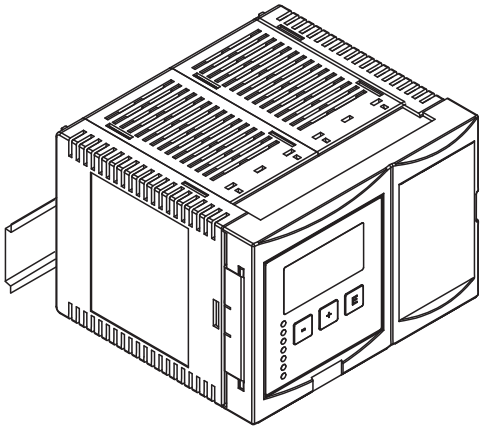
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

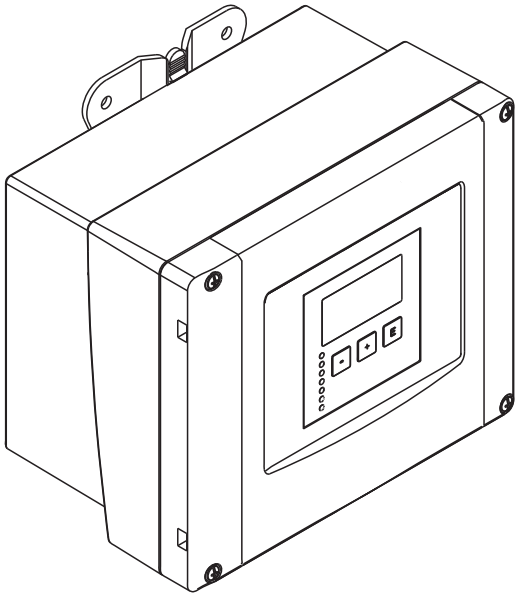
Description of Instrument Functions

Prosonic S FMU95

Transmitter for 5 or 10 ultrasonic sensors

PROFIBUS®





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Endress+Hauser

People for Process Automation

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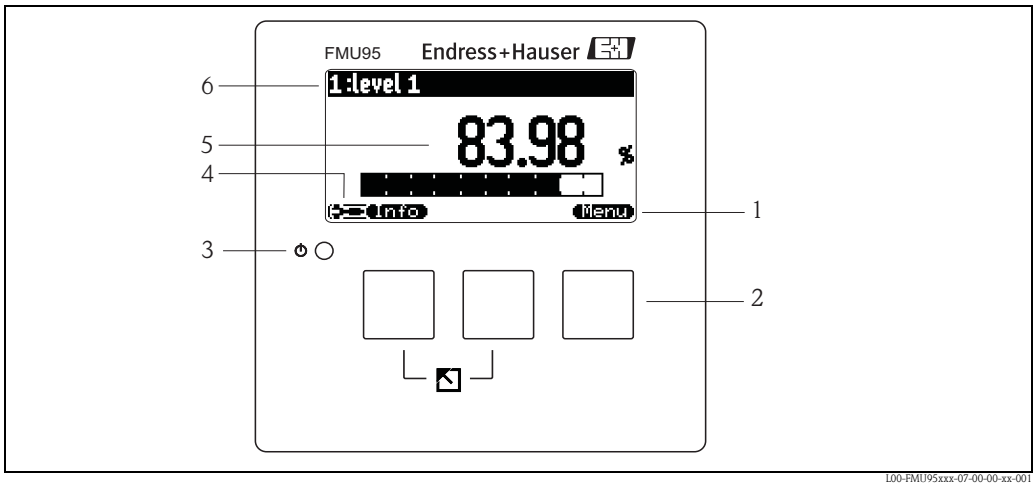
1.1.1 Display and operating elements



1 Softkey symbol
2 Key
3 LED indicating the operating state
4 Display symbols
5 Value of the parameter, including unit
6 Name of the parameter

Display symbols

Symbol	Meaning
Operating mode of the instrument	
	**User** User parameters can be edited. Service parameters are locked.
	**Diagnosis** The service interface is connected.
	**Service** User and service parameters can be edited.
	**Locked** All parameters are locked.
Locking state of the currently displayed parameter	
	**Display parameter** The parameter can **not** be edited in the current operating mode of the instrument.
	**Editable parameter** The parameter can be edited.
Scroll symbols	
	**Scroll list available** Indicates that the list contains more parameters than can be represented on the display. By pressing ↑ or ↓ repeatedly, all parameters of the list can be accessed.
Navigation in the envelope curve display	
	**Move left**
	**Move right**
	**Zoom in**
	**Zoom out**

LEDs

LED indicating the operating state (pos. 3 in the figure)	
green	normal measuring mode; no error detected
red (flashing)	Warning: An error is detected but the measurement continues. Reliability of the measured value is no longer ensured.
red	Alarm: An error is detected. The measurement is interrupted. The measured value assumes the value specified by the user (parameter "output on alarm").
off	supply voltage missing

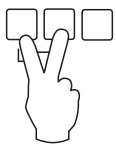
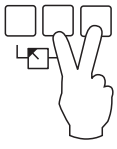
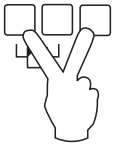
Keys (softkey operation)

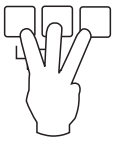
The function of the keys depends on the current position within the operating menu (softkey functionality). The key functions are indicated by softkey symbols in the bottom line of the display.

Symbol	Meaning
	**Move downwards** Moves the marking bar downwards within a selection list.
	**Move upwards** Moves the marking bar upwards within a selection list.
	**Enter** ■ Opens the marked submenu, the marked parameter set or the marked parameter ■ Confirms the edited parameter value
	**Previous parameter set** Reopens the previous parameter set within the submenu.
	**Next parameter set** Opens the next parameter set within the submenu.
	**Confirm selection** Selects the option of a selection list which is currently marked by the bar.
	**Increase value** Increases the active digit of an alphanumeric parameter.
	**Decrease value** Decreases the active digit of an alphanumeric parameter
	**Error list** Opens the list of all errors which are currently detected. If a warning is present, this symbol flashes. If an alarm is present, the symbol is displayed continuously.
	**Change Display** Change to the next page of measured values (only available if more than one pages of measured values have been defined; see "display" menu)
	**Info** Opens the Shortcut Menu, which contains the most important information about the current state of the instrument
	**Menu** Opens the Main Menu, which contains **all** parameters of the Prosonic S

General key combinations

The following key combinations do not depend on the menu position:

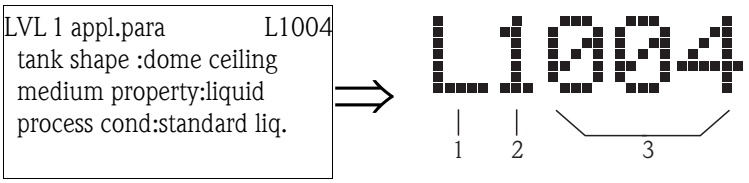
Key combination	Meaning
	**Escape** ■ While editing a parameter: Exit the editing mode without accepting the changes. ■ Within the navigation: Move upwards to the previous layer of the menu.
	**Increase contrast** Increases the contrast of the display module.
	**Decrease contrast** Decreases the contrast of the display module.

Key combination	Meaning
	**Locking** Locks the instrument against parameter changes. The instrument can only be unlocked again by the keys.

1.1.2 The operating menu

Structure of the menu

The parameters of the Prosonic S are organized in an operating menu (consisting of a main menu and several submenus). Parameters which are related to each other are comprised in a common parameter set. To simplify the navigation within the menu, a five-digit position code is displayed with each parameter set.



Identification of the parameter sets:
1 Submenu
2 Number of the associated input or output
3 Number of the parameter set within the submenus

- The **first digit (1)** specifies the submenu[1]:
  - **L:** "level"
  - **A:** "safety settings"
  - **O:** "output/calculations"
  - **D:** "device properties", "calibr. display" and "sensor management"
  - **I:** "system information"
  - **S:** "service" (only available if the service password has been entered)

  Diagrams of the submenus can be found in the chapter "Operating menu".

- The **second digit (2)** is used if the parameter set occurs several times within the Prosonic S (e.g. for different inputs or outputs).

  Example:
  - L1002: level 1
  - L2002: level 2
  - ...
  - L9002: level 9
  - LA002: level 10

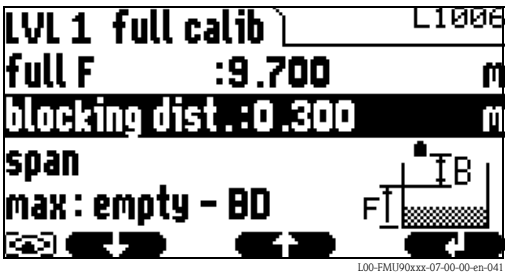
  If the parameter set occurs only once wihtin the Prosonic S, "X" is indicated at this position.

- The **last three digits (3)** specify the individual parameter sets within the submenu.

1) Depending on the instrument version, the installation environment and the selected operating mode, some of the submenus may not be present.

Parameter types

Display parameters



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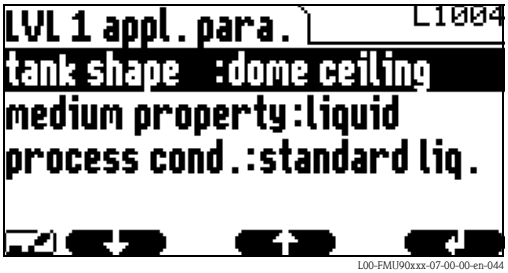
Parameters for which the symbol is displayed in the left bottom corner of the display module, are either locked or display-only parameters.

Editable parameters



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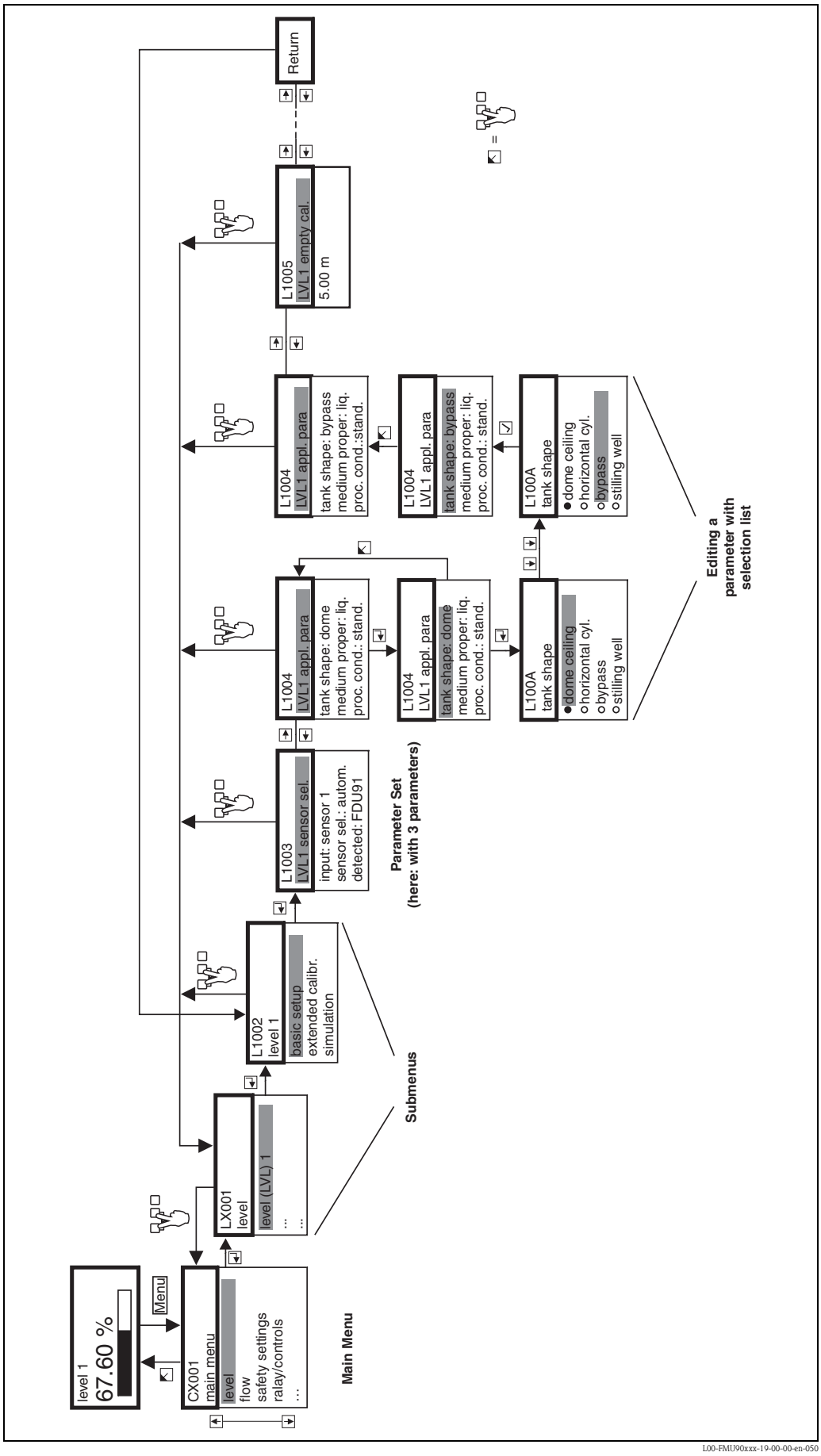
Parameters, for which the symbol is displayed in the left bottom corner of the display module, can be entered for editing by pressing .

The editing procedure depends on the type of parameter:

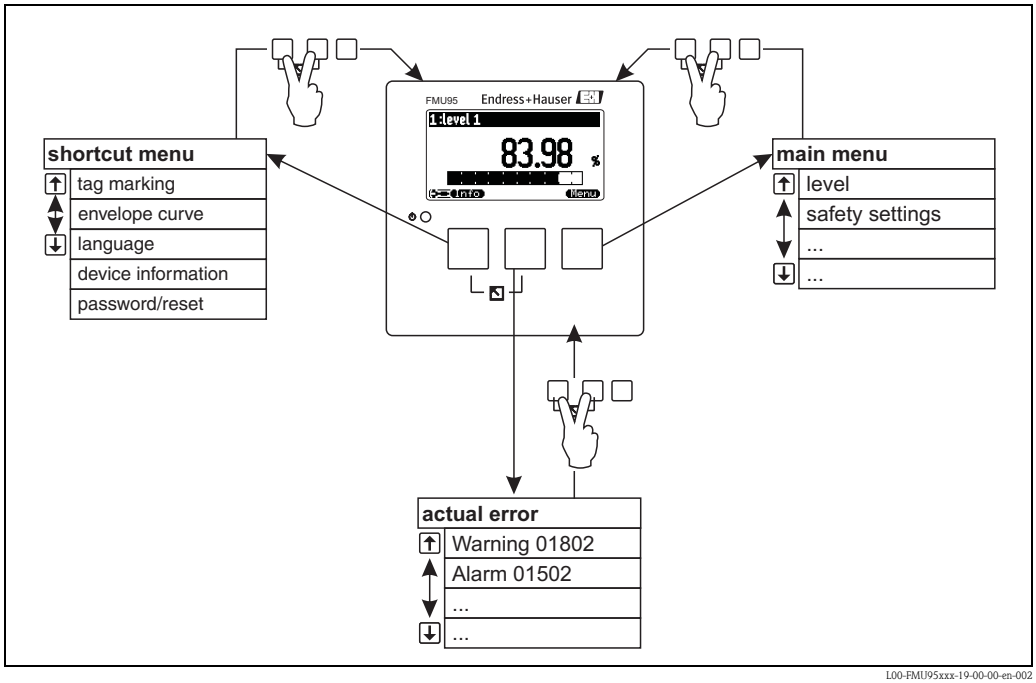
- when entering a **selection parameter**, the associated selection list appears (see below: "Editing a parameter with selection list").
- when entering a **numerical or alphanumerical parameter**, the text and number editor appears (see below: "Entering numbers and characters").

Navigation within the menu (Example)



Entering the menu

The navigation always starts from the main screen (measured value display[2]). From there, the following menus can be opened by the keys:



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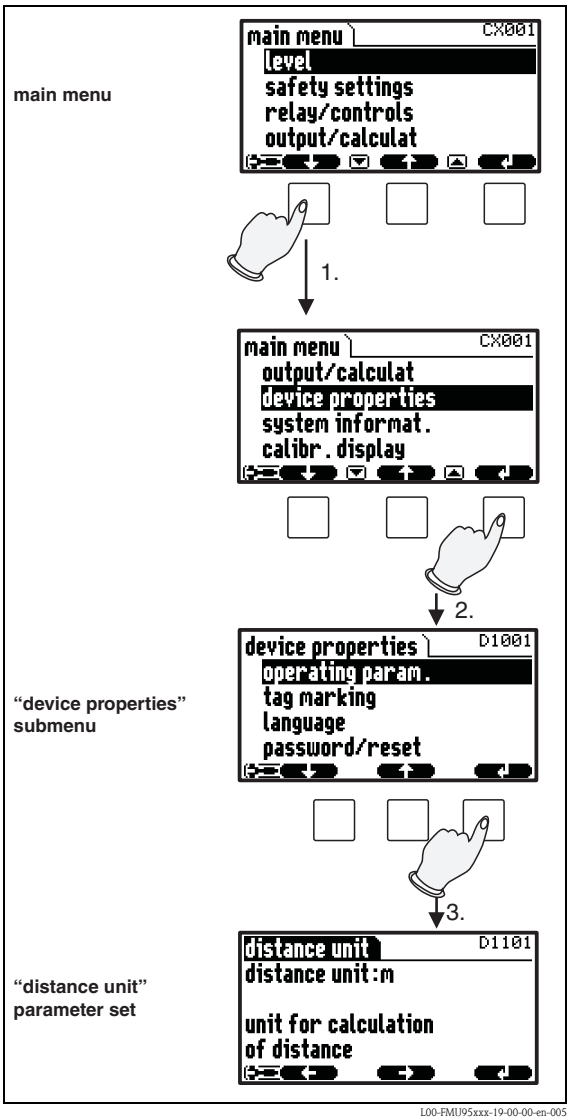
- **shortcut menu**
  The shortcut menu is accessed via the **"Info"** key. It allows quick access to device information:
  – tag marking
  – envelope curve: used to check the signal quality
  – language: sets the display language
  – device information: serial number, versions of software and hardware
  – password/reset: used to enter the password or reset code
  All parameters of the shortcut menu are contained in the main menu as well.
- **main menu**
  The main menu is accessed via the **"Menu"** key. It contains all parameters of the Prosonic S. It is divided into submenus. Some of the submenus consist of further submenus. Which submenus are actually present, depends on the instrument version and the installation environment.
  An overview of all submenus and parameters is given in the chapter "Operating menu".
- **actual error**
  If the self-monitoring of the Prosonic S detects an error, the [redacted] softkey symbol appears above the middle key.
  If the softkey symbol flashes, only "warnings" are present.
  If the softkey symbol is displayed permanently, at least one "alarm" is present.
  After pressing the key, a list of all currently present errors appears.

2) Note: Depending on the configuration, the appearance of the measured value display may be differemt from the example in the figure.

Selecting a submenu



1. In the main menu press ↓ or ↑ until the required submenu is marked by the bar.

   Note!
   The symbols ▼ ▲ indicate that the selection list contains more items than can be displayed on the module. Press ↓ or ↑ several times, to mark one of the hidden items.

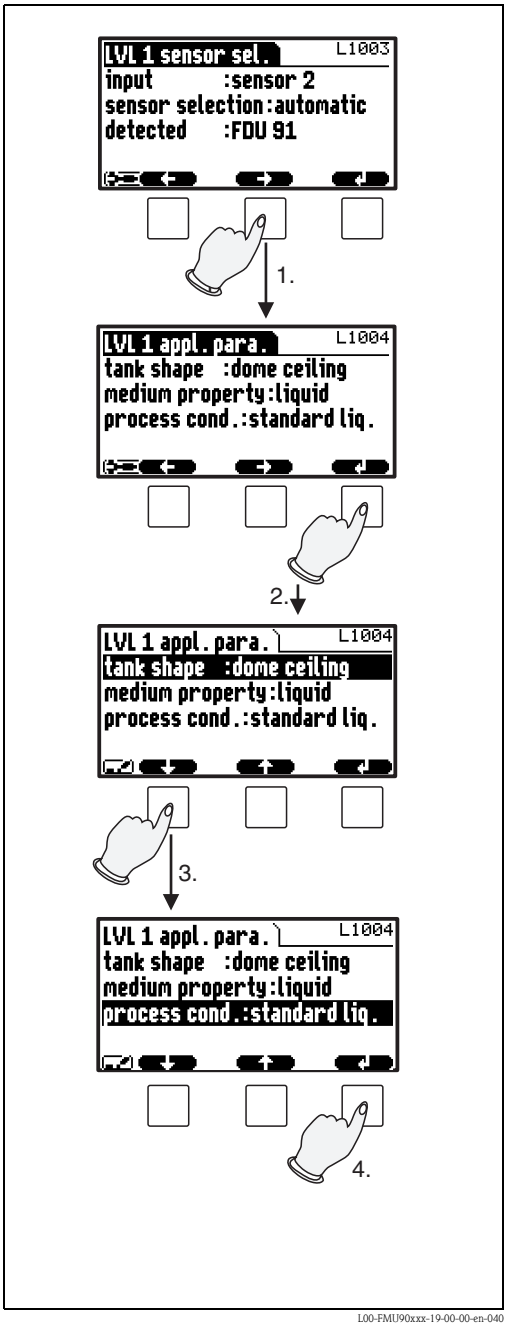
2. Press ↵, in order to enter the marked submenu.

3. If the submenu contains further submenus, continue until you reach the level of the parameter sets. This level is reached if the softkey symbols ← and → appear.

Note!
If necessary, you can return to the previous level of the menu by pressing ESC.

Selecting a parameter

By pressing → or ← you can switch between the parameter sets of the current submenu. For each parameter set the values of all its parameters are displayed. In order to change one of the values, proceed as follows:



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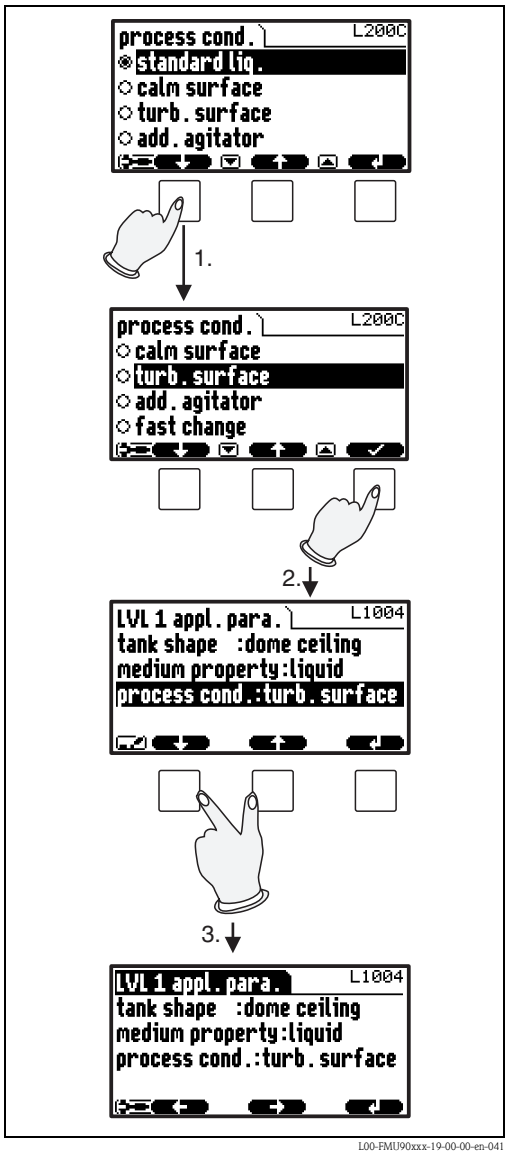
1. Press → or ←, until you have reached the required parameter set.
2. Press ↵, in order to enter the parameter set.
3. Select the required parameter by pressing ↓ or ↑.
   (This step is not required if the set contains only one parameter.)
4. Press ↵, in order to enter the editing mode of the parameter.
   The editing method depends on the type of parameter (selection list, numeric or alphanumeric parameter). For details refer to the following sections.

Note!
If necessary, you can exit the parameter and parameter set by pressing  .

Editing a parameter with selection list



1. Press ↓ or ↑, until the required option is marked by the bar (in the example: "turb. surface").

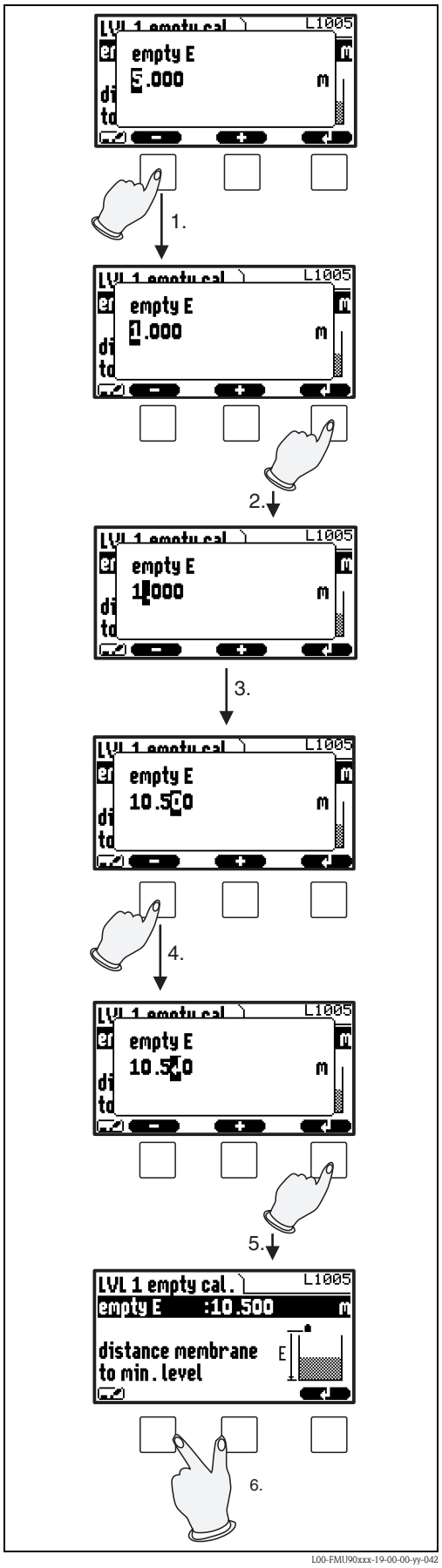
   Note!
   The symbols ▼ ▲ indicate that the selection list contains more items than can be displayed on the module. Press ↓ or ↑ several times, to mark one of the hidden items.

2. Press ✓, in order to select the marked option. It is then stored in the instrument.

3. Press the left and middle keys simultaneously in order to quit the parameter.
   The software key symbols ← and → reappear and you can switch to the next parameter set.

Note!
By pressing before ✓ you can quit the parameter without accepting your changes.

Entering numbers and characters



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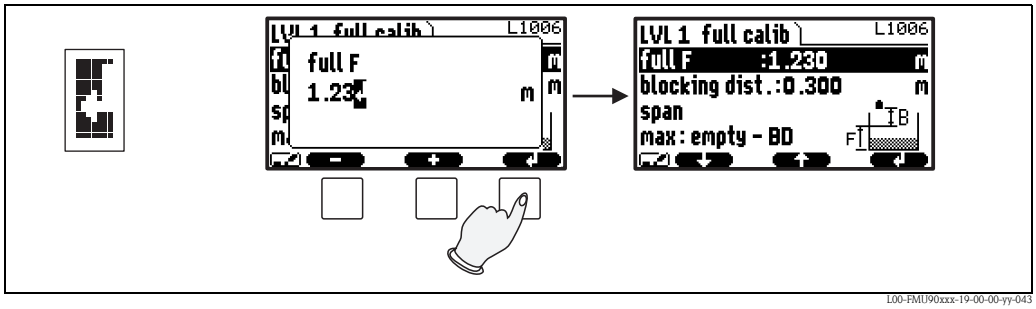
When you select a numeric parameter ("empty calibration", "full calibration" etc.) or an alpha-numeric parameter ("device marking" etc.), the editor for numbers and text strings appears. Enter the desired value in the following way:

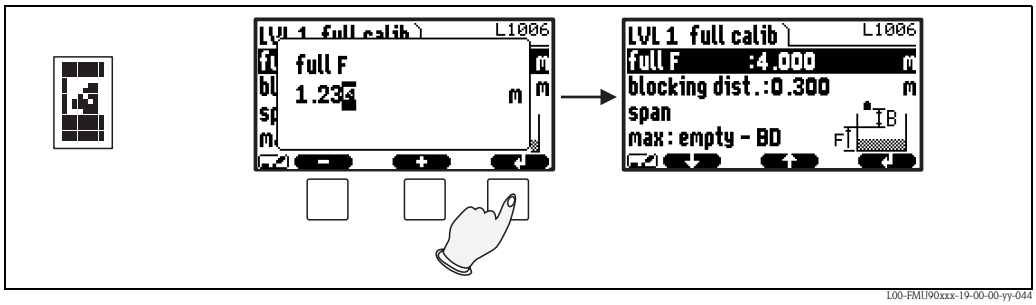
1. The cursor is at the first digit. Press − or + until this digit has the required value.
2. Press ↵ in order to confirm the value and to jump to the next digit.
3. Repeat the procedure for all relevant digits.
4. If all relevant digits have been entered: Press − or +, until ↵ appears at the cursor.
5. Press ↵ to store the complete value in the device.
6. Press the left and middle keys simultaneously in order to quit the parameter.

Special editing functions

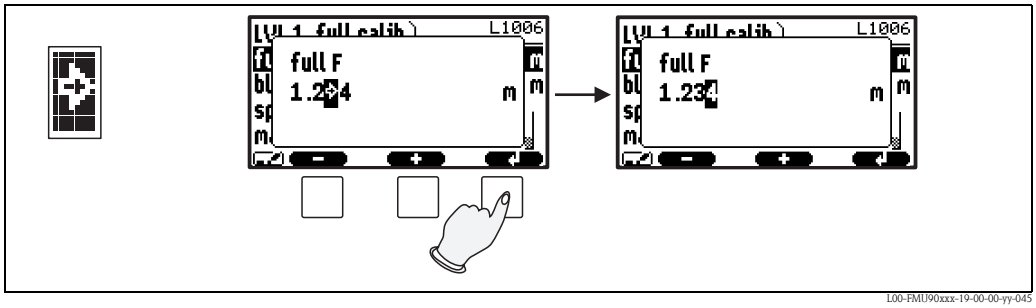
Within the editor for alphanumeric characters, pressing [−] or [+] does not only lead to numbers and characters but also to the following symbols for special editing functions. They simplify the editing procedure.



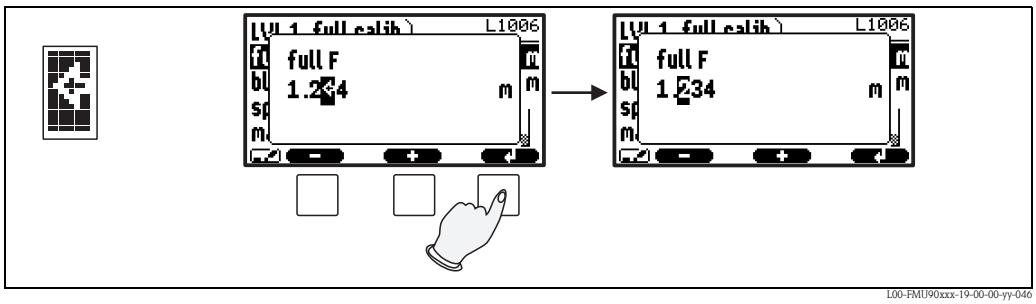
Enter: *The number left of the cursor is transferred to the instrument.*



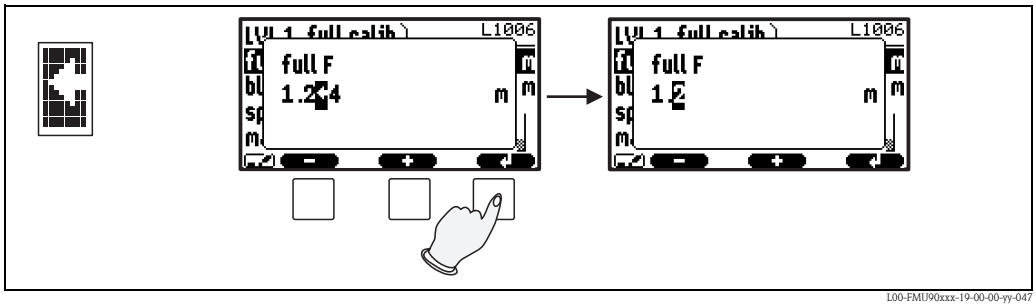
Escape: *The editor is closed. The parameter maintains its former value. The same behavior can be achieved by pressing the left and the middle key simultaneously ( ).*



Next digit: *The cursor moves on to the next digit.*



Previous digit: *The cursor moves back to the previous digit.*



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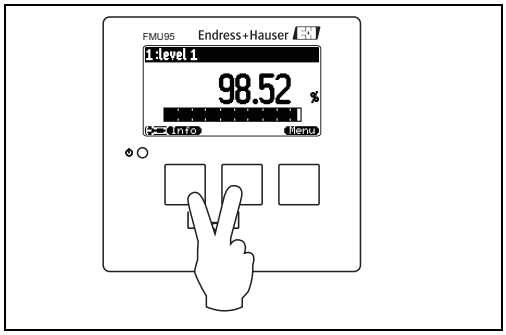
Delete: *The current digit and all digits to its right are deleted.*

Return to the measured value display



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By pressing the left and middle keys simultaneously you can return

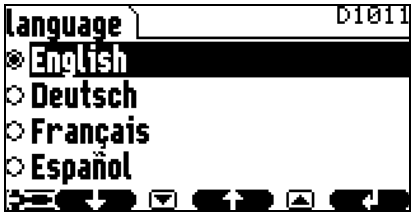
- from a parameter to the parameter set
- from the parameter set to the submenu
- from the submenu to the main menu
- from the main menu to the measured value display

1.2 First setup

Note!
This chapter describes the commissioning of the Prosonic S via the display and operating module. Commissioning via the FieldCare is similar. For further instructions refer to the FieldCare Online Help.

After switching on the power supply for the first time, the instrument asks for a number of operating parameters:

1. Select the display language.
   a. Press ↓ or ↑ to move the marking bar to the desired language.
   b. Press ↵ to confirm your selection.



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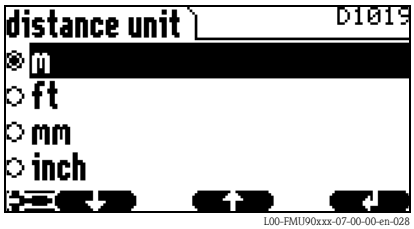
2. Select the unit for distance measurements.



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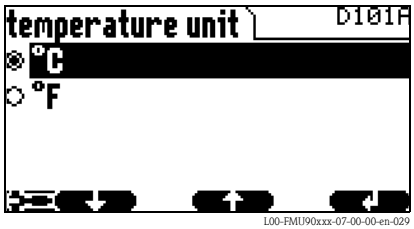
3. Select the temperature unit.



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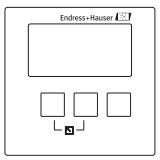
Note!
By pressing **you can return to the previous parameter** (e.g. in order to correct the value). All these parameters can also be changed at a later point of time in the "device properties/operating parameters" and "device properties/language" parameter sets.

2 The "level" menu

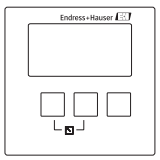


level LX001
level (LVL) 1
level (LVL) 2
level (LVL) 3
level (LVL) 4

"level" selection list
Use this list to select the level channel you are going to configure.

2.1 The "basic setup" submenu

2.1.1 "LVL N sensor selection" (N = 1 - 10)



LVL1 sensor sel. L1003
input:
sensor selection:
detected:

"input"

Use this parameter to assign a sensor to the channel.

Selection:
- no sensor
- sensor 1
- ...
- sensor 10

"sensor selection"

Use this parameter to specify the type of the connected ultrasonic sensor.

Note!
- For the sensors **FDU9x** the option "automatic" is recommended (default setting). With this setting the Prosonic S recognizes the type of sensor automatically.
- For the sensors **FDU8x** the type has to be assigned explicitly. The automatic sensor recognition does not work for these sensors.

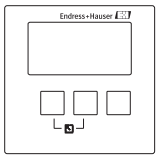
Caution!
After **exchanging a sensor**, observe the following:
The automatic sensor recognition is also active after a sensor has been exchanged[3]. The Prosonic S recognizes the type of the new sensor automatically and changes the "detected" parameter if required. The measurement continues without a break.
Nevertheless, in order to ensure perfect measurement, the following checks are required:
- Check the **"empty calibration"** and **"full calibration"** parameters. Adjust these values if required. Take into account the blocking distance of the new sensor.
- Go to the **"LVL N check value"** parameter set (last set of the basic setup) and check the displayed distance. If required, perform a new interference echo suppression.

"detected" (only available for "sensor selection" = "automatic")

Indicates the type of the automatically detected sensor.

3) if the new sensor is of the type FDU9x

2.1.2 "LVL N application parameters" (N = 1 - 10)

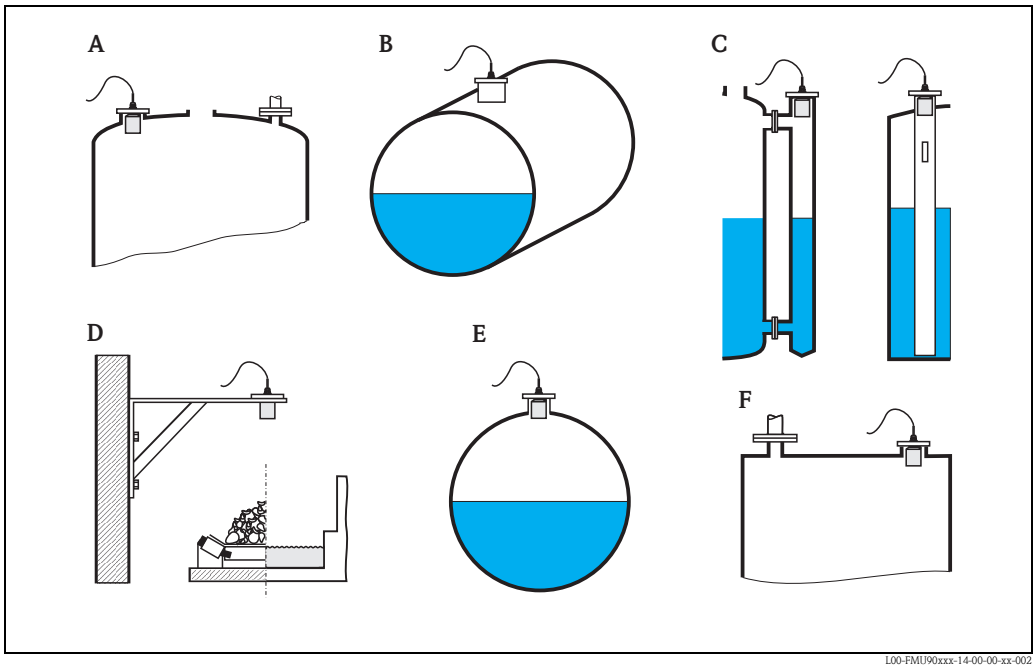


LVL1 appl. para. L1004
tank shape:
medium property:
process cond.:

"tank shape"

Use this parameter to specify the tank shape of your application.

Selection:



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A Dome ceiling
B Horizontal cyl.
C Bypass, stilling well/ultrasonic guide pipe
D No ceiling, e.g. dumps, open levels, chanels, weirs
E Sphere
F Flat ceiling

"medium property"

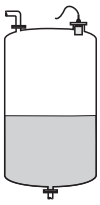
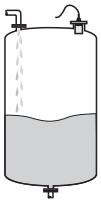
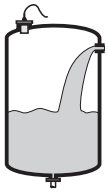
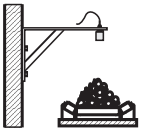
Use this parameter to specify the type of medium.

Selection:
- liquid
- paste like
- solid < 4 mm
- solid > 4 mm
- unknown

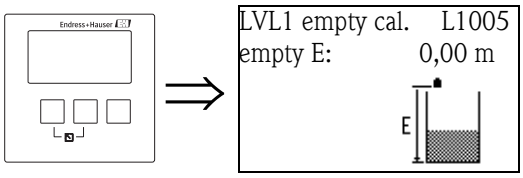
Note!
If the medium does not fit into one of the groups, select "unknown".

"process conditions"

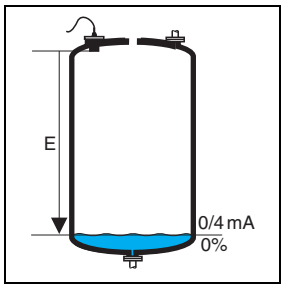
Use this parameter to specify the process conditions of your application. The filters of the signal evaluation are automatically adjusted to the selected conditions.

"process conditions"	for the following situations	Example	filter settings
standard liquid	for all fluid applications which do not fit in any of the following groups		The filters and output damping are set to average values.
calm surface	Storage tanks with immersion tube or bottom filling		The averaging filters and output damping are set to large values. -> stable measured value -> accurate measurement -> slow reaction time
turbulent surface	Storage/accumulation tanks with uneven surface due to free filling, mixing nozzles or small bottom stirrers		Special filters for stabilizing the input signal are activated. -> stable measured value -> medium reaction time
additional agitator	Moving surfaces (possibly with vortex formation) due to agitators		Special filters for stabilizing the input signal are set to large values. -> stable measured value -> medium reaction time
fast change	Rapid level change, particularly in small tanks		The averaging filters are set to small values. -> rapid reaction time -> possibly unstable measured value
standard solid	For all bulk solid applications which do not fit in any of the following groups.		The filter and output damping are set to average values.
solid dusty	Dusty bulk solids		The averaging filters are set to detect even relatively weak signals.
conveyor belt	Bulk solids with rapid level change		The averaging filters are set to small values. -> rapid reaction time -> possibly unstable measured value
test: no filter	For service and diagnosis only		All filters are switched off.

2.1.3 "LVL N empty calibration" (N = 1 - 10)



"empty E"

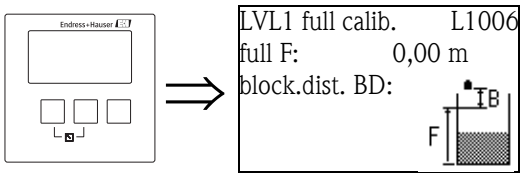


Use this parameter to specify the empty distance E, i.e. the distance between the sensor membrane and the minimum level (zero point).

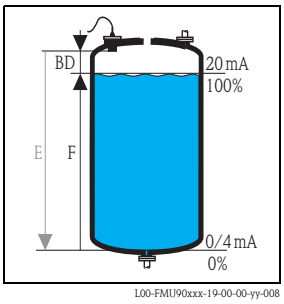
– Default: max. measuring range of the respective sensor
– Range of values: depending on sensor type

☞ Caution!
The zero point should not be deeper than the point at which the ultrasonic wave impinges on the tank bottom

2.1.4 "LVL N full calibration" (N = 1 - 10)



"full F"



Use this parameter to specify the span F, i.e. the distance from the minimum level to the maximum level.

- Default setting: depending on sensor type
- Range of values: depending on sensor type
- blocking distance BD: depending on sensor type (see table)

Caution!
The maximum level may not project into the blocking distance:

$F_{max} = E - BD$

"blocking distance"

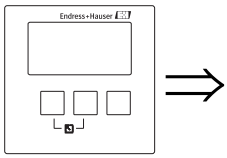
Indicates the blocking distance of the respective sensor. The blocking distance is measured from the sensor membrane.

Type of sensor	blocking distance (BD)	maximum measuring distance[1)]
FDU90	0.07 (0.2)	3.0 (9.8) (for liquids)
FDU91/FDU91F	0.3 (1.0)	10 (33) (for liquids)
FDU92	0.4 (1.3)	20 (66) (for liquids)
FDU93	0.6 (2.0)	25 (82) (for liquids)
FDU95 - *1*** (low temperature version)	0.7 (2.3)	45 (148) (for solids)
FDU95 - *2*** (high temperature version)	0.9 (3.0)	45 (148) (for solids)
FDU96	1.6 (5.2)	70 (230) (for solids)
FDU80/FDU80F	0.3 (1.0)	5 (16) (for liquids)
FDU81/81F	0.5 (1.6)	10 (33) (for liquids)
FDU82	0.8 (2.6)	20 (66) (for liquids)
FDU83	1.0 (3.3)	25 (82) (for liquids)
FDU84	0.8 (2.6)	25 (82) (for solids)
FDU85	0.8 (2.6)	45 (148) (for solids)
FDU86	1.6 (5.2)	70 (230) (for solids)

m (ft)

1) valid for optimum process conditions

2.1.5 "LVL N unit" (N = 1 to 10)



LVL 1 unit level	L1007
unit level:	
level 1:	
sensor:	

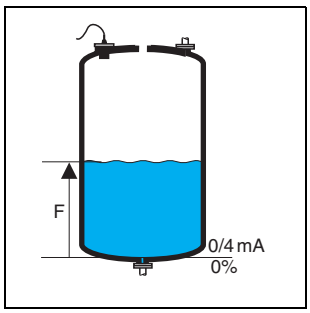
"unit level"

Use this parameter to select the distance unit.
If no linearization is performed, the level is displayed in this unit.

Selection:
- m
- ft
- inch
- mm
- **% (Default)**

"level N" (N = 1 - 10)

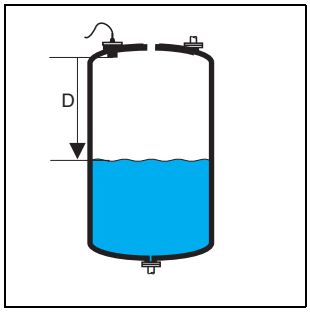
Displays the currently measured level F (from the zero point to the product surface) in the selected unit.



L00-FMU90xxx-19-00-00-yy-021

"sensor"

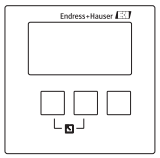
Displays the currently measured distance D (from the sensor membrane to the product surface) in the distance unit. If the display value does not match the real distance, an interference echo suppression must be performed prior to linearization.



L00-FMU90xxx-19-00-00-yy-022

Note!
The distance unit is defined during the first setup of the instrument. If required, it can be changed in the "device properties/operating params" menu.

2.1.6 "LVL N linearisation" (N = 1 - 10)



LVL 1 linearisat.	L1008
type:	
mode:	

Note!
Number and type of the parameters in this set depend on the selected linearization type.
Only the parameters "type" and "mode" are always present.

The "linearization" is used to convert the level into other quantities. Especially, it can calculate the volume or mass within a vessel of arbitrary shape. The Prosonic S provides different linearization modes for the most common types of vessels. Additionally, a linearization table for arbitrarily shaped vessels can be entered.

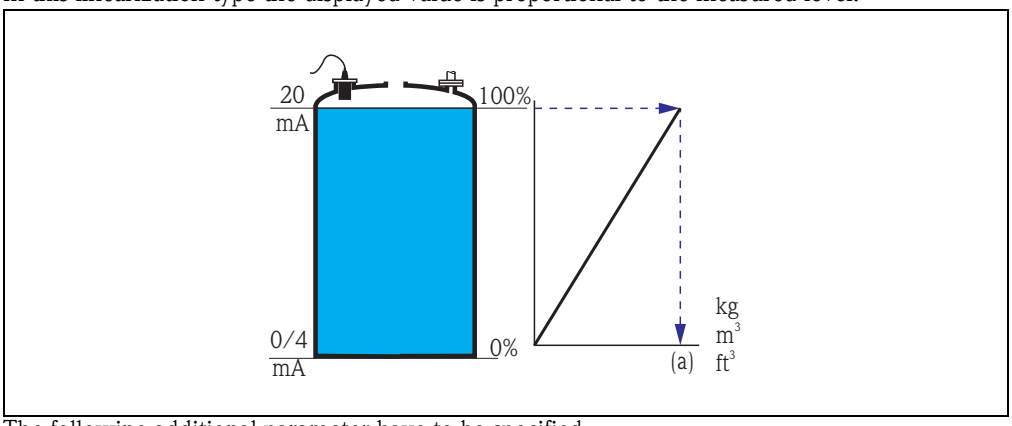
"type"

Use this parameter to select the type of linearisation.

Selection:

- **none**
  In this linearization type the measured level is not converted but displayed in the selected level unit (see above, "unit level").

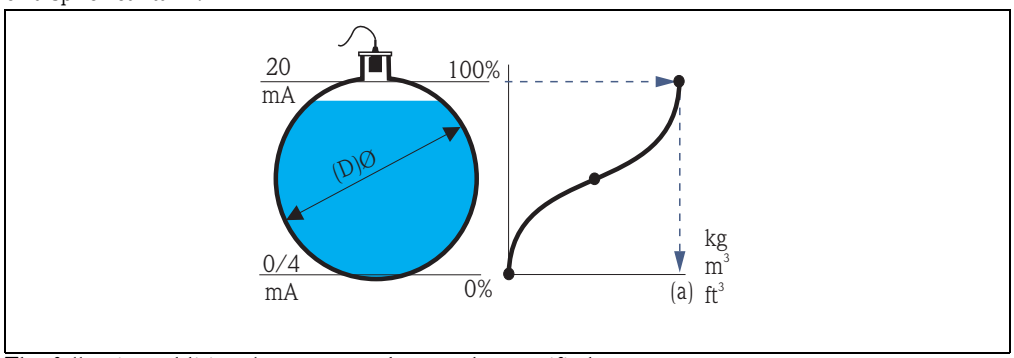
- **linear**
  In this linearization type the displayed value is proportional to the measured level.



The following additional parameter have to be specified:
– the unit for the linearized value, e.g. kg, m^3, ft^3, ... (**"customer unit"**)
– the maximum capacity (a) of the vessel, measured in the customer unit (**"maximum scale"**).

- **horizontal cylinder**[4)]
- **sphere**

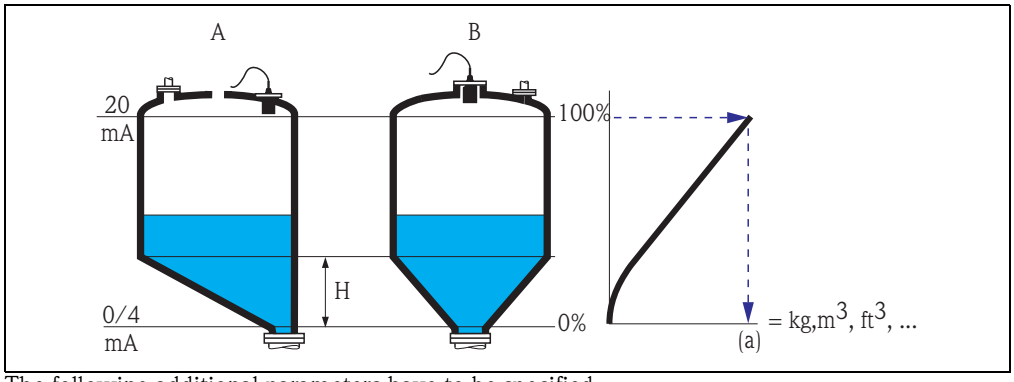
In these linearization types the measured level is convertet to the volume in a horizontal cylinder or a spherical tank.



The following additional parameters have to be specified:
– the unit of the linearized value, e.g. kg, m^3, ft^3, ... (**"customer unit"**)
– the diameter (D) of the tank (**"diameter"**)
– the maximum capacity (a) of the tank, measured in the customer unit (**"maximum scale"**).

- **angled bottom (A)**
- **pyramid bottom (B)**
- **conical bottom (B)**

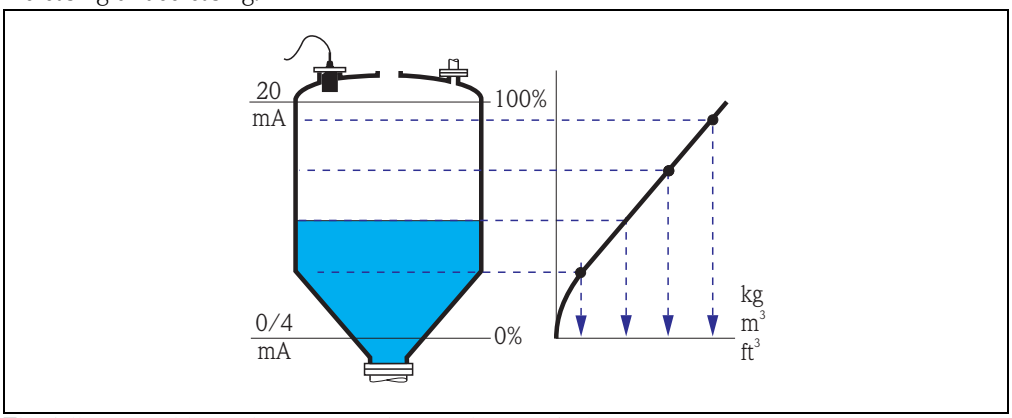
In these linearisation modes the measured level is converted to the volume in the respective type of vessel.



The following additional parameters have to be specified:
– the unit for the linearized value, e.g. kg, m^3, ft^3, ... (**"customer unit"**)
– the intermediate height H according to the diagram (**"intermediate height"**)
– the maximum capacity (a) of the tank, measured in the customer unit (**"maximum scale"**).

4) This option is only valid for horizontal cylinders without bumped ends. For tanks with bumped ends, a linearization table can be calculated and stored in the instrument with the FieldCare.

- **table**
  In this linearization mode the measured value is calculated from a linearization table. The table may consist of up to 32 pairs of values (level – volume). The table must be monotonically increasing or decreasing.



The following additional parameters have to be specified:
– the unit of the linearized value, e.g. kg, m^3, ft^3, ... (**"customer unit"**)
– the linearization table (**"edit"**)

"customer unit"

Use this parameter to select the desired unit for the linearized values (e.g. kg, m^3, ft^3, ...). This unit is only indicated on the display. It does not cause a conversion of the measured value.

Note!
After selecting the option "customer specific", the parameter "customized text" appears. An arbitrary string (consisting of up to 5 alphanumeric characters) can be entered into this parameter.

"maximum scale"

Use this parameter to specify the maximum content of the vessel in the customer unit.

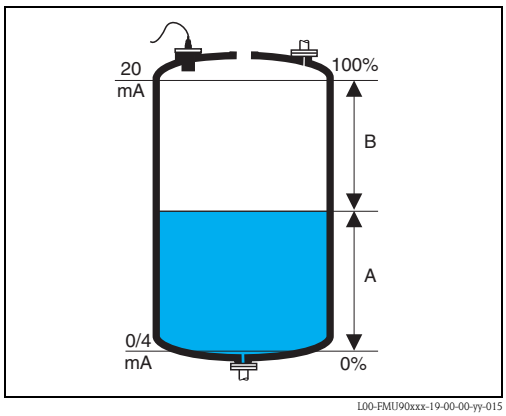
"diameter"

Use this parameter to specify the diamter of the horizontal cylinder or the spherical tank respecitvely.

"intermediate height"

Use this parameter to specify the intermediate height of the vessel.

"mode"



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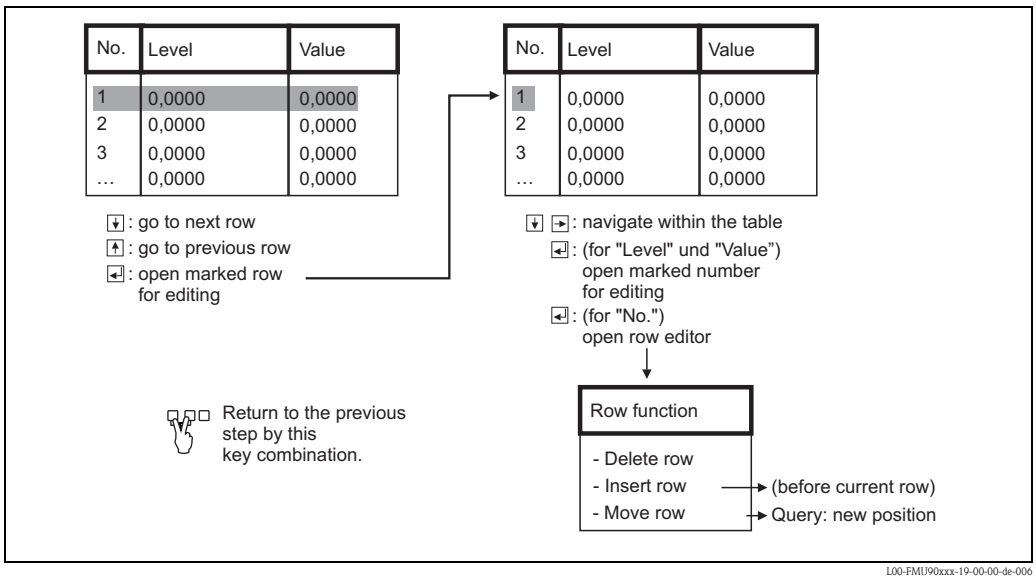
Use this parameter to specify if the measurement refers to the **"level"** (A) or to the **"ullage"** (B).

"edit"

Use this parameter to enter, change or read a linearization table. There are the following options:

- **read:**
  The table editor is opened. The existing table can be read but not changed.
- **manual:**
  The table editor is opened. Table values can be entered and changed.
- **semi-automatic:**
  The table editor is opened. The level is automatically read by the Prosonic S. The measured value (volume, weight or flow) must be entered by the user.
- **delete:**
  The linearization table is deleted.

The table editor



"status table"

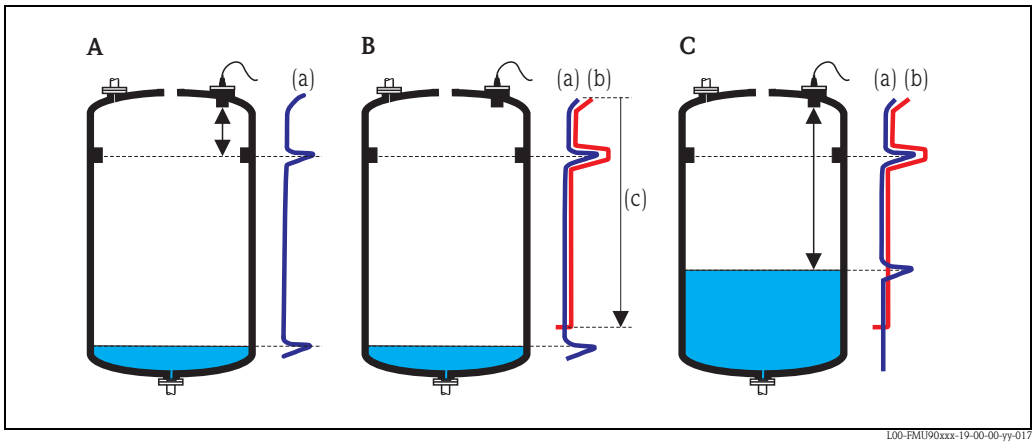
Use this parameter to enable or disable the linearization table.

Selection:

- **enabled**
  The table is used.
- **disabled**
  The table is **not** used. The measured values is transferred to the output without linearization.

2.1.7 Interference echo suppression: Basic principles

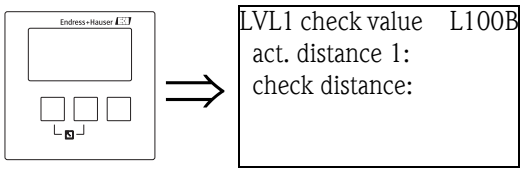
The **"check value"** and **"distance mapping"** parameters are used to configure the interference echo suppression of the Prosonic S.
The following picture shows the operating principle of the interference echo suppression:

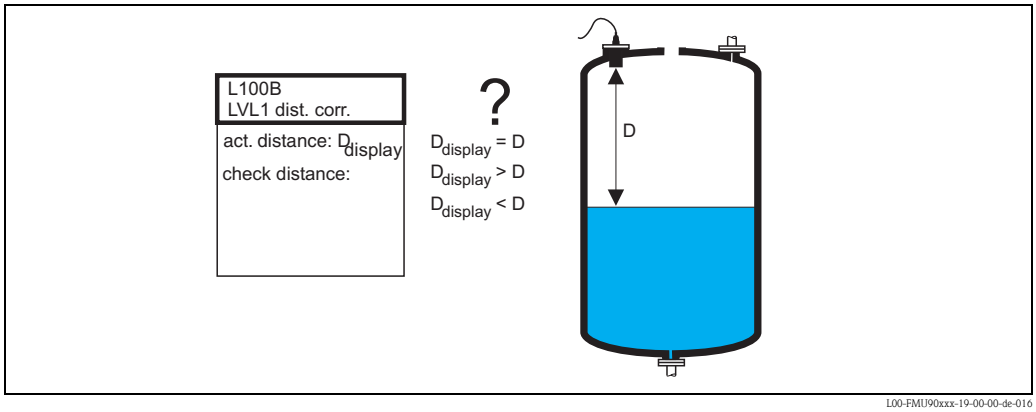


A: *The envelope curve* ***(a)*** *contains the level echo and an interference echo. Without interference echo suppression, the interference echo is evaluated.*
B: *The interference echo suppression generates the mapping curve* ***(b)****. This curve suppresses all echos within the range of mapping* ***(c)****.*
C: *From now on, only those echos are evaluated, which are higher than the mapping curve. The interference echo is below the mapping curve and is therefore ignored.*

Note!
In order to include all interference echos, the interference echo suppression should be performed with the level as low as possible. If during commissioning the vessel can not be sufficiently emptied, it is advisable to repeat the interference echo suppression at a later point of time (as soon as the level reaches nearly 0%).

2.1.8 "LVL N check value" (N = 1 - 10)





"actual distance N" (N = 1 - 10)

Displays the currently measured distance $D_{display}$.

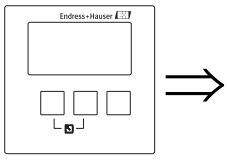
"check distance"

Use this parameter to state if the displayed distance $D_{display}$ matches the real distance D (measured by a rule for example). Based on your selection, the Prosonic S automatically proposes a suitable range of mapping.
You have got the following options:

- **distance = ok**
  Choose this option if the displayed value $D_{display}$ matches the real distance D.
  After selecting this option, the Prosonic S changes to the **"distance mapping"** parameter set. The preset range of mapping is identical to D. That means: all interference echos above the current product surface will be suppressed by the mapping curve.
- **distance too small**
  Choose this option if the displayed value $D_{display}$ is smaller than the real distance D.
  In this case the currently evaluated echo is an interference echo.
  After selecting this option, the Prosonic S changes to the **"distance mapping"** parameter set. The preset range of mapping is slightly larger than $D_{display}$. Therefore, the currently evaluated interference echo is suppressed by the mapping curve.
  If after the mapping $D_{display}$ still is too small, repeat the mapping until $D_{display}$ matches the real distance D.
- **distance too big**
  Choose this option if the displayed value $D_{display}$ exceeds the real distance D.
  This error is not caused by interference echos. Therefore, no interference echo suppression is performed and the Prosonic S returns to the "level 1(2)" submenu. Check the calibration parameters, especially the **"empty calibration"** and the **"application parameters"**.
- **distance unknown**
  Choose this option if you do not know the real distance D.
  In this case, an interference echo suppression can not be performed and the Prosonic S returns to the "level N" submenu.

- **manual**
  Choose this option if you want to define the range of mapping manually.
  The Prosonic S changes to the **"distance mapping"** parameter set, where you can define the required range of mapping.

2.1.9 "LVL N distance mapping" (N = 1 to 10)



LVL 1 dist. map L000B
act. distance:
range of mapping:
start mapping:
status:

"actual distance N" (N = 1 - 10)

Displays the currently measured distance between the sensor membrane and the product surface. Compare this value to the real distance in order to find out if currently an interference echo is evaluated.

"range of mapping"

Use this parameter to specify the range of the mapping curve. Normally, a suitable value has already been entered automatically. Nevertheless, you can change this value if required.

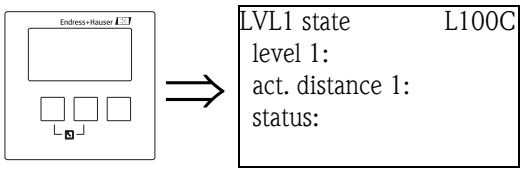
"start mapping"

Select **"yes"** in this parameter in order to start the mapping. When the mapping is finished, the state is automatically changed to **"enable map"**.
The **"LVL N state"** parameter set appears, in which the currently mesaured level and distance are displayed. Compare the displayed distance to the real distance in order to decide if a further mapping is necessary.
If yes: Press the left-arrow key (←) in order to return to the **"LVL N dist. map"** parameter set.
If no: Press the right-arrow key (→), in order to return to the **"level (LVL) N"** submenu.

"Status"

see below, "LVL N state" parameter set

2.1.10 "LVL N state" (N = 1 - 10)



"level N" (N = 1 - 10)

Displays the currently measured level.

"act. distance N" (N = 1 - 10)

Displays the currently measured distance.

"status"

Use this parameter to define the status of the interference echo suppression.

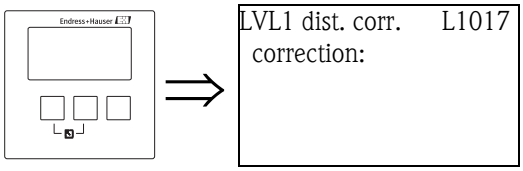
- **enable map**
  Choose this option in order activate the interference echo suppression. The mapping is then used for signal evaluation.
- **disable map**
  Choose this option in order to deactivate the interference echo suppression. The mapping is then no longer used for signal evaluation but it can be reactivated if required.
- **delete map**
  Choose this option in order to delete the mapping. It can not be reactivated again and the instrument uses the preprogrammed default mapping.

2.2 The "extended calibration" submenu

2.2.1 "LVL N distance mapping" (N = 1 to 10)

Is identical to the "LVL N distance mapping" parameter set in the "basic setup" submenu, see above.

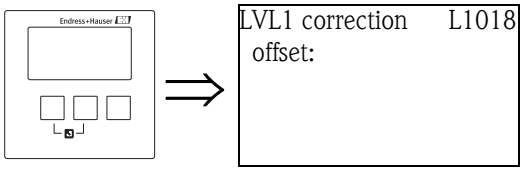
2.2.2 "LVL N dist. correction" (N = 1 to 10)



"correction"

This parameter can be used to shift the measured distance (between the sensor membrane and the product surface) by a constant value. The distance entered into this parameter is added to the measured distance.

2.2.3 "LVL N correction" (N = 1 to 10)

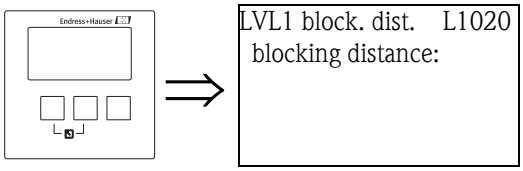


"offset"

This parameter can be used to shift the measured level by a constant value. The level entered into this parameter is added to the measured level.

Note!
The level correction is applied before the linearisation.

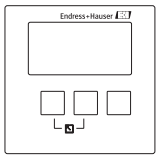
2.2.4 "LVL N blocking distance" (N = 1 to 10)



"blocking distance"

Indicates the blocking distance of the respective sensor.

2.2.5 "LVL N limitation" (N = 1 to 10)



LVL1 limitation L1019
limitation:
upper limit:
lower limit:

"limitation"

Use this parameter to specify if the measured value has a lower and/or upper limit.

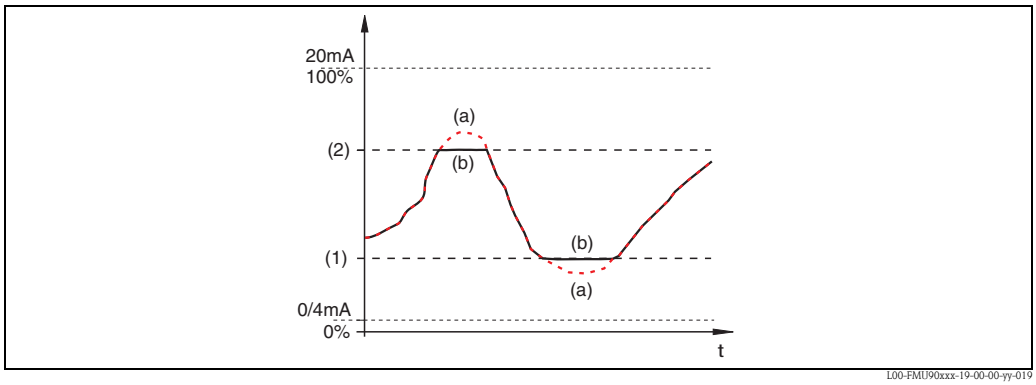
Selection:
- off
- low limit (Default)
- high limit
- low/high limit

"upper limit"

Defines the upper limit for the measured value.
(only available for the options "high limit" and "low/high limit")

"lower limit"

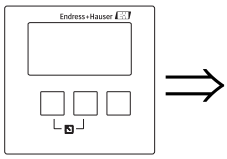
Defines the lower limit for the measured value.
(only available for the options "low limit" and "low/high limit")
Default: 0%



(1): *lower limit;* ***(2):*** *upper limit*
(a): *limitation switched off;* ***(b):*** *limitation switched on*

2.3 The "simulation" submenu

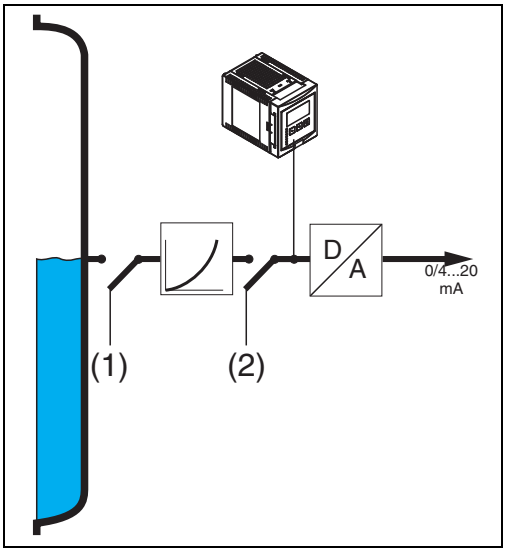
2.3.1 "LVL N simulation" (N = 1 to 10)



LVL1 Simulation L1022
simulation:
(sim. level value:)
(sim. vol. value:)

The parameters of this set are used to simulate a level or a measured value in order to check the linearisation, the signal output and the connected switching units.

"simulation"



(1): simulation of level; (2): simulation of volume

Use this parameter to select the simulation mode:

- **sim off.**
  This is the normal mode used for measurement. No simulation is performed in this mode.
- **sim. level**
  After selection of this mode, the "sim. level value" parameter appears, where you can specify a level value (1). The display and the output signal assume values according to this level.
  Use this mode to check the linearisation.
- **sim. volume**
  After selection of this mode, the "siml vol. value" parameter appears, where you can specify a volume value (2). The output assumes a value according to this volume.
  Use this mode to check the signal output and the connected switching units.

✎ Note!
An error mesage is generated as long as one of the modes "sim. level" or "sim. volume" is active.

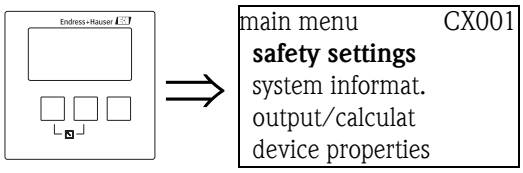
"sim. level value"

This parameter is available for a level simulation. It is used to specify the desired level value. The display and the output signal assume values according to this level.

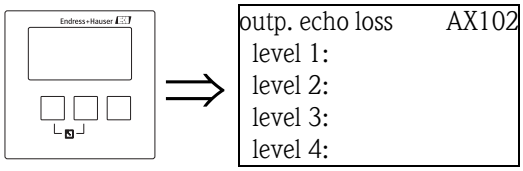
"sim. vol. value"

This parameter is available for a volume simulation (more general: a simulation of the linearized value). It is used to specify the desired volume (or linearized value). The output signal assumes a value according to this volume.

3 The "safety settings" menu



3.1 "output echo loss"

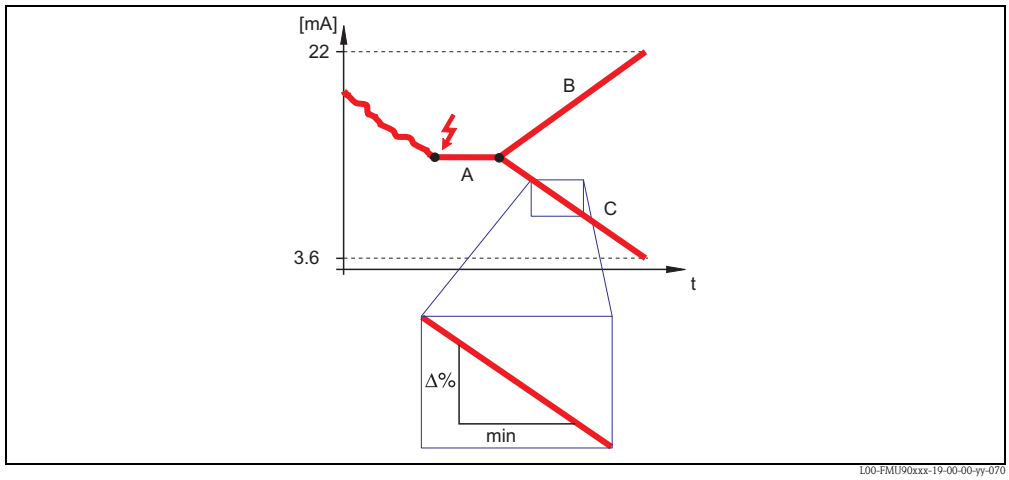


3.1.1 "level N" (N = 1 to 10)

Defines the output value in the case of an echo loss.

Selection:

- **hold (Default)**
  The current value is held.
- **ramp %/min**
  After the time defined in "delay echo loss" (see below), the output value is continuously shifted towards 0% (for a negative ramp) or towards 100% (for a positive ramp). The ramp must be specified as a percentage of the measuring range per minute ("ramp level N" parameter).



***A:** delay echo loss; **B:** ramp (positive); **C:** ramp (negative)*

- **customer specific**
  After the time defined in "delay echo loss" (see below), the output assumes the value which has been defined in the "value level N" parameter.
- **alarm**
  After the time defined in "delay echo loss" (see below), the instrument generates an alarm.

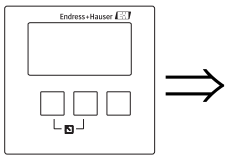
3.1.2 "ramp level N" (N = 1 to 10)

(only available for the option "ramp %/min")
Use this parameter to specify the ramp (percentage of the measuring range per minute).

3.1.3 "value level N" (N = 1 to 10)

(only available for the option "customer specific")
Use this parameter to specify the output value in the case of an echo loss.

3.2 "delay echo loss"

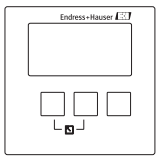


delay echo loss	AX103
delay sensor 1:	
delay sensor 2:	
delay sensor 3:	
delay sensor 4:	

3.2.1 "delay sensor N" (N = 1 to 10)

Use this parameter to define the delay time for echo loss.
After an echo loss the instruments waits for the time specified in this parameter before generating an alarm. Thus the measurement is not interrupted by short-time interferences.
Default: 60 s

3.3 "safety distance"

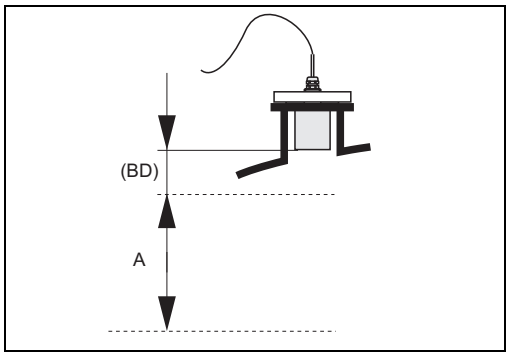


safety distance AX104
saf.dist. sen 1:
saf.dist. sen 2:
saf.dist. sen 3:
saf.dist. sen 4:

3.3.1 "safety distance sensor N" (N = 1 to 10)

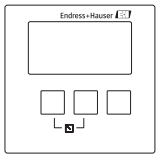
Use this parameter to specify a safety distance for the sensor.
The safety distance is located immediately below the blocking distance. If the level projects into the safety distance, an alarm is generated.

- Default: 0 m



BD: *blocking distance (depending on the type of sensor);*
A: *safety distance*

3.4 "in safety distance"



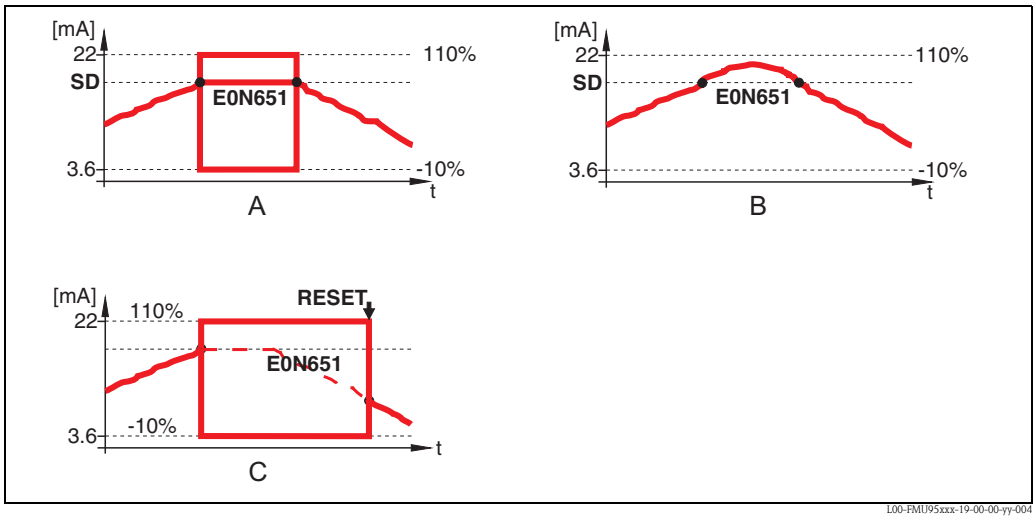
in safety dist. AX105
in saf. dist. s 1:
in saf. dist. s 2:
in saf. dist. s 3:
in saf. dist. s 4:

3.4.1 "in safety distance sensor N" (N = 1 to 10)

Defines the reaction of the instrument if the level is in the safety distance.

Selection:

- **warning (default)**
  A warning (A0N651, N = 1 to 10) is generated but the instrument continues to measure. If the level drops out of the safety distance, the warning disappears.
- **alarm**
  The instrument enters the defined alarm state ("output on alarm"). Additionally, and an error message (A0N651, N = 1 to 10) is generated. If the level drops out of the safety distance, the alarm disappears and the instrument continues to measure.
- **self holding**
  The instrument enters the defined alarm state ("output on alarm"). Additionally, and an error message (A0N651, N = 1 to 10) is generated.
  If the level drops out of the safety distance, the alarm remains active. The measurement is continued only after a reset of the self holding.



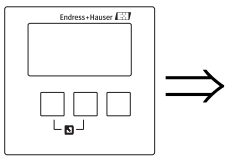
A: alarm; B: warning; C: self holding

3.4.2 "reset sensor N" (N = 1 to 10)

(only available for the option "self holding")
This parameter is used to reset the alarm in the case of a self holding.

Selection:
- **no (default)**
  The alarm is **not** reset.
- **yes**
  The alarm is reset. The measurement is resumed.

3.5 "reaction high temperature"



react. high temp AX107
overtemp sen 1:
max. temp. Sen. 1:
overtemp sen 2:
max. temp. Sen. 2:

3.5.1 "overtemperature sensor N" (N = 1 to 10)

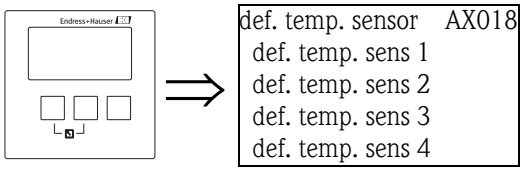
Defines how the instrument reacts if the maximum temperature of the sensor is exceeded.

Selection:
- **warning (default)**
  If the maximum temperature is exceeded, an error message (E0N661, N = 1 to 10) is generated but the measurement is continued.
- **alarm**
  If the maximum sensor temperature is exceeded, the output assumes a defined value ("output on alarm", see above). Additionally, an error meassage (E0N661, N = 1 to 10) is generated.

3.5.2 "maximum temperature sensor N" (N = 1 to 10)

Displays the maximum temperature of the respective sensor.

3.6 "defective temperature sensor"



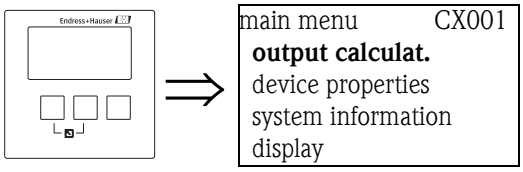
3.6.1 "defective temperature sensor N" (N = 1 to 10)

Defines how the instrument reacts in the case of a defective temperature sensor.

Selection:

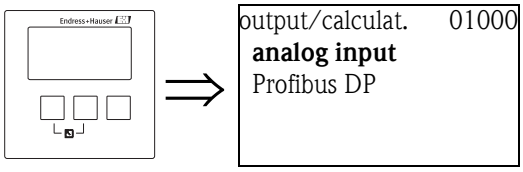
- **warning**
  If the temperature sensor is defective, an error message (A0N281, N = 1 to 10) is generated but the measurement is continued.
- **alarm (default)**
  If the temperature sensor is defective, the output assumes a defined value ("output on alarm", see above). Additionally, an error meassage (A0N281, N = 1 to 10) is generated.

4 The "output/calculations" menu

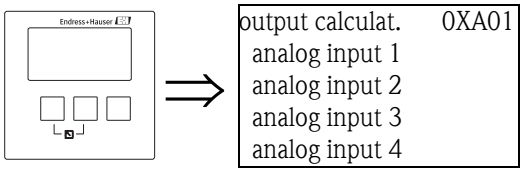


The "output/calculations" menu is used to configure the Analog Input blocks (AI) and the general properties of the Profibs DP interface.
The AI blocks transfer analog values to a PLC.

4.1 "analog input" (AI)

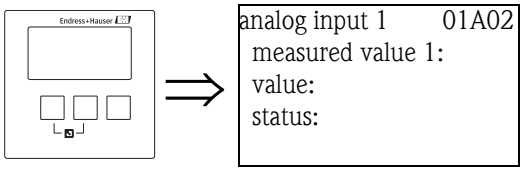


4.1.1 "output/calculations"



Use this list to select the AI block you are going to configure.

4.1.2 "analog input N" (N = 1 - 10)



"measured value N" (N = 1 - 20)

Use this parameter to select the measured or calulated variable which is transferred by the AI block.

Selection
- none
- level N (N = 1 to10)
- sum N (N = 1 to 5)
- average N (N = 1 to 5)
- temperature sensor N (N = 1 to 10)
- distance sensor N (N = 1 to10)

Note!
If **"sum N"** or **"average N"** are selected, the Prosonic S returns to the "analog input N" parameter set, which now contains the parameters **"level 1"** to **"level 10"**. Select **"yes"** for each parameter which is to be included in the sum or average. Select **"no"** (default) if the respective parameter is not to be included in the sum or average.

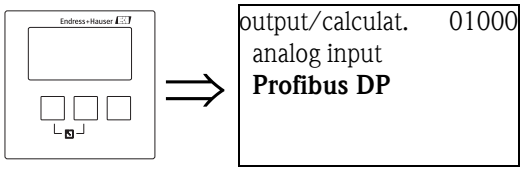
"value"

Displays the current value of the measured or calculated variable.

"status"

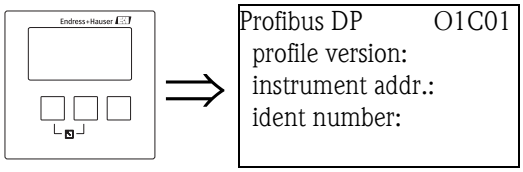
Displays the status which is transferred with the measured value.

4.2 "PROFIBUS DP"



This submenu is used to configure the general properties of the PROFIBUS DP interface.

4.2.1 "PROFIBUS DP"



"profile version"

Displays the version of the PROFIBUS profiles used.

"instrument address"

Displays the instrument address.

Note!
There are two options for setting the instrument address:
- by the DIP switches in the terminal compartment
- by a configuration tool (e.g. FieldCare)

"ident number"

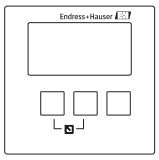
Defines the ident number of the instrument.

Selection:
- **profile**
  The ident number of the PROFIBUS profiles is used.
- **manufacturer (default)**
  The ident number of the instrument specific GSD files is used.

5 The "device properties" menu

5.1 The "operating parameters" submenu

5.1.1 "distance unit"

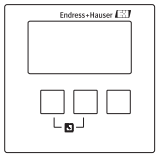


distance unit D1101
distance unit:

Defines the distance unit.

Selection:
- m (default)
- ft
- mm
- inch

5.1.2 "temperature unit"



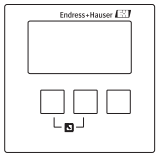
temperature unit D110B
temperature unit:

Defines the temperature unit.

Selection:
- °C (default)
- °F

5.2 The "tag marking" submenu

5.2.1 "tag marking"



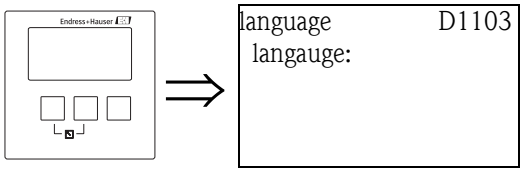
tag marking D1102
device marking:

"device marking"

Use this parameter to define a tag (designation) for the entire instrument. The tag may consist of up to 16 alphanumeric characters.

5.3 The "language" submenu

5.3.1 "language"



Defines the language for the display module. The feature "language" of the product structure determines which languages are available:

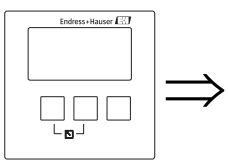
"language" = 1:
- Deutsch
- English
- Nederlands
- Français
- Español
- Italiano
- Nederlands
- Portuguese

"language" = 2:
- Englisch
- Deutsch
- Russian
- Polish
- Czech

"language" = 3:
- English
- Chinese
- Japanese
- Korean
- Thai
- Bahasa (Indonesia, Malaysia)

5.4 The "password/reset" submenu"

5.4.1 "password/reset"



password/reset D1104
reset:
code:
status:

"reset"

Enter the reset code into this parameter in order to reset all parameters to their default values.

Reset Code
- PROFIBUS DP: 33333

Note!
- The default values of all parameters are printed in bold in the menu diagrams at the end of this document.
- The linearisation type is set to "none". However, the linearisation table (if present) is not deleted. If required, it can be reactivated at a later point of time

5-point linearity protocol

Note!
The specified measuring accuracy is a typical value. With the production of the 5-point linearity protocol the measuring system (FDU9x sensor and FMU9x transmitter electronic) is adjusted exactly to one another and the measuring accuracy is optimized for the specified range. To realize this, the parameter "zero distance" is fine adjusted. After a reset the value for the zero distance has to be re-parameterized in the service menu according to the data on the associated 5-point linearity protocol for the FDU9x sensor. Please contact the Endress+Hauser service.

"code"

This parameter is used to lock the instrument against unauthorized or unintentional changes.

- Enter a number other than the release code in order to lock the instrument. Parameters can no longer be changed.
- Enter the release code in order to unlock the instrument. Parameters can be changed again.

Release code
- PROFIBUS DP: 2457

"status"

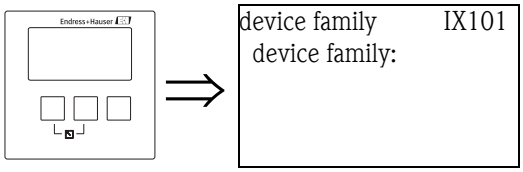
Displays the current locking state of the instrument. The following states may occur:

- **unlocked**
  All parameters (except of service parameters) can be changed.
- **code locked**
  The instrument has been locked via the operating menu. It can be unlocked by entering the release code into the "code" parameter.
- **key locked**
  The key has been locked by a key combination. It can only be unlocked by pressing all three keys simultaneously.
- **switch locked**
  The instrument has been locked by the switch in the terminal compartment. It can only be unlocked by this switch.

6 The "system information" menu

6.1 The "device information" submenu

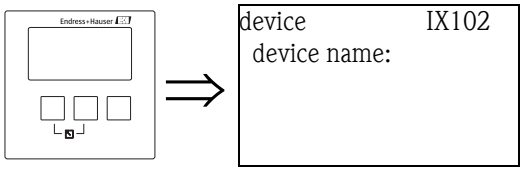
6.1.1 "device family"



"device family"

Displays the device family.

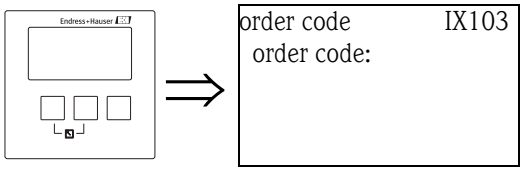
6.1.2 "device name"



"device name"

Displays the device name.

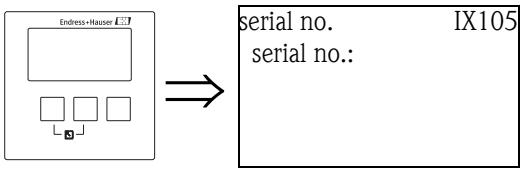
6.1.3 "order code"



"order code"

Displays the order code of the instrument.

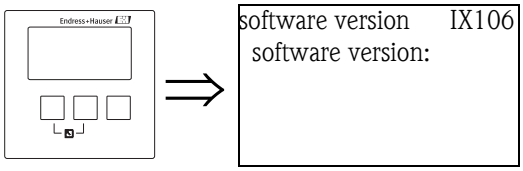
6.1.4 "serial number"



"serial no."

Displays the serial number of the instrument.

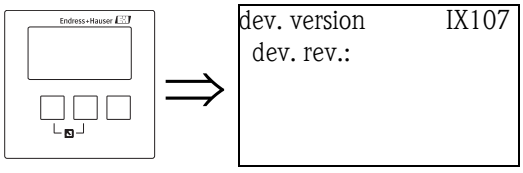
6.1.5 "software version"



"software version"

Displays the software version of the instrument.
This function shows the protocol and the hardware and software version: Vxx.yy.zz.prot
Display:
xx: hw-version
yy: sw-version
zz: sw-revision
prot: protocol type (e.g. HART)

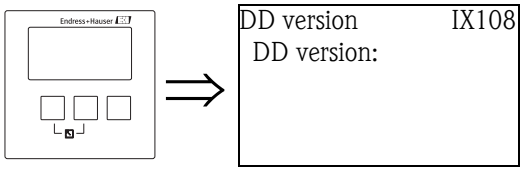
6.1.6 "device version"



"dev. rev."

Displays the device revision.

6.1.7 "DD version"

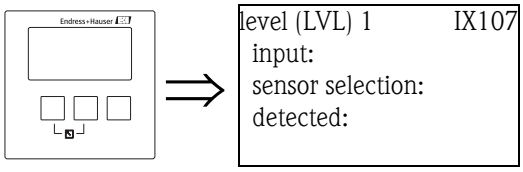


"DD version"

Displays the DD version which is required to operate the instrument by the FieldCare.

6.2 The "in/output info" submenu[5)]

6.2.1 "level (LVL) N" (N = 1 to 10)



"input"

Indicates, which sensor input is connected to the level channel.

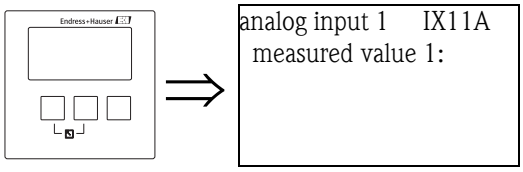
"sensor selection"

Displays the type of the connected sensor. For the sensors FDU9x, "automatic" id displayed, as these sensors are automatically detected by the sensor (They have not to be spedified by the user.)

"detected"

(only for "sensor selection" = automtic")
Displays the type of the automatically detected sensor.

6.2.2 "analog input N" (N = 1 to 20)



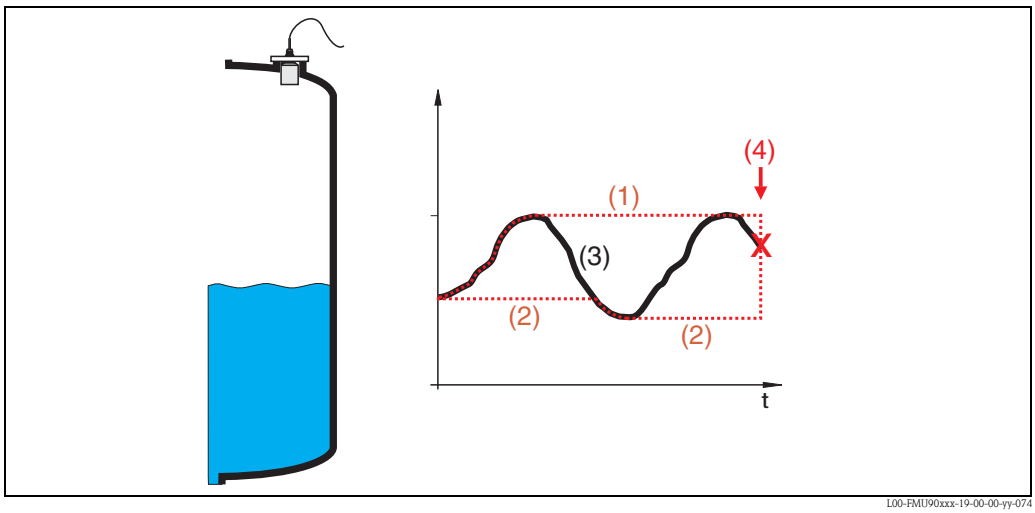
"measured value N" (N = 1 to 20)

Indicates which measured value has been allocated to the Analog Input Block N.

5) This submenu can be accessed only by the display module (not by an operating software).

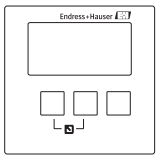
6.3 The "min/max values" submenu

Use this submenu to display the minimum and maximum values a certain parameter has reached during the measurement (drag indicator functionality).



(1): max value; (2): min value; (3): measured value; (4): reset

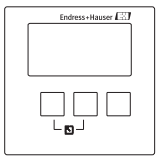
6.3.1 "min/max values"



min/max values	IX300
level	
temperature	

From this list, select a quantity (level, flow or temperature) for the display of the min/max values.

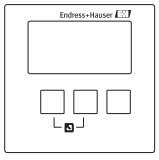
6.3.2 "level" or "temperature"



level	IX301
level (LVL) 1	
level (LVL) 2	
level (LVL) 3	
level (LVL) 4	

From this list, select the level or temperature channel for the display of the min/max values.

6.3.3 "level (LVL) N" or "temperaturs sen. N" (N = 1 to 10)



level (LVL) 1	IX302
max. value:	
min. value:	
reset:	

"max. value"

Displays the maximum value which has been reached by the selected parameter.

"min. value"

Displays the minimum value which has been reached by the selected parameter.

"reset"

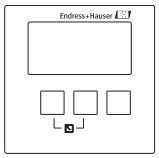
Use this parameter to reset the min and max drag indicators.

Selection:
- **keep (default)**
  The drag indicators are **not** reset.
- **erase**
  The minimum and maximum values are reset, i.e. they assume the current value of the respective parameter.
- **reset min.**
  The minimum value is reset, i.e. it assumes the current value of the respective parameter. The maximum value is **not** reset.
- **reset max.**
  The maximum value is reset, i.e. it assumes the current value of the respective parameter. The minimum value is **not** reset.

6.4 The "envelope curve" submenu

This submenu can be used to display the envelope curve of the connected sensor on the display module.

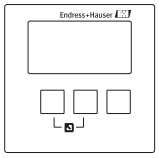
6.4.1 "envelope curve"



envelope curve	IX126
en. curve sen. 1	
en. curve sen. 2	
en. curve sen. 3	
en. curve sen. 4	

In this list, select a sensor for the envelope curve display.

6.4.2 "Plot settings" (Part 1: curve selection)

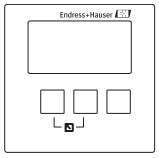


Plot settings	IX127
Envelope curve	
Env.curve+FAC	
Env.curve+cust.map	

In this list, select which curves are to be displayed.

Selection:
- Envelop curve (default)
- Env. curve + FAC
- Envelope curve + customer map

6.4.3 "Plot settings" (Part 2: single curve <-> cyclic change)



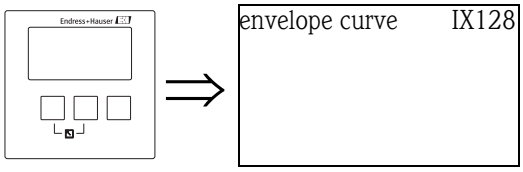
Plot settings	IX128
single curve	
cyclic	

In this list, select the type of plotting.

Selection:
- **single curve (default)**
  The envelope curve is plotted once.
- cyclic
  The envelope curve display is updated in regular intervals.

Note!
If the cyclical envelope curve display is still active on the display, the measured value is updated at a slower cycle time. We therefore advise you to exit the envelope curve display after optimising the measuring point.

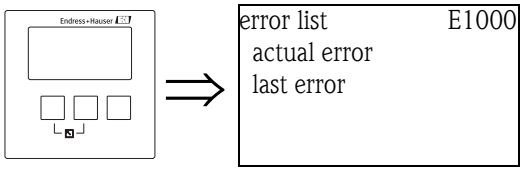
6.4.4 "envelope curve"



The envelope curve is displayed in this screen.
In order to exit the display, press the left and middle key simultaneously (ESC).

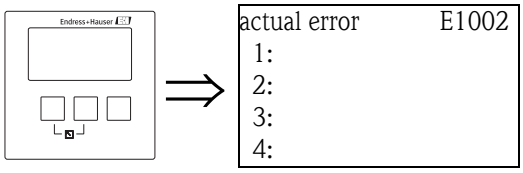
6.5 The "error list" submenu

6.5.1 "error list"



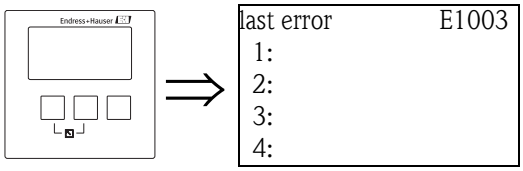
From this list, select if the currently active errors or the previosuly rectified errors are to be displayed.

6.5.2 "actual error"



A list of the currently active errors is displayed in this screen. Select an error to get an error description. By pressing the left and middle key simultaneously you can return from the error description to the error list.

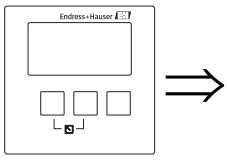
6.5.3 "last error"



A list of the previously rectifed errors is displayed in this screen. Select an error to get an error description. By pressing the left and middle key simultaneously you can return from the error description to the error list.

6.6 The "diagnsotics" submenu

6.6.1 "operating hours"

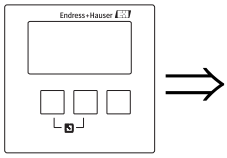


operating hours E1403
operating hours:

"operating hours"

Indicates, how long the instrument has been in operation.

6.6.2 "actual distance"

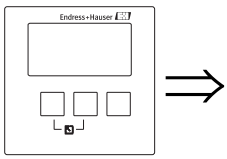


actual distance E1404
act. distance 1:
act. distance 2:
act. distance 3:
act. distance 4:

"act. distance N" (N = 1 to 10)

Displays the currently measured distance (between the sensor membrane and the product surface).

6.6.3 "actual measured value"

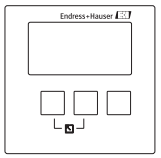


act. mes. value E1405
level 1:
level 2:
level 3:
level 4:

"level N" (N = 1 to 10)

Displays the currently measured level or (if a linearisation has been performed) the currently measured volume of the respective channel.

6.6.4 "application parameter"

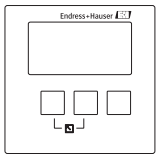


appl. parameter	E1405
sensor 1:	
sensor 2:	
sensor 3:	
sensor 4:	

"sensor N" (N = 1 to 10)

Indicates if a setting which depends on the application parameters ("tank shape", "medium property", "process condition") has been changed after the setting of the application parameters in the service menu.

6.6.5 "echo quality sensor"



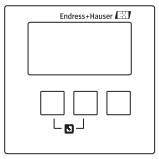
echo quality sen.	E1406
echo quality 1:	
echo quality 2:	
echo quality 3:	
echo quality 4:	

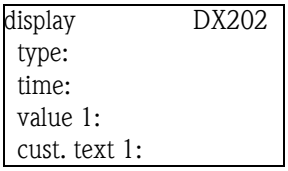
"echo quality N" (N = 1 to 10)

Displays the echo quality of the respective sensor.
The echo quality is the distance (in dB) between the level echo and the Floating Average Curve (FAC).

7 The "display" menu

7.1 "display"

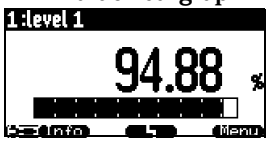




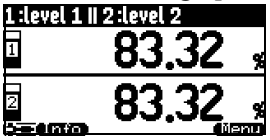
"type"
Use this parameter to select the format of the measured value display.

Selection:

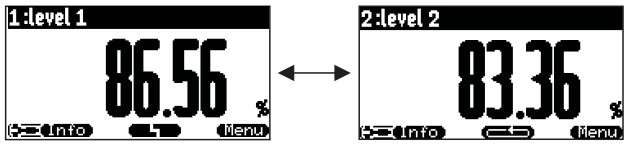
- **1x value+bargraph**



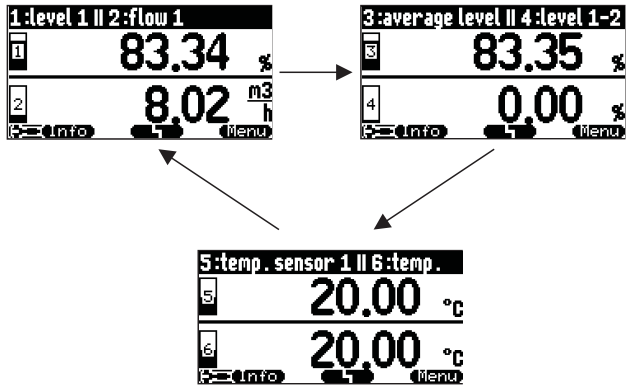
- **2x value+bargraph**



- **value max. size**
  Up to two values are displayed alternately using the entire display:



- **alter 5x2 values**
  Up to 10 values can be displayed on five alternating pages. Each pages contains two values.



- **bargraph profile (default)**
  Bargraphs are displayed for up to 10 measuring values.

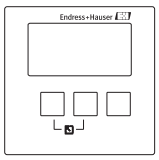
"time"
This parameter is used for the options "value max. size" and "alter 53x2 values". It specifies the time after which the next page appears.

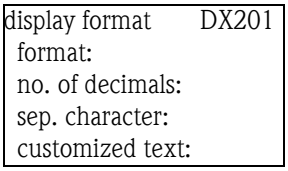
Note!
To change to the next page immediately, press .

"value 1" ... "value 10"
Use these parameters to allocate a measured or calculated value to each of the display values. The selection depends on the instrument version and installation environment.

"cust. text 1" ... "cust. text 10"
These parameters can be used to allocate a text string to each of the display values. This text is displayed together with the value if **"customized text"** (in the "display format" parameter set) has been set to **"yes"**.

7.2 "display format"





"format"
Use this parameter to select the display format for numbers.

Selection:
- decimal (Default)
- ft-in-1/16"

"no. of decimals"
Use this parameter to select the number of decimals for the representation of numbers.

Selection:
- x
- x.x
- x.xx (Default)
- x.xxx

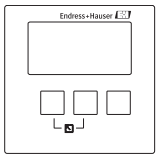
"sep. character"
Use this parameter to select the separation character for the representation of decimal numbers.

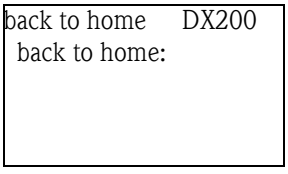
Selection:
- point (.) (Default)
- comma (,)

"customized text"
Determines if "text 1" to "text 10" from the "display" parameter set are displayed.

Selection:
- no (Default)
- yes

7.3 "back to home"

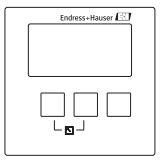


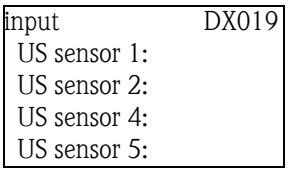


"back to home"
Use this parameter to specify the return time. If no entry is made during the specified time, the display returns to the measured value display.

- Range of values: 3 ... 9999 s
- Default: 900 s

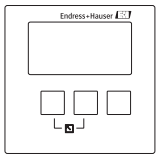
8 The "sensor management" menu

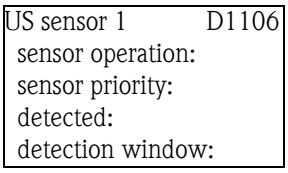




Upon entering this menu, a selection list appears, from which you can select a sensor for parametrization.

8.1 "US sensor N" (N = 1 to 10)





8.1.1 "sensor operation"

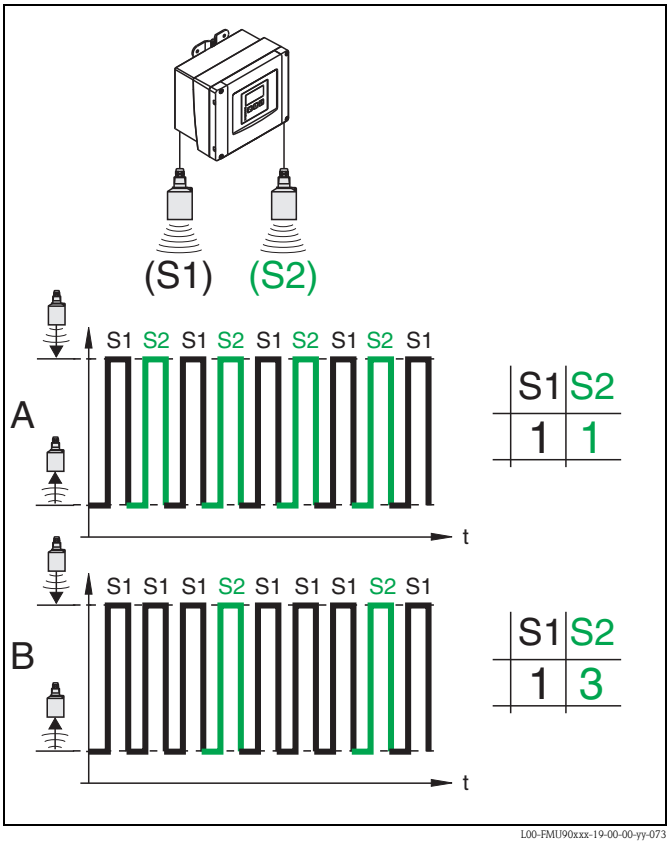
This parameter is used to switch the sensor on and off.

Selection:
- **on (default)**
  The sensor is switched on.
- **hold**
  The sensor is switched off. The last measured value is held.
- **off**
  The sensor is switched off. No measured value is transmitted.
  On the display, connected values are set to "————".

8.1.2 "sensor priority"

This parameter is used to define the sensor priority. A sensor with high prioority sends pulses more often than a sensor with low priority.
Priorities can be assigned for all connectable sensors 1 to 10. The priorities can be adjusted between 1 and 255. The number of the priority is equal to the number of scanning cycles after which the value is requested.

Example for 2 sensors



A:
priority sensor 1: 1
priority sensor 2: 1

⇒ both sensors send the same number of pulses

B:
priority sensor 1: 1
priority sensor 2: 3

⇒ Sensor 1 sends **three** pusles. Then, sensor 2 send **one** pulse.

8.1.3 "detected" (only available for automatic sensor detection)

Indicates the type of the automatically detected sensor.

8.1.4 "detection window"

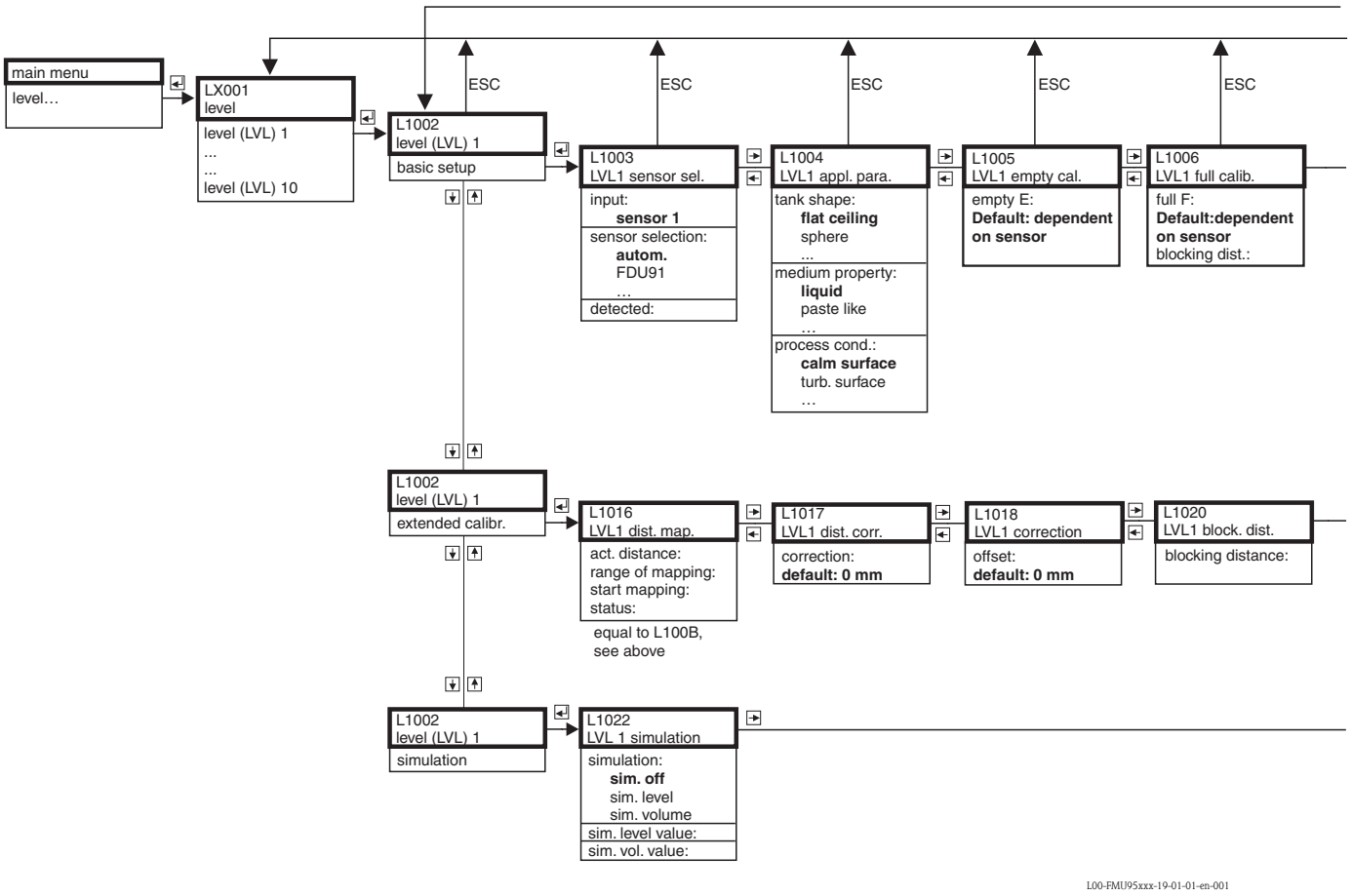
Is used to switch the detection window on and off and to reset an existing detection window.
If this function is switched on, a window is defined surrounding the current level echo (typical width: 1 to 2.5 m; depending on the application parameters).
The window always moves togehter with a rising or falling echo.
Echos beyond the limits of the window are ignored for a certain time.

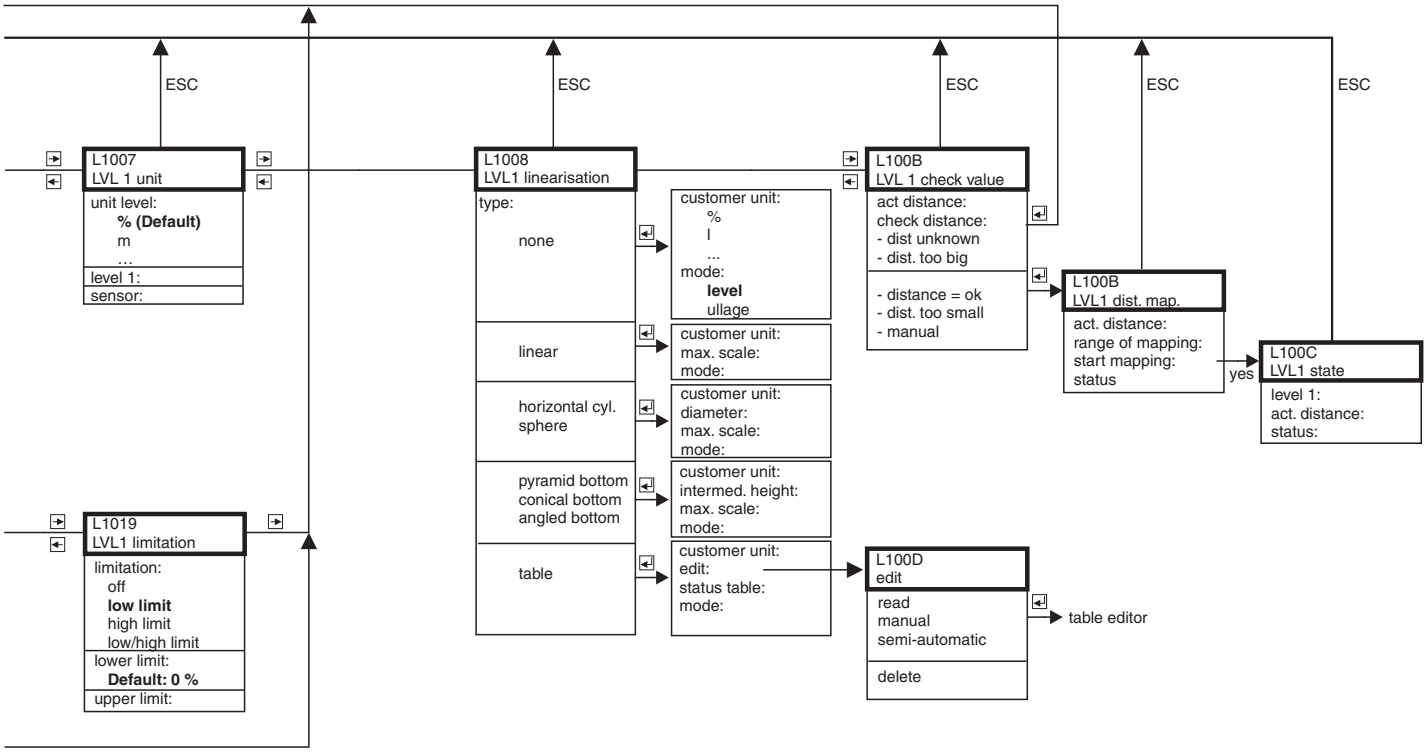
Note!
This parameter is set automatically according to the application parameters.

Selection:
- **off**
- on
- reset
  After selection of this option, the current window is reset, the level echo is looked for in the complete measuring range and a new window is defined surrounding the current level echo.

9 Operating menu

9.1 "level"





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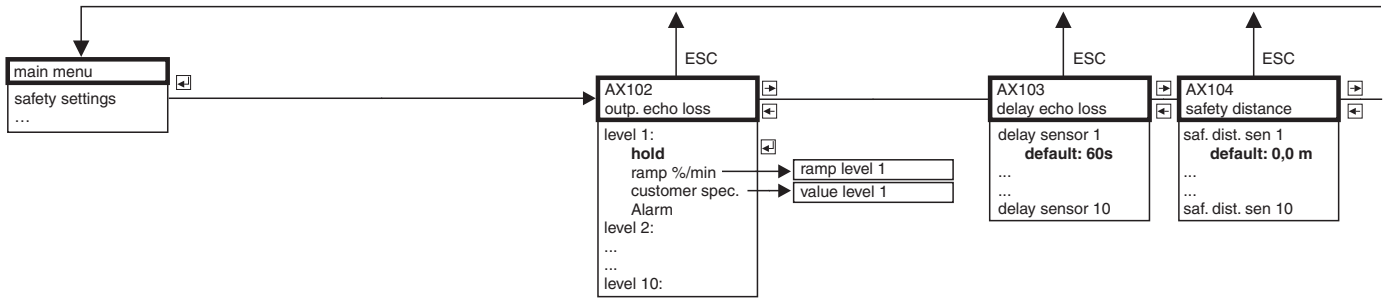
9.2 "safety settings"



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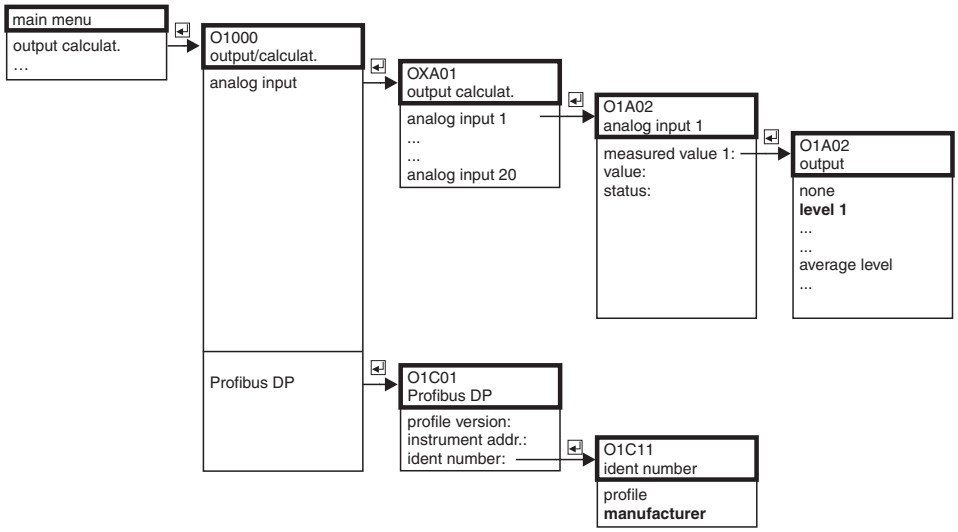
9.3 "outputs/calculations"



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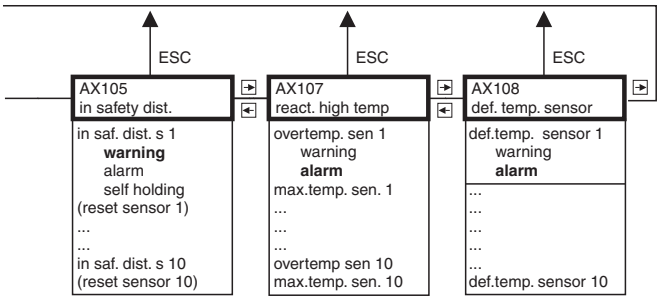

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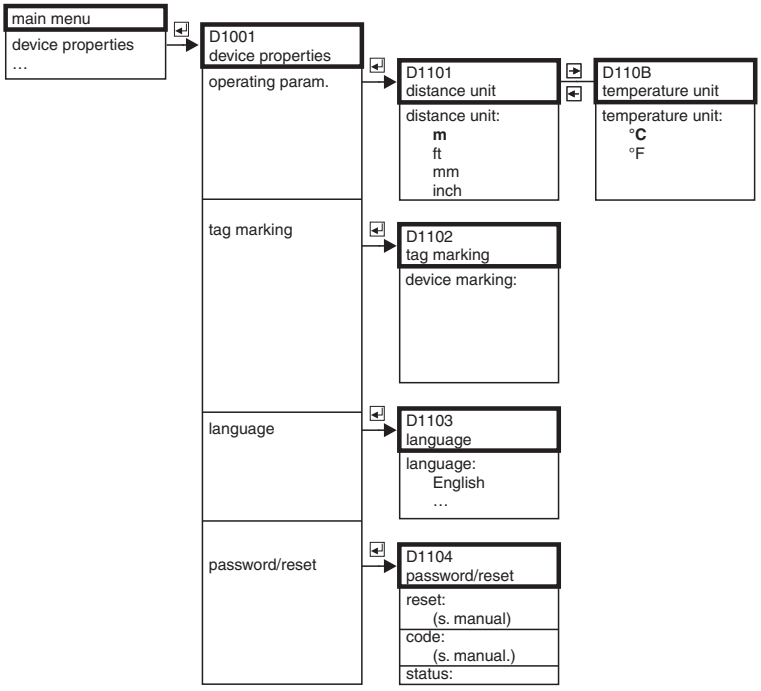
9.4 "device properties"



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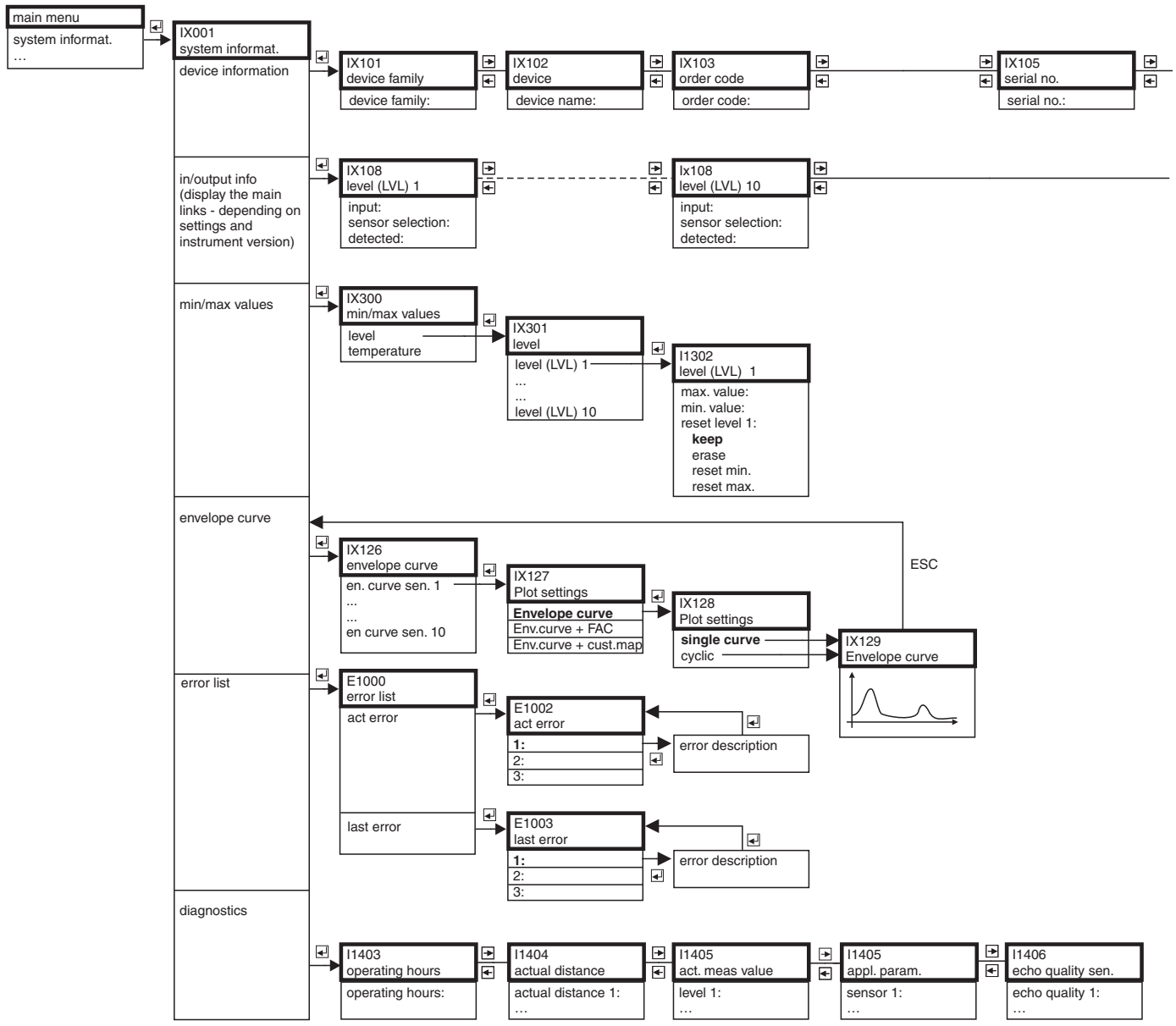
9.5 "system information"



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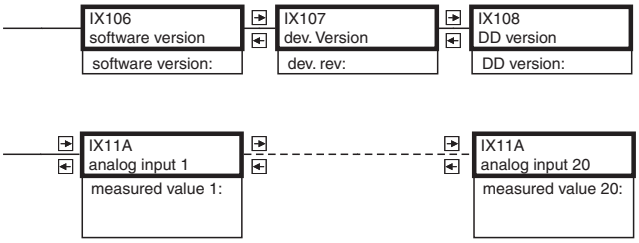

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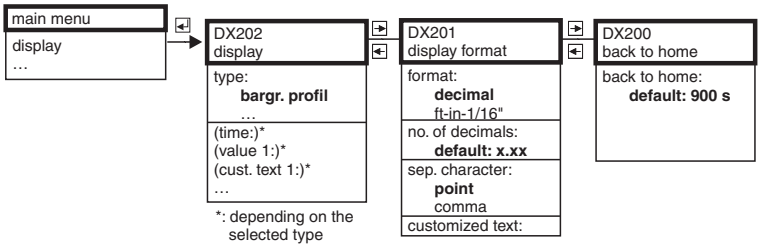
9.6 "display"



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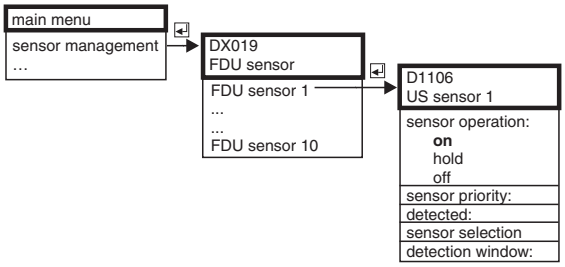
9.7 "sensor management"



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10 Appendix

10.1 System error messages

10.1.1 Error signal

Errors occurring during commissioning or operation are signalled in the following way:

- Error symbol, error code and error description on the display and operating module
- Status of the output values in the cyclic data telegram
- In the menu: "system information/error list/actual error"

10.1.2 Last error

To access a list of the last errors which have been cleared, go to "system information/error list/last error".

10.1.3 Types of errors

Type of error	Display symbol	Meaning
Alarm (A)	 continuous	The output signal assumes a value which can be defined by the "output on alarm" function: ■ MAX: 110% ■ MIN: -10% ■ Hold: last value is held ■ user-specific value An error message appears on the display. The operating state LED lights red The status of the output signal of the affected blocks is BAD.
Warning (W)	 flashing	The instrument continues to measure. An error message appears on the display. The operating state LED flashes red. The status of the output signal of the affected blocks is UNCERTAIN.

10.1.4 Error codes

The error code consists of 6 digits with the following meaning:

- Digit 1: Type of error
  - A: alarm
  - W: warning
  - E: error (the user can define if the error behaves like an alarm or a warning.)
- Digits 2 and 3:
  indicate the input channel, output channel or the relay to which the error refers. "00" means that the error does not refer to a specific channel or relay.
- Digits 4-6:
  indicate the error according to the following table.

Example:

W 01 641	■ W: Warning ■ 01: sensor input 1 ■ 641: loss of echo

Code	Description of error	Remedy
A 00 100	software version does not fit to hardware version	
A 00 101	checksum error	full reset and recalibration required
A 00 102	checksum error	full reset and recalibration required
W 00 103	initializing - please wait	if the message does not disappear after a couple of seconds: replace electronics
A 00 106	downloading - please wait	wait for completion of the download
A 00 110	checksum error	full reset and recalibration required
A 00 111 A 00 112 A 00 114 A 00 115	electronics defective	switch instrument off/on; if the error persists: call Endress+Hauser service
A 00 116	download error	repeat download
A 00 117	hardware not recognised after exchange	
A 00 125	electronics defective	replace electronics
A 00 152	checksum error	full reset and recalibration required
W 00 153	initializing	if the message does not disappear after a couple of seconds: replace electronics
A 00 155	electronics defective	replace electronics
A 00 164	electronics defective	replace electronics
A 00 171	electronics defective	replace electronics
A 00 180	synchronization faulty	check synchronization wiring (s. chapter "Wiring")
A 00 183	hardware not supported	check if the installed board complies with the order code of the instrument; call Endress+Hauser service
A 01 231 ... A 10 231	sensor 01 - 10 defective - check connection	check for correct connection of the sensor (s. chapter "Wiring")
A 01 281 ... A 10 281	temperature measurement 01 - 10 defective - check connection	check for correct connection of the sensor (s. chapter "Wiring")

Code	Description of error	Remedy
W 01 501 ... W 10 501	no sensor selected for channel 01 – 10	allocate sensor (s. "level" or "flow" menu)
A 01 502 ... A 10 502	Sensor 01 – 10 not recognized	Enter type of sensor manually ("level" or "flow" menu, submenu "basic calibration".
A 00 511	no factory calibration present	
A 01 512 ... A 10 512	mapping in process	wait for completion of mapping
W01 521 ... W10 521	new sensor 01 – 10 detected	
W01 601 ... W10 601	non-monotonic linearisation curve for level 01 – 10	re-enter linearisation (s. "level" menu")
A 01 604 ... A 10 604	faulty calibration for level 01 – 10	adjust calibration (s. "level" menu)
W01 611 ... W10 611	linearisation points level 01 – 10: number < 2	enter further linearisation points (s. "level" menu)
E 01 641 ... E 10 641	no usable echo sensor 01 – 10	check basic calibration for the respective sensor (s. "level" or "flow" menu)
A 01 651 ... A 10 651	Safety distane reached for sensor 01 – 10: danger of overfilling	Error disappears if the level is out of the safety distance again. Possibly, the function "acknowledge alarm" must be used (s. "safety settings" menu)
E 01 661 ... E 10 661	temperature sensor 01 – 10 too high	
W01 691 ... W10 691	filling noise detected sensor 01 – 10	
W00 801	simulation level switched on	switch off level simulation (s. "level" menu)
W01 802 ... W10 802	simulation sensor 01 -10 switched on	switch off simulation
A 00 820 ... A 00 832	Different units for calculation of average value or sum	Check the units of the respective basic calibrations (s. "level" menu)

10.1.5 Influence of the errors on the status byte of the output signal

The following table specifies the status, which the block output values assume if an error is present. There are three possible status values: GOOD, UNCERTAIN and BAD.
The status is transmitted to the next block. If different status values occur in one chain, the weaker status is overwritten by the stronger one according to the following priority:

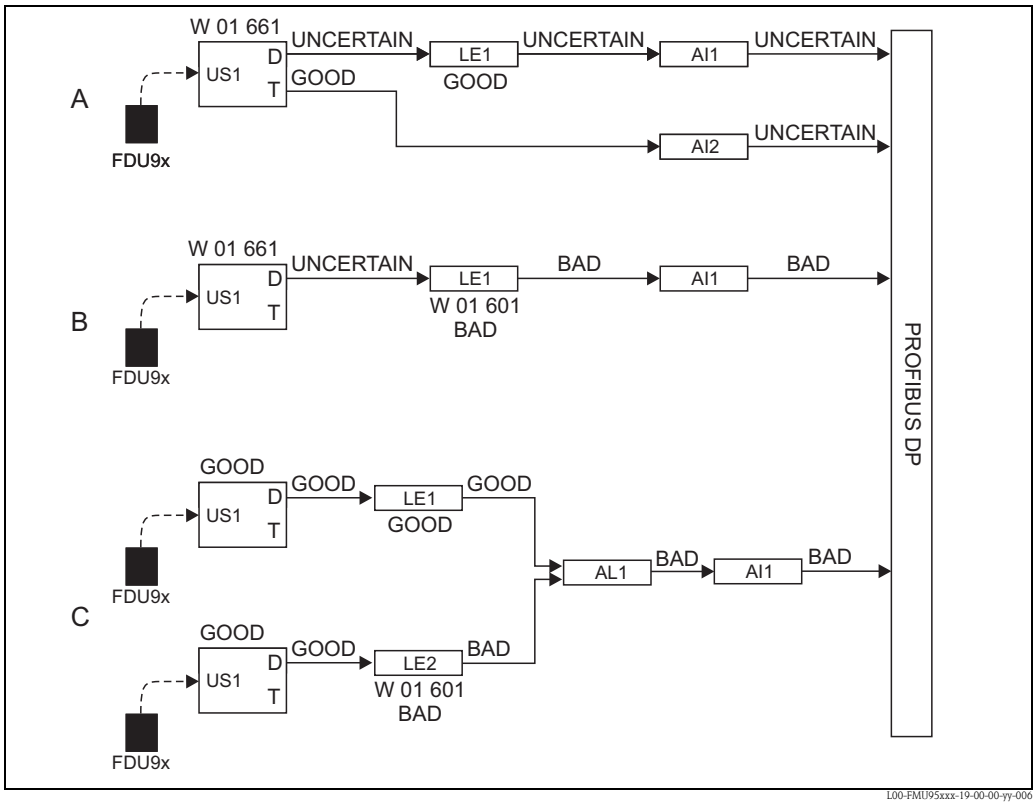
- BAD overwrites UNCERTAIN and GOOD.
- UNCERTAIN overwrites GOOD.
- GOOD overwrites no other status.

Therefore, the strongest status of the chain remains at the output of the AI Block. This status is transferred to the PLC together with the measured value.

Examples

Note!
Errors may occur at different places within the instrument. Each error is allocated to one of the following areas:
- sensor error => sensor block (US 1 - US 10)
- level error => level block (LE 1 - LE 10)
- calculation error => sum block/averaging block (SL 1 - SL 10; AL 1 - AL 10)
- output error => AI Block (AI 1 - AI 20)

Each sensor block (US1 to US10) has two outputs. The first transmits for the measured distance D, the second transmits the sensor temperature T.



A: UNCERTAIN from the sensor block (US1) overwrites GOOD from the level block (LE1);
B: BAD from the level block (LE1) overwrites UNCERTAIN from the sensor block (US1);
C: BAD from the second level block (LE2) overwrites GOOD from the first level block (LE1). Therefore, the status at the output of the averaging block AL1 is BAD.

Errors in the sensor block (US1 to US10)

Code	Output	Status
A 01 231 ... A 10 231	distance	BAD
	temperature	GOOD
A 01 281 ... A 10 281	distance	BAD
	temperature	BAD
W 01 281 ... W 10 281	distance	UNCERTAIN
	temperature	UNCERTAIN
W 01 501 ... W 10 501	distance	BAD
	temperature	BAD
A 01 502 ... A 10 502	distance	BAD
	temperature	BAD
W 01 521 ... W 10 521	distance	UNCERTAIN
	temperature	BAD
A 01 641 ... A 10 641	distance	BAD
	temperature	GOOD
A 01 651 ... A 10 651	distance	BAD
	temperature	GOOD
W 01 651 ... W 10 651	distance	UNCERTAIN
	temperature	GOOD
A 01 661 ... A 10 661	distance	BAD
	temperature	GOOD
W 0N 661 ... W 10 661	distance	UNCERTAIN
	temperature	GOOD
W 01 691 ... W 10 691	distance	UNCERTAIN
	temperature	GOOD
W 01 802 ... W 10 802	distance	UNCERTAIN
	temperature	GOOD

Errors in the level block (LE1 to LE10)

Code	Output	Status
A 01 604 ... A 10 604	level	BAD
W 01 601 ... W 10 601	level	BAD
W 01 611 ... W 10 611	level	BAD
A 0N 671 ... A 10 671	level	BAD

Code	Output	Status
W 0N 801 ... W 10 801	level	UNCERTAIN

Errors in the averaging and sum blocks (SL1 to SL5 and AL1 to AL5)

Code	Output	Status
A 00 820 ... A 00 832	■ sum ■ average	BAD

Note!
The output of the AI Block assumes the strongest status of all blocks connected to it. See the example in the above diagram.

10.2 Default Block Configuration

The Prosonic S contains the following function blocks. During commissioning they are linked to each other according to the required measuring task.

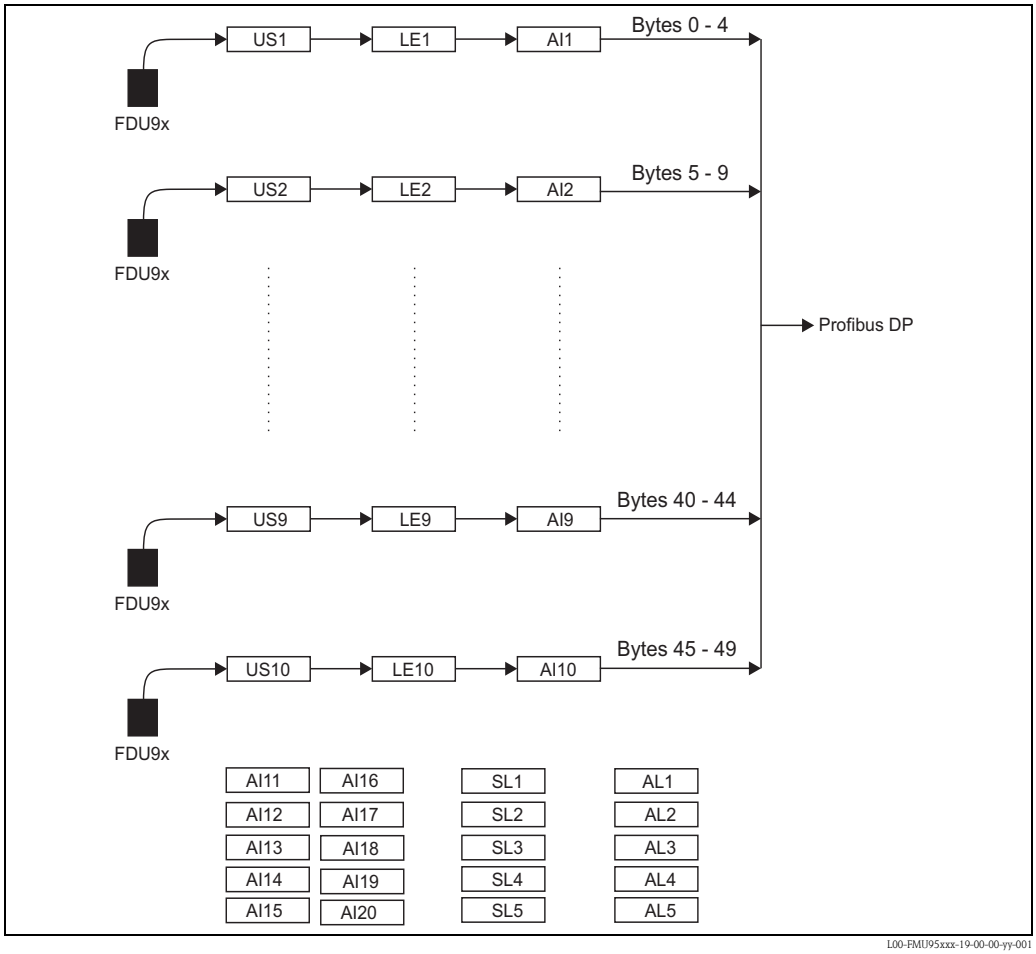
Signal inputs
- 10 Ultrasonic Sensor Blocks (US1 bis US10)

Measured value calculation
- 10 Level Blocks (LE1 bis LE10)

Signal Outputs
- 20 Analog Input Blocks (AI1 bis AI20)

Calculations
- 5 Sum Level Blocks (SL1 bis SL5)
- 5 Average Level Blocks (AL1 bis AL5)

On delivery, each sensor block is connected to a level block and an AI block. The blocks AI 11 to AI 20 as well as the Sum and Average Blocks are not connected on delivery.



10.3 Software history

Date	Software version	Changes to software	Documentation
04.2007	01.00.00	Original software	BA344F/00/en/04.07 71034224
07.2009	01.01.00	Integration of the FDU90 sensor	▪ BA344F/00/en/07.09 71100152 ▪ BA00344F/0/EN/13.12 71164423
05.2011	01.01.03	Improvement temperature plausibility	

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