

Flow-Meter DF 9648

Flow measurement with pulse sensors

Features

- LED-Display 14.2 mm red
- Measuring range programmable
-99999 ... 99999 Digit
- 0 ... 3 decimals programmable
- 2 totalizers programmable
indicating range -99999 ... 999999 digit
- Additional 2nd measuring input
- Pulse output for external evaluation
- Max. 4 alarm outputs,
relay (SPDT) or electronic voltage free
- Isolated analog output
0/4 ... 20 mA, 0/2 ... 10 V DC (depends on burden)
- Front protection IP65



DIN 96x48 mm

General

The Flow-Meter DF9648 is used in food technology, chemical and pharmaceutical industry and water technology. In connection with any type of pulse flow sensor the actual flow rate and total flow can be measured, displayed and converted to an analog output signal. Using the alarm outputs a dosage of quantity may be realized.

Short information

Programming	Parameters are programmed via front side membrane keypad
Flow rate measurement	The measured values are averaged continuously over a period of 0.1 ... 10 s (programmable). Please notice, for real measurement at least 2 positive pulses are needed within programmed time interval.
Totalizers	Totalizers can be reset manually or by external signal. While the daily totalizer is also reset with power-off, the overall totalizer is zero voltage protected
Alarm outputs	Switching performance min. or max., hysteresis, on-delay time and off-delay time are programmable in range from 1 s up to 9 h.
Analog output	Proportional to the display value an isolated analog output signal 0 ... 20 mA / 0 ... 10 V DC or 4 ... 20 mA / 2 ... 10 V DC can be generated. Start value and end value are programmable. Dependent on burden, the output switches from current to voltage.
Pulse output	Allows an external summation of flow quantity.

Technical data

Power supply

Supply voltage	: 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$; 24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption	: max. 3.5 VA, with analog output 5 VA
Working temperature	: -10 ... +55 °C
Rated voltage	: 250 V _r acc to VDE 0110 between input/output/supply voltage degree of pollution 2, over voltage category III
Test voltage	: 4 kV _r , between input/output/supply voltage
Konformität	: CE

Measuring input

Type	: Sensor with AC-output (coil), Namur-Sensor or e.g. Hall-Sensor (rectangular pulse) programmable. Alternative external pulses 0/5 ... 24 V DC
Input coil	: Switching threshold programmable from ± 5 ... ± 2000 mV pull-down resistor 100 k Ω
Input NPN-sensor	: Low level < 0.9 V, high level > 2.1 V, pull-up-resistor 20 k Ω
Input PNP-sensor	: Low level < 0.9 V, high level > 2.1 V, pull-down-resistor 20 k Ω
Input Namur-sensor	: Low level < 1.2 mA, high level > 2.1 mA, hysteresis 0.5 mA, pull-down-resistor 1 k Ω
Input relay	: Pulse width min. 5 ms
Measuring frequency	: Input A or B 0.1 Hz ... 15k Hz (relay max. 30 Hz) Input A and B together 0.1Hz ... 8 kHz (relay max. 30 Hz)
Reset-input	: Low level < 0.9 V, high level > 2.1 V pull-down-resistor 20 k Ω , pulse width min. 5 ms, reset at rising edge
Accuracy	: $\leq 0.1\%$ ± 1 Digit
Sensor supply	: 8 V DC stabilized (Namur), 24 V DC (coil, NPN, PNP, Push-Pull), Ri approx. 150 Ω , max.50 mA (25 mA with 4 relay outputs)

Display

Parameter display	: LED 2-digit red, 7 mm (parameter - and output indicator)
Display range	: Flow = -99999 ... 999999 Digit, Totalizers = -99999 ... 0 ... 999999 Digit with leading zero suppression, max. 3 decimals daily totalizer is not voltage safe; overall totalizer is voltage safe

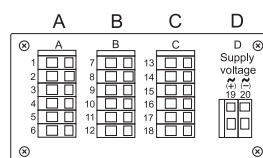
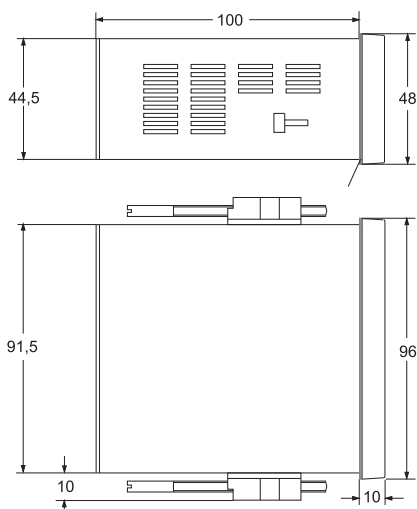
Output

Relay	: SPDT <250 V AC <250 VA <2 A, <300 V DC <50 W <2 A
Transistor	: max. 35 V AC/DC/100 mA, with short circuit protection and optical isolation
Analog output	: 0/4 ... 20 mA burden $\leq 500 \Omega$; 0/2 ... 10 V burden $> 500 \Omega$, isolated Automatic output changing (burden dependent)
-Accuracy	: 0.1 %; TK 0.01 %/K
Pulse output	: Transistor ≤ 5 Hz, Relay ≤ 0.1 Hz (max 500,000 switching cycles) pulse-width 100 ms

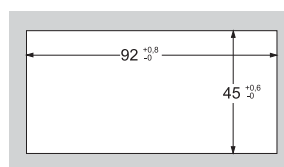
Panel case

Weight	: max. 390 g
Electrical connection	: Clamp terminals, 2 mm ² single wire, 1,5 mm ² flexible wire, AWG14
Protection	: Front IP65, terminals IP20, finger safe acc. BGV A3

Dimension



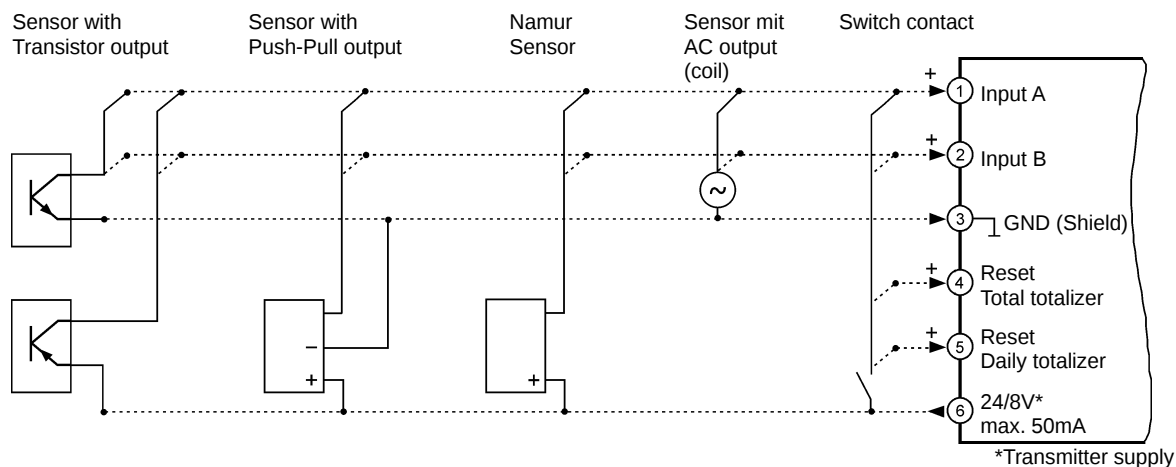
Position terminal strips



Panel cut-out

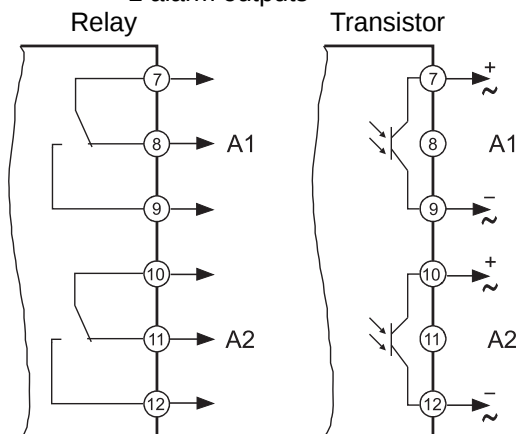
Connection diagrams

Terminal strip A



Terminal strip B (varies with version)

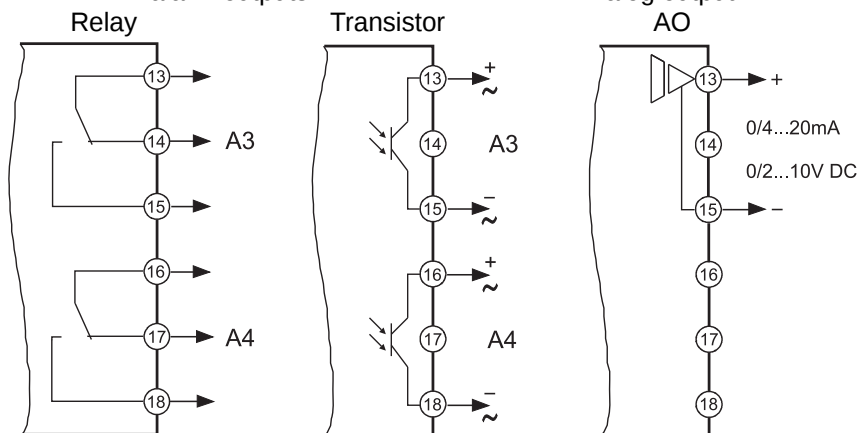
2 alarm outputs



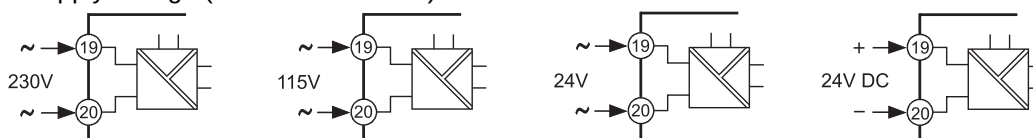
Terminal strip C (varies with version)

2 alarm outputs

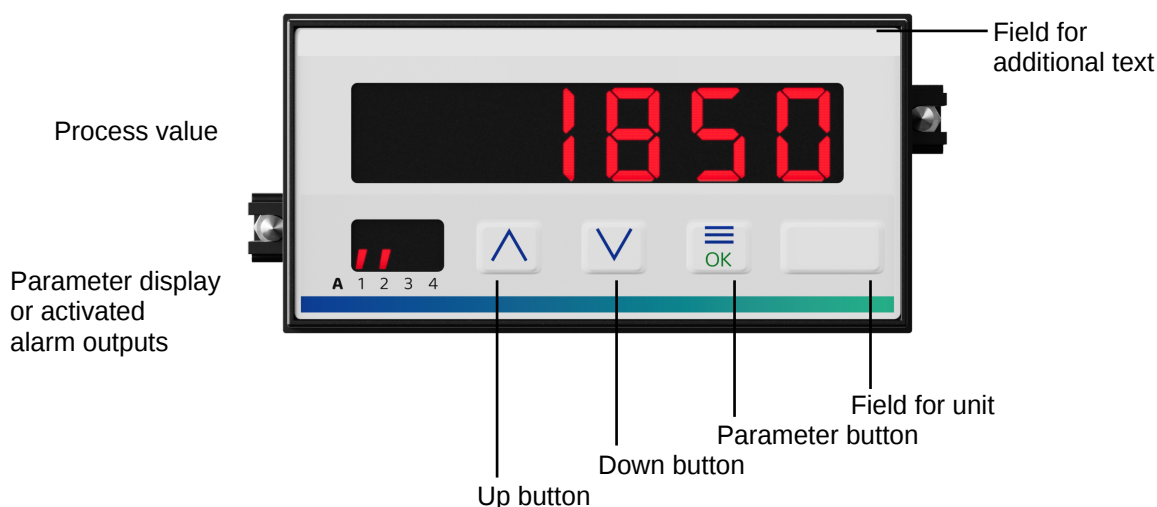
Analog output



Terminal strip D supply voltage (varies with version)



Controls and indicators



Description

Operation of the device is arranged in 2 levels. While programming, pressing the button  saves the current parameter and moves to the next programming step. For selection within a parameter or for entering data, use buttons  and .

Button combinations:

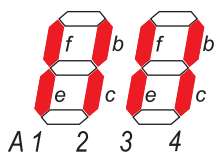
-  +  one parameter back.
-  +  setting parameter to zero or minimum value.

After powering up, the device is located in the **Working level**. The actual flow rate, daily and overall totalizers can be displayed and changed.

Pressing the button  for more than 2 seconds, activates the **Configuration level**. Now all the parameters which defines the function of the panelmeter can be programmed. These are the measuring input, input configuration, totalizer, switching performance of the alarm outputs and the analog output signal.

After finishing the configuration or when no button was pushed for more than 2 minutes, the program returns to the working level. Leaving the configuration level is possible at any time by pressing the button  for more than 2 seconds.

Parameter display as status indicator for the alarm outputs A1-A4.



Segments f (A1 / A3) and/or b (A2 / A4) are flashing with 2 Hz, when delay time is active.

Segments e (A1 / A3) or c (A2 / A4) are output indicators.

Error messages:

PE When reading this message in the parameter display, a parameter failure has been occurred. The display flashes. When pushing one of the buttons the error code will be deleted and the device is running with factory settings. Configuration and function of the device must be checked. If the error occurs again, please ship the device to factory for repair service.

Loc Programming lock active ⇒ see configuration page 10

Display flashes Overflow of the display range

Start-up note:

Before setting into operation, the device must be configured for the intended use.

⇒ see page 6

Notes to representation



Parameter is only displayed if configured

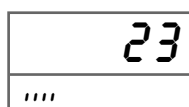


Parameter is only displayed if included (see order code)

Note: All parameters can be called if they are not blocked by other programmed parameters and if they are available. Factory settings are shown at the configuration level in the **display graphic**.

Working level

Button	Display	Description
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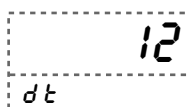


Primary process value

The standard version displays the flow rate as primary process value. With option 12 even the totalizer can be programmed as primary process value. Additional indication of the output state (only if installed and activated).

Secondary process values

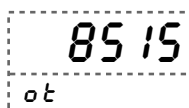
If no button was pressed, the primary process value will be displayed automatically after 2 minutes. An overflow of a secondary process value will set display flashing with 999999 or -999999).



Daily totalizer (quantity of the day)

Reset to "0" or programmed start value (parameter 15) by pressing buttons ▲ and ▼ simultaneous.

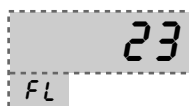
Display will alternating between totalizer value and programmed measuring unit (see page 8, parameter 13).



Overall totalizer (overall quantity)

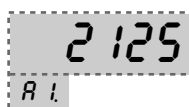
Reset not possible in working level

Display will alternating between totalizer value and programmed measuring unit (see page 8, parameter 13).



Flow rate.

If a totalizer is programmed as primary process value (see page 8, parameter 19). Display will alternating between flow rate and programmed measuring unit (see page 8, parameter 13).



Setpoint alarm output A1 (acc. to configuration)

Setting possible from -99999 ... 999999 digit with buttons ▲ and ▼.

Note: Settings of alarm outputs A1 to A4 are identical.

Configuration

Button	Display	Description (Display graphic shows factory settings)
--------	---------	--

Press
2s



1

COIL
In

Configuration level

Measuring principle (sensor) input A and B

COIL : coil

PNP, PNP : transistor

NPNPNP : Namur

RELAYS : relay (external switch contacts)

Selection with buttons ▲ and ▼.

For sensors with push-pull output, PNP must be selected.
(e.g. flow sensor FS222, ⇒ see page 11).



2

100
Er

Input sensitivity / switching level for AC-signal (COIL)

Setting possible from ± 5 ... 1999 mV with buttons ▲ and ▼.

Note: The switching level of the input should be programmed as high as possible. Please take into consideration that the amplitude of the output signal is getting lower, with less flow. Not used inputs should be connect to terminal 3 (gnd).



3

A-b
Fu

Input function

Subb addition of input A and B

A-b subtraction of input A and B

Selection with buttons ▲ and ▼.



For K-factor see type label or data sheet of the used sensor.



4

.000
d1

Decimals K-factor of flow sensor input A

0 ... 5 decimals

Selection with buttons ▲ and ▼.



5

1.000
F1

K-factor of flow-sensor input A, stated in pulses/litre.

Other units must be converted to pulses/litre.

Setting possible from 1 ... 999999 digit with buttons ▲ and ▼.



6

.000
d2

Decimals K-factor of flow sensor input B

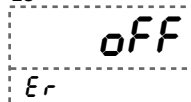
0 ... 5 decimals

Selection with buttons ▲ and ▼.



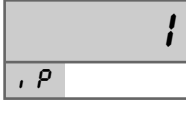
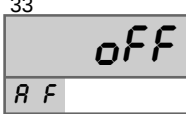
continue
page 7

Button	Display	Description (Display graphic shows factory settings)
 	7 1.000 F2	K-factor from flow-sensor input B, stated in pulses/litre. Other units must be converted to pulses/litre. Setting possible from 1 ... 999999 digit with buttons  and  .
 	8 LitEr UF	Measuring unit of flow LitEr : litre/time base m ³ : m ³ /time base GALLON : gallon (US)/time base bArrel : barrel (US)/time base Selection with buttons  and  . (Time base "t b" see parameter 9)
 	9 mm,n tb	Time unit flow rate (e.g. L/s , m ³ /h) s E c : second mm,n : minute hour : hour Selection with buttons  and  .
 	10 1.0 rt	Refresh time (measuring interval) Attention! Within programmed refresh time at least 2 positive slopes of the input signal must be detected. Setting possible from 0.1 ... 10.0 s with buttons  and  .
 	11 0. dP	Decimals of flow process value 0 ... 3 decimals Selection with buttons  and  .
 	12 off t	Totalizers active / not active Selection with buttons  and  .

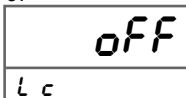
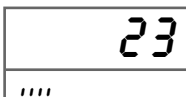
Button	Display	Description (Display graphic shows factory settings)
 	13 	Measuring unit of totalizers <i>L.tE.r</i> : litre/time base <i>m³</i> : m ³ /time base <i>GALLON</i> : gallon (US)/time base <i>BARREL</i> : barrel (US)/time base Selection with buttons  and  .
 	14 	Decimals for totalizers 0 ... 3 decimals Selection with buttons  and  .
 	15 	Start value of both totalizers Setting possible from -99999 ... 999999 digit with buttons  and  .
 	16 	Actual value of daily totalizer Reset to programmed start value (parameter 15) by pressing buttons  and  at the same time.
 	17 	Actual value of overall totalizer Reset to programmed start value (parameter 15) by pressing buttons  and  at the same time.
 	18 	External reset of overall totalizer <i>oFF</i> : only internal reset in the configuration level allowed <i>oN</i> : external reset signal connected to terminal 4 possible Selection with buttons  and  .
 	19 	Selection of primary process value (option 12) <i>FL</i> : flow <i>d.t</i> : daily totalizer <i>o.t</i> : overall totalizer Not selected values can be displayed as secondary process values in the working level. Selection with buttons  and  .

Button	Display	Description (Display graphic shows factory settings)
↓	20 	Alarm function of output A1 oFF : off FL : flow dt : daily totalizer ot : total totalizer Selection with buttons ▲ and ▼.
↺		
↓	21 	Switching performance of alarm output A1 onL : (min) continuous contact: on-off onJ : (max) continuous contact: off-on Selection with buttons ▲ and ▼.
↺		
↓	22 	Set point of alarm output A1 Setting possible from -99999 ... 999999 digit with buttons ▲ and ▼.
↺		
↓	23 	Hysteresis of alarm output A1 Setting possible from 1 ... 999999 digit with buttons ▲ and ▼.
↺		
↓	24 	Switch-on delay time output A1 Setting possible from 000.00 ... 9.00.00 (h.mm.ss) with buttons ▲ and ▼.
↺		
↓	25 	Switch-off delay time output A1 Setting possible from 0.00.00 ... 9.00.00 (h.mm.ss) with buttons ▲ and ▼.
↺		
		Note: The switching delay time can be delaying additional to the measuring interval (parameter 10).
↓	26 	Alarm function of alarm output A2 oFF : off FL : flow dt : daily totalizer ot : total totalizer P : pulse output Selection with buttons ▲ and ▼.
↺		

continue
page 10

Button	Display	Description (Display graphic shows factory settings)
	27 	Switching performance of alarm output A2 <i>on</i> : (min) continuous contact: on-off <i>off</i> : (max) continuous contact: off-on Selection with buttons  and  .
		
	28 	Set point of alarm output A2 Setting possible from -99999 ... 999999 digit with buttons  and  .
		
	29 	Hysteresis of alarm output A2 Setting possible from 1 ... 999999 digit with buttons  and  .
		
	30 	Switch-on delay time alarm output A2 Setting possible from 0.00.00 ... 9.00.00 (h.mm.ss) with buttons  and  .
		
	31 	Switch-off delay time alarm output A2 Setting possible from 0.00.00 ... 9.00.00 (h.mm.ss) with buttons  and  .
		Note: The parameter settings for A3 ... A4 have to be configured the same way as A1
	32 	Pulse output Volume per pulse in the programmed measuring unit of flow. Please note the maximum output frequency (see technical data). For indication of negative flow rates (via input B), it is possible to set an alarm output to "0". Setting possible from 1 ... 99999 digit with buttons  and  . Example: measuring unit <i>L.t.Er/...</i> , configuration <i>!0</i> . All 10 litres an impuls will be generated.
		
	33 	Assignment of the analog output <i>off</i> : off <i>FL</i> : flow <i>dt</i> : daily totalizer <i>ot</i> : total totalizer Selection with buttons  and  .
		

continue
page 11

Button	Display	Description (Display graphic shows factory settings)
	34 	Configuration of analog output $0 - 20$ mA (0 - 10 V DC) $4 - 20$ mA (2 - 10 V DC). Dependent on burden the output switches from current to voltage mode. ($\leq 500\Omega$ = current output, $> 500\Omega$ = voltage output). Selection with buttons  and  .
		
	35 	Start value for analog output Setting possible from -99999 ... 999999 digit with buttons  and  .
		
	36 	End value for analog output Setting possible from -99999 ... 999999 digit with buttons  and  . If the start value $R5 >$ end value RE , the output works with decreasing characteristic.
		
	37 	Parameter lock off : no lock $conf.$: configuration level locked ALL : all parameters locked RL : only with analog output (for factory settings) Selection with buttons  and  .
		
		Return to the working level.

Ordering code

DF9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A

- 1 Input for sensors with AC-signals (coil), pulse signal (Namur, NPN, PNP, Push-Pull) or switching contact
- 2 as 1, but additional 2nd measuring input for addition / subtraction

2. Terminal strip B

- 00 not installed
- 2R 2 alarm outputs Relay
- 2T 2 alarm outputs Transistor (1 alarm / 1 pulse output Option11)

3. Terminal strip C

- 00 not installed
- 2R 2 alarm outputs Relay
- 2T 2 alarm outputs Transistor
- AO analog output 0/4 ... 20 mA or 0/2 ... 10 V DC isolated

4. Terminal strip D supply voltage

- 0 230 V AC $\pm 10 \%$ 50-60 Hz
- 1 115 V AC $\pm 10 \%$ 50-60 Hz
- 4 24 V AC $\pm 10 \%$ 50-60 Hz
- 5 24 V DC $\pm 15 \%$

5. Options

- 00 without option
- 11 pulse output external applications (only in connection with terminal strip B)
- 12 primary process value programmable as flow, daily - or overall totalizer

6. Unit (appears in the unit field)

- 7. Additional text (appears in the field for additional text max. 3 x 90 mm, WxH)