

Technical manual BA 0809



Filling level



SRK – 600

Filling level limit switch

for conductive filling level monitoring
in electrical conductive liquids, sludge's and pastes

Useable

- for filling level resp. limit level detection in container
- as dry run protection for pumps

Active coat compensation for sticky or slow-moving products

Flush installation – no influence on flow

Suitable for wide process temperature range from – 40°C to +150 °C

Useable for process pressures from –1 to 25 bar

Rotatable housing

Integrated evaluation electronic

- 3-wire-connection 16...45 V DC with PNP switching output
- 3-wire-connection 20...253 V AC/DC with relay output

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know how mit system



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1. Application

The device **SRK – 600** with integrated evaluation electronic is a compact conductive filling level limit switch for monitoring of filling levels in electrically conductive liquids in container or pipelines at process temperatures from – 40°C to +150°C and process pressures from –1 up to 25 bar.

The device is suitable for limit value detection or also as dry run protection in liquids and viscous substances, that forms no isolating greasy film, like e.g. mustard, stewed apple, honey or milled turnips.

2. Function

Measuring principle

The ready status is indicated by the come on of a green LED (ON) at the front side of the devices.

An alternating voltage, that is generated by the integrated electronic, is applied to the electrode contacts.

Due to the use of an alternating voltage, the corrosion of the electrodes and the electrolytic decomposition of the filling material is avoided.

As far as the electrically conductive filling material with a minimum conductivity of 7,5µS forms a contact between the electrodes, the existence of a liquid is detected, in which there will be differenced between a filling level signal and a coat at the measuring tip. The integrated active coat compensation is responsible for a reliable switching of the device, if the liquid releases the electrodes but there still remains material coat. An adjustment of the detection sensitivity is not necessary.

In some applications it is necessary, to compensate strong wave fluctuations, that are generated e.g. by mixing machines or at filling resp. emptying, to avoid unwanted switching actions.

The device is equipped with a switching delay of one second. This delay is applied as well as at activation and also at deactivation of the output relay.

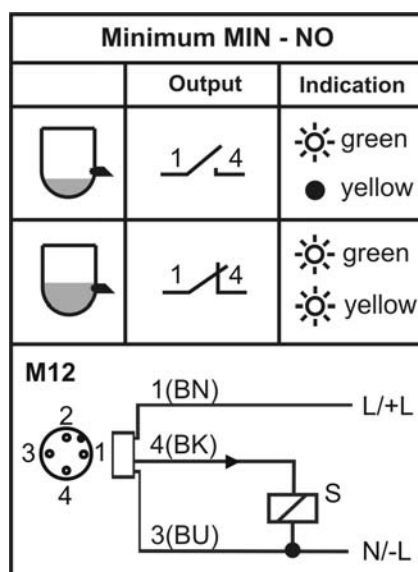
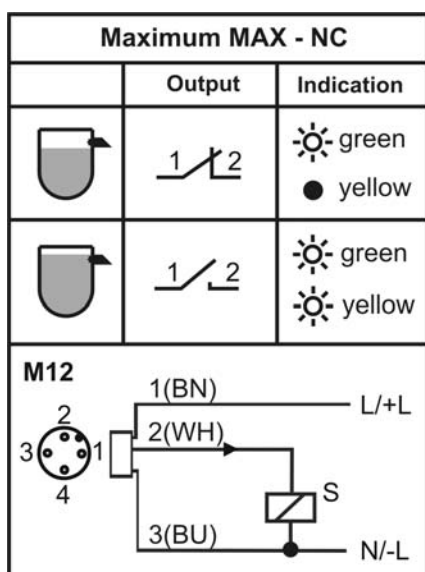
The detection of a filling level signal is indicated at the front side of the device by a yellow LED and converted into a switching command and output at the PNP switching output resp. at the relay output.

This allows the drive of relays, contactors, magnetic vents, optical indicators, horns as well as of SPS inputs. At a switching reaction, the voltage of the connection terminal 1 (L/+L) is output alternating to two connection terminals. At the variant GA – PNP switching output this is realized by two contrary operated semiconductor switches, whereas at the variant WB – relay output a relay changing contact is used.

Safety function

The safety function defines the operation principle of the output.

- Maximum safety: The output switches off, if the switching level is exceeded (liquid detected at measuring electrode) or the power supply fails.
- Minimum safety: The output switches off, if the switching level is underrun (no liquid detected at measuring electrode) or the power supply fails.





3. Safety notes

Each person that is engaged with inauguration and operation of this device, must have read and understood this technical manual and especially the safety notes.

Installation, electrical connection, inauguration and operation of the device must be made by a qualified employee according to the informations in this technical manual and the relevant standards and rules.


The device may only be used within the permitted operation limits that are listed in this technical manual. Every use besides these limits as agreed can lead to serious dangers.

The materials of the device must be chosen resp. checked for compatibility with the respective application requirements (contacting materials, process temperature)

An unsuitable material can lead to damage, abnormal behavior or destruction of the device and to the resulting dangers.

The device may not be used as sole measure for prevention of dangerous conditions in machines and plants.

This device is conform to article 3 (3) of the EC directive 97/23/EC (pressure equipment device directive) and is designed and produced in good engineer practice.

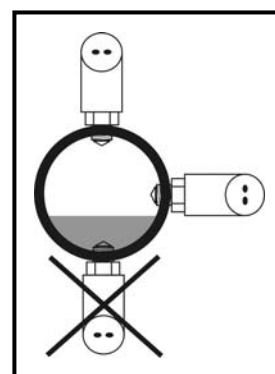
The device meets the legal requirements of all relevant EC directives. 

4. Installation

Prior to installation resp. deinstallation of the device the system must be pressure free. High temperatures should be avoided to protect from injury

At horizontal pipes the installation position decides about the switching behaviour:

- If the device is mounted at the top side of the horizontal pipe, a switching action is generated already at a minimum of liquid deficiency. Remains of the liquid can flow off easily from the electrode tip.
- At sided installation in a horizontal pipe, the switching action is generated at partially filled resp. partially empty pipe. Remains of the liquid can flow off easily from the electrode tip.
- The installation at the bottom of a horizontal pipe is not recommended. If liquid remains stays in the pipe, this can possibly not be detected.



For the use as pump protection, the installation at the suction side of the pump is recommended.

Avoid a strong icing-up of the liquid, because ice is an isolator that can influence the function ability of the device.

The existence of air bubbles in a liquid, especially at slow-moving liquids with very low conductivity, can lead to function impairment.

The tightening of the process connection with screw in thread may only be done at the hexagon by a suitable tool.

The screw in of the process connection by using the connection housing is not permitted.

The housing can be rotated every time, also at operation, without a tool by 340°.

5. Maintenance

The device is free of maintenance.

6. Repair

A repair may only be carried out by the manufacturer.

If the device must be sent back for repair, the following informations must be enclosed:

- An exact description of the application.
- The chemical and physical characteristics of the product.
- A short description of the occurred error.

Before returning the device for repair, the following measures must be proceeded:

- All adhesive product residues must be removed. This is especially important, if the product is unhealthily, e.g. caustic, toxic, carcinogenic, radioactive etc.
- A returning must be refrained, if it is not absolutely possible to remove unhealthily products completely, because e.g. they have been penetrated into cracks or are diffused through plastic.

7. Electrical connection

The electrical connection of the device must be carried out according to the respective country specific standards. Incorrect installation or adjustment could cause applicationally conditioned risks.

For the connection use only suitable cables, that fulfills the requirements e.g. regarding temperature, chemical resistance or laying at the place of installation.

The device must be grounded. The metallic parts of the device are electrically connected with the socket of the plug M12. Due to this the grounding can be carried out by the process connection.

For inauguration it is suggested to switch off all connected control devices to avoid unintended control actions.

Type GA – supply 16...45V DC / PNP switching output

The power supply voltage and the PNP switching output are galvanically separated from the electrode circuit.

The power supply voltage may not exceed 45 V to avoid damage of the electronic.

The power supply voltage connection is polarity protected.

A fuse is integrated internally at the power supply circuit. Due to this the installation of a fine protection is not necessary. The PNP switching output is not protected by this fuse.

At an activated output, the load at the PNP switching output will be connected contactless and by this bounce-free by a semiconductor switch with the terminal 1, that is the terminal +L of the power supply voltage.

Thus, at the respective output terminal a positive signal near power supply voltage is produced.

At deactivated switching state and at failure of power supply voltage the semiconductor switch is shut off.

The PNP switching output is current limited to 0,5 A.

Inductive loads at the PNP switching output, e.g. relays or contactors may only be used with a free-wheeling diode or a RC protection circuit to avoid high voltage peaks.

The device is suitable for antivalent use. Using both outputs the MIN and MAX outputs leads contrary states at trouble-free operation. In the case of failure or at wire break both electronic switches are opened.

By using a two-channel evaluation, besides the filling level monitoring also a function dependent monitoring of the sensor can be realized.

Type WB – supply 20...253V AC/DC / relay output

The power supply voltage and the relay contacts are galvanically separated from the electrode circuit.

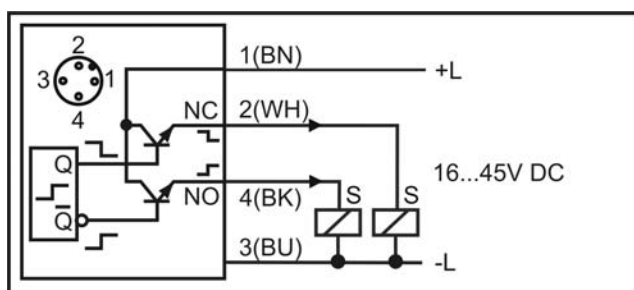
Due to the integrated wide range power supply, for connection to supply voltages from 20...253V AC / DC, the filling level limit switch is suitable for using in all common energy supply networks.

The connection is reverse polarity protected.

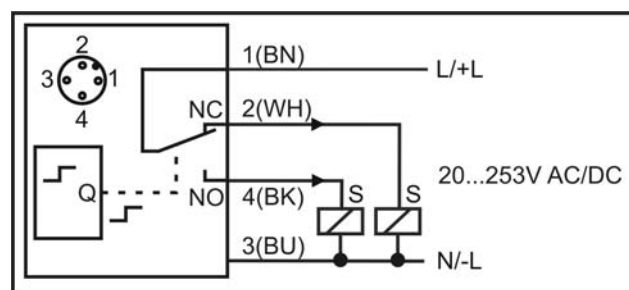
A fuse is integrated internally at the power supply circuit. Due to this the installation of a fine protection is not necessary. The relay output is not protected by this fuse.

At an activated output, the load at the relay output will be connected with the terminal 1, that is the terminal L/+L of the power supply voltage.

Inductive loads at the relay contacts, e.g. auxiliary contactors or magnetic vents may only be used with a free-wheeling diode or a RC protection circuit to avoid high voltage peaks.



Type GA Power supply voltage 16...45V DC
PNP switching output to +L (1)



Type WB Power supply voltage 20...253V AC/DC
relay output to L/+L (1)

Conductor color standard connection cable: BN = brown, WH = white, BK = black, BU = blue
The connection cable is not enclosed in the delivery contents.

8. Technical data

Auxiliary power supply

Type GA – supply 16...45V DC

Permissible supply voltage:	16 V to 45 V DC	polarity protected
Ripple voltage:	$\leq 2 V_{PP}$	condition: within the permissible supply voltage range
Power consumption:	$\leq 1 W$	switching output with no load
Overvoltage category:	II	acc. to DIN EN 61010-1
Protection classification:	II	double or reinforced insulation
Isolation voltage:	2kV~	auxiliary power / switching output to electrode circuit

Type WB – supply 20...253V AC/DC

Permissible supply voltage:	20 V to 253 V AC/DC 48...62 Hz	polarity protected
Power consumption:	$\leq 1 VA / 1 W$	
Overvoltage category:	II	acc. to DIN EN 61010-1
Protection classification:	II	double or reinforced insulation
Isolation voltage:	2kV~	auxiliary power / relay output to electrode circuit

Output

Type GA – PNP switching output

Function:	PNP transistor output, to contact +L	
Output voltage:	$V_{OUT} \geq V_{+L} - 2 V$	
Output current:	$\leq 500 mA$	current limited, short circuit protected
Cutoff current:	$\leq 100 \mu A$	current limited, short circuit protected
Rise up time:	$< 30 \mu s$	$R_L < 3 k\Omega$ resp. $I_L > 4,5 mA$
Switching cycles:	$\geq 100.000.000$	

Type WB – relay output

Function:	changing contact, to contact L/+L	
Contact data:	$\leq 2 A - 62,5 VA / 60 W$ (at ohmic load)	
	$\geq 100 \mu V$	
Switching cycles:	≥ 100.000	at maximum contact load

Electrode circuit – measuring circuit

Output voltage:	potential free alternating voltage
Output data:	$1 V_{SS} \pm 0,2 V / \leq 5 kHz \pm 200 Hz / \leq 5 mA$
Measuring range:	$\geq 7,5 \mu S/cm$
Delay time:	$1s \pm 0,4s$

Materials

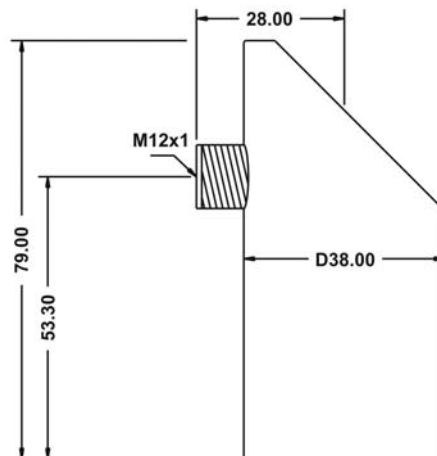
Process connection: (medium contact)	steel 1.4404 (AISI 316L) / 1.4571 (AISI 316Ti)
Electrode isolation: (medium contact)	PEEK
Temperature decoupler:	CrNi-steel
Groove nut DIN11851:	CrNi-steel
Connection housing:	CrNi-steel / PC polycarbonate
Device plug M12x1:	socket CrNi-steel, insert PUR, contacts gold-plated
Gaskets:	FPM – fluoroelastomer, at SRK-601 medium contact

Environmental conditions

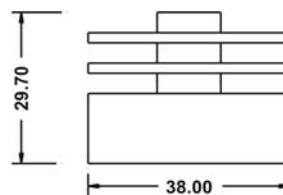
Environmental temperature:	– 40°C...+85°C	connection housing
Process temperatures:	<u>SRK-600</u> standard – 40°C...+100°C extended – 40°C...+150°C, with temperature decoupler	
	<u>SRK-601</u> standard – 25°C...+100°C extended – 25°C...+150°C, with temperature decoupler	
Process pressures:	– 1 bar ...25 bar	
Weight:	depends on variant	e.g. 0,4 kg – type SRK-600 S8 – G3/4“
Torque strength:	≤ 80 Nm	for variants with screw-in thread
Protection classification:	IP68 / 1mH ₂ O for 1h	DIN EN 60529
Climatic classification:	4K4H	DIN EN 60721-3-4
Shock classification:	50 g / 11 ms	DIN EN 60068-2-27
Vibration classification:	20 g / 10 – 2000 Hz	DIN EN 60068-2-6
EM – compatibility:	emission	DIN EN 61326-1 operation device class B
	immunity	DIN EN 61326-1 industrial range
Reference conditions:	DIN EN 60770-1 T = 25 °C, rel. humidity 45...75 %, environm. air pressure 860...1060 kPa	

9. Dimension drawings

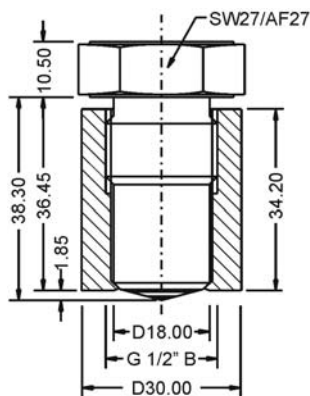
Connection housing



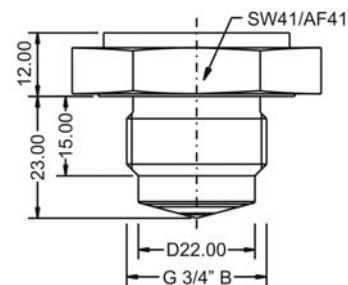
Temperature decoupler
for extended temperature range
– 25/40°C...+150°C (optional)



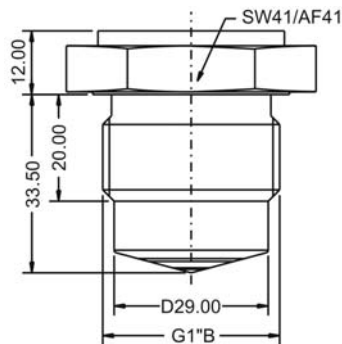
SRK – 600
Type S 6
G 1/2"
metallic sealing
weld-in sleeve SEM-22



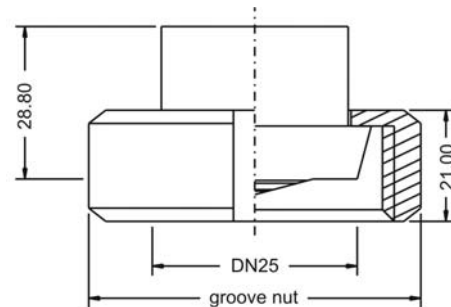
SRK – 600
Type S 8
G 3/4"
front flush



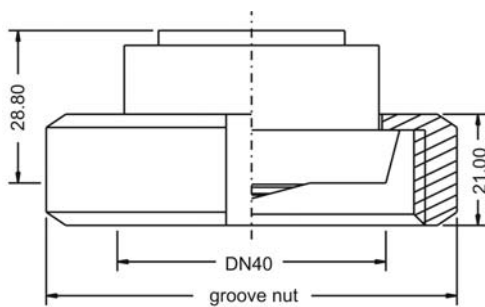
SRK – 600
Type S 5
G 1"
front flush



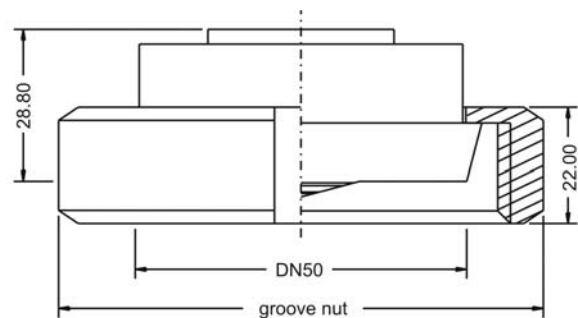
SRK – 600
Type S R
Milk tube
DN25



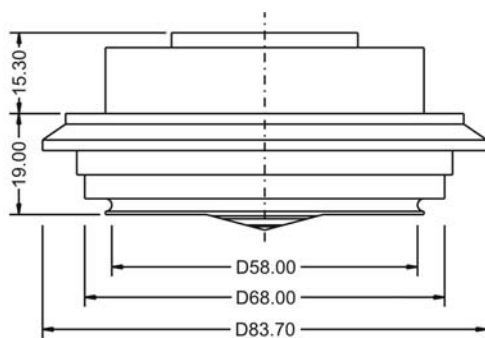
SRK – 600
Type S N
Milk tube
DN40



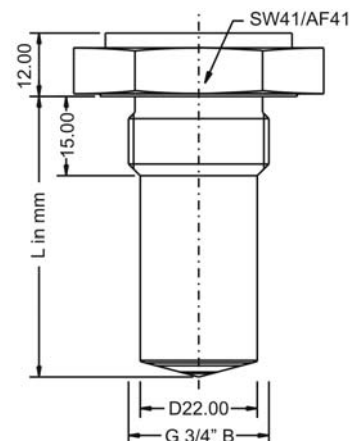
SRK – 600
Type S M
Milk tube
DN50



SRK – 600
Typ S O
Varivent
68mm



SRK – 601
Typ S 8
G 3/4"
Tube extension



10. Order code overview SRK – 600 – standard

Type:

S Standard

Process connection:

6	G 1/2" B	DIN EN ISO228-1	metallic sealed installation into weld-in sleeve SEM-22 / SEM-42
8	G 3/4" B	DIN EN ISO228-1	front flush installation into weld-in sleeve BEFV-34 / BEFE-34
5	G 1" B	DIN EN ISO228-1	front flush installation into weld-in sleeve BEFV-10
O	Varivent	68 mm	DN40-80/DN1 1/2" ..6", PN25 DN100/DN4", PN20 DN125/DN6", PN10
R	Milk tube	DN 25	DIN 11851
N	Milk tube	DN 40	DIN 11851
M	Milk tube	DN 50	DIN 11851
Y	Other process connection		separate specification necessary

Process temperature:

0	Standard	-40°C to +100°C	
1	Extended	-40°C to +150°C	with temperature decoupler

Electronic - output:

GA	Direct voltage	16...45 V DC	PNP switching output	3-wire-connection
WB	Universal voltage	20...253V AC/DC	relay output	3-wire-connection

Electrical connection:

S Plug M 12x1

SRK – 600 – S _ _ _ S

11. Order code overview SRK – 601 – tube extension

Type:

S Standard

Process connection:

8	G 3/4" B	DIN EN ISO228-1	
Y	Other process connection		separate specification necessary

Process temperature:

0	Standard	-25°C to +100°C	
1	Extended	-25°C to +150°C	with temperature decoupler

Electronic - output:

GA	Direct voltage	16...45 V DC	PNP switching output	3-wire-connection
WB	Universal voltage	20...253V AC/DC	relay output	3-wire-connection

Electrical connection:

S Plug M 12x1

Length L in mm:

SRK – 601 – S _ _ _ S _

Installation material and connection cable are not enclosed in the delivery contents.