



# PRODUCT CATALOGUE

### OUR GLOBAL REACH

Our sales network is there for you in more than 50 countries. Thanks to our sales representation in China, Russia, USA and Poland, as well as our broad network of distributors, we are available whenever our products or services are required.

### HEADQUARTERS

#### **BROEN A/S - Clorius Division**

Skovvej 30  
DK-5610 Assens  
+45 77 32 31 30  
mail@cloriuscontrols.com



### SALES REPRESENTATION

#### **Clorius Controls - CHINA**

Room 1910-1911,  
Unicom International Tower,  
NO 547 West Tian Mu Road  
Shanghai 200070  
P.R. China  
Tel: +86 21 33 030 279 //  
+86 21 33 035 279

#### **Clorius Controls - RUSSIA**

BROEN Ltd.  
8-ya Tekstilschikov Street 11/2  
109129 Moscow,  
Russia  
Tel: +7 495 228 1150 ext. 11-24

#### **Clorius Controls - POLAND**

BROEN SA  
ul. Strefowa 19  
58-200 Dzierżonów  
Poland  
Tel: +48 74 832 54 00

Premium flow management systems	4
A century of delivering quality	6
Preferred supplier to the maritime industry	7
Industries we serve	8
Solution overview	9
Product overview	10
Applications overview	12
Electric temperature controls	14
Pneumatic temperature controls	16
Standards & certificates	18
Valve Sizing & Selection Software	20
Frequently asked questions	21
<b>CASE STUDY:</b> Reduce up to 10% in fuel consumption	22
Our clients	24
Overview of Clorius Valves - Available standards for connections	26
Overview of Clorius actuators	28
<b>SECTION 1 // CONTROL VALVES</b>	<b>32</b>
<b>SECTION 2 // THERMOSTATS</b>	<b>202</b>
<b>SECTION 3 // ELECTRIC ACTUATORS</b>	<b>216</b>
<b>SECTION 4 // ELECTRIC CONTROLLERS</b>	<b>236</b>
<b>SECTION 5 // PNEUMATIC ACTUATORS</b>	<b>250</b>
<b>SECTION 6 // PNEUMATIC CONTROLLERS &amp; POSITIONERS</b>	<b>262</b>
<b>SECTION 7 // DIFFERENTIAL PRESSURE CONTROLS</b>	<b>282</b>
<b>SECTION 8 // PRESSURE REDUCING VALVES</b>	<b>292</b>
<b>SECTION 9 // ACCESSORIES</b>	<b>298</b>
<b>TERMS &amp; CONDITIONS</b>	<b>314</b>

# PREMIUM FLOW MANAGEMENT SOLUTIONS

Clorius Controls is a leading manufacturer of valves, actuators, and comprehensive control solutions supporting various marine and industrial applications. Aside from our extensive assortment of control valves and actuators, we provide tailored solutions, including electric, pneumatic, self-acting and direct-acting control systems to meet the specific requirements set by the customer.

Clorius' products are designed to meet the challenging requirements of our clients. Our products, constructed with premium materials ensure longer life cycle, minimal maintenance and lower cost of ownership.







**WE ARE SURPASSING EXPECTATIONS BY PROVIDING THE BEST FLOW MANAGEMENT SOLUTIONS, THE MOST EXPERIENCED PEOPLE, AND UNPARALLELED APPLICATION KNOWLEDGE.**



# A CENTURY OF DELIVERING QUALITY

Clorius specializes in the development and production of equipment for monitoring, controlling and regulating heating, cooling and ventilation.

The product range consists of valves, thermostats, pressure differential regulators and electronic controllers. The products make up a complete range within our field of expertise. We have a long-standing tradition of delivery to the ship building industry, industrial applications as well as building heating and ventilation. This means that our products and services are developed in order to match the high requirements set by the maritime industry.

Our vision is to ensure the most reliable and economic solutions whilst meeting the challenging requirements set by our clients.

Clorius' products, constructed with premium materials ensure longer life cycle, minimal maintenance and lower cost of ownership.



## **PREFFERED SUPPLIER TO THE MARITIME INDUSTRY**

With roots in the maritime industry that go back to 1902, Clorius has become a preferred supplier of solutions for relatively simple as well as far more complex challenges. By working closely with our clients and their suppliers, Clorius adds value throughout the entire lifecycle of the ship. With our focus on quality we provide solutions that guarantee optimal use of the equipment and the vessel.

We take pride in being the preferred supplier to the maritime industry by offering customer-specific, value-driven and long-lasting solutions.

All Clorius Controls solutions are designed with extensive research and development and is supported by over 115 years of experience in the maritime industry.

This is acknowledged by the type approvals for our solutions from multiple classification authorities, including Germanischer Lloyds, DNV GL, ABS, RINA, RS, CCS, KR to name a few.

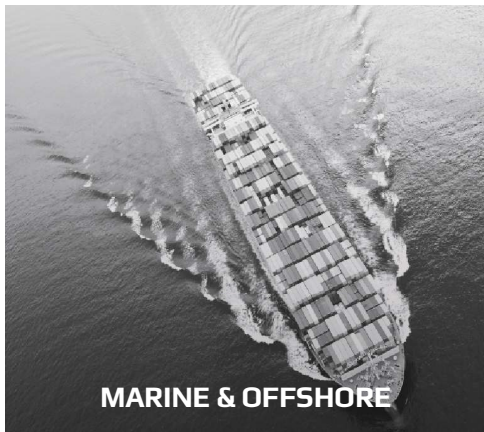
Clorius' marine products are designed to meet the challenging requirements of shipbuilders around the globe, by delivering premium quality valves and actuators for various marine applications. Their robust construction coupled with premium materials ensures longer life cycle for the vessels, minimal maintenance and lower cost of ownership.



# INDUSTRIES WE SERVE

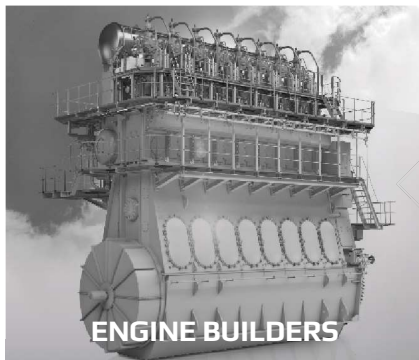
*Clorius Controls caters to the specific needs of our clients by supplying premium and highly efficient flow management solutions, comprising of top-quality control valves, actuators and positioners. Our industry insight and knowledge is grounded in the identification of key issues that our client face as well as firsthand experience gained from serving clients throughout out 100-year-plus history.*

## OUR MARKETS

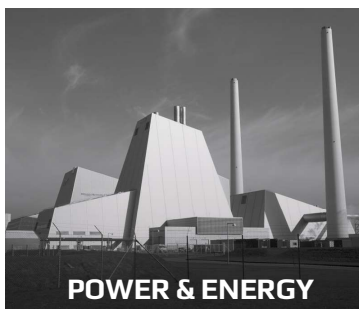


## TYPICAL APPLICATIONS

- Main and auxiliary engine cooling systems
- Fuel and lubricating oil temperature control
- Tank heating and cleaning



- Customer specific engineered valves for main and auxiliary engine cooling systems



- Cooling systems on Biomass, Oil & Gas and nuclear power plants
- Cooling water and lubricating oil temperature control on power units

# SOLUTIONS OVERVIEW

*Clorius Controls specializes in a control valve and actuator portfolio with the lowest cost of ownership for use in challenging conditions. As one of the leading control valve manufacturers, we are committed to providing premium industrial solutions to our clients.*

*Below are just a few of the configurations we currently produce and supply.*

## ELECTRIC

**ELECTRIC ACTUATOR  
3 POINT, ANALOG**



For 2-way and 3-way valve up to DN 800. Actuators for linear and rotating valve types. Handle for manual control available

## PNEUMATIC

**PNEUMATIC ACTUATOR  
SPRING CLOSE/OPEN POSITIONER**



For 2-way and 3-way valve up to DN 800. Actuators for linear and rotating valve types. PI or alternatively PID pneumatic controllers.

## SELF-ACTING

**THERMOSTAT  
DN15 - 150**



For 2-way and 3-way valve up to DN 150. No external power needed. Narrow neutral zone (1.5 °C - 2.5 °C) compared to all other brands.



# PRODUCT OVERVIEW

*Quality is at the heart of who we are – it shows up in our people, our conversations and our products. Product quality is the foundation we stand on and this foundation is comprised of three key areas: Material, performance and craftsmanship.*

Clorius Controls continually aims to develop our product portfolio by identifying the needs of the market and providing products and solutions of uncompromised quality. Our product range is divided into 5 different sections, offering an extensive range of equipment for monitoring and control of heating, cooling and ventilation systems.

- Electric Control Valves
- Pneumatic Control Valves
- Self-acting temperature controls
- Self-acting pressure controls
- Controlling & Monitoring

Clorius valves are the preferred choice of the maritime industries, being installed in more than 1500 vessels within the last five years.

Simple, reliable and durable.

## OUR SOLUTIONS

### SOLUTION 1



THERMOSTAT



2-WAY VALVE  
DN 15/4 - 150

### SOLUTION 2



THERMOSTAT



3-WAY VALVE  
DN 15 - 150

### SOLUTION 3



PRESSURE REDUCING  
VALVE  
DN 15 - 80

### SOLUTION 4



DIFFERENTIAL PRESSURE  
CONTROLS  
DN 15 - 80

## SOLUTION 5



ELECTRIC ACTUATOR  
2 + 3 POINT, ANALOGUE

2 WAY VALVE  
DN 15/4 - 800 MM

+



CONTROLLER ER 2000  
OR ER 2022  
ELECTRIC

+



SENSOR PT100

**Clorius**  
CONTROLS

## SOLUTION 6



ELECTRIC ACTUATOR  
3 POINT, ANALOGUE

3 WAY VALVE  
DN 15 - 800 MM

+



CONTROLLER ER 2000  
OR ER 2022  
ELECTRIC

+



SENSOR PT100

## SOLUTION 7



ELECTRIC ACTUATOR  
3 POINT, ANALOGUE

3 WAY VALVE  
DN 15 - 800 MM

+



CONTROLLER ER 3000  
ELECTRIC

+



SENSOR PT100



TRANSMITTER 4 - 20

## SOLUTION 8



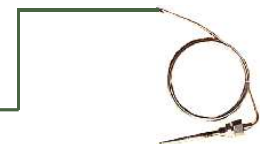
PNEUMATIC ACTUATOR  
SPRING CLOSE/OPEN

2 WAY VALVE  
DN 15/4 - 800 MM

+



CONTROLLER  
PNEUMATIC



TRANSMITTER

## SOLUTION 9



PNEUMATIC ACTUATOR  
SPRING CLOSE/OPEN

3 WAY VALVE  
DN 15 - 800 MM

+



CONTROLLER  
PNEUMATIC



TRANSMITTER

## SOLUTION 10



PNEUMATIC ACTUATOR  
SPRING CLOSE/OPEN

2 WAY VALVE  
DN 15/4 - 800 MM

+



CONTROLLER ER 2000  
OR ER 2022  
ELECTRIC

+



SENSOR PT100

## SOLUTION 11



PNEUMATIC ACTUATOR  
SPRING CLOSE/OPEN

3 WAY VALVE  
DN 15 - 800 MM

+



CONTROLLER ER 2000  
OR ER 2022  
ELECTRIC

+



SENSOR PT100

[www.cloriuscontrols.com](http://www.cloriuscontrols.com)

# APPLICATIONS OVERVIEW

Clorius Controls' control valves make up a uniquely integrated system of valve, actuator, positioner and process controller - working in perfect harmony for ideal results.

Clorius provides a comprehensive and carefully coordinated system of product solutions specifically tailored to your individual needs.

Possible applications include:

## TYPICAL APPLICATIONS

### MAIN ENGINE AND AUXILLIARY ENGINE

- Jacket cooling water system
- Piston cooling
- Nozzle cooling
- Load and scavenging air cooling
- Lubricating oil cooling

### OIL PREHEATING

- Fuel or diesel oil in storing, settling and servicing tank
- Preheating prior to seperation and injection

### HEAT EXCHANGERS

- Water heaters for radiator plant
- Water heaters for domestic plant
- Evaporators (production of fresh water)

### TANK HEATING

- Bilge water tank
- Cargo tank
- Sludge tank
- FO drain tank
- FO overflow tank
- Asphalt tank

### AIR CONDITIONING PLANT

- Preheating of air
- Reheating of air
- Cooling of air

Solutions are depending on the actual method required:  
2 way with self-acting thermostat or with actuator, controller and sensor.

3 way valve (mixing or diverting) with self-acting thermostat or actuator, controller and sensor.

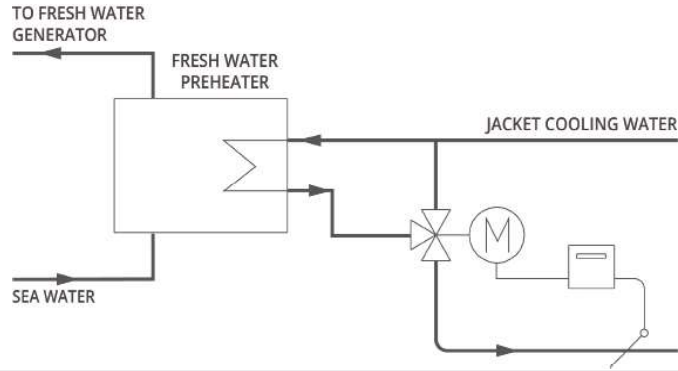
Actuators can be electrical, pneumatic or electro-pneumatic.

Hydraulic or electric/hydraulic actuators are optional solutions. Communication with central control system (RS 485 for controller type ER 2000)

Illustrations on the right side only displays a small fraction of the possible applications in our portfolio.

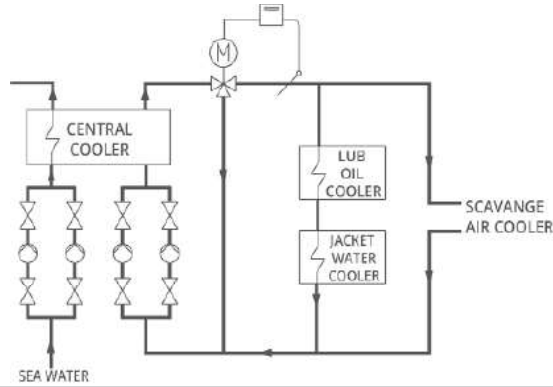
**HEAT EXCHANGERS - Heating system for fresh water generation**

TEMPERATURE CONTROLS



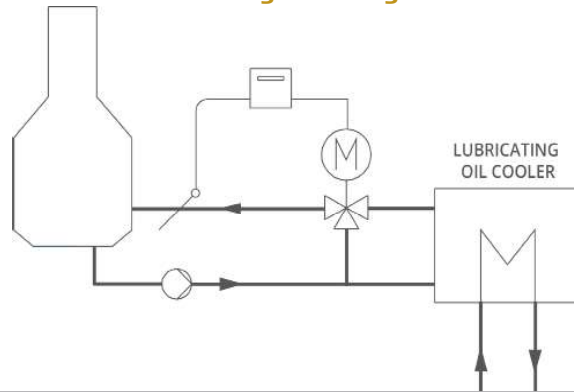
**MAIN AND AUXILIARY ENGINE - Central cooling water system**

TEMPERATURE CONTROLS



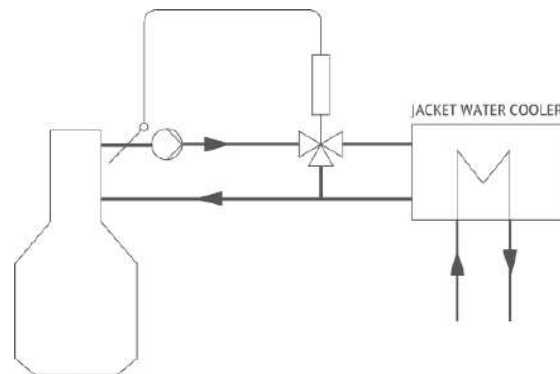
**MAIN AND AUXILIARY ENGINE - Lubricating oil cooling**

TEMPERATURE CONTROLS



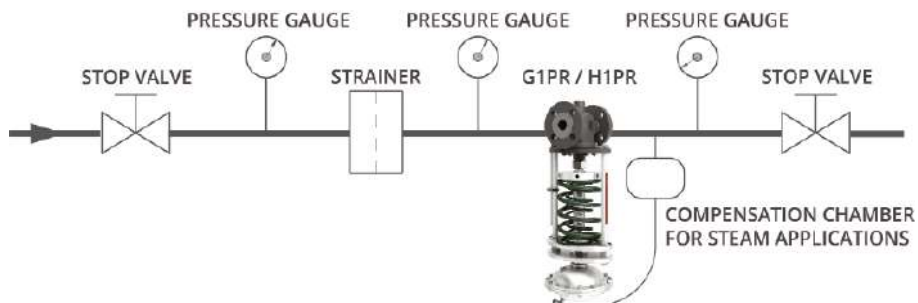
**MAIN AND AUXILIARY ENGINE - Engine jacket cooling water system - electric**

TEMPERATURE CONTROLS



**PRESSURE REDUCTION - Applicable for various media (eg. AIR, STEAM, LIQUID)**

PRESSURE CONTROLS



# ELECTRIC TEMPERATURE CONTROLS

***ELECTRONIC SYSTEM** - The electronic temperature and pressure control system combines an electrically actuated three-way control valve with an electronic controller and essential temperature sensor.*

Microprocessor-based Controller type ER2000 for electronic temperature control is used for constant temperature control. It is suitable for all heating and cooling control systems. The ER2000 is a single loop controller which is intended for marine installations and other industrial applications - such as cooling water and lubricating oil installations, flow temperature control etc.

Microprocessor-based Controller type ER3000 Electronic Temperature Control

is used where conventional single loop controllers cannot maintain a constant and precise temperature.

The ER2000 and ER3000 controllers are designed for panel mounting and are fully programmable, which allows for uncomplicated system configuration.

The valve is designed for mixing and diverting media flows for large flow control systems.





## SELECTING YOUR SOLUTION >>>

### STEP 1

Choose your valve  
and actuator

**ELECTRIC ACTUATOR**



**3-WAY VALVE**

### STEP 2

Choose your controller

**PLC  
PROGRAMMABLE  
LOGIC CONTROLLER**



**CONTROLLER ER 2000  
OR ER 2022**



**CONTROLLER ER 3000**

### STEP 3

Choose your sensor

**SENSOR**



**SENSOR**



# PNEUMATIC TEMPERATURE CONTROLS

**PNEUMATIC SYSTEM** - The pneumatic temperature control system integrates a pneumatically actuated three-way control valve with a pneumatic controller and temperature sensor and a pneumatic-pneumatic positioner. The pneumatic system is especially suitable when there is lack of electricity or when a fail-safe system is required.

## **ELECTRO-PNEUMATIC SYSTEM**

The electro-pneumatic temperature control system utilizes both electric and pneumatic technology, composed of a pneumatically actuated three-way control valve and electro-pneumatic positioner.

## **PERFECTED FOR HARSH ENVIRONMENTS**

Clorius Controls' EPR/PPR Electro-pneumatic/pneumatic-pneumatic positioner is a rugged control device especially suited for harsh environments and engineered to meet the highest and most demanding control performance that the process industries of today require.

The AD/ADHW pneumatic actuators are made according to the Scotch Yoke principle, which is characteristic for its high torque when required - at the beginning and at the end of each operation. This increases safety and reduces the energy consumption. The filter regulator, equipped with auto drain is protecting the positioner from dust, water and oil particles in the compressed air supply. With the backflow function it incorporates a mechanism to exhaust the air pressure in the outlet side reliably and quickly.



## SELECTING YOUR SOLUTION >>>

### STEP 1

Choose your valve, actuator and positioner



3-WAY VALVE



PNEUMATIC ACTUATOR  
TYPE AD/ADHW



PPR/EPR  
POSITIONER

### STEP 2

Choose your air reduction valve/Filter



FILTER REGULATOR

### STEP 3

Choose your controller

PLC  
PROGRAMMABLE  
LOGIC CONTROLLER



PNEUMATIC  
CONTROLLER



CONTROLLER ER 2000  
OR ALTERNATIVE  
ER 2022

### STEP 4

Choose your sensor



SENSOR





## STANDARDS & CERTIFICATES

*Clorius Controls routinely manufactures and tests its products to the most demanding customer specifications and recognized national and international industry standards.*

*A long-standing tradition of delivering to the shipbuilding industry means that products delivered by Clorius Controls A/S are developed to match the high requirements set by the maritime industry.*

Since 1993 we have been ISO 9001 certified for development, manufacturing, sales and servicing of controls for buildings, industrial and marine applications.

Clorius' internal standards for excellence are reflected in how we conduct our daily business. Our valves can be delivered with certificates issued by various recognized ship classification societies, stating that the classification society has participated in pressure test of the valve.

We can also deliver valves with certificates in accordance to:

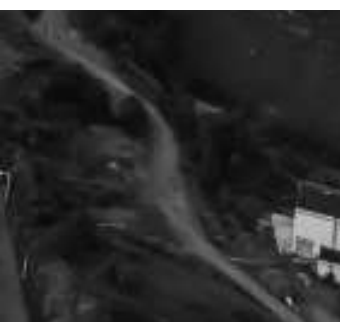
- EN 10.204 / 2.1
- EN 10.204 / 2.2
- EN 10.204 / 3.1

Furthermore, we conduct:

- Inspection and test plan
- Pressure and leakage test

Valves from Clorius Controls can be delivered in accordance with the following standard and conformity assessment systems.

- ANSI, EN, JIS





# VALVE SIZING & SELECTION SOFTWARE

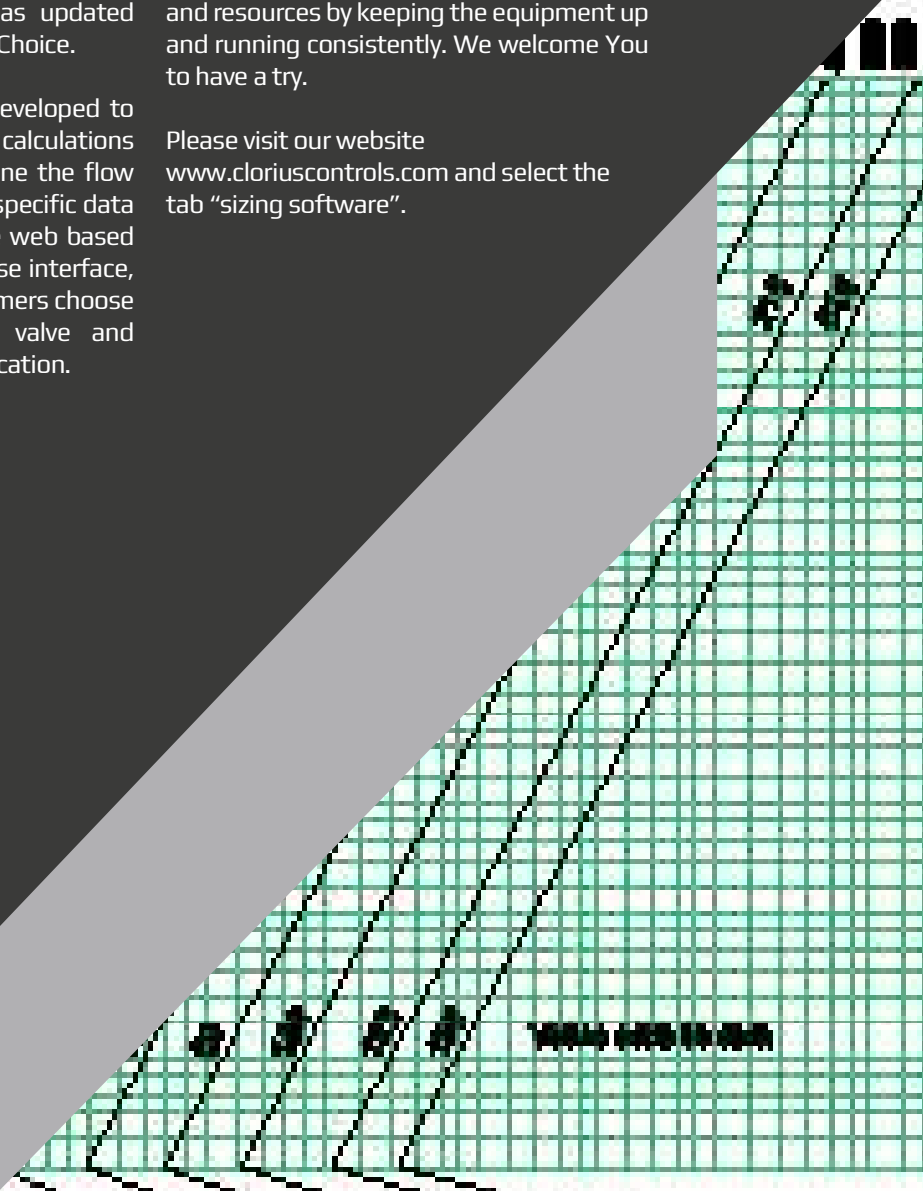
*The Clorius Controls Valve Sizing Program is a software for calculating and sizing control valves. The software calculates the valve-specific data (Kvs value, required nominal valve size, etc.)*

In an effort to provide leading support to our customers, Clorius Controls has updated the valve sizing software Quick Choice.

Our new software has been developed to quickly and accurately make calculations of a proper valve size, determine the flow coefficient and calculate valve specific data (Kvs value, pressure drop). The web based software provides an easy to use interface, and is meant to help our customers choose the proper Clorius Controls valve and actuator solution for their application.

Accurate sizing of valves saves time, energy and resources by keeping the equipment up and running consistently. We welcome You to have a try.

Please visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select the tab "sizing software".



# FREQUENTLY ASKED QUESTIONS

*Our Frequently Asked Questions attempts to provide answers to the most commonly asked questions relating to our products and services. If you don't find answers to your questions here, please get in touch with your nearest Clorius Controls representative.*

## How to determine the correct size of the valve and what actuator to choose?

In an attempt to simplify the process and avoid potential mistakes we advise our client to utilize our sizing software "Quick Choice 4" which enables you to size the control valve and select the right combination of actuator and control valve.

## What is the definition of $k_{VS}$ value and how to calculate the flow?

The  $k_{VS}$ -value is identical to the IEC flow coefficient  $k_V$  and defined as the water flow rate in  $m^3/h$  through the fully open valve by a constant differential pressure,  $\Delta p_V$ , of 1 bar.

The  $K_{vs}$  value is a special case of the  $K_v$  value, which indicates the flow at a given valve position and a pressure differential of 1 bar.

The flow at a lower pressure loss can be calculated by rearranging the equation:

$$K_{VS} = Q / \sqrt{\Delta P}$$

where

$K_{VS}$ :  $K_{vs}$  value [ $m^3/h$ ]

$Q$ : Flow [ $m^3/h$ ]

$\Delta P$ : Pressure differential across a regulating valve [bar]

$$k_{vs} = \frac{Q(m^3/h)}{\sqrt{\Delta p(\text{bar})}}$$

$$\Delta p(\text{bar}) = \left( \frac{Q(m^3/h)}{k_{vs}} \right)^2$$

## Should I use a strainer with my control valve?

It is recommended to use a strainer in front of the control valve if the liquid contains suspended particles.

## What standards are used when manufacturing the valve?

All valves are manufactured under ISO 9001 certification and are pressure and leakage tested before shipment.

# REDUCE UP TO 10% IN FUEL CONSUMPTION

*Clorius Controls' low leakage control valve assures energy savings by reduction in fuel consumption, leading to reduced costs and downtime for shipowners.*

## **BACKGROUND**

In 2013 Clorius Controls successfully designed a robust low leakage valve in collaboration with MAN Diesel & Turbo, for a new internal cooling water system.

Today the low leakage control valve is used in the standard design of MAN Diesel & Turbo's two stroke engines, improving the performance of the engine cooling system.

The low leakage control valve is also installed on the world's largest container ships, the Triple E series.

## **THE CHALLENGE**

Shipowners are currently faced with two main challenges:

- Fresh water generation when slow steaming

When a ship is slow steaming, a high leakage cooling valve causes the fresh water generator to stop producing water, leaving two options; either to buy fresh water from the nearest shore or start the preheater.

- Unwanted engine cooling when in harbour

When the ship is in harbour, energy is wasted for preheating purposes as a result of leaking cooling water. The cooling water passing through the engines causes unwanted cooling.



## FEATURED TESTIMONIAL

“ Clorius Controls has been a trusted partner for many years, and their equipment has been included in the auxiliary systems for our two-stroke diesel engines during the last 30 years. Furthermore, their service and equipment have been an appreciated part in our systems, at our R&D center”.

Ole Skeltved,  
Head of Marine Installation Department  
MAN Diesel & Turbo

### THE SOLUTION

By installing Clorius Controls' low leakage control valve, following savings can be achieved:

#### ■ By not starting the preheater for fresh water generation:<sup>1</sup>

Water consumption	= 7t /day
1 kg oil to produce	= 13 kg water
Oil consumption	= 538 kg/day
Savings in USD <sup>2</sup>	~ <b>325\$/day</b>

#### ■ By not wasting energy on leaking cooling water:

Oil consumption can be reduced up to **10%** by implementing a low leakage control valve, compared to valves with leakage rate of 5%.<sup>3</sup>

Oil consumption	= 7t/day
Oil consumption saving	= 0.7 t/day
Savings in USD <sup>2</sup>	~ <b>420\$/day</b>

### THE RECOMMENDATION

Shipowners should specify leakage class IV with max 0.01% leakage rate for both new builds and existing installations.

ROI for installing or replacing existing valves, with a Clorius Controls' low leakage control valve, is less than 1 month.

## THE FACTS

**LOCATION**  
COPENHAGEN, DENMARK

### TECHNICAL DATA

Valve body:	Nodular cast iron
Trim:	Gun metal RG 5
Size & Pressure:	
DN 80-200	PN 16
DN 250-300	PN 10
Temperature range:	Max 150 °C
Flowrate :	80-1250m <sup>3</sup>
Leakage Port AB-B:	<0,01% of KVS
Lead time:	4-6 weeks

### European make

Valve supplied with electric or pneumatic actuation

<sup>1</sup> Example from a large container ship

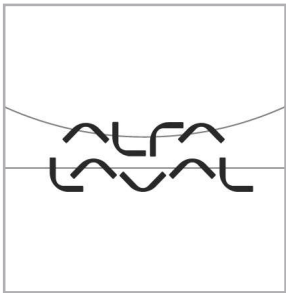
<sup>2</sup> Bunkerindex-MDO 05.02.2015: 601 USD/t

<sup>3</sup> Based on feedback from various shipowners.

# OUR CLIENTS

*We have had the good fortune of being involved with a large number of strong global companies. Our clients are our starting point. They drive everything we do and we work collaboratively with them to achieve results they can measure. Our size enables our specialists to work closely together to develop tailor-made solutions, that meet our clients' evolving needs.*

Here are some clients we have recently added to our growing list of partnerships.







# OVERVIEW OF CLORIUS VALVES

## AVAILABLE STANDARDS FOR CONNECTIONS

Type	Material	Material	DN	INCH	Flange connection						Internal Connection Threads		
					EN 1092	ANSI 150	JIS 5K	JIS 10K	JIS 16K	DIN86021	ISO 7/1	NPT	
L1S	RG5	CuSn10-C	15/6 - 20	¾"								•	•
L1SB	RG5	CuSn10-C	15 - 32	½" - 1¼"						•		•	•
L1SBR	RG5	CuSn10-C	15 - 32	½" - 1¼"								•	•
L2S	RG5	CuSn10-C	40 - 50	1½" - 2"								•	
L2F	RG5	CuSn10-C	65 - 150	2½" - 6"						•			
L2SR	RG5	CuSn10-C	40	1½"								•	
L2SR	RG5	CuSn10-C	50	2"								•	•
L3S	RG5	CuSn10-C	15 - 50	½" - 2"								•	
L3F	RG5	CuSn10-C	65 - 100	2½" - 4"		•							
L3FA	RG5	CuSn10-C	80 - 300	3" - 12"						•			
L2FMT	RG5	CuSn10-C	65 - 800	2½" - 32"	•	•	•	•					
L3FMT	RG5	CuSn10-C	65 - 800	2½" - 32"	•	•	•	•					
H1F	GS-C25	GP240GH	15/4 - 50	2"	•	•	•	•	•				
H1FBN	GS-C25	GP240GH	15 - 80	½" - 3"	•	•	•	•	•				
H1FB	GS-C25	GP240GH	25 - 80	1" - 3"	•								
H1FBE and H1FBE	GS-C25	GP240GH	200 - 300	7" - 10"	•	•	•	•	•				
H2F	GS-C25	GP240GH	20 - 80	¾" - 3"	•	•	•	•	•				
H2F	GS-C25	GP240GH	100 - 150	4" - 6"	•	•							
H2FR	GS-C25	GP240GH	20 - 80	¾" - 3"	•	•	•	•	•				
H2FR	GS-C25	GP240GH	100 - 150	4" - 6"	•								
H3F	GS-C25	GP240GH	20 - 65	¾" - 2½"	•	•	•	•	•				
H3F	GS-C25	GP240GH	100 - 150	4" - 6"	•	•							
G1F	GGG40	EN-GJS-400-15	15/4 - 50	2"	•	•	•	•	•				
G1FB	GGG40	EN-GJS-400-15	25 - 65	1" - 2½"	•								
G1FBN	GGG40	EN-GJS-400-15	15 - 80	½" - 2½"	•	•	•	•	•				
G2F	GGG40	EN-GJS-400-15	20 - 80	¾" - 3"	•	•	•	•	•				
G2F	GGG40	EN-GJS-400-15	100 - 150	4" - 6"	•	•							
G2FR	GGG40	EN-GJS-400-15	20 - 80	¾" - 2½"	•	•	•	•	•				
G2FR	GGG40	EN-GJS-400-15	100 - 150	4" - 6"	•	•							
G3F	GGG40	EN-GJS-400-15	20 - 65	1" - 2½"	•	•	•	•	•				
G3F	GGG40	EN-GJS-400-15	80 - 150	2½" - 6"	•	•							
G3F-I with soft seats	GGG40	EN-GJS-400-15	80 - 300	6" - 10"	•								
G3FA-I with soft	GGG40	EN-GJS-400-15	80 - 300	6" - 10"	•								

Type	Material	Material	DN	INCH	Flange connection					
					EN 1092	ANSI 150	JIS 5K	JIS 10K	JIS 16K	Grooved
G3FA	GGG40	EN-GJS-400-15	80 - 300	3" - 12"	•	•		•		
G3FA-I	GGG40	EN-GJS-400-15	80 - 300	3" - 12"	•	•		•		
G2FM-T	GGG40	EN-GJS-400-15	65 - 800	2½" - 32"	•	•	•	•		
G3FM-T	GGG40	EN-GJS-400-15	65 - 800	2½" - 32"	•	•	•	•		
G3CM-TR/L	GGG40	EN-GJS-400-15	100 - 300	4" - 6"						•
M1F	GG25	EN-GJS-400-15	15/4 - 50	2"	•	•	•	•	•	
M1FBN	GG25	EN-GJS-400-15	15 - 80	½" - 3"	•	•	•	•	•	
M2F	GG25	EN-GJS-400-15	20 - 80	¾" - 3"	•	•	•	•	•	
M2F	GG25	EN-GJS-400-15	100 - 150	4" - 6"	•					
M2FR	GG25	EN-GJS-400-15	20 - 80	¾" - 3"	•	•	•	•	•	
M2FR	GG25	EN-GJS-400-15	80 - 150	3" - 6"	•	•				
M3F	GG25	EN-GJS-400-15	20 - 65	¾" - 2½"	•	•	•	•	•	
M3F	GG25	EN-GJS-400-15	80 - 150	3" - 6"	•	•				
M3FA	GG25	EN-GJS-400-15	80 - 150	3" - 6"	•	•		•		
M3FA-I	GG25	EN-GJS-400-15	80 - 300	3" - 6"	•	•		•		
S2FM-T	AISI316	AISI316	65 - 800	2½" - 6"	•	•	•	•		
S3FM-T	AISI316	AISI316	65 - 800	2½" - 6"	•	•	•	•		
TREX	STEEL	STEEL ST 235	15 - 40	½" 1½"						•
TREX	ALU	ALUMINIUM AW 6082/T6	15 - 40	½" 1½"						•

# OVERVIEW OF CLORIUS ACTUATORS

## ELECTRIC AND PNEUMATIC ACTUATORS FOR ROTARY VALVES

### Type L3FMT-/L/R, G3FMT-/L/R, S3FMT-L/R VALVES

DN	KVS mixing	KVS Diverting	Required torque, Nm (P1≤5bar)	CAR	ADHW	AS & ASHW	AD	Required torque, Nm (P1≤10bar)	CAR	ADHW	AS & ASHW	AD
65	95	120	28	009	65	65	65	35	009	100	65	65
80	122	154	30	009	100	65	65	40	009	100	100	65
100	175	220	55	009	100	100	65	70	009	100	100	100
125	245	330	90	019	100	100	100	120	019	100	125	100
150	395	425	120	019	125	125	100	160	028	125	125	100
200	800	1100	185	028	125	125	100	250	060	140	140	125
250	1500	2100	285	060	140	140	125	395	060	160	160	125
300	2000	2650	400	060	160	160	125	550	100	210	160	140
350	2530	3380	640	100	210	210	140	980	200	250	210	160
400	3050	3950	895	100	210	210	160	1370	200	250	250	210
450	3680	4480	1050	200	250	210	160	1550	200	250	250	210
500 550	4150	5250	1300	200	250	250	210	1920	250	300	300	250
600	4150	6050	1850	200	300	250	210	2950	300	300	300	250
800	6200	8000	2600	-	300	-	-	4000	-	-	-	-

## ELECTRIC AND PNEUMATIC ACTUATORS FOR ROTARY VALVES

### Type L3FMT-M, G3FMT-T, S3FMT-T VALVES

DN	KVS mixing	KVS Diverting	Required torque, Nm (P1≤5bar)	CAR	ADHW	AS & ASHW	AD	Required torque, Nm (P1≤10bar)	CAR	ADHW	AS & ASHW	AD
65	110	127	42	009	65	100	65	50	009	100	100	65
80	148	162	45	009	100	100	65	55	009	100	100	65
100	220	248	80	009	100	100	100	97	019	125	100	100
125	369	437	125	019	125	125	100	153	019	125	125	100
150	510	600	179	019	125	125	100	215	028	140	140	100
200	807	1100	285	060	140	140	125	345	060	160	160	125
250	1500	2100	465	060	160	160	125	585	060	210	210	140
300	2000	2650	650	100	210	210	160	795	100	250	210	160
350	2505	3515	980	100	250	210	160	1350	200	250	250	210
450	3400	4300	1550	200	300	250	210	2100	250	300	300	210

DN	KVS mixing	KVS Diverting	Required torque, Nm (P1≤16bar)	CAR	ADHW	AS & ASHW	AD	Required torque, Nm (P1≤25bar)	CAR	ADHW	AS & ASHW	AD
65	95	120	46	009	100	100	65	60	009	100	100	65
80	122	154	55	009	100	100	65	65	009	100	100	65
100	175	220	90	019	100	100	100	120	019	125	125	100
125	245	330	150	028	125	125	100	200	028	125	125	100
150	395	425	200	028	125	125	100					
200	800	1100	330	060	160	140	125					
250	1500	2100	525	060	210	160	140					
300	2000	2650	730	100	210	210	160					
350	2530	3380										
400	3050	3950										
450	3680	4480										
500	4150	5250										
550	4150	6050										
600	4150	6050										
800	6200	8000						5800	-	-	-	8420

DN	KVS mixing	KVS Diverting	Required torque, Nm (P1≤16bar)	CAR	ADHW	AS & ASHW	AD	Required torque, Nm (P1≤25bar)	CAR	ADHW	AS & ASHW	AD
65	110	127	60	009	100	100	65	72	009	100	100	100
80	148	162	67	009	100	100	100	85	009	100	100	100
100	220	248	115	019	100	125	100	145	019	125	125	100
125	369	437	197	028	125	125	100	245	028	125	140	125
150	510	600	259	028	160	140	125					
200	807	1100	435	060	210	160	125					
250	1500	2100	695	100	210	210	160					
300	2000	2650	975	100	250	210	160					
350	2505	3515										
450	3400	4300										

## MINIMAL LEAKAGE MAXIMAL PERFORMANCE

Clorius Controls, linear and rotary control valves assure energy savings by reduction in oil consumption, leading to reduced cost and downtime for ships.





# CONTROL VALVES

---

## OUR CONTROL VALVES PROGRAM INCLUDES:

MATERIAL	AVAILABLE SIZES	PN	GENERAL STANDARDS
GUN METAL	15/6 mm - 600 mm	PN10//PN16	ANSI//JIS//EN
CAST IRON	15/4 mm - 300 mm	PN10//PN16	ANSI//JIS//EN
CAST STEEL	15/4 mm - 150 mm	PN16//PN25//PN40	ANSI//JIS//EN
NODULAR CAST STEEL	15/4 mm - 800 mm	PN10//PN16//PN25	ANSI//JIS//EN
STAINLESS STEEL	65 mm - 600 mm	PN10//PN16	ANSI//JIS//EN
STEEL ST 235	15 mm - 40mm	PN16	

# 2-way Control Valve type L1S

Gun Metal, PN 16, DN 15/6 – 20 mm. Single Seated

0-2.2.02-L

Page 1 of 2



## APPLICATIONS

Control valves type L1S are designed for regulating low, medium and high pressure hot water, steam and lubricating oils with thermostats, pneumatic or electric actuators. The valves are installed combined with temperature or pressure differential regulators in control systems for heating of domestic premises, district heating, industrial processes or marine installations. They can also be used in cooling applications when used with an electric actuator.

## DESIGN

The valve components - spindle, seat and cone - are made of stainless steel. The valve body is made of gun metal RG 5. The thread for the actuator connection is G1B ISO 228. The valve is single seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

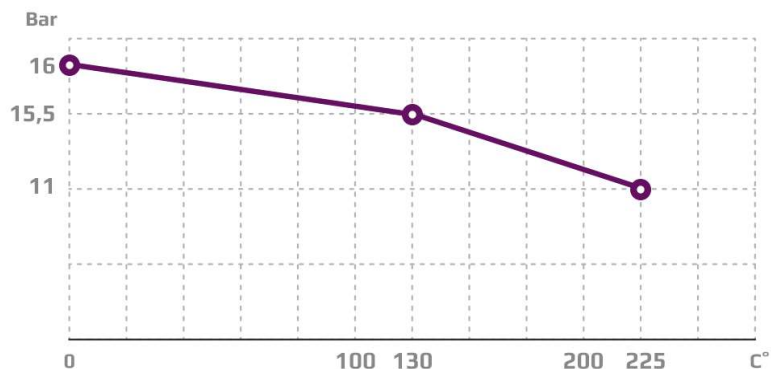
Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with thermostats, pneumatic or electric actuators, the valve will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly.
- Reliable and secure due to internal parts of stainless steel.
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## TECHNICAL DATA

### Materials:

- Valve body

Gun metal RG 5

- Components

Stainless steel

- Gasket

Reinz AFM34

Nominal pressure

PN 16

Seating

Single seated

Flow characteristic

Quadratic

Leakage rate

≤ 0.05% of Kvs

Regulating capability

Kvs/Kvr > 25

Internal connection threads

ISO 7/1

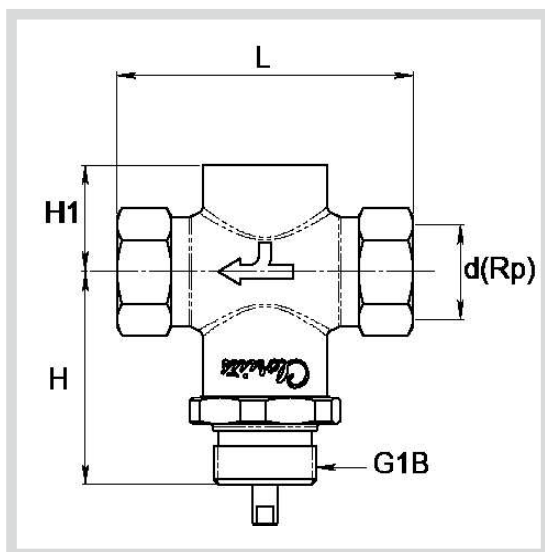
Single seated and tight closing

Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to datasheets for the electric actuators).

## DIMENSION SKETCH



Type	L (mm)	H (mm)	H1 (mm)	d
15/6 L15	85	65	20	Rp ½
15/9 L15	85	65	20	Rp ½
15/12 L15	85	65	20	Rp ½
15 L15	85	65	26	Rp ½
20 L15	95	67	32	Rp ¾

## SPECIFICATIONS

Type	Connection threads	DN (mm)	Opening (mm)	$k_{vs}$ -value $\text{m}^3/\text{h}$	Lifting height (mm)	Weight (kg)
15/6 L15	Rp ½	15	6	0.45	6	0.7
15/9 L15	Rp ½	15	9	0.95	6	0.7
15/12 L15	Rp ½	15	12	1.7	6	0.7
15 L15	Rp ½	15	15	2.75	6	0.7
20 L15	Rp ¾	20	20	5.00	7	0.8

# 2-way Control Valve type L1SB

Gun Metal, PN 16, DN 15 - 32 mm

0-2.2.04-I

Page 1 of 2



## APPLICATIONS

Balanced control valves type L1SB are designed for regulation of hot water, steam and lubricating liquids. The valves are installed combined with our self-acting thermostats, pressure differential regulators, pneumatic or electric valve actuators for regulation in central heating plants, industrial plants, industrial processes or marine installations. Balanced valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a standard single seated valve, and where the leakage rate for a double-seated valve is unacceptable.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of gun metal RG 5 (red brass). The thread for the actuator connection is G1B ISO 228. The valve is single seated, balanced. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats the valves will close at rising temperatures. In connection with our pneumatic or electric valve actuators the valves will either close or open depending on the application. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## FEATURES

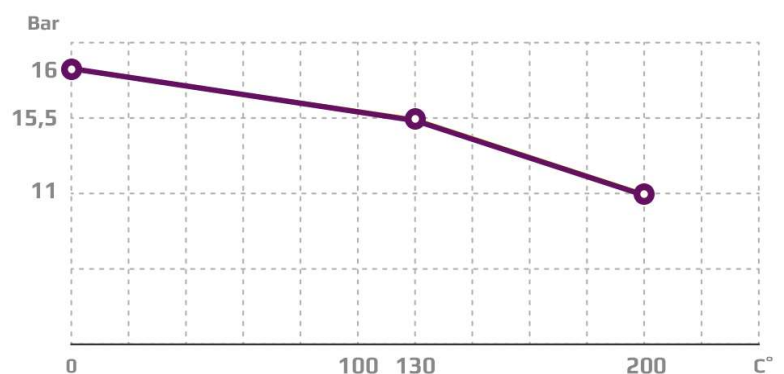
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly.
- Reliable and secure due to internal parts of stainless steel.
- Low leakage rate reduces the risk of overheating

## TECHNICAL DATA

### Materials:

- Valve body	Gun metal RG 5
- Components	Stainless steel
- O-ring	FPM, 75 SHOREA
- Gasket	Reinz-AFM34
Nominal pressure	PN 16
Seating	Single seated
Flow characteristic	Quadratic
Leakage rate	$\leq 0.05\%$ of Kvs
Regulating capability	Kvs/Kvr > 25
Internal connection threads	ISO 7/1
Pressure balanced control valve	

## PRESSURE/TEMPERATURE DIAGRAM



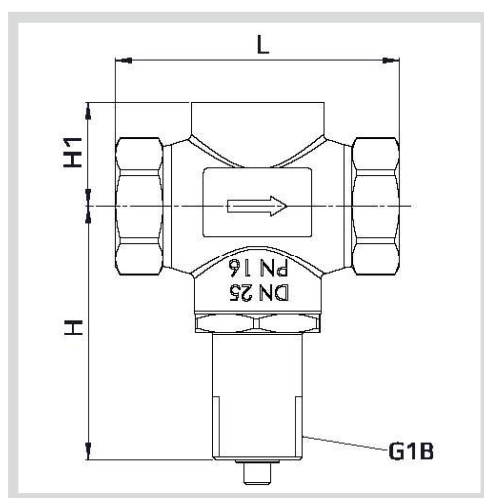
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to datasheets for the electric actuators).



## DIMENSION SKETCH



Type	L (mm)	H (mm)	H1 (mm)
15 L15B	85	86	30
20 L15B	95	94	35
25 L15B	105	92	40
32 L15B	138	94	54

## SPECIFICATIONS

Type	Connection threads	DN (mm)	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
15 L15B	Rp ½	15	15	2.75	6	1.0
20 L15B	Rp ¾	20	20	5	6.5	1.3
25 L15B	Rp 1	25	25	7.5	7	1.6
32 L15B	Rp 1¼	32	32	12.5	8	2.9

# Balanced 2-way Control Valve type L1SBR

Gun Metal, PN 16, DN 15 – 32 mm, Reverse acting

0-2.2.04.01-D

Page 1 of 2



## APPLICATIONS

Balanced control valves type L1SBR are mainly designed for regulation of cooling water and lubricating liquids. Balanced valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a standard single seated valve, and where the leakage rate for a double-seated valve is unacceptable. The valves are installed combined with our self-acting thermostats, pressure differential regulators or electric actuators for regulation in industrial plants, industrial processes or marine installations - especially in control systems for cooling.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of gun metal RG 5. The thread for the actuator connection is G1B ISO 228. The valve is single seated, balanced. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

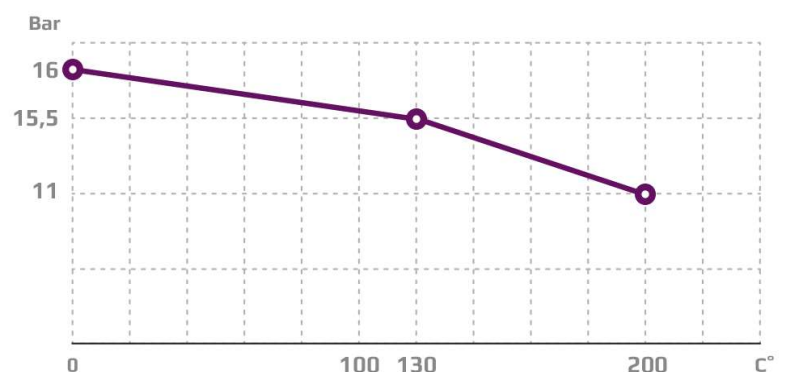
Without the actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our thermostats the valves will open at rising temperatures. In connection with our electric actuators the valves will either close or open depending on the application. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly.
- Reliable and secure due to internal parts of stainless steel.
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## TECHNICAL DATA

### Materials:

- Valve body	Gun metal RG 5
- Components	Stainless steel
- O-ring	FPM, 75 SHOREA
- Gasket	Reinz-AFM34
Nominal pressure	PN 16
Seating	Single seated
Flow characteristic	Quadratic
Leakage rate	≤ 0.05% of Kvs
Regulating capability	Kvs/Kvr > 25
Internal connection threads	ISO 7/1

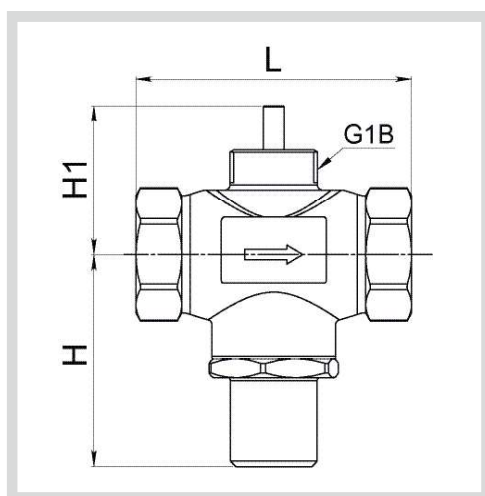
Subject to change without notice.



## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).

## DIMENSION SKETCH



Type	L (mm)	H (mm)	H1 (mm)
15 L1SBR	85	71	40
20 L1SBR	95	79	46
25 L1SBR	105	79	50
32 L1SBR	138	81	64

## SPECIFICATIONS

Type	Connection threads	DN (mm)	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
15 L1SBR	Rp ½	15	15	2.75	6	1.0
20 L1SBR	Rp ¾	20	20	5	6.5	1.3
25 L1SBR	Rp 1	25	25	7.5	7	1.6
32 L1SBR	Rp 1¼	32	32	12.5	8	2.9

# 2-way Control Valve type L2S

Gun Metal, PN 16, DN 40 – 50 mm

0-2.2.05-K

Page 1 of 2



## APPLICATIONS

Control valves type L2S are designed for regulation of hot water and lubricating oils. The valves are installed combined with one of our self-acting thermostats, pressure differential regulators or electric valve actuators for regulation in central heating plants, industrial plants, industrial processes or marine installations.

## DESIGN

The valve body, seats and cone are made of gun metal RG 5. The stem is made of brass. The thread for the actuator connection is G1B ISO 228. The valves are double seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The linear characteristic will not cease, until the flow has dropped below 4% of the full flow.

## FEATURES

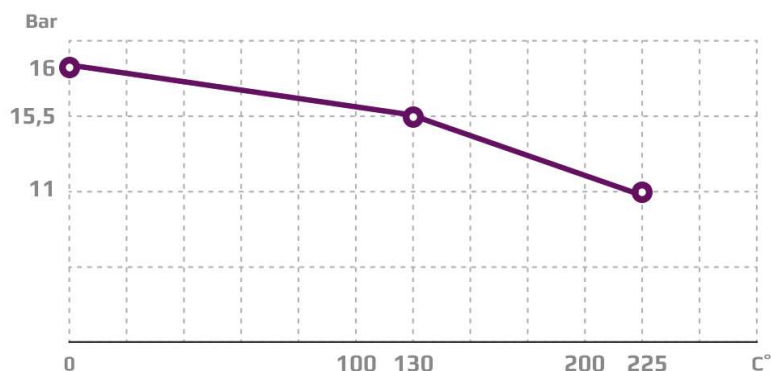
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Gun metal RG 5
- Components	Gun metal RG 5
- Stem	Brass
- Gasket	Reinz-AFM34
Nominal pressure	PN 16
Seating	Double seated
Flow characteristic	Linear
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25
Internal connection threads	ISO 7/1

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



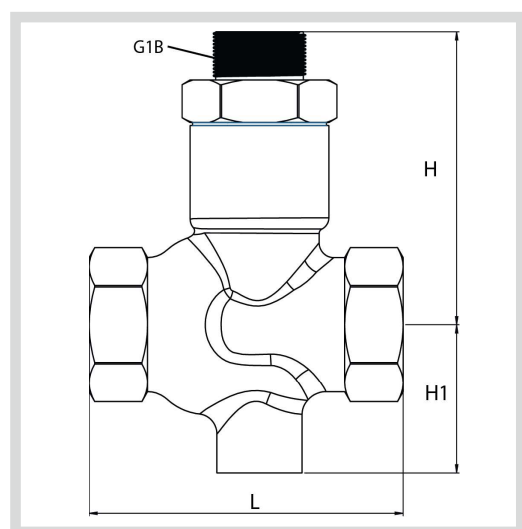
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



Type	L (mm)	H (mm)	H1 (mm)
40 L25	129	118	68
50 L25	153	122	71

## SPECIFICATIONS

Type	Connection threads	DN (mm)	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
40 L25	Rp 1/2	40	40	20	8	2.9
50 L25	Rp 2	50	50	30	9	3.8

# 2-way Control Valve type L2F

Gun metal, PN 10, DN 65 – 150 mm

0-2.2.05.01-B

Page 1 of 2



## APPLICATIONS

Control valves type L2F are designed for regulating hot water - and cold and hot sea water. The valves are used in connection with one of our temperature regulators in control systems for industrial processes or marine installations.

## DESIGN

The valve components - valve body, seats, cone and spindle - are made of sea water resistant materials with connection flanges drilled according to DIN 86021. The connection thread for the actuator is G1B.

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats or electronic actuators, the valves will close at rising temperatures. The linear characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

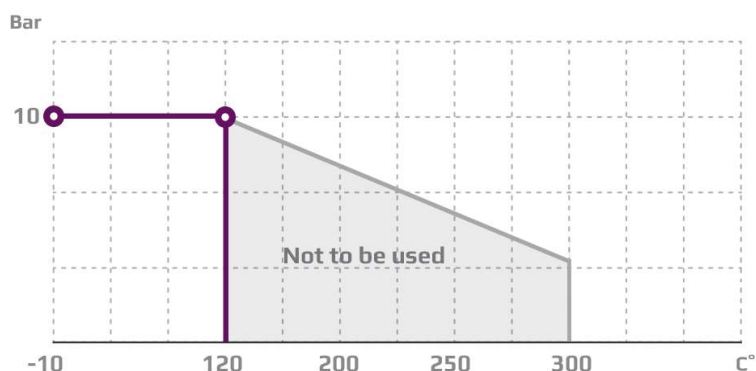
- Valve body	CuSn10
- Seats and cone	CUAl10Fe5Ni5
- Spindle	W.no. 1.4436
- O-ring	90 NBR
- Gasket	Reinz-AFM34
Nominal pressure	PN 10
Seating	2 balanced seats
Flow characteristic	Almost linear
Leakage rate	$\leq 0.5\%$ of Kvs
Regulating capability	Kvs/Kvr > 25
Flanges drilled according to	DIN 86021 or ANSI Class 150

## FEATURES

- Sea water resistant
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly.
- Reliable and secure due to internal parts of stainless steel.

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



Subject to change without notice.

### PORT NUMBERING

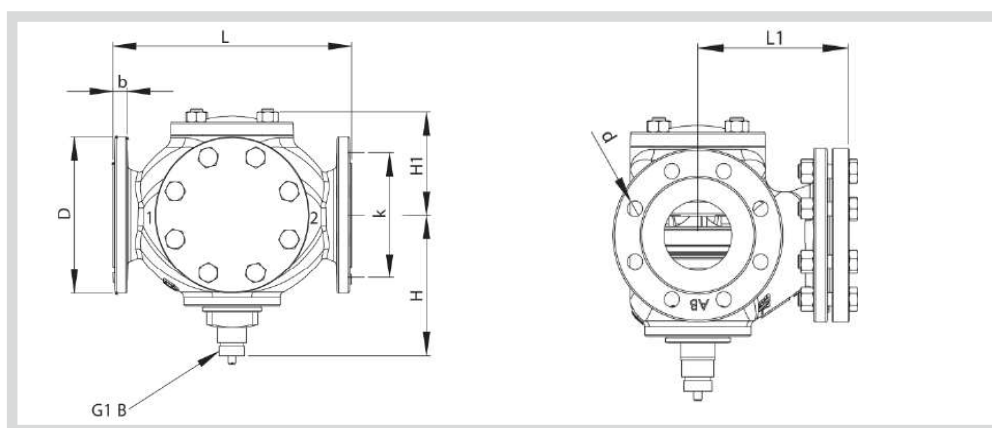
The ports of valves type L2F are marked with the figures 1 and 2. The letters in parentheses refer to the corresponding internationally adapted designations.



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

### DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	D (dia.) (mm)	b (mm)	k (dia.) (mm)	d mm dia. (number)
65 L2F	240	150	175	120	185	20	145	18x(4)
80 L2F	260	160	185	125	200	22	160	18x(8)
100 L2F	350	205	195	145	220	22	180	18x(8)
125 L2F	400	275	245	180	250	24	210	18x(8)
150 L2F	480	305	280	189	285	24	240	22x(8)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
65 L2F	65	65	50	10.50	27
80 L2F	80	80	80	11	36
100 L2F	100	100	125	13	62
125 L2F	125	125	215	18	102
150 L2F	150	150	310	21	145

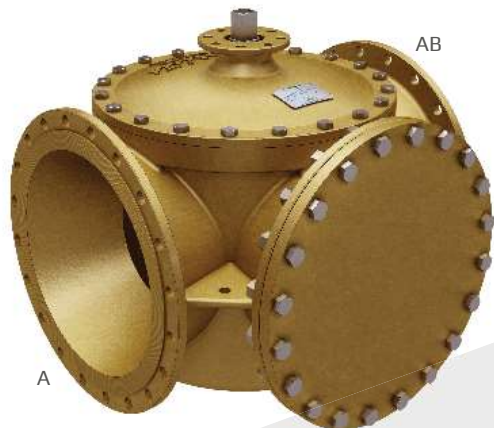


# 2-way Control Valve type L2FM-T

Gun metal, PN 16, DN 65 – 125 / PN 10, DN 150 – 300 / PN 6, DN 350 – 800 mm

0-2.2.05.03-C

Page 1 of 4



## APPLICATIONS

Control valve type L2FM-T is a three-way control valve with blocked port making a two-way control valve. The slide for quarter turn operation designed for regulating of sea water. The valves are designed for use in conjunction with industrial processes, marine installations with large water quantities. The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body is made of gun metal and the valve slide is made of alu bronze. The valve flanges are drilled according to EN 1092-2 or ANSI Class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one extreme position by turning the spindle, flow from A to AB is kept fully open. In the other extreme position the valve is fully closed. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

### Materials:

- Valve body	CuSn10
- Slide	CuAl10Fe5Ni5
- O-ring	NBR 70A
- U-ring	PTFE
- Gasket	AF 1000

### - Nominal pressure

DN 65-300 L3FM-T PN 10, max. 100°C (option 120°C)

DN 350-800 L3FM-T PN 6, max. 100°C (option 120°C)

### Flow characteristic

Almost linear

### Leakage rate

≤ 0.5% of KV100

### Regulating capability

Kvs/Kvr > 25

### Flanges

EN 1092-2

PN 6/10/16

### Counter flanges

ANSI Class 150

(suggested)

DIN 2631 – PN 6

DIN 2632 – PN 10

DIN2633 – PN 16

### Max. pressure $\Delta p_L$ , against which the control can close:

- DN 65-125 L3FM-T 16 bar

- DN 150-300 L3FM-T 10 bar

- DN 350-800 L3FM-T 6 bar

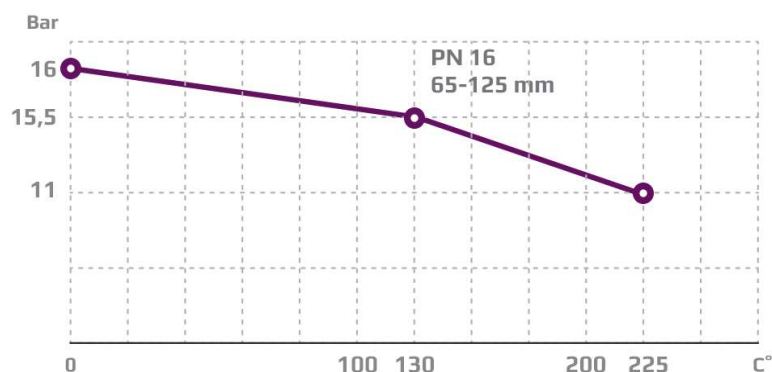
Slide in CuAl10Fe5Ni5

## FEATURES

- Sea water resistant
- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings.
- Flexible choice of port placements

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

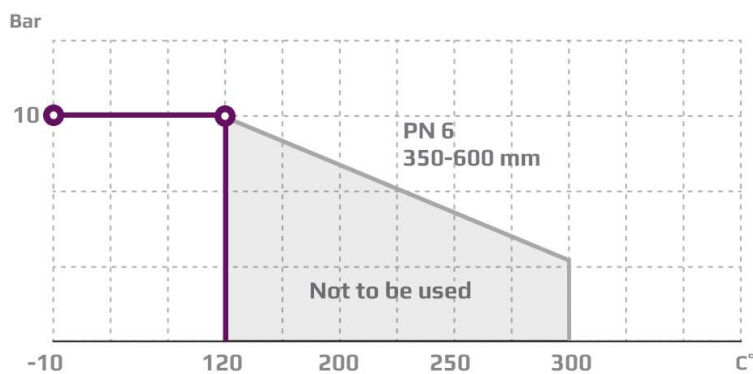
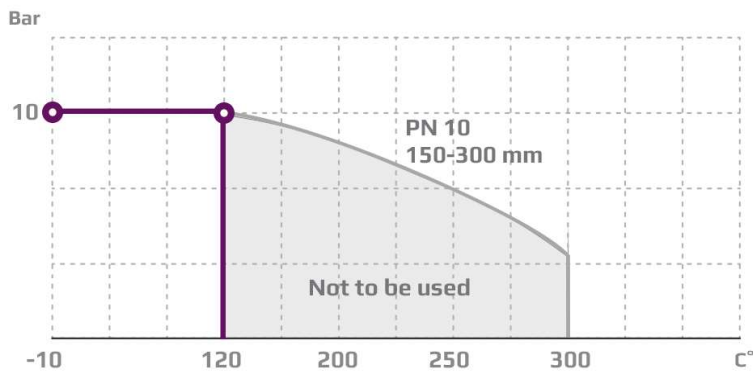


Subject to change without notice.

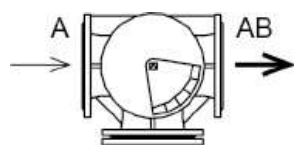


**PRESSURE/TEMPERATURE DIAGRAM**

According to DIN 2401



**PORT NUMBERING**



**MOUNTING**

The valve connections are marked A and AB. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

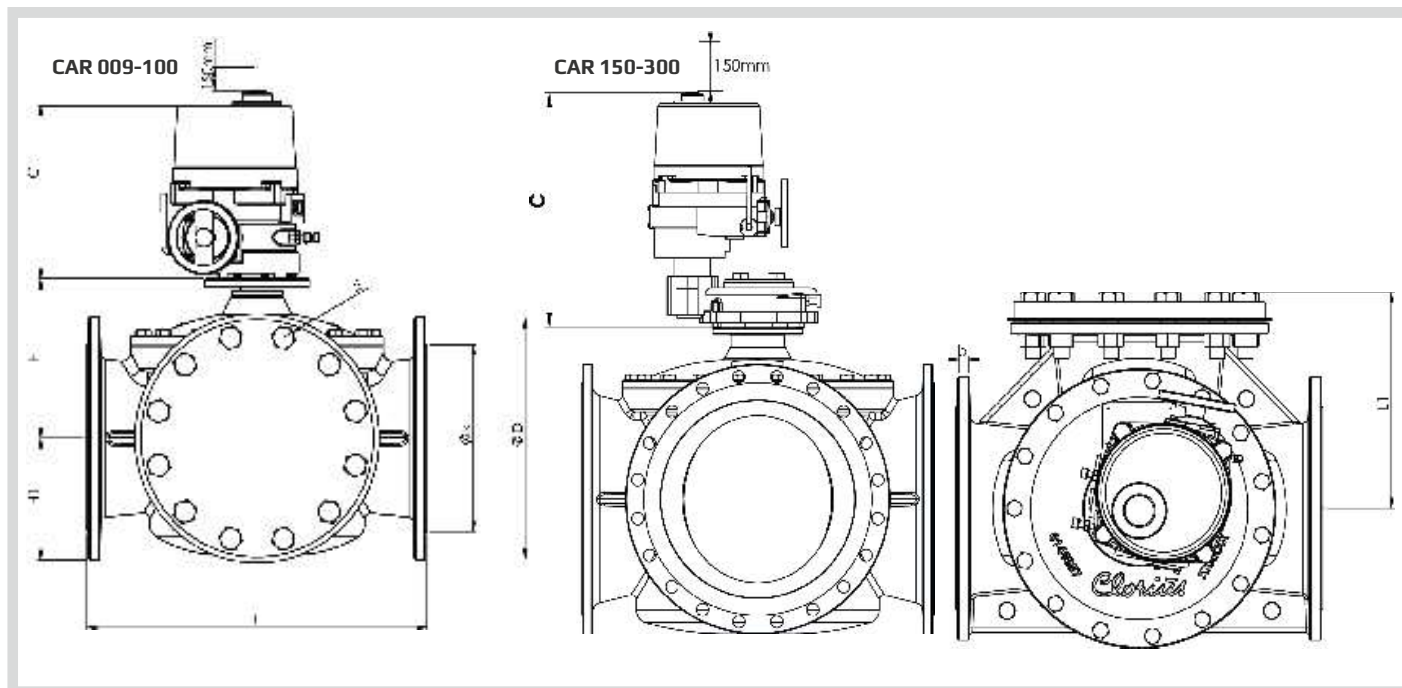
# 2-way Control Valve type L2FM-T

Gun metal, PN 16, DN 65 – 125 / PN 10, DN 150 – 300 / PN 6, DN 350 – 800 mm

O-2.2.05.03-C

Page 3 of 4

## DIMENSION SKETCH



Type							EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 L2FM-T	292	175	135	90	20	273	185	145	19x(8)	180	140	19x(4)	165	130	15x(4)	175	140	19x(4)
80 L2FM-T	292	175	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 L2FM-T	350	205	158	112	17	273	220	180	19x(8)	230	190,9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 L2FM-T	400	231	179	123	17	273	250	210	19x(8)	255	216	19x(8)	235	200	19x(8)	250	210	23x(8)
150 L2FM-T	438	249	196	139	20	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 L2FM-T	530	301	236	175	21	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 L2FM-T	592	333	273	205	23	361	395	350	23x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 L2FM-T	649	365	305	230	25.5	361	455	400	23x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 L2FM-T	717	395	337	255	25.5	361	490	445	23x(12)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 L2FM-T	770	421	375	285	26	361	540	495	23x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 L2FM-T	820	446	391	310	26.5	556	595	550	23x(16)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 L2FM-T	900	492	425	340	27.5	556	645	600	23x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 L2FM-T	900	492	425	373	27.5	556							720	665	27x(20)	745	680	33x(20)
600 L2FM-T	1000	546	470	393	31.0	556	755	705	28x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
700 L2FM-T	1106	649	519	462	34.0	556	860	810	28x(24)				875	820	27x(24)	905	840	33x(24)
800 L2FM-T	1200	702	579	507	37	556	975	920	31x(24)				995	930	33x(24)	1020	950	33x(28)

Subject to change without notice.

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
65 L2FM-T	65	120	46	37
80 L2FM-T	80	154	55	41
100 L2FM-T	100	220	90	56
125 L2FM-T	125	330	150	73
150 L2FM-T	150	425	160	84
200 L2FM-T	200	1100	250	153
250 L2FM-T	250	2100	395	215
300 L2FM-T	300	2650	550	277
350 L2FM-T	350	3380	640	340
400 L2FM-T	400	3950	895	459
450 L2FM-T	450	4480	1050	579
500 L2FM-T	500	5250	1300	744
550 L2FM-T	550	5250	1300	950
600 L2FM-T	600	6050	1850	1090
700 L2FM-T	700	7000	TBC	TBC
800 L2FM-T	800	8000	2600	2100

\*Torque calculated at max inlet P for:

DN 65 - 125 = 16 Bar

DN 150-300 = 10 Bar

DN 350-800 = 5 Bar



# 2-way Control Valve type L2SR

Gun metal, PN 16, DN 40 – 50 mm, 2 seats, Reverse acting

0-2.2.06-L

Page 1 of 2



## APPLICATIONS

Valves type L2SR are mainly intended for control of cooling water, sea water and lubricating liquids. The valves are used in conjunction with temperature- or pressure differential regulators in industrial processes or marine installations - especially in control systems for cooling. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring and when opening the valve, the actuator has to overcome the spring force.

## DESIGN

The valve body, seats and cone – are made of gun metal RG 5 and the stem of stainless steel – the valve body with threaded ends according to ISO 7-1. The thread for the actuator connection is G1B. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

### REVERSE ACTING

Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with thermostats, pneumatic or electric valve actuators. The valves act as “cooling” valves, i.e. they open at rising temperatures.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly.

## TECHNICAL DATA

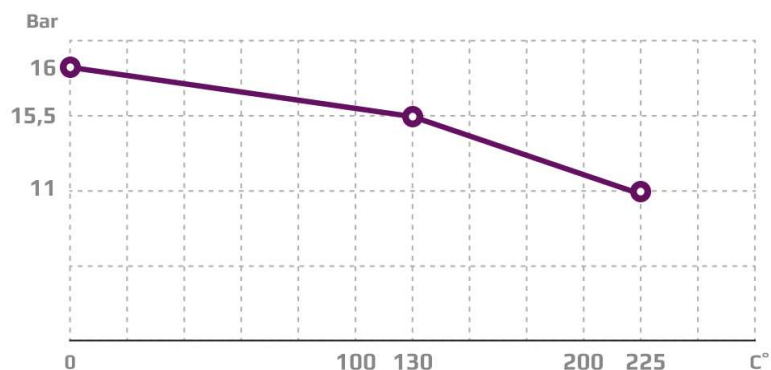
### Materials:

- Valve body	Gun metal RG 5 W.No. 2.1086
- Stem	Stainless steel W.No. 1.4436
- O-ring	70 NBR
- Gasket	Reinz-AFM34
Nominal pressure	PN 16
Seating	Double seated
Flow characteristic	Linear
Leakage rate	$\leq 0.5\%$ of Kvs
Regulating capability	Kvs/Kvr > 25
Connection threads	ISO 7-1

Reverse acting (normally closed)  
For cooling water and lubricants

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



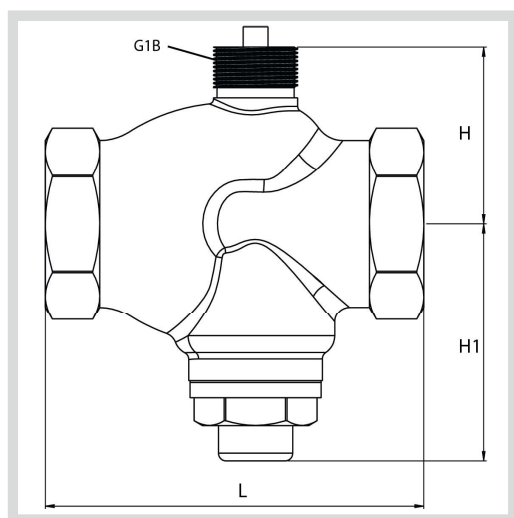
Subject to change without notice.

### MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



### DIMENSION SKETCH



Type	L (mm)	H (mm)	H1 (mm)
40 L2SR	129	65	90
50 L2SR	153	70	94

### SPECIFICATIONS

Type	Connection R <sub>p</sub>	Opening dia. Mm	k <sub>vs</sub> -value m <sup>3</sup> /h	Rated travel mm	Max. Δp <sub>L</sub> bar	Actuator Force N	Corresp. p <sub>1max</sub> bar	Weight kg
40 L2SR	1 ½"	40	20.00	8	2.7	400	16.0	3.0
50 L2SR	2"	50	30.00	9	1.8	400	16.0	4.0

# 3-way Control Valve type L3S

Gun metal, PN 10, DN 15 – 50 mm

0-2.2.07-K

Page 1 of 2



## APPLICATIONS

Control valves type L3S are designed for regulating fresh water, cold and hot sea-water and lubricating liquids. The valves are used in conjunction with temperature regulators in control systems for cooling and heating of domestic premises, district heating, industrial processes or marine installations.

## DESIGN

The valve components - valve body, seats and cone - are made of sea-water resistant gun metal RG 5. The valves are single seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174). Note: The design of the sizes DN 15 (1/2") and DN 20 (3/4") is different from the bigger ones.

## FUNCTION

Without an actuator being connected, connection 2-1 is fully open and connection 3-1 completely closed by means of a spring. On increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection 3-1 is fully open and connection 2-1 completely closed.

## TECHNICAL DATA

### Materials:

- Valve body, seats and cone	Gun metal RG 5
- O-ring	90 NBR
- Gasket	Reinz-AFM34
Nominal pressure	PN 10
	(max. 120°C option 200°C)

Seating	Two single seats
	15-20 mm unbalanced
	25-50 mm balanced

Flow characteristic	Almost linear
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25
Way of operation	When spindle is actuated:

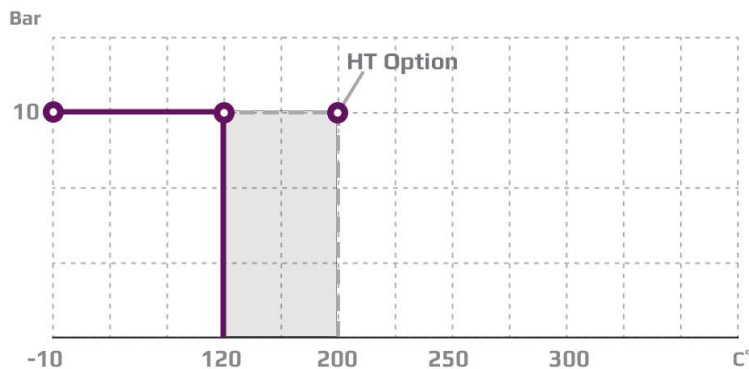
	Gate 1-2 closes
	Gate 1-3 opens
Internal connection threads	ISO 7/1

## FEATURES

- Sea water resistant
- Simple design secures reliable controls and reduces costly downtime.
- Can be used for both mixing and diverting

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

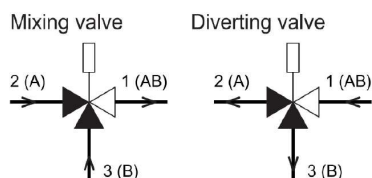


Subject to change without notice.



### PORT NUMBERING

The ports of valves type L3S are marked with the figures 1, 2 and 3. The letters in parentheses refer to the corresponding internationally adapted designations.



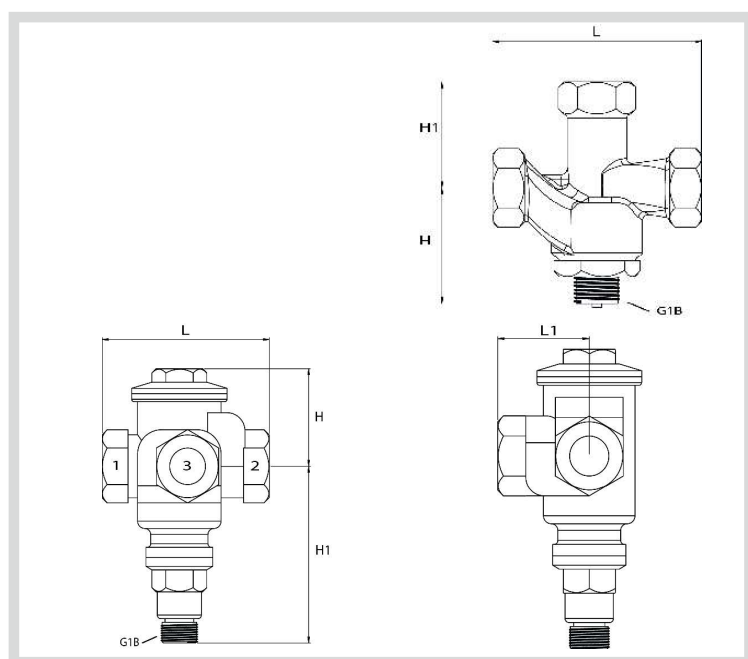
Port 1(AB) common port always open  
 Port 2(A) closes at load on spindle  
 Port 3(B) opens at load on spindle



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The thermostat/actuator can be fitted below or above the valve.

### DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)
15 L3S	110	-	60	55
20 L3S	110	-	60	55
25 L3S	140	70	145	80
32 L3S	140	70	145	80
40 L3S	185	95	150	105
50 L3S	185	95	150	105

### SPECIFICATIONS

Type	Connection threads	DN mm	Opening mm	$k_{vs}$ -value mixing valve $m^3/h$	$k_{vs}$ -value diverting valve $m^3/h$	Lifting height mm	Weight kg
15 L3S	Rp 1/2	15	15	2.75	2.4	3	1
20 L3S	Rp 3/4	20	20	5	4.3	4	1
25 L3S	Rp 1	25	25	7.5	6.4	4	4.4
32 L3S	Rp 1 1/4	32	32	12.5	10.7	6	4.5
40 L3S	Rp 1 1/2	40	40	20	17.2	6	7.7
50 L3S	Rp 2	50	50	30	25.8	8	8,3

# 3-way Control Valve type L3F

Gun metal, PN 10, DN 65 – 150 mm

0-2.2.08-K

Page 1 of 2



## APPLICATIONS

Control valves type L3F are designed for regulating hot water - and cold and hot sea water. The valves are used in connection with one of our temperature regulators in control systems for industrial processes or marine installations.

## DESIGN

The valve components - valve body, seats, cone and spindle - are made of sea water resistant materials with connection flanges drilled according to DIN 86021. The connection thread for the actuator is G1B.

## FUNCTION

Without an actuator being installed, connection 2-1 is fully open and connection 3-1 completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection 3-1 is fully open and connection 2-1 completely closed.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	CuSn10
- Seats, cone, spindle	CuAl10Fe5Ni5
- O-ring	90 NBR
- Gasket	Reinz-AFM34
<b>Nominal pressure</b>	PN 10
<b>Seating</b>	2 balanced seats
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	$\leq 0.5\%$ of Kvs
<b>Regulating capability</b>	Kvs/Kvr > 25
<b>Flanges drilled according to</b>	DIN 86021

### Important note

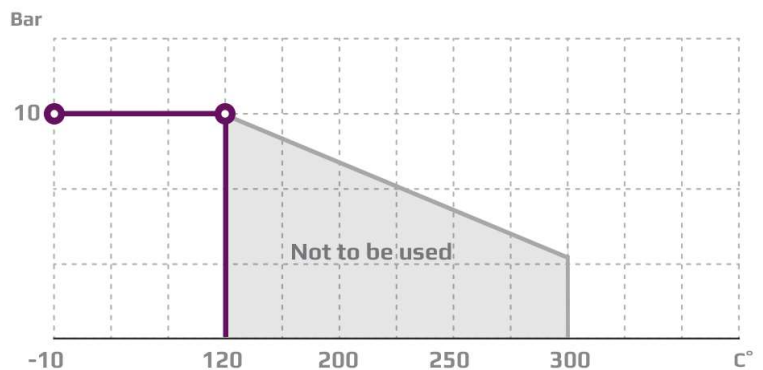
In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the Kvs-value will decrease by 14% as against mixing valves.

## FEATURES

- Sea water resistant
- Simple design secures reliable controls and reduces costly downtime.
- Can be used for both mixing and diverting

## PRESSURE/TEMPERATURE DIAGRAM

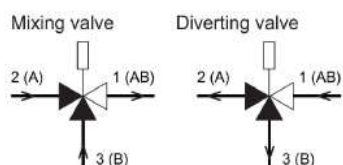
According to DIN 2401



Subject to change without notice.

### PORT NUMBERING

The ports of valves type L3F are marked with the letters AB, A and B.



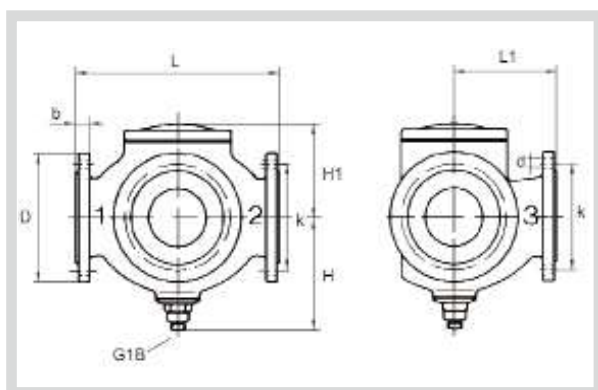
Port 1 (AB) common port always open  
 Port 2 (A) closes at load on spindle  
 Port 3 (B) opens at load on spindle



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the actuator will be exposed to a minimum of moisture and unnecessary vibrations.

### DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	D (dia.) (mm)	b (mm)	k (dia.) (mm)	d mm dia. (number)
65 L3F	240	120	175	120	185	20	145	18x(4)
80 L3F	310	155	180	127	200	22	160	18x(8)
100 L3F	350	175	195	145	220	22	180	18x(8)
125 L3F	400	240	245	180	250	24	210	18x(8)
150 L3F	480	270	280	189	285	24	240	22x(8)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	Mixing valve $k_{vs}$ -value $m^3/h$	Diverting valve $k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
65 L3F	65	65	50	43	10.5	22.5
80 L3F	80	80	80	69	11	40
100 L3F	100	100	125	108	13	55
125 L3F	125	125	215	185	18	91
150 L3F	150	150	310	267	21	131

# 3-way control valve type L3FA

Gun metal, PN 10, DN 65 – 200 mm / PN 6, DN 300/250 – 300 mm

0-2.2.09.01-B

Page 1 of 2



## APPLICATIONS

Control valve type L3FA is designed for regulating of sea water. The valves are used in conjunction with marine installations, e.g. cooling of main and auxiliary engines. Designed for use in conjunction with Clorius valve motor type AVM234 or AVF234.

## DESIGN

The valve components (seats, cone and spindle) are made of alu bronze and the valve body is made of CuSn10.

The valve flanges are drilled according to DIN 86021.

## FUNCTION

The valve cone is firmly connected with the motor spindle. When the valve cone is in the one outer position by draw on the spindle, connection A-AB is kept fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## TECHNICAL DATA

### Materials:

- Valve body	CuSn10
- Seat, cone, spindle	CuAL10Fe5Ni5
- O-ring	AFLAS 75H
- Gasket	Reinz-AFM34

### Nominal pressure

- 65-200 mm	PN 10 max. 120°C
- 300/250-300 mm	PN 6 max. 120°C

**Seats** 2 balanced single seats

**Flow characteristic** Almost linear

**Leakage rate** ≤ 0.5%

**Regulating capability** Kvs/Kvr > 25

**Temperature range** Max. 120°C

**Flanges** According to DIN 86021

### Note!

Valve type 300/250 L3FA has outer measures and flanges drilled as valve type 300 L3FA

### For cooling and heating purposes

Sea water resistant

### Important note

In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the kvs-value will decrease by 14% as against mixing valves.

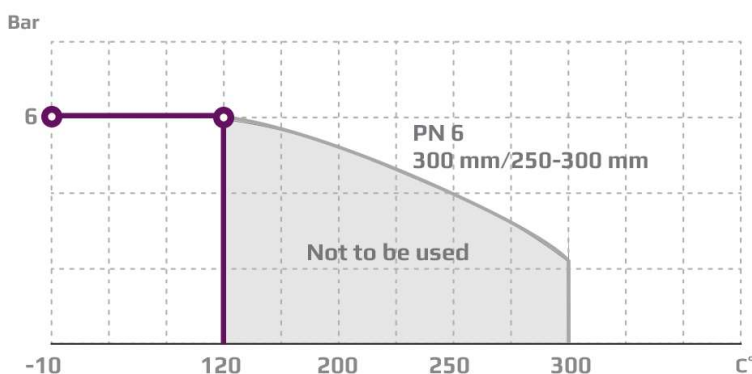
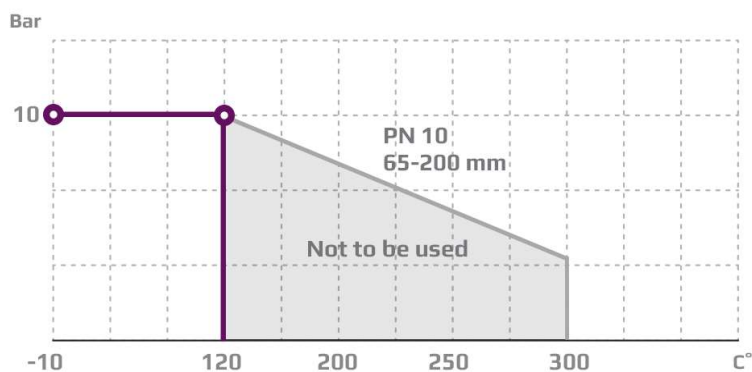
Subject to change without notice.

## FEATURES

- Sea water resistant
- Simple design secures reliable controls and reduces costly downtime.
- Can be used for both mixing and diverting

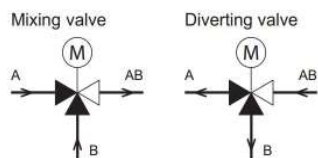
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



### PORT NUMBERING

The ports of valves type L3FA are marked with the letters AB, A and B.



Port AB  
Port A  
Port B

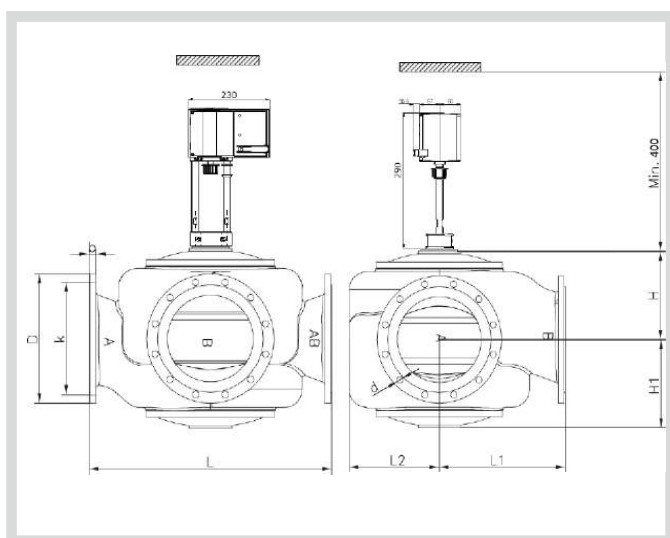
common port always open  
closes at load on spindle  
opens at load on spindle



### MOUNTING

The valve can be installed vertical as well as horizontal. The valve must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM234 See drawing.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) (mm)	d mm dia. (number)
65 L3FA								
80 L3FA	310	155	117	127	19	200	160	18x(8)
100 L3FA	350	175	132	141	19	220	180	18x(8)
125 L3FA	400	240	181	171	19	250	210	18x(8)
150 L3FA	480	270	216	189	19	285	240	22x(8)
200/175 L3FA	600	325	238	238	20	340	295	22x(8)
200 L3FA	600	325	238	238	20	340	295	22x(8)
300/250 L3FA <sup>2)</sup>	850	450	305	305	25	445	400	22x(12)
300 L3FA	850	450	305	305	25	445	400	22x(12)

### SPECIFICATIONS

<sup>2)</sup> Valve type 300/250 L3FA has outer measures and flanges drilled as type 300 L3FA.

Type	Flange connection DN in mm	Opening (mm)	k <sub>vs</sub> -value <sup>1)</sup> Mixing valve m <sup>3</sup> /h	k <sub>vs</sub> -value <sup>1)</sup> Diverting valve m <sup>3</sup> /h	Lifting height (mm)	Weight (kg)
65 L3FA						
80 L3FA	80	80	80	69	11	40
100 L3FA	100	100	125	108	13	49
125 L3FA	125	125	215	185	18	80
150 L3FA	150	150	310	267	20	126
200/175 L3FA	200	175	425	366	22	195
200 L3FA	200	200	555	477	28	190
300/250 L3FA <sup>2)</sup>	300	250	865	744	28	365
300 L3FA	300	300	1250	1075	45	355

# 3-way Control Valve type L3FM-T

Gun metal, PN16, DN65 - 125mm/ PN10, DN150 - 300mm/ PN6, DN350 - 800mm

O-2.2.10-G

Page 1 of 4



## APPLICATIONS

Control valve type L3FM-T is a three-way control valve with a slide for quarter turn operation designed for regulating of sea water. The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body is made of gun metal, while the slide is made of aluminum bronze. The valve flanges are drilled according to EN 1092-2.

## FUNCTION

The slide is firmly connected with the actuator spindle. When the slide is in the one extreme position by turning the spindle, connection A-AB is kept fully open and connection B-AB is fully closed. In the other extreme position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

### Materials:

- Valve body	CuSn10
- Slide	CuAL10Fe5Ni5
- O-ring	NBR 70A
- U-ring	PTFE
- Gasket	AF1000

### - Nominal pressure

DN 65-125 L3FM-T PN 16, max. 100°C  
(option 120°C)

### DN 150-300 L3FM-T

PN 10, max. 100°C  
(option 120°C)

### DN 350-800 L3FM-T

PN 6, max. 100°C  
(option 120°C)

### Flow characteristic

Almost  
linear

### Leakage rate

max 0.5%

### Regulating capability

Kvs/Kvr > 25

### Flanges

EN 1092-2  
PN 6/10 /16

### Counter flanges (suggested)

DIN 2631 - PN 6  
DIN 2632 - PN 10  
DIN 2633 - PN 16

### Max. pressure $\Delta p_L$ , against which the control can close:

- 65-125 L3FM-T	16 bar
- 150-300 L3FM-T	10 bar
- 350-800 L3FM-T	6 bar

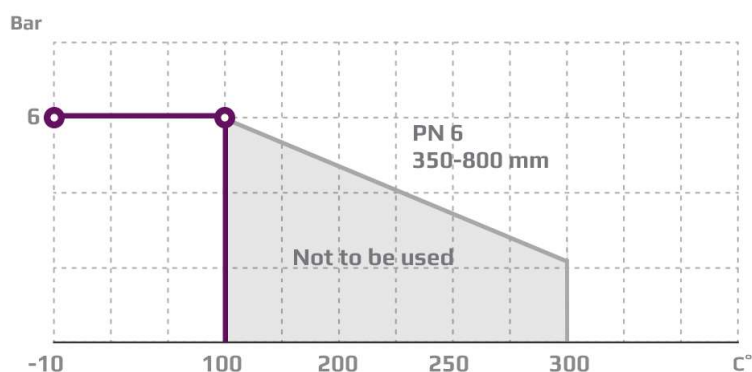
Subject to change without notice.

## FEATURES

- Sea water resistant
- Simple design secures reliable controls and reduces costly downtime
- Low leakage rate secures energy savings
- Flexible choice of port placements
- Can be used for both mixing and diverting

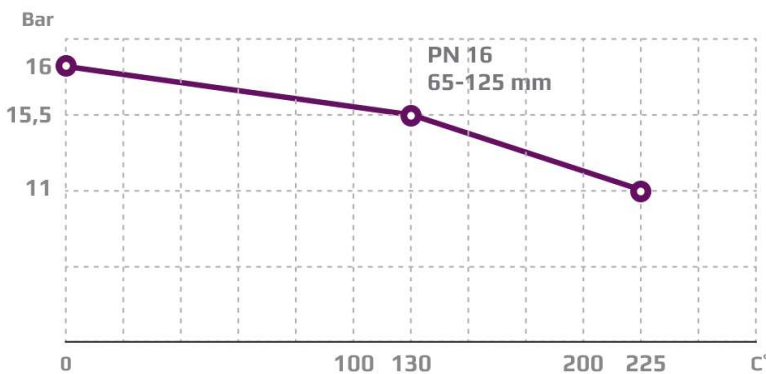
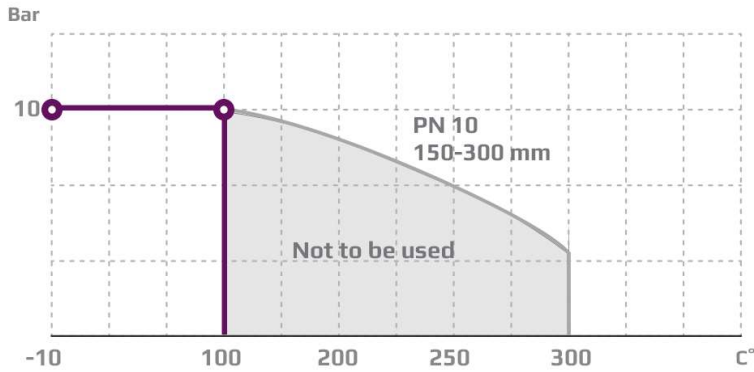
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

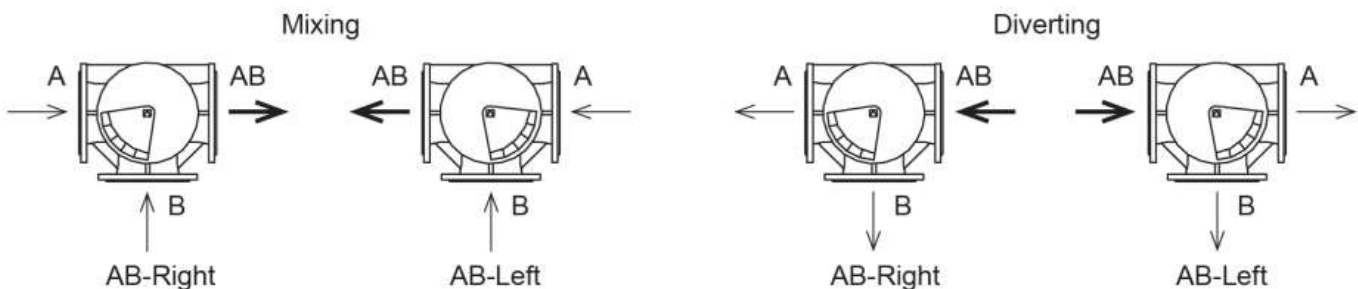


**PRESSURE/TEMPERATURE DIAGRAM**

According to DIN 2401



**PORT NUMBERING/CONFIGURATION**



Further specification for ordering (e.g. 400 L3FM-T, AB-Right)

**MOUNTING**

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. Valve can be supplied in two different configurations, AB-Right and AB-Left. A valve with AB-middle port is available on request. Please note that the supplied configuration is according to installation. The valve can be installed with vertical as well as horizontal spindles. The valve must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.



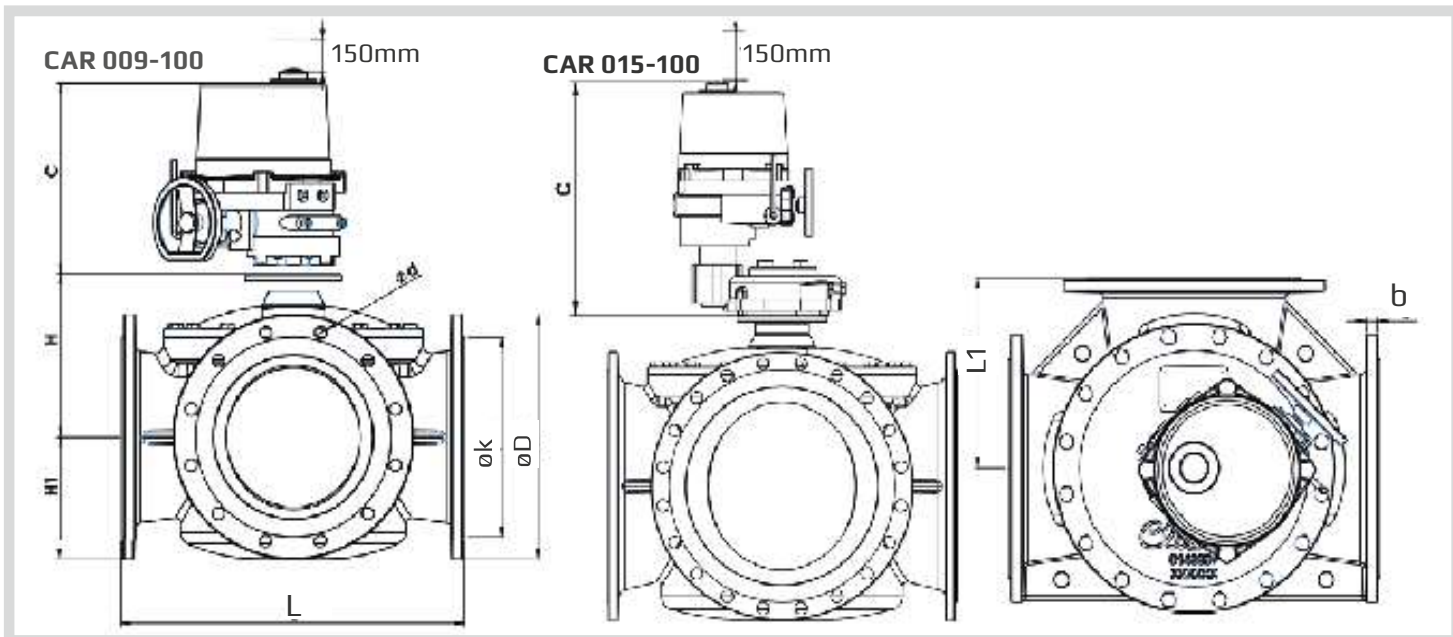
# 3-way Control Valve type L3FM-T

Gun metal, PN16, DN65 - 125mm/ PN10, DN150 - 300mm/ PN6, DN350 - 800mm

0-2.2.10-G

Page 3 of 4

## DIMENSION SKETCH



Type	Pressure DN	L mm	L1 mm	H mm	H1 mm	b mm	C mm	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
								D (dia.) mm	k (dia.) mm	d mm dia. (number)	D (dia.) mm	k (dia.) mm	d mm dia. (number)	D (dia.) mm	k (dia.) mm	d mm dia. (number)	D (dia.) mm	k (dia.) mm	d mm dia. (number)
65 L3FM-TR	16	292	146	135	90	20	273	185	145	19x(4)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 L3FM-TR	16	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 L3FM-TR	16	350	175	158	112	17	273	220	180	19x(8)	230	190.5	19x(8)	200	165	19x(8)	210	175	19x(8)
125 L3FM-TR	16	400	200	179	123	17	273	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 L3FM-TR	16	438	219	196	139	20	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 L3FM-TR	10	530	270	236	175	21	361	340	295	23x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
250 L3FM-TR	10	592	300	273	205	23	361	400	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)
300 L3FM-TR	10	649	330	305	230	25.5	361	455	400	23x(12)	483	432	25x(12)	430	390	23x(12)	445	400	25x(16)
350 L3FM-TR	6	717	360	337	255	25.5	361	490	445	23x(12)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 L3FM-TR	6	770	385	375	285	26	361	540	495	23x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 L3FM-TR	6	820	410	391	310	26.5	556	595	550	23x(16)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 L3FM-TR	6	900	455	425	340	27.5	556	645	600	23x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 L3FM-TR	6	900	455	425	373	27.5	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 L3FM-TR	6	1000	505	470	393	31.0	556	755	705	28x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 L3FM-TR	6	1050	525	515	423	35	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
700 L3FM-TR	6	1106	553	519	462	34.0	556	860	810	28x(24)	-	-	-	875	820	27x(24)	905	840	33x(24)
800 L3FM-TR	6	1200	600	579	507	37	556	975	920	31x(24)	-	-	-	995	930	32x(24)	1020	950	33x(28)

**SPECIFICATIONS**

Type	Flange connection DN in mm	k <sub>vs</sub> -value <sup>1)</sup> Mixing valve m <sup>3</sup> /h	k <sub>vs</sub> -value <sup>1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
65 L3FM-T	65	95	120	46	28
80 L3FM-T	80	122	154	55	32
100 L3FM-T	100	175	220	90	47
125 L3FM-T	125	245	330	150	64
150 L3FM-T	150	395	425	160	75
200 L3FM-T	200	800	1100	250	114
250 L3FM-T	250	1500	2100	395	159
300 L3FM-T	300	2000	2650	550	207
350 L3FM-T	350	2530	3380	640	278
400 L3FM-T	400	3050	3950	895	346
450 L3FM-T	450	3680	4480	1050	433
500 L3FM-T	500	4150	5250	1300	563
550 L3FM-T	550	4150	5250	1300	575
600 L3FM-T	600	4800	6050	1850	816
700 L3FM-T	700	5500	7000	TBC	1150
800 L3FM-T	800	6200	8000	2600	2100

1) kvs-value for port A and B 50% open.

\*Torque calculated at max inlet P for:

DN 65 - 125 = 16 Bar

DN 150-300 - 10 Bar

DN 350-800 - 5 Bar



# 2-way Control Valve type M1F

Cast iron, PN 16, DN 15/4 – 50 mm

O-2.3.02-L

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body

Cast iron  
EN-GJS-400-15

- Components

Stainless steel

- Bolts, nuts

24 CrMo 4/A4

- Gasket

Graphite

Nominal pressure

PN 16

Seating

Single-seated,

Flow characteristic

Quadratic

Leakage rate

$\leq 0,05\%$  of Kvs

Regulating capability

Kvs/Kvr > 25

Flanged ends

drilled according to

EN 1092-2

PN 16

Counter flanges

DIN 2633/B5 4504

## APPLICATIONS

Control valves type M1F are designed for regulating low, medium and high pressure hot water, steam and lubricating oils. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat and cone - are made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

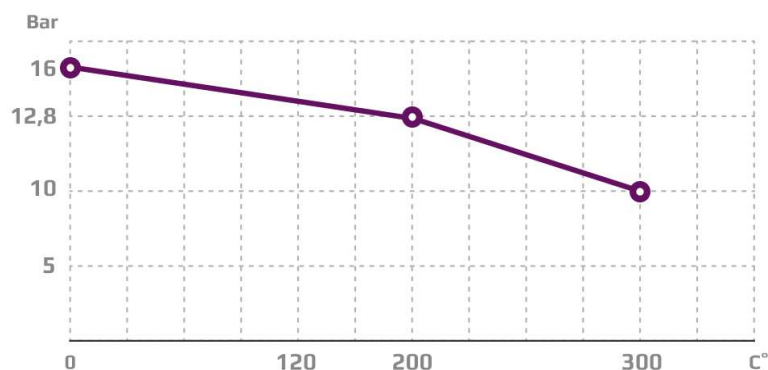
Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electronic actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



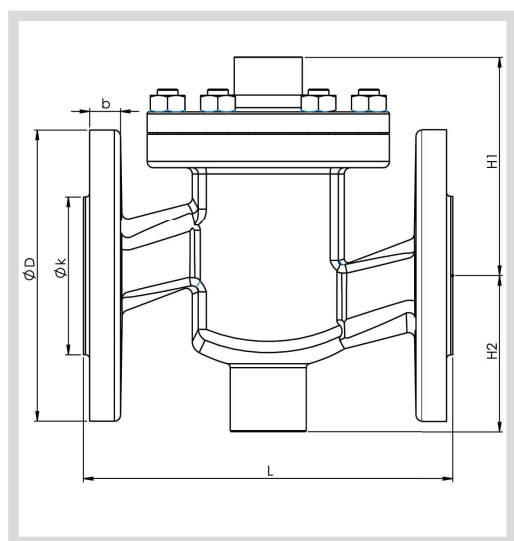
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to datasheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
15/4 M1F	130	80	60	14	95	65	14x(4)
15/6 M1F	130	80	60	14	95	65	14x(4)
15/9 M1F	130	80	60	14	95	65	14x(4)
15/12 M1F	130	80	60	14	95	65	14x(4)
15 M1F	130	80	60	14	95	65	14x(4)
20 M1F	150	85	65	16	105	75	14x(4)
25 M1F	160	95	70	16	115	85	14x(4)
32 M1F	180	105	75	18	140	100	14x(4)
40 M1F	200	110	85	18	150	110	14x(4)
50 M1F	230	125	95	20	165	125	14x(4)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
15/4 M1F	15	4	0.20	6	3
15/6 M1F	15	6	0.45	6	3
15/9 M1F	15	9	0.95	6	3.1
15/12 M1F	15	12	1.70	6	3.1
15 M1F	15	15	2.75	6	3.1
20 M1F	20	20	5	6.5	4.2
25 M1F	25	25	7.50	7	5.5
32 M1F	32	32	12.50	8	8.1
40 M1F	40	40	20	9	9.7
50 M1F	50	50	30	10	14

# Balanced 2-way Control Valve type M1FBN

Cast iron, PN 16, DN 15 – 80 mm

O-2.3.03.01-F

Page 1 of 2



## APPLICATIONS

Balanced control valves type M1FBN are designed for regulating hot water, steam and hot oil systems. Balanced valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a standard single seated valve, and where the leakage rate for a double-seated valve is unacceptable. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components, spindle, seat and cone - are made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2 or ANSI B16.5 Class 150. The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without an actuator being connected, the valve is held in open position by means of a spring. With force on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- O-ring	A.75H FEPM
- Gasket	Graphite
Nominal pressure	PN 16

### Pressure balanced valve

Seating	Single-seated, balanced
---------	----------------------------

### Flow characteristic

Leakage rate	Quadratic
--------------	-----------

Regulating capability	$\leq 0.05\%$ of Kvs
-----------------------	----------------------

	Kvs/Kvr > 25
--	--------------

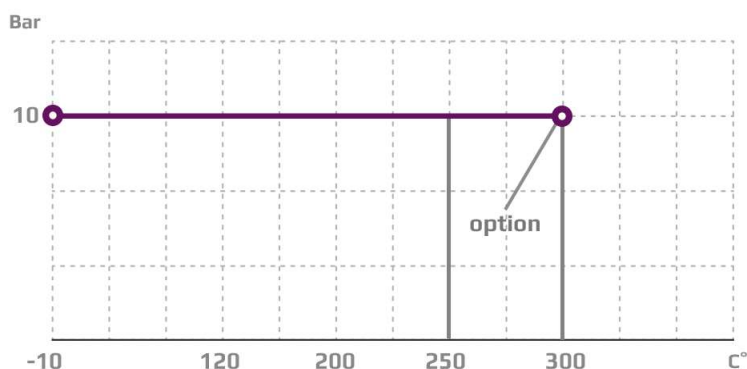
Flanges drilled according to	EN 1092-2 or ANSI B16.5 Class 150
------------------------------	---

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

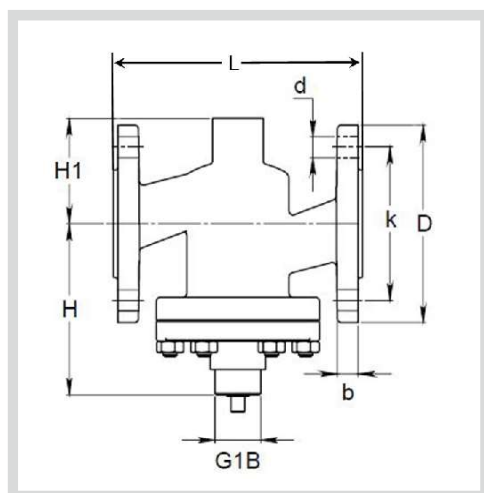


Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).

## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
15 M1FBN	130	101	80	95	14	65	14x(4)
20 M1FBN	150	107	85	105	16	75	14x(4)
25 M1FBN	160	112	70	115	16	85	14x(4)
32 M1FBN	180	122	75	140	18	100	18x(4)
40 M1FBN	200	125	85	150	19	110	18x(4)
50 M1FBN	230	140	95	165	19	125	18x(4)
65 M1FBN	290	154	110	185	19	145	18x(4)
80 M1FBN	310	164	115	200	19	160	19x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
15 M1FBN	15	15	4	7.5	4
20 M1FBN	20	20	6.3	7.5	5
25 M1FBN	25	25	10	9	6
32 M1FBN	32	32	16	10	9
40 M1FBN	40	40	25	11	13
50 M1FBN	50	50	35	11.5	16
65 M1FBN	65	65	58	14.5	23
80 M1FBN	80	80	80	16	38

# 2-way Control Valve type M2F,

Cast iron, PN 16, DN 20 – 80 mm, 2 seats, Flanged ends

O-2.3.04-N

Page 1 of 2

## APPLICATIONS

Control valves type M2F are designed for regulating hot water, steam and lubricating oil systems. The double-seated valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a single-seated valve. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

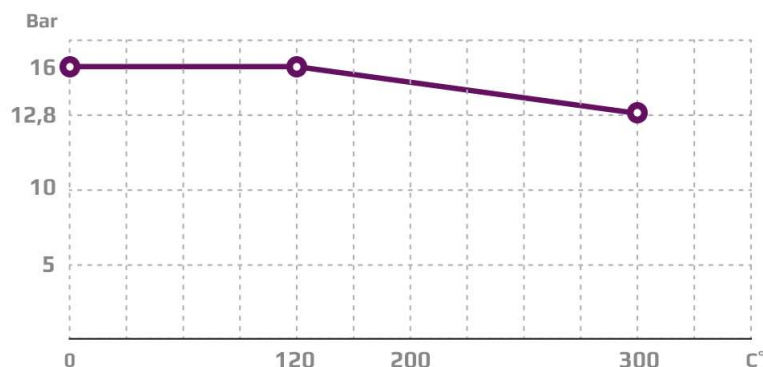
Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats or electronic actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Spring	1.4568
- Cone	1.4408, 1.4305
- Gasket	Stainless steel foil and graphite
- Upper seat	AISI 303
- Lower seat	1.4301, 1.4305, 1.4307
- Bolts, nuts	24 CrMo 4/A4
Nominal pressure	PN 16
Seating	Double-seated
Flow characteristic	Quadratic
Leakage rate	≤ 0,5% of Kvs
Regulating capability	Kvs/Kvr > 25

### Flanges drilled

EN 1092-2 PN 16

### Counter flanges

DIN 2633/BS 4504

### Adjustable seat interspace

Subject to change without notice.

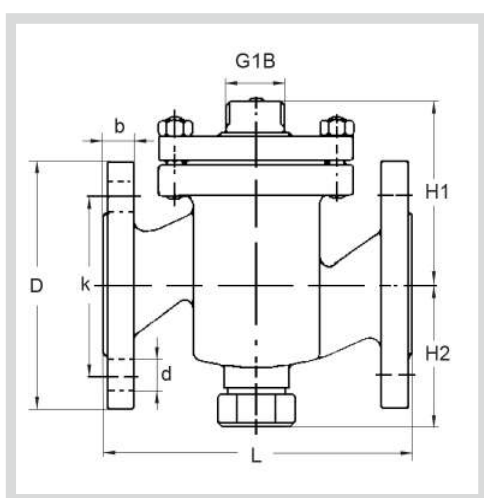


## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
20 M2F	150	85	70	16	105	75	14x(4)
25 M2F	160	95	77	16	115	85	14x(4)
32 M2F	180	105	82	18	140	100	19x(4)
40 M2F	200	110	92	19	150	110	19x(4)
50 M2F	230	125	102	19	165	125	19x(4)
65 M2F	290	135	120	19	185	145	19x(4)
80 M2F	310	145	130	19	200	160	19x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
20 M2F	20	20	5	6.5	5
25 M2F	25	25	7.5	7	6.5
32 M2F	32	32	12.5	8	9
40 M2F	40	40	20	9	11
50 M2F	50	50	30	10	16
65 M2F	65	65	50	11	21
80 M2F	80	80	80	13	38

# 2-way Control Valve type M2F

Cast iron, PN 16, DN 100 – 150 mm

O-2.3.05-H

Page 1 of 2



## APPLICATIONS

Control valves type M2F are designed for regulating hot water, steam and hot oil systems. The valves are installed combined with temperature or pressure differential regulators in control systems for heating to domestic premises, district and group heating schemes, industrial processes or marine installations.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The connection thread for the actuator connection is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The linear characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 4/A4
- Gasket	Graphite
Nominal pressure	PN 16
Seating	Double-seated
Flow characteristic	Almost quadratic
Function	Closing with pressure on spindle
Leakage rate	$\leq 0,5\%$ of Kvs
Regulating capability	Kvs/Kvr > 25

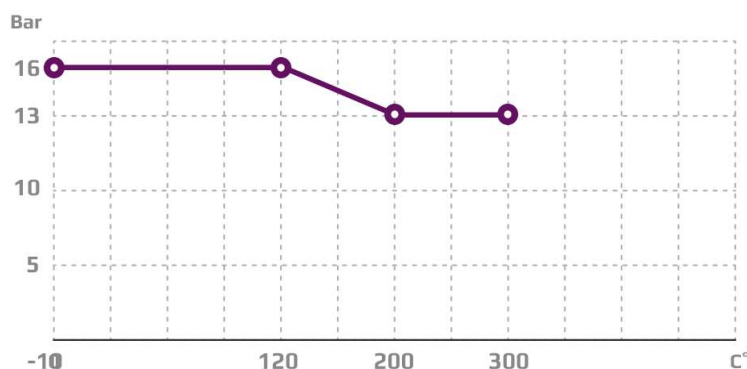
Flanges drilled according to Counter flanges	EN 1092-2 DIN 2633
--	-----------------------

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



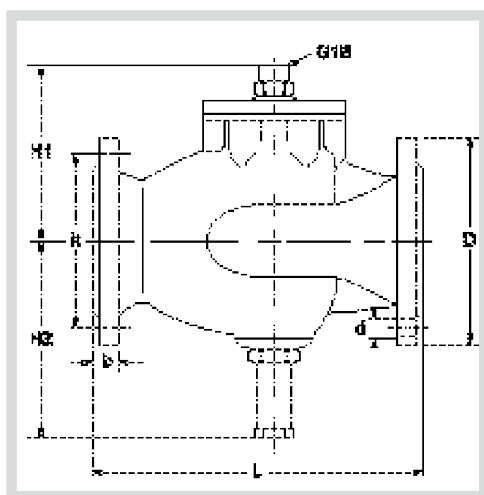
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
100 M2F	350	185	209	24	220	180	18x(8)
125 M2F	400	205	224	26	250	210	18x(8)
150 M2F	400	240	244	26	285	240	22x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
100 M2F	100	100	125	20	32
125 M2F	125	125	215	20	50
150 M2F	150	150	310	20	70

# 2-way Control Valve type M2FA,

Cast Iron, PN 10, DN 200 mm / PN 6, DN 250 – 300 mm

O-2.3.05.01-B

Page 1 of 2



2 (A)

## APPLICATIONS

Regulating valve type M2FA is designed for regulating water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations, e.g. cooling of main and auxiliary engines. Is designed for use in conjunction with Clorius valve motor type AVM/AVF 234.

## DESIGN

The valve components (seats and cone) are made of alu bronze, the spindle of stainless steel. The valve body is made of cast iron and the valve flanges are drilled according to EN 1092-2.

## FUNCTION

The valve cone is firmly connected with the motor spindle. The valve will close or open at rising temperatures. Depending on the application a reverse acting actuator can be used. The linear characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Trim	Alu Bronze CuAL10Fe5Ni5
- Valve spindle	Stainless steel (W.no. 1.4436)
- O-ring	AFLAS A75H
- Gasket	Reinz-AFM34

### Nominal pressure

- 200 M2FA	PN 10 (max. 120°C)
- 250-300 M2FA	PN 6 (max. 120°C)

Seating Double-seated

Flow characteristic Almost linear

Leakage rate  $\leq 0.5\%$  of Kvs

Regulating capability Kvs/Kvr > 25

Flanges EN 1092-2 PN 10

### Note!

Type 250 M2FA has outer measures and flanges drilled as type 300 M2FA

### Counter flanges (suggested)

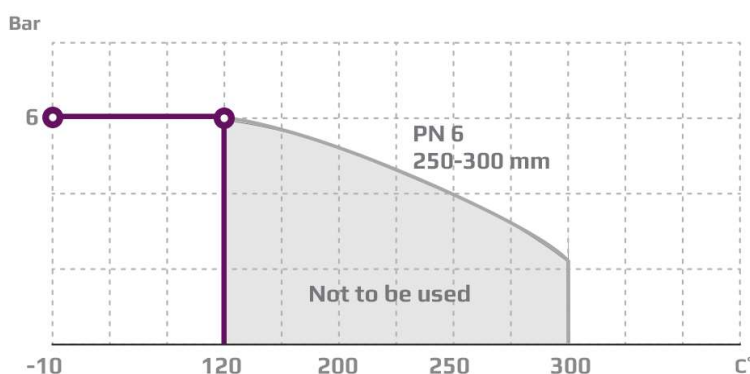
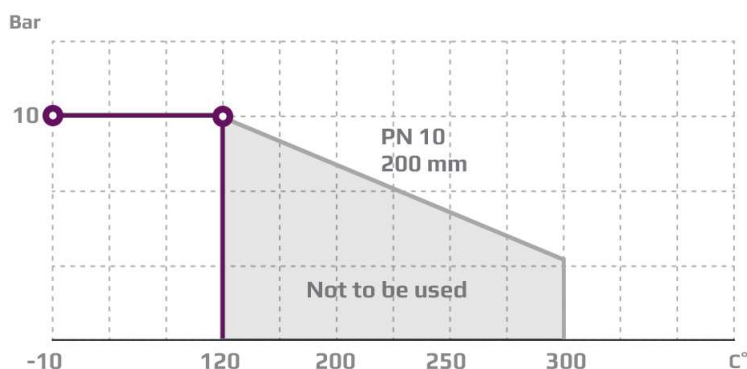
- 200 M2FA	DIN 2633 – PN 10/16
- 250-300 M2FA	DIN 2632 – PN 10

## FEATURES

- Simple design secures reliable controls and reduces costly downtime
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

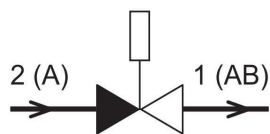
According to DIN 2401



Subject to change without notice.

### PORT NUMBERING

The ports of valves type M2FA are marked with the figures 1 and 2. The letters in parentheses refer to the corresponding internationally adapted designations.



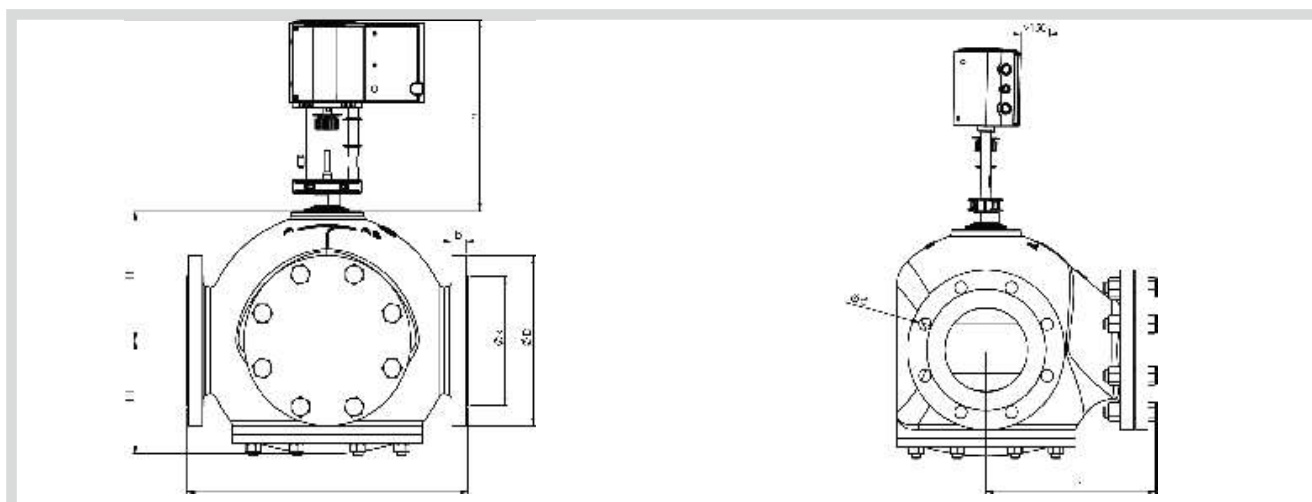
Port 2(A) closes at load on spindle.



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AFM 234 or AVF234 motor. See drawing.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
200 M2FA	600	380	238	238	26	340	295	22x(8)
250 M2FA <sup>1)</sup>	850	510	305	305	28	445	400	23x(12)
300 M2FA	850	510	305	305	28	445	400	23x(12)

1) Valve type 250 M2FA has outer measures and flanges drilled as type 300 M2FA.

### SPECIFICATIONS

Type	Flange connection mm	Opening DN in mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Weight kg
200 M2FA	200	200	555	28	160
250 M2FA <sup>1)</sup>	300	300	865	28	306
300 M2FA	300	300	1250	45	290

1) Valve type 250 M2FA has outer measures and flanges drilled as type 300 M2FA.

# 2-way Control Valve type M2FR

Cast iron, PN 16, DN 20 – 80 mm, 2 seats, Reverse acting

O-2.3.06-N

Page 1 of 2



## APPLICATIONS

Valves type M2FR are mainly intended for control of cooling systems. The valves are used in conjunction with temperature or pressure differential regulators for controlling industrial processes or cooling systems. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring and when opening the valve, the actuator has to overcome the spring force. The table on the next page shows the max. allowable values of  $\Delta p_L$  as well as the max. allowable inlet pressures for opening the valves,  $p_{1max}$ , for various actuator forces.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION REVERSE ACTING

Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our actuators, the valves act as "cooling" valves, i.e. they open at rising temperatures. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Trim	Stainless steel
- Nuts, bolts	24 CrMo 4/A4
- Gasket	Graphite
Nominal pressure	PN 16
Seating	Double-seated
Flow characteristic	Quadratic
Function	Opens by pressing the spindle
Leakage rate	$\leq 0,5\%$ of $Kvs$
Regulating capability	$Kvs/Kvr > 25$
Flanges drilled according to	EN 1092-2
Counter flanges	DIN 2633/BS 4504

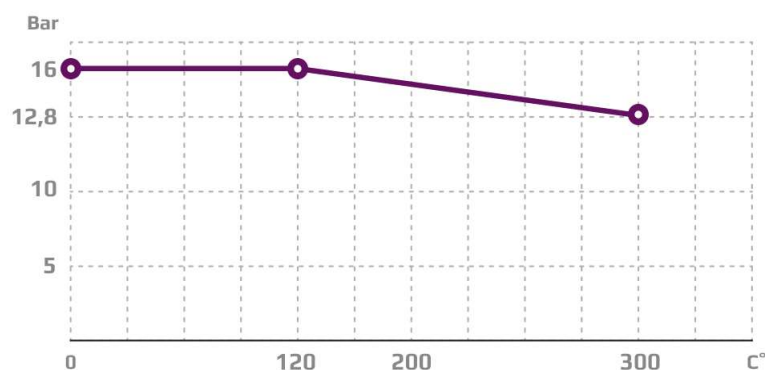
Reverse acting (normally closed)  
For cooling systems or similar  
Adjustable seats

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



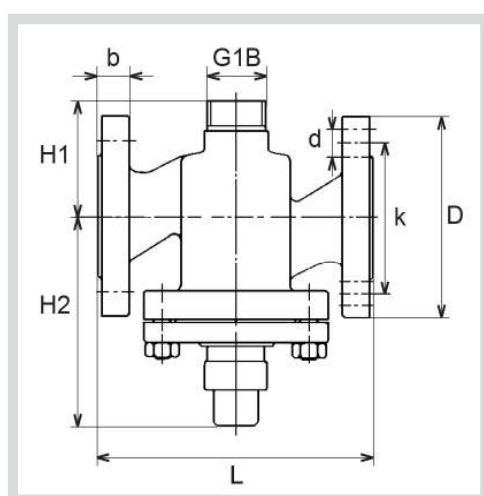
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 M2FR	150	63	112	105	16	75	14x(4)
25 M2FR	160	70	117	115	16	85	14x(4)
32 M2FR	180	75	151	140	18	100	19x(4)
40 M2FR	200	85	155	150	19	110	19x(4)
50 M2FR	230	95	169	165	19	125	19x(4)
65 M2FR	290	110	180	185	19	145	19x(4)
80 M2FR	310	120	180	200	19	160	19x(8)

## SPECIFICATIONS

Type	Flange connection Dn in mm	Opening mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Max. $\Delta p_L$ bar	Actuat. force N	Corresp. $p_{1max}$ bar	Weight kg
20 M2FR	20	20	5	6.5	8.3	200 400	9.4 16	5
25 M2FR	25	25	7.5	7	8	200 400	8.8 16	6.5
32 M2FR	32	32	12.5	8	7	400	16	9
40 M2FR	40	40	20	9	6.6	400	16	11
50 M2FR	50	50	30	10	5.8	400	15	16
65 M2FR	65	65	50	11	10	400 800	10 16	21
80 M2FR	80	80	80	13	6.7	400 800	10 16	38



# 2-way Control Valve type M2FR

Cast iron, PN 16, DN 100 – 150 mm, Reverse acting

0-2.3.07-1

Page 1 of 2



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast iron EN-GJS-400-15
- Trim	Stainless steel
- Nuts, bolts	24 CrMo 4/A4
- Gasket	Graphite
Nominal pressure	PN 16
Seating	Double-seated
Flow characteristic	Quadratic
Function	Opening with pressure on spindle
Leakage rate	≤ 0,5% of Kvs
Regulating capability	Kvs/Kvr > 25
Flanges	EN 1092-2 PN 16
Counter flanges	DIN 2633 / DS623

Reverse acting (normally closed)  
For cooling water and lubrications

## APPLICATIONS

Valve type M2FR are mainly intended for control of cooling systems. The valves are used in conjunction with temperature or pressure differential regulators. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring and when opening the valve, the actuator has to overcome the spring force. On the next page please find the max. allowable values of  $\Delta p_L$  as well as the max. allowable inlet pressures for opening the valve,  $p_{1_{max}}$  for various actuator forces.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast iron EN-GJL-250 with flanges drilled according to EN 1092-2. The connection thread for the actuator is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

### REVERSE ACTING

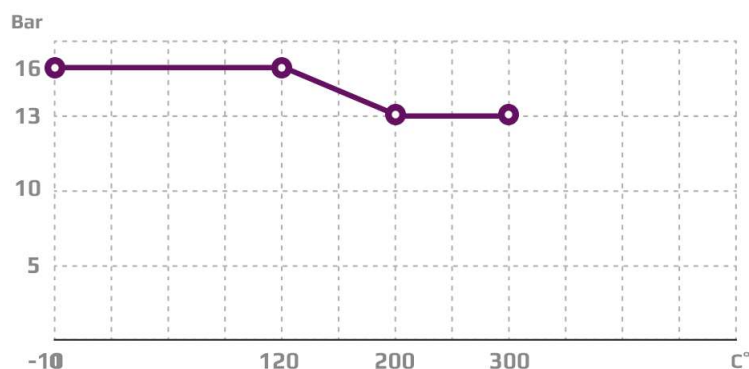
Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our thermostats, the valves act as "cooling" valves, i.e. they open at rising temperatures. The linear characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



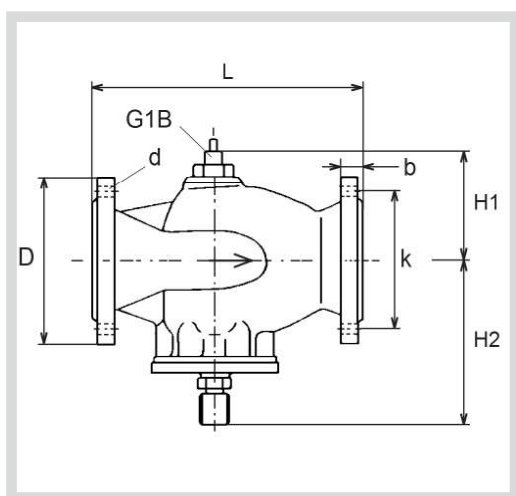
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
100 M2FR	350	145	240	220	24	180	18x(8)
125 M2FR	400	160	260	250	26	210	18x(8)
150 M2FR	400	180	293	285	26	240	22x(8)

## SPECIFICATIONS

Type	Flange connection Dn in mm	Opening mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Max. $\Delta p_L$ bar	Actuat. force N	Weight kg
100 M2FR	100	100	125	20	12.1	800	39
125 M2FR	125	125	215	20	9	800	53
150 M2FR	150	150	310	20	7.5	800	73

# 3-way control valve type M3F

Cast iron, PN 16, DN 20 – 65 mm, Flanged ends

0-2.3.08-J

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- seats and cone	ST.ST.1.4305 DIN/EN 1982 CC491K
- spindle	Stainless steel (W.No.1.4305)
- bolts, nuts	24 CrMo 4/A4
- Gasket	Graphite
- O-ring	80 FPM

Nominal pressure PN 16  
Seating 2 balanced single seats

Flow characteristic Quadratic/linear

Leakage rate  $\leq 0,5\%$  of Kvs

Regulating capability Kvs/Kvr > 25

Flanges - drilled according to EN 1092-2 PN 16

Counter flanges DIN 2633

Same Kvs-value as mixing and diverting valve  
Ideal for controlling process and central heating plants

Subject to change without notice.

## APPLICATIONS

Control valves type M3F are designed for lubricants, hot water and other liquids and can be installed in pipe systems as mixing or diverting valves. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - seats, cone and stem are made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2 PN 16. The thread for the actuator connection is G1B ISO 228. The valves have two balanced single seats. The leakage rate is less than 0.5 % of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without an actuator being installed, connection A-AB is fully open and connection B-AB completely closed by means of a spring.

By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection B-AB is fully open and connection A-AB completely closed.

The valve characteristics are as follows:

**Port A-AB and AB-A: quadratic**

**Port B-AB and AB-B: almost linear**

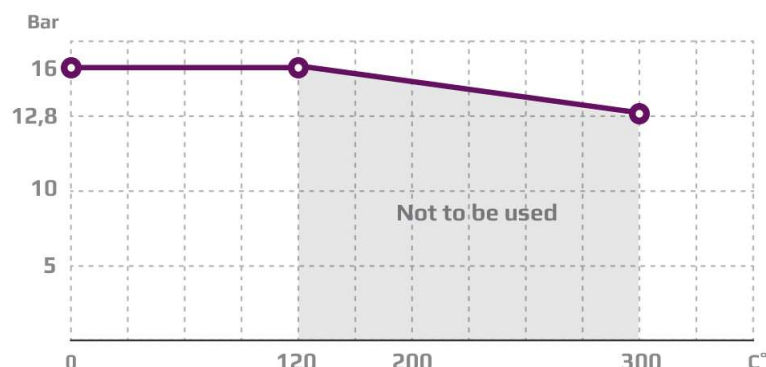
These characteristics ensure constant total flow under almost all pressure conditions and optimum circulation in the individual circuits.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

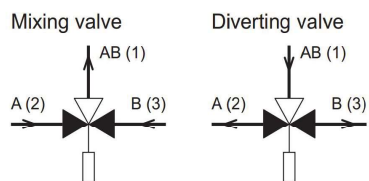
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



### PORT NUMBERING

Valves type M3F are marked with the internationally recognized port designations: A, B, AB



Port AB  
Port A  
Port B

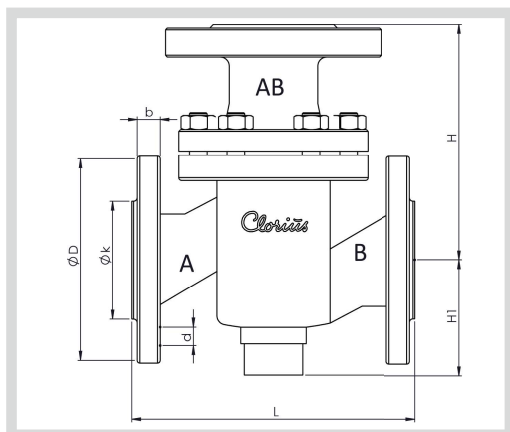
common port always open  
closes by activating the spindle  
opens by activating the spindle



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles.

### DIMENSION SKETCH



Type	L mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 M3F	150	115	63	105	16	75	14x(4)
25 M3F	160	130	70	115	16	85	14x(4)
32 M3F	180	150	75	140	18	100	18x(4)
40 M3F	200	160	85	150	18	110	18x(4)
50 M3F	230	190	95	165	20	125	18x(4)
65 M3F	290	220	110	185	20	145	18x(4)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value* $m^3/h$	Lifting height mm	Weight kg
20 M3F	20	20	6.3	7.5	6
25 M3F	25	25	10	9	7
32 M3F	32	32	16	10	10
40 M3F	40	40	25	11	14
50 M3F	50	50	38	11.5	18
65 M3F	65	65	63	14.5	26

\*Same  $k_{vs}$ -values for mixing and diverting valves

# 3-way Control Valve type M3F

Cast iron, PN 10, DN 80 – 150 mm

0-2.3.09-J

Page 1 of 2



## APPLICATIONS

Control valves type M3F are designed for regulating of water, lubricating oil and other liquid media and can be mounted in the pipe system as either mixing or diverting valves. However when mounting as a diverting valve the pressure drop is increased, compared with mounting as a mixing valve. See "Important note" under Technical Data. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district and central heating plants and marine installations.

## DESIGN

The valve components - seats and cone are made of alu bronze, the spindle is made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The connection thread for the actuator is G1B ISO 228. The valves have two balanced single seats. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174). Tight between port 1(AB) og 3(B) is optional.

## FUNCTION

Without an actuator being installed, connection A-AB is fully open and connection B-AB completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection B-AB is fully open and connection A-AB completely closed.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel
- O-ring	90 NBR
- Gasket	Reinz-AFM34

Seating	Two balanced single seats
---------	------------------------------

Flow characteristic	Almost linear
---------------------	---------------

Leakage rate	$\leq 0.5\%$ of Kvs
--------------	---------------------

Regulating capability	Kvs/Kvr > 25
-----------------------	--------------

Flanges drilled	
-----------------	--

according to	EN 1092-2 PN 10
--------------	-----------------

Counter flanges	DIN 2632
-----------------	----------

Nominal pressure	PN 10 (10 bar/max 120°C, option 9 bar/max 160 °C)
------------------	--

### For regulating of process and central heating plants

### Important note

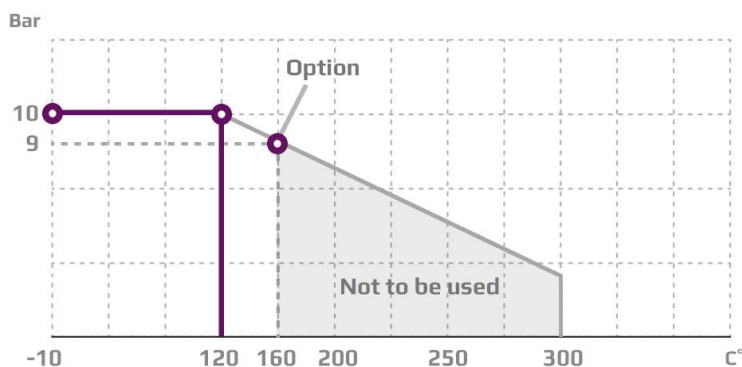
In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the kvs-value will decrease by 14% as against mixing valves.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

## PRESSURE/TEMPERATURE DIAGRAM

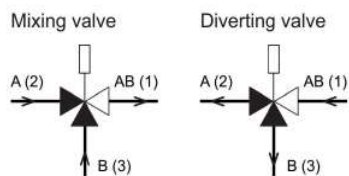
According to DIN 2401



Subject to change without notice.

### PORT NUMBERING

The ports of valves type M3F are marked with the letters AB, A and B.



Port AB(1)  
Port A(2)  
Port B(3)

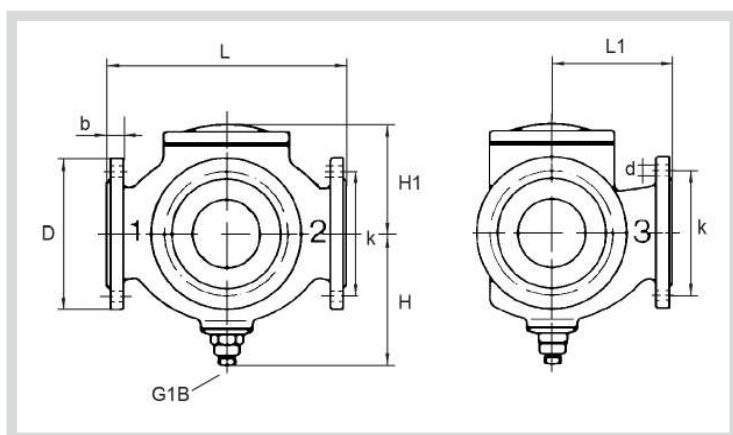
common port always open  
closes at load on spindle  
opens at load on spindle



### MOUNTING

The valve can be installed with vertical as well as horizontal spindles. The valve must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
80 M3F	310	155	180	127	200	20	160	18x(8)
100 M3F	350	175	195	141	220	22	180	18x(8)
125 M3F	400	240	245	171	250	21	210	19x(8)
150 M3F	480	270	280	189	285	22	240	22x(8)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	Mixing valve $k_{vs}$ -value $m^3/h$	Diverting valve $k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
80 M3F	80	80	80	69	11	35
100 M3F	100	100	125	108	13	44
125 M3F	125	125	215	185	18	72
150 M3F	150	150	310	267	20	111

# 3-way control valve type M3FA

PN 10, DN 80 – 300 mm, except DN 200/175 and 200 mm - PN 16

0-2.3.10.01-B

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	80 – 300 M3FA	Nodular cast iron EN-GJS-400-15
- Trim		Alu bronze, CuAL10Fe5Ni5
- Valve spindle		Stainless steel (W.no. 1.4436)
- O-ring		AFLAS A75H
- Gasket		Reinz-AFM34
<b>Nominal pressure PN 10</b>		
- 80-150 mm		PN 10 max. 120°C
- 200/175-200 mm		PN 16 max. 120°C
- 300/250-300 mm		PN 10 max. 120°C
<b>Seals</b>		2 balanced single seats
<b>Flow characteristic</b>		Almost linear
<b>Leakage rate</b>		0.5%
<b>Regulating capability</b>		Kvs/Kvr > 25
<b>Temperature range</b>		Max. 120° C
<b>Flanges</b>		EN 1092-2 PN 10/16

### Note !

Valve type 200/175 M3FA has outer measures and flanges drilled as valve type 200 M3FA. Valve type 300/250 M3FA has outer measures and flanges drilled as valve type 300 M3FA.

### Counter flanges (suggested)

80 – 150 M3FA: DIN 2632 – PN 10  
200/175 – 200 M3FA: DIN 2633 – PN 16  
300/250 – 300 M3FA: DIN 2632 – PN 10

### For cooling and heating purposes

#### Important note

In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the  $K_{vs}$ -value will decrease by 14% as against mixing.

Subject to change without notice.

## APPLICATIONS

Control valves type M3FA are designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations, e.g. cooling of main and auxiliary engines. The valve is designed for use in conjunction with Clorius valve motor type AVM234 or AVF234.

## DESIGN

The valve components (seats and cone) are made of alu bronze, the spindle of stainless steel. The valve body is made of cast iron and the valve flanges are drilled according to EN 1092-2. Tight between port 1(AB) og 3(B) is optional.

## FUNCTION

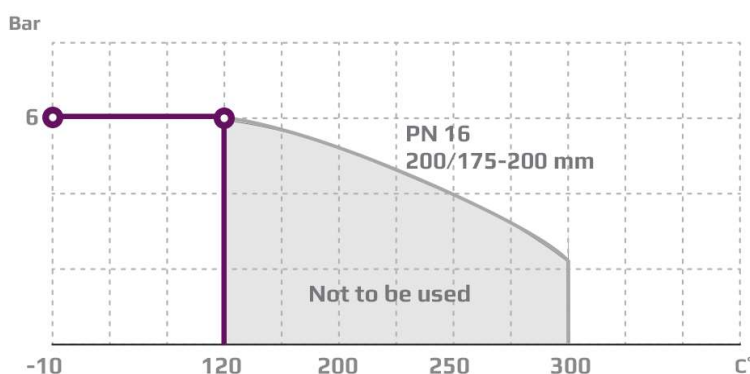
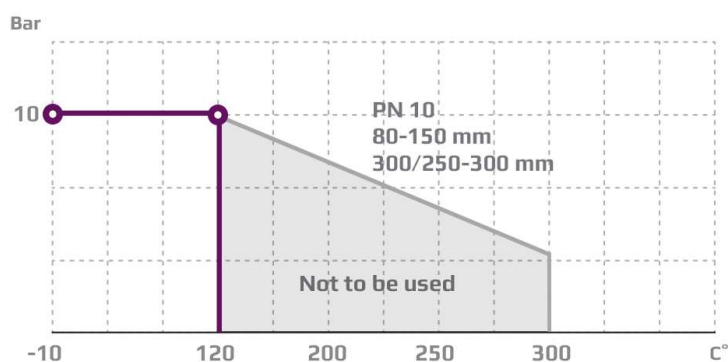
The valve cone is firmly connected with the motor spindle. When the valve cone is in the one extreme position by draw on the spindle, connection A-AB is kept fully open and connection B-AB is fully closed. In the other extreme position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

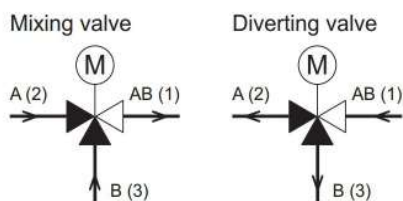
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401





### PORT NUMBERING



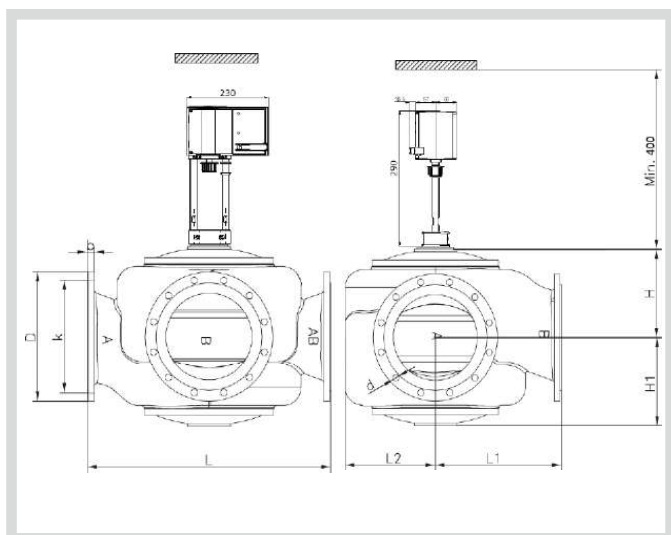
Port AB  
Port A  
Port B

common port always open  
closes at load on spindle  
opens at load on spindle



The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AFM 234 or AVF234 motor. See drawing.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
80 M3FA	310	155	117	127	20	200	160	18x(8)
100 M3FA	350	175	132	141	22	220	180	18x(8)
125 M3FA	400	240	181	171	24	250	210	18x(8)
150 M3FA	480	270	216	189	24	285	240	23x(8)
200/175 M3FA	600	325	238	238	20	340	295	23x(12)
200 M3FA	600	325	238	238	20	340	295	23x(12)
300/250 M3FA	850	450	305	305	25	445	400	23x(12)
300 M3FA	850	340	305	305	25	445	400	23x(12)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value <sup>1)</sup> mixing m <sup>3</sup> /h	$k_{vs}$ -value <sup>1)</sup> diverting m <sup>3</sup> /h	Lifting height mm	Weight kg
80 M3FA	80	80	80	69	11	35
100 M3FA	100	100	125	108	13	44
125 M3FA	125	125	215	185	18	72
150 M3FA	150	150	310	267	20	111
200/175 M3FA	200	200	425	366	22	165
200 M3FA	200	200	555	477	28	160
300/250 M3FA	300	300	865	744	28	306
300 M3FA	300	300	1250	1075	45	290

<sup>1)</sup> The stated  $k_{vs}$  values apply for mixing valves. Diverting valves:  $0.86 \times (k_{vs}$ -values for mixing valves).

# 3-way Control Valve type M3F-I

Cast iron, PN 10, DN 150 mm

0-2.3.12-B

Page 1 of 2



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast iron EN-GJS-400-15
- Seats and cone	Alu bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no. 1.4436)
- O-ring	90 NBR
- Gasket	Reinz-AFM34
Nominal pressure	PN 10
Seating	Two balanced single seats
Flow characteristic	Almost linear
Flanges drilled according to	EN 1092-2 PN 10
Counter flanges	DIN 2632
Leakage rate	0,5 %
Regulating capability	Kvs/Kvr > 25

For regulating of process and central heating plants

### Important note

In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the  $k_{vs}$ -value will decrease by 14% as against mixing valves.

Subject to change without notice.

## APPLICATIONS

Control valves type M3F-I are designed for regulating of water, lubricating oil and other liquid media and can be mounted in the pipe system as either mixing or diverting valves. However when mounting as a diverting valve the pressure drop is increased, compared with mounting as a mixing valve. See "Important note" under Technical Data. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district and central heating plants and marine installations.

## DESIGN

The valve components - seats and cone are made of alu bronze, the spindle is made of stainless steel. The valve body is made of cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The connection thread for the actuator is G1B ISO 228. The valves have two balanced single seats. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

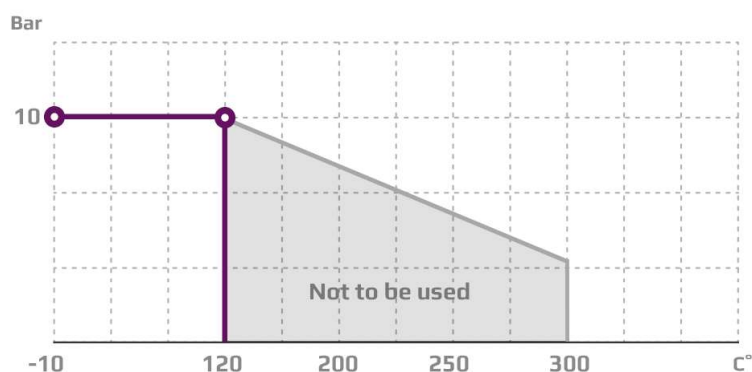
Without an actuator being installed, connection B-AB is fully open and connection A-AB completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection A-AB is fully open and connection B-AB completely closed.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

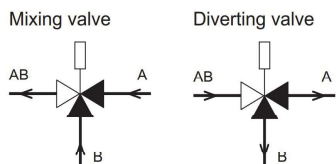
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



### PORT NUMBERING

The ports of valves type M3F-I are marked with the letters AB, A and B.



Port AB  
Port A  
Port B

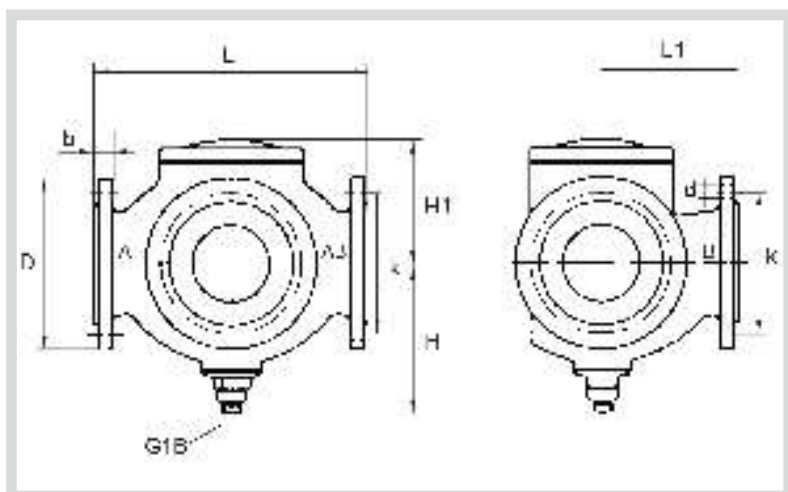
common port always open  
closes at load on spindle  
opens at load on spindle



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
150 M3F-I	480	270	280	189	285	24	240	22x(8)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	Mixing valve $k_{vs}$ -value $m^3/h$	Divertng valve $k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
150 M3F-I	150	150	310	267	20	111

# 3-way Control Valve type M3FA-I (Ports A-AB interchanged)

Cast Iron, PN 10, DN 80 – 300 mm, DN 200/175 and 200 mm/PN 16

0-2.3.12.02-D

Page 1 of 2



## APPLICATIONS

Control valves type M3FA-I are designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations, e.g. cooling of main and auxiliary engines. To be used with AVM234 or AVF234 electric actuators.

## DESIGN

The valve components (seats and cone) are made of alu bronze, the spindle of stainless steel. The valve body is made of cast iron and the valve flanges are drilled according to EN 1092-2.

## FUNCTION

The valve cone is firmly connected with the motor spindle. When the valve cone is in the one extreme position by draw on the spindle, connection B-AB is kept fully open and connection A-AB is fully closed. In the other extreme position connection B-AB is fully closed and connection A-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Trim	Alu Bronze CuAL10Fe5Ni5
- Valve spindle	Stainless steel (W.no. 1.4436)

### Nominal pressure

- DN200/175-200 M3FA-I	PN 16/232 psi max -20°C/248°F
- DN300/250-300 M3FA-I	PN 10/145 psi max. 120°C/248°F

Seats	2 balanced single seats
Flow characteristic	Almost linear
Leakage rate	0.5%
Regulating capability	Kvs/Kvr > 25
Temperature range	Max. 120° C/248°F

Flanges	EN 1092-2 PN 10/16 EN 1092-2 145/232 psi
---------	---

### Note !

Valve type 200/175 M3FA-I has outer measures and flanges drilled as valve type 200 M3FA-I Valve type 300/250 M3FA-I has outer measures and flanges drilled as valve type 300 M3FA-I

### Counter flanges (suggested)

- DN 200/175-200 M3FA-I	DIN 2633 – PN 16 -
- DN 300/250-300 M3FA-I	DIN 2632 – PN 10

### For cooling and heating purposes

#### Important note

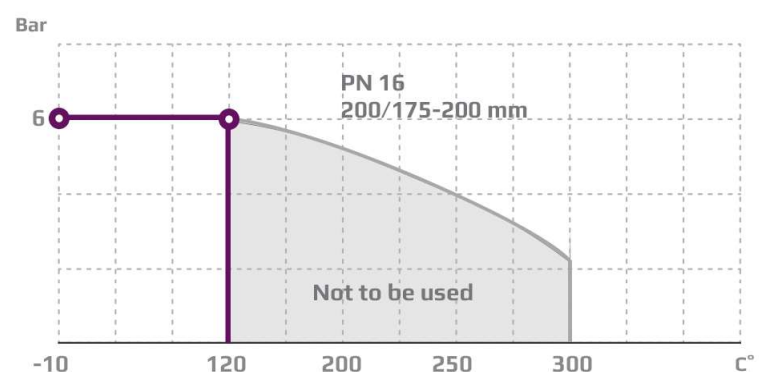
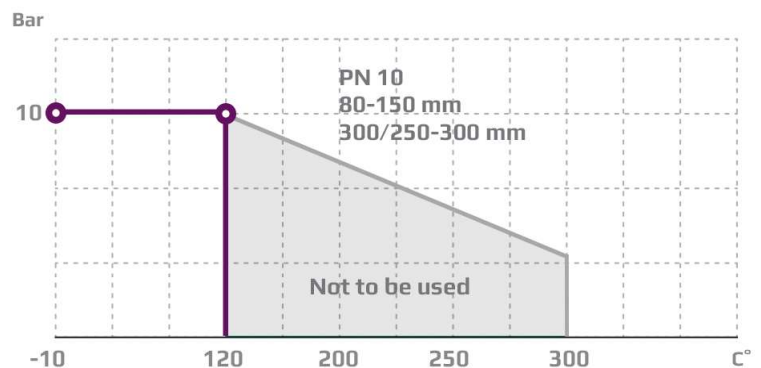
In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the kvs-value will decrease by 14% as against mixing valves.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

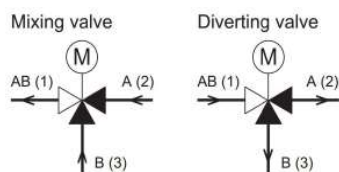
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



### PORT NUMBERING

The ports of valves type M3FA-I are marked with the letters AB, B and A.



Port AB  
Port A  
Port B

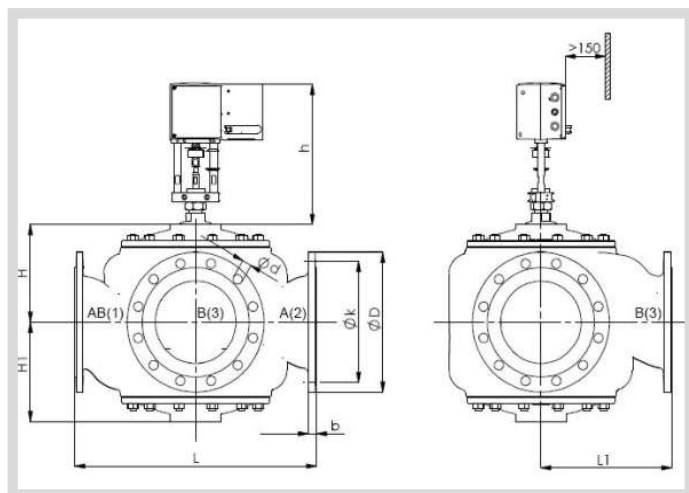
common port always open  
opens at load on spindle  
closes at load on spindle



### MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor. See drawing.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
80 M3FA-I	310	155	117	127	20	200	160	18x(8)
100 M3FA-I	350	175	132	141	22	220	180	18x(8)
125 M3FA-I	400	240	181	171	24	250	210	18x(8)
150 M3FA-I	480	270	216	189	24	285	240	23x(8)
200/175 M3FA-I	600	325	238	238	20	340	295	23x(12)
200 M3FA-I	600	325	238	238	20	340	295	23x(12)
250 M3FA-I	850	340	305	305	25	445	400	23x(12)
300 M3FA-I	850	450	305	305	25	445	400	23x(12)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value <sup>1)</sup> mixing m <sup>3</sup> /h	$k_{vs}$ -value <sup>1)</sup> diverting m <sup>3</sup> /h	Lifting height mm	Weight kg
80 M3FA-I	80	80	80	69	11	35
100 M3FA-I	100	100	125	108	13	44
125 M3FA-I	125	125	215	185	18	72
150 M3FA-I	150	150	310	267	20	111
200/175 M3FA-I	200	200	425	366	22	165
200 M3FA-I	200	200	555	477	28	160
300/250 M3FA-I	300	300	865	744	28	306
300 M3FA-I	300	300	1250	1075	45	290

<sup>1)</sup> The stated  $k_{vs}$  values apply for mixing valves. Diverting valves:  $0.86 \times (k_{vs}\text{-values for mixing valves})$ .

# 2-way Control Valve type H1F

Cast steel, PN 40, DN 15/4 – 50 mm

O-2.4.02-K

Page 1 of 2



## APPLICATIONS

Control valves type H1F are designed for regulating hot water, steam and hot oil systems. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat and cone - are made of stainless steel. The valve body is made of cast steel GP240GH (GS-C25) with flanges drilled according to EN 1092-1 or ANSI B16.5 Class 150. The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, electric or pneumatic actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

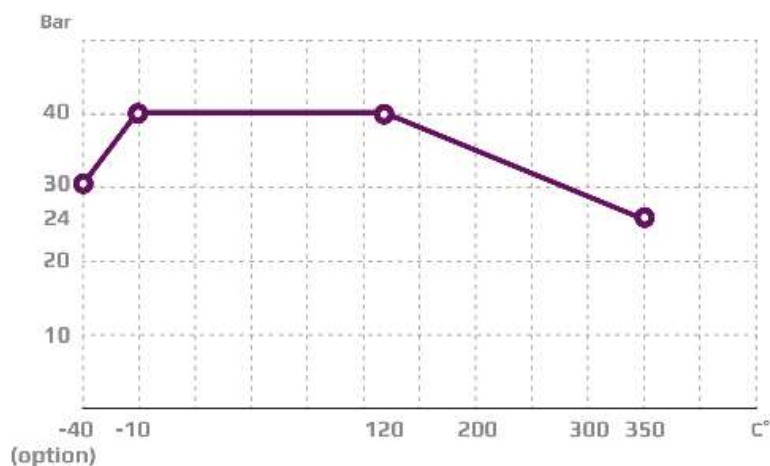
<b>Materials:</b>	
- Valve body	Cast steel GP240GH (GS-C25)
- Trim	Stainless steel
- Bolts, nuts	24 CrMo 4/A4
- Gasket	Graphite and stainless steel foil
<b>Nominal pressure</b>	PN 40
<b>Seating</b>	Single seated, tight closing
<b>Flow characteristic</b>	Quadratic
<b>Leakage rate</b>	≤ 0.05% of Kvs
<b>Regulating capability</b>	Kvs/Kvr > 25
<b>Flanges drilled according to</b>	EN 1092-1 PN 40 or ANSI B16.5 Class 150
<b>Counter flanges</b>	DIN 2635

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



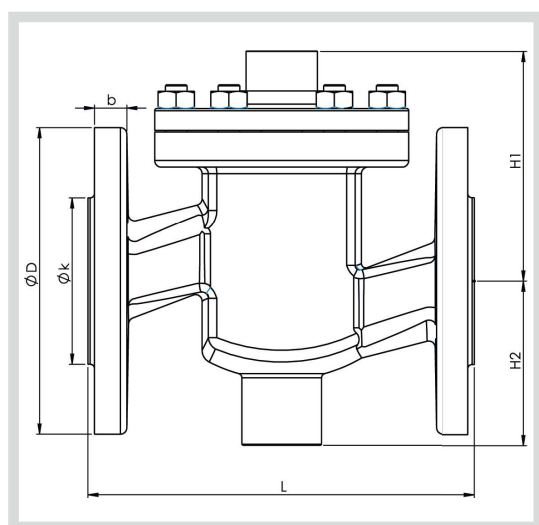
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



## SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
15/4 H1F	15	4	0.20	6	3.3
15/6 H1F	15	6	0.45	6	3.3
15/9 H1F	15	9	0.95	6	3.4
15/12 H1F	15	12	1.7	6	3.4
15 H1F	15	15	2.75	6	3.4
20/4 H1F	20	4	0.2	6.5	4.7
20/6 H1F	20	6	0.45	6.5	4.7
20/9 H1F	20	9	0.95	6.5	4.7
20 H1F	20	20	5	6.5	4.9
25 H1F	25	25	7.5	7	6.1
32 H1F	32	32	12.5	8	9.0
40 H1F	40	40	20	9	10.8
50 H1F	50	50	30	10	15.5

Type	L (mm)	H1 (mm)	H2 (mm)	b (mm)	EN 1092-1			ANSI B16.5 Class 150		
					D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
15/4 H1F	130	80	60	16	95	65	14x(4)	89	61	16x(4)
15/6 H1F	130	80	60	16	95	65	14x(4)	89	61	16x(4)
15/9 H1F	130	80	60	16	95	65	14x(4)	89	61	16x(4)
15/12 H1F	130	80	60	16	95	65	14x(4)	89	61	16x(4)
15 H1F	130	80	60	16	95	65	14x(4)	89	61	16x(4)
20/4 H1F	150	85	65	18	105	75	14x(4)	98	70	16x(4)
20/6 H1F	150	85	65	18	105	75	14x(4)	98	70	16x(4)
20/9 H1F	150	85	65	18	105	75	14x(4)	98	70	16x(4)
20 H1F	150	85	65	18	105	75	14x(4)	98	70	16x(4)
25 H1F	160	95	70	18	115	85	14x(4)	108	79	16x(4)
32 H1F	180	105	75	18	140	100	18x(4)	118	89	16x(4)
40 H1F	200	110	85	18	150	110	18x(4)	127	98	16x(4)
50 H1F	230	125	95	20	165	125	18x(4)	153	121	19x(4)



# Balanced 2-way Control Valve type H1FB

Cast steel, PN 40, DN 25 – 80 mm

O-2.4.03-I

Page 1 of 2



## APPLICATIONS

The pressure balanced control valves type H1FB are designed for regulating hot water, steam, hot oil etc. and can be used if a single-seated valve is required, but where the system pressure and valve size, out of regard for the pressure force of the actuator, necessitate a pressure balanced valve. The valves are installed combined with one of our temperature regulators in control systems in domestic premises, district heating systems, industrial processes or marine installations.

## DESIGN

The valve components - spindle, seat, cone and bellows - are made of stainless steel. The bellows for balancing the pressure is fitted on the valve spindle and it reduces the power necessary for closing the valve, as the upstream pressure of the medium through the hollow valve spindle acts outside and the pressure after the valve acts inside the bellows system. The valve body is made of cast steel GP240GH (G5-C25) with connection flanges drilled according to EN 1092-1. The connection thread for the actuator is G1B ISO 228. The valves are single seated and tight closing. The leakage is less than 0.05% of full flow (see VDI/VDE 2174).

## FUNCTION

Without an actuator being connected, the valve is held in open position by means of a spring and the bellows system. With pressure on the spindle the valve will close. In connection with our thermostats, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

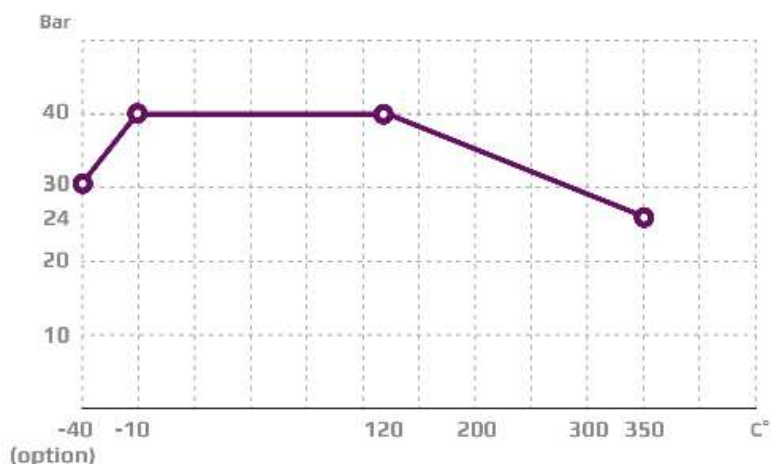
- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast steel GP240GH (G5-C25)
- Components	Stainless steel
- Gasket	Copper and graphite Reinz-AFM34
- Bellow	Stainless steel W.1.4541
- Bolts, nuts	24 CrMo 4/A4
Nominal pressure	PN 40
Seating	Single seated, tight closing
Flow characteristic	Quadratic
Leakage rate	≤ 0.05% of Kvs
Regulating capability	Kvs/Kvr > 25
Flanges	EN 1092-1 PN 40
Pressure balanced	

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



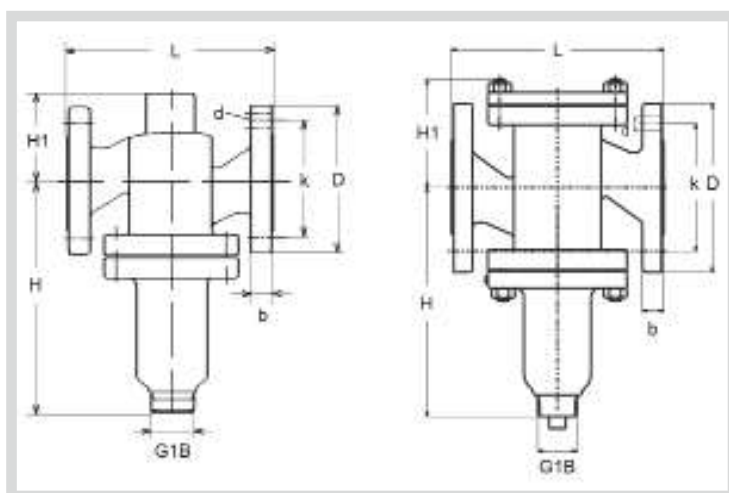
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
25 H1FB	160	180	70	18	115	85	14x(4)
32 H1FB	180	195	75	18	140	100	18x(4)
40 H1FB	200	205	85	18	150	110	18x(4)
50 H1FB	230	225	95	20	165	125	18x(4)
65 H1FB	290	260	110	22	185	145	18x(8)
80 H1FB	310	275	115	24	200	160	18x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
25 H1FB	25	25	7.5	7	6
32 H1FB	32	32	12.5	8	9
40 H1FB	40	40	20	9	13
50 H1FB	50	50	30	10	16
65 H1FB	65	65	50	13	23
80 H1FB	80	80	80	16	38

# Balanced 2-way Control Valve type H1FBN

Cast steel, PN 40, DN 15 – 80 mm

0-2.4.03.01-G

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Cast steel GP240GH (G5-C25)
- Components	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- Gasket	Stainless steel foil
- O-ring	A75H FEPM

Nominal pressure	PN 40
Seating	Single seated, balanced

Flow characteristic	Quadratic
Leakage rate	$\leq 0.05\%$ of $Kvs$
Regulating capability	$Kvs/Kvr > 25$

Flanges drilled according to	EN 1092-1 PN 40
Pressure balanced valve	

## APPLICATIONS

Balanced control valves type H1FBN are designed for regulating hot water, steam and hot oil systems. Balanced valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a standard single seated valve, and where the leakage rate for a double-seated valve is unacceptable. The valves are used in conjunction with our temperature- or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat, cone - are made of stainless steel. The valve body is made of cast steel GP240GH (G5-C25). The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

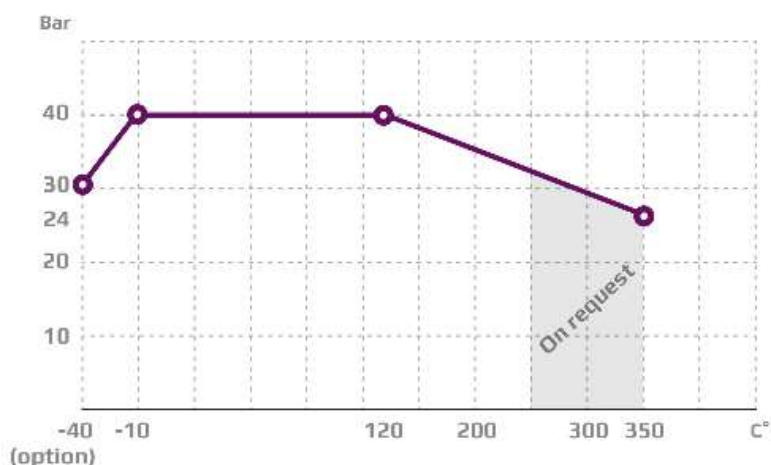
Without an actuator being connected, the valve is held in open position by means of a spring. With force on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting double seated valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



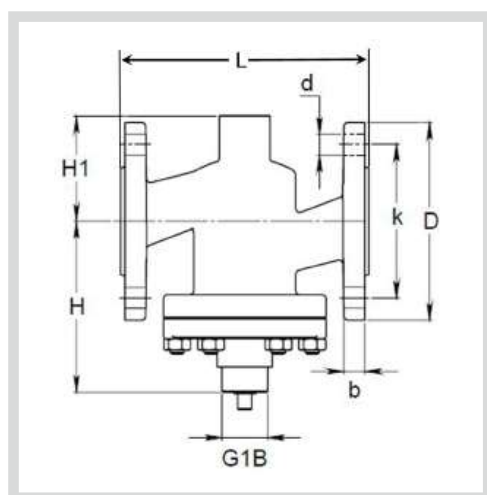
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
15 H1FB	130	101	80	14	95	65	14x(4)
20 H1FB	150	107	85	16	105	75	14x(4)
25 H1FB	160	112	70	16	115	85	14x(4)
32 H1FB	180	122	75	18	140	100	18x(4)
40 H1FB	200	125	85	19	150	110	18x(4)
50 H1FB	230	140	95	19	165	125	18x(4)
65 H1FB	290	154	110	19	185	145	18x(8)
80 H1FB	310	164	115	19	200	160	19x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
15 H1FBN	15	15	4	7.5	4
20 H1FBN	20	20	6.3	7.5	5
25 H1FBN	25	25	10	9	6
32 H1FBN	32	32	16	10	9
40 H1FBN	40	40	25	11	13
50 H1FBN	50	50	35	11.5	16
65 H1FBN	65	65	58	14.5	23
80 H1FBN	80	80	80	16	38

# 2-Way Control Valve Type H1FBE and H1FBE HV

with SC Pneumatic Actuator and PPL or PS-2 Positioners

Cast Steel, Single Seat Balanced, PN 25, DN 200-300, Flanged Ends

O-2.4.04-A

Page 1 of 4



## TECHNICAL DATA

<b>Valve size</b>	DN 200/8" DN 250/10" DN 300/12"
<b>Valve design</b>	Linear
<b>Max working temperature</b>	225°C/437°F
<b>Materials</b>	
Valve body/cover	Cast Steel P240GH
Cone/seat/shaft	Stainless steel
Gasket	TFM and PVMQ
	Graphite metal
Bolts/nuts	Stainless steel A2-70
<b>Color</b>	
Valve	RAL7016
Protection shield	RAL6018
<b>Flange drilled according to:</b>	EN 1092-1 PN 25/363 psi ANSI 150
<b>Counter flanges</b>	JIS 5K, JIS 10K DIN2635
<b>Kvs-value (M<sup>3</sup>/h)</b>	DN 200/8" 725 M <sup>3</sup> /h DN 250/10" 1,000 M <sup>3</sup> /h DN 300/12" 1,500 M <sup>3</sup> /h
<b>Flow characteristic</b>	Up to 0.01% of Kvs Equal percentage + linear
<b>Regulating capability</b>	kvs/kvr > 50

## Accessories

PNEUMATIC POSITIONER PPL (See data sheet O-6.6.01)

PNEUMATIC POSITIONER EPL (See data sheet O-6.6.02)

SMART POSITIONER PS-2 (See data sheet O-6.9.01)

FILTER REGULATOR AW20K (See data sheet O-6.8.01)

Subject to change without notice.

## APPLICATIONS

Control valves type H1FBE and H1FBE HV are designed for regulating steam hot water systems and liquid medias other than water.

The valves are used in conjunction with our temperature or pressure regulators for controlling industrial processes, municipal or domestic heating systems and marine installations.

Control valves type H1FBE HV are equipped with an additional cooling unit located between the valve and pneumatic actuator. This allows the system to be used in high ambient temperature environments. It also protects additional equipment such as positioners, filter regulators etc. from over-heating and prevents damage caused as a result.

## DESIGN

The valve components - spindle, seat and cone - are made of stainless steel. The valve body is made of cast steel GP240GH with flanges drilled according to EN 1092-1. The leakage rate is 0.01%.

## FUNCTION

Pressure on the spindle causes the valve to close.

The steam valve is based on a "balancing plug" design.

This means that a low and constant actuating force is necessary to operate the valve over all pressure ranges (0 – 25 Bar/0-363 psi)

## FEATURES

- 2-way steam valve with linear pneumatic actuator type SC
- Manual override operation
- Linear - equal percentage flow characteristic
- For high flow applications
- For control devices such as PPL, EPL and PS-2

## FUNCTION continued

Pneumatic actuator SC (Spring Close ) means that springs close the valve cone in case of air failure.

The pneumatic actuator contains a manual override function.

The manual override should be operated as follows:

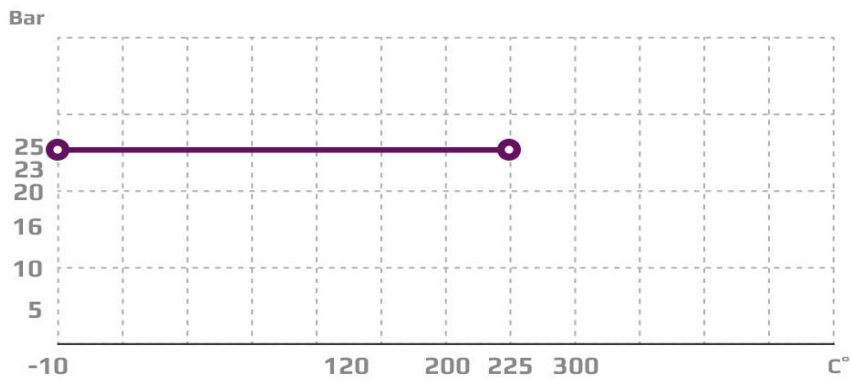
**AIR PRESSURE MUST BE DISCONNECTED WHEN USING THE MANUAL OVERRIDE. BEFORE CHANGING FROM MANUAL CONTROL TO AUTOMATIC MODE, THE MANUAL OVERRIDE MUST BE SET TO MINIMUM (CLOSE) POSITION.**

## OPTIONS

- The protection shield of the pneumatic actuators can be supplied without air ventilation holes. This allows the system to be used in rugged environments.
- Pneumatic 3/2 WAY VALVE – AUTO/MANUAL SWITCH

### PRESSURE/TEMPERATURE DIAGRAM

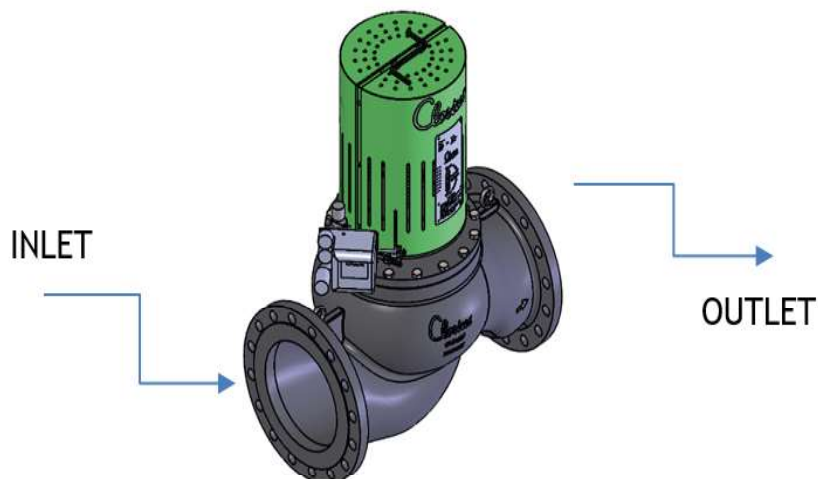
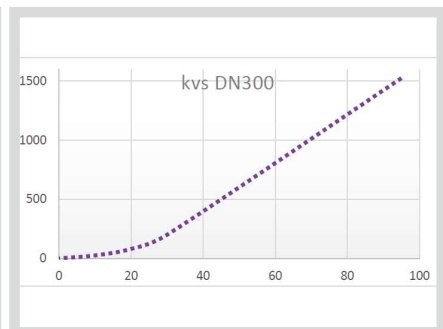
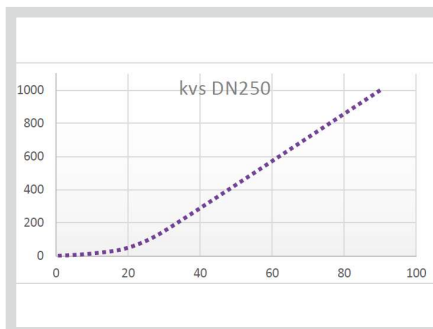
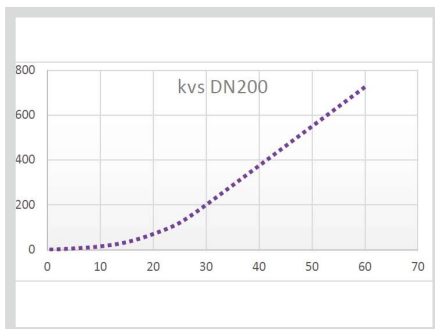
According to DIN 2401



### MOUNTING

The valve can be installed both vertically and horizontally.

### CHARACTERISTICS



# 2-Way Control Valve Type H1FBE and H1FBE HV

with SC Pneumatic Actuator and PPL or PS-2 Positioners

Cast Steel, Single Seat Balanced, PN 25, DN 200-300, Flanged Ends

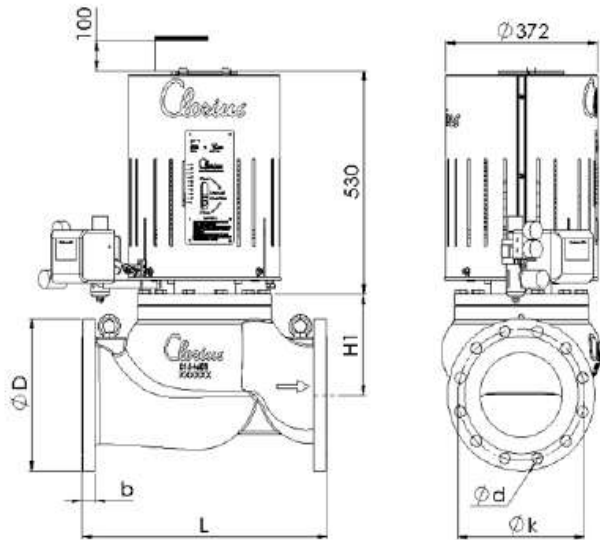
0-2.4.04-A

Page 3 of 4

## DIMENSION SKETCH

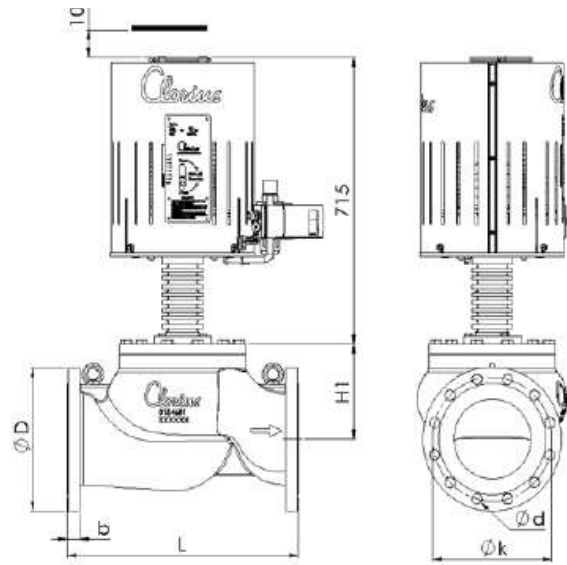
### DIMENSIONS IN MM

Control valve H1FBE with pneumatic actuator and positioner



### DIMENSIONS IN MM

Control valve H1FBE HV with pneumatic actuator, positioner and cooling unit



Size	Norm	L (mm)	L (inch)	H1 (mm)	H1 (inch)	D (dia.) (mm)	D (dia.) (inch)	b (mm)	b (inch)	k (dia.) (mm)	k (dia.) (inch)	d (mm/inch) dia.
DN 200	EN1092-1 PN25	600	24	238	9.3	360	14	30	1	310	12	12 x Ø26/1
	ANSI150	600	24	238	9.3	343	13.5	30	1	298	12	8 x Ø22/0.8
	JIS 5K	600	24	238	9.3	320	12.5	30	1	280	11	8 x Ø23/0.9
	JIS 10K	600	24	238	9.3	320	12.5	30	1	290	11	12 x Ø23/09
DN 250	EN1092-1 PN25	730	29	227	8.9	425	17	32	1.3	370	14.5	12 x Ø30/1
	ANSI150	730	29	227	8.9	406	16	32	1.3	362	14	12 x Ø25/0.9
	JIS 5K	730	29	227	8.9	385	15	32	1.3	345	13.5	12 x Ø23/0.9
	JIS 10K	730	29	227	8.9	400	16	32	1.3	355	14	12 x Ø25/0.9
DN 300	EN1092-1 PN25	850	33	301	11.8	485	19	32	1.3	430	17	16 x Ø30/1
	ANSI150	850	33	301	11.8	483	19	32	1.3	432	17	12 x Ø25/0.9
	JIS 5K	850	33	301	11.8	430	17	32	1.3	390	15	12 x Ø23/09
	JIS 10K	850	33	301	11.8	445	17.5	32	1.3	400	16	16 x Ø25/0.9



## SPECIFICATION

Type	Opening mm/inch	$k_{vs}$ rating m <sup>3</sup> /h	Lifting height mm/inch	Weight kg/lbs
DN 200 H1FBE	200/8	725	75/3	220/485 lbs
DN 200 H1FBE HV	200/8	725	75/3	225/496 lbs
DN 250 H1FBE	250/10	1,000	90/3.5	258/568 lbs
DN 250 H1FBE HV	250/10	1,000	90/3.5	263/579 lbs
DN 300 H1FBE	300/12	1,500	95/3.7	320/705 lbs
DN 300 H1FBE HV	300/12	1,500	95/3.7	320/705 lbs

## ITEM NUMBERS

for standard Clorius Controls kits

Item no.	Description	Material	Pressure
1-7511750	VALVE DN 200 H1FBE PN 25 with SC pneumatic actuator and positioner PPL	GP240GH	PN 25/363 psi
1-7511752	VALVE DN 200 H1FBE PN 25 with SC pneumatic actuator and positioner PS-2	GP240GH	PN 25/363 psi
1-7511754	VALVE DN 200 H1FBE HV PN 25 with SC pneumatic actuator and positioner PPL	GP240GH	PN 25/363 psi
1-7511756	VALVE DN 200 H1FBE HV PN 25 with SC pneumatic actuator and positioner PS-2	GP240GH	PN 25/363 psi
1-7511760	VALVE DN 250 H1FBE PN 25 with SC pneumatic actuator and positioner PPL	GP240GH	PN 25/363 psi
1-7511762	VALVE DN 250 H1FBE PN 25 with SC pneumatic actuator and positioner PS-2	GP240GH	PN 25/363 psi
1-7511764	VALVE DN 250 H1FBE HV PN 25 with SC pneumatic actuator and positioner PPL	GP240GH	PN 25/363 psi
1-7511766	VALVE DN 250 H1FBE HV PN 25 with SC pneumatic actuator and positioner PS-2	GP240GH	PN 25/363 psi
1-7511770	VALVE DN 300 H1FBE PN 25 with SC pneumatic actuator and positioner PPL	GP240GH	PN 25/363 psi
1-7511772	VALVE DN 300 H1FBE PN 25 with SC pneumatic actuator and positioner PS-2	GP240GH	PN 25/363 psi
1-7511774	VALVE DN 300 H1FBE HV PN 25 with SC pneumatic actuator and positioner PPL	GP240GH	PN 25/363 psi
1-7511776	VALVE DN 300 H1FBE HV PN 25 with SC pneumatic actuator and positioner PS-2	GP240GH	PN 25/363 psi

# 2-way Control Valve type H2F

Cast Steel, PN 40, DN 20 – 80 mm

O-2.4.05-L

Page 1 of 2



## APPLICATIONS

Control valves type H2F are designed for regulating hot water, steam and hot oil systems. The double-seated valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a single-seated valve. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast steel GP240GH (G5-C25) with flanges drilled according to EN 1092-1. The connection thread for the actuator is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast steel GP240GH (G5-C25)
- Spring	1.4568
- Cone	1.4408, 1.4305
- Gasket	Stainless steel foil and graphite
- Upper seat	AISI 303
- Lower seat	1.4301, 1.4305, 1.4307
- Bolts, nuts	24 CrMo 4/A4
Nominal pressure	PN 40
Seating	Double-seated
Flow characteristic	Quadratic
Function	Closes by pressing the spindle
Leakage rate	$\leq 0.5\%$ of Kvs
Regulating capability	Kvs/Kvr > 25

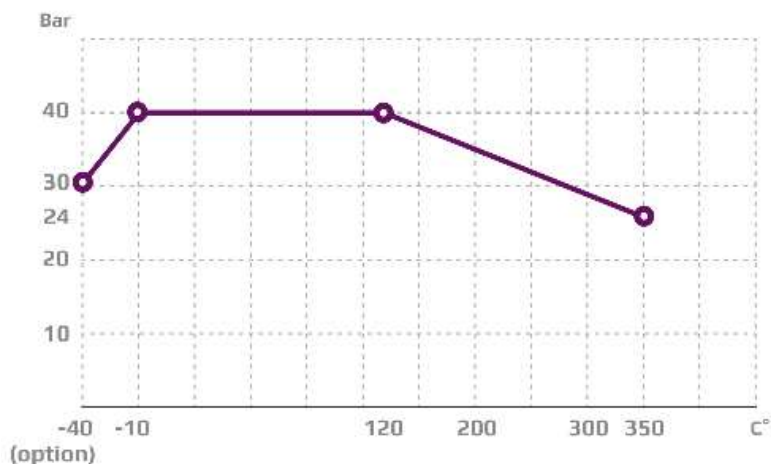
Flanges drilled according to	EN 1092-1 PN 40
Counter flanges	DIN 2635
Adjustable seat interspace	

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



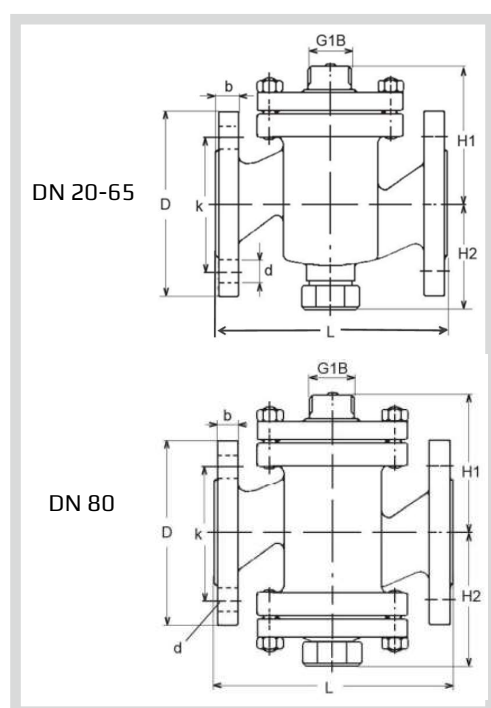
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
20 H2F	150	85	70	18	105	75	14x(4)
25 H2F	160	95	77	18	115	85	14x(4)
32 H2F	180	105	82	18	140	100	18x(4)
40 H2F	200	110	92	18	150	110	18x(4)
50 H2F	230	125	102	20	165	125	18x(4)
65 H2F	290	135	120	22	185	145	18x(8)
80 H2F	310	145	165	24	200	160	18x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
20 H2F	20	20	5	6.5	5
25 H2F	25	25	7.5	7	6.5
32 H2F	32	32	12.5	8	9
40 H2F	40	40	20	9	11
50 H2F	50	50	30	10	16
65 H2F	65	65	50	11	21
80 H2F	80	80	80	13	38

# 2-way Control Valve type H2F

Cast Steel, PN 25, DN 100 – 150 mm / PN 25, DN 150 - 200 mm

O-2.4.06-M

Page 1 of 2



## APPLICATIONS

Control valves type H2F are designed for use in regulating high pressure hot water, steam and heat transfer oil. The valves are used in conjunction with temperature or pressure differential regulators for controlling district or central heating plants, industrial processes or marine installations.

## DESIGN

The valve components – spindle, seats and cone – are made of stainless steel. The valve body is made of cast steel GP240GH (GS-C25) with flanges drilled according to EN 1092-1. The connection thread for the actuator is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The linear characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast steel GP240GH (GS-C25)
- Components	Stainless steel
- Bolts, nuts	24 CrMo 4/A4
- Gaskets	Stainless steel foil and copper
Nominal pressure	PN 25
Seating	Double seated
Flow characteristic	Almost quadratic
Function	Closing with pressure on spindle
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25
Flanges drilled according to	EN 1092-1 PN 25
Counter flanges	DIN 2635

### Note

All Clorius valves are approved in accordance to the Pressure Equipment Directive (PED). Valve type 150 & 200 H2F in only approved for nominal pressure PN 16, but for applications not effected by the PED, valve type 150 & 200 H2F can be delivered for nominal pressure PN 25

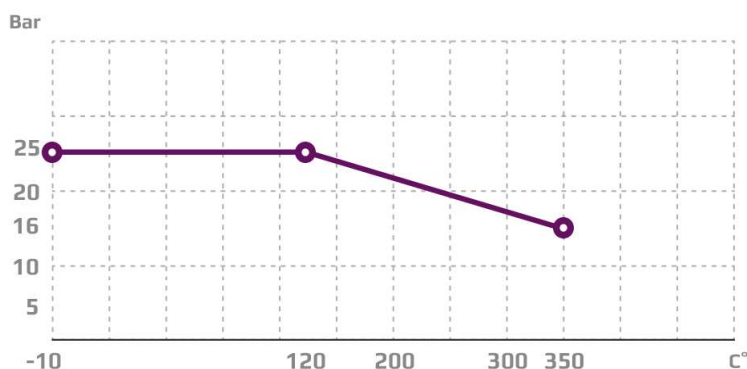
Subject to change without notice.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

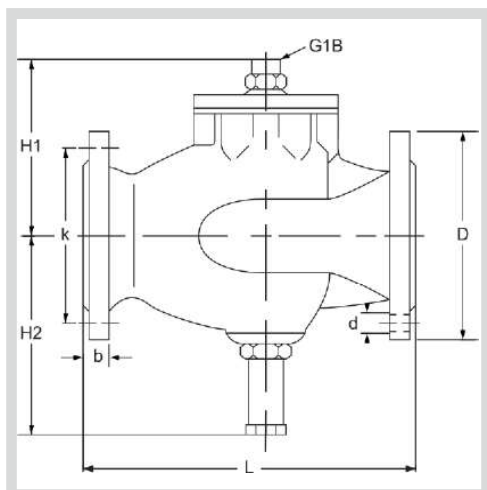


### MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



### DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
100 H2F	350	185	209	235	24	190	23x(8)
125 H2F	400	240	230	270	26	220	27x(8)
150 H2F	400	240	230	300	28	250	27x(8)
200 H2F	600	260	250	340	24	295	22x(12)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
100 H2F	100	100	125	20	38
125 H2F	125	125	215	20	73
150 H2F	150	150	310	20	76
200 H2F	200	200	500	20	110

# 3-way Control Valve type H3F

Cast steel, PN 40, DN 20 – 65 mm, Flanged ends

O-2.4.07-L

Page 1 of 2



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast steel GP240GH (G5-C25) (W. No. 1.0619)
- Trim	Stainless steel (W. No. 1.4305)
- Bolts, nuts	Steel (24 CrMo 4/A4)
- Gasket	Stainless steel foil and graphite
- O-Ring	70 EPM
Nominal pressure	PN 40
Seating	2 balanced single seats
Flow characteristic	Quadratic/linear
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25
Flanges drilled according to	EN 1092-1 PN 40
Counter flanges	DIN 2635
Same Kvs-value as mixing and diverting valve	

Subject to change without notice.

## APPLICATIONS

Control valves type H3F are designed for control of hot oil, water and other liquids and can be installed in pipe systems as mixing or diverting valves. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast steel GP240GH (G5-C25) with flanges drilled according to EN 1092-1. The thread for the actuator connection is G1B ISO 228. The valves have two balanced single seats. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without an actuator being installed, connection A-AB is fully open and connection B-AB completely closed, by means of a spring.

By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection B-AB is fully open and connection A-AB completely closed.

The valve characteristics are as follows:

**Port A-AB and AB-A: quadratic**

**Port B-AB and AB-B: almost linear**

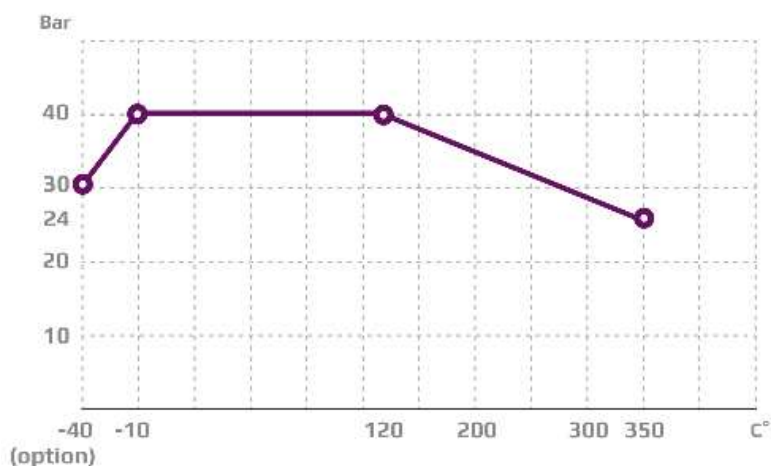
These characteristics ensure constant total flow under almost all pressure conditions and optimum circulation in the individual circuits.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

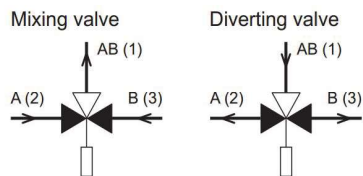
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



### PORT NUMBERING

Valves type H3F are marked with the internationally recognized port designations: A, B, AB.



Port AB  
Port A  
Port B

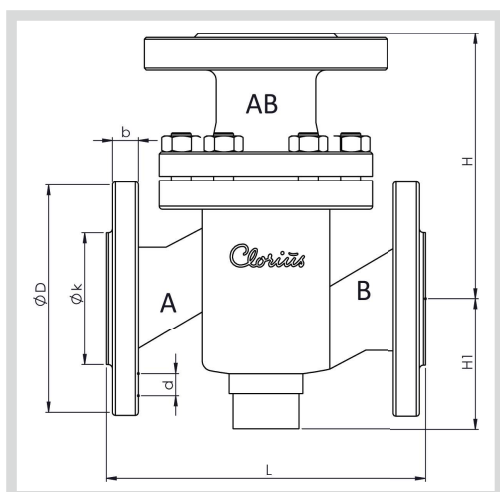
common port always open  
closes by activating the spindle  
opens by activating the spindle



### MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).

### DIMENSION SKETCH



Type	L mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 H3F	150	115	63	105	16	75	14x(4)
25 H3F	160	130	70	115	18	85	14x(4)
32 H3F	180	150	75	140	18	100	18x(4)
40 H3F	200	160	85	150	18	110	18x(4)
50 H3F	230	190	95	165	20	125	18x(4)
60 H3F	290	220	110	185	20	145	18x(8)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value* $m^3/h$	Lifting height (mm)	Weight (kg)
20 H3F	20	20	6.3	7.5	6
25 H3F	25	25	10	9	7
32 H3F	32	32	16	10	10
40 H3F	40	40	25	11	14
50 H3F	50	50	38	11.5	18
65 H3F	65	65	63	14.5	26

\* Same  $k_{vs}$ -values for mixing and diverting valves



# 3-way Control Valve type H3F

Cast steel, PN 16, DN 80 – 150 mm

O-2.4.08-B

Page 1 of 2



## APPLICATIONS

Control valves type H3F are designed for regulating of hot water, lubricating oil and other liquid media and can be mounted in the pipe system as either mixing or diverting valves. However when mounting as a diverting valve the pressure drop is increased, compared with mounting as a mixing valve. See "Important note" under technical data. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district and central heating plants and marine installations.

## DESIGN

The valve components - seats and cone - are made of alu bronze, the spindle is made of stainless steel. The valve body is made of cast steel GP240GH (GS-C25) with flanges drilled according to EN 1092-2 or ANSI B16.5 Class 150. The connection thread for the actuator is G1B ISO 228. The valves have two balanced single seats. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174). Tight between port 1(AB) og 3(B) is optional.

## FUNCTION

Without an actuator being installed, connection 2-1 is fully open and connection 3-1 completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection 3-1 is fully open and connection 2-1 completely closed.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Cast steel GP240GH (GS-C25)
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no. 1.4436)
- Gasket	Reinz-AFM34
- O-ring	90 NBR
<b>Nominal pressure</b>	PN 16
<b>Seating</b>	2 balanced single seats
<b>Flow characteristic</b>	Almost linear
<b>Temperature range</b>	Max. 120°C (160°C option)
<b>Leakage rate</b>	≤ 0.5% of Kvs
<b>Regulating capability</b>	Kvs/Kvr > 25
<b>Flanges drilled according to</b>	EN 1092-2 PN 16 or ANSI B16.5 Class 150
<b>Counter flanges</b>	DIN 2633

**For regulating of process- and central heating plants**

### Important note

In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the kvs-value will decrease by 14% as against mixing valves.

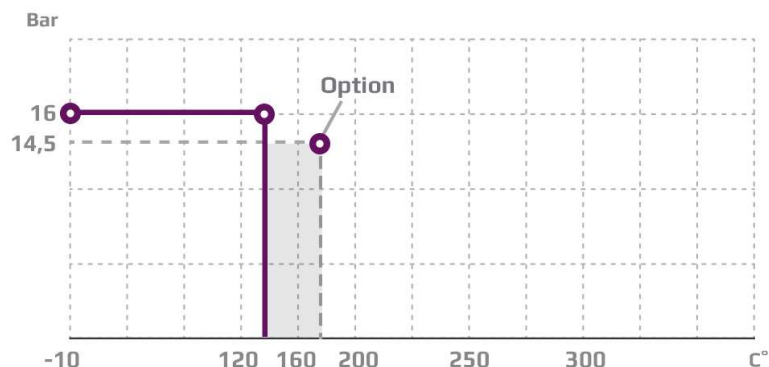
Subject to change without notice.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

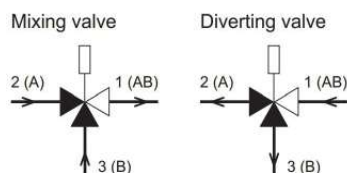
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



### PORT NUMBERING

The ports of valves type H3F are marked with the figures 1, 2 and 3. The letters in parentheses refer to the corresponding internationally adapted designations.



Port 1 (AB)  
Port 2 (A)  
Port 3 (B)

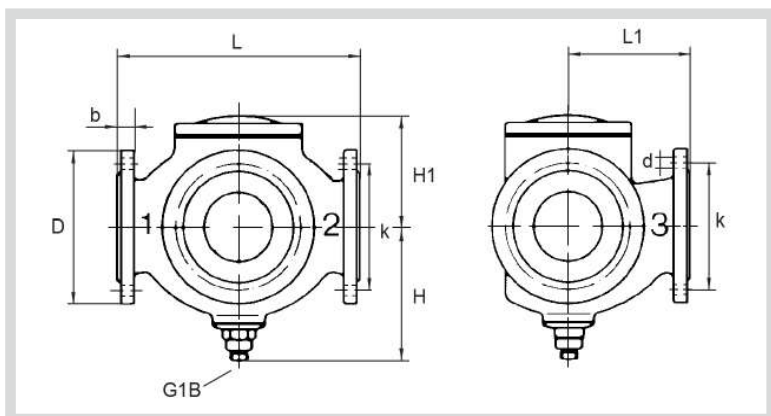
common port always open  
closes at load on spindle  
opens at load on spindle



### MOUNTING

The valve must always be mounted with vertical spindle, preferable with the motorconnection over the valve. Besides, the valve should be mounted so that the valve motor is exposed to a minimum of moisture and unnecessary vibrations. Free height above/below the valve must be minimum 400 mm for mounting and operating of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

### DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
80 H3F	310	155	180	127	200	19	160	19x(8)
100 H3F	350	175	195	141	220	19	180	19x(8)
125 H3F	400	240	245	171	250	21	210	19x(8)
150 H3F	480	270	280	189	285	22	240	23x(8)

### SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	Mixing value $k_{vs}$ -value $m^3/h$	Diverting value $k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
80 H3F	80	80	80	69	11	35
100 H3F	100	100	125	108	13	44
125 H3F	125	125	215	185	18	72
150H3F	150	150	310	267	20	111

# 2-way Control Valve type H2FR

Cast Steel, PN 40, DN 20 – 80 mm, 2 Seats, Reverse acting

0-2.4.09-1

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Cast steel GP240GH (G5-C25)
- Trim	Stainless steel
- Nuts, bolts	24 CrMo 4/A4
- Gasket	Graphite with stainless steel foil and copper
Nominal pressure	PN 40
Seating	Double seated
Flow characteristic	Quadratic
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25

Function	Opens by pressing the spindle
Flanges drilled according to Counter flanges	EN 1092-1 PN 40 DIN 2635/BS 4504

Reverse acting (normally closed)  
For cooling systems or similar  
Adjustable seat interspace

## APPLICATIONS

Valves type H2FR are mainly intended for control of cooling systems. The valves are used in conjunction with temperature or pressure differential regulators for controlling industrial processes or cooling systems. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring. When opening the valve, the actuator has to overcome the spring force. The table on the next page shows max. allowable values of  $\Delta p_L$  as well as the max. allowable inlet pressures for opening the valves,  $p_{1max}$  for various actuator forces.

## DESIGN

The valve components – spindle, seat and cone - are made of stainless steel. The valve body is made of cast steel GP240GH (G5-C25) with flanges drilled according to EN 1092-1. The thread for the actuator connection is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

### REVERSE ACTING

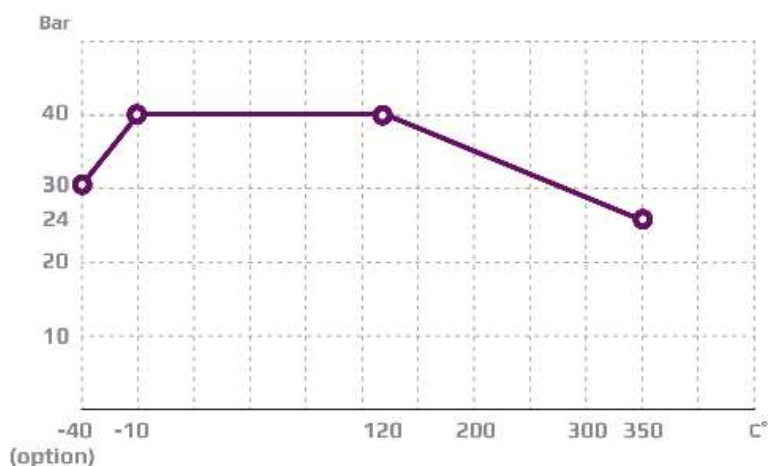
Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our actuators, the valves act as "cooling" valves, i.e. they open at rising temperatures. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



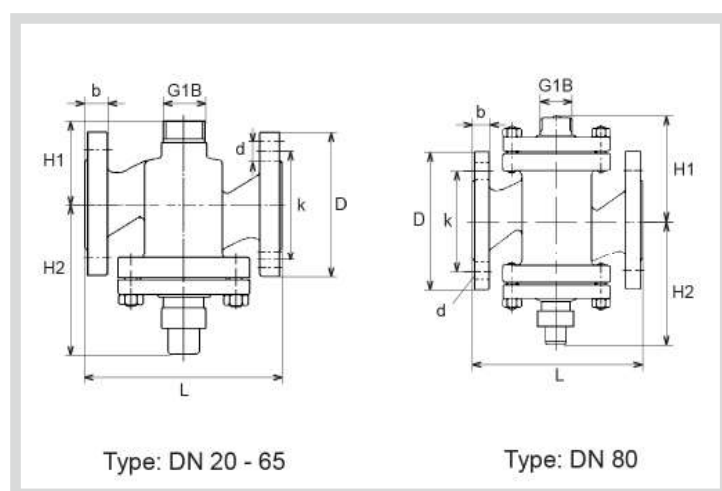
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 H2FR	150	63	112	105	18	75	14x(4)
25 H2FR	160	70	117	115	18	85	14x(4)
32 H2FR	180	75	151	140	18	100	18x(4)
40 H2FR	200	85	155	150	18	110	18x(4)
50 H2FR	230	95	169	165	20	125	18x(4)
65 H2FR	290	110	180	185	22	145	18x(8)
80 H2FR	310	155	195	200	24	160	18x(8)

## SPECIFICATIONS

Type	Flange connection Dn in mm	Opening mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Max. $\Delta p_L$ bar	Actuat. force N	Corresp. $p_{1max}$ bar	Weight kg
20 H2FR	20	20	5	6.5	8.3	200 400	9.4 25	5
25 H2FR	25	25	7.5	7	8	200 400	8.8 25	6.5
32 H2FR	32	32	12.5	8	7	400	16	9
40 H2FR	40	40	20	9	6.6	400	16	11
50 H2FR	50	50	30	10	5.8	400	15	16
65 H2FR	65	65	50	11	10	400 800	10 40	21
80 H2FR	80	80	80	13	6.7	400 800	10 40	38

# 2-way control valve type H2FR

Cast steel, PN 25, DN 100 – 125 mm / PN 16, DN 150 mm, Reverse acting

O-2.4.10-G

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Cast steel GP240GH (G5-C25)
- Trim	Stainless steel CuSn5Zn5Pb5-C
- Bolts, nuts	24 CrMo 4/A4
- Gasket	Stainless steel foil Copper

Nominal pressure	PN 25
Seating	Double seated
Flow characteristic	Almost quadratic
Function	Opens by pressing the spindle
Leakage rate	$\leq 0.5\%$ of Kvs
Regulating capability	Kvs/Kvr > 25
Flanges	EN 1092-1 PN 25
Counter flanges	DIN 2635/DS625
Reverse acting (normally closed)	
For cooling water and lubrications	

### Important note

All Clorius valves are approved in accordance to the Pressure Equipment Directive (PED). Valve type 150 H2FR is only approved for nominal pressure PN 16, but for applications not effected by the PED, valve type 150 H2FR can be delivered for nominal pressure PN 25.

Subject to change without notice.

## APPLICATIONS

Valves type H2FR are mainly intended for control of cooling systems. The valves are used in conjunction with temperature- or pressure differential regulators. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring and when opening the valve, the actuator has to overcome the spring force. On the next page please find the max. allowable values of  $\Delta p_L$  as well as the max. allowable inlet pressures for opening the valves,  $p_{1max}$  for various actuator forces.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of cast steel GP240GH (G5-C25) with flanges drilled according to EN 1092-1. The connection thread for the actuator is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

### REVERSE ACTING

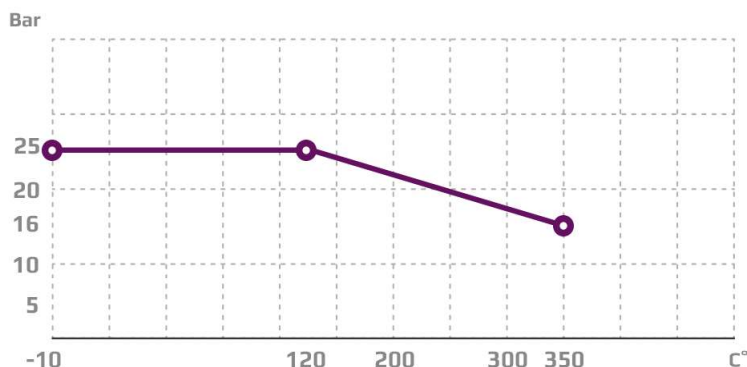
Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our actuators, the valves act as "cooling" valves, i.e. they open at rising temperatures. The linear characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

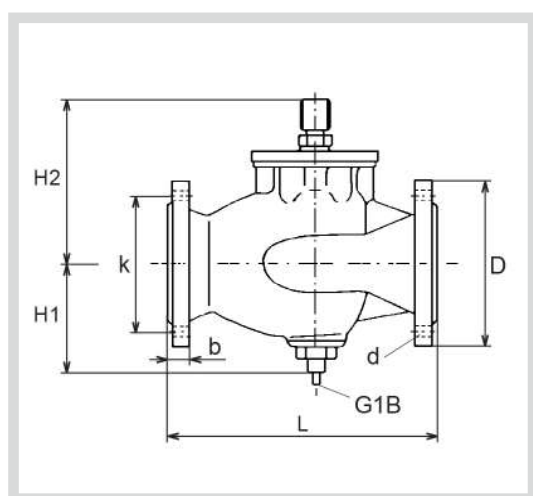


## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
100 M2FR	350	145	240	220	24	190	23x(8)
125 M2FR	400	180	290	250	26	220	27x(8)
150 M2FR	400	180	290	285	28	250	27x(8)

## SPECIFICATIONS

Type	Flange connection Dn in mm	Opening mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Max. $\Delta p_L$ bar	Actuat. force N	Weight kg
100 H2FR	100	100	125	20	12.1	800	39
125 H2FR	125	125	215	20	9	800	73
150 H2FR	150	150	310	20	7.5	800	76

# 2-way Control Valve type G1F

Nodular cast iron, PN 25, DN 15/4 – 50 mm

0-2.5.02-1

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 4/A4
- Gasket	Stainless steel foil

Nominal pressure	PN 25
Seating	Single seated
Flow characteristic	Quadratic
Leakage rate	$\leq 0.5\%$ of Kvs
Regulating capability	Kvs/Kvr > 25

Flanges drilled according to	EN 1092-2 or ANSI B16.5 Class 150
Counter flanges	DIN2634

Subject to change without notice.

## APPLICATIONS

Control valves type G1F are designed for regulating hot water, steam and hot oil systems. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat and cone - are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2 or ANSI B16.5 Class 150. The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

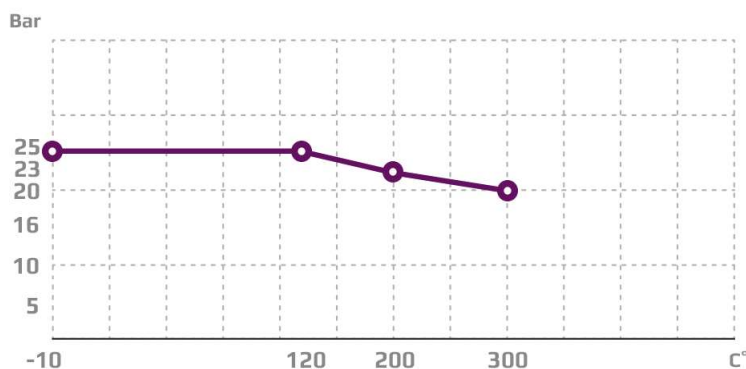
Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



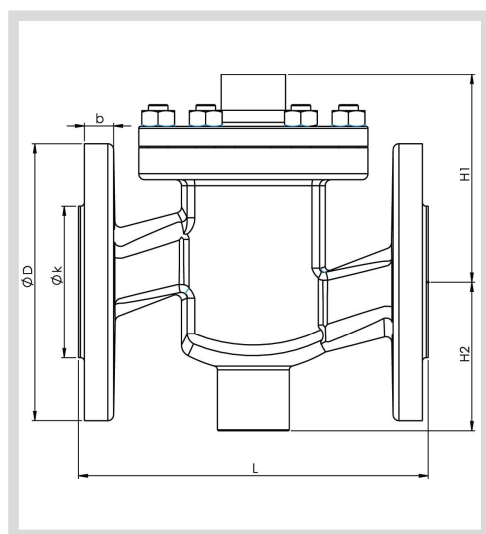


## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
15/4 G1F	15	4	0.20	6	3.0
15/6 G1F	15	6	0.45	6	3.0
15/9 G1F	15	9	0.95	6	3.1
15/12 G1F	15	12	1.7	6	3.1
15 G1F	15	15	2.75	6	3.1
20 G1F	20	20	5	6.5	4.2
25 G1F	25	25	7.5	7	5.5
32 G1F	32	32	12.5	8	8.1
40 G1F	40	40	20	9	9.7
50 G1F	50	50	30	10	14.0

Type	L (mm)	H1 (mm)	H2 (mm)	b (mm)	EN 1092-2			ANSI B16.5 Class 150		
					D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
15/4 G1F	130	80	60	14	95	65	14x(4)	89	61	16x(4)
15/6 G1F	130	80	60	14	95	65	14x(4)	89	61	16x(4)
15/9 G1F	130	80	60	14	95	65	14x(4)	89	61	16x(4)
15/12 G1F	130	80	60	14	95	65	14x(4)	89	61	16x(4)
15 G1F	130	80	60	14	95	65	14x(4)	89	61	16x(4)
20 G1F	150	85	65	16	105	75	14x(4)	98	70	16x(4)
25 G1F	160	95	70	16	115	85	14x(4)	108	79	16x(4)
32 G1F	180	105	75	18	140	100	18x(4)	118	89	16x(4)
40 G1F	200	110	85	18	150	110	18x(4)	127	98	16x(4)
50 G1F	230	125	95	20	165	125	18x(4)	153	121	19x(4)

# Balanced 2-way Control Valve type G1FB

Nodular cast iron, PN 25, DN 25 – 65 mm

O-2.5.03-E

Page 1 of 2



## APPLICATIONS

The pressure balanced control valves type G1FB are designed for regulating hot water, steam and hot oil systems. Balanced valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a standard single seated valve, and where the leakage rate for a double-seated valve is unacceptable.

The valves are used in conjunction with our temperature- or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat, cone and bellow - are made of stainless steel. The bellows for balancing the pressure are fitted on the valve spindle which reduces the force necessary for closing the valve, as the upstream pressure of the medium through the hollow valve spindle acts outside and the pressure after the valve acts inside the bellow system. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

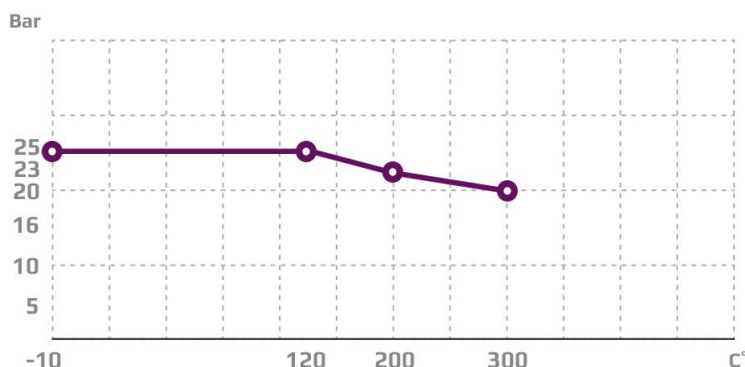
Without an actuator being connected, the valve is held in open position by means of a spring and the bellow system. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting double seated valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- Gasket	Reinz-AFM34 Metal - Copper
- Bellow	Stainless steel W.1.1541

Nominal pressure	PN 25
Seating	Single-seated, tight closing
Flow characteristic	Quadratic
Leakage rate	≤ 0.05% of Kvs
Regulating capability	Kvs/Kvr > 25

Flanges	EN 1092-2 PN 25
---------	--------------------

Pressure balanced valve

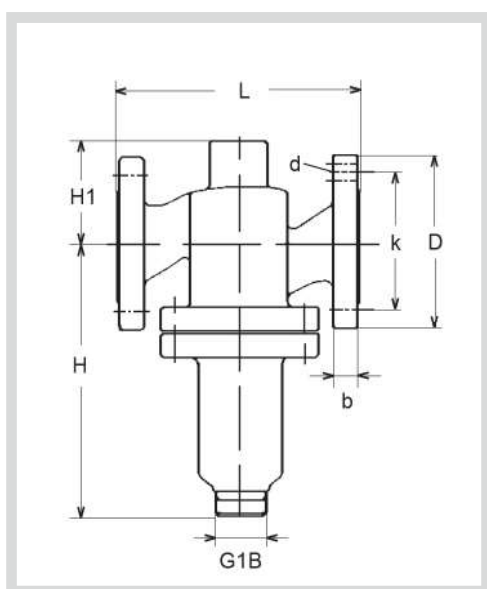
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
25 H1FB	160	180	70	115	16	85	14x(4)
32 H1FB	180	195	75	140	18	100	18x(4)
40 H1FB	200	205	85	150	19	110	18x(4)
50 H1FB	230	225	95	165	19	125	18x(4)
65 H1FB	290	260	110	185	19	145	18x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height (mm)	Weight (kg)
25 G1FB	25	25	7.5	7	6
32 G1FB	32	32	12.5	8	9
40 G1FB	40	40	20	9	13
50 G1FB	50	50	30	10	16
65 G1FB	65	65	50	13	23

# Balanced 2-way Control Valve type G1FBN

Nodular cast iron, PN 25, DN 15 – 80 mm

O-2.5.03.01-H

Page 1 of 2



## APPLICATIONS

Balanced control valves type G1FBN are designed for regulating hot water, steam and hot oil systems. Balanced valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a standard single seated valve, and where the leakage rate for a double-seated valve is unacceptable. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat, cone - are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2 or ANSI B16.5 Class 150. The thread for the actuator connection is G1B ISO 228. The valves are single-seated. The leakage rate is less than 0.05% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without an actuator being connected, the valve is held in open position by means of a spring. With force on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting double seated valve can be used with our self-acting thermostats. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- Gasket	Stainless steel foil
- O-ring	A75H FEPM 75 CO

Nominal pressure	PN 25
Seating	Single-seated, balanced

Flow characteristic	Quadratic
Leakage rate	$\leq 0,05\%$ of Kvs
Regulating capability	Kvs/Kvr > 25

Flanges drilled according to	EN 1092-2 PN 25 or ANSI B16.5 Class 150
------------------------------	---

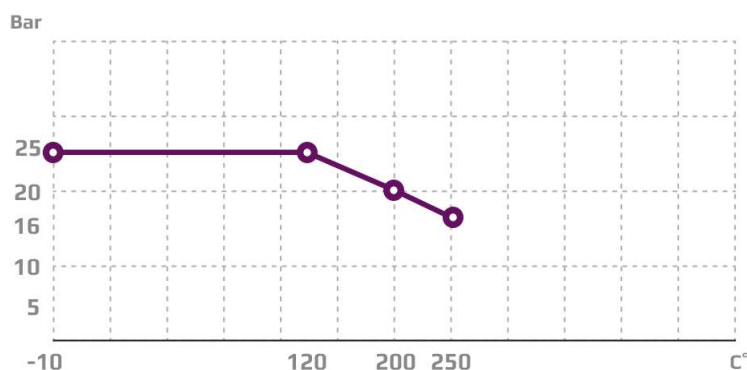
Pressure balanced valve

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel
- Low leakage rate reduces the risk of overheating

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



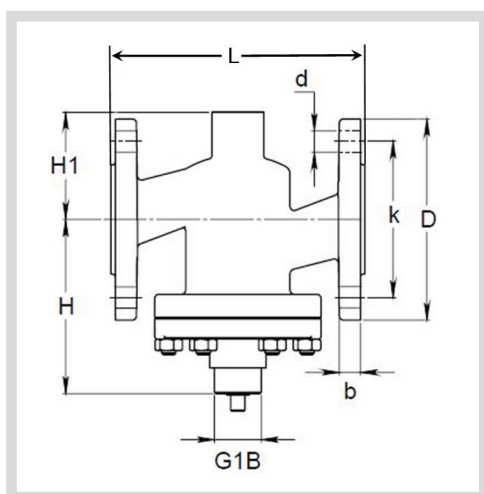
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
15 G1FBN	130	101	80	95	14	65	14x(4)
20 G1FBN	150	107	85	105	16	75	14x(4)
25 G1FBN	160	112	70	115	16	85	14x(4)
32 G1FBN	180	122	75	140	18	100	18x(4)
40 G1FBN	200	125	85	150	19	110	18x(4)
50 G1FBN	230	140	95	165	19	125	18x(4)
65 G1FBN	290	154	110	185	19	145	18x(4)
80 G1FBN	310	164	115	200	19	160	19x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
15 G1FBN	15	15	4	7.5	4
20 G1FBN	20	20	6.3	7.5	5
25 G1FBN	25	25	10	9	6
32 G1FBN	32	32	16	10	9
40 G1FBN	40	40	25	11	13
50 G1FBN	50	50	35	11.5	16
65 G1FBN	65	65	58	14.5	23
80 G1FBN	80	80	80	16	38

# 2-way Control Valve type G1FBE

Nodular cast iron, Single seat balanced, PN 25, DN 200 - 300 mm, Flanged ends

0-2.5.04.02-A

Page 1 of 2



## APPLICATIONS

Control valves type G1FBE are designed for regulating steam and hot water systems. The valves are used in conjunction with our temperature or pressure regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seat and cone - are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The leakage rate is 0.01% Class IV of the full flow (according to VDI/VDE 2174)

## FUNCTION

With pressure on the spindle the valve will close. Because of the balanced plug, the closing force is pressure independent. In connection with our pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator or positioner. The equal percentage characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Spring	1.4568
- Cone	1.4408, 1.4305
- Gasket	TFM and PVMQ
- Bolts, Nuts	4 CrMo 4/A4
Nominal pressure	PN 25
Seating	Single seated balanced
Flow characteristic	Equal percentage
Leakage rate	$\leq 0.01\%$ of Kvs Class IV
Regulating capability	Kvs/Kvr > 25

### Flanges drilled according to

EN 1092-2 PN 25  
(ANSI)  
(JIS)

### Counter flanges

DIN2634

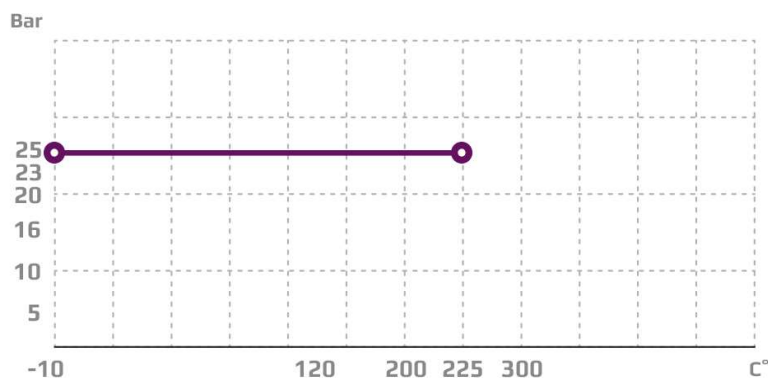
### Adjustable seat interspace

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Easy maintenance
- Hand wheel for manual override

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

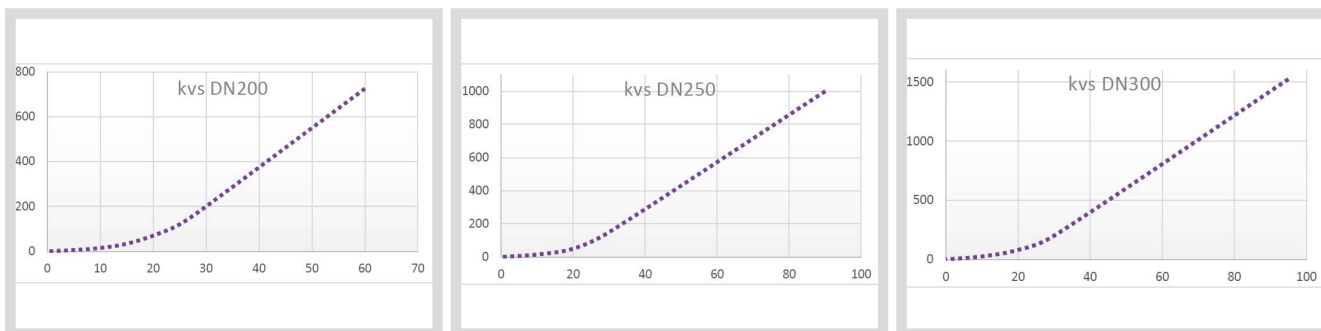


Subject to change without notice.

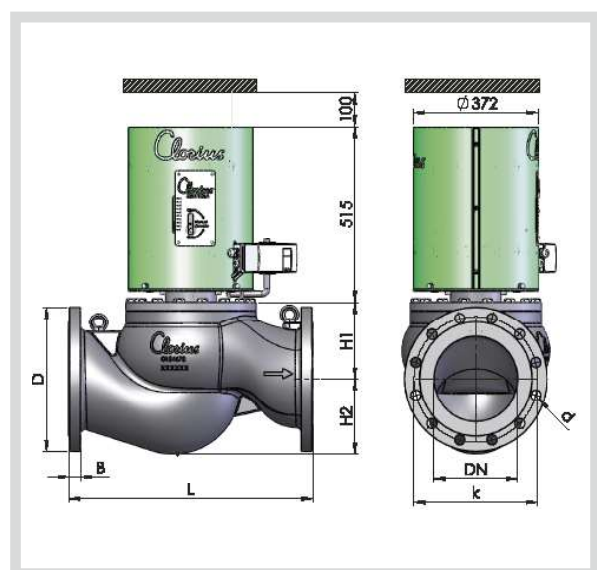
## MOUNTING

The valve can be installed with vertical as well as horizontal spindles.

## CHARACTERISTICS



## DIMENSION SKETCH



Type	L (mm)	H1 (mm)	H2 (mm)	D (dia.) (mm)	b (mm)	k (dia.) (mm)	d mm dia. (number)
200 G1F	600	238	180	360	32	310	12xø26
250 G1F	730	227	220	425	35	370	12xø30
300 G1F	850	301	250	485	38	430	16xø30

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
200 G1F	DIN1092 PN25	200	725	80	220*
250 G1F	DIN1092 PN25	250	1000	95	258*
300 G1F	DIN1092 PN25	300	1500	95	370*

\*including actuator





# 2-way Control Valve type G2F

Nodular cast iron, 2 seats, PN 25, DN 20 – 80 mm, Flanged ends

O-2.5.04-F

Page 1 of 2



## APPLICATIONS

Control valves type G2F are designed for regulating hot water, steam and hot oil systems. The double-seated valves are used in installations where the system pressure necessitates a closing force greater than available in the actuator programme for a single-seated valve. The valves are used in conjunction with our temperature or pressure differential regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Nodular cast iron EN-GJS-400-15
- Spring	1.4568
- Cone	1.4408, 1.4305
- Gasket	Stainless steel foil and graphite
- Upper seat	AISI 303
- Lower seat	1.4301, 1.4305, 1.4307
- Bolts, nuts	24 CrMo 4/A4
Nominal pressure	PN 25
Seating	Double seated
Flow characteristic	Quadratic
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25

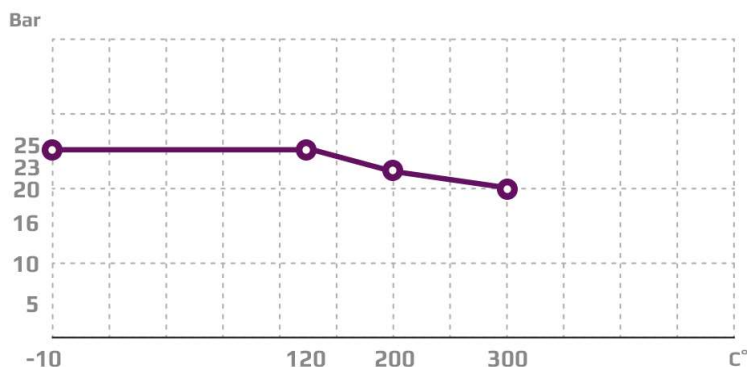
Flanges drilled according to	EN 1092-2 PN 25
Counter flanges	DIN 2634
Adjustable seat interspace	

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



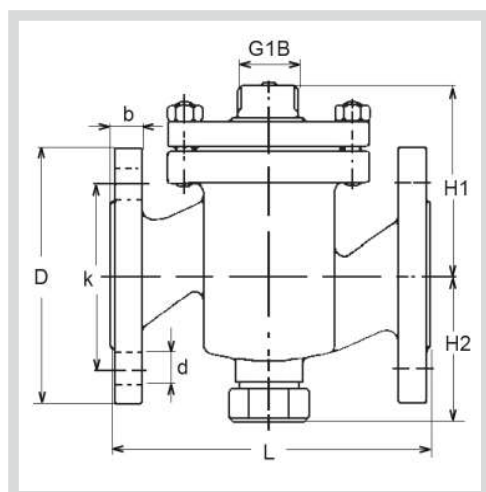
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 G2F	150	85	70	105	16	75	14x(4)
25 G2F	160	95	77	115	16	85	14x(4)
32 G2F	180	105	82	140	18	100	19x(4)
40 G2F	200	110	92	150	19	110	19x(4)
50 G2F	230	125	102	165	19	125	19x(4)
65 G2F	290	135	120	185	19	145	19x(4)
80 G2F	310	145	130	200	19	160	19x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
20 G2F	20	20	5	6.5	5
25 G2F	25	25	7.5	7	6.5
32 G2F	32	32	12.5	8	9
40 G2F	40	40	20	9	11
50 G2F	50	50	30	10	16
65 G2F	65	65	50	11	21
80 G2F	80	80	80	13	38

# 2-way Control Valve type G2F

Nodular cast iron, PN 16, DN 100 – 150 mm

O-2.5.05-D

Page 1 of 2

## APPLICATIONS

Control valves type G2F are designed for use in regulating high pressure hot water, steam and heat transfer oil. The valves are used in conjunction with temperature or pressure differential regulators for controlling district or central heating plants, industrial processes or marine installations.

## DESIGN

The valve components – spindle, seats and cone – are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The connection thread for the actuator is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

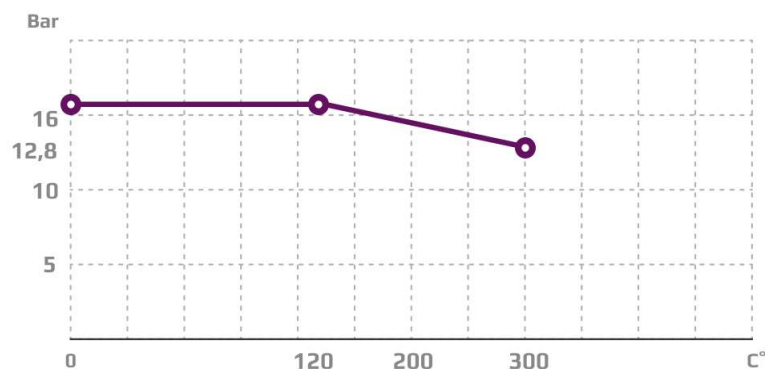
Without the actuator being connected, the valve is held in open position by means of a spring. With pressure on the spindle the valve will close. In connection with our thermostats, pneumatic or electric actuators, the valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. Alternatively a reverse acting valve can be used with our self-acting thermostats. The quadratic characteristic will not cease, until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- Gasket	Stainless steel foil - Copper

### Nominal pressure

PN 16

### Seating

Double seated

### Flow characteristic

Almost quadratic

### Function

Closing with pressure  
on spindle

### Leakage rate

≤ 0.5% of Kvs

### Regulating capability

Kvs/Kvr > 25

### Flanges drilled

EN 1092-2

### according to

DIN 2633

### Counter flanges

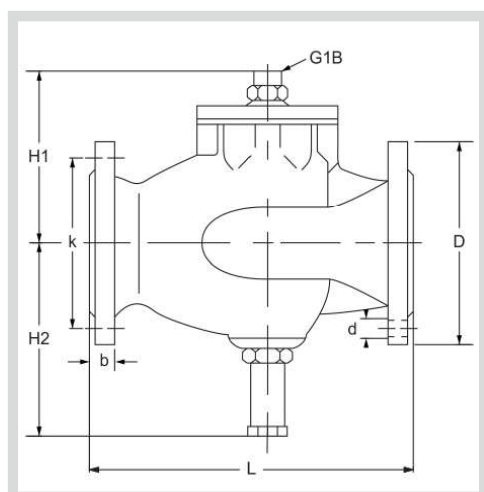
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
100 G2F	350	185	209	220	19	180	19x(8)
125 G2F	400	205	224	250	19	210	19x(8)
150 G2F	400	240	244	285	19	240	23x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Weight kg
100 G2F	100	100	125	20	32
125 G2F	125	125	215	20	50
150 G2F	150	150	310	20	70

# 2-way Control Valve type G2FM-T

Nodular cast iron PN 25, DN 65-125 mm / PN 16, DN 150 – 300 / PN 10, DN 350 – 600 mm

O-2.5.05.01-E

Page 1 of 4



## TECHNICAL DATA

### Materials:

- Valve body, slide	Nodular cast iron EN-GJS-400-15
- O-ring	NBR 70A
- Nuts, bolts	24 CrMo 5/A4
- U-ring	PTFE
<b>Nominal pressure</b>	
- DN 65-125	PN 25, max. 100°C (option 250°C)
- DN 150-300	PN 16, max. 100°C (option 250°C)
- DN 350-600	PN 10, max. 100°C (option 250°C)
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	Max. 0.5%
<b>Regulating capability</b>	Kvs/Kvr > 25

<b>Flanges</b>	EN 1092-2 PN 10/16/25
<b>Counter flanges (suggested)</b>	ANSI Class 150 DIN 2632 – PN 10 DIN 2633 – PN 16 DIN 2634 – PN 25

### Max. pressure $\Delta p_L$ , against which the control can close:

- DN 65-125	25 bar
- DN 150-300	16 bar
- DN 350-600	10 bar

## APPLICATIONS

Control valve type G2FM-T is a two-way control valve with blocked port making a two-way control valve. The slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil quantities. The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 or ANSI Class 150.

## FUNCTION

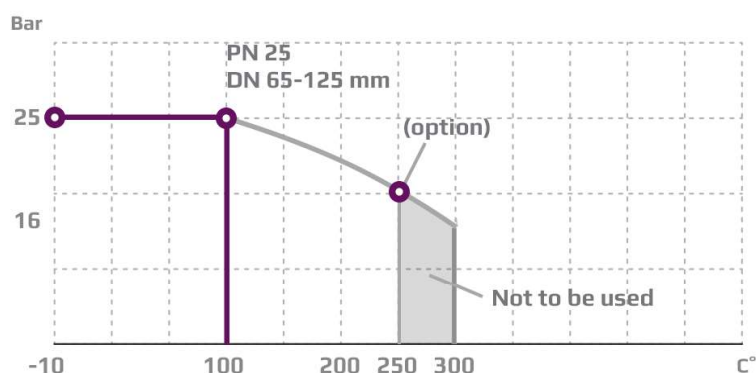
The slide is firmly connected with the motor spindle. When the slide is in the one extreme position by turning the spindle, connection A-AB is kept fully open. In the other extreme position connection the valve is fully closed. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings and avoids overheating.

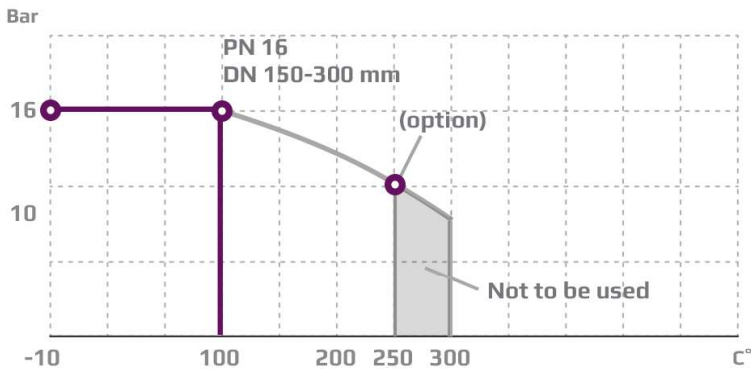
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

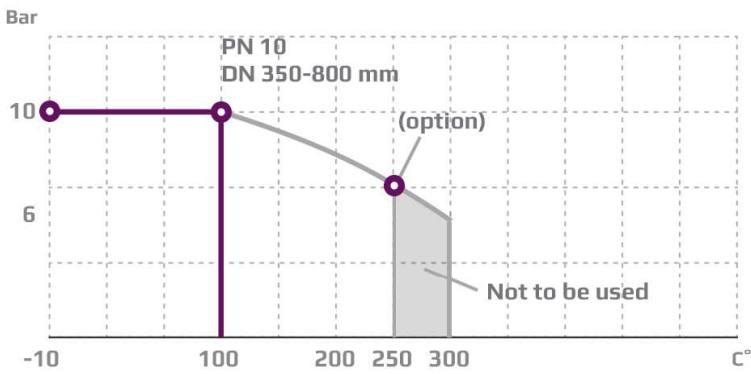


**PRESSURE/TEMPERATURE DIAGRAM**

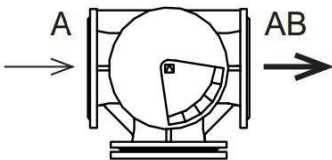
According to DIN 2401



\* DN125 available on request in PN16



**PORT NUMBERING**



**MOUNTING**

The valve connections are marked A and AB. Check slide position before installation of the valve. The slide position is marked on the top of the shaft. The valve can be installed with vertical as well as horizontal spindles. The valve must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

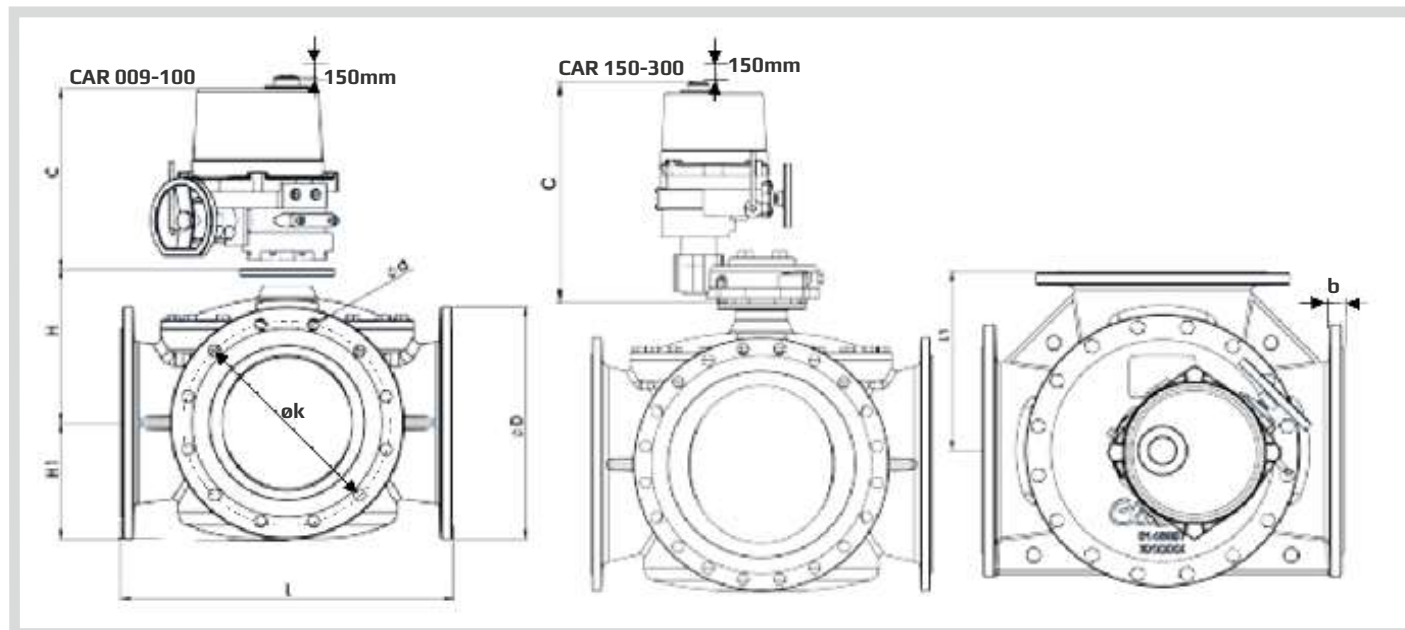
# 2-way Control Valve type G2FM-T

Nodular cast iron PN 25, DN 65-125 mm / PN 16, DN 150 – 300 / PN 10, DN 350 – 600 mm

O-2.5.05.01-E

Page 3 of 4

## DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 G3FM-TR	292	146	135	92	19	273	185	145	19x(8)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 G3FM-TR	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TR	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TR	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TR	437	218.5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TR	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TR	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TR	649	324.5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TR	717	358.5	334.5	251.5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TR	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TR	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 G3FM-TR	900	450	421	335	27	556	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 G3FM-TR	900	450	421	335	27	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 G3FM-TR	918	459	470	354	31	556	780	725	31x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 G3FM-TR	1050	525	534	426	37	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
800 G3FM-TR	1230	615	596	461	53	556	1085	990	34x(24) 50x(24) PN25	-	-	-	995	930	33x(24)	1020	950	33x(28)



## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value $m^3/h$	Torque Nm For inlet P*	Weight kg
60 G2FM-T	65	120	60	37
80 G2FM-T	80	154	65	41
100 G2FM-T	100	220	120	56
125 G2FM-T	125	330	200	73
150 G2FM-T	150	425	200	84
200 G2FM-T	200	1100	330	153
250 G2FM-T	250	2100	525	215
300 G2FM-T	300	2650	730	277
350 G2FM-T	350	3380	980	340
400 G2FM-T	400	3950	1370	459
450 G2FM-T	450	4480	1550	579
500 G2FM-T	500	5250	1920	744
550 G2FM-T	550	5250	1920	1090
600 G2FM-T	600	6050	2950	950
800 G2FM-T	800	8000	4000	2100

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-300 = 16 Bar

DN 350-800 = 10 Bar



# 2-way Control Valve type G2FA

Nodular cast iron, PN 16, DN 200 mm / PN 10, DN 300/250 – 300 mm

O-2.5.05.03-A

Page 1 of 2



## APPLICATIONS

Regulating valve type G2FA is designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations. G2FA is used in conjunction with Clorius valve motor type AVM/AVF 234 or Clorius pneumatic actuators.

## DESIGN

The valve components (seats and cone) are made of alu bronze, the spindle of stainless steel. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2.

## FUNCTION

The valve cone is firmly connected with the motor spindle. The valves will close at rising temperatures. For cooling circuits the valve can be used in conjunction with a reverse acting electric actuator. The linear characteristic will not cease, until the flow has dropped below 4% of the full flow.

## TECHNICAL DATA

### Materials:

- Valve body	Cast iron EN-GJS-400-15
- Trim	Alu Bronze CuAL10Fe5Ni5
- Valve spindle	Stainless steel (W.no. 1.4436)
- O-ring	AFLAS A75H
- Gasket	Reinz-AFM34

### Nominal pressure

- 200 G2FA	PN 16 (max. 120/160°C)
- 300/250-300 G2FA	PN 10 (max. 120/160°C)

Seating	Double seated
Leakage rate	≤ 0.5%
Regulating capability	Kvs/Kvr > 25

Flow characteristic	Almost linear
Flanges according to	EN 1092-2 PN 16 & PN 10

**Note!** 300/250 G2FA has outer measures and flanges drilled as a 300 G2FA

### Counter flanges:

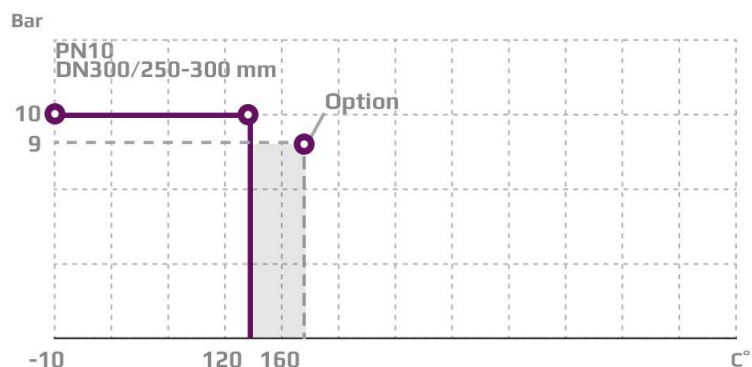
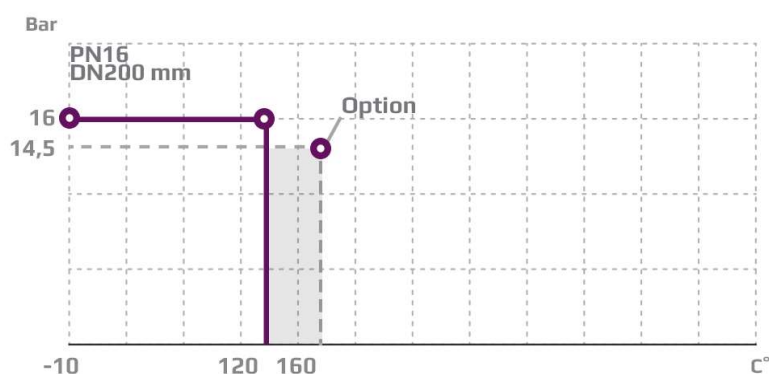
- 200 G2FA	DIN 2633 - PN 16
- 300/250-300 G2FA	DIN 2632 - PN 10

## FEATURES

- Simple design secures reliable controls and reduces costly downtime
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

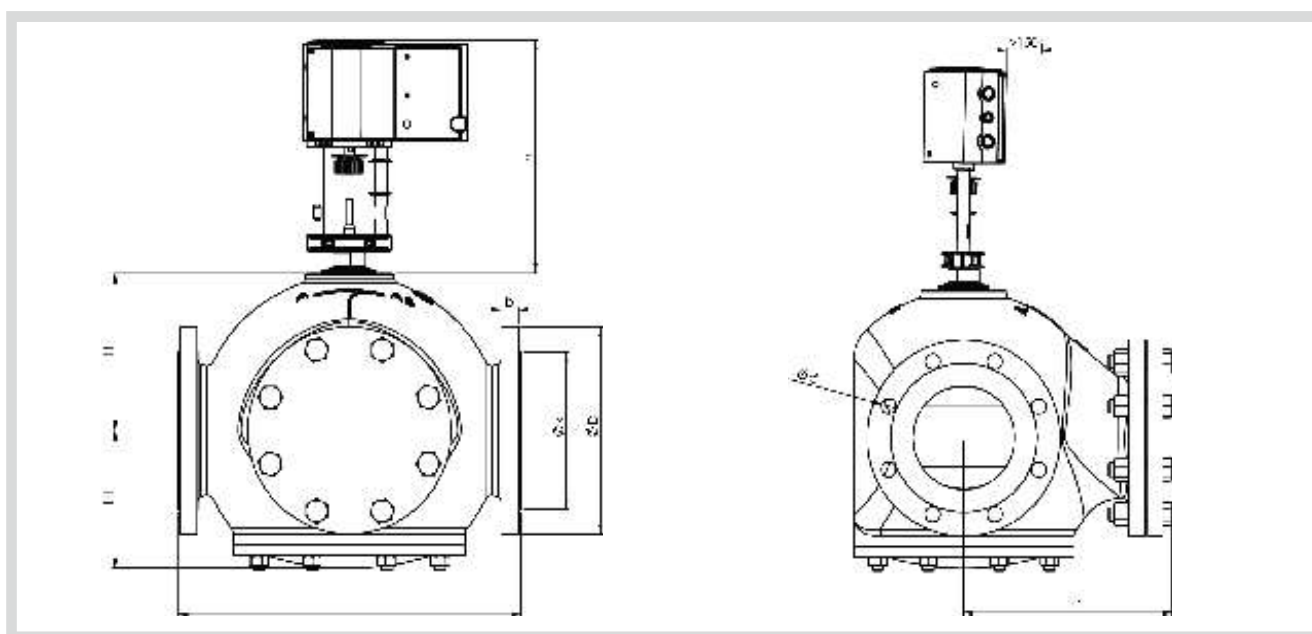


Subject to change without notice.

## MOUNTING

The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AFM 234 or AVF234 motor. See drawing.

## DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
200 G2FA	600	380	238	238	26	340	295	22x(8)
300/250 G2FA <sup>1)</sup>	850	510	305	305	28	445	400	23x(12)
300 G2FA	850	510	305	305	28	445	400	23x(12)

1) Valve type 300/250 G2FA has outer measures and flanges drilled as type 300 G2FA.

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
200 G2FA	200	200	555	28	160
300/250 G2FA <sup>1)</sup>	300	300	865	28	311
300 G2FA	300	300	1250	45	300

1) Valve type 300/250 G2FA has outer measures and flanges drilled as type 300 G2FA.

# 2-way Control Valve type G2FR

Nodular cast iron, PN 25, DN 20 – 80 mm, Reverse acting

O-2.5.06-F

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Trim	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- Gasket	Graphite with stainless steel foil - Copper

Nominal pressure PN 25

Seating Double seated

Flow characteristic Quadratic

Function Opens by pressing the spindle

Leakage rate  $\leq 0.5\%$  of Kvs

Regulating capability Kvs/Kvr  $> 25$

Flanges EN 1092-2  
PN 25

Counter flanges: DIN 2634

Reverse acting (normally closed)

For cooling systems or similar

Adjustable seats

## APPLICATIONS

Valves type G2FR are mainly intended for control of cooling systems. The valves are used in conjunction with temperature or pressure differential regulators. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring and when opening the valve, the actuator has to overcome the spring force. On the next page please find the max. allowable values of  $\Delta p_L$  as well as the max. allowable inlet pressures for opening the valves,  $p_{1max}$ , for various actuator forces.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves are double-seated. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

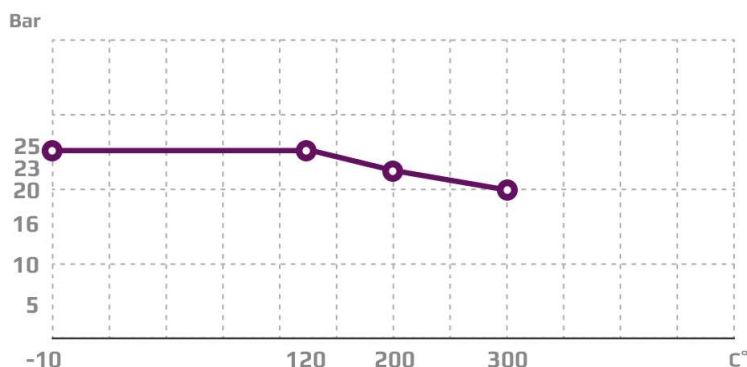
Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our actuators, the valves act as "cooling" valves, i.e. they open at rising temperatures. The quadratic characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



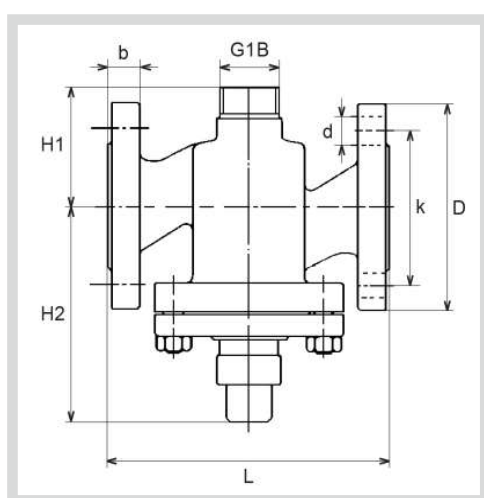
Subject to change without notice.

## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 G2FR	150	63	112	105	16	75	14x(4)
25 G2FR	160	70	117	115	16	85	14x(4)
32 G2FR	180	75	151	140	18	100	19x(4)
40 G2FR	200	85	155	150	19	110	19x(4)
50 G2FR	230	95	169	165	19	125	19x(4)
65 G2FR	290	110	180	185	19	145	19x(4)
80 G2FR	310	120	180	200	19	160	19x(8)

## SPECIFICATIONS

Type	Flange connection Dn in mm	Opening mm	k <sub>vs</sub> -value m <sup>3</sup> /h	Lifting height mm	Max. Δp <sub>L</sub> bar	Actuat. force N	Corresp. p <sub>1max</sub> bar	Weight kg
20 G2FR	20	20	5	6.5	8.3	200 400	9.4 25	5
25 G2FR	25	25	7.5	7	8	200 400	8.8 25	6.5
32 G2FR	32	32	12.5	8	7	400	27	9
40 G2FR	40	40	20	9	6.6	400	26	11
50 G2FR	50	50	30	10	5.8	400	15	16
65 G2FR	65	65	50	11	10	400 800	10 16	21
80 G2FR	80	80	80	13	6.7	400 800	10 16	38

# 2-way Control Valve type G2FMT-ULL (Ultra Low Leakage)

Nodular cast iron, PN10, DN100 - 400 mm

0-2.5.30-A

Page 1 of 4



## APPLICATIONS

Control valve type G2FMT-ULL is a two way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator type VT.

## DESIGN

The valve body and the valve slide are made of nodular cast iron.

The valve flanges are drilled according to EN 1092-2 - option

JIS B 2210 5K/10K and ANSI class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one extreme position by turning the spindle, connection A-AB is kept fully open. In the other extreme position connection the valve is fully closed. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. PTFE sealing element and O-ring are mounted in the slider groove to minimize leakage.

This section to be read together with sketches page 2 this data sheet.

## TECHNICAL DATA

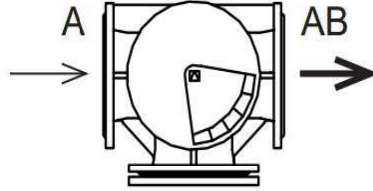
<b>Materials:</b>	
- Valve body, slide	Nodular cast iron EN-GJS-400-15
- Sealing element and O-ring	Silicone/PTFE
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	ANSI class IV/EN 1349 < 0.01%
<b>Flanges</b>	EN 1092-2 PN 10
- Option	JIS B 2210 5K/10K ANSI class 150
<b>Max. pressure <math>\Delta p</math>, against which the valve can close</b>	5 bar
<b>Nominal pressure</b>	PN 10
<b>Design temperature</b>	120°C
<b>Optional temperature</b>	150°C

## FEATURES

- Simple design secures reliable controls and reduces costly downtime
- Ultra Low Leakage rate secures energy savings - Best in class
- Most compact valve on the market

Subject to change without notice.

## PORT NUMBERING



## MOUNTING

The valve connections are marked A and AB. Check slide position before installation of the valve. The slide position is marked on the top of the shaft. The valve can be installed with vertical as well as horizontal spindles. The valve must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

1



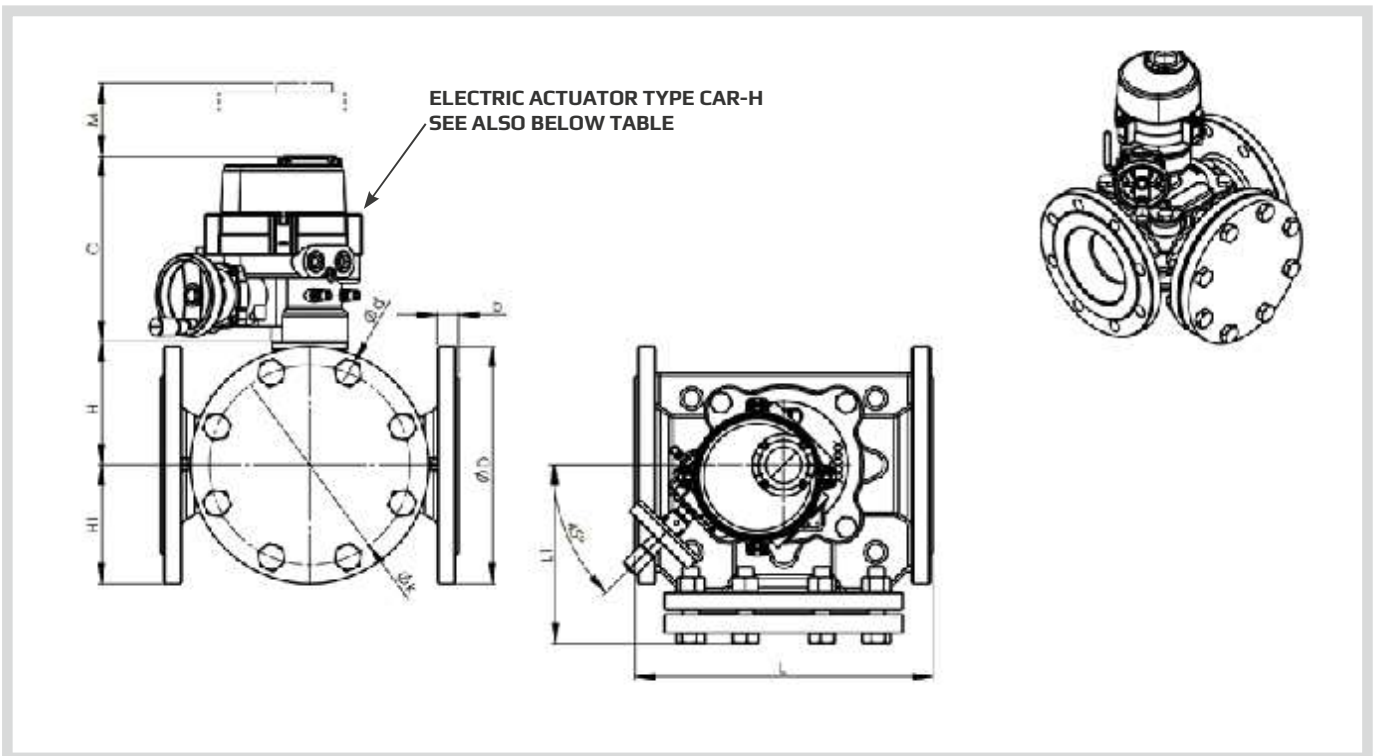
# 2-way Control Valve type G2FMT-ULL (Ultra Low Leakage)

Nodular cast iron, PN10, DN100 - 400 mm

0-2.5.30-A

Page 3 of 4

## DIMENSION SKETCH



**SPECIFICATIONS - TABLE 1** (read this together with table on page 4)

Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C1 (mm)	M (mm)	Electric Actuator Type CAR-H
100 G2FMT-ULL (*HF)	296	180	140	ØD/2	24	223	110	CAR-H 006/010
125 G2FMT-ULL	330	199	140	ØD/2	24	223	110	CAR-H 006/010
125 G2FMT-ULL (JIS5K)	320	194	140	ØD/2	19	223	110	CAR-H 006/010
150 G2FMT-ULL	356	214,5	149	ØD/2	25,4	223	110	CAR-H 006/010
200 G2FMT-ULL	410	243,5	182	ØD/2	28,4	261	150	CAR-H 016
200 G2FMT-ULL (**L)	484	280,5	182	ØD/2	28,4	261	150	CAR-H -016
250 G2FMT-ULL	480	280,5	202	ØD/2	31	261	150	CAR-H -016
300 G2FMT-ULL (**RF)	580	330,5	202	ØD/2	32	261	150	CAR-H 016
300 G2FMT-ULL	560	320,5	237	ØD/2	32	315	180	CAR-H -035
350 G2FMT-ULL	660	370,5	256	ØD/2	36	315	180	CAR-H 050
400 G2FMT-ULL	720	403	278	ØD/2	38	315	180	CAR-H 050

\* High Flow

\*\* Long Version

\*\*\* Reduced Flow

ØD/2 - Depends on flange type (see also table 2)

Subject to change without notice.

SPECIFICATIONS - TABLE 2

Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)
DN300	455	400	23x(12)	483	432	25x(12)	430	390	23x(12)	445	400	25x(16)
DN350	505	460	23x(16)	533	476	29x(12)	480	435	25x(12)	490	445	25x(16)
DN400	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)

SPECIFICATIONS - TABLE 3

Type	Flange connection DN in mm	Kv5 m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
DN100 (*HF)	100	259	40	32
DN125	125	259	40	43
DN125 (JIS5K)	125	259	40	43
DN150	150	430	90	53
DN200 (**L)	200	770	120	85
DN200	200	770	120	85
DN250	250	1.230	150	122
DN300 (**RF)	300	1.190	150	174
DN300	300	2.090	320	162
DN350	350	2.950	418	215 (estimated)
DN400	400	3.760	530	269 (estimated)

\*Torque calculated at max  $\Delta P$  for: DN100 - 300 - 5 Bar

\* High Flow

\*\* Long Version

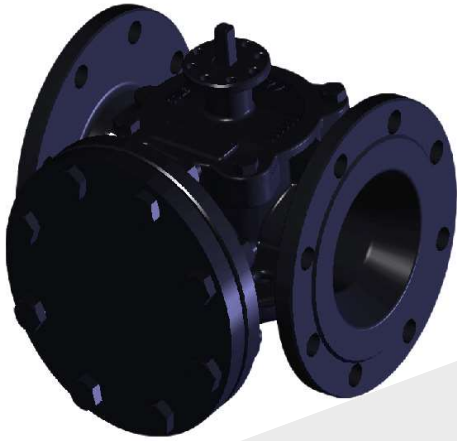
\*\*\* Reduced Flow

# 2-way Control Valve type G2FMT-SL

Nodular cast iron, PN10, DN100 - 400 mm

0-2.5.31-A

Page 1 of 4



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body, slide	Nodular cast iron EN-GJS-400-15
- Sealing element and O-ring	Silicone/PTFE
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	ANSI class I
<b>Flanges</b>	EN 1092-2 PN 10
- Option	JIS B 2210 5K/10K ANSI class 150
<b>Max. pressure <math>\Delta p</math>, against which the valve can close</b>	5 bar
<b>Nominal pressure</b>	PN 10
<b>Design temperature</b>	120°C

## APPLICATIONS

Control valve type G2FMT-SL is a two way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator type VT.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 - option JIS B 2210 5K/10k and ANSI class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one extreme position by turning the spindle, connection A-AB is kept fully open. In the other extreme position connection the valve is fully closed. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide.

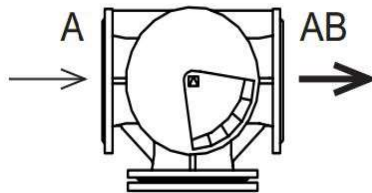
This section to be read together with sketches page 2 this data sheet.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime
- Most compact valve on the market

Subject to change without notice.

**PORT NUMBERING**



**MOUNTING**

The valve connections are marked A and AB. Check slide position before installation of the valve. The slide position is marked on the top of the shaft. The valve can be installed with vertical as well as horizontal spindles. The valve must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.



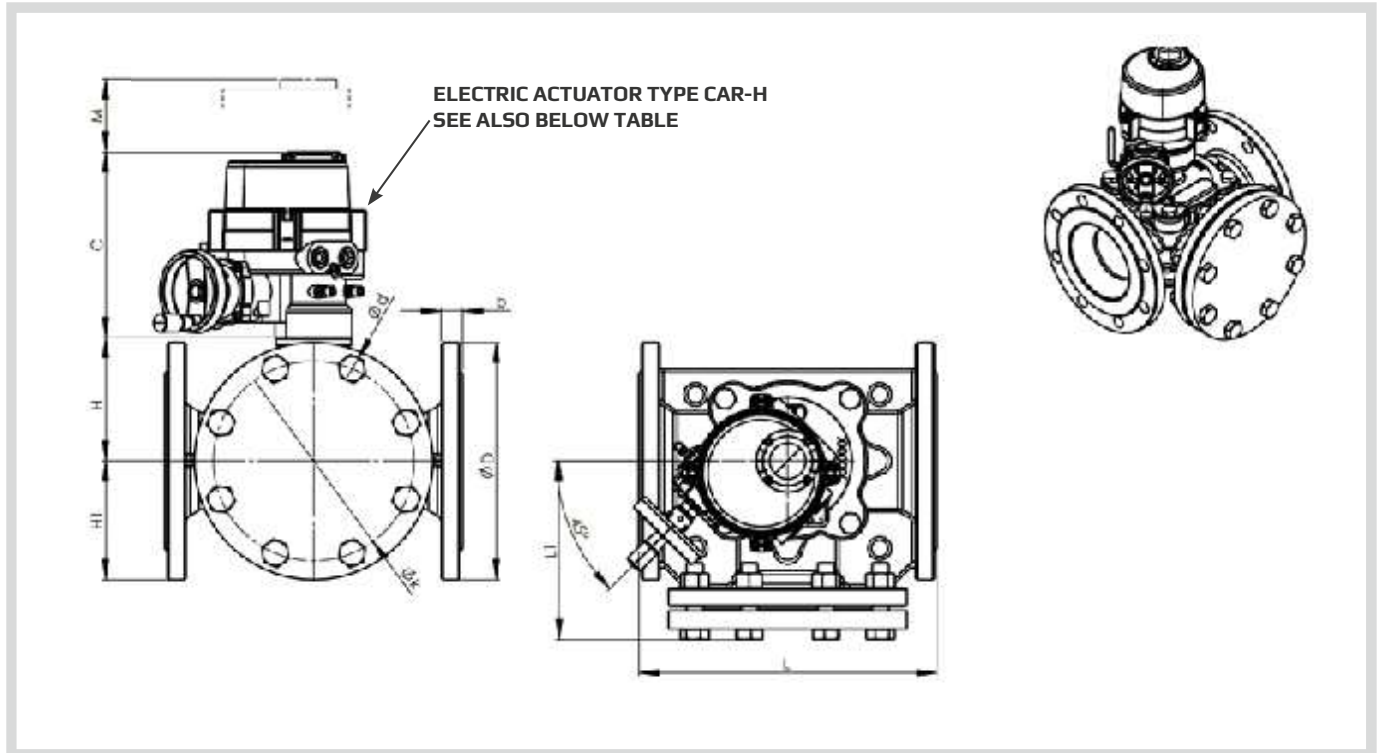
# 2-way Control Valve type G2FMT-SL

Nodular cast iron, PN10, DN80 - 400 mm

0-2.5.31-A

Page 3 of 4

## DIMENSION SKETCH



**SPECIFICATIONS - TABLE 1** (read this together with table on page 4)

Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C1 (mm)	M (mm)	Electric Actuator Type CAR-H
100 G2FMT-SL (*HF)	296	180	140	ØD/2	24	223	110	CAR-H 006/010
125 G2FMT-SL	330	199	140	ØD/2	24	223	110	CAR-H 006/010
125 G2FMT-SL (JIS5K)	320	194	140	ØD/2	19	223	110	CAR-H 006/010
150 G2FMT-SL	356	214,5	149	ØD/2	25,4	223	110	CAR-H 006/010
200 G2FMT-SL	410	243,5	182	ØD/2	28,4	223	110	CAR-H 016
200 G2FMT-SL (**L)	484	280,5	182	ØD/2	28,4	223	110	CAR-H -016
250 G2FMT-SL	480	280,5	202	ØD/2	31	223	110	CAR-H -016
300 G2FMT-SL (**RF)	580	330,5	202	ØD/2	32	223	110	CAR-H 016
300 G2FMT-SL	560	320,5	237	ØD/2	32	261	150	CAR-H -035
350 G2FMT-SL	660	370,5	256	ØD/2	36	261	150	CAR-H 050
400 G2FMT-SL	720	403	278	ØD/2	38	315	180	CAR-H 050

\* High Flow

\*\* Long Version

\*\*\* Reduced Flow

ØD/2 - Depends on flange type (see also table 2)

Subject to change without notice.

**SPECIFICATIONS - TABLE 2**

Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)
DN300	455	400	23x(12)	483	432	25x(12)	430	390	23x(12)	445	400	25x(16)
DN350	505	460	23x(16)	533	476	29x(12)	480	435	25x(12)	490	445	25x(16)
DN400	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)

**SPECIFICATIONS - TABLE 3**

Type	Flange connection DN in mm	KvS m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
DN100 (*HF)	100	259	40	32
DN125	125	259	40	43
DN125 (JIS5K)	125	259	40	43
DN150	150	430	90	53
DN200	200	770	120	85
DN200 (**L)	200	770	120	85
DN250	250	1.230	150	122
DN300 (***)RF)	300	1.190	150	174
DN300	300	2.090	320	162
DN350	350	2.950	418	215 (estimated)
DN400	400	3.760	530	269 (estimated)

\*Torque calculated at max Δ P for: DN100 - 300 - 5 Bar

\* High Flow

\*\* Long Version

\*\*\* Reduced Flow

# 2-way Control Valve type G2FR

Nodular cast iron, PN 16, DN 100 – 150 mm, Reverse acting

O-2.5.07-E

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Trim	Stainless steel
- Bolts, nuts	24 CrMo 4/A4
- Gasket	Stainless steel foil - Copper

Nominal pressure	PN 16
Seating	Double seated
Flow characteristic	Almost quadratic
Function	Opens by pressing the spindle
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25

Flanges	EN 1092-2 PN 16
Counter flanges	DIN 2633

Reverse acting (normally closed)  
For cooling water and lubrications

Subject to change without notice.

## APPLICATIONS

Valves type G2FR are mainly intended for control of cooling systems. The valves are used in conjunction with temperature- or pressure differential regulators. As the reverse acting valves are held in closed position by means of a built-in spring, the max. differential pressure,  $\Delta p_L$ , against which a valve can close depends on the spring and when opening the valve, the actuator has to overcome the spring force. On the next page please find the max. allowable values of  $\Delta p_L$  as well as the max. allowable inlet pressures for opening the valves,  $p_{1max}$  for various actuator forces.

## DESIGN

The valve components; spindle, seats and cone are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The connection thread for the actuator is G1B ISO 228. The valves are double-seated and designed for tight closure. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

### REVERSE ACTING

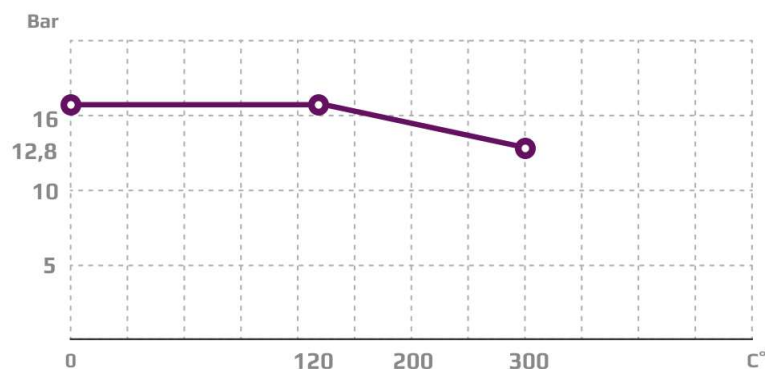
Without an actuator being connected, the valve is held in closed position by means of a spring. With pressure on the spindle the valve opens. In connection with our actuators, the valves act as "cooling" valves, i.e. they open at rising temperatures. The linear characteristic will not cease until the flow has dropped below 4% of the full flow.

## FEATURES

- Simple design secures reliable controls.
- Location of the pack box in the actuator makes the valve service friendly
- Reliable and secure due to internal parts of stainless steel

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



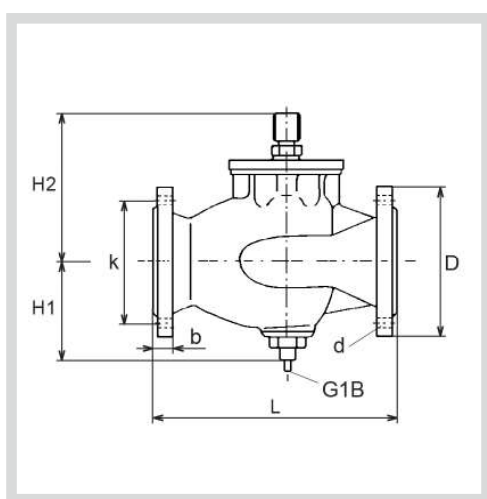


## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data sheets for the electric actuators).



## DIMENSION SKETCH



Type	L mm	H1 mm	H2 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
100 G2FR	350	145	240	220	24	180	18x(8)
125 G2FR	400	160	260	250	26	210	18x(8)
150 G2FR	400	180	293	285	26	240	22x(8)

## SPECIFICATIONS

Type	Flange connection Dn in mm	Opening mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Max. $\Delta p_L$ bar	Actuat. force N	Weight kg
100 G2FR	100	100	125	20	12.1	800	39
125 G2FR	125	125	215	20	9	800	53
150 G2FR	150	150	310	20	7.5	800	73

# 3-way Control Valve type G3F

Nodular cast iron, PN 25, DN 20 – 65 mm, Flanged ends

0-2.5.08-1

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Components	Stainless steel
- Nuts, bolts	24 CrMo 5/A4
- Gasket	Graphite with stainless steel foil
- O-ring	70 FPM

Nominal pressure	PN 25
Seating	2 balanced single seats

Flow characteristic	Quadratic/linear
Leakage rate	≤ 0.5% of Kvs
Regulating capability	Kvs/Kvr > 25

Flanges - drilled according to Counter flanges	EN 1092-2 PN 25 DIN 2634
--	-----------------------------

Same Kvs-value as mixing and diverting valve

Subject to change without notice.

## APPLICATIONS

Control valves type G3F are designed for hot water and hot oil systems and can be installed in pipe systems as mixing or diverting valves. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district or central heating plants or marine installations.

## DESIGN

The valve components - spindle, seats and cone - are made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2. The thread for the actuator connection is G1B ISO 228. The valves have two balanced single seats and are designed for tight closure. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174).

## FUNCTION

Without an actuator being installed, connection A-AB is fully open and connection B-AB completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection B-AB is fully open and connection A-AB completely closed.

The valve characteristics are as follows:

**Port A-AB and AB-A: quadratic**

**Port B-AB and AB-B: almost linear**

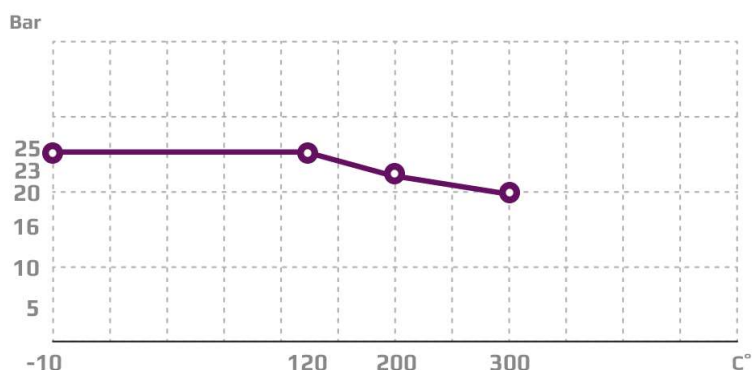
These characteristics ensure constant total flow under almost all pressure conditions and optimum circulation in the individual circuits.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

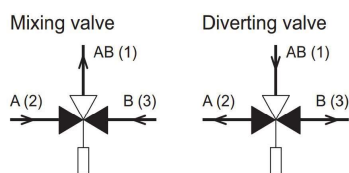
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING

Valves type G3F are marked with the internationally recognized port designations: A, B, AB.



Port AB  
Port A  
Port B

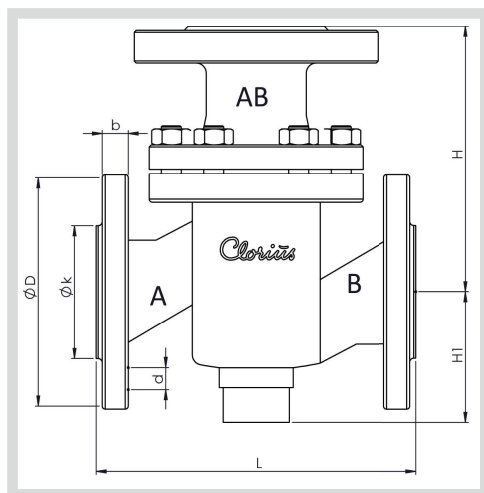
common port always open  
closes by activating the spindle  
opens by activating the spindle



## MOUNTING

The valve can be installed with vertical as well as horizontal spindles. For valve temperatures of max. 170 °C, the thermostat/ actuator can be fitted below or above the valve. For valve mounted with thermostats in media temperatures above 170 °C, a cooling unit has to be applied with connection downwards (please refer to data sheet for thermostat accessories). For electric actuators a high temperature adaptor must be used (please refer to data-sheets for the electric actuators).

## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
20 G3F	150	115	63	105	16	75	14x(4)
25 G3F	160	130	70	115	16	85	14x(4)
32 G3F	180	150	75	140	18	100	18x(4)
40 G3F	200	160	85	150	18	110	18x(4)
50 G3F	230	190	95	165	20	125	18x(4)
65 G3F	290	220	110	185	20	145	18x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value* m <sup>3</sup> /h	Lifting height mm	Weight kg
20 G3F	20	20	6.3	7.5	6
25 G3F	25	25	10	9	7
32 G3F	32	32	16	10	10
40 G3F	40	40	25	11	14
50 G3F	50	50	38	11.5	18
65 G3F	65	65	63	14.5	26

\*Same  $k_{vs}$ -values for mixing and diverting valves

# 3-way Control Valve type G3F

Nodular cast iron, PN 16, DN 80 – 150 mm

O-2.5.09-E

Page 1 of 2



## APPLICATIONS

Control valves type G3F are designed for regulating of water, lubricating oil and other liquid media and can be mounted in the pipe system as either mixing or diverting valves. However when mounting as a diverting valve the pressure drop is increased, compared with mounting as a mixing valve. See "Important note" under technical data. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district and central heating plants and marine installations.

## DESIGN

The valve components - seats and cone - are made of alubronze, the spindle is made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2 or ANSI B16.5 Class 150. The connection thread for the actuator is G1B ISO 228. The valves have two balanced single seats and are designed for tight closure. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174). [Tight between port 1(AB) og 3(B) is optional.]

## FUNCTION

Without an actuator being installed, connection 2-1 is fully open and connection 3-1 completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection 3-1 is fully open and connection 2-1 completely closed.

## TECHNICAL DATA

### Materials:

- Valve body

Nodular cast iron  
EN-GJS-400-15

- Seats and cone

Alu Bronze  
CuAL10Fe5Ni5

- Spindle

Stainless steel

- O-ring

90 NBR

- Gasket

Reinz-AFM34

Nominal pressure

PN 16

Seating

Two balanced  
single seats

Flow characteristic

Almost linear

Flanges drilled  
according to

EN 1092-2 PN 16  
or ANSI B16.5  
Class 150

Counter flanges

DIN 2633

Regulating capability

Kvs/Kvr > 25

For regulating of process- and central heating plants

### Important note

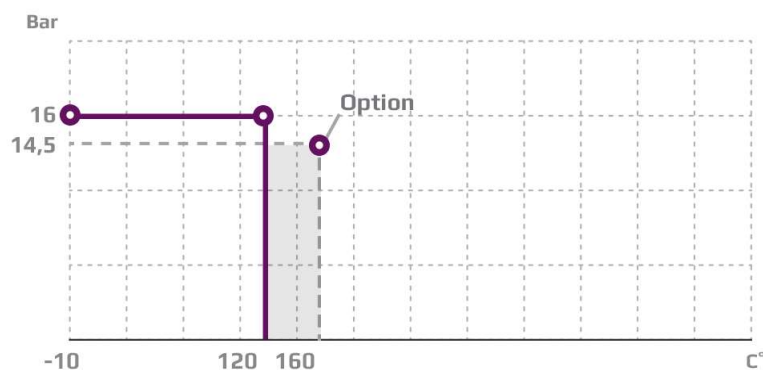
In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the  $k_{vs}$ -value will decrease by 14% as against mixing valves.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

## PRESSURE/TEMPERATURE DIAGRAM

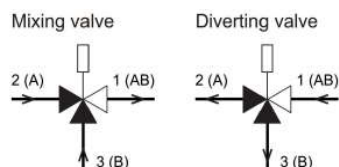
According to DIN 2401



Subject to change without notice.

## PORT NUMBERING

The ports of valves type G3F are marked with the figures 1, 2 and 3. The letters in parentheses refer to the corresponding internationally adapted designations.



Port 1 (AB)  
Port 2 (A)  
Port 3 (B)

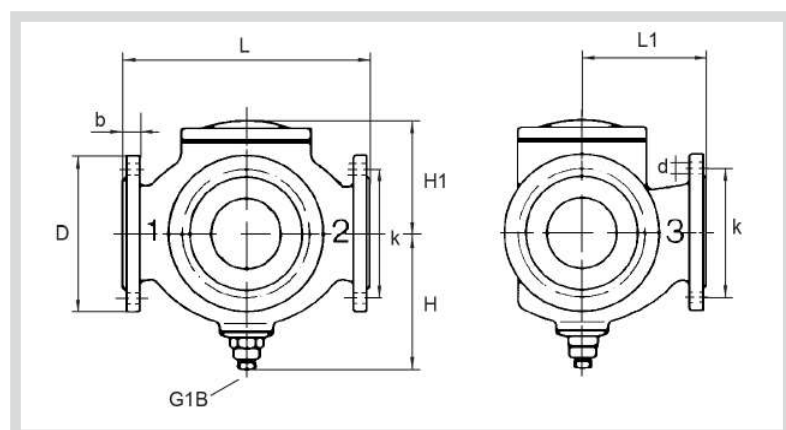
common port always open  
closes at load on spindle  
opens at load on spindle



## MOUNTING

The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

## DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
80 G3F	310	155	180	127	200	19	160	19x(8)
100 G3F	350	175	195	141	220	19	180	19x(8)
125 G3F	400	240	245	171	250	19	210	19x(8)
150 G3F	480	270	280	189	285	24	240	23x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	Mixing valve $k_{vs}$ -value $m^3/h$	Divertng valve $k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
80 G3F	80	80	80	69	11	35
100 G3F	100	100	125	108	13	44
125 G3F	125	125	215	185	18	72
150 G3F	150	150	310	267	20	111

# 3-way Control Valve type G3F-I

(Ports A-AB interchanged) Nodular cast iron, PN 16, DN 80 – 150 mm

O-2.5.09.01-A

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel
- O-ring	90 NBR
- Gasket	Reinz-AFM34
Nominal pressure	PN 16
Seating	Two balanced single seats
Flow characteristic	Almost linear
Flanges drilled according to	EN 1092-2 PN 16 or ANSI B16.5 Class 150
Counter flanges	DIN 2633
Regulating capability	Kvs/Kvr > 25

For regulating of process- and central heating plants

### Important note

In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the  $k_{vs}$ -value will decrease by 14% as against mixing valves.

Subject to change without notice.

## APPLICATIONS

Control valves type G3F-I are designed for regulating of water, lubricating oil and other liquid media and can be mounted in the pipe system as either mixing or diverting valves. However when mounting as a diverting valve the pressure drop is increased, compared with mounting as a mixing valve. See "Important note" on page 2. The valves are used in conjunction with our temperature regulators for controlling industrial processes, district and central heating plants and marine installations.

## DESIGN

The valve components - seats and cone - are made of alubronze, the spindle is made of stainless steel. The valve body is made of nodular cast iron EN-GJS-400-15 with flanges drilled according to EN 1092-2 or ANSI B16.5 Class 150. The connection thread for the actuator is G1B ISO 228. The valves have two balanced single seats and are designed for tight closure. The leakage rate is less than 0.5% of the full flow (according to VDI/VDE 2174). Tight between port 1(AB) og 3(B) is optional.

## FUNCTION

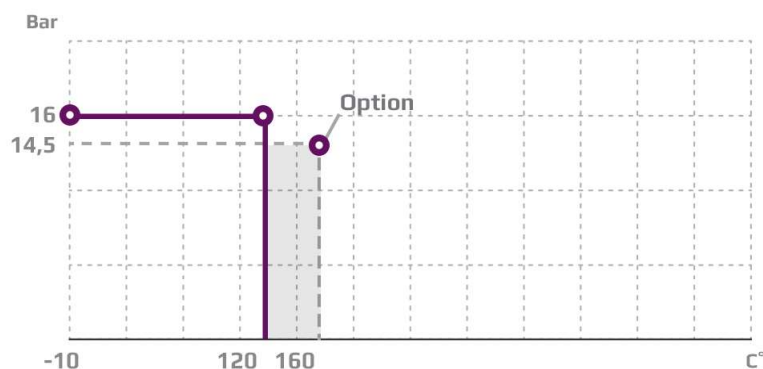
Without an actuator being installed, connection 2-1 is fully open and connection 3-1 completely closed, by means of a spring. By increasing pressure on the spindle, the opening of the ports changes proportionally to the travel of the spindle, and when the spindle is pressed to the bottom, connection 3-1 is fully open and connection 2-1 completely closed.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Reliable and secure due to internal parts of stainless steel

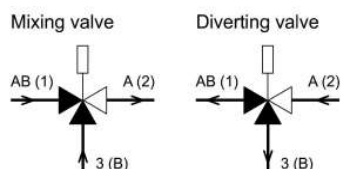
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING

The ports of valves type G3F-I are marked with the figures 1, 2 and 3. The letters in parentheses refer to the corresponding internationally adapted designations.



Port AB(1)  
Port A(2)  
Port 3(B)

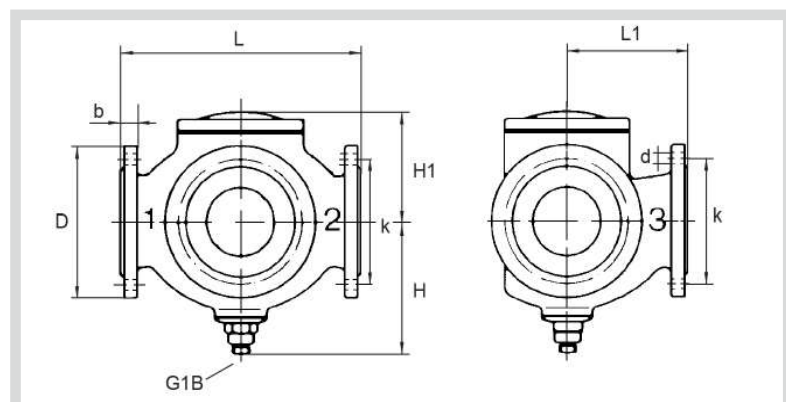
common port always open  
closes at load on spindle  
opens at load on spindle



## MOUNTING

The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

## DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	D (dia.) mm	b mm	k (dia.) mm	d mm dia. (number)
80 G3F-I	310	155	180	127	200	19	160	19x(8)
100 M3F-I	350	175	195	141	220	19	180	19x(8)
125 M3F-I	400	240	245	171	250	19	210	19x(8)
150 M3F-I	480	270	280	189	285	24	240	23x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	Mixing valve $k_{vs}$ -value $m^3/h$	Diverting valve $k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
80 G3F-I	80	80	80	69	11	35
100 G3F-I	100	100	125	108	13	44
125 G3F-I	125	125	215	185	18	72
150 G3F-I	150	150	310	267	20	111

# 3-way Control Valve type Low Leakage

Nodular Cast Iron, PN16, DN80 – 300 mm / PN10, DN300/250 mm

O-2.5.14-A

Page 1 of 2



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Nodular cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no 1.4436)
- O-ring	A75H- Gasket Reinz-AFM34
<b>Nominal pressure</b>	
- DN 80-200	PN 16 (max.150°C)
- DN 300/250-300	PN 10 (max.150°C)
- DN 80-300	JIS 10K (option)
<b>Seats</b>	2 balanced single seats
<b>Flow characteristic</b>	Almost linear
<b>Leakage Port AB-B</b>	0.0%
<b>Flanges</b>	According to EN 1092-2, PN 16 & PN 10
- <b>Option:</b>	According to JIS B 2210 10K
<b>Regulating capability</b>	Kvs/Kvr > 25

### Note!

Valve DN 200/175 has outer measures and flanges drilled as valve DN 200. Valve DN 300/250 has outer measures and flanges drilled as valve DN 300

### Counter flanges (suggested for EN 1092-2)

- DN 80-200:	DIN 2633 – PN 16
- DN 300/250-300:	DIN 2632 – PN 10

### Soft seat with O-ring

Leakage class IV

Subject to change without notice.

## APPLICATIONS

Control valves type G3FA soft seated are designed for regulating of load dependant cylinder liner (LDCL), cooling water systems.

## DESIGN

The valve components (seats and cone) are made of alubronzel, the spindle of alu. bronze. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2 (JIS B 2210 option). The valve has two balanced single seats and the port AB-B is designed 100 % tight.

## FUNCTION

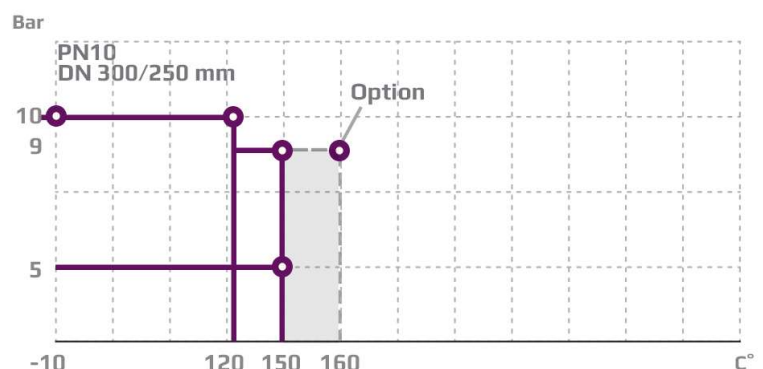
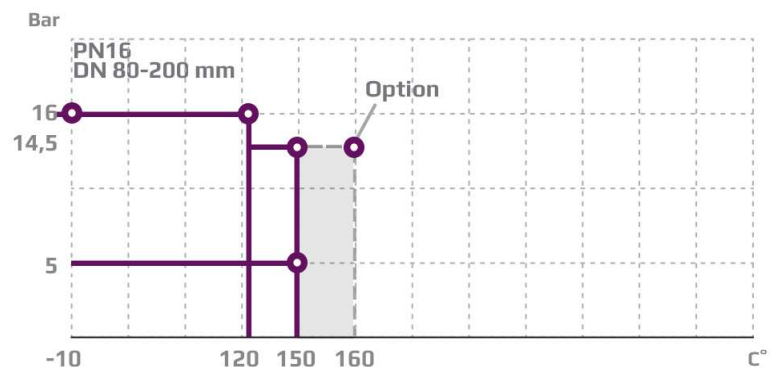
The valve cone is firmly connected with the actuator spindle. When the valve cone is in the one extreme position by draw on the spindle, connection A-AB is kept fully open and connection B-AB is fully closed. In the other extreme position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## FEATURES

- Soft-seat makes the valve 99.99% tight between port AB-B for energy savings
- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

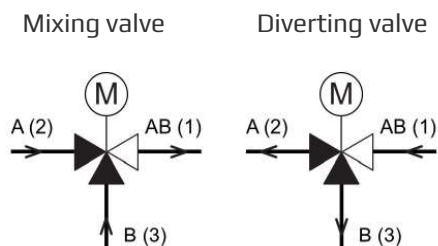




### MOUNTING

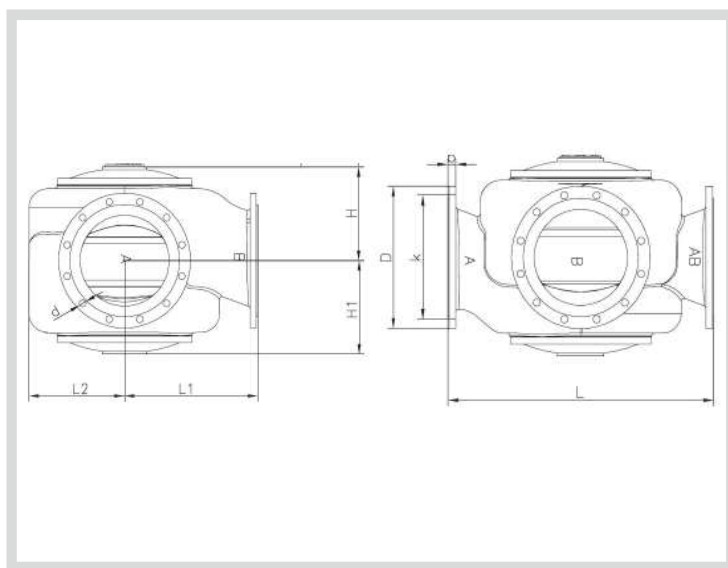
The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745mm for pneumatic actuators.

### PORT NUMBERING



Port AB (1) common port always open  
 Port A (2) closes at load on spindle  
 Port B (3) opens at load on spindle

### DIMENSION SKETCH



### SPECIFICATIONS

DN	Flange connection DN in mm	Opening (mm)	k <sub>vs</sub> -value m <sup>3</sup> /h	Lifting height (mm)	Weight (kg)
80	80	80	80	11	35
100	100	100	125	13	44
125	125	125	215	18	72
150	150	150	310	22	111
200/175	200	200	425	23	165
200	200	200	555	29	160
300/250	300	300	865	31	306
300	300	300	1250	45	306

The stated kvs values apply for mixing valves. Diverting valves: 0.86 x (kvs -values for mixing valves)

DN	L (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	b (mm)	EN 1092-2			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
80	310	155	102	117	127	19	200	160	19x(8)	185	150	19x(8)
100	350	175	112	132	141	19	220	180	19x(8)	210	175	19x(8)
125	400	240	138	181	171	19	250	210	19x(8)	250	210	23x(8)
150	480	270	165	216	189	24	285	240	23x(8)	280	240	23x(8)
200/175	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
200	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
300/250	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)
300	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)

# 3-way Control Valve type Low Leakage (INVERTED)

Nodular Cast Iron, PN16, DN 80 – 300 mm / PN10, DN300/250 mm

0-2.5.14.01-A

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no 1.4436)
- O-ring	<b>A75H- Gasket</b> Reinz-AFM34

### Nominal pressure

- DN 80-200	PN 16 (max.150°C)
- DN 300/250-300	PN 10 (max.150°C)
- DN 80-300	JIS 10K (option)

Seats 2 balanced single seats

Flow characteristic Almost linear

Leakage Port AB-B 0.0%

Flanges According to EN 1092-2,

PN 16 & PN 10

- Option: According to JIS B 2210 10K

Regulating capability Kvs/Kvr > 25

### Note!

Valve DN 200/175 has outer measures and flanges drilled as valve DN 200. Valve DN 300/250 has outer measures and flanges drilled as valve DN 300

### Counter flanges (suggested for EN 1092-2)

- DN 80-200: DIN 2633 – PN 16

- DN 300/250-300: DIN 2632 – PN 10

Soft seat with O-ring

Leakage class IV

Subject to change without notice.

## APPLICATIONS

Control valves type Low Leakage are designed for regulating of load dependant cylinder liner (LDCL), cooling water systems. The valve is designed with inverted ports for application with common port on the left side.

## DESIGN

The valve components (seats and cone) are made of alubronzel, the spindle of stainless steel. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2 (JIS B 2210 option). The valve has two balanced single seats and the port AB-B is designed 100 % tight.

## FUNCTION

The valve cone is firmly connected with the actuator spindle.

When the valve cone is in the one extreme position by draw on the spindle, connection A-AB is kept fully open and connection B-AB is fully closed.

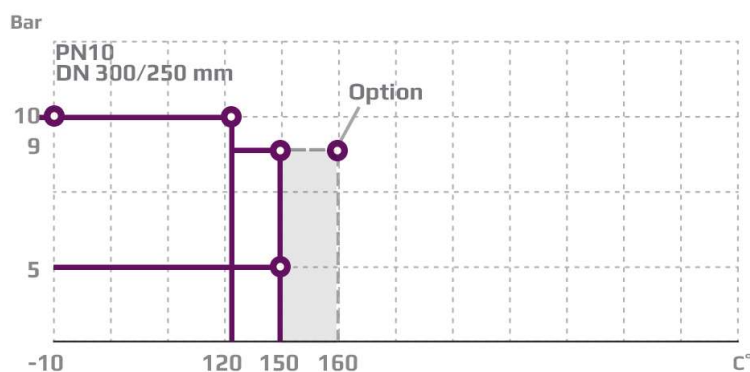
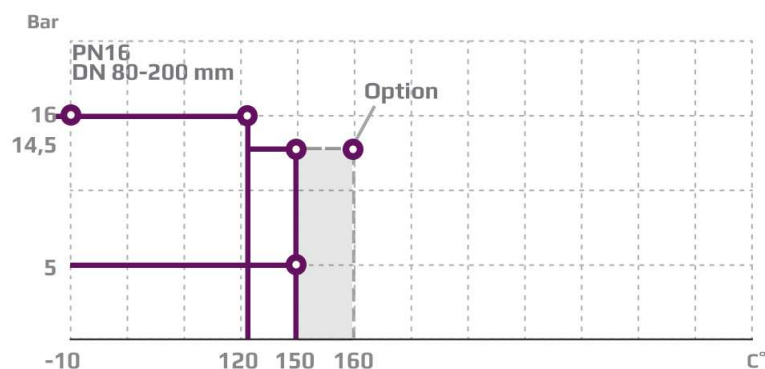
In the other extreme position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## FEATURES

- Soft-seat makes the valve 99.99% tight between port AB-B for energy savings
- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Common port AB on the left side

## PRESSURE/TEMPERATURE DIAGRAM

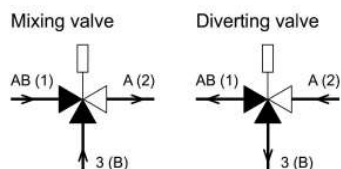
According to DIN 2401



## MOUNTING

The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

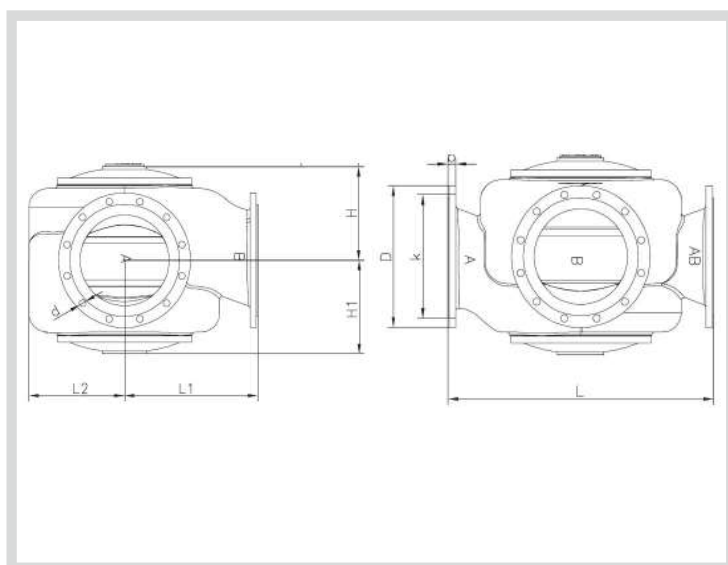
## PORT NUMBERING



Port AB(1)  
Port A(2)  
Port 3(B)

common port always open  
closes at load on spindle  
opens at load on spindle

## DIMENSION SKETCH



## SPECIFICATIONS

DN	Flange connection DN in mm	Opening (mm)	$k_{vs}$ -value $m^3/h$	Lifting height (mm)	Weight (kg)
80	80	80	80	11	35
100	100	100	125	13	44
125	125	125	215	18	72
150	150	150	310	22	111
200/175	200	200	425	23	165
200	200	200	555	29	160
300/250	300	300	865	31	306
300	300	300	1250	45	306

<sup>1)</sup>The stated  $k_{vs}$  values apply for mixing valves. Diverting valves:  $0.86 \times (k_{vs} \text{ -values for mixing valves})$

DN	L (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	b (mm)	EN 1092-2			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
80	310	155	102	117	127	19	200	160	19x(8)	185	150	19x(8)
100	350	175	112	132	141	19	220	180	19x(8)	210	175	19x(8)
125	400	240	138	181	171	19	250	210	19x(8)	250	210	23x(8)
150	480	270	165	216	189	24	285	240	23x(8)	280	240	23x(8)
200/175	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
200	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
300/250	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)
300	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)

# 3-way Control Valve type G3FA

Nodular cast iron, PN16, DN 80 – 300 mm / PN10, DN300/250 mm

O-2.5.16-A

Page 1 of 2



## APPLICATIONS

Control valves type G3FA are designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations, e.g. cooling of main and auxiliary engines. Is used in conjunction with Clorius valve motor type AVM/AVF 234 or Clorius pneumatic actuators.

## DESIGN

The valve components (seats and cone) are made of alubronze, the spindle of stainless steel. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2 (JIS B 2210 option). Tight between port 1(AB) og 3(B) is optional.

## FUNCTION

The valve cone is firmly connected with the motor spindle. When the valve cone is in the one extreme position by draw on the spindle, connection A-AB is kept fully open and connection B-AB is fully closed. In the other extreme position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Nodular cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no 1.4436)
- O-ring	A75H
- Gasket	Reinz-AFM34
<b>Nominal pressure</b>	
- 80-200 G3FA:	PN 16 (max.120/160°C)
- 300/250-300 G3FA:	PN 10 (max 120/160°C)
- 80-300 G3FA:	JIS 10K (option)
<b>Seats</b>	2 balanced single seats
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	≤ 0.5%
<b>Regulating capability</b>	Kvs/Kvr > 25
<b>Flanges</b>	According to EN 1092-2, PN 16 & PN 10
- Option:	According to JIS B 2210 10K

### Note !

Valve type 200/175 G3FA has outer measures and flanges drilled as valve type 200 G3FA. Valve type 300/250 G3FA has outer measures and flanges drilled as valve type 300 G3FA.

### Counter flanges (suggested for EN 1092-2)

- 80-200 G3FA:	DIN 2633 – PN 16
- 300/250-300 G3FA:	DIN 2632 – PN 10

### For cooling and heating purposes

#### Important note

In case the valves are applied as diverting valves, the pressure drop will increase by 35% and the kvs-value will decrease by 14% as against mixing valves.

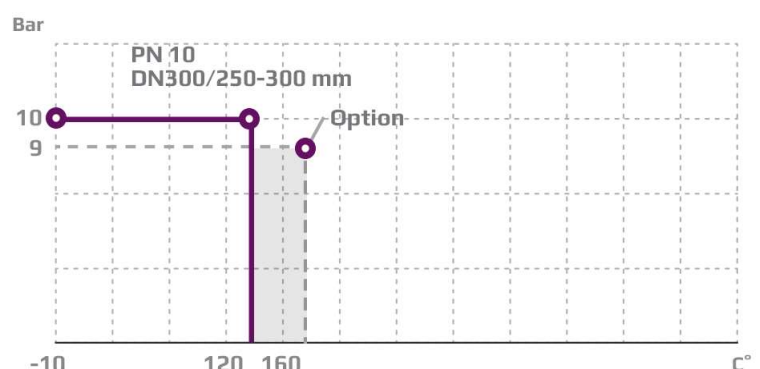
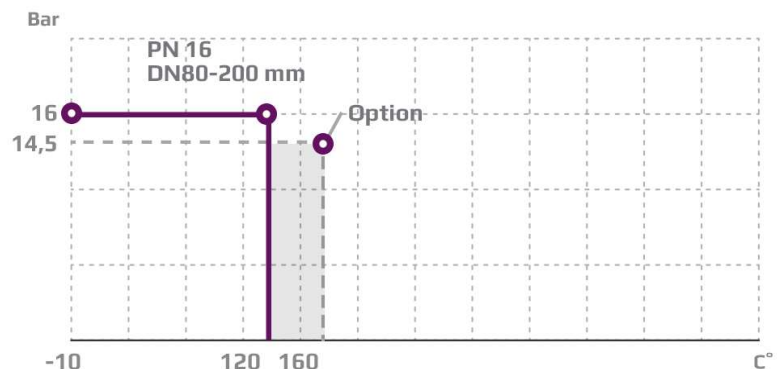
Subject to change without notice.

## FEATURES

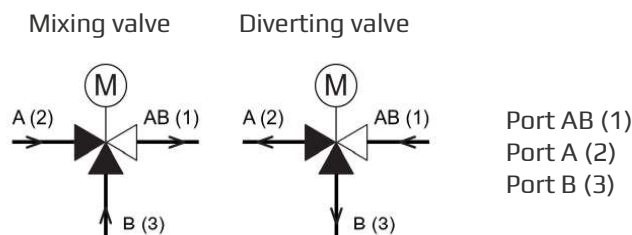
- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



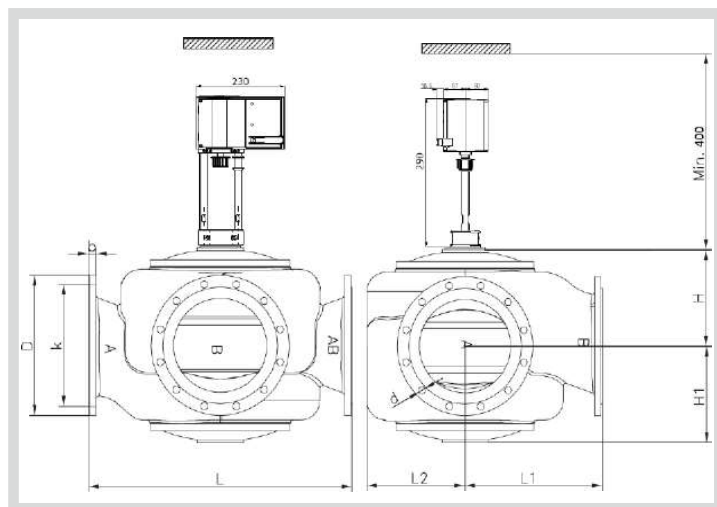
common port always open  
closes at load on spindle  
opens at load on spindle



## MOUNTING

The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

## DIMENSION SKETCH



## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value <sup>1)</sup> m <sup>3</sup> /h	Lifting height mm	Weight kg
80 G3FA	80	80	80	11	35
100 G3FA	100	100	125	13	44
125 G3FA	125	125	215	18	72
150 G3FA	150	150	310	20	111
200/175 G3FA	200	200	425	22	165
200 G3FA	200	200	555	28	160
300/250 G3FA	300	300	865	28	306
300 G3FA	300	300	1250	45	290

1) The stated kvs values apply for mixing valves. Diverting valves: 0.86 x (kvs-values for mixing valves).

Type	EN 1092-2							JIS B 2210 10				
	L mm	L1 mm	L2 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)	D (dia.) mm	k (dia.) mm	d mm dia. (number)
80 G3FA	310	155	102	117	127	19	200	160	19x(8)	185	150	19x(8)
100 G3FA	350	175	112	132	141	19	220	180	19x(8)	210	175	19x(8)
125 G3FA	400	240	138	181	171	19	250	210	19x(8)	250	210	23x(8)
150 G3FA	480	270	165	216	189	24	285	240	23x(8)	280	240	23x(8)
200/175 G3FA	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
200 G3FA	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
300/250 G3FA	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)
300 G3FA	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)

# 3-way Control Valve type G3FA-HT

Nodular cast iron, PN 16, DN 80 – 200 mm / PN 10, DN 300/250 – 300 mm

**HIGH TEMPERATURE (TEFLON GRAPHITE SEALING)**

0-2.5.17.01-B

Page 1 of 2



## APPLICATIONS

Control valves type G3FA-HT are designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations, e.g. cooling of main and auxiliary engines. The valve is used in conjunction with Clorius valve motor type MT90 Marine.

## DESIGN

The valve components (seats and cone) are made of alubronze, the spindle of stainless steel. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2.

## FUNCTION

The valve cone is firmly connected with the motor spindle. When the valve cone is in the one extreme position by draw on the spindle, connection A-AB is kept fully open and connection B-AB is fully closed. In the other extreme position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## TECHNICAL DATA

### Materials:

- Valve body	Nodular cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no 1.4436)
- O-ring	A75H
- Gasket	Reinz-AFM34

### Nominal pressure

- 80-200 G3FA-HT:	PN 16 (max.120/150°C)
- 300/250-300 G3FA-HT:	PN 10 (max.120/150°C)

Seats 2 balanced single seats

Flow characteristic Almost linear

Leakage rate  $\leq 0.5\%$

Regulating capability Kvs/Kvr > 25

Flanges According to EN 1092-2,  
PN 16 & PN 10

### Note !

Valve type 200/175 G3FA has outer measures and flanges drilled as valve type 200 G3FA. Valve type 300/250 G3FA has outer measures and flanges drilled as valve type 300 G3FA.

### Counter flanges (suggested for EN 1092-2)

- 80-200 G3FA-HT:	DIN 2633 – PN 16
- 300/250-300 G3FA-HT:	DIN 2632 – PN 10

For cooling and heating purposes

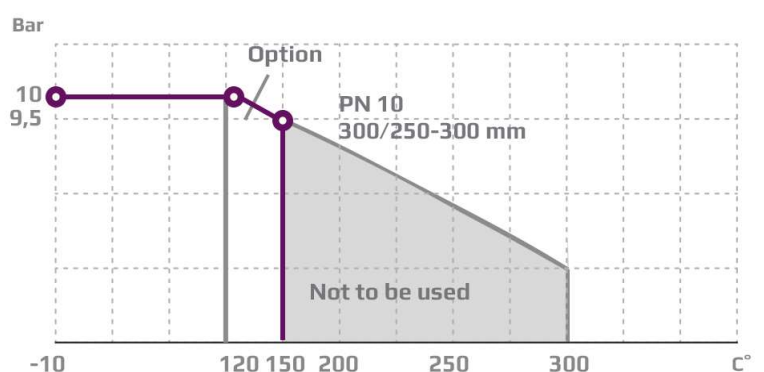
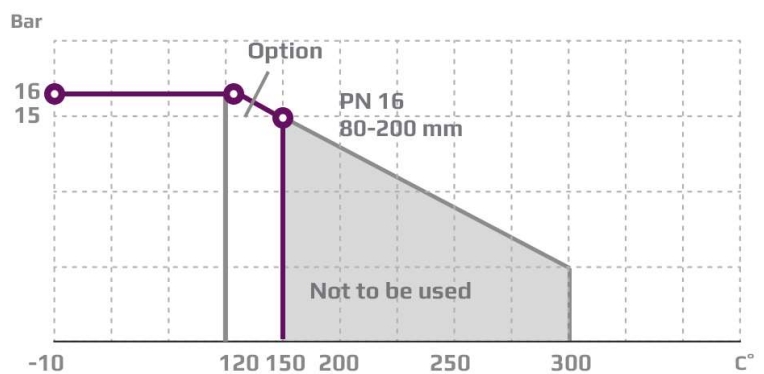
Subject to change without notice.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

## PRESSURE/TEMPERATURE DIAGRAM

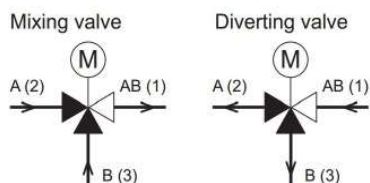
According to DIN 2401





## PORT NUMBERING

The ports of valves type G3FA-HT are marked with the letters AB, A and B. The letters in parentheses refer to the corresponding internationally adapted designations.



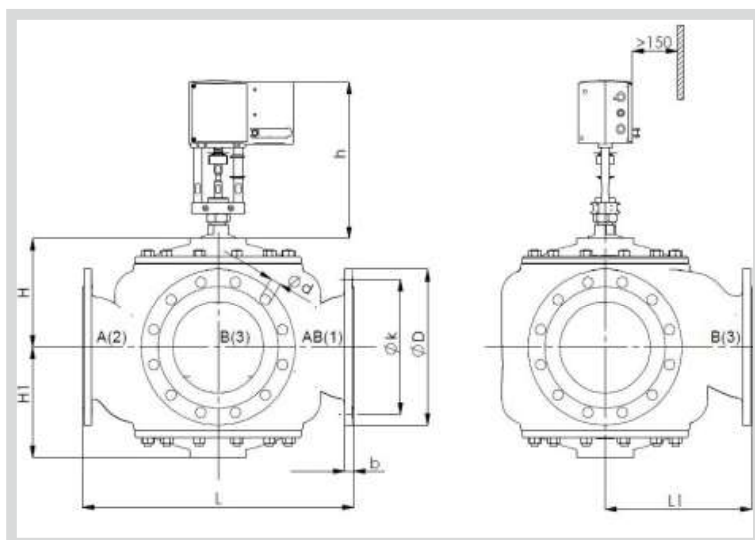
Port AB (1)  
Port A (2)  
Port B (3)

common port always open  
closes at load on spindle  
opens at load on spindle

## MOUNTING

The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

## DIMENSION SKETCH



Type	L mm	L1 mm	H mm	H1 mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
80 G3FA-HT	310	155	117	127	19	200	160	19x(8)
100 G3FA-HT	350	175	132	141	19	220	180	19x(8)
125 G3FA-HT	400	240	181	171	19	250	210	19x(8)
150 G3FA-HT	480	270	216	189	24	285	240	23x(8)
200/175 G3FA-HT	600	325	238	238	20	340	295	23x(12)
200 G3FA-HT	600	325	238	238	20	340	295	23x(12)
300/250 G3FA-HT	850	450	305	305	25	445	400	23x(12)
300 G3FA-HT	850	450	305	305	25	445	400	23x(12)

## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value <sup>1)</sup> m <sup>3</sup> /h	Lifting height mm	Weight kg
80 G3FA-HT	80	80	80	11	35
100 G3FA-HT	100	100	125	13	44
125 G3FA-HT	125	125	215	18	72
150 G3FA-HT	150	150	310	20	111
200/175 G3FA-HT	200	200	425	22	165
200 G3FA-HT	200	200	555	28	160
300/250 G3FA-HT	300	300	865	28	306
300 G3FA-HT	300	300	1250	45	290

<sup>1)</sup> The stated kvs values apply for mixing valves. Diverting valves: 0.86 x (kvs-values for mixing valves).



# 3-way Control Valve type G3FA-I

Nodular cast iron, DN 80 - 200 mm - PN 16, DN 300/250 and 300 mm - PN 10

(PORTS A-AB INTERCHANGED)

O-2.5.18-A



## APPLICATIONS

Control valves type G3FA-I are designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with large industrial processes, district heating and marine installations, e.g. cooling of main and auxiliary en-gines. Is used in conjunction with Clorius valve motor type AVM/F 234 or Clorius pneumatic actuators

## DESIGN

The valve components (seats and cone) are made of alubronze, the spindle of stainless steel. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2 (JIS B 2210 option).

## FUNCTION

The valve cone is firmly connected with the motor spindle. When the valve cone is in the one extreme position by draw on the spindle, connection B-AB is kept fully open and connection A-AB is fully closed. In the other extreme position connection B-AB is fully closed and connection A-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Nodular cast iron EN-GJS-400-15
- Seats and cone	Alu Bronze CuAL10Fe5Ni5
- Spindle	Stainless steel (W.no 1.4436)
- O-ring	A75H
- Gasket	Reinz-AFM34
<b>Nominal pressure</b>	
- 80-200 G3FA-I:	PN 16 (max.120/160°C)
- 300/250-300 G3FA-I:	PN 10 (max 120/160°C)
- 200/175-300 G3FA-I:	JIS 10K (option)
<b>Seats</b>	2 balanced single seats
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	≤ 0.5%
<b>Regulating capability</b>	Kvs/Kvr > 25
<b>Flanges</b>	According to EN 1092-2, PN 16 & PN 10
- Option:	According to JIS B 2210 10K

### Note !

Valve type 200/175 G3FA-I has outer measures and flanges drilled as valve type 200 G3FA-I.

Valve type 300/250 G3FA-I has outer measures and flanges drilled as valve type 300 G3FA-I.

### Counter flanges (suggested for EN 1092-2)

- 80-200 G3FA-I:	DIN 2633 – PN 16
- 300/250-300 G3FA-I	DIN 2632 – PN 10

### For cooling and heating purposes

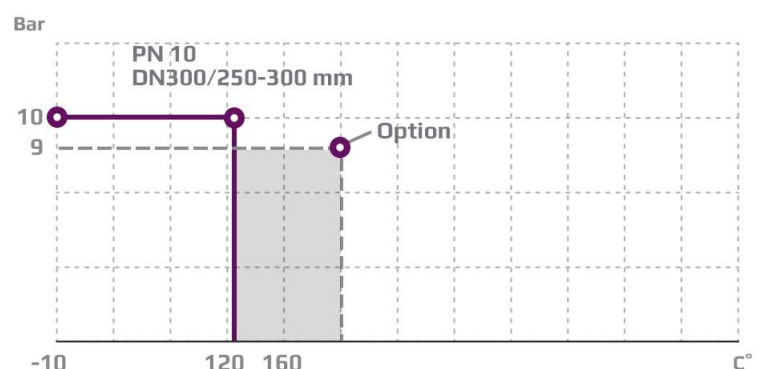
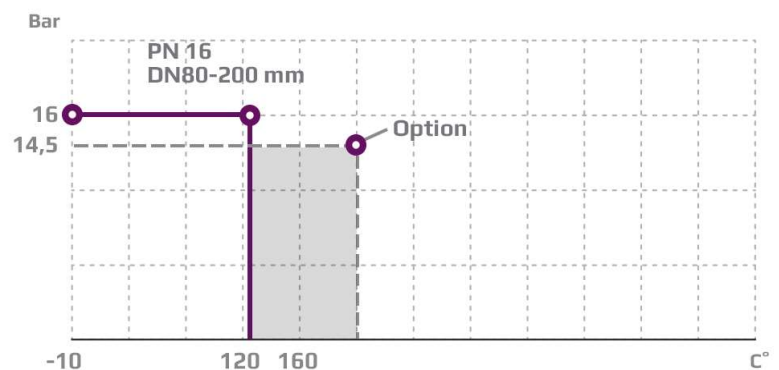
Subject to change without notice.

## FEATURES

- Can be used for both mixing and diverting
- Simple design secures reliable controls and reduces costly downtime.
- Location of the pack box in the actuator makes the valve service friendly

## PRESSURE/TEMPERATURE DIAGRAM

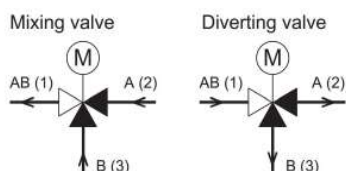
According to DIN 2401





## PORT NUMBERING

The ports of valves type G3FA-I are marked with the letters AB, A and B. The letters in parentheses refer to the corresponding internationally adapted designations.



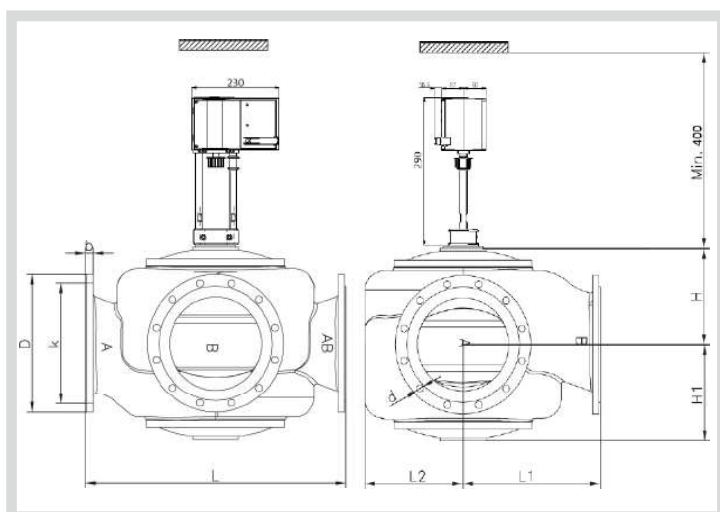
Port AB (1)  
Port A (2)  
Port B (3)

common port always open  
opens at load on spindle  
closes at load on spindle

## MOUNTING

The valves can be installed vertical as well as horizontal. The valves must be mounted in a way that the valve motor will be exposed to a minimum of moisture and unnecessary vibrations. Free height above / below the valve must be minimum 400 mm for mounting and operation of the AVM/AVF 234 motor, otherwise minimum 745 mm for pneumatic actuators.

## DIMENSION SKETCH



## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value <sup>(1)</sup> m <sup>3</sup> /h	Lifting height mm	Weight kg
80 G3FA-I	80	80	80	11	35
100 G3FA-I	100	100	125	13	44
125 G3FA-I	125	125	215	18	72
150 G3FA-I	150	150	310	20	111
200/175 G3FA-I	200	200	425	22	165
200 G3FA-I	200	200	555	28	160
300/250 G3FA-I	300	300	865	28	306
300 G3FA-I	300	300	1250	45	290

1) The stated  $k_{vs}$  values apply for mixing valves. Diverting valves:  $0.86 \times (k_{vs}\text{-values for mixing valves})$ .

Type	L mm	L1 mm	L2 mm	H mm	H1 mm	b mm	EN 1092-2			JIS B 2210 10K		
							D (dia.) mm	k (dia.) mm	d mm dia. (number)	D (dia.) mm	k (dia.) mm	d mm dia. (number)
80 G3FA-I	310	155	102	117	127	19	200	160	19x(8)	185	150	19x(8)
100 G3FA-I	350	175	112	132	141	19	220	180	19x(8)	210	175	19x(8)
125 G3FA-I	400	240	138	181	171	19	250	210	19x(8)	250	210	23x(8)
150 G3FA-I	480	270	165	216	189	24	285	240	23x(8)	280	240	23x(8)
200/175 G3FA-I	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
200 G3FA-I	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
300/250 G3FA-I	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)
300 G3FA-I	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)



# 3-way Control Valve type G3FA Soft Seat/Low Leakage

Nodular Cast Iron, PN16, DN 80 – 200 mm / PN10, DN300/250 - 300 mm

0-2.5.19-B

Page 1 of 2



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Nodular cast iron EN-GJS-400-15
-Color	RAL 7016 (anthracite grey)
- Seats and cone	Aluminum Bronze CuAL10Fe5Ni5
- Spindle	CuAL10Fe5Ni5 (W.no 1.4436)
- O-ring	A75H
- Gasket	Reinz-AFM34
<b>Nominal pressure</b>	
- 80-200 G3FA:	PN 16 (max.120/160°C)
- 300/250-300 G3FA:	PN 10 (max. 120/160°C)
- 80-300 G3FA:	JIS 10K (option)
<b>Seats</b>	2 balanced single seats
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	≤ 0.01%
<b>Regulating capability</b>	Kvs/Kvr > 25
<b>Flanges</b>	<b>According to</b> EN 1092-2, PN 16 & PN 10
- Option:	According to JIS B 2210 10K

### Note !

Valve type 200/175 G3FA has outer measures and flanges drilled as for valve type 200 G3FA. Valve type 300/250 G3FA has outer measures and flanges drilled as valve type 300 G3FA.

### Counter flanges (suggested for EN 1092-2)

- 80-200 G3FA:	DIN 2633 – PN 16
- 300/250-300 G3FA:	DIN 2632 – PN 10

### For cooling and heating purposes

#### Important note

If the valves are applied as diverting valves, the pressure drop will increase by 35% and the Kvs-value will decrease by 14% compared with mixing valves.

Subject to change without notice.

## APPLICATIONS

G3FA soft seat control valves are designed for regulating of low and high temperature cooling systems for marine engines.

## DESIGN

The valve components (seats, cone and spindle) are made of aluminum bronze. The valve body is made of nodular cast iron and the valve flanges are drilled according to EN 1092-2 (JIS B 2210 option). The valve has two balanced single seats and the design of port AB-B is 100 % tight.

## FUNCTION

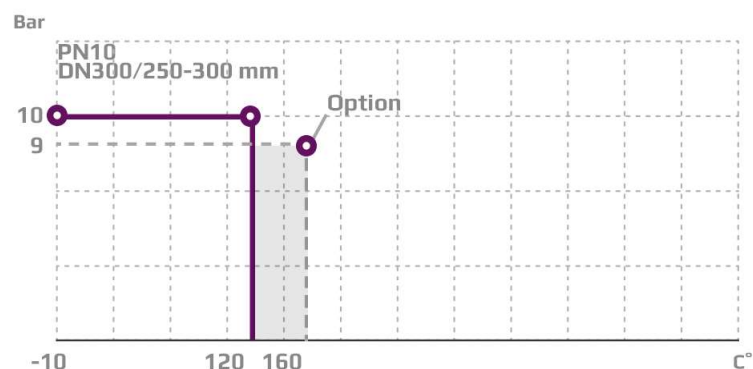
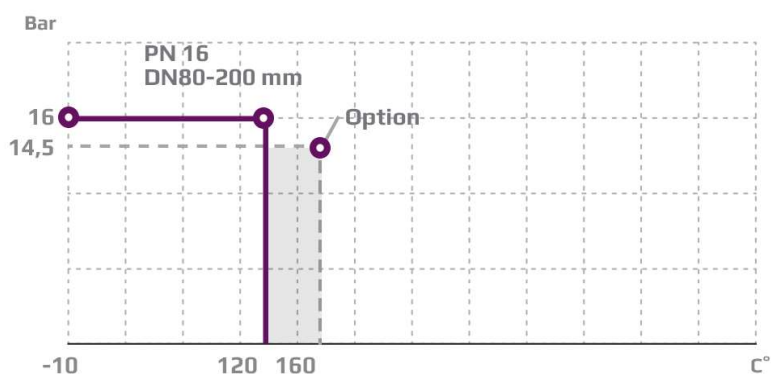
The valve cone is firmly connected to the actuator spindle. When the valve cone is located in one extreme position by drawing on the spindle, port A-AB is kept fully open and port B-AB is fully closed. In the other extreme position port A-AB is fully closed and port B-AB is fully open. In the intermediate positions the opening degrees change proportionally.

## FEATURES

- Soft-seat makes the valve 99.99% tight between port AB-B for energy savings
- Can be used for both mixing and diverting
- Simple design endures reliable control and reduces costly downtimes
- Designed for linear electric actuators

## PRESSURE/TEMPERATURE DIAGRAM

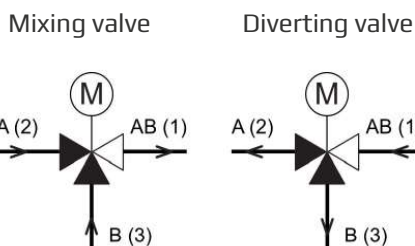
According to DIN 2401



## MOUNTING

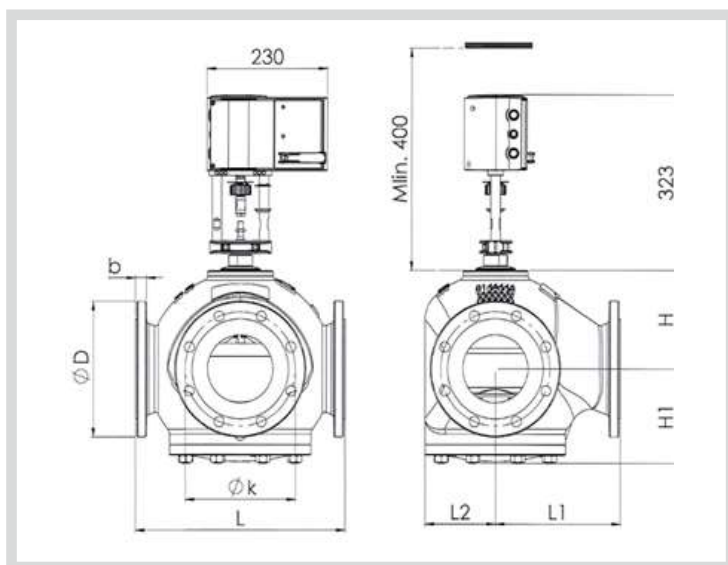
The valves can be installed both vertically and horizontally. The valves must be mounted in such a way that the valve motor is exposed to minimal moisture and unnecessary vibrations. Free height above / below the valve must be a minimum 400 mm to mount and operate of the AVM/AVF 234 motor.

## PORT NUMBERING



Port AB (1) common port always open  
 Port A (2) closes for load on spindle  
 Port B (3) opens for load on spindle

## DIMENSION SKETCH



## SPECIFICATIONS

Type	Flange connection DN in mm	Opening mm	$k_{vs}$ -value <sup>1)</sup> m <sup>3</sup> /h	Lifting height mm	Weight kg
80 G3FA	80	80	80	11	35
100 G3FA	100	100	125	13	44
125 G3FA	125	125	215	18	72
150 G3FA	150	150	310	20	111
200/175 G3FA	200	200	425	22	165
200 G3FA	200	200	555	28	160
300/250 G3FA	300	300	865	28	306
300 G3FA	300	300	1250	45	290

1) The stated  $k_{vs}$  values apply for mixing valves. Diverting valves: 0.86 x ( $k_{vs}$ -values for mixing valves).

Type	L mm	L1 mm	L2 mm	H mm	H1 mm	b mm	EN 1092-2			JIS B 2210 10		
							D (dia.) mm	k (dia.) mm	d mm dia. (number)	D (dia.) mm	k (dia.) mm	d mm dia. (number)
80 G3FA	310	155	102	117	127	19	200	160	19x(8)	185	150	19x(8)
100 G3FA	350	175	112	132	141	19	220	180	19x(8)	210	175	19x(8)
125 G3FA	400	240	138	181	171	19	250	210	19x(8)	250	210	23x(8)
150 G3FA	480	270	165	216	189	24	285	240	23x(8)	280	240	23x(8)
200/175 G3FA	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
200 G3FA	600	325	230	238	238	20	340	295	23x(12)	330	290	23x(12)
300/250 G3FA	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)
300 G3FA	850	450	325	305	305	25	445	400	23x(12)	445	400	25x(16)

# 3-way Control Valve type G3FM-TR (AB-Right)

Nodular cast iron, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

0-2.6.02-x

Page 1 of 4



## TECHNICAL DATA

### Materials:

- Valve body, slide	Nodular cast iron EN-GJS-400-15
- O-ring	NBR 70A
- U-ring	PTFE
Flow characteristic	Almost linear
Leakage rate	Max. 0.5%
Regulating capability	Kvs/Kvr > 25

Flanges	EN 1092-2 PN 10/16/25
---------	--------------------------

- Option	JIS B 2210 5K
Counter flanges (suggested for EN 1092-2)	
DIN 2632 – PN 10	
DIN 2633 – PN 16	
DIN 2634 – PN 25	

### Max. pressure $\Delta p_L$ , against which the valve can close:

- DN 65 - 125	25 bar
- DN 150-300	16 bar
- DN 350-800	10 bar

### Nominal pressure

- DN 65-125 mm	PN 25 max. 100 °C (option 250°C)
- DN 150-300 mm	PN 16, max. 100°C (option 250°C)
- DN 350-800 mm	PN 10, max. 100°C (option 250°C)
- DN 150-800 mm	JIS 5K (option)

### Slide in Nodular cast iron

Subject to change without notice.

## APPLICATIONS

Control valve type G3FM-TR is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 (JIS B 2210 option).

## FUNCTION

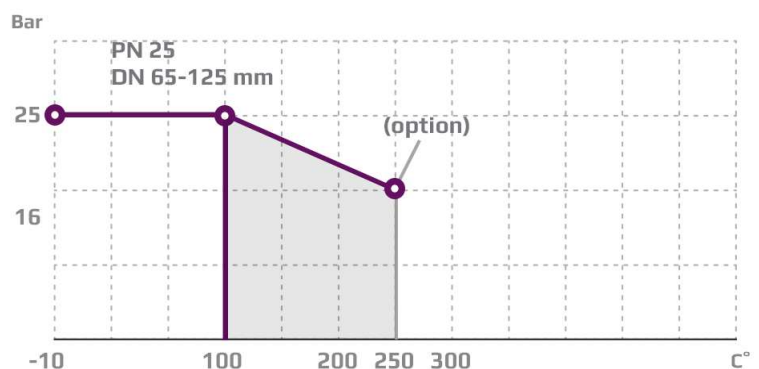
The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings.
- Flexible choice of port placement

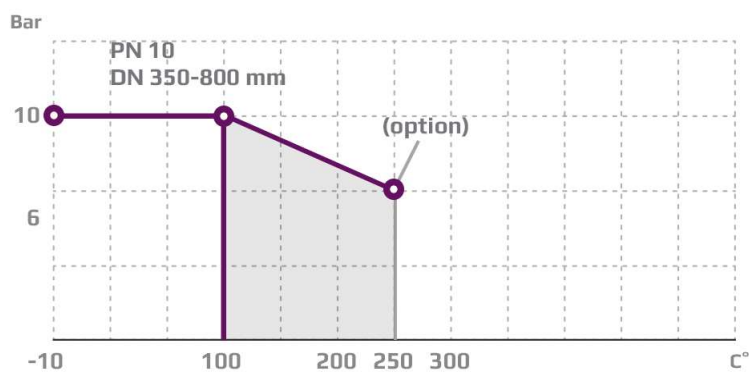
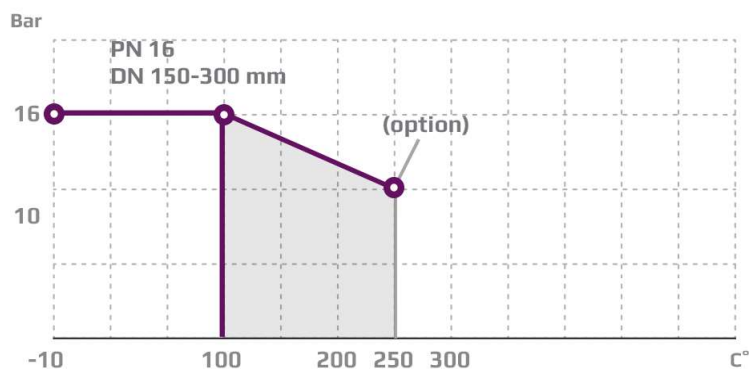
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

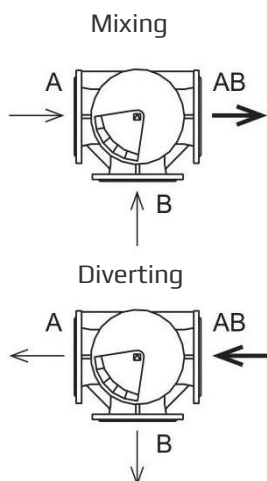


## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



## MOUNTING

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

Valves can also be supplied in AB-Left configuration (data sheet 2.6.03) and AB-Middle (data sheet 2.6.03.02).



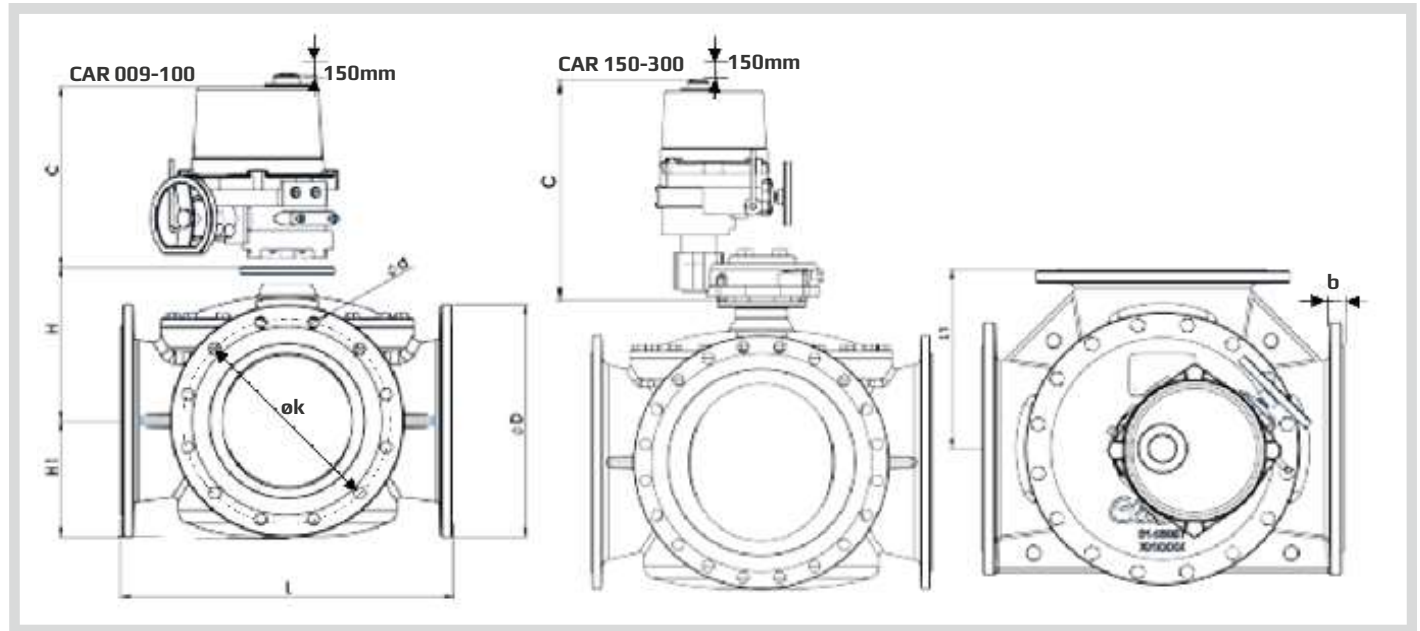
# 3-way Control Valve type G3FM-TR (AB-Right)

Nodular cast iron, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.6.02-X

Page 3 of 4

## DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 G3FM-TR	292	146	135	92	19	273	185	145	19x(8)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 G3FM-TR	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TR	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TR	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TR	437	218.5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TR	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TR	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TR	649	324.5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TR	717	358.5	334.5	251.5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TR	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TR	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 G3FM-TR	900	450	421	335	27	556	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 G3FM-TR	900	450	421	335	27	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 G3FM-TR	918	459	470	354	31	556	780	725	31x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 G3FM-TR	1050	525	534	426	37	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
800 G3FM-TR	1230	615	596	461	53	556	1085	990	34x(24) 50x(24) PN25	-	-	-	995	930	33x(24)	1020	950	33x(28)

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
65 G3FM-TR	65	95	120	60	26
80 G3FM-TR	80	122	154	65	29
100 G3FM-TR	100	175	220	120	41
125 G3FM-TR	125	245	330	200	58
150 G3FM-TR	150	395	425	200	71
200 G3FM-TR	200	800	1100	330	114
250 G3FM-TR	250	1500	2100	525	159
300 G3FM-TR	300	2000	2650	730	207
350 G3FM-TR	350	2530	3380	980	278
400 G3FM-TR	400	3050	3950	1370	346
450 G3FM-TR	450	3680	4480	1550	433
500 G3FM-TR	500	4150	5250	1920	563
550 G3FM-TR	550	4150	5250	1920	575
600 G3FM-TR	600	4800	6050	2950	816
650 G3FM-TR	650	6700	7800	TBC	1050
800 G3FM-TR	800	6200	8000	4000	2100

<sup>1)</sup> $k_{vs}$ -value for port A and B 50% open.

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-300 = 16 Bar

DN 350-800 = 10 Bar





# 3-way Control Valve type G3FM-TL (AB-Left)

Nodular cast iron, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.6.03-I

Page 1 of 4



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body, slide	Nodular cast iron EN-GJS-400-15
- O-ring	NBR 70A
- U-ring	PTFE
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	Max. 0.5%
<b>Regulating capability</b>	Kvs/Kvr > 25

<b>Flanges</b>	EN 1092-2 PN 10/16
- Option	JIS B 2210 5K

### Counter flanges (suggested for EN 1092-2)

DIN 2632 – PN 10

DIN 2633 – PN 16

### Max. pressure $\Delta p_L$ , against which the valve can close:

- DN 65 - 125	25 bar
- DN 150-300	16 bar
- DN 350-800	10 bar

### Nominal pressure

- DN 65-125 mm	PN 25 max. 100 °C (option 250 °C)
- DN 150-300 mm	PN 16, max. 100 °C (option 250 °C)
- DN 350-800 mm	PN 10, max. 100 °C (option 250 °C)
- DN 150-800 mm	JIS 5K (option)

Slide in Nodular cast iron

## APPLICATIONS

Control valve type G3FM-TL is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 (JIS B 2210 option).

## FUNCTION

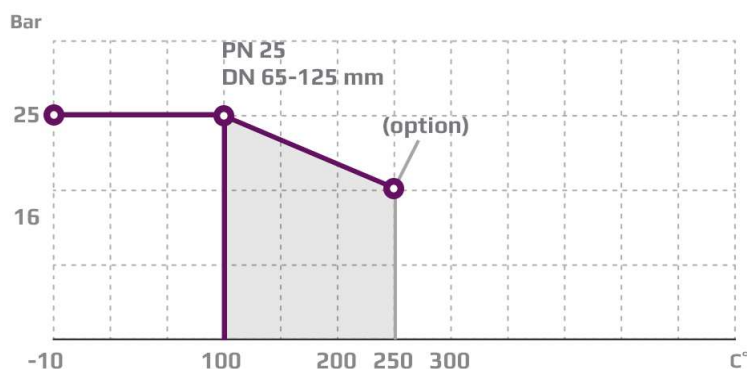
The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings.
- Flexible choice of port placement

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

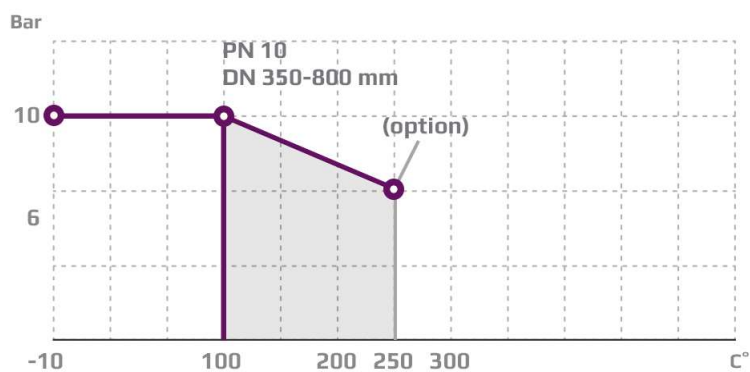
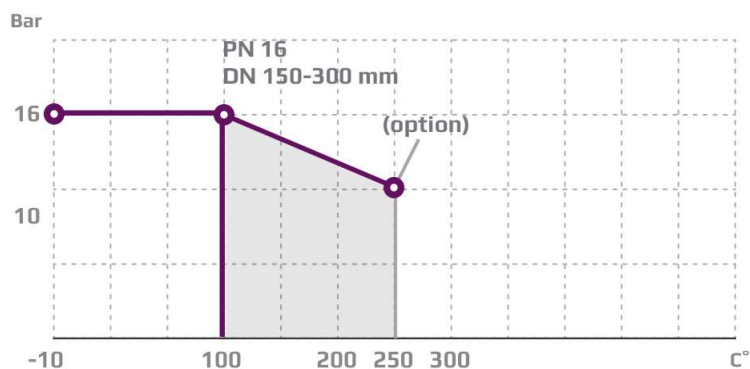


Subject to change without notice.

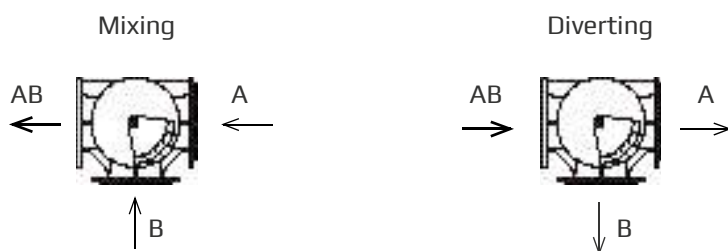


## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



## MOUNTING

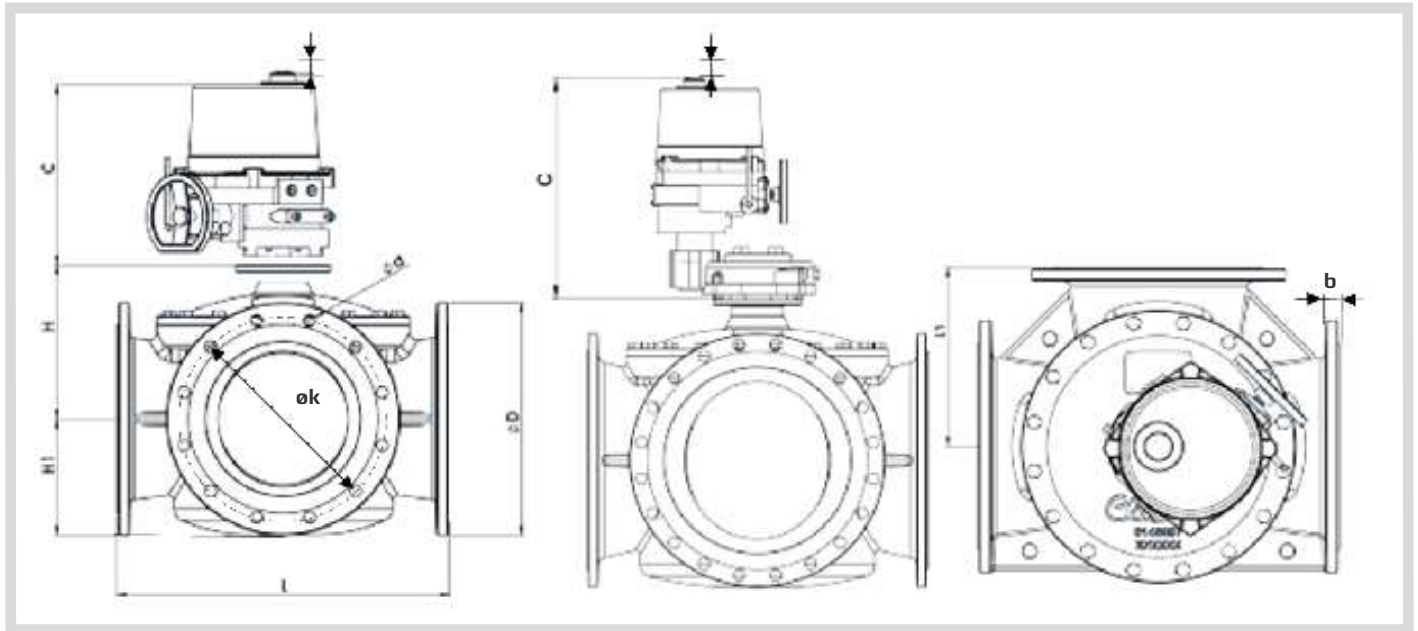
The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations. Valves can also be supplied in AB-Right configuration (data sheet 0.2.6.02).

# 3-way Control Valve type G3FM-TL (AB-Left)

Nodular cast iron, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.6.03-I

Page 3 of 4



Type	EN 1092-2						ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K					
	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 G3FM-TR	292	146	135	92	19	273	185	145	19x(8)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 G3FM-TR	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TR	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TR	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TR	437	218.5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TR	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TR	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TR	649	324.5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TR	717	358.5	334.5	251.5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TR	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TR	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 G3FM-TR	900	450	421	335	27	556	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 G3FM-TR	900	450	421	335	27	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 G3FM-TR	918	459	470	354	31	556	780	725	31x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 G3FM-TR	1050	525	534	426	37	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
800 G3FM-TR	1230	615	596	461	53	556	1085	990	34x(24) 50x(24) PN25	-	-	-	995	930	33x(24)	1020	950	33x(28)

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
65 G3FM-TL	65	95	120	60	26
80 G3FM-TL	80	122	154	65	29
100 G3FM-TL	100	175	220	120	41
125 G3FM-TL	125	245	330	200	58
150 G3FM-TL	150	395	425	200	71
200 G3FM-TL	200	800	1100	330	114
250 G3FM-TL	250	1500	2100	525	159
300 G3FM-TL	300	2000	2650	730	207
350 G3FM-TL	350	2530	3380	980	278
400 G3FM-TL	400	3050	3950	1370	346
450 G3FM-TL	450	3680	4480	1550	433
500 G3FM-TL	500	4150	5250	1920	563
550 G3FM-TL	550	4150	5250	1920	575
600 G3FM-TL	600	4800	6050	2950	816
650 G3FM-TL	650	6700	7800	TBC	1050
800 G3FM-TL	800	6200	8000	4000	TBC

<sup>(1)</sup> $k_{vs}$ -value for port A and B 50% open.

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-300 = 16 Bar

DN 350-800 = 10 Bar

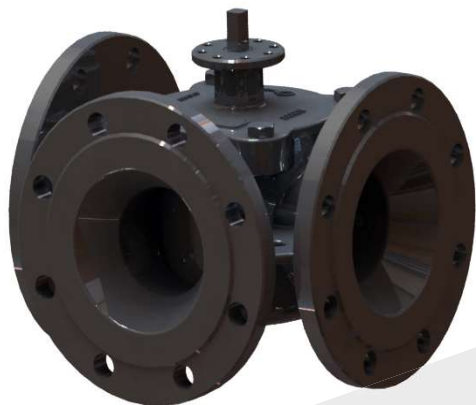


# 3-way Control Valve type G3FMT-ULL (Ultra Low Leakage)

Nodular cast iron, PN10, DN100 - 450 mm

0-2.6.15-G

Page 1 of 4



## APPLICATIONS

Control valve type G3FMT-ULL is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator type VT.

## DESIGN

The valve body and the valve slide are made of nodular cast iron.

The valve flanges are drilled according to EN 1092-2 - option JIS B 2210 5K/10K and ANSI class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open.

In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. PTFE sealing element and O-ring are mounted in the slider groove to minimize leakage.

Connection described for AB-Left valves - reverse connection for AB-Right valves.

This section to be read together with sketches page 2 this data sheet.

## TECHNICAL DATA

### Materials:

- Valve body, slide	Nodular cast iron EN-GJS-400-15
- Sealing element and O-ring	Silicone/PTFE

Flow characteristic Almost linear

Leakage rate ANSI class IV/EN 1349  
< 0.01%

Flanges EN 1092-2 PN 10  
- Option JIS B 2210 5K/10K  
ANSI class 150

Max. pressure  $\Delta p$ , against which the valve can close 5 bar

Nominal pressure PN 10

Design temperature 120°C

Optional temperature 150°C

## FEATURES

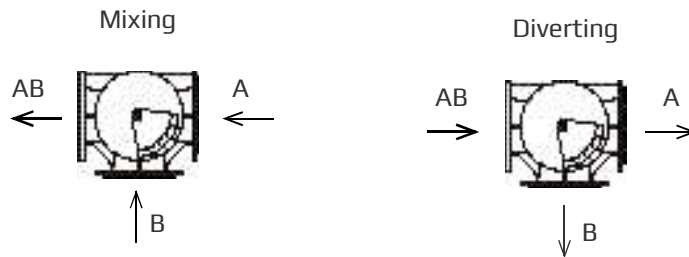
- Simple design secures reliable controls and reduces costly downtime
- Ultra Low Leakage rate secures energy savings - Best in class
- Most compact valve on the market
- Full flexibility on port orientation on AB right or AB left

Subject to change without notice.

**PORT NUMBERING: AB-RIGHT**



**PORT NUMBERING: AB-LEFT**



**MOUNTING**

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

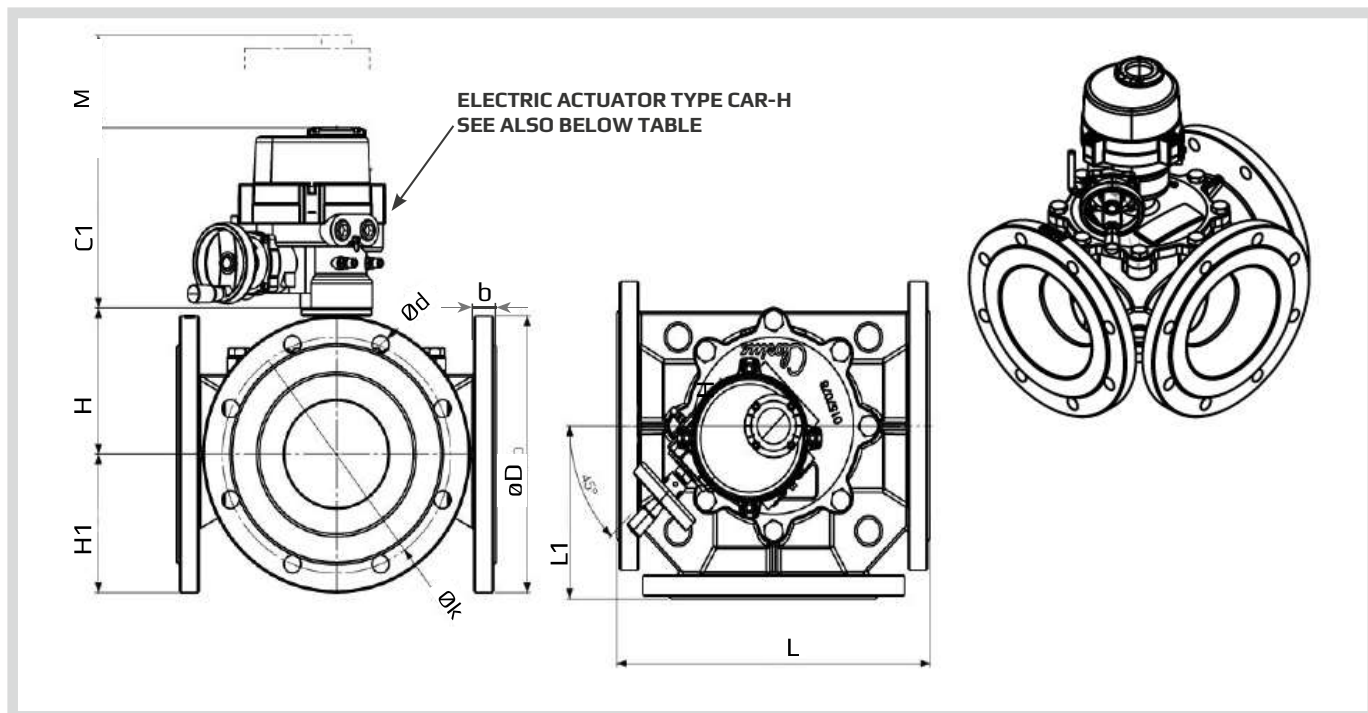
# 3-way Control Valve type G3FMT-ULL (Ultra Low Leakage)

Nodular cast iron, PN10, DN100 - 450 mm

0-2.6.15-G

Page 3 of 4

## DIMENSION SKETCH



**SPECIFICATIONS - TABLE 1** (read this together with table on page 4)

Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C1 (mm)	M (mm)	Electric Actuator Type CAR-H
100 G3FMT-ULL (*HF)	296	148	140	ØD/2	24	223	110	CAR-H 006/010
125 G3FMT-ULL	330	165	140	ØD/2	24	223	110	CAR-H 006/010
125 G3FMT-ULL (JIS5K)	320	160	140	ØD/2	19	223	110	CAR-H 006/010
150 G3FMT-ULL	356	178	149	ØD/2	25,4	223	110	CAR-H 006/010
200 G3FMT-ULL	410	205	182	ØD/2	28,4	261	150	CAR-H 016
200 G3FMT-ULL (**L)	484	242	182	ØD/2	28,4	261	150	CAR-H -016
250 G3FMT-ULL	480	240	202	ØD/2	31	261	150	CAR-H -016
300 G3FMT-ULL (**RF)	580	290	202	ØD/2	32	261	150	CAR-H 016
300 G3FMT-ULL	560	280	237	ØD/2	32	315	180	CAR-H -035
350 G3FMT-ULL	660	330	256	ØD/2	36	315	180	CAR-H 050
400 G3FMT-ULL	720	360	278	ØD/2	38	315	180	CAR-H 050
450 G3FMT-ULL	780	390	314	ØD/2	26	352	195	CAR-H 080

\* High Flow

\*\* Long Version

\*\*\* Reduced Flow

ØD/2 - Depends on flange type (see also table 2)

Subject to change without notice.

SPECIFICATIONS - TABLE 2

Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)
DN300	455	400	23x(12)	483	432	25x(12)	430	390	23x(12)	445	400	25x(16)
DN350	505	460	23x(16)	533	476	29x(12)	480	435	25x(12)	490	445	25x(16)
DN400	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
DN450	620	565	28x(20)	620	578	32x(16)	620	555	25x(16)	620	565	27x(20)

SPECIFICATIONS - TABLE 3

Type	Flange connection DN in mm	KvS m <sup>3</sup> /h**	Torque Nm For inlet P*	Weight kg
DN100 (*HF)	100	270	40	27.9
DN125	125	260	40	34
DN150	150	430	90	42
DN200	200	770	120	67
DN250	250	1.230	150	95
DN300 (***RF)	300	1.190	150	140
DN300	300	2.030	320	130
DN350	350	2.850	418	175
DN400	400	3.760	530	220
DN450	450	4.600	654	227

\*Torque calculated at max  $\Delta P$  for: DN100 - 450 - 5 Bar

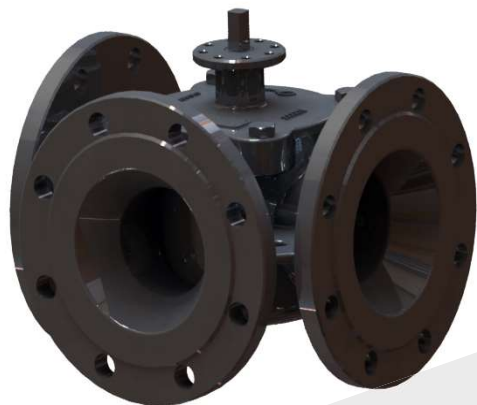
\*\*NOTE: KvS is max. KvS value

# 3-way Control Valve type G3FMT-ULLM Ultra Low Leakage (Middle)

Nodular cast iron, PN10, DN100 - 250 mm

0-2.6.17-A

Page 1 of 4



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body, slide	Nodular cast iron EN-GJS-400-15
- Sealing element and O-ring	Silicone/PTFE
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	ANSI class IV/EN 1349 < 0.01%
<b>Flanges</b>	EN 1092-2 PN 10
- Option	JIS B 2210 5K/10K ANSI class 150
<b>Max. pressure <math>\Delta p</math>, against which the valve can close</b>	5 bar
<b>Nominal pressure</b>	PN 10
<b>Design temperature</b>	120°C
<b>Optional temperature</b>	150°C

## APPLICATIONS

Control valve type G3FMT-ULLM is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator type VT.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 - option JIS B 2210 5K/10K and ANSI class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open.

In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. PTFE sealing element and O-ring are mounted in the slider groove to minimize leakage.

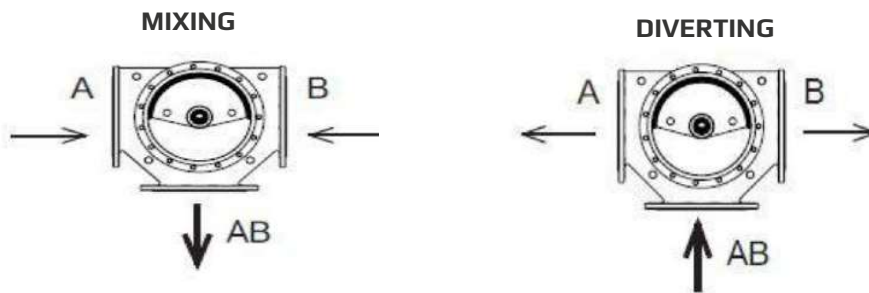
This section to be read together with sketches page 2 this data sheet.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime
- Ultra Low Leakage rate secures energy savings - Best in class
- Most compact valve on the market
- Full flexibility on port orientation

Subject to change without notice.



**PORT NUMBERING: AB-MIDDLE****MOUNTING**

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

1

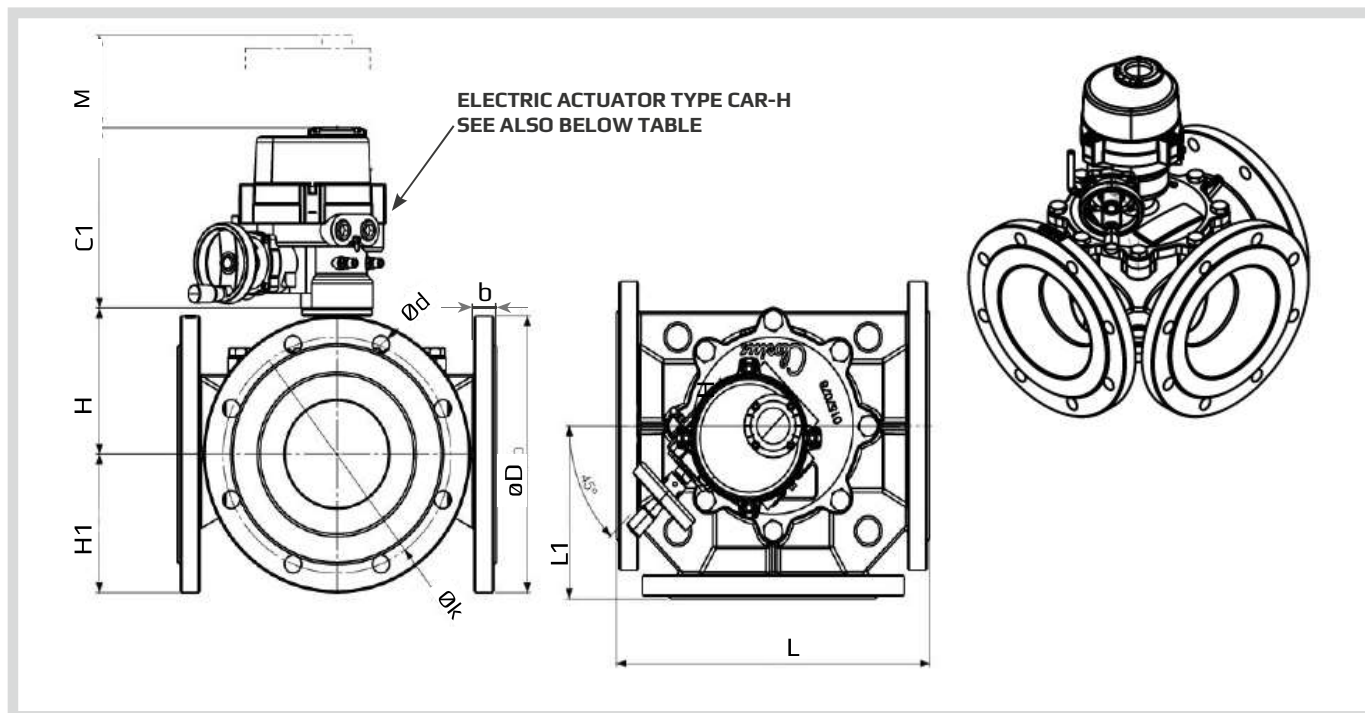
# 3-way Control Valve type G3FMT- ULLM Ultra Low Leakage (Middle)

Nodular cast iron, PN10, DN100 - 250 mm

0-2.6.17-A

Page 3 of 4

## DIMENSION SKETCH



**SPECIFICATIONS - TABLE 1** (read this together with table on page 4)

Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C1 (mm)	M (mm)	Electric Actuator Type CAR-H
100 G3FMT-ULLM (*HF)	296	148	140	ØD/2	24	223	110	CAR-H 006/010
125 G3FMT-ULLM	330	165	140	ØD/2	24	223	110	CAR-H 006/010
125 G3FMT-ULLM JIS5K	320	160	140	ØD/2	19	223	110	CAR-H 006/010
150 G3FMT-ULLM	356	178	149	ØD/2	25,4	223	110	CAR-H 006/016
200 G3FMT-ULLM	410	205	182	ØD/2	28,4	261	150	CAR-H 016
200 G3FMT-ULLM (**L)	484	242	182	ØD/2	28,4	261	150	CAR-H -016
250 G3FMT-ULLM	480	240	202	ØD/2	31	261	150	CAR-H -020

\* High Flow

\*\* Long Version

\*\*\* Reduced Flow

ØD/2 - Depends on flange type (see also table 2)

Subject to change without notice.

**SPECIFICATIONS - TABLE 2**

Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)

**SPECIFICATIONS - TABLE 3**

Type	Flange connection DN in mm	KvS m <sup>3</sup> /h	Torque Nm For inlet P	Weight kg
DN100 (*HF)	100	179	40	27
DN125	125	179	40	36
DN150	150	310	90	44,5
DN200	200	550	120	71
DN250	250	830	150	102

Torque calculated at max Δ P for: DN100 - 300 - 5 Bar

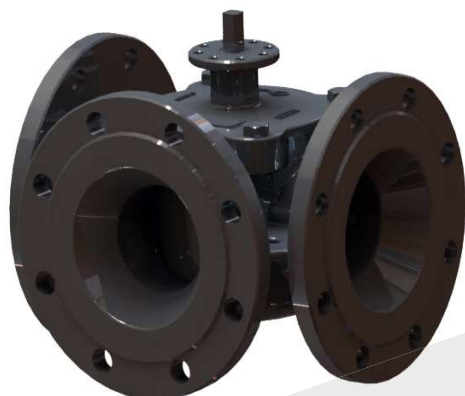
**NOTE: DN300/350/400 ARE AVAILABLE ON REQUEST**

# 3-way Control Valve type G3FMT-SL

Nodular cast iron, PN10, DN100 - 550 mm

0-2.6.16-E

Page 1 of 4



## APPLICATIONS

Control valve type G3FMT-SL is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator type VT.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 - option JIS B 2210 5K/10k and ANSI class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide.

Connection described for AB-Left valves - reverse connection for AB-Right valves.

This section to be read together with sketches page 2 this data sheet.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body, slide	Nodular cast iron EN-GJS-400-15
- Sealing element and O-ring	Silicone/PTFE
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	ANSI class I
<b>Flanges</b>	EN 1092-2 PN 10
- Option	JIS B 2210 5K/10K ANSI class 150
<b>Max. pressure <math>\Delta p</math>, against which the valve can close</b>	5 bar
<b>Nominal pressure</b>	PN 10
<b>Design temperature</b>	120°C

## FEATURES

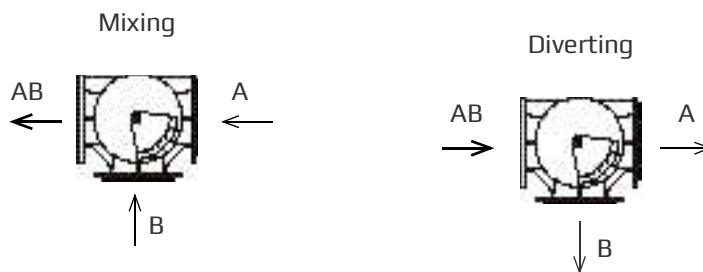
- Simple design secures reliable controls and reduces costly downtime
- Most compact valve on the market
- Full flexibility on port orientation AB right or AB left

Subject to change without notice.

**PORT NUMBERING: AB-RIGHT**



**PORT NUMBERING: AB-LEFT**



**MOUNTING**

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.



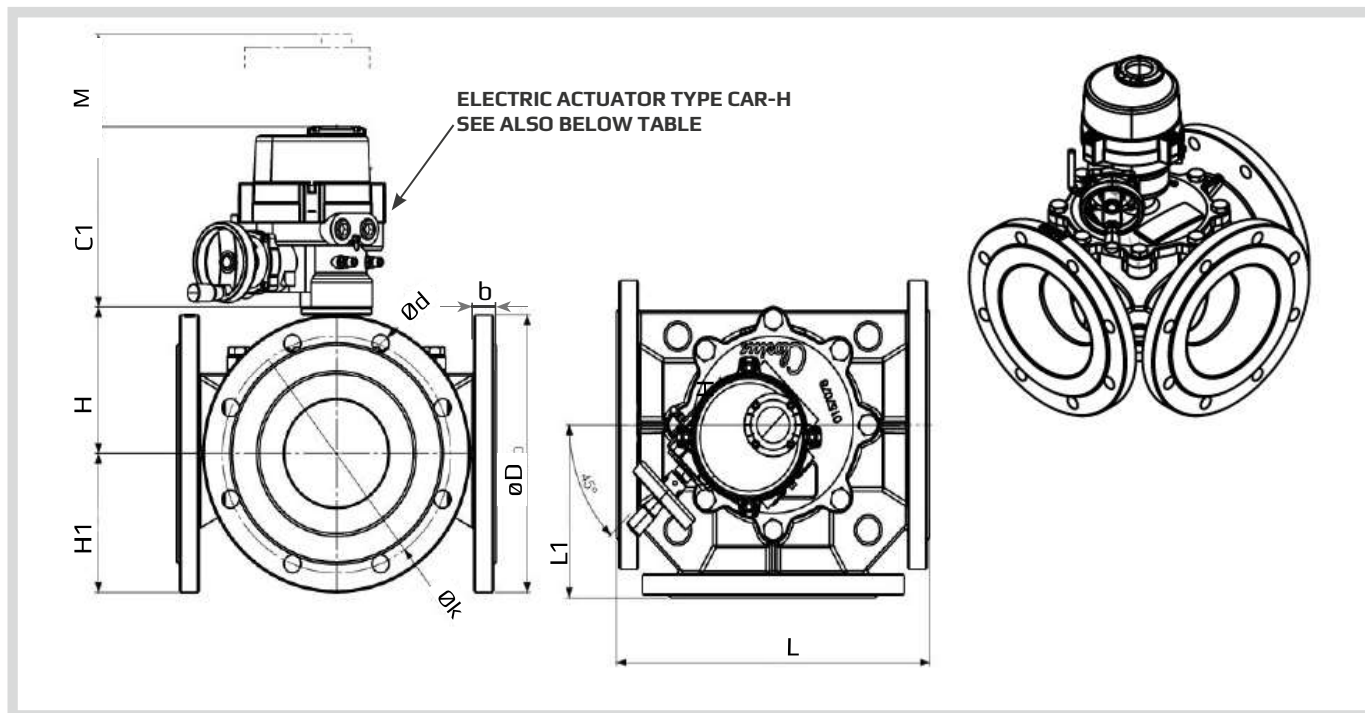
# 3-way Control Valve type G3FMT-SL

Nodular cast iron, PN10, DN80 - 550 mm

0-2.6.16-E

Page 3 of 4

## DIMENSION SKETCH



**SPECIFICATIONS - TABLE 1** (read this together with table on page 4)

Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C1 (mm)	M (mm)	Electric Actuator Type CAR-H
100 G3FMT-SL (*HF)	296	148	140	ØD/2	24	223	110	CAR-H 006
125 G3FMT-SL	330	165	140	ØD/2	24	223	110	CAR-H 006
125 G3FMT-SL J155K	320	160	140	ØD/2	19	223	110	CAR-H 006
150 G3FMT-SL	356	178	149	ØD/2	25,4	223	110	CAR-H 006
200 G3FMT-SL	410	205	182	ØD/2	28,4	223	110	CAR-H 010
200 G3FMT-SL (**L)	484	242	182	ØD/2	28,4	223	110	CAR-H -010
250 G3FMT-SL	480	240	202	ØD/2	31	223	110	CAR-H -010
300 G3FMT-SL (**RF)	580	290	202	ØD/2	32	223	110	CAR-H 010
300 G3FMT-SL	560	280	237	ØD/2	32	261	150	CAR-H -020
350 G3FMT-SL	660	330	256	ØD/2	36	261	150	CAR-H 024
400 G3FMT-SL	720	360	278	ØD/2	38	315	180	CAR-H 035
500 G3FMT-SL	840	420	308	ØD/2	32	315	180	CAR-H 050
550 G3FMT-SL	840	420	308	ØD/2	32	315	180	CAR-H 050

\* High Flow

\*\* Long Version

\*\*\* Reduced Flow

Subject to change without notice.

**SPECIFICATIONS - TABLE 2**

Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)
DN300	455	400	23x(12)	483	432	25x(12)	430	390	23x(12)	445	400	25x(16)
DN350	505	460	23x(16)	533	476	29x(12)	480	435	25x(12)	490	445	25x(16)
DN400	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
DN500	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
DN550	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)

**SPECIFICATIONS - TABLE 3**

Type	Flange connection DN in mm	KvS m <sup>3</sup> /h	Torque Nm For inlet P*	Weight kg
DN100 (*HF)	100	232	40	27.9
DN125	125	232	40	34
DN150	150	370	45	42
DN200	200	680	90	67
DN250	250	1.055	115	95
DN300 (**RF)	300	1.030	115	140
DN300	300	1.750	160	130
DN350	350	2.500	210	175
DN400	400	3.170	265	220
DN500	500	4.560	396	249
DN550	550	4.560	396	298

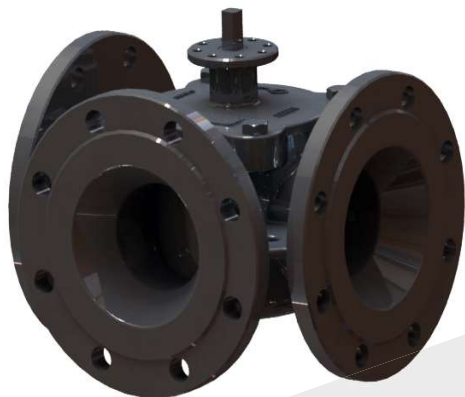
\*Torque calculated at max  $\Delta P$  for: DN100 - 300 - 5 Bar

# 3-way Control Valve type G3FMT-SLM (Middle)

Nodular cast iron, PN10, DN100 - 250 mm

0-2.6.18-A

Page 1 of 4



## APPLICATIONS

Control valve type G3FMT-SLM is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator type VT.

## DESIGN

The valve body and the valve slide are made of nodular cast iron.

The valve flanges are drilled according to EN 1092-2 - option JIS B 2210 5K/10k and ANSI class 150.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide.

This section to be read together with sketches page 2 this data sheet.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body, slide	Nodular cast iron EN-GJS-400-15
- Sealing element and O-ring	Silicone/PTFE
<b>Flow characteristic</b>	Almost linear
<b>Leakage rate</b>	ANSI class I
<b>Flanges</b>	EN 1092-2 PN 10
- Option	JIS B 2210 5K/10K ANSI class 150
<b>Max. pressure <math>\Delta p</math>, against which the valve can close</b>	5 bar
<b>Nominal pressure</b>	PN 10
<b>Design temperature</b>	120°C

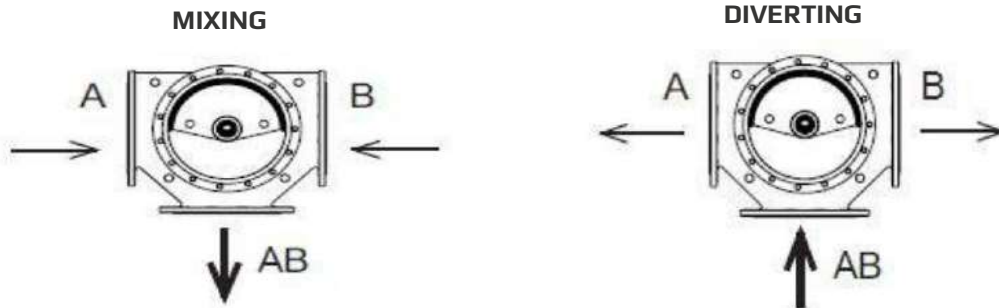
## FEATURES

- Simple design secures reliable controls and reduces costly downtime
- Most compact valve on the market
- Full flexibility on port orientation

Subject to change without notice.



**PORT NUMBERING: AB-MIDDLE**



**MOUNTING**

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

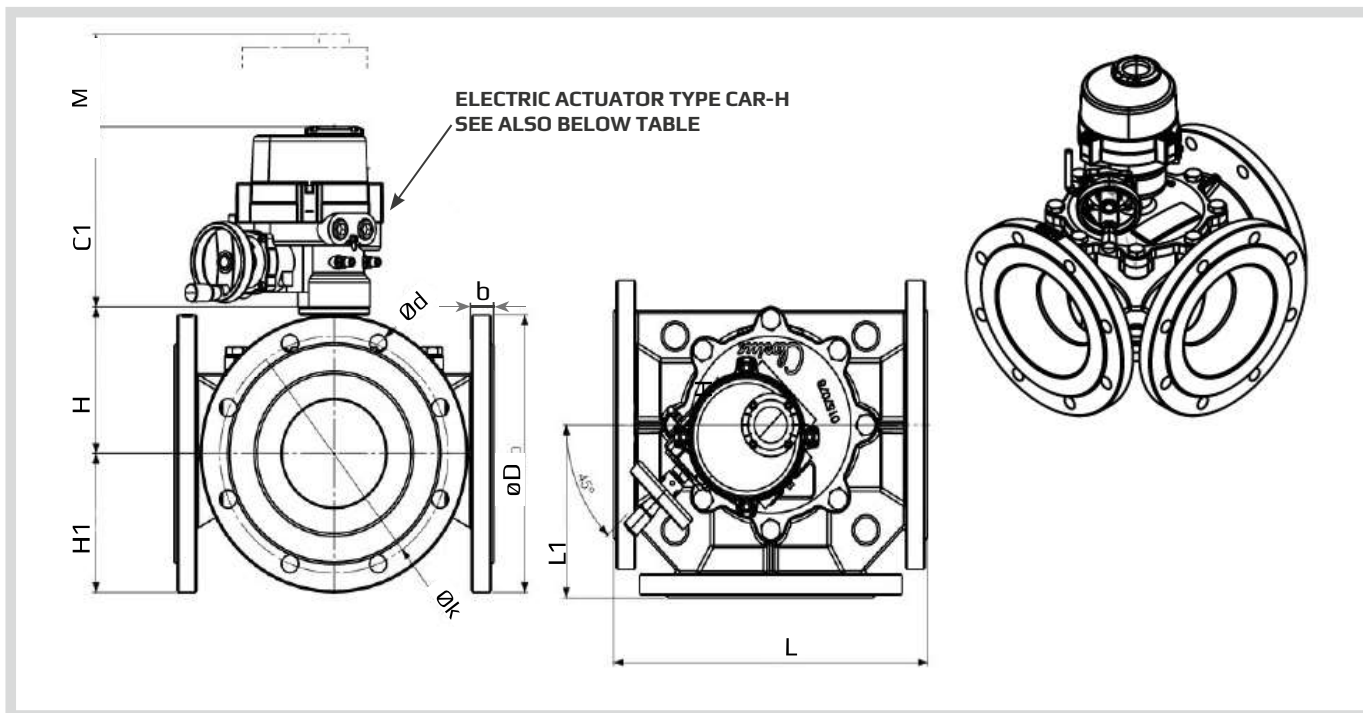
# 3-way Control Valve type G3FMT-SLM (Middle)

Nodular cast iron, PN10, DN80 - 250 mm

O-2.6.18-A

Page 3 of 4

## DIMENSION SKETCH



**SPECIFICATIONS - TABLE 1** (read this together with table on page 4)

Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C1 (mm)	M (mm)	Electric Actuator Type CAR-H
100 G3FMT-SLM (*HF)	296	148	140	ØD/2	24	223	110	CAR-H 006
125 G3FMT-SLM	330	165	140	ØD/2	24	223	110	CAR-H 006
125 G3FMT-SLM (JIS5K)	320	160	140	ØD/2	19	223	110	CAR-H 006
150 G3FMT-SLM	356	178	149	ØD/2	25,4	223	110	CAR-H 006
200 G3FMT-SLM	410	205	182	ØD/2	28,4	223	110	CAR-H 010
200 G3FMT-SLM (**L)	484	242	182	ØD/2	28,4	223	110	CAR-H -010
250 G3FMT-SLM	480	240	202	ØD/2	31	223	110	CAR-H -010

\* High Flow  
 \*\* Long Version  
 \*\*\* Reduced Flow

ØD/2 - Depends on flange type (see also table 2)

Subject to change without notice.

SPECIFICATIONS - TABLE 2

Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)

SPECIFICATIONS - TABLE 3

Type	Flange connection DN in mm	KvS m <sup>3</sup> /h	Torque Nm For inlet P	Weight kg
DN100 (*HF)	100	179	40	27
DN125	125	179	40	36
DN150	150	310	45	44,5
DN200	200	550	90	71
DN250	250	830	115	102

Torque calculated at max  $\Delta P$  for: DN100 - 250 - 5 Bar

NOTE: DN300/350/400 ARE AVAILABE ON REQUEST

# 3-way Control Valve type G3FM-TM (AB-Middle)

Nodular cast iron, PN16, DN 80 - 250 mm / PN10, DN 300 - 450 mm

0-2.6.03.02-D

Page 1 of 4



## APPLICATIONS

Control valve type G3FM-TM is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body and the valve slide are made of nodular cast iron. The valve flanges are drilled according to EN 1092-2 (JIS B 2210 option).

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

### Materials:

- Valve body, slide	Nodular cast iron EN-GJS-400-15
- O-ring	NBR 70A
- U-ring	PTFE
Flow characteristic	Almost linear
Leakage rate	Max. 0.5%
Regulating capability	Kvs/Kvr > 25

Flanges	EN 1092-2 PN 10/16
- Option	JIS B 2210 5K

Counter flanges (suggested for EN 1092-2) DIN 2633 – PN 16

Max. pressure  $\Delta p_L$ , against which the valve can close:

- DN 250 16 Bar
- DN 450 10 Bar

### Nominal pressure

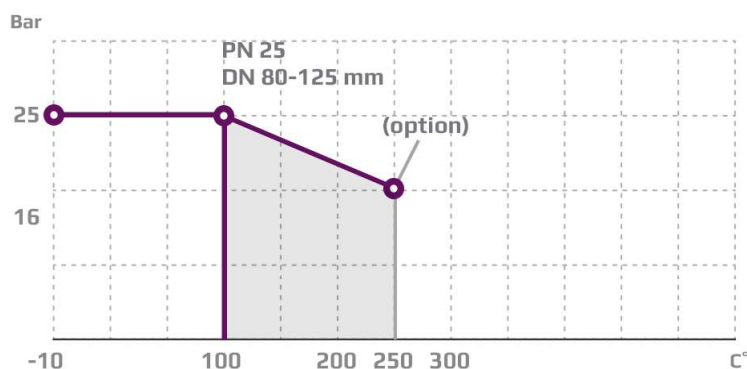
- DN 250 mm	PN 16, max. 100°C
- DN 450 mm	PN 10, max. 100 °C

Slide in Nodular cast iron

## FEATURES

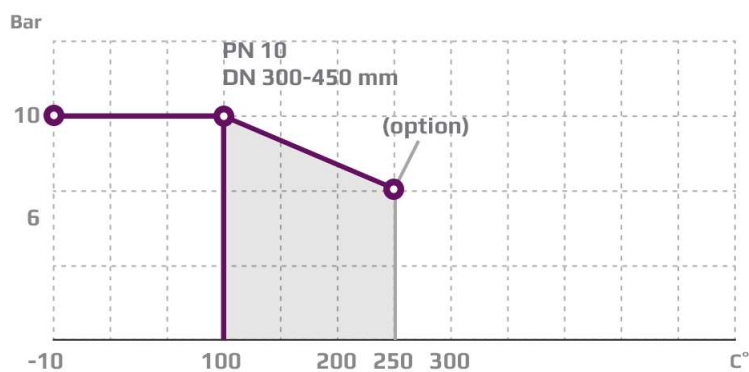
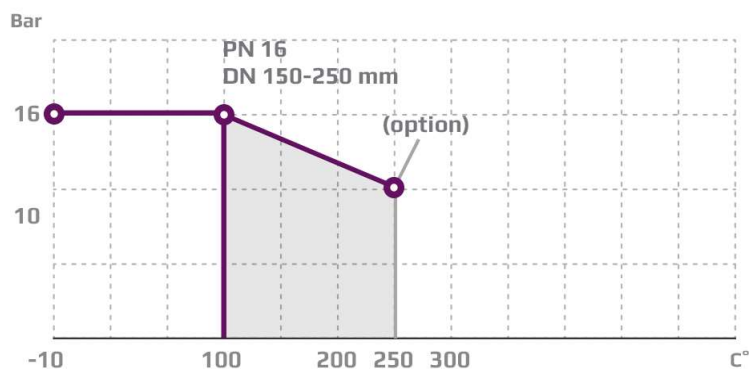
- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings.
- Flexible choice of port placement

Subject to change without notice.

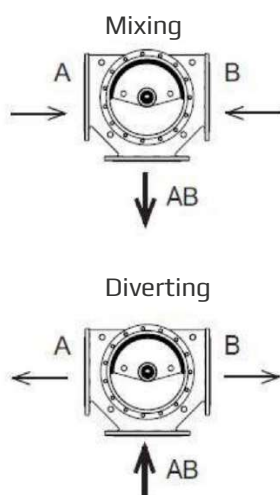


## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



## MOUNTING

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations. Valves can also be supplied in AB-Right configuration (data sheet 0.2.6.02.01) or AB-Left (data sheet 0.2.6.03).

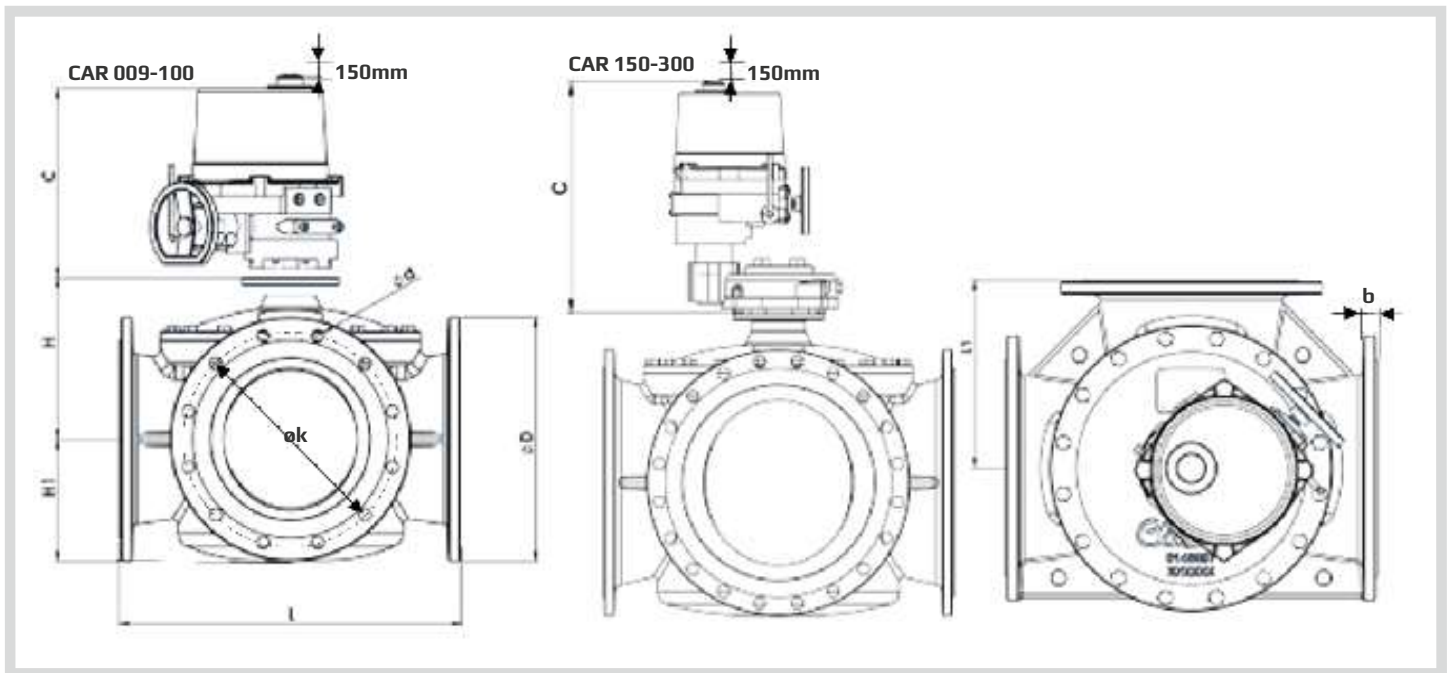
# 3-way Control Valve type G3FM-TM (AB-Middle)

Nodular cast iron, PN16, DN 80 - 250 mm / PN10, DN 300 - 450 mm

0-2.6.03.02-D

Page 3 of 4

## DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
80 G3FM-TM	292	146	140	94	20	273	200	160	19x(8)	190	190.8	19x(8)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TM	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TM	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TM	437	218,5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TM	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TM	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TM	649	324,5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TM	717	358,5	334,5	251,5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TM	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TM	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm for inlet P*	Weight kg
65 G3FM-TM	65	110	127	72	20
80 G3FM-TM	80	122	154	85	29
100 G3FM-TM	100	220	248	145	41
125 G3FM-TM	125	369	437	245	58
150 G3FM-TM	150	510	600	259	71
200 G3FM-TM	200	807	1100	435	114
250 G3FM-TM	250	1500	2100	695	159
300 G3FM-TM	300	2000	2650	795	207
350 G3FM-TM	350	2530	3380	1350	278
400 G3FM-TM	400	3050	3950	TBC	346
450 G3FM-TM	450	3680	4480	2100	433

<sup>(1)</sup> $k_{vs}$ -value for port A and B 50% open.

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-250 = 16 Bar

DN 300-450 = 10 Bar



# 3-WAY CONTROL VALVE TYPE G3CM-T

Nodular Cast Iron, PN25 DN 100 – 125 mm, PN16 DN 150 - 300 mm, Grooved Joints

O-2.6.05-B

Page 1 of 2



## TECHNICAL DATA

### Materials:

- Valve body, slide	EN-GJS-400-15
- O-ring	NBR 70A
- U-ring	PTFE

Flow characteristic	Almost linear
Leakage rate	Max. 0.5%
Regulating capability	Kvs/Kvr > 25

Connection	Grooved joints acc. to ANSI/AWWA C-606 (Victaulic joints)
------------	---

Max. pressure  $\Delta p_L$ , against which the valve can close 16 bar

Nominal pressure  
DN 100 - 125mm PN 25, max. 100°C (option 250°C)  
DN 150 - 300mm PN 16, max. 100°C (option 250°C)

Slide in Nodular cast iron

Subject to change without notice.

## APPLICATIONS

Control valve type G3CM-T is a three-way control valve with a slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil volumes:

- Engine Jacket Cooling Water System
- Lubricating Oil Cooling
- Central Cooling Water System, etc.

The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body and the valve slide are made of nodular cast iron.

## FUNCTION

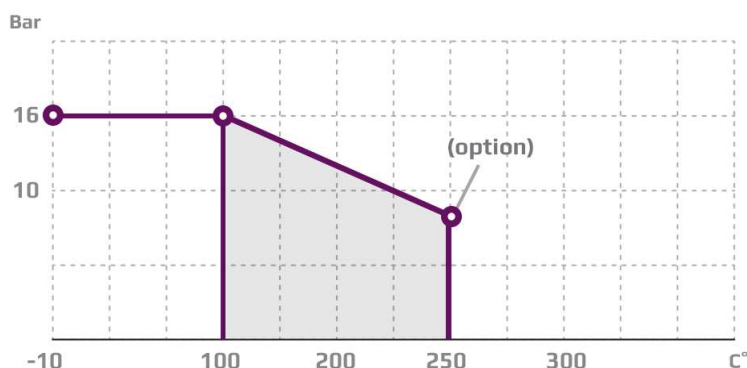
The slide is firmly connected with the motor spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Grooved ends - ready for coupling installation
- No need for counter flange

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401





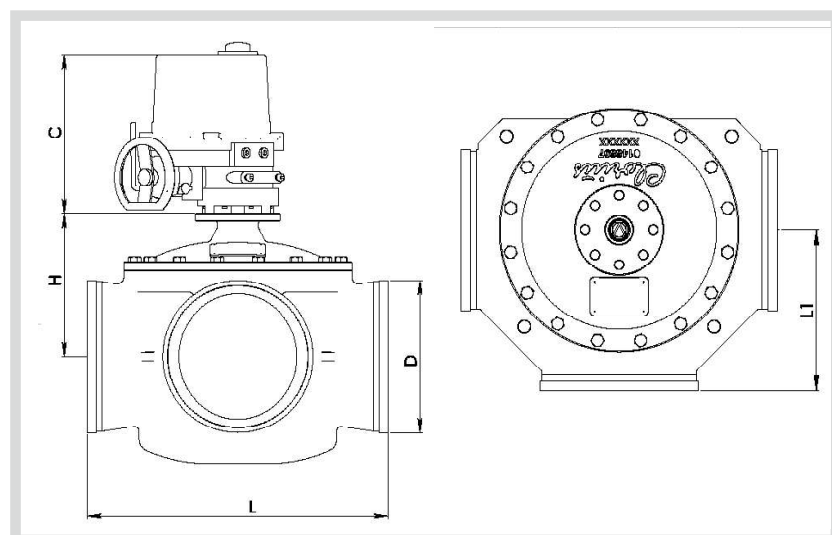
## PORT NUMBERING



## MOUNTING

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed vertically as well as horizontally. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

## DIMENSION SKETCH



Type	L mm	L1 mm	H mm	B mm	C mm	D (dia.) mm
100 G3CM-T	350	175	132	19	470	114
150 G3CM-T	480	270	216	24	470	168
200 G3CM-T	530	270	236	21	361	219
250 G3CM-T	592	300	273	23	361	273
300 G3CM-T	649	330	305	25.5	361	324

## SPECIFICATIONS

Type	Connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Weight kg
100 G3CM <sup>(2)</sup>	100	125	107.5	33
150 G3CM	150	310	266.6	88
200 G3CM-T	200	800	1100	92
250 G3CM-T	250	1500	2100	130
300 G3CM-T	300	2000	2650	170

<sup>1)</sup> kvs-value for port A and B 50% open. <sup>2)</sup> available from 2015

# 3-way Control Valve type S3FM-TR (AB-Right)

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

0-2.7.01-D

Page 1 of 4



## APPLICATIONS

Control valve type S3FM-T is a three way control valve with a slide for quarter turn operation, designed for most industrial fluids and aggressive media.

## DESIGN

The valve body and the valve slide are made of stainless steel AISI316. The valve flanges are drilled according to EN 1092-2. Optional: ANSI, JIS and Grooved Victaulic Joints. Valves can also be supplied in AB-Left configuration (data sheet 2.7.02) and AB-Middle (data sheet 2.7.03)

## FUNCTION

The slide is firmly connected with the actuator spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a minimum gap between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

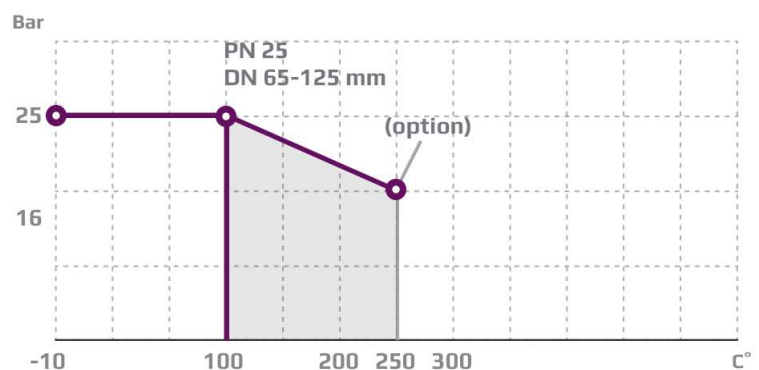
<b>Materials:</b>	
- Valve body, slide	Stainless steel - AISI316/ (Option DUPLEX)
- O-ring	A75H
- U-ring	PTFE
Flow characteristic	Almost linear
Leakage rate	Max. 0.5%
Regulating capability	Kvs/Kvr > 25
<b>Flanges</b>	EN 1092-2 PN 10/16
- Option	JIS B 2210 5K, ANSI, Grooved Victaulic Joints
<b>Counter flanges (suggested for EN1092-2)</b>	DIN 2632 – PN 10 DIN 2633 – PN 16
<b>Max. pressure <math>\Delta p_L</math>, against which the valve can close:</b>	
- DN 65 - 125	25 bar
- DN 150-300	16 bar
- DN 350-800	10 bar
<b>Nominal pressure</b>	
- DN 65-125:	PN 25, max. 100 °C (optional 250°C)
- DN 150-300:	PN 16, max. 100 °C (optional 250°C)
- DN 350-800:	PN 10, max. 100 °C (optional 250°C)

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings and avoids overheating.
- Flexible choice of port placement
- Corrosion resistance
- Designed for high precision control

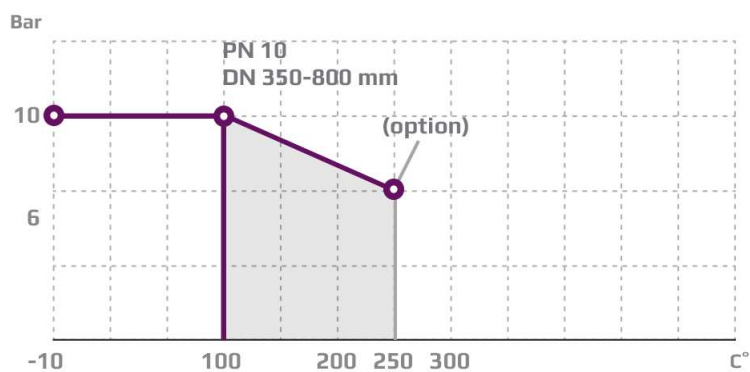
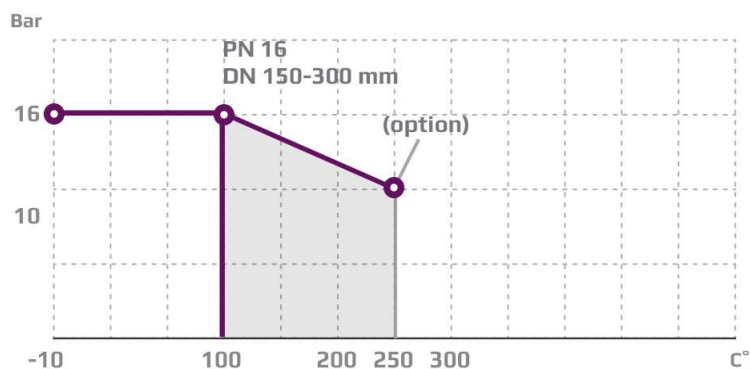
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

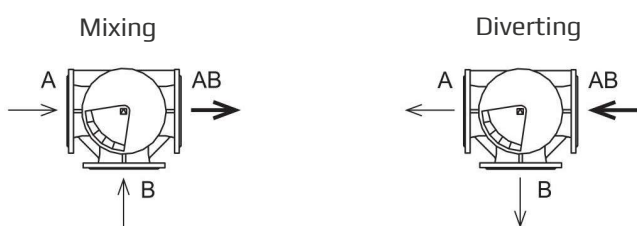


## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



## MOUNTING

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.



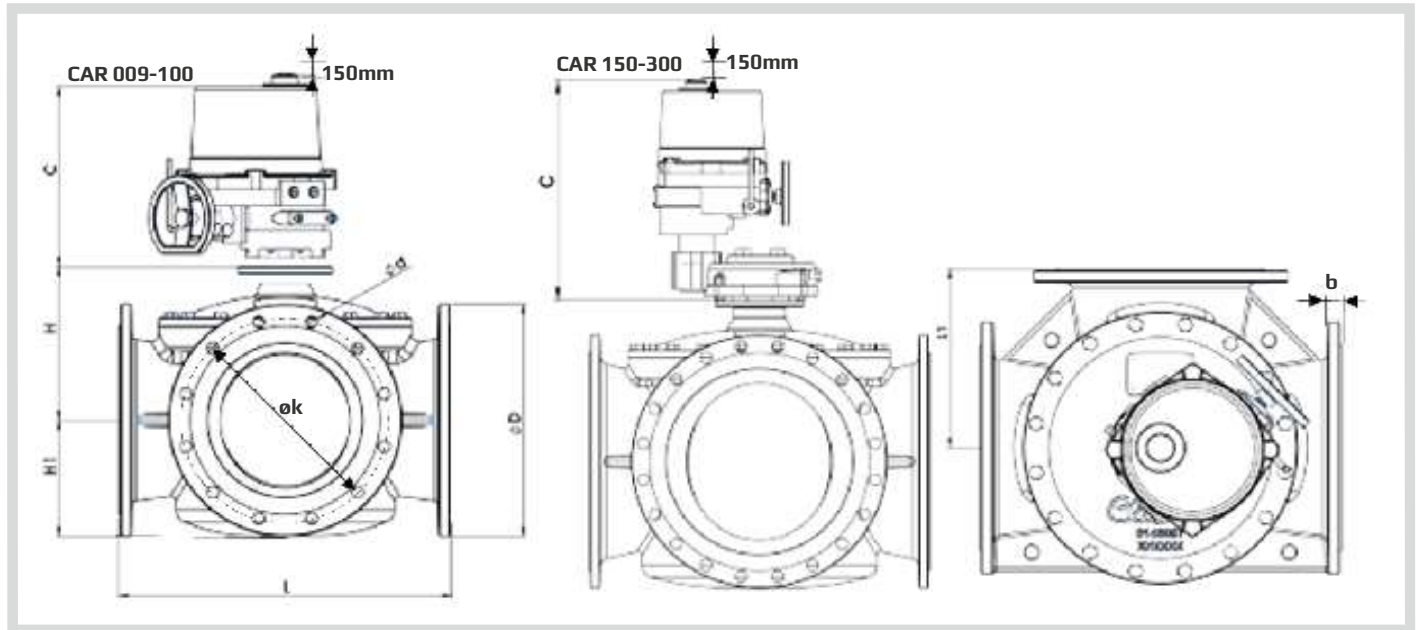
# 3-way Control Valve S3FM-TR (AB-Right)

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.7.01-D

Page 3 of 4

## DIMENSION SKETCH



Type	EN 1092-2						ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K					
	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 G3FM-TR	292	146	135	92	19	273	185	145	19x(8)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 G3FM-TR	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TR	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TR	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TR	437	218.5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TR	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TR	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TR	649	324.5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TR	717	358.5	334.5	251.5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TR	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TR	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 G3FM-TR	900	450	421	335	27	556	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 G3FM-TR	900	450	421	335	27	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 G3FM-TR	918	459	470	354	31	556	780	725	31x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 G3FM-TR	1050	525	534	426	37	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
800 G3FM-TR	1230	615	596	461	53	556	1085	990	34x(24) 50x(24) PN25	-	-	-	995	930	33x(24)	1020	950	33x(28)

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm for inlet P*	Weight kg
65 S3FM-TR	65	95	120	60	28
80 S3FM-TR	80	122	154	65	32
100 S3FM-TR	100	175	220	120	47
125 S3FM-TR	125	245	330	200	64
150 S3FM-TR	150	395	425	200	71
200 S3FM-TR	200	800	1100	330	114
250 S3FM-TR	250	1500	2100	525	159
300 S3FM-TR	300	2000	2650	730	207
350 S3FM-TR	350	2530	3380	980	278
400 S3FM-TR	400	3050	3950	1370	346
450 S3FM-TR	450	3680	4480	1550	433
500 S3FM-TR	500	4150	5250	1920	563
550 S3FM-TR	550	4150	5250	1920	575
600 S3FM-TR	600	4800	6050	2950	TBC
650 S3FM-TR	650	6700	7800	TBC	1050
800 S3FM-TR	800	6200	8000	4000	2100

<sup>1)</sup> $k_{vs}$ -value for port A and B 50% open.

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-300 = 16 Bar

DN 350-800 = 10 Bar



# 3-way Control Valve type S3FM-TL (AB-Left)

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

0-2.7.02-C

Page 1 of 4



## APPLICATIONS

Control valve type S3FM-TL is a three way control valve with a slide for quarter turn operation, designed for most industrial fluids and aggressive media.

## DESIGN

The valve body and the valve slide are made of stainless steel AISI316. The valve flanges are drilled according to EN 1092-2. Optional: ANSI, JIS and Grooved Victaulic Joints Valves can also be supplied in AB-Right configuration (data sheet 0.2.7.01) and AB-Middle (data sheet 0.2.7.03).

## FUNCTION

The slide is firmly connected with the actuator spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a minimum gap between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

<b>Materials:</b>	
- Valve body, slide	Stainless steel - AISI316 Option (DUPLEX)
- O-ring	A75H
- U-ring	PTFE
Flow characteristic	Almost linear
Leakage rate	Max. 0.5%
Regulating capability	Kvs/Kvr > 25
<b>Flanges</b>	EN 1092-2 PN 10/16
- Option	JIS B 2210 5K, ANSI, Grooved Victaulic Joints
<b>Counter flanges (suggested to EN1092-2)</b>	DIN 2632 – PN 10 DIN 2633 – PN 16

<b>Max. pressure <math>\Delta p_L</math>, against which the valve can close:</b>	
- DN 65 - 125	25 bar
- DN 150-300	16 bar
- DN 350-800	10 bar

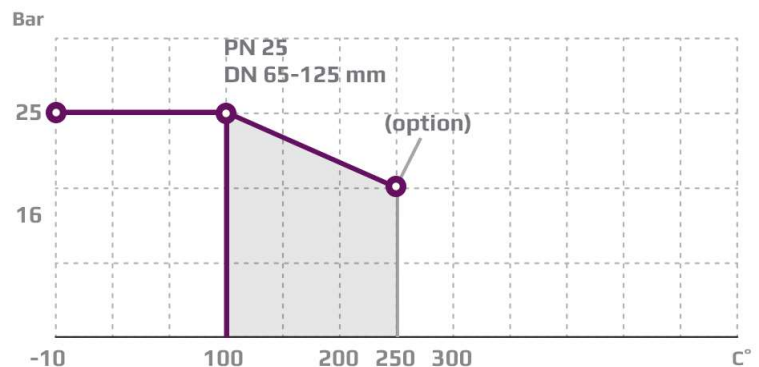
<b>Nominal pressure</b>	
- DN 65-125:	PN 25, max. 100 °C (optional 250°C)
- DN 150-300:	PN 16, max. 100 °C (optional 250°C)
- DN 350-800:	PN 10, max. 100 °C (optional 250°C)

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings and avoids overheating.
- Flexible choice of port placement
- Corrosion resistance
- Designed for high precision control

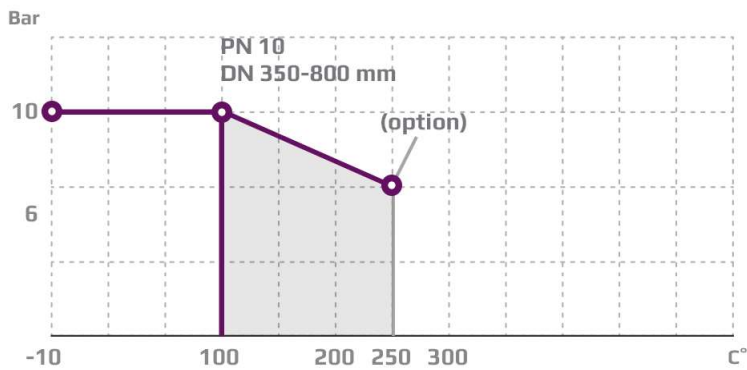
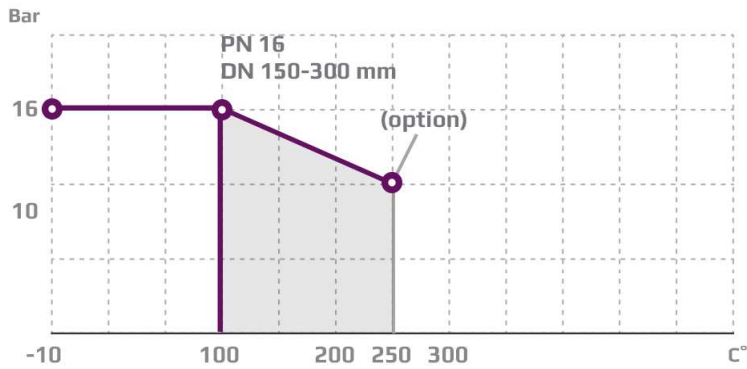
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401

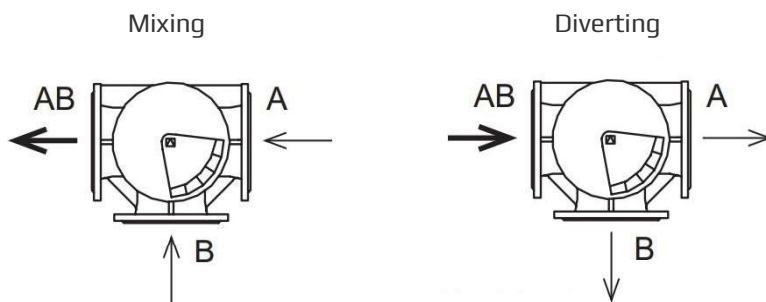


## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



## MOUNTING

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

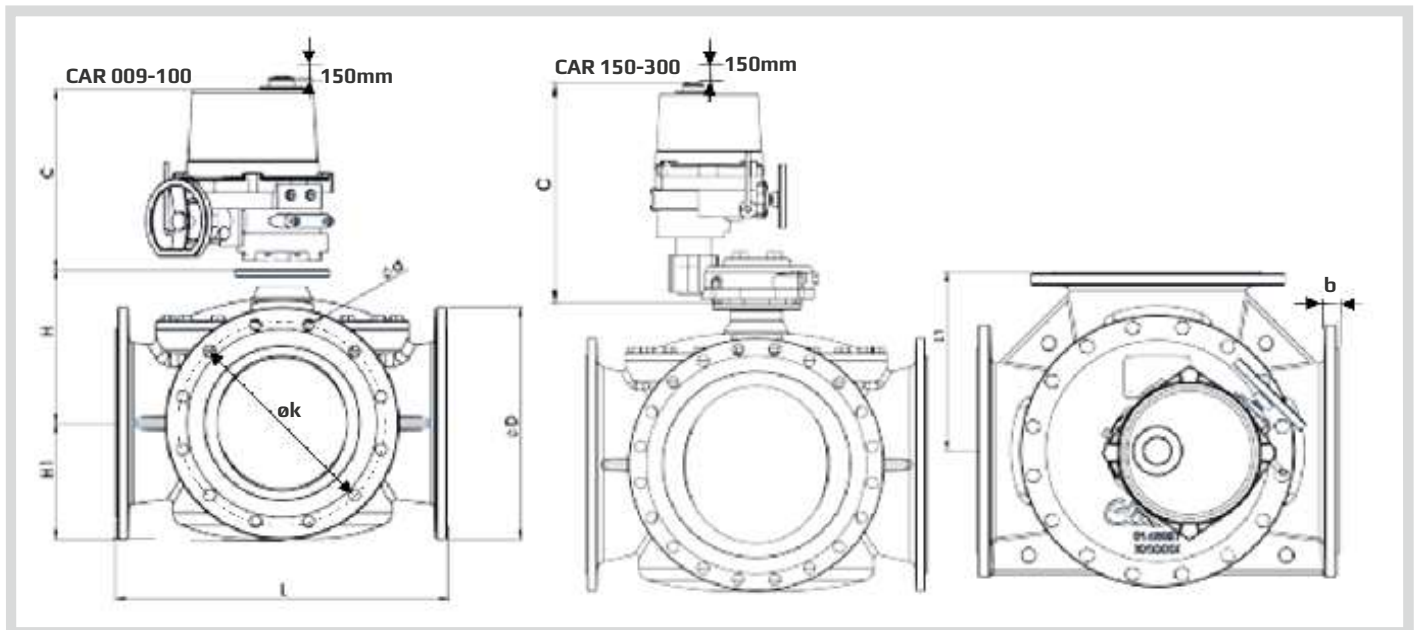
# 3-way Control Valve type S3FM-TL (AB-Left)

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.7.02-C

Page 3 of 4

## DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 G3FM-TR	292	146	135	92	19	273	185	145	19x(8)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 G3FM-TR	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TR	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TR	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TR	437	218.5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TR	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TR	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TR	649	324.5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TR	717	358.5	334.5	251.5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TR	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TR	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 G3FM-TR	900	450	421	335	27	556	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 G3FM-TR	900	450	421	335	27	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 G3FM-TR	918	459	470	354	31	556	780	725	31x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 G3FM-TR	1050	525	534	426	37	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
800 G3FM-TR	1230	615	596	461	53	556	1085	990	34x(24) 50x(24) PN25	-	-	-	995	930	33x(24)	1020	950	33x(28)



## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm	Weight kg
65 S3FM-TL	65	95	120	46	28
80 S3FM-TL	80	122	154	49	32
100 S3FM-TL	100	175	220	52	47
125 S3FM-TL	125	245	330	98	64
150 S3FM-TL	150	395	425	135	75
200 S3FM-TL	200	800	1100	330	114
250 S3FM-TL	250	1500	2100	450	159
300 S3FM-TL	300	2000	2650	700	207
350 S3FM-TL	350	2530	3380	780	278
400 S3FM-TL	400	3050	3950	880	346
450 S3FM-TL	450	3680	4480	1250	433
500 S3FM-TL	500	4150	5250	1450	563
550 S3FM-TL	550	4150	5250	1450	575
600 S3FM-TL	600	4800	6050	1750	816
800 S3FM-TL	800	6200	8000	2550	2100

1)  $k_{vs}$ -value for port A and B 50% open.



# 3-way Control Valve type S3FM-TM (AB-Middle)

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 450 mm

O-2.7.03-C

Page 1 of 4



## APPLICATIONS

Control valve type S3FM-TM is a three way control valve with a slide for quarter turn operation, designed for most industrial fluids and aggressive media.

## DESIGN

The valve body and the valve slide are made of stainless steel AISI316. The valve flanges are drilled according to EN 1092-2. Optional: ANSI, JIS and Grooved Victaulic Joints.

Valves can also be supplied in AB-Right configuration (data sheet 0.2.7.01) and AB-Left (data sheet 0.2.7.02)

## FUNCTION

The slide is firmly connected with the actuator spindle. When the slide is in the one outer position by turning the spindle, connection A-AB is fully open and connection B-AB is fully closed. In the other outer position connection A-AB is fully closed and connection B-AB is fully open. In the intermediate positions the opening degrees change proportionally. The valve has a minimum gap between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

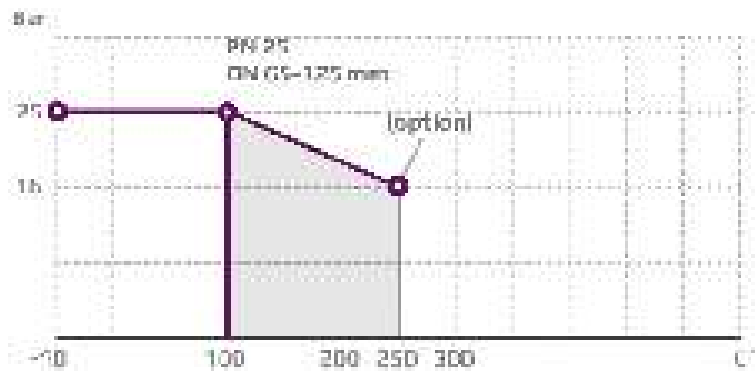
<b>Materials:</b>	Stainless steel
- Valve body, slide	- AISI316 (option DUPLEX)
- O-ring	A75H
- U-ring	PTFE
Flow characteristic	Almost linear
Leakage rate	Max. 0.5%
Regulating capability	Kvs/Kvr > 25
<b>Flanges</b>	EN 1092-2 PN 10/16
- Option	JIS B 2210 5K, ANSI, Grooved Victaulic Joints
<b>Counter flanges (suggested for EN 1092-2)</b>	DIN 2632 – PN 10 DIN 2633 – PN 16
<b>Max. pressure <math>\Delta p_L</math>, against which the valve can close:</b>	
- DN 250	16 Bar
- DN 450	10 Bar
<b>Nominal pressure</b>	
- DN 65-125:	PN 25, max. 100 °C (optional 250°C)
- DN 150-300:	PN 16, max. 100 °C (optional 250°C)
- DN 350-450:	PN 10, max. 100 °C (optional 250°C)

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings and avoids overheating.
- Flexible choice of port placement
- Corrosion resistance
- Designed for high precision control

## PRESSURE/TEMPERATURE DIAGRAM

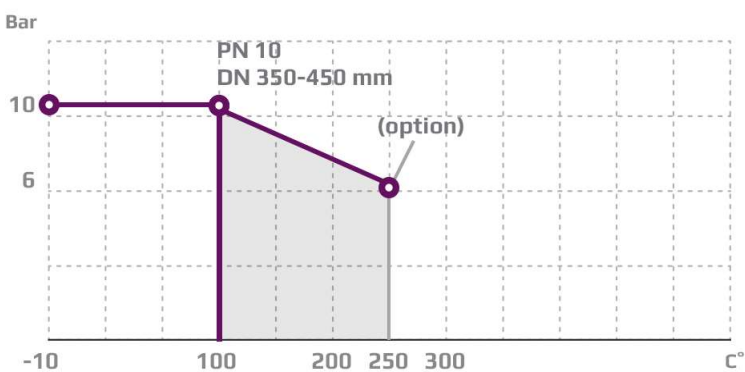
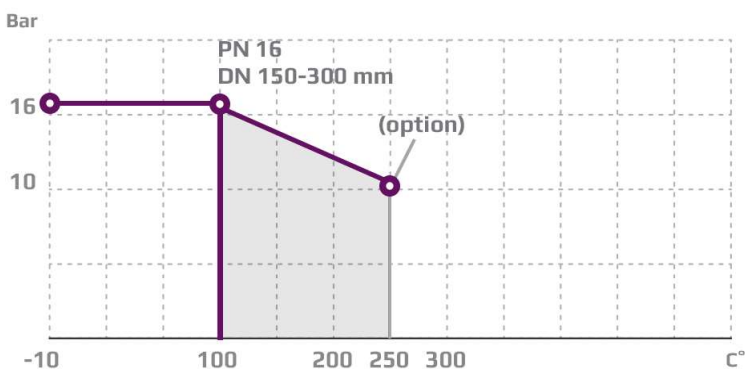
According to DIN 2401



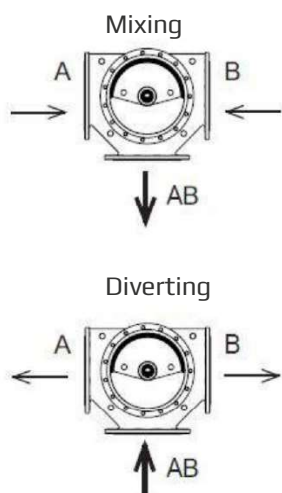
Subject to change without notice.

## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



## PORT NUMBERING



## MOUNTING

The valve connections are marked A, B and AB. The slide is operating between A and B. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.



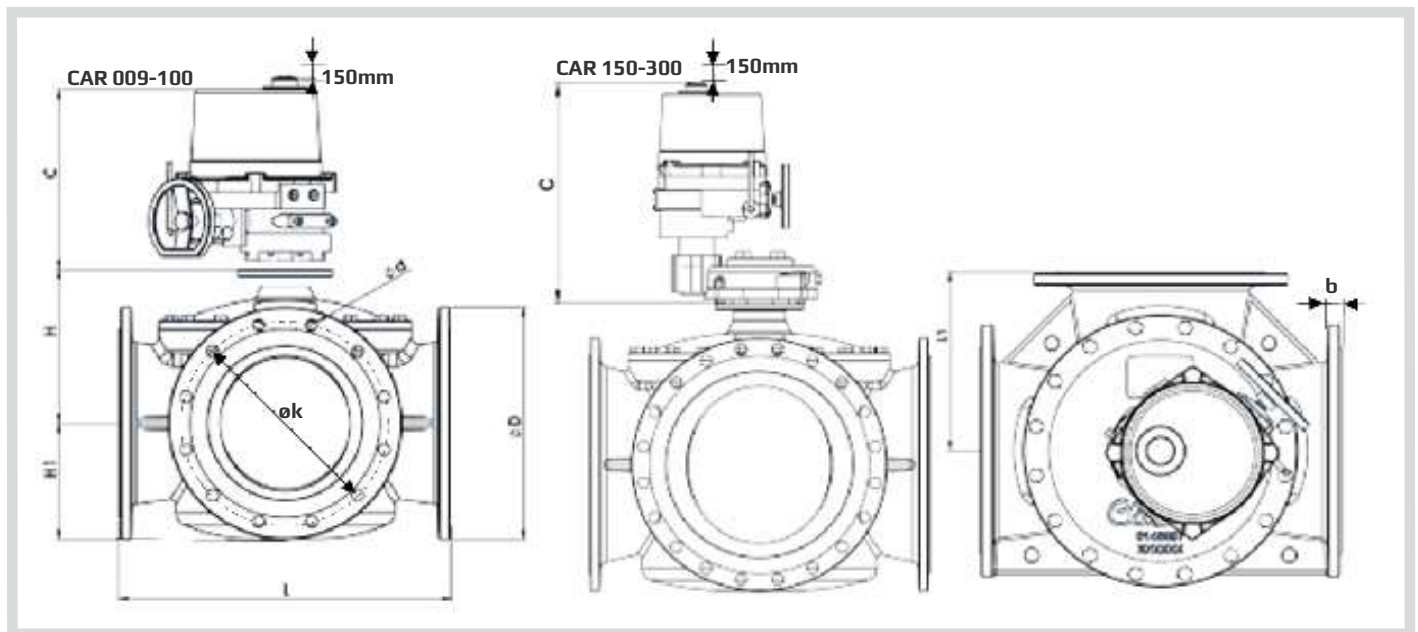
# 3-way Control Valve type S3FM-TM (AB-Middle)

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 450 mm

O-2.7.03-C

Page 3 of 4

## DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
80 S3FM-TM	292	146	140	94	20	273	200	160	19x(8)	190	190.8	19x(8)	180	145	19x(4)	185	150	19x(8)
100 S3FM-TM	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 S3FM-TM	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 S3FM-TM	437	218,5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 S3FM-TM	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 S3FM-TM	592	265	232	169	20	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 S3FM-TM	649	324,5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 S3FM-TM	717	358,5	334,5	251,5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 S3FM-TM	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 S3FM-TM	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value <sup>(1)</sup> Mixing valve m <sup>3</sup> /h	$k_{vs}$ -value <sup>(1)</sup> Diverting valve m <sup>3</sup> /h	Torque Nm for inlet P*	Weight kg
65 S3FM-TM	65	95	120	72	22
80 S3FM-TM	80	122	154	85	29
100 S3FM-TM	100	220	248	145	41
125 S3FM-TM	125	369	437	245	58
150 S3FM-TM	150	510	600	259	71
200 S3FM-TM	200	807	1100	435	114
250 S3FM-TM	250	1500	2100	695	159
300 S3FM-TM	300	2000	2650	975	207
350 S3FM-TM	350	2530	3380	1350	278
400 S3FM-TM	400	3050	3950	TBC	346
450 S3FM-TM	450	3680	4480	2100	433

<sup>1)</sup> $k_{vs}$ -value for port A and B 50% open.

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-300 = 16 Bar

DN 350-450 = 10 Bar



# 2-way Control Valve type S2FM-T

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.7.04-B

Page 1 of 4



## APPLICATIONS

Control valve type S2FM-T is a three-way control valve with blocked port making a two-way control valve. The slide for quarter turn operation designed for regulating of fresh water, lubricating oil and other liquid media. The valves are designed for use in conjunction with industrial processes, district heating and marine installations with large water or lubricating oil quantities. The valves are designed for use in conjunction with valve motor type CAR with handle for manual operation or for use in conjunction with a pneumatic actuator.

## DESIGN

The valve body and the valve slide are made of stainless steel AISI316. The valve flanges are drilled according to EN 1092-2. Optional: ANSI, JIS and Grooved Victallic Joints.

## FUNCTION

The slide is firmly connected with the motor spindle. When the slide is in the one extreme position by turning the spindle, connection A-AB is kept fully open. In the other extreme position connection the valve is fully closed. In the intermediate positions the opening degrees change proportionally. The valve has a small tolerance between body and slide. To minimize the leakage an O-ring is mounted in a groove on the slide.

## TECHNICAL DATA

### Materials:

- Valve body, slide	Stainless steel - AISI316 (option DUPLEX)
- O-ring	A75H
- U-ring	PTFE

### Nominal pressure:

- 65-125 S2FM-T	PN 25
- 150-300 S2FM-T	PN 16
- 350-600 S2FM-T	PN 10

### Flow characteristic

Almost linear

### Leakage rate

Max. 0.5%

### Regulating capability

Kvs/Kvr > 25

### Flanges

EN 1092-2  
PN 10/16

### Counter flanges (suggested):

DIN 2632 – PN 10  
DIN 2633 – PN 16

### Max. pressure $\Delta p_L$ , against which the valve can close:

- DN 65 - 125	25 bar
- DN 150-300	16 bar
- DN 350-800	10 bar

### Nominal pressure

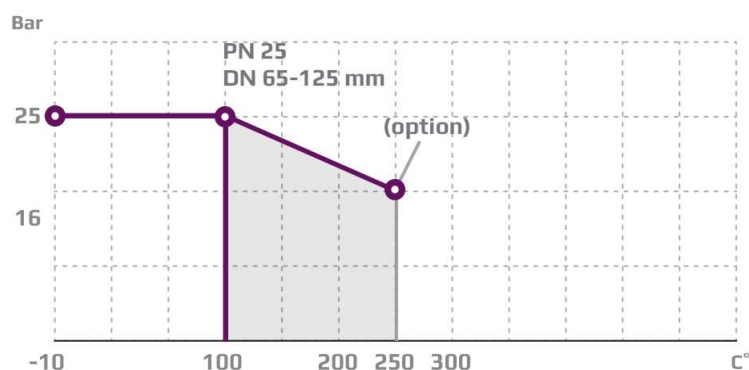
- DN 65-125:	PN 25, max. 100 °C (optional 250°C)
- DN 150-300:	PN 16, max. 100 °C (optional 250°C)
- DN 350-800:	PN 10, max. 100 °C (optional 250°C)

## FEATURES

- Simple design secures reliable controls and reduces costly downtime.
- Low leakage rate secures energy savings and avoids overheating.
- Corrosion resistance

## PRESSURE/TEMPERATURE DIAGRAM

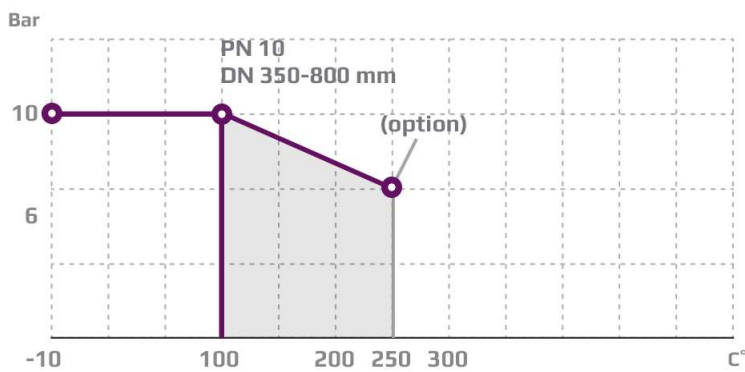
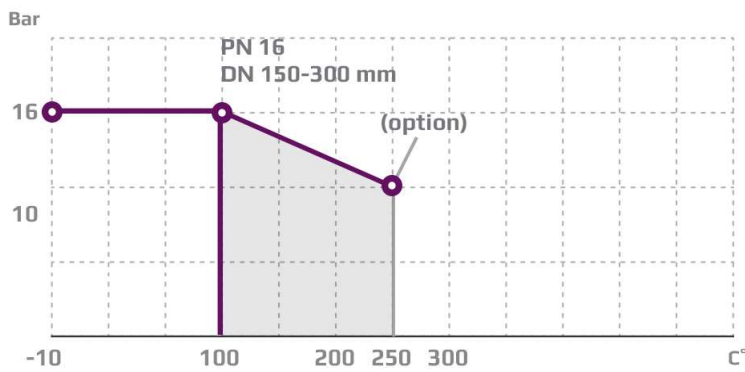
According to DIN 2401



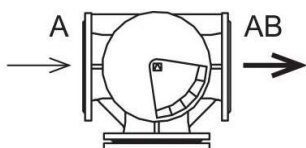


**PRESSURE/TEMPERATURE DIAGRAM**

According to DIN 2401



**PORT NUMBERING**



**MOUNTING**

The valve connections are marked A and AB. Check slide position before installation in the pipe. The slide position is marked on the top of the shaft. The valves can be installed with vertical as well as horizontal spindles. The valves must be mounted in a way that the valve actuator will be exposed to a minimum of moisture and unnecessary vibrations.

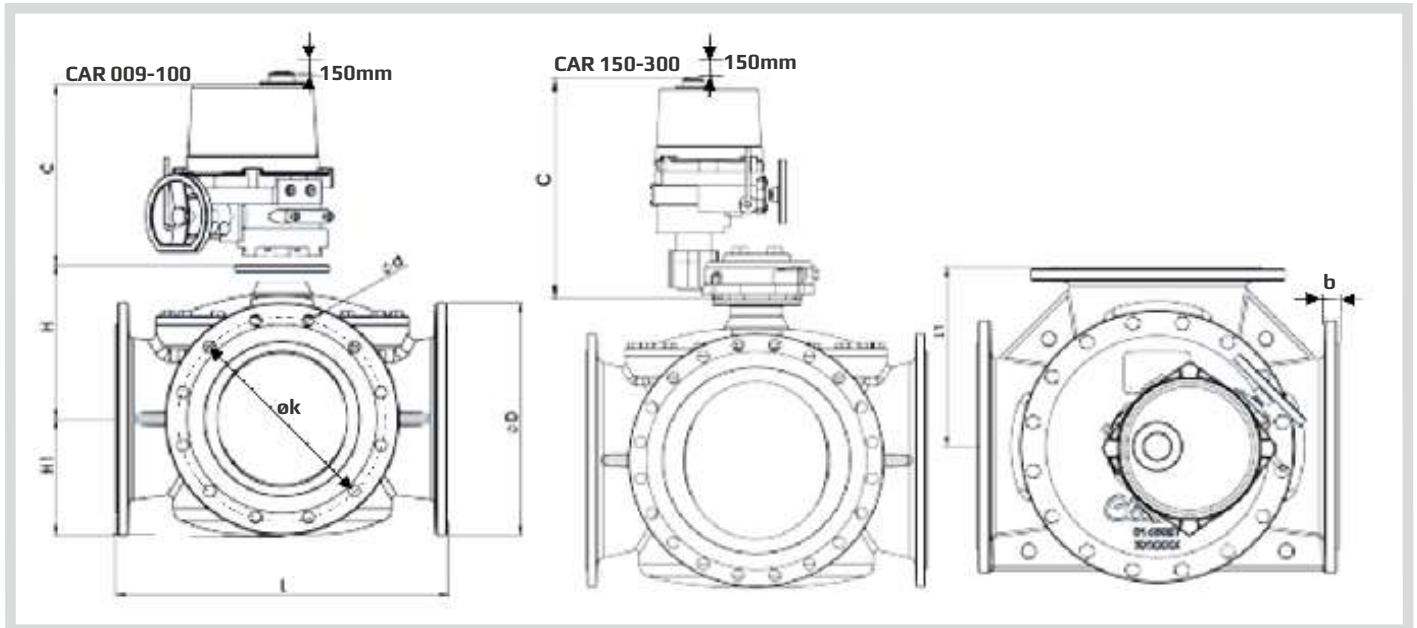
# 2-way Control Valve type S2FM-T

Stainless Steel, PN25, DN 65 – 125 mm / PN16, DN150 - 300 mm / PN10, DN 350 - 800 mm

O-2.7.04-B

Page 3 of 4

## DIMENSION SKETCH



Type	L (mm)	L1 (mm)	H (mm)	H1 (mm)	b (mm)	C (mm)	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
							D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)	D (dia.) (mm)	k (dia.) (mm)	d mm dia. (number)
65 G3FM-TR	292	146	135	92	19	273	185	145	19x(8)	180	140	19x(4)	155	130	15x(4)	175	140	19x(4)
80 G3FM-TR	292	146	140	94	20	273	200	160	19x(8)	190	152	19x(4)	180	145	19x(4)	185	150	19x(8)
100 G3FM-TR	350	175	158	112	17	273	235	190	23x(8)	230	190.9	19x(8)	200	165	19x(8)	210	175	19x(8)
125 G3FM-TR	400	200	179	123	19	273	270	220	28x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
150 G3FM-TR	437	218.5	196	139	19	276	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
200 G3FM-TR	530	265	232	169	20	361	340	295	23x(12)	343	299	23x(8)	320	280	23x(8)	320	290	23x(12)
250 G3FM-TR	592	296	272	199	22	361	400	355	28x(12)	407	362	26x(12)	385	345	23x(12)	400	355	25x(12)
300 G3FM-TR	649	324.5	302	227	25	361	455	410	28x(12)	483	432	26x(12)	430	390	23x(12)	445	400	25x(16)
350 G3FM-TR	717	358.5	334.5	251.5	25	361	505	460	23x(16)	534	477	29x(12)	480	435	25x(12)	490	445	25x(16)
400 G3FM-TR	770	385	370	282	25	361	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
450 G3FM-TR	820	410	391	307	26	556	615	565	28x(20)	635	578	32x(16)	605	555	25x(16)	620	565	27x(20)
500 G3FM-TR	900	450	421	335	27	556	670	620	28x(20)	699	635	32x(20)	655	605	25x(20)	675	620	27x(20)
550 G3FM-TR	900	450	421	335	27	556	-	-	-	-	-	-	720	665	27x(20)	745	680	33x(20)
600 G3FM-TR	918	459	470	354	31	556	780	725	31x(20)	813	750	35x(20)	770	715	25x(20)	795	730	33x(24)
650 G3FM-TR	1050	525	534	426	37	556	-	-	-	-	-	-	825	770	27x(24)	845	780	33x(24)
800 G3FM-TR	1230	615	596	461	53	556	1085	990	34x(24) 50x(24) PN25	-	-	-	995	930	33x(24)	1020	950	33x(28)



## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value m <sup>3</sup> /h	Torque Nm for inlet P*	Weight kg
65 S2FM-T	65	120	60	37
80 S2FM-T	80	154	65	41
100 S2FM-T	100	220	120	56
125 S2FM-T	125	330	200	73
150 S2FM-T	150	425	200	84
200 S2FM-T	200	1100	330	153
250 S2FM-T	250	2100	525	215
300 S2FM-T	300	2650	730	277
350 S2FM-T	350	3380	980	340
400 S2FM-T	400	3950	1370	459
450 S2FM-T	450	4480	1550	579
500 S2FM-T	500	5250	1920	744
550 S2FM-T	550	5250	1920	1090
600 S2FM-T	600	6050	2950	TBC
800 S2FM-T	800	8000	4000	2100

\*Torque calculated at max inlet P for:

DN 65 - 125 = 25 Bar

DN 150-300 = 16 Bar

DN 350-800 = 10 Bar

1

# TREX Thermostatic Control Valve

Steel & Aluminum, PN16, DN15 to DN40 - ½" to 1½"



O-2.10.01-B



## TECHNICAL DATA

### Materials:

- Valve body	Steel ST 235
- Valve body	Aluminium AW 6082/T6
- Colour body	RAL 7016
- Colour body, adapter	RAL 9006
- O-rings	Silicone
- Cartridge	PPS/GF40

### Available with leakholes

**Recommended pressure drop across the valve** 0.5-7 PSI/ .03-0.5 bar

**Nominal pressure** 232 PSI/16 bar

Table 2

Control temperatures	
75°F/24°C	140°F/60°C
85°F/29°C	150°F/66°C
95°F/35°C	160°F/71°C
100°F/38°C	170°F/77°C
110°F/43°C	175°F/79°C
120°F/49°C	180°F/82°C
130°F/54°C	190°F/88°C



## APPLICATION

TREX thermostatic control valves are designed to regulate fresh water, lubricating oils and other liquids. The valves are designed for marine and industrial applications such as engines (LT/HT), compressors (gas and air), boilers, heat systems, generator sets and can be used to divert or mix liquids.

## DESIGN

TREX thermostatic control valves are very compact and robust, designed to fit in applications with high vibration levels and do not require any kind of external power source. The valves are designed to fully close between port A and port C and regulate the set temperature very precisely. If a setup requires continuous flow, the valve can be delivered with a leak hole.

A range of different control temperatures can be supplied. Please consult Clorius Controls if you need other temperatures than those specified in Table 2.

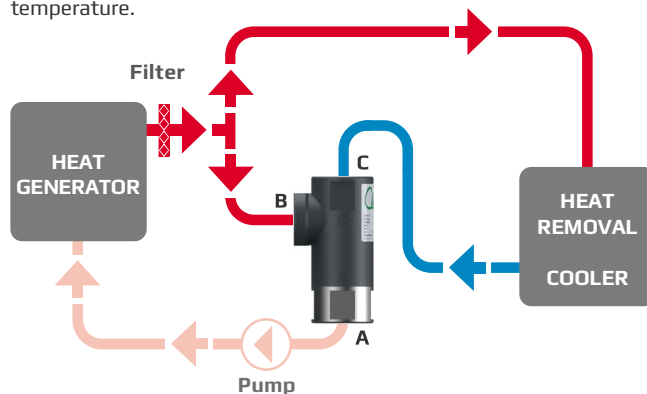
Table 1

Size	Cv/Kv	Body material	Connections
½"/DN15	7.0/6.1	Steel	BSPP ISO 7 Rp thread BSPT ISO 7 Rt/JIS thread NPT ASME B1.20.1 thread SAE J1926-1 ORB thread
¾"/DN20	9.5/8.2	Steel & Aluminium	
1"/DN25	10.4/9.0	Steel & Aluminium	
1¼"/DN32	11.0/9.5	Steel	
1½"/DN40	11.0/9.5	Steel	

## TYPICAL SETUP

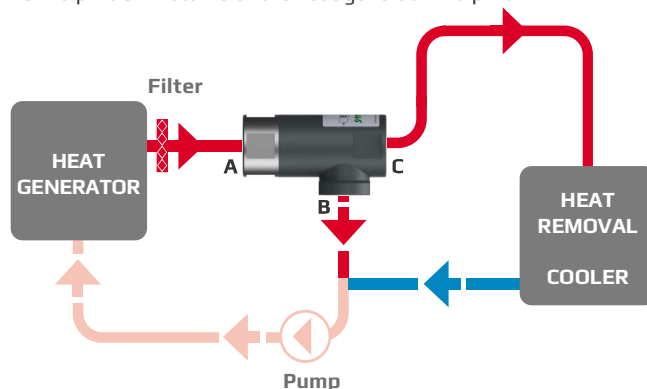
### MIXING SETUP

The hot media enters port B and port C is closed. If the temperature rises, port B begins to close and port C begins to open, forcing the water through the cooler, port A allows the mixed media to return to the heat generator at the controlled temperature.

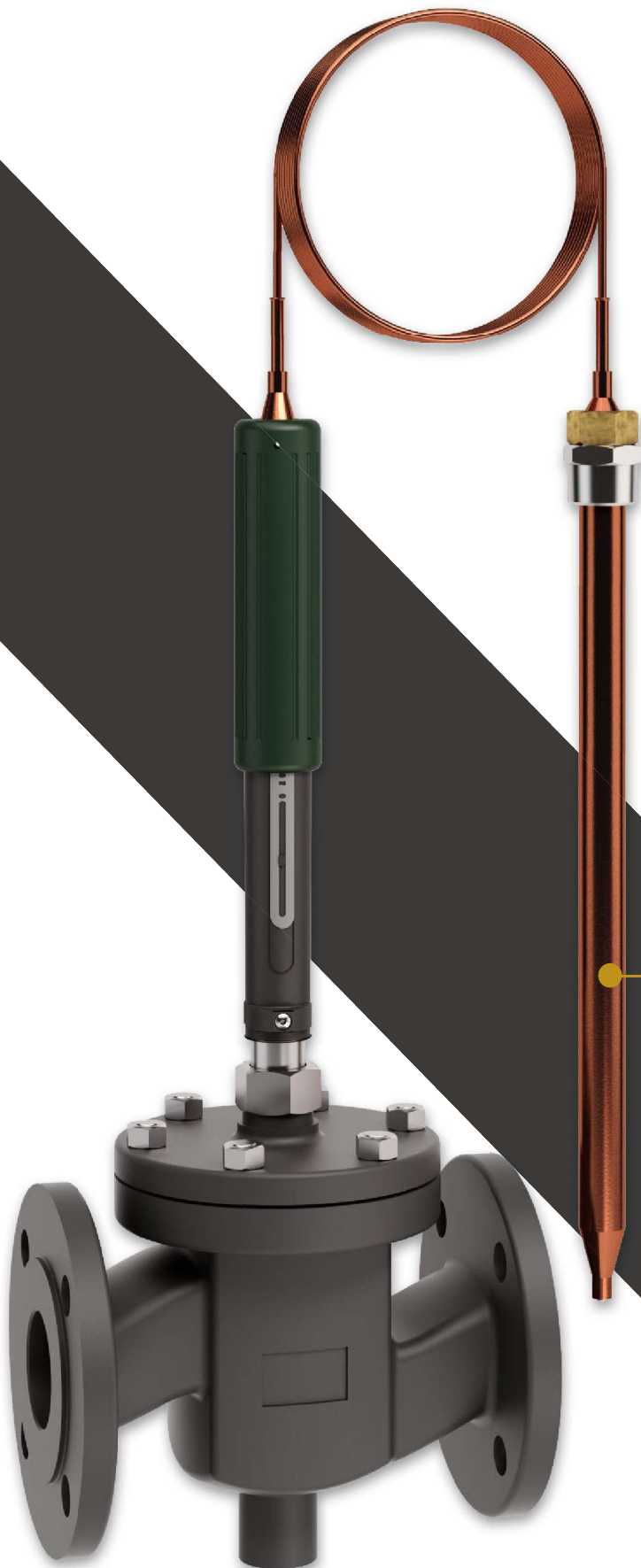


### DIVERTING SETUP

The hot media enters in port A and depending on the temperature, it is led to the cooler via port C or returns to the heat generator via port B.







## ENSURING CONTINUOUS OPERATION

Self-acting temperature controller will operate in all conditions — without external controls or energy supply, resulting in continuous operation instead of disastrous breakdown.

# THERMOSTATS

---

## OUR CONTROL VALVES PROGRAM INCLUDES:

THERMOSTAT TYPES	V2.05	V4.03	V4.05	V4.10	V8.09	V8.18
MAX. CLOSING FORCE	400N	500N	500N	500N	800N	800N
STANDARD SETTING RANGE (°C)	0-60	0-160	0-120	0-60	0-120	0-60
	30-90		40-160	30-90	40-160	30-90
	60-120			60-120		60-120

# V2, V4 and V8 Thermostats

Self-acting Temperature Controls

0-3.4.01-L

Page 1 of 6



## TECHNICAL DATA

<b>Closing force</b>	400 N, 500 N and 800 N
<b>Capillary length</b>	3m to 21m
<b>Neutral zone</b>	1,5°C - 2,5°C
<b>Temperature range</b>	0 to 160°C (-30 to 280°C on request)

For linear valves up to DN150  
For heating or cooling valves

## APPLICATIONS

The temperature controller, which consists of a thermostat and a valve, is used for controlling the temperature in central heating systems, district heating systems, industrial plants or industrial processes and in marine systems. It can be used for the control of cold or hot water, steam or oil in heating as well as cooling systems.

## DESIGN

### Thermostat

A thermostat consists of a sensor and a capillary tube, filled with liquid, and an adjusting cylinder. The thermostat type designations and technical data are specified in fig. 2. With temperatures above 170°C, a cooling unit must be fitted between the valve and the thermostat - see fig. 1. The thermostat is self-acting and works on the principle of liquid expansion, it is sturdy in its design, and works with a large closing force - see fig. 2

### Sensor

The following sensor types are available - see fig. 4:

- 4.1. Rod sensor in copper or stainless steel and spiral sensor in copper with threaded connection according to ISO R7/1.
- 4.2. Spiral sensor (copper only) with air duct flange.
- 4.3. Rod/spiral sensor with steel flange DN 50, PN 40 and DN 50, PN 160.
- 4.4. Sensor without connection. Usually used with capillary pack box for temperature control in tanks.

### Capillary Tube

The capillary tube is made of copper, stainless steel, or of PVC-coated copper - see fig. 3, but can also be delivered with a flexible iron tube protection.

### Valve

A wide range of valve types for heating as well as cooling systems can be delivered. For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice 4.

## FEATURES

- No external power required.
- For use in hazardous area.
- Simple design secures reliable controls and reduces costly downtime.
- Customizable, User friendly, Plug & Control
- No special tools needed for service
- Low installation cost
- Sturdy and reliable

## FUNCTION

The adjusting cylinder of the thermostat is set at the required temperature for the heating medium in °C or °F. This setting can be fixed, if required. The temperature control is carried out by the thermostatically controlled valve reducing or increasing the flow of the heating (or cooling) medium. The sensor and the capillary tube, which are filled with a liquid, constitute - together with the adjusting cylinder - a closed system. If the temperature of a medium to be heated is above the required level, the temperature of the sensor liquid rises and expands, causing the piston of the thermostat to act upon the valve, reducing the flow of the heating medium.

Subject to change without notice.

## FUNCTION

If the temperature of the medium to be heated is below the required level, the temperature of the sensor liquid falls, reducing the volume of the liquid, so that the piston allows the valve to open under its internal spring, thus increasing the flow of the heating medium. The neutral zone of a thermostat is the temperature difference which can occur at the sensor without any movement of the valve spindle. This represents the sensitivity of the control system to temperature changes: V2 = 2.5°C, V4 = 2°C and V8 = 1.5°C. (see fig. 2.)

## CHOICE OF TEMPERATURE CONTROL

The selection of the correct temperature controller is determined by the sizing of the valve and thermostat respectively, which may be chosen by using our web-based software "Quick Choice" available on our website.

**Fig. 1** indicates whether the temperature of the heating medium necessitates a cooling unit, and how the thermostat is to be mounted in relation to the valve; for a temperature range -30°C to 170°C the thermostat may be installed both above and below the valve.

**Fig. 2** shows the type designation of the thermostat, its closing force in N and its setting range in °C.

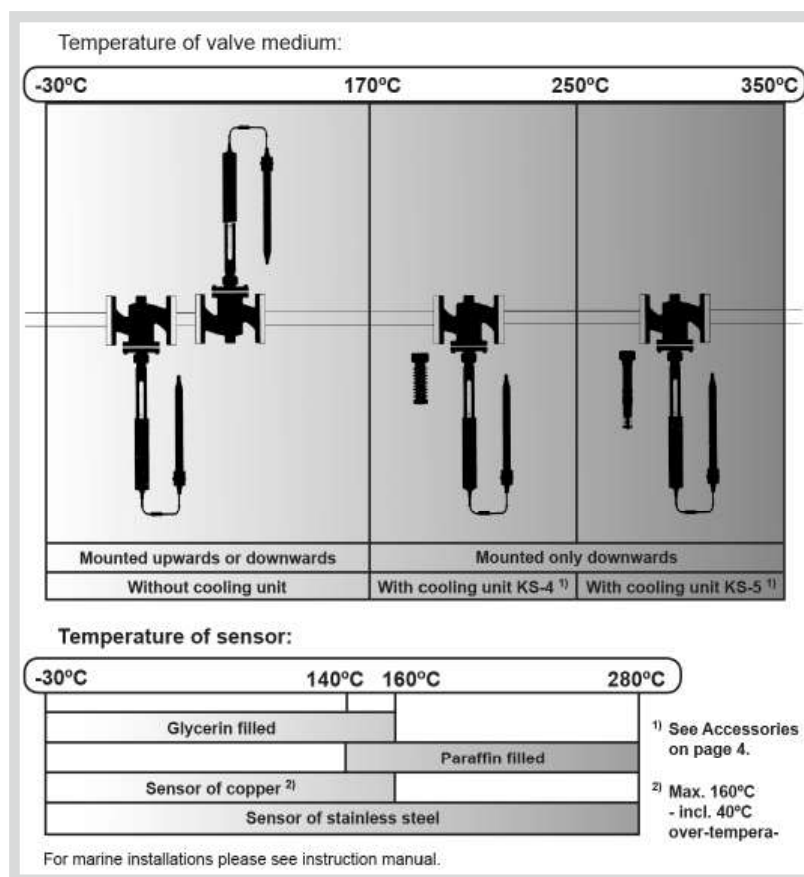
**Fig. 3** shows the choices of length and material for the capillary tubes.

**Fig. 4** shows the different types of sensors.

**Fig. 5** shows the time coefficients for the sensors. **Fig. 6** shows the choices of sensor materials, etc.

**Fig. 7** shows the dimensions and weights of the sensors as well as the weight of adjusting cylinders and the thermostats.

**FIG. 1. TEMPERATURE LIMITS**



**FIG. 2. TEMPERATURE TYPES**

Technical Data		Thermostat Types					
		V2.05	V4.03	V4.05	V4.10	V8.09	V8.18
Max. closing force	N	400	500	500	500	800	800
Setting range for standard thermostats <sup>1)</sup>	°C	0-60	0-160	0-120	0-60	0-120	0-60
		30-90		40-160	30-90	40-160	30-90
		60-120			60-120		60-120
Neutral zone	°C	2.5	2	2	2	1.5	1.5
For valves with rated travel up to:	mm	10	21	21	21	21	21
Travel (amplification) in range: mm/°C	-30 to 160°C <sup>2)</sup>	0.5	0.3	0.5	1	0.9	1.8
	140 to 280°C <sup>3)</sup>	0.7	0.33	0.7	1.33	1.2	2.4

<sup>1)</sup> Setting ranges from -30 to 280°C on request. - Excess temp. safety range: 40°C <sup>2)</sup> Glycerine <sup>3)</sup> Paraffin

Subject to changes, without notice.

# V2, V4 and V8 Thermostats

Self-acting Temperature Controls

0-3.4.01-L

Page 3 of 6

Rod Sensor

Spiral Sensor



FIG. 3. CAPILLARY TUBES

Choice of capillary tube, length and material, is determined according to the table below, independent of the choice of the thermostat type.

Length	Copper threads	PVC-coated copper	Stainless steel
3 m	✓	✓	✓
4.5 m			✓
6 m	✓	✓	✓
7.5 m			✓
9 m	✓	✓	✓
10.5 m			✓
12 m	✓	✓	✓
13.5 m			✓
15 m	✓	✓	✓
16.5 m			✓
18 m	✓	✓	✓
19.5 m			✓
21 m	✓	✓	✓

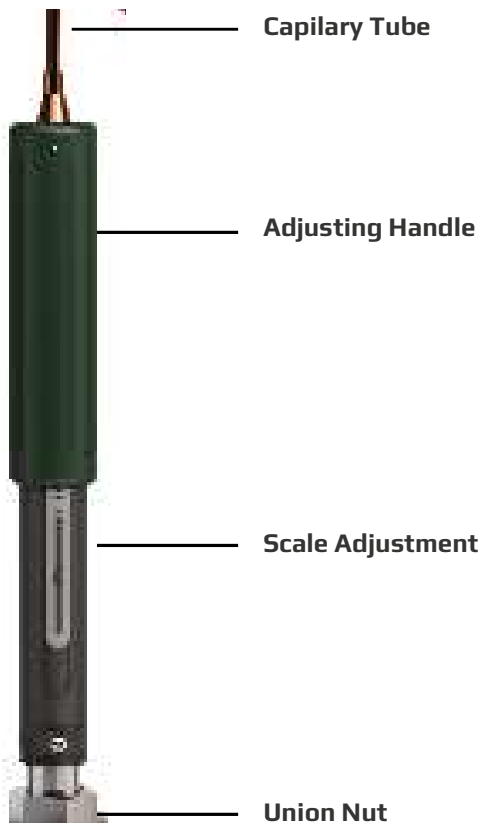
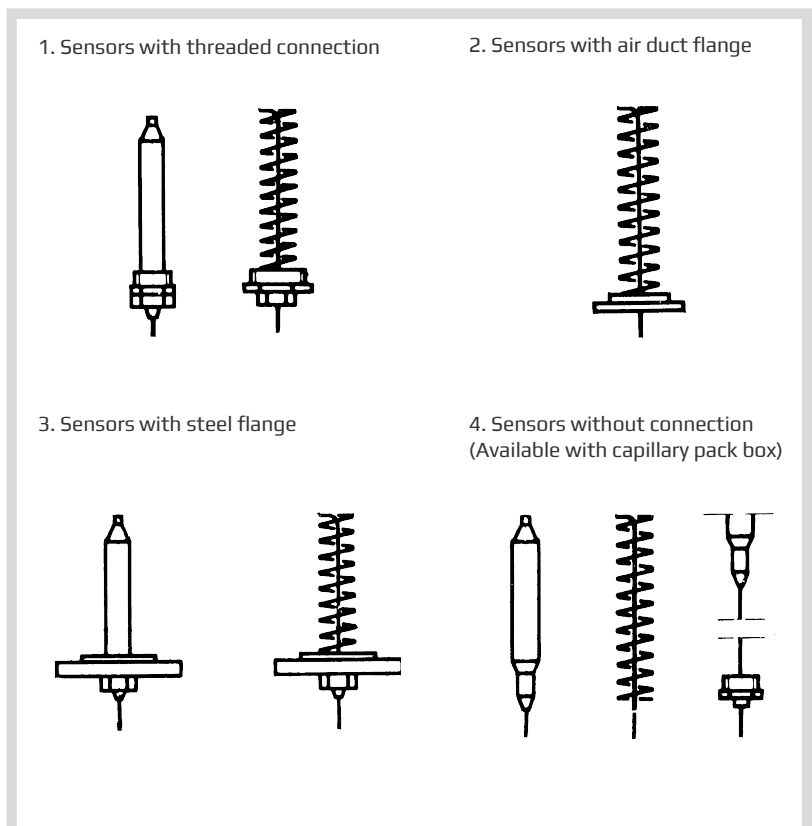
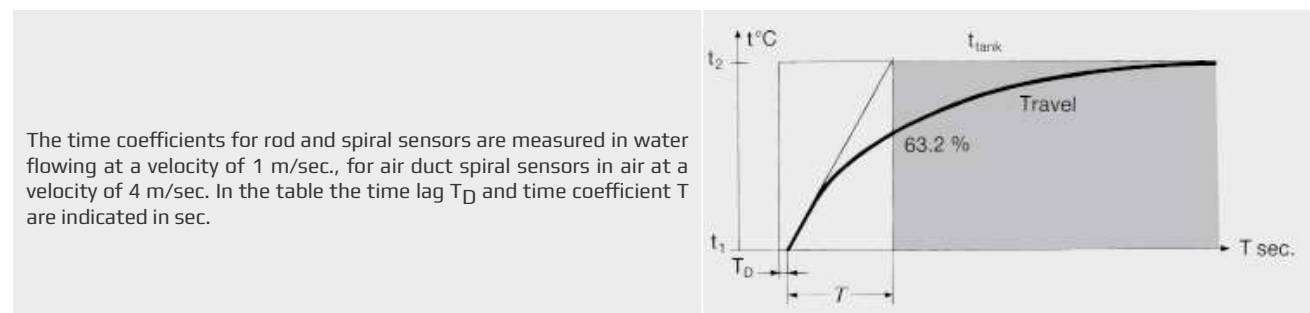


FIG. 4. SENSOR TYPES





**FIG. 5. TIME COEFFICIENT FOR SENSORS**



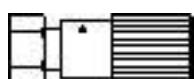
Type	Copper					Acid-resistant stainless steel (mm)				Copper with sensor pocket		
	Rod sensor		Spiral sensor		Spiral sensor for air duct	Rod sensor		Spiral sensor		Rod sensor		Liquid in sensor pocket
	$T_D$	T	$T_D$	T	T	$T_D$	T	$T_D$	T	$T_D$	T	
V2.05	10	85	3	20	360	10	85	3	20	20	210	Hot oil
V4.03	6	120	3	20	360	6	90	3	20	20	250	Hot oil
V4.05	6	130	2	20	360	6	100	2	20	20	200	Hot oil
V4.10	8	165	2	20	360	8	150	2	25	25	300	Hot oil
V8.09	8	165	2	30	600	9	220	2	30	25	450	Hot oil
V8.18						9	280	10	65	28*	570*	Hot oil

**FIG. 6. SENSOR MATERIAL ETC.**

Adjusting Cylinder	Copper sensors				Acid-resistant stainless steel sensors				Capillary tubes
									Copper = c Stainless steel = n
	a	b	c	d	e	f	h	k	n
DIN/EN no.	10088	17440	1787	OM-Metal	17100	1725	17440	17440	17440
Material no.	1.4301	1.4305	2.0090	OM-Metal	1.0134	3.2581	1.4436	1.4435	1.4301

**ACCESSORIES**

**Manual Adjusting Device**



With stuffing box. For tightening and manual operation of the valves, when a thermostat has not been fitted, e.g. during periods of construction etc.

**Cooling Unit KS-4**



Cooling unit protecting the stuffing box of the thermostat. To be applied at valve temperatures between 170°C and 250°C.

**Cooling Unit KS-5**



Cooling unit with built-in bellows gland. Replaces the stuffing box of thermostat. Must be applied by valve temperatures between 250°C and 350°C.

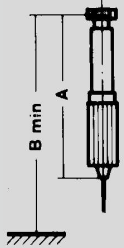
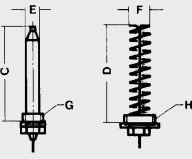
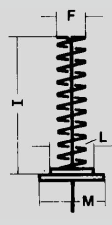
# V2, V4 and V8 Thermostats

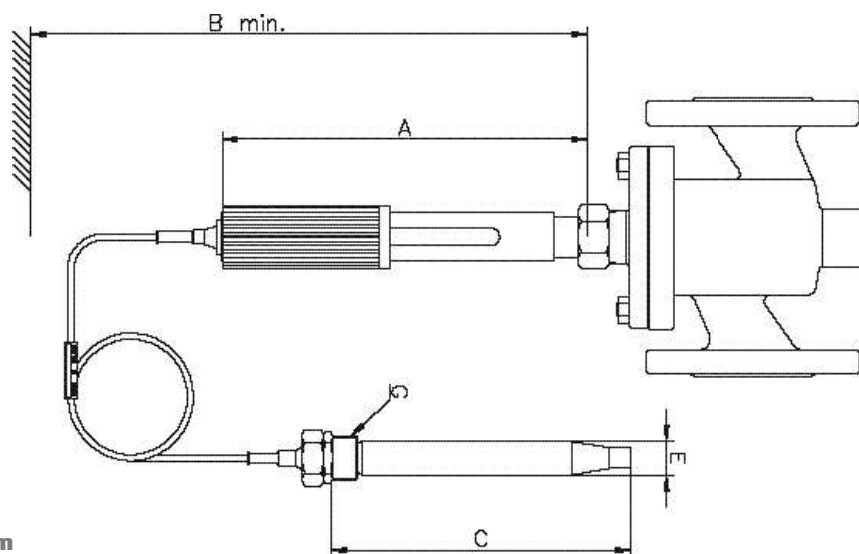
Self-acting Temperature Controls

O-3.4.01-L

Page 5 of 6

FIG. 7. DIMENSIONS AND WEIGHTS

		Thermostat / Sensor material											
		Type V2.05		Type V4.03		Type V4.05		Type V4.10		Type V8.09		Type V8.18	
		c	s	c	s	c	s	c	s	c	s	c	s
<b>Adjusting cylinder</b>  Weights see below  	<b>A</b>	305	305	385	385	385	385	385	385	560	560		560
	<b>B</b>	405	406	525	525	525	525	525	525	740	740		740
<b>Sensor with threaded connection</b>  	<b>C</b>	210	190	210	190	390	380	490	515	710	745		800
	<b>D</b>	235	170	235	170	235	250	325	325	425	435		810
	<b>E</b>	22	22	22	22	22	22	28	25	28	25		34
	<b>F</b>	49	49	49	49	49	49	49	49	49	49		49
	<b>G</b>	R $\frac{3}{4}$	R $\frac{3}{4}$	R1	R1	R1	R1	R1	R1	R2	R2		R2
	<b>H</b>	R2	R2	R2	R2	R2	R2	R2	R2	R2	R2		R2
	<b>kg</b>	1.8	1.8	2.4	2.4	2.6	2.6	3.3	3.3	6.3	6.3		7.3
	<b>kg</b>	2.3	2.3	2.9	2.9	3.1	3.1	3.8	3.8	6.3	6.3		7.3
Weight incl. G-connection Weight incl. H-connection													
<b>Sensors with air duct flange</b>  	<b>F</b>	49		49		49		49		49			
	<b>I</b>	430		430		430		430		450			
	<b>L</b>	60		60		60		60		60			
	<b>M</b>	95		95		95		95		95			
	<b>kg</b>	1.8		2.4		2.6		3.3		5.8			



**FIG. 7. DIMENSIONS AND WEIGHTS**

The measurements G and H are pipe threads according to ISO R7/1. All other measurements are mm.  
 Weight: Net.  
 c = Copper sensor.  
 s = Acid-resistant stainless steel sensor.

		Thermostat / Sensor material											
		Type V2.05		Type V4.03		Type V4.05		Type V4.10		Type V8.09		Type V8.18	
		c	s	c	s	c	s	c	s	c	s	c	s
<b>Sensor with steel flange DN 50, PN 40</b> 	<b>E</b>	22	22	22	22	22	22	28	25	28	25		34
	<b>F</b>	49	49	49	49	49	49	49	49	49	49		49
	<b>N</b>	200	180	200	180	380	360	480	505	700	735		790
	<b>O</b>	225	160	225	160	225	240	315	315	415	425		800
	<b>P</b>	4x18	4x18	4x18	4x18	4x18	4x18	4x18	4x18	4x18	4x18		4x18
	<b>R</b>	125	125	125	125	125	125	125	125	125	125		125
	<b>S</b>	165	165	165	165	165	165	165	165	165	165		165
	<b>T</b>	22	22	22	22	22	22	22	22	22	22		22
	<b>kg</b>	5.3	5.3	5.9	5.9	6.1	6.1	6.8	6.8	9.3	9.3		10.3
	<b>Sensor with steel flange DN 50, PN 160</b> 	<b>E</b>	22	22	22	22	22	22	28	25	28	25	
<b>F</b>		49	49	49	49	49	49	49	49	49	49		49
<b>N</b>		180	160	180	160	360	340	460	485	680	715		770
<b>O</b>		205	140	205	140	205	220	295	295	395	405		780
<b>P</b>		4x27	4x27	4x27	4x27	4x27	4x27	4x27	4x27	4x27	4x27		4x27
<b>R</b>		145	145	145	145	145	145	145	145	145	145		145
<b>S</b>		195	195	195	195	195	195	195	195	195	195		195
<b>T</b>		45	45	45	45	45	45	45	45	45	45		45
<b>kg</b>		11.3	11.3	11.9	11.9	12.1	12.1	12.8	12.8	15.3	15.3		16.3
<b>Sensors without connection Available with capillary pack box in stainless steel (1.4436)</b> 		<b>E</b>	22	22	22	22	22	22	28	25	28	25	
	<b>F</b>	49	49	49	49	49	49	49	49	49	49		49
	<b>G</b>	R1	R1	R1	R1	R1	R1	R1	R1	R2	R2		R2
	<b>H</b>	R2	R2	R2	R2	R2	R2	R2	R2	R2	R2		R2
	<b>U</b>	250	230	250	230	430	410	535	555	750	785		840
	<b>V</b>	290	220	290	220	290	310	375	370	470	490		860
	<b>kg<sup>1)</sup></b>	1.6	1.6	2.2	2.2	2.3	2.3	3	3	5.5	5.5		6.5
	<b>kg<sup>2)</sup></b>	1.6	1.6	2.2	2.2	2.4	2.4	3.1	3.1	5.6	5.6		6.6
	<b>kg<sup>3)</sup></b>	1.8	1.8	2.4	2.4	2.6	2.6	3.3	3.3	6.3	6.3		7.3
	<b>kg<sup>4)</sup></b>	2.3	2.3	2.9	2.9	3.1	3.1	3.8	3.8	6.3	6.3		7.3



# Thermostats of stainless steel types V4.03 and V4.05

O-3.4.05-F

Page 1 of 2



## TECHNICAL DATA

<b>Max. closing force</b>	500 N
<b>Standard settings:</b>	
- Type V4.03	0-160 °C
- Type V4.05	0-120, 40-160 °C
<b>Reinforcement (mm/°C):</b>	
- Glycerine	Type V4.03: 0.3 Type V4.05: 0.5
- Paraffin	Type V4.03: 0.33 Type V4.05: 0.7
<b>For valves with lifting height up to</b>	21 mm
<b>Time constant for rod sensor:</b>	
- Type V4.03:	90 sec.
- Type V4.05:	100 sec.
<b>Time constant for spiral sensor,</b>	20 sec.
<b>Neutral zone</b>	< 2°C
<b>Excess temperature protection</b>	40°C
<b>Materials:</b>	
- Spring:	1.4401
- Capillary:	1.4301
- Adjusting cylinder:	1.4501
<b>Sensor material</b>	W. No. 1.4436

## APPLICATIONS

The thermostat is particularly suitable for installation in demanding environments such as tank installations, outdoor plants and where it must be non-magnetic, e.g. in submarines.

## FUNCTION

The adjusting cylinder of the thermostat is set at the temperature in °C for the required heated medium. The temperature is regulated by the thermostatically controlled valve reducing or increasing the flow of the heating medium. Together with the adjusting cylinder, the liquid-filled sensor and capillary tube constitute a closed system. If the temperature of the medium to be heated is above the required level, the sensor liquid expands, causing the spindle of the thermostat to act upon the valve, thereby reducing the flow of the heating medium. If the temperature is below the required level, the temperature of the liquid in the sensor decreases and the volume is reduced, thereby the valve spring opens the valve causing an increasing flow of the heating medium.

## CONSTRUCTION

The parts of the thermostat are made of stainless steel. The thermostat consists of a liquid-filled sensor, a capillary tube, and an adjusting cylinder. The adjusting cylinder has O-ring sealings and is sealed with silicone glue at the top for hermetical closure. The thermostat is available with settings between -30°C and +280°C. At flow temperatures above 170°C, a cooling unit must be installed between the valve and the thermostat. Please see datasheet no. 8.5.00.

## FEATURES

- No external power required.
- For use in hazardous area.
- Simple design secures reliable controls and reduces costly downtime.
- Customizable, User friendly, Plug & Control.
- No special tools needed for service.
- Low installation cost.
- For outdoor installation even on open ship deck.
- Self-acting
- P-controller
- Completely sealed
- Excess temperature protection
- All parts made of stainless steel
- Non-magnetic

## NEUTRAL ZONE

The neutral zone of the thermostat, which is less than 2 °C, is the temperature difference which can occur at the sensor without the thermostat spindle being actuated.

## SENSOR TYPES

Rod sensors of stainless steel with pipe thread. Sensors are also available with a pack-box on the capillary tube for applications where the sensor is to be lowered into a tank etc.

Subject to change without notice.

## SENSOR LIQUID

Glycerine at a scale range between - 30 °C and 160 °C. Paraffin at a scale range between 140 °C and 280 °C.

## CAPILLARY TUBE

The capillary tube is made of stainless steel and is available in lengths from 3 m up to 21 m.

## VALVES

The thermostat may be used for valves up to DN 150 mm for heating and cooling plants. For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice 4.

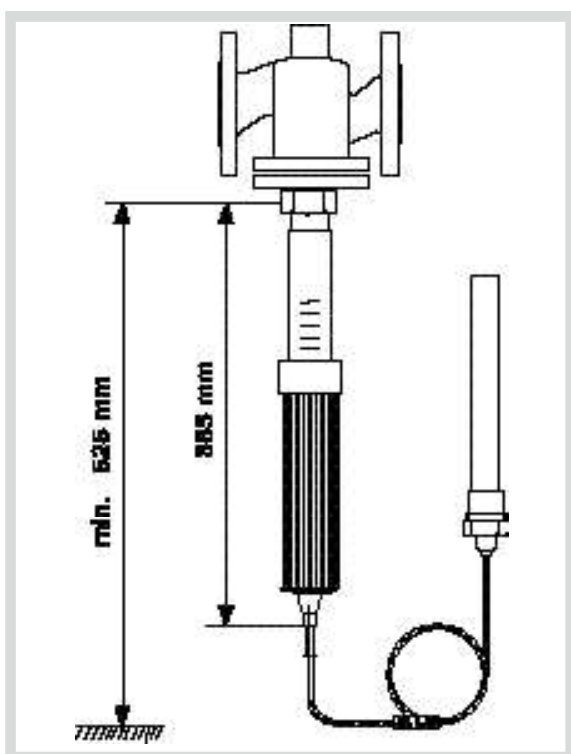


Sensors with pipe thread	Type V4.03	Type V4.05
	C E G*	190 mm 22 mm 1"
Weight including G connection	2.4 kg	2.6 kg

Sensors without connection Available with capillary packbox	Type V4.03	Type V4.05
1)	E U G*	22 mm 230 mm 1"
3)	Weight	
	1)	2.2 kg
	2)	2.4 kg
		2.3 kg
		2.6 kg

\* The measurements G and H are pipe threads according to ISO R7/1.

## DIMENSION SKETCH

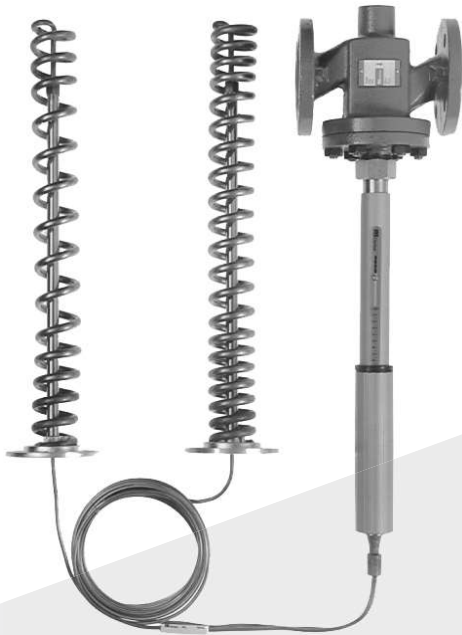


# Duostats

Self-acting Temperature Controls

O-3.5.01-F

Page 1 of 4



## CLORIUS DUOSTATS

Duostats are thermostats, type V, which via two sensing elements in a common hydraulic system act on one and the same control valve.

Two basic types are available: V4.05 or V4.10, depending on the preferable proportional band PB, and the valve size.

For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice 4.

The sensing elements are two spiral sensors for the ventilation duct or two rod sensors (a combination of one spiral sensor and one rod sensor may be supplied in certain combinations). The effect, which the two sensing elements have on the adjustment, is proportional to the liquid volume of the individual sensors. Duostats are therefore available with varying proportions between the liquid volumes of the two sensors (sensor proportions) and in that way they can meet the requirements made by a number of different adjustment problems. As the adjustment result is a weighted average value of the temperatures of the two sensors, no fixed adjustment value can be indicated. Hence, Duostats are not equipped with a temperature scale, but with a marking for adjustment towards higher or lower temperatures, respectively.

## APPLICATIONS

1. Adjustment of discharge air temperatures in hot-air heating plants, dependent on the outdoor temperature.
2. Adjustment of two temperatures which are interdependent. E.g. the hot-water tank of a district heating plant with simultaneous control that the return water temperature does not become too high.

## FEATURES

- No external power required.
- For use in hazardous area.
- Simple design secures reliable controls and reduces costly downtime.
- Customizable, User friendly, Plug & Control.
- No special tools needed for service.
- Low installation cost.

## SELECTION OF DUOSTAT TYPES

For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice 4.

## TECHNICAL DATA

Closing force	500 N
Capillary length	3m to 21m
Neutral zone	1,5°C - 2,5°C
Temperature range	0to160°C(-30to280°C on request)

For linear valves up to DN150  
For heating or cooling valves

Subject to change without notice.

## APPLICATIONS

### Air Heating Plants

For air heating plants Duostats with two spiral sensing elements for air ducts are used. **Fig. 1** shows an example of a plant with Duostat. The primary sensor  $V_p$  (red) is the real control sensor which goes into the controlled system. The secondary sensor  $V_s$  (blue) which is located outside the controlled system, registers the outdoor temperature and determines the necessary air temperature by  $V_p$ . If there is no supply air duct, where the secondary sensor can be built in, it can be placed in free air. For this purpose a wall bracket is available. In order to determine the correct Duostat, use diagram A where the combinations of spiral sensors for air ducts are found on the left hand.

### Other Applications

Duostats are sometimes used for purposes where both sensing elements go into the same controlled system (see examples 2 and 3). The controlled condition will then be a weighted average of the registrations of the two sensors, as shown in the following examples.

In **fig. 2** a hot-water tank connected to district heating is adjusted by a Duostat whose one sensor - the primary sensor - controls the temperature of the tank which should be constant. The secondary sensor registers the temperature of the water which is led back to the district heating network. It secures that the valve does not open so much that the temperature of the return water rises in an uncontrolled manner, when a large water consumption reduces the temperature in the tank.

**Fig. 3** shows a room heated by hot air. The primary sensor is built into the extract air duct in order to serve as a room thermostat from this place. The secondary sensor is built into the discharge air duct where it counteracts that the discharge air temperature becomes too low - which would feel like a draught - when the room temperature rises as a result of the heat development which may come from persons or heating processes in the room.

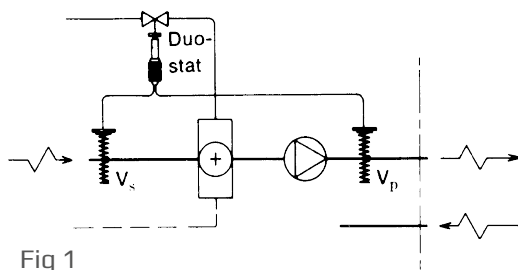


Fig 1

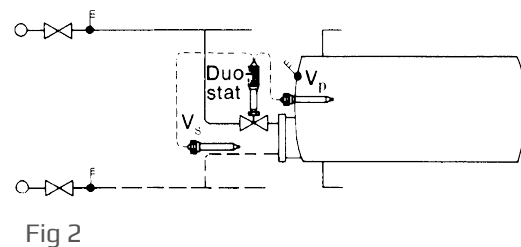


Fig 2

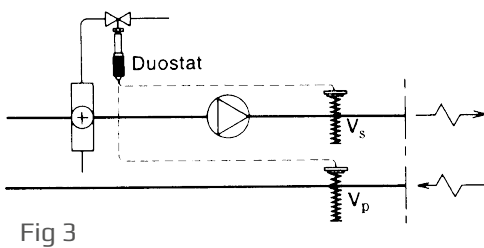
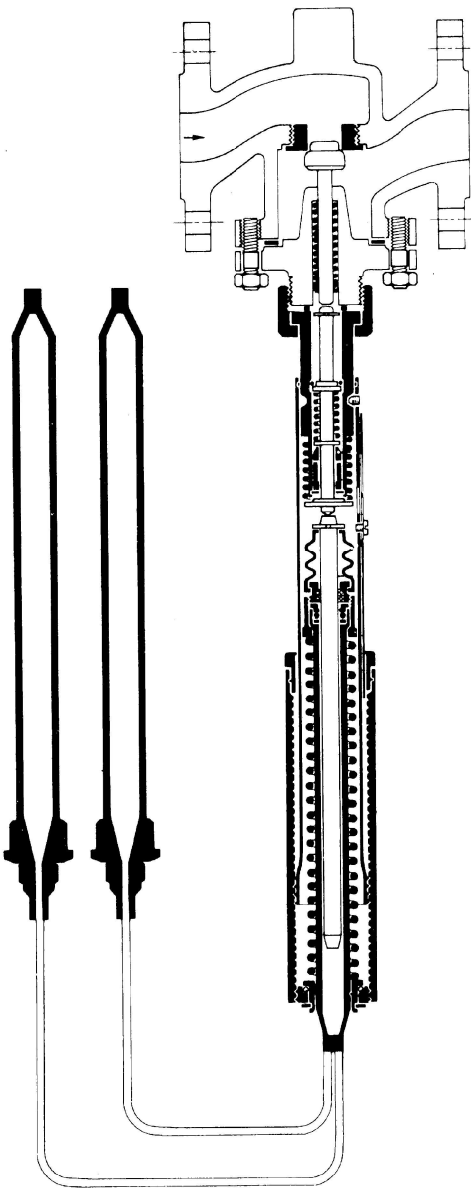


Fig 3



### THEORETICAL BASIS

The theoretical basis for the use of Duostats for room heating plants rests on the balance between the heat brought to the plant, and the thermal loss from the heated rooms to the surroundings. By hot-air plants (**fig. 1**) this may approximately be expressed by equation 1), but with small changes, these considerations may be applied to central heating plants with water as the heat carrier.

$$1) Lc_p (t_i - t_u) = \Sigma kf(t_r - t_u)$$

Here L is the quantity of air which is heated from the outdoor temperature  $t_u$  to the discharge temperature  $t_r$ , and  $c_p$  is the specific heat of the air.  $k \cdot f$  expresses the sum of transmission surfaces, joints, etc., through which heat is lost to the surroundings by the difference between the temperatures of the heated rooms  $t_r$  and the outdoor temperature  $t_u$ . As L,  $c_p$ ,  $k \cdot f$  and the room temperature are constant sizes, equation 1) can be converted into:

$$2) (t_{i \max} - t_{i \min}) / (t_{u \max} - t_{u \min}) = \Delta t_i / \Delta t_u = n$$

Here  $t_{i \max}$  and  $t_{u \min}$  are belonging values for the calculated discharge air temperature by the outdoor temperature for which the plant has been dimensioned. In the same way,  $t_{i \min}$  and  $t_{u \max}$  are interbelonging values by the condition where the thermal loss is 0 (normally 20°C). The size n expresses how many degrees  $t_i$  has to be raised, when  $t_u$  falls one degree. It is constant for the individual plant, but varies from plant to plant. This problem can be met by supplying the Duostats with different sensor proportions. The proportion between the liquid volume in secondary and primary sensors is:

$$3) V_s / V_p = 1.25n$$

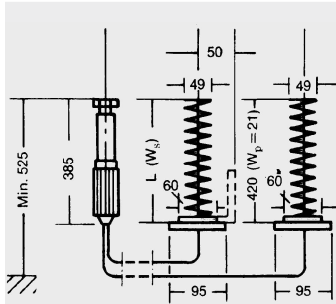
This formula is approximate, as the expansion coefficient of the liquid (glycerine) varies with the temperature, which is compensated for with the factor 1.25.

### ORDER DIAGRAM

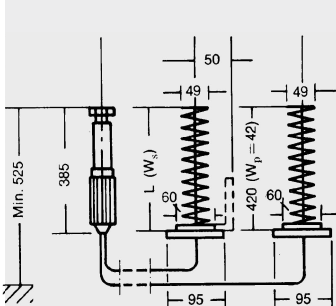
By specifications of Duostats, the following information is given:

1. Valve. Dimension and type	Example 15 M1F
2. Duostat. Basic type and sensor proportion	V4.05 C
3. Capillary tube from adjusting cylinder to secondary sensor ( $V_s$ , blue)	6 m
4. Capillary tube from adjusting cylinder to primary sensor ( $V_p$ , red)	3 m

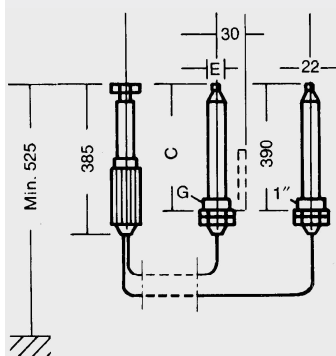




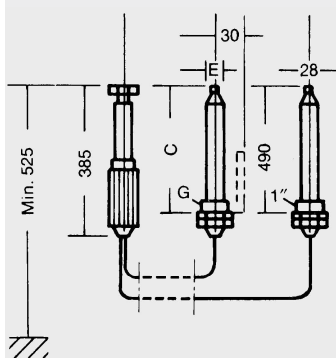
Type		V4.05 A	V4.05 B	V4.05 C	V4.05 D	V4.05 E
Closing power	N	500	500	500	500	500
Length of secondary sensor L	mm	430	430	430	430	430
Secondary sensor's windings $W_s$		7	10	14	21	29
Secondary sensor's time constant *	sec.	360	360	360	360	360
Primary sensors's time constant *	sec.	360	360	360	360	360
Sensor proportion $V_s : V_p$		0.35:1	0.5:1	0.7:1	1:1	1.4:1
Excess temperature protector	°C	80	80	80	80	80
Max. lifting height	mm	21	21	21	21	21
Travel	mm/°C	0.5	0.5	0.5	0.5	0.5



Type		V4.10 A	V4.05 B	V4.05 C	V4.05 D	V4.05 E
Closing power	N	500	500	500	500	500
Length of secondary sensor L	mm	430	430	430	430	430
Secondary sensor's windings $W_s$		14	21	29	42	42
Secondary sensor's time constant *	sec.	360	360	360	360	360
Primary sensors's time constant *	sec.	360	360	360	360	360
Sensor proportion $V_s : V_p$		0.35:1	0.5:1	0.7:1	1:1	1.45:1
Excess temperature protector	°C	40	40	40	40	40
Max. lifting height	mm	21	21	21	21	21
Travel	mm/°C	1	1.0	1.0	1.0	1.0



Type		V4.05 L	V4.05 M
Closing power	N	500	500
Length of secondary sensor C	mm	390	490
Secondary sensor's diam. E	mm	22	28
Secondary sensor's thread conn. G	ISO 7/1	R1	R1
Secondary sensor's time constant*	sec.	130	165
Primary sensor's time constant	sec.	130	130
Sensor proportion $V_s : V_p$		1:1	2:01
Excess temperature protector	°C	0:00	80
Max. lifting height	mm	21	21
Travel	mm/°C	0.5	0.5



Type		V4.10 L	V4.10 N
Closing power	N	500	500
Length of secondary sensor C	mm	490	800
Secondary sensor's diam. E	mm	28	34
Secondary sensor's thread conn. G	ISO 7/2	R1	R2
Secondary sensor's time constant*	sec.	165	280
Primary sensor's time constant	sec.	165	165
Sensor proportion $V_s : V_p$		1:1	2.9:1
Excess temperature protector	°C	0:00	40
Max. lifting height	mm	21	21
Travel	mm/°C	1	1.0

\*The time constants are for spiral sensing elements for air ducts measured in air with a velocity of 4 m/sec. For rod sensing elements they are measured in water with a velocity of 1 m/sec.

## HIGH PRECISION & REPEATABILITY

Our Electric actuators are compact and powerful actuator systems, which provide a long service life. Designed for our range of both linear and rotary valves



# ELECTRIC ACTUATORS

---

## OUR ELECTRIC ACTUATOR PROGRAM INCLUDES:

### ACTUATOR TYPE

ROTARY ELECTRIC

LINEAR ELECTRIC

LINEAR WITH FAIL SAFE FUNCTION

### ACTUATOR MODEL

CAR 009 - 300

CAR-H 006 - S300

AVM321, AVM322, AVM234

AVF234

# ELECTRIC VALVE ACTUATOR TYPE CAR

FOR 2 & 3-WAY VALVES TYPE G/L/M/S 2FM-T & G/L/M/S 3FM-T

O-4.11.08-L

Page 1 of 4



## APPLICATIONS

Electric valve actuator type CAR is specially designed to meet the demands of the powerful low frequency vibration environments in marine installations.

The main applications are cooling of fresh water, sea water and lubricating oil systems for main and auxiliary engines. The actuator is used for Clorius 2 or 3-way valves type L3FM-T, M3FM-T, G3FM-T and S3FM-T.

## MOUNTING

For mounting and starting up, the instructions delivered with the actuator must be followed carefully.

## SERVICE

No special service is needed. It is recommended to check and grease the actuator at every docking or every three years.

## TECHNICAL DATA

<b>Casing:</b>	Watertight IP67, Nema 4 and 6
<b>Ambient temp.:</b>	-30°C to +70°C, 150°C/1 hr.
<b>Power Supply:</b>	110/230 VAC, 1-Phase (50Hz/60Hz), 380/400/440 VAC, 3-Phase (50Hz/60Hz) 24 VDC (CAR 015-028)
<b>Torque switches:</b>	Open/Close
<b>Limit switches:</b>	Open/Close, additional limit switches on request
<b>Stall protection:</b>	Built-in Thermal Protection Cut-off at 150°C ± 5°C / Reset at 97°C ± 15°C
<b>Travel angle:</b>	90° ± 5°
<b>Indicator:</b>	Continuous Position Indicator
<b>Manual override:</b>	AUTO Declutching Mechanism
<b>Worm gear:</b>	Permanently lubricated and Self-locking
<b>Mechanical stops:</b>	External Adjustable Limit Stops
<b>Space heater:</b>	20 W (115/230 VAC, 24 VDC) Anti-Condensation
<b>Cabeling:</b>	2 x M20 x 1,5
<b>Lubrication:</b>	Grease GADUS S2 V220 2
<b>Materials:</b>	Steel, Aluminium Alloy, Al Bronze
<b>External coating:</b>	Anodizing and Dry Powder Epoxy
<b>Duty Cycle:</b>	Please see specification Overvoltage category III acc. to IEC60664-1

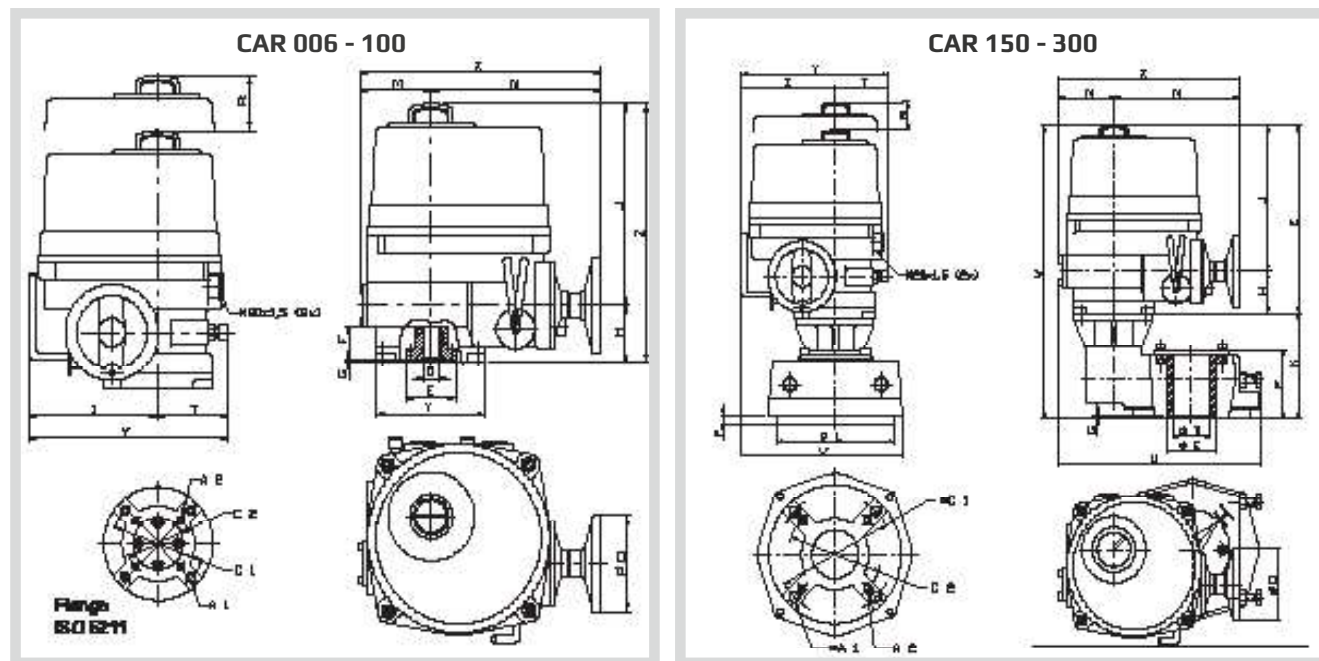
## FEATURES

- Robust design
- Maintenance free
- Reliable even in rough environments
- Easy installation
- User friendly

## SPECIFICATIONS

Type	Max. torque Nm	Operating time sek/90° (50/60 Hz)	Weight kg	No. of handle turns	Current draw max. A (1-phase 110VAC)	Current draw max. A (1-phase 230VAC)	Current draw max. A (3-ph 400VAC)	Current draw max. A (24 VDC)	Duty cycle 54(%)
CAR 006	60	17/14	9	8.5	0.7	0.38	0.15	2.5	50
CAR 009	90	17/14	9	8.5	1.1	0.56	0.18	2.5	50
CAR 019	190	20/17	11.5	10	1.6	0.75	0.3	4.5	50
CAR 028	280	24/20	14	12.5	1.6	0.75	0.32	6.5	50
CAR 060	600	29/24	24	14.5	3.5	1.2	0.47	-	25
CAR 080	800	29/24	24	14.5	3.8	1.8	0.75	-	25
CAR 100	1000	29/24	24	14.5	4.0	2	0.85	-	25
CAR 150	1500	87/72	60	43.5	3.5	1.2	0.47	-	25
CAR 200	2000	87/72	60	43.5	3.8	1.8	0.75	-	25
CAR 300	3000	116/96	60	43,5	-	2.0	0.85	-	25

## DIMENSION SKETCH



3

Type	CAR 006	CAR 009	CAR 019	CAR 028	CAR 060 CAR 080 CAR 100	CAR 150 CAR 200	CAR 300
Flange	F07	F07	F07, F10	F12, F10	F14, F12	F16, F14*	F16
C1	-	-	102	125	140	165	165
C2	82	82	70	102	125	140*	140*
A1	-	-	M10	M12	M16	M14*/M16*	M20
A2	M8	M8	M8	M10	M12	M20	<b>M20</b>
B	12	12	15	18	22	30	30
<b>D(Max**)</b>	<b>22</b>	<b>22</b>	<b>22</b>	<b>32</b>	<b>42</b>	<b>75</b>	<b>75</b>
E	55	55	57	75	85	100	100
F	43	43	43	52	59	126	126
G	2	2	2	2	2	7	7
H	60	60	60	70	78	78	78
I	120	120	139	149	192	192	192
J	213	213	213	250	283	283	283
K	-	-	-	-	-	195	195
L	102	102	120	145	170	266	266
M	56	56	77	83	99	99	99
N	174	174	184	202	226	315	315
O	102	102	102	125	170	170	170
P	-	-	-	-	-	16	16
R	108	108	108	130	178	178	178
T	68	68	85	95	105	152	152
U	-	-	-	-	-	388	388
V	-	-	-	-	-	318	318
W	-	-	-	-	-	556	556
X	230	230	261	285	325	414	414
Y	188	188	224	244	297	344	344
Z	270	270	274	321	362	554	554
øD	102	102	102	125	155	170	170

# ELECTRIC VALVE ACTUATOR TYPE CAR

For 2 & 3-way valves type G/L/M/S 2FM-T & G/L/M/S 3FM-T

O-4.11.08-L

Page 3 of 4

## ACCESSORIES

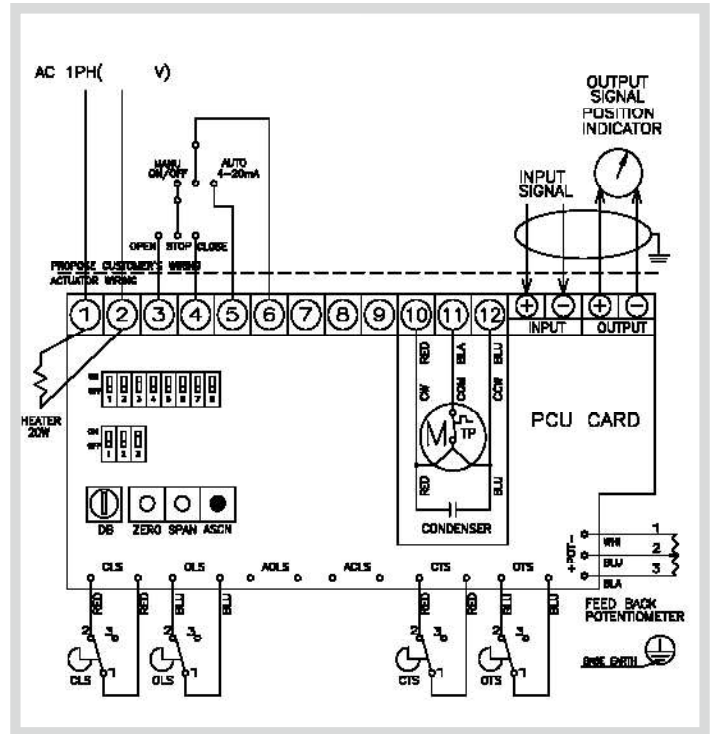
### CAR PROPORTIONAL CONTROL UNIT PCU PB90

<b>Command signal input</b>	4-20 mA, nominal input impedance 150 Ohm, jumpers I1 and I2 0-10 V, nominal input impedance 260k Ohm, jumper V1
<b>Analogue feedback signal</b>	4-20 mA, self powered, can drive up to 300 Ohm
<b>Fuse</b>	3, 15 AT 5x20 mm, mounted on the PB90 card
<b>Resolution</b>	Approx. 0,3%
<b>Conversion</b>	12 bit maximum. Normal range (4-20 mA) = 1/3200

Position board. Characteristic of feedback element and actuator system response affect the true performance.

- CLS: Close Limit Switch (250VAC 15A)
- OLS: Open Limit Switch (250VAC 15A)
- CTS: Close Torque Switch (250VAC 15A)
- OTS: Open Torque Switch (250VAC 15A)
- TP: Thermal Protector (250VAC 15A)

CAR 006-300

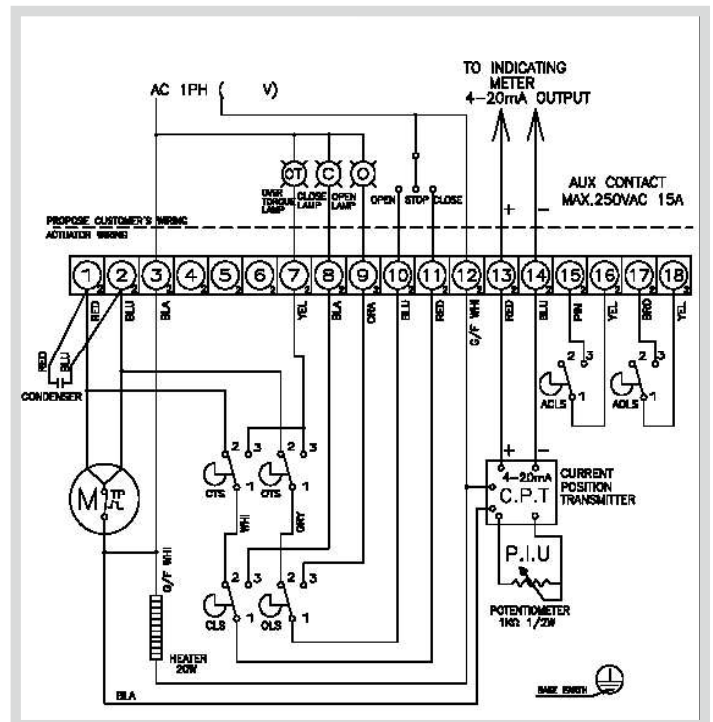


CAR 009-300

### CAR CURRENT POSITION TRANSMITTER CPT

- For continuous, analogue feed back signal 4-20 mA
- R/I Transmitter
- The electronic components are protected against dirt and similar

- CLS: Close Limit Switch (250VAC 6A)
- OLS: Open Limit Switch (250VAC 6A)
- CTS: Close Torque Switch (250VAC 6A)
- OTS: Open Torque Switch (250VAC 6A)
- TP: Thermal Protector (250VAC 15A)



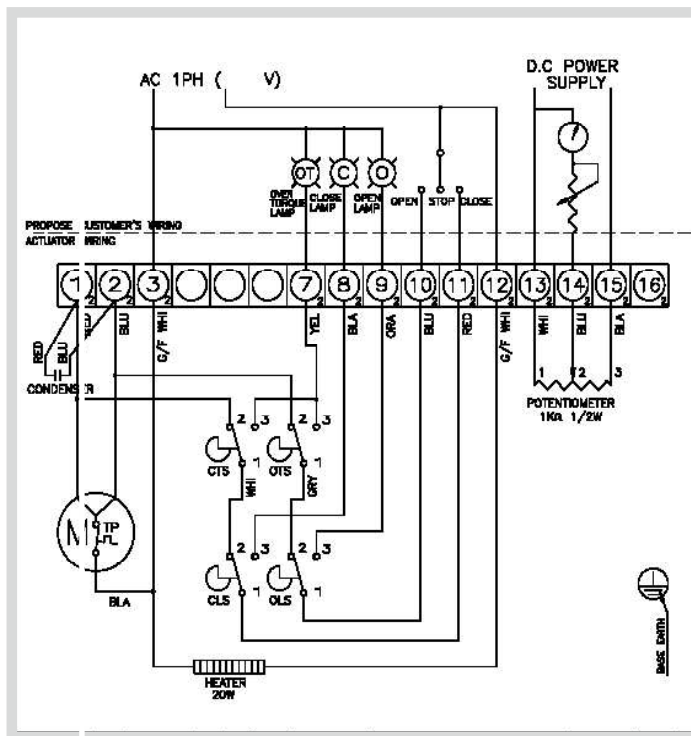
## ACCESSORIES

### CAR POTENTIOMETER PIU

- For CAR 006 - CAR 250
- For continuous position feedback from 0° to 90°
- The whole unit is built into the actuator
- Potentiometer 1k Ohm, senses the actuator position during the whole turning movement
- Mounting details included
- Resistance 1k Ohm
- Resistance tolerance ±20%
- Linearity ±1%
- Max load 1W at +70 °C

CLS: Close Limit Switch (250VAC 15A)  
 OLS: Open Limit Switch (250VAC 15A)  
 CTS: Close Torque Switch (250VAC 15A)  
 OTS: Open Torque Switch (250VAC 15A)  
 ACLS: Aux. Close Limit Switch (250VAC 15A)  
 AOLS: Aux. Open Limit Switch (250VAC 15A)  
 TP: Thermal Protector (250VAC 15A)

CAR 006-300



3

### RECOMMENDED ACTUATOR TYPES FOR G2/G3FM-TR and G2/G3FM-TL VALVES

Valve size	Actuator type CAR			
	P1≤5bar	P1≤10bar	P1≤16bar	P1≤25bar
DN 65	006	006	006	006
DN 65	009	009	009	009
DN 80	009	009	009	009
DN 100	009	009	009	019
DN 125	009	019	019	019
DN 150	019	019	028	-
DN 200	019	028	060	-
DN 250	028	060	060	-
DN 300	060	060	100	-
DN 350	060	100	-	-
DN 400	100	200	-	-
DN 450	200	200	-	-
DN 500	200	200	-	-
DN 550	200	200	-	-
DN 600	200	300	-	-
DN 800	-	-	-	-

### RECOMMENDED ACTUATOR TYPES FOR G3FM-TM VALVES

Valve size	Actuator type CAR			
	P1≤5bar	P1≤10bar	P1≤16bar	P1≤25bar
DN 65	006	006	006	006
DN 65	009	009	009	009
DN 80	009	009	009	009
DN 100	009	009	019	019
DN 125	019	019	019	028
DN 150	019	028	028	-
DN 200	028	060	060	-
DN 250	060	060	100	-
DN 250	080	080	100	-
DN 300	100	100	100	-
DN 350	100	200	-	-



# ELECTRIC VALVE ACTUATOR TYPE CAR-H

FOR 2 & 3-WAY VALVES TYPE G/L/M/S 2FM-T & G/L/S/T AND TM

O-4.11.09-B

Page 1 of 4



## TECHNICAL DATA

<b>Protection class:</b>	IP67/IP68 option
<b>Ambient temperature:</b>	-20°C to +60°C
<b>Power supply:</b>	110/230 VAC + -10% (50-60Hz) 24VAC/DC and -10% / CAR-H 020-S250
<b>Torque switches:</b>	Open/Close
<b>Limit switches:</b>	2x Open/Close
<b>Stall protection:</b>	Built-in thermal protection Cut-off at 125°C ± 5°C / reset at 90°C ± 15°C
<b>Travel angle:</b>	90°±5°
<b>Indicator:</b>	Continuous position indicator
<b>Manual override:</b>	AUTO declutching mechanism
<b>Worm gear:</b>	Permanently lubricated and self-locking
<b>Mechanical stops:</b>	External adjustable limit stops
<b>Space heater:</b>	5W Anti-condensation
<b>Cable glands:</b>	2 x M20 x 1,5mm
<b>Lubrication:</b>	Grease NLGI grade 2 (EP-type)
<b>Materials:</b>	Steel, aluminium alloy, Al-bronze
<b>External coating:</b>	anodizing and dry powder epoxy painted RAL 6018 (green)
<b>Duty cycle:</b>	On-Off: S2:10min
<b>Modulating:</b>	S4:30%, 1200 start/hour
<b>Anti-vibration:</b>	XYZ 10g 02 ~ 34Hz, 30min
<b>Overvoltage:</b>	CAT. III
<b>Available actuator size</b>	
<b>STANDARD:</b>	On-Off, 3-Point
<b>Modulating/PCU</b>	
<b>Command signal input:</b>	4-20mA or 0-10V
<b>Analogue feedback signal:</b>	4-20mA or 0-10V self powered
<b>Deep band:</b>	1,0% adjustable
<b>CPT:</b>	feedback signal 4-20mA

## APPLICATIONS

Electric valve actuator type CAR-H is specially designed to meet the demands of the powerful low frequency vibration environments in marine installations.

The main applications are cooling of fresh water, sea water and lubricating oil systems for main and auxiliary engines. The actuator is used for Clorius 2 or 3-way valves type L3FM-T, M3FM-T, G3FM-T and S3FM-T, H3FM-T and type TM with double slides.

## MOUNTING

For mounting and starting up, the instructions delivered with the actuator must be followed carefully.

## SERVICE

No special service is needed. It is recommended to check and grease the actuator at every docking or every three years.

## FEATURES

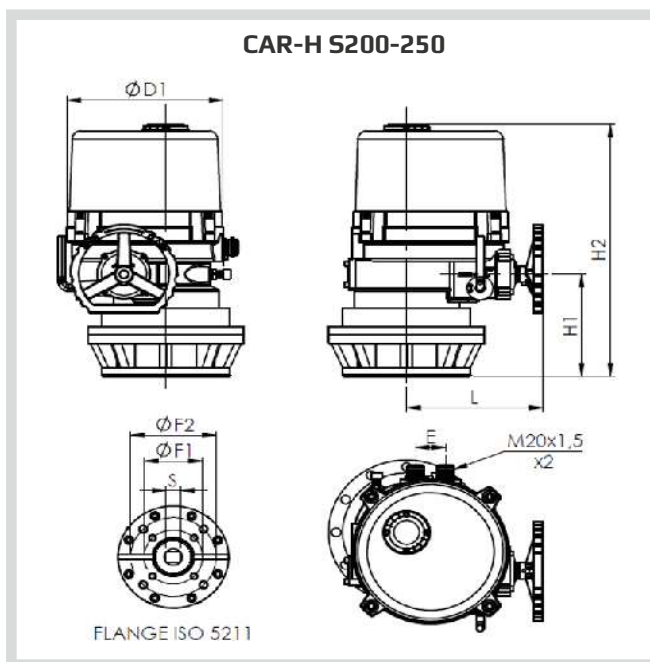
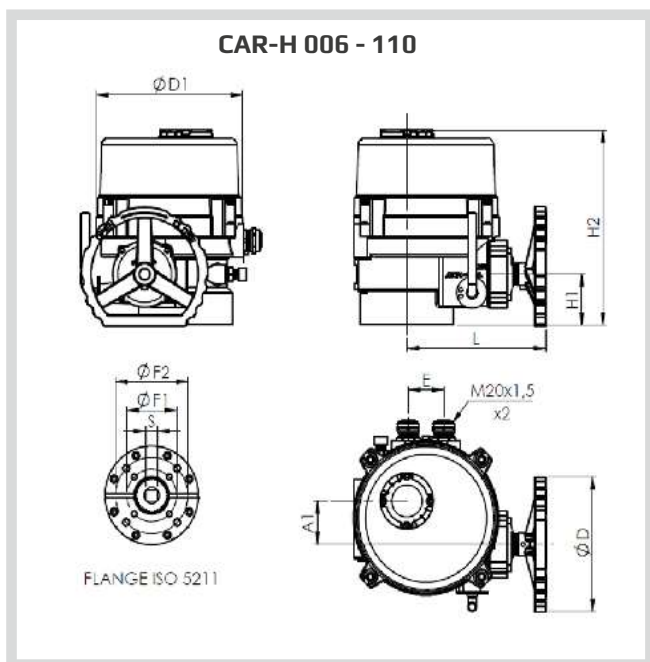
- Robust design
- Maintenance free
- Reliable even in rough environments
- Easy installation
- User friendly

## SPECIFICATIONS

Type	Max. torque Nm	Operating time sek/90° (50/60 Hz)	RATED CURRENT (A) 230 V AC	RATED CURRENT (A) 110 V AC	RATED CURRENT (A) 24 V AC/DC	Power (W)	Duty cycle S5 (%)	Weight (kg)
CAR-H 006	60	26/24	0,45	-	-	20	30	8
CAR-H 010	100	26/24	0,5	1,0	1,7	20	30	8
CAR-H 016	160	28/26	0,6	1,5	2,2	40	30	14
CAR-H 020	200	28/26	0,6	1,5	2,2	40	30	14
CAR-H 024	240	28/26	0,7	1,6	2,8	45	30	14
CAR-H 035	350	32/29	0,9	1,8	4,0	60	30	18
CAR-H 050	500	32/29	1,3	3,2	6,9	90	30	19
CAR-H 080	800	36/33	1,5	3,9	9,8	120	30	24
CAR-H 110	1100	36/33	2,2	4,2	12,5	180	30	26
CAR-H S200	2000	110/99	1,5	3,9	9,8	120	30	50
CAR-H S300	2500	110/99	2,2	4,2	12,5	180	30	52



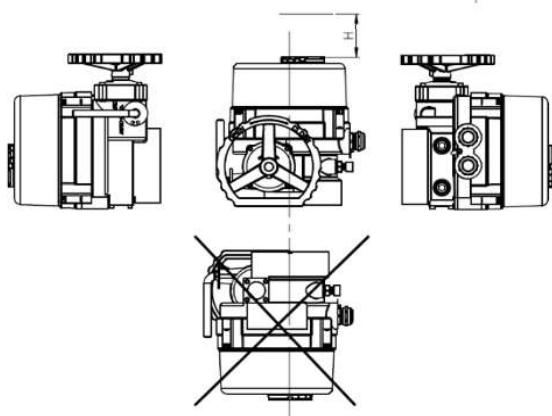
**DIMENSION SKETCH**



3

Type	A1	ØD	ØD1	H1	H2	L	E	ISO FLANGE 5211				
								F1	F2	M1	M2	S
								Ø	Ø			SQUARE
CAR-H 006	41	100	157	55	223	167	46	70	82	M8	M8	12x12 - 17x17
CAR-H 010	41	100	157	55	223	167	46	70	82	M8	M8	12x12
CAR-H 016	57,5	180	206	67	261	197	50	70	-	M8	-	17x17
CAR-H 020	57,5	180	206	67	261	197	50	82	102	M8	M10	17x17
CAR-H 024	57,5	180	206	67	261	197	50	70	102	M8	M10	19x19
CAR-H 035	60,5	180	222	70	315	208	50	102	125	M8	M10	19x19
CAR-H 050	60,5	180	222	70	315	208	50	102	125	M8	M10	27x27
CAR-H 080	70	180	262	81	352	230	50	125	140	M12	M16	27x27
CAR-H 110	70	180	262	81	352	230	50	125	140	M12	M16	27x27
CAR-H S200	70	180	262	185	456	230	50	140	165	M16	M20	27x27 - 46x46
CAR-H S250	70	180	262	185	456	230	50	140	165	M16	M20	46x46

**RECOMMENDED CAR MOUNTING POSITION**



Actuator type	H
CAR-H 006 - 110	150
CAR-H S200-250	200

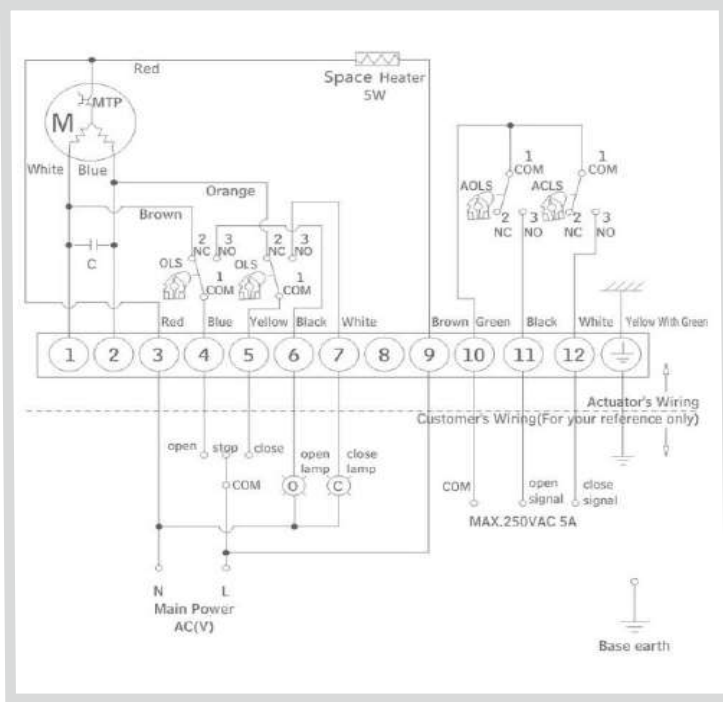
# ELECTRIC VALVE ACTUATOR TYPE CAR-H

For 2 & 3-way valves type G/L/M/S 2FM-T & G/L/M/S 3FM-T

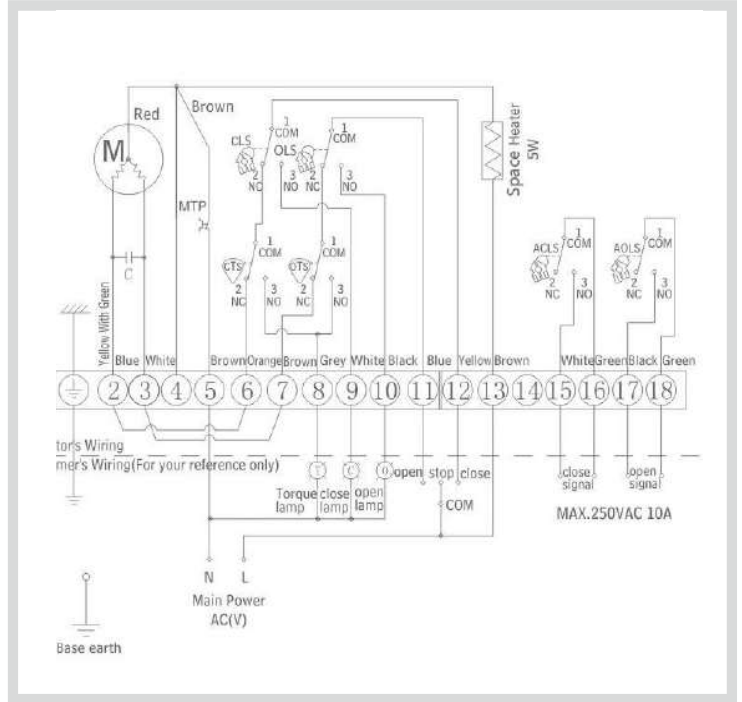
O-4.11.09-B

Page 3 of 4

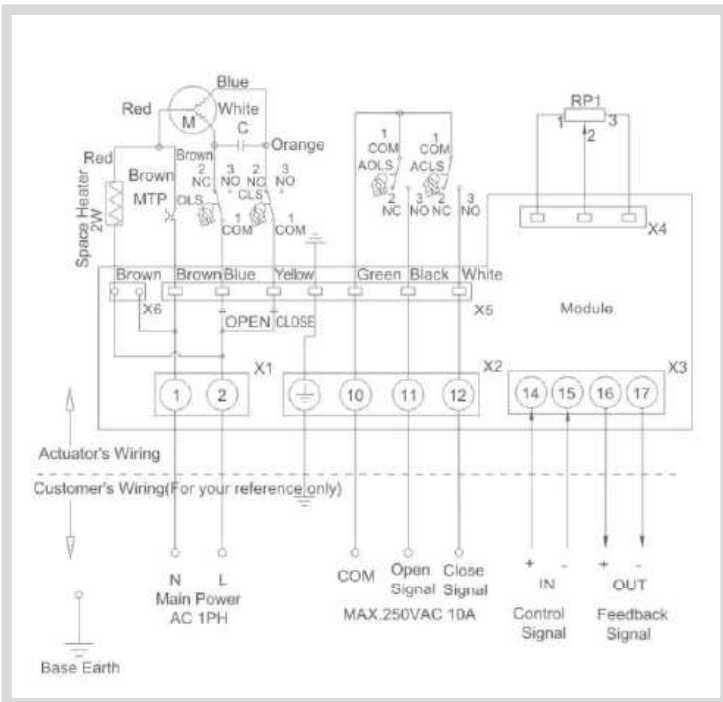
**110/230 VAC**  
**On/Off type wiring diagram - for CAR-H 006-010**



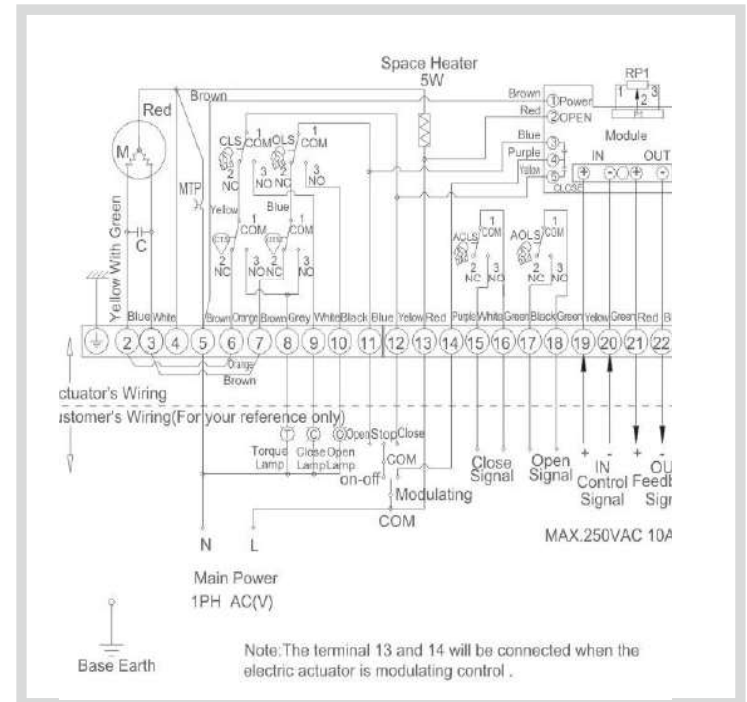
**110/230 VAC**  
**On/Off type wiring diagram - for CAR-H 016-S250**



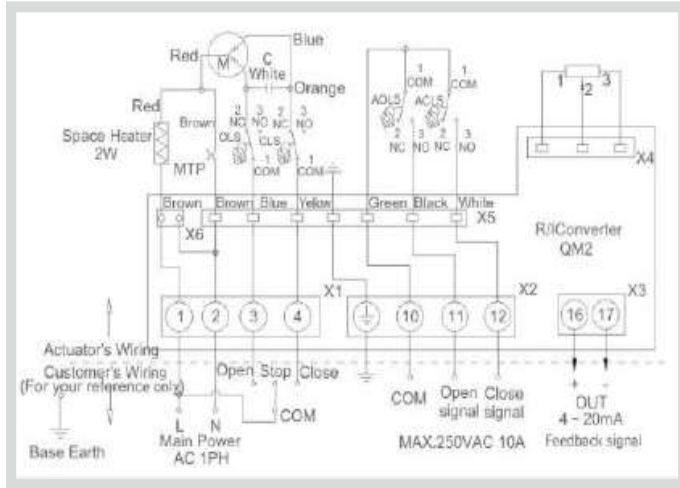
**110/230 VAC**  
**Modulating type wiring diagram - for CAR-H 006-010**



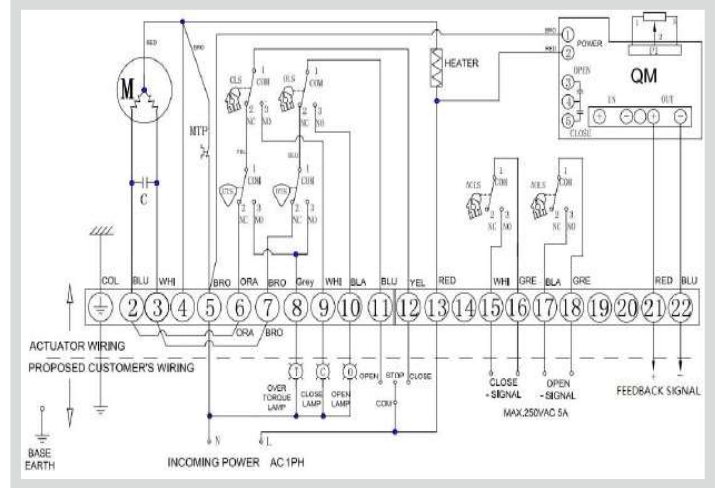
**110/230 VAC**  
**Modulating type wiring diagram - for CAR-H 016-S250**



**110/230 VAC**  
**CPT type wiring diagram - for CAR-H 006-010**



**110/230 VAC**  
**CPT type wiring diagram - for CAR-H 016-S250**



**Modulating/PCU actuator data**

<b>CAR-H 006-010</b> Technical data	• Analogue input signal 4-20mA or 0-10V	Optional
	• Analogue feedback signal 4-20mA or 0-10 self-powered	Optional
	• Input impedance $\geq 400K\Omega$	-
	• Dead band 1-%	Adjustable
	• The electronic components are protected dirt and similar	-
<b>CAR-H 016-S250</b> Technical data	• Analogue input signal 4-20mA or 0-10V	DIP Switches
	• Analogue feedback signal 4-20mA or 0-10V self-powered	DIP Switches
	• Input impedance $\geq 400K\Omega$	-
	• Dead band 1-%	Adjustable
	• The electronic components are protected dirt and similar	-
<b>CLS</b>	Close limit switch (250VAC 5A)	-
<b>OLS</b>	Close limit switch (250VAC 5A)	-
<b>CLS</b>	Close Torque switch (250VAC 5A)	-
<b>OTS</b>	Close Torque switch (250VAC 5A)	-
<b>Torque switch</b>	x 2 close/open	CAR-H 016-S250
<b>Torque switch</b>	without	CAR-H 006-010
<b>TP</b>	Thermal protector (250VAC 5A)	-
<b>Header</b>	CAR-H 006-10: 5W; CAR-H 016-S250: 7W	-

3

# AVM234S: 2500N Actuator

(With analog SUT positioner) 2 point or 3 point control and analogue I/O signals

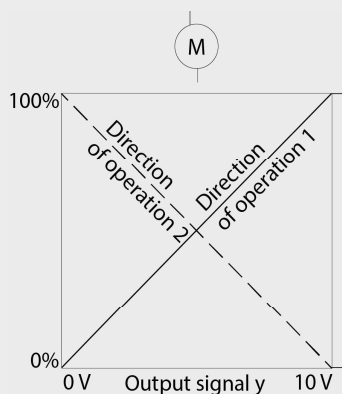
0-99.70.04-B

Page 1 of 2



## TECHNICAL DESCRIPTION

Power supply 230 V with modules or direct connection for 24 V~ or 24 V=; continuous activation also permissible at 230 V  
Two-part housing made of fire-retardant yellow plastic and seals to IP66.  
Maintenance-free gearbox of sintered steel, gearbox plate of steel.  
Patented actuator-valve coupling.  
Mounting column made of stainless steel; mounting bracket (for fitting the valve) of aluminium  
Electrical connections (max. 2.5 mm<sup>2</sup>) with screw terminals.  
Three pre-scored cable inlets for M20×1.5 (2×) and M16×1.5.  
Installation position: vertically upright to horizontal, but not upside down unless protected from dripping water.



Subject to change without notice.

## AREAS OF USE

For use with two or three-way control valves. For controllers with continuous output (0...10 V or 4...20 mA) or switching output (2-point or 3-point control).

## HOW ENERGY EFFICIENCY IS IMPROVED

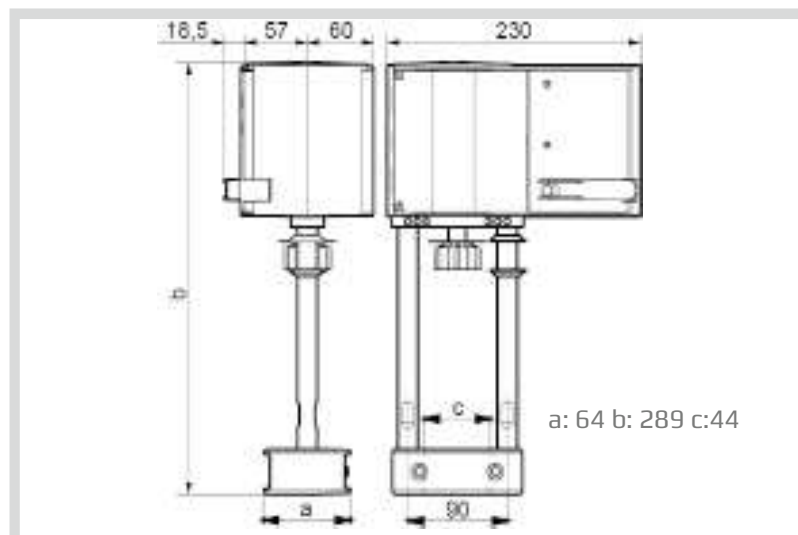
Automatic adaptation to valve, precision control and high energy efficiency with minimal operating noise.

## FEATURES

- Pushing force of at least 2500 N
- Stepping motor with SUT (Superior Universal Technology) electronic control unit and electronic load-dependent cut-off
- Automatic detection of control signal applied (continuous or switching), indicated by two LEDs
- The type of characteristic (linear, quadratic or equal-percentage) can be set on the actuator
- Automatically adapts to valve stroke between 8 and 49 mm; captive even in the event of a power failure
- Direction of travel can be selected via screw terminals when making electrical connection or remotely
- Coding switches for selecting the characteristic and the running time (2, 4 or 6 s/mm)
- Lever for external manual adjustment, with motor cut-off, and for triggering a re-initialisation
- Easy assembly with valve; spindle is connected automatically when control voltage is applied

Type	Positioning time (s/mm)	Nominal stroke (mm)
AVM2345K002	2/4/6	49

## DIMENSION DRAWING



## TECHNICAL DATA

Type	Run time s/mm	Stroke mm	Pushing force N	Power supply <sup>1)</sup>	Weight kg
<b>AVM 234S K002</b>	<b>2/4/2006</b>	<b>8...40</b>	<b>2500</b>	<b>24 V~/=</b>	<b>4.1</b>
<b>Positioner: <sup>1)</sup></b>					
Control signal 1	0...10 V, R <sub>i</sub> > 100 kΩ		Starting point U <sub>0</sub>		0 or 10
Control signal 2	4...20 mA, R <sub>i</sub> = 50 kΩ		Control span ΔU		10 V
Position feedback signal	0...10 V, load > 2.5 kΩ		Switching range Xsh		300 mV
Power supply	24 V~ ±20 %, 50...60 Hz		Degree of protection		IP 66 (EN 60529)
with accessories	24 V= ±15% 230 V~ ±15% 50...60 Hz		Protection class		III (IEC 60730)
Power consumption	10 W 18 VA <sup>2)</sup>		Response time for 3-point		200 ms
Stroke	8...49 mm		Wiring diagram		A10357
Max temperature of medium	130 °C (option 240 °C) <sup>3)</sup>		Dimension drawing		M10356
Permitted ambient temperature	-10...55 °C		Fitting instructions		99.70.01
Permitted ambient humidity	< 95% rh without conversion		Material declaration		MD 51.377

1) Also for 2-point or 3-point depending on the connection for 24 V~

2) Design the transformers for this value, otherwise functional faults may occur.

3) If the temperature of the medium is higher (from 130 °C to 240 °C), an adaptor is required (see accessories)

### CE conformity

EMC Directive 2004/108/EC  
EN 61000-6-2  
EN 61000-6-4

Low-Voltage Directive 2006/95/EC  
EN 60730-1  
EN 60730-2-14

Over-voltage category III  
Degree of pollution III

### ACCESSORIES

Type	Description
<b>1-0152285</b>	<b>Temperature adaptor</b> for media temperature > 130 °C ... 240 °C
<b>1-0152287</b>	<b>Potentiometer 1000 Ω</b> , 1 W, 24 V; installation as per MV 505894
<b>1-0152289</b>	<b>Auxiliary change-over contacts</b> (2 pcs. each) 12...250 V infinitely variable, min. 100 mA and 12 V, additional load 6(2) A, MV 505866
<b>1-0152281</b>	<b>230 V Module, plug-in type</b> , for 2-/3-point and continuous activation, additional power 2 VA 230 V 15% power supply, MV 505901, 50/60 Hz
<b>1-0152287</b>	<b>115 V Module, plug-in type</b> 50/60 Hz
<b>1-0152627</b>	<b>4-20 mA Position feedback signal</b> , for 24VAC/DC, output load resistor max. 600 ohm Accuracy +/- 5% of full range
<b>1-0147655</b>	<b>Cable gland</b> M20×1.5

# AVM321/AVM322: 1000N Actuator

For 2-point or 3-point control

0-99.70.05-B

Page 1 of 2



## AREAS OF USE

For actuation of 2 and 3-way valves. For controllers with a switching output (2-point or 3-point control)

## IMPROVING ENERGY EFFICIENCY

Automatic adaptation to valve, optimal operator convenience, precision control and high energy efficiency with minimal operating noise.

## FEATURES

- Synchronous motor with electronic control unit and load-dependent cut-off
- Direction of operation and positioning time can be set using coding switches
- Crank handle for external manual adjustment with motor cut-off
- Very low operating noise
- Simple assembly with valve; spindle is automatically connected after nominal voltage is applied
- Electrical parallel operation of 5 actuators

## TECHNICAL DESCRIPTION

Power supply 24 V~/= or 230 V~

Three-piece housing of flame retardant yellow/black plastic and seals with degree of protection IP54.

Maintenance-free gearbox made of plastic, threaded spindle and gearbox base-plates made of steel.

Patented actuator-valve coupling

Mounting studs made of aluminium.

Fixing bracket made of aluminium for the valve fitting with 20 mm and made of plastic for the valve fitting with 10 mm stroke.

Electrical connections (max. 1.5 mm<sup>2</sup>) with screw terminals.

Two break-out cable inlets for metric screw fitting made of plastic M20×1.5.

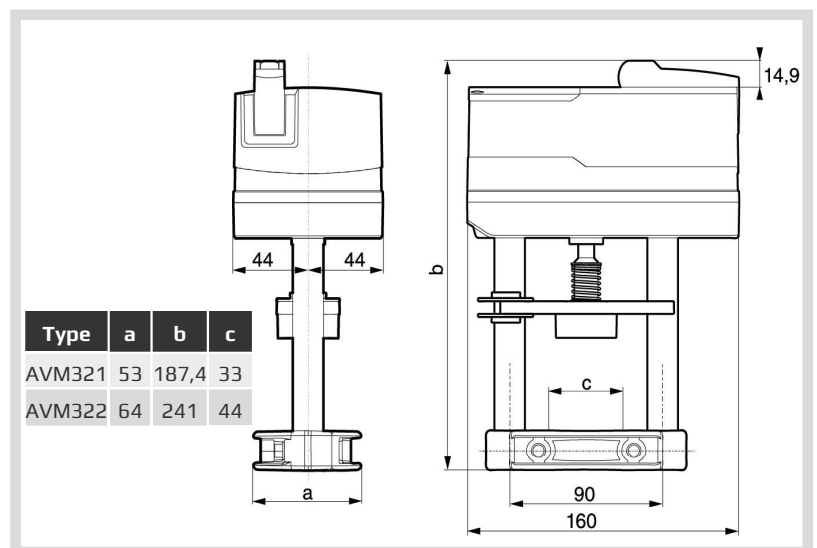
Fitting position, vertically upright to horizontal, not upside down unless protected from dripping water.

## PRODUCTS

Type	Positioning time (s/mm)	Nominal stroke (mm)	Nominal voltage (V)
AVM321K001	12 (6)	10	230 V~
AVM321K002 <sup>†</sup>	12 (6)	10	24 V~/=
AVM322K001	6 (12)	20	230 V~
AVM322K002 <sup>†</sup>	6 (12)	20	24 V~/=

<sup>†</sup> CSA-certified actuators on request (only for devices with nominal voltage 24 V~/=)

## DIMENSION DRAWING



Subject to change without notice.



## TECHNICAL DATA

Power supply		
Operating voltage		
	24 V~	±20 %, 50...60 Hz
	24 V~	-10%...+20 %
	230 V~	±15 %, 50...60 Hz
Power consumption (at nominal voltage, with movement)		
AVM * K001	< 2.0 W	< 3.0 VA
AVM * K002	< 2.4 W	< 4.0 VA

Parameters	
Nominal force <sup>1)</sup>	1000 N
Operating noise <sup>2)</sup> (at nominal force)	< 30 dB(A)
Response time	Approx. 200 ms
Max. media temperature <sup>3)</sup>	0...100 °C

Admissible ambient conditions	
Operating temperature	-10...55 °C
Storage and transport temperature	-40...80 °C
Humidity	5...85% rh
	No condensation

1) Actuating power 1000 N under nominal conditions (24 V or 230 V, 25 °C ambient temperature, 50 Hz). With boundary conditions (19.2 V~ / 28.8 V~ / 21.6 V= / 28.8 V=, -10 °C / 55 °C, 60 Hz) and positioning time, the actuating tensile force is minimised to 800 N

2) Operating noise with the slowest positioning time, test distance 1m

3) Use the appropriate accessory when the temperature of the medium is > 100 °C (temperature adaptor).

### POWER CONSUMPTION AT NOMINAL VOLTAGE

Type	Positioning time (s/mm)	Status	Active power P (W)	Apparent power S (VA)
AVM * K001	6 (12)	Standstill *)	< 0,35	≥ 5,0
		Sizing		
AVM * K002	6 (12)	Operation	< 2,4	< 4,0
		Standstill *)		
	12 (6)	Sizing	< 0,3	≥ 4,0
		Operation		
	12 (6)	Operation	< 2,0	< 3,0

\*) Standstill = actuator in the end position, voltage applied to terminal 1 or 2, motor switched off.

### ACCESSORIES

Type	Description
1-0152285	Temperature adaptor for media temperature > 100 °C ... 240 °C
1-0147655	Cable glands M20×1.5 IP68

Installation	
Dimensions W x H x D (mm)	AVM321: 60x187x88 AVM 322: 160x241x88
Weight (kg)	AVM321: 1.5 AVM322: 1.6

Standards and directives	
Degree of protection	IP 54 (EN 60529)
Protection class	II EN60730 III EN60730

Additional information	
Fitting instructions	99.70.03
Declaration on materials and the environment	MD 51.374
Declaration of incorporation	P100012470
Manual & electrical connection diagram	99.70.05.01

### CE CONFORMITY

<b>EMC Directive 2004/108/EC</b>
EN 61000-6-1
15/9 H1F
EN 61000-6-2
EN 61000-6-3
EN 61000-6-4
<b>Low-voltage Directive 2006/95/EC</b>
EN 60730-1
EN 60730-2-14
Over-voltage category III
Degree of contamination II
Maximum altitude. 2000 m
<b>Machinery Directive 2006/42/EC in accordance with Annex II B</b>
EN 12100

# AVM321S/AVM322S: 1000N Actuator

(With analog SUT positioner)

0-99.70.06-B

Page 1 of 2



## TECHNICAL DESCRIPTION

Power supply 24 V~ or 24 V= (optional accessory module for 85...265V ac 50/60Hz)  
Three-piece housing of flame retardant yellow/black plastic and seals with degree of protection IP54

Maintenance-free gearbox made of plastic, threaded spindle and gearbox base-plates made of steel.

Patented actuator-valve coupling  
Mounting studs made of aluminium.  
Fixing bracket made of aluminium for the valve fitting with 20 mm and made of plastic for the valve fitting with 10 mm stroke.  
Electrical connections (max. 1.5 mm<sup>2</sup>) with screw terminals.  
Two break-out cable inlets for metric screw fitting made of plastic M20×1.5.  
Fitting position, vertically upright to horizontal, not upside down unless protected from dripping water.

Subject to change without notice.

## AREAS OF USE

For actuation of 2 and 3-way valves. For controllers with constant output (0...10 V / 4...20 mA).

## IMPROVING ENERGY EFFICIENCY

Automatic adaptation to valve, optimal operator convenience, precision control and high energy efficiency with minimal operating noise.

## FEATURES

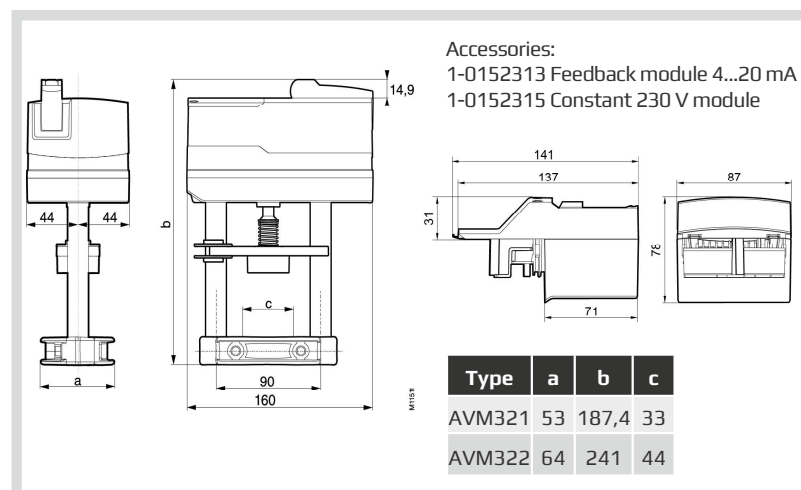
- BLDC motor (brushless DC) with electronic control unit SUT (Superior Universal Technology) of the third generation and electronic load-dependent cut-off
- Automatic recognition of applied control signal (constant or switched), operating display with bi-coloured LED
- Independent adaptation to the stroke of the valve between 8 and 20 mm
- Very low operating noise
- With the built-in absolute distance measurement system, the position is always maintained in case of power failure
- The direction of operation, characteristic (linear / equal percentage), positioning time and control signal (voltage/current) can be adjusted with coding switches
- Integrated forced operation can be set with coding switches (with selectable direction of operation)
- Easy re-initialisation using a coding switch
- Crank handle for external manual adjustment with motor cut-off
- Simple assembly with valve; spindle is automatically connected after control voltage is applied
- Electrical parallel operation of 5 actuators
- Parameterisation option available through bus interface

## PRODUCTS

Type	Positioning time (s/mm)	Nominal stroke (mm)
AVM321SK001 <sup>*)</sup>	12 (4)	10
AVM322SK001 <sup>*)</sup>	6 (4)	20

<sup>\*)</sup>CSA-certified actuators on request

## DIMENSION DRAWING





## TECHNICAL DATA

Power supply	
Operating voltage	24 V~±20 %, 50...60 Hz
	24 V=-10%...+20 %
	230 V~±15 % 50...60 Hz
Power consumption (at nominal voltage, with movement)	< 1.7 W, < 3.5 VA

Parameters	
Nominal force <sup>1)</sup>	1000 N
Operating noise <sup>2)</sup> (at nominal force)	< 30 dB(A)
Response time	> 200 ms
Media temperature <sup>3)</sup>	0...100 °C Option 240°C
Nominal voltage	24 V~/=
Characteristic	Linear / equal percentage
Positioner <sup>4)</sup>	
Control signal y	0...10 V, R
Control signal y	4...20 mA, R <sub>i</sub> ≤ 50 kΩ
Positional feedback signal y <sub>0</sub>	0...10 V, load ≥ 5 kΩ
Starting point U <sub>0</sub>	0 or 10 V
Starting point I <sub>0</sub>	4 or 20 mA
Control span ΔU	10 V
Hysteresis Xsh	160 mV
Control span ΔI	16 mA
Hysteresis Xsh	0.22 mA

<sup>1)</sup> Actuating power 1000 N under nominal conditions (24 V, 25 °C ambient temperature, 50 Hz). With boundary conditions (19.2 V~/ 28.8 V~/ 21.6 V= / 28.8 V=, -10 °C / 55 °C, 60 Hz) and positioning time, the actuating tensile force is minimised to 800 N

<sup>2)</sup> Noise level with the slowest positioning time, test distance 1m

<sup>3)</sup> Use the appropriate accessory when the temperature of the medium is > 100 °C (temperature adaptor).

<sup>4)</sup> Also for 2- or 3-point, depending on type of connection

## POWER CONSUMPTION AT NOMINAL VOLTAGE

Type	Positioning time (s/mm)	Status	Active power P (W)	Apparent power S (VA)
AVM3215	12 / (4)	Operation	< 1.7	< 3.5
AVM3225	6 / (4)	Standstill *	< 0.45	
		Sizing		≥ 4.5

\*) Standstill = actuator in the end position, voltage applied to terminal 1 or 2, motor switched off.

## ACCESSORIES

Type	Description
1-0152285	Temperature adaptor for media temperature > 100 °C ... 240 °C
1-0152313 *	4...20 mA feedback module, Accuracy +/- 5% of full range
1-0152315 *	Power supply 85-265V 50/60HZ
1-0147655	Cable glands M20×1.5 IP68

\*) Dimension drawing or connection diagram is available under the same number

Admissible ambient conditions	
Operating temperature	-10...55 °C
Storage and transport temperature	-40...80 °C
Humidity	5...85% rh No condensation

Installation	
Dimensions W x H x D (mm)	AVM3215 160x187x88 AVM3225 160x241x88
Degree of protection IP 54	(EN 60529)
Weight (kg)	
AVM3215	1.5
AVM3225	1.6

Standards and directives	
Protection class III (EN 60730-1), EN60730-2-14	

Additional information	
Fitting instructions	99.70.03
Declaration on materials and the environment	MD 51.375
Declaration of incorporation	P100012470
Manual & connection diagram	99.70.06.01

## CE CONFORMITY

EMC Directive 2004/108/EC	
EN 61000-6-1	
EN 61000-6-2	
EN 61000-6-3	
EN 61000-6-4	
Low-voltage Directive 2006/95/EC	
EN 60730-1	
EN 60730-2-14	
Over-voltage category III	
Degree of contamination II	
Maximum altitude. 2000 m	
Machinery Directive 2006/42/EC in accordance with Annex II B	
EN 12100	

# AVF234S: 2000N Actuator

With analog SUT positioner (analogue I/O signals) and spring return

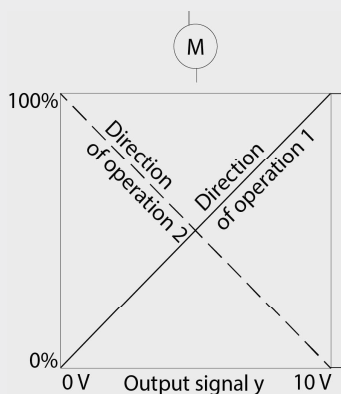
0-99.70.07-B

Page 1 of 2



## TECHNICAL DESCRIPTION

Power supply 230 V with modules or direct connection for 24 V~ or 24 V=; continuous activation also permissible at 230 V  
 Two-part housing made of fire-retardant yellow plastic and seals to IP66  
 Maintenance-free gearbox of sintered steel, gearbox plate of steel.  
 Patented actuator-valve coupling.  
 Mounting column made of stainless steel; mounting bracket (for fitting the valve) of aluminium  
 Electrical connections (max. 2.5 mm<sup>2</sup>) with screw terminals.  
 Three pre-scored cable inlets for M20×1.5 (2×) and M16×1.5.  
 Installation position: vertically upright to horizontal, but not upside down unless protected from dripping water.



Subject to change without notice.

## AREAS OF USE

For use with two or three-way control valves. For controllers with continuous output (0...10 V or 4...20 mA) or switching output (2-point or 3-point control). For applications where a fail-safe function is required.

## HOW ENERGY EFFICIENCY IS IMPROVED

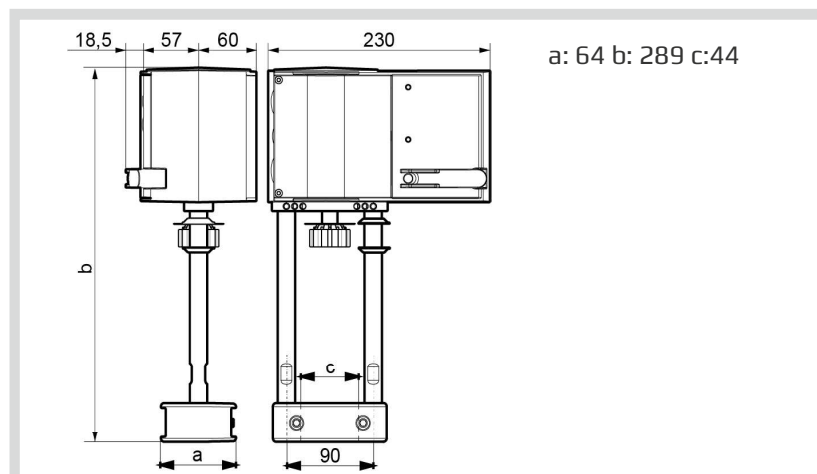
Automatic adaptation to valve, precision control and high energy efficiency with minimal operating noise.

## FEATURES

- Actuator with spring return action and pushing force of at least 2000 N with actuator extending or retracting spindle versions.
- Stepping motor with SUT (Superior Universal Technology) electronic control unit and electronic load-dependent cut-off
- Automatic detection of control signal applied (continuous or switching), indicated by two LEDs
- The type of characteristic (linear, quadratic or equal-percentage) can be set on the actuator
- Automatically adapts to valve stroke between 8 and 49 mm; captive even in the event of a power failure
- Direction of travel can be selected via screw terminals when making electrical connection or remotely
- Coding switches for selecting the characteristic and the running time (2, 4 or 6 s/mm)
- Lever for external manual adjustment, with motor cut-off, and for triggering a re-initialisation
- Easy assembly with valve; spindle is connected automatically when control voltage is applied
- The availability of numerous adaptors enables the actuator to be fitted to third-party valves

Type	Positioning time (s/mm)	Nominal stroke (mm)
AVF234SK008 Actuator spindle normally retracted	2/4/6	49
AVF234SK009 Actuator spindle normally extended		

## DIMENSION DRAWING



## TECHNICAL DATA

Type	Run time s/mm	Stroke mm	Pushing force N	Power supply <sup>1)</sup>	Weight kg
<b>AVM 2345 K002</b> AVF 2345 K009	<b>2/4/2006</b>	<b>8...49</b>	<b>2000</b>	<b>24 V~/=</b>	<b>5.6</b>
<b>Positioner:</b> <sup>1)</sup> Control signal 1 Control signal 2 Position feedback signal	0...10 V, R <sub>i</sub> > 100 kΩ 4...20 mA, R <sub>i</sub> = 50 kΩ 0...10 V, load > 2.5 kΩ (Optional: 4-20mA)		Starting point U <sub>0</sub> Control span ΔU Switching range Xsh		0 or 10 10 V 300 mV
Power supply with accessories	24 V~ ±20 %, 50...60 Hz 24 V= ±15% 230 V~ ±15%, 50...60 Hz		Degree of protection Protection class		IP 66 (EN 60529) III (IEC 60730)
Power consumption	10 W 18 VA <sup>2)</sup>		Response time for 3-point		200 ms
Stroke	8...49 mm		Manual and wiring diagram		99.70.02.02
Number of spring returns	>40.000		Dimension drawing		M10356
Spring return time <sup>3)</sup>	15...30s		Fitting instructions		99.70.02
Max. temperature of medium	130 °C (Option 240°C) <sup>4)</sup>		Material declaration		MD 51.377
Permitted ambient temperature	-10...55 °C				
Permitted ambient humidity	< 95% rh without condensation				

1) Also for 2-point or 3-point depending on the connection for 24 V~

2) Design the transformers for this value, otherwise functional faults may occur.

3) The return time corresponds to a stroke of 14 to 40mm and does not depend on the set run time

4) If the temperature of the medium is higher (from 130 °C to 240 °C), an adaptor is required (see accessories)

## CE conformity

EMC Directive 2004/108/EC

EN 61000-6-2 <sup>1)</sup>

EN 61000-6-4

Low-Voltage Directive 2006/95/EC

EN 60730-1

EN 60730-2-14

Over-voltage category III

Degree of pollution III

## ACCESSORIES

Type	Description
<b>1-0152285</b>	<b>Temperature adaptor</b> for media temperature > 130 °C ... 240 °C
<b>1-0152287</b>	<b>Potentiometer 1000 Ω</b> , 1 W, 24 V; installation as per MV 505894
<b>1-0152289</b>	<b>Auxiliary change-over contacts</b> (2 pcs. each) 12...250 V Infinitely variable, min. 100 mA and 12 V, additional load 6(2) A, MV 505866
<b>1-0152281</b>	<b>230 V Module, plug-in type</b> , for 2-/3-point and continuous activation, additional power 2 VA 230 V 15% power supply, MV 505901
<b>1-0152627</b>	<b>4-20 mA Position feedback signal</b> , for 24VAC/DC, output load resistor max. 600 ohm Accuracy +/- 0,25% of full range
<b>1-0147655</b>	<b>Cable gland M20×1.5 IP68</b>
<b>1-0145537</b>	<b>Cable gland M16×1.5 IP68</b>

# Electric Actuator Linear CAL M301 & M302

with manual override and 2-point or 3-point control and analog I/O signals

0-4.20.01-B

Page 1 of 2



## TECHNICAL DATA

<b>Material - Body and cover:</b>	Aluminum/polycarbonate RAL6018 green
<b>Material - Pillar:</b>	Steel. 1.4104
<b>Material - Bracket:</b>	Galv. steel 1.0037
<b>Weight:</b>	5.6 kg without accessories
<b>Handwheel and positioner:</b>	Integrated
<b>Stroke:</b>	from 5mm - max 40mm
<b>Power supply:</b>	24 VAC/DC, 100 - 240 VAC, ±10%
<b>Control signals:</b>	2 and 3-point control signals 24 AC/DC, 100 - 230 VAC. Analog I/O signals 0-20 mA, 4-20 mA, 0-10V, 2-10 V
<b>Duty cycle according to IEC 60034-1.8</b>	
<b>Binary ON/OFF:</b>	52 - 30 min 50% ED
<b>Modulating:</b>	54 - 1200 c/h 50% ED

<b>Valve positioner function:</b>	Integrated, dead band 0.6% of full signal range, shut-off minimum
<b>Manual override:</b>	Electrically via 2 push buttons and handwheel
<b>Permitted ambient temp:</b>	-20 to +60°C
<b>Operating speed:</b>	0.6 / 0.9 / 1.2 mm/s
<b>Enclosure acc. to EN 60529:</b>	IP65
<b>Overvoltage category:</b>	CAT III
<b>Minimum force:</b>	1 kN - Type M301 2 kN - Type M302
<b>Power consumption:</b>	Type M301 - 9 W Type M302 - 12 W

Subject to change without notice.

## APPLICATION

The Electric valve actuator type CAL is specifically designed to meet the demands of the powerful low frequency vibration environments in marine installations as well as in other demanding environments.

The main applications are heating, cooling, ventilation and industrial systems where the medium is water, steam or oil. The actuator is designed to be used with Clorius 2-way and 3-way linear control valves.

## DESIGN

Linear actuator with manual override, power supply with direct connection for 24 VAC/DC.

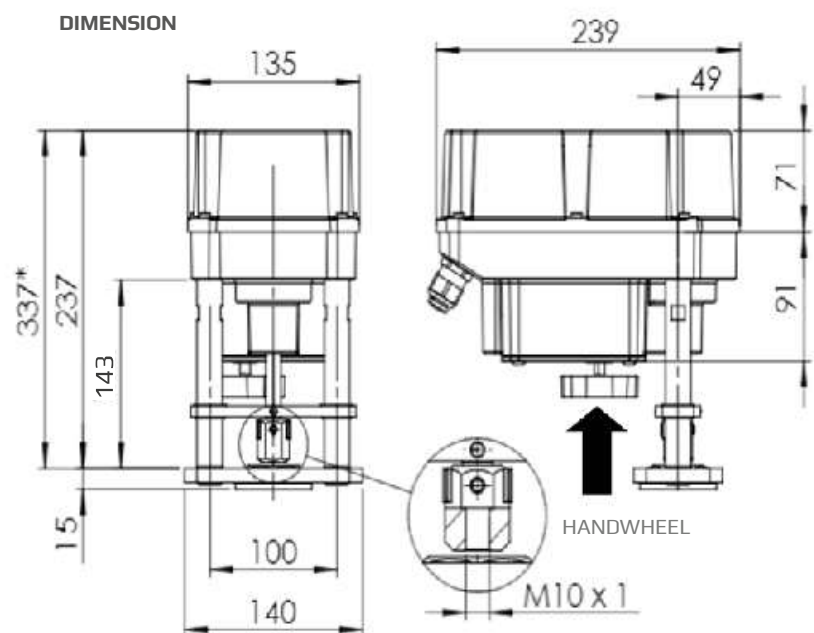
Also available with a wide range power supply module (100 - 240 VAC) Gearbox made of high quality aluminum die casting, powder-coated (60 µm thickness).

## FUNCTION

Brushless DC motor (BLDC) driving the gear system. This turning is converted into an upward and downward motion via the crank mechanism.

## FEATURES

- Robust and compact design
- Low installation height
- Easy valve mounting
- Contactless, non-wearing travel detection with Hall sensor for exact positioning
- Durable aluminum gearbox
- Brushless DC motor
- Manual operation with push buttons and handwheel



\*FOR TEMPERATURES UP TO 240°C

## MOUNTING

Vertically upright to horizontal, but not upside down unless protected against dripping liquids

Delivered with cable glands for correct installation, M20 x 1.5 (x2) and M16 x 1.5 (x1)

Electrical connections (max. 2.5 mm<sup>2</sup> wire) with screw terminals

The instructions supplied with the actuator must be followed carefully for mounting and start-up

**TABLE 1**

PRODUCT NO.	TYPE	FORCE (kN)	STROKE (mm)
1-5231960	ACTUATOR CAL-M301 24 VAC/DC	1	40
1-5231962	ACTUATOR CAL-M301 WITH POWER MODULE 100-240 VAC	1	40
1-5231965	ACTUATOR CAL-M302 24 VAC/DC	2	40
1-5231967	ACTUATOR CAL-M302 WITH POWER MODULE 100-240 VAC	2	40

3

**TABLE 2**

PRODUCT NO.	ACCESSORIES	
1-0156919	MODULE 100-240 VAC FOR M301 AND M302	Module 100 - 240 VAC
1-0156955	TEMPERATURE ADAPTOR CAL M301 AND M302	Adapter for temperatures up to 240°C
1-0156957	POSITION SIGNAL SWITCHES	2 potential-free position switches, mechanical, with silver changeover contacts (0.1 A - 5 A switching current)
1-0156959	POSITION SIGNAL RELAYS	Switching points can be adjusted from 0 - 100% of the stroke using potentiometers 2 position signal relays with changeover contacts, calibrated automatically to valve stroke 24V to 230V AC/DC 0.1 A - 1 A

### CONTROLLER ER 2000



### BETTER EFFICIENCY IN ENERGY GENERATION

Our electric controllers ensure a better efficiency in energy generation and energy conversion in marine, industry and HVAC systems.

### CONTROLLER ER 2022



# ELECTRIC CONTROLLERS

---

4

## OUR ELECTRIC CONTROLLERS PROGRAM INCLUDES:

### CONTROLLER TYPE

ER2000  
ER2000P  
ER 2022

### USAGE

CONSTANT TEMPERATURE CONTROL  
CONSTANT PRESSURE CONTROL  
CONSTANT TEMPERATURE CONTROL

# Microprocessor-based Controller type ER 2000

For Electronic Temperature Control

O-4.6.01-H

Page 1 of 2



## TECHNICAL DATA

### Line voltage

230 V AC }  
115 V AC\* } -15 % / +10 %, 50 / 60 Hz  
24 V AC\* }

\*- optional (please specify)

**Power consumption** approx. 7 VA  
**Weight** approx. 1 kg

### Permissible ambient temperature

- Operation 0 to 50°C  
- Transport and storage -25 to + 65°C

### Degree of protection

- Front: IP 65 according to DIN 40050  
- Terminals: IP00

### Design

For control panel installation  
96 x 96 x 135 mm (W x H x D)  
panel cut out 92 x 92 mm

### Installation position

Input arbitrary  
Pt100, 0°C to 300°C

### Output

Connection in three - wire system  
Option: 4-20 mA  
2- or 3-point  
Option: 4-20 mA

**Measuring accuracy** 0.1% of the measuring range

**Displays** Two 4 - digit 7 segment displays,  
LED, red,  
character height = 13 mm

### Alarm

Type A, B, C;  
working contact normally  
closed circuit principle

### Relay

Switching capacity: 250 V AC/3A  
Spark quenching element

### Data protection

Semi - conductor memory

Subject to change without notice.

## APPLICATIONS

The ER 2000 controller is used for constant temperature control. It is suitable for all heating and cooling control systems. The controller is primarily intended for marine installations and other industrial applications - such as cooling water and lubricating oil installations, flow temperature control etc.

## DESIGN

The ER 2000 controller is designed for panel mounting. For easy start-up it has optimization for automatic determination of favourable control parameters. The optimization starts when changing the set point or when switching over from manual mode to automatic control. The optimization can be disregarded. For easy operation it has three keys - two for scrolling or changing values and an enter key. Two digital displays show the process variable and the set point. 3 LEDs indicate actuator opens, actuator closes and alarm.

The controller can be switched from auto mode to manual mode. In manual mode the actuator can be opened, closed or stopped in a certain position.

Three different alarm settings are possible:

- A:** Alarm at a deviation from the set point SP
- B:** Alarm at a fixed limit value
- C:** Alarm at leaving a band around the set point SP.

It can operate either as a three position or as a two position controller or analogue (4-20 mA) controller and has adjustable proportional band, integral action time and derivative action time.

## FUNCTION

The temperature input comes via a Pt 100 sensor with a single sensing element. The measured value of the controlled variable is compared with the set point value and adjusted via a PI or a PID control structure. The ER 2000 can act as either a heating controller, the actuator closes at rising temperature, or as a cooling controller, the actuator opens at rising temperature. The ER 2000 permits direct reading of the actual temperature value (PV) and it is secured from failure in the measuring circuit, i.e. the controller can be set to give either a closing, an opening or remain in current position command in case of sensor short circuit or sensor break. The error message Err appears in the LED display PV.

## FEATURES

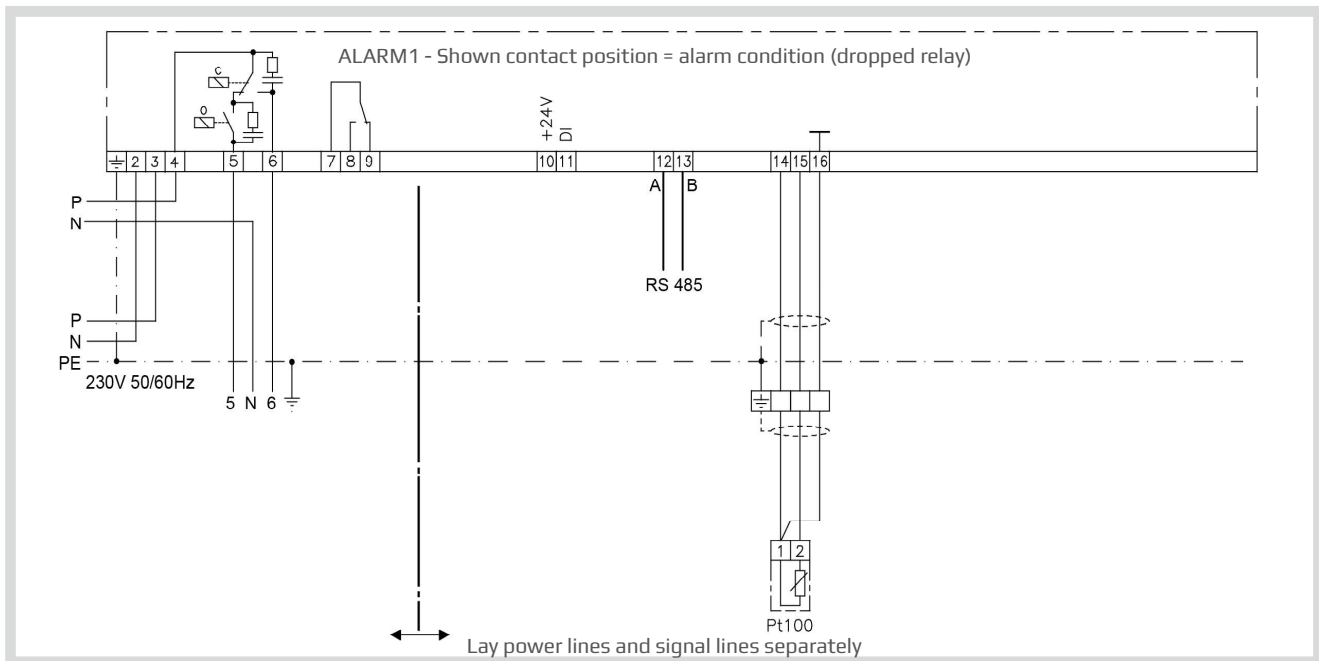
- PI and PID performance
- Easy operation
- For heating and cooling systems in maritime and industrial installations
- Manual- / automatic changeover
- Robust self-optimization
- Alarm indicating a deviation from set point, positive or negative
- Only one sensor element Pt 100 required for control and temperature indication
- User-defined operation level
- 2 or 3 positional output for controlling the actuator

## COMMUNICATION

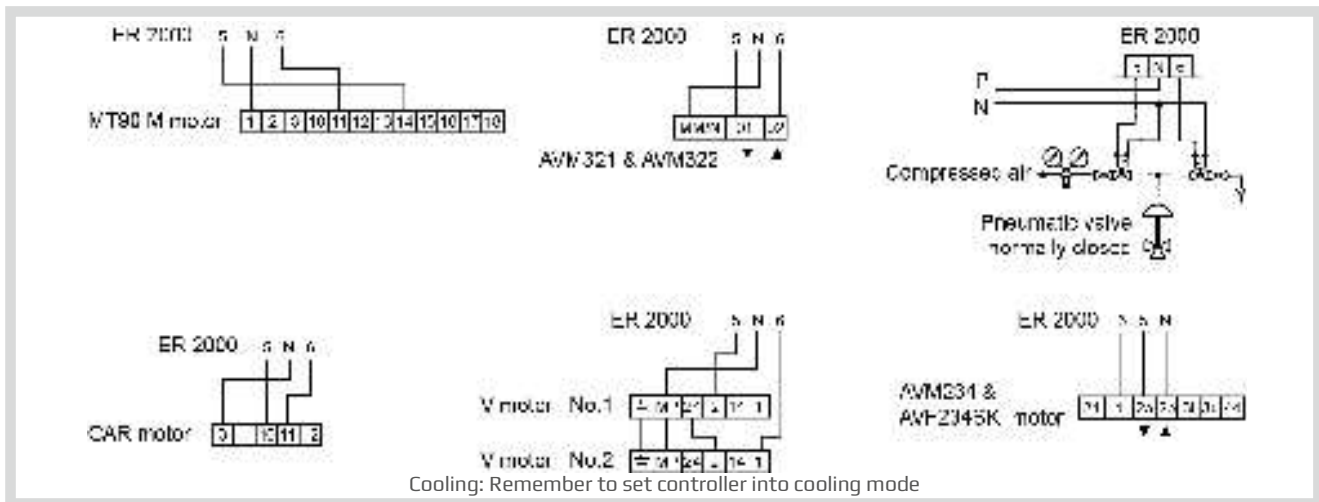
The controller is equipped with a RS 485 communication module.



## WIRING DIAGRAM

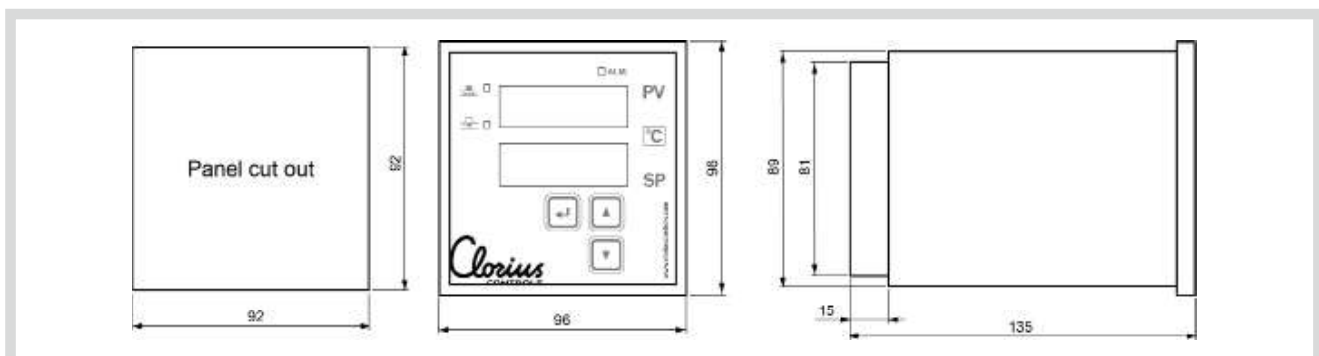


## ELECTRICAL CONNECTIONS - OPTIONAL EXTERNAL UNITS



\* AVM321/322/321S/322S and AVM234: Please refer to instruction depending on the type

## DIMENSIONS IN MM



# Microprocessor-based controller type ER 2000-P

For electronic pressure control

O-4.6.07-D

Page 1 of 2



## APPLICATIONS

The ER 2000-P controller is used for constant pressure control. It is suitable for all heating and cooling control systems. The controller is primarily intended for marine installations and other industrial applications.

## DESIGN

The ER 2000-P controller is designed for panel mounting. For easy start-up it has optimization for automatic determination of favourable control parameters. The optimization starts when changing the set point or when switching over from manual mode to automatic control. The optimization can be disregarded. For easy operation it has three keys - two for scrolling or changing values and an enter key. Two digital displays show the process variable and the set point. 3 LEDs indicate actuator opens, actuator closes and alarm. The controller can be switched from auto mode to manual mode. In manual mode the actuator can be opened, closed or stopped in a certain position.

Three different alarm settings are possible:

- A:** Alarm at a deviation from the set point SP
- B:** Alarm at a fixed limit value
- C:** Alarm at leaving a band around the set point SP.

It can operate either as a three position or as a two position controller or analogue controller (4-20 mA) and has adjustable proportional band, integral action time and derivative action time.

## FUNCTION

The pressure input comes via a 4-20 mA signal. The measured value of the controlled variable is compared with the set point value and adjusted via a PI or a PID control structure. The ER 2000-P permits direct reading of the actual temperature value (PV) and it is secured from failure in the measuring circuit, i.e. the controller can be set to give either a closing, an opening or remain in current position command in case of sensor short circuit or sensor break. The error message Err appears in the LED display PV.

## FEATURES

- PI and PID performance
- Easy operation
- For heating, cooling and pressure systems in maritime and industrial installations
- Manual / automatic changeover
- Robust self-optimization
- Alarm indicating a deviation from set point, positive or negative
- User-defined operation level
- 2- or 3-positional output for controlling the actuator

## COMMUNICATION

The controller is equipped with a RS 485 communication module.

## TECHNICAL DATA

### Line voltage

230 V AC  
115 V AC\* } -15 % / +10 %, 50 / 60 Hz  
24 V AC\*

\*- optional (please specify)

**Power consumption** approx. 7 VA

**Weight** approx. 1 kg

### Permissible ambient temperature

- **Operation** 0 to 50°C

- **Transport and storage** -25 to + 65°C

### Degree of protection

- **Front:** IP 65 according to DIN 40050

- **Terminals:** IP00

### Design

For control panel installation  
96 x 96 x 135 mm (W x H x D)  
panel cut out 92 x 92 mm

**Installation position** arbitrary

**Inputs** 4-20 mA

**Outputs** 2- or 3-point

- **Option:** 4-20 mA

**Measuring accuracy** 0.1% of the measuring range

**Displays** Two 4 - digit 7 segment displays, LED, red, character height = 13 mm

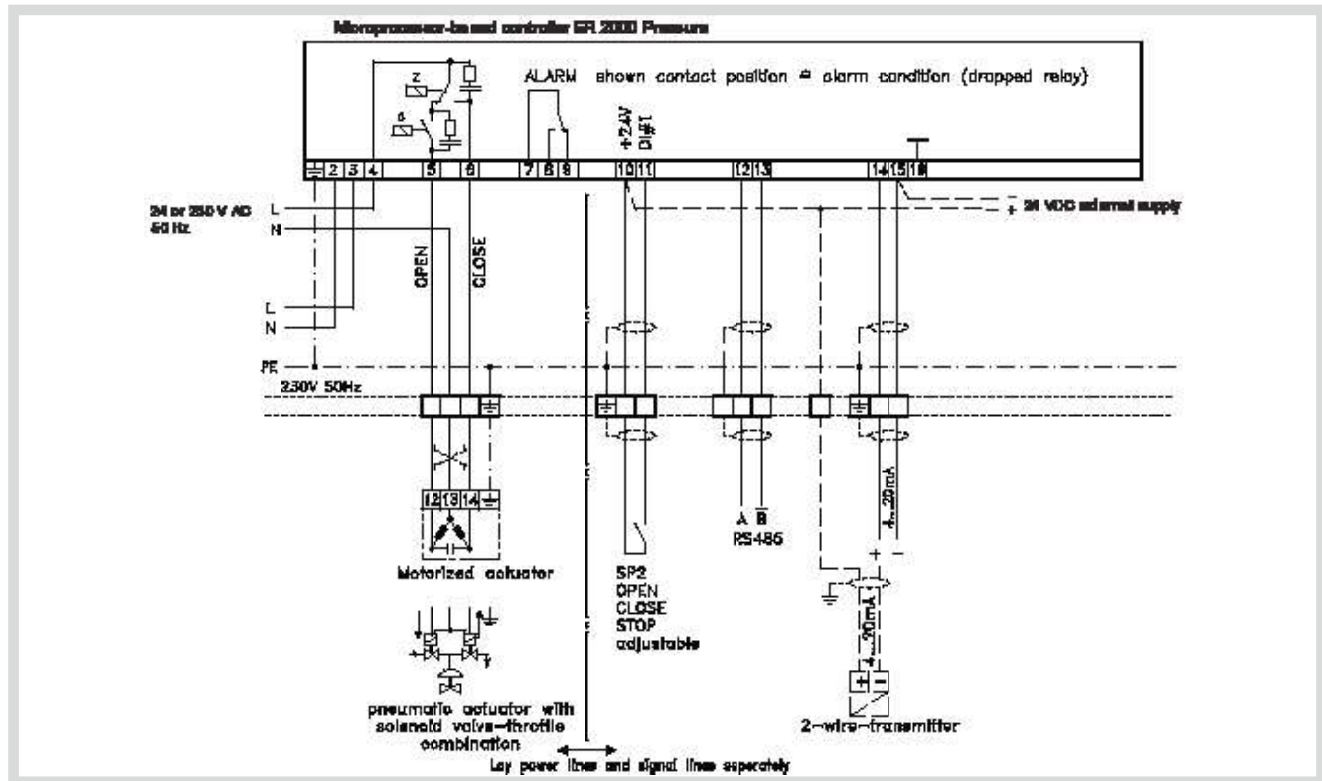
**Alarms** Type A, B, C; working contact normally closed circuit principle

**Relay** Switching capacity: 250 V AC/3 A  
Spark quenching element

**Data protection** Semi - conductor memory

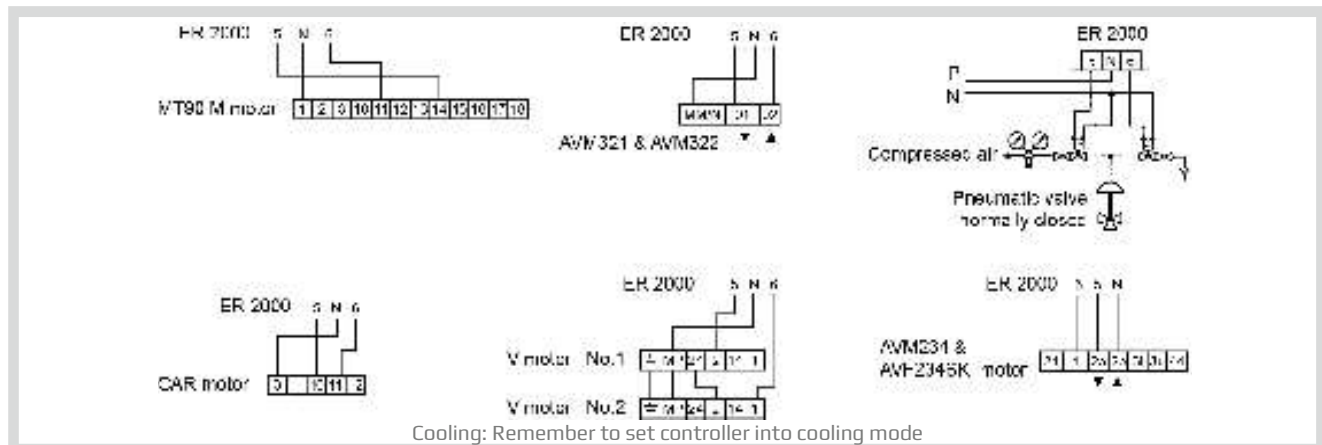
Subject to change without notice.

## WIRING DIAGRAM



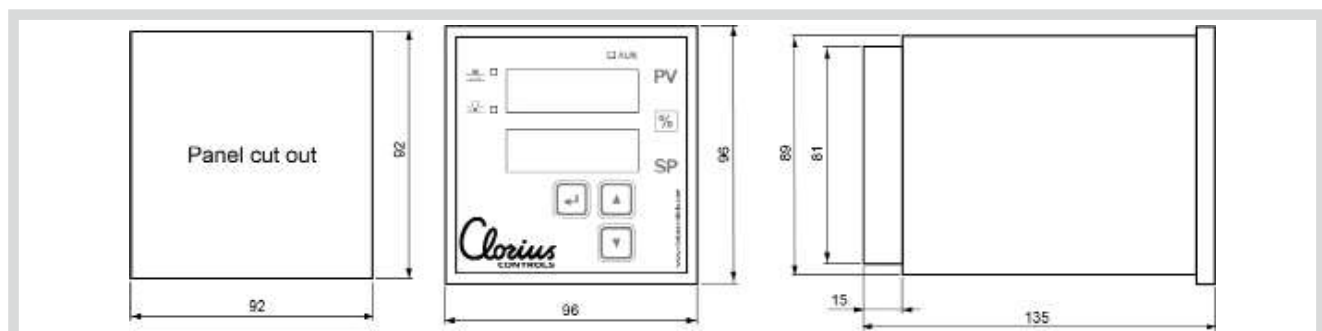
4

## ELECTRICAL CONNECTIONS - OPTIONAL EXTERNAL UNITS



\* AVM321/322/3215/3225 and AVM234: Please refer to instruction depending on the type

## DIMENSIONS IN MM



# Compact Controller type ER 2022 & ER 2022A

For Electronic Temperature Control

O-4.6.02-D

Page 1 of 4



## TECHNICAL DATA

### Line voltage

110-240 V AC -15 % /+10 %, 48-63 Hz  
20-30 V AC/DC -15 % /+10 %, 48-63 Hz - optional

### Power consumption

Approx. 6,6 VA

Measuring rate: -200°C/+850°C or -328°F/+1562°F

### Permissible ambient temperature

Operation -10 to +55°C

Transport and storage -30 to +70°C

### Degree of protection

Front IP 65 according to DIN 60529  
IP20 on the back

### Design

For control panel installation 96 x 96 x 65 mm  
(W x H x D) panel cut out 92 x 92 mm

### Installation position

Arbitrary

### Set-point values

4 available

### ER 2022

Input: Pt100, 0-10V, 2-10V, 0-20mA, 4-20mA

Output: 3-point

### ER 2022A

Analoge Input: Pt100, 0-10V, 2-10V, 0-20mA, 4-20mA

Analoge output: 0-10V, 2-10V, load resistance >500Ω  
20mA, 4-20mA, load resistance >450Ω

### Measuring accuracy

0.1% of the measuring range

### Overvoltage

Category III

### Displays

18-segment LCD displays  
24,8 mm x 12 mm

### Alarm

Alarm functions work with a fixed limit value which corresponds to the limit value entered

ER 2022 1xAlarm and ER 2022A 2xAlarm

### Relay (N/O)

3x switching capacity - 230 V AC/3A

### Electric connection

Conductor cross section  
wire min.0,2 mm<sup>2</sup>, max 1,5 mm<sup>2</sup>

### Data protection

Semi - conductor memory

### Weight

Approx. 0,22 kg

### Approvals

DNV GL – on request

Subject to change without notice.

[www.cloriuscontrols.com](http://www.cloriuscontrols.com)

## APPLICATIONS

The ER 2022 and ER 2022A controller are used for constant temperature control. It is suitable for all heating and cooling control systems. The controller is primarily intended for marine installations and other industrial applications - such as cooling water and lubricating oil installations, flow temperature control etc.

## DESIGN

The device is characterized by a simple, clearly structured operation supported with texts. Process values and parameters are represented by two 18-segment LCD displays. The ER 2022 and ER 2022A type are additionally equipped with a pixel matrix LCD display for displaying text. In addition, the device have individual display elements for the switch positions of the outputs as well as for manual mode. The device is operated using a membrane keyboard with four buttons and can be used under harsh environmental influences thanks to the high IP65 protection.

The ER 2022 and ER 2022A includes, a program controller, manual mode, limit value monitoring functions, digital control signals.

## FUNCTION

The temperature input comes via a Pt100 sensor with a single sensing element. The measured value of the controlled variable is compared with the set point value and adjusted via a PI or a PID control structure.

The ER 2022 & ER 2022A can act as either a heating controller, the actuator closes at rising temperature, or as cooling controller, the actuator opens at rising temperature.

The ER 2022 & ER 2022A permits direct reading of the actual temperature value (PV) and it is secured from failure in the measuring circuit i.e. the controller can be set to give either a closing, an opening or remain in current position command in case of sensor short circuit or sensor break. The error message Err appears in the LED display PV.

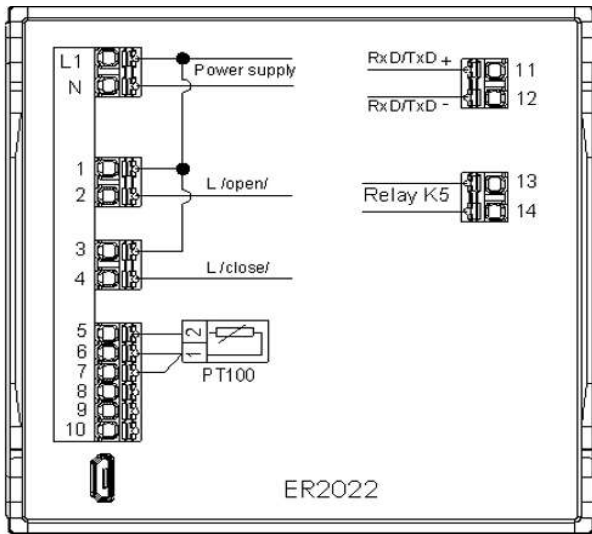
## FEATURES

- PI and PID performance
- Easy operation
- For heating and cooling systems in maritime and industrial installations
- Manual and automatic changeover
- Robust self-optimization
- Alarm indicating a deviation from set point, positive or negative
- Only one sensor element Pt 100 required for control and temperature indication
- User-defined operation
- 3 positional output for controlling the actuator

## COMMUNICATION

The controller is equipped with a RS 485 communication module.

### WIRING DIAGRAM - ER 2022 - 3-POINT OUTPUT



ER 2022 TERMINALS	CONNECTION
L1 (+) - N	Voltage supply 24VAC/DC - 110-240VAC
1 - 2	Output 1 (relay)
3 - 4	Output 2 (relay)
5 (+) - 6 - 7	Input/Pt100 - three-wire
5 - 7	Input/Pt100-two-wire
6(+) - 7(-)	Input 0-20mA or 4-20mA
8(+) * 7(-)	Input 0-10V or 2-10V
8 - 9 - 10	Set point SP 1-4 changeover
11(+) - 12(-)	RS485
13 - 14	ALARM

### ELECTRICAL CONNECTIONS POWERED 110-240VAC - OPTIONAL EXTERNAL UNITS 3-POINT OUTPUT

UNIT	TERMINALS	CAR	TERMINAL
ER 2022	Voltage supply	L	-
		N	3
	Output 1	2	10
		4	11

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022	Voltage supply	L	-
		N	MM/N
	Output 1	2	.01
		4	.02

UNIT	TERMINALS	CAR	TERMINAL
ER 2022	Voltage supply	L	-
		N	3
	Output 1	2	4
		4	5

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022	Voltage supply	L	-
		N	N
	Output 1	2	2a
		4	2b

UNIT	TERMINALS	CAR	TERMINAL
ER 2022	Voltage supply	L	-
		N	5
	Output 1	2	11
		4	12

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022	Voltage supply	L	21
		N	N
	Output 1	2	2a
		4	2b

UNIT	TERMINALS	CAR	TERMINAL
ER 2022	Voltage supply	L	X5-2
		N	X5-1 AND X1-2
	Output 1	2	X1-1
		4	X1-3

\* AVM321/322/3215/3225 and AVM234: Please refer to instruction depending on the type

4

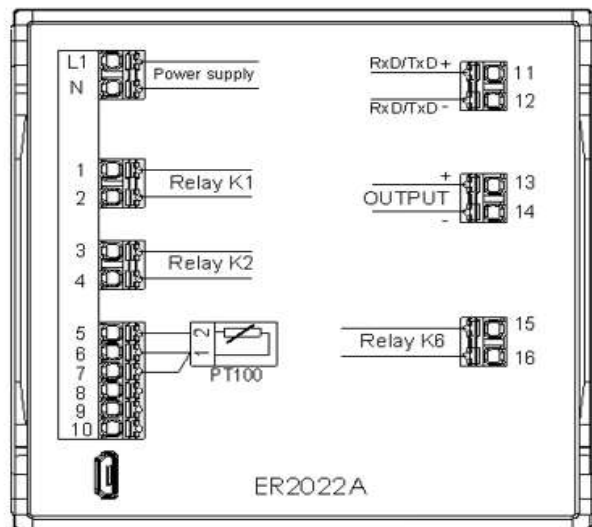
# Compact Controller type ER 2022 & ER 2022A

For Electronic Temperature Control

0-4.6.02-D

Page 3 of 4

## WIRING DIAGRAM - ER 2022A- ANALOG



ER 2022 TERMINALS	CONNECTION
L1 (+) - N	Voltage supply 24 VAC/DC -110-240VAC
1 - 2	Output K1 (relay)
3 - 4	Output K2 (relay)
5 (+) - 6 - 7	Input/Pt100 - three-wire/
5 - 7	Input/Pt100-two-wire/
6(+)- 7(-)	Input 0-20mA or 4-20mA
8(+)- 7(-)	Input 0-10V or 2-10V
8 - 9 -10	Set point SP 1-4 changeover
11 (+) - 12 (-)	RS485
13(+)- 14(-)	Output analog signal
15-16	ALARM

## ELECTRICAL CONNECTIONS 110 - 240VAC - OPTIONAL EXTERNAL UNITS

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022A	Voltage supply	L	1
		N	2
	Control signal 4-20mA	13	5-6 (bridge)
		14	Input (-)
			Input (+)

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022A	Voltage supply	L	2
		N	1
	Control signal 4-20mA	13	14
		14	15

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022A	Voltage supply	L	13
		N	5
	Control signal 4-20mA	13	13-14 (bridge)
		14	19
			20

UNIT	TERMINALS	UNIT	TERMINAL
ER 2022A	Voltage supply	L	X5-2
		N	X5-1
	Control signal 4-20mA	13	X3-1
		14	X2-1

UNIT	TERMINALS	UNIT	TERMINAL	
ER 2022A	Voltage supply	L	L	
		N	N	
	Control signal	13	AVM 3215K/3225K	03
		14		MM

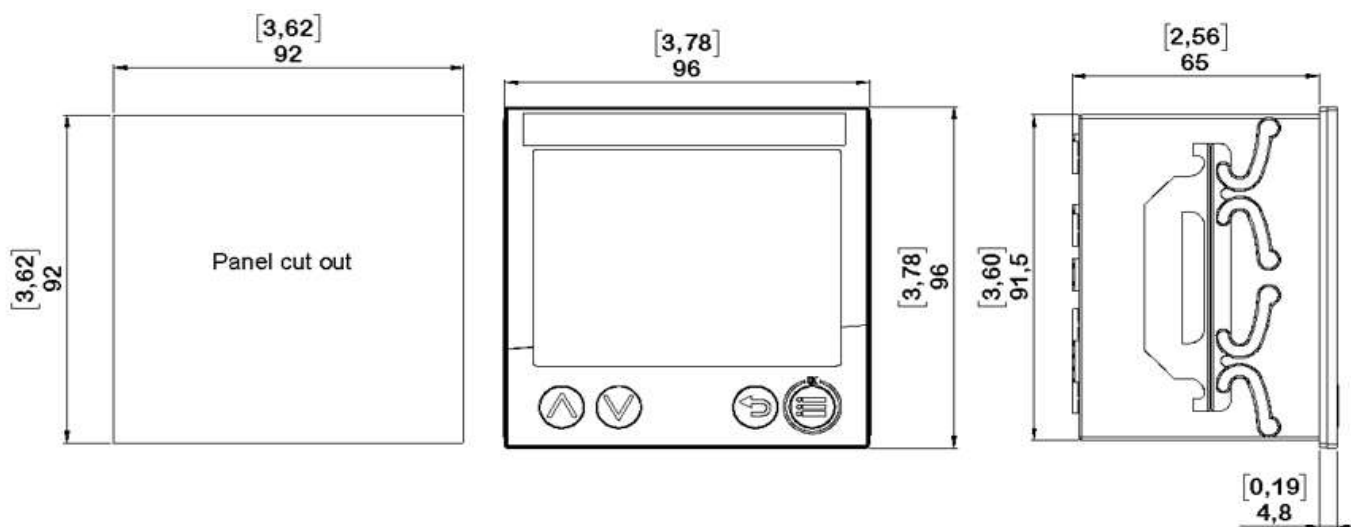
UNIT	TERMINALS	UNIT	TERMINAL	
ER 2022A	Voltage supply	L	21 & 2a or 2b	
		N	N	
	Control signal	13	AVF2345K	3i
		14		1

UNIT	TERMINALS	UNIT	TERMINAL	
ER 2022A	Voltage supply	L	2a or 2b	
		N	N	
	Control signal	13	AVM2345K	3i
		14		1

\* AVM321/322/3215/3225 and AVM234: Please refer to instruction depending on the type

Subject to change without notice.

DIMENSIONS IN MM/INCH





# Compact Controller type ER 2022S (Smart) & ER 2022SA (Smart Analog)

For Electronic Temperature Control

O-4.6.03-A

Page 1 of 4



## TECHNICAL DATA

### Line voltage

110-240 V AC -15 % /+10 %, 48-63 Hz  
20-30 V AC/DC -15 % /+10 %, 48-63 Hz - **optional**

### Power consumption

110-240V AC - approx. 8W  
Measuring rate: -200°C/+850°C or -328°F/+1562°F

### Permissible ambient temperature

Ambient 0 to +55°C  
Transport and storage -30 to +70°C

### Degree of protection

Front IP 65 according to DIN 60529  
IP20 on the back

### Design

For control panel installation 96 x 96 x 65 mm  
(W x H x D) panel cut out 92 x 92 mm

### Installation position

Horizontal

### Set-point values

4 available

### Measuring accuracy

0.1 & of the measuring range  
Over voltage cat. III

### Displays

18-segment LCD displays

### Alarm

Alarm functions work with a fixed limit value  
which corresponds to limit value entered

### Relay (N/O contact)

Switching capacity: 230V AC/5A

### ER 2022S

Input: Pt100, 0-10V, 2-10V, 0-20mA, 4-20mA  
Output: 3-point

### ER 2022SA

Analoge Input: Pt100, 0-10V, 2-10V, 0-20mA, 4-20mA  
Analoge output: 0-10V, 2-10V, load resistance >500Ω  
20mA, 4-20mA, load resistance >450Ω

### Electric connection

Conductor cross section  
via screw terminals - max 2.5mm<sup>2</sup>

### Interface

RS485 - **optional**

### Weight

Approx. 0,38 kg

## APPLICATIONS

The ER 2022S and ER 2022SA controller are used for constant temperature control. It is suitable for all heating and cooling control systems. The controller is primarily intended for marine installations and other industrial applications - such as cooling water and lubricating oil installations, flow temperature control and where it is needed to use remote set point function.

## DESIGN

The device is characterized by a simple, clearly structured operation supported with texts. Process values and parameters are represented by two 30-segment LCD displays. The ER 2022S and ER 2022SA types are additionally equipped with a pixel matrix LCD display for displaying text. In addition, the device have individual display elements for the switch positions of the outputs as well as for manual mode. The device is operated using a membrane keyboard with four buttons and can be used under harsh environmental influences thanks to the high IP65 protection.

The ER 2022S and ER 2022SA includes, a program controller, manual mode, limit value monitoring functions, digital control signals.

## FUNCTION

The temperature input comes via a Pt100 sensor with a single sensing element or from other devices/Remote set point. The measured value of the controlled variable is compared with the set point value and adjusted via a PI or a PID control structure.

The ER 2022S & ER 2022SA can act as either heating or cooling controller, the actuator closes at rising temperature, or as a cooling controller, the actuator opens at rising temperature. The controller permits direct reading of the actual temperature value and it is secured from failure in the measuring circuit, i.e. the controller can be set to give either a closing, an opening or remain in current position command in case of sensor short circuit or sensor break. The error message appears in the LED display.

## FEATURES

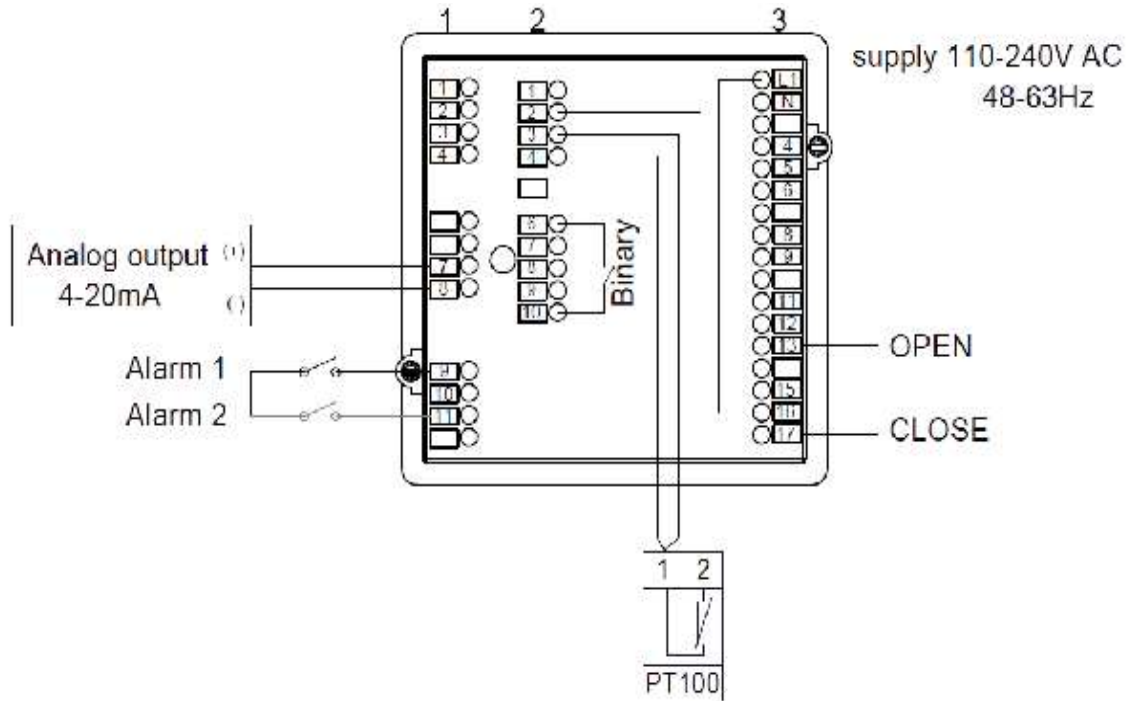
- PI and PID performance
- Easy operation
- For heating and cooling systems in maritime and industrial installations
- Manual and automatic changeover
- Robust self-optimization
- Changeover from remote analog set point to local set point PT100 and vice versa
- User-defined operation
- 3 positional output for controlling the actuator

## COMMUNICATION

The controller is equipped with a RS 485 communication module.



**WIRING DIAGRAM - ER 2022S - 3-POINT OUTPUT**



4

TERMINAL STRIP 1	CONNECTION	
7	Input signal 4-20mA (+)	Set point controller signal
8	Input signal 4-20mA (+)	
9	ALARM 1	-
10	ALARM common	-
11	ALARM 2	-

TERMINAL STRIP 2	CONNECTION	
2	Input/PT100- three wire/E	
3	Input/PT100 - two wire/S	
4	Input/PT100- two wire/A	
6	Binary PT100/input 4-20mA	
10		

TERMINAL STRIP 3	CONNECTION	
L1(+) and N(-)	Voltage supply 110-240VAC	-
8 (+)	Supply voltage for 2-wire transmitter (off-load voltage approx. 25V)	17V/20mA
9 (-)		
13	OPEN	-
17	CLOSE	-

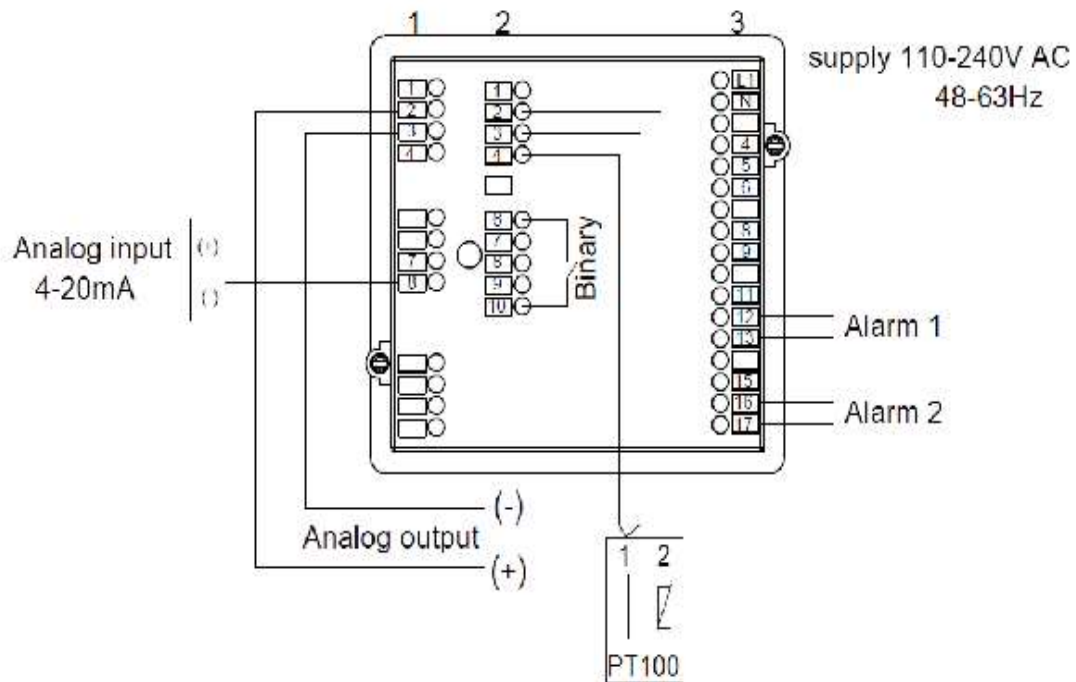
# Compact Controller type ER 2022S (Smart) & ER 2022SA (Smart Analog)

For Electronic Temperature Control

0-4.6.03-A

Page 3 of 4

## WIRING DIAGRAM - ER 2022SA- ANALOG



TERMINAL STRIP 1	CONNECTION	
2	Output signal (+)	Factory setting 4-20mA
3	Output signal (-)	
7	Input signal 4-20mA(+)	Set point signal 4mA +65°C/ 20mA - 95°C
8	Input signal 4-20mA(-)	

TERMINAL STRIP 2	CONNECTION
2	Input/PT100- three wire/E
3	Input/PT100 - two wire/S
4	Input/PT100- two wire/A
6	Binary PT100/input 4-20mA
10	

TERMINAL STRIP 3	CONNECTION	
L1(+) and N(-)	Voltage supply 110-240 V AC	
8 (+)	Supply voltage for 2-wire transmitter (off-load voltage approx. 25 V)	17 V/20mA
9 (-)		
12	ALARM 1	
13		
16	ALARM 2	
17		

### CAUTION:

Use always shielded cables.

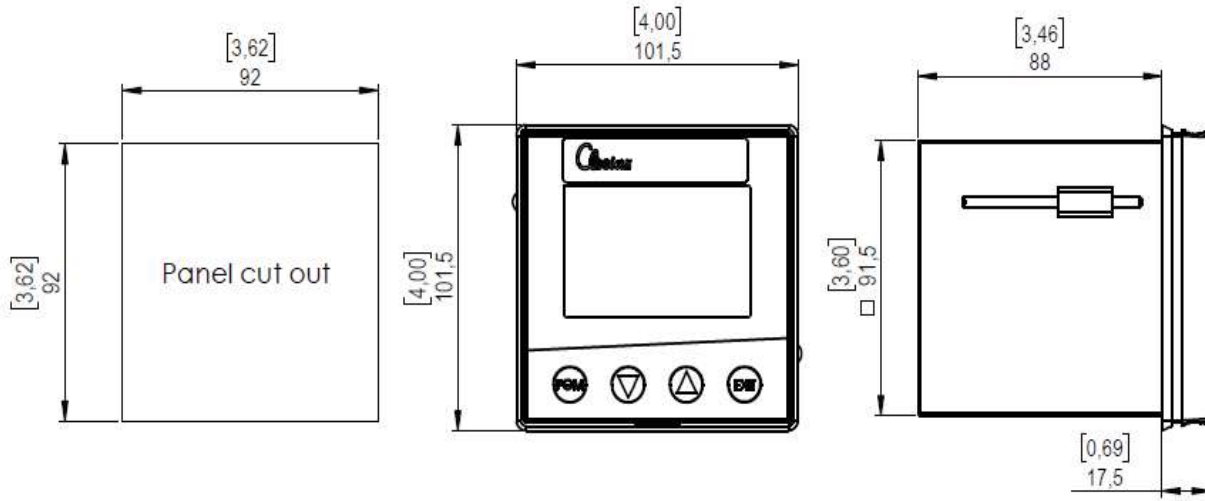
It is recommended to use the cable end clamps when installing wire.

### ELECTRIC CONNECTION:

At the back, via screw terminals, conductor cross-section up to 2.5mm<sup>2</sup> With core ferrules (length: 10mm)

Subject to change without notice.

**DIMENSIONS IN MM/INCH**



## PRECISION PERFORMANCE & RELIABILITY

Reliable and efficient pneumatic actuators for extreme environments and critical applications without compromising performance or safety.



# PNEUMATIC ACTUATORS

---

5

## OUR PNEUMATIC ACTUATOR PROGRAM INCLUDES:

### ACTUATOR TYPE

ROTARY PNEUMATIC  
LINEAR PNEUMATIC

### USAGE

VT SINGLE AND DOUBLE ACTING  
S16, S25, S34

# Pneumatic Actuator

Series S

0-6.5.01-E

Page 1 of 2



## APPLICATIONS

Pneumatic actuator for actuating and control of Clorius valves in various environments.

Relevant datasheets for accessories to the S actuators:

- Positioners	0.6.6.01, 0.6.6.02
- Filter regulators	0.6.8.01
- Controller	ER2000 0.4.6.01
- Sensor	PT100 0.4.7.01
- Pneumatic controller	S80 0.6.7.01

## DESIGN

Compact pneumatic actuator with rolling diaphragm and multiple internal compression springs for operating Clorius valves.

Reinforced rolling diaphragm guarantees long lifetime and reliable, safe operation. Maintenance or change of operating method does not require any special tools.

## FUNCTION

The pneumatic actuator is powerful with a high control speed compared to electric actuators. The linear actuator has a simple and light design with a minimum of moving parts. The pneumatic actuator are also low maintenance due to the simple design and the few moving parts. The linear actuator is ideal for on/off and control functions of globe valves. The spring loaded actuator offers the possibility for a fail-safe function, the safety installation is low cost compared to example battery backup. The pneumatic actuator can be used in Eex areas, without extraordinary encapsulation or other precautions.

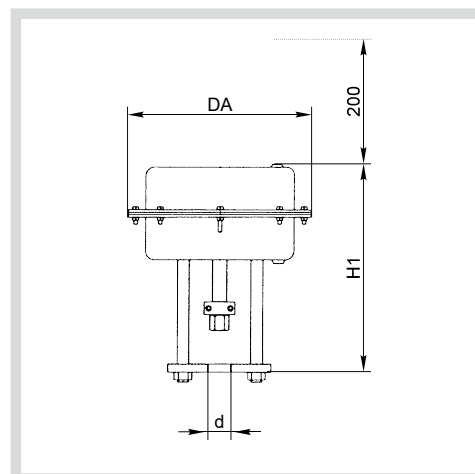
## FEATURES

- Linear characteristic
- Multispring diaphragm actuator
- Compact design with low weight
- Diaphragm with vulcanised terylene support secures a long and safe life-time

## TECHNICAL DATA

<b>Material:</b>	
- Body	Polyester coated steel
- Stem	Stainless steel 1.4301
- Tie rods	Stainless steel AISI 316
- Mounting plate	Polyester coated steel
- O-rings	NBR (Nitrile rubber)
- Diaphragm	Neoprene rubber w/terylene support
- Springs	Galvanized steel
<b>Air quality</b>	Dry and filtrated air, non aggressive gasses
<b>Air supply</b>	Max. 6 bar
<b>Air supply connect.</b>	1/8" RG Female
<b>Temperature</b>	-25°C to +115°C
<b>Acting mode:</b>	
- Type SC: Spring close / Air open (NC)	
- Type SO: Spring open / Air close (NO)	
<b>Data sheet</b>	0-6.5.01-E

## DIMENSION SKETCH



Type	d mm	DA mm	H1 mm	Travel mm
S16	25	160	237	20
S25	35	250	277,5	20
S34	32	340	350	33.5

Subject to change without notice.

Actuator	Type	Force	Travel (max)	Min. pressure to close valve	Min. pressure to open valve
S16	SC	1270 N	20 mm	-	1.1 Bar
	SO	925 N	20 mm	0.8 Bar	-
S25	SC	9090 N	20 mm	-	2.9 Bar
	SO	1740 N	20 mm	0.6 Bar	-
S34	SC	16100 N	33.5 mm	-	3.2 Bar
	SO	-	-	-	-

## SELECTION OF LINEAR PNEUMATIC ACTUATORS

Valve size DN	Valve type	MAX P1 Inlet Pressure	Pneumatic actuator type
15	L1S, L1SB, M1F, M1FBN, G1F, G1FBN, H1F, H1FBN	16	S16
20	L2S, M1FBN, M2F, G1FBN, G2F, H1FBN, H2F	16	S16
	L1S, L1SB, L3S	10	
	M1F, G1F, H1F	7,5	
25	L1SB, L2S, M1FBN, M2F, G1FBN, G2F, G1FB, H1FBN, H2F, H1FB	16	S16
	M1F, G1F, H1F	5	
32	L1SB, L2S, G1FBN, G2F, H1FBN, H2F, M1FBN, M2F	16	S16
	L3S, M3F, G3F, H3F	10	
40	L2S, G2F, M2F, H2F	16	S16
	M1FBN, G1FBN, H1FBN	10	
	M3F, G3F, H3F	7,5	
	L3S	5	
50	L2S, G2F, M2F, H2F	16	S16
	M1FBN, G1FBN, H1FBN	16	
	L3S, M3F, G3F, H3F	16	
65	L3F, M1FBN, M2F, M3F, G1FBN, G2F, G3F, H1FBN, H2F	16	S25
80	L3F, M1FBN, M2F, M3F, G1FBN, G2F, G3F, H1FBN, H2F	16	S25
100	L3F, M2F, M3F, G2F, G3F, H2F	16	S25
125	L3F, M2F, M3F, G2F, G3F, H2F	16	S25
150	L3F, M2F, M3F, G2F, G3F, H2F	16	S25
200	L3F, M3F, G3F	16	S34
250	L3F, M3F, G3F	10	S34
300	L3F, M3F, G3F	10	S34 (on request)

Where the differential pressure is higher than noted S16 must be replaced with S25.

Where manual override is needed S16 must be replaced with S25

# Pneumatic actuators type VT Single Acting

For 2 & 3-way valves type G/L/M/S 2FM-T & G/L/M/S 3FM-T

0-6.5.15

Page 1 of 4



## TECHNICAL DATA

### Materials:

Cap	Aluminum alloy
Piston	Aluminum alloy
Drive shaft	Alloy Steel
Nut	Stainless steel
Washer	Stainless steel
Spring clip	Spring steel
Position indicator	Nylon
Indicator thrust bearing	Stainless steel
Bearing	POM+PTFE
Wear band	Nylon
Spring seat	Nylon
"o" ring	NBR
Spring	High-carbon steel

## APPLICATIONS

Pneumatic actuators type VT and are the main component of the automatic control system.

It is mainly used for rotary angle 90° to open and close the rotary Clorius valves.

Single-acting cylinders use one air port to allow compressed air to enter the cylinder to move the piston to the desired position, as well as an internal spring to return the piston to the "home" position when the air pressure is removed.

Actuators can work with SPRING OPEN or SPRING CLOSE functions. Pneumatic actuators type VT has cooperated with manual override type KH or mounted directly on the valve.

VT actuators are made in accordance with the latest international standards and higher efficiency and reliability.

## QUALITY

Products manufactured acc. to ISO9001 standard.

Each individual actuator has been factory inspected and tested and given a serial number for full traceability.

A single compact design utilising identical body and end caps for both - double and single acting.

Full conformance to following latest specifications: ISO 5211, DIN 3337 and VDI/VDE 3845 for products interchangeability and easy mounting of solenoids, limit switches and other accessories.

## FEATURES

VT series pneumatic actuators have an advantageous characteristic in:

- Reliability
- High performance
- Extensive products range allows the best versatility
- Compact and light
- VT piston rack and pinion design for compact construction, symmetric mounting position, high-cycle life and fast operation.
- Two independent external travel stop adjustments permit easy and precise adjustment of +/- 5° In both directions.
- This adjustment may be made in either the open or closed position and provides for accurate valve.
- Multiple bearings and guides on pistons and racks for precise operation, low friction, high cycle life and a blowout proof pinion shaft.
- Electroless nickel-plated blowout resistant, bearing guided, one-piece pinion shaft for improved safety and maximum cycle life.
- High precision teeth on piston racks and pinion shaft for accurate positioning, low backlash, and maximum engagement resulting in overall efficient operation.
- Extruded aluminium body with both internal and external corrosion protections having a honed cylinder surface for longer life and a lower coefficient of friction.
- Selected high-quality bearings and seals that provide a wide operating temperature range, low friction, and high cycle life.
- Multifunctional position indicator for visual position indication, and a direct, easy, economical way to mount popular sensor.
- Protection class in IP65

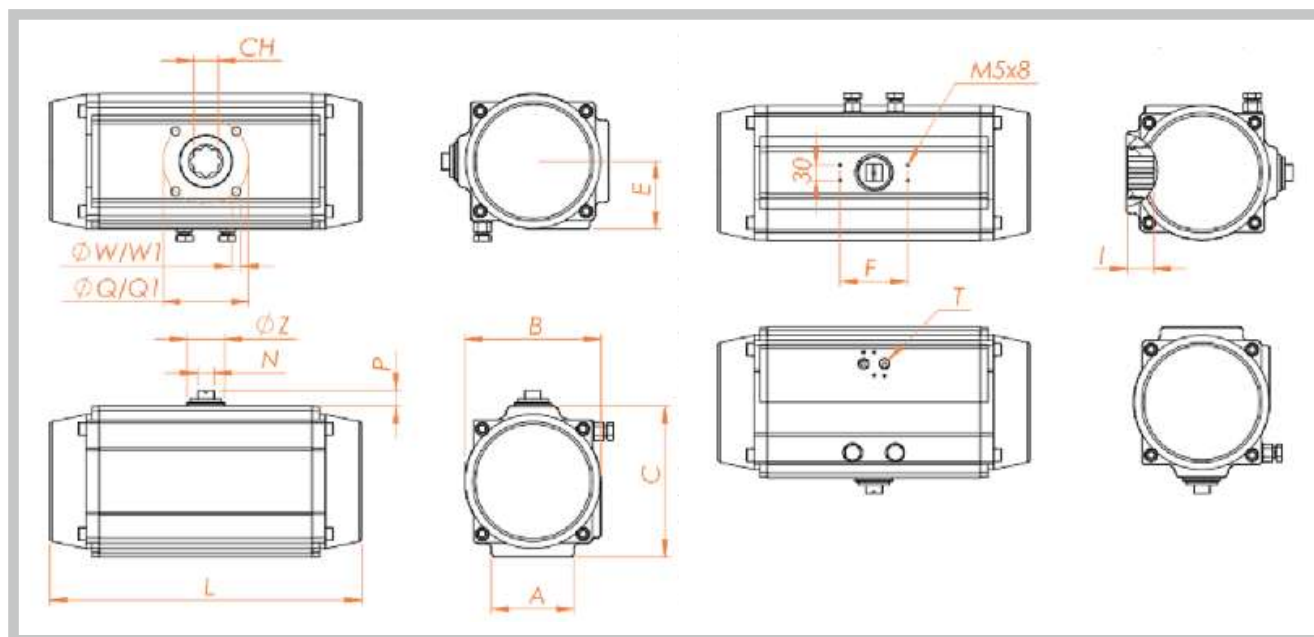
Subject to change without notice.



## RECOMMENDED PNEUMATIC ACTUATORS TYPES SINGLE ACTING AND CLORIUS ROTARY VALVES AND DECLUTCH

DN	Type	Drop pressure (P1 ≤ ...bar)	Pneumatic Actuator for DP 5 bar	DECLUTCH
65	G3FM-T	25	VT125S	KH-3
65	G3FM-TM	25	VT125S	KH-3
80	G3FM-T	25	VT125S	KH-3
80	G3FM-TM	25	VT140S	KH-4
100	G3FM-T	25	VT160S	KH-4
100	G3FM-TM	25	VT160S	KH-4
125	G3FM-T	25	VT190S	KH-5
125	G3FM-TM	25	VT190S	KH-5
150	G3FM-T	16	VT190S	KH-5
150	G3FM-TM	16	VT190S	KH-5
200	G3FM-T	16	VT210S	KH-5
200	G3FM-TM	16	VT240S	KH-6
250	G3FM-T	16	VT240S	KH-6
250	G3FM-TM	16	VT270S	KH-6
300	G3FM-T	16	VT270S	KH-6
300	G3FM-TM	16	VT300S	KH-7
350	G3FM-T	10	VT300S	KH-7
350	G3FM-TM	10	VT350S	KH-8
400	G3FM-T	10	VT350S	KH-8
400	G3FM-TM	10	VT400S	KH-9
450	G3FM-T	10	VT400S	KH-9
450	G3FM-TM	10	VT400S	KH-9
500	G3FM-T	10	VT400S	KH-9
500	G3FM-TM	10	Available on request	
600	G3FM-T	10	Available on request	
600	G3FM-TM	10	Available on request	

## DIMENSION SKETCH



MODEL	A	B	C	D	E	F	P	ØZ	N	I	FLANGE	Q	Q1	W	W1	Ch	T	Weight [kg]
VT125S	96	157	161	337	85	80	30	56	22	25	F07/10	70	102	M8x12	M10x15	22x22	G1/4'	12.5
VT140S	110	178	178	377	97	80	30	56	22	31	F10/12	102	125	M10x15	M12x18	27x27	G1/4'	15.9
VT160S	112	196	200	412	106	130	30	56	22	31	F10/12	102	125	M10x15	M12x18	27x27	G1/4'	23.8
VT190S	136	216.5	232	488	112	130	30	56	22	41	F10/14	102	140	M10x15	M16x24	36x36	G1/4'	33.8
VT210S	140	235.5	255	550	120	130	30	80	32	40	F14	-	140	-	M16x24	36x36	G1/4'	48.4
VT240S	159	262	292	602	131	130	30	80	32	50	F16	-	165	-	M20x28	46x46	G1/2'	77.8
VT270S	159	295	331	672	147.5	130	30	80	32	50	F16	-	165	-	M20x28	46x46	G1/2'	90.6
VT300S	180	335	354	784	173	130	30	80	32	50	F16	-	165	-	M20x28	46x46	G1/2'	135.6
VT350S	270	385	410	845	195	130	30	80	32	50	F16/F25	165	254	M20x28	M16x30	46x46	G1/2'	188.1
VT400S	290	520	466	956	260	130	30	80	32	60	F25	-	254	-	M16x30	55x55	G1/2'	283.5

Other relevant data sheets for VT actuators:

- 2-way valves
- 3-way valves
- Positioners
- Filter regulators
- Controller
- Sensor PT 100
- Pneumatic controller S80

G2FM-T 0.2.5.05.01  
G3FM-T 0.2.6.02, 0.2.6.03  
0.6.6.01, 0.6.6.02  
0.6.8.01  
ER2000 0.4.6.01  
0.4.7.01  
0.6.7.01

# Pneumatic actuators type VT Double Acting

For 2 & 3-way valves type G/L/M/S 2FM-T & G/L/M/S 3FM-T

0-6.5.16

Page 1 of 4



## APPLICATIONS

Pneumatic actuators type VT and are the main component of the automatic control system.

It is mainly used for rotary angle 90° to open and close the rotary Clorius valves.

Double-acting cylinders have an air port at each end and move the piston forward and back by alternating the port that receives the high-pressure air.

Pneumatic actuators type VT has cooperated with manual override type KH or mounted directly on the valve.

VT actuators are made in accordance with the latest international standards and higher efficiency and reliability.

## QUALITY

Products manufactured acc. to ISO9001 standard.

Each individual actuator has been factory inspected and tested and given a serial number for full traceability.

A single compact design utilising identical body and end caps for both - double and single acting.

Full conformance to following latest specifications: ISO 5211, DIN 3337 and VDI/VDE 3845 for products interchangeability and easy mounting of solenoids, limit switches and other accessories.

## TECHNICAL DATA

### Materials:

Body	Aluminum alloy
Cap	Aluminum alloy
Drive shaft	Alloy Steel
Nut	Stainless steel
Washer	Stainless steel
Position indicator	Nylon
Indicator thrust bearing	Stainless steel
Bearing	POM+PTFE
Wear band	Nylon
Spring seat	Nylon
"o" ring	NBR

## FEATURES

VT series pneumatic actuators have an advantageous characteristic in:

- Reliability
- High performance
- Extensive products range allows the best versatility
- Compact and light
- VT piston rack and pinion design for compact construction, symmetric mounting position, high-cycle life and fast operation.
- Two independent external travel stop adjustments permit easy and precise adjustment of +/- 5° In both directions.
- This adjustment may be made in either the open or closed position and provides for accurate valve.
- Multiple bearings and guides on pistons and racks for precise operation, low friction, high cycle life and a blowout proof pinion shaft.
- Electroless nickel- plated blowout resistant, bearing guided, one-piece pinion shaft for improved safety and maximum cycle life.
- High precision teeth on piston racks and pinion shaft for accurate positioning, low backlash, and maximum engagement resulting in overall efficient operation.
- Extruded aluminium body with both internal and external corrosion protections having a honed cylinder surface for longer life and a lower coefficient of friction.
- Selected high-quality bearings and seals that provide a wide operating temperature range, low friction, and high cycle life.
- Multifunctional position indicator for visual position indication, and a direct, easy, economical way to mount popular sensor.
- Protection class in IP65

Subject to change without notice.

**RECOMMENDED PNEUMATIC ACTUATORS TYPES DOUBLE ACTING AND CLORIUS ROTARY VALVES AND DECLUTCH**

DN	Type	Drop pressure (P1 ≤ ...bar)	Pneumatic Actuator for DP 5 bar	DECLUTCH
65	G3FM-T	25	VT085D	KH-1
65	G3FM-TM	25	VT095D	KH-2
80	G3FM-T	25	VT095D	KH-2
80	G3FM-TM	25	VT095D	KH-2
100	G3FM-T	25	VT110D	KH-2
100	G3FM-TM	25	VT125D	KH-3
125	G3FM-T	25	VT125D	KH-3
125	G3FM-TM	25	VT140D	KH-3
150	G3FM-T	16	VT125D	KH-3
150	G3FM-TM	16	VT140D	KH-3
200	G3FM-T	16	VT160D	KH-4
200	G3FM-TM	16	VT190D	KH-4
250	G3FM-T	16	VT190D	KH-4
250	G3FM-TM	16	VT210D	KH-5
300	G3FM-T	16	VT210D	KH-5
300	G3FM-TM	16	VT240D	KH-5
350	G3FM-T	10	VT240D	KH-5
350	G3FM-TM	10	VT240D	KH-5
400	G3FM-T	10	VT240D	KH-5
400	G3FM-TM	10	VT270D	KH-6
450	G3FM-T	10	VT270D	KH-6
450	G3FM-TM	10	VT300D	KH-6
500	G3FM-T	10	VT270D	KH-6
500	G3FM-TM	10	Available on request	
600	G3FM-T	10	VT350D	KH-7
600	G3FM-TM	10	Available on request	

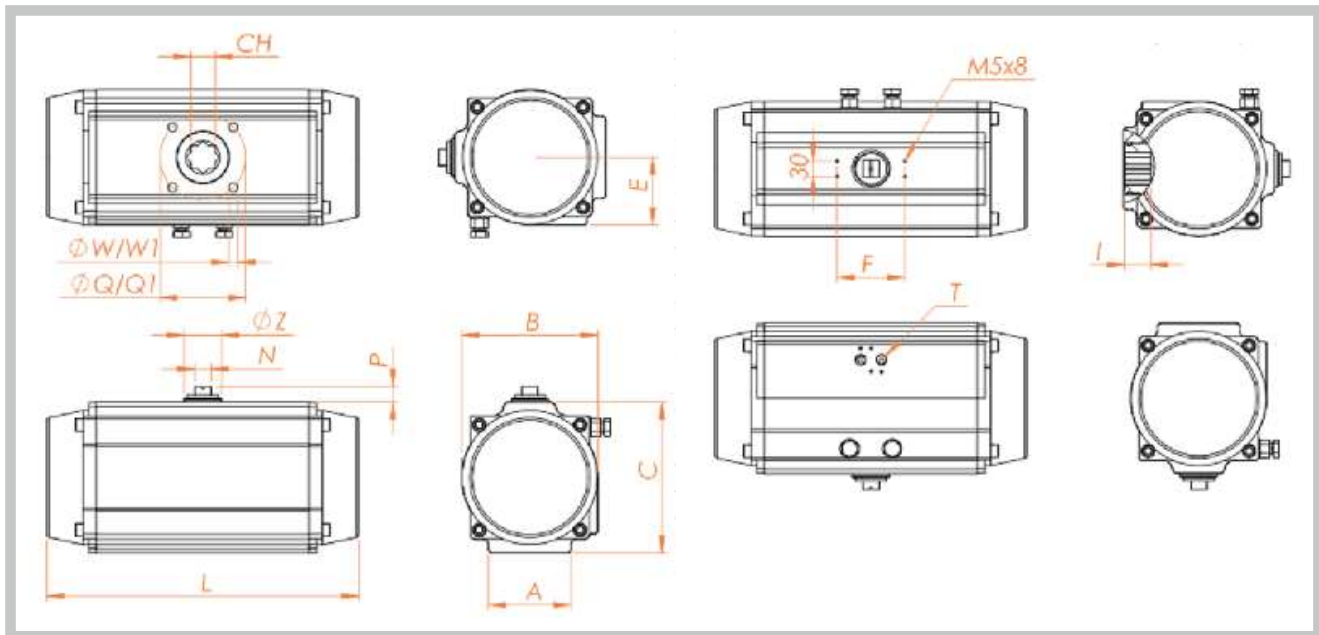
# Pneumatic actuators type VT Double Acting

For 2 & 3-way valves type G/L/M/S 2FM-T & G/L/M/S 3FM-T

0-6.5.16

Page 3 of 4

## DIMENSION SKETCH



MODEL	A	B	C	D	E	F	P	QZ	N	I	FLANGE	Q	Q1	W	W1	Ch	T	Weight [kg]
VT085D	68	112.5	113	229	63.5	80	20	40	14	19	F 05/07	50	70	M6x9	M8x12	17x17	G1/4'	3.8
VT095D	92	126	123	264	71	80	20	40	14	19	F05/07	50	70	M6x9	M8x12	17x17	G1/4'	5.1
VT110D	93	138.5	136	266	76.5	80	20	40	14	19	F07/10	70	102	M8x12	M10x15	17x17	G1/4'	6.1
VT125D	96	157	161	337	85	80	30	56	22	25	F07/10	70	102	M8x12	M10x15	22x22	G1/4'	10.9
VT140D	110	178	178	377	97	80	30	56	22	31	F10/12	102	125	M10x15	M12x18	27x27	G1/4'	13.8
VT160D	112	196	200	412	106	130	30	56	22	31	F10/12	102	125	M10x15	M12x18	27x27	G1/4'	20.2
VT190D	136	216.5	232	488	112	130	30	56	22	41	F10/14	102	140	M10x15	M16x24	36x36	G1/4'	28.4
VT210D	140	235.5	255	550	120	130	30	80	32	40	F14	-	140	-	M16x24	36x36	G1/4'	40.0
VT240D	159	262	292	602	131	130	30	80	32	50	F16	-	165	-	M20x28	46x46	G1/2'	52.6
VT270D	159	295	331	672	147.5	130	30	80	32	50	F16	-	165	-	M20x28	46x46	G1/2'	73.6
VT300D	180	335	354	784	173	130	30	80	32	50	F16	-	165	-	M20x28	46x46	G1/2'	108.0
VT350D	270	385	410	845	195	130	30	80	32	50	F16/F25	165	254	M20x28	M16x30	46x46	G1/2'	146.7
VT400D	290	520	466	956	260	130	30	80	32	60	F25	-	254	-	M16x30	55x55	G1/2'	220.5

Other relevant data sheets for VT actuators:

- 2-way valves
- 3-way valves
- Positioners
- Filter regulators
- Controller
- Sensor PT 100
- Pneumatic controller S80

G2FM-T 0.2.5.05.01  
G3FM-T 0.2.6.02, 0.2.6.03  
0.6.6.01, 0.6.6.02  
0.6.8.01  
ER2000 0.4.6.01  
0.4.7.01  
0.6.7.01

## **RUGGET, EASY MAINTENANCE & PRECISE CALIBRATION**

Rugged valve control device giving a confidence in reliable performance and outstanding durability under harsh working conditions.





# PNEUMATIC CONTROLLERS & POSITIONERS

---

6

## OUR PNEUMATIC CONTROLLERS AND POSITIONER PROGRAM INCLUDES:

### POSITIONER TYPE

PNEUMATIC-PNEUMATIC  
ELECTRO-PNEUMATIC

### POSITIONER MODEL

PPL, PPR  
EPL, EPR

### CONTROLLER TYPE

PNEUMATIC INDICATING CONTROLLER

### CONTROLLER MODEL

S80

### FILTER REGULATOR

FLOAT TYPE WITH AUTO-DRAIN

### REGULATOR MODEL

AW 20K-F02CE-H

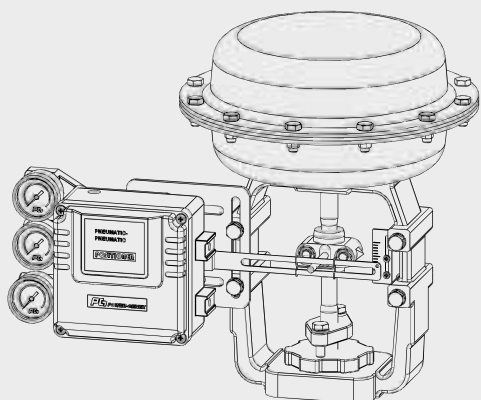
# PPL / PPR

Pneumatic-Pneumatic Positioner

O-6.6.01-C

Page 1 of 4

## PPL



Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

### FEATURES

- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included

### OPTIONS

- High temperature

### SPECIFICATIONS

	PPL	
	Single	Double
Input Signal	0.2-1.0 bar (3-15 psi) (Note 1,2)	
Supply Air Pressure	Max 7.0 bar (100 psi)	
Standard Stroke	10-80 mm (Note.3)	
Pneumatic Connections	PT(Rc) 1/4 or NPT 1/4	
Ambient Temperature	-20~ +70 °C (Note. 4)	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ±1.0% F.S.	Within ±1.5% F.S.
Sensitivity	Within ±0.2% F.S.	Within ±0.5% F.S.
Hysteresis	Within ±1.0% F.S.	
Repeatability	Within ±0.5% F.S.	
Air Consumption	5 LPM (Sup. 1.4 bar)	
Flow Capacity	80 LPM (Sup. 1.4 bar)	
Body Material	Aluminium die-cast	
Weight	2.1 kg	

Note:

- 1) 1/2 split range is available for 3-9 psi input signal or 9-15 psi input signal
- 2) Please contact for 6-30 psi input signal
- 3) Feedback lever can be extended to stroke 80-150mm
- 4) High temperature option: up to +120°C

## HOW TO ORDER

# PPL

Feedback Lever

Pressure Gauge

Pilot Valve Orifice

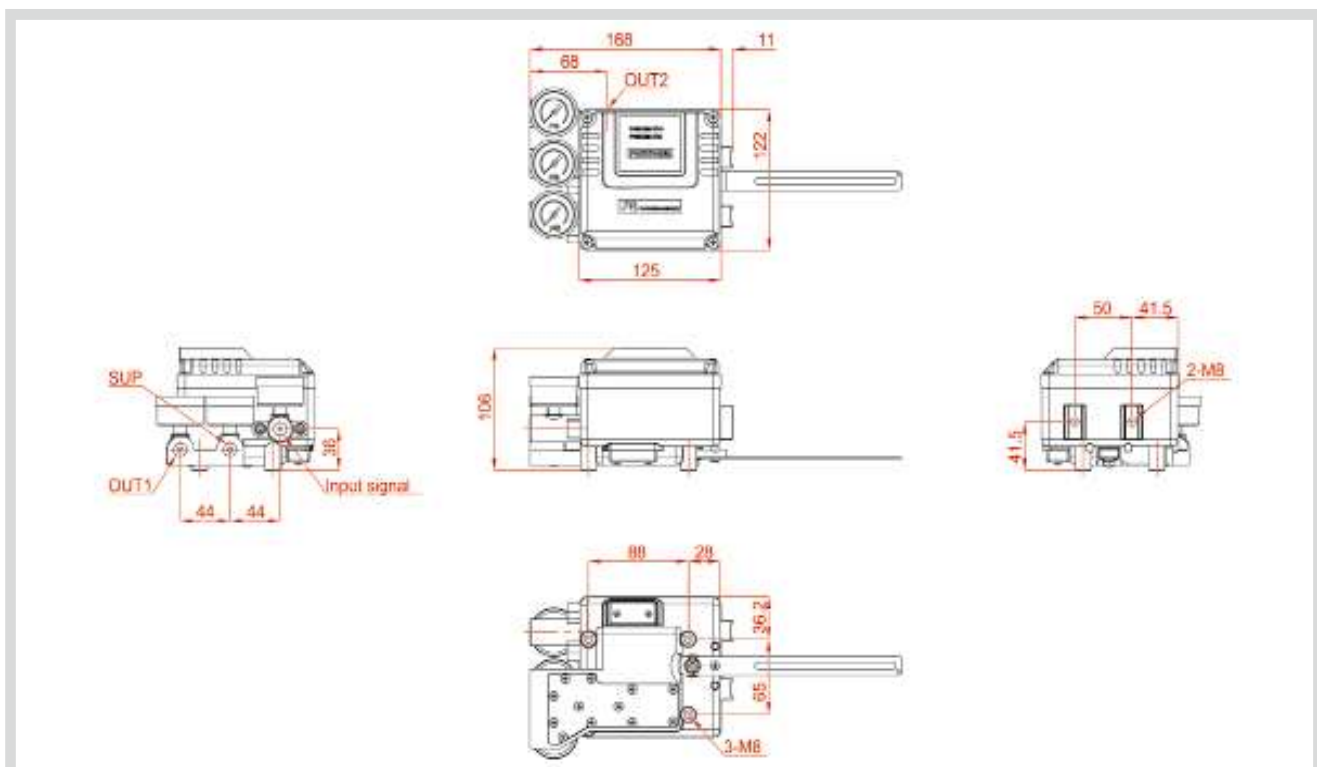
Connection Threads

Operating Temperature

Mounting Bracket

Description	Code	Description	Code
<b>Feedback Lever:</b>	A: Stroke 10 ~ 40mm B: Stroke 10 ~ 80mm C: Stroke 80 ~ 150mm	<b>Connection Threads:</b> (pneumatic)	3: PT(Rc) 1/4 4: NPT 1/4
<b>Pressure Gauge</b>	1: 6 bar (90psi) 2: 10 bar (150psi)	<b>Operating Temperature:</b>	T: 70°C (standard) H: 120°C L: -40°C
<b>Pilot Valve Orifice:</b>	S: Standard (Actuator volume over 180 cm <sup>3</sup> ) M: Small orifice (Ø 1.0 or Ø0.7) (Actuator volume 90~180cm <sup>3</sup> )	<b>Mounting Bracket:</b>	L: DIN/IEC 60534-6-1

## DIMENSION SKETCH



# PPL / PPR

Pneumatic-Pneumatic Positioner

O-6.6.01-C

Page 3 of 4

## PPR



With Dome Indicator



Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

### FEATURES

- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included

### OPTIONS

- Position transmitter (4-20mA output signal)
- 2 x SPDT limit switch
- 2 x P&F proximity sensor NJ2-V3-N
- Visual dome indicator
- High temperature

### SPECIFICATIONS

	PPR	
	Linear Type (Lever Feedback)	
	Single	Double
Input Signal	0.2-1.0 bar (3-15 psi) (Note 1,2)	
Supply Air Pressure	Max 7.0 bar (100 psi)	
Standard Stroke	60-100° (Note.3)	
Pneumatic Connections	PT(Rc) 1/4 or NPT 1/4	
Ambient Temperature	-20~ +70 °C (Note. 4)	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ±1.0% F.S.	Within ±1.5% F.S.
Sensitivity	Within ±0.5% F.S.	
Hysteresis	Within ±1.0% F.S.	
Repeatability	Within ±0.5% F.S.	
Air Consumption	5 LPM (Sup. 1.4 bar)	
Flow Capacity	80 LPM (Sup. 1.4 bar)	
Body Material	Aluminium die-cast	
Weight	2.5 kg	

Note:

1) 1/2 split range is available for 3-9 psi input signal or 9-15 psi input signal

2) Please contact for 6-30 psi input signal

3) Operating angle can be adjusted to 0-60° or 0-100°

4) High temperature option: up to +120°C without feedback options  
up to +85°C with feedback options

## HOW TO ORDER

# PPR

Feedback  
Lever

Pressure  
Gauge

Pilot  
Valve  
Orifice

Position  
Feedback

Connection  
Threads

Dome  
Indicator

Operating  
Temperature

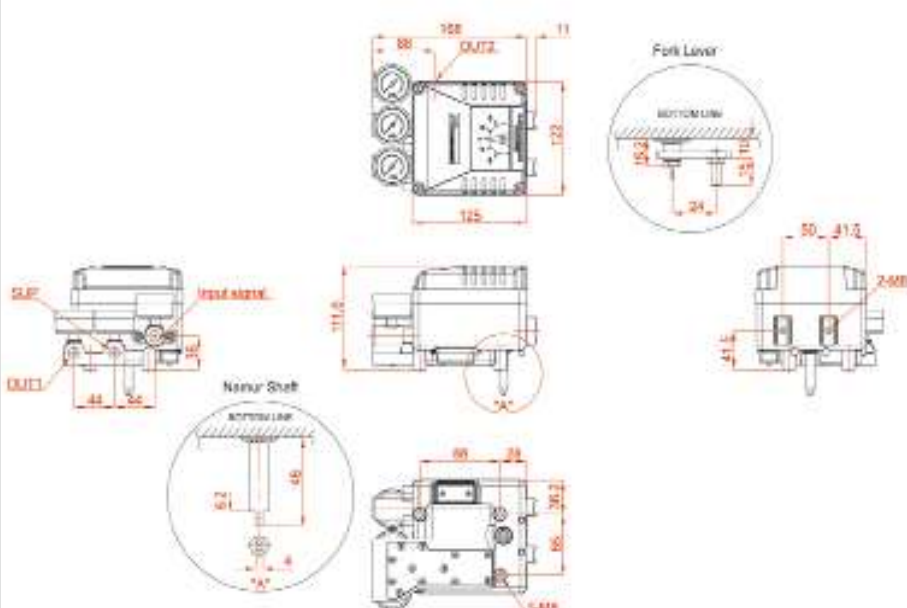
Mounting  
Bracket

Description	Code
<b>Feedback Lever:</b>	A: NAMUR shaft (direct mounting) B: Fork lever M6 x 40L C: Fork lever other size on request
<b>Pressure Gauge</b>	1: 6 bar (90psi) 2: 10 bar (150psi)
<b>Pilot Valve Orifice:</b>	S: Standard (Actuator volume over 180 cm <sup>3</sup> ) M: Small orifice (Ø 1.0 or Ø0.7) (Actuator volume 90~180cm <sup>3</sup> )
<b>Position Feedback:</b>	N: None (standard) O: Position transmitter (4~20mA output signal) L: 2 x SPDT limit switch P: 2 x proximity sensor P&F NJ2-V3-N M: O + L Q: O + P

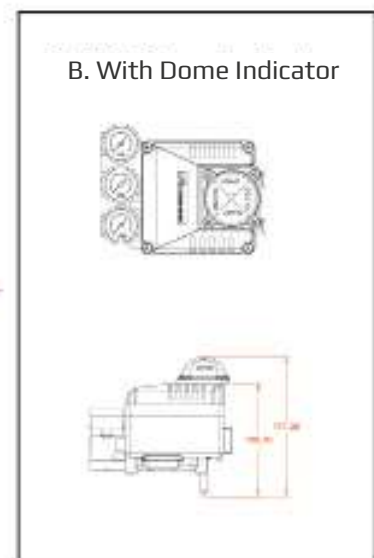
Description	Code
<b>Connection Threads:</b> (pneumatic)	3: PT(Rc) ¼ 4: NPT ¼
<b>Dome Indicator:</b>	N: Flat indicator (standard) D: Dome indicator
<b>Operating Temperature:</b>	T: 70°C (standard) H: 120°C (without position feedback option) 85°C (with position feedback option) L: -40°C (without position feedback option)
<b>Mounting Bracket</b> - <b>NAMUR Shaft Type:</b>	R: Multi-size NAMUR bracket for DIN VDI/VDE 3845 (130 x 30 x 50 bracket on request)
- <b>Fork Lever Type</b>	F: DHCT bracket 80x30 for fork lever type E: Multi-size NAMUR bracket for Fork lever type (130 x 30 x 50 bracket on request)

## DIMENSION SKETCH

A. With Flat Indicator



B. With Dome Indicator



# EPL / EPR

Electro-Pneumatic Positioner

O-6.6.02-E

Page 1 of 8

## EPL



### FEATURES for EPL

- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included
- Kcs-certified flameproof Ex dmb 11B+H<sub>2</sub> T6
- NEPSI-certified flameproof Ex dmb 11B+H<sub>2</sub> T6
- IECEx-certified flameproof Ex dmb IIC T6/T5
- ATEX-certified flameproof Ex dmb IIC T6/T5
- Kcs-certified flameproof Ex dmb IIC T6/T5
- IECEx-certified intrinsically safe Ex ia IIC T6
- ATEX-certified intrinsically safe Ex ia IIC T6
- Kcs-certified intrinsically safe Ex ia IIC T6

### OPTIONS

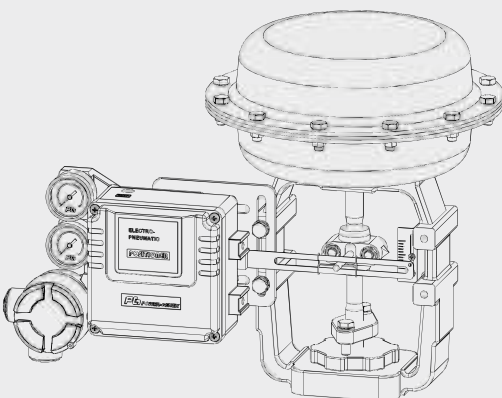
- Position transmitter (4...20 mA output signal)
- High temperature (+120°C)
- Low temperature (-40°C)

### SPECIFICATIONS

	EPL	
	Linear Type (Lever Feedback)	
	Single	Double
<b>Input Signal</b>	4-20mA DC (Note. 1)	
<b>Input Resistance</b>	235 ± 15Ω	
<b>Air Supply</b>	Max 7.0 bar (100 psi) free of oil, water and moisture	
<b>Standard Stroke</b>	10-80 mm (Note. 2)	
<b>Pneumatic Connections</b>	PT(Rc) 1/4 or NPT 1/4	
<b>Electrical Connections</b>	PF (G) ½ or NPT ½	
<b>Protection Class</b>	Ex dmb IIB+H <sub>2</sub> T6/ Ex dmb IIC T6/T5 Ex ia IIC T6/IP66	
<b>Ambient Temperature</b>	-20~ +70 °C (Note. 3)	
<b>Pressure Gauge</b>	Stainless steel	
<b>Output Characteristics</b>	Linear	
<b>Linearity</b>	Within ±1.0% F.S.	Within ±1.5% F.S.
<b>Sensitivity</b>	Within ±0.2% F.S.	Within ±0.5% F.S.
<b>Hysteresis</b>	Within ±1.0% F.S.	
<b>Repeatability</b>	Within ±0.5% F.S.	
<b>Air Consumption</b>	5 LPM (Sup. 1.4 bar)	
<b>Flow Capacity</b>	80 LPM (Sup. 1.4 bar)	
<b>Body Material</b>	Aluminium die-cast	
<b>Weight</b>	3.3 kg (with terminal box) 3.0 kg (without terminal box)	

Note:

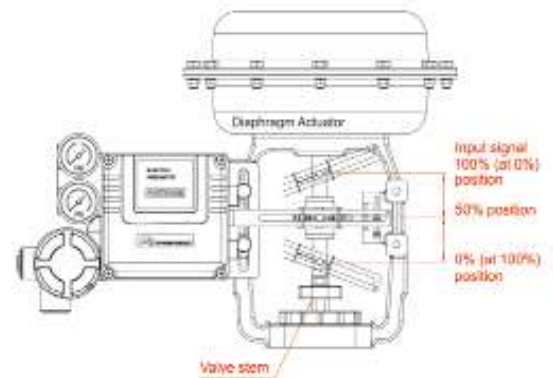
- 1) 1/2 split range is available for 4-12mA input signal or 12-20mA input signal
- 2) Feedback lever can be extended to stroke 80-150mm
- 3) Temperature option: up to +120°C without feedback options  
up to +85°C without feedback options  
up to -40°C without feedback options



Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

## MOUNTING

1. Install the EPL positioner so that the angle between the valve stem and the feedback lever can be  $90^\circ$  at 12 mA input signal (50%) as shown to the right.
2. The operating angle of the EPL feedback lever is minimum  $10^\circ$  to maximum  $30^\circ$ .



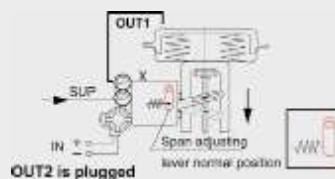
## INTERNAL VIEW



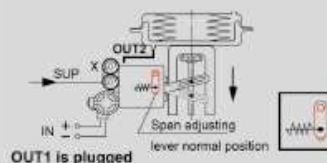
## AIR CONNECTIONS

### Direct Acting (DA)

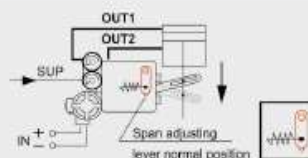
As the input increases,  
Valve stem moves downwards  
Actuator: **DA**  
Connection: out 1



As the input increases,  
Valve stem moves downwards  
Actuator: **DA**  
Connection: out 2

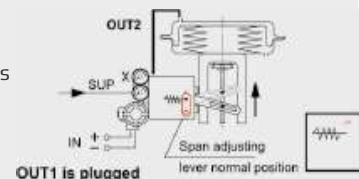


As the input increases,  
Valve stem moves downwards

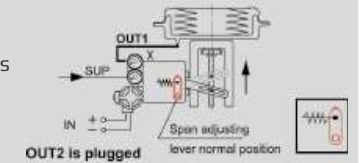


### Reverse Acting (RA)

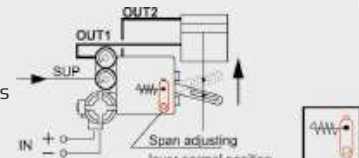
As the input increases,  
Valve stem moves upwards  
Actuator: **RA**  
Connection: out 2



As the input increases,  
Valve stem moves upwards  
Actuator: **RA**  
Connection: out 1



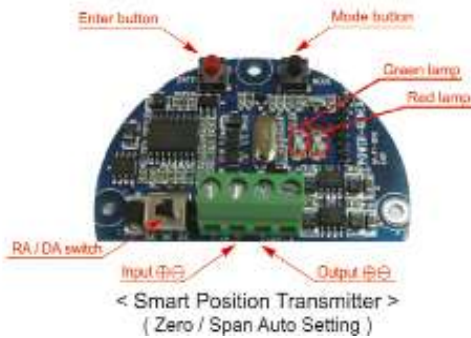
As the input increases,  
Valve stem moves upwards



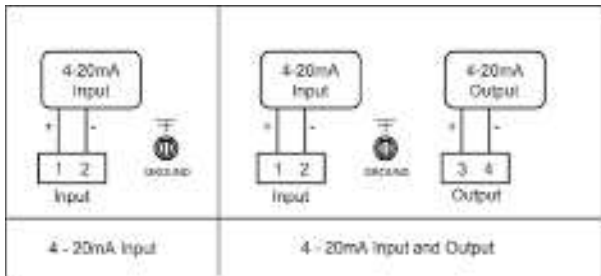


## POSITION TRANSMITTER OPTIONS (BUILT-IN TYPE)

### 1. Board View



### 3. Wiring Diagram

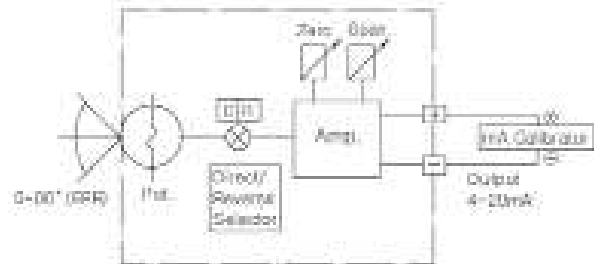


### 2. Position Transmitter (4-20mA output signal)

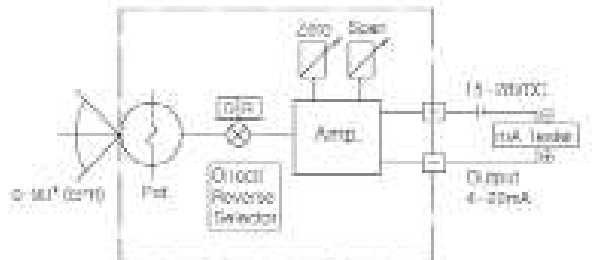
#### a. Specifications

Power Supply Rating	5.5-30 VDC loop power
Recommended Power Supply	24 VDC
Output Signal	4-20 mA, 2-wire
Operating Temperature	-20°C ~ +85°C
Load Impedance	0 ~ 600 ohms
Max. Output	30 mA DC
Linearity	± 1.0 %
Hysteresis	1.0 % of full scale
Repeatability	±0.5 % of full scale
Adjustment	Zero and Span in terminal box

#### b. with mA calibrator

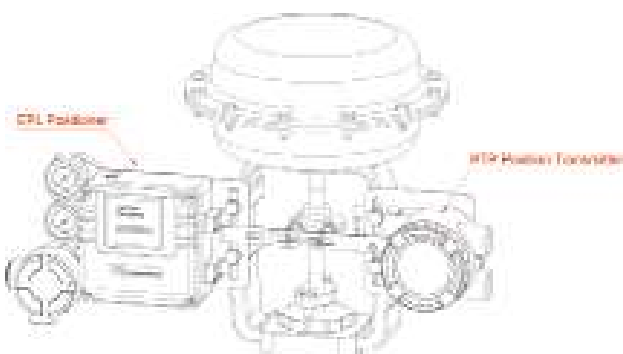


#### c. with multimeter



## APPLICATION FOR LIMIT SWITCHES (EXTERNAL TYPE)

### 1) With explosion proof PTP-L



### 2) With non-explosion proof LSB-200



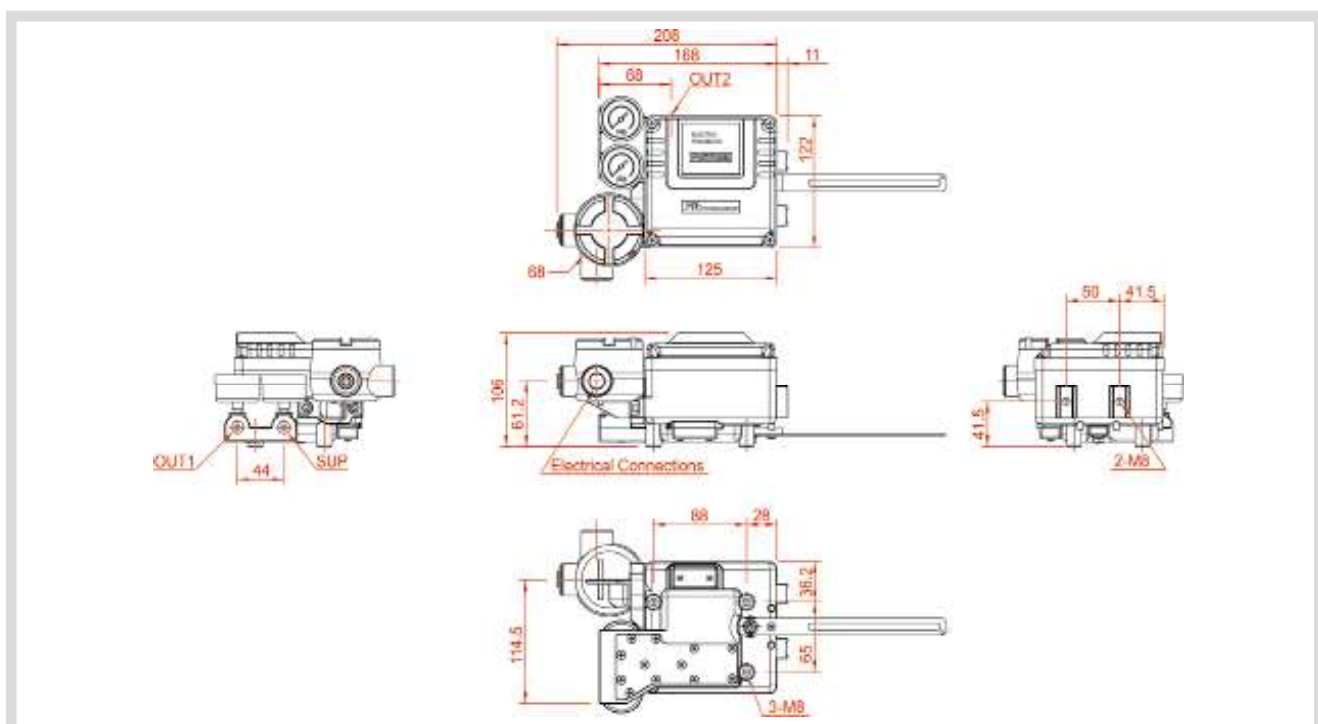


## HOW TO ORDER

<b>EPL</b> —	Protection Class	Feedback Lever	Pressure Gauge (SUP, OUT)	Pilot Valve Orifice	Position Feedback	Connection Threads	Operating Temp.	Mounting Bracket

Description	Code	Description	Code
<b>Protection Class:</b>	F: KC flameproof Ex dmb IIB+H <sub>2</sub> T6 NEPSI flameproof Ex dmb IIB+H <sub>2</sub> T6 A: KC flameproof Ex dmb IIC T6/T5 D: IECEx flameproof Ex dmb IIC T6 I: IECEx intrinsically safe Ex ia IIC T6 ATEX intrinsically safe Ex ia IIC T6 KC intrinsically safe Ex ia IIC T6 W: Weatherproof to IP66	<b>Position Feedback:</b> (only for waterproof type)	N: None (standard) O: Analog position transmitter (4~20mA output signal) S: Smart position transmitter (4~20mA output signal)
<b>Feedback Lever:</b>	A: Stroke 10~40 mm B: Stroke 10~80 mm C: Stroke 80~150 mm	<b>Connection Threads:</b> (pneumatic - electrical)	3: PT(Rc) ¼ - PF(G) ½ (standard) 4: NPT ¼ - NPT ½ 5: PT(Rc) ¼ - M20 x 1.5
<b>Pressure Gauge:</b>	1: 6 bar (90 psi) 2: 10 bar (150 psi)	<b>Operating Temperature:</b> (only for waterproof type)	T: 70°C (standard) H: 120°C (without position feedback option) 85°C (with position feedback option) L: -40°C (without position feedback option)
<b>Pilot Valve Orifice:</b>	S: Standard (Actuator volume over 180 cm <sup>3</sup> ) M: Small orifice (Ø1.0 or Ø0.7) (Actuator volume over 90~180 cm <sup>3</sup> )	<b>Mounting Bracket:</b>	N: None L: IEC 60534-6-1

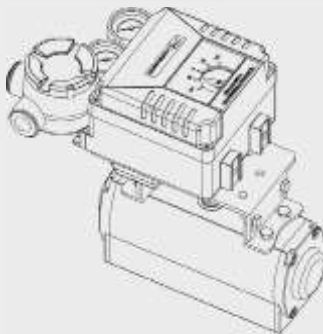
## DIMENSION SKETCH



## EPR



With Dome Indicator













Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments.

## OPTIONS

- Position transmitter (4...20 mA output signal)
- 2 x SPDT limit switch
- 2 x P&F proximity sensor NJ2-V3-N
- Visual dome indicator
  - High temperature (+120 °C)
  - Low temperature (-40 °C)

## FEATURES for EPR

- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included
-  KC-certified flameproof Ex dmb 11B+H<sub>2</sub> T6
-  NEPSI-certified flameproof Ex dmb 11B+H<sub>2</sub> T6
-   IECEx/KC-certified flameproof Ex dmb IIC T6/T5
-   ATEX/TR-CU-certified flameproof Ex dmb IIC T6/T5
-   IECEx/KC-certified intrinsically safe Ex ia IIC T6
-   ATEX/TR-CU-certified intrinsically safe Ex ia IIC T6

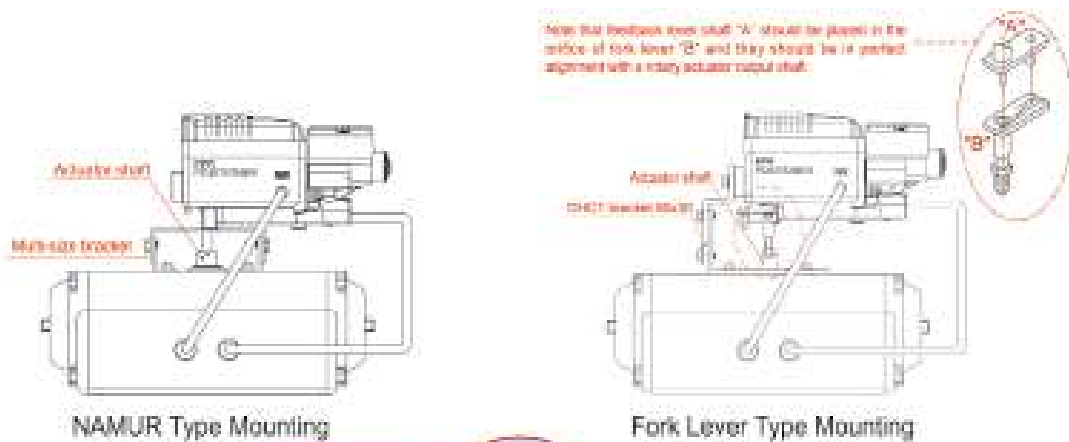
## SPECIFICATIONS

	EPR	
	Rotary Type (Cam Feedback)	
	Single	Double
<b>Input Signal</b>	4-20mA DC (Note. 1)	
<b>Input Resistance</b>	235 ± 15Ω	
<b>Air Supply</b>	Max 7.0 bar (100 psi) free of oil, water and moisture	
<b>Operating Angle</b>	60~100° (Note. 2)	
<b>Pneumatic Connections</b>	PT(Rc) 1/4 or NPT 1/4	
<b>Electrical Connections</b>	PF (G) ½ or NPT ½	
<b>Protection Class</b>	Ex dmb IIB+H <sub>2</sub> T6/ Ex dmb IIC T6/T5 Ex ia IIC T6/ IP66	
<b>Ambient Temperature</b>	-20~ +70 °C (Note. 3)	
<b>Pressure Gauge</b>	Stainless steel	
<b>Output Characteristics</b>	Linear	
<b>Linearity</b>	Within ±1.0% F.S.	Within ±1.5% F.S.
<b>Sensitivity</b>	Within ±0.5% F.S.	
<b>Hysteresis</b>	Within ±1.0% F.S.	
<b>Repeatability</b>	Within ±0.5% F.S.	
<b>Air Consumption</b>	5 LPM (Sup. 1.4 bar)	
<b>Flow Capacity</b>	80 LPM (Sup. 1.4 bar)	
<b>Body Material</b>	Aluminium die-cast	
<b>Weight</b>	3.5 kg (with terminal box) 3.2 kg (without terminal box)	

Note:

- 1) 1/2 split range is available for 4-12mA input signal or 12-20mA input signal
- 2) Operating angle can be adjusted to 0~60° or 0~100°
- 3) Temperature option: up to +120°C without feedback options  
up to +85°C without feedback options  
up to -40°C without feedback options

## MOUNTING

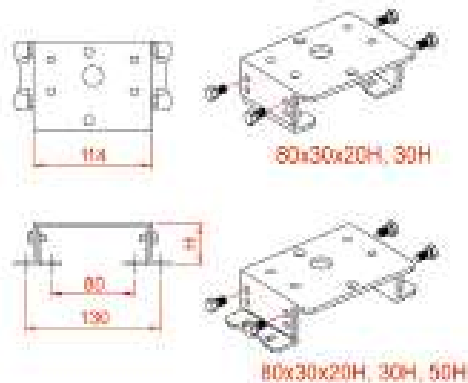


## INTERNAL VIEW



## MULTI-SIZE BRACKET

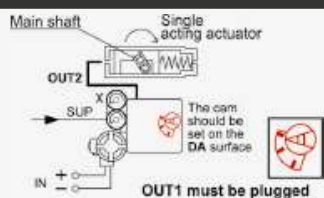
Type	H
80 x 30 x 20H	41
80 x 30 x 30H	51
130 x 30 x 20H	41
130 x 30 x 30H	51
130 x 30 x 50H	71



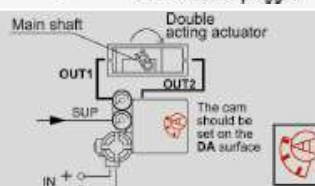
## AIR CONNECTIONS

### Direct Acting (DA)

As the input increases, Actuator stem rotates clockwise.

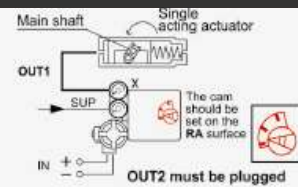


As the input increases, Actuator stem rotates clockwise.

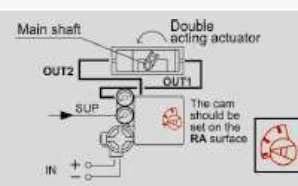


### Reverse Acting (RA)

As the input signal increases, Actuator stem rotates counter clockwise.

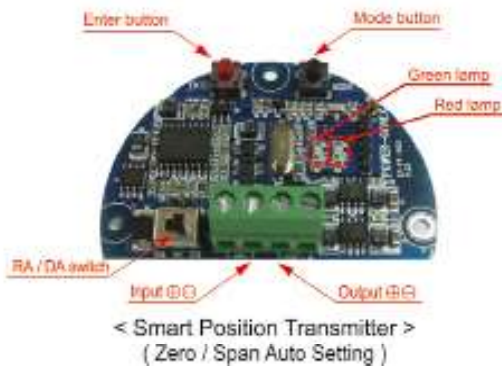
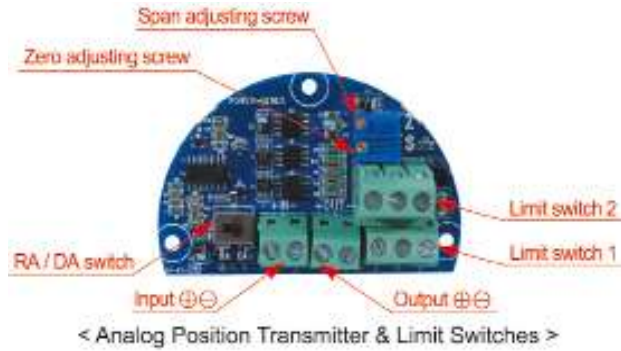


As the input signal increases, Actuator stem rotates counter clockwise.

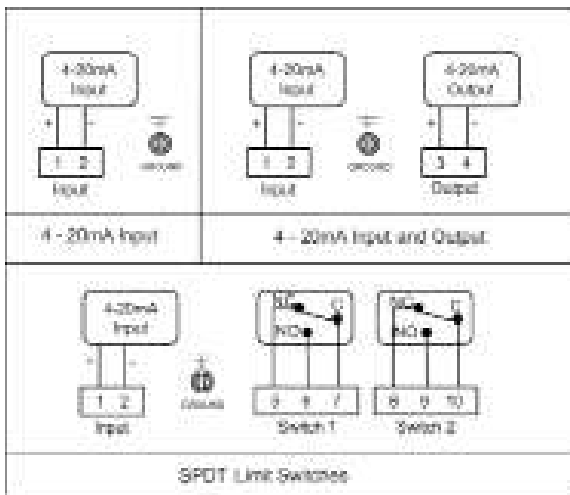


## POSITION TRANSMITTER OPTIONS (BUILT-IN TYPE)

### 1. Board View



### 3. Wiring Diagram



### 4. SPDT Limit Switches

#### a. Specifications

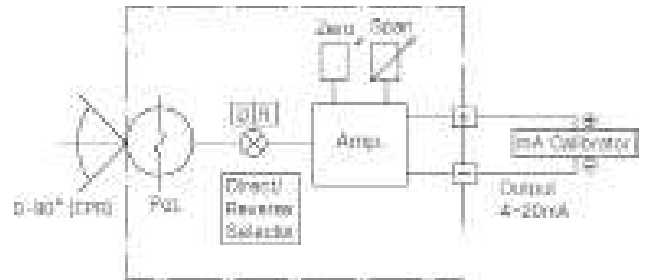
Contacts	SPDT Form C
AC Rating	16 A ½ HP 125/250 VAC
DC Rating	0.6 A 125 VDC / 0.3 A 250 VDC
Adjustment	Cams with set screws (L-wrench included for setting)

### 2. Position Transmitter (4-20mA output signal)

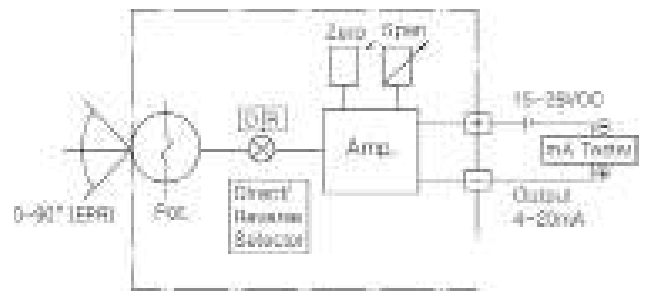
#### a. Specifications

Power Supply Rating	5.5-30 VDC loop power
Recommended Power Supply	24 VDC
Output Signal	4-20 mA, 2-wire
Operating Temperature	-20°C ~ +85°C
Load Impedance	0 ~ 600 ohms
Max. Output	30 mA DC
Linearity	± 1.0 %
Hysteresis	1.0 % of full scale
Repeatability	±0.5 % of full scale
Adjustment	Zero and Span in terminal box

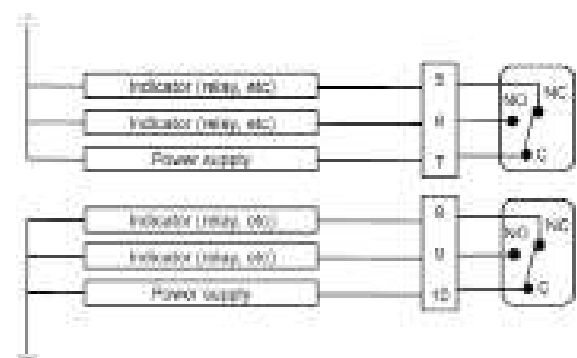
#### b. with mA calibrator



#### c. with multimeter



#### b) Wiring and Application



## HOW TO ORDER

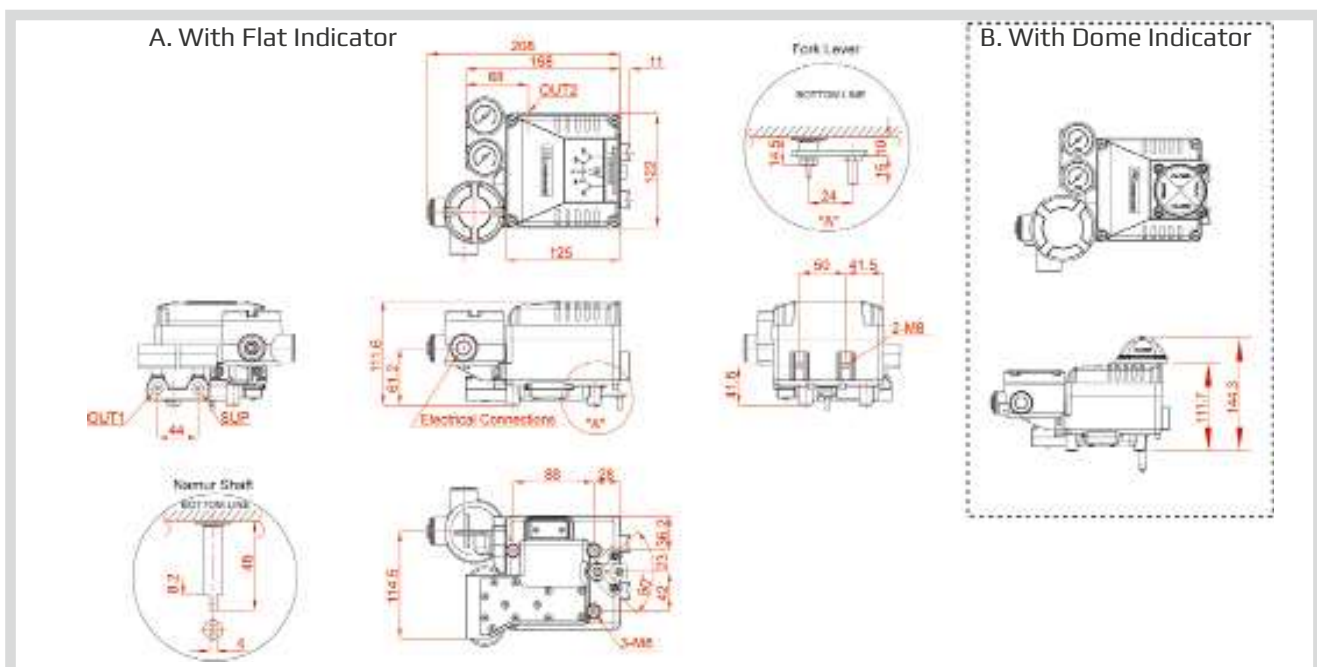
### EPR

Protection Class	Feedback Shaft	Pressure Gauge (SUP, OUT)	Pilot Valve Orifice	Position Feedback	Connection Threads	Dome Indicator	Operating Temp.	Mounting Bracket
------------------	----------------	---------------------------	---------------------	-------------------	--------------------	----------------	-----------------	------------------

Description	Code
<b>Protection Class:</b>	F: KC flameproof Ex dmb IIB+H2 T6 NEPSI flameproof Ex dmb IIB+H2 T6 A: KC flameproof Ex dmb IIC T6/T5 D: IECEx flameproof Ex dmb IIC T6 I: IECEx intrinsically safe Ex ia IIC T6 ATEX intrinsically safe Ex ia IIC T6 KC intrinsically safe Ex ia IIC T6 W: Weatherproof to IP66
<b>Feedback Shaft:</b>	N: NAMUR shaft (direct mounting) A: Fork lever M6 x 40L B: Fork lever other size on request
<b>Pressure Gauge</b>	1: 6 bar (90psi) 2: 10 bar (150psi)
<b>Pilot Valve Orifice:</b>	S: Standard (Actuator volume over 180 cm <sup>3</sup> ) M: Small orifice (Ø 1.0 or Ø0.7) (Actuator volume 90~180cm <sup>3</sup> )
<b>Position Feedback:</b> (only for weatherproof type)	N: None (standard) O: Analog position transmitter (4~20mA output signal) S: Smart position transmitter (4~20mA output signal) L: 2 x SPDT limit switch P: 2 x proximity sensor P&F NJ2-V3-N M: O + L Q: O + P

Description	Code
<b>Connection Threads:</b> (pneumatic)	3: PT(Rc) ¼ 4: NPT ¼ 5: PR(Rc) ¼ - M20 x 1.5
<b>Dome Indicator:</b>	N: Flat indicator (standard) D: Dome indicator
<b>Operating Temperature:</b> (only for weatherproof type)	T: 70°C (standard) H: 120°C (without position feedback option) 85°C (with position feedback option) L: -40°C (without position feedback option)
<b>Mounting Bracket - NAMUR Shaft Type:</b>	N: None R: Multi-size NAMUR bracket for IEC 60534-6-2/VDI/VDE 3845 (130 x 30 x 50 bracket on request)
<b>- Fork Lever Type:</b>	F: PG bracket 80x30 for fork lever type E: Multi-size NAMUR bracket for Fork lever type (130 x 30 x 50 bracket on request)

## DIMENSION SKETCH



# Pneumatic indicating controllers and transmitters

Series 80

O-6.7.01-C

Page 1 of 2



## APPLICATIONS

For the control of temperature and pressure in industrial or process plants. The indicating controller is used for control of liquid, gaseous or vaporous media. The instrument senses the temperature/pressure of the measured medium directly, displays the operating value, compares the measured variable with the set point and puts out a pneumatic signal in the standard range of 0.2 to 1 bar or 3 to 15 psi. This output pressure actuates the final control element. Four control forms are available: ON-OFF, P, P+I, P+I+D. The units can also be used for remote control of processes operating whether with a pneumatic transmitter (output 0.2-1 bar or 3-15 psi) or as a receiver controller (input 0.2-1 bar, 3-15 psi).

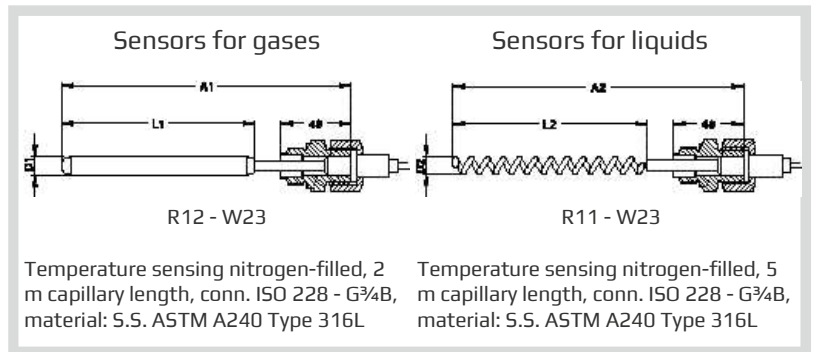
## FEATURES

- Robust design.
- Maintenance free.
- Easy installation.
- User friendly.
- Can be used for remote control of processes.

## TECHNICAL DATA

<b>Body</b>	Die cast aluminium with anti corrosive paint
<b>Cover</b>	ABS
<b>Degree of protection</b>	IP55
<b>Mounting</b>	Wall or panel
<b>Pneumatic connections</b>	1/4" NPT
<b>Supply air pressure</b>	20±1.5 psi / 1.4 ± 0.1 bar
<b>Output</b>	3-15 psi / 0.2-1 bar
<b>Proportional action</b>	Proportional band ≈...200%
<b>Integral action</b>	>0...>10 rep. /min.
<b>Derivative action</b>	0...>5 min. rep
<b>Steady state air consumption</b>	Air supply 20 psi/1,4 bar 0,13 Nm <sup>3</sup> /h
<b>Max. air delivery</b>	Air supply 20 psi / 1,4 bar 2,6 Nm <sup>3</sup> /h
<b>Accuracy</b>	≤ 1% deviation
<b>Hysteresis</b>	≤ 0.5%
<b>Non linearity</b>	≤ 0.5%
<b>Repeatability</b>	≤ 0.5%
<b>Control range</b>	0...150 °C
<b>Permissible ambient temperature</b>	-20...+ 80 °C
<b>Weight</b>	~3 kg

## TEMPERATURE ELEMENT



SPAN	25 °C	30 °C	40 °C	50 °C	60 °C	70 °C	80 °C	100 °C	120 °C	130 °C	150 °C	200 °C	250 °C	300 °C	400 °C	500 °C
<b>A1</b>	250	250	250	200	200	200	200	200	200	200	200	200	200	200	200	200
<b>L1</b>	170	170	170	120	120	120	120	120	120	120	120	120	120	120	120	120
<b>D1</b>	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
<b>A2</b>	250	250	250	200	200	200	200	200	200	200	200	200	200	200	200	200
<b>L2</b>	170	170	170	130	130	120	120	120	120	120	120	120	120	120	120	120
<b>D2</b>	16	16	16	16	16	16	14	14	14	14	14	14	14	14	14	14

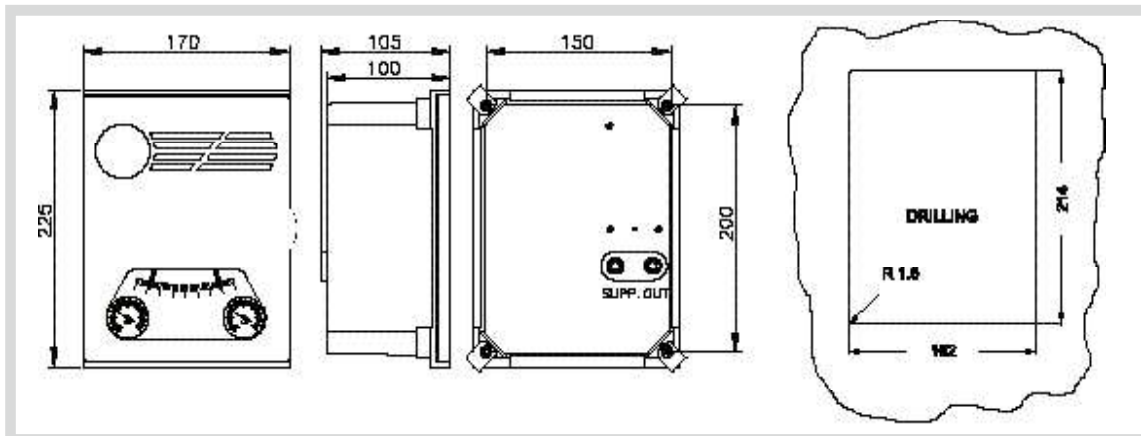
## OPTIONS

- External set point knob
- Box for tropical conditions
- Output signal 6 to 30 psi / 0.4 to 2 bar

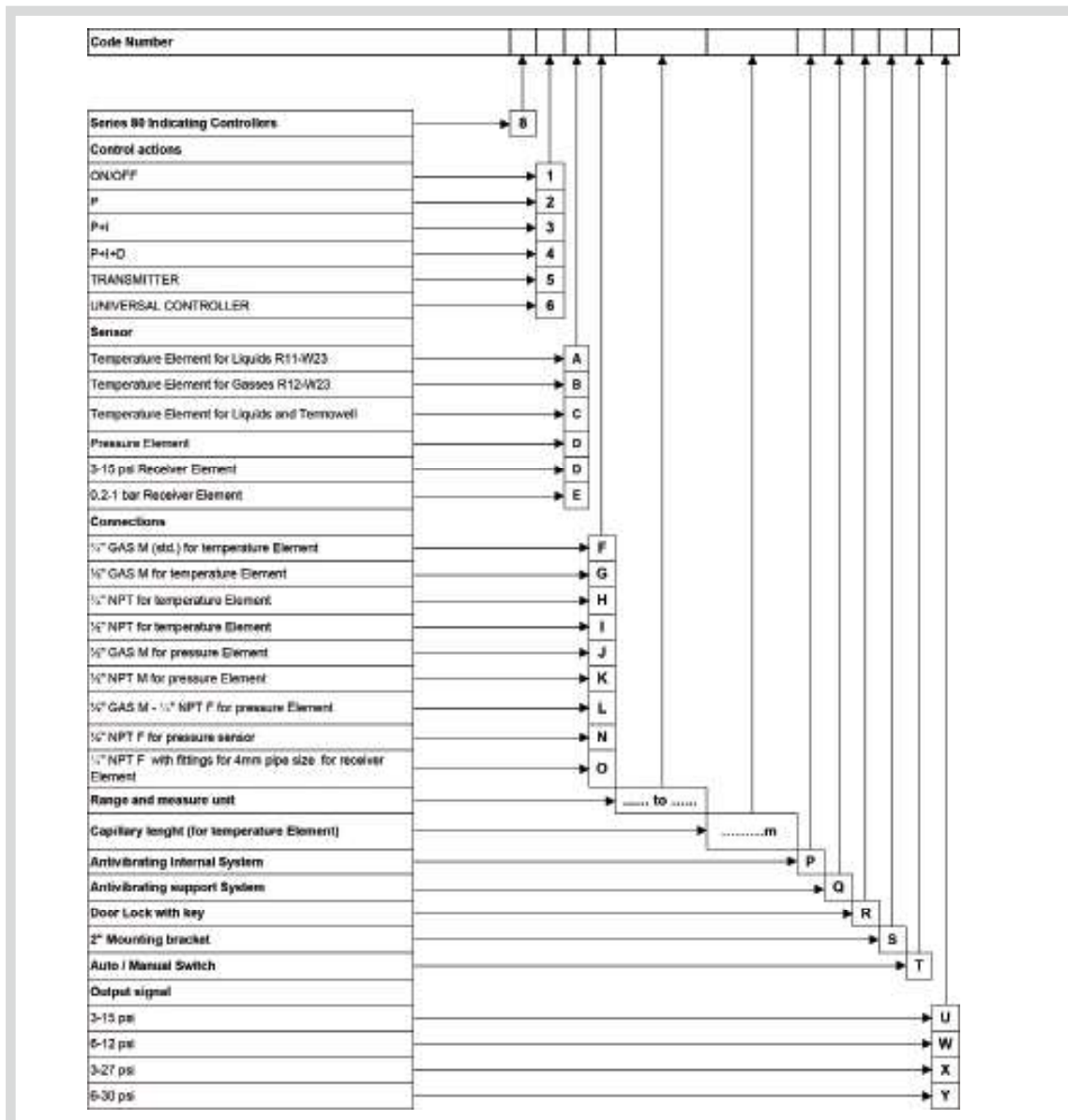
Subject to change without notice.



## DIMENSIONS



## CODIFICATION



# AW 20K-F02CE-H

Filter Regulator AW20K

0-6.8.01-C

Page 1 of 4



## TECHNICAL DATA

With backflow function	YES	
Thread type	G 1/8	
Port Size	1/4	
Float type auto drain	Float type auto drain N.C. type-0.1 MPa (AD27)	
Pressure gauge	Square embedded type pressure gauge (with limit indicator)	
	<b>Material</b>	<b>Color</b>
Body	Zinc die-cast	Platinum Silver
Bonnet	Polyacetal	Black
Port Size	1/4	
Pressure gauge port size	1/8	
Fluid	Air	
Ambient and fluid temperature	-5 to 60°C	
Proof pressure	1.5 MPa	
Maximum operating pressure	1.0 MPa	
Set pressure range	0.05 to 0.85 MPa	
Relief pressure	Set pressure + 0.05 MPa at relief flow rate of 0.1	
Nominal filtration rating		
Drain capacity (cm <sup>3</sup> )	8	
Bowl material	Polycarbonate	
Optional	Replaceable with Nylon bowl part no. AD27-6	
Bowl guard	Semi-standard	
Construction	Relieving type	
Mass (kg)	0.32	
	Resistan to oil mist. (AW20K-F02CEH-6-B)	

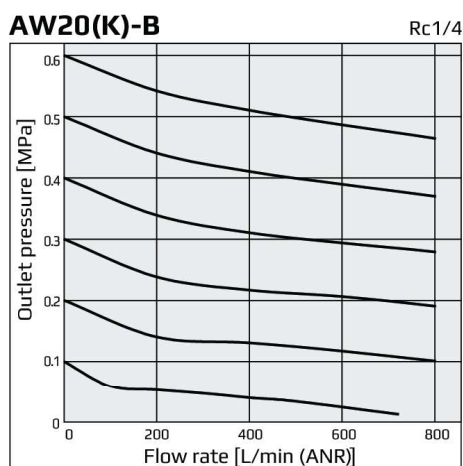
## DESIGN

Integrated filter and regulator units save space and require less piping. With the backflow function it incorporates a mechanism to exhaust the air pressure in the outlet side reliably and quickly.

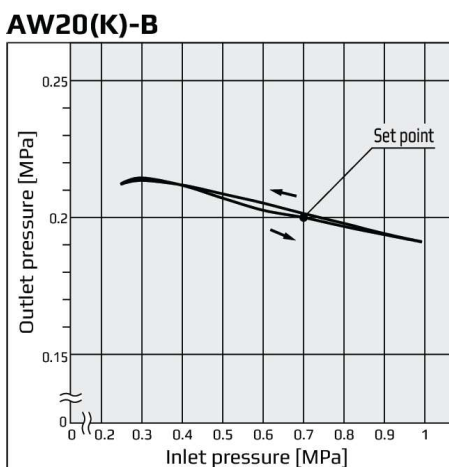
## FEATURES

- Space saving and requires less piping
- No manual draining due to auto drain function

## FLOW CHARACTERISTICS



## PRESSURE CHARACTERISTICS



## OPTIONS/PART NO.

Float type auto drain <sup>1,2</sup>

AD27

<sup>1</sup> Minimum operating pressure: N.O. type-0.1 MPa; (AD27)

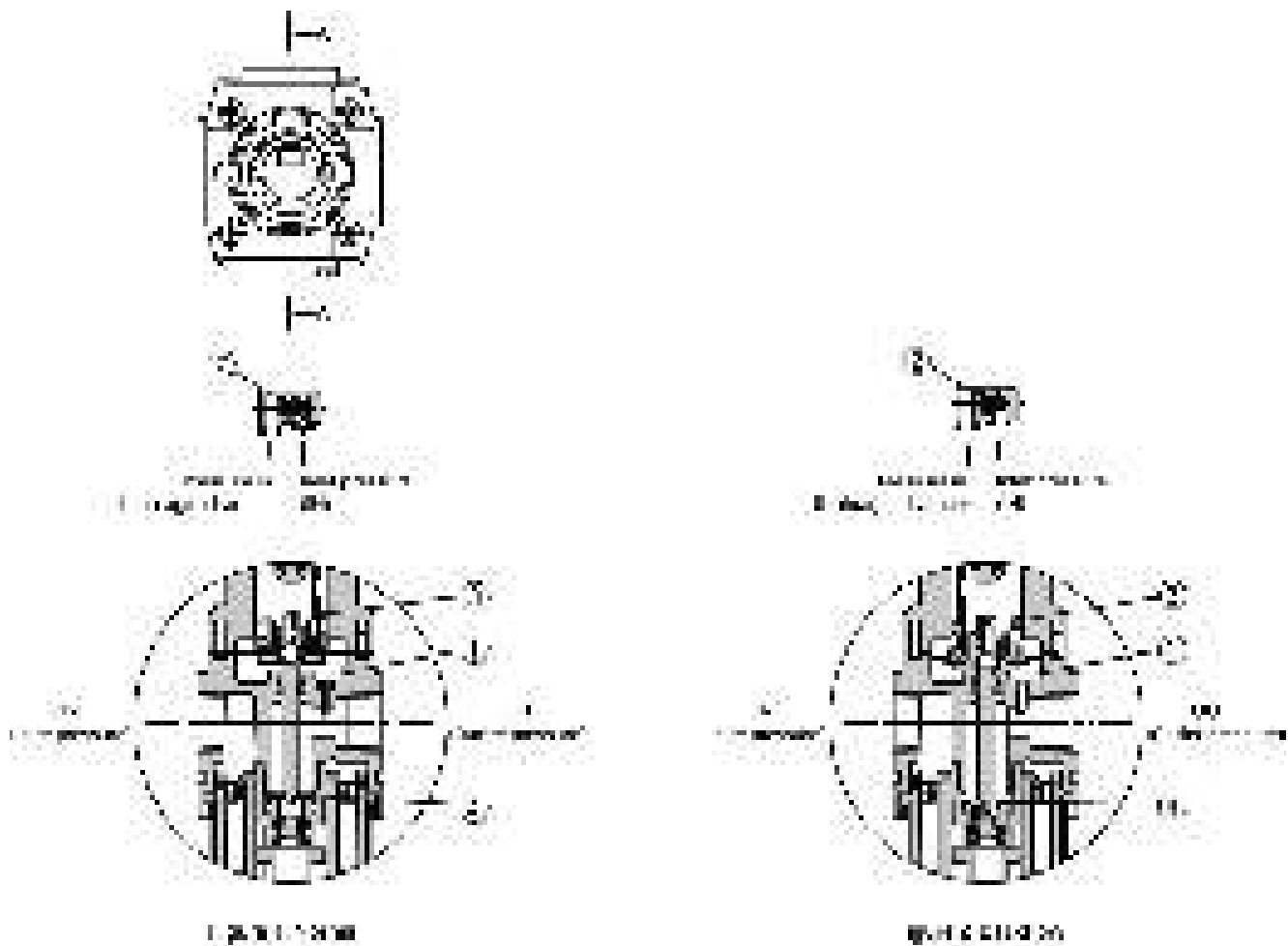
<sup>2</sup> Please consult Clorius Controls for details on drain piping to fit NPT or G port sizes

Subject to change without notice.



**WORKING PRINCIPLE**

When the inlet pressure is higher than the regulating pressure, check valve (2) closes and operates as a normal regulator (**Figure 1**). When the inlet pressure is shut off and released, check valve (2) opens and the pressure in the diaphragm chamber (1) is released in the inlet side. This lowers the pressure in diaphragm chamber (1) and the force generated by pressure regulator spring (3) lifts the diaphragm. Valve (4) opens through the stem, and the outlet pressure is released to the inlet side.

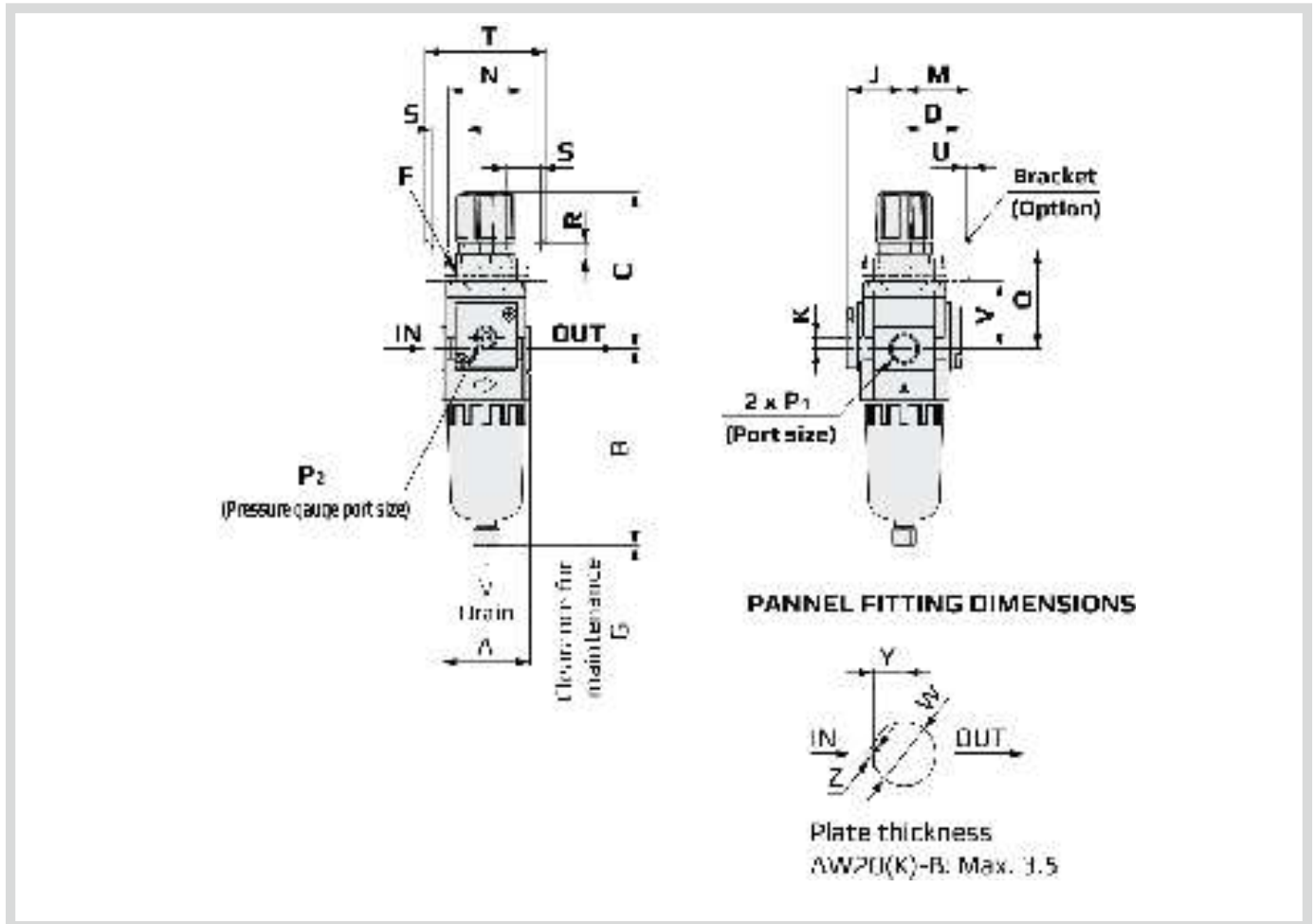


# AW 20K-FO2CE-H

Filter Regulator AW20K

O-6.8.01-C

## DIMENSION SKETCH



Model	Standard specifications										
	P1	P2	A	B(note)	C	D	E	F	G	J	K
AW20K	1/8	1/8	40	160	73	26	-	M28x1	40	26	5

Model	Standard specifications											
	Bracket mount							Panel Mount				With auto drain
	M	N	Q	R	S	T	U	V	W	Y	Z	B <sup>(note)</sup>
AW20K	30	34	44	5.4	15.-4	55	2.3	30	28.5	14	6	177

Note) The total length of B dimension is the length when the filter regulator knob is unlocked.

## SPECIFIC PRODUCT PRECAUTIONS

### Maintenance

#### WARNING

1. Replace the regulator when the pressure drop becomes 0.1 MPa

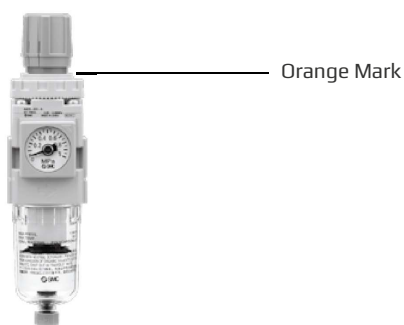
### Mounting and adjusting

#### WARNING

1. Set the regulator while verifying the displayed values of the inlet and outlet pressure gauges. Turning the regulator knob excessively can cause damage to the internal parts.
2. The pressure gauge included with regulators for 0.02 to 0.2 MPa setting is for up to 0.2 MPa use only. Exceeding 0.2 MPa of pressure can damage the gauge.
3. Do not use tools on the pressure regulator knob as this may cause damage. It must be operated manually.

#### CAUTION

1. Be sure to unlock the knob before adjusting the pressure and lock it after setting the pressure. Failure to follow this procedure can cause damage to the knob and the outlet pressure may fluctuate.
  - Pull the pressure regulator knob to unlock. (You can visually verify this with the "orange mark" that appears in the gap.)
  - Push the pressure regulator knob to lock. When the knob is not easily locked, turn it left and right a little and then push it (when the knob is locked, the "orange mark", i.e. the gap will disappear).



2. A knob cover is available to prevent careless operation of the knob. Refer to page 90 for details.



## UNRIVALED ACCURACY & STABILITY

High-performing and self-acting differential pressure controller which allows for fast installation and easy maintenance. Optimized for flow stability.

# DIFFERENTIAL PRESSURE CONTROLS

---

7

**OUR DIFFERENTIAL PRESSURE CONTROLS PROGRAM INCLUDES:**

**TYPE**

TDS  
TD66  
TD56-2  
TDL

# Pressure Differential Controls

Type TD

0-3.9.01-J

Page 1 of 2



TDS

**Pressure differential controls**, type TD, comprise a control valve, a diaphragm unit and 2 connecting capillaries.

Type TDS is supplied fitted to a brass valve and is available in four size/range combinations. For further information, see separate data sheet no. 0.3.9.02.

The large controls type TD56-2, TD66-4 and TD66-8 can be used with our wide range of 2-way control valves, in sizes from 4 mm up to 80 mm (type TD56-2M up to DN 150 mm). For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice. TD56-2 is delivered complete with actuator and valve - please see datasheet 0.3.9.06.01.

The diaphragm housings are made of cast iron and the diaphragms of synthetic rubber clamped between 2 steel discs. To prevent the diaphragm from being ruptured, a safety overload spring is fitted between the diaphragm and the valve to prevent damage when subjected to excess pressure, forcing the diaphragm against the housing.

The controls are proportional controls. The proportional band is given as a percentage of set pressure value.

The TD-controls are primarily for use in water systems where they maintain a constant differential pressure across 2 points and ensure stable flow conditions.

With the lower pressure connected to the valve side of the diaphragm and the higher pressure to the other side; the differential pressure across the diaphragm will be balanced by the force exerted by the spring. Any change in the differential pressure will cause the diaphragm and the valve mechanism to move up or down to restore the set condition.

## WORKING PRINCIPLE OF THE TD-CONTROLS

**Fig. 1.** In the control valve the pressure is reduced from P1 to P2, and the control keeps (P2-P3) constant at a set value, although the external pressures "P1" and "P3" or the resistance "R" may be fluctuating. Sizing of the valve is based on the smallest value of (P1-P2) with the maximum flow. For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice. Similarly, **fig. 2** shows the TD-control installed after the resistance "R" (in the return flow). In this case, (P2-P3) forms the basis for sizing the valve.



TD66

TD56-2

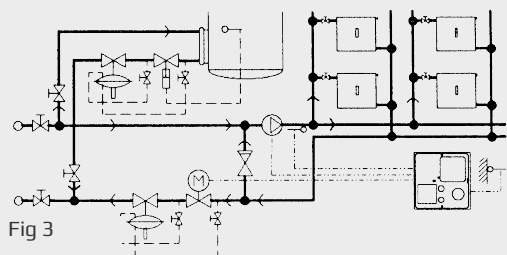
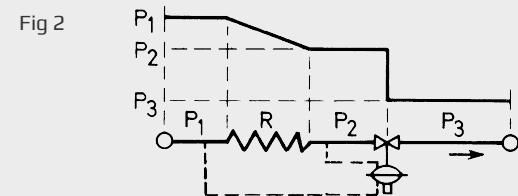
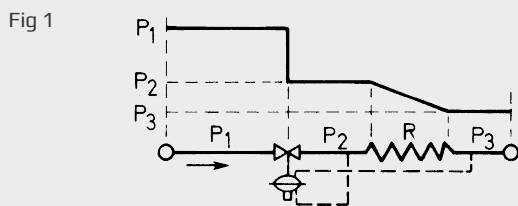


Fig 3

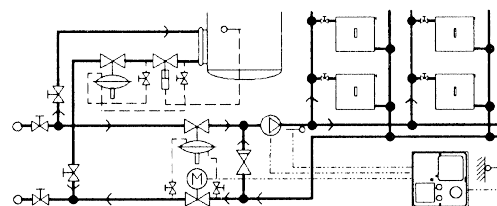


Fig 4

## APPLICATIONS

### District Heating - in Housing Circuits without by-passes

The function of the TD-controls is to reduce the high and fluctuating pump head in the district heating system to a suitable and, under all circumstances, a constant differential pressure. It is very important that the TD-controls reduce the water flow as much as possible, to satisfy the design temperature drop across radiators and maintain heat output without excessive water flow.

An inexpensive arrangement for a district heating scheme is to use the TD-control instead of a return by-pass to reduce the flow rate to a minimum. This results in small bore pipework and reduces the need for additional pumps or electrically operated controls.

Depending on the circumstances, the TD-controls may be installed in the return main (**fig. 3**) or the flow main (**fig. 4**). Installation in the return main is preferable where there is a risk of air in the system, and in high buildings where the pressure in the return main does not considerably exceed the static head. For low buildings, and high flow pressures, it is normally preferable to install the TD in the flow main to reduce the pressure in the radiators to a level almost equivalent to the static head in the return main. Please also note the TD-control in the district heating circuit of the hot water tank (H.W.T), and that the capillaries are connected across the control valves, maintaining a constant differential pressure across the valves and an optimum control. The H.W.T's control valve should be as

small as possible ensuring a slow heating and a good cooling of the district heating water.

### Pressure Stabilization for Temperature Control

The TD-controls also apply for heating systems with heat exchangers see **fig. 5**. When temperatures have to be kept within close limits e.g. in ventilating plants, control may be difficult if the differential pressure in the system is not constant or is very high. This can be overcome by installing a TD-control in front of one or more places to be controlled. Examples are shown in **fig. 6**, and **7**.

**Fig. 6** is for district heating, direct supply, whereas **fig. 7** is for boiler supply. Note that a by-pass is established by a 3-way valve and a TD control.

The TD-controls can be used with our range of reverse acting valves in by-pass around pumps or across the flow and return pipes of a circuit - see **fig. 8** (boiler supply). This avoids the pump working against a dead head when all the sub-circuits are closed down and stops any bypassing on motorised valves or thermostatic radiator valves.

### Noise Prevention

Noise from central heating installations can often be overcome by TD-controls. The noise arising from a control valve is normally related to the pressure drop across it. Experts recommend that the pressure drop across radiator valves should not exceed 0,08 bar, especially in the case of living room applications. In blocks of buildings with a common district heating station, there has, in recent years, been a tendency to increase the main pump head and this often results in valve noise.

**Fig. 9** shows an example of the circuit to a block of buildings. The TD-control on the take off from the distribution main reduces the high pump head to suit the local pump head. The pressure differential across the TD-controls itself may exceed 2 bar if the distribution pump head is high. In such cases, to avoid noise problems, the TD-controls should be installed well away from living quarters and the immediate pipework should be well muffled.

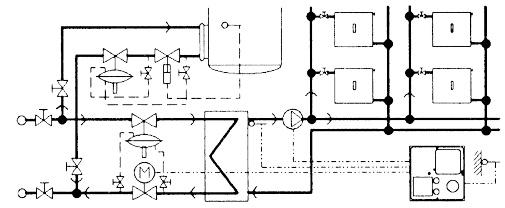


Fig 5

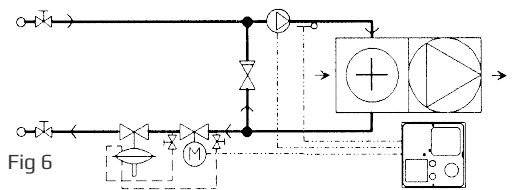


Fig 6

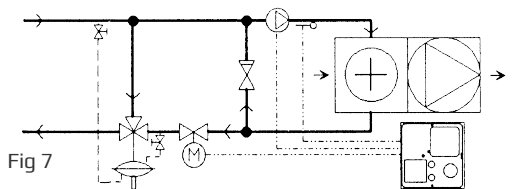


Fig 7

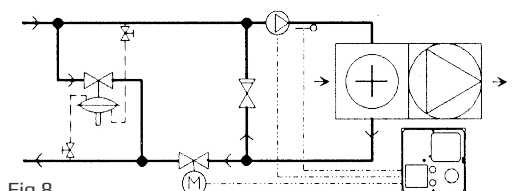


Fig 8

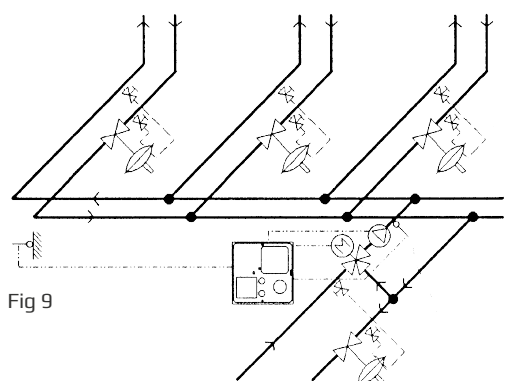


Fig 9

7

# Pressure Differential Controls

Type TDS

0-3.9.02-E

Page 1 of 2



## TECHNICAL DATA

<b>Materials:</b>	
- Valve body	Hot-pressed brass (W. no. 2.0400-ASTM B283)
- Seat and cone	Stainless steel (W. no. 1.4305-AISI 303)
- Diaphragm housing	Nodular cast iron EN-GJS-400-15 (W. no. 0.7040 -ASTM A395)
- Diaphragm	EPDM rubber with web reinforcement (ASTM D2000)
- Capillary	Copper (ASTM B42) 2x1 m
Type of valve	Single seated
Flow characteristic	Linear (approx.)
Weight, incl. valve	2.5 kg

## APPLICATIONS

The TDS controllers, which are made in four variants, have the following major applications:

Control of differential pressure, noise and dynamic balance. In individual users circuits and sub-mains within a large distribution network. For example in District Heating or Group Heating networks. Control of by-pass between flow and return where 3-way valves or 2-way zone control valves are installed. To limit volume variations and maximum  $\Delta p$ . Similarly for low water content boilers and devices requiring a minimum circulation irrespective of load conditions. With the addition of a miniature solenoid valve in the impulse connection the valve can also be used to isolate a circuit with respect to time or temperature.

## FUNCTION

The TDS controller can be installed in either the flow or return of the sub-circuits.

The high pressure line is connected to the adjustment side of the diaphragm housing and the low pressure line to the valve body side of the diaphragm. Any change of differential pressure across the diaphragm - which is connected to the valve mechanism - above or below the set point will cause the diaphragm to change its position. If higher than set pressure the valve will move to close, if lower than set pressure the valve will move to open, until the system is once again in balance. Adjustment of the differential pressure setting is made by rotating the adjusting handle clockwise or anticlockwise until the desired set point is reached (see diagram). The upper edge of the adjustment cap in conjunction with the scale marked on the spring guide tube is an indication of the actual setting. The scale moves into or out of the handle loading the valve and diaphragm. The set pressure is shown on a percentage scale in 10% increments.

## DESIGN

The TDS controller is a spring loaded self-acting proportional controller consisting of a valve, a diaphragm and housing and two capillary tubes on either side of the diaphragm.

The valve body, available in DN15 and DN20, is made of hot-pressed brass, and the seat and cone of stainless steel. The diaphragm housing is made of nodular cast iron, and the diaphragm itself is made of EPDM rubber with web reinforcement. If required, the TDS controller adjustment handle can be sealed, preventing unauthorised persons from altering the set point.

## FEATURES

- Good regulating accuracy
- Nominal pressure PN 16
- Max. temperature 150°C
- Self-acting
- Low-noise control.

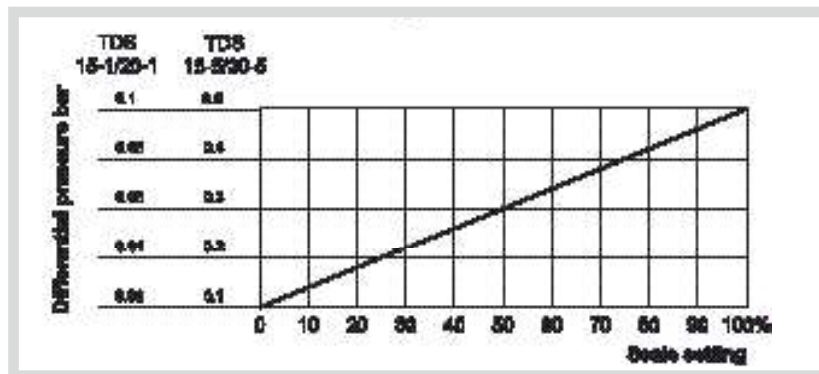
Subject to change without notice.



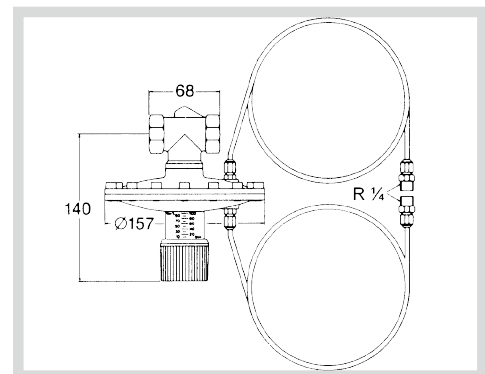
## INSTALLATION

According to the conditions, the TDS controller can be built into either the return pipe or the flow pipe in a suitable position. The diaphragm area is large enough to give a sensitive response to small pressure variations; it is designed to be a compact controller without sacrificing performance.

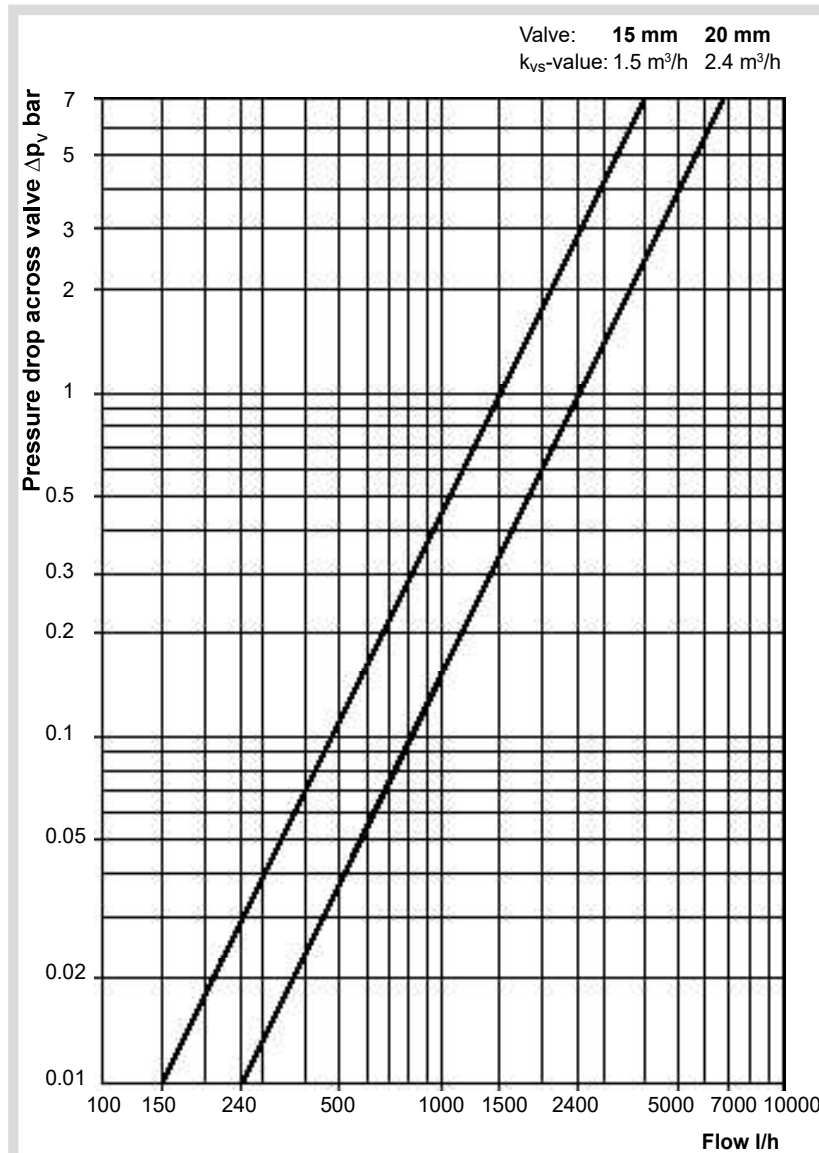
## RELATION BETWEEN SCALE SETTING AND DIFFERENTIAL PRESSURE



## DIMENSION SKETCH



## SIZING CHART



Type	TDS			
Setting range bar	TDS15-1	TDS15-5	TDS20-1	TDS20-5
	0.02-0.1	0.1-0.5	0.02-0.1	0.1-0.5
Proportional band mbar	16	80	16	80
Max. thrust on stem N	200		200	
Nom. pressure PN bar	16		16	
Max. rated travel mm	7		7	
Max. temp. of liquid °C	130 (150) <sup>1)</sup>		131 (150) <sup>1)</sup>	
Note	Incl. hot pressed brass valve, Rp ½ k vs =1.5, Δp L =7 bar		Incl. hot pressed brass valve, Rp ¾ k vs =2.4, Δp L =7 bar	

The max. pressure against which the controls can close  $\Delta p_v$ , depends on the valves and it is stated above. To avoid noise problems it is recommended that the pressure drop across valve  $\Delta p_v$  does not exceed 1 bar in living quarters.

<sup>1)</sup> 150°C - Only if TD cotroller is installed below the valve.

# Pressure Differential Controller

Type TDL, PN 16, DN 20 – 32 mm

0-3.9.03-E

Page 1 of 2



## TECHNICAL DATA

### Materials:

-Valve body	RG5 CuSn5Zn5Pb5-C
-Cone	Stainless steel (W.no. 1.4305 – AISI 303)
-Diaphragm housing	Nodular cast iron EN-GJS-400-15 (W.no.0.7040 – ASTM A395)
-Diaphragm	EPDM rubber with web reinforcement (ASTM D2000)
-Capillary Pressure stage	2 pieces of 1 m, Cu PN 16

## APPLICATIONS

The TDL controllers which are made in 6 variants have the following major applications:

Control of differential pressure, noise and dynamic balance. In individual users circuits and sub-mains within a large distribution network. For example in District Heating or Group Heating networks. Control of by-pass between flow and return where 3 port valves or 2 port zone control valves are installed. To limit volume variations and maximum  $\Delta p$ . Similarly for low water content boilers and devices requiring a minimum circulation irrespective of load conditions.

With the addition of a miniature solenoid valve in the impulse connection the valve can also be used to isolate a circuit with respect to time or temperature.

## FUNCTION

The TDL controller can be installed in either the flow or return of the sub-circuits.

The high pressure line is connected to the adjustment side of the diaphragm housing and the low pressure line to the valve body side of the diaphragm.

Any change of differential pressure across the diaphragm – which is connected to the valve mechanism – above or below the set point will cause the diaphragm to change its position. If higher than set pressure the valve will move to close, if lower than set pressure the valve will move to open, until the system is once again in balance.

Adjustment of the differential pressure setting is made by rotating the adjusting handle clockwise or anticlockwise until the desired set point is reached (see diagram). The upper edge of the adjustment cap in conjunction with the scale marked on the spring guide tube is an indication of the actual setting. The scale moves into or out of the handle loading the valve and diaphragm. The set pressure is shown on a percentage scale in 10 % increments.

## FEATURES

- Good regulating accuracy
- Nominal pressure PN 16
- Max. temperature 150°C
- Self-acting

## DESIGN

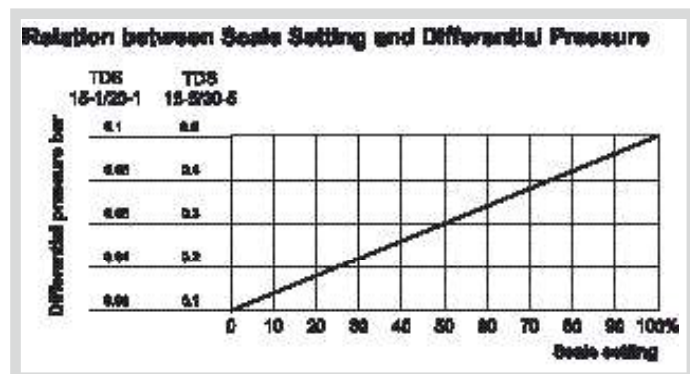
The TDL controller is a self-acting proportional controller consisting of a valve, a diaphragm and housing and two capillary tubes on either side of the diaphragm. The valve body is made of gun metal, and the seat and cone of stainless steel. The diaphragm housing is made of nodular cast iron, and the diaphragm itself is made of EPDM rubber with web reinforcement. If required, the TDL controller adjustment handle can be sealed, preventing unauthorised persons from altering the set point.

Subject to change without notice.

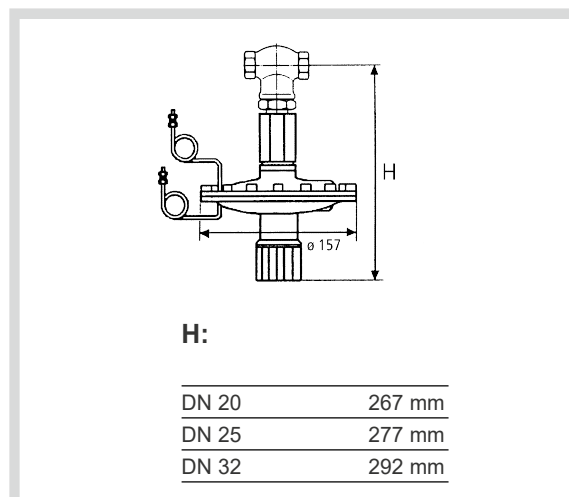
## INSTALLATION

According to the conditions, the TDL controller can be built into either the return pipe or the flow pipe in a suitable position. The diaphragm area is large enough to give a sensitive response to small pressure variations; it is designed to be a compact controller without sacrificing performance.

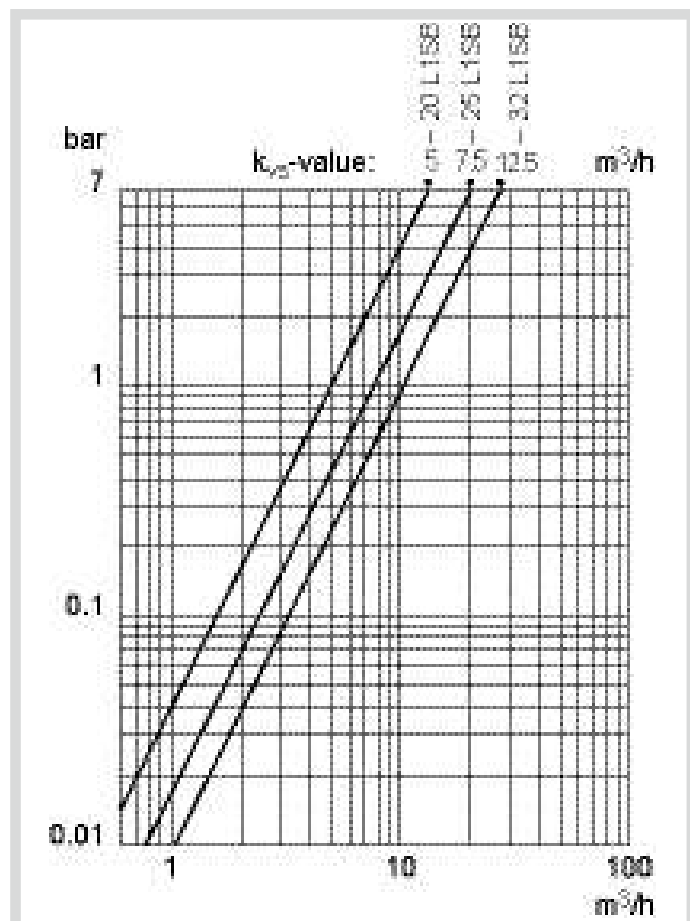
## RELATION BETWEEN SCALE SETTING AND DIFFERENTIAL PRESSURE



## DIMENSION SKETCH



## SIZING CHART



Type designation	TDL 1-20-1	TDL 1-20-5	TDL 1-25-1	TDL 1-25-5	TDL 1-32-1	TDL 1-32-5
Valve type	20 L15B	20 L15B	25 L15B	25 L15B	32 L15B	32 L15B
Pressure stage PN 16	•	•	•	•	•	•
Max. temperature 150°C	•	•	•	•	•	•
Max. diff. pressure, $\Delta p$ , across the valve in bar	7	7	7	7	7	7
Overall valve length in mm	95	95	105	105	138	138
$k_{vs}$ -value	5	5	7.5	7.5	12.5	12.5
Setting range in bar	0.02-0.1	0.1-0.5	0.02-0.1	0.1-0.5	0.02-0.1	0.1-0.5
Proportional band 10%	•	•	•	•	•	•
Weight in kg, incl. Valve	3.7	3.7	4	4	5.3	5.3
2 pcs capillary each 1 m enclosed, connection ISO 7 - R ¼	•	•	•	•	•	•

# Pressure Differential Controls

Type TD66

0-3.9.04-D

Page 1 of 2



**Pressure differential controls**, type TD66, comprise a control valve, a diaphragm unit and 2 connecting capillaries.

The controls type TD66-4 and TD66-8 can be used with our wide range of 2-way control valves, in sizes from 4 mm up to 80 mm. For further information see technical data and data sheets on individual valves. For quick and accurate valve selection and valve sizing, we advise you to visit our website [www.cloriuscontrols.com](http://www.cloriuscontrols.com) and select our sizing software Quick Choice.

Type TD66 (TD66-4 and -8) is spring loaded and is available in several setting ranges. The differential pressure required is set by turning the handle, the upper edge of which acts as a pointer on the scale.

## FEATURES

- Good regulating accuracy
- Nominal pressure PN 16
- Max. temperature 120°C (150° C dependant on the installation)
- Self-acting

## TECHNICAL DATA

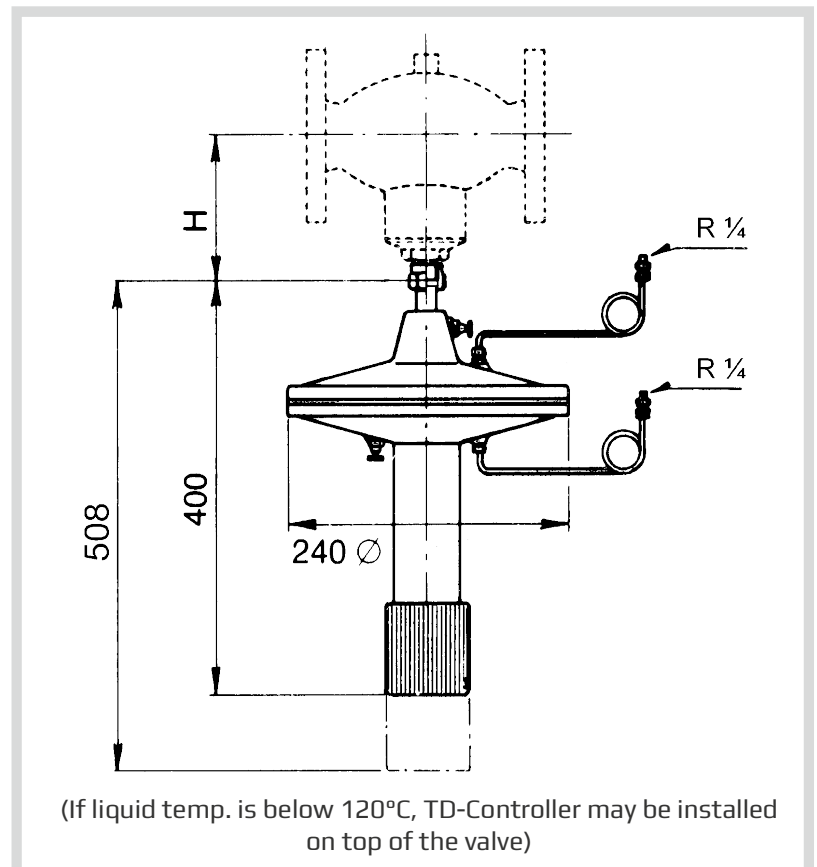
**Materials:**  
-Diaphragm

EPDM rubber with  
web reinforcement  
(ASTM D2000)

-Capillary  
Pressure stage

2 pieces Cu  
PN 16

## DIMENSION SKETCH



## TECHNICAL DATA

Type		TD66-4	TD66-8			
Setting range	bar	0.15-0.3	0.15-0.3	0.2-0.8	0.7-1.3	1.35-1.5
Proportional band		10%	10%	30%	30%	20%
Max. thrust on stem	N	400	800			
Nom. pressure PN	bar	16 <sup>1)</sup>	161)			
Max. rated travel	mm	14	14			
Max. temp. of liquid	°C	120 (150) <sup>2)</sup>	120 (150) <sup>2)</sup>			
Weight	kg	13				
Note	Primarily in connection with double seated valves up to DN 80 mm (Single seated valves only up to DN 25 mm, and not balanced valves - type M1FB, G1FB, H1FB) <sup>3)</sup>					

1) PN is only valid for the diaphragm housing. See also data sheets for the valves.

2) 150°C - Only if TD controller is installed below the valve.

3) Balanced and larger single seated valves only to be selected if an increased variation of the desired diff. pressure  $\Delta p$  is allowable.  
(An increase of the inlet pressure may result in a substantial increase of  $\Delta p$ ).

# Self-acting Differential Pressure Controls

Type TD56-2G (PN 25) and TD56-2M (PN 16), DN 15 – 80 mm

O-3.9.06.01-H

Page 1 of 2



## TECHNICAL DATA

### Materials:

- TD56-2M valve body	Nodular cast iron EN-GJS-400-15
- TD56-2G valve body	Nodular cast iron EN-GJS-400-15
- Cone, Seat	Stainless steel
- O-ring	A70H FEPM
- Bolts, nuts	24 CrMo 4/A4
- Stag bolt, Set point adjuster	St. 42, 1.0503 Electroplated
- Spindle housing	St. 42, 1.0503 Electroplated
- Spring	W. Nr. 1.4568 powder coated
- Diaphragm housing	Steel 1.0122
- Diaphragm	NBR / EPDM
Nominal pressure	TD56-2G - 25 bar TD56-2M - 16 bar
Seating	Single-seated
Flow characteristic	Quadratic
Leakage rate	≤ 0.05% of Kvs
Flanges drilled according to:	
- TD56-2G	EN 1092-2 PN 25
- TD56-2M	EN 1092-2 PN 16
Counter flanges	DIN 2634
Colour (valve body, cover):	
- TD56-2G	Gray
- TD56-2M	Grey

Subject to change without notice.

## APPLICATIONS

This unit is designed for controlling of differential pressure in individual users circuits and sub-mains within a large distribution network. For instance in district heating or group heating networks. Control of by-pass between flow and return where 3 way valves or 2 way zone control valves are installed to limit volume variations and maximum  $\Delta p$ . Similarly for low water content boilers and devices requiring a minimum circulation irrespective of load conditions.

## FUNCTION

The medium flows through the free area between the seat and cone in the direction indicated by the arrow on the body.

The high pressure line is connected to the diaphragm housing via **C1** and the low pressure line to the diaphragm housing via **C2**. Any change of differential pressure across the diaphragm which is connected to the valve mechanism – above or below the set point will cause the diaphragm to change its position.

If higher than set pressure the valve will move to close, if lower than set pressure the valve will move to open, until the system is once again in balance. Adjustment of the differential pressure setting is made by rotating the setpoint adjuster clockwise or anticlockwise until the desired set point is reached. The valve cone is pressure balanced. The pressure acts onto the bottom and top surface of the cone at the same time. In this way, the forces produced by the media are compensated.

## DESIGN

The differential pressure control valve is a self-acting unit consisting of a valve, springs, an actuator and two capillary tube connected on the upper and lower side of the actuator. The valve body is made of nodular cast iron. The seat and cone are made of stainless steel. The diaphragm is made of EPDM or NBR rubber, depending on the medium to be controlled.

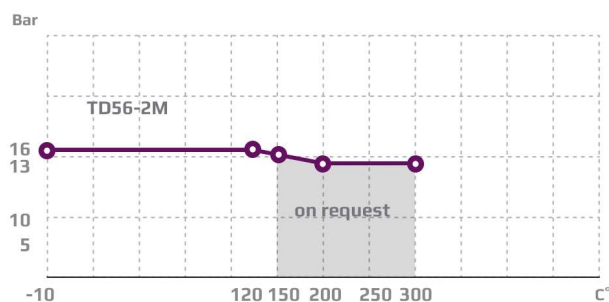
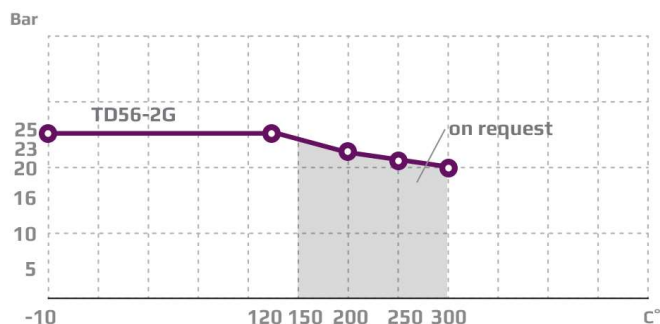
## FEATURES

- Exact regulating
- Nominal pressure PN 25 / PN 16
- Self-acting
- Easy to install and use

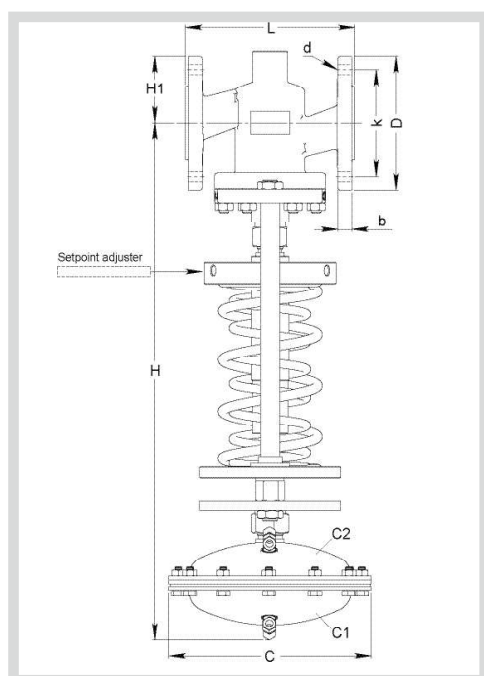
## INSTALLATION

According to the conditions, the TD56-2 can be built into either the return pipe or the flow pipe in a suitable positions. The diaphragm area is large enough to give a sensitive response to small pressure variations.

## PRESSURE/TEMPERATURE DIAGRAM



## DIMENSION SKETCH



Type	L mm	H mm	H1 mm	C mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)
15 TD56-2G/M	130	582	60	220	14	95	65	14x(4)
20 TD56-2G/M	150	595	65	220	16	105	75	14x(4)
25 TD56-2G/M	160	601	70	220	16	115	85	14x(4)
32 TD56-2G/M	180	618	75	220	18	140	100	19x(4)
40 TD56-2G/M	200	630	85	220	19	150	110	19x(4)
50 TD56-2G/M	230	660	95	220	19	165	125	19x(4)
65 TD56-2G/M	290	685	110	220	20	185	145	19x(8)
80 TD56-2G/M	310	708	155	220	20	200	160	19x(8)

## SPECIFICATIONS

Type	Flange connection DN in mm	$k_{vs}$ -value m <sup>3</sup> /h	Lifting height mm	Weight kg
15 TD56-2G/M	15	4	7.5	21
20 TD56-2G/M	20	6,3	7.5	23
25 TD56-2G/M	25	10	9	24
32 TD56-2G/M	32	16	10	27
40 TD56-2G/M	40	25	11	29
50 TD56-2G/M	50	35	11.5	33
65 TD56-2G/M	65	58	14.5	38
80 TD56-2G/M	80	80	16	55
<b>Set point</b> bar	0.4-0.8	0.6-1.5	1-2.5	2-5



## **RUGGET DEPENDABILITY & SUPERIOR PERFORMANCE**

Premium and self-acting pressure reducing valve, ideal for maintaining accurate downstream pressure while responding quickly and effectively.



# PRESSURE REDUCING VALVES

---

OUR PRESSURE REDUCING VALVE PROGRAM INCLUDES:

**TYPE**

G1PR  
H1PR

# Pressure Reducing Valves

Type G1PR (PN 25) and H1PR (PN 40), DN 15 – 80 mm

0-3.9.08-K

Page 1 of 2



## TECHNICAL DATA

### Materials:

- H1PR valve body	Cast steel GP240GH (GS-C25)
- G1PR valve body	Nodular cast iron EN-GJS-400-15
- Cone, Seat	Stainless steel
- O-ring	A70H FEPM
- Bolts, nuts	24 CrMo 4/A4
- Stag bolt, Set point adjuster	St. 42, 1.0503 Electroplated
- Spindle housing	St. 42, 1.0503 Electroplated
- Spring	W. Nr. 1.4568 powder coated
- Diaphragm housing	Steel 1.0122
- Diaphragm	NBR / EPDM
Nominal pressure	PN 25 - G1PR PN 40 - H1PR
Seating	Single-seated
Flow characteristic	Quadratic
Leakage rate	≤ 0.05% of Kvs
Flanges drilled according to:	
- H1PR	EN 1092-1 PN 40
- G1PR	EN 1092-2 PN 25
Counter flanges	"G" DIN 2634 "H" DIN 2635
Colour (valve body, cover):	
- H1PR	Gray
- G1PR	Gray

## APPLICATIONS

This unit is designed for maintaining the pressure downstream of the valve to an adjusted set point value.

## FUNCTION

The medium flows through the free area between the seat and cone in the direction indicated by the arrow on the body.

The position of the valve cone determines the flow rate and consequently the pressure ratio across the valve. The downstream pressure is transmitted through the compensation chamber and the capillary to the diaphragm, where it is converted into a positioning force. This positioning force is adjusting the cone with dependence on the force of the operating springs. The spring force can be adjusted by using the setpoint adjuster. The valve cone is pressure balanced. The pressure acts onto the bottom and top surface of the cone at the same time. In this way, the forces produced by the media are compensated.

## DESIGN

The pressure reducing valve is a self-acting unit consisting of a valve, springs, an actuator and one capillary tube connected on the upper side of the actuator. The valve body is made of nodular cast iron or cast steel. The seat and cone are made of stainless steel. The diaphragm is made of EPDM or NBR rubber, depending on the medium to be controlled.

## FEATURES

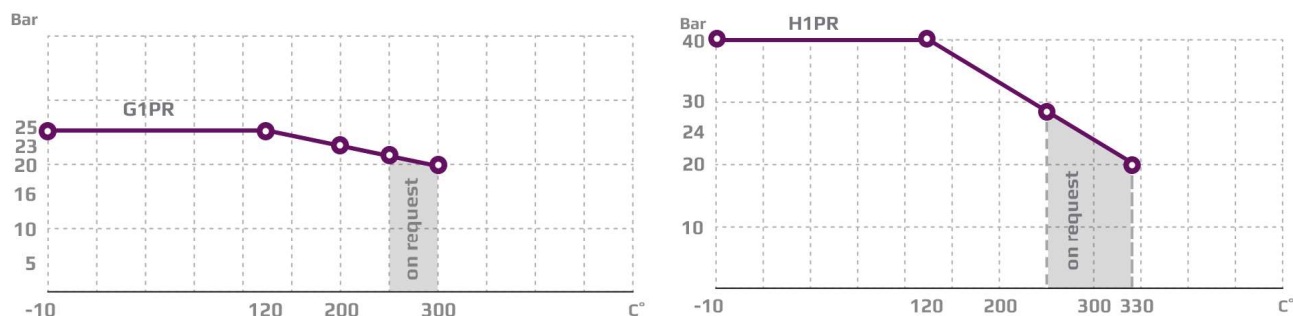
- Exact regulating
- Nominal pressure PN 25 / PN 40
- Self-acting
- Easy to install and use

## INSTALLATION

The pressure reducing valve must be installed in a horizontal pipe with the actuator directed downwards. The flow through the valve must coincide with the arrow on the valve body.

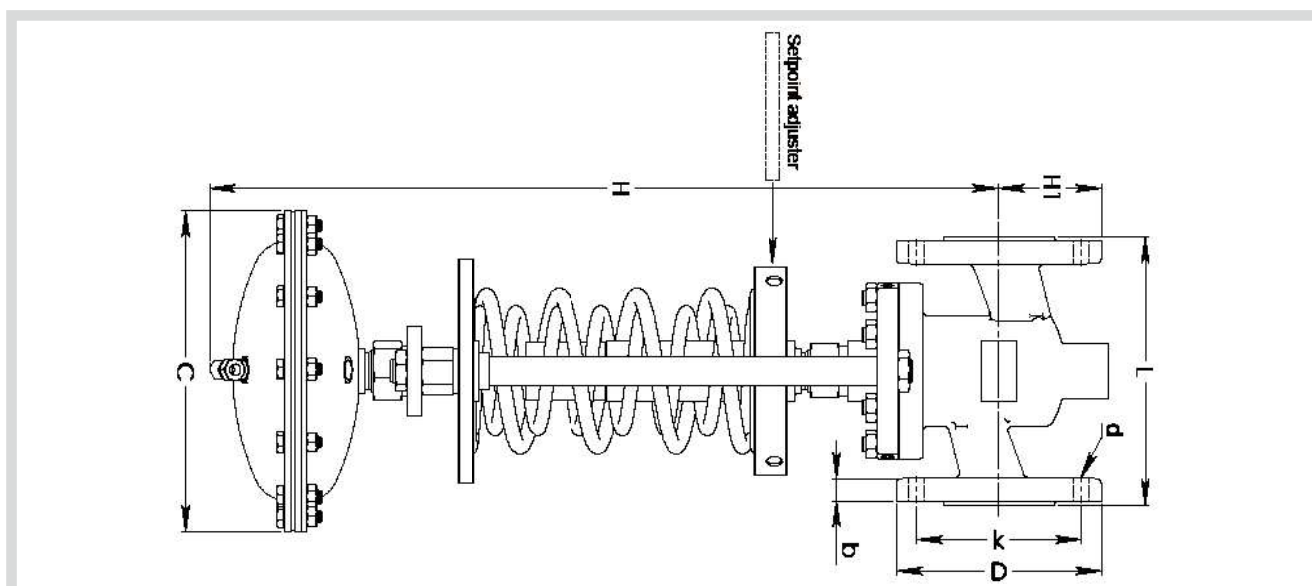
Subject to change without notice.

## PRESSURE/TEMPERATURE DIAGRAM



\*For temperature above 100°C a compensation chamber is needed.

## DIMENSION SKETCH



## SPECIFICATIONS

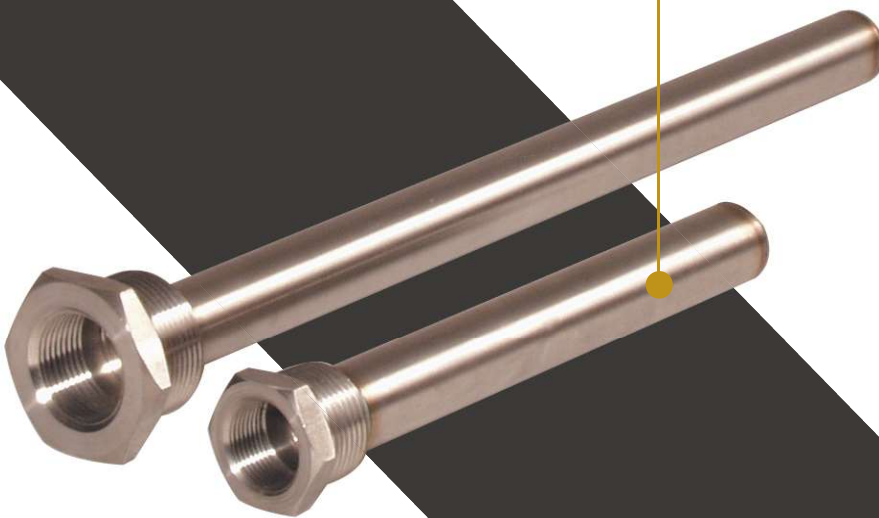
Type	L mm	H1 mm	H mm	C mm	b mm	D (dia.) mm	k (dia.) mm	d mm dia. (number)	Flange conection DN in mm	$k_{vs}$ -value $m^3/h$	Lifting height mm	Weight kg
15 G/H1PR	130	60	582	220	14	95	65	14x(4)	15	4	7,5	21
20 G/H1PR	150	65	595	220	16	105	75	14x(4)	20	6,3	7,5	23
25 G/H1PR	160	70	601	220	16	115	85	14x(4)	25	10	9	24
32 G/H1PR	180	75	618	220	18	140	100	19x(4)	32	16	10	27
40 G/H1PR	200	85	630	220	19	150	110	19x(4)	40	25	11	29
50 G/H1PR	230	95	660	220	19	165	125	19x(4)	50	35	11,5	33
65 G/H1PR	290	110	685	220	20	185	145	19x(8)	65	58	14,5	38
80 G/H1PR	310	155	708	220	20	200	160	19x(8)	80	80	16	55

SET POINT	bar	0.4-1.2	1-2.5	2,5	4-10
-----------	-----	---------	-------	-----	------

Maximum allowable differential pressure is 25 bar.

## VALVE ACCESSORIES FOR A WIDE VARIETY OF REQUIREMENTS

High quality accessories for a variety of Clorius  
Controls products



# ACCESSORIES

## OUR ACCESSORIES PROGRAM INCLUDES:

### MODEL

TEMPERATURE SENSORS  
TYPE M-F821A, G-F821C, H-F821F  
SENSOR POCKETS  
SAFETY SETS  
COOLING UNITS  
MANUAL ADJUSTING DEVICE  
SPACER CONCEPT

### TYPE

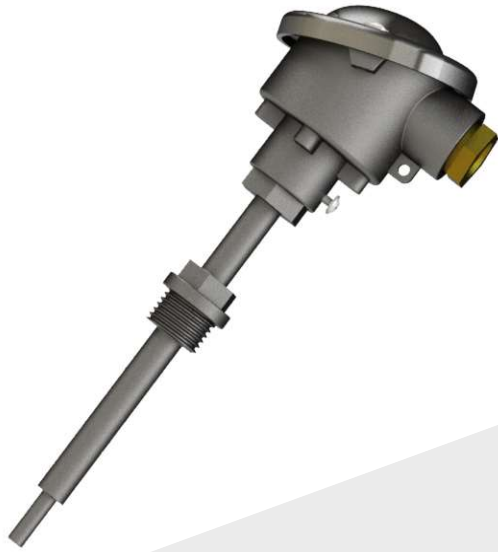
1XPT100, 2XPT100  
EPL, EPR  
FOR CLORIUS V-THERMOSTATS  
SM6  
KS-4, KS-5  
FOR CLORIUS V-THERMOSTATS  
FOR CLORIUS CONTROL VALVES

# Temperature sensors

Type FF12-2, FF12 - 4 -20mA and FF15-2, FF15-2 -4-20mA for electronic temperature regulation

0-4.25.01-A

Page 1 of 3



## TECHNICAL DATA

### DATA FOR POCKETS

According to PN-EN 60751

Material X10CrNiMoTi1810 W. No. 1.4571 corresponding to AISI 316 Ti

Connection thread G:	½" BSP, ½" NPT
Permissible torque moment:	50 Nm
Permissible flow velocities:	
-Air:	25 m/s
-Hot steam:	25 m/s
-Water:	3 m/s
Reaction times at liquid velocity:	
-0.4 m/sec:	t 1/2: 7,5s
	t 9/10: 21s
	t = total temperature step
Max. pressure:	50 bar
Max. temperature:	260°C
Weight incl. insert:	1 kg

### DATA FOR MEASURING INSERT

According to PN-EN 60751

Measuring range:	-50°C to + 260°C
Measuring resistance:	1 x Pt 100 Ω or 2 x Pt 100 Ω
Max. temperature:	260°C

Insulation resistance between measuring resistance and insert tube is over 1000 MΩ at room temperature. The insert is made of stainless steel.

Spring travel:	8 mm
----------------	------

Two-core coupling  
Resistance of inner cables for supply and return line of the measuring insert: < 0.07 Ω/m

Weight of loose insert:	0.06 kg
-------------------------	---------

### DATA FOR CONNECTION HEAD

According to PN-EN 60751, form B	
Material:	Light-alloy metal
Seal:	IP 65
Ambient temperature:	max. 100°C
Cable Gland:	M20x1,5

## APPLICATIONS

The temperature sensors are used for registration of temperatures in tubes, tanks and piping. The output signal of the sensor is used as reference for our ER2000 and ER3000 regulators.

The FF12-2 and FF15-2 with 4-20mA is equipped with a built-in 2-wire transmitter with 4-20 mA output signals.

Due to small installation dimensions and internationally widespread measuring element the sensor is especially fitted for marine purposes, just as the applications on land are innumerable.

## DESIGN

The sensor consists of a pocket, a connection head and a measuring insert. The pocket is constructed of acid proof steel and can stand temperature/pressure as stated in the diagram. The connection head is made of light-alloy metal and complies with IP 65. The measuring insert contains one or two measuring windings and are exchangeable. The supply lines of the measuring insert are insulated from each other and from the insert tube with a ceramic insulator. Exchangeable measuring insert is mounted in the connection head by means of two spring loaded screws. This means that the measuring insert is always pressed towards the bottom of the pocket, and vibrations from the surroundings will not be transferred to the measuring insert, just like different heat evolutions of pocket and measuring insert are adjusted. Our standard types are shown in the below diagram.

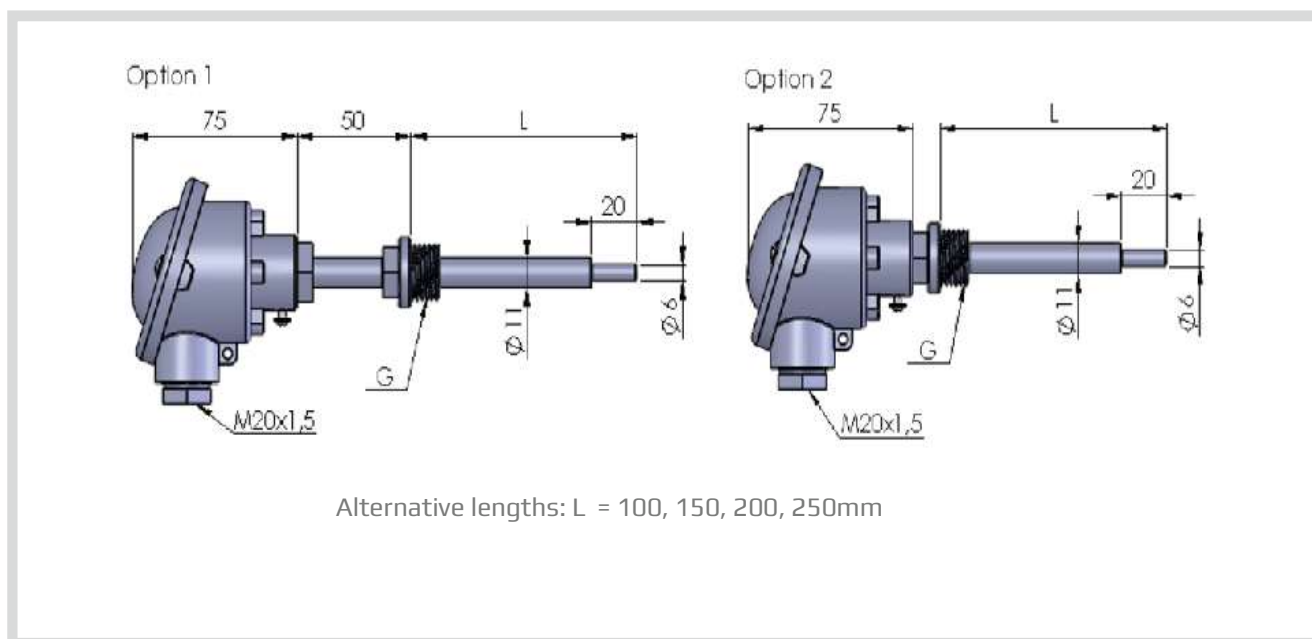
## FEATURES

- Resistance sensor Pt 100 Ω/0°C.
  - Standardized design according to PN-EN 60751
  - Robust and reliable sensor for use in gaseous and liquid media,
  - For medium temperature up to 260°C.
  - For pressures up to 50 bar.
  - Internationally recognized for marine purposes
  - To be used together with ER regulators type ER2000
- See data sheet no. 0.4.6.01

## STANDARD TYPES

Type	Measuring	Comments
FF12-2	1 x Pt100	With exchangeable measuring insert
FF12-R		Measuring insert for FF 12-2
FF15-2	2 x PT100	With exchangeable measuring insert
FF15-R		Measuring insert for FF 12-2
FF 12-2, 4-20mA	4-20mA	With exchangeable measuring insert

## DIMENSION SKETCH

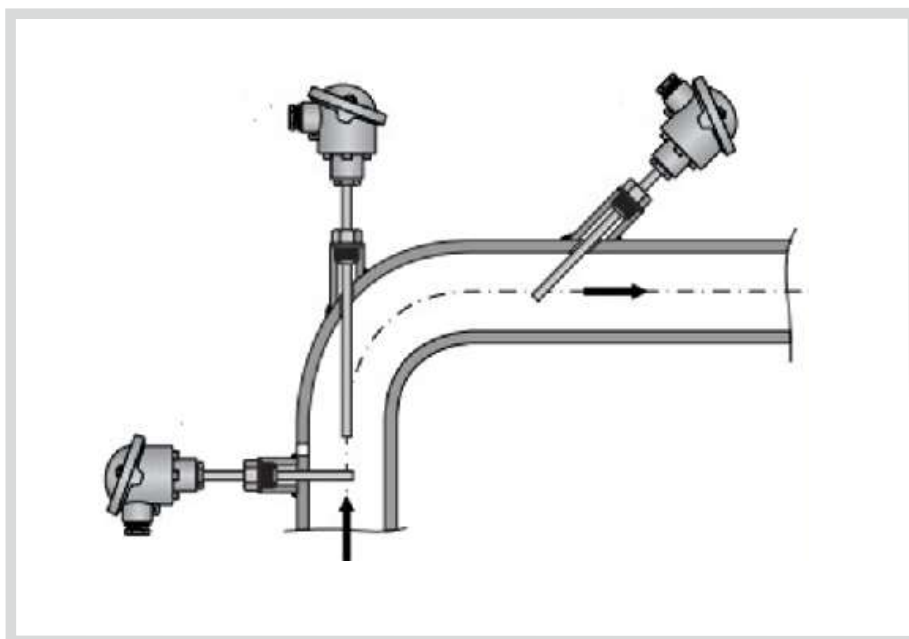


## RECOMMENDATIONS REGARDING INSTALLATION OF TEMPERATURE SENSORS IN WATER SYSTEMS

We recommend that the temperature sensors should be installed after a straight pipe. Pipe length should be 3 to 5 times the pipe diameter, especially after pump installation.

When installing the Temperatures sensors please always follow the instruction given in the Clorius installation instruction no. 99.209.01.

## EXAMPLES OF MOUNTING POSITIONS



# Temperature sensors

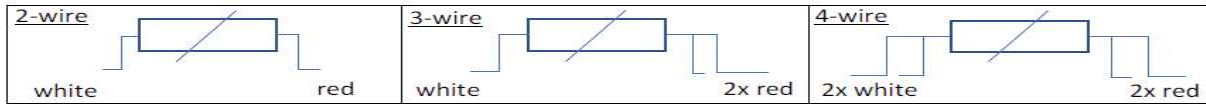
Type FF12-2, FF12 - 4 -20mA and FF15-2, FF15-2 -4-20mA for electronic temperature regulation

0-4.25.01-A

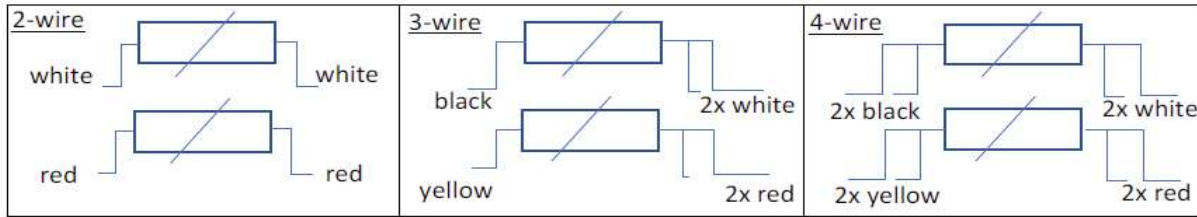
Page 3 of 3

## PT100 - WIRING DIAGRAM

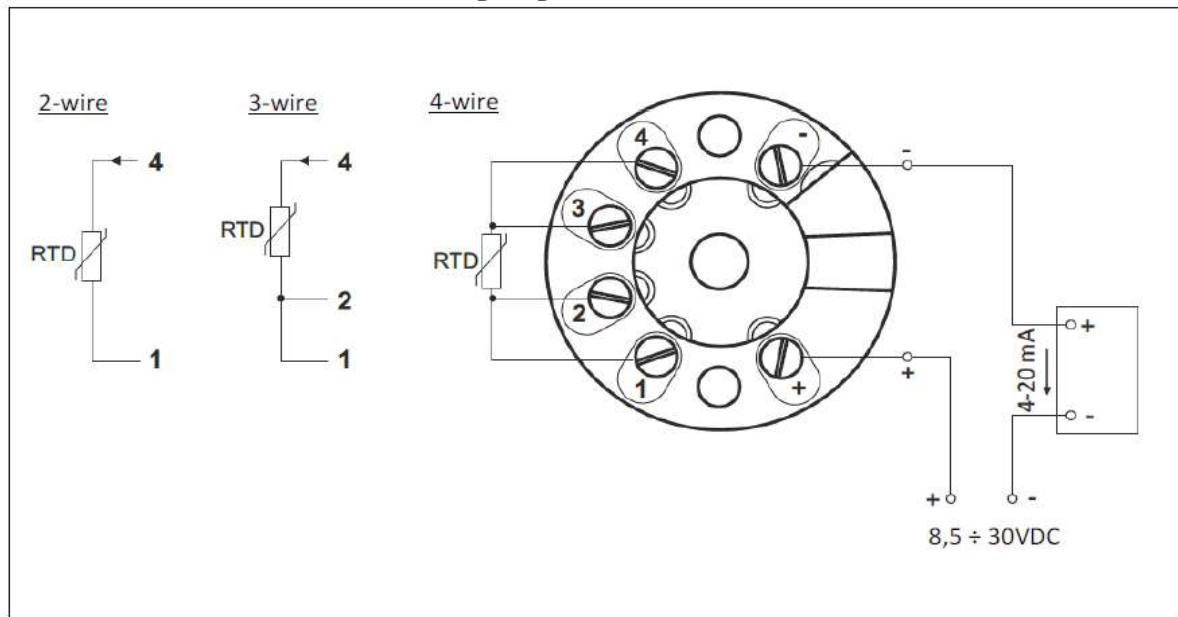
### 1 x PT100



### 2 x PT100



### PT100 with transmitter 4-20mA - wiring diagram



Subject to change without notice.





# Y strainers

Type M-F821A, G-F821C and H-F821F

O-8.1.11-E

Page 1 of 2



## TECHNICAL DATA

Face-to-face dimension according to EN 558-1 series 1

Flanges drilled according to EN 1092-1 for body material F (H-F821F)

Flanges drilled according to EN 1092-2 for body material A (M-F821A), C (G-F821C)

Closing tightness acc. EN 12266-1

## APPLICATIONS

Saturated steam, water, oil, air and other compatible fluids.

## DESCRIPTION

The Y strainers are applicable to all types of steam, water, oil and air systems. Their purpose is to protect traps, regulating valves, piping, etc. from dirt which often cause damage and consequently energy loss in fluid systems. Connections are flanged.

## INSTALLATION

Horizontal or vertical downstream installation.

## FEATURES

- Screen made of stainless steel
- Compact settlement
- Environment-friendly
- Cleaning of screen without disassembling

## SPECIFICATIONS

Type	Body material	Nominal pressure PN bar	Nominal diameter DN mm	Max temperature °C
M-F821A	A: Grey cast iron	16	15-200	300
G-F821C	C: Nodular cast iron	25		350
H-F821F	F: Cast steel	40		400

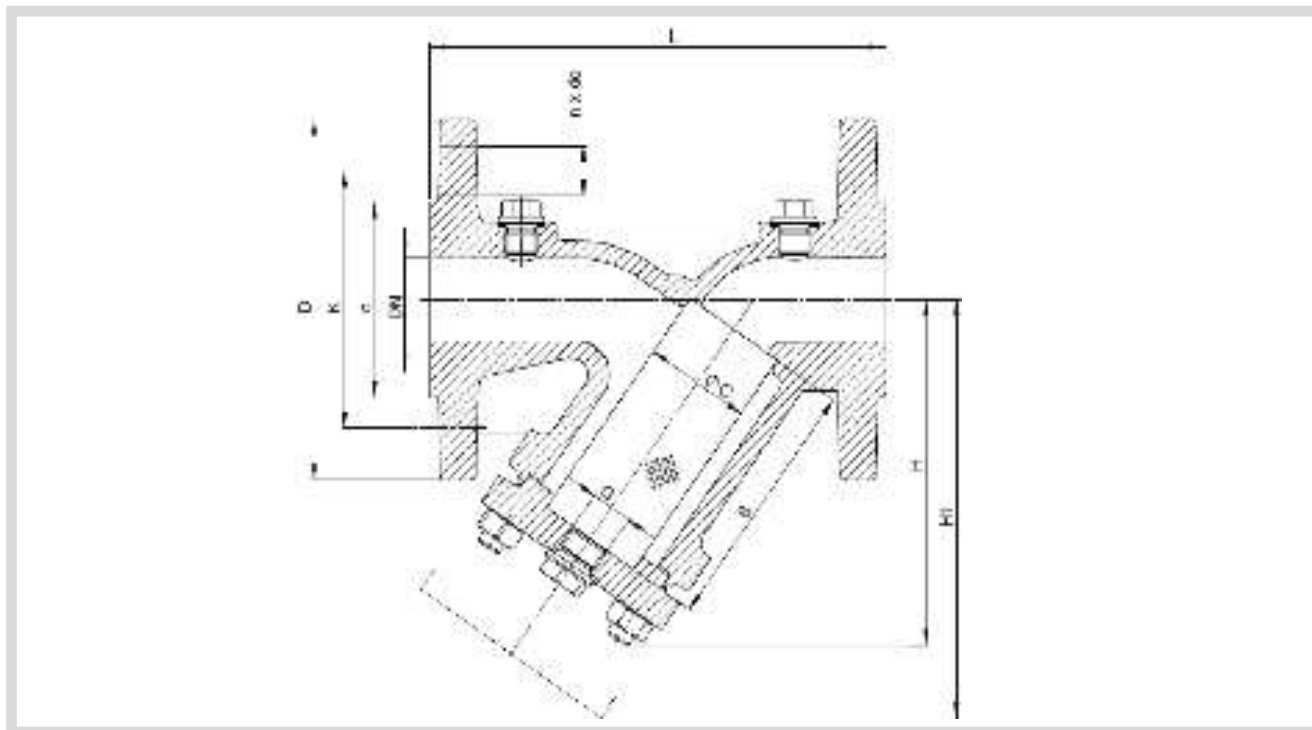
## SCREENS

Type	Mesh (mm)	
M-F821A	DN 15-50	1
	DN 65-150	1.25
	DN 200	1.6
G-F821C H-F821F	DN 15-50	1
	DN 65-80	1.25
	DN 100-200	1.6

Meshes in 0.6, 0.5, 0.4, 0.32 and 0.2 mm are available on request.

Subject to change without notice.

## DIMENSION SKETCH



									Type M-F821A, PN 16					Type G-F821C, PN 25					Type H-F821F, PN 40				
DN	L	H	H1	G	C	B	K <sub>v</sub>	D	d	K	n x do	Weight	D	d	K	n x do	Weight	D	d	K	n x do	Weight	
mm	mm	mm	mm	mm	mm	mm	m <sup>3</sup> /h	mm	mm	mm	mm	kg	mm	mm	mm	mm	kg	mm	mm	mm	mm	kg	
15	130	90	135	3/8	23	56	5,7	95	46	65	4x14	2,6	95	46	65	4x14	2,6	95	45	65	4x14	2,7	
20	150	100	150	3/8	28	68	10,4	105	56	75	4x14	3	105	56	75	4x14	3	105	58	75	4x14	3,6	
25	160	115	180	3/4	36	82	16,4	115	65	85	4x14	4,3	115	65	85	4x14	4,3	115	68	85	4x14	4,5	
32	180	135	215	3/4	42	98	27,3	140	76	100	4x19	6,8	140	76	100	4x19	6,8	140	78	100	4x18	6,3	
40	200	150	240	1	50	114	42	150	84	110	4x19	8,8	150	84	110	4x19	8,8	150	88	110	4x18	8,7	
50	230	160	250	1	61,5	119	64,7	165	99	125	4x19	11	165	99	125	4x19	11	165	102	125	4x18	11	
65	290	180	285	1	78,5	134	98	185	118	145	4x19	14,6	185	118	145	8x19	14,6	185	122	145	8x18	18,5	
80	310	215	330	1	89,5	149	149	200	132	160	8x19	18,6	200	200	160	8x19	18,6	200	138	160	8x18	23,5	
100	350	235	365	1 1/2	109,5	169	234	220	156	180	8x19	27	235	235	190	8x23	27	235	162	190	8x22	33	
125	400	280	425	1 1/2	137,5	199	376	250	184	210	8x19	38,5	270	270	220	8x28	38,5	270	188	220	8x26	54	
150	480	320	480	1 1/2	160	224	454	285	211	240	8x23	54,5	300	300	250	8x28	54,5	300	218	250	8x26	75	
200	600	405	610	1 1/2	210	284	853	340	266	295	12x23	110	360	360	310	12x28	110	375	285	320	12x30	137	

# Sensor pockets

For Clorius V-thermostats

0-8.3.41-E

Page 1 of 2



## APPLICATIONS

Sensor pockets of stainless steel can be supplied to all Clorius self-acting thermostats with rod sensors. They are used where it is impossible to empty the system or the tank. Use of sensor pockets imply delay of heat transfer to the rod sensors and thus a longer reaction time for the controllers. This is to some extent counteracted by filling up the sensor pockets with paste or oil.

## MOUNTING

The installation site for the sensor pocket is arbitrary when paste is applied. When using oil the sensor pocket must point somewhat downwards.

## FEATURES

- Secures quick heat transfer from media to the thermostat sensor
- Can be delivered with various flange connections as an option
- Protects the sensor
- Makes change of sensor easy

## TECHNICAL DATA

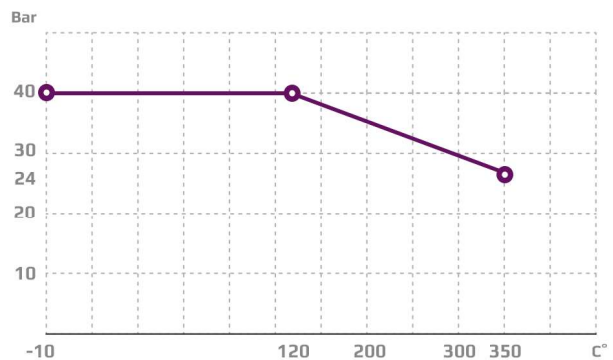
**Material** High alloy stainless steel  
Werkstoff No. 1.4436.

**Outer threads** BSP for all standard sensor pockets

**Optional** Sensor pockets with NPT threads are only available for V.2.05 and V.4.05

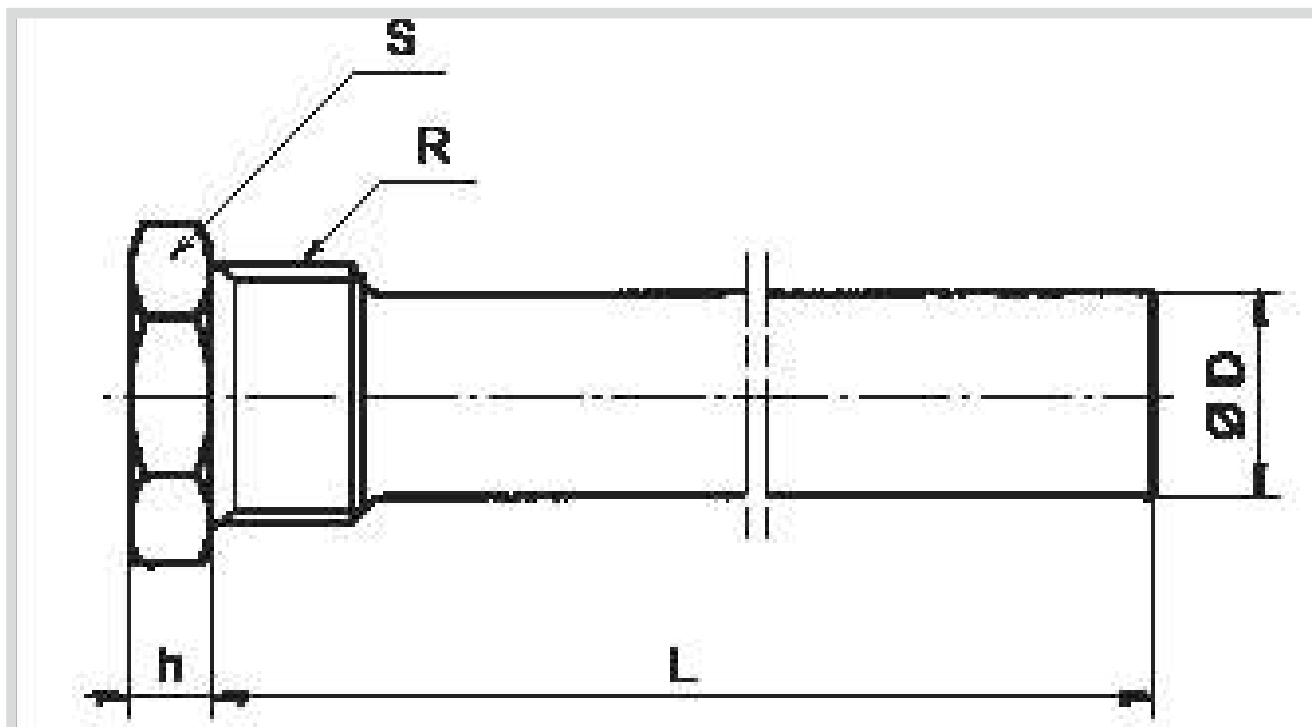
## PRESSURE/TEMPERATURE DIAGRAM

According to DIN 2401



Subject to change without notice.

## DIMENSION SKETCH



For thermostat type	Clorius product number	Dimensions in mm				ISO 7/1 (tapered)
		Ø D	L	h	S	
V 2.05	3290069	25	215	9	36	R 1
V 4.03	3290182			10	50	R 1¼
V 4.05	3290077	25	390	10	50	R 1¼
V 4.10	3290085	34	512	10	50	R 1¼
V 8.09	3290093	34	740	12	80	R 2½
V 8.18	3290204	38	805	12	80	R 2½



## TECHNICAL DATA

<b>Valve motor</b>	
- Power supply	24 V AC +10/-15%, 50/60 Hz
- Consumption approx.	24 VA
- Casing	IP66
- Cable union	2xM20 1xM16
- Closing speed	15...30 sec.
- Ambient temp.	-10 to +55 °C
- Closing force	1100 N
- Stroke	0 - 40 mm
- Weight	5.6 kg
<b>Control box</b>	
- Transformer	230/24 V AC, 10 VA, 50/60 Hz
- Timer	10 sec.
- External alarm	Potential free switch
- Fuse	T 0.5 A / 250 V
<b>Dual thermostat</b>	
- Adjustable	35 - 95 °C
- Overheat protection	95 - 110 °C, Sealed at 105 °C, Manual reset
- Thread	½ RG
- Immersion-tube	110 mm

Subject to change without notice.

## APPLICATIONS

Safety Set SM6 is developed for all Clorius valves up to 150 mm, but may be used for some other valve brands of corresponding size and function, too. It is consequently well suited for modernisation of existing systems.

## FUNCTION

Safety Set SM6 is used for heating, cooling, ventilation and industrial systems, no matter whether the medium is water, steam or oil.

## DESIGN

Safety Set SM6 consists of a valve motor, a control box and a dual thermostat. The valve motor is driven by a gear motor. Stepping motor with SUT (Superior Universal Technology) electronic control unit and electronic load-dependant cut-off.

The valve motor is delivered for 24 V AC/DC. The build-in spring return ensures a closing time of max. 4 sec. By temperatures higher than 130°C, a cooling unit (1-0152285) is to be mounted between valve and motor.

All gear wheels and bearings are life-time lubricated. Maintenance-free gear unit made of sintered steel; gearbox base-plate made of steel. The spring return is released when the power disappears from the holding coil, closing the valve completely. A timer in the control box ensures that the motor is not turned on again before 10 sec. after a spring return release. This function protects against starting the motor before the spring return function has terminated.

## FEATURES

- IP66 (EN60529)
- Valve actuator with safety function (as per DIN EN 14597) and pushing force of 1100 N
- Easy to fit and self adjustable
- Spring return
- Simple assembly with valve; spindle is automatically connected after control voltage is applied (patented system)
- Lifetime lubricated gearbox
- 2-4 safety functions
- Direction of operation can be selected via screw terminals when making the electrical connection

## THE CONTROL BOX CONTAINS:

- a 230/24 V AC transformer for the valve motor
- the 10 sec. timer for the spring return
- a potential free alarm switch
- terminal blocks for connections to the valve motor, the dual thermostat, other safety equipment, an alarm, and power
- a build-in fuse protecting against over-load and short-circuiting

The dual thermostat is set to the normal close-down temperature, e.g., 90°C, where the valve is to be closed. It further includes an overheating thermostat for spring return emergency close-down at 105°C. This ensures correct function, even if, e.g., the normal thermostat should fail. For additional safety, the overheating thermostat has to be reset manually after a break.

## BUILD-IN SAFETY FUNCTIONS

### Power failure

The build-in spring return closes the valve. When the power returns, the motor starts again after 10 sec. and moves the valve back to its original position.

### Overheating protection

The spring return of the motor closes the valve on a signal from the 105°C overheating thermostat or other safety devices. The overheating thermostat has manual reset.

Other protections possibilities:

### Against circulation failure

The motor closes the valve when a flow switch placed in the secondary circuit releases the spring return, e.g. by a pump failure. When circulation returns, the valve reopens automatically after 10 sec.

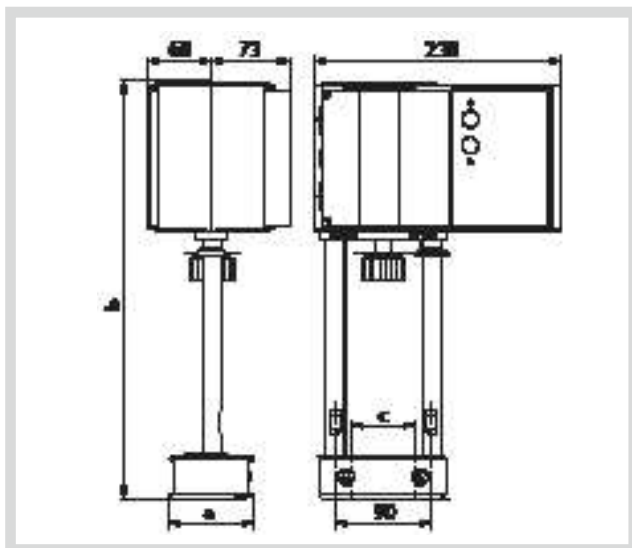
### Against pressure failure

By means of a pressure switch the motor will release the spring return if the water pressure in the secondary circuit is reduced (static pressure).

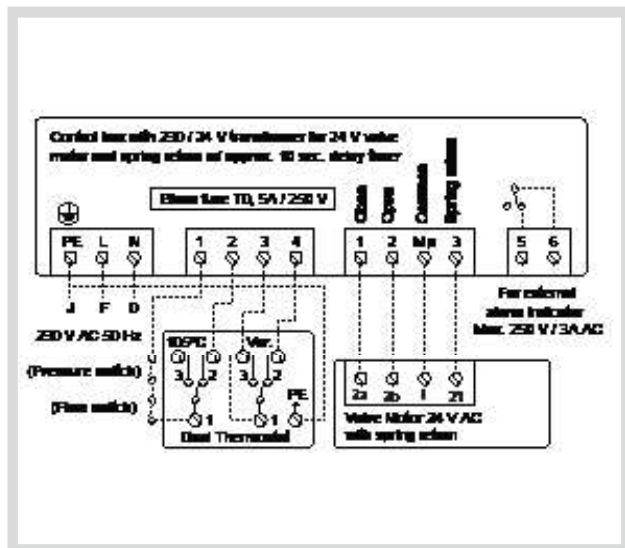
## ALARM FUNCTION

The build-in potential free alarm relay is activated at emergency close down (spring return).

## DIMENSION SKETCH

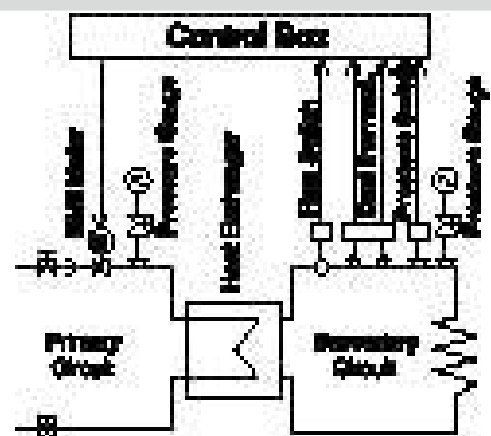


## WIRING DIAGRAM, SAFETY SET SM6



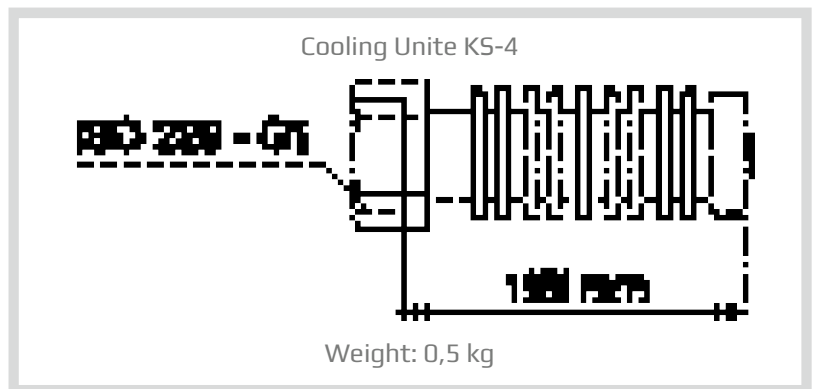
## EQUIPMENT DIAGRAM

For steam/hot water heating systems, where the primary circuit is dimensioned for the maximum pressure of the steam/hot-water.



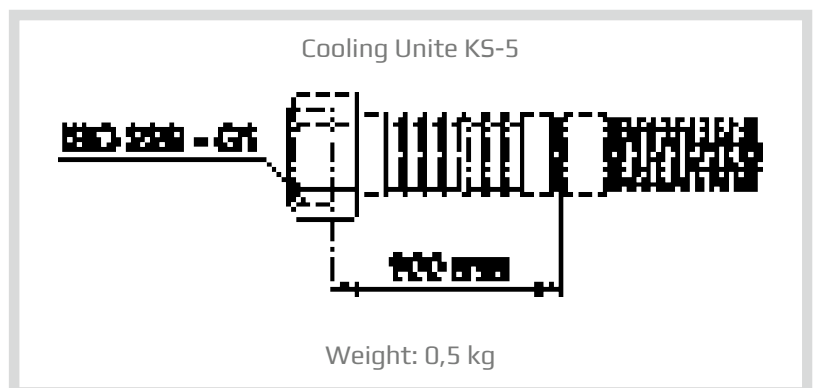
## TYPE KS-4

Cooling unit protecting the stuffing box of the thermostat. To be applied at valve temperatures between 170°C and 250°C. For higher temperatures please see type KS-5.



## TYPE KS-5

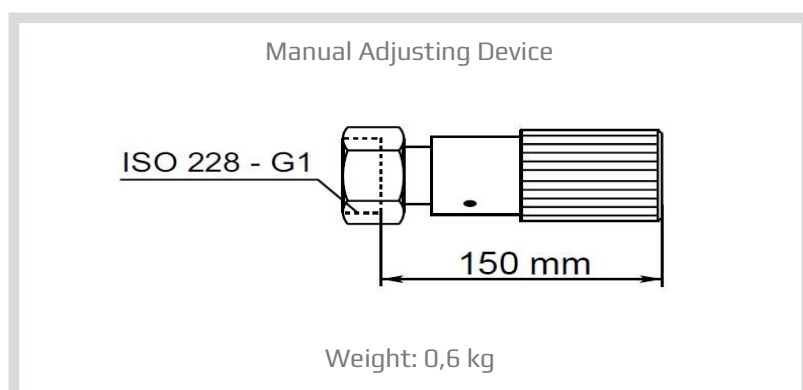
Cooling unit with a built-in bellow gland, replacing the stuffing box of the thermostat. To be applied at valve temperatures between 250°C and 350°C.





### MANUAL ADJUSTING DEVICE

The device has a built-in thermostat stuffing box. For sealing and manual operation of valves when an actuator has not been fitted, e.g. during periods of construction (max. 170°C).



# Spacer Concept (Machined and welded)

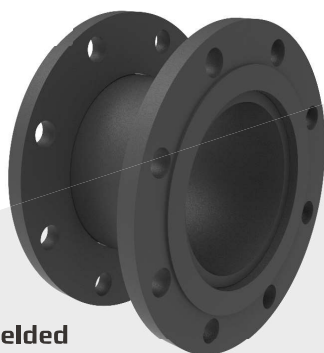
2 & 3 way control valves, DN 100, 125, 150, 200, 250 & 300

0-8.06.11-A

Page 1 of 2



Machined



Welded

## TECHNICAL DATA

<b>Material:</b>	
- Spacer	Steel 1.0570 (S355J2G3)
- Colour	Anthracite grey RAL 7016
<b>Flange drilled according to:</b>	
- Option	EN 1092-2 JIS B 2210 5K/10K ANSI class 150
<b>Available types:</b>	Machined spacers Welded spacers
<b>Available sizes:</b>	DN 100 - DN300 DN 350, 400, 450 on request
<b>Used for:</b>	2 & 3 ways control valves

## APPLICATIONS

Spacer concept is designed for use together with all types of 2 & 3 ways Clorius control valves.

## FUNCTION

Spacers are available as both machined and welded types. Spacers are used to avoid changing the existing pipework and installation when replacing old control valves with new control valves.

## DESIGN

Spacers are available in machined design with a distance from. <100mm for DN100 to DN300

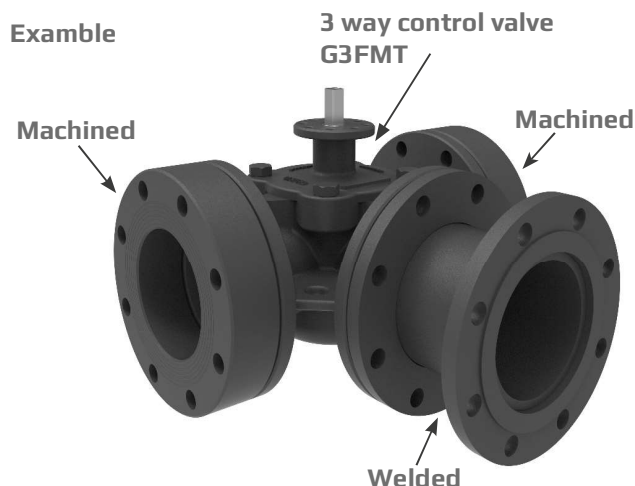
Spacers are available in welded design with a distance from. >100mm for DN100 to DN300

Spacers will be produced after piping & installation specifications.

Flanges are drilled according to the different flange standards. EN 1092-2, JIS 5K/10K & ANSI Class 150

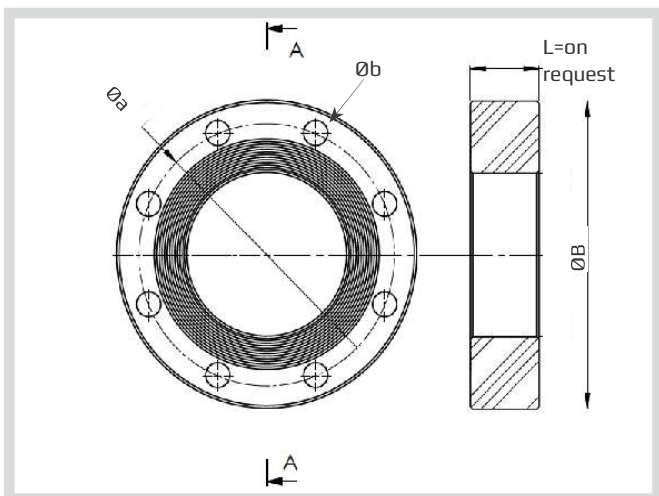
## FEATURES

- Spacers can be used in combination with all types of 2 & 3 ways control valves.
- Simple design according to the required flange standards
- Easy Installation - no change to already used installation.

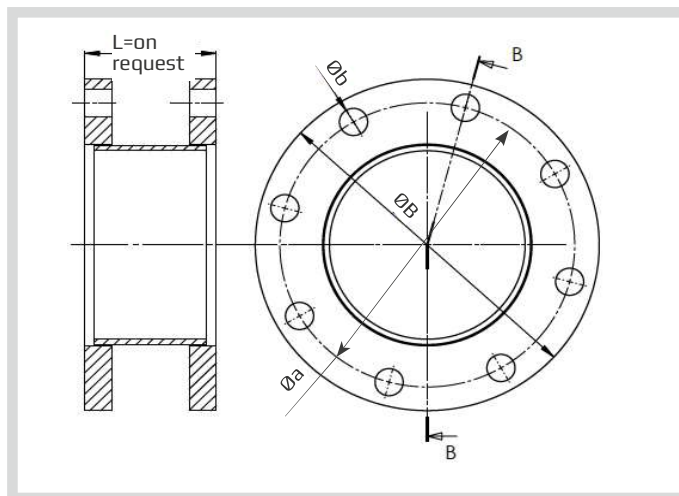


Subject to change without notice.

MACHINED VERSION



WELDED VERSION



Flange connections	EN 1092-2			ANSI Class 150			JIS B 2210 5K			JIS B 2210 10K		
	B (dia.) (mm)	a (dia.) (mm)	b mm dia. (number)	B (dia.) (mm)	a (dia.) (mm)	b mm dia. (number)	B (dia.) (mm)	a (dia.) (mm)	b mm dia. (number)	B (dia.) (mm)	a (dia.) (mm)	b mm dia. (number)
DN100	220	180	19x(8)	230	191	19x(8)	200	165	19x(8)	210	175	19x(8)
DN125	250	210	19x(8)	255	216	22x(8)	235	200	19x(8)	250	210	23x(8)
DN150	285	240	23x(8)	280	241	22x(8)	265	230	19x(8)	280	240	23x(8)
DN200	343	295	22x(8)	343	298	22x(8)	320	280	23x(8)	330	290	23x(12)
DN250	405	350	23x(12)	405	362	25x(12)	385	345	23x(12)	400	355	25x(12)
DN300	455	400	23x(12)	483	432	25x(12)	430	390	23x(12)	445	400	25x(16)
*DN350	505	460	23x(16)	533	476	29x(12)	480	435	25x(12)	490	445	25x(16)
*DN400	565	515	28x(16)	597	540	29x(16)	540	495	25x(16)	560	510	27x(16)
*DN450	620	565	28x(20)	620	578	32x(16)	620	555	25x(16)	620	565	27x(20)

Spacers for DN350, 400, 450 are available on request.

Example



Installation of 3 way control valve GFMT with machined spacers and CAR-H actuator.



# TERM & CONDITIONS

---

## 1. General

These terms of sale are binding unless otherwise agreed and require no confirmation. Any amendments to these terms must be made in writing by Clorius Controls A/S (hereinafter called Clorius) and shall apply only to the transaction contemplated.

## 2. Delivery

Times of delivery are approximate and subject to strikes, breakdowns of machinery, accidents, lock-outs, interruptions of work or business, war, force majeure or other causes beyond Clorius' control. Clorius shall assume no liability for any delay or for expenses or penalties incurred by any delay.

## 3. Prices

- 3.1 Unless otherwise agreed in writing all prices are ex. works Copenhagen (according to latest edition of Incoterms).
- 3.2 In the event of fluctuations in costs of raw materials and labour during the period between confirmation and delivery of goods, Clorius reserves the right to adjust prices accordingly.
- 3.3 The smallest order amount not subject to an additional administrative charge is EURO 270. Back orders caused by Clorius' inability to supply are not subject to administrative charges.

## 4. Shipping

- 4.1 All risks in respect of the goods shall pass to the Buyer as soon as the products have left Clorius' premises, or as soon as Clorius has otherwise placed the products at the disposal of the Buyer according to agreement in writing.
- 4.2 If the Buyer has given no definite shipping instructions Clorius shall effect shipment according to its best judgement. However, Clorius is not obliged to select the cheapest method of transportation.

## 5. Insurance

If as per written agreement Clorius shall take out insurance for the Buyer's account, Clorius shall assume no liability whatsoever for the selection of insurance company or its adjustment of claims subsequent to delivery.

## 6. Complaints

- 6.1 In case of complaints in respect of goods in non-contractual conditions, short delivery or shipment, written notice shall be given to Clorius immediately upon receipt of the goods. Clorius shall assume no liability whatsoever for loss or damage arising or resulting from failure on the part of the Buyer to comply with this provision.
- 6.2 In the event of a justified warranty claim Clorius may at its discretion replace or repair the goods or issue a credit note for the amount paid or debited, provided the goods be returned to Clorius' warehouse, free of charge

## 7. Product Liability

- 7.1 Clorius shall only be liable for personal injury, if it can be established that the injury is attributable to faults or negligence committed by Clorius or by others for whom Clorius is responsible.
- 7.2 Clorius shall not be liable for damage to immovables or movables, which occurs when the goods are in the Buyer's possession. Otherwise Clorius shall only be liable for damage to immovables or movables as stipulated in 7.1 (personal injury)
- 7.3 Any compensation payable by Clorius shall in no circumstances exceed EURO 674000.
- 7.4 The Buyer agrees to indemnify and hold harmless Clorius against any claims, liabilities, costs or expenses incurred by Clorius in relation to personal injury or property damage suffered by the Buyer's customers or other third parties resulting or arising from defective goods, unless it is established that such injury or damage is solely attributable to defective design or manufacture of goods.
- 7.5 Clorius shall, however, at no time be liable for consequential or incidental loss, loss of income or revenue or any other indirect loss.

## **8. Warranty**

- 8.1 Unless otherwise provided, the warranty period is 12 months covering any defects in material or craftsmanship found and notified to Clorius in writing without delay. This warranty shall, at Clorius' discretion, cover repairs, replacement, service replacement or crediting of the goods in question.
- 8.2 The warranty shall be void if the goods are in bad repair or maintenance or if attempts have been made to repair them or if they have been modified without Clorius' written consent.
- 8.3 The warranty shall also be void if the goods are used for purposes for which they were not designed or intended or if they are installed and used in contravention of the directions given by Clorius.
- 8.4 Clorius shall, however, at no time be liable for consequential or incidental loss, loss of income or revenue or any other indirect loss.

## **9. Terms of Payment**

- 9.1 All goods are sold on the terms of payment stated in Clorius invoices. Any default in payment shall entitle Clorius to suspend shipment or to cancel unexecuted orders. If payment is overdue, interest will be charged.
- 9.2 The rate of interest will be stated in the order confirmation and in the invoice.
- 9.3 The Buyer shall not be entitled to withhold payment or to set off counterclaims against goods or services supplied.

## **10. Retention of Title**

- 10.1 The legal property in the goods shall not pass to the Buyer until the purchase price including interest and expenses have been fully paid.
- 10.2 Until the purchase price has been fully paid the Buyer shall:
  - a. not pledge the goods or documents of title thereto,
  - b. not allow any lien to be created on the good, and
  - c. secure that the goods are or remain fully insured.

## **11. Patents, Trademarks, etc.**

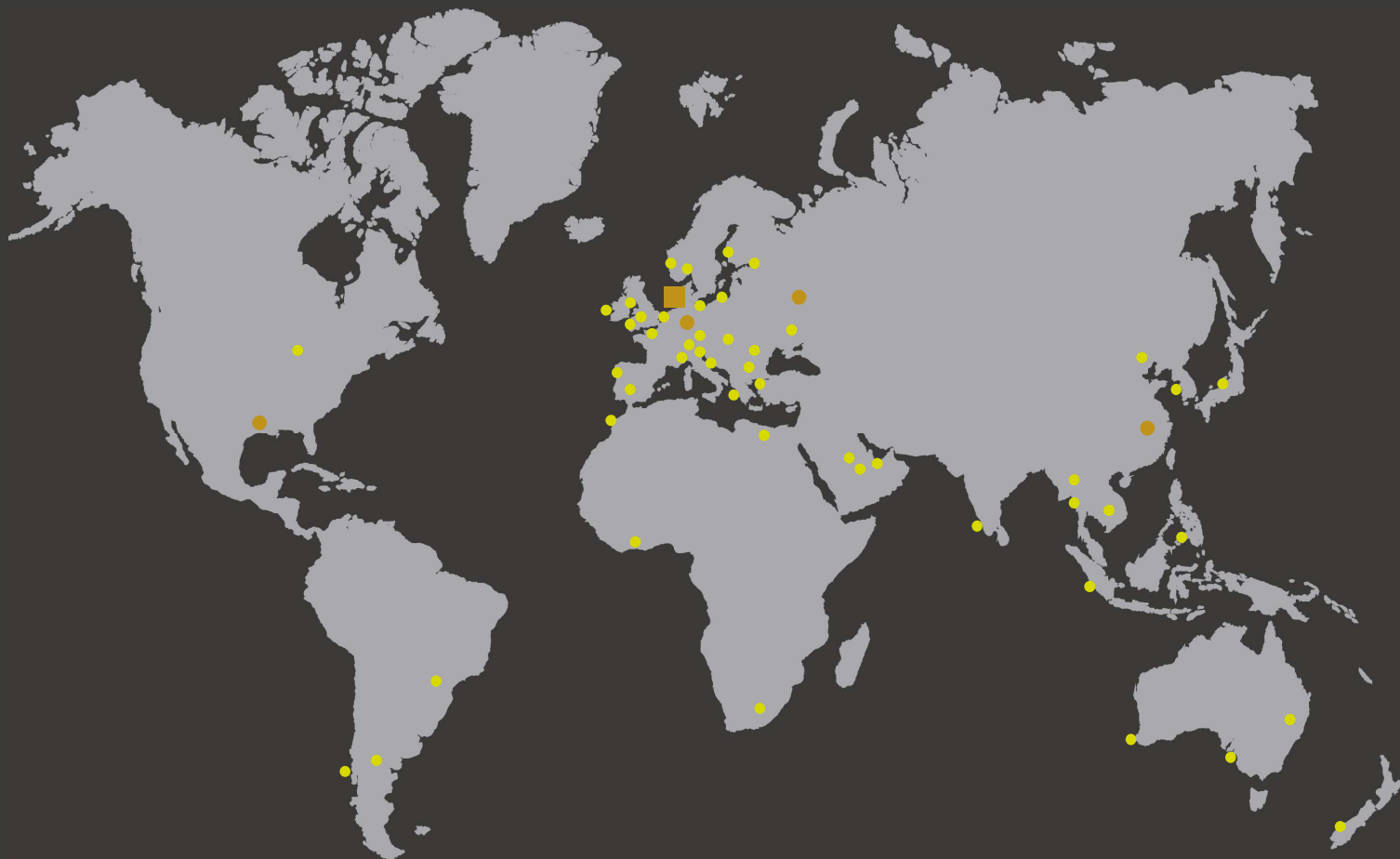
Clorius shall warrant that the goods manufactured and supplied by Clorius do not infringe any third party's proprietary rights, patents, copyrights or trademarks in Denmark, but shall not provide any express or implied warranty that the goods do not infringe any such rights of a third party outside Denmark, in particular in the Buyer's country, and Clorius shall not be liable to defend any alleged infringement suit or to pay any costs, damages or royalties arising from such infringement.

## **12. Return of products**

- 12.1 Return of products can only take place if agreed with Clorius and return will only be possible for saleable products returned in undamaged Clorius packing. Invoice number for the returned products must be stated. If the invoice number is not stated, Clorius reserves the rights to charge extra costs in addition to the costs stated in 12.4.
- 12.2 Return of the goods at consignors account and risk.
- 12.3 Products at a value less than EURO 55 are not taken back.
- 12.4 For returned products an administration charge of min. 20% - minimum EURO 35 - will be charged.

## **13. Venue**

Any dispute which may arise between the Buyer and Clorius shall be governed by Danish Law and settled by the Maritime and Commercial Court in Copenhagen, which has been accepted as venue by both parties.



Headquarters  
**BROEN A/S - Clorius Division**  
Skovvej 30  
DK-5610 Assens  
+45 77 32 31 30  
mail@cloriuscontrols.com

DECEMBER 2023 - EDITION 14

## SALES REPRESENTATION

### Clorius Controls - **CHINA**

Room 1910-1911, Unicom International Tower,  
NO 547 West Tian Mu Road  
Shanghai 200070 P.R. China  
Tel: +86 21 33 030 279 // +86 21 33 035 279

### Clorius Controls - **RUSSIA**

BROEN Ltd.  
8-ya Tekstilschikov Street 11/2  
109129 Moscow, Russia  
Tel: +7 495 228 1150 ext. 11-24

### Clorius Controls - **USA**

27657 Commerce Oaks Drive  
Oak Ridge North, TX 77385  
United States of America  
Tel: +1 (920) 350 3622

### Clorius Controls - **POLAND**

BROEN SA

