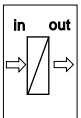
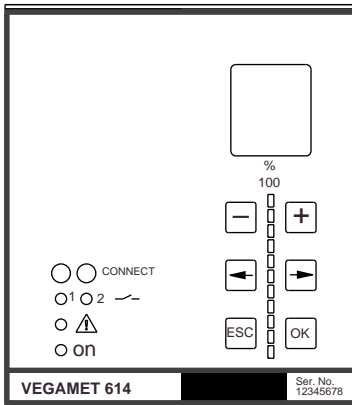


# Operating Instruction

## VEGAMET 614



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## Safety information

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

# 1 Product description

## 1.1 Function and configuration

VEGAMET 614 signal conditioning instrument is designed for a number of applications, e.g.

- level measurement
- gauge measurement
- process pressure measurement
- etc.

### Function

The signal conditioning instruments feed the connected sensors and process their analogue measuring data. The processing is made via a special software composing of functional components (FB), input components (EB), output components (AB) as well as PLC-components (PB).

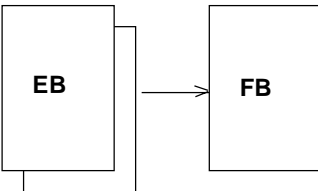
### Configuration

VEGAMET 614 signal conditioning instrument is a module unit with terminal socket. The front plate includes an adjustment module with LC-display and keys.

## Software configuration

### Input components

- Continuous current input
- Contact input

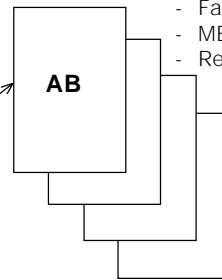


### Functional component

- Measurement loop TAG 1

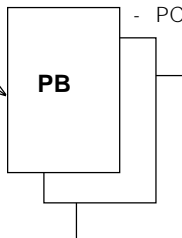
### Output components

- Current output
- Voltage output
- DISBUS-outputs
- Fail safe output
- MET-indication
- Relay outputs



### PC/PLC-component

- PC/PLC-outputs



## 1.2 Approvals

### Ex-approval

As appropriate intrinsically safe instrument.  
EC-type approval certified acc. to



CENELEC II (1) G [EEx ia] IIC

### WHG-approval

Signal conditioning instrument applied as part  
of an overfill protection acc. to WHG.

## 1.3 Features

- Microcomputer controlled signal conditioning instrument for continuous measurement
- Adjustment module with LC-display and 6 keys
- Adjustable integration time
- Two fixed and three individually programmable linearization curves
- Fault monitoring
- Fault signal and failure diagnosis via display

Input:

- 1 sensor input (capacitive electrode or pressure transmitter or another 4 ... 20 mA - sensor)

Outputs:

- 1 current output 0/4 ... 20 mA
- 1 voltage output 0/2 ... 10 V
- 2 relay outputs (spdt)
- 1 DISBUS-output for digital wiring and connection of VEGADIS 174
- Can be configured for various applications
- 1 fail safe relay
- Adjustment also via PC with adjustment software VVO; connection via VEGACON-NECT

## 1.4 Technical data

### Power supply

---

Operating voltage	$U_{\text{nom}}$ = 20 ... 250 V AC, 50/60 Hz = 20 ... 72 V DC
Power consumption	approx. 10 VA or approx. 4 W

### Measuring data input

---

Number	1 input
Kind of input	active two-wire input, analogue
Range	4 ... 20 mA (sensor is powered by VEGAMET)
Possible sensors (loop powered)	capacitive electrodes, pressure transmitters, process pressure transmitters, differential pressure transmitters, ultrasonic sensors (4 ... 20 mA - sensor), radar sensors (4 ... 20 mA - sensors)
Voltage	
- at 4 mA	approx. 19,5 V DC
- at 20 mA	approx. 16 V DC
Current limitation	at approx. 26 mA, shortcircuit proof
Detection-line break	< 3,6 mA
Detection-shortcircuit	> 21 mA
Min. adjustment delta	2 % of the adjusted sensor values
Connection line	2-wire standard line (screening recommended)
max. resistance per conductor	35 $\Omega$
Resolution	1 $\mu\text{A}$
Linearity error	0,025 % at 4 ... 20 mA
Temperature error	0,04 %/10 K at 4 ... 20 mA

### Current output

---

Number	1 output
Function	analogue output of processing results
Range	in range 0 ... 20 mA individually adjustable
Load	max. 500 $\Omega$
Resolution	1 $\mu\text{A}$
Linearity error	0,05 % (relating to 20 mA)
Temperature error	0,05 %/10 K (relating to 20 mA)

### Voltage output

---

Number	1 output
Function	analogue output of processing results
Range	in range 0 ... 10 V individually adjustable
Current	max. 1 mA
Resolution	0,5 mV
Linearity error	0,05 % (relating to 10 V)
Temperature error	0,06 %/10 K (relating to 10 V)

**Relay outputs**

Number	2 switching relays 1 fail safe relay
Contact	floating spdt
Contact material	AgNiO, hard gold plated
Turn-on voltage	min. 10 mV DC max. 250 V AC/DC
Switching current	min. 10 $\mu$ A max. 3 A AC, 1 A DC
Breaking capacity	max. 500 VA, 54 W
Min.switching hysteresis (Low/High-Delta)	0,5 %

**DISBUS-output**

Function	for wiring among signal conditioning instruments and for connection of digital indicators
Connection line	2-wire standard line (screening recommended)
max. line length	1000 m

**Indicating elements**

Clear text indication	LC-display - 4-lines, 6 digits each - background lightning
Analogue indication	LED-chain consisting of: - 11 segments 0 % ... 100 % - indicates the actual value of the selected measuring point
LEDs in front plate	green: Operating voltage on red: Fault signal (LED lights when relay is de-energized) yellow: Relay status (standard adjustment: lights when relay is energized)

**Adjustment elements**

Front plate	6 keys for configuration and parameter adjustment
upper housing side	rotating switch for adjustment of instrument address on DISBUS (when mounted, covered by plug-in socket)

**Ambient conditions**

Permissible ambient temperature	-20°C ... +60°C
Storage and transport temperature	-40°C ... +80°C

**Electrical connection**

Screw terminal	max. 1,5 mm <sup>2</sup>
----------------	--------------------------

**Electrical protective measures**

Instrument	IP 30
Terminal socket	IP 20
Protection class	II
Overvoltage category	II

**Electrical separating measures**

---

Reliable separation acc. to VDE 0106, part 1 between	power supply, fail safe and level relay and measuring data inputs
- reference voltage	250 V
- isolation resistance	2,3 kV
Galvanic isolation	between the relay outputs
- reference voltage	250 V
- isolation resistance	1,4 kV
Potential separation	between DISBUS and outputs
- reference voltage	50 V
- isolation resistance	0,5 kV
Common reference potential at	voltage and current output

**Mechanical data**

---

Series	module unit with terminal socket, including transparent cover, cover of special terminals, coded pin, two bridges
Mounting	carrier rail mounting acc. to DIN 46 277, Bl. 3
Dimensions unassembled	W = 72 mm, H = 118,5 mm, D = 134 mm
Weight	approx. 480 g

**CE-conformity **

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VEGAMET 614 and VEGAMET 614 Ex signal conditioning instruments meet the protective regulations of EMVG (89/336/EWG) and NSR (73/23/EWG). For industrial use only. The conformity has been judged acc. to the following standards:

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



## 2 Mounting and installation instructions

### Mounting

Each series 600 signal conditioning instrument consists of a terminal socket for carrier rail mounting DIN 46 277 and a module unit.

The supply voltage can be connected to terminals 17 and 18.

For neighbouring series 600 signal conditioning instruments it is possible to continue the connection L1 and N directly via the supplied bridges. The same is valid for the connection of VEGAMET-voltage output 0 ... 10 V (terminals 15 and 16) and for the DISBUS-output (terminals 9 and 10).

#### Note!

The bridges must be never used with single instrument or at the respective end of an instrument row.

If this note is not observed, there exists the danger to come in touch with the operating voltage or to generate a shortcircuit.

VEGAMET 614 Ex signal conditioning instrument is intrinsically safe and must not be installed in hazardous areas.

Before set-up the Ex-separating chamber must be provided as shown on VEGAMET 614 Ex.

A correct operation is only ensured if the operating instruction and the EC-type approval are noted.


VEGAMET 614 Ex must not be opened.

### Coding

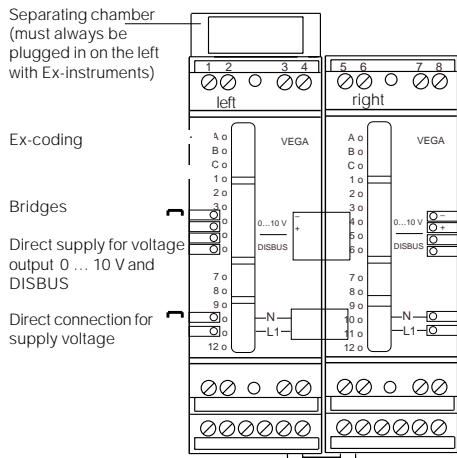
The terminal socket is provided with pins and the signal conditioning instrument with appropriate gaps (mechanical coding) to avoid interchanging of the various signal conditioning instruments.

An instrument coding ensures that the various signal conditioning instruments of series 600 are not interchanged due to differently positioned coded pins.

An Ex-coding with inserted coding pin ensures that the not-Ex and Ex-instruments are not interchanged.

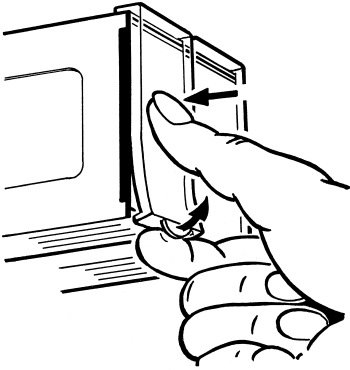
 On VEGAMET 614 Ex the supplied coded pins (instrument coded pin and Ex-coded pin) must be inserted by the user according to the below table.

	Instrument coding	Ex-coding
VEGAMET 614	right 1 left B right B	—
VEGAMET 614 Ex	right 1 left B right B	left A



### **Transparent cover**

To protect the instrument against unauthorized adjustment, the front plate of VEGAMET can be provided with two lockable transparent covers after set-up. See the figure to remove transparent cover.



### 3 Electrical connection

#### 3.1 Connection instructions

Generally note the following instructions for electrical connection:

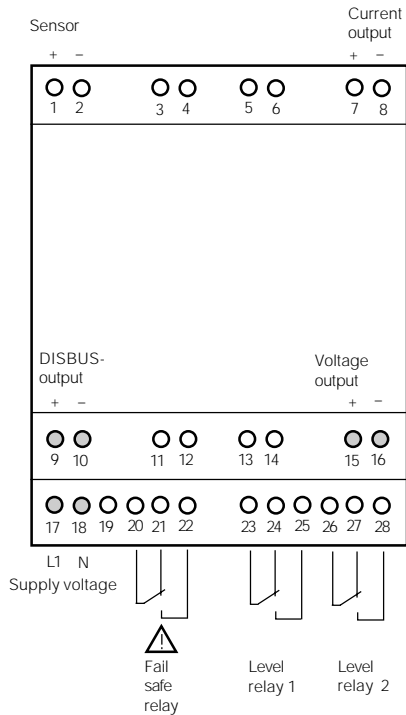
- The connection must be made acc. to the national installation standards (e.g. in Germany acc. to the VDE-regulations).
- The wiring between VEGAMET 614 and sensor can be made with standard two-wire cable.
- If strong electromagnetic interferences have to be expected, screened cable is recommended. The screening must be earthed on one sensor end.
- The line resistances stated in the technical data must not be exceeded.
- If overvoltages have to be expected, we recommend a sensor electronics with integral overvoltage arrester or the installation of VEGA-overvoltage arresters.

#### 3.2 Connection instructions for Ex-approved applications



For wiring between VEGAMET 614 Ex and an explosion protected sensor, the installation regulations, in Germany acc. to VDE 165, and the EC-type approval must be noted. The legal documents are supplied with the appropriate instrument.

#### 3.3 Wiring plan



● These connections can be connected to the neighbouring series 600 signal conditioning instruments with the supplied bridges.

#### Ex-version

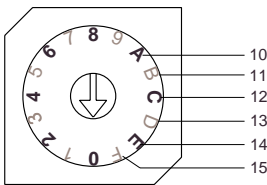
For connection of Ex-certified instruments, please note the instructions in the enclosed legal documents as well as the valid installation instructions. Note that before set-up the Ex-separating chamber must be plugged to the left instrument side (see figure page 10).

## 4 Adjustment

### 4.1 Indicating and adjustment elements

A rotating switch is located on the upper side of the housing. It is used for adjustment of the instrument address on DISBUS. This adjustment is necessary if several VEGAMET signal conditioning instruments are connected via DISBUS or if you control an indicating instrument VEGADIS 174 via DISBUS.

Adjustment range 1 ... F corresponds to DISBUS-addresses 1 ... 15.  
Factory setting: 0



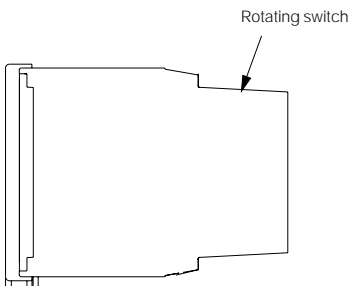
#### Rotating switch

The adjusted instrument address on DISBUS can be indicated via the LC-display.

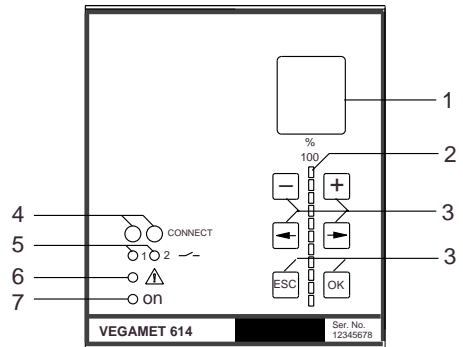
#### Note

If several VEGAMET should be connected via DISBUS, each address must only be used once!

#### Position of the rotating switch



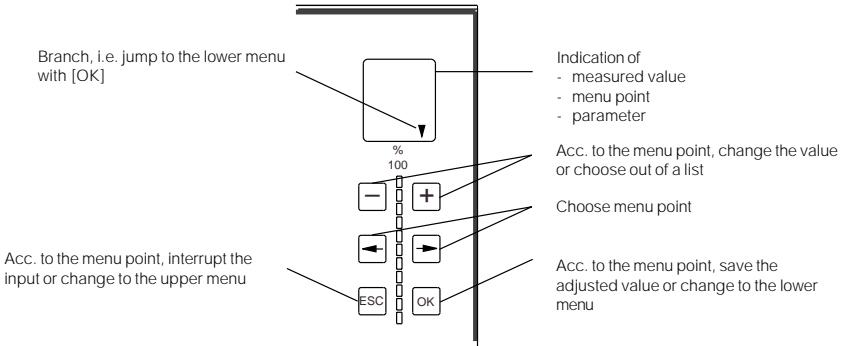
#### Front plate



- 1 LCD (4 lines with 6 figures each, lightened) for clear text indication
- 2 LED-chain (yellow) for quasianalogue indication of the measured value
- 3 Keys for menu adjustment
- 4 Connection socket for VEGACONNECT
- 5 LED (yellow) lights when relay energized (standard adjustment)
- 6 LED (red) lights when the relay de-energized
- 7 LED (green) lights, when operating voltage is on

## 4.2 Adjustment system

### Indication and adjustment module



### Reduced menu – Extended menu

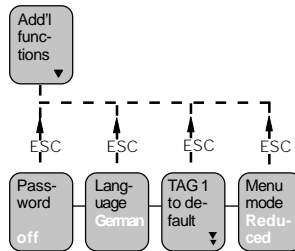
Two menu plans are available: the plan "Reduced menu" and the plan "Extended menu".

#### Note:

As factory setting VEGAMET 614 is adjusted such that you are in the menu mode "Reduced menu"!

For most applications you can make the necessary adjustments in this menu mode (see also chapter 4.5 Comparison of the menu modes).

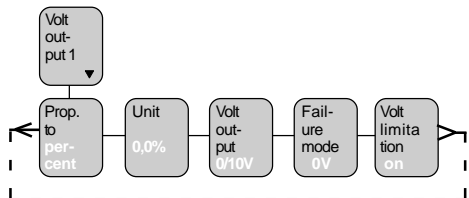
menu with [ESC] can be made from any menu point, even if no connection is shown in the menu plans.



### Adjustment structure

The adjustment is made via 6 keys in conjunction with text indication. The jump from measured value indication to the lower menu point is made with [OK]. Use [→] or [←] to move within this menu stage from one menu point to the other. A branch is marked with the symbol ▼ and enables with [OK] a jump to the lower menu point. Parameters can be determined by a missing symbol ▼. The value of the parameters can be modified with [+] or [-] or chosen out of a list. The modified value can be saved with [OK]. Push [ESC] to interrupt an adjustment (without saving the modification). The reset to the upper menu point is made with [ESC]. 15 minutes after a key was pushed for the last time, an automatic reset to the measured value indication is triggered. The reset to the upper

If you are in the complete right menu point of a menu row, push the key [→] and you reach immediately the complete left menu point of this row. Furthermore you reach from the left menu point of a row immediately the right menu point when you push the key [←]. These connections (shown with a broken line) are not shown in this menu for better survey.



### Demonstrations in the menu plan

**Language** **German** In white letters you see the parameters which can be modified with the [+] or [-]-key and can be saved with the [OK]-key.

Examples:

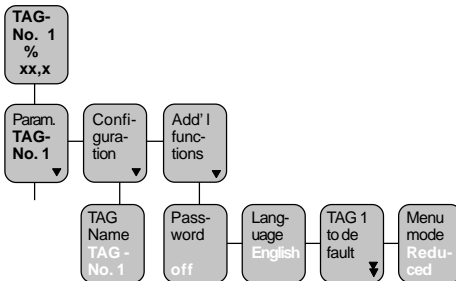
- In the menu "Language" you can switch over from German to English

**Param. TAG-No. 1** Bolt print/italic inputs, e.g. the meas. point name "TAG-No. 1" can differ when you have made your parameter adjustment or configuration of the measuring point appropriately. In the menu plans you see the factory setting

**Volt at 0% 0,000** Light grey menu points are only displayed if required (dependent on the adjustment in the other menu points).

### Change of the menu mode:

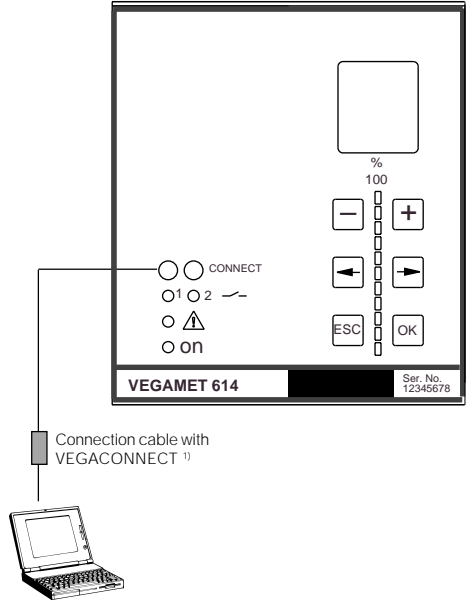
Move from the measured value indication (TAG-No. 1) to the menu "Menu mode Reduced". Now push [+] twice until "Menu mode Extended" appears, then push [OK]. You can now return to measured value indication by pushing [ESC] twice.



### 4.3 Adjustment via PC

Set-up

- directly via the keys of the adjustment module
- or with a PC, equipped with VVO-software (VEGA Visual Operating) and a connection cable VEGACONNECT <sup>1)</sup>



<sup>1)</sup> For VEGAMET connected via DISBUS only 1 VEGACONNECT must be used.

## 4.4 Configuration and parameter adjustment

Unaffected whether you set-up your VEGA-MET via the keys of the adjustment module or via a PC with the software VVO, the procedure is always the same.

Proceed in the following sequence:

- configuration (if not already configured as factory setting)
- parameter adjustment.

In this operating instruction the adjustment steps are described which are directly carried out on the keys of VEGAMET. The adjustment via the software VVO is described in a separate instruction.

### Configuration

Configure means coordinate, determination of functions (once). VEGAMET requires a (mostly once) basic coordination, determining the application and the coordination of the inputs and outputs. There is a choice out of existing functions and possibilities. This procedure is called configuration. The signal conditioning instruments are already supplied with a configuration which must only be changed in exceptions.

The basic configuration includes the following steps:

#### 1 Configuration measuring point

- Choose the kind of application (level, gauge...)
- Choose sensor type (capacitive, hydrostatic...)
- Determine application (standard, level difference...)
- Determine options (no option, corrections...)

Note:

The meas. point configuration can only be modified when a "reset to single measurement" was carried out before (under "Additional functions" in the extended menu).

When you only want to modify the sensor type you first have to carry out "Reset TAG1" (under "Additional functions" in the reduced menu).

#### 2 Configuration inputs

- Determine from where your VEGAMET receives the input data (sensor, other VEGAMET)
- Enter sensor characteristics values (meas. range, current range)

#### 3 Configuration outputs

- All outputs (except fail safe relay) can be coordinated to one sensor or can be switched off.

After basic configuration VEGAMET goes to operating condition and indicates the actual measured value. The other configurations should be carried out after the parameter adjustment.

### Parameter adjustment

Parameter adjustment means modify values. Signal conditioning instruments have many parameters, the values of which can be modified, such as e.g. the integration time in the range of 0 ... 600 s. The modification of these values is called parameter adjustment. The parameter adjustment does not influence the configuration. A parameter adjustment is only possible after a configuration (e.g. adjust values of the current input when the current output had been coordinated).

## 4.5 Comparison reduced menu – extended menu

In the table the most important functions of VEGAMET 614 are listed – together with the information in which menu mode the functions are available.

Function	Reduc. menu	Ext. menu
Adjustment with medium	x	x
Adjustment without medium	x	x
Adjust integration time	x	x
Simulation	x	x
Changeover current output (4/20 mA, 0/20 mA, 20/4 mA, 20/0 mA)	x	x
Changeover Volt output (2/10 V, 0/10 V, 10/2 V, 10/0 V)	x	x
Changeover relay mode (overflow protection – protection against dry running of pumps)	x	x
Scaling (display)	x	x
Change menu mode (reduced – extended)	x	x
Change menu language	x	x
Activate/deactivate password	x	x
Modify sensor type	x	x
Modify measuring point name	x	x
Reset measuring point (Reset TAG)	x	x
Set measuring point to factory setting (TAG to default)	x	x
Edit linearization curves	–	x
Change application (e.g. level – gauge)	–	x
Choose different measuring results for outputs	–	x
Define output reaction (current/Volt output) in case of failure	–	x
Adapt VEGAMET to sensor characteristics values	–	x
Offset correction with adjustment	–	x
Reset level	–	x
Coordinate input (of another VEGAMET)	–	x
Switch on/off current/Volt limitation	–	x
Adjust current/Volt output value individually between 0 ... 20 mA/0 ... 10 V	–	x
Manual offset correction	–	x
Manual real value correction	–	x
Info indication	–	x

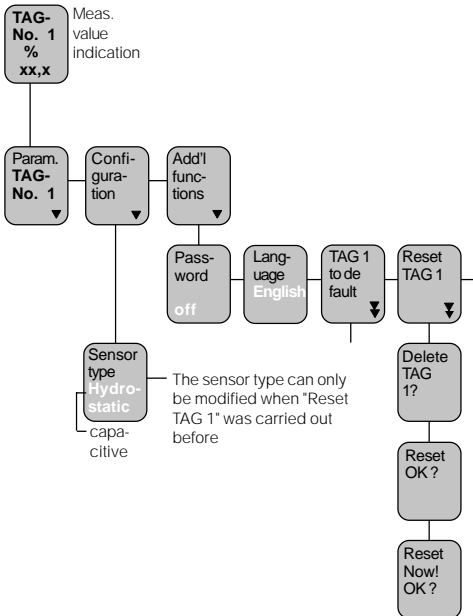
## 5 Set-up

- Adjust VEGAMET-instrument address by means of the rotating switch on the circuit board (only necessary if you have connected several VEGAMET via DISBUS).
- Install VEGAMET
- Connect sensor and power supply
- After switching on, the display shows for approx. 10 secs. the instrument type and the software version, e.g. "MET 614 V1.12"
- If no meas. point is configured, the display shows "Configuration", in addition the red failure LED lights. In this case proceed as described under "7.1 Configuration meas. point".
- If already a meas. point is configured, the display shows a value e.g. "TAG-No. 1 21,8 %". You can now carry out the adjustments as described in chapter "6 Adjustments in the reduced menu".

## 6 Adjustments in "reduced menu"

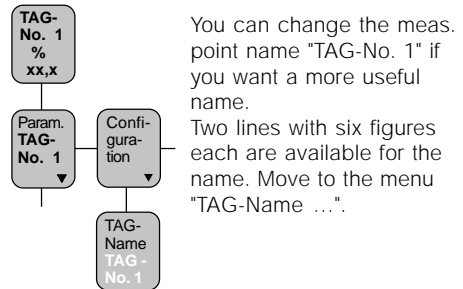
### 6.1 Configure meas. point

#### Choose sensor type



VEGAMET 614 was pre-configured for connection of a hydrostatic sensor. If you want to connect a capacitive electrode, proceed as follows:  
 Move to the menu "Sensor type Hydrostatic". Push once [+] or [-]. The word "Hydrostatic" flashes. You are now in the editing mode.  
 Push again [+] or [-] until the display now shows "Sensor type Capacitive". You are still in the editing mode.  
 Now push the [OK]-key. Hence you save the adjustment and quit the editing mode.

#### Name meas. point



You can change the meas. point name "TAG-No. 1" if you want a more useful name.

Two lines with six figures each are available for the name. Move to the menu "TAG-Name ...".

Push [+] or [-] once. The first figure of the meas. point name, in this example the letter T, flashes (editing mode). Continue pushing the [+] or [-] key, hence you scroll through the alphabet, through a row of figures and through a list of letters.

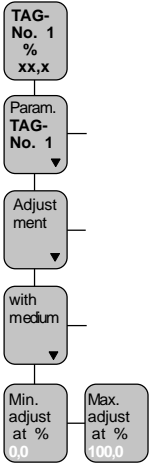
When you have reached the requested letter, push [->]. The next figure is activated and flashes. Scroll again with [+] and [-] up to the requested figure. With [->] you reach the next figure.

When you have finished "writing" the name of the meas. point and you have reached the last position, you have to push [OK] to save the adjustment. When you quit the menu without saving, the meas. point keeps the name "TAG-No. 1".

In the meas. value indication and all other menus where the meas. point name is mentioned, the new name is shown.

## 6.2 Adjustment with medium

You can either carry out the adjustment **with** or **without** medium. To carry out an adjustment with medium, it is necessary that you know the percentage values of the actual filling of the vessel.



For this procedure the percentage values for min. and max. have to be adjusted which correspond to the actual fillings. The adjustment sequence of the min. and max. value is not important. If you know that your filling is actually 80 %, you can enter in the menu "max. adjustment" the value "80". At another time, when your filling is e.g. 10 %, enter in the menu min. adjustment the value "10".

The higher the difference between the two adjustment points, the more exact will be the measurement over the whole meas. curve. Ideally would be the adjustment at 0 % and 100 %. Due to practical reasons, it is not always possible, to completely fill or empty a vessel. The distance between the two adjustment points however should be at least 10 % of the sensor range.

### Adjustment example

**Max. adjust at % 100,0** You know that your vesse is actually filled up to 80%. Move to the menu "Max. adjustment at % 100,0". Shortly push the [-]-key, so that the figure 100,0 flashes (editing mode).

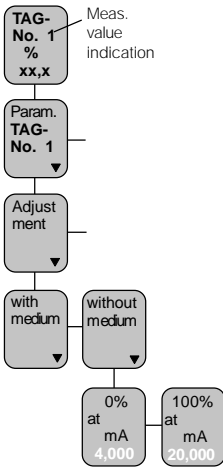
**Max. adjust at % 80,0** Continue pushing [-] until the figure 80,0 appears on the display. Now push [OK] to save the adjustment.

**Min. adjust at % 0,0** Then your filling is e.g. 10 % you move to the menu "Min. adjustment at % 0,0". Shortly push [+] until the figure 0,0 flashes (editing mode).

Continue pushing [+] until "10" appears on the display. Now push [OK] to save the adjustment.

**Min. adjust mentat % 10,0** You can carry out the adjustment with medium also at 0 % and 100 % filling. Note: The figures 0 % and 100 % must flash (editing mode), before they can be saved with the [OK]-key.

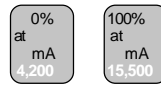
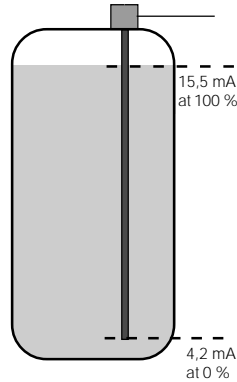
### 6.3 Adjustment without medium



For this adjustment procedure you have to enter two sensor current values (4 ... 20 mA) corresponding to the levels 0 % and 100 %.

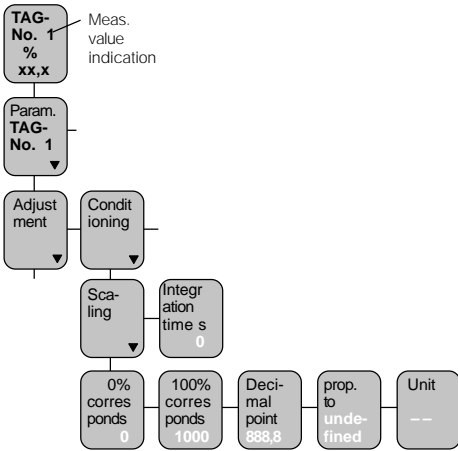
### Adjustment example

You know the data of the sensor, i.e. you know that the sensor delivers at 0 % filling a current of 4,2 mA and at 100 % filling a current of 15,5 mA. Enter these values in the menus.



Enter in these two menus the values of the sensor. Use the [+] and [-] keys to adjust the values and [OK] to save the values.

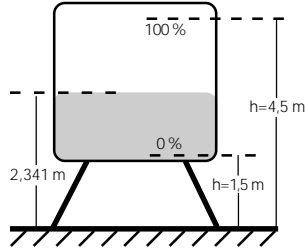
## 6.4 Scaling



The adjustments under scaling determine which values and which unit should be actually shown on the meas. value indication (upper menu point). In the menu "0 % corresponds..." and "100 % corresponds..." you can adjust the figures with [+] or [-] and [OK] which should be displayed at 0 % and at 100 % filling. In the menu "Decimal point..." you determine the position of the decimal point. In the next menu "prop. to..." you get a choice of the parameters: percent, mass, volume, pressure etc. by pushing [+] or [-] which you can enquire and save with [OK]. In the menu "Unit..." a new choice, e.g. m, dm, cm, mm, ft, yd and in is displayed when you have chosen "Height" as parameter (see chapter "7 Measuring results and units").

## Scaling example

You have a raised tank and you want that the level is indicated in the meas. value indication menu in metres with three positions after the comma.



0% corresponds  
1500

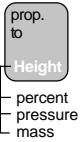
Adjust in this menu the figure 1500 (with the keys [+], [-] and [OK]). This corresponds to the level at 0 % (when you want to have a lower resolution of the meas. value indication, you can also adjust 150 or 15).

100% corresponds  
4500

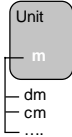
Adjust in this menu the figure 4500 (with keys [+], [-] and [OK]). This corresponds to the level at 100 %.

Decimal point  
88.88

Adjust the decimal point as shown (with keys [+], [-] and [OK]).



Choose in the menu the term "Height" (with keys [+], [-] and [OK]).

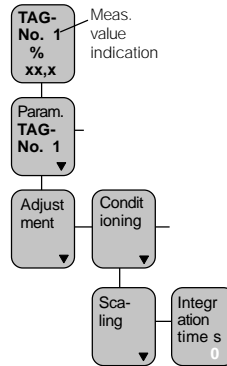


As you have chosen "Height" in the previous menu, you get a choice of several units (mm, dm, cm, m, yard...). Choose m (with keys [+], [-] and [OK]).



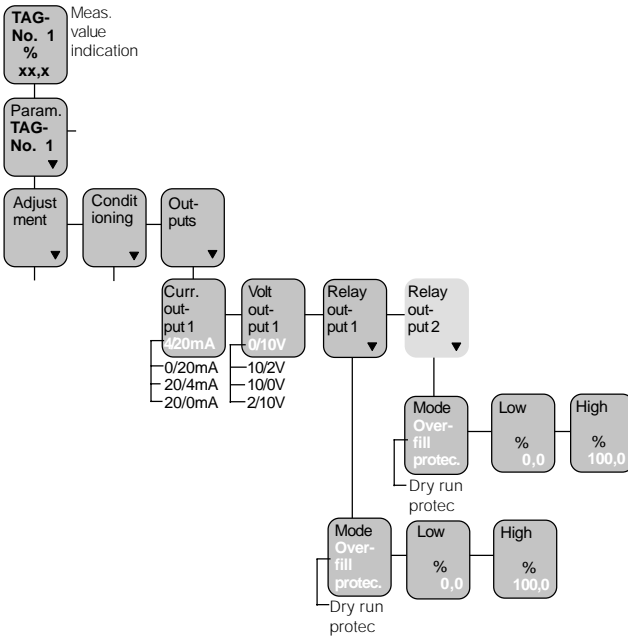
In the meas. value indication the scaled value is now shown.

## 6.5 Integration time



If the integration time is set to 0 s (factory settint) each quick change of the product surface (e.g. waves) is immediately detected and interpreted as level change. All output values of VEGAMET will follow the wave movements. To avoid this, the integration time will be increased (max. 600 s are possible with VEGAMET). The higher the time adjustment, the slower reacts the measurement.

### 6.7 Outputs



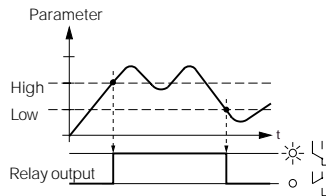
The current output of VEGAMET is adjusted to 4 ... 20 mA. By pushing of [+] or [-] and [OK] the output can be adjusted to the following values: 0/20 mA, 20/4 mA and 20/0 mA.

For the voltage output the following operations are available beside the pre-adjustment (0/10 V): 10/2 V, 10/0 V and 2/10 V.

As a factory setting the relay outputs are adjusted to mode "Overfill protection" (mode A). By pushing [+] or [-] and [OK] you can coordinate the mode "Dry run protec" (mode B) separately from the relay output. In the following menu points you can determine the upper and lower switch point for the adjusted mode.

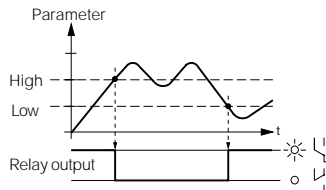
The graphic shows how the relay outputs and the LEDs react depend on the level.

#### Overfill protection



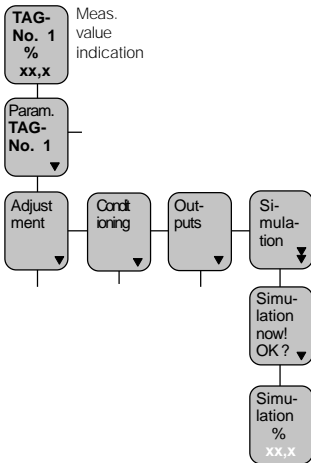
The relay of relay output 1 de-energizes at switch point "High" (safe condition).

#### Dry run protec



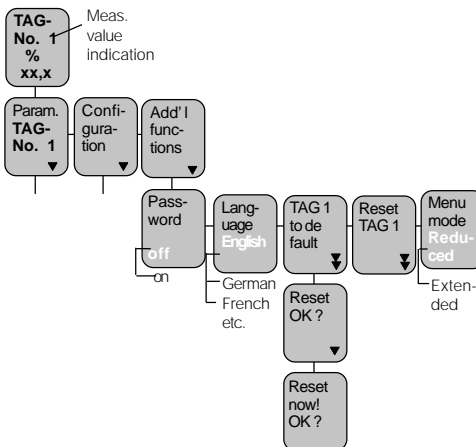
The relay of relay output 1 de-energizes at switch point "Low" (safe condition).

## 6.8 Simulation



To check the outputs and the connected instruments, you can adjust in this menu any individual percentage value with the keys [+ ] and [- ]. Initial point is always the actual measured value. The indicated value flashes when simulation is activated. 15 minutes after adjustment of the simulated value, the simulation is automatically finished and reset to meas. value indication is made.

## 5.9 Password, language, reset, menu mode



## Password

You have the possibility to protect VEGAMET 614 against unauthorized or wrong adjustment. Activate in the menu "Password" the option "on" (with keys [+ ], [- ] and [OK]). Now you can only check the measured value on the display. Nevertheless you reach any menu with the arrow and OK-keys but as soon as you modify an adjustment, you are asked for the password. Enter the figure "614" (with keys [+ ], [- ] and [OK]) to carry out the adjustment. Input of the password once is sufficient to open all protected menu points.

## Language

In the menu "Language" you can choose another language than German such as e.g. English, French etc. (with keys [+ ], [- ] and [OK]).

## Reset

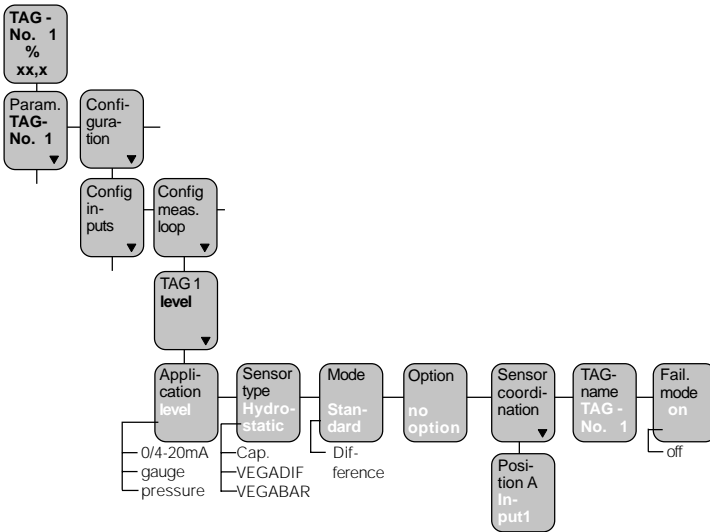
In the menu "TAG 1 to default" all adjustments concerning meas. point 1 are reset to factory setting. When you have e.g. changed the name of the meas. point to "Silo 5", the name after the reset is again "TAG-No. 1". Also all adjustment values you have entered for meas. point 1, are now reset to factory setting.

## Menu mode

The menu modes "Reduced" and "Extended" are available. With the keys [+ ], [- ] and [OK] you choose the required menu mode. The plan of the reduced menu and the plan of the extended menu are shown later in this operating instruction. As factory setting "Reduced menu" is adjusted.

## 7 Adjustment in "extended menu"

### 7.1 Configuration meas. point



The meas. point configuration is normally made as factory setting. Should a general modification of the meas. point configuration be necessary, first of all a "Reset to single measurement" must be carried out (see appropriate menu point). Only then you can modify the adjustments in the menu points, application, sensor type, mode and option. Hence work on the individual menu points in the given sequence. The adjustment or selection possibilities always depend on the adjustment in the previous menu point. If e.g. in the menu point application "Level" is adjusted, only one sensor mode can be adjusted in the menu point "Sensor type" which is also suitable for level detection. As soon as you have carried out an adjustment in the menu point "Option" and confirmed it, on the display appears the message: "TAG being created!".

You choose the application 4/20 mA when you want to connect an analogue ultrasonic sensor, an analogue radar sensor or a sensor of another manufacturer to VEGAMET.

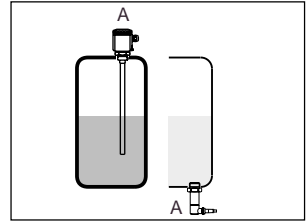
On the following figures, further application modes are shown. In addition you see which adjustments you must carry out in the menu points "Sensor type" and "Mode".

In the menu point "TAG-Name" you can give an individual name to the meas. point (see chapter "5.2 Standard menu").

When you choose "Failure mode off", the fail safe relay and the failure indication on the front plate are not in operation.

**Level measurement**

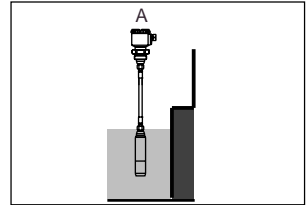
Application: Level  
 Sensor: Capacitive electrodes  
           Hydrostatic pressure transmitters  
           Differential pressure transmitters  
 Kind: Standard  
 Option: none  
 Parameter: TAG1 level



Level measurement

**Gauge measurement**

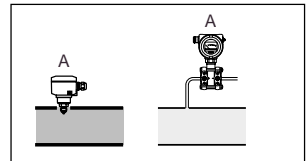
Application: Gauge  
 Sensor: Hydrostatic pressure transmitters  
 Kind: Standard  
 Option: none  
 Parameter: TAG1 gauge



Gauge measurement

**Process pressure measurement**

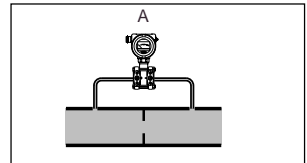
Application: Pressure  
 Sensor: Process pressure transmitters (VEGABAR)  
           Differential pressure transmitters (VEGADIF)  
 Kind: Standard  
 Option: none  
 Parameter: TAG1 process pressure



Process pressure measurement as standard measurement

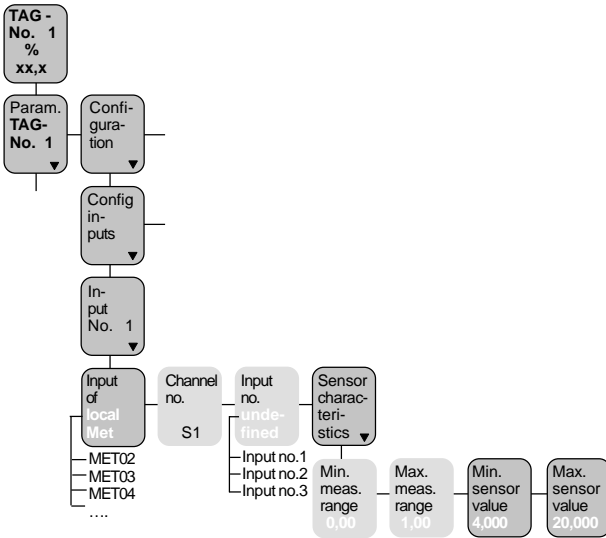
**Differential pressure measurement**

Application: Pressure  
 Sensor: Differential pressure transmitters (VEGADIF)  
 Kind: Difference  
 Option: none  
 Parameter: TAG1 pressure difference



Process pressure measurement as differential pressure measurement

## 7.2 Configuration inputs

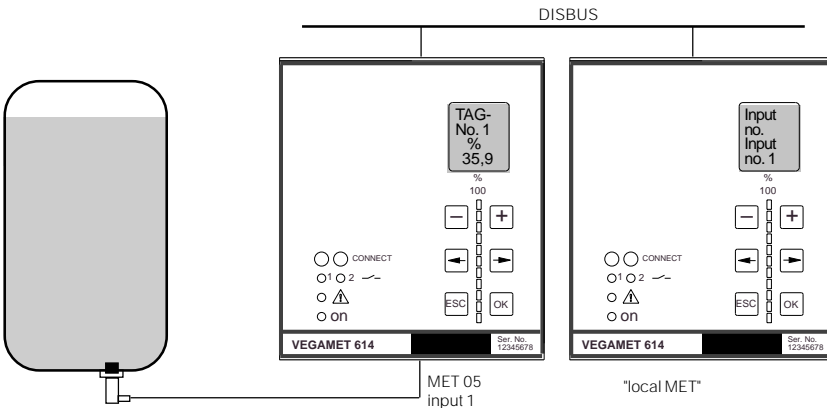


### Input local MET:

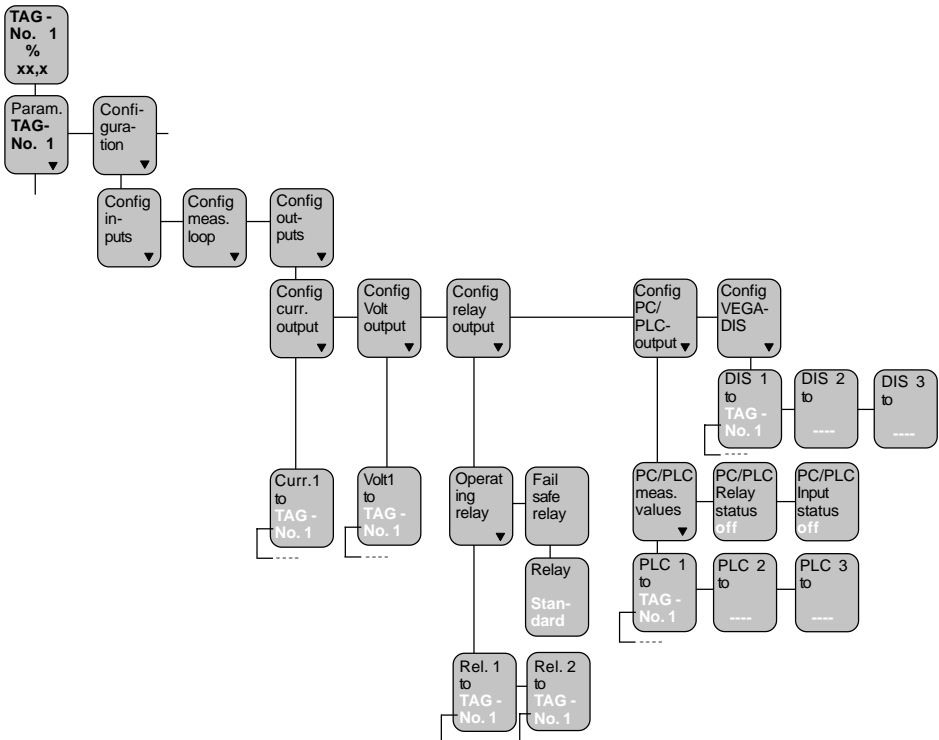
Here you can enquire another VEGAMET (e.g. Met 05) and hence determine that the input signal is not taken over by a directly connected sensor but from a VEGAMET connected via DISBUS (e.g. VEGAMET 614). The enquired VEGAMET-number corresponds to the DISBUS-address of the instrument (see chapter 4.1).

If another VEGAMET has been chosen, the menu point "Input undefined" appears in which you can adjust the input number of the other VEGAMET (see figure).

The menu points "Min. meas. range" and "Max. meas. range" are only visible with hydrostatic pressure transmitters. Sensor values are stated in the test certificate of the hydrostatic pressure transmitter.



### 7.3 Configuration outputs



#### PC/PLC-output and DIS-output:

Via the DISBUS either the PC/PLC-signal as well as the DIS-signal are transmitted.

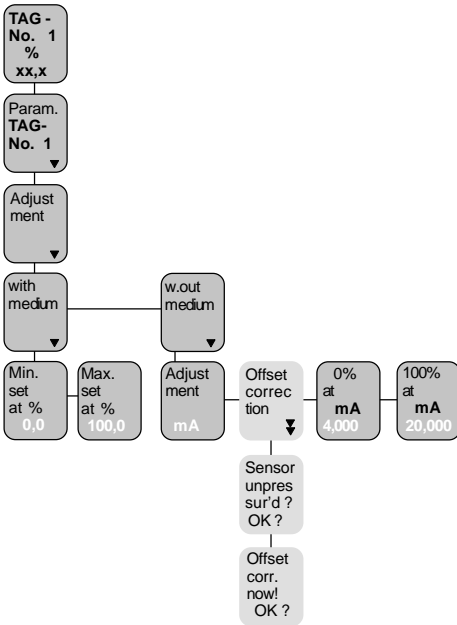
The PC/PLC-output delivers output signals of VEGAMET to an interface converter VEGA-COM 557. The interface converter transfers the signals of VEGAMET in different standard protocols to connected systems (DCS/PLC). In the menus "PLC 1 to" up to "PLC 3 to..." the meas. loop can be coordinated or switched off.

In the menu points "PC/PLC relay status" and "PC/PLC input status" it can be determined that the relay and input status are transmitted via the DISBUS.

Up to three external indicating instruments (VEGADIS 173 or VEGADIS 174) can be connected to DISBUS. In the menus "DIS 1 to..." up to "DIS 3 to-" the meas. loop can be coordinated or switched off.

The current output, the Volt output and the relay outputs are coordinated as factory setting to meas. loop "TAG-No. 1". They can all be switched off individually (----), i.e. outputs do not access a meas. loop.

## 7.4 Adjustment



The **adjustment with medium** corresponds to the procedure in the reduced menu (see appropriate chapter).

- if later on the medium is changed (medium with other density value or dielectric constant value) and no new adjustment can be made
- or if the VEGAMET-indication and VEGA-DIS-outputs are related to height in metres you have to note the following:

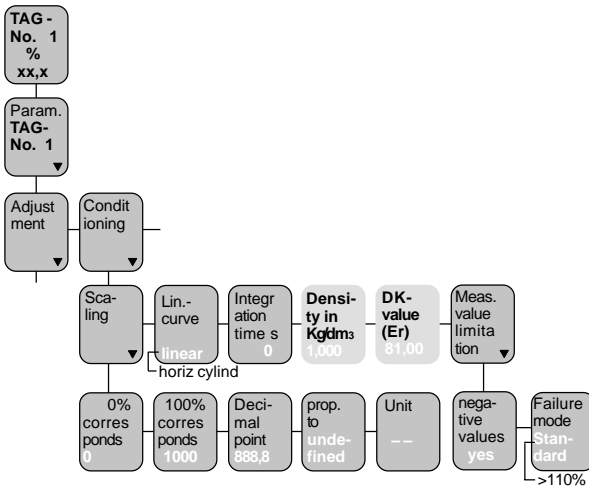
In applications with hydrostatic pressure transmitters, the adjusted density value (see menu "Parameter, Conditioning") must correspond to the value of the medium. In applications with capacitive electrodes the adjusted dielectric constant value must correspond to the value of the medium.

For the **adjustment without medium** two future levels, gauges etc. must adjusted which correspond to 0 % and 100 %.

The menu point "Offset correction" is released when connecting hydrostatic pressure transmitters. The offset correction should be carried out after installation of the sensor, as the sensor values can slightly differ with various installation positions (vertical or horizontal mounting).

With the offset correction, the meas. data of the unpressurized sensor (vessel empty) are detected as correction figure and considered for the following measurements.

## 7.5 Conditioning



The menu points "Scaling" and "Integration time" correspond to the menu points in the "reduced menu" (see appropriate chapter).

The menu points "Density..." or "DK-value..." are displayed optionally when under "Configuration meas. loop" the appropriate sensor has been selected. The density or dielectric constant value must be adjusted such before adjustment with medium that it corresponds to the value of the medium (water has a density of 1,0 kg/dm<sup>3</sup> and a dielectric constant figure of 81,00).

The following linearisation curves are available:

- linear (factory setting)
- horiz. cylindrical tank
- spherical tank
- Lin-curve 1
- Lin-curve 2
- Lin-curve 3

The Lin-curves 1 ... 3 can be edited by you (see appropriate chapter).

After a scaling or linearisation the required output must be coordinated to the scaled or linearized value (menu points "prop. to..." and "Unit..." in the menu range "Parameter adjustment outputs").

Under meas. value limitation you can exclude negative values.

### Failure mode Standard

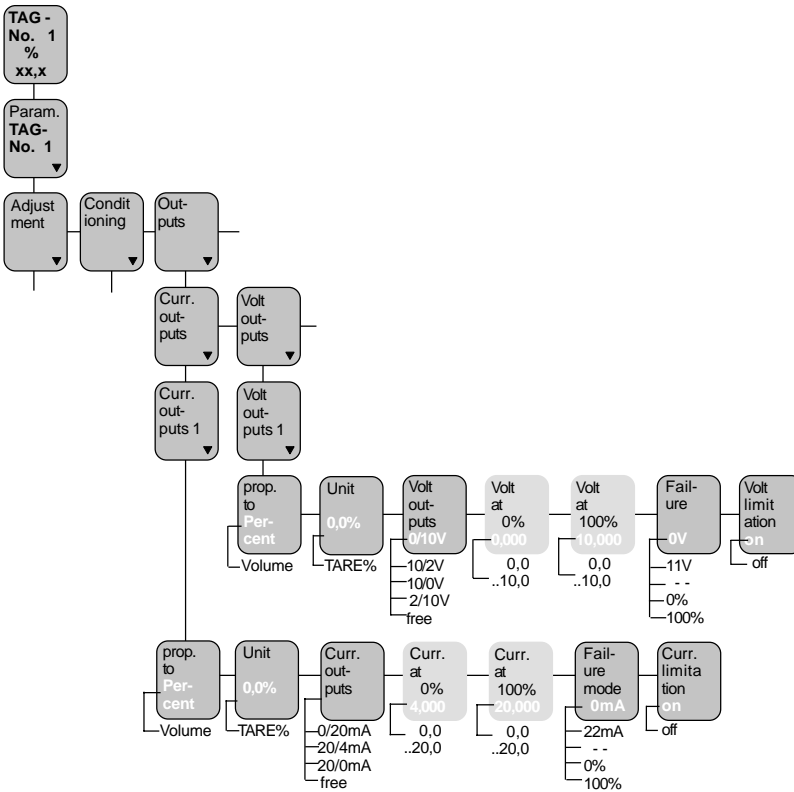
means that with a sensor current of 3,6 mA or 21 mA the fail safe relay responds.

### Failure mode >110%

effects additionally a fault signal with a meas. value of more than 110 % or less than -10 %.

## 7.6 Parameter adjustment outputs

### Current outputs/Volt outputs



In the menu point "prop. to" you can choose between percent and volume. "Prop. to volume" is then useful when you have chosen under "Conditioning - Linearisation curves" for example a cylindrical tank or an individually defined linearisation curve. The output current or the output voltage than acts proportional to the volume of the tank contents.

**Unit:**

List dependent on the selection in the previous menu "prop. to" (see chapter "7 Measuring results and units").

**Volt output/Current output:**

If "free" is chosen, the following (light grey) menu points appear:

- Volt at 0%/100 %:  
Individual voltage values between 0 V and +10 V can be adjusted.
- Current at 0%/100 %:  
Individual current values between 0 mA and +20 mA can be adjusted.

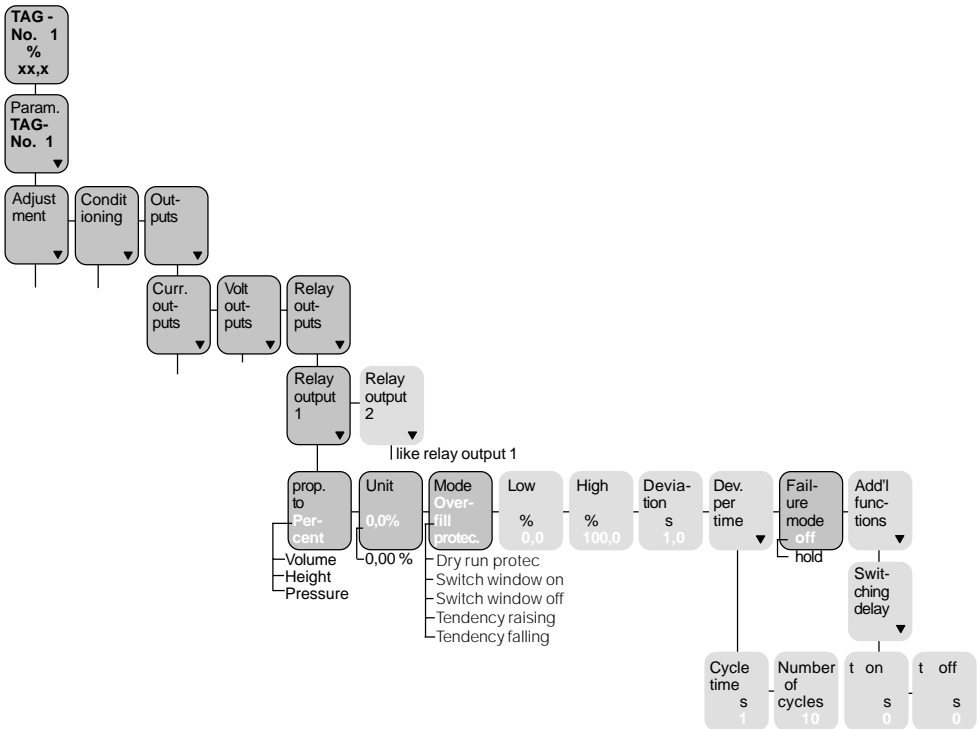
**Failure mode:**

The height of the output current/output voltage in case of failure is here determined. If "--" is chosen, the actual value is kept.

**Volt limitation/Current limitation on:**

Voltage/current remain within the values which are given in the menu Volt output/Current output.

## Relay outputs



In the menu point "prop. to" you choose a parameter to which the relay reacts. You can choose between percent and volume ("prop. to volume" is useful when under "Conditioning - Linearisation curves", for example a cylindrical tank or an individually defined line.-curve was selected). In the next menu point you can choose the suitable unit. In the menu point "Mode" the mode of the relay can be chosen. The individual relay modes are described on the following pages.

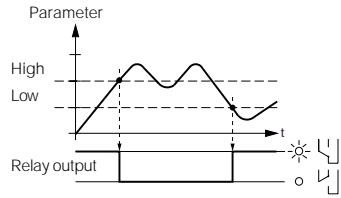
If the mode "Raising tendency" or "Falling tendency" is selected, the menu points "Deviation", "Dev. per time", "Cycle time" and "Number of cycles" appear.

With all other modes, the menu points "Low" and "High" appear. There you can determine the switch points for the relay. The menu point "Failure mode" always appears. "Failure mode off" effects that the relay deenergizes when a failure (e.g. sensor shortcircuit) occurs. "Failure mode hold" effects that the actual relay status is kept with failure.

Under "Add'l functions" you can adjust a switch on delay (t on) and a switch off delay (t off) of the relay of max. 600 s. (with the relay modes "Raising tendency" or "Falling tendency" no switching delay can be adjusted).

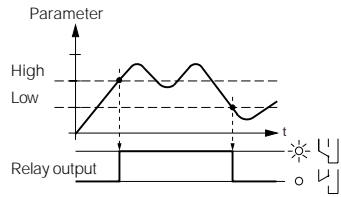
## Relay mode overflow protection

The relay of relay output 1 de-energizes at switch point "High" (safe condition)



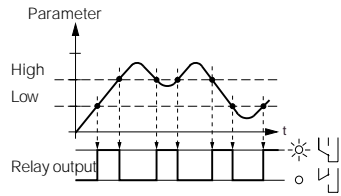
## Relay mode protection against dry running of pumps

The relay of relay output 1 de-energizes at switch point "Low" (safe condition)



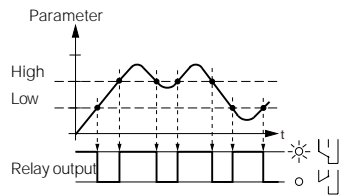
## Relay mode switching window on

Within the switching window, the relay of relay output 1 is energized.



## Relay mode switching window off

Within the switching window, the relay of relay output 1 is de-energized.

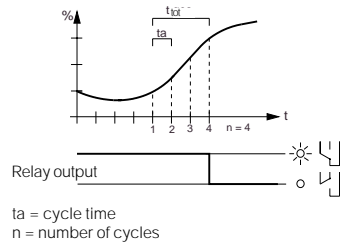


### Tendency determination

The level change within the scanning time ( $t_a$ ) is determined and after all scanings ( $n$ ) an average value is generated out of the sum of the level changes. If this average value exceeds a previously defined %-value, the tendency determination responds, i.e. an energized relay de-energizes. With the selection "Raising tendency" or "Falling tendency" the menu points "Deviation in %" and "Deviation per time" are released.

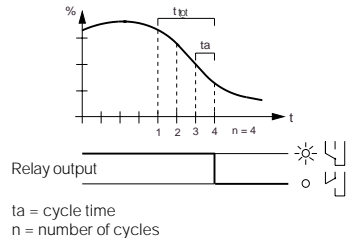
#### -- Mode Raising tendency

The relay of relay output 1 de-energizes when the raising average value of "t tot." exceeds the previously defined %-value



#### Falling tendency

same dependence, however with falling average value



-- Deviation in %      2

If the level change exceeds the %-value adjusted here, the tendency determination responds. 0 ... 110 %  
 Example 2 % (change) per t tot.

-- Deviation per time

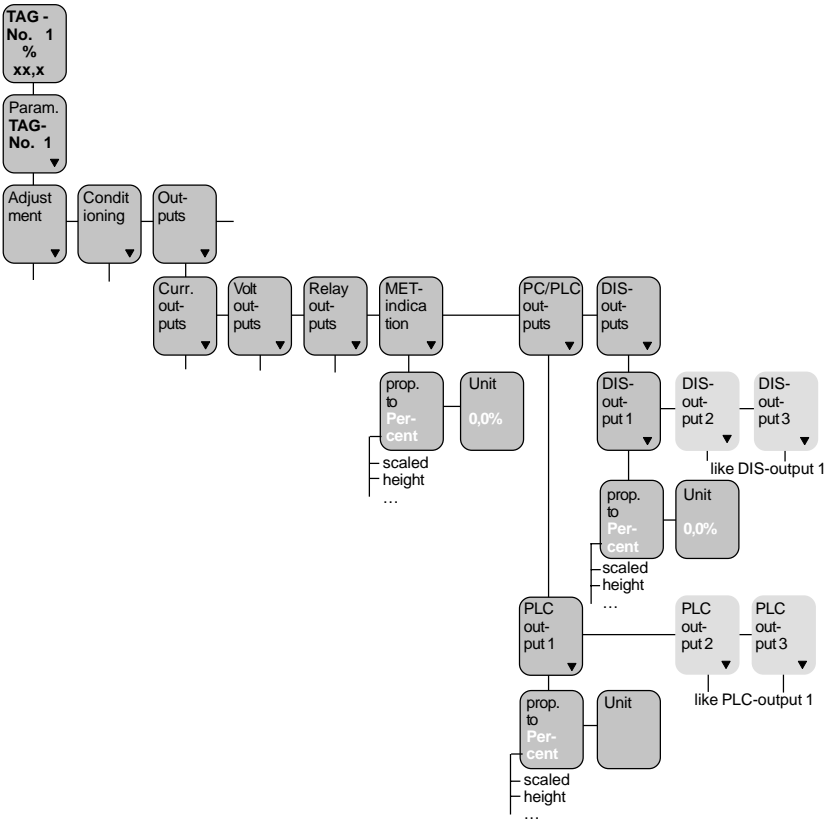
-- Cycle time  
 in s                      60

Adjustment range 0 ... 999 s  
 Example 60 s correspond to 1 minute

-- Number of  
 cycles                    4

Adjustment range 0 ... 99 cycles  
 Example:  $t_{tot} = t_a \cdot n = 60 \cdot 4 = 240 \text{ s} = 4 \text{ min}$ ,  
 i.e. after 4 min. each the average value of the deviation is generated and the result is compared with the given deviation in %, here in the example = 2 %

**MET-indication/PC/PLC-outputs/DIS-outputs**



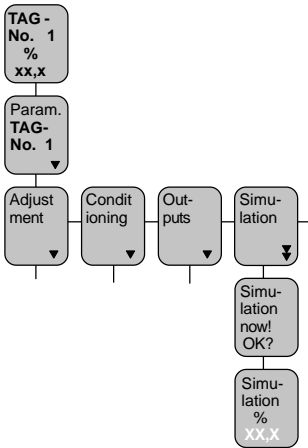
**MET-indication/Unit:**

In the menu point "prop. to" you choose the parameter to which the VEGAMET-display reacts (when you have carried out a scaling under the menu point "Conditioning", automatically "prop. to scaled" has been adjusted, i.e. the display indicates the scaled value). "Prop. to volume" is then useful when you have selected under "Conditioning - Linearisation curves" for example a cylindrical tank or an individually defined lin.-curve. The indicated value of the VEGAMET-display acts then proportional to the volume of the tank contents.

**PC/PLC-outputs and DIS-outputs:**

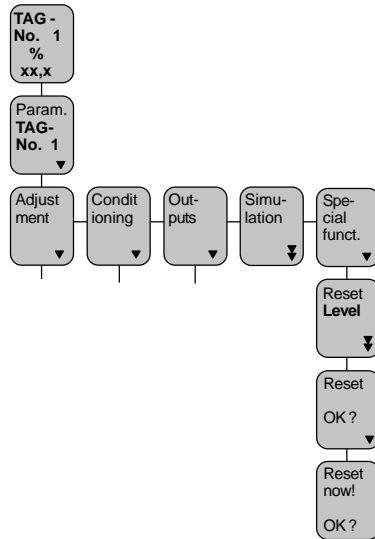
Are adjusted acc. to the same scheme than the MET-indication.

### 7.7 Simulation



To check outputs and connected instruments, you can adjust in this menu point any individual percentage value with the keys [+] and [-]. Initial point is always the actual measured value. The indicated value flashes with activated simulation. 15 minutes after adjustment of the simulated value, the simulation is automatically finished and reset to meas. value indication is made.

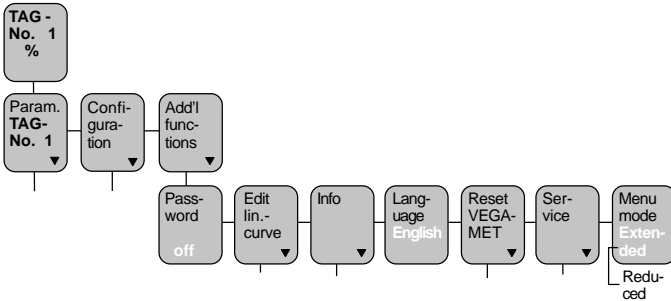
### 7.8 Special function: Reset



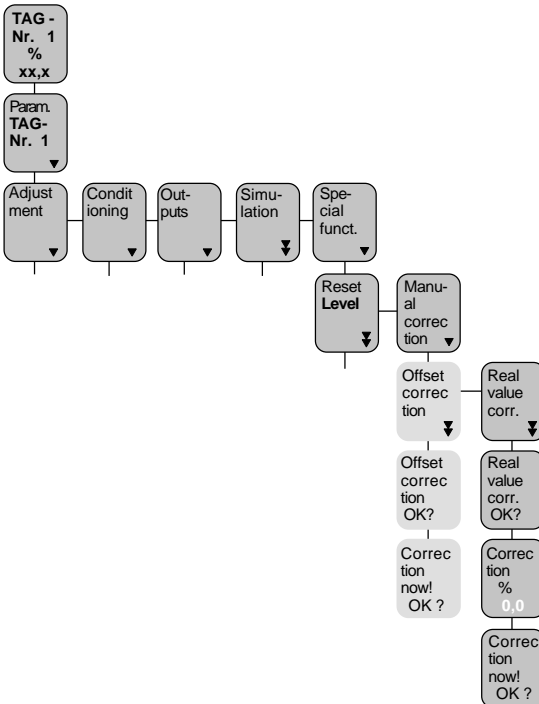
With this reset all parameter values of the meas. loop TAG-No. 1 are reset to factory setting (empty and full adjustment, relay outputs, current output, Volt output and meas. point designation are reset).

## 7.9 Password/Language/Menu mode

See chapter "5 Set-up in reduced menu".



## 7.10 Special function: Manual correction



### Manual Offset-correction

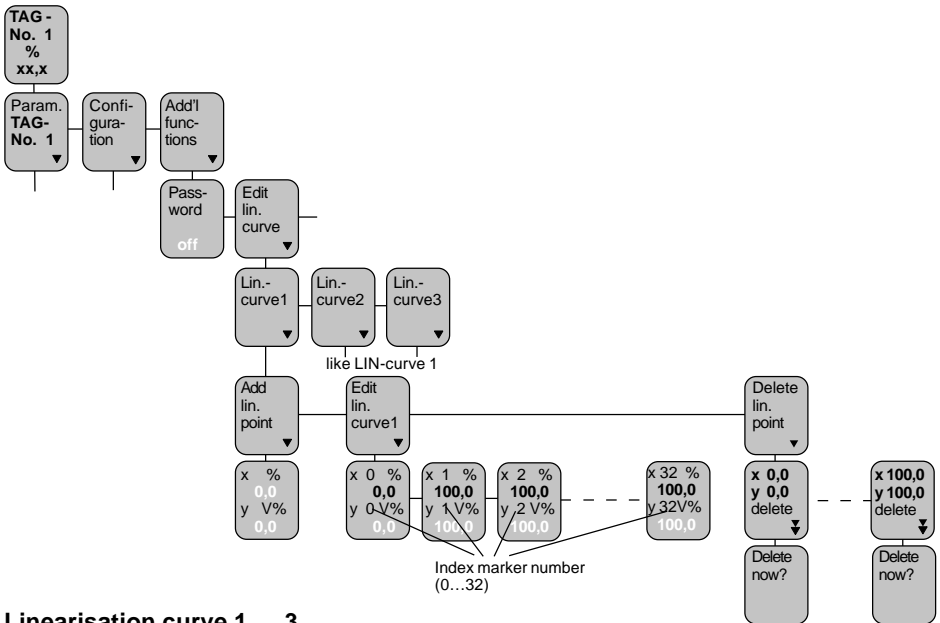
(only with hydrostatic pressure transmitters)

This correction can be carried out to compensate modification of the sensor values due to ageing. The sensor must hence be in unpressurized condition (empty vessel).

### Manual real value correction

In the menu point "Correction % 0,0" you can enter a percentage value corresponding to the actual level.

### 7.11 Linearisation curves



#### Linearisation curve 1 ... 3

A linearisation curve is built by a certain number of index markers and their value pairs. A value pair consists of a value for level percent (X %) and a value for volume percent (Y V %). Up to max. 32 index markers can be added. A linearisation curve can be terminated after any individual number of index markers. The signal conditioning instrument terminates the linearisation curve automatically with the values X = 100 % and Y = 100 %.

The data for the value pairs can be determined by gauging by litres or can be taken out of the available table of the vessel manufacturer.

#### Example for gauging by litres

Initial situation:

- the adjustment 0 % and 100 % was already carried out by you
- the total volume of the vessel is known to you, for this example 300 m<sup>3</sup>
- the gauging volume here in this example was determined to 15 m<sup>3</sup>

#### 1. Index marker

- fill the vessel with the liquid quantity of the gauging volume of 15 m<sup>3</sup>
- the value for level percent is indicated on VEGAMET, transfer this value to the linearity protocol, column X %
- the value for volume percent must be calculated acc. to the following formula

$$Y \text{ V} \% = \frac{100 \% \times \text{gauging volume}}{\text{total volume}}$$

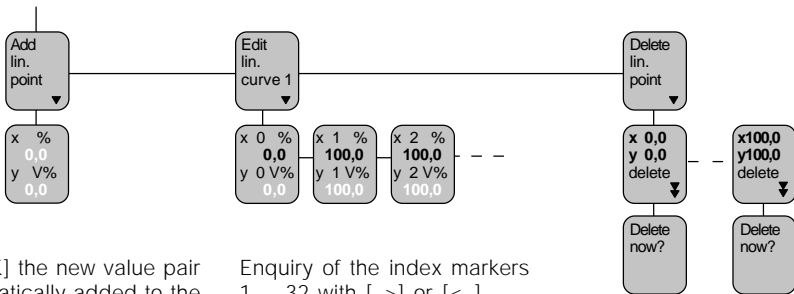
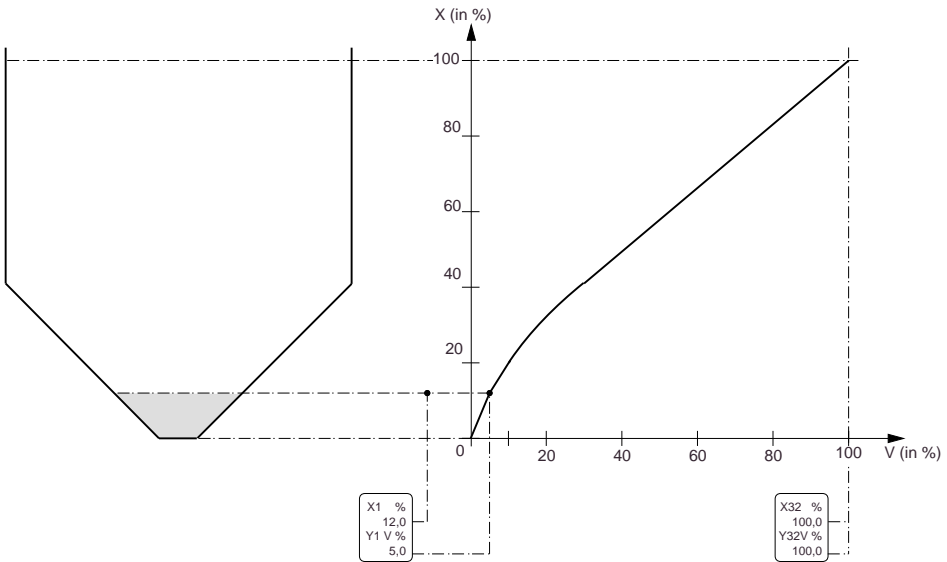
$$= \frac{100 \% \times 15 \text{ m}^3}{300 \text{ m}^3} = 5 \%$$

Transfer this value also into the linearity protocol, column Y V %.

#### 2. Index marker etc.

In addition see the following demonstration.

**Demonstration of a linearisation curve**



With [OK] the new value pair is automatically added to the correct position in the linearisation curve. The already available index markers are sorted again.

Enquiry of the index markers 1 ... 32 with [->] or [-<], editing of the Y-value with [+] or [-], take over with [OK].

To delete the index markers enquire the value pairs with [->] or [-<]. With [OK] the value pair and the appropriate index marker are deleted in the lin.-curve. The remaining index markers move up.

### Linearity protocol

The adjustment of a linearisation curve is made in the menu point "Add lin. point".

#### Linearisation curve 1

Indexmarker No.	Value pair	
	X %	Y V %
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
29		
30		
31		
32		

#### Linearisation curve 2

Indexmarker No.	Value pair	
	X %	Y V %
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
29		
30		
31		
32		

#### Linearisation curve 3

Indexmarker No.	Value pair	
	X %	Y V %
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
29		
30		
31		
32		

Note \_\_\_\_\_

\_\_\_\_\_

Date \_\_\_\_\_

Name \_\_\_\_\_

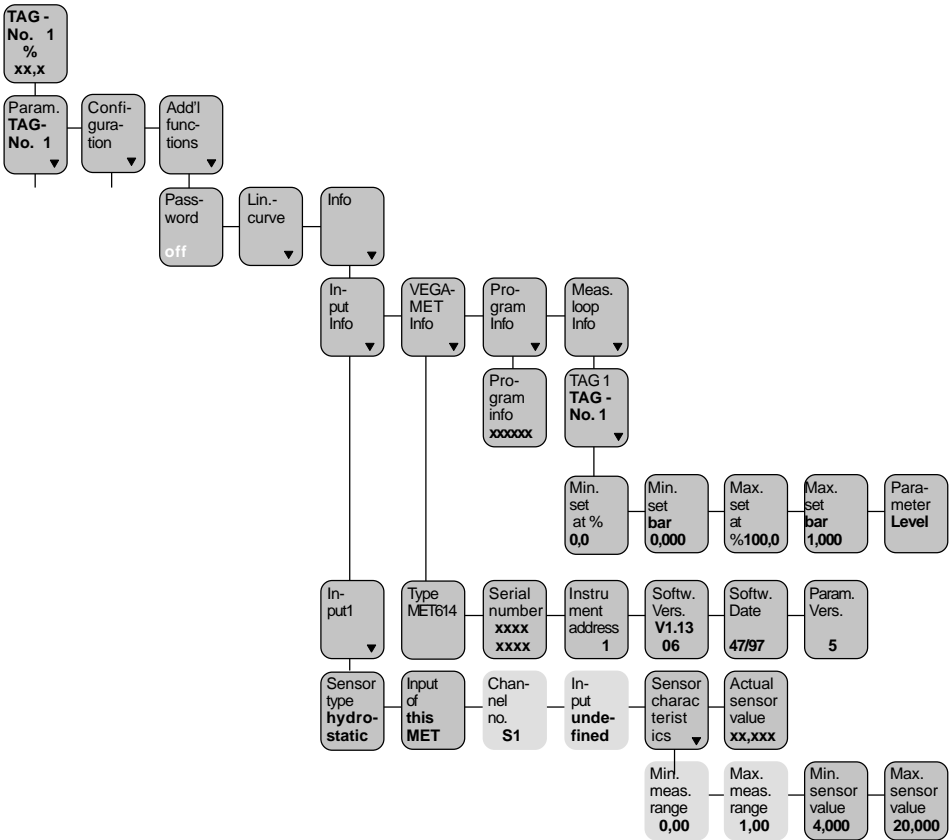
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\_\_\_\_\_

\_\_\_\_\_

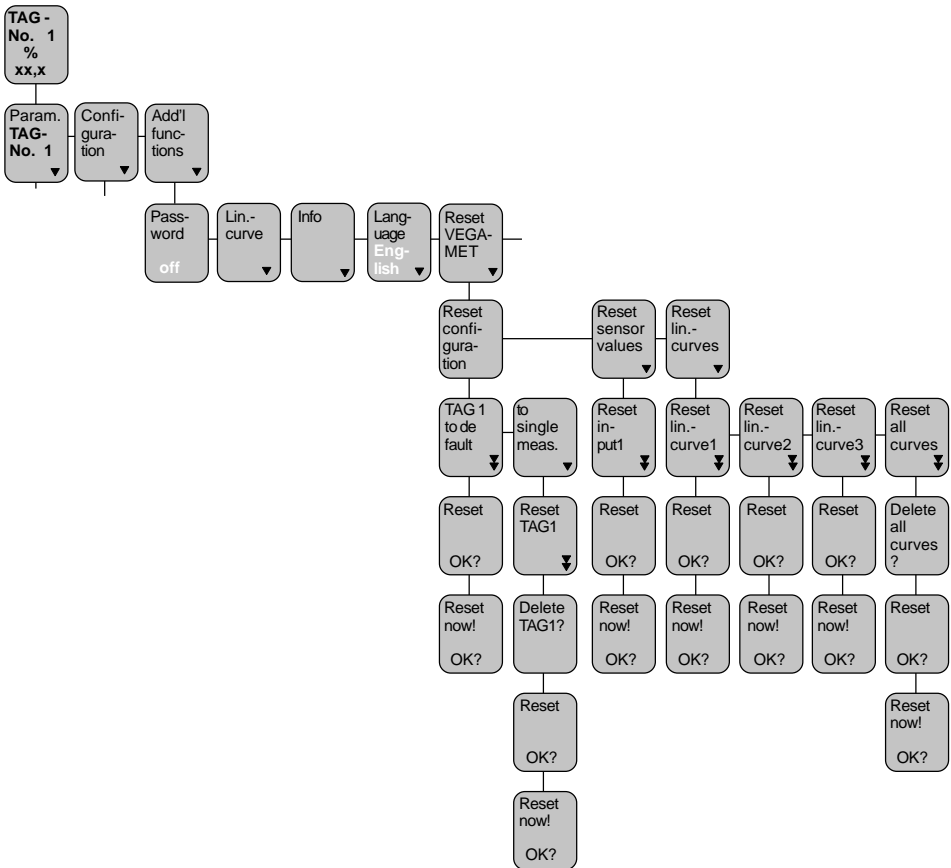
\_\_\_\_\_

**7.12 Info**



All menus under "Info" have just display function.

### 7.13 Reset VEGAMET



With the function "TAG 1 to default" the complete configuration and the parameter adjustment is reset to factory setting. However the basic configuration remains, e.g. "Level measurement/hydrostatic".

With the function "Reset TAG 1" also the basic configuration is deleted. The meas. loop must be created completely new (Config. meas. loop).

With "Reset sensor values" the adjusted sensor data of the connected sensor are deleted.

With the function "Reset lin-curves" you can delete your manually edited linearisation curves.

With "Reset all curves" you can delete all together, with "Reset lin-curve 1" you only delete one curve.

The three pre-programmed lin.-curves "linear, cylindrical tank, spherical tank" cannot be deleted.

## 8 Measuring results and units

With all outputs and with scaling, you find the menu points "prop. to" and "unit". Here you can choose the meas. result and the suitable unit. The list of the units depends on the selected meas. result. In the table the possible units are listed.

### Current/Volt output

prop. to	unit
Percent	0,0 %
Volume	0,0 %

### VEGADIS/PLC/MET-indication

prop. to	unit
Percent	0,0 % 0,00 %
Volume	V %
Height	m
Pressure	bar psi
scaled	m

### Relay outputs

prop. to	unit
Percent	0,0 % 0,00 %
Volume	V %
Height	m
Pressure	bar

### Scaling

prop. to	unit
Percent	%
Volume	m <sup>3</sup> hl l gal V % ft <sup>3</sup> in <sup>3</sup>
Height	m dm cm mm yd ft in
Pressure	bar mbar psi hPa
Mass	kg t lb
Density	kg/dm <sup>3</sup> g/cm <sup>3</sup>

## 9 Diagnosis

### 9.1 Maintenance

There is no maintenance required.

### 9.2 Simulation

#### Note

With activated simulation the complete indication flashes. The meas. data delivered from the sensors are not released for processing hence you should quit this menu point as soon as possible. After 15 minutes there is an automatic reset to meas. value indication.

### 9.3 Fault signal

The signal conditioning instrument and the connected sensor are permanently monitored during operation. During the parameter adjustment the adjusted values are checked on plausibility. In both cases a fault signal can be triggered by irregularities.

In case of failure an error code is displayed (only within the meas. value indication), the fail safe relay de-energizes, the signal lamp lights and the outputs react acc. to the preadjusted condition.

The error codes are listed in section "8.5 Error codes" on the following pages.

The diagnosis info is transmitted as current text info.

### Configuration

You can determine individually for each meas. loop, if a fault signal should be triggered or not. See menu range "Configuration meas. loop" menu point "Fault signal".

### Parameter adjustment

In the menu point "Failure mode" you can determine individually for each meas. loop, whether and how an exceeding of the meas. range should trigger a fault signal.

### 9.4 Repair

For safety and guarantee reasons repair on the instrument must only be carried out by VEGA-staff.

In case of defect, please return the appropriate instrument along with a short description of the fault to our repair department.

**9.5 Error codes**

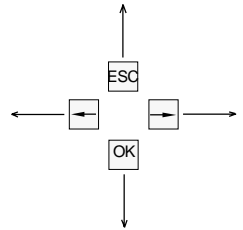
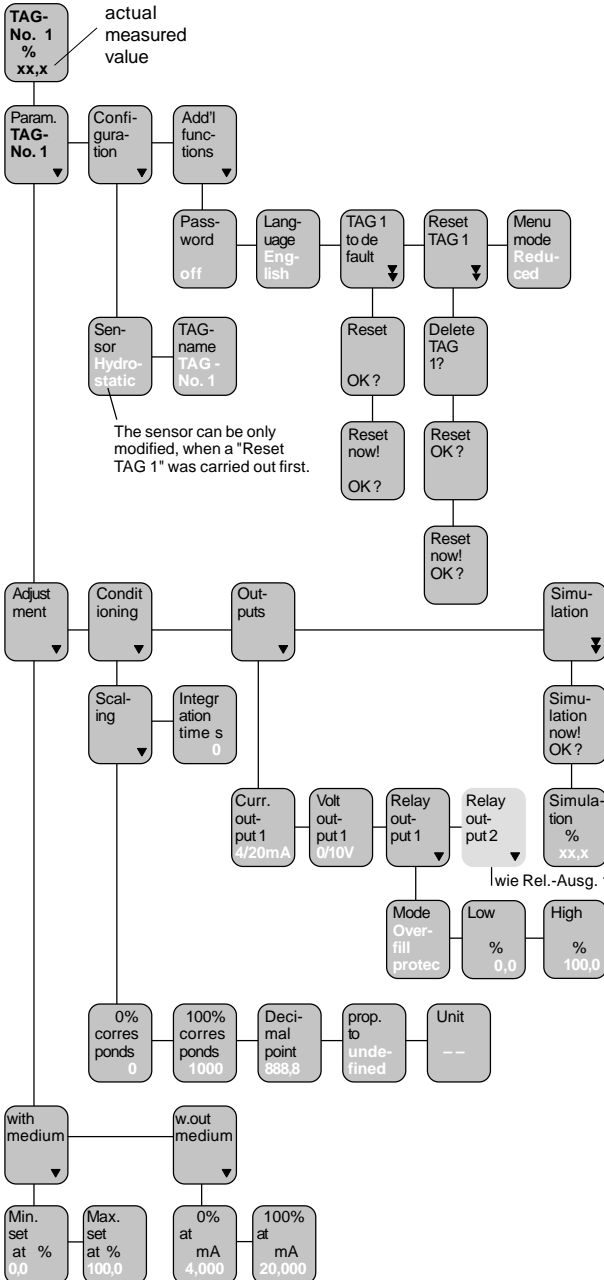
Error code	Meaning
E004	<p>This operation is not supported by the instrument (different software version). You tried to activate a function with a newer software version of VEGA Visual Operating in an instrument with older software version. However the instrument cannot support this operation. Have the software of your instrument updated.</p>
E014	<p>Suspected shortcircuit            Reasons:            - shortcircuit            - sensor is defect            Please check the connection line and if necessary the sensor.            Probably            - wrong adjustment of the meas. range on the capacitive electrode            Adjust a smaller range.</p>
E015	<p>Suspected line break            Reasons:            - no sensor connected            - line break            - sensor is defect            Check the connection line and if necessary the sensor.</p>
E016	<p>Empty / full adjustment exchanged. The values for the empty adjustment are above the values for the full adjustment. Carry out the adjustment again.</p>
E017	<p>Adjustment span too small. The adjustment values are too close together or are identical. Carry out the adjustment again.            Probably            - wrong adjustment of the meas. range on the capacitive electrode            Adjust a smaller range.</p>
E021	<p>Span of the sensor characteristics values too small or values exchanged. The sensor characteristics values are too close together or are identical or the min sensor characteristics value is higher than the max. sensor characteristics value. Check the sensor characteristics values.</p>
E029	<p>Measured value is simulated. The measured value is generated by simulation and does not indicate the actual condition.</p>
E031	<p>Same DISBUS-address. At least another instrument with the same DISBUS-address is connected to the DISBUS. Check this DISBUS-address.</p>
E032	<p>Instrument address 0. The instrument address 0 is adjusted on VEGAMET. With this address VEGAMET does not participate in the DISBUS-communication, even the DISBUS is wired. If necessary modify the instrument address.</p>

Error code	Meaning
E034	Instrument error. A considerable error was detected on the instrument (possibly defect EEPROM). Disconnect voltage and then connect again (cold start). If the error does not extinguish, please contact your VEGA-agency.
E035	Instrument error. A considerable error was detected on the instrument (check sum error in EEPROM). Disconnect voltage and then connect again (cold start). If the error does not extinguish, please contact your VEGA-agency.
E050	Remote VEGAMET not found. The VEGAMET from which a measured value is expected cannot be found. Reason: <ul style="list-style-type: none"> <li>- the remote VEGAMET is not connected</li> <li>- no VEGAMET with this instrument address connected</li> <li>- line break (DISBUS)</li> <li>- shortcircuit (DISBUS)</li> <li>- the remote VEGAMET is defect</li> <li>- interferred communication (DISBUS)</li> </ul> Probably <ul style="list-style-type: none"> <li>- failure in the DISBUS-transmitter/receiver part of VEGAMET</li> </ul> Check the instrument address on both VEGAMET, the connection line, the remote VEGAMET and if necessary this VEGAMET.
E051	Failure during transmission of measured values via DISBUS. It is not possible to receive a valid measured value via DISBUS from the remote VEGAMET; the communication to the remote VEGAMET however is okay. Reason: <ul style="list-style-type: none"> <li>- failure on the remote VEGAMET</li> <li>- the input on the remote VEGAMET which should be transmitted is not yet configured.</li> </ul> Check the remote VEGAMET and if necessary its input configuration.
E052	The input number of the VEGAMET, from which a measured value is expected, has not yet been coordinated.
E053	Span of the sensor characteristics values too small. The sensor characteristics values are too close together or are identical.
E054	Sensor characteristics values exchanged. The min. sensor characteristics value is higher than the max. sensor characteristics value.
E055	The hysteresis on the correction signal input is too small.
E060	Span of the current output values too small. The values for the current output are too close together or are identical. Check the adjustment of the current output.

Error code	Meaning
E061	Span of the voltage output values too small. The values for the voltage output are too close together or are identical. Check the adjustment of the voltage output.
E070	Scaling span too small. The values of the scaling are too close together or are identical. Check the adjustments of the scaling.
E102	On this VEGAMET a reset of the configuration had been carried out via keyboard.
E110	Switching hysteresis too small. The switch points are too close together or are identical.
E111	Relay switch points exchanged. The values for the relay switch points are exchanged in relation to the selected relay mode.

# 10. Menu plans

## 10.1 Menu plan reduced menu



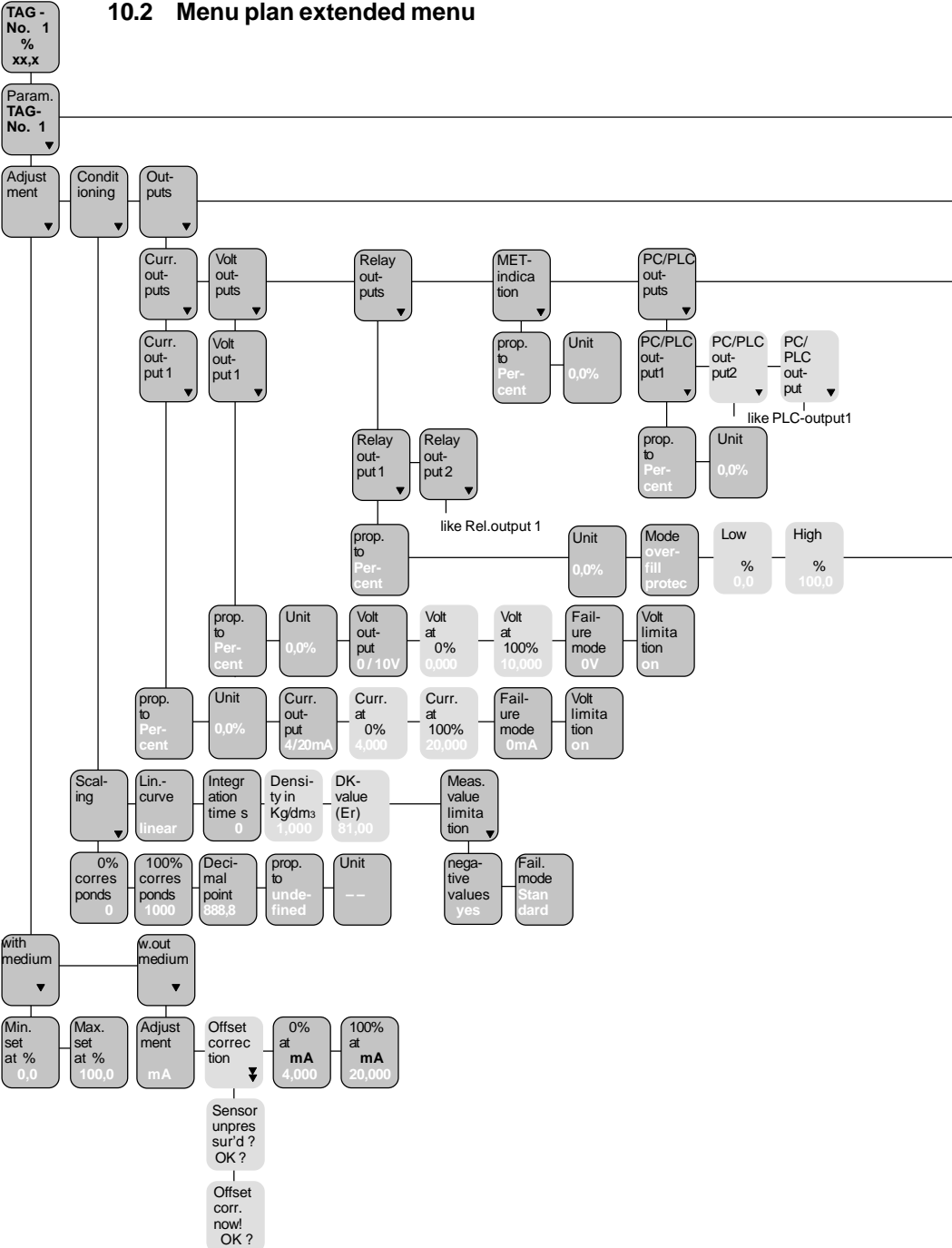
With these key you move in the menu field

**Language English** In white letters you see the parameters which can be modified with the + or - key and which can be saved with the OK-key.

**Param. TAG No. 1** Bolt print / italic are the sensor or measured value information which cannot be modified in this position.

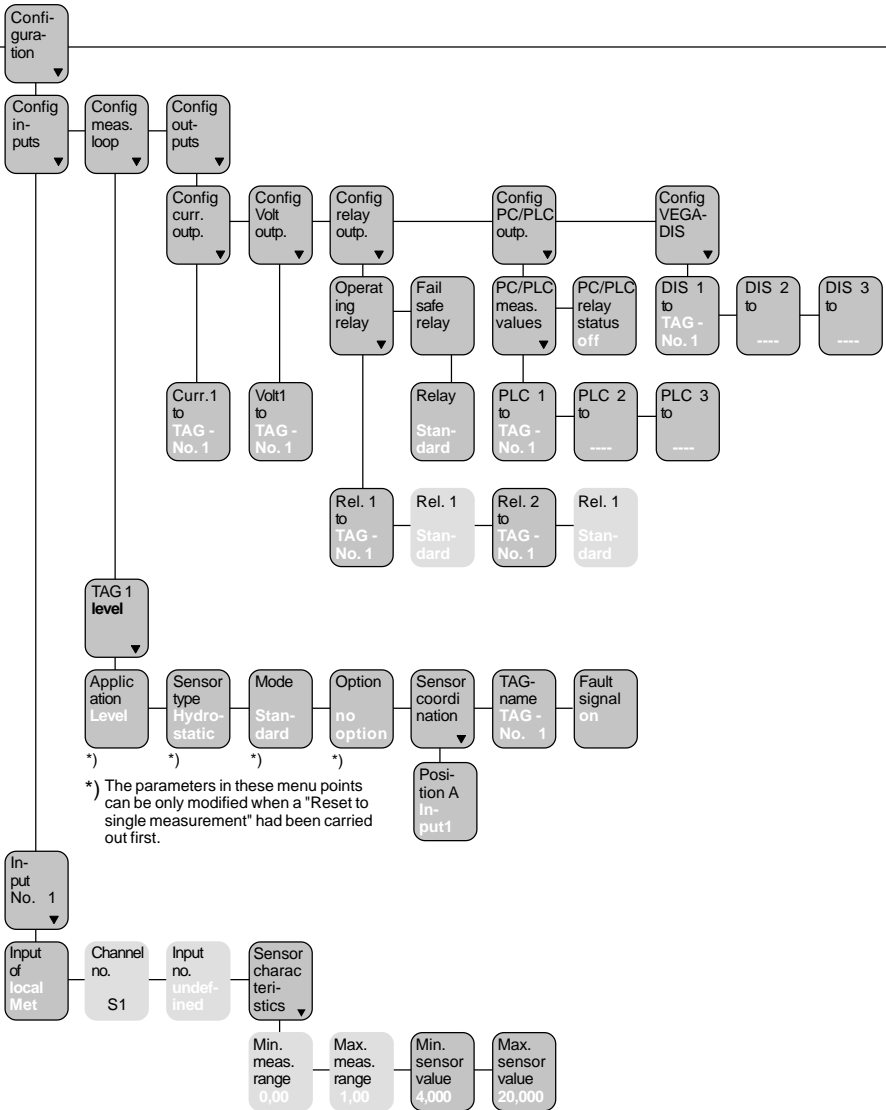
**Relay output 2** Light grey menu points are only displayed if necessary (dependent on the adjustments in other menus).

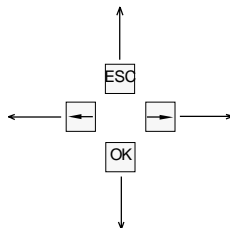
### 10.2 Menu plan extended menu





see previous page





With these keys you move in the menu field

Sensor type  
**hydrostatic**

Bolt print / italic are the sensor or measured value information which cannot be modified in this position.

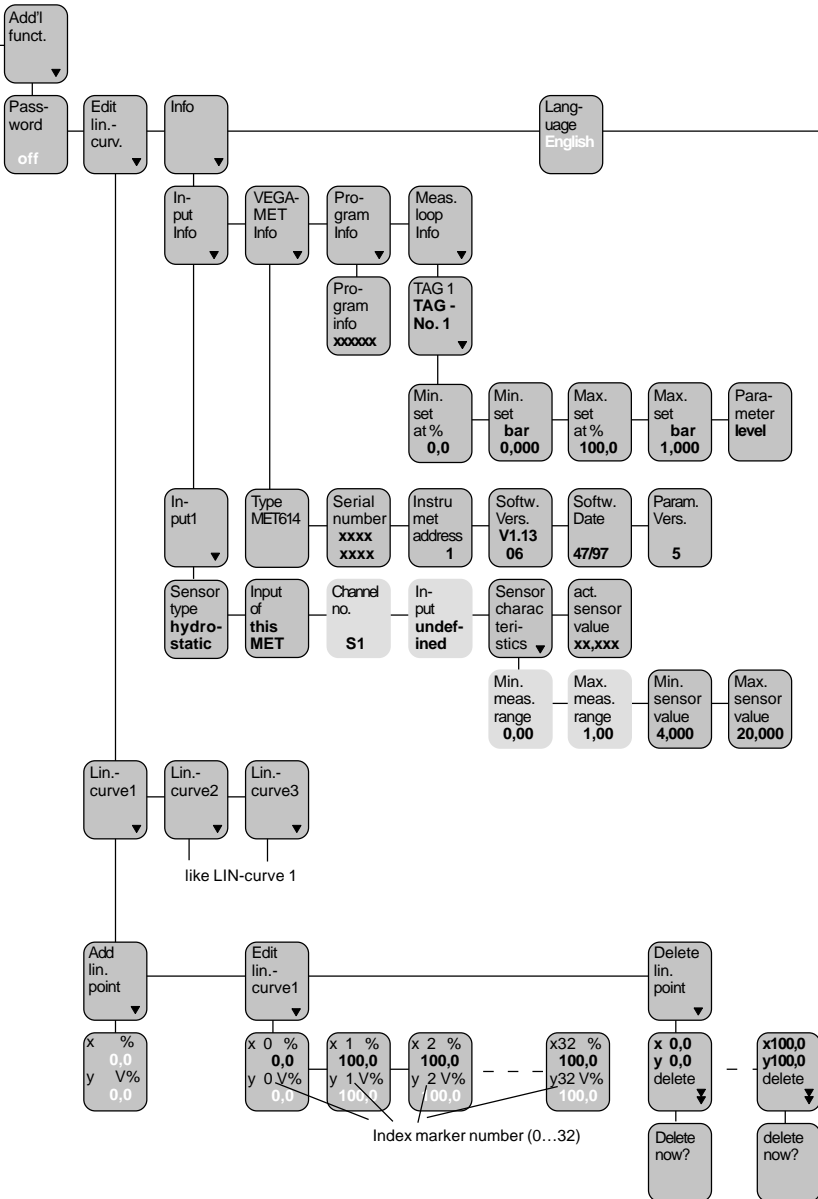
Language  
English

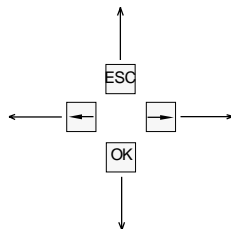
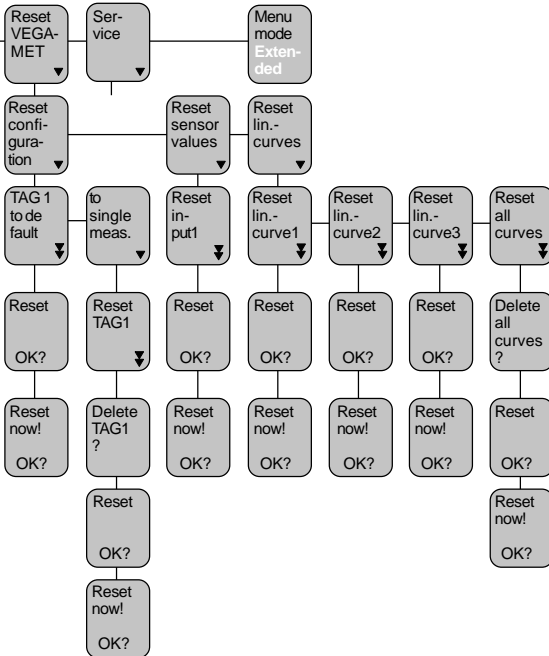
In white letters you see the parameters which can be modified with the + or - key and which can be saved with the OK-key.

Curr. at  
100%  
20,000

Light grey menu points are only displayed if necessary (dependent on the adjustments in other menus).

see previous page





With these keys you move in the menu field



Bolt print / italic are the sensor or measured value information which cannot be modified in this position.



In white letters you see the parameters which can be modified with the + or - key and which can be saved with the OK-key.



Light grey menu points are only displayed if necessary (dependent on the adjustments in other menus).

# ***HiTECH***

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