E110-U

EXPLOSION PROOF FLOWRATE INDICATOR / TOTALIZER

Signal input flowmeter: 0-10V

Signal outputs: (0)4-20mAref. flowrate and pulse ref. total

Remote control: External reset with clear-lock

Options: **Modbus Communication,** *USB Communication*

E-Series - Explosion proof indicators for hazardous areas.
More info: www.fluidwell.com/eseries.

SAFETY INSTRUCTIONS

- Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.
- LIFE SUPPORT APPLICATIONS: The E110-U 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 E110-U, the installer has to discharge himself by touching a well-grounded object.
- The E110-U must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).
- Do connect a proper grounding to the housing as indicated if the E110-U is used on a ship, truck or other application with no ground. The earth lead between the housing and the removable terminal-block may never be removed.

DISPOSAL OF ELECTRONIC WASTE

- At the end of its life this product should be disposed of according to the (inter)national regulations regarding waste electronic equipment. If a battery is installed in this product it should be disposed of separately. The separate collection and recycling of your waste equipment will help to conserve natural resources and ensure that it is recycled in a manner that protects the environment

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 E110-U implemented without preceding written consent from the manufacturer, will result in the immediate termination of product liability and warranty period.
- Installation, use, maintenance and servicing of this equipment must be carried out by authorized technicians.
- Check the mains voltage and information on the manufacturer's plate before installing the E110-U.
- Check all connections, settings and technical specifications of the various peripheral devices with the E110-U supplied.
- Never open the enclosure in hazardous areas while connected to power supplying or consuming devices other than the internal battery supply.
- Open the E110-U 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 enclosure classification (see manufacture's plate and chapter 4.2.).
- If the operator detects errors or danger, 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 OPERATION MANUAL

This operation manual is divided into two main sections:

- The daily use of the E110-U 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 E110-U as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the E110-U 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 E110-U or connected instruments.

A "**caution !**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the E110-U or connected instruments

*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.*

Hardware version : E100-V13.02.xx
Software version : 03.04.xx
Manual : FW-E110-U-M_v0102_01_EN
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CONTENTS MANUAL

1 INTRODUCTION

1.1 SYSTEM DESCRIPTION OF THE E110-U

Functions and features

The flowrate / totalizer model E110-U is an explosion proof microprocessor driven instrument designed to show the flowrate, the total and the accumulated total.

This product has been designed with a focus on:

- User-friendliness: operation through the glass without removing the cover.
- Good readings in full sunlight and darkness through a bright backlight.
- Mounting flexibility: multiple solutions for sensor mounting, including 1" NPT or M25 bottom entry as well as suitable for wall or pipe mount applications.
- Ruggedness for harsh surrounding: not designed to be just explosion proof.
- Usability: wide operational temperature, high ingress protection rating and international certification.
- Installation friendly design: spacious cabling area, plug and play cable connection and easy removable electronic module.
- Aluminum enclosure with high quality industrial two component coating.
- Stainless steel 316L enclosure available for offshore applications.
- Ability to process any type of sensor signal,
- Multiple power supply options to suit any application, including long-life battery supply.
- Configurable pulse and analog signal outputs and optional communication outputs.

Flowmeter input

This manual describes the unit with a 0-10V <u>analog type</u> input from the flowmeter "-U version". Other versions are available to process pulses or (0)4-20mA flowmeter signals.

One flowmeter with a 0-10V output can be connected to the E110-U. To power the sensor, several options are available.
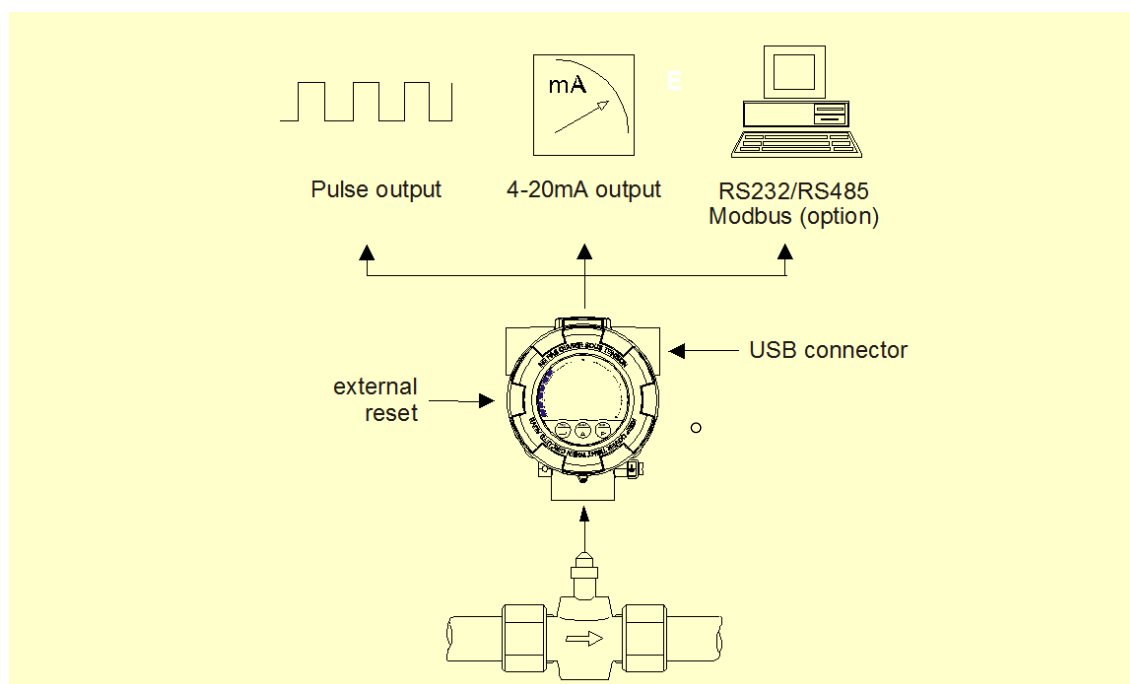

Fig. 1: Application lay-out (typical)

Outputs

- Configurable pulse output: a scaled pulse representing a certain total quantity. Maximum frequency 500Hz. The pulse length can be set as desired.
- Configurable linear 4-20mA isolated analog output with 12-bits resolution representing the actual flowrate. Flowrate levels as well as the minimum and maximum signal output can be tuned.

Configuration

The E110-U has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your E110-U according to your specific requirements.

It includes several important settings, such as Span, measurement units, signal selection etc. All setting are stored in EEPROM memory and will not be lost in the event of power failure. A backup of the total and accumulated total in EEPROM memory is made every minute.

To extend the battery-life time, please use of the power-management functions as described in chapter 3.

Display information

Flowrate and totals can be displayed either with the 11 small 7mm (0.28") digits or with the 7 large 12mm (0.47") digits. Additionally, the E110 has an analog bargraph to show the actual flowrate.

Backlight

A backlight is standard available. The intensity can be set as desired with SETUP 3.3. (externally powered only).

In battery powered applications it will be switched on during a limited period of time at a fixed intensity and will switch off automatically within 30 seconds after the key touch.

Note !   *For loop powered applications only,*
the backlight will not come on because of limited power.

Options

The following options are available: full Modbus communication via RS232/485 or USB, mechanical relay, power- and sensor-supply options.

2 OPERATIONAL

2.1 GENERAL INFORMATION

This chapter describes the daily use of the E110-U. This instruction is meant for users / operators.

Caution !

- The E110-U 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

It is possible to operate the E110-U with the optical keys (operator) or, when the cover is removed, with the pushbuttons at the side (engineer). The optical keys are operated through the glass. The following keys are available:

Fig. 2: Control panel, optical keys.

Functions of the keys

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

This key is used to SELECT accumulated total.
The arrow-key ▲ is used to increase a value after PROG has been pressed
or to configure the unit; please read chapter 3.

Press this key twice to CLEAR the value for total.
The arrow-key ▶ is used to select a digit after PROG has been pressed or to configure the E110-U; please read chapter 3.

The optical keys
The optical keys are designed for through glass operation. The optical keys are used in three different modes of operation. When the key symbol is shown,

- disabled by the Optical keys on-off switch:
- locked because there has been no human interaction for at least 30 seconds;
- locked because the pushbuttons at the side are used.

Normally the E110-U is operated through glass. For a correct operation it is advised to keep the glass clean. If the operation of the optical keys is not satisfactorily, you can clean the glass with a soft, lint-free cloth made damp with a mild soap solution.

Enable optical keys
The optical keys are locked after 30 seconds when enabled at in the setup menu. A key lock symbol will appear at the top of the display to indicate this.

To enable the optical keys, touch briefly after each other all three keys in the following order:

PROG – SELECT – CLEAR. The display will hint this sequence. The key lock symbol will disappear when the sequence is successfully executed.

Lock optical keys
To lock the optical keys: touch simultaneously the PROG and CLEAR keys for 3 seconds (or wait for 30 seconds). The key lock symbol will appear as shown.
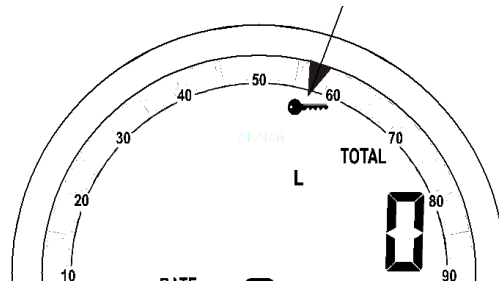
Fig. 3: Control panel, disable optical keys.

Enable or disable optical keys with on-off switch
Under the optical keys an on-off switch is located to enable or disable the optical keys. Move this switch to the right to enable or to the left to disable the optical keys. The key lock symbol will appear in the display.
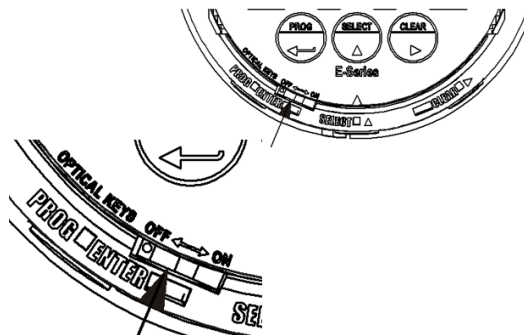
Fig. 4: Control panel, ON/OFF optical keys.

For battery powered applications it is recommended to switch off the optical keys when possible to save on power consumption significantly.

Note !

Push button operation
Next to the three optical keys also three pushbuttons are available when the cover is removed. Make sure the key lock is active before removing the cover to prevent unwanted actions.

On the side of the collar of the display three black mechanical push buttons are present in the same order as the optical keys, PROG/ENTER – SELECT – CLEAR. They operate in the same manner as the optical keys.
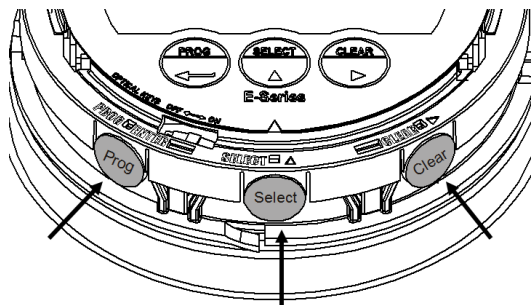
Fig. 5: Control panel, Push button operation.

2.3 OPERATOR INFORMATION AND FUNCTIONS

Note !

Check the key lock and unlock before operation
Unlock the optical keys as described before.

By default, the E110-U will act at Operator level. The information displayed is dependent upon the SETUP-settings. The signal generated by the connected flowmeter is measured by the E110-U in the background. The display values are however updated depending on the selected refresh rate. After pressing a key, the display will be refreshed 8 times per second, after 30 seconds it will return to the selected setting.

Fig. 6: Example of display information during process.

For the Operator, the following functions are available:

- **Display flowrate / total or flowrate**
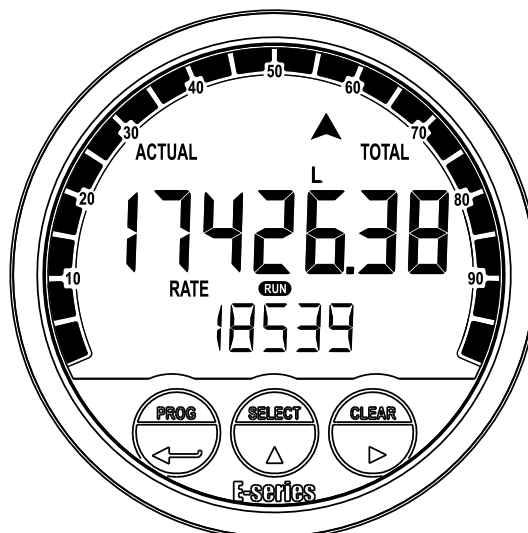 This is the main display information of the E110-U. After selecting any other information, it will always return to this main display automatically.
  Total is displayed on the upper-line of the display and flowrate on the bottom line.
  It is possible to display flowrate only with the large 12mm digits; in this instance press the SELECT-key to read the total. When "-------" is shown, the flowrate value is too high to be displayed. The arrows ⬍ indicate the increase/decrease of the flowrate trend.

- **Clear total**
  The value for total can be reset to zero. 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.
  A reset of the total DOES NOT influence the accumulated total.

Note !

The IB option (external keyboard) allows clear total also via an external pushbutton. This clear operates in parallel with the clear action via the control panel but does not require an extra confirmation. When the switch is closed, Total still counts but the "Clear Total" function is disabled.

- **Display accumulated total**
  When the SELECT-key is pressed, the total (upper line) and the accumulated total (lower line) 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 displayed according to the configuration settings for total. After 20 seconds the operational mode, as selected in the setup menu, shows flowrate or total.

- **Display speedometer flowrate**
  The display shows along the edge a percent based impression of the actual flowrate. The bargraph consists of 20 segments which run from 0 to 100%. This function can be enabled or disabled with SETUP 3.4 – Bargraph. The range can be set with SETUP 3.5 – Ratespan.

2.4   OPERATOR ALARMS

Low-battery alarm (PB only)

During operation the battery voltage drops. When the battery voltage becomes too low, the battery indicator comes on. When the battery indicator is on, install a fresh and new battery (as soon as possible) to keep a reliable operation and indication. When the E110-U has the communication option, it is possible to monitor the battery status. Refer to Appendix C, Modbus communication.

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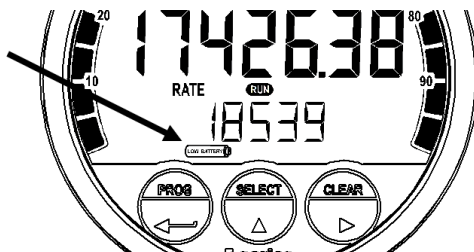*The use of unapproved batteries will void the warranty.*

Fig. 7: Example of low-battery alarm.

Alarm

When "alarm" is displayed, see 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 manual before carrying out its instructions.
- The E110-U 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 authorized personnel.
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.

3.2 PROGRAMMING SETUP-LEVEL

You can program the setup level by use of the optical keys, the pushbuttons at the side or with the remote configuration tool which is free downloadable from our internet site.

Note !

Be aware that the optical keys may be locked and will not function.
Unlock the optical keys as described before.

3.2.1 GENERAL INFORMATION

Configuration of the E110-U is done at SETUP level. SETUP level is reached by pressing the PROG/ENTER key for 7 seconds; at which time ☞ will be displayed. To return to the operator level, press PROG for three seconds or do not press any key for 2 minutes, the unit will exit SETUP automatically.

SETUP can be reached at all times while the E110-U remains fully operational. Be aware that in this case any change to the settings may have an influence on the operation. The 'setup' indicator will be activated and the 'run' indicator will be deactivated.

Note !

A password may be required to enter SETUP.

Without this password access to SETUP is denied.

To enter SETUP-level
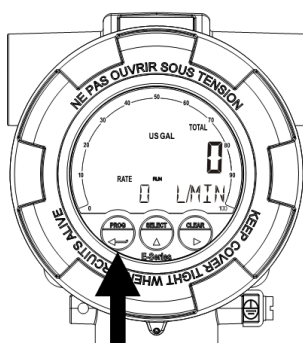
Press the PROG/ENTER key for 7 seconds.

Matrix structure SETUP-level

Each function has a unique number, which is displayed below the word "SETUP" at the bottom of the display. The number is a combination of two figures. The first figure indicates the function-group and the second figure the sub-function. Additionally, each function is expressed with a keyword.

After selecting a sub-function, the next main function is selected by scrolling through all "active" sub-functions (e.g. 1▲, 1.1▲, 1.2▲, 1.3▲, 1.4▲, 1▸, 2▸, 3▲, 3.1 etc.).
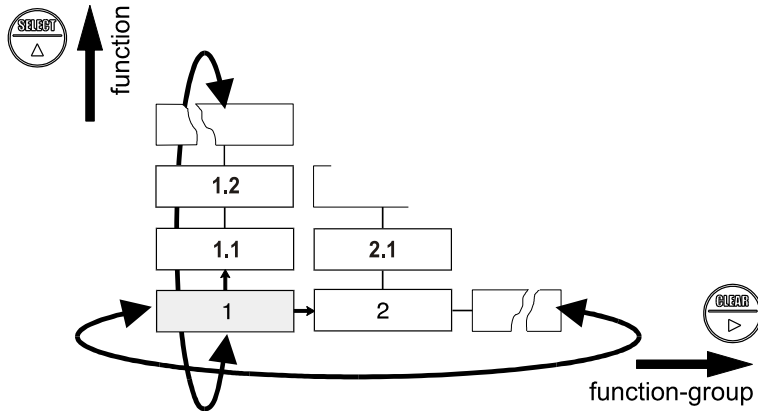
Scroll back a function group is done by pressing PROG (e.g. 4↵, 3↵, 2↵, 1↵)

Scroll back a sub-function is done by pressing CLEAR (e.g. 1.4▸, 1.3▸, 1.2▸, 1.1▸)

SCROLLING THROUGH SETUP-LEVEL

Selection of function-group and function

SETUP is divided into several function groups and functions.
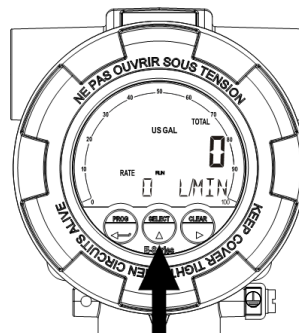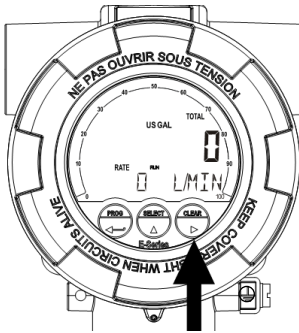
Select the function group with the CLEAR/▸ key.   Select the function with the SELECT/▲ key.

To change or select a value
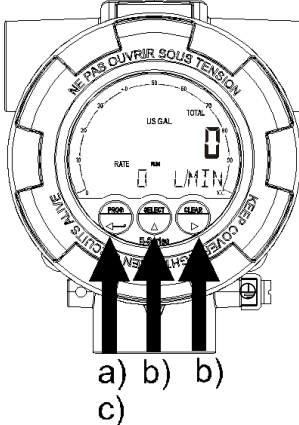
- Momentarily, press the PROG/ENTER key. The program indicator start to flash.

- Select or enter a value with the SELECT/▲ key and/or the CLEAR/▸ key.

- Press the PROG/ENTER key to confirm the value/selection.

- To change a value, use ▸ to select the digits and ▲ to increase that value.

If the new value is invalid, the increase sign▲ or decrease-sign▼ will be displayed while you are programming.

To select a setting, ▲ is used to select in one direction and ▸ can be used to select in the other direction.

When data is altered but ENTER is not pressed, then the alteration can still be cancelled by waiting for 20 seconds or by pressing ENTER for three seconds: the PROG-procedure will be left automatically and the former value is not changed.

Note !   *Alterations will only be set after ENTER has been pressed momentarily!*

To return to OPERATOR-level
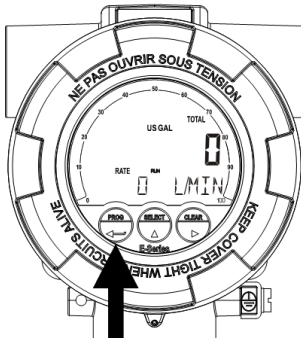
Press the PROG/ENTER key for 3 seconds.

In order to return to the operator level, PROG will have to be pressed for three seconds. Also, when no keys are pressed for 2 minutes, SETUP will be left automatically

3.2.2 OVERVIEW FUNCTIONS SETUP LEVEL

1	**TOTAL**		
	1.1	UNIT	L; m3; US gal; I gal; cf; oilbbl; kg; ton; US ton; lb; ---- (none)
	1.2	DECIMALS	0; 0.1; 0.02; 0.003
	1.3	SPAN	0.000001 - 999,999 unit/time unit
	1.4	SPANDECS	0 - 6
	1.5	FACTOR-X	x1; x10; x100; x1000
2	**FLOWRATE**		
	2.1	UNIT	mL; L; m3; US gal; I gal; cf; oilbbl; nL; nm3; scf; mg; g; kg; ton; lb; US ton; rev; p; ---- (none)
	2.2	TIME	/sec; /min; /hour; /day
	2.3	DECIMALS	0; 0.1; 0.02; 0.003
	2.4	SPAN	0.000001 - 999,999 unit/time unit
	2.5	SPANDECS	0 - 6
3	**DISPLAY**		
	3.1	FUNCTION	total; flowrate
	3.2	LCD NEW	fast; 1 sec; 3 sec; 15 sec; 30 sec; off
	3.3	BACKLGHT	0%; 20%; 40%; 60%; 80%; 100%
	3.4	BARGRAPH	enable; disable
	3.5	RATESPAN	0000000 – 9999999
4	**FLOWMETER**		
	4.1	FORMULA	Interpolation; square root
	4.2	FILTER	01 - 99
	4.3	CUT-OFF	0.0 - 99.9%
	4.4	CALIB-LO	default; calibrate; calibrate set
	4.5	CALIB-HI	default; calibrate; calibrate set
5	**ANALOG**		
	5.1	OUTPUT	enable; disable
	5.2	RATE-MIN (4mA)	0000000 – 9999999
	5.3	RATE-MAX (20mA)	0000000 – 9999999
	5.4	CUT-OFF	0.0 – 9.9%
	5.5	TUNE-MIN (4mA)	0000 – 9999
	5.6	TUNE-MAX (20mA)	0000 – 9999
	5.7	FILTER	1 – 99
6	**PULSE**		
	6.1	WIDTH	0.000 – 9.999
	6.2	DECIMALS	0; 0.1; 0.02; 0.003
	6.3	AMOUNT	0000000 – 9999999
7	**COM-MODB**		
	7.1	SPEED	1200; 2400; 4800; 9600; 9600HP; 19200; 38400
	7.2	ADDRESS	001 – 247
	7.3	MODE	off; bus asc; bus rtu
	7.4	DATABITS	8 bits; 7 bits
	7.5	PARITY	none; even; odd
8	**OTHERS**		
	8.1	MODEL	E110-U
	8.2	SOFTWARE VERSION	xx.xx.xx
	8.3	SERIAL NO	xxxxxxx
	8.4	PASSWORD	0000 – 9999
	8.5	KEY LOCK	enable; disable
	8.6	TAG NO	0000000 – 9999999

3.2.3 EXPLANATION OF SETUP-MENU 1 – TOTAL

	SETUP FUNCTIONS AND VARIABLES	
1	**TOTAL**	
1.1	UNIT	SETUP 1.1 determines the measurement unit for total, accumulated total and pulse output. The following units can be selected:
		L; m3; US gal; I gal; cf; oilbbl; kg; ton; US ton; lb; ---- (none)
	Note !	*Alteration of the measurement unit will result in also making changes to related settings to keep a match. Please note that the Span 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: 0; 0.1; 0.02; 0.003.
1.3	SPAN	With the span, the flowmeter signal is converted to a quantity.
		The span for Total is determined on the basis of the measurement unit (SETUP 1.1) and the flowrate per second at 20mA (or max signal). Enter the span in whole numbers (decimals are set with SETUP 1.4). The more accurate the span, the more accurate the functioning of the system will be:
		Example 1: Calculating the Span
		Assume that the flowmeter generates 20mA at a rate of 652.31 USGAL per hour, the selected unit is barrels. There are 42 gallons in one barrel; so the rate is 652.31/42 is 15.53119 barrels/hour.
		This is 0.0043142 barrels/second, which is the span.
		Enter for SETUP-1.3: "004314" and for SETUP-1.4 "6".
		Example 2: Calculating the Span
		Let us assume that the flowmeter generates 20mA at a flowrate of 2,481.3 Liters/minute and the selected unit is "cubic meters/m3". The rate per second is 2,481.3÷60 is 41.355 L/sec.
		This is 0.041355 m3/sec., which is the span.
		Enter for SETUP-1.3: "041355" and for SETUP-1.4 - decimals span "6".
1.4	SPANDECS	This setting determines the number of decimals for the Span (SETUP 1.3). The following can be selected: 0; 1; 2; 3; 4; 5; 6
	Note !	*This function influences the Span indirectly. This setting has NO influence on the displayed number of decimals for total (SETUP 1.2)!*
1.5	FACTOR-X	This setting determines the multiplication factor of the Total. This makes it possible to show up to 3 digits more of the Total/accumulated Total. The amount shown is a rounded number. The following can be selected: x1; x10; x100; x1000

3.2.4 EXPLANATION OF SETUP-MENU 2 – FLOWRATE

Note !   *These settings also influence the analog output.*

	SETUP FUNCTIONS AND VARIABLES	
2	**FLOWRATE**	
2.1	UNIT	SETUP 2.1 determines the measurement unit for flowrate.
		The following units can be selected:
		mL; L; m3; US gal; I gal; cf; oilbbl; nL; nm3; scf; mg; g; kg; ton; lb; US ton; rev; p; ---- (none)
	Note !	*Alteration of the measurement unit will NOT affect operator and SETUP-level values. Please note that the Span has to be adapted as well; the calculation is not done automatically.*

2.3	DECIMALS	This setting determines for flowrate the number of decimals. The following can be selected: 0; 0.1; 0.02; 0.003.
	Note !	*Changes to SETUP 2.3 Decimals will also change the decimal setting of SETUP 6.2 Rate Min and SETUP 63 Rate Max and SETUP 3.5 Ratespan. Therefore it is best practice to first determine the required decimals for the flowrate!*
2.4	SPAN	With the span, the flowmeter signal is converted to a quantity. The span for flowrate is determined on the basis of the selected measurement unit and time unit at 20mA (or maximum signal). Enter the span in whole numbers (decimals are set with SETUP 2.5).
		The more accurate the span, the more accurate the functioning of the system will be:
		Example 1: Calculating the Span *Assume that the flowmeter generates 20mA at a flowrate of 2,481.3 Liters/minute, the selected unit is "Liters" and time unit "minute". The span is 2481.3*
		Enter for SETUP 2.4: "248130" and for SETUP 2.5 - decimals span "2".
		Example 2: Calculating the Span *Assume that the flowmeter generates 20mA at a rate of 652.31 USGAL per hour, the selected unit is USG and the time unit is minute. The span is 652.31 / 60 minutes is 10.87183 (GPM).*
		Enter for SETUP 2.4: "108718" and for SETUP 2.5 "4".
2.5	SPANDECS	This setting determines the number of decimals for the Span (SETUP 2.3). The following can be selected: 0; 1; 2; 3; 4; 5; 6
	Note !	*This function influences the Span indirectly. This setting has NO influence on the displayed number of digits for flowrate (SETUP 2.2)!*

3.2.5   EXPLANATION OF SETUP-MENU 3 – DISPLAY

SETUP FUNCTIONS AND VARIABLES		
3	**DISPLAY**	
3.1	FUNCTION	The function can be set to display total or flowrate.
		• When "total" is selected, total is displayed with the large digits and flowrate is displayed with the smaller digits simultaneously.
		• When "flowrate" is selected, only flowrate will be displayed with the large digits together with its measuring unit while total will be displayed after pressing SELECT.
	Note !	*When battery powered, the user can expect reliable measurement over a long period of time. The E110-U has several smart power management functions to extend the (optional) battery life time significantly next to permanently disabling the optical keys. The following functions can be set:*
3.2	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. The following can be selected: fast; 1 sec; 3 sec; 15 sec; 30 sec; off
		When "off" is selected the display will be automatically switched off after 30 seconds since the last action. The display will return again after touching one of the keys
3.3	BACKLIGHT	The unit is provided with a backlight. The backlight brightness can be adjusted from off (0) to a 100% in steps of 20%.
		The following can be selected: 0%; 20%; 40%; 60%; 80%; 100%
		For battery powered units the brightness is not adjustable
	Note !	*When the unit is only loop powered it cannot make use of the backlight. In that case an external supply is required*

3.4	BARGRAPH	The unit has a bargraph indicator which offers a quick impression of the actual flow rate. This graph on the display can be switched on or off. The following can be selected: enable / disable
3.5	RATESPAN	With ratespan the range of the bargraph indicator can be set. The display shows 0 – 100 with 20 blocks so each block is 5% of the 100% range set here. The following can be selected: 0000000 – 9999999.
		When the ratespan is enabled and the ratespan is set to 0, the bargraph will use the span of the flowrate as set in 2.4 Span.
	Note !	*The number of decimals displayed depends upon SETUP 2.3.*

3.2.6 EXPLANATION OF SETUP-MENU 4 – FLOWMETER

SETUP FUNCTIONS AND VARIABLES		
4	**FLOWMETER**	
4.1	FORMULA	The E110-U can process the 0-10V signal in two ways:
		Interpolation or Square root
		• Interpolation: the signal is processed linear: $R = S \times I$
		• Square root: for differential pressure: $R = S \sqrt{I}$
		where:
		R = Rate: the calculated flowrate
		S = Span: the maximum flowrate at 10V. The span is programmed with setting 24 for flowrate and with setting 13 for total.
		I = Input: the scaled analog value; in these formulas value 0 (zero) for 0V and value 1 (one) for 10V.
4.2	FILTER	The analog output signal of a flowmeter does mirror the actual flow rate. This signal is updated several times a second by the E112-U. The signal value represents a "snap-shot" of the real flow. With the help of this digital filter a more stable and accurate reading can be obtained while the filter level can be set to a desired value.
		The filter algorithm is based on three input values: the filter level (01-99), the last measured analog value and the last average value. The higher the filter level, the longer the response time on a value change will be.
4.3	CUT-OFF	To ignore e.g. leakage of the flow or vibration, a low-flow cut-off can be set as percentage over the full range of 10V. When the analog value is less then required with this setting, the signal will be ignored. The cut-off value can be programmed is the range 0.0 - 99.9%.
Examples:		

4.1 **FORMULA**	1.3/2.4 **SPAN**	Required cut-off	4.3 **CUT-OFF**	Required output
interpolation	450 L/min	25 L/min	25/450 x 100%=5.5%	16mA x 5.5% + 4mA = 4.88mA
square root	450 L/min	25 L/min	$(25/450)^2$ x 100%=0.3%	16mA x 0.3% + 4mA = 4.05mA

4.4	CALIB-LO	To calibrate the input value for 0V as the signal from the flowmeter might not be exact 0.0V at flowrate zero.
	Caution !	***Be very sure that the offered signal is correct before the calibration is executed as this function has major influence on the accuracy of the system!*** After pressing PROG, three settings can be selected: • CALIB: on confirmation, the input will be calibrated with the actual 0V value. After pressing enter, CAL SET will be displayed as soon as the calibration is completed. From that moment, the analog value must be more than the calibrated value before the signal will be processed. • DEFAULT: with this setting, the factory calibration is re-installed. • CAL SET: to select the last calibrated value.
4.5	CALIB-HI	To calibrate the input value for 10V as the signal from the flowmeter might not be exact 10.0V at maximum flowrate. This function will measure the real output value at maximum flowrate.
	Caution !	***Be very sure that the offered signal is correct before the calibration is executed as this function has major influence on the accuracy of the system!*** After pressing PROG, three settings can be selected: • CALIB: on confirmation, the input will be calibrated with the actual 10V value. After pressing enter, CAL SET will be displayed as soon as the calibration is completed. From that moment, the analog value must be less than the calibrated value for a reliable measurement. • DEFAULT: with this setting, the factory calibration is re-installed. • CAL SET: to select the last calibrated value.

3.2.7   EXPLANATION OF SETUP-MENU 5 – ANALOG OUTPUT

An analog 0-10V signal is generated according to the differential flowrate with a 12 bits resolution. The settings for flowrate (SETUP 2) influence the analog output directly. The relationship between rate and analog output is set with the following functions.

SETUP FUNCTIONS AND VARIABLES					
5	**ANALOG OUTPUT**				
5.1	OUTPUT	The analog output can be disabled. In case of a passive analog output 3.5mA will be generated if a power supply is available but the output is disabled. The following can be selected: enable; disable			
5.2	RATE-MIN	Enter here the flowrate-at which the output should generate the minimum signal (4mA) – in most applications at flowrate "0". The number of decimals displayed depend upon SETUP 2.3. The time and measuring units (L/min for example) are dependent upon SETUP 2.1 and SETUP 2.2 and are displayed during editing.			
5.3	RATE-MAX	Enter here the flowrate-at which the output should generate the maximum signal (20mA) – in most applications at maximum flow. The number of decimals displayed depend upon SETUP 2.3. The time and measuring units (L/min for example) are dependent upon SETUP 2.1 and SETUP 2.2 and are displayed during editing.			
5.4	CUT-OFF	To ignore leakage of the flow for example, a low flow cut-off can be set as a percentage of the full range of 16mA, (or 20mA). When the flow is less than the required rate, the current will be the minimum signal (4mA). **Example**:			
		5.2 **4MA**	5.3 **20MA**	5.4 **CUT-OFF**	**REQUIRED RATE**	**OUTPUT**
		0 L/min	100 L/min	2%	(100-0)*2% = 2.0 L/min	4+(16*2%) = 4.32mA
		20 L/min	800 L/min	3.5%	(800-20)*3.5%= 27.3 L/min	4+(16*3.5%)=4.56mA

5.5	TUNE MIN	The initial minimum analog output value is 4mA. However, this value might differ slightly due to ambient influences such as temperature for example. The 4mA value can be tuned precisely with this setting.
	Caution !	**Before tuning the signal, be sure that the analog signal is not being used for any application!**
		After pressing PROG, the current will be about 4mA. The current can be increased / decreased with the arrow-keys and is directly active. Press ENTER to store the new value.
	Note !	*The analog output value can be programmed "up-side-down" if desired, so 20mA at minimum flowrate for example!*
5.6	TUNE MAX	The initial maximum analog output value is 20mA. However, this value might differ slightly due to ambient influences such as temperature for example. The 20mA value can be tuned precisely with this setting.
	Caution !	**Before tuning the signal, be sure that the analog signal is not being used for any application!**
		After pressing PROG, the current will be about 20mA. The current can be increased / decreased with the arrow-keys and is directly active. Press ENTER to store the new value.
	Note !	*The analog output value can be programmed "up-side-down" if desired, so 4mA at maximum flowrate for example!*
5.7	FILTER	This function is used to stabilize the analog output signal. The output value is updated every 0.1 second. With the help of this digital filter a more stable but less precise reading can be obtained. The filter principal is based on three input values: the filter level (01-99), the last analog output value and the last average value. The higher the filter level, the longer the response time on a value change will be.

3.2.8 EXPLANATION OF SETUP-MENU 6 – PULSE

One transistor or relay output is available as scaled pulse output according to the accumulated total.

SETUP FUNCTIONS AND VARIABLES		
6	**PULSE**	
6.1	WIDTH	The pulse width determines the time that the output will be active; in other words the pulse duration. The pulse width is set in milliseconds in the range 0.001 – 9.999 sec. Value "zero" will disable the pulse output.
	Note !	*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 flowrate increases for example – an internal buffer will be used to "store the missed pulses": As soon as the flowrate 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	This setting determines the number of decimals for the amount. The following can be selected: 0, 0.1, 0.02, 0.003
6.3	AMOUNT	A pulse will be generated every time a certain quantity is added to the accumulated total. Mind the decimal position of SETUP 6.2 when you enter the quantity. The following can be selected: 0000.000 – 9999999

3.2.9 EXPLANATION OF SETUP-MENU 7 – COMMUNICATION (OPTION)

SETUP FUNCTIONS AND VARIABLES		
7	COM-MODB	
7.1	SPEED	For external control, the following communication speeds can be selected: 1200; 2400; 4800; 9600; 9600HP; 19200; 38400, 9600 is a low power setting, 9600HP is a high power setting (Modbus compliant).
7.2	ADDRESS	For communication purposes, a unique identity can be attributed to every E110-U. This address can vary from 001-247.
7.3	MODE	The communication protocol is Modbus ASCII or RTU mode. Select OFF, to disable the communication.
7.4	DATABITS	This setting determines for communication the number of data bits. Select 8 bit for BUS-RTU and 7 bits for BUS-ASC.
7.5	PARITY	As demanded by the connected equipment, select a parity bit (odd, even or none).

3.2.10 EXPLANATION OF SETUP-MENU – OTHERS

For support and maintenance it is important to have information about the characteristics of the E110-U. Your supplier will ask for this information when support is required.

| SETUP FUNCTIONS AND VARIABLES		
8	OTHERS	
8.1	MODEL	MODEL shows the model type of your E110-U. This number is factory set and cannot be changed.
8.2	SOFTWARE VERSION	SOFTWARE VERSION shows the software version of the E110-U. This number is factory set and cannot be changed.
8.3	SERIAL NO.	SERIAL NO. shows the unique 7-digit serial number of the E110-U. This number is factory set and cannot be changed.
8.4	PASSWORD	All SETUP values can be password protected. This protection is disabled with value 0000 (zero). Up to and including 4 digits can be programmed, for example 1234.
8.5	KEY LOCK	To avoid undesired use of the optical keyboard it can be locked automatically after 30 seconds by enabling this function.
8.6	TAG-NO	For identification of the unit and communication purposes, a unique tag number of maximum 7 numerical digits can be entered.

4 INSTALLATION

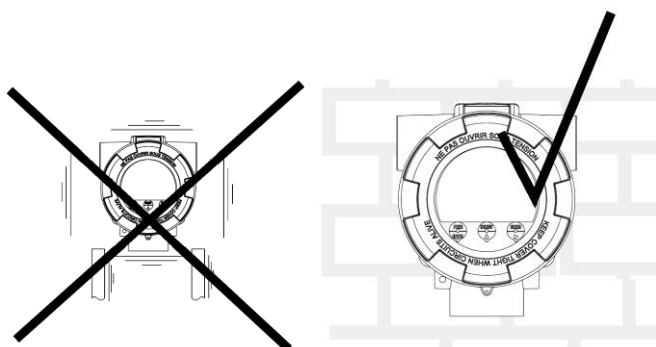## 4.1 GENERAL DIRECTIONS

Caution !

- 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 E110-U 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. 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 personnel.

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

4.2 INSTALLATION / SURROUNDING CONDITIONS
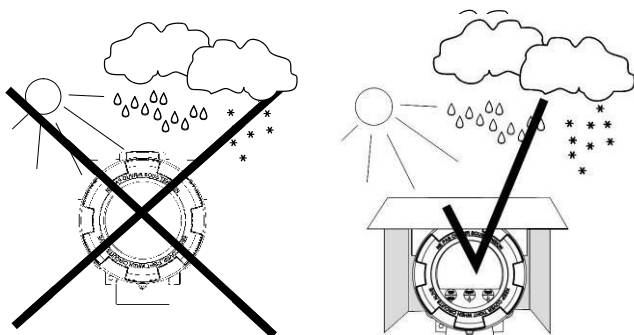
Take the relevant IP classification of the casing into account (see manufactures plate). Even an IP67 (TYPE 4X) enclosure should NEVER be exposed to strongly varying (weather) conditions.

When used in very cold surroundings or varying climatic conditions, take the necessary precautions against moisture by placing a dry sachet of silica gel, for example, inside the instrument case.

Mount the E110-U on a solid structure to avoid vibrations.

4.3   DIMENSIONS – ENCLOSURE

112

Left connection
Cablegland options:
- M20x1.5
- M25x1.5
- ½ NPT
- ¾ NPT

Right connection
Cablegland options:
- M20x1.5
- M25x1.5
- ½ NPT
- ¾ NPT

NE PAS OUVRIR SOUS TENSION

∅ 65

KEEP COVER TIGHT WHEN CIRCUITS ALIVE

PROG ENTER   SELECT △   CLEAR ▷

E-series

Bottom
connection
Cablegland
options:
- M20x1.5
- M25x1.5
- ½ NPT
- ¾ NPT
- 1 NPT

148

133

Short cylinder = 18
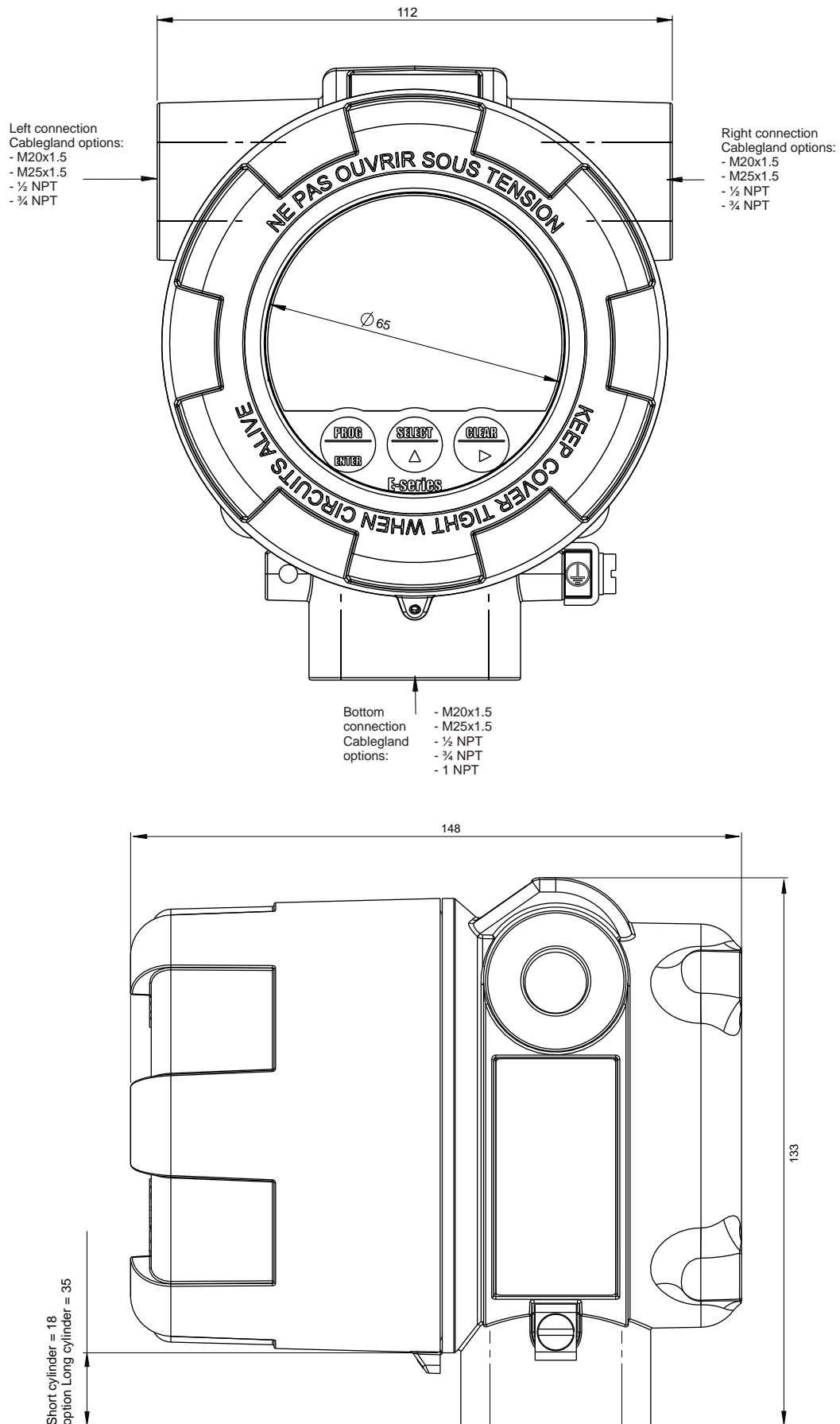option Long cylinder = 35

Fig. 8: Dimensions (in mm) – Aluminum / Stainless Steel enclosures.

4.4   INSTALLING THE HARDWARE

4.4.1   INTRODUCTION

WARNING

- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the E110-U, the installer has to discharge himself by touching a well-grounded object.
- The E110-U must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).

WARNING

- When installed in a potentially explosive atmosphere that requires apparatus of equipment protection level Gb and Db, 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 aluminum/steel is excluded.
- Do ground the aluminum / stainless steel enclosure properly with a PE wire as indicated to the Protective Earth terminal.
- The installation must comply with national requirements (e.g. in Canada, the Canadian Electrical Code, C22.1, Part 1 and in USA, the National Electrical Code, NFPA 70 and ANSI/ISA-RP 12).

Note !   *The display inside the enclosure can be installed in four positions:*
0°; 90°; 180°; 270°, so the enclosure can be installed in four positions.

Maximum torque: 4 Nm
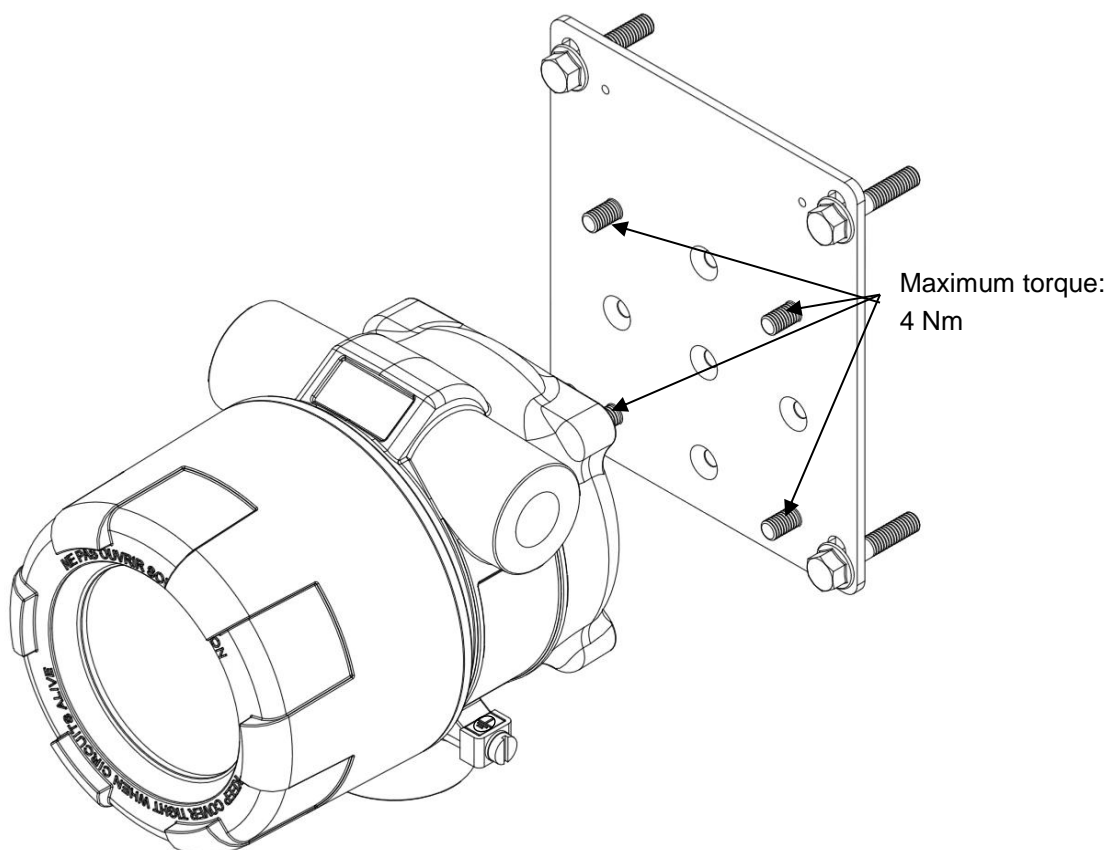
Fig. 9: Installation – Plate mounted

Pipe mount with bracket and hose clamps

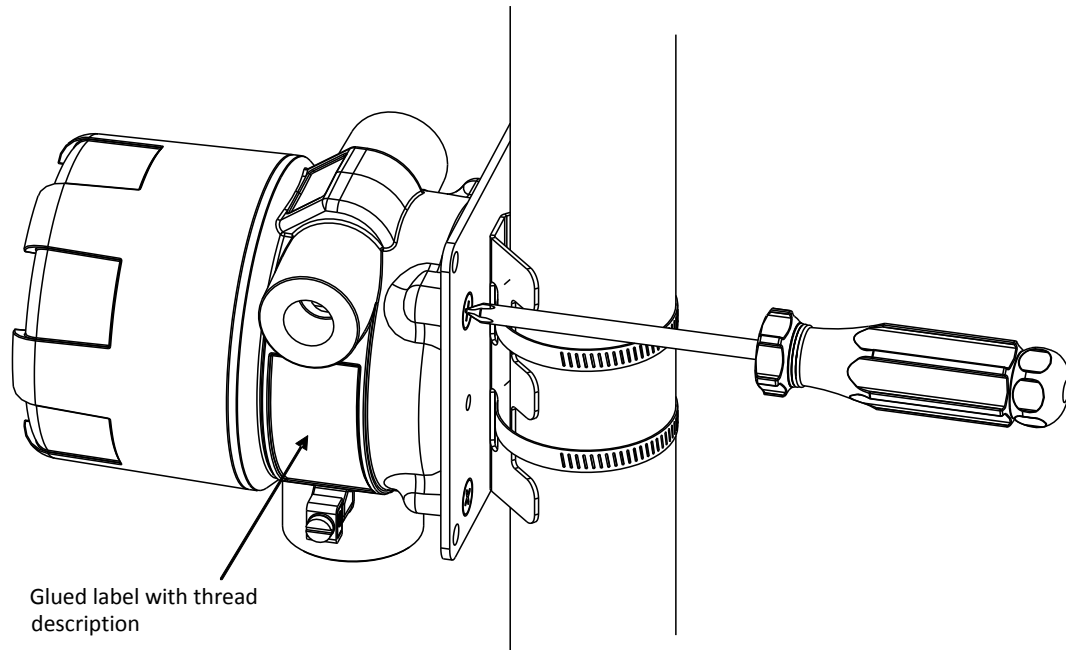Glued label with thread
description

Fig. 10: Installation – Pipe mounted

For Class 1 applications make sure to apply proper internal (as well as external) grounding to PE terminal as shown.

PE terminal:

- Nominal cross section 4 mm²
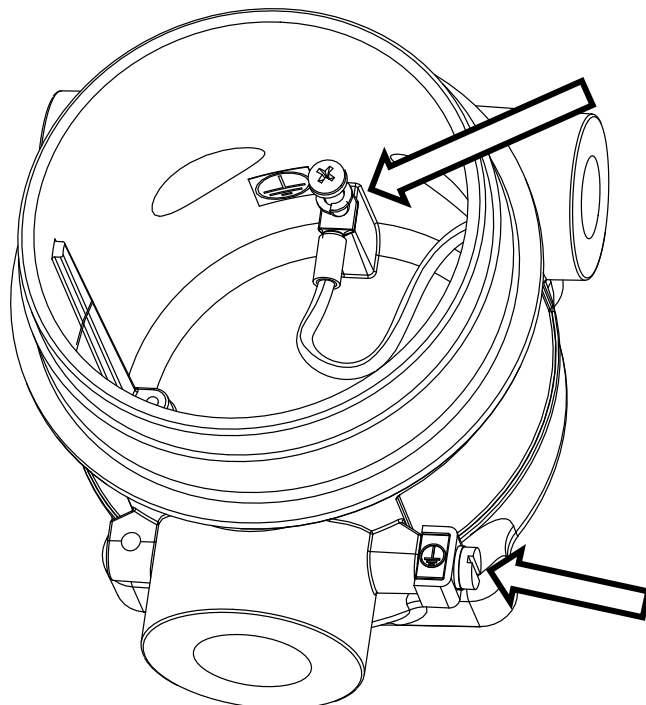- Stranded conductor:4 mm², Single conductor: 6 mm²

Fig. 11: Grounding enclosure – PE terminals

Installation instructions – Electrical

⚠️ **WARNING**

For battery supplied equipment:
DO NOT OPEN WHEN AN EXPLOSIVE GAS ATMOSPHERE IS PRESENT.

- Use Ex-d cable glands with effective IP67 (TYPE4X) seals for the cables used;
- For unused cable entries fit IP67 (TYPE4X) blind plugs;
- Make a reliable ground connection to the metal enclosure.;
- Use only an effective screened cable for the input signal, and grounding of its screen to terminal S1 (GND) AND to the enclosure or at the sensor itself, whichever is appropriate to the application. Be careful not to create ground loops!.
- Without thermal separator, the process temperature shall not exceed the specified maximum ambient temperature;
- When the enclosure temperature exceeds 70 °C / 158 °F, apply suitable cable and gland for this temperature;
- When included in the shipment, the plugs supplied must be used.

The E-series can be connected to another Ex-d enclosure following the compulsory conditions below:

- The part which is used for the connection between the two volumes must be Ex-d certified;
- The connected enclosure must be Ex-d certified with its own electrical equipment inside (i.e. pickup coil or other sensors);
- For the short cylinder version, the volume of empty space inside this added volume must not represent more than 13,5 cm^3;
- There may be no generation of heat in the added enclosure;
- There may be no added electrical energy in the added enclosure; any energy which comes from the E-series is already taken into account in the E-series certificate.

4.4.2 SEAL CONDUITS/ENCLOSURE

⚠️ **WARNING**

- *For FM Group A,B,C,D : "SEAL ALL CONDUIT ENTRIES WITHIN 18 INCHES".*
- *For CSA group B,C,D: "SEAL ALL CONDUIT ENTRIES WITHIN 18 INCHES".*
- For CSA group A: "FOR GROUP A SEAL AT ENCLOSURE WALL"

4.4.3 SPECIAL CONDITIONS FOR SAFE USE

The painted aluminum enclosure shall be installed in such a way that danger of ignition due to electrostatic discharge is avoided.

4.4.4 FLAMEPROOF JOINTS

⚠️ **WARNING**

- *Clause 5: EN/IEC 60079-1:2007 (Use certified / Ex-d cable glands).*
- *All flameproof joints are designed for:*
  - Volume 500 < V ≤ 2000 cm³;
  - Group IIC enclosures.

There are 4 types of joints between inner and outside of the E-type enclosure which are flameproof:

1. The cement between glass and cover (length ≥10mm)
2. Thread between body/cover M100x1.5 (Tolerance 6g/6H min. 8 full threads engaged)
3. Thread for conduit opening left and right:
   - M20 x 1.5, M25 x 1.5, (for metric: Tolerance 6g/6H min. 8 full threads engaged);
   - ½ NPT, ¾ NPT. (for NPT: Tolerance ANSI/ASME B1.20.1).
4. The process opening:
   - M20 x 1.5, M25 x 1.5 (for metric: Tolerance 6g/6H min. 8 full threads engaged);
   - ½ NPT, ¾ NPT, 1 NPT (for NPT: Tolerance ANSI/ASME B1.20.1);
   - All NPT threads (cable entry openings) are in accordance with ANSI/ASME B1.20.1.
   - All Metric threads (cable entry openings, thread between body and cover and threaded holes for feed thru capacitors) are in accordance with fit class 6g/6H (ISO 965-1 + 965-3).

When installed according to this manual, this product will meet the directives and standards as listed in Appendix A of this manual.

4.4.5 ELECTRICAL SAFETY

The following environmental conditions and safety parameters apply when installing the E110-U.

Relative humidity	< 90% RH
Outdoor use	suitable for outdoor use
IP and TYPE rating	IP66, IP67 and TYPE4X.
Supply voltage fluctuation	± 10% unless stated otherwise
Means of protection	Class I
Over-voltage category	II
Pollution degree	3 (external environment), 2 (internal environment)
Ambient temperature	-40 °C to +70 °C, (-40 °F to +158 °F)
Altitude	up to 2000m

The following supply ratings apply for the various installed options
(not mentioned options implies no or neglectable influence on the ratings)

Installed option	Input	Supply Voltage range	Maximum supply current	Remark
PD	P6	24-27Vdc	110 mA	With 2xOR option
PD	P2	9-27Vdc	75 mA	Without OR option
PX	P2	9-27Vdc	50 mA	Without OR option
PB	Battery connector	Typical 3.6V. Only use Fluidwell replacements	10 mA	Without OR option
AH	A1/A2	11-27Vdc	25 mA	AH only not suitable for OR

If a combination of inputs is used, use the maximum value mentioned!

The output relay (OR option) is of type SPDT and has the following contact ratings:

Load type & Voltage	Current
Maximum resistive load at 30 Vdc, 125 Vac or 250 Vac.	Max. 2 A
Maximum inductive load (for pilot duty applications) at 30 Vdc, 125 Vac or 250 Vac.	Max. 0.5 A

- All wiring must be in accordance with local codes and regulations.

- In case this instrument is connected to a supply by means of a permanent connection a switch or circuit-breaker shall be included in the installation. This shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.

- Except for the relay outputs R7 to R10 all connections to the unit shall be low voltage defined as "SELV" circuit per IEC 60950-1.

- The equipment shall be supplied from a "SELV" circuit defined as per IEC 60950-1.

- A suitable power supply should be considered in end-use equipment. The power supply must be in compliance with a limited-energy circuit (maximum available current of 8 A). If the power supply cannot be in compliance with a limited-energy circuit:

- For safety install an overcurrent protection device (such as fuse) with adequate breaking capacity close to the instrument.

  - Fuse type: Time-lag fuse (Approved fuse according to IEC60127-2 and/or UL248-14)

  - Fuse rating: Rated current: 5 A

- The installation must comply with national requirements (e.g. in Canada, the Canadian Electrical Code, C22.1, Part 1 and in USA, the National Electrical Code, NFPA 70, Article 500-series and ANSI/ISA-RP 12).

4.4.6   VOLTAGE SELECTION SENSOR SUPPLY

Type PB / PX – Pickup element supply
Terminal S3 provides a limited supply voltage of 3V DC for the signal output of the flowmeter.
The output impedance is 2700Ω, power is limited to 3mW under short circuit conditions.

Note !

> *This voltage MAY NOT be used to power 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 (type PB).*

Type PD: Sensor supply: 8.2V – 12V or 24 V (V$_{in}$ P2 minus 1V) DC
With this option, a supply derived from the input supply becomes available. The output voltage of P3 can be adjusted by means of switches J1 and J2 on the back of the PCB (see figure 12) See the label or **Appendix A**, section **"Sensor excitation"**, for the exact ratings of terminal P3.

Note !

> - *8.2V DC supply requires an input voltage of 9-27V and 12V DC supply requires an input voltage of 13-27V*
> - *The output is protected against overload. In case of an overload also the functionality of the E110-U is affected!*

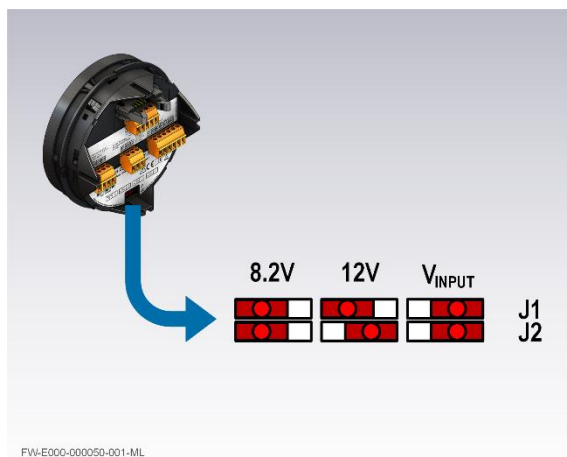The voltage is selected with the two switches at the rear of the Main Electronics Module (MEM).

FW-E000-000050-001-ML

Fig. 12: DC Voltage selection - Sensor supply.

4.5 TERMINAL CONNECTORS – MAIN ELECTRONICS MODULE

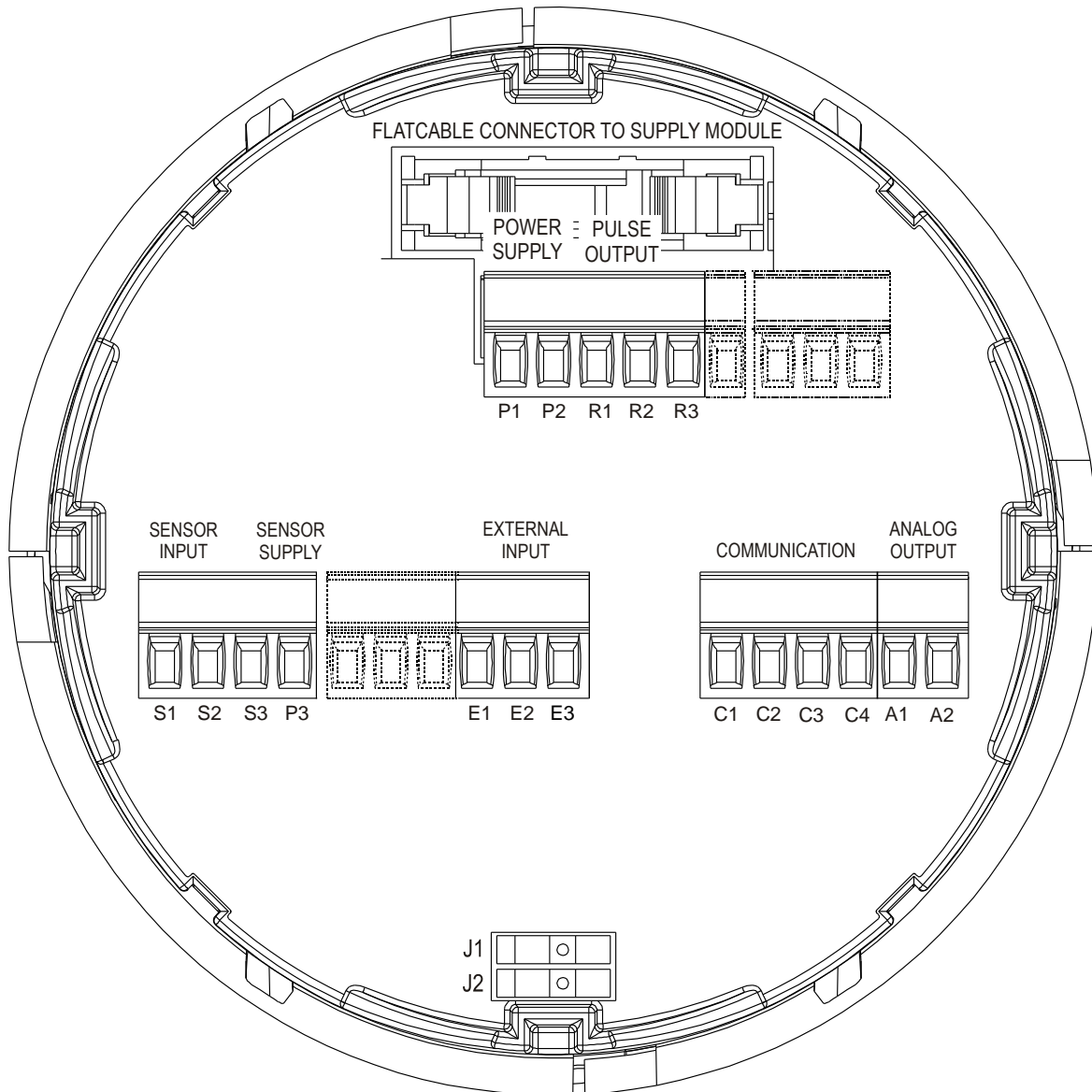The following terminal connectors are available for the Main Electronics Module (MEM):

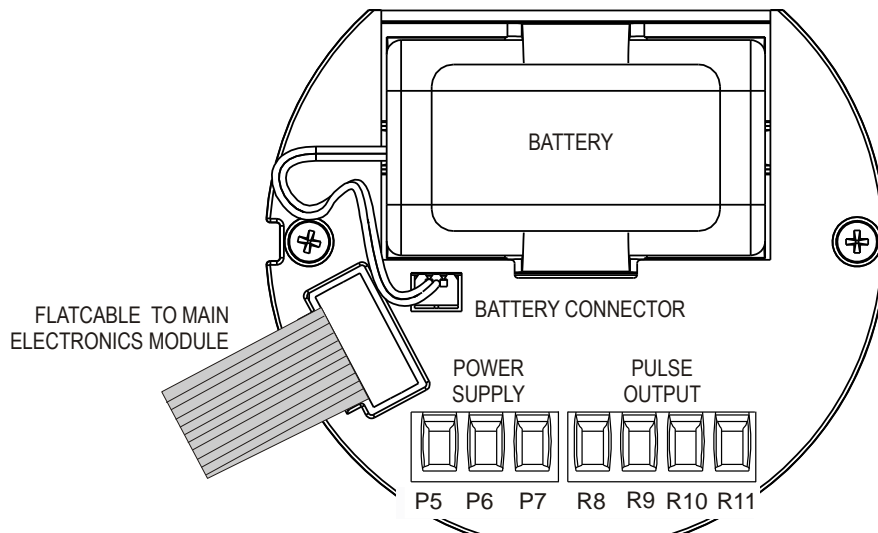**Fig. 13: Terminal connectors MEM – standard and options.**

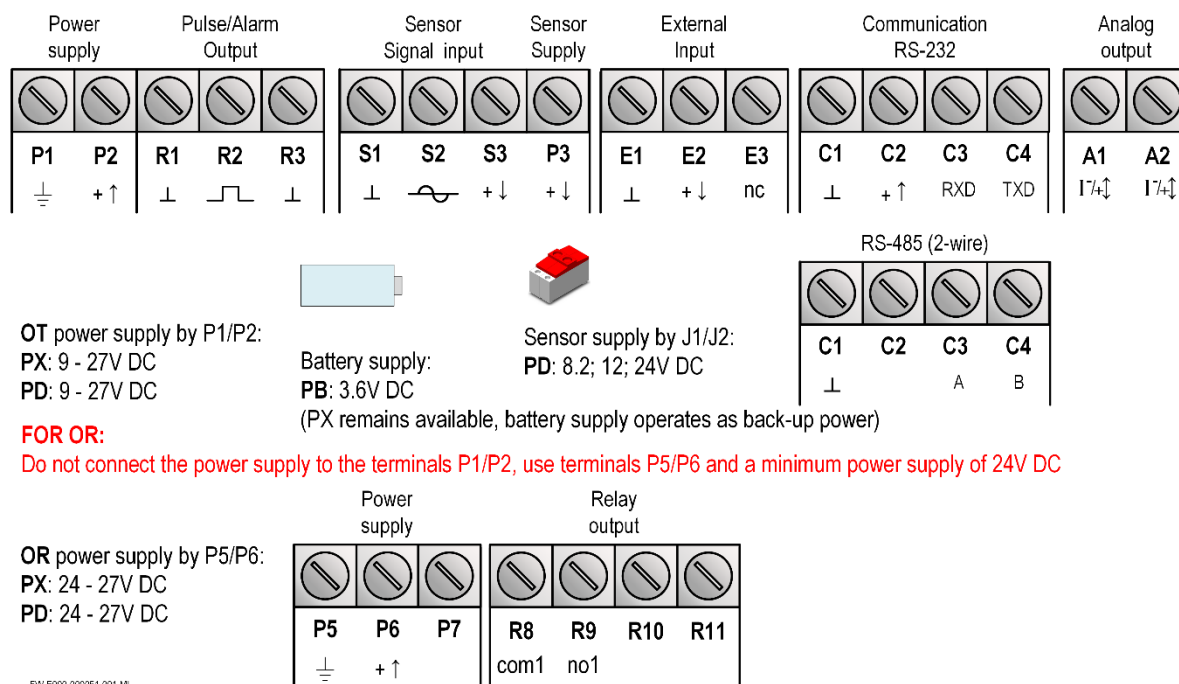**Fig. 14: Terminal connectors supply module – standard and options.**

FW-E110-U-M_v0102_01_EN

Fig. 15: Terminal connectors – Connection Overview.

For detailed information for your model, please refer to the internal labels.

Note !

4.6   TERMINAL CONNECTIONS

Terminal P1-P2: Power Supply – type PD/PX (OT only)
Connect an external power supply of 9-27VDC to these terminals.

When power is applied to these terminals, discharge of the (optional) internal battery will be disabled. See also 4.4.6: VOLTAGE SELECTION SENSOR SUPPLY.

Power requirements for sensor supply P3:

- 8.2V supply requires 9-27V;
- 12V supply requires 13-27V;
- 24V = P2– 1V (max 27V).

Terminal R1-R2 / R8-R9; (scaled) pulse output
Setup 7 (par. 3.2.) determines the pulse output function.
The maximum output frequency is 500Hz.

Type OT

A <u>passive</u> transistor output is available with this option. Max. driving capacity 300mA@50V DC.
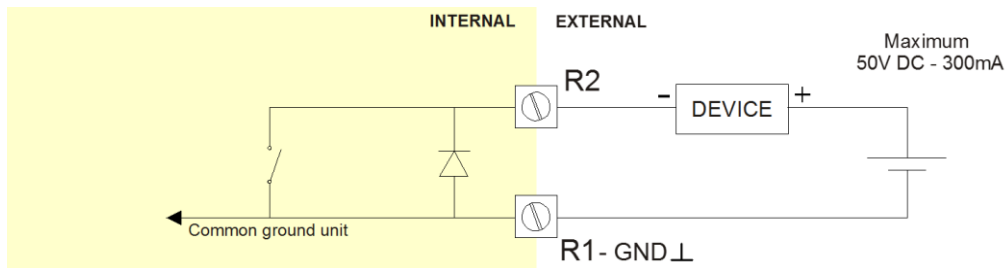
Note !

R1 is a common ground (GND) terminal.

Fig. 16: Terminal connections – Passive output R1.

Type OR

The functionality of the relay outputs are programmed through the SETUP menu, see par. 3.2. for more details. Max. switch power 240V 0,5A per output.

Be sure that the output frequency does not exceed 0.5Hz, else the relay life time and reliability will be reduced significantly.

Note !
- *If the OR option is present use power supply terminals P5-P6.*
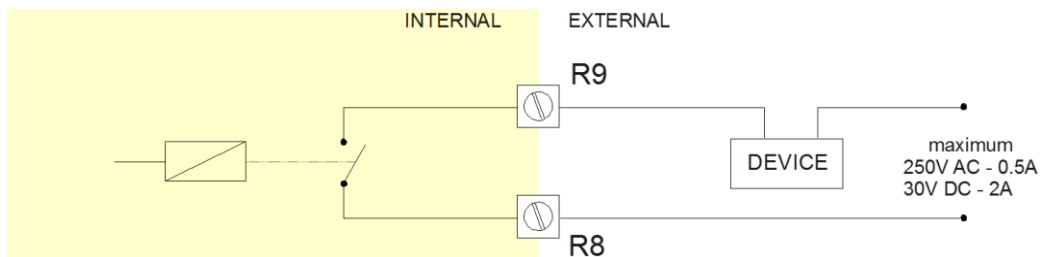- *With OR option the minimum supply voltage is limited to 24VDC!*

Fig. 17: Terminal connections – Mechanical relay output R1.

Terminal S1-S3; Flowmeter inputs

The E110-U requires a 0-10V flowmeter signal which will be processed 4 times a second with a 16 bits accuracy. The input is not isolated.
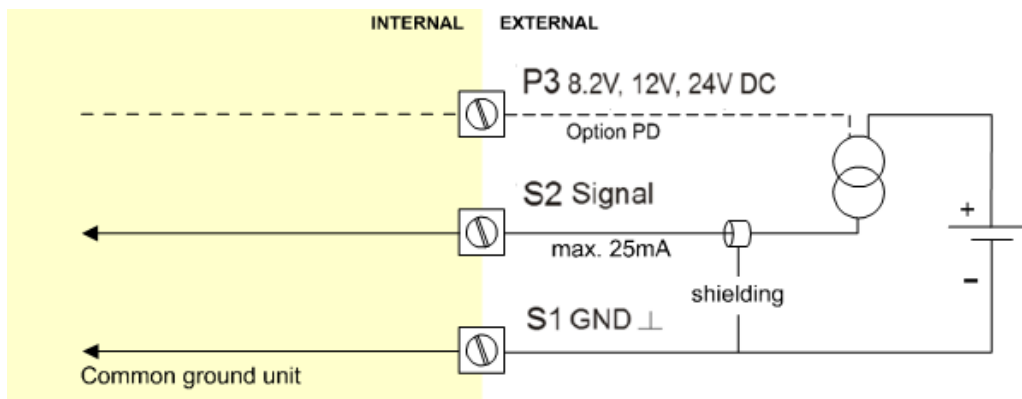

Fig. 18: Terminal connections – Signal input 0-10V

Terminal E1-E2 – External Reset with clear-lock- Type IB
With this function the total can be reset to zero with an external switch. The total resets at the moment a falling edge is detected (the moment the switch *closes)*. During close the "Clear Total" function is disabled (see chapter 2). Make sure the contact resistance of the switch is less than 0.8V@2uA=400k Ohm. A reset pulse should last for at least 200ms

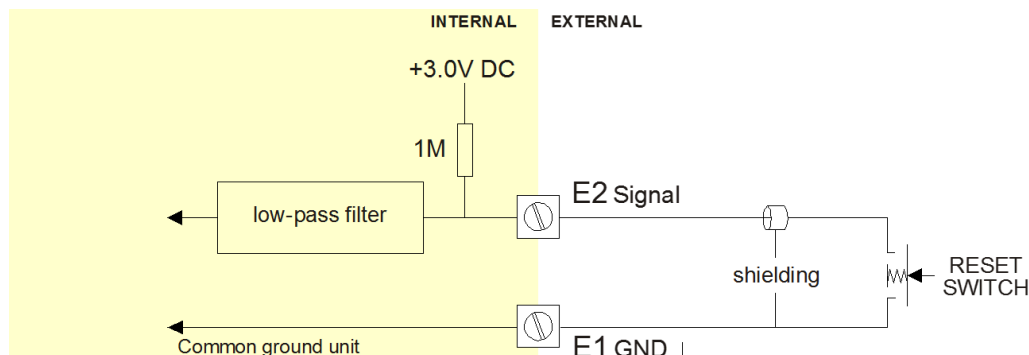The input must be switched with a normally open contact to GND.

Fig. 19: Terminal connections – External reset input.

Terminal C1-C4 – Communication RS232/RS485 (option) – Type CB/CH (USB)
- Serial communications on hardware layers RS232 (length of cable max. 5 meters), RS485 (length of cable max. 1200 meters) and USB (max 5 m) are possible. Make sure that the hardware layer specific requirements are met to achieve reliable communication.
- Read the Modbus communication protocol and Appendix C.

When using the RS232 communication option, terminal C2 can be used for supplying the interface. Please connect the DTR (or the RTS) signal of the interface to this terminal and set it active (current limited 12mA). If no active signal is available it is possible to connect a separate supply between terminals C1 and C2 with a voltage between 6V and 10V.

Terminal A1-A2 Isolated analog output (type AH)
The flowrate proportional output (AH) is standard available. This output is an isolated 4-20mA output with the possibility to power the device via the 4-20mA loop. It is Non-polarity sensitive.

When the output is disabled, the current is by default limited to 3.5mA. Max. driving capacity 1000 Ohm @ 27V DC. If only powered by the loop the backlight will not be activated.

The total loop resistance may not exceed 1000 Ohm and may not be less than 330 Ohm (at 30mA). This makes that the resistance of other loop-devices in total may not exceed 670 Ohm.
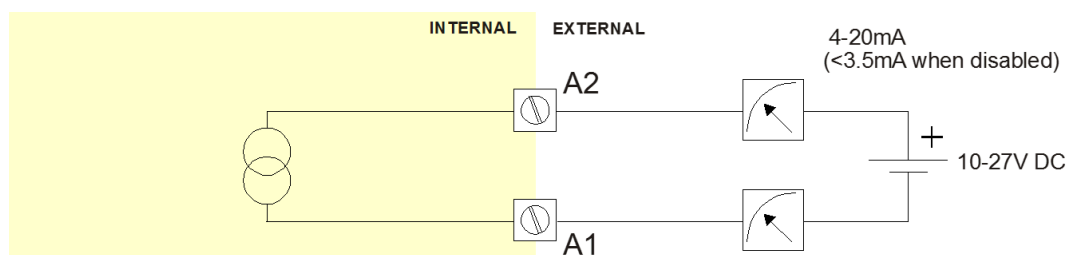E.g. 18Vdc allows 250 Ohm.

Fig. 20: Terminal connections – Isolated 4-20mA analog output.

5 MAINTENANCE

5.1 GENERAL DIRECTIONS

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. Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.
- The E110-U 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 E110-U 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 E110-U 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.

Note !

Due to incompatibility do not use silica gel in environments where Hydrogen fluoride, strong acids and strong bases are to be expected.

Battery life-time

Note !

It is strongly advised to use only necessary functions.
E.g. disable analog output signal if not in use.

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.
- NPN and PNP inputs consume more energy than coil inputs.
- High input frequency.
- Communication.
- Optical key activity.

Check periodically

- The condition of the enclosure, 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 enclosure with a lint-free cloth, soaked with a mild soap solution or fresh water.

5.2 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.

5.3 OPEN AND CLOSE THE E-SERIES

5.3.1 REMOVE THE COVER

1. Make the E-Series and the environment safe.
2. Unlock the set screw (2) to release the cover (3).
3. Use a wrench to turn the cover (3) counter-clockwise to release the cover (3).
4. Mind the Main Electronics Module (4) and carefully remove the cover (3) from the housing (1).
5. Keep the cover (3), with the glass facing upwards, in a clean and safe location.
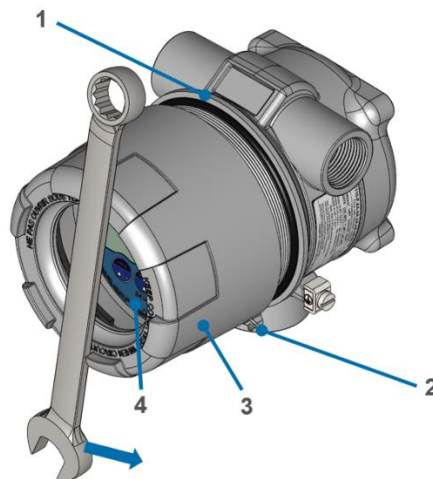
5.3.2 INSTALL THE COVER

1. On the first two wire threads and O-ring, apply a very thin layer of the specified anti-seize compound.
2. Hold the cover (3) in the correct position for installation.
3. By hand, turn the cover (3) clockwise onto the housing (1) until the O-ring is tight to meet the required IP or TYPE protection rating.
4. Refer to chapter: Remove the cover; Lock the cover with the set screw (2) to safety the cover (3).
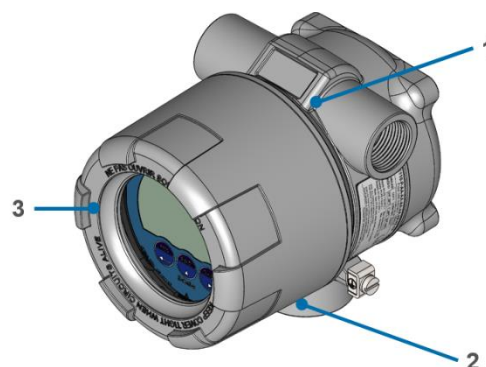
5.4 BATTERY REPLACEMENT – SUPPLY MODULE (IF INSTALLED)

Note !

This procedure assumes the E-Series and the environment are made safe.

This procedure assumes, the E-Series is opened..

5.4.1 REMOVE THE MAIN ELECTRONICS MODULE (MEM)

1. Mind the wiring and carefully, pull to remove the MEM (4) from the housing (1).
2. Unlock and carefully disconnect the flatcable connector (7).
   Note that the MEM goes off.
3. Disconnect the connectors (6) from the MEM (4).
4. Protect the connectors (6, 7) against the ingress of contamination.
5. Protect the display and the optical keys against damage and contamination.
6. Keep the MEM (4) in a clean and safe location.
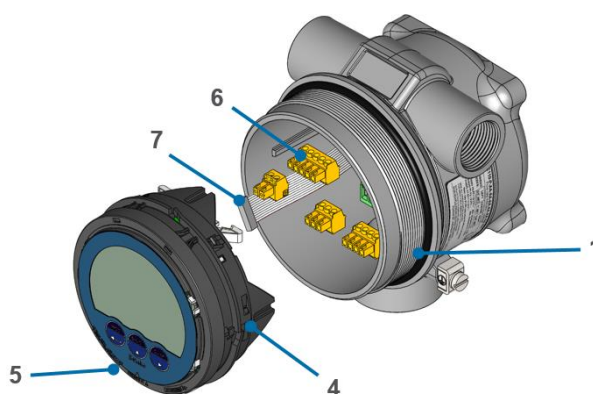
5.4.2   REMOVE THE BATTERY FROM THE BASIC SUPPLY MODULE (BSM)

1. Disconnect the connector (13) from the
    BSM (8).
2. Carefully, remove the battery (12) from
    the battery holder (11).
3. As applicable, discard the battery (12),
    refer to the job close up.
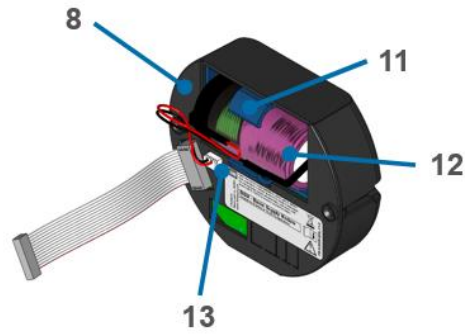
5.4.3   INSTALL THE BATTERY IN THE BASIC SUPPLY MODULE (BSM)

⚠ **WARNING**   **Handle the battery with care. A mistreated battery can become unsafe. Unsafe batteries can cause (serious) injury to persons.**

1. Unpack the new battery (12).
2. Make sure, the new battery (12) shows no
    signs of damage or overheating.
3. Hold the battery (12) in the correct position
    for installation.
4. Carefully, install the battery (12) in the
    battery holder (11).
5. Carefully, install the connector (13).

5.4.4   REMOVE THE BATTERY FROM THE RELAY SUPPLY MODULE (RSM)

1. Disconnect the connector (13) from the
    RSM (8).
2. Carefully, remove the battery (12) from the
    battery holder (11).
3. As applicable, discard the battery (12),
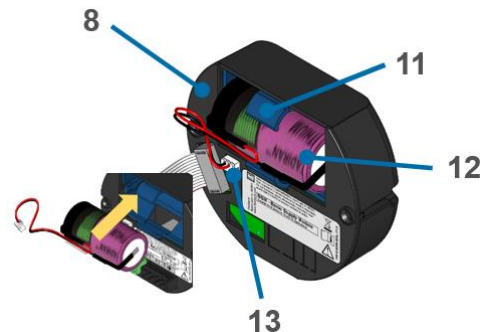   refer to the job close up.

5.4.5   INSTALL THE BATTERY IN THE RELAY SUPPLY MODULE (RSM)

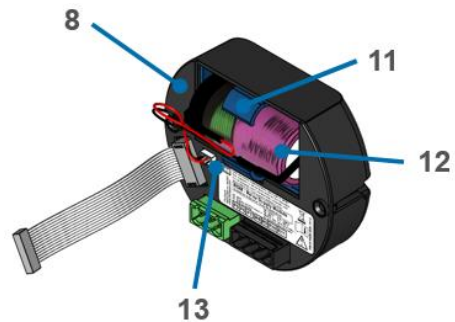⚠ **WARNING**   **Handle the battery with care. A mistreated battery can become unsafe. Unsafe batteries can cause (serious) injury to persons.**

1. Unpack the new battery (12).
2. Make sure, the new battery (12) shows no
    signs of damage or overheating.
3. Hold the battery (12) in the correct position
    for installation.
4. Carefully, install the battery (12) in the
    battery holder (11).
5. Carefully, install the connector (13).
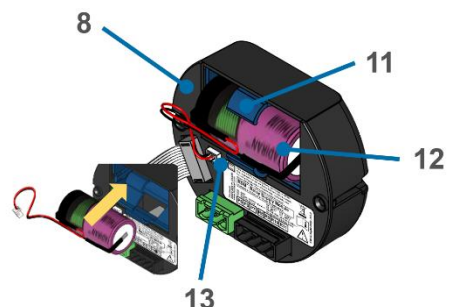
5.4.6 INSTALL THE MAIN ELECTRONICS MODULE (MEM)

1. Install the connectors (6, 7) to the MEM (4).
2. Lock the flatcable connector (7) by hand and note that the MEM (4) comes on.
3. Make sure, the battery level indicator does not show.
4. Hold the MEM (4) in the correct position for installation.
5. Mind the wiring and carefully move the MEM (4) into the housing (1).

5.4.7 TEST AND ADJUST THE E110-U

Note !

This procedure assumes that the E110-U is serviceable.

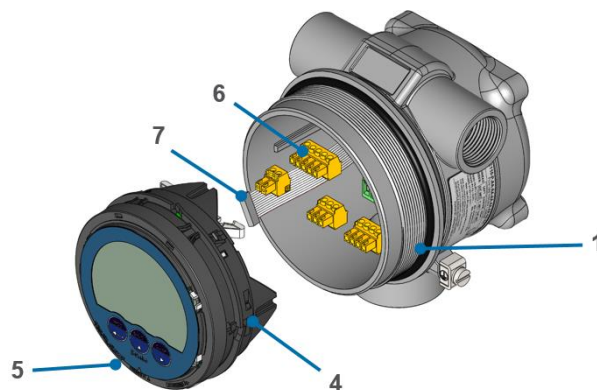| ACTION	RESULT	NOTICE
1. At the side, press the PROG button for at least 7 seconds.	• The SETUP indicator comes on continuously. • The setup menu 1 shows.	After a short period of time, the backlight goes off. This is normal behavior to save the battery power.
2. At the side, press the ► button.	• The setup menu 2 shows.	
3. At the side, press the ▲ button.	• The setup menu 2.1 shows.	
4. At the side, press and hold the PROG button for at least 3 seconds.	• The display goes to the operation menu.	The E110-U is ready for daily use.
5. Install the cover.	• The cover is installed and locked.	

5.4.8 JOB CLOSE UP

1. Install the cover, refer to procedure; 5.3.2 Install the cover.
2. Do a test of the optical keys to make sure the E110-U is ready for daily use.
3. Remove all tools, materials and equipment from the work area.
4. Make sure, the work area is clean.
5. Dispose of the (electronic) waste in accordance with the (inter)national, the manufacturer's and the plant owner's standards and regulations.
6. For future reference, make a note in the maintenance log of the installation.
7. Ask the safety officer for permission to return the E110-U into service.
8. Return the E110-U into service.

6   LABEL INFORMATION

6.1   GENERAL REMARKS REGARDING THE SHOWN LABELS

Two labels will be fitted on the E-series enclosure: one showing the certification data, the other showing the thread sizes, type number, serial number and address applied.

6.2   LABEL WITH CERTIFICATION DATA

Note !

The labels show a typical example for recognition. For the actual data, refer to the label which is attached to your unit or refer to the Appendix A; Technical specifications.

The E-series comes in two temperature classes, T5 as well as T6. T6 classified versions consume 4.5 watts or less (e.g. when supplied from a barrier, battery and/or distribution network). T5 classified versions consume 9.2 watts or less (e.g. with additional power module).

E-series external label for enclosures with direct passage or feed-through, temperature class T6:

E-series external label for enclosures with direct passage or feed-through, temperature class T5:

The label will match the certification data and markings as stated in **Appendix A: Specifications**..

6.3   LABEL WITH THREAD SIZES.

Note ! *The labels show a typical example for recognition. For the actual data, refer to the label which is attached to your unit or refer to the Appendix A; Technical specifications.*

The thread sizes will be indicated on the label as per the drawings below.

E-series external THREAD label for enclosures with direct passage or feed-through:
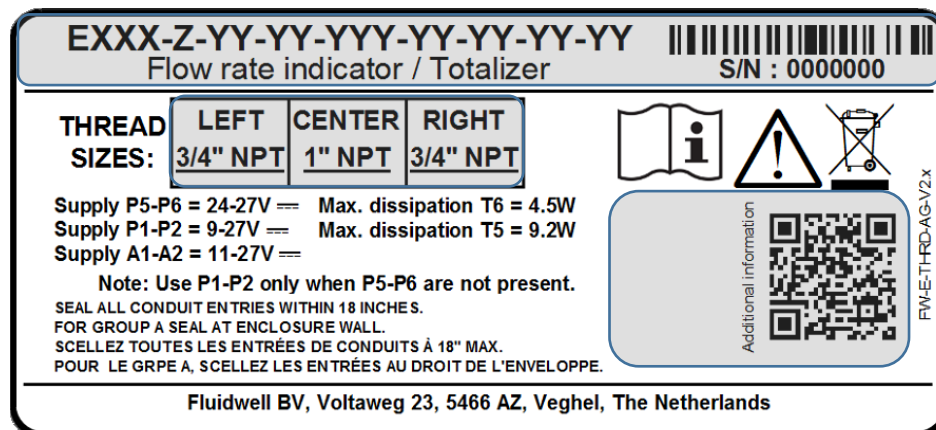
Note 1: The specific certification data may change when the certificates become available.

Note 2: The thread label is freely changeable within the gray shaded areas. If not already present on the certification label, an optional date code can be included as well. Thread sizes shown may vary.

The model designation Exxx-Z… and the text below it are subject to change to indicate the specific hardware and software functionality. All model configurations that are safety related (like –PD, –OR) will always be shown.

The label will match the certification data and markings as stated in **Appendix A: Specifications**.
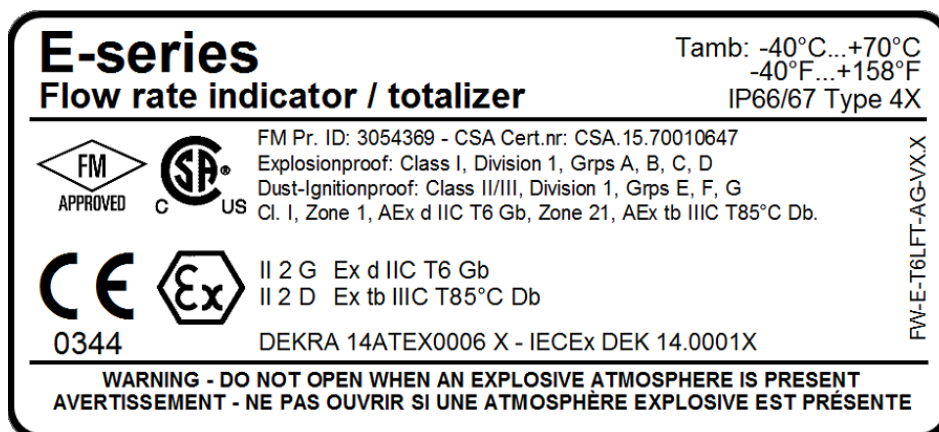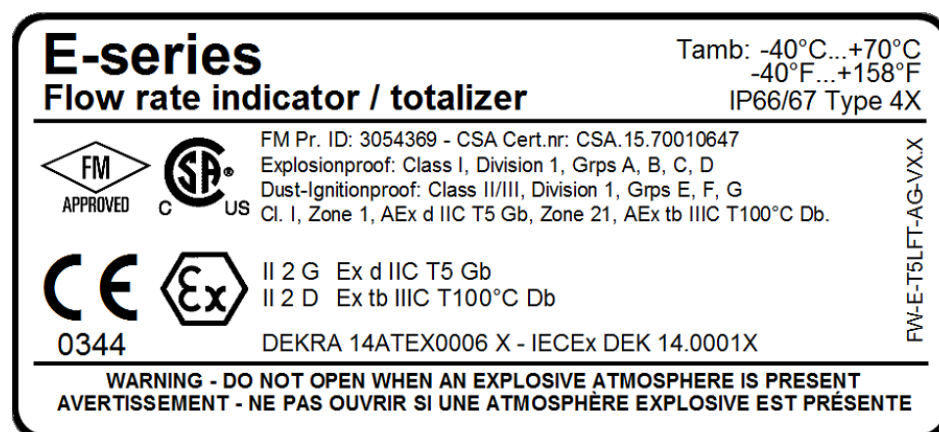
6.4   INTERNAL LABELS.

**Note !** *The labels show a typical example for recognition. For the actual data, refer to the label which is attached to your unit or refer to the Appendix A; Technical specifications.*

Label on the main electronics module (MEM):
The labels below are to be found on the main electronics module and supply modules inside the enclosure.

Label on the Main Electronics Module (MEM) (typical)
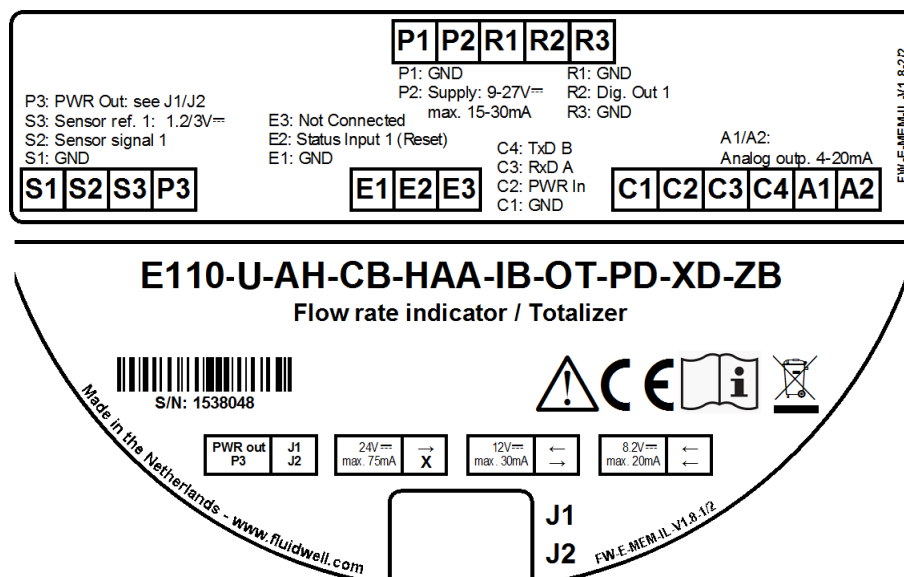
Label on the Basic Supply Module (BSM) (typical)

| Batt. conn. | Only use factory supplied battery, spare part nr. SPB01. Fire, explosion or severe burns may result if mistreated. Do not recharge, crush, disassemble, incinerate, heat above 100°C (121°F) or expose contents to water. |

BSM - Basic Supply Module
Suitable for E-Series in T5 and T6 applications

Fluidwell
Spare part nr. SES01
www.fluidwell.com

FW-E-BSM-IBSL-V1.0
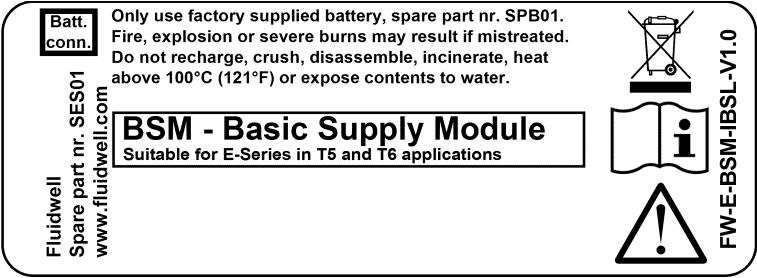
Label on the Relay Supply Module (RSM) (typical)

| Batt. conn. | Only use factory supplied battery, spare part nr. SPB01. Fire, explosion or severe burns may result if mistreated. Do not recharge, crush, disassemble, incinerate, heat above 100°C (121°F) or expose contents to water. |

RSM - Relay Supply Module
Suitable for E-Series in T5 and T6 applications

P5 : GND
P6 : Supply: 24-27V/110mA ⎓
P7 : Not connected

R8 : COM 1   R10 : COM 2
R9 : NO 1   R11 : NO 2
R8/R11. Max. 2A/0.5A at 250V ∼
for resistive/inductive loads

P5 | P6 | P7 | R8 | R9 | R10 | R11

Fluidwell
Spare part nr. SES02
www.fluidwell.com

FW-E-RSM-IRSL-V1.0

Appendix A. TECHNICAL SPECIFICATION

Display	
Type	High intensity numeric and alphanumeric LCD, UV-resistant, with bright backlight. Intensity can be adjusted. *When battery powered, the backlight is only operational after a keypad touch to extend the battery lifetime.*
Dimensions	Ø 65 x 45mm (2.56" x 1.77").
Digits	Seven 12mm (0.47") and eleven 7mm (0.28"). Various symbols and measuring units.
Refresh rate	User definable: 8 times/sec – 30 secs.
Bargraph	To indicate the actual flow rate, the bargraph runs from 0 to 100% in 20 blocks, each block is 5%.

Enclosures	
General	Aluminum or stainless steel EX-d enclosure with glass window.
Sealing	Silicone.
Control Keys	Three optical keys with operation through the glass front window.
Rating	IP67 / TYPE 4X / TYPE 7 / TYPE 8 / TYPE 9.
Type	
HA_	Aluminum EX d enclosure.
Dimensions	112 x 133 x 148mm (4.41" x 5.24" x 5.83") – W x H x D.
Weight	1300 gr.
HS_	Stainless steel 316L Ex d enclosure.
Dimensions	112 x 133 x 148mm (4.41" x 5.24" x 5.83") – W x H x D.
Weight	3600 gr.
Entry threads	
H_A	2 x ¾"NPT / 1 x 1"NPT
H_B	3 x ¾"NPT
H_C	2 x ½"NPT / 1 x 1"NPT
H_D	2 x ½"NPT / 1 x ¾"NPT
H_G	2 x M20 / 1 x M25
H_H	3 x M25

Operating temperature	
Ambient	-40°C to +70°C (-40°F to +158°F).

Power requirements	
Type PB	Long life Lithium battery – life-time depends upon settings and configuration –up to approx.. 3 years *The battery can power the backlight for a short time after a keypad touch but cannot power the relay output (OR) or the real sensor supply (Terminal P3).*
Type PD	9 – 27V DC. Consumption max. 4.5W (sensor excitation included).
Type PX	9 – 27V DC. Consumption max. 3W.
Type AH	Loop powered, analog output. 11 – 27V DC, Min. 3.5mA. Consumption max. 675mW (25mA @ 27VDC). *The loop powered analog output cannot power the backlight, mechanical relay output (OR) or the real sensor supply (Terminal P3).*

Sensor excitation	
Type AH/PB/PX	Terminal S3: 3V DC for pulse signals and 1.2V DC for coil pick-up, I_{out} max. 100µA. *This is not a real sensor supply. Only suitable for sensors with a very low power consumption like coils (sine wave) and reed-switches.*
Type PD	Terminal P3 : 8.2 / 12 / 24V DC • 8.2V DC, I_{out} max. 20mA. • 12V DC, I_{out} max. 30mA. • 24V DC, I_{out} max. 75mA (this voltage varies depending on the input supply voltage)

Terminal connections	
Type	Removable plug-in terminal strip. Wire max. 1.5 mm^2 and 2.5 mm^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	
ATEX	Gas : ⟨Ex⟩ II 2 G Ex d IIC T6/T5 Gb. Dust : ⟨Ex⟩ II 2 D Ex tb IIIC T85°C/T100°C Db.
IECEx	Gas : Ex d IIC T6/T5 Gb. Dust : Ex tb IIIC T85°C/T100°C Db.
CSA c-us	Class I, Division 1, Grps A, B, C, D Class II/III, Division 1, Grps E, F, G Class I, Zone 1, Aex d IIC T6/T5 Gb Zone 21, Aex tb IIIC T85°C/T100°C Db
FM	Class I, Division 1, Grps A, B, C, D Class II/III, Division 1, Grps E, F, G Class I, Zone 1, Aex d IIC T6/T5 Gb Zone 21, Aex tb IIIC T85°C/T100°C Db

Directives and Standards	
EMC	EN 61326-1; FCC 47 CFR part 15
LVD	EN/IEC 61010-1
ATEX / IECEx	EN/IEC 60079-0; EN/IEC 60079-1; EN/IEC 60079-31
CSA	CSA 22.2 No. 25, CSA 22.2 No. 30
FM	FM3600; FM3615; FM3616; FM3810
RoHS	EN 50581
IP & TYPE	EN 60529; NEMA 250

INPUT

Flowmeter	
Type U	0-10V - with signal calibration feature at any current within the range.
	External power is required (e.g. Type PD)
Accuracy	16 bit. Low level cut-off programmable. Error 0.03% @ 20°C (Typical 45ppm/°C)
Span	0.001 / 9,999,999 with variable decimal position
Update time	Two times per second.
Load impedance	3kΩ
Relationship	Linear and square root calculation.

Output

Digital output	
General	Pulse: Transmitting accumulated total.
Frequency	Max. 500Hz. Pulse length user definable between 1msec up to 10 seconds.
Type OT	One passive transistor output (NPN) - not isolated. 300mA - 50V @ 25°C.
Type OR	One isolated electro-mechanical relay output (NO). Maximum resistive load: 2A @ 250V AC / 30V DC. Maximum inductive load: 0,5A (pilot duty applications). • Requires 24 - 27V DC and supplied via P5 - P6. Frequency max. 5Hz. • Type OT remains available.

Note !

Analog output	
General	Transmitting flow rate.
Type AH	Galvanically isolated, loop powered 4 - 20mA output.
Accuracy	12 bit. Error 0.03% @ 20°C (Typical 45ppm/°C). Can be scaled to any desired range.

Modbus communication (option)	
Function	Reading display information, reading / writing all configuration settings and data log extraction.
Speed [baud]	1200 - 2400 - 4800 - 9600 - 9600HP - 19200 - 38400
Addressing	maximum 247 addresses.
Type CB	Modbus RTU - RS232
Type CH	Modbus RTU - RS485 2-wire, bus termination without resistor for low power solutions
Type CU Note !	USB communication incl. Ex d plug *Requires ¾"NPT or M25 side entry thread.*
Type CX	No communication, remote configuration possible with accessory cable ACE02.

Operational

Operator functions	
Displayed information	• bargraph indication for flow rate. • Total can be reset to zero.

Total	
Digits	7 digits.
Unit	L, m3, US gal, igal, cf, Oil bbl, kg, ton, US ton, lb or none.
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.
Note !	Accumulated total cannot be reset to zero.

Flow rate	
Digits	7 digits.
Units	mL, L, m3, mg, g, kg, ton, US ton, US gal, igal, Oil bbl, lb, cf, rev, none, scf, nm3, nL or p.
Bargraph	20 blocks, each block is 5% of total span
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

Appendix B. PROBLEM SOLVING

In this appendix, several problems are included that can occur when the E110-U 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 connector;
- Power supply of flowmeter.

Analog output does not function properly
Check:

- SETUP 5.1 - is the function enabled?
- SETUP 5.2 / 5.3: are the flow-levels programmed correctly?
- Connection of the external power-supply according to the specification.

Pulse output does not function
Check:

- SETUP 7.1 - pulse per "x" quantity; is the value programmed reasonable?
- SETUP 7.2 - impulse width; is the external device able to recognize the selected pulse width and frequency?

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

- SETUP 2.2 / 2.5: are the K-factor and time unit correct?
- SETUP 2.6 / 2.7: The unit has to count the number of pulses according to the flowrate calculation within the time according to the flowrate cut-off. Make sure that the flowrate cut-off is set to 10.0 seconds for example: the result is that the unit has at least 10 seconds time to measure the number of pulses according to the flowrate calculation.

The password is unknown
If the password cannot be retrieved, 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. The codes are:

0001:   PCF error

0002:   EEPROM ERROR
0004:   INITIALISATION ERROR
0016:   IO EXPANDER BASE ERROR
0032:   IO EXPANDER INTERFACE ERROR
0128:   ANALOG INPUT ERROR

When multiple alarms occur, the error code shown is the sum of the error codes as given above.
E.g. 0048 is a combination of error code 0016 and 0032.

If the alarm occurs more often or stays active for a long time, please contact your supplier.

Appendix C. MODBUS COMMUNICATION

General

The E110-U 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 Modbus PDU addresses in the decimal representation, followed by its hexadecimal representation (0x0000). When the PLC address range is required (4x references typically used by PLCs), please add a value of 40001 to the Modbus PDU address. E.g. reading the serial number with PLC-based addressing means reading 165 + 40001 = register 40166. Variables spanning multiple registers use 'big-endian' data representation. This means that the lowest register holds the least significant word of the variable. Although most Modbus Masters will support variables that span 2 registers, variables spanning more registers sometimes require you to manually calculate the resulting value.

Variables spanning multiple registers have always to be read / written in 1 single action!

Following example shows how data is represented and how this calculation can be accomplished:

For a total-value of 158928, the following register data has been received by the Modbus master:

    PDU Address 566   = 0x0000   = 0
    PDU Address 567   = 0x0002   = 2
    PDU Address 568   = 0x6CD0   = 27856

If we interpret this as a 48 bit unsigned integer value, it's value would be:
0x0000.0002.6CD0 = 158928.
If this value needs to be calculated: 0*65536*65536 + 2*65536 + 27856 = 158928.

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 of the E110-U

PDU ADDRESS	REGISTER	VARIABLE	REGISTERS	R/W	TYPE	VALUE / REMARKS	
572d 0x23C	40573	flow rate	2	R	Uint32	0...9999999, Representation: unit, time, decimals depending on variables 48, 49, 50	
566d 0x236	40567	total	3	R	uint48	0...9999999999, Representation: unit, decimals depending on variables 32, 33	
560d 0x230	40561	accumulated total	3	R	uint48	0...99999999999999, Representation: unit, decimals depending on variables 32, 33	
516d 0x204	40517	error status	1	R	uint16	Bit field: 0x0001=Display error 0x0002=EEPROM error 0x0004=EEPROM initialization error 0x0010=IO configuration error 0x0020=IO configuration error	
255 0x0FF	40256	battery status	1	R	uint16	0= not determined 1= normal power	2=low power

Reading flowrate, 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 displayed 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 in a single write action. Writing any other value will result in the reply of an error message.

Type
uint16 = 16 bits unsigned integer
uint24 = 24 bits unsigned integer (stored in unit32 with MSB always 0)
uint32 = 32 bits unsigned integer
uint48 = 48 bits unsigned integer
char = 8 bits ASCII character

Setup variables of the E110-U

PDU ADDRESS	REGISTER	VARIABLE TOTAL	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS			
32 0x020	40033	unit	1	R/W	uint16	0=none 1=L 2= m^3	3=US GAL 4= I GAL 5=ft3	6= OilBBL 7=kg 8=ton	9=lb 10=us ton
33 0x021	40034	decimals	1	R/W	uint16	0…3			
34 0x022	40035	Span	2	R/W	uint32	1...9999999 Representation: 0.000001…9999999 depending on variable 54: Span decimals.			
37 0x025	40038	Span Decimals	1	R/W	uint16	0…6			
47 0x02F	40048	Multiply factor	1	R/W	uint16	0=x1	1=x10	2=x100	3=x1000
PDU ADDRESS	**REGISTER**	**VARIABLE FLOWRATE**	**NO. REGISTERS**	**R/W**	**TYPE**	**VALUE / REMARKS**			
48 0x030	40049	unit	1	R/W	uint16	1=mL 2=L 3=m^3 4=US GAL	5=I GAL 6=ft3 7=OilBBL 8=nL 9=nm^3	10=SCF 11=mg 12=g 13=kg 14=ton	15=lb 16=US Ton 17=rev 18=p
49 0x031	40050	time unit	1	R/W	uint16	0=/sec	1=/min	2=/hour	3=/day
50 0x032	40051	decimals	1	R/W	uint16	0…3			
51 0x033	40052	Span	2	R/W	uint32	1...9999999 Representation: 0.000010…9999999 depending on variable 54: decimals K-factor.			
54 0x036	40055	Span decimals	1	R/W	uint16	0…6			
PDU ADDRESS	**REGISTER**	**VARIABLE DISPLAY**	**NO. REGISTERS**	**R/W**	**TYPE**	**VALUE / REMARKS**			
64 0x040	40065	display function	1	R/W	uint16	0=total	1=flowrate		
80 0x050	40081	LCD update time	1	R/W	uint16	0= fast 1=1 sec	2=3 sec 3=15 sec	4=30 sec 5=off	
67 0x043	40068	backlight brightness	1	R/W	uint16	0=off 1=20%	2=40% 3=60%	4=80% 5=100%	
58 0x03A	40059	bar graph enable	1	R/W	uint16	0=disable	1=enable		
59 0x03B	40060	Rate span	2	R/W	uint32	1…9999999			
PDU ADDRESS	**REGISTER**	**VARIABLE METER**	**NO. REGISTERS**	**R/W**	**TYPE**	**VALUE / REMARKS**			
98d 0x062	40099	Formula	1	R/W	uint16	0=interpolate	1=root		
99d 0x063	40100	Filter	1	R/W	uint16	1…99			
100d 0x064	40101	Cut-Off	1	R/W	uint16	0…999			
102d 0x066	40103	Calib-LO	1	R/W	Uint16	0=Default 1=Calib-Set 2=Calib			
103d 0x067	40104	Calib-HI	1	R/W	uint16	0=Default 1=Calib-Set 2=Calib			

PDU ADDRESS	REGISTER	VARIABLE ANALOG	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
112 0x070	40113	analog output	1	R/W	uint16	0=disable 1=enable
113 0x071	40114	minimum rate	2	R/W	uint32	0…9999999 Representation: unit, time, decimals depending on variables 48, 49, 50
116 0x074	40117	maximum rate	2	R/W	uint32	0…9999999 Representation: unit, time, decimals depending on variables 48, 49, 50
119 0x077	40120	cut off percentage	1	R/W	uint16	0...99 Representation: 0.0 – 9.9%
120 0x078	40121	tune minimum rate	1	R/W	uint16	0...9999
122 0x07A	40123	tune maximum rate	1	R/W	uInt16	0...9999
127 0x07F	40128	filter	1	R/W	uint16	1...99
PDU ADDRESS	REGISTER	VARIABLE PULSE	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
128 0x080	40129	pulse time width	1	R/W	uint16	0…9999 Representation: 0.001 – 9.999 sec
133 0x085	40134	quantity decimals	1	R/W	uint16	0…3
130 0x082	40131	pulse per X quantity	2	R/W	uint32	1...9999999 Representation: 0.000001…9999999 depending on variables 130, 32
PDU ADDRESS	REGISTER	VARIABLE MODBUS	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
144 0x090	40145	speed (Baudrate)	1	R/W	uint16	0=1200 2=4800 4-9600HP 6=38400 1=2400 3=9600 5=19200
145 0x091	40146	Modbus address	1	R/W	uint16	1…247
146 0x092	40147	Modbus mode	1	R/W	uint16	0=off 1=RTU 2=ASCII
1271 0x4F7	41272	Data bits	1	R/W	uint16	0=7 bits 1=8 bit
1272 0x4F8	41273	Parity	1	R/W	uint16	0=none 1=even 2=odd
PDU ADDRESS	REGISTER	VARIABLE OTHERS	NO. REGISTERS	R/W	TYPE	VALUE / REMARKS
160 0x0A0	40161	model number	1	R	uint16	0…9999
173 0x0AD	40174	model suffix	1	R	char	Representation: ASCII character
162 0x0A2	40163	firmware version	2	R	uint32	0…999999 Representation: xx.xx.xx
165 0x0A5	40166	serial no	2	R	uint32	0…9999999 Representation: xxxxxxx
168 0x0A8	40169	Password	1	R	uint16	0…9999
139 0x08B	40140	keyboard lock	1	R/W	uint16	0=disable 1=enable
170 0x0AA	40171	tag no	2	R/W	uint32	0...9999999 Representation: xxxxxxx

Appendix D. DECLARATION OF CONFORMITY

Indicators, controllers and monitoring systems for flow, level, pressure and temperature measurement in industrial environments.

FLUIDWELL
Accurate Liquid Management

Count on us.

Declaration of Conformity

Fluidwell E-series indicators

Veghel, February 2016

We, Fluidwell BV, declare under our sole responsibility that the E-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 –XD, flame proof:	EN60079-0:2012; EN60079-1:2007; EN60079-31:2009
	Protective system:	⊕ II 2 G Ex d IIC T6/T5 Gb
	(for power consumption up till 4.5 W / 9.2 W respectively)	⊕ II 2 D Ex tb IIIC T85 °C/T100 °C Db

Certification	Certificates:	DEKRA 14ATEX0006 X, Issue 4
	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: 13.
Remark: compliance is not affected by standards EN60079-1:2014 and EN60079-31:2014.

The object of the declaration above is in conformity with the relevant Union harmonisation legislation:

	until April 19th, 2016	from April 20th, 2016
EMC Directive	2004/108/EC	2014/30/EU
RoHS Directive	2011/65/EU	2011/65/EU
Low Voltage Directive	2006/95/EC	2014/35/EU
ATEX Directive	94/9/EC	2014/34/EU

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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LIST OF FIGURES E110-U

LIST OF CONFIGURATION SETTINGS				
	SETTING	DEFAULT	DATE:	DATE:
1	**TOTAL**	Enter your settings here		
1.1	UNIT	L		
1.2	DECIMALS	0		
1.3	SPAN	1600		
1.4	SPANDECS	0		
1.5	FACTOR-X	x1		
2	**FLOWRATE**			
2.1	UNIT	L		
2.2	TIME	/sec		
2.3	DECIMALS	0		
2.4	SPAN	1600		
2.5	SPANDECS	0		
3	**DISPLAY**			
3.1	FUNCTION	total		
3.2	LCD NEW	1 sec		
3.3	BACKLIGHT	100%		
3.4	BARGRAPH	enable		
3.5	RATESPAN	0		
4	**FLOWMETER**			
4.1	FORMULA	interpolate		
4.2	FILTER	1		
4.3	CUT-OFF	0.0 %		
4.4	CALIB-LO	default		
4.5	CALIB-HI	default		
5	**ANALOG**			
5.1	OUTPUT	disable		
5.2	RATE-MIN	0		
5.3	RATE-MAX	99999		
5.4	CUT-OFF	0.0%		
5.5	TUNE-MIN	1438		
5.6	TUNE-MAX	5778		
5.7	FILTER	1		
6	**PULSE**			
6.1	WIDTH	0.000 sec		
6.2	DECIMALS	0		
6.3	AMOUNT	1000		
7	**COM MODB**			
7.1	SPEED	9600		
7.2	ADDRESS	1		
7.3	MODE	bus-rtu		
7.4	DATABITS	8 bits		
7.5	PARITY	none		
8	**OTHERS**			
8.1	MODEL	E110-U		
8.2	SOFTWARE VERSION	03.03.xx		
8.3	SERIAL NO	xxxxxxx		
8.4	PASSWORD	0000		
8.5	KEY LOCK	enable		
8.6	TAG-NO	0000000		