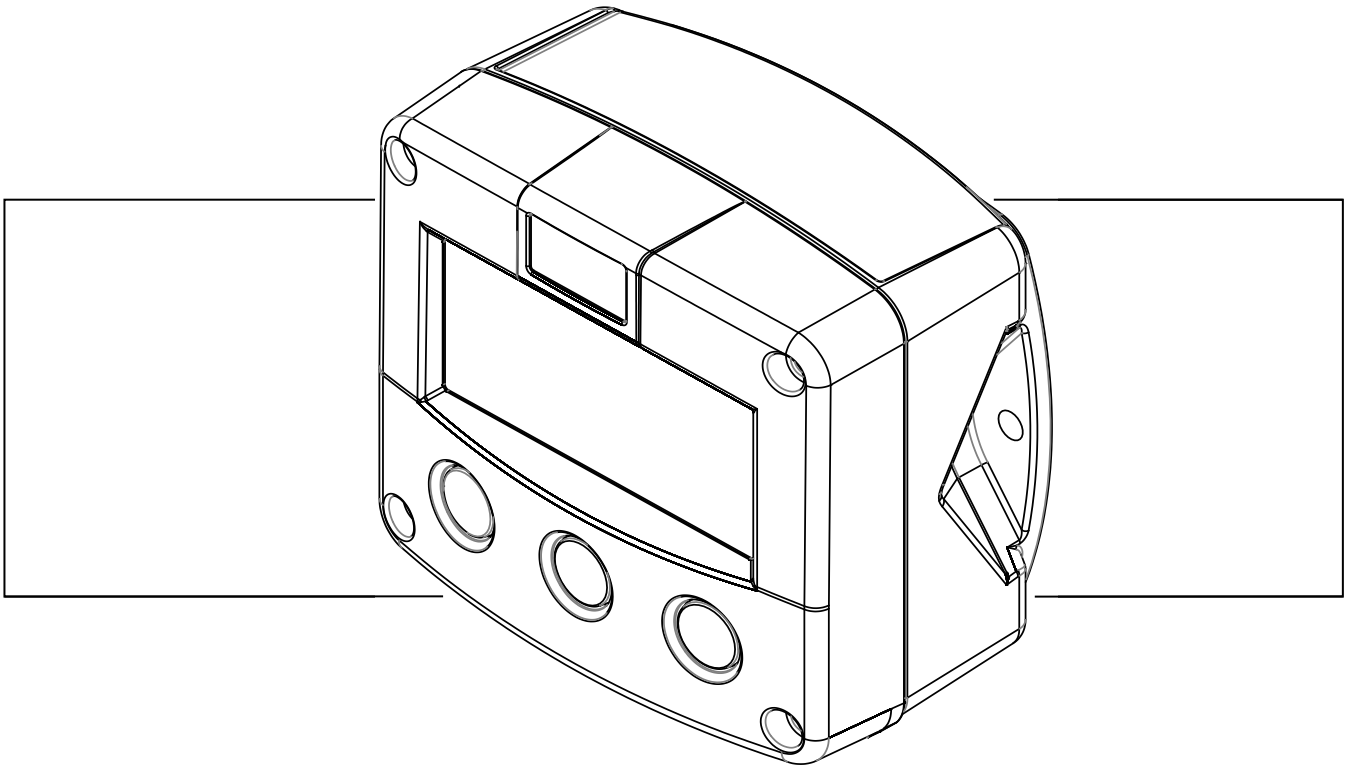


F130-P

BATCH CONTROLLER

two-stage control and pulse output



Signal input flowmeter: pulse, Namur and coil

External controls: start and stop

*Digital outputs: two control outputs for two stage control, or
one control output and pulse output*

Options: Intrinsically safe, Modbus communication



SAFETY INSTRUCTIONS



- Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.
- **LIFE SUPPORT APPLICATIONS:** The F130-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 unit, the installer has to discharge himself by touching a well-grounded object.
- This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).
- Do connect a proper grounding to the metal enclosure as indicated if the F130-P has an incoming power line which carries a 115-230V AC. The Protective Earth (PE) wire may never be disconnected or removed.
- Intrinsically safe applications: follow the instructions as mentioned in Chapter 5 and consult "Fluidwell F1...-XI - Documentation for Intrinsic safety".

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 wheeled 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 F130-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 unit.
- Check all connections, settings and technical specifications of the various peripheral devices with the F130-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 the classification of the enclosure (see manufacture's plate and chapter 4).
- If the operator detects errors or dangers, or disagrees with the safety precautions taken, then inform the owner or principal responsible.
- The local labor and safety laws and regulations must be adhered to.

ABOUT THE MANUAL

This manual is divided into two main sections:

- The daily use of the F130-P is described in chapter 0 "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 manual describes the standard F130-P as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the F130-P is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information in this 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 F130-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 F130-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.

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Software version : 03.03.xx
Manual : FW_F130P_v1702_02_EN
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CONTENTS MANUAL

SAFETY INSTRUCTIONS	3
DISPOSAL OF ELECTRONIC WASTE	3
SAFETY RULES AND PRECAUTIONARY MEASURES	3
ABOUT THE MANUAL	4
WARRANTY AND TECHNICAL SUPPORT	4
CONTENTS MANUAL	5
1 INTRODUCTION	6
1.1 System description of the F130-P	6
2 OPERATIONAL	7
2.1 Control panel	7
2.2 Operator information and functions	7
3 CONFIGURATION	9
3.1 How to program the F130-P	9
3.1.1 Setup menu - Parameters	11
3.1.2 Explanation of SETUP-menu 1 - Preset	12
3.1.3 Explanation of SETUP-menu 2 - Overrun	13
3.1.4 Explanation of SETUP-menu 3 - Alarm	13
3.1.5 Explanation of SETUP-menu 4 - Display	13
3.1.6 Explanation of SETUP-menu 5 - Power management	13
3.1.7 Explanation of SETUP-menu 6 - Flowmeter	14
3.1.8 Explanation of SETUP-menu 7 - Relay output	14
3.1.9 Explanation of SETUP-menu 8 - Communication	15
3.1.10 Explanation of SETUP-menu 9 - Others	15
4 INSTALLATION	16
4.1 General directions	16
4.2 installation / surrounding conditions	16
4.3 Dimensions- Enclosure	17
4.4 Installing the hardware	19
4.4.1 General installation guidelines	19
4.4.2 Aluminum enclosure - Field mounted	20
4.4.3 Aluminum enclosure - Panel mounted	20
4.4.4 Plastic (GRP) enclosure	21
4.4.5 Terminal connectors	22
4.5 Sensor supply	22
5 INTRINSICALLY SAFE APPLICATIONS	29
5.1 Terminal connectors Intrinsically safe applications	31
5.2 Configuration examples	33
5.3 Battery replacement	35
5.3.1 Safety instructions	35
5.3.2 Replace the battery	35
5.3.3 Disposal of batteries	35
6 MAINTENANCE	36
6.1 General directions	36
6.2 Repair	36
6.3 Repair policy	36
APPENDIX A. TECHNICAL SPECIFICATION	37
APPENDIX B. PROBLEM SOLVING	40
APPENDIX C. MODBUS COMMUNICATION	41
APPENDIX D. DECLARATION OF CONFORMITY	44
INDEX OF THIS MANUAL	45
LIST OF FIGURES F130-P	46

1 INTRODUCTION

1.1 SYSTEM DESCRIPTION OF THE F130-P

Functions and features

The batch controller model F130-P is a microprocessor driven instrument designed for batching and filling of small up to large quantities as well as displaying the flow rate, the total and 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 aluminum or GRP enclosures for harsh industrial surroundings;
- ability to process all types of flowmeter signals;
- receipt printer interface to print completed batch receipts.

Flowmeter input

This manual describes the unit with a pulse input from the flowmeter. Other versions are available to process (0)4-20mA signals.

One flowmeter with a passive or active pulse, Namur or sine wave (coil) signal output can be connected to the F130-P. To power the sensor, several options are available.

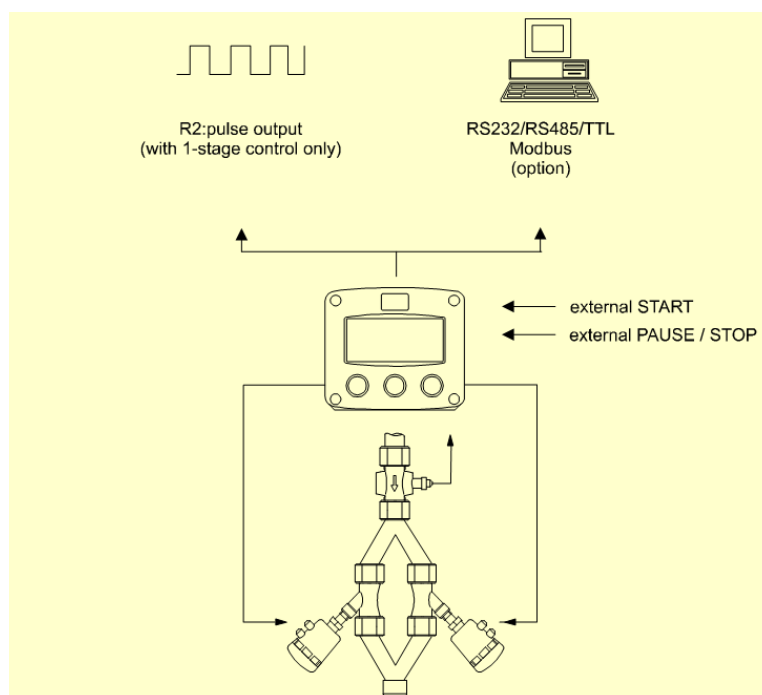


Fig. 1: Typical application

Configuration of the F130-P

The F130-P is designed for use in many types of applications. For that reason, a setup menu is available to program the F130-P according to your specific requirements.

The setup includes several important features, such as K-Factors, engineering units, signal selection, power management (to extend battery life-time), etc. All settings are stored in a non-volatile memory and therefore kept in the event of a power failure or an exhausted battery.

Display information

The unit has a LCD with (optional) backlight to show the process information, status and alarm messages. The display refresh rate is programmed in the setup menu.

At a key press, the display refresh rate will switch to FAST for 30 seconds. When 'OFF' is selected, the display goes off after 30 seconds after the last key press. The display temporarily comes on after a key press.

A backup of the total and accumulated total in EEPROM memory is made every minute.

Options

The following options are available: full Modbus communication RS232/485/TTL (also battery powered), intrinsic safety, mechanical relay or active output, power- and sensor-supply options, panel-mount, wall-mount and weather-proof enclosures, flame proof enclosure and LED backlight.

2 OPERATIONAL



Caution !

- 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.
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.

This chapter describes the daily use of the F130-P . This instruction is meant for users / operators.

2.1 CONTROL PANEL

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



Fig. 2: Control Panel

Functions of the keys



This key is used to program and save new values or settings.
The PROG/ENTER key is also used to gain access to the setup menu (read chapter 3).



This key is used to START the batch process.
The START/▲ key is also used to increase a value after the PROG/ENTER key has been pressed (read chapter 3).



This key is used to pause or stop the batch process. When the batch process is stopped, it cannot be continued. The STOP/▶ key is also used to select the total and the accumulated total.
The STOP/▶ key is also used to select a digit or an option after the PROG/ENTER key has been pressed (read chapter 3).

2.2 OPERATOR INFORMATION AND FUNCTIONS

In general, the F130-P operates in the operator mode. The shown information depends on the settings which are made in the setup menu.

The signal from the connected sensor is processed by the F130-P in the background, independent from the selected display refresh rate.

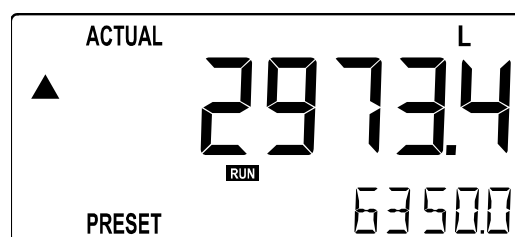


Fig. 3: Process information (typical)

To enter a batch quantity (change the preset)

You can only change the preset when the READY indicator is on.

1. Press the PROG/ENTER key until the PROGRAM indicator starts to blink.
2. Use the START/▲ and STOP/▶ key to change the value.
3. Momentarily, press the PROG/ENTER key to confirm the new preset.

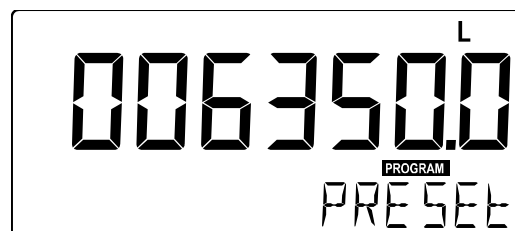


Fig. 4: Program preset value (typical)

When data is altered but ENTER has not been pressed yet, then the alteration can still be cancelled by waiting for 20 seconds or by pressing ENTER during three seconds: the former value will be reinstated. The PRESET-value can be used time after time till a new value is programmed.



Note !

Changes are only saved when you press the PROG/ENTER key.

▪ **Leading zero**

The amount of leading zeros is dependent on the batch maximum setting. In this menu the leading zeros will show. When you confirm the selection with the *PROG/ENTER* key, the F130-P will hide the leading zeros in the operational preset menu.



Note !

It is not possible to enter a preset value which exceeds the batch maximum setting. E.g. if the batch maximum is set to 20000, it will not be possible to set 21000. If you want to preset 21000, you must change the batch maximum setting.

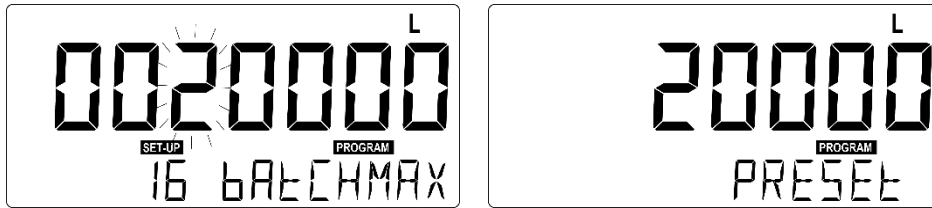


Fig. 5: Leading zero (typical)

▪ **Batch maximum/minimum**

When you program a new value which is not valid, the decrease-sign ▼ (batch too big, program a smaller batch) or the increase-sign ▲ (batch too small, program a bigger batch) will show.

▪ **To start the batch process**

The batch process can only be started when "READY" is shown. The batch process is started by pressing the *START/▲* key. Depending on the *SETUP*-settings, one or two relays will be switched. The arrows at the display indicate if the *ACTUAL*-value is counting up or down.

▪ **To interrupt or to stop the batch process**

When the *STOP/▶* key is pressed once, the batch process is paused; the actual values are not lost. At the display, the word "PAUSE" blinks. In this case the, the batch process can be resumed with the *START/▲* key. When the *STOP/▶* key is pressed two times, the batch process is stopped completely. In this case the actual values are "lost" and the system returns to steady state: the batch process cannot be resumed.

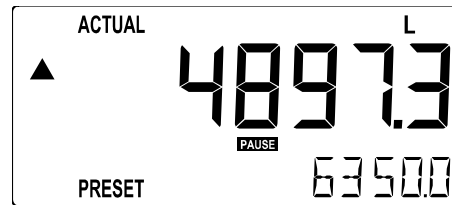


Fig. 6: Process paused (typical)

▪ **Clear batch total**

The value for total can be reset. To do so, select Total and press *PROG* followed by *STOP - STOP*. After pressing the *STOP/▶* key once, the flashing text "PUSH STOP" is shown. To avoid a reset at this stage, press another key than the *STOP/▶* key or wait for 20 seconds. The reset of total **DOES NOT** influence the accumulated total.

▪ **Display accumulated total**

When the *STOP/▶* key is pressed, total and accumulated total are shown. The accumulated total cannot be reset. The value will count up to 99,999,999,999. The unit and number of decimals are shown according to the configuration settings for total.

▪ **Low-battery alarm**



Note !

Only use original batteries. Original batteries can be ordered at the manufacturer. The use of unapproved batteries will void the warranty.

At the end of the battery's life-time, the voltage starts to drop. When the voltage becomes too low, the battery indicator comes on. When the battery indicator is on, install a new and fresh battery as soon as possible.

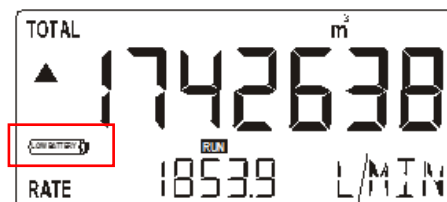


Fig. 7: Example of low-battery alarm

▪ **No-flow alarm**

The F130-P offers a no-flow monitoring feature: When the flowmeter does not generate a signal during a certain (preset) time period, the F130-P will shut-off the control output(s) and bring the batch controller in alarm status. The "PAUSE" and "ALARM" indicators come on and NO FLOW is shown. Press the *STOP/▶* key to confirm the alarm status and note that the "PAUSE" indicator stays on. Now you can cancel or continue the batch (after you have solved the possible problem).

▪ **Alarm**

When the alarm indicator is shown, refer to Appendix B: Problem Solving.

3 CONFIGURATION

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 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 housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing 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" in the front of this manual.

The SETUP menu is used to program the F130-P.

The SETUP menu is accessible at all times while the F130-P remains fully operational. Be aware that in this case any change to the settings may have an influence on the operation.



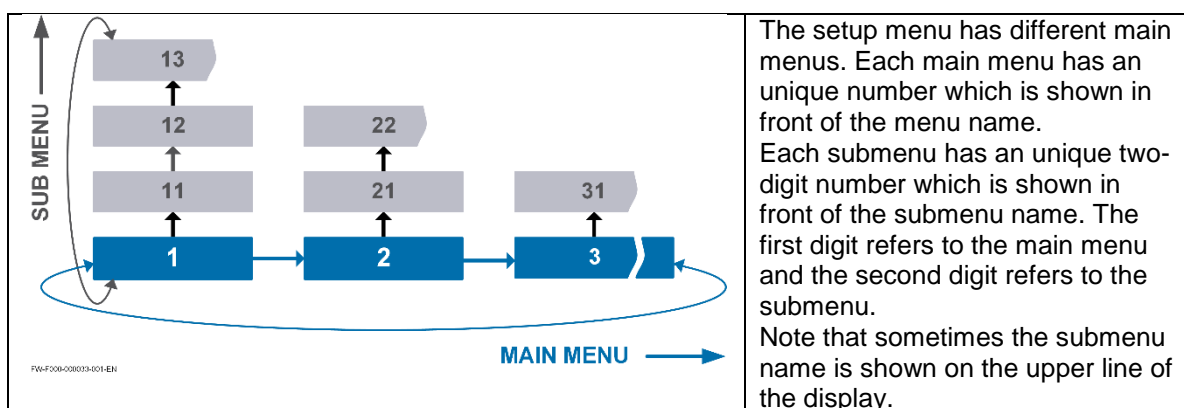
Note !

It is possible to prevent access to the SETUP menu with a password. A password may be required to enter the SETUP menu. Without this password, access to SETUP is denied.

3.1 HOW TO PROGRAM THE F130-P



Press the PROG/ENTER key for 7 seconds to access the setup menu.



How to enter the setup menu

When the setup menu is protected by a password, the F130-P asks for a password to access the setup menu.

Action	Result	Remark
1 Press the PROG/ENTER key, for at least 7 seconds.	<ul style="list-style-type: none"> • The SETUP indicator To enter the setup menu comes on continuously. 	To enter the setup menu.
2 Wait for the main menu PRESET to show.	<ul style="list-style-type: none"> • The main menu PRESET shows. 	<ul style="list-style-type: none"> • The RUN indicator goes off. • The SETUP indicator comes on.

How to navigate in the setup menu

The setup menu has different main menus and submenus to program the F130-P. For navigation, the main menus and the submenus are identified with numbers (for the main menu: e.g. .; for the submenu: e.g. 12.).

The STOP/▶ key and the PROG/ENTER key are used to navigate between the menus. The explanation assumes that you are in the main menu PRESET.

Action	Result	Remark	
1	Press the STOP /▶ key to select the next main menu.	<ul style="list-style-type: none"> The main menu FLOW RATE shows 	-
2	Press again to go to the next main menu.	<ul style="list-style-type: none"> The main menu OVERRUN shows. 	-
3	Momentarily, press the PROG/ENTER key to select the previous main menu.	<ul style="list-style-type: none"> The main menu FLOW RATE shows 	-
4	Press again to go to the previous main menu.	<ul style="list-style-type: none"> The main menu PRESET shows 	-

The START/▲ key and the STOP/▶ key are primarily used to navigate between the submenus. The explanation assumes that you are in the main menu PRESET. When you are:

- in the first submenu and you navigate to the previous submenu, the F130-P goes back to the main menu PRESET.
- in the last submenu and you navigate to the next submenu, the F130-P goes back to the main menu PRESET.

Action	Result	Remark	
1	Press the START /▲ key to select the submenu.	<ul style="list-style-type: none"> The submenu UNIT shows. 	-
2	Press the START /▲ key again to go to the next submenu.	<ul style="list-style-type: none"> The submenu DECIMALS shows. 	-
3	Press the STOP/▶ key to select the previous submenu.	<ul style="list-style-type: none"> The submenu UNIT shows. 	-
4	Press the STOP/▶ key again to go to the previous submenu.	<ul style="list-style-type: none"> The main menu PRESET shows 	This is normal behavior because the submenu UNIT is the first submenu of the main menu PRESET.

How to make a setting



Caution !

Changes are only saved when you press the PROG/ENTERPROG/ENTER.

The explanation assumes that you are in the main menu PRESET and the submenu UNIT. When you do not want to save the change, wait for approximately 20 seconds or press and hold the PROG/ENTER key for approximately 3 seconds.



Action	Result	Remark	
1	Momentarily, press the PROG/ENTER key.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. The engineering unit L shows. 	To access the submenu.
2	Press the START/▲ key to select the next menu item.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. The engineering unit m³ shows. 	If you wait too long, the program mode goes off and changes are not saved, this is normal behavior.
3	Press the START/▲ key again to select the next menu item.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. The engineering unit US GAL shows. 	-
4	Press the STOP/▶ key to select the previous menu item.	<ul style="list-style-type: none"> The PROG indicator blinks continuously. The engineering unit m³ shows. 	-

5	To confirm the changes: Momentarily, press the PROG/ENTER key.	<ul style="list-style-type: none"> The PROG indicator goes off. The change is saved. The engineering unit m³ shows. 	If you do not press the PROG/ENTER key to confirm, your selection is not saved.
	To discard the changes: Press and hold the PROG/ENTER key for approximately 3 seconds.	<ul style="list-style-type: none"> The PROG indicator goes off. The change is discarded. The engineering unit L shows. 	-

3.1.1 SETUP MENU - PARAMETERS


1	PRESET		
	11	unit	L; m ³ ; kg; lb; GAL; USGAL; bbl; no unit
	12	decimals	0000000; 111111.1; 22222.22; 3333.333
	13	K-factor:	0.000010 - 9999999
	14	decimals K-factor	0 - 6
	15	batch-min	0000000 - 9999999
	16	batch-max	0000000 - 9999999
2	OVERRUN		
	21	overrun	disable; enable
	22	time	0.1 - 999.9 seconds
3	ALARM		
	31	no flow	disable; enable
	32	time	0.1 - 999.9 seconds
4	DISPLAY		
	41	display	increase; decrease
	42	light	0% (off); 20%; 40%; 60%;- 80%; 100% (full brightness)
5	POWER MANAGEMENT		
	51	LCD new	fast; 1 sec; 3 sec; 15 sec; 30 sec; off
	52	battery mode	operational; shelf
6	FLOWMETER		
	61	signal	npn; npn-lp; reed; reed-lp; pnp; pnp-lp; namur; coil-hi; coil-lo; 8-1 DC; 12 DC; 24 DC
7	RELAYS		
	71	relays	1-step; 2-step
	72	preclose	0000.000 - 9999999
	73	width	0.000 - 9.999 sec (0 = off)
	74	decimals	0000000; 111111.1; 22222.22; 3333.333
	75	amount	0000.001 - 9999999
	76	pulse	total; batch
8	COMMUNICATION		
	81	speed	1200; 2400; 4800; 9600
	82	address	1 - 247
	83	mode	bus-rtu; bus-asc; off
9	OTHERS		
	91	model	F130-P
	92	software version	nn:nn:nn
	93	serial no.	nnnnnnn
	94	password	0000 - 9999
	95	tag-nr	0000000 - 9999999

3.1.2 EXPLANATION OF SETUP-MENU 1 - PRESET

1		PRESET
11	UNIT	<p>This setting is used to select the engineering unit for the indication of the batch total, the accumulated total and the pulse output.</p> <p> Note !</p> <p>When you change the engineering unit, you must recalculate and reprogram the K-factor for the (accumulated) total. When you recalculate and reprogram the K-Factor, the history for (accumulated) batch total is not correct anymore, because the (accumulated) batch total is not recalculated. For future reference, best practice is to make a note of the accumulated total before you program the recalculated K-Factor.</p>
12	DECIMALS	<p>This setting is used to set the amount of digits behind the decimal point for the (accumulated) total indication.</p>
13	K-FACTOR	<p>This setting is used to set the K-Factor for the total. 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 engineering unit, for example per m³. A more accurate K-Factor (more decimals, as set in decimals K-Factor) allows for a more accurate operation of the system.</p> <p>Example 1: Calculating the K-Factor. The flowmeter generates 2.4813 pulses per liter and the selected unit is m³. A cubic meter consists of 1000 liter which gives 2.4813 pulses*1000 liter=2481.3 pulses per m³. So, the K-Factor is 2481.3. Enter for the Flowmeter K-Factor: 24813 and for the flowmeter K-Factor decimals: 1.</p> <p>Example 2: Calculating the K-Factor. The flowmeter generates 6.5231 pulses per gallon and the selected engineering unit is gallons. So, the K-Factor is 6.5231. Enter for the Flowmeter K-Factor: 65231 and for the Flowmeter K-Factor decimals: 4.</p> <p> Note !</p> <p>When you recalculate and reprogram a new K-Factor, the history for (accumulated) batch total is not correct anymore, because the (accumulated) batch total is not recalculated. For future reference, best practice is to make a note of the accumulated total before you program the recalculated K-Factor.</p>
14	DECIMALS K-FACTOR	<p>This setting is used to set the amount of digits behind the decimal point for the K-Factor.</p>
15	BATCH MINIMUM	<p>This setting is used to set the lower limit for a batch volume. An operator cannot set a batch volume which is beyond the lower limit.</p>
16	BATCH MAXIMUM	<p>This setting is used to set the upper limit for a batch volume. An operator cannot set a batch volume which is beyond the upper limit.</p>

3.1.3 EXPLANATION OF SETUP-MENU 2 - OVERRUN

Due to system parameters which are beyond the settings of the batch controller, an overrun can occur at the end of a batch. The batch controller analyzes the overrun volume and automatically corrects the volume each time after each batch (self learning).

2 OVERRUN		
21	OVERRUN	For an accurate overrun correction, it is necessary that the flowmeter meets certain technical demands, such as "high resolution" and shows no "false" overrun due to a slow update time. Do not enable this function if the flow meter is not compatible to this function.
22	TIME	The overrun characteristic of the system will be analyzed during a certain time after the batch relay has been de-energized. In this way, false signal generated through leakage are eliminated. Enter here the expected time needed by the system to stop a batch. It is advisable to provide extra time in order to avoid an incorrect overrun correction or false leakage alarms.  <i>The next batch can only be started after the overrun time is completed!</i>

3.1.4 EXPLANATION OF SETUP-MENU 3 - ALARM

The F130-P offers a no-flow monitoring feature: When the flowmeter does not generate a signal during a certain (preset) time period, the F130-P will shut-off the control output(s) and bring the batch controller in alarm status.

3 ALARM		
31	NO-FLOW	This setting is used to program the behavior of the no-flow alarm. When the flow rate is zero, it is possible to ignore or disable the no-flow monitoring.
32	TIME	This setting is used to set a delay time for the related alarm. When the alarm condition is still valid after the delay time, an alarm is given.

3.1.5 EXPLANATION OF SETUP-MENU 4 - DISPLAY

4 DISPLAY		
41	DISPLAY	This setting is used to set the behavior of the counter during a batch process: count down (quantity to do) or count up (quantity done).
42	LIGHT	The backlight brightness can be adjusted from 0% (off) to 100% (full brightness) in steps of 20%.

3.1.6 EXPLANATION OF SETUP-MENU 5 - POWER MANAGEMENT

When used with the internal battery option (type PB/PC), the user can expect reliable measurement over a long period of time. The F130-P has several smart power management functions to extend the battery life time significantly. Two of these functions can be set.

5 POWER MANAGEMENT		
51	LCD NEW	The calculation of the display-information influences the power consumption significantly. When the application does not require a fast display refresh rate, 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 signals will be generated in the normal way. At a key press, the display refresh rate will switch to FAST for 30 seconds. When 'OFF' is selected, the display goes off after 30 seconds after the last key press. The display temporarily comes on after a key press. Example battery life-time with a coil pick-up: <ul style="list-style-type: none"> • 1kHz pulse and FAST update: about 2 years; • 1kHz pulse and 1 sec update: about 5 years.
52	BATTERY MODE	The F130-P has two modes: operational or shelf. After "shelf" has been selected, the F130-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 F130-P again, press the START/▲ key two times.


3.1.7 EXPLANATION OF SETUP-MENU 6 - FLOWMETER


With this setting the type of flowmeter output is selected. The settings with LP (low-pass) filter are used to apply a build-in noise reduction. Selections "active pulse" offer a detection level of 50% of the supply voltage.

6		FLOWMETER			
61	SIGNAL				
	TYPE OF SIGNAL	EXPLANATION	RESISTANCE	FREQ. / mV	REMARK
	NPN	NPN input	100 kΩ pull-up	max.6 kHz.	(open collector)
	NPN - LP	NPN with low pass filter	100 kΩ pull-up	max.1.2 kHz.	(open collector) less sensitive
	REED	Reed-switch input	1 MΩ pull-up	max.1.2 kHz.	
	REED - LP	Reed-with low pass filter	1 MΩ pull-up	max.120 Hz.	Less sensitive
	PNP	PNP input	100 kΩ pull-down	max.6 kHz.	
	PNP - LP	PNP with low pass filter	100 kΩ pull-down	max 1.2 kHz.	Less sensitive
	NAMUR	NAMUR input	820 Ω pull-down	max.4 kHz.	External power required
	COIL-HI	High sensitive coil input	-	min. 20 mV _{pp}	Sensitive for interference!
	COIL-HI (option ZF)			min. 10 mV _{pp}	
	COIL-HI (option ZG)			min. 5 mV _{pp}	
	COIL LO	Low sensitive coil input	-	min. 80 mV _{pp}	Normal sensitivity
	8-1 DC	Active pulse input detection level 8.2V DC	3.9 kΩ	max.10KHz.	External power required
	12 DC	Active pulse input detection level 12V DC	4 kΩ	max.10KHz.	External power required
24 DC	Active pulse input detection level 24V DC	3 kΩ	max.10KHz.	External power required	

3.1.8 EXPLANATION OF SETUP-MENU 7 - RELAY OUTPUT

Two control outputs are available to control relays or valves. Relay 2 can also be used as pulse output according the batch total (actual) or accumulated total.

7		RELAYS	
71	RELAYS	<p>This submenu is used to set the function of related output.</p> <p>1-Step: The F130-P is used for one-stage batch control while R2 is used as a scaled pulse output.</p> <p>2-Step: The F130-P is used for two-stage batch control.</p>	
72	PRECLOSE	<p>According to the setting 71 - 2-step, relay two will be used to control a second valve for the batch process. If the product is batched in two steps, the switch-off-moment for relay 2 has to be set. The switch moment is based on the remaining quantity before the end of batch.</p> <p>If preclose is set to zero, relay 2 will switch simultaneously with relay 1.</p> <p><i>The settings: width, decimals, amount and pulse are only valid when relay 2 is used as a scaled pulse output. A scaled pulse output is used to indicate that the batch or accumulated total has increased with the value as set in the setup 75.</i></p>	
		Note !	

73	WIDTH	<p>When relay 2 is used as a scaled pulse output:</p> <p>The pulse width determines the time that the output will be active; in other words the pulse duration. Value “zero” will disable the pulse output.</p> <p>The pulse signal always has a 50% duty cycle, hence the minimum time between the pulses is equal to the pulse width setting. 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”.</p> <p><i>It might be that pulses will be missed due to a buffer-overflow, so it is advised to program this setting within its range!</i></p>
74	DECIMALS	This setting is used to set the amount of digits behind the decimal point for the amount.
75	AMOUNT	A pulse will be generated every time a certain quantity is added to the preset. Enter this quantity here while taking the decimals for pulse into account.
76	PULSE	<p>The pulse generation is controlled by the batch total or the accumulated total.</p> <p> <i>When set to “batch”, the buffer (setting: Width) will be emptied when a new batch is started.</i></p> <p>Note !</p>

3.1.9 EXPLANATION OF SETUP-MENU 8 - COMMUNICATION

This product is designed for the connection to a communication network. Products with a communication option do not include cyber security functions. Fluidwell cannot take any responsibility for the cyber security, omissions or errors in the communication safety. To maintain a secure operation, automation and control, it is the sole responsibility of the owner to install and manage the appropriate safety measures to protect the network, the product and the communication against any kind of security breaches.

The functions described below deal with hardware that is not part of the standard delivery. Programming of these functions does not have any effect if this hardware has not been installed. Consult Appendix C and the Modbus communication protocol description for a detailed explanation.

8	COMMUNICATION	
81	SPEED	This setting is used to set the Baudrate.
82	ADDRESS	This setting is used to set the communication address for the F130-P.
83	MODE	This setting is used to set the Modbus transmission mode. Select OFF to disable the communication.

3.1.10 EXPLANATION OF SETUP-MENU 9 - OTHERS

For support and maintenance it is important to have information about the characteristics of the F130-P. Your supplier will ask for this information when support is required.

9	OTHERS	
91	MODEL	This setting shows the model name.
92	SOFTWARE VERSION	This setting shows the version number of the firmware (software).
93	SERIAL NO.	This setting shows the serial number.
94	PASSWORD	This setting is used to set a password (pin code) to limit the access for the setup menu. Only persons who know the pin code can access the setup menu. The pin code 0000 disables the pin code to allow for access by any person.
95	TAG-NR	This setting is used to set a tag number for the F130-P.

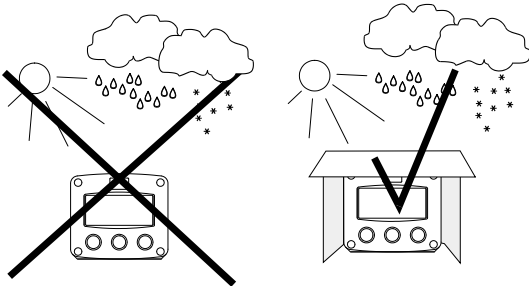
4 INSTALLATION

4.1 GENERAL DIRECTIONS



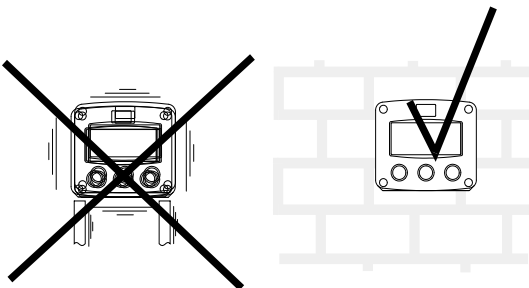
- Mounting, electrical installation, start-up and maintenance of this device may only be carried out by trained persons authorized by the operator of the facility. Persons must read and understand this manual before carrying out its instructions.
- This device may only be operated by persons who are 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 housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing 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.

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 panel-mounted, the front panel of the F130-P is rated for IP65 / TYPE 4(X)!



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

Mount the F130-P onto a solid structure to avoid vibrations.

4.3 DIMENSIONS- ENCLOSURE

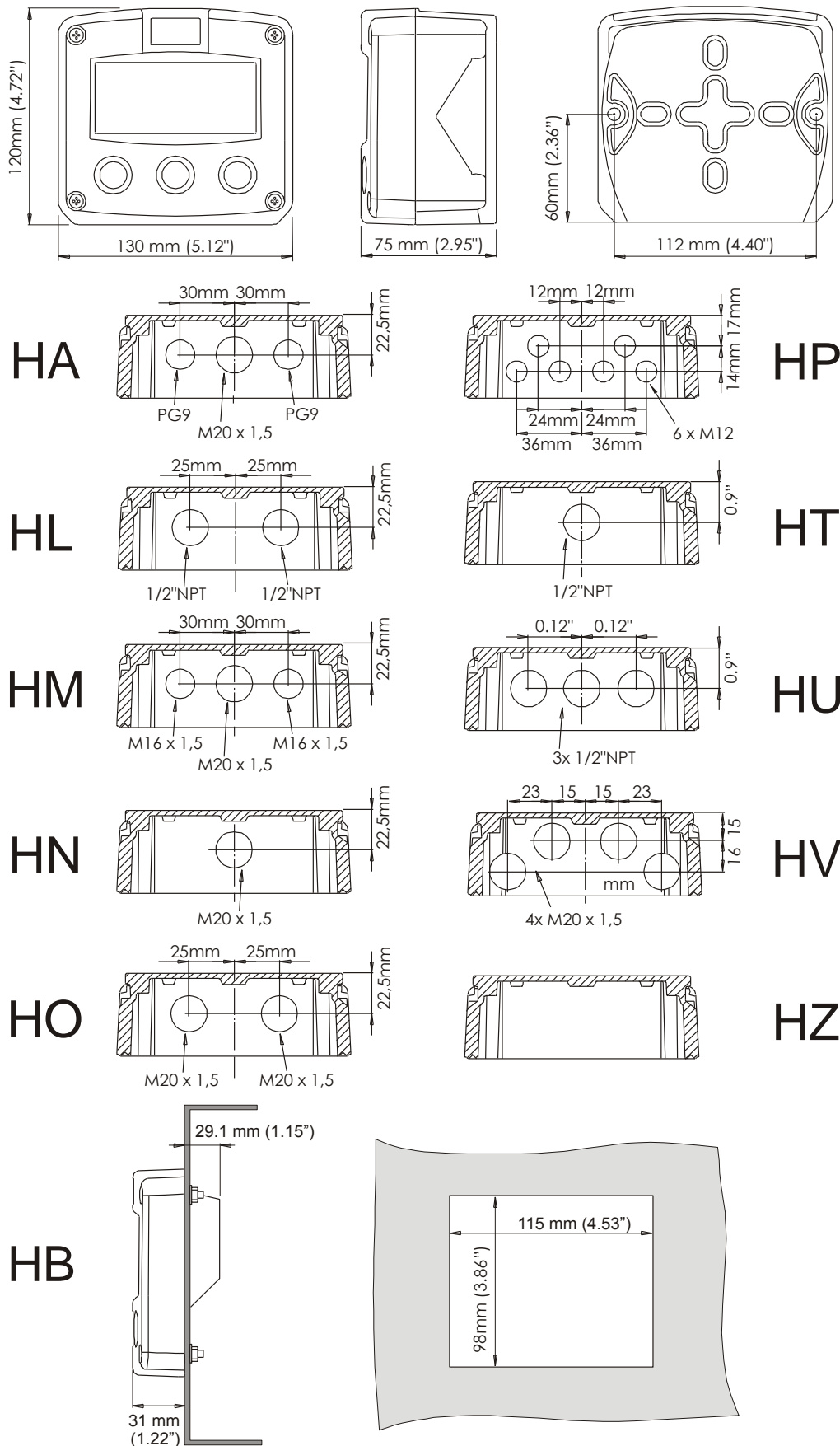


Fig. 8: Aluminum enclosures - Dimensions

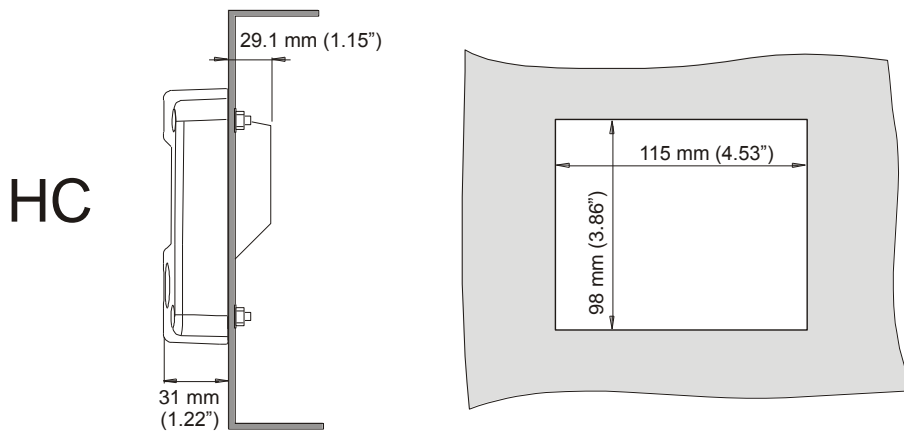
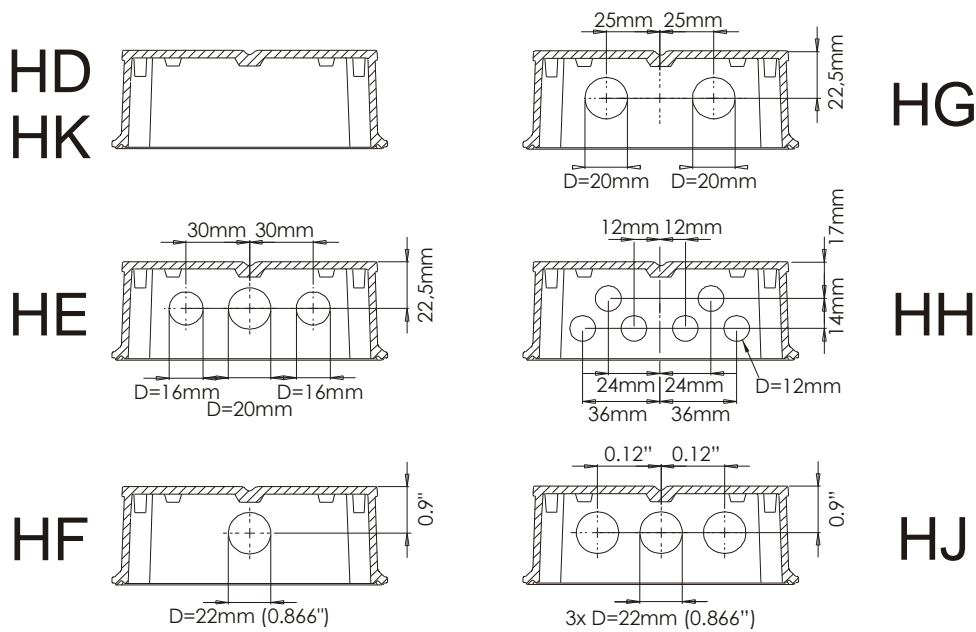
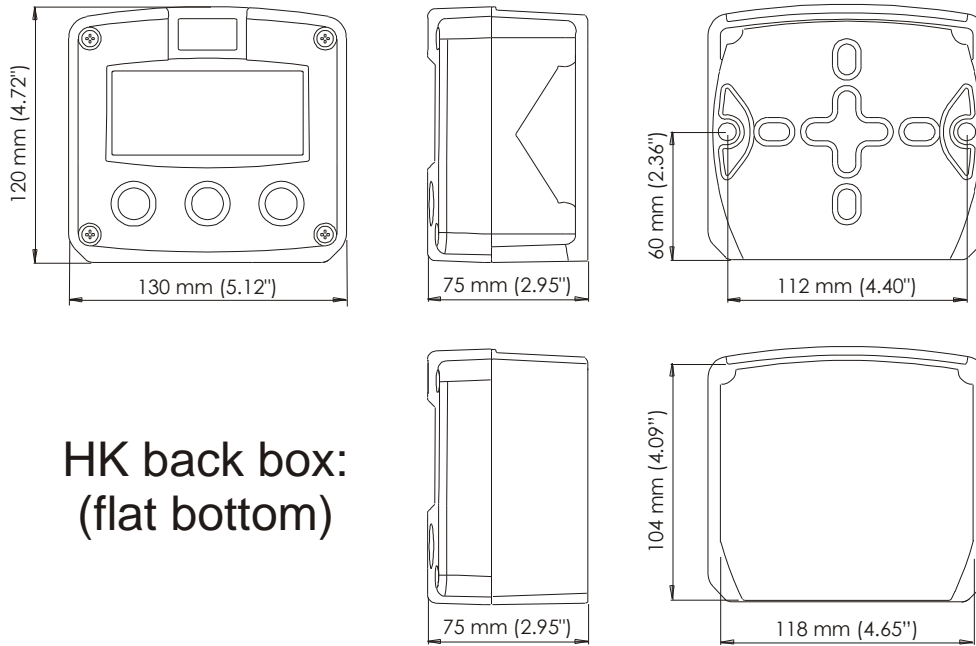


Fig. 9: GRP enclosures - Dimensions

4.4 INSTALLING THE HARDWARE



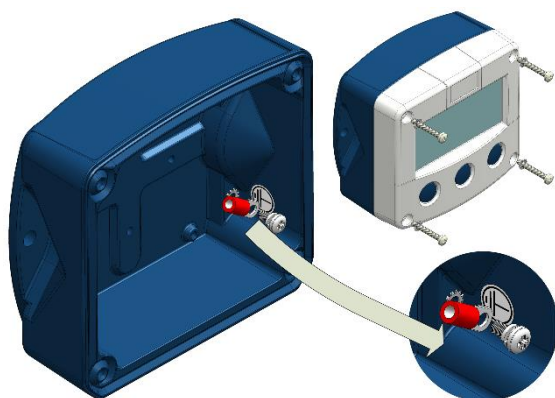
- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the F130-P , the installer has to discharge himself by touching a well-grounded object.
- Do ground the aluminum enclosure properly as indicated. It is the responsibility of the installer to install, 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 F130-P . Chapter 5 gives additional specific information regarding Intrinsically safe installation and overrules the information given in this chapter.



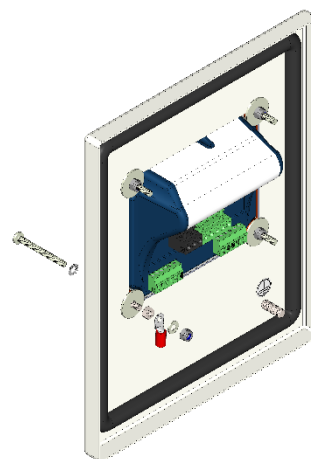
- When installed in an aluminum enclosure and a potentially explosive atmosphere requiring apparatus of equipment protection level Ga and Da, the unit must be installed such that, even in the event of rare incidents, an ignition source due to impact or friction sparks between the enclosure and iron/steel is excluded.

4.4.1 GENERAL INSTALLATION GUIDELINES

- In the F130-P , different types of bonding and earthing are used. The common (ground) is mostly used for termination of the wire shields and the Protective Earth (PE) is used for electrical safety.
- The F130-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.
- For V AC applications, the terminal 00 shall not be connected to avoid earth loops. For V DC applications, the terminal 00 shall be connected to the common (do NOT use for PE).
- The wire screens (shield) are meant to prevent electromagnetic interference and shall be, galvanic isolated, 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 (above).
- 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.



Field mounted



Panel mounted

4.4.2 ALUMINUM ENCLOSURE - FIELD MOUNTED

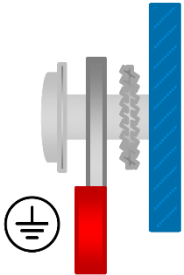


Risk of damage to equipment!

Do not use the terminal 00 to connect the protective earth wire, the 00 and the common ground terminals are internally connected. Be careful, to prevent damage to equipment when you connect different power supplies (sensor, PLC, etc.). Inside the Fluidwell display, the common grounds are internally connected to each other.

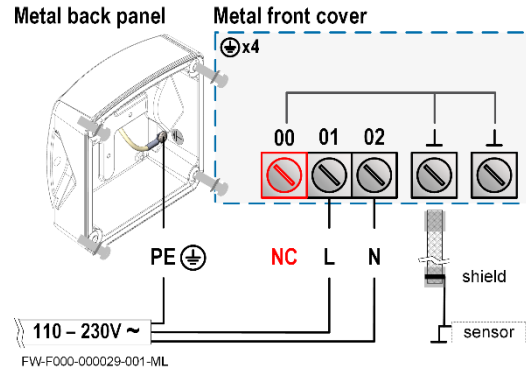
The PE connection

The PE connection is made with the PE stud inside the back panel and the 4 mounting screws that attach the cover to the back panel.

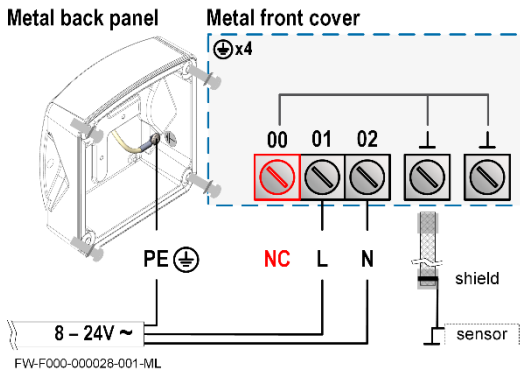


The PE connection in the metal back panel is made with a serrated washer, a terminal, a washer and a screw.

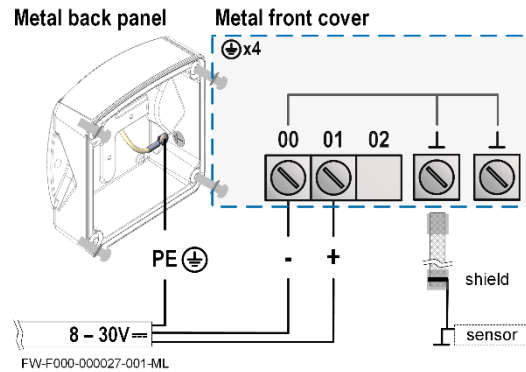
The PE connection to the metal cover is made with the serrated washers and the mounting screws.



Type PM (110-230V AC)



Type OR (8-24V AC)

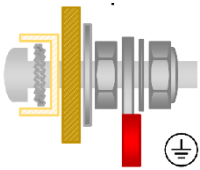


Type OR (8-30V DC)

4.4.3 ALUMINUM ENCLOSURE - PANEL MOUNTED

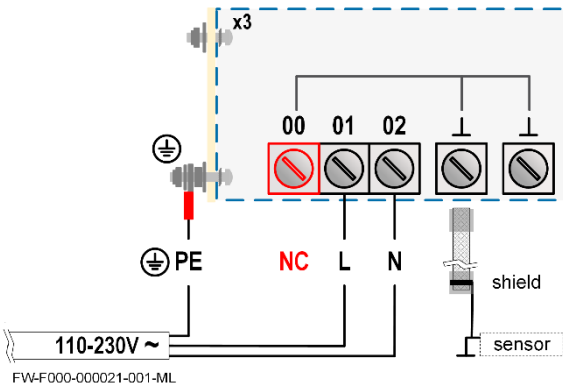
The PE connection

The PE connection is made with one of the mounting screws that attaches the front panel to the panel.

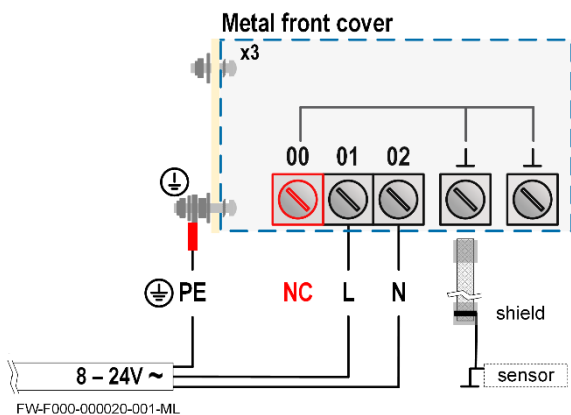


The PE connection to the metal cover is made with the serrated washers and the mounting screws.

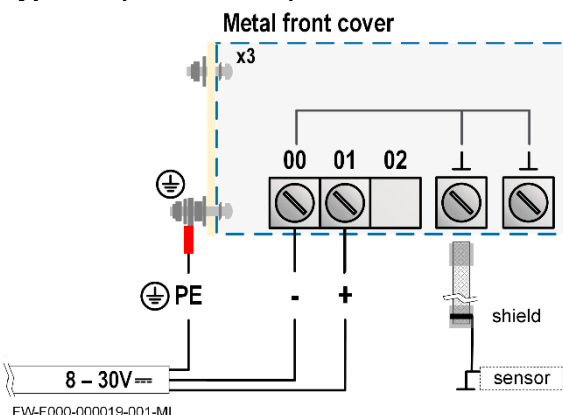
The PE connection to the panel is made with the washer, the nut, the terminal, the washer and a lock nut.



Type PM (110-230V AC)



Type OR (8-24V AC)

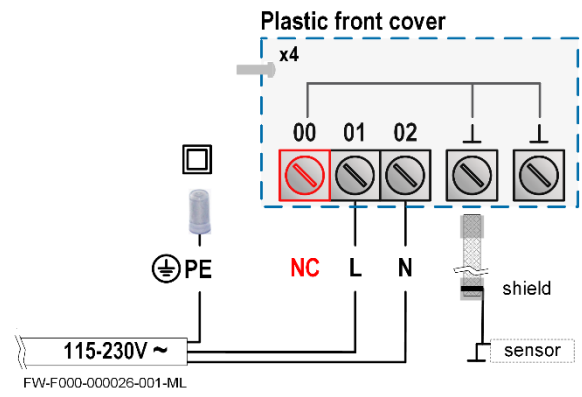


Type OR (8-30V DC)

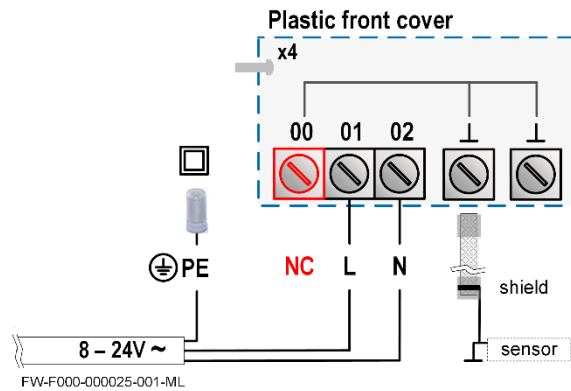
4.4.4 PLASTIC (GRP) ENCLOSURE

The PE connection

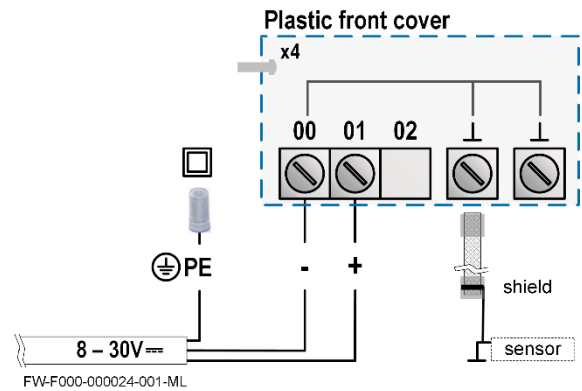
The F130-P in a GRP enclosure meets the requirements of class 2 (double insulated). Therefore the incoming PE wire is terminated with an insulating end cap.



Type PM (110-230V AC)



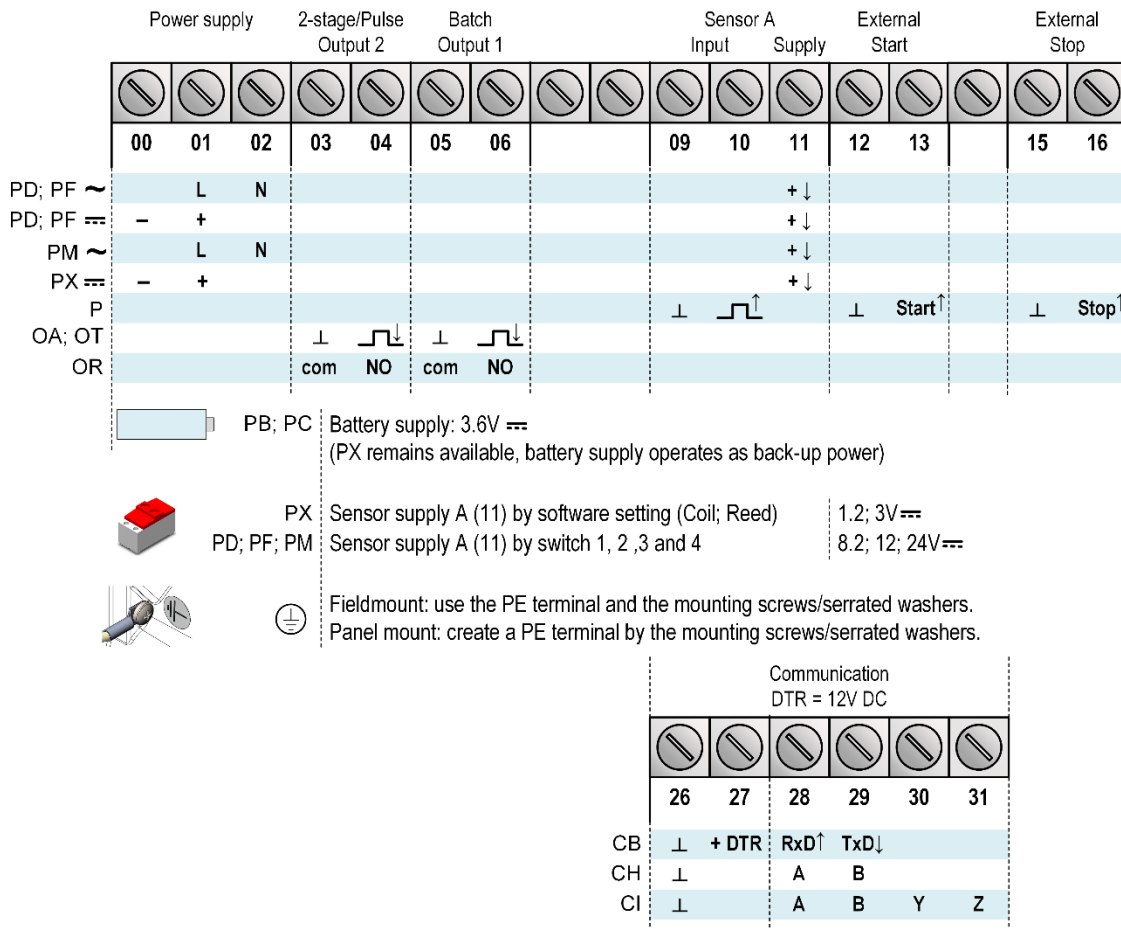
Type OR (8-24V AC)



Type OR (8-30V DC)

4.4.5 TERMINAL CONNECTORS

Refer to Appendix A: Technical Specification



FW-F130-000001-002-EN

Fig. 10: Overview of terminal connectors - Standard configuration and options

4.5 SENSOR SUPPLY

For type PB/PC; PX; AP:

There is no real sensor supply out available. Only a limited power supply is available. This power supply MAY 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 is fixed: 1.2V DC or 3V DC (set by the firmware).

For type PD; PF; PM:

It is possible to supply the sensor with different voltages. You can set the voltage with the switches. Internal power is only applicable for low power sensors (Coil, Reed). External power is only available when the main external power supply is connected.

The sensor supply voltage is selectable: 1.2; 3; 8.2; 12 or 24V DC.

Set the sensor supply

1. Make the F130-P safe. If applicable, mind the battery power.
2. Open the F130-P and carefully remove the cable-connectors and the protective cover.
3. Find and set the switches and select the V_{out} as required.
4. Close the protective cover and install the cable connectors.
5. Close the F130-P .



Risk of electrocution - High voltage!

Make sure, all the leads to the terminals are disconnected from the F130-P and NEVER connect the mains power supply to the unit when the protection cover has been removed!

Type PD	Power supply in: 8-24V AC / 10-30V DC				
<p>FW-PD-000001-001-EN Switch location (typical)</p>	Sensor A		V _{out} selection		Sensor supply out
	1	2	3	4	NOTE: Use an AC autotransformer (spartrafo) with galvanic isolation.
	int	-	off	off	Coil 1.2V DC; <1mA Reed 3V DC; <1mA
	ext	-	on on off	on off off	8.2V DC @8V _{in} AC / 10V _{in} DC 12V DC @10V _{in} AC / 14V _{in} DC 24V DC @18V _{in} AC / 26V _{in} DC
Type PF	Power supply in: 15-24V AC / 20-30V DC				
<p>FW-PFPM-000001-001-EN Switch location (typical)</p>	Sensor A		V _{out} selection		Sensor supply out
	1	2	3	4	
	int	-	off	off	Coil 1.2V DC; <1mA Reed 3V DC; <1mA
	ext	-	on on off	on off off	8.2V DC @8V _{in} AC / 10V _{in} DC 12V DC @10V _{in} AC / 14V _{in} DC 24V DC @18V _{in} AC / 26V _{in} DC
Type PM	Power supply in: 115V - 230V AC				
<p>FW-PFPM-000001-001-EN Switch location (typical)</p>	Sensor A		V _{out} selection		Sensor supply out
	1	2	3	4	
	int	-	off	off	Coil 1.2V DC; <1mA Reed 3V DC; <1mA
	ext	-	on on off	on off off	8.2V DC 12V DC 24V DC

Fig. 11: Sensor supply voltage - Switch setting

Terminal 00-01; basic POWER SUPPLY - type PX.

Connect an external power supply of 8-30VDC to these terminals; the "-" to terminal 00 and the "+" to terminal 01. When power is applied to these terminals, the (optional) internal battery will be disabled / enabled automatically to extend the battery life time.

Terminal 03-04; control or pulse output R2:

This output is available to control the batch process for two-step control or as pulse output. In case of a pulse output function: the maximum pulse frequency of this output is 500Hz.

Terminal 05-06; control output R1:

This output is designed to drive a low-power device (e.g. relay) to control the batch process. Relay 1 is switched-on during the whole batch process.

Type OA

An active 24V DC signal according to the functions R1 and R2 is available with this option. Max. driving capacity 50mA@24V per output. (Requires power supply type PD/PF/PM).

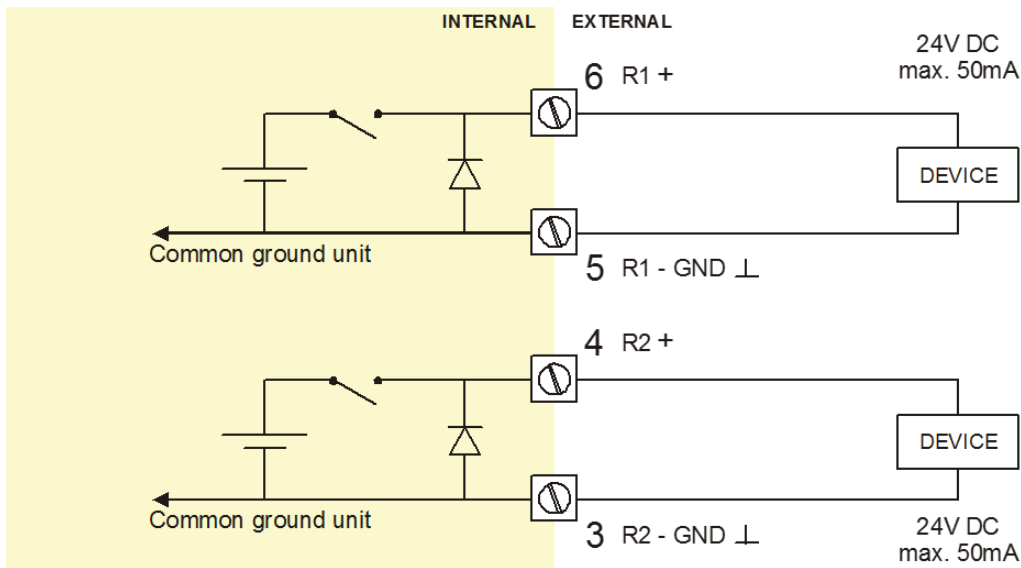


Fig. 12: Terminal connections - Active output (typical)

Type OR

A mechanical relay output according the functions R1 and R2 is available with this option. Max. switch power 240V-0,5A per output. (Requires power supply type PF/PM).

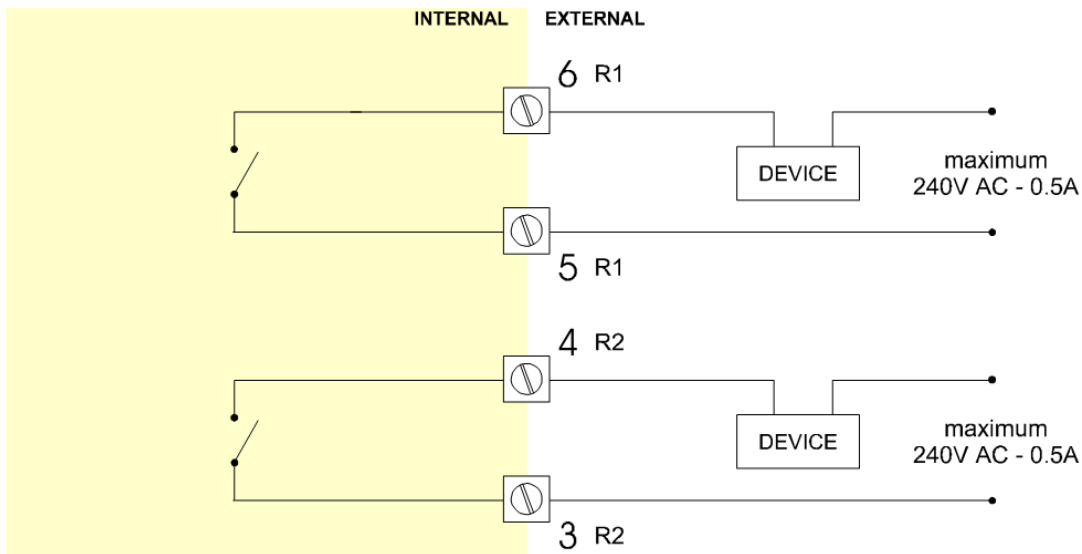


Fig. 13: Terminal connections - Mechanical relay output R1 and R2.

Type OT

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

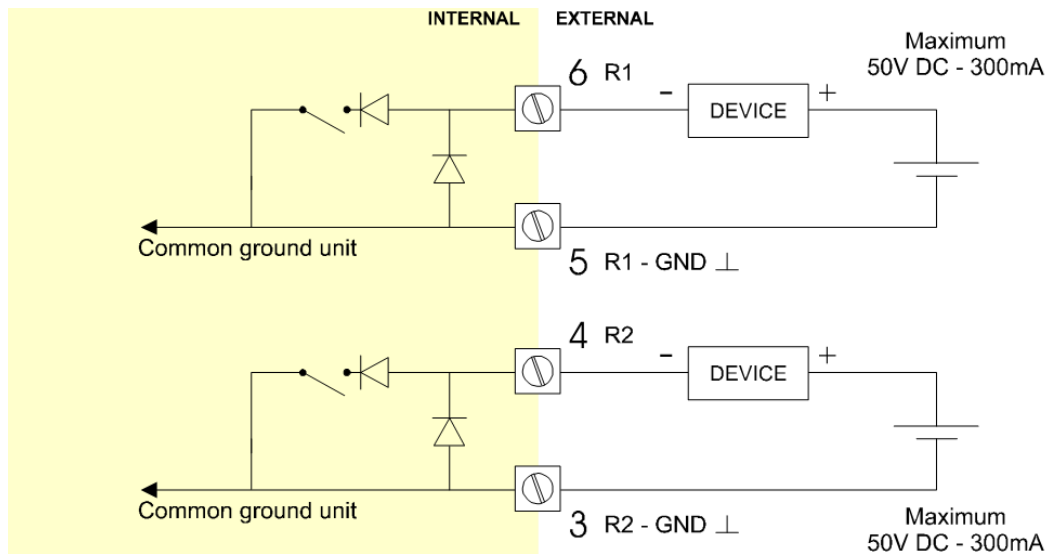


Fig. 14: Terminal connections - Passive transistor output (typical)

Terminal 09-11; Flowmeter input:

Three basic types of flowmeter signals can be connected to the unit: pulse, active pulse or sine-wave (coil). The screen of the signal wire must be connected to the common ground terminal 09 (unless earthed at the sensor itself).

The maximum input frequency is approximately 10 kHz (depending on the type of signal). The input signal type has to be selected in the flowmeter setup (read chapter 3).

Sine-wave signal (Coil):

The F130-P is suitable for use with flowmeters which have a coil output signal.

Two sensitivity levels can be selected:

- COIL-LO: sensitivity from about 80mV_{pp};
- COIL-HI: sensitivity from about 20mV_{pp};
- type ZF, COIL-HI: sensitivity from about 10mV_{pp};
- type ZG, COIL-HI: sensitivity from about 5mV_{pp}.

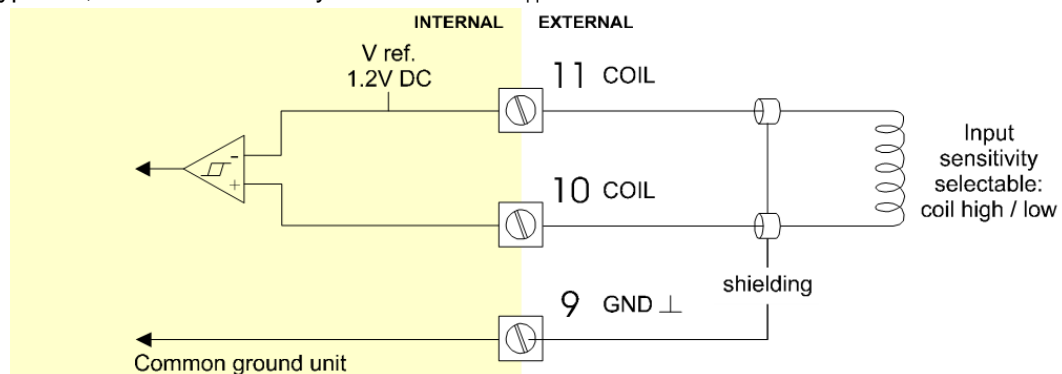


Fig. 15: Terminal connections - Coil signal input (typical)

Pulse-signal NPN / NPN-LP:

The F130-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).

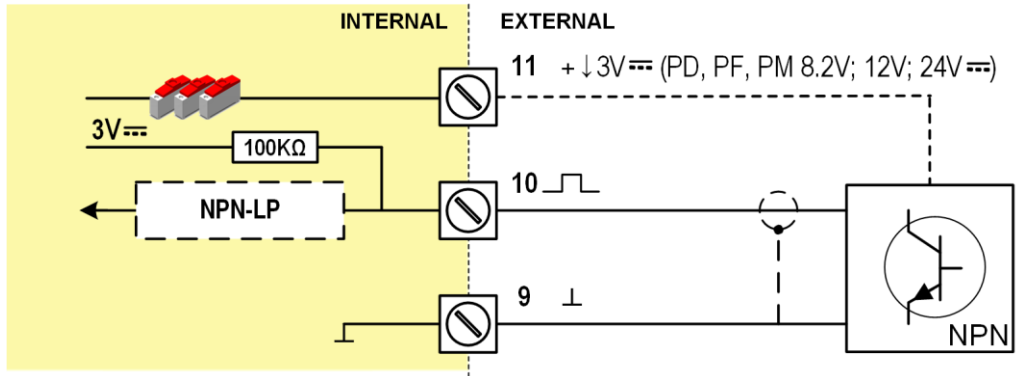


Fig. 16: Terminal connections - NPN signal input (typical)

Pulse-signal PNP / PNP-LP:

The F130-P is suitable for use with flowmeters which have a PNP output signal. 3V is offered on terminal 11 which has to be switched by the sensor to terminal 10 (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).

A sensor supply voltage of 8.2, 12 or 24V DC can be provided with power supply type PD, PF, PM. For a signal detection level of 50% of the supply voltage: please refer to “active signals”.

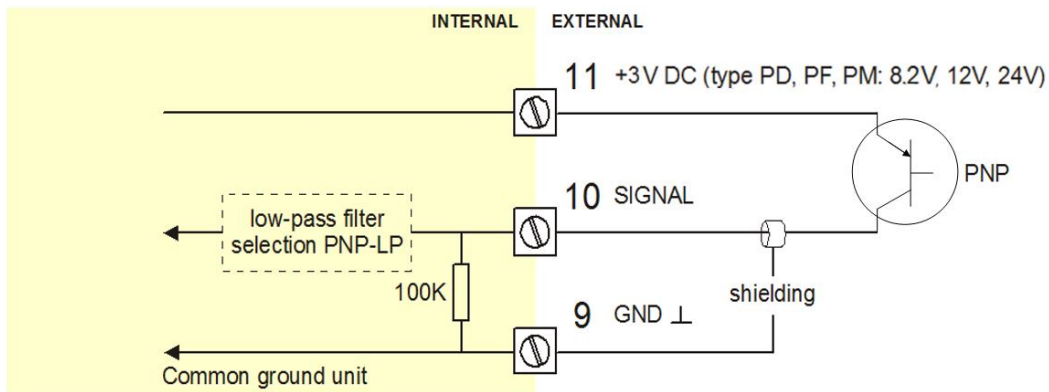


Fig. 17: Terminal connections - PNP signal input (typical)

Active signal - 8.2V - 12V and 24V:

If a sensor gives an active signal (read chapter 3). The detection levels are 50% of the selected supply voltage; approx. 4V (8-1 DC) or 6V (12 DC) or 12V (24 DC). Active signal selection may well be desired in case of power supply type PD, PF, PM is available for sensor supply.

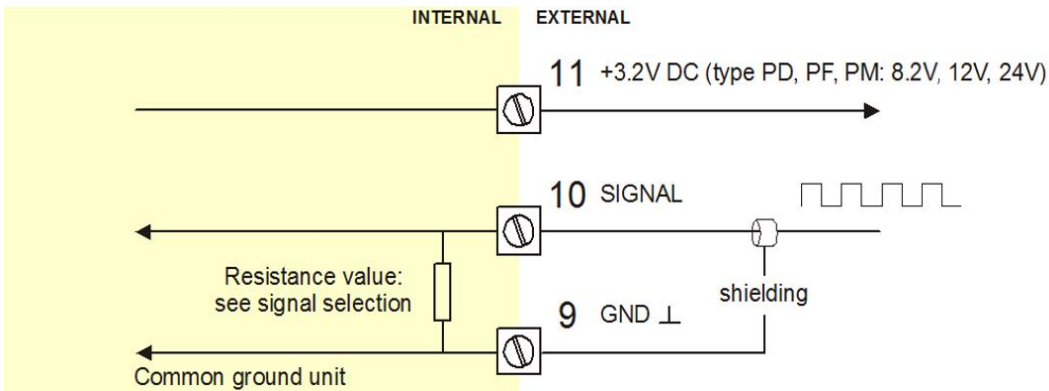


Fig. 18: Terminal connections - Active signal input (typical)

Reed-switch:

The F130-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).

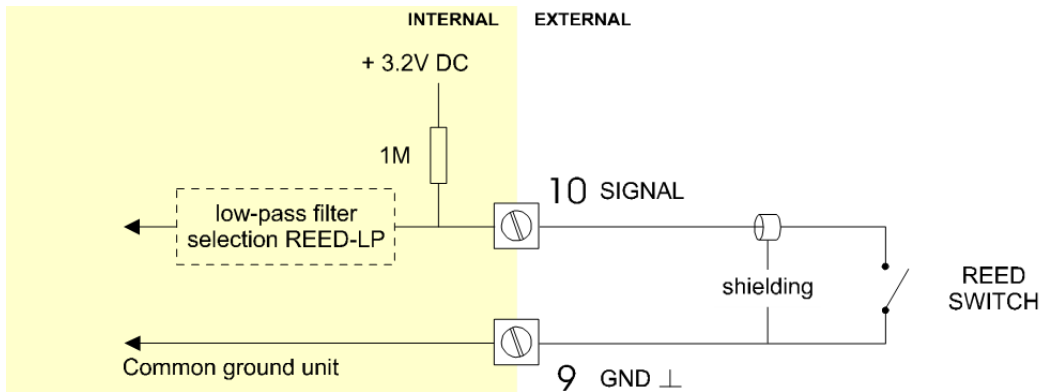


Fig. 19: Terminal connections - Reed-switch signal input (typical)

NAMUR-signal:

The F130-P is suitable for flowmeters with an Namur signal. The standard F130-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 11) can be provided with power supply type PD, PF, PM.

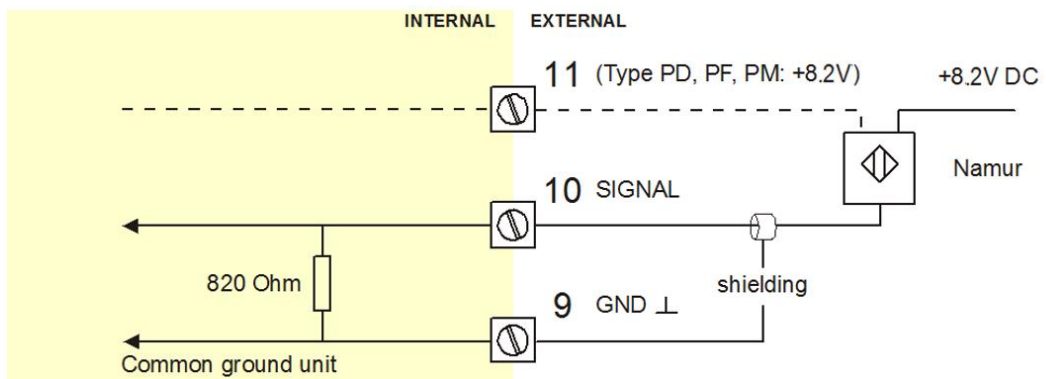


Fig. 20: Terminal connections - NAMUR signal input (typical)

Terminal 12-13; external START:

With this function, the batch controller can be started with an external switch. The input must be switched with a potential free contact to the GND-terminal number 12 for at least 0.3 seconds.

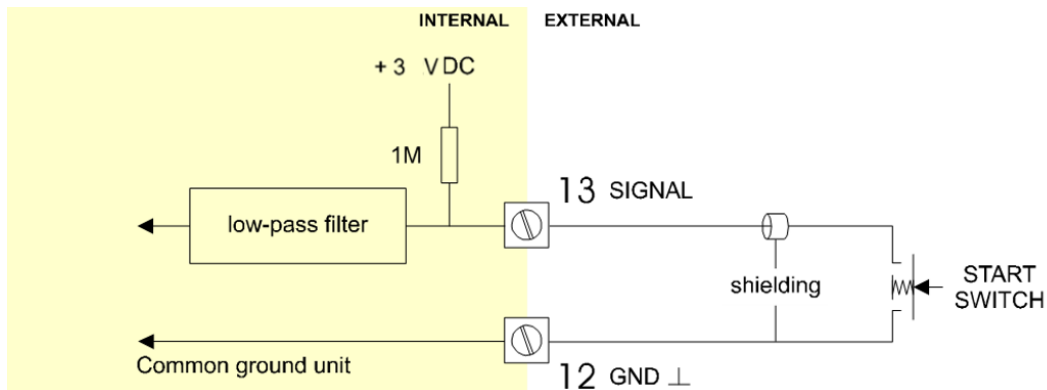


Fig. 21: Terminal connections - External start (typical)

Terminal 15-16; external STOP:

With this function, the batch controller can be interrupted or cancelled with an external switch.

The input must be switched once for interruption or switch twice for cancellation with a potential free contact to the GND-terminal number 15 for at least 0.3 seconds.

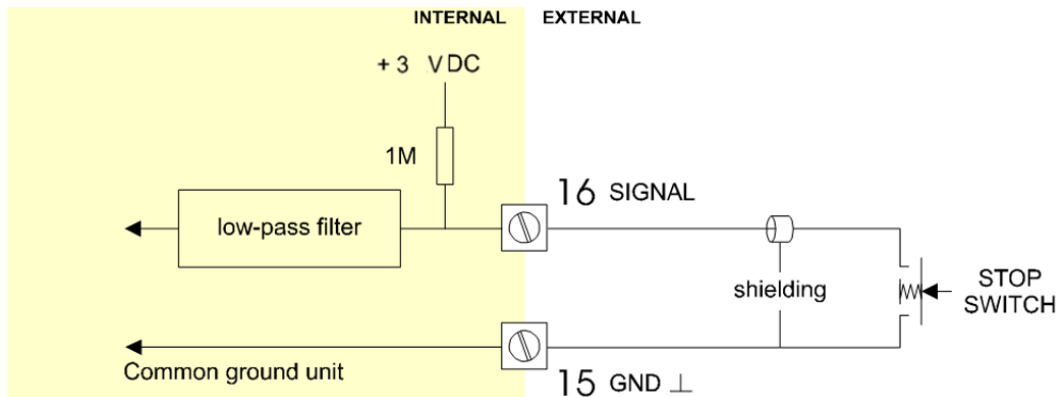


Fig. 22: Terminal connections - External stop (typical)

Terminal 26-31: type CB / CH / CI / CT - communication RS232 / RS485 / TTL (option)

For connections, refer to figure: Overview of terminal connectors - Standard configuration and options

Full serial communications and computer control in accordance with RS232 (length of cable max. 15 meters) or RS485 (length of cable max. 1200 meters) is possible.

When using the RS232 communication option, terminal 27 is used for supplying the interface.

Please connect the DTR (or the RTS) signal of the interface to this terminal and set it active (+12V).

If no active signal is available it is possible to connect a separate supply between terminals 26 and 27 with a voltage between 8V and 24V.

Terminal GND - 01: type ZB backlight (option):

If the unit is supplied with a power supply:

- type PD, PF or PM, the backlight supply is integrated.
- type PX, use the terminals 00 and 01 to supply the backlight.

The backlight intensity is set in the setup menu: Display.

5 INTRINSICALLY SAFE APPLICATIONS



- For the combined connection of the different supply, input and output circuits, the instructions in this manual must be observed. From the safety point of view the circuits shall be considered to be connected to earth.
- Certificates, safety values, control drawing and declaration of compliance can be found in the document named: "Fluidwell F1...-XI - Documentation for Intrinsic safety".
- For installation under ATEX directive: this Intrinsically safe device must be installed in accordance with the latest ATEX directive and product certificate KEMA 03ATEX1074 X.
- For installation under IECEx scheme: this Intrinsically safe device must be installed in accordance the product certificate IECEx DEK 11.0042X.
- Exchange of Intrinsically safe battery FWLiBAT-00x with certificate number KEMA 03ATEX1071 U or IECEx KEM 08.0005U is allowed in Hazardous Area. Read chapter 6 for battery replacement instructions.
- When the enclosure of the F130-P is made of aluminum alloy, when used in a potentially explosive atmosphere requiring apparatus of EPL 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.
- 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.
- 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.
- 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.
- 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.



Caution !

- 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 housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing 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" in the front of this manual.



Note !

- Special conditions for safe use mentioned in both the certificate and the installation instructions must be observed for the connection of power to both input and / or output circuits.
- When installing this device in hazardous areas, the wiring and installation must comply with the appropriate installation standards for your industry.
- Study the following pages with wiring diagrams per classification.

Serial number and year of production

This information can be looked-up in the setup menu: Others.

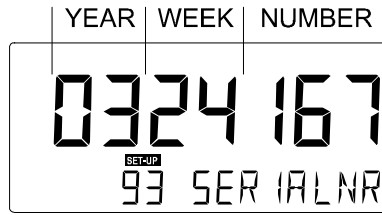


Fig. 23: Example serial number (typical)

Label information pulse input type – F1..P-XI (inside and outside the enclosure)

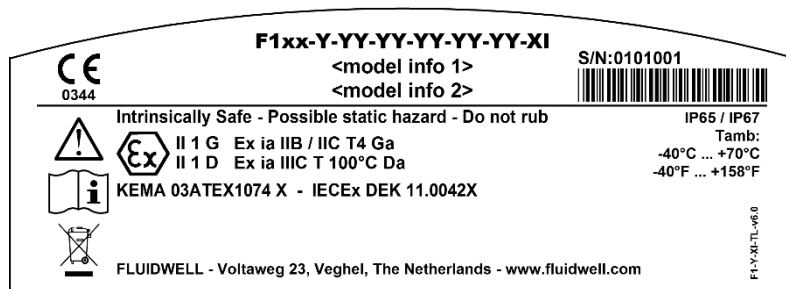


Fig. 24: Label information - Intrinsically safe application (typical)

5.1 TERMINAL CONNECTORS INTRINSICALLY SAFE APPLICATIONS



The unit is classified as group IIB/IIIC by default.

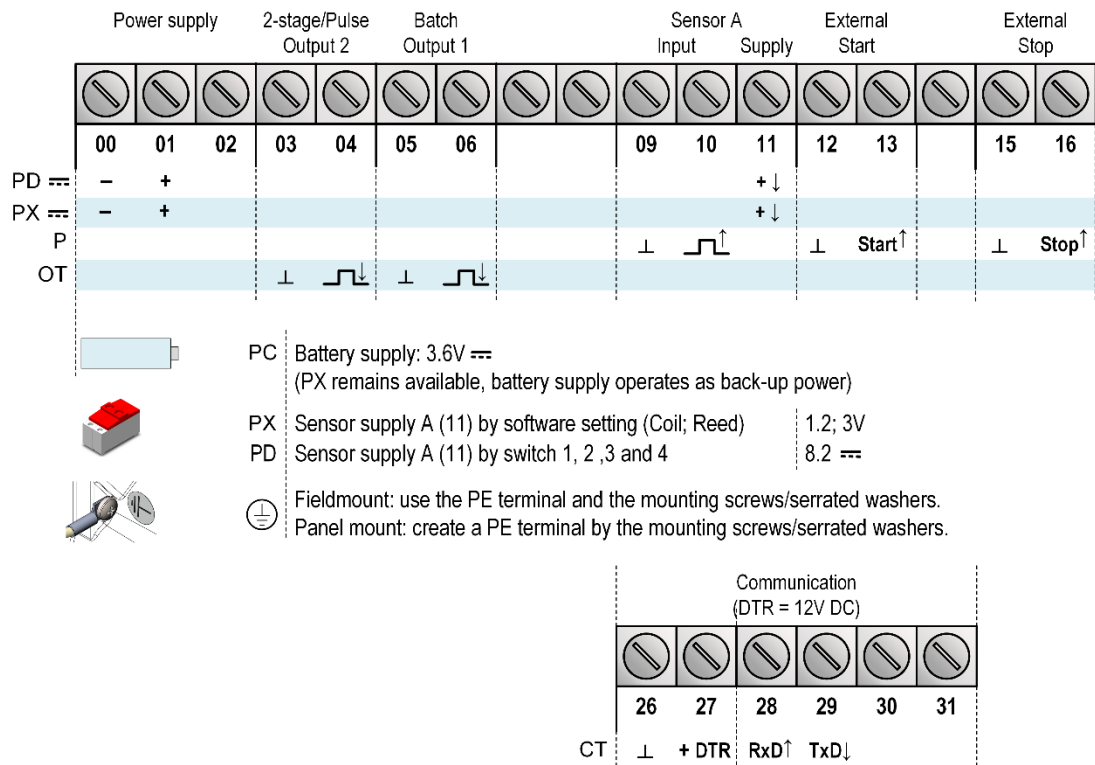
Classification of the unit as group IIC is only possible under the following conditions:

The indicator is either supplied by

- the internal supply (option -PC);
- the external supply connected to terminals 0 and 1 (option -PD);
- The maximum values for any of those circuits are those as defined for group IIB/IIIC;
- No other active external Intrinsically safe circuits may be connected to the indicator, with exception of circuits connected to terminals 3 and 4 and/or terminals 5 and 6; the maximum values for any of those circuits are those as defined for group IIB/IIIC.

Terminal connectors F130-P-XI:

For intrinsically safe applications, consult the safety values in the certificate.



FW-F130-000002-002-EN

Fig. 25: Overview terminal connectors XI – Intrinsically safe applications

Explanation Intrinsically safe options:

For option PD-XI: It is possible to supply the sensor with different voltages. You can set the voltage with the switches. Internal power is only applicable for low power sensors (Coil, Reed). The sensor supply is set by the firmware: 1.2V DC or 3V DC. External power is only available when the main external power supply is connected. The sensor supply voltage is fixed: 8.2V DC.

Set the sensor supply

1. Make the F130-P safe. If applicable, mind the battery power.
2. Open the F130-P and carefully remove the cable-connectors and the protective cover.
3. Find and set the switches and select the V_{out} as required.
4. Close the protective cover and install the cable connectors.
5. Close the F130-P.



Risk of electrocution - High voltage!

Make sure, all the leads to the terminals are disconnected from the F130-P and NEVER connect the mains power supply to the unit when the protection cover has been removed!

Type PD-XI	Power supply in: 16-30V DC / max. 1W			
<p style="font-size: small;">FW-PD-000002-001-EN</p> <p>Switch location (typical)</p>	Sensor		Sensor supply out	
	A			
	1	2		
	off	-		
on	-			8.2V DC; 7mA (max)

Fig. 26: Switch position voltage selection option PD-XI

5.2 CONFIGURATION EXAMPLES

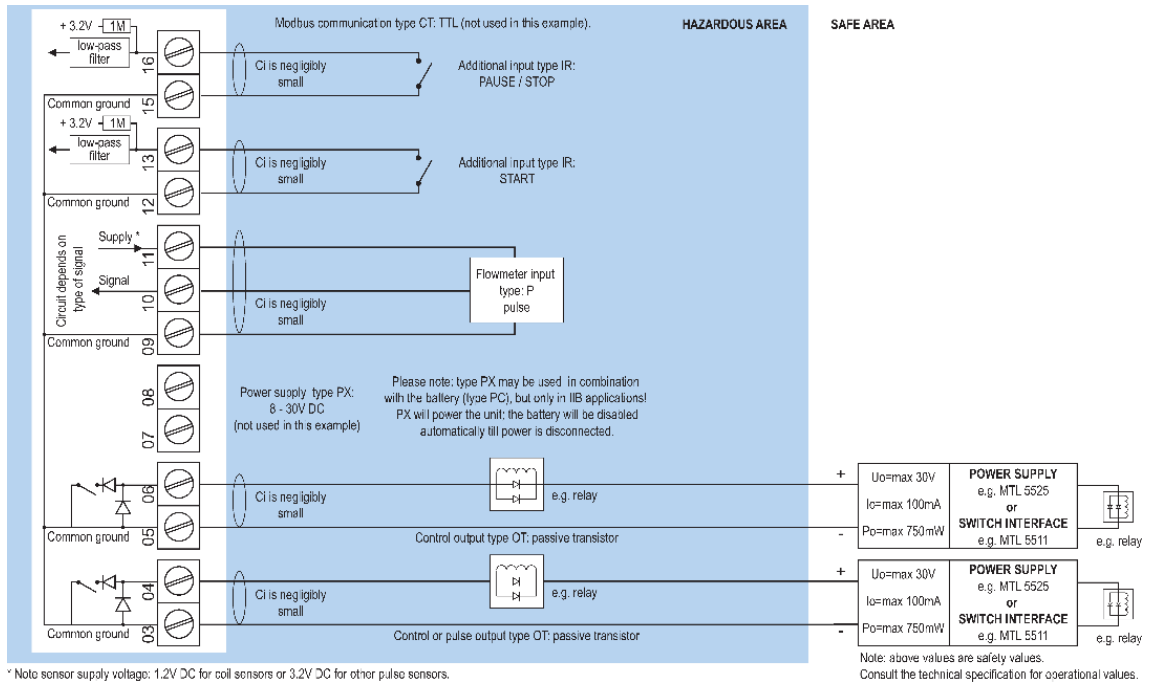
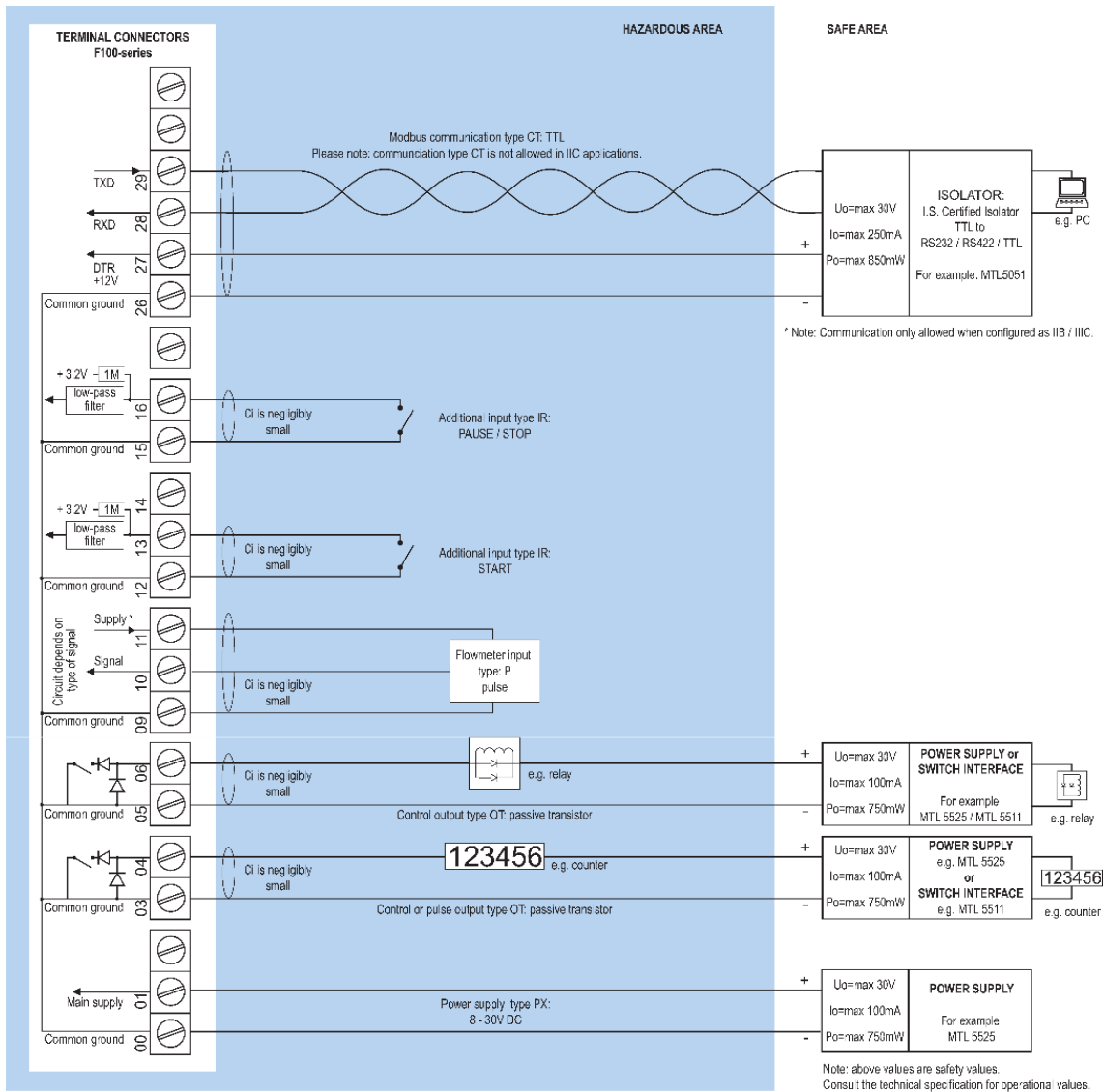


Fig. 27: F130-P-OT-PC-(PX)-XI - Battery powered - IIB/IIC – IIIC



* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

Fig. 28: F130-P-(CT)-OT-PX-XI - External power supply - IIB/IIC - IIC

5.3 BATTERY REPLACEMENT

5.3.1 SAFETY INSTRUCTIONS



- Handle the battery with care. A mistreated battery can become unsafe. Unsafe batteries can cause (serious) injury to persons.
- Only use batteries which are certified for use in hazardous areas. The use of standard batteries in hazardous area's is not safe and prohibited. Batteries that are regarded as unsafe can cause (serious) injury to persons and damage to the property.
- 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.
- Only use batteries which are certified for use in hazardous areas. The use of standard batteries in hazardous area's is not safe and prohibited. Batteries that are regarded as unsafe can cause (serious) injury to persons and damage to the property.
- For use in hazardous areas we advise to apply FW-LiBAT batteries only.

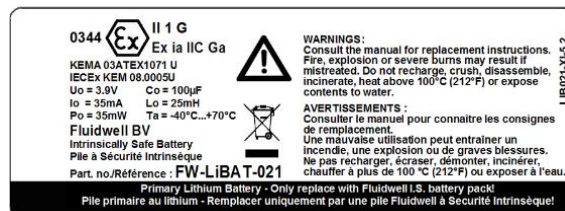
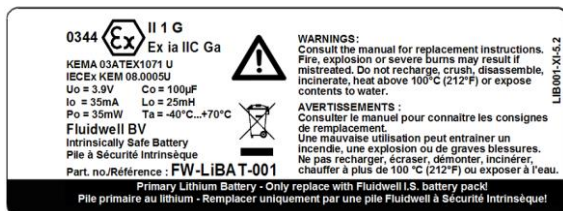


Caution !

5.3.2 REPLACE THE BATTERY

The batteries are used to store electrical energy. The battery is a high power battery which must be treated carefully. When the battery is mistreated or damaged, there is a risk of a fire, an explosion and serious burns.

1. Mind that you cannot switch off a battery.
2. Make sure, it is safe to work on the battery system.
3. Handle the battery with the utmost care to prevent a short circuit and damage.
4. Do not recharge, crush, disassemble, incinerate, heat above its rated temperature or expose the contents to water.
5. Dispose of the battery in accordance with the (inter)national, the manufacturer's and the plant owner's standards and regulations.
6. Read and understand the instructions.
7. Get approval from the safety officer to do the work.
8. Lock-out/Tag-out the unit and related system.
9. Make sure, it is safe to do the work.



REMOVE THE BATTERY

1. If necessary, clean the housing with an anti-static cloth made damp with a mild soap solution.
2. Let the enclosure dry onto the air.
3. Carefully, open the enclosure.
4. Keep the removed parts in a clean location.
5. Get access to the battery.
6. Find the battery connector and disconnect the battery from the unit.
7. Remove and keep the battery from the unit.
8. Install an insulation tape over the battery connector to prevent a short circuit.

INSTALL THE BATTERY

1. Make sure, the new battery is certified for use in the unit.
2. Work as clean as possible, to prevent contamination to enter the unit.
3. Carefully, install the battery.
4. Make sure, the battery is correctly locked into the battery holder.
5. Install the battery connector.
6. Carefully assemble the unit and close the enclosure.
7. With the enclosure carefully closed, do a test of the unit.
8. If necessary, get access to the setup menu and make any adjustments to obtain the correct settings.

5.3.3 DISPOSAL OF BATTERIES



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

6 MAINTENANCE

6.1 GENERAL DIRECTIONS



Caution !

- 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 housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing 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" in the front of this manual.

The F130-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 F130-P in such a way that no condensation will occur, e.g. to put a dose of desiccant (drying agent) inside the enclosure just before closing it. Furthermore, it is required to replace the desiccant periodically as advised by its supplier.

Battery life-time:

It is influenced by several issues :

- Type of sensor (read chapter 3): NPN and PNP inputs consume more energy than coil inputs;
- Input frequency: the higher the frequency, the shorter the battery life-time;
- Display update: fast display update uses significantly more power;
- Pulse output and communications;
- Low temperatures; the available power will be less due to battery chemistry.



Note !

It is strongly advised to disable the unused functions.

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 polyester coating.

6.2 REPAIR

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

6.3 REPAIR POLICY

If you have any problem with your Fluidwell product and you wish to repair it, 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, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.



Appendix A. TECHNICAL SPECIFICATION

Display	
Type	High intensity numeric and alphanumeric LCD, UV-resistant.
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)	LCD with LED backlight. Improved readability in full sunlight and darkness. Power requirements: 12-24V DC + 10% or type PD, PF, PM. Power consumption max. 1 Watt

Enclosures	
General	Die-cast aluminum or GRP (Glassfibre Reinforced Polyamide) 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") – LxHxD.
Classification	IP65 / TYPE 4(X)
Panel cut-out	115 x 98mm (4.53" x 3.86") LxH.
Type HC	GRP panel-mount enclosure
Type HB	Aluminum panel-mount enclosure
Field/wall-mount enclosures	Dimensions: 130 x 120 x 75mm (5.10" x 4.72" x 2.95") – LxHxD.
Classification	IP67 / TYPE 4(X)
Aluminum enclosures	
Type HA	Drilling: 2x PG9 – 1x M20.
Type HL	Drilling: 2x ½"NPT.
Type HM	Drilling: 2x M16 – 1x M20.
Type HN	Drilling: 1x M20.
Type HO	Drilling: 2x M20.
Type HP	Drilling: 6x M12.
Type HT	Drilling: 1x ½"NPT.
Type HU	Drilling: 3x ½"NPT.
Type HV	Drilling: 4x M20
Type HZ	No drilling.
GRP enclosures	
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 HJ	Drilling: 3x 22mm (0.87").
Type HH	Drilling: 6x 12mm (0.47").
Type HK	Flat bottom - no drilling.

Operating temperature	
Operational	-40°C to +80°C (-40°F to +178°F).
Intrinsically safe	-40°C to +70°C (-40°F to +158°F).
Relative humidity	90%, no condensation allowed.

Power requirements	
Type AP	8-30V DC; Power consumption max. 0.5 Watt.
Type PB	Lithium battery - life-time depends upon settings - up to 5 years.
Type PC	Intrinsically safe lithium battery - life-time depends upon settings - up to 5 years.
Type PD	8-24V AC / 8-30V DC; Power consumption max. 5 Watt.
Type PD-ZB	10-24V AC / 12-30V DC; Power consumption max. 5 Watt.
Type PD-XI	16-30V DC; Power consumption max. 1 Watt.
Type PF	15-24V AC / 20-30V DC; Power consumption max. 15 Watt.
Type PM	115-230V AC; Power consumption max. 15 Watt.
Type PX	8-30V DC; Power consumption max. 0.75 Watt.
Type PX-ZB	12-30V DC; Power consumption max. 1.5 Watt.
Type PX-XI	8-30V DC; Power consumption max. 0.75 Watt.
Note I.S. applications	For Intrinsically safe applications, consult the safety values in the certificate.

Sensor excitation	
Type PB / PC / PX	3V DC for low power pulse signals and 1.2V DC for coil pick-up.
Type PD	1.2; 3; 8.2; 12; 24V DC - max. 50mA@24V DC
Type PD-XI	Intrinsically safe: Pulse signals: 1.2; 3; 8.2 - max. 7mA@8.2V DC.
Type PF / PM	1.2; 3; 8.2; 12; 24V DC - max. 400mA@24V DC.
Type PB / PC / PX	3V DC for low power pulse signals and 1.2V DC for coil pick-up.
Terminal connections	
Removable plug-in terminal strip	Removable plug-in terminal strip. Wire max. 1.5mm ² and 2.5mm ²
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 :  II 1 G Ex ia IIB/IIC T4 Ga II 1 D Ex ia IIIC T100°C Da
Explosion proof Type XD/XF	IECEX approval : Ex ia IIB/IIC T4 Ga Ex ia IIIC T100°C Da
	ATEX approval ref:  II 2 EEx d IIB T5. Weight appr. 15kg. Dimensions of enclosure: 350 x 250 x 200mm (13.7" x 9.9" x 7.9") LxHxD.
Directives and Standards	
EMC	EN 61326-1 and FCC 47 CFR part 15
LVD	EN/IEC 61010-1
ATEX / IECEX	EN/IEC 60079-0; EN/IEC 60079-11
RoHS	EN 50581
IP & NEMA	EN 60529 & NEMA 250
INPUT	
Flowmeter	
Type P	npn; npn-lp; reed; reed-lp; pnp; pnp-lp; namur; coil-hi; coil-lo; 8-1 DC; 12 DC; 24 DC
Frequency	Minimum 0 Hz - maximum 7 kHz for total and 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 - 9999999 with variable decimal position.
Low-pass filter	nnp-lp; reed-lp; pnp-lp
Control inputs	
Function	External START and PAUSE / STOP.
Type P	Two Reed switch inputs / make-contacts. Minimum contact duration 100msec.
OUTPUT	
Control output	
Function	User defined: batch process two stage control or scaled pulse output acc. batch or acc. total.
Pulse output	Max. frequency 500Hz. Pulse length user definable between 0.001 up to 9.999 seconds.
Type OA	Two active 24V DC transistor outputs; max. 50mA per output (requires type PD, PF or PM).
Type OR	Two mechanic relay outputs; max. switch power 230V AC - 0,5A (requires type PF or PM).
Type OT	Two passive transistor outputs - not isolated. Load max. 50V DC - 300mA.
Communication option	
Protocol	bus-rtu; bus-asc
Speed	1200; 2400; 4800; 9600
Type CB	1 - 247
Type CH	RS232
Type CI	RS485 2-wire
Type CT	RS485 4-wire
Type CX	TTL Intrinsically safe communication.

Operational

Operator functions	
Functions	<ul style="list-style-type: none"> • enter a preset value, • start / interrupt and stop the batch process, • reprint last receipt.
Shown information	<ul style="list-style-type: none"> • preset value • running batch total or remaining quantity, • total and accumulated total • number of completed batches.

Preset / Total	
Digits	7 digits.
Unit	L; m ³ ; GAL; USGAL; kg; lb; bbl; no unit.
Decimals	0000000; 111111.1; 22222.22; 3333.333
Note	total can be reset to zero.

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

Appendix B. PROBLEM SOLVING

In this appendix, several problems are included that can occur when the F130-P is going to be installed or while it is in operation.

Flowmeter does not generate pulses:

Check:

- Signal selection;
- Pulse amplitude;
- Flowmeter, wiring and connection of terminal connectors;
- Power supply of flowmeter.

Flowmeter generates "too many pulses":

Check:

- Settings for total;
- Type of signal selected with actual signal generated;
- Sensitivity of coil input;
- Proper grounding of the F130-P;
- Use screened wire for flowmeter signals and connect screen to terminal 9. (unless connected at sensor).

Pulse output does not function:

Check:

- amount: pulse per "x" quantity; is the value programmed reasonable and will the maximum output be under 20Hz?
- width; is the external device able to recognize the selected pulse width and frequency?

The password is unknown:

- If the password 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 error code. When multiple errors arise at the same time, their error codes are added and their sum is shown. The digital [d] codes are:

Not recoverable by the end user:

[d] 0 = no error;

[d] 1 = display error;

[d] 2 = data-storage error;

[d] 3 = error 1 + error 2 simultaneously;

[d] 4 = initialization error.

For a not recoverable error, keep the error code at hand and contact your supplier.

Appendix C. MODBUS COMMUNICATION

General

The product is fitted with the Modbus communication protocol and can be equipped with various physical interfaces like RS485 and RS232 (please see device datasheet for available options). The tables below show the various variables that can be accessed through the communication. Currently, the function codes supported are:

- function code 3 “Read Holding Registers” (4x references);
- function code 16 “Preset Multiple Registers” (4x references).

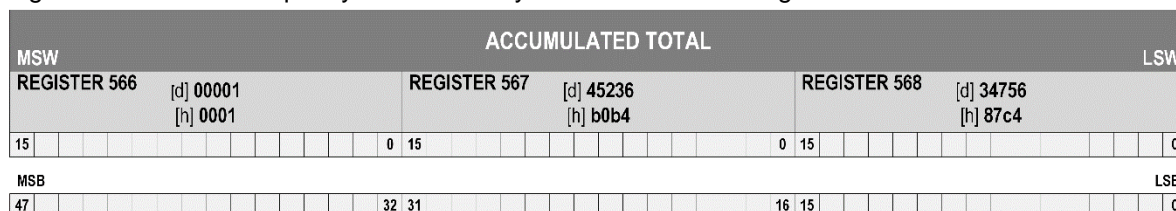
The table below shows the Modbus PDU addresses in a decimal format, followed by its hexadecimal representation (0x0000). When the PLC address range is required (4x references are typically used by PLCs), please add a value of 40001 to the Modbus PDU address. E.g. reading the serial number of the product with PLC-based addressing means: 165 + 40001 = register 40166.

The variables that consist of a multiple register must always read/write in 1 single action!

Refer to the illustration:

For this example it is assumed that the variable accumulated total has 3 registers (words) with address 566, 567 and 568. When a transmission is done, register 566, which acts as the MSW, arrives first with bit 15 which is the MSB of the lowest addressed word, but is also the MSB (bit 47) of the complete variable that represents the Accumulated total.

Although most Modbus Masters will support variables that span 2 registers, variables spanning more registers sometimes require you to manually calculate the resulting value.



FW-F000-000032-002-#L

ACCUMULATED TOTAL: [register 566 * 4294967296] + [register 567* 65536] + [register 568*1] =
 [d] ACCUMULATED TOTAL: [00001 * 4294967296] + [45236 * 65536] + [34756*1] = 7259588540
 [h] ACCUMULATED TOTAL: 0x[0001] [b0b4] [87c4] = 1B0B487BC

For additional information regarding using your Fluidwell Modbus device, please read the ‘Fluidwell General Modbus Communication Protocol’ and ‘Modbus troubleshooting guide’ that are available through our website or your distributor.

Runtime variables

PDU ADDRESS	REGISTER	VARIABLE	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 566d [h] 0x236	40567	total	3	R*	uint48	0...9999999999, Representation: unit, decimals depending on variables 32, 33
[d] 560d [h] 0x230	40561	accumulated total	3	R	uint48	0...99999999999999, Representation: unit, decimals depending on variables 32, 33
[d] 208 [h] 0x0d0	40209	batch total	3	R	uint48	0...999999999999, Representation: unit, decimals depending on variables 32, 33
[d] 200 [h] 0x0C8	40201	preset	2	R/W	uint32	0...999999999999, Representation: unit, decimals depending on variables 32, 33
[d] 516 [h] 0x204	40517	error status (bitfield)	1	R	uint16	[d] 0 = no error [d] 1 = display error [d] 2 = data-storage error [d] 3 = error 1 + error 2 simultaneously [d] 4 =: initialization error

Reading flow rate, total or accumulated total: The returned values are given including the decimals and represent the actual value. The given value may differ from the value that is shown on the display – this is due to the fact that the display is limited in the number of digits and may have a slower update rate set.

For example when two decimals are selected for total and total has a value of 123456,78 the display will show 23456,78 while communication will read a “total” of 12345678 (note that the decimals should be adapted according the setting in “total decimals” which is in this case 2).

* **Clearing total:** It is possible to clear the total counter by means of writing a value of 0 to all the 3 registers of total/flow rate in a single write action. Writing any other value will result in the reply of an error message because the registers of total/flow rate are during operation read-only.

Setup variables

PDU ADDRESS	REGISTER	VARIABLE PRESET	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 32 [h] 0x020	40033	unit	1	r/w	uint16	0=none 3=kg 6= USGAL 1=L 4= lb 7=bb1 2= m ³ 5=GAL
[d] 33 [h] 0x021	40034	decimals	1	r/w	uint16	0...3
[d] 34 [h] 0x022	40035	K-factor	2	r/w	uint32	1...9999999 Representation: 0.000010...9999999 depending on variable 34: K-factor decimals.
[d] 37 [h] 0x025	40038	K-factor decimals	1	r/w	uint16	0...6
[d] 217 [h] 0x0D9	40218	batch minimum	3	r/w	uint48	0-9999999 Representation: 0000000...9999999 depending on variable 33: decimals.
[d] 218 [h] 0x0DA	40219	batch maximum	3	r/w	uint48	0-9999999 Representation: 0000000...9999999 depending on variable 33: decimals.

PDU ADDRESS	REGISTER	VARIABLE OVERRUN	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 194 [h] 0x0C2	40195	overrun	1	r/w	uint16	0=disable 1=enable
[d] 192 [h] 0x0C0	40193	time	1	r/w	uint32	0.1 – 999.9

PDU ADDRESS	REGISTER	VARIABLE DISPLAY	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 195 [h] 0x0C3	40196	display	1	r/w	uint16	0=increase 1=decrease
[d] 67 [h] 0x043	40068	backlight brightness	1	r/w	uint16	0=off 2=40% 4=80% 1=20% 3=60% 5=100%

PDU ADDRESS	REGISTER	VARIABLE POWER MANAGEMENT	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 80 [h] 0x050	40081	LCD update time	1	r/w	uint16	0=fast 2=3sec 4=30sec 1=1sec 3=15sec 5=off
[d] 81 [h] 0x051	40082	power mode	1	r/w	uint16	0=operational 1=shelf

PDU ADDRESS	REGISTER	VARIABLE FLOWMETER	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 96 [h] 0x060	40097	flowmeter signal	1	r/w	uint16	0=NPN 4=PNP 8= coil lo 1=NPN LP 5=PNP LP 9=act 8.1V 2=Reed 6=NAMUR 10= act 12 V 3=Reed LP 7=coil hi 11=act 24V

PDU ADDRESS	REGISTER	VARIABLE RELAYS	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 196 [h] 0x0C4	40197	relays	1	r/w	uint16	0=1 step 1=2 step
[d] 197 [h] 0x0C5	40198	preclose	2	r/w	uint32	0000.000...9999999
[d] 128 [h] 0x080	40129	width	1	r/w	uint16	0.000 – 9.999 seconds (0=off)
[d] 133 [h] 0x085	40134	decimals	1	r/w	uint16	0...3
[d] 130 [h] 0x082	40131	amount	2	r/w	uint32	0.001 - 9999999
[d] 134 [h] 0x086	40135	pulse	1	r/w	uint16	0=total 1=batch

PDU ADDRESS	REGISTER	VARIABLE COMMUNICATION	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 144 [h] 0x090	40145	speed (Baudrate)	1	r/w	uint16	0=1200 1=2400 2=4800 3=9600
[d] 145 [h] 0x091	40146	Modbus address	1	r/w	uint16	1...247
[d] 146 [h] 0x092	40147	Modbus mode	1	r/w	uint16	0=ASCII 1=RTU 2=OFF

PDU ADDRESS	REGISTER	VARIABLE OTHERS	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 173 [h] 0x0AD	40174	model number	1	r	uint16	0...9999
[d] 160 [h] 0x0A0	40161	model suffix	1	R	char	Representation: ASCII character
[d] 162 [h] 0x0A2	40163	firmware version	2	r	uint32	0...999999 Representation: nn:nn:nn
[d] 165 [h] 0x0A5	40166	serial number	2	r	uint32	0...9999999 Representation: nnnnnnn
[d] 168 [h] 0x0A8	40169	password	1	r	uint16	0...9999
[d] 170 [h] 0x0AA	40171	tag-nr	2	r/w	uint32	0...9999999 Representation: nnnnnnn

Process variables

PDU ADDRESS	REGISTER	VARIABLE	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 223 [h] 0x0DF	40224	batch mode	1	r	uint16	Bitfiel[d] Bitfiel[d] Bitfiel[d] 0=idle 2=pended 8=in overrun 1=running 4=finished
[d] 154 [h] 0x09A	40155	batch keylock	2	r/w	uint32	0.0...999.9 seconds
[d] 156 [h] 0x09C	40157	batch keylock mask (keys are not detected)	1	r	uint16	Bitfiel[d] Bitfield Bitfield prog=0x001 start=0x002 stop=0x003
[d] 157 [h] 0x09D	40158	batch command	1	r	uint16	1=start 2=pause 3=stop 4=release 5=reset Read out returns last executed command entered through communication. Before a new batch can be initiated through communication, the release command must be send. This way, when combined with the keylock, overwriting of batch information (total/preset) data can be prevented.
[d] 200 [h] 0x0C8	40201	preset quantity	2	r/w	uint32	0...9999999 depending on variable 33: decimals.

Communication variables

PDU ADDRESS	REGISTER	VARIABLE	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
[d] 147 [h] 0x093	40148	delay	1	R/W	uint16	delay between read and write command 0...65355

Appendix D. DECLARATION OF CONFORMITY



Count on us.

Declaration of Conformity

Fluidwell F1-series indicators

Veghel, July 2016

We, Fluidwell BV, declare under our sole responsibility that the F1-series indicators are designed and will operate conform the following applicable European Directives and Harmonised Standards, when installed and operated according to the related manual:

EMC Directive		EN61000-6-2:2005; EN61000-6-3:2007; EN61326-1:2013
RoHS Directive		EN 50581:2012
Low Voltage Directive	For options –PM or –OR:	EN61010-1:2010
ATEX Directive	For option –XI, intrinsically safe:	EN60079-0:2012+A11; EN60079-11:2012
	Protective system:	Ⓢ II 1 G Ex ia IIB/IIC T4 Ga Ⓢ II 1 D Ex ia IIIC T100 °C Da
Certification	Certificates:	KEMA 03ATEX1074 X, Issue 5
	Notified body 0344:	DEKRA Certification BV, Meander 1051, 6825 MJ, Arnhem, the Netherlands.

Last two digits of the year in which the CE marking was affixed: 03.



Fluidwell BV

I. Meij, Manager Technology

Fluidwell BV are ISO9001 certified by DEKRA Certification BV, Meander 1051, 6825 MJ, Arnhem, The Netherlands.

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INDEX OF THIS MANUAL

accumulated Total	8	Low-battery alarm	8
actual settings	47	maintenance	36
backlight		manual version	4
density	13	namur signal	27
Clear Total	8	operational	7, 9, 10, 16
coil-signal	25	operator level	7
Coil-signal	25	pass code	40
communication	28	preset	
contents	5	max. batch size	12
dimensions	17	pulse output	
display		pulse length / period time	15
function	13	pulse-signal NPN	26
Flowmeter input	25	pulse-signal PNP	26
functional description	6	reed-switch:	27
hardware version	4	Relay output	14
intrinsic safety	29	software version	4
Intrinsic safety	29	Start, external input	27
Intrinsically Safe options	32	Stop, external input	28
IP classification	16	transistor output	24

LIST OF FIGURES F130-P

Fig. 1: Typical application	6
Fig. 2: Control Panel	7
Fig. 3: Process information (typical)	7
Fig. 4: Program preset value (typical)	7
Fig. 5: Leading zero (typical)	8
Fig. 6: Process paused (typical)	8
Fig. 7: Example of low-battery alarm	8
Fig. 8: Aluminum enclosures - Dimensions	17
Fig. 9: GRP enclosures - Dimensions	18
Fig. 10: Overview of terminal connectors - Standard configuration and options	22
Fig. 11: Sensor supply voltage - Switch setting	23
Fig. 12: Terminal connections - Active output (typical)	24
Fig. 13: Terminal connections - Mechanical relay output R1 and R2.	24
Fig. 14: Terminal connections - Passive transistor output (typical)	25
Fig. 15: Terminal connections - Coil signal input (typical)	25
Fig. 16: Terminal connections - NPN signal input (typical)	26
Fig. 17: Terminal connections - PNP signal input (typical)	26
Fig. 18: Terminal connections - Active signal input (typical)	26
Fig. 19: Terminal connections - Reed-switch signal input (typical)	27
Fig. 20: Terminal connections - NAMUR signal input (typical)	27
Fig. 21: Terminal connections - External start (typical)	27
Fig. 22: Terminal connections - External stop (typical)	28
Fig. 23: Example serial number (typical)	30
Fig. 24: Label information - Intrinsically safe application (typical)	30
Fig. 25: Overview terminal connectors XI – Intrinsically safe applications	31
Fig. 26: Switch position voltage selection option PD-XI	32
Fig. 27: F130-P-OT-PC-(PX)-XI - Battery powered - IIB/IIC – IIIC	33
Fig. 28: F130-P-(CT)-OT-PX-XI - External power supply - IIB/IIC - IIIC	34

LIST OF CONFIGURATION SETTINGS				
SETTING	DEFAULT	DATE:	DATE:	
1	PRESET	Enter your settings here		
11	unit	L		
12	decimals	0000000		
13	k-factor:	0000001		
14	decimals k-factor	0		
15	batch min	0		
16	batch max	0		
2	OVERRUN			
21	overrun	disable		
22	time	1.0		
3	ALARM			
31	no flow	disable		
32	time	10		
4	DISPLAY			
41	display	increase		
42	light	100%		
5	POWER MANAGEMENT			
51	LCD new	1 sec.		
52	battery mode	operational		
6	FLOWMETER			
61	signal	coil-lo		
7	RELAYS			
71	relays	1-step		
72	preclose	0		
73	width	0		
74	decimals	0		
75	amount	1000		
76	pulse	total		
8	COMMUNICATION			
81	speed	9600		
82	address	1		
83	mode	BUS-RTU		
9	OTHERS			
91	model	F130-P		
92	software version			
93	serial nr.			
94	password	0000		
95	tag-nr	0000000		

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