

## Field IT Flowcont M

Magnetisch\_induktiver Durchflussmesser  
Electromagnetic Flowmeter  
Débitmètre électromagnétique  
Caudalímetro electromagnético

### Operating Instruction



#### По вопросам продаж и поддержки обращайтесь:

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Владивосток (423)249-28-31  
Волгоград (844)278-03-48  
Вологда (8172)26-41-59  
Воронеж (473)204-51-73  
Екатеринбург (343)384-55-89  
Иваново (4932)77-34-06  
Ижевск (3412)26-03-58  
Иркутск (395) 279-98-46

Казань (843)206-01-48  
Калининград (4012)72-03-81  
Калуга (4842)92-23-67  
Кемерово (3842)65-04-62  
Киров (8332)68-02-04  
Краснодар (861)203-40-90  
Красноярск (391)204-63-61  
Курск (4712)77-13-04  
Липецк (4742)52-20-81  
Магнитогорск (3519)55-03-13  
Москва (495)268-04-70  
Мурманск (8152)59-64-93  
Набережные Челны (8552)20-53-41  
Нижний Новгород (831)429-08-12

Новокузнецк (3843)20-46-81  
Новосибирск (383)227-86-73  
Омск (3812)21-46-40  
Орел (4862)44-53-42  
Оренбург (3532)37-68-04  
Пенза (8412)22-31-16  
Пермь (342)205-81-47  
Ростов-на-Дону (863)308-18-15  
Рязань (4912)46-61-64  
Самара (846)206-03-16  
Санкт-Петербург (812)309-46-40  
Саратов (845)249-38-78  
Севастополь (8692)22-31-93  
Симферополь (3652)67-13-56

Смоленск (4812)29-41-54  
Сочи (862)225-72-31  
Ставрополь (8652)20-65-13  
Сургут (3462)77-98-35  
Тверь (4822)63-31-35  
Томск (3822)98-41-53  
Тула (4872)74-02-29  
Тюмень (3452)66-21-18  
Ульяновск (8422)24-23-59  
Уфа (347)229-48-12  
Хабаровск (4212)92-98-04  
Челябинск (351)202-03-61  
Череповец (8202)49-02-64  
Ярославль (4852)69-52-93

## 1 Safety instructions

### 1.1 Fundamental safety requirements

#### 1.1.1 Equipment safety standards

This equipment corresponds to the fundamental safety requirements of the Pressure Equipment Directive and state-of-the-art technology. It has been inspected and its technical safety condition was perfect when it left the factory. In order to retain this condition during time of operation we predict for the equipment, the information provided in the operating instruction must be observed and followed.

This equipment satisfies the EMC requirements in accordance with EN 61326 /NAMUR NE 21. If the power supply fails, all equipment parameters are saved (including the present counter status). Once the power has been switched back on, the equipment is immediately ready for operation.

#### 1.1.2 Correct usage

This equipment is used to measure flow and to forward fluids with an electrical conductivity of at least 50  $\mu\text{S}/\text{cm}$

##### **Correct usage includes the following:**

- Usage within technical limit values.
- Observing and following the information provided on permissible fluids.
- Observing and following the instructions provided in the operating instruction.
- Observing and following the associated documents (specification, diagrams, dimensions sheet).

##### **The following equipment uses are not permitted:**

- Operation as a flexible adapter in piping, e.g. to compensate for pipe offsets, pipe vibrations, pipe expansions etc.
- Use as a climbing aid, e.g. for assembly purposes.
- Use as a support for external loads, e.g. as support for piping etc.
- Addition of materials or parts, e.g. by painting over the type plate or welding on or soldering on parts.
- Removal of materials, e.g. by drilling into the housing.
- Repairs, modifications and supplements or the fitting of spare parts are only permitted if undertaken as described in the operating instruction. More extensive work must be agreed with ACS. Exceptions to this are repairs undertaken by specialist workshops authorised by ourselves. We assume no liability for unauthorised work. The operating, maintenance and repair conditions stated in this operating manual must be observed. The manufacturer assumes no liability for damage caused by usage which is unprofessional or any usage other than that described as correct.

#### 1.1.3 Technical limit values

The equipment is only designed for use within the technical limit values specified on the type plate and in the operating instruction.

##### **The following technical limit values should be observed:**

- The permissible pressure level (PS) and the permissible fluid temperature (TS) must be  $\leq$  the pressure-temperature values (p/T ratings) specified in the operating instructions. (see page GB 7)
- The maximum operating temperature specified in the equipment specification must not be exceeded.
- The permissible ambient temperature specified in the equipment specification must not be exceeded.
- The type of housing protection is IP65 in accordance with EN60529.
- Graphite must not be used for the seals because under certain circumstances this will cause an electrically conductive coating to form on the inside of the measurement pipe.






- The flow recorder must not be operated close to strong electro-magnetic fields, e.g. motors, pumps, transformers etc. A minimum distance of approx. 100 cm should be observed.
- When fitting on or to steel parts (e.g. steel carriers), a minimum distance of 100 mm should be observed. (Values have been determined on the basis of IEC801-2 and/or IEC TC 77B (SEC101).)
- The max. tightening torque for the process connection (the thread) should be observed. (see page GB 13)

## 1.1.4 Permissible fluids

- Process media (fluids) may only be used iff, depending on state-of-the-art technology or the operating experience of the operator, it can be assured that the chemical and physical properties (required) for operating safety) of the materials of the components coming into contact with the media (measurement electrode, grounding electrodes, cladding, connection part, protective panel and/or protective flange) assure a operating period of successful operation.
- Measuring agents (fluids) with unknown properties or abrasive measuring agents may only be used if the operator can perform regular and suitable tests to assure the safe condition of the equipment.
- The information on the type plate should be noted.

## 1.1.5 Safety labels and symbols, type plates, factory panels and CE mark

All safety labels, symbols and the type plate should be kept legible and replaced if damaged or lost. Note the following general information:

	<b>Warning!</b>	Indicates a risk or potentially hazardous situation which, if not avoided, could result in death or serious injury.
	<b>Caution!</b>	Indicates a potentially hazardous situation or alerts against unsafe practices which, if not avoided, may result in injury of persons or property damage.
	<b>Notice!</b>	Indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects.
	<b>Important! (or Tip)</b>	Indicates useful hints or other special information which, if not observed, could lead to a decline in operating convenience or affect the functionality (does not indicate a dangerous or harmful situation).  Example: „Read-made C-routines are available on the support disk.“
	<b>CE-mark</b>	The CE mark symbolises that the equipment corresponds to the following guidelines and satisfies their fundamental safety requirements: <ul style="list-style-type: none"> <li>• <b>CE-mark on type plate (on the measurement transmitter)</b> <ul style="list-style-type: none"> <li>– declaration of conformity with EMC guideline 89/336/EWG</li> </ul> </li> <li>• <b>CE-mark on factory panel (on the measurement recorder)</b> <ul style="list-style-type: none"> <li>– conformity with <b>PressureEquipmentDirective</b> (DGRL) 97/23/EG</li> </ul> </li> </ul> The factory panel of pressure equipment does not include the CE mark, if e.g.: <ul style="list-style-type: none"> <li>– the max. permissible pressure (PS) is less than 0.5 bar.</li> <li>– no registration procedure is needed as a result of low pressure risk (nominal size ≤ DN 25 / 1").</li> </ul>

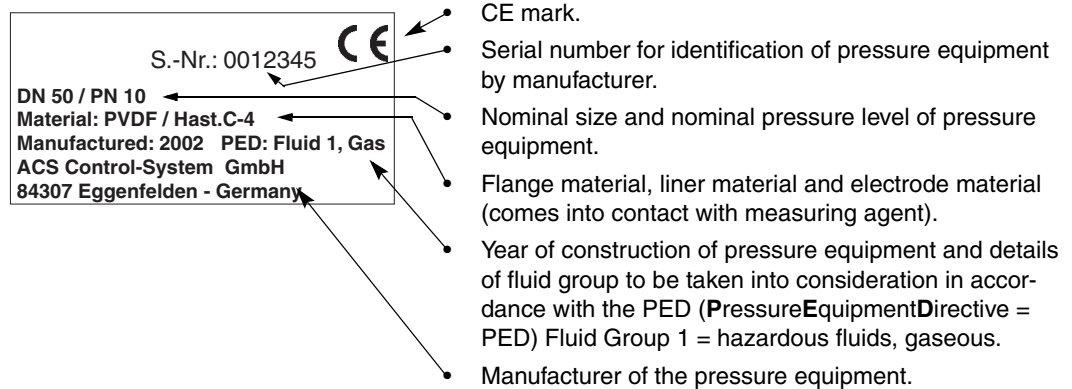
## 1.1.6 Information provided on the factory panel

The factory panel can be found on the converter housing. Labelling is undertaken using 2 different factory panels depending on whether the pressure equipment falls within the scope of the PED or not (also refer to Article 3 Paragraph 3 of the PED 97/23/EC):

### a) Pressure equipment falling under the scope of the PED

(only applies to Flowcont M with nominal size of DN 50. Classification in accordance with category I, implementation in accordance with module A, conformity evaluation and CE marking by ACS)

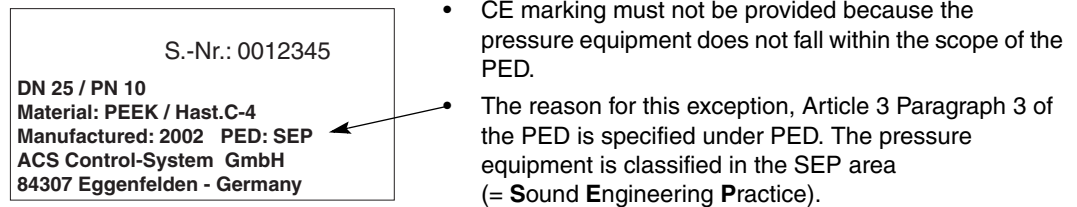
The factory panel on the Flowcont M DN 50 contains the following details:



### b) Pressure equipment not falling under the scope of the PED

(applies to Miniflow with nominal size DN 10, 15, 25. classification in accordance with Article 3, Paragraph 3 "Sound engineering practice" no CE mark),

The factory panel contains almost the same information as the plate described under a) with the following differences:



## 1.1.7 Staff training

- Only trained specialists and those authorised by the system operator may undertake electrical installation work, equipment commissioning and maintenance.

## 1.1.8 Obligations of the operator

- Before using corrosive or abrasive measuring agents, the operator must clarify that all parts which come into contact with these fluids are resistant to such agents. ACS would be more than happy to assist you in your selection, but cannot assume liability for any choices made.
- Always observe your country's national regulations governing function tests, repair and maintenance of electrical equipment.

## 1.1.9 Possible risks present during transport

Note the following before transporting equipment to the measurement site:

- The centre of gravity may not be in the centre of the equipment.
- Ensure that the threaded connection and angle connector are not damaged.

## 1.1.10 Possible risks present during assembly

During assembly, ensure that:

- The flow direction corresponds to the marking.
- The maximum tightening torque of the process connection thread is not exceeded. (see Page GB 13)
- The equipment is fitted without mechanical stress (torsion, bending) and is only fitted with appropriate gaskets.
- Check the suitability of the Viton gaskets used at the face end for your intended operating conditions
- The equipment displays should be aligned to the user wherever possible.

## 1.1.11 Possible risks during electrical installation

Only specialists may connect the equipment up to the electric circuit in accordance with the electrical diagrams.

### Attention!



**When the housing cover is open, EMC and contact protection is no longer provided.**

Earth the flow measurement system.

Observe max. signal values for signal inputs and outputs of measurement recorder.

## 1.1.12 Possible risks when using in hazardous areas

### Warning!



The equipment is not authorised for use in hazardous areas and must therefore not be installed and operated in such areas.

## 1.1.13 Possible risks during active operation

- During the flow of hot fluids, contact with the surface may result in burns.
- Aggressive fluids may result in corrosion, abrasion and cavitation on liner or electrodes and pressurised fluids may thereby escape prematurely.
- Pressurised fluids may escape as a result of fatigue / brittleness of process connection seals.
- Overtorquing of the male thread process connection may result in damage of the meter tube. Pressurised fluids may thereby escape prematurely.

## 1.1.14 Possible risks during servicing and maintenance

Before disassembling the equipment, depressurise the equipment and if necessary any neighbouring lines or containers. Otherwise, pressurised fluids may spray out when the process connection is loosened and cause serious injury.

Before opening the equipment and/or before disassembly, check whether hazardous materials have been used as the flow fluids. There may be hazardous residue in the equipment and this may escape upon opening. The process connection should be secured so that it cannot come loose as a result of piping vibrations. Depending on the application, the process connection seals should be checked periodically and replaced if necessary.

Undertake regular servicing to check:

- the pressure-resistant panels/liner material of the pressure equipment
- the function
- the seal integrity
- the wear level (corrosion, abrasion, cavitation)

## 1.1.15 Returns

- If you wish to send the equipment to the ACS parent company in Eggenfelden for repairs or re-calibration, use the original packaging or a suitable secure transport container. Please specify the reason for returning the equipment.



### Information! In accordance with EU guideline governing hazardous materials

Anyone in possession of special-category waste is responsible for its disposal and/or must note the following rulings if transporting such waste:

- All flow recorders and flow measurement transformers delivered to ACS for repairs must not contain any traces of hazardous substances (acids, lyes, solvents, etc.). In order to do this, hazardous substances should be rinsed out of the measurement pipe and neutralised. These measures should be confirmed in writing in the accompanying papers.
- If anyone in possession of these hazardous substances is not able to completely remove them from, the equipment should be transported with the necessary accompanying papers. The owner of the equipment will be invoiced for any costs which ACS may incur through the disposal of hazardous substances during repairs.

## 1.2 Material loading

### 1.2.1 General

#### Attention!

Limitations in the equipment's permissible fluid temperature (TS) and permissible pressure (PS) result from the liner and process connection material used as well as the Viton gasket used. Refer to factory panel and type plate on equipment.



### 1.2.2 Process connections

#### Material of loaded components:

- PEEK (DN 10, 15, 25); PVDF (DN 50)

#### Operating data

- Nominal pressure : PN10 ( for max. perm. levels of operating pressure as function of temperature, refer to p/T rating)
- Max. operating temperature : 110°C

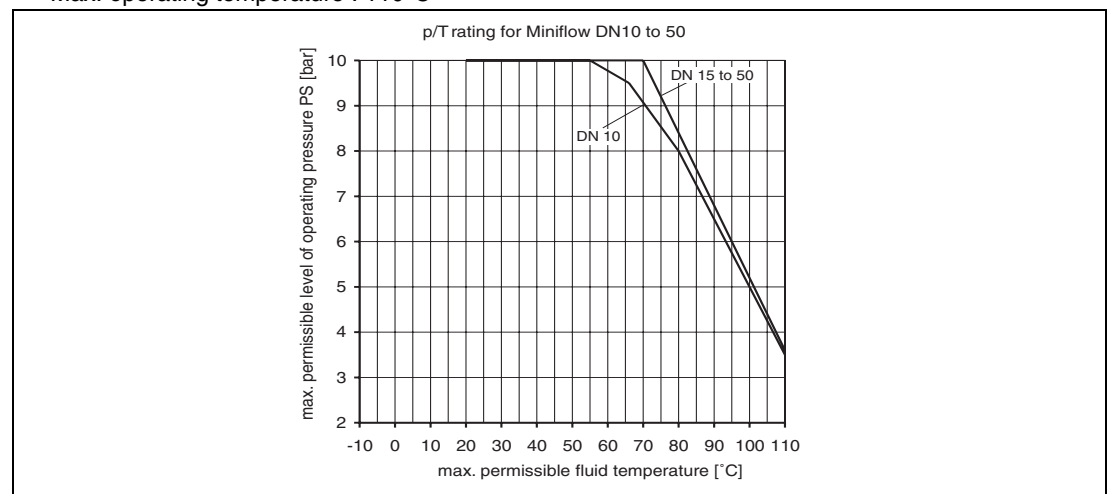


Fig. 1:

## 2 Description

### 2.1 Description of structure and function

The flowmeter Flowcont M can be used to measure fluids with a minimum conductivity of 50  $\mu\text{S}/\text{cm}$ . (Also refer to chapter 1.1.4 "Permissible fluids")

According to Faraday's law of electromagnetic induction, voltage is created which is linear and proportional to the mean speed of flow. This voltage is recorded by two electrodes which are in contact with the measuring agent.

The various electrical signals for further processing are available at the converter output (e.g. pulse proportional to flow, 20 mA current output, min./max. contact output for flow monitoring).

The electrical connection is provided by means of plugs.

### 2.2 Technical data

#### Opto-electronic coupler as

##### a) Passive pulse output

(Optocoupler data:)

$16\text{ V} \leq U_{\text{CEH}} \leq 30\text{ V}$ ;  $0\text{ V} \leq U_{\text{CEL}} \leq 2\text{ V}$ ;

$0\text{ mA} \leq I_{\text{CEH}} \leq 0.2\text{ mA}$ ;  $2\text{ mA} \leq I_{\text{CEL}} \leq 220\text{ mA}$

$f_{\text{max}} = 20\text{ pulses/sec}$ ;

Pulse width min. 20 ms; max. 2550 ms

or

##### b) Passive contact output

With the display version, the function of the output

can be set, e.g. inlet/outlet signalling, min./ max.

contact, system alarm, opto-electronic coupler data: refer to pulse output

When using the display version, the function of the optocoupler output can be selected from the menu on-site, e.g. min./max. alarm etc. The optocoupler output can either adopt the function of a "pulse output" or the function of a "contact output". When using the version without a display, the function of the optocoupler output can be set to "pulse output" or "inlet/outlet signalling". Factory presetting is "pulse output"

#### Current output

can be set 0/4 to 20 mA; load  $\leq 600\text{ Ohm}$

#### Contact input

The contact is considered as actuated at an external voltage of between  $16\text{ V} \leq U \leq 30\text{ V}$ . It is not considered as actuated at a voltage of between  $0\text{ V} \leq U \leq 2\text{ V}$ . The internal resistance of the contact input is:  $R_i = 2\text{ kOhm}$ .

#### Failure signal

The contact output (optocoupler) can be configured as a system alarm. Optocoupler data: refer to pulse output

#### Load

Max. load of current output:  $\leq 600\text{ Ohm}$

#### Low flow out off

The low flow volume can be set. (Display version is needed for this function).

Factory presetting: 1 % (fixed in version without display)

**2.3 Performance characteristics**

**Reference conditions in accordance with EN29104**

**Fluid temperature**

20 °C ± 2 K

**Ambient temperature**

20 °C ± 2 K

**Auxiliary power**

Nominal voltage in accordance with type plate  $U_N \pm 1 \%$ , frequency  $f \pm 1 \%$

**Warm-up phase**

30 min.

**Straight pipe section**

Inlet > 10 x DN  
outlet > 5 x DN

**Measurement deviation from reference conditions**

(pulse output)

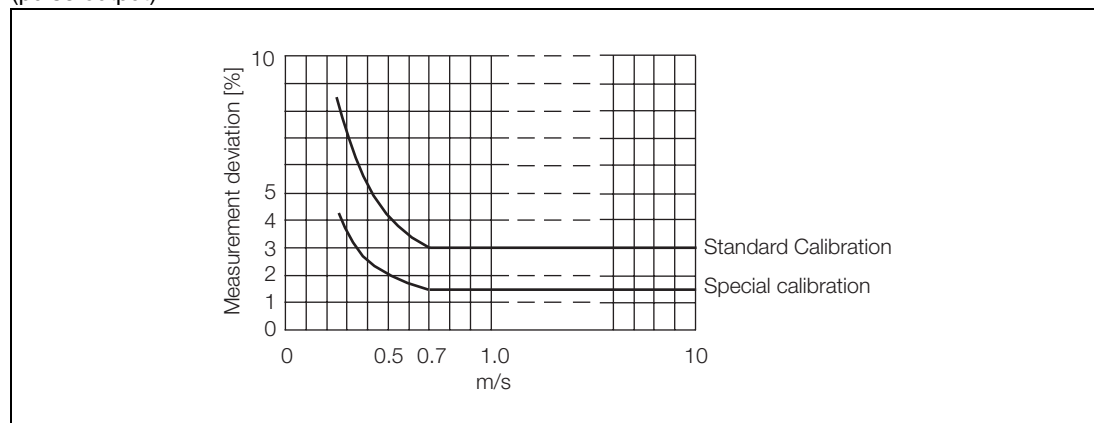


Fig. 2: Measurement deviation of Flowcont M measuring system

**Measurement deviation for standard equipment:**

Flow  $Q > 0.07 Q_{maxDN}$ : ± 3 % of rate  
Flow  $Q \leq 0.07 Q_{maxDN}$ :  $0.0021 Q_{maxDN}$

**Measurement deviation for equipment with special calibration**

Flow  $Q > 0.07 Q_{maxDN}$ : ± 1.5 % of rate  
Flow  $Q \leq 0.07 Q_{maxDN}$ :  $0.00105 Q_{maxDN}$

For  $Q_{maxDN}$  (see table below)

DN	$Q_{maxDN}$
10	50 l/min
15	100 l/min
25	300 l/min
50	1200 l/min



**Repeatability**

≤ 0.2 % of rate

**Attenuation time**

As jump function 0-99 % (corresponding to  $5 \tau$ ) ≥ 5 s  
Excitation frequency : 6 1/4 Hz

**Entry and exit lengths**

We recommend a straight entry length of 3 x DN upstream of the equipment and an exit length of 2 x DN downstream of the equipment

**Ambient conditions****Ambient temperature**

-10 °C to 50 °C

**Type of protection**

IP 65 (acc. to EN60529)

**Resistance to vibration**

Max. acceleration: 15 m/s<sup>2</sup> (10–150 Hz)

**Electromagnetic compatibility**

The equipment corresponds to the NAMUR recommendations NE21. Electromagnetic compatibility of tooling used in process and laboratory control equipment 5/93 and EMC Directive 89/336/EEC (EN50081-1, EN 50082-2).

**Attention!**

The EMC protection is limited when the housing cover is open.

**Process conditions****Process temperature**

Permissible measuring agent temperature: -10 °C to +110 °C

**Conductivity**

At least 50 µS/cm

**Air pockets**

Ensure that the measuring equipment is always filled completely. Partial filling creates an additional source of measuring error just like gas bubbles entrained in the medium.

**Process pressure limit**

Max. permissible pressure: 10 bar, depending on fluid temperature (refer to p-T rating page GB 7)

**Max. perm. measuring agent temperature and pressure**

(refer to p-T rating page GB 7)

**Loss of pressure**

The Flowcont M does not have any parts which protrude into the measurement pipe. The level of pressure loss is negligible.

### 3 Dimensions and materials

The Flowcont M has a thread as defined in ISO228 or a NPT thread as process connection . The difference in diameter at the transition between piping and measuring equipment should be as small as possible. As one option, adapters are available. These can be screwed onto the process connection thread and extend the ISO threads listed in the table without increasing the installation length.

**The following adapters are available:**

Extension from G $\frac{3}{4}$ " to G1" Part No. D365B262U01  
 Extension from G 1 $\frac{1}{4}$ " to G 1 $\frac{1}{2}$ " Part No. D365B262U02  
 Extension from G 2 $\frac{1}{2}$ " to G 2 $\frac{3}{4}$ " Part No. D365B262U03

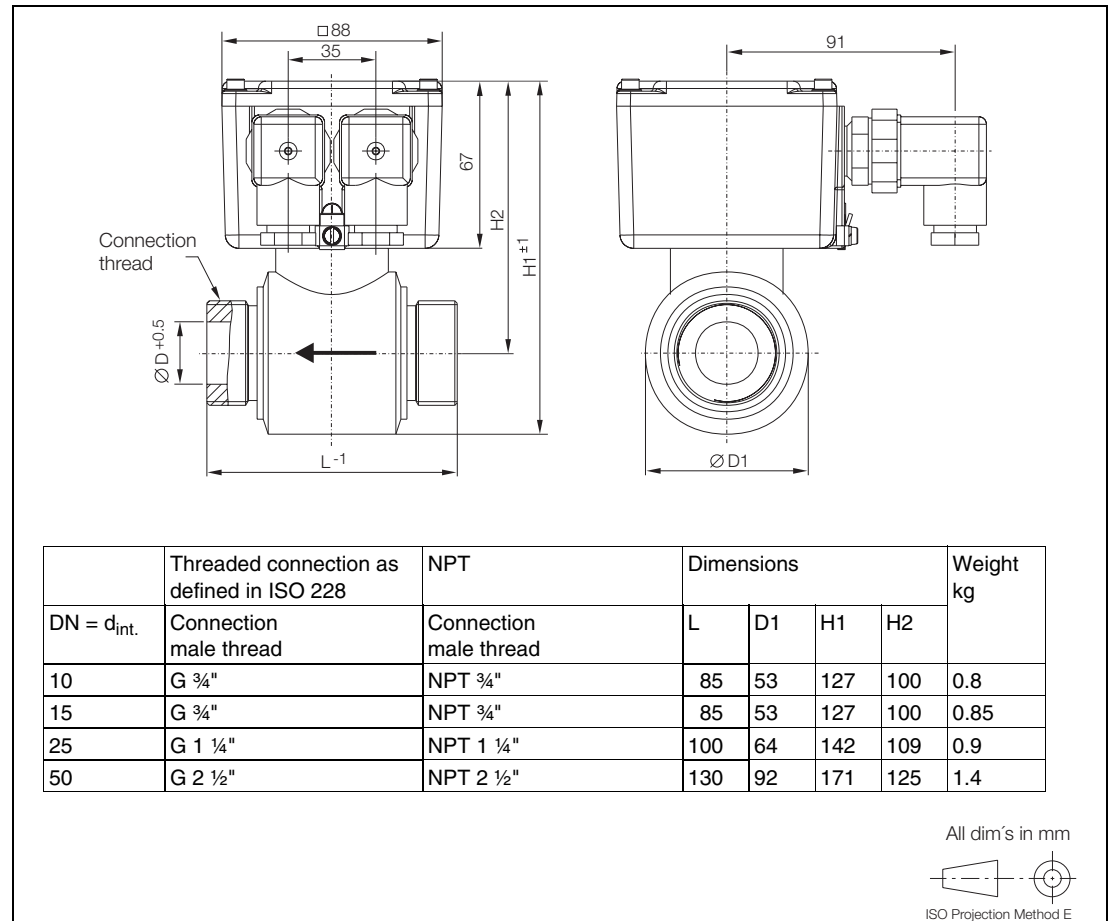


Fig. 3:

#### Materials/process connection

Liner material	PVDF, PEEK
Measurement pipe and process connection	DN 50 PVDF; DN 10, 15, 25 PEEK
Sensor housing	PP
Material of measurement/earthing electrodes	Hast. C
O-ring (face end)	Viton
Converter housing	Alum die casting
Colour: sensor	RAL 9002
Colour: converter housing	RAL 7012

## 4 Assembly and start-up

## 4.1 Installation conditions

The flowmeter should not be installed close to electromagnetic fields. Any installation position is possible! When installing, always ensure that the measurement pipe is filled completely. Partial filling causes measurement errors. The Flowcont M measures in both directions of flow! The forwards direction is defined by the arrow stuck onto the equipment. If the equipment is only operated in one direction of flow, then a straight entry length of  $3 \times \text{DN}$  should be observed upstream of the equipment and an exit length of  $2 \times \text{DN}$  downstream of the equipment. If it is operated in both directions of flow, then a pipe length of  $3 \times \text{DN}$  should be observed upstream and downstream of the equipment.

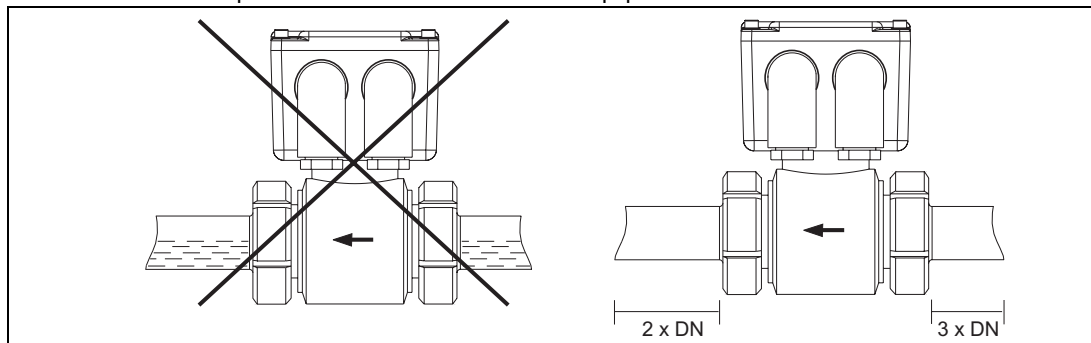


Fig. 4:

Valves or other shut-off devices should be fitted downstream of the flowmeter so that it cannot run dry. A slight rise in the piping of approx. 3 % is useful for degassing.

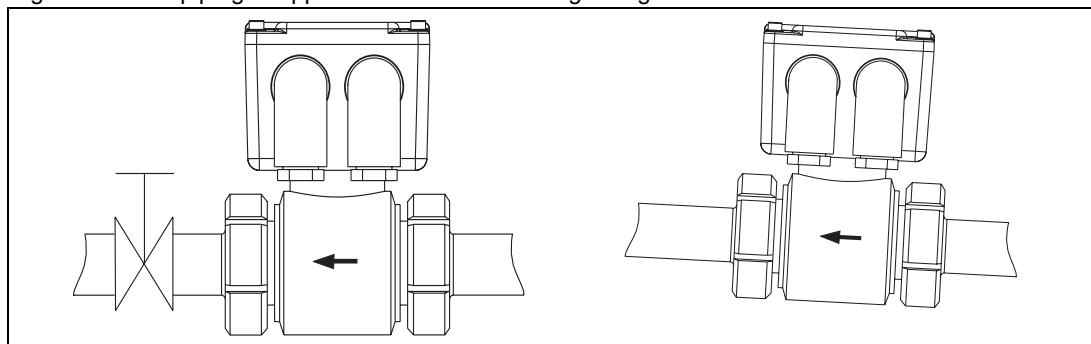


Fig. 5:

Installation in vertical piping is ideal, if the measuring agent is pumped from the bottom to the top. Installation in what are commonly referred to as downpipes, i.e. flow from top to bottom, should be avoided because experience has shown that with such installations complete pipe filling cannot be guaranteed because an equilibrium sets in between the gas pushing upwards and the fluid flowing downwards. The primary should usually be fitted in the piping so that the Pg screw connections face downwards. If installed in horizontal piping, ensure that the intended connection line to the two electrodes is as horizontal as possible so that no air or gas bubbles can influence the measurement voltage which is recorded by the electrodes. The position of the electrode axis can be seen from the figure below.

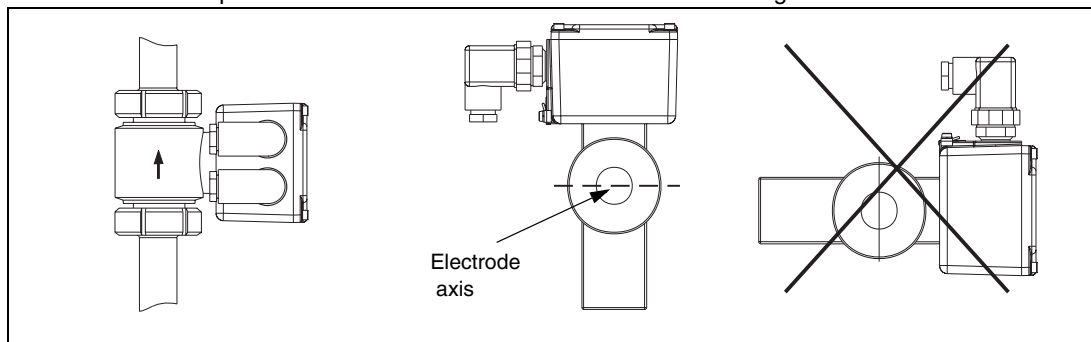


Fig. 6:

Air bubbles carried in the measurement medium distort the measurement result.

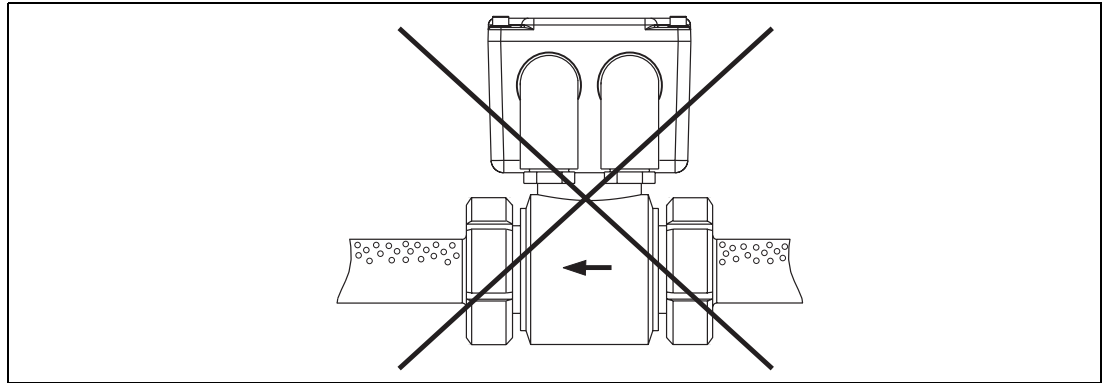


Fig. 7:

With a free exit (downpipe), the flowmeter should not be installed at the highest point and/or in the out-flowing side of the piping (measurement pipe runs dry; air bubbles). Stationary turbulence (e.g. with half open gate valve or with tangential inflow upstream of equipment) which extends into the flowmeter should be avoided. If the fluid is displaced with the aid of pumps, then the flowmeter should be installed on the pressure side of the pump.

In metering systems, the flowmeter should be installed in a place which ensures that both fluids are mixed well. An inhomogenous distribution of one fluid in others should be avoided in the flowmeter. A pulsation damper should be provided. The earthing connection between the two connectors on the converter housing should be connected to a good earthing point.

Earthing electrodes are integrated in the meter tube of the flowmeter. The meter tube and the electrodes integrated in the meter tube come into contact with the fluid. Before starting up the equipment, check whether the materials used are chemically resistant to the fluid to be measured. When fitting the equipment, use gaskets. These must also be resistant to the fluid. Ensure that the max. fluid temperature of 110 °C is not exceeded.

Observe the max. torque to which the screw connection on the Flowcont M may be tightened.

Max. tightening torque for process connection thread		
	PVDF	PEEK
10	– Nm	3 Nm
15	– Nm	3 Nm
25	– Nm	7 Nm
50	50 Nm	–

The equipment with ISO threads should be sealed with threads at its face end. The supplied O-ring should be used for this purpose. This is made of Viton: Check the chemical resistance of this material before fitting. Avoid using ferrous magnetic materials as process connections.

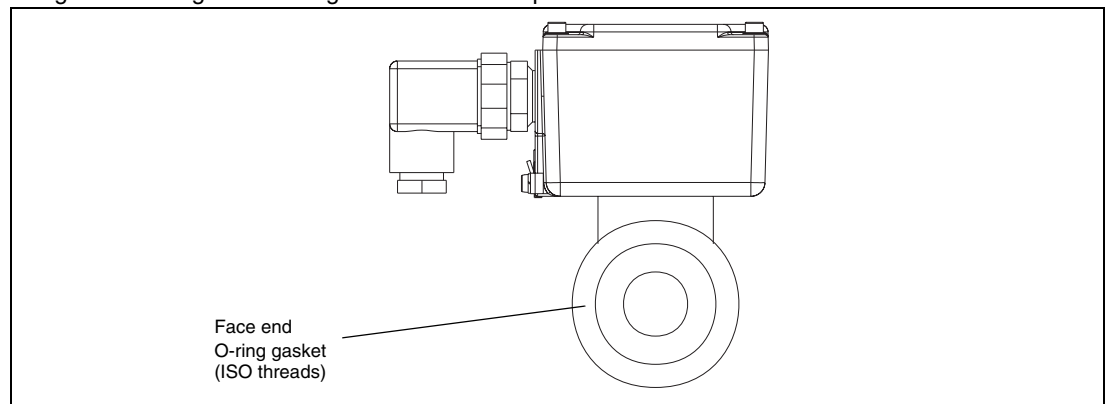
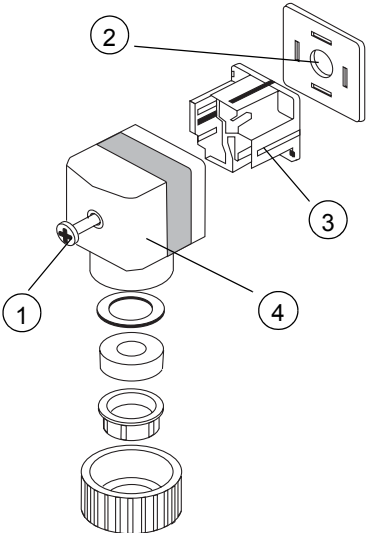


Fig. 8:

5 Electrical connection

5.1 Signal outputs and auxiliary power

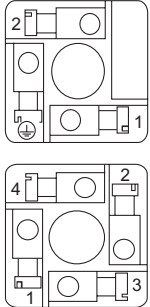


**Connection**  
 Receptacle acc. to DIN 43650 with PG 9 screw connection, line cross-section up to max. 1.5 mm<sup>2</sup>, type of protection IP 65  
 Open up plug and connect up as follows:

**Left-hand plug = auxiliary energy**  
 1 24 V AC/DC  
 2 GND  
 ⊕ Functional earthing

**Right-hand plug = signal outputs**  
 Pin 1+2 20 mA or contacted input (option)  
 Pin 3+⊕ pulse/contact output opto  
 (Also refer to "Connection peripherals" chapter)

**Assembling plug**  
 1. Use screw 1 to open the plug.  
 2. Take inner section 3 out of outer section 4.  
 3. Energise in accordance with connection arrangement.  
 4. The plug is assembled in reverse order.



Consult the type plate for the equipment variant. You will find the relevant information under the key word "variant".  
 The pin assignment for each variant is summarised in the following table.

Variant 1 (without display) or variant 3 (with display)	Pulse output, passive, optocoupler	+ pin 3 - pin ⊕
	Not assigned	+ pin 1 - pin 2
Variant 2 (without display) or variant 4 (with display)	Pulse output, passive, optocoupler	+ pin 3 - pin ⊕
	Current output 0/4 - 20 mA	+ pin 2 - pin 1
Variant 5 (with display)	Pulse output, optocoupler	+ pin 3 - pin ⊕
	Current input, optocoupler	+ pin 2 - pin 1

Fig. 9:

5.2 Earthing

When fitting the equipment in a metal or copper line, potential equalisation should be established as shown in the following diagram.



**Warning!**

If functional earthing is connected up together with auxiliary power (left-hand plug) on the plug (point A), then the line which is connected up to point B must have the same potential as point A. If this is not the case, then connections may only be made to one point - either in plug (point A) or outside on equipment (point B). We recommend connecting up functional earthing at point B. Refer to fig. 10.

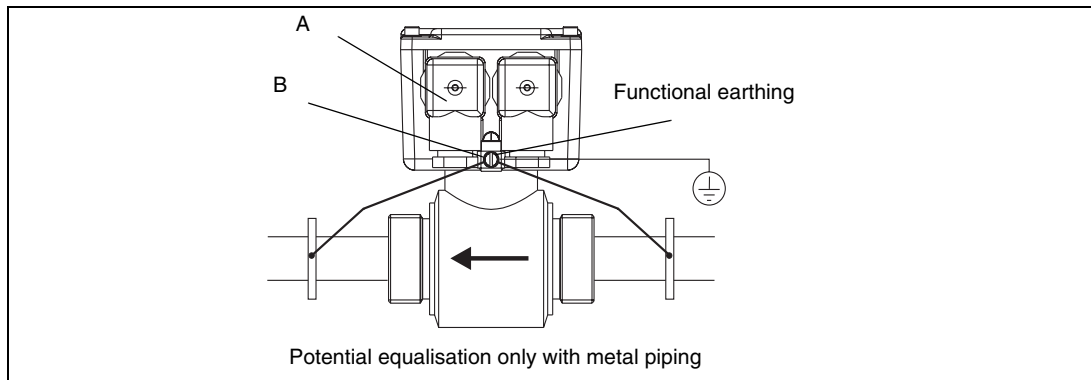


Fig. 10:

5.3 Connection diagram, examples of connections for peripherals

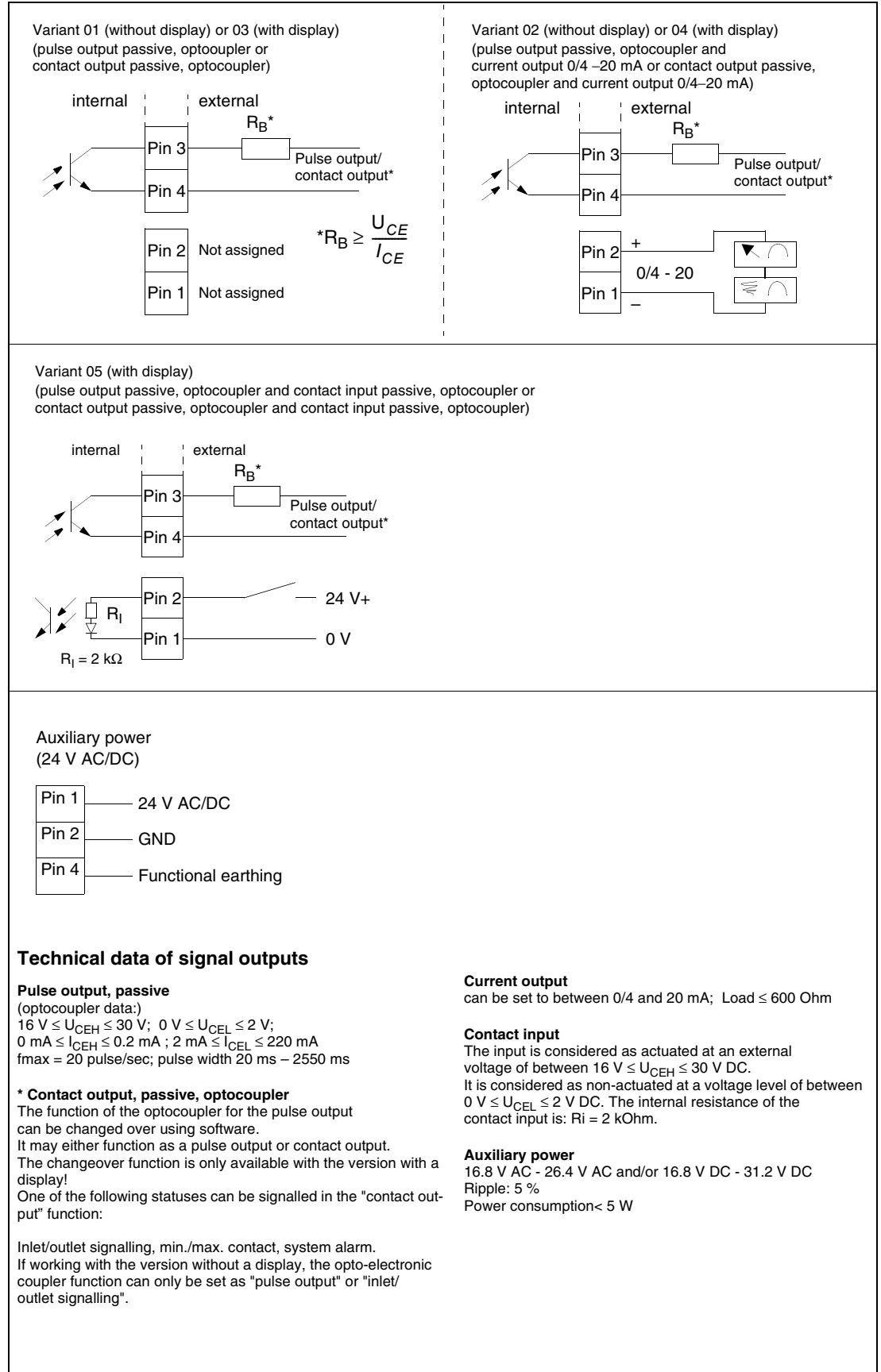


Fig. 11: Examples of connections for peripherals, signal output data

## 6 Operation

### 6.1 Overview of factory default settings for converter

When you receive the Flowcont M it contains a converter preset in the factory. The factory default settings can be changed on site. For more information, refer to Section 6.2 and 6.3. The following table provides an overview of the default settings:

#### Factory default settings

<b>Measurement range</b>	
DN 10	50 l/min
DN 15	100 l/min
DN 25	300 l/min
DN 50	1200 l/min
<b>Unit</b>	l/min
<b>Current output (option)</b>	4 - 20 mA
<b>Damping</b>	5 sec.
<b>Pulse output</b>	1 pulse / litre

### 6.2 Setting Flowcont M in version without display

Open the cover and use the DIP switches to set the equipment. The following table contains the switch positions for setting damping, unit, current output and pulse output for Flowcont M without a display. Carefully close the housing once the converter has been set. Ensure that the cover seal is in the correct position as this is the only way of ensuring the IP 65 type of protection.

The factory default setting for all switches is "On"

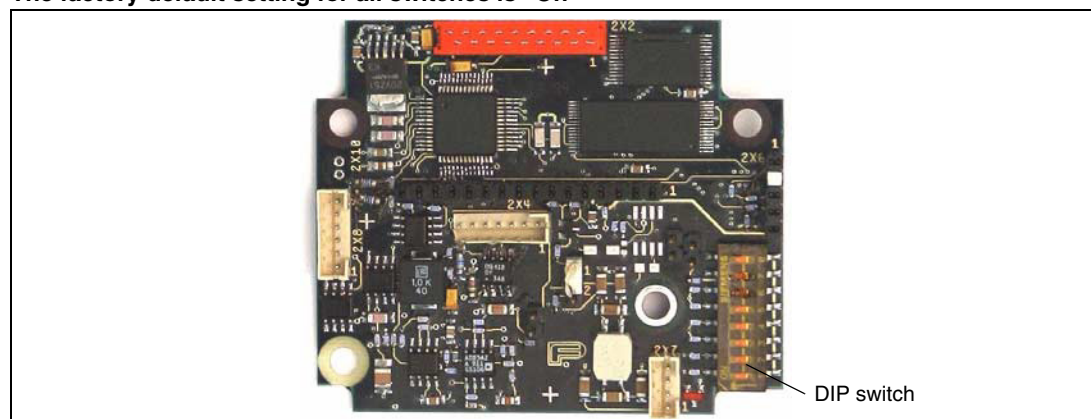


Fig. 12: Version without display

#### Brief overview of function of DIP switch

DIP switch		
8	<input checked="" type="checkbox"/>	Pulse output/contact output (inlet/outlet signalling)
7	<input checked="" type="checkbox"/>	0 - 20 / 4 - 20 mA
6	<input checked="" type="checkbox"/>	Operation
5	<input checked="" type="checkbox"/>	Damping
4	<input checked="" type="checkbox"/>	Unit (litre/US gallons)
3	<input checked="" type="checkbox"/>	Measurement range
2	<input checked="" type="checkbox"/>	Measurement range
1	<input checked="" type="checkbox"/>	Measurement range
	ON OFF	

The S6 switch should always be set to "On".

Damping			
S5	On	=	5 seconds
S5	Off	=	10 seconds

Measurement range and pulse output			
S4	On	=	Litre
S4	Off	=	US gallon

Current output			
S7	On	=	4–20 mA
S7	Off	=	0–20 mA

Pulse output/contact output (F/R)			
S4 on and	S8 on	=	1 pulse per 1 litre
S4 off and	S8 on	=	1 pulse per gallon
S8 off		=	Contact output Signalling in direction of flow Forwards/reverse (F/R)



### Comment!

If S8 is on, then the optocoupler output functions as a pulse output. For pulse values, refer to table.

If **S8 is off**, then the optocoupler output functions as a contact output and signals the forwards/reverse direction of flow.

If working with the version without a display, you have the option of setting the measurement range in l/min or in US gal/min. The switch position for the relevant measurement range can be found in the following tables. The factory presetting is: all switches to ON.

### Measurement range setting in l/min (S4 on)

DN	Stage 1			Stage 2			Stage 3			Stage 4		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
	Off	Off	Off	Off	Off	On	Off	On	Off	Off	On	On
10	2.5 l/min			5 l/min			7.5 l/min			10 l/min		
15	5 l/min			10 l/min			15.0 l/min			20 l/min		
25	15 l/min			30 l/min			45.0 l/min			60 l/min		
50	60 l/min			120 l/min			180.0 l/min			240 l/min		

DN	Stage 1			Stage 2			Stage 3			Stage 4		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
	On	Off	Off	On	Off	On	On	On	Off	On	On	On
10	12.5 l/min			15 l/min			25 l/min			50 l/min		
15	25.0 l/min			30 l/min			50 l/min			100 l/min		
25	75.0 l/min			90 l/min			150 l/min			300 l/min		
50	300.0 l/min			360 l/min			600 l/min			1200 l/min		



## Measurement range setting in USgal/min (S4 off)

DN	Stage 1			Stage 2			Stage 3			Stage 4		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
	Off	Off	Off	Off	Off	On	Off	On	Off	Off	On	On
10	1.0 gal/min			1.5 gal/min			2.0 gal/min			2.5 gal/min		
15	1.5 gal/min			2.5 gal/min			4.0 gal/min			5.0 gal/min		
25	4.0 gal/min			8.0 gal/min			12.0 gal/min			15.0 gal/min		
50	16.0 gal/min			30.0 gal/min			50.0 gal/min			60.0 gal/min		

DN	Stage 1			Stage 2			Stage 3			Stage 4		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
	On	Off	Off	On	Off	On	On	On	Off	On	On	On
10	3.0 gal/min			4.0 gal/min			5.0 gal/min			10.0 gal/min		
15	7.0 gal/min			8.0 gal/min			10.0 gal/min			25.0 gal/min		
25	20.0 gal/min			25.0 gal/min			40.0 gal/min			80.0 gal/min		
50	80.0 gal/min			100.0 gal/min			160.0 gal/min			320.0 gal/min		

## 6.3 Setting Flowcont M, version with display

If a display is connected to the converter electronics, then the settings of the DIP switch which are used to set the equipment without a display are ignored. The converter can now be set using a simple, operator-guided menu with plain language in the display.

The advantages of this version over the version without a display are:

1. Measurement range and damping can now be set in infinitely variable manner
2. Operator is free to choose from several physical units for flow
3. The optocoupler output can – when configured as contact output assume several functions. (e.g. min. alarm, max. alarm etc.)
4. The pulse value can now be set!

## Measurement range table

DN	Measurement range can be set (in infinitely variable manner) in l/min between			
10	min. 0 -	2.5	l/min	max. 0 - 50 l/min
15	min. 0 -	5	l/min	max. 0 - 100 l/min
25	min. 0 -	15	l/min	max. 0 - 300 l/min
50	min. 0 -	60	l/min	max. 0 - 1200 l/min

DN	Measurement range can be set (in infinitely variable manner) in USgal/min between			
10	min. 0 -	1.0	gal/min	max. 0 - 10 gal/min
15	min. 0 -	1.5	gal/min	max. 0 - 25 gal/min
25	min. 0 -	4	gal/min	max. 0 - 80 gal/min
50	min. 0 -	16	gal/min	max. 0 - 320 gal/min

## Display format

The display in the Flowcont M is a graphic-compatible display in 97\*32 point format.

## Process display

The first line of the process display indicates the value of the present flow and the second line indicates the unit.

The counter status is shown in the lower line litres or US gallons. During the alarm or other fault reporting, the display disappears and the fault reporting appears in plain language.

>V	122.5
	l/min
>V	3256 l

### Data input

During data input, the converter remains online, i.e. current and pulse output continue to display the present operating status.

The individual key functions are described below:



The clear key is used to switch from the operating mode into the menu and vice versa



The arrow keys are used to page through the menu



The ENTER function is produced by simultaneously pressing both arrow keys. ENTER is firstly used to switch programmer protection on and off. Secondly, you can use ENTER to enter the parameters to be modified and you can use ENTER to fix the new value.

### Rotating the display

The display is secured to the inside of the cover.

The position of the display can be modified by rotating (moving) the cover.



### Attention!

Close cover carefully as this is the only way to ensure the type of protection!

6.4 Data input (brief form)

Purpose		→ with keypad = display information	
Starting point "Process information"		→ F 233.55 l/min → F 3225 I	
Example: End value in measurement range Change Qmax	#	Any parameter can appear here	
Search for "Program protection" parameter	↓	*Program protection* on	
"Program protection"	↵	*Program protection* off	

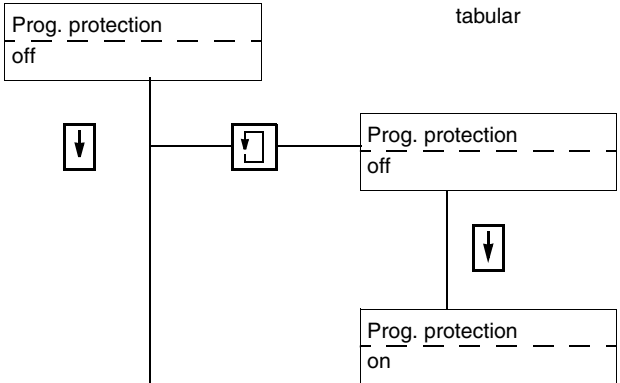

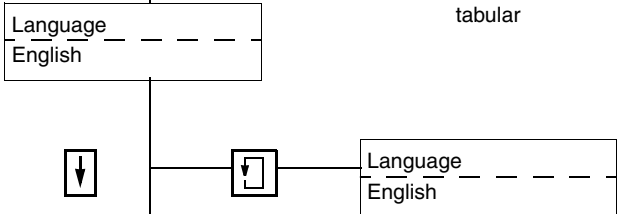

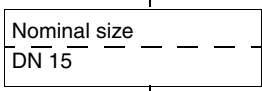
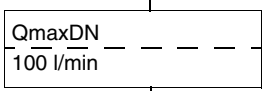
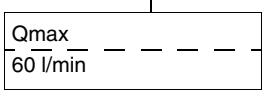
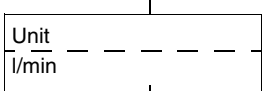
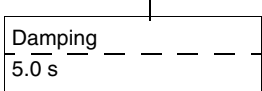
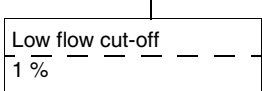
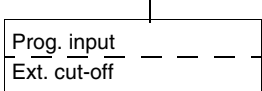
  

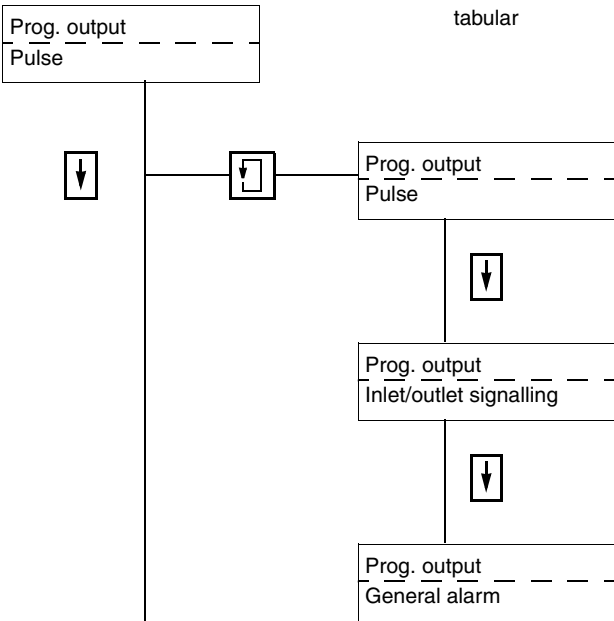
Direct-numerical input			Tabular input		
Purpose	with keypad =	display-inform.	Purpose	with keypad =	Display-inform
Search for "Qmax" parameter	Arrow keys ↓	→ F 233.55 l/min → F 3225 I	Search for "Current output" sub-menu	Arrow keys ↓	Sub-menu Current output
Alter "Qmax" parameter	ENTER ↵	Qmax - l/min	Alter "Current output" parameter	ENTER ↵	Current output 0 - 20 mA
Input sequence of numbers wanted	6 x ↓	Qmax 6 2 0 l/min	Alter current output from 0-20 mA to 4-20 mA	ENTER ↵	Current output 0 - 20 mA
	↑		Search for current output	Arrow keys ↓	Current output 4 - 20 mA
	2 x ↓		Fix new current output	ENTER ↵	Current output 4 - 20 mA
Fix new Qmax value	ENTER ↵	Qmax 6 2 0 l/min			

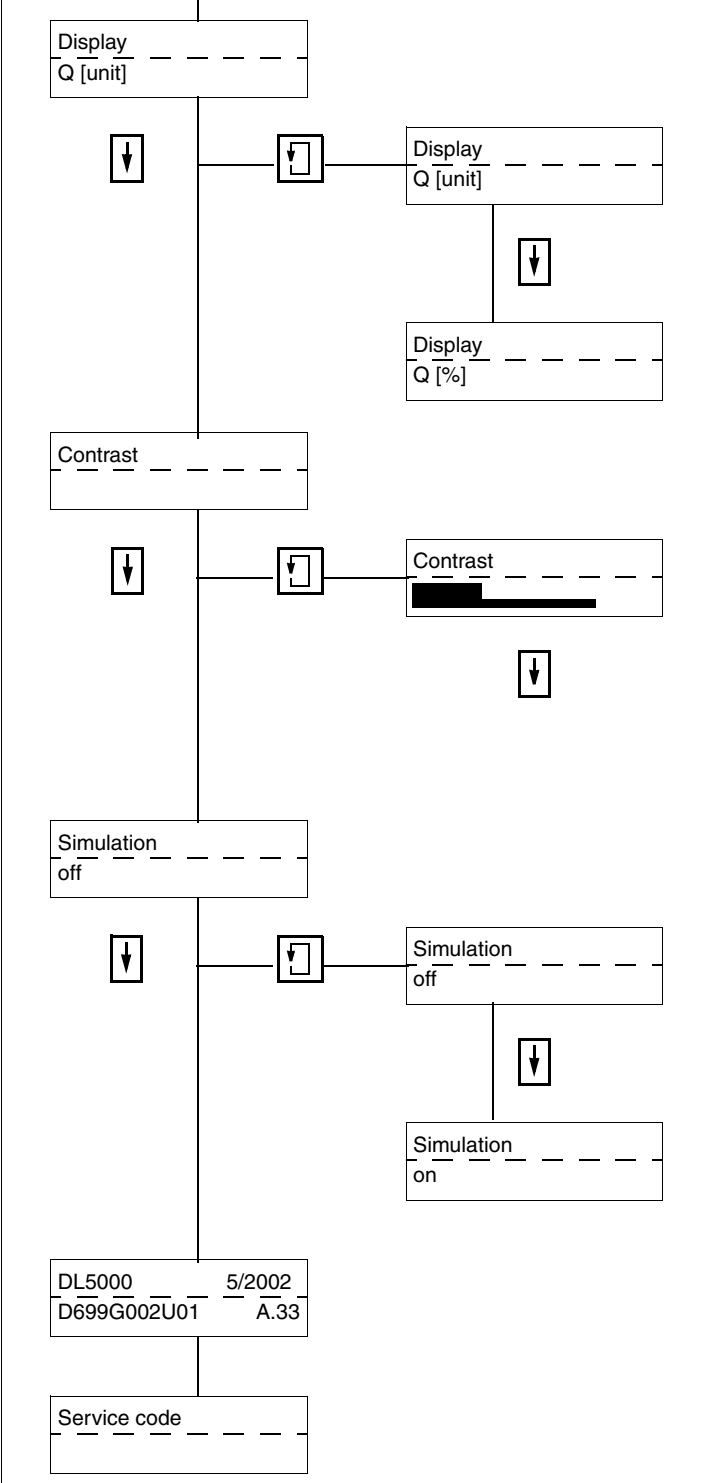
Exit from Qmax Parameter. Search for program protection	↓	*Program protection* off
Switch program back on	↵	*Program protection* on
Starting point Process information	#	→ F 233.55 l/min → F 3225 I

## 6.5 Data input

Sub-menu/parameter	Type of input	Comment
	tabular	On / off If the prog. protection has been switched off, parameters can be changed. Exit the sub-menu using  .
	tabular	German/English/French/Spanish (Default value is German)  Use arrow key to select the language required and confirm using  .
	tabular	DN 10, 15, 25, 50 refer to type plate
	for information only	Max. end value in measurement range which can be set for the nominal size selected (=10 m/s). Definition is undertaken automatically using nominal size
	numerical	End value in measurement range for forward and reverse (Default value here is QmaxDN) min. measurement range 0-0.5 m/s; max. measurement range 0-10 m/s The unit is selected in the "Unit" sub-menu
	tabular	l/s; l/min; l/h; gal/s; gal/min; gal/h (Default value is l/min)
	numerical	Can be set to between 5 and 40 seconds. The damping corresponds to the response time of the 20 mA output for 0-99 % flow change. (Default value is 5 sec.)
	numerical	Range of between 0 and 10 % of set measurement range. Effective for the reading in the display and all outputs. If the value falls below the low flow cut-off, then there is no flow measurement. Overlap of low flow cut-off: 1 % (Default value for low flow volume is 1 %)
	tabular	External output cut-off or external counter reset or no function. This menu only appears if the function is available; i.e. if this option is ordered. The 20 mA output is then not used. <u>Comment:</u> If 05 is specified as the "Variant" on the type plate, then this function is available. (Default value for prog. input is "No function")

Sub-menu/parameter	Type of input	Comment
	<p>tabular</p>	<p>Can be set as pulse output or inlet/outlet signalling or min. alarm, max. alarm, min./max. alarm, general alarm, no function. When set as pulse output, the following always applies: max. pulse frequency 20 Hz. <i>Default value for prog. output is always "Pulse"</i></p>
<p>Pulse 1.0 / 1</p>	<p>tabular</p>	<p>Pulse value can be set (0.01 / 0.1 / 1 / 10 / 100 pulses per litre).</p>
<p>Pulse width 600 ms</p>	<p>for info only</p>	<p>only display, cannot be set. The pulse width is calculated automatically depending on the final figure in the measurement range set. Pulse/pause ratio 1:1 provided that pulse width is within the limits of 2550 ms (max. pulse width) and/or 20 ms (min. pulse width). If you want a different pulse width, then change the pulse value or final figure in measurement range (Qmax).</p>
<p>MAX alarm 105 %</p>	<p>numerical</p>	<p>The pulse width is calculated as follows: <math>30 / (Q_{max} \times \text{pulse value}) = \text{pulse width in seconds}</math> whereby Qmax must be in l/min and the pulse value in pulse/litre.</p>
<p>MIN alarm 0 %</p>	<p>numerical</p>	<p>Can be set to between 0 and 105 % of the final figure in the measurement range set. The alarm message is always output in the display. It is only then available as an electrical signal if min.alarm, max.alarm, minmax. alarm has been selected in the "Prog.output" menu. <i>(Default value for max.alarm is 105 %)</i></p>
<p>MIN alarm 0 %</p>	<p>numerical</p>	<p>Can be set to between 0 and 105 % of the final figure in the measurement range set. The alarm message is always output in the display. It is only then available as an electrical signal if min.alarm, max.alarm, minmax. alarm has been selected in the "Prog.output" menu. <i>(Default value for min.alarm is 0 %)</i></p>
		<p>For pin assignment, see connection diagram.</p>

Sub-menu/parameter	Type of input	Comment
	<p>tabular</p> <p>tabular</p> <p>tabular</p>	<p>0-20 <math>\mu</math>A or 4-20 <math>\mu</math>A can be selected Default value for current output is "4-20 mA"</p> <p>Exit the sub-menu using <b>#</b> or</p> <p>Confirm the new value using <b>↵</b></p> <p>Current output during fault With 4–20 <math>\mu</math>A, the following status can be selected for the current output: 0 mA; 3.6 mA; 21 mA With 0–20 <math>\mu</math>A, the following status can be selected for the current output: 0 mA; 21 mA Default value for Iout with alarm is "21 mA"</p> <p>The counter in the display functions as a differential counter, i.e. inlet and outlet volumes are displayed on a counter. Reset counter to zero using <b>↵</b></p> <p>Exit sub-menu using <b>#</b></p> <p>Manual input of zero</p> <p>Valve must be closed. Pipe must be filled completely. Fluid must be at standstill. The autom. zero adjustment is started using ENTER. The limit for the zero is 50 Hz. If the value is outside this limit, there is no zero adjustment. Exit the sub-menu using <b>#</b></p> <p>Standard/Opposite Definition of the forward flow direction for an installed instrument. Standard = no change Opposite = reversed indication</p>

Sub-menu/parameter	Type of input	Comment
		<p>Unit of indication in display (present flow and counter). In % or in the unit selected under "Unit"</p> <p>Confirm using Enter or exit the sub-menu using #</p> <p>Use arrow keys to set.</p> <p>Flow simulation on/off. E.g. checking the connected 20 mA loop or pulse output or the inlet-outlet signalling and min. and max. alarms. Set flow using arrow keys. Flow can be simulated in both directions of flow. Once the simulation has been switched on, enter the flow value in % and use ENTER to confirm. Then use # to return to the display. "Simulation" then appears in the display. The equipment is no longer online. The arrow keys can now also be used to alter the flow simulation. (More flow/less flow). Once the test phase is complete, the simulation is switched off again.</p> <p>Flowmeter model; date of software Part no. of software; revision status</p> <p>Only for ACS Service</p>

7 Printed circuit boards, position of fuse on converter printed circuit board

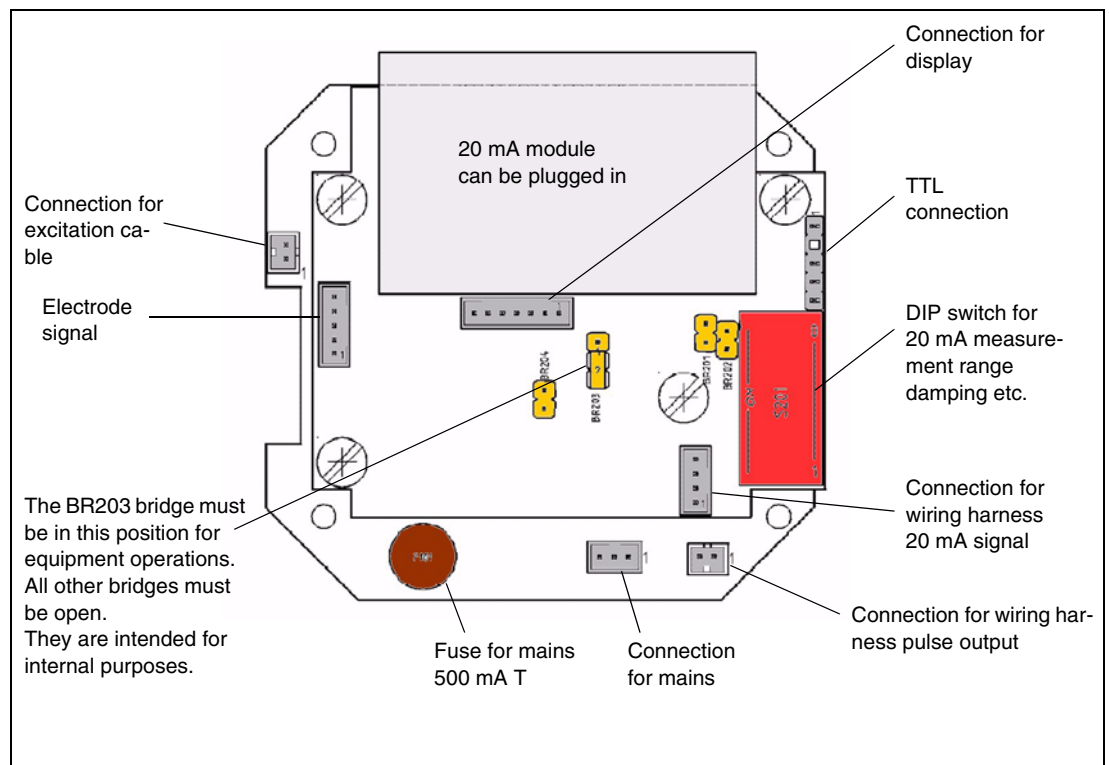


Fig. 13: Version without display



## 8 Order information

## M –Mini flowmeter

010 = DN10  
 015 = DN15  
 025 = DN25  
 050 = DN50

**Liner material**

P....PVDF (max. 110 °C) (DN50)  
 E....PEEK (max. 110°) (DN10, 15, 25)

**Process connection**

E... Male thread acc. to ISO 228  
 N... NPT male thread

**Meas./earthing electrode material**

0.... Hastelloy C4

**Display / In-/outputs**

0....without Display, Impulse output Opto  
 1....without Display, Impulse output Opto + 20mA Signal  
 2....with Display, Impulse output Opto  
 3....with Display, Impulse output Opto + 20mA Signal  
 4....with Display, Impulse output Opto + contact input Opto

**Measuring accuracy**

P....3 % of the measurement (Standard)  
 M...1,5 % of the measurement

**Auxiliary power**

2 ... Low voltage 16,8V - 26,4V AC / 16,8V - 31,2V DC

S ... Standard

Flowcont M	-	-	-	0	-	-	2	S
------------	---	---	---	---	---	---	---	---

Earthing electrodes are integrated in the sensor as standard.

A transformer for connecting the meter to a 230 V ac power supply is available as an option.  
 Part-no. D164B002U08

**Option:****Threaded adapter****Order number**

For DN 15 3/4" to 1" External thread ..... GA-034-100

For DN 25 1 1/4" to 1 1/2" External thread ..... GA-114-112

For DN 50 2 1/2" to 2 3/4" External thread ..... GA-212-234

**Comment:**

The function of the optocoupler for the pulse output can be changed over using software. This either functions

as a pulse output or contact output. The function can only be changed in the version with a display!

The preferred versions have grey backgrounds.

**По вопросам продаж и поддержки обращайтесь:**

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Иваново (4932)77-34-06	Мурманск (8152)59-64-93	Саратов (845)249-38-78	Челябинск (351)202-03-61
Ижевск (3412)26-03-58	Набережные Челны (8552)20-53-41	Севастополь (8692)22-31-93	Череповец (8202)49-02-64
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Казахстан (772)734-952-31

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