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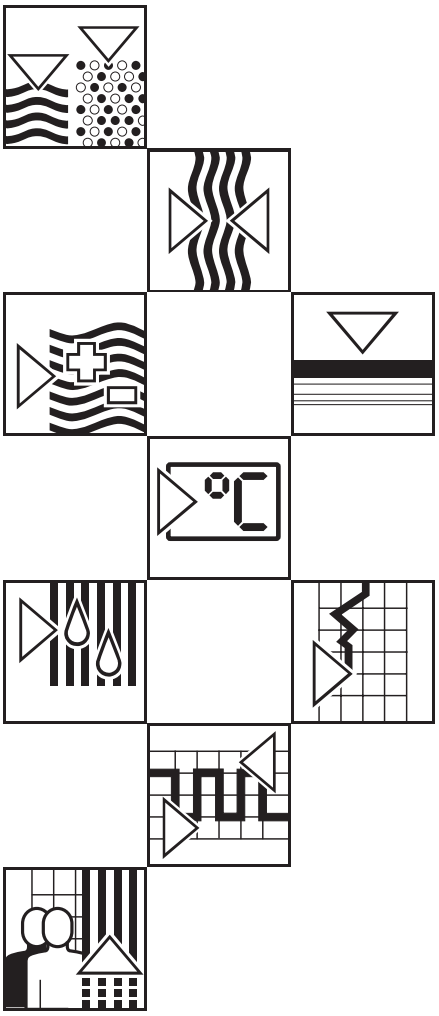
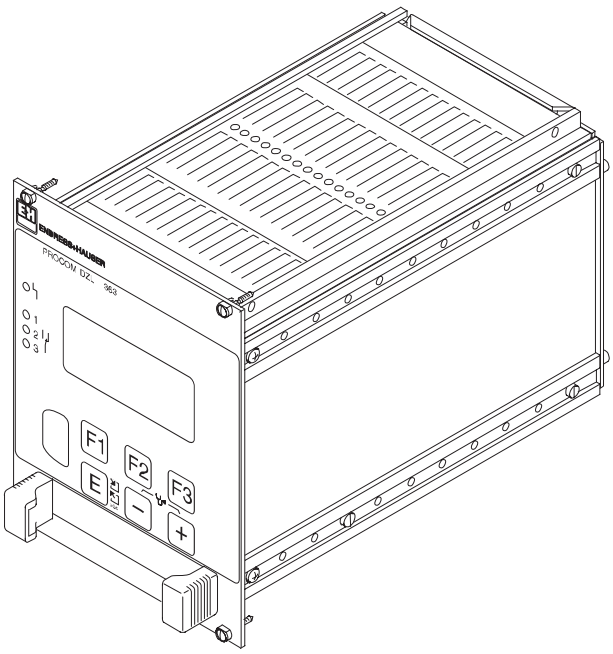
Valid as of software version
V 3.00.XX (Promass 63)
V 1.00.XX (Procom DZL 363)

procom DZL 363
Transmitter for the Promass 63 Measuring System

Operating Manual





Endress+Hauser

Nothing beats know-how

Brief Operating Instructions

With the following instructions, you may configure your measuring instrument quickly and easily.

Caution!

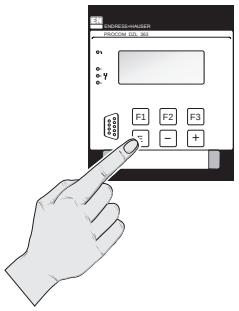
Caution!
For details on the mounting and connection of the Promass A, I, M, and F sensors, see Operating Manual BA 014D/06/en “Promass 63”.

Safety instructions → see page 5

Mounting and electrical connection
- Mounting → see page 9
- Electrical connection → see page 13

Commissioning → see page 22

Operation
- Short operating menu → see page 24
- Programming with the E+H operating matrix → see page 26
- Programming example → see page 30



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Display configuration
- Language → see page 84
- Contrast → see page 83
- Configuration of display lines → see page 83
- Number of decimal digits → see page 83

continued next column

Engineering units → see page 80 ff.

Configuration of outputs

Current output
- Assign output → see page 47
- Zero/full scale value → see page 48 ff.
- Current span → see page 50

Pulse/frequency output
- Operation mode → see page 52
- Assign output → see page 52
- Pulse value → see page 52 ff.
- Pulse width → see page 53
- Zero/full scale value → see page 55
- Full scale frequency → see page 54
- Output signal → see page 56

Other applications
require programming of additional functions. You will find the appropriate pages and functions in the
- Index → see page 115
- Operating matrix → see page 28

Relay outputs → see page 58 ff.
Auxiliary inputs → see page 62

For optimum measuring results
- Zero point calibration → see page 90
- Density adjustment → see page 77
- Empty pipe detection → see page 87
- Creep suppression → see page 86

Contents

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1 Safety Instructions

1.1 Correct usage

- The Procom DZL 363 transmitter, with the sensors of the Promass 63 measuring system, is only to be used to measure mass flow of liquids and gases.
  This measuring system also measures density and temperature of fluids and thus allows calculation of other parameters such as volume flow, solids content or density units (standard density, °Brix, °Baumé, °API).
- The manufacturer assumes no liability for damage caused by incorrect use of the instrument.
- Instruments which are used in the explosion hazardous area are supplied with a separate “Ex documentation”, which is an *integral part of this Operating Manual*. The instructions and connected loads provided in this supplement must absolutely be observed.
  An appropriate icon is shown on the front of this document according to the approval given and the test center.

1.2 Dangers and notes

All instruments are designed to meet state-of-the-art safety requirements. They have been tested, and have left the works in an operationally perfectly safe condition. The devices were developed according to EN 61010 “Protection Measures for Electronic Equipment for Measurement, Control, Regulation and Laboratory Procedures”. A hazardous situation may occur if the flowmeter is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information provided in this Operating Manual indicated by the following pictograms:

Warning!
A “Warning” indicates actions or procedures which, if not performed correctly, may lead to personal injury or a safety hazard. Please strictly observe the instructions supplied and proceed carefully.


Warning!

Caution!
A “Caution” indicates actions or procedures which, if not performed correctly, may lead to faulty operations or the destruction of the instrument. Please strictly observe the respective instructions.


Caution!

Note!
A “Note” indicates actions or procedures which, if not performed correctly, may indirectly affect operations or lead to an unexpected instrument response.


Note!

1.3 Operational safety

- The Procom DZL 363 transmitter fulfills the general EMC requirements according to the European Standard EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 as well as the NAMUR recommendations.
- Extensive self-monitoring of the measuring system gives complete operational safety. Any errors or power failure may immediately be shown by way of relay output 1 (configured to “FAILURE”). Existing errors can be automatically called up and their cause determined using the diagnosis function.
- On power failure, all data and parameters of the measuring system are safely stored in the EEPROM (no batteries required).
- All inputs and outputs are galvanically isolated from the power supply and the sensor.

1.4 Personnel for installation, start-up and operation

- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must absolutely and without fail read and understand this Operating Manual before carrying out its instructions.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this Manual are to be observed without fail.
- The installer has to make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system is to be grounded.
- Please observe all provisions valid for your country and pertaining to the opening and repairing of electrical devices.


Warning!

Danger from electric shock!
With the housing open, the protection against accidental contact is no longer present.

1.5 Repairs

If you send the Procom DZL 363 transmitter for repairs to Endress+Hauser, enclose a note with the following data:
- description of the fault
- description of the application
- description of the use of Procom DZL 363 within the installation

1.6 Technical improvement

The manufacturer reserves the right to modify technical data without prior notice. Your local Endress+Hauser Sales Office will supply you with all current information and any updates to this Operating Manual.

2 Description of the System

2.1 Application

The Procom DZL 363 transmitter is a multifunctional device which substantially complements the range of possible applications of the already proven Promass 63 measuring system:
- The Procom transmitter can be mounted at a distance of up to 1200 metres from the sensor, suitable for use in control rooms of medium-sized or large industrial plants.
- Several inputs and outputs are at disposal for complex process control and automation (2 auxiliary inputs; 3 current, 3 pulse/frequency, and 3 relay outputs; Rackbus and HART communication interfaces).

2.2 Procom DZL 363 measuring system

As an expansion of the modular Promass 63 measuring system, the multifunctional Procom DZL 363 transmitter can be connected to all Promass sensors. Thus, the complete measuring installation consists of:
- Promass A, I, M, or F sensors,
- a Promass 63 amplifier (blind version with DZL 363 interface),
- a Procom DZL 363 transmitter.

Depending on the order specifications, Procom measuring electronics are supplied in two different versions:
- *DoS (Data over Supply) version:* data transmission and power supply for Promass 63 on the common two-wire connection.
- *Dx version:* Two-wire connection only for data transmission. Promass 63 with a separate power supply.

Caution!
The measuring system is available with various Ex approvals.
Your Endress+Hauser representative will be pleased to supply information on the approvals available at present. All Ex information and specifications are included in a separate documentation which can be sent by Endress+Hauser on request.

Fig. 1
Procom DZL 363 measuring system (Technical data: see pages 109 ff.)

3 Mounting and Installation

Warning!
- All instructions given in this section are to be observed at all times in order to ensure safe and reliable operation of the measuring system.
- Mounting regulations and technical specifications for Ex-certified instruments may differ from those given below. All mounting regulations and connection values in the Ex documentation must, therefore, be strictly observed.


Warning!

The Procom DZL 363 transmitter is available in three different housing or assembly versions:
– Racksyst cassette (IP 20)
– Panel mounted housing (IP 20; front door: IP 54)
– Field housing for wall or post mounting (IP 65 / NEMA 4X)

3.1 General information

- The maximum approved ambient temperature during operation must be observed (see page 111).
- An all-weather cover should be used to protect the housing from direct sunlight when mounted outdoor. This is especially important in warmer climates and with high ambient temperatures.

3.2 Mounting of the 19" Racksyst cassette

The Racksyst cassette can be inserted into all common 19" rack systems (standardized connection form F acc. to DIN 41 612). The unit is then fastened with the four front panel screws.

Note!
- Note the general instructions in Section 3.1.
- Only install the Racksyst cassette in a dry and clean environment.
- Dimensions: see page 107


Note!

3.3 Mounting of the panel housing

1. Prepare the installation opening in your panel (138^{+1} mm x 138^{+1} mm). Make sure there is enough space behind the female multipoint connector for the wiring. Installation depth = 199 mm (without space for the wiring).
2. Slide the housing throught the panel cut-out from the front.
3. Keep the housing horizontal and insert the tighteners into the prepared cut-outs of the housing.
4. Tighten the mounting screws of the two tighteners until the housing sits firmly on the panel wall. No additional support is necessary.

Note!

Note!
- Only install the panel-mounted housing in a dry and clean environment.
- Note the general instructions on page 9.
- Dimensions: see page 107

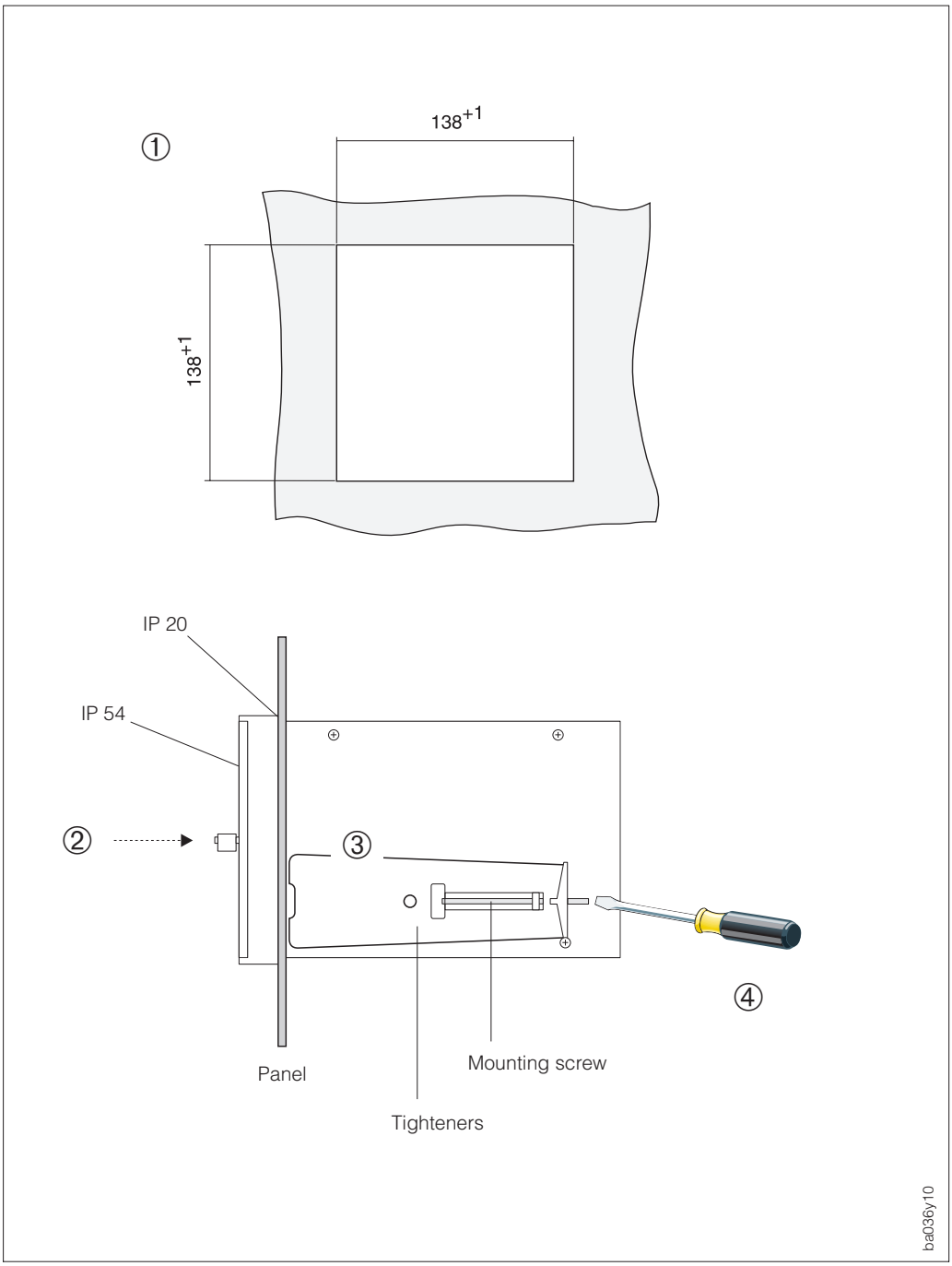

Fig. 2
Mounting the panel housing

3.4 Mounting of the field housing

The field housing allows either a wall- or post mounting. A special mounting kit is available for post mounting.

Note!

Note!

- Note the general instructions on page 9.
- Dimensions: see page 107
- Protection IP 65 (EN 60529) / NEMA 4X:
  The field housing fulfils all the requirements for IP 65. After successful installation in the field or after servicing, the following points must always be observed in order to ensure protection to IP 65:
  – Housing gaskets must be clean and undamaged when inserted in the gasket groove. The gaskets may need to be dried, cleaned or replaced.
  – All housing screws and the housing cover must be firmly tightened.
  – The cables used for connecting must have the correct outer diameter.
  – The cable gland must be firmly tightened.
  – Any cable glands not used are to be replaced with a blind plug.
  – The protective bush should not be removed from the cable gland.

Wall mounting

1. Put both fastening screws (**a**) through the respective bore holes in the housing (**b**).
   Fastening screws: Ø 6 mm; screw head: Ø 10 mm
2. Mount field housing as shown in the figure below.

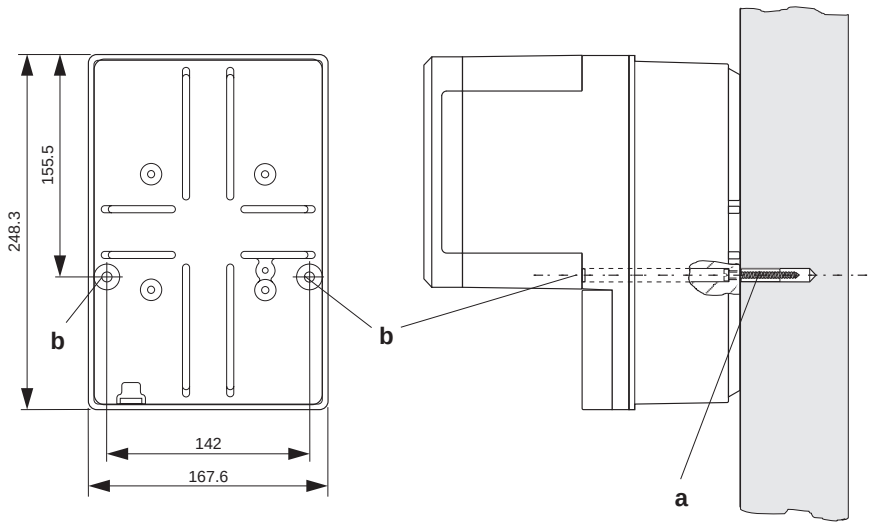

Fig. 3
Wall mounting (field housing)

Caution!

Post mounting

The field housing is mounted on a post with the help of a special mounting kit (order no. 50061357)

Caution!
If a hot pipe is used as a post, make sure the admissible ambient temperature for the field housing is not exceeded.

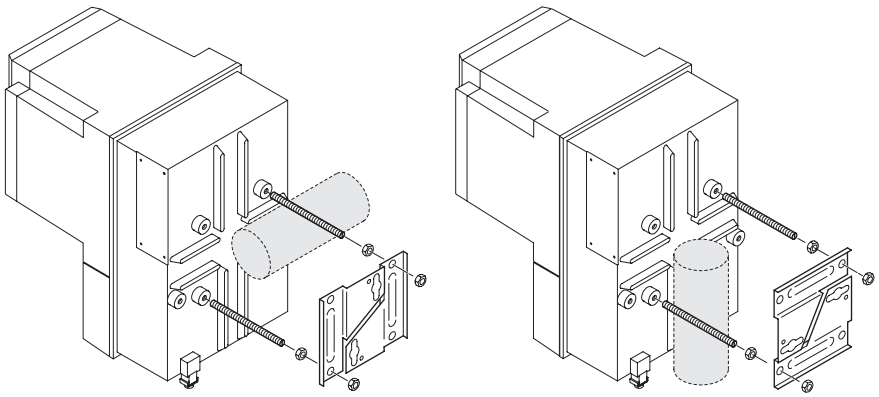

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Fig. 4
Post mounting (field housing)

4 Electrical Connection

4.1 General information


Caution!

Caution!
- Do not lay cable in the vicinity of electrical machines or switching elements.
- Connection of the field housing: Fix the cable gland or fix it in a conduit.
- Ensure equipotential bonding between transmitter and sensor (see wiring diagram on page 14 ff.).
- The information in Section 3.1 must be observed in order to maintain protection to IP 65 / NEMA 4X for the field housing.

4.2 Connecting the transmitter


Warning!

Warning!
- Danger of electric shock!
  – Switch off the power supply before opening the instrument.
  – For the DoS version, there is a supply voltage of 60 V DC on the transmitter/sensor connection (galvanically isolated from the mains).
- Connect protective earth to the ground connection of the housing before applying the power supply.
- Before turning on, ensure that the power applied is within the range specified on the nameplate. All relevant national regulations for mounting must also be observed.
- For Racksyst cassettes and panel housings, non-applied terminals may, for safety reasons, not be used for other purposes.
- When connecting flowmeters with Ex approval, all appropriate instructions and connections diagrams in the separate Ex documentation to this Operating Manual must be ovserved.

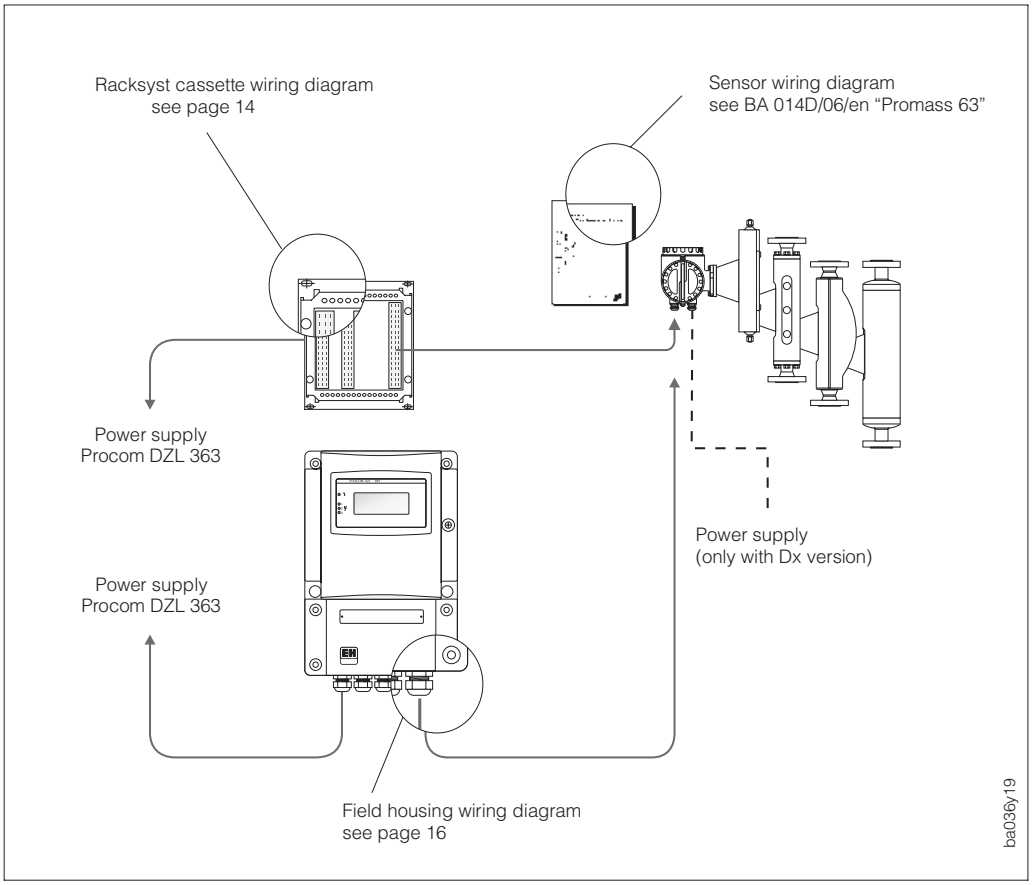


Fig. 5
Electrical Connection:

DoS version
Promass 63 is supplied with power by Procom DZL 363.

Dx version
Promass 63 has to be supplied with separate power.

Wiring diagrams (Racksyst cassette, panel mounted housing)

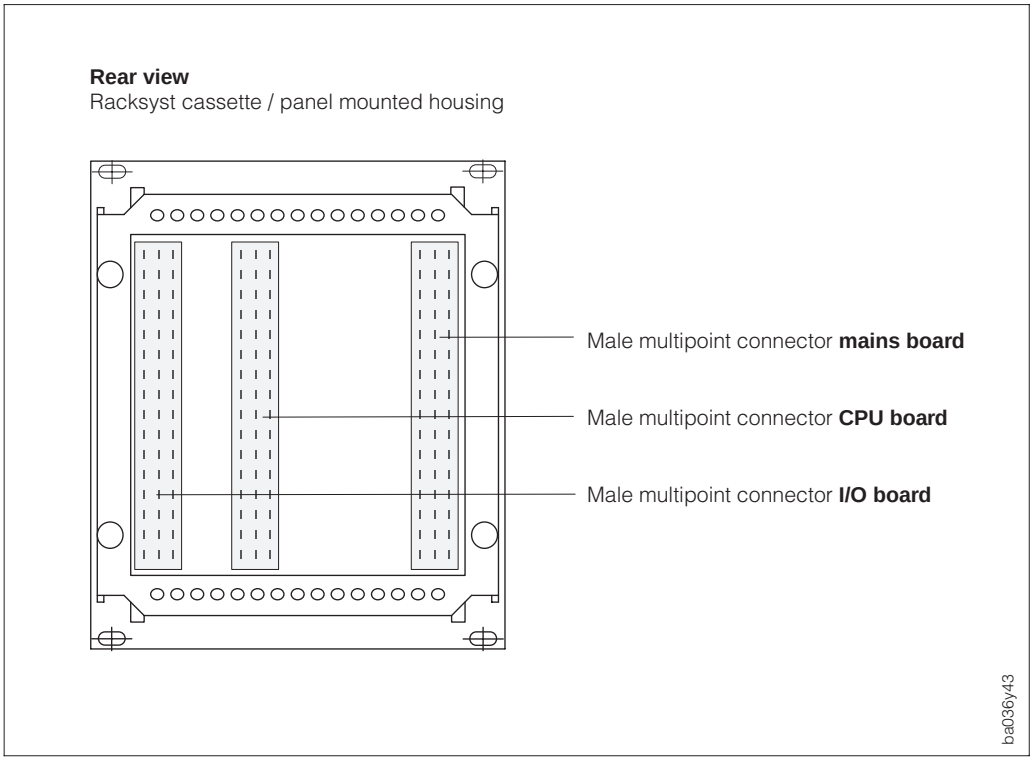


Fig. 6
Male multipoint connector

	d	b	z	Mains Board	
2	▮	▯	▮ ⏚	d2 = A data (Dx+) z2 = Earth connection	Sensor connection (only Dx version)
4	▮	▯	▮ ⏚	d4 = B data (Dx–) z4 = Earth connection	
6	▯	▯	▯		
8	▮	▯	▯	(+) DoS	Sensor connection (only DoS version)
10	▮	▯	▯	(–) DoS	
12	▮ ⏚	▮ ⏚	▮ ⏚	3 Earth connection terminals	Earth connections
14	▯	▯	▯		
16	▯	▯	▮ ⏚	1 Earth connection terminal	Earth connection
18	▮ ⏚	▮ ⏚	▮ ⏚	3 Earth connection terminals	Earth connections
20	▯	▯	▯		
22	▯	▯	▯		
24	▯	▯	▯		
26	▯	▯	▯		
28	▯	▯	▯		
30	▮ L1	▯	▮ L-	L1 for AC L– for DC	Power supply
32	▮ N L1+	▯	▮ ⏚	N for AC L+ for DC z32 = earth connection	

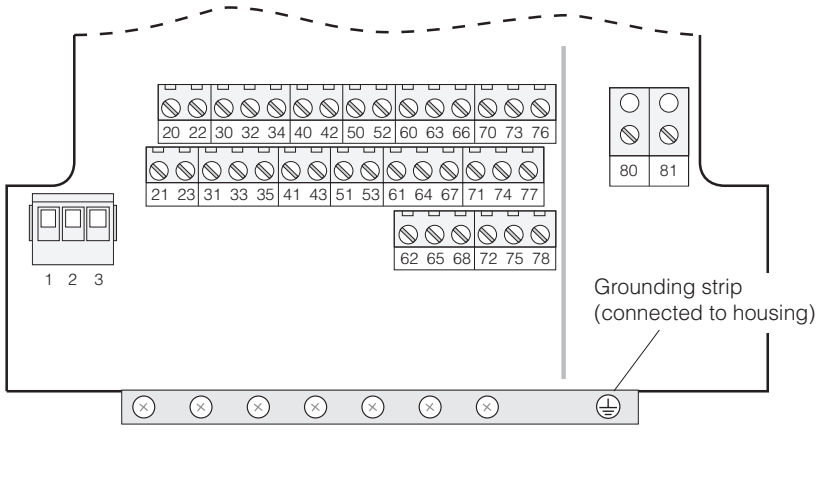
Caution!
At least two of the ground terminals z2, z4, z16, and z32 have to be connected to the protective earth. Terminals d12, b12, z12, d18, and z18 are additional earth terminals you may use to improve electromagnetic compatibility (EMC).

Caution!

	d	b	z	CPU Board	
2	▯	▮	▮	b2 = B data z2 = A data	Rackbus RS 485 (Panel housing)
4	▯	▮	▮	b4 = Earth connection z4 = Rackbus data	E+H Rackbus (rack)
6	▯	▯	▯		
8	▯	▯	▯		
10	▮ ⏚	▮ ⏚	▮ ⏚	3 Earth connection terminals	Earth connections
12	▯	▯	▯		
14	▯	▯	▯		
16	▮	▮	▮	d16/b16 = HART interface 1 z16 = MUS+	HART master interfaces (in prep.)
18	▮	▮	▮	d18/b18 = HART interface 2 z18 = MUS–	
20	▮ ⏚	▮ ⏚	▮ ⏚	3 Earth connection terminals	Earth connections
22	▯	▯	▯		
24	▮	▮	▮		External keyboard connection (in prep.)
26	▮	▮	▮		
28	▮	▮	▮		
30	▮	▯	▯		Data logger interface (in prep.)
32	▮	▮	▮		

	d	b	z	I/O Board	
2	▮	▮	▮	(+) Output: d2 = 1 b2 = 2 z2 = 3	Pulse/frequency outputs 1, 2, 3
4	▮	▮	▮	(–) Earth, all linked	
6	▮	▮	▯	(+) Current input: d6 = 1 b6 = 2	Current inputs 1, 2 (in prep.)
8	▮	▮	▯	(–) Earth connection: d8 = 1 b8 = 2	
10	▮	▮	▯	(+) Auxiliary input: d10 = 1 b10 = 2	Auxiliary inputs 1, 2
12	▮	▮	▯	(–) Earth connection: d12 = 1 b12 = 2	
14	▮	▮	▮	D Testing terminals for current measurement	Current outputs 1, 2, 3
16	▮	▮	▮	(+) Current output: d16 = 1 b16 = 2 z16 = 3	
18	▮	▮	▮	(–) Earth connection: d18 = 1; b18 = 2; z18 = 3	
20	▮ ⏚	▮ ⏚	▮ ⏚	3 Earth connection terminals	Earth connections
22	▮	▯	▮	d22 = NO contact z22 = NC contact	Relay output 1
24	▯	▮	▯	b24 = common contact	
26	▮	▯	▮	d26 = NO contact z26 = NC contact	Relay output 2
28	▯	▮	▯	b28 = common contact	
30	▮	▯	▮	d30 = NO contact z30 = NC contact	Relay output 3
32	▯	▮	▯	b32 = common contact	

Wiring diagram (field housing)



1 **2** **3** **Grounding strip**	L– for DC L1 for AC N for AC L+ for DC Ground connection for protective earth and cable screen	Power supply
20 **21**	A data B data	Rackbus RS 485
22 **23**		Data logger (in prep.)
30 **32** **34** **31, 33, 35**	(+) Pulse/frequency output 1 (active or passive) (+) Pulse/frequency output 2 (active or passive) (+) Pulse/frequency output 3 (active or passive) (–) Common earth connection for all outputs	Pulse/frequency output 1, 2, 3
40 **41** **42** **43**	(+) Current input 1 (–) Earth connection current input 1 (+) Current input 2 (–) Earth connection current input 2	Current input 1, 2 (in prep.)
50 **51** **52** **53**	(+) Auxiliary input 1 (–) Earth connection auxiliary input 1 (+) Auxiliary input 2 (–) Earth connection auxiliary input 2	Auxiliary input 1, 2
60 **61** **63** **64** **66** **67** **62** **65** **68**	(+) Current output 1 (–) Earth connection current output 1 (+) Current output 2 (–) Earth connection current output 2 (+) Current output 3 (–) Earth connection current output 3 Testing terminal, current output 1 Testing terminal, current output 2 Testing terminal, current output 3	Current output 1, 2, 3
70 **71** **72**	(no) NO contact (c) Common contact (nc) NC contact	Relay output 1
73 **74** **75**	(no) NO contact (c) Common contact (nc) NC contact	Relay output 2
76 **77** **78**	(no) NO contact (c) Common contact (nc) NC contact	Relay output 3
80 **81**	Dx version: A data (Dx+) DoS version: DoS+ Dx version: B data (Dx–) DoS version: DoS–	Connection to Promass 63

Fig. 7
Terminal assignment (field housing)

4.3 Galvanic isolation

Signal group	Board	Terminals		Notes
				
Power supply	power unit	d30, z30, d32	1, 2, 3	
Protective earth	power unit	z2, z4, z16, z32	housing	
Sensor connection	power unit	d2, d4, d8, d10	80, 81	DoS, Dx
PC connection (DB9) Keyboard entry	front panel CPU	d24, b24, z24 d26, b26, z26 d28, b28, z28	D-SUB-9	common earth
Rackbus	CPU	b2, z2, b4, z4	20, 21	
Data Logger	CPU	d30, d32 b32, z32	22, 23	
Pulse/Freq. output 1, 2, 3	I / O	d2, b2, z2 d4, b4, z4	30...35	common earth
Current input 1, 2	I / O	d6, b6, d8, b8	40...43	common earth
Auxiliary input 1	I / O	d10, d12	50, 51	
Auxiliary input 2	I / O	b10, b12	52, 53	
Current output 1, 2, 3	I / O	d14, b14, z14 d16, b16, z16 d18, b18, z18	60...68	common earth
Relay 1	I / O	d22, z22, b24	70, 71, 72	
Relay 2	I / O	d26, z26, b28	73, 74, 75	
Relay 3	I / O	d30, z30, b32	76, 77, 78	

galvanic isolation between the individual current loops.

Galvanic isolation

Power supply: 1000 V AC to earth, relays, inputs/outputs and sensor
Relays: 1000 V AC to earth, supply, inputs/outputs and sensor
Sensor connection: 1500 V AC to earth, supply, relays and inputs / outputs
Inputs/outputs: 500 V AC to earth

The inputs and outputs are combined into the following groups, each with the same earth and galvanically isolated from each other (500 V DC):
- Current output 1, 2, 3
- Current input 1, 2
- Pulse/frequency output 1, 2, 3
- RS 232 interface (socket on the display front panel) and keyboard connection

4.4 E+H Rackbus and Rackbus RS 485

Procom DZL 363 can be linked to other E+H measuring instruments using an E+H Rackbus or a Rackbus RS 485 and connected to superset process-control systems such as MODBUS or PROFIBUS, etc., with the help of corresponding gateways (see Figure 8). A maximum of 64 addresses can be connected to a ZA 672 gateway, including those connected to the FXA 675.

- **E+H Rackbus (19" Racksyst cassette)**
  – For use in a control room up to a max. distance of 15 metres.
  – A maximum of 64 addresses can be integrated into this bus.

- **Rackbus RS 485 (panel, field housing)**
  – For use in the field up to a max. distance of 1200 metres.
  – A maximum of 25 measuring instruments can by intergrated consecutively using a Rackbus RS 485.

  Commubox FXA 192 allows a direct connection to a PC (see Figure 9). Up to 25 Procom transmitters can be connected; however, the actual number depends on the network topology and the application conditions.


Caution!

Caution!
Even if only a single instrument (with a Rackbus RS 485) has been installed in an hazardous area, not more than ten instruments (with Rackbus RS 485) may be connected to the bus.


Note!

Note!
For the initial installation of a Rackbus network, please refer to the operating instructions of the instruments and the software you use, in particular
- BA 134 F/00/e “Rackbus RS 485 – Topology, Components, Software”
- BA 124 F/00/en “Commuwin II operating program”.

Gateway connections to PCs or process-control systems

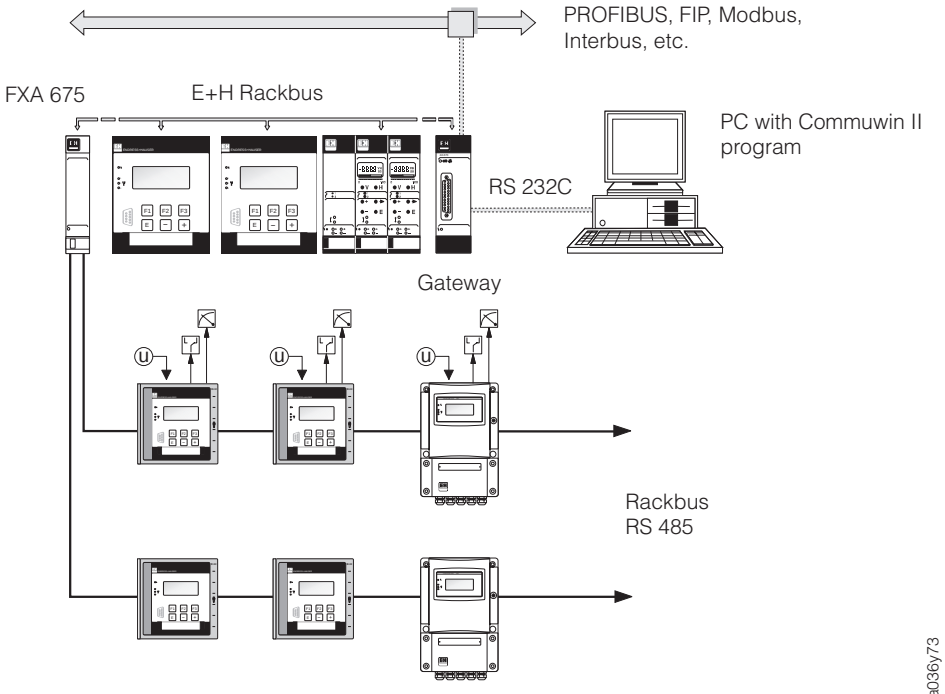


Fig. 8
Connection versions with the E+H Rackbus or Rackbus RS 485

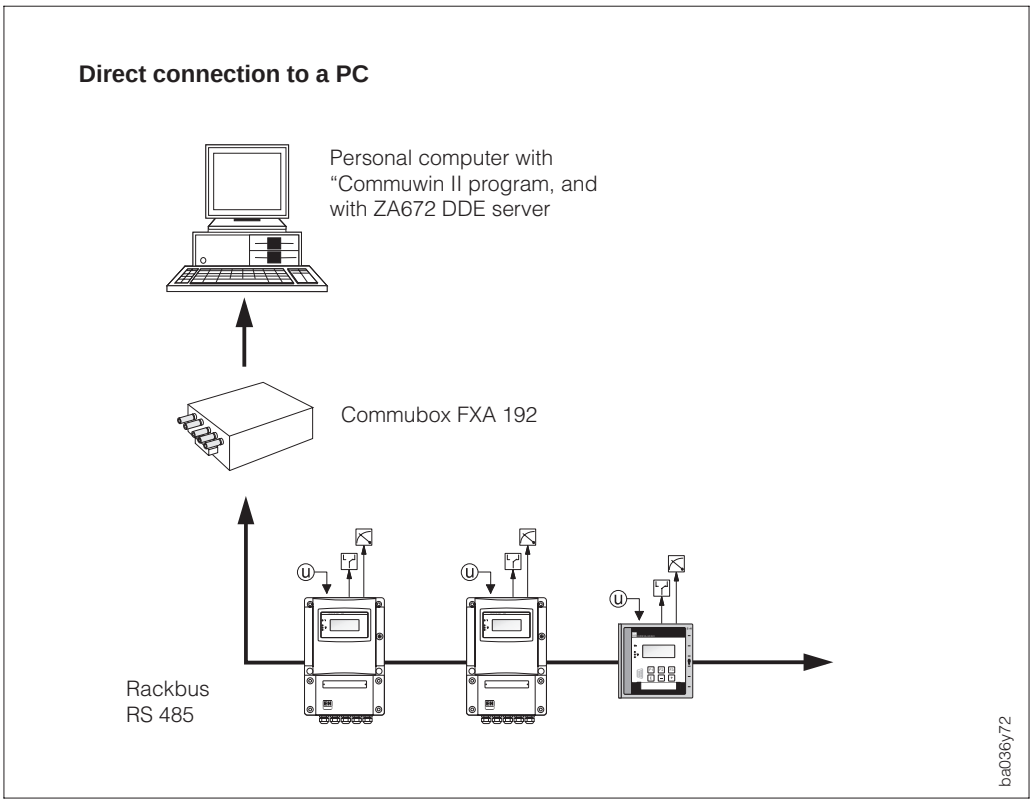


Fig. 9
Direct PC connection to Rackbus RS 485 via Commubox FXA 192

E+H Rackbus and Rackbus RS 485 wiring

Warning!
When connecting flowmeters with Ex approval, all appropriate instructions and connections diagrams in the separate Ex documentation to this Operating Manual must be observed.

1. Each Procom DZL 363 transmitter supplied is configured for E+H Rackbus or Rackbus RS 485 operation mode, depending on the housing type:
   – Racksyst cassette → E+H Rackbus
   – Panel mounted housing, field housing → Rackbus RS 485

   If necessary, this configuration may be changed using a jumper on the CPU board (see page 106).

2. Wire up according to Figure 10:
   The bus connection can be executed by way of various interface cards, adapters, or the FXA 675 assembly module (see Figures 8, 9).

   E+H Rackbus (for 19" Racksyst cassette):
   – z4 terminal/CPU board → Rackbus data, connect to d2 of the gateway
   – b4 terminal/CPU board → Rackbus mass, connect to d4 of the gateway

   Rackbus RS 485 (panel mounted housing, field housing)
   – z2 terminal/CPU board → A data (terminal 20 with field housing)
   – b2 terminal/CPU board → B data (terminal 21 with field housing)

   Cable specifications:
   - Connection cable: two-core, twisted, screened
   - Conductor cross-section/cable diameter: ≥0.20 mm^2 (24 AWG)
     cable length: max. 1200 m (3900 ft)

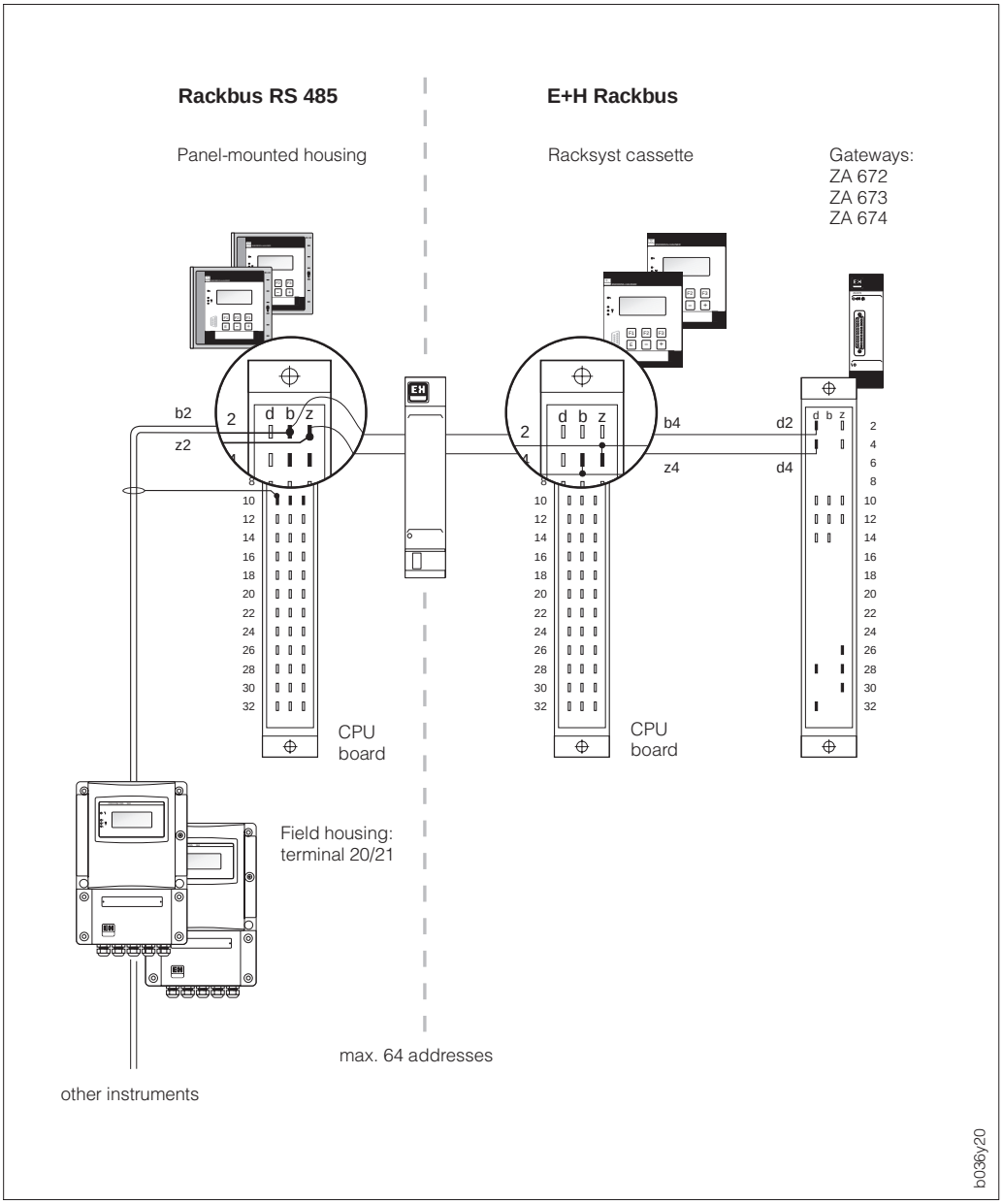


Fig. 10
Wiring with Rackbus

3. Ground the bus screen on terminals d10, b10, z10 (CPU board) or with the grounding strip of the field housing.

4. Set terminating resistors if necessary → see page 106.
Normally, the corresponding selection switches on the CPU board may be left in the factory setting position (all switches = OFF).

5. Subsequent to the bus installation, the following functions of the operating matrix have to be set:

"PROTOCOL" (see page 85)	→	Select communication protocol "RACKBUS" (factory setting = OFF)
"BUS ADDRESS" (see page 85)	→	Set bus address (0...64) for the respective transmitters

4.5 HART Communicator and Commubox FXA 191

Possible connection versions:
- Direct connection via terminals d16/d18 (Racksyst cassette, panel mounted housing) resp. 60/61 (field housing)
- Connection via the analogue 4...20 mA cable of the current output 1

Note!
- In both cases the measuring loop must have a minimum resistance of 250 Ω.
- Move the switch on the Commubox to “HART”!
- Set the “CURRENT SPAN” function to “4–20 mA” (see page 50) and the “PROTOCOL” function to “HART” (see page 85).
- For connecting, please also refer to the documentation published by the HART Communication Foundation, in particular HCF LIT 20: “HART, a Technical Overview”.

Note!

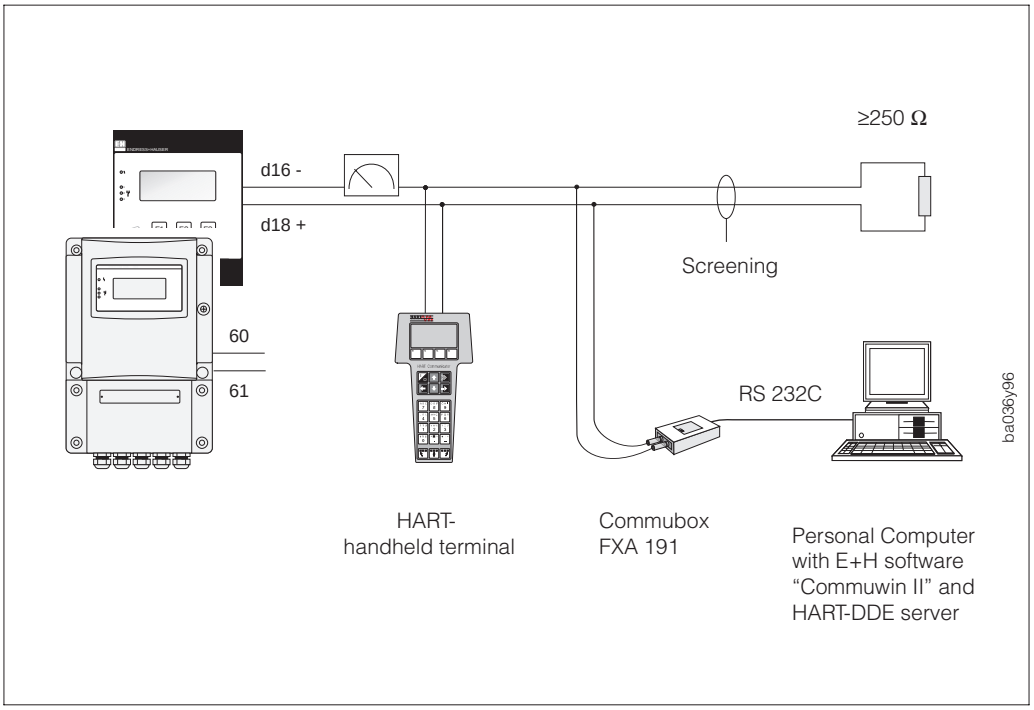


Fig. 11
Electrical connection: HART communicator and Commubox FXA 191

4.6 Commissioning

Before switching on the measuring system, the following checks should be carried out again:

- *Installation*
  Does the arrow head on the nameplate agree with the actual flow direction in the piping?
- *Electrical connection*
  Check electrical connections and terminal coding. Check that the local power supply and frequency agree with the information stated on the nameplate.

If these checks are successful, then switch on the power supply. The measuring system runs through a series of internal checks and is ready for use. During this procedure the following sequence of messages is shown on the display.

	P	R	O	C	O	M		D	Z	L		3	6	3
	V	1	.	0	0	.	0	0						

Display of the current software version

S	:		S	T	A	R	T	-	U	P				
			R	U	N	N	I	N	G					

Having started up successfully, normal operation continues. Four (freely selectable) measuring variables are simultaneously displayed.

	5	9	.	8	7	0		k	g	/	m	i	n	
	1	.	2	5	5	8		k	g	/	l			
			2	5	.	6		°	C					
			1	7	8	3	0	.	5		k	g		

Example (factory settings):

Display line 1 → Mass flow
Display line 2 → Density
Display line 3 → Temperature
Display line 4 → Totalizer 1


Note!

Note!
- If the ± keys are simultaneously actuated when starting up the flowmeter, then display messages are shown in English and with maximum contrast.
- If start-up is not successful, then an error message is shown indicating the cause (see page 99).

5 Operation

5.1 Display and operating elements

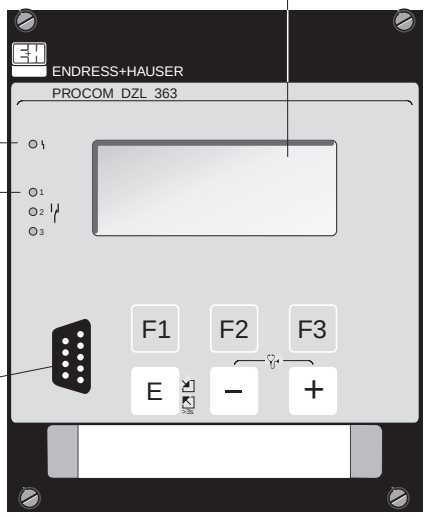
LC-Display

- Displays menu texts and numerical values as well as error, alarm and status messages
- HOME position = display during normal measuring operation e.g. of parameters such as “mass flow – volume flow – density – temperature”

LED (red)
flashes → system error / failure

LED (green)
flashes → relay energized
does not flash → relay de-energized

Service interface
Connection socket



E Key

- HOME position → accessing operating matrix
- Leave the operating matrix → HOME position (keep key pressed for more than 3 seconds)
- Select functions
- Store numerical values/settings entered

Keys

- Select function blocks and groups.
- Enter numerical values. (If kept pressed, the numbers displayed will begin changing at an accelerated rate).
- Select parameters or settings.

Diagnostic or help function (keep both keys pressed)
- Display error causes
- Help function during programming
- Display of additional information

Function keys

- You may assign a freely selected function to these three keys (see page 27). This allows you to call up frequently-used functions immediately.
  F1 → short operating menu “QUICK SETUP” (factory setting)
  F2, F3 → not assigned (factory setting)
- Escape function during programming

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Fig. 12
Display and operating elements

5.2 First programming steps – "Quick Setup"

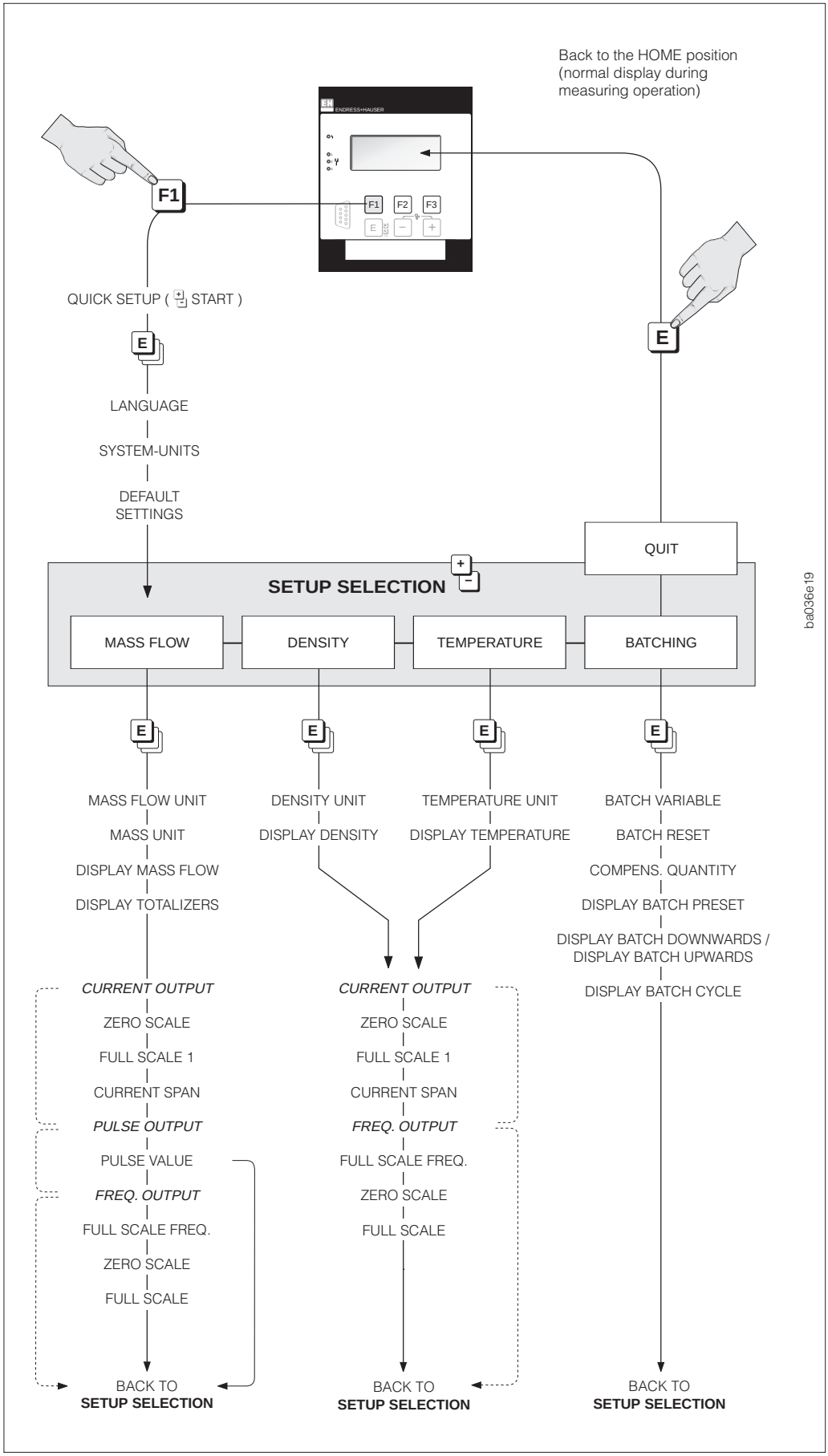


Fig. 13
Overview of the short operating menu – "Quick Setup"

Function keys (factory setting)
F1 → QUICK SETUP
F2 → not assigned
F3 → not assigned

Selection of settings, Entering of numerical values, SETUP selection

Store inputs or numerical values (→ next function)

"QUICK SETUP" Menu: procedure and possible selections

The F1 function key (factory setting) allows you to access the "QUICK SETUP" operating menu, with which you can program the most important Procom DZL 363 features quickly and easy.
The function-key assignments may be changed any time (see page 27). The QUICK SETUP menu may also be accessed through the E+H operating matrix (→ SERVICE & ANALYSE → SERVICE DATA → QUICK SETUP function)

Procedure (Fig. 13)

1. Press function key F1 → to start the short "QUICK SETUP" programming menu.
2. ± keys → Select parameters / enter numerical values / Setup selection
3. E key → Store parameters or numerical values (automatic display of the next function).

For more complex applications additional functions need to be configured. These can be selected using the E+H operating matrix (see page 26).

START FUNCTIONS	± Selection / Input
QUICK SETUP	START – CANCEL
LANGUAGE	ENGLISH – DEUTSCH – FRANCAIS – ESPANOL – ITALIANO – NEDERLANDS – DANSK – NORSK – SVENSKA – SUOMI BAHASA INDONESI – JAPANESE (in original alphabet) – CANCEL
SYSTEM-UNITS	UNITS SI-SYSTEM – UNITS US-SYSTEM – CANCEL
DEFAULT SETTINGS	YES – NO *Default settings:* • Current output 1 → MASS; .....2 → DENSITY; .....3 → TEMPERATURE • Pulse/Freq. output 1 → MASS; .....2 → OFF; .....3 → OFF • Relay 1 → FAILURE

BATCHING	± Selection / Input
BATCH VARIABLE	OFF – MASS – VOLUME – STD. VOLUME – TARGET MATERIAL – CARRIER FLUID – CANCEL
BATCH PRESET	Input of numerical values (e.g. 5.010 kg)
COMPENS. QUANTITY	Input of numerical values (e.g. –0.102 kg)
DISPLAY	BATCH PRESET – CANCEL
DISPLAY	BATCH UPWARDS – BATCH DOWNWARDS – CANCEL
DISPLAY	BATCH CYCLE – CANCEL

MASS FLOW	± Selection / Input
MASS FLOW UNIT	g/min – g/h – kg/s – kg/min – kg/h t/min – t/h – t/d – lb/s – lb/min – lb/hr – ton/min – ton/hr – ton/day – CANCEL
MASS UNIT	g – kg – t – lb – ton – CANCEL
DISPLAY	MASS FLOW – CANCEL
DISPLAY	TOTALIZER 1 – CANCEL

→ continue with **"CURRENT OUTPUT"**

DENSITY	± Selection / Input
DENSITY UNIT	g/cm^3 – kg/dm^3 – kg/m^3 – SD_4 °C – SD_15 °C – SD_20 °C – g/cc – lb/cf – lb/USgal resp. lb/gal – lb/bbl – SG_59 °F – SG_60 °F – SG_68 °F – SG_4 °C – SG_15 °C – SG_20 °C – CANCEL
DISPLAY	DENSITY – CANCEL

→ continue with **"CURRENT OUTPUT"**

TEMPERATURE	± Selection / Input
TEMPERATURE UNIT	°C (CELCIUS) – °K (KELVIN) – °F (FAHRENHEIT) – °R (RANKINE) – CANCEL
DISPLAY	TEMPERATURE – CANCEL

→ continue with **"CURRENT OUTPUT"**

CURRENT OUTPUT	NONE – CURRENT OUTPUT 1 – ...2 –...3 – CANCEL
ZERO SCALE	Input of numerical values: e.g. 0.000 kg/h; 105.60; 8682 kg/m^3
FULL SCALE	Input of numerical values: e.g. 566.00 kg/h; 125.00 °C; 8932 kg/m^3
CURRENT SPAN	0-20 mA (25 mA) – 4-20 mA (25 mA) – 4..20 (25) mA HART – 4..20 mA HART – 0-20 mA – 4-20 mA – CANCEL
PULSE OUTPUT (only with mass flow)	NONE – PULS/FREQ. OUTPUT 1 – ....2 – ....3 – CANCEL
PULSE VALUE (only with mass flow)	Input of numerical values: e.g. 0.200 kg/p
FREQUENCY	NONE – PULS/FREQ. OUTP. 1 – ....2 – ....3 – CANCEL
FULL SCALE FREQ.	Input of numerical values: 2...10000 Hz
ZERO SCALE	Input of numerical values: e.g. 0.000 kg/h; 0.9000 kg/m^3, 105.90 °C;
FULL SCALE	Input of numerical values: e.g. 566.00 kg/h; 0.9950 kg/m^3; 120.00 °C

5.3 Programming with the E+H operating matrix

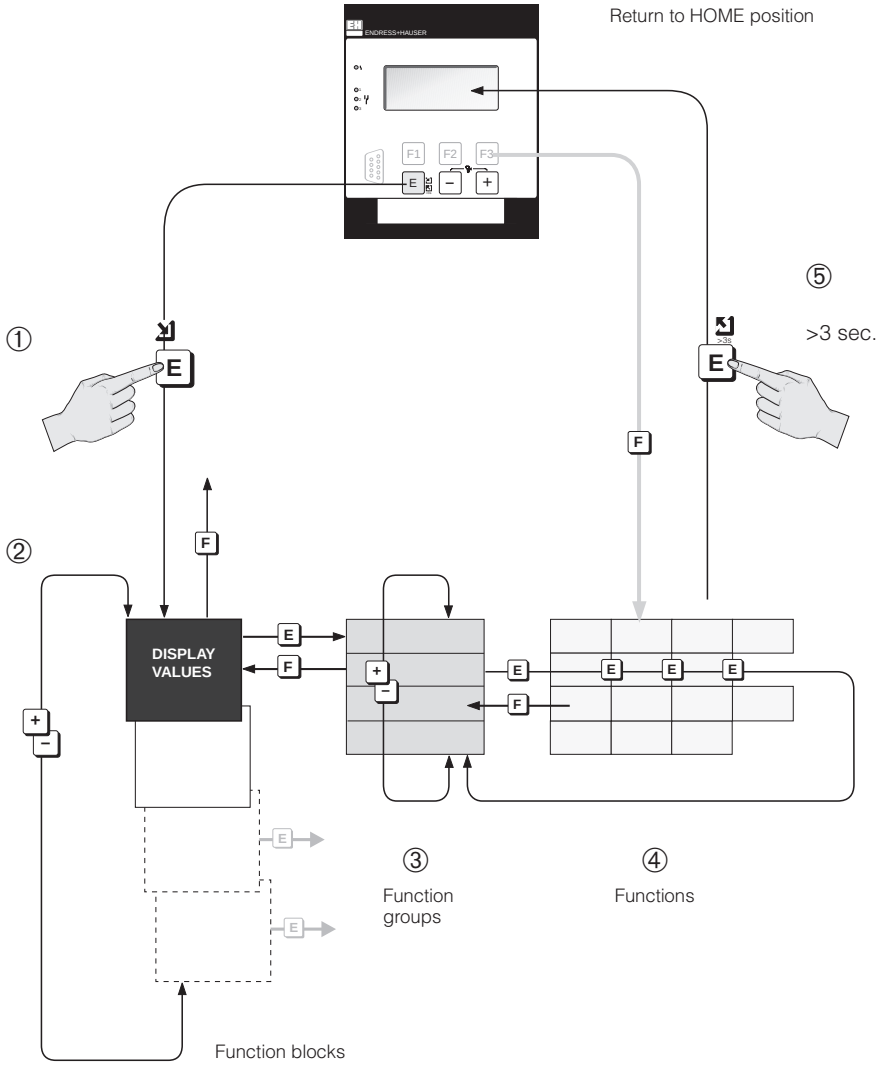
① HOME position → access to the operating matrix

② Select function block >BLOCK SELECT<)

③ Select function group (>GROUP SELECT<)

④ Select function (enter/select data with ± ; store with E)

⑤ Leave operating matrix → HOME position
The operating matrix may be left step by step by pressing a function key (F1, 2, 3).



Notes!
- The three function keys F1–3 may be assigned to a freely selectable function of the E+H operating matrix. Frequently-used functions are thus directly accessible.
- You may leave the operating matrix step by step using the function keys (ESCAPE function).
- An automatic return to the HOME position will be made if the operating keys are not pressed for 60 seconds (only when the programming is locked).
- After returning to the HOME position, programming is again locked after 60 s, if no operating key is pressed.

- Operating matrix → page 28
- Programming example → page 30
- Function description → page 43

Note!

Fig. 14
Selecting functions in the E+H operating matrix

Further information to programming

Procom DZL 363 offers a wide range of functions which the user – additionally to the "Quick Setup" – may set individually and adapt to his specific process conditions. The various functions may be selected and changed using the E+H operating matrix operation guidelines (see Fig. 14).

Please remark the following important programming notes:

- If the power supply cuts out, then all calibrated and set values are safely stored in the EEPROM (without requiring batteries).
- Functions which are not required, e.g. current or pulse/frequency output, can be set to "OFF". The appropriate functions in other function groups then no longer appear on the display.
- If, when programming, you wish to undo a setting carried out with ± then select "CANCEL" or press a function key.
- In certain functions, a safety prompt is given after entering data. Select "SURE? [YES]" with the ± keys and confirm by pressing E again. The setting is now stored or a function, e.g. zero point calibration, is activated.
- Procom may not show values with all decimal places as this depends on the unit used and the number of decimal places selected (see function "FORMAT FLOW", page 83). When programming, an arrow is therefore shown between the measured value and the unit (e.g. 1.2 → kg/h).

Function keys F1, F2, F3

- These three keys can be assigned to a freely selectable function of the E+H operating matrix. Frequently-used functions are thus directly accessible.

  Procedure:
  1. Select the desired function in the operating matrix.
  2. Keep the desired function key pressed for more than 2-3 seconds, until "INPUT STORED" is displayed (this deletes any former key assignment).

- By pressing the function key, you may also leave the operating matrix step by step using the various program levels (function → function group → function block → HOME position).

Enable programming (entering the code number)

Normally programming is locked. Any unauthorised changes to the instrument functions, values or factory settings are therefore not possible. Only when a code has been entered (factory setting = 363) parameters can be entered or changed. The use of a personal code number which can be freely chosen prevents unauthorised personnel from gaining access to data (see page 89).
An exception to this is the function group "BATCHING". In this group only the function "BATCH VARIABLE" is protected by the code number. All other functions in this group can be changed without the code number.

Caution!

- If programming is locked and the ± keys are pressed in a given function, then a prompt to enter the code automatically appears on the display.
- With code "0" (zero) the programming is **always** enabled!
- If the personal code number is no longer available, then please contact the Endress+Hauser service organisation.


Caution!

Locking programming

- After returning to the HOME position, programming is again locked after 60 seconds if no operating element is pressed.
- Programming can also be locked by entering any number (not the customer code number) in the function "ACCESS CODE".

E+H Operating Matrix

Function blocks	Function groups		Functions			
DISPLAY VALUES	PROCESS VARIABLE	S. 44	MASS FLOW	VOLUME FLOW	STD. VOLUME	TARGET FLOW
	TOTALIZERS	S. 45	TOTALIZER 1	TOTAL. 1 OVERFLOW	TOTALIZER 2	TOTAL. 2 OVERFLOW
	I/O VARIABLES	S. 46	CURRENT OUTPUT 1	CURRENT OUTPUT 2	CURRENT OUTPUT 3	PULS/FREQ. OUTP. 1
	ESCAPE					
CURRENT OUTPUTS	CURRENT OUTPUT 1	S. 47	ASSIGN OUTPUT	ZERO SCALE	FULL SCALE 1	DUAL RANGE MODE
	CURRENT OUTPUT 2	S. 47	ASSIGN OUTPUT	ZERO SCALE	FULL SCALE 1	DUAL RANGE MODE
	CURRENT OUTPUT 3	S. 47	ASSIGN OUTPUT	ZERO SCALE	FULL SCALE 1	DUAL RANGE MODE
	ESCAPE					
OUTPUTS	PULS / FREQ. OUTP. 1	S. 52	ASSIGN OUTPUT	OPERTION MODE	PULSE VALUE	PULSE WIDTH
	PULS / FREQ. OUTP. 2	S. 52	ASSIGN OUTPUT	OPERATION MODE	PULSE VALUE	PULSE WIDTH
	PULS / FREQ. OUTP. 3	S. 52	ASSIGN OUTPUT	OPERATION MODE	PULSE VALUE	PULSE WIDTH
	RELAYS	S. 58	ASSIGN RELAY 1	RELAY 1 ON-VALUE	RELAY 1 OFF-VALUE	ASSIGN RELAY 2
	ESCAPE					
INPUTS	AUXILIARY INPUTS	S. 62	ASSIGN AUX. INP. 1	START PLS. WIDTH 1	ASSIGN AUX. INP. 2	START PLS. WIDTH 2
	ESCAPE					
METERING FUNCT.	TOTALIZERS	S. 64	ASSIGN TOTAL. 1	ASSIGN TOTAL. 2	ASSIGN TOTAL. 3	ASSIGN TOTAL. 4
	TIMER CONTROL	S. 65	ASSIGN TIMER	TOTAL TIME	WAITING TIME	START/STOP TIMER
	SET BATCHING	S. 68	BATCH VARIABLE	SELECT BATCH QTY	BATCH PRESET	BATCH PREWARN
	BATCHING	S. 70	SELECT BATCH QTY	BATCHING	BATCH CYCLE	RESET BATCH CYC.
	ESCAPE					
CALCULAT. FUNCT.	VOLUME FUNCTION	S. 73	VOLUME FLOW MEAS	STD. VOL. CALC.	REFERENCE TEMP.	EXP. COEF.
	DENSITY FUNCTION	S. 75	CALC. DENSITY	REFERENCE TEMP.	EXP. COEF.	CARRIER DENSITY
	ESCAPE					
USER INTERFACE	FLOW SYST. UNITS	S. 80	MASS FLOW UNIT	MASS UNIT	VOLUME FLOW UNIT	STDVOL. FLOW UNIT
	AUX. SYST. UNITS	S. 82	DENSITY UNIT	STD. DENSITY UNIT	TEMPERATURE UNIT	NOM. DIAM. UNIT
	DISPLAY SETTING	S. 83	ASSIGN LINE 1	ASSIGN LINE 2	ASSIGN LINE 3	ASSIGN LINE 4
	ESCAPE					
PARAMETERS	COMM. PARAMETER	S. 85	PROTOCOL	BUS-ADDRESS	TAG NUMBER	
	PROCESSING PARA.	S. 86	LOW FLOW CUTOFF	SELF CHECKING	MEASURING MODE	FLOW DIRECTION
	SYSTEM PARAMETER	S. 89	ACCESS CODE	DEF. PRIVATE CODE	SELECT ZEROPOINT	ZEROPOINT ADJUST
	SYSTEM INFO	S. 92	PRESENT SYSTEM CONDITION	PREVIOUS SYSTEM CONDITIONS	SERIAL NO. DZL	SW VERSION DZL
	ESCAPE					
SERVICE & ANALYSIS	SERVICE DATA	S. 94	CLEAR ERROR LIST	K-FACTOR	SYSTEM RESET	QUICK SETUP
	CALIBRATION DATA	S. 95	DENSITY COEF. C0	DENSITY COEF. C1	DENSITY COEF. C2	DENSITY COEF. C3
	ESCAPE					

E+H Operating Matrix

CARRIER FLOW	DENSITY	CALC. DENSITY	TEMPERATURE	
TOTALIZER 3	TOTAL. 3 OVERFLOW	TOTALIZER 4	TOTAL. 4 OVERFLOW	BATCH UPWARDS BATCH DOWNWARDS
PULS/FREQ. OUTP. 2	PULS/FREQ. OUTP. 3			

FULL SCALE 2	ACTIVE RANGE	TIME CONSTANT	CURRENT RANGE	FAILSAFE MODE	SIMULATION CURR.
FULL SCALE 2	ACTIVE RANGE	TIME CONSTANT	CURRENT RANGE	FAILSAFE MODE	SIMULATION CURR.
FULL SCALE 2	ACTIVE RANGE	TIME CONSTANT	CURRENT RANGE	FAILSAFE MODE	SIMULATION CURR.

FULL SCALE FREQ.	ZERO SCALE	FULL SCALE	OUTPUT SIGNAL	FAILSAFE MODE	SIMULATION FREQ.
FULL SCALE FREQ.	ZERO SCALE	FULL SCALE	OUTPUT SIGNAL	FAILSAFE MODE	SIMULATION FREQ.
FULL SCALE FREQ.	ZERO SCALE	FULL SCALE	OUTPUT SIGNAL	FAILSAFE MODE	SIMULATION FREQ.
RELAY 2 ON-VALUE	RELAY 2 OFF- VALUE	ASSIGN RELAY 3	RELAY 3 ON-VALUE	RELAY 3 OFF-VALUE	

RESET TOTALIZER			
TIME ELAPSED	TIME REMAINING		
BATCH COMP. MODE	COMPENS. QUANTITY	MAX. BATCH TIME	DISPLAY BATCH

FIXED STD. DENS.				
EXP. COEF. CARRIER	TARGET MAT. DENS.	EXP. COEF. TARGET	DENS. ADJ. VALUE	DENSITY ADJUST

VOLUME UNIT	STD. VOLUME UNIT	GALLON / BARREL		
FORMAT FLOW	DISPLAY DAMPING	LCD CONTRAST	LANGUAGE	DISPLAY TEST

EPD THRESHOLD	NOISE SUPPRESS	DENSITY FILTER	PRESS. PULSE SUPPR	
ZERO POINT	POS. ZERO RETURN			
SER. NO. PROMASS	SW VERS. PROMASS	NOMINAL DIAMETER	MIN. TEMPERATURE	MAX. TEMPERATURE

DENSITY COEF. C4	DENSITY COEF. C5	TEMP. COEF. Km	TEMP. COEF. Kt	CAL. COEF. Kd1	KAL. COEF. Kd2

5.4 Example of programming

If you wish to set current output 2 to 0–20 mA (factory setting 4–20 mA), proceed as shown in Fig. 15:

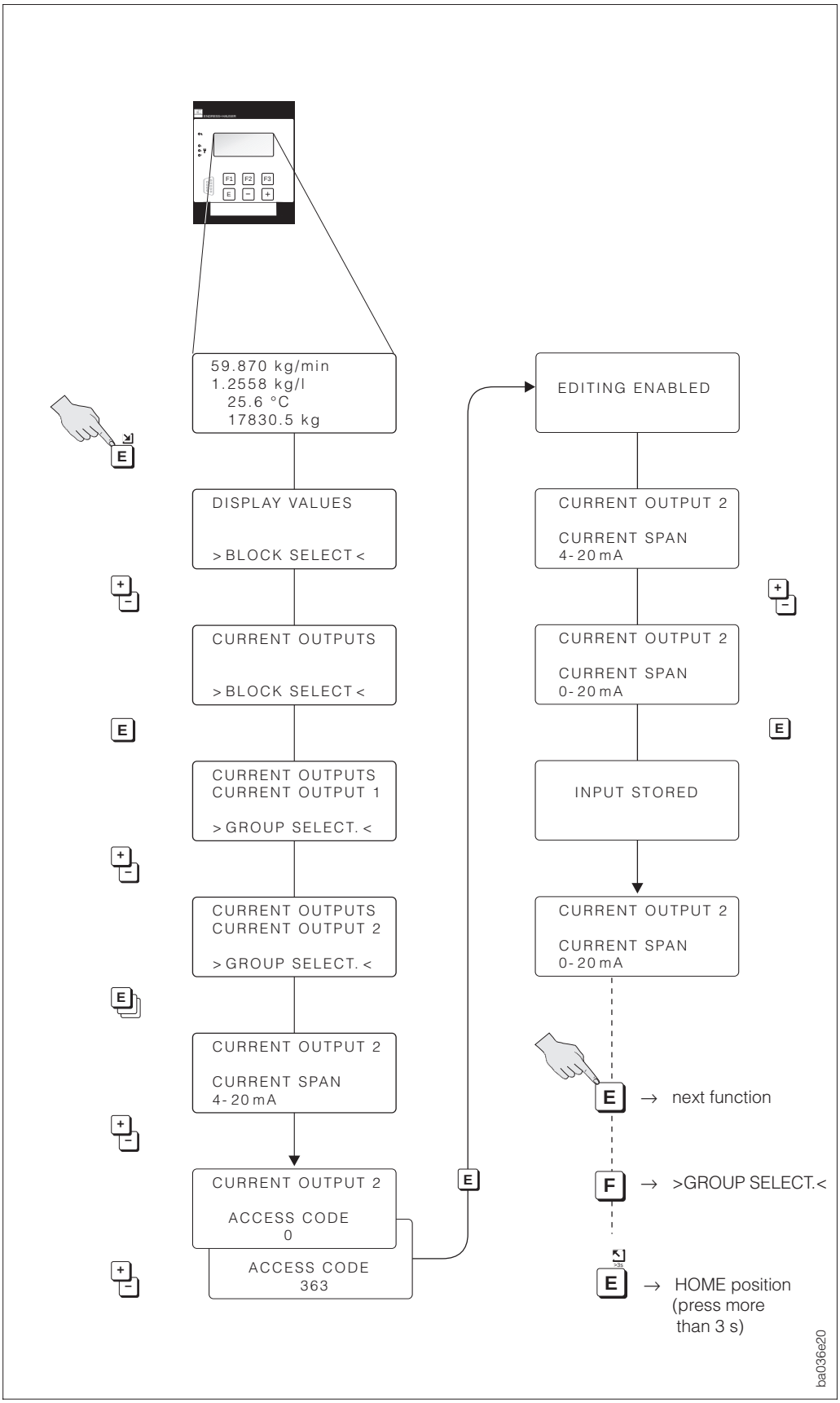
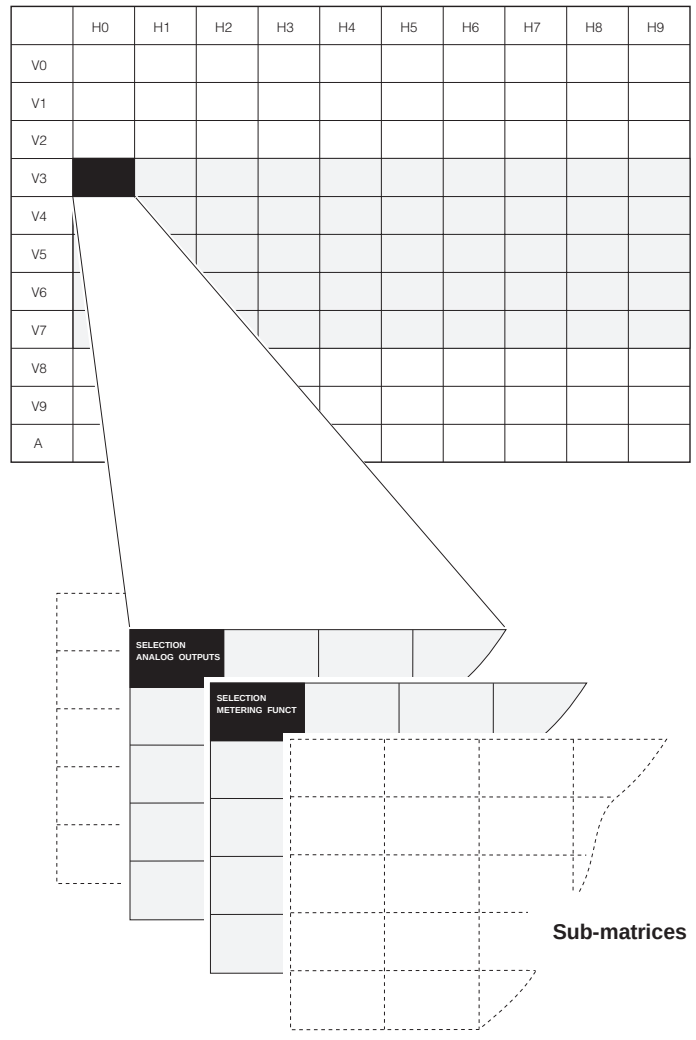


Fig. 15
Example of programming

5.5 Operating with Rackbus RS 485

All Procom DZL 363 programming functions using the Rackbus interface are synoptically arranged in an operating matrix (see Fig. 16).

With the help of the “SELECTION” function (V3HO), different sub-matrices of the complete matrix may be accessed which comprise different function groups and functions.



The V0...2, V8...A lines of the complete Rackbus matrix are always displayed.
With the “**SELECTION**” function (V3H0) nine sub-matrices are accessible:

0: DISPLAY VALUES → see page 32
1: ANALOG OUTPUTS → see page 32
2: DIGITAL OUTPUT → see page 34
3: INPUTS → see page 34
4: METERING FUNCT → see page 36
5: COMPUTED FUNCT → see page 36
6: DEVICE CONFIG. → see page 38
7: DEVICE PARAMS. → see page 40
8: SERVICE-DIAG → see page 40

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Fig. 16
Rackbus RS 485
Operating matrix

Operating matrix for Rackbus RS 485					
		H0	**H1**	**H2**	**H3**
V0	**PROCESS VARIABLE**	**MASS FLOW**	**VOLUME FLOW**	**STD. VOLUME FL.**	**TARGET FLOW**
V1	**TOTALIZERS**	**TOTALIZER 1**	**TOTAL. 1 OVERFLOW**	**TOTALIZER 2**	**TOTAL. 2 OVERLFOW**
V2	**I/O VARIABLES**	**CURRENT OUTPUT 1**	**CURRENT OUTPUT 2**	**CURRENT OUTPUT 3**	**PULS / FREQ. OUTPUT 1**
V3	**SELECTION**	**SELECTION** **0: DISPLAY VALUES** 1: ANALOG OUTPUTS 2: DIGITAL OUTPUT 3: INPUTS 4: METERING FUNCT 5: COMPUTED FUNCT 6: DEVICE CONFIG. 7: DEVICE PARAMS. 8: SERVICE - DIAG 9: CANCEL			
V4	**–**				
V5	**–**				
V6	**–**				
V7	**–**				
V8	**PROCESSING PARA.**	**LOW FLOW CUTOFF**	**DEVICE MODE** 0: UNIDIRECTIONAL 1: BIDIRECTIONAL 2: CANCEL	**FLOW DIRECTION** 0: FORWARD 1: REVERSE 2: CANCEL	**NOISE SUPPRESSION** 0: OFF 1: MODERATE 2: MEDIUM 3: HIGH 4: CANCEL
V9	**SYSTEM PARAMETER**	**DIAGNOSTIC CODE**		**ACCESS CODE**	**ZERO ADJUST** 0: CANCEL 1: EXECUTE
A	**SETUP**	**TAG NUMBER**			

Rackbus sub-matrix "ANALOG OUTPUTS"

V3	**SELECTION**	**SELECTION** **ANALOG OUTPUTS**			
V4	**CURRENT OUTPUT 1**	**ASSIGN OUTPUT** 0: OFF 1: MASS 2: FLOWRATE 3: STD. VOL. FLOW 4: TARGET FLOW 5: CARRIER FLOW 6: DENSITY 7: CALC. DENSITY 8: TEMPERATURE 9: NOT USED 10: NOT USED 11: NOT USED 12: CANCEL	**VALUE FOR 0/4 mA**	**FULL SCALE 1**	**DUAL RANGE MODE** 0: RANGE 1 1: RANGE 2 2: AUTOMATIC 3: AUX. INPUT 4: CANCEL
V5	**CURRENT OUTPUT 2**	**ASSIGN OUTPUT** (Selection: see above)	**VALUE FOR 0/4 mA**	**FULL SCALE 1**	**FULL SCALE** (Selection: see above)
V6	**CURRENT OUTPUT 3**	**ASSIGN OUTUPT** (Selection: see above)	**VALUE FOR 0/4 mA**	**FULL SCALE 1**	**FULL SCALE** (Selection: see above)
V7	**–**				

H4	H5	H6	H7	H8	H9
CARRIER FLOW	**DENSITY**	**CALC. DENSITY**	**TEMPERATURE**		
TOTALIZER 3	**TOTAL. 3 OVERFLOW**	**TOTALIZER 4**	**TOTAL. 4 OVERFLOW**	**BATCH PROCESS QTY**	
PULS / FREQ. OUTP.	**PULS / FREQ. OUTP. 3**				
DENSITY FILTER 0: OFF 1: MODERATE 2: MEDIUM 3: HIGH 4: CANCEL	**EPD THRESHOLD**	**SELF CHECKING** 0: NOT USED 1: CYCLIC 2: SMART 3: CANCEL			
POS. ZERO RETURN 0: OFF 1: ON 2: NOT USED	**SOFTWARE VER COM**	**SOFTWARE VERSION**	**NOMINAL SIZE**	**SERIAL-NO. SENS.**	

FULL SCALE 2	**ACTIVE RANGE** 0: RANGE 1 1: RANGE 2	**TIME CONSTANT**	**CURRENT RANGE** 0: 0...20 mA 1: 4...20 mA 2: 0...20 mA NAMUR 3: 4...20 mA NAMUR 4: CANCEL	**FAILSAFE MODE** 0: MINIMUM 1: MAXIMUM 2: HOLD 3: GO 4: CANCEL	**SIMULATION CURR.** 0: OFF 5: 12 mA 1: 0 mA 6: 20 mA 2: 2 mA 7: 22 mA 3: 4 mA 8: 25 mA 4: 10 mA 9: CANCEL
FULL SCALE 2	**ACTIVE RANGE**	**TIME CONSTANT**	**CURRENT RANGE** (Selection: see above)	**FAILSAFE MODE** (Selection: see above)	**SIMULATION CURR.** (Selection: see above)
FULL SCALE 2	**ACTIVE RANGE**	**TIME CONSTANT**	**CURRENT RANGE** (Selection: see above)	**FAILSAFE MODE** (Selection: see above)	**SIMULATION CURR.** (Selection: see above)

Rackbus sub-matrix “DIGITAL OUTPUT” and “INPUTS”

		H0	H1	H2	H3
V3	SELECTION	SELECTION DIGITAL OUTPUT			
V4	PULS / FREQ. OUTP. 1	ASSIGN PULS / FREQ 0: OFF 1: MASS 2: VOLUME 3: STD. VOLUME 4: TARGET FLOW 5: CARRIER FLOW 6: DENSITY 7: CALC. DENSITY 8: TEMPERATURE 9–11: NOT USED 12: CANCEL	OPERATION MODE 0: PULSE 1: FREQUENCY 2: CANCEL	PULSE VALUE	PULSE WIDTH
V5	PULS / FREQ. OUTP. 2	ASSIGN PULS / FREQ (Selection: see above)	OPERATION MODE (Selection: see above)	PULSE VALUE	PULSE WIDTH
V6	PULS / FREQ. OUTP. 3	ASSIGN PULS / FREQ (Selection: see above)	OPERATION MODE (Selection: see above)	PULSE VALUE	PULSE WIDTH
V7	RELAYS	ASSIGN RELAY 1 0: OFF 1: ON 2: TEST 3: ERROR 4: EPD 5: ERROR + EPD 6: FULL SCALE 1 7: FULL SCALE 2 8: FULL SCALE 3 9: BATCHING 10: PRE AL BATCH 11: TIMER CONTROL 12: FLOW DIRECT. 13: MASS FLOW 14: VOLUME FLOW 15: STD. VOLUME FL. 16: TARGET FLOW 17: CARRIER FLOW 18: DENSITY 19: CALC. DENSITY 20: TEMPERATURE 21: NOT USED 22: NOT USED 23: CANCEL	SWITCH-ON PT. RE 1	SWITCH-OFF PT. RE 1	ASSIGN RELAY 2 0: OFF 1: ON 2: TEST 3: NOT USED 4: EPD 5: NOT USED 6: FULL SCALE 1 7: FULL SCALE 2 8: FULL SCALE 3 9: BATCHING 10: PRE AL BATCH 11: TIMER CONTROL 12: FLOW DIRECT 13: MASS FLOW 14: VOLUME FLOW 15: STD. VOLUME FL. 16: TARGET FLOW 17: CARRIER FLOW 18: DENSITY 19: CALC. DENSITY 20: TEMPERATURE 21: NOT USED 22: NOT USED 23: CANCEL

V3	SELECTION	SELECTION INPUTS			
V4	AUXILIARY INPUTS	INPUT 1 CONFIG. 0: OFF 1: RESET ALL TOT. 2: RESET TOTAL 1 3: RESET TOTAL 2 4: RESET TOTAL 3 5: RESET TOTAL 4 6: RES. TOTAL 1 & 2 7: RES. TOTAL 3 & 4 8: STRT / STP TIMER 9: SELCT. BATCHQTY 10: STRT / STP BATCH 11: ZEROPOINT SEL. 12: ZEROPOINT ADJ. 13: FULL SCALE 1 14: FULL SCALE 2 15: FULL SCALE 3 16: POS. ZERO 17: CANCEL	START PULS WIDTH	INPUT 2 CONFIG. 0: OFF 1: RESET ALL TOT. 2: RESET TOTAL 1 3: RESET TOTAL 2 4: RESET TOTAL 3 5: RESET TOTAL 4 6: RES. TOTAL 1 & 2 7: RES. TOTAL 3 & 4 8: STRT / STP TIMER 9: SELCT. BATCHQTY 10: STRT / STP BATCH 11: ZEROPOINT SEL. 12: ZEROPOINT ADJ. 13: FULL SCALE 1 14: FULL SCALE 2 15: FULL SCALE 3 16: POS. ZERO 17: CANCEL	START PULS WIDTH
V5	–				
V6	–				
V7	–				

H4	H5	H6	H7	H8	H9
FULL SCALE FREQ.	**ZERO SCALE**	**FULL SCALE**	**OUTPUT SIGNAL** 0: NORMALLY CLOSED 1: NORMALLY OPEN 2: ACTIVE POS. 3: ACTIVE NEG. 4: CANCEL	**FAILSAFE MODE** 0: LOGIC VALUE 0 1: HOLD 2: GO 3: CANCEL	**SIMULATION** 0: OFF 1: 0 Hz 2: 2 Hz 3: 10 Hz 4: 1 kHz 5: 10 kHz 6: CANCEL
FULL SCALE FREQ.	**ZERO SCALE**	**FULL SCALE**	**OUTPUT SIGNAL** (Selection: see above)	**FAILSAFE MODE** (Selection: see above)	**SIMULATION** (Selection: see above)
FULL SCALE FREQ.	**ZERO SCALE**	**FULL SCALE**	**OUTPUT SIGNAL** (Selection: see above)	**FAILSAFE MODE** (Selection: see above)	**SIMULATION** (Selection: see above)
SWITCH-ON PT. RE 2	**SWITCH-OFF PT. RE 2**	**ASSIGN RELAY 3** 0: OFF 1: ON 2: TEST 3: NOT USED 4: EPD 5: NOT USED 6: FULL SCALE 1 7: FULL SCALE 2 8: FULL SCALE 3 9: BATCHING 10: PRE AL BATCH 11: TIMER CONTROL 12: FLOW DIRECT. 13: MASS FLOW 14: VOLUME FLOW 15: STD. VOLUME FL. 16: TARGET FLOW 17: CARRIER FLOW 18: DENSITY 19: CALC. DENSITY 20: TEMPERATURE 21: NOT USED 22: NOT USED 23: CANCEL	**SWITCH-ON PT. RE 3**	**SWITCH-OFF PT. RE 3**	

Rackbus sub-matrix “METERING FUNCT” and “COMPUTED FUNCT”

		H0	H1	H2	H3
V3	SELECTION	**SELECTION METERING FUNCT**			
V4	TOTALIZERS	**ASSIGN TOTAL 1** 0: OFF 1: MASS 2: MASS (+) 3: MASS (–) 4: VOLUME 5: STD. VOLUME 6: VOLUME (+) 7: VOLUME (–) 8: STD. VOL. (+) 9: STD. VOL. (–) 10: TARGET MAT. 11: TARGET MAT. (+) 12: TARGET MAT. (–) 13: CARRIER MAT. 14: CARRIER MAT. (+) 15: CARRIER MAT. (–) 16: NOT USED 17: CANCEL	**ASSIGN TOTAL 2** Selection: see ASSIGN TOTAL 1	**ASSIGN TOTAL 3** Selection: see ASSIGN TOTAL 1	**ASSIGN TOTAL 4** Selection: see ASSIGN TOTAL 1
V5	TIMER CONTROL	**ASSIGN TIMER** 0: OFF 1: TOTALIZER 1 2: TOTALIZER 2 3: TOTALIZER 1 & 2 4: TOTALIZER 3 5: TOTALIZER 4 6: TOTALIZER 3 & 4 7: ALL TOTALIZER 8: CANCEL		**TOTAL TIME**	**PRESET TIME**
V6	SET BATCHING	**BATCH MODUS** 0: OFF 1: MASS 2: VOLUME 3: STD. VOLUME 4: TARGET MATERIAL 5: CARRIER FLUID 6: CANCEL	**SEL BATCH QUANT.** 0: BATCH QUANT. 1 1: BATCH QUANT. 2 2: BATCH QUANT. 3 3: BATCH QUANT. 4 4: CANCEL	**BATCH PRESET**	**BATCH PREWARN**
V7	OPERATE BATCHING	**SEL BATCH QUANT.** 0: BATCH QUANT. 1 1: BATCH QUANT. 2 2: BATCH QUANT. 3 3: BATCH QUANT. 4 4: CANCEL	**BATCHING** 0: CANCEL 1: EXECUTE 2: STOP	**BATCH CYCLE**	**RESET BAT. CYCLES** 0: CANCEL 1: YES

V3	SELECTION	**SELECTION COMPUTED FUNCT**			
V4	VOLUME FUNCTIONS	**VOLUME FLOW MEAS.** 0: OFF 1: VOLUME FLOW 2: STD. VOLUME FL. 3: VOLUME & STD. VOL. 4: CANCEL	**STD. VOL. CALC.** 0: CALC. STD. DENS 1: FIXED STD. DENS 2: CANCEL	**STD. TEMPERATURE**	
V5	DENSITY FUNCTIONS	**DENSITY OPTION** 0: OFF 1: %-MASS 2: %-VOLUME 3: STD. DENSITY 4: BRIX 5: BAUME (>1 kg/dm3) 6: BAUME (<1 kg/dm3) 7: API 8: %-BLACK LIQUOR 9: %-ALCOHOL 10: CANCEL	**STD. TEMPERATURE**		**STD. EXPANSION**
V6	–				
V7	–				

H4	H5	H6	H7	H8	H9
RESET TOTALIZER 0: CANCEL 1: RESET ALL TOT. 2: RESET TOTAL 1 3: RESET TOTAL 2 4: RESET TOTAL 3 5: RESET TOTAL 4 6: RES. TOTAL 1 & 2 7: RES. TOTAL 3 & 4					
STRT / STP TIMER 0: CANCEL 1: EXECUTE 2: CONTINUOUS 3: STOP	**TIME ELAPSED**	**TIME REMAINING**			
AVERAGING DRIP 0: OFF 1: MODERATE 2: MEDIUM 3: HIGH 4: CANCEL	**COMPENS. QUANTITY**			**MAX. BATCH TIME**	**DISPLAY BATCH** 0: BATCH UPWARDS 1: BATCH DOWNWARDS 2: CANCEL

STD. EXPANSION	**FIXED STD. DENS.**				
DENSITY PHASE 1	**EXPANS. PHASE 1**	**DENSITY PHASE 2**	**EXPANS. PHASE 2**	**DENS. ADJ. VALUE**	**DENSITY ADJUST** 0: LIQUID 1 1: LIQUID 2 2: DENSITY ADJUST 3: CANCEL

Rackbus sub-matrix “DEVICE CONFIG.”

		H0	H1	H2	H3
V3	SELECTION	SELECTION DEVICE CONFIG.			
V4	FLOW SYST. UNITS	MASS FLOW UNIT 0: not used 1: g/min 2: g/h 3: kg/s 4: kg/min 5: kg/h 6: t/min 7: t/h 8: t/d 9: lb/s 10: lb/min 11: lb/h 12: ton/min 13: ton/h 14: ton/day 15: CANCEL	MASS UNIT 0: g 1: kg 2: t 3: lb. 4: ton 5: CANCEL	EINHT. VOL.FLUSS 0: cm3/min 1: cm3/h 2: dm3/s 3: dm3/min 4: dm3/h 5: l/s 6: l/min 7: l/h 8: hl/min 9: hl/h 10: NOT USED 11: m3/min 12: m3/h 13: cc/min 14: cc/h 15: gal/min 16: gal/h 17: gal/day 18: gpm 19: gph 20: gpd 21: mgd 22: bbl/min 23: bbl/h 24: bbl/d 25: CANCEL	STD. FLOW UNIT. 0: Nl/s 1: Nl/min 2: Nl/h 3: Nl/d 4: Nm3/s 5: Nm3/min 6: Nm3/h 7: Nm3/d 8: scm/s 9: scm/min 10: scm/h 11: scm/day 12: scf/s 13: scf/min 14: scf/h 15: scf/day 16: CANCEL
V5	AUX. SYST. UNITS	DENSITY UNIT 0: g/cm3 1: kg/dm3 2: kg/l 3: kg/m3 4: SD_4C 5: SD_15C 6: SD_20C 7: g/cc 8: lb/cf 9: lb/USgal 10: lb/gal 11: lb/bbl 12: SG_59F 13: SG_60F 14: SG_68F 15: SG_4C 16: SG_15C 17: SG_20C 18: CANCEL	STD. DENSITY UNIT 0: kg/Nm3 1: kg/Nl 2: g/scc 3: kg/scm 4: lb/scf 5: CANCEL	TEMPERATURE UNIT 0: C 1: K 2: F 3: R 4: CANCEL	
V6	DISPLAY SETTING	DISPLAY LINE 1 0: NOT USED 1: MASS FLOW 2: VOLUME FLOW 3: STD. VOLUME FL. 4: TARGET FLOW 5: CARRIER FLOW 6: DENSITY 7: CALC. DENSITY 8: TEMPERATURE 9: NOT USED 10: NOT USED 11: TOTALIZER 1 12: TOT. 1 OVERFL. 13: TOTALIZER 2 14: TOT. 2 OVERFL. 15: TOTALIZER 3 16: TOT. 3 OVERFL. 17: TOTALIZER 4 18: TOT. 4 OVERFL. 19: BATCH PRESET 20: BATCH UPWARDS 21: BATCH DOWNWARDS 22: BATCH CYCLE 23: TIME REMAINING 24: TIME ELAPSED 25: CANCEL	DISPLAY LINE 2 0: OFF 1: MASS FLOW 2: VOLUME FLOW 3: STD. VOLUME FL. 4: TARGET FLOW 5: CARRIER FLOW 6: DENSITY 7: CALC. DENSITY 8: TEMPERATURE 9: NOT USED 10: NOT USED 11: TOTALIZER 1 12: TOT. 1 OVERFL. 13: TOTALIZER 2 14: TOT. 2 OVERFL. 15: TOTALIZER 3 16: TOT. 3 OVERFL. 17: TOTALIZER 4 18: TOT. 4 OVERFL. 19: BATCH PRESET 20: BATCH UPWARDS 21: BATCH DOWNWARDS 22: BATCH CYCLE 23: TIME REMAINING 24: TIME ELAPSED 25: CANCEL	DISPLAY LINE 3 Selection: see DISPLAY LINE 2	DISPLAY LINE 4 Selection: see DISPLAY LINE 2
V7	–				

H4	H5	H6	H7	H8	H9
VOLUME UNITS 0: cm3 1: dm3 2: l (Liter) 3: hl 4: m3 5: cc 6: gal 7: bbl 8: CANCEL	**STD. VOLUME UNIT** 0: Nm3 1: Nl 2: scm 3: scf 4: CANCEL	**GALLON / BARREL** 0: 31 gal 1: 31.5 gal 2: 42 gal 3: 55 gal 4: 36 ImpGal 5: 42 ImpGal 6: CANCEL			
	PIPE SIZE UNIT 0: mm 1: inch 2: CANCEL				
FORMAT FLOW 0: xxxxx. 1: xxxx.x 2: xxx.xx 3: xx.xxx 4: x.xxxx 5: CANCEL	**DISPLAY DAMPING**	**LCD CONTRAST**	**LANGUAGE** 0: ENGLISH 1: DEUTSCH 2: FRANCAIS 3: ESPANOL 4: ITALIANO 5: NEDERLANDS 6: DANSK 7: NORSK 8: SVENSK 9: SUOMI 10: BAHASA 11: JAPANESE 12: CANCEL	**TEST DISPLAY** 0: CANCEL 1: EXECUTE	

Rackbus sub-matrix “DEVICE PARAMS.” and “SERVICE-DIAG”

		H0	H1	H2	H3
V3	SELECTION	SELECTION DEVICE PARAMS.			
V4	COMM. PARAMETER		INTERFACE RS 485		RACKBUS ADDRESS
V5	PROCESSING PARA.	LOW FLOW CUTOFF	SELF CHECKING 0: NOT USED 1: CYCLIC 2: SMART 3: CANCEL	DEVICE MODE 0: UNIDIRECTIONAL 1: BIDIRECTIONAL 2: CANCEL	FLOW DIRECTION 0: FORWARD 1: REVERSE 2: CANCEL
V6	SYSTEM PARAMETER			SELECT ZEROPOINT 0: ZEROPOINT 1 1: ZEROPOINT 2 2: CANCEL	ZERO ADJUST 0: CANCEL 1: EXECUTE
V7	SYSTEM-INFO.	DIAGNOSTIC CODE		SERIAL NUMBER	SOFTWARE VER COM

V3	SELECTION	SELECTION SERVICE - DIAG			
V4	SERVICE DATA	CLEAR ERROR LIST 0: YES 1: NOT USED 2: CANCEL			CALIBR. FACTOR
V5	CALIBRATION DATA	DENSITY COEFF. C0	DENSITY COEFF. C1	DENSITY COEFF. C2	DENSITY COEFF. C3
V6	–				
V7	–				

H4	H5	H6	H7	H8	H9
EPD THRESHOLD	**NOISE SUPPRESSION** 0: OFF 1: MODERATE 2: MEDIUM 3: HIGH 4: CANCEL	**DENSITY FILTER** 0: OFF 1: MODERATE 2: MEDIUM 3: HIGH 4: CANCEL	**PRESS. PULSE SUPPR**		
ZERO POINT	**POS. ZERO RETURN** 0: OFF 1: ON 2: NOT USED				
SERIAL-NO. SENS.	**SOFTWARE VERSION**		**MIN. TEMPERATURE**	**MAX. TEMPERATURE**	

DENSITY COEFF. C4	**DENSITY COEFF. C5**	**TEMP. COEFF. KM**	**TEMP. COEFF. KT**	**CAL. COEF. KD1**	**CAL. COEF. KD2**

5.6 Operation with the HART protocol

Two procedures can be used:
- Restricted operation using the “HART Communicator DXR 275” universal handheld terminal.
- Operation using a personal computer with specific software, e.g. “Commuwin II”, and the “Commubox FXA 191” HART modem.

“HART Communicator DXR 275”
Procom DZL 363 functions are selected with the HART Communicator over a number of menu levels. If you use the HART Communicator, only the universal HART command set is available. Programming possibilities are restricted to those functions offered by these universal commands. The parameters associated to the current output 1 can therefore be called up and changed.


Note!

Notes!
- The HART protocol requires a 4...20 mA setting of the current output 1 (see page 50).
- Further information on the HART Communicator is given in the appropriate operating manual in the carrying case.
  Please refer to the documentation published by the HART Communication Foundation, in particular HCF LIT 20: “HART, a Technical Overview”.

“Commuwin II” operating program
Commuwin II is a universal program for remote operation of field and control-room devices. Use of the Commuwin II operating program is possible independent of the type of instrument or Communication (HART, PROFIBUS, Rackbus RS 485, etc.) chosen.

Commuwin II offers the following functions:
- parameterization of functions,
- visualization of measuring values,
- saving of instrument parameters,
- device diagnostics,
- measuring-point documentation.

Commuwin II may also be combined with other software packages to visualize processes.


Note!

Note!
For additional information on Commuwin II, see the following E+H documentation:
- System Information: SI 018F/00/en “Commuwin II”
- Operating Manual: BA124F/00/en “Commuwin II Operating Program”

6 Functions

This chapter lists in detail a description as well as all the information required for the individual functions of the Procom DZL 363.
Factory settings are shown in ***bold italics***. On request, Procom DZL 363 measuring instruments are also available with customised parameterisation. In such cases, values/settings may differ from the factory settings shown here.


Note!

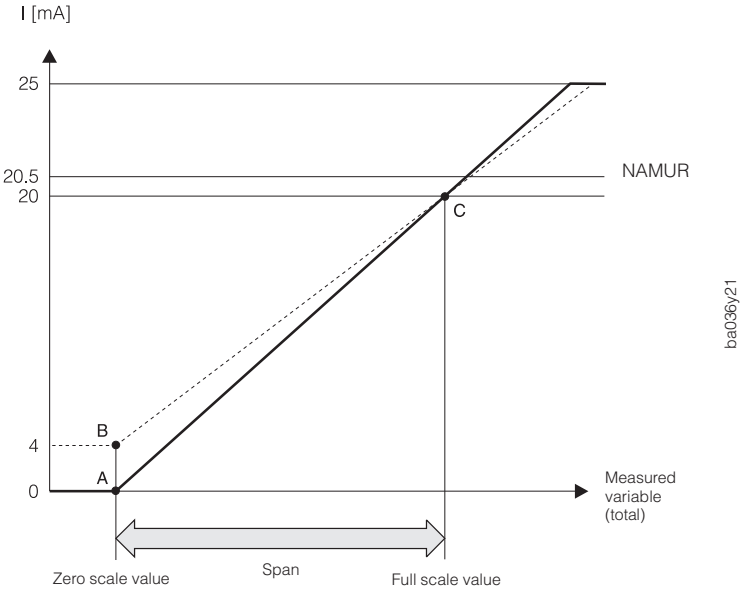
DISPLAY VALUES	Function group PROCESS VARIABLE
Notes! • The engineering units of all variables shown here can be set in the Function group “SYSTEM-UNITS”. • You may set the maximum number of displayed decimals in “FORMAT DISPLAY” (see page 83). • If the fluid in the piping flows backwards, then the flow rate value is indicated by a negative sign on the display independent of the setting in the function “MEASURING MODE” (see page 86).	
MASS FLOW	Display of currently measured mass flow: 5-digit number with floating decimal point, incl. units and arithmetical sign e.g. 462.87 kg/h; –731.63 lb/min; etc.
VOLUME FLOW	Display of currently measured volume flow. The volume flow is derived from the measured mass flow and the measured density of the medium. 5-digit number with floating decimal point, incl. units and arithmetical sign e.g. 5.5445 dm^3/min; 1.4359 m^3/h; –731.63 gal/d; etc.
STD. VOLUME	Display of currently measured standard volume flow. The standard volume flow rate is derived from the measured mass flow rate and the standard (or fixed entry) density of the fluid measured. 5-digit number with floating decimal point, incl. units and arithmetical sign e.g. 1.3549 Nm^3/h; 7.9846 scm/day; etc. FIXED STD. DENSITY or CALC. DENS. Display whether the standard density value used for calculating the standard volume flow rate is a fixed entry value or derived from process data (see page 74).
TARGET FLOW	Display of currently measured flow rate of the target medium as a mass or volumetric flow rate: 5-digit number with floating decimal point, incl. units and arithmetical sign e.g. 0.1305 m^3/h; 1.4359 t/h; etc. *Target medium* = material transported in a solids-containing fluid (e.g. lime powder)
CARRIER FLOW	Display of currently measured flow rate of the carrier fluid as a mass or volumetric flow rate: 5-digit number with floating decimal point, incl. units and arithmetical sign e.g. 0.8305 m^3/h; 16.435 t/h; etc. *Carrier fluid* = carrier liquid of a solids-containing fluid (e.g. water)
DENSITY	Display of currently measured fluid density or its specific gravity: 5-digit number with fixed decimal point, incl. units (corresponding to 0.10000...6.0000 kg/dm^3), e.g. 1.2345 kg/dm^3; 993.5 kg/m^3; 1.0015 SG_20 °C; etc.
CALC. DENSITY	Display of calculated value using a density function (see page 75 ff.): 5-digit number with fixed decimal point, incl. units e.g. 76.409 °Brix; 39.170 %v; 1391.7 kg/Nm^3 Display of the current density function used by the measuring system, e.g. °BRIX, %-VOLUME, etc.

DISPLAY VALUES	Function group PROCESS VARIABLE
TEMPERATURE	Display of currently measured fluid temperature: max. 4-digit number with fixed decimal point, incl. units and arithmetical sign e.g. –23.4 °C; 160.0 °F; 295.4 K; etc.
	Function group TOTALIZERS
TOTALIZER 1 **TOTALIZER 2** **TOTALIZER 3** **TOTALIZER 4**	Display of totalized flow rate since the initial measuring operation or the last totalizer reset. This value is either positive or negative depending on the flow direction. max. 7-digit number with floating decimal point, incl. engineering units e.g. 1.546704 t; –4925.631 kg Notes! • If the totalized value has more figures than can be displayed (>9'999'999) the symbols ">" (pos. value) or "–" (neg. value) appears before the displayed value. The number of totalizer overflows is shown in "TOTAL. OVERFLOW". • If the "MEASURING MODE" function is set to "UNIDIRECTIONAL" (see page 86), the following applies: *Flow-direction function → FORWARD (see page 87):* The totalizer only takes into account **positive** flow directions. *Flow-direction function → REVERSE (see page 87):* The totalizer only takes into account **negative** flow directions. • In cases of error the totalizer is coupled to the error response of the pulse/frequency output 1 (see page 57). ASSIGN TOTAL. .... Display showing which measuring variable is assigned to the totalizer.
TOTAL. 1 **TOTAL. 2** **TOTAL. 3** **TOTAL. 4** **OVERFLOW**	Display of totalizer overflows. On the display the totalized flow is shown as a max. 7-digit number with floating decimal point. Larger numbers (>9'999'999) can be read off in this function as overflows. The effective amount is calculated from the sum of the value shown in the function "TOTAL. OVERFLOW" and in the function "TOTALIZER 1, 2, 3, 4". *Example:* Display of 2 overruns: **2 e7 kg** = $2 \cdot 10^7$ kg = 20,000,000 kg The value shown in the function "TOTALIZER 1" is 196,845.7 kg Total amount = 20,196,845.7 kg ASSIGN TOTAL. .... Display showing which measuring variable is assigned to the totalizer.
BATCH UPWARDS **BATCH DOWNWARDS**	Continual display (ascending or descending) of an ongoing batching process. Set the "BATCH UPWARDS" or "BATCH DOWNWARDS" parameters in the "DISPLAY BATCH" function (see page 70).

Note!

DISPLAY VALUES	Function group I/O VARIABLES
CURRENT OUTPUT 1 / 2 / 3	In this function, the current and calculated target value of the output current is shown (0.00...25.00 mA). The actual value can vary slightly due to external effects such as temperature.  Display showing the current measured value for the variable assigned to the current output.
PULS/FREQ. OUTP. 1 / 2 / 3	In this function the calculated target value of the output frequency (0.00...12500 Hz) is shown.  Display showing the current measured value for the variable assigned to the frequency output.

CURRENT OUTPUTS	Function group CURRENT OUTPUT 1 – 2 – 3
ASSIGN OUTPUT	In this function, any variable required can be assigned to the current outputs 1, 2 or 3. OFF – ***MASS FLOW**** – VOLUME FLOW – STD. VOLUME FLOW – TARGET FLOW – CARRIER FLOW – ***DENSITY***** – CALC. DENSITY – ***TEMPERATURE******* – CANCEL Factory setting: * current output 1, ** current output 2, *** current output 3 Diagnosis (for flow rate variables only): Display showing whether the flowmeter measures in one or in both flow directions (see function “MEASURING MODE”, page 86).

CURRENT OUTPUTS	Function group CURRENT OUTPUT 1 – 2 – 3
ZERO SCALE **FULL SCALE 1**	With these two functions, you define the following values for the variable assigned to the current outputs: • 0/4 mA quiescent current → *zero value of the measured value* • 20 mA → *full scale value of the measured value* These values apply to both flow directions (bi-directional). Notes! • The flow direction can be shown by the configurable relay outputs (see page 59, 61). • The zero scale value may be higher or lower than the full scale value: *Zero scale value (min. setting)* → Q = 0.0 kg/h; ρ = 0.0 kg/dm^3; T = –273.15 °C *Full scale value (max. setting)* → Q = 180.0 t/h; r = 5.999 kg/dm^3; T = 300.00 °C • The span between zero- and full scale value should not fall below a set minimum as, otherwise, very small measured-value changes may cause large jumps of the output signal: Q (density-dependent) → min. 0.5 m/s; ρ → min. 0.1 kg/dm^3; T → min. 10 K Caution! For installations with piston pumps, the full scale value has to be adjusted to the actual peak-flow values and not to the mean flow.  **A** Zero scale value 0...20 mA **B** Zero scale value 4...20 mA **C** Full scale value 0/4...20 mA 5-digit number with floating decimal point e.g. 0.000 kg/h; 245.92 kg/m^3; 105.60 °C Factory settings: Zero scale value: ***0.0000 kg/h*** or ***0.0000 kg/l*** or ***–50.000 °C*** Full scale value: Mass flow → ***dependent*** on the nominal diameter Density → ***2.0000 kg/l*** Temperature → ***200.00 °C*** Display showing which process variable is assigned to the current output.

Note!

Caution!

CURRENT OUTPUTS	Function group CURRENT OUTPUT 1 – 2 – 3

DUAL RANGE MODE

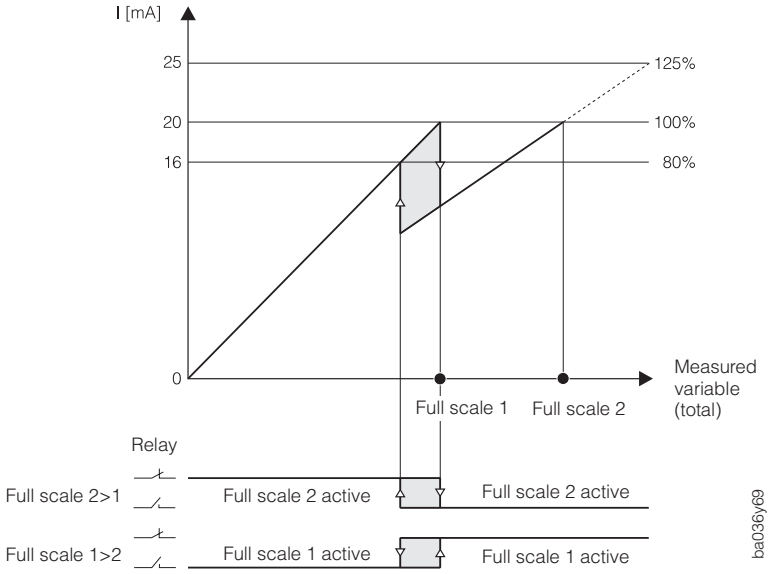
For specific applications the scaling of a second full scale value is useful or possibly required expecially with flow rate variables. In this function one of the two full scale values is selected with which the measuring system operates. The setting “AUTOMATIC” allows the measuring system to switch between two full scale values.

Applications:
- Frequent measurement of two different fluids with widely differing flow velocities. The operator defines a full scale value for each of these two fluids which can be activated in this function as required.
- Higher resolution of the measuring signal with very small flow velocities. The setting “AUTOMATIC” allows the Procom DZL 363 measuring system to switch automatically between two full scale values depending on the flow velocity.

Note!
The actual full scale value can be supplied by the relay if this is configured accordingly (see Figure below as well as pages 60 and 61).

Note!

Example *(0...20 mA; full scale 1 < full scale 2)*



FULL SCALE 1 DZL 363 operates with full scale value 1 only
FULL SCALE 2 DZL 363 operates with full scale value 2 only

AUTOMATIC DZL 363 operates with full scale value 1 or 2
Automatic switching between full scale values 1–2

AUXILIARY INPUT 1 * select full scale value by way of auxiliary input 1
AUXILIARX INPUT 2 * select full scale value by way of auxiliary input 2

* Selection only available if the respective auxiliary input has been set to “DUAL RANGE MODE 1, 2, 3” (see page 62)

CANCEL

Display showing which process variable is assigned to the current output.

CURRENT OUTPUTS	Function group CURRENT OUTPUT 1 – 2 – 3
FULL SCALE 2	For description of function → see "FULL SCALE 1" function (page 48) Notes! • This function is only available if "FULL SCALE 2" has been activated in the function "DUAL RANGE MODE" (see page 49). • Full scale 2 may be larger or smaller than full scale 1 resp. zero scale.
ACTIVE RANGE	Display of current full scale value (FULL SCALE 1 or FULL SCALE 2). Note! The actual full scale value can be supplied by the relay if this is configured accordingly (see pages 49, 60). Display showing which process variable is assigned to the current output.
TIME CONSTANT	Select the time constant to determine whether the current output signal reacts quickly (small time constant) or slowly (larger time constant) to rapidly changing variables (e.g. flowrate). The time constant does not affect the behaviour of the display. 3- to 5-digit number with fixed decimal point (0.01...100.00 s) Factory setting: ***1.00 s*** Display showing which process variable is assigned to the current output.
CURRENT SPAN	Setting of the 0/4 mA quiescent current. The current for the scaled full scale value (= 100%) is always 20 mA. Note! The 0–20 mA setting can only be selected if the HART protocol has not been activated (see page 85). 0–20 mA (25 mA) → maximum 25 mA 4–20 mA (25 mA) → maximum 25 mA 0–20 mA → maximum 20.5 mA (NAMUR) ***4–20 mA*** → maximum 20.5 mA (NAMUR) CANCEL Display showing which process variable is assigned to the current output.

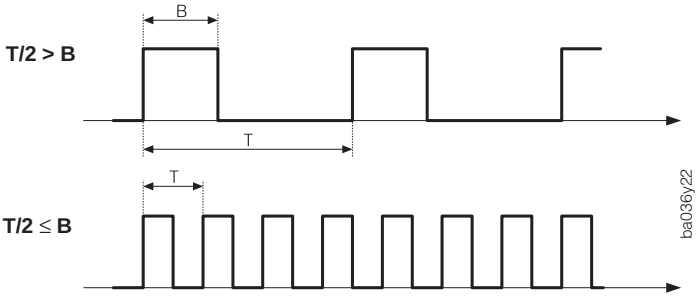
CURRENT OUTPUTS	Function group CURRENT OUTPUT 1 – 2 – 3
FAILSAFE MODE	In cases of an instrument error it is advisable for safety reasons that the current output assumes a previously defined status which can be set in this function. Note! The setting chosen only affects the corresponding current output. Other outputs or the display (e.g. totalizer) are not affected. ***MIN. CURRENT*** Current signal is set to 0 mA (0...20 mA) or 2 mA (4...20 mA) on error. MAX. CURRENT Current signal set to 25 mA for 0/4...20 mA (25 mA) or to 22 mA for 4...20 mA on error. HOLD VALUE Last valid measured value is held ACTUAL VALUE Normal measured value given despite error CANCEL Display showing which process variable is assigned to the current output.
SIMULATION CURR.	Simulation of the output current corresponding to 0%, 50% or 100% of the set current range. In addition, errors may be simulated. *Application example:* • Checking instruments connected • Checking the adjustment of the internal current signal Notes! • After activating the simulation mode, the message “S: CURRENT OUTPUT SIMUL. ACTIVE” appears on the display in the HOME position. • The selected simulation mode affects only the current output. The flowmeter remains fully operational for measurement during simulation, i.e. totalizer, flow display etc. are operating normally. • Positive zero return interrupts any simulation being carried out and sets the output current to 0 mA or 4 mA (see page 91). At 0–20 (25 mA): ***OFF*** – 0 mA – 10 mA – 20 mA – 25 mA – At 4–20 (25 mA): ***OFF*** – 2 mA – 4 mA – 12 mA – 20 mA – 25 mA – CANCEL *Current output acc. to NAMUR* At 0–20 mA: ***OFF*** – 0 mA – 10 mA – 20 mA – 22 mA – At 4–20 mA: ***OFF*** – 2 mA – 4 mA – 12 mA – 20 mA – 22 mA – CANCEL

Note!

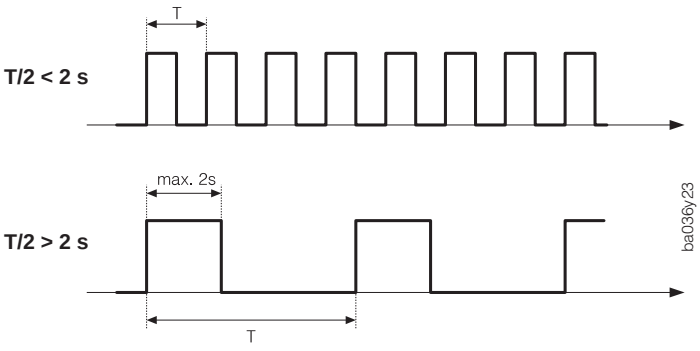
Note!

OUTPUTS	Function group PULS / FREQ. OUTP. 1 – 2 – 3
ASSIGN OUTPUT	In this function, a particular variable can be assigned to the pulse/frequency output. ***OFF * – MASS ***** – VOLUME – STD. VOLUME TARGET FLOW – CARRIER FLOW – DENSITY [1] – CALC. DENSITY [1] – TEMPERATURE [1] – CANCEL [1] only selectable with operation mode “FREQUENCY” Factory setting: * pulse/freq. output 2, 3; ** pulse/freq. output 1 Display showing whether the flowmeter measures in one or in both flow directions (see function “MEASURING MODE”, page 86).
OPERATION MODE	In this function, the output is configured as a pulse or frequency output. Various functions are available in this function group depending on the variable selected (pulse or frequency). ***PULSE*** [1] – FREQUENCY – CANCEL [1] not selectable if the output was assigned for “DENSITY, CALC. DENSITY or TEMPERATURE” Display showing which flow variable is assigned to the pulse/frequency output.
PULSE VALUE	Define the flow quantity per output pulse. By means of an external counter the sum of these pulses can be totalized and the total quantity determined since the start of measurement. Note! This function is only available if the setting “PULSE” is selected in the function “OPERATION MODE”. 5-digit number with floating decimal point, incl. units (e.g. 240.00 kg/p) Factory setting: ***dependent*** on the nominal diameter Display showing which flow variable is assigned to the pulse output.

Note!

OUTPUTS	Function group PULS / FREQ. OUTP. 1 – 2 – 3
PULSE WIDTH	Set the maximum pulse width for example for external counters with max. possible input frequency. The pulse width is limited to the set value. Note! This function is only available if the setting “PULSE” is selected in the function “OPERATION MODE” (see page 52). 3-digit number with fixed decimal point (0.05...2.00 s) Factory setting: ***0.25 s*** Display: T/2 < PULSE ==> PULSE/PAUSE = 1:1 If the frequency resulting from the selected pulse value and the current flow rate is too high (T/2 < selected pulse width B), the pulses emitted are automatically reduced to half the cycle. The pulse/pause ratio is then 1:1 (see Figure below).  B = Pulse width (the above Figure applies to positive pulses) *Example:* Pulse width B = 1 sec. • At T = 3 s → pulse width = 1 s; pause period = 2 s • At T = 1 s → pulse width = 0.5 s; pause period = 0.5 s

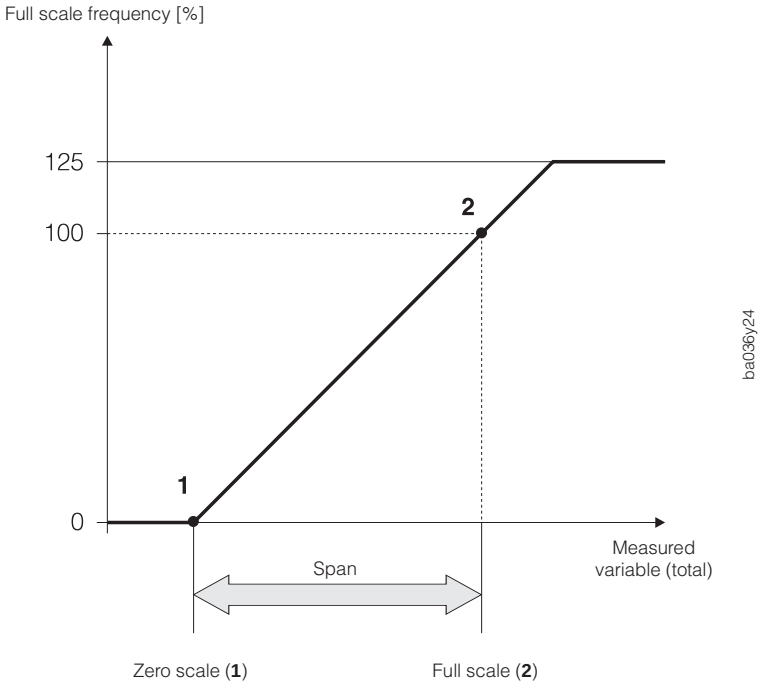
Note!

OUTPUTS	Function group PULS / FREQ. OUTP. 1 – 2 – 3
FULL SCALE FREQ.	Enter the full scale frequency (2...10,000 Hz) of the maximum measured variable. The value for this variable is defined in the function “FULL SCALE” (see page 55). Note! • This function is only available if the setting “FREQUENCY” is selected in the function “OPERATION MODE” (see page 52). • An extension up to 125% of the selected full scale frequency is possible. max. 5-digit number (2...10000 Hz) Factory setting: ***10000 Hz*** Display: T/2 < 2s ==> PULSE/PAUSE = 1:1 In the mode “FREQUENCY” the output signal is symmetrical (pulse/pause ratio = 1:1). At low frequencies the pulse duration is limited to max. 2 seconds (see Figure below), i.e. the pulse/pause ratio is no longer symmetrical.  The above Figure applies to positive pulses.

Note!

OUTPUTS	Function group PULS / FREQ. OUTP. 1 – 2 – 3
ZERO SCALE **FULL SCALE**	With these two functions, you may set the following values for the measuring variables assigned to the output: • 0 Hz → *zero scale value* of the measured variable • End frequency → *full scale value* of the measured variable The measuring range required is defined by the zero scale value and full scale value. Notes! • This function is only available, if "FREQUENCY" has been set in the function "OPERATION MODE" (see page 52). • The zero scale value cannot be larger than the full scale value. • The full scale value cannot be smaller than the zero scale value. • The span between the zero and full scale value should not drop below a minimum value (Q → min. 0.5 m/s; ρ → min. 0.1 kg/dm^3; T → min. 10K).

Note!



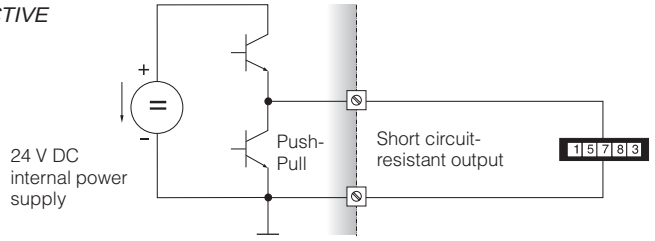
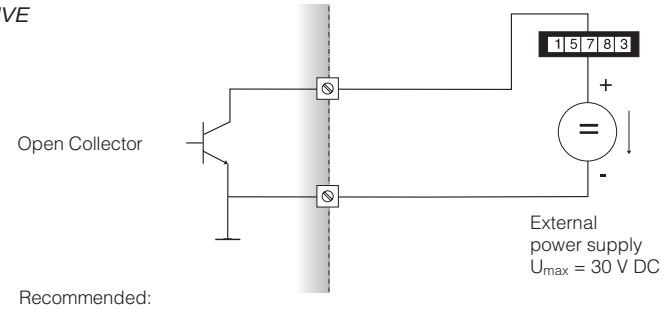
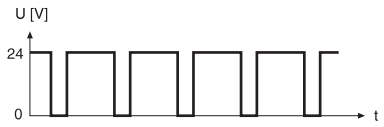
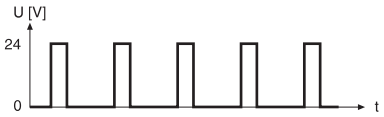
Zero scale

5-digit number with floating decimal point
(e.g. 0.0000 kg/h; 245.92 kg/m^3; 105.60 °C)
Factory setting: Mass flow: ***0.0000 kg/h***
Density: ***0.0000 kg/l***
Temperature: ***–50.000 °C***

Full scale

5-digit number with floating decimal point, according to measured variable (e.g. 566.00 kg/h; 0.9956 kg/m^3; 105.60 °C)
Factory setting: Mass flow: ***dependent*** on the nominal diameter
Density: ***2.0000 kg/l***
Temperature: ***200.00 °C***

Display showing which variable is assigned to the frequency output.

OUTPUTS	Function group PULS / FREQ. OUTP. 1 – 2 – 3
OUTPUT SIGNAL	In this function the pulse/frequency output can be configured as required, for example for an external counter. ACTIVE: Internal power supply used (+24 V) PASSIVE: External power supply required POSITIVE: Fall-back value at 0 V (active-high) NEGATIVE: Fall-back value at 24 V (active-low) or external power supply *ACTIVE*  ba036y25 Recommended: – for high output frequencies and – a continuous flow up to 25 mA (I_{max} = 250 mA for 20 ms) *PASSIVE*  ba036y26 Recommended: – for low output frequencies or – high continuous flows up to max. 250 mA Caution! The output with this wiring is not proof against short-circuits. *NEGATIVE pulses*  *POSITIVE pulses*  ba036y27 ***PASSIVE-POSITIVE*** PASSIVE-NEGATIVE ACTIVE-POSITIVE ACTIVE-NEGATIVE CANCEL Display: PASSIVE = OPEN-COLL or ACTIVE = PUSH-PULL (see above Figure for details)

Caution!

OUTPUTS	Function group PULS / FREQ. OUTPUT 1 – 2 – 3
FAILSAFE MODE	In cases of an instrument error it is advisable for safety reasons that the pulse/frequency output assumes a previously defined status which can be set in this function. Notes! • The setting chosen only affects the pulse/frequency output and the totalizer. • With unidirectional measuring mode and flow in negative direction (reverse) the measuring system is not able to give a failsafe response. • The failsafe response of the totalizers depend exclusively on the failsafe response defined here for *pulse/frequency output 1!* + / − ***FALL-BACK VALUE*** In event of fault, the signal is set to the fall-back value = 0 Hz. HOLD VALUE Last valid measured value is held. ACTUAL VALUE Normal measured value given despite failure/error. CANCEL + / − Display showing which flow variable is assigned to the pulse/frequency output.
SIMULATION FREQ.	With this function preset frequency signals can be simulated in order to check, for example, any instruments connected. The simulated signals are always symmetrical (pulse/pause ratio = 1:1). After activating the simulation mode, the display (HOME position) shows the message “S: FREQ. OUTPUT SIMUL. ACTIVE”. Notes! • The flowmeter remains fully operational for measurement during simulation, i.e. totalizer, flow display etc. continue to operate normally. • Positive zero return interrupts a simulation in progress and sets the output signal to the fall-back value. + / − ***OFF*** – 0 Hz – 2 Hz – 10 Hz – 1 kHz – 10 kHz – CANCEL

Note!

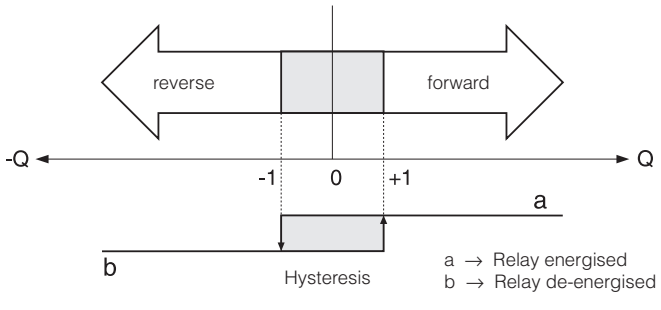
Note!


Caution!

OUTPUTS	Function group RELAYS
ASSIGN **RELAY 1** **RELAY 2** **RELAY 3**	Selection or assignment of relay function. Caution! • Take into account information on pages 60 and 61 on the relay switching response. • For safety reasons we recommend configuring relay output 1 to “FAILURE” and to define the failsafe mode of the outputs (see page 51 and 57). • For gases, empty-pipe detection (EPD) is not possible. Avoid in such cases the “EPD” or “FAILURE & EPD” settings. OFF — Relay switched off ON — Relay switched on, but without function assignments, e.g. for test purposes TEST — Relay switched ON–OFF in second intervals (test function) ***FAILURE **** — Error messages (see page 99) EMPTY PIPE DET. — Empty pipe detection → falling below a defined density response value, e.g. with empty measuring pipes (see page 87) FAILURE & EPD * — Error messages (system fault) or Empty pipe detection response DUAL RANGE MODE 1 DUAL RANGE MODE 2 DUAL RANGE MODE 3 — Registering active full scale value 1 or 2 of current outputs 1, 2 or 3 BATCH CONTACT — Message indicating batch quantity reached BATCH PRECONTACT — Message indicating pre-batch quantity reached TIMER CONTROL — Report that time measurement with totalizer is active (see page 65). FLOW DIRECTION — Flow direction message (forward/revers). On unidirectional measurement Relay 1 also switches in the negative flow direction. ***LIMIT MASS FLOW*** ** LIMIT VOL. FLOW LIMIT STD.VOL. FL LIMIT TARGET FL. LIMIT CARRIER FL. LIMIT DENSITY LIM. CALC. DENSITY LIMIT TEMPERAT. — Registrating if preset limit value is outside range. CANCEL * may only be selected by relay 1 (factory setting relay 1) ** factory setting relays 2 and 3 *With selection “EPD” or “FAILURE & EPD”* Display showing EPD THRESHOLD value (see page 87) *With selection “LIM. CALC. DENSITY”* Display of current set density function (see page 75)

OUTPUTS	Function group RELAYS
ON-VALUE **RELAY 1** **RELAY 2** **RELAY 3**	If you have configured a relay for “LIMIT.....” or “FLOW DIRECTION”, you can define the necessary switching points in these functions. If the respective measured value reaches these preset values, the relay will switch as shown in the Figures below.
OFF-VALUE **RELAY 1** **RELAY 2** **RELAY 3**	Note! The value for the switch-on point can be larger or smaller than for the switch-off point. **Relay → FLOW DIRECTION** The value entered in this function also defines the switch-on point for the positive and negative flow direction. If the switching point entered is for example = 1 kg/s, then the relay de-energises at –1 kg/s and energises again at +1 kg/s. If a direct switchover is required (no hysteresis), then set the switching point to the value “0”. If creep suppression is activated (see page 86), then it is recommended to set the hysteresis factor to a value either higher or equal to the creepage.

Note!



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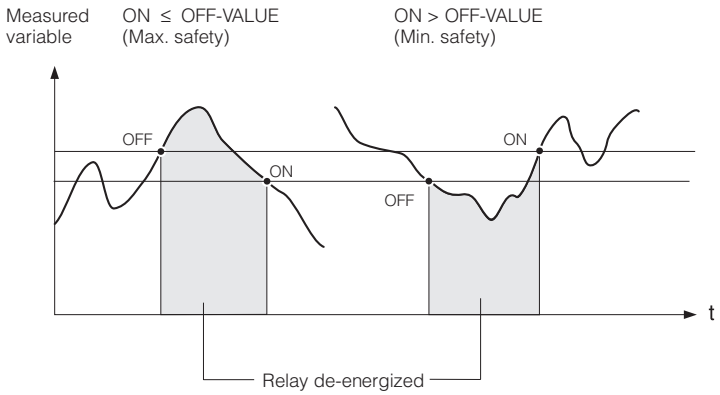
Relay → LIMIT (mass- and volume flow, density, temperature etc.)
The relay switches if the current variable exceeds or drops below the limits of a specific switching point.
Applications: monitoring flow, density, temperature and thus also the product quality; monitoring process conditions (process control).



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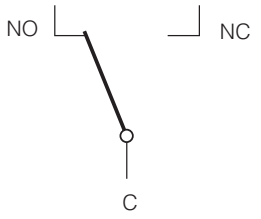
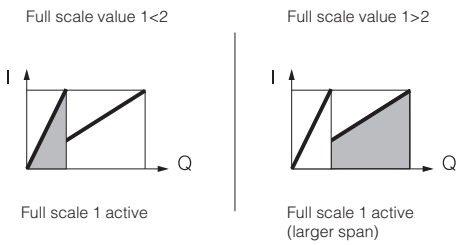
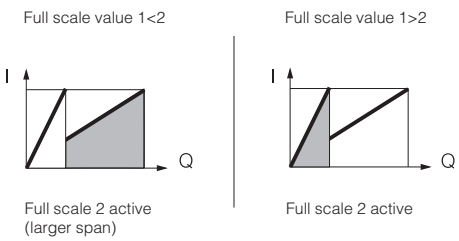
Density/flow variables: 5-digit number with floating or fixed decimal point, incl. units (e.g. 0.0037 t/min; 900.00 kg/m^3; etc.)
Temperature: max. 4-digit number with fixed decimal point, incl. units and arithmetical sign (e.g. –22.50 °C)
Density function: 5-digit number with floating decimal point (e.g. 76.409 °Brix, etc.)

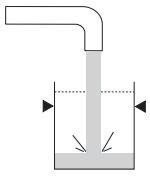
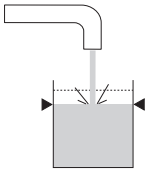
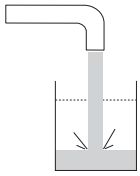
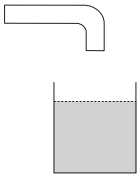
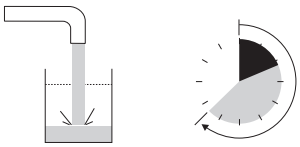
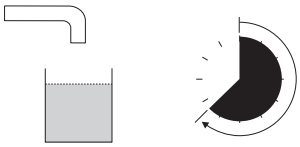
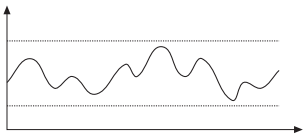
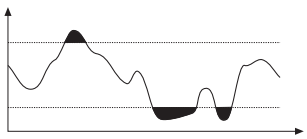
Display of the function assigned to the respective relay.

<table>
<tr><th>Assignment
Relay 1 – 2 – 3</th><th colspan="2">Relay contacts</th></tr>
<tr><td></td><th>Energized</th><th>De-energized</th></tr>
<tr><td></td><td colspan="2"> 

Terminal assignment NO = normally open contact , C = common contact, NC = normally closed contact

Racksyst cassette / Panel mounted housing:
Relay 1: NO = d22, C = b24, NC = z22
Relay 2: NO = d26, C = b28, NC = z26
Relay 3: NO = d30, C = b32, NC = z30

Field housing:
Relay 1: NO = 70, C = 71, NC = 72
Relay 2: NO = 73, C = 74, NC = 75
Relay 3: NO = 76, C = 77, NC = 78</td></tr>
<tr><td>FAILURE
(only with Relay 1)</td><td>System OK  </td><td>  Failure:
– System error
– Power failure
etc.</td></tr>
<tr><td>FAILURE & EPD
(only with Relay 1)</td><td>System OK 
and
Measuring tube(s) filled  </td><td>  Failure
(System error)
or
  Falling below density response level e.g. with empty measuring tube(s)</td></tr>
<tr><td>EPD
(Empty pipe detection)</td><td>Measuring tube(s) filled  </td><td>  Falling below density response level e.g. with empty measuring tube(s)</td></tr>
<tr><td>DUAL RANGE MODE 1
DUAL RANGE MODE 2
DUAL RANGE MODE 3</td><td> 
</td><td> 
</td></tr>
</table>

Assignment Relay 1 – 2 – 3	**Relay contacts**	
	Energized	**De-energized**
BATCH PRECONTACT	Batching cycle running and pre-batch quantity *not* reached 	 Batching cycle running and pre-batch quantity *reached*
BATCH CONTACT	Batching cycle running batch quantity *not* reached yet. 	 Batching quantity reached (batch cycle stopped)
TIMER CONTROL (totalizers)	Measuring period active 	Measuring period stopped or not active 
FLOW DIRECTION	forward 	reverse 
LIMIT MASS FLOW **LIMIT VOL. FLOW** **LIMIT STD. VOL. FL.** **LIMIT TARGET FL.** **LIMIT CARRIER FL.** **LIMIT DENSITY** **LIM. CALC. DENSITY** **LIMIT TEMPERAT.**	Limit values *not* outside range limits 	Limit values outside range limits 

ba036y28

INPUTS	Function group AUXILIARY INPUTS
ASSIGN AUX. **INPUT 1** **INPUT 2**	Selection and assignment of function for auxiliary inputs. The functions of the auxiliary inputs are activated by applying an external voltage (see page 63). ***OFF*** – RESET ALL TOTALS – RESET TOTAL. 1 – RESET TOTAL. 2 – RESET TOTAL. 3 – RESET TOTAL. 4 – RESET TOTAL. 1&2 – RESET TOTAL. 3&4 – STAR/STOP TIMER – SET BATCHING – BATCHING – SELECT ZEROPOINT – ZEROPOINT ADJUST – DUAL RANGE MODE 1 [1] – DUAL RANGE MODE 2 [1] – DUAL RANGE MODE 3 [1] – POS. ZERO RETURN – CANCEL [1] only available if the corresponding current output is available and the function “DUAL RANGE MODE” is set to “AUXILIARY INPUT”. As long as the auxiliary input is set to “DUAL RANGE MODE”, neither the current output can be switched off nor its dual range mode changed.
START PLS. WIDTH 1, 2	Certain functions of the auxiliary input are only started via a pulsed voltage. In this function, you enter the minimum pulse width to be reached by the input pulse in order that the appropriate function is activated. max. 3-digit number, incl. units (20...100 ms) Factory setting: ***20 ms***

Assignments of the auxiliary inputs 1 / 2

Pulsed mode

Assignment	Pulse at auxiliary input	Activated Function
RESET ALL TOT. RESET TOTAL 1 RESET TOTAL 2 RESET TOTAL 3 RESET TOTAL 4 RESET TOTAL 1 & 2 RESET TOTAL 3 & 4	• Pulse between 3...30 V DC, at least for the duration of the start pulse width which has been set.	→ Totalizer reset
START/STOP TIMER (for totalizers)	• Pulse between 3...30 V DC, at least for the duration of the start pulse width which has been set. • Repeating a pulse of 3...30 V DC	→ Measuring period for totalizer starts → Measuring period interrupted
BATCHING	• Pulse between 3...30 V DC, at least for the duration of the start pulse width which has been set. • Repeating a pulse of 3...30 V DC	→ Dosing or filling operation is started → Dosing or filling operation interrupted
ZEROPOINT ADJUST	• Pulse between 3...30 V DC, at least for the duration of the start pulse width which has been set.	→ Zero point calibration is started

Level mode

Assignment	Voltage at auxiliary input	Activated Function
DUAL RANGE MODE 1 * DUAL RANGE MODE 2 * DUAL RANGE MODE 3 * * for current outputs 1, 2 or 3	• No voltage • Voltage between 3...30 V DC	→ Current output operates with FULL SCALE 1 → Current output operates with FULL SCALE 2
POS. ZERO RETURN	• No voltage • Voltage between 3...30 V DC	→ Instrument operates normally → All output signals are set to “zero” (corresponds to no flow)
SELECT ZEROPOINT	• No voltage • Voltage between 3...30 V DC	→ Instrument operates with ZEROPOINT 1 → Instrument operates with ZEROPOINT 2
SET BATCHING	• No voltage • Voltage between 3...30 V DC	→ Measuring system works with set batch quantity (see page 68) → Measuring system works with batch quantity 1

METERING FUNCT.	Function group TOTALIZERS
ASSIGN **TOTAL. 1** **TOTAL. 2** **TOTAL. 3** **TOTAL. 4**	With the help of these functions, you can assign a desired measuring variable to the various totalizers. Note! • The totalizers are reset to zero if the assignment in this function is changed. • Note that the totalizers also allows determination of the totalized value over a defined period of time (see function group “TIMER CONTROL”, page 65). ***OFF ***** – ***MASS **** – MASS (+) – MASS (-) – VOLUME – STD. VOLUME – VOLUME (+) – VOLUME (-) – STD. VOLUME (+) – STD. VOLUME (-) – TARGET MATERIAL – TARGET MAT. (+) – TARGET MAT. (-) – CARRIER FLUID – CARRIER FLUID (+) – CARRIER FLUID (-) – CANCEL (+/-): The totalizer only registers flow in the positive (+) or negative (-) direction. Factory setting: * Totalizer 1, ** Totalizer 2–4 Display showing whether the flowmeter measures in one or in both flow directions (see function “MEASURING MODE”, page 86).
RESET TOTALIZER	Reset totalizer to “Zero”. Note! • The overflow value as well as the value shown in the function “TOTALIZER ...” are reset to zero. • The totalizer can also be reset through the auxiliary inputs (see page 62). ***CANCEL*** – RESET ALL TOTALS – TOTALIZER 1 – TOTALIZER 2 – TOTALIZER 3 – TOTALIZER 4 – TOTAL. 1 & 2 – TOTAL. 3 & 4

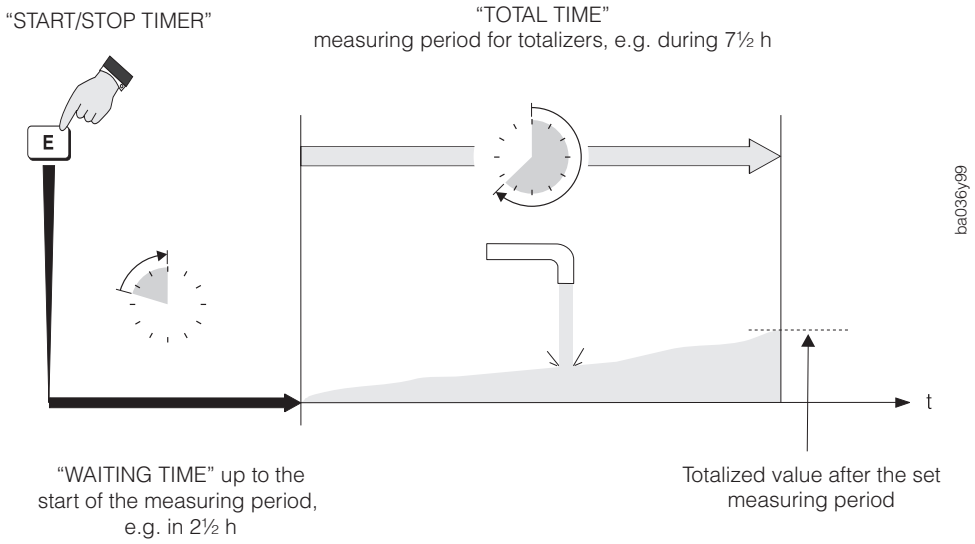
Note!

Note!

METERING FUNCT.	Function group TIMER CONTROL

Introduction

In some applications it is necessary to record the totalized value of the fluid over a defined period of time (= "Total time"). The functions below allow you to set the corresponding time parameters for the various totalizers.



ASSIGN TIMER	The set values selected in the following functions, e.g. "TOTAL TIME" or "WAITING TIME", may be assigned to the various totalizers. In this manner the total of up to four flow variables may be recorded. *Example:* Function ASSIGN TOTAL. 1 → MASS (+) Function ASSIGN TOTAL. 2 → VOLUME (+) Selection "TOTALIZERS 1&2" → mass as well as volume flow are recorded by way of time measurements. ***OFF*** – TOTALIZER 1 – TOTALIZER 2 – TOTAL. 1&2 TOTALIZER 3 – TOTALIZER 4 – TOTAL. 3&4 – TOTALIZERS – CANCEL
TOTAL TIME	Set the measuring period for the time over which the total of the measured fluid is to be recorded (see Figure above). Hours – minutes – seconds Factory setting: ***00 : 00 : 00***
WAITING TIME	Set a "waiting" period. This allows you to define the starting point of the actual measuring period ("total time", see Figure above). Hours – minutes – seconds Factory setting: ***00 : 00 : 00***

METERING FUNCT.	Function group TIMER CONTROL
START/STOP TIMER	Start and stop of the time measurement for totalizers. Note! Time measurements can also be started over the auxiliary inputs (see page 62). START – CONTINUOUS [1] – STOP – ***CANCEL*** [1] After the measuring period, a new measuring cycle consisting of "waiting time" and "total time" immediately starts. After the "waiting time" has passed, the assigned totalizers are reset to zero.
TIME ELAPSED	Display of "total time" already passed (e.g. 05 : 30 : 45). Note! • This function is only available if at least one totalizer was activated in the "ASSIGN TIMER" function (see page 65). • As long as the set "waiting" time is running, the time until the start of the measuring period ("total time") is shown as a negative value. Display of set measuring period ("total time")
TIME REMAINING	Display of remaining measuring period ("total time") (e.g. 01 : 22 : 43). Note! This function is only available if at least one totalizer was activated in the "ASSIGN TIMER" function (see page 65). Display of set measuring period ("total time")

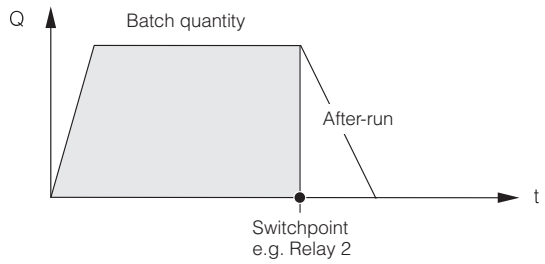
METERING FUNCT.

Function group SET BATCHING / BATCHING

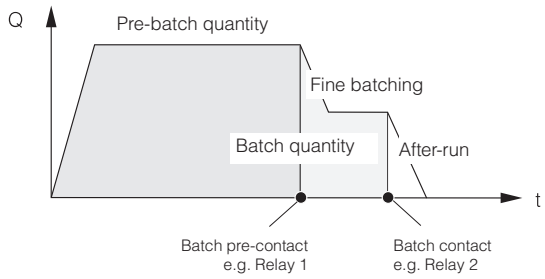
Introduction

The Procom DZL 363 batching functions allow control of simple batching operations with the help of a preset device (external counter). To do so, the transmitter has several relays which may be used to control one- or two-stage batching operations:

Single-stage batching cycle



Two-stage batching cycle (with batch pre-contact)



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Entering a compensation quantity can adjust for plant-specific, ***constant*** errors in quantity e.g. after-runs of pumps, closing time of valves, etc. (see page 69). In addition, it is possible to detect, calculate and compensate for ***variable*** errors in volume (see page 69). This ensures high accuracy even with very small batch quantities.

Note!
- For short-cycle batching (filling time <10 s) → see function “SELF CHECKING”, page 86.
- Batching cycles of less than 5 seconds duration are not recommended as accuracy may diminish if the connection cable between transmitter / sensor is influenced by interference.
- In the following, the terms “batching” and “filling” are used as synonyms.

Note!

Starting / Stopping a Batching Cycle

The batching cycle can be started and stopped in different ways:
- via the HART interface or Rackbus 485
- via the auxiliary input 1 or 2
- via the “BATCHING” function
- via a function key set to “BATCHING”

All batching functions can be changed without entering a code number.

METERING FUNCT.	Function group SET BATCHING
BATCH VARIABLE	Select and activate batching variable. +/- ***OFF*** – MASS – VOLUME – STD. VOLUME – TARGET MATERIAL – CARRIER FLUID – CANCEL
SELECT BATCH QTY	Select differently pre-defined "batch quantities" and the corresponding "data sets" such as "BATCH PRESET", "BATCH PREWARN", etc. This allows you to individually program the measuring point for four different batching operations, e.g. for different fluid or changing process conditions. **Procedure / definition of fill quantities:** 1. Select a batch quantity (1, 2, 3 or 4). 2. Enter the required numerical values in the following functions: BATCH PRESET, BATCH PREWARN, BATCH COMP. MODE, etc. 3. The "data set" for the respective batch quantity is thus defined and may be retrieved on demand any time and without further programming. Note! As an option, the batch quantity can also be selected over the auxiliary inputs (see page 62). +/- BATCH QUANTITY 1 – BATCH QUANTITY 2 – BATCH QUANTITY 3 – BATCH QUANTITY 4 – CANCEL
BATCH PRESET	Enter the batch quantity at which the corresponding relay should switch (batch contact: see page 61, 67). +/- 4-digit number with floating decimal point e.g. 5.010 kg; 0.120 m^3; 0.110 Nm^3 Factory setting: ***1.000 kg***
BATCH PREWARN	Enter the preset quantity. With ***two-stage batching cycles*** the relay switches as soon as the filled quantity reaches this value (see page 61, 67). +/- 4-digit number with floating decimal point e.g. 2.000 kg; 1.234 m^3; 1.234 Nm^3 Factory setting: ***0.000*** [unit]

Note!

METERING FUNCT.	Function group SET BATCHING
BATCH COMP. MODE	This function can detect, calculate and compensate for ***variable*** errors in volume. This ensures high accuracy even with very small batch quantities. The Procom DZL 363 again determines the after-runs, for example, after every filling cycle. The number of after-runs is determined by selecting "LOW, MEDIUM, HIGH" from which the smoothed average can be calculated for compensating the after-runs. This specifies how quickly the measuring system is to react to changing after-run volumes: • LOW → The measuring system reacts slowly. After-run compensation is operating with a large number of after-runs. • HIGH → The measuring system reacts quickly. After-run compensation is operating with a small number of after-runs. Note! If the functions "BATCH VARIABLE" or "BATCH PRESET" are changed, then the transmitter detects and recalculates the appropriate after-run errors in volume. [+/-] ***OFF*** – LOW – MEDIUM – HIGH [E +/-] Display of the error quantity calculated by the transmitter.
COMPENS. QUANTITY	Set a positive or negative compensation quantity. This quantity compensates for a ***constant*** error in the batching quantity due to plant operation. This can be caused, e.g. due to after running of a pump or the closing time of a valve. The compensation quantity is determined by the operator of the plant. The compensation quantity only affects the batching quantity. • Overfilling → a negative correction factor is to be set • Underfilling → a positive correction factor is to be set Note! If no sufficiently large negative correction factor can be set then the initial preset quantity ("batch prewarn") may have to be lowered. [+/-] 4-digit number with floating decimal point and arithmetical sign e.g. –0.102 kg; 0.002 m^3 Factory setting: ***0.000*** [unit] *Example:* Batching quantity = 100 kg; pre-batch quantity = 90 kg → maximum positive correction factor = +100 kg → maximum negative correction factor = –10 kg
MAX. BATCH TIME	Set the maximum filling period according to which the corresponding relay (batch contact) is to switch (de-energized), e.g. for safety reasons in case of plant failure. [+/-] max. 5-digit number (0...30000 s) Factory settting: ***0 s (= switched off)*** [E +/-] Display of the current batching variable

Note!

Note!

METERING FUNCT.	Function group SET BATCHING
DISPLAY BATCH	Set the display mode for batching operations (up or down). CANCEL BATCH UPWARDS — Display starts at “0” (→ until dosing quantity is reached) BATCH DOWNWARDS — Display starts with the dosing quantity to be filled (→ until dosing quantity is reached)
	Function group BATCHING
SELECT BATCH QTY	Select a predefined “filling quantity” and the corresponding “data sets” such as “BATCH PRESET”, “BATCH PREWARN”, etc. to be used for a specific batching operation. Notes! • This function is identical to that of the function group “SET BATCHING” (see page 68), where you will find a more in-depth description of this function. • As an option, the batch quantity may also be selected over the auxiliary inputs (see page 62). BATCH QUANTITY 1 – BATCH QUANTITY 2 – BATCH QUANTITY 3 – BATCH QUANTITY 4 – CANCEL
BATCHING	This function is used to manually start a batching cycle or to stop a batching cycle already running. Start and stop only affect the corresponding relays. START – STOP – ***CANCEL*** (E activates START or STOP) Display of the current batching variable
BATCH CYCLE	Display of the number of batching cycles executed. max. 7-digit number (0...9999999) Factory setting: ***0*** Display of the current batching variable
RESET BATCH CYC.	Reset batching counter (“batch cycle”) to “zero”. ***CANCEL*** – YES Display of the number of batching cycles executed.

Note!

CALCULAT. FUNCT.

Function group VOLUME FUNCTION / DENSITY FUNCTION

Introduction

Procom DZL 363 determines three variables simultaneously: mass flow – density – temperature.

This allows calculations of additional parameters such as the ***volume flow***.
However, there are a number of other interpretation possibilities, particularly for special ***density calculations***:
- calculating temperature-compensated density values (standard density).
- calculating percentage contents of target and carrier medium in two-phase media.
- converting fluid density into special density units, such as °Brix, °Baumé, °API, etc.

Density functions with Procom DZL 363

STANDARD DENSITY / STANDARD VOLUME
Many density calculations are mathematically derived from the standard density or standard volume. Standard density and -volume are calculated as follows:

Standard density $\rho_N = \rho \cdot (1 + \alpha\,\Delta t)$; where $\Delta t = t - t_N$ Standard volume $V_N = \frac{\dot{m}}{\rho_N}$

ρ_N = standard density, V_N = standard volume
m = actual measured mass flow
ρ = actual measured fluid density
t = actual measured fluid temperature
t_N = standard temperature for calculating standard density (e.g. 15 °C)
α = volumetric expansion coefficient of the fluid. Unit = [1/K]; K = Kelvin

°API (= American Petroleum Institute)
Density units specifically used in North America for liquefied mineral oil products.

°BAUME
This density unit or scale is mainly used for acidic solutions, e.g. ferric chloride solutions.
Two Baumé scales are used in practice:
- BAUME > 1 kg/l: for solutions heavier than water
- BAUME < 1 kg/l: for solutions lighter than water

°BRIX
Density unit used in the food industry which gives the saccharose content of aqueous solutions, e.g. measurement of sugar containing solutions such as fruit juice, etc.
The ICUMSA table for degrees Brix given on page 114 is the basis for the corresponding calculations.

%-MASS and %-VOLUME
By using the functions for two-phase flow, it is possible to calculate the percentage mass or volume contents of the carrier fluid or the target flow. The basic formulae (without temperature compensation) are:

$$\text{mass}\,[\%] = \frac{D2 \cdot (\rho - D1)}{\rho \cdot (D2 - D1)} \cdot 100\% \qquad \text{volume}\,[\%] = \frac{(\rho - D1)}{(D2 - D1)} \cdot 100\%$$

D1 = density of carrier fluid → transporting liquid, e.g. water
D2 = density of target medium → material transported, e.g. lime powder or a second liquid to be measured
ρ = total density measured

%-BLACK LIQUOR
The units of concentration used in the paper industry for black liquor in % mass.
The formula used for the calculation is the same as for %-MASS.

%-ALCOHOL
Density measurement for units of concentration for alcohol-containing solutions in % volume.
The formula used for the calculation is the same as for %-VOLUME.

Note!
These calculations assume a linear response of two-phase flow, which is not always the case in praxis.


Note!

(continued on next page)

CALCULAT. FUNCT.

Function group VOLUME FUNCTION / DENSITY FUNCTION

Procedure for programming volume- and density functions

❶ Firstly, select the desired volume or density function.
❷ Afterwards, enter the parameters necessary for the calculation.

Functions	Calibrating		
DENSITY	Direct measurement with Procom DZL 363		
STANDARD DENSITY	❶ CALC. DENSITY ❷ REFERENCE TEMP. EXP. COEF.	→ page 75 → page 73 → page 73	Select density function Enter standard temperature Enter coefficient
VOLUME	❶ VOLUME FLOW MEAS	→ page 73	Select function accordingly
STANDARD VOLUME	❶ VOLUME FLOW MEAS ❷ STD. VOL. CALC. a) Fixed standard density: FIXED STD. DENSITY b) Calculated standard density: REFERENCE TEMP. EXP. COEF.	→ page 73 → page 73 → page 74 → page 73 → page 73	Select function accordingly Determine the type of calculation: a) with fixed standard density b) with calculated standard density Enter fixed density value Enter standard temperature Enter coefficient
°API	❶ CALC. DENSITY ❷ REFERENCE TEMP. EXP. COEF.	→ page 75 → page 75 → page 75	Select density function Enter standard temperature Enter coefficient
°BAUME	❶ CALC. DENSITY ❷ REFERENCE TEMP. EXP. COEF.	→ page 75 → page 75 → page 75	Select density function Enter standard temperature Enter coefficient
°BRIX	❶ CALC. DENSITY ❷ EXP. COEF.	→ page 75 → page 75	Select density function Enter coefficient Calculation using the ICUMSA-table (see page 114)
%-MASS %-BLACK LIQUOR (temperature-compensated)	❶ CALC. DENSITY ❷ REFERENCE TEMP. TARGET MAT. DENS. EXP. COEF. TARGET CARRIER DENSITY EXP. COEF. CARRIER	→ page 75 → page 75 → page 76 → page 76 → page 76 → page 76	Select density function Enter standard temperature Enter target material density Enter coefficient Enter carrier material density Enter coefficient

Field density adjustment (calibration)

Procom DZL 363 offers the option of “field calibration” carried out in the “DENSITY ADJUST” function to gain optimum accuracy for calculating density functions → see page 77.
The assumption is, however, that the user knows the exact fluid density (= density adjust value).


Caution!

Caution!
A field density adjustment alters the factory-set density calibration values.

CALCULAT. FUNCT.	Function group VOLUME FUNCTION
VOLUME FLOW MEAS	Volume and standard volume measurement are only available in other functions if the appropriate setting is activated here. ***OFF*** – VOLUME FLOW – STD. VOLUME FLOW – VOLUME & STD. VOL. – CANCEL
STD. VOL. CALC.	This function is used to set the standard density for calculating the standard volume flow. Note! This function is only available if the setting "STD. VOLUME FLOW" or "VOLUME & STD. VOL." has been selected in the above function. ***CALC. STD.DENS.*** The standard density is determined from the process data measured. FIXED STD.DENS. The standard density is entered as a fixed (known) value → see page 74 CANCEL Display of the actual calculated standard volume flow.
REFERENCE TEMP.	Input of the reference temperature for calculating the standard volume resp. standard volume flow. Caution! This function is identical to that in the "DENSITY FUNCTION" group (see page 75). If you change the reference temperature, this will *automatically* affect both functions. 5-digit number with fixed decimal point, incl. units and arithmetical sign e.g. 25.000 °C; –10.500 °C; 60.000 °F Factory setting: ***15.000 °C*** Display of actual engineering units used for the fluid temperature (see function "TEMPERATURE UNIT", page 82)
EXP. COEF.	For calculating the standard volume a fluid specific expansion coefficient is required and can be entered in this function. Note! This function is only displayed if you configure the "STD. VOL. CALC." function to "CALC. STD. DENS.". Caution! This function is identical to that in the "DENSITY FUNCTION" group (see page 75). If you change the expansion coefficient, this will *automatically* affect both functions. 5-digit number with floating decimal point, incl. units and arithmetical sign (e.g. 0.4400 e-3 1/K = $0.44 \cdot 10^{-3}$ 1/K = 0.00044 1/K) Factory setting: ***0.5000 e-3 1/K***

Note!

Caution!

Note!

Caution!

CALCULAT. FUNCT.	Function group VOLUME FUNCTION
FIXED STD. DENS.	In this function, a fixed value for the standard density can be entered, with which the standard volume flow rate or the standard volume is calculated. Note! This function is displayed only if the setting “FIXED STD. DENS.” is set in the function “STD. VOL. CALC.” (see page 73). 5-digit number with fixed decimal point, incl. units e.g. 1.0000 kg/sl; 1000.0 kg/Nm^3 Factory setting: ***1000.0 kg/Nm^3*** Display showing the unit used for the standard density (see function “STD. DENSITY UNIT”, page 82)

Note!

CALCULAT. FUNCT.	Function group DENSITY FUNCTION
CALC. DENSITY	Select the desired density function. ***OFF*** %-MASS [%m] %-VOLUME [%v] STD. DENSITY [.....] °BRIX [°Brix] °BAUME>1kg/dm^3 [°Baumé] °BAUME<1kg/dm^3 [°Baumé] °API [°API] %-BLACK LIQUOR [%Bl.Liq] %-ALCOHOL [%alc] CANCEL For details: see page 71 [ ] → displayed measuring unit Display of actual value to be calculated using the above selected density function and the acquired variables.
REFERENCE TEMP.	Input of the reference temperature for calculating the density functions °BAUME>1.0 SG, °BAUME<1.0 SG, °API, %-MASS, %-VOLUME, %-BLACK LIQUOR, %-ALCOHOL and STD. DENSITY. Caution! This function is identical to that in the "VOLUME FUNCTION" group (see page 73). If you change the reference temperature, this will *automatically* affect both functions. 5-digit number with fixed decimal point, incl. units and arithmetical sign e.g. 25.000 °C; –10.500 °C; 60.000 °F; etc. Factory setting: ***15.000 °C*** Display of actual engineering units used for the fluid temperature (see function "TEMPERATURE UNIT", page 82)
EXP. COEF.	For temperature-compensated calculations of the standard density a fluid specific expansion coefficient is required and can be entered in this function. Note! This function is only displayed if you configure other functions, accordingly: • CALC. DENSITY → "°API", "°BAUME", "°BRIX" or "STD. DENSITY" • STD. VOL. CALC. → "CALC. STD. DENS." Caution! This function is identical to that in the "VOLUME FUNCTION" group (see page 73). If you change the expansion coefficient, this will *automatically* affect both functions. 5-digit number with floating decimal point, incl. units and arithmetical sign (e.g. 0.4400 e-3 1/K = $0.44 \cdot 10^{-3}$ 1/K = 0.00044 1/K) Factory setting: ***0.5000 e-3 1/K***

Caution!

Note!

Caution!

CALCULAT. FUNCT.	Function group DENSITY FUNCTION
CARRIER DENSITY	Setting of the density for the carrier fluid. This density value is required for calculating the target medium contents in a two-phase flow. Calculation formula → see page 71. *Carrier fluid* = transporting liquid (e.g. water) *Target medium* = material transported (e.g. lime powder) 5-digit number with fixed decimal point, incl. units e.g. 1.0000 kg/dm^3; 1.0016 SG Factory setting: ***1.0000 kg/l*** Display showing the actual density units (see function "DENSITY UNIT", page 82)
EXP. COEF. CARRIER	Setting of the expansion coefficient of the carrier fluid. This value is required for the temperature-compensated calculation of the target medium contents in a two-phase flow. *Carrier fluid* = transporting liquid (e.g. water) *Target medium* = material transported (e.g. lime powder) 5-digit number with floating decimal point, incl. arithmetical sign and units (e.g. 0.5000 e-3 1/K = $0.5 \cdot 10^{-3}$ 1/K = 0.0005 1/K) Factory setting: ***0.0000 e-3 1/K***
TARGET MAT. DENS.	Setting of the density for the target medium. This density value is required for calculating the target medium contents in a two-phase flow. Calculation formula → see page 71. *Carrier fluid* = transporting liquid (e.g. water) *Target medium* = material transported (e.g. lime powder) 5-digit number with fixed decimal point, incl. units e.g.1.0000 kg/dm^3; 1.0016 SG Factory setting: ***2.0000 kg/l*** Display showing the actual density units (see function "DENSITY UNIT", page 82)
EXP. COEF. TARGET	Setting of the expansion coefficient of the target medium. This value is required for the temperature-compensated calculation of the target medium contents in a two-phase flow. *Carrier fluid* = transporting liquid (e.g. water) *Target medium* = material transported (e.g. lime powder) 5-digit number with floating decimal point, incl. arithmetical sign and units (e.g. 0.5000 e-3 1/K = $0.5 \cdot 10^{-3}$ 1/K = 0.0005 1/K) Factory setting: ***0.0000 e-3 1/K***

CALCULAT. FUNCT.	Function group DENSITY FUNCTION
DENS. ADJ. VALUE	Setting of the "target density" (= density adjust value) of the particular fluid for which you want to carry out a field density adjustment. The density adjust value corresponds to the fluid density determined e.g. by laboratory tests. Implementation and procedure of this field adjustment is described in detail in the following function "DENSITY ADJUST". Note! • With two-point density adjustment, a target density value is to be given in this function for each of the two media. The two target density values must differ from each other by at least 0.2 kg/dm^3. • The density adjust value entered here may deviate from the currently measured fluid density by max. ±10%. 5-digit number with floating decimal point, incl. units corresponding to 0.1...5.9999 kg/l Factory setting: ***0.0000 kg/l*** MANUAL DENSITY CALIBRATION
DENSITY ADJUST	With this function a density adjustment can be carried out on site. The density adjustment values will thus be recalculated and stored. This ensures that the values dependent on density calculations are as accurate as possible. Two types of adjustment are to be distinguished: **1-point density adjustment** (with *one* medium) This type of density adjustment is necessary under the following conditions: • The sensor does not measure the density accurately which the operator expects from laboratory trials. • The fluid properties are outside the measuring points set at the factory or reference conditions under which the flowmeter has been calibrated. • The plant is used solely for measuring a medium whose density is to be determined very accurately under constant conditions. *Examples:* Brix density measurement for apple juice. **2-point density adjustment** (with *two* media) This type of adjustment should only be carried out if the measuring tubes have been mechanically altered by, e.g. • material build-up • abrasion • corrosion In such cases, the resonant frequency of the measuring tubes has been affected by these factors and is no longer compatible with the calibration data set at the factory. The 2-point density adjustment allows for these mechanical changes and recalculates new revised calibration data. Caution! Corrosion and abrasion affect the operational safety of the measuring system! ***CANCEL*** – SAMPLE FLUID 1 – SAMPLE FLUID 2 – DENSITY ADJUST Display of actual density adjust value (continued on next page)

Note!

Caution!

CALCULAT. FUNCT.	Function group DENSITY FUNCTION
DENSITY ADJUST	**Carrying out density adjustment** (see page 79, Fig. 18)

Caution!

Caution!
- Density adjustment on site always demands that the operator accurately knows the density of the fluid, for example from laboratory tests.
- The density adjust value entered here may deviate from the currently measured fluid density by max. ±10%.
- Errors when entering the target density affect *all* calculated density and volume functions.
- Density adjustment changes the density calibration values entered at the factory or by the service engineer.

1-point density adjustment

1. Fill the sensor with fluid. Ensure that the measuring tubes are completely filled and that the fluid is free of gas bubbles.
2. Wait until the temperature between the fluid and the measuring tube is constant (time taken → depends on the temperature and the fluid).
3. Enter the target value of your fluid in the function “DENS. ADJ. VALUE” (see page 77) with ± and store this value with E.
4. Select the setting “SAMPLE FLUID **1**” in the function “DENSITY ADJUST” with ± and press E. The message “SAMPLE FLUID 1 RUNNING” is shown on the display for approx. 10 seconds. During this time, Procom DZL 363 measures a new density specific resonance frequency for the measuring tubes and the fluid.

Note!

Note!
Repeat the procedure if an error message is displayed.
Check the plant and process conditions if necessary.

5. Select the setting “DENSITY ADJUST” with ± and press E.
A prompt is displayed. Select “SURE [YES]” with ± and confirm with E.
The density adjustment values are now calculated and then stored in the Procom transmitter.

2-point density adjustment

Note!

Note!
This type of density adjustment is only possible if both target density values are different from each other by at least 0.2 kg/l, otherwise the message “DENSITY ADJUST FAILURE” is shown on the display during adjustment.

1. Fill the sensor with the fluid. Ensure that the measuring tubes are completely filled and that the fluid is free of gas bubbles.
2. Wait until the temperature between the fluid and the measuring pipe is constant (time taken → depends on the temperature and the fluid).
3. Enter the target value of your fluid in the function “DENS. ADJ. VALUE” (see page 77) with ± and store this value pressing E.
4. Select the setting “SAMPLE FLUID **1**” in the function “DENSITY ADJUST” with ± and press E. The message “SAMPLE FLUID 1 RUNNING” is shown on the display for approx. 10 seconds. During this time, Procom DZL 363 measures a new density specific resonance frequency for the measuring tubes.

Note!

Note!
Repeat the procedure if an error message is displayed.
Check the plant and process conditions if necessary.

5. Repeat step 1 to 4 for a second fluid. Select the setting “SAMPLE FLUID **2**” for your second fluid.
6. Select the setting “DENSITY ADJUST” with ± and press E.
A prompt is displayed. Select “SURE [YES]” with ± and confirm with E.
The density adjustment values are now calculated and then stored in the Procom transmitter.

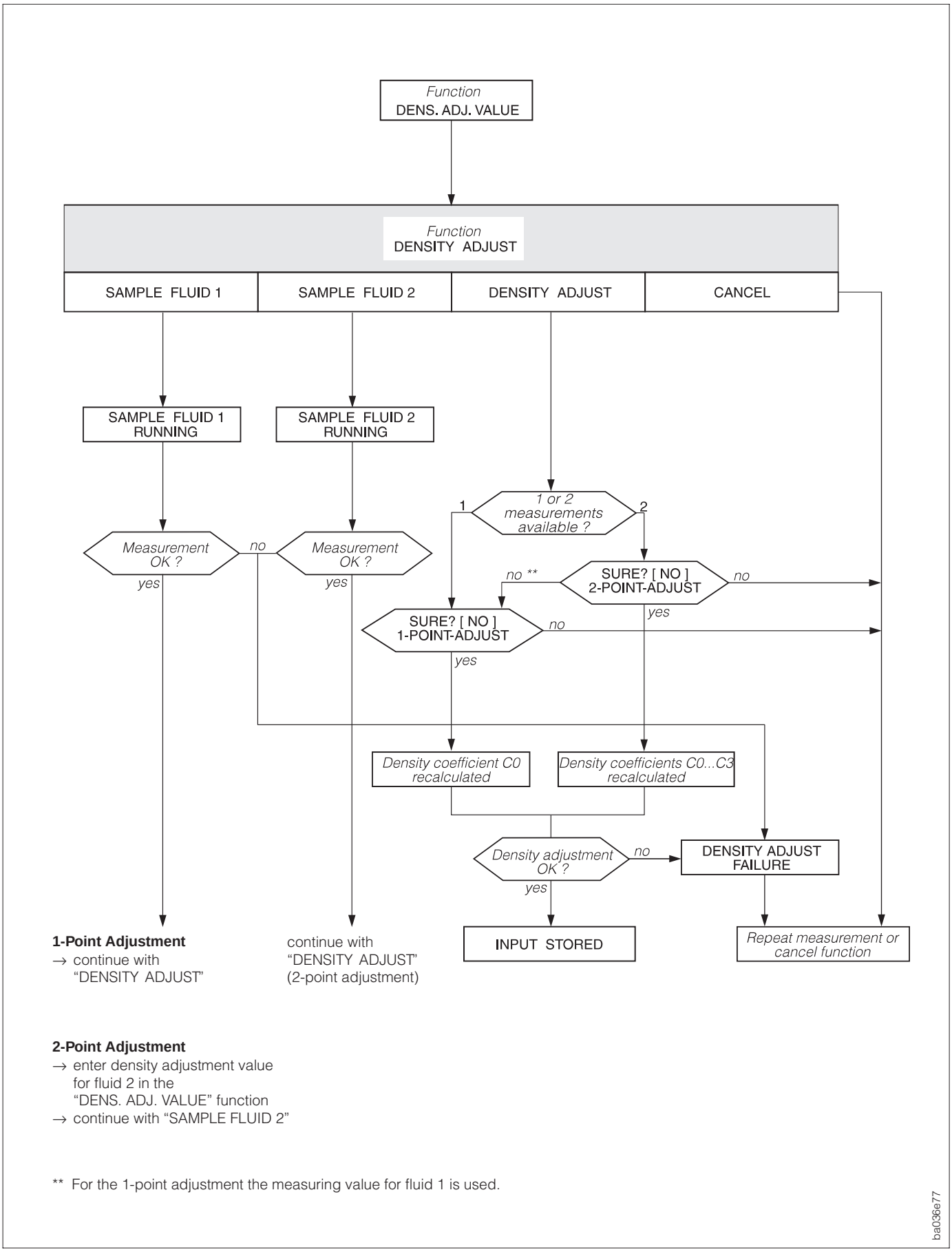

Fig. 18
Carrying out density adjustment
(1-point and 2-point density adjustment)

USER INTERFACE	Function group FLOW SYST. UNITS
MASS FLOW UNIT	Select the units required for mass flow rate (mass/time). The units selected here also define those for: • Zero and full scale value for current and frequency • Relay switching points (limit value for mass flow; flow direction) • Creep rate • Flow rate of the target and carrier fluid  g/min – g/h – kg/s – kg/min – ***kg/h*** – t/min – t/h – t/d – lb/s lb/min – lb/hr – ton/min – ton/hr – ton/day – CANCEL  Display of current mass flow rate. The total flow rate is always displayed, also with two-phase media.
MASS UNIT	Select the units required for mass. The units selected here also define those for: • Pulse weighting (e.g. kg/p) • Totalizer • Batch preset, batch prewarn, compensation quantity  g – ***kg*** – t – lb – ton – CANCEL
VOLUME FLOW UNIT	Select the units required for volume flow rate (volume/time). The volume flow rate is derived from the measured density of the fluid and the mass flow rate. The units selected here also define those for: • Zero and full scale value for current and frequency • Relay switching points (limit value for volume flow rate) • Flow rate of the target and carrier fluid  cm^3/min – cm^3/h – dm^3/s – dm^3/min – ***dm^3/h*** – l/s – l/min l/h – hl/min – hl/h – m^3/min – m^3/h – cc/min – cc/hr – gal/min gal/hr – gal/day – gpm – gph – gpd – mgd – bbl/min – bbl/hr bbl/day – CANCEL  Display of the actual volume flow rate. The total flow rate is always displayed, also with two-phase media.
STDVOL. FLOW UNIT	Select the units required for standard volume flow rate (standard volume/time). The standard volume flow is derived from the standard density and the mass flow rate. The units selected here also define those for: • Zero and full scale value for current and frequency • Relay switching points (limit value for standard volume flow rate)  Nl/s – Nl/min – Nl/h – Nl/d – Nm^3/s – ***Nm^3/min*** – Nm^3/h – Nm^3/d – scm/s – scm/min – scm/hr – scm/day – scf/s – scf/min – scf/hr – scf/day – CANCEL  Display of the actual standard volume flow rate.

USER INTERFACE	Function group FLOW SYST. UNITS
VOLUME UNIT	Select the units required for volume flow. The flow volume is derived from the measured density of the fluid and the mass flow. The units selected here also define those for: • Pulse weighting (e.g. m^3 → m^3/pulse) • Totalizer • Batch preset, batch prewarn, compensation quantity +/- cm^3 – ***dm^3*** – l – hl – m^3 – cc – gal – bbl – CANCEL
STD. VOLUME UNIT	Select the units required for standard volume. The standard volume is derived from the standard density (see page 71) and the mass flow. The units selected here also define those for: • Pulse weighting (e.g. Nm^3 → Nm^3/pulse) • Batch preset, batch prewarn, compensation quantity +/- ***Nm^3*** – Nl – scm – scf – CANCEL
GALLON / BARREL	In the USA and UK, the ratio of barrels (bbl) to gallons (gal) is defined according to the fluid used and the specific industry. Therefore the following definitions have to be selected: • US or imperial gallons • Ratio gallons/barrel Note! The definition selected here also determines the units in other functions e.g. in "VOLUME UNIT, VOLUME FLOW UNIT, DENSITY UNIT". If a new definition is selected, then the values on the display will change accordingly. +/- US: 31.0 gal/bbl → for beer ***US: 31.5 gal/bbl*** → for liquids (used in normal cases) US: 42.0 gal/bbl → for mineral oil (petrochemicals) US: 55.0 gal/bbl → for filling tanks Imp: 36.0 gal/bbl → for beer and similar liquids Imp: 42.0 gal/bbl → for mineral oil (petrochemicals) CANCEL +/- US: 1 gal = 3.785 l (litre) Imp: 1 gal = 4.546 l (litre)

Note!

USER INTERFACE	Function group AUX. SYST. UNITS
DENSITY UNIT	Select the units required for density. The units selected here also define those for: • Zero and full scale value for current and frequency • Relay switching points (limit value for density) • Density response value for Empty Pipe Detection • Density adjustment value g/cm³ – kg/dm³ – ***kg/l*** – kg/m³ – SD_4 °C – SD_15 °C – SD_20 °C g/cc – lb/cf – lb/USgal resp. lb/gal * – lb/bbl – SG_59 °F – SG_60 °F – SG_68 °F – SG_4 °C – SG_15 °C – SG_20 °C – CANCEL * see function “GALLON/BARREL”, page 81 SD = Specific Density, SG = Specific Gravity The specific gravity is the ratio between the density of the fluid and the density of water (at water temperatures = 4, 15, 20 °C or 59, 60, 68 °F) Display showing current density or specific gravity.
STD. DENSITY UNIT	Select the units required for standard density of the fluid. The units selected here also define those for: • Zero and full scale value for current • Relay switching points (limit of standard density) • Fixed standard density (for measuring standard volume flow) ***kg/Nm³*** – kg/Nl – g/scc – kg/scm – lb/scf – CANCEL Display of actual standard density value.
TEMPERATURE UNIT	Select the units required for temperature. The units selected here also define those for: • Zero and full scale value for current and frequency • Relay switching points (limit value for temperature) • Reference temperature (for density functions) • Min./max. temperatures (sensor coefficients) ***°C (CELSIUS)*** – K (KELVIN) – °F (FAHRENHEIT) – °R (RANKINE) CANCEL Display showing the current fluid temperature.
NOM. DIAM. UNIT	Select the units required for the nominal diameter of the sensor. ***mm*** – inch – CANCEL Display showing the nominal diameter of the sensor in current use.

USER INTERFACE	Function group DISPLAY SETTING
ASSIGN **LINE 1** **LINE 2** **LINE 3** **LINE 4**	Select the measuring variables which are to appear during normal measuring operations in display lines 1–4. OFF – MASS FLOW – VOLUME FLOW – STD. VOLUME FLOW – TARGET FLOW – CARRIER FLOW – DENSITY – CALC. DENSITY – TEMPERATURE – TOTALIZER 1 – TOTAL. 1 OVERFLOW – TOTALIZER 2 – TOTAL. 2 OVERFLOW – TOTALIZER 3 – TOTAL. 3 OVERFLOW – TOTALIZER 4 – TOTAL. 4 OVERFLOW – BATCH PRESET – BATCH UPWARDS – BATCH DOWNWARDS – BATCH CYCLE – TIME REMAINING – TIME ELAPSED – CANCEL Factory setting: Line 1 → ***MASS FLOW*** Line 2 → ***DENSITY*** Line 3 → ***TEMPERATURE*** Line 4 → ***TOTALIZER 1***
FORMAT FLOW	Select the number of decimals of all measured variables and parameters of flow rates. Note! Depending on the measuring units and the setting of this function, decimals calculated by Procom DZL 363 are not always fully displayed. The number of decimals selected here, however *only* affects the display, not the internal calculation accuracy of the system. If the measuring system calculates on the basis of more decimals than shown, an arrow symbol is displayed (e.g. 1.2→ kg/h) between the numerical value and measuring unit, during programming. xxxxx. – xxxx.x – xxx.xx – xx.xxx – ***x.xxxx*** – CANCEL
DISPLAY DAMPING	Select a time constant determines whether the display reacts quickly (small time constant) or slowly (large time constant) to widely changing flow variables. Note! • Damping is inactivated when set to “zero”. • The time constant does not affect the response of the current output. max. 2-digit number: 0...99 seconds Factory setting: ***1 s***
LCD CONTRAST	The display contrast can be optimally adjusted to match prevailing operating conditions on site (ambient temperature). Caution! In case of low temperatures the visibility of the LCD is no longer assured. The display contrast is at a maximum if the ± keys are simultaneously pressed when starting up the flowmeter. IIIIIIIIIII..... Any change in contrast is immediately seen with the adjustable bar graph.

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Caution!


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USER INTERFACE	Function group DISPLAY SETTING
LANGUAGE	Select the appropriate language in which all text, parameters and operating messages are to be displayed. Note! English is selected if the ± keys are simultaneously pressed when starting up the flowmeter. ± ENGLISH – DEUTSCH – FRANCAIS – ESPANOL – ITALIANO NEDERLANDS – DANSK – NORSK – SVENSKA – SUOMI BAHASA INDONESIA – JAPANESE (in original alphabet) CANCEL
DISPLAY TEST	With this function, you can verify display operations. The following displays are visible on all lines throughout the test: 1. ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ 2. 8888888888888888 3. ———————————— 4. 0000000000000000 ± ***CANCEL*** – START

PARAMETERS	Function group COMM. PARAMETER
PROTOCOL	For communication via a serial interface, various data transmission protocols are available which can be activated or switched off in this function. Note! The HART protocol can only be switched on if the current output is set to “4–20 mA”. OFF – ***HART*** – RACKBUS – CANCEL
BUS ADDRESS	Select the bus address for carrying out data transfer via the HART protocol or RACKBUS RS 485. Note! With an address ≠ 0 the current output is set to 4 mA. 2-digit number (HART: 0...15; RS 485: 0...63) Factory setting: ***0***
TAG NUMBER	Display of the current measuring-point designation (name, max. 8 decimals). This designation can only be entered by way of the serial interface. Note! This function is only available if the function “PROTOCOL” is set to “HART” or “RACKBUS” (see above).

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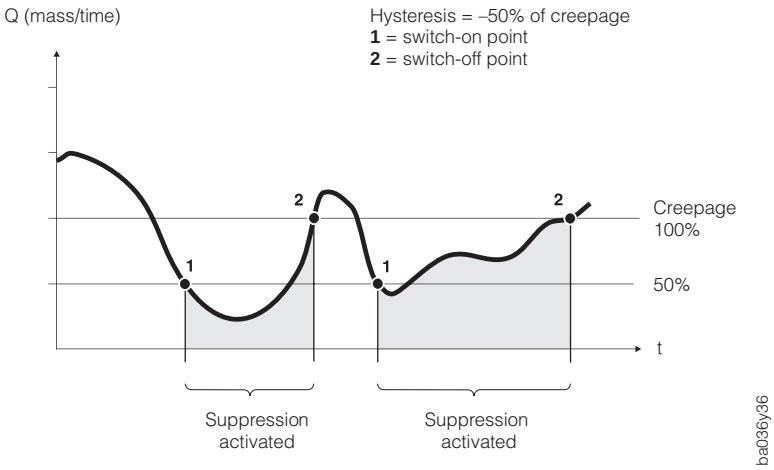
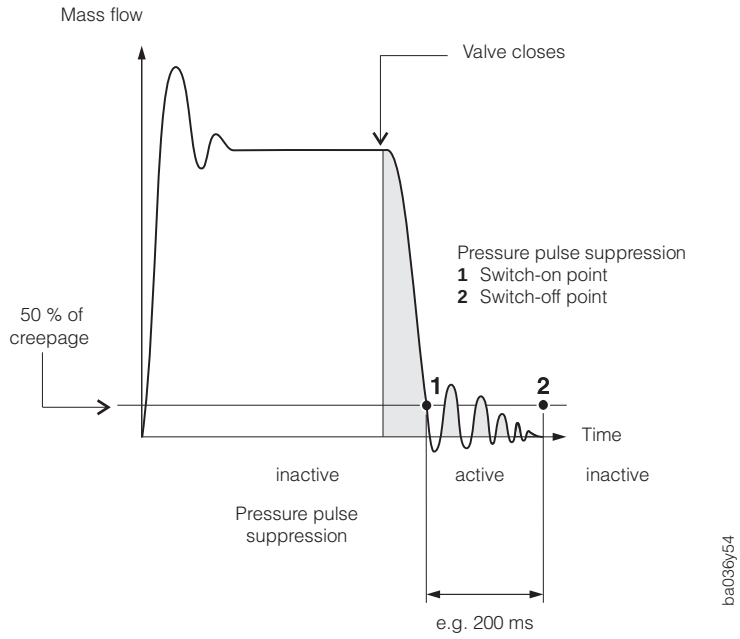
PARAMETERS	Function group PROCESSING PARA.
LOW FLOW CUTOFF	Set the desired switching points for creep suppression (= low flow cutoff). The creep suppression prevents the flow rate being registered in the lowest measuring range (e.g. a variable column of liquid at standstill). When creep suppression is active, the sign of the flow appears optically inverted on the display.  5-digit number with floating decimal point (e.g. 25.000 kg/min) Factory setting: ***0*** HYSTERESIS = 50% Creep suppression operates with a negative hysteresis of 50% (see above Figure).
SELF CHECKING Note!	Better reproducibility for short batching cycles (<10 s) can be guaranteed by activating the selection “SMART”. Note! • Select “CYCLIC” for batching times >10 s and for continuous measuring mode. • Batching cycles of less than 5 s duration are not recommended as accuracy may diminish if the connection cable between transmitter / sensor is influenced by interference. ***CYCLIC*** – SMART – CANCEL
MEASURING MODE Note!	The measuring system generally measures flow in both directions. This function enables you to switch the signal outputs (incl. totalizer) to uni- or bidirectional mode as required: • Unidirectional: Signal output in the positive direction only (forward). Flows in a negative direction (backwards) are not included or totalised. • Bidirectional: Signal output in both directions. Note! The display for flow variables always operates in both flow directions independent of the setting in this function. ***UNIDIRECTIONAL*** – BIDIRECTIONAL – CANCEL

PARAMETERS	Function group PROCESSING PARA.
FLOW DIRECTION	In special cases it is possible that the arrow marked on the sensor nameplate does not agree with the actual flow direction of the fluid. In this function you have the option to change the arithmetical sign of the flow variable. ***FORWARD*** – REVERSE – CANCEL
EPD THRESHOLD	EPD = Empty Pipe Detection: With empty measuring tubes the density of the fluid falls below a specified value (= response or threshold value) which can be specified in this function. Caution! • For gases, empty pipe detection is not possible. • Select a correspondingly low EPD response value so that the difference to the effective density of the fluid is sufficiently large enough. This ensures that only totally empty measuring tubes are detected, and not those partly filled. Notes! • When the preset response value is reached or exceeded the display shows the error message “A: EMPTY PIPE”. The flow is then set to the value “0.0000” and the density to the EPD threshold value. • Switching on and off the EPD operates at a time constant of 1 second. 5-digit number with fixed decimal point, incl. engineering units corresponding to 0.0000...5.9999 kg/l Factory setting: ***0.0000 (= switched off)***
NOISE SUPPRESS.	With the help of the interference blanking (software filter), you can reduce the sensitivity of the *flow signal* to pulsating flow and peak interferences, e.g. in case of solids-containing fluids or gas pockets. ***OFF*** – LOW – MEDIUM – HIGH – CANCEL
DENSITY FILTER	With the help of the density filter, you can reduce the sensitivity of the *density signal* to fluctuations of fluid density, e.g. in case of solids-containing media or gas pockets. OFF – LOW – ***MEDIUM*** – HIGH – CANCEL


Caution!


Note!

PARAMETERS	Function group PROCESSING PARA.
PRESS. PULSE SUPPR	When closing a valve, there may be a sudden but strong rush of liquid in the piping which is then detected by the measuring system. The pulses will be counted, and produce an incorrect result in the totalizer, especially in filling operations. Because of this, the Procom DZL 363 has a function for pressure pulse suppression (= transient signal suppression) which can eliminate such interferences. The time interval of the active pressure pulse suppression is defined in this function: **Switch-on point** Pressure pulse suppression is activated after the flow velocity falls below 50% of creepage (see page 86). The following applies during the pressure pulse suppression: • Current output → is set to 0 mA or 4 mA • Pulse/frequency output → at the fall back value • Display flow = 0 • Display totalizer → both totalizers remain at the last applicable value. • Temperature and density values continue to be shown. **Switch-off point** The pressure pulse suppression is again deactivated after the set time interval. Note! This function only appears if the value set for creepage is not “0”.  max. 4-digit number, incl. units (0...10 s) Factory setting: ***0 ms (= switched off)*** Caution! For batching applications, always select the time interval for pressure pulse suppression to be smaller than the set time interval between batching cycles. This ensures that there is no positive zero return in the start phase of a filling cycle.

Note!

Caution!

PARAMETERS	Function group SYSTEM PARAMETER
ACCESS CODE	Enter a code number to release the programming (via operating matrix). All data of the Procom DZL 363 measuring system are thus protected against unauthorised access. If you activate the ± operating keys and the operating matrix is still locked, this function is automatically displayed with the request to enter the code: → Enter code number 63 (factory setting) or → Enter personal code number Note! • After return to HOME position programming is again locked after 60 seconds if no operating element is pressed during this time. • Programming can also be locked by entering any number (not the customer code number) in this function. • If you can no longer find your personal code number, then the Endress+Hauser service organisation will be pleased to help you. ± max. 4-digit number (0...9999) Factory setting: ***0***
DEF. PRIVATE CODE	This function enables a personal code number to be selected with which programming can be enabled. Note! • Programming is always enabled with the code number “0”. • When programming is locked this function is not available and access to the personal code number by third parties is not possible. • The code number can only be altered when programming has been enabled. ± max. 4-digit number (0...9999) Factory setting: ***363***
SELECT ZEROPOINT	According to the application (fluid characteristics) the zero point can be shifted slightly. This function enables you to select two different (previously calibrated) zero points. Additionally you can determine for which zero point (1 or 2) a new calibration is to be done. Note! • Zero point calibration is described in detail on page 90. • As an option, both zero points may also be activated by way of the auxiliary input (see page 62). Any selection by way of the auxiliary input is given priority. ± ***ZEROPOINT 1*** – ZEROPOINT 2 – CANCEL ± Display showing the current zero point used by the measuring system.

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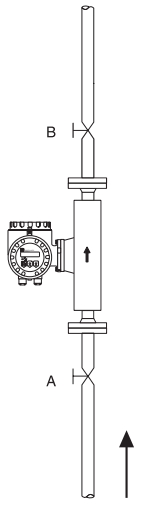
PARAMETERS	Function group SYSTEM PARAMETER
ZEROPOINT ADJUST	This function enables a zero point adjustment to be automatically carried out. The new zero point determined by the measuring system is adopted by the function "ZEROPOINT". In the function "SELECT ZEROPOINT" specify which zero point (1 or 2) should be recalibrated. Note! • Programming is locked during zero point adjustment and the display shows "S: ZERO ADJUST RUNNING" for approx. 30...60 seconds. • If the zero point adjustment is not possible, e.g. with a flow velocity v > 0.1 m/s, or has been cancelled, then the alarm message "A: ZERO ADJUST NOT POSSIBLE" is shown on the display. • The zero point can also be activated using the auxiliary input as required (see page 62). ***CANCEL*** – START Display showing the current zero point value used by the measuring system. **General information for zero point calibration** All Promass 63 sensors are calibrated using the most up-to-date technoloy available with the zero point stated on the nameplate. Calibration is carried out according to the reference conditions (see page 110). Therefore a zero point calibration is generally **not** necessary! Practical experience has shown that a zero point calibration is only required in special cases: • to achieve highest measuring accuracy • with extreme process conditions (e.g. with very high fluid temperatures). **Requirements** – For fluids without gas or solids – Zero point calibration is carried out using completely filled measuring tubes and at no-flow with e.g. shut-off valves both upstream and downstream of the sensor or by using existing shut-off and sliding valves, etc.: *Normal operation* • Open valves A and B *Zero point calibration **with** pumping* • Open valve A • Close valve B *Zero point calibration **without** pumping* • Close valve A • Open valve B Caution! With difficult fluids (ontgassing fluids or fluids with solids content) it is possible that no stable zero point can be achieved despite carrying out a number of zero point calibrations. In such cases, please contact your E+H Service Centre.  (continued on next page)

Note!

Caution!

PARAMETERS	Function group SYSTEM PARAMETER
ZEROPOINT ADJUST (continued)	**Carrying out a zero point calibration** 1. Run the plant for as long as necessary until it is operating normally. 2. Stop the flow (v = 0 m/s). 3. Check the shut-off valves (for leaks). Also check the operating pressure. 4. Carry out the calibration with use of the local display (programming example: see page 30). Notes! • During zero point calibration the message "S: ZERO ADJUST RUNNING" is shown on the display for approx. 30...60 seconds. • If the zero point calibration is not possible, e.g. with a flow velocity >0.1 m/s, or has been cancelled, then the alarm message "A: ZERO ADJUST NOT POSSIBLE" is shown on the display. • After a successful zero point calibration the new zero point value can immediately be called up with the diagnosis function (simultaneously pressing ⊞). The value in the function "ZEROPOINT" is overwritten.
ZEROPOINT	In this function, the zero point correction currently used by the sensor can be called up and/or changed, if necessary. ⊞ max. 5-digit number (–10000...+10000) Factory setting: ***dependent*** on the nominal diameter of sensor and its calibration *Example:* Correction factor 100 = 1 % of Q_{ref} with v = 1 m/s (ρ = 1 kg/l) Correction factor 100 = 0.5 % of Q_{ref} with v = 2 m/s (ρ = 1 kg/l) ⊞ Display showing the active zero point
POS. ZERO RETURN	This function enables signals to be set from the current and pulse/frequency output to the fallback value, e.g. for interrupting the measurement for cleaning the piping. • Current output → set to 0 mA or 4 mA • Pulse/frequency output → at the fallback value • Display flow → 0 • Display totalizers → both totalizers remain at the last applicable value. • Display temperature and density → will continue to be displayed. Note! • This function has top priority above all other functions of the instrument. Simulations, as example are suppressed. • After positive zero return is activated, the display shows the message "S: POS. ZERO-RET. ACTIVE". • During positive zero return the relays are energized (except for the assignment "OFF, BATCH PRECONTACT or BATCH CONTACT"). Any error messages occurring (fault, alarm) can then only be called up using the diagnosis function or in the function "PRESENT SYSTEM CONDITION". These do not, however, affect the outputs. • The positive zero return can also be activated over the auxiliary inputs (see page 62). ⊞ ***OFF*** – ON ⊞ ALL SIGNALS SET TO ZERO (for description: see above)


Note!


Note!

PARAMETERS	Function group SYSTEM INFO
PRESENT SYSTEM CONDITION	System/process errors as well as status messages which occur while measurement is in progress can be called up according to their priority. Error and status messages are displayed in the HOME position alternately with the actual measurement variable. Note! • On activating the diagnosis function there is automatically a jump to this function. • A complete listing of all possible error and alarm messages is given on page 99 ff. Calling up other current errors or status messages: "+" → message with higher display priority "–" → message with lower display priority When the listing is complete the display shows the message "END OF LIST". By pressing the diagnosis function again when a system error occurs you can also call up error descriptions. In such cases a diagnosis symbol (stethoscope) is shown on the display.
PREVIOUS SYSTEM CONDITION	In this function, all system/process errors and status messages that have occurred so far are listed in *chronological* order (error history with max. 15 entries). Note! • A complete list of all possible error and alarm messages is given on page 99 ff. • If no error or status messages have occurred since the measuring system was last started up then the display shows the message "S: NO ENTRY EXISTING". • With more than 15 entries the oldest is overwritten. • Storage of this list is volatile and is lost in case of power failure. Calling up other errors and status messages: "+" Listing is done chronologically with the oldest, second oldest ...etc. message "–" Listing is done chronologically with the latest, second latest ..... etc. message When the listing is complete the display shows the message "END OF LIST". By activating the diagnosis function when a system error occurs you can also call up error descriptions.
SERIAL NO. DZL	Display of the serial number of the Procom DZL 363 transmitter: 6-digit number (100000...999999)

PARAMETER	Function group SYSTEM INFO
SW VERSION DZL	Display of software currently installed in the Procom DZL 363 transmitter. The numbers of the software version have the following meaning: V 1 . 00. 00 – Number changes if minor alterations are made to the new software. This also applies to special versions of software. – Number changes if the new software contains additional functions. – Number changes if basic alterations have to be made to the software, e.g. owing to technical modifications to the instrument.
SER. NO. PROMASS	Display of serial number of the Promass sensor: 6-digit number (100000...999999)
SW VERS. PROMASS	Display of software currently installed on the Promass measuring-amplifier board. The numbers of the software version have the following meaning: V 3 . 00. 00 M – Promass sensor type – Number changes if minor alterations are made to the new software. This also applies to special versions of software. – Number changes if the new software contains additional functions. – Number changes if basic alterations have to be made to the software, e.g. owing to technical modifications to the instrument.
NOMINAL DIAMETER	Display of current nominal diameter of the Promass sensor: e.g. 25 mm, 2 inch, etc.
MIN. TEMPERATURE	Display of the lowest medium temperature ever measured by the Promass sensor (e.g. –165.7 °C).
MAX. TEMPERATURE	Display of the highest medium temperature ever measured by the Promass sensor (e.g. +178.3 °C).

SERVICE & ANALYSIS	Function group SERVICE DATA
CLEAR ERROR LIST	Deletes all (error) reports listed in the “PREVIOUS SYSTEM CONDITION” function. + – ***CANCEL*** – YES
K-FACTOR	Display of current calibration factor of the Promass sensor: max. 5-digit number with fixed decimal point (0.1000...5.9999) Factory setting: ***dependent*** on the nominal diameter and its calibration Caution! The calibration factor may only be altered under special circumstances. The appropriate E+H Service Centre should first be contacted before this is done.
SYSTEM RESET	With this function Procom DZL 363 can be restarted without the power supply being switched off and on. Note! With a “restart” all error entries in the function “PREVIOUS SYSTEM CONDITIONS” are deleted. + – ***CANCEL*** – RESTART SYSTEM
QUICK SETUP	Start the “Quick Setup” menu. For an in-depth description of this abbreviated programming menu see page 24. + – ***CANCEL*** – START

Caution!

Note!

SERVICE & ANALYSIS	Function group CALIBRATION DATA
DENSITY COEF. C0 **DENSITY COEF. C1** **DENSITY COEF. C2** **DENSITY COEF. C3** **DENSITY COEF. C4** **DENSITY COEF. C5** **TEMP. COEF. Km** **TEMP. COEF. Kt** **CAL. COEF. Kd1** **CAL. COEF. Kd2**	Display of the calibration and sensor data **currently** used by the measuring system. Changes to calibration values shown in these functions can only be carried out by an Endress+Hauser service technician. This also applies to resetting calibration values originally done in the factory.

7 Diagnosis and Troubleshooting

7.1 Response of the measuring system on fault or alarm

Error indications which occur during operation are indicated in the HOME position alternately with the measured values. The Procom DZL 363 measuring system recognizes two types of error:

Type of error	Response of the instrument
Fault (system error, failure) Errors due to failure of the instrument	• Error message displayed → see page 99 • Relay 1 de-energized if configured for “FAILURE” → see page 60 • Signal outputs respond according to the set failsafe mode → see page 51 and 57
Alarm (process errors) Errors due to process conditions	• Alarm message displayed → see page 101 • Response of relays according to configuration → see page 60 and 61


Caution!

Caution!
Please note the following points on **positive zero return** or active **simulation**:

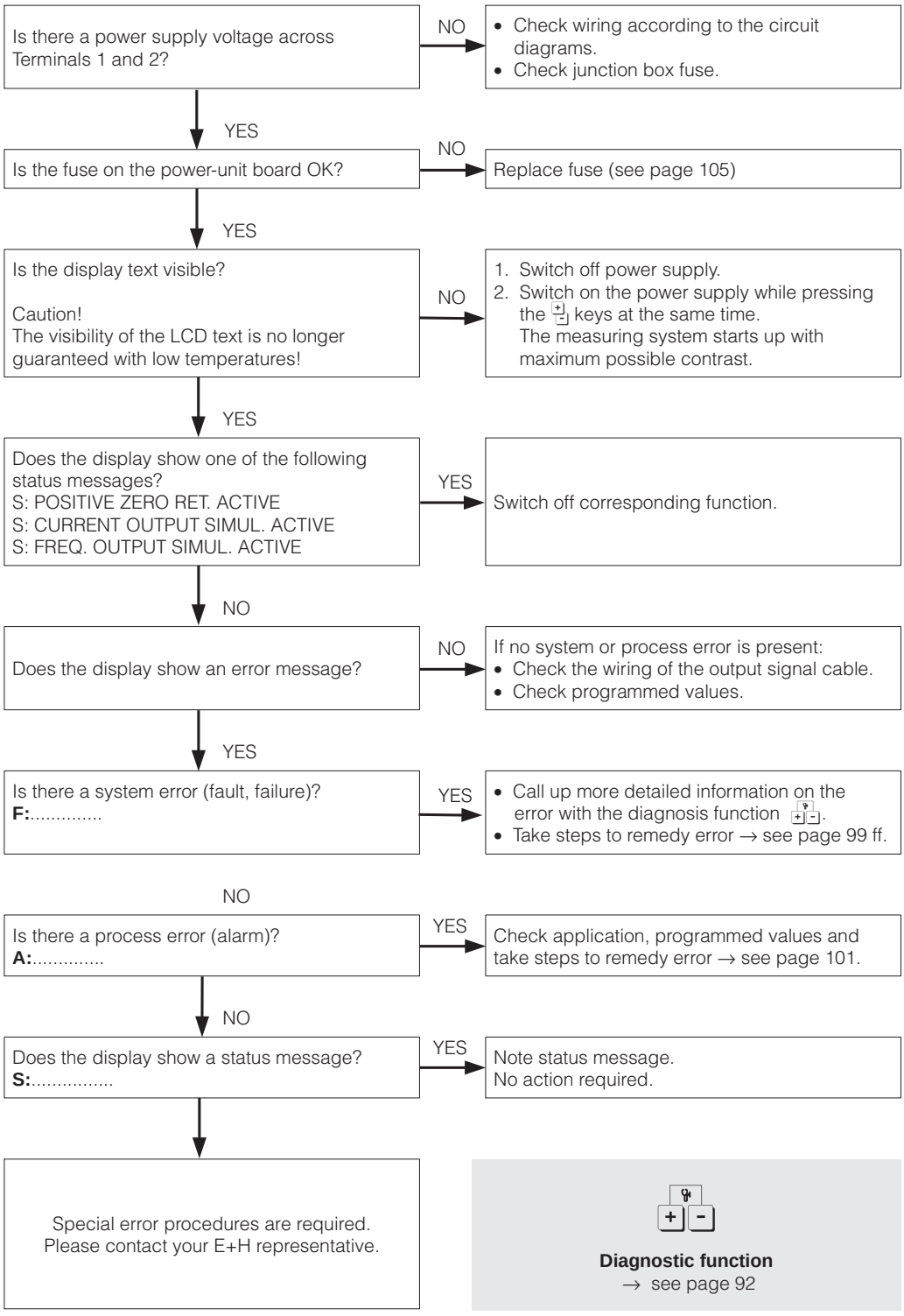
Positive Zero return
- This function has top priority above all other instrument functions. Simulations are suppressed for example.
- After measurand suppression is activated, the display shows the message “S: POS. ZERO-RET. ACTIVE”.
- During positive zero return all relays (1 and 2) are energised. Any error messages occurring (fault, alarm) can then only be called up using the diagnostic function or in the function “PRESENT SYSTEM CONDITION”. These do not, however, affect the outputs.

Simulation
- This function has the second highest priority, just as the related status messages. Occurring error messages can during simulation only be called up using the diagnostic function.
- Normal output of system errors if Relay 1 is configured for “FAILURE”. Normal function of the remaining relays (according to configuration).

7.2 Diagnosis flow chart and troubleshooting

All instruments undergo various stages of quality control during production. However, should an error or fault occur during set-up or operation, then refer to the flow chart below to identify possible causes.


Caution!



7.3 Error and alarm messages

Error messages **F: . . . . .** (System error, failure)	**Cause** Call up by ⊞	**Remedy**
F: SYSTEM ERROR AMPLIFIER	**: LOW VOLTAGE DETECTED**	
	The amplifier is detecting a too low voltage. Power supply or amplifier defective.	By E+H-Service
	: DAT FAILURE	
	Error on access to data in DAT (calibration values of sensor).	By E+H-Service
	: EEPROM FAILURE	
	Error on access to EEPROM data (calibration values of the amplifier).	By E+H-Service
	: RAM FAILURE	
	Error on access to working memory (RAM) of the processor.	By E+H-Service
	: TEMP. CIRCUIT FAILURE	
	Temperature switching of the amplifier is defective.	By E+H-Service
	: ASIC FAILURE	
	The ASIC on the amplifier board is defective.	By E+H-Service
	: TEMP. SENSOR MEAS. TUBES	
	The temperature sensor of the measuring tube(s) is defective.	By E+H-Service
	: TEMP. SENSOR CARRIER TUBE	
	The temperature sensor of the secondary containment is defective.	By E+H-Service
F: TUBES NOT OSCILLATING	**: NO DIAGNOSIS**	
	Instrument error or application problem.	• By E+H-Service • Check application: – gas or solids content – system pressure etc.

Error messages **F: . . . . .** (System error, failure)	**Cause** Call up by ±	**Remedy**
F: PICK-UP FAILURE	**: NO DIAGNOSIS** The sensor coil is defective.	By E+H-Service
F: SYSTEM ERROR POWER SUPPLY	**: LOW VOLTAGE DETECTED** The power supply board is supplying a too low voltage.	By E+H-Service
F: NO AMPLIFIER RESPONSE	**: NO DIAGNOSIS** No data transfer between amplifier (Promass sensor) and Procom DZL 363 possible.	• Restart measuring system: switch power supply off and on again; the same with the sensor if using the Dx version. • Dx version: – verify the supply of the Promass sensor. – verify the polarity of the connection. • DoS version → verify voltage (60 V DC) and if necessary replace the fuse of the DoS version (see page 105). • Verify the connection between the Promass sensor and Procom DZL 363 transmitter. Otherwise by E+H Service.
F: VALUE NOT ACCEPTED	**: NO DIAGNOSIS** Internally-stored values cannot be read by Procom DZL 363	Restarting the measuring system may be required → switch off power supply and then switch it on again. Otherwise by E+H Service.
F: SYSTEM ERROR COM-MODUL	**: EEPROM FAILURE** Error on access to EEPROM data (process and calibration data of Procom DZL 363).	By E+H-Service
	: RAM FAILURE Error on access to the working memory (RAM).	By E+H-Service
	: ROM FAILURE Error on access to the program memory (ROM).	By E+H-Service

Error messages **F: . . . . .** (System error, failure)	**Cause** Call up by ⊞	**Remedy**
F: SYSTEM ERROR COM-MODUL (continued)	**: LOW VOLTAGE DETECTED** DC/DC converter of Procom DZL 363 is supplying a power voltage which is too low.	By E+H-Service
	: VOLTAGE REFERENCE Reference voltage of Procom DZL 363 outside tolerance, i.e. correct functioning of the current output is no longer guaranteed.	By E+H-Service
	: EEPROM HW DATA ERROR A part of the EEPROM data of Procom DZL 363 is damaged or has been overwritten. Default values from the ROM are written in. The measuring system can still operate on a makeshift basis using these values.	By E+H-Service
	: EEPROM PARA. DATA ERR A part of the EEPROM data of Procom DZL 363 is damaged or has been overwritten. Default values from the ROM are written in. The measuring system can still operate on a makeshift basis using these values.	By E+H-Service
	: EEPROM TOT. DATA ERROR A part of the EEPROM data of Procom DZL 363 (totalizer block) is damaged or is overwritten. The default value “0” is entered in the totaliser.	By E+H-Service
Alarm messages **A: . . . . .** (Process error)	**Cause**	**Remedy**
A: DAT CONTAINS DEFAULT DATA	Empty DAT on the amplifier board of the Promass sensor. The instrument is operating with default values (factory settings).	By E+H-Service

Alarm messages A: . . . . . (Process error)	**Cause**	**Remedy**
A: EXCIT. CURRENT LIMIT	The maximum excitation current for the excitation coil has been attained with specified fluid characteristics at limit values (e.g. gas or solids content). The instrument is continuing to operate correctly.	If the excitation current is no longer sufficient, then the application conditions are to be changed.
A: SLUG FLOW CONDITIONS	The fluid is heterogeneous (gas or solids content). The current needed to excite the measuring tube(s) therefore varies significantly.	Check application.
A: EMPTY PIPE	Applicational problem: • gas in the measuring tubes • density too low (see page 87), Empty Pipe Detection)	Check application. Ensure that the measuring tubes are always filled with fluid (see page 87).
A: FLOW TOO HIGH	Velocity of liquid in the measuring tube is >12.5 m/s. Measuring range of transmitter electronics is exceeded.	Lower the flowrate.
A: CURRENT OUTP. 1 OVERFLOW	The actual measured value is outside the range preset by the scaled zero and full scale values.	Change scaled zero and full scale values (see page 48 ff.) or change measured variable.
A: CURRENT OUTP. 2 OVERFLOW		
A: CURRENT OUTP. 3 OVERFLOW		
A: FREQ. OUTPUT 1 OVERFLOW	The actual measured value is outside the range preset by the scaled zero and full scale values.	Change scaled zero and full scale values (see page 55) or change measured variable.
A: FREQ. OUTPUT 2 OVERFLOW		
A: FREQ. OUTPUT 3 OVERFLOW		
A: ZERO ADJUST NOT POSSIBLE	The zero point calibration is not possible or has been cancelled.	Check if flow velocity = 0 m/s (see page 90).
A: BATCH TIME EXCEEDED	The maximum time for a batch cycle has been exceeded.	Identify the cause for exceeding the time provided. Possible plant error (defective or blocked valve).

7.4 Replacing the 19" Racksyst cassette

Warning!
- Danger of electric shock! Switch off power supply before removing the Racksyst cassette.
- When using Ex instruments the regulations given in the separate Ex documentation have to be observed.

1. Loosen the four fastening screws on the front of the 19" Racksyst cassette.
2. Pull out the 19" Racksyst cassette from the mount fixture.
3. Reassemble in reverse sequence.

7.5 Replacing the DAT module

Warning!
- Danger of electric shock! Switch off power supply before removing the Racksyst cassette.
- When using Ex instruments the regulations given in the separate Ex documentation have to be observed.

1. Switch of power supply.
2. Remove the Racksyst cassette (see Section 7.4).
3. Directly pull the blue DAT module off the CPU board, exchange and reinsert it (see Fig. 19):
   – Necessary if replacing the Procom transmitter → insert old DAT into new transmitter.
   – Necessary if replacing a defect DAT → insert new DAT into transmitter.
4. Reinsert the Racksyst cassette.
5. Switch on power supply.

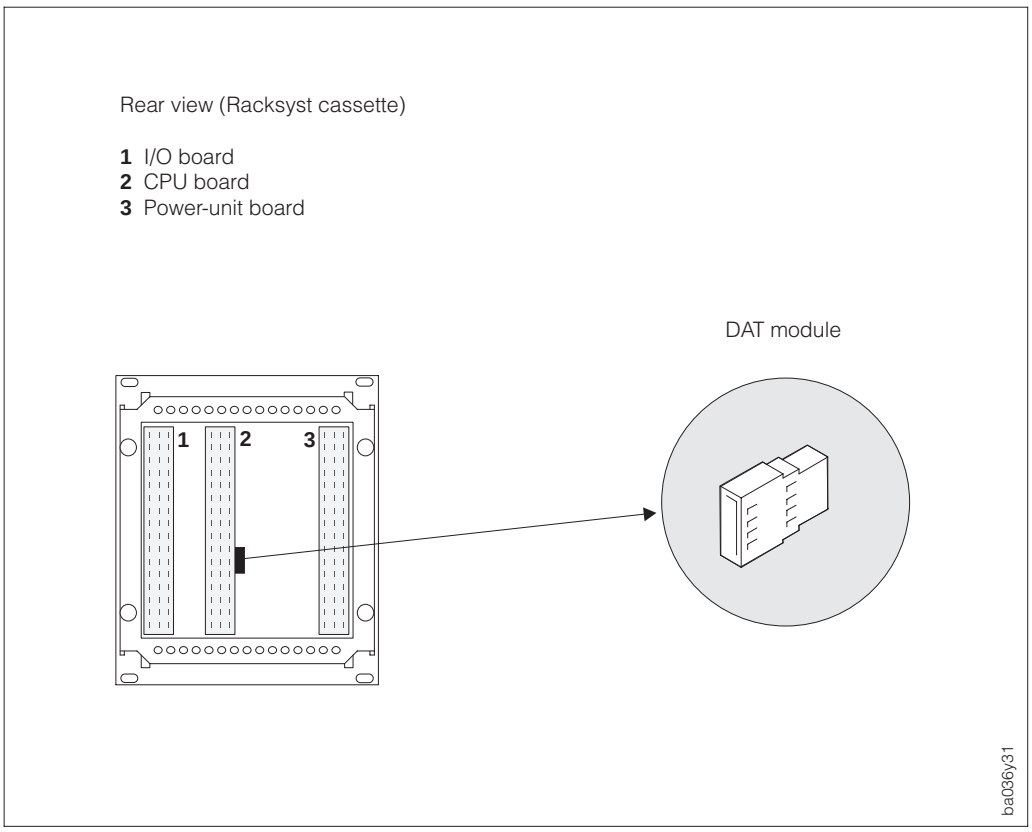


Fig. 19
Position of the DAT module on the CPU board.

7.6 Insertion and removal of electronics board

Warning!

Warning!
- Danger of electric shock! Switch off power supply before removing the Racksyst cassette.
- Danger of damage to the electronic components (ESD protection)! Electrostatic charging may damage electronics components or affect their functioning. Use an ESD-conform work station with grounded work surface.
- When using Ex instruments the regulations given in the separate Ex documentation have to be observed.

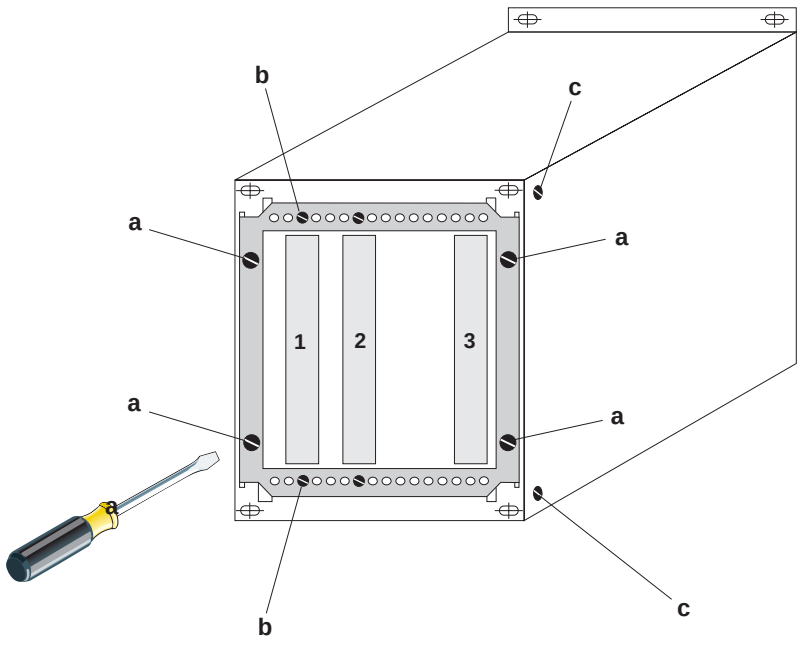
1. Switch off power supply.
2. Remove the Racksyst cassette (see page 103).
3. Loosen the four screws (**a**) of the fastening frame on the back of the cassette.
4. Loosen the two fixing screws (**b**) of the I/O board.
5. Pull the fastening frame including the CPU board from the Racksyst cassette.

Caution!

Caution!
The CPU board is the first board to be removed and the last to be reinserted.

6. Loosen the two lateral screws (**c**) to remove the power-unit board.
7. Reassemble in reverse sequence.

1 I/O board
2 CPU board
3 Power-unit board



ba036y49

Fig. 20
Removal of the electronics board (back of the Racksyst cassette)

7.7 Replacing the fuses

Warning!
- Danger of electric shock! Switch off power supply before removing the Racksyst cassette.
- When using Ex instruments the regulations given in the separate Ex documentation have to be observed.

1. Switch off power supply.
2. Remove the Racksyst cassette (see page 103).
3. The fuses to be removed are on the power-unit board (see Fig. 21). Remove the power-unit board according to the description on page 104. Exclusively use the following fuse types:

   Mains fuse (in horizontal position)
   – 2 A slow-acting/250 V; 5 x 20 mm (20...55 V AC / 20...62 V DC)
   – 1 A slow-acting/250 V; 5 x 20 mm (85...253 V AC)

   Fuse for DoS version (in vertical position)
   – 0.5 A slow-acting/250 V; 5 x 20 mm

4. Mount the power supply board back into the Racksyst cassette.
5. Reinsert the Racksyst cassette.
6. Switch on power supply.

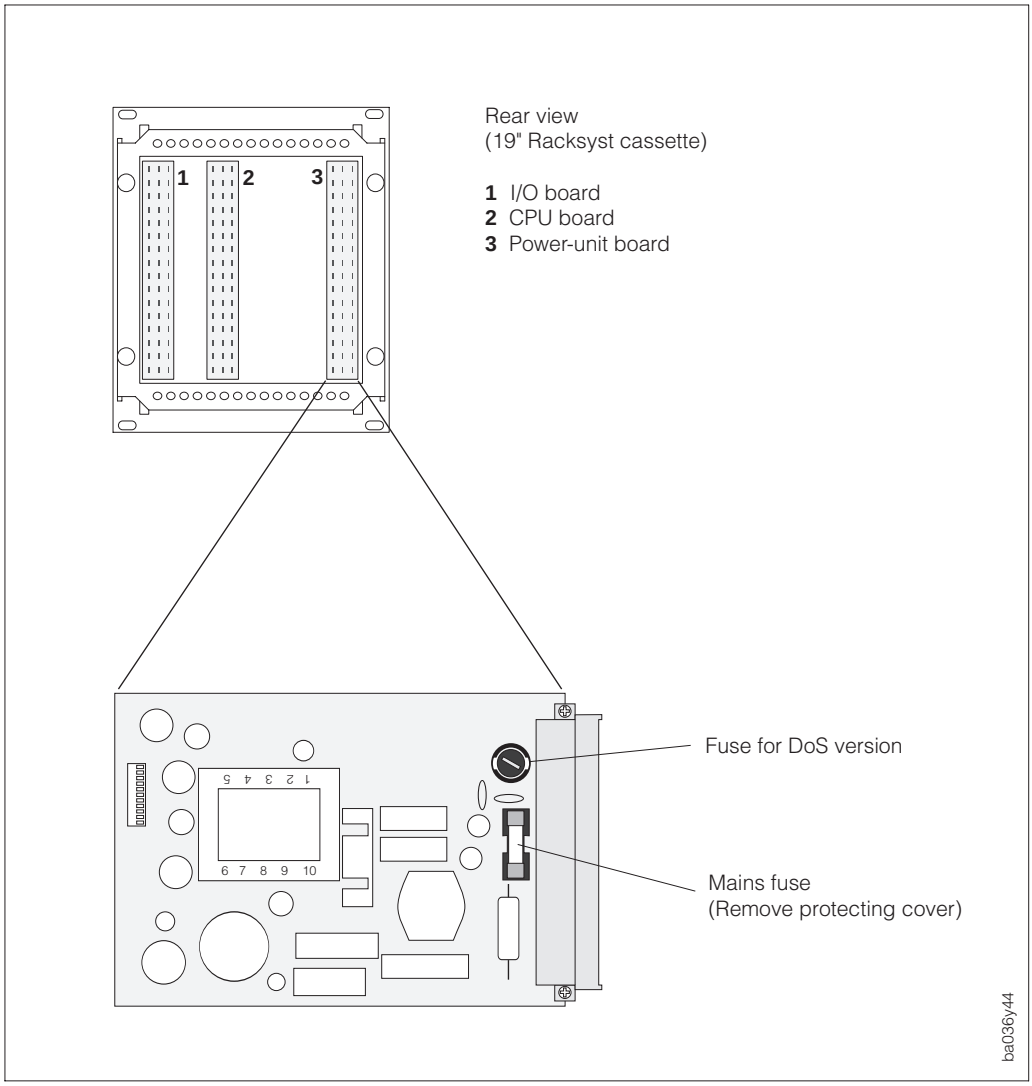


Fig. 21
Position of the fuse(s) on the CPU board

7.8 Terminating resistors / Rackbus mode configuration

Warning!

Warning!
- Danger of electric shock! Switch off power supply before removing the Racksyst cassette.
- When using Ex instruments the regulations given in the separate Ex documentation have to be observed.

1. Switch off power supply.
2. Remove Racksyst cassette (see page 103) and then the CPU boards (see page 104).
3. Set terminating resistors resp. the Rackbus mode according to Figure 22.
4. Reinsert the CPU boards into the Racksyst cassette.
5. Reinsert the Racksyst cassette.
6. Switch on power supply.

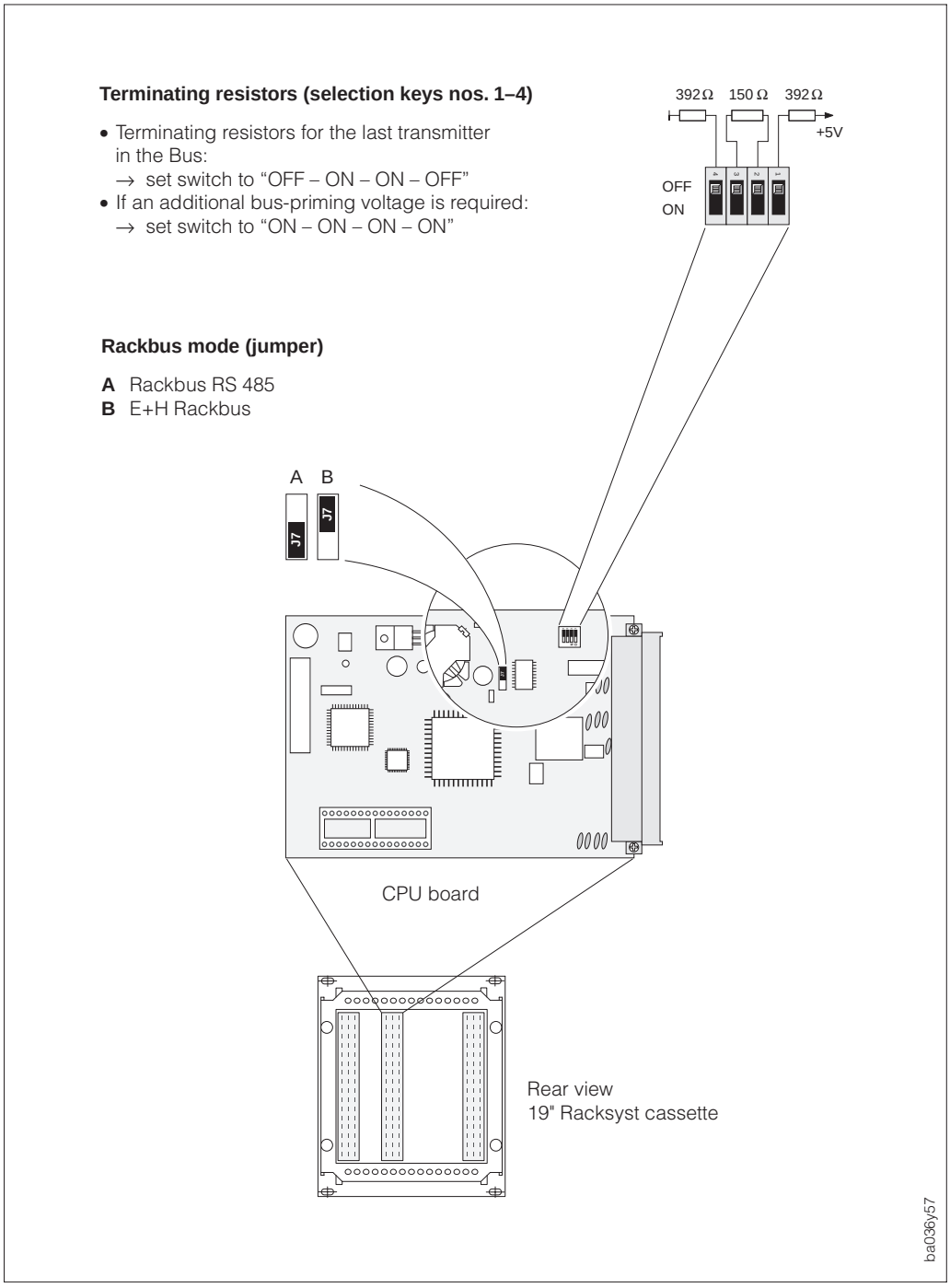
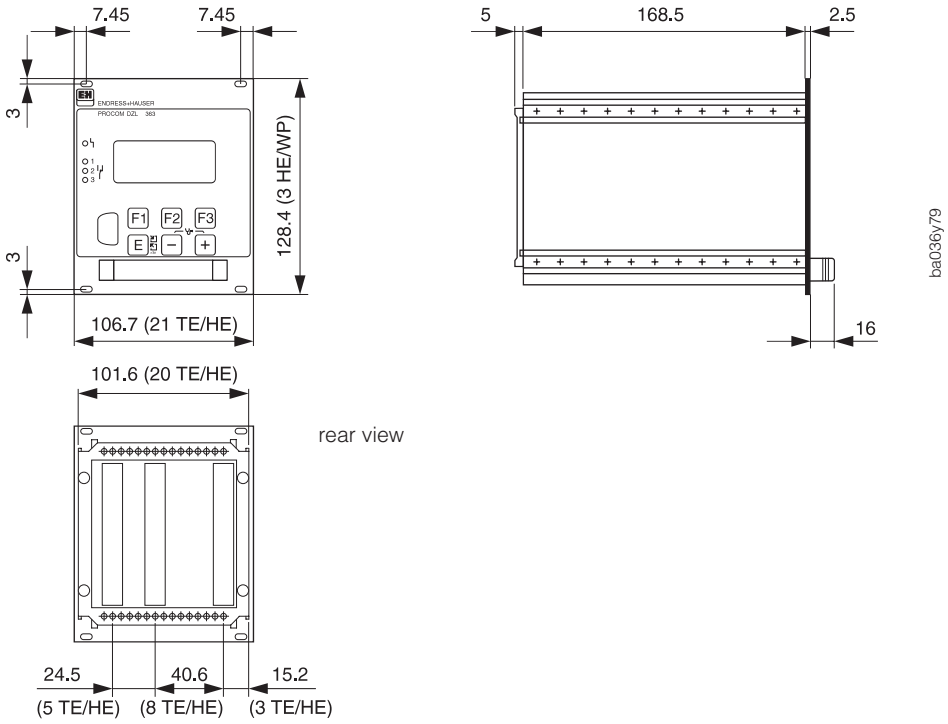


Fig. 22
Rackbus configuration and terminating resistors (CPU board)

8 Dimensions

19" Racksyst cassette (IP 20)



Panel mounted housing (IP 20; front door: IP 54)

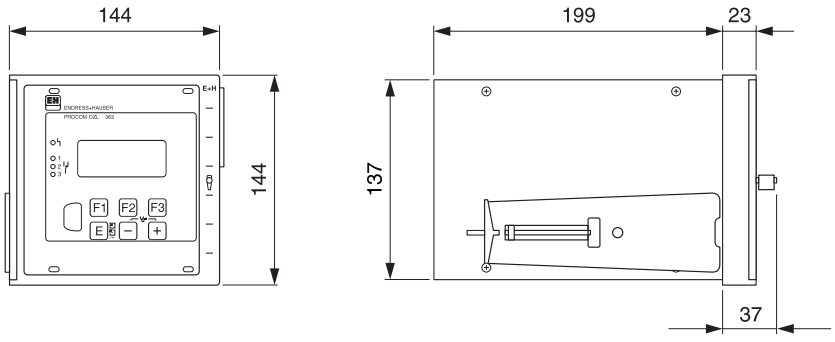


Fig. 23
Dimensions
19" Racksyst cassette and panel mounted housing

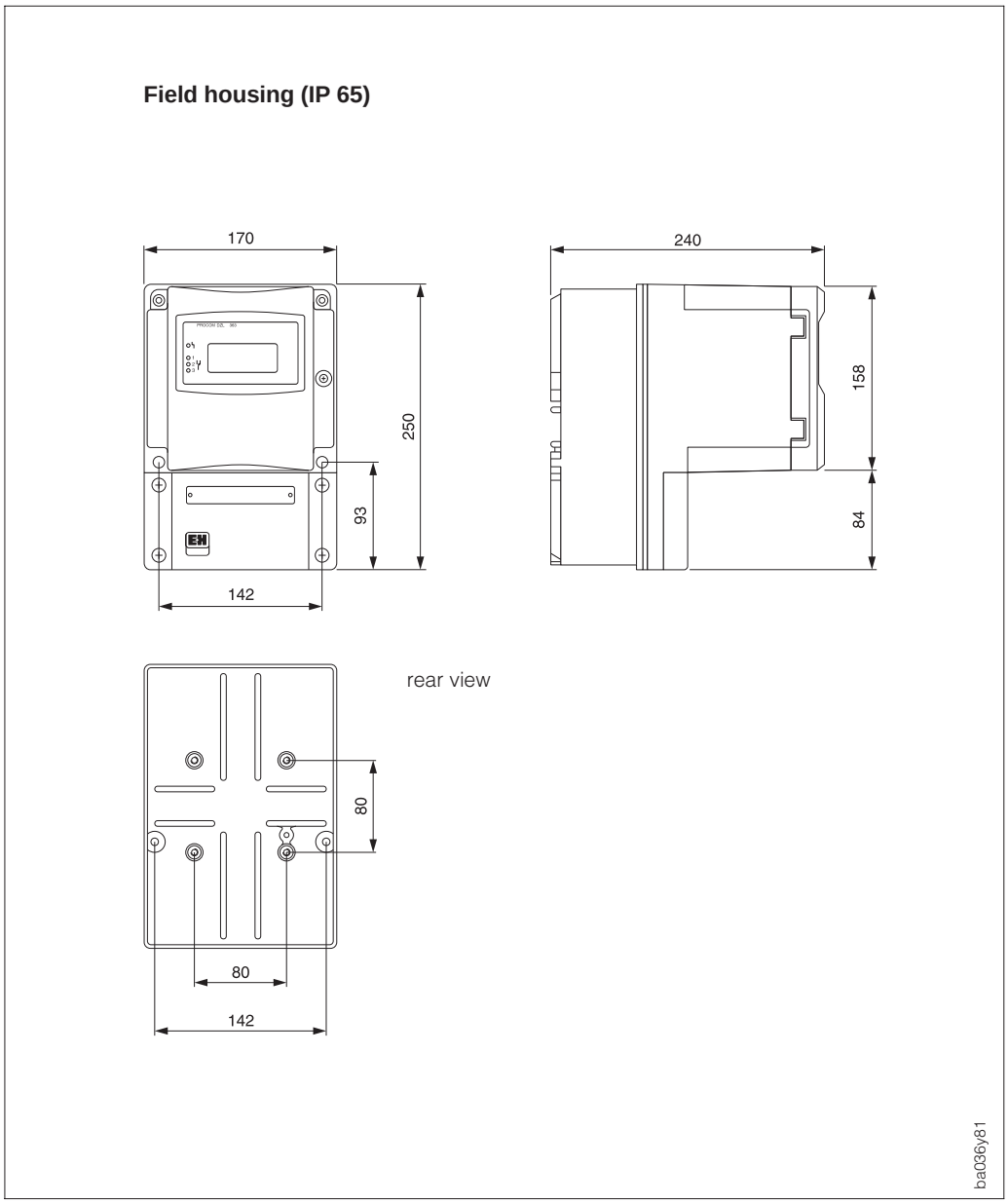


Fig. 24
Dimensions
field housing

9 Technical Data

Application	
Instrument name	"Procom DZL 363" transmitter
Instrument function	Transmitter to process and display measuring data supplied by the Promass 63 flowmeters.
Function and system design	
Measuring principle	Transmitter for mass flow measurement according to the Coriolis measuring principle → see Operating Manual BA 014D/06/en "Promass 63"
Measuring system	The complete measuring device consists of (see page 7): • a Procom DZL 363 transmitter, • a Promass 63 amplifier (blind version with "DZL 363" interface), and • Promass sensors A, I, M or F. Two versions are available: • *DoS version (Data over Supply)* → data transmission and power supply for Promass 63 on the common two-wire connection • *Dx version (Data exchange)* → two-wire connection only for data transmission. Promass 63 with a separate power supply.
Input variables	
Measured variables	Digital data exchange with Promass 63 sensors: • mass flow • fluid density • fluid temperature
Measuring range	Depending on the Promass sensor used → see Operating Manual BA 014D/06/en "Promass 63"
Operable flow range	Depending on the Promass sensor used → see Operating Manual BA 014D/06/en "Promass 63"
Auxiliary inputs	2 auxiliary inputs: U = 3...30 V DC, R_i = 1.8 kΩ pulsed or level mode Configurable for (see page 63): totalizer reset, start/stop timer, start/stop batching, zero point adjustment, full scale switching, positive zero return, zero point selection, batch quantity selection.
Current inputs (in prep.)	2 inputs, 0/4...20 mA, U_{max} = 24 V DC

Output variables	
Output signal	• *Relay output 1* max. 250 V AC / 1 A or max. 30 V DC / 0.1 A NO contact or NC contact available Configurable for: error message (failure), empty pipe detection, full scale switching, batch contact, batch precontact, time measurement with totalizer, flow direction, limit value (see pages 60, 61) • *Relay output 2 and 3* max. 250 V AC / 1 A or max. 30 V DC / 0.1 A NO contact or NC contact available Configurable like relay 1 except for “FAILURE” • *Current output 1, 2 and 3* 0/4...20 mA (also acc. to NAMUR recommendations), R_L <700 Ω, freely assignable to different measured values (see page 47), time constant freely selectable (0.01...100.00 s), full scale value selectable, temperature coefficient typ. 0.005% o.f.s./°C Current output 1: with HART protocol • *Pulse/frequency output 1, 2 and 3* freely assignable to one flow variable, active or passive (see page 52) active: 24 V DC, 25 mA (250 mA during 20 ms), R_L > 100 Ω, passive: 30 V DC, 250 mA *Frequency output:* full scale frequency selectable up to 10 kHz, On/off ratio 1:1, pulse width max. 2 s *Pulse output:* pulse value adjustable, pulse polarity adjustable, pulse width adjustable (50 ms...2 s), above a frequency of $^1/_{(2 \times \text{pulse width})}$ the on/off ratio is 1:1
Signal on alarm	The following applies until the fault has been cleared: • Current output → failure mode selectable • Pulse/frequency output → failure mode selectable • Relay 1 → de-energised if configured to “FAILURE”
Load	R_L < 700 Ω (current output)
Creep suppression	Switch points for low flow selectable (see page 86). Hysteresis: –50 %
Accuracy (process data)	
Reference conditions (Promass sensor)	Error limits based on ISO/DIS 11631: • 20...30 °C; 2...4 bar • Calibration rig based on national standards • Zero point calibrated under operating conditions • Field density calibration carried out (or special density calibration)
Measured error	Depending on the Promass sensor used. For further details → see Operating Manual BA 014D/06/en “Promass 63” Note! • The values shown there refer to the pulse/frequency output. • Additional error of the current output: ±5 µA typical.
Repeatability	Depending on the Promass sensor used. For further details → see Operating Manual BA 014D/06/en “Promass 63”

Operating conditions	
Installation conditions	
Installation instructions	Installation possible in all positions: for further details → see pages 9 ff.
Connection cable length	max. 1200 metres between transmitter and sensor screened cable, loop resistance max. 44 Ω
Ambient conditions	
Ambient temperature	–25...+40 °C (for all housing types) An all-weather cover should be used to protect the housing from direct sunlight when mounting in the open. This is especially important in warmer climates and with high ambient temperatures.
Storage temperature	–40...+80 °C
Degree of protection (EN 60529)	Racksyst cassette: IP 20 Panel mounted housing: IP 20 (front door: IP 54) Field housing: IP 65 / NEMA 4X
Shock resistance	according to IEC 68-2-31
Vibrational resistance	1 g, 10...150 Hz according to IEC 68-2-6
Electromagnetic compatibility (EMC)	According to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 as well as to NAMUR recommendations
Mechanical construction	
Design *Dimensions (L x B x H)*	Racksyst cassette (19" / 21 TE): 192 x 106.7 x 128.4 mm Panel mounted housing: 236 x 144 x 144 mm Field housing: 250 x 170 x 240 mm Dimensional drawings → see page 107
Weights	Racksyst cassette: 0.9 kg Panel mounted housing: 1.7 kg (without Racksyst cassette) Field housing: 5.0 kg (without Racksyst cassette)
Materials	*Racksyst cassette* • Front plate made of aluminium with glued-on synthetic foil • Cassette housing made of aluminium and galvanized steel *Panel mounted housing* • Front door made of painted aluminium with inspection window • Tubus made of stainless steel *Field housing* • Housing body made of painted aluminium • Inspection window made of polycarbonate

Mechanical construction (continued)	
Electrical connection	• Wiring diagrams: see Chapter 4 • Female multipoint connector or cable glands: Field housing: PG 13.5 cable glands (5...15 mm) or $^1/_2$“ NPT , M20 x 1.5 (8...15 mm), G $^1/_2$” threads for cable glands Racksyst cassette/panel mounted housing: Female multipoint connectors type F according to DIN 41612 • Galvanic isolation: All circuits for inputs, outputs, power supply, and sensor are galvanically isolated from each other (see page 17).
User interfaces	
Operation	On-site operation with: • 3 operating elements for setting all instrument functions in the Endress+Hauser operating matrix (see page 26) • 3 configurable function keys for quick access to frequently-used functions. • Diagnostic or help function (⊡)
Display	LC-display, illuminated, double-spaced with 16 characters each
Communication	• E+H Rackbus and Rackbus RS 485 interface (Rackbus protocol) • HART protocol via current output 1
Power supply	
Supply voltage, frequency	*Transmitter:* 85...253 V AC (45...65 Hz) 20...55 V AC, 20...62 V DC *Sensors:* • DoS version: Supply by way of the Procom DZL 363 transmitter via the two-wire transmission connection, 45...55 V DC, galvanically isolated • Dx version: Sensor with separate supply (connection values: see Operating Manual BA 014D/06/en “Promass 63”)
Power consumption	*DoS version:* AC: <30 VA (incl. sensor) DC: <30 W (incl. sensor) *Dx version:* AC: <25 VA DC: <25 W
Power supply failure	Bridges min. one power cycle (22 ms). • EEPROM saves measuring system data on power failure (no batteries required). • DAT = exchangeable data storage module which stores all sensor data.

Certificates and approvals	
Ex approvals	Information on presently available Ex versions (e.g. CENELEC, SEV, FM, CSA) can be supplied by your E+H Sales Centre on request. All explosion protection data are given in separate documentation available on request.
CE mark	By attaching the CE-mark, Endress+Hauser confirms that the Procom DZL 363 transmitter has been successfully tested and fulfils all legal requirements of the relevant EC directives.
Order information	
Accessories	• Plug-in point installation kit (Order No. 500 48140) • Plug-in point installation kit for Ex versions (Order No. 500 48144) • Post mounting set for field housing (Order No. 500 81375)
Supplementary documentation	System Information Procom DZL 363 SI 023D/06/en Technical Information Procom DZL 363 TI 041D/06/en Ex documentation Procom DZL 363 EX.....D/06/... (various doc. Nos.) System Information Promass SI 014D/06/en Technical Information Promass 63 TI 030D/06/en Operating Manual Promass 63 BA 014D/06/en

Other standards and guidelines

EN 60529	Degrees of protection provided by enclosures (IP Code)
EN 61010	Protection Measures for Electronic Equipment for Measurement, Control, Regulation and Laboratory Procedures
EN 50081	Part 1 and 2 (interference emission)
EN 50082	Part 1 and 2 (interference immunity)
NAMUR	Association of Standards for Measurement and Control in the Chemical Industry

Table of °Brix (density calculation)

Density of hydrous saccharose solution in kg/m^3								
°Brix	**10 °C**	**20 °C**	**30 °C**	**40 °C**	**50 °C**	**60 °C**	**70 °C**	**80 °C**
0	999.70	998.20	995.64	992.21	988.03	983.19	977.76	971.78
5	1019.56	1017.79	1015.03	1011.44	1007.14	1002.20	996.70	989.65
10	1040.15	1038.10	1035.13	1031.38	1026.96	1021.93	1016.34	1010.23
15	1061.48	1059.15	1055.97	1052.08	1047.51	1042.39	1036.72	1030.55
20	1083.58	1080.97	1077.58	1073.50	1068.83	1063.60	1057.85	1051.63
25	1106.47	1103.59	1099.98	1095.74	1090.94	1085.61	1079.78	1073.50
30	1130.19	1127.03	1123.20	1118.80	1113.86	1108.44	1102.54	1096.21
35	1154.76	1151.33	1147.58	1142.71	1137.65	1132.13	1126.16	1119.79
40	1180.22	1176.51	1172.25	1167.52	1162.33	1156.71	1150.68	1144.27
45	1206.58	1202.61	1198.15	1193.25	1187.94	1182.23	1176.14	1169.70
50	1233.87	1229.64	1224.98	1219.93	1214.50	1208.70	1202.56	1196.11
55	1262.11	1257.64	1252.79	1247.59	1242.05	1236.18	1229.98	1223.53
60	1291.31	1286.61	1281.59	1276.25	1270.61	1264.67	1258.45	1251.88
65	1321.46	1316.56	1311.38	1305.93	1300.21	1294.21	1287.96	1281.52
70	1352.55	1347.49	1342.18	1336.63	1330.84	1324.80	1318.55	1312.13
75	1384.58	1379.38	1373.88	1368.36	1362.52	1356.46	1350.21	1343.83
80	1417.50	1412.20	1406.70	1401.10	1395.20	1389.20	1383.00	1376.60
85	1451.30	1445.90	1440.80	1434.80	1429.00	1422.90	1416.80	1410.50

Table of °Brix used in the Brix density calculation

Source:
A. & L. Emmerich, Technical University of Brunswick; officially recommended by ICUMSA, 20th Session, 1990

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