FISCHER MESS- UND REGELTECHNIK

Operating Manual

FD38 | **Digital flow transmitter / switch with colour-change LCD**

Table of Content

1 Safety Guidelines

1.1 General

This operating manual contains instructions fundamental to the installation, operation and maintenance of the device that must be observed unconditionally. It must be read by the assembler, operator and the specialized personnel in charge of the device before it is installed and put into operation.

This operating manual is part of the product and must be kept close by where it is easily accessible to the responsible specialized personnel.

The subsequent sections, in particular the instructions on assembly, commissioning and maintenance, contain important safety instructions, non-observance of which can endanger persons, animals, the environment and physical objects.

1.2 Personnel Qualification

The device may only be installed and commissioned by specialized personnel familiar with the installation, commissioning and operation of this product.

Specialized personnel are persons who can assess the work they have been assigned and recognize potential dangers by virtue of their specialized training, their skills and experience and their knowledge of the relevant standards.

1.3 Risks due to Non-Observance of Safety Instructions

Non-observance of these safety instructions, the intended use of the device or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the system itself.

The manufacturer will not be liable for damage claims if this should happen.

1.4 Safety Instructions for the Operating Company and the Operator

The safety instructions on correct operation of the device must be observed. The operating company must make them available to the installation, maintenance, inspection and operating personnel.

Dangers arising from electrical components, energy discharged by the medium, escaping medium and incorrect installation of the device must be eliminated. For more information, please see the applicable national and international regulations.

In Germany these are the DIN, EN, accident prevention regulations (UVV) and - for industry-specific individual applications - also in the industry guidelines issued by the DVWG, Ex, GL, etc. as well as VDE and local EVUs.

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1.5 Unauthorised Modification

Modifications of or other technical alterations to the device by the customer are not permitted. This also applies to replacement parts. Any modifications / alterations required must be carried out by Fischer Mess- und Regeltechnik GmbH only.

1.6 Inadmissible Modes of Operation

The operational safety of this device can only be guaranteed if it is used as intended. The device model must be suitable for the medium used in the system. The limit values given in the technical data may not be exceeded.

1.7 Safe working practices for maintenance and installation work

The safety instructions given in this operating manual, any nationally applicable regulations on accident prevention and any of the operating company's internal work, operating and safety guidelines must be observed.

The operating company is responsible for ensuring that all required maintenance, inspection and installation work is carried out by qualified specialized personnel.

1.8 Pictogram explanation

WARNING!
… indicates a potentially dangerous situation, non-observance of which could endanger persons, animals, the environment or objects.

ATTENTION!
… highlights important information efficient and smooth operation.

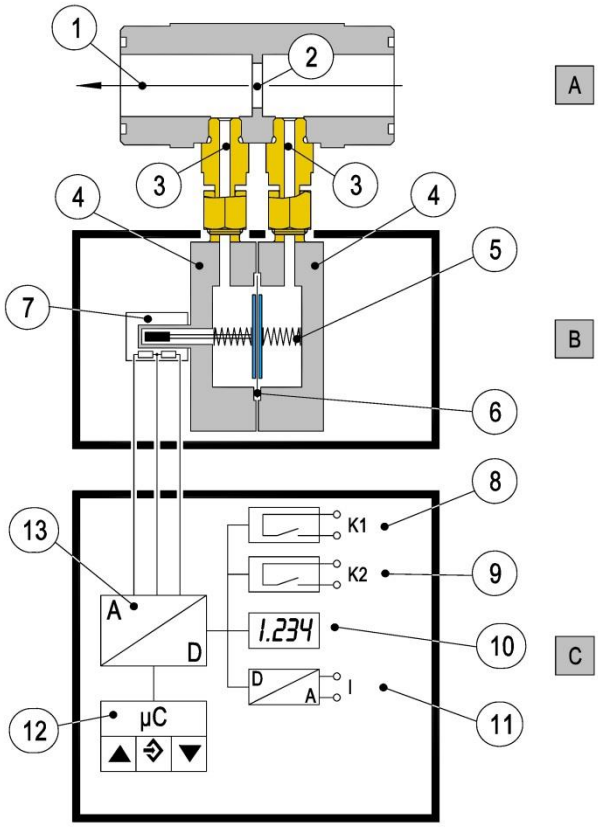
NOTE!
… indicates recommendations that are not specifically necessary in certain situations but which could be useful.

2 Application Purpose

The device serves to measure the flow of non-aggressive liquid and gaseous media. The manufacturer must be consulted before using the device for aggressive media because media-compatible materials are required for the measuring path.

3 Description of the Product and Functional Description

3.1 Function Diagram



A	**Measuring path**
1	Flow direction
2	Measuring orifice
3	Differential pressure removal borehole

B	**Membrane measuring system**
4	Pressure chamber
5	Measuring springs
6	Measuring membrane
7	Inductive displacement transducer

C	**Electronics**
8	Switch output 1
9	Switch output 2
10	LC display
11	Analogue output
12	Microcontroller
13	Signal preparation

3.2 Design and mode of operation

The measuring section comprises a measuring orifice with differential pressure removal boreholes and a differential pressure sensor with a sturdy and non-sensitive unit.

In case of differential pressure, a force is exerted on the measuring diaphragm which causes a deflection in the direction of the lower pressure. This deflection is transferred to an inductive displacement transducer via a tappet, and is then converted to a

square rooted analogue output signal by the microprocessor-controlled electronics.

Optionally, there are also two additional switch outputs available.

4 Installation and Assembly

All supply lines are arranged so that there are no mechanical forces acting on the device.

The device is set ex-works for vertical installation, however any installation position is possible. If an installation position other than vertical is selected, the zero-point signal can be corrected with the offset setting.

The device is designed for installation onto flat assembly plates. The device has four mounting boreholes for tapping screws with a diameter of 3.5 mm on the reverse for screwing to the mounting plate.

Optionally, the device can be supplied with a wall mounting plate (see order code).

If the device is intended for outdoor use, we recommend permanently protecting the membrane keypad against UV radiation and using a suitable enclosure or at least the erection of a sufficiently dimensioned canopy as a protection measure against constant rain or snow.

4.1 Process connection

- By authorized and qualified specialized personnel only.
- The pipes need to be depressurized when the device is being connected.
- Appropriate steps must be taken to protect the device from pressure surges.
- Check the suitability of the device for the media to be measured.
- Maximum pressures must be observed.
- Check that the pressure connections do not leak before commissioning.

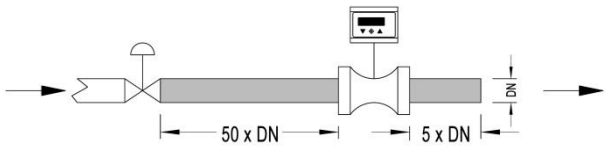
A connection thread with an O-ring is required for the pipe connection. The device must be installed between two straight cylindrical pipe paths. Deposits, edges and offsets that protrude into the flow should be avoided. The pipe must be completely filled with the medium that is to be measured. Air bubbles in the fluid must be avoided. Prevent cavitation.

The DIN ISO 5167-1 defines the stipulated feed and discharge paths for the various installation situations. To achieve smooth flow conditions, this line mass must be observed.

The following shows the most common installation situations. The arrows show the flow direction and DN denotes the nominal width.

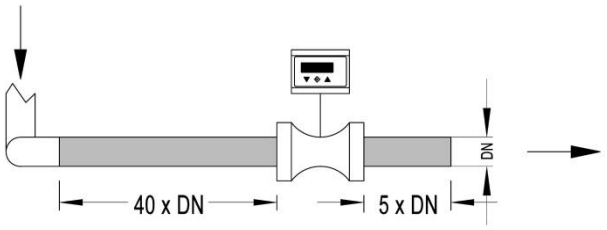
4.1.1 Control valve

Feed and discharge path after a control valve.



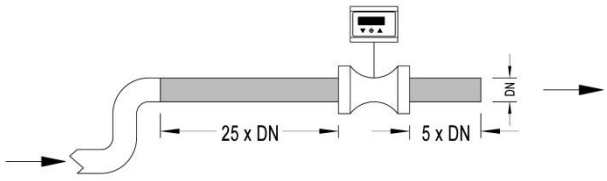
4.1.2 2 x 90° bend (3D)

Feed and discharge path after a 90° bend in the space.



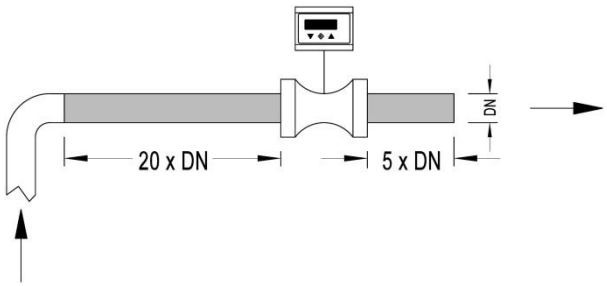
4.1.3 2 x 90° bend (2D)

Feed and discharge path after a 90° bend on a level.



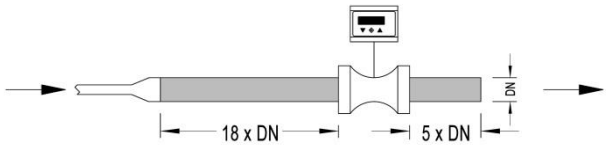
4.1.4 90° bend or T-piece

Feed and discharge path after a single 90° bend.



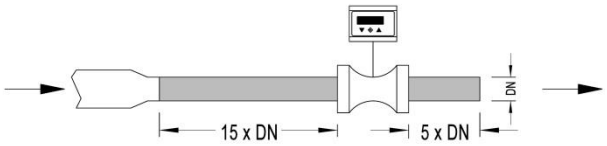
4.1.5 Pipe expansion

Feed and discharge path after an expansion of the nominal width.



4.1.6 Pipe reduction

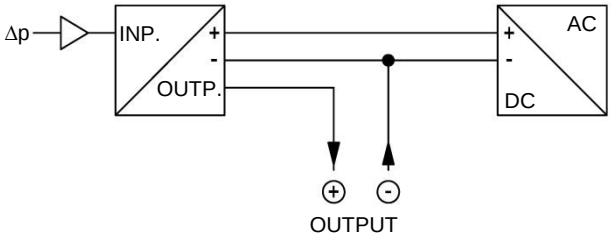
Feed and discharge path after a reduction of the nominal width.



4.2 Electronic connection

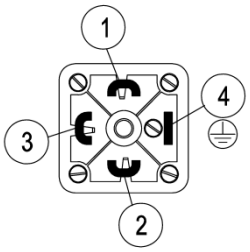
- By authorized and qualified specialized personnel only.
- The electrical connection of the device shall be performed according to relevant VDE and local electricity board regulations.
- Disconnect the system from the mains before connecting the device.
- Add a fuse adapted to the energy requirements.

4.2.1 3-conductor circuit



4.2.2 Version with rectangular connector

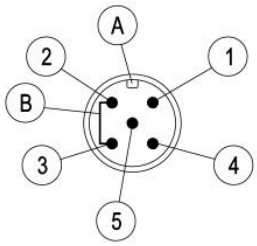
Plug DIN EN 175 301-803 A:
Supply and output signal



Pin	Signal name		Cable colour
1	Supply	$+U_b$	brown
2	Supply	$- U_b$	blue
3	Output	+ Sig	black
4	Functional earth	FE ⏚	green/yellow

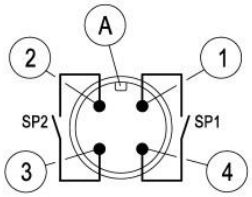
4.2.3 Version with M12 plug connectors

Connector 1: Supply and output signal



Pin	Signal name		Cable colour
1	Supply	$+U_b$	brown
2	Output	- Sig	white
3	Supply	$- U_b$	blue
4	Output	+ Sig	black
5	Functional earth	FE ⏚	green/yellow
A	Coding		
B	Bridge		

Connector 2: Switching outputs



Pin	Signal name		Cable colour
1	Switch output 1	SP1	brown
2	Switch output 2	SP2	white
3	Switch output 2	SP2	blue
4	Switch output 1	SP1	black
A	Coding		

4.3 Commissioning

All electrical supply, operating and measuring lines, and the pressure connections must have been correctly installed before commissioning. All supply lines are arranged so that there are no mechanical forces acting on the device.

Check that the pressure connections do not leak before commissioning.

5 Operation

5.1 General points

During programming, the display shows the menu item and the associated parameter. The device works whilst parameters are being set; changes come into effect immediately apart from one exception. The exception is the change of switching times - in this case, the previously valid time must have expired first.

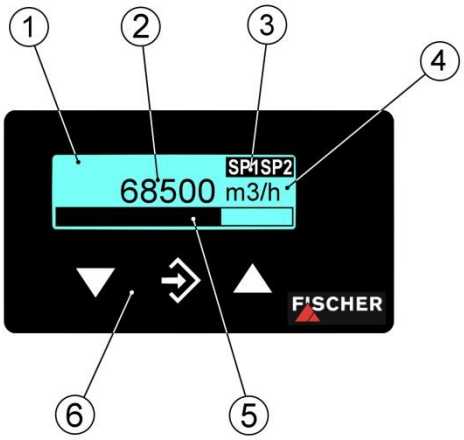
The device is configured to customer specifications in the factory. This is why it is necessary to complete the panel questionnaire [1].

WARNING!

Configuring the device in the factory means that it is set to the optimum for the measuring path. Modification of individual parameters can significantly impact on or destroy the functional capability.

5.2 Display

5.2.1 LC display



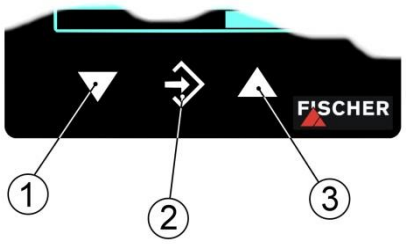
1 LC display with back lighting
2 Measurement display 4…6 digits
3 Status display of the switch points
4 Unit
5 Bar chart display
6 Keyboard

In normal mode the current flow is represented on a 4-digit LD display. This can be changed to a 5 or 6-digit presentation in the case of very large values (parameter ***Decimal place MB*** (Nachkomma MB)). The unit is shown on the right of the display. If the device is equipped with contacts, a closed contact is symbolised by the inverted text "SP1" or. "SP2".

Various colours can be selected for the back lighting (see 5.3.4). Depending on the measured value, the colour of the back lighting can be automatically changed. This can be used e.g. to depict good/poor differences. The back lighting can also be deactivated.

The measured value can also be shown in a bar chart. In this case, the measured value is shown in a smaller illustration above the bar chart.

5.2.2 Keyboard



1 Menu downwards, reduce value
2 Call up menu, save value
3 Menu upwards, increase value

The individual menu items and parameters can be displayed using the buttons ▲ and ▼. The respective menu item is selected or the parameters for making changes are called up via the button ↵.

If a parameter can be changed, the display flashes. The change is made via the buttons ▲ and ▼. The value is saved with the button ↵.

To leave a menu level or the entire menu, select "Quit" and press ↵.

Example: Setting the switch points

In normal mode, press the button ↵ to enter the menu. ***Menüebene Schaltpunkte*** appears in the display; to change the switch points press the ↵ button again and the parameter ***Schaltpunkt 1 ein*** is shown.

The device jumps to the input:

- The parameter is stated in the first line.
- The value that is to be changed is shown in the second line, the display flashes.
- The input limits are displayed in the 3rd line (if there is one).

The required value is set with the buttons ▲ and ▼ and then confirmed with ↵.

[1] Please contact our sales team about this.

5.3 Menu

Description *Parameter name*

Menu Level Switch points

Switch point 1:

Switch point 1 On .... ***SP1 Ein***
Switch point 1 Off .... ***SP1 Aus***
Switch point 1 Delay..... ..... ***SP1 Verzögerung***
Switch point 1 Function..... ..... ***SP1 Funktion***

Switch point 2:

Switch point 2 On .... ***SP2 Ein***
Switch point 2 Off .... ***SP2 Aus***
Switch point 2 Delay..... ..... ***SP2 Verzögerung***
Switch point 2 Function..... ..... ***SP2 Funktion***

Menu Level Input

Damping..... ..... ***Dämpfung***
Offset correction .... ***Offsetkorrektur***
Zero-point window .... ***Nullpunktfenster***

Men level measurement (default setting)

Measuring range 1 start..... ..... ***Messber. Anfang***
Measuring range 1 end .... ***Messber. Ende***
Measuring range 1 unit..... ..... ***Einheit***
Measuring range 1 limit .... ***Begrenzung***

Menu Level Output

min. output .... ***min. Ausgang***
max. output..... ..... ***max. Ausgang***
Error signal..... ..... ***Fehlersignal***

Men level function (default setting)

Function: root extracted..... ..... ***radiziert***
Measuring range decimal places .... ***Nachkomma MB***
Measuring range start .... ***MB-Anfang***
Measuring range end .... ***MB-Ende***
Measuring range unit..... ..... ***Einheit MB***

Menu Level Display

Colour..... ..... ***Farbe***

(a) *The menu changes for the value Auto1:*

Red-green switchover..... ..... ***Rot-Grün Umsch.***
Green-red switchover .... **Grün-Rot Umsch.**
Hysteresis .... ***Hysterese***
Delay .... ***Verzögerung***
Colour .... ***Farbe***

(a) The menu changes for the value Auto2:

Red-yellow switchover..... ..... ***Rot-Gelb Umsch.***
Yellow-green switchover..... ..... ***Gelb-Grün Umsch.***
Green-yellow switchover .... ***Grün-Gelb Umsch.***
Yellow-red switchover..... ..... ***Gelb-Rot Umsch.***
Hysteresis .... ***Hysterese***
Delay .... ***Verzögerung***
Colour .... ***Farbe***

Lighting time..... ..... ***Beleuchtung***
Contrast..... ..... ***Kontrast***
Bar chart..... ..... ***Bargraf***

Menu Level System

Device information..... ..... ***Software Info***
Device information..... ..... ***Konfig Info***
Operating time/switch cycles .... ***Statistik***
Access control .... ***Passwort***
Data backup .... ***Konfig. laden***
Data backup .... ***Konfig. sichern***

5.3.1 Menu Level Switch points

The two switch outputs are configured by four parameters respectively.

For the switch point 1 these are

SP1 Ein	SP1 On
SP1 Aus	SP1 Off
SP1 Verzögerung	SP1 Delay
SP1 Funktion	SP1 Function
Zuordnung SP	Assignment SP

Accordingly for switch point 2:

SP2 Ein	SP2 On
SP2 Aus	SP2 Off
SP2 Verzögerung	SP2 Delay
SP2 Funktion	SP2 Function

SP1 Ein defines the activation point, ***SP1 Aus*** the deactivation point of switch output 1. The values are shown in the valid unit and set accordingly.

Together, the two parameters determine the switch function of switch output 1:

If ***SP1 Aus*** < ***SP1 Ein***, the output switches on, if SP1 On exceeds the measured value ***SP1 Ein***. It is only switched off again if the measured value ***SP1 Aus*** is undercut (hysteresis function).

If ***SP1 Ein*** = ***SP1 Aus***, the output switches on if the measured value exceeds ***SP1 Ein*** and off if the measured value undercuts ***SP1 Aus***.

If ***SP1 Aus*** > ***SP1 Ein***, the output switches on, if ***SP1 Ein*** < Measured value < ***SP1 Aus*** applies (window function).

Both parameters can be set independently over the entire range.

SP1 Verzögerung allows the reaction of the switch output 1 to be delayed by between 0 and 1800 s. This value applies equally for switching on and off.

SP1 Funktion changes the function of the switch output. It is possible here to define whether the contact should work as an open contact (NO) or a break contact (NC).

5.3.2 Menu Level Input

Dämpfung	Damping
Offsetkorrektur	Offset correction
Nullpunktfenster	Zero-point window

If there are unsteady pressure readings during operation, you can use the parameters ***Dämpfung*** and ***Nullpunktfenster*** to stabilise the reading (and the output signal).

The effect of parameter ***Dämpfung*** (on the reading, output signal and switching points, if available, but not on the measuring cell!) corresponds to that of a capillary throttle. You can set the response time to pressure jumps in the range 0.0 to 100 s. But with maximum damping, it will take more than 2 minutes

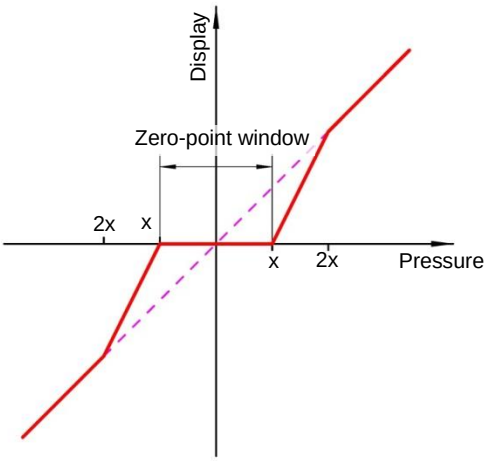
for the reading to also reach zero after a pressure jump from nominal pressure (100 %) to zero!

In many cases the unsteady readings are not a problem in normal mode, but can be a problem in idle mode, i.e. if one expects a zero (differential) pressure. The parameter ***Nullpunktfenster*** is designed to solve this. Its value defines a range around zero at which the measured value is set to zero (see fig.). The display only stops showing zero when the pressure leaves the set window. When twice the window value is reached, the measuring pressure and the display correspond again. This avoids jumps in the display.

It makes sense to set the ***Offsets*** (zero-point displacement) if, without differential pressure (remove measuring line), the display shows a value that is not zero. Before the offset correction, the zero-point window should be set to zero.

Select the ***Offsetkorrektur*** parameter and correct the reading using the buttons ▲ and ▼ until zero is shown.

When setting the offset, the current measured value is displayed. The zero-point window is not active during the offset setting.



5.3.3 Output

min. Ausgang	min. output
max. Ausgang	max. output
Fehlersignal	error signal

The parameters ***min. Ausgang***, ***max. Ausgang*** and ***Fehlersignal*** define the limits of the output signal that may not be undercut or exceeded regardless of the pressure. The limit values take priority over the range defined by the ***Messbereich Anfang*** and ***Messbereich Ende***!

These parameters primarily serve to prevent error messages in downstream systems caused by brief overstepping of measuring ranges.

The parameter ***min. Ausgang*** is usually only used for devices with an output signal 4…20 mA because frequently values of below 3.8 mA are evaluated as error signals. The ***max. Ausgang*** values can be used for the voltage and current to limit the maximum value.

The value defined via the parameter ***Fehlersignal*** is issued if the device detects an internal error and can no longer work correctly. It should be noted here that not all potential errors and faults can be detected by the device itself.

5.3.4 Menu Level Display

Farbe	Colour
Beleuchtung	Lighting
Kontrast	Contrast
Bargraf	Bar chart

Menu change for colour = Auto1:

Rot-Grün Umsch.	Red-green switchover
Grün-Rot Umsch.	Green-red switcho.
Hysterese	Hysteresis
Verzögerung	Delay
Farbe	Colour
Beleuchtung	Lighting
Kontrast	Contrast
Bargraf	Bar chart

Menu change for colour = Auto2:

Rot-Gelb Umsch.	Red-yellow switchover
Gelb-Grün Umsch.	Yellow-green switchover
Grün-Gelb Umsch.	Green-yellow switchover
Gelb-Rot Umsch.	Yellow-red switchover
Hysterese	Hysteresis
Verzögerung	Delay
Farbe	Colour
Beleuchtung	Lighting
Kontrast	Contrast
Bargraf	Bar chart

The parameters for influencing the display are summarised in this menu.

The most important parameter is ***Farbe***. Here, a permanent background colour (red, green, yellow, blue, pink, turquoise, white) can be selected. There are also two auto functions with colour switches available.

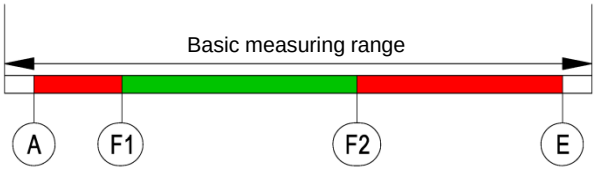
Auto1: red-green,
Auto2: red-yellow-green.

Alternatively, the background illumination can be permanently deactivated.

In the mode with the automatic colour switchover, it is possible to enter the required switch thresholds "red-yellow switchover", "yellow-green switchover", green-yellow switchover, "yellow-red switchover" or "red-green switchover" and "green-red switchover".

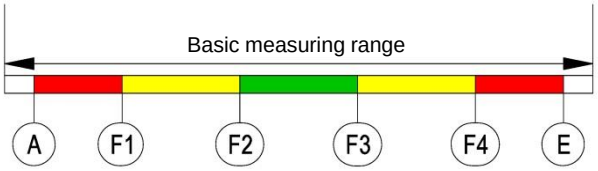
The switching thresholds can be moved within the measuring range. The series of switch points cannot be altered.

Auto-function red-green (Auto1)



	Parameter name	Description
A	MB-Anfang	Measuring range start
F1	Rot-Grün Umsch.	Colour-change red to green
F2	Grün-Rot Umsch.	Colour-change green to red
E	MB-Ende	Measuring range end

Auto-function red-yellow-green (Auto2)

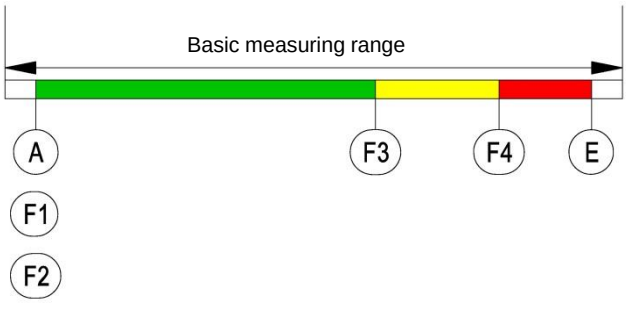


	Parameter name	Description
A	MB-Anfang	Measuring range start
F1	Rot-Gelb Umsch.	Colour-change red to yellow
F2	Gelb-Grün Umsch.	Colour-change yellow to green
F3	Grün-Gelb Umsch.	Colour-change green to yellow
F4	Gelb-Rot Umsch.	Colour-change yellow to red
E	MB-Ende	Measuring range end

N**OTE!** If a range is not to be used, the associated switch thresholds can be set to the same value.

Example:

The parameter ***Farbe*** is set to Auto2. Only the areas green, yellow and red are required. To hide the lower red and yellow areas, the switch thresholds "red-yellow switchover" and "yellow-green switchover" are set at the start of the measuring range.



The parameter ***Hysterese*** can be used to prevent fast and unwanted colour changes. The hysteresis is set in the range 0.1... 10%.

ATTENTION! In the case of large hysteresis values, steps must be taken to ensure that the areas of the individual colours do not overlap. Otherwise it is possible that the colour change will not function as required.

The parameter ***Verzögerung*** offers a further option to prevent unwanted colour changes.

The colour change here can be delayed between 0…1800 s.

If permanent lighting is not required, the parameter ***Beleuchtungszeit*** can be used to define when the lighting should be switched off after the last time a button is pressed. In addition to permanent lighting, automatic shut-down after 10…600 s is also possible. The set time is only valid if the parameter ***Hintergrundfarbe*** is not set to "off".

Amongst other things, the legibility of the display depends on the temperature and the reading angle. To ensure optimised legibility, this can be adjusted using the parameter ***Kontrast***. When the contrast is changed, it is possible that the display appears empty or almost completely black. In this case, the contrast must be turned up or down.

The parameter ***Bargraf*** is used to switch the display as follows. Either the measured value is displayed with large digits or the display uses small digits and an additional bar chart to show the measured value more quickly.

5.3.5 Menu Level System

Software info	Software info
Konfig info	Config info
Statistik	Statistics
Passwort	Password
Konfig. laden	Load config.
Konfig. speichern	Save config.

The menu items ***Software Info*** and ***Konfig Info*** provide information about the device. This information helps to answer questions about the device quickly.

The device type, controller ID and the firmware version is shown in the software info.

The basic measuring range, the defined output signal and existing contacts are stated in the Config Info.

The ***Statistik*** provide information about the operating time and the relay switching cycles from the time of delivery. The operating time is shown in days (d) and hours (h)

In the menu item ***Passwort*** the menu can be protected with a password to prevent unauthorised changes. The password is a figure from 1 to 999. The input 0 means that no password is active.

The password needs to be set if the user presses the button in normal mode to enter the menu. If a wrong password is entered, the system automatically jumps back to normal mode again. If no password is active, the display immediately jumps to the menu.

WARNING!

The user has no possibility of deleting a forgotten password!

The user can load a saved configuration via the menu item ***Konfig. laden*** This means that a functional set of parameters can be loaded after trying out various settings.

ATTENTION! if the user has not saved a configuration, the default values (delivery status) are loaded. In this case, any measuring range spreads or switch points are reset and the device needs to be reconfigured.

The menu item ***Konfig. sichern*** serves to save the existing parameters in a protected memory area. This is helpful if the settings of a functional device needs to be optimised. ***Konfig. sichern*** and ***Konfig. laden*** can be used to quickly restore the initial status again.

6 Maintenance and Repeat Tests

The device is maintenance-free. We recommend the following regular inspection to guarantee reliable operation and a long service life:

- Check the function in combination with downstream components.
- Check the leak-tightness of the pressure connection lines.
- Check the electrical connections.

The exact test cycles need to be adapted to the operating and environmental conditions. In combination with other devices, the operating instructions for the other devices also need to be observed.

7 Transport

The measuring device must be protected against impacts. It should be transported in the original packaging or a suitable transport container.

8 Service

All damaged or faulty devices must be sent directly to our repair department. Please coordinate all shipments with our sales department.

Warning

Process media residues in and on dismantled devices can be a hazard to people, animals and the environment. Take adequate preventive measures. If required, the devices must be cleaned thoroughly.

Return the device in the original packaging or a suitable transport container.

9 Accessories

- Connection cable with M12 connector
- Adapter for parameterization via PC software

10 Disposal

Incorrect disposal may pose a risk to the environment.

Please help to protect the environment by always disposing of the work pieces and packaging materials in compliance with the valid national waste and recycling guidelines or reuse them.

11 Technical data

Basic measuring ranges	mbar / bar		0…400	0…0.6
Static operating pressure	bar	max	16	16
Characteristic curve deviation	%FS	max	2.5	2.5
		type	0.8	0.8
Tk span°°	%FS/10K	max	0.8	0.4
		type	0.2	0.2
Tk zero point °°	%FS/10K	max	0.8	0.5
		type	0.2	0.2

° : Characteristic curve deviation (non-linearity and hysteresis) at 25°C, basic measuring range (linear characteristic curve, not spread)
°° : with reference to the basic measuring range (linear characteristic curve, not spread), compensation range 0..60 C.

	General points	
Admissible ambient temperature	-10 … 70°C	
Admissible media temperature	-10 … 70°C	
Admissible storage temperature	-20 … 70°C	
Enclosure protection class	IP 65 acc. to DIN EN 60529	
	Electrical data	
Rated Voltage	24 V DC/AC	
Admissible operating voltage U_b	12 … 32 V DC/AC	
Electrical connection type	Three-wire	
Characteristic curve	Programmable (partially set ex-works)	
Power consumption	approx. 2 W / VA	
Display	4-digit colour change LCD for free unit up to 6 points Display with 4-digit resolution	
	Output signal	
Admissible apparent ohmic resistance	0/4… 20 mA $U_b \le 26V$ $R_L \le \frac{U_b-4V}{0,02A}$ $U_b > 26V$ $R_L \le 1100\Omega$	0 … 10 V $U_b < 15V$ $R_L \ge 10k\Omega$ $U_b \ge 15V$ $R_L \ge 2k\Omega$
	Programmable switch contacts	
	2 potential-free relay contacts as NO contact or NC contact	2 potential-free MOSFET semiconductor switch SPST[2] as NO contact or NC contact
U_{max}	32 V AC/DC	3…32 V AC/DC
I_{max}	2 A	0.25 A
P_{max}	64 W/VA	8 W/VA
	Ports	
Electrical connection	1 x rectangular plug connector DIN EN 175 301-803 A or 2 x round plug connector M12 Plug 1 for supply and analogue output signal (5-pin, male) Plug 2 for switch contacts (4-pin, male)	
	Materials	
Casing	Polyamide PA 6.6	
Media-contacting material	Brass, FKM, NBR	

11.1 Parameters

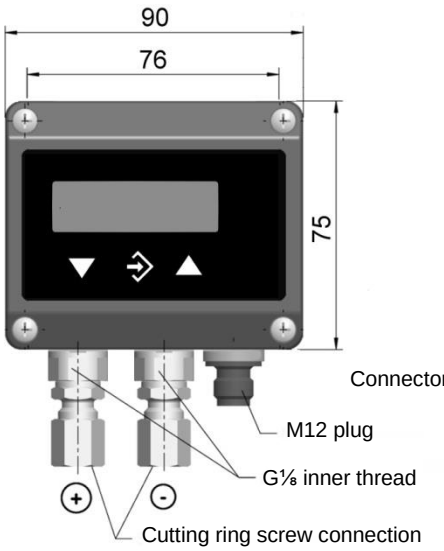
Via membrane keyboard with menu-controlled operation or PC adapter; can be locked with a password.

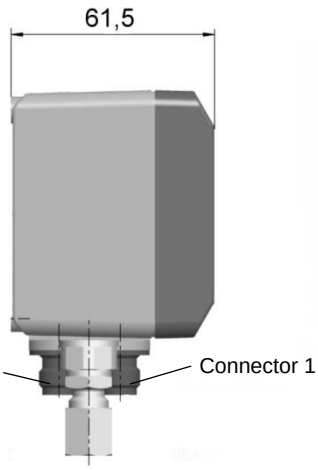
	Settings
Attenuation	0.0 ... 100.0 s (jump response time 10 / 90 %), separate also for display
Switch contacts (SP1, SP2)	Switch-off point, switch-on point, response time (0 ... 100 s); function (NO contact /NC contact)
Measuring range unit	m^3/h, l/min
Zero-point stabilising	0 ... ⅓ of the basic measuring range [3]
Zero point correction	⅓ of the basic measuring range [4]
Implementation of characteristic curve	root extracted
Password	001 ... 999 (deactivated via value = 000)

[2] SPST: **S**ingle **P**ole **S**ingle **T**hrow
[3] Measured values around zero are set to zero, e.g. to suppress leak flow rate.
[4] Zero-point correction to compensate the different installation positions.

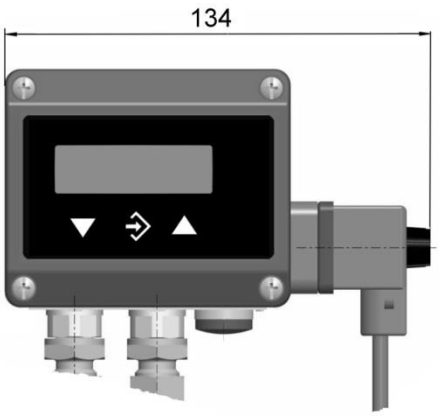
12 Dimensional drawings (All dimensions in mm unless stated otherwise)

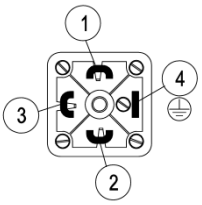
Model with M12 plug connector





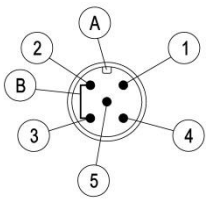
Version with rectangular connector





Rectangular plug connector
DIN EN 175 301-803 A

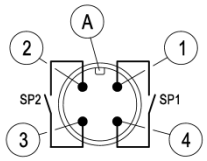
1	Supply	$+U_b$
2	Supply	$-U_b$
3	Output	+Sig
4	Functional earth	



Plug 1
M12 plug 5-pin

1	Supply	$+U_b$
2	Output	-Sig
3	Supply	$-U_b$
4	Output	+Sig
5	Functional earth	

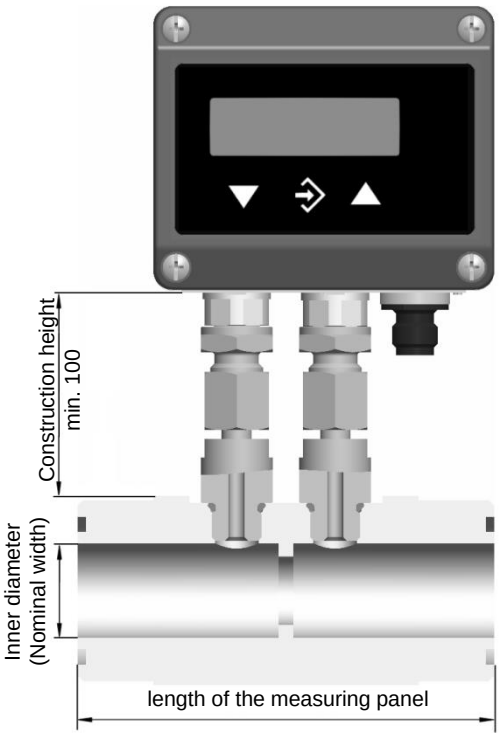
A Coding
B Bridge



Connector 2
M12 plug 4-pin

1	Switch output 1	SP1
2	Switch output 2	SP2
3	Switch output 2	SP2
4	Switch output 1	SP1

A Coding



ATTENTION! NOTE: The dimensions of the measuring panel, in particular the construction height and the length, are determined on the basis of the information in the panel questionnaire [5] and are recalculated for each application case.

[5] Please contact our sales team about this.

13 Order Codes

Digital flow transmitter with colour-change LCD

Type FD38 [ ][ ] **V** [ ][ ][ ] **K** [ ][ ][ ][ ]

Nominal width / connection thread

DN15	G1	> **1**	**A**
DN20	G1¼	> **2**	**B**
DN25	G1½	> **3**	**C**
DN32	G2	> **4**	**D**
DN40	G2¼	> **5**	**E**
DN50	G2¾	> **6**	**F**
DN63	G3	> **7**	**G**

Seal with contact the measuring medium

FKM > **V**

Measuring panel material

Polypropylene (grey) > **A**
Stainless steel 1.4404 > **C**
Polyvinylide flouride (PVDF) > **E**

Measuring medium

Gas > **0** **G**
Liquid > **0** **F**

Electrical output signal (DC, 3-conductor, root extracted)

0 … 20 mA > **E**
4 … 20 mA. > **F**
0 … 10 V > **G**

Operating voltage

12 … 32 V AC/DC (24 V nominal voltage) > **K**

Measuring unit (flow)

without > **0**
m^3/h > **B**
l/min > **F**

Measured value display / contact elements

4-digit colour change LCD – without contacts > **B**
4-digit colour change LCD - 2 relay contacts > **C**
4-digit colour change LCD - 2 semiconductor switch > **D**

Electrical connection

Rectangular plug connector DIN EN 175 301-803 A (4-pin, male)6 > **H**
2x M12 round plug connector (5-pin, male and 4-pin, male) > **M**

Flow direction

Vertical > **A**
Horizontal > **D**

Customer information

In order to produce the measuring panel, the panel questionnaire needs to be completed.

13.1 Accessories

Order no.	Designation	No. of Poles	Usage	Length
06401993	Connection cable with M12 connector	4-pole	for switching outputs	2 m
06401994	Connection cable with M12 connector	4-pole	for switching outputs	5 m
06401995	Connection cable with M12 connector	5-pole	for supply / signal	2 m
06401996	Connection cable with M12 connector	5-pole	for supply / signal	5 m
EU03	Transmitter PC Interface (incl. PC software)			

[6] No switch contacts possible

14 Manufacturer's Declarations and Certificates

EG-Konformitätserklärung

Für das nachfolgend bezeichnete Erzeugnis

Digitaler Differenzdrucktransmitter / -schalter mit Farbwechsel-LCD

EC Declaration of Conformity

For the product described as follows

Digital Differential Pressure Transmitter / Switch with colour changing LCD

DE38

gemäß gültigem Datenblatt **DB_DE_DE38_LCD**
wird hiermit erklärt, dass es den grundlegenden Anforderungen entspricht, die in den nachfolgend bezeichneten Richtlinien festgelegt sind:

in accordance with the valid data sheet **DB_EN_DE38_LCD**
it is hereby declared that it corresponds with the basic requirements specified in the following designated directives:

EG Richtlinien			EC Directives		
2004/108/EG	EMV Richtlinie	EMV	EMC Directive		EMC

Die Produkte wurden entsprechend der folgenden Normen geprüft:

The products were tested in compliance with the following standards:

EMV			EMC		
EN 61326-1	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen - Teil 1: Allgemeine Anforderungen (IEC 61326-1:2005); Deutsche Fassung EN 61326-1:2006	2006-10	EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	2006-10
EN 61326-2-3	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen - Teil 2-3: Besondere Anforderungen - Prüfanordnung, Betriebsbedingungen und Leistungsmerkmale für Messgrößenumformer mit integrierter oder abgesetzter Signalaufbereitung	2007-05	EN 61326-2-3	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning	2007-05
EN 61010-1	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 1: Allgemeine Anforderungen	2011-07	EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements	2011-07

Die Geräte werden gekennzeichnet mit:

The devices bear the following marking:

CE

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung in Bezug auf die Erfüllung der grundlegenden Anforderungen und die Anfertigung der technischen Unterlagen trägt der Hersteller :

Sole responsibility for the issue of this declaration of conformity in relation to fulfilment of the fundamental requirements and the production of the technical documents is with the manufacturer:

Fischer Mess- und Regeltechnik GmbH
Bielefelderstr. 37a
32107 Bad Salzuflen, Germany
Tel. +49 5222 974 0

Bad Salzuflen, 11.09.13
(Ort, Datum / Place, date)

G. Gödde
(Geschäftsführer / Managing director)

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Harmonisierungsrechtsvorschriften, beinhaltet jedoch keine Zusicherung von Eigenschaften.

This declaration certifies compliance with the specified harmonisation law regulations, but does not include assurance of specific properties.

09010002 CE_DE_EN_DE38_LCD Rev.A 09/13

15 Attachments

Panel questionnaire

(Please complete in full)

Installation position:	Vertical from bottom to top	☐					
	Vertical from top to bottom	☐					
	Horizontal from left to right	☐					
	Horizontal from right to left	☐					
Nominal width / connection thread:	DN15 G1“	☐					
	DN20 G1¼“	☐					
	DN25 G1½“	☐					
	DN32 G2“	☐					
	DN40 G2¼	☐					
	DN50 G 2¾“	☐					
	DN63 G3“	☐					
	Special: ☐ DN:			Connection:			
In flange version:	Flange standard DIN:						
	Nominal width DN						
	Pressure level PN:						
Pipe:	Inner diameter of pipe:						
	Pipe material:						
Pipe condition:	Rusted	☐		Smooth	☐	Seam-less	☐
Corrosive parts:	YES	☐				No	☐
Mechanical soiling:	YES	☐	⇨	Which?		No	☐
Flow		m^3/h					
Required differential pressure:		mbar					
Static pressure:		mbar					
Max. allowed pressure loss:		mbar					
Medium:	Liquid:	☐		Gas:	☐		
	Designation:						
	Medium temp. °C			Ambient temperature:		°C	
	Standard density at 20°C:						
	Density at operating temperature:						
	Kinematic viscosity (v):			m^2/s			
Panel material:	PP	☐		1.4305	☐		
	PVDF	☐		1.4404	☐		
	Special:	☐	⇨	Material:	Which?		
Sealing material:	NBR:	☐		Viton:	☐		
	EPDM:	☐		Kalrez®:	☐		
	Special:	☐	⇨	Material:	Which?		
Measuring unit:	Without:	☐		Nm^3/h:	☐		
	m^3/h:	☐		l/min:	☐		
	Special:	☐	⇨	Unit:	Which?		
Display:	Without display (only transmitter)				☐		
	3½-digit LED measurement display				☐		
	4-digit colour change LCD				☐		
Switch points:	None	☐		1 point	☐	2 points	☐
Required connection:	M12	☐		Valve plug DIN 43 650	☐		
	Special connection	☐		Which?			