

**Operating Instructions  
for  
Torsion Paddle  
Flow Meter / Monitor**

**Model: DPT-...**



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## 2. Note

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Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

### as per PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

|                  |  |
|------------------|--|
|                  | Diagram 6<br>Pipe, gas<br>Group 1 dangerous fluids |
| DPT, 3/8" - 1"   | Art. 4, § 3  |
| DTP, 1 1/2" – 3" | Cat. II  |

## 3. Instrument Inspection

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Instruments are inspected before shipping and sent out in perfect condition. Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

### Scope of delivery:

The standard delivery includes:

- Torsion Paddle Flow Meter      model: DPT
- Operating Instructions

## 4. Regulation Use

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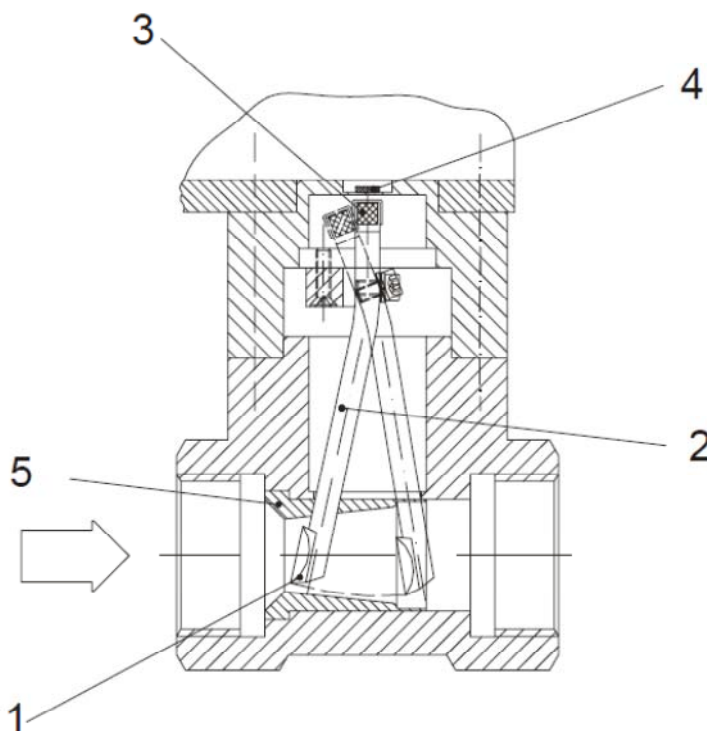
Any use of the Flow Meter, model: DPT, which exceeds the manufacturers specification may invalidate its warranty. Therefore any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

## 5. Operating Principle

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The patented KOBOLD Torsion Paddle Flow Meter, model: DPT, operates according to the diaphragm plate principle. A flat torsion spring acts simultaneously as a mount for the paddle and as an elastic force. The device thus operates with almost no wear.

The paddle comprises a diaphragm plate (1) and a lever arm (2).



When the diaphragm plate is moved by the flow in the flow direction, the lever arm is deflected by the force of the leaf spring.

This angular motion is transferred non-contacting through the casing wall by a magnet (3) to a Hall-effect sensor (4) with no losses. Different measuring ranges and instrument sizes are realised with the geometry of the lever arm, the diameter and shape of the diaphragm plate as well as the height and thickness of the leaf spring. Calibration nozzles (5) can also be press-fitted to adapt to the measuring ranges. The signal from the Hall-effect sensor is displayed by different electronic means and serves to monitor the volume flow.

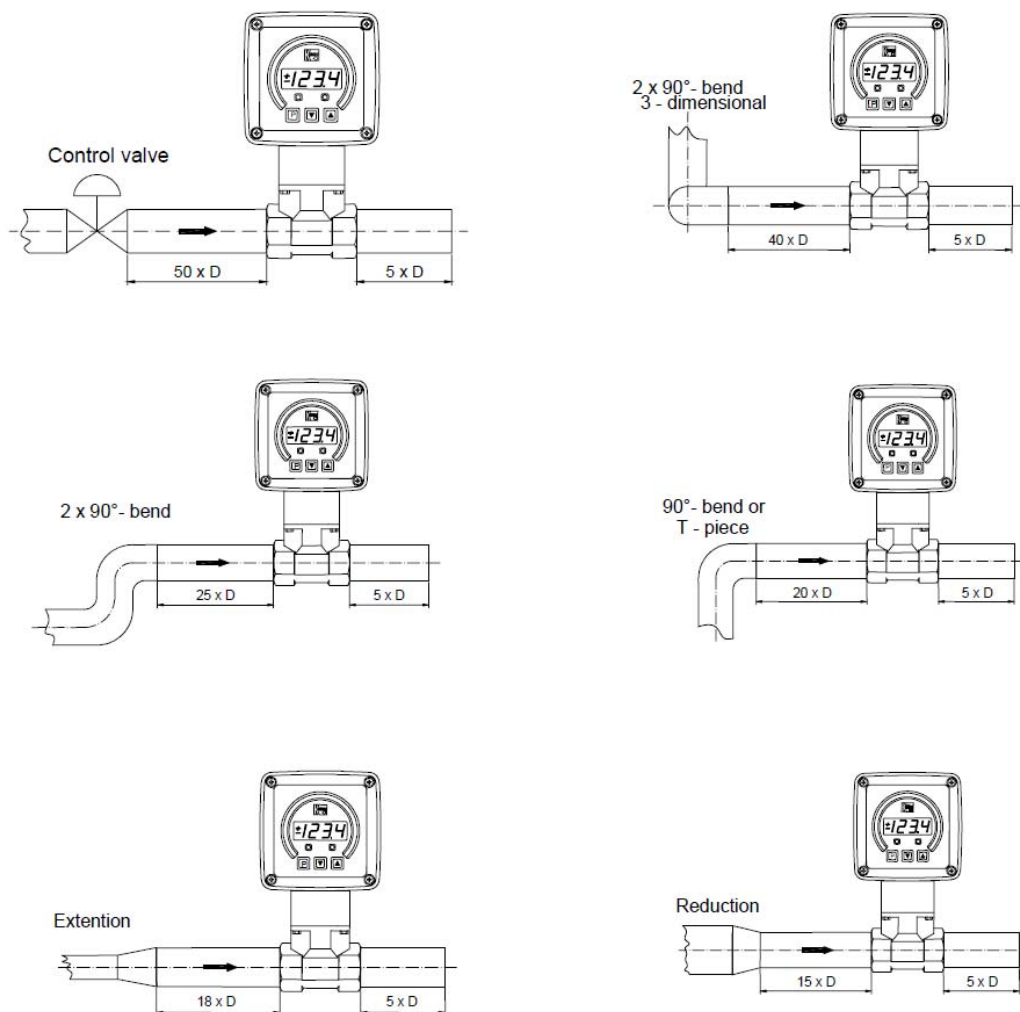
## 6. Mechanical Connection

### 6.1. Check Service Conditions:

- Flow quantity
- Max. operating pressure
- Max. operating temperature
- Medium
- Mounting position

### 6.2. Installation

- Flow in direction of arrow (horizontal)
- Avoid pressure and tensile loads  
Mechanically fix inlet and outlet lines at distances of 50 mm from the connections
- Check connections for leakage
- Pay attention to the inlet and outflow zone (see drawing below)



## 7. Electrical Connection

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### 7.1. General



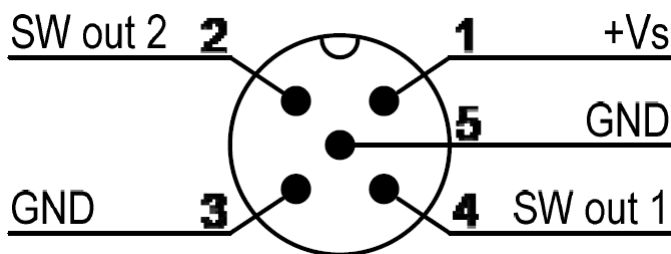
**Attention! Make sure that the voltage values of your system correspond with the voltage values of the Flow Meter.**

- **Make sure that the supply wires are de-energised.**
- Connect the supply voltage and the output signals to the plug connector PINs as shown below.
- We recommend the use of wires with cross sectional area of min. 0,25 mm<sup>2</sup>

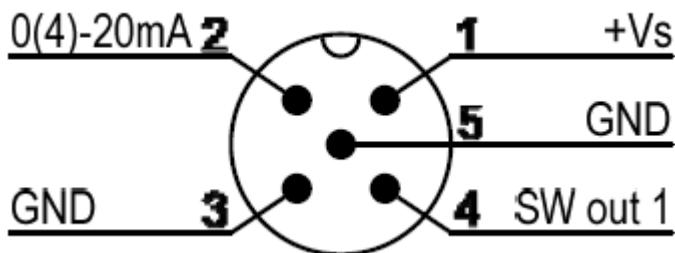


**Attention! Incorrect wiring will lead to damage of the unit's electronics.**

### 7.2. Compact Electronics: (..C30R, ..C30M)



### 7.3. Compact Electronics: (..C34P, ..C34N)

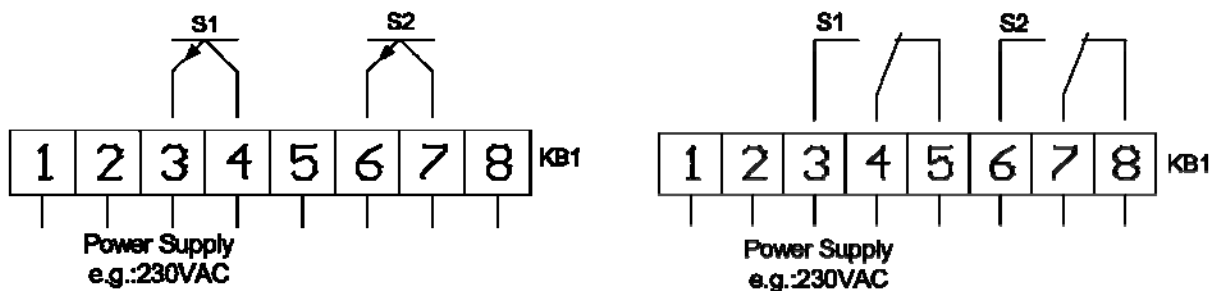


Terminals 3 and 5 are linked internally and can therefore be used either for the output signal or the power supply.

### 7.4. ADI-Evaluation Electronic

To avoid damaging the device during electrical connection, the electrician should take suitable precautions against electrostatic discharge (e.s.d.).

The supply voltage for the indicating unit and the optional switching outputs are connected to terminal block 1 according to the wiring diagram below (KB1).

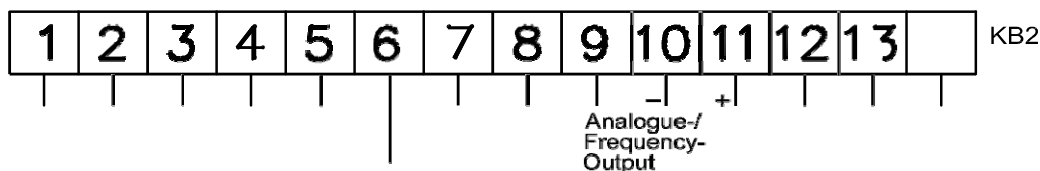


or

Sensor signal and the pickup supply can be connected to terminal block 2 (KB2).



The electrical connection of the device to the sensor should not be changed.



## 8. Commissioning

### 8.1. Setting Compact Electronics


#### 8.1.1. Programming


Connect the compact electronics according to the previous wiring diagram and apply the specified voltage.

The measuring range (upper range value) is displayed for 3 seconds after switch-on.

#### 8.1.2. Key Function

Standard mode (measuring mode)

 : pressing 3 sec. → set-up mode


 : switchpoint/window point

Set-up mode

 : Next level

 : Set value

Anytime:

3 sec 

or 20 sec  
no key pressing

↓

Standard mode

#### 8.1.3. Settings

The following values can be changed in the compact electronics:

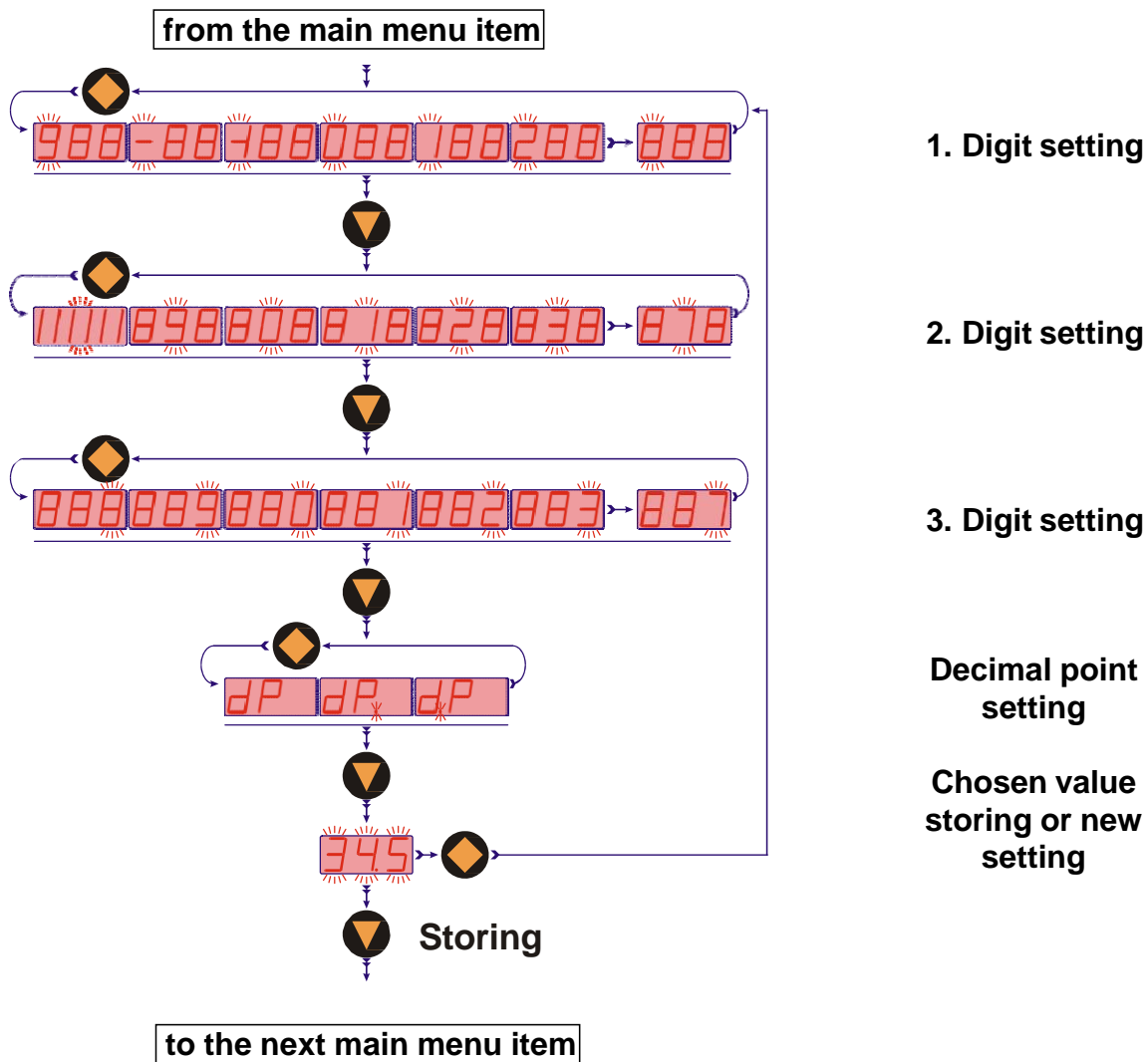
|  | Scale range  | Factory setting         |
|--|--|-------------------------|
| Switching point ( <b>SPo</b> , <b>SP1</b> , <b>SP2</b> ) | 0 - 999  | 0.00                    |
| Hysteresis ( <b>HYS</b> )                                | -199 - 0   | -0.00                   |
| Window point ( <b>duo</b> )                              | Switching point ...999   | --- (de-activated)      |
| Filter ( <b>Filt</b> )                                   | 1/2/4/8/16/32/64   | 1                       |
| Contact type ( <b>Con</b> , <b>Co1</b> , <b>Co2</b> )    | N/O contact ( <b>no</b> ), N/C ( <b>nc</b> )<br>or frequency ( <b>Fr</b> ) | <b>no</b> (N/O contact) |
| Start current ( <b>S-C</b> )*                            | 000 - 999  | 000                     |
| End current ( <b>E-C</b> )*                              | 000 - 999  | Upper range value       |
| Start current selection ( <b>SCS</b> )                   | 0-- (0 mA), 4-- (4 mA)   | 4 mA                    |
| Change code ( <b>CCo</b> )                               | 000 - 999  | 000                     |

\* Lower and upper range values of the flow rate are based on 0/4-20 mA.



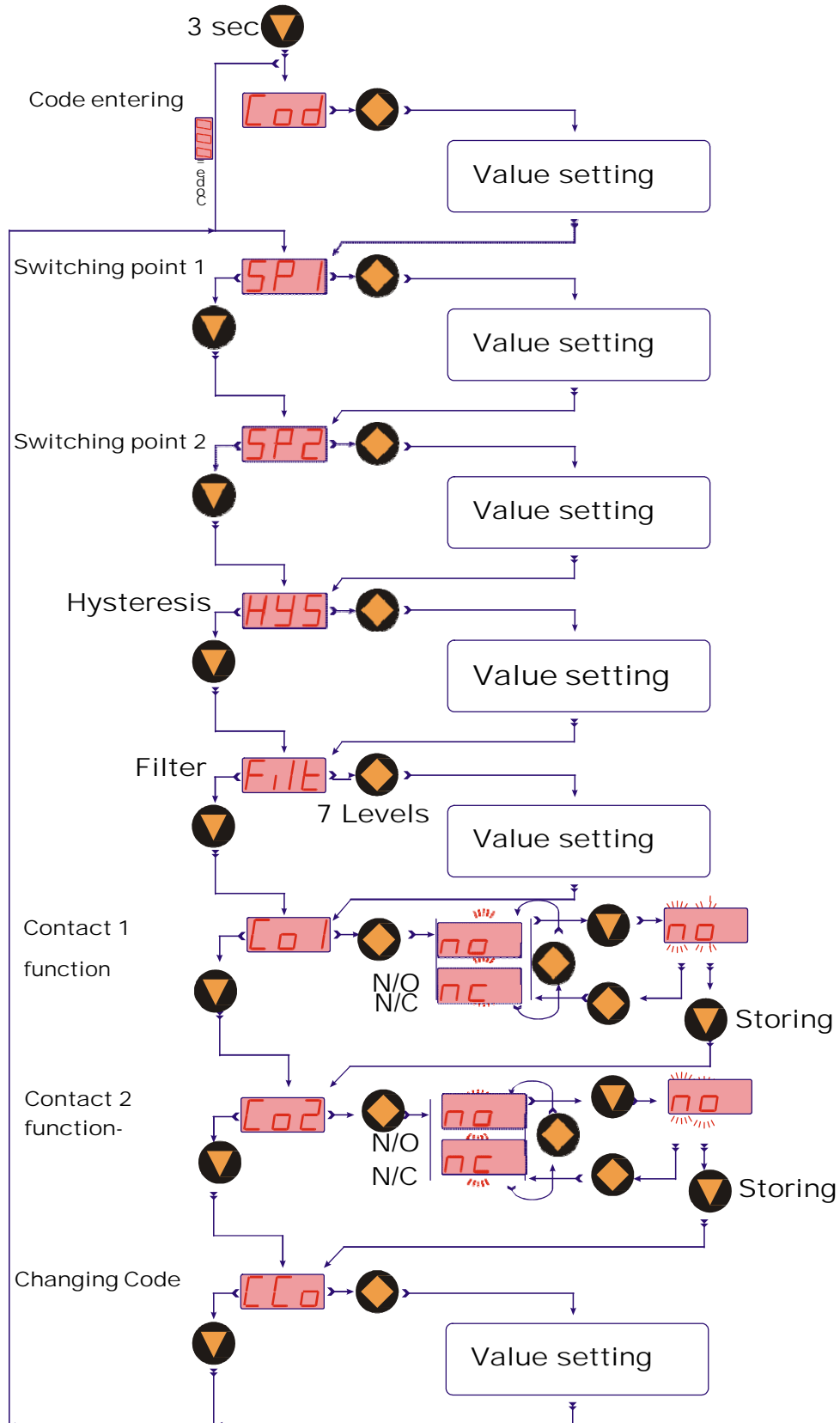
### 8.1.4. Value Setting

You can select value setting in the main menu item (for example: Switching point, "SPo") by pressing the "☐" key. The structure shown below illustrates the universal routine for changing individual parameters.

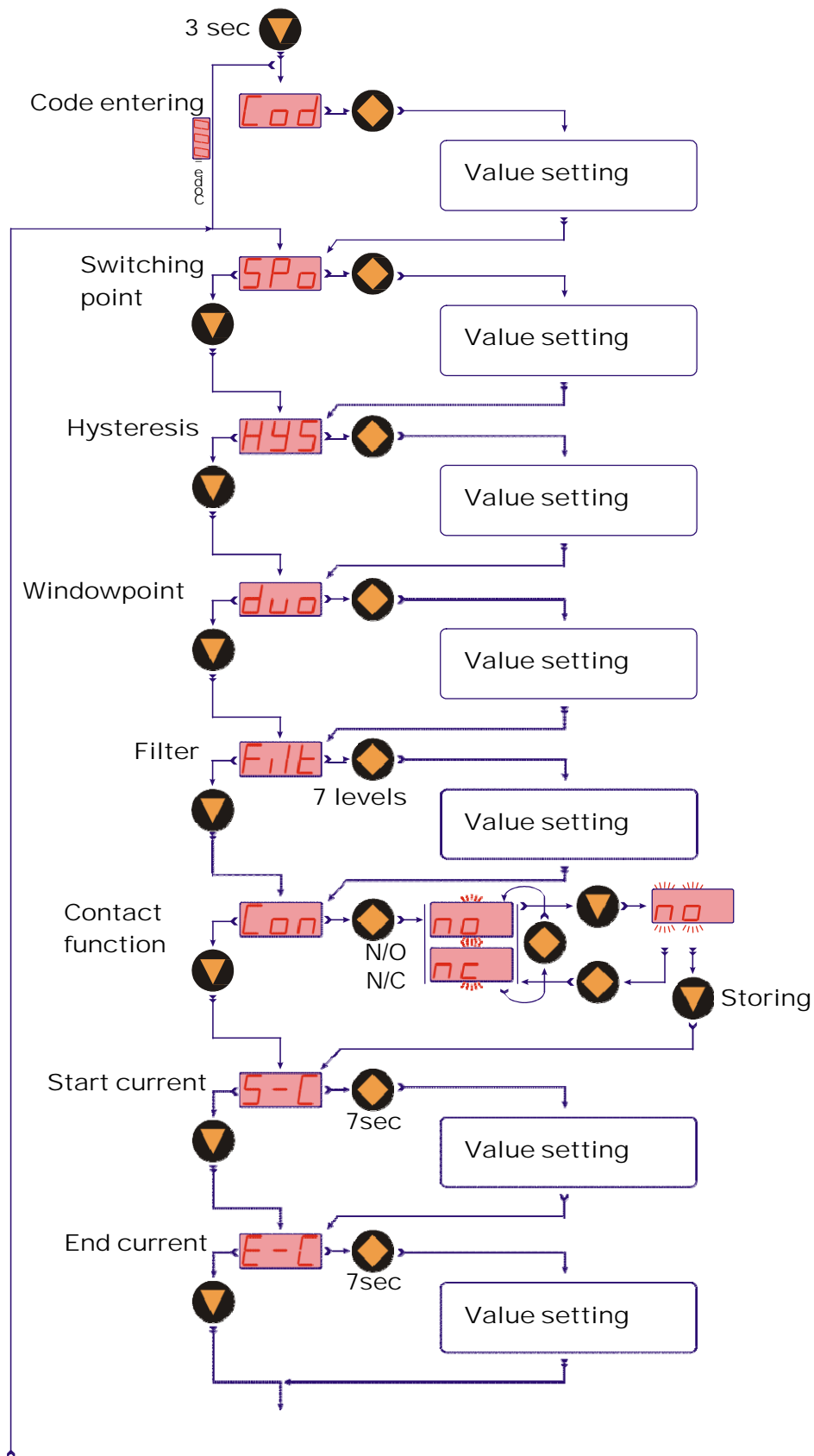


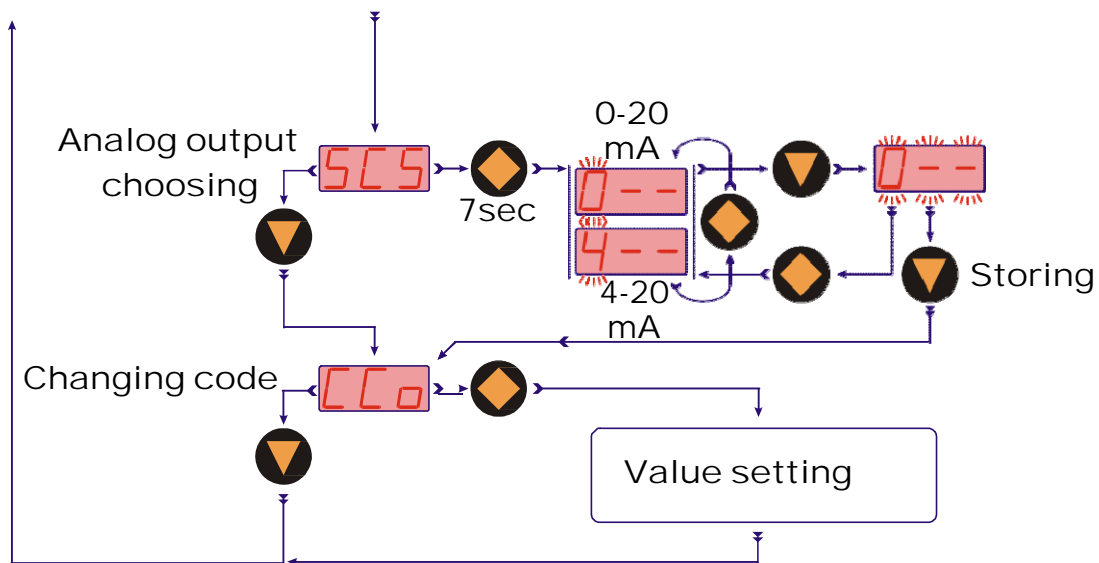
## 8.1.5. Set-up Mode

Compact electronics ..C30...



Compact electronic ..C34..





## 8.1.6. Main Menu Items

### Switching point

The switching point is entered in menu item "**SP<sub>0</sub>, SP<sub>1</sub>, SP<sub>2</sub>**". A value in the range 000 to 999 may be chosen. A decimal point position is also assigned to this value. The position of the decimal point can be set after the first, second or last position (no decimal point). If the indicated value exceeds the set switching point, then the electronics switches and energizes the LED.

If the hysteresis is equal to zero and the window point is de-activated, the electronic switches back whenever the indicated value falls below the switching point.

### Hysteresis

After the switching point, hysteresis can be entered as a negative value in the menu "**HYS**". The default hysteresis value is zero. However, this can lead to confused switching, when the measuring signal fluctuates around the switching point or window point. This problem can be cured by increasing the hysteresis. The hysteresis is based on the switching point and the window point (switching point minus hysteresis; window point plus hysteresis).

Example: switching point 100 l/min; hysteresis: -2.5 l/min

The electronics switches when 100 l/min is exceeded and switches back when the flow rate falls below 97.5 l/min.

### Window point (duo point)

A window point "**duo**" (duo point) can be defined in addition to the switching point. The window point must be greater than the switching point. The measured value can be monitored within a set range by means of the window point and switching point. The switching point marks the lower end of the range of values and the window point the upper end.



If the window point (duo point) is lower than or equal to the switching point, an error message is displayed (Er4), its value is then deleted and thus its function is disabled (applies to window point and switching point setting).

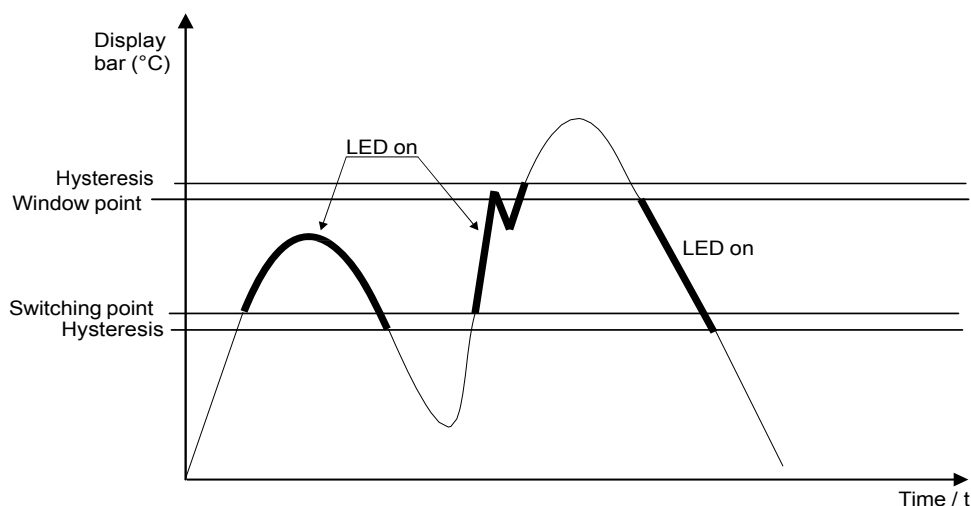
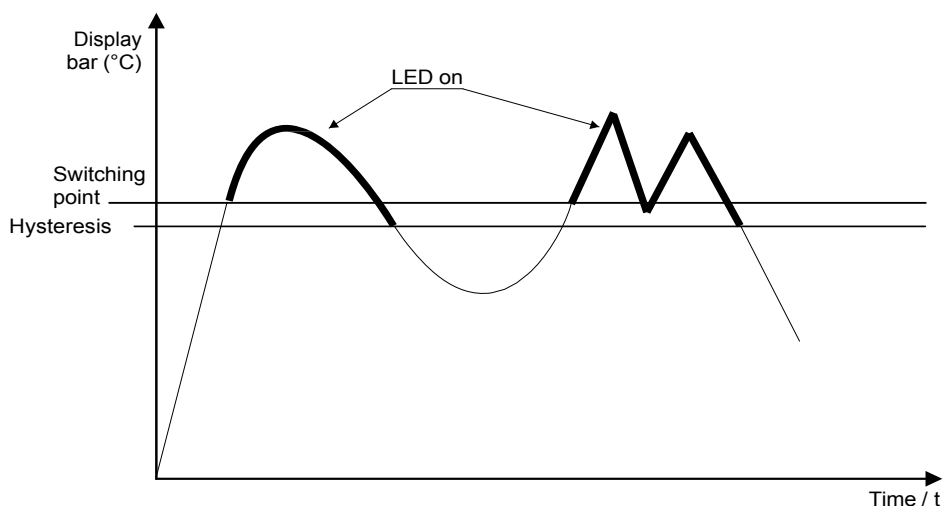
Value setting is similar to switching point setting.

The window point serves to monitor the measured value within a set range.

**Example:** Switching point: 100 l/min; window point: 150 l/min; hysteresis: -1 l/min  
The electronics switches when 100 l/min is exceeded. When the measured value stays within the limits 99 l/min (100-1) and 151 l/min (150+1), then the electronics also remains in the activated switch state (LED on). Should the measured value exceed 151 l/min or drop below 99 l/min, then the electronics switches back.

### Switching performance

The switching performance of the electronics is illustrated in the diagram below. The contact closes (N/O contact) when the switching point is exceeded or when the value drops below the window point. It opens when the window point plus hysteresis is exceeded or when the value drops below the switching point minus hysteresis. The switch state of the electronics is indicated by an **LED**.



## Filter

The filter function "**Filt**" generates the sliding average value from the measured values. The following values are available (see section 8.1.3 Settings):

1 / 2 / 4 / 8 / 16 / 32 / 64

The filter value determines the dynamic behaviour of the indicated value: high values results in a slow display response. The filter is disabled if a filter value of "1" is selected. In other words, the indicated value is equal to the unfiltered measured value.

The integrated step detector responds to a measured-value step change greater than approximately 6.25% of the upper range value. When a measured-value step change is detected, the actual measured value is displayed immediately.

## Contact Model

The function of the transistor switching output is set in menu item "**Con, Co1 or Co2**". The switching function switches from

**no - N/O contact to**  
**nc - N/C to**  
and back.

N/O contact means: contact closes when switching point is exceeded

N/C means: contact opens when switching point is exceeded

## Current output

The current output is selected in menu items

"**S-C**" Start current indicated value < > 0(4) mA

"**E-C**" End current indicated value < > 20 mA

"**SCS**" Start current selection (0-20 mA or 4-20 mA).

The indicated value at which 0(4) mA flow is entered in the menu item Start current. The indicated value at which 20 mA flow is entered in the menu item End current.

## Change Code

The change code option "**CCo**" secures the unit against unauthorised tampering. If the code is different from 000, the user must input the code immediately after entering the adjustment mode.

See Operating instructions supplement for compact electronics with frequency output

## 8.2. Setting ADI Evaluation Electronic

See Operating instructions supplement for ADI evaluation electronic

## 9. Maintenance

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The measuring instrument requires no maintenance if the measured medium is not contaminated. In order to avoid any problems, we recommend that a filter is installed. For example the magnetic filter, model MFR.

Work on the sensor and electronics should only be carried out by the supplier, otherwise the guarantee is nullified.

## 10. Technical Information

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### 10.1. Sensor Data

|                          |  |
|--------------------------|--|
| Measuring accuracy:      | 3% F.S.  |
| Mounting position:       | arbitrary  |
| Process temperature:     | max. 80 °C   |
| Ambient temperature:     | max. 80 °C   |
| Max. operating pressure: | PN 40/20 °C  |
| Protection type:         | IP 65  |
| <b>Materials:</b>        |  |
| Case:                    | aluminium bronze<br>stainless steel 1.4581                   |
| Paddle, spring strip:    | stainless steel 1.4571                                       |
| Calibration nozzles:     | stainless steel 1.4571                                       |
| Gaskets:                 | aluminium bronze design: NBR<br>stainless steel version: FPM |
| Magnet:                  | oxide ceramics   |

### 10.2. Electronics

#### Compact electronic

|                        |  |
|------------------------|--|
| Display:               | 3-segment LED  |
| Analogue output:       | (0)4 - 20 mA scalable, max. 500 Ω                      |
| Transistor output:     | 1 (2) semiconductor PNP or NPN,<br>set at the factory. |
| Contact function:      | N/C / N/O contact programmable                         |
| Setting:               | with 2 buttons   |
| Supply:                | 24 V <sub>DC</sub> ±20%, 3-wire technology             |
| Electrical connection: | plug connector M12x1                                   |

#### ADI-Evaluation Electronic

|                  |  |
|------------------|--|
| Display:         | combined bargraph- and digital-<br>display               |
| Analogue output: | (0)4...20 mA, 0-10 V,<br>scalable pulse output 0-1000 Hz |

# DPT

|                        |  |
|------------------------|--|
| 2 switching outputs:   | 2 relays /changeover contact<br>max. 230 V <sub>AC</sub> ,<br>5 A ohm resistive load<br>max. 30 V <sub>DC</sub> /5 A |
| Option:                | 2 optocoupler<br>max. 35 V <sub>DC</sub> , I = 10-50 mA  |
| Adjustment:            | via 3 keys   |
| Power supply .:        | 230/115/48/24 V <sub>AC</sub> , 24 V <sub>DC</sub>   |
| Electrical connection: | pluggable terminal block via cable gland   |

For further technical information ADI-Evaluation electronic see brochure Z2.

## 11. Order Codes

Example: DPT 1105H G3 B000

| Measuring range<br>l/min.<br>Water | Type                         |                            | Connection  |               | Electronics              |   |  |   |
|------------------------------------|------------------------------|----------------------------|-------------|---------------|--------------------------|---|--|---|
|                                    | Material aluminium bronze    | Material stainless steel   | Standard    | Special       | Display                  | Supply  | Output   | Contacts  |
| 5 - 30<br>12 - 50                  | DPT 1105H...<br>DPT 1110H... | DPT 1205H..<br>DPT 1210H.. | G3= G 3/8   | N3= 3/8 NPT   | ADI electronic indicator |   |  |   |
| 5.5 - 30<br>12 - 70                | DPT 1115H...<br>DPT 1120H... | DPT 1215H..<br>DPT 1220H.. | G4= G 1/2   | N4= 1/2 NPT   | K= Bargr./ Digital       | 0= 230 V <sub>AC</sub><br>4= 115 V <sub>AC</sub><br>2= 24 V <sub>AC</sub><br>1= 48 V <sub>AC</sub><br>3= 24 V <sub>DC</sub> | 0= without<br>F= scalable frequency*<br>1= 0 - 10 V<br>2= 0 - 20 mA<br>4= 4 - 20 mA  | 0= without<br>2= 2 change-over cont.<br>6= 2 Optocouplers |
| 6.5 - 55<br>15 - 85                | DPT 1125H...<br>DPT 1130H... | DPT 1225H..<br>DPT 1230H.. | G5= G 3/4   | N5= 3/4 NPT   |                          |   |  |   |
| 15 - 65<br>70 - 130                | DPT 1135H...<br>DPT 1140H... | DPT 1235H..<br>DPT 1240H.. | G6= G 1     | N6= 1 NPT     |                          |   |  |   |
| 50 - 170<br>100 - 230              | DPT 1145H...<br>DPT 1150H... | DPT 1245H..<br>DPT 1250H.. | G8= G 1 1/2 | N8= 1 1/2 NPT | Compact electronics      |   |  |   |
| 80 - 450<br>150 - 800              | DPT 1155H...<br>DPT 1160H... | DPT 1255H..<br>DPT 1260H.. | G9= G 2     | N9= 2 NPT     | C= Digital               | 3= 24 V <sub>DC</sub>   | Output/ contacts   |   |
| 650 - 1500<br>850 - 1900           | DPT 1165H...<br>DPT 1170H... | DPT 1265H..<br>DPT 1270H.. | GB= G 3     | NB= 3 NPT     |                          |   | 0R= 2 x Open Collector, PNP<br>0M= 2 x Open Collector, NPN<br>4P= 4 - 20 mA, 1 x Open Coll. PNP<br>4N= 4 - 20 mA, 1 x Open Coll. NPN |   |

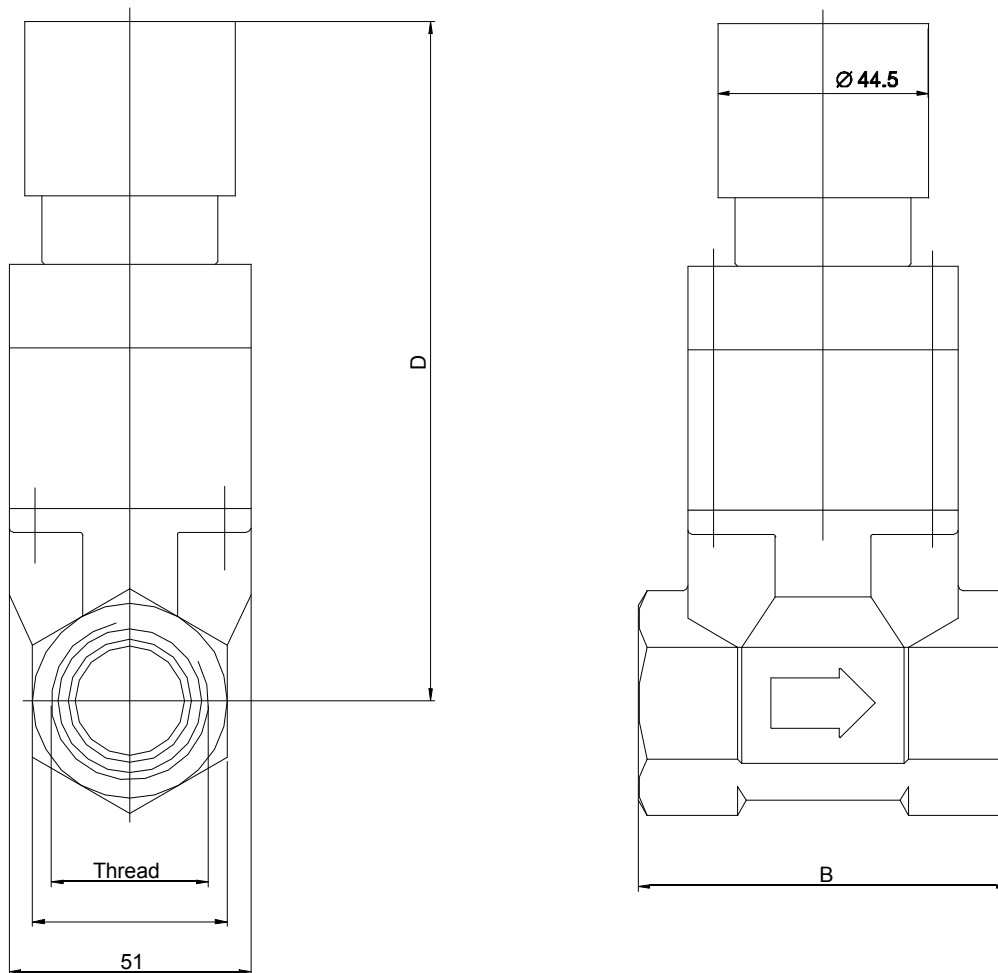
\* only for ADI-K

Please mention in order:  
Flow direction (left → right or right → left)



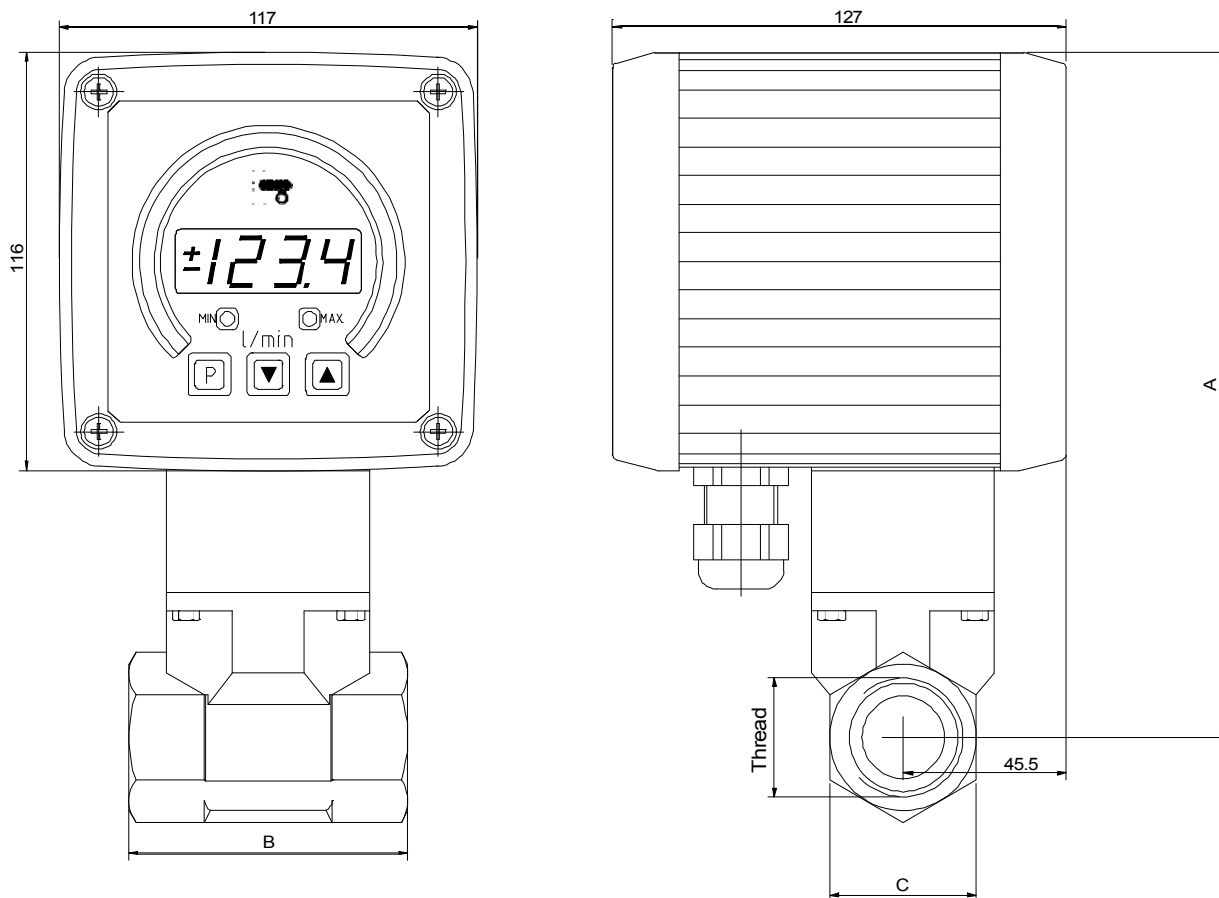
## 12. Dimensions

### DPT...C with compact electronics



| Screw thread | A   | B   | C               | D   |
|--------------|-----|-----|-----------------|-----|
| G 3/8        | 186 | 78  | Wrench size 27  | 138 |
| G 1/2        | 186 | 78  | Wrench size 27  | 138 |
| G 3/4        | 187 | 78  | Wrench size 41  | 139 |
| G1           | 187 | 78  | Wrench size 41  | 139 |
| G 1 1/2      | 203 | 78  | Wrench size 55  | 155 |
| G 2          | 205 | 81  | Wrench size 70  | 157 |
| G3           | 222 | 106 | Wrench size 100 | 174 |

## DPT...K with ADI evaluation electronic



| Screw thread | A   | B   | C               |
|--------------|-----|-----|-----------------|
| G 3/8        | 186 | 78  | Wrench size 27  |
| G 1/2        | 186 | 78  | Wrench size 27  |
| G 3/4        | 187 | 78  | Wrench size 41  |
| G1           | 187 | 78  | Wrench size 41  |
| G 1 1/2      | 203 | 78  | Wrench size 55  |
| G 2          | 205 | 81  | Wrench size 70  |
| G3           | 222 | 106 | Wrench size 100 |

## 13. EU Declaration of Conformance

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

**Torsion Paddle Flow Meter / Monitor      model: DPT -...**

to which this declaration relates is in conformity with the standards noted below:

**EN 61000-6-4:2011**

Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environment

**EN 61000-6-2:2006**

Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

**EN 61010-1:2010**

Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

**EN 60529:2014**

Degrees of protection provided by enclosures (IP Code)

**EN 50581:2012**

Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

in accordance with the general requirements of the guideline

**2014/35/EU                      Low Voltage Directive**

**2011/65/EU                      RoHS (category 9)**

**for DPT, 1 ½" –3"**

**2014/68/EU                      PED**

- Category III (IV) Diagram 1, vessel, group 1 dangerous fluids
- Module D, marking CE0575
- Notified body: DNV GL
- Certificate No. PEDD0000002



H. Peters  
General Manager



M. Wenzel  
Proxy Holder

Hofheim, 11. Jan. 2018