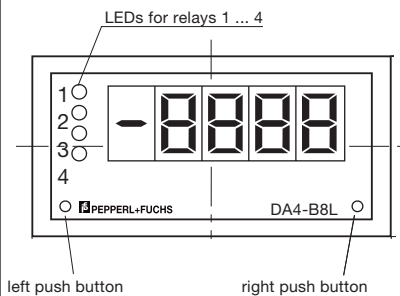


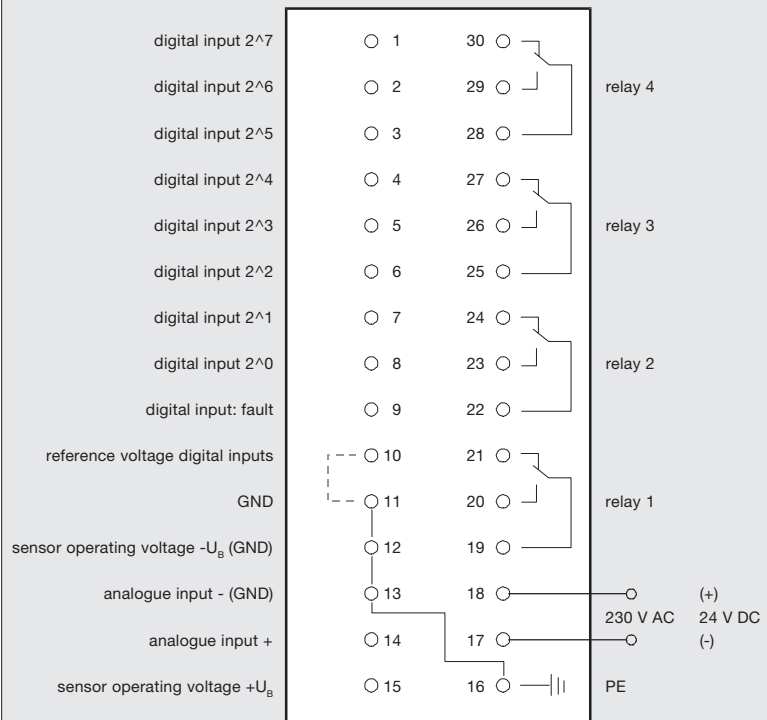
- programmable
- 8 bit input
- current/voltage input
- 4 relay outputs with programmable time functions



**Technical data**

Operating voltage $U_B$ :	115/230 V AC, $\pm 15\%$ , alternatively available: 24 V DC
Display:	4 digit display, red 7 segment LED, 13.5mm, 4 LED for relay
A/D-converter resolution:	with 0/4...20 mA, 0.2 % of full scale value with 0/2...10 V, 0.1 % of full scale value
A/D-converter error:	$\pm 0.4$ % of full scale value
Inputs:	<ul style="list-style-type: none"> <li>· 8 bit digital inputs pnp, current consumption 6.5 mA at 24 V, switching threshold at approx. 12 V/3 mA</li> <li>· 1 bit fault input pnp, current consumption 6.5 mA at 24 V, switching threshold, at approx. 12 V/3 mA</li> <li>· 1 analogue input 0/4...20 mA, load 150 <math>\Omega</math>, programmable to 0/2...10 V, <math>R_i</math> approx. 70 k<math>\Omega</math></li> </ul>
Outputs:	<ul style="list-style-type: none"> <li>4 relays each with 1 CO contact, potential-free, max. 250 V AC, 2 A, resistive load (with inductive load, switching protection with RC elements must be used)</li> <li>· Status LED in the display</li> <li>duration and type of time function are programmable</li> </ul>
Sensor operating voltage $U_B$ :	approx. 24 V DC, 90 mA
Operating temperature:	263 Kelvin ... 323 Kelvin (-10°C ... +50°C)
Storage temperature:	263 Kelvin ... 343 Kelvin (-10°C ... +70°C)
Housing:	DIN 43700, 96x48x182 mm
Connection type:	removable screw terminals 1.5 mm <sup>2</sup> ,
Protection class to DIN 40 050:	front window IP43

**Connection:**



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## DA4-B8L

The display unit DA4 - B8L has been conceived as a digital display, threshold value indicator and power supply for ultrasonic sensors. The following can be connected to the device:

- sensors with 8 bit output
- sensors with analogue output (0/2...10V) or (0/4...20mA) and in special cases
- sensors in 2 conductor design (4...20mA)

The unit has 4 relay outputs which can be programmed independently from each other in respect to time and switching characteristic.

Two programming push-buttons allow fast and easy adjustment of the display or limit value indication to the sensor type and measuring application.

### 1. Commissioning

The sensor is connected to the display unit, depending on its output transistor, according to connection plans 1 to 4 (see appendix).

If the sensor requires more current than the display device can provide, it must be connected to an external mains power supply.

After switching on the supply voltage, 230 VAC (or 24 VDC) the unit must be switched to the programming mode (editing) and the appropriate measuring applications programmed.

Error messages U-01 to U-04 (see sect. 3) show that the selection of the input signal must be corrected for the display unit under the parameter address A23.

## 2. Programming/editing

### 2.1 General information for programming

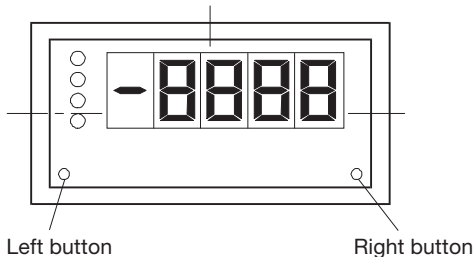
The programming / editing of the display unit must be completed from the password entry (address A00 = 0123) through to the storage of the modified parameters.

Since under certain circumstances up to 23 programming steps can be necessary, the important parameters should be noted before the programming is carried out and according to the ascending parameter address.

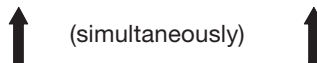
Application examples (in the appendix) can assist with the selection of the parameters.

To commence the program mode/editing, both push-buttons must be simultaneously pushed upwards.

2.2 Overview of Button Functions



**Starting the Program Mode / Edit**  
Parameter addresses (A00...A26)  
are displayed



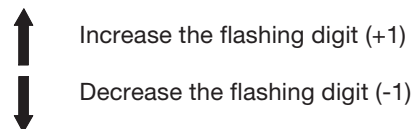
**Change Parameter Address Displays**



**Change Parameter Word Display**  
the word consists of 4 positions, the flashing  
digits are alterable



alterable, adjust the flashing position to the left



Display address

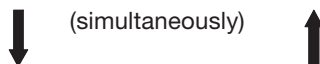


**Ending the Program Mode / Edit**

Display address



save the altered parameters in the EEPROM  
clear the ABS (A85) signal with the left button  
→ standard signal



or

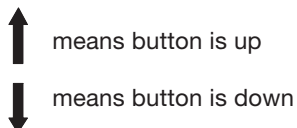
Display address



**do not** save the altered parameters in the EEPROM  
supply



(are maintained until deactivation of  
voltage)



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**2.3 Short description of the most important parameters**

The given **standard values are adjusted for normal operation!**

min. = minimal value

max. = maximal value

st. val. = standard value

**A 00 = Password entry:** (software version 6) Password **0123**, if the parameter words are to be modified. Display is possible at any time.

**A 01....A 16 = parameter set for relays 1...4**

Relay1	Relay2	Relay3	Relay4	Min.	Max.	Stw.
A 01	A 05	A 09	A 13 = <b>lower limit</b>	0	9999	800
A 02	A 06	A 10	A 14 = <b>upper limit</b>	0	9999	1000
A 03	A 07	A 11	A 15 = <b>Time for time function</b>	1	250	10..40
A 04	A 08	A 12	A 16 = <b>Type of time function</b>	0	9	1

0 = none

1 = pickup delay

2 = dropout delay

3 = pulse output

4 = pulse extension

5 = inverted none

6 = inverted pickup delay

7 = inverted dropout delay

8 = inverted pulse output

9 = inverted pulse extension

**A 17 = general relay time constant** x 10 msec.

min. = 0 / max. = 250 / st. val. = 10

**A 18 = display time:** time for constant display x 10 msec

min. = 1 / max. = 250 / st. val. = 30

**A 19 = fixed decimal place display:**

digits after the decimal point (comma)

min. = 0 / max. = 3 / st. val. = 0

**A 20 = minimum display value:**

min. = 0 / max. = 9999 / st. val. = 0

**A 21 = maximum display value:**

min. = 0 / max. = 9999 / st. val. = 9999

**A 22 = maximum decimal value from the table:**

min. = 230 / max. = 255 / st. val. = 255

**A 23 = selection of the input signal**

0 = digital input 8 bit parallel,

1 = analogue input 0 V...10 V,

2 = analogue input 2 V...10 V,

3 = analogue input 0 mA...20 mA,

4 = analogue input 4 mA...20 mA,

I min approx. 5mA

Ri approx. 70 kOhm

Ri approx. 70 kOhm

load approx. 150 Ohm

load approx. 150 Ohm

**A 26 = software version number request:** (= 6)

**2.4 Explanation of parameters**

The given **standard values are adjusted for normal operation!**

**A 00** = Password entry: if the parameters are to be modified, the password **0123** for the software version 6 must be entered!

**A 01...A 16** = parameter set for relays 1 to 4

Relay1	Relay2	Relay3	Relay4
A 01	A 05	A 09	A 13 = <b>lower limit for the switching signal</b>
A 02	A 06	A 10	A 14 = <b>upper limit for the switching signal</b>
A 03	A 07	A 11	A 15 = <b>time for time functions</b>
A 04	A 08	A 12	A 16 = <b>type of time function</b>

**Lower/upper limit value**

These are the values, set with A20 and A21, at which the relay should switch.

A hysteresis can be realised for both parameters. In this way, the relay will not continually switch if the sensor detects objects which move back and forth across the limit value (e.g. changing water levels).

With ultrasonic sensors and some opto-electronic sensors, the **dead zone** determines the minimum switching interval. The measured values are not valid in this zone (see the sensor data sheet).

minimum value = 0  
 maximum value = 9999  
 standard value (lower limit) = 800  
 (upper limit) = 1000

**Time for time functions:**

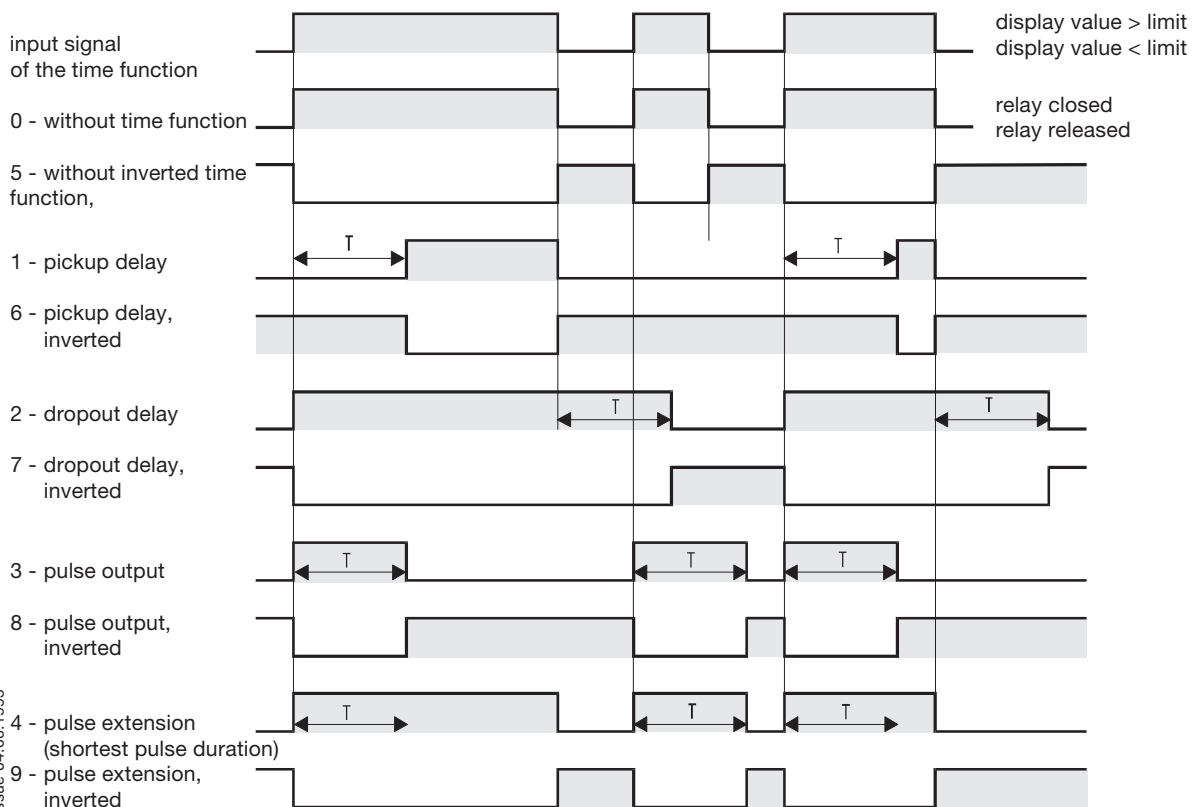
The effective time for the relay functions results from a combination of a general time constant, which is set at parameter address A17, and the selected time for the time function. Both values are multiplied together and again multiplied by 10 ms (e.g. for relay1 = (A03) x (A17) x 10 msec)

minimum value = 1  
 maximum value = 250  
 standard value (relay 1)= 10  
 (relay 2)= 20  
 (relay 3)= 30  
 (relay 4)= 40

**Type of time function:**

- 0 = without
- 1 = pickup delay
- 2 = dropout delay
- 3 = pulse output
- 4 = pulse extension
- 5 = inverted without
- 6 = inverted pickup delay
- 7 = inverted dropout delay
- 8 = inverted pulse output
- 9 = inverted pulse extension

With the options 0 to 4, the relay closes if the limit is reached. With the options 5 to 9, it opens. The appropriate time function input signal is the selected limit value for the respective relay.



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**Pickup delay:** If the limit is reached, then the relay closes only after the time T; but opens immediately if the value falls below the limit.

**Inverted pickup delay:** If the limit is reached, then the relay opens only after the time T; but closes immediately if the value falls below the limit.

**Dropout delay:** If the limit is reached then the relay closes immediately however, if the value falls below the limit then the relay opens only after the time T.

**Inverted dropout delay:** If the limit is reached, then the relay opens immediately, however it closes only after the time T.

**Pulse output :** If the limit is reached, then the relay closes immediately; and remains closed for time T independent of whether, in the mean time, the measured value changes.

**Inverted pulse output :** If the limit is reached, then the relay opens immediately; and remains open for time T independent of whether, in the mean time, the measured value changes.

**Pulse extension:** The relay remains closed when the measured value rises above the limit, for at least the time T .

**Inverted pulse extension:** The relay opens when the limit is reached and remains open when the measured value rises above the limit; for at least the time T y.

**A 17 = general relay time constant** x 10 msec.

$$T = (A03/A07/A11/A15) \times (A17) \times 10 \text{ msec}$$

The selected value here is multiplied with the stored value from A 03 (relay 1), A 07 (relay 2), A 11 (relay 3) or A 15 (relay 4) and 10 msec. This results in an effective time constant of the time functions for each relay.

The time function of all the relays can then be modified with a common factor.

minimum value = 0  
maximum value = 250  
standard value = 10

**A 18 = display time:** time for constant display x 10 msec.

The time for which the display does not change can be fixed here, even if the value measured changes. After this time, the display will be updated.

minimum value = 1  
maximum value = 250  
standard value = 30

**A 19 = fixed decimal place display**

The display consists of 4 digits. This option determines where the decimal point will be set, e.g. the value 2 sets 2 display digits **after** the decimal point.

Normally, the analogue value measured will be displayed in units of length in mm. Depending upon the size of the acquisition range of the connected sensor and the measuring requirement, the display in mm can be incompatible, e.g. for a 6 meter sensor, option 1 should at least be selected. Then the value measured will be displayed in cm.

The following parameters A 20 and A21 determine in which units and with which display value the measured value will be set, as well as the setting of the corresponding decimal point.

minimum value = 0  
maximum value = 3  
standard value = 0

**A 20 = minimum display value:**

The 4 digits given here define the display value that the device should display close to the measurement range of the sensor. The measurement range begins after the dead zone (see data sheet) or, with sensors with adjustable measurement windows, with the appropriately matched value measured in the acquisition range.

The display value is freely selectable. Normally, the value will be given in mm (A19 determines the decimal place). Using a calculated factor a display is also possible in other units (e.g. cubic meter, tonnes, gallons, etc.)

minimum value = 0  
maximum value = 9999  
standard value = 0

**A 21 = maximum display value:**

This value should be displayed on the unit if the sensor detects an object outside the measurement limit (or the maximum acquisition range). The value here will also be given in mm or in other units with a calculated factor.

minimum value = 0  
maximum value = 9999  
standard value = 9999

**A 22 = maximum decimal value from table:**

(only for ultrasonic-sensors with 8 bit output)

If the measured distance is converted into an exact mm display, then the value 254 must be given and the parameter under the addresses A 20 (minimum display value) and A 21 (maximum display value) correspondingly adjusted:

Sensor	A 22	A 20	A 21	LSB
UJ3000+U1+8B+RS	254	300	3083	11 mm
UJ4000-FP-8B	254	500	4042	14 mm
UJ6000-FP-8B+RS	254	800	6113	21 mm

minimum value = 230  
maximum value = 255  
standard value = 255

**A 23 = selection of the input signal**

0 = digital input 8 bit parallel,	I min approx. 5mA
1 = analogue input 0 V...10 V,	Ri approx. 70 kOhm
2 = analogue input 2 V...10 V,	Ri approx. 70 kOhm
3 = analogue input 0 mA...20mA,	load approx. 150 Ohm
4 = analogue input 4 mA...20 mA,	load approx. 150 Ohm

If doubt exists about an option, the data sheet of the connected sensor should be referred to. If an adjustment is incorrect during the commissioning, the error indicators U-01 to U-04 can be displayed (see sect. 3).

**A 26 = query software version number:**

The version number of the unit corresponding to this document is number 6. The value can only be requested by the user, however it cannot be modified.

**A 24 = maximum input signal** for analogue input calibration (for clarification see the appendix)**Attention!**

This option should only be used by appropriately qualified personnel!

**A 25 = minimum input signal** for analogue input calibration (for a clarification refer to the appendix)

minimum value = 0  
maximum value = 255  
standard value = 0

**Attention!**

This option should only be used by appropriately qualified personnel!

**3. Error messages / special messages ABS**

**U-00** An attempt has been made to modify a parameter value without having entered the correct password (A 00 = 0123). Acknowledge with the left key and repeat the password entry.

**U-01** DIGITAL-ERROR, the selected digital channel has the signal decimal 0 or decimal 255 in the digital inputs (for an example refer to the appendix)

**U-02** DISTURBANCE-ERROR, the selected digital channel has the input disturbance signal active. i.e. the sensor received uncontrollable noise signals (dual-red LED, 2 Hz blinking; the 8 bit data word contains the last value measured).

**Attention!**

Pepperl+Fuchs sensors with 8 bit output are programmed to operate as normally closed contacts with the disturbance output. Therefore, before connecting the display unit, it must be reprogrammed for normally open contacts. (see appendix)

**U-03** Analogue input signal too small, e.g.:  
< 1 V for 2...10V, or  
< 2 mA for 4...20mA

With modified offset values (with A 25), the failure threshold will be half of the lowest value of the measurement range. e.g. for a 3...10 V measurement range, the failure will occur for input signals below 1.5V.

(for an example, see the appendix)

**U-04** Input signal too large

With a 0/2...10V input, the error signal threshold voltage will be > approx. 12 V, with the 0/4...20 mA input, the threshold will be at a current flow > approx. 30 mA.

For protection of the input measuring resistances, the input will be set to a high impedance state and the current flow interrupted.

Error messages can only be removed by a short-term interruption of the input signal or by reducing the voltage below 5V (the voltage will now be measured).

**U-05** Parameter error when reading the EEPROM (see appendix)

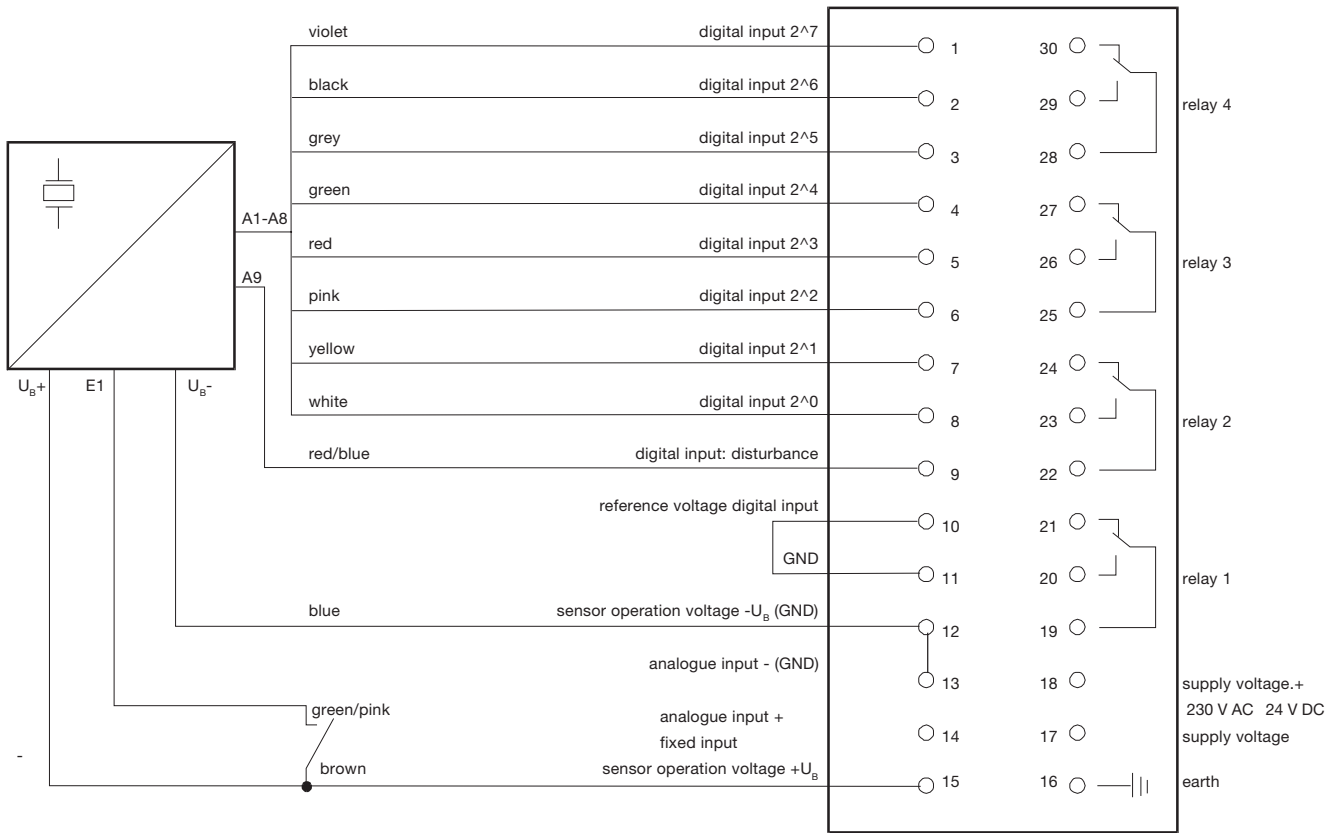
The error messages U-01 to U-04 will be automatically reset when the error is removed. If an error occurs, all relays will be de-energised (as with a mains failure). If the program mode/editing is activated, all decimal points light as an error indication, however the device can be programmed further.

**ABS (A85)** Parameter set is stored in the EEPROM.

After acknowledgement with the left key, the display changes back to normal.

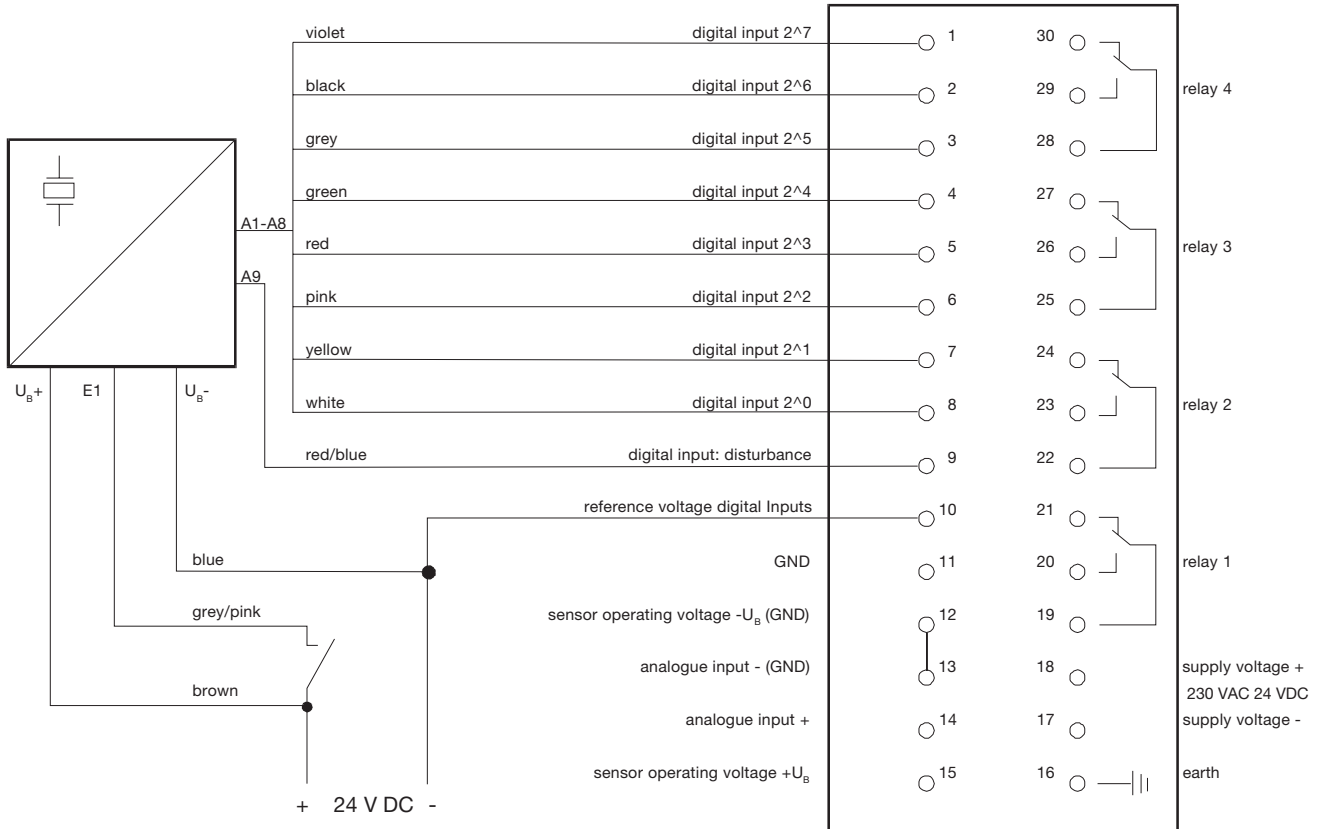
**Connection diagram 1: Pepperl+Fuchs ultrasonic sensor with 8 bit output**

Voltage supply of the sensor from the display unit



**Connection diagram 2: Pepperl+Fuchs ultrasonic sensor with 8 bit output**

Voltage supply of the sensor with an external mains supply

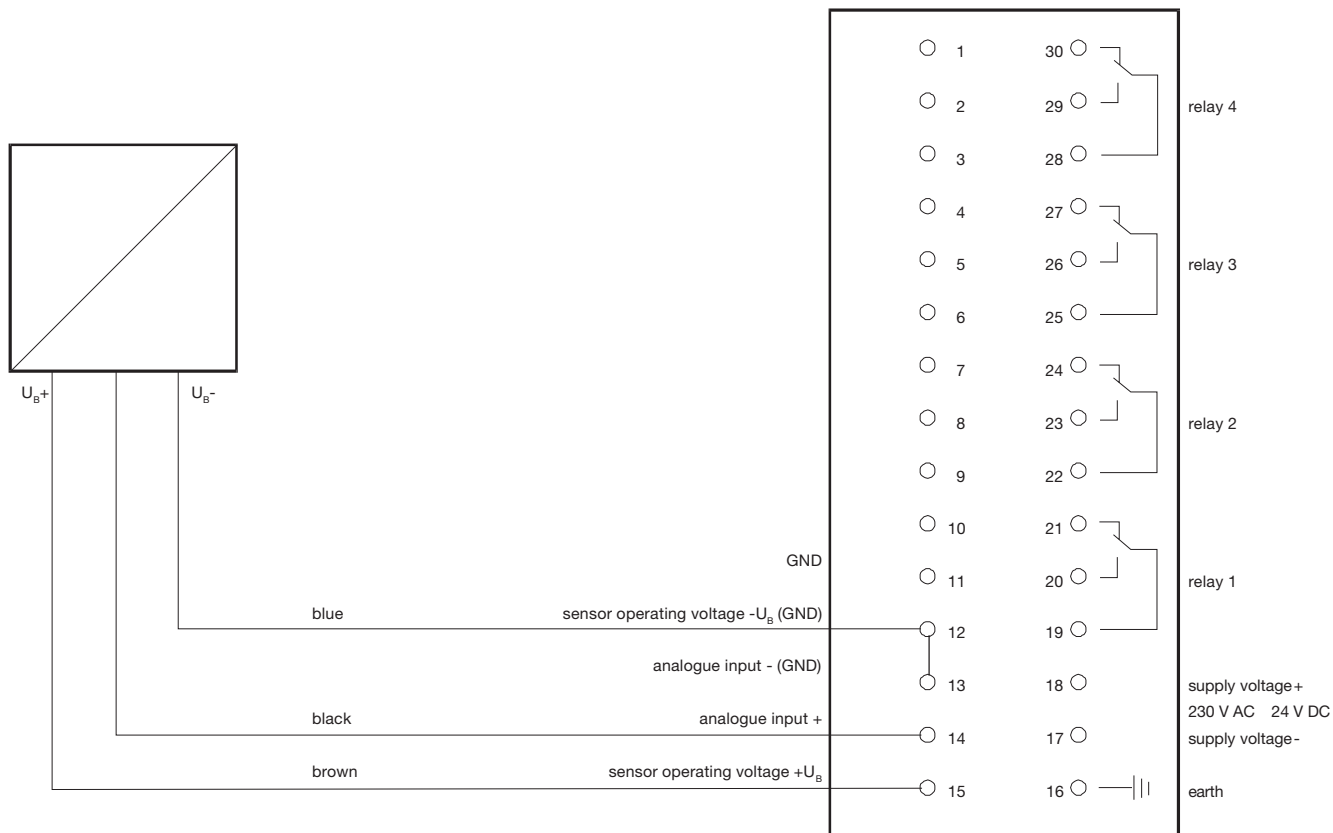


E1 - Fixed input

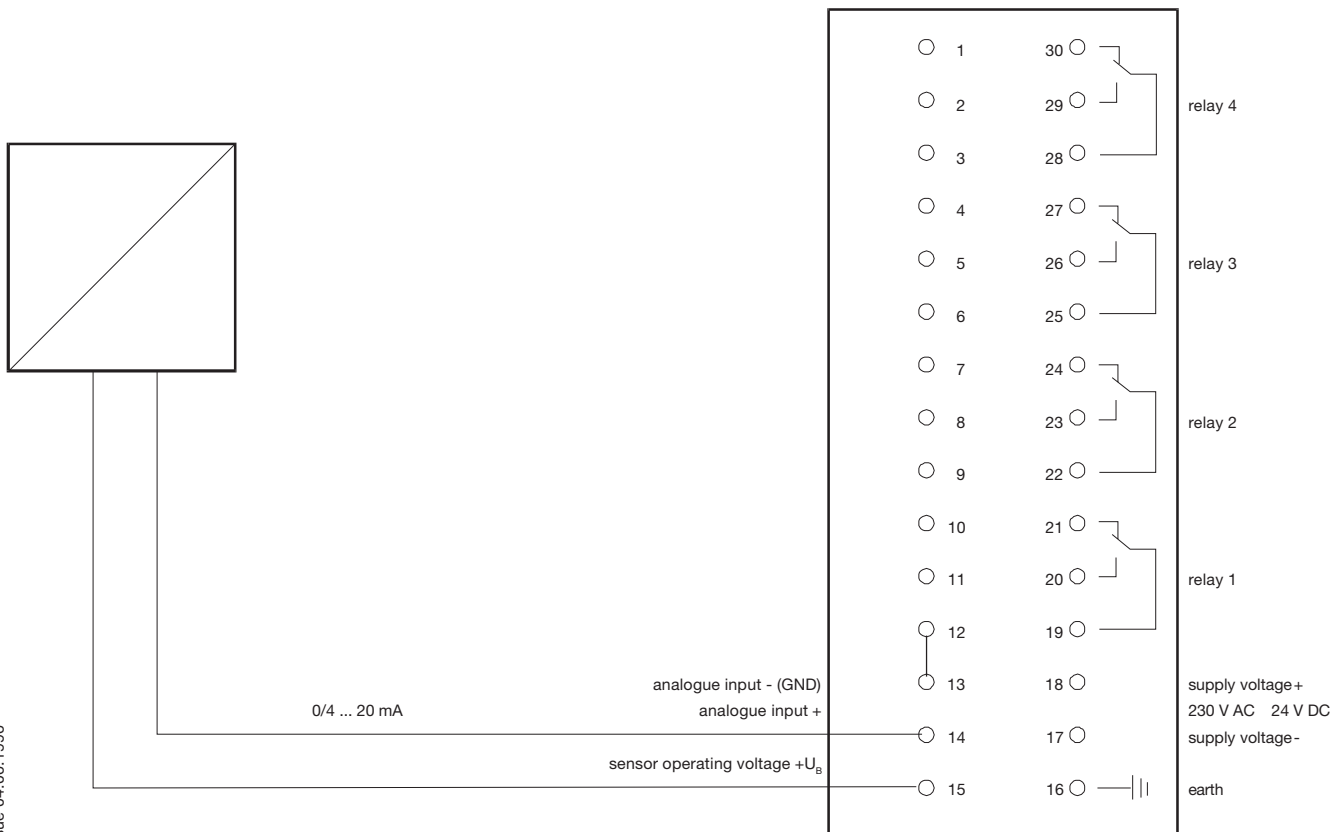
Date of issue 04.06.1996



Connection diagram 3: Analogue sensor in 3-lead configuration



Connection diagram 4: Analogue sensor in 2-lead configuration



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## Appendix

for **calibration functions for the A/D converter:**

### Attention!

**This option should only be used by appropriately qualified personnel!**

#### A 24 = maximum input signal

for analogue input calibration

With the selected input signal 0/2 V...10 V (A 23 = 1/2) an analogue input voltage of exactly 10 V, or with selected input signal 0/4 mA...20 mA (A 23 = 3/4) an analogue input current of exactly 20 mA must be applied. With the entry of the password 0127, the A/D-converter will be newly calibrated, i.e. the stored correction value in the EEPROM will be newly calculated and again stored in the EEPROM.

If a voltage or current signal is selected, an appropriate correction value must be used.

After a successful calibration, the password will be automatically reset to 0000 and all actual parameter values will be stored in the EEPROM.

minimum value = 0  
maximum value = 255  
standard value = 0

#### A 25 = minimum input signal

for analogue input calibration

This function is applicable with the selected input signal with offset, i.e. 2 V...10 V or 4 mA...20 mA. The max. value (with A 24) must have been previously correctly calibrated!

With selected input signal 2 V...10 V (A 23 = 2) an analogue input a voltage of exactly 2 V, or with selected input signal 4 mA...20 mA (A 23 = 4) an analogue input a current of exactly 4 mA must be applied. After entry of the password 0063 the A/D-converter will be newly calibrated, i.e. the offset value previously stored in the EEPROM will be newly calculated and again stored in the EEPROM.

If a voltage or current signal is selected, an appropriate offset value is to be used.

After a successful calibration, the password will be automatically reset to 0000 and all actual parameter values will be stored in the EEPROM.

With a selected input signal of 0 V...10 V, the zero offset can be newly programmed with this function. The analogue input must be short-circuited and the password 0063 entered.

minimum value = 0  
maximum value = 255  
standard value = 0

**The upper and lower measurement range limits alternatively can be adjusted according to other voltages or currents.**

## Error messages U-01...U-05

for **error U-01:** e.g. 8 bit input is used, but there is no bridge 10-11 or programmed for 8 bit input (A23 = 0), but 3-lead sensor is connected or no or faulty  $U_B$  connection to the sensor

for **error U-02:** **programming normally-open operation with the interface**

Programming can be achieved with a service unit or with a PC installed program.

**service unit UG-SER-RS:** For programming the sensor, the RS-232 interface must be connected with that of the service unit. For the sensor versions A, B and C, the Datapack version 2.0 must be used.

With the menus MAIN and CONFIG, the sub-menu OM can be started. For the desired closing function, the option E2 must be selected.

**PC with program Ultra 2.0:** For programming the sensor, the RS-232 interface must be connected with the PC (mouse interface). For the sensor versions A, B and C the program Ultra 2.0 must be installed.

The option Connection must be selected from the main menu. Using the option Direct Entry with "OM,2", the closing function for the disturbance output can be programmed. Or: with the option Read Equipment Data, the program shows all data of the connected sensors. With TAB, the data in the masked fields can be modified. With the menu Set Connection and Equipment Data, the new data will be put into the sensor.

for **error U-03:** e.g. during the commissioning with no or a faulty connection of the analogue input 14 or the connected analogue sensor (0 mA...20 mA), but with A23 = 4 incorrect input signal selected

for **error U-05:** Check sum failure of the EEPROM parameters on starting the program (e.g. after connecting the operating voltage). By switching the operating voltage off and then on again (Power-On-Reset), the read failure can be eliminated if it is only caused by a momentary external disturbance.

If, however, the Power-On-Reset does not eliminate the error, then a parameter has been modified in the EEPROM due to an external disturbance. In this case, all parameters will be read as standard values from the program memory in order to guarantee a defined start-up set.

All programmable parameters must correspond to the special requirements that have been newly entered and stored.

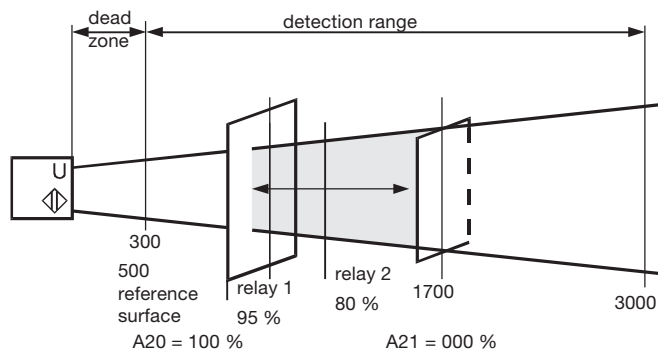
With use of the analogue input, the calibration must be newly performed with A 24 and A 25. Then the unit must be restarted by switching the operating voltage off and then on again.

The indicator U-05 shows that the relays remain off (as with a mains failure).

**Examples of use**

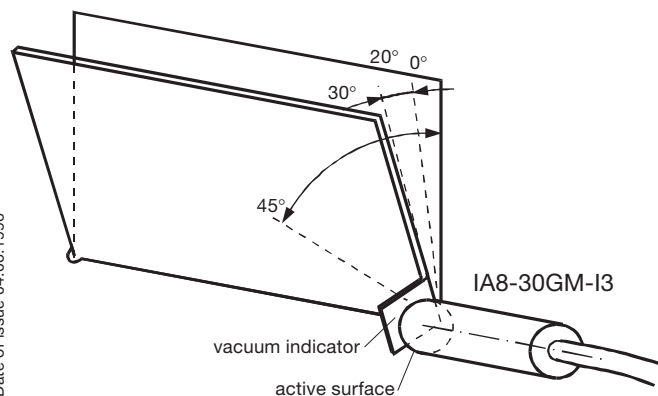
**1. Example:**

In **dusty environments**, the approximation of a target on a reference surface in the range 0.5 to approx. 2 m must be possible. Therefore a **UJ3000+U1+8B+RS** will parameterise a measurement window from 500 to 1770 mm. For this measurement range the LSB will correspond to 5mm (with the maximum acquisition range, LSB will be 11mm). The approach should be displayed in percent; a warning given before (relay 2) and error **when** it is reached (relay 1) the reference surface is requested.  
UJ3000+U1+8B+RS



**2. Example:**

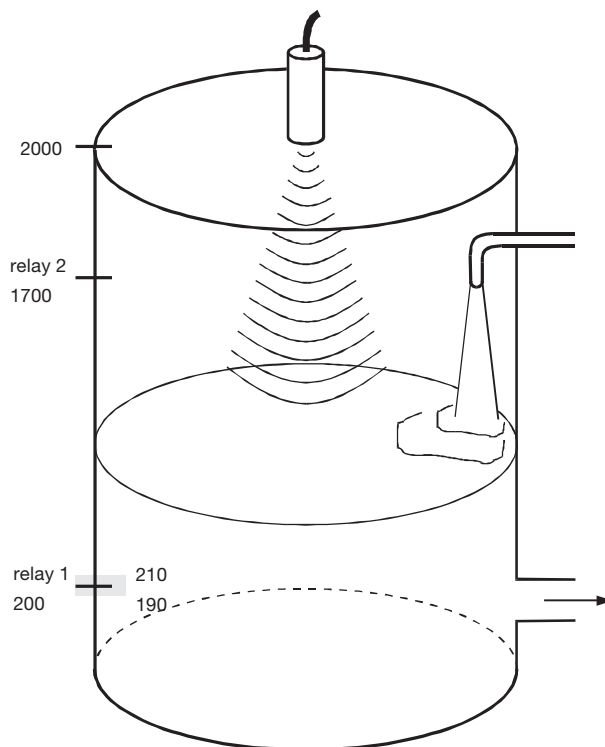
The **opening angle of a ventilating shutter** is evaluated with a vacuum indicator from an inductive analogue transducer **IA-8-30GM-I3**. The opening angle should be displayed from „open“ (approx. 45°) to „closed“ (0°). If the shutter is closed, then the active surface of the sensor is free (analogue output 20 mA). If it is open, then the vacuum indicator swings in front of the sensor (analogue output 0 mA). The optimised ventilation (20° to 30°) should be indicated with the relay 1 or 2 and the total closure (approx. 5°) indicated with relay 3.  
If the shutter continually swings, the display can be stabilised with display rate (A 18).



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**3. Example: Level Measurement** with the Ultrasonic Sensor **UC 2000-30GM-IU-V1**.

The level should be continuously displayed between 0000 and 2000 mm. An overflow would be avoided with a limit alarm at 1700 mm (relay 2), the drying out with an alarm at 200 mm. The rapidly moving surface (during filling) requires an evaluation hysteresis on the relay 1.  
UC2000-30GM-IU-V1



**Selected parameter words**

Parameter addresses	Meaning	Example 1	Example 2	Example 3	Level
		Factory set standard size	Ultrasonic (8 bit) UJ3000+U1+8B+RS	Ventilation shutter IA8-30GM-I3	UC2000-30GM-IU E3: ascending ramp
A00	Password for Entry	0	0123	0123	0123
A01	lower limit	800	095	020	210
A02	upper limit	1000	0095	0020	0190
A03	time for time function	10	-	-	-
A04	type of time function	1	-	-	-
A05	lower limit	1800	0080	0030	1700
A06	upper limit	2000	0080	0030	1700
A07	time for time function	20	-	-	-
A08	type of time function	1	-	-	-
A09	lower limit	2800	-	5	-
A10	upper limit	3000	-	5	-
A11	time for time function	30	-	-	-
A12	type of time function	1	-	-	-
A13	lower limit	3800			
A14	upper limit	4000			
A15	time for time function	40			
A16	type of time function	1			
A17	general time constant (x 10 msec)	10			
A18	display time (x 10 msec)	30	-	50	-
A19	decimal place display	0	1	2	1
A20	minimum display value	0	100	45	1800
A21	maximum display value	9999	0000	0000	0000
A22	for 8 bit sensors decimal value from table	255	246	-	-
A23	type of input signal	1	0	3	4

Note: With the parameter words that are not newly set, the factory set values are used!