



Badger Meter

F001 - Basic Flow rate Indicator / Totalizer

with analog and pulse signal outputs



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1. BASIC SAFETY RECOMMENDATION

Before installing or using this product, please read this instruction manual thoroughly.

Only qualified personnel should install and/or repair this product. If a fault appears, contact your distributor.

Installation

Do not place any unit on an unstable surface that may allow it to fall.

Never place the units above a radiator or heating unit.

Route all cabling away from potential hazards.

Isolate from the mains before removing any covers.

Power connection

Use only the type of power source suitable for electronic equipment. If in doubt, contact your distributor. Ensure that any power cables are of a sufficiently high current rating.

All units must be earthed to eliminate risk of electric shock.

Failure to properly earth a unit may cause damage to that unit or data stored within it.

Protection class

The device has protection class IP 65 and needs to be protected against dripping water, water, oils, etc.

Setup & operation

Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage, incorrect operation or loss of data.

Cleaning

Switch off all units and isolate from mains before cleaning.

Clean using a damp cloth. Do not use liquid or aerosol cleaners.

Repair of faults

Disconnect all units from power supply and have it repaired by a qualified service person if any of the following occurs:

- If any power cord or plug is damaged or frayed
- If a unit does not operate normally when operating instructions are followed
- If a unit exposed to rain/water or if any liquid has been spilled into it
- If a unit has been dropped or damaged
- If a unit shows a change in performance, indicating a need for service.



FAILURE TO ADHERE TO THESE SAFETY INSTRUCTIONS MAY RESULT IN DAMAGE TO THE PRODUCT OR SERIOUS BODILY INJURY.

RoHs

Our products are RoHs compliant.

Battery disposal

The batteries contained in our products need to be disposed of as per your local legislation acc. to EU directive 2006/66/EG.



2. INTRODUCTION

2.1. Purpose of the document

The purpose of this Installation guide is to give a general guide to the safety regulations, the storage and transport requirements and the installation instructions of the F001.

2.2. Use of the F001

2.2.1. INTENDED USE

The F001 is intended for use in safe areas (ordinary locations).

The F001 is designed and constructed for measurement purposes in industrial processes to show the flow rate, the total and the accumulated total of a medium that passes a sensor. For details, refer to the chapter: *Technical specifications*.

2.2.2. UNINTENDED USE

A hazardous situation may occur if the F001 is not used for purpose it was designed for or is used incorrectly. Please obey the information as given in this instruction manual:

- Do not use the standard configuration (safe area / ordinary location applications) in an hazardous area.
- Do not use the F001 in life support applications. A possible malfunction of the F001 can cause (serious) injury or death to persons.

2.3. Target audience

This installation guide is aimed at the persons who are:

- involved in the preparation of the required work;
- involved in the installation, and the commissioning work;
- appointed to supervise the required work;
- appointed for the certification, the occupational, the health, the safety and the quality related tasks.

3. GENERAL DESCRIPTION

3.1. Function of the F001

The function of the F001 is to show the flow rate, the total and the accumulated total as well as to generate a scaled pulse according to the accumulated total.

3.2. Component information

The F001 has:

- the front cover (3) with the display (5) and the control keys (4);
- the body (1) with knockouts for the cable glands (2).



Figure 1: F001 - Component information (typical)

3.3. Setup menu - Parameters

1. Total			
1.1	unit	Unit	---- (no unit); L; m ³ ; kg; lb; gal; USGAL; bb
1.2	decs	Decimals	0; 0.1; 0.02; 0.003
1.3	k-f	K-Factor	0.000010 - 9999999
1.4	kf-d	K-Factor Decimals	0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006

2. Rate			
2.1	unit	Unit	mL; L; m ³ ; g; kg; ton; gal; bbl; lb; cf; ---- (no unit)
2.2	time	Time unit	/sec; /min; /hour; /day
2.3	decs	Decimals	0; 0.1; 0.02; 0.003
2.4	k-f	K-Factor	0.000010 - 9999999
2.5	kf-d	K-Factor Decimals	0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006
2.6	meas	Measurement	1 sec; 2 sec; 3 sec; 4 sec; 5 sec; 7 sec; 10 sec

3. Meter			
3.1	sign	Signal	coil; reed; NPN, PNP, Namur

4. A-OUT			
4.1	mode	Output	disable - enable
4.2	r.min	Rate min	0.000 - 9999999
4.3	r.max	Rate max	0.000 - 9999999
4.4	t.min	Tune min	0 - 9999
4.5	t.max	Tune max	0 - 9999

5. D-OUT			
5.1	mode	Output mode	Off; Short; Long
5.2	decs	Decimals	0; 0.1; 0.02; 0.003
5.3	amnt	Amount	0.001 - 9999999

6. OTHERS			
6.1	modl	Model	BASIC71
6.2	v-no	Software version	nn.nn.nn
6.3	s-no	Serial number	nnnnnnnn
6.4	pin	Pin code	nnnn
6.5	bl	Backlight	on; off

3.4. Setup menu - Explanation

The settings for the (accumulated) total and flow rate are independent from each other. For this reason it is possible to have for (accumulated) total and for the flow rate different engineering units, e.g. the (accumulated) total is set to m³ where the flow rate is set to liters per time unit. For this reason you need to calculate and set the K-Factor for the (accumulated) total as well as for the flow rate.

1. Total		
1.1	unit	<p>This submenu is used to select the engineering unit for the indication of the total and the accumulated total.</p> <p>When you change the engineering unit for total, you must recalculate and enter the K-Factor for the (accumulated) total. When you recalculate and enter the new K-Factor, the history for (accumulated) total is not correct anymore, because the (accumulated) total is not recalculated. For future reference, best practice is to make a note of the (accumulated) total before you enter the recalculated K-Factor.</p>
1.2	decs	This submenu is used to set the amount of digits behind the decimal pointer for the (accumulated) total indication.
1.3	k-f	This submenu is used to set the K-Factor for the total. With the K-Factor, the flow meter pulse signals are converted to a quantity. The K-Factor is based on the number of pulses generated by the flow meter per selected engineering unit, for example per m ³ . A more accurate K-Factor (more decimals, as set in kf-d) allows for a more accurate operation of the system.
1.4	kf-d	<p>This submenu is used to set the amount of digits behind the decimal pointer for the K-Factor.</p> <p>The setting for the K-Factor decimals has an indirect effect on the accuracy of the K-Factor because more decimals give a higher accuracy.</p>

Examples

- Metric** The flow meter generates 2.4813 pulses per liter and the selected engineering unit is m^3 . 1 m^3 equals 1,000 liters, therefore per m^3 , 2,481.300 pulses are generated. The K-Factor is based on the number of pulses generated by the flow meter per selected engineering unit, which gives $2,481.300/\text{m}^3$ and equals a K-Factor of 2,481.300.
- For the K-Factor enter 2481300.
 - For the Decimals K-Factor enter 3.
- Imperial** The flow meter generates 6.5231 pulses per USGAL and the selected engineering unit is USGAL. The engineering unit is the same, so 6.523100 pulses are generated. The K-Factor is based on the number of pulses generated by the flow meter per selected engineering unit, which equals a K-Factor 6.523100.
- For the K-Factor enter 6523100.
 - For the Decimals K-Factor enter 6.

2. Rate		
2.1	unit	This submenu is used to select the engineering unit for the indication of the flow rate.
2.2	time	This submenu is used to set the time unit for the flow rate calculation. Note that the flow rate is given in engineering unit/time unit, e.g. liter/minute (l/min).
2.3	decs	This submenu is used to set the amount of digits behind the decimal pointer for the flow rate indication.
2.4	k-f	This submenu is used to set the K-Factor for the flow rate. With the K-Factor, the flow meter pulse signals are converted to a quantity. The K-Factor is based on the number of pulses generated by the flow meter per selected engineering unit, for example per m^3 . A more accurate K-Factor (more decimals, as set in kf-d) allows for a more accurate operation of the system.
2.5	kf-d	This submenu is used to set the amount of digits behind the decimal pointer for the K-Factor. The setting for the K-Factor decimals has an indirect effect on the accuracy of the K-Factor because more decimals give a higher accuracy.
2.6	meas	This submenu is used to set the time during which the flow rate is calculated. The flow rate is calculated from the number of pulses which have passed during a set period of time.

3. Meter		
3.1	sign	This submenu is used to set the type of output signal from the flow meter. <ul style="list-style-type: none"> • Coil is used for coil pickup (sine waves); • Reed is used for reed switches; • NPN is used for flow meters with a NPN output signal; • PNP is used for flow meters with a PNP output signal; • NAMUR is used for flow meters with a NAMUR output.

4. A-OUT		
4.1	mode	This submenu is used to enable or disable the analog output.
4.2	r.min	This submenu is used to set the flow rate at which the output generates the minimum signal (4 mA).
4.3	r.max	This submenu is used to set the flow rate at which the output generates the maximum signal (29 mA).

WARNING

DO NOT TUNE THE OUTPUT IF A PROCESS IS ACTIVE. UNWANTED RESULTS WILL OCCUR IF YOU TUNE THE F001 WHEN THE ANALOG OUTPUT IS IN USE. UNWANTED RESULTS CAN RESULT IN (SERIOUS) DAMAGE TO EQUIPMENT.

NOTE: If required, you can program the analog output up-side-down. In other words the minimum current represents the 20 mA signal and the maximum current represents the 4 mA signal.

4.4	t.min	The minimum analog output is set to 4 mA (as a default). However, as a result of the ambient conditions, this value might need a correction for the actual situation. This submenu is used to set a correction for the minimum signal (4 mA).
4.5	t.max	The maximum analog output is set to 20 mA (as a default). However, as a result of the ambient conditions, this value might need a correction for the actual situation. This submenu is used to set a correction for the maximum signal (20 mA).

5. D-OUT		
5.1	mode	This submenu is used to disable or to set a pulse output length. Short represents a pulse length of 10 ms (maximum), Long represents a pulse length of 100 ms (maximum).
5.2	decs	This submenu is used to set the amount of digits behind the decimal pointer for the quantity (amnt).
5.3	amnt	This submenu is used to set the quantity of a medium that has passed the sensor (is added to the total) to generate a pulse. In other words, the quantity that represents one pulse.

For support and maintenance it is important to have information about the characteristics of the F001. Your supplier will ask for this information when support is required.

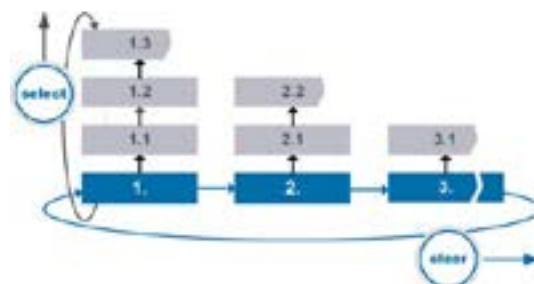
6. Other		
6.1	modl	This submenu shows the model name. The model name is set by the factory.
6.2	v-no	This submenu shows the version number of the firmware (software). The version number is set by the factory.
6.3	s-no	This submenu shows the serial number of the F001. The serial number is set by the factory.
6.4	pin	This submenu is used to set a password (pin code) to limit the access for the setup menu. Only persons who know the pin code can access the setup menu. The pin code 0000 disables the pin code to allow for access by any person.
6.5	bl	This submenu is used to set the backlight. Due to lack of sufficient power, the backlight does not come on at battery power only.

3.5. Navigation

This section describes how to navigate through the setup menu.

The setup menu has different menus and pages to configure the F001. For navigation, the menus and pages are identified with main menu numbers (e.g. 1) and submenu numbers (e.g. 1.2).

- Enter the setup menu: Press the SELECT key, for at least 7 seconds.
- Select a main menu: Press the CLEAR key, to find the required main menu.
- Select submenu (setting): Press the SELECT key, to find the required submenu.
- Enter a submenu to make a selection: Short and simultaneously, press the SELECT and CLEAR key to access the submenu.



- Make a selection: Press the SELECT key as many times as applicable, to make the required selection, or;
- Make a setting: Use the SELECT key to increase the digit. Use the CLEAR key to go to the next number.
- Save a change: Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.
- Leave the setup menu: Press and hold the SELECT key, for at least 3 seconds.

4. INSTALLATION

4.1. Mechanical installation

4.1.1. INTRODUCTION

When you install the F001 make sure:

- the F001 is installed free from excessive vibrations;
- the F001 is protected against severe weather conditions.

WARNING

ONLY QUALIFIED AND WELL-TRAINED PERSONS WHO ARE FAMILIAR WITH THE MECHANICAL INSTALLATION AND THE SERVICE PROCEDURES AND WHO OBEY THE SPECIFIC REGULATIONS AND THE REQUIREMENTS SET BY THE AUTHORITIES, THE MANUFACTURER, THE EMPLOYER AND THE PLANT OWNER, ARE ALLOWED TO DO THE MECHANICAL WORK.

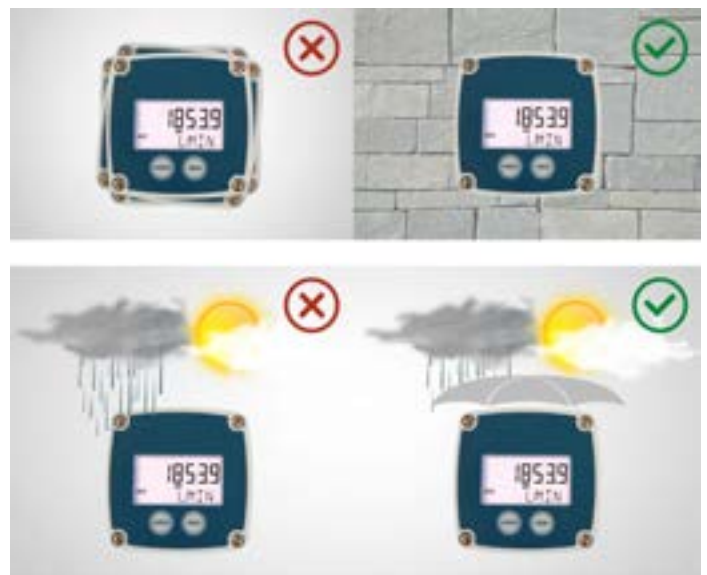


Figure 2: Installation - Introduction

4.1.2. REMOVE THE COVER

NOTE: The wiring and the electronics are attached to the inside of the cover.

1. Remove and keep the screws (2) to release the cover (1).
2. Carefully, remove and hold the cover (1).
3. Inspect the seal for signs of deterioration.
4. Do any necessary work.

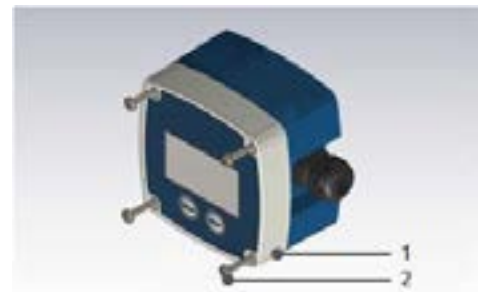


Figure 3: Remove the cover

4.1.3. INSTALL THE BODY

1. As applicable, remove the knock-out ports (2) and install the cable glands (3).
2. As applicable, mark and drill the mounting holes in the structure (4).
3. Hold the body (1) in the correct position for installation.
4. Attach the body (1) with the screws (5) to the structure (4).

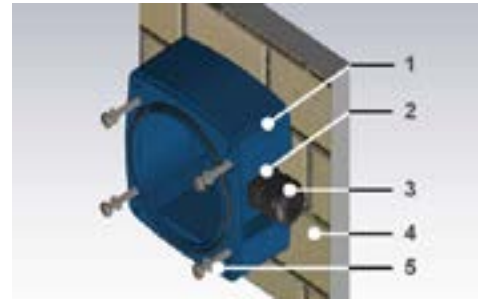


Figure 4: Install the body

4.2. Electrical installation - General

WARNING

ONLY QUALIFIED AND WELL-TRAINED PERSONS WHO ARE FAMILIAR WITH THE ELECTRICAL INSTALLATION AND THE SERVICE PROCEDURES AND WHO OBEY THE SPECIFIC REGULATIONS AND REQUIREMENTS SET BY THE AUTHORITIES, THE MANUFACTURER, THE EMPLOYER AND THE PLANT OWNER, ARE ALLOWED TO DO THE ELECTRICAL WORK.

4.2.1. PREPARATION

1. Ask the responsible (safety) staff for permission to lock-out / tag-out a part of the installation or system and to do any required work.
2. Lock-out and Tag-out the F001 and the related system.
3. Make sure, the work area is safe.

4.3. Electrical installation - Coil

4.3.1. ELECTRICAL CONNECTIONS - COIL

1. Hook up the F001 in accordance with the wiring diagrams. It is possible that not all terminals are used, this depends on the configuration of the installation.
2. Note that sensor supply (4) is only available when an external power supply (9, 10) is connected.
3. Note that the common ground terminals are inside the F001 connected to each other.
4. Apply battery power to the F001. For detailed instructions, refer to the chapter: Commissioning.

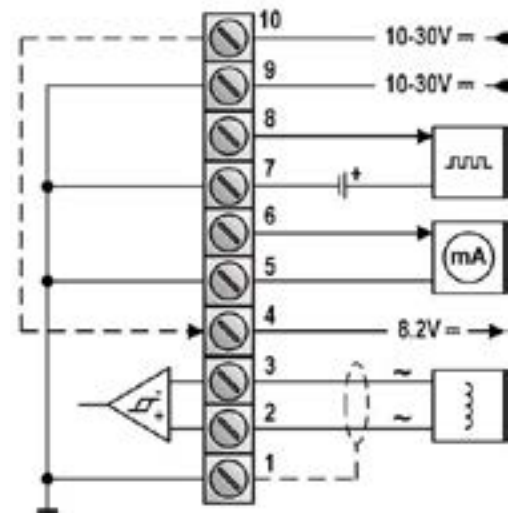


Figure 5: Coil - Wiring diagram

4.3.2. CONFIGURATION - COIL

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: METER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The main menu shows: METER. 	Press the CLEAR key as many times as applicable.
3. Press the SELECT key, to find the submenu: SIGN.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: SIGN. 	Press the SELECT key as many times as applicable.
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: SIGN.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
5. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can make the required selection. 	Select the setting: COIL.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The selection shows: COIL. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

4.4. Electrical installation - Reed

4.4.1. ELECTRICAL CONNECTIONS - REED

1. Hook up the F001 in accordance with the wiring diagrams. It is possible that not all terminals are used, this depends on the configuration of the installation.
2. Note that sensor supply (4) is only available when an external power supply (9, 10) is connected.
3. Note that the common ground terminals are inside the F001 connected to each other.
4. Apply battery power to the F001. For detailed instructions, refer to the chapter: Commissioning.

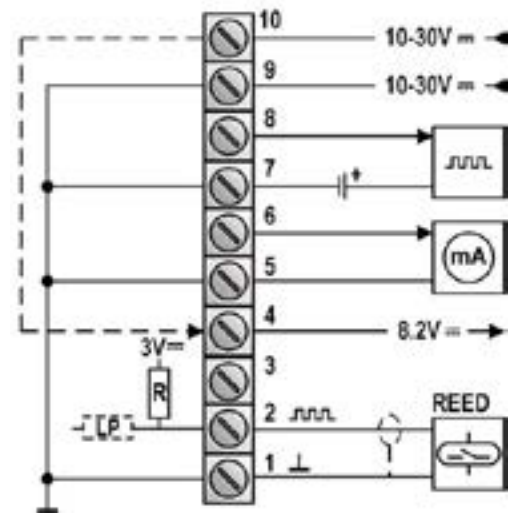


Figure 6: Reed - Wiring diagram

4.4.2. CONFIGURATION - REED

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: METER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The main menu shows: METER. 	Press the CLEAR key as many times as applicable.
3. Press the SELECT key, to find the submenu: SIGN.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: SIGN. 	Press the SELECT key as many times as applicable.
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: SIGN.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
5. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can make the required selection. 	Select the setting: REED.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The selection shows: REED. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

4.5. Electrical installation - NPN

4.5.1. ELECTRICAL CONNECTIONS - NPN

1. Hook up the F001 in accordance with the wiring diagrams. It is possible that not all terminals are used, this depends on the configuration of the installation.
2. Note that sensor supply (4) is only available when an external power supply (9, 10) is connected.
3. Note that the common ground terminals are inside the F001 connected to each other.
4. Apply battery power to the F001. For detailed instructions, refer to the chapter: Commissioning.

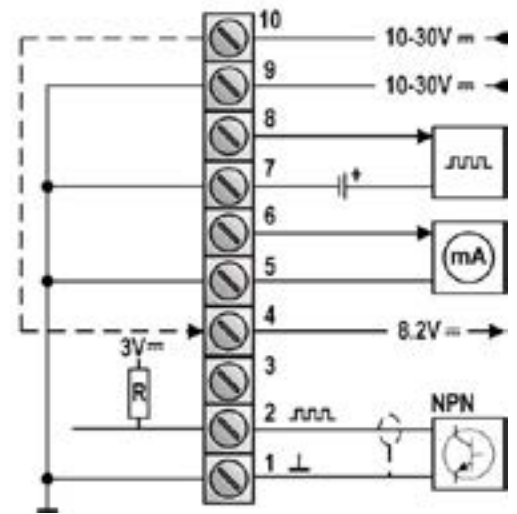


Figure 7: NPN - Wiring diagram

4.5.2. CONFIGURATION NPN

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: METER. Press the CLEAR key, to find the main menu: METER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The main menu shows: METER. 	Press the CLEAR key as many times as applicable.
3. Press the SELECT key, to find the submenu: SIGN.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: SIGN. 	Press the SELECT key as many times as applicable.
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: SIGN.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
5. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can make the required selection. 	Select the setting: NPN.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The selection shows: NPN. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

4.6. Electrical installation - PNP

4.6.1. ELECTRICAL CONNECTIONS - PNP

1. Hook up the F001 in accordance with the wiring diagrams. It is possible that not all terminals are used, this depends on the configuration of the installation.
2. Note that sensor supply (4) is only available when an external power supply (9, 10) is connected.
3. Note that the common ground terminals are inside the F001 connected to each other.
4. Apply battery power to the F001. For detailed instructions, refer to the chapter: Commissioning.

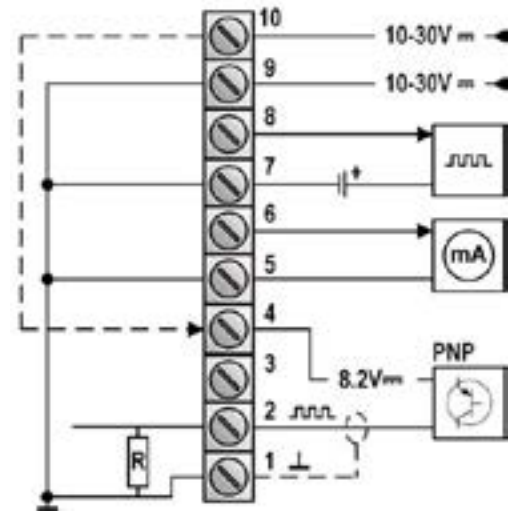


Figure 8: PNP - Wiring diagram

4.6.2. CONFIGURATION - PNP

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: METER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The main menu shows: METER. 	Press the CLEAR key as many times as applicable.
3. Press the SELECT key, to find the submenu: SIGN.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: SIGN. 	Press the SELECT key as many times as applicable.
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: SIGN.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
5. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can make the required selection. 	Select the setting: PNP.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The selection shows: PNP. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

4.7. Electrical installation - NAMUR

4.7.1. ELECTRICAL CONNECTIONS - NAMUR

1. Hook up the F001 in accordance with the wiring diagrams. It is possible that not all terminals are used, this depends on the configuration of the installation.
2. Note that sensor supply (4) is only available when an external power supply (9, 10) is connected.
3. Note that the common ground terminals are inside the F001 connected to each other.
4. Apply battery power to the F001. For detailed instructions, refer to the chapter: Commissioning.

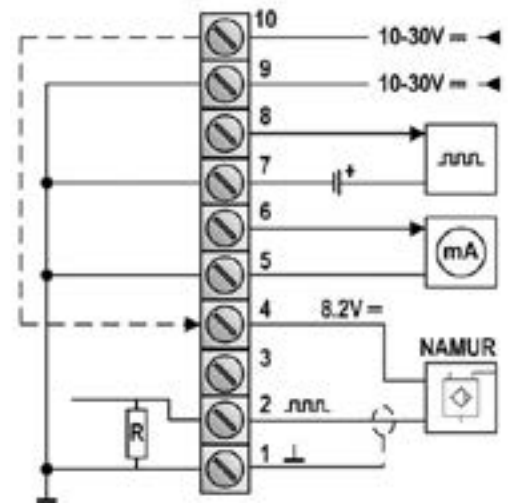


Figure 9: NAMUR - Wiring diagram

4.7.2. CONFIGURATION - NAMUR

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: METER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The main menu shows: METER. 	Press the CLEAR key as many times as applicable.
3. Press the SELECT key, to find the submenu: SIGN.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: SIGN. 	Press the SELECT key as many times as applicable.
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: SIGN.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
5. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can make the required selection. 	Select the setting: NAMUR.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The selection shows: NAMUR. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

5. COMMISSIONING

5.1. Remove the battery tab

1. To apply battery power, remove the battery tab (3).
2. Note that the F001 comes on at battery power. This is normal behavior.

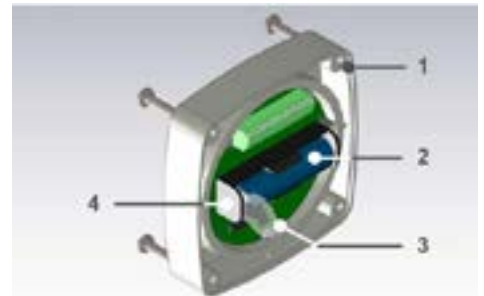


Figure 10: Remove the battery tab

5.2. How to setup the totalizer

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the SELECT key, to find the submenu: UNIT.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: UNIT. 	You can select: ---- (no unit); L; m3; kg; lb; GAL; USGAL; bb.
3. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: UNIT.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
4. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required engineering unit. 	Press the SELECT key as many times as applicable.
5. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected engineering unit. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
6. Press the SELECT key, to find the submenu: DECS.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: DECS. 	You can select: 0; 0.1; 0.02; 0.003.
7. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: DECS.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
8. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required amount of decimals for the engineering unit. 	Press the SELECT key as many times as applicable.
9. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected amount of decimals. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
10. Press the SELECT key, to find the submenu: K-F.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: K-F. 	You can select: 0.000010 -9999999.

11. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: K-F.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
12. Use the SELECT key to increase the digit. Use the CLEAR key to go to the next number.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required K-Factor. 	The 0 (zero) in front of the number will not show when the setting is saved. Also set the decimal numbers. The decimal separator is set in the next step.
13. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected K-Factor. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
14. Press the SELECT key, to find the submenu: KF-D.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: KF-D. 	You can select: 0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006
15. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: KF-D.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
16. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required amount of decimals for the K-Factor. 	Press the SELECT key as many times as applicable.
17. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected amount of decimals. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
18. Press the SELECT key, to return to the main menu: TOTAL.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The setup menu TOTAL shows. 	-
19. Press the SELECT key, to review the settings you made. Make any corrections as necessary.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. Each submenu shows the selected parameter. 	This step is used to verify the saved value for each setting. Press the SELECT key as many times as applicable.
20. When in the main menu: TOTAL, press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

5.3. How to setup the flow rate

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: RATE.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: RATE. 	-
3. Press the SELECT key, to find the submenu: UNIT.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: UNIT. 	You can select: mL; L; m3; g; kg; ton; gal; bbl; lb; cf; ----(no unit).
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: UNIT.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.

5. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required engineering unit. 	Press the SELECT key as many times as applicable.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected engineering unit. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press the SELECT key, to find the submenu: TIME.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: TIME. 	You can select: /sec; /min; /hour; /day.
8. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: TIME.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
9. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required time unit for the flow rate calculation. 	<p>Press the SELECT key as many times as applicable.</p> <p>Note that the flow rate is given in engineering unit/time unit, e.g. liters/minute (l/min).</p>
10. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected amount of decimals. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
11. Press the SELECT key, to find the submenu: DECS.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: DECS. 	You can select: 0; 0.1; 0.02; 0.003.
12. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: DECS.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
13. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required amount of decimals for the engineering unit. 	Press the SELECT key as many times as applicable.
14. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected amount of decimals. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
15. Press the SELECT key, to find the submenu: K-F.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: K-F. 	<p>You can select: 0.000010 - 9999999.</p> <p>Note that de K-Factor setting for the total and the flow rate are different.</p>
16. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: K-F.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
17. Use the SELECT key to increase the digit. Use the CLEAR key to go to the next number.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required K-Factor. 	<p>The 0 (zero) in front of the number will not show when the setting is saved.</p> <p>Also set the decimal numbers. The decimal separator is set in the next step.</p>
18. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected K-Factor. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.

19. Press the SELECT key, to find the submenu: KF-D.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: KF-D. 	<p>You can select: 0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006</p> <p>Note that the K-Factor decimal setting for the total and the flow rate are different.</p>
20. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: KF-D.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
21. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required amount of decimals for the K-Factor. 	Press the SELECT key as many times as applicable.
22. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected amount of decimals. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
23. Press the SELECT key, to find the submenu: MEAS.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: MEAS. 	<p>You can select: 1 sec; 2 sec; 3 sec; 4 sec; 5 sec; 7 sec; 10 sec.</p> <p>The flow rate is calculated from the number of pulses which have passed during a set period of time.</p>
24. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: MEAS.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
25. Press the SELECT key, to make the required selection.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can select the required time during which the flow rate is calculated. 	Press the SELECT key as many times as applicable.
26. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected time during which the flow rate is calculated. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
27. Press the SELECT key, to return to the main menu: RATE.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The setup menu RATE shows. 	-
28. Press the SELECT key, to review the settings you made. Make any corrections as necessary.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. Each submenu shows the selected parameter. 	<p>This step is used to verify the saved value for each setting.</p> <p>Press the SELECT key as many times as applicable.</p>
29. When in the main menu: RATE, press and hold the SELECT key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

5.4. How to set setup menu authorization

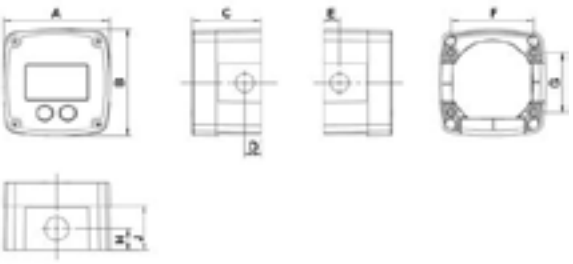
This procedure is used to set a pin code to protect the setup menu for unauthorized access. The pin code has no influence on the operator menus.

Action	Result	Remark
1. Press the SELECT key, for at least 7 seconds.	<ul style="list-style-type: none"> The SETUP indicator comes on continuously. The setup menu TOTAL shows. 	The SETUP indicator starts to flash when you enter the setup menu.
2. Press the CLEAR key, to find the main menu: OTHER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: OTHER. 	Press the SELECT key as many times as applicable.
3. Press the SELECT key, to find the submenu: PIN.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The submenu shows: PIN. 	You can set any 4 digit numerical value.
4. Short and simultaneously, press the SELECT and CLEAR key to access the submenu: PIN.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
5. Use the SELECT key to increase the digit. Use the CLEAR key to go to the next number.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. You can set the required pin code. 	The pin code 0000 disables the pin code to allow for access by any person.
6. Short and simultaneously, press the SELECT and CLEAR key to confirm the selection.	<ul style="list-style-type: none"> The PROG indicator goes off. The selection is saved. The display shows the selected engineering unit. 	If you do not press the SELECT and CLEAR key short and simultaneously to confirm, your selection is not saved.
7. Press the SELECT key, to return to the main menu: OTHER.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. The setup menu OTHER shows. 	-
8. Press the SELECT key, to review the settings you made. Make any corrections as necessary.	<ul style="list-style-type: none"> The SETUP indicator stays on continuously. Each submenu shows the selected parameter. 	<p>This step is used to verify the saved value for each setting.</p> <p>Press the SELECT key as many times as applicable.</p>
9. When in the main menu: OTHER, press and hold the START key, for at least 3 seconds.	<ul style="list-style-type: none"> The SETUP indicator goes off. The RUN indicator comes on. The operator menu shows. 	The F001 is ready for daily use.

6. TECHNICAL SPECIFICATIONS

Display	
Type	High intensity transfective numeric and alphanumeric LCD, with white LED backlight
Dimensions	2.13" x 1.14" (54 x 29 mm)
Digits	Seven 0.47" (12 mm) and seven 0.28" (7 mm) digits
Refresh rate	During operation 8 times/sec, it will automatically switch to 1 time/sec after 30 sec without operation

Enclosure	
Length x Height x Depth	3.63" x 3.63" x 2.35" (92.2 x 92.2 x 60 mm)
Weight	200 g
Material	Glass Reinforced Plastic (GRP)
Cable entry	Knockout: 2 x 16 mm; 1 x 20 mm
Protection degree	IP 65 / Nema Type 4

Dimensions		
	A = 3.62" (92 mm)	F = 2.05" (52 mm)
	B = 3.62" (92 mm)	G = 2.87" (72.8 mm)
	C = 2.36" (60 mm)	H = 0.75" (19 mm)
	D = 0.55" (14 mm)	J = 1.49" (38 mm)
	E = 0.55" (14 mm)	

Ambient conditions - Storage	
Temperature	-4 °F to 176 °F (-20 °C to +80 °C)
Humidity, relative	90%, no condensation allowed

Ambient conditions - Operation	
Temperature	-4 °F to 176 °F (-20 °C to +80 °C)
Humidity, relative	90%, no condensation allowed

Power requirements	
External power supply	10 - 30 V DC. Consumption max. 625 mW. The external power supply will also supply the backlight.
Battery power	1 x 3.6 V AA Lithium battery - life-time depends upon settings and configuration - up to approx. 2 years.

Sensor excitation	
Terminal 3	1.2 V for coil pick-up and 3 V for low power pulse signals. I _{out} =max. 63 µA.
NOTE: This voltage shall not be used to supply the flow meter's electronics, converters etc., as it will not provide adequate sustained power! All energy used by the flow meter's pick-up will directly influence the battery life-time. It is strongly advised to use a 'zero power' pickup such as a coil or reed-switch when operating without external power. It is possible to use some low power NPN or PNP output signals, but the battery life time will be significantly reduced (consult your distributor).	
Terminal 4	8.2 V; Only available when external power is connected.

Input parameters	
Coil	90 mVpp
Reed	R = 1 M Ω , pull-up; F = 120 Hz
NPN	R = 100 k Ω , pull-up; F = 6 kHz
PNP	R = 47 k Ω , pull-down; F = 6 kHz
NAMUR	R = 820 Ω , pull-down; F = 4 kHz

Output parameters - Digital	
Function	To transmit accumulated total
Type	One passive transistor output (NPN), not isolated; 300 mA; 30 V DC max.
Frequency	5 Hz; 100 Hz

Output parameters - Digital	
Function	To transmit flow rate
Type	Loop powered, analog output; 12-30 V DC; 3-22 mA (according NAMUR NE45)

Output parameters - Digital	
Loop data	Liftoff voltage: 12 V DC; 500 Ω @ 24 V DC (typical); 800 Ω max.
Accuracy	10 bit; Error 0.5% of full scale and temperature range

Directives and standards	
Electro Magnetic Compatibility	Directive 2014/30/EU; FCC 47 CFR part 15
Low Voltage Directive	Directive 2014/35/EU
Restriction of Hazardous Substances	Directive 2011/65/EU
Protection rating	EN60529; NEMA 250

7. DEFAULT AND CUSTOMIZED SETTINGS

In this chapter, a table with default settings (DEFAULT) are given. For future reference, we advise to complete the empty columns (CUSTOM) with your own settings and selections.

7.1. Default and customized settings

1. Total			Default	Custom	Custom
1.1	unit	Unit	L		
1.2	decs	Decimals	0		
1.3	k-f	K-Factor	1		
1.4	kf-d	K-Factor Decimals	0		

2. Rate			Default	Custom	Custom
2.1	unit	Unit	L		
2.2	time	Time unit	/min		
2.3	decs	Decimals	0		
2.4	k-f	K-Factor	1		
2.5	kf-d	K-Factor Decimals	0		
2.6	meas	Measurement	1		

3. Meter			Default	Custom	Custom
3.1	sign	Signal	Coil lo		

4. A-Out			Default	Custom	Custom
4.1	mode	Output	Disable		
4.2	r.min	Rate min	0		
4.3	r.max	Rate max	99999		
4.4	t.min	Tune min	1365		
4.5	t.max	Tune max	5461		

5. D-Out			Default	Custom	Custom
5.1	mode	Output mode	Off		
5.2	decs	Decimals	0		
5.3	amnt	Amount	1000		

6. D-Out			Default	Custom	Custom
6.1	modl	Model	BASIC71		

6.2	v-no	Software version	nn.nn.nn		
6.3	s-no	Serial nr.	nnnnnnnn		
6.4	pin	Pin code	0000		
6.5	bl	Backlight	on		

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