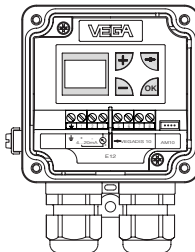
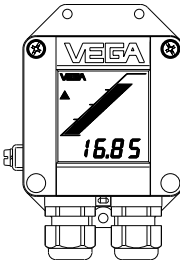
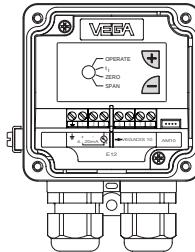
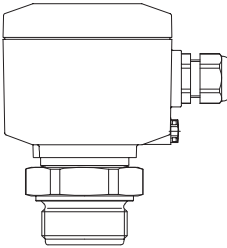


Operating Instructions

VEGABAR 44 (HART®)



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Safety information

Please read this manual carefully, and also take note of country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

For safety and warranty reasons, any internal work on the instruments, apart from that involved in normal installation and electrical connection, must be carried out only by qualified VEGA personnel.



Note Ex area

Please note the attached safety instructions containing important information on installation and operation in Ex areas.

These safety instructions are part of the operating instructions and come with the Ex approved instruments.

4 Setup

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1 Product description

1.1 Function and configuration

VEGABAR 44 process pressure transmitters are efficient instruments for process pressure measurement. As pressure sensor element, the dry ceramic-capacitive measuring cell CERTEC® is used. The process pressure causes a capacitance change within the measuring cell via the diaphragm. This capacitance change is detected by an ASIC (Application specific integrated circuit) and converted into a pressure-proportional signal by the integrated sensor electronics with microcontroller. Precise, high-resolution digital processing of measured data ensures excellent technical data.

The electronics module is powered by a separate VEGA signal conditioning instrument, a stabilised power supply unit or a PLC (active input). After the adjustment, a standardised 4 ... 20 mA current signal is made available which can be displayed (e.g. in PLC systems) or further processed.

For carrying out adjustment, the following alternatives are available:

- adjustment module directly on VEGABAR
- adjustment module in external housing (VEGADIS 10)
- via PC with adjustment software VEGA Visual Operating (VVO)
- with HART® handheld

1.2 Self-monitoring

To improve reliability, the functionality of important electronic components is constantly checked, and internal parameters such as sensor value, temperature and operating voltage are closely monitored.

VEGABAR 40 with ceramic CERTEC® measuring cell offers the advantage of continuous self-monitoring. The measuring and reference capacitances of the measuring cell constitute a predefined ratio over the entire measuring range. Any deviation from these data is a reliable indicator of a malfunction of the measuring cell.

If errors or malfunctions are detected during these routines, the fault signal is triggered via the 4 ... 20 mA output (current jump to 3.6 mA or 22 mA).

1.3 Technical data

Mechanical data

Materials, wetted parts

Process connection	brass 2.041, stainless steel 1.4571
Diaphragm	sapphire-ceramic® (99.9 % Oxide ceramic)
Seal, measuring cell	Viton, EPDM, Hifluour, Kalrez

Materials, non-wetted parts

Housing	high resistance plastic PBT (Polyester)
- optional	Alu-die casting, powder-coated
Ground terminal	stainless steel 1.4305
Indicating module window	Lexan

Weight

VEGABAR	approx. 0.8 kg (depending on process fitting)
---------	---

Adjustment and indicating elements

Adjustment of the basic functions	2 keys, 1 rotary-type switch
Menu-driven adjustment with additional functions	
- adjustment elements	4 keys
- indicating elements	DOT-matrix display, 3 lines with 7 figures each
Indicating module	LC display with
	- bar graph (20 segments)
	- digital value (4 digits)
	- tendency indicators for rising or falling values

Nominal measuring range	Gauge pressure resistance	Low pressure resistance
Gauge pressure		
0...0,1 bar / 0...10 kPa	15 bar / 1 500 kPa	-0,2 bar / -20 kPa
0...0,2 bar / 0...20 kPa	20 bar / 2 000 kPa	-0,4 bar / -40 kPa
0...0,4 bar / 0...40 kPa	30 bar / 3 000 kPa	-0,8 bar / -80 kPa
0...1,0 bar / 0...100 kPa	35 bar / 3 500 kPa	-1,0 bar / -100 kPa
0...2,5 bar / 0...250 kPa	50 bar / 5 000 kPa	-1,0 bar / -100 kPa
0...5,0 bar / 0...500 kPa	65 bar / 6 500 kPa	-1,0 bar / -100 kPa
0...10,0 bar / 0...1 000 kPa	90 bar / 9 000 kPa	-1,0 bar / -100 kPa
0...20,0 bar / 0...2 000 kPa	130 bar / 13 000 kPa	-1,0 bar / -100 kPa
0...40,0 bar / 0...4 000 kPa	200 bar / 20 000 kPa	-1,0 bar / -100 kPa
0...60,0 bar / 0...6 000 kPa	300 bar / 30 000 kPa	-1,0 bar / -100 kPa
-0,05...+0,05 bar / -5...+5 kPa	15 bar / 1 500 kPa	-0,2 bar / -20 kPa
-0,1...+0,1 bar / -10...+10 kPa	20 bar / 2 000 kPa	-0,4 bar / -40 kPa
-0,2...+0,2 bar / -20...+20 kPa	30 bar / 3 000 kPa	-0,8 bar / -80 kPa
-0,5...+0,5 bar / -50...+50 kPa	35 bar / 3 500 kPa	-1,0 bar / -100 kPa
-1,0...0,0 bar / -100...0 kPa	35 bar / 3 500 kPa	-1,0 bar / -100 kPa
-1,0...+1,5 bar / -100...+150 kPa	50 bar / 5 000 kPa	-1,0 bar / -100 kPa
-1,0...+4,0 bar / -100...+400 kPa	65 bar / 6 500 kPa	-1,0 bar / -100 kPa
-1,0...+10,0 bar / -100...+1 000 kPa	90 bar / 9 000 kPa	-1,0 bar / -100 kPa
-1,0...+20,0 bar / -100...+2 000 kPa	130 bar / 13 000 kPa	-1,0 bar / -100 kPa
-1,0...+40,0 bar / -100...+4 000 kPa	200 bar / 20 000 kPa	-1,0 bar / -100 kPa
-1,0...+60,0 bar / -100...+6 000 kPa	300 bar / 30 000 kPa	-1,0 bar / -100 kPa
Absolute pressure		
0...1,0 bar / 0...100 kPa	35 bar / 3 500 kPa	
0...2,5 bar / 0...250 kPa	50 bar / 5 000 kPa	
0...5,0 bar / 0...500 kPa	65 bar / 6 500 kPa	
0...10,0 bar / 0...1 000 kPa	90 bar / 9 000 kPa	
0...20,0 bar / 0...2 000 kPa	130 bar / 13 000 kPa	
0...40,0 bar / 0...4 000 kPa	200 bar / 20 000 kPa	
0...60,0 bar / 0...6 000 kPa	300 bar / 30 000 kPa	

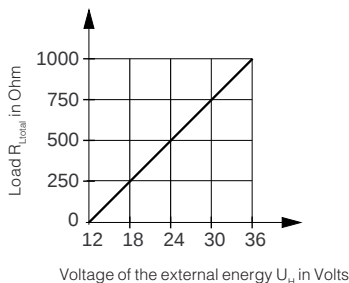
Electrical data

Adjustment ranges

Zero	adjustable from -20 ... +95 % of nominal range
Span	adjustable from 3.3 ... 120 % of nominal range

Supply and signal circuit

Supply voltage	12 ... 36 V DC
Exd version (pressure-tight encapsulation)	18 ... 36 V DC
Permissible residual ripple	$U_{ss} \leq 1 \text{ V}$
- at 500 Hz ... 10 kHz	$U_{ss} \leq 10 \text{ mV}$
Output signal	
- range	3.8 ... 20.5 mA
- resolution	6 μA
Current limiting	approx. 22 mA
Fault signal	22 mA (3.6 mA)
Integration time	0 ... 10 s adjustable
Rise time	85 ms ($t_i = 0 \text{ sec}$; 0 – 63 %)
Connection cable	2-wire
Max. permissible load	dependent on the supply voltage (see load diagram)



Display and adjustment circuit

For connection to	VEGADIS 10 and/or indicating module
Data transmission	digital
Connection cable	4-wire (standard cable)
Max. cable length	25 m

Connection

Cable entry	M20 x 1.5 (for cable- $\varnothing$ 5 ... 10 mm)
Screw terminals	for conductor cross sections of up to 2.5 mm ²

Protective measures

Protection ¹⁾	IP 65
Protection class	III
Overvoltage category	III

¹⁾ Use of a suitable seal for the cable in the PG is necessary for maintaining the housing protection. If the seal used does not fit the cable, it should be replaced by a suitable one.

Accuracy (similar to DIN 16 086, DIN V 19 259 - 1 and IEC 770)

Deviation

Reference conditions (acc. to IEC 770)	
- temperature	15°C ... 35°C
- rel. humidity	45 % ... 75 %
- air pressure	860 mbar ... 1060 mbar/86 kPa ... 106 kPa
Determination of characteristics	limit point adjustment acc. to DIN 16 086
Characteristics	linear
Deviation in characteristics	incl. hysteresis and repeatability
- Turn Down 1 : 1	< 0.25 % with accuracy class 0.25 < 0.1 % with accuracy class 0.1
- Turn Down up to 1 : 5	typ. < 0.3 % with accuracy class 0.25 typ. < 0.1 % with accuracy class 0.1
- Turn Down up to 1 : 10	typ. < 0.4 % with accuracy class 0.25 typ. < 0.2 % with accuracy class 0.1

Influence of the ambient temperature

Average temperature coefficient of the zero signal ²⁾	
- Turn Down 1 : 1	< 0.15 %/10 K with accuracy class 0.25 < 0.05 %/10 K with accuracy class 0.1
- Turn Down up to 1 : 5	typ. < 0.225 %/10 K with accuracy class 0.25 typ. < 0.075 %/10 K with accuracy class 0.1
- Turn Down up to 1 : 10	typ. < 0.3 %/10 K with accuracy class 0.25 typ. < 0.1 %/10 K with accuracy class 0.1

Long-term stability

Long-term drift of the zero signal ^{1) 3)}	< 0.1 % per 2 years
---	---------------------

Other actuating variables

Calibration position	upright, diaphragm points downwards
Influence of the mounting position	< 0.2 mbar/20 Pa
Vibration resistance	mechanical vibrations with 4 g and 5 ... 100 Hz, tested acc. to the regulations of German Lloyd GL-characteristics 2

¹⁾ Relating to the nominal measuring range.

²⁾ In the compensated temperature range of 0°C ... +80°C, reference temperature 20°C.

³⁾ Acc. to IEC 770, point 6.1.2 relating to the nominal measuring range.

Operating conditions

Ambient conditions

Ambient temperature	-40°C ... +85°C
- with indicating module	-20°C ... +70°C
Storage and transport temperature	-40°C ... +85°C
Product temperature, dependent on the seal material of the measuring cell	
- Viton	-20°C ... +100°C
- EPDM	-40°C ... +100°C
- Kalrez	0°C ... +100°C

1.4 Approvals and certificates

Approvals

-
- Ex Zone 2
 - StEx Zone 10
 - Ship approval
 - CENELEC EEx ia IIC
 - ATEX II 1G EEx ia IIC
 - ATEX II 2G EExd ia IIC

If the use of approved instruments is required for certain applications, the relevant official documents (test reports, test certificates and conformity certificates) must be observed. These are supplied with the respective instrument.

CE conformity

VEGABAR 40 corresponds to the requirements of EMC (89/336/EEG) and NSR (73/23/EEG). Conformity has been judged acc. to the following standards:

EMC	Emission	EN 50 081 - 1: 1992
	Susceptibility	EN 50 082 - 2: 1995
NSR		EN 61 010 - 1: 1993

NAMUR regulations

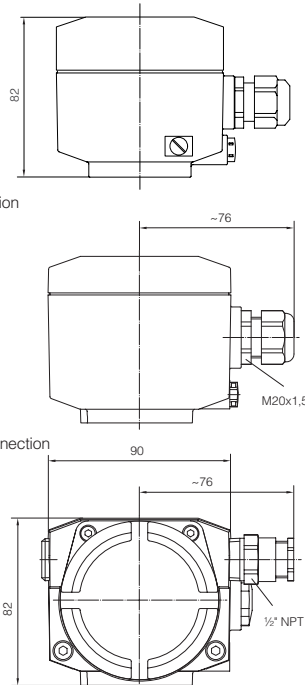
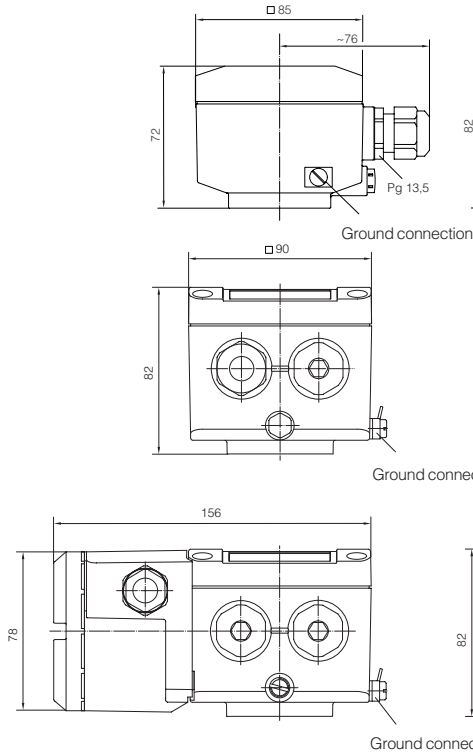
Full compliance with the NAMUR regulations NE 21 and NE 43.

1.5 Dimensions

Housing

without indicating module

with indicating module

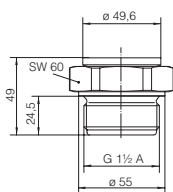


Version
plastic PBT

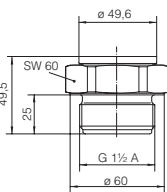
Version
Alu-die casting

Version
Alu-die casting
in EExd

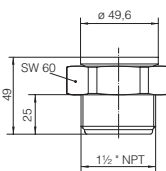
Process fitting



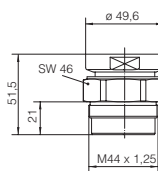
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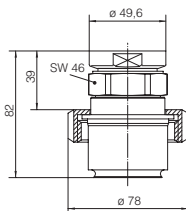
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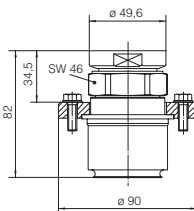
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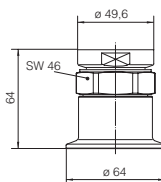
BA/BB



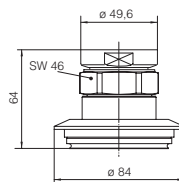
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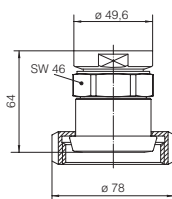
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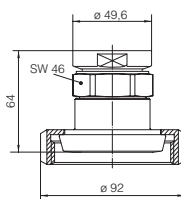
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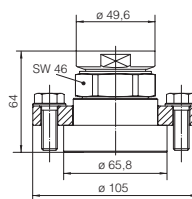
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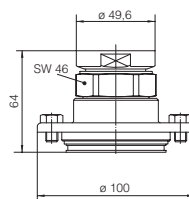
RA



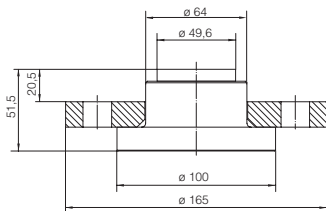
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AA



PA

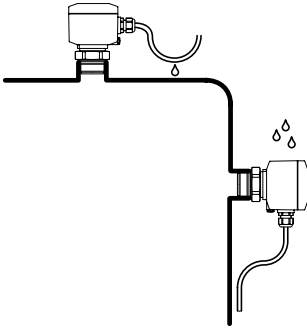


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2 Mounting

2.1 Mounting instructions

VEGABAR can be mounted in any position. Cable entries must point downwards to avoid moisture ingress. For this purpose, the housing can be rotated by 330° in relation to the mounting part.



A seal, appropriate for connection, must be used for mounting. This seal is either supplied with VEGABAR or must be provided by the customer.

2.2 Compensation of the atmospheric pressure

On instruments for gauge pressure measurement, the atmospheric pressure is compensated via a breather facility integrated in the housing.

3 Electrical connection

3.1 Connection instructions

The electronics in VEGABAR 44 requires a supply voltage of 12 ... 36 V DC. It is provided in two-wire technology, i.e. supply voltage and current signal are led to the terminals via the same two-wire connection cable.

This external energy is provided via a separate power supply unit:

- power supply unit, e.g. VEGASTAB 690
- processing unit with integrated DC current source (e.g. active PLC input)
- VEGAMET or VEGADIS 371

Make sure that the external energy source is reliably separated from the mains circuits acc. to DIN VDE 0106, part 101. The above-mentioned VEGA instruments meet this requirement, and protection class II is therefore ensured.

The external energy source must supply a terminal voltage of at least 12 V to the transmitter. The actual terminal voltage on the transmitter depends on the following factors:

- output voltage of the external energy source under nominal load.
- electrical resistances of the connected instruments in the circuit (see Connected instruments, load resistor).

Note the following instructions for electrical connection:

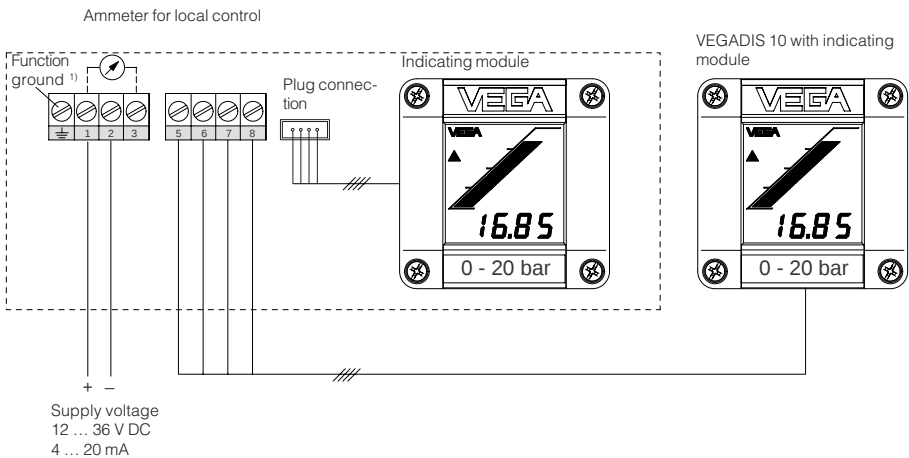
- Connection must be made according to the specific installation standards (e.g. in Germany acc. to the VDE regulations).
- Terminal voltage must not exceed 36 V, to avoid damage to the electronics.
- Electrical connection must have a preventative measure against inadvertent polarity reversal.
- The wiring between VEGABAR and the power supply can be carried out using standard two-wire cable.
- Screened cable is recommended, if strong electromagnetic interference is to be expected. The shielding must be grounded at both sensor ends. Please note the installation regulations for mounting in Ex areas.
- If overvoltages are expected, we recommend the installation of VEGA overvoltage arresters.
- In the cable connection, a seal must be used which fits the cable.
- For instrument version EExd (pressure-tight encapsulation) screened cable must be used for the instrument connection. Note the installation regulations.

3.2 Connection diagram

Note:

An ammeter for local control of the output current can be connected to terminals 1 and 3. This measurement can be made during operation without interrupting current on the supply cable.

VEGABAR with indicating module



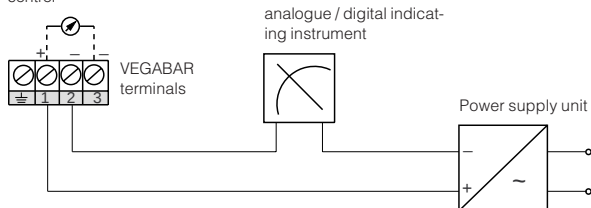
¹⁾ If screened cable is used, the screening should be grounded in the terminal compartment and the ground terminal on the outside of the housing must be grounded according to regulations. The terminals are connected to each other in the housing.

3.3 Connection examples

Supply via power supply unit

Processing is carried out using an indicating instrument.

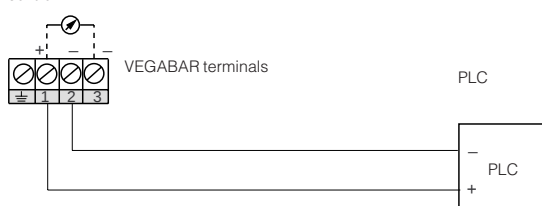
Ammeter for local control



Supply via a PLC with active input circuit

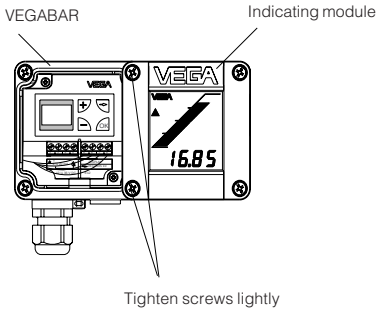
Processing is carried out via a PLC with active input circuit.

Ammeter for local control



4 Setup

Electrical connection and setup can be simplified by temporarily mounting the cover or the indicating module on VEGABAR laterally or downwardly displaced.

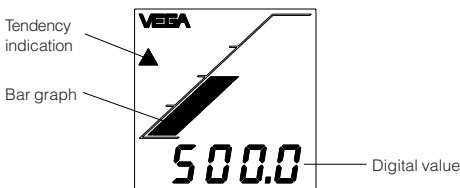


4.1 Indicating module

Digital value

- 4 digits and decimal point
- basic function module: indicates a permanent bar measurement range
- menu-driven module: allows individual scaling of bar measurement range

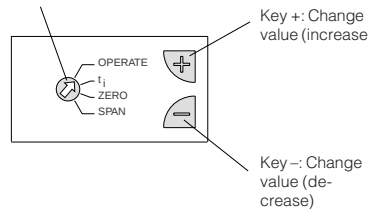
The connection is made via a plug connection acc. to the scheme in the "Electrical connection" section.



4.2 Setup with module "Adjustment of the basic functions"

Adjustment elements

Rotary switch: Select requested function



Adjustment system

- Select the required function with the rotary switch.
- Change the value with the "+" and "-" keys.
- Reset rotary switch to OPERATE, the adjusted values are transferred to the EEPROM memory. They remain there even in case of voltage drop.

Adjustment

For adjustment of zero and span, an ammeter must be connected to terminals 1 and 3. The measured value is identical to the output current.

1 Adjustment of zero

(e.g. process pressure zero or vessel empty)

- Set rotary switch to zero.
- By pushing the "+" and "-" keys simultaneously, the current jumps directly to 4 mA or set it to 4 mA by pushing the "+" and "-" keys.

Adjustment range of zero:

-20 % ... +95 % of nominal measuring range
(corresponds to turn up of up to +95 %)

2 Adjustment of span

(e.g. process pressure or level at maximum)

- Set rotary switch to span.
- By pushing the "+" and "-" keys simultaneously, the current jumps directly to 20 mA or set it to 20 mA by pushing the "+" and "-" keys.

Adjustment range of span:

3.3 % ... 120 % of the nominal measuring range (corresponds to turn down 1 : 30)

Note:

- A modification of zero does not influence the span, i.e. the final value of the measuring range will simply be shifted.
- It is also possible to adjust currents for partial fillings or partial pressures, e.g. 8 mA for 25 % and 16 mA for 75 %. VEGA-BAR automatically calculates the current values for 0 % or 100 % (only possible with ≥ 3.3 %).

Integration time

An integration time t_i of 0 ... 10 s can be adjusted for damping pressure shocks.

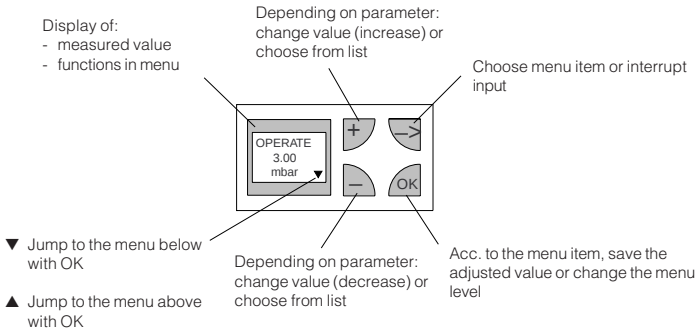
Procedure

- Set rotary switch to t_i .
- By pushing the "-" key 10 times, make sure that the integration time is set to 0 s.
- Push the "+" key once for every 1 s integration time required.

The integration time is the time required by the current output signal to reach 90 % of the actual level after a sudden change of the process pressure.

4.3 Setup with module "Menu-driven adjustment with additional functions"

Adjustment elements



The adjustment with the multifunctional module is menu-orientated and is made via the four keys in conjunction with the text display. The move from the measured value indication to the main menu is made with the "OK" key. Use the "→" key to change within a menu from one menu item to another.

Reset

A reset is shown by the ▲ symbol and enables a jump back to the menu above with the "OK" key.

Automatic jump back to measured value indication is triggered 60 minutes after the last key push.

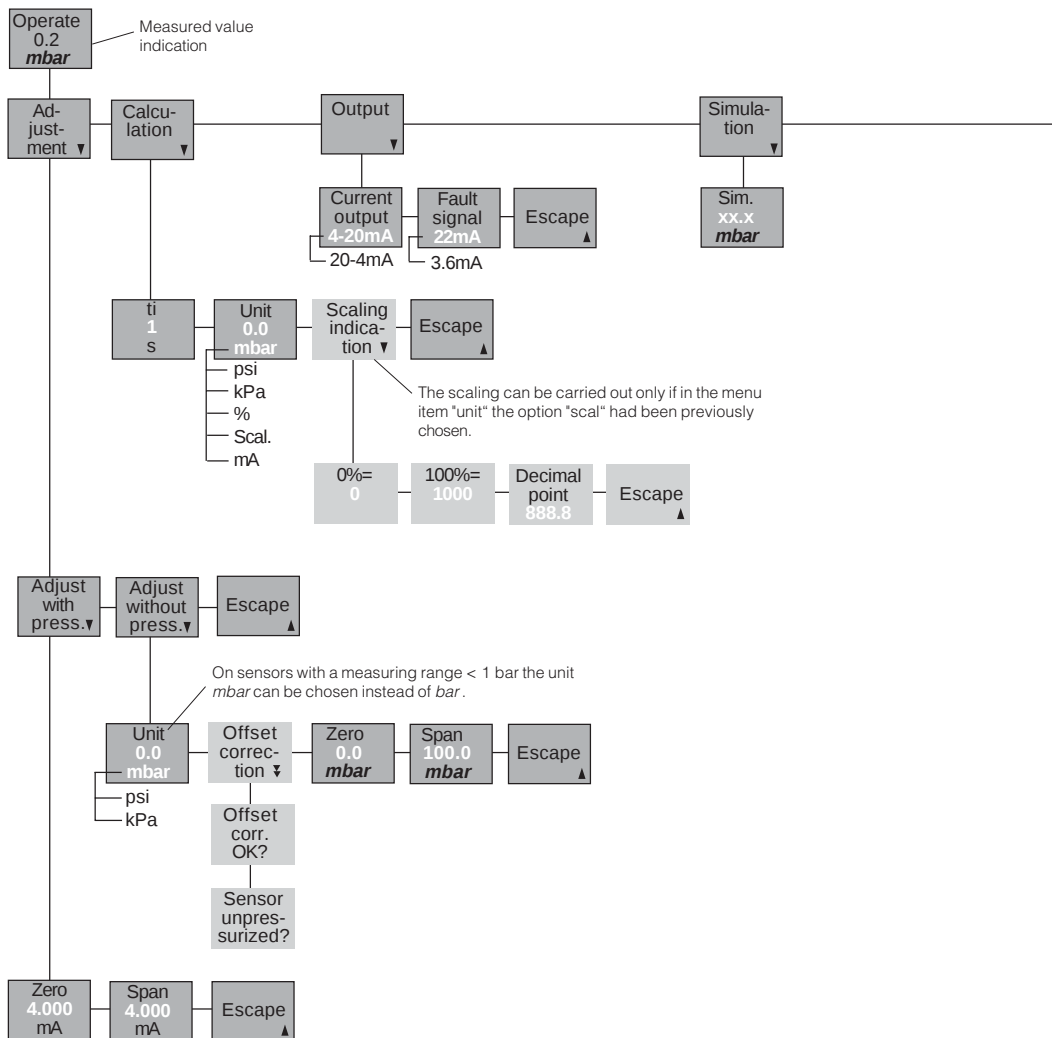
Branching points

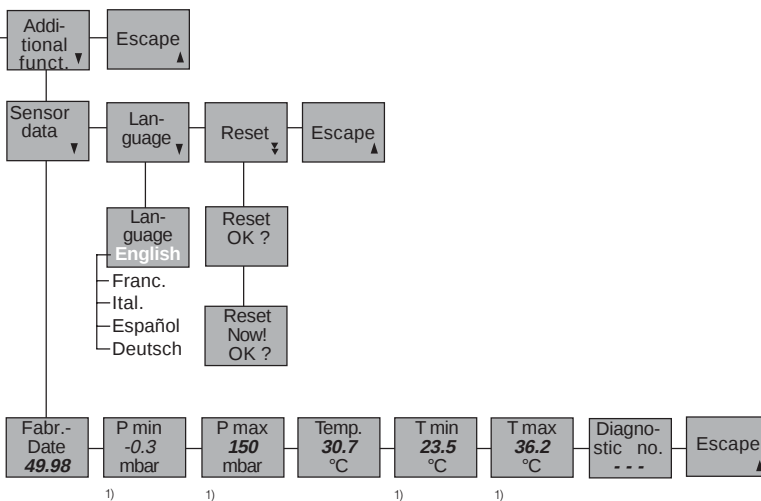
A branching point is shown by the ▼ symbol and enables a jump to the menu below with the "OK" key. In this menu you can find parameters which are linked (possibly in other submenus).

Parameters have no ▲ or ▼ symbol. The value of the parameters can be modified with the "+" and "-" keys or chosen from a list. When these keys are pushed once, the value flashes first. When pushed again, the value is modified. The modified value can be saved with the "OK" key. Push the "→" key to interrupt input (without storing the modification).

Certain parameters can be displayed but not modified.

Menu schematic

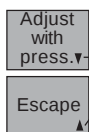




¹⁾ The values indicated here (min. and max. values) can be set to the present value by pushing the "+" and "-" keys simultaneously.



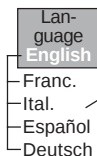
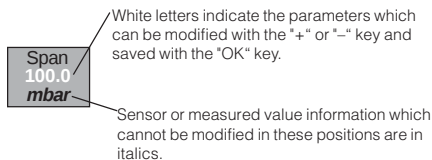
Use the arrow key to move to the right in the menu plan.



In the menu items with these symbols, you can move to the top or bottom with the "OK" key.



Light grey menu items are only displayed if necessary (dependent on the instrument version).



List
These options can be selected with the "+" or "-" key and saved with the "OK" key.

Adjustment taking the current pressure into account (live adjustment)

The live adjustment comprises two steps:

- 1 Adjustment of zero
- 2 Adjustment of span

The appropriate output current is displayed via the DOT-matrix.

1 Adjustment of zero

(e.g. process pressure zero or vessel empty)

Zero
4,000
mA

Set the current value to 4.000 mA with the "+" or "-" keys. Then push the "OK" key.

2 Adjustment of span

(e.g. process pressure or level at maximum)

Span
20,000
mA

Set the current value to 20.000 mA with the "+" or "-" keys. Then push the "OK" key.

Note:

- A modification of zero does not influence the adjusted span, i.e. the final value of the measuring range will simply be shifted.
- Push "+" and "-" simultaneously for standard adjustment of zero/span. The value jumps directly to 4 mA/20 mA.
- In the case of a high turn down the "+" and "-" key should generally be pressed simultaneously (due to resolution).
- By pushing the "+" or "-" keys individually, the current output remains at the last value, it takes on the adjusted value only after storing with the "OK" key.
- It is also possible to adjust currents for partial fillings or partial pressures, e.g. 8 mA for 25 % and 16 mA for 75 %. VEGA-BAR automatically calculates the current values for 0 % or 100 % (only possible with a delta >3.3 %).

Adjustment without taking the current pressure into account (dry adjustment)

Adjustment without pressure comprises four steps:

- 1 Selection of the unit in which the adjustment is to be carried out
- 2 Offset correction
- 3 Adjustment of zero
- 4 Adjustment of span

The offset correction (only in mode gauge pressure) defines the reference position for the measurement. It can be carried out:

- before or after the adjustment of zero and span
- before or after installation of VEGABAR.

VEGABAR must be unpressurised for the offset correction!

The adjustment without pressure can be carried out with the sensor installed or not installed (e.g. workroom). Any currently existing pressure has no effect on the adjustment.

1 Selection of the unit

Adjust
without
press.▼

Choose the unit with the "+" or "-" key. Save the selected unit with the "OK" key.

Unit
0,0
mbar

└─ psi

└─ kPa

3 Adjustment of zero

Zero
0,0
mbar

Adjust zero with the "+" or "-" key and save with the "OK" key.

4 Adjustment of span

Span
100,0
mbar

Adjust span with the "+" or "-" key and save with the "OK" key.

Note:

- A modification of zero does not influence the adjusted span, i.e. the final value of the measuring range will simply be shifted.
- By pushing the "+" or "-" keys individually, the current output remains at the last value, it takes on the adjusted value only after storing with the "OK" key.

Evaluation**Linearisation curve**

Lin.-
curve
active

Is only displayed if a linearisation curve had been activated with VVO.

Adjustment of the integration time

t_i
1
s

An integration time t_i of 0 s ... 10 s can be adjusted with the "+" or "-" key. The adjusted value can be saved with the "OK" key.

Selection of the indicated unit

Unit
0.0
mbar
psi
kPa
%
Scal.
mA

The actual measured pressure is indicated in the DOT-matrix in the measured value indication. The respective unit can be chosen with the "+" or "-" key and the "OK" key from a list. When choosing the unit "Scal.", the following menu items are available.

Scaling indication

In operating condition, the actual measured pressure is displayed on the indicating module:

- as bar graph with 20 segments
- as 4-digit digital value.

Scaling
indica-
tion ▼

0% = 0 100% = 1000 Decimal point 888.8 Escape ▲

Bar graph and digital value relate to the adjusted measuring range and change in proportion to the current output. Digital values < -10 % or > 110 % are shown as flashing figures.

As a result of scaling, the 4 mA or 20 mA user-specific current output values are passed to the indicating module as 4-digit digital values.

Outputs**Current output/Selection of the characteristics**

The current output provides the actual measured pressure as an analogue current signal 4 ... 20 mA relating to the adjustment.

Current
output
4-20mA
20-4mA

The characteristics can also be inverted, e.g. switched to 20 ... 4 mA with the "+" or "-" key and the "OK" key.

Fault signal

If, during the continuous self-monitoring, errors, damage or malfunctions in the measuring cell or the electronics are detected, a fault signal is triggered via the current output.

Fault
signal
22mA
3.6mA

With "+" or "-" key and the "OK" key you can choose if the failure current should be 22 mA or 3.6 mA.

Simulation

Simu-
lation ▼

Sim.
xx.x
mbar

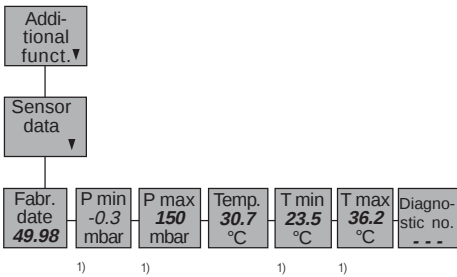
You can set with the "+" and "-" key an individual pressure or % value to check the outputs of VEGABAR and connected components. The set value flashes during activated simulation. The simulation can be stopped with the "OK" key.

Additional functions

Sensor data

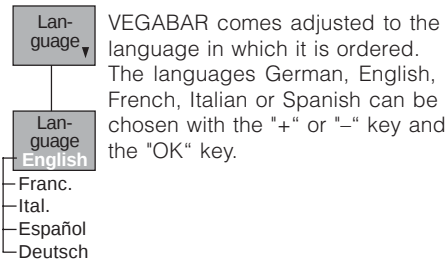
Important sensor data can be displayed via the DOT-matrix for information and diagnostic purposes:

- manufacturing date
- pointer function ($p_{\min}$)
- pointer function ($p_{\max}$)
- actual temperature value (Temp)
- pointer function ($T_{\min}$)
- pointer function ($T_{\max}$)
- diagnostic number



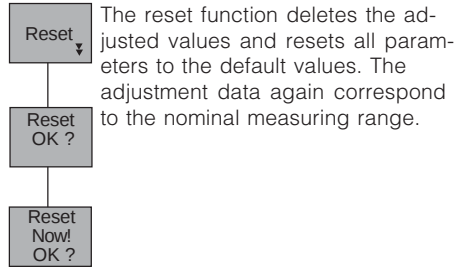
1) The min. and max. values can be set to the actual value by pushing the "+" and "-" keys simultaneously.

Language



VEGABAR comes adjusted to the language in which it is ordered. The languages German, English, French, Italian or Spanish can be chosen with the "+" or "-" key and the "OK" key.

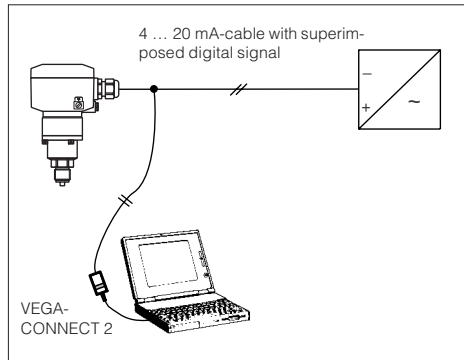
Reset



The reset function deletes the adjusted values and resets all parameters to the default values. The adjustment data again correspond to the nominal measuring range.

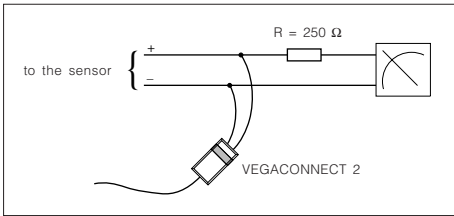
4.4 Setup with adjustment software VEGA Visual Operating (VVO)

VVO-connection to the 4 ... 20 mA-cable



For connection of the PC to the sensor, a VEGACONNECT 2 must be connected as adapter between PC and 4 ... 20 mA cable of the sensor.

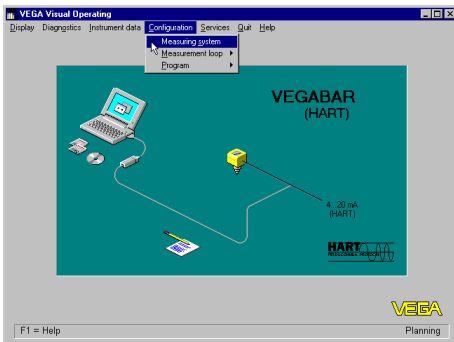
A digital signal is superimposed on the 4 ... 20 mA output of the sensor. Please note the internal resistance of the connected evaluation system. If it is $< 100 \Omega$ (e.g. with a power supply unit), the digital signal will be damped. In this case, connect a load resistor of $R = 250 \Omega$ into the 4 ... 20 mA cable loop.



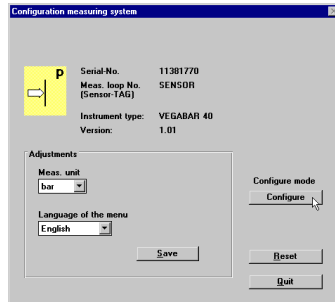
On analogue inputs of VEGA signal conditioning instruments or PLC systems, this resistance is generally $> 100 \Omega$, so that no damping occurs.

Sensor configuration

Connect the PC via VEGACONNECT 2 directly to the sensor or to the 4 ... 20 mA-cable. Then start VVO. If the PC was connected with VVO already running, push the function key **F8** on the PC. Then your monitor shows this picture "VEGA Visual Operating". For configuration of the sensor, first click to **Configuration**, then to **Measuring system**.



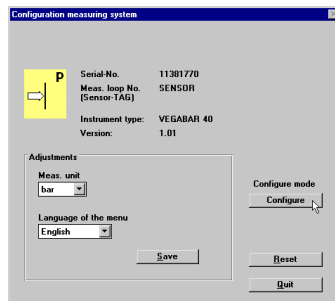
In the window "Configuration measuring system" the menu language of VEGABAR can be adjusted (only on VEGABAR with electronic version "HL"). As measuring unit you can choose bar, psi or kPa. By clicking **Reset** the VEGABAR will be reset to default. Click to **Save**, after you have made modifications. With **Quit** you return to the window "VEGA Visual Operating".



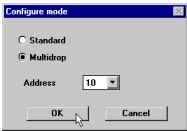
Multidrop operation

VVO supports from version 2.60 the Multidrop operation of HART[®] sensors. Multidrop means that the pressure transmitter always consumes a supply current of 4 mA, independent of the pressure. The output signal is not transmitted as usual via the current strength but exclusively via a superimposed digital signal. By means of this, up to 15 HART[®] sensors can be operated on only one two-wire cable. Therefore it is necessary to allocate in advance an address (1 ... 15) to each individual sensor.

If you want to operate VEGABAR in Multidrop mode, you have to click to the button **Configure mode** in the window "Configuration measuring system".



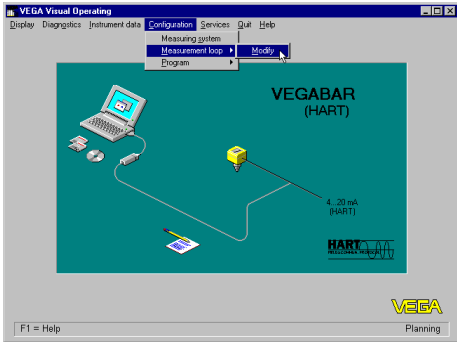
In the following window first choose **Multidrop**, then you can adjust the address and click to **OK**.



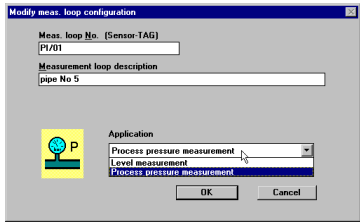
After this, several HART[®] sensors can be connected to one common cable. The further adjustments of VEGABAR in Multidrop operation (e.g. adjustment, measured value display) do not differ from the adjustments in standard operation.

Configuration measurement loop

Click to **Configuration**, point to **Measurement loop**, then click to **Modify**.

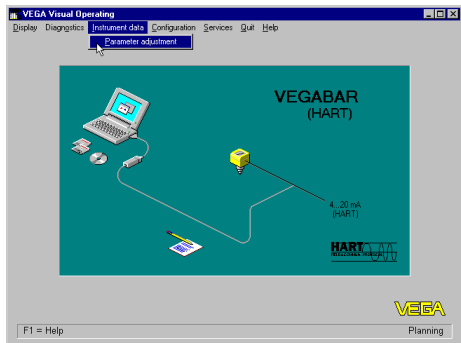


In the window "Configuration Measurement loop Modify" you can assign a name and a description to the measurement loop. An unambiguous name is important when you adjust several sensors or measurement loops with VVO. State under "Application" if you want to have a process pressure or level measurement. With **OK** you again reach the window "VEGA Visual Operating". In the following explanations we assume that you have chosen the application "Process pressure measurement". With the application "Level measurement" the adjustment deviates slightly from the following demonstration.



Sensor parameter adjustment – Adjustment

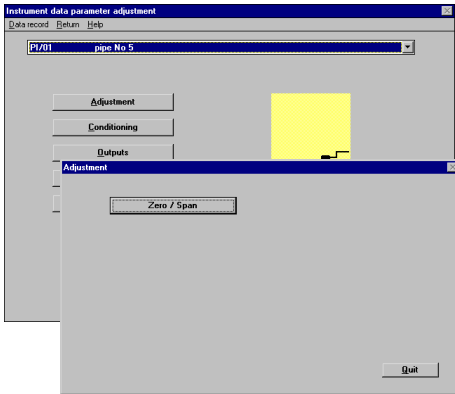
Click to **Instrument data**, then to Parameter adjustment.



Confirm this message with **OK**. Then the window "Instrument data parameter adjustment" appears.

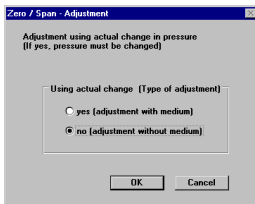


From the window "Instrument data parameter adjustment" you reach all submenus of the sensor. We recommend trying the individual buttons one after the other. Then you always reach this window. Click to the button **Adjustment** to carry out the adjustment.

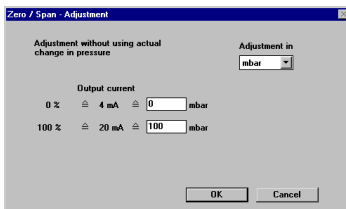


In the window "Adjustment" you click to **Zero/ Span**.

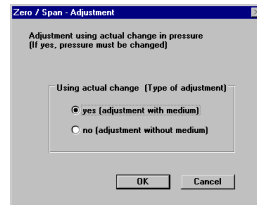
Then, in the window "Zero/ Span adjustment" you must choose the adjustment mode. If you want to carry out the "adjustment without taking the actual product into account" (dry adjustment), click to **no**, then to **OK**.



Here you can choose in which unit the adjustment should be carried out (mbar, psi, kPa). Then you enter in the appropriate fields the pressure values corresponding to 0 % and 100 %. Then click to **OK**. The adjustment is now carried out.



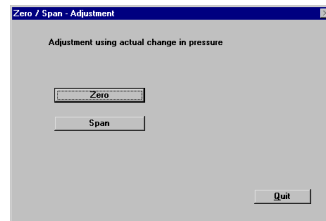
If you want to carry out the "Adjustment with medium" (live adjustment), click in this window to **yes**, then to **OK**.



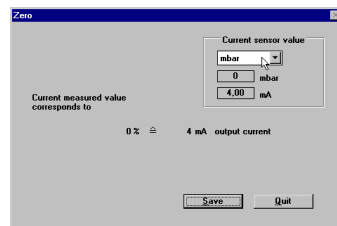
Click to **Zero** or to **Span** to carry out the appropriate adjustment.

Note:

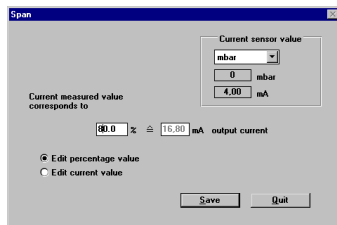
For the zero adjustment, the vessel or the pressure lines must be unpressurised! For the span adjustment you have to generate a defined pressure (e.g. 80 %) in the vessel or in the pressure lines.



In the window "Zero adjustment" you choose in which unit the adjustment should be carried out (mbar, psi, kPa). Click to **Save**. The zero adjustment is then carried out.

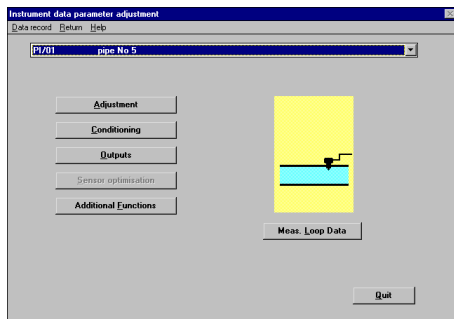


In the window "Span adjustment" you first choose in which unit the adjustment should be carried out (mbar, psi, kPa). Please state if you want to edit the percentage value or the current value. If you want to edit the percentage value, enter the value (e.g. 80 %) in the field. Then click to **Save**. The span adjustment is carried out.

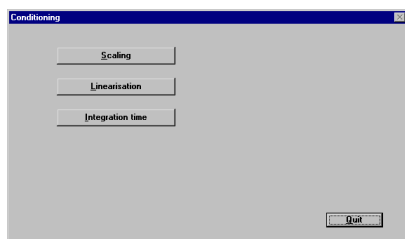


Sensor parameter adjustment – Linearisation curves

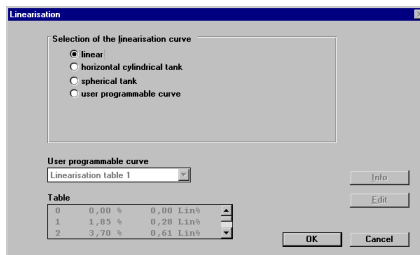
Click in the window "Instrument data parameter adjustment" to **Conditioning**.



Click in the window "Conditioning" to **Linearisation**.

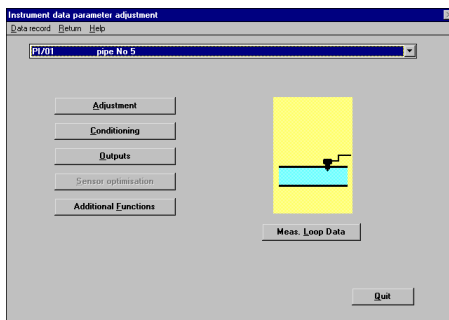


In the window "Linearisation" you can choose the linearisation curves of a horizontal cylindrical tank or a spherical tank. When choosing a user-programmable curve, you can then click to **Edit** and start the program "Tank Calculation". With this program you can calculate the curves of different tank shapes (see manual "VEGA Visual Operating"). After selection of the curve, click to **OK**.

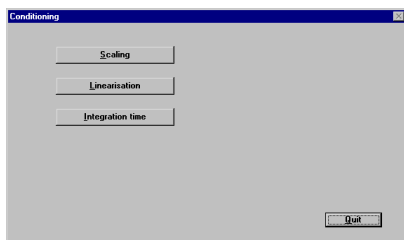


Sensor parameter adjustment – Integration time

Click in the window "Instrument data parameter adjustment" to **Conditioning**.



Click in the window "Conditioning" to **Integration time**.

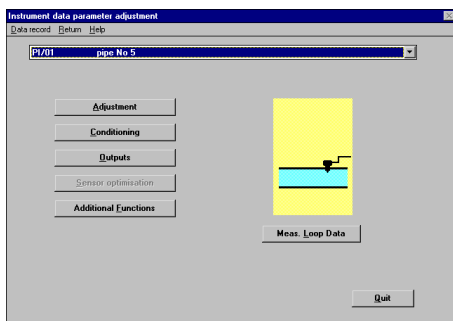


In the window "Integration time" you can enter a time of max. 10 seconds. Then click to **OK**.

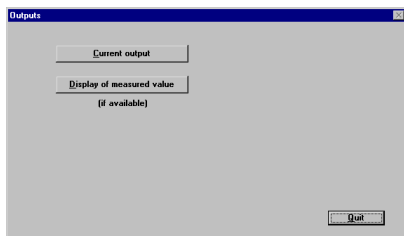


Sensor parameter adjustment – Outputs

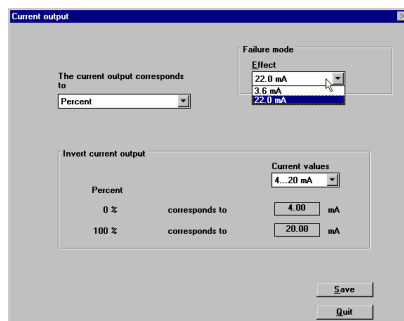
Click in the window "Instrument data parameter adjustment" to **Outputs**.



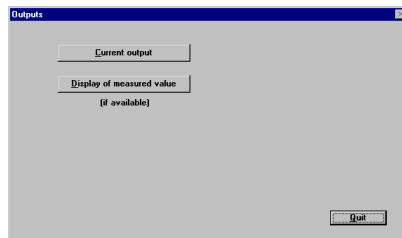
Click in the window "Conditioning" to **Current output**.



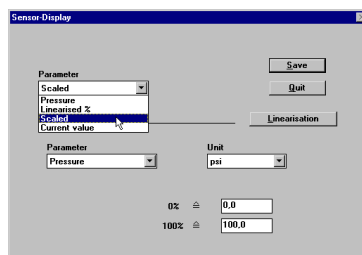
In the window "Current output" you can set the strength of the current in case of failure (e.g. line break). Furthermore the current can be inverted, i.e. at 0 % the current output is 20 mA, at 100 % 4 mA. Click to **Save** when you have modified the adjustment.



Click in the window "Conditioning" to **Display of measured value** (only possible if you have connected a display on VEGABAR).

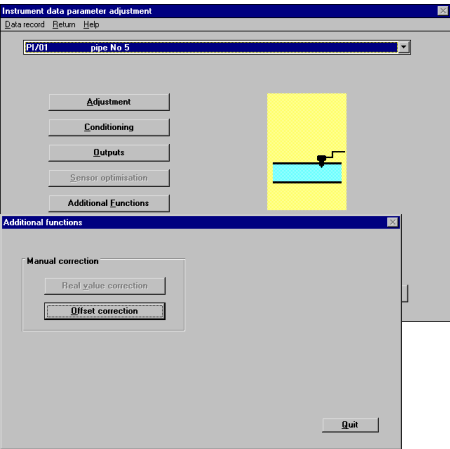


In the window "Sensor-Display" you choose the parameter and the unit which the display should indicate. If you choose "scaled", you can enter the figures corresponding to 0 % and 100 %. Click to **Save** when you have finished the adjustments in this window.

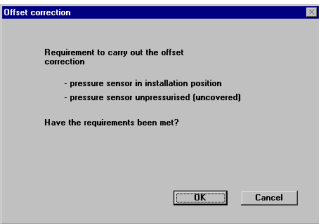


Sensor parameter adjustment – Offset correction

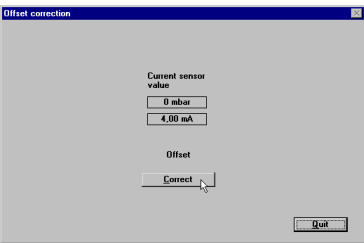
Click in the window "Instrument data parameter adjustment" to **Additional Functions**, then in the window "Additional Functions" to **Offset correction**.



Confirm the question with **OK**, if the conditions are met.

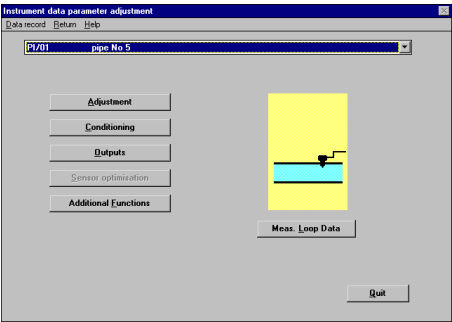


Click in the window "Offset correction" to **Correct**.

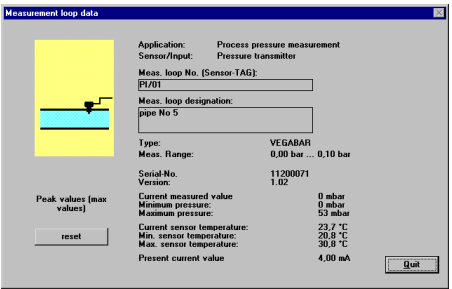


Pointer function

Click in the window "Instrument data parameter adjustment" to **Meas. Loop Data**.

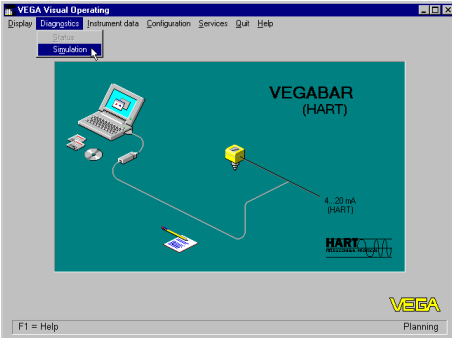


In the window "Measurement loop data" all available actual sensor values and the peak values (pointer function) will be displayed. With the button **reset** you can set all indicated peak values simultaneously to the actual value.

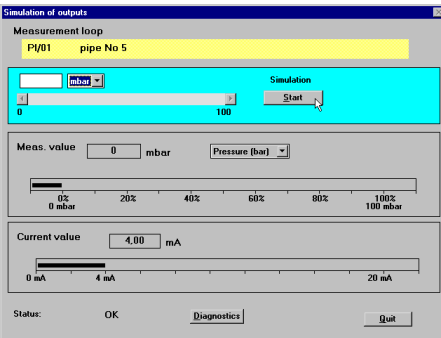


Simulation

Pressure can be simulated to check the outputs of VEGABAR and connected instruments or components. To do this, click to **Diagnosis**, then to **Simulation**.



In the window "Simulation of outputs" click to **Start** to start the simulation. With the buttons "<-" and "->" (or with the horizontal scroll bar between) you can adjust values between -10 % and 110 %. Click to **Stop** to end the simulation.

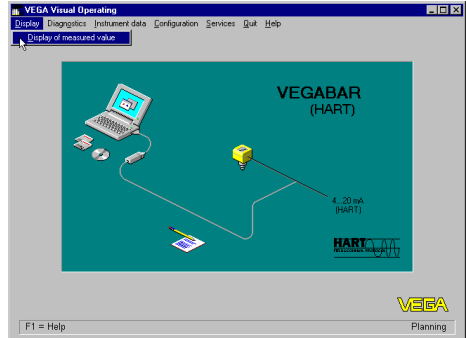


Note:

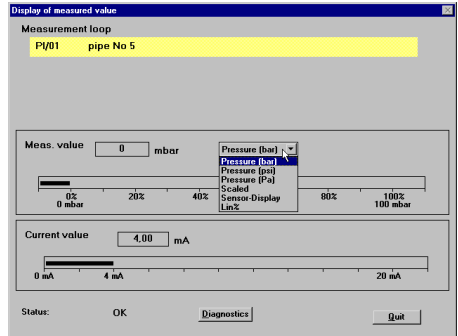
The simulation mode is not stopped automatically, but remains active until you switch it off!

Display of measured value

The actual values of the measurement loops can be displayed from the main menu. Click to **Display**, then to **Display of measured value**.



In the window "Display of measured value" you can choose the unit in which the measured value is indicated. Furthermore you see the current value. By clicking to **Quit** you return to the window "VEGA Visual Operating".

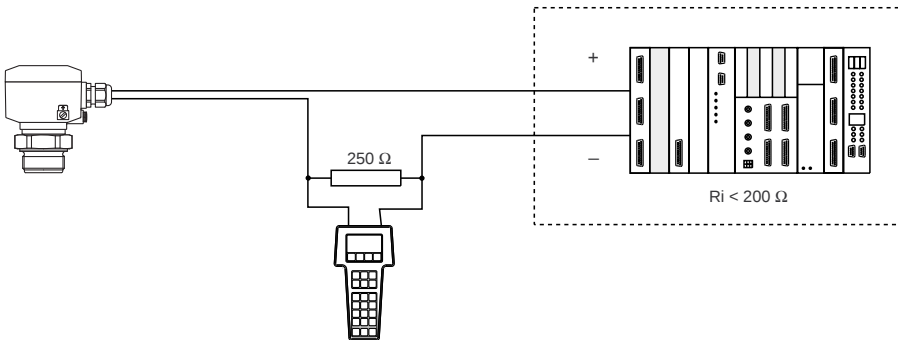


4.5 Setup with HART® handheld

With any HART® handheld you can set up VEGABAR 44 like all other HART® compatible sensors. A special DD (Device Description) is not necessary. Just connect the HART® handheld to the sensor signal cable after you have connected the sensor to supply voltage.

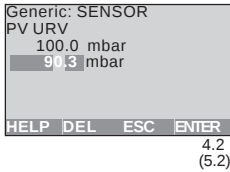
Note:

If the resistance of the signal circuit is less than $200\ \Omega$, a resistor of $250\ \dots\ 350\ \Omega$ must be looped into the signal/connection line during adjustment. The digital adjustment and communication signals would otherwise be short-circuited through insufficient resistance of e.g. the supply voltage source or the processing system. In such case, communication with the sensor would not be assured. Simply connect the adjustment resistor in parallel to the connection socket of the HART® handheld (see figure).

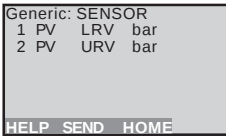


The most important adjustment steps

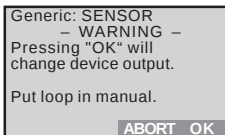
On the following four pages you see a menu schematic of the HART® handheld in conjunction with VEGABAR process pressure transmitters. The most important adjustment steps are marked in the menu schematic with the letters A ... E. If you are not familiar with HART® handheld, please note: For the parameter adjustment, first push the "ENTER" key. The adjustment is saved in the handheld, but not in the sensor itself.



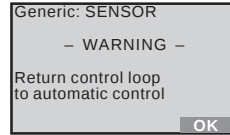
After you have pushed "ENTER", you have to push "SEND" (here in the example for the min. adjustment).



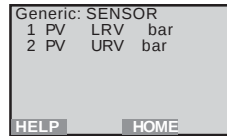
After pushing "SEND", a warning is displayed that you are about to change device output and for safety reasons you should switch your system to manual operation.



Push "OK" and the adjustment is now transferred to the sensor. After a short moment, you are asked to switch the system from manual to automatic operation. Confirm with "OK".



You now see the adjustment that was made.



HART® menu schematic

Switch on:

Hart Communicator

Self Test
in Progress

Firmware Rev: F2.2
Module Rev: 3.6
01992-96 FRSI

after approx.
20 s

Generic: SENSOR
Online(Generic)

1 Device setup
2 PV 80.945 mbar
3 PV AO mA
4 PV LRV bar
5 PV URV bar

SAVE

Set up the sensor in the sequence of the letters A, B, C and D (adjustment without medium).
For the adjustment with medium you setup the sensor in the sequence A1, B1, C and D.

Generic: SENSOR
Device setup

1 Process variables
2 Diag/Service
3 Basic setup
4 Detailed setup
5 Review

SAVE HOME

Generic: SENSOR
Process variables

1 Snr 80.945 mbar
2 AI % rnge
3 AO1 mA

HELP SAVE HOME

Generic: SENSOR
PV

80.945 mbar

HELP EXIT

Generic: SENSOR
AO1

16.952 mA

HELP EXIT

Generic: SENSOR

1 PV LRV bar
2 PV URV bar

HELP HOME

Generic: SENSOR

- WARNING -

Return control loop
to automatic control

OK

Generic: SENSOR

- WARNING -

Pressing "OK" will
change device output.

Put loop in manual.

ABORT OK

Generic: SENSOR

1 PV LRV bar
2 PV URV bar

HELP SEND HOME

Generic: SENSOR
PV LRV

0.000 mbar
10.000 mbar

HELP DEL ESC ENTER

Generic: SENSOR
PV URV

100.000 mbar
90.300 mbar

HELP DEL ESC ENTER

Important and
required
menu windows

Less important
menu windows

Not required, unimportant
or blocked menu windows

Generic: SENSOR

1 PV LRV bar
2 PV URV bar

HELP HOME

Generic: SENSOR

1 PV LRV bar
2 PV URV bar

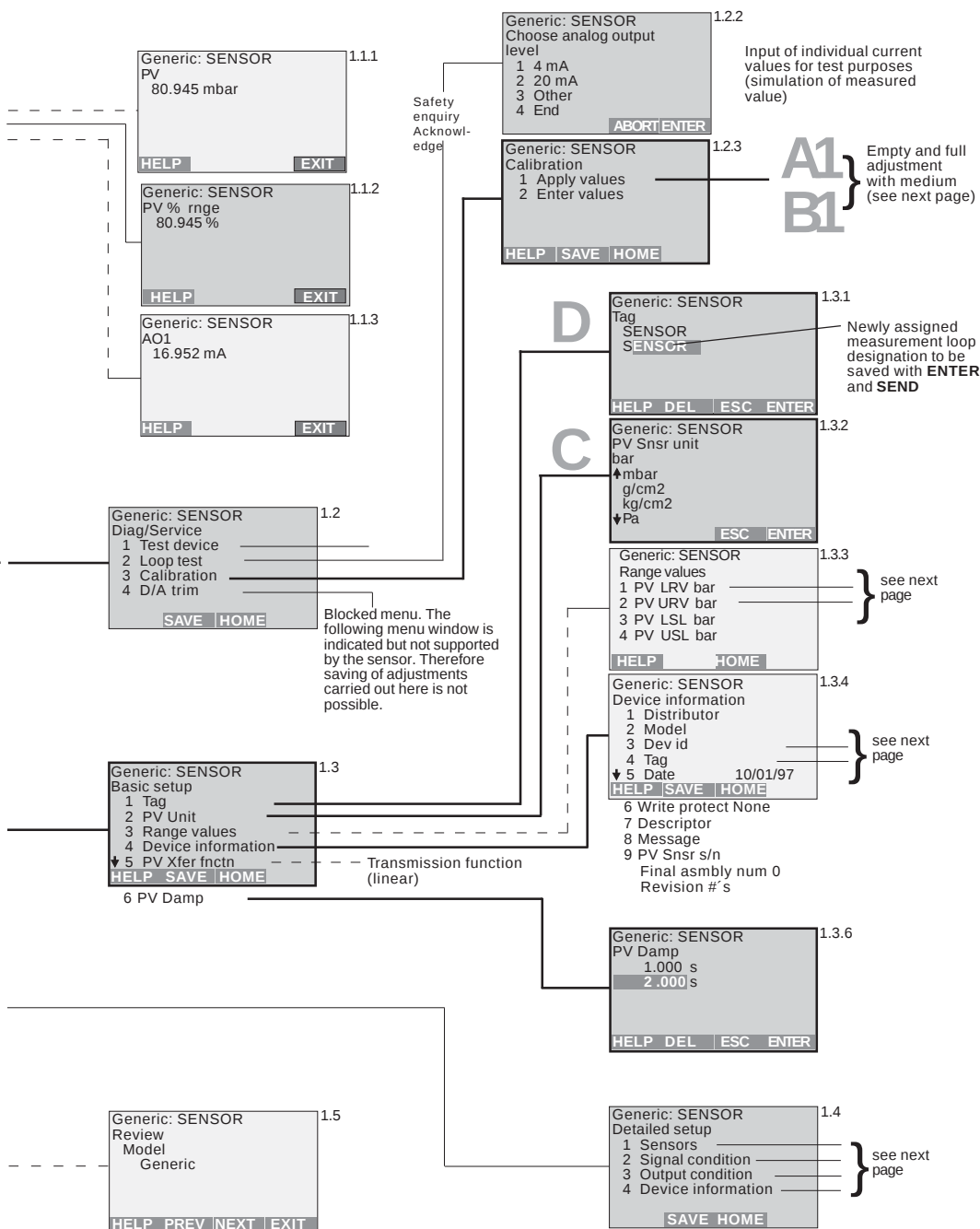
HELP HOME

continue like under 4

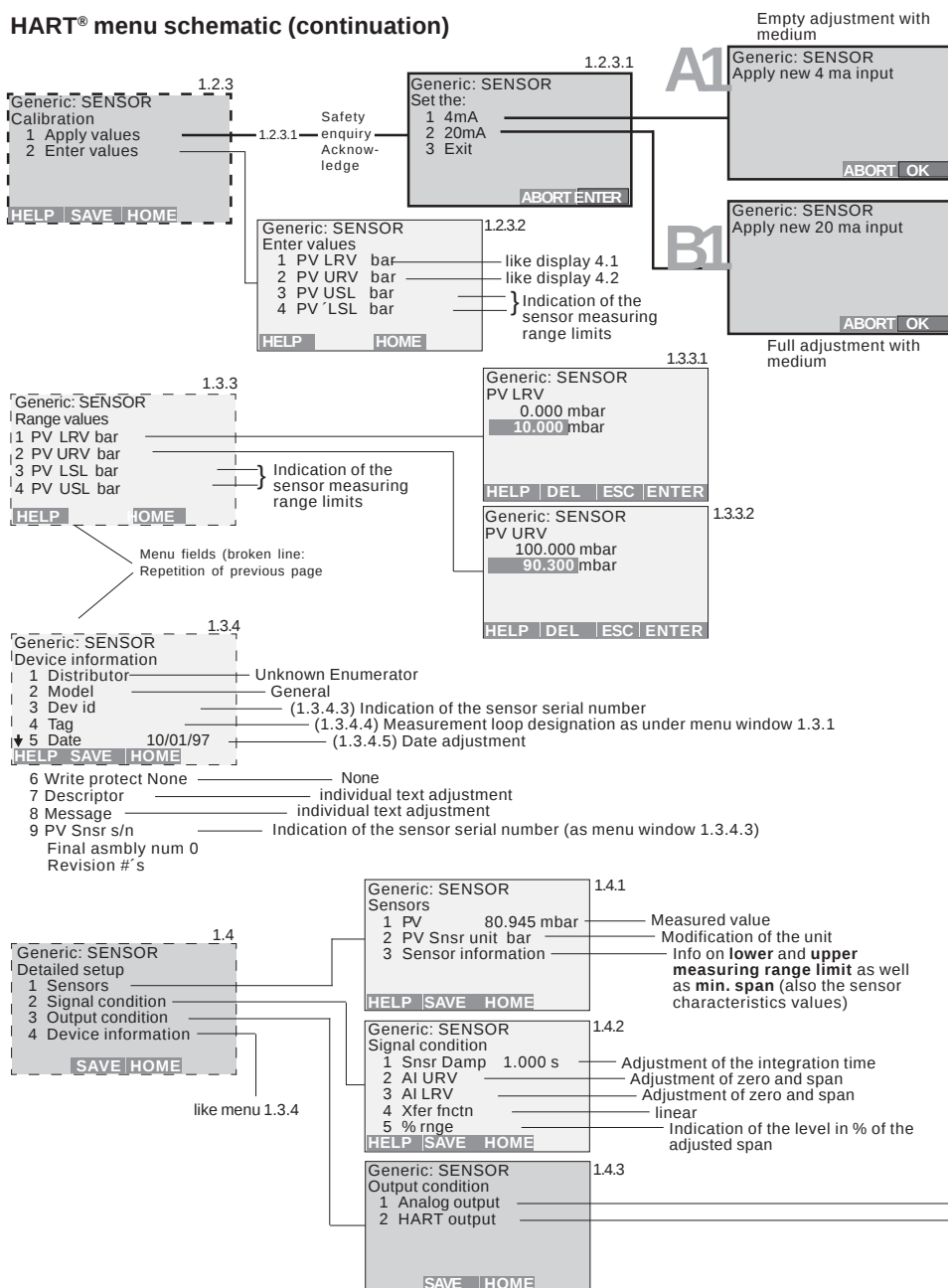
A

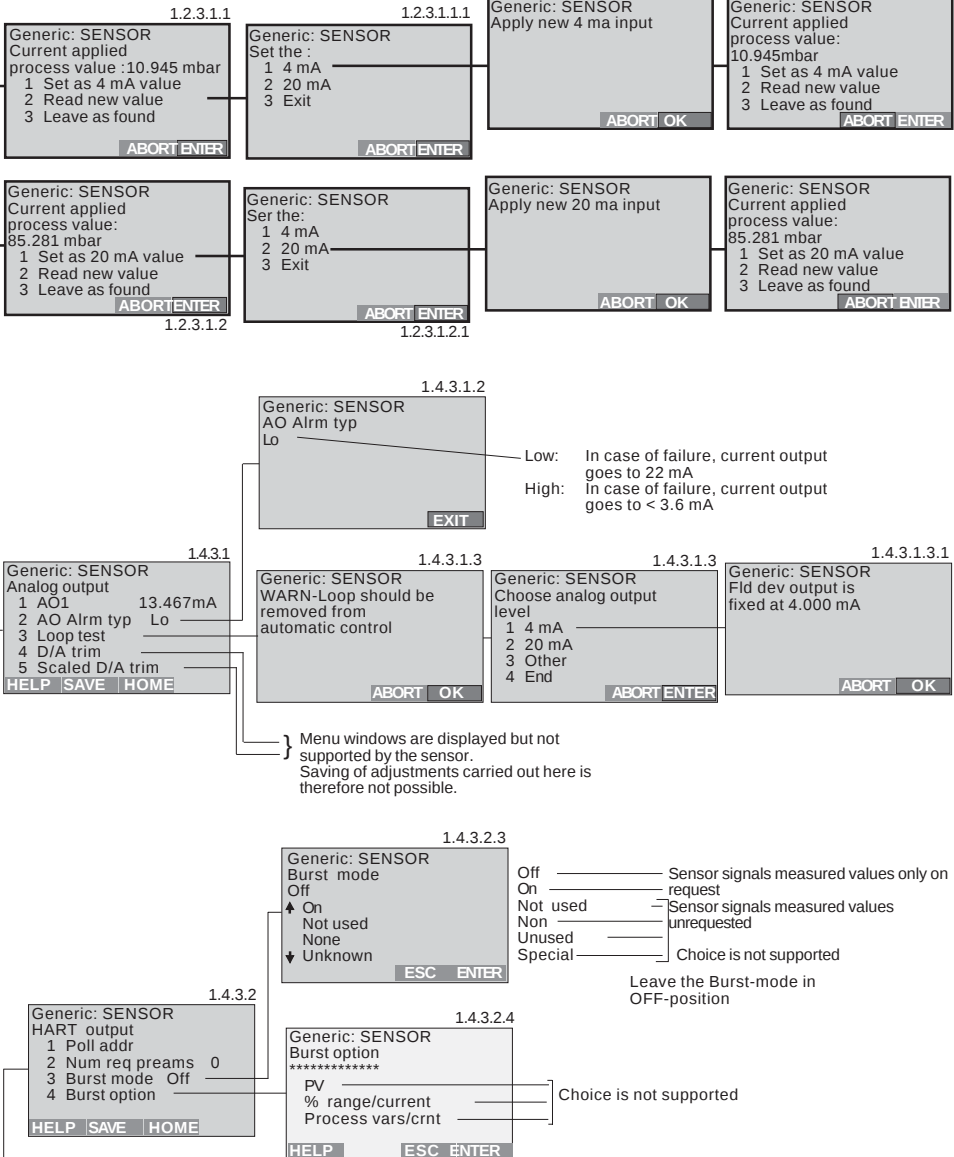
B

continue like under
A figure 4.1(5.1)



HART® menu schematic (continuation)



**Note:**

After adjustment of a parameter, push "ENTER" and then "SEND".
Confirm the message to switch over to manual operation with "OK".
Confirm the message to reset to automatic operation also with "OK".
Only then will the adjustment be stored in the sensor and take effect.

5 Diagnostics

5.1 Maintenance

VEGABAR process pressure transmitters are maintenance-free.

5.2 Failure rectification

Fault signals

VEGABAR provides maximum reliability with its self-test and continuous self-monitoring. VEGABAR diagnostics distinguishes between atypical process conditions and faults in the VEGABAR.

Atypical process conditions

Exceeding or falling short of measuring range limits (fault signal extinguishes when the measured value is again in the measuring range).

Failure in VEGABAR

Failure in the electronics, interference or damage to the measuring cell.

The following table assists in analysis of fault signals.

Reason	Fault signal via		
	DOT-matrix	Bar graph Digital indication	Current output
Clearly outside measuring range	"OPERATE ???? bar"	Bar graph 0 % or 100 % digital value flashes	Current value 3.6 mA or 22 mA
Overload range of the meas. cell		Bar graph 0 % or 100 %, digital value, four flashing segments "- - - -"	
Failure in VEGABAR		all segments flash	

On instruments with menu-driven adjustment with additional functions, the possible reasons are displayed under the menu item "Diagnostics no.". .

Diagnostics no.	Meaning
1	Connection to CID converter interrupted
2	Frequency signal of the capacitor not within the limit values
3	Frequency signal of the reference capacitor not within the limit values
4	Frequency signal temperature not within the limit values
7	Communication error to EEPROM
9	Error in EEPROM CRC-checksum
11	Process fitting or electronics unit has been exchanged (appears for approx. 20 s after switching on for the first time after the exchange)

Troubleshooting

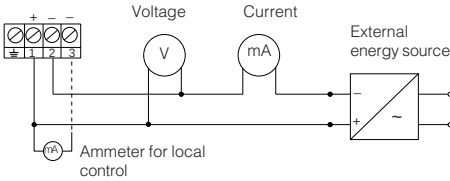
If the displayed value does not correspond to the level in the vessel or to the process pressure, the following measures must be taken:

- check the pressure compensation (only with gauge pressure measuring ranges)
- check the electrical connection.

Checking pressure compensation

Open the housing of VEGABAR. The measured value must not change. However, if the displayed value changes, compensation of the atmospheric pressure is not ensured, which will lead to distortion of the measured value. Check the breather on the VEGABAR housing.

Checking the electrical components



Voltage

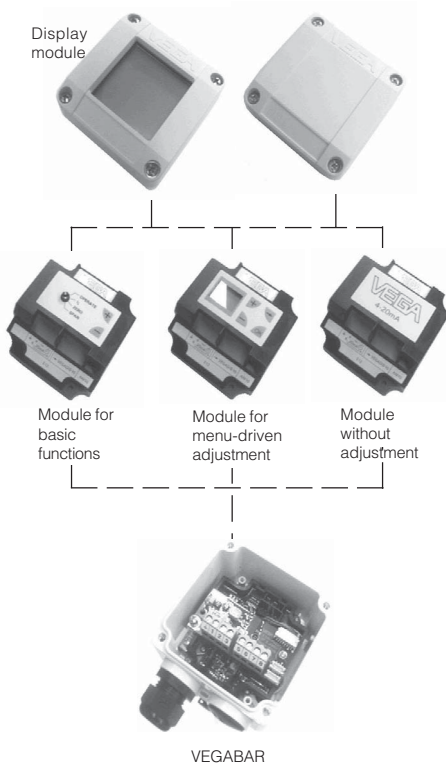
- the terminal voltage on VEGABAR must be at least 12 V DC

Current

Current value	Condition
3.8 ... 20.5 mA	standard range for the output current
0 mA	signal cable interrupted
< 3.6 mA	sensor electronics or pressure sensor element defective
22 mA	sensor electronics or pressure sensor element defective

6 Instrument modification

6.1 Exchange of adjustment modules



Exchange of the adjustment module

Removal of the adjustment module

- Separate VEGABAR from the power supply
- Loosen the screws on the upper side of the housing and remove the cover or the display module
- Loosen connection cables from the terminals, if necessary pull out the plug connection of the display module
- Loosen the two screws of the adjustment module
- Remove adjustment module and pull out the plug connection

Insertion of an adjustment module

- Plug the plug connection of the new adjustment module into the plug-in socket of the sensor electronics
- Fasten the new adjustment module
- Reconnect the connection cables, if necessary, also the cable from the display module
- Close cover or display module of VEGABAR
- Reconnect VEGABAR to power supply

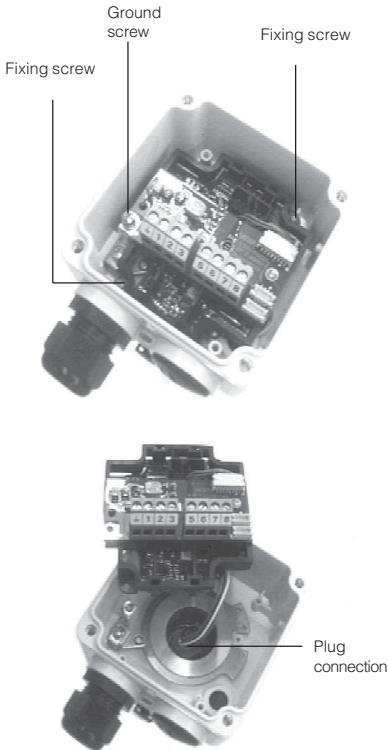
The modular construction of VEGABAR allows retrofitting, interchange or removal of the adjustment and display modules. Data previously saved (e.g. adjustment values) are not stored in the adjustment module but in an EEPROM of the electronics module and therefore readjustment is not necessary. The connection of the modules is made via a 4-pole plug connection.

6.2 Exchange of electronics

You first have to remove the adjustment module, as described in chapter "6.1 Exchange of adjustment modules", in order to exchange the complete electronic module of VEGABAR.

Note:

No new adjustment is necessary after exchanging the electronics module. When switching on (connection of supply voltage) for the first time after exchange of the electronic unit, it takes approx. 20 s until the actual measured value is displayed.



- Remove the ground screw and the two smaller fixing screws connecting the electronic unit with the housing
- Pull the electronic unit to the top and pull out the plug connection
- Proceed in reverse sequence when installing the new electronics module

6.3 Exchange of the hygienic form seal on VEGABAR 44

On the VEGABAR 44 process pressure transmitter with hygienic fitting LA or LB, the ceramic measuring cell is sealed by a gapless, radial form seal. This form seal (material EPDM-FDA ¹⁾ approved) can be exchanged by the user without readjustment being necessary. The criteria and time periods for such an exchange are determined by process conditions and hygienic requirements.

Important:

Only use the original VEGA replacement part, article no. 2.17 775 as seal ring!

Note the following procedure when exchanging the seal.

Removal procedure:

- 1 Pressure transmitter should be unpressurized (switch off process pressure or empty vessel).
- 2 Loosen the hexagon head screw (46 mm across flats) (1) by turning counter-clockwise

Note!

The process connection (2) (i.e. sleeve nut) must not be loosened!

- 3 Completely loosen the compression screw (hex head) and remove the pressure transmitter from the process connection

Note:

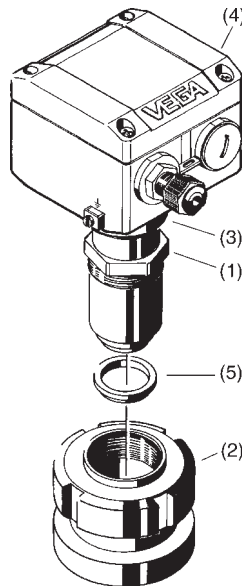
Should the pressure transmitter turn by loosening the pressure screw, it can be held by the adapter (3) with a wrench (36 mm across flats).

- 4 Slightly lift the form seal (5) (with a knife or similar utensil) and loosen it from the ceramic measuring cell
- 5 If the form seal (5) does not completely surround the measuring cell, it should be carefully removed from the process connection.

Installation procedure:

- 6 Pull a new form seal (5) over the measuring cell (the conical side should point towards the process connection!).
- 7 Insert the pressure transmitter carefully into the process connection by turning clockwise.
- 8 Tighten hexagon head screw (46 mm) (1) to its fixed position (45 Nm).
- 9 Rotate the housing (4) of the pressure transmitter to its original position

Exchange of the form seal is now finished. Ensure proper disposal of the removed seal.



- 1 Hexagon compression screw
- 2 Process connection
- 3 Adapter
- 4 Housing
- 5 Form seal

¹⁾ Food and Drugs Administration



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The statements on types, application, use and operating conditions of the sensors and processing systems correspond to the latest information at the time of printing.

Technical data subject to alterations