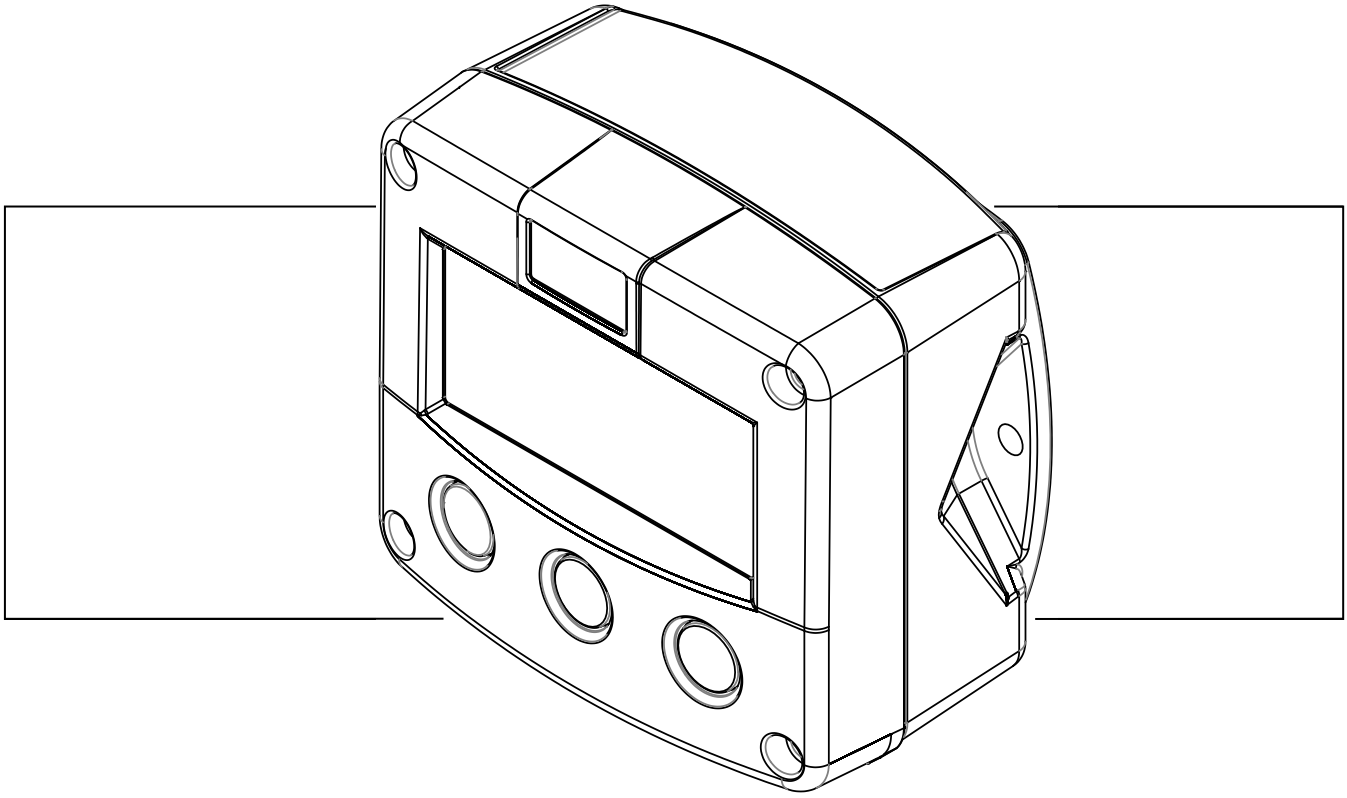
KLAY-INSTRUMENTS

F014-P

FLOW RATE INDICATOR / TOTALIZER

WITH SCALED PULSE OUTPUT



Signal input flowmeter: pulse, Namur and coil

Output: one scaled pulse ref. accumulated total

Options: Intrinsically Safe

CE UKCA

F-Series - Field mounted indicators for safe and hazardous areas.

SAFETY INSTRUCTIONS

- Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.
- LIFE SUPPORT APPLICATIONS: The F014-P is not designed for use in life support appliances, devices, or systems where malfunction of the product can reasonably be expected to result in a personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify the manufacturer and supplier for any damages resulting from such improper use or sale.
- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the F014-P, the installer has to discharge himself by touching a well-grounded object.
- The F014-P must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).
- Connect a proper grounding to the metal enclosure as indicated if the F014-P has an incoming power or signal line which carries a hazardous live voltage.
  The Protective Earth (PE) wire may never be disconnected or removed.
- Intrinsically Safe applications: follow the instructions as mentioned in Chapter 5.
  Certificates and related documents are available on our website or from your distributor.

DISPOSAL OF ELECTRONIC WASTE

- The WEEE Directive requires the recycling of disposed electrical and electronic equipment in the European Union. When the WEEE Directive does not apply to your region, we support its policy and ask you to be aware on how to dispose of this product.
- The crossed out wheelie bin symbol as illustrated and found on our products tells that this product shall not be disposed of into the general waste system or into a landfill.
- At the end of its life, equipment shall be disposed of according to the local regulations regarding waste of the electrical and the electronic equipment.
- Please contact your local dealer, national distributor or the manufacturer’s Technical helpdesk for information on the product disposal.

SAFETY RULES AND PRECAUTIONARY MEASURES

- The manufacturer accepts no responsibility whatsoever if the following safety rules and precautions, instructions and the procedures as described in this manual are not followed.
- Modifications of the F014-P implemented without preceding written consent from the manufacturer, will result in the immediate termination of product liability and warranty period.
- Mounting, electrical installation, start-up and maintenance of this device may only be carried out by trained persons authorized by the operator of the facility. Persons must read and understand this manual before carrying out its instructions.
- This device may only be operated by persons who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Check the mains voltage and information on the manufacturer's plate before installing the F014-P.
- Check all connections, settings and technical specifications of the various peripheral devices with the F014-P supplied.
- Open the enclosure only if all leads are free of potential.
- Never touch the electronic components (ESD sensitivity).
- Never expose the system to heavier conditions than allowed according to the classification of the enclosure (see manufacture's plate and chapter 4.2.).
- If the operator detects errors or dangers, or disagrees with the safety precautions taken, he should inform the owner or principal responsible.
- The local labor and safety laws and regulations must be adhered to.

ABOUT THE MANUAL

This operation manual is divided into two main sections:

- The daily use of the F014-P is described in chapter 2 “Operational”. These instructions are meant for users.
- The following chapters and appendices are exclusively meant for electricians/technicians. These provide a detailed description of all software settings and hardware installation guidance.

This operation manual describes the standard F014-P as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the F014-P is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information in this operating manual indicated by the pictograms:

A "**warning !**" indicates actions or procedures which, if not performed correctly, may lead to personal injury, a safety hazard or damage of the F014-P or connected instruments.


Caution !

A "**caution !**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the F014-P or connected instruments.


Note !

*A "**note !**" indicates actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.*

WARRANTY AND TECHNICAL SUPPORT

For warranty and technical support for your Fluidwell products,
visit our internet site www.fluidwell.com or contact us at support@fluidwell.com.

Hardware version : 03.03.xx
Software version : 03.03.xx
Manual : FW-F014-P-M_v0404_01_EN.docx

CONTENTS MANUAL

1 INTRODUCTION

1.1 SYSTEM DESCRIPTION OF THE F014-P

Functions and features
The flow rate / totalizer model F014-P is a microprocessor driven instrument designed to display flow rate, total and accumulated total as well as to generate a scaled pulse according the accumulated total.
This product has been designed with a focus on:

- ultra-low power consumption to allow long-life battery powered applications (type PB / PC);
- intrinsic safety for use in hazardous applications (type XI);
- several mounting possibilities with GRP, aluminum or stainless steel 316L enclosures for industrial surroundings,
- ability to process all types of flowmeter signals;
- transmitting possibilities with one configurable output.

Flowmeter input
This manual describes the F014-P with a pulse type input from the flowmeter "-P version". Other versions are available to process (0)4-20mA or 0-10V flowmeter signals.
One flowmeter with a passive or active pulse, Namur or coil signal output can be connected to the F014-P. To power the sensor, several options are available.

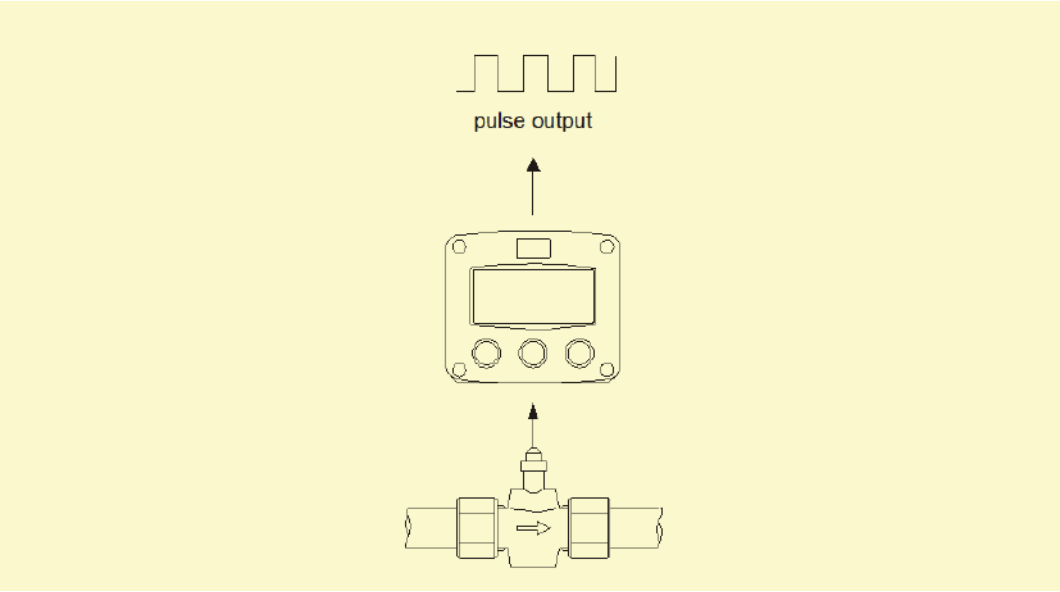


Fig. 1: Typical application for the F014-P.

Configuration of the F014-P
The F014-P has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your F014-P according to your specific requirements.
It includes several important features, such as K-Factor, measurement units, signal selection etc. All setting are stored in EEPROM memory and will not be lost in the event of power failure. To extend the battery-life time, please use of the power-management functions as described in chapter 3.3.2.

Display information
The F014-P has a large transflective LCD with all kinds of symbols and digits to display measuring units, status information, trend-indication and key-word messages.
Flow rate and totals can be displayed either with the small 8mm digits or with the 17mm digits.
A backup of the total and accumulated total in EEPROM memory is made every minute.

Options
The following options are available: intrinsic safety, mechanical relay or active outputs, power- and sensor-supply options, panel-mount, wall-mount and weather-proof enclosures, flame proof enclosure and LED backlight.

2 OPERATIONAL

2.1 GENERAL INFORMATION

This chapter describes the daily use of the F014-P. This instruction is meant for users / operators.

- The F014-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.

2.2 CONTROL PANEL

The control panel has three keys. The following keys are available:

Fig. 2: Control panel.

Functions of the keys

PROG-key
This key is used to program and save new values or settings.
The PROG-key is also used to gain access to SETUP-level; please read chapter 3.

SELECT-key
This key is used to SELECT the displayed information, like accumulated total and flow rate.

CLEAR-key
This key is used to CLEAR the value of total.

2.3 OPERATOR INFORMATION AND FUNCTIONS

In general, the F014-P will always function at Operator level. The information displayed is dependent upon the SETUP-settings. The signal from the connected sensor is processed by the F014-P in the background, whichever screen refresh rate setting is chosen. After pressing a key, the display will be updated very quickly during a 30 second period, after which it will slow-down again.

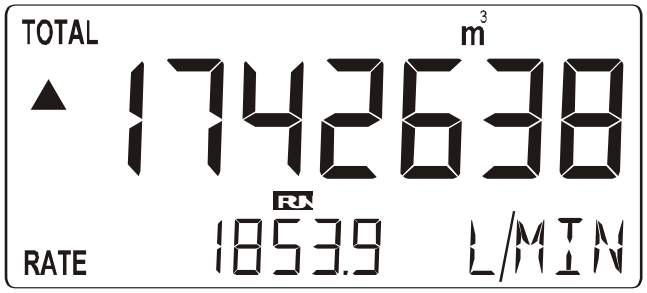


Fig. 3: Example of display information during process.

For the Operator, the following functions are available:

- **Display flow rate / total or Flow rate**
  This is the main display information of the F014-P. After selecting any other information, it will always return to this main display automatically.
  Total is displayed on the upper-line of the display and flow rate on the bottom line.
  It is possible to display flow rate only with the large 17mm digits; in this instance press the SELECT-key to read the total.
  When "-------" is shown, then the flow rate value is too high to be displayed. The arrows ⬍ indicate the increase/decrease of the flow rate trend.

- **Clear total**
  The value for total can be re-initialized. To do so, press CLEAR twice. After pressing CLEAR once, the flashing text "PUSH CLEAR" is displayed. To avoid re-initialization at this stage, press another key than CLEAR or wait for 20 seconds.
  Re-initialization of total DOES NOT influence the accumulated total.
- **Display accumulated total**
  When the SELECT-key is pressed, total and accumulated total are displayed. The accumulated total cannot be re-initialized. The value will count up to 99,999,999,999. The unit and number of decimals are displayed according to the configuration settings for total.
- **Low-battery alarm**
  When the battery voltage drops, it must be replaced. At first "low-battery" will flash, but as soon as it is displayed continuously, the battery MUST be replaced shortly after!
  The remaining lifetime after the first moment of indication is generally several days up to some weeks. See paragraph 6.3for further information on battery replacement.

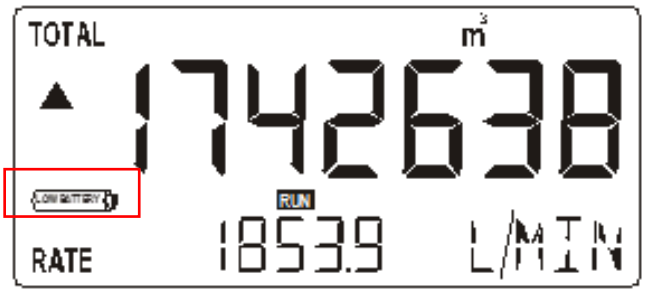


Fig. 4: Example of low-battery alarm.

- **Alarm 01-03**
  When "alarm" is displayed, please consult Appendix B: problem solving.

3 CONFIGURATION

3.1 INTRODUCTION

This and the following chapters are exclusively meant for electricians and non-operators. In these, an extensive description of all software settings and hardware connections are provided.

Caution !

- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.
- The F014-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Ensure that the measuring system is correctly wired up according to the wiring diagrams. The housing may only be opened by trained personnel.
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.

3.2 PROGRAMMING SETUP-LEVEL

WARNING

Changing the settings of the F014-P may have an influence on the current operation of the device, even when SETUP-level is still active.
Make sure that the unit is not being used for any application when altering the settings.

3.2.1 ENTERING SETUP-LEVEL

Configuration of the F014-P is done at SETUP-level, which can be reached at all times while the F014-P remains fully operational. At SETUP-level the display will deactivate the RUN indicator and activate the SETUP indicator.

Use the control panel to access SETUP-level

PROG ENTER

PROG-key
To enter SETUP-level, press the PROG-key for 7 seconds at OPERATOR-level. During this time, the symbols ▲▼ will be displayed.
When SETUP-level is entered, a password might be required to continue. You can enter the password by following the procedure for programming values as described in the following paragraphs.

Note !

A password may be required to enter SETUP.
Without this password access to SETUP is denied.

3.2.2 NAVIGATING THROUGH SETUP-LEVEL

Each function has a unique menu-number, which is displayed below the SETUP indicator at the bottom of the display. The menu-number is a combination of two figures, e.g. 1.2. The first number indicates the function-group and the second number indicates the function. Additionally, each function and function-group is expressed with a keyword.

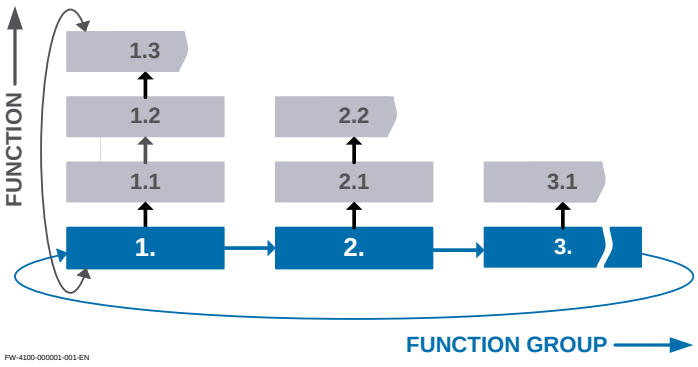


Fig. 5: SETUP matrix structure

Use the control panel to navigate through SETUP-level

PROG-key
When a function is selected, this key is used to start the programming sequence.
When only a function group is selected (and no function), this key is used to scroll back a function group (e.g. 3 → 2 → 1 → 3).

SELECT-key
This key is used to select the next function in the list (e.g. 1 → 1.1 → 1.2 → 1). When the top of the list is reached, it will wrap around and return to the function group selection.

CLEAR-key
This key is used to select the previous function in the list (e.g. 1.2 → 1.1 → 1 → 2). When the bottom of the list is reached, it will return to the function group selection. When only a function group is selected (and no function), this key is used to scroll to the next function group. (e.g. 1 → 2 → 3 → 1).

3.2.3 PROGRAMMING SEQUENCE

After selecting a function at SETUP-level, a new value can be programmed using the control panel. A function either contains a value (a number with optionally a decimal point, e.g. 123.45) or a list with items (e.g. Disable – Enable).
For each function that needs to change, navigate to that function and follow the steps indicated below. During the programming sequence, the display will deactivate the SETUP indicator and activate the PROGRAM indicator.

When programming new values, alterations will only be set after the PROG-key has been pressed to confirm the new value! (STEP 3)

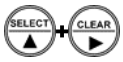
Step 1: Starting the programming sequence

PROG-key
When a function is selected at SETUP-level, this key is used to start the programming sequence.

Step 2a: Changing a value

SELECT-key
This key is used to increment the selected digit.
When the entered value is out of range, the increase sign ▲ or decrease-sign ▼ will be displayed while you are programming. If this value is confirmed by pressing the PROG-key, the value will be brought within a valid range automatically.

CLEAR-key
This key is used to select the next digit. If a decimal point can be set, this will be included in the sequence as well (e.g. [decimal point] → digit 1 → digit 2→ digit 3 → [decimal point].



SELECT-key + **CLEAR**-key
The combination of the SELECT-key and CLEAR-key is used to select a negative value. When a value can also be entered as a negative number, pressing the SELECT-key and CLEAR-key simultaneously will toggle the '–' (minus) sign on and off.

Step 2b: Changing the selected item in a list

SELECT-key
This key is used to select the next item in the list (e.g. Disable → Enable).
At the end of the list, the selection will wrap around to the first selection.

CLEAR-key
This key is used to select the previous item in the list (e.g. Enable → Disable).
At the bottom of the list, the selection will wrap around to the last selection.

Step 3: Finishing the programming sequence

PROG-key
During the programming sequence, this key is used to confirm the new value and return to SETUP-level. To cancel the operation, either press the PROG-key for 3 seconds or wait for 20 seconds: the programming sequence is cancelled and the former value is reinstated.

3.2.4 RETURNING TO OPERATOR-LEVEL

When all settings are configured correctly, the unit can be returned to OPERATE-level.
Please keep a record of all settings for later reference.

Use the control panel to return to OPERATE-level

PROG-key
In order to return to the operator level, press the PROG-key for three seconds.
When no keys are pressed for 2 minutes, SETUP-level will be left automatically.

3.3 CONFIGURATION SETTINGS

All settings of the F014-P can be set via the control panel.
The following paragraphs give a detailed description of each setting.

3.3.1 OVERVIEW FUNCTIONS SETUP LEVEL

SETUP FUNCTIONS AND VARIABLES			
1	**TOTAL**		
	1.1	UNIT	L - m3 - kg - lb - GAL - USGAL - bbl - no unit
	1.2	DECIMALS	0 - 1 - 2 - 3 (Ref: displayed value)
	1.3	K-FACTOR:	0.000010 - 9,999,999
	1.4	DECIMALS K-FACTOR	0 - 6
2	**FLOW RATE**		
	2.1	UNIT	mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - no unit - scf - Nm3 - NL - P
	2.2	TIME UNIT	sec - min - hour - day
	2.3	DECIMALS	0 - 1 - 2 - 3 (Ref: displayed value)
	2.4	K-FACTOR	0.000010 - 9,999,999
	2.5	DECIMALS K-FACTOR	0 - 6
	2.6	CALCULATION	per 1 - 255 pulses
	2.7	CUT-OFF	0.1 - 999.9 seconds
3	**DISPLAY**		
	3.1	FUNCTION	total - flow rate
	3.2	BACKLIGHT (optional)	off - on
	3.3	BL. BRIGHTNESS (optional)	1 - 5
4	**POWER MANAGEMENT**		
	4.1	LCD NEW	fast - 1 sec - 3 sec - 15 sec - 30 sec - off
	4.2	BATTERY MODE	operational - shelf
5	**FLOWMETER**		
	5.1	SIGNAL	npn - npn_lp - reed - reed_lp - pnp - pnp_lp - namur - coil_hi - coil_lo - active
6	**PULSE output**		
	6.1	PULSE WIDTH	0.001 - 9.999 sec
	6.2	DECIMALS	0 - 1 - 2 - 3
	6.3	IMPULSE PER	X-quantity
7	**OTHERS**		
	7.1	TYPE / MODEL	F014-P
	7.2	SOFTWARE VERSION	03.xx.xx
	7.3	SERIAL NO.	xxxxxxx
	7.4	PASS CODE	0000 - 9999
	7.5	TAGNUMBER	0000000 - 9999999

3.3.2 EXPLANATION OF SETUP-MENU 1 - TOTAL

SETUP FUNCTIONS AND VARIABLES		
1	**TOTAL**	
1.1	UNIT	This setting determines the measurement unit for total and accumulated total. The following units can be selected: L - m3 - kg - lb. - GAL - USGAL - bbl - ---- (no unit). Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.
1.2	DECIMALS	The decimal point determines for total and accumulated total the number of digits following the decimal point. The following can be selected: 0000000 - 111111.1 - 22222.22 - 3333.333
1.3	K-FACTOR:	With the K-factor, the flowmeter pulse signals are converted to a quantity. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 1.1), for example per cubic meter. The more accurate the K-factor, the more accurate the functioning of the system will be. **Example 1: Calculating the K-factor.** Let us assume that the flowmeter generates 2.4813 pulses per liter and the selected unit is "cubic meters / m3". A cubic meter consists of 1000 parts of one liter which implies 2,481.3 pulses per m3. So, the K-factor is 2,481.3. Enter for SETUP 1.3: "2481300" and for SETUP 1.4 - decimals K-factor "3". **Example 2: Calculating the K-factor.** Let us assume that the flowmeter generates 6.5231 pulses per gallon and the selected measurement unit is gallons. So, the K-Factor is 6.5231. Enter for SETUP 1.3: "6523100" and for SETUP 1.4 decimals K-factor "6".
1.4	DECIMALS K-FACTOR	This setting determines the number of decimals for the K-factor entered (SETUP 1.3). The following can be selected: 0 - 1 - 2 - 3 - 4 - 5 - 6 Please note that this setting influences the accuracy of the K-factor indirectly (i.e. the position of the decimal point and thus the value given). This setting has NO influence on the displayed number of digits for total (SETUP 1.2)!

3.3.3 EXPLANATION OF SETUP-MENU 2 - FLOW RATE

The settings for total and flow rate are entirely separate. In this way, different units of measurement can be used for each e.g. cubic meters for total and liters for flow rate.
The display update time for flow rate is one second or more.

SETUP FUNCTIONS AND VARIABLES		
2	**FLOW RATE**	
2.1	UNIT	SETUP 2.1 determines the measurement unit for flow rate. The following units can be selected: mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - ---- (no unit) - scf - Nm3 - NL - P. Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.
2.2	TIME UNIT	The flow rate can be calculated per second (SEC), minute (MIN), hour (HR) or day (DAY).

2.3	DECIMALS	This setting determines for flow rate the number of digits following the decimal point. The following can be selected: 00000 - 1111.1 - 2222.22 - 3333.333
2.4	K-FACTOR	With the K-factor, the flowmeter pulse signals are converted to a flow rate. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 2.1), for example per liter. The more accurate the K-factor, the more accurate the functioning of the system will be. For examples read SETUP 1.3.
2.5	DECIMALS K-FACTOR	This setting determines the number of decimals for the K-factor (SETUP 2.4). The following can be selected: 0 - 1 - 2 - 3 - 4 - 5 - 6 Please note that this SETUP - influences the accuracy of the K-factor indirectly. This setting has NO influence on the displayed number of digits for "flow rate" (SETUP 2.3)!
2.6	CALCULATION Note !	The flow rate is calculated by measuring the time between a number of pulses, for example 10 pulses. The more pulses the more accurate the flow rate will be. The maximum value is 255 pulses. • *The lower the number of pulses, the higher the power consumption of the F014-P will be (important for battery powered applications).* • *For low frequency applications (below 10Hz): do not program more than 10 pulses else the update time will be very slow.* • *For high frequency application (above 1kHz) do program a value of 100 or more pulses.*
2.7	CUT-OFF	With this setting, you determine a minimum flow requirement thresh-hold, if during this time less than XXX-pulses (SETUP 2.6) are generated, the flow rate will be displayed as zero. The cut-off time has to be entered in seconds - maximum time is 999 seconds (about 15 minutes).

3.3.4 EXPLANATION OF SETUP-MENU 3 - DISPLAY

SETUP FUNCTIONS AND VARIABLES		
3	**DISPLAY**	
3.1	FUNCTION	The large 17mm digits can be set to display total or flow rate. When "total" is selected, both total and flow rate are displayed simultaneously. When "flow rate" is selected, only flow rate will be displayed with its measuring unit while total will be displayed after pressing SELECT.
	Note !	*The functions below will only effect the optional LED-backlight.*
3.2	BACKLIGHT (optional)	If a LED backlight has been supplied, it can be turned on or off.
3.3	BL. BRIGHTNESS (optional)	The backlight brightness is adjustable. The following can be selected: 1 – 5 (where 1 is minimum and 5 is maximum brightness)

3.3.5 EXPLANATION OF SETUP-MENU 4 - POWER MANAGEMENT

When used with the internal battery option, the user can expect reliable measurement over a long period of time. The F014-P has several smart power management functions to extend the battery life time significantly. Two of these functions are available.

SETUP FUNCTIONS AND VARIABLES		
4	**POWER MANAGEMENT**	
4.1	LCD NEW	The calculation of the display-information influences the power consumption significantly. When the application does not require a fast display update, it is **strongly advised** to select a slow refresh rate. Please understand that NO information will be lost; every pulse will be counted and the output signal will be generated in the normal way. The following can be selected: Fast - 1 sec - 3 sec - 15 sec - 30 sec - off. **Example battery life-time with a coil pick-up:** • 1kHz pulse and FAST update: about 2 years. • 1kHz pulse and 1 sec update: about 5 years. Note ! *After a button has been pressed by the operator - the display refresh rate will always switch to FAST for 30 seconds. When "OFF" is selected, the display will be switched off after 30 seconds and will be switched on as soon as a button has been pressed.*
4.2	BATTERY MODE	The F014-P has two modes: operational or shelf. After "shelf" has been selected, the F014-P can be stored for several years; it will not process the sensor signal; the display is switched off but all settings and totals are stored. In this mode, power consumption is extremely low. To wake up the F014-P again, press the SELECT/▲ key twice.

3.3.6 EXPLANATION OF SETUP-MENU 5 - FLOWMETER

The F014-P is able to handle several types of input signal. The type of flowmeter pickup / signal is selected with SETUP 51. Read also paragraph 4.6.1 Terminals 1-3: Flowmeter input.

SETUP FUNCTIONS AND VARIABLES					
5	**FLOWMETER**				
5.1	SIGNAL				
	TYPE OF SIGNAL	EXPLANATION	RESISTANCE	FREQ. / mV	REMARK
	NPN	NPN input	100 kΩ pull-up	6 kHz.	(open collector)
	NPN - LP	NPN input with low pass filter	100 kΩ pull-up	1.2 kHz.	(open collector) less sensitive
	REED	Reed-switch input	1 mΩ pull-up	600 Hz.	
	REED - LP	Reed-switch input with low pass filter	1 mΩ pull-up	120 Hz.	Less sensitive
	PNP	PNP input	47 kΩ pull-down	6 kHz.	
	PNP - LP	PNP input with low pass filter	100 kΩ pull-down	1.2 kHz.	Less sensitive
	NAMUR	Namur input	820 Ω pull-down	4 kHz.	External power required
	COIL HI	High sensitive coil input	-	20 mV p.t.p.	Sensitive for disturbance!
	COIL LO	Low sensitive coil input	-	90 mV p.t.p.	Normal sensitivity
	ACTIVE	Active pulse input detection level 1.2V DC	47 kΩ	10 kHz.	External power required

3.3.7 EXPLANATION OF SETUP-MENU 6 - PULSE OUTPUT

SETUP FUNCTIONS AND VARIABLES		
6	**PULSE OUTPUT**	
6.1	PULSE WIDTH	The pulse width determines the time that the output will be switched; in other words the pulse length. The minimum time between the pulses is as long as the period time (50/50 duty cycle). The pulse width is set in milliseconds in the range 0.001 - 9.999 sec. Value “zero” disable the pulse output. Note ! *If the frequency should go out of range - when the flow rate increases for example - an internal buffer will be used to "store the missed pulses": As soon as the flow rate slows down, the buffer will be "emptied". It might be that pulses will be missed due to a buffer-overflow, so it is advised to program this setting within its range!*
6.2	DECIMALS Note !	This setting determines the decimal position for SETUP 6.3. *The measuring unit is according to SETUP 1.1 – Total Unit*
6.3	IMPULSE PER	A pulse will be generated every X-quantity. Enter this quantity here while taking the displayed decimal position and measuring unit into account.

3.3.8 EXPLANATION OF SETUP-MENU 7 - OTHERS

SETUP FUNCTIONS AND VARIABLES		
7	**OTHERS**	
7.1	TYPE / MODEL	For support and maintenance it is important to have information about the characteristics of the F014-P. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
7.2	SOFTWARE VERSION	
7.3	SERIAL NO.	
7.4	PASS CODE	All SETUP-values can be pass code protected. This protection is disabled with value 0000 (zero). Up to and including 4 digits can be programmed, for example 1234.
7.5	TAGNUMBER	For identification of the F014-P and communication purposes, a unique tag number of maximum 7 digits can be entered.

4 INSTALLATION

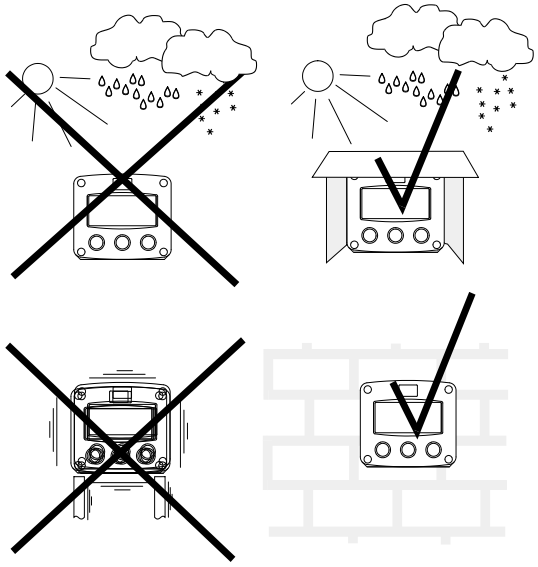
4.1 GENERAL DIRECTIONS

- Mounting, electrical installation, start-up and maintenance of this instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.
- The F014-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Make sure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the enclosure cover is removed or the panel cabinet has been opened (danger from electrical shock). The enclosure may only be opened by trained persons authorized by the operator of the facility.
- Take careful notice of the "Safety rules, instructions and precautionary measures" at the front of this manual.

The F0-Series can be supplied as suitable for Safe Area or Hazardous Area. This is indicated in the model code (shown on the product label) by the Type X* designator, with following options:

- Type **XX**: Suitable for safe area applications only (e.g. F014-P-XX)
  Follow the mechanical and electrical installation instructions shown in chapter 4.
- Type **XF**: Suitable for explosion proof / flame proof applications (e.g. F014-P-XF)
  Follow the electrical installation instructions as shown in chapter 4 and
  the mechanical installation instructions of the enclosure that are supplied separately.
- Type **XI**: Suitable for intrinsically safe applications (e.g. F014-P-XI)
  Follow the *general* mechanical and electrical installation instructions of chapter 4
  and the *specific* installation instructions of chapter 5.

4.2 INSTALLATION / SURROUNDING CONDITIONS



Take the relevant IP classification of the enclosure into account (see identification plate). Even an enclosure rated for IP67 / TYPE 4(X) should NEVER be exposed to strongly varying (weather) conditions.

When used in very cold surroundings or varying climatic conditions, inside the instrument case, take the necessary precautions against moisture.

Mount the F-Series onto a solid structure to avoid vibrations.

For use in Safe and Hazardous Areas (or Locations), the following conditions apply:

Relative humidity:	< 90% RH
Outdoor use:	suitable for outdoor use
IP and NEMA rating:	IP65 (panel mount), IP67 (field mount) and Type 4X
Supply voltage fluctuation:	As indicated by the supply range (e.g. 10V to 30V), otherwise +/- 10% unless stated otherwise
Means of protection:	Intrinsically safe: IS Ordinary locations: Class I (PE connected metal enclosure) Class II (non-metallic enclosure)
Over-voltage category:	II (when supplied from mains)
Pollution degree:	2 (internal environment), 3 (external environment)
Ambient:	Intrinsically safe: -40 °C to +70 °C, -40 °F to +158 °F (limited to +50 °C, 122 °F for EPL Da) Ordinary locations: -40 °C to +80 °C, -40 °F to +176 °F
Altitude:	up to 2000 m

4.3 HANDLING THE F-SERIES ENCLOSURE

4.3.1 IDENTIFICATION

Note !

The F0-Series can be supplied as suitable for Safe Area or Hazardous Area.
Suitability for Intrinsic Safety is indicated in the model code by Type XI (e.g. F014-P-XI).

For Intrinsically Safe applications: Installation and identification labels are shown in chapter 5.

Identification label
To identify your F0-Series device, all field mount enclosures have a weatherproof identification label placed on the outside of the unit.

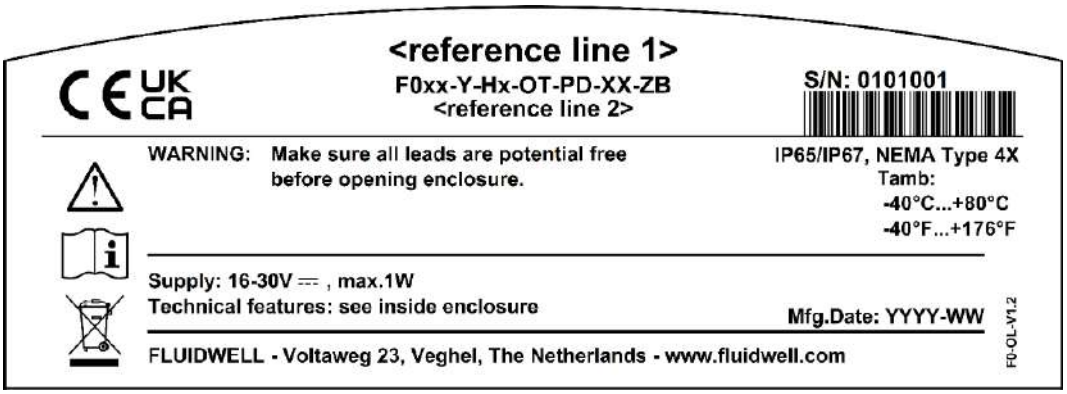


Fig. 6: Identification – Example of F0-Series identification label (safe area)

Installation label
A second label is located on the inside and shows additional installation data. For panel mount enclosures, the outside label is not available, so the inside label also serves as identification label. After installation, the inside label is only visible from the rear side of the panel.

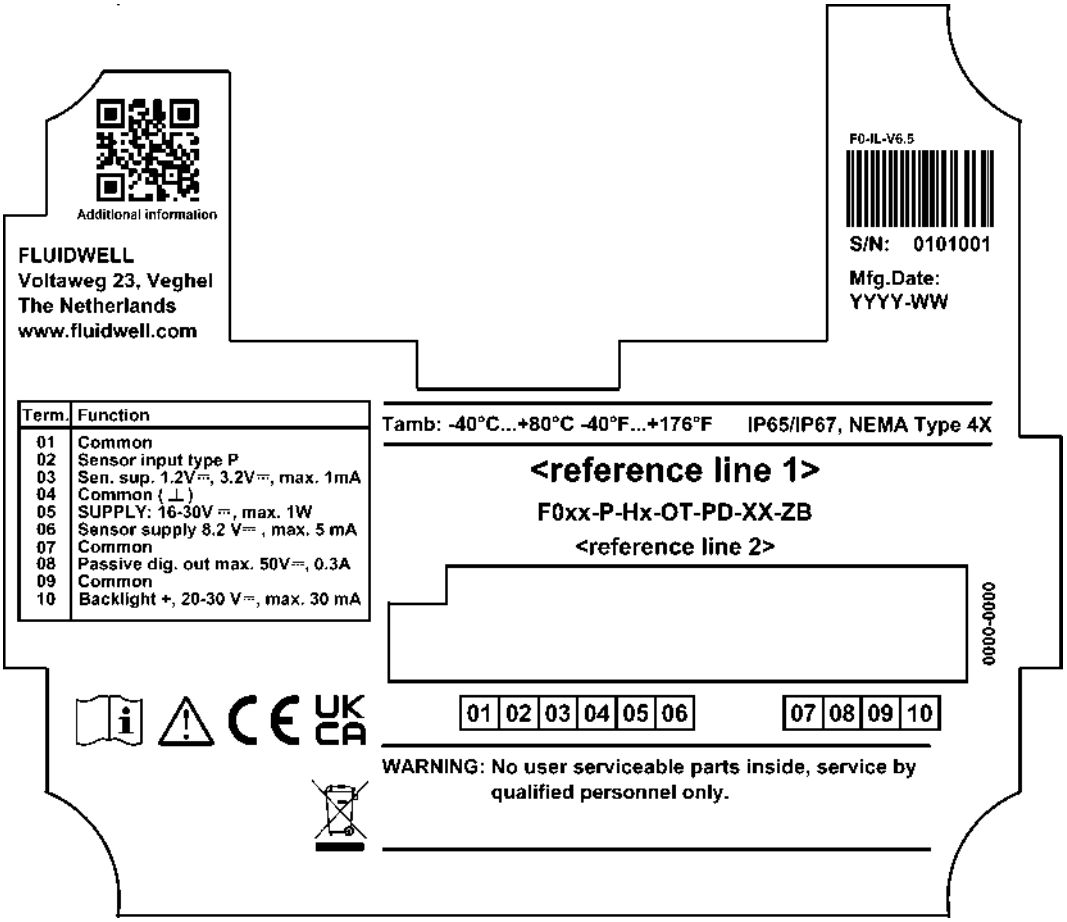


Fig. 7: Identification – Example of F0-Series installation label (safe area - Type PB, PX or PD)

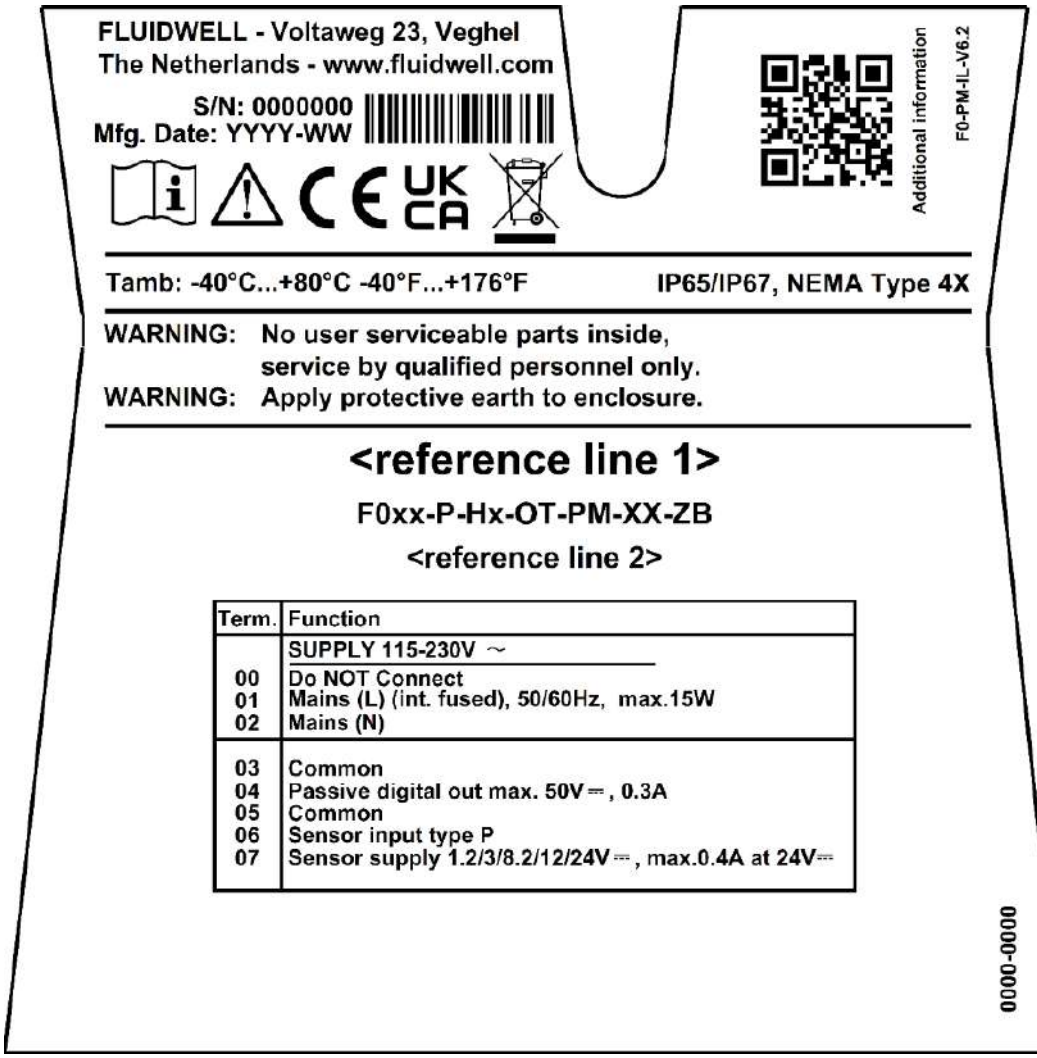
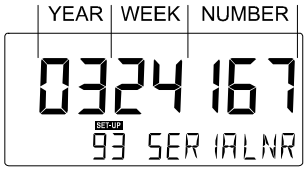


Fig. 8: Identification – Example of F0-Series installation label (safe area - Type PM or PF)

Serial number and year of production

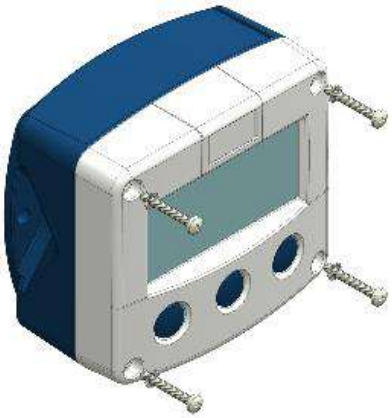
The serial number can be reviewed on the identification label or in SETUP-menu Others. The production date is either shown separately on the label or indicated by the first 4 digits of the serial number representing year and week number (YYWW).



4.3.2 OPENING / REMOVING THE COVER

To open the F-Series enclosure, the front cover needs to be removed. Please follow this procedure:

1. If necessary, clean the enclosure with an anti-static cloth made damp with a mild soap solution. Wait for the enclosure to dry before opening.
2. While loosening the screws, hold on to the front cover to prevent it from falling down.
3. Unscrew all 4 screws from the front of the enclosure and (if present) mind that the serrated washers are kept with the screws.
4. Carefully take the front cover away from the rear cover, minding that the wiring stays intact.
5. Depending on the work to be done, all terminal connectors can be removed from their mating parts and the front cover is now completely separate.



4.3.3 CLOSING / REPLACING THE COVER

To replace the cover on the F-Series enclosure, follow this procedure:

1. Re-insert all terminals to their original position.
2. Carefully position the front cover onto the back cover, making sure that the gasket falls nicely into the gutter of the back cover.
3. Replace all 4 screws into the front cover and mind that the serrated washers are replaced (metal enclosure only).
4. Fasten all 4 screws in an alternating way so that the front cover is placed evenly across the edge of the back cover.
   Tighten the 4 screws with the torque value for the type of enclosure as specified in following table:

Plastic enclosure:	1 Nm per screw
Aluminum enclosure:	1 Nm per screw
Aluminum w. extended back enclosure:	1 Nm per screw
Stainless steel enclosure:	2 Nm per screw

5. The F-Series in now ready to be returned to service.

4.4 MECHANICAL INSTALLATION

4.4.1 DIMENSIONS – ALUMINUM AND STAINLESS STEEL ENCLOSURES

Note !

- *When ordering stainless steel enclosures, insert S after H, e.g. HA → HSA).*
- *Aluminium enclosures are available with a 15 mm/0.6" deeper rear cover (insert B after H: HBx).*

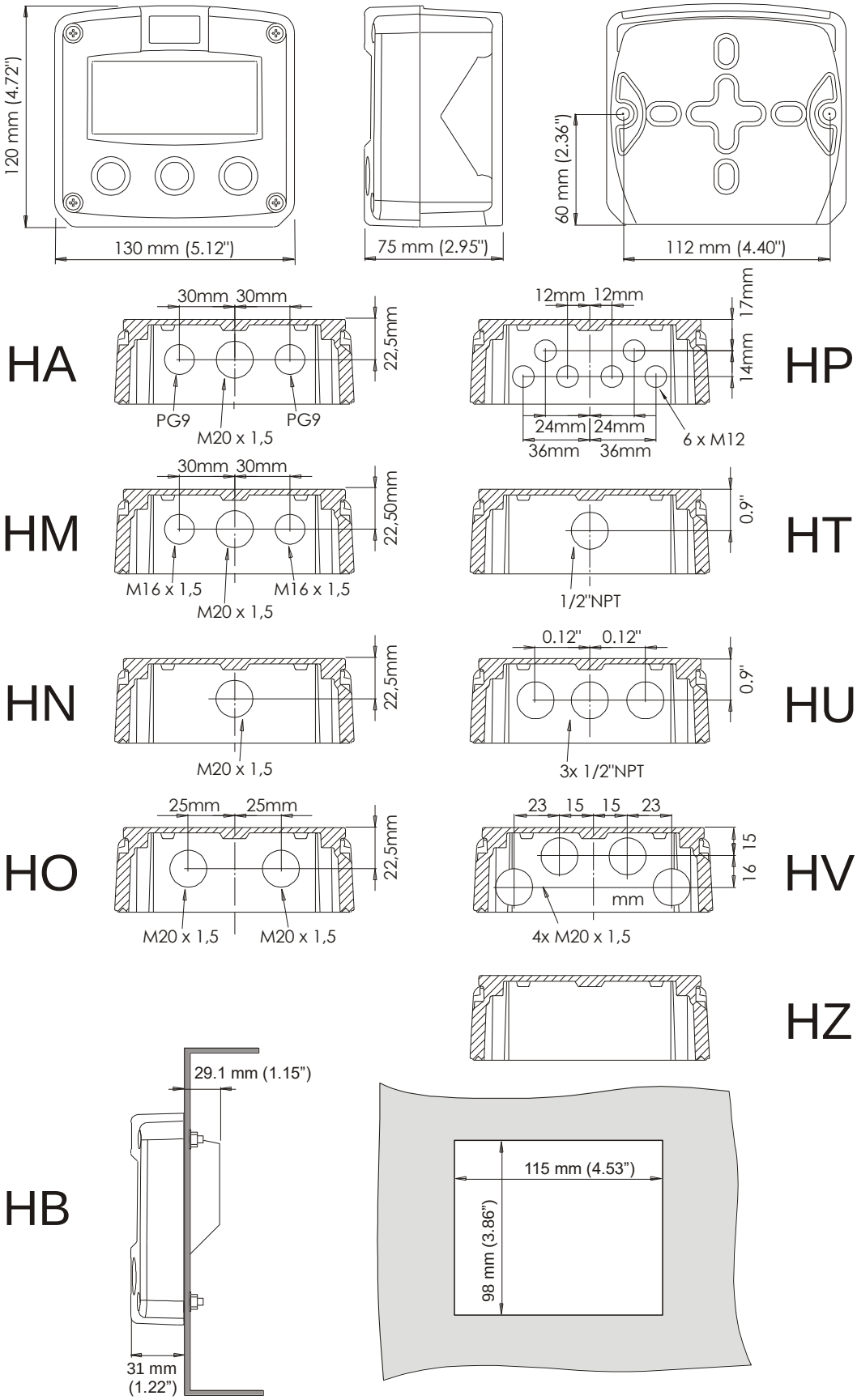
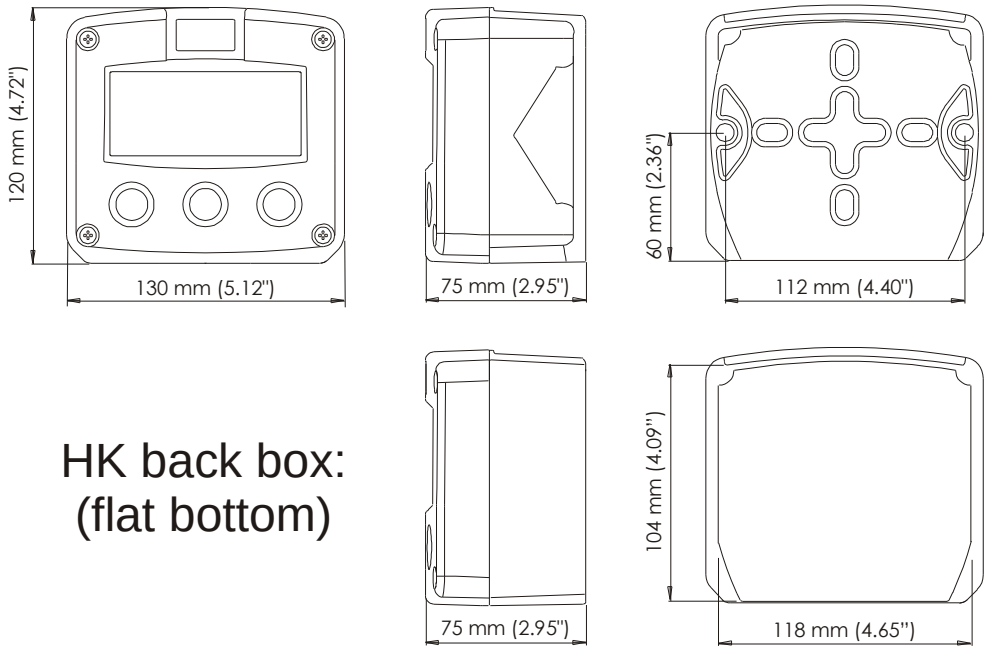
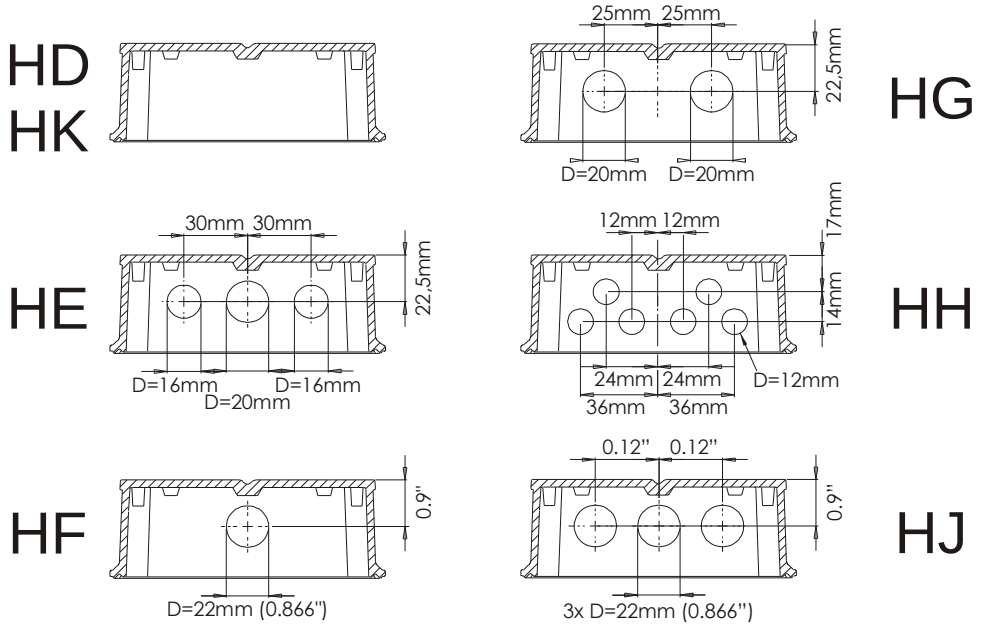


Fig. 9: Dimensions – Aluminum and stainless steel enclosures

4.4.2 DIMENSIONS – NON-METALLIC ENCLOSURES





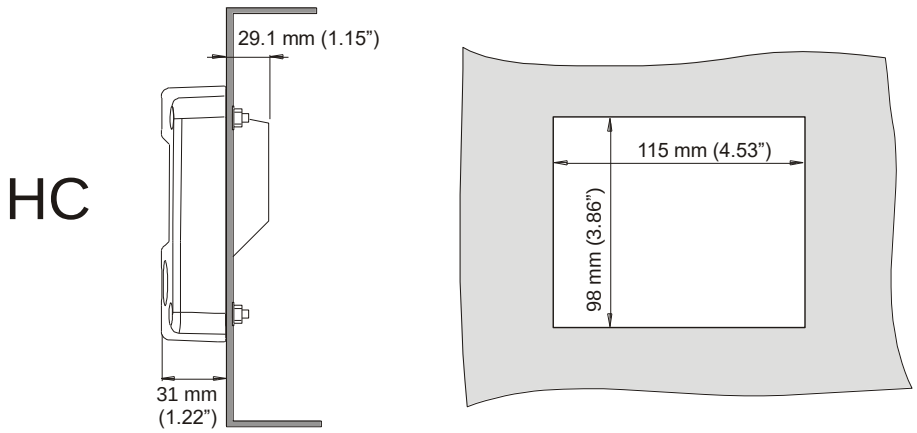
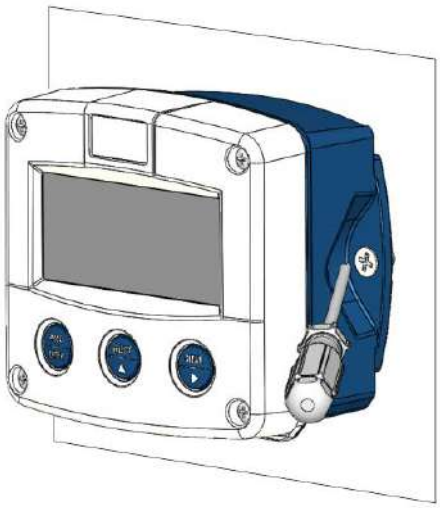


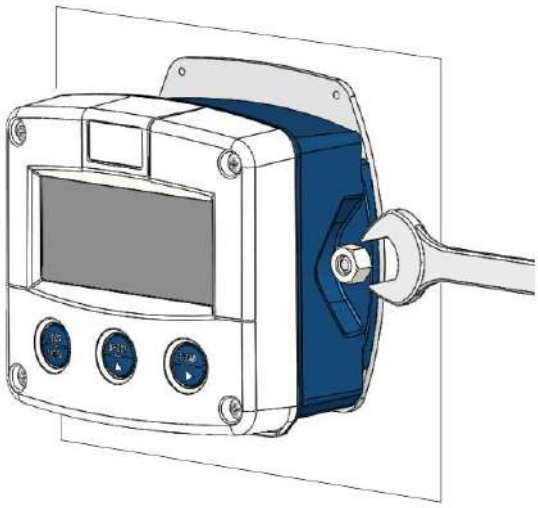
Fig. 10: Dimensions – Non-metallic enclosures

4.4.3 MOUNTING

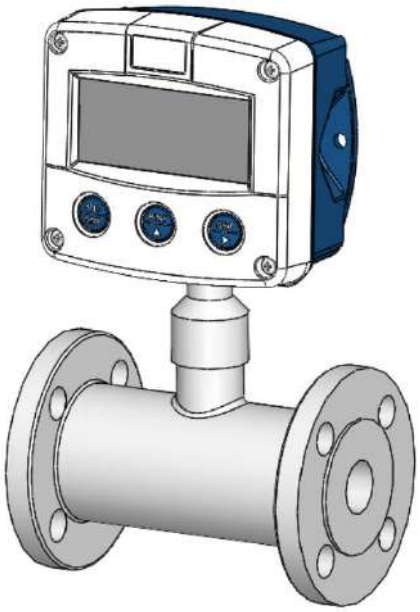
The enclosure can be installed by itself or with the aid of a mounting plate in the configurations shown below. When the unit is installed on a wall or onto a meter, please use components and installation techniques that are suitable for the used materials.
When using the mounting plate, please follow the instructions that came with the accessories.
Alternatively, the unit can be panel mounted by using only the front cover.



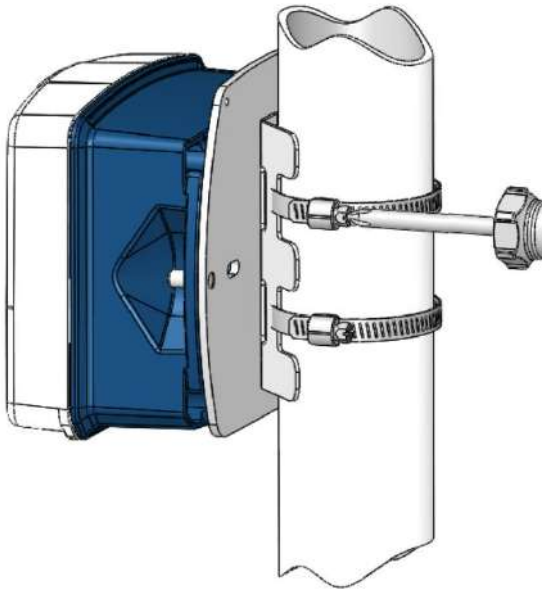
Wall mount by using the openings on the (out)side of the back cover.



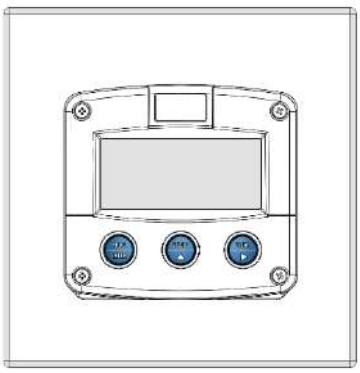
Wall mount by using the mounting plate (accessory)

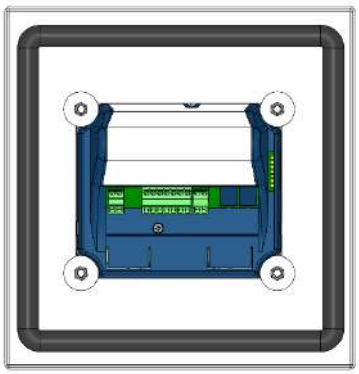


Meter mount by using one of the openings in the bottom of the back cover.



Pipe mount by using the mounting plate with the bracket and hose clamps (accessory).





Panel mount by using only the front cover

Fig. 11: Installation – Mounting configurations

4.5 ELECTRICAL INSTALLATION

- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the F014-P , the installer has to discharge himself by touching a well-grounded object.
- For reasons of ESD and safety, always ground the metal enclosure properly as indicated, especially if the unit has been supplied with the 115-230V AC power-supply type PM or relays type OR. It is the responsibility of the installer to install, connect and test the Protective Earth connections in accordance with the (inter)national Rules and Regulations.
- This chapter shows general information regarding the electrical installation of the F014-P . Chapter 5 gives additional specific information regarding Intrinsically safe installation and overrules the information given in this chapter.

- Do not combine metal front covers with non-metallic rear covers, vice versa and / or cable glands. A metal cover on a non-metallic rear cover could lead to ESD. A metal cable gland in a non-metallic enclosure could invalidate isolation.
- The installation must comply with (inter)national requirements and local ordinances.
    - Within the European Union and the UK, all installations must comply with national regulations.
    - Within Canada all field wiring must conform to Section 18-156 of the Canadian Electrical Code for installations within Canada.
    - Within the United States all field wiring must conform to the National Electric Code, NFPA 70, Article 501-4(b).

4.5.1 ELECTRICAL SAFETY

Please consult the table with environmental conditions and safety parameters shown at the beginning of this chapter.

General directions:

- The F014-P that came with a power module type PM; 110V-230V AC or type PD/PF with an option OR (the relays can handle 110V-230V AC) shall be connected to the Protective Earth (PE) stud which is installed in the metal back panel. The metal front panel is connected to the Protective Earth by the mounting screws and serrated washers.
- The wire screens (shield) are meant to prevent electromagnetic interference and shall be connected to the common ground terminals that belong to the specific sensor connection. The wire screens shall be terminated at one side to prevent wire loops. Inside of the Fluidwell unit, the different common ground terminals are connected to each other. It is advised, as illustrated, to terminate the wire screens in the vicinity of the sensor and to insulated the wire screen with a shrink tube at the Fluidwell unit side.
- Separate cable glands with effective IP67 / TYPE 4(X) seals for all wires.
- Unused cable entries: ensure that you fit IP67 / TYPE 4(X) plugs to maintain rating.
- A reliable ground connection for both the sensor, and if applicable, for the metal enclosure.
- An effective screened cable for the input signal, and grounding of its screen to the "⊥ " terminal or at the sensor itself, whichever is appropriate to the application.

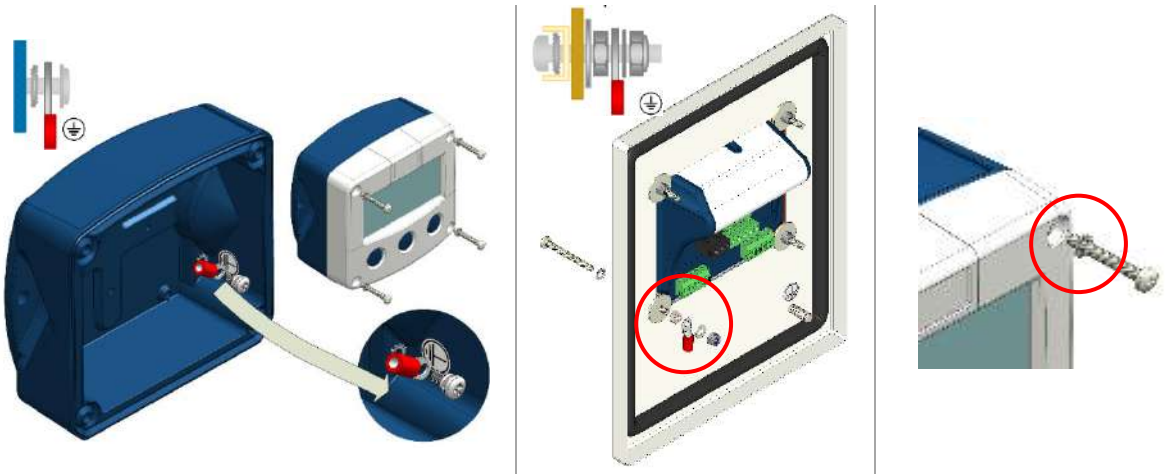
4.5.2 PROTECTIVE EARTH (PE) CONNECTIONS

Inside the unit, different types of bonding and earthing are used. The common ground is mostly used for termination of the wire shields; the Protective Earth (PE) is used for electrical safety.
For externally powered installations, route the Protective Earth (PE) grounding conductor into the enclosure together with the incoming power conductors.

Risk of damage to equipment!
Be very careful when connecting the common ground of the system to Protective Earth (PE). Connecting the common ground to Protective Earth (PE) (especially when multiple power supplies are connected) can cause ground loop currents that could damage the equipment.

Metal enclosure
When the F014-P is supplied with a metal enclosure (aluminum or stainless steel), the enclosure must be grounded in accordance with national and local electrical codes.
To ground the field mounted unit, the PE conductor must be connected to the PE stud which is located in the metal back cover, as indicated in the image below. To connect the conductor, a screw

(M4 x 6mm) with a serrated washer, a terminal and a washer is used (torque: 2 Nm). The metal front cover is connected to the Protective Earth by the mounting screws with serrated washers.
To ground the panel mounted unit, the PE conductor must be connected to the metal front cover through one of the four mounting screws. For this purpose, an additional nut, terminal and washer is supplied.



Field mounted *Panel mounted* *Front cover*

Fig. 12: Protective Earth (PE) connections on metal enclosure

Plastic enclosure
When the F014-P is supplied with a non-metal enclosure (e.g. plastic), the field mount enclosure meets the requirements of class 2 (double insulated). Therefore any incoming PE conductor can be terminated with an insulating end cap.
When the F014-P is panel mounted, the installation class and protective earth requirements depend on the panel or type of cabinet.

4.5.3 FIELD WIRING CONNECTIONS

- Do ground the aluminum / stainless steel enclosure properly with a PE wire as indicated to the Protective Earth terminal. It is the responsibility of the installer to install, connect and test the Protective Earth connections in accordance with the local and (inter)national Rules and Regulations.
- When a power supply is connected to the field wiring connections, please also consider the demands for power supply wiring shown in paragraph 4.5.4.
- The installation must comply with (inter)national requirements and local ordinances.
  - Within the Europe Union and the UK, all installations must comply with national regulations.
  - Within Canada all field wiring must conform to Section 18-156 of the Canadian Electrical Code for installations within Canada.
  - Within the United States all field wiring must conform to the National Electric Code, NFPA 70, Article 501-4(b).

All field wiring enters the F014-P through the bottom of the enclosure and connects to the circuit assembly inside the enclosure. Wiring is routed through cable glands. Please make sure to order the F014-P with the correct drilling pattern and thread (metal) or hole (plastic) sizes.

The wire screens (shield) are meant to prevent electromagnetic interference and shall be terminated at one side to prevent ground loops. Connection of the screen can either be made to the common ground terminal or at the sensor itself, whichever is appropriate to the application.
Inside of the Fluidwell unit, the various common ground terminals are connected to each other. It is advised to terminate the wire screens in the vicinity of the sensor and to insulate the wire screen with a shrink tube at the F014-P side.

4.5.4 POWER SUPPLY WIRING

When not directly supplied from mains (type PM), the external power supply must be an approved ELV source, insulated from AC mains by double / reinforced insulation per CSA C22.2 No. 61010-1 / UL61010-1 / EN/IEC 61010-1.

The F014-P can be powered from an external power supply. An internal power supply is also available in the form of a lithium battery. When both external and internal power supplies are available, the internal power supply is interrupted and will act as a backup supply. Note that the optional backlight only works with an external power supply.

4.5.5 SENSOR SUPPLY

For type PB / PX – Terminal 3: limited sensor supply

With these types of power supply, there is no real sensor supply output available but only a limited power supply. This power supply SHOULD NOT be used to supply the flowmeters electronics, converters etc. as it will not provide adequate sustained power! All energy used by the flowmeters 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). The sensor supply at terminal 3 is fixed to 1.2V DC for coil type inputs and 3.2V DC for all other types of flowmeter inputs (set by firmware).

For type PD - Terminal 6: sensor supply 8.2V

Besides offering the limited sensor supply on terminal 3 (see above), type PD also offers a real sensor supply of 8.2V DC, for example to power a Namur sensor, on terminal 6.

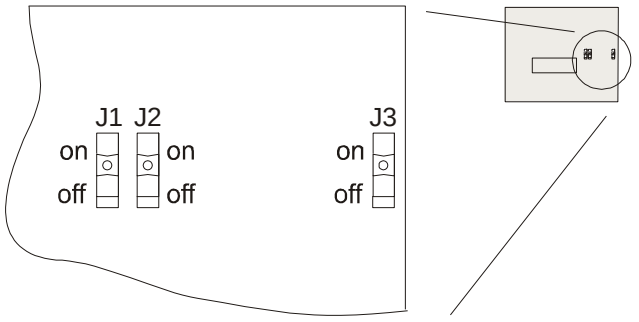
For type PF / PM – Terminal 7: sensor supply, 8.2V, 12V or 24V

Besides offering an identical limited sensor supply on terminal 3 as described above, type PF and PM offers a real power supply for the sensor. The flowmeter can be externally powered with 8.2V, 12V or 24V DC (max. 400mA@24V). The voltage is selected with the three switches inside the F014-P.

- Be sure that all the leads to the terminals are disconnected from the F014-P when the internal plastic protection cover has been removed !
- HIGH VOLTAGE 400V !!
  NEVER connect the mains power supply to the F014-P when the plastic protection cover has been removed !!!

To gain access to the switches, first remove the terminal strip(s) after which the internal plastic cover can be removed. The switches are located on the right hand side as indicated:

Voltage selection for Type PF and Type PM



Power supply input:
Type PF: 24V AC / DC
Type PM: 115V - 230V AC

Sensor supply output:
Max 400mA @ 24V DC

Sensor power	Switch J1	J2	J3
1.2 / 3.2V DC	on	on	on
8.2V DC	off	on	on
12V DC	off	on	off
24V DC	off	off	Off

Fig. 13: Switch position voltage selection (type PF and PM).

4.6 TERMINAL CONNECTORS SAFE AREA APPLICATIONS – TYPE PB / PX / PD

Take careful notice of all safety and precautionary measures indicated in paragraph 4.5: Electrical Installation and review paragraph 4.5.3 and 4.5.4 before applying any field or power supply wiring.

Caution !

For Intrinsically Safe applications: read chapter 5.

Following terminal connectors are available on the F014-P when supplied with Type PB / PX / PD:

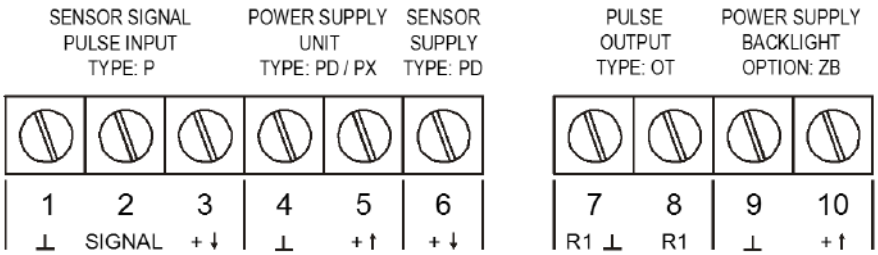


Fig. 14: Overview of terminal connectors F014-P – type PB / PD / PX

4.6.1 TERMINALS 1-3: FLOWMETER INPUT

Three basic types of flowmeter signals can be connected to the F014-P: pulse, active pulse or coil. The screen of the signal wire can be connected to the common ground terminal. See paragraph 4.5. The input signal type has to be selected with the correct SETUP-function (read chapter 3.3.2).

On terminal 3 and 6, an internal and external sensor supply is available. To configure the sensor supply, see paragraph 4.5.5: Sensor supply for details.

Coil

The F014-P is suitable for use with flowmeters which have a coil output signal.
Two sensitivity levels can be selected with the SETUP-function:

- COIL LO: sensitivity from about 90mVp-p.
- COIL HI: sensitivity from about 20mVp-p.
- Type ZF (option): offers for setting COIL HI : sensitivity from about 10mVp-p.
- Type ZG (option): offers for setting COIL HI : sensitivity from about 5mVp-p.

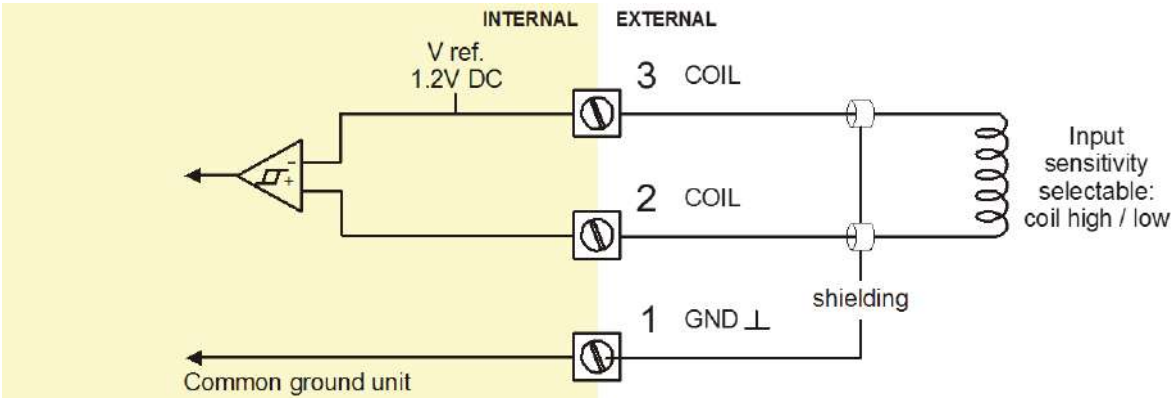


Fig. 15: Terminal connections - Coil signal input.

Pulse-signal NPN / NPN-LP
The F014-P is suitable for use with flowmeters which have a NPN output signal. For reliable pulse detection, the pulse amplitude has to go below 1.2V. Signal setting NPN-LP employs a low-pass signal noise filter, which limits the maximum input frequency (read chapter 3.3.2).

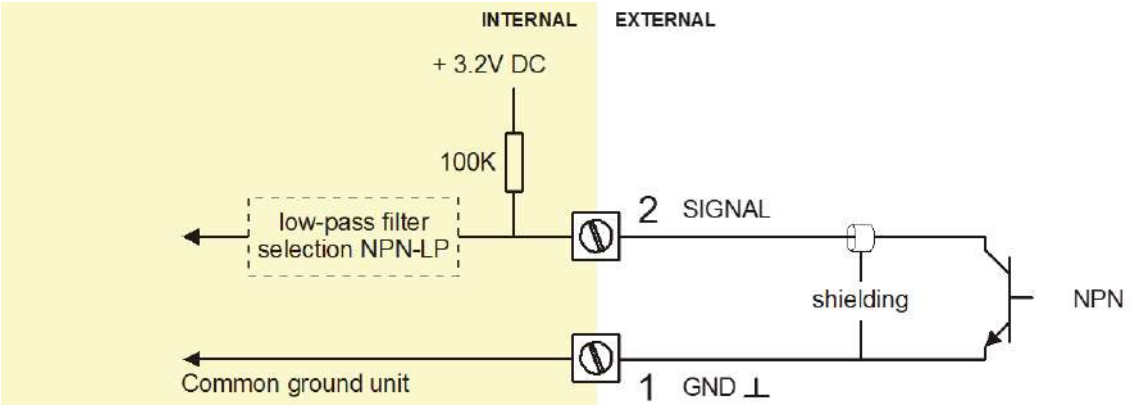


Fig. 16: Terminal connections - NPN signal input.

Pulse-signal PNP / PNP-LP
The F014-P is suitable for use with flowmeters which have a PNP output signal. Terminal 3 offers 3.2V which has to be switched by the sensor to terminal 2 (SIGNAL). For a reliable pulse detection, the pulse amplitude has to go above 1.2V. Signal setting PNP-LP employs a low-pass signal noise filter, which limits the maximum input frequency (read chapter 3.3.2).
A sensor supply voltage of 8.1V DC can be provided with option PD on terminal 6.

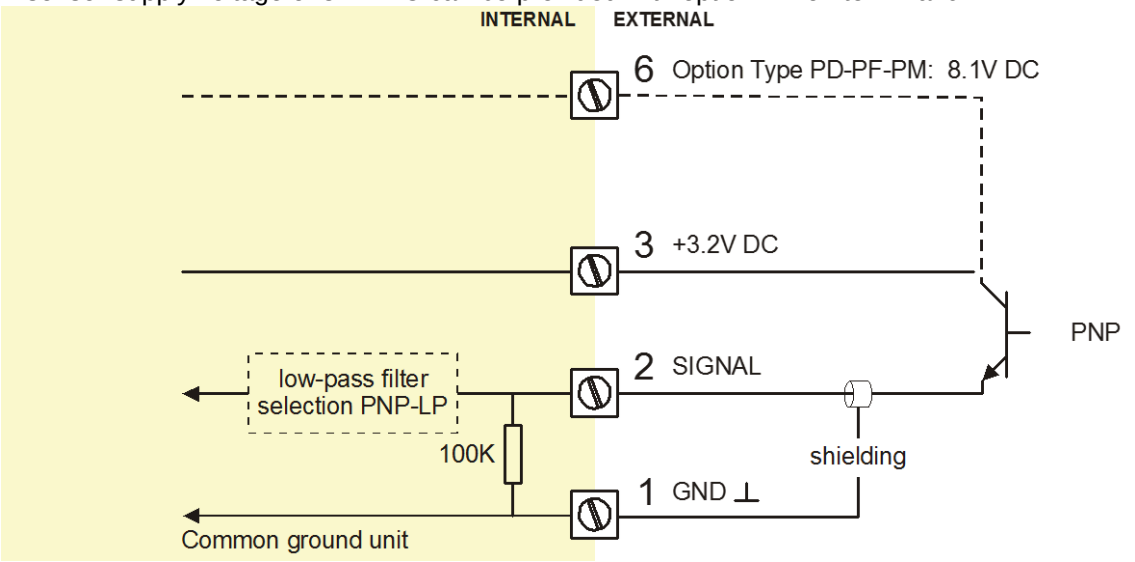


Fig. 17: Terminal connections - PNP signal input.

Active signal
Active signal selection may well be desired in the case of option PD being supplied for sensor supply.

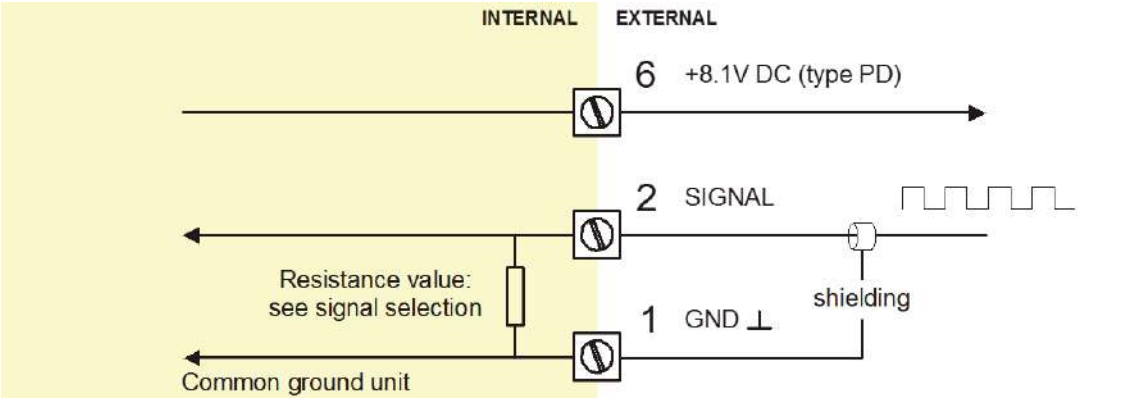


Fig. 18: Terminal connections - Active signal input.

Reed-switch
The F014-P is suitable for use with flowmeters which have a reed-switch. To avoid pulse bounce from the reed-switch, it is advised to select REED LP - low-pass filter (read chapter 3.3.2).

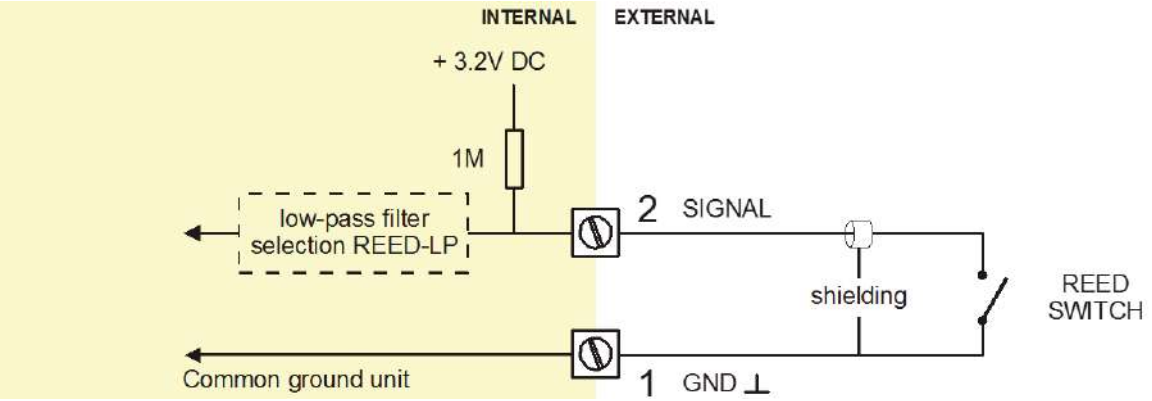


Fig. 19: Terminal connections - Reed-switch signal input.

NAMUR-signal
The F014-P is suitable for flowmeters with an NAMUR signal. The standard F014-P is not able to power the NAMUR sensor, as an external power supply for the sensor is required. However, a 8.2V sensor supply voltage (terminal 6) can be provided with type PD.

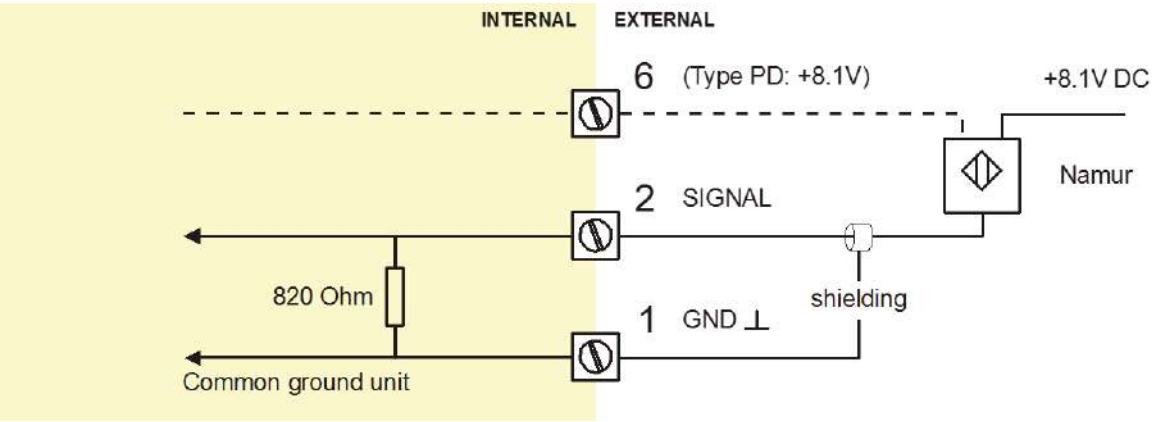


Fig. 20: Terminal connections - NAMUR signal input.

4.6.2 TERMINAL 4-5: POWER SUPPLY - TYPE PX (DEFAULT) AND PD (OPTION)

To power the F014-P an internal battery can be used (type PB) and / or an external DC power supply of 8-30V DC (type PX) or 16-30V DC (type PD).
Connect the "**-**" to terminal 4 and the "**+**" to terminal 5.
When power is applied to these terminals, the optional internal battery will be disabled / enabled automatically to extend the battery life time.

4.6.3 TERMINAL 6: POWER SUPPLY TYPE PD: 8.2V SENSOR SUPPLY

With this option, a limited power supply for the sensor is available, for example to power a Namur sensor. It offers 8.2V DC (max. 5mA).

Note !

This terminal is only available if type PD has been ordered

4.6.4 TERMINAL 7-8: PULSE OUTPUT – TYPE OT

With SETUP 6, the function of this output is set to a scaled pulse output.
A passive transistor output is available with this option.
Max. driving capacity 300mA@50V DC.

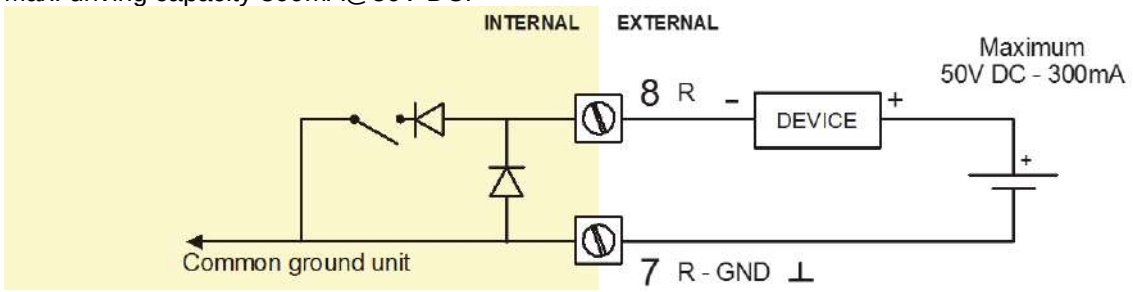


Fig. 21: Terminal connections - Passive transistor output.

4.6.5 TERMINAL 9-10: POWER SUPPLY BACKLIGHT - TYPE ZB (OPTION)

To power the backlight, a voltage in the range 20-30V DC has to be connected.
Maximum current 30mA. Connect the "**-**" to terminal 9 and the "**+**" to terminal 10.

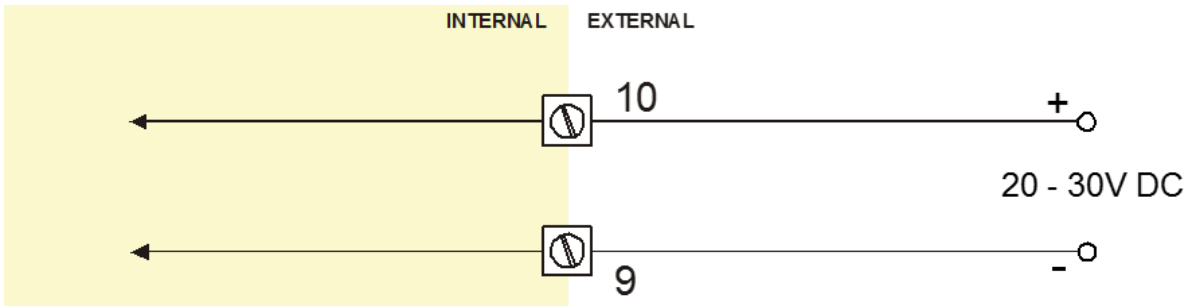


Fig. 22: Terminal connections - Backlight (ZB).

4.7 TERMINAL CONNECTORS SAFE AREA APPLICATIONS – TYPE PF / PM

Take careful notice of all safety and precautionary measures indicated in paragraph 4.5: Electrical Installation and review paragraph 4.5.3 and 4.5.4 before applying any field or power supply wiring.

For Intrinsically Safe applications: read chapter 5.

Following terminal connectors are available on the F014-P when supplied with Type PF / PM:

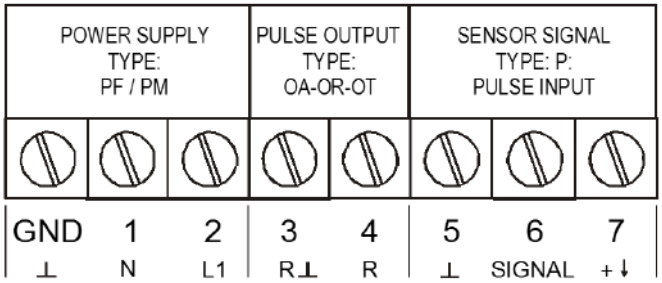


Fig. 23: Overview of terminal connectors F014-P – type PF / PM

4.7.1 TERMINAL GND-1-2: POWER SUPPLY

To power the F014-P with a power supply option of type PF or type PM, connect a suitable power supply to the terminals as indicated in below table:

Power supply option	Power supply	Terminal		
		GND	01	02
Type PF	24V AC ± 10%		AC	AC
Type PF	24V DC ± 10%	L-	L+	
Type PM	115-230V AC ± 10%		AC	AC
Note !	*The total consumption of the sensor, transistor output type OA and backlight type ZB may not exceed 400mA@24V DC.*			

Risk of damage to equipment!
Be very careful when connecting the common ground of the system to Protective Earth (PE). Connecting the common ground to Protective Earth (PE) (especially when multiple power supplies are connected) can cause ground loop currents that could damage the equipment. See paragraph 4.5.2: Protective Earth (PE) connections for more information.

4.7.2 TERMINAL 3-4: PULSE OUTPUT

With SETUP 6, the function of this pulse output is determined with a maximum frequency of 500Hz. If a relay output option has been supplied, be sure that the output frequency does not exceed 5Hz or else the life-time of the relay will be reduced significantly.

Type OT
A passive transistor output is available with this option. Max. driving capacity 300mA@50V DC.

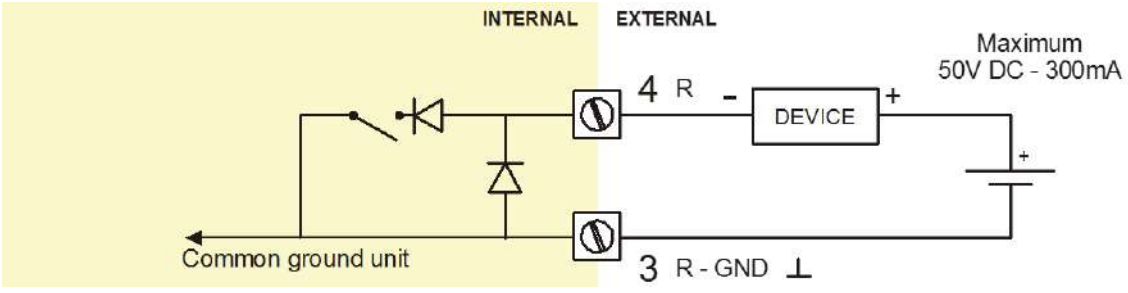


Fig. 24: Terminal connections - Passive transistor output (OT).

Type OA
An active 24V DC transistor output is available with this option.
Max. driving capacity 400mA@24V DC. (Requires power supply type PF / PM)

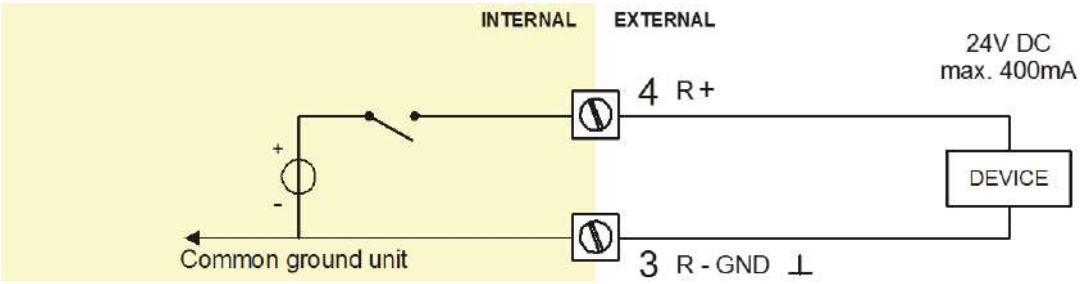


Fig. 25: Terminal connections - Active transistor output (OA).

Type OR
An isolated mechanical relay output is available with this option.
Max. switch power 240V 0,5A. (Requires power supply type PF / PM). Be sure that the output frequency does not exceed 5Hz, else the relay life time will be reduced significantly.

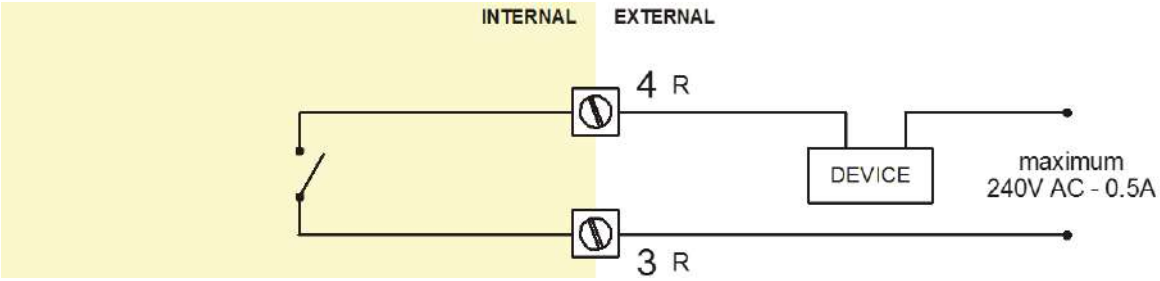


Fig. 26: Terminal connections - Mechanic relay output (OR).

4.7.3 TERMINALS 5-7: FLOWMETER INPUT

Three basic types of flowmeter signals can be connected to the F014-P: pulse, active pulse or coil. The screen of the signal wire can be connected to the common ground terminal. See paragraph 4.5. The input signal type has to be selected with the correct SETUP-function (read chapter 3.3.2).

On terminal 7, the internal or external sensor supply is available. To configure the sensor supply, see paragraph 4.5.5: Sensor supply for details.

Coil-signal
The F014-P is suitable for use with flowmeters which have a coil output signal.
Two sensitivity levels can be selected with the SETUP-function:

- COIL LO: sensitivity from about 90mVp-p.
- COIL HI: sensitivity from about 20mVp-p.
- Type ZF (option): offers for setting COIL HI : sensitivity from about 10mVp-p.
- Type ZG (option): offers for setting COIL HI : sensitivity from about 5mVp-p.

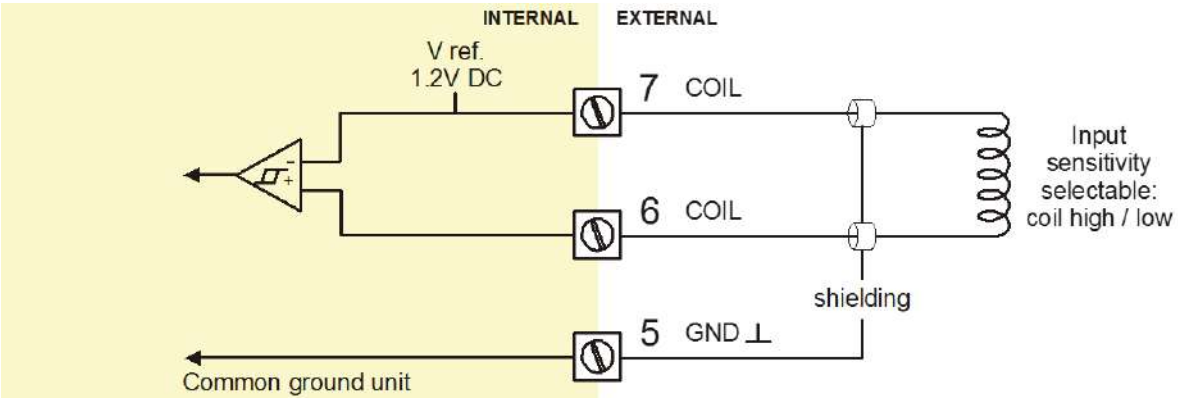


Fig. 27: Terminal connections - Coil signal input.

Pulse-signal NPN / NPN-LP
The F014-P is suitable for use with flowmeters which have a NPN output signal. For reliable pulse detection, the pulse amplitude has to go below 1.2V. Signal setting NPN-LP employs a low-pass signal noise filter, which limits the maximum input frequency (read chapter 3.3.2).

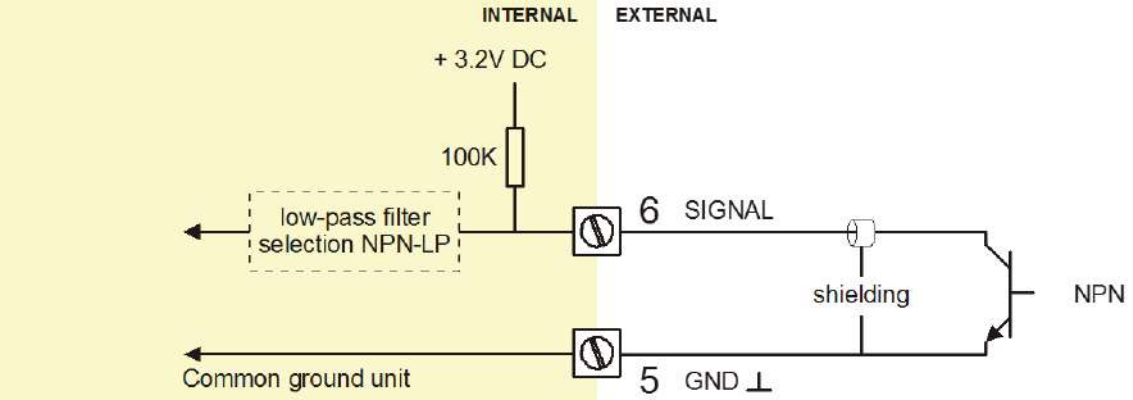


Fig. 28: Terminal connections - NPN signal input.

Pulse-signal PNP / PNP-LP
The F014-P is suitable for use with flowmeters which have a PNP output signal. For a reliable pulse detection, the pulse amplitude has to go above 1.2V. Signal setting PNP-LP employs a low-pass signal noise filter, which limits the maximum input frequency (read chapter 3.3.2).
A sensor supply voltage is offered with terminal 7.

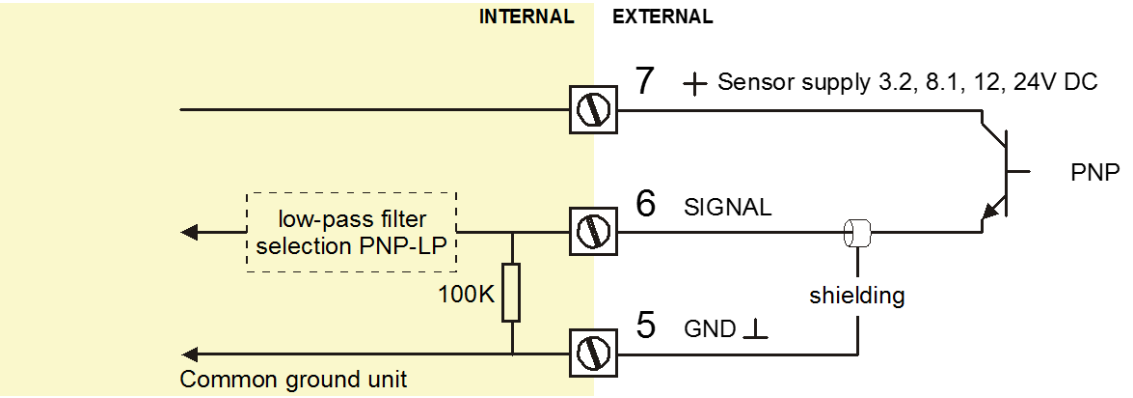


Fig. 29: Terminal connections - PNP signal input.

Active signals
Active signal selection may well be desired if an active signal is offered from the sensor.

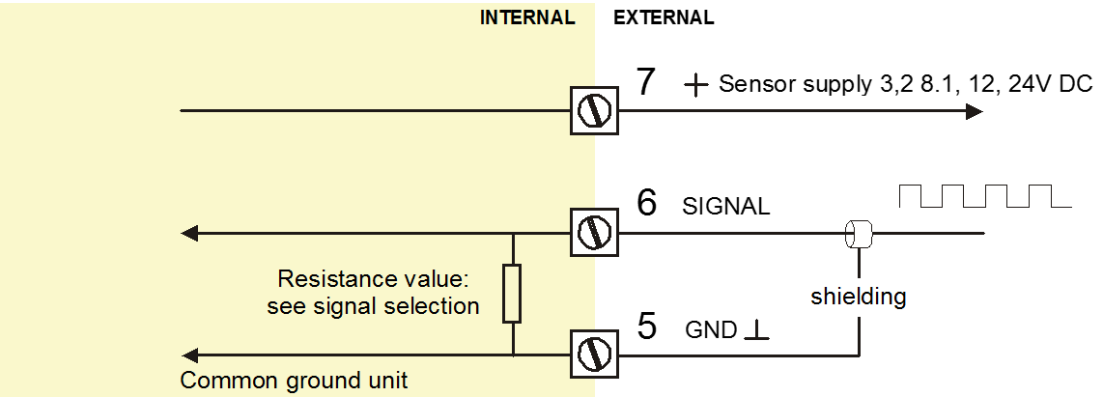


Fig. 30: Terminal connections - Active signal input.

Reed-switch
The F014-P is suitable for use with flowmeters which have a reed-switch. To avoid pulse bounce from the reed-switch, it is advised to select REED LP - low-pass filter (read chapter 3.3.2).

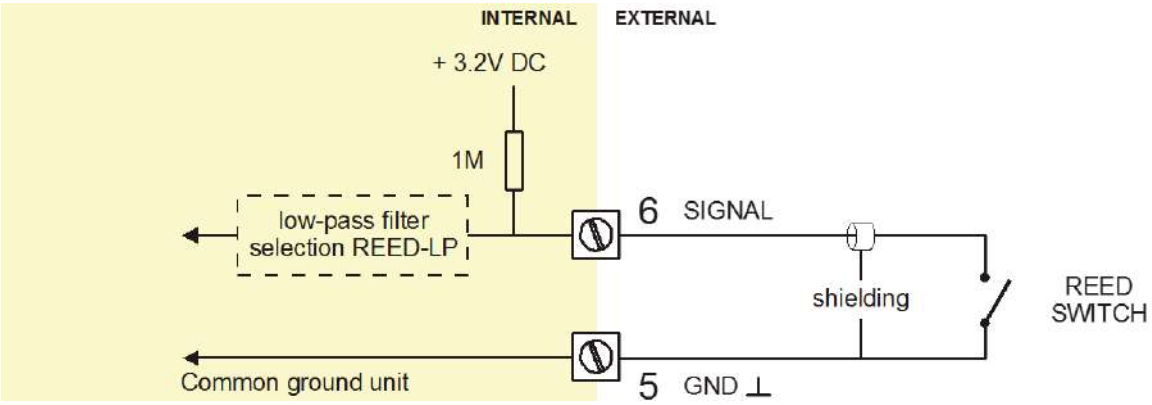


Fig. 31: Terminal connections - Reed-switch signal input.

NAMUR-signal
The F014-P is suitable for flowmeters with an NAMUR signal.
Terminal 7 can provide a 8.2V sensor supply voltage (please read section “sensor supply”).

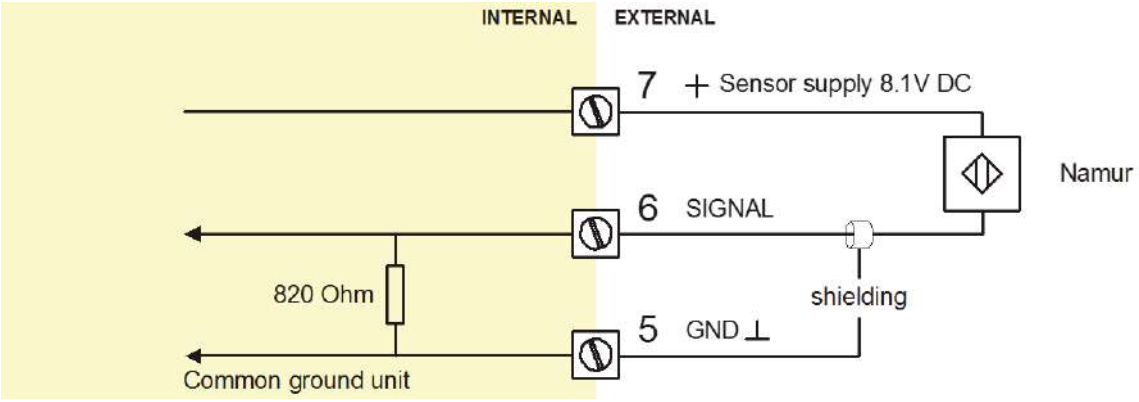


Fig. 32: Terminal connections - NAMUR signal input.

5 INTRINSICALLY SAFE APPLICATIONS

5.1 IDENTIFICATION

Caution !

The F0-Series can be supplied as suitable for Safe Area or Hazardous Area.
Suitability for Intrinsic Safety is indicated in the model code by Type XI (e.g. F014-P-XI).

If Type XI is not indicated your device is not suitable for Intrinsically Safe applications!

Identification label

To identify your F0-Series device, all field mount enclosures have a weatherproof identification label placed on the outside of the unit.

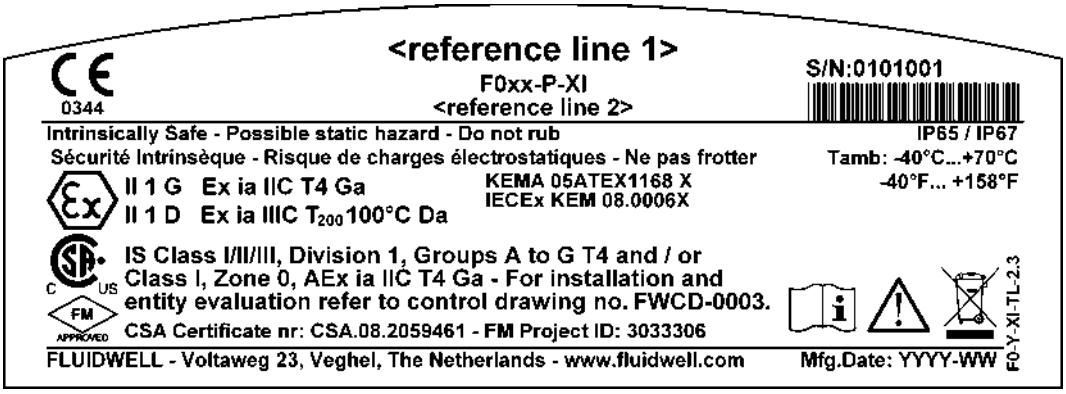


Fig. 33: Identification – Example of F0-Series identification label (intrinsic safety)

Installation label

A second label is located on the inside and shows additional installation data. For panel mount enclosures, the outside label is not available, so the inside label also serves as identification label. After installation, the inside label is only visible from the rear side of the panel.

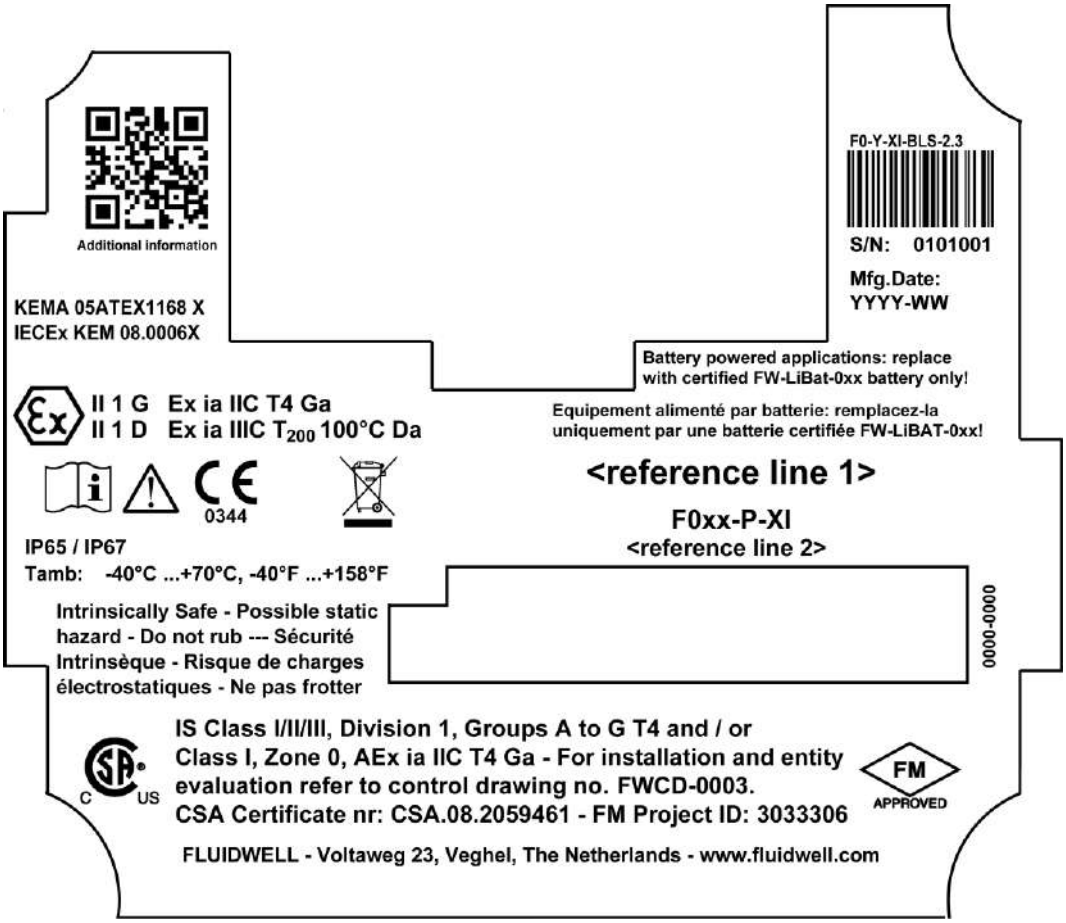


Fig. 34: Identification – Example of F0-Series installation label (intrinsic safety)

5.2 ELECTRICAL INSTALLATION IN HAZARDOUS AREA

5.2.1 GENERAL INFORMATION AND INSTRUCTIONS


Caution !

Cautions

- Mounting, electrical installation, start-up and maintenance of this device may only be carried out by trained persons authorized by the operator of the facility. Persons must read and understand this manual before carrying out its instructions.
- This device may only be operated by persons who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Make sure the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the enclosure cover is removed or the panel cabinet is opened (danger from electrical shock). The enclosure may only be opened by trained persons authorized by the operator of the facility.
- To maintain the degree of protection of at least IP65 in accordance with IEC 60529, suitable cable entries and blanking elements must be used and correctly installed.
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.
- Chapter 4 shows general information regarding the electrical installation of your indicator. This chapter gives additional specific information regarding Intrinsically safe installation and overrules the information given in chapter 4.
- When installing this device in hazardous areas, the wiring and installation must comply with the appropriate installation standards for your industry.

Safety instructions

- For the combined connection of the different supply, input and output circuits, the instructions in this manual must be observed.
- Precautions shall be taken to avoid the risk of electrostatic discharge (ESD) and propagating brush discharges.
- For reasons of ESD and safety, always ground the metal enclosure properly as indicated in section “4.5. Electrical installation” of this manual.
- Do not blend metal front covers with non-metallic rear covers, vice versa and / or cable glands. A metal cover on a non-metallic rear cover could lead to ESD. A metal cable gland in a non-metallic enclosure could invalidate isolation.
- For enclosures and windows with a high surface resistance, potential charging hazard exists. Do not rub these surfaces of the indicator. Clean window and enclosure only with a lint-free cleaning cloth made damp with a mild soap solution.


Note !

Please note

- Certificates and related documents are available on our website or from your distributor.
- Carefully study the configuration examples with wiring diagrams per classification in the following paragraphs.

5.2.2 INSTALLATIONS BASED ON FM OR CSA CERTIFICATE

Installation instructions

- For installation in the **US**: this Intrinsically Safe device must be installed in accordance with the National Electrical Code, NFPA 70, Article 504 and ANSI/ISA-RP 12.6 and product certificate FM16US0177X or CSA.08.2059461.
- For installation in **Canada**: this Intrinsically Safe device must be installed in accordance with the Canadian Electrical Code, Part 1 Appendix F and product certificate CSA.08.2059461.

Covered markings

- Intrinsically Safe for Class I/II/III, Division 1, Groups A,B,C,D,E,F,G, Temperature class T4
- Class I, Zone 0, AEX ia IIC T4

Safety instructions

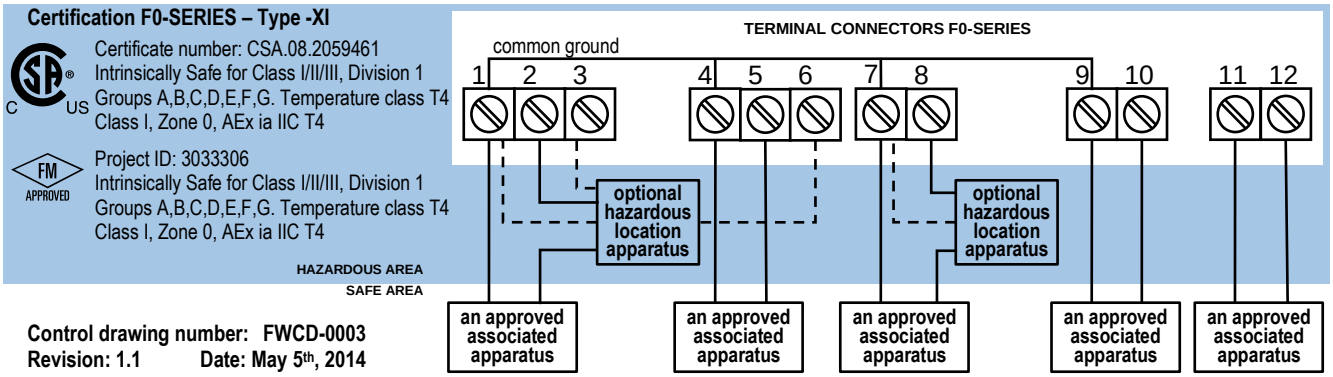
- Please consult the control drawing for this F0-Series model on the following page.
- Read paragraph 6.3 for battery replacement instructions.

Specific conditions of use

- When the enclosure of the indicator is made of aluminum alloy, when used in a potentially explosive atmosphere requiring apparatus of equipment protection level Ga, the indicator shall be installed so, that even in the event of rare incidents, an ignition source due to impact or friction sparks between the enclosure and iron/steel is excluded.

5.2.3 ELECTRICAL DATA - CONTROL DRAWING

Control Drawing F0xx-P-XI



- The installation must comply with national requirements (e.g. in Canada, the Canadian Electrical Code, Part 1 Appendix F and in USA, the National Electrical Code, NFPA 70, Article 504 and ANSI/ISA-RP 12.6).
- Warning: Substitution of components may impair intrinsic safety.
- For the circuits connected to terminals 1, 2 and 3, 4 and 5, 7 and 8, 9 and 10, the output parameters of the connected barriers (up to 4) or hazardous location apparatus must meet the following requirements:

  Voc ≤ The lowest Vmax of the CSA / FM Approved apparatus in the circuit
  Isc ≤ The lowest Imax of the CSA / FM Approved apparatus in the circuit
  Pmax ≤ The lowest Pmax of the CSA / FM Approved apparatus in the circuit
  Ca ≥ The sum of the cable capacitance and the internal capacitance Ci of each CSA / FM Approved apparatus installed in the circuit
  La ≥ The sum of the cable inductance and the internal inductance Li of each CSA / FM Approved apparatus installed in the circuit

- For the circuits connected to terminals 1, 2 and 3, 4 and 6, 7 and 8, 11 and 12, the input parameters of the connected hazardous location apparatus must meet the following requirements:

  Vmax ≥ The Voc of the of the circuit
  Imax ≥ The Isc of the circuit
  Pmax ≥ The Pmax of the circuit
  Ci ≤ The difference between the Ca of the circuit and the sum of the cable capacitance and the internal capacitance Ci of all other CSA / FM Approved apparatus installed in the circuit
  Li ≤ The difference between the La of the circuit and the sum of the cable inductance and the internal inductance Li of all other CSA / FM Approved apparatus installed in the circuit

- Hazardous Location Apparatus – switches, thermocouples or non-inductive resistance devices, or CSA / FM – Certified Apparatus – should be connected in accordance with the manufacturer's installation instructions.
- The cable parameters are determined by the parameters of the system into which the F0-Series General Purpose Indicators is connected.
- Only certified Intrinsically Safe Fluidwell battery type FW-LiBat-0xx may be used and replaced in hazardous area.

The entity parameters for F0-Series General Purpose Indicators, model F0xx-P-XI, are as follows:

Terminals 1 and 2 – Input parameters:	Vmax	=	30 V	Ci	=	0 nF
	Imax	=	150 mA	Li	=	0 mH
	Pmax	=	0.92 W			
Terminals 1 and 2 – Output parameters:	Vcc	=	5.4 V	Ci	=	65 µF
	Imax	=	2.4 mA	Li	=	1 H
	Pmax	=	3.2 mW			
Terminals 1 and 3 – Output parameters:	Vcc	=	5.4 V	Ci	=	65 µF
	Imax	=	2.1 mA	Li	=	1 H
	Pmax	=	2.9 mW			
Terminal 4 and 5 – Input parameters – Type -PD/-PX	Vmax	=	30 V	Ci	=	0 nF
	Imax	=	200 mA	Li	=	0 mH
	Pmax	=	1.2 W			
Terminal 4 and 6 – Output parameters – Type -PD	Vmax	=	8.7 V	Ci	=	5.9 µF
	Imax	=	12 mA	Li	=	240 mH
	Pmax	=	72 mW			
Terminal 7 and 8 – Input parameters – Type -OT	Vmax	=	30 V	Ci	=	0 nF
	Imax	=	200 mA	Li	=	0 mH
	Pmax	=	1.2 W			
Terminal 9 and 10 – Input parameters – Type -ZB	Vmax	=	30 V	Ci	=	0 nF
	Imax	=	200 mA	Li	=	0 mH
	Pmax	=	0.75 W			
Terminal 11 and 12 – Input parameters – Type -AH	Vmax	=	30 V	Ci	=	6.1 nF
	Imax	=	100 mA	Li	=	0 mH
	Pmax	=	0.75 W			

5.2.4 INSTALLATIONS BASED ON ATEX OR IECEX CERTIFICATE

Installation instructions

- For installation under **ATEX directive**: this Intrinsically Safe device must be installed in accordance with ATEX directive 2014/34/EU and product certificate KEMA 03ATEX1168 X.
- For installation under **IECEx scheme**: this Intrinsically Safe device must be installed in accordance with product certificate IECEx DEK 08.0006X.

Covered Ex markings

- II 1 G Ex ia IIC T4 Ga
- II 1 D Ex ia IIIC T_{200} 100°C Da

Safety instructions

- When two or more active Intrinsically safe circuits are connected to the indicator, in order to prevent voltage and/or current addition, applicable to the external circuits, precautions must be taken to separate the Intrinsically safe circuits in accordance with EN 60079-11.
- For electrical data, consult Annex 1 for this F0-Series model on the following page.
- Substitution of components may impair intrinsic safety.
  Exchange of Intrinsically safe battery FWLiBAT-0xx with certificate number KEMA 03ATEX1071 U or IECEx KEM 08.0005U is allowed in Hazardous Area.
  Read paragraph 6.3 for battery replacement instructions.

Specific conditions of use

- When the enclosure of the indicator is made of aluminum alloy, when used in a potentially explosive atmosphere requiring apparatus of equipment category 1 G / equipment protection level Ga, the indicator shall be installed so, that even in the event of rare incidents, an ignition source due to impact or friction sparks between the enclosure and iron/steel is excluded.
- For EPL Da the ambient temperature Ta shall not exceed 50 °C.

5.2.5 ELECTRICAL DATA – ANNEX 1

Annex 1 (model specific)
to product certificates KEMA 03ATEX1168 X, IECEx DEK 08.0006X, DEKRA 21UKEX0202 X.

	Model F0..-P-XI	
Internal supply Type -PC (connector)	for use with the certified replaceable battery type FW-LiBAT-… or to another certified non rechargeable battery in type of protection intrinsic safety Ex ia IIC/IIIC, with the following maximum values: U_i = 4 V I_i = 50 mA P_i = 200 mW L_i = 0 mH C_i = 0 µF	
Pulse input circuit (terminals 1 and 2)	in type of protection intrinsic safety Ex ia IIC/IIIC, only for connection to a certified intrinsically safe circuit, with following maximum values: U_i = 30 V I_i = 150 mA P_i = 0.92 W L_i = 0 mH C_i = 0 nF	type of protection intrinsic safety Ex ia IIC/IIIC, with the following maximum values: U_o = 5.4 V I_o = 2.4 mA P_o = 3.2 mW L_o = 1 H C_o = 65 µF
Reference output circuit (terminals 3 and 1 or 2)	in type of protection intrinsic safety Ex ia IIC/IIIC, with the following maximum values: U_o = 5.4 V I_o = 2.1 mA P_o = 2.9 mW L_o = 1 H C_o = 65 µF	
External supply input circuit Type -PD, -PX (terminals 4 and 5)	in type of protection intrinsic safety Ex ia IIC/IIIC, only for connection to a certified intrinsically safe circuit, with following maximum values: U_i = 30 V I_i = 200 mA P_i = 1.2 W L_i = 0 mH C_i = 0 nF	
External supply output circuit Type -PD (terminals 6 and 1, 2, 7 or 8)	in type of protection intrinsic safety Ex ia IIC/IIIC, with the following maximum values: U_o = 8.7 V I_o = 12 mA P_o = 72 mW L_o = 240 mH C_o = 5.9 µF	
Pulse output circuit Type -OT (terminals 7 and 8)	in type of protection intrinsic safety Ex ia IIC/IIIC, only for connection to a certified intrinsically safe circuit, with following maximum values: U_i = 30 V I_i = 200 mA P_i = 1.2 W L_i = 0 mH C_i = 0 nF	
Backlight supply input circuit Type -ZB (terminals 9 and 10)	in type of protection intrinsic safety Ex ia IIC/IIIC, only for connection to a certified intrinsically safe circuit, with following maximum values: U_i = 30 V I_i = 200 mA P_i = 0.75 W L_i = 0 mH C_i = 0 nF	
Analog output (with HART) Type -AH (terminals 11 and 12)	in type of protection intrinsic safety Ex ia IIC/IIIC, only for connection to a certified intrinsically safe circuit, with following maximum values: U_i = 30 V I_i = 100 mA P_i = 0.75 W L_i = 0 mH C_i = 6.1 nF	
From the safety point of view the circuits shall be considered to be connected to earth.		

5.2.6 POWER SUPPLY WIRING

The F014-P can be powered from an external power supply. An internal power supply is also available in the form of a lithium battery. When both external and internal power supplies are available, the internal power supply is interrupted and will act as a backup supply. Note that the optional backlight only works with an external power supply.

The following types of power supply are available for hazardous area:

- **Type PX / PD**: As standard, all intrinsically safe products are supplied with terminal 4 and 5 to power the product externally.
- **Type PC:** Offers an internal intrinsically safe lithium battery.
  This ATEX / IECEx certified battery (FW-LiBAT) may be replaced in hazardous area, but only with a new certified FW-LiBAT battery. (See paragraph 6.3).

5.2.7 SENSOR SUPPLY

For type PC / PX – Terminal 3: limited sensor supply

These types of power supply only offer a limited power supply. This power supply SHOULD NOT be used to supply the flowmeters electronics, converters etc. as it will not provide adequate sustained power! All energy used by the flowmeters 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. The sensor supply at terminal 3 is fixed to 1.2V DC for coil type inputs and 3.2V DC for all other types of flowmeter inputs (set by firmware).

For type PD - Terminal 6: sensor supply 8.2V

Besides offering the limited sensor supply on terminal 3 (see above), type PD also offers a real sensor supply of 8.2V DC, for example to power a Namur sensor, on terminal 6.

5.3 TERMINAL CONNECTORS INTRINSICALLY SAFE APPLICATIONS

Terminal connectors F014-P-(PC / PD / PX)-XI-(ZB):

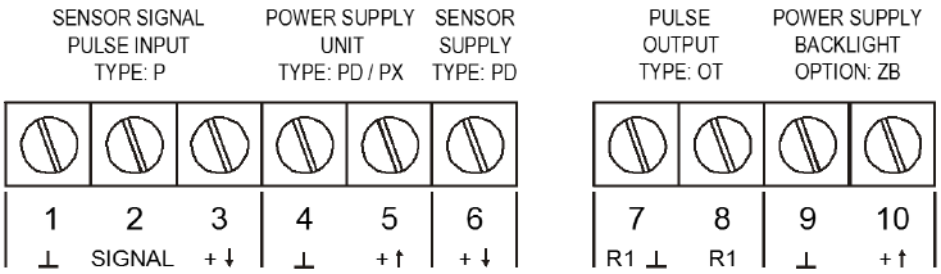


Fig. 35: Overview terminal connectors Type XI - Intrinsically Safe applications

Note !

- ***Type PC:***
  offers - additional to type PX - an internal Intrinsically Safe lithium battery. This ATEX certified battery (FW-LiBAT-xxx) may be changed in hazardous area.
- ***Type PD:***
  offers with terminal 6 - additional to type PX - a real sensor supply of 8.2V DC to power a Namur sensor for example.
- ***Type PX**:*
  as standard, all intrinsically safe products are supplied with terminal 4 and 5 to power the product externally.

5.4 CONFIGURATION EXAMPLES INTRINSICALLY SAFE APPLICATIONS

5.4.1 F014-P-(OT)-PC-(PX)-XI-(ZB) BATTERY POWERED - Ex ia IIC/IIIC

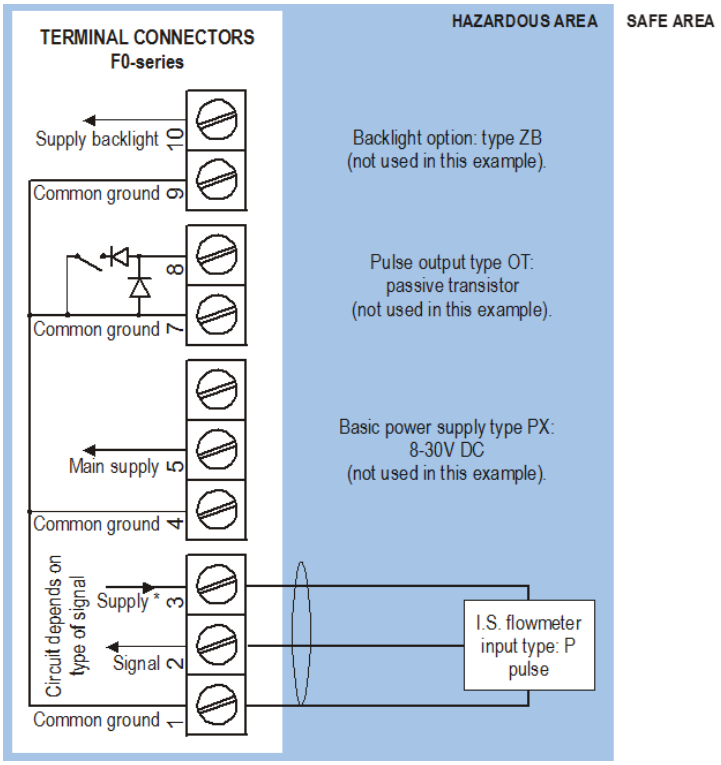


Fig. 36: F014-P-(OT)-PC-(PX)-XI-(ZB) - Ex ia IIC/IIIC - Intrinsically Safe application.

*****
Sensor supply voltage for pulse type P: Terminal 3: 1.2-3.2V DC.
Please note: Type PX may be used in combination with the battery (Type PC).
PX will power the F014-P, the battery will be disabled automatically until the power is disconnected.

5.4.2 F014-P-OT-PX-XI-ZB - Ex ia IIC/IIIC

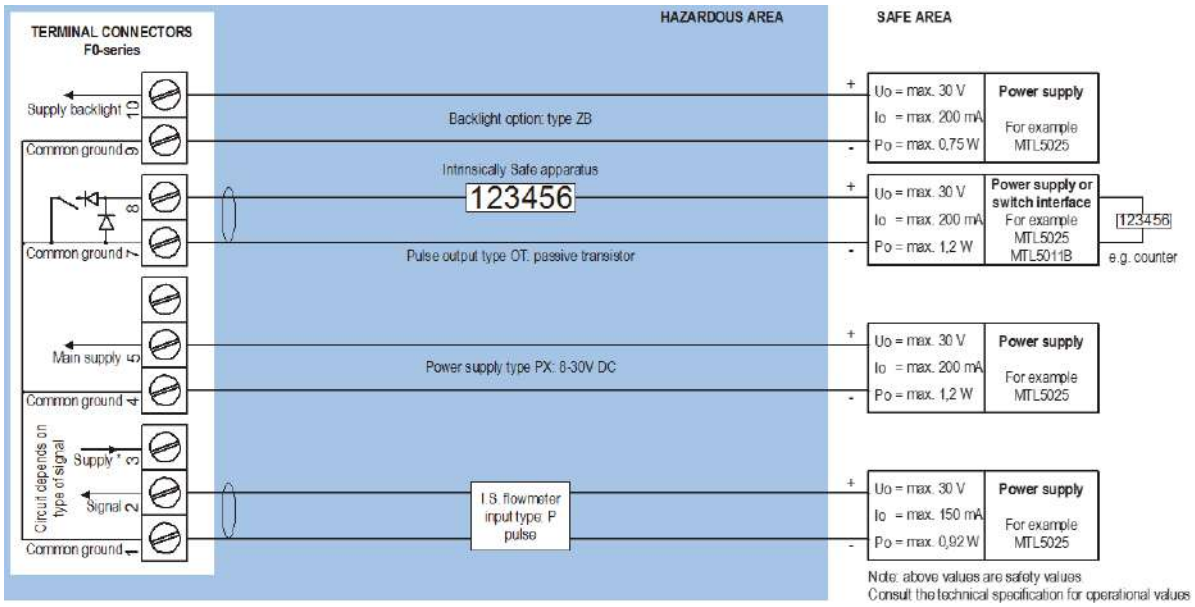


Fig. 37: F014-P-OT-PX-XI-ZB - Ex ia IIC/IIIC - Intrinsically Safe application.

*

Sensor supply voltage for pulse type P: Terminal 3: 1.2-3.2V DC.
Please note: Type PX may be used in combination with the battery (Type PC).
PX will power the F014-P, the battery will be disabled automatically until the power is disconnected.

5.4.3 F014-P-OT-PX-XI-(ZB) - Ex ia IIC/IIIC

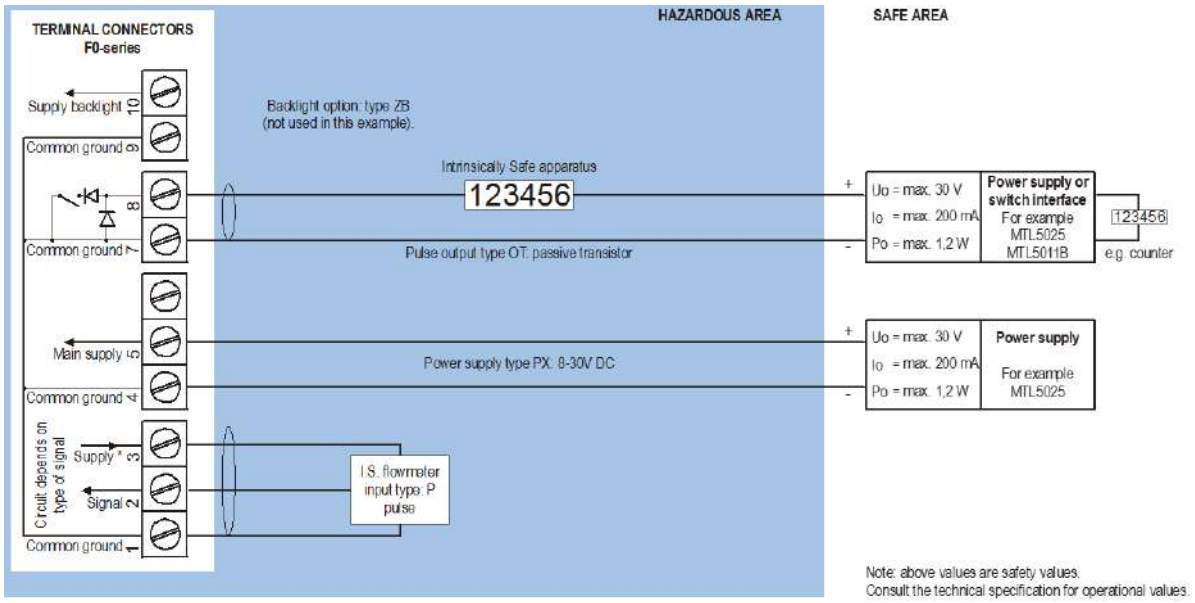


Fig. 38: F014-P-OT-PX-XI-(ZB) - Ex ia IIC/IIIC - Intrinsically Safe application.

*

Sensor supply voltage for pulse type P: Terminal 3: 1.2-3.2V DC.
Please note: Type PX may be used in combination with the battery (Type PC).
PX will power the F014-P, the battery will be disabled automatically until the power is disconnected.

5.4.4 F014-P-OT-PD-XI-ZB - Ex ia IIC/IIIC

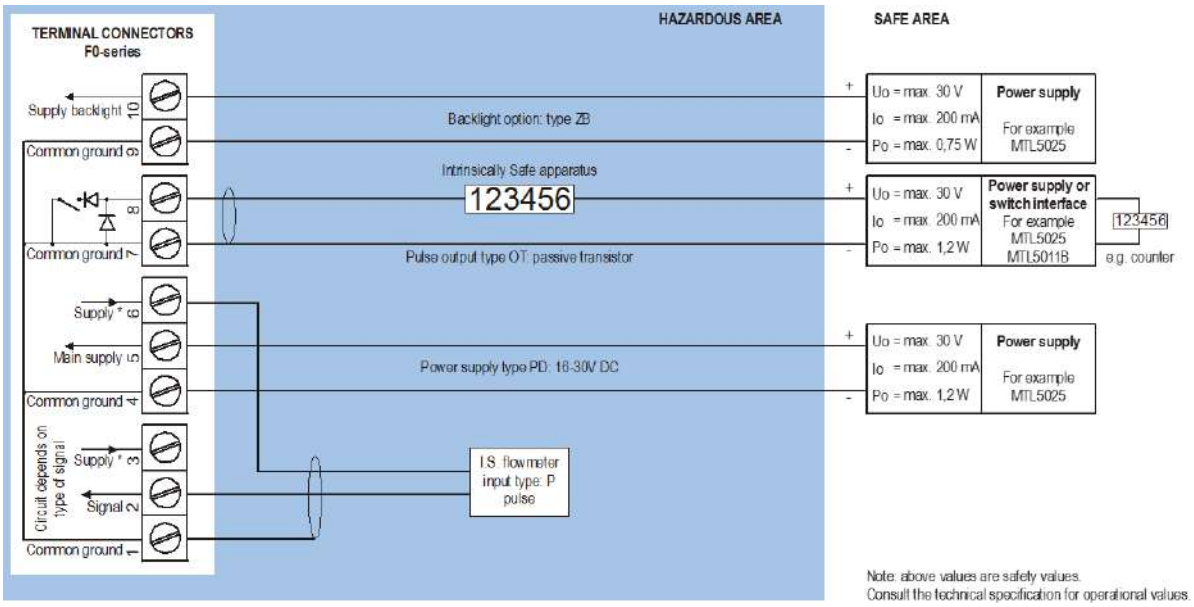


Fig. 39: F014-P-OT-PD-XI-ZB - Ex ia IIC/IIIC - Intrinsically Safe application.

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Sensor supply voltage for pulse type P: Terminal 3: 1.2-3.2V DC; Terminal 6: 8.2V DC.
Please note: Type PD may be used in combination with the battery (Type PC).
PD will power the F014-P, the battery will be disabled automatically until the power is disconnected.

6 MAINTENANCE

6.1 GENERAL DIRECTIONS

- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.
- The F014-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Ensure that the measuring system is correctly wired up according to the wiring diagrams. The housing may only be opened by trained personnel.
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.

The F014-P does not require special maintenance unless it is used in low-temperature applications or surroundings with high humidity (above 90% annual mean). It is the users responsibility to take all precautions to dehumidify the internal atmosphere of the F014-P in such a way that no condensation will occur, for example by placing dry silica-gel sachet in the casing just before closing it. Furthermore, it is required to replace or dry the silica gel periodically as advised by the silica gel supplier.

Battery life-time:

It is strongly advised to use only necessary functions.

It is influenced by several issues :

- Display update: fast display update uses significantly more power.
- Pulse output.
- Low temperatures; the available power will be less due to battery chemistry.

Check periodically:

- The condition of the casing, cable glands and front panel.
- The input/output wiring for reliability and aging symptoms.
- The process accuracy. As a result of wear and tear, re-calibration of the flowmeter might be necessary. Do not forget to re-enter any subsequent K-factor alterations.
- The indication for low-battery.
- Clean the casing with soapy-water. Do not use any aggressive solvents as these might damage the coating.

6.2 INSTRUCTIONS FOR REPAIR

This product cannot be repaired by the user and must be replaced with an equivalent certified product. Repairs are only allowed to be carried out by the manufacturer or his authorized agent.

Substitution of components may impair intrinsic safety.

Repair policy

If you have any problem with your product and you wish to have it repaired, please follow the procedure below:

a. Obtain a Return Material Authorization (RMA) from your supplier or distributor. Together with the RMA, you need to complete a repair form to submit detailed information about the problem.
b. Send the product, within 30 days, to the address provided with the RMA. The physical return of your repair can only take place after the authorization of your repair application, as confirmed by the RMA number.

If the product is within the warranty period and the reported problem falls under the warranty conditions, the product will be repaired or exchanged and returned within three weeks. Otherwise, you will receive a repair estimate.

6.3 BATTERY REPLACEMENT

6.3.1 SAFETY INSTRUCTIONS

- Handle the battery with the utmost care to prevent a short circuit and damage.
  A mistreated battery can become unsafe. Unsafe batteries can cause (serious) injury to persons. **Do not recharge, crush, disassemble, incinerate, heat above its rated temperature or expose the contents to water.**
- Mounting, electrical installation, start-up and maintenance of this device may only be carried out by trained persons authorized by the operator of the facility. Persons must read and understand this manual before carrying out its instructions.

Intrinsically safe applications – Type PC

- **Only batteries of type FW-LiBAT-021 that hold the Ex marking as shown below are suitable replacements and certified for use in hazardous areas.**
- **Before replacing the battery in hazardous area, verify that the new battery is undamaged, in good condition and suitable for use in the unit.**
  (Type: FW-LiBAT-021 - re-ordering nr. SPC02)
- **Never use safe areas batteries in hazardous area. DO NOT EXCHANGE.**
  Using the wrong type of battery can pose a SERIOUS RISK.

Fig. 40: Marking Type PC battery: Intrinsically Safe FW-LiBAT-021 (SPC02)

Safe area applications – Type PB

- Before replacing the battery, verify that the new battery is undamaged, in good condition and suitable for use in the unit.
  (Type: StdLiBAT021 - re-ordering nr. SPB02)

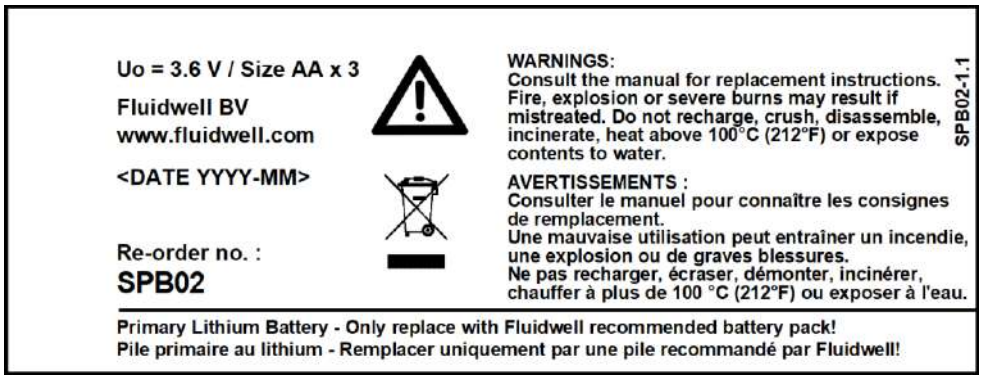

Fig. 41: Marking Type PB battery: Safe area StdLiBAT021 (SPB02)

6.3.2 REPLACE THE BATTERY

Before starting the battery replacement procedure, make sure that the marking on the new battery corresponds with the type of installation, as shown in paragraph 6.3.1.

When used in Intrinsically safe applications – Type PC:

The VELCRO strap that holds the battery is antistatic: DO NOT REPLACE.
When lost or broken, temporarily use a tie-wrap to hold the battery.

Remove the old battery as follows:

1. Open the enclosure as indicated in section 4.3 and locate the battery on the inside cover.
2. Carefully disconnect the battery connector (1) from the unit.
3. Open the Velcro strap (2) without pulling it out and remove the battery (3) from its retainer (4).
4. Store the old battery in a small plastic bag (e.g. the bag the new battery came in) or install an insulation tape over the battery connector to prevent a short circuit.

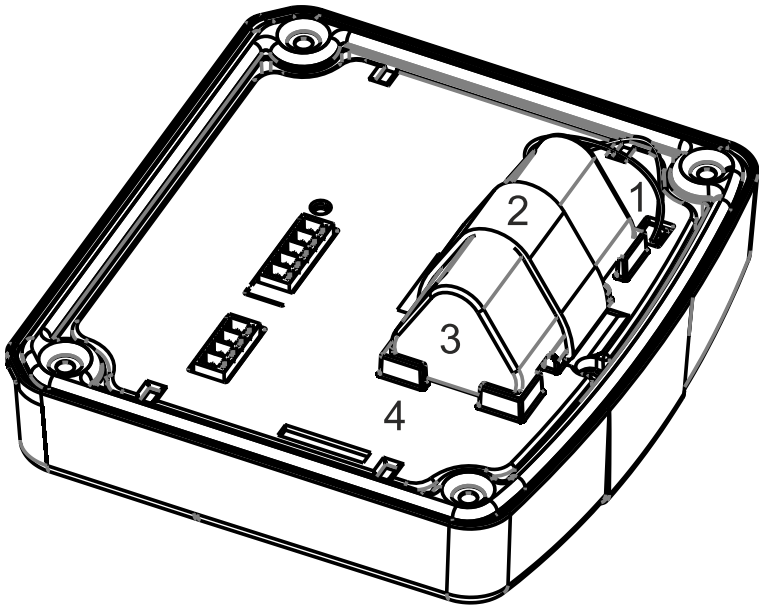

Fig. 42: Battery replacement procedure

Install the new battery as follows:

1. Make sure the new battery is undamaged, in good condition and suitable for use in the unit. Check that the markings on the battery correspond with the type of installation, as shown above.
2. Install the battery (3) into the retainer (4) making sure the wire (1) comes out at the correct side.
3. Close the Velcro strap (2) tightly around the battery (3) to secure it in place.
4. Carefully connect the battery connector (1) to the unit.
5. Check that the battery is installed properly by checking that the screen has come on.
6. Close the enclosure as indicated in section 4.3.
7. If required, initialize the date and time on the unit.

6.3.3 DISPOSAL OF BATTERIES

Dispose of batteries in accordance with the (inter)national, the manufacturer's and the plant owner's standards and regulations.

- Batteries pose an environmental hazard.
- Do not dispose of as general waste or incinerate.
- Return used batteries to a recycling point.

Appendix A. TECHNICAL SPECIFICATION

General

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Dimensions	90 x 40mm (3.5”x 1.6”)
Digits	Seven 17mm (0.67") and eleven 8mm (0.31"). Various symbols and measuring units.
Refresh rate	User definable: 8 times/sec - 30 secs.
Type ZB (option)	Configurable LED-backlight. Intensity adjustable from the keyboard.

Enclosures	
General	Die-cast aluminum, Stainless Steel 316L or GRP (Glass Reinforced Plastic) wall / field mount enclosure with Polycarbonate window, silicone and EPDM gaskets. UV stabilized and flame retardant material.
Control Keys	Three industrial micro-switch keys. UV-resistant silicone keypad.
Painting	Aluminum enclosure only: UV-resistant 2-component industrial painting.
Panel mount enclosures	
Dimensions	130 x 120 x 60mm (5.10” x 4.72” x 2.38”) – WxHxD
Panel cut-out	115 x 98mm (4.53" x 3.86") – WxH
Protruding at front	31mm (1.22")
Classification	IP65 / TYPE 4X
Type HC	Plastic / GRP panel-mount enclosure. Weight 450gr.
Type HB / HSB	Aluminum / Stainless Steel panel-mount enclosure. Weight 600gr.
Field/wall-mount enclosures	
Dimensions	130 x 120 x 75mm (5.10” x 4.72” x 2.95”) – WxHxD
with extended back	130 x 120 x 90mm (5.10” x 4.72” x 3.54”) – WxHxD
Classification	IP67 / TYPE 4X
Aluminum / SS enclosures	(types HS_ are stainless steel versions, HB_ are extended aluminum back versions)
Type HA	Drilling: 2x PG9 – 1x M20.
Type HB / HSB	Panel mount front cover only
Type HL	Drilling: 2x ½”NPT.
Type HM / HBM / HSM	Drilling: 2x M16 – 1x M20.
Type HN	Drilling: 1x M20.
Type HO / HBO / HSO	Drilling: 2x M20.
Type HP	Drilling: 6x M12.
Type HT	Drilling: 1x ½”NPT.
Type HU / HBU / HSU	Drilling: 3x ½”NPT.
Type HV	Drilling: 4x M20
Type HZ	No drilling.
GRP enclosures	
Type HC	Panel mount front cover only
Type HD	No drilling.
Type HE	Drilling: 2x 16mm (0.63”) – 1x 20mm (0.78”).
Type HF	Drilling: 1x 22mm (0.87”).
Type HG	Drilling: 2x 20mm (0.78”).
Type HH	Drilling: 6x 12mm (0.47”).
Type HJ	Drilling: 3x 22mm (0.87”).
Type HK	Flat bottom - no drilling.

Operating temperature	
Safe area	-40°C to +80°C (-40°F to +178°F).
Intrinsically Safe	-40°C to +70°C (-40°F to +158°F). For EPL Da: -40°C to +50°C (-40°F to +122°F)

Power requirements	
Type PB	Standard Lithium battery - life-time depends upon settings - up to 5 years. **SAFE AREA ONLY**
Type PC	**Intrinsically Safe** lithium battery - life-time depends upon settings - up to 5 years.
Type PD	16-30 V DC. Power consumption max. 1 Watt.
Type PF	24V AC/DC ±10%. Power consumption max. 15 Watt.
Type PM	115-230V AC ±10%. Power consumption max. 15 Watt.
Type PX	8-30 V DC (also available with PB / PC). Power consumption max. 0.3 Watt.
Type ZB	20-30V DC. Power consumption max. 1 Watt. Note: with type PF / PM: internally powered.
Note for Type PF and PM	*The total consumption of the sensor, transistor output type OA and backlight type ZB may not exceed 400mA@24V DC.*
Note for I.S. applications	*For **Intrinsically safe** applications, consult the safety values in the certificate.*

Sensor excitation	
Type PB / PC / PX	Sensor supply voltage: 3.2V DC for low power pulse signals and 1.2V DC for coil pick-up.
Type PD	Sensor supply output 8.2V DC, max. 5mA (additional to type PX sensor excitation options).
Type PF / PM	sensor supply 8.2V, 12V and 24V DC - max. 400mA@24V DC (additional to type PX sensor excitation options).

Terminal connections	
Type:	Removable plug-in terminal strip. Wire max. 1.5mm2 and 2.5mm2

Data protection	
Type	EEPROM backup of all settings. Backup of running totals every minute. Data retention at least 10 years.
Password	Configuration settings can be password protected.

Hazardous area (option)		
Intrinsically safe Type XI	**ATEX approval: KEMA 05ATEX1168 X** II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T_{200} 100°C Da	**CSA approval: CSA.08.2059461** IS Class I/II/III, Division 1, Groups A to G T4 Class I, Zone 0, AEx ia IIC T4 Ga
	IECEx approval: IECEx KEM 08.0006X Ex ia IIC T4 Ga Ex ia IIIC T_{200} 100°C Da	**FM approval: FM16US0177X** project ID: 3033306 IS Class I/II/III, Division 1, Groups A to G T4 Class I, Zone 0, AEx ia IIC T4 Ga
Explosion proof Type XF	**ATEX approval:** II 2 G Ex db IIB+H2 T5 Gb II 2 D Ex tb IIIC T80°C Db	**IECEx approval:** Ex db IIB+H2 T5 Gb Ex tb IIIC T80°C Db
Weight	Appr. 15 kg.	
Dimensions	350 x 250 x 200mm (13.7" x 9.9" x 7.9") WxHxD.	

Directives & Standards			
EMC	EN 61326-1	FCC 47 CFR part 15	
Low voltage	EN/IEC 61010-1	CSA C22.2 No. 61010-1	UL61010-1
ATEX	EN IEC 60079-0	EN 60079-11	
IECEx	IEC 60079-0	IEC 60079-11	
CSA c-us	CAN/CSA-C22.2 NO. 157 CAN/CSA-C22.2 NO. 142 CAN/CSA-C22.2 NO. 60079-0 CAN/CSA-C22.2 NO. 60079-11	ANSI/UL 913 UL 508 ANSI/ISA-60079-0 ANSI/ISA-60079-11	
FM	FM Class 3600 FM Class 3610 FM Class 3810	ANSI/UL 60079-0 ANSI/UL 60079-11	
RoHS	EN 50581	IEC 63000	
IP & NEMA	EN 60529	ANSI/IEC 60529	NEMA 250
Note: See the applicable Declaration of Conformity or product certificate for specific revisions and publication dates.			

Input

Flowmeter	
Type P	Coil/sine wave (minimum 20mVpp or 80mVpp - sensitivity selectable), NPN/PNP, open collector, reed-switch, Namur, active pulse signals.
Frequency	Minimum 0 Hz - maximum 7 kHz for flow rate. Maximum frequency depends on signal type and internal low-pass filter. E.g. Reed switch with low-pass filter: max. frequency 120 Hz.
K-Factor	0.000010 - 9,999,999 with variable decimal position.
Low-pass filter	Available for all pulse signals.
Type ZF	coil sensitivity 10mVpp.
Type ZG	coil sensitivity 5mVpp.

Output

Pulse output	
Function	Scaled Pulse Output, transmitting accumulated total.
Frequency	max frequency 500Hz.
Type OA	One active 24V DC transistor output; max. 400mA per output (requires type PF or PM).
Type OR	One mechanic relay output; max. switch power 230V AC - 0,5A (requires type PF or PM).
Type OT	One passive transistor output - not isolated. Load max. 50V DC - 300mA.

Operational

Operator functions	
Displayed functions	• total and/or flow rate. • total and accumulated total. • total can be reset to zero by pressing the CLEAR-key twice.

Total	
Digits	7 digits.
Unit	L - m3 - kg - lb - GAL - USGAL - bbl - no unit
Decimals	0 - 1 - 2 or 3.
Note	total can be reset to zero.

Accumulated total	
Digits	11 digits.
Unit / decimals	According to selection for total.

Flow rate	
Digits	7 digits.
Unit	mL, L, m3, Gallons, KG, Ton, lb, bl, cf, RND, ft3, scf, Nm3, Nl, igal - no unit.
Time units	sec - min - hr - day
Decimals	0 - 1 - 2 or 3.

Appendix B. PROBLEM SOLVING

In this appendix, several problems are included that can occur when the F014-P is going to be installed or while it is in operation.

Flow rate displays "0 / zero" while there is flow (total is counting):
Check:

- SETUP 22 / 25: are the K-Factor time unit correct?

The pass code is unknown:
If the pass code is not 1234, there is only one possibility left: call your supplier.

ALARM
When the alarm flag starts to blink an internal alarm condition has occurred. Press the "select button" several times to display the 4-digit error code. The codes are:

- 0001:
  irrecoverable display-data error: data on the display might be corrupted.
- 0002:
  irrecoverable data-storage error: the programming cycle might have gone wrong: check programmed values.
- 0003:
  error 1 and error 2 occurred simultaneously

The alarm condition will almost certainly be handled internally and if all mentioned values still appear correct, no intervention by the operator is needed. If the alarm occurs more often or stays active for a longer time, please contact your supplier.

INDEX OF THIS MANUAL

LIST OF FIGURES

LIST OF CONFIGURATION SETTINGS			
SETTING	DEFAULT	DATE:	DATE:
1 – TOTAL		Enter your settings here	
11 unit	L		
12 decimals	0000000		
13 K-factor	0000001		
14 decimals K-factor	0		
2 - FLOW RATE			
21 unit	L		
22 time unit	/min		
23 decimals	0000000		
24 K-factor	0000001		
25 decimals K-factor	0		
26 calculation / pulses	010		
27 cut-off time	30.0 sec.		
3 - DISPLAY			
31 function	total		
32 backlight	off		
33 brightness	5		
4 - POWER MANAGEMENT			
41 LCD-new	1 sec.		
42 mode	operational		
5 - FLOWMETER			
51 signal	coil-lo		
6 - PULSE OUTPUT			
61 pulse width	0.000 sec		
62 decimals	0000000		
63 pulse per	1000 L		
7 - OTHERS			
71 model	F014-P	F014-P	F014-P
72 software version	03.____.____	03.____.____	03.____.____
73 serial number	_ _ _ _ _ _ _	_ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _
74 pass code	0000		
75 tagnumber	0000000		

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