

1 Process Control System – Collection of data sheets

Sensors	Analog	Ultrasonic sensors
		Flow sensors
		Pressure sensor
		Temperature sensor
		Pressure gauge
	Digital	Capacitive proximity switch
		Float switch
		Float switch (overflow)
Actuators	Analog	Pump
	Digital	Proportional valve
		Heating
		2/2-way solenoid valve
		Namur solenoid valve
		Solenoid coil
		Semi-rotary drives
		Exhaust flow control valve
		Limit switch attachment
Connection parts	Interfaces	Analog terminal
		I/O-terminal
	Signal converters	PT100/voltage
		Current/voltage
		Frequency/voltage
Controlling units		Industrial controller, Bürkert
		Motor controller
		Potentiometer
Passive elements		Container
		Pressure vessel
		Fitting
		Pipe
		Plexiglass pipe
		Ball valve
		Service unit



Ultrasonic sensor

Function

The operational principle of an ultrasonic sensor is based on the generation of acoustic waves and their detection following reflection on an object. Normally, atmospheric air acts as a carrier of the ultrasonic waves.

A sound generator is actuated for a short period of time and emits an ultrasonic pulse which is inaudible to the human ear. Following emission, the ultrasonic pulse is reflected on an object located within range and echoed back to the receiver. The duration of the ultrasonic pulse is evaluated electronically. Within a certain range, the output signal is proportional to the signal duration of the ultrasonic pulse. The object to be detected can be made of different materials. The shape or colour, solid, fluid or powdery condition do not have any or a very minimal effect on detection.

In the case of objects of smooth, even surface, the surface must be aligned vertically to the ultrasonic beam.

With this kind of sensor you are able to do two kinds of measurements:

First you can measure the distance between the sensor and an object. The manufacturer setup of the sensor is ideal for this kind of measurement. Rising output signal at rising distance to the object.

But for measuring the filling level of a container a different setup is necessary because with a rising filling level the distance of the measured object (water surface) to the sensor is getting smaller.

Therefore the signal output was changed from rising to falling characteristics. Also the measurement range was changed so that we can get maximum output signal at maximum and the minimum output signal at minimum filling level.

See the explanations at pages 3 and 4 for detailed information.

BE.SI.0193

Ultrasonic sensor

Technical data

Parameter	Value
Protection class	IP 67
Weight	max. 67g
Ambient temperature	-25 bis 70°C
Switching point error	± 2,5 % (-25 to 70°C)
Rated operation voltage U _e	24 V DC
Operation voltage range U _B	20...30 V DC (at 12...20 V DC reduced sensitivity up to 20 %)
Permissible residual ripple	10%
Idle current consuption I ₀	< 50 mA
Switch output (NC/NO) / Frequency output (FA) Rated operating current I _e Voltage drop U _d	150 mA 3 V at 150 mA
Analog output (UA/IA) Current range Burden	4...20 mA 0...300
Sensor activ	Operating voltage or high impedance input current I _E max. 16 mA
Sensor not activ	0...3 V Input current I _E max 11 mA
Subject to change	

Mounting & dimensions

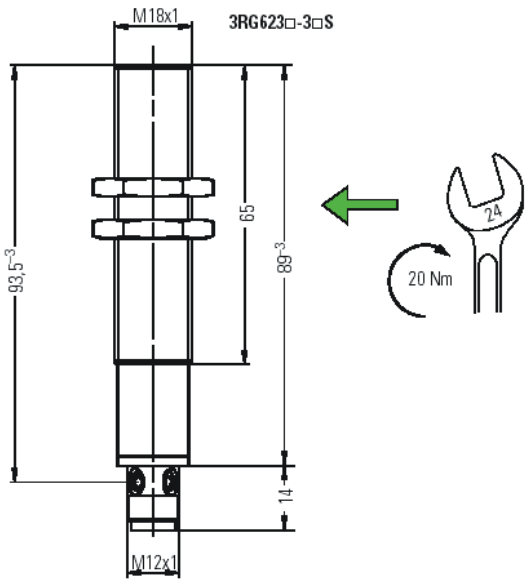
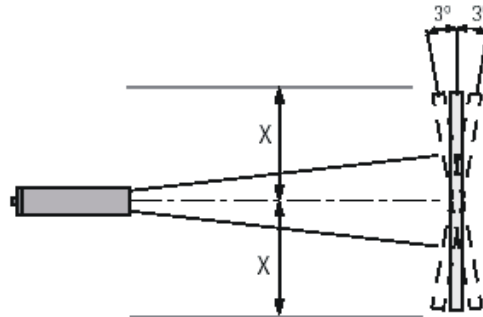


figure of the sensor, all dimensions in mm

Free space diagram



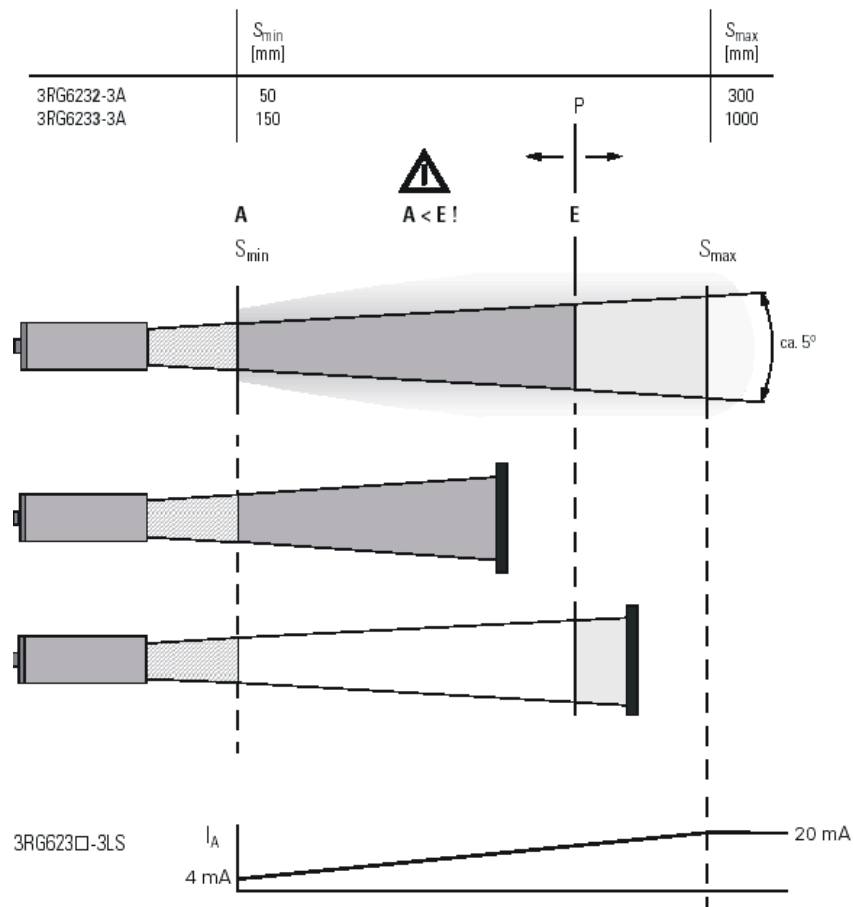
Free space

Free space at distance „x“ around the sonic lobe axis has to be free of disturbing objects. Angular misalignment of 3° is for smooth surfaces.



There are two different setups of the sensors (manufacturer and Adiro). See the diagrams below for detailed information!

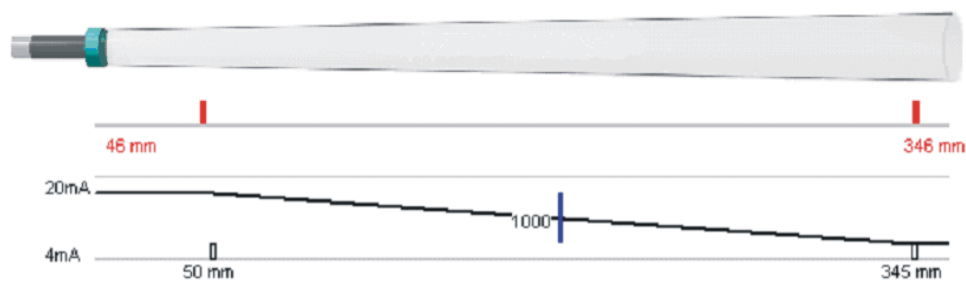
From April, 1st. 2004 all ultrasonic sensors, mounted in our products, will have the Adiro setup. Sensors with Adiro setup can be identified by a special label.

Switching range
(manufacturer setup)

BE.SI.0193

Ultrasonic sensor

Switching range
(Adiro setup)



Adiro setup details

Parameter	Value
Measurement range	From: 50mm To: 345mm
Max. measurement range	From: 46mm To: 346mm
Output (current)	4...20 mA
Subject to change	

- A Beginning of switching range (programmable)
E End of switching range

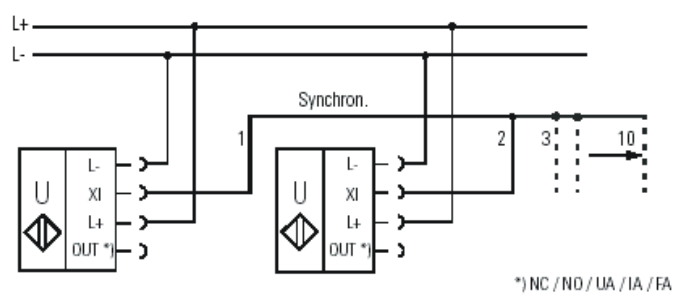
Connection

1: L+ 20...30 V DC 3: L - 0 V		
	2	4
3RG623□-3□A	S	XI
3RG623□-3□B	XI	S
3RG623□-3□S	XI	$U_A / I_A / F_A$
XI : Enable /sync S : Output		
U_A / I_A : Analog output F_A : Frequency output		

Pin assignment

- 1 24V (brown)
3 0V (blue)
4 analog output (black)

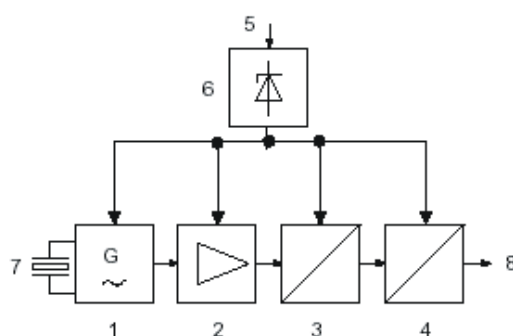
The connections are polarity-safe, short circuit proof and overload-proof.
At occurrence of disturbances screened cables are recommended.



Synchronization by connection of the clamps XI (max. 10 BERO)



Analog ultrasonic sensor



Schematic diagram of the analog ultrasonic sensor

- 1 Oscillator
- 2 Amplifier
- 3 Evaluating unit
- 4 Measuring transducer
- 5 External voltage
- 6 Internal constant power supply
- 7 Ultrasonic converter with active zone
- 8 Output: Current signal

Function

The operational principle of an ultrasonic sensor is based on the generation of acoustic waves and their detection following reflection on an object. Normally, atmospheric air acts as a carrier of the ultrasonic waves. A sound generator is actuated for a short period of time and emits an ultrasonic pulse which is inaudible to the human ear. Following emission, the ultrasonic pulse is reflected on an object located within range and echoed back to the receiver. The duration of the ultrasonic pulse is evaluated electronically. Within a certain range, the output signal is proportional to the signal duration of the ultrasonic pulse. The object to be detected can be made of different materials. The shape or colour, solid, fluid or powdery condition do not have any or a very minimal effect on detection. In the case of objects of smooth, even surface, the surface must be aligned vertically to the ultrasonic beam.

170710

Analog ultrasonic sensor

Design

The ultrasonic sensor can be assembled on a mounting bracket using two connector nuts. The sensor is of cylindrical design with a M30x1 thread.

Note

During operation, please observe the polarity of the connected voltage. The terminals are colour coded.

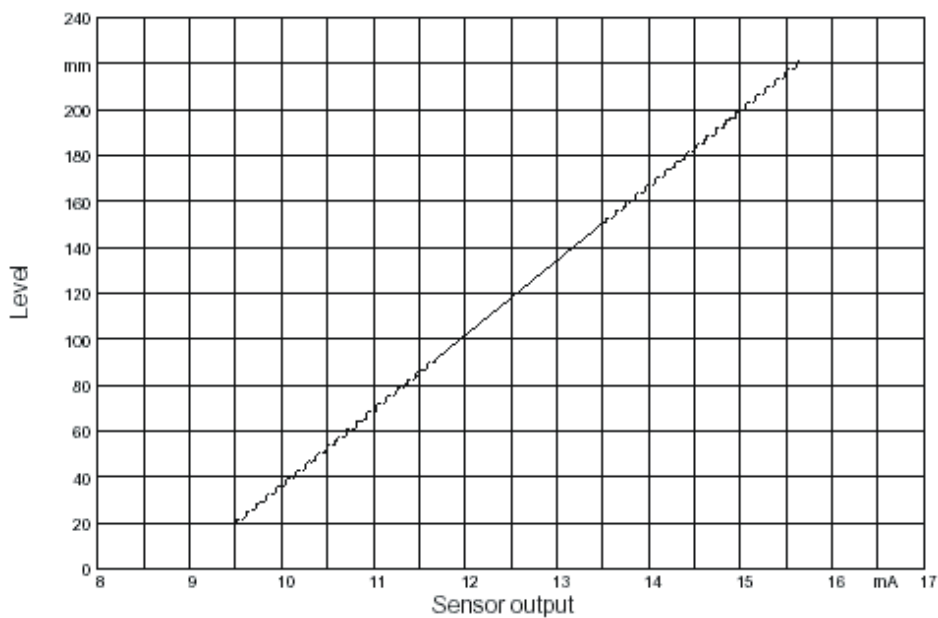
Operating voltage	Positive terminal	white
	Negative terminal	brown
Analogue output signal	Current	green

The sensor is protected against reverse polarity.

The sensor output supplies an impressed current and is loaded during short-circuit operation. Ideally, the output should be loaded with a resistance of $R_L = 0 \Omega$.

Technical data

Parameter	Value
Permissible operating voltage	24 VDC
Current consumption (without load)	< 35 mA
Load resistance	< 400
Current output	4 ... 20 mA
Measuring range	500 ... 150 mm
Minimum distance between sensor and a laterally reflecting wall	> 75 mm
Resolution	1 mm
Operating/ambient temperature range	-20 ... +75 °C
Temperature drift	0,1%/°C
Linearity error	0,2% FSD* (*FSD=full scale deflection)
Measuring pulse frequency	40 Hz
Sound cone aperture angle	Approx. 5°
Reverse polarity protection	yes
Degree of protection	IP 65
Materials (housing)	Plastic
Weight	0,250 kg
Subject to change	



Characteristic curve

The oscillations at the beginning and the end of the characteristic curve are caused by the type of sensor construction. For the characteristic curve displayed, the distance between the sensor and the bottom of the container was adjusted to 330 mm.

Note

Please notice that the sensor is not linear over the whole measurement range. You should use this sensor only for measurements in the tank with filling levels between 80mm to 180mm. Outside this borders the sensor might differ from the characteristic curve.

Please see the figure below to see the connectivity between output signal and distance.

- A distance > 500 mm is not defined for measurement.
- A value of 20 mA is only theoretically measurable.

170710

Analog ultrasonic sensor

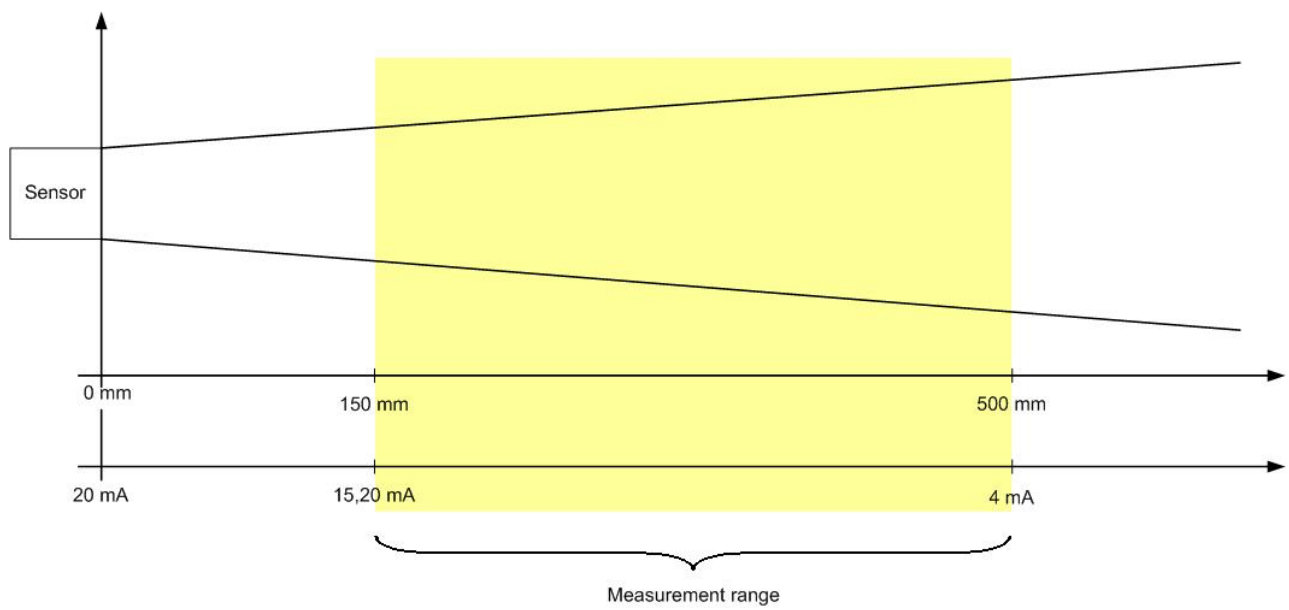


Figure of distance an measurement range



Flow sensor, Type 3

Function

The transparent fluid admitted in the direction of the arrow is guided into a circular motion via the swirl plate in the measuring chamber and directed onto the lightweight triple vane rotor. The speed of the rotor is proportional to the flow rate and is detected without feedback via the built-in optoelectronic infrared system (diode and phototransistor).

The integrated amplifier supplies a steady square wave signal, whereby the signal level is dependent on the applied supply voltage (5 to 12 V DC).

Due to the particular design of the rotor, any gas bubbles (air bubbles) which may occur in the fluid, are not dissolved, but carried along with the fluid. Any assembly position is possible. The direction of flow is indicated by an arrow on the sensor housing. Stabilizing zones up or downstream of the measuring device are not necessary.

Flow rate fluctuations or pulsations do not have a negative influence on the resulting measurement.

A protective filter is fitted on the inlet side.

All parts of the measurement housing in contact with media are made of polyvinylidene fluoride (PVDF).

Design

The flow sensor is built into the pipework using adapters.

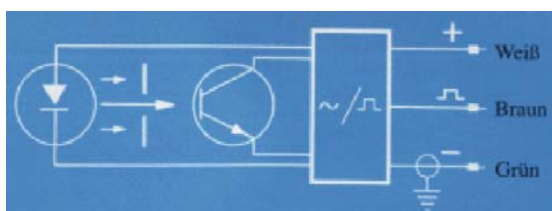
170711

Flow sensor, Type 3

Note

During operation, please observe the polarity of the applied voltage. The terminals are colour coded.

Operating voltage	Positive terminal	white
	Negative terminal	green
Output signal	Square-wave signal	brown

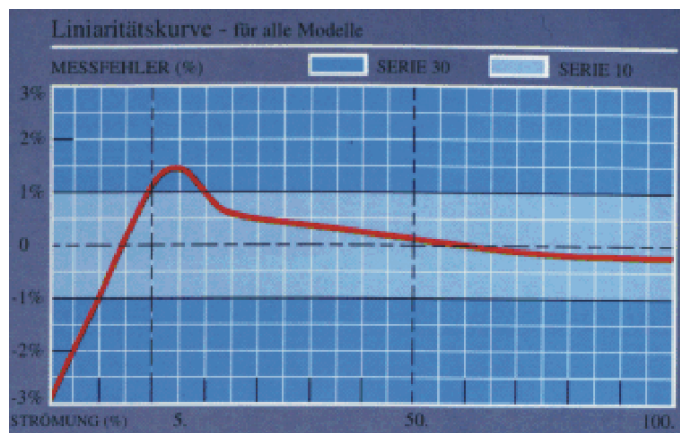


electrical schematic diagram

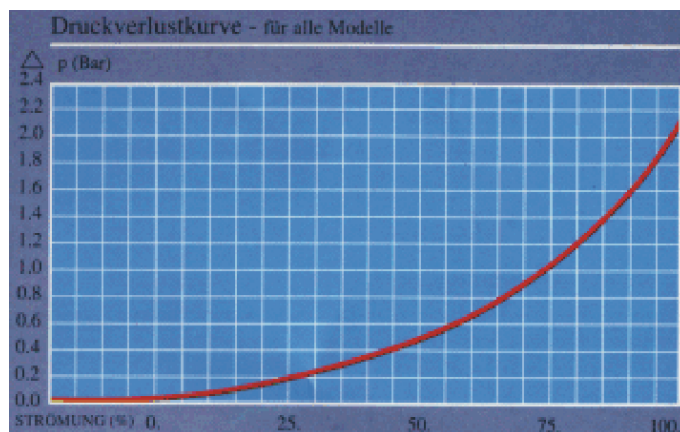
Technical Data

Parameter	Value
Permissible operating voltage	5 ... 12 VDC
Current consumption	6 ... 24 mA
Frequency range (output)	26,66 ... 800 Hz
Max. load	2,2 k
Signal tapping	Infrared (optoelectronic)
K-Factor (pulse / dm ³)	3200
Measuring range	0,5 ... 15,0 l/min
Measurement reliability	± 1% of meas. Value, at 20 °C
Linearity	± 1% at 20 °C
Viscosities	Applicable up to 15 cST.
Operating pressure	max. 6 bar at 80°C
Standard-temperature range	0°C... +65 °C
Reverse polarity protection	yes
Materials: All media-contacting parts Seals	PVDF Viton
Dimensions Length Connecting thread	47mm M20x2
Electrical connection	Cable, 750 mm long
Subject to change	

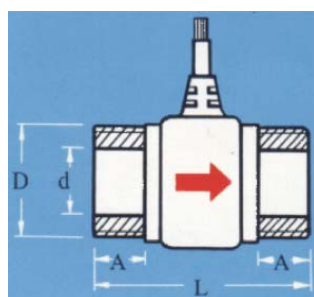
Characteristic curves and dimensions



Measurement range



Leakage of pressure



Dimensions with B.S.P (British Standard Pipe) and N.P.T. (National Standard Taper Pipe type).

A: 12,7 mm
 L: 47 mm
 D: 1/2"
 d: 13 mm



Flow sensor, Type 2

Function

The transparent fluid admitted in the direction of the arrow is guided into a circular motion via the swirl plate in the measuring chamber and directed onto the lightweight triple vane rotor. The speed of the rotor is proportional to the flow rate and is detected without feedback via the built-in optoelectronic infrared system (diode and phototransistor).

The integrated amplifier supplies a steady square wave signal, whereby the signal level is dependent on the applied supply voltage (5 to 12 V DC).

Due to the particular design of the rotor, any gas bubbles (air bubbles) which may occur in the fluid, are not dissolved, but carried along with the fluid. Any assembly position is possible. The direction of flow is indicated by an arrow on the sensor housing. Stabilizing zones up or downstream of the measuring device are not necessary.

Flow rate fluctuations or pulsations do not have a negative influence on the resulting measurement.

A protective filter is fitted on the inlet side.

All parts of the measurement housing in contact with media are made of polyvinylidene fluoride (PVDF).

Aufbau

The flow sensor is built into the pipework using adapters.

Hinweis

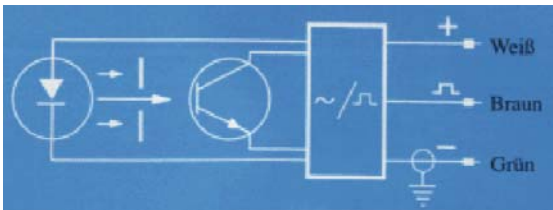
This design is: B.S.P. (British Standard Pipe)

BE.PC.0031

Flow sensor, Type 2

Note During operation, please observe the polarity of the applied voltage. The terminals are colour coded.

Operating voltage	Positive terminal	white
	Negative Terminal	green
Output signal	Square-wave signal	brown

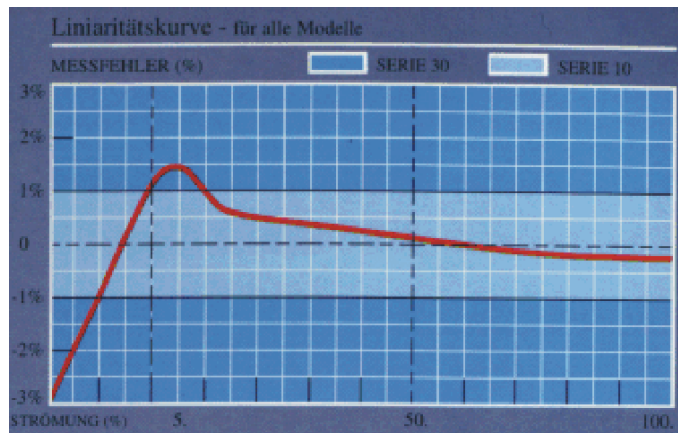


Electrical schematic diagram

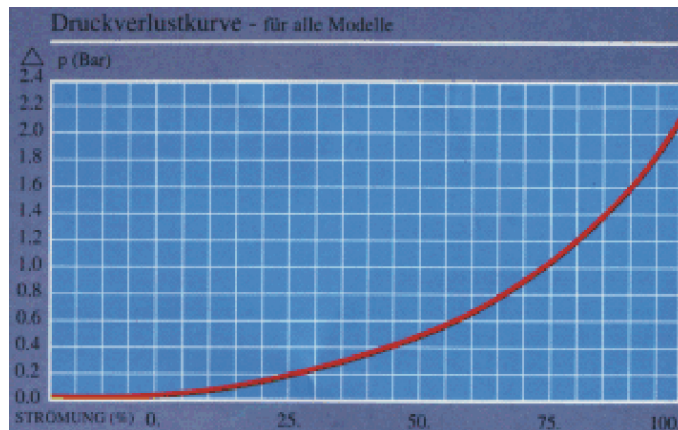
Technical data

Parameter	Value
Permissible operating voltage	8 ... 24 VDC
Current consumption	18 ... 30 mA
Frequency range (output)	40 ... 1200 Hz
Max. load	2,2 k
Signal tapping	Infrared (opto-electrical)
K-Factor (pulse / dm ³)	8000
Measuring range	0,3 ... 9,0 l/min
Measurement reliability	± 1% f. meas. value, at 20 °C
Linearity	± 1% f. meas. value
Viscosities	Applicable up to 15 cSt
Operating pressure	max. 10 bar
Standard-temperature range	-40 °C... +85 °C
Reverse polarity protection	yes
Materials: All media-contacting parts Seals	PVDF Viton
Dimensions Length Connecting thread	47mm M20x2
Electrical connection	Cable
Subject to change	

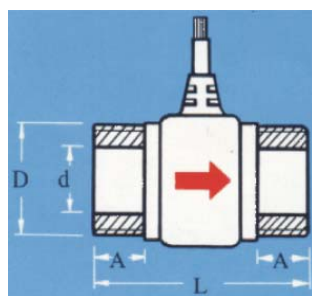
Characteristic curves and dimensions



Measurement range



Leakage of pressure



Dimensions with B.S.P (British Standard Pipe) and N.P.T. (National Standard Taper Pipe type).

A: 12,7 mm
 L: 47 mm
 D: 1/2"
 d: 13 mm

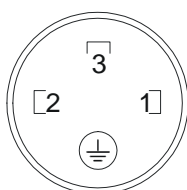


Analog pressure sensor

Function The piezoresistive analog pressure sensor with built-in amplifier and temperature compensator is fitted into a single aluminium housing. The pressure to be measured is transmitted to a piezoresistive element. The signal thus generated is amplified and output as voltage at the electrical connector.

Design The analogue pressure sensor is fitted to the piping system via a G ½" connector. The electrical connection is realized by means of a 3-pin socket.

Pin assignment



- 1 Supply voltage +24 VDC
- 2 Ground, 0 VDC
- 3 Voltage output: 0 VDC to 10 VDC

167224

Analog pressure sensor

Installation

You have to consider the following during installation:

- In- and uninstall the sensor only unpressurized.
- Screw the sensor with a torque of 45Nm.
The fitting position of the sensor is arbitrary.
- Avoid elektrostatic discharge! Connect to a ground wire!

The sensor is calibrated factory-made and is maintenance-free.

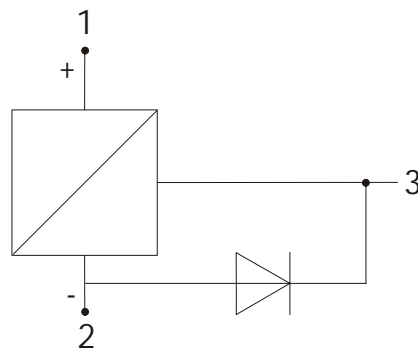
Note

Take care by connecting the sensor with the Bürkert-controller!

By switching the station off a vacuum can be produced temporarily. The analogue pressure sensor would deliver a negative output voltage. This situation would cause an error at the controller.

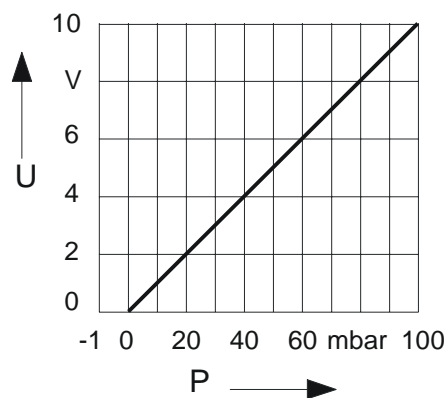
To avoid this error there has just a free wheeling diode to be installed to inhibit the negative voltage.

See the following connection diagram for details.



Connection diagram for installing the free wheeling diode.

Characteristic curve



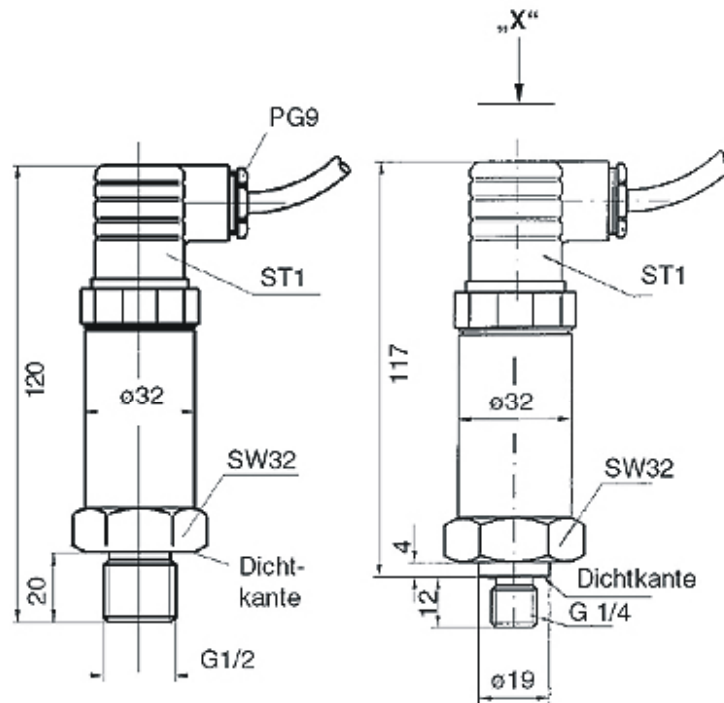
Voltage output in dependence of the pressure

Technical Data

Parameter	Value
Measuring range	0 mbar to 100 mbar
Overload	2,5 bar
Supply voltage UB	13 VDC to 30 VDC
Output signal	0 VDC to 10 VDC
Current consumption	max. 25 mA at current output max. 5 mA at voltage output
Linearity error	±0,5% f. s.
Response time	1 ms
Repeatability	±0,1% v. f. s.
Medium	Water
Membrane	Stainless steel
Standard ambient temperature	0 °C to +65 °C
Electrical connection	3-pin socket
Process connection	G ½" external screw thread, stainless steel
Weight	250 g
Temperature range	
Media	-25°C to +100°C
Electronics	-25°C to +80°C
Storage	-40°C to +100°C
Subject to change	

167224

Analog pressure sensor



Dimension diagram



Pressure sensor

Schematic diagram

Function

The pressure measurement transducer uses ceramic measurement cell as sensor. The electronics transduces the measured signal into output signals of 4..20mA, 0..20mA or 0..10V. Because of its robust design, this sensor is for use in rough industry environment as well. The maximum process temperature range must not exceed 100°C.

Design

To protect the electronics against vibrations and humidity it is infused. The zero point can be adjusted with an integrated potentiometer. It can be reached by removing one housing screw. The sensor can be connected with 2 wire or 3 wire technology. The pressure compensation is realized by a hole at top of the sensor.

BE.EL.0600

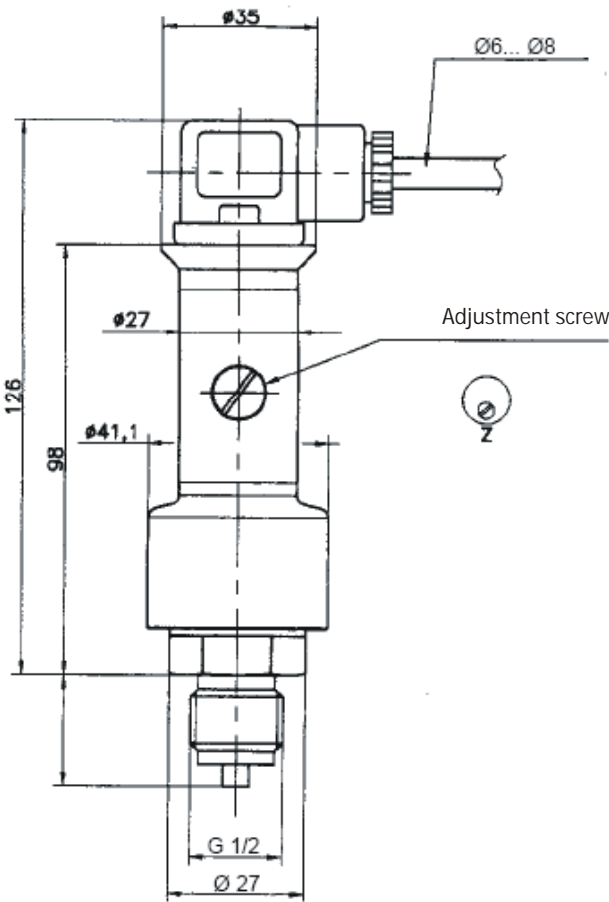
Pressure sensor

Note Watch the polarity of connected voltage supply.

Pin assignment

Parameter	Value
2-wire technology (4..20mA)	
1	positive terminal
2	negative terminal
3	not used
Earthing	connected
3-wire technology (0..20mA / 0..10V)	
1	output signal
2	negative terminal / output signal
3	positive terminal
Earthing	connected
Subject to change	

Technical diagram

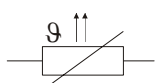


Technical data

Parameter	Value
Electrical connection	Push-in elbow connector to DIN 43650
Protection class	IP 65
Process connection	G ½
Parts in contact with measured substance	Ceramic, stainless steel, NBR-sealing ring
Measurement cell	Ceramic cell
Temperature ranges Process temperature (at max. environment temperature of 50°C) Storage temperature permissible environment temperature compensated temperature range	-25°C...+100°C -40°C...+85°C -25°C...+85°C -10°C...+55°C
Temperature influence on zero point on range	<0,25% f.E./10K <0,15% f.E./10K
Power supply nominal voltage voltage range max. permissible voltage supply	24VDC 11VDC...40VDC 40VDC
Signal output 2-wire technology 3-wire technology	4...20mA 0...20mA or 0...10V
Current limiting at output signal	At 110% of pressure range
Adjustment range	Zero point ± 10%
Characteristic curve deviation (Linearity, hysteresis, repeatability)	<0,5% f.E. (zero point adjustment)
Response time	<3ms
Load R_L max	$\frac{(U_{supply} - 11)}{0,02}$
Load at signal output 0...10V	>2,5 k
Weight	approx. 300g
Noise immunity	to DIN 50082
Subject to change	



Temperature sensor



Graphical symbol

Function

The temperature sensor contains a platinum resistance thermometer with interchangeable measuring element.

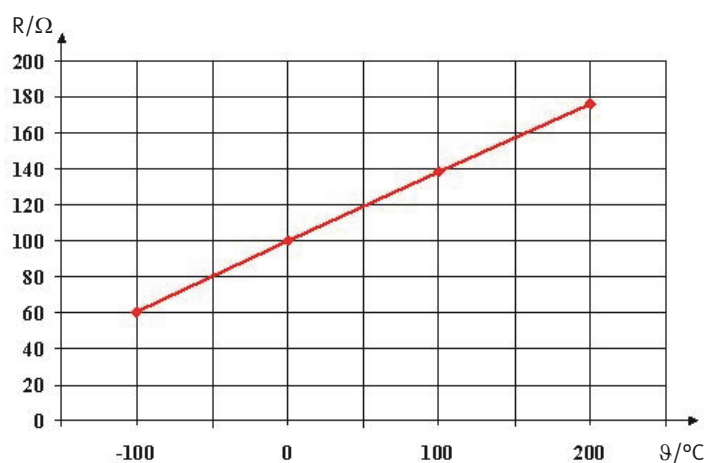
The sensor consists of a shield tube, a connection head and the measuring element. During installation, ensure as accurately as possible that the sensor accepts the temperature to be measured. Heat absorbed or given out by the sensor is to be avoided.

Design

The temperature sensor is screwed into a threaded hole in the container.

Resistance default value of platinum resistance thermometer Pt100 – as a function of temperature:

Temperature [°C]	-100,00	0,00	100,00	200,00
Basic value [Ω]	60,25	100,00	138,50	175,84



Characteristic curve of the PT100- sensor from –100°C to +200°C

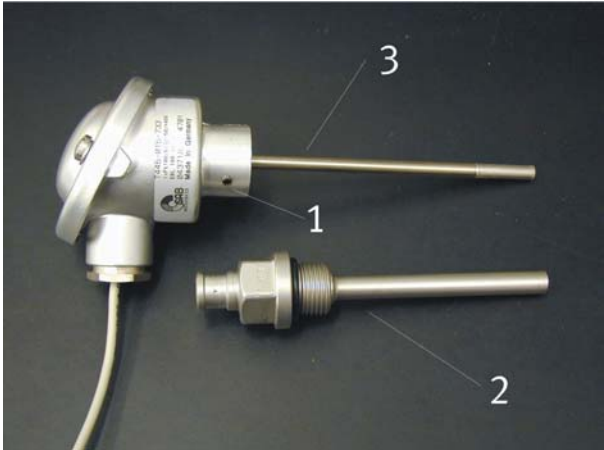
170709

Temperature sensor

Note

The permissible flow velocity for water is 3 m/s.

To disassemble the sensor there is no need to remove the whole element out of the container. Just remove the two grub screws (see figure below). After that you are able to remove the thermo element very easily.

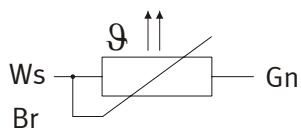


Disassembly of the sensor

- 1 Grub screw (2x)
- 2 Shield tube
- 3 Thermo element

Parameter	Value
Design	to DIN 43 763
Measurement range	-50 °C ... +150 °C
Measurement resistor	Pt 100
Tolerance	
0 °C	+/- 0,12 Ω
100 °C	+/- 0,30 Ω
Materials:	
Casing	stainless steel
Tube protector	stainless steel
Dimensions	
Length	100 mm
Measuring element length	145 mm
Screw thread	G 1/2"
Electrical connection	Cable, 750 mm long
Subject to change	

Pin assignment



Die nachfolgende Tabelle enthält die Darstellung des digitalisierten Messwertes für den Temperaturbereich Standard des Gebers.

Simatic S7
range of values

Temperature range Standard PT 100 850°C	decimal unit	hexadecimal unit	Range
>1000,0	32767	7FFF _H	Overflow
1000,0 . . 850,1	10000 . . 8501	2710 _H . . 2135 _H	Oversteer
850,0 . . -200,0	8500 . . -2000	2134 _H . . F830 _H	Nominal range
-200,1 . . -243,0	-2001 . . -2430	F82F _H . . F682 _H	Understeer range
<-243,0	-32768	8000 _H	Unterlauf

162844

Pressure gauge



Pressure gauge



Symbol

Description

This pressure gauge (to EN 837-1) is designed for pressure measurement and display in controls.

The maximum pressure at continuous operation (dead load) is at $\frac{3}{4}$ of the full scale value. The Pressure gauge is free of paint-wetting impairment substances.

162844

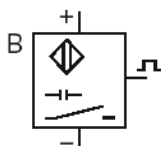
Pressure gauge

Technical data

Parameter	Value
Nominal diameter	63 mm
Indicating range	0...1 bar
Operating pressure	0...0,7 bar
Medium	Liquid and gaseous media (not permissible: oxygen, acetylene)
Design	Bourdon tube pressure gauge
Connection	G1/4(Type MA-40-...-1/8-EN: R1/8)
Anschlusslage	Rear side (centrically)
Temperaturbereich	-20°C...+60°C
Measuring device class (DIN 16005/EN 837-1)	2,5
Vibration resistance (DIN IEC 68-2-6/EN 837-1)	5 m/s ² at 10 ... 150 Hz
Resistance to shocks (DIN IEC 68-2-27/EN 837-1)	150 m/s ² at 11 ms
Protection class	IP 43
Materials Housing Window shield Dial Labelling Connection thread	PS, black SAN ABS white black, blue Brass
Subject to change	



Capacitive proximity sensor



graphical symbol

Function

The operational principle of a capacitive proximity sensor is based on the evaluation of the change in capacitance of a capacitor in an RC resonant circuit. The capacitance increases, when an object approaches the proximity sensor. This leads to a change in the oscillating action of the RC circuit which can be evaluated. The change in capacitance largely depends on the distance, the dimensions and the dielectric constant of the respective material.

The proximity sensor has a PNP output, i.e. the signal line is switched to positive potential in the switched status. The switch is designed in the form of a normally open contact.

The load is connected between the sensor signal output and earth. A yellow light emitting diode (LED) indicates the switching status.

The capacitive proximity sensor cannot be flush fitted.

Design

The capacitive proximity sensor can be attached via an angle bracket and two lock nuts. The sensor is of cylindrical design with an M18x1 thread.

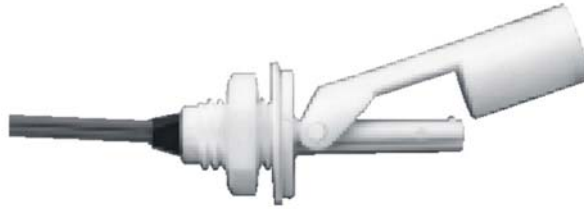
Capacitive proximity sensor

During operation, please observe the polarity of the applied voltage. The terminals are colour coded.

- 1 Oscillator
- 2 Demodulator
- 3 Trigger state
- 4 Switching status display
- 5 Output stage with protective circuit
- 6 External voltage
- 7 Internal constant voltage supply
- 8 Capacitor with active zone
- 9 Switch output

Technical Data

Parameter	Value
Permissible operating voltage	10 ... 55 VDC
Switch output	PNP, Normally open contact
Nominal switching distance	2 ... 8 mm
Hysteresis (at nominal switching distance)	3 ... 15 %
Maximum switching current	200 mA
Maximum switching frequency	300 Hz
Current consumption during idling (at 55 V)	7 mA
Permissible ambient operating temperature	20 °C ... +70 °C
Degree of protection	IP 65
Reverse polarity protection, short circuit strength	yes
Materials (housing)	Thermoplast
Weight	0,20 kg
Electrical Connection	Cable, 2000 mm long
Subject to change	



Float switch

Function

This float switch is designed to be mounted lateral into compact containers. Because this sensor is made from versaplast, it can be used with temperatures up to 150°C. That are up to 50% more than sensors made from other plastics.

Versaplast is a special development of the sensor-manufacturer.

Versaplast is usable with water, oil and all chemicals where nylon could be used with, too.

This switches are ideal for the use in the food industry,

The switch is ideal for the use in food industry, medical technology, for motor oil and water treatment.

With a long life the sensor delivers exact and repeatable results in control of high, low and other levels.

The mounting is done with a ½" NPT external thread. The switch works in a range of – 40° C to 150° C and a pressure 7 bar/20° C.

The method of operation is simple and is based on the level change of the liquid.

The magnet integrated into the floating body operates a Reed-switch hermetically closed into the housing.

Through rotation of the switch from 180° the Reed-switch is used as a normally open switch or a normally closed switch.

Arrows on the housing ease the mounting. The electrical connection is done with a 60 cm long cable.

The sensor is mounted from inside of the container.

BE.PC.0028

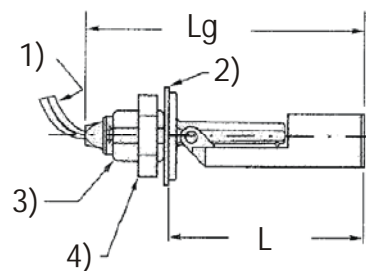
Float switch

Technical data

Parameter	Value
Materials	
Floating body	Versaplast Polypropylen**
Cable	Nylon* PVC
Temperatures	
Versaplast	-40°C bis 121°C
PP	-40°C bis 107°C
Nylon	-40°C bis 121°C
Min. density of liquids	
Versaplast	0,80
PP	0,55
Nylon	0,65
Operating pressure	7 bar
Reed-switch	20 VA
Cable (length approx. 0,6m)	22 AWG
Way of floating body	55 mm
Protection to DIN 40050	IP64
Weight (approx.)	80g
Subject to change	

* Not appropriate for long use in water. ** Not appropriate for mineral oil.

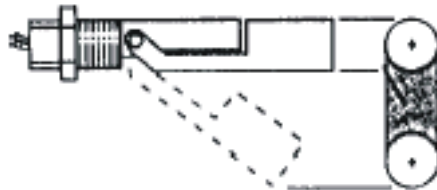
Dimensons



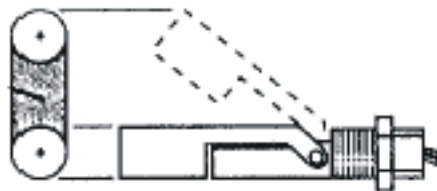
- Lg: 101,6 mm
- L: 69,8 mm
- 1) 610 mm
- 2) Seal Buna ,N'
- 3) 5/8"
- 4) Lock nut, Nylon

Mounting

By rotation of the floating body to 180 degree the switching function can be reversed. When the arrow on the housing points to the top, the switching function is normally opened.



If the floating body is sinking with the level of the liquid the switching function is normally opened.



If the floating body is rising with the level of the liquid the switching function is normally closed.

Electrical pin assignment

Parameter	Value
Positive terminal	red plug-pin: 1
Negative terminal	black plug pin: 3
Pin 2 is not used	



Float switch

Function

This float switch is optimally usable for flat tanks or at a shortage of space. It is designed only for vertical mounting.
The measured medium pushes floating body upwards and activates a switch at a defined position.

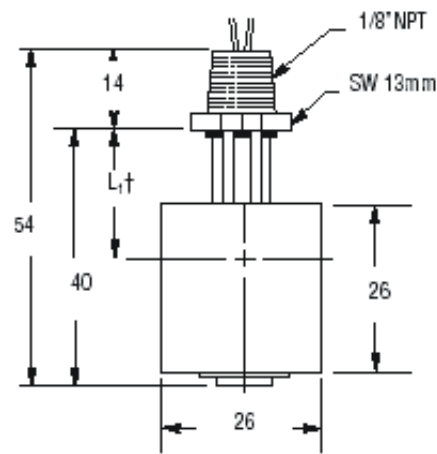
Technical data

Parameter	Value
Materials Switch pipe Floating body	Polysulfon Polysulfon
Temperature Cable Standard wire	-40°C...+80°C -40°C...+107°C
Immersion depth of the floating body at density 1:	~ 15 mm
Operating pressure	3 bar
Min. density of the liquid:	0,75
Reed- switch-Type:	SPST 50 VA cable SPST 20 VA wire
Electrical connection (Length approx. 0,6 m)	Cable: 0,34 mm ² PVC Wire: AWG 22 PVC
Protection to DIN 40050	IP64
Weight (approx.)	20g
Screw thread	1/8" NPT
Subject to change	

BE.PC.0027

Float switch (overflow)

Dimensions



L₁= Switch activation when the nominal level is reached (related to the specific Weight 1,0)
Polysulfon switch: 19,0 mm

Electrical pin assignment

Parameter	Value
Positive terminal	red Plug-pin: 1
Negative terminal	black Plug-pin: 3
Plug pin-2 ist not used	



Pump

Typical operational area

- Circulating pump for water, antifreezing mixture in heating installations in cars, boats, caravans etc.
- Circulating pump for cooling the freshwater in caravans.
- All-purpose-pump where no self-priming is needed.

Installation instruction

The pump is a self-priming centrifugal pump and has to be flooded before operation. Avoid the pump running dry. Running the pump dry for a short time doesn't damage the pump, if the time is shorter than 30 min. After 30 min. the pump will be useless. While running the pump dry, a special noise can be heard.

Attention: The pump always has to run in the prescribed direction.

The motor is suitable for continuous operation. The pump must not be used for sea water or contaminated fluids.

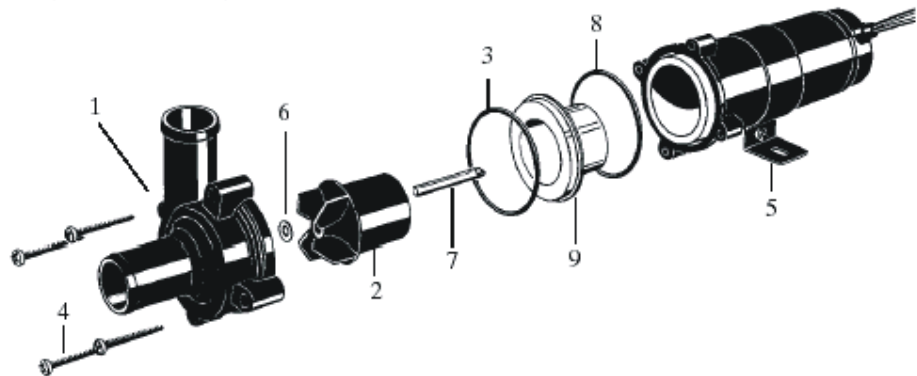
The pump can be mounted horizontally or vertically. If mounted vertically, the motor must be mounted above the pump body. If mounted horizontally, the output of the pump must point upwards.

170712

Pump

Design

The pump is attached via a ring clamp, which is mounted on the profile plate by means of two screws and T-head nuts.



Exploded view of the pump

- 1 Housing, $\varnothing 20$
- 2 Blade wheel
- 3 O-ring seal
- 4 Screw
- 5 Engine mounting
- 6 Shim
- 7 Driveshaft
- 8 Seal
- 9 Solenoid housing

Note

During operation, please observe the polarity of the applied voltage. The terminals are colour coded.

Operating voltage	Positive terminal	red
	Negative terminal	black

The max. length of the cable is 44m at:

Cable: 1,0mm²

Voltage supply: 24V

Technical data

Parameter	Value
Pump housing	Plastic (PPA, GF 30%)
Driveshaft	Stainless steel
Wear plate	Stainless steel
O-ring seal	EPDM
Blade wheel	Corpus: Plastic (PPS, GF 40%) Magnet: Ferrite
Magnet housing	Plastic (PSU, GF 30%)
Motor flange	Plastic (PA66, GF 30%)
Motor housing	Stahl, eisenzinkbehandelt, schwarzchromatiert
Motor cover	Plastic (PA 66, GF 30%)
Screws	Steel
Motor	permanent magnet motor 12/24V
Motor mounting	Aluminium
Protection class	IP67 (DIN 40050)
Connection	20mm (¾")
Noise suppression	EN 55014
Temperature ranges	
Fluid	-40°C bis + 100°C
Ambient	-40°C bis +70°C
Max. system pressure	2,5 bar
Voltage supply	24 V
Power	26 W
Subject to change	

170712

Pump

Pressure of power

Pressure (bar)	Flow(l/min)	Current at 24V (A)
0,1	26	1,1
0,2	19,5	1,0
0,3	9,0	0,75
Measured values are at a connection of $\frac{3}{4}$ " (20 mm)		
Subject to change		



Proportional valve

Function

The proportional valve facilitates flow control of neutral gases and fluids. It can be used as a remote controllable final control element or in closed control loops.

The proportional valve is a directly actuated 2/2- way valve. The valve piston is lifted of its seat as a function of the solenoid coil current and releases the flow from connection 1 to connection 2. Once the valve is de-energised, it is closed via a reset spring.

Design

The proportional valve is mounted on an angle bracket and can be attached to an MPS profile plate using a screw and T-head nut.

170714

Proportional valve

Technical data of the valve

Parameter	Value
Permissible operating voltage (to be connected to control electronics)	24 VDC
Power consumption (solenoid)	8 W
Rated duty	Continuous operation
Degree of protection	IP 65f
Nominal size	6 mm
Operating pressure	0 to 0.5 bar
Ambient operating temperature	max. +55 °C
Response sensitivity	0,5 % of final value
Repetition accuracy	0,5 % of final value
Flow media	Neutral media e.g. water, compressed air
Temperature of medium	0 °C to +65 °C
Materials Housing Internal valve parts Seal	Brass Stainless steel FPM
Dimensions Height with plugged in control electronics Length	108 mm 46 mm
Pipe connection	G 1/4
Electrical connection	Pins for the control electronics
Subject to change	

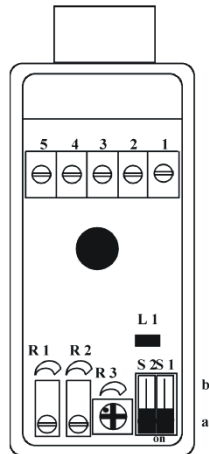
Technical data of the control electronics

Parameter	Value
Permissible voltage supply	24 VDC bis max. 28 VDC
Residual ripple	max. 10 %
Input signal	0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA
Input resistance	16,8 kΩ
Power consumption	0,5 W
Current consumption at approx.. 24V	Approx. 18mA
Ambient operating voltage	max. +55 °C
Material (Housing)	Plastic
Electrical connection	Screwed cable connector 7mm screw terminals in housing
Subject to change	

170714

Proportional valve

Pin assignment



- | | | |
|---|------------------------------|---------|
| 1 | Protective earth (PE) | |
| 2 | Voltage supply (24 – 28 VDC) | (brown) |
| 3 | Common ground | (blue) |
| 4 | Nominal signal input | (black) |
| 5 | Monitor output | |

Setup potentiometer

- | | |
|-------|--|
| R_1 | minimal flow (point of origin) |
| R_2 | maximum flow (gain) |
| R_3 | Ramp time (ascending and descending equal) |

Switch and display

- | | |
|-------|---|
| S_1 | Switch to interchange the triggering frequency |
| a | (on) middle frequency |
| b | (off) low frequency |
| S_2 | Switch to deactivate the point of origin- switching |
| a | (on) point of origin deactivation inactive |
| b | (off) point of origin deactivation active |

LED display

Shines when the solenoid coil is energised
LED does not shine when:

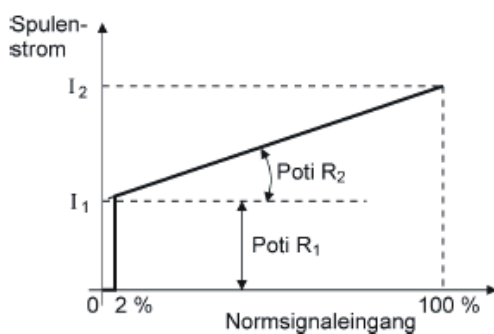
- The voltage supply is missing
- Input signals are less 2 %
- Active point of origin deactivation is enabled

Notes

The point of origin deactivation guarantees the closing of the valve at input signals $< 2\%$ of the maximum value.

Therefore the solenoid coil current is set to zero electronically, when the input signal is below 2% (e.g. 0,2 V at nominal signal input 0 .. 10 V) (See figure below)

The point of origin deactivation can be activated by a DIP-switch.



Characteristic curve

Notes for installation

Closed loop flow control

- Setup of the switches
S1 down (ON)
S2 up (OFF)
- Setup of the potentiometers R1 with a Bürkert- controller connected

The container has to be filled to the lowest level. The setup of the controller has to be done already.

Switch on the pump and the valve.

Close the hand valve between pump and tank.

Setup Y(signal power out) 10%

Push button as long until Y appears in the upper line.

The button in the upper right corner should not shine, if it does please push again. After that setup Y with the arrow buttons.

Turn R1 CW carefully. Stop as soon as the water starts to flow. (Display Flowmeter I at the controller)

After that turn CCW carefully.

Pressure control

- Switch position
S1 down (ON)
S2 up (OFF)
- Setup of the R2 Potentiometer in St2:

Set Y to 90 %. Turn R2 CW, Stop as soon as the value of I doesn't rise anymore (max. flow approx. 2.5 m/s).

Precision adjustment: adjust CCW to exact point of reverse.

Control R1 once again!

The setup of R2 can change the value of R1 as well!

After this setup, setup the controller to remote mode.

Press ENTER and SELECT for min. 5 sec. At the same time, then press SELECT 6 times, the display shows extras.

Press ENTER, the display shows speech. Press SELECT, serial is shown.

ENTER Local SELECT

Remote ENTER and ENTER ENTER Serial SELECT*7time. End a ENTER

Exreas SELECT End a ENTER.

CW= clockwise

CCW= counterclockwise



Heating

- Function** The heating unit is operated using 230 VAC. The conducting connections are within the earthed housing.
The heating unit is switched on and off via a relay. The control voltage of the relay is 24 VDC.
- Design** The heating unit is screwed into a 50 mm hole in the container by means of a hexagon heat.
- Note** Do not use the heating unit unless the heating element is fully immersed in the fluid.

Technical data of the heating

Parameter	Value
Heating capacity	1000 W / 230 VAC
Control voltage	24 VDC
Dimensions	
Heating element	150 mm x Ø 20 mm
Screw thread	G 1 ½"
Materials (casing –heating element)	Stainless steel
Connection	
Heating unit	Mains cable with plug, 2000 mm long
Control connection	3-pin socket
Subject to change	

170713

Heating

Technical data of the relay

Parameter	Value
Control voltage	24 VDC
Max. coil temperature	140°C
Max. coil capacity	2,8W
Nominal operating temperature	-55°C...+85°C
Housing	Unsealed housing
Subject to change	

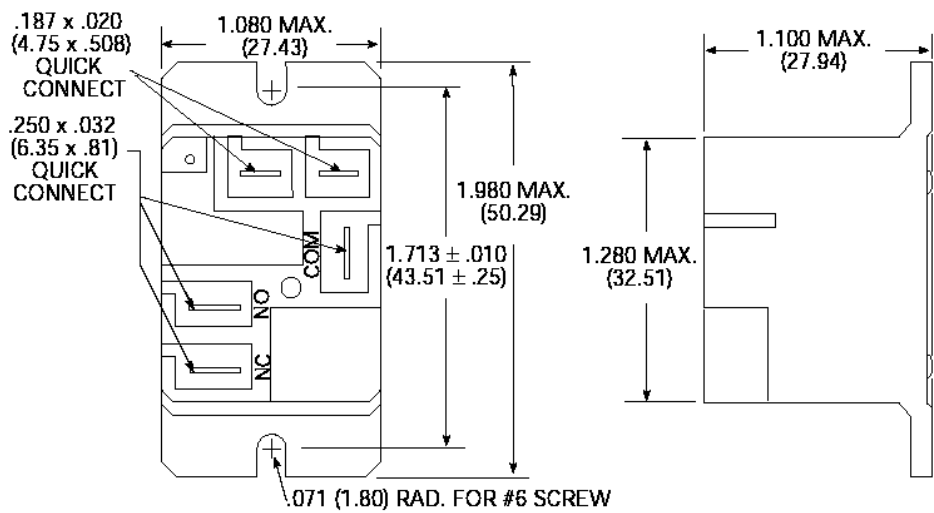
Pin assignment

Parameter	Value
Negative terminal	blue Plug-pin: 2
Positive terminal (signal)	black plug-pin: 3

Note

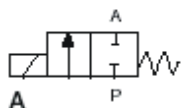
Pin 1 is not used

Dimensions of the relay





2/2-way solenoid valve



Graphical symbol

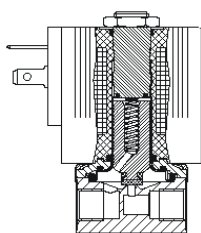
Function	The 2/2-way solenoid valve is a direct controlled valve. If the coil is out of current, the valve is closed by a spring.
Design	The 2/2-way solenoid valve is mounted with plug connectors into the piping.
Mounting position	The mounting position of the valve is arbitrary, preferably drive unit to the top.
Medium	Neutral gases and liquids as e.g. compressed air, town gas, water, hydraulic oil, steam, technical vacuum.
Electrical connection	Plug vanes to DIN 43650 A for a connector socket Type 2508.
Note	For a firm attachment, a pipe clamp may be fitted in front and behind the valve.

170715

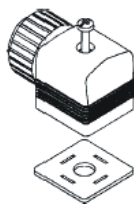
2/2-way solenoid valve

Technical data

Parameter	Value
Connection	15 mm
Nominal size	6 mm
Pressure range	0...0,5 bar
Temperture range (with plastic connectors)	0...+65 °C
Sealing materials	FPM, EPDM, PTFE/Graphit
Media temperatures at FPM at EPDM at PTFE/Graphit	-10 to +100°C -30 to + 120°C to +180°C
Operating voltage	24 VDC ±10%
Switching time(Measured at the valve output at 6 bar and +20°C) Opening, pressure built-up 0 to 90% Coloding, pressure reducing 100 to 10%	20 ms 30 ms
Switching frequency	Approx.. 1000/min.
Viscosity of usable media	max. 21 mm²/s
Powerconsumption	8 W
Kv-Value of water (Measurement at +20°C, 1 bar at the valve input and open (free) output	0,55 m³/h
Subject to change	

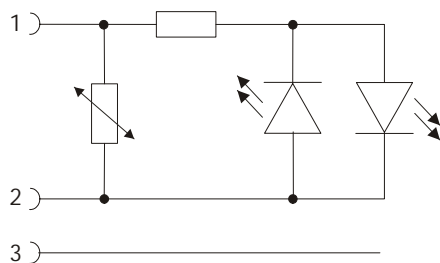


Cutaway view



Plug

Electrical connection



- 1 24V (black)
- 2 Ground(black)
- 3 PE (green/yellow)



Solenoid valve

Function Through electrical reversing the valve pressurises the following piping alternately or simultaneously.

- The solenoid valve is for controlling pneumatical actuators.
- Only use the valve with pressurised air of quality class 5 to ISO 8573-1. The usage of liquids and gases is not intended.
- The solenoid valves can be used with the specified operating conditions*) and in dependance of the used explosion-proof solenoid coils in the zones 1 and 2 of hazardous gas-atmosphere.

Warning The explosion-proof specified solenoid valves are only for the use with explosion-proof specified solenoid coils in hazardous areas to the specified operating conditions*)

If a valve of explosion-proof category 2 G is combined with a solenoid coil of explosion-proof category 3 GD the whole system has an explosion-proof category 3 G

If a valve of explosion-proof category 2 G is combined with a solenoid coil of explosion-proof category 2 GD the whole system has an explosion-proof category 2 G

If a valve of any explosion-proof category is combined with a solenoid coil with no explosion-proof category the whole system has no explosion-proof category.

Note The draw-in of air from explosion-proof areas is not intended.
Use the valve only in original status without own-done changes. If changes are not done by the manufacturer the certification is no longer valid.

Commissioning Watch the specifications on the rating plate. Mounting and commissioning only by authorised persons to the instruction manual.

535987

Solenoid valve

An electro static discharge can cause electrical sparks.

Use only piping with max Ø of 20mm.

For equipotential bounding connect all materials from metal and earth the whole system.

Comply with all national and international specifications. For manifold assembly use the specified common supply manifolds.

The mounting of the solenoid coils at the electrical controlled valves is done by spring washer and a knurled nut. The tightening torque is 1...1,5 Nm

Impacts on the valve (with corroded metals or light metals) can cause electrical sparks. Never use tools with corroded surfaces. Protect the product from down-falling subjects. Only use specified accessories*)

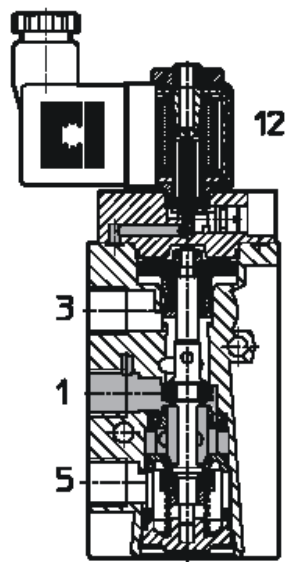
Avoid mechanical stress. Close unused connections with blanking plugs or slot covers.

Maintenance

Dust deposits on heated surfaces are simply inflammable Clean the product continuously. Maintenance the valve after 5 mill. cycles or 5 month.

Parameter	Wert
Switching interrupts	1. Control the switching fuction of the valve if there are fluctuations of the current consumption , signal errorsor signal delays. 2. Avoid the contamination of the valve with dirt paricles . 3. Exchange the valve
Deceleration of switching times	
Audible Leakage at the connections	Control the tightening of the connections
Incomplete pressurising of an outlet	Ensure a constant pressure in the system
Subject to change	

Schematic diagrams

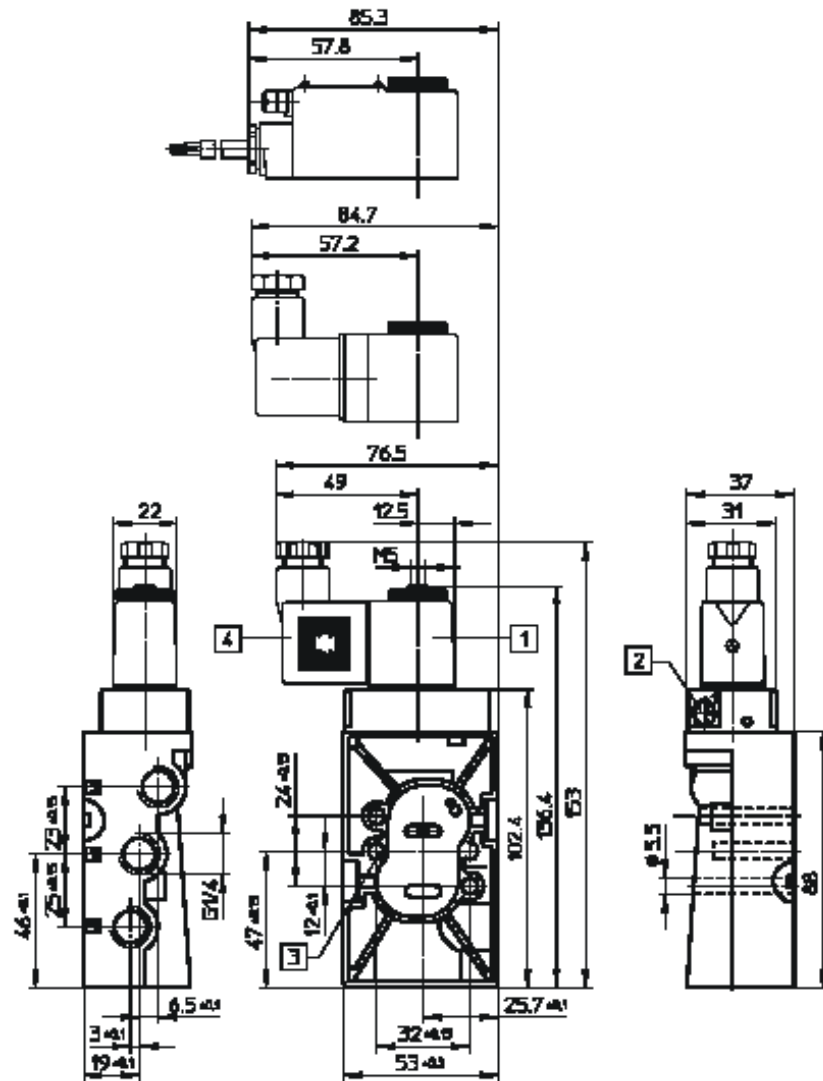


Cutaway view

- 1: Supply ports
- 3,5: Exhausts
- 12: auxiliary pilot air connection

535987

Solenoid valve



Dimension

- [1]: Solenoid coil 360° turnable
- [2]: Drilled hole for coding plug
- [3]: Manually operating switch, 180° turnable
- [4]: Connection plug, 180° turnable

Electrical connection

The assignment of the two pins is interchangeable.

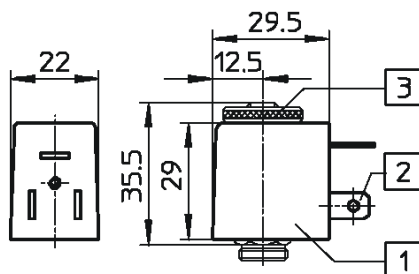


Solenoid coil

Function

This solenoid coil is characterised by a less power consumption and a less heating. It is in compliance with VDE regulation 0580, insulation class F. They can be replaced without interrupting the pneumatic circuit. The solenoid coils can be used for manifold mounting. The minimum clearance from coil to coil is 5mm.

Dimensions



- [1]: The solenoid coil can be rotated 360° on the armature tube.
- [2]: Plug pins
- [3]: Tightening torque for the securing nut: min. 100 Ncm, max. 150 Ncm

34411

Solenoid coil

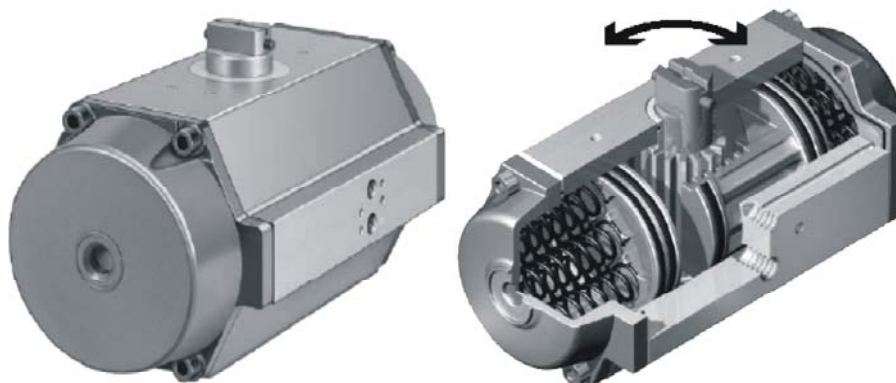
Technical data

Parameter	Value
Voltage supply	24 VDC
Permissible voltage fluctuation	±10%
Power consumption	5,65 W
Duty cycle	100%
Protection class to EN 60 529	IP 65 mit plug socket
Electrical connection	Moulded-in cable 3x0,75 mm ² , 1 m or 5 m long (other lengths upon request)
Ambient temperature	-5 ... +40 °C
Temperature of medium	-5 ... +40 °C
Minimum pickup time	12 ms
Materials	Steel, Cu, Al, epoxy resign
Weight	0,175 kg
Subject to change	

Electrical connection

Parameter	Value
Positive pin	plug-Pin: 1
Negative pin	plug-Pin: 2
Protective earth (PE)	plug-Pin: 3

The positive and the negative connection can be interchanged. The connection to protective earth depends on the application.



Copar quarter turn actuator



Symbol

Function

Festo Copar quarter turn actuators are ideally suited for use in water, sewage, industrial process water and silage technology, as well as the paper and bulk goods industry. Sturdy, but nevertheless accurate for high precision positioning, especially with ball valves and plug valves, as well as shut-off and butterfly valves.

- Direction of rotation can be optionally changed from clockwise to anticlockwise
- Torques graduated in accordance with ISO
- End-position sensor and limit switch module can be mounted directly to the drive
- Fast or slow valve actuation
- Suitable for manual on-site use, as well as automatic operation
- Resistant to overload and continuous loads
- Can be used as a variable-speed actuator in combination with an electro-pneumatic positioning controller
- Opening and closing are controlled with a flange-mounted solenoid valve with Namur port pattern
- Highly corrosion resistant
- Optionally adjustable end positions for sizes 8 ... 100, facilitating adjustment ranges of -4° ... $+8^{\circ}$ and 74° ... 98°
- Port pattern to Namur (VDI/ VDE 3845) for attaching solenoid valves



Port pattern to Namur

189781

Copar quarter turn actuator

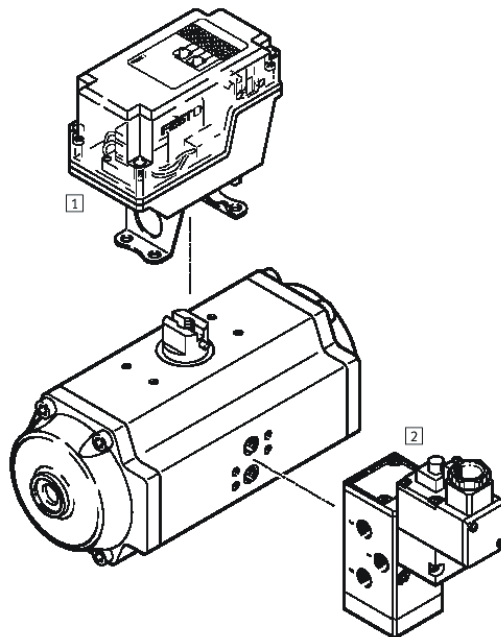
Note

There are various designs of actuators, so the figures above can differ to your design.

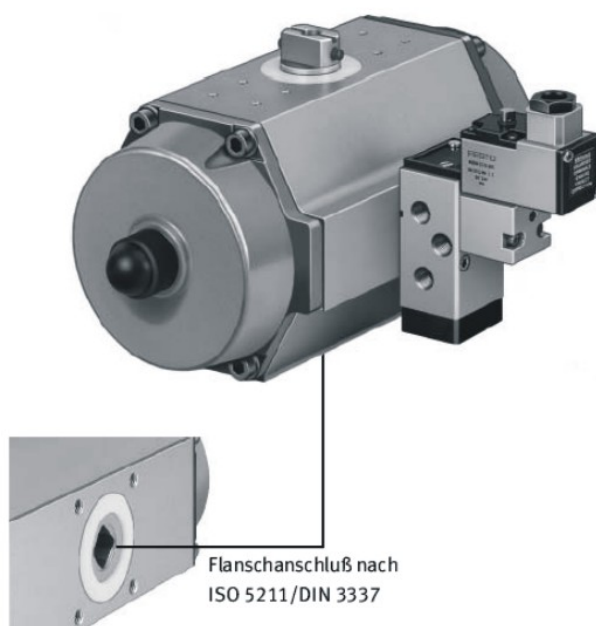
Mounting

The mounting position is arbitrary.

Connection options



- [1] End-position sensing attachment (see data sheet limit switch attachment)
- [2] Solenoid valves with port pattern to VDI/VDE 3845



Flange connection

Sizing information

Breakaway torque for the process valve

The torque required to facilitate reliable opening of the valve's shut-off device (disc in a butterfly valve, ball in a ball valve ...) under the specified operating conditions (medium, temperature, inline pressure, etc.).

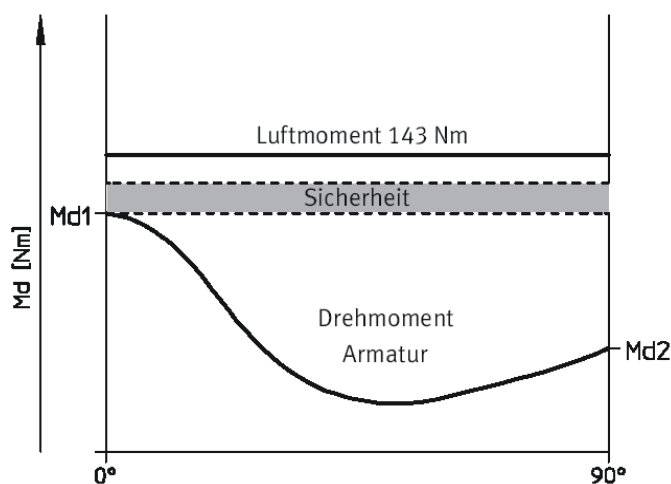
The main operating conditions must be known before the breakaway torque can be specified by the valve manufacturer or correctly derived from existing tables:

- Medium
- Temperature, concentration, viscosity of the medium
- Gas or liquid, lubricating or nonlubricating
- Presence of particles that form deposits or caking
- Differential pressure at the process valve
- Required safety factor

If no safety factor is specified, a factor of at least approx. 1.2 (20% safety) should be taken into account when sizing the quarter turn actuator.

Compressed air supply

The minimum compressed air pressure available at all times at the valve to be sized forms the basis for sizing (worst-case analysis). This gives a minimum torque of 120 Nm for the quarter turn actuator. The torque tables for double-acting quarter turn actuators propose the actuator with the designation DRD-14-F05 from the Copar series. This actuator has a torque of 143 Nm at compressed air pressure of 6 bar.



Relationship of the actuator to the butterfly torque valve curve

0° = Valve closed 90° = Valve open

M_{d1} = Breakaway torque M_{d2} = Closing torque

189781

Copar quarter turn actuator

This torque is constant across the entire swivel range (0° ... 90°) thanks to the rack-and-pinion design and is therefore sufficient for the valve.

Type designation

- DRD-1-F03
 - Flange pattern F03
 - Size 1
 - Double acting rotary actuator

Technical data

Parameter	Value
Design	Piston zylinder, double-acting
Operating pressure	2,5 ... 10 bar
Temperature range	-20 ... +80 °C (Einsatzbereich der Näherungsschalter beachten)
Materials <ul style="list-style-type: none">HousingFront capShaftExternal screwsSales	Aluminium, painted GFK Aluminium Stainless steel Polyurethane, Perbunan, POM
theo. torque [Nm] at operating pressure <ul style="list-style-type: none">2 bar3 bar4 bar5 bar6 bar7 bar8 bar	2,48 3,72 4,96 6,2 7,44 8,68 8,68
Weight	600 g
Consumption at 6 bar	0,72 l/stroke
Subject to change	



Semi rotary drive

Symbol



Function

The DAPS Sypar is a semi-rotary drive which is entirely adapted to the requirements of the process industry. The Sypar semi-rotary drive is used to control process valves through which various media flow, and, thanks to its rugged design and torque gradations, is above all suitable for use in process industry equipment. The DAPS is used on valves, predominantly with angles of rotation restricted to 90 degrees such as ball valves and butterfly valves.

Mounting

The mounting of the actuator is arbitrary.

533417

Semi rotary drive

Type designation

Series	Nominal torque	Swivel angle	Closing direction	Method of operation	Spring force	Connection	Alternativ connection
--------	----------------	--------------	-------------------	---------------------	--------------	------------	-----------------------

- DAPS-0015-090-R-F03

Parameter	Value
Series (DAPS)	D=Drives A=adapted constructions (Industry solution) P=Industry: Process automation S=Scotch-Yoke (as against: Rack-Pinion)
Nominal torque (number, four-digit)	Nominal torque [Nm]. The specification of the nominal torque is Die Angabe des Nennmomentes ist branchenüblich, daher steht hier nicht der Kolbendurchmesser.
Swivel angle (number, four-digit)	Swivel angle in degree. Hubgröße für alle Rotationsantriebe.
Direction of closing	R: right closing L: left closing
Method of operation - S	double acting S: Spring Return / single-acting
Spring force - 1 2 3 4	not at double-acting Spring force at connection pressure 2.8 bar Spring force at connection pressure 3.5 bar Spring force at connection pressure 4.2 bar Spring force at connection pressure 5.6 bar
Anschluss zur Armatur Flange with pattern to ISO 5211.	Fxx One pattern Fxx/yy Two concentrically patterns
For xx and yy	03 flange-pattern F03 04 flange-pattern F04 05 flange-pattern F05 07 flange-pattern F07 10 flange-pattern F10 12 flange-pattern F12 14 flange-pattern F14 16 flange-pattern F16
Subject to change	

Technical data

Parameter	Value
Dimension (Profile cross section–rectangle rounded)	50 mm
Square	V11
Medium	Dried air, with or without oil, or gasses which are compatible with the actuator oil. If oiled the oil has to be compatible with NBR. (manufacturer specification)
Consumption (volume) for 1 cycle (Hubraum)	0,06 l/cycl.
Connection thread	1/8"
Switching times Min. switching time, open close Cycle	0,04 s 0,04 s 0,08 s
Service life	1 Mio. cycles
Operating temperature	-20°C bis +80°C
Corrosion resistance	FN 940 070 Part 1, KBK3
Weight	0,75 kg
Subject to change	

533417

Semi rotary drive

Characteristic pressure values

Definitions and conditions for measurements to FN 942 022:

Characteristic pressure values drive units short-time

Supplementary there are the following definitions to specifications respectively the factory standard of the manufacturer:

Through-travel pressure "drive unit long rest"

Opening and closing without load after 15 days rest

Through-travel pressure "drive unit warm"

Opening and closing

New test specimen without load after 2 hours continuous duty.

Bursting pressure:

Test of both chambers with oil pressure to crack initiation or cab open

Test value: "Maximum supply pressure allowed * 3"

Parameter	Value
Through-travel pressure "drive unit long rest"	0,4 bar
Through-travel pressure "drive unit warm"	0,25 bar
Min. operating pressure	1 bar
Nominal pressure (for torque specifications DW)	5,6 bar
Max. pressure	8,4 bar
Bursting pressure	>25,2 bar
Subject to change	

Leakage

Definitions and conditions for measurement to FN 942 014: Measurement of small flows.

Supplementary there are the following definitions to specifications respectively the factory standard of the manufacturer:

Method for measuring leakage:

Measured is the leakage from chamber A to chamber B and from chamber B to chamber A. Therefore the drive unit is dived and the pressure side pressurized. From the other side one outlet leads into water.

Test conditions:

6 bar at the pressure side, upper edge of the drive unit 20 mm under water, leakage outlet pipe 10 mm under water.

Measurement:

Counting the blebs per time at the outlet pipe, bleb-cross-section is 6mm.

The specifications are as well blebs/10sec as in NL/h

Measurement time:

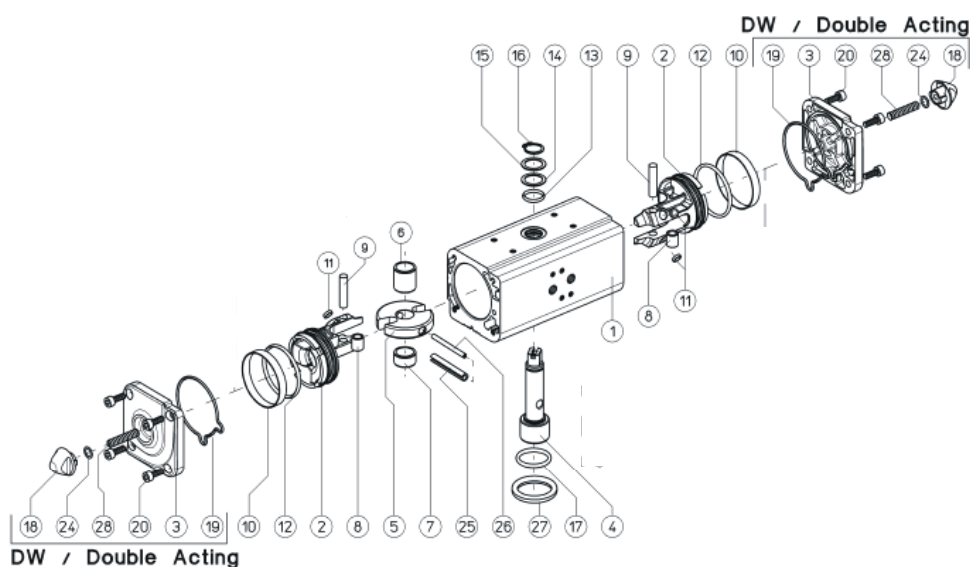
2h

Max permissible leakage [NI/h]: 0,04

Adjustable end stops

Only one of the two end stops is adjustable, normally the closing position will be adjusted. Therefore there are two adjusting screws in the side cabs which act on the both pistons.

End position	End position 0°	End position 90°
End position adjustments	No adjustments	Adjustment range $\pm 5\%$



- | | | | |
|----|----------------------------------|----|---------------------------------|
| 1 | Cylinder | 15 | Washer |
| 2 | Piston | 16 | Circlip |
| 3 | Cab | 17 | Down shaft- o-ring (leak proof) |
| 4 | Shaft | 18 | Thread nut |
| 5 | Scotch Yoke | 19 | Cab- o-ring |
| 6 | Sleeve | 20 | Screw |
| 7 | Shaft sleeve | 21 | (not available) |
| 8 | Sleeve | 22 | (not available) |
| 9 | Spacing sleeve | 23 | (not available) |
| 10 | Dynamical seal | 24 | O-ring |
| 11 | Piston guide | 25 | External, elastic Yoke- pin |
| 12 | Piston O-ring | 26 | Internal, elastic Yoke- pin |
| 13 | Upper shaft- o-ring (leak proof) | 27 | Centering sleeve |
| 14 | External O-ring | 28 | Stroke adjust screw |

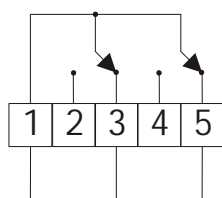


Limit switch attachment

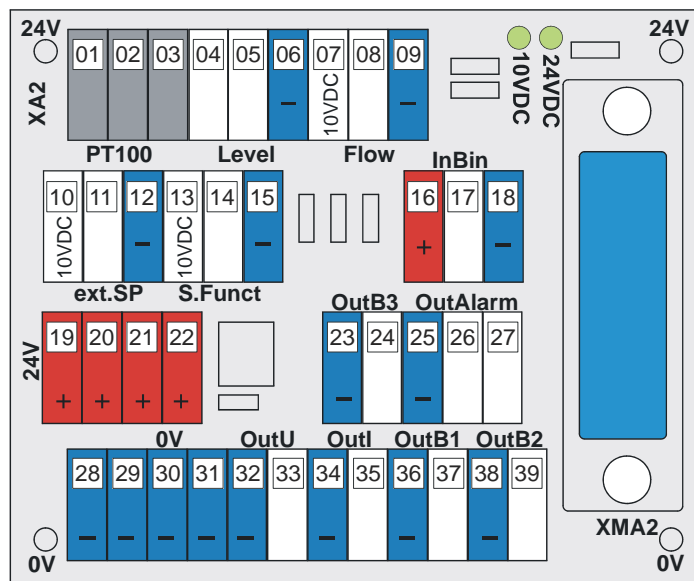
Technical data

Parameter	Value
Switching element function	Normally closed contact
Breaking capacity	16A, 250VAC
Voltage supply	0...30 VDC
Temperature range	-25 °C to +100 °C
Protection class	Housing IP65
Corrosion resistance classification CRC	2
Cable secure screw	M20 x 1,5
Display	yes
Design	round
Minimal durability (cycles)	2 x 10 ⁵
CE- Symbol	73/23 EEC (low voltage)
Subject to change	

Electrical pin assignment



- 1 brown, 24V
- 2 black, Signal 1
- 3 blue, Signal 2



Analog terminal, top view

Function

The analog terminal is an optimized terminal strip for the connection of sensors and actuators over SYSLINK to an industrial controller. An integrated 10 VDC voltage supply facilitates the connection of sensors or setpoint generators requiring this voltage.

Design

The analog terminal is mounted on a top-hat rail.

Technical data

Parameter	Value
Permissible operating voltage	24VDC
Analog inputs	5
Digital inputs	1
Analog outputs	2
Digital outputs	4
Operating voltage display	LED, green "24VDC"
Constant voltage display	LED, green "10VDC"
Connection to controller	24-pin Centronics
Subject to change	

Note

The function of the clamps are described in the circuit diagrams.
Please follow the recommendations in the operating instruction of the connected controller!

170699

Analog terminal

Clamp XA2	Connection designation	Function	Pin assignment SYSLINK
1	PT100 (1)	3-wire-connection for resistance-thermocouple, see the handbook of the controller for assignment	13 grey-pink
2	PT100 (2)		14 red-blue
3	PT100 (3)		15 white-green
4	Level (+)	+24VDC	
5	Level (\bar{I})	0/4...20mA current, controller input	18 ye.-brown
6	Level (-)	0VDC	
7	Flow (+)	+10VDC constant voltage	
8	Flow (\bar{I})	0...1000Hz frequency, controller input	16 br.-green
9	Flow (-)	0VDC	
10	ext.SP (+)	+10VDC constant voltage	
11	ext.SP (\bar{I})	0...10V voltage; external setpoint	19 white-grey
12	ext.SP (-)	0VDC	
13	S.Funct. (+)	+10VDC constant voltage	
14	S.Funct. (\bar{I})	0...10V voltage, controller input	17 wh.-yellow
15	S.Funct. (-)	0VDC	
16	InBin (+)	+24VDC	
17	InBin (\bar{I})	Switch signal, binary input controller	20 grey-brown
18	InBin (-)	0VDC	
19	+	+24VDC	9 black
20	+	+24VDC	10
21	+	+24VDC	21 white-pink
22	+	+24VDC	22
23	-	0VDC	
24	OutB3 (\bar{I})	Switch signal, binary output controller	7 blue
25	-	0VDC	
26	OutAlarm (nc)	Normally close 1 (24VDC), Alarm-relay 3 controller	5 grey
27	OutAlarm (no)	Normally open 1 (24VDC), Alarm-relay 3 controller	6 pink
28	-	0VDC	8 red
29	-	0VDC	11 pink-brown
30	-	0VDC	12 purple
31	-	0VDC	23 white-blue
32	-	0VDC	24
33	OutU	0...10V voltage, output controller	1 white
34	-	0VDC	
35	OutI	0/4...20mA current, output controller	2 green
36	-	0VDC	
37	OutB1 (\bar{I})	Normally open (24VDC), relais 1 binary output	3 yellow
38	-	0VDC	
39	OutB2 (\bar{I})	Normally open (24VDC), relais 2 binary output	4

PIN- and SYSLINK-assignment analog terminal



Measuring transformer PT100/U



Function

The measuring transformer transforms the measures vale of the PT100 element into a voltage from 0 to 10V. The range of the transformer is from 0 to 100°C. It is used by supplying it with a voltage of 24VDC. It is pluggable on a terminal block and can be easily removed by pulling it out.

Technical data measuring transformer

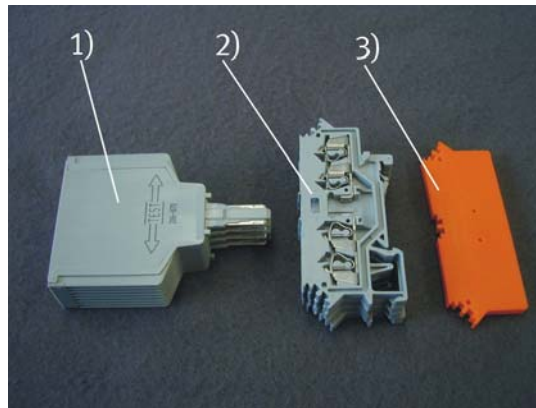
Parameter	Value
Temperature range	0°C ... 100°C
Voltage supply	DC 24 V (+/-10 %)
Nominal current	30 A
Output	0 ... 10 V
Burden	500 kOhm
Error output (positive switching)	U_b /max. 20 mA
Transmission error (bezogen auf Endwert)	0,3%
Temperature coefficient	< 0,02 %/K
Electromagnetic compatibility (IEC 801-2/4/5)	passed, EN 50082 T2 (E3.94)
Permissible ambient temperature	0 °C ... + 55 °C
Weight	29,8 g
Color	grey
Subject to change	

BE.EL.0546

Measuring transformer PT100/U

Notes, terminal block

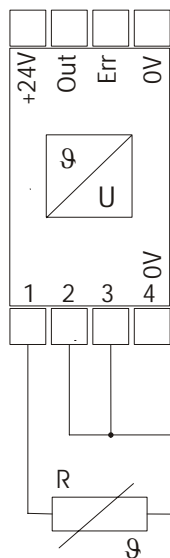
The terminal block offers the possibility of labelling at its side. It has 2-wire-claps. Front-wiring; Connectors: CAGE-CLAMP.



Measuring transformer PT100/U with terminal block

- 1) Measuring transformer (pluggable)
- 2) Terminal block
- 3) Label

Electrical connection



Technical data terminal
block

Parameter	Value
Cross section from [mm ²]	0,08 mm ²
Cross section to [mm ²]	2,5 mm ²
Cross section from [AWG]	28 AWG
Cross section to [AWG]	14 AWG
Allowable stress EN	400 V
Allowable stress impulse	6 kV
Degree of pollution	3
Nominal current	10 A
Weight	21,028 g
Color	grey
Form of wiring	Front-wiring
Number of clamps	2
Number of electric potential	2
Height [mm]	28 mm
Height [inch]	1,1 in
Width [mm]	22 mm
Width [inch]	0,866 in
Depth [mm]	50 mm
Depth [inch]	1,97 in
Length of skinning from [mm]	8 mm
Length of skinning to [mm]	9 mm
Length of skinning [inch]	0,33 in
Subject to change	



Measuring transformer current/voltage

Function

The measuring transformer transforms the measured value of the ultrasonic detector into an output voltage from 0 to 10V. Its voltage supply is 24VDC. It is pluggable on a terminal block and can be easily removed by pulling it out.

Technical data measuring transformer

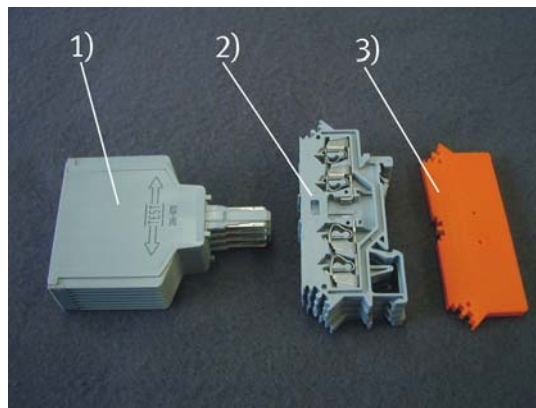
Parameter	Value
Input signal	4...20mA
Input current	22 mA
Input resistance	<400
Line voltage drop, input, max.	<8V
Output signal	0...10V
Burden	>2k
Broken wire detection	LED green = off
Transmission error (based on final value)	<0,15%/<0,1%
Temperature coefficient (based on final value)	<0,02%/K
Barrier frequency (sine)	1 kHz
Isolation voltage Input/Output	4kV, 50Hz, 1min
Voltage supply RW <6%	DC 20V...30V
Permissible ambient temperature	0°C...+55°C
Color	grey
Subject to change	

BE.EL.0545

Measuring transformer current/voltage

Notes, terminal Block

The terminal block offers the possibility of labelling at its side. It has 2-wire-claps. Front-wiring; Connectors: CAGE-CLAMP.



Measuring transformer with block terminal

- 1) Measuring transformer f/U (pluggable)
- 2) Terminal block
- 3) Label

Technical data terminal
block

Parameter	Value
Cross section from [mm ²]	0,08 mm ²
Cross section to [mm ²]	2,5 mm ²
Cross section from [AWG]	28 AWG
Cross section to [AWG]	14 AWG
Allowable stress EN	400 V
Allowable stress impulse	6 kV
Degree of pollution	3
Nominal current	10 A
Weight	21,028 g
Color	grey
Form of wiring	Front-wiring
Number of clamps	2
Number of electric potential	2
Height [mm]	28 mm
Height [inch]	1,1 in
Width [mm]	22 mm
Width [inch]	0,866 in
Depth [mm]	50 mm
Depth [inch]	1,97 in
Length of skinning from [mm]	8 mm
Length of skinning to [mm]	9 mm
Length of skinning [inch]	0,33 in
Subject to change	



Measuring transformer frequency/voltage (similar figure)



graphical symbol

Function

This measuring transformer transforms the measured value of the flow rate sensor to a voltage output from 0 to 10V.

Its voltage supply is 24VDC.

It is pluggable on terminal block and can be simply removed by pulling it out.

Technical data measuring transformer

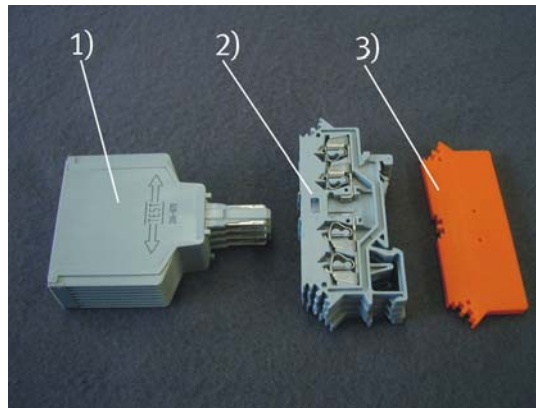
Parameter	Value
Permissible ambient temperature	55°C
Voltage supply	20- 30 VDC
Current consumption	12mA
Linearity error	<0,1%
Transmission error	<0,1%
Input Square wave generator Signal level	0- 1kHz 6V _{SS} - 30V _{SS}
Output Output signal Burden	0- 10V >2k
Color	grey
Subject to change	

BE.EL.0544

Measuring transformer frequency/voltage

Notes, terminal block

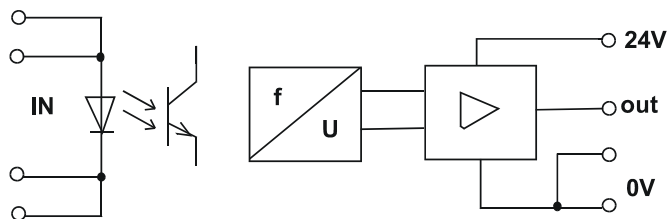
The terminal block offers the possibility of labelling at its side. It has 2-wire-claps. Front-wiring; Connectors: CAGE-CLAMP.



Measuring transformer with block terminal

- 1) Measuring transformer f/U (pluggable)
- 2) Terminal block
- 3) Label

Electrical connection



Technical data terminal
block

Parameter	Value
Cross section from [mm ²]	0,08 mm ²
Cross section to [mm ²]	2,5 mm ²
Cross section from [AWG]	28 AWG
Cross section to [AWG]	14 AWG
Allowable stress EN	400 V
Allowable stress impulse	6 kV
Degree of pollution	3
Nominal current	10 A
Weight	21,028 g
Color	grey
Form of wiring	Front-wiring
Number of clamps	2
Number of electric potential	2
Height [mm]	28 mm
Height [inch]	1,1 in
Width [mm]	22 mm
Width [inch]	0,866 in
Depth [mm]	50 mm
Depth [inch]	1,97 in
Length of skinning from [mm]	8 mm
Length of skinning to [mm]	9 mm
Length of skinning [inch]	0,33 in
Subject to change	



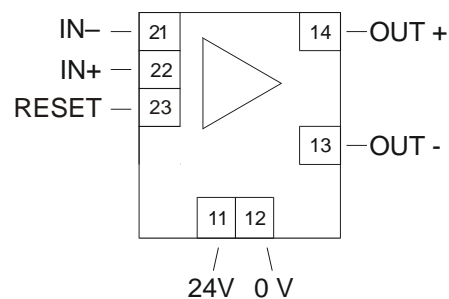
Motor controller

Function The motor controller enables you to vary the supply voltage and as such the speed of the pump.

An error can be reset by using the reset input (RESET). By clamping 0V at the reset input the error will be deleted.

Design The motor controller is mounted on a top-hat rail.

Connection allocation



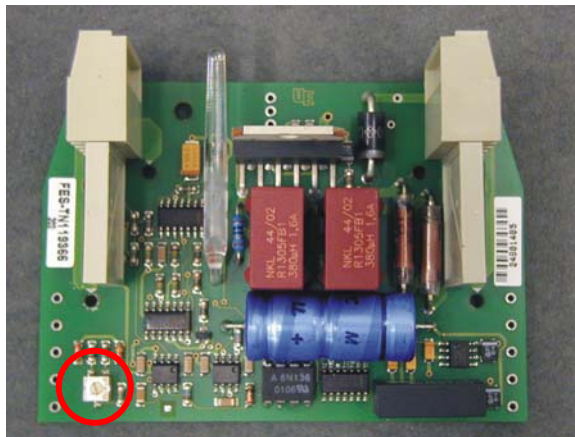
170698

Motor controller

Note

- Adjustment of the controller

On the circuit board there is a potentiometer (see picture below). With a small screw driver you are able to adjust the controller. Aim of the adjustment is to have 0V at the output clamp at 0V at input clamp and 24 V at the output clamp at 10V at the input clamp.



Picture of the circuit board: The circle marks the potentiometer for the adjustment.

Technical data

Parameter	Value
Permissible operating voltage	24 VDC
Input	-10 ... +10 VDC
Output	-24 ... +24 VDC
Output current	max. 1 A
Connections	Clamp with screws
Subject to change	



Potentiometer

Description

The potentiometer can be used with a voltage supply of 10VDC or 24VDC.

By using a series resistance the voltage at the potentiometer can be divided in that way so that if you use 24VDC as input it is possible to reach an adjustable range of the set point from approx. 0...11 V.

Electrical connection with clamps, using screws.

The installation of the potentiometer is on a top hat rail.

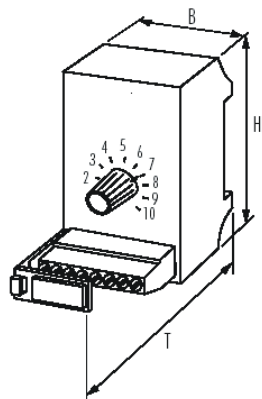
Technical data

Parameter	Value
Resistance	10 k
Tolerance	±20 %
Power of the potentiometer	1 W
Power of the resistance	0,25 W
Temperature range	0...+60°C
Installation	Top hat rail, EN 50022
Abmessungen H x B x T	75 x 45 x 65 mm
Subject to change	

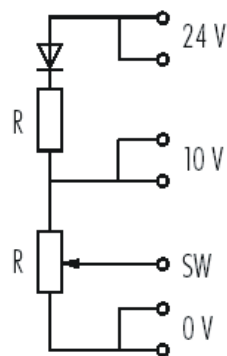
BE.EL.0528

Potentiometerbaustein

Dimensions



Basic circuit diagram



Electrical pin assignment

24V		10V		SW	0V	

Terminal strip, top view



Container

Function Threaded connections are provided for inflow and outflow and for sensors with threaded connection. A hole is provided for the connection of a heating unit. Threaded holes which are not required, are to be fitted with end plugs.

Design The container is mounted on the profile plate or attached to an MPS profile using four screws and T-head nuts.

Note Tighten the mounting screws carefully.

Parameter	Value
Permissible operating temperature	max. +65 °C
Capacity	approx. 12 l
Dimensions (external measurements)	
Width	240 mm
Depth	190 mm
Height	380 mm
Dimensions (internal measurements)	
Width	190 mm
Depth	175 mm
Height	370 mm
Materials	Plastic
Line connections: Screw connections	15 mm pipe-Ø
Subject to change	



Pressure vessel

Function The pressure vessel is used for storage of pressurized media.

Design The pressure vessel is used for the storage of pressurized media.

Technical data

Parameter	Value
Medium	Water
Design	Welded vessel
Mounting	Mounting bracket
Connection	G ½"
Volume	2 l
Pressure range *	-0,95 bar to 16 bar
Materials	Steel (X 5 Cr Ni 18 10)
Weight	1,681 kg
Subject to change	



Note * If you use the pressure vessel within the pressure control station, the maximum operating pressure must not exceed 0,5 bar!



Fitting

Function

Pipework for the process engineering systems can be effected quickly, safely and leak- proof using the piping and push-in connection system. The individual tubing components are:

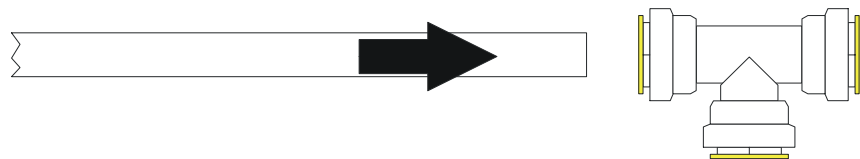
- Straight pipe piece (see above) (Order Nr. BE.PC.0001)
various length on request
- End plugs (see above) (Order Nr. BE.PC.0015)
- 90°-push-in connector (see above, left) (Order Nr. BE.PC.0009)
- 90°- push-in connector (see above, right) (Order Nr. BE.PC.0010)
- T-push-in connector (see above) (Order Nr. BE.PC.0008)
- Stop cocks (see above) (Order Nr. BE.PC.0011)

Design

The piping system consists of plastic pipes and push-in connectors.

Assembly/Disassembly

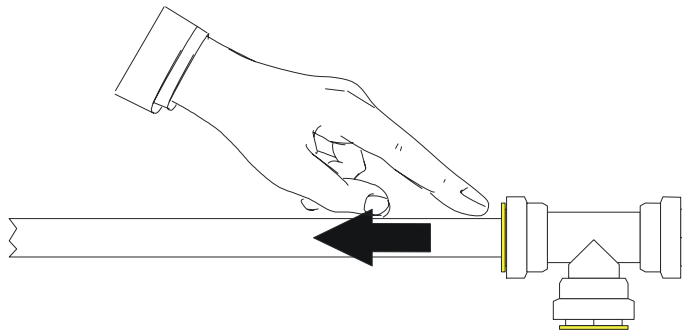
- A pipe cutter is required to cut the pipes to size.
- The piping is assembled without the use of tools.
- Assembly:
Pipes must be inserted in the push-in connector up to the Stopp.



170701, 170702, 170703

Fitting

- Disassembly:
To release the connection, the collect on the push-in connector must be pressed down and the pipe pulled out.



Technical data

Parameter	Value
Operating characteristics	
Cold water system	20 °C / 10 bar
Hot water system	65 °C / 7 bar
Central heating system	82 °C / 4 bar
Withdrawal force	> 1200 N / 20 °C
Burst pressure	> 40 bar / 20 °C
Flow media	Water, various gases
Operating pressure	max. 6 bar at 80 °C
Material	Plastic
Pipe diameter	Ø eternal: 15 mm
Subject to change	



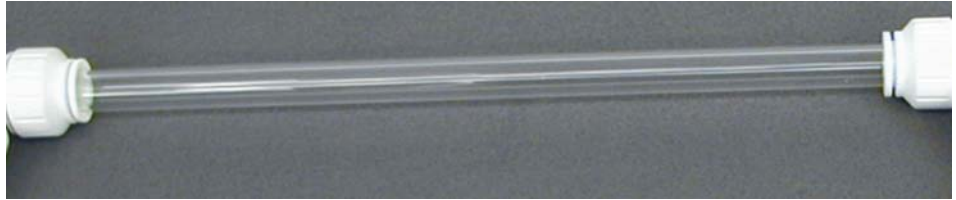
Pipe

Function With the pipe all connections are made. An exception is the connection with plexiglass-pipes.

Technical data

Parameter	Value
Temperature and pressure hot water cold water periodical with breaks*	6 bar at 65°C 12 bar at 20°C 114°C
Expansion	1% at the whole length (20°C ... 82°C)
Media	Everything, but: Gas, petrol, oil or compressed air
Light	Avoid ultraviolet Light. (insolation over a long time etc.)
Subject to change	

*never use the pipe in combination with an uncontrolled heating source!



Plexiglass-pipe

Function

The plexiglass pipe is a transparent pipe with gives you the possibility check the flow of a medium.

Technical data

Parameter	Value
Material	Acrylpolymer based on Methylmethacrylate
Softening temperature	>100°C
Flashpoint	>250°C (ASTM D1929-68)
Inflammation temperature	>400°C (ASTM D1929-68)
Density	1,18g/cm ³ bei 20°C
Thermal disruption	>250°C
Subject to change	



Ball valve

- Function** Swivelling of the lever, causes the flow to be shut off completely in both directions.
- Design** The ball valve is installed in the piping by means of quick push-pull connectors.
- Note** The figure above shows the ball valve in closed position. If the lever is turned to 90° ball valve is opened completely.

Technical data

Parameter	Value
Connection	15 mm
Nominal size	15
Pressure range	0 ... 7 bar
Temperature range (with plastic connectors)	0 ... +65 °C
Actuating force	5 Nm
Weight	Approx. 0,45 kg
Subject to change	

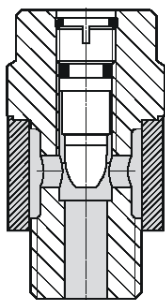


Exhaust flow control valve

Function

Exhaust air flow control valves are screwed into exhaust ports 3 and 5 of the control valves, and make it possible to control the piston speed of cylinders by means of exhaust port flow control.

Exhaust air restriction can be adjusted with the throttle screw. Exhaust air is discharged via the integrated silencer to reduce noise levels.

Design

Cutaway view of the valve

10352

Exhaust flow control valve

Technical data

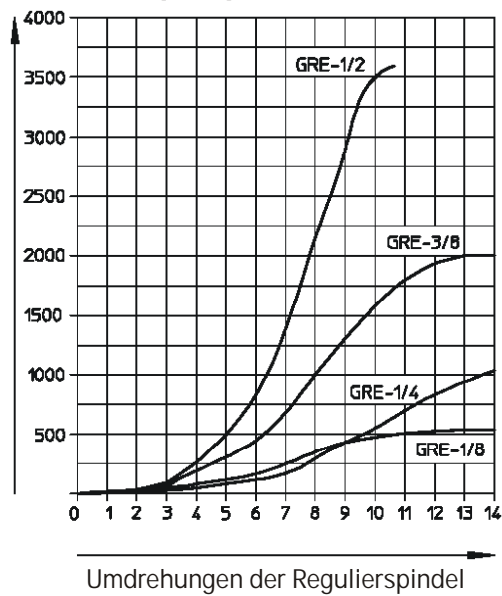
Parameter	Value
Threads	G 1/4
Nominal width	5 mm
Flow*	0 to 996 l/min
Pressure range	0 to 10 bar
Temperature range	-10 °C to 70 °C
Noise level**	80 dB(A)
Materials	
Housing	Al, Ms
Silencer	Sintered bronze
Seals	Perbunan
Weight	0,025 kg
Subject to change	

* at 6 bar against atmosphere

** measured at a distance of 1m

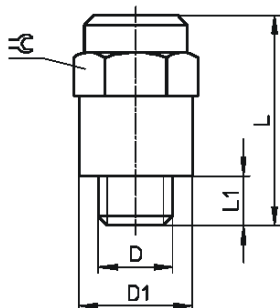
Characteristic curve

Nenndurchfluss [l/min]



See the curve with the designation GRE-1/4

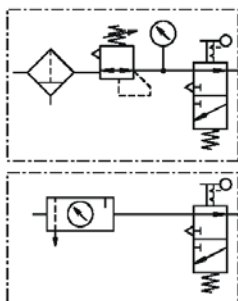
Dimensions



D: G¼
D1(ø): 18,2
L: 34
L1: 8
☞: 22



Service unit



Symbol

Function

Filter control valve with pressure gauge, start-up valve, quick push-pull connectors and quick couplings, mounted on a swivel support.

The filter with water separator removes dirt, pipe sinter, rust and condensed water. The pressure control valve regulates the supply air pressure to the set operating pressure and compensates pressure fluctuations. The filter bowl has a condensate drain valve.

The start-up valve/shutoff valve ventilates and vents the entire control. The 3/2-way valve is actuated by a rotary button.

152894

Service unit

Design

The control valve with manometer, start-up valve, push-in fittings and quick coupling plug is mounted on a swivel support. Over the filter bowl there is a metal bowl. The mounting of the unit is done by cheese head screws and nuts mounting variant "C". Added is one quick coupling socket with threaded bush and union nut for plastic tubing PUN 6 x 1.

Note

When mounting the valve you have to attend that it is mounted vertically. The pressure control valve has an adjustment button. By rotating this button you can adjust the wanted pressure. When this adjustment button is turned to the housing, the adjustment is fixed.

Technical data

Parameter	Value
Medium	Druckluft
Design	Sinterfilter mit Wasserabscheider, Membranregelventil
Mounting position	senkrecht $\pm 5^\circ$
Nominal flow rate*	750 l/min
Input pressure maximal	1600 kPa (16 bar)
Operating pressure maximal	1200 kPa (12 bar)
Connection	Kupplungsstecker für Kupplungsdose G 1/8 S- Steckanschluss für Kunststoffschlauch PUN 6 x 1
Subject to change	

* Input pressure: 1000 kPa (10 bar), Operating pressure: 600 kPa (6 bar), Differential pressure: 100 kPa (1 bar).