



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services

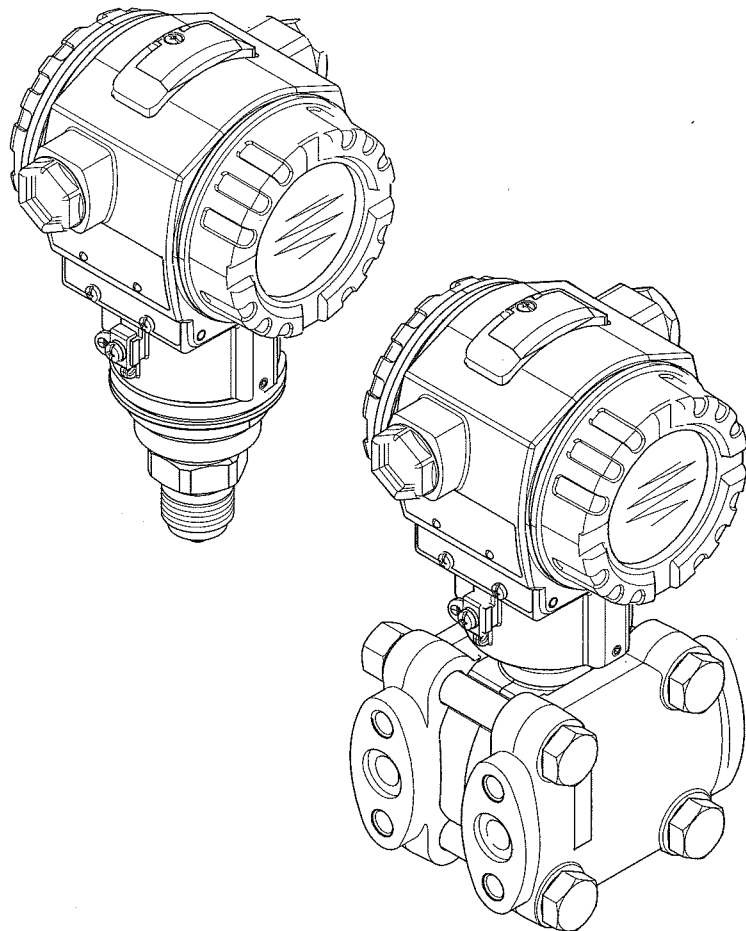


Solutions

Operating Instructions – Description of device functions

Cerabar S/Deltabar S

Pressure and Differential pressure transmitters



BA274P/00/en/05.04
52021469
gültig ab
Software-Version 02.00
Hardware-Version 02.00

Endress+Hauser 
People for Process Automation

Overview documentation

Device	Documentation	Content	Bemerkung
Cerabar S 4...20 mA HART	Technical Information TI383P	Technical data	The documentation is available on the ToF Tool CD. The CD is supplied with any device ordered with the "HistoROM module" option. (See also: www.endress.com → Download)
	Operating Instructions BA271P	<ul style="list-style-type: none"> – Identification – Installation – Wiring – Operation – Commissioning, Description of Quick Setup menus – Maintenance – Trouble-shooting and spare parts – Appendix: Illustration of menu 	The documentation is supplied with the device. (See also: www.endress.com → Download)
	Operating Instructions BA274P	<ul style="list-style-type: none"> – Examples of configuration for pressure and level measurement – Description of parameters – Trouble-shooting – Appendix: Illustration of menu 	→ See: www.endress.com → Download
	Brief Operating Instructions KA218P	<ul style="list-style-type: none"> – Wiring – Operation without on-site display – Description of Quick Setup menus – Operation HistoROM®/M-DAT 	The documentation is supplied with the device. See cover of the terminal compartment.
	Functional Safety Manual SD190P	<ul style="list-style-type: none"> – Safety function with Cerabar S – Behaviour in operation and failure – Commissioning and iterative tests – Settings – Technical safety characteristic quantities – Management Summary 	The documentation is supplied with the devices showing version "E" in feature 100 "Additional options 1" or in feature 110 "Additional options 2". → See also Technical Information TI383P, chapter "Ordering information".

Device	Documentation	Content	Bemerkung
Deltabar S 4...20 mA HART	Technical Information TI382P	Technical data	The documentation is available on the ToF Tool CD. The CD is supplied with any device ordered with the "HistoROM module" option. (See also: www.endress.com → Download)
	Operating Instructions BA270P	<ul style="list-style-type: none"> – Identification – Installation – Wiring – Operation – Commissioning, Description of Quick Setup menus – Maintenance – Trouble-shooting and spare parts – Appendix: Illustration of menu 	The documentation is supplied with the device. (See also: www.endress.com → Download)
	Operating Instructions BA274P	<ul style="list-style-type: none"> – Examples of configuration for pressure, level and flow measurement – Description of parameters – Trouble-shooting – Appendix: Illustration of menu 	→ See: www.endress.com → Download
	Brief Operating Instructions KA218P	<ul style="list-style-type: none"> – Wiring – Operation without on-site display – Description of Quick Setup menus – Operation HistoROM®/M-DAT 	The documentation is supplied with the device. See cover of the terminal compartment.
	Functional Safety Manual SD189P	<ul style="list-style-type: none"> – Safety function with Deltabar S – Behaviour in operation and failure – Commissioning and iterative tests – Settings – Technical safety characteristic quantities – Management Summary 	The documentation is supplied with the devices showing version "E" in feature 100 "Additional options 1" or in feature 110 "Additional options 2". → See also Technical Information TI382P, chapter "Ordering information".

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1 Notes on use

Section 7 describes all the parameters in order of how they appear in the menu. Sections 4 to 6 provide typical examples of configuration.

Sections 1.1 to 1.3 describe ways of finding a certain parameter description more easily.

1.1 Finding parameter description using ID numbers

Each parameter is shown on the on-site display with a unique identification number (ID). Section 2 lists all the parameters in numerical order. The page reference/link takes you to the parameter in question.

In the ToF Tool, additional parameters and, to an extent, other parameters are displayed. These parameters are not listed in section 2. You can find these parameters by means of the index. → See also section 1.3.

1.2 Finding function group using graphic representation

All the function groups are shown in table form in section 3. The page reference/link takes you to the function group in question. In section 7, all the parameters of a function group are compiled in a table.

1.3 Finding parameter description using parameter names (index)

The index lists all the parameters in alphabetical order. The page reference/link takes you to the parameter in question.

2 Finding parameter description using ID numbers

ID number	Parameter name	Description, see page
036	PREAMBLE NUMBER	91
046	ALARM STATUS	103
047	ENTER RESET CODE	100
048	INSERT PIN No	101
050	LEVEL BEFORE LIN	98
055	CUST. TAG NUMBER	92
060	PRESS. ENG. UNIT	43, 46 or 70
075	CUSTOMER UNIT P	43, 46 or 70
079	LANGUAGE	34
245	SET LRV – "Pressure" measuring mode	36 or 44
246	SET URV – "Pressure" measuring mode	37 or 44
247	DAMPING VALUE	37, 39, 41, 44, 55, 59, 68 or 73
250	SENSOR SER. No.	95
251	Pmin SENS. DAMAGE	95
252	Pmax SENS. DAMAGE	95
254	OUTPUT CURRENT	87
264	SOFTWARE VERSION	92
266	HARDWARE REV.	92
270	SIM. CURRENT	102
271	HART MESSAGE	91
272	ADDITIONAL INFO.	92
301	PRESSURE – "Pressure" measuring mode	97
	PRESSURE – "Level" measuring mode	97
	PRESSURE – "Flow" measuring mode	98
305	LONG TAG NUMBER	92
309	GET LRV	44
310	GET URV	44
311	MAX. FLOW	40 or 73
313	UNIT VOLUME – "Linear" level type	50
	UNIT VOLUME – "Pressure linearized" level type	57
	UNIT VOLUME – "Height linearized" level type	62
314	EMPTY CALIB. – QUICK SETUP	39
	EMPTY CALIB. – "Linear" level type	52
	EMPTY CALIB. – "Height linearized" level type	65
315	FULL CALIB. – QUICK SETUP	39
	FULL CALIB. – "Pressure linearized" level type	53
	FULL CALIB. – "Height linearized" level type	65
316	ADJUST DENSITY – "Linear" level type	53
	ADJUST DENSITY – "Height linearized" level type	66
	ADJUST DENSITY – "Level" extended setup	75
317	CUST. UNIT FACT. P	44, 46 or 71
318	TEMP. ENG. UNIT – "Pressure" measuring mode	74
	TEMP. ENG. UNIT – "Level" measuring mode	74
	TEMP. ENG. UNIT – "Flow" measuring mode	76
319	CALIB. OFFSET	42
323	SET. L. FL. CUT-OFF	76
329	FACT. U. U. TOTAL. 1	84
330	FACT. U. U. TOTAL. 2	85
331	RESET TOTALIZER1	84
332	Pmin ALARM WINDOW	104
333	Pmax ALARM WINDOW	105
334	Tmin ALARM WINDOW	105
335	Tmax ALARM WINDOW	105
336	ALARM DELAY	104
339	DISPLAY CONTRAST	87
342	SET MAX. ALARM	89
343	SET MIN. CURRENT	89
345	BUS ADDRESS	90

ID number	Parameter name	Description, see page
350	DEVICE DESIGN.	92
351	DEVICE TYPE, Deltabar S	90
352	CONFIG RECORDER	92
354	DEVICE SERIAL No	92
357	PCB TEMPERATURE	92
358	ALLOWED MIN. TEMP	92
359	ALLOWED MAX. TEMP	92
360	MAT. PROC. CONN. +	93
361	MAT. PROC. CONN. -	93
362	SEAL TYPE	94
363	DIP STATUS	93
365	MAT. MEMBRANE	95
366	FILLING FLUID	95
367	SENSOR TEMP.	97 or 98
368	Tmin SENSOR	95
369	Tmax SENSOR	95
370	TANK CONTENT	98
375	SUPPRESSED FLOW	98
378	MEAS. VAL. TREND	97 or 98
380	COUNTER:P > Pmax	99
382	RESET PEAKHOLD	99
383	MAX. MEAS. PRESS.	99
386	ELECTR. SERIAL No	92
388	OUTPUT FAIL MODE	88
389	MEASURING MODE	35
390	LINEAR/SQROOT	89
391	UNIT FLOW	71
392	CALIBRATION MODE - "Linear" level type	52
	CALIBRATION MODE - "Height linearized" level type	65
397	LIN. EDIT MODE	78
398	TOTALIZER 1 UNIT - "Volume p. cond." flow type	83
399	TOTALIZER 2 UNIT - "Volume p. cond." flow type	84
400	NEG. FLOW TOT. 1	84
401	ACK. ALARM MODE	103
404	COUNTER:T > Tmax	99
409	OPERATING HOURS	100
413	SIMULATION MODE	102
414	SIM. PRESSURE	102
416	NEG. FLOW TOT. 2	85
419	MENU DESCRIPTOR	86
423	ALTERNATE DATA	86
432	MANUFACTOR ID	91
434	CORRECTED PRESS. - "Pressure" measuring mode	97
	CORRECTED PRESS. - "Level" measuring mode	97
	CORRECTED PRESS. - "Flow" measuring mode	98
442	LOW FLOW CUT-OFF	76
467	COUNTER:P < Pmin	99
469	MIN. MEAS. PRESS.	99
471	MAX. MEAS. TEMP.	99
472	COUNTER:T < Tmin	99
474	MIN. MEAS. TEMP.	99
476	SIM. ERROR NO.	103
480	ALARM DISPL. TIME	104
481	HART DATE	91
482	PROC. CONN. TYPE	93
484	PRESS. SENS LOLIM	95
485	PRESS. SENS HILIM	95
487	SENS H/WARE REV	95
488	PCB COUNT:T > Tmax	99
490	PCB MAX. TEMP.	99
492	PCB COUNT:T < Tmin	99
494	PCB MIN. TEMP.	99
500	ACK. ALARM	103
549	MEASURING TABLE (display)	80
549	EDITOR TABLE, LINE-NUMB (enter values)	79

ID number	Parameter name	Description, see page
550	EDITOR TABLE, X-VAL. (enter values)	79
551	EDITOR TABLE, Y-VAL. (enter values)	79, 79
563	POS. INPUT VALUE	36, 38 or 42
564	LAST DIAG. CODE	103
570	Pmax PROC. CONN.	93
571	MASS FLOW UNIT	72
581	SENSOR MEAS.TYPE	95
584	SENSOR PRESSURE -- "Pressure" measuring mode	97
	SENSOR PRESSURE -- "Level" measuring mode	97
	SENSOR PRESSURE -- "Flow" measuring mode	98
591	MINIMUM SPAN	95
595	SELECT ALARMTYPE	104
597	ALT. CURR. OUTPUT	89
600	SELECT ALARMTYPE	104
603	RESET ALL ALARMS	104
607	CUST. UNIT FACT. V -- "Linear" level type	51
	CUST. UNIT FACT. V -- "Pressure linearized" level type	57
	CUST. UNIT FACT. V -- "Height linearized" level type	63
608	CUSTOMER UNIT V -- "Linear" level type	50
	CUSTOMER UNIT V -- "Pressure linearized" level type	57
	CUSTOMER UNIT V -- "Height linearized" level type	63
609	CUST. UNIT FACT. F	73
610	CUSTOMER UNIT F	72
627	TOT. 1 USER UNIT	84
628	TOT. 2 USER UNIT	85
634	MAX PRESS. FLOW	40 or 73
637	SET LRV -- "Flow" extended setup	76
638	SET URV -- "Flow" extended setup	77
639	SIM.FLOW VALUE	102
640	FLOW-MEAS. TYPE	71
652	TOTALIZER 1	98
655	TOTAL. 1 OVERFLOW	99
657	TOTALIZER 2	99
658	TOTAL. 2 OVERFLOW	99
660	STD. FLOW UNIT	72
661	NORM FLOW UNIT	71
662	TOTALIZER 1 UNIT -- "Mass p. cond." flow type	83
663	TOTALIZER 2 UNIT -- "Mass p. cond." flow type	84
664	TOTALIZER 1 UNIT -- "Gas. std. conditions" flow type	83
665	TOTALIZER 2 UNIT -- "Gas. std. conditions" flow type	84
666	TOTALIZER 1 UNIT -- "Gas. norm conditions" flow type	83
667	TOTALIZER 2 UNIT -- "Gas. norm conditions" flow type	84
679	MEASURED VALUE -- "Pressure"	96
	MEASURED VALUE -- "Level"	97
	MEASURED VALUE -- "Flow"	98
685	POS. ZERO ADJUST	36, 38, 40 or 41
688	MAIN DATA FORMAT	86
694	CURR. CHARACT. -- "Pressure"	88
695	CURR. CHARACT. -- "Flow"	88
696	CURR. CHARACT. -- "Height"	88
699	DEVICE REVISION	91
703	CUST. UNIT FACT. M -- "Linear" level type	52
	CUST. UNIT FACT. M -- "Pressure linearized" level type	58
	CUST. UNIT FACT. M -- "Height linearized" level type	64
704	CUSTOMER UNIT M -- "Linear" level type	51
	CUSTOMER UNIT M -- "Pressure linearized" level type	58
	CUSTOMER UNIT M -- "Height linearized" level type	64
705	CUST. UNIT FACT. H -- "Linear" level type	50, 54
	CUST. UNIT FACT. H -- "Height linearized" level type	62, 67
706	CUSTOMER UNIT H -- "Linear" level type	49, 54
	CUSTOMER UNIT H -- "Height linearized" level type	62, 67
708	HEIGHT UNIT -- "Linear" level type	49, 54
	HEIGHT UNIT -- "Height linearized" level type	61, 66
709	MASS UNIT -- "Linear" level type	51
	MASS UNIT -- "Pressure linearized" level type	58
	MASS UNIT -- "Height linearized" level type	63

ID number	Parameter name	Description, see page
710	EMPTY PRESSURE – "Linear" level type	52
	EMPTY PRESSURE – "Height linearized" level type	65
711	FULL PRESSURE – "Linear" level type	53
	FULL PRESSURE – "Height linearized" level type	65
712	LEVEL MAX	64
713	TANK CONTENT MAX	78
714	SIM. LEVEL	102
715	SIM. TANK CONT.	102
717	MEASURING TABLE (selection)	80
718	LEVEL MODE	47
719	SET LRV – "Level" basic setup	55
720	SET URV – "Level" basic setup	55
755	LEVEL MIN	64
759	TANK CONTENT MIN	78
760	ASSIGN CURRENT	89
761	HYDR. PRESS MAX.	59
762	SET LRV – "Level" extended setup	75
763	SET URV – "Level" extended setup	75
764	CURR. CHARACTER. – "Tank content"	
770	EDITOR TABLE (continue entry)	79
775	HYDR. PRESS MIN.	58
802	DEVICE TYPE, Cerabar S	90
804	LIN. MEASURAND	49
805	LINd. MEASURAND	57
806	COMB. MEASURAND	61
808	TABLE SELECTION	78
809	EDITOR TABLE (select table)	79
810	ADJUSTED DENSITY – "Linear" level type	53
	ADJUSTED DENSITY – "Height linearized" level type	65
811	PROCESS DENSITY	75
812	DENSITY UNIT – "Linear" level type	53
	DENSITY UNIT – "Height linearized" level type	66
813	100% POINT – "Linear" level type	54
	100% POINT – "Height linearized" level type	67
814	ZERO POSITION – "Linear" level type	55
	ZERO POSITION – "Height linearized" level type	68
815	TANK DESCRIPTION	80
831	HistoROM AVAIL.	101
832	HistoROM CONTROL	101
836	SAFETY LOCKSTATE SAFETY LOCK	See ¹
838	SAFETY PASSWORD	See ¹
841	DIGIT SETS	See ¹
844	ACK. ALARM MODE	See ¹
845	MEASURING MODE	See ¹
847	CALIB. OFFSET	See ¹
848	MAX. FLOW	See ¹
849	MAX PRESS. FLOW	See ¹
850	LOW FLOW CUT-OFF	See ¹
851	SET. L. FL. CUT-OFF	See ¹
852	SET LRV	See ¹
853	SET URV	See ¹
854	LINEAR/SOROOT.	See ¹
855	DAMPING VALUE	See ¹
856	CONF. PASSWORD	See ¹
858	TANK VOLUME	53
859	TANK HEIGHT	53
875	CURRENT OUTPUT	See ¹

1) See Safety Manual SD189P for Deltabar S and SD190P for Cerabar S.

3 Graphic representation of function groups



Note!

The "Flow" measuring mode is only available for the Deltabar S differential pressure transmitter. The groups marked with "*" are only displayed for Deltabar S.

1st selection level	2nd selection level (groups)	Function groups	Description, see page
LANGUAGE	LANGUAGE (079)	→	34
MEASURING MODE	MEASURING MODE (389)	→	35
QUICK SETUP pressure		→	35
QUICK SETUP level		→	37
QUICK SETUP flow *		→	39
OPERATING MENU (555)	→ SETTINGS (557)	→ POSITION ADJUSTMENT	→ 41
		→ BASIC SETUP pressure	→ 43
		→ BASIC SETUP level	→ 45
		→ BASIC SETUP flow *	→ 69
		→ EXTENDED SETUP pressure	→ 74
		→ EXTENDED SETUP level	→ 74
		→ EXTENDED SETUP flow *	→ 76
		→ LINEARISATION – on-site display	→ 77
		→ LINEARISATION – ToF Tool, HART handheld terminal	→ 80
		→ TOTALIZER SETUP *	→ 83
	→ SAFETY CONFIRM.		→ See ¹
	→ DISPLAY (558)		→ 86
	→ OUTPUT (559)		→ 87
	→ TRANSMITTER INFO (560)	→ HART DATA	→ 90
		→ TRANSMITTER DATA	→ 92
		→ PROCESS CONNECTION	→ 93
		→ SENSOR DATA	→ 95
	→ PROCESSINFO (561)	→ PROCESS VALUES pressure	→ 96
		→ PROCESS VALUES level	→ 97
		→ PROCESS VALUES flow*	→ 98
		→ PEAK HOLD INDICATOR	→ 99
	→ OPERATING		→ 100
	→ DIAGNOSTICS (562)	→ SIMULATION	→ 102
		→ MESSAGES	→ 103
		→ USER LIMITS	→ 104

1) See Safety Manual SD189P for Deltabar S and SD190P for Cerabar S.

4 Pressure measurement

4.1 Calibration with reference pressure

Example:

In this example, a device with a 500 mbar sensor is configured for the 0...+300 mbar measuring range, i.e. 0 mbar and 300 mbar are assigned to the 4 mA value and 20 mA value respectively.

Prerequisite:

- The pressure values 0 mbar and 300 mbar can be specified. The device is already installed, for example.



Note!

- See also Operating Instructions BA270P Deltabar S, section 6.6 "Differential pressure measurement" or Operating Instructions BA271P Cerabar S, section 6.4 "Pressure measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 43, table 7: BASIC SETUP.
- For a description of further relevant parameters, see
 - Page 74, table 13: EXTENDED SETUP
 - Page 96, table 25: PROCESS VALUES.

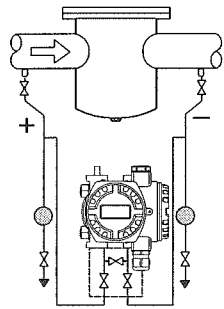
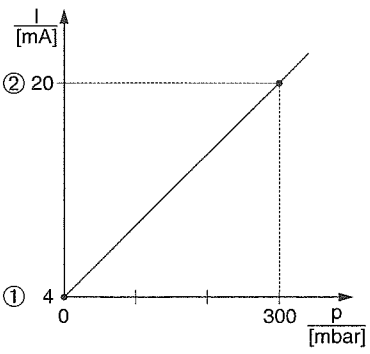
	Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA270P, section 6.6.	 <p>P01-PM075xxx-10-xx-xx-xx-000</p>
2	Carry out position adjustment if necessary. See page 41, table 6: POSITION ADJUSTMENT.	
3	If necessary, select the "Pressure" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, HART handheld terminal: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	
6	The pressure for the lower range value (4 mA value) is present at the device, here 0 mbar for example. Select GET LRV parameter. Confirm value present. The pressure value present is assigned to the lower current value (4 mA).	
		 <p>P01-xxxxxx-05-xx-xx-xx-010</p>

Fig. 1: Calibration with reference pressure

- 1 See table, step 6.
2 See table, step 7.

Description	
7	The pressure for the upper range value (20 mA value) is present at the device, here 300 mbar for example.
	Select GET URV parameter.
	Confirm value present. The pressure value present is assigned to the upper current value (20 mA).
8	Result: The measuring range is set for 0...+300 mbar.



Note!

- You can also specify a customer-specific unit. See parameter description for PRESS. ENG. UNIT (→ Page 43).

4.2 Calibration without reference pressure

Example:

In this example, a device with a 400 mbar sensor is configured for the 0...+300 mbar measuring range, i.e. 0 mbar and 300 mbar are assigned to the 4 mA value and 20 mA value respectively.

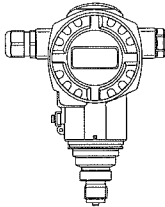
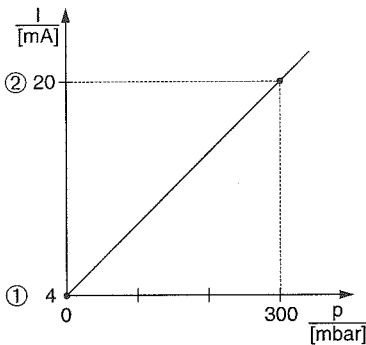
Prerequisite:

- This is a theoretical calibration, i.e. the pressure values for the lower range and upper range value are known.



Note!

- See also Operating Instructions BA270P Deltabar S, section 6.6 "Differential pressure measurement" or Operating Instructions BA271P Cerabar S, section 6.4 "Pressure measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 43, table 7: BASIC SETUP.
- For a description of further relevant parameters, see
 - Page 74, table 13: EXTENDED SETUP
 - Page 96, table 25: PROCESS VALUES.

	Description	
1	Carry out position adjustment if necessary. See page 41, table 6: POSITION ADJUSTMENT.	 <p>P01-PMP71xxx-19-xx-xx-xx-000</p>  <p>P01-XXXXXXXX-05-xx-xx-xx-010</p> <p>Fig. 2: Calibration without reference pressure</p> <p>1 See table, step 5. 2 See table, step 6.</p>
2	If necessary, select the "Pressure" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, HART handheld terminal: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
3	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	
4	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	
5	Select SET LRV parameter. Enter value, here 0 mbar, for the SET LRV parameter and confirm. This pressure value is assigned to the lower current value (4 mA).	
6	Select SET URV parameter. Enter value, here 300 mbar, for the SET URV parameter and confirm. This pressure value is assigned to the upper current value (20 mA).	
7	Result: The measuring range is set for 0...+300 mbar.	



Note!

- You can also perform calibration without reference pressure by means of the QUICK SETUP menu. → See page 35 ff, table 3: QUICK SETUP menu.
- You can also specify a customer-specific unit. See parameter description for PRESS. ENG. UNIT (→ Page 43).

5 Level measurement

5.1 Overview of level measurement

Measuring task	Measured variable selection	LEVEL MODE	Description	Measured value display
The measured variable is in direct proportion to the measured pressure.	<ul style="list-style-type: none"> – % (level) – Level – Volume – Mass 	Linear	<ul style="list-style-type: none"> – Calibration with reference pressure – wet calibration, see page 16, section 5.2.1 – Calibration without reference pressure – dry calibration, see page 18, section 5.2.2 	The measured value display and the LEVEL BEFORE LIN parameter display the measured value.
The measured variable is not in direct proportion to the measured pressure as, for example, with containers with a conical outlet. A linearisation table must be entered for the calibration.	<ul style="list-style-type: none"> – Pressure and % – Pressure and volume – Pressure and mass 	Pressure linearized	<ul style="list-style-type: none"> – Calibration with reference pressure: semiautomatic entry of linearisation table, see page 20, section 5.3.1 – Calibration without reference pressure: manual entry of linearisation table, see page 22, section 5.3.2 	The measured value display and the TANK CONTENT parameter display the measured value.
<ul style="list-style-type: none"> – Two measured variables are required or – The container shape is given by value pairs, such as height and volume. <p>The 1st measured variable %-height or height must be in direct proportion to the measured pressure. The 2nd measured variable volume, mass or % must not be in direct proportion to the measured pressure. A linearisation table must be entered for the 2nd measured variable. The 2nd measured variable is assigned to the 1st measured variable by means of this table.</p>	<ul style="list-style-type: none"> – Height and volume – Height and mass – Height and % – %-height and volume – %-height and mass – %-height and % 	Height linearized	<ul style="list-style-type: none"> – Calibration with reference pressure: wet calibration and semiautomatic entry of linearisation table, see page 24, section 5.4.1 – Calibration without reference pressure: dry calibration and manual entry of linearisation table, see page 28, section 5.4.2 	<p>The measured value display and the TANK CONTENT parameter display the 2nd measured value (volume, mass or %).</p> <p>The LEVEL BEFORE LIN parameter displays the 1st measured value (%-height or height).</p>

5.2 "Linear" level type

5.2.1 Calibration with reference pressure – wet calibration

Example:

In this example, the level in a tank should be measured in m³. The maximum level is 3 m. The pressure range is set to 0 to 300 mbar.

Prerequisite:

- The measured variable is in direct proportion to the pressure.
- The tank can be filled or emptied.



Note!

- See also Operating Instructions BA270P Deltabar S or Operating Instructions BA271P Cerabar S, section 6.5 "Level measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 45, table 8: BASIC SETUP
 - Page 49, table 9: BASIC SETUP – "Linear" level type.
- For a description of further relevant parameters, see
 - Page 74, table 14: EXTENDED SETUP
 - Page 97, table 26: PROCESS VALUES.

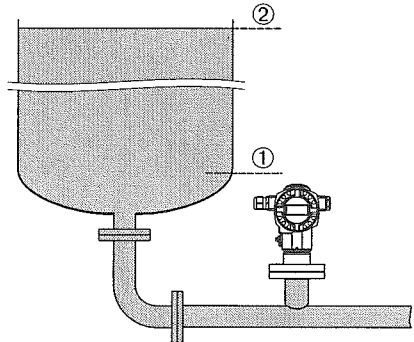
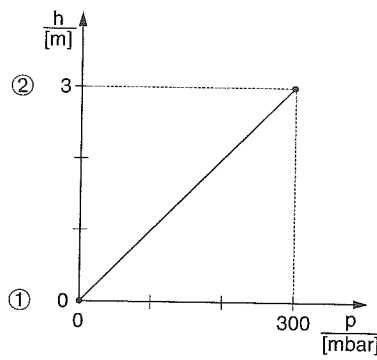
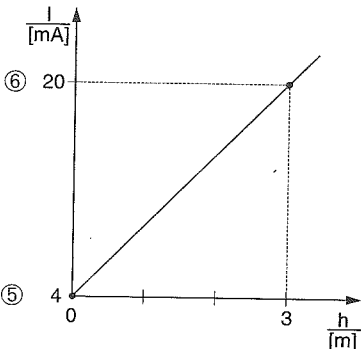
	Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA270P, section 6.5.1	 <p style="text-align: right; font-size: small;">P01-PMF75xxx-10-xx-xx-xx-000</p>
2	Carry out position adjustment if necessary. See page 41, table 18: POSITION ADJUSTMENT.	
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, HART handheld terminal Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	

Fig. 3: Calibration with reference pressure – wet calibration

- 1 See table, step 10.
2 See table, step 11.

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	Description	
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	 <p>PO1-XXXXXXXX-05-XX-XX-XX-011</p>
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	
6	Select the "Linear" option by means of the LEVEL MODE parameter.	
7	Select the "Level" option by means of the LIN. MEASURAND parameter.	
8	Select a level unit via the HEIGHT UNIT parameter, here m for example.	
9	Select the "Wet" option by means of the CALIBRATION MODE parameter.	 <p>PO1-XXXXXXXX-05-XX-XX-XX-014</p>
10	The pressure for the lower calibration point is present at the device, here 0 mbar for example. Select EMPTY CALIB. parameter. Enter the level value, here 0 m for example. Confirm the value to assign the pressure value present to the lower level value.	
11	The pressure for the upper calibration point is present at the device, here 300 mbar for example. Select FULL CALIB. parameter. Enter the level value, here 3 m for example. Confirm the value to assign the pressure value present to the upper level value.	
12	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.	
13	Set the value for the upper current value (20 mA) by means of the SET URV parameter.	
14	Result: The measuring range is set for 0...3 m.	<p>Fig. 4: Calibration with reference pressure – wet calibration</p> <p>1 See table, step 10. 2 See table, step 11. 3 See table, step 12. 4 See table, step 13.</p>



Note!

1. You can also perform calibration with reference pressure by means of the QUICK SETUP menu. → See page 37 ff, table 4: QUICK SETUP menu.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 46), HEIGHT UNIT (→ Page 49), UNIT VOLUME (→ Page 50) and MASS UNIT (→ Page 51).
3. For this level type, the measured variables %, level, volume and mass are available. → See Page 49 ff.
4. The EMPTY PRESSURE (→ Page 52) and FULL PRESSURE (→ Page 53) parameters display the pressure values belonging to the EMPTY CALIB. and FULL CALIB. parameters.

5.2.2 Calibration without reference pressure – dry calibration

Example:

In this example, the volume in a tank should be measured in m³. The maximum volume is 5 m³ and the maximum height 4 m. The density of the fluid is 1 kg/dm³. The device is mounted below the level lower range value.

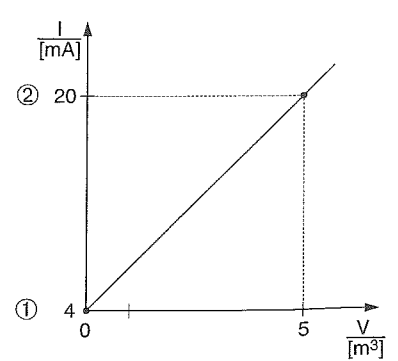
Prerequisite:

- The measured variable is in direct proportion to the pressure.
- This is a theoretical calibration, i.e. the tank volume, tank height and density of the fluid are known.

Note!

- See also Operating Instructions BA270P Deltabar S or Operating Instructions BA271P Cerabar S, section 6.5 "Level measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 45, table 8: BASIC SETUP
 - Page 49, table 9: BASIC SETUP – "Linear" level type.
- For a description of further relevant parameters, see
 - Page 74, table 14: EXTENDED SETUP
 - Page 97, table 26: PROCESS VALUES.

	Description	
1	Carry out position adjustment if necessary. See page 41, table 6: POSITION ADJUSTMENT.	<p style="text-align: right;">P01-PMP75xxx-10-xx-xx-xx-003</p>
2	Select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, HART handheld terminal: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
3	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	
		<p>Fig. 5: Calibration without reference pressure – dry calibration</p> <p>1 See table, step 9. 2 See table, step 10. 3 See table, step 11. 4 See table, step 12.</p>

	Description	
4	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	 <p>Fig. 6: Current output calibration</p> <p>5 See table, step 13. 6 See table, step 14.</p>
5	Select the "Linear" option by means of the LEVEL MODE parameter.	
6	Select the "Volume" option by means of the LIN. MEASURAND parameter.	
7	Select a volume unit via the UNIT VOLUME parameter, here m ³ for example.	
8	Select the "Dry" option by means of the CALIBRATION MODE parameter. See also the following note, point 3.	
9	Enter the value for density via the ADJUST DENSITY parameter, here 1 kg/dm ³ for example.	
10	Enter the tank volume via the TANK VOLUME parameter, here 5 m ³ for example.	
11	Enter the tank height via the TANK HEIGHT parameter, here 4 m for example.	
12	Enter the level offset via the ZERO POSITION parameter, here -0.5 m for example.	
13	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.	
14	Set the value for the upper current value (20 mA) by means of the SET URV parameter.	
15	Result: The measuring range is set for 0...5 m ³ .	



Note!

- For this level type, the measured variables %, level, volume and mass are available.
→ See page 49 ff.
- You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 46), HEIGHT UNIT (→ Page 49), UNIT VOLUME (→ Page 50) and MASS UNIT (→ Page 51).
- A level value is assigned to the lower and upper current value by means of the SET LRV (→ Page 55) and SET URV (→ Page 55) parameters respectively. Once you have selected the "Dry" calibration mode, the error message A711 "LRV or URV out of edit limits" can appear. The error message goes out as soon as level values which are within the editing limits are entered for the SET LRV and SET URV parameters.
By means of the ENTER RESET CODE parameter (→ Page 100), you can use the code 2710 to automatically set the SET LRV and SET URV parameters to level values which are within the editing limits.

5.3 "Pressure linearized" level type

5.3.1 Semiautomatic entry of the linearisation table

Example:

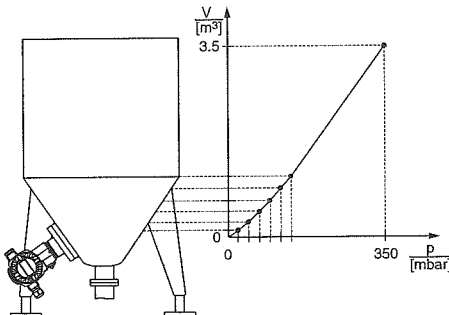
In this example, the volume in a tank with a conical outlet should be measured in m^3 .

Prerequisite:

- The tank can be filled. The linearisation characteristic must rise continuously.

Note!

- See also Operating Instructions BA270P Deltabar S or Operating Instructions BA271P Cerabar S, section 6.5 "Level measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 45, table 8: BASIC SETUP
 - Page 56, table 10: BASIC SETUP – "Pressure linearized" level type
 - Page 77, table 16: LINEARISATION – on-site operation
 - Page 80, table 17: LINEARISATION – ToF Tool, HART handheld terminal.
- For a description of further relevant parameters, see
 - Page 74, table 14: EXTENDED SETUP
 - Page 97, table 26: PROCESS VALUES.

	Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA270P, section 6.5.1.	 <p>P01-PMF75xxx-10-xx-xx-xx-002</p>
2	Carry out position adjustment if necessary. See page 41, table 18: POSITION ADJUSTMENT.	
Carry out basic setup:		
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, HART handheld terminal: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	
6	Select the "Pressure linearized" option by means of the LEVEL MODE parameter. See also the following note, point 3.	
7	Select the "Volume" option by means of the LIND. MEASURAND parameter.	
8	Select a volume unit via the UNIT VOLUME parameter, here m³ for example.	
9	Select HYDR. PRESS MIN. parameter. Enter the minimum hydrostatic pressure to be expected, here 0 mbar for example.	

Description	
10	Select HYDR. PRESS MAX . Enter the maximum hydrostatic pressure to be expected.
Carry out linearisation:	
11	Change the function group: Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION
12	Select TANK CONTENT MIN parameter. Specify the minimum tank contents to be expected, here 0 m ³ for example.
13	Select TANK CONTENT MAX parameter. Specify the maximum tank contents to be expected, here 3.5 m ³ for example.
14	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.
15	Select the "Semiautomatic" option by means of the LIN. EDIT MODE parameter.
16	Select the "New table" option by means of the EDITOR TABLE parameter.
17	Enter linearisation table (min. 2 points, max. 32 points). Fill the tank to the height of the 1st point. LINE-NUMB: confirm value displayed. X-VAL.: the hydrostatic pressure present is displayed. On-site display, ToF Tool: The X-VAL. displayed is saved by confirming the Y-value. See following line, Y-VAL. HART handheld terminal: Confirm X-VAL. displayed. Y-VAL.: enter the volume value, here 0 m ³ for example, and confirm the value.
18	On-site display: If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 17. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. ToF Tool, HART handheld terminal: You can enter further points for the linearisation table as explained in step 17. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.
19	Result: The linearisation table has been entered.

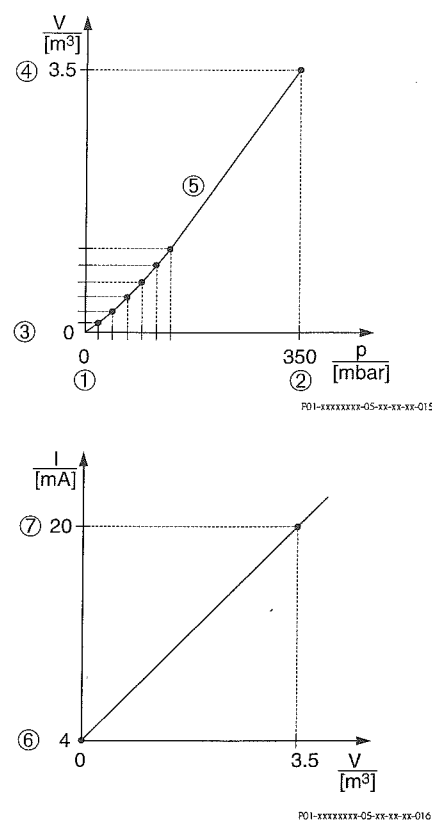


Fig. 7: Semiautomatic entry of the linearisation table

- 1 See table, step 9.
- 2 See table, step 10.
- 3 See table, step 12.
- 4 See table, step 13.
- 5 See table, steps 14 – 18.
- 6 See the following note, point 4.
- 7 See the following note, point 4



Note!

1. For this level type, the measured variables %, volume and mass are available.
→ See page 56 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 46), HEIGHT UNIT (→ Page 57), UNIT VOLUME (→ Page 57) and MASS UNIT (→ Page 58).

3. Once you have selected the "Pressure linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, page 95). The message goes out as soon as the highest X-VAL. is larger than the minimum span.
4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 75) and SET URV (→ Page 75) parameters. If you enter values for TANK CONTENT MIN (→ Page 78 or 81) and TANK CONTENT MAX (→ Page 78 or 81), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5.3.2 Manual entry of the linearisation table

Example:

In this example, the volume in a tank with a conical outlet should be measured in m³.

Prerequisite:

- This is a theoretical calibration, i.e. the points for the linearisation table are known.



Note!

- See also Operating Instructions BA270P Deltabar S or Operating Instructions BA271P Cerabar S, section 6.5 "Level measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 45, table 8: BASIC SETUP
 - Page 56, table 10: BASIC SETUP – "Pressure linearized" level type
 - Page 77, table 16: LINEARISATION – on-site operation
 - Page 80, table 17: LINEARISATION – ToF Tool, HART handheld terminal.
- For a description of further relevant parameters, see
 - Page 74, table 14: EXTENDED SETUP
 - Page 97, table 26: PROCESS VALUES.

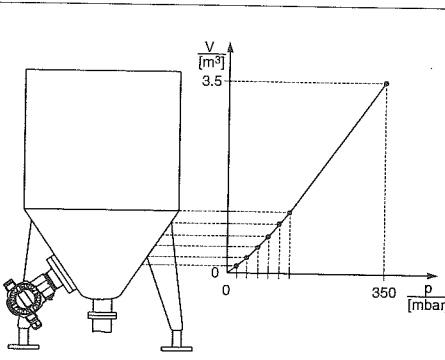
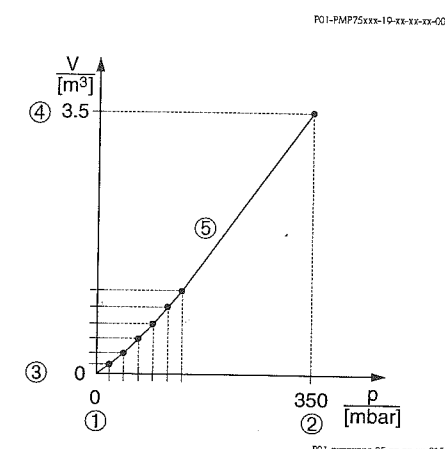
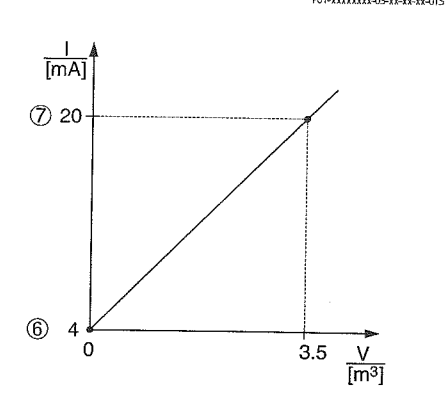
	Description	
1	Perform basic setup as per section 5.3.1, steps 2 to 10.	 <p>P01-PMP75xx-10-xx-xx-xx-002</p>
	Carry out linearisation:	
2	Change the function group: Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION	
3	Select TANK CONTENT MIN parameter . Specify the minimum tank contents to be expected, here 0 m³ for example.	
4	Select TANK CONTENT MAX parameter . Specify the maximum tank contents to be expected, here 3.5 m³ for example.	
5	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.	 <p>P01-xxxxxxx-05-xx-xx-xx-015</p>
6	Select the "Manual" option by means of the LIN. EDIT MODE parameter.	
7	Select the "New table" option by means of the EDITOR TABLE parameter.	
8	Enter linearisation table (min. 2 points, max. 32 points). LINE-NUMB: confirm value displayed. X-VAL.: enter the pressure value and confirm. Y-VAL.: enter the volume value, here 0 m³ for example, and confirm.	
9	On-site display If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 8. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. ToF Tool, HART handheld terminal: You can enter further points for the linearisation table as explained in step 8. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.	
10	Result: The linearisation table has been entered.	 <p>P01-xxxxxxx-05-xx-xx-xx-016</p>

Fig. 8: Manual entry of the linearisation table

- 1 See section 5.3.1, table, step 9.
- 2 See section 5.3.1, table, step 10.
- 3 See table, step 3.
- 4 See table, step 4.
- 5 See table, steps 5 – 9.
- 6 See the following note, point 4.
- 7 See the following note, point 4.

**Note!**

1. For this level type, the measured variables %, volume and mass are available.
→ See page 56 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 46), HEIGHT UNIT (→ Page 57), UNIT VOLUME (→ Page 57) and MASS UNIT (→ Page 58).

3. Once you have selected the "Pressure linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, page 95). The message goes out as soon as the highest X-VAL. is larger than the minimum span.
4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 75) and SET URV (→ Page 75) parameters. If you enter values for TANK CONTENT MIN (→ Page 78 or 81) and TANK CONTENT MAX (→ Page 78 or 81), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5.4 "Height linearized" level type

5.4.1 Wet calibration and semiautomatic entry of the linearisation table

Example:

In this example, the height and the volume should be measured at the same time.

Prerequisite:

- The tank can be filled. The linearisation characteristic must rise continuously.



Note!

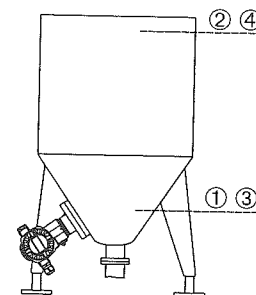
- See also Operating Instructions BA270P Deltabar S or Operating Instructions BA271P Cerabar S, section 6.5 "Level measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 45, table 8: BASIC SETUP
 - Page 61, table 11: BASIC SETUP – "Height linearized" level type
 - Page 77, table 16: LINEARISATION – on-site operation
 - Page 80, table 17: LINEARISATION – ToF Tool, HART handheld terminal.
- For a description of further parameters, see
 - Page 74, table 14: EXTENDED SETUP
 - Page 97, table 26: PROCESS VALUES.

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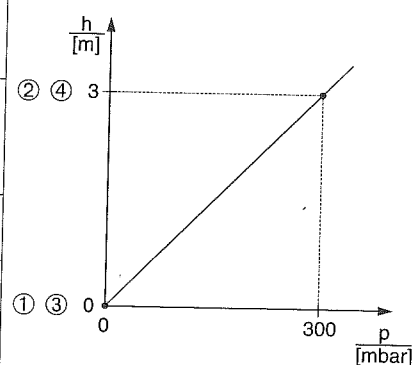
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Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA270P, section 6.5.1
2	Carry out position adjustment if necessary. See Page 41, table 6: POSITION ADJUSTMENT.
Perform calibration for the 1st measured variable:	
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, HART handheld terminal: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
6	Select the "Height linearized" option by means of the LEVEL MODE parameter.
7	Select the "Height + volume" option by means of the COMB. MEASURAND parameter.
8	Select the unit for the 1st measured value via the HEIGHT UNIT parameter, here m for example.
9	Select the unit for the 2nd measured variable via the UNIT VOLUME parameter, here m ³ for example.
10	Select LEVEL MIN parameter. Enter the minimum level to be expected, here 0 m for example.
11	Select LEVEL MAX parameter. Enter the maximum level to be expected, here 3 m for example.
12	Select the "Wet" option via the CALIBRATION MODE parameter (calibration mode for the 1st measured variable).
13	The pressure for the lower calibration point is present at the device, here 0 mbar for example. Select EMPTY CALIB. parameter. Enter the level value, here 0 m for example. Confirm the value to assign the pressure value present to the lower level value.
14	The pressure for the upper calibration point is present at the device, here 300 mbar for example. Select FULL CALIB. parameter. Enter the level value, here 3 m for example. Confirm the value to assign the pressure value present to the upper level value.



P01-PMP75xxx-10-xx-xx-xx-004



P01-xxxxxxx-05-xx-xx-xx-017

Fig. 9: Calibrating the 1st measured variable

- 1 See table, step 10.
- 2 See table, step 11.
- 3 See table, step 13.
- 4 See Table, step 14.

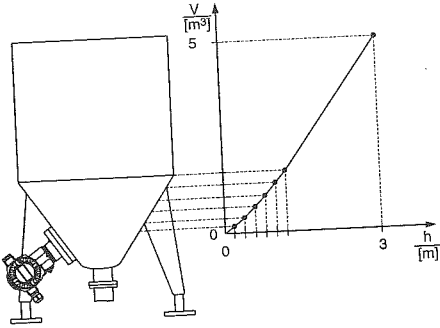
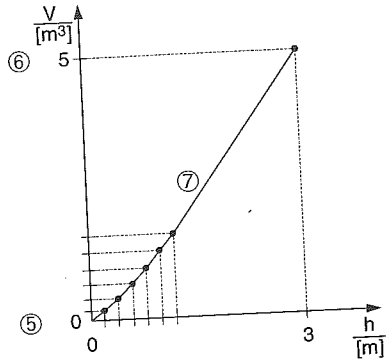
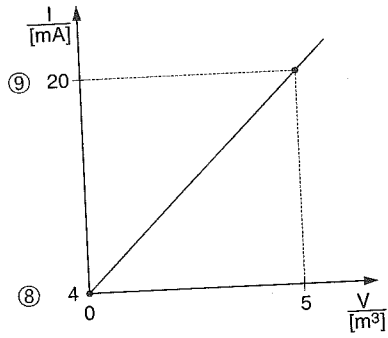
	Description	
15	Result: The calibration for the 1st measured variable is carried out.	 <p>PO1-PMP75xxx-10-xx-xx-xx-005</p>
Perform linearisation (calibration for the 2nd measured variable)		
16	Change the function group. Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION	
17	Select TANK CONTENT MIN parameter. Specify the minimum tank contents to be expected, here 0 m³ for example.	
18	Select TANK CONTENT MAX parameter. Specify the maximum tank contents to be expected, here 5 m³ for example.	
19	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.	 <p>PO1-xxxxxxx-05-xx-xx-xx-018</p>
20	Select the "Semiautomatic" option by means of the LIN. EDIT MODE parameter.	
21	Select the "New table" option by means of the EDITOR TABLE parameter.	
22	Enter linearisation table (min. 2 points, max. 32 points). Fill the tank to the height of the 1st point. LINE-NUMB: confirm value displayed. X-VAL.: the hydrostatic pressure present is measured and converted to the corresponding level and displayed. On-site display, ToF Tool: The X-VAL. displayed is saved by confirming the Y-value. See following line, Y-VAL. HART handheld terminal: Confirm X-VAL. displayed. Y-VAL.: enter the volume value, here 0 m³ for example, and confirm the value.	
23	On-site display If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 22. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. ToF Tool, HART handheld terminal: You can enter further points for the linearisation table as explained in step 22. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.	
24	Result: - The linearisation table has been entered. - The measured value display and the TANK CONTENT parameter display the 2nd measured value (here the volume). - The LEVEL BEFORE LIN parameter displays the 1st measured value (here the height). See also the following note, point 5.	 <p>PO1-xxxxxxx-05-xx-xx-xx-019</p>

Fig. 10: Calibrating the 2nd measured variable

5 See table, step 17.
6 See table, step 18.
7 See table, steps 19 – 23.
8 See the following note, point 4.
9 See the following note, point 4.

Fig. 10: Calibrating the 2nd measured variable

- 5 See table, step 17.
6 See table, step 18.
7 See table, steps 19 – 23.
8 See the following note, point 4.
9 See the following note, point 4.



Note!

- For this level type, the measured variables "height + %", "height + volume", "height + mass", "%-height + %", "%-height + volume" and "%-height + mass" are available. → See page 57 ff.

2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 46), HEIGHT UNIT (→ Page 61), UNIT VOLUME (→ Page 62) and MASS UNIT (→ Page 63).
3. Once you have selected the "Pressure linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, page 95). The message goes out as soon as the highest X-VAL. is larger than the minimum span.
4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 75) and SET URV (→ Page 75) parameters.
You can use the ASSIGN CURRENT parameter (→ Page 89) to specify whether the current output should depict the 1st or 2nd measured variable. Depending on the setting of the ASSIGN CURRENT parameter, enter the following values for SET LRV and SET URV:
 - ASSIGN CURRENT = tank content (factory setting) ⇒ %-value, volume value or mass value
 - ASSIGNMENT = height ⇒ level value

The following applies for the setting ASSIGN CURRENT "Tank content":

If you enter values for TANK CONTENT MIN (→ Page 78 or 81) and TANK CONTENT MAX (→ Page 78 or 81), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

The following applies for the setting ASSIGN CURRENT "Height":

If you enter values for LEVEL MIN (→ Page 64) and LEVEL MAX (→ Page 64), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for LEVEL MIN and LEVEL MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5. You can use the MENU DESCRIPTOR parameter (→ Page 86) to specify which measured value should be displayed on the on-site display.

5.4.2 Dry calibration and manual entry of the linearisation table

Example:

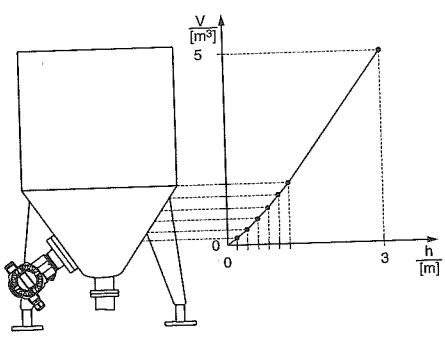
In this example, the height and the volume should be measured at the same time.

Prerequisite:

- This is a theoretical calibration, i.e. the points for the linearisation table are known.

Note!

- See also Operating Instructions BA270P Deltabar S or Operating Instructions BA271P Cerabar S, section 6.5 "Level measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 45, table 8: BASIC SETUP
 - Page 61, table 11: BASIC SETUP – "Height linearized" level type
 - Page 77, table 16: LINEARISATION – on-site operation
 - Page 80, table 17: LINEARISATION – ToF Tool, HART handheld terminal.
- For a description of further parameters, see
 - Page 74, table 14: EXTENDED SETUP
 - Page 97, table 26: PROCESS VALUES.

	Description	
Perform calibration for the 1st measured variable:		
1	Perform calibration as per section 5.4.1, steps 2 to 11.	
2	Select the "Dry" option via the CALIBRATION MODE parameter (calibration mode for the 1st measured variable).	
3	Enter the density of the fluid via the ADJUST DENSITY parameter, here 1 kg/dm³ for example.	
4	If necessary, enter a level offset via the ZERO POSITION parameter, here 0 m for example.	
5	Result: The calibration for the 1st measured variable is carried out.	<p>P01-PMP75xxx-10-xx-xx-xx-005</p>

	Description	
Perform linearisation (calibration for the 2nd measured variable)		
6	Change the function group. Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION	
7	Select TANK CONTENT MIN parameter. Specify the minimum tank contents to be expected, here 0 m³ for example.	
8	Select TANK CONTENT MAX parameter. Specify the maximum tank contents to be expected, here 5 m³ for example.	
9	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.	
10	Select the "Manual" option by means of the LIN. EDIT MODE parameter.	
11	Select the "New table" option by means of the EDITOR TABLE parameter.	
12	Enter linearisation table (min. 2 points, max. 32 points). LINE-NUMB: confirm value displayed. X-VAL.: enter the height value and confirm. Y-VAL.: enter the volume value, here 0 m³ for example, and confirm.	
13	On-site display If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 12. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. ToF Tool, HART handheld terminal: You can enter further points for the linearisation table as explained in step 12. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.	
14	Result: - The linearisation table has been entered. - The measured value display and the TANK CONTENT parameter display the 2nd measured value (here the volume). - The LEVEL BEFORE LIN parameter displays the 1st measured value (here the height). See also the following note, point 5.	<p>Fig. 11: Calibrating the 2nd measured variable</p> <p>5 See table, step 7. 6 See table, step 8. 7 See table, steps 9 – 13. 8 See the following note, point 4. 9 See the following note, point 4.</p>



Note!

- For this level type, the measured variables "height + %", "height + volume", "height + mass", "%-height + %", "%-height + volume" and "%-height + mass" are available. → See page 57 ff.
- You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 46), HEIGHT UNIT (→ Page 61), UNIT VOLUME (→ Page 62) and MASS UNIT (→ Page 63).
- Once you have selected the "Pressure linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, page 95). The message goes out as soon as the highest X-VAL. is larger than the minimum span.

4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 75) and SET URV (→ Page 75) parameters.
You can use the ASSIGN CURRENT parameter (→ Page 89) to specify whether the current output should depict the 1st or 2nd measured variable. Depending on the setting of the ASSIGN CURRENT parameter, enter the following values for SET LRV and SET URV:
 - ASSIGN CURRENT = tank content (factory setting) ⇒ %- value, volume value or mass value
 - ASSIGNMENT = height ⇒ level value

The following applies for the setting ASSIGN CURRENT "Tank content":

If you enter values for TANK CONTENT MIN (→ Page 78 or 81) and TANK CONTENT MAX (→ Page 78 or 81), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

The following applies for the setting ASSIGN CURRENT "Height":

If you enter values for LEVEL MIN (→ Page 64) and LEVEL MAX (→ Page 64), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for LEVEL MIN and LEVEL MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5. You can use the MENU DESCRIPTOR parameter (→ Page 86) to specify which measured value should be displayed on the on-site display.

6 Flow measurement

6.1 Calibration

Example:

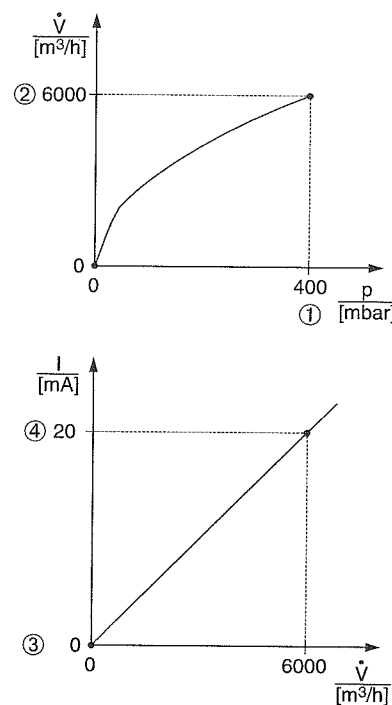
In this example, a volume flow should be measured in m^3/s .



Note!

- The "Flow measurement" measuring mode is only available for the Deltabar S differential pressure transmitter.
- See also Operating Instructions BA270P Deltabar S, section 6.4 "Flow measurement".
- For a description of the parameters mentioned, see
 - Page 35, table 2: MEASURING MODE
 - Page 41, table 6: POSITION ADJUSTMENT
 - Page 69 ff, table 12: BASIC SETUP
 - Page 76 ff, table 15: EXTENDED SETUP.
- For a description of further parameters, see
 - Page 76, table 15: EXTENDED SETUP
 - Page 98, table 27: PROCESS VALUES.

Description	
1	Before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA270P, section 6.4.1.
2	Carry out position adjustment if necessary. See page 41, table 6: POSITION ADJUSTMENT.
3	If necessary, select the "Flow" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE ToF Tool, handheld terminal: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
6	Select the "Volume p. cond." option by means of the FLOW-MEAS. TYPE parameter.
7	Select a flow unit via the UNIT FLOW parameter, here m^3/h for example.
8	Select MAX. FLOW parameter. Enter the maximum flow value of the primary device, here 400 mbar for example. See also layout sheet of primary device.
9	Select MAX PRESS. FLOW parameter. Enter the maximum pressure, here 6000 m^3/h for example. See also layout sheet of primary device.
10	Result: The device is configured for flow measurement.



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Fig. 12: Flow measurement calibration

- 1 See table, step 9.
- 2 See table, step 8.
- 3 See the following note, point 4.
- 4 See the following note, point 4.



Note!

1. You can also perform calibration by means of the QUICK SETUP menu. → See page 39 ff, table 5: QUICK SETUP menu.
2. Using the FLOW-MEAS. TYPE parameter, you can choose between the following flow types:
 - Volume p. cond. (volume under operating conditions)
 - Gas norm. cond. (norm volume under norm conditions in Europe: 1013.25 mbar and 273.15 (0 °C))
 - Gas std. cond. (standard volume under standard conditions in USA: 1013.25 mbar (14.7 psi) and 288.15 K (15 °C/59 °F))
 - Mass p. cond. (mass under operating conditions)
3. Depending on the flow type selected, you can choose between various units. You can also specify a customer-specific unit.
See parameter description for PRESS. ENG. UNIT (→ Page 70), UNIT FLOW (→ Page 71), NORM FLOW UNIT (→ Page 71), STD. FLOW UNIT (→ Page 72) and MASS FLOW UNIT (→ Page 72).
4. A flow value or a pressure value is assigned to both the lower and upper current value with the SET LRV (→ Page 76) and SET URV (→ Page 77) parameters.
You can use the LINEAR/SQROOT parameter (→ Page 89) to specify whether the current output should depict the linear pressure signal or the square root flow signal. Depending on the setting of the LINEAR/SQROOT parameter, enter the following values for SET LRV and SET URV:
 - LINEAR/SQROOT = square root (factory setting) ⇒ flow value
 - LINEAR/SQROOT = linear ⇒ pressure value

The following applies for the setting LINEAR/SQROOT "Square root":

As per the factory settings, the lower current value is set to equal zero and the upper current value is set to the MAX. FLOW value. If you enter a value for MAX. FLOW, the SET URV parameter is also changed. If you want to assign values other than zero and MAX. FLOW to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

The following applies for the setting LINEAR/SQROOT "Linear":

As per the factory settings, the lower current value is set to equal zero and the upper current value is set to the MAX. FLOW value. If you enter a value for MAX PRESS. FLOW, the SET URV parameter is also changed. If you want to assign values other than zero and MAX PRESS. FLOW to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5. In the lower measuring range, small flow quantities (creepages) can lead to large measured value fluctuations. You can activate low flow cut-off via the LOW FLOW CUT-OFF parameter (→ Page 76).

6.2 Totalizers

Example:

In this example, the volume flow should be totalised and displayed in the unit m^3E^3 . Negative flows should be added to the flow rate.



Note!

- For a description of the parameters mentioned, see
 - Page 83 ff, table 18: TOTALIZER SETUP
 - Page 98 ff, table 27: PROCESS VALUES
- Totalizer 1 can be reset. Totalizer 2 cannot be reset.

	Description
1	Calibrate the device as per section 6.1.
2	Change the function group: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP
3	Select a flow unit via the TOTALIZER 1 UNIT parameter, here m^3E^3 for example.
4	Use the NEG. FLOW TOT. 1 parameter to specify the totalising mode for negative flows, here the "Positive" option for example.
5	Reset totalizer 1 to zero via the RESET TOTALIZER parameter.
6	Result: The TOTALIZER 1 and TOTAL. 1 OVERFLOW parameters display the totalised volume flow.



Note!

- You can also specify a customer-specific unit. → See parameter description for TOTALIZER 1 UNIT (→ Page 83) and TOTALIZER 2 UNIT (→ Page 84).
- The TOTALIZER 1 and TOTAL. 1 OVERFLOW parameters display the totalised flow value of the first totalizer. The TOTALIZER 2 and TOTAL. 2 OVERFLOW parameters display the totalised flow value of the second totalizer. → See page 98 ff, PROCESS VALUES function group.
- You can use the MENU DESCRIPTOR parameter (→ Page 86) to specify which measured value should be displayed on the on-site display.

7 Description of parameters



Note!

- The following tables list all the parameters as per the menu structure. Each table corresponds to a function group in the menu tree. The overall menu structure is illustrated in section 9.1.
- The menu structure for on-site operation and the ToF Tool are slightly different. The differences mainly affect the MEASURING MODE and LANGUAGE parameters and the LINEARISATION function group.
- In the ToF Tool or HART handheld terminal, additional parameters are displayed. These parameters are marked accordingly.
- The menu path is indicated in the header of each table. You can use this path to get to the parameters in question.
- The menu has a different structure depending on the measuring mode selected. This means that some function groups are only displayed for one measuring mode, e.g. the "LINEARISATION" function group for the "Level" measuring mode. If certain requirements have to be met for a function group, these are listed in the first row of the table.
- Some parameters are only displayed if other parameters are appropriately configured. For example, the EMPTY CALIB. parameter is not displayed in the Quick Setup menu ("Level" measuring mode) unless the "Linear" option was selected for the LEVEL MODE parameter and the "Wet" option was selected for the CALIBRATION MODE parameter. There is a comment in the parameter description here stating: Note: prerequisite: LEVEL MODE = linear and CALIBRATION MODE = wet.
- Parameter names are written in upper case in the text.
- In the "Parameter name" column, the unique identification number (ID) of the parameter is indicated in brackets. This ID only appears on the on-site display.

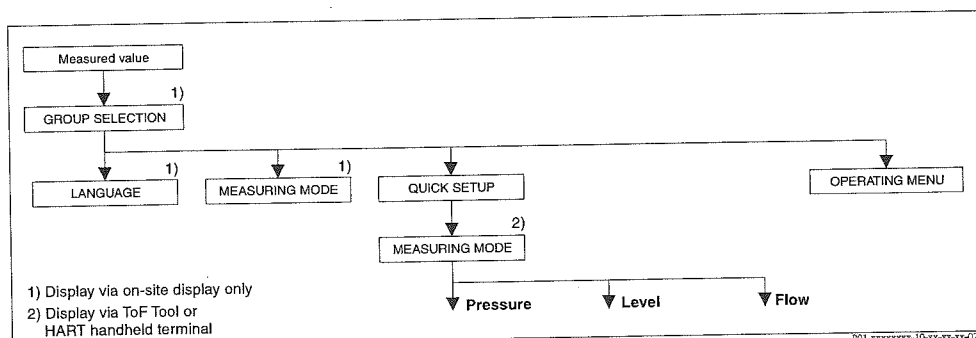


Fig. 13: 1st selection level in menu, LANGUAGE (→ see page 34, table 1) and MEASURING MODE (→ see page 35, table 2)

Table 1: GROUP SELECTION → LANGUAGE – on-site operation	
Parameter name	Description
LANGUAGE (079) Selection	<p>Select the menu language for the on-site display.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ In the ToF Tool and in the HART handheld terminal, the LANGUAGE parameter is arranged in the DISPLAY function group. ■ Select the menu language for the ToF Tool via the "Options" menu → "Settings" → "Language" tab → "Tool language" field. <p>Options:</p> <ul style="list-style-type: none"> ■ Deutsch ■ English ■ Français ■ Italiano ■ Español ■ Nederlands <p>Factory setting: English</p>

Table 2: GROUP SELECTION → MEASURING MODE – on-site operation

Parameter name	Description
MEASURING MODE (389) Selection	<p>Select the measuring mode. The operating menu is structured according to the selected measuring mode.</p> <p> Note!</p> <ul style="list-style-type: none"> When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed. The MEASURING MODE parameter is displayed in the ToF Tool and in the HART handheld terminal in the QUICK SETUP menus and in the BASIC SETUP function group (OPERATING MENU → SETTINGS → BASIC SETUP). <p>Options:</p> <ul style="list-style-type: none"> Pressure Level Deltabar S: flow <p>Factory setting: Pressure</p>

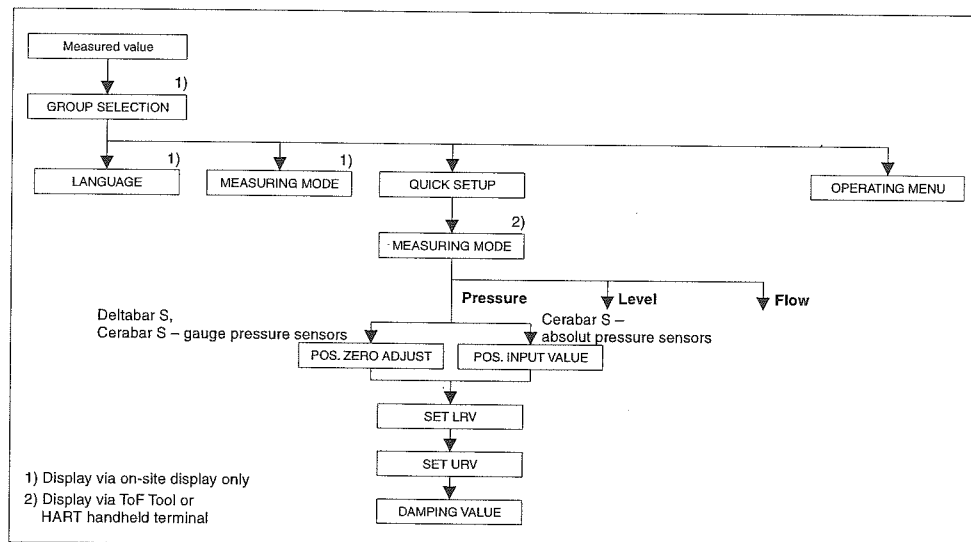


Fig. 14: Quick Setup menu for the "Pressure" measuring mode

Table 3: (GROUP SELECTION →) QUICK SETUP "Pressure"

Parameter name	Description
This menu displays the most important parameters for the "Pressure" measuring mode.	
Prerequisite:	
■ MEASURING MODE = pressure (→ see also page 35).	
Note:	
See also	
– Page 43 ff, table 7: BASIC SETUP	
– Page 74, table 13: EXTENDED SETUP	
– Page 96 ff, table 25: PROCESS VALUES	
– Page 12 ff, section 4 "Pressure measurement".	

Table 3: (GROUP SELECTION →) QUICK SETUP "Pressure"


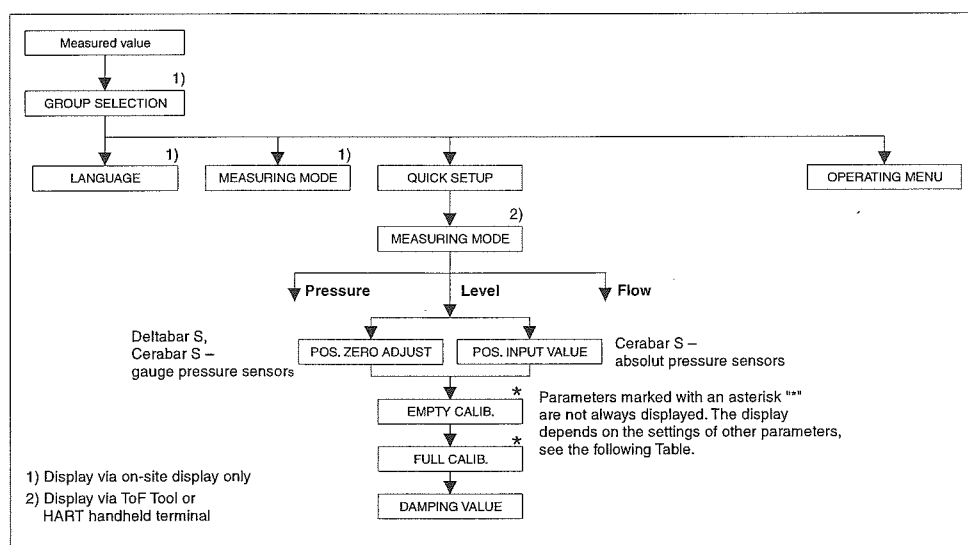
Parameter name	Description
MEASURING MODE Selection	<p>Select the measuring mode. The operating menu is structured according to the selected measuring mode.</p> <p> Note! When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal <p>Options:</p> <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Deltabar S: flow <p>Factory setting: Pressure</p>
POS. ZERO ADJUST (685) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.) Due to the orientation of the device, there may be a shift in the measured value, i.e. for example, when the container is empty, the MEASURED VALUE parameter does not display zero.</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. <p>The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ This parameter is displayed for Deltabar S and Cerabar S with gauge pressure sensors. <p>Options:</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm <p>Factory setting: 0</p>
POS. INPUT VALUE (563) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.) Due to the orientation of the device, there may be a shift in the measured value, i.e. for example, when the container is empty, the MEASURED VALUE parameter does not display zero or the desired value.</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 0.5 mbar – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2 mbar. ($\text{MEASURED VALUE}_{\text{new}} = \text{POS. INPUT VALUE}$) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. $\text{CALIB. OFFSET} = \text{MEASURED VALUE}_{\text{old}} - \text{POS. INPUT VALUE}$, here: $\text{CALIB. OFFSET} = 0.5 \text{ mbar} - 2.0 \text{ mbar} = -1.5 \text{ mbar}$ – The current value is also corrected. <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ This parameter is displayed for Cerabar S with absolute pressure sensors. <p>Factory setting: 0.0</p>
SET LRV (245) Entry	<p>Set lower range value – without reference pressure. Enter pressure value for the lower current value (4 mA).</p> <p>Factory setting: 0.0 or as per order specifications</p>

Table 3: (GROUP SELECTION →) QUICK SETUP "Pressure"

Parameter name	Description
SET URV (246) Entry	Set upper range value – without reference pressure. Enter pressure value for the upper current value (20 mA). Factory setting: High sensor limit (→ see PRESS. SENS HILIM, page 95) or as per order specifications
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. Input range: 0.0...999.0 s Factory setting: 2.0 s or as per order specifications

**Fig. 15: Quick Setup menu for the "Level" measuring mode****Table 4: (GROUP SELECTION →) QUICK SETUP "Level"**

Parameter name	Description
This menu displays the most important parameters for the "Level" measuring mode.	
Prerequisite: ■ MEASURING MODE = level (→ see also page 35).	
Note: See also – Page 45 ff, tables 8 to 11: BASIC SETUP – Page 74 ff, table 14: EXTENDED SETUP – Page 77 ff, table 16: LINEARISATION – on-site operation – Page 80 ff, table 17: LINEARISATION – ToF Tool and HART handheld terminal – Page 97 ff, table 26: PROCESS VALUES – Page 15 ff, section 5 "Level measurement".	

Table 4: (GROUP SELECTION →) QUICK SETUP "Level"


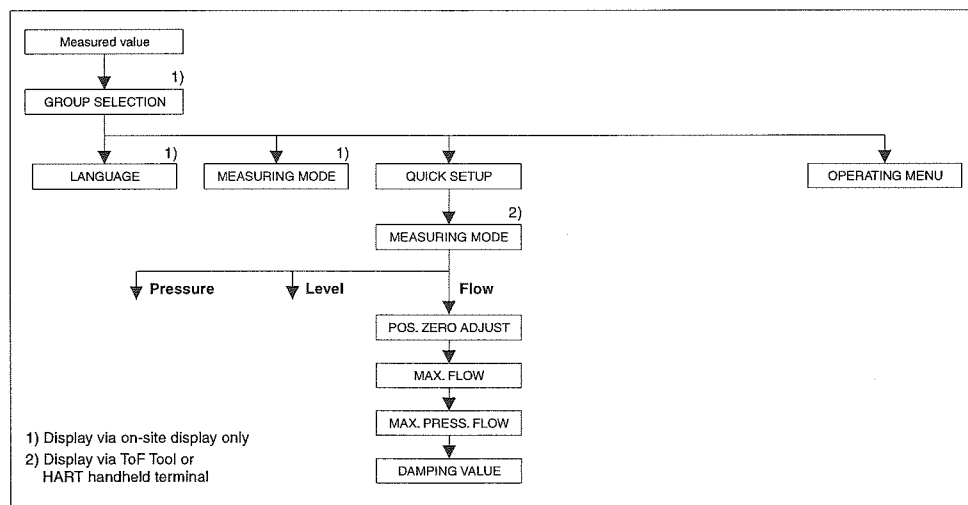
Parameter name	Description
MEASURING MODE Selection	<p>Select the measuring mode. The operating menu is structured according to the selected measuring mode.</p> <p> Note! When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal <p>Options:</p> <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Deltabar S: flow <p>Factory setting: Pressure</p>
POS. ZERO ADJUST (685) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.) Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty, the MEASURED VALUE parameter does not display zero.</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. <p>The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ This parameter is displayed for Deltabar S and Cerabar S with gauge pressure sensors. <p>Options:</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm <p>Factory setting: 0</p>
POS. INPUT VALUE (563) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.) Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty, the MEASURED VALUE parameter does not display zero or the desired value.</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 0.5 mbar – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2 mbar. (MEASURED VALUE_{new} = POS. INPUT VALUE) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. CALIB. OFFSET = MEASURED VALUE_{old} – POS. INPUT VALUE, here: CALIB. OFFSET = 0.5 mbar – 2.0 mbar = – 1.5 mbar – The current value is also corrected. <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ This parameter is displayed for Cerabar S with absolute pressure sensors. <p>Factory setting: 0.0</p>

Table 4: (GROUP SELECTION →) QUICK SETUP "Level"

Parameter name	Description
EMPTY CALIB. (314) Entry	<p>Enter level value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LEVEL MODE = linear (→ see also page 47), CALIBRATION MODE = wet (→ see also page 52) <p>Factory setting: 0.0</p>
FULL CALIB. (315) Entry	<p>Enter level value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LEVEL MODE = linear (→ see also page 47), CALIBRATION MODE = wet (→ see also page 52) <p>Factory setting: 100.0</p>
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>



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Fig. 16: Quick Setup menu, "Flow" measuring mode

Table 5: (GROUP SELECTION →) QUICK SETUP "Flow"

Parameter name	Description
<p>This menu displays the most important parameters for the "Flow" measuring mode.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ Deltabar S differential pressure transmitter ■ MEASURING MODE = flow (→ see also page 35). <p>Note: See also</p> <ul style="list-style-type: none"> – Page 69, table 12: BASIC SETUP – Page 76, table 15: EXTENDED SETUP – Page 83, table 18: TOTALIZER SETUP – Page 31 ff, section 6 "Flow measurement". 	

Table 5: (GROUP SELECTION →) QUICK SETUP "Flow"




Parameter name	Description
MEASURING MODE Selection	<p>Select the measuring mode. The operating menu is structured according to the selected measuring mode.</p> <p> Note! When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed.</p> <p>Prerequisites:</p> <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal <p>Options:</p> <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Deltabar S: flow <p>Factory setting: Pressure</p>
POS. ZERO ADJUST (685) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.) Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty, the MEASURED VALUE parameter does not display zero.</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. <p>The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected.</p> <p>Selection</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm <p>Factory setting: 0</p>
MAX. FLOW (311) Entry	<p>Enter maximum flow of primary device. See also layout sheet of primary device. The maximum flow is assigned to the maximum pressure which you enter via MAX PRESS. FLOW.</p> <p> Note! Use the LINEAR/SQROOT parameter (→ Page 89) to specify the current signal for the "Flow" measuring mode. The following applies for the "Square root" setting: If you enter a new value for MAX. FLOW, the value for SET URV is also changed. Use SET URV to assign a flow to the upper current value. If you want to assign the upper current value a value other than that for MAX. FLOW, you must enter the desired value for SET URV. (→ SET URV, page 77).</p> <p>Factory setting: 1.0</p>
MAX PRESS. FLOW (634) Entry	<p>Enter maximum pressure of primary device. → See layout sheet of primary device. This value is assigned to the maximum flow value (→ see MAX. FLOW).</p> <p> Note! Use the LINEAR/SQROOT parameter (→ Page 89) to specify the current signal for the "Flow" measuring mode. The following applies for the "Linear" setting: If you enter a new value for MAX PRESS. FLOW, the value for SET URV is also changed. Use SET URV to assign a pressure value to the upper current value. If you want to assign the upper current value a value other than that for MAX PRESS. FLOW, you must enter the desired value for SET URV. (→ SET URV, page 77).</p> <p>Factory setting: High sensor limit (→ See PRESS. SENS HILIM, page 95)</p>

Table 5: (GROUP SELECTION →) QUICK SETUP "Flow"

Parameter name	Description
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>

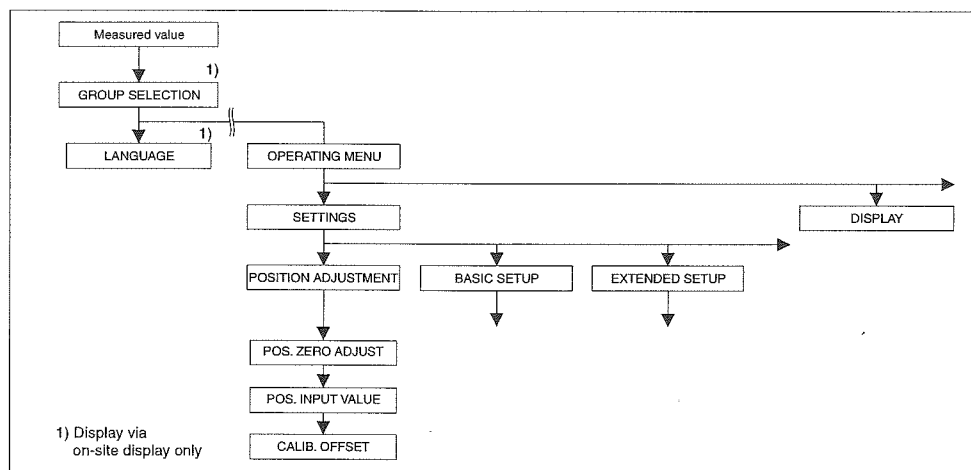


Fig. 17: POSITION ADJUSTMENT function group

Table 6: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUSTMENT

Parameter name	Description
<p>Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty, the measured value does not display zero. Deltabar S and Cerabar S offer three different ways of performing a position adjustment.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> ■ The pressure difference between zero (set point) and the measured pressure need not be known. <ul style="list-style-type: none"> – POS. ZERO ADJUST: Deltabar S or Cerabar S with gauge pressure sensors. – POS. INPUT VALUE: Cerabar S with absolute pressure sensors. ■ The pressure difference between zero (set point) and the measured pressure is known. <ul style="list-style-type: none"> – CALIB. OFFSET: Deltabar S, Cerabar S with gauge pressure sensors, Cerabar S with absolute pressure sensors. 	
POS. ZERO ADJUST (685) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.)</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. <p>The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected.</p> <p>Selection</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm <p>Factory setting: 0</p>

Table 6: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUSTMENT	
Parameter name	Description
POS. INPUT VALUE (563) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.)</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 0.5 mbar – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2 mbar. ($\text{MEASURED VALUE}_{\text{new}} = \text{POS. INPUT VALUE}$) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. $\text{CALIB. OFFSET} = \text{MEASURED VALUE}_{\text{old}} - \text{POS. INPUT VALUE}$, here: $\text{CALIB. OFFSET} = 0.5 \text{ mbar} - 2.0 \text{ mbar} = -1.5 \text{ mbar}$ – The current value is also corrected. <p>Factory setting: 0.0</p>
CALIB. OFFSET (319) Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure is known. (A reference pressure is not present at the device.)</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – Via the CALIB. OFFSET parameter, enter the value by which the MEASURED VALUE should be corrected. To correct the MEASURED VALUE to 0.0 mbar, you must enter the value 2.2 here. ($\text{MEASURED VALUE}_{\text{new}} = \text{MEASURED VALUE}_{\text{old}} - \text{CALIB. OFFSET}$) – MEASURED VALUE (after entry for calib. offset) = 0.0 mbar – The current value is also corrected. <p>Factory setting: 0.0</p>

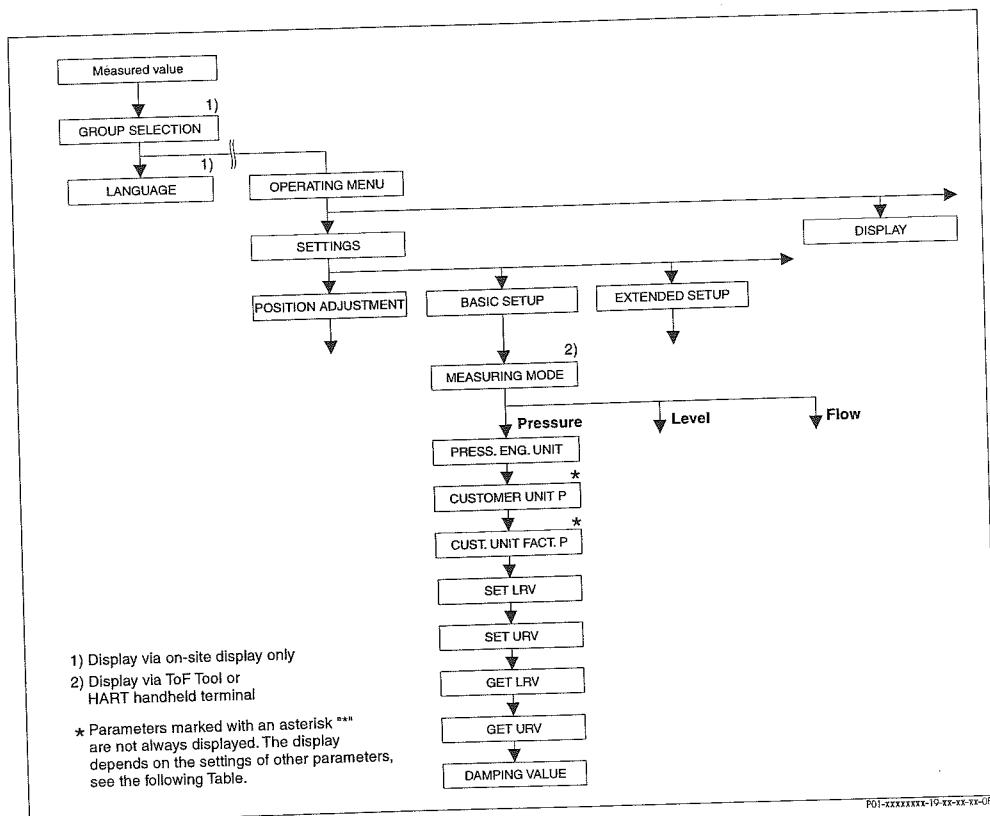


Fig. 18: BASIC SETUP function group for the "Pressure" measuring mode



Table 7: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Pressure"	
Parameter name	Description
Prerequisite: <ul style="list-style-type: none"> ■ MEASURING MODE = pressure (→ see also page 35). Note: See also <ul style="list-style-type: none"> – Page 35, table 3: QUICK SETUP – Page 74, table 13: EXTENDED SETUP – Page 96 ff, table 25: PROCESS VALUES – Page 12 ff, section 4 "Pressure measurement". 	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. <p> Note! When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed.</p> Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal Options: <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Deltabar S: flow Factory setting: Pressure
PRESS. ENG. UNIT (060) Selection	Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. Options <ul style="list-style-type: none"> ■ mbar, bar ■ mmH₂O, mH₂O, inH₂O, ftH₂O ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg ■ Torr ■ g/cm², kg/cm² ■ lb/ft² ■ atm ■ gf/cm², kgf/cm² ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. Factory setting: Depends on the sensor nominal measuring range mbar or bar or as per order specifications
CUSTOMER UNIT P (075) Entry	Enter text (unit) for customer-specific pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P. Prerequisite: <ul style="list-style-type: none"> ■ PRESS. ENG. UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit".</p> Factory setting: -----

Table 7: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Pressure"	
Parameter name	Description
CUST. UNIT FACT. P (317) Entry	<p>Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ PRESS. ENG. UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 10000 Pa \approx 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU <p>Factory setting: 1.0</p>
SET LRV (245) Entry	<p>Set lower range value – without reference pressure. Enter pressure value for the lower current value (4 mA).</p> <p>Factory setting: 0.0 or as per order specifications</p>
SET URV (246) Entry	<p>Set upper range value – without reference pressure. Enter pressure value for the upper current value (20 mA).</p> <p>Factory setting: High sensor limit (→ See PRESS. SENS HILIM, page 95)</p>
GET LRV (309) Entry	<p>Set lower range value – reference pressure is present at device. The pressure for the lower current value (4 mA) is present at device. With the "Confirm" option, you assign the lower current value to the pressure value present. On-site display: the pressure value present is displayed in the bottom line.</p> <p>Options</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm
GET URV (310) Entry	<p>Set upper range value – reference pressure is present at device. The pressure for the upper current value (20 mA) is present at device. With the "Confirm" option, you assign the upper current value to the pressure value present. On-site display: the pressure value present is displayed in the bottom line.</p> <p>Options</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>

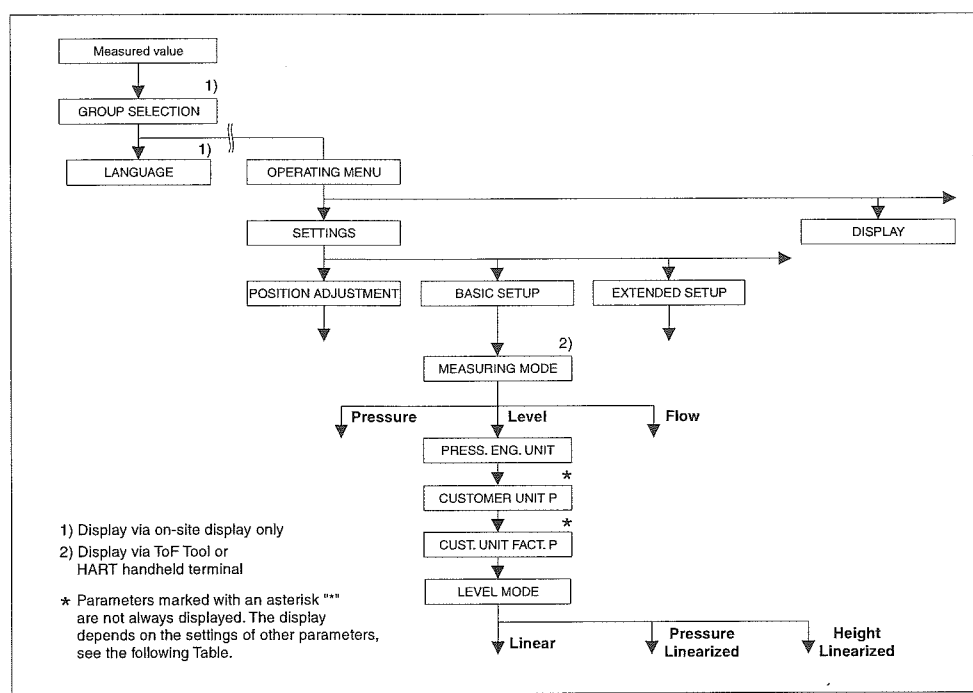


Fig. 19: BASIC SETUP function group for the "Level" measuring mode, depending on the setting for the LEVEL MODE parameter
 → See page 48, Fig. 8 for LEVEL MODE = linear;
 → See page 56, Fig. 9 for LEVEL MODE = pressure linearized,
 → See page 60, Fig. 10 for LEVEL MODE = height linearized

Table 8: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level"	
Parameter name	Description
Prerequisite: ■ MEASURING MODE = level (→ see also page 35).	
Note: See also – Page 49 ff, tables 9 to 11: BASIC SETUP – contd. – Page 74 ff, table 14: EXTENDED SETUP – Page 77 ff, table 16: LINEARISATION – on-site operation – Page 80 ff, table 17: LINEARISATION – ToF Tool and HART handheld terminal – Page 97 ff, table 27: PROCESS VALUES – Page 15 ff, section 5 "Level measurement".	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. Note! When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed. Prerequisite: ■ ToF Tool or HART handheld terminal Options: ■ Pressure ■ Level ■ Deltabar S: flow Factory setting: Pressure

Table 8: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level"


Parameter name	Description
PRESS. ENG. UNIT (060) Selection	<p>Select pressure unit.</p> <p>If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ mbar, bar ■ mmH₂O, mH₂O, inH₂O, ftH₂O ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg ■ Torr ■ g/cm², kg/cm² ■ lb/ft² ■ atm ■ gf/cm², kgf/cm² ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. <p>Factory setting: Depends on the sensor nominal measuring range mbar or bar or as per order specifications</p>
CUSTOMER UNIT P (075) Entry	<p>Enter text (unit) for customer-specific pressure unit.</p> <p>You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ PRESS. ENG. UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m²" is specified as the customer-specific unit, "crate/m²" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. P (317) Entry	<p>Enter conversion factor for a customer-specific pressure unit.</p> <p>The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ PRESS. ENG. UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 10000 Pa ≈ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU <p>Factory setting: 1.0</p>

Table 8: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level"

Parameter name	Description
LEVEL MODE (718) Selection	<p>Select level type.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Linear: the measured variable (level, volume, mass or %) is in direct proportion to the measured pressure. → See also page 49 ff, table 9. ■ Pressure linearized: the measured variable (volume, mass or %) is not in direct proportion to the measured pressure such as in the case of containers with a conical outlet. For the calibration, enter a linearisation table with at least 2 and not more than 32 points. → See also page 56 ff, table 10. ■ Height linearized: select this level type if you require two measured variables or if the container shape is given with value pairs, e.g. height and volume. The following combinations are possible: <ul style="list-style-type: none"> – Height + volume – Height + mass – Height + % – %-height + volume – %-height + mass – %-height + % <p>Perform two calibrations for this level type. First for the measured variable height or %-height like for the "Linear" option and then for the measured variable volume, mass or % like for the "Pressure linearized" option. → See also page 61 ff, table 11.</p> <p>Factory setting: Linear</p>
<p>→ For LEVEL MODE = linear, see page 49, table 9. → For LEVEL MODE = pressure linearized, see page 56, table 10. → For LEVEL MODE = height linearized, see page 61, table 11.</p>	

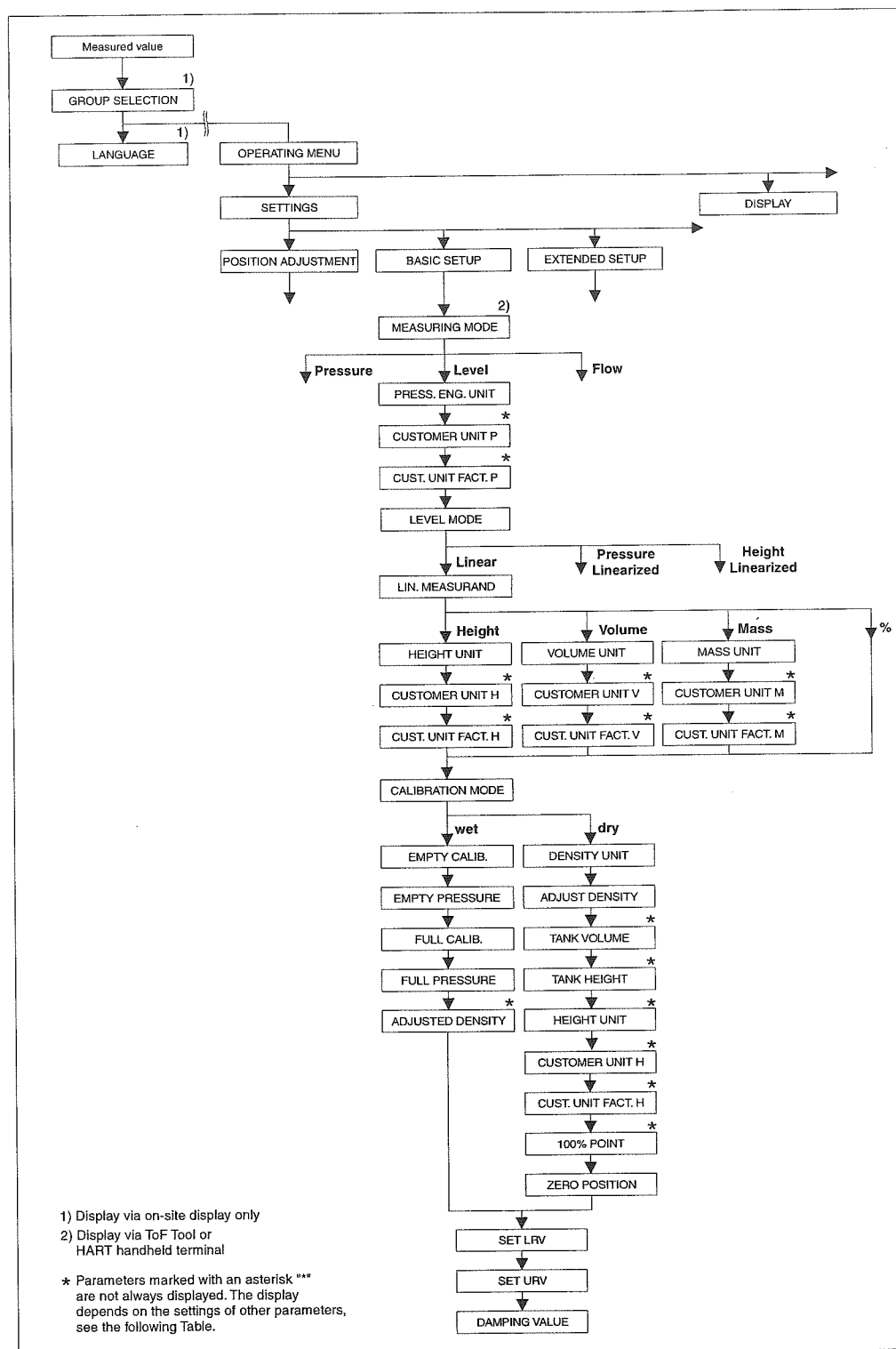


Fig. 20: BASIC SETUP function group for the "Level" measuring mode and "Linear" level type

Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"


Parameter name	Description
<p>The following parameters are displayed if you selected the "Linear" option for the LEVEL MODE parameter. For this level type, the measured variable (level, volume, mass or %) is in direct proportion to the measured pressure.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level (→ see also page 35). ■ LEVEL MODE = linear (→ see also page 47). <p>Note: See also</p> <ul style="list-style-type: none"> – Page 45 ff, table 8 BASIC SETUP – general – Page 74 ff, table 14: EXTENDED SETUP – Page 97 ff, table 26: PROCESS VALUES – Page 15 ff, section 5 "Level measurement". 	
LIN. MEASURAND (804) Selection	<p>Select measured variable.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Level ■ Volume ■ Mass ■ % (level) <p>Factory setting: % (level)</p>
HEIGHT UNIT (708) Selection	<p>Select level unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = level <p>Options:</p> <ul style="list-style-type: none"> ■ mm ■ cm ■ dm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. <p>Factory setting: m</p>
CUSTOMER UNIT H (706) Entry	<p>Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = level, HEIGHT UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>


Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	Description
CUST. UNIT FACT. H (705) Entry	<p>Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = level, HEIGHT UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m $\hat{=}$ 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU <p>Factory setting: 1.0</p>
UNIT VOLUME (313) Selection	<p>Select volume unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = volume <p>Options:</p> <ul style="list-style-type: none"> ■ l ■ hl ■ cm³ ■ dm³ ■ m³ ■ m³ E³ ■ ft ■ ft³ E³ ■ gal ■ lgal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. <p>Factory setting: m³</p>
CUSTOMER UNIT V (608) Entry	<p>Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = volume, UNIT VOLUME = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>

Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"


Parameter name	Description
CUST. UNIT FACT. V (607) Entry	<p>Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m³". → See also CUSTOMER UNIT V.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = volume, UNIT VOLUME = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 0.01 m³ ≈ 1 bucket – Entry CUSTOMER UNIT V: bucket – Entry CUST. UNIT FACT. V: 100 – Result: MEASURED VALUE = 1 bucket <p>Factory setting: 1.0</p>
MASS UNIT (709) Selection	<p>Select mass unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = mass <p>Options:</p> <ul style="list-style-type: none"> ■ g ■ kg ■ t ■ oz ■ lb ■ ton ■ User unit, → see also the following parameter description for CUSTOMER UNIT M and CUST. UNIT FACT. M. <p>Factory setting: kg</p>
CUSTOMER UNIT M (704) Entry	<p>Enter text (unit) for customer-specific mass unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. M.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = mass, MASS UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT M parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>

Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"

Parameter name	Description
CUST. UNIT FACT. M (703) Entry	<p>Enter conversion factor for a customer-specific mass unit. The conversion factor must be entered in relation to the SI unit "kg". → See also CUSTOMER UNIT M.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = mass, MASS UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 10 kg \approx 1 bucket – Entry CUSTOMER UNIT M: bucket – Entry CUST. UNIT FACT. M: 0.1 – Result: MEASURED VALUE = 1 bucket <p>Factory setting: 1.0</p>
CALIBRATION MODE (392) Selection	<p>Select calibration mode.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Wet Wet calibration takes place by filling and emptying the container. This calibration mode requires two pressure-level value pairs to be entered. In the case of two different levels, the level value is entered and the pressure measured at this moment is assigned to the level value. → See also the following parameter description for EMPTY CALIB., EMPTY PRESSURE, FULL CALIB. and FULL PRESSURE. ■ Dry Dry calibration is a theoretical calibration which you can carry out even if the device is not mounted or the container is empty. <ul style="list-style-type: none"> – For the "Level" measured variable, the density of the fluid (→ see page 53, ADJUST DENSITY) must be entered. – For the "Volume" measured variable, the density of the fluid and the tank volume and tank height must be entered (→ see page 53, ADJUST DENSITY, TANK VOLUME and TANK HEIGHT). – For the "Mass" measured variable, the tank volume and the tank height must be entered (→ see page 53, TANK VOLUME and TANK HEIGHT). The density must also be entered in the case of a zero point shift (level offset) (→ see page 53, ADJUST DENSITY). – For the "%" measured variable, the density of the fluid must be entered and a level assigned to the 100 % point (→ see page 53 and 54, ADJUST DENSITY and 100% POINT). <p>If the measurement should not start at the mounting location of the device, a level offset must be entered (→ see page 55, ZERO POSITION).</p> <p>Factory setting: Wet</p>
EMPTY CALIB. (314) Entry	<p>Enter level value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also EMPTY PRESSURE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: 0.0</p>
EMPTY PRESSURE (710) Display	<p>Displays the pressure value for the lower calibration point (container empty). → See also EMPTY CALIB.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: 0.0</p>

Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	Description
FULL CALIB. (315) Entry	<p>Enter level value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also FULL PRESSURE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: 100.0</p>
FULL PRESSURE (711) Display	<p>Displays the pressure value for the upper calibration point (container full). → See also FULL CALIB.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: High sensor limit (→ see PRESS. SENS HILIM, page 95)</p>
ADJUSTED DENSITY (810) Display	<p>Displays the density calculated from the upper and lower level point.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet, LIN. MEASURAND = level
DENSITY UNIT (812) Selection	<p>Select density unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = level, CALIBRATION MODE = dry ■ LIN. MEASURAND = % (level), CALIBRATION MODE = dry ■ LIN. MEASURAND = volume, CALIBRATION MODE = dry ■ LIN. MEASURAND = mass, CALIBRATION MODE = dry <p>Options:</p> <ul style="list-style-type: none"> ■ g/cm³ ■ kg/dm³ ■ kg/m³ ■ US lb/in³ ■ US lb/ft³ <p>Factory setting: kg/dm³</p>
ADJUST DENSITY (316) Entry	<p>Enter density of fluid.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = level, CALIBRATION MODE = dry ■ LIN. MEASURAND = % (level), CALIBRATION MODE = dry ■ LIN. MEASURAND = volume, CALIBRATION MODE = dry ■ LIN. MEASURAND = mass, CALIBRATION MODE = dry <p>Factory setting: 1000.0</p>
TANK VOLUME (858) Entry	<p>Enter tank volume.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = volume, CALIBRATION MODE = dry ■ LIN. MEASURAND = mass, CALIBRATION MODE = dry <p>Factory setting: 1.0 m³</p>
TANK HEIGHT (859) Entry	<p>Enter tank height.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = volume, CALIBRATION MODE = dry ■ LIN. MEASURAND = mass, CALIBRATION MODE = dry <p>Factory setting: 1.0 m</p>


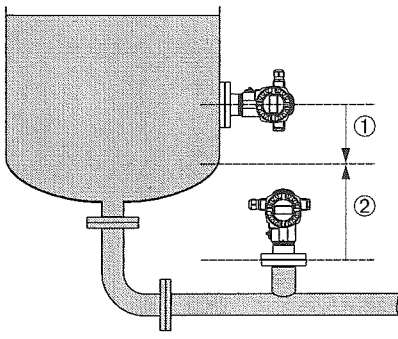
Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	Description
HEIGHT UNIT (708) Selection	<p>Select level unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = % (level), CALIBRATION MODE = dry <p>Options:</p> <ul style="list-style-type: none"> ■ mm ■ dm ■ cm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. <p>Factory setting: m</p>
CUSTOMER UNIT H (706) Entry	<p>Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = % (level), CALIBRATION MODE = dry, HEIGHT UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. H (705) Entry	<p>Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = % (level), CALIBRATION MODE = dry, HEIGHT UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m $\hat{=}$ 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU <p>Factory setting: 1.0</p>
100% POINT (813) Entry	<p>Enter level value for 100% point.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LIN. MEASURAND = % (level), CALIBRATION MODE = dry <p>Example:</p> <ul style="list-style-type: none"> – The 100 %-point should correspond to 4 m. – Select the "m" unit via the HEIGHT UNIT parameter. – Enter the value "4" for this parameter (100% POINT). <p>Factory setting: 1.0</p>

Table 9: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"

Parameter name	Description
ZERO POSITION (814) Entry	<p>Enter value for level offset. If the measurement should not start at the mounting location of the device, e.g. for containers with a sump, carry out zero point shift (level offset).</p> <p>Prerequisite: ■ CALIBRATION MODE = dry</p> <p>Factory setting: 0.0</p>  <p><i>Fig. 21: Zero point shift</i></p> <p>1 Device is mounted above the level lower range value: a positive value has to be entered for ZERO POSITION.</p> <p>2 Device is mounted below the level lower range value: a negative value has to be entered for ZERO POSITION.</p>
SET LRV (719) Entry	<p>Enter level value for the lower current value (4 mA).</p> <p>Factory setting: 0.0</p>
SET URV (720) Entry	<p>Enter level value for the upper current value (20 mA).</p> <p>Factory setting: 100.0</p>
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>

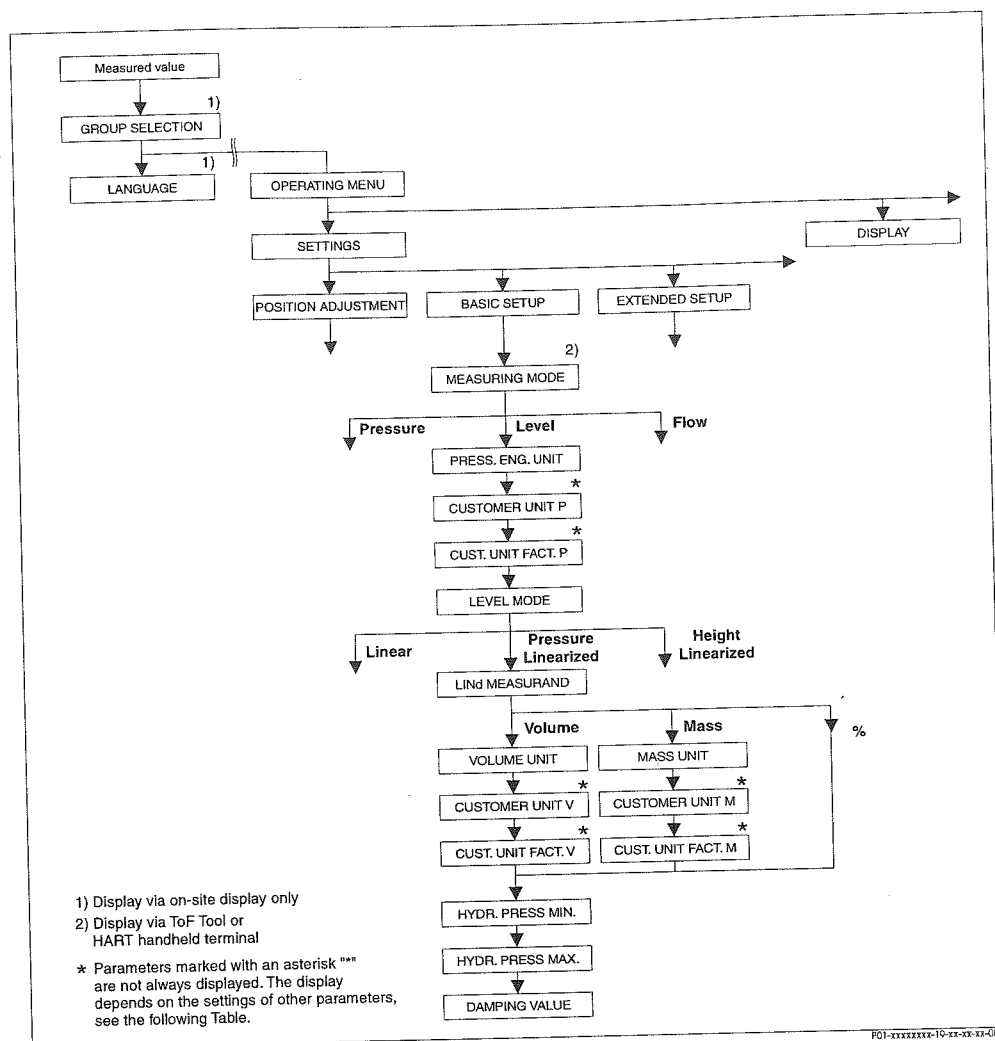


Fig. 22: BASIC SETUP function group for the "Level" measuring mode and the "Pressure linearized" level type, continue calibration with LINEARISATION function group
→ See page 77 ff for on-site operation and page 80 ff for operation with ToF Tool or HART handheld terminal.

Table 10: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure linearized"

Parameter name	Description
<p>The following parameters are displayed if you selected the "Pressure linearized" option for the LEVEL MODE parameter. For this level type, the measured variable (volume, mass or %) is not in direct proportion to the measured pressure. For the calibration, enter a linearisation table with at least 2 and not more than 32 points.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> MEASURING MODE = level (→ see also page 35). LEVEL MODE = pressure linearized (→ see also page 47). <p>Note:</p> <p>See also</p> <ul style="list-style-type: none"> Page 45 ff, table 8: BASIC SETUP – general Page 74 ff, table 14: EXTENDED SETUP Page 77 ff, table 16: LINEARISATION – on-site operation Page 80 ff, table 17: LINEARISATION – ToF Tool and HART handheld terminal Page 97 ff, table 26: PROCESS VALUES Page 15 ff, section 5 "Level measurement". 	

Table 10: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure linearized"



Parameter name	Description
LINd. MEASURAND (805) Selection	<p>Select measured variable.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Pressure and volume ■ Pressure and mass ■ Pressure and % <p>Factory setting: Pressure and %</p>
UNIT VOLUME (313) Selection	<p>Select volume unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LINd. MEASURAND = pressure and volume <p>Options:</p> <ul style="list-style-type: none"> ■ l ■ hl ■ cm³ ■ dm³ ■ m³ ■ m³ E³ ■ ft ■ ft³ E³ ■ gal ■ lgal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. <p>Factory setting: m³</p>
CUSTOMER UNIT V (608) Entry	<p>Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LINd. MEASURAND = pressure and volume, UNIT VOLUME = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT V parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. V (607) Entry	<p>Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m³". → See also CUSTOMER UNIT V.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LINd. MEASURAND = pressure and volume, UNIT VOLUME = user unit <p>Example:</p> <ul style="list-style-type: none"> - You want the measured value to be displayed in "buckets". - MEASURED VALUE = 0.01 m³ ≈ 1 bucket - Entry CUSTOMER UNIT V: bucket - Entry CUST. UNIT FACT. V: 100 - Result: MEASURED VALUE = 1 bucket <p>Factory setting: 1.0</p>

Table 10: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure linearized"

Parameter name	Description
MASS UNIT (709) Selection	<p>Select mass unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LInD. MEASURAND = pressure and mass <p>Options:</p> <ul style="list-style-type: none"> ■ g ■ kg ■ t ■ oz ■ lb ■ ton ■ User unit, → see also the following parameter description for CUSTOMER UNIT M and CUST. UNIT FACT. M. <p>Factory setting: kg</p>
CUSTOMER UNIT M (704) Entry	<p>Enter text (unit) for customer-specific mass unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. M.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LInD. MEASURAND = pressure and mass, MASS UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT M parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. M (703) Entry	<p>Enter conversion factor for a customer-specific mass unit. The conversion factor must be entered in relation to the SI unit "kg". → See also CUSTOMER UNIT M.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ LInD. MEASURAND = pressure and mass, MASS UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 10 kg \cong 1 bucket – Entry CUSTOMER UNIT M: bucket – Entry CUST. UNIT FACT. M: 0.1 – Result: MEASURED VALUE = 1 bucket <p>Factory setting: 1.0</p>
HYDR. PRESS MIN. (775) Entry	<p>Enter the minimum hydrostatic pressure to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum hydrostatic pressure to be expected, the more accurate the measurement result.</p> <p>Factory setting: 0.0</p>

**Table 10: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level",
LEVEL MODE "Pressure linearized"**

Parameter name	Description
HYDR. PRESS MAX. (761) Entry	<p>Enter the maximum hydrostatic pressure to be expected.</p> <p>The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum hydrostatic pressure to be expected, the more accurate the measurement result.</p> <p>Factory setting: High sensor limit (→ See PRESS. SENS HILIM, page 95)</p>
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ).</p> <p>The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>

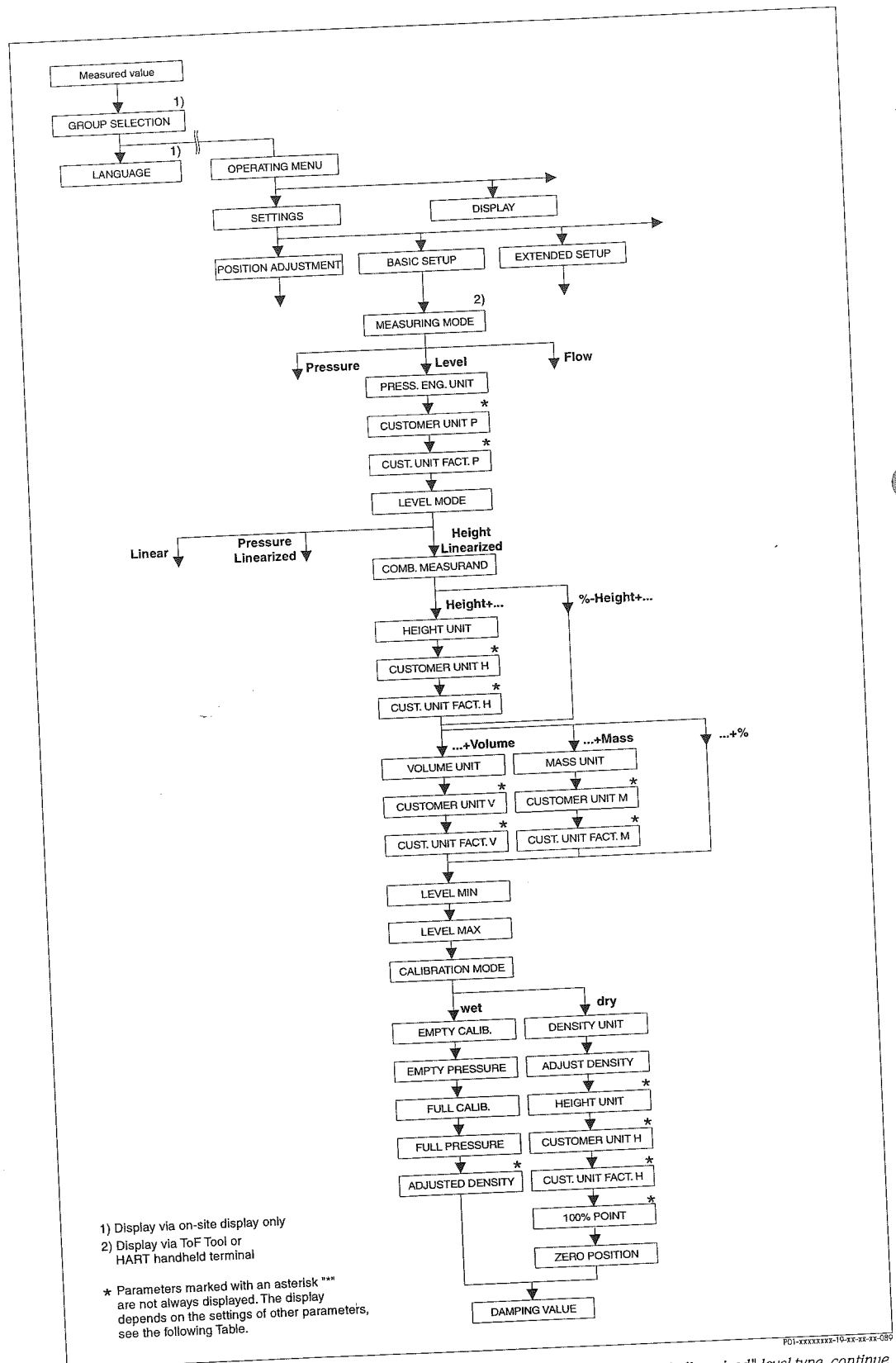


Fig. 23: BASIC SETUP function group for the "Level" measuring mode and the "Height linearized" level type, continue calibration with LINEARISATION function group → See page 77 ff for on-site operation and page 80 ff for operation with ToF Tool and HART handheld terminal.

**Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level",
LEVEL MODE "Height linearized"**

Parameter name	Description
	<p>The following parameters are displayed if you selected the "Height linearized" option for the LEVEL MODE parameter.</p> <p>Select this level type if you require two measured variables or if the container shape is given with value pairs, e.g. height and volume.</p> <p>The following combinations are possible:</p> <ul style="list-style-type: none"> ■ Height + volume ■ Height + mass ■ Height + % ■ %-height + volume ■ %-height + mass ■ %-height + % <p>The 1st measured variable (%-height or height) must be in direct proportion to the measured pressure. The 2nd measured variable (volume, mass or %) must not be in direct proportion. A linearisation table must be entered for the 2nd measured variable. The 2nd measured variable is assigned to the 1st measured variable by means of this table.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level (→ see also page 35). ■ LEVEL MODE = height linearized (→ see also page 47). <p>Note:</p> <p>See also</p> <ul style="list-style-type: none"> – Page 45 ff, table 8: BASIC SETUP – general – Page 74 ff, table 14: EXTENDED SETUP – Page 77 ff, table 16: LINEARISATION – on-site operation – Page 80 ff, table 17: LINEARISATION – ToF Tool and HART handheld terminal – Page 97 ff, table 26: PROCESS VALUES – Page 15 ff, section 5 "Level measurement".
COMB. MEASURAND (806) Selection	<p>Select measured variable.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Height and volume ■ Height and mass ■ Height and % ■ %-height and volume ■ %-height and mass ■ %-height and % <p>Factory setting: %-height and %</p>
HEIGHT UNIT (708) Selection	<p>Select level unit for the 1st measured variable.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume, height and mass or height and % <p>Options:</p> <ul style="list-style-type: none"> ■ mm ■ dm ■ cm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. <p>Factory setting: m</p>

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level",
LEVEL MODE "Height linearized"


Parameter name	Description
CUSTOMER UNIT H (706) Entry	<p>Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume, HEIGHT UNIT = user unit ■ COMB. MEASURAND = height and mass, HEIGHT UNIT = user unit ■ COMB. MEASURAND = height and %, HEIGHT UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. H (705) Entry	<p>Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume, HEIGHT UNIT = user unit ■ COMB. MEASURAND = height and mass, HEIGHT UNIT = user unit ■ COMB. MEASURAND = height and %, HEIGHT UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m ± 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU <p>Factory setting: 1.0</p>
UNIT VOLUME (313) Selection	<p>Select the volume unit for the 2nd measured value.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume or %-height and volume <p>Options:</p> <ul style="list-style-type: none"> ■ l ■ hl ■ cm³ ■ dm³ ■ m³ ■ m³ E³ ■ ft ■ ft³ E³ ■ gal ■ lgal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. <p>Factory setting: m³</p>

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height linearized"


Parameter name	Description
CUSTOMER UNIT V (608) Entry	<p>Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume, HEIGHT UNIT = user unit ■ COMB. MEASURAND = %-height and volume, HEIGHT UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT V parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. V (607) Entry	<p>Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m³". → See also CUSTOMER UNIT V.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume, HEIGHT UNIT = user unit ■ COMB. MEASURAND = %-height and volume, HEIGHT UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> - You want the measured value to be displayed in "buckets". - MEASURED VALUE = 0.01 m³ ≈ 1 bucket - Entry CUSTOMER UNIT V: bucket - Entry CUST. UNIT FACT. V: 100 - Result: MEASURED VALUE = 1 bucket <p>Factory setting: 1.0</p>
MASS UNIT (709) Selection	<p>Select the mass unit for the 2nd measured value.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and mass or %-height and mass <p>Options:</p> <ul style="list-style-type: none"> ■ g ■ kg ■ t ■ oz ■ lb ■ ton ■ User unit, → see also the following parameter description for CUSTOMER UNIT M and CUST. UNIT FACT. M. <p>Factory setting: kg</p>




Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height linearized"	
Parameter name	Description
CUSTOMER UNIT M (704) Entry	<p>Enter text (unit) for customer-specific mass unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. M.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and mass, MASS UNIT = user unit ■ COMB. MEASURAND = %-height and mass, MASS UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT M parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. M (703) Entry	<p>Enter conversion factor for a customer-specific mass unit. The conversion factor must be entered in relation to the SI unit "kg". → See also CUSTOMER UNIT M.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and mass, MASS UNIT = user unit ■ COMB. MEASURAND = %-height and mass, MASS UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> - You want the measured value to be displayed in "buckets". - MEASURED VALUE = 10 kg \cong 1 bucket - Entry CUSTOMER UNIT M: bucket - Entry CUST. UNIT FACT. M: 0.1 - Result: MEASURED VALUE = 1 bucket <p>Factory setting: 1.0</p>
LEVEL MIN (755) Entry	<p>Enter the minimum level to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum level to be expected, the more accurate the measurement result.</p> <p> Note! ■ The following applies for the setting LEVEL MODE "Height linearized" and ASSIGN CURRENT "Linear": If you enter a new value for LEVEL MIN, the value for SET LRV is also changed. Use SET LRV to assign a height to the lower current value. If you want to assign the lower current value a value other than that for LEVEL MIN, you must enter the desired value for SET LRV. (→ SET LRV, page 75 and ASSIGN CURRENT, page 89)</p> <p>Factory setting: 0.0</p>
LEVEL MAX (712) Entry	<p>Enter the maximum level to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum level to be expected, the more accurate the measurement result.</p> <p> Note! ■ The following applies for the setting LEVEL MODE "Height linearized" and ASSIGN CURRENT "Linear": If you enter a new value for LEVEL MAX, the value for SET URV is also changed. Use SET URV to assign a height to the upper current value. If you want to assign the upper current value a value other than that for LEVEL MAX, you must enter the desired value for SET URV. (→ SET URV, page 75 and ASSIGN CURRENT, page 89)</p> <p>Factory setting: 100.0</p>


Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height linearized"

Parameter name	Description
CALIBRATION MODE (392) Selection	<p>Select the calibration mode for the calibration of the 1st measured variable.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Wet Wet calibration takes place by filling the container. This calibration mode requires two pressure-level value pairs to be entered. In the case of two different levels, the level value is entered and the pressure measured at this moment is assigned to the level value. → See also the following parameter description for EMPTY CALIB., EMPTY PRESSURE, FULL CALIB. and FULL PRESSURE. ■ Dry Dry calibration is a theoretical calibration which you can carry out even if the device is not mounted or the container is empty. <ul style="list-style-type: none"> – For the "Level" measured variable, the density of the fluid (→ see page 66, ADJUST DENSITY) must be entered. – For the "%" measured variable, the density of the fluid must be entered and a level assigned to the 100 % point (→ see page 66, ADJUST DENSITY and 100% POINT). If the measurement should not start at the mounting location of the device, a level offset must be entered (→ see page 68, ZERO POSITION). <p>Factory setting: Wet</p>
EMPTY CALIB. (314) Entry	<p>Enter level value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also EMPTY PRESSURE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: 0.0</p>
EMPTY PRESSURE (710) Display	<p>Displays the pressure value for the lower calibration point (container empty). → See also EMPTY CALIB.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet
FULL CALIB. (315) Entry	<p>Enter level value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also FULL PRESSURE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: 100.0</p>
FULL PRESSURE (711) Display	<p>Displays the pressure value for the upper calibration point (container full). → See also FULL CALIB.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = wet <p>Factory setting: High sensor limit (→ see PRESS. SENS HILIM, page 95)</p>
ADJUSTED DENSITY (810) Display	<p>Displays the density calculated from the upper and lower level point.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = height and volume, CALIBRATION MODE = wet ■ COMB. MEASURAND = height and mass, CALIBRATION MODE = wet ■ COMB. MEASURAND = height and %, CALIBRATION MODE = wet,

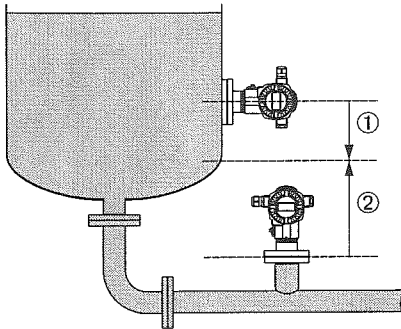
**Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level",
LEVEL MODE "Height linearized"**

Parameter name	Description
DENSITY UNIT (812) Selection	<p>Select density unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = %-height and %, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height and volume, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height and mass, CALIBRATION MODE = dry ■ COMB. MEASURAND = height and %, CALIBRATION MODE = dry ■ COMB. MEASURAND = height and volume, CALIBRATION MODE = dry ■ COMB. MEASURAND = height and mass, CALIBRATION MODE = dry <p>Options:</p> <ul style="list-style-type: none"> ■ g/cm³ ■ kg/dm³ ■ kg/m³ ■ US lb/in³ ■ US lb/ft³ <p>Factory setting: kg/dm³</p>
ADJUST DENSITY (316) Entry	<p>Enter density of fluid.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = %-height and %, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height and volume, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height and mass, CALIBRATION MODE = dry ■ COMB. MEASURAND = height and %, CALIBRATION MODE = dry ■ COMB. MEASURAND = height and volume, CALIBRATION MODE = dry ■ COMB. MEASURAND = height and mass, CALIBRATION MODE = dry <p>Factory setting: 1.0</p>
HEIGHT UNIT (708) Selection	<p>Select level unit.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = %-height and volume, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height and mass, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height + %, CALIBRATION MODE = dry <p>Options:</p> <ul style="list-style-type: none"> ■ mm ■ dm ■ cm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. <p>Factory setting: m</p>

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height linearized"

Parameter name	Description
CUSTOMER UNIT H (706) Entry	<p>Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = %-height and volume, CALIBRATION MODE = dry, HEIGHT UNIT = user unit ■ COMB. MEASURAND = %-height and mass, CALIBRATION MODE = dry, HEIGHT UNIT = user unit ■ COMB. MEASURAND = %-height and %, CALIBRATION MODE = dry, HEIGHT UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>
CUST. UNIT FACT. H (705) Entry	<p>Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = %-height and volume, CALIBRATION MODE = dry, HEIGHT UNIT = user unit ■ COMB. MEASURAND = %-height and mass, CALIBRATION MODE = dry, HEIGHT UNIT = user unit ■ COMB. MEASURAND = %-height and %, CALIBRATION MODE = dry, HEIGHT UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m \approx 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU <p>Factory setting: 1.0</p>
100% POINT (813) Entry	<p>Enter level value for 100% point.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ COMB. MEASURAND = %-height and volume, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height and mass, CALIBRATION MODE = dry ■ COMB. MEASURAND = %-height + %, CALIBRATION MODE = dry <p>Example:</p> <ul style="list-style-type: none"> – The 100 %-point should correspond to 4 m. – Select the "m" unit via the HEIGHT UNIT parameter. – Enter the value "4" for this parameter (100% POINT). <p>Factory setting: 1.0</p>

**Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level",
LEVEL MODE "Height linearized"**

Parameter name	Description
ZERO POSITION (814) Entry	<p>Enter value for level offset. If the measurement should not start at the mounting location of the device, e.g. for containers with a sump, carry out zero point shift (level offset).</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ CALIBRATION MODE = dry  <p style="text-align: right;"><small>FD1-PMP75xx-10-xx-xx-xx-001</small></p> <p><i>Fig. 24: Zero point shift</i></p> <ol style="list-style-type: none"> 1 Device is mounted above the level lower range value: a positive value has to be entered for ZERO POSITION. 2 Device is mounted below the level lower range value: a negative value has to be entered for ZERO POSITION. <p>Factory setting: 0.0</p>
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>

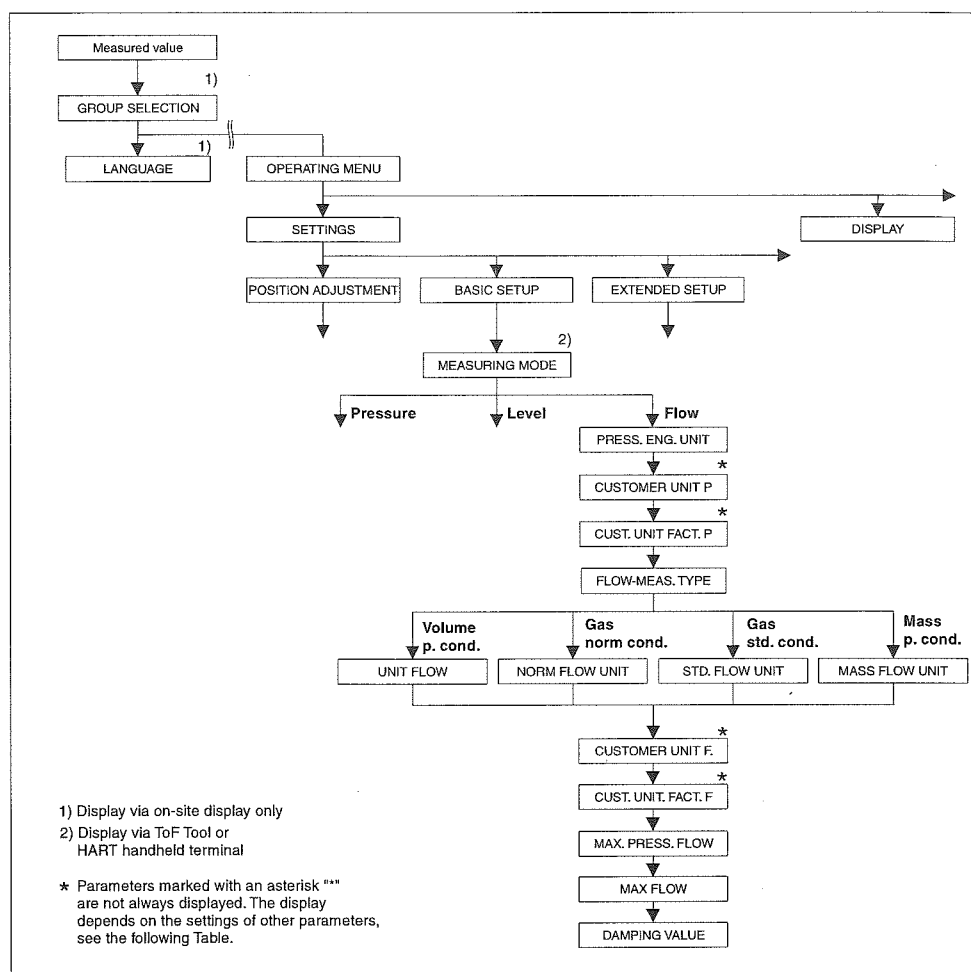


Fig. 25: BASIC SETUP function group for the "Flow" measuring mode

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"

Parameter name	Description
Prerequisite:	
■ MEASURING MODE = flow (→ see also page 35).	
Note:	
See also	
– Page 39, table 5: QUICK SETUP	
– Page 76, table 15: EXTENDED SETUP	
– Page 83, table 18: TOTALIZER SETUP	
– Page 98, table 27: PROCESS VALUES.	
– Page 31 ff, section 6 "Flow measurement".	



Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	Description
MEASURING MODE Selection	<p>Select the measuring mode. The operating menu is structured according to the selected measuring mode.</p> <p> Note! When the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal <p>Options:</p> <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Deltabar S: flow <p>Factory setting: Pressure</p>
PRESS. ENG. UNIT (060) Selection	<p>Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ mbar, bar ■ mmH₂O, mH₂O, inH₂O, ftH₂O ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg ■ Torr ■ g/cm², kg/cm² ■ lb/ft² ■ atm ■ gf/cm², kgf/cm² ■ User unit, → see also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. <p>Factory setting: Depends on the sensor nominal measuring range mbar or bar or as per order specifications</p>
CUSTOMER UNIT P (075) Entry	<p>Enter text (unit) for customer-specific pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ PRESS. ENG. UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m²" is specified as the customer-specific unit, "crate/m²" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"

Parameter name	Description
CUST. UNIT FACT. P (317) Entry	<p>Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ PRESS. ENG. UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 10000 Pa $\hat{=}$ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU <p>Factory setting:</p> <p>1.0</p>
FLOW-MEAS. TYPE (640) Selection	<p>Select the flow type.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Volume p. cond. (volume under operating conditions) ■ Gas norm. cond. (norm volume under norm conditions in Europe: 1013.25 mbar and 273.15 K (0 °C)) ■ Gas std. cond. (standard volume under standard conditions in USA: 1013.25 mbar (14.7 psi) and 288.15 K (15 °C/59 °F)) ■ Mass p. cond. (mass under operating conditions) <p>Factory setting:</p> <p>Volume p. cond.</p>
UNIT FLOW (391) Selection	<p>Select volume flow unit.</p> <p>When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ FLOW-MEAS. TYPE = volume p. cond. <p>Options:</p> <ul style="list-style-type: none"> ■ m³/s, m³/min, m³/h, m³/day ■ l/s, l/min, l/h ■ hl/s, hl/min, hl/day ■ ft³/s, ft³/min, ft³/h, ft³/day ■ ACFs, ACFM, ACFH, ACFD ■ ozf/s, ozf/min ■ US Gal/s, US Gal/min, US Gal/h, US Gal/day ■ Imp. Gal/s, Imp. Gal/min, Imp. Gal/h ■ bbl/s, bbl/min, bbl/h, bbl/day ■ User unit, → see also this table, parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F <p>Factory setting:</p> <p>m³/s</p>
NORM FLOW UNIT (661) Selection	<p>Select norm volume flow unit.</p> <p>When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ FLOW-MEAS. TYPE = gas norm conditions <p>Options:</p> <ul style="list-style-type: none"> ■ Nm³/s, Nm³/min, Nm³/h, Nm³/day ■ User unit, → see also this table, parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F <p>Factory setting:</p> <p>Nm³/s</p>




Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	Description
STD. FLOW UNIT (660) Selection	<p>Select standard volume flow unit. When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ FLOW-MEAS. TYPE = gas std. conditions <p>Options:</p> <ul style="list-style-type: none"> ■ Sm³/s, Sm³/min, Sm³/h, Sm³/day ■ SCFS, SCFM, SCFH, SCFD ■ User unit, → see also this table, parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F <p>Factory setting: Sm³/s</p>
MASS FLOW UNIT (571) Selection	<p>Select mass flow unit. When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ FLOW-MEAS. TYPE = mass p. cond. <p>Options:</p> <ul style="list-style-type: none"> ■ g/s, kg/s, kg/min, kg/min, kg/h ■ t/s, t/min, t/h, t/day ■ oz/s, oz/min ■ lb/s, lb/min, lb/h ■ ton/s, ton/min, ton/h, ton/day ■ User unit, → see also the following parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F <p>Factory setting: kg/s</p>
CUSTOMER UNIT F (610) Entry	<p>Enter text (unit) for customer-specific flow unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. F.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ UNIT FLOW = user unit ■ NORM FLOW UNIT = user unit ■ STD. FLOW UNIT = user unit ■ MASS FLOW UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT F parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting: -----</p>

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"

Parameter name	Description
CUST. UNIT FACT. F (609) Entry	<p>Enter conversion factor for a customer-specific flow unit. The conversion factor must be entered in relation to an appropriate SI unit, e.g. m^3/s for the "Volume p. cond." flow mode. → See also CUSTOMER UNIT F.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ UNIT FLOW = user unit ■ NORM FLOW UNIT = user unit ■ STD. FLOW UNIT = user unit ■ MASS FLOW UNIT = user unit <p>Example:</p> <ul style="list-style-type: none"> - You want the measured value to be displayed in "bucket/h". - MEASURED VALUE = $0.01 \text{ m}^3/\text{s} \approx 3600 \text{ bucket/h}$ - Entry CUSTOMER UNIT F: bucket/h - Entry CUST. UNIT FACT. F: 360000 - Result: MEASURED VALUE = 3600 bucket/h <p>Factory setting: 1.0</p>
MAX. FLOW (311) Entry	<p>Enter maximum flow of primary device. → See also layout sheet of primary device. The maximum flow is assigned to the maximum pressure which you enter via MAX PRESS. FLOW.</p> <p> Note! Use the LINEAR/SQROOT parameter (→ Page 89) to specify the current signal for the "Flow" measuring mode. The following applies for the "Square root" setting: If you enter a new value for MAX. FLOW, the value for SET URV is also changed. Use SET URV to assign a flow to the upper current value. If you want to assign the upper current value a value other than that for MAX. FLOW, you must enter the desired value for SET URV. (→ SET URV, page 77).</p> <p>Factory setting: 1.0</p>
MAX PRESS. FLOW (634) Entry	<p>Enter maximum pressure of primary device. → See layout sheet of primary device. This value is assigned to the maximum flow value (→ see MAX. FLOW).</p> <p> Note! Use the LINEAR/SQROOT parameter (→ Page 89) to specify the current signal for the "Flow" measuring mode. The following applies for the "Linear" setting: If you enter a new value for MAX PRESS. FLOW, the value for SET URV is also changed. Use SET URV to assign a pressure value to the upper current value. If you want to assign the upper current value a value other than that for MAX PRESS. FLOW, you must enter the desired value for SET URV. (→ SET URV, page 77).</p> <p>Factory setting: High sensor limit (→ see PRESS. SENS HILIM, page 95)</p>
DAMPING VALUE (247) Entry	<p>Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.</p> <p>Input range: 0.0...999.0 s</p> <p>Factory setting: 2.0 s or as per order specifications</p>

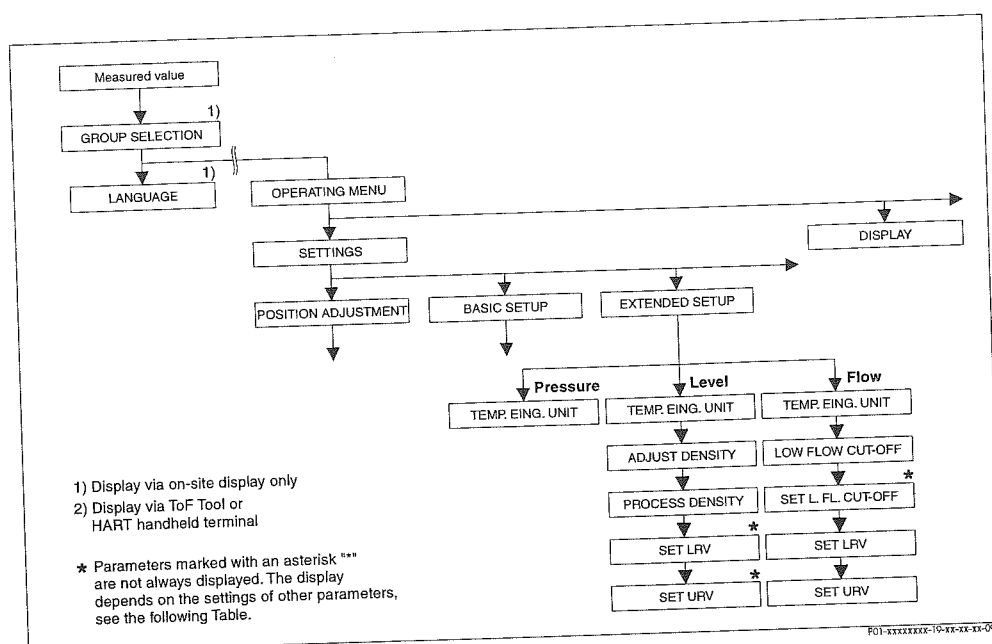


Fig. 26: EXTENDED SETUP function group
 → For the "Pressure" measuring mode, see page 74, table 13
 → For the "Level" measuring mode, see page 74, table 14
 → For the "Flow" measuring mode, see page 76, table 15

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Pressure"	
Parameter name	Description
Prerequisite: ■ MEASURING MODE = pressure (→ see also page 35).	
Note: ■ See also page 12 ff, section 4 "Pressure measurement".	
TEMP. ENG. UNIT (318) Selection	Select the unit for the temperature measured values. → See also PCB TEMPERATURE (Page 92) and SENSOR TEMP. (Page 97). Options: ■ °C ■ °F ■ K ■ R Factory setting: °C

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Level"	
Parameter name	Description
Prerequisite: ■ MEASURING MODE = level (→ see also page 35).	
Note: ■ See also page 15 ff, section 5 "Level measurement".	
TEMP. ENG. UNIT (318) Selection	Select the unit for the temperature measured values. → See also PCB TEMPERATURE (Page 92) and SENSOR TEMP. (Page 97). Options: ■ °C ■ °F ■ K ■ R Factory setting: °C

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Level"



Parameter name	Description
ADJUST DENSITY (316) Entry	Enter density of fluid. Factory setting: 1.0
PROCESS DENSITY (811) Entry	Enter a new density value for density correction. The calibration was carried out with the medium water, for example. Now the container is to be used for another fluid with another density. The calibration is corrected appropriately by entering the new density value in the PROCESS DENSITY parameter. Factory setting: 1.0
SET LRV (762) Entry	Enter value for the lower current value (4 mA). Prerequisite: ■ LEVEL MODE = pressure linearized or height linearized  Note! ■ For the LEVEL MODE "Height linearized", you can use the ASSIGN CURRENT parameter (→ Page 89) to specify whether the current output should depict the 1st or 2nd measured variable (height or tank content). Depending on the setting of the ASSIGN CURRENT parameter, enter the following value for SET LRV: – ASSIGN CURRENT = tank content (factory setting) ⇒ %- value, volume value or mass value – ASSIGN CURRENT = height ⇒ level value The following applies for the LEVEL MODE "Pressure linearized" or LEVEL MODE "Height linearized" + ASSIGN CURRENT "Tank content": ■ If you enter a new value for TANK CONTENT MIN, the value for SET LRV is also changed. If you want to assign the lower current value a value other than that for TANK CONTENT MIN, you must enter the desired value for SET LRV. (→ TANK CONTENT MIN, page 78 or 81.) The following applies for the LEVEL MODE "Height linearized" + ASSIGN CURRENT "Height": ■ If you enter a new value for LEVEL MIN, the value for SET LRV is also changed. If you want to assign the lower current value a value other than that for LEVEL MIN, you must enter the desired value for SET LRV. (→ LEVEL MIN, page 64.) Factory setting: 0.0
SET URV (763) Entry	Enter value for the upper current value (20 mA). Prerequisite: ■ LEVEL MODE = pressure linearized or height linearized  Note! ■ For the LEVEL MODE "Height linearized", you can use the ASSIGN CURRENT parameter (→ Page 89) to specify whether the current output should depict the 1st or 2nd measured variable (height or tank content). Depending on the setting of the ASSIGN CURRENT parameter, enter the following value for SET URV: – ASSIGN CURRENT = tank content (factory setting) ⇒ %- value, volume value or mass value – ASSIGN CURRENT = height ⇒ level value The following applies for the LEVEL MODE "Pressure linearized" or LEVEL MODE "Height linearized" + ASSIGN CURRENT "Tank content": ■ If you enter a new value for TANK CONTENT MAX, the value for SET URV is also changed. If you want to assign the upper current value a value other than that for TANK CONTENT MAX, you must enter the desired value for SET URV. (→ TANK CONTENT MAX, page 78 or 81.) The following applies for the LEVEL MODE "Height linearized" + ASSIGN CURRENT "Height": ■ If you enter a new value for LEVEL MAX, the value for SET URV is also changed. If you want to assign the lower current value a value other than that for LEVEL MAX, you must enter the desired value for SET URV. (→ LEVEL MAX, page 64.) Factory setting: 100.0

Table 15: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Flow"	
Parameter name	Description
Prerequisite: ■ MEASURING MODE = flow (→ see also page 35). Note: ■ See also page 31 ff, section 6 "Flow measurement".	
TEMP. ENG. UNIT (318) Selection	Select the unit for the temperature measured value. → See also PCB TEMPERATURE (Page 92) and SENSOR TEMP. (Page 98). Options: ■ °C ■ °F ■ K ■ R Factory setting: °C
LOW FLOW CUT-OFF (442) Selection	Switches "low flow cut-off" function on and off. In the lower measuring range, small flow quantities (creepages) can lead to large measured value fluctuations. Switching on this function stops these flow quantities from being recorded. → See also SET. L. FL. CUT-OFF. Options: ■ Off ■ On Factory setting: Off
SET. L. FL. CUT-OFF (323) Entry	Enter switch-off point of low flow cut-off. The hysteresis between the switch-on point and the switch-off point is always 1 % of the end flow value. → See also LOW FLOW CUT-OFF. Prerequisite: ■ LOW FLOW CUT-OFF = on Input range: Switch-off point: 0...50 % of end flow value (→ MAX. FLOW). <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>①</p> </div> <div style="text-align: center;"> <p>②</p> </div> </div> <p style="text-align: right; font-size: small;">FCI-PMD/2xxx-05-xx-xx-xx-000</p> Factory setting: 5 % (of end flow value)
SET LRV (637) Entry	Depending on the setting in the LINEAR/SQROOT parameter (→ Page 89), enter a flow value or a pressure value for the lower current value (4 mA) here. ■ LINEAR/SQROOT = square root (factory setting) ⇒ flow value ■ LINEAR/SQROOT = linear ⇒ pressure value Factory setting: 0

Table 15: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Flow"

Parameter name	Description
SET URV (638) Entry	<p>Depending on the setting in the LINEAR/SQROOT parameter (→ Page 89), enter a flow value or a pressure value for the upper current value (20 mA) here.</p> <ul style="list-style-type: none"> ■ LINEAR/SQROOT = square root (factory setting) ⇒ flow value ■ LINEAR/SQROOT = linear ⇒ pressure value <p>The following applies for the setting LINEAR/SQROOT "Square root":</p> <ul style="list-style-type: none"> ■ If you enter a new value for MAX. FLOW, the value for SET URV is also changed. If you want to assign the upper current value a value other than that for MAX. FLOW, you must enter the desired value for SET URV. (→ MAX. FLOW, page 73). <p>The following applies for the setting LINEAR/SQROOT "Linear":</p> <ul style="list-style-type: none"> ■ If you enter a new value for MAX PRESS. FLOW, the SET URV value is also changed. If you want to assign the upper current value a value other than that for MAX PRESS. FLOW, you must enter the desired value for SET URV. (→ MAX PRESS. FLOW, page 73). <p>Factory setting: MAX. FLOW</p>

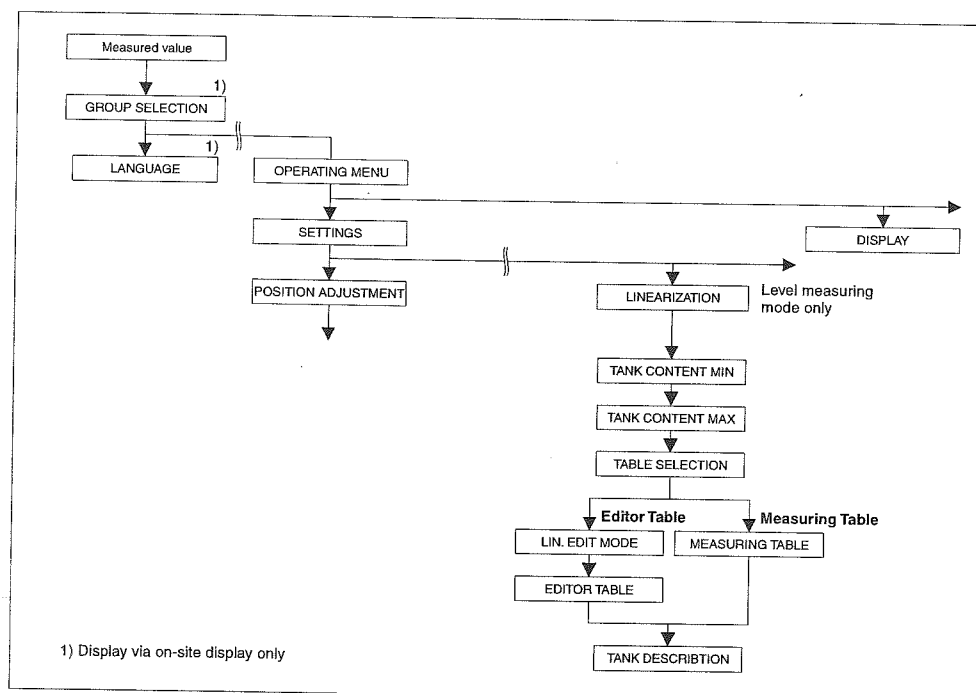


Fig. 27: LINEARISATION function group for on-site operation

Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION
– on-site operation

Parameter name	Description
<p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level (→ see also page 35). ■ LEVEL MODE = pressure linearized or height linearized (→ see also page 47). <p>Note:</p> <ul style="list-style-type: none"> – See also page 15 ff, section 5 "Level measurement". 	



Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – on-site operation	
Parameter name	Description
TANK CONTENT MIN (759) Entry	<p>Enter the minimum tank contents to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum tank content to be expected, the more accurate the measurement result.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ If you enter a new value for TANK CONTENT MIN, the value for SET LRV is also changed. Use SET LRV to assign a %-value, volume value or mass value to the lower current value. If you want to assign the lower current value a value other than that for TANK CONTENT MIN, you must enter the desired value for SET LRV. (→ SET LRV, page 75). ■ For the setting LEVEL MODE "Height linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MIN parameter does not affect the SET LRV parameter. (→ SET LRV, page 75 and ASSIGN CURRENT, page 89) <p>Factory setting: 0.0</p>
TANK CONTENT MAX (713) Entry	<p>Enter the maximum tank contents to be expected. The input limits for the subsequent calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum tank content to be expected, the more accurate the measurement result.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ If you enter a new value for TANK CONTENT MAX, the value for SET URV is also changed. Use SET URV to assign a %-value, volume value or mass value to the upper current value. If you want to assign the upper current value a value other than that for TANK CONTENT MAX, you must enter the desired value for SET URV. (→ SET URV, page 75.) ■ For the setting LEVEL MODE "Height linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MAX parameter does not affect the SET URV parameter. (→ SET URV, page 75 and ASSIGN CURRENT, page 89) <p>Factory setting: 100.0</p>
TABLE SELECTION (808) Selection	<p>Select table. The device works with a measuring and an editor table. The measuring table is used to calculate the measured value. To make sure measuring also runs properly when entering a new table, there is another table, the editor table, for entering new values.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ View meas. table ■ Editor table <p>Factory setting: View meas. table</p>
LIN. EDIT MODE (397) Selection	<p>Select the entry mode for the linearisation table.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ TABLE SELECTION = editor table <p>Options:</p> <ul style="list-style-type: none"> ■ Manual: the container neither has to be filled nor emptied for this entry mode. Enter the value pairs for the linearisation table. ■ Semiautomatic: the container is filled or emptied in stages in this entry mode. The device automatically records the hydrostatic pressure. The associated volume, mass or %-value is entered. <p>Factory setting: Manual</p>

Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION
 – on-site operation

Parameter name	Description
EDITOR TABLE (809) Selection	<p>Select table.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ TABLE SELECTION = editor table <p>Options:</p> <ul style="list-style-type: none"> ■ New table: enter new linearisation table. ■ Edit measure table: The measuring table is loaded as an editor table so that changes can be made. → See also TAB. SELECTION ■ Continue edit: Edit an editor table that already exists. → See also TABLE EDITOR (770) <p>Factory setting: New table</p>
EDITOR TABLE Entry ("Semiautomatic" edit mode) – LINE-NUMB (549) – Y-VAL. (551)	<p>Enter table in the "Semiautomatic" editing mode. A linearisation table must have at least 2 points and may not have more than 32 points. A point consists of LINE-NUMB, X-VAL. and Y-VAL. For this editing mode, the container is filled or emptied in stages.</p> <p>Example: Enter point for LEVEL MODE = pressure linearized</p> <ul style="list-style-type: none"> – LINE-NUMB: confirm value displayed. – Y-VAL.: depending on the setting in the LIND. MEASURAND parameter, enter the volume, mass or % value. – X-VAL.: the hydrostatic pressure present is displayed and saved by confirming the Y-value. <p>Example: Enter point for LEVEL MODE = height linearized</p> <ul style="list-style-type: none"> – LINE-NUMB: confirm value displayed. – Y-VAL.: depending on the setting in the COMB. MEASURAND parameter, enter the volume, mass or % value. – X-VAL.: the hydrostatic pressure present is measured. Depending on the setting in the COMB. MEASURAND parameter, the measured pressure is converted to a level unit or a % and displayed. The value is saved by confirming the Y-value. <p>Factory setting: LINE-NUMB = 1, X-VAL. = 0.0, Y-VAL. = 0.0</p>
EDITOR TABLE Entry ("manual" edit mode) – LINE-NUMB (549) – Y-VAL. (551) – X-VAL. (550)	<p>Enter table in the "manual" editing mode. A linearisation table must have at least 2 points and may not have more than 32 points. A point consists of a line number, X-value and Y-value. The container neither has to be filled nor emptied for this editing mode.</p> <p>Example: Enter point for LEVEL MODE = pressure linearized</p> <ul style="list-style-type: none"> – LINE-NUMB: confirm value displayed. – X-VAL.: enter pressure value. – Y-VAL.: depending on the setting in the LIND. MEASURAND parameter, enter the related volume, mass or % value. <p>Example: Enter point for LEVEL MODE = height linearized</p> <ul style="list-style-type: none"> – LINE-NUMB: confirm value displayed. – X-VAL.: the hydrostatic pressure present is measured. Depending on the setting in the COMB. MEASURAND parameter, enter a level value or % value. – Y-VAL.: depending on the setting in the COMB. MEASURAND parameter, enter the related volume, mass or % value. <p>Factory setting: LINE-NUMB = 1, X-VAL. = 0.0, Y-VAL. = 0.0</p>
EDITOR TABLE (770) Selection	<p>Select the function for the editor table.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Next point: enter next point. ■ Last input point: jump back to previous point to correct a mistake for example. ■ Accept input table: save editor table as measuring table. This overwrites the old measuring table. ■ Abort: save values entered up to this point for the editor table and display next parameter. The editor table is not activated as a measuring table. <p>Factory setting: Next point</p>

Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – on-site operation	
Parameter name	Description
MEASURING TABLE (549) Display	A point of the linearisation table saved (measuring table) appears on the display The parameter first displays the first point of the linearisation table. By entering a line number, you can directly display the corresponding point in the linearisation table.
MEASURING TABLE (717) Selection	Select the function for the measuring table. Options: <ul style="list-style-type: none"> Next point: view next point of the measuring table. Last input point: view previous point of the measuring table. Abort: cancel measuring table display. Display next parameter. Factory setting: Next point
TANK DESCRIPTION (815) Entry	Enter tank description. (max. 32 alphanumeric characters) Factory setting: -----

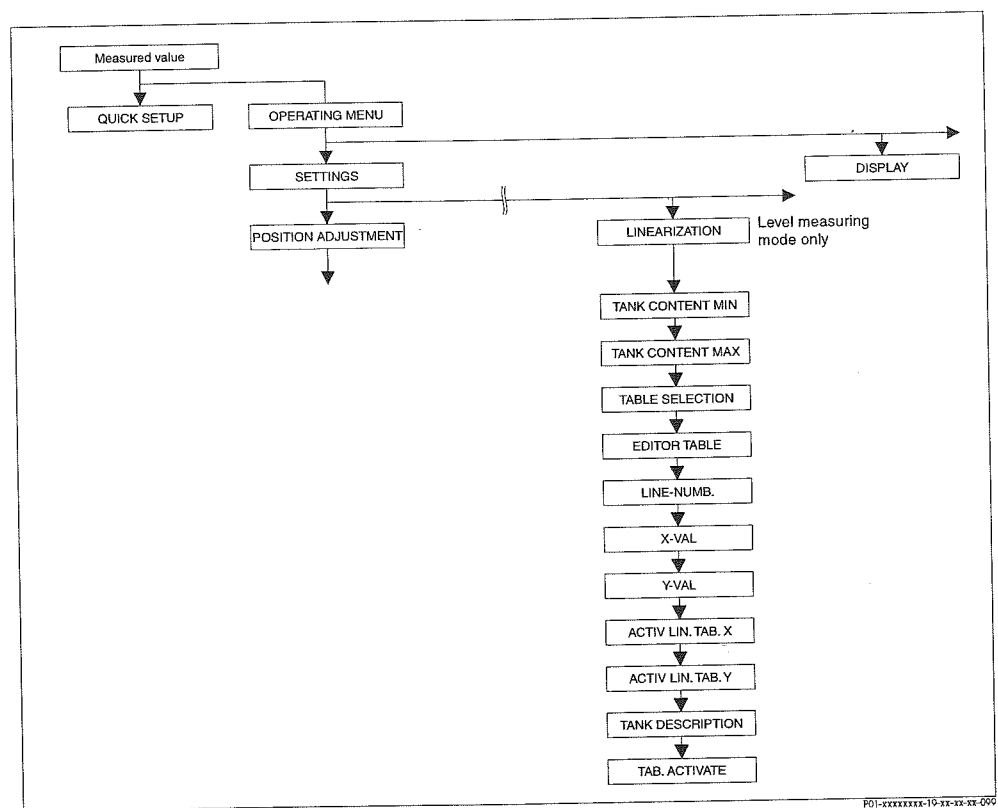


Fig. 28: LINEARISATION function group for ToF Tool or HART handheld terminal

Table 17: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – ToF Tool, HART handheld terminal	
Parameter name	Description
Prerequisite: <ul style="list-style-type: none"> MEASURING MODE = level (→ see also page 35). LEVEL MODE = pressure linearized or height linearized (→ see also page 47). Note: <ul style="list-style-type: none"> See also page 15 ff, section 5 "Level measurement". 	

Table 17: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – ToF Tool, HART handheld terminal







Parameter name	Description
TANK CONTENT MIN Entry	<p>Enter the minimum tank contents to be expected.</p> <p>The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum tank content to be expected, the more accurate the measurement result.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ If you enter a new value for TANK CONTENT MIN, the value for SET LRV is also changed. Use SET LRV to assign a %-value, volume value or mass value to the lower current value. If you want to assign the lower current value a value other than that for TANK CONTENT MIN, you must enter the desired value for SET LRV. (→ SET LRV, page 75). ■ For the setting LEVEL MODE "Height linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MIN parameter does not affect the SET LRV parameter. (→ SET LRV, page 75 and ASSIGN CURRENT, page 89) <p>Factory setting: 0.0</p>
TANK CONTENT MAX Entry	<p>Enter the maximum tank contents to be expected.</p> <p>The input limits for the subsequent calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum tank content to be expected, the more accurate the measurement result.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ If you enter a new value for TANK CONTENT MAX, the value for SET URV is also changed. Use SET URV to assign a %-value, volume value or mass value to the upper current value. If you want to assign the upper current value a value other than that for TANK CONTENT MAX, you must enter the desired value for SET URV. (→ SET URV, page 75.) ■ For the setting LEVEL MODE "Height linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MAX parameter does not affect the SET URV parameter. (→ SET URV, page 75 and ASSIGN CURRENT, page 89) <p>Factory setting: 100.0</p>
LIN. EDIT MODE Selection	<p>Select the entry mode for the linearisation table.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Manual: The container neither has to be filled nor emptied for this entry mode. Enter the value pairs for the linearisation table. ■ Semiautomatic: the container is filled or emptied in stages in this entry mode. The device automatically records the hydrostatic pressure. The associated volume, mass or %-value is entered. <p>Factory setting: Manual</p>
EDITOR TABLE Selection	<p>Select table.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ New table: Enter new linearisation table. ■ View meas. table: View saved linearisation table and change points if necessary. ■ Continue edit: Edit a linearisation table that already exists. <p> Note!</p> <p>ToF Tool:</p> <ul style="list-style-type: none"> ■ If you select the "View meas. table" option, the saved measuring table is loaded in the ToF Tool. Use the "Lin.-Tab." window to view the entire table, change values if necessary and write the modified table to the device. ■ If you change a value via the X-VAL. or Y-VAL. parameters, the table in the "Lin.-Tab." window is not updated. To view the table saved in the device, this table must first be read out of the device. <p>Factory setting: New table</p>

Table 17: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – ToF Tool, HART handheld terminal

Parameter name	Description
LINE-NUMB Entry	<p>Enter the line number for the linearisation table. A linearisation table must have at least 2 points and may not have more than 32 points. Enter a point via the LINE-NUMB, X-VAL. and Y-VAL. parameters. → See also this table, parameter description for LIN. EDIT MODE, X-VAL. ("Manual" entry mode), X-VAL. ("Semiautomatic" entry mode) and Y-VAL.</p> <p> Note! In the ToF Tool, you can enter a complete linearisation table in one go via the "Lin.-Tab." window.</p>
X-VAL. ("Manual" entry mode) Entry	<p>Enter the pressure value for the linearisation table. → See also LIN. EDIT MODE, LINE-NUMB and Y-VAL.</p>
X-VAL. ("Semiautomatic" entry mode) Display	<p>In the "Semiautomatic" entry mode, the container is filled or emptied in stages. The X-VAL. displays the measured hydrostatic pressure.</p> <p>ToF Tool The X-VAL. is saved by confirming the Y-value.</p> <p>HART Handheld Confirm X-VAL. displayed.</p> <p>→ See also LIN. EDIT MODE, LINE-NUMB and Y-VAL.</p>
Y-VAL. Entry	<p>Enter the volume, mass or %-value belonging to the X-VAL. for the linearisation table. Depending on the setting in the LIND. MEASURAND or COMB. MEASURAND parameters, enter a volume, mass or %-value here. → See also this table, parameter description for LIN. EDIT MODE, LINE-NUMB, X-VAL. ("Manual" entry mode), X-VAL. ("Semiautomatic" entry mode).</p>
ACTIV LIN. TAB. X Display	<p>An X-value of the linearisation table already saved appears on the display You can select a point of the linearisation table via the LINE-NUMB parameter.</p> <p> Note! In the ToF Tool, you can view the entire saved table in the "Lin-Tab." window.</p>
ACTIV LIN. TAB. Y Display	<p>A Y-value of the linearisation table already saved appears on the display You can select a point of the linearisation table via the LINE-NUMB parameter.</p> <p> Note! In the ToF Tool, you can view the entire saved table in the "Lin-Tab." window.</p>
TANK DESCRIPTION Entry	<p>Enter tank description. (max. 32 alphanumeric characters)</p> <p>Factory setting: -----</p>
TAB. ACTIVATE Selection	<p>Activate a table entered.</p>

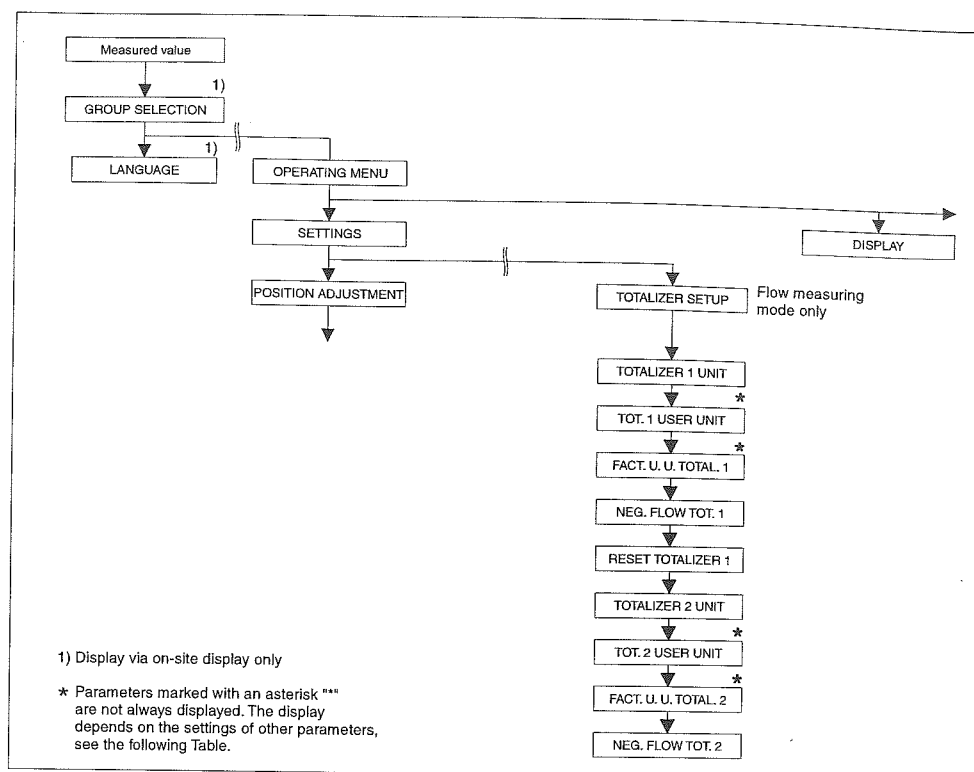


Fig. 29: TOTALIZER SETUP function group

PC1-11111111-10-11-11-11-002

Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP

Parameter name	Description
Prerequisite: <ul style="list-style-type: none"> MEASURING MODE = flow (→ see also page 35). 	
Note: <ul style="list-style-type: none"> See also page 31 ff, section 6 "Flow measurement". 	
TOTALIZER 1 UNIT (398), (666), (664), (662) Selection	Select unit for totalizer 1. Depending on the setting in the FLOW-MEAS. TYPE parameter (→ Page 71) this parameter offers a list of volume, norm volume, standard volume and mass units. When a new volume or mass unit is selected, totalizer-specific parameters are converted and displayed with the new unit within a unit group. When the flow mode is changed, the totalizer value is not converted. The 3-digit ID number on the on-site display depends on the FLOW-MEAS. TYPE selected: <ul style="list-style-type: none"> (398): FLOW-MEAS. TYPE "Volume p. cond." (662): FLOW-MEAS. TYPE "Mass p. cond." (664): FLOW-MEAS. TYPE "Gas. std. cond." (666): FLOW-MEAS. TYPE "gas. norm conditions" Factory setting: m^3


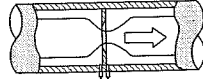
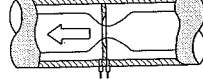
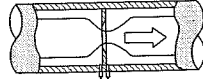
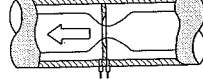
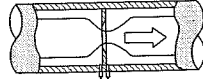
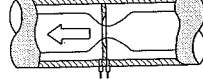
Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP																	
Parameter name	Description																
TOT. 1 USER UNIT (627) Entry	<p>Enter text (unit) for customer-specific unit for totalizer 1. You can enter a maximum of eight alphanumeric characters here. → See also FACT. U. U. TOTAL. 1.</p> <p>Prerequisite:</p> <ul style="list-style-type: none">■ TOTALIZER 1 UNIT = user unit <p> Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the ToF Tool, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the TOT. 1 USER UNIT parameter. The measured value is displayed with the additional text "User Unit".</p> <p>Factory setting:</p> <p>-----</p>																
FACT. U. U. TOTAL. 1 (329) Entry	<p>Enter conversion factor for a customer-specific unit for totalizer 1. The conversion factor must be entered in relation to an appropriate SI unit, e.g. m³ for the "Volume p. cond." FLOW-MEAS. TYPE. → See also TOT. 1 USER UNIT.</p> <p>Prerequisite:</p> <ul style="list-style-type: none">■ TOTALIZER 1 UNIT = user unit <p>Example: You want the measured value to be displayed in "buckets".</p> <ul style="list-style-type: none">– MEASURED VALUE = 1 m³ ≈ 100 buckets– Entry TOT. 1 USER UNIT: bucket– Entry FACT. U. U. TOTAL. 1: 100– Result: MEASURED VALUE = 100 buckets <p>Factory setting:</p> <p>1.0</p>																
NEG. FLOW TOT. 1 (400) Selection	<p>Specify way of counting negative flows for totalizer 1.</p> <table><tr><td></td><td></td><td></td></tr><tr><td>Optionen</td><td></td><td></td></tr><tr><td>positiv</td><td>Zählersumme steigt</td><td>Zählersumme steigt</td></tr><tr><td>negativ</td><td>Zählersumme steigt</td><td>Zählersumme nimmt ab</td></tr><tr><td>neutral</td><td>Zählersumme steigt</td><td>Zählersumme bleibt konstant</td></tr></table> <p><small>P01-xMD7xxxx-16-xx-xx-xx-003</small></p> <p>Factory setting:</p> <p>Positive</p>					Optionen			positiv	Zählersumme steigt	Zählersumme steigt	negativ	Zählersumme steigt	Zählersumme nimmt ab	neutral	Zählersumme steigt	Zählersumme bleibt konstant
																	
Optionen																	
positiv	Zählersumme steigt	Zählersumme steigt															
negativ	Zählersumme steigt	Zählersumme nimmt ab															
neutral	Zählersumme steigt	Zählersumme bleibt konstant															
RESET TOTALIZER1 (331) Selection	<p>You reset totalizer 1 to zero with this parameter.</p> <p>Options:</p> <ul style="list-style-type: none">■ Abort (do not reset)■ Reset <p>Factory setting:</p> <p>Abort</p>																
TOTALIZER 2 UNIT (399), (663), (665), (667) Selection	<p>Select unit for totalizer 2. → See also TOTAL 1. ENG. UNIT.</p> <p>The 3-digit ID number on the on-site display depends on the FLOW-MEAS. TYPE selected:</p> <ul style="list-style-type: none">– (399): FLOW-MEAS. TYPE "Volume p. cond."– (663): FLOW-MEAS. TYPE "Mass p. cond."– (665): FLOW-MEAS. TYPE "Gas. std. cond."– (667): FLOW-MEAS. TYPE "Gas. norm conditions" <p>Factory setting:</p> <p>m³</p>																

Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP	
Parameter name	Description
TOT. 2 USER UNIT (628) Entry	Enter text (unit) for customer-specific unit for totalizer 2. → See also TOT. 1 USER UNIT. Prerequisite: ■ TOTALIZER 2 UNIT = user unit Factory setting: -----
FACT. U. U. TOTAL. 2 (330) Selection	Enter conversion factor for a customer-specific unit for totalizer 2. → See also FACT. U. U. TOTAL. 1. Prerequisite: ■ TOTALIZER 2 UNIT = user unit Factory setting: 1.0
NEG. FLOW TOT. 2 (416) Selection	Specify way of counting negative flows for totalizer 2. → See NEG. FLOW TOT. 1. Factory setting: Positive

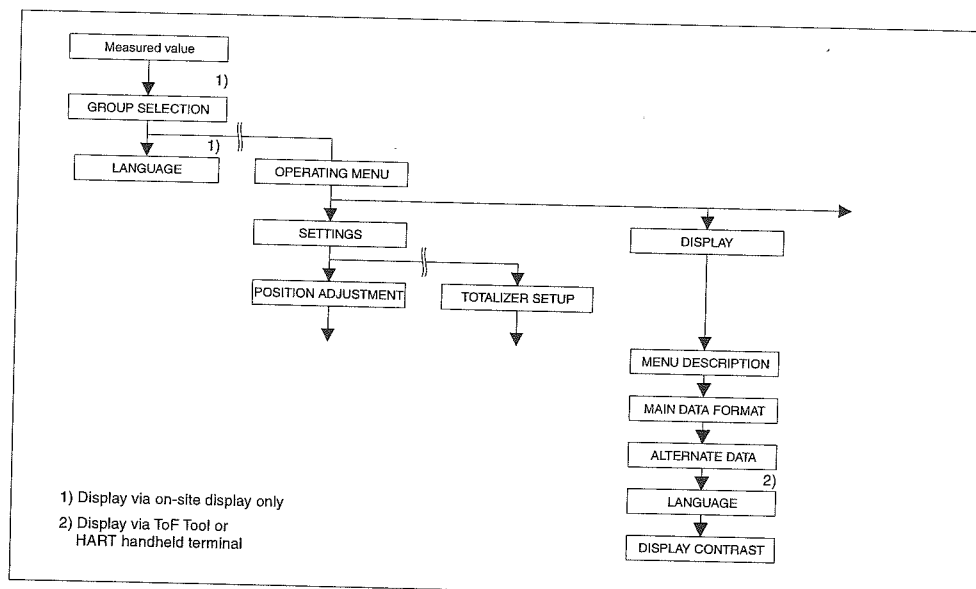


Fig. 30: DISPLAY group

P01-xxxxxx-10-xx-xx-xx-093

Table 19: (GROUP SELECTION →) OPERATING MENU → DISPLAY


Parameter name	Description
MENU DESCRIPTOR (419) Selection	<p>Specify contents for the main line of the on-site display in the measuring mode. → See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.1 "On-site display".</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Main measured value (PV) ■ Main measured value (%) ■ Pressure ■ Flow ■ Level ■ Tank content ■ Current ■ Temperature ■ Error number ■ Totalizer 1 ■ Totalizer 2 <p>The selection depends on the measuring mode chosen.</p> <p>Factory setting: Main measured value (PV)</p>
MAIN DATA FORMAT (688) Selection	<p>Specifies the number of places after the decimal point for the value displayed in the main line. → See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.1 "On-site display".</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Auto ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx <p>Factory setting: Auto</p>
ALTERNATE DATA (423) Selection	<p>Switch on "Alternating display" mode.</p> <p>In this display mode, the on-site display alternates between the following measured values depending on the measuring mode selected.</p> <ul style="list-style-type: none"> – Pressure: main measured value (PV), main measured value (%), pressure, current and temperature – Level: main measured value (PV), main measured value (%), pressure, level, tank content, current and temperature – Flow: main measured value (PV), main measured value (%), pressure, flow, temperature, totalizer 1 and totalizer 2 <p>Options:</p> <ul style="list-style-type: none"> ■ Off ■ On <p>Factory setting: Off</p>
LANGUAGE Selection	<p>Select the menu language for the on-site display.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ For on-site operation, the LANGUAGE parameter is arranged directly under GROUP SELECTION (menu path: GROUP SELECTION → LANGUAGE, see also page 34). ■ Select the menu language for the ToF Tool via the "Options" menu → "Settings" → "Language" tab → "Tool language" field. <p>Options:</p> <ul style="list-style-type: none"> ■ Deutsch ■ English ■ Français ■ Italiano ■ Español ■ Nederlands <p>Factory setting: English</p>

Table 19: (GROUP SELECTION →) OPERATING MENU → DISPLAY

Parameter name	Description
DISPLAY CONTRAST (339) Entry	<p>Adjust contrast of on-site display.</p> <p>You specify the contrast of the display with a number. You can also adjust the contrast of the display by means of the keys on the electronic insert or at the device.</p> <p>→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.2.3 "Function of operating keys".</p> <p>Input range: 4...13, 4: contrast weaker (brighter), 13: contrast stronger (darker).</p> <p>Factory setting: 8</p>

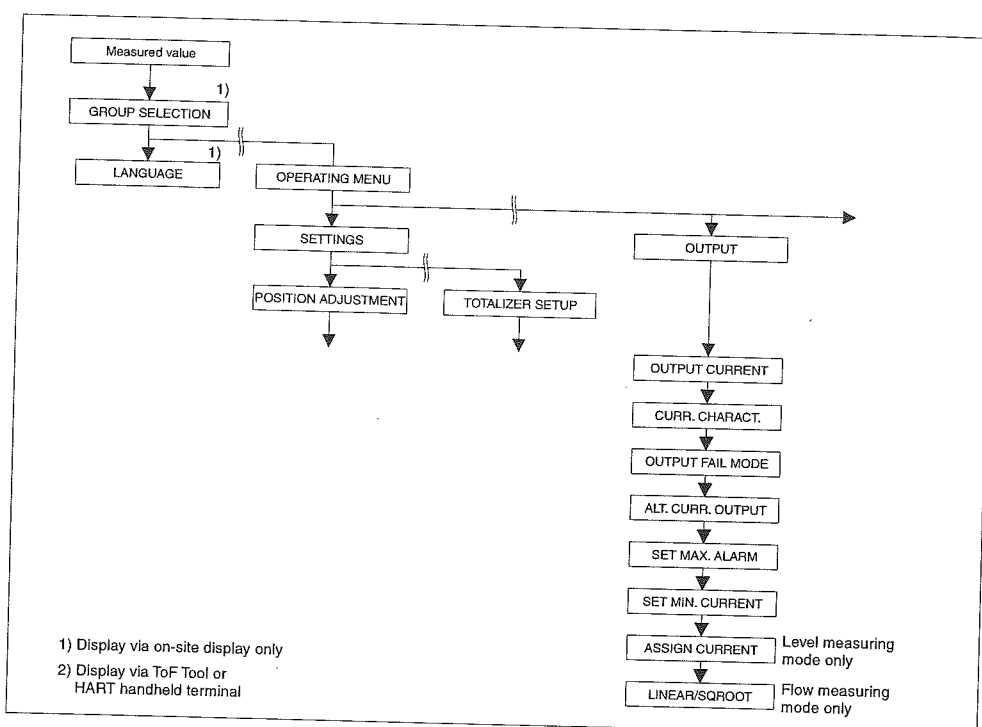


Fig. 31: OUTPUT group

Table 20: (GROUP SELECTION →) OPERATING MENU → OUTPUT

Parameter name	Description
OUTPUT CURRENT (254) Display	Displays the current current value.

Table 20: (GROUP SELECTION →) OPERATING MENU → OUTPUT	
Parameter name	Description
CURR. CHARACT. (694), (695), (696), (764) Selection	<p>Select curve of current output.</p> <p>Options:</p> <p>Fig. 32: Illustration of current output curves</p> <ol style="list-style-type: none"> Linear: lower range value = 4 mA, upper range value = 20 mA Bi-linear: lower range value = 4 mA, centre or zero = 20 mA, upper range value = 4 mA Linear inverse: lower range value = 20 mA, upper range value = 4 mA Bi-linear inverse: lower range value = 20 mA, centre or zero = 4 mA, upper range value = 20 mA <p>LRV Lower range value URV Upper range value I Current p Measured value (pressure)</p> <p>The 3-digit ID number on the on-site display depends on the MEASURING MODE selected:</p> <ul style="list-style-type: none"> – (694): MEASURING MODE "Pressure" or MEASURING MODE "Flow" with the setting for LINEAR/SQROOT "Linear" – (695): MEASURING MODE "Flow" with the setting LINEAR/SQROOT "Square root" – (696): MEASURING MODE "Level", LEVEL MODE "Linear" or "Pressure linearized" and LEVEL MODE "Height linearized" with the setting for ASSIGN CURRENT "Level" – (764): MEASURING MODE "Level", LEVEL MODE "Height linearized" with the setting for ASSIGN CURRENT "Tank content" <p>Factory setting: Linear</p>
OUTPUT FAIL MODE (388) Entry	<p>Select the current value in the event of an alarm. In the event of an alarm, the current and the bargraph assume the current value specified with this parameter.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Max. alarm (110%): can be set between 21...23 mA ■ Hold meas. value: last measured value is kept. ■ Min. alarm (–10%): 3.6 mA <p>→ See also this table SET MAX. ALARM and Operating Instructions BA 270P (Deltabar S) or BA271P (Cerabar S), section 8.2.1. "Setting current output for alarm".</p> <p>Factory setting: Max. alarm 110% (22 mA)</p>

Table 20: (GROUP SELECTION →) OPERATING MENU → OUTPUT

Parameter name	Description
ALT. CURR. OUTPUT (597) Selection	<p>Set current output if sensor limits undershot or overshot.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Normal: the current output assumes the value set via the OUTPUT FAIL MODE and SET MAX. ALARM parameters. ■ NAMUR: <ul style="list-style-type: none"> – Lower sensor limit undershot (E120): Current output = 3.6 mA – Upper sensor limit overshoot (E115): current output assumes the value set via the SET MAX. ALARM parameter <p>Factory setting: Normal</p>
SET MAX. ALARM (342) Entry	<p>Enter current value for maximum alarm current. → See also OUTPUT FAIL MODE.</p> <p>Input range: 21...23 mA</p> <p>Factory setting: 22 mA</p>
SET MIN. CURRENT (343) Entry	<p>Enter lower current limit. Some switching units sometimes do not accept currents less than 4.0 mA.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ 3.8 mA ■ 4.0 mA <p>Factory setting: 3.8 mA</p>
ASSIGN CURRENT (760) Selection	<p>Specify current signal for the "Level" measuring mode. See also SET LRV (→ Page 75) and SET URV (→ Page 75).</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level, LEVEL MODE = height linearized <p>Options:</p> <ul style="list-style-type: none"> ■ Height ■ Tank content <p>Factory setting: Tank content</p>
LINEAR/SQROOT (390) Selection	<p>Specify current signal for the "Flow" measuring mode. See also SET LRV (→ Page 76) and SET URV (→ Page 77).</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = flow <p>Options:</p> <ul style="list-style-type: none"> ■ Linear: the linear pressure signal is used for the current output. ■ Square root: the root flow signal is used for the current output. The "square root" current signal is indicated on the on-site display with a root symbol. <p>Factory setting: Square root</p>

Table 20: (GROUP SELECTION →) OPERATING MENU → OUTPUT

Parameter name	Description
ALT. CURR. OUTPUT (597) Selection	<p>Set current output if sensor limits undershot or overshoot.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Normal: the current output assumes the value set via the OUTPUT FAIL MODE and SET MAX. ALARM parameters. ■ NAMUR: <ul style="list-style-type: none"> – Lower sensor limit undershot (E120): Current output = 3.6 mA – Upper sensor limit overshoot (E115): current output assumes the value set via the SET MAX. ALARM parameter <p>Factory setting: Normal</p>
SET MAX. ALARM (342) Entry	<p>Enter current value for maximum alarm current. → See also OUTPUT FAIL MODE.</p> <p>Input range: 21...23 mA</p> <p>Factory setting: 22 mA</p>
SET MIN. CURRENT (343) Entry	<p>Enter lower current limit. Some switching units sometimes do not accept currents less than 4.0 mA.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ 3.8 mA ■ 4.0 mA <p>Factory setting: 3.8 mA</p>
ASSIGN CURRENT (760) Selection	<p>Specify current signal for the "Level" measuring mode. See also SET LRV (→ Page 75) and SET URV (→ Page 75).</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level, LEVEL MODE = height linearized <p>Options:</p> <ul style="list-style-type: none"> ■ Height ■ Tank content <p>Factory setting: Tank content</p>
LINEAR/SQROOT (390) Selection	<p>Specify current signal for the "Flow" measuring mode. See also SET LRV (→ Page 76) and SET URV (→ Page 77).</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = flow <p>Options:</p> <ul style="list-style-type: none"> ■ Linear: the linear pressure signal is used for the current output. ■ Square root: the root flow signal is used for the current output. The "square root" current signal is indicated on the on-site display with a root symbol. <p>Factory setting: Square root</p>

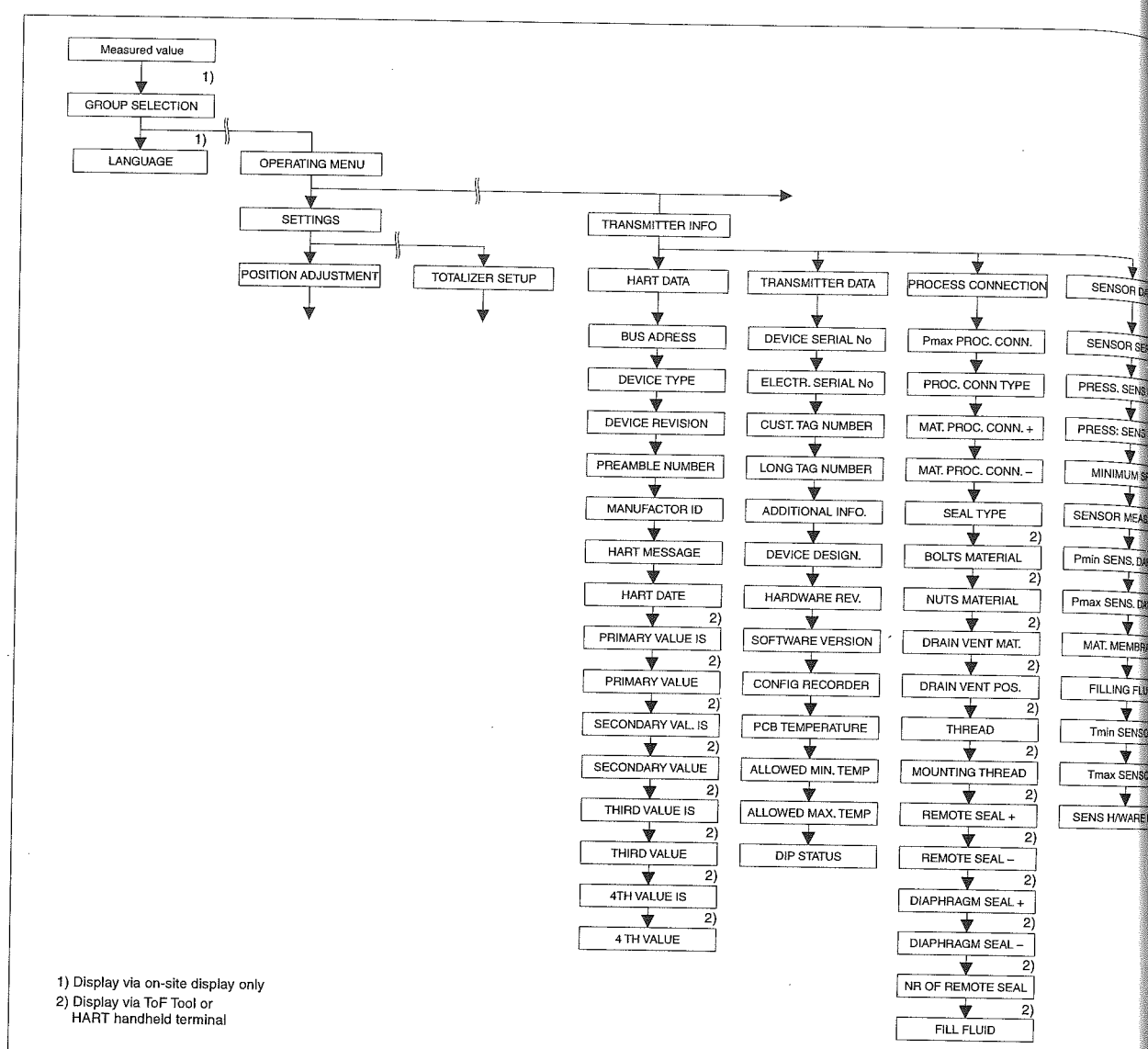


Fig. 33: TRANSMITTER INFO group

- For the HART DATA function group, see page 90, table 21
 → For the TRANSMITTER DATA function group, see page 92, table 22
 → For the PROCESSINFO function group, see page 93, table 23
 → For the SENSOR DATA function group, see page 95, table 24

Table 21: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → HART DATA

Parameter name	Description
BUS ADDRESS (345) Entry	Enter the address for the exchange of data with the HART protocol. (HART 5.0: range 0...15, HART 6.0: range 0...63) Factory setting: 0
DEVICE TYPE (351) Display	Displays the device identification number in decimal numerical format, here Deltabar S: 23 Prerequisite: ■ Deltabar S differential pressure transmitter
DEVICE TYPE (802) Display	Displays the device identification number in decimal numerical format, here Cerabar S: 24 Prerequisite: ■ Pressure transmitter Cerabar S

Table 21: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → HART DATA

Parameter name	Description
DEVICE REVISION (699) Display	Displays the device revision
PREAMBLE NUMBER (036) Entry	Enter the number of preambles in the HART protocol. (Synchronisation of the modem modules along a transmission path, each modem module could "swallow" a byte – at least 2 bytes must arrive.) Input range: 2...20 Factory setting: 5
MANUFACTURER ID (432) Display	Displays the manufacturer number in a decimal numerical format. Here: 17 Endress+Hauser
HART MESSAGE (271) Entry	Enter message (max. 32 alphanumeric characters). On command from the master, this message is sent via the HART protocol. Factory setting: ----- or as per order specifications
HART DATE (481) Entry	Enter the date of the last configuration change. Factory setting: DD.MM.YY (date of final test)
PRIMARY VALUE IS Display	This parameter displays the following measured value depending on the measuring mode selected: – Measuring mode "Pressure": PRESSURE – "Level" measuring mode, "Linear" or "Pressure linearized" level type: LEVEL BEFORE LIN – Measuring mode "Level", level type "Height linearized": TANK CONTENT – Measuring mode "Flow": SUPPRESSED FLOW → See also PRIMARY VALUE. Prerequisite: ■ ToF Tool or HART handheld terminal
PRIMARY VALUE Display	Displays the primary value. → See also PRIMARY VALUE IS. Prerequisite: ■ ToF Tool or HART handheld terminal
SECONDARY VAL. IS	Select second process value. You can choose between the following process values depending on the measuring mode selected: – PRESSURE – CORRECTED PRESS. – SENSOR PRESSURE – SENSOR TEMP. – PCB TEMPERATURE – SUPPRESSED FLOW – TOTALIZER 1 – TOTALIZER 2 – LEVEL BEFORE LIN – TANK CONTENT Prerequisite: ■ ToF Tool or HART handheld terminal
SECONDARY VALUE	Display second process value. → See also SECONDARY VAL. IS. Prerequisite: ■ ToF Tool or HART handheld terminal
THIRD VALUE IS	Select third process value. → See also SECONDARY VAL. IS. Prerequisite: ■ ToF Tool or HART handheld terminal

Table 21: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → HART DATA	
Parameter name	Description
THIRD VALUE	Display third process value. → See also SECONDARY VAL. IS. Prerequisite: ■ ToF Tool or HART handheld terminal
4TH VALUE IS	Select fourth process value. → See also SECONDARY VAL. IS. Prerequisite: ■ ToF Tool or HART handheld terminal
4TH VALUE	Display fourth process value. → See also SECONDARY VAL. IS. Prerequisite: ■ ToF Tool or HART handheld terminal

Table 22: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → TRANSMITTER DATA	
Parameter name	Description
DEVICE SERIAL No (354) Display	Displays the serial number of the device (11 alphanumeric characters).
ELECTR. SERIAL No (386) Display	Displays the serial number of the main electronics (11 alphanumeric characters).
CUST. TAG NUMBER (055) Entry	Enter TAG number (max. 8 alphanumeric characters). Factory setting: _____ or as per order specifications
LONG TAG NUMBER (305) Entry	Enter TAG number (max. 32 alphanumeric characters). Factory setting: _____ or as per order specifications
ADDITIONAL INFO. (272) Entry	Enter tag description (max. 16 alphanumeric characters). Factory setting: _____ or as per order specifications
DEVICE DESIGN. (350) Display	Displays the device designation and order code.
HARDWARE REV. (266) Display	Displays the revision number of the main electronics e.g.: V02.00
SOFTWARE VERSION (264) Display	Displays the software version e.g.: V02.00
CONFIG RECORDER (352) Display	Displays the configuration counter. This counter is increased by one with each change to a parameter or group. The counter counts to 65535 and then starts again at zero. Changes in the parameters of the DISPLAY function group do not increase the counter.
PCB TEMPERATURE (357) Display	Displays the measured temperature of the main electronics.
ALLOWED MIN. TEMP (358) Display	Displays the lower temperature limit of the main electronics.
ALLOWED MAX. TEMP (359) Display	Displays the upper temperature limit of the main electronics.

Table 22: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → TRANSMITTER DATA

Parameter name	Description
DIP STATUS (363) Display	<p>Displays the status of DIP switch 1 on the electronic insert.</p> <p>You can lock or unlock parameters relevant to the measured value with DIP switch 1. If operation is locked by means of the INSERT PIN No. parameter, you can only unlock operation again by means of this parameter. (→ INSERT PIN NO, see page 101.)</p> <p>→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.9 "Locking/unlocking operation".</p> <p>Display:</p> <ul style="list-style-type: none"> ■ On (locking switched on) ■ Off (locking switched off) <p>Factory setting:</p> <p>Off (locking switched off)</p>

Table 23: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → PROCESS CONNECTION

Parameter name	Description
Pmax PROC. CONN. (570) Entry	<p>For entering and displaying the maximum permitted pressure of the process connection.</p> <p>Factory setting:</p> <p>In accordance with nameplate data (→ see also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 2.1.1 nameplate)</p>
PROC. CONN. TYPE (482) Selection	<p>For selecting and displaying the process connection type.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Not used ■ Unknown ■ Special ■ Oval flange ■ Thread female ■ Thread male ■ Flange ■ Remote seal
MAT. PROC. CONN. + (360) Selection	<p>For selecting and displaying the material of the process connection (P+).</p> <p>→ See also parameter description for MAT. PROC. CONN. -</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Not used ■ Unknown ■ Special ■ Steel ■ 304 st. steel ■ 316 st. steel ■ Alloy C ■ Monel ■ Tantalum ■ Titanium ■ PTFE (Teflon) ■ 316L st. steel ■ PVC ■ Inconel ■ PVDF ■ ECTFE <p>Factory setting:</p> <p>As per order specifications</p>
MAT. PROC. CONN. - (361) Selection	<p>For selecting and displaying the material of the process connection (P-).</p> <p>→ See also parameter description for MAT. PROC. CONN. +</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ Deltabar S differential pressure transmitter

Table 23: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → PROCESS CONNECTION

Parameter name	Description
SEAL TYPE (362) Selection	For selecting and displaying the material of the process seal. Options: <ul style="list-style-type: none"> ■ Not used ■ Unknown ■ Special ■ FKM Viton ■ NBR ■ EPDM ■ Urethane ■ IIR ■ Kalrez ■ FKM Viton oxyg ■ CR ■ MVQ ■ PTFE glass ■ PTFE graphite ■ PTFE oxygen ■ Copper ■ Copper f. oxygen Factory setting: As per order specifications
BOLTS MATERIAL	For selecting and displaying the material of the bolts. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
NUTS MATERIAL	For selecting and displaying the material of the nuts. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
DRAIN VENT MAT.	For selecting and displaying the material of the vent valves. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
DRAIN VENT POS.	For selecting and displaying the position of the vent valves. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
THREAD	For selecting and displaying the process connection thread. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
MOUNTING THREAD	For selecting and displaying the ways of securing the device. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
REMOTE SEAL +	For selecting and displaying the diaphragm seal type on the positive side. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
REMOTE SEAL -	For selecting and displaying the diaphragm seal type on the negative side. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
DIAPHRAG. MAT. +	For selecting and displaying the diaphragm material on the positive side. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
DIAPHRAG. MAT. -	For selecting and displaying the diaphragm material on the negative side. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal
NR OF REMOTE SEAL	For selecting and displaying the number of diaphragm seals. Prerequisite: <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal

Table 23: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → PROCESS CONNECTION

Parameter name	Description
FILL FLUID	For selecting and displaying the diaphragm seal fill fluid. Prerequisite: ■ ToF Tool or HART handheld terminal

Table 24: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → SENSOR DATA (all measuring modes)

Parameter name	Description
SENSOR SER. No. (250) Display	Displays the serial number of the sensor (11 alphanumeric characters).
PRESS. SENS. LOLIM (484) Display	Displays the lower measuring limit of the sensor.
PRESS. SENS. HILIM (485) Display	Displays the upper measuring limit of the sensor.
MINIMUM SPAN (591) Display	Displays the smallest possible span.
SENSOR MEAS. TYPE (581) Display	Displays the sensor type. ■ Deltabar S = differential ■ Cerabar S with gauge pressure sensors = relative ■ Cerabar S with absolute pressure sensors = absolute
Pmin SENS. DAMAGE (251) Display	Displays the minimum permissible absolute pressure of the sensor (vacuum-proofing).
Pmax SENS. DAMAGE (252) Display	Displays the maximum permissible absolute pressure of the sensor (overpressure-proofing).
MAT. MEMBRANE (365) Display	Displays the membrane material Factory setting: As per version in the order code → For Deltabar S, see Technical Information TI382P or for Cerabar S, see Technical Information TI383P, "Ordering information" section.
FILLING FLUID (366) Display	Displays the filling fluid.
Tmin SENSOR (368) Display	Displays the lower nominal temperature limit of the sensor.
Tmax SENSOR (369) Display	Displays the upper nominal temperature limit of the sensor.
SENS H/WARE REV (487) Display	Displays the revision number of the sensor hardware. e.g.: 1

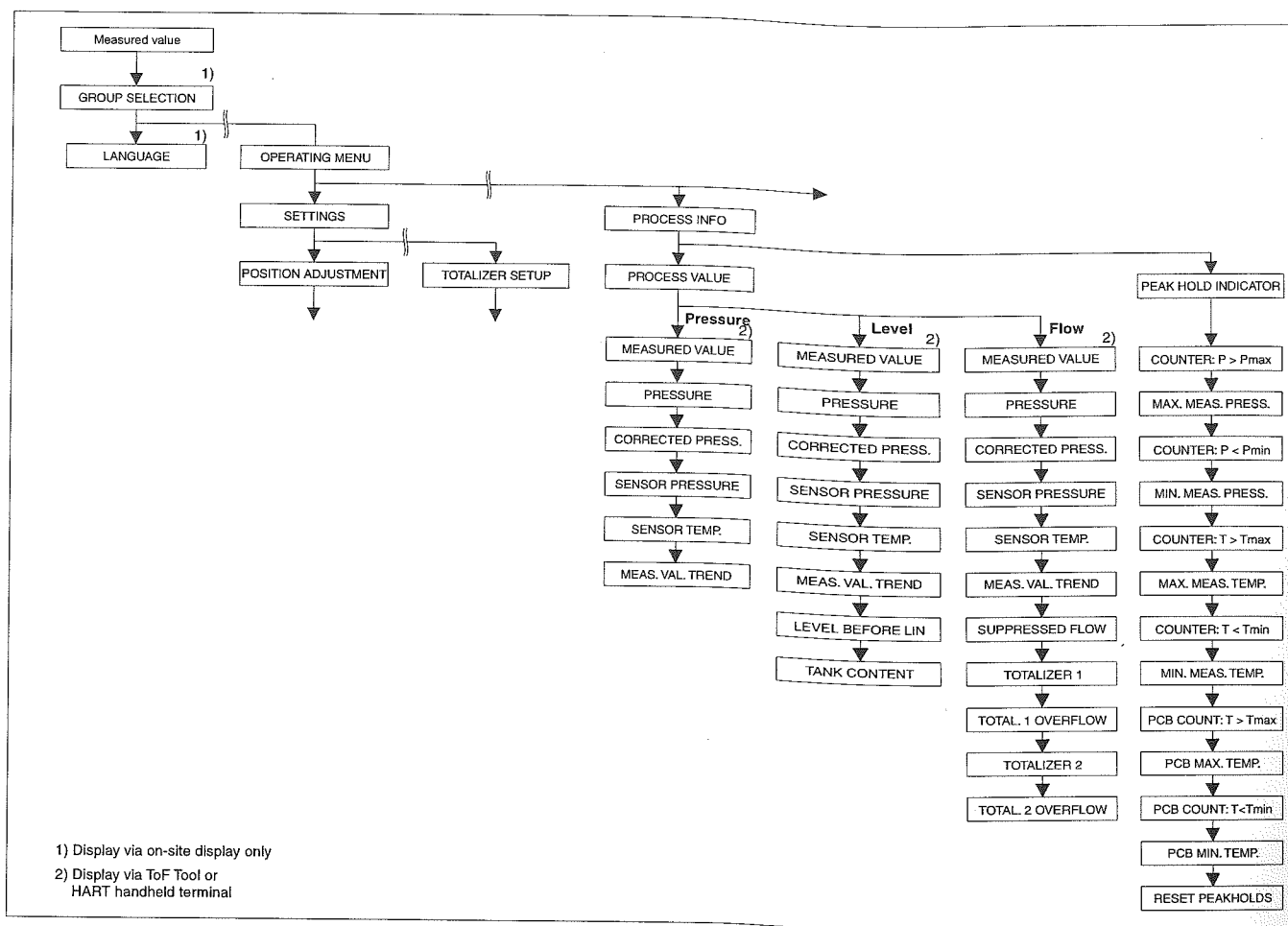


Fig. 34: PROCESSINFO group

- For the PROCESS VALUES function group, "Pressure" measuring mode, see page 96, table 25
- For the PROCESS VALUES function group, "Level" measuring mode, see page 97, table 26
- For the PROCESS VALUES function group, "Flow" measuring mode, see page 98, table 27
- For the PEAK HOLD INDICATOR function group, see page 99, table 28

Table 25: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Pressure"	
Parameter name	Description
Prerequisite:	
■ MEASURING MODE = pressure (→ see also page 35).	
MEASURED VALUE (679)	<p>Displays the measured value</p> <p>In the "Pressure" measuring mode, this value corresponds to the PRESSURE parameter.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ ToF Tool or HART handheld terminal <p>On-site operation:</p> <ul style="list-style-type: none"> ■ For on-site operation, the MEASURED VALUE parameter is displayed on the 1st level.

Table 25: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Pressure"

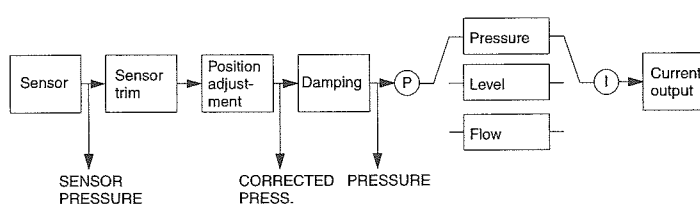
Parameter name	Description
PRESSURE (301) Display	<p>Displays the measured pressure after sensor recalibration, position adjustment and damping. This value corresponds to the MEASURED VALUE parameter in the "Pressure" measuring mode.</p>  <p style="text-align: right;">P01-xMD7xxxx-05-xx-xx-xx-000</p>
CORRECTED PRESS. (434) Display	Displays the measured pressure after sensor trim and position adjustment and before damping. → See also PRESSURE diagram.
SENSOR PRESSURE (584) Display	Displays the measured pressure before sensor trim, position adjustment and damping. → See also PRESSURE diagram.
SENSOR TEMP. (367) Display	Displays the temperature currently measured in the sensor. This temperature can deviate from the process temperature.
MEAS. VAL. TREND (378) Display	Displays the trend of the pressure measured value. Possibilities: increasing, decreasing, constant

Table 26: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Level"

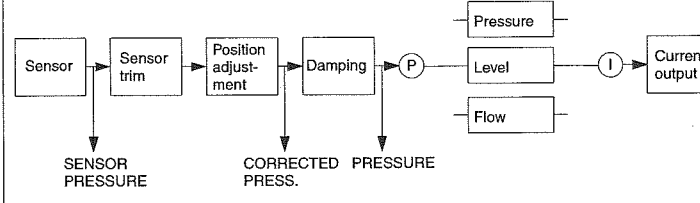
Parameter name	Description
Prerequisite: ■ MEASURING MODE = level (→ see also page 35).	
MEASURED VALUE (679) Display	<p>Displays the measured value</p> <p>In the "Level" measuring mode with "Linear" or "Pressure linearized" level type, this value corresponds to the LEVEL BEFORE LIN parameter</p> <p>In the "Level" measuring mode with "Height linearized" level type, this value corresponds to the TANK CONTENT parameter.</p> <p>Prerequisite:</p> <p>■ ToF Tool or HART handheld terminal</p> <p>On-site operation:</p> <p>■ For on-site operation, the MEASURED VALUE parameter is displayed on the 1st level.</p>
PRESSURE (301) Display	<p>Displays the measured pressure after sensor recalibration, position adjustment and damping. This value corresponds to the MEASURED VALUE parameter in the "Pressure" measuring mode.</p>  <p style="text-align: right;">P01-xMD7xxxx-05-xx-xx-xx-002</p>
CORRECTED PRESS. (434) Display	Displays the measured pressure after sensor trim and position adjustment and before damping. → See also PRESSURE diagram.
SENSOR PRESSURE (584) Display	Displays the measured pressure before sensor trim, position adjustment and damping. → See also PRESSURE diagram.
SENSOR TEMP. (367) Display	Displays the temperature currently measured in the sensor. This temperature can deviate from the process temperature.

Table 26: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Level"

Parameter name	Description
MEAS. VAL. TREND (378) Display	Displays the trend of the pressure measured value. Possibilities: increasing, decreasing, constant
LEVEL BEFORE LIN (050) Display	Displays the level value prior to linearisation. Prerequisite: ■ LEVEL MODE = linear or height linearized Depending on the setting for the LIN. MEASURAND or COMB. MEASURAND parameter, this parameter displays the current level in % or in a unit of level.
TANK CONTENT (370) Display	Displays the level value after linearisation. Prerequisite: ■ LEVEL MODE = pressure linearized or height linearized Depending on the settings for the LIND. MEASURAND or COMB. MEASURAND parameter, the current tank content is displayed in % or in a unit of volume or mass. This value corresponds to the MEASURED VALUE.

Table 27: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Flow"

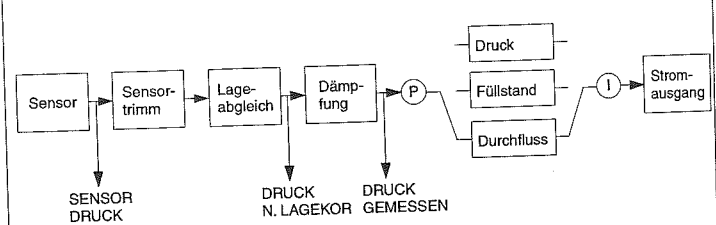
Parameter name	Description
Prerequisite: ■ MEASURING MODE = flow (→ see also page 35).	
MEASURED VALUE (679)	Displays the measured value In the "Flow" measuring mode, this value corresponds to the SUPPRESSED FLOW parameter. Prerequisite: ■ ToF Tool or HART handheld terminal On-site operation: ■ For on-site operation, the MEASURED VALUE parameter is displayed on the 1st level.
PRESSURE (301) Display	Displays the measured pressure after sensor recalibration, position adjustment and damping. This value corresponds to the MEASURED VALUE parameter in the "Pressure" measuring mode.  <small>PG1-XMD7xxxx-05-xx-xx-xx-003</small>
CORRECTED PRESS. (434) Display	Displays the measured pressure after sensor trim and position adjustment and before damping. → See also PRESSURE diagram.
SENSOR PRESSURE (584) Display	Displays the measured pressure before sensor trim, position adjustment and damping. → See also PRESSURE diagram.
SENSOR TEMP. (367) Display	Displays the temperature currently measured in the sensor. This temperature can deviate from the process temperature.
MEAS. VAL. TREND (378) Display	Displays the trend of the pressure measured value. Possibilities: increasing, decreasing, constant
SUPPRESSED FLOW (375) Display	Displays the current flow. Depending on the flow mode selected (→ FLOW-MEAS. TYPE), a volume flow, mass flow, standard volume flow or corrected volume flow is displayed.
TOTALIZER 1 (652) Display	Displays the total flow value of totalizer 1. You can reset the value with the RESET TOTALIZER 1 parameter. The TOTAL. 1 OVERFLOW parameter displays the overflow. Example: The value 123456789 m ³ is displayed as follows: – TOTALIZER 1: 3456789 m ³ – TOTAL. 1 OVERFLOW: 12 E7

Table 27: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Flow"

Parameter name	Description
TOTAL. 1 OVERFLOW (655) Display	Displays the overflow value of totalizer 1. → See also TOTALIZER 1.
TOTALIZER 2 (657) Display	Displays the total flow value of totalizer 2. You cannot reset totalizer 2. The TOTAL. 2 OVERFLOW parameter displays the overflow. → See also example for TOTALIZER 1.
TOTAL. 2 OVERFLOW (658) Display	Displays the overflow value of totalizer 2. → See also TOTALIZER 2 and example for TOTALIZER 1.

Table 28: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PEAK HOLD INDICATOR

Parameter name	Description
COUNTER:P > Pmax (380) Display	Displays the overpressure counter of the sensor The limit value is: upper nominal pressure limit of sensor + 10 % of upper nominal pressure limit of sensor. You can reset this counter by means of the RESET PEAKHOLD parameter.
MAX. MEAS. PRESS. (383) Display	Displays the largest measured pressure value (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
COUNTER P < Pmin (467) Display	Displays the vacuum pressure counter of the sensor The limit value is: lower nominal pressure limit of sensor – 10 % of upper nominal pressure limit of sensor. You can reset this counter by means of the RESET PEAKHOLD parameter.
MIN. MEAS. PRESS. (469) Display	Displays the smallest measured pressure value (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
COUNTER:T > Tmax (404) Display	Displays the number of times the specified temperature range of the sensor has been overshoot. You can reset this counter by means of the RESET PEAKHOLD parameter.
MAX. MEAS. TEMP. (471) Display	Displays the largest measured temperature in the sensor (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
COUNTER:T < Tmin (472) Display	Displays the number of times the specified temperature range of the sensor has been undershot. You can reset this counter by means of the RESET PEAKHOLD parameter.
MIN. MEAS. TEMP. (474) Display	Displays the smallest measured temperature in the sensor (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
PCB COUNT:T > Tmax (488) Display	Displays the number of times the specified temperature range of the electronics has been overshoot.
PCB MAX. TEMP. (490) Display	Displays the largest electronics temperature measured.
PCB COUNT:T < Tmin (492) Display	Displays the number of times the specified temperature range of the electronics has been undershot.
PCB MIN. TEMP. (494) Display	Displays the smallest electronics temperature measured.
RESET PEAKHOLD (382) Selection	<p>This parameter lists all the peak hold indicator parameters that can be reset. You can select the peak hold indicators you want to reset.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ None ■ Max. pressure ■ Min. pressure ■ Pmax history ■ Pmin history ■ Max. temp. ■ Min. temp. ■ Tmax history ■ Tmin history ■ Reset all <p>Factory setting: None</p>

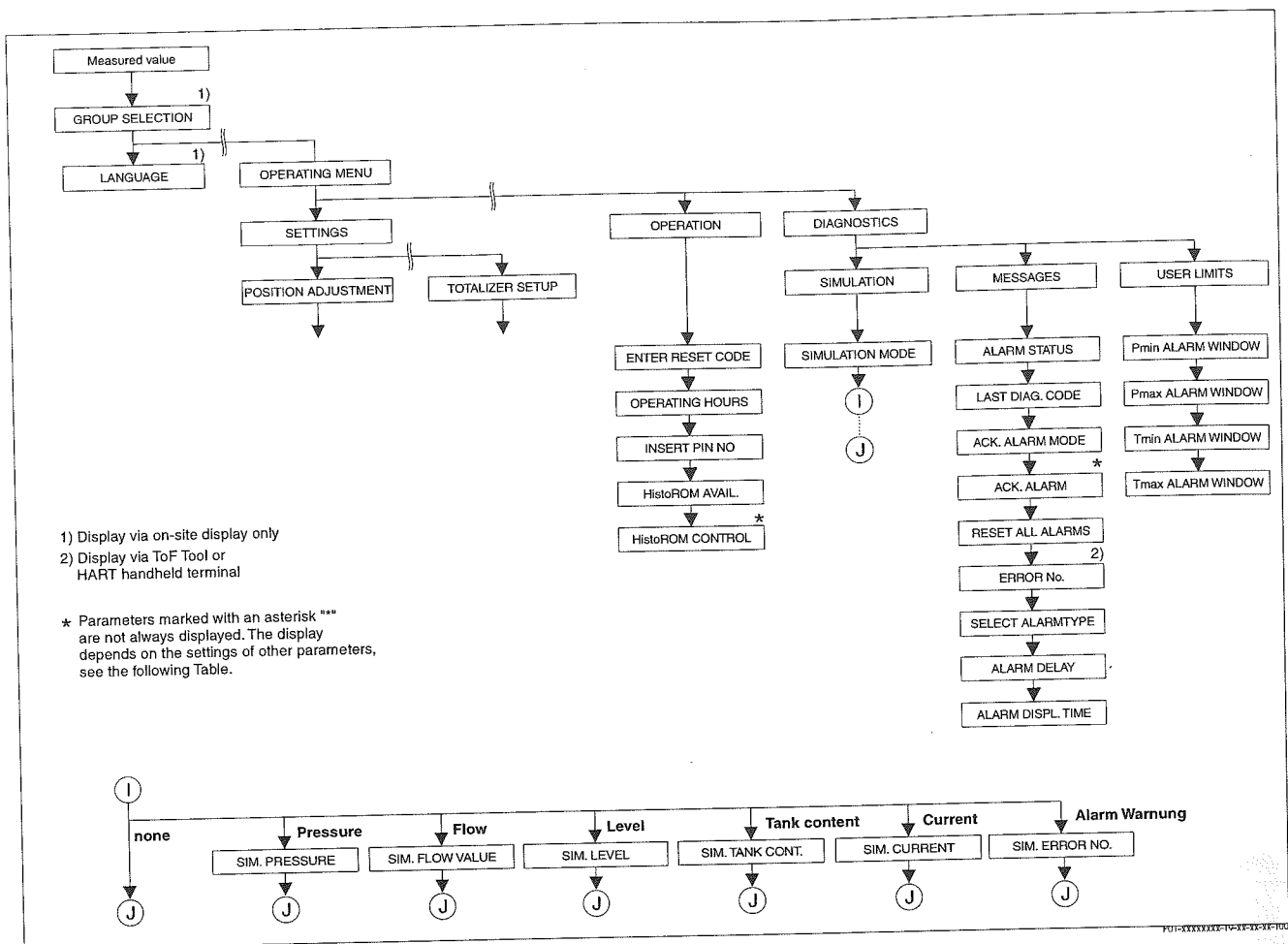


Fig. 35: OPERATING and DIAGNOSTICS group
 → For the OPERATING group, see page 100, table 29
 → For the SIMULATION function group, see page 102, table 30
 → For the MESSAGES function group, see page 103, table 31
 → For the USER LIMITS function group, see page 104, table 32

Table 29: (GROUP SELECTION →) OPERATING MENU → OPERATING	
Parameter name	Description
ENTER RESET CODE (047) Entry	Reset parameters completely or partially to factory values or delivery status. → See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.10 "Factory setting" (reset). Factory setting: 0
OPERATING HOURS (409) Display	Displays the hours of operation. This parameter cannot be reset.

Table 29: (GROUP SELECTION →) OPERATING MENU → OPERATING



Parameter name	Description
INSERT PIN NO (048) Entry	<p>For entering a code to lock or unlock operation.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ The -symbol on the on-site display indicates that operation is locked. Parameters which refer to how the display appears, e.g. LANGUAGE and DISPLAY CONTRAST can still be altered. ■ If operation is locked by means of the DIP-switch, you can only unlock operation again by means of the DIP-switch. If operation is locked by means of the on-site display or remote operation e.g. ToF Tool, you can unlock operation again by means of the on-site display or using remote operation. ■ If the operation is locked, any change to the "Damping on/off" DIP switch will not have any impact on the damping time. Any change will not take effect until the operation has been unlocked again. <p>→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.9 "Locking/unlocking operation".</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Lock: enter a number between 0...9999 which is ≠100. ■ Unlock: enter the number 100. <p>Factory setting: 100</p>
HistoROM AVAIL. (831) Display	<p>Indicates whether the optional HistoROM®/M-DAT memory module is connected to the electronic insert.</p> <p>→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.5 "HistoROM®/M-DAT (optional)".</p> <p>Options:</p> <ul style="list-style-type: none"> ■ Yes (HistoROM®/M-DAT is attached to the electronic insert) ■ No (HistoROM®/M-DAT is not attached to the electronic insert)
HistoROM CONTROL (832) Selection	<p>For selecting the direction for copying the data.</p> <p>→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.5. "HistoROM®/M-DAT (optional)".</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ A HistoROM®/M-DAT is attached to the electronic insert (HistoROM AVAIL. = yes) <p>Options:</p> <ul style="list-style-type: none"> ■ Abort ■ HistoROM → Device ■ Device → HistoROM <p>Factory setting: Abort (if HistoROM®/M-DAT is connected to the electronic insert)</p>

Table 30: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → SIMULATION	
Parameter name	Description
SIMULATION MODE (413) Selection	<p>Switch on simulation and select simulation type. Any simulation running is switched off if the measuring mode or level type is changed.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ None ■ Pressure, → see also this table parameter description for SIM. PRESSURE ■ Flow (only differential pressure transmitter), → see also this table parameter description for SIM. FLOW VALUE ■ Level, → see also this table parameter description for SIM. LEVEL ■ Tank content, → see also this table parameter description for SIM. TANK CONT. ■ Current, → see also this table parameter description for SIM. CURRENT ■ Alarm/warning, → see also this table parameter description for SIM. ERROR NO. <div style="text-align: center;"> <p style="text-align: right; font-size: small;">P01-xMD7xxxx-05-xx-xx-xx-004</p> </div> <p>Factory setting: None</p>
SIM. PRESSURE (414) Entry	<p>Enter simulation value. → See also SIMULATION MODE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ SIMULATION MODE = pressure <p>Factory setting: Current pressure measured value</p>
SIM. FLOW VALUE (639) Entry	<p>Enter simulation value. → See also SIMULATION MODE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = pressure and SIMULATION MODE = flow ■ MEASURING MODE = flow and SIMULATION MODE = flow
SIM. LEVEL (714) Entry	<p>Enter simulation value. → See also SIMULATION MODE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level and SIMULATION MODE = level
SIM. TANK CONT. (715) Entry	<p>Enter simulation value. → See also SIMULATION MODE.</p> <p>Prerequisites:</p> <ul style="list-style-type: none"> ■ MEASURING MODE = level, LEVEL MODE = pressure linearized and SIMULATION MODE = tank content ■ MEASURING MODE = level, LEVEL MODE = height linearized and SIMULATION MODE = tank content
SIM. CURRENT (270) Entry	<p>Enter simulation value. → See also SIMULATION MODE.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ SIMULATION MODE = current value <p>Factory setting: Current current value</p>

Table 30: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → SIMULATION	
Parameter name	Description
SIM. ERROR NO. (476) Entry	<p>Enter message number. → See also SIMULATION MODE. → See also these Operating Instructions, section 8.1 "Messages", "Code" table column.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ SIMULATION MODE = alarm/warning <p>Factory setting: 613 (simulation active)</p>


Table 31: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES	
Parameter name	Description
ALARM STATUS (046) Display	<p>Displays the current messages present. → See also these Operating Instructions, section 8.1. "Messages" and section 8.3 "Confirming messages".</p> <p>On-site display</p> <ul style="list-style-type: none"> ■ The measured value display shows the message with the highest priority. ■ The ALARM STATUS parameter shows all the messages in descending order of priority. You can scroll through all the messages present with the <input type="checkbox"/> or <input type="checkbox"/> key. <p>ToF Tool</p> <ul style="list-style-type: none"> ■ The "Status" field and the ALARM STATUS parameter show the message with the highest priority.
LAST DIAG. CODE (564) Display	<p>Displays the last messages that occurred and were eliminated.</p> <p> Note!</p> <ul style="list-style-type: none"> ■ On-site display: you can scroll through the last 15 messages with the <input type="checkbox"/> or <input type="checkbox"/> key. ■ ToF Tool, HART handheld terminal and Commuwin II: the last message appears on the display. ■ Use the RESET ALL ALARMS parameter to delete the messages listed in the LAST DIAG. CODE parameter.
ACK. ALARM MODE (401) Selection	<p>Switch on acknowledge alarm mode. → See also ACK. ALARM.</p> <p>Options:</p> <ul style="list-style-type: none"> ■ On ■ Off <p>Factory setting: Off</p>
ACK. ALARM (500) Selection	<p>Acknowledge alarm.</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> ■ ACK. ALARM MODE = on <p>Options:</p> <ul style="list-style-type: none"> ■ Abort ■ Confirm <p>The cause of the alarm must be eliminated, the message must be acknowledged via the ACK. ALARM parameter and, where applicable, the ALARM DISPL. TIME (→ Page 104) has to have elapsed before the device starts measuring again following an alarm. → See also these Operating Instructions, section 8.3 "Confirming messages".</p> <p>Factory setting: Abort</p>

Table 31: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES



Parameter name	Description
RESET ALL ALARMS (603) Selection	Use this parameter to reset all the messages of the LAST DIAG. CODE parameter. Options: ■ Abort ■ Confirm Factory setting: Abort
ERROR No. Entry	For "Error"-type messages, you can decide whether the device should behave as in the event of an alarm (A) or as in the event of a warning (W). Enter the corresponding message number for this parameter. → See also SELECT ALARMTYPE. → See also these Operating Instructions, section 8.1 "Messages" and section 8.2 "Response of outputs to errors". Prerequisite: ■ ToF Tool or HART handheld terminal
SELECT ALARMTYPE (595) – Entry (600) – Selection	For "Error"-type messages, you can decide whether the device should behave as in the event of an alarm (A) or as in the event of a warning (W). → See also ERROR No. → See also these Operating Instructions, section 8.2 "Response of outputs to errors". Options: ■ Alarm (A): output current assumes a defined value. ■ Warning (W): device continues measuring On-site operation: 1. Enter the corresponding message number for ERROR No. field. 2. Select "Alarm" or "Warning" option. ToF Tool or HART handheld terminal: 1. Enter the corresponding message number via the ERROR No. parameter. 2. Use the SELECT ALARMTYPE parameter to select the "Alarm" or "Warning" option.
ALARM DELAY (336) Entry	Enter alarm response time.  Note! There is no alarm if the cause of the error is eliminated within the alarm delay time. Input range: 0...100 s Factory setting: 0.0 s
ALARM DISPL. TIME (480) Entry	Enter alarm display time. Once the cause of the error is rectified, the alarm display time starts running.  Note! The following applies if the setting for ACK. ALARM MODE = on: If an alarm appears and the alarm display time elapses before the alarm has been acknowledged, the message will be cleared once it has been acknowledged. → See also these Operating Instructions, section 8.3 "Confirming messages". Input range: 0...999.9 s Factory setting: 0.0 s

Table 32: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → USER LIMITS

Parameter name	Description
Pmin ALARM WINDOW (332) Entry	Customer-specific process monitoring – enter lower pressure limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, section 8.1 "Messages", table, Code E730 and section 8.2. "Response of outputs to errors". Factory setting: Low sensor limit ■ 1.1 (→ For the low sensor limit, see PRESS. SENS LOLIM.)

Table 32: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → USER LIMITS

Parameter name	Description
Pmax ALARM WINDOW (333) Entry	Customer-specific process monitoring – enter upper pressure limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, section 8.1 "Messages", table, Code E731 and section 8.2. "Response of outputs to errors". Factory setting: High sensor limit ■ 1.1 (→ For the high sensor limit, see PRESS. SENS HILIM.)
Tmin ALARM WINDOW (334) Entry	Customer-specific process monitoring – enter lower temperature limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, section 8.1 "Messages", table, Code E732 and section 8.2. "Response of outputs to errors". Factory setting: Lower sensor temperature application limit – 10 K (→ For the lower temperature application limit, see Tmin SENSOR)
Tmax ALARM WINDOW (335) Entry	Customer-specific process monitoring – enter upper temperature limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, section 8.1 "Messages", table, Code E733 and section 8.2. "Response of outputs to errors". Factory setting: Upper sensor temperature application limit +10 K (→ For the upper temperature application limit, see Tmax SENSOR)

8 Trouble-shooting

8.1 Messages

The following table lists all the possible messages that can occur.



The device differentiates between the error types "Alarm", "Warning" and "Error". At the factory, all "Error" type messages are set to "Warning".

→ See "Error type/NA 64" column and parameter descriptions for ERROR No. and SELECT ALARMTYPE (→ Page 104).

In addition, the "Error type/NA 64" column classifies the messages in accordance with NAMUR Recommendation NA 64:

- Break down: indicated with "B"
- Maintenance need: indicated with "C" (check request)
- Function check: indicated with "I" (in service)

Error message display on the on-site display:

- The measured value display shows the message with the highest priority. → See "Priority" column.
- The ALARM STATUS (→ Page 103) parameter shows all the messages present in descending order of priority. You can scroll through all the messages present with the -key or -key.

Message display via the ToF Tool, HART handheld terminal and Commuwin II:

- The ALARM STATUS (→ Page 103) parameter shows the message with the highest priority.
→ See "Priority" column.

Note!

- For support and further information, please contact Endress+Hauser Service.
- → See also section 8.4, 8.5 and 8.6.



Code	Error type/ NA 64	Message/description	Cause	Measure	Priority
101 (A101)	Alarm B	B>Sensor electronic EEPROM error	<ul style="list-style-type: none"> Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). This message normally only appears briefly. Sensor defect. 	<ul style="list-style-type: none"> Wait a few minutes. Restart the device. Perform reset (Code 62). Block off electromagnetic effects or eliminate source of disturbance. Replace sensor. 	17
102 (W102)	Warning C	C>Checksum error in EEPROM: peakhold segment	<ul style="list-style-type: none"> Main electronics defect. Correct measurement can continue as long as you do not need the peak hold indicator function. 	<ul style="list-style-type: none"> Replace main electronics. 	53
106 (W106)	Warning C	C>Downloading - please wait	<ul style="list-style-type: none"> Downloading. 	<ul style="list-style-type: none"> Wait for download to complete. 	52
110 (A110)	Alarm B	B>Checksum error in EEPROM: configuration segment	<ul style="list-style-type: none"> The supply voltage is disconnected when writing. Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). Main electronics defect. 	<ul style="list-style-type: none"> Reestablish supply voltage. Perform reset (Code 7864) if necessary. Carry out calibration again. Block off electromagnetic effects or eliminate sources of disturbance. Replace main electronics. 	6
113 (A113)	Alarm B	B>ROM failure in transmitter electronic	<ul style="list-style-type: none"> Main electronics defect. 	<ul style="list-style-type: none"> Replace main electronics. 	1
115 (E115)	Error C	C>Sensor overpressure	<ul style="list-style-type: none"> Overpressure present. Sensor defect. 	<ul style="list-style-type: none"> Reduce pressure until message disappears. Replace sensor. 	29
116 (W116)	Warning C	C>Download error, repeat download	<ul style="list-style-type: none"> The file is defect. During the download, the data are not correctly transmitted to the processor, e.g. because of open cable connections, spikes (ripple) on the supply voltage or electromagnetic effects. 	<ul style="list-style-type: none"> Use another file. Check cable connection PC – transmitter. Block off electromagnetic effects or eliminate sources of disturbance. Perform reset (Code 7864) and carry out calibration again. Repeat download. 	36
120 (E120)	Error C	C>Sensor low pressure	<ul style="list-style-type: none"> Pressure too low. Sensor defect. 	<ul style="list-style-type: none"> Increase pressure until message disappears. Replace sensor. 	30
121 (A121)	Alarm B	B>Checksum error in factory segment of EEPROM	<ul style="list-style-type: none"> Main electronics defect. 	<ul style="list-style-type: none"> Replace main electronics. 	5
122 (A122)	Alarm B	B>Sensor not connected	<ul style="list-style-type: none"> Cable connection sensor –main electronics disconnected. Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). Main electronics defect. Sensor defect. 	<ul style="list-style-type: none"> Check cable connection and repair if necessary. Block off electromagnetic effects or eliminate source of disturbance. Replace main electronics. Replace sensor. 	13
130 (A130)	Alarm B	B>EEPROM is defect.	<ul style="list-style-type: none"> Main electronics defect. 	<ul style="list-style-type: none"> Replace main electronics. 	10
131 (A131)	Alarm B	B>Checksum error in EEPROM: min/max segment	<ul style="list-style-type: none"> Main electronics defect. 	<ul style="list-style-type: none"> Replace main electronics. 	9

Code	Error type/ NA 64	Message/description	Cause	Measure	Priority
132 (A132)	Alarm B	B>Checksum error in totalizer EEPROM	– Main electronics defect.	– Replace main electronics.	7
133 (A133)	Alarm B	B>Checksum error in History EEPROM	– An error occurred when writing. – Main electronics defect.	– Perform reset (Code 7864) and carry out calibration again. – Replace electronics.	8
602 (W602)	Warning C	C>Linearisation curve not monoton	– The linearisation table is not monotonic increasing.	– Add to linearisation table or perform linearisation again.	57
604 (W604)	Warning C	C>Linearisation table not valid. At least 2 points	– The linearisation table consists of less than 2 points.	– Add to linearisation table. If necessary, perform linearisation again.	58
613 (W613)	Warning I	I>Simulation is active	– Simulation is switched on, i.e. the device is not measuring at present.	– Switch off simulation.	60
620 (E620)	Error C	C>Current output out of range	The current is outside the permitted range 3.8...20.5 mA. – The pressure applied is outside the set measuring range (but within the sensor range).	– Check pressure applied, reconfigure measuring range if necessary (→ See also these Operating Instructions, chapter 4 to 6.) – Perform reset (Code 7864) and carry out calibration again.	49
700 (W700)	Warning C	C>Last configuration not stored	– An error occurred when writing or reading configuration data or the power supply was disconnected. – Main electronics defect.	– Perform reset (Code 7864) and carry out calibration again. – Replace main electronics.	54
701 (W701)	Warning C	C>Measuring chain config. exceeds sensor range	– The calibration carried out would result in the sensor nominal operating range being undershot or overshoot.	– Carry out calibration again.	51
702 (W702)	Warning C	C>HistoROM data not consistent.	– Data were not written correctly to the HistoROM, e.g. if the HistoROM was detached during the writing process. – HistoROM does not have any data.	– Repeat upload. – Perform reset (Code 7864) and carry out calibration again. – Copy suitable data to the HistoROM. (→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.5.1 "Copying configuration data".)	55
703 (A703)	Alarm B	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	22
704 (A704)	Alarm B	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	12
705 (A705)	Alarm B	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	21

Code	Error type/ NA 64	Message/description	Cause	Measure	Priority
706 (W706)	Warning C	C>Configuration in HistoROM and device not identical	<ul style="list-style-type: none"> Configuration (parameters) in the HistoROM and in the device is not identical. 	<ul style="list-style-type: none"> Copy data from the device to the HistoROM. (→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.5.1 "Copying configuration data".) Copy data from the HistoROM to the device. (→ See also Operating Instructions BA270P (Deltabar S) or BA271P (Cerabar S), section 5.5.1 "Copying configuration data".) The message remains if the HistoROM and the device have different software versions. The message goes out if you copy the data from the device to the HistoROM. 	59
707 (A707)	Alarm B	B>X-VAL. of lin. table out of edit limits.	<ul style="list-style-type: none"> At least one X-VALUE in the linearisation table is either below the value for HYDR. PRESS MIN. or MIN. LEVEL or above the value for HYDR. PRESS. MAX. or LEVEL MAX. 	<ul style="list-style-type: none"> Carry out calibration again. (→ See also these Operating Instructions, chapter 5.) 	38
710 (W710)	Warning C	B>Set span too small. Not allowed.	<ul style="list-style-type: none"> Values for calibration (e.g. lower range value and upper range value) are too close together. The sensor was replaced and the customer-specific configuration does not suit the sensor. Unsuitable download carried out. 	<ul style="list-style-type: none"> Adjust calibration to suit sensor. (→ See also page 95, parameter description MINIMUM SPAN.) Adjust calibration to suit sensor. Replace sensor with a suitable sensor. Check configuration and perform download again. 	51
711 (A711)	Alarm B	B>LRV or URV out of edit limits	<ul style="list-style-type: none"> Lower range value and/or upper range value undershoot or overshoot the sensor range limits. The sensor was replaced and the customer-specific configuration does not suit the sensor. Unsuitable download carried out. 	<ul style="list-style-type: none"> Reconfigure lower range value and/or upper range value to suit the sensor. Pay attention to position factor. Reconfigure lower range value and/or upper range value to suit the sensor. Pay attention to position factor. Replace sensor with a suitable sensor. Check configuration and perform download again. 	37
713 (A713)	Alarm B	B>100% POINT level out of edit limits	<ul style="list-style-type: none"> The sensor was replaced. 	<ul style="list-style-type: none"> Carry out calibration again. 	39
715 (E715)	Error C	C>Sensor over temperature	<ul style="list-style-type: none"> The temperature measured in the sensor is greater than the upper nominal temperature of the sensor. (→ See also page 95, parameter description Tmax SENSOR.) Unsuitable download carried out. 	<ul style="list-style-type: none"> Reduce process temperature/ ambient temperature. Check configuration and perform download again. 	32
716 (A716)	Alarm B	B>Sensor diaphragm broken	<ul style="list-style-type: none"> Sensor defect. 	<ul style="list-style-type: none"> Replace sensor. 	24
717 (E717)	Error C	C>Transmitter over temperature	<ul style="list-style-type: none"> The temperature measured in the electronics is greater than the upper nominal temperature of the electronics (+88 °C). Unsuitable download carried out. 	<ul style="list-style-type: none"> Reduce ambient temperature. Check configuration and perform download again. 	34

Code	Error type/ NA 64	Message/description	Cause	Measure	Priority
718 (E718)	Error C	C>Transmitter under temperature	<ul style="list-style-type: none"> The temperature measured in the electronics is smaller than the lower nominal temperature of the electronics (-43°C). Unsuitable download carried out. 	<ul style="list-style-type: none"> Increase ambient temperature. Insulate device if necessary. Check configuration and perform download again. 	35
719 (A719)	Alarm B	B>Y-VAL of lin. table out of edit limits	<ul style="list-style-type: none"> At least on Y-VALUE in the linearisation table is below the MIN. TANK CONTENT or above the MAX. TANK CONTENT. 	<ul style="list-style-type: none"> Carry out calibration again. (→ See also these Operating Instructions, chapter 5.) 	40
720 (E720)	Error C	C>Sensor under temperature	<ul style="list-style-type: none"> The temperature measured in the sensor is smaller than the lower nominal temperature of the sensor. (→ See also page 95, parameter description Tmin SENSOR.) Unsuitable download carried out. 	<ul style="list-style-type: none"> Increase process temperature/ ambient temperature. Check configuration and perform download again. 	33
721 (A721)	Alarm B	B>ZERO POSITION level out of edit limits	<ul style="list-style-type: none"> LEVEL MIN or LEVEL MAX has been changed. 	<ul style="list-style-type: none"> Perform reset (Code 2710) and carry out calibration again. 	41
722 (A722)	Alarm B	B>EMPTY CALIB. or FULL CALIB. out of edit limits	<ul style="list-style-type: none"> LEVEL MIN or LEVEL MAX has been changed. 	<ul style="list-style-type: none"> Perform reset (Code 2710) and carry out calibration again. 	42
723 (A723)	Alarm B	B>MAX. FLOW out of edit limits	<ul style="list-style-type: none"> FLOW-MEAS. TYPE has been changed. 	<ul style="list-style-type: none"> Carry out calibration again. 	43
725 (A725)	Alarm B	B>Sensor connection error, cycle disturbance	<ul style="list-style-type: none"> Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). Sensor or main electronics defect. 	<ul style="list-style-type: none"> Block off electromagnetic effects or eliminate source of disturbance. Replace sensor or main electronics. 	25
726 (E726)	Error C	C>Sensor temperature error - overrange	<ul style="list-style-type: none"> Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). Process temperature is outside permitted range. Sensor defect. 	<ul style="list-style-type: none"> Block off electromagnetic effects or eliminate source of disturbance. Check temperature present, reduce or increase if necessary. If the process temperature is within the permitted range, replace sensor. 	31
727 (E727)	Error C	C>Sensor pressure error - overrange	<ul style="list-style-type: none"> Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). Pressure is outside permitted range. Sensor defect. 	<ul style="list-style-type: none"> Block off electromagnetic effects or eliminate source of disturbance. Check pressure present, reduce or increase if necessary. If the pressure is within the permitted range, replace sensor. 	28
728 (A728)	Alarm B	B>RAM error	<ul style="list-style-type: none"> Fault in the main electronics. Main electronics defect. 	<ul style="list-style-type: none"> Briefly disconnect device from the power supply. Replace main electronics. 	2

Code	Error type/ NA 64	Message/description	Cause	Measure	Priority
729 (A729)	Alarm B	B>RAM error	<ul style="list-style-type: none"> – Fault in the main electronics. – Main electronics defect. 	<ul style="list-style-type: none"> – Briefly disconnect device from the power supply. – Replace main electronics. 	3
730 (E730)	Error C	C>LRV user limits exceeded	<ul style="list-style-type: none"> – Pressure measured value has undershot the value specified for the Pmin ALARM WINDOW parameter. 	<ul style="list-style-type: none"> – Check system/pressure measured value. – Change value for Pmin ALARM WINDOW if necessary. (→ See also page 104, parameter description Pmin ALARM WINDOW.) 	46
731 (E731)	Error C	C>URV user limits exceeded	<ul style="list-style-type: none"> – Pressure measured value has overshoot the value specified for the Pmax ALARM WINDOW parameter. 	<ul style="list-style-type: none"> – Check system/pressure measured value. – Change value for Pmax ALARM WINDOW if necessary. (→ See also page 105, parameter description Pmax ALARM WINDOW.) 	45
732 (E732)	Error C	C>LRV Temp. User limits exceeded	<ul style="list-style-type: none"> – Temperature measured value has undershot the value specified for the Tmin ALARM WINDOW parameter. 	<ul style="list-style-type: none"> – Check system/temperature measured value. – Change value for Tmin ALARM WINDOW if necessary. (→ See also page 105, parameter description Tmin ALARM WINDOW.) 	48
733 (E733)	Error C	C>URV Temp. User limits exceeded	<ul style="list-style-type: none"> – Temperature measured value has overshoot the value specified for the Tmax ALARM WINDOW parameter. 	<ul style="list-style-type: none"> – Check system/temperature measured value. – Change value for Tmax ALARM WINDOW if necessary. (→ See also page 105, parameter description Tmax ALARM WINDOW.) 	47
736 (A736)	Alarm B	B>RAM error	<ul style="list-style-type: none"> – Fault in the main electronics. – Main electronics defect. 	<ul style="list-style-type: none"> – Briefly disconnect device from the power supply. – Replace main electronics. 	4
737 (A737)	Alarm B	B>Measurement error	<ul style="list-style-type: none"> – Fault in the main electronics. – Main electronics defect. 	<ul style="list-style-type: none"> – Briefly disconnect device from the power supply. – Replace main electronics. 	20
738 (A738)	Alarm B	B>Measurement error	<ul style="list-style-type: none"> – Fault in the main electronics. – Main electronics defect. 	<ul style="list-style-type: none"> – Briefly disconnect device from the power supply. – Replace main electronics. 	19
739 (A739)	Alarm B	B>Measurement error	<ul style="list-style-type: none"> – Fault in the main electronics. – Main electronics defect. 	<ul style="list-style-type: none"> – Briefly disconnect device from the power supply. – Replace main electronics. 	23
740 (E740)	Error C	C>Calculation overflow, bad configuration	<ul style="list-style-type: none"> – Level measuring mode: the measured pressure has undershot the value for HYDR. PRESS. MIN. or overshoot the value for HYDR. PRESS MAX. – Flow measuring mode: the measured pressure has undershot the value for MAX. PRESS FLOW. 	<ul style="list-style-type: none"> – Check configuration and carry out calibration again if necessary. – Select a device with a suitable measuring range. – Check configuration and carry out calibration again if necessary. – Select a device with a suitable measuring range. 	27
741 (A741)	Alarm B	B>TANK HEIGHT out of edit limits	<ul style="list-style-type: none"> – LEVEL MIN or LEVEL MAX has been changed. 	<ul style="list-style-type: none"> – Perform reset (Code 2710) and carry out calibration again. 	44

Code	Error type/ NA 64	Message/description	Cause	Measure	Priority
742 (A742)	Alarm B	B>Sensor connection error (upload)	<ul style="list-style-type: none"> – Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). This message normally only appears briefly. – Cable connection sensor –main electronics disconnected. – Sensor defect. 	<ul style="list-style-type: none"> – Wait a few minutes. – Perform reset (Code 7864) and carry out calibration again. – Check cable connection and repair if necessary. – Replace sensor. 	18
743 (E743)	Alarm B	B>Electronic PCB error during initialisation	<ul style="list-style-type: none"> – This message normally only appears briefly. – Main electronics defect. 	<ul style="list-style-type: none"> – Wait a few minutes. – Restart the device. Perform reset (Code 62). – Replace main electronics. 	14
744 (A744)	Alarm B	B>Main electronic PCB error	<ul style="list-style-type: none"> – Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). – Main electronics defect. 	<ul style="list-style-type: none"> – Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics. 	11
745 (W745)	Warning C	C>Sensor data unknown	<ul style="list-style-type: none"> – Sensor does not suit the device (electronic sensor nameplate). Device continues measuring. 	<ul style="list-style-type: none"> – Replace sensor with a suitable sensor. 	56
746 (W746)	Warning C	C>Sensor connection error - initialising	<ul style="list-style-type: none"> – Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). This message normally only appears briefly. – Overpressure or low pressure present. 	<ul style="list-style-type: none"> – Wait a few minutes. – Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Reduce or increase pressure. 	26
747 (A747)	Alarm B	B>Sensor software not compatible to electronics	<ul style="list-style-type: none"> – Sensor does not suit the device (electronic sensor nameplate). 	<ul style="list-style-type: none"> – Replace sensor with a suitable sensor. 	16
748 (A748)	Alarm B	B>Memory failure in signal processor	<ul style="list-style-type: none"> – Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI382P (Deltabar S) or TI383P (Cerabar S). – Main electronics defect. 	<ul style="list-style-type: none"> – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics. 	15

8.2 Response of outputs to errors

The device differentiates between the error types Alarm, Warning and Error.

→ See also section 8.1 "Messages" und page 87 ff, table 20: OUTPUT and page 87 ff, table 31: MESSAGES the following table and page 105, section 8.1 "Messages".

Output	A (Alarm)	W (Warning)	E (Error: Alarm/Warning)
Current output	Assumes the value specified via the OUTPUT FAIL MODE ¹ , ALT. CURR. OUTPUT ¹ and SET MAX. ALARM ¹ parameter. → See also the following section "Configuring current output for an alarm".	Device continues measuring.	For this error, you can enter whether the device should react as in the event of an alarm or as in the event of a warning. See corresponding "Alarm" or "Warning" column. (→ See also these Operating Instructions, parameter description SELECT ALARMTYPE.)
Bar graph (on-site display)	→ See this table, current output.	→ See this table, current output.	→ See this table, current output.
On-site display	<ul style="list-style-type: none"> The measured value and message are displayed alternately Measured value display: $\frac{1}{2}$-symbol is permanently displayed. Message display <ul style="list-style-type: none"> 3-digit number such as A122 and Description 	<ul style="list-style-type: none"> The measured value and message are displayed alternately Measured value display: $\frac{1}{2}$-symbol flashes. Message display: <ul style="list-style-type: none"> 3-digit number such as W613 and Description 	<ul style="list-style-type: none"> The measured value and message are displayed alternately Measured value display: see corresponding "Alarm" or "Warning" column Message display: <ul style="list-style-type: none"> 3-digit number such as E731 and Description
Remote operation (ToF Tool, HART handheld terminal or Commuwin II)	In the case of an alarm, the ALARM STATUS ² parameter displays a 3-digit number such as 122 for "Sensor not connected".	In the case of a warning, the ALARM STATUS ² parameter displays a 3-digit number such as 613 for "Simulation is active".	In the case of an error, the ALARM STATUS ² parameter displays a 3-digit number such as 731 for "URV user limits exceeded".


- 1) Menu path: (GROUP SELECTION →) OPERATING MENU → OUTPUT
- 2) Menu path: (GROUP SELECTION →) OPERATING MENU → MESSAGES



8.3 Confirming messages

Depending on the settings for the ALARM DISPL. TIME (→ Page 104) and ACK. ALARM MODE (→ Page 103) parameters, the following measures should be taken to clear a message:

Settings ¹	Measures
<ul style="list-style-type: none"> ALARM DISPL. TIME = 0 s ACK. ALARM MODE = off 	<ul style="list-style-type: none"> Rectify cause of the message (see also section 8.1).
<ul style="list-style-type: none"> ALARM DISPL. TIME > 0 s ACK. ALARM MODE = off 	<ul style="list-style-type: none"> Rectify cause of the message (see also section 8.1). Wait for the alarm display time to elapse.
<ul style="list-style-type: none"> ALARM DISPL. TIME = 0 s ACK. ALARM MODE = on 	<ul style="list-style-type: none"> Rectify cause of the message (see also section 8.1). Confirm message using ACK. ALARM parameter.
<ul style="list-style-type: none"> ALARM DISPL. TIME > 0 s ACK. ALARM MODE = on 	<ul style="list-style-type: none"> Rectify cause of the message (see also section 8.1). Confirm message using ACK. ALARM parameter. Wait for the alarm display time to elapse. If a message appears and the alarm display time elapses before the message has been acknowledged, the message will be cleared once it has been acknowledged.

- 1) Menu path for ALARM DISPL. TIME and ACK. ALARM MODE: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES

If the on-site display displays a message, you can delete it with the -key.

If there are several messages, the on-site display shows the message which has the highest priority (see also section 8.1). Once you have deleted this message using the -key, the message with the next highest priority is displayed. You can use the -key to delete each message, one after the other.

The ALARM STATUS parameter continues to display all the messages present.

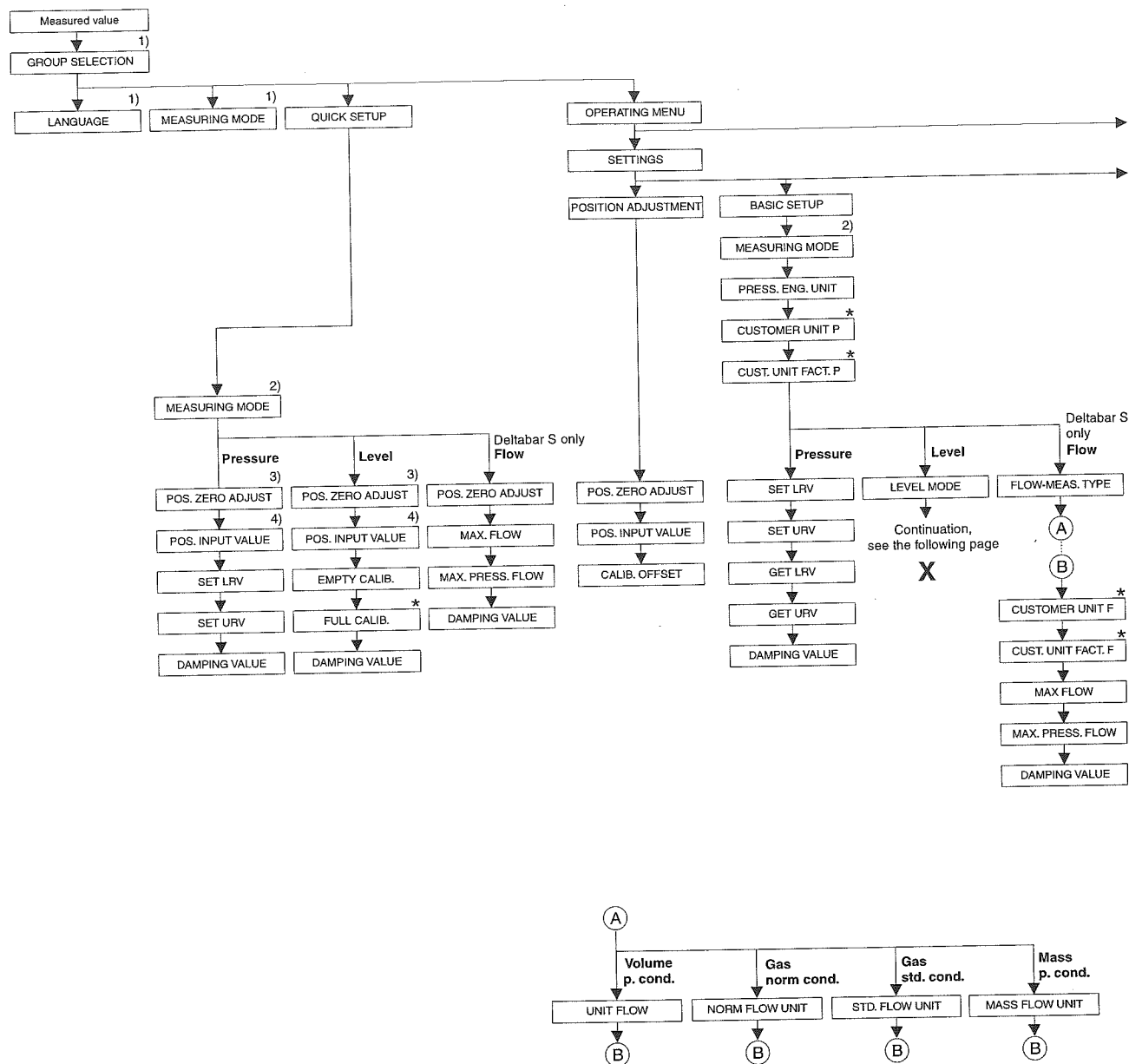
9 Appendix

9.1 Operating menu for on-site display, ToF Tool and HART handheld terminal



Note!

- The entire menu is depicted on the following pages.
- The menu has a different structure depending on the measuring mode selected. This means that some function groups are only displayed for one measuring mode, e.g. "LINEARISATION" function group for the Level measuring mode (Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP).
- In addition, there are also parameters that are only displayed if other parameters are appropriately configured. For example the Customer Unit P parameter is only displayed if the "User unit" option was selected for the PRESS. ENG. UNIT parameter. These parameters are indicated with a "*".
- For a description of the parameters, please refer to chapter 7 "Description of parameters". The exact dependency of individual parameters on one another is explained here.



1) Display via on-site display only

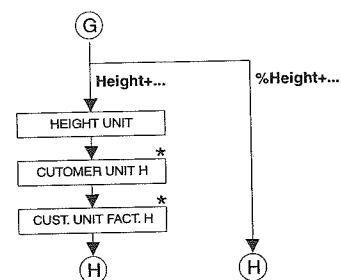
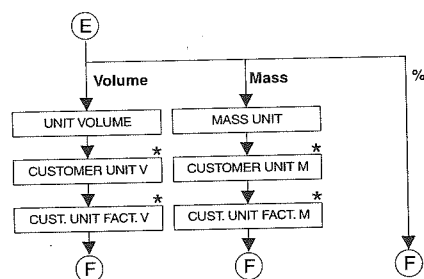
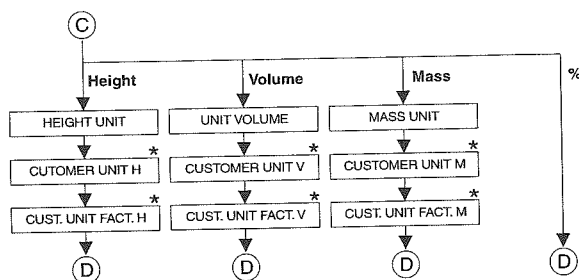
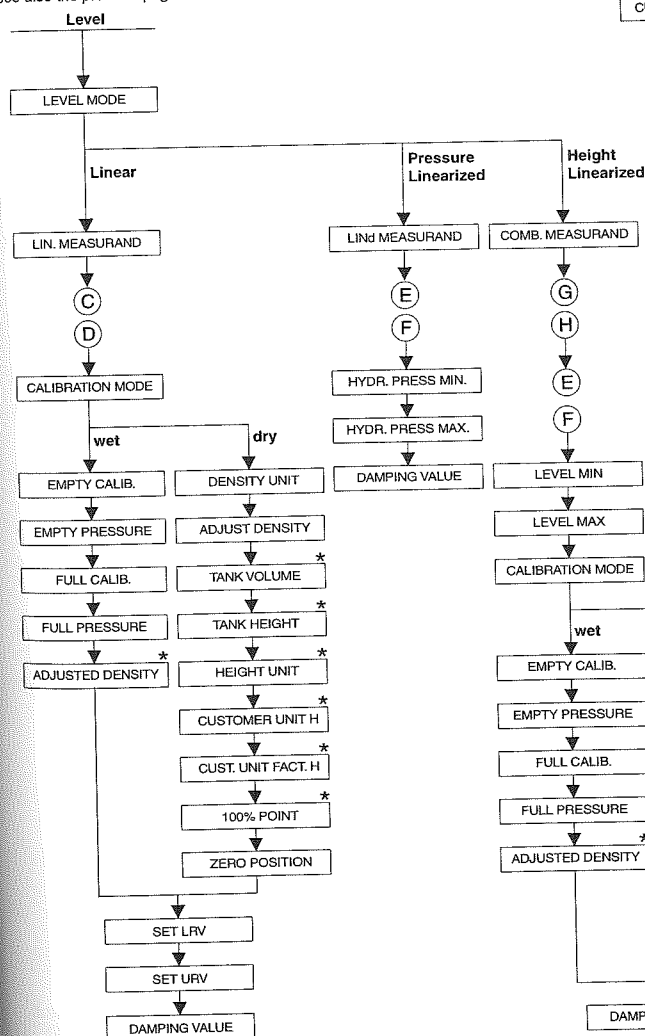
2) Display via ToF Tool and
HART handheld terminal only

3) Deltabar S or Cerabar S with gauge pressure sensor

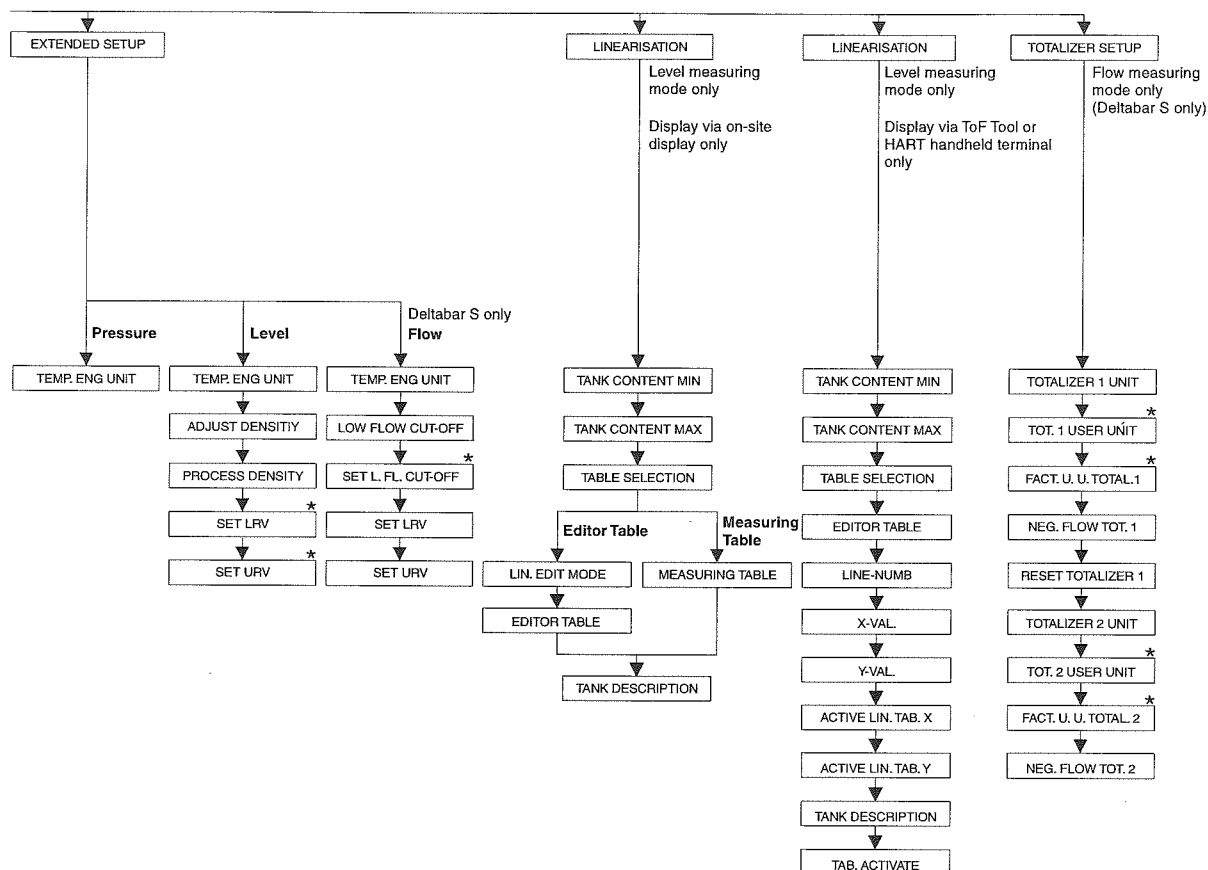
4) Cerabar S with absolute pressure sensor

* There are parameters that are only displayed if other parameters are appropriately configured. For example the CUSTOMER UNIT P parameter is only displayed if the "User unit" option was selected for the PRESS. ENG. UNIT parameter. These parameters are indicated with a "*".

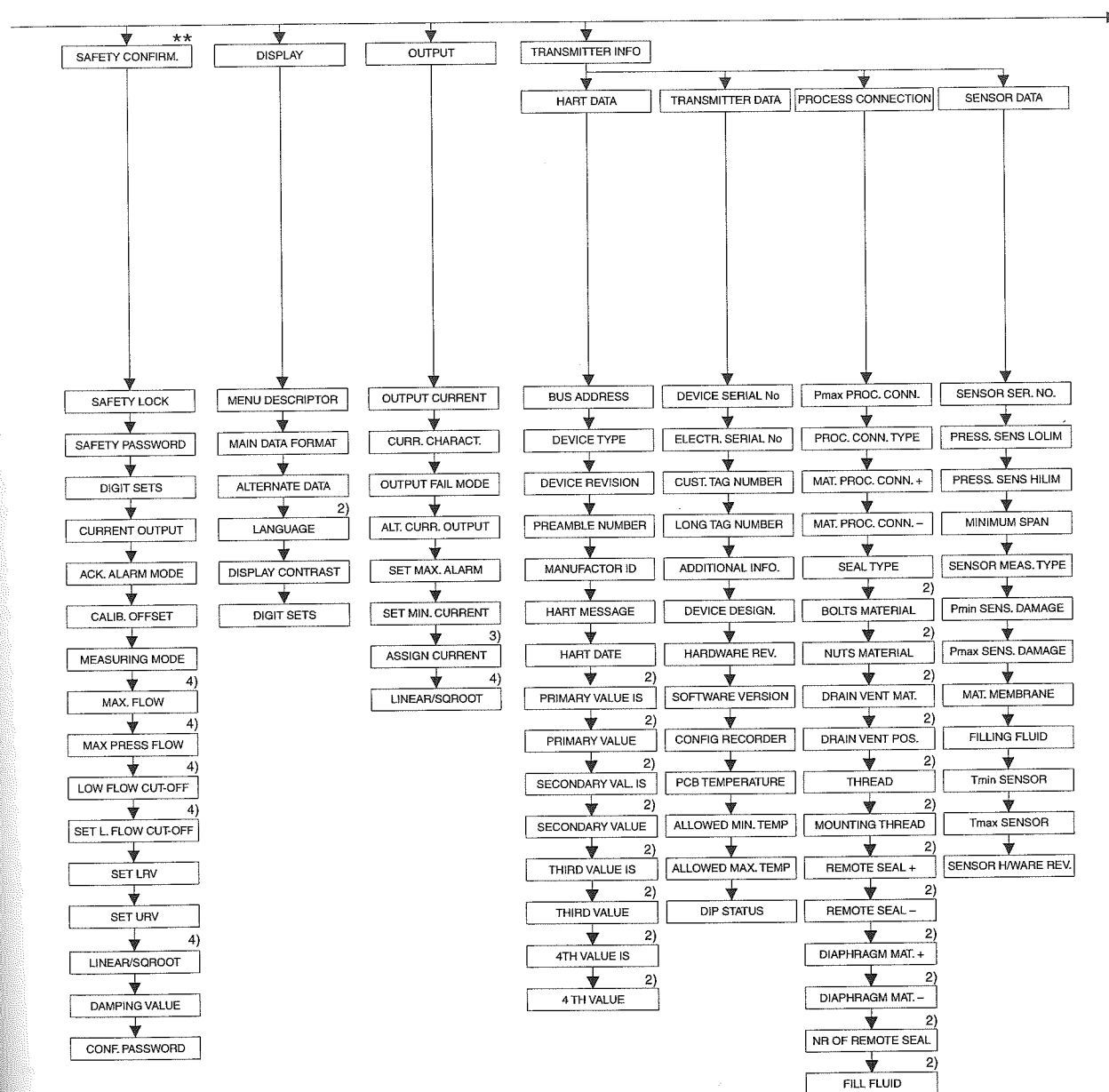
X
Continuation
BASIC SETUP "Level",
see also the previous page



* There are parameters that are only displayed if other parameters are appropriately configured.
For example the CUST. UNIT FACT. H parameter is only displayed if the "User unit" option was selected for the HEIGHT UNIT parameter.
These parameters are indicated with a ***.



* There are parameters that are only displayed if other parameters are appropriately configured.
 For example the TOT. 1 USER UNIT parameter is only displayed if the "User unit" option was selected for the TOTALIZER 1 UNIT parameter.
 These parameters are indicated with a "**".

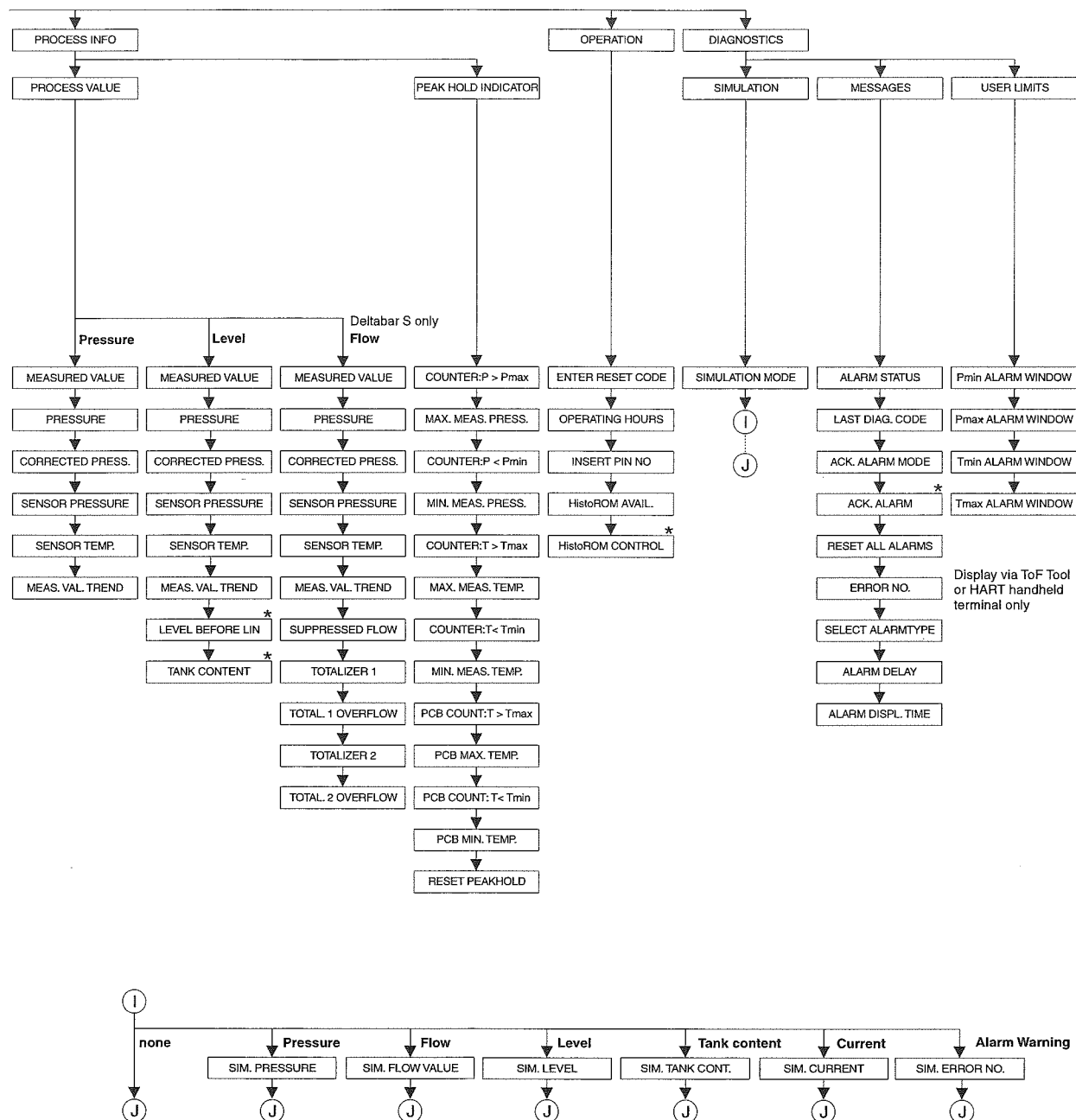


2) Display via ToF Tool and HART handheld terminal only

3) Level measuring mode only

4) Flow measuring mode only

** See Safety Manual SD189P for Deltabar S and SD190P for Cerabar S.



* There are parameters that are only displayed if other parameters are appropriately configured.
These parameters are indicated with a ***.

9.2 Operating matrix HART Commuwin II



Note!

All parameters are displayed via the ToF Tool, the HART handheld terminal and the on-site display (→ see section 9.1). Commuwin II only displays the parameters listed below.

	H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0 Basic setup	Measured value	Set LRV	Set URV	Get LRV	Get URV	Calib. offset	Pos. zero adjust	Damping value	Output fail mode	Press. eng. unit
V1 Peak hold indic.	Min. meas. press.	Max. meas. pressure	Pos. input value	Sensor temp.	Min. meas. temp.	Max. meas. temp.	PCB tempera- ture	PCB min. temp.	PCB max. temp.	Temp. eng. unit
V2 Transmit- ter info	Counter: P < Pmin	Counter: P > Pmax	Safety lockstate		Counter: T < Tmin	Counter: T > Tmax	Reset peakhold	HistoROM avail.	HistoROM control	Table selection
V3 Lineari- sation	Measuring mode	Level mode	Measurand	Tank content unit	Editor table	Lin. edit mode	Tab. activate	Line-numb	X-Val.	Y-Val.
V4 Level	Eng. unit level	Level min./ Hydr. press. min.	Level max./ Hydr. press. max.	Tank content min.	Tank content max.	Calibration mode	Empty calib.	Empty pressure	Full calib.	Full pressure
V5 Flow	Unit flow	Flow-meas. type	Max. pressure flow	Max flow	Low flow cut-off	Set l. fl. cut- off	Reset totalizer 1	Neg. flow tot. 1	Totalizer 1	Totalizer 1 unit
V6 Process info	Pmin Alarm window	Pmax Alarm window	Tmin Alarm window	Tmax alarm window	Proc. conn. type	Mat. proc. conn. +	Mat. proc. conn. -	Seal type	Filling fluid	Sensor meas. type
V7 Output	Output current	Set min. current	Set max. alarm	Linear/ sqroot.	Assing current	Low sensor trim	High sensor trim	Press. sens. LOLIM	Press. sens. HILIM	Sensor pressure
V8 Additional function	Simulation mode	Simulated value	Main line format	Menu descriptor	Density unit	Adjust density	Zero position	100% point	DIP status	Damp switch
V9 Service	Alarm status	Last diag. code	Ack. alarm	Ack. alarm mode	Alarm delay	Alarm displ. time	Operating hours	Revision count	Enter reset code	Insert PIN no
VA User info	Cust. tag number	Additional info.	Device serial no	Sensor ser. no.	Electr. serial no	Device design.	Software version	Cust. unit flow	Flow unit scale	

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