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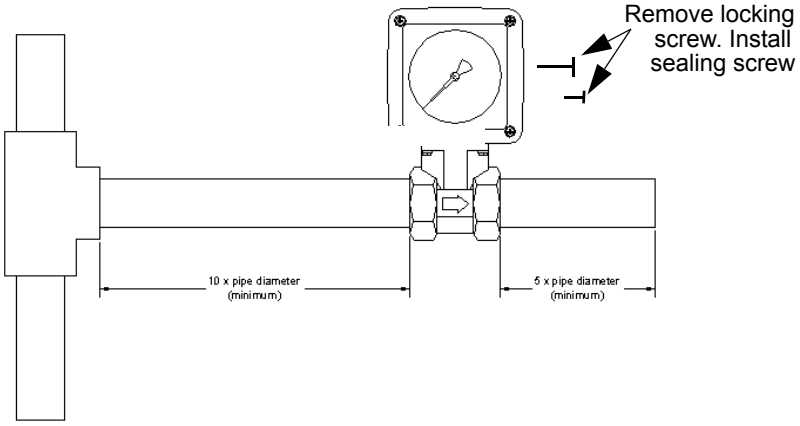
KOBOLD Series RCD Installation and Operating Instructions

Removal of Indicator Locking Screw

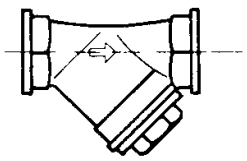
Important: The RCD arrives from the factory with an indicator locking screw installed on the right side of the indicator housing. The screw protects the indicator mechanism during shipping and must be removed prior to operation. A sealing screw (attached to the indicator housing) must be installed in its place.



Installation in Piping

In order to obtain a fully developed flow profile through the instrument, the pipe run should be straight and should not contain any elbows, bends or fittings. A free pipe run of a minimum of 10 times the pipe bore upstream and 5 times downstream of the meter is recommended. See diagram above

Filtration



The meter can be installed in any orientation, but should not be installed with the diaphragm housing at the bottom of the pipe, since the housing may then function as a collection point for dirt. If there is a risk that the liquid may contain dirt particles which are larger than the pressure sensing ports, a filter must be installed in the system upstream of the meter.

Prevention of Damage from Water Hammer

Undoubtedly, the majority of failures which occur in mechanical flowmeters is caused by water hammer. Water hammer occurs when flow is quickly started or stopped in a fluid system. When flow is quickly initiated, the lack of back pressure in the system. which was originally at rest, results in a brief flow transient which may exceed the measuring device's range by several times. When flow is quickly secured, stored momentum in the fluid which was originally moving and is suddenly brought to a halt causes a pressure surge which can exceed the normal operating pressure by several times. These flow and pressure transients can result in personal injury and permanent damage to a flowmeter's components, i.e. float, bellows etc., or at a minimum can throw the meter out of calibration.

During operation there are a number of situations to avoid which will minimize flowmeter damage due to water hammer:

1. When installing the RCD, ensure that the piping will stay filled with liquid even after the system is secured. Install isolation and control valves downstream of the flowmeter. Use a check valve upstream of the flowmeter if necessary.

2. Flow should be introduced slowly into the system. This will allow back pressure to develop in the system, thereby minimizing the initial flow transient which causes water hammer.

3. System flow should also be secured slowly to minimize pressure surges which are caused by a sharp reduction in fluid velocity.

4. If the flowmeter is being used in a compressed gas system, pressure should be slowly increased to normal operating pressure.

Correction Factors for Compressed Gas Service

When this flowmeter is ordered for compressed gas applications, it will arrive factory calibrated to provide an accurate, direct indication for the specific type of gas to be metered, operating pressure, and operating temperature. The conditions to which the unit was factory calibrated are stamped on the indicating scale. Operation of this flowmeter at conditions other than those to which the unit was originally calibrated will introduce an error into the indicated flow reading.

The good news is that this error can be predicted and the indicated flow can be corrected to obtain the true gas flow by applying a correction factor to the indicated reading:

$$F_{True} = F_{Indicated} \times \sqrt{\frac{Sc}{Sa} \times \frac{Pa + 14.7}{Pc + 14.7} \times \frac{Tc + 460}{Ta + 460}}$$

Where:

F_{True}	= True (corrected) gas flow rate
$F_{Indicated}$	= Indicated meter reading
Sa	= Actual specific gravity of the fluid being measured
Sc	= Specific gravity for which the meter is calibrated
Pa	= Actual gas pressure at the meter outlet in PSIG
Pc	= Calibrated gas pressure marked on the meter indicator
Tc	= Calibrated gas temperature marked on the meter indicator
Ta	= Actual gas temperature at the meter in °F

Arrival of Damaged Goods

Your instrument was inspected prior to shipment and found to be defect-free. If damage is visible on the unit, we advise that you carefully inspect the packing in which it was delivered. If damage is visible, notify your local carrier at once. The carrier is liable for a replacement under these circumstances. If your claim is refused, please contact KOBOLD Instruments.

Need Help With Your Flowmeter?

Call one of our friendly engineers at (412)-788-2830

KOBOLD Compact Electronics

User Instructions

KOBOLD Instruments Inc. 1801 Parkway View Drive Pittsburgh PA 15205

Phone (412) 788-2830 • Fax (412)-788-4890 • www.koboldusa.com

Manual-compactelectronics_2262002

Table Of Contents

List of Diagrams

KOBOLD Compact Electronics
User Instructions

CAUTION: For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.

1.0 General

The KOBOLD compact series electronics is a versatile, modular instrument package which is integrated into numerous KOBOLD flow, pressure and temperature products. The compact electronics features a 3 digit LED display of the measured value. In addition to the display, a 4-20 mA tramsmitter and open collector transistor switch or dual open collector transistor switches are available depending on the model supplied. The 4-20 mA transmitter has a programmable zero and span. The switches have programmable setpoint, hysteresis, and switch logic (N/O or N/C). When the compact electronics is conbined with KOBOLD paddle, turbine or gear type flow sensors, the switch can also be configured as a frequency transmitter. In addition to these functions, the compact electronics also has programmable dampening and lockout code. All parameters are set via a keypad accessed menu.

2.0 Specifications

Input Power:	24 VDC ±20%, 80 mA max.
Electrical Connection:	Micro-DC plug, 5 pin male
Display Type:	3 digit LED 0.5” characters
Housing:	304 Stainless Steel
Setup Mode:	Menu-driven via keypad on front face
Analog outptut:	0/4-20 mA into a Max. loop load of 500 ohms
Switches:	NPN or PNP open collector based on model code max. 300 mA, short circuit protected
Electrical Protection:	NEMA 4X / IP65

2.1 Model Codes

The compact electronics are specified as a portion of the model number of the flow, pressure, or temperature device upon which it is installed. Descriptions of the available compact electronics are as follows

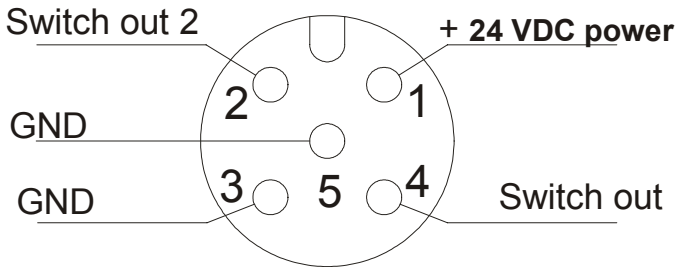
C34P	4-20 mA transmitter + 1 PNP switch
C34N	4-20 mA transmitter + 1 NPN switch
C30R	2 PNP switches
C30M	2 NPN switches

An example of a KOBOLD part number with a compact electronics suffix is as follows:

RCD-1125GN6**C34P**

3.0 Electrical Wiring

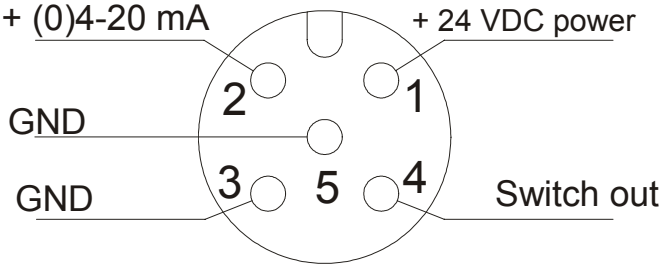
Micro-DC Plug Pinout for electronic C30R or C30M (dual switches)



Switches are PNP or NPN open collectors based on model code
C30R = PNP switches
C30M = NPN switches

Note: the DC ground at pins 3 and 5 are not isolated they can be interchanged and used in conjunction with either switch, or a single ground may be used for both switches

Micro-DC Plug Pinout for electronic C34P or C34N (4-20 mA + switch)



Switch 1 is PNP or NPN open collector based on model code
C34P = PNP switch
C34N = NPN switcH

Note: the DC ground at pins 3 and 5 are not isolated they can be interchanged and used in conjunction with the switch or 4-20 mA output, or a single ground may be used for both outputs

Caution: The 4-20 mA output (pin 2) is an active output. Connecting a voltage source to this pin may damage the transmitter output. The output should only be connected to a device with a passive current input.

Color Codes for Mating Micro-DC Plugs with Cable (sold separately)

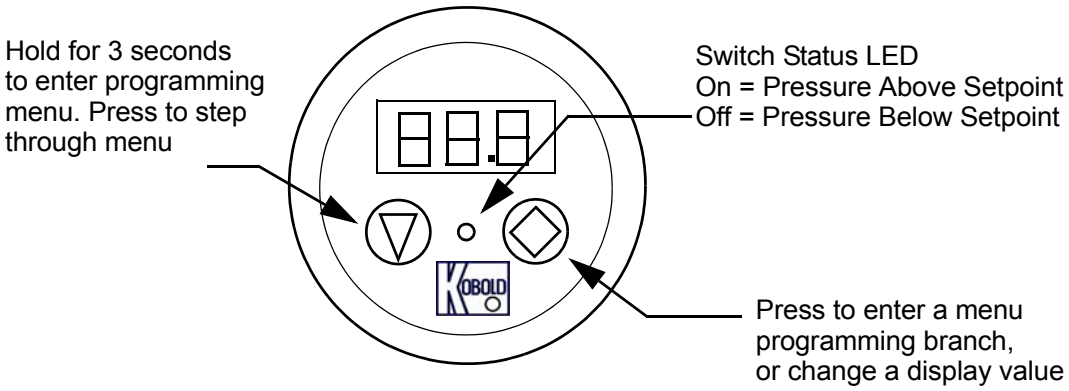
4 pin plug

Brown = pin 1
White = pin 2
Blue = pin 3
Black = pin 4

5 pin plug

Brown = pin 1
White = pin 2
Blue = pin 3
Black = pin 4
Gray = pin 5

4.0 Operation



4.1 Programming Functions

The compact electronics is programmed via membrane push-buttons on the faceplate of the switch as shown in the following figure.

During Normal Operation

: Press for 3 Sec to Enter Setup Mode

: Display Switch Point/ Window Point

During Setup Mode

: Next Step

: Change Values

Press 3 sec

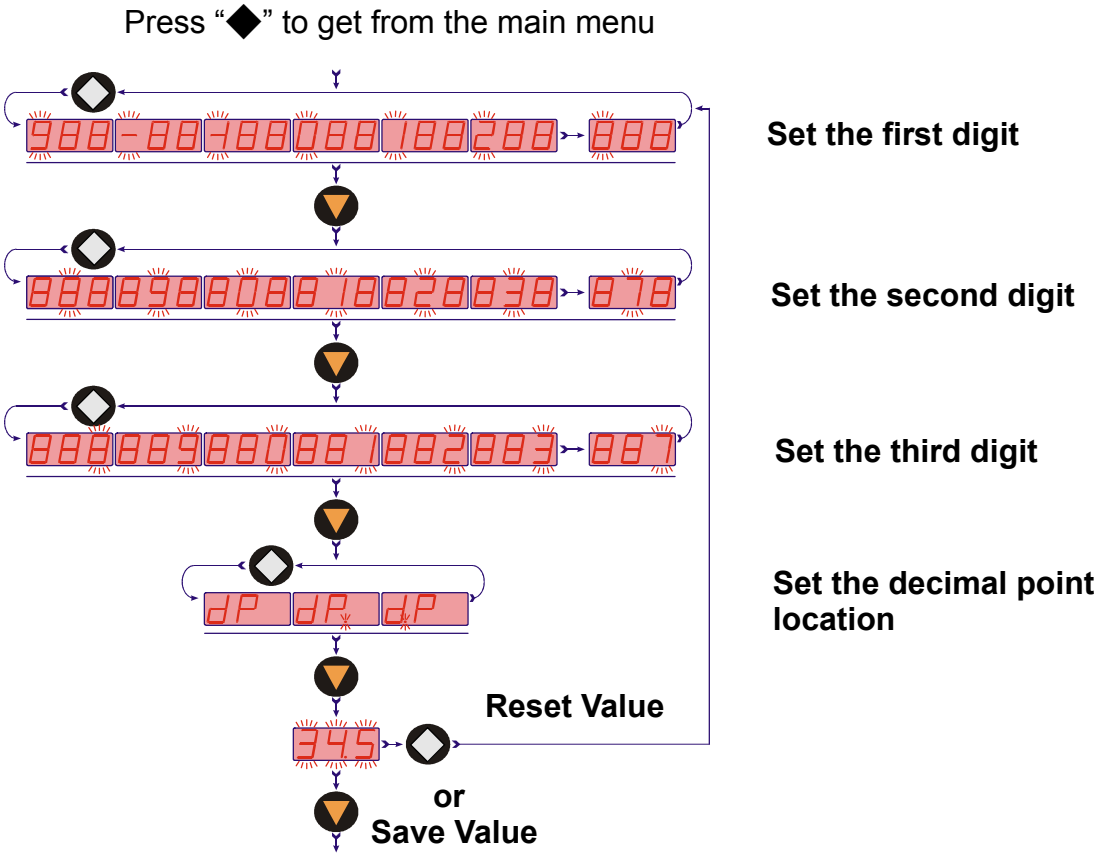
Or for 20 sec
Press no buttons

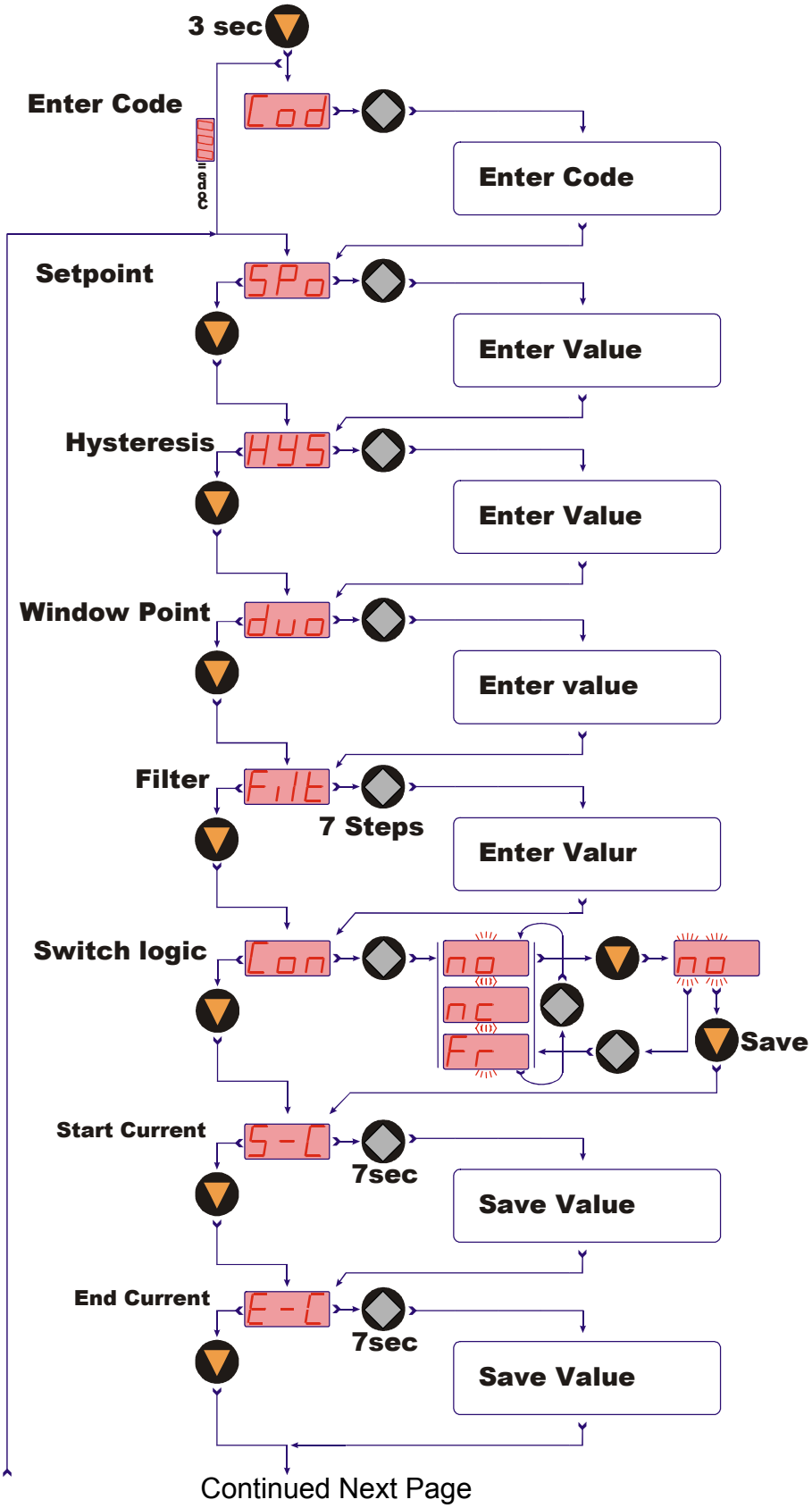
Exit Setup

4.1.1 Changing Values in Setup Mode

When in the Setup Mode the actual values of setpoint, hysteresis, switch logic and other functions are adjusted as required by the user. From the main menu (e.g. switching point "**SPo**"), press the "◆" button to adjust that function's value. The following diagram shows the sequence of steps required to change a value.

Diagram 4.1 Changing Item Values in Setup Mode





Continued Next Page

C34P & C34N Programming (continued)

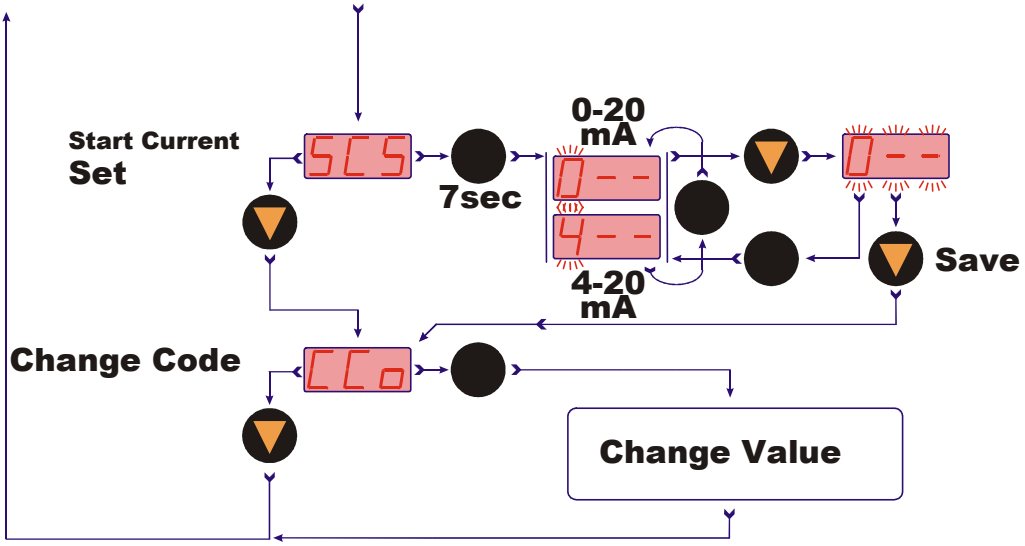
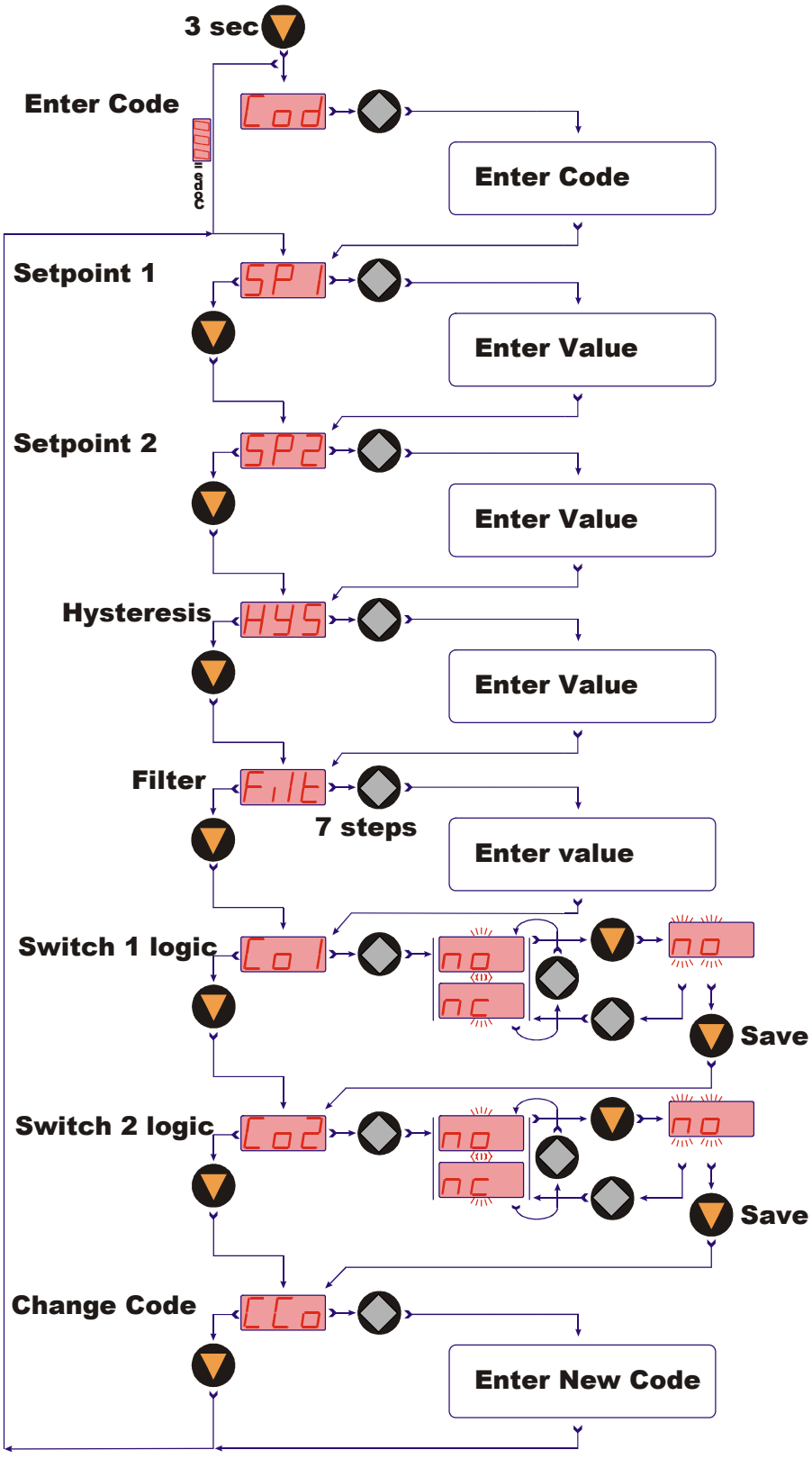


Diagram 4.3 Programming Flowchart for Versions with Two Switches (C30R or C30M)



4.2 Programming Menu Item Descriptions

The programming flowcharts for both available compact electronic versions are shown in Diagrams 4.2 and 4.3. Below are detailed descriptions of each menu item for both versions. Any given item may be applicable to only one, or both versions. The series codes for which each menu item applies is provided in parenthesis in the title.

After the ▼ Button is depressed for three seconds to enter the setup mode, and the lockout code is entered (if lockout is enabled), the programming menu is accessed. Diagrams 4.2 and 4.3 provide a flowchart of the programming menu. Section 4.1.1 and Diagram 4.1 provide details on how to change the value of each menu item parameter. The following is a detailed description of each menu item.

4.2.1 **Cod** - Code (C34P, C34N, C30R, C30M)

If the lockout feature was enabled during a prior setup, the user code which was selected at that time must be entered. Section 4.1.1 ‘Changing Values in Setup Mode’ on page 4 provides steps required to enter the value.

4.2.2 **SPo** - Switchpoint (C34P, C34N)

For versions with transmitter and 1 switch, this menu item allows the user to input the desired switching point. Any number between -199 and 999 can be entered. Additionally, a decimal point can be added if desired. Section 4.1.1 ‘Changing Values in Setup Mode’ on page 4 provides steps required to change a value. If the measured value exceeds the switchpoint value, the switch will activate.

4.2.3 **SP1** - Switchpoint, Switch 1 (C30R, C30M)

For versions with two switches, this menu item allows the user to input the desired switching point of switch 1. Any number between -199 and 999 can be entered. Additionally, a decimal point can be added if desired. Section 4.1.1 ‘Changing Values in Setup Mode’ on page 4 provides steps required to change a value. If the measured pressure exceeds the switchpoint value, the switch will activate.

4.2.4 **SP2** - Switchpoint, Switch 2 (C30R, C30M)

For versions with two switches, this menu item allows the user to input the desired switching point of switch 2. Any number between -199 and 999 can be entered. Additionally, a decimal point can be added if desired. Section 4.1.1 ‘Changing Values in Setup Mode’ on page 4 provides steps required to change a value. If the measured value exceeds the switchpoint value, the switch will activate.

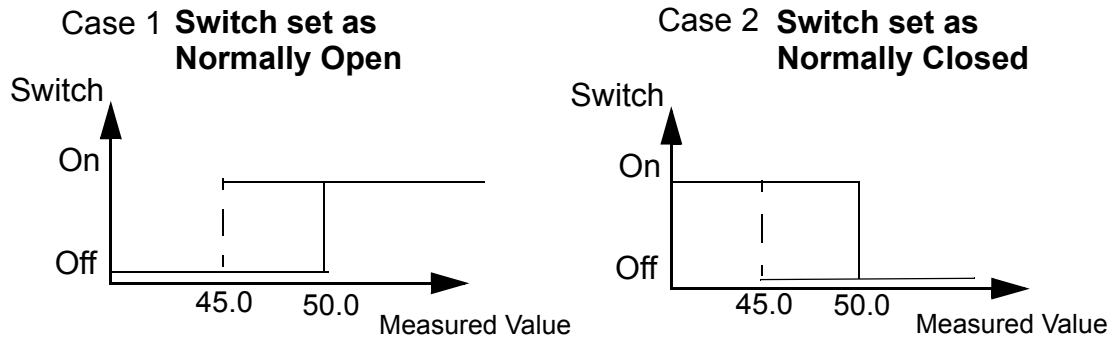
4.2.5 **HYS** - Hysteresis (C34P, C34N, C30R, C30M)

This menu item allows the user to set a deadband value below the switchpoint such that the switch will not de-activate until the measured value falls below the setpoint minus the hysteresis value. The hysteresis value will always be a negative value and can be set as any number between 0 and -199. Additionally, a decimal point can be added if desired. For versions C30R and C30M which have two switches, the single hysteresis value applies to both switchpoints. Section 4.1.1 ‘Changing Values in Setup Mode’ on page 4 provides steps required to change a value.

See examples on next page

Example: Switchpoint Value (**SPo, SP 1 or SP2**) is set at 50.0

Hysteresis Value (**HYS**) is set at -5



4.2.6 **duo** - Window Point (C34P, C34N)

For versions which have a transmitter and one switch, this menu item allows the user to set a value above the switchpoint such that a band or window can be monitored.

Note: The **duo** value must be a positive number and it must be a larger value than the **SPo** value. If it is not, an error message is displayed. If the error occurs both the SPo value and the duo values are cleared and must be re-entered.

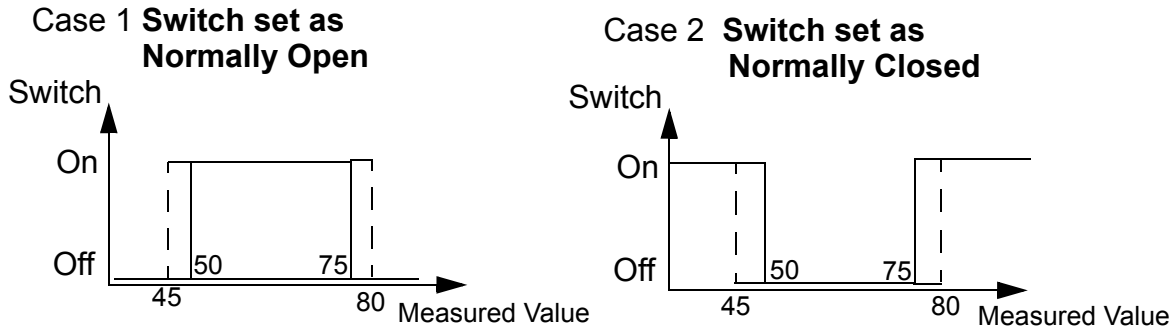
Additionally, a decimal point can be added if desired. Section 4.1.1 ‘Changing Values in Setup Mode’ on page 4 provides steps required to change a value. When the measured value is above the switchpoint, the switch will activate. The switch will de-activate when the measured value either increases to above the window point value or decreases to below the switchpoint value. The window point can also used with the hysteresis function if desired. The following example illustrates.

Example: Switchpoint Value (**SPo**) is set at 50

Window Point (**duo**) value is set at 75

Hysteresis Value (**HYS**) is set at -5

The switch will activate (LED on) when measured value is above 50.0 and will de-activete (LED off) when measured value is above 80 (75 + 5) or below 45 (50 - 5).



4.2.7 **Filt** - Filtering (C34P, C34N, C30R, C30M)

This menu item allows the user to average the measured output over 1, 2, 4, 8, 16, 32 or 64 samples. Section 4.1.1 'Changing Values in Setup Mode' on page 4 provides steps required to change a value. Adding filtering provides a more stable display and prevents false switching for systems in which pulsations are a problem. The larger the number of samples the more stable the display and switch. A **Filt** value of "1" shuts off the filtering.

When filtering is being used, the compact electronics employs an integrated overshoot function which detects any overshoot above 6.25% and processes that measured value without filtering. This feature allows the switch to differentiate between pulsations and actual system flow changes and process the change signals without filtering. This greatly enhances the switch's response time when the filtering function is being used.

4.2.8 **Con** - Switch Logic (C34P, C34N)

For versions with transmitter and 1 switch, This menu item allows the user to setup the transistor switch output as either normally closed (**nc**) switch, a normally open (**no**) switch or a frequency versus flow transmitter (**Fr**) (note: frequency transmitter choice not available on RCD or DPT series flowmeters):

Normally Open: Switch activates when measured value above switchpoint

Normally Closed: Switch activates when measured value below switchpoint

Frequency Transmitter: Switch acts as a frequency output flow transmitter

4.2.9 **Co 1** - Switch Logic for Switch One (C30R, C30M)

For versions with 2 switches, This menu item allows the user to select the output switch logic for switch 1 as either normally closed (**nc**) switch, normally open (**no**) switch or a frequency versus flow transmitter **(Fr)** see 4.2.8 for more details.

4.2.10 **Co 2** - Switch Logic for Switch Two (C30R, C30M)

For versions with 2 switches, this menu item allows the user to select the output switch logic for switch 2 as either normally closed (**nc**), or normally open (**no**).

4.2.11 **S - C** - Start Current (C34P, C34N)

For versions with transmitters, this menu item allows the user to input the measured value which corresponds to the current transmitter's zero point (4 mA or 0 mA point). Typically this value is zero (i.e. zero flow = 4 mA). Any number between -199 and 999 within the measuring range of the devise can be entered. Additionally, a decimal point can be added if desired. This value is preset at the factory to be zero flow = 4mA. To perform a Start Current adjustment, if desired, use the ▼ button to get to the **S - C** menu item. Then press the ◆ button and hold down for 7 seconds to enter the **S - C** branch. After entering, Section 4.1.1 'Changing Values in Setup Mode' on page 4 provides steps required to change a value. The transmitter output will remain at its zero point (4 mA or 0 mA) until the system pressure rises above the Start Current setting.

4.2.12 **E - C** - End Current (C34P, C34N)

For versions with transmitters, this menu item allows the user to input the measured value which corresponds to the current transmitter's maximum span (20mA point). The device is preset at the factory with this value set to the transmitters full scale measuring range. Any number between -199 and 999 within the measuring range of the device can be entered. Additionally, a decimal point can be added if desired. To perform the End Current adjustment, if desired, use the ▼ button to get to the **E - C** menu item. Then press the ◆ button and hold down for 7 seconds to enter the **E - C** branch. After entering, Section 4.1.1 'Changing Values in Setup Mode' on page 4 provides steps required to change a value.

4.2.13 **SCS** - Start Current Select (C34P, C34N)

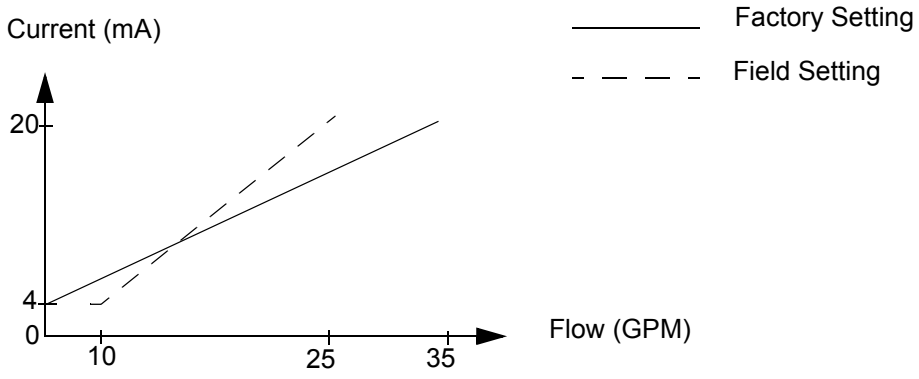
For versions with transmitters, this menu item allows the user to select a transmitter zero point of either 0 mA or 4 mA. A zero point of 4 mA is preset at the factory. To change this setting, if desired, use the ▼ button to get to the **SCS** menu item. Then press the ◆ button and hold down for 7 seconds to enter the **SCS** branch. Use the ◆ button to change the value. Use the ▼ button to accept the value. Use the ▼ button to proceed through the programming menu.

See example next page

Example: A flowmeter with compact electronics is purchased with a measuring range of 5-35 GPM (The Max. measuring range can be determined by the model number code, or by applying power to the device. When power is first applied the Max. measuring range flashes on the display for 3 seconds.) From the factory, the Start Current **(S - C)** value is preset at 00.0 and the End Current **(E - C)** value is preset at 35.0. The Start Current Select **(SCS)** value is set at 4 for 4 mA.

It is desired to field program the transmitter's output such that the zero point is at 10 GPM (**S - C** adjusted to 10.0) and the span point is at 25 GPM. (**E - C** adjusted to 25.0). The transmitter output Vs. flow for the factory settings and the field modified settings are shown in Diagram 4.4

Figure 4.4 Start Current and End Current Example



4.2.14 **CCo** - Change Code (C34P, C34N, C30R, C30M)

This menu item allows the user to set a pass code which will lock out the programming functions. This protects the device from un-authorized access to the setup menu. Section 4.1.1 'Changing Values in Setup Mode' on page 4 provides steps required to change a value. The code can be any value from 000 to 999. A code of 000 disables the lockout function. A value other than 000 will require entry of that code to access the setup menu.

CAUTION

PLEASE READ THE FOLLOWING WARNINGS BEFORE ATTEMPTING INSTALLATION OF YOUR NEW DEVICE. FAILURE TO HEED THE INFORMATION HEREIN MAY RESULT IN EQUIPMENT FAILURE AND POSSIBLE SUBSEQUENT PERSONAL INJURY.

- **User's Responsibility for Safety:** KOBOLD manufactures a wide range of process sensors and technologies. While each of these technologies are designed to operate in a wide variety of applications, it is the user's responsibility to select a technology that is appropriate for the application, to install it properly, to perform tests of the installed system, and to maintain all components. The failure to do so could result in property damage or serious injury.
- **Wiring and Electrical:** Section 2.0, Specifications and Section 3.0, Electrical Connections, provide the voltage and current limitations and the wiring for the various sensor types. The sensor electrical ratings should never be exceeded. Electrical wiring of the sensor should be performed in accordance with all applicable national, state and local codes.
- **Temperature and Pressure:** Section 2.0, Specifications, provides the temperature and pressure limits for each model. Operation outside these limitations will cause damage to the unit and can potentially cause personal injury. Fluid should never be allowed to freeze inside the sensor.
- **Material Compatibility:** Make sure that the model which you have selected is chemically compatible with the application liquids. While the meter is liquid and spray resistant when installed properly, it is not designed to be immersed.
- **Flammable, Explosive and Hazardous Applications:** The compact electronics series is not an intrinsically safe or explosion proof design. They should not be used in installations in which an instrinsically safe or explosion proof design is required.
- **Make a Fail-safe System:** Design a fail-safe system that accommodates the possibility of device or power failure. In critical applications, KOBOLD recommends the use of redundant backup systems and alarms in addition to the primary system.

Operating Instruction

for
Universal Indicating Unit

Norm signals 0/4-20 mA, 0-10 VDC

Model: ADI-1V... 96x96 mm

Identification

Options – break-down ordering code:

	A	D	I-	1	V	0	0	0	2	0	0
Standard type ADI											
Bargraph and Digital display, red											
Bargraph 55 points 270°, digital display 5-digit, 14 mm				1							
Type of display											
Voltage-/current input 0-10 VDC / 0/4-20 mA					V						
Power supply											
100-240 VAC +/- 10% (50-60Hz) / DC						0					
10-40 VDC / 18-30 VAC 50/60 Hz						3					
Analogue output											
without							0				
0-10 VDC, 0/4-20 mA, 16 bit reversible							4				
Sensor supply											
without								0			
5 VDC / 20 mA								U			
12 VDC / 50 mA, incl. digital input								V			
24 VDC / 50 mA, incl. digital input								W			
Setpoints											
2 relay outputs									2		
Housing											
Panel mounting housing										0	
Field housing										F	
Field housing with wall mounting finally rotatable										S	
Field housing with pipe mounting										R	
Special											
without											0
Special please specify in clear text											Y

Contents

1. Brief description

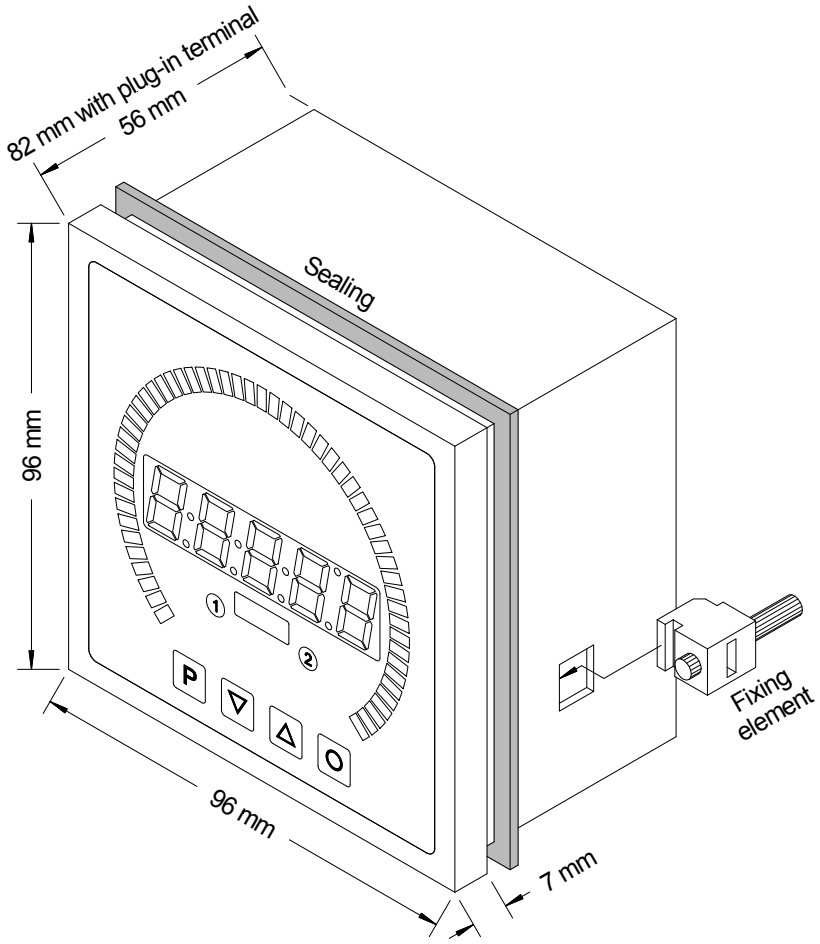
The panel meter instrument **ADI-1V** is a 5-digit digital display with a 55 points bargraph display and two galvanic insulated setpoints; designed for direct current/direct voltage signals. The configuration happens via four keys at the front. The integrated programming interlock prevents unrequested changes of parameters and can be unlocked again with an individual code. Optional the following functions are available: a supply for the sensor, a digital input for triggering of Hold (Tara), two analog outputs and interfaces for further evaluating in the unit. The electrical connection is done via plug-in terminals on the back side.
Selectable functions like e.g. the recall of the min/max-value, an averaging of the measuring signals, a nominal presetting or setpoint presetting, a direct threshold value regulation during operation mode and further measuring setpoints for linearisation, complete the modern device concept.

Technical features:

- red display of -19999…99999 digits
- red 55 points bargraph
- adjustable bar or dot operation or operation with permanent display of center point
- min/max memory
- 30 additional adjustable setpoints
- display flashing at threshold value exceedance/undercut
- zero-key for triggering of HOLD, TARA
- permanent min/max-value recording
- volume metering (totalisator)
- mathematical functions like reciprocal value, square root, squaring or rounding
- setpoint generator
- sliding averaging
- brightness control
- programming interlock via access code
- protection class IP65 at the front
- plug-in screw terminal
- 2 relay outputs (changer)
- optional: sensor supply and digital input
- optional: analog output

2.1 Mounting panel housing

Please read the *Safety advice* on *page 37* before installation and keep this user manual for future reference.



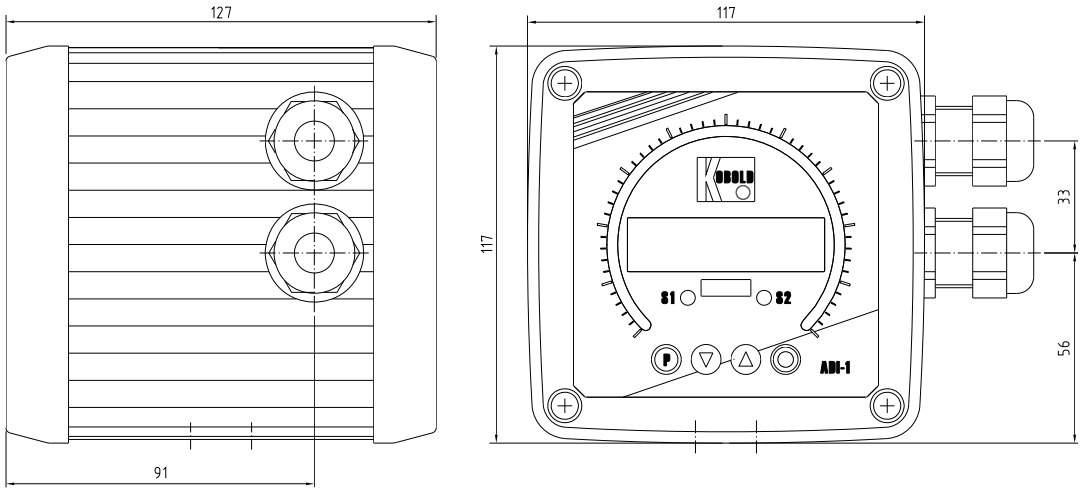
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

CAUTION! The torque should not exceed 0.1 Nm!

Please state you favorite dimension symbol in your order, they can not be exchanged afterwards!

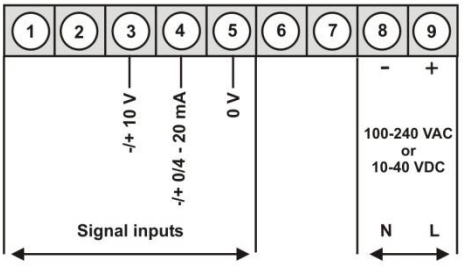
2.2 Mounting field housing

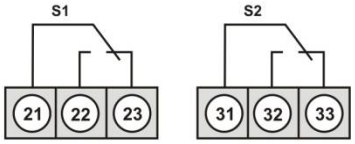
For the assembling of ADI-1 field housing please use the M4 screws. Optionally the housing can be delivered with wall mounting or pipe mounting. For the electrically connection please pull the housing lead back.



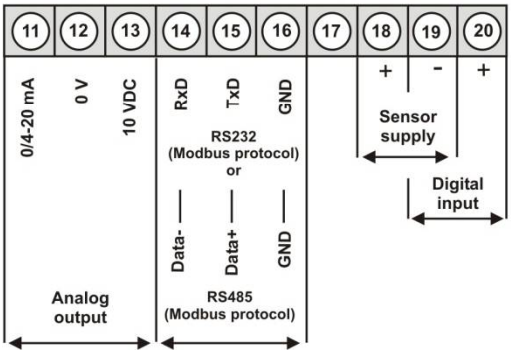
3. Electrical connection

Model ADI-1V000200 with supply of 100-240 VAC
Model ADI-1V300200 with supply of 10-40 VDC





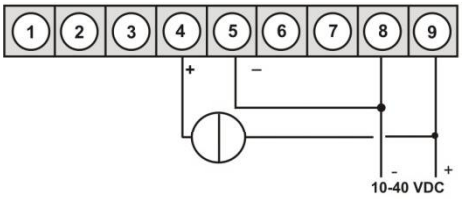
Options:



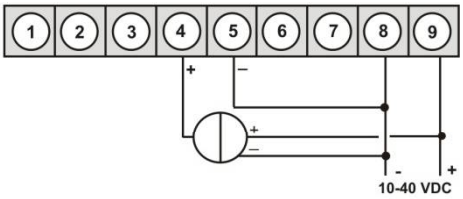
Connection examples

ADI-1V devices with current input / voltage input

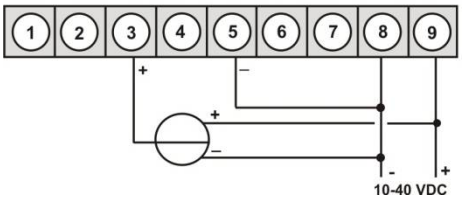
ADI-1V devices in combination with a 2-wire-sensor 4-20 mA



ADI-1V devices in combination with a 3-wire-sensor 0/4-20 mA

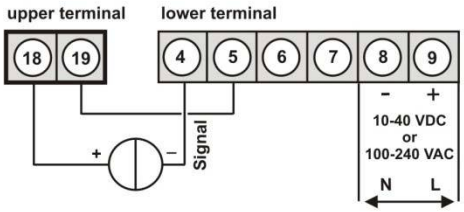


ADI-1V devices in combination with a 3-wire-sensor 0-10 V

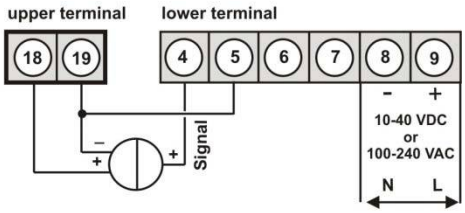


ADI-1V -devices with current input / voltage input and sensor supply

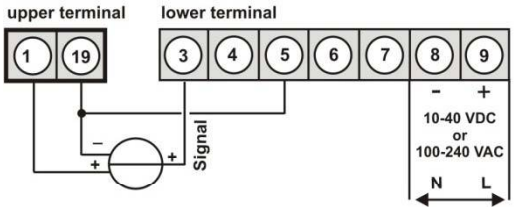
2-wire-sensor 4-20 mA



3-wire-sensor 0-20 mA



3-wire-sensor 0-10 V



4. Description of function and operation

Operation
The operation is divided into three different levels.

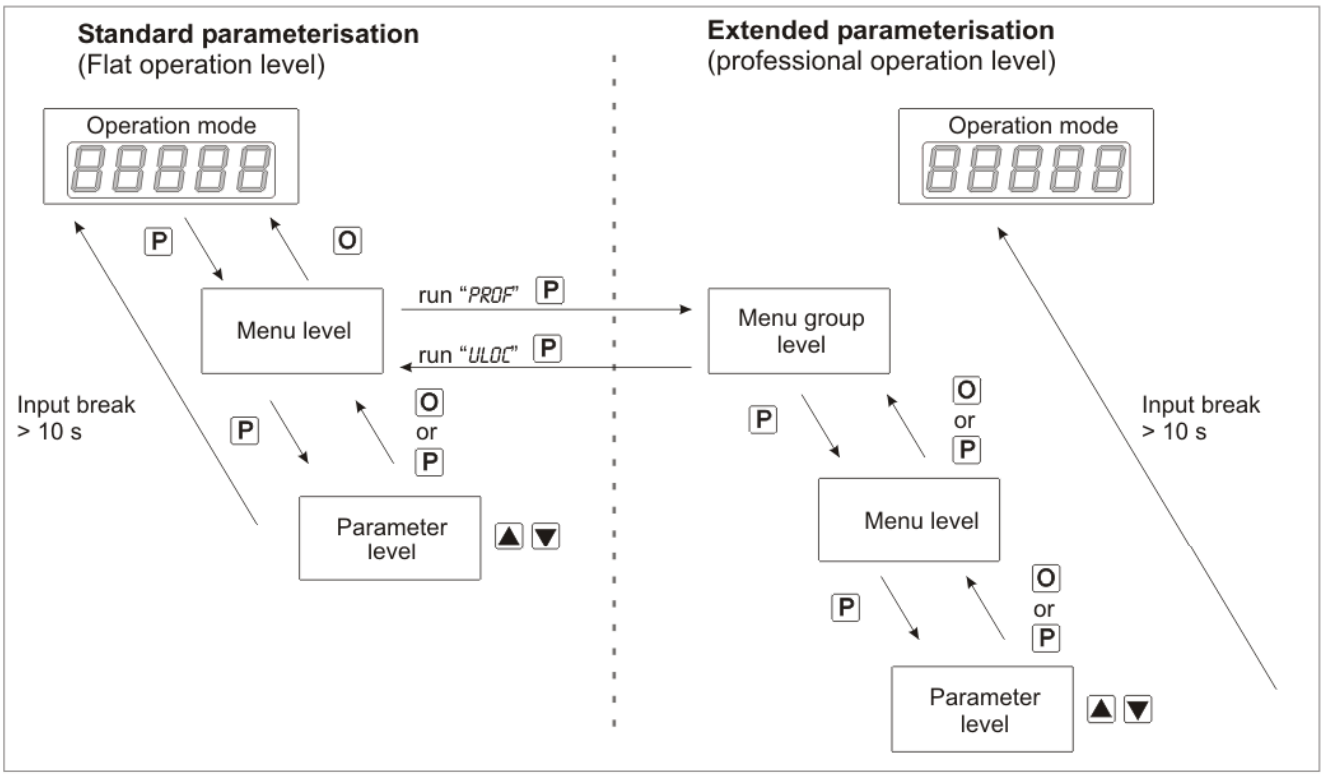
Menu level (delivery status)
This level is for the standard settings of the device. Only menu items which are sufficent to set the device into operation are displayed. To get into the professional level, run through the menu level and parameterise "*prof*" under menu item *RUN*.

Menu group level (complete function volume)
Suited for complex applications as e.g. linkage of alarms, setpoint treatment, totaliser function etc. In this level function groups which allow an extended parameterisation of the standard settings are availabe. To leave the menu group level, run through this level and parameterise „*uloc*„ under menu item *RUN*.

Parameterisation level:
Parameter deposited in the menu item can here be parameterised. Functions, that can be changed or adjusted, are always signalised by a flashing of the display. Settings that are made in the parameterisation level are confirmed with **[P]** and thus safed. By pressing the „**[O]-key**" it leads to a break-off of the value input and to a change into the menu level. All adjustments are safed automatically by the device and changes into operating mode, if no further key operation is done within the next 10 seconds.

Level	Key	Description
Menu-level	P	Change to parameterisation level and deposited values.
	▲ ▼	Keys for up and down navigation in the menu level.
	O	Change into operation mode.
Parameterisation-level	P	To confirm the changes made at the parameterisation level.
	▲ ▼	Adjustment of the value / the setting.
	O	Change into menu level or break-off in value input.
Menu-group-level	P	Change to menu level.
	▲ ▼	Keys for up and down navigation in the menu group level.
	O	Change into operation mode or back into menu level.

Function chart:



Underline:

- P **Takeover**
- O **Stop**
- ▲ **Value selection (+)**
- ▼ **Value selection (-)**

5. Setting up the device

5.1. Switching on

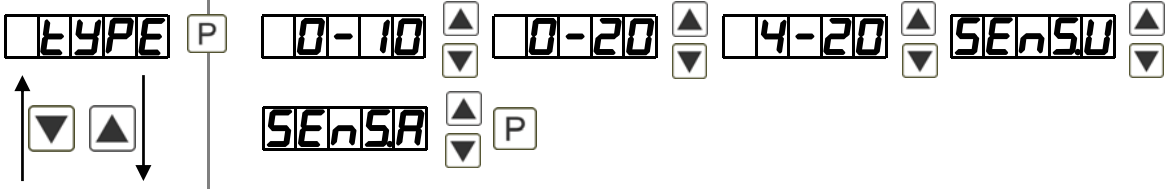
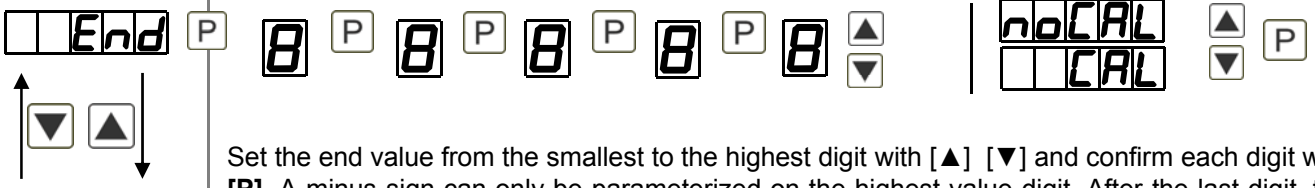
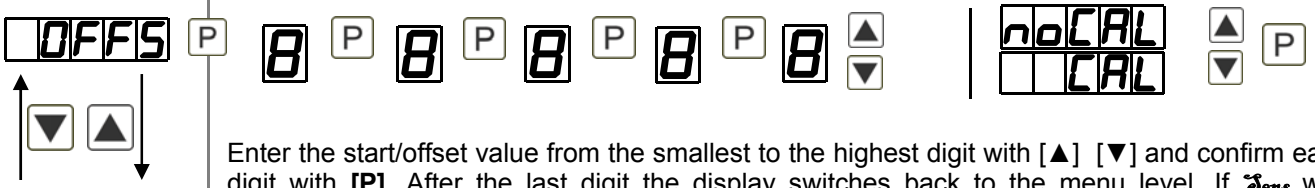
Once the installation is complete, you can start the device by applying the voltage supply. Before, check once again that all electrical connections are correct.

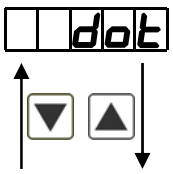
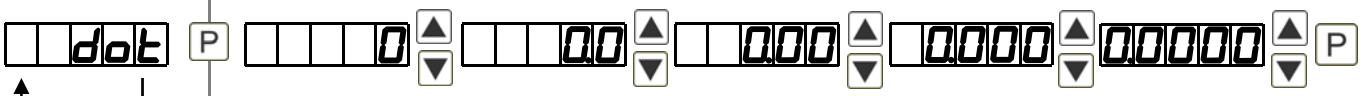
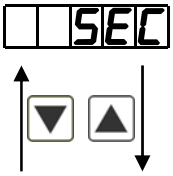
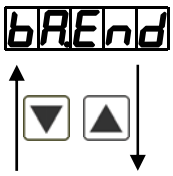
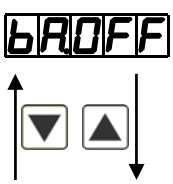
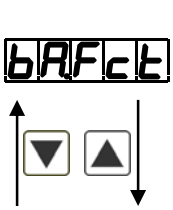
Starting sequence

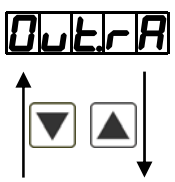
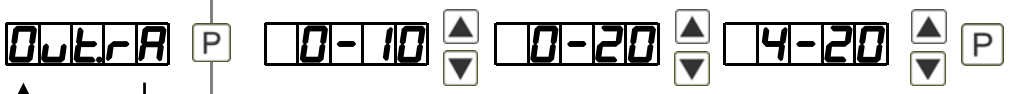
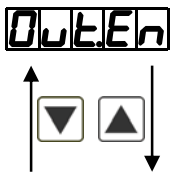
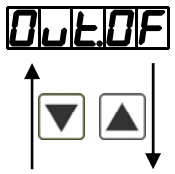
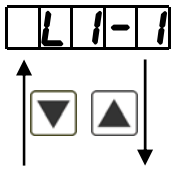
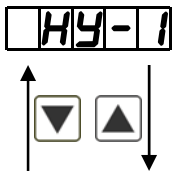
For 1 second during the switching-on process, the segment test (8 8 8 8 8) is displayed followed by an indication of the software type and, after that, also for 1 second the software version. After the starting sequence, the device switches to operation/display mode.

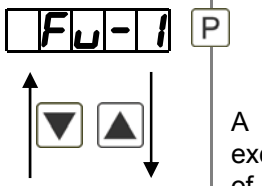
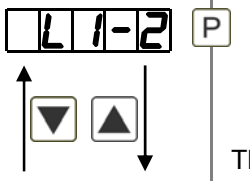
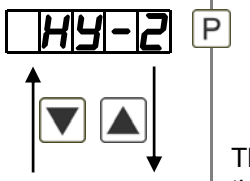
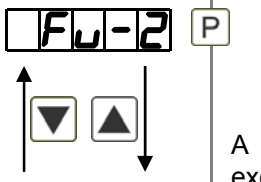
5.2. Standard parameterisation: (Flat operation level)

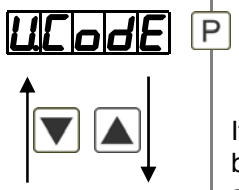
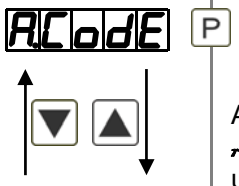
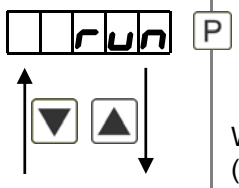
To parameterise the display, press the **[P]** key in operating mode for 1 second. The display then changes to the menu level with the first menu item *TYPE*.

Menu level	Parameterisation level
	**Selection of the input signal, *TYPE*:** Default: *sens.u* Available as measuring input options are 0-20 mA, 4-20 mA or 0-10 VDC signals as works calibration (without application of the sensor signal) and *SenSU* (voltage) **or** *SENSA* (current) as sensor calibration (with the sensor applied). Confirm the selection with **[P]** and the display switches back to menu level.
	**Setting the end value of the measuring range, *END*:** Default: *10000* Set the end value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. A minus sign can only be parameterized on the highest value digit. After the last digit, the display switches back to the menu level. If *Sens* was selected as input option, you can only select between *noca* and *cal*. With *noca*, only the previously set display value is taken over, and with *cal*, the device takes over both the display value and the analogue input value.
	**Setting the start/offset value of the measuring range, *offs*:** Default: *0* Enter the start/offset value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. After the last digit the display switches back to the menu level. If *Sens* was selected as input option, you can only select between *noca* and *cal*. With *noca*, only the previously set display value is taken over, and with *cal*, the device takes over both the display value and the analogue input value.

Menu level	Parameterisation level
	**Setting the decimal point, *dot*:** Default: 0  The decimal point on the display can be moved with [▲] [▼] and confirmed with **[P]**. The display then switches back to the menu level again.
	**Setting up the display time, *SEC*:** Default: *1.0*  The display time is set with [▲] [▼]. The display moves up in increments of 0.1 sec up to 1 sec and in increments of 1.0 sec up to 10.0 sec. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.
	**Setting up the final value of the bargraph, *ba.End*:** Default: *10000*  Set the final value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. A minus sign can only be parameterised on the highest value digit. After the last digit, the display switches back to the menu level.
	**Setting up the initial value of the bargraph, *ba.off*:** Default: 0  Set the initial value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. A minus sign can only be parameterised on the highest value digit. After the last digit, the display switches back to the menu level.
	**Selection of the bargraph functions, *ba.fct*:** Default: *bar.fo* The bargraph can be displayed with the following possibilites: bars from left to right (top to bottom) or bars from right to left (bottom to top), bars from the middle, a dot display of the bargraph or a dot display with a permanently displayed midpoint. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.

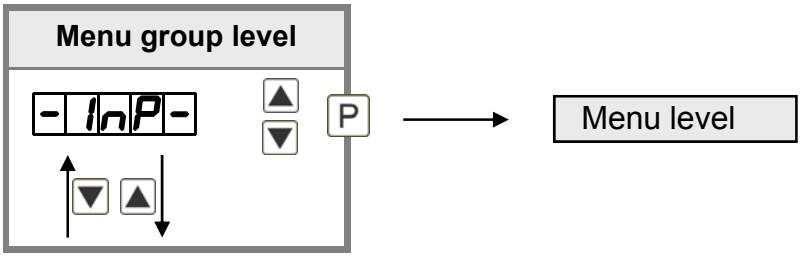
Menu level	Parameterisation level
	**Selection of analog output, Out.rA:** Default: 4-20  Three output signals are available: 0-10 VDC, 0-20 mA and 4-20 mA, with this function, the demanded signal is selected.
	**Setting up the final value of the analog output, Out.En:** Default: 10000  The final value is adjusted from the smallest digit to the highest digit with **[▲] [▼]** and digit by digit confirmed with **[P]**. A minus sign can only be parameterised on the highest digit. After the last digit, the device changes back into menu level.
	**Setting up the initial value of the analog output, Out.OF:** Default: 00000  The final value is adjusted from the smallest digit to the highest digit with **[▲] [▼]** and digit by digit confirmed with **[P]**. A minus sign can only be parameterised on the highest digit. After the last digit, the device changes back into menu level.
	**Threshold values / Limits, LI-1:** Default: 2000 This value defines the threshold, that activates/deactivates an alarm.
	**Hysteresis for limit values, HY-1:** Default: 00000  The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.

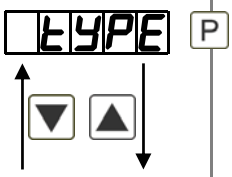
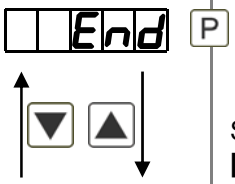
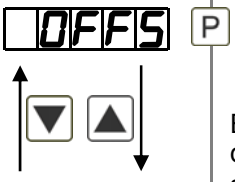
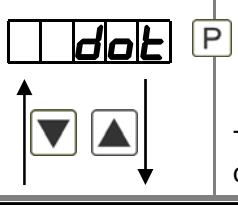
Menu level	Parameterisation level
	**Function for threshold value undercut /exceedance, *Fu-1:*** Default: *high*  A limit value undercut is selected with *Low* (for LOW = lower limit value), a limit value exceedance with *High* (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function *High*, an alarm is activated by reaching of the threshold level. If the threshold value was allocated to *Low,* an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.
	**Threshold values / Limits, *LS-2:*** Default: 2000 This value defines the threshold, that activates/deactivates an alarm.
	**Hysteresis for limit values, *HYS-2:*** Default: 00000 The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.
	**Function for threshold value undercut /exceedance, *Fu-2:*** Default: *high*  A limit value undercut is selected with *Low* (for LOW = lower limit value), a limit value exceedance with *High* (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function *High*, an alarm is activated by reaching of the threshold level. If the threshold value was allocated to *Low,* an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.

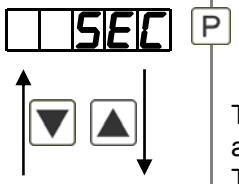
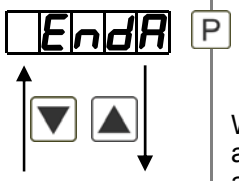
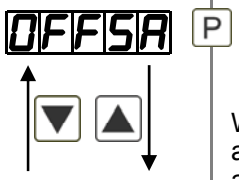
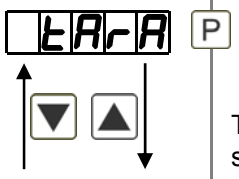
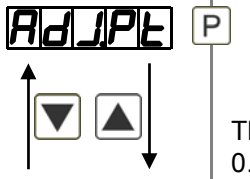
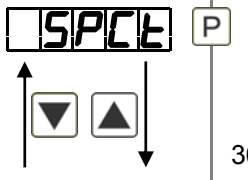
Menu level	Parameterisation level
	**User code (4-digit number-combination, free available), *U.CodE*:** Default: *0000* If this code was set (>0000), all parameters are locked for the user, if *LOC* has been selected before under menu item *run*. By pressing **[P]** for 3 seconds in operation mode, the display shows *CODE*. The *U.Code* needs to be entered to get to the reduced number of parameter sets. The code has to be entered befor each parameterisation, until the *A.Code* (Master code) unlocks all parameters again.
	**Master code (4-digit number-combination, free available), *A.CodE*:** Default: *1234* All parameters can be unlocked with this code, after *LOC* has been activated under menu item *run*. By pressing **[P]** for 3 seconds in operation mode, the display shows *CODE* and enables the user to reach all parametes by entering the *A.codE*. Under *run* the parameterisation can be activated permanently by selecting *ULOC* or *ProF*, thus at an anew pushing of **[P]** in operation mode, the code needs not to be entered again.
5.3. Programming interlock „*run*“	
	**Activation / deactivation of the programming lock or completion of the standard parameterisation with change into menu group level (complete function range), *run:*** Default: *uloc* With the navigation keys [▲] [▼], you can choose between the deactivated key lock *Uloc* (works setting) and the activated key lock *Loc*, or the change into the menu group level *ProF*. Confirm the selection with **[P]**. After this, the display confirms the settings with "- - - - -", and automatically switches to operating mode. If *Loc* was selected, the keyboard is locked. To get back into the menu level, press **[P]** for 3 seconds in operating mode. Now enter the *CODE* (works setting *1 2 3 4*) that appears using [▲] [▼] plus **[P]** to unlock the keyboard. *FAIL* appears if the input is wrong. To parameterise further functions *ProF* needs to be set. The device confirms this setting with „- - - - - „ and changes automatically in operation mode. By pressing **[P]** for approx. 3 seconds in operation mode, the first menu group *InP* is shown in the display and thus confirms the change into the extended parameterisation. It stays activated as long as *ULOC* or *LOC* is entered in menu group *RUN*.

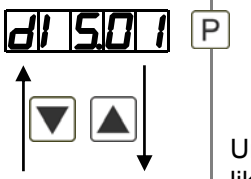
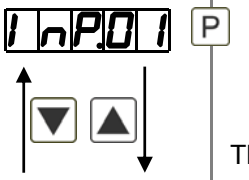
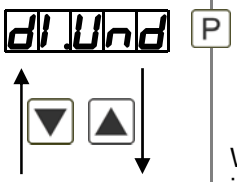
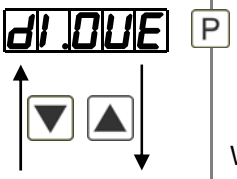
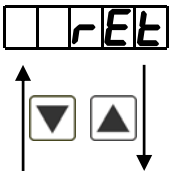
5.4. Extended parameterisation (professional operation level)

5.4.1. Signal input parameters

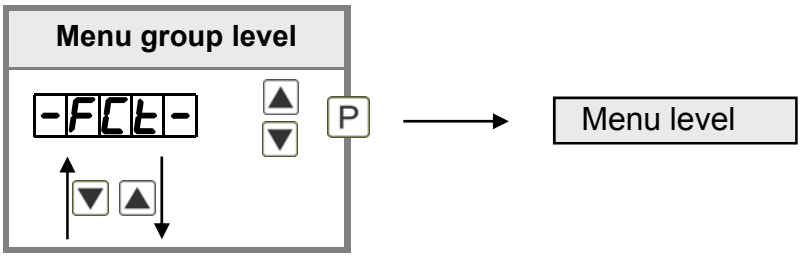


Menu level	Parameterisation level
	**Selection of the input signal, *TYPE*:** Default: *sens.u* There are several measuring input options: 0-20 mA, 4-20 mA or 0-10 VDC signals as works calibration (without application of the sensor signal) and *SenSU* (voltage) **or** *SENSA* (current) as sensor calibration (with the sensor applied). Confirm the selection with **[P]** and the display switches back to menu level.
	**Setting the end value of the measuring range, *END*:** Default: *10000* Set the end value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. A minus sign can only be parameterised on the highest value digit. After the last digit, the display switches back to the menu level. If *Sens* was selected as input option, you can only select between *noca* and *cal*. With *noca*, only the previously set display value is taken over, and with *cal*, the device takes over both the display value and the analogue input value.
	**Setting up the start/offset value of the measuring range, *offs*:** Default: *0* Enter the start/offset value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. After the last digit the display switches back to the menu level. If *Sens* was selected as input option, you can only select between *noca* and *cal*. With *noca*, only the previously set display value is taken over, and with *cal*, the device takes over both the display value and the analogue input value.
	**Setting the decimal point, *dot*:** Default: *0* The decimal point on the display can be moved with [▲] [▼] and confirmed with **[P]**. The display then switches back to the menu level again.

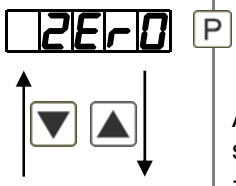
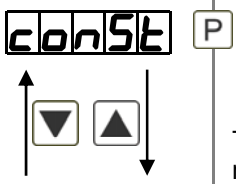
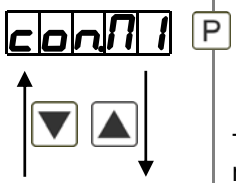
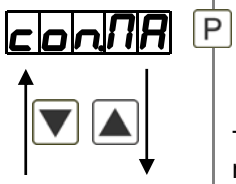
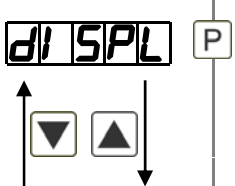
Menu level	Parameterisation level
	**Setting up the display time, SEC:** Default: 1.0  The display time is set with [▲] [▼]. The display moves up in increments of 0.1 sec up to 1 sec and in increments of 1.0 sec up to 10.0 sec. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.
	**Rescaling the measuring input values, EndA:** Default: 10000 With this function, you can rescale the input value of **e.g. 19.5 mA** (works setting) without applying a measuring signal. If sensor calibration has been selected, these parameters are not available.
	**Rescaling the measuring input values, OFFA:** Default: 0  With this function, you can rescale the input value of **e.g. 3.5 mA** (works setting) without applying a measuring signal. If sensor calibration has been selected, these parameters are not available.
	**Setting up the tare/offset value, tArA:** Default: 0  The given value is added to the linearised value. In this way, the characteristic line can be shifted by the selected amount.
	**Setting up the balance point, Adj.pt:** **Default:** 80000  The balance point for the final value can be chosen from the measuring range by Sens.u with 0…10 V or Sens.A with 0…20 mA in %. The preset 80.000% result from the widespread detuning of the melt pressure sensors.
	**Number of additional setpoints, SPCt:** Default: 00  30 additional setpoints can be defined to the initial- and final value, so linear sensor values are not linearised. Only activated setpoint parameters are displayed.

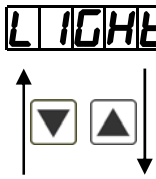
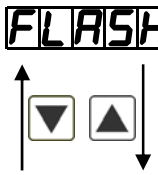
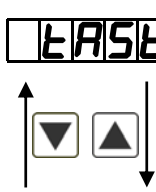
Menu level	Parameterisation level
	**Display values for setpoints,** *dFS.01… dFS.30:*  Under this parameter setpoints are defined according to their value. At the sensor calibration, like at Endwert/Offset, one is asked at the end if a calibration shall be activated.
	**Analog values for setpoints,** *InP.01… InP.30:*  The setpoints are always set according to the selected input signal. The desired analog values can be freely parametrised in ascending order.
	**Device undercut,** *dF.Und:* Default: *-19999*  With this function the device undercut (_ _ _ _ _) can be defined on a definite value. Exception is input type **4-20 mA**, it already shows undercut at a signal <1 mA, so a sensor failure is marked.
	**Display overflow,** *dF.OUE:* Default: *99999*  With this function the display overflow (⁻⁻⁻⁻⁻) can be defined on a definite value.
	**Back to menu group level,** *rEt:* With **[P]** the selection is confirmed and the device changes into menu group level „*-InP-*“.

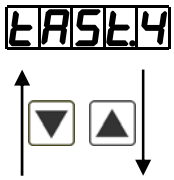
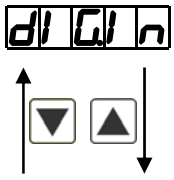
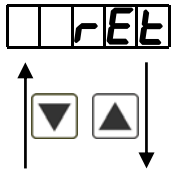
5.4.2. General device parameters



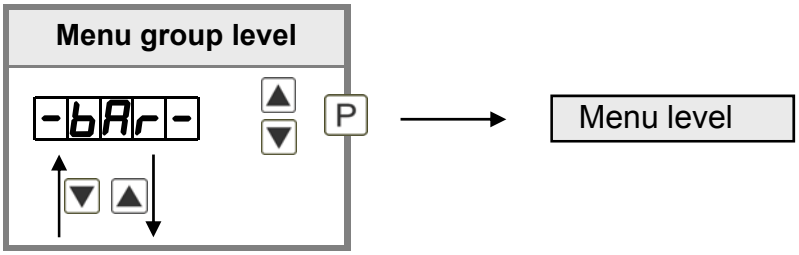
Menu level	Parameterisation level
dI.SEC P	**Display time,** *dISEC:* Default: *01.0* 0.01 0.09 then 0.1.0 10.0 P The display is set up with [▲] [▼]. Thereby it switches up to 1 second in increments of 0.1 seconds and up to 10.0 seconds in increments of 1.0. With **[P]** the selection is confirmed and the device changes into menu level.
round P	**Rounding of display values,** *round:* Default: *00001* 00001 00005 00010 00050 P This function is for instable display values, where the display value is changed in increments of 1, 5, 10 or 50. This does not affect the resolution of the optional outputs. With **[P]** the selection is confirmed and the device changes into menu level.
ArIth P	**Arithmetic,** *ArIth:* Default: *no* no rEZI P (Reciprocal) rAdI C (Root extraction) SQUAr (Square) P With this function the calculated value, not the measuring value, is shown in the display. With *no*, no calulation is deposited. With **[P]** the selection is confirmed and the device changes into menu level.
AUG P	**Sliding average determination,** *AVG:* Default: *1.0* 01 50 P Here, the number of the meterings that need to be averaged is preset. The time of averaging results of the product of measuring time *SEC* and the averaged metering *AVG*. With the selection of *AVG* in the menu level *dISPL* the result will be shown in the display and evaluated via the alarms.

Menu level	Parameterisation level
	**Zero point slowdown,** *ZERO*: Default: ∞  At the zero point slowdown, a value range around the zero point can be preset, so the display shows a zero. If e.g. a 10 is set, the display would show a zero in the value range from -10 to +10; below continue with -11 and beyond with +11. The maximum adjustable range of value is 99.
	**Definite contstant value,** *const*: Default: 0  The constant value can be evaluated via the alarms or via the analog output, like the current measurand. The decimal place cannot be changed for this value and is taken over by the current measurand. Like this a setpoint generator can be realised via the analog output by this value. Furthermore it can be used for calculating the difference. At this the constant value is substracted from the current measurand and the difference is evaluated in the alerting or by the analog output. Thus regulations can be displayed quite easily.
	**Minimum constant value,** *con.mi*: Default: -19999  The minimum constant value is adjusted from the smallest to the highest digit with the navigation keys **[▲] [▼]** and confirmed digit per digit with **[P]**. A minus sign can only be adjusted on the highest digit. After the last digit the display changes back into menu level.
	**Maximum constant value,** *con.ma*: Default: 99999  The maximum constant value is adjusted from the smallest to the highest digit with the navigation keys **[▲] [▼]** and confirmed digit per digit with **[P]**. A minus sign can only be adjusted on the highest digit. After the last digit the display changes back into menu level.
	**Display,** *dISPL*: Default: *actua* With this function the current measuring value, Min-/Max value, totaliser value or the process-controlled Hold-value can be allocated to the display. With **[P]** the selection is confirmed and the device changes into menu level.

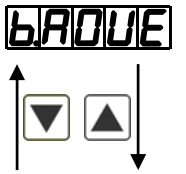
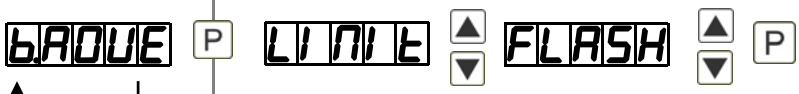
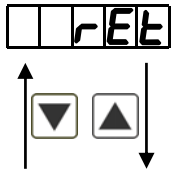
Menu level	Parameterisation level
	**Brightness control, *Light*:** Default: *lo* The brightness of the display can be adjusted in 16 levels from 00 = very dark to 15 = very bright via this parameter or alternatively via the navigation keys from the outside. During the start of the device, the level that is deposited under this parameter will always be used, even though the brightness has been changed via the navigation keys in the meantime.
	**Display flashing, *FLASH*:** Default: *no* A display flashing can be added as additional alarm function either to single or to a combination of off-limit condition. With *no*, no flashing is allocated.
	**Assignment (deposit) of key functions, *toAst*:** Default: *no* For the operation mode, special functions can be deposited on the navigation keys [▲] [▼], in particular this function is made for devices in housing size 48x24 which do not have a 4th key (**[O]**-key). If the min-/max-memory is activated with *EHtr*, all measured min/max-values are safed during operation and can be recalled via the navigation keys. The values get lost by re-start of the device. If the threshold value correction *LI.12* or *LI.34* is choosen, the values of the threshold can be changed during operation without disturbing the operating procedure. With *toArA* the device is tared to zero and safed permanently as offset. The device confirms the correct taring by showing *ooooo* in the display *Set.toA* switches into the offset value and can be changed via the navigation keys [▲] [▼]. Via *totAL* the current value of the totaliser can be displayed for approx.7 seconds, after this the device changes back on the parameterised display value. If *tot.rE* is deposited, the totaliser can be set back by pressing of the navigation keys [▲] [▼], the device acknowledges this with *ooooo* in the display. The configuration of *EHt.rE* deletes the min/max-memory. Under *ActuA* the measurand is shown for approx. 7 seconds, after this the display returns to the parameterised display value. If *AbS.Unt* (absolute value) was selected, the display shows the value that has been measured since voltage connection, without consideration of a previous taring. If *no* is selected, the navigation keys are without any function in the operation mode.

Menu level	Parameterisation level
	**Special function [O]-key, *toFS t.4*:** **Default: *no*** For the operation mode, special functions can be deposited on the **[O]-**Taste. This function is activated by pressing the key. With *toArA* the device is set temporarily on a parameterised value. The device acknowledges the correct taring with ***oooo*** in the display. *Set.toA* switches into the offset value and can be changed via the navigation keys [▲] [▼]. Via *totAL* the current value of the totaliser can be displayed for approx. 7 seconds, after this the device switches back on the parameterised display value. If *tot.rE* is deposited, the totaliser can be set back by pressing of the navigation keys [▲] [▼], the device acknowledges this with ***oooo*** in the display. *EHt.rE* deletes the min/max-memory. If *HOLD* has been selected, the moment can be hold constant by pressing the **[O]-**key, and is updated by releasing the key. **Advice:** *Hold* is activated only, if *HOLD* is selected under parameter *DISPL*. *ActuA* shows the measuring value for approx. 7 seconds, after this the device switches back on the parameterised display value. The same goes for *AVG*, here the sliding average values will be displayed. A sensor calibration is done by triggering of the digital input via *se.cal*, the flow diagram is shown in *Chapter 9*. The constant value *const* can be recalled via the digital input, or changed digit per digit. At *AL-1…AL-4* an output can be set and therewith e.g. a setpoint adjustment can be done. If *no* is selected, the **[O]-**key is without any function in the operation mode.
	**Special function digital input, *dIG.In*:** Default: *no* In operation mode, the above shown parameters can be laid on the optional digital input, too. Function description see *toFS t.4*.
	**Back to menu group level, *rEt*:** With **[P]** the selection is confirmed and the device changes into menu group level „*-fct-*“.

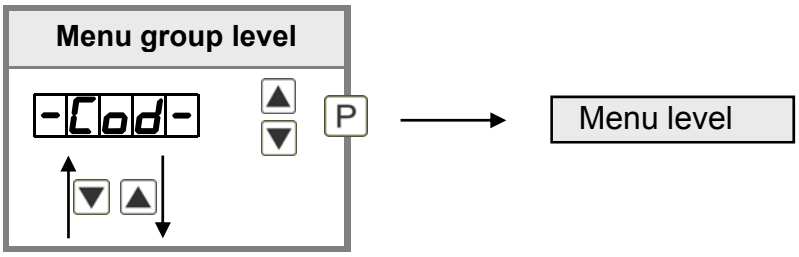
5.4.3. Bargraph functions

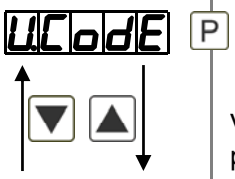
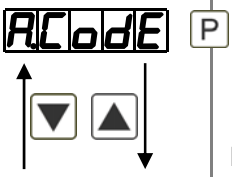
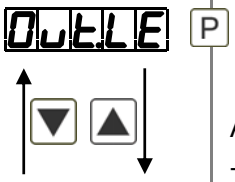
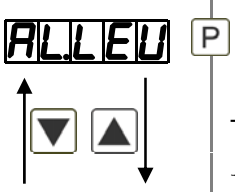


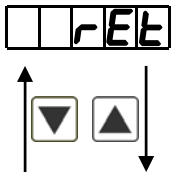
Menu level	Parameterisation level
bASrc P	**Bargraph,** *Ba.src:* Default: *actua* ActuA · MI nUA · MAXUA · totAL · HoLd · AUG · conSt · d IFF · P With this function the following values can be allocated to the display: the current measuring value, min/max value, totaliser value or the process-controlled hold-value, the sliding average value, the constant value or the difference between constant value and current value of the display. With **[P]** the selection is confirmed and the device changes into menu level.
bAEnd P	**Setting up the final value of the bargraph,** *ba.End:* Default: *10000* 8 P 8 P 8 P 8 P 8 ▲▼ P Set the final value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. A minus sign can only be parameterised on the highest value digit. After the last digit, the display switches back to the menu level.
bAOFF P	**Setting up the initial value of the bargraph,** *ba.off:* Default: *0* 8 P 8 P 8 P 8 P 8 ▲▼ P Set the initial value from the smallest to the highest digit with [▲] [▼] and confirm each digit with **[P]**. A minus sign can only be parameterised on the highest value digit. After the last digit, the display switches back to the menu level.
bAFct P	**Selection of the bargraph functions,** *ba.fct:* Default: *bar.fo* bAr.Fo · bAr.rE · bAr.n1 · dot · dot.n1 P The bargraph can be displayed with the following possibilities: bars forwards, bars backwards, bars starting out of the middle, bars from the middle, a dot display of the bargraph or a dot display with a permanently displayed midpoint. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.

Menu level	Parameterisation level
	**Bargraph alarm,** *bA.Sim:* Default: *no*  If the alarms are triggered (*AL1* to *AL4*), a flashing of the dots can be assigned to the bargraph by selecting *Flash*. If *No* was adjusted the bargraph remains statical. With **[P]** the selection is confirmed and the device changes into menu level.
	**Overflow behaviour,** *bA.oUE*: Default: *Limit*  The overflow behaviour of the bargraph can be defined to identify and evaluate faulty signals, e.g. via a control system. Overflow *Limit* means the bargraph remains still at adjusted min- or max-value. The complete bargraph display flashes during an overflow, if *Flash* was selected. With **[P]** the selection is confirmed and the device changes into menu level.
	**Back to menu group level,** *rEt*: With **[P]** the selection is confirmed and the device changes into menu group level „- *bAr* -“.

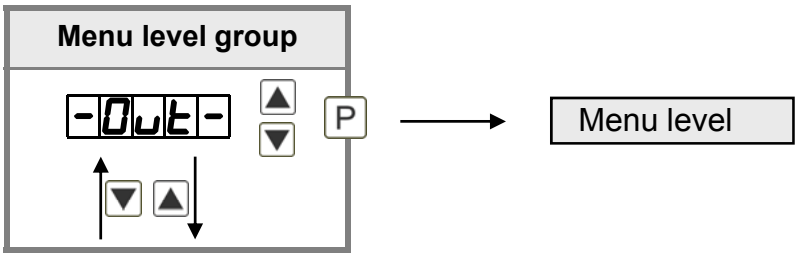
5.4.4. Safety parameters

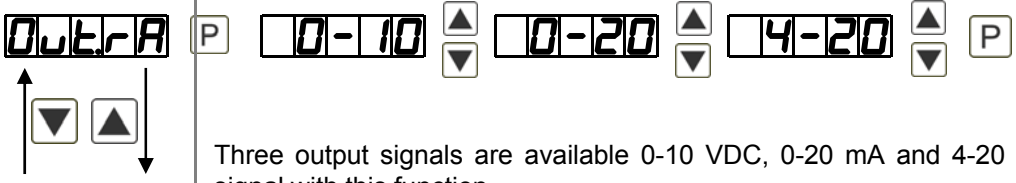


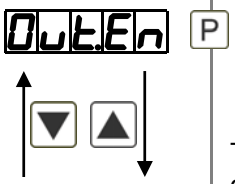
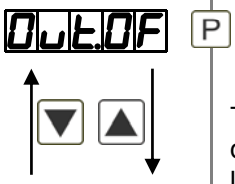
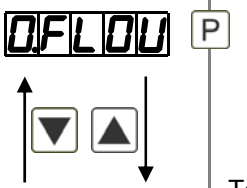
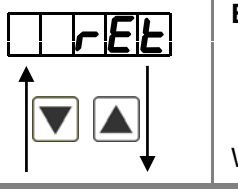
Menu level	Parameterisation level
	**Setting up the user code, *U.Code:*** **Default:** 0000  Via this code, reduced sets of parameters *out.lo* and *al.lev* can be unlocked, in case of a locked programming. There is no access to further parameters via this code. The *U.CodE* can only be changed via the correct input of the *A.CodE* (master code).
	**Master code, *A.Code*:** **Default:** 1234  By entering *A.CodE* the device will be unlocked and all parameters are released.
	**Release/lock analog output parameter, *Out.LE:*** Default: *all*  Analog output parameter can be locked or released for the user: - At *En-oF* the initial or final value can be changed in operation mode. - At *Out.EO* the output signal can be changed from e.g. 0-20 mA to 4-20 mA or 0-10 VDC. - At *ALL* analog output parameters are released. - At *no* all analog output parameters are locked.
	**Release/lock alarm parameters, *AL.LEU:*** Default: *all*  This parameter describes the user relase/user lock of the alarm. - *LIMit*, here only the range of value of the threshold values 1-4 can be changed. - *AL.M.L*, here the range of value and the alarm trigger can be changed. - *ALL*, all alarm parameters are released. - *no*, all alarm parameters are locked.

Menu level	Parameterisation level
	**Back to menu group level, *rEt*:** With **[P]** the selection is confirmed and the device changes into menu group level „- *COD* -“.

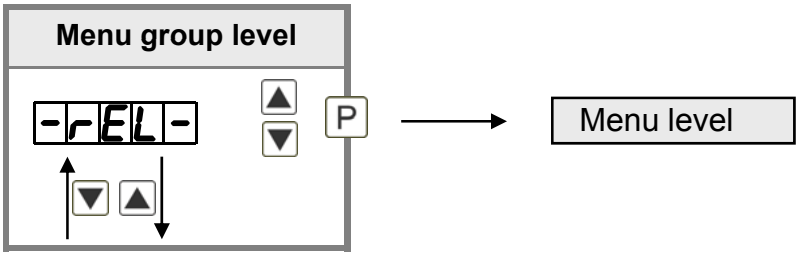
5.4.5. Analog output parameters

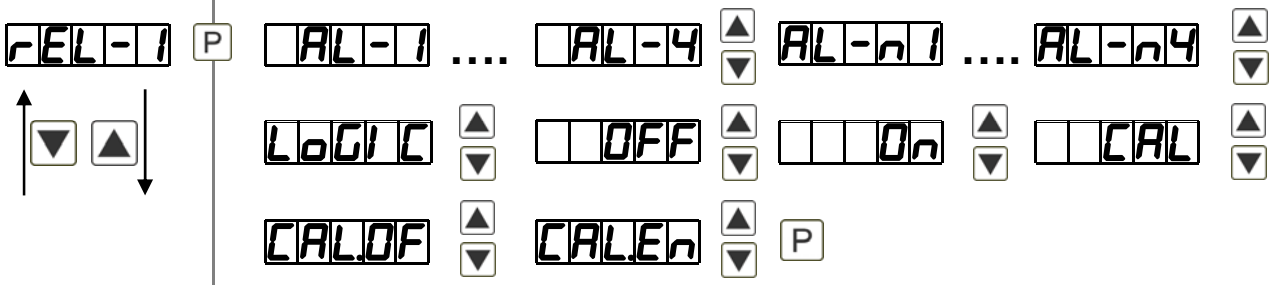
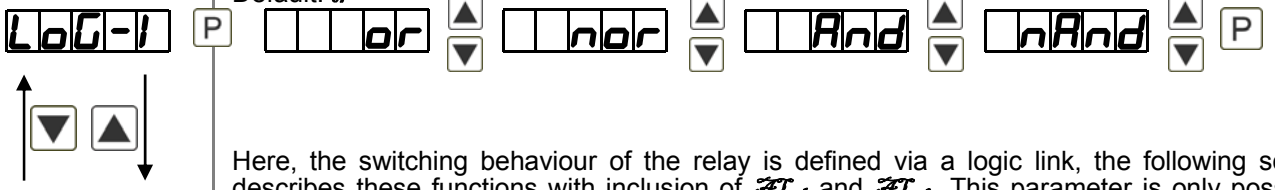


Menu level	Parameterisation level
	**Selection reference of analog output, *OutPt*:** Default: *actua* The analog output signal can refer to different functions, in detail these are the current measurand, the min-value, the max-value, the totaliser-/sum function, the constant value or the difference between current measurand and constant value. If *HoLd* is selected, the signal of the analog output will be kept. It can be continued processing after a deactivation of *Hold*: With **[P]** the selection is confirmed and the device changes into menu level.
	**Selection analog output, *Out.rA*:** Default: *4-20* Three output signals are available 0-10 VDC, 0-20 mA and 4-20 mA. Select the demanded signal with this function.

Menu level	Parameterisation level
	**Setting the final value of the analog output, Out.En:** Default: 10000 The final value is adjusted from the smallest to the highest digit with [▲] [▼] and confirmed digit per digit with **[P]**. A minus sign can only be parameterised on the highest digit. After the last digit the device changes back into menu level.
	**Setting the initial value of the analog output, Out.OF:** Default: 00000 The initial value is adjusted from the smallest to the highest digit with [▲] [▼] and confirmed digit per digit with **[P]**. A minus sign can only be parameterised on the highest digit. After the last digit the device changes back into menu level.
	**Overflow behaviour, O.FLoU:** Default: edge To recognise and evaluate faulty signals, e.g. by a controller, the overflow behaviour of the analog output can be defined. As overflow can be seen either EdGE, that means the analog output runs on the set limits e.g. 4 and 20 mA, or to.OFF (input value smaller than initial value, analog output switches on e.g. 4 mA), to.End (higher than final value, analog output switches on e.g. 20 mA). If to.MIn or to.MAX is set, the analog output switches on the smallest or highest possible binary value. This means that values of e.g. 0 mA, 0 VDC or values higher than 20 mA or 10 VDC can be reached. With **[P]** the selection is confirmed and the device changes into menu level.
	**Back to menu group level, rEt:** With **[P]** the selection is confirmed and the device changes into menu group level „- out -“.

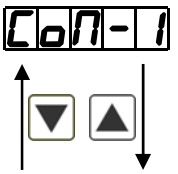
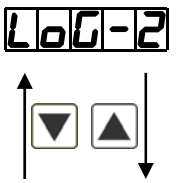
5.4.6. Relay functions



Menu level	Parameterisation level
	**Alarm relay 1, *rEL-1*:** **Default: *AL-1*** Each setpoint (optional) can be linked up via 4 alarms (by default). This can either be inserted at activated alarms *AL-1/4* or de-activated alarms *ALn1/4*. If *LOGIC* is selected, logical links are available in the menu level *Log-1* and *Com-1*. One can only get to these two menu levels via *LOGic*, at all other selected functions, these two parameters are overleaped. Via *On/OFF* the setpoints can be activated/de-activated, in this case the output and the setpoint display are set/not set on the front of the device. The parameters *Cal*, *Cal.of* and *CAL.en* can only be used in accordance with the semi-automatic calibration (*Chapter 9. Sensor alignment*). At *Cal* the relay switches during sensor calibration, at *cal.of* during offset calibration and at *Cal.en* during the calibration of the final value. With **[P]** the selection is confirmed and the device changes into menu level.
	**Logic relay 1, *Log-1*** Default: *or* Here, the switching behaviour of the relay is defined via a logic link, the following schema describes these functions with inclusion of *AL-1* and *AL-2*. This parameter is only possible if *LOGIC* was selected under *REL-1*.

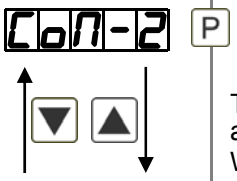
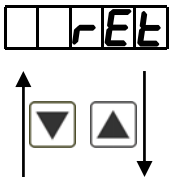
or	A1 ∨ A2	As soon as a selected alarm is activated, the relay operates. Equates to operating current principle.
nor	A1 ∨ A2 = A1 ∧ A2	The relay operates only, if no selected alarm is active. Equates to quiescent current principle.
And	A1 ∧ a2	The relay operates only, if all selected alarms are active.
nAnd	A1 ∧ A2 = A1 ∨ A2	As soon as a selected alarm is not activated, the relay operates.

With **[P]** the selection is confirmed and the device changes into menu level.

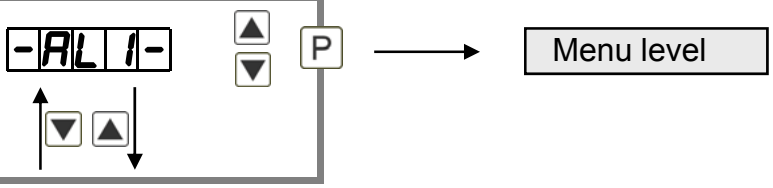
Menu level	Parameterisation level
	**Alarms for relay 1, *CoM-1:*** **Default:** *a.1*  The allocation of the alarms to relay 1 happens via this parameter, one alarm or a group of alarms can be chosen. This parameter is only available if *LOGIC* was selected under *REL-1*. With **[P]** the selection is confirmed and the device changes into menu level.
	**Alarm relay 2, *rEL-2:*** **Default:** *AL-2* Each setpoint (optional) can be linked up via 4 alarms (by default). This can either be inserted at activated alarms *AI-1/4* or de-activated alarms *AIn1/4*. If *LOGIC* is selected, logical links are available in the menu level *Log-1* and *Com-1*. One can only get to these two menu levels via *LOGic*, at all other selected functions, these two parameters are overleaped. Via *On/OFF* the setpoints can be activated/de-activated, in this case the output and the setpoint display are set/not set on the front of the device. The parameters *Cal*, *Cal.of* and *CAL.en* can only be used in accordance with the semi-automatic calibration (*Chapter 9. Sensor alignment*). At *Cal* the relay switches during sensor calibration, at *cal.of* during offset calibration and at *Cal.en* during the calibration of the final value. With **[P]** the selection is confirmed and the device changes into menu level.
	**Logic relay 2, *Log-2*** Default: *or*  Here, the switching behaviour of the relay is defined via a logic link, the following schema describes these functions with inclusion of *AL-1* and *AL-2*. This parameter is only possible if *LOgic* was selected under *REL-1*.

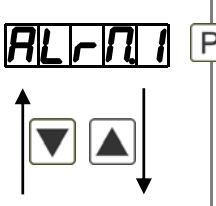
or	*A1* v *A2*	As soon as a selected alarm is activated, the relay operates. Equates to operating current principle.
nor	$\overline{A1 \vee A2} = \overline{A1} \wedge \overline{A2}$	The relay operates only, if no selected alarm is active. Equates to quiescent current principle.
And	A1 ∧ a2	The relay operates only, if all selected alarms are active.
nAnd	$\overline{A1 \wedge A2} = \overline{A1} \vee \overline{A2}$	As soon as a selected alarm is not activated, the relay operates.

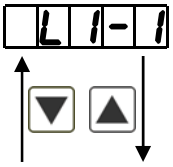
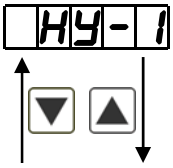
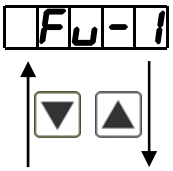
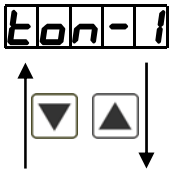
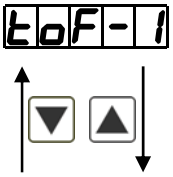
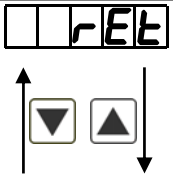
With **[P]** the selection is confirmed and the device changes into menu level.

Menu level	Parameterisation level
	**Alarms for relay 2, *CoM-2:*** **Default:** *a.1*  The allocation of the alarms to relay 1 happens via this parameter, one alarm or a group of alarms can be chosen. This parameter is only available if *LOGIC* was selected under *REL-1*. With **[P]** the selection is confirmed and the device changes into menu level.
	**Back to menu group level, *rEt*:** With **[P]** the selection is confirmed and the device changes into menu group level *„- rel -“*.

5.4.7. Alarm parameters

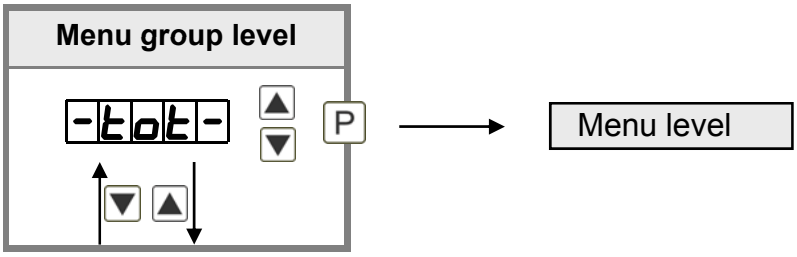
Menu group level


Menu level	Parameterisation level
	**Dependency alarm1, *ALrM.1:*** Default: *actua* The dependency of alarm 1 can be related to special functions, in detail these are the current measuring value, the min-value, the max-value, the totaliser-/sum-value, the constant value or the difference between the current measurand and the constant value. If *Hold* was selected, then the alarm is hold and processed just after deactivation of *HOLD*. *EHtEr* causes the dependency either by pressing the **[O]**-key on the front of the housing or by an external signal via the digital input. With **[P]** the selection is confirmed and the device changes into menu level. **Example:** By using the maximum value *Alarm.1* = *Max.va* in combination with a threshold monitoring *Fu-1* = *High*, an alarm confirmation can be realised. Use the navigation keys, the fourth key or the digital input for confirmation.

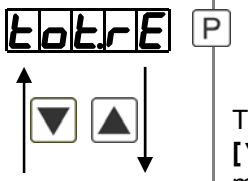
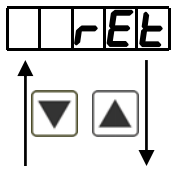
Menu level	Parameterisation level
	**Threshold values / Limit values, *LI-1:*** Default: *2000* The limit value defines the threshold, that activates/deactivates an alarm.
	**Hysteresis for threshold values, *HYL-1:*** Default: *00000* The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.
	**Function for threshold value undercut/exceedance, *Fu-1:*** Default: *high* A limit value undercut is selected with *Louu* (for LOW = lower limit value), a limit value exceedance with *High* (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function *High*, an alarm is activated by reaching the threshold level. If the threshold value was allocated to *Low*, an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.
	**Switching-on delay, *ton-1:*** Default: *000* For limit value 1 one can preset a delayed switching-on of 0-100 seconds.
	**Switching-off delay, *toF-1:*** Default: *000* For limit value 1 one can preset a delayed switching-off of 0-100 seconds.
	**Back to menu group level, *rEt*:** With **[P]** the selection is confirmed and the device changes into menu group level „– *AL1* –“.

The same applies for *AL2* to *AL8*.

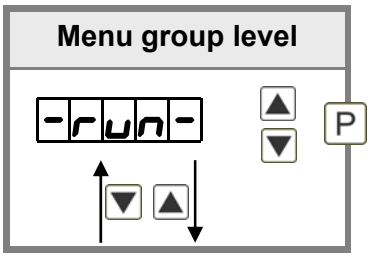
5.4.8. Totaliser (Volume metering)



Menu level	Parameterisation level
totAL P	**Totaliser state,** *total:* Default: *off* OFF SteAd tEMP P The totaliser makes measurements on a time base of e.g. l/h possible, at this the scaled input signal is integrated by a time and steadily (select *Stead*) or temporarily (select *temp*) safed. Select the constant storage for consumption measurements and the quick storage for frequently filling processes. During the constant storage *STEAD* the current sum value is safed at each totaliser reset. Furthermore it is safed every 30 minutes in the not-volatile storage of the device. If *Off* is selected, the function is deactivated. With **[P]** the selection is confirmed and the device changes into menu level.
tbASE P	**Time base,** *t.base:* Default: *sec* SEC Min hour P Under this parameter the time base of the measurement can be preset in seconds, minutes or hours.
FActo P	**Totaliser factor,** *Facto:* Default: *1e0* 1E0 … 1E6 P At this, the factor (1E0…1E6) respectively the divisor for the internal calculation of the measuring value is assigned.
tot.dt P	**Setting up the decimal point for the totaliser,** *tot.dt:* Default: *0* 0 0.0 0.00 0.000 0.0000 P The decimal point of the device can be adjusted with the navigation keys **[▲] [▼]**. With **[P]** the selection is confirmed and the device changes into menu level.

Menu level	Parameterisation level
	**Totaliser reset,** *tot.re:* Default: ooo  The reset value is adjusted from the smallest to the highest digit with the navigation keys **[▲] [▼]** and digit per digit confirmed with **[P]**. After the last digit, the display switches back to the menu level. The activator for the reset is parameter driven via the 4th key or via the optional digital input.
	**Back to menu group level,** *rEt*: With **[P]** the selection is confirmed and the device changes into menu group level „- *tot* -“.

Programming interlock, *run*:



Description see page 11, menu level *run*

6. Reset to default values

To return the unit to a **defined basic state**, a reset can be carried out to the default values.

The following procedure should be used:

- Switch off the power supply
- Press button [**P**]
- Switch on voltage supply and press **[P]-**button until „- - - - -“ is shown in the display.

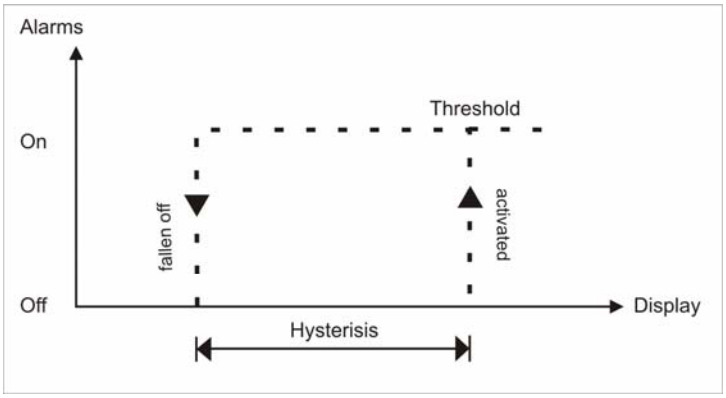
With reset, the default values of the program table are loaded and used for subsequent operation. This puts the unit back to the state in which it was supplied.

Caution! All application-related data are lost.

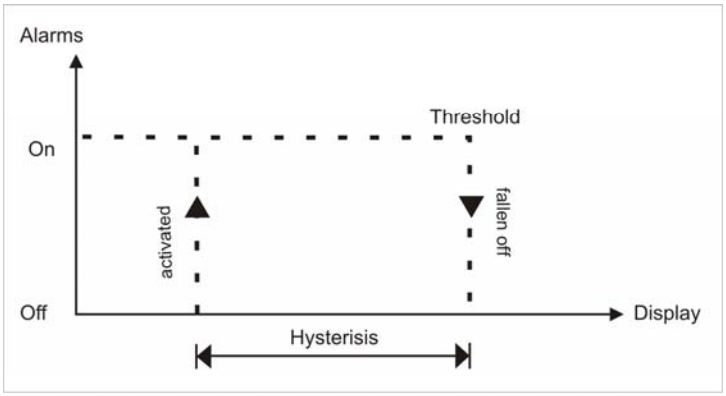
7. Alarms / Relays

This device has 4 virtual alarms that can monitor one limit value in regard of an undercut or exceedance. Each alarm can be allocated to an optional relay output S1-S2; furthermore alarms can be controlled by events like e.g. hold-value or min-/max-value.

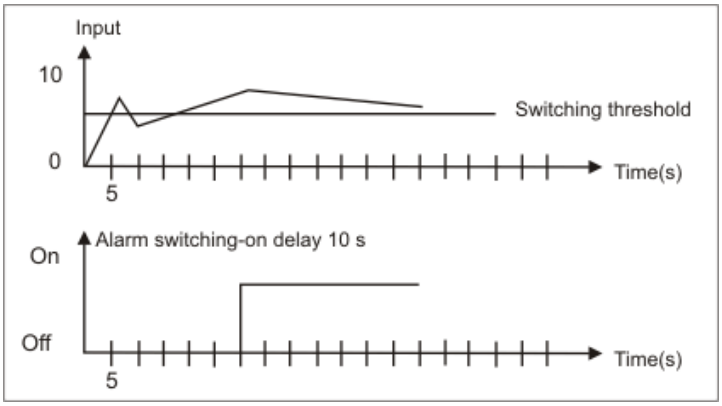
Function principle of alarms / relays	
Alarm / Relay x	deactivated, instantaneous value, min-/max-value, hold-value, totaliser value, sliding average value, constant value, difference between instantaneous value and constant value or an activation via the digital input
Switching threshold	Threshold / limit value of the change-over
Hysteresis	Broadness of the window between the switching thresholds
Working principle	Operating current / Quiescent current



Operating current
By operating current the alarm S1-S2 is off below the threshold and on on reaching the threshold.



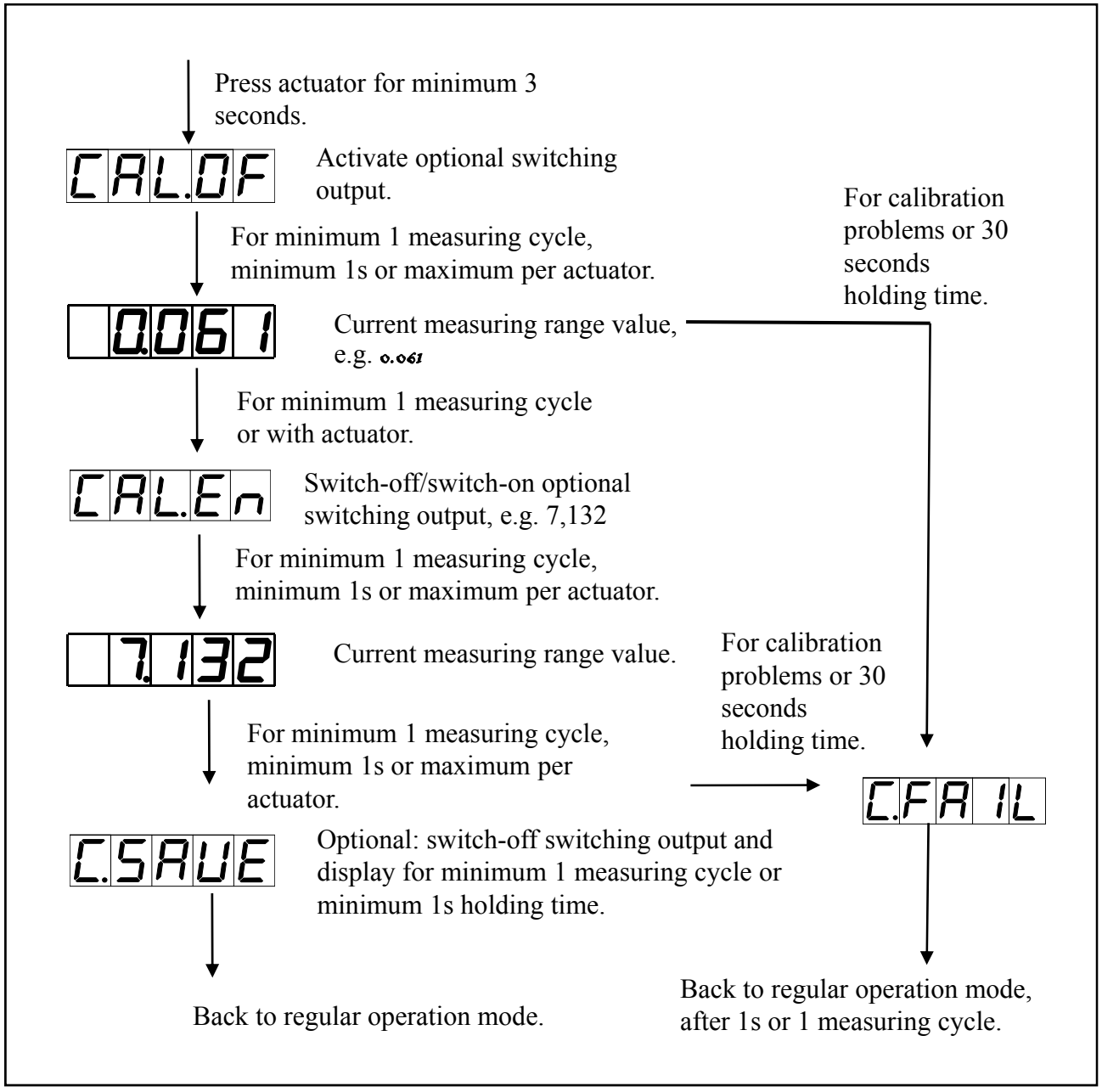
Quiescent current
By quiescent current the alarm S1-S2 is on below the threshold and switched off on reaching the threshold.



Switching-on delay
The switching-on delay is activated via an alarm and e.g. switched 10 seconds after reaching the switching threshold, a short-term exceedance of the switching value does not cause an alarm, respectively does not cause a switching operation of the relay. The switching-off delay operates in the same way, keeps the alarm / the relay switched longer for the parametrised time.

8. Sensor alignment offset / final value

The device is equipped with a semi-automatic sensor calibration (*SENSu/SENSa*). A switching output operates the trimming resistor, which exists in some sensors. An adjustment of offset and final value takes place, after which the sensor can be used directly. Depending on parameterisation, the calibration can be realized via the fourth key or via the digital input. It is possible to key during the calibration steps. So, reference signals can be connected manually. However, the calibration will be interrupted after 30 seconds.



9. Technical data

Panel meter				
Dimensions	Field housing: 96x96x56 mm (BxHxD)			
	Installation housing: 96x96x82 mm (BxHxD) including plug-in terminal			
Panel cut-out	$91.0^{+0.6}$ x $91.0^{+0.6}$ mm			
Wall thickness	up to 10 mm			
Fixing	screw elements			
Material	LEXAN 500R, black			
Sealing material	EPDM, 65 Shore, black			
Protection class	standard IP65 (front), IP00 (back side)			
Weight	approx. 330 g			
Connection	plug-in terminal; wire cross section up to 2.5 mm^2			
Display				
Digit height	14 mm			
Segment colour	red			
Display range	-19999 to 99999			
Setpoints	one LED per setpoint			
Overflow	horizontal bars at the top			
Underflow	horizontal bars at the bottom			
Display time	0.1 to 10.0 seconds			
Bargraph	55 segments in a 270° angle			
Bragraph colour	red			
Input	**Measuring range**	**Ri**	**Measuring error**	**Digit**
min. -22…max. 24 mA	0/4 – 20 mA	~100 Ω	0.1 % of measuring range	±1
min. -12…max. 12 VDC	0-10 VDC	~200 kΩ	0.1 % of measuring range	±1
Digital input	< 2,4 V OFF, 10 V ON, max. 30 VDC R_I ~ 5 kΩ			
Accuracy				
Drift of temperature	100 ppm / K			
Measuring time	0.1…10.0 seconds			
Measuring principle	U/F-conversion			
Resolution	approx. 18 Bit at 1 second measuring time			

Output	
Sensor supply	24 VDC / 50 mA; 12 VDC / 50 mA; 5 VDC / 20 mA
Analog output	0/4-20 mA /burden 350 Ω or 0-10 VDC / 10 kOhm, 16 Bit
Switching outputs	
Relay with change-over contacts Switching cycles	250 VAC / 5 AAC; 30 VDC / 5 ADC 30 x 10^3 at 5 AAC, 5 ADC ohm resitive burden 10 x 10^6 mechanically Division according to DIN EN50178 / Characteristics accrording to DIN EN60255
Memory	EEPROM
Data life	≥ 100 years at 25°C
Ambient conditions	
Working temperature	0°…50°C for panel meters, -20°…60°C for built-on devices
Storing temperature	-20…80°C
Weathering resistance	relative humidity 0-80% on years average without dew
Height	up to 2000 m above sea level
EMV	EN 61326
CE-sign	Conformity according to directive 2004/108/EG
Safety standard	Accroding to low voltage directive 2006/95/EG EN 61010; EN 60664-1

10. Safety advices

Please read the following safety advice and the assembly *chapter 1* before installation and keep it for future reference.

Proper use

The **ADI-1V-device** is designed for the evaluation and display of sensor signals.

Danger! Careless use or improper operation can result in personal injury and/or damage to the equipment.

Control of the device

The panel meters are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

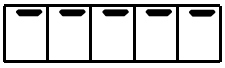
Installation

The **ADI-1V-device** must be installed by a suitably **qualified specialist** (e.g. with a qualification in industrial electronics).

Notes on installation

- There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.
- The **fuse rating** of the supply voltage should not exceed a value of **6A N.B. fuse**.
- Do not install **inductive consumers** (relays, solenoid valves etc.) near the device and **suppress** any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.
- Keep input, output and supply lines separate from one another and do not lay them parallel with each other. Position “go” and “return lines” next to one another. Where possible use twisted pair. So, you receive best measuring results.
- Screen off and twist sensor lines. Do not lay current-carrying lines in the vicinity. Connect the **screening on one side** on a suitable potential equaliser (normally signal ground).
- The device is not suitable for installation in areas where there is a risk of explosion.
- Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.
- The terminal area of the devices is part of the service. Here electrostatic discharge needs to be avoided. Attention! High voltages can cause dangerous body currents.
- Galvanic insulated potentials within one complex need to be placed on a appropriate point (normally earth or machines ground). So, a lower disturbance sensibility against impacted energy can be reached and dangerous potentials, that can occur on long lines or due to faulty wiring, can be avoided.

11. Error elimination

	Error description	Measures
1.	The unit permanently indicates overflow. 	• The input has a very high measurement, check the measuring circuit. • With a selected input with a low voltage signal, it is only connected on one side or the input is open. • Not all of the activated setpoints are parameterised. Check if the relevant parameters are adjusted correctly.
2.	The unit permanently shows underflow. 	• The input has a very low measurement, check the measuring circuit . • With a selected input with a low voltage signal, it is only connected on one side or the input is open. • Not all of the activated setpoints are parameterised. Check if the relevant parameters are adjusted correctly.
3.	The word "HELP" lights up in the 7-segment display.	• The unit has found an error in the configuration memory. Perform a reset on the default values and re-configure the unit according to your application.
4.	Program numbers for parameterising of the input are not accessible.	• Programming lock is activated • Enter correct code
5.	"Err" lights up in the 7-segment display	• Please contact the manufacturer if errors of this kind occur.
6.	The device does not react as expected.	• If you are not sure if the device has been parameterised before, then follow the steps as written in *chapter 6.* and set it back to its delivery status.

12. Declaration of Conformance

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

Universal Indicatin Unit Model: ADI-1V…

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

EN 61326

EN 61010

EN 60664

Also the following EWG guidelines are fulfilled:

2004/108/EC	EMC Directive
2006/95/EC	Low Voltage Directive

Hofheim, den 12. Januar 2012

H. Peters
General Manager

M. Wenzel
Proxy Holder