

E018-P

EXPLOSION PROOF FLOWRATE INDICATOR / TOTALIZER

With Analog and Pulse Signal Outputs, Alarm, Linearization and HART Communication



Signal input flowmeter: pulse, Namur and coil

Signal outputs: Analog referenced flowrate and pulse referenced total

Options: HART communication and external reset



SAFETY INSTRUCTIONS



- Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.
- **LIFE SUPPORT APPLICATIONS:** The E018-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 E018-P, the installer has to discharge himself by touching a well-grounded object.
- The E018-P must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).
- Do connect a proper grounding to the housing as indicated if the E018-P 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 E018-P 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 E018-P.
- Check all connections, settings and technical specifications of the various peripheral devices with the E018-P supplied.
- Never open the enclosure in hazardous areas while connected to power supplying or consuming devices other than the internal battery supply.
- Open the E018-P 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 E018-P is described in chapter "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 E018-P as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the E018-P is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information in this operating manual indicated by the pictograms:



A "**warning !**" indicates actions or procedures which, if not performed correctly, may lead to personal injury, a safety hazard or damage of the E018-P or connected instruments.



A "**caution !**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the E018-P 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:	03.02.xx
Manual :	FW_E018-P_M_v0201_01_EN
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1 INTRODUCTION

1.1 SYSTEM DESCRIPTION

Functions and features

The flowrate / totalizer model E018-P is an explosion proof microprocessor driven instrument designed to linearize the flowmeter's flow curve and 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) HART communication for configuring unit and monitoring process.

Flowmeter input

This manual describes the unit with a pulse type input from the flowmeter "-P version". Other versions, (0)4-20mA or 0-10V flowmeter signals, are pending.

One flowmeter with a passive or active pulse, Namur or sine wave (coil) signal output can be connected to the E018-P. To power the sensor, several options are available.

Standard outputs

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

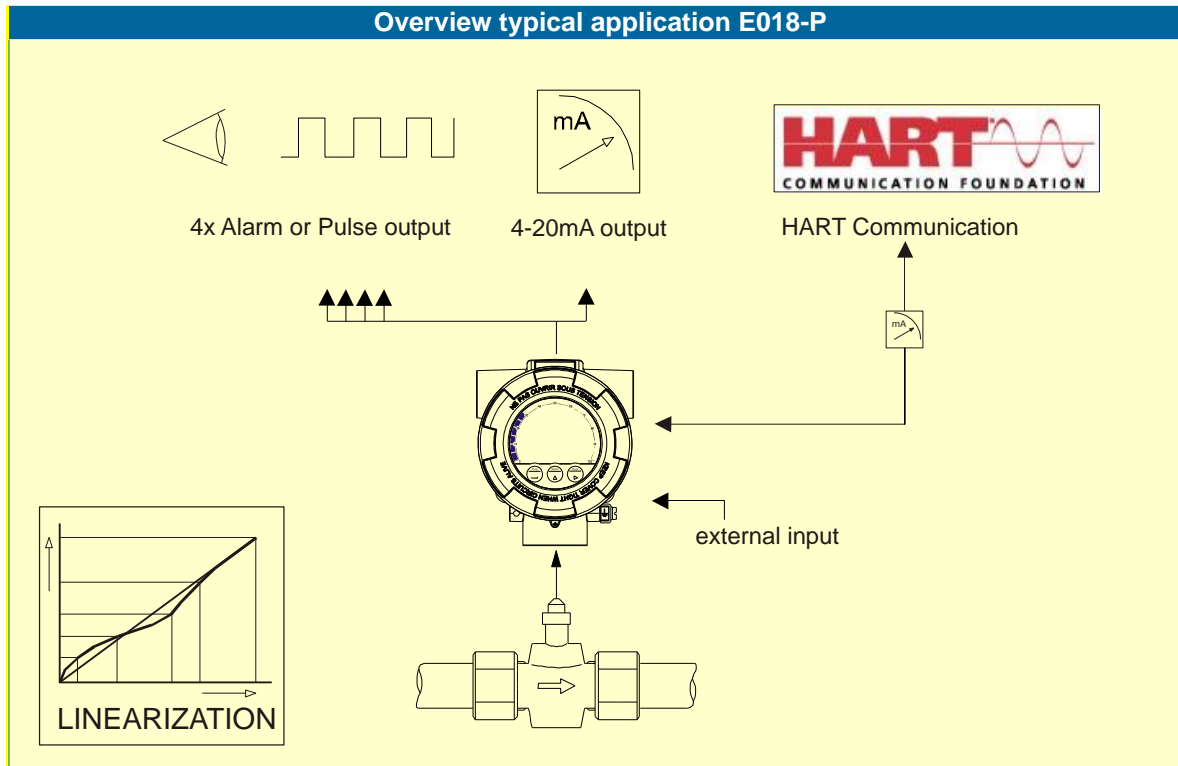


Fig. 1: Typical application for the E018-P

Configuration of the unit

The E018-P has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure the E018-P according to your specific requirements.

It includes several important settings, such as K-factors, measurement units, signal selection etc.

All settings are stored in an EEPROM memory and will not be lost in the event of a power failure or a drained battery.

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

Display information

Flowrate and (accumulated) totals can be displayed either with the 11 small 7mm (0.28") digits or with the 7 large 12mm (0.47") digits. Additionally, the E018 has an analog bargraph to show the actual flowrate.

Backlight

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

The backlight can even be used in battery powered applications: it will be switched on, at a fixed intensity, during a limited period of time and will switch off automatically, 30 seconds after a key touch.



Note !

For loop powered applications only, the backlight will not come on because of the limited power as supplied by the loop power supply.

Options

The following options are available: mechanical relay, power- and sensor-supply options.

2 OPERATIONAL

2.1 GENERAL INFORMATION

This chapter describes the daily use of the E018-P. This instruction is meant for users / operators.



Caution !

- The E018-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed
- Take careful notice of the “Safety rules, instructions and precautionary measures” in the front of this manual.

2.2 CONTROL PANEL

It is possible to operate the E018-P 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 E018-P; 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 E018-P 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 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.

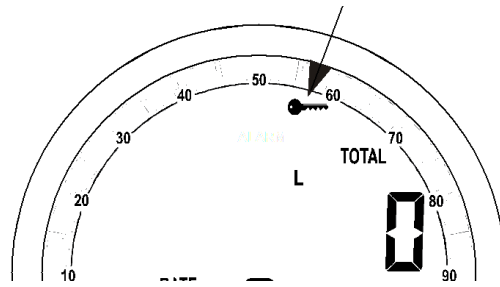


Fig. 3: Control panel, disable optical keys

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.

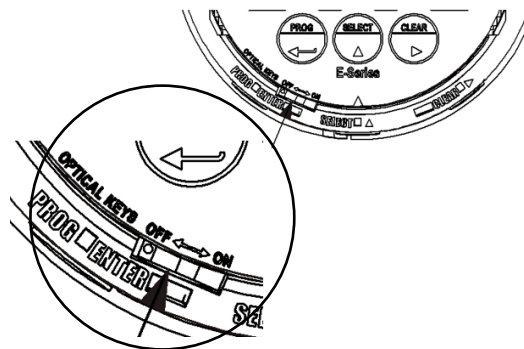


Fig. 4: Control panel, ON/OFF optical keys



Note !

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

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.

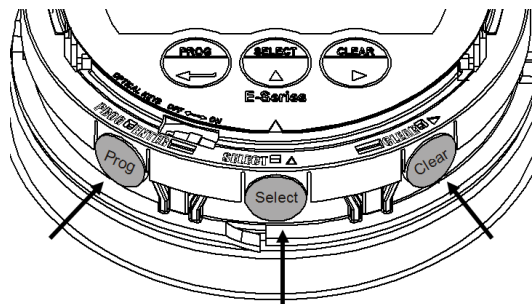


Fig. 5: Control panel, Push button operation

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 E018-P 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 E018-P 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.

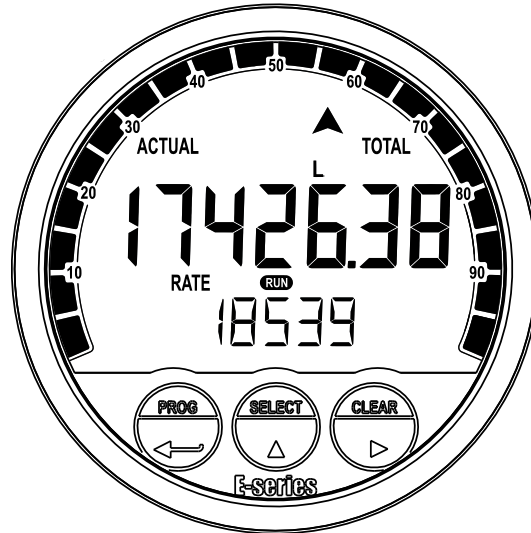


Fig. 6: Example of display information during process

For the Operator, the following functions are available:

- **Display flowrate / total or flowrate**

This is the main display information of the E018-P. After selecting any other information, it will always return to this main display automatically.

Total is displayed on the upper-line of the display and 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 \blacktriangleleft \blacktriangleright 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 bargraph 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 in the setup menu Display.

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 E018-P 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.

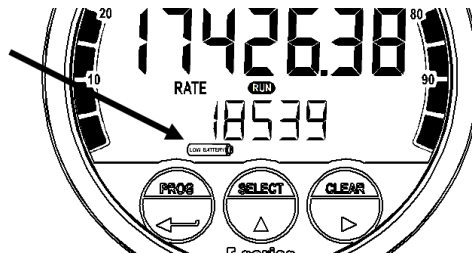


Fig. 7: Example of low-battery alarm

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.



- **Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.**
- **The E018-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.**
- **Ensure that the measuring system is correctly wired up according to the wiring diagrams. The housing may only be opened by trained personnel.**
- **Take careful notice of the "Safety rules, instructions and precautionary measures "in the front of this manual.**


3.2 PROGRAMMING SETUP LEVEL

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.



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

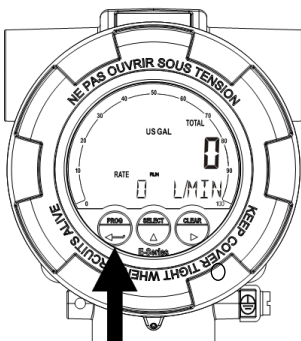
Configuration of the E018-P is done at SETUP level. SETUP level is reached by pressing the PROG/ENTER key for 7 seconds; at which time  will be displayed. In order to return to the operator level, PROG will have to be pressed for three seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit SETUP automatically.

SETUP can be reached at all times while the E018-P remains fully operational. Be aware that in this case any change to the settings may have an influence on the operation.

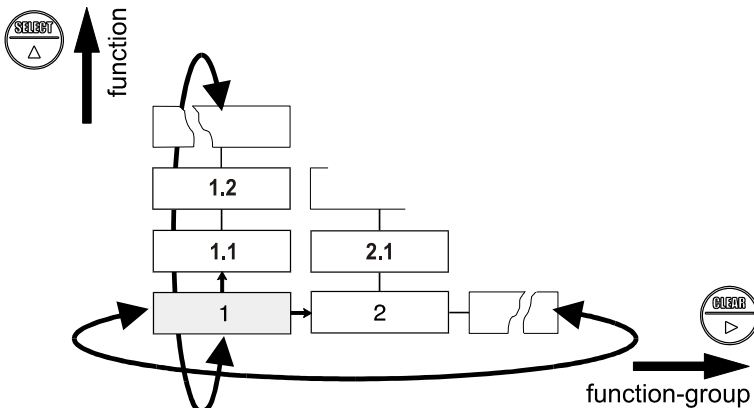


A password may be required to enter SETUP. Without this password access to SETUP is denied.

To enter SETUP-level:



Press the PROG/ENTER key for 7 seconds.



- 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.

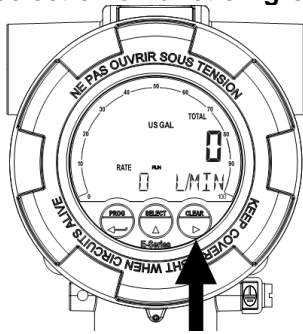
After selecting a sub-function, the next main function is selected by scrolling through all "active" sub-functions (e.g. 1[▲], 1.1[▲], 1.2[▲], 1.3[▲], 1.4[▲], 1[▶], 2[▶], 3[▲], 3.1 etc.).

Scroll back a function group is done by pressing PROG (e.g. 4[◀], 3[◀], 2[◀], 1[◀])

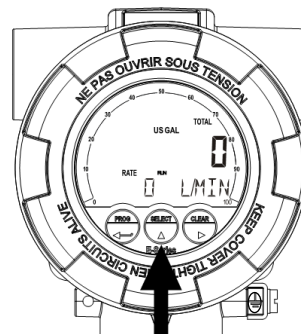
Scroll back a sub-function is done by pressing CLEAR (e.g. 1.4[▶], 1.3[▶], 1.2[▶], 1.1[▶])

SCROLLING THROUGH SETUP-LEVEL

Selection of function-group and function

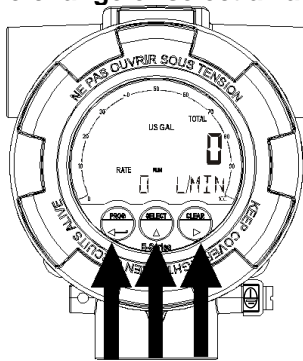


Select the function group with the STOP/▶ key.



Select the function with the START/▲ key.

To change or select a value



a) b) b)
c)

- 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.

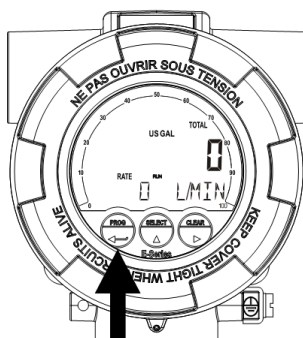
To select a setting, ▲ is used to select in one direction and ▶ can be used to select in the other direction. When data is altered but ENTER is not pressed, then the alteration can still be cancelled by waiting for 20 seconds or by pressing ENTER for three seconds: the PROG-procedure will be left automatically and the former value reinstated.



Note !

Alterations will only be set after ENTER has been pressed!

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; l gal; cf; oilbbl; kg; ton; US ton; lb; ---- (none)
1.2	DECIMALS	0; 0.1; 0.02; 0.003
1.3	K-FACTOR:	0.000010 - 9,999,999
1.4	K-FACTOR DECIMALS	0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006
2	FLOWRATE	
2.1	UNIT	mL; L; m3; US gal; l gal; cf; oilbbl; nL; nm3; scf; g; kg; ton; lb; US ton; rev; ---- (none)
2.2	TIME	/sec; /min; /hr; /day
2.3	DECIMALS	0; 0.1; 0.02; 0.003
2.4	K-FACTOR	0.000010 - 9,999,999
2.5	K-FACTOR DECIMALS	0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006
2.6	CALCULATION	per 1 - 255 pulses
2.7	CUT-OFF	0.1 - 999.9 seconds
2.8	DAMPING	0.1 - 999.9 seconds
3	ALARM	
3.1	FLOWZERO	default; no relays; ignore
3.2	ALARM LL	0000.000 - 999,999
3.3	ALARM LO	0000.000 - 999,999
3.4	ALARM HI	0000.000 - 999,999
3.5	ALARM HH	0000.000 - 999,999
3.6	DELAY LL	0 - 999.9 seconds
3.7	DELAY LO	0 - 999.9 seconds
3.8	DELAY HI	0 - 999.9 seconds
3.9	DELAY HH	0 - 999.9 seconds
4	DISPLAY	
4.1	FUNCTION	rate; total; acc total
4.2	ALARMSET	operator; setup; hidden
4.3	LCD NEW	fast; 1 sec; 3 sec; 15 sec; 30 sec; off
4.4	BACKLIGHT	0%; 20%; 40%; 60%; 80%; 100%
4.5	BL ALARM	Off; flash; on
4.6	BARGRAPH	enable; disable
4.7	RATESPAN	0000000 - 9999999
5	FLOWMETER	
5.1	SIGNAL	NPN - NPN_LP - REED - REED_LP - PNP - PNP_LP - NAMUR - Coil_Hi - Coil_Lo - Act_8.2 (8.2V DC) - Act_24 (24V DC)
6	LINEARISE	
6.1	FREQ. / M-FACTOR 1	0000.1 - 9999.9 Hz / 0.000001 - 9.999999
6.2	FREQ. / M-FACTOR 2	0000.1 - 9999.9 Hz / 0.000001 - 9.999999
	↑	↑
6.F	FREQ. / M-FACTOR 15	0000.1 - 9999.9 Hz / 0.000001 - 9.999999
6.G	LINEARIZATION	enable; disable
6.H	DECIMALS	0; 0.1; 0.02; 0.003
7	ANALOG	
7.1	RATE-MIN	-999999 - 999999
7.2	RATE-MAX	-999999 - 999999
7.3	TUNE-MIN	665
7.4	TUNE-MAX	3277
8	PULSE	
8.1	RELAY 1	lo-lo; lo; hi; hi-hi; all; pulse; off
8.2	RELAY 2	lo-lo; lo; hi; hi-hi; all; pulse; off
8.3	RELAY 3	lo-lo; lo; hi; hi-hi; all; pulse; off
8.4	RELAY 4	lo-lo; lo; hi; hi-hi; all; pulse; off
8.5	WIDTH	0.000 - 9.999 sec
8.6	DECIMALS	0; 0.1; 0.02; 0.003
8.7	AMOUNT	0000000 - 9999999
9	COM-HART	
9.1	ADDRESS	0 - 63
9.2	LOOP CURRENT	enable; disable
9.3	LOOP TEST	Off; Set 4mA; Set 20mA



10 OTHERS			
10.1	MODEL	E018-P	
10.2	SOFTWARE VERSION	xx:xx:xx	
10.3	SERIAL NO	xxxxxxx	
10.4	PASSWORD	0000 - 9999	
10.5	KEY LOCK	enable - disable	
10.6	TAG NO	0000000 - 9999999	

3.2.3 Explanation of setup-functions - Total

1 TOTAL		
1.1	UNIT	<p>SETUP 1.1 determines the measurement unit for total, accumulated total and pulse output. The following units can be selected: L; m3; US gal; l gal; cf; oilbbl; kg; ton; US ton; lb; ---- (none)</p> <p><i>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.</i></p>  <p>Note !</p>
1.2	DECIMALS	<p>The decimal point determines for Total and accumulated Total the number of digits following the decimal point. <i>The following can be selected: 0; 0.1; 0.02; 0.003.</i></p>
1.3	K-FACTOR	<p>With the K-factor, the flowmeter pulse signals are converted to a total unit. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 1.1), for example per cubic meter. The more accurate the K-factor, the more accurate the functioning of the system will be.</p> <p>Example 1: Calculating the K-factor. <i>Assume that the flowmeter generates 2.4813 pulses per liter and the selected unit is "cubic meters / m3". A cubic meter consists of 1000 parts of one liter which implies 2,481.3 pulses per m3. So, the K-factor is 2,481.3. Enter for SETUP – 1.3: "2481300" and for SETUP – 1.4 - decimals K-factor "3".</i></p> <p>Example 2: Calculating the K-factor. <i>Assume that the flowmeter generates 6.5231 pulses per gallon and the selected measurement unit is gallons. So, the K-Factor is 6.5231. Enter for SETUP – 1.3: "6523100" and for SETUP – 1.4 decimals K-factor "6".</i></p>
1.3	K-FACTOR DECIMALS	<p>This setting determines the number of decimals for the Total K-Factor entered (SETUP 1.3). The following can be selected: 0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006</p>  <p>Note !</p> <p><i>This setting influences the accuracy of the total K-Factor indirectly (i.e. the position of the decimal point and thus the value given).</i></p> <p>This setting has NO influence on the displayed number of digits for total (SETUP 1.2)!</p>

3.2.4 Explanation of setup-functions - Flowrate

2 FLOWRATE		
<p>The settings for total and flowrate are entirely separate. In this way, different units of measurement can be used for each e.g. cubic meters for total and liters for flowrate. The display update time for flowrate is one second or more. Note: these settings also influence the analog output.</p>		
2.1	UNIT	<p>SETUP 2.1 determines the measurement unit for flowrate. The following units can be selected: mL; L; m3; US gal; l gal; cf; oilbbl; nL; nm3; scf; g; kg; ton; lb; US ton; rev; ---- (none)</p> <p><i>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.</i></p>  <p>Note !</p>
2.2	TIME	The flowrate can be calculated per /sec - /min - /hour - /day.
2.3	DECIMALS	<p>This setting determines for flowrate the number of decimals. The following can be selected: 0; 0.1; 0.02; 0.003.</p>

		 <i>Changes to SETUP 2.3 Decimals will also change the decimal setting for the URV and LR V (7.1 and 7.2). Therefore it is best practice to first determine the required decimals for the flowrate!</i>
2.3	K-FACTOR	With the K-factor, the flowmeter pulse signals are converted to a flowrate. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 2.1), for example per liter. The more accurate the K-factor, the more accurate the functioning of the system will be. For examples read SETUP 1.3.
2.4	K-FACTOR DECIMALS	 This setting determines the number of decimals for the Total K-Factor entered (SETUP 1.3). The following can be selected: 0; 0.1; 0.02; 0.003; 0.0004; 0.00005; 0.000006 <i>This setting influences the accuracy of the total K-Factor indirectly (i.e. the position of the decimal point and thus the value given).</i> This setting has NO influence on the displayed number of digits for flowrate (SETUP 2.1)!
2.5	CALCULATION	The flowrate is calculated by measuring the time between a number of pulses, for example 10 pulses. The more pulses the more accurate the flowrate will be. The maximum value is 255 pulses. Note: the lower the number of pulses, the higher the power consumption of the unit will be (important for battery powered applications). Note: for low frequency applications (below 10Hz): do not program more than 10 pulses else the update time will be very slow. Note: for high frequency application (above 1kHz) do program a value of 100 or more pulses.
2.6	CUT-OFF	With this setting, you determine a minimum flow requirement threshold, if during this time less than XXX-pulses (SETUP 2.5) are generated, the flowrate will be displayed as zero. The cut-off time has to be entered in seconds - maximum time is 999 seconds (about 15 minutes).
2.7	DAMPING	This sets the step-response time of the flowrate measurement. The step-response time is the time it takes for the displayed value (and thus the analog output value) to reach 63% of the final value. For example, when the flowrate increases from 10 to 100 l/s and the damping is set to 10 seconds, the analog output (and the displayed value) will increase to: $10 + 0,63 \times (100-10) = 66\text{l/sec}$ after 10 sec. eventually it will display 100 l/sec.

3.2.5 Explanation of setup-functions - Alarm



3	ALARM	
		With these settings, it is determined how the flowrate will be monitored and the functionality of the transistor / relay outputs (terminals R2-R3, R5-R6 and R9-R10) be determined. <ul style="list-style-type: none"> • For transistor / relay output functions: read SETUP 8 "Relays". • The flowrate alarms are visible in HART. <ul style="list-style-type: none"> - A low alarm will set dev.statusbit 14.5 - A high alarm will set dev.statusbit 14.6
3.1	FLOWZERO	When the flowrate is zero, then it is possible to ignore or disable the flowrate monitoring. The following settings can be selected: DEFAULT: in case of a low-flowrate alarm and zero flow, it will switch the alarm output and indicate the alarm on the display. NO RELAY: in case of a low-flowrate alarm and zero flow, it won't switch the alarm output but will indicate the alarm on the display only. IGNORE: in case of a low-flowrate alarm and zero flow, it won't switch the alarm output and nothing will be indicated on the display.
3.2	ALARM LL	The low-low alarm is set with this setting. An alarm will be generated as long as the flowrate is lower as this. With value 0.0 this function is disabled.
3.3	ALARM LO	The low alarm is set with this setting. An alarm will be generated as long as the flowrate is lower as this. With value 0.0 this function is disabled.




Note !

3.4	ALARM HI	The high alarm is set with this setting. An alarm will be generated as long as the flowrate is higher as this. With value 0.0 this function is disabled.
3.5	ALARM HH	The high-high alarm is set with this setting. An alarm will be generated as long as the flowrate is higher as this. With value 0.0 this function is disabled.
3.6	DELAY LL	An alarm generated by SETUP 3.2 "low-low" can be ignored during X-time period. If the actual flowrate is still incorrect after this delay time, then an alarm will be generated.
3.7	DELAY LO	An alarm generated by SETUP 3.3 "low" can be ignored during X-time period. If the actual flowrate is still incorrect after this delay time, then an alarm will be generated.
3.8	DELAY HI	An alarm generated by SETUP 3.4 "high" can be ignored during X-time period. If the actual flowrate is still incorrect after this delay time, then an alarm will be generated.
3.9	DELAY HH	An alarm generated by SETUP 3.5 "high-high" can be ignored during X-time period. If the actual flowrate is still incorrect after this delay time, then an alarm will be generated.

3.2.6 Explanation of setup-functions - Display

4	DISPLAY	
4.1	FUNCTION	<p>The function can be set to display total or flowrate.</p> <ul style="list-style-type: none"> 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. When "accumulated total" is selected, total is displayed with the large digits and accumulated total is displayed with the small digits simultaneously
4.2	ALARMSET	<p>This function determines if the flowrate alarm values can be set at both Operator level and SETUP-level or SETUP-level only, and if the alarm values are visible at operator level.</p> <p><i>If SETUP has been selected, the alarm values are still visible for the Operator but cannot be changed. If Hidden has been selected, the alarm values are invisible.</i></p>
	 Note !	<p><i>When battery powered, the user can expect reliable measurement over a long period of time. The E018-P 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:</i></p>
4.3	LCD NEW	<p>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 <i>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.</i></p>
4.4	BACKLIGHT	<p>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% <i>For battery powered units the brightness is not adjustable</i></p> <p> Note ! <i>When the unit is only loop powered it cannot make use of the backlight. In that case an external supply is required</i></p>

4.5	BL ALARM	In case the E018-P generates a flowrate alarm, the backlight can be set to change to red. Following selections are available: OFF: during flowrate alarm the color is white ON: during flowrate alarm the color is red FLASH: during flowrate alarm the color flashes red
4.6	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
4.7	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.
	 Note!	<i>The number of decimals displayed depends upon SETUP 2.2.</i>

3.2.7 Explanation of setup-functions - Flowmeter

5. FLOWMETER				
5.1	SIGNAL	The E018-P is able to handle several types of input signal. The type of flowmeter signal is selected with SETUP 5.1.		
	TYPE OF SIGNAL	EXPLANATION	RESISTANCE	FREQ. / mVpp
	NPN	NPN input	100 kΩ pull-up	max. 6 kHz.
	NPN - LP	NPN input with low pass filter	100 kΩ pull-up	max. 2.2 kHz.
	REED	Reed-switch input	1 MΩ pull-up	max. 1.2k Hz.
	REED - LP	Reed-switch input with low pass filter	1 MΩ pull-up	max. 120 Hz.
	PNP	PNP input	51 kΩ pull-down	max. 6 kHz.
	PNP - LP	PNP input with low pass filter	51 kΩ pull-down	max. 700 Hz.
	NAMUR	NAMUR input	820 Ω pull-down	max. 4 kHz.
	COIL HI	High sensitive coil input	-	min. 20 mVpp.
	COIL HI (option ZF)			min. 10 mVpp.
	COIL HI (option ZG)			min. 5 mVpp.
	COIL LO	Low sensitive coil input	-	min. 90 mVpp
	ACT_8.1	Active pulse input detection level 3.9 Vdc	3k9 Ω pull-down	max. 10 kHz.
	ACT_24	Active pulse input detection level 11 Vdc	3 k Ω pull-down	max. 10 kHz.

3.2.8 Explanation of setup-functions - Linearise

The linearization function is available to approach the real flow-signal curve better as with the general K-factor (KF0). This to obtain a more accurate flowrate, total and accumulated total as well as the analog and pulse output at any flowmeter frequency.

A maximum of 15 linearization-positions can be entered while the interpolation will calculate any other position in-between.

For each linearization position, the frequency and a Meter Factor (MF) must be entered.

The Meter Factor for each frequency is calculated with following formula:



$$\text{Meter Factor} = \frac{\text{K-Factor @ flow rate X}}{\text{KF0}}$$

The lowest frequency and MF you enter will be valid from 0Hz. The highest frequency and MF will be valid till 10KHz. It is advised to enter the frequencies in increasing order, however it is not necessary. Please have a look at following example to understand the method of linearization:


6 LINEARISE		
<p>K-Factor</p> <p style="text-align: center;">KF0=51.64178</p> <p style="text-align: center;">KF1=35.7 @ 64Hz. MF1=0.691300 KF2=47.5 @ 93Hz. MF2=0.919798 KF3=53.8 @ 161Hz. MF3=1.041792 KF4=49.2 @ 336Hz. MF4=0.952717 KF5=52.9 @ 514Hz. MF5=1.024364</p>		
6.1	FREQ. / M-FACTOR 1	<p>The frequency is displayed at the bottom line of the display. The maximum frequency is 9,999.9 Hz. With value 0.0Hz, the M-Factor is disabled. (Please read SETUP 5.H - decimals frequency)</p> <p>The M-Factor is displayed at the top-line of the display. The minimum value to be entered is 0.000001 and the maximum value is 9.999999. Most M-factors will be around 1.000000 like 0.945354 or 1.132573.</p> <p><i>This value has always six decimals while the "dot" is not displayed.</i></p>
6.F	FREQ. / M-FACTOR 15	
Note !		
6.G	LINEARIZATION	With this setup function, you can easily enable / disable the linearization function.
6.H	DECIMALS	This setting determines the number of decimals for the frequency entered. The following can be selected: 0; 0.1; 0.02; 0.003.

3.2.9 Explanation of setup-functions - Analog

7 ANALOG		
<p>An analog 4-20mA signal is generated according to the flowrate with a 12 bits resolution. The settings for flowrate (SETUP 2) influence the analog output directly.</p> <p>The relationship between rate and analog output is set with the following functions:</p>		
7.1	RATE-MIN	Primary Variable Lower Range Value (PV-LRV)
7.2	RATE-MAX	<p>Primary Variable Upper Range Value (PV-URV)</p> <p>PV URV and PV LRV define the range of the analog output.</p> <p>Suppose the flowrate is 1000l/s</p> <p>If URV is set at 1600 and LRV is set at 0, then the output current will be: $1000/1600 * (20mA-4mA) + 4mA = 14mA$</p>
7.3	TUNE-MIN	<p>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.</p> <p>BEFORE TUNING THE SIGNAL, BE SURE THAT THE ANALOG SIGNAL IS NOT BEING USED FOR ANY APPLICATION!</p> <p> Caution ! After pressing PROG, the current will be about 4mA (or 0mA / 0V). The current can be increased / decreased with the ▲ and ► push buttons. The new value will become active after pressing PROG again.</p> <p> Note ! <i>The analog output value can be programmed "up-side-down" if desired, so 20mA at minimum flowrate for example!</i></p>

7.4	TUNE-MAX	 Caution !	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.
			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 (or 0mA / 0V). The current can be increased / decreased with the ▲ and ► push buttons. The new value will become active after pressing PROG again.
			<i>The analog output value can be programmed “up-side-down” if desired, so 4mA at maximum flowrate for example!</i>
		 Note !	

3.2.10 Explanation of setup-functions - Pulse

8	PULSE	
Four transistor or relay outputs are available as scaled pulse output according to the accumulated total.		
8.1	RELAY 1	This output is available to transmit the alarm condition or scaled pulse. Assign with this function the type of alarm to be transmitted: low- low flowrate alarm , low flowrate alarm, high flowrate alarm, high-high flowrate alarm , both alarms or pulse output.
8.2	RELAY 2	This output is available to transmit the alarm condition or scaled pulse. Assign with this function the type of alarm to be transmitted: low- low flowrate alarm , low flowrate alarm, high flowrate alarm, high-high flowrate alarm , both alarms or pulse output.
8.3	RELAY 3	This output is available to transmit the alarm condition or scaled pulse. Assign with this function the type of alarm to be transmitted: low- low flowrate alarm , low flowrate alarm, high flowrate alarm, high-high flowrate alarm , both alarms or pulse output.
8.4	RELAY 4	This output is available to transmit the alarm condition or scaled pulse. Assign with this function the type of alarm to be transmitted: low- low flowrate alarm , low flowrate alarm, high flowrate alarm, high-high flowrate alarm , both alarms or pulse output.
8.5	WIDTH	 Note ! 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. <i>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!</i>
8.6	DECIMALS	This setting determines the number of decimals for the amount. The following can be selected: 0; 0.1; 0.02; 0.003
8.7	AMOUNT	A pulse will be generated every time a certain quantity is added to the accumulated total. Mind the decimal position of SETUP 7.2 when you enter the quantity. The following can be selected: 0000.000 – 9999999

3.2.11 Explanation of setup-functions – Com-Hart

9	COM-HART	
9.1	ADDRESS	0..63 HART address
9.2	LOOP CURRENT	Loop current mode sets the output current fixed to 4mA (for multidrop purposes) or in normal mode.
9.3	LOOP TEST	The loop test is meant to be able to calibrate the 4 and 20 mA values with menus 7.5 and 7.6. The loop current mode has to be set to ‘enabled’ for this loop test to function !

3.2.12 Explanation of setup-functions - Others

10	OTHERS	
	For support and maintenance it is important to have information about the characteristics of the E018-P. Your supplier will ask for this information when support is required.	
10.1	MODEL	MODEL shows the model type of your E018-P. This number is factory set and cannot be changed.
10.2	SOFTWARE VERSION	SOFTWARE VERSION shows the software version of the E018-P. This number is factory set and cannot be changed.
10.3	SERIAL NO.	SERIAL NO. shows the unique 7-digit serial number of the E018-P. This number is factory set and cannot be changed.
10.4	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.
10.5	KEY LOCK	To avoid undesired use of the optical keyboard it can be locked automatically after 30 seconds by enabling this function.
10.6	TAG-NO	For identification of the unit and communication purposes, a unique tag number of maximum 7 numerical digits can be entered.

4 HART COMMUNICATION

Highway Addressable Remote Transducer (HART) is an industrial protocol that must be superimposed on the 4-20mA signal. It is an open standard, and full details about HART can be obtained from the FieldComm Group (HART Communication Foundation) at www.fieldcommgroup.org.

For a detailed description of the supported HART-commands and all the status bits, please refer to the HART Communication Protocol manual.

4.1 FLUIDWELL HART DEVICE DESCRIPTOR

In order to configure a HART device, the configurator must have the HART Device Descriptor (DD) for the E018-P. HART DD's are controlled by the FieldComm Group (HART Communication Foundation). Download the DD from www.fieldcommgroup.org.

5 INSTALLATION

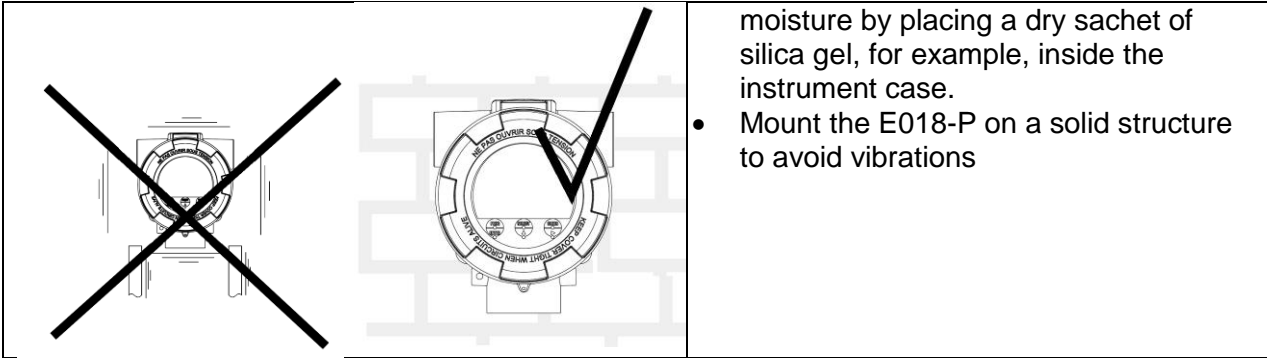
5.1 GENERAL DIRECTIONS



- **Mounting, electrical installation, start-up and maintenance of this instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.**
- **The E018-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.**
- **Ensure that the measuring system is correctly wired up according to the wiring diagrams. 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.**

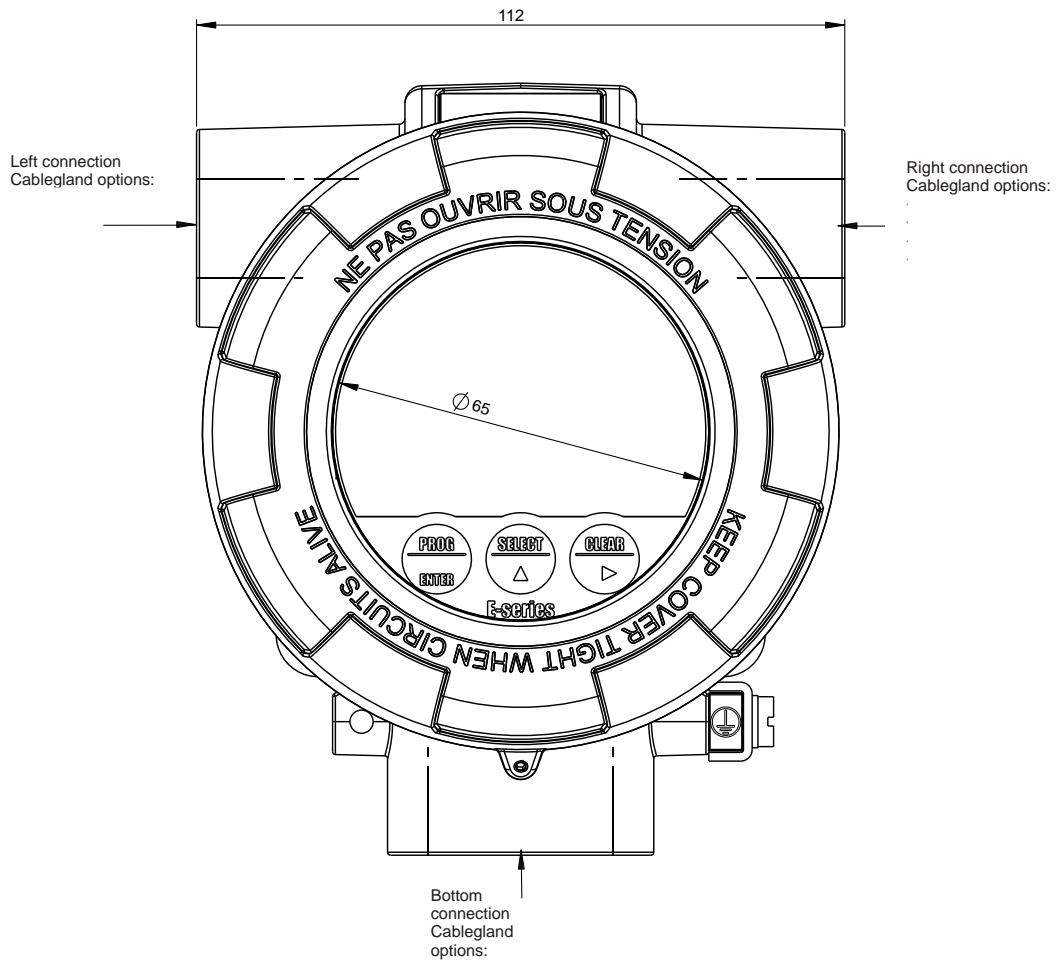
5.2 INSTALLATION / SURROUNDING CONDITIONS

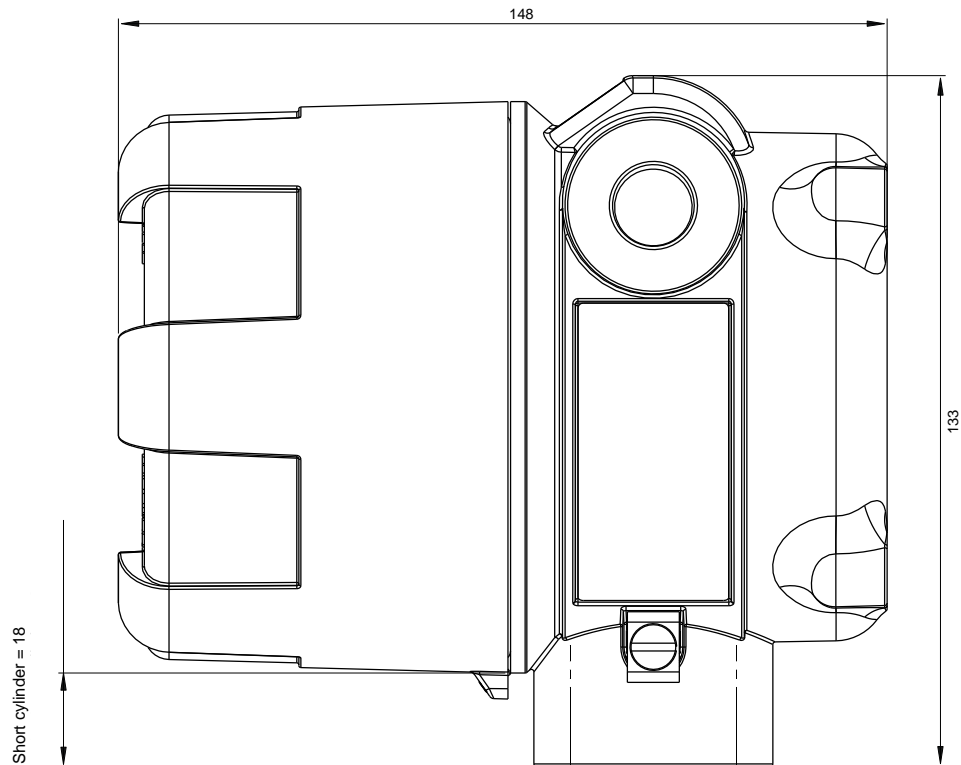
	<ul style="list-style-type: none"> • Take the relevant IP classification of the casing into account (see manufactures plate). Even an IP66/67 (TYPE 4X) casing should NEVER be exposed to strongly varying (weather) conditions. • When used in very cold surroundings or varying climatic conditions, take the necessary precautions against
--	---



5.3 DIMENSIONS- ENCLOSURE

Aluminum / Stainless steel enclosures:





5.3.1 Fig. 8: Dimensions aluminum / Stainless Steel enclosures

5.4 INSTALLING THE HARDWARE

5.4.1 Introduction



- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the E018-P, the installer has to discharge himself by touching a well-grounded object.
- The E018-P must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).



- 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.

5.4.2 Installation guidelines – Mechanical

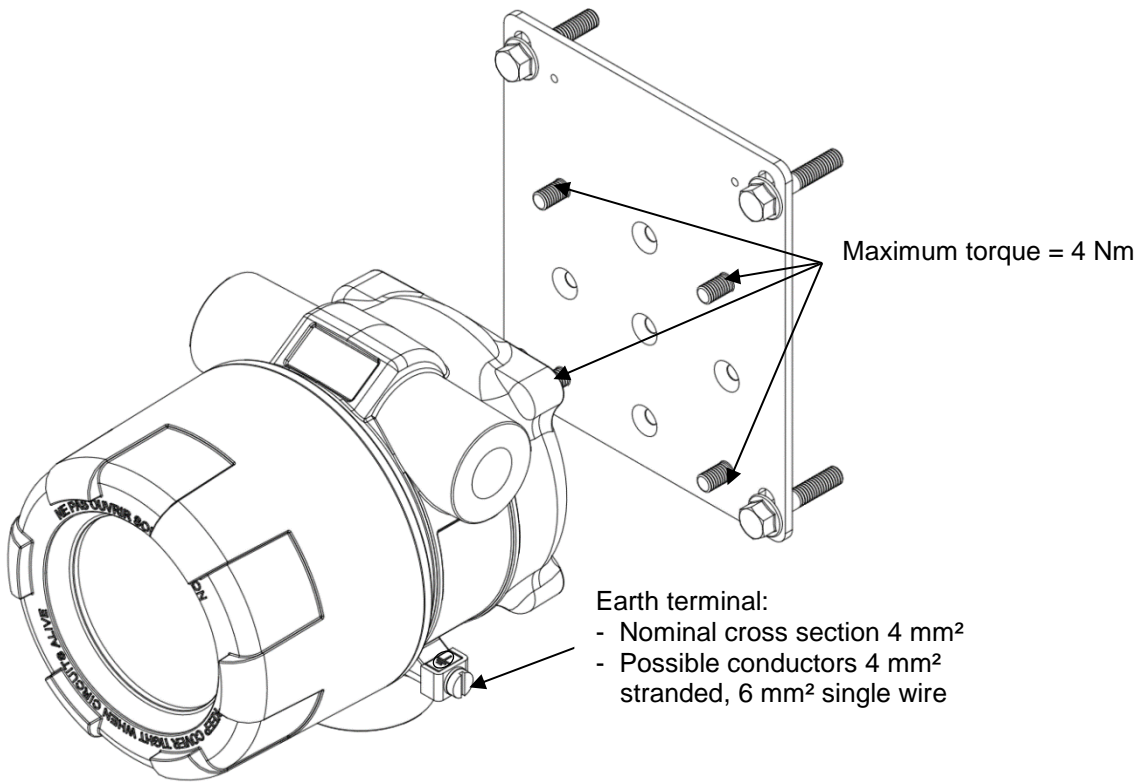


Fig. 8: Installation – Plate mounted

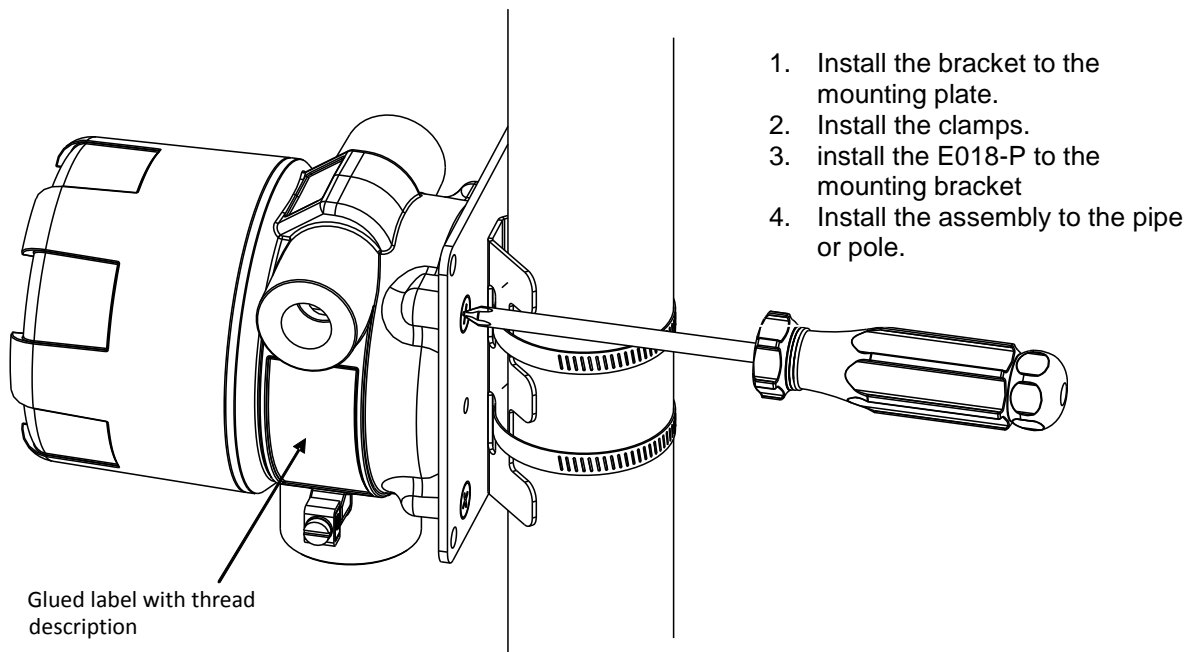
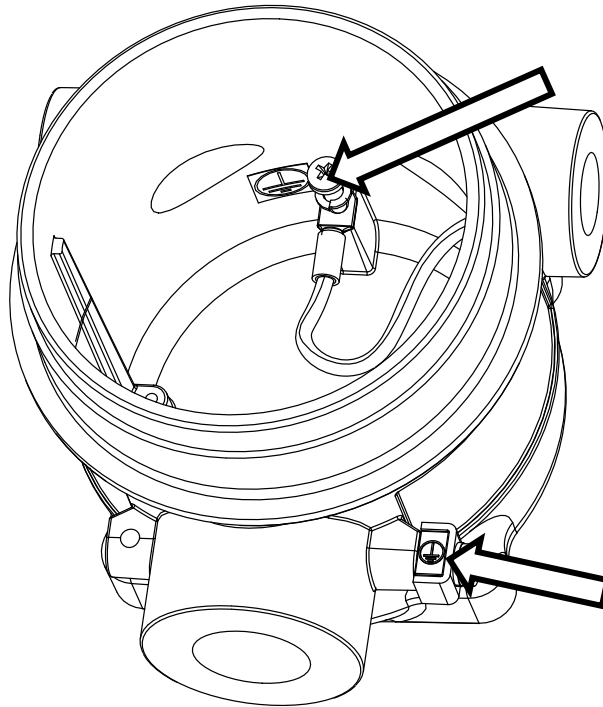


Fig. 9: Installation – Pipe mounted

5.4.3 Installation instructions - Electrical

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



**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 cm³;
- 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.

Seal conduits/enclosure



- 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"

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.

Flameproof joints



- Clause 5: EN/IEC 60079-1:2007 (Use certified / Ex-d cable glands).
- All flameproof joints are designed for:
 - Volume $500 < V \leq 2000 \text{ cm}^3$;
 - 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 $\geq 10\text{mm}$)
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);
 - $\frac{1}{2}$ NPT, $\frac{3}{4}$ 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);
 - $\frac{1}{2}$ NPT, $\frac{3}{4}$ 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.

Electrical Safety

The following environmental conditions and safety parameters apply when installing the E018-P.

Relative humidity	< 90% RH
Outdoor use	suitable for outdoor use
IP and TYPE rating	IP66, IP67 and TYPE4X.
Supply voltage fluctuation	$\pm 10\%$ 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).

5.4.4 Voltage selection sensor supply (P3)

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 E018-P is affected!

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

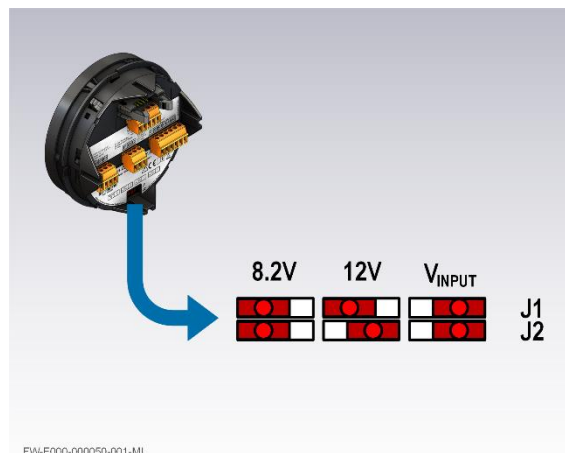


Fig. 10: DC Voltage selection - Sensor supply (P3).

5.5 OVERVIEW OF TERMINAL CONNECTORS

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

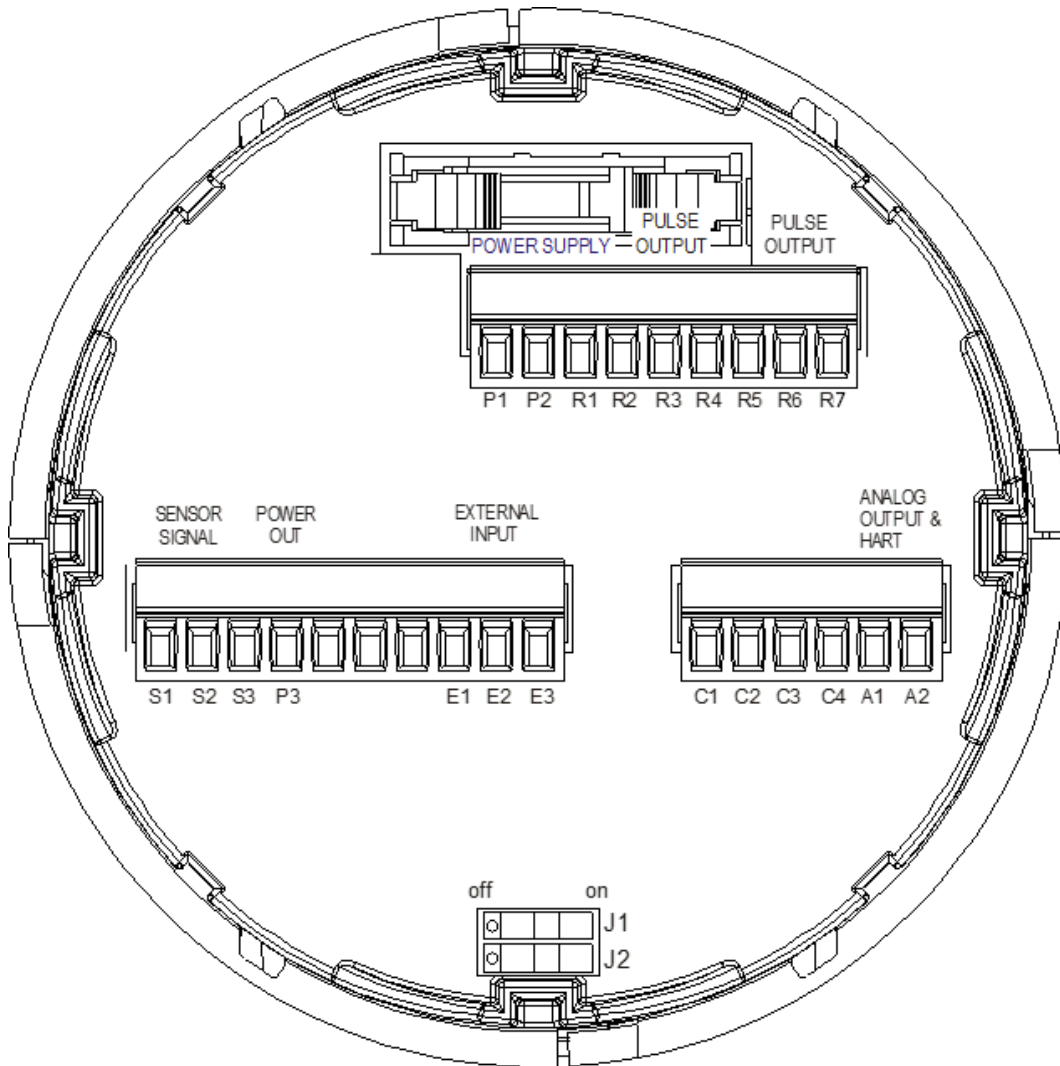


Fig. 11: Terminal connectors MEM – standard and options.

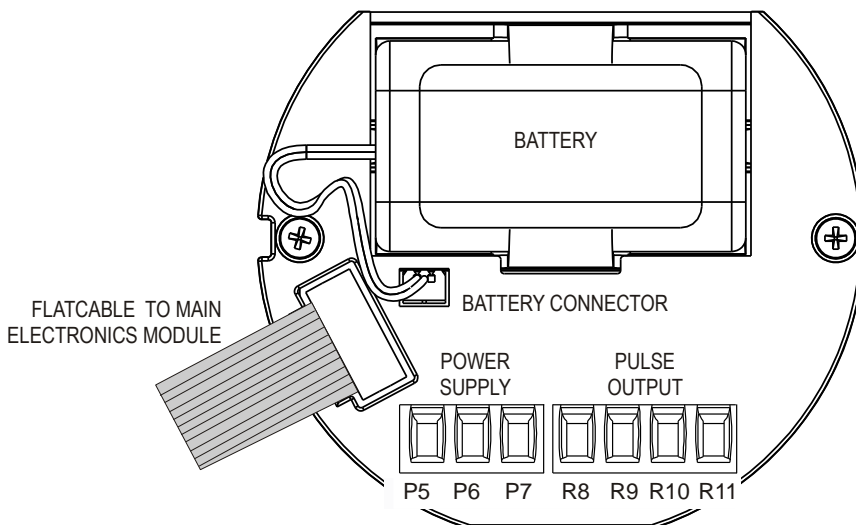


Fig. 12: Terminal connectors supply module – standard and options

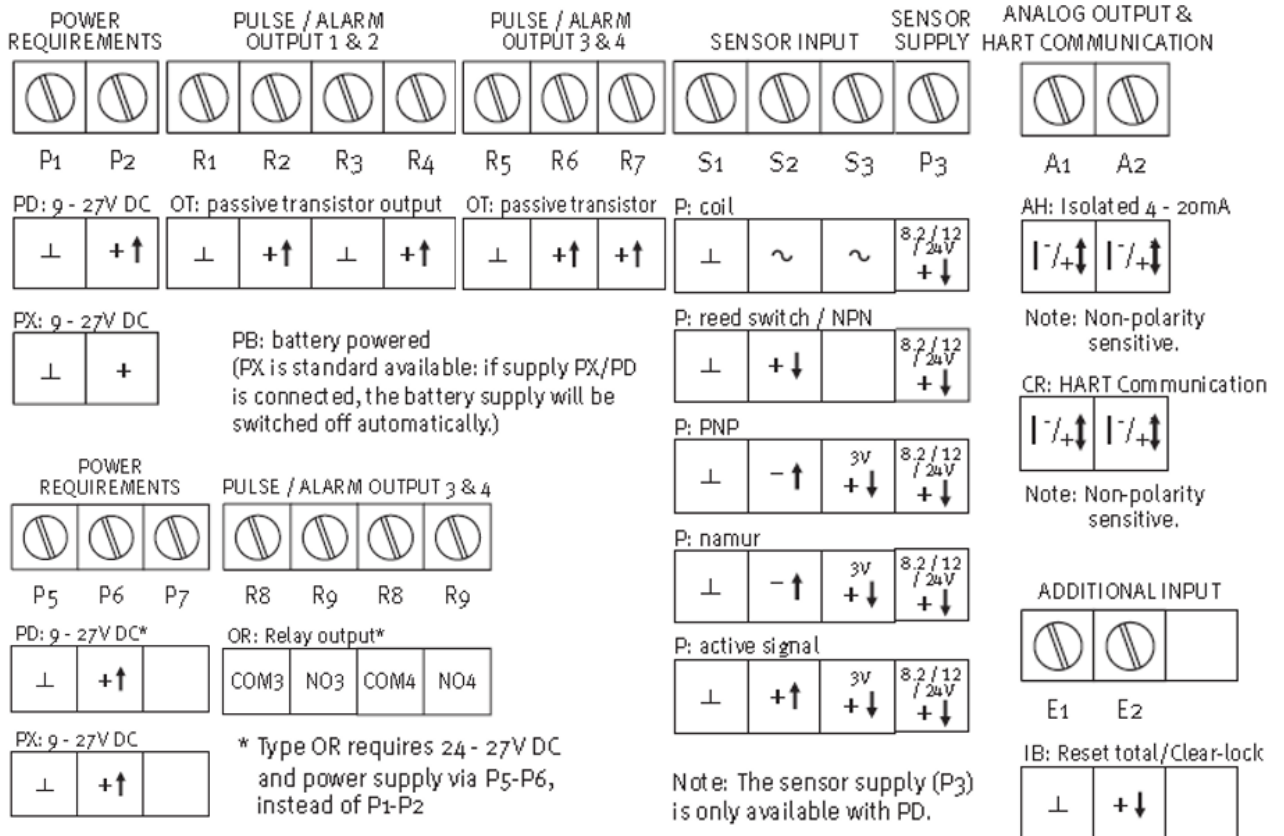


Fig. 13: Terminal connectors - Connection Overview.

5.5.1 Terminal connectors

Terminal P1-P2 and P5-P6: Power Supply - type PD/PX:

To connect an external power supply. When power is applied to these terminals, the (optional) internal battery will be disabled / enabled automatically.

When using the regulated sensor supply (8.2 or 12V) the input voltage must be at least 3V higher than the selected voltage. On the 24V output setting the output voltage varies with the supply voltage minus approximately 1V.

Terminal R1-R7:

The setting made in Setup 8 determines the output function. The maximum output frequency of output 1 is 60Hz and outputs 2-4 are 50Hz.

Type OT:

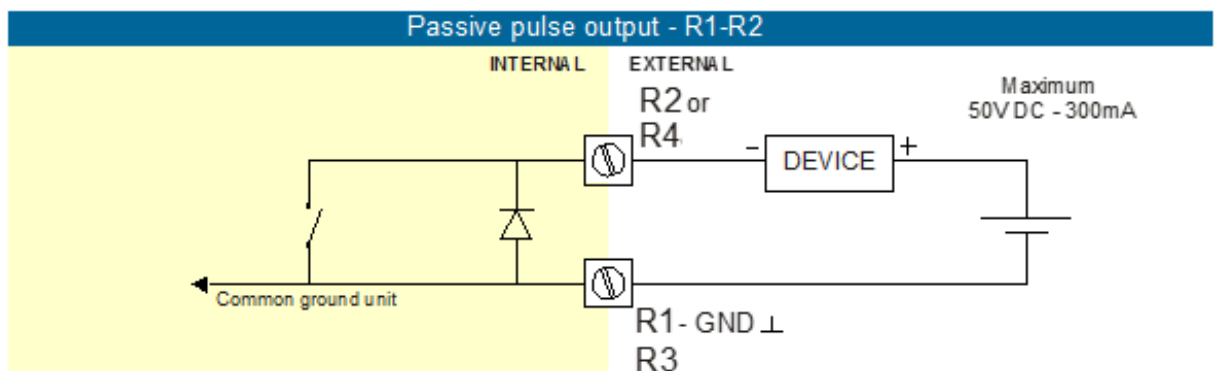
A passive transistor output is available with this option. Max. driving capacity 300mA@50V DC.

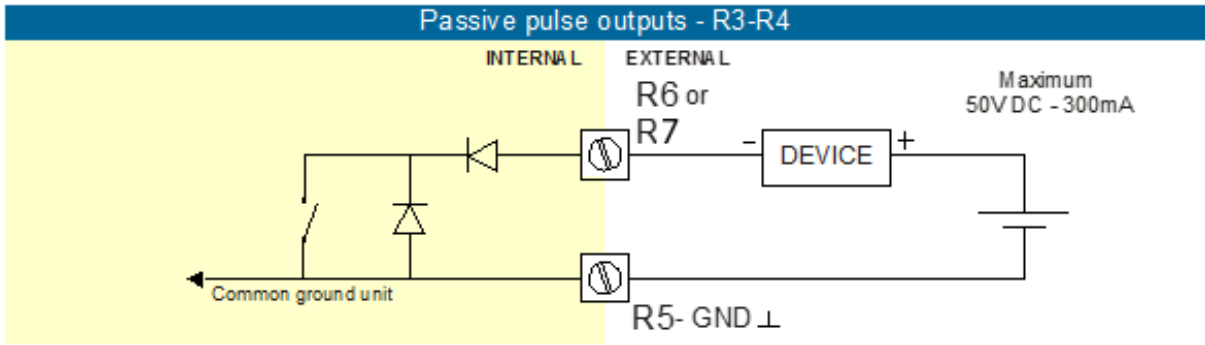


Note1: R1 and R3 are common ground (GND) terminals.

Note2: The OT outputs are coupled with the OR outputs

Note 3: If an OR option is also connected it is recommended to use power supply terminals P5-P6.





Type OR:

A mechanical relay output flowrate alarm output or pulse output is available with this option.

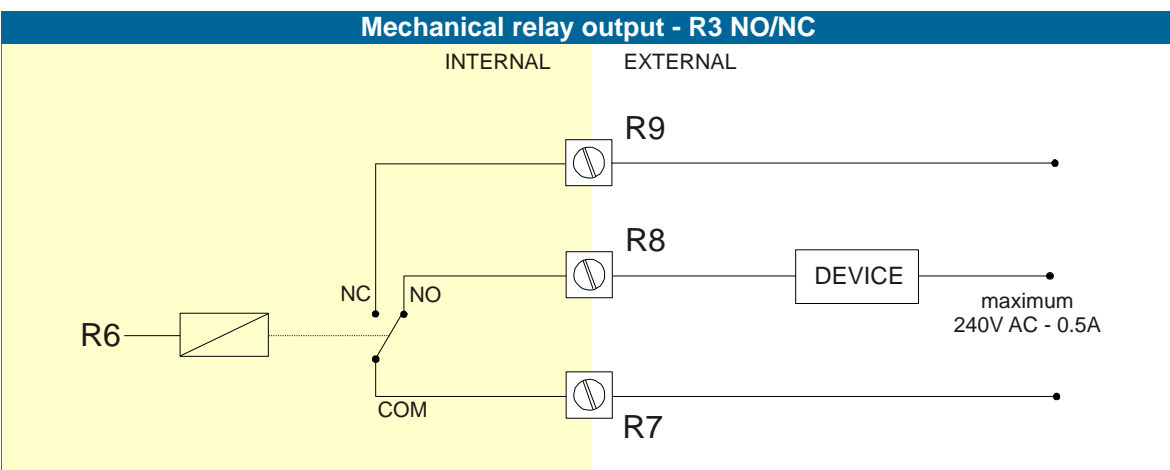
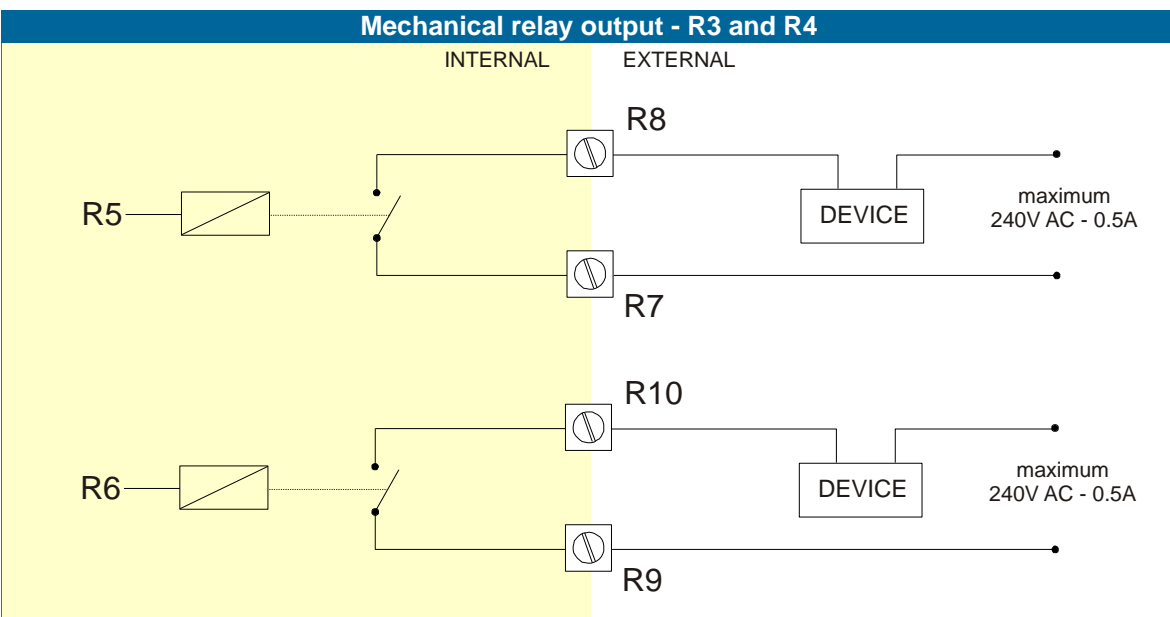
Max. switch power 240V 0,5A per output.

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



Note !

With option OR the minimum voltage is limited to 24V DC!



Terminal S1-S6; 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 (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 with SETUP 51 (read par. 3.4.).



Note: Unless otherwise noted, all connections are equal to the second flowmeter input (S4, S5, S6).

Sine-wave signal (Coil):

The E018-P is suitable for use with flowmeters which have a coil output signal. Two sensitivity levels can be selected with the SETUP-function:

COIL LO: sensitivity 90mVpp.

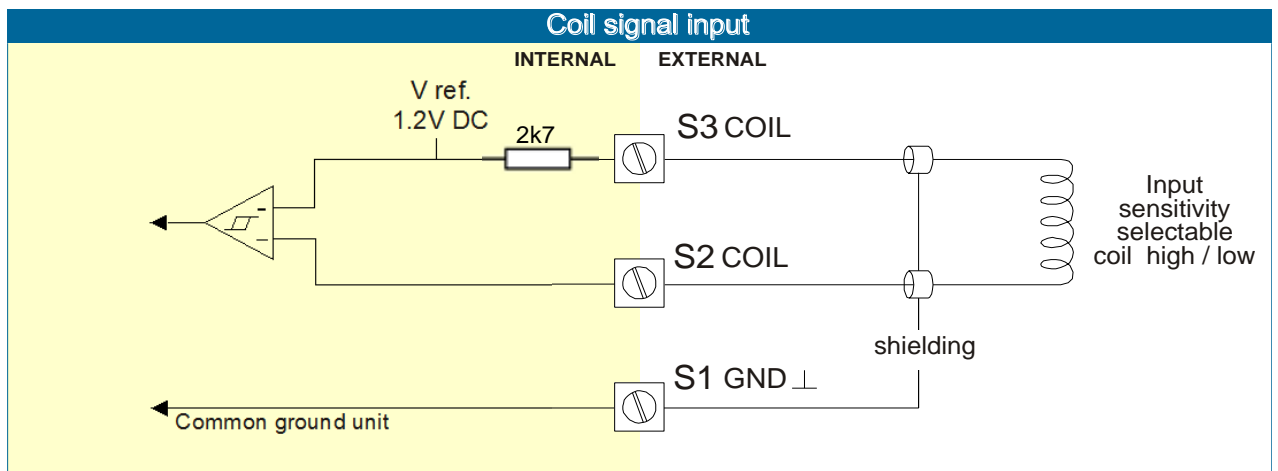
COIL HI: sensitivity 20mVpp.

Type ZF offers for setting COIL HI: sensitivity 10mVpp.

Type ZG offers for setting COIL HI: sensitivity 5mVpp.

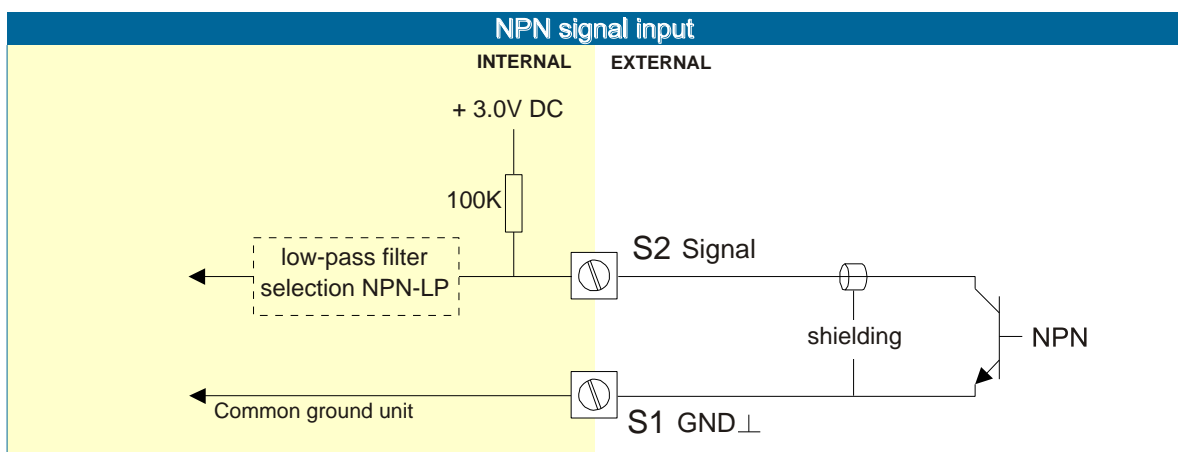


Note: if inputs 1 AND 2 are both configured as coil the selected sensitivity is equal for both!



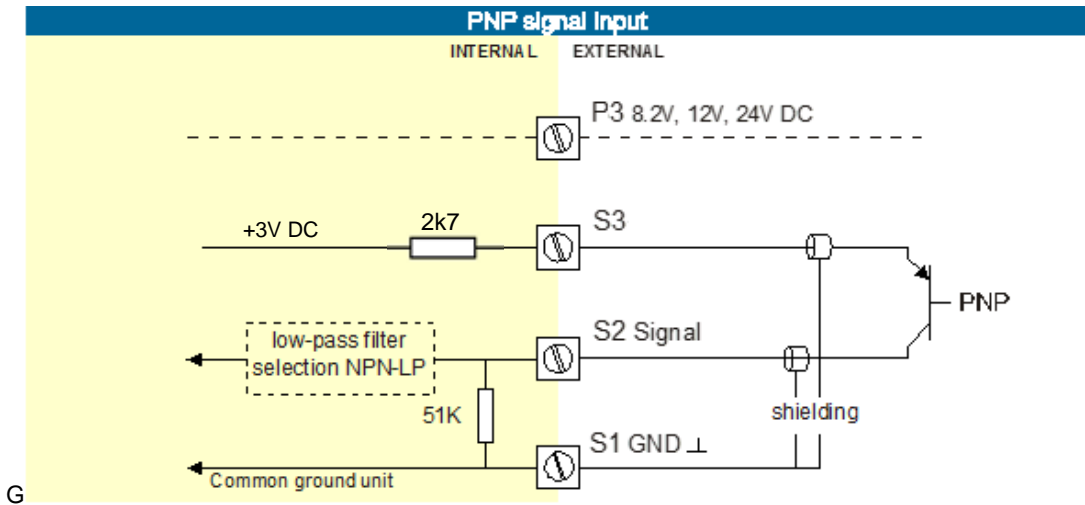
Pulse-signal NPN / NPN-LP:

The E018-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. It is advised to select Signal setting NPN-LP - low-pass signal noise filter which limits the maximum input frequency, to avoid pulse bounce (read par. 3.4.).



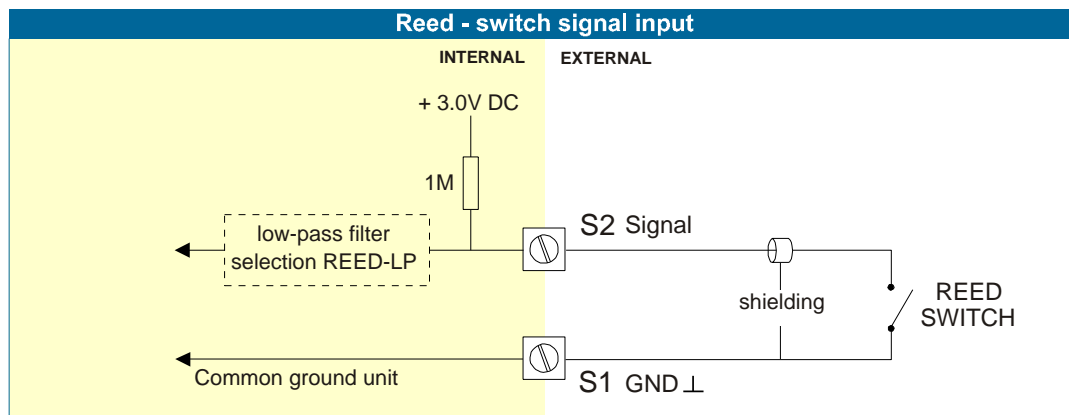
Pulse-signal PNP / PNP-LP:

The E018-P is suitable for use with flowmeters which have a PNP output signal. 3.0V is offered on terminal S3 which has to be switched by the sensor to terminal S2 (SIGNAL). For reliable pulse detection, the pulse amplitude has to go above 1.2V. It is advised to select Signal setting PNP-LP - low-pass signal noise filter which limits the maximum input frequency, to avoid pulse bounce (read par. 3.4.). A sensor supply voltage of 8.2, 12 or 24V DC can be provided with power supply type PD.



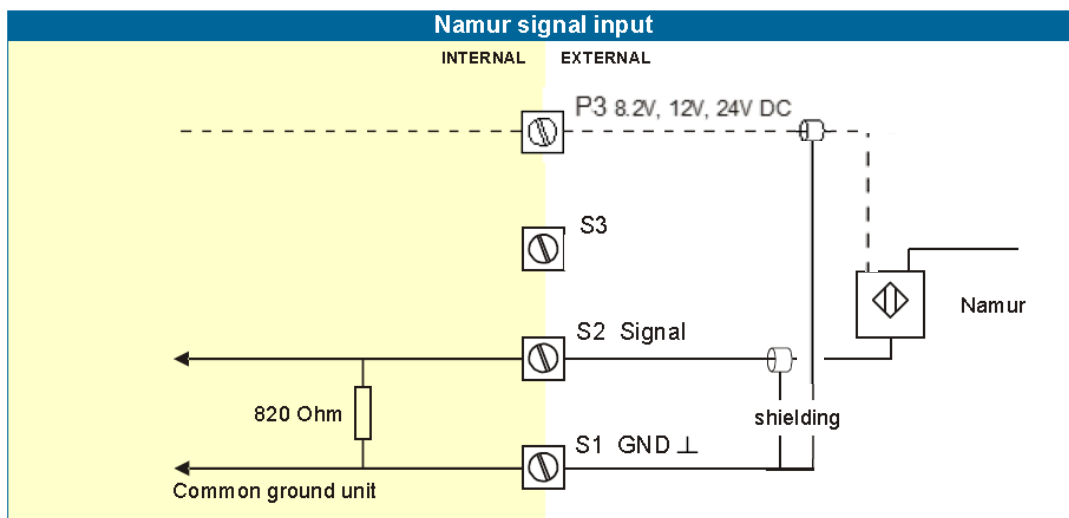
Reed-switch:

The E018-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 noise filter, which limits the maximum input frequency (read par. 3.4.).



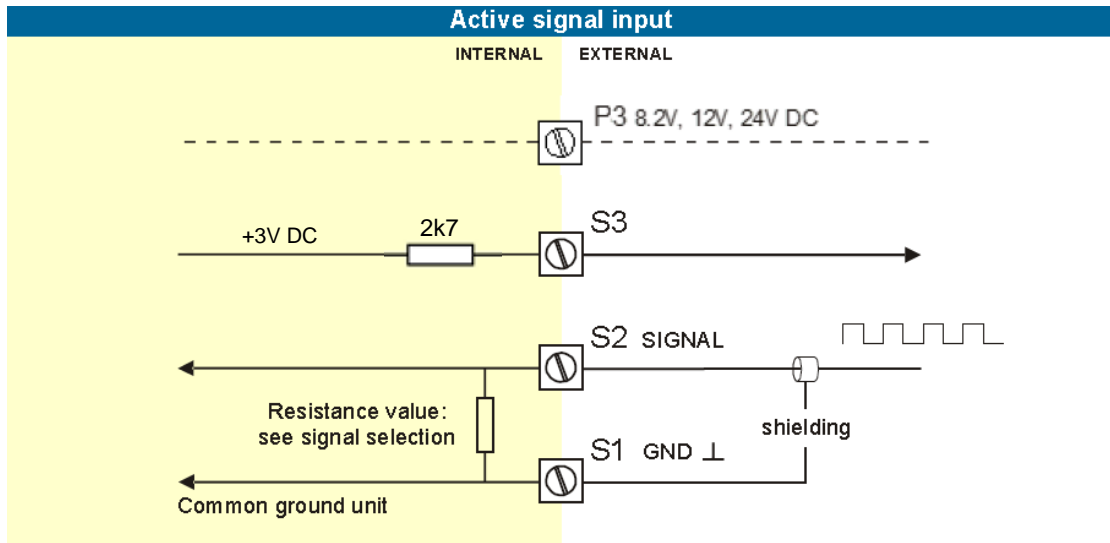
NAMUR-signal:

The E018-P is suitable for flowmeters with a Namur signal. The standard E018-P is not able to power the Namur sensor. If required the Namur sensor can be supplied via an 8.2V sensor supply (terminal P3) with power supply type PD. See par. 3.4. for more information.



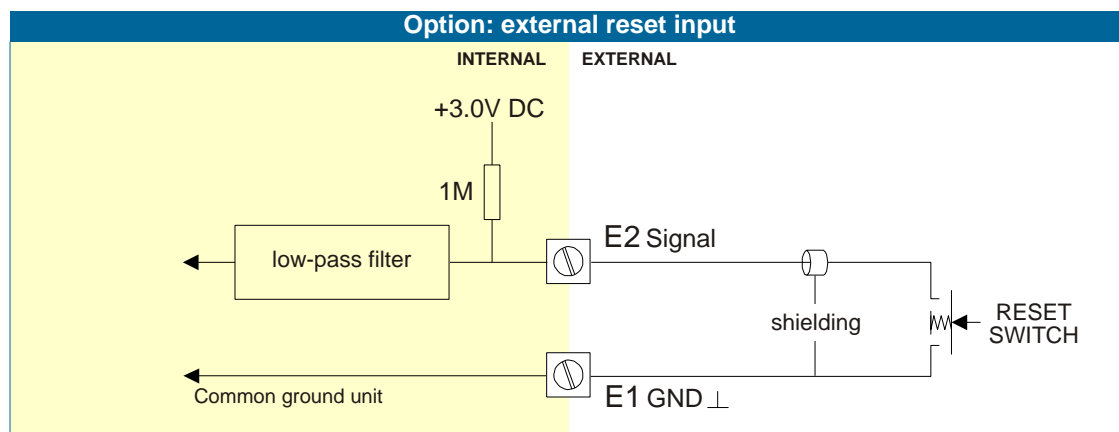
Active signals 8.2V and 24V:

The E018-P is suitable for flowmeters with an Active signal. The detection levels are 50% of the selected supply voltage; approximately 4V (ACT_8.1) or 12V (ACT_24). See par. 3.4. for more information. Active signal selection may well be desired in the case of power supply type PD being supplied for sensor supply.



Terminal E1-E2 - External Reset (option) - Type IB:

With this function the total can be reset to zero with an external switch. The Total resets only when the switch *closes*. When closed Total still counts but the "Clear Total" function is disabled (see chapter 2). The input must be switched with a potential free contact to the GND-terminal number E1.



Terminal A1-A2 Isolated analog output (SETUP 6):

An isolated analog output signal proportional to the flowrate is available as standard.

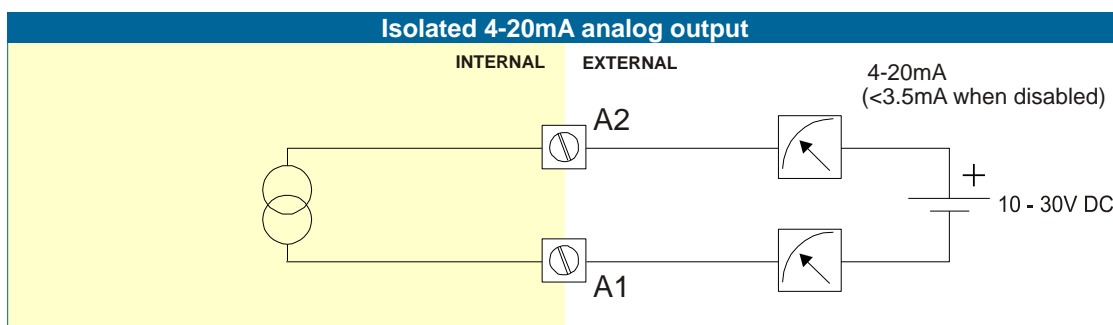
Type AH

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.

When the output is disabled, the current is by default limited to 3.5mA.

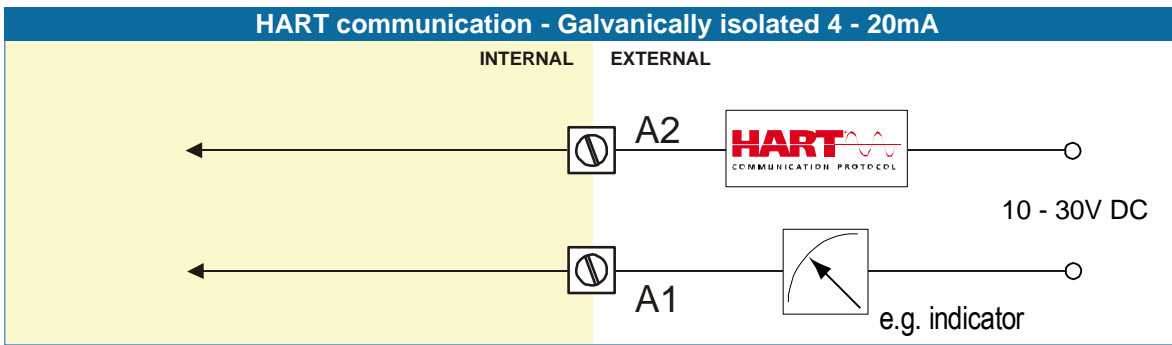
Max. driving capacity 1000 Ohm @ 30VDC.

This loop can also be used to power the E018-P. If only powered by the loop, the backlight will not be activated.

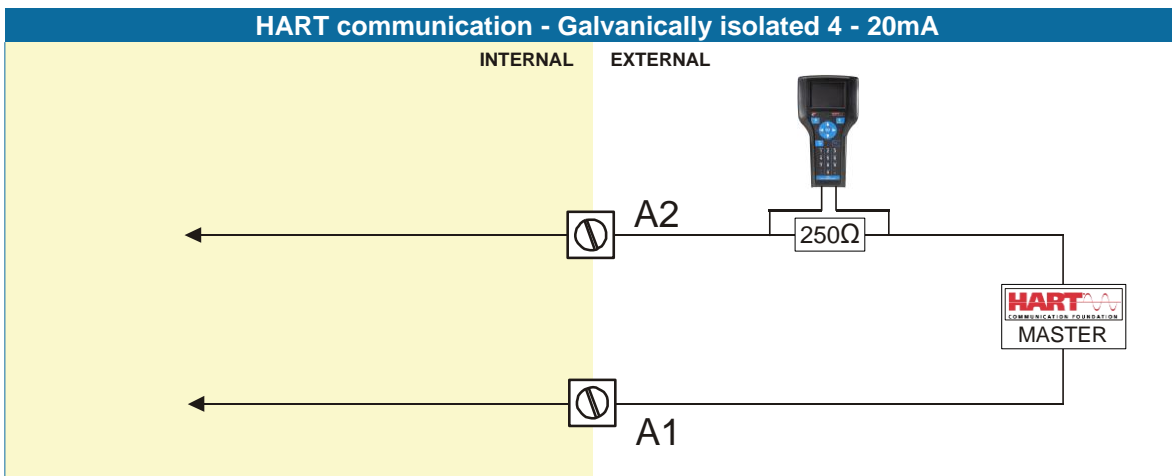


Terminal A1-A2; HART Communication – Type CR:

The E018-P is suitable for connecting a HART master device. This HART master device is connected to Terminal A1 and Terminal A2 to enable HART communication with the unit.



With HART Hand-Held device:



6 MAINTENANCE

6.1 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 E018-P may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Ensure that the measuring system is correctly wired up according to the wiring diagrams. The housing may only be opened by trained personnel.
- Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.

The E018-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 E018-P in such a way that no condensation will occur, for example by placing dry silica-gel sachet in the casing just before closing it. Furthermore, it is required to replace or dry the silica gel periodically as advised by the silica gel supplier.



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, the cable installation and mounting materials.
- 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.
- To avoid the generation of static-electricity, clean the enclosure with a lint-free cloth, made damp with a mild soap solution or fresh water.

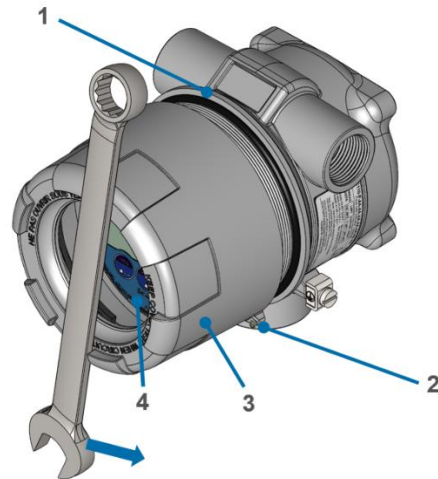
6.2 INSTRUCTIONS FOR REPAIR

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

6.3 OPEN AND CLOSE THE E-SERIES

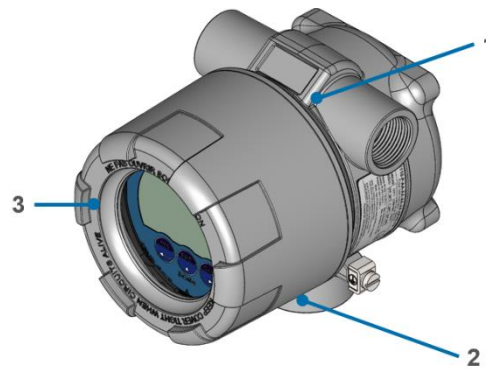
6.3.1 Remove the cover

1. Make the E-Series and the environment safe.
2. Loosen 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.



6.3.2 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).



6.4 BATTERY REPLACEMENT - SUPPLY MODULE (IF INSTALLED)



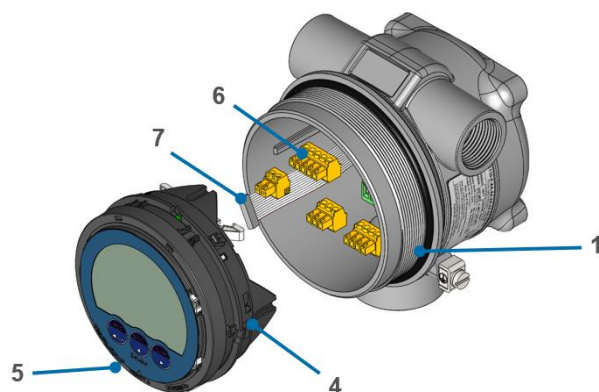
Note !

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

This procedure assumes, the E-Series is opened.

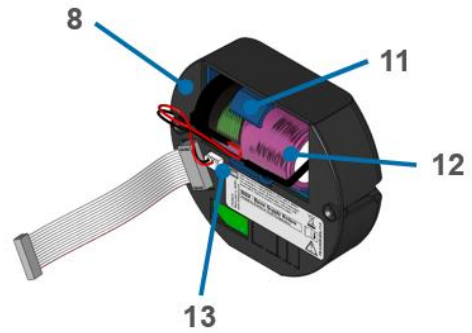
6.4.1 Remove the Main Electronics Module (MEM)

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. Keep the MEM (4) in a clean and safe location.



6.4.2 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 or keep the battery (12) and the BSM (8) in a clean and safe location.



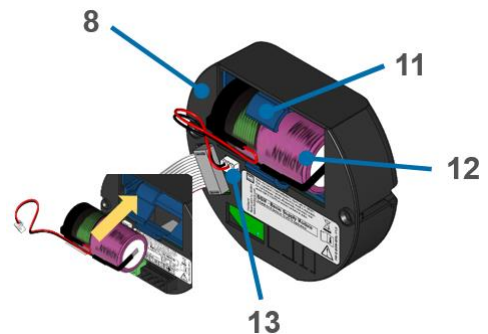
6.4.3 Install the battery in the Basic Supply Module (BSM)



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

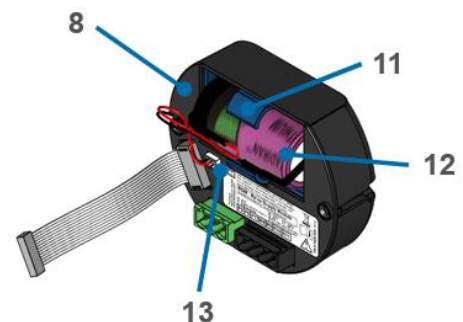
Unpack the new battery (12).

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



6.4.4 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 or keep the battery (12) and the RSM (8) in a clean and safe location.

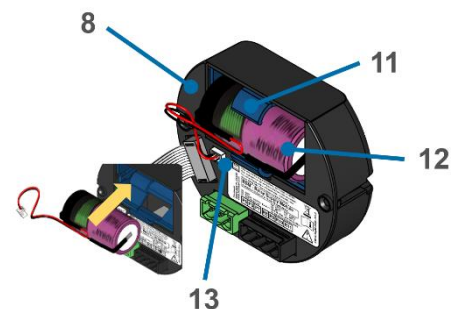


6.4.5 Install the battery in the Relay Supply Module (RSM)



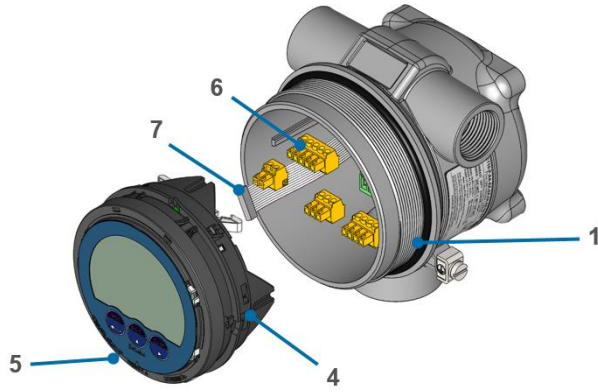
Handle the battery with care. A mistreated battery can become unsafe. Unsafe batteries can cause (serious) injury to persons.

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).



6.4.6 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).



6.4.7 Test and adjust the E018-P



Note !

This procedure assumes that the E018-P is serviceable.

ACTION	RESULT	NOTICE
1. At the side, press the PROG button for at least 7 seconds.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • The setup menu 2 shows. 	
3. At the side, press the ▲ button.	<ul style="list-style-type: none"> • The setup menu 2.1 shows. 	
4. At the side, press and hold the PROG button for at least 3 seconds.	<ul style="list-style-type: none"> • The display goes to the operation menu. 	The E018-P is ready for daily use.
5. Install the cover.	<ul style="list-style-type: none"> • The cover is installed and locked. 	

6.4.8 Job close up

1. Do a test of the optical keys to make sure the E018-P is ready for daily use.
2. Remove all tools, materials and equipment from the work area.
3. Make sure, the work area is clean.
4. Dispose of the (electronic) waste in accordance with the (inter)national, the manufacturer's and the plant owner's standards and regulations.
5. For future reference, make a note in the maintenance log of the installation.
6. Ask the safety officer for permission to return the E018-P into service.
7. Return the E018-P into service.

7 LABEL

7.1 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.

7.2 LABEL WITH CERTIFICATION DATA



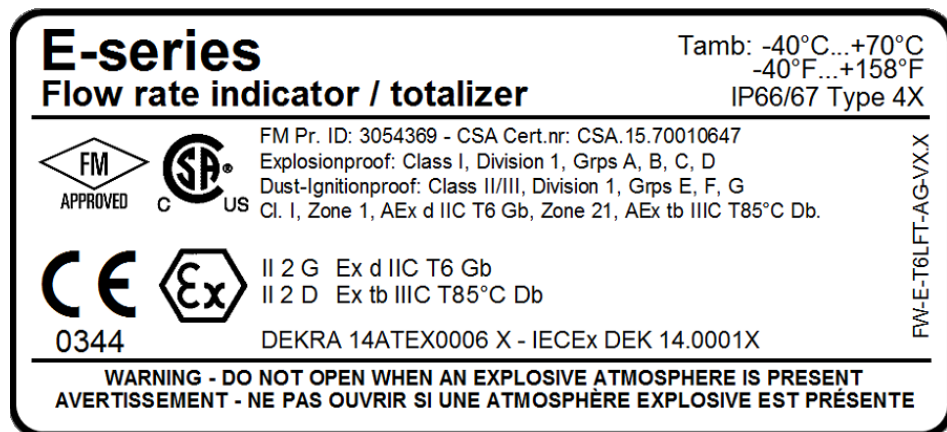
Note !

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 temperature class T5.

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



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

7.3 LABEL WITH THREAD SIZES.

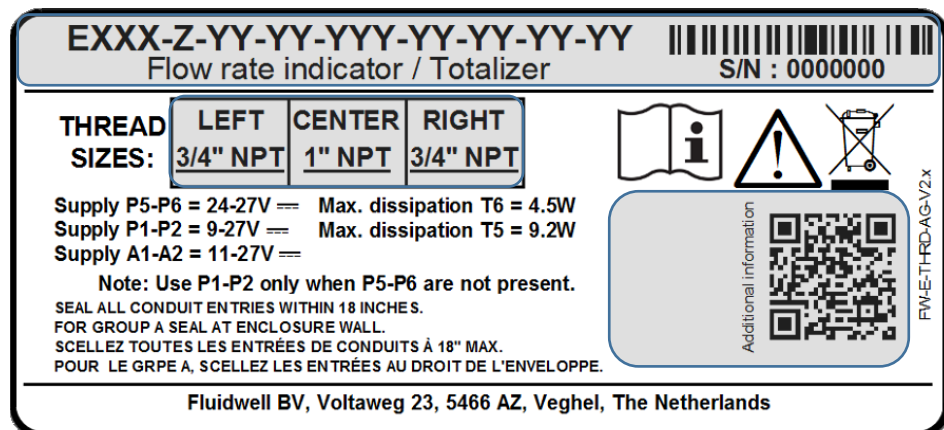


Note !

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.**

7.4 INTERNAL LABELS.

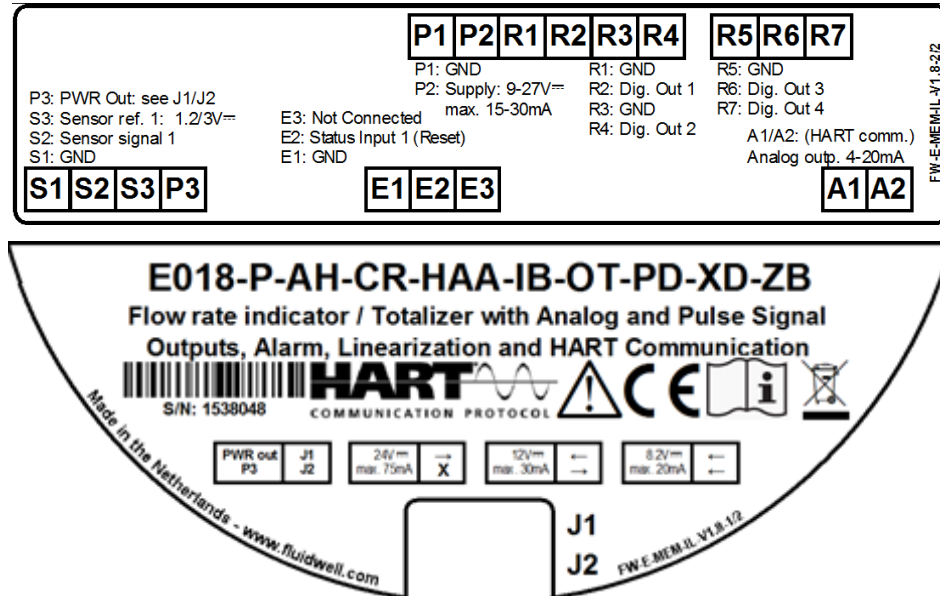


The labels show a typical example for recognition. For the actual data, refer to the label which is attached to your unit or refer to the Appendix A; Technical specifications.

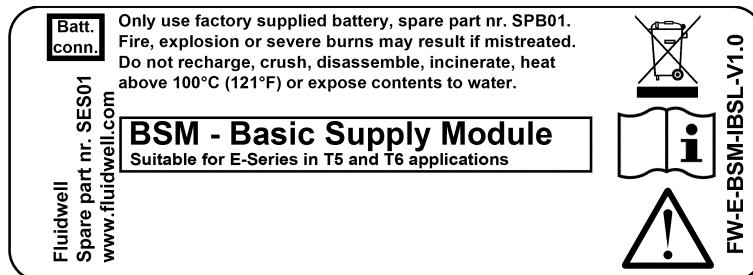
Label on the main electronics module (MEM):

The labels below are to be found on the main electronics module and supply modules inside the enclosure.

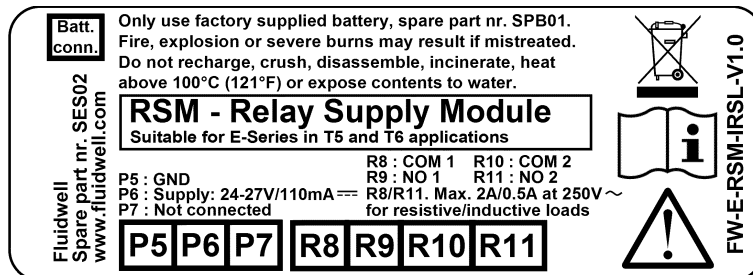
Label on the Main Electronics Module (MEM) (typical)



Label on the Basic Supply Module (BSM) (typical)





Label on the Relay Supply Module (RSM) (typical)



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. Silicone. Three optical keys with operation through the glass front window. IP67 / TYPE 4X / TYPE 7 / TYPE 8 / TYPE 9.
Type	Aluminum EX d enclosure. 112 x 133 x 148mm (4.41" x 5.24" x 5.83") – W x H x D. 1300 gr.
HA_ Dimensions	Stainless steel 316L Ex d enclosure. 112 x 133 x 148mm (4.41" x 5.24" x 5.83") – W x H x D. 3600 gr.
HS_ Dimensions	
Weight	
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 <i>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).</i>
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). <i>The loop powered analog output cannot power the backlight, mechanical relay output (OR) or the real sensor supply (Terminal P3).</i>
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. <i>This is not a real sensor supply. Only suitable for sensors with a very low power consumption like coils (sine wave) and reed-switches.</i>
Type PD	Terminal P3 : 8.2 / 12 / 24V DC <ul style="list-style-type: none"> 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 :  II 2 G Ex d IIC T6/T5 Gb. Dust :  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 P	Coil / sine wave (COIL-HI: 20mVpp or COIL-LO: 90mVpp sensitivity selectable), NPN, PNP, reed switch, NAMUR, active pulse signals 8 or 24V DC.
Frequency	Minimum 0Hz - maximum 10kHz 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 120Hz.
K-Factor	0.000010 - 9,999,999 with variable decimal position.
Low-pass filter	Available for all pulse signals.
Option ZF	Coil sensitivity 10mVpp.
Option ZG	Coil sensitivity 5mVpp.

Output

Digital output	
General	Pulse: Transmitting linearized 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). <ul style="list-style-type: none"> Requires 24 - 27V DC and supplied via P5 - P6. Frequency max. 5Hz. Type OT remains available.




Note !


Analog output	
General	Transmitting linearized 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.

HART communication (option)	
Functions	Reading display information, reading / writing all configuration settings
Protocol type CR	HART Communication protocol, Revision 7.0
Loop resistance	Between 250 and 1100Ω
Addressing	Maximum 32 addresses

Operational

Operator functions	
Displayed information	<ul style="list-style-type: none"> • Linearized flow rate and / or total. • Linearized total and accumulated total. • bargraph indication for flow rate. • Total can be reset to zero.

Total	
Digits	7 digits.
Unit	L; m3; US gal; l gal; cf; oilbbl; kg; ton; US ton; lb; ---- (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; US gal; l gal; cf; oilbbl; nL; nm3; scf; g; kg; ton; lb; US ton; rev; ---- (none)
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 E018-P is going to be installed or while it is in operation.

Flowmeter does not generate pulses:

Check:

- Signal selection SETUP – 5.1,
- Pulse amplitude (par. 4.4.3.),
- Flowmeter, wiring and connection of terminal connectors (par. 4.4.3.),
- Power supply of flowmeter (par. 4.4.2.).

Flowmeter generates "too many pulses":

Check:

- Settings for Total and Flowrate: SETUP 1.1-1.4 and 2.1-2.7,
- Type of signal selected with actual signal generated - SETUP – 5.1,
- Sensitivity of coil input - SETUP – 5.1 and par. 4.4.3.
- Proper grounding of the E018-P - par. 4.4.1.
- Use screened wire for flowmeter signals and connect screen to terminal S1. (unless connected at sensor)

Analog output does not function properly:

Check:

- SETUP 7.1 / 7.2: are the flow-levels programmed correctly?
- Connection of the external power-supply according to the specification.

Pulse output does not function:

Check:

- SETUP 8.7 - pulse per "x" quantity; is the value programmed reasonable and will the maximum output be under 20Hz?
- SETUP 8.6 - impulse width; is the external device able to recognize the selected pulse width and frequency?
- SETUP 8.1 – 84: is a "pulse output" selected for the correct output(s) ?

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 SETUP 2.6 within the time according to SETUP 2.7. Make sure that 2.7 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 SETUP 2.6.

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. The codes are:

0001: PCF error

0002: EEPROM ERROR
0004: INITIALISATION ERROR
0016: IO EXPANDER BASE ERROR
0032: IO EXPANDER INTERFACE ERROR
0064: LINEARIZATION ERROR
0128: KFACTOR CONVERSION 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. HART COMMUNICATION

IDENTIFICATION			
Manufacturer Name	Fluidwell B.V.	Model Name	E018-P
Manufacture ID Code	0x6039	Device Type Code	0xE2CD
HART Protocol revision	7.0	Revisions	Device Revision 0x03; Software Revision 0x01, Hardware Revision 0x00).
Physical layer	FSK, 4-wire high-impedance transmitter	Device type / Physical category	DC-isolated Bus Device Transmitter
Device ID	0x177864	Device profile	0x01
	HCF SDC625 tokenized output: Emerson 475 Field communicator:		
Universal commands	All universal commands (including command 38 and 48) are supported.		
Common practice commands	Following common practice commands are supported:		
	Command 34 Set PV damping value Command 35 Write PV Range Values Command 38 Reset configuration change flag Command 40 Enter/Exit Fixed Current Mode Command 42 Device Reset Command 45 Trim Loop current zero Command 46 Trim Loop current gain Read additional device status Command 48 Read additional device status Command 54 Read device variable information Command 59 Write Response Preambles Command 100 Write PV Alarm Code		
Number of device-specific commands	17 (+2 used indirectly)	Number of dynamic variables	3
Map-able dynamic variables	No	Additional device status flags	Yes
Burst mode	No	Alternative operating modes	No
Catch device variable	No	Write protection	No

HART Device Description

All standard HART configuration items are accessible without any special configuration. In order to be able to configure all settings of your E018-P HART device, your host or communicator requires the use of a specific HART Device Descriptor (DD), especially designed for the E018-P. These DD's can be downloaded from the HART Communication Foundations website (www.hartcomm.org) or the Fluidwell website (www.fluidwell.com).

HART VARIABLES

The following E018-P runtime variables are mapped to the HART dynamic device variables:

HART VARIABLES	
Type	E018-P
PV (primary variable)	Flowrate
SV(secondary variable)	Total
TV (tertiary variable)	Accumulated total
QV (quaternary variable)	Not used



Note !

The Flowrate value is permanently linked to the PV and the analog output.

Device status information

The E018-P returns its status in the device status byte available through command 48. When the status flag 'more status available' is set, command 48 can return the following status flags in its additional status bytes:

DEVICE STATUS INFORMATION			
BYTE	DESCRIPTION	CONTENT	
14	E0 error register 1	Fld. Dev.stat 14-1	0x01: Display error
		Fld. Dev.stat 14-2	0x02: EEPROM error
		Fld. Dev.stat 14-3	0x04: not used
		Fld. Dev.stat 14-4	0x08: not used
		Fld. Dev.stat 14-5	0x10: Low alarm error
		Fld. Dev.stat 14-6	0x20: High alarm error
		Fld. Dev.stat 14-7	0x40: Linearization error
		Fld. Dev.stat 14-8	0x80: Input frequency too high
15	E0 error register 2	Fld. Dev.stat 15-1	0x01: Initialization error
		Fld. Dev.stat 15-2	0x02: Warning: Total was cleared (either via HART or by hand).



Caution !

FLD. DEV.STAT 14-1 AND FLD. DEV.STAT 14-2 ARE CRITICAL ERRORS AND RESULT IN THE DEVICE MALFUNCTION FLAG TO BE SET IN DEVICE STATUS.



Note !

The device malfunction is not expressed with Namur43-conditions but by means of a status flag in the device status through command 48.

Command specific response codes

The following response codes are valid for all implemented commands:

COMMAND SPECIFIC RESPONSE CODES		
CODE	CLASS	DESCRIPTION
0	Success	No command-specific errors
1	-	Undefined
2	Error	Invalid selection
3	Error	Passed parameter too big
4	Error	Passed parameter too small
5	Error	Too few data bytes received
6	Error	Device-specific command error
7	Error	In write protect mode

UNITS

The predefined units in HART are mapped to the E018-P totalizer and flowrate units as follows:

TOTALIZER			
Setup unit	Display icon	DD UNIT	Hart Nr.
l	L	L	41
m3	M3	M3/Cum	43
US Gal	gal	gal	40
l GAL	gal	Imp gal.	42
Cf	ft3	Cuft	112
Oil bbl	bbl	bbl	46
kg	kg	kg	61
ton	ton	met ton	62
lb	lb	lb	63
US ton	ton	STon	64
none	----	none	251

FLOWRATE								
E018 unit	Unit /second	HART unitnr.	Unit /minute	HART unitnr.	Unit /hour	HART unitnr.	Unit /day	HART unitnr.
ml	ml/sec	246*	ml/min	247*	ml/hr	248*	ml/day	249*
L	l/sec	24	l/min	17	l/hr	138	l/day	240*
m3	m3/sec	28	m3/min	131	m3/hr	19	m3/day	29
USgal	gal/sec	22	gal/min	16	gal/hr	136	gal/day	235
lgal	lgal/sec	137	lgal/min	18	lgal/hr	30	lgal/day	31
cf	Cuft/sec	26	Cuft/min	15	Cuft/hr	130	Cuft/day	27
bbl	bbl/sec	132	bbl/min	133	bbl/hr	134	bbl/day	135
nl	Normal l/sec	176	Normal l/min	175	Normal l/hr	122	Normal l/day	174
nm3	Normal m3/sec	183	Normal m3/min	182	Normal m3/hr	121	Normal m3/day	181
scf	Std. Cuft/sec	186	Std. Cuft/min	123	Std. Cuft/hr	185	Std. Cuft/day	184
g	g/sec	70	g/min	71	g/hr	72	g/day	241*
kg	kg/sec	73	kg/min	74	kg/hr	75	kg/day	76
ton**	ton/sec	242*	tons/min	77	tons/hr	78	tons/day	79
lb	lb/sec	80	lb/min	81	lb/hr	82	lb/day	83
USTon	USTon/sec	243*	USTon/min	84	USTon/hr	85	USTon/day	86
rev	rev/sec	118	rev/min	119	rev/hr	244	rev/day	245
none	none/sec	251	none /min	251	none /hr	251	none /day	251

Appendix D. DECLARATION OF CONFORMITY



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	Ⓜ II 2 D Ex tb IIIC T85 °C/T100 °C Db
	4.5 W / 9.2 W respectively)	

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 19 th , 2016	from April 20 th , 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 CONFIGURATION SETTINGS

SETTING	DEFAULT	DATE :	DATE :
1 - TOTAL	Enter your settings here:		
1.1 unit	L		
1.2 decimals	0000000		
1.3 K-factor	0000001		
1.4 decimals K-factor	0		
2 - FLOWRATE			
2.1 unit	L		
2.2 time	/min		
2.3 decimals	0000000		
2.4 K-factor	0000001		
2.5 decimals K-factor	0		
2.6 calculation / pulses	010		
2.7 cut-off time	30.0 sec.		
2.8 damping	0.1		
3 - ALARM			
3.1 flowzero	ignore		
3.2 alarm low-low	0		
3.3 alarm low	0		
3.4 alarm high	0		
3.5 alarm high-high	0		
3.6 delay alarm low-low	0.0 sec		
3.7 delay alarm low	0.0 sec		
3.8 delay alarm high	0.0 sec		
3.9 delay alarm high-high	0.0 sec		
4 - DISPLAY			
4.1 function	flowrate		
4.2 set alarm	operator		
4.3 LCD-new	1 sec		
4.4 backlight	100%		
4.5 backlight alarm	off		
4.6 bargraph	enabled		
4.7 ratespan	1000		
5 - FLOWMETER			
5.1 signal	coil-lo		
6 - LINEARIZE			
6.1 frequency 1	0.0Hz		
m-factor 1	1.000000		
6.2 frequency 2	0.0Hz		
m-factor 2	1.000000		
6.3 frequency 3	0.0Hz		
m-factor 3	1.000000		
6.4 frequency 4	0.0Hz		
m-factor 4	1.000000		
6.5 frequency 5	0.0Hz		
m-factor 5	1.000000		
6.6 frequency 6	0.0Hz		
m-factor 6	1.000000		
6.7 frequency 7	0.0Hz		
m-factor 7	1.000000		
6.8 frequency 8	0.0Hz		
m-factor 8	1.000000		
6.9 frequency 9	0.0Hz		
m-factor 9	1.000000		

LIST OF CONFIGURATION SETTINGS (CONTINUED)			
SETTING	DEFAULT	DATE :	DATE :
6 – LINEARIZE (continued)			
6.A frequency A	0.0Hz		
m-factor A	1.000000		
6.B frequency B	0.0Hz		
m-factor B	1.000000		
6.C frequency C	0.0Hz		
m-factor C	1.000000		
6.D frequency D	0.0Hz		
m-factor D	1.000000		
6.E frequency E	0.0Hz		
m-factor E	1.000000		
6.F frequency F	0.0Hz		
m-factor F	1.000000		
6.G linearization	disabled		
6.H decimals frequency	1111.1		
7 - ANALOG OUTPUT			
7.1 rate-min; pv-lrv	0		
7.2 rate-max; pv-urv	1600		
7.3 tune-min	725		
7.4 tune-max	3627		
8 - PULSE			
8.1 output R1	off		
8.2 output R2	off		
8.3 output R3	off		
8.4 output R4	off		
8.5 width	000 sec		
8.6 decimals	0		
8.7 amount	0001000		
9 – COM-HART			
9.1 address	00		
9.2 loop current	enabled		
9.3 loop test	off		
10 - OTHERS			
10.1 model	E018-P	E018-P	E018-P
10.2 software version	03: _ : _		
10.3 serial number	_ _ _ _ _		
10.4 password	0000		
10.5 key lock	enabled		
10.6 tag-no	0000000		

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