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# Flow control

Solenoid valves · Flow monitors

CERTIFIED  
ISO 9001  
ISO 14001

PED 97/23 EC  
RL 94/9 ATEX

**DVGW**  
**TÜV**



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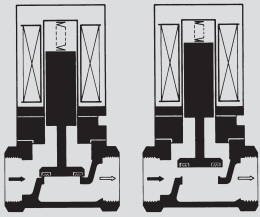
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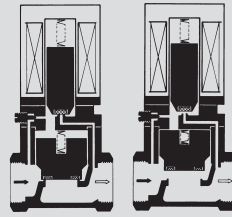
Solenoid valves

## Solenoid valve operating methods



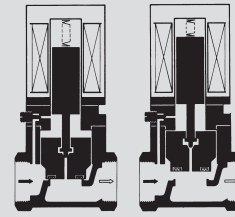
### Direct-acting

For small nominal diameters  
No minimum differential pressure required.



### servo-assisted

A minimum differential pressure of approx. 0.5 bar is required. Cannot open without differential pressure between input and output.



### Automatically servo-assisted

(coupled) For differential pressures from 0 to maximum pressure. For universal application.

Fema piston-type solenoid valves are suitable for demanding applications, particularly in the field of heat, energy and gas technology. All valves of the product groups mentioned below are automatically servo-assisted and may therefore be used from 0 bar to maximum pressure. No minimum differential pressure is required. A DC coil is normally used. A rectifier is supplied for connection to a 230 VAC supply.

### Product Summary

Series	Nom. diameter DN (mm)	M= screwed F= flange	Working pressure* (bar)	Seals			Temperatures		N = Normal type Ex = Ex-type	Operating-mode	DIN testing agency
				Piston	Nozzle	Static seal	Medium °C	Environment °C			
<b>TG</b> for neutral media	15/20 25/32 40/50	M + F M + F F	0–40 0–32 0–20	NBR	NBR	NBR	-15 to +90 60°C for Ex	-15 to +60	N + Ex	nc + no	
<b>TGK</b> for high temperatures	15/20 25/32 40/50	M + F M + F F	0–40 0–32 0–20	PTFE	Stainl. steel cone	EPDM	max. 180	-15 to +60	N	nc + no	
<b>K</b> for fuel gases up to 4 bar	15/20 15/20 25/32 40/50	M F F F	0–4 0–4 0–4 0–4	NBR	NBR	NBR	-15 to +60	-15 to +60	N + Ex	nc	DVGW DIN-EN 161
<b>K</b> f. fuel gases over 4 bar	15/20 25/32 40/50	F F F	0–25 0–25 0–20	NBR	NBR	NBR	-15 to +60	-15 to +60	N + Ex	nc	DVGW DIN 3394 part 1
<b>K</b> for liquid gases in liquid phase	15/20 25	F F	0–25 0–25	NBR	NBR	NBR	-15 to +60	-15 to +60	N + Ex	nc	TÜV DIN 32725 (draft Nov '92)
<b>K</b> for fuel oil	15/20 15/32 40/50	F F F	0–25 0–25 0–20	NBR	NBR	NBR	-15 to +60	15 to +60	N	nc	TÜV DIN-EN 264
<b>LG</b> for hot water and steam up to 120°C	15/20 25/32 40/50	M + F M + F F	0–25 0–20 0–16	PTFE	Stainl. steel cone	EPDM	max. 120	+4 to +60	N	nc	TÜV DIN 32730
<b>LGK</b> for hot water and steam up to 180°C	15/20 25/32 40/50	M + F M + F F	0–20 0–16 0–12	PTFE	Stainl. steel cone	EPDM	max. 180	+4 to +60	N	nc	TÜV DIN 32730

nc = normally closed, opened under voltage.

no = normally open, closed under voltage (identified in the Product Summary by the letter "U").

\* = The respective data sheet contains exact details of the limits of use.



### Sealing materials:

NBR = Perbunan  
EPDM = Ethylene-propylene rubber  
PTFE = Teflon





T25G31M

## TG series

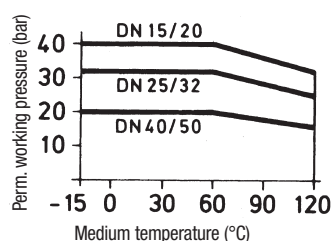
For medium temperatures up to 90°C

The piston-type solenoid valves of the TG series are suitable for universal application under a wide range of pressures. The coupled (automatically servo-assisted) method of

operation requires no minimum differential pressure; the valves open and close without difficulty even without pressure or with low differential pressures.

### Limits of use

(applies only to the "normally closed" operating mode)



### NB:

To avoid heat build-up, the solenoid system must not be insulated or painted.

### Technical data

#### Type

#### Operating mode

#### Type of construction

#### Materials

#### Sealing materials

#### Mounting position

#### Outdoor installations

#### Ambient temperature

#### Temperature of medium

#### Flanges

#### Recommended weld-on flanges

#### Maintenance

#### Type

Normally closed (standard version) or normally open (on request)

Piston-type solenoid valve, coupled

no minimum differential pressure required

Casing: Bronze Rg 5 to DIN 1705

Internal parts: Brass (CuZn) and corrosion-resistant steel

Piston: Perbunan (NBR).

Nozzle: Perbunan (NBR).

Static seal: Perbunan (NBR).

Solenoid system preferably upright. Horizontal mounting position only permitted for DN 15–DN 32. In general, the solenoid system should not hang downwards.

fr = suitable for outdoor use

-15°C to +60°C

-15°C to +90°C

To DIN 2501 Part 1

PN 40 for DN 15–32

PN 25 for DN 40/50

PN 40 to DIN 2635

The valve should be operated 5-10 times per month to prevent the piston from sticking. No further maintenance is required.

### Product Summary

DN (mm)	k <sub>vs</sub> value (m³/h)	Working pressure (bar)	Internal thread	Screwed connection Type	Flange connection Type
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#### TG series (up to 90°C)

15	4.0	See graph opposite (Limits of use)	G 1/2"	T15G31M	T15G31F
20	4.8		G 3/4"	T20G31M	T20G31F
25	10		G 1"	T25G31M	T25G31F
32	13		G 1 1/4"	T32G31M	T32G31F
40	34				T40G31F
50	40				T50G31F

#### Ex-versions · Operating mode: normally closed

15	4.0	0 - 30	G 1/2"	T15G35M-Ex	T15G35F-Ex
20	4.8	0 - 30	G 3/4"	T20G35M-Ex	T20G35F-Ex
25	10	0 - 25	G 1"	T25G35M-Ex	T25G35F-Ex
32	13	0 - 25	G 1 1/4"	T32G35M-Ex	T32G35F-Ex
40	34	0 - 16			T40G35F-Ex
50	40	0 - 16			T50G35F-Ex

All valves are also available in normally open versions. Identified by the letter "U". For example: T25G31FU





T40G31FK

## TGK series

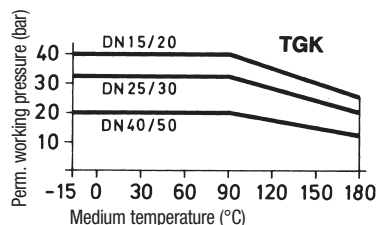
For medium temperatures up to 180°C

The piston-type solenoid valves of the TGK series are suitable for hot water, steam, fuel oil and other non-aggressive media up to a temperature of 180°C.

The cooling piece between the valve section and the solenoid actuator ensures good heat discharge and protects the solenoid against overheating.

### Limits of use

(applies only to the "normally closed" operating mode)



### Technical data

#### Type

#### Operating mode

#### Type of construction

#### Materials

#### Sealing materials

#### Mounting position

#### Outdoor installations

#### Ambient temperature

#### Temperature of medium

#### Flanges

#### Recommended weld-on flanges

#### Maintenance

#### 2/2-way

Normally closed (standard version) or normally open (on request)

Piston-type solenoid valve, coupled  
no minimum differential pressure required

Casing: Bronze Rg 5 to DIN 1705

Internal parts: Brass (CuZn) and corrosion-resistant steel

Piston: Teflon (PTFE).

Nozzle: Cone seal made of stainless steel.

Static seal: EPDM.

Solenoid system preferably upright. Horizontal mounting position only permitted for DN 15–DN 32. The solenoid system should not hang downwards.

fr = suitable for outdoor use

-15°C to +60°C

-15°C to +180°C

To DIN 2501 Part 1

PN 40 for DN 15–32

PN 25 for DN 40/50

PN 40 to DIN 2635

The valve should be operated 5–10 times per month to prevent the piston from sticking. No further maintenance is required.

### Product Summary

DN (mm)	k <sub>vs</sub> value (m³/h)	Working pressure (bar)	Internal thread	Screwed connection Type	Flange connection Type
15	4.0	See graph opposite (Limits of use)	G 1/2"	T15G31MK	T15G31FK
20	4.8		G 3/4"	T20G31MK	T20G31FK
25	10		G 1"	T25G31MK	T25G31FK
32	13		G 1 1/4"	T32G31MK	T32G31FK
40	34				T40G31FK
50	40				T50G31FK

All valves are also available in normally open versions.

Identified by the letter "U". For example: T25G31FU

### NB:

To avoid heat build-up, the solenoid system must not be insulated or painted.



Degree of protection:  
IP 65



K25G31F

## K series

for gas, liquid gas and liquid fuels

Suitable for all gases in accordance with DVGW Worksheet G 260, for liquid gas in the liquid phase (up to DN 25 inclusive) and for fuel oil. No minimum differential pressure required. For explosion-endangered areas (zone 1, 2 and

21, 22) solenoid actuators with pressure-proof encapsulated solenoid systems (Ex II G/D EEx de IIC T4 IP65 T125°C) are available.

**Reg. no.: PTB 04 ATEX 1026**



K...G35F-Ex

### Registrations:

1 = DIN-EN 161 for gas up to 4 bar  
2 = DIN 3394-1 for gas, over 4 bar  
4 = DIN-EN 264 for liquid fuels (fuel oil)  
5 = CE identification number  
6 = U-symbol, Construction Products List (Bauregelliste) A, Part 1, Edition 95/1

The following CE identification numbers are defined for gas solenoid valves:

K15...K50F	CE-0085AN0072
K15...K50F-Ex	CE-0085AN0073
K15...K20M	CE-0085AN0074
K15...K20M-Ex	CE-0085AN0075

Solenoid valves of the K series are tested according to PED 97/23/EC Module B, testing basis: DIN-EN 264, DIN 3394-1, DIN-EN 161

### CE-Identification numbers:

K15G31...K15G35-Ex,  
K20G31...K20G35-Ex  
CE-0035BN0022

K25G31...K25G35-Ex,  
K32G31...K32G35-Ex  
CE-0035BN0023

K40G31...K40G35-Ex,  
K50G31...K50G35-Ex  
CE-0035BN0024

**Factory certified to Module D**  
**Cert. no.: 01 202 931/Q-02 0010**

### NB:

To avoid heat build-up, the solenoid system must not be insulated or painted.

### Technical data

#### Type

#### Operating mode

#### Type of construction

#### Valve class to DIN EN 161

#### Materials

#### Sealing materials

#### Mounting position

#### Outdoor installations

#### Ambient temperature

#### Temperature of medium

#### Working pressure

#### Flanges

#### Recommended weld-on flanges

**Maintenance:** The valve should be operated 5-10 times per month to prevent the piston from sticking. No further maintenance is required.

2/2-way

normally closed

Piston-type solenoid valve, coupled,  
no minimum differential pressure required

**B** for DN 15 – DN 32, **C** for DN 40 – DN 50

Casing: Bronze Rg 5 to DIN 1705

Internal parts: Brass (CuZn40Pb) and corrosion-resistant steel

Piston: Perbunan (NBR).

Nozzle: Perbunan (NBR).

Static seal: Perbunan (NBR).

Standard version: Solenoid system upright.

Ex-version: Solenoid system upright.

Other mounting positions not permitted.

Standard version: fr = suitable for outdoor use Ex-version:

Can be used with upright solenoid system in outdoor installations (see technical notes on Ex solenoid actuators).

-15°C to +60°C

-15°C to +60°C

See Product Summary

To DIN 2501 Part 1, PN 40 for DN 15–32, PN 25 for DN 40/50

PN 40 to DIN 2635

DN (mm)	k <sub>vs</sub> value (m³/h)	Working pressure (bar)	Connection	Registrations	Valve class	Type
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#### Operating mode: normally closed

15	4.0	0–4	G 1/2"	1, 5	B	K15G31M
20	4.8	0–4	G 3/4"	1, 5	B	K20G31M
15	4.0	0–25		1, 2, 4, 5, 6	B	K15G31F
20	4.8	0–25		1, 2, 4, 5, 6	B	K20G31F
25	10	0–25	Flange	1, 2, 4, 5, 6	B	K25G31F
32	13	0–25		1, 2, 4, 5, 6	B	K32G31F
40	34	0–20		1, 2, 4, 5, 6	C	K40G31F
50	40	0–20		1, 2, 4, 5, 6	C	K50G31F

#### Ex-versions

15	4.0	0–4	G 1/2"	1, 5	B	K15G35M-Ex
20	4.8	0–4	G 3/4"	1, 5	B	K20G35M-Ex
15	4.0	0–25		1, 2, 4, 5, 6	B	K15G35F-Ex
20	4.8	0–25		1, 2, 4, 5, 6	B	K20G35F-Ex
25	10	0–25	Flange	1, 2, 4, 5, 6	B	K25G35F-Ex
32	13	0–25		1, 2, 4, 5, 6	B	K32G35F-Ex
40	34	0–20		1, 2, 4, 5, 6	C	K40G35F-Ex
50	40	0–20		1, 2, 4, 5, 6	C	K50G35F-Ex



Degree of protection:  
IP 65



L25G31F

## LG series

up to 120°C/180°C · TÜV-tested to DIN 32 730

Fema piston-type solenoid valves of the LG series are particularly suitable for use as stop and safety check valves in heating installations up to 120°C or 180°C.

The coupled (automatically servo-controlled) mode of operation does not require a minimum differential pressure; the units open and close without difficulty even without pressure or with low differential pressures.

Solenoid valves of the L series are tested according to PED 97/23/EC Module B, testing basis: DIN 32730

### CE-Identification numbers:

L15..., L20...	CE-0035BN0060
L25..., L32...	CE-0035BN0061
L40..., L50...	CE-0035BN0062

**Factory certified to Module D**  
**Cert. no.: 01 202 931/Q-02 0010**

### NB:

To avoid heat build-up, the solenoid system must not be insulated or painted.

### Technical data

#### Type

#### Operating mode

#### Type of construction

### TÜV-tested

### Materials

### Sealing materials

### Mounting position

### Outdoor installations

#### Ambient temperature

#### Temperature of medium

#### Working pressure

#### Flanges

### Recommended weld-on flange

### Maintenance

2/2-way

normally closed

Piston-type solenoid valve, coupled,  
no minimum differential pressure required  
to DIN 32730

Type test approval mark (DIN reg. no.)

see Product Summary

Casing: Bronze Rg 5 to DIN 1705

Internal parts: Brass (CuZn40Pb) and corrosion-resistant steel

Piston: Teflon (PTFE).

Nozzle: Cone made of stainless steel.

Static seal: EPDM

Standard version: Solenoid system preferably upright. Horizontal mounting position possible for DN 15 to DN 32. For DN 40 and 50 a horizontal mounting position is not permitted. The solenoid system should not hang downwards.

fr = suitable for outdoor use

4°C to +60°C

120°C/180°C maximum

See Product Summary

To DIN 2501 Part 1

PN 40 for DN 15–32

PN 25 for DN 40/50

PN 40 to DIN 2635

The valve should be operated 5-10 times per month to prevent the piston from sticking. No further maintenance is required.

DN (mm)	k <sub>vs</sub> value (m³/h)	Working pressure (bar)	Internal thread	Screwed connection Type	Flange connection Type	DIN Reg. No.
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#### Temperature of medium 120°C maximum

15	4.0	0–25	G 1/2"	L15G31M	L15G31F	1F02204
20	4.8	0–25	G 3/4"	L20G31M	L20G31F	1F02204
25	10	0–20	G 1"	L25G31M	L25G31F	1F02304
32	13	0–20	G 1 1/4"	L32G31M	L32G31F	1F02304
40	34	0–16			L40G31F	1F02404
50	40	0–16			L50G31F	1F02404

#### Temperature of medium 180°C maximum

15	4.0	0–20	G 1/2"	L15G31MK	L15G31FK	1F01904
20	4.8	0–20	G 3/4"	L20G31MK	L20G31FK	1F01904
25	10	0–16	G 1"	L25G31MK	L25G31FK	1F02004
32	13	0–16	G 1 1/4"	L32G31MK	L32G31FK	1F02004
40	34	0–12			L40G31FK	1F02104
50	40	0–12			L50G31FK	1F02104

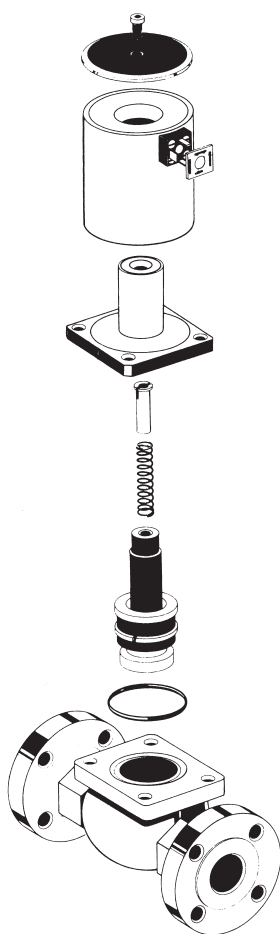
## T/K series

### Solenoid actuators G 31 for standard version

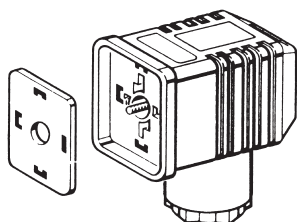
Only solenoids of the G 31 series are used to operate piston-type solenoid valves in non-explosion-proof installations. All G 31 solenoid actuators are generally equipped with a DC coil and plug connector with contact arrangement according to DIN 43 650. The solenoid coils are fully encapsulated in silicone

rubber (to protect against moisture). All solenoid actuators are mutually interchangeable.

The name of the solenoid actuator forms part of the type designation of the complete solenoid valve. For example: T 40 G 31 F



Valve with standard solenoid G 31



Replacement rectifier and connection plug for standard solenoid valves

#### Technical data

**Degree of protection** IP 65 to DIN 40 050  
fr = suitable for outdoor use.

**Power consumption** 50 VA with warm solenoid.

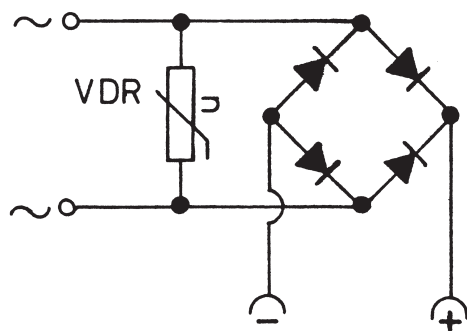
**Nominal voltages** Alternating current (AC):  
230 V, 45–60 Hz  
Rectifier is built into the connection plug  
Direct current (DC):  
24 V  
Supplied without rectifier

**Important:** In all orders or enquiries, the supply voltage and current type (AC or DC) must be specified.

#### Electrical connection for switching device G 31

The AC power supply is connected to the terminals on the PCB inside the plug. The earth conductor is directly connected to the plug cube (underneath the PCB).

#### Rectifier PCB circuit diagram



#### Exchanging solenoid actuators

Complete G 31 solenoid actuators can easily be replaced, even under pressure (undo the screw on the solenoid cover plate, remove the cover and lift out the solenoid). It is not possible to change the coil on its own.

#### GS type

Device socket with built-in rectifier for G 31 solenoid.

Primary 230 V, 50 Hz

Secondary approx. 220 V

#### ST 5

Connection plug with seal and fastening screw (without rectifier)

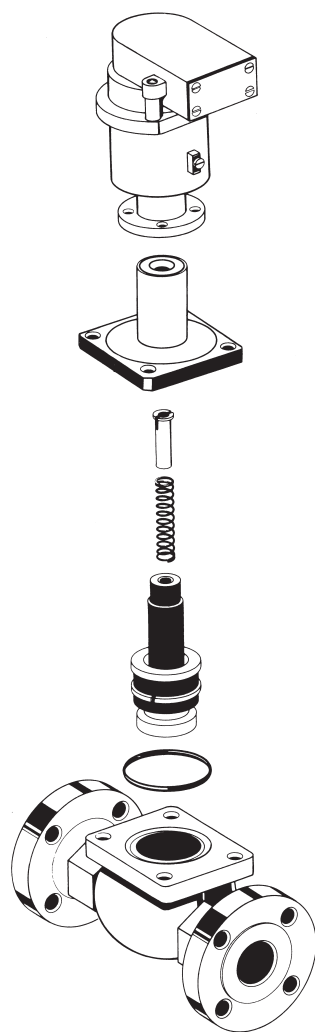


## T-Ex/K-Ex series

### Ex solenoid actuators

Solenoid valves of type G 35-Ex, of pressure-proof encapsulated design for use in explosion-endangered areas, are generally equipped with

a DC coil which is mounted in a pressure-proof encapsulated cast steel housing and sealed with silicone rubber.



Valve with Ex-solenoid G 35-Ex

#### NB:

Solenoid actuators of older G3-Ex solenoid valves cannot be replaced under pressure.

#### Technical data

##### Nominal voltages

Alternating current (AC):

230 V, 45–60 Hz

Rectifier is built into the solenoid casing

Direct current (DC): 24 V, supplied without rectifier

Pressure-proof encapsulation (Ex II 2 G/D EEx de IIC T4 IP 65 T 125°C).

Suitable for  $\geq$  Zone 1, 21.

##### Ex-protection

##### Can be used in outdoor

installations. Because of the deflagration gap specified for the solenoid, the solenoid actuator must be installed vertically.

A protective hood is needed to give the solenoid additional protection against weather conditions.

##### Mounting position

Ex-solenoid valves must only be installed with the solenoid system standing vertically. Other mounting positions are not permitted.

##### Power consumption

approx. 50 VA with warm solenoid.

##### Duty cycle

100% ED. Other technical data are the same as for G 31 solenoid actuators.

##### Connection cables

Heat-resistant cables must be used to connect the Ex-solenoid actuator. The solenoid temperature must not exceed 125°C.

#### Replacing solenoid actuators on Ex-solenoid valves G 35-Ex

Solenoid actuators with the type designation G 35-Ex can also be replaced under pressure.

The procedure is as follows:

##### Removing the old solenoid

1. Turn off the power and remove the connection cable.
2. Loosen the three M6 Allen screws on the solenoid cover (aluminum hood), **but do not remove them** (2–3 turns of the screw are sufficient).
3. Remove the Allen screws on the bottom mounting flange of the solenoid and carefully lift up the whole solenoid.

##### Fitting a new solenoid

4. Before fitting the new solenoid, loosen the three Allen screws on the solenoid cover (aluminum hood), but do not undo them completely (2–3 turns of the screw are sufficient).
5. Put the solenoid in place carefully, moving it gently to and fro to allow the solenoid cover plate lying inside (not visible) to center itself on the guide tube. The mounting flange must lie squarely on the lower flange.
6. Align the solenoid head: The terminal connection box must face against the flow direction.
7. Tighten the 4 fastening screws on the lower flange.
8. Tighten the three M6 Allen screws on the solenoid cover.
9. Remove the terminal connection cover and carry out electrical connections in accordance with VDE guidelines.
10. Fit the terminal connection cover.
11. Commission the valve in accordance with the accompanying instruction manual.

## T/K series

### Mounting instructions

Satisfactory operation demands expert installation with due observance of the technical

regulations applicable to the planning and construction of the installation as a whole.

#### Mounting position

A vertical mounting position (solenoid system standing upright) is preferable if at all possible. In general, the solenoid system should not hang downwards. In the case of Ex-solenoids, only a vertical mounting position is permissible. For information about the mounting position of valves, refer to the individual data sheets.

#### Installation location

Solenoid valves contain moving parts which are subject to natural wear. Therefore, care must be taken to ensure that valves can be dismantled for repair.

#### Risk of freezing

If solenoid valves are operated at ambient or medium temperatures of 0°C or lower, or if it is possible that such temperatures may occur, the customer must take steps to ensure that valves cannot freeze up — due to condensation for example.

#### Painting the solenoid

Solenoid coils must not be painted or lacquered, as this will hinder the dissipation of heat.

#### Stress-free mounting

Stresses from the pipe system acting on the valve can cause the piston to stick, hindering or even preventing it from opening and closing. The solenoid casing must on no account be used as a lever during mounting (key faces are cast on the valve body for this purpose).

#### Maintenance

The valve should be operated 5-10 times per month to prevent the piston from sticking. No further maintenance is required.

#### Back-pressure

If the back-pressure (at the output of the valve) is 0.2 bar higher than the pressure on the input side, the piston or diaphragm is automatically lifted from the seat. In this case the medium may flow back through the solenoid valve.

#### Commissioning

Upon first commissioning, medium should be admitted to the valve very gently so as to allow any air trapped in the valve to escape. Sudden admission at working pressure on first commissioning may cause uncontrolled opening of the valve.

#### Dirt trap

The operation of solenoid valves is often impaired by impurities in the medium flowing through the valve. Welding beads, rust flakes, scale and other impurities may prevent a tight seal on the valve seat. Therefore it is advisable to install a dirt trap before every solenoid valve. This will greatly improve the reliability of the installation.

#### Factory certificates and acceptance testing certificates

Factory certificates in accordance with EN 10 204 and DIN 50 049, section 2.3 or 3.1 B, can be supplied for all piston-type valves if required, and enclosed with the delivery documents. The factory certificate contains information about the quality of the materials used and confirms that the solenoid valve was subjected to rigorous pressure tests, leak tests and function tests prior to delivery. The costs of the certificates are shown in the relevant price list.

#### Spare parts

For spare parts such as solenoids and connection plugs, refer to the relevant price list.

### Faults and troubleshooting

If the valve does not function correctly, carry out the following checks:

1. Is the flow direction correct? Observe the arrow on the valve.
2. Is the power supply properly connected?
3. Is the operating voltage present?
4. Does the operating voltage correspond to the details on the rating plate?
5. Is the rectifier in working order?
6. Is the solenoid coil in working order?

The condition of solenoid coils and rectifiers can easily be checked by carrying out resistance, current and voltage measurements.

If the coils and rectifiers are satisfactory, solenoid actuators of the G 31 and G 35 series should give the following readings:

Mains voltage	Coil resistance Ohms	Coil current consumption approx.
230 V~ / =	990–1050	224 mA
24 V =	11.35–12.02	2.1 A

All values are measured on the DC side, i.e. after the rectifier, and are for a solenoid temperature of 20°C.

The values are approximate. If the measured values deviate significantly from those shown in the table, either the solenoid coil is faulty (broken or shorted coil) or the rectifier is damaged.

If a valve actuator with a DC coil is accidentally charged with alternating current at the same level, it will not be damaged but the valve will not operate. Voltage measurements on the secondary side of the rectifier without load (coil) are not meaningful, therefore you should never measure the DC voltage with the system unplugged.

### Replacing rectifiers on Ex-solenoid valves

Rectifiers on Ex-solenoid valves must only be replaced by an authorised electrician. The greatest care must be taken, with due observance of safety regulations.

The following procedure must be observed:

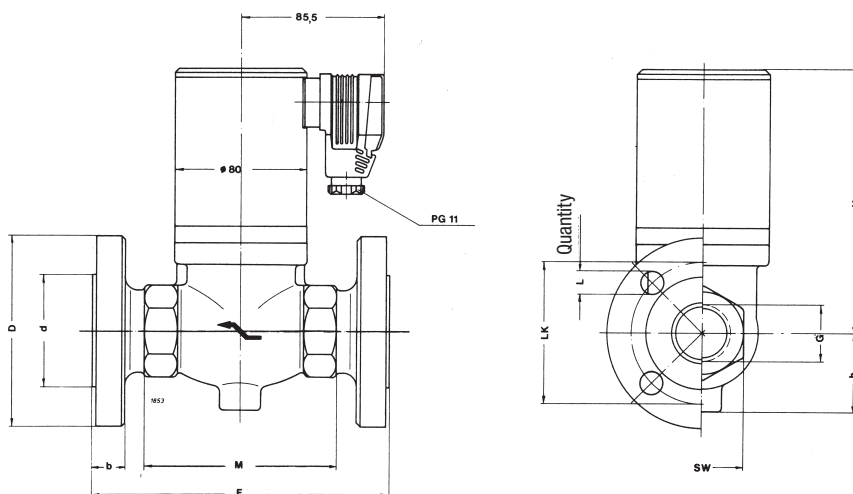
1. Turn off the power and remove the terminal box cover.
2. Disconnect and remove the connection cable.
3. Undo the M6 Allen screws and remove the terminal connection housing.  
NB: Remove the terminal housing carefully to avoid tearing the coil connection wires.
4. Remove the clip (to do this you have to undo the two M3 screws).
5. Pull off the connection wire to the coil. NB: Use thin-nosed pliers and grip it by the plug; do not pull it by the connection cable (otherwise the coil wire may be torn off).
6. Detach the connecting wire on the primary side of the rectifier at the cable guides (use open-ended spanner SW 7).
7. Remove the rectifier (black plastic housing) including the white flat connector guide.
8. Install the new rectifier in the reverse order. Make sure the connection plug of the coil wire is fully inserted in the flat connector guide. The ends of the connector must not project beyond the flat connector guide.

When fitting the terminal connection housing on the solenoid housing, make sure the connection cables do not get caught.

## T/K series

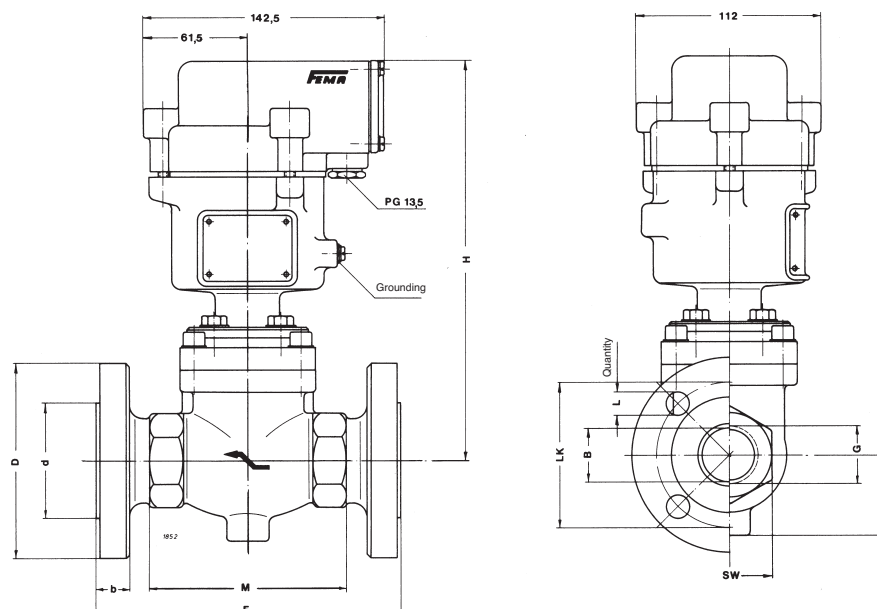
### Dimensioned drawings/weights

Series  
TG, K, LG



DN	Screwed version				Weight kg	Flange version								Weight		
	G	M	SW			F	B	D	d	LK	b	L	i	kg	H	h
15	G 1/2	82	32		4.5	150	20	95	45	65	18	14	4	6.1	137.8	35
20	G 3/4	82	32		4.5	150	20	105	58	75	18	14	4	6.6	137.8	35
25	G 1	112	50		5.8	180	31	115	68	85	20	14	4	9.0	158.3	47.5
32	G 1 1/4	112	50		5.8	180	31	140	78	100	20	18	4	10.5	158.3	47.5
40						200	45	150	88	110	20	18	4	15.0	181.8	53
50						230	45	165	102	125	22	18	4	17.5	181.8	53

Series  
TG-Ex, K-Ex, LG-Ex



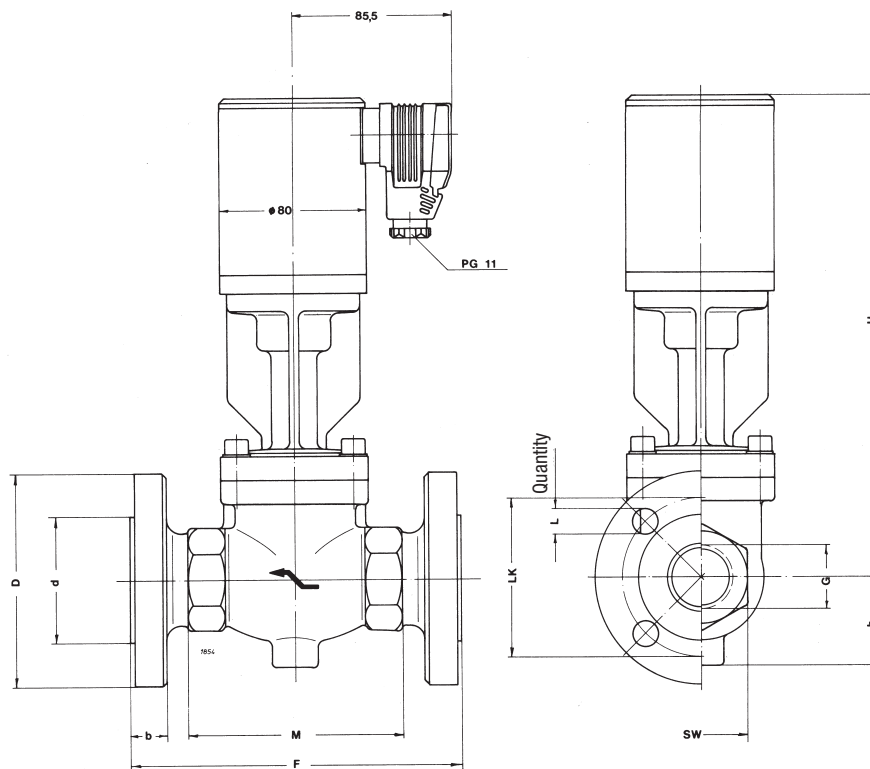
DN	Screwed version				Weight kg	Flange version								Weight		
	G	M	SW			F	B	D	d	LK	b	L	i	kg	H	h
15	G 1/2	82	32		5.8	150	20	95	45	65	18	14	4	7.6	197.9	35
20	G 3/4	82	32		5.8	150	20	105	58	75	18	14	4	8.0	197.9	35
25	G 1	112	50		8.0	180	31	115	68	85	20	14	4	11.0	235.4	47.5
32	G 1 1/4	112	50		8.0	180	31	140	78	100	20	18	4	12.5	235.4	47.5
40						200	45	150	88	110	20	18	4	16.5	253.9	53
50						230	45	165	102	125	22	18	4	20.0	253.9	53



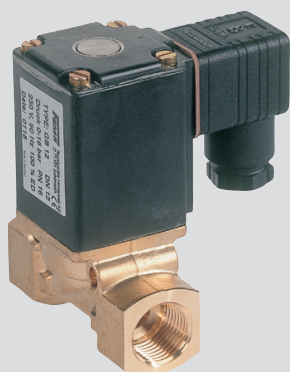
T/K series

Dimensioned drawings/weights

Series  
TGK, LGK



DN	Screwed version			Weight kg	Flange version								Weight		
	G	M	SW		F	B	D	d	LK	b	L	i	kg	H	h
15	G 1/2	82	32	5.6	150	20	95	45	65	18	14	4	7.5	238.3	35
20	G 3/4	82	32	5.6	150	20	105	58	75	18	14	4	7.8	238.3	35
25	G 1	112	50	7.2	180	31	115	68	85	20	14	4	10.5	256.8	47.5
32	G 1 1/4	112	50	7.2	180	31	140	78	100	20	18	4	12.0	256.8	47.5
40					200	45	150	88	110	20	18	4	16.0	277.3	53
50					230	45	165	102	125	22	18	4	19.0	277.3	53



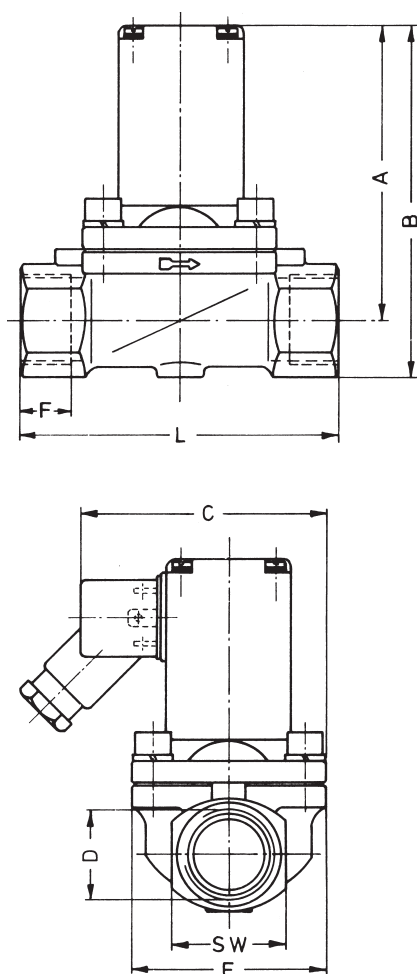
## GB series

DN 12–25

This range of solenoid valves is of high quality and suitable for universal application, and is not dependent on a specific minimum differential pressure; the valves operate correctly with no pressure, at slight differential pressure, right through to maximum pressure.

They are therefore the valves of choice for installation in plants where differential pressures fluctuate greatly and are not possible to determine precisely in advance. The valves are also suitable for use in heating and cooling circuits.

### Dimensioned drawings



### Technical data

#### Type

2/2-way

#### Operating mode

normally closed

#### Type of construction

Diaphragm solenoid valve, coupled. No initial pressure needed.

#### Materials

Casing: brass, internal parts: stainless steel

Alternatively: Casing: stainless steel 1.4410, internal parts: stainless steel

#### Sealing material

Perbunan (standard version),

EPDM or FPM (Viton) available on request

#### Mounting position

Any, solenoid system preferably upright

#### Temperature of medium

-10°C to 90°C

#### Max. ambient temperature

55°C

#### Max. viscosity

Approx. 21 mm²/s

#### Power consumption

100 to 120 VA (start)

25 VA / 12 W (operation)

#### Operating frequency

Up to 50 cycles per minute

#### Duty cycle

100% ED

#### Electrical connection

Angled plug to DIN 43 650

#### Voltage / current type

Standard version 230 V, 45–60 Hz

#### Special voltages available

Voltage	Code
110 VAC	2
24 VAC	8
24 VDC	6

For example: GB 12-2 (2 = 110 VAC)

#### Degree of protection

IP 65 according to DIN 40 050

### Product Summary

DN (mm)	Pressure range (bar)	k <sub>vs</sub> value (m³/h)	Connection thread	Weight (kg)	Type
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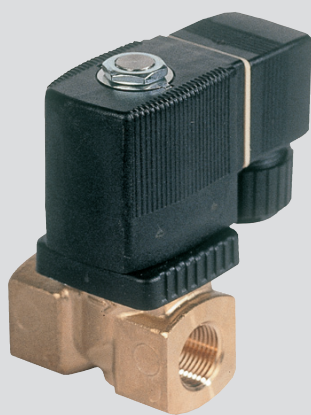
#### Brass valve body

12	0–16	2.8	G 1/2"	1.0	GB 12
20	0–16	5.0	G 3/4"	1.4	GB 20
25	0–16	10.0	G 1"	1.8	GB 25

#### Stainless steel 1.4410 valve body, seal: Viton

12	0–16	2.8	G 1/2"	1.0	GB 12 VA
20	0–16	5.0	G 3/4"	1.4	GB 20 VA
25	0–16	10.0	G 1"	1.8	GB 25 VA

DN	D	A	B	C	E	L	SW	F
15	G 1/2"	80	95.5	73	40	74.5	27	14
20	G 3/4"	106	122	86.5	60	100	32	16
25	G 1"	110.5	131	91.5	70	115	41	18



## AB series

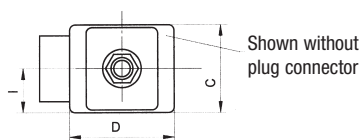
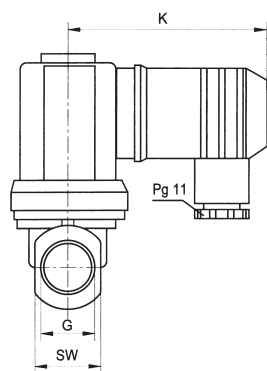
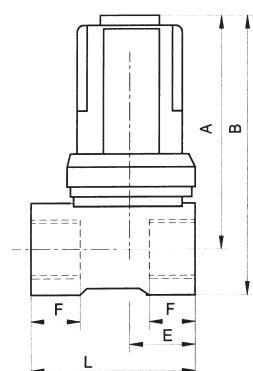
DN 10–40

This range of high-quality solenoid valves is not dependent on a specific minimum differential pressure; the valves operate correctly with no pressure, at slight differential pressure, right through to maximum pressure.

They are therefore the valves of choice for installation in plants where differential pressures fluctuate greatly and are not possible to determine precisely in advance.

These solenoid valves are suitable for neutral liquids such as water, hydraulic oil, oils and greases.

### Dimensioned drawings



### Technical data

#### Type

#### Operating mode

#### Type of construction

#### Pressure range

### Materials

#### Sealing material

#### Mounting position

#### Temperature of medium

#### Max. ambient temperature

#### Duty cycle

#### Electrical connection

#### Voltage / current type

#### Special voltages available

2/2-way

normally closed

Diaphragm solenoid valve, coupled. No initial pressure needed.

0 – 10 bar, also suitable for vacuum of up to -0.9 bar.

No back-pressure may occur as the valve will open in an uncontrolled manner.

Casing: brass, internal parts: stainless steel

Perbunan

Any, solenoid system preferably upright

-10°C to +90°C

55°C

100% ED

Device socket to DIN 43 650

Standard version 230 V, 50 Hz

Voltage	Code
110 VAC	2
24 VAC	8
24 VDC	6

### Degree of protection

### Power consumption in VA or W

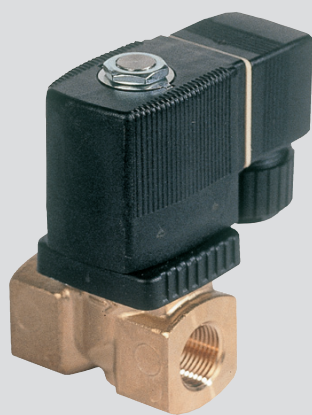
IP 65 according to DIN 40 050 with device socket

Switching state	Nominal diameter/DN					mm
	10	13	20	25	40	
AC: Start	34	36	38	160	202	VA
AC: Oper.	14	14	14	38	38	VA
DC: Start						
+ Operation	10	10	10	–	–	W

### Product Summary

DN (mm)	Pressure range (bar)	Kvs value (m³/h)	Connection thread	Weight (kg)	Type
10	0–10	1.8	G 3/8"	0.4	AB 10
13	0–10	3.5	G 1/2"	0.55	AB 13
20	0–10	8.6	G 3/4"	1.0	AB 20
25	0–10	11.0	G 1"	1.7	AB 25
25	0–10	11.0	G 1 1/4"	1.7	AB 32
40	0–10	30.0	G 1 1/2"	3.5	AB 40
40	0–10	30.0	G 2"	3.5	AB 50

DN	A	B	C	D	E	F	G	K	L	M	SW
10	72	86	38	38	20	12	G 3/8"	65	50	3.5	27
13	83	99	45	51	24	14	G 1/2"	65	58	3.5	32
20	99	119	66	66	35	16	G 3/4"	65	80	3.5	41
25	145	166	105	105	69	18	G 1"	69	95	7	41
25	145	166	105	105	69	18	G 1 1/4"	69	95	7	50
40	157	187	105	105	69	22	G 1 1/2"	69	132	7	60
40	157	187	105	105	69	22	G 2"	69	132	7	70



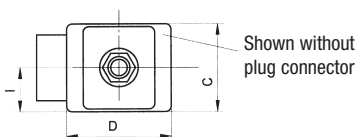
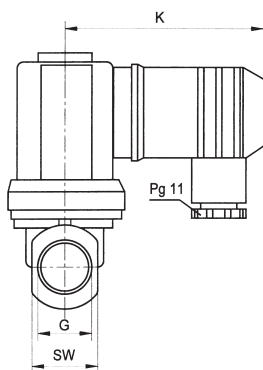
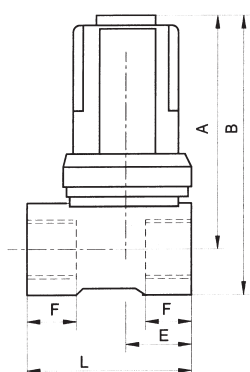
## AT series

DN 10–40

This range of high-quality solenoid valves is not dependent on a specific minimum differential pressure; the valves operate extremely reliably with no pressure, at slight differential pressure, right through to maximum pressure. They are therefore the valves of choice for installation in plants where differential pressures fluctuate greatly and are not possible to determine precisely in advance. The AT valve series **may only be used**

**for media free from oil and grease**, such as drinking water, hot water or alkaline detergents and bleaches. Solenoid valves of the AT series are VDE-approved according to EN 60730 as **electrically operated water valves up to 50°C**. Furthermore, the **EPDM** sealing material satisfies the **“KTW” (plastics in drinking water) recommendations of the German Department of Health**.

### Dimensioned drawings



### Technical data

#### Type

2/2-way

#### Operating mode

normally closed

#### Type of construction

Diaphragm solenoid valve, coupled. No initial pressure needed.

#### Pressure range

0 – 10 bar, also suitable for vacuum of up to -0.9 bar.

No back-pressure may occur as the valve will open in an uncontrolled manner.

#### Materials

Casing: brass, internal parts: stainless steel

#### Sealing material

EPDM

#### Mounting position

Any, solenoid system preferably upright

#### Temperature of medium

0°C to +120°C

#### Max. ambient temperature

55°C

#### Duty cycle

100% ED

#### Electrical connection

Device socket to DIN 43 650

#### Voltage/current type

Standard version 230 V, 50 Hz

#### Special voltages available

Voltage	Code
110 VAC	2
24 VAC	8
24 VDC	6

#### Degree of protection

IP 65 according to DIN 40 050 with device socket

#### Power consumption in VA or W

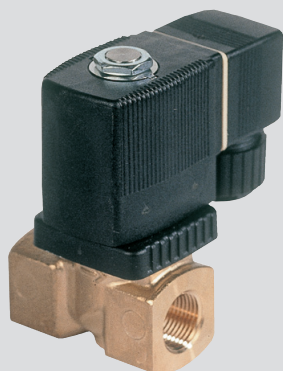
Switching state	Nominal diameter/DN					
	10	13	20	25	40	mm
AC: Start	34	36	38	160	202	VA
AC: Oper.	14	14	14	38	38	VA
DC: Start						
+ Operation	10	10	10	–	–	W

### Product Summary

DN (mm)	Pressure range (bar)	k <sub>vs</sub> value (m³/h)	Connection thread	Weight (kg)	Type
10	0–10	1.8	G 3/8"	0.4	AT 10
13	0–10	3.5	G 1/2"	0.55	AT 13
20	0–10	8.6	G 3/4"	1.0	AT 20
25	0–10	11.0	G 1"	1.7	AT 25
25	0–10	11.0	G 1 1/4"	1.7	AT 32
40	0–10	30.0	G 1 1/2"	3.5	AT 40
40	0–10	30.0	G 2"	3.5	AT 50

DN	A	B	C	D	E	F	G	K	L	M	SW
10	72	86	38	38	20	12	G 3/8"	65	50	3.5	27
13	83	99	45	51	24	14	G 1/2"	65	58	3.5	32
20	99	119	66	66	35	16	G 3/4"	65	80	3.5	41
25	145	166	105	105	69	18	G 1"	69	95	7	41
25	145	166	105	105	69	18	G 1 1/4"	69	95	7	50
40	157	187	105	105	69	22	G 1 1/2"	69	132	7	60
40	157	187	105	105	69	22	G 2"	69	132	7	70





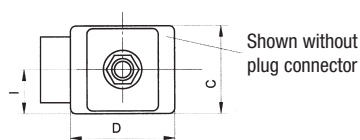
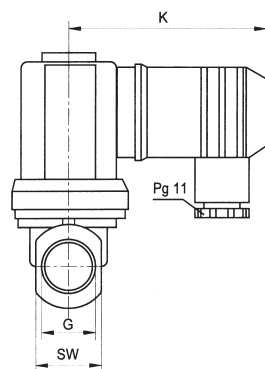
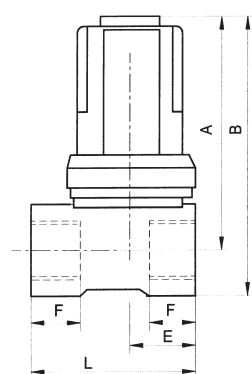
## AV series

DN 10–40

This range of high-quality solenoid valves is not dependent on a specific minimum differential pressure; the valves operate extremely reliably with no pressure, at slight differential pressure, right through to maximum pressure. They are therefore the valves of choice for installation in plants where differential pressures fluctuate

greatly and are not possible to determine precisely in advance. Solenoid valves of the AV series are approved as **safety shut-off devices according to DIN EN 264 (Registration No. 5S235/2000)** and are particularly suitable for use as anti-siphon valves in supply installations for light fuel oil EL.

### Dimensioned drawings



### Technical data

#### Type

#### Operating mode

#### Type of construction

#### Pressure range

#### Materials

#### Sealing material

#### Mounting position

#### Temperature of medium

#### Max. ambient temperature

#### Duty cycle

#### Electrical connection

#### Voltage / current type

#### Special voltages available

2/2-way

normally closed

Diaphragm solenoid valve, coupled. No initial pressure needed.

-0.9 to 4 bar (DN 10, 13), -0.9 to 10 bar (DN 20-40)

No back-pressure may occur as the valve will open in an uncontrolled manner.

Casing: brass, internal parts: stainless steel

FPM (Viton)

Any, solenoid system preferably upright

0°C to +90°C

55°C

100% ED

Device socket to DIN 43 650

Standard version 230 V, 50 Hz

Voltage Code

110 VAC 2

24 VAC 8

24 VDC 6

#### Degree of protection

#### Power consumption in VA or W

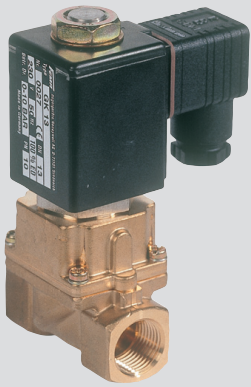
IP 65 according to DIN 40 050 with device socket

Switching state	Nominal diameter/DN					
	10	13	20	25	40	mm
AC: Start	34	36	38	160	202	VA
AC: Oper.	14	14	14	38	38	VA
DC: Start						
+ Operation	10	10	10	–	–	W

### Product Summary

DN (mm)	Pressure range (bar)	k <sub>vs</sub> value (m³/h)	Connection thread	Weight (kg)	Type
10	-0.9 – 4	1.8	G 3/8"	0.4	AV102MS2
13	-0.9 – 4	3.5	G 1/2"	0.55	AV131MS2
20	-0.9 – 10	8.6	G 3/4"	1.0	AV201MS2
25	-0.9 – 10	11.0	G 1"	1.7	AV251MS2
25	-0.9 – 10	11.0	G 1 1/4"	1.7	AV252MS2
40	-0.9 – 10	30.0	G 1 1/2"	3.5	AV401MS2
40	-0.9 – 10	30.0	G 2"	3.5	AV402MS2

DN	A	B	C	D	E	F	G	K	L	M	SW
10	72	86	38	38	20	12	G 3/8"	65	50	3.5	27
13	83	99	45	51	24	14	G 1/2"	65	58	3.5	32
20	99	119	66	66	35	16	G 3/4"	65	80	3.5	41
25	145	166	105	105	69	18	G 1"	69	95	7	41
25	145	166	105	105	69	18	G 1 1/4"	69	95	7	50
40	157	187	105	105	69	22	G 1 1/2"	69	132	7	60
40	157	187	105	105	69	22	G 2"	69	132	7	70



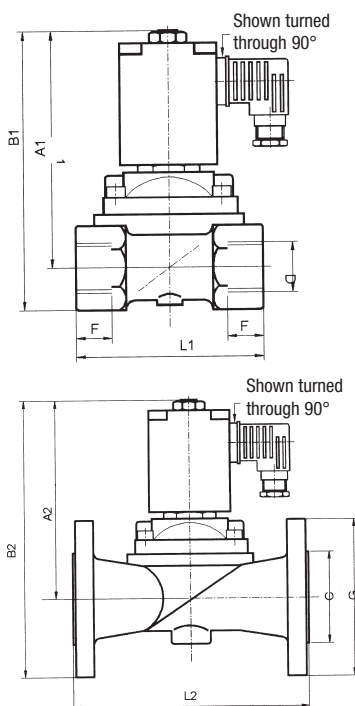
## GK series

for neutral media up to 180°C

The GK series piston-type solenoid valves are ideal for use as shutoff valves in heating and process engineering systems for neutral media such as hot water and steam. The valves require

no minimum differential pressure and can open and close even without pressure or with low differential pressures.

### Dimensioned drawings



### Technical data

#### Type

#### Operating mode

#### Type of construction

#### Materials

#### Sealing material

#### Media

#### Temperature of medium

#### Ambient temperature

#### Viscosity

#### Line connection

#### Operating voltages (±10%)

#### Special voltages available

2/2-way

normally closed

Piston-type solenoid valve, coupled, no minimum differential pressure required.

Screwed version: brass; flange version: cast iron GG 25.

PTFE and graphite

Neutral media, e. g. hot water and steam.

0°C to 180°C

max. 55°C

max. 21 mm²/s

G 1 to G 2, flange for DN 25—DN 50

230 V, 50 Hz

Voltage	Code
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110 VAC	2
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24 VAC	8
--------	---

For example: GK 20-2 (2 = 110 VAC)

100%

Angled plug to DIN 43 650

Start: 100 VA; operation: 35 VA, DN 50: 30 W

IP 65

Any, solenoid actuator preferably upwards

**opening:** DN 15—DN 25: 100—400 ms

DN 32—DN 50: 200—1200 ms

**closing:** DN 15—DN 25: 300—500 ms

DN 32—DN 50: 1000—3000 ms

#### Duty cycle

#### Electrical connection

#### Power consumption

#### Degree of protection

#### Mounting position

#### Switching times (standard values)

### Product Summary

DN (mm)	k <sub>vs</sub> value (m³/h)	Working pressure (bar)	Connection	Material	Weight (kg)	Type
13	3.7	0–10	G 1/2"	Brass	1.0	GK 13
20	5.0	0–10	G 3/4"	Brass	1.4	GK 20
25	10.0	0–10	G 1"	Brass	1.9	GK 25
32	16.0	0–10	G 1 1/4"	Brass	3.2	GK 32
40	16.0	0–10	G 1 1/2"	Brass	3.7	GK 40
50	36.0	0–10	G 2"	Brass	7.8	GK 50
25	10.0	0–10	Flange	GG 25	4.6	GK 25 F
32	16.0	0–10	Flange	GG 25	7.0	GK 32 F
40	16.0	0–10	Flange	GG 25	7.5	GK 40 F
50	36.0	0–10	Flange	GG 25	12.8	GK 50 F


DN	Screwed versions					Flange versions				
	D	L 1	A 1	B 1	F	C	G	L 2	A 2	B 2
13	G 1/2"	65	113	127	14					
20	G 3/4"	100	131	147	16					
25	G 1/2"	115	136.5	157	18	68	120	160	140.5	210.5
32	G 1 1/4"	126	161	186	20	78	140	180	161	231
40	G 1 1/2"	126	165	195	22	88	150	200	165	240
50	G 2"	164	225	260	24	102	165	230	225	307.5

# Specifications

## Solenoid valves

<b>Type series</b>	<b>Solenoid valves</b>
<b>TG</b>	2/2-way solenoid valve, flange version NW..., screwed version G..., Perbunan seal, normally closed/open, for connection to ... V, ... Hz, type ...
<b>TGK</b>	2/2-way solenoid valve for hot water/steam up to 180°C: Flange version NW..., screwed version G..., Teflon seal, normally closed/open, for connection to ... V, ... Hz, type ...
<b>LG/LGK</b>	Solenoid valve for hot water and steam. TÜV-tested to DIN 32 730 Flange version DN..., screwed version G..., normally closed, 0 to ... bar, ...°C, with built-in rectifier for connection to ... V ... Hz, type ...
<b>K</b>	<b>Medium: Gas (standard version)</b> Solenoid valve for gas, DVGW tested, Flange version DN.../, screwed version G...“, normally closed, 0 to ... bar, PN 25, with/without built-in rectifier for connection to ... V, ... Hz, type ... <b>Medium: Gas (ex-version)</b> Solenoid valve for gas, DVGW tested, Flange version DN.../, screwed version G...“, normally closed, 0 to ... bar, PN 25, explosion-proof version, degree of protection EEx de IIC T5, with/without built-in rectifier for connection to ... V, ... Hz, type ...
<b>K</b>	<b>Medium: Liquid gas (standard version)</b> Solenoid valve for liquid gas, TÜV-tested to DIN 32725 Flange version DN.../, normally closed, 0 to ... bar, PN..., with/without built-in rectifier for connection to ... V, ... Hz, type ... <b>Medium: Liquid gas (ex-version)</b> Solenoid valve for liquid gas, TÜV-tested to DIN 32725 Flange version DN.../, normally closed, 0 to ... bar, PN..., explosion-proof version, degree of protection EEx de IIC T5, with/without built-in rectifier for connection to ... V, ... Hz, type ...
<b>K</b>	<b>Medium: Fuel oil (standard version)</b> Solenoid valve for fuel oil, TÜV-tested to DIN EN 264 Flange version DN.../, normally closed, 0 to ... bar, with/without built-in rectifier for connection to ... V, ... Hz, type ... <b>Medium: Fuel oil (ex-version)</b> Solenoid valve for fuel oil, TÜV-tested to DIN EN 264 Flange version DN.../, normally closed, 0 to ... bar, PN..., explosion-proof version, degree of protection EEx de IIC T5, with/without built-in rectifier for connection to ... V, ... Hz, type ...
<b>GB</b>	Diaphragm solenoid valve, 2/2-way, normally closed, coupled version, 0 to 16 bar, DN ..., connection G ...“, sealing material ..., for connection to ... V ... Hz, type ...
<b>AB</b>	Diaphragm solenoid valve, 2/2-way, normally closed, coupled version, 0 to 10 bar, DN ..., connection G ...“, sealing material Perbunan, for connection to ... V ... Hz, type ...
<b>AT</b>	Diaphragm solenoid valve, 2/2-way, normally closed, coupled version, 0 to 10 bar, DN ..., connection G ...“, sealing material EPDM, for connection to ... V ... Hz, type ...
<b>AV</b>	Diaphragm solenoid valve, 2/2-way, normally closed, coupled version, -0.9 to 10 bar, DN ..., connection G ...“, sealing material FPM (Viton), for connection to ... V ... Hz, type ...
<b>GK</b>	Diaphragm solenoid valve, 0 – 180°C, 2/2-way, normally closed, coupled version, 0 to 10 bar, DN ..., connection G ...“, sealing material Perbunan, for connection to ... V ... Hz, type ...



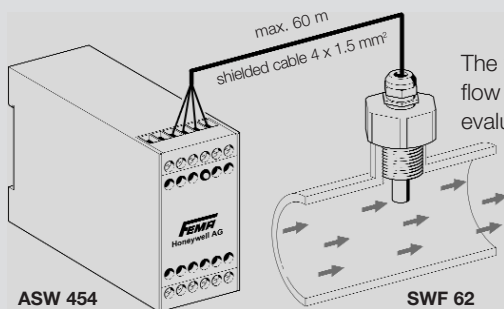


Flow monitors



## SWW series

For monitoring flow of liquid and piped, gaseous media



The flow in fluids can be monitored reliably with flow sensors SWF 62 and SWF 62 L and evaluation unit ASW 454.

The sensitivity can be adjusted accurately with a rough and fine potentiometer. The switching state is indicated by LED. The sensor element must be located in the flow.

### Technical data of sensor

#### General

The flow sensor in stainless steel 1.4571 is suitable for lightly contaminated media, and also aggressive media provided the material is compatible. Flows in gaseous media can also be monitored with this sensor.

**Medium temperature** 0...80°C.

Higher medium temperatures (up to 120°C) may cause a deviation of the switching point but cannot damage the sensor.

**Temperature compensation** up to 80°C

#### Sensor material

In contact with medium: stainless steel 1.4571  
Casting compound: Wepuran (vu 4459/41 sv)  
Cable gland: Nickel-plated brass

**Max. permitted pressure** 20 bar

**Process connection** G 1/4" or G 1/2"

**Connection cable** four-core, 2.5 m long

**Degree of protection** IP 65

### i Function

The flow monitors work according to the calorimetric principle. A thermistor is heated up. As heat is withdrawn by the flowing medium, the thermistor resistance alters. The change in resistance is evaluated. As the resistance also depends on the temperature of the medium, the difference must be determined by a second thermistor. The difference is compensated and in this way the switching point is kept stable. When monitoring high flow rates, rapid temperature fluctuations can trigger switching operations. Suspended materials adhering to the sensor can have an insulating effect and so affect the measurement result and hence the defined switching point. Therefore it is advisable to remove any dirt during routine maintenance operations.

### Product Summary

Sensors	Screw-in thread	Sensor length (from thread)	Thread length	Type
	G 1/4	25 mm	23 mm	SWF 62
	G 1/2	45 mm	18 mm	SWF 62 L

### Technical data of evaluation unit

#### Power supply

230 V AC or 24 V AC/DC  
(see Product Summary)

**Power consumption** approx. 3 VA

#### Contact load

Relay, single pole  
8 A, max. 250 V AC

**Ambient temperature** 0 - 60°C

**Max. temperature gradient** 10 K/min.

#### Flow rate

0.1...3 m/s (liquid media) 1...15 m/s  
(gaseous media)

**Response time** approx. 20 - 60 s

#### Repetition accuracy

< 2%, relative to the flow rate at the sensor.

#### Switching hysteresis

Approx. 2% of overall range.

**Max. cable length between sensor and evaluation unit**

60 m, for shielded cable 1.5 mm².

#### Sensor protection

In case of breakage or interruption of the sensor wires, the unit switches off or an interruption of flow is signaled.

**Type of construction** Standard housing N 45

**Weight** approx. 0.35 kg

### Evaluation units

### Supply voltage

### Type

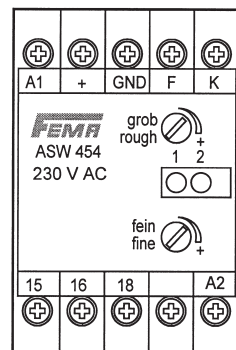
230 V AC

ASW 454

24 V AC/DC

ASW 454/24

### Operator interface



### Adjusting elements

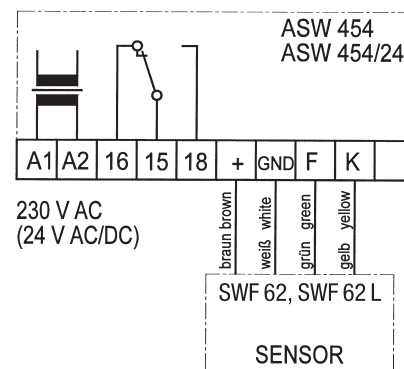
Sensitivity (rough and fine)  
(high sensitivity at low flow)

### Signal lamps

1 = Flow present

2 = Supply voltage present

### Wiring diagram



**i** In case of malfunction, a sensor error can be ruled out by checking the resistances between the connecting wires of the sensor. Sensor SWF62 or SWF62L must be disconnected and checked with a suitable ohmmeter between the individual connecting wires:

White-brown approx. 0.2 kOhm  
White-green approx. 1.0 kOhm  
White-yellow approx. 1.0 kOhm

The terminal voltage of the evaluation units ASW454 or ASW 454/24 can also be checked with a voltmeter between the "+" and "Gnd" terminals after disconnecting the sensor.  
14.8 VDC is the correct value.



KSW 230

## KSW series

For monitoring flow of liquid and piped, gaseous media

These compact flow monitors reliably measure the flow of liquids and gases in pipes and detect any falling below a predefined switching point. The sensitivity and hence the switching point

can be set very precisely with a rough and fine potentiometer. The switching state is shown by a yellow LED. The sensor element must be located in the flow.

### Technical data

**Medium temperature** -10...+80°C

**Max. ambient temperature** -20...+60°C

#### Temperature compensation

0–80°C, higher temperatures (up to 120°C) may cause a deviation of the switching point but cannot damage the sensor.

#### Sensor material

In contact with medium: stainless steel 1.4305  
Sealing compound: Wepuran (vu 4459/41 sv)

**Max. pressure** 30 bar

**Process connection** G 1/2"

**Power supply** 230 VAC or 24 VAC/DC

**Power consumption** 4 VA

#### Contact load

Relay, single pole  
250 VAC, 10 (2) A

**Max. temperature gradient** 15 K/min.

**Flow rate** 0.05...3 m/s

**Response time** 1...10 s

#### Sensor protection

In case of mechanical failure of the sensor element or power failure or short circuit, the relay drops out.

**Reproducibility of switching point**  
+/-1%

**Weight** 430 g

### Applications and conditions of use

The sensor is easy to install and has no mechanical moving parts liable to wear. It is especially suitable for monitoring **cooling and heating circuits containing up to 35% glycol. Prevents pumps from running dry.** These devices are used in the **chemical industry** for **monitoring flow of aqueous alkaline solutions and bases.** Such use is subject to compatibility with the material 1.4305.

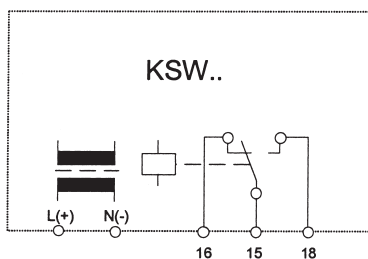
Thanks to its robust design, the sensor is suitable for lightly contaminated media, and also aggressive media provided the material is compatible. Suspended material adhering to the sensor can have an insulating effect and so affect the measurement result and hence the defined switching point. Therefore it is advisable to remove any dirt during routine maintenance operations.

### i Operating method

The electronic flow monitors work according to the calorimetric principle. A thermistor is heated up. As heat is withdrawn by the flowing medium, the thermistor resistance alters. The change in resistance is evaluated. As the resistance also depends on the temperature of the medium, the difference is determined by a second thermistor and the temperature deviation is compensated. In this way the switching point remains stable.

Type	Supply voltage
KSW 230	230 VAC
KSW 24	24 V AC/DC

### Wiring diagram

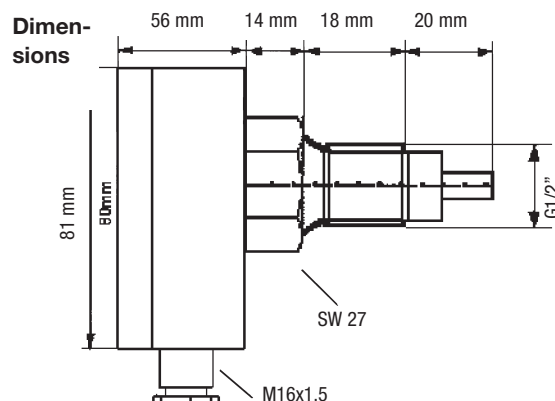


### Operator interface and dimensioned drawing of setting potentiometer

Rough and fine sensitivity  
(high sensitivity for small flow).

### Signal lamps

Mains power present: LED green "mains" ON  
LED yellow "flow" ON





SWL series

Sensor for air ducts, evaluation unit for enclosed mounting

The combination of air flow sensor SLF 3 and evaluation unit ASL 453 is suitable for air flow monitoring in air-conditioning, ventilation and cooling installations and in any situation where

flow processes must be detected in air or neutral gases. Sensitivity is adjustable over a wide range.

ASL 453

Technical data of sensor

- General
- Fast-reacting air flow sensor with movable flange for installation in air ducts. With temperature compensation, suitable for media with rapid temperature changes.
- Medium temperature -20...+100°C
- Compensation behavior  
(Reaction speed on change in medium temperature) fast, approx. 0.3 s
- Installation depth 35 mm
- Sensor tube diameter 10 mm
- Sensor tube material nickel-plated brass
- Measuring element  
Insensitive to moisture (can be cleaned in water). Sensitive to mechanical deformation (care must be taken when cleaning with hard objects).
- Degree of protection IP 32
- Electrical connection  
Terminal strip accessible after removal of cover. 3-core connection to evaluation unit

Technical data of evaluation unit

- Power supply  
230 V AC or 24 V AC/DC  
(see Product Summary)
- Power consumption approx. 3 VA
- Contact load  
Relay, single pole 8 A, max. 250 V AC
- Ambient temperature 0 – 60°C
- Flow rate  
Adjustable from 0.1 to 20 m/s for gaseous media
- Response time approx. 1 s
- Repetition accuracy  
<2%, relative to the flow rate directly on the sensor.
- Switching hysteresis approx. 2% of overall range
- Max. cable length between sensor and evaluation unit  
100 m, for shielded cable 1.5 mm².
- Sensor protection  
In case of breakage or interruption of the sensor wires, the unit switches off or an interruption of flow is signaled.
- Type of construction Standard housing N 45
- Weight approx. 0.35 kg

Function

The air flow monitors work according to the calorimetric principle. A thermistor is heated up. As heat is withdrawn by the flowing air, the thermistor resistance alters. The change in resistance is evaluated. As the resistance also depends on the temperature of the medium, the difference must be determined by a second thermistor. The difference is compensated and in this way the switching point is kept stable.

Suspended materials adhering to the sensor can have an insulating effect and so affect the measurement result and hence the defined switching point. Therefore it is advisable to remove any dirt during routine maintenance operations.

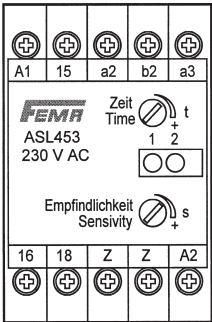
Switch-on bypass

While the plant is being started up (still no airflow present), the output contact is activated and the flow condition signaled. The time for the switch-on bypass is adjustable from 2-60 s. The start-up or switch-on bypass starts when the unit is switched on. If an external start button (normally closed contact) is connected (to the Z-Z terminals), the start-up bypass begins when the (locking) button is pressed.

Product Summary

	Supply voltage	Type
Sensor	–	SLF 3
Evaluation unit	230 V AC 24 V AC/DC	ASL 453 ASL 453/24

Operator interface



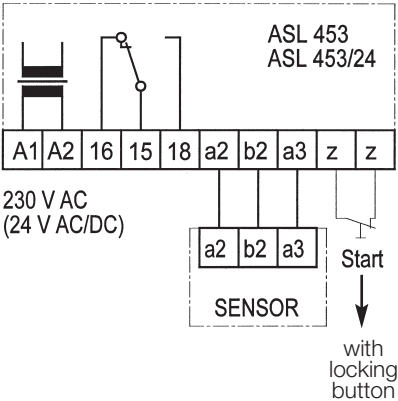
Adjusting elements

- s = sensitivity
- t = time for switch-on bypass  
(high sensitivity at low flow)

Signal lamps

- 1 = Flow present or switch-on bypass active
- 2 = supply voltage present

Wiring diagram



In case of malfunction, a sensor error can be ruled out by checking the resistances between the connecting wires. Sensor SLF 3 must be disconnected and checked with a suitable ohmmeter between the individual connecting wires:

- Black-brown approx. 8.2 kOhm
- Black-blue approx. 8.2 kOhm
- Brown-blue approx. 18 kOhm

The terminal voltage of evaluation units ASW454 or ASW 454/24 can also be checked with a voltmeter between the “a2” and “a3” terminals after disconnecting the sensor. 31.4 VDC is the correct value.





KSL 230

## KSL series

These compact flow monitors reliably measure air flow in air ducts and detect any falling below a predefined switching point. The sensitivity and hence the switching point can be set very precisely with a potentiometer. The switching state is shown by a yellow LED.

The sensor tip must be completely immersed in the medium. Signal evaluation and the switching process take place within the unit itself so that no additional space is required inside the switch cabinet.

### Technical data

**Medium temperature** -10...+80°C

**Max. ambient temperature** -20...+60°C

**Temperature compensation**  
fast, adjustment no more than 0.3 s after change in air temperature.

**Sensor tube material** MS 58, nickel-plated

**Max. permitted pressure** 10 bar

**Connection** PG 7, mounting flange

**Power supply** 230 VAC or 24 VAC/DC

**Power consumption** 4 VA

**Contact load**  
Relay, single pole  
250 VAC, 10 (2) A

**Temperature gradient** 15 K/min.

**Flow rate** 0.1...30 m/s

**Response time** 1...10 s

**Measuring element**  
Insensitive to moisture. Clean only under running water, without tools.

**Immersion depth** max. 130 mm

**Sensor protection**  
In case of mechanical failure of the sensor element, power failure or short circuit, the relay drops out.

**Reproducibility of switching point** +/-1%

**Weight** 400 g

### Applications and conditions of use

The sensor is easy to install and has no mechanical moving parts liable to wear. Ideal for **ventilation and air-conditioning systems**, where the sensor can be used to monitor **fans, air intakes and butterfly valves**. Other applications include **clean rooms**, where the sensor can be used to monitor **air locks**. Ideal for the **medium, air and all non-combustible and non-aggressive gases**.

### i Operating method

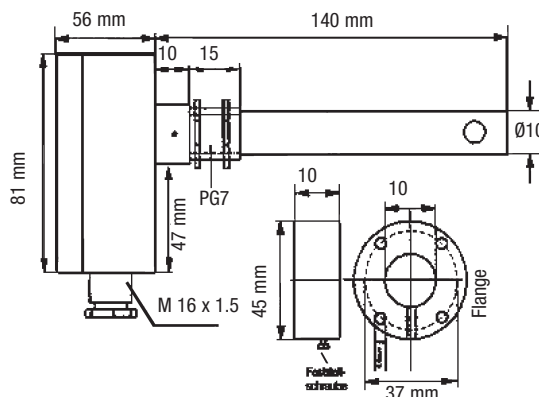
The electronic flow monitors work according to the calorimetric principle. A thermistor is heated up. As heat is withdrawn by the flowing medium, the thermistor resistance alters. The change in resistance is evaluated. As the resistance also depends on the temperature of the medium, the difference is determined by a second thermistor and the temperature deviation is compensated.

In this way the switching point remains stable. Suspended materials adhering to the sensor can have an insulating effect and so affect the measurement result and hence the defined switching point. Therefore it is advisable to remove any dirt during routine maintenance operations.

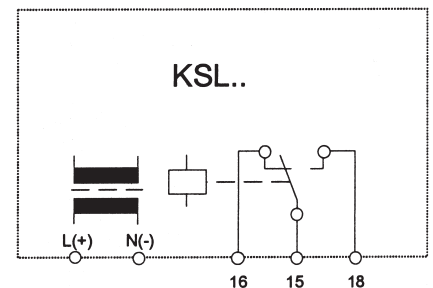
### Product Summary

Type	Supply voltage
KSL 230	230 VAC
KSL 24	24 V AC/DC

### Dimensioned drawing



### Wiring diagram

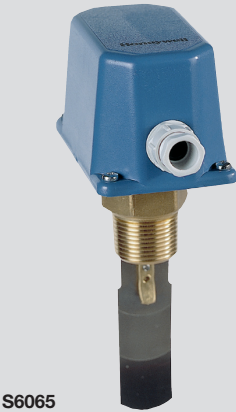


### Setting potentiometer

- + = high sensitivity
- = low sensitivity

### Signal lamps

- Mains power present: Green LED ON
- Closing delay ON: Yellow "time" LED ON
- Flow present: Yellow "air flow" LED ON



Series S6065

Flow monitoring for liquid media (TÜV-tested)

TÜV-tested (according to notice “Strömung 100”) flow monitors of series S6065A are particularly suitable for flow monitoring of coolants in

air-conditioning and refrigeration systems. Version V4A is also suitable for monitoring aggressive liquids.

Technical data

- Switching capacity 15 (8) A, 24...250 VAC
- Service life  
50000 cycles at nominal load
- Working temperature -40°C...+85°C
- Electrical connection  
Screw terminals for 1.5 mm²
- Cable diameter 6...9 mm
- Protection class I according to EN60730
- Degree of protection IP65 according to EN60529
- Housing material  
ABS and corrosion-protected steel

Product characteristics

- Low-cost solution for flow monitoring in heating, ventilation and air-conditioning installations
- Fully encapsulated microswitch (single-pole changeover contact) with high current capacity
- TÜV-tested according to notice “Strömung 100”

Switching point adjustment

The unit is preset to the lowest switching range. The desired switching range can be set by turning the adjusting screw in a clockwise direction (in the area of the connection terminals). Table of switching values 1 shows reset points (RP), switching points (SP) and paddle sizes for different pipe diameters.

Mounting

Flow monitors for liquid media S6065A1003 and S6065A2001 can be mounted in any position, but must be positioned far enough away from pipe angles, filters and valves. The arrow on the housing must point in the flow direction. When installing in vertical pipes, take care to ensure that the flow direction is from bottom to top. Readjustment of the switching point is also necessary, as the weight of the paddle in this position affects the cut-off range. To protect the internal bellows against dirt deposits, the unit must never be installed in the pipe with the housing pointing downwards.

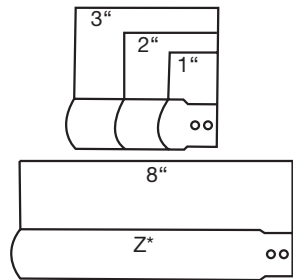
Replacement paddle: PA2

Unit specifications

Models	S6065A1003	S6065A2001
Flow medium	non-aggressive liquids	aggressive liquids
Mounting	Rp 1" (ISO 7/1)	Rp 1" (ISO 7/1)
Max. temperature of medium	120°C	120°C
Pressure	11 bar	30 bar
Sensor housing material	Brass	1.4404
Paddle material	1.4401	1.4401
Paddle lever material	Brass	1.4401
Housing dimensions	113 x 70 x 65 mm	108 x 70 x 72 mm
Weight	850 g	850 g
Approvals	TÜV Strömung 100	TÜV Strömung 100

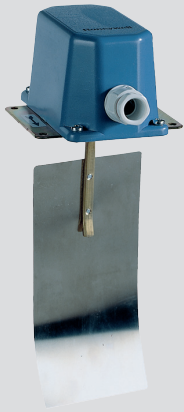
Table of switching values 1

Pipe DN	Length of paddle	Reset and switching points (m³/h)			
		min. flow rate RP	SP	max. flow rate. RP	SP
1"	1"	0.6	1.0	2.0	2.1
1 1/4"	1"	0.8	1.3	2.8	3.0
1 1/2"	1"	1.1	1.7	3.7	4.0
2"	1" + 2"	2.2	3.1	5.7	6.1
2 1/2"	1" + 2"	2.7	4.0	6.5	7.0
3"	1" + 2" + 3"	4.3	6.2	10.7	11.4
4"	1" + 2" + 3"	11.4	14.7	27.7	29.0
4"	1" + 2" + 3" + Z*	6.1	8.0	17.3	18.4
5"	1" + 2" + 3"	22.9	28.4	53.3	55.6
5"	1" + 2" + 3" + Z*	9.3	12.9	25.2	26.8
6"	1" + 2" + 3"	35.9	43.1	81.7	85.1
6"	1" + 2" + 3" + Z*	12.3	16.8	30.6	32.7
8"	1" + 2" + 3"	72.6	85.1	165.7	172.5
8"	1" + 2" + 3" + Z*	38.6	46.5	90.8	94.2



\*Z: 8" paddle must be shortened according to the pipe diameter. The installed paddle must not touch the pipe walls.





S6040

## Series S6040

### Flow monitoring in ventilation systems

Air flow monitor S6040A1003 is suitable for flow monitoring of air and non-aggressive gases in

ducts of air-conditioning and air-purification systems.

#### Technical data

**Switching capacity** 15 (8) A, 24...250 VAC

**Service life**

50000 cycles at nominal load

**Working temperature** -40°C...+85°C

**Electrical connection**

Screw terminals for 1.5 mm<sup>2</sup>

**Cable diameter** 6...9 mm

**Protection class** I according to EN60730

**Degree of protection**

IP65 according to EN60529

**Housing material**

ABS and corrosion-protected steel

**Replacement paddle:** PA1

#### Unit specifications

Specification	S6040A1003
Flow medium	Air
Mounting	Vertically through a 20 mm hole. Paddle mounted inside.
Max. temperature of medium	85°C
Pressure	0.25 bar
Paddle material	1.4301
Paddle lever material	Brass
Housing dimensions	108 x 70 x 72 mm
Weight	700 g

#### Mounting

The air flow monitor S6040A1003 (with paddle included) is mounted in the air duct with the switch housing at the top. The paddle is mounted from the inside of the air duct. Settling distance required: at least 5 x duct diameter before and after the switch.

To ensure a proper seal, the unit with the accompanying sealing plate must be fastened on the air duct through a 20 mm hole using the screws supplied. Once the unit is mounted on the duct, the paddle is fastened on the shaft from the inside.

#### Switching point adjustment

Lowest switching point: approx. 2.5 m/s; reset point: 1 m/s.

Highest switching point: approx. 9.2 m/s; reset point: 8.0 m/s.

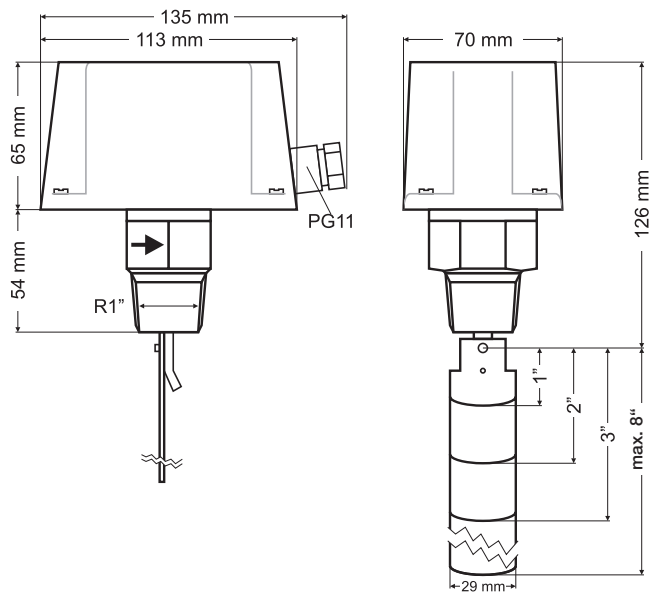


Degree of protection:  
IP 65

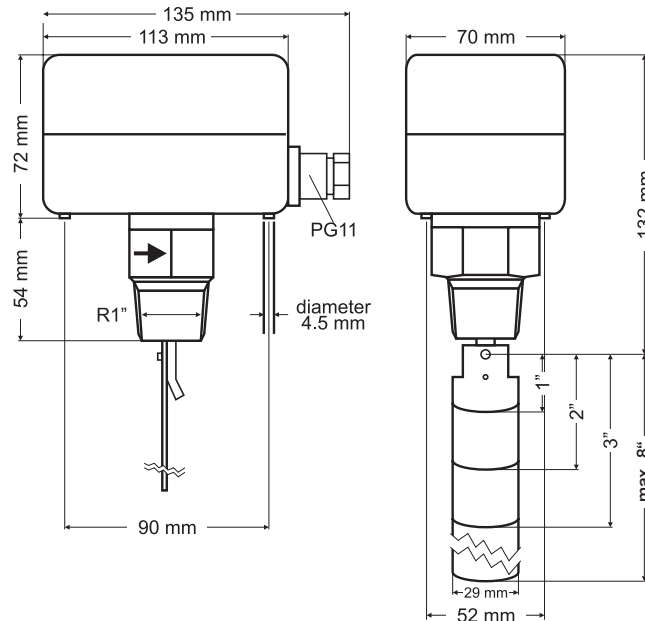
# Series S6040/S6065

## Dimensions

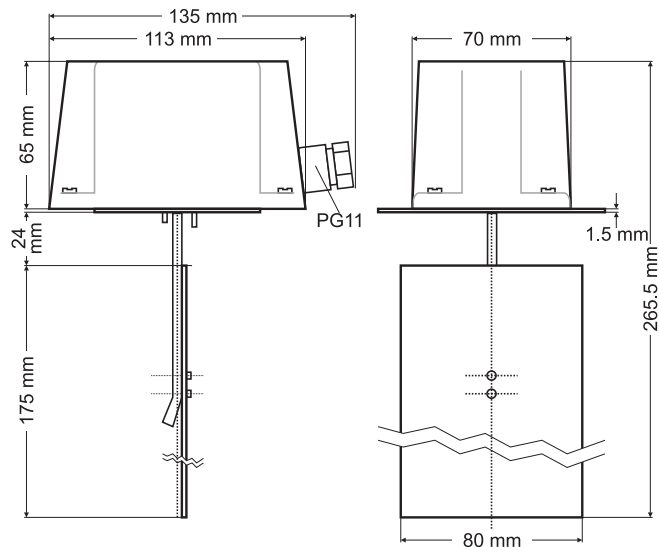
S6065A1003



S6065A2001



S6040A1003



# Specifications

## Flow monitoring

<b>Type series</b>	<b>Flow monitoring</b>
<b>SWF 62</b>	Flow sensor for liquid media, screw-in thread G 1/4 Parts in contact with medium made from 1.4571 Max. pressure 20 bar, connection cable 2.5 m Type: SWF 62 together with
<b>ASW 454</b>	Evaluation unit for flow sensor SWF 62 in standard housing N 45, with integrated sensor protection, Signal output: Relay 8 A, max. 250 V Supply voltage 230V AC (Type: ASW 454) or 24 V AC/DC (Type ASW 454/24)
<b>KSW 230</b>	Compact flow monitor with integrated sensor protection, operating voltage 230 V AC Type: KSW 230
<b>KSW 24</b>	Compact flow monitor with integrated sensor protection, operating voltage 24 V Type: KSW 24
<b>SLF 3</b>	Air flow sensor for installation in air ducts, with mounting flange and terminal connection housing Type: SLF 3 together with
<b>ASW 453</b>	Evaluation unit for air flow sensor SLF 3 in standard housing N 45, with integrated sensor protection, Signal output: Relay 8 A, max. 250 V Supply voltage 230 V AC (Type ASL 453) or 24 V AC/DC (Type ASL 453/24)
<b>KSL 230</b>	Compact flow monitor with integrated sensor protection, operating voltage 230 V AC Type: KSL 230
<b>KSL 24</b>	Compact flow monitor with integrated sensor protection, operating voltage 24 V Type: KSL 24
<b>S6040A1003</b>	Air flow monitor, for installation in air ducts Switching point adjustable from 2.5 – 9.2 m/sec. Contact load 15 (8) A, 24 – 250 VAC Maximum air temperature 85°C.
<b>S6065A1003</b>	Flow monitor for non-aggressive liquids Switching point adjustable from 1 m³ to 94 m³. Contact load 15 (8) A, 24 – 250 VAC Maximum medium temperature: 120°C. Mounting connection Rp 1" (ISO 7/1) Housing brass, paddle 1.4401 Switch housing ABS TÜV-tested to notice 100
<b>S6065A2001</b>	Flow monitor for aggressive liquids Switching point adjustable from 1 m³ to 94 m³. Contact load 15 (8) A, 24 – 250 VAC Maximum medium temperature: 120°C. Mounting connection Rp 1" (ISO 7/1) Housing and paddle 1.4401 Switch housing ABS TÜV-tested to notice 100

The specifications refer to the listed normal versions of the equipment. In the case of equipment with variants or additional functions, the texts must be supplemented or amended accordingly.