Level	Pressure	Flow	Temperature	Liquid Analysis	Registration	Systems Components	Services	Solutions

Description of Device Functions

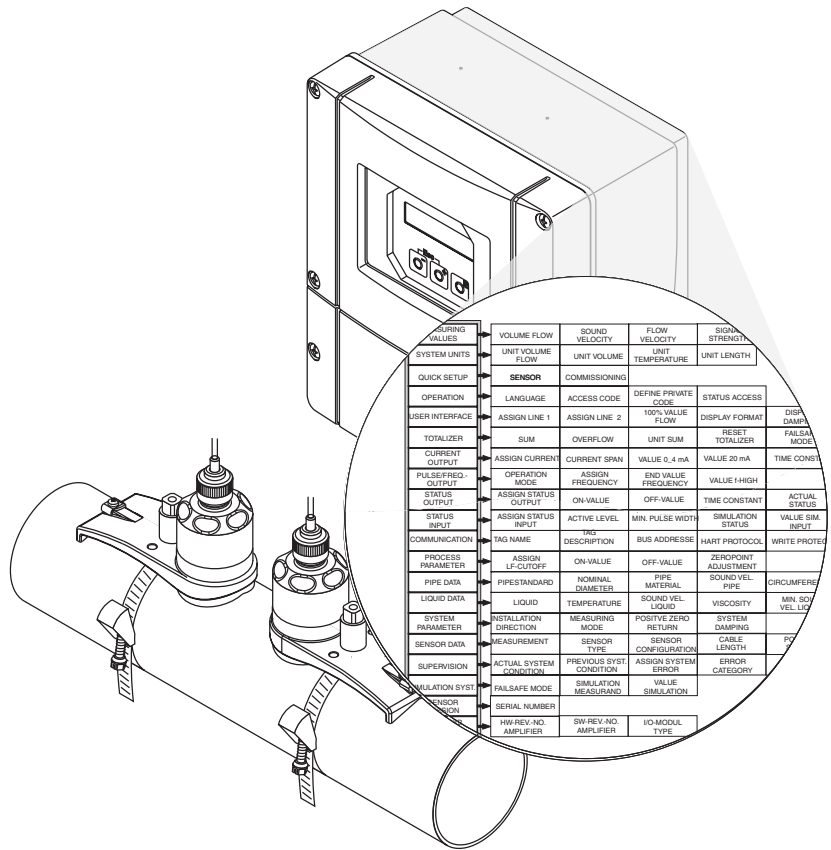# Proline Prosonic Flow 90

Ultrasonic Flow Measuring System

HART
FIELD COMMUNICATION PROTOCOL

MEASURING VALUES	VOLUME FLOW	SOUND VELOCITY	FLOW VELOCITY	SIGNAL STRENGTH
SYSTEM UNITS	UNIT VOLUME FLOW	UNIT VOLUME	UNIT TEMPERATURE	UNIT LENGTH
QUICK SETUP	**SENSOR**	COMMISSIONING		
OPERATION	LANGUAGE	ACCESS CODE	DEFINE PRIVATE CODE	STATUS ACCESS
USER INTERFACE	ASSIGN LINE 1	ASSIGN LINE 2	100% VALUE FLOW	DISPLAY FORMAT	DISP. DAMP.
TOTALIZER	SUM	OVERFLOW	UNIT SUM	RESET TOTALIZER	FAILSAFE MODE
CURRENT OUTPUT	ASSIGN CURRENT	CURRENT SPAN	VALUE 0_4 mA	VALUE 20 mA	TIME CONST.
PULSE/FREQ.-OUTPUT	OPERATION MODE	ASSIGN FREQUENCY	END VALUE FREQUENCY	VALUE f-HIGH
STATUS OUTPUT	ASSIGN STATUS OUTPUT	ON-VALUE	OFF-VALUE	TIME CONSTANT	ACTUAL STATUS
STATUS INPUT	ASSIGN STATUS INPUT	ACTIVE LEVEL	MIN. PULSE WIDTH	SIMULATION STATUS	VALUE SIM. INPUT
COMMUNICATION	TAG NAME	TAG DESCRIPTION	BUS ADDRESSE	HART PROTOCOL	WRITE PROTEC.
PROCESS PARAMETER	ASSIGN LF-CUTOFF	ON-VALUE	OFF-VALUE	ZEROPOINT ADJUSTMENT	
PIPE DATA	PIPESTANDARD	NOMINAL DIAMETER	PIPE MATERIAL	SOUND VEL. PIPE	CIRCUMFERE
LIQUID DATA	LIQUID	TEMPERATURE	SOUND VEL. LIQUID	VISCOSITY	MIN. SOU. VEL. LIQ
SYSTEM PARAMETER	INSTALLATION DIRECTION	MEASURING MODE	POSITIVE ZERO RETURN	SYSTEM DAMPING	
SENSOR DATA	MEASUREMENT	SENSOR TYPE	SENSOR CONFIGURATION	CABLE LENGTH	PO
SUPERVISION	ACTUAL SYSTEM CONDITION	PREVIOUS SYST. CONDITION	ASSIGN SYSTEM ERROR	ERROR CATEGORY	
SIMULATION SYST.	FAILSAFE MODE	SIMULATION MEASURAND	VALUE SIMULATION		
SENSOR VERSION	SERIAL NUMBER				
	HW-REV.-NO. AMPLIFIER	SW-REV.-NO. AMPLIFIER	I/O-MODUL TYPE		

Endress+Hauser

People for Process Automation

Table of Contents

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1   Function matrix Prosonic Flow 90

1.1   The function matrix: layout and use

The function matrix is a two–level construct: the groups form one level and the groups' functions the other.
The groups are the "highest-level grouping" of the operating options for the measuring device.
A number of functions is assigned to each group.
You select a group in order to access the individual functions for operating and parameterizing the measuring device.
An overview of all the groups available is provided in the table of contents on page 3 and in the graphical representation of the function matrix on Page 8.
An overview of all the functions available is provided on Page 8, complete with page references to the detailed function descriptions.
The descriptions of the individual functions start on Page 9.

Example of how to parameterize a function (in this case changing the language for the UI):
① Enter into the function matrix (E-key).
② Select the OPERATION group.
③ Select the LANGUAGE function, change the setting from ENGLISH to DEUTSCH
    +/- and save E (all text on the display now appears in German).
④ Exit the function matrix (ESC > 3 seconds).

A0001142

1.2　Illustration of the function matrix

MEASURING VALUES (P. 9) → VOLUME FLOW (P. 9) · SOUND VELOCITY (P. 9) · FLOW VELOCITY (P. 9) · SIGNAL STRENGTH (P. 9)

SYSTEM UNITS (P. 10) → UNIT VOLUME FLOW (P. 10) · UNIT VOLUME (P. 11) · UNIT TEMPERATURE (P. 11) · UNIT VISCOSITY (P. 11) · UNIT LENGTH (P. 11) · UNIT VELOCITY (P. 12)

QUICK SETUP (P. 13) → QUICK SETUP SENSOR (P. 13) · QS-COMMISSION (P. 13)

OPERATION (P. 18) → LANGUAGE (P. 18) · ACCESS CODE (P. 19) · DEF. PRIVATE CODE (P. 19) · ACCESS CODE COUNTER (P. 19) · STATUS ACCESS (P. 19)

USER INTERFACE (P. 18) → ASSIGN LINE 1 (P. 20) · ASSIGN LINE 2 (P. 20) · 100%-VALUE (P. 20) · FORMAT (P. 21) · DISPL. DAMPING (P. 21) · CONTRAST LCD (P. 21) · BACKLIGHT (P. 21) · TEST DISPLAY (P. 22)

TOTALIZER 1...2 (P. 23) → ASSIGN TOTALIZER (P. 23) · SIM (P. 23) · OVERFLOW (P. 23) · UNIT TOTALIZER (P. 23) · TOTALIZER MODE (P. 24) · RESET TOTAL. (P. 24)

HANDLING TOT. (P. 25) → RESET ALL TOT. (P. 25) · FAILSAFE ALL TOT. (P. 25)

CURRENT OUTPUT (P. 26) → ASSIGN CURRENT (P. 26) · CURRENT SPAN (P. 27) · VALUE 0_4 mA (P. 28) · VALUE 20 mA (P. 28) · TIME CONSTANT (P. 29) · FAILSAFE MODE (P. 29) · ACTUAL CURRENT (P. 29) · SIMULATION CURR. (P. 29) · VALUE SIM. CURR. (P. 30)

PULSE/FREQ.OUTP. (P. 31) → OPERATION MODE (P. 31) · ASSIGN FREQUENCY (P. 31) · END VALUE FREQ. (P. 31) · VALUE-f LOW (P. 32) · VALUE-f HIGH (P. 32) · OUTPUT SIGNAL (P. 33) · TIME CONSTANT (P. 35) · FAILSAFE MODE (P. 35) · FAILSAFE VALUE (P. 35) · ACTUAL FREQ. (P. 35) · SIMUL. FREQUENCY (P. 36) · VALUE SIM.FREQ. (P. 36) · ASSIGN PULSE (P. 36) · PULSE VALUE (P. 37) · PULSE WIDTH (P. 37) · OUTPUT SIGNAL (P. 38) · FAILSAFE MODE (P. 40) · SIMUL. PULSE (P. 40) · VALUE SIM. PULSE (P. 41)

STATUS OUTPUT (P. 42) → ASSIGN STATUS (P. 42) · ON-VALUE (P. 42) · OFF-VALUE (P. 43) · TIME CONSTANT (P. 43) · ACTUAL STATUS (P. 43) · SIM. SCHALTPKT. (P. 43) · VAL.SIM.SWITT.PNT (P. 44)

STATUS INPUT (P. 47) → ASSIGN STATUS IN (P. 47) · ACTIVE LEVEL (P. 47) · MIN. PULSE WIDTH (P. 47) · SIM. STATUS IN. (P. 47) · VAL.SIM.STAT.IN (P. 48)

COMMUNICATION (P. 49) → TAG NAME (P. 49) · TAG DESCRIPTION (P. 49) · FIELDBUS ADDRESS (P. 49) · HART PROTOCOL (P. 49) · MANUFACT. ID (P. 49) · DEVICE ID (P. 49)

PROCESS PARAMETER (P. 50) → ASSIGN LF-CUT-OFF (P. 50) · ON-VAL.LF-CUT-OFF (P. 50) · OFFVAL. LF-CUT-OFF (P. 50) · ZEROPOINT ADJUST. (P. 50)

PIPE DATA (P. 52) → PIPE STANDARD (P. 52) · NOMINAL DIAMETER (P. 52) · PIPE MATERIAL (P. 52) · SOUND VEL. PIPE (P. 53) · CIRCUMFERENCE (P. 53) · PIPE DIAMETER (P. 53) · WALL THICKNESS (P. 53) · LINER MATERIAL (P. 54) · LINER THICKNESS (P. 54) · SOUND VEL. LINER (P. 54)

LIQUID DATA (P. 55) → LIQUID (P. 55) · TEMPERATURE (P. 55) · SOUND VEL. LIQ. (P. 56) · VISCOSITY (P. 56) · MIN. S. VELOC. LIQ (P. 56) · MAX. S. VELOC. LIQ. (P. 57)

SYSTEM PARAM. (P. 58) → INSTL. DIR. SENSOR (P. 58) · MEASURING MODE (P. 58) · POS. ZERO RETURN (P. 60) · FLOW DAMPING (P. 60)

SENSOR DATA (P. 61) → MEASUREMENT (P. 61) · SENSOR TYPE (P. 61) · SENSOR CONFIG. (P. 61) · POSITION SENSOR (P. 62) · CABLE LENGTH (P. 62) · WIRE LENGTH (P. 62) · SENSOR DISTANCE (P. 62) · PATH LENGTH (P. 62)

CALIBRATION DATA (P. 63) → P-FACTOR (P. 63) · ZERO POINT (P. 63) · CORR. FACTOR (P. 63) · DEV. SENSOR DIST. (P. 63) · DEV. PATH LENGTH (P. 63)

SUPERVISION (P. 64) → ACTUAL SYS.COND (P. 64) · PREV. SYS. CONDIT. (P. 64) · ASSIGN. SYS. ERR. (P. 64) · ERROR CATEG. (P. 64) · ASSIGN. PROC. ERR. (P. 64) · ERROR CATEGORY (P. 65) · ALARM DELAY (P. 65) · OPERAT. HRS. (P. 65)

SIMULAT. SYSTEM (P. 66) → SIM. FAILSAFE-MODE (P. 66) · SIM. MEAS. VARIAB. (P. 66) · VALUE SIM. MEAS. VAR. (P. 66)

SENSOR VERSION (P. 67) → SERIAL NUMBER (P. 67)

AMPLIFIER VERS. (P. 67) → DEVICE SOFTWARE (P. 67) · HW-REV. AMP. (P. 67) · SW-REV. AMP. (P. 67) · LANGUAGE GROUP (P. 67) · I/O-MODULE TYPE (P. 67) · HW-REV. I/O MOD. (P. 67) · SW-REV. I/O MOD. (P. 67)

2   Group MEASURING VALUES

Function description MEASURING VALUES	
✎ Note! ■ The engineering unit of the measured variable displayed here can be set in the SYSTEM UNITS group, (see Page 10). ■ If the fluid in the pipe flows backwards, a negative sign prefixes the flow reading on the display.	
VOLUME FLOW	The volume flow currently measured appears on the display. **Display:** 5-digit floating-point number, including unit and sign (z.B. 5.5445 dm^3/min; 1.4359 m^3/h; −731.63 gal/d; usw.)
SOUND VELOCITY	The current measured sound velocity in the liquid appears on the display. **Display:** 5-digit fixed-point number, incl. unit (e.g. 1400.0 m/s, 5249.3 ft/s)
FLOW VELOCITY	The flow velocity currently measured appears on the display. **Display:** 5-digit floating-point number, including unit and sign (e.g. 8.0000 m/s, 26.247 ft/s)
SIGNAL STRENGTH	The signal strength appears on the display. **Display:** 4-digit fixed-point number (e.g. 80.0) ✎ Note! To ensure reliable measurement takes place, Prosonic Flow requires a signal strength of > 30.

3   Group SYSTEM UNITS

Function description SYSTEM UNITS	
Use this function group to select the unit for the measured variable.	
UNIT VOLUME FLOW	Use this function to select the unit for displaying the volume flow. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Switch points (limit value for volume flow, flow direction) ■ Low flow cut off **Options:** Metric: Cubic centimeter $\rightarrow$ cm^3/s; cm^3/min; cm^3/h; cm^3/day Cubic decimeter $\rightarrow$ dm^3/s; dm^3/min; dm^3/h; dm^3/day Cubic meter $\rightarrow$ m^3/s; m^3/min; m^3/h; m^3/day Milliliter $\rightarrow$ ml/s; ml/min; ml/h; ml/day Liter $\rightarrow$ l/s; l/min; l/h; l/day Hectoliter $\rightarrow$ hl/s; hl/min; hl/h; hl/day Megaliter $\rightarrow$ Ml/s; Ml/min; Ml/h; Ml/day US: Cubic centimeter $\rightarrow$ cc/s; cc/min; cc/h; cc/day Acre foot $\rightarrow$ af/s; af/min; af/h; af/day Cubic foot $\rightarrow$ ft^3/s; ft^3/min; ft^3/h; ft^3/day Fluid ounce $\rightarrow$ oz f/s; oz f/min; oz f/h; oz f/day Gallon $\rightarrow$ gal/s; gal/min; gal/h; gal/day Million gallons $\rightarrow$ Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (normal fluids: 31.5 gal/bbl) $\rightarrow$ bbl/s; bbl/min; bbl/h; bbl/day Barrel (beer: 31.0 gal/bbl) $\rightarrow$ bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 42.0 gal/bbl) $\rightarrow$ bbl/s; bbl/min; bbl/h; bbl/day Barrel (filling tanks: 55.0 gal/bbl) $\rightarrow$ bbl/s; bbl/min; bbl/h; bbl/day Imperial Gallon $\rightarrow$ gal/s; gal/min; gal/h; gal/day Mega gallon $\rightarrow$ Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (beer: 36.0 gal/bbl) $\rightarrow$ bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 34.97 gal/bbl) $\rightarrow$ bbl/s; bbl/min; bbl/h; bbl/day **Factory setting:** l/s

Function description SYSTEM UNITS	
UNIT VOLUME	Use this function to select the unit for displaying the volume. The unit you select here is also valid for: ■ Pulse weighting (e.g. m^3/p) **Options:** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals) → bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** liter ✎ Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.
UNIT TEMPERATURE	Use this function to select the unit for the liquid temperature. ✎ Note! The liquid temperature is entered in the function TEMPERATURE ("QUICK SETUP" for rapid commissioning 55). **Options:** °C (Celsius) K (Kelvin) °F (Fahrenheit) R (Rankine) **Factory setting:** °C
UNIT VISCOSITY	Use this function to select the unit for liquid viscosity. **Options:** mm^2/s cSt St **Factory setting:** mm^2/s
UNIT LENGTH	Use this function to select the unit for the measure of length. The unit you select here is valid for: ■ Nominal diameter ■ Diameter ■ Wall thickness ■ Liner thickness ■ Path length ■ Wire length ■ Sensor spacing **Options:** MILLIMETER INCH **Factory setting:** MILLIMETER

Function description SYSTEM UNITS

UNIT VELOCITY	Use this function to select the unit for velocity. The unit you select here is valid for: ■ Sound velocity ■ Flow velocity **Options:** m/s ft/s **Factory setting:** m/s

4   Group QUICK SETUP

Function description QUICK SETUP	
QUICK SETUP SENSOR	Use this function to start the Quick Setup menu for assembling the ultrasonic sensors. **Options:** YES NO **Factory setting:** NO ✎ Note! You will find a flowchart of the Quick Setup SENSOR menu on Page 14. For more information on Setup menus, please refer to the accompanying Operating Instructions Proline Prosonic Flow 90 (BA 068D/06/en/...)
QUICK SETUP COMMISSIONING	Use this function to start the Quick Setup menu for commissioning. **Options:** YES NO **Factory setting:** NO ✎ Note! You will find a flowchart of the Quick Setup menu COMMISSIONING on Page 16. For more information on Quick Setup menus, please refer to the accompanying Operating Instructions Proline Prosonic Flow 90 (BA 068D/06/en/...)

4.1   Quick Setup "Sensor"

If the measuring device is equipped with a local operation, the sensor distance can be ascertained using the "Sensor" Quick Setup menu.

If a measuring device does not have a local operation, the individual parameters and functions must be configured via the configuration program ToF Tool – Fieldtool Package.

F06-90xxxxx-19-xx-xx-en-001
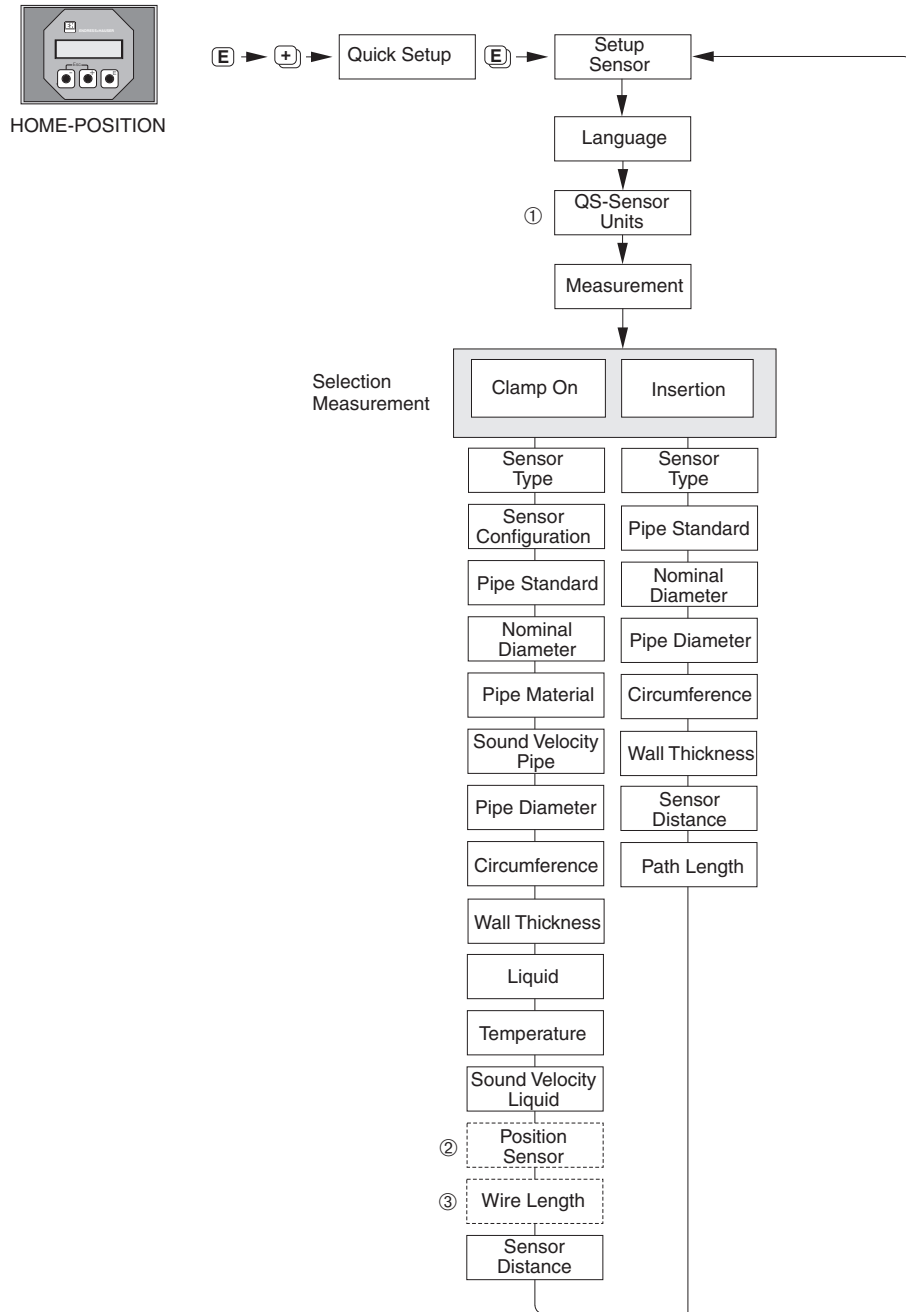
✎ Note!
The display returns to the QUICK SETUP COMMISSIONING function cell if you press the ESC key
(⊟⊞) during parameter interrogation.

①
Selection of the system units only influences the functions UNIT TEMPERATURE, UNIT LENGTH
and UNIT VELOCITY.

②
The POSITION SENSOR function only appears when the CLAMP ON option is set in the
MEASUREMENT function and the number of traverses is 2 or 4 in the SENSOR CONFIGURATION
function.

③
The WIRE LENGTH function only appears when the CLAMP ON option is set in the
MEASUREMENT function and the number of traverses is 1 or 3 in the SENSOR CONFIGURATION
function.

4.2   Quick Setup "Commissioning"

If the measuring device is equipped with a local operation, all the device parameters important for standard measuring mode can be configured easily and quickly using the "Commissioning" Quick Setup menu.

If a measuring device does not have a local operation, the individual parameters and functions must be configured via the configuration program ToF Tool – Fieldtool Package.
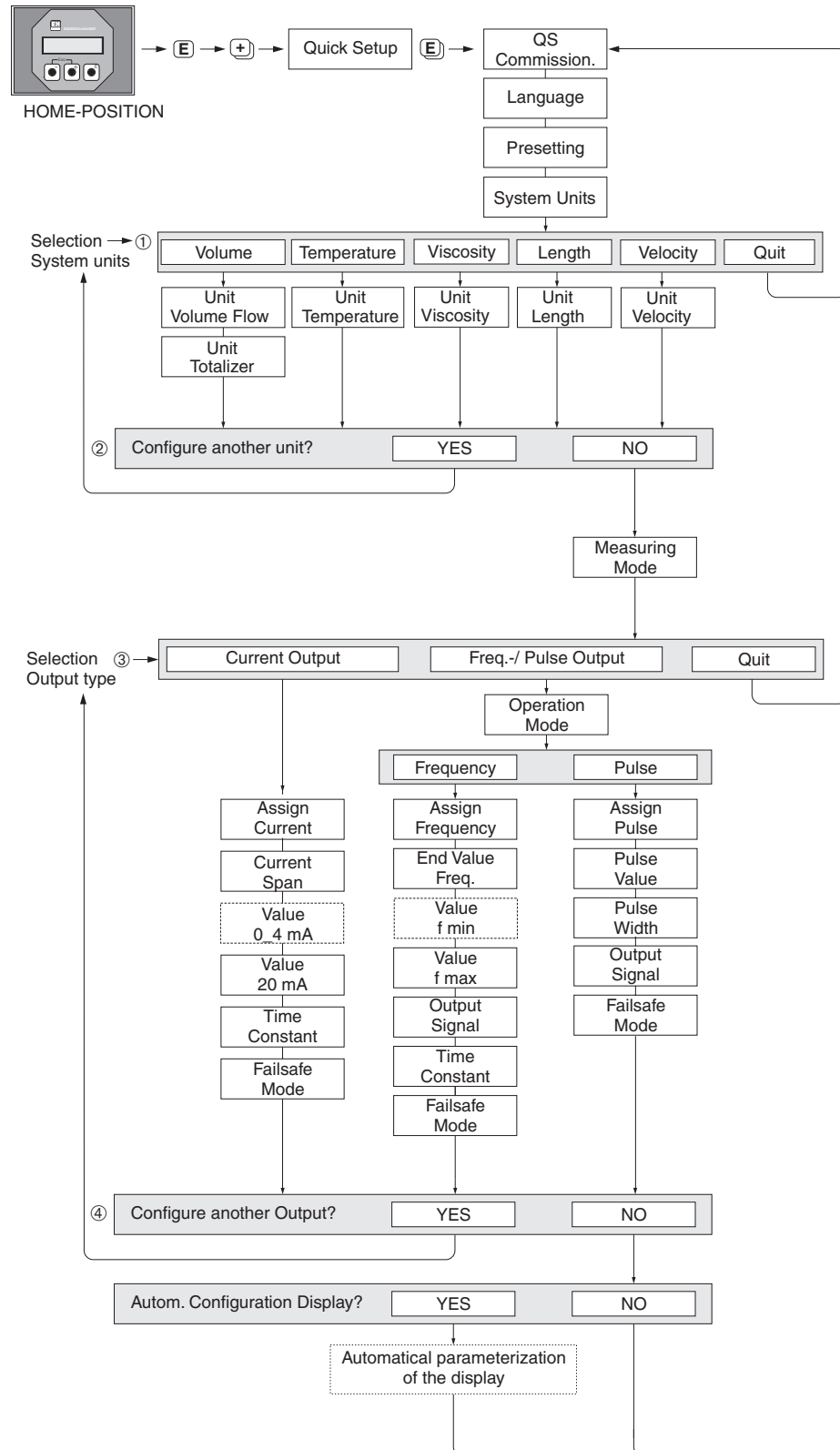
F06-90xxxxx-19-xx-xx-en-000

✎   Note!
The display returns to the QUICK SETUP COMMISSIONING cell if you press the ESC key combination during interrogation.

①
Only the units not yet configured in the current Quick Setup are offered for selection in each cycle. The unit for volume is derived from the volume flow unit.

②
The "YES" option remains visible until all the units have been parameterized.
"NO" is the only option displayed when no further units are available.

③
Only the outputs not yet configured in the current Quick Setup are offered for selection in each cycle.

④
The "YES" option remains visible until all the outputs have been parameterized.
"NO" is the only option displayed when no further outputs are available.

5   Group OPERATION

Function description OPERATION	

LANGUAGE	Use this function to select the language for all texts, parameters and messages shown on the local display.
	
	✎ Note!
	The displayed options depend on the available language group shown in the LANGUAGE GROUP function.
	
	Options:
	Language group WEST EU / USA ENGLISH
	                                    DEUTSCH
	                                    FRANCAIS
	                                    ESPANOL
	                                    ITALIANO
	                                    NEDERLANDS
	                                    PORTUGUESE
	
	Language group EAST EU / SCAND ENGLISH
	                                    NORSK
	                                    SVENSKA
	                                    SUOMI
	                                    POLISH
	                                    CZECH
	                                    RUSSIAN
	
	Language group ASIA ENGLISH
	                               BAHASA INDONESIA
	                               JAPANESE (syllabary)
	
	Language group CHINESE CHINESE
	                               ENGLISH
	
	Factory setting:
	Country-dependent, see Page 68
	
	✎ Note!
	■ If you press the ⊞-keys simultaneously during startup, the language defaults to "ENGLISH".
	■ You can change the language group via the configuration software ToF Tool – Fieldtool Package. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.

Function description OPERATION	
ACCESS CODE	All data of the measuring system are protected against inadvertent change. Programming is disabled and the settings cannot be changed until a code is entered in this function. If you press the +/– keys in any function, the measuring system automatically goes to this function and the prompt to enter the code appears on the display (when programming is disabled). You can enable programming by entering your personal code (factory setting = 90, see function DEF. PRIVATE CODE on Page 19) **User input:** max. 4-digit number: 0...9999 ✎ Note! ■ The programming levels are disabled if you do not press a key within 60 seconds following automatic return to the HOME position. ■ You can also disable programming in this function by entering any number (other than the defined private code). ■ The Endress+Hauser service organization can be of assistance if you mislay your personal code.
DEF. PRIVATE CODE	Use this function to enter a personal code number for enabling programming. **User input:** 0...9999 (max. 4-digit number) **Factory setting:** 90 ✎ Note! ■ Programming is always enabled with the code "0". ■ Programming has to be enabled before this code can be changed. When programming is disabled this function is not available, thus preventing others from accessing your personal code.
STATUS ACCESS	Use this function to check the access status for the function matrix. **Display:** ACCESS CUSTOMER (parameterization possible) LOCKED (parameterization disabled)
ACCESS CODE COUNTER	The number of times the private or service code was entered to access the device appears on the display. **Display:** Integer (delivery status: 0)

6 Group USER INTERFACE

Function description USER INTERFACE	
ASSIGN LINE 1	Use this function to define which display value is assigned to the main line (top line of the local display) during normal measuring operation. **Options:** OFF VOLUME FLOW VOLUME FLOW IN % SOUND VELOCITY FLOW VELOCITY **Factory setting:** VOLUME FLOW
ASSIGN LINE 2	Use this function to define which display value is assigned to the additional line (bottom line of the local display) for display during normal measuring operation. **Options:** OFF VOLUME FLOW VOLUME FLOW IN % SOUND VELOCITY FLOW VELOCITY TOTALIZER TAG NAME OPERATING/SYSTEM CONDITION DISPLAY FLOW DIRECTION VOLUME FLOW BARGRAPH IN % SIGNAL STRENGTH BARGRAPH IN % **Factory setting:** TOTALIZER
100% VALUE	✎ Note! This function is only available if VOLUME FLOW IN % or VOLUME FLOW BARGRAPH IN % was selected in the function ASSIGN LINE 1 or ASSIGN LINE 2. Use this function to define the flow value which should be shown on the display as the 100% value. **User input:** 5–digit floating–point number **Factory setting:** 10 l/s

Function description USER INTERFACE	
FORMAT	Use this function to define the maximum number of places after the decimal point displayed for the reading in the main line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX –X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 $\rightarrow$ m^3/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY DAMPING	Use this function to enter a time constant defining how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** 0...100 seconds **Factory setting:** 1 s ✎ Note! Setting the time constant to zero seconds switches off damping.
CONTRAST LCD	Use this function to optimize display contrast to suit local operating conditions. **User input:** 10...100% **Factory setting:** 50%
BACKLIGHT	Use this function to optimize the backlight to suit local operating conditions. **User input:** 10...100% **Factory setting:** 50%

Function description USER INTERFACE
TEST DISPLAY

TEST DISPLAY	Use this function to test the operability of the local display and its pixels.
	Options:
	OFF
	ON
	Factory setting:
	OFF
	Test sequence:
	1. Start the test by selecting ON.
	2. All pixels of the main line and additional line are darkened for at least 0.75 seconds.
	3. The main line and additional line show an "8" in each field for at least 0.75 seconds.
	4. The main line and additional line show a "0" in each field for at least 0.75 seconds.
	5. The main line and additional line show nothing (blank display) for at least 0.75 seconds.
	When the test is completed the local display returns to its initial state and the setting changes to OFF.

Function description USER INTERFACE

7   Group TOTALIZER 1...2

Function description TOTALIZER 1...2	
ASSIGN TOTALIZER	Use this function to assign a measured variable (volume flow) to the totalizer. **Options:** OFF VOLUME FLOW **Factory setting:** VOLUME FLOW ✎ Note! The totalizer is reset to "0" as soon as the selection is changed.
SUM	The total for the totalizer's measured variable aggregated since measuring commenced appears on the display. This value can be positive or negative, depending on the direction of flow. **Display:** max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m^3) ✎ Note! The totalizer's response to faults is defined in the function "FAILSAFE MODE", (see Page 25).
OVERFLOW	The total for the totalizer's overflow aggregated since measuring commenced appears on the display. Total flow quantity is represented by a floating-point number consisting of max. 7 digits. You can use this function to view higher numerical values (>9,999,999) as overflows. The effective quantity is thus the total of the function OVERFLOW plus the value displayed in the function SUM. Example: Reading for 2 overflows: 2 E7 dm^3 (= 20 dm^3) The value displayed in the function "SUM" = 196,845.7 dm^3 Effective total quantity = 20,196,845.7 dm^3 **Display:** Integer with exponent, including sign and unit, e.g. 2 E7 dm^3
UNIT TOTALIZER	Use this function to define the unit for the totalizer. **Options:** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** m^3

Function description TOTALIZER 1...2	
TOTALIZER MODE	Use this function to define how the flow components are to be totaled by the totalizer in question. **Options:** BALANCE Positive and negative flow components. The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD Positive flow components only REVERSE Negative flow components only **Factory setting:** Totalizer 1 = BALANCE Totalizer 2 = FORWARD
RESET TOTALIZER	Use this function to reset the sum and the overflow of the totalizer to "zero" (= RESET). **Options:** NO YES **Factory setting:** NO ✎ Note! If the device is equipped with a status input and if it is appropriately configured, totalizer resetting can also be triggered by a pulse.
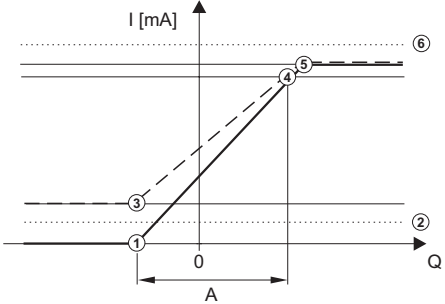
8   Group HANDLING TOTALIZER

Functional description	
RESET ALL TOTALIZERS	Use this function to reset the totals (including all overflows) of the totalizers (1...2) to "zero" (= RESET). **Options:** NO YES **Factory setting:** NO ✎ Note! If the device is equipped with a status input and if it is appropriately configured, a reset for the totalizer (1...2) can also be triggered by a pulse (see function ASSIGN STATUS IN).
FAILSAFE ALL TOTALIZERS	Use this function to define the common response of all totalizers (1...2) in case of error. **Options:** STOP The totalizer is paused until the fault is rectified. ACTUAL VALUE The totalizer continues to count based on the current flow measuring value. The fault is ignored. HOLD VALUE The totalizer continues to count the flow is based on the last valid flow value (before the fault occurred). **Factory setting:** STOP

9 Group CURRENT OUTPUT

Function description CURRENT OUTPUT	
ASSIGN CURRENT OUTPUT	Use this function to assign a measured variable to the current output. **Options:** OFF VOLUME FLOW SOUND VELOCITY FLOW VELOCITY **Factory setting:** VOLUME FLOW ✎ Note! If you select OFF, the only function shown in this group is the function ASSIGN CURRENT OUTPUT.

Function description CURRENT OUTPUT	
CURRENT SPAN	Use this function to define the current span. The selection specifies the operational range and the lower and upper signal on alarm. **Options:** 0−20 mA 4−20 mA 4−20 mA HART 4−20 mA NAMUR 4−20 mA HART NAMUR 4−20 mA US 4−20 mA HART US 0−20 mA (25 mA) 4−20 mA (25 mA) 4−20 mA (25 mA) HART **Factory setting:** 4−20 mA HART NAMUR ✎ Note! When switching the hardware from an active (factory setting) to a passive output signal select a current span of 4...20 mA, (see Operating Instructions Proline Prosonic Flow 90, BA 068D/06/en/.) **Current span, operational range and signal on alarm level** | a	1	2	3
---	---	---	---
0-20 mA	0 - 20.5 mA	0	22
4-20 mA	4 - 20.5 mA	2	22
4-20 mA HART	4 - 20.5 mA	2	22
4-20 mA NAMUR	3.8 - 20.5 mA	3.5	22.6
4-20 mA HART NAMUR	3.8 - 20.5 mA	3.5	22.6
4-20 mA US	3.9 - 20.8 mA	3.75	22.6
4-20 mA HART US	3.9 - 20.8 mA	3.75	22.6
0-20 mA (25 mA)	0 - 24 mA	0	25
4-20 mA (25 mA)	4 - 24 mA	2	25
4-20 mA (25 mA) HART	4 - 24 mA	2	25	 A0001222 *I = Current span* *1 = Operational range (measuring information)* *2 = Lower signal on alarm level* *3 = Upper signal on alarm level* ✎ Note! ■ If the measured value exceeds the measuring range (as defined in the functions VALUE 0_4 mA and VALUE 20 mA) a notice message is generated (#351−354, current span). ■ In case of a fault the behaviour of the current output is according to the selected option in the function FAILSAFE MODE. Change the error category in the function ASSIGN SYSTEM ERROR to generate a fault message instead of a notice message.

Function description CURRENT OUTPUT	
VALUE 0_4 mA	✎ Note! This function is not available unless the sound velocity is assigned to the current output. Use this function to assign the 0_4 mA current a value. The value can be greater or less than the value assigned to 20 mA, (function VALUE 20 mA). Example for STANDARD measuring mode: A0001223 ① = Initial value (0...20 mA) ② = Lower signal on alarm level: depends on the setting in the function CURRENT SPAN ③ = Initial value (4...20 mA): depends on the setting in the function CURRENT SPAN ④ = Full scale value (0/4...20 mA): depends on the setting in the function CURRENT SPAN ⑤ = Maximum current value: depends on the setting in the function CURRENT SPAN ⑥ = Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN (see Page 27) and FAILSAFE MODE, (see Page 29) A = Measuring range (the minimum measuring range has to exceed the value that correlates with a flow velocity of 0.3 m/s) **User input:** 5–digit floating–point number **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the group SYSTEM UNITS (see Page 10). ■ For details on current span, operational range and signal on alarm level see Page 27.
VALUE 20 mA	Use this function to assign the 20 mA current a value. The value can be greater or less than the value assigned to 0/4 mA, (function VALUE 0_4 mA). Positive and negative values are permissible, depending on the measured variable assigned (e.g. volume flow). The assignment applies for both flow directions for measuring mode SYMMETRY (see Page 58) and only for the selected flow direction for measuring mode STANDARD. **User input:** 5–digit floating–point number, with sign **Factory setting:** depends on the seting in the function assign current input: volume flow: 20 l/s sound velocity: 1800 m/s flow velocity: 10 m/s corresponds to the factory setting for the final value. ✎ Note! ■ The appropriate unit is taken from the group SYSTEM UNITS, (see Page 10). ■ For an example for STANDARD measuring mode See "VALUE 0_4 mA" on Page 28.

Function description CURRENT OUTPUT	
TIME CONSTANT	Use this function to enter a time constant defining how the current output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** fixed-point number 0.01...100.00 s **Factory setting:** 1.00 s
FAILSAFE MODE	For safety reasons it is advisable to ensure that the current output assumes a predefined state in the event of a fault. The setting you select affects only the current output. It has no effect on other outputs or the display (e.g. totalizers). **Options:** MIN. CURRENT The current output adopts the value of the lower signal on alarm level (as defined in the function CURRENT SPAN (4001) MAX. CURRENT The current output adopts the value of the upper signal on alarm level (as defined in the function CURRENT SPAN (4001) HOLD VALUE (**not recommended**) Measuring value output is based on the last measuring value saved before the error occurred. ACTUAL VALUE Measured value output is based on the current flow measurement. The fault is ignored. **Factory setting:** MIN. CURRENT
ACTUAL CURRENT	Use this function to view the computed actual value of the output current. **Display:** 0.00...25.00 mA
SIMULATION CURRENT	Use this function to activate simulation of the current output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ■ The "SIMULATION CURRENT OUTPUT" message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs. ☝ Caution! The setting is not saved if the power supply fails.

Function description CURRENT OUTPUT

VALUE SIMULATION CURRENT	✎ Note! This function is not available unless the function SIMULATION CURRENT is active (= ON). Use this function to define a selectable value (e.g. 12 mA) to be output at the current output. This is used to test downstream devices and the measuring device itself. **User input:** Floating-point number: 0.00...25.00 mA **Factory setting:** 0.00 mA ☝ Caution! The setting is not saved if the power supply fails.
	Function description CURRENT OUTPUT

10   Group PULSE/FREQUENCY OUTPUT

Function description PULSE/FREQUENCY OUTPUT	
This group is not available unless the measuring device is equipped with a pulse/frequency output.	
OPERATION MODE	Use this function to configure the output as a pulse output or frequency output. The functions available in this function group vary, depending on which option you select here. **Options:** PULSE FREQUENCY **Factory setting:** PULSE
ASSIGN FREQUENCY	✎ Note! This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. Use this function to assign a measured variable to the frequency output. **Options:** OFF VOLUME FLOW SOUND VELOCITY FLOW VELOCITY **Factory setting:** VOLUME FLOW ✎ Note! If you select OFF, the only functions shown in this function group are the functions ASSIGN FREQUENCY and OPERATION MODE.
END VALUE FREQ.	✎ Note! This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. Use this function to define a full scale frequency for the frequency output. You define the associated measured value of the measuring range in the function VALUE-f HIGH on Page 32. **User input:** 4-digit fixed-point number 2...1000 Hz **Factory setting:** 1000 Hz Example: ■ VALUE-f HIGH = 1000 l/h, end frequency = 1000 Hz: i.e. at a flow of 1000 l/h, a frequency of 1000 Hz is output. ■ VALUE-f HIGH = 3600 l/h, end frequency = 1000 Hz: i.e. at a flow of 3600 l/h, a frequency of 1000 Hz is output. ✎ Note! ■ In the FREQUENCY operating mode the output signal is symmetrical (on/off ratio = 1:1). At low frequencies the pulse duration is limited to a maximum of 10 seconds, i.e. the on/off ratio is no longer symmetrical. ■ The start value frequency is always 0 Hz. This value is fixed and cannot be edited.

Function description PULSE/FREQUENCY OUTPUT	
VALUE-f LOW	✎ Note! This function is not available unless FREQUENCY was selected in the OPERATION MODE function and the sound velocity is assigned to the frequency output. Use this function to assign a value to the start value frequency. You define a measuring range by defining VALUE-f LOW and VALUE-f HIGH. **User input:** 5–digit floating–point number **Factory setting:** 0 [e.g. m/s] ✎ Note! ■ The appropriate unit is taken from the group SYSTEM UNITS (see Page 10).
VALUE-f HIGH	✎ Note! This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. Use this function to assign a value to the end frequency. Positive and negative values are permissible. The desired measuring range is defined by defining the VALUE-f HIGH. The assignment applies for both flow directions for measuring mode SYMMETRY (see Page 58) and only for the selected flow direction for measuring mode STANDARD. **User input:** 5–digit floating–point number **Factory setting:** depends on the setting in the function ASSIGN FREQUENCY: volume flow: 20 l/s sound velocity: 1800 m/s flow velocity: 10 m/s corresponds to the factory setting for the final value. A0001279 ① = *Value f min* ② = *Value f max* ☞ Caution! The frequency output responds differently, depending on the parameters set in the various functions. Some examples of parameter settings and their effect on the frequency output are given in the following section. ✎ Note! ■ The appropriate unit is taken from the group SYSTEM UNITS (see Page 10).

Function description PULSE/FREQUENCY OUTPUT	
OUTPUT SIGNAL	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATING MODE function. For selecting the output configuration of the frequency output. **Options:** 0 = PASSIVE – POSITIVE 1 = PASSIVE – NEGATIVE **Factory setting:** PASSIVE – POSITIVE **Explanation** ■ PASSIVE = power is supplied to the frequency output by means of an external power supply. Configuring the output signal level (POSITIVE or NEGATIVE) determines the quiescent behaviour (at zero flow) of the frequency output. The internal transistor is activated as follows: ■ If POSITIVE is selected, the internal transistor is activated with a **positive** signal level. ■ If NEGATIVE is selected, the internal transistor is activated with a **negative** signal level (0 V). ✎ Note! With the passive output configuration, the output signal levels of the frequency output depend on the external circuit (see examples). **Example for passive output circuit (PASSIVE)** If PASSIVE is selected, the frequency output is configured as an open collector.
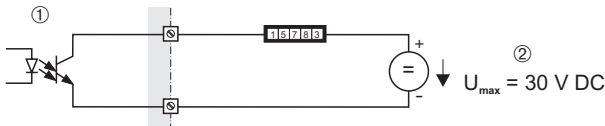
Diagram: passive output circuit showing open collector (①) and external power supply (②), $U_{max} = 30$ V DC

A0001225

① = *Open Collector*
② = *External power supply*

✎ Note!
For continuous currents up to 25 mA (I_{max} = 250 mA / 20 ms).

Example for output configuration PASSIVE–POSITIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.

Diagram: $+ U_{max} = 30$ V DC; open collector circuit with pull-up resistance; U(V) vs t plots

F06-xxxxxxxx-04-xx-xx-xx-000

① = *Open Collector*
② = *Pull-Up-Resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.

Diagram: U(V) vs t pulse train

F06-xxxxxxxx-04-xx-xx-xx-004

(continued on next page)

Function description PULSE/FREQUENCY OUTPUT	
OUTPUT SIGNAL (Continued)	**Example for output configuration PASSIVE-POSITIVE:** Output configuration with an external pull-down resistance. In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance. ① = *Open Collector* ② = *Pull-Down-Resistance* ③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)* ④ = *Output signal level in quiescent state (at zero flow)* In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V. **Example for output configuration PASSIVE-NEGATIVE:** Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level. ① = *Open Collector* ② = *Pull-Up-Resistance* ③ = *Transistor activation in "NEGATIVE" quiescent state (at zero flow)* ④ = *Output signal level in quiescent state (at zero flow)* In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.

Function description PULSE/FREQUENCY OUTPUT	
TIME CONSTANT	✎ Note! This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. Use this function to enter a time constant defining how the frequency output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** Floating-point number 0.00...100.00 s **Factory setting:** 0.00 s
FAILSAFE MODE	✎ Note! This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. For safety reasons it is advisable to ensure that the frequency output assumes a prede-fined state in the event of a fault. Use this function to define this state. The setting you select here affects only the frequency output. It has no effect on other outputs or the display (e.g. totalizers). **Options:** FALLBACK VALUE Output is 0 Hz. FAILSAFE LEVEL Output is the frequency specified in the FAILSAFE VALUE function. HOLD VALUE Measuring value output is based on the last measuring value saved before the error occurred ACTUAL VALUE Measuring value output based on the actual flow measurement (fault is ignored). **Factory setting:** FALLBACK VALUE
FAILSAFE VALUE	✎ Note! This function is not available unless FREQUENCY was selected in the OPERATION MODE function and FAILSAFE LEVEL was selected in the function FAILSAFE MODE. Use this function to define the frequency that the measuring device should output in the event of a fault. **User input:** max. 4-digit number: 0...1250 Hz **Factory setting:** 1250 Hz
ACTUAL FREQUENCY	✎ Note! This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. Use this function to view the computed actual value of the output frequency. **Display:** 0 ...1250 Hz

Function description PULSE/FREQUENCY OUTPUT	
SIMULATION FREQUENCY	✎ **Note!** This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE. Use this function to activate simulation of the frequency output. **Options:** OFF ON **Factory setting:** OFF ✎ **Note!** ▪ The "SIMULATION FREQUENCY OUTPUT" message indicates that simulation is active. ▪ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs. ☝ **Caution!** The setting is not saved if the power supply fails.
VALUE SIMULATION FREQUENCY	✎ **Note!** This function is not available unless FREQUENCY was selected in the OPERATION MODE function and the function VALUE SIMULATION FREQUENCY is active (= ON). Use this function to define a selectable frequency value (e.g. 500 Hz) to be output at the frequency output. This is used to test downstream devices and the measuring device itself. **User input:** 0 ...1250 Hz **Factory setting:** 0 Hz ☝ **Caution!** The setting is not saved if the power supply fails.
ASSIGN PULSE	✎ **Note!** This function is not available unless the PULSE setting was selected in the function OPERATION MODE. Use this function to assign a measured variable to the pulse output. **Options:** OFF VOLUME FLOW **Factory setting:** VOLUME FLOW ✎ **Note!** If you select OFF, the only functions shown in this function group are the functions ASSIGN PULSE and OPERATION MODE.

Function description PULSE/FREQUENCY OUTPUT	
PULSE VALUE	✎ Note! This function is not available unless the PULSE setting was selected in the function OPERATION MODE. Use this function to define the flow at which a pulse is triggered. These pulses can be totalled by an external totalizer and the total flow since measuring started can be recorded in this way. **User input:** 5–digit floating-point number **Factory setting:** 1 l/pulse Corresponds to the factory setting for the pulse value (see Page 68). ✎ Note! The appropriate unit is taken from the group SYSTEM UNITS, (see Page 10).
PULSE WIDTH	✎ Note! This function is not available unless the PULSE setting was selected in the function OPERATION MODE. Use this function to enter the maximum pulse width of the output pulses. **User input:** 0.5...2000 ms **Factory setting:** 100 ms Pulse output is **always** with the pulse width (B) entered in this function. The intervals (P) between the individual pulses are automatically adjusted. However, they must at least correspond to the pulse width (B = P). B = Pulse width entered (the illustration applies to positive pulses) P= Intervals between the individual pulses ✎ Note! When entering the pulse width, select a value that can still be processed by an external totalizer (e.g. mechanical totalizer, PLC, etc.). ☞ Caution! If the pulse number or frequency resulting from the pulse value entered, (see function PULSE VALUE on Page 37), and from the current flow is too large to maintain the pulse width selected (the interval P is smaller than the pulse width B entered), a system error message (pulse memory) is generated after buffering/balancing.

Function description PULSE/FREQUENCY OUTPUT	
OUTPUT SIGNAL	✎ Note! Function is not available unless the PULSE setting was selected in the OPERATION MODE function. For selecting the output configuration of the pulse output. **Options:** 0 = PASSIVE – POSITIVE 1 = PASSIVE – NEGATIVE **Factory setting:** PASSIVE – POSITIVE **Explanation** ▪ PASSIVE = power is supplied to the pulse output by means of an external power supply. Configuring the output signal level (POSITIVE or NEGATIVE) determines the quiescent behaviour (at zero flow) of the pulse output. The internal transistor is activated as follows: ▪ If POSITIVE is selected, the internal transistor is activated with a **positive** signal level. ▪ If NEGATIVE is selected, the internal transistor is activated with a **negative** signal level (0 V). ✎ Note! With the passive output configuration, the output signal levels of the pulse output depend on the external circuit (see examples). **Example for passive output circuit (PASSIVE)** If PASSIVE is selected, the pulse output is configured as an open collector. A0001225 ① = *Open Collector* ② = *External power supply* ✎ Note! For continuous currents up to 25 mA (I_{max} = 250 mA / 20 ms). **Example for output configuration PASSIVE-POSITIVE:** Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is 0 V. F06-xxxxxxxx-04-xx-xx-xx-000 ① = *Open Collector* ② = *Pull-Up-Resistance* ③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)* ④ = *Output signal level in quiescent state (at zero flow)* In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level. F06-xxxxxxxx-04-xx-xx-xx-004 (continued on next page)
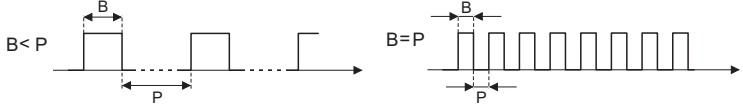
Function description PULSE/FREQUENCY OUTPUT	
OUTPUT SIGNAL (Continued)	**Example for output configuration PASSIVE–POSITIVE:** Output configuration with an external pull–down resistance. In the quiescent state (at zero flow), a positive voltage level is measured via the pull–down resistance. F06-xxxxxxxx-04-xx-xx-xx-001 ① = *Open Collector* ② = *Pull-Down-Resistance* ③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)* ④ = *Output signal level in quiescent state (at zero flow)* In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V. F06-xxxxxxxx-04-xx-xx-xx-006 **Example for output configuration PASSIVE–NEGATIVE:** Output configuration with an external pull–up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level. F06-xxxxxxxx-04-xx-xx-xx-002 ① = *Open Collector* ② = *Pull-Up-Resistance* ③ = *Transistor activation in "NEGATIVE" quiescent state (at zero flow)* ④ = *Output signal level in quiescent state (at zero flow)* In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V. F06-xxxxxxxx-04-xx-xx-xx-006

Function description PULSE/FREQUENCY OUTPUT

FAILSAFE MODE	✎ Note! This function is not available unless the PULSE setting was selected in the function OPERATION MODE. For safety reasons it is advisable to ensure that the pulse output assumes a predefined state in the event of a fault. Use this function to define this state. The setting you select here affects only the pulse output. It has no effect on other outputs or the display (e.g. totalizers). **Options:** FALLBACK VALUE Output is 0 pulses. HOLD VALUE Measuring value output based on the last measuring value saved before the error occurred. ACTUAL VALUE Measuring value output based on the current flow measurement. The fault; is ignored. **Factory setting:** FALLBACK VALUE
SIMULATION PULSE	✎ Note! This function is not available unless the PULSE option was selected in the OPERATING MODE function. Use this function to activate simulation of the pulse output. **Options:** OFF COUNTDOWN The pulses specified in the VALUE SIMULATION PULSE function are output. CONTINUOUSLY Pulses are continuously output with the pulse width specified in the PULSE WIDTH function. Simulation is started once the CONTINUOUSLY option is confirmed with the ⌷ key. ✎ Note! Simulation is started by confirming the CONTINUOUSLY option with the ⌷ key. The simulation can be switched off again via the SIMULATION PULSE function. **Factory setting:** OFF ✎ Note! ■ The notice message #631 "SIM. PULSE" indicates that simulation is active. ■ The on/off ratio is 1:1 for both types of simulation. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. ☞ Caution! The setting is not saved if the power supply fails.

Endress+Hauser

Function description PULSE/FREQUENCY OUTPUT	
VALUE SIMULATION PULSE	✎ Note! This function is not available unless the COUNTDOWN option was selected in the SIMULATION PULSE function. Use this function to specify the number of pulses (e.g. 50) which are output during the simulation. This value is used to test downstream devices and the measuring device itself. The pulses are output with the pulse width specified in the PULSE WIDTH function. The on/off ratio is 1:1. Simulation is started once the specified value is confirmed with the Ⓔ key. The display remains at 0 if the specified pulses have been output. **User input:** 0...10,000 **Factory setting:** 0 ✎ Note! Simulation is started by confirming the simulation value with the Ⓔ key. The simulation can be switched off again via the SIMULATION PULSE function. ☜ Caution! The setting is not saved if the power supply fails.

11   Group STATUS OUTPUT

Function description STATUS OUTPUT	
This group is not available unless the measuring device is equipped with a status output.	
ASSIGN STATUS OUTPUT	Use this function to assign a switching function to the status output. **Options:** OFF ON (operation) FAULT MESSAGE NOTICE MESSAGE FAULT MESSAGE & NOTICE MESSAGE FLOW DIRECTION VOLUME FLOW LIMIT VALUE SOUND VELOCITY LIMIT VALUE FLOW VELOCITY LIMIT VALUE **Factory setting:** FAULT MESSAGE ✎ Note! ■ The behaviour of the status output is a normally closed behaviour, in other words the output is closed (transistor conductive) when normal, error-free measuring is in progress. ■ It is very important to read and comply with the information on the switching characteristics of the status output, (see Page 45). ■ If you select OFF, the only function shown in this function group is the function ASSIGN STATUS OUTPUT.
ON-VALUE	✎ Note! This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN STATUS OUTPUT. Use this function to assign a value to the switch-on point (status output pulls up). The value can be equal to, greater than or less than the switch-off point. Positive and negative values are permissible. **User input:** 5–digit floating–point number **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the group SYSTEM UNITS, (see Page 10). ■ Only the switch-on point is available for flow direction output (no switch-off point). If you enter a value not equal to the zero flow (e.g. 5), the difference between the zero flow and the value entered corresponds to half the switchover hysteresis.

Function description STATUS OUTPUT	
OFF-VALUE	✎ Note! This function is not available unless LIMIT VALUE was selected in the ASSIGN STATUS OUTPUT function. Use this function to assign a value to the switch-off point (status output drops out). The value can be equal to, greater than or less than the switch-on point. Positive and negative values are permissible. **User input:** 5-digit floating-point number **Factory setting:** 0 [unit] ✎ Note! ▪ The appropriate unit is taken from the group SYSTEM UNITS, (see Page 10). ▪ If SYMMETRY is selected in the function MEASURING MODE (Page 58) and values with different signs are entered for the switch-on and switch-off points, the notice message "INPUT RANGE EXCEEDED" appears.
TIME CONSTANT	Use this function to enter a time constant defining how the measuring signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). The purpose of damping, therefore, is to prevent the status output changing state continuously in response to fluctuations in flow. **User input:** fixed-point number 0.00...100.00 s **Factory setting:** 0.00 s
ACTUAL STATUS	Use this function to check the current status of the status output. **Display:** NOT CONDUCTIVE CONDUCTIVE
SIMULATION SWITCH POINT	Use this function to activate simulation of the status output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ▪ The "SIMULATION SWITCH POINT" message indicates that simulation is active. ▪ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs. ☞ Caution! The setting is not saved if the power supply fails.

Function description STATUS OUTPUT

VALUE SIMULATION SWITCH POINT	✎ Note! This function is not available unless the function SIMULATION SWITCH POINT is active (= ON). Use this function to define the switching response of the status output during the simulation. This is used to test downstream devices and the measuring device itself. **Options:** NOT CONDUCTIVE CONDUCTIVE **Factory setting:** NOT CONDUCTIVE ☝ Caution! The setting is not saved if the power supply fails.

Function description STATUS OUTPUT

11.1   Information on the response of the status output

General

If you have configured the status output for "LIMIT VALUE" or "FLOW DIRECTION", you can configure the requisite switch points in the functions ON-VALUE and OFF-VALUE. When the measured variable in question reaches these predefined values, the status output switches as shown in the illustrations below.

Status output configured for limit value

The status output switches as soon as the measured variable undershoots or overshoots a defined switch point.
Application: Monitoring flow or process-related boundary conditions.
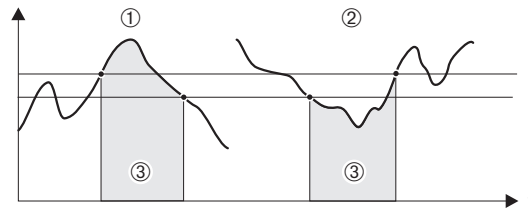
A0001235

① = ON ≤ SWITCH-OFF POINT (maximum safety)
② = ON > SWITCH-OFF POINT (minimum safety)
③ = Status output switched off (not conductive)

Status output configured for flow direction

The value entered in the function SWITCH-ON POINT defines the switch point for the positive and negative directions of flow. If, for example, the switch point entered is = 1 m^3/h, the status output switches off at −1 m^3/h (not conductive) and switches on again at +1 m^3/h (conductive). Set the switch point to 0 if your process calls for direct switchover (no switching hysteresis). If low flow cut off is used, it is advisable to set hysteresis to a value greater than or equal to the low flow cut off.
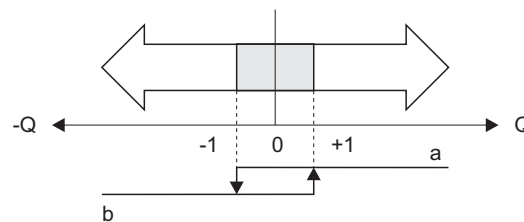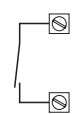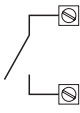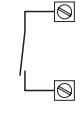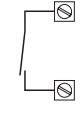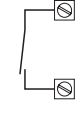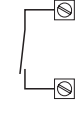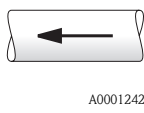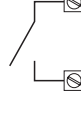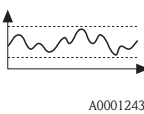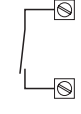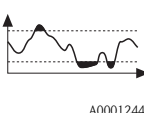

A0001236

a = Status output conductive
b = Status output not conductive

11.2   Switching action of the status output

Function	Status	Open collector response (transistor)	
ON (operation)	System in measuring mode	conductive	A0001237
	System not in measuring mode (power supply failed)	not conductive	A0001238

Function	Status	Open collector response (transistor)
Fault message	System OK	conductive A0001237
	(System or process error) Fault → Error response of out-puts/inputs and totalizer	not conductive A0001238
Notice message	System OK	conductive A0001237
	(System or process error) Fault → Continuation of measuring	not conductive A0001238
Fault message or notice message	System OK	conductive A0001237
	(System or process error) Fault → Response to error or Note → Continuation of measuring	not conductive A0001238
Flow direction	Forward A0001241	conductive A0001237
	Reverse A0001242	not conductive A0001238
Limit value – Volume flow – Sound velocity – Flow velocity	Limit value not overshot or undershot A0001243	conductive A0001237
	Limit value overshot or undershot A0001244	not conductive A0001238

12 Group STATUS INPUT

Function description STATUS INPUT	
This group is not available unless the measuring device is equipped with a status input.	
ASSIGN STATUS INPUT	Use this function to assign a switching function to the status input. **Options:** OFF RESET TOTALIZER1 POSITIVE ZERO RETURN ZERO POINT ADJUSTMENT RESET TOTALIZER2 RESET ALL TOTALIZERS **Factory setting:** OFF ✎ Note! Positive zero return is active as long as the active level is available at the status input (continuous signal). All other assignments react to a change in level (pulse) at the status input.
ACTIVE LEVEL	Use this function to define whether the assigned switch function, (see function ASSIGN STATUS INPUT) is released or sustained when the level is present (HIGH) or not present (LOW). **Options:** HIGH LOW **Factory setting:** HIGH
MINIMUM PULSE WIDTH	Use this function to define a minimum pulse width which the input pulse must achieve in order to trigger the selected switching function. **User input:** 0...100 ms **Factory setting:** 50 ms
SIMULATION STATUS INPUT	Use this function to activate simulation of the status input, i.e. to trigger the function assigned to the status input, (see function ASSIGN STATUS INPUT on Page 42). **Options:** OFF ON **Factory setting:** OFF ✎ Note! ■ The "SIMULATION STATUS INPUT" message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, and the current measuring values are output correctly via the outputs. ☝ Caution! The setting is not saved if the power supply fails.

Function description STATUS INPUT	
VALUE SIMULATION STATUS INPUT	✎ Note! This function is not available unless the function SIMULATION STATUS INPUT is active (= ON). Use this function to select the level to be simulated at the status input. **Options:** HIGH LOW **Factory setting:** LOW ☝ Caution! The setting is not saved if the power supply fails.
	Function description STATUS INPUT

13   Group COMMUNICATION

Function description COMMUNICATION	
TAG NAME	Use this function to enter a tag name for the measuring device. You can edit and read this tag name via the local display or the HART protocol. **User input:** max. 8-character text, permitted characters are: A–Z, 0–9, +,–, punctuation marks **Factory setting:** "_ _ _ _ _ _ _ _" (without text)
TAG DESCRIPTION	Use this function to enter a tag description for the measuring device. You can edit and read this tag description at the local display or via the HART protocol. **User input:** max. 16-character text, permitted characters are: A–Z, 0–9, +,–, punctuation marks **Factory setting:** "_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _" (without text)
FIELDBUS ADDRESS	Use this function to define the address for the exchange of data with the HART protocol. **User input:** 0...15 **Factory setting:** 0 ✎ Note! Addresses 1...15: a constant 4 mA current is applied.
HART PROTOCOL	Use this function to display if the HART protocol is active. **Display:** OFF = HART protocol not active ON = HART protocol active ✎ Note! The HART protocol is activated by selecting 4–20 mA HART or 4–20 mA (25 mA) HART in the function CURRENT SPAN (see Page 27).
MANUFACT. ID	Use this function to view the manufacturer number in decimal numerical format. **Display:** 17 ($\cong$ 11 hex) for Endress+Hauser
DEVICE ID	Use this function to view the device ID in hexadecimal numerical format. **Display:** 58 ($\cong$ 88 dez) for Prosonic Flow 90

14 Group PROCESS PARAMETER

Function description PROCESS PARAMETER	
ASSIGN LOW FLOW CUT OFF	Use this function to assign the switch point for the low flow cut off. **Options:** OFF VOLUME FLOW **Factory setting:** VOLUME FLOW
ON-VALUE LOW FLOW CUT OFF	✎ Note! This function is not available unless VOLUME FLOW was selected in the function ASSIGN LOW FLOW CUT OFF. Use this function to enter the switch-on point for low flow cut off. Low flow cut off is active if the value entered is not equal to 0. The sign of the flow value is highlighted on the display to indicate that low flow cut off is active. **User input:** 5-digit floating-point number **Factory setting:** 0 l/s ✎ Note! The appropriate unit is taken from the group SYSTEM UNITS, (see Page 10).
OFF-VALUE LOW FLOW CUT OFF	✎ Note! This function is not available unless VOLUME FLOW was selected in the function ASSIGN LOW FLOW CUT OFF. Use this function to enter the switch-off point for low flow cut off. Enter the switch-off point as a positive hysteresis value from the switch-on point. **User input:** Integer 0...100% **Factory setting:** 50% Example: A0001245 Q = Flow [volume/time] t = Time H = Hysteresis a = ON-VALUE LOW FLOW CUT OFF = 200 dm^3/h b = OFF-VALUE LOW FLOW CUT OFF = 10% c = Low flow cut off active 1 = Low flow cut off is switched on at 200 dm^3/h 2 = Low flow cut off is switched off at 220 dm^3/h

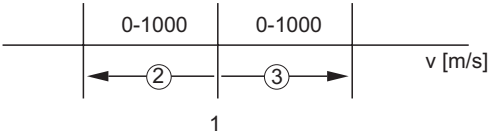| Function description PROCESS PARAMETER	
ZEROPOINT ADJUSTMENT	Use this function to start zero point adjustment automatically. The new zero point determined by the measuring system is adopted by the ZERO POINT function, (see P. 63). **Options:** CANCEL START **Factory setting:** CANCEL Caution! Before carrying this out, please refer to the Operating Instructions Proline Prosonic Flow 90 (BA 068D/06/en/...) for a detailed description of the procedure for zero point adjustment. Note! ■ Programming is locked during zero point adjustment The message "ZEROPOINT ADJUST RUNNING" appears on the display. ■ If the zero point adjustment is not possible, (e.g. if v > 0.1 m/s), or has been canceled, then the alarm message "ZERO ADJUST NOT POSSIBLE" is shown on the display. ■ If the Prosonic Flow 90 electronics are fitted with a status input, then the zero point adjustment can also be activated by using this input.

15   Group PIPE DATA

Function description PIPE DATA

PIPE STANDARD	Use this function to select a pipe standard. **Options:** OTHER DIN: PN10, PN16, 28610, 28614, 28615, 28619 ANSI: SCHEDULE 40, SCHEDULE 80 AWWA: CLASS 50, CLASS 53, CLASS 55 ✎ Note! The selection specifies the values for the following functions: ▪ PIPE MATERIAL ▪ SOUND VELOCITY PIPE ▪ LINER MATERIAL If you edit these functions the pipe standard will be reset to the option OTHERS. **Factory setting:** DIN PN10
NOMINAL DIAMETER	✎ Note! This function does not appear if the option OTHERS was selected in the function PIPE STANDARD. Use this function to select the nominal diameter of the pipe. **Options:** OTHER DN: 25/1", 40/1½", 50/2", 80/3", 100/4", 150/6", 200/8", 250/10", 300/12", 400/16", 450/18", 500/20", 600/24", 700/28", 750/30", 800/32", 900/36", 1000/40", 1200/48", 1400/54", 1500/60", 1600/64", 1800/72", 2000/80" ✎ Note! The selection specifies the values for the following functions: ▪ CIRCUMFERENCE ▪ PIPE DIAMETER ▪ WALL THICKNESS If you edit these functions the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. **Factory setting:** 80/3"
PIPE MATERIAL	This function displays the pipe material determined via the values entered in the function PIPE STANDARD. If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. If a pipe standard was not available for selection and the selection OTHER was made in the function PIPE STANDARD the pipe material must be entered here. **Options:** CARBON STEEL, DUCTILE IRON, STAINLESS STEEL, SS ANSI 304, SS ANSI 316, SS ANSI 347, SS ANSI 410, SS ANSI 430, ALLOY C, PVC, PE, LDPE, HDPE, GRP, PVDF, PA, PP, PTFE, GLASS PYREX, ASBESTOS CEMENT, OTHER **Factory setting:** STAINLESS STEEL

Function description PIPE DATA	
SOUND VELOCITY PIPE	This function displays the sound velocity in the pipe determined via the values entered in the function PIPE STANDARD. If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. If a pipe standard was not available for selection and the selection OTHER was made in the function PIPE STANDARD the sound velocity must be entered here. **User input:** Fixed-point number 800...6500 m/s **Factory setting:** 3120 m/s
CIRCUMFERENCE	This function displays the outer circumference of the pipe determined via the values entered in the function NOMINAL DIAMETER. If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. If a nominal diameter was not available for selection and the selection OTHER was made in the function NOMINAL DIAMETER the outer circumference must be entered here. **User input:** Fixed-point number 31.4...15708.0 mm **Factory setting:** 279.3 mm
PIPE DIAMETER	This function displays the outer diameter of the pipe determined via the values entered in the function NOMINAL DIAMETER. If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. If a nominal diameter was not available for selection and the selection OTHER was made in the function NOMINAL DIAMETER the outer diameter must be entered here. **User input:** Fixed-point number 10.0...5000.0 mm **Factory setting:** 88.9 mm
WALL THICKNESS	This function displays the thickness of the pipe walls determined via the values entered in the function NOMINAL DIAMETER. If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. If a nominal diameter was not available for selection and the selection OTHER was made in the function NOMINAL DIAMETER the thickness of the pipe wall must be entered here. **User input:** Fixed-point number 0.1...100.0 mm **Factory setting:** 3.2 mm

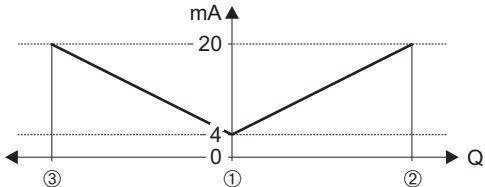| Function description PIPE DATA	
LINER MATERIAL	This function displays the liner material of the pipe determined via the values entered in the function PIPE STANDARD. If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER does not appear. If a pipe standard was not available for selection and the selection OTHER was made in the function PIPE STANDARD the liner material must be entered here. **Options:** LINER NONE MORTAR RUBBER TAR EPOXY OTHERS **Factory setting:** LINER NONE
SOUND VELOCITY LINER	✎ Note! This function does not appear if the option LINER NONE was selected in the function LINER MATERIAL This function displays the sound velocity of the liner determined via the values entered in the function LINER MATERIAL. If you edit the predetermined value the liner material will be reset to the option OTHERS. If a liner material was not available for selection and the selection OTHER was made in the function LINER MATERIAL the sound velocity of the liner must be entered here. **User input:** Fixed-point number 800...6500 m/s **Factory setting:** Depends on the setting selected in the function LINER MATERIAL
LINER THICKNESS	✎ Note! This function does not appear if the option LINER NONE was selected in the function LINER MATERIAL Use this function to enter the thickness of the liner. **User input:** Fixed-point number 0.1...100 mm **Factory setting:** 0 mm
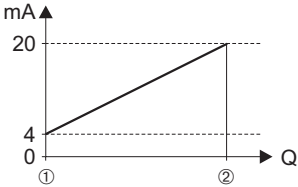
16   Group LIQUID DATA

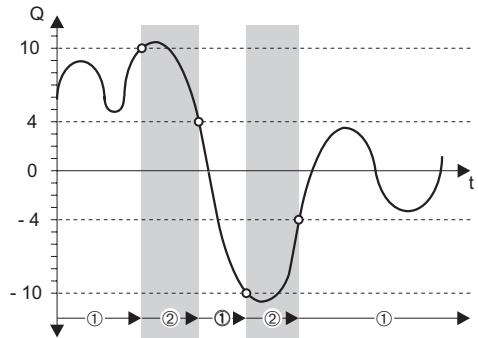| Function description LIQUID DATA	
LIQUID	Use this function to select the liquid in the pipe. **Options:** WATER, SEAWATER, DISTILLED WATER, AMMONIA, ALCOHOL, BENZENE, BROMIDE, ETHANOL, GLYCOL, KEROSENE, MILK, METHANOL, TOLUOL, LUBE OIL, FUEL OIL, PETROL, OTHERS ✎ Note! The selection specifies the values for the sound velocity and viscosity. If OTHER is selected, these must be entered via the SOUND VELOCITY LIQUID and VISCOSITY functions. **Factory setting:** WATER
TEMPERATURE	Use this function to enter the process temperature of the liquid. Via the sound velocity, the value influences the determination of the sensor distance. Enter the process temperature at normal operating conditions to achieve an optimum configuration of the measuring system. **User input:** Fixed-point number −273.15 °C...726.85 °C (0...1000 K) **Factory setting:** 20 °C

Function description LIQUID DATA	
SOUND VELOCITY LIQUID	This function displays the sound velocity of the liquid determined via the values entered in the functions LIQUID and TEMPERATURE. If you edit the predetermined value the function LIQUID will be reset to the option OTHERS. If a liquid was not available for selection and the selection OTHER was made in the function LIQUID the sound velocity must be entered here. **Transmitter search range:** The measuring device searches for the measuring signal within a defined sound velocity range. You specify the search range in the SOUND VELOCITY NEGATIVE (6545) and SOUND VELOCITY POSITIVE (6546) functions. An error message is displayed if the sound velocity of the liquid exceeds the search range. ✎ Note! We recommend you select a smaller search range by unfavourable signal conditions (signal strength < 50%). A0001246 *1 = Sound velocity liquid* ②*= Lower search range: defined in the SOUND VELOCITY NEGATIVE function* ③ *= Upper search range: defined in the SOUND VELOCITY POSITIVE function* **User input:** Fixed-point number 400...3000 m/s **Factory setting:** 1485 m/s
VISCOSITY	This function displays the viscosity of the liquid. This is determined via the values entered in the LIQUID and TEMPERATURE functions.If you edit the predetermined value the function LIQUID will be reset to the option OTHERS. If the liquid is not available for selection in the LIQUID function and the OTHER option was selected the viscosity must be entered here. **User input:** Fixed-point number 0.0...5000.0 cSt **Factory setting:** 1 mm2/s
SOUND VELOCITY NEGATIVE	Use this function to specify the lower search range for the sound velocity of the liquid. **User input:** Fixed-point number 0...1000 m/s **Factory setting:** 500 m/s ✎ Note! Pay particular attention to the information in the SOUND VELOCITY LIQUID function.

Function description LIQUID DATA	
SOUND VELOCITY POSI-TIVE	Use this function to specify the upper search range for the sound velocity of the liquid. **User input:** Fixed-point number 0...1000 m/s **Factory setting:** 300 m/s ✎ Note! Pay particular attention to the information in the SOUND VELOCITY LIQUID function.

17   Group SYSTEM PARAMETERS

Function description SYSTEM PARAMETERS	
INSTALLATION DIRECTION SENSOR	Use this function to reverse the sign of the flow quantity, if necessary. **Options:** NORMAL INVERSE **Factory setting:** NORMAL
MEASURING MODE	Use this function to define the measuring mode for all outputs. **Options:** STANDARD SYMMETRY **Factory setting:** STANDARD The responses of the individual outputs in each of the measuring modes are described in detail on the following pages: **Current output and frequency output** STANDARD The output signals of the current and frequency outputs are proportional to the measured variable assigned. Only positive flow components are totalled. Negative components are not taken into account. Example for current output: A0001248 SYMMETRY The output signals of the current and frequency outputs are independent of the direction of flow (absolute amount of the measured variable). The "VALUE 20 mA" or "VALUE–f HIGH" ③ (e.g. backflow) corresponds to the mirrored VALUE 20 mA or VALUE–f HIGH ② (e.g. flow). Positive and negative flow components are taken into account. Example for current output: A0001249 ✎ Note! The direction of flow can be output via the configurable status output.

Function description SYSTEM PARAMETERS

| MEASURING MODE (Contd) | **Pulse output**
STANDARD
Only positive flow components are totalled. Negative components are not taken into account.

SYMMETRY
Positive and negative flow components are taken into account.

✎ Note!
The direction of flow can be output via the configurable status output.

Status output

✎ Note!
The information is only applicable if LIMIT VALUE was selected in the function ASSIGN STATUS OUTPUT.

STANDARD
The status output signal switches at the defined switch points.

SYMMETRY
The status output signal switches at the defined switch points, irrespective of the sign. In other words, if you define a switch point with a positive sign, the status output signal switches as soon as the value is reached in the negative direction (negative sign), (see illustration).

Example for the SYMMETRY measuring mode:
Switch-on point: Q = 4
Switch-off point: Q = 10

① = Status output switched on (conductive)
② = Status output switched off (not conductive)

A0001247 |

Function description SYSTEM PARAMETERS	
POSITIVE ZERO RETURN	Use this function to interrupt evaluation of measured variables. This is necessary when a piping system is being cleaned, for example. This setting acts on all function and outputs of the measuring device. **Options:** OFF ON Signal output is set to the "ZERO FLOW" value. **Factory setting:** OFF
FLOW DAMPING	Use this function to set the filter depth of the digital filter. The sensitivity of the measure-ment signal can be reduced with respect to interference peaks (e.g. in the event of a high solid content, gas bubbles in the fluid etc.). The reaction time of the measuring device increases with the filter setting. **User input:** 0 ...15 **Factory setting:** 0 ✎ Note! The system damping acts on all functions and outputs of the measuring device.

18   Group SENSOR DATA

Function description SENSOR DATA	
You can set the parameter settings for the ultrasonic sensors in this group.	
MEASUREMENT	**Options:** CLAMP ON INSERTION **Factory setting:** CLAMP ON
SENSOR TYPE	**Options:** W-CL-05F-L-B [1] W-CL-1F-L-B [1] W-CL-2F-L-B [1] P-CL-05F-L-B [1] P-CL-1F-L-B [1] P-CL-2F-L-B [1] U-CL-2F-L-A [1] P-CL-05F-M-B [1] P-CL-1F-M-B [1] P-CL-2F-M-B [1] W-IN-1F-L-B [2] **Factory setting:** W-CL-2F-L-B ✎ Note! [1] This option is not available unless CLAMP ON was selected in the function MEASUREMENT. [2] This option is not available unless INSERTION was selected in the function MEASUREMENT.
SENSOR CONFIGURATION	Use this function to select the configuration for the ultrasonic sensors, e.g. the number of traverses (in the clamp-on design). **Options:** NO. TRAVERSE: 1 [1] NO. TRAVERSE: 2 [1] NO. TRAVERSE: 3 [1] NO. TRAVERSE: 4 [1] SINGLE PATH [2] **Factory setting:** NO. TRAVERSE: 2 ✎ Note! ■ When using the U-Sensor it is always required to set this function to "NO. TRAVERSE: 2" ■ For flow measurement it is basically not recommended to set this function to "NO. TRAVERSE: 3". [1] This option is not available unless CLAMP ON was selected in the function MEASUREMENT. [2] This option is not available unless INSERTION was selected in the function MEASUREMENT.

Function description SENSOR DATA
CABLE LENGTH	Use this function to select the length of the sensor cable. **Options:** LENGTH 5m/15 feet LENGTH 10m/30 feet LENGTH 15m/45 feet LENGTH 30m/90 feet **Factory setting:** LENGTH 5m/15 feet
POSITION SENSOR	Use this function to view the position of both sensors on the rail. ✎ Note! This function is not available unless CLAMP ON was selected in the function MEASURE-MENT and the number of traverses is 2 or 4, (see function SENSOR CONFIGURATION). **Display:** 4-digit number combination
WIRE LENGTH	The wire length for assembling the sensors at the correct distance apart appears on the display. ✎ Note! This function is not available unless CLAMP ON was selected in the function MEASURE-MENT and the number of traverses is 1 or 3, (see SENSOR CONFIGURATION). **Display:** max. 4-digit number, including unit (e.g. 200 mm)
SENSOR DISTANCE	The distance between sensor 1 and sensor 2 as a length measurement appears on the display. **Display:** max. 4-digit number, including unit (e.g. 200 mm)
PATH LENGTH	The path length appears on the display. ✎ Note! This function is not available unless INSERTION was selected in the function MEASURE-MENT. **Display:** max. 4-digit number, including unit (e.g. 200 mm)

19   Group CALIBRATION DATA

Function description CALIBRATION DATA	
P-FACTOR	This function displays the p-factor. The p-factor indicates the influence of the velocity distribution of the flow profile inside the pipe; it is dependent on the reynolds number. The p-factor varies in the range 0.75...0.95. If the displayed value ranges 0.75...0.94 the measurement will have a reduced linearity.
ZERO POINT	Use this function to call up or manually change the zero point correction currently being used. **User input:** 5–digit floating-point number, including unit and sign (e.g. +0010.0 ns)
CORRECTION FACTOR	Use this function to enter a correction factor at the client's site. **User input:** 5–digit floating-point number **Factory setting:** 1.000 (no correction)
DEVIATION SENSOR DISTANCE	Use this function to enter a deviation value for the sensor distance. ✎ Note! This function is not available unless INSERTION was selected in the function MEASURE-MENT. **User input:** 5–digit floating-point number, including unit and sign (e.g. +2.000 mm) **Factory setting:** 0 mm
DEVIATION PATH LENGTH	Use this function to enter a deviation value for the path length. ✎ Note! This function is not available unless INSERTION was selected in the function MEASURE-MENT. **User input:** 5–digit floating-point number, including unit and sign (e.g. +2.000 mm) **Factory setting:** 0 mm

20   Group SUPERVISION

Function description SUPERVISION	
ACTUAL SYSTEM CONDITION	Use this function to check the current system condition. **Display:** "SYSTEM OK" or the fault / notice message with the highest priority.
PREVIOUS SYSTEM CONDITIONS	Use this function to view the fifteen most recent error and notice messages since measuring last started. **Display:** The last 15 fault/ notice messages.
ASSIGN SYSTEM ERROR	Use this function to view all system errors and the associated error categories (fault message or notice message). If you select a single system error you can change its error category. **Options:** CANCEL List of system errors with an icon preceding each entry. ✎ Note! ■ Press the Ⓔ – key twice to call up the ERROR CATEGORY function. ■ Use the ⊞/⊟ – key combination or select "CANCEL" in the system error list to exit the function. ■ A list of possible system errors is provided in the Operating Instructions Proline Prosonic Flow 90 (BA 068D/06/en/...).
ERROR CATEGORY	Use this function to define whether a system error triggers a notice message or a fault message. If you select "FAULT MESSAGES", all outputs respond to an error in accordance with their defined error response patterns. **Options:** NOTICE MESSAGES (display only) FAULT MESSAGES (outputs and display) ✎ Note! Press the Ⓔ – key twice to call up the function ASSIGN SYSTEM ERROR.
ASSIGN PROCESS ERROR	Use this function to view all process errors and the associated error categories (fault message or notice message). If you select a single process error you can change its error category. **Options:** CANCEL List of process errors with an icon preceding each entry. ✎ Note! ■ Press the Ⓔ – key twice to call up the ERROR CATEGORY function. ■ Use the ⊞/⊟ – key combination or select "CANCEL" in the process error list to exit the function. ■ A list of possible process errors is provided in the Operating Instructions Proline Prosonic Flow 90 (BA 068D/06/en/...).

Function description SUPERVISION
ERROR CATEGORY	Use this function to define whether a process error triggers a notice message or a fault message. If you select "FAULT MESSAGES", all outputs respond to an error in accordance with their defined error response patterns. **Options:** NOTICE MESSAGES (display only) FAULT MESSAGES (outputs and display) ✎ Note! Press the ⊡ – key twice to call up the ASSIGN PROCESS ERROR function.
ALARM DELAY	Use this function to define a time span in which the criteria for an error have to be satisfied without interruption before an error or notice message is generated. Depending on the setting and the type of error, this suppression acts on the: ▪ Display ▪ Status output ▪ Current output ▪ Frequency output **User input:** 0 s...100 s (in steps of one second) **Factory setting:** 0 s ☞ Caution! If this function is activated error and notice messages are delayed by the time corresponding to the setting before being forwarded to the higher-order controller (process controller, etc.). It is therefore imperative to check in advance in order to make sure whether a delay of this nature could affect the safety requirements of the process. If error and notice messages cannot be suppressed, a value of 0 seconds must be entered here.
SYSTEM RESET	Use this function to perform various resets of the measuring system. **Options:** NO RESTART SYSTEM (restart without interrupting power supply) **Factory setting:** NO
OPERATION HOURS	The hours of operation of the device appear on the display. **Display:** Depends on the number of hours of operation elapsed: Hours of operation < 10 hours → display format = 00:00:00 (hr:min:sec) Hours of operation 10...10,000 hours → display format = 0000:00 (hr:min) Hours of operation > 10,000 hours → display format = 000000 (hr)

21 Group SIMULATION SYSTEM

Function description SIMULATION SYSTEM	
SIMULATION FAILSAFE MODE	Use this function to set all inputs, outputs and the totalizer to their defined failsafe modes, in order to check whether they respond correctly. During this time, the words "SIMULATION FAILSAFE MODE" appear on the display. **Options:** ON OFF **Factory setting:** OFF
SIMULATION MEAS–URED VARIABLE	Use this function to set all inputs, outputs and the totalizer to their defined flow–response modes, in order to check whether they respond correctly. During this time, the words "SIMULATION MEASURAND" appear on the display. **Options:** OFF VOLUME FLOW SOUND VELOCITY **Factory setting:** OFF ✋ Caution! ■ The measuring device cannot be used for measuring while this simulation is in progress. ■ The setting is not saved if the power supply fails.
VALUE SIMULATION MEASURED VARIABLE	✎ Note! This function is not available unless the function SIMULATION MEASURED VARIABLE is active. Use this function to define a free selectable value (e.g. 12 m^3/s). This is used to test downstream devices and the measuring device itself. **User input:** 5–digit floating–point number **Factory setting:** 0 ✋ Caution! The setting is not saved if the power supply fails. ✎ Note! The appropriate unit is taken from the group SYSTEM UNITS, (see Page 10)

22   Group SENSOR VERSION

Function description SENSOR VERSION	
SERIAL NUMBER	Use this function to view the serial number of the sensor.

23   Group AMPLIFIER VERSION

Function description AMPLIFIER VERSION	
DEVICE SOFTWARE	Displays the current device software version.
HARDWARE REVISION NUMBER AMPLIFIER	Use this function to view the hardware revision number of the amplifier.
LANGUAGE GROUP	Use this function to view the language group. The following language groups can be ordered: WEST EU / USA, EAST EU / SCAND., ASIA, CHINESE. **Display:** available language group ✎ Note! ■ The language options of the available language group are displayed in the LANGUAGE (2000) function. ■ You can change the language group via the configuration software ToF Tool – Fieldtool Package. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.
SOFTWARE REVISION NUMBER AMPLIFIER	Use this function to view the software revision number of the amplifier.
I/O-MODULE TYPE	Use this function to view the configuration of the I/O module complete with terminal numbers.
HARDWARE REVISION NUMBER I/O-MODUL	Use this function to view the hardware revision number of the I/O module.
SOFTWARE REVISIONNUMBER I/O-MODUL	Use this function to view the software revision number of the I/O module.

24 Factory settings

24.1 SI units

Parameter	Factory setting
Nominal diameter	80 [mm]
Low flow cut off (v ≈ 0,04 m/s)	12 [dm^3/min]
Full scale value (v ≈ 2,5 m/s)	750 [dm^3/min]
Pulse value	5,0 [dm^3]
Unit totalizer	dm^3
Unit length	mm
Unit temperature	° C

24.2 US units (for USA and Canada only)

Parameter	Factory setting
Nominal diameter	3"
Low flow cut off (v ≈ 0,04 m/s)	2,5 [gal/min]
Full scale value (v ≈ 2,5 m/s)	200 [gal/min]
Pulse value	2,0 [gal]
Unit totalizer	gal
Unit length	mm
Unit temperature	° C

24.3 Language

Country	Language
Australia	English
Austria	Deutsch
Belgium	English
Canada	English
China	Chinese
Czech Republic	Czech
Denmark	English
England	English
Finland	Suomi
France	Francais
Germany	Deutsch
Hong Kong	English
Hungary	English
India	English
Indonesia	Bahasa Indonesia
Instruments International	English
Italy	Italiano
Japan	Japanese
Malaysia	English
Netherlands	Nederlands
Norway	Norsk
Poland	Polish
Portugal	Portuguese
Russia	Russian
Singapore	English
South Africa	English
Spain	Espanol
Sweden	Svenska
Switzerland	Deutsch
Thailand	English
USA	English

Index

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