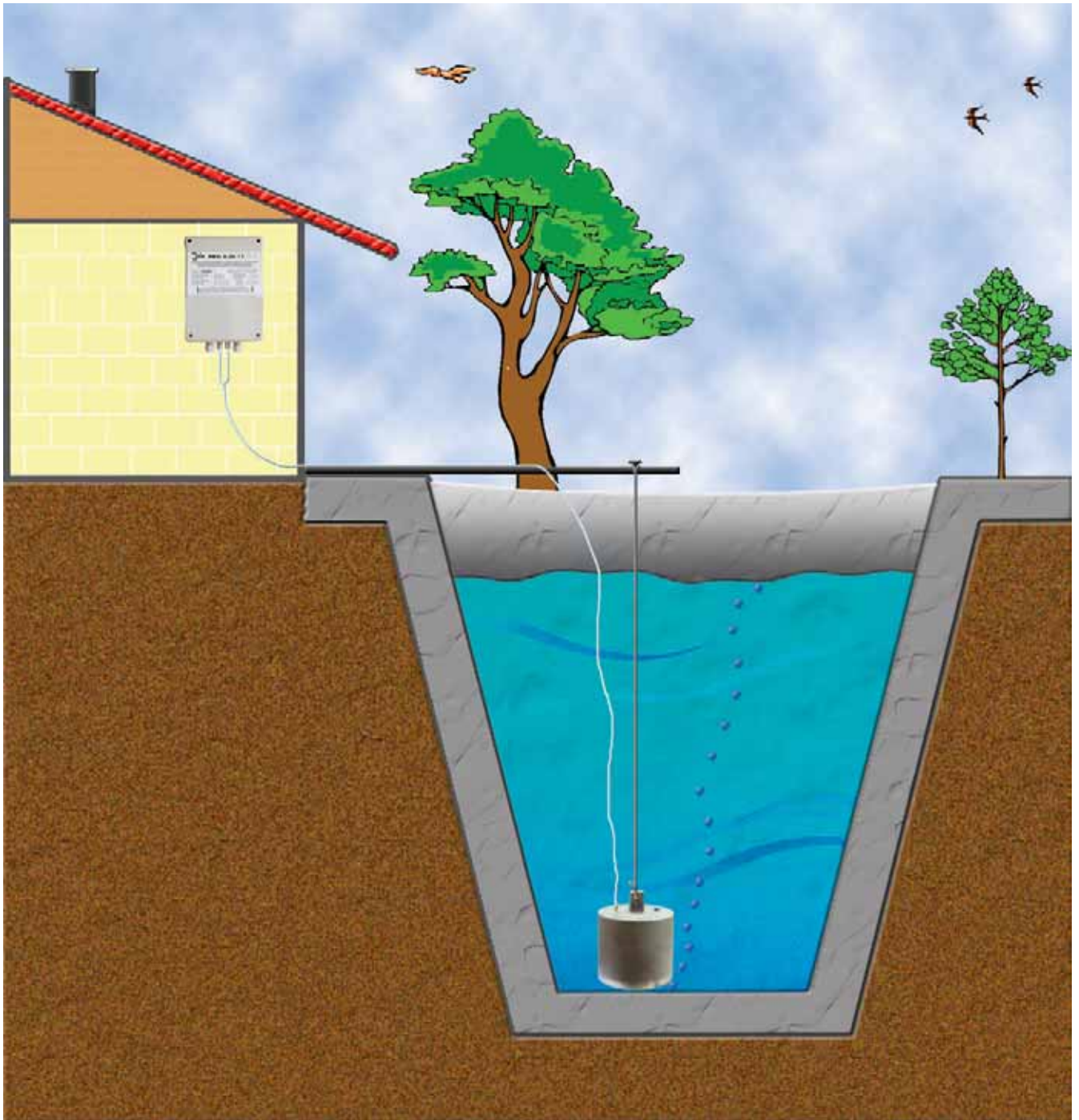




PKG 4-20 Liquid Level Transmitter for continuous level measurement

for remote transmission of liquid levels using the air bubbler method



Jola Spezienschalter K. Mattil & Co. KG

Postfach 11 49 · D-67460 Lambrecht (Pfalz) · Telefon: (0 63 25) 1 88-01 · Telefax: (0 63 25) 63 96
E-Mail: kontakt@jola-info.de · Website: www.jola-info.de



PKG 4-20 Liquid Level Transmitter for continuous level measurement

for remote transmission of liquid levels using the air
bubbler method



Mode of operation

Due to the force of gravity and as a function of the specific gravity of the liquid, the pressure at the bottom of a tank is proportional to the liquid level in the tank. The pressure corresponding to the liquid level is measured by means of an immersion bell mounted just above the bottom of the tank or an immersion tube which is open at the end and suspended slightly above the bottom of the tank. An air pump integrated in the liquid level transmitter pumps air into the bell or tube via a hose for 10 seconds every 50 seconds.

The air pressure at the bottom edge of the immersion bell or at the end of the immersion tube following the injection of air is equal to the pressure generated by the liquid. The air pressure in the immersion bell or immersion tube is measured by a pressure sensor integrated in the liquid level transmitter and converted into a load-independent current signal of between 4 and 20 mA via an integrated current loop transmitter.

Area of application

The PKG 4-20 liquid level transmitter with accessories is suitable/not suitable for use in the following liquids and/or the following areas:

Suitable for use:

- in clean, low-viscosity liquids (e.g. cooling water) through to soiled liquids with high solid content (e.g. milk of lime) in non-pressurised open tanks or shafts.

Not suitable for use:

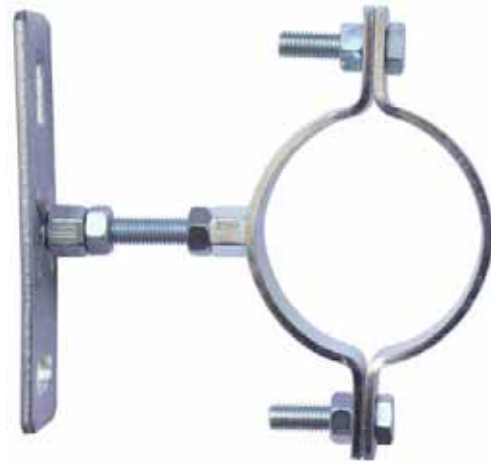
- in liquids which, due to deposits, bonding or crystallisation, might prevent the injection of air into the immersion bell or immersion tube
- in liquids whose viscosity is so high that they do not allow the surplus air bubbles to escape through the liquid to the top
- in liquids with a tendency to foam
- in liquids that attack the materials used
- in liquid foodstuffs
- in contaminant liquids (as, if the air hose ruptures above the filling level, the suction action in the hose could allow contaminant liquids to escape)
- in liquids in tanks that are under pressure
- in dusty rooms (as installation site for the PKG 4-20 liquid level transmitter)
- in potentially explosive areas

Technical data	PKG 4-20
<p>Temperature appl. range Housing</p> <p>Integrated in the housing: Air pump Supply voltage Power consumption Interval circuit</p> <p>Pressure sensor Supply voltage</p> <p>Measuring range</p> <p>Measuring signal</p>	<p>+ 5°C to + 40°C insulated housing, 237 x 183 x 152 mm, protection class IP 43 (dimensional drawing see page 6-2-12)</p> <p>AC 230 V; other supply voltage on request max. 100 VA in operation for approx. 10 seconds, in standstill mode for approx. 50 seconds</p> <p>DC 15 ... 30 V via separate voltage source SELV or PELV or via MSU ... transducer or SKG 4-20 switching unit as desired by the customer, but: smallest measuring range 0 to 0.7 m water column (tolerance +/- 15 mm) - largest measuring range 0 to 10 m water column (tolerance +/- 55 mm) load-independent current DC 4 ... 20 mA</p> <p>The pressure sensor used is works-set so that the output signal 4 ... 20 mA corresponds to its entire measuring range. If, for application reasons, the entire measuring range of the pressure sensor used should not correspond to the output signal 4 ... 20 mA, the range can be altered by intermediate connection of a MSU 420 or MSU 1020 transducer. The 0% value and the 100% value can be redefined by adjusting two spindle trimmers. The MSU 1020 transducer also permits conversion into the output signals 0 ... 10 V and 0 ... 20 mA.</p>
<p>Extras: Hose line Material and dimensions of hose line</p> <p>Length of hose line Max. distance between housing and immersion bell or immersion tube</p> <p>Immersion bell PVC version (for wall mounting)</p> <p>Grey cast iron version (for suspension mounting)</p> <p>Stainless steel version (for suspension mounting)</p> <p>Alternative: immersion tube PP version Stainless steel 316 Ti version</p>	<p>PVC air hose, 6 x 4 mm Ø, including a plastic "Y" connection piece 20 metres; other lengths on request</p> <p>100 m</p> <p>PVC, approx. 63 mm Ø x 200 mm high, mounted using 1 hose connector and 1 dummy plug and with 1 hose connector as option and with wall bracket made of galvanised steel</p> <p>grey cast iron, approx. 114 mm Ø x 100 mm high, mounted using 1 hose connector and 1 dummy plug and with 1 hose connector as option, with 2 metres stainless steel rope of 3 mm Ø and 2 rope clips made of stainless steel; longer stainless steel rope on request</p> <p>stainless steel 316 Ti or 316, approx. 101 mm Ø x 108 mm high, mounted using 1 stainless steel hose connector and 1 stainless steel dummy plug, with 1 stainless steel hose connector as option, with 2 metres stainless steel rope of 3 mm Ø and 2 rope clips made of stainless steel; longer stainless steel rope on request</p> <p>on request on request</p>

PVC immersion bell



Wall bracket suitable for PVC immersion bell



Hose line



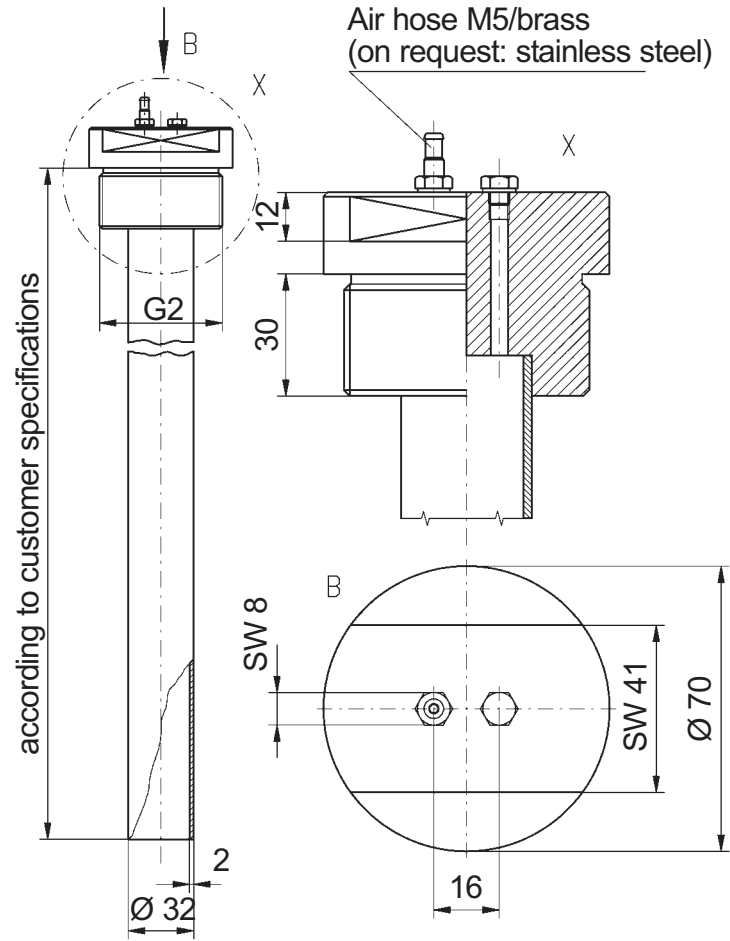
Grey cast iron immersion bell



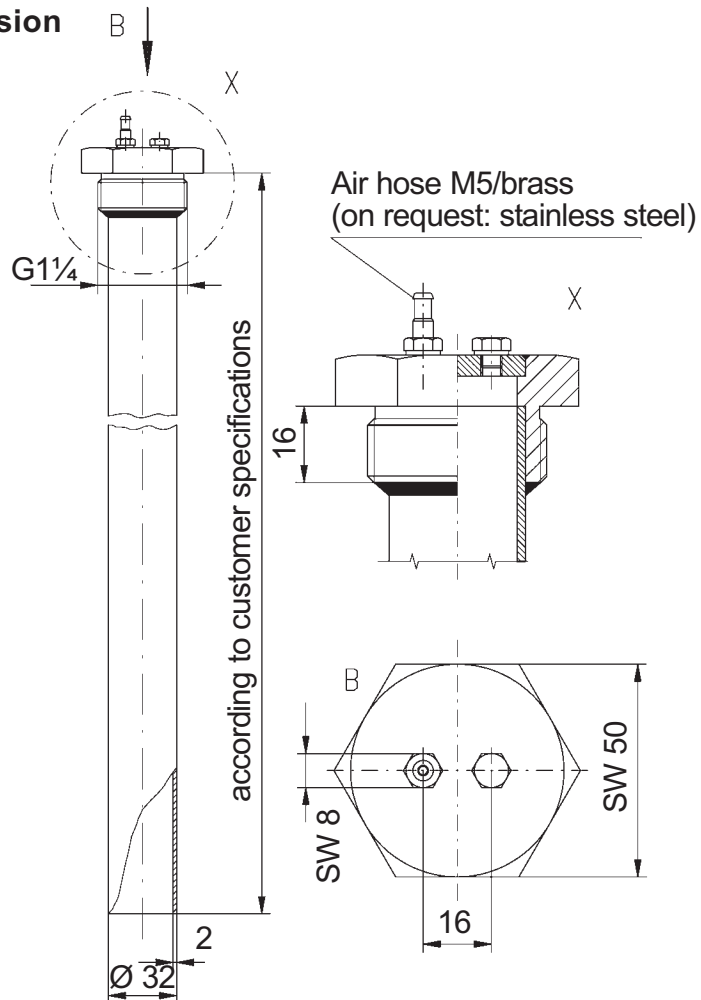
Stainless steel immersion bell



PP immersion tube



Stainless steel immersion tube



Installation and start-up

The units described in this documentation may only be installed, connected and started up by suitably qualified personnel!

Installation of the PKG 4-20 liquid level transmitter:

The liquid level transmitter PKG 4-20 is designed for wall mounting. It is fastened in place using 4 screws from the inside of the housing (see dimensional diagram on page 6-2-12). The electrical connections for the operating equipment may only be made after the mechanical installation of the measuring system has been completed.

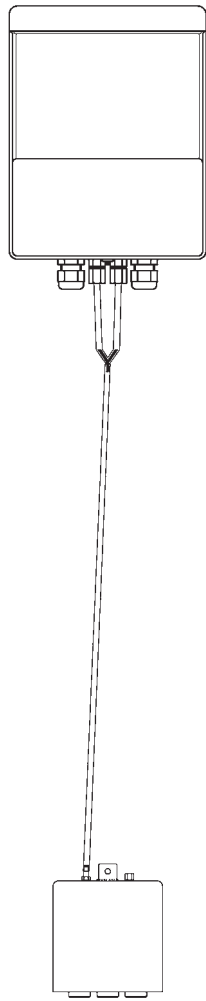
Installation of the immersion bell or immersion tube and the hose lines:

There are basically two ways to install the immersion bell/immersion tube and the hose lines:

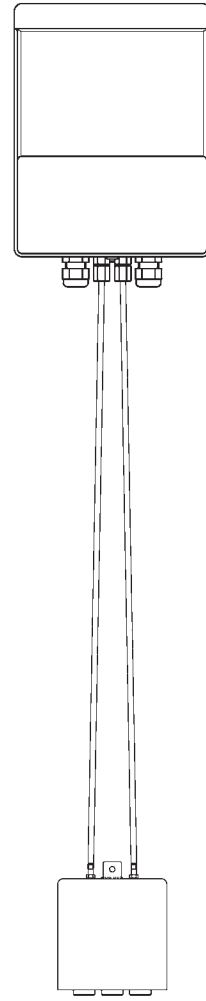
Methods	Method 1	Method 2
Description	<u>Joint air hose for air injection and measurement of pressure build-up</u>	<u>One hose each for air injection and measurement of pressure build-up</u>
Advantages	The joint air hose is purged with compressed air every 50 seconds. This ensures that no liquid can rise in the joint air hose and falsify the measurement value.	In contrast to Method 1, there is no short-term pressure build-up when the air pump is started. The measurement value remains almost stable.
Disadvantages	There is a short-term pressure build-up when the air pump is started up, and the measurement value therefore rises temporarily.	The air hose for measurement of the built-up pressure is not purged, with the result that residues may form or the liquid may rise, leading to an incorrect measurement value. The measuring system may not be shut down. In other words, you must ensure that there is always an air cushion in the immersion bell to prevent liquid from rising in the air hose which is used to measure the built-up pressure.
Recommendation	<u>Preferred method:</u> particularly with short hose lengths up to 20 metres and wherever fluctuations in measuring values are acceptable.	<u>Only to be used where</u> fluctuations in measuring values are to be kept to a minimum.

Whichever method is used, you must always ensure that the measuring system is already in operation before the liquid is filled into the tank.

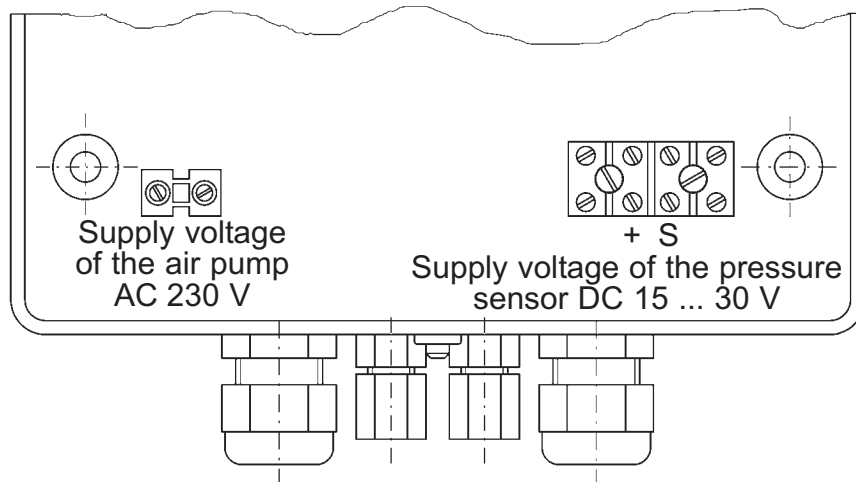
Method 1



Method 2



Connection diagram



N.B. The connection line supplying voltage to the air pump and the connection line supplying voltage to the pressure sensor are to be separately routed.



MSU 420 and MSU 1020 Transducers for application-based redefinition or conversion of the measuring signal from the PKG 4-20 liquid level transmitter



Measuring signal transducers for U-bar mounting or surface mounting with connection terminals on top and two spindle trimmers for adjustment of the min. and max. values.

The units are designed for switch cabinet mounting or installation in a suitable protective housing only and may therefore only be mounted/installed in these locations. They are suitable for use in clean environments only.

Mode of operation:

A PKG 4-20 liquid level transmitter is connected to a MSU ... transducer in 2-wire mode.

In the event of a cable break, the unit regulates downwards in a negative safety direction (in other words, the output signal falls below the minimum value).

A low current signal of the liquid level transmitter causes a low output signal; a high current signal of the liquid level transmitter causes a high output signal.

Technical data	MSU 420 with current output 4 ... 20 mA	MSU 1020 with voltage output 0 ... 10 V and current output 0 ... 20 mA
Alternative supply voltages (AC versions: terminals 15 and 16; DC versions: - terminal 15: – - terminal 16: +)	<ul style="list-style-type: none"> - AC 230 V (supplied if no other supply voltage is specified in the order) or - AC 240 V or - AC 115 V or - AC 24 V or - DC 24 V or } in these two cases, the unit must only be - DC 12 V or } connected to a low safety voltage which <li style="padding-left: 100px;">corresponds to the safety regulations relating <li style="padding-left: 100px;">to the application - further supply voltages on request 	
Power input	approx. 3 VA	
Supply voltage to the transmitter (terminals 1 and 2)	approx. DC 20 V (safety extra low voltage SELV)	
Input signal Setting range: - for min. value - for max. value	<p style="text-align: center;">4 ... 20 mA</p> <p style="text-align: center;">approx. 2.5 mA ... 10 mA approx. 6 mA ... 16 mA</p>	
Output signal (terminals 4, 5 or 7, 8)	4 ... 20 mA	0 ... 10 V and 0 ... 20 mA
Output current limitation	< 35 mA	
Load at voltage output	— > 1000 Ohm	
Load at current output	0 ... 450 Ohm	
Measuring error	< 0.5 %	
Housing	insulating material, 75 x 55 x 110 mm (dimensional drawing see page 6-2-12)	
Connection	via terminals on top of housing	
Protection class	IP 20	
Mounting	clip attachment for U-bar to DIN 46277 and EN 50022 or fastening via 2 boreholes	
Mounting orientation	any	
Temperature application range	- 15°C to + 60°C	
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies	



SKG 420 and SKG 1020 Limit Value Switching Units



Switching units for U-bar mounting or surface mounting with connection terminals on top and soft-touch coding switch.

The units are designed for switch cabinet mounting or installation in a suitable protective housing only and may therefore only be mounted/installed in these locations. They are suitable for use in clean environments only.

Mode of operation:

If the input is a voltage between 0 ... 10 V (only with type SKG 1020), the input terminals U and GND are to be used. If the input is a current between 0 ... 20 mA or 4 ... 20 mA, the input terminals I and GND are to be used.

A limit value can be set within a range of 0 to 99 % using the soft-touch coding switch.

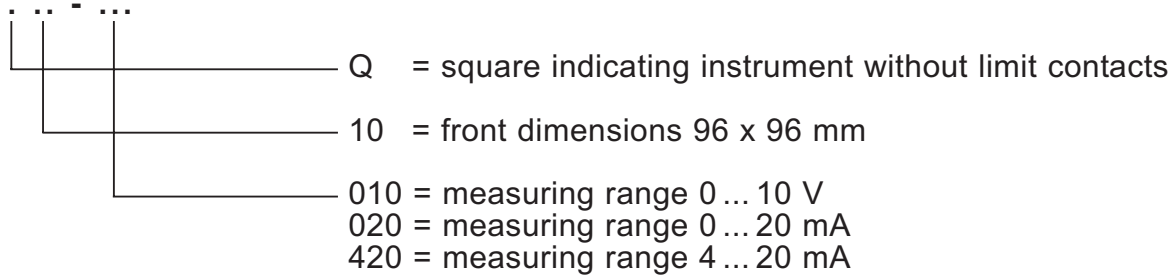
If the input is below the set limit value, the output relay is energised; if the input is above the limit value, the output relay is de-energised (quiescent current principle).

The respective switching status of the output relay is indicated by LEDs.

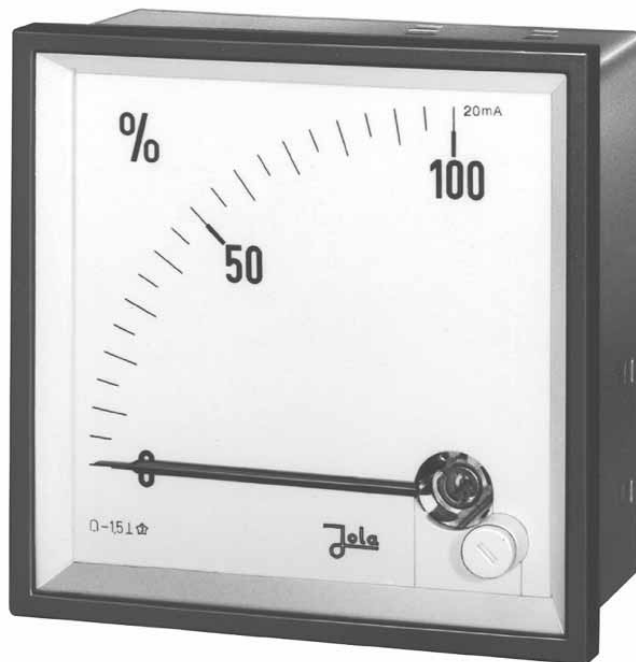
Technical data	SKG 420 for current input 4 ... 20 mA	SKG 1020 for voltage input 0 ... 10 V or current input 0 ... 20 mA
Alternative supply voltages (AC versions: terminals 15 and 16; DC versions: - terminal 15: – - terminal 16: +)	<ul style="list-style-type: none"> - AC 230 V (supplied if no other supply voltage is specified in the order) or - AC 240 V or - AC 115 V or - AC 24 V or - DC 24 V or - DC 12 V or <p style="text-align: center;">} in these two cases, the unit must only be connected to a low safety voltage which corresponds to the safety regulations relating to the application</p> <ul style="list-style-type: none"> - further supply voltages on request 	
Power input	approx. 3 VA	
Input signal	4 ... 20 mA	0 ... 10 V or 0 ... 20 mA
Input resistance	current input: 50 Ohm	current input: 50 Ohm voltage input: 200 kOhm
Setting of switching point	via soft-touch coding switch in the range from 0 ... 99 %	
Switching status indication	2 red LEDs for signalling when the value is below or above the limit value	
Reproducibility	approx. 1 %	
Controlled circuit	one single-pole potential-free changeover contact	
Switching voltage	max. AC 250 V	
Switching current	max. AC 4 A	
Switching capacity	max. 500 VA	
Housing	insulating material, 75 x 55 x 110 mm (dimensional drawing see page 6-2-12)	
Connection	via terminals on top of housing	
Protection class	IP 20	
Mounting	clip attachment for U-bar to DIN 46277 and EN 50022 or fastening via 2 boreholes	
Mounting orientation	any	
Temperature application range	- 15°C to + 60°C	
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies	

Jola - Indicating Instruments for connection to MSU ... transducers

Indicating instruments - type code

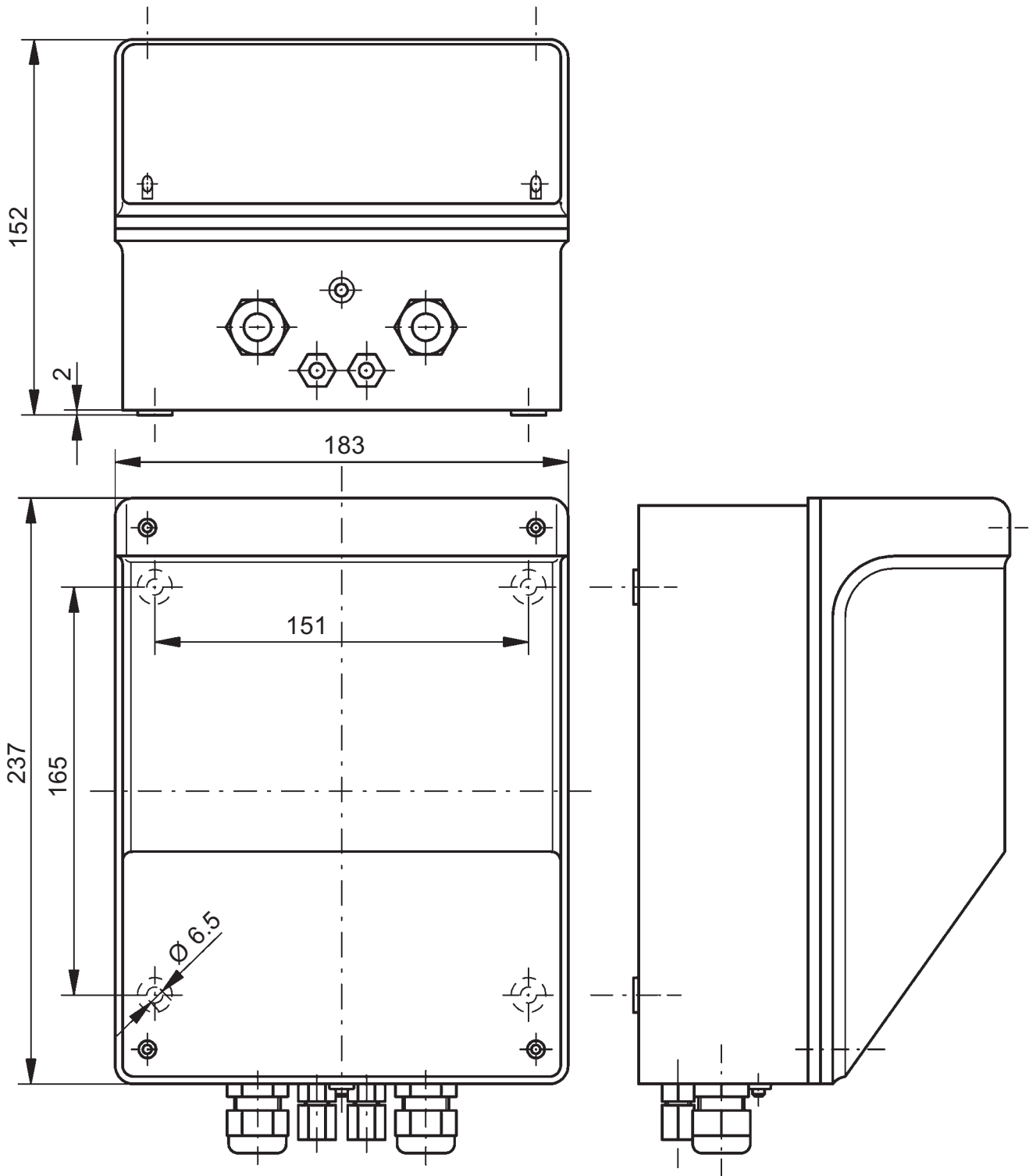


These indicating instruments are designed for switch cabinet mounting or installation in a suitable protective housing only and may therefore only be mounted/installed in these locations. They are suitable for use in clean environments only.

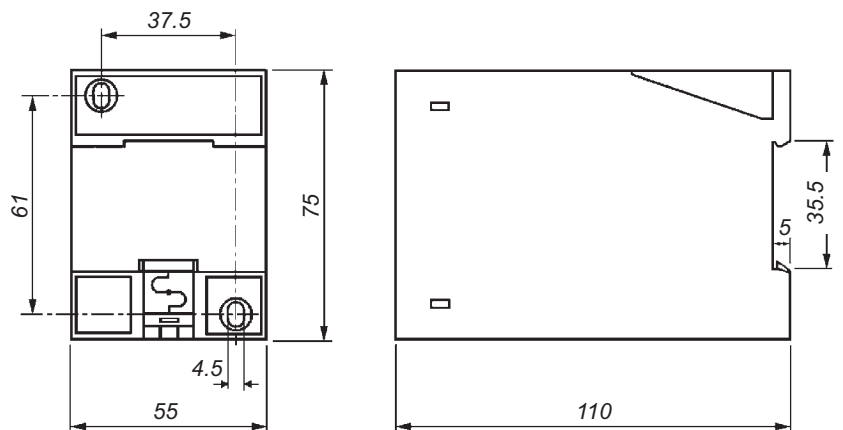


Connection to →	MSU 420	MSU 1020	
Technical data	Q 10 - 420	Q 10 - 010	Q 10 - 020
Input signal	4 ... 20 mA	0 ... 10 V	0 ... 20 mA
Scale		0 - 100 %	
Scale length		94 mm	
Front dimensions		96 x 96 mm	
Cutout dimensions		92 x 92 mm	
Installation depth		61 mm	
Indicating accuracy		class 1.5	
Temperature appl. range		- 15°C to + 40°C	

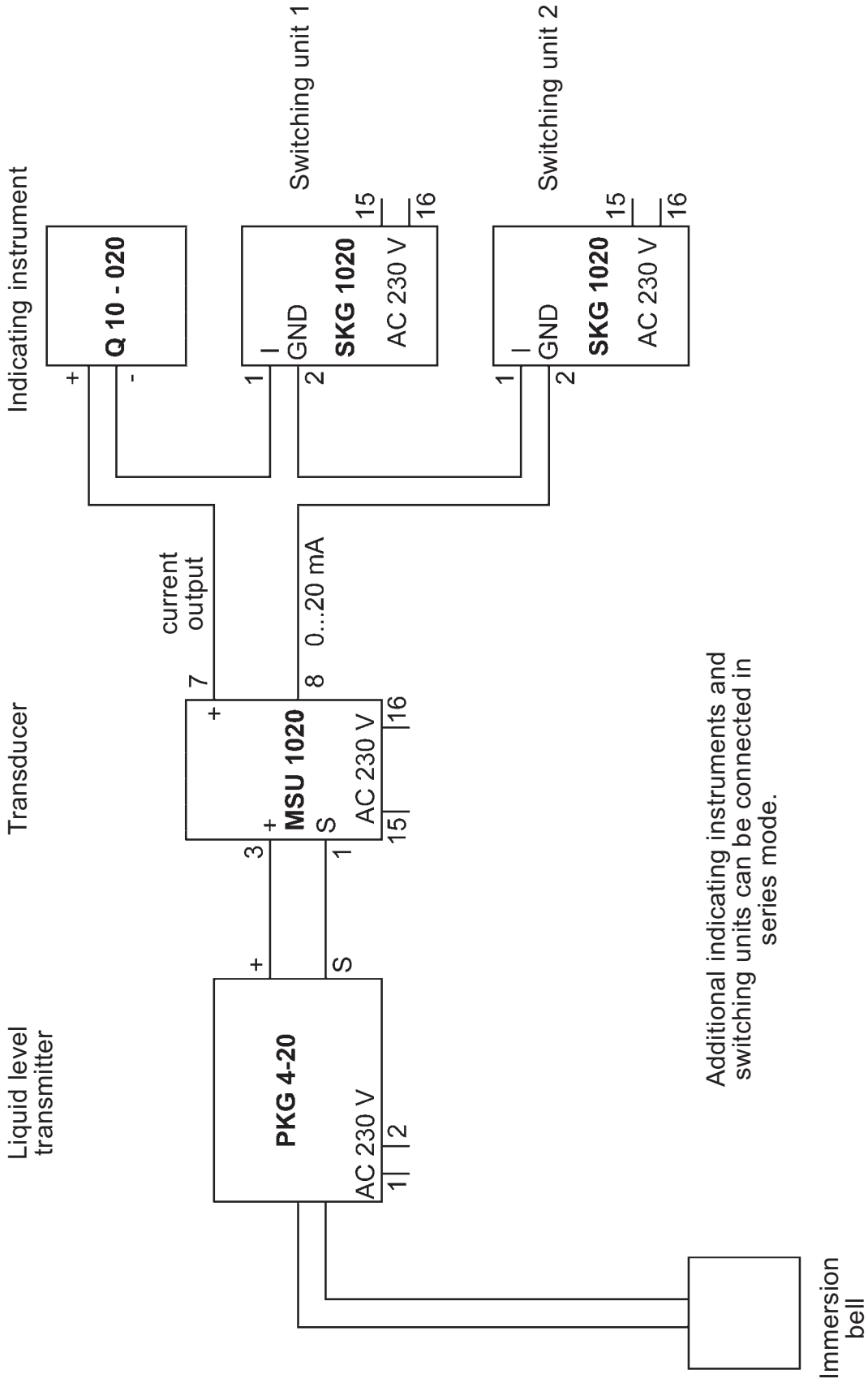
PKG 4-20 dimensional drawing



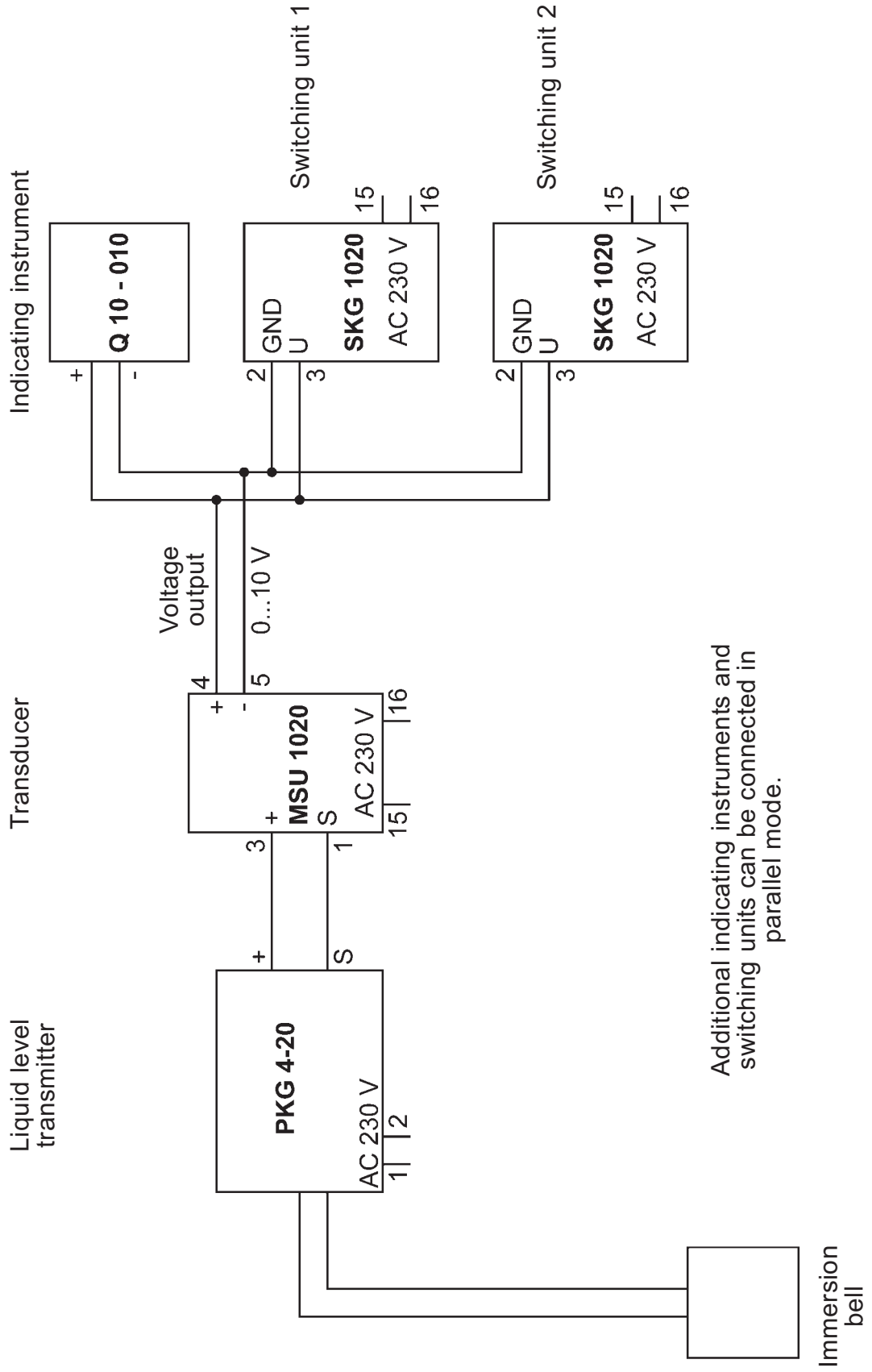
**MSU ... or SKG ...
dimensional drawing**



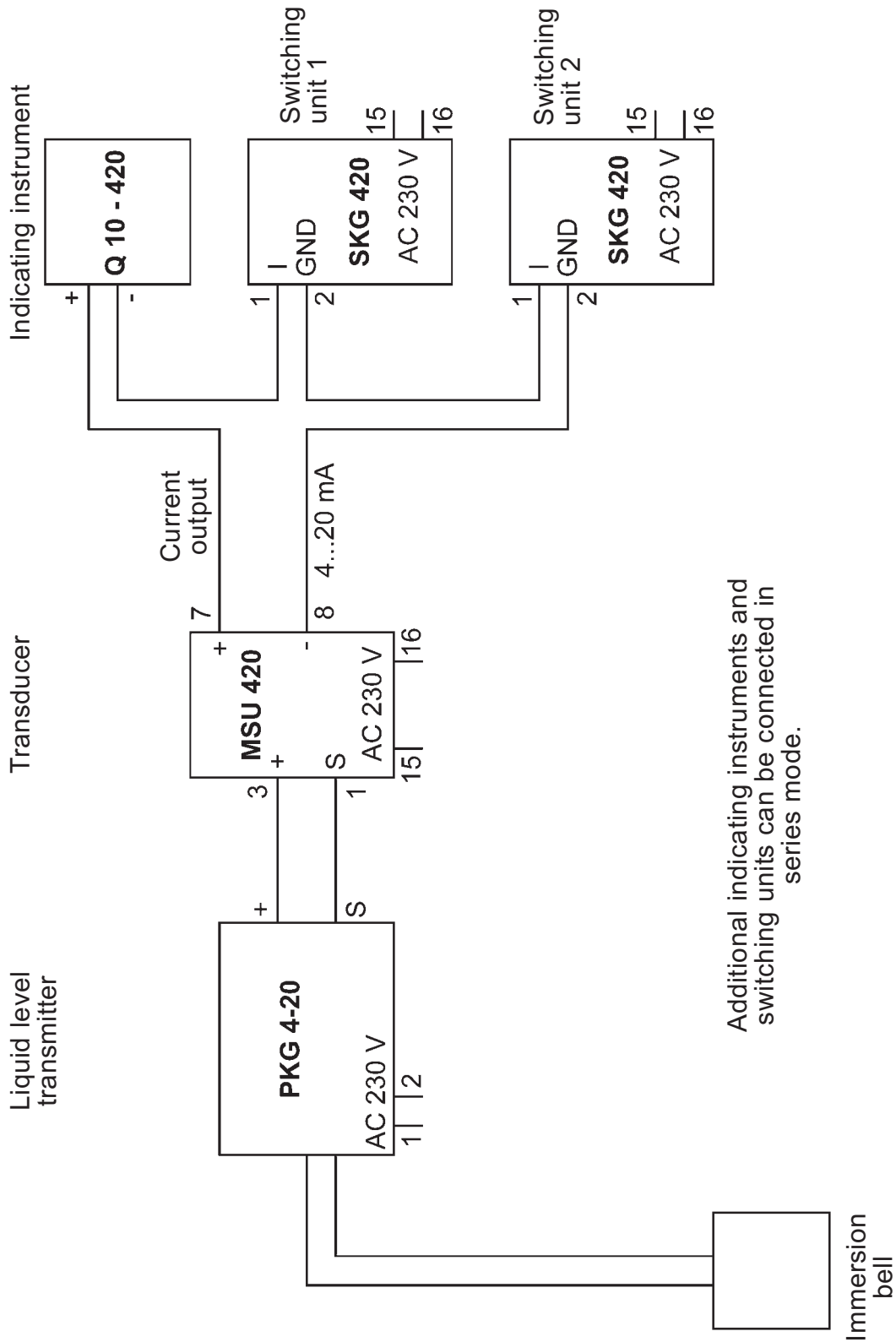
Basic connection diagram PKG 4-20, MSU 1020, Q 10-020 and SKG 1020



Basic connection diagram PKG 4-20, MSU 1020, Q 10 - 010 and SKG 1020



Basic connection diagram PKG 4-20, MSU 420, Q 10 - 420 and SKG 420



Additional indicating instruments and switching units can be connected in series mode.

The units described in this documentation may only be installed, connected and started up by suitably qualified personnel!

Subject to deviations from the diagrams and technical data.

The details in this brochure are product specification descriptions and do not constitute assured properties in the legal sense.