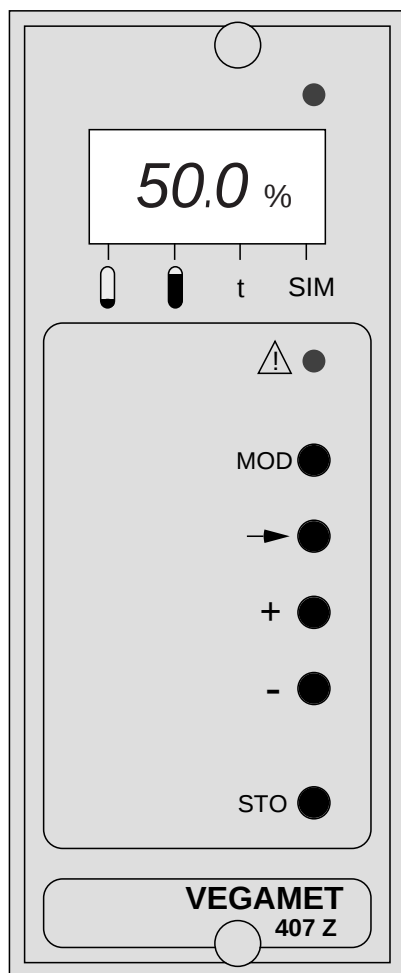


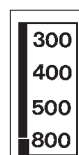
VEGAMET 407 Z

VEGA

TIB • Technical Information • Operating Instructions



Signal conditioning instrument for continuous level measurement



Signal conditioning instrument with plastic housing of series 400

Supply for

- one pressure sensor or
- one capacitive measuring electrode

Conditioning of analog transmitted measuring data

VEGA Grieshaber KG
Am Hohenstein 113
Postfach 11 42
D-77757 Schiltach
Phone 0 78 36/50-0
Fax 0 78 36/50-201

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Contents of the instruction manual

The **Technical Information / Operating instructions** is called **TIB**. It contains all necessary information for correct:

- installation
- connection
- set-up
- parameter adjustment of the signal conditioning instrument VEGAMET 407 Z.

If you feel that any points in this data sheet are not adequately covered our technical sales or service departments will be pleased to assist.

Additional copies of this data sheet are freely available and are automatically supplied with quotations and purchases product.

Security information

The described module must only be inserted and operated as described in this TIB. Please note that other action can cause damage or destruction for which VEGA does not take responsibility.

The measuring systems certified as overfill protection acc. to WHG and as overfill protection acc. to the regulation for combustible liquids (VbF) are listed on page 6 and 7.

Product description

The signal conditioning instrument VEGAMET 407 Z is used for manifold applications for continuous level measurement.

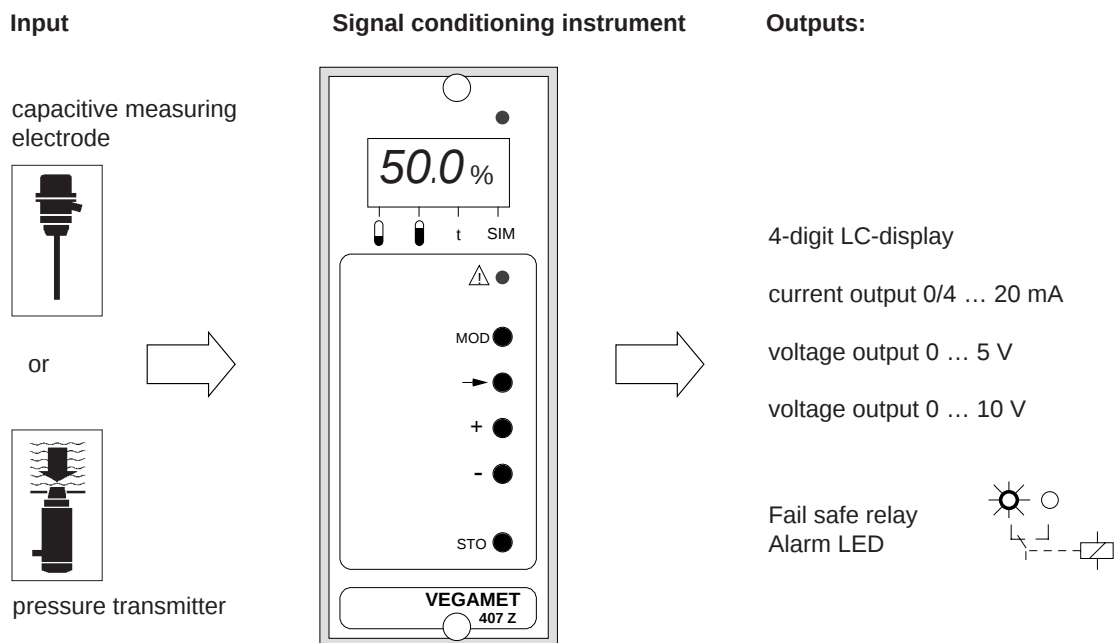
VEGAMET 407 Z is integrated in a series 400 plastic housing.

A sensor (pressure transmitter or capacitive measuring electrode) can be connected via a two-core line to the signal conditioning instrument. This line is responsible for the power supply from the signal conditioning instrument to the sensor. The measuring currents are transmitted analog from the sensor to the signal conditioning instrument and evaluated.

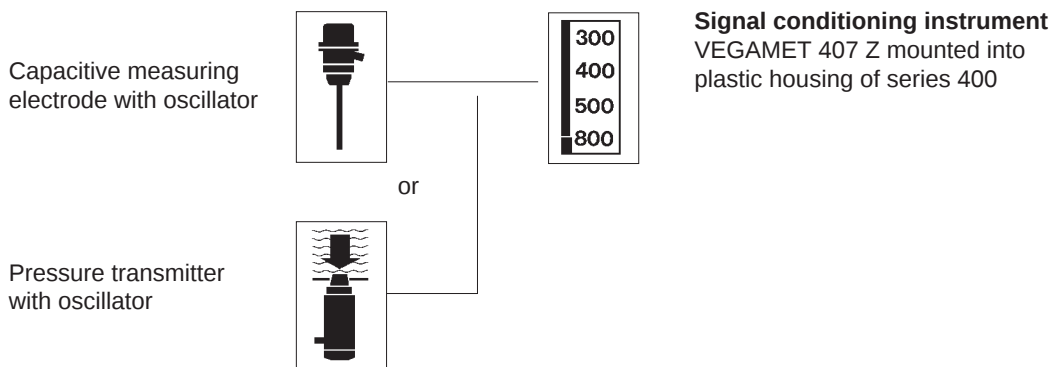
The signal conditioning instrument can be calibrated and adapted to the measurement by the user via parameter adjustment.

These adjustments are made without additional facilities and tools via a 5-button keyboard integrated on the front panel.

Configuration of a signal conditioning instrument



Configuration of a measuring system

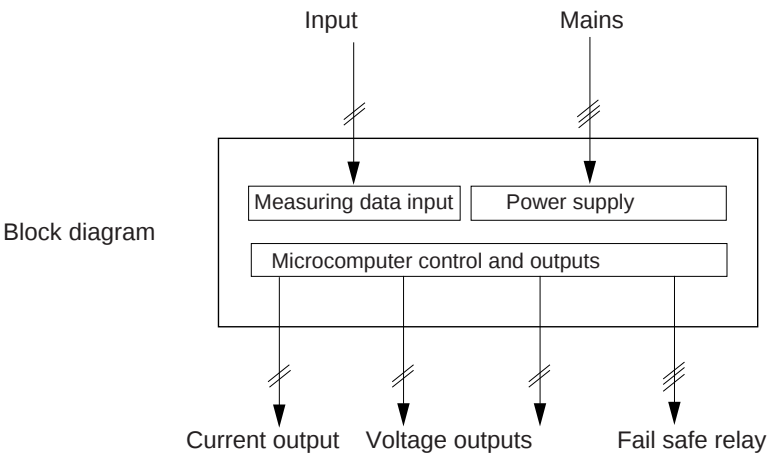


- Optional auxiliary instruments e.g.:
- Overvoltage arresters
 - Indicating meters VEGADIS 171 (connection 0 ... 20 mA)
 - Auxiliary level switch VEGASEL
 - Safety barrier type 145

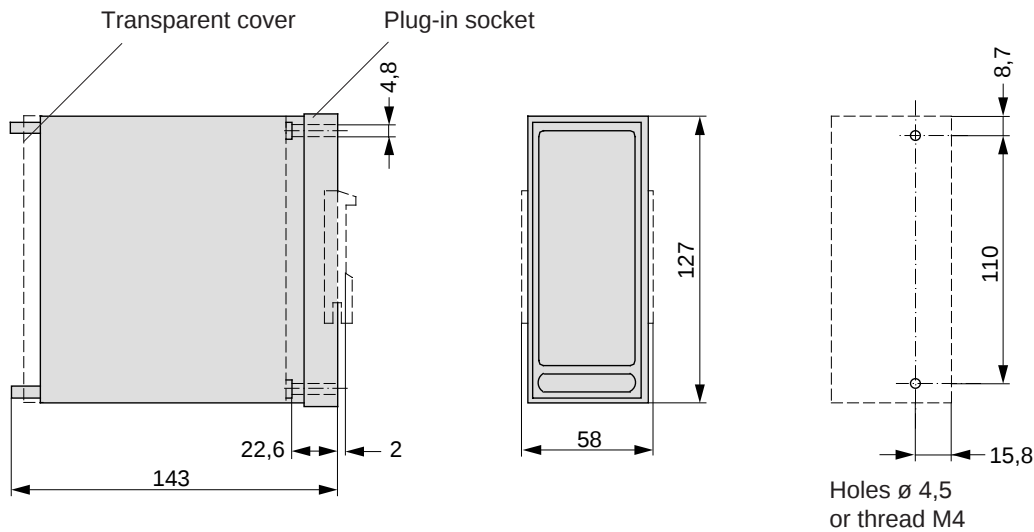
Technical data

Power supply	Operating voltage	value	tolerance	frequency
	Standard	230 V AC	+10 % –15 %	50 / 60 Hz
	Options	110 V AC 130 V AC 240 V AC	+15 % –10 %	50 / 60 Hz
		24 V AC 42 V AC 48 V AC	+15 % –10 %	50 / 60 Hz
		16 ... 60 V DC		
	Power consumption	approx. 6 VA or 4 W		
Measuring data	Supply voltage for capacitive measuring electrode or pressure transmitter Data transmission Connection cable Resistance per conductor Valid measured values Fault signal at Min. measuring distance	24 V (max. 26 V) short-circuit proof, galvanically isolated analog 2-core, unscreened (standard line) max. 200 Ω 2 ... 22 mA < 2 mA; > 22 mA 300 µA		
Indication	LC-display	4-digit		
Current output	Range Load Galvanical separation Resolution Linearity error Temperature error	0 ... 20 mA or 4 ... 20 mA max. 750 Ω to power supply unit and input 0,05 % of range 0,05 % of range 0,06 % / 10 K of sensor		
Voltage output 1	Range Galvanical separation Resolution Linearity error Temperature error	0 ... 10 V, max. 1 mA to power supply unit and to input 0,05 % of range 0,1 % of range 0,06 % / 10 K of sensor		
Voltage output 2	Range Galvanical separation Resolution Linearity error Temperature error	0 ... 5 V, max. 1 mA to power supply unit and to input 0,05 % of range 0,1 % of range 0,06 % / 10 K of sensor		
Fail safe relay	Relay data: 1 spdt Contact material min. turn-on voltage switching circuit max. turn-on voltage switching circuit max. breaking capacity	floating Ag CdO and Au plated 10 mV 10 µA AC U = 250 V I = 2 A S = 125 VA DC U = 60 V I = 1 A P = 54 W		
Operating conditions	Permissible operating temperatur. Storage and transport temperatur.	–20°C ... +60°C –20°C ... +70°C		
Electrical protective measures	Protection Protection class	IP 40 II		
Mechanical data	Series Dimensions Weight	Panel mounting, housing plastic ABS light grey W = 53 mm, H = 127 mm, D = 143 mm approx. 700 g		

Galvanical separation



Dimensional drawing (dimensions in mm)



Approvals (for following measuring systems)

If measuring systems acc. to the below approval are installed, the legal documents have to be observed.

Approval as overfill protection acc. to **WHG**

Pressure transmitters, approved for the following measuring systems

Type	D33, D34, D35, for type A, F, G, N, K
	D36, Type G, N, F, S063
	D37, Type G, N, S052
	D38, Type G, N

Oscillator	E27, E27 B
Signal conditioning instrument	VEGAMET 407 Z
Auxiliary level switch	VEGASEL 444, 441 B, 441 C
defined in test certificate no.	PA-VI 810.76

Capacitive measuring electrodes, approved for the following measuring systems

Type	12.02, 12.12, 12.42 Ex, 12.72 Ex
	22.02, 22.12
	23.02, 23.12, 23.42 Ex, 23.72 Ex
	25.02, 25.03, 25.12, 25.13
	25.02 Ex, 25.03 Ex, 25.12 Ex, 25.13 Ex
	26.02, 26.03, 26.12, 26.13
	27.01, 27.11, 27.41 Ex, 27.71 Ex
	32.04, 32.05, 32.14, 32.15
	32.44 Ex, 32.45 Ex, 32.74 Ex, 32.75 Ex
	42.04, 42.05, 42.14, 42.15
	52.04, 52.05, 52.14, 52.15

Oscillator	117 A, 117/4 A, 117/4 A Ex
Signal conditioning instrument	VEGAMET 407 Z
Auxiliary level switch	VEGASEL 444, 441 B, 441 C
defined in test certificate no.	PA-VI 870.15

Measuring systems for the use in hazardous areas must only be operated in conjunction with pressure transmitters or capacitive measuring electrodes in Ex-version and safety barrier type 145.

see
 - Conformity certificate
 PTB-no. Ex-85.B.2038
 - diagram page 7.

Approvals (continued)

Approval as overfill protection acc. to the regulation for combustible liquids **VbF**

Capacitive measuring electrodes, approved for the following measuring systems

Type.....	12.02, 12.03, 12.12, 12.13 23.02, 23.03, 23.12, 23.13 27.00, 27.01, 27.10, 27.11
	32.04, 32.05, 32.06, 32.07 42.04, 42.05, 42.06, 42.07
	32.14, 32.15, 32.16, 32.17 42.14, 42.15, 42.16, 42.17
	12.42 Ex, 12.43 Ex, 12.72 Ex, 12.73 Ex 23.42 Ex, 23.43 Ex, 23.72 Ex, 23.73 Ex 27.40 Ex, 27.41 Ex, 27.70 Ex, 27.71 Ex
	32.44 Ex, 32.45 Ex, 32.46 Ex, 32.47 Ex 32.74 Ex, 32.75 Ex, 32.76 Ex, 32.77 Ex
	25.02 Ex, 25.03 Ex 25.12 Ex, 25.13 Ex

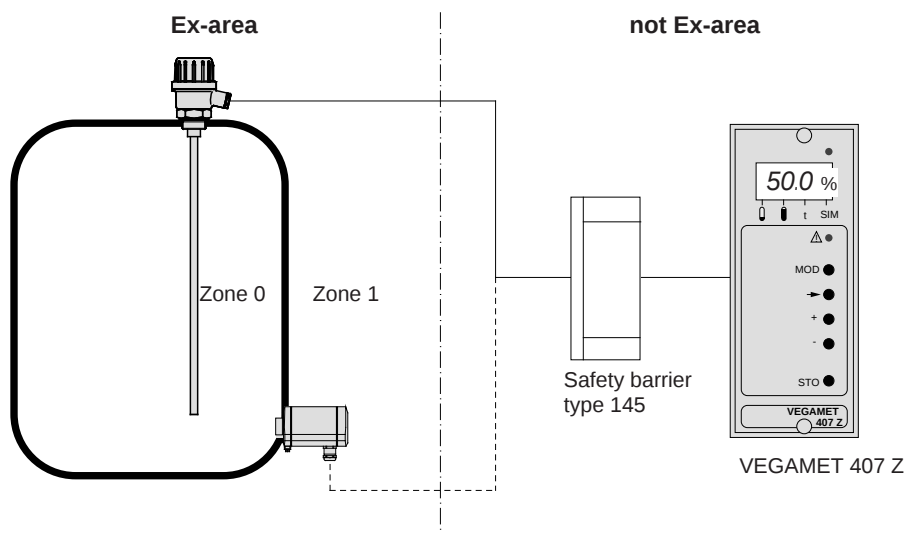
Oscillator	117/4 A Ex
Signal conditioning instrument	VEGAMET 407 Z
Auxiliary level switch	VEGASEL 444, 441 B, 441 C
defined in test certificate no.	PTB-no. III B/S 2032 F
and type approval.....	01/PTB-no. III B/S 2032 F

Measuring systems for the use in hazardous areas must only be operated in conjunction with pressure transmitters or capacitive measuring electrodes in

Ex-version and safety barrier type 145. See conformity certificate PTB-no. Ex-85.B.2038.

Transducer (capacitive measuring electrode or pressure transmitter)
If the sensor is installed in hazardous areas, the special conditions of the conformity certificate must be observed.

Signal conditioning instrument
The signal conditioning instrument VEGAMET 407 Z must be generally installed outside hazardous areas (or special protective measures must be taken).



Mounting instructions

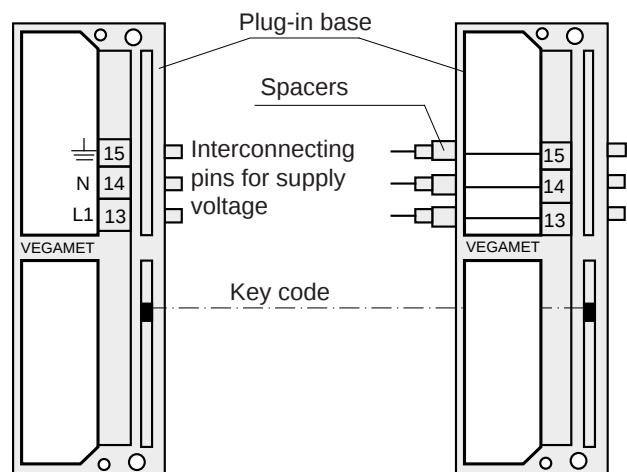
- The plug-in base is provided with
- field terminals
 - interconnection pins
 - spacers for installation in series
 - key coded

For installation in series the interconnection pins are the power supply connections and the distance sleeves ensure that adjacent instruments have a minimum gap of 5 mm between each other.

Remove the interconnection pins on the first plug-in socket.

Warning: Beware of high voltage on power supply terminals.

In case of single mounting remove the interconnection pins and spacers, connect the supply voltage directly.

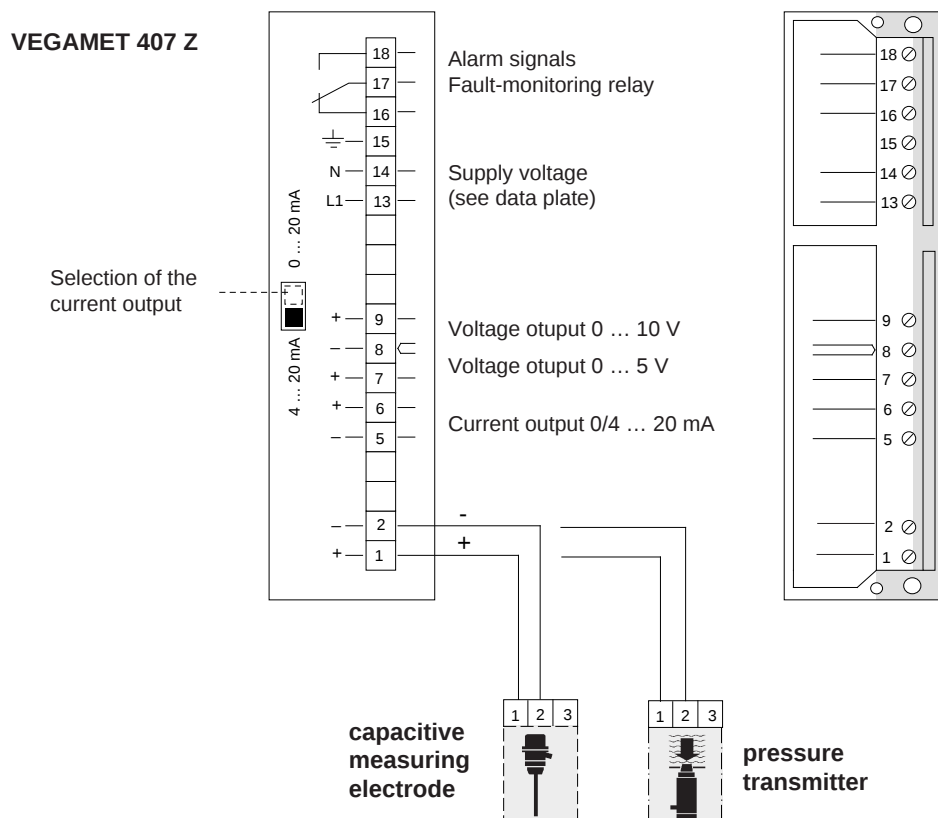


The key coded base prevents other series 400 instruments being inserted. Use adapter no. 040 002 for mounting on standard rail.

Electrical connection

Signal conditioning instrument
back view (type plate)

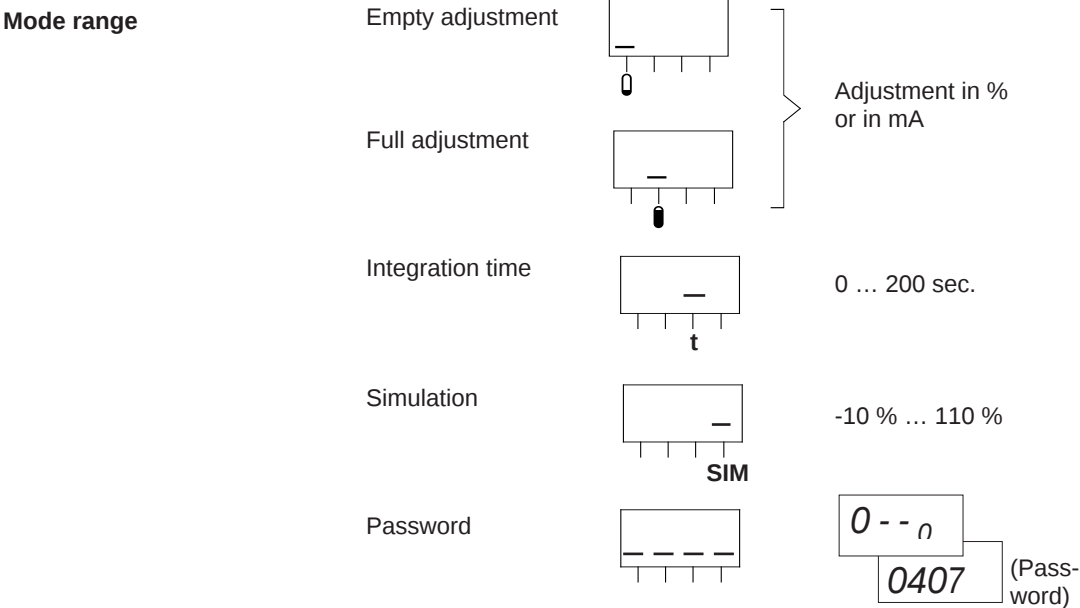
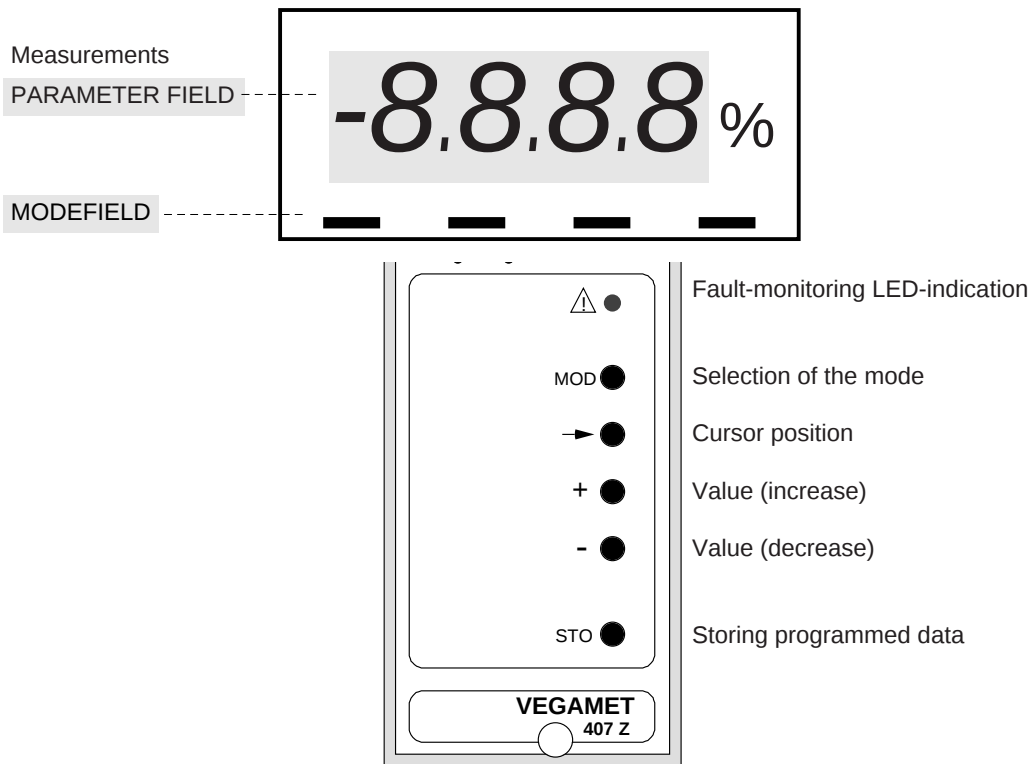
Plug-in socket with
terminals



Installation regulations:

- The wiring between VEGAMET 407 Z and sensor (capacitive measuring electrode or pressure transmitter) can be made with standard cable.
- In case of strong electromagnetic interferences, screened cable must be used. The screening must be earthed at one sensor end.

Indication and operating elements

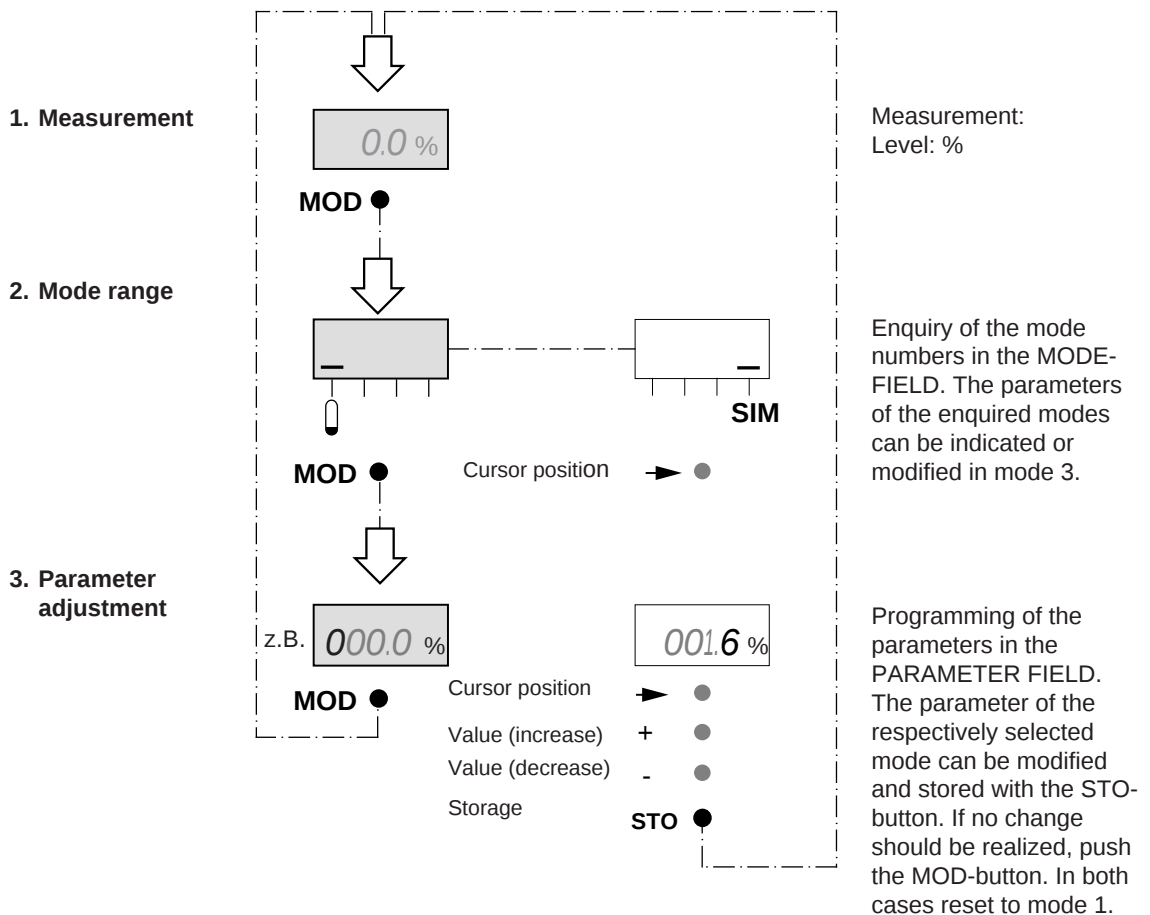


Operation

The VEGAMET 407 Z has 3 modes which can be obtained by scrolling the **MOD**-button:

- Mode:
1. Measurement
 2. Mode range
 3. Parameter adjustment

Note that if no pushbutton is operated, after a period of 60 minutes the display resets to level measurement.

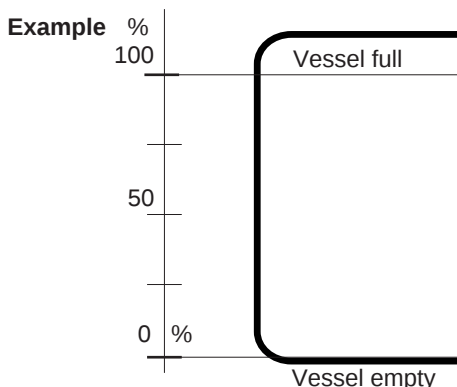
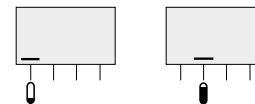


Set-up (procedure)

- mounting socket
- connect capacitive measuring electrode or pressure transmitter with the mounting socket terminal 1 and 2, see page 8
- adjust the current output, see page 8
- check the connection and type plate push VEGAMET 407 Z onto mounting socket and fasten
- switch on power supply
 - LED (green) voltage supply lights
 - LED (red) fault signal lights
 - fault monitoring relay remains de-energized
 - software stage is indicated
- after approx. 2 sec. fault-monitoring LED extinguishes
- fault-monitoring relay is energized
- a meaningless figure is displayed
- program **empty and full adjustment**, see page 11
- if necessary, program integration time, see page 12
- password, see page 13

Empty, full adjustment in %

The measurement range for level 0 % and 100 % is defined via the adjustment procedure.

**Full adjustment**

- fill vessel
- select mode  in MODEFIELD
- program level 100 % in PARAMETER FIELD
- then store with STO

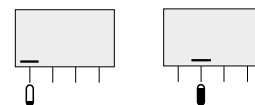
Empty adjustment

- empty vessel
- select mode  in MODEFIELD
- program level 0 % in PARAMETER FIELD
- then store with STO

When the vessel is partly filled or emptied the programming is as described on the right, however with previously determined %-values.
The min. measuring range must correspond to a current Δ of $> 300 \mu\text{A}$.

The empty and full adjustments may be performed in any order.

Empty, full adjustment in mA

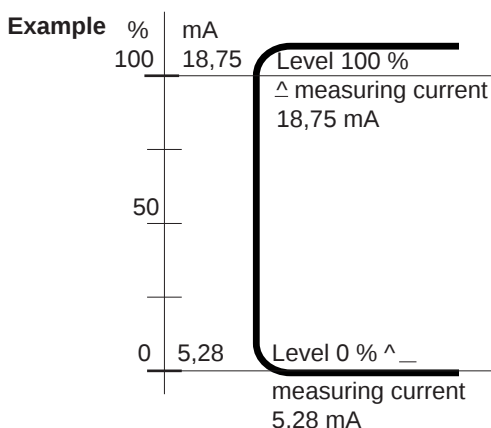


The measuring current values are coordinated to the levels 0 % and 100 % with the adjustment.

The measuring currents are experience values or can be taken from the attached test certificate.

The procedure is used:

- for adjustment without rate of product level change
- for correction of previous adjustments (alarm E3 or E4)
- for adjustment without connection of a capacitive electrode or a pressure transmitter (alarm E2)

**Full adjustment**

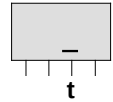
- select mode  in MODEFIELD
- push button + and button MOD simultaneously (data input for mA)
- program 18,75 mA in PARAMETER FIELD
- then store with STO

Empty adjustment

- select mode  in MODEFIELD
- push button + and button MOD simultaneously (data input for mA)
- program 5,28 mA in PARAMETER FIELD
- then store with STO

The empty and full adjustments may be performed in any order.

Integration time



Application

- Where the product surface is agitated the system outputs may be stabilized by adjusting the integration time.

Important notes:

The integration time depends on the filling and emptying period of the vessel, i.e. **integration time** ≤ **filling / emptying time**. Mis-adjustment of the integration time may degrade output sensitivity.

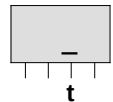
Definitions

- range = 0 ... 199 sec.
- (0 ... 199 secs. corresponds to the definition in sec.)
- At 200 sec. effects a time period, the actual value is approx. 45 minutes.
- settings > 200 sec. are automatically limited to the max. value 200 sec.

Example

- integration time of e.g. 15 sec.
 - select mode **t** in MODEFIELD
 - program 15 sec. in PARAMETER FIELD
 - then store with STO

Simulation mode



In the simulation mode it is possible to test the measuring system over the whole measuring range independent of the process.

Button + increases and
button – reduces
all output values.

The longer the simulation button + and – are pressed the greater the rate of change.

Integration time is ignored during the simulation sequence.

Exampleto activate the simulation

- select mode **SIM** in MODEFIELD
- activate the simulation with button MOD
- increase or reduce the output with button + or button –

Effects

within the measuring range

-10 % ... 0 %100 % ... 110 %
0/4 mA20 mA
0 V10 V
0 V5 V

outside the measuring range

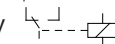
< -10 % or >110 %
22 mA
11 V
5,5 V

fault-monitoring-LED



lights

fault-monitoring relay



de-energizes

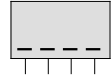
Example to end simulation

- push MOD–button again

Effects

- Cancel the simulated output values
- Transmits the true output values

Password

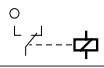
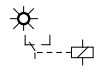


All parameters can be interrogated as previously described and their data indicated on the display.

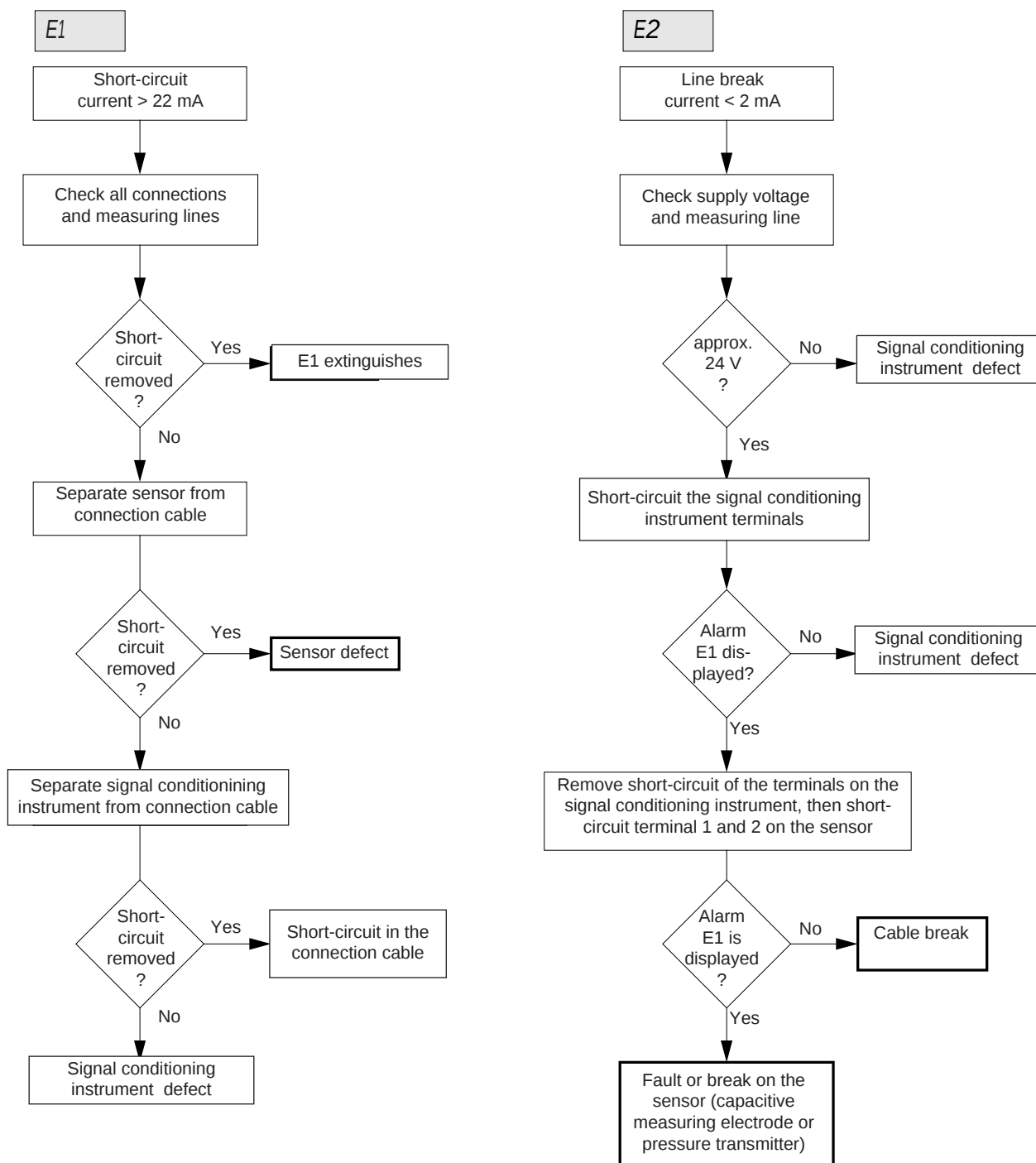
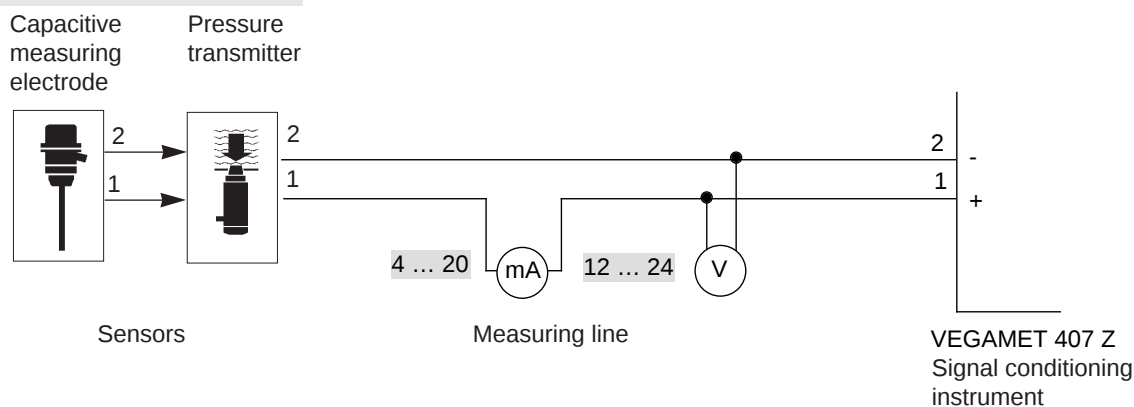
Data input can be inhibited by programming the password.

- Activate password • select mode - - - - in MODEFIELD
 • program figure 1 in PARAMETER FIELD
 • then store with button STO
- Adjust password • select the mode required for parameter adjustment in the MODEFIELD, in the example mode **t**
 • select data input, the keyword **0 - - 0** is displayed in the PARAMETER FIELD
 • program **0407** as password
 • then store with button STO
 • the parameter adjustment of e.g. mode **t** can be made

Alarm signals (fail safe)

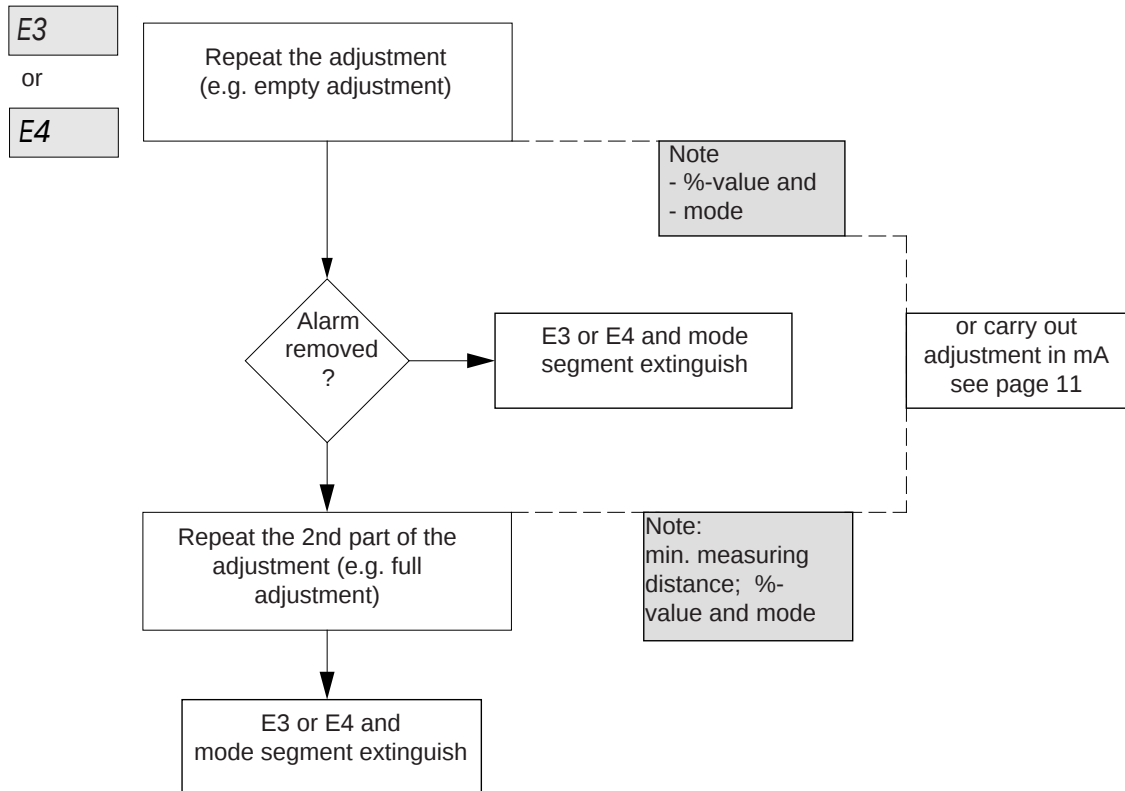
	Indication	Reason	Result
Measuring results	< - 10 %	Input below minimum limit (flashing)	without fail safe 
	> 110 %	Input above maximum limit (flashing)	
Error code	E1	Connection cables reversed on short-circuit	with fail safe 
	E2	Line break	
	E3 E4	Incomplete or incorrect adjustm. proced. (together with flashing mode segments)	
	E8.1 ... E8.4	Fault during data transfer (acc. to STO)	
	E9	Fault in the EEPROM-memory	Current output = 22 mA Voltage output = 11 V or 5,5 V

Fault diagnosis related to E1 or E2



Fault diagnosis related to E3 = Adjustment had been carried with no or with too small level change.

Fault diagnosis related to E4 = The modes or %-values had been exchanged during adjustment



Help for fault diagnosis

The measuring current stored during empty and full adjustment can be displayed in the mode range by pushing the plus-button.

Application with

- inaccurate measurements or
- alarm E3 or E4

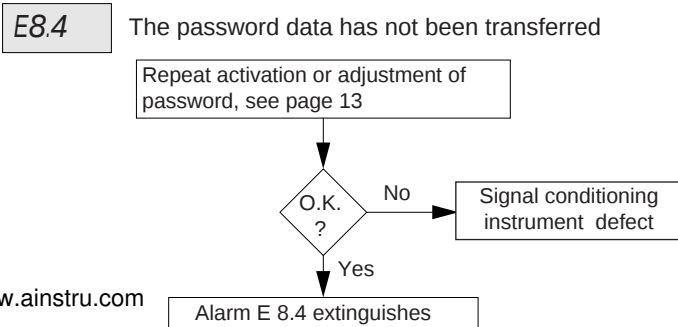
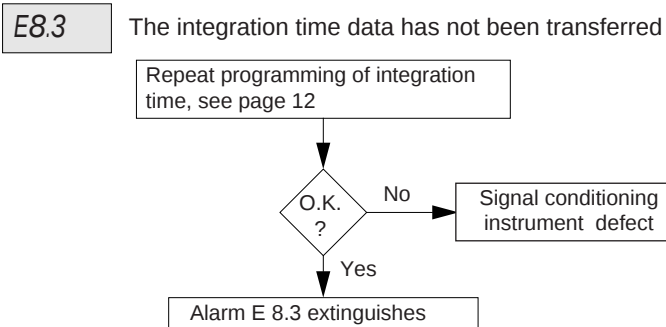
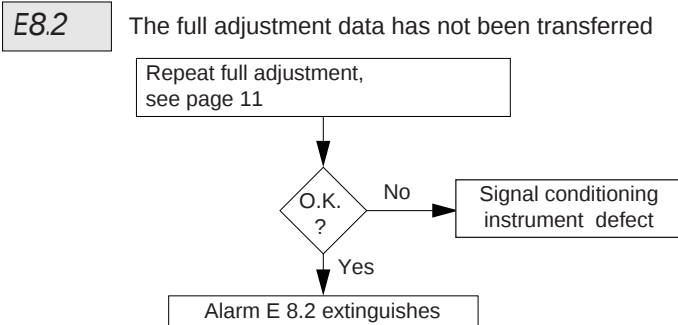
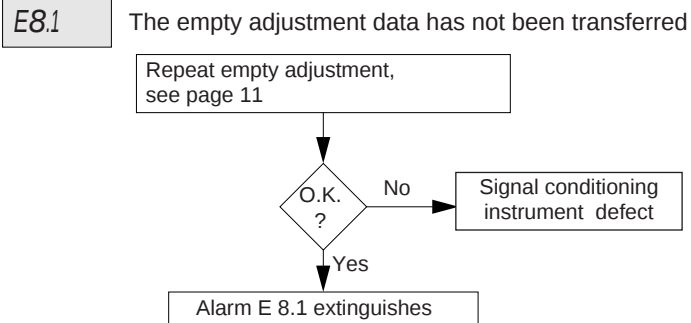
Example: Measuring current of the previous adjustment related to 0 %

- select mode in MODEFIELD
- push plus-button, the adjustment current related to 0 %, is displayed in PARAMETER FIELD
- reset by pushing the MOD-button twice

Measuring current of the previous adjustment related to 100 %

- select mode in MODEFIELD
- push plus-button, the adjustment current related to 100 %, is displayed in PARAMETER FIELD
- reset by pushing the MOD-button twice

Fault diagnosis related to E 8.1



For more VEGA product please visit: www.ainstru.com
 Mail: Sales@ainstru.com

Fault (data loss) in the EEPROM-memory

