

*FLOWRATE INDICATOR / TOTALIZER
Intrinsically Safe*

Model: ERAX

MS1163
0515
0009

METER MOUNT

REMOTE MOUNT



*ERAX-M
H6110-P-HR-XI*

*ERAX-RMA
H6110 -P-HA/E/U-PC-XI*

*Signal input flowmeter: pulse, Namur and coil
Signal outputs: (0)4-20mA ref. flowrate and pulse ref. total
Options: Modbus communication*



SAFETY INSTRUCTIONS



- Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.



- **LIFE SUPPORT APPLICATIONS:** The ERAX is not designed for use in life support appliances, devices, or systems where malfunction of the product can reasonably be expected to result in a personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify the manufacturer and supplier for any damages resulting from such improper use or sale.



- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the unit, the installer has to discharge himself by touching a well-grounded object.



- This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).



- **Do connect a proper grounding to the aluminum casing as indicated.**

- **Intrinsically Safe applications:** follow the instructions as mentioned in Chapter 5 and see Macnaught H61..-P-XI Documentation for Intrinsic Safety.

DISPOSAL - WEEE DIRECTIVE



- *The WEEE Directive requires the recycling of waste electrical and electronic equipment in the European Union.*
- *Whilst the WEEE Directive does not apply to some of Macnaught's products, we support its policy and ask you to be aware of how to dispose of this product.*
- *The crossed out wheeled bin symbol illustrated and found on our products signifies that this product should not be disposed of in general waste or landfill.*
- *Please contact your local dealer national distributor or Macnaught Technical Services for information on product disposal..*

SAFETY RULES AND PRECAUTIONARY MEASURES

- The manufacturer accepts no responsibility whatsoever if the following safety rules and precautions instructions and the procedures as described in this manual are not followed.
- Modifications of the ERAX 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 unit.
- Check all connections, settings and technical specifications of the various peripheral devices with the ERAX supplied.
- Open the casing 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 casing classification (see manufacture's plate and chapter 4.2.).
- If the operator detects errors or dangers, or disagrees with the safety precautions taken, then inform the owner or principal responsible.
- The local labor and safety laws and regulations must be adhered to.

ABOUT THE INSTRUCTION MANUAL

This instruction manual is divided into two main sections:

- The daily use of the unit is described in chapter 2 "Operation". 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 instruction manual describes the standard unit as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the ERAX 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 ERAX or connected instruments.



Caution !

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



Note !

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

Hardware version:	03.01.xx
Software version:	03.01.xx
Manual :	MS1163_0515_0009_(H6110)
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1. INTRODUCTION

1.1. SYSTEM DESCRIPTION OF THE ERAX

Functions and features

The flowrate / totalizer model ERAX is a microprocessor driven instrument designed to display flowrate, total and accumulated total.

This product has been designed with a focus on:

- ultra-low power consumption to allow long-life battery powered applications (type PB / PC),
- intrinsic safety for use in hazardous applications (type XI),
- several mounting possibilities with Meter mount, GRP or aluminum enclosures for industrial surroundings,
- ability to process all types of flowmeter signals,
- transmitting possibilities with analog / pulse and communication (option) outputs.

Flowmeter input

This manual describes the unit with a pulse type input from the flowmeter. One flowmeter with a passive or active pulse, Namur or sine wave (coil) signal output can be connected to the ERAX. To power the sensor an external power supply is required (8-24V DC)..

Standard outputs

- Configurable pulse output: a scaled pulse mirroring a certain totalized quantity. Maximum frequency 500Hz.; the pulse length can be set in steps of 1ms.
- Configurable linear 4-20mA analog output with 10-bits resolution mirroring the actual flowrate. Flowrate levels as well as the minimum and maximum signal output can be tuned.

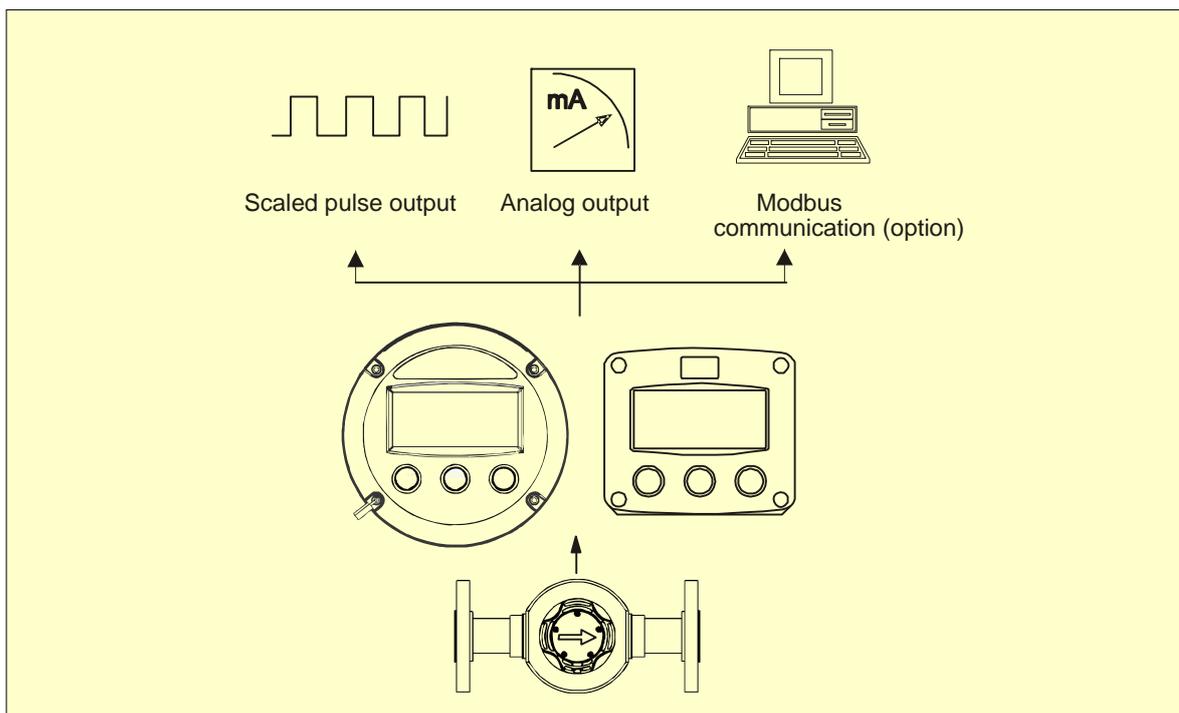


Fig. 1: Typical application for the ERAX

Configuration of the unit

The ERAX was designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your ERAX according to your specific requirements. SETUP includes several important features, such as K-factors, measurement units, signal selection etc. All settings are stored in EEPROM memory and will not be lost in the event of 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 3.2.3.

Display information

The unit has a large transfective LCD with all kinds of symbols and digits to display measuring units, status information, trend-indication and key-word messages.

Flowrate and totals can be displayed either with the small 8mm digits or with the 17mm digits.

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

Communication

Full Modbus communication through TTL levels is available intrinsically safe (also battery powered).

2. OPERATIONAL

2.1. GENERAL



- The ERAX 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.

This chapter describes the daily use of the ERAX. This instruction is meant for users / operators.

2.2. CONTROL PANEL

The following keys are available:



Fig. 2: Control Panel.

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 unit; please read chapter 3.

2.3. OPERATOR INFORMATION AND FUNCTIONS

In general, the ERAX will always act at Operator level. The information displayed is dependant upon the SETUP-settings. All pulses generated by the connected flowmeter are measured by the ERAX in the background, whichever screen refresh rate setting is chosen. After pressing a key, the display will be updated very quickly during a 30 second period, after which it will slow-down again.



Fig. 3: Example of display information during process

For the Operator, the following functions are available:

- **Display flowrate / total or flowrate**
This is the main display information of the ERAX. 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 17mm digits; in this instance press the SELECT-key to read the total.
When "-----" is shown, then the flowrate value is too high to be displayed. The arrows \blacklozenge indicate the increase/decrease of the flowrate trend.
- **Clear total**
The value for total can be re-initialized. To do so, press CLEAR twice. After pressing CLEAR once, the flashing text "PUSH CLEAR" is displayed. To avoid re-initialization at this stage, press another key than CLEAR or wait for 20 seconds.
Re-initialization of total DOES NOT influence the accumulated total.
- **Display accumulated total**
When the SELECT-key is pressed, total and accumulated total are displayed. The accumulated total cannot be re-initialized. The value will count up to 99,999,999,999. The unit and number of decimals are displayed according to the configuration settings for total.
- **Low-battery alarm**
When the battery voltage drops, it must be replaced. At first "low-battery" will flash, but as soon as it is displayed continuously, the battery MUST be replaced shortly after!
Only original batteries supplied by the manufacturer may be used, else the guarantee and liability will be terminated. The remaining lifetime after the first moment of indication is generally several days up to some weeks.



Fig. 4: Example of low-battery alarm

- **Alarm**
When "alarm" is displayed, please consult **Appendix B: Problem Solving**.

3. CONFIGURATION

3.1. INTRODUCTION

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



Caution !

- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by authorized and trained personnel. Personnel must read and understand this Operating Manual before carrying out its instructions.
- The ERAX may only be operated by personnel who are authorized and trained. 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

3.2.1. GENERAL

Configuration of the ERAX is done at SETUP-level. SETUP-level is reached by pressing the PROG/ENTER key for 7 seconds; at which time, both arrows \blacktriangle 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.

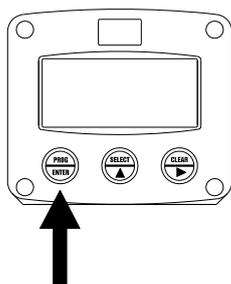
SETUP can be reached at all times while the ERAX remains fully operational.



Note !

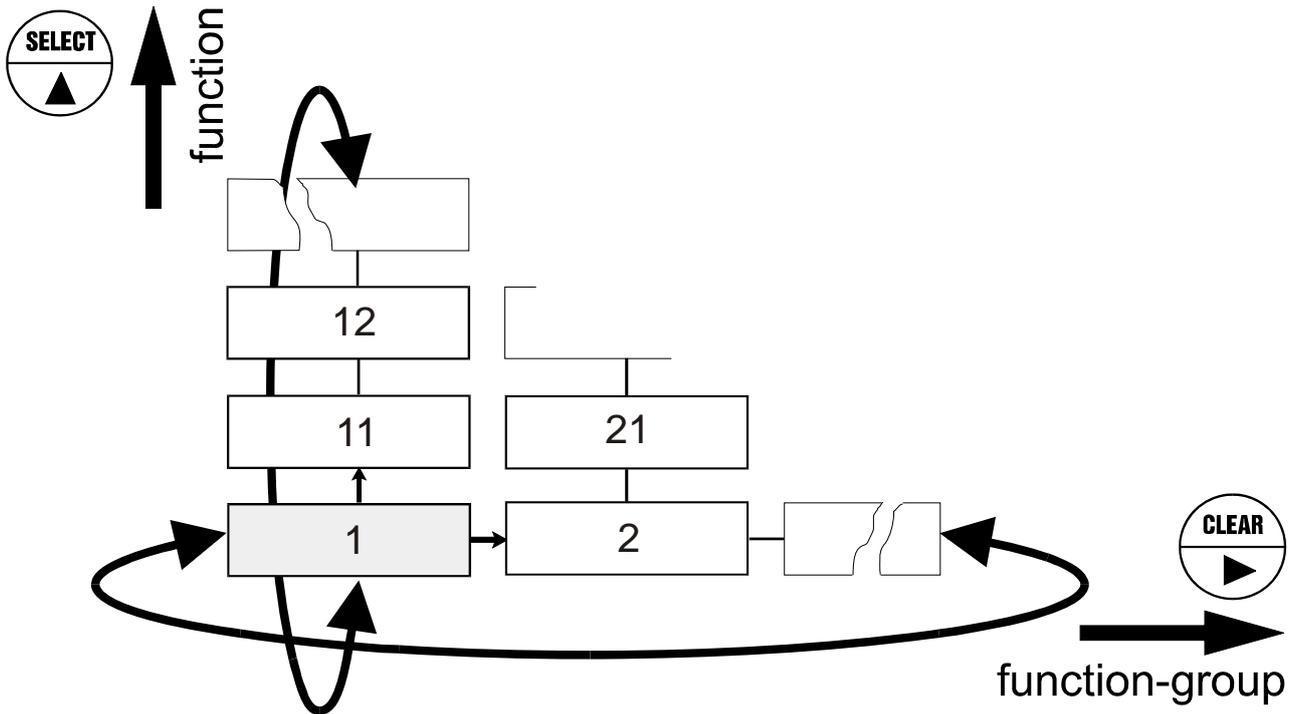
Note: A password may be required to enter SETUP. Without this password access to SETUP is denied.

To enter SETUP-level:



Press  for 7 seconds

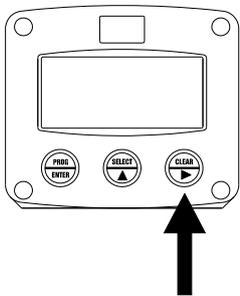
Matrix structure SETUP-level:



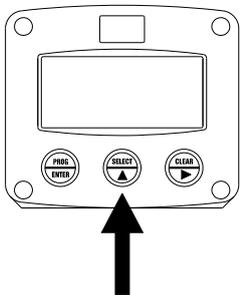
SCROLLING THROUGH SETUP-LEVEL

Selection of function-group and function:

SETUP is divided into several function groups and functions.



Select function-group with 

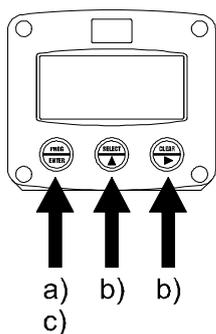


Select function with 

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[▲], 11[▲], 12[▲], 13[▲], 14[▲], 1[▶], 2[▶], 3[▲], 31 etc.).

To change or select a value:



a) press  briefly; **PROGRAM** will start flashing

b) select or enter value with  and / or 

c) press  to confirm the value / selection

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

To select a setting, both  and  can be used.

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

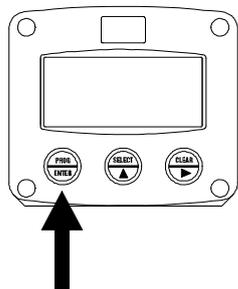
When data is altered but ENTER is not pressed, then the alteration can still be cancelled by waiting for 20 seconds or by pressing ENTER for three seconds: the PROG-procedure will be left automatically and the former value reinstated.



Note !

Note: alterations will only be set after ENTER has been pressed!

To return to OPERATOR-level:



Press  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

SETUP FUNCTIONS AND VARIABLES		
1	TOTAL	
11	UNIT	L - m3 - kg - lb - GAL - USGAL - bbl - no unit
12	DECIMALS	0 - 1 - 2 - 3 (Ref: displayed value)
13	K-FACTOR:	0.000010 - 9,999,999
14	DECIMALS K-FACTOR	0 - 6
2	FLOWRATE	
21	UNIT	mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - no unit - scf - Nm3 - NL - P
22	TIME UNIT	sec - min - hour - day
23	DECIMALS	0 - 1 - 2 - 3 (Ref: displayed value)
24	K-FACTOR	0.000010 - 9,999,999
25	DECIMALS K-FACTOR	0 - 6
26	CALCULATION	per 1 - 255 pulses
27	CUT-OFF	0.1 - 999.9 seconds
3	DISPLAY	
31	FUNCTION	total - rate
32	LIGHT	0% (OFF) - 20% - 40% - 60% - 80% - 100% (FULL BRIGHTNESS)
4	POWERMANAGEMENT	
41	LCD UPDATE	fast - 1 sec - 3 sec - 15 sec - 30 sec - off
42	BATTERY MODE	operational - shelf
5	FLOWMETER	
51	SIGNAL	nnp - nnp_lp - reed - reed_lp - pnp - pnp_lp - namur - coil_hi - coil_lo - act_8.1 - act_12 - act_24
6	ANALOG	
61	OUTPUT	disable - enable
62	MINIMUM SIGNAL	0000.000 - 9,999,999 unit/time unit
63	MAXIMUM SIGNAL	0000.000 - 9,999,999 unit/time unit
64	CUT-OFF	0.0 - 9.9%
65	TUNE MIN - (0)4mA / 0V	0 - 9,999
66	TUNE MAX- 20mA / 10V	0 - 9,999
67	FILTER	00 - 99
7	PULSE	
71	PULSE WIDTH	0.000 - 9.999 sec (0 = Off)
72	DECIMALS	0 - 1 - 2 - 3
73	AMOUNT	X,XXX,XXX quantity
8	COMMUNICATION	
81	SPEED / BAUDRATE	1200 - 2400 - 4800 - 9600
82	ADDRESS	1 - 255
83	MODE	ASCII - rtu - off
9	OTHERS	
91	TYPE / MODEL	
92	SOFTWARE VERSION	
93	SERIAL NO.	
94	PASSWORD	0000 - 9999
95	TAGNUMBER	0000000 - 9999999

3.2.3. EXPLANATION OF SETUP-FUNCTIONS

1 - TOTAL	
UNIT 11	<p>SETUP - 11 determines the measurement unit for total, accumulated total and pulse output. The following units can be selected:</p> <p style="text-align: center;">L - m3 - kg - lb. - GAL - USGAL - bbl - _ (no unit).</p> <p>Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.</p>
DECIMALS 12	<p>The decimal point determines for total, accumulated total and pulse output the number of digits following the decimal point. The following can be selected:</p> <p style="text-align: center;">0000000 - 111111.1 - 22222.22 - 3333.333</p>
K-FACTOR 13	<p>With the K-factor, the flowmeter pulse signals are converted to a quantity. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 11), 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>Let us assume that the flowmeter generates 2.4813 pulses per liter and the selected unit is "cubic meters / m3". A cubic meter consists of 1000 parts of one liter which implies 2,481.3 pulses per m3. So, the K-factor is 2,481.3. Enter for SETUP - 13: "2481300" and for SETUP - 14 - decimals K-factor "3".</i></p> <p>Example 2: Calculating the K-factor. <i>Let us assume that the flowmeter generates 6.5231 pulses per gallon and the selected measurement unit is gallons. So, the K-Factor is 6.5231. Enter for SETUP - 13: "6523100" and for SETUP - 14 decimals K-factor "6".</i></p>
DECIMALS K-FACTOR 14	<p>This setting determines the number of decimals for the K-factor entered. (SETUP 13). The following can be selected:</p> <p style="text-align: center;">0 - 1 - 2 - 3 - 4 - 5 - 6</p> <p>Please note that this setting influences the accuracy of the K-factor indirectly. (i.e. the position of the decimal point and thus the value given) This setting has NO influence on the displayed number of digits for total (SETUP 12)!</p>

2 - FLOWRATE

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 !

Note: these settings also influence the analog output.

UNIT 21	<p>SETUP - 21 determines the measurement unit for flowrate. The following units can be selected:</p> <p style="text-align: center;">mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - no unit - scf - Nm3 - NL - P.</p> <p>Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.</p>
TIME UNIT 22	The flowrate can be calculated per second (SEC), minute (MIN), hour (HR) or day (DAY).
DECIMALS 23	<p>This setting determines for flowrate the number of digits following the decimal point. The following can be selected:</p> <p style="text-align: center;">00000 - 1111.1 - 2222.22 - 3333.333</p>
K-FACTOR 24	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 21), for example per liter. The more accurate the K-factor, the more accurate the functioning of the system will be. For examples read SETUP 13.
DECIMALS K-FACTOR 25	<p>This setting determines the number of decimals for the K-factor (SETUP 24). The following can be selected:</p> <p style="text-align: center;">0 - 1 - 2 - 3 - 4 - 5 - 6</p> <p>Please note that this SETUP - influences the accuracy of the K-factor indirectly. This setting has NO influence on the displayed number of digits for "flowrate" (SETUP 23)!</p>
CALCULATION 26	<p>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.</p> <p>Note: this setting does influence the update time for the analog output directly (maximum update 10 times a second). If the output response is too slow, decrease the number of pulses.</p> <p>Note: the lower the number of pulses, the higher the power consumption of the unit will be (important for battery powered applications).</p> <p>Note: for low frequency applications (below 10Hz): do not program more than 10 pulses else the update time will be very slow.</p> <p>Note: for high frequency application (above 1kHz) do program a value of 50 or more pulses.</p>
CUT-OFF TIME 27	<p>With this setting, you determine a minimum flow requirement threshold, if during this time less than XXX-pulses (SETUP 26) are generated, the flowrate will be displayed as zero.</p> <p>The cut-off time has to be entered in seconds - maximum time is 999 seconds (about 15 minutes).</p>



Note !

3 - DISPLAY	
FUNCTION 31	The large 17mm digits can be set to display total or flowrate. When "total" is selected, both total and flowrate are displayed simultaneously. When "flowrate" is selected, only flowrate will be displayed with it's measuring unit while total will be displayed after pressing SELECT.
LIGHT (BACKLIGHT BRIGHTNESS) 32	The density of the backlight can be set in following range: 0% (OFF) – 20% - 40% - 60% - 80% - 100% (FULL BRIGHTNESS) Note: Backlight functionality is not available on intrinsically safe units.



Note !

4 - POWERMANAGEMENT	
LCD UPDATE 41	The calculation of the display-information influences the power consumption significantly. When the application does not require a fast display update, it is strongly advised to select a slow refresh rate. Please understand that NO information will be lost; every pulse will be counted and the output signals will be generated in the normal way. The following can be selected: Fast - 1 sec - 3 sec - 15 sec - 30 sec - off. Example 3: Battery life-time <i>battery life-time with a coil pick-up, 1KHz. pulses and FAST update: about 2 years.</i> <i>battery life-time with a coil pick-up, 1KHz. pulses and 1 sec update: about 5 years.</i> Note: after a button has been pressed by the operator - the display refresh rate will always switch to FAST for 30 seconds. When "OFF" is selected, the display will be switched off after 30 seconds and will be switched on as soon as a button has been pressed.
BATTERY-MODE 42	The unit has two modes: operational or shelf. After "shelf" has been selected, the unit can be stored for several years; it will not count pulses, the display is switched off but all settings and totals are stored. In this mode, power consumption is extremely low. To wake up the unit again, press the SELECT-key twice.



Note !

5 - FLOWMETER



Note !

SIGNAL 51	The ERAX is able to handle several types of input signal. The type of flowmeter pickup / signal is selected with SETUP 51. Note: The selections "active pulse" offer a detection level of 50% of the supply voltage. Read also par. 4.4.3. Flowmeter input terminal 09-11.			
TYPE OF SIGNAL	EXPLANATION	RESISTANCE	FREQ. / MV	REMARK
NPN	NPN input	100K pull-up	6 kHz.	(open collector)
NPN - LP	NPN input with low pass filter	100K pull-up	2.2 kHz.	(open collector) less sensitive
REED	Reed-switch input	1M pull-up	1.2 kHz.	
REED - LP	Reed-switch input with low pass filter	1M pull-up	120 Hz.	Less sensitive
PNP	PNP input	100K pull-down	6 kHz.	
PNP - LP	PNP input with low pass filter	100K pull-down	700 Hz.	Less sensitive
NAMUR	Namur input	820 Ohm pull-down	4 kHz.	External power required
COIL HI	High sensitive sine-wave (coil) input	-	20mVp-p.	Sensitive for disturbance!
COIL LO	Low sensitive sine-wave (coil) input	-	90mVp-p.	Normal sensitivity
ACT_8.1	Active pulse input 8.1 VDC	3K9	10KHz.	External power required
ACT_12	Active pulse input 12 VDC	4K	10KHz.	External power required
ACT_24	Active pulse input 24 VDC	3K	10KHz.	External power required

6 - ANALOG OUTPUT

A linear analog (0)4-20mA or 0-10V signal is generated according to the flowrate with a 10 bits resolution. The settings for flowrate (SETUP - 2) influence the analog output directly. The relationship between rate and analog output is set with the following functions:

DISABLE / ENABLE 61	The analog output can be disabled. 3.5mA will be generated if a power supply is available but the output is disabled (this is not valid in case type AB or AU has been supplied).
MINIMUM FLOWRATE 62	Enter here the flowrate at which the output should generate the minimum signal (0/4mA or 0V) - in most applications at flowrate "zero". The number of decimals displayed depend upon SETUP 23. The time and measuring units (L/min for example) are dependant upon SETUP 21 and 22 but cannot be displayed.
MAXIMUM FLOWRATE 63	Enter here the flowrate at which the output should generate the maximum signal (20mA or 10V) - in most applications at maximum flow. The number of decimals displayed depend upon SETUP 23. The time and measuring units (L/min for example) are dependant upon SETUP 21 and 22 but cannot be displayed.
CUT-OFF 64	To ignore leakage of the flow for example, a low flow cut-off can be set as a percentage of the full range of 16mA, (or 20mA or 10V). When the flow is less than the required rate, the current will be the minimum signal (0/4mA or 10V). Examples:

4mA (SETUP 62)	20mA (SETUP 63)	CUT-OFF (SETUP 64)	REQUIRED RATE	OUTPUT
0 L/min	100 L/min	2%	$(100-0)*2\% = 2.0 \text{ L/min}$	$4+(16*2\%) = 4.32\text{mA}$
20 L/min	800 L/min	3.5%	$(800-20)*3.5\% = 27.3 \text{ L/min}$	$4+(16*3.5\%) = 4.56\text{mA}$

TUNE MIN / 4MA 65	The initial minimum analog output value is 0/4mA or 0V. However, this value might differ slightly due to external influences such as temperature for example. The 0/4mA or 0V 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 arrow-keys and is directly active. Press ENTER to store the new value.

Remark: the analog output value can be programmed "up-side-down" if desired, so 20mA at minimum flowrate for example!

TUNE MAX / 20MA 66	The initial maximum analog output value is 20mA (or 10V). However, this value might differ slightly due to external influences such as temperature for example. The 20mA value (or 10V) 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 20mA. The current can be increased / decreased with the arrow-keys and is directly active. Press ENTER to store the new value.

Remark: the analog output value can be programmed "up-side-down" if desired, so 4mA at maximum flowrate for example!

Continued next page >>>



6 - ANALOG OUTPUT (CONTINUED)

FILTER 67	This function is used to stabilize the analog output signal. The output value is updated 8 times per second. With the help of this digital filter a more stable but less precise reading can be obtained. The filter principal is based on three input values: the filter level (01-99), the last analog output value and the last average value. The higher the filter level, the longer the response time on a value change will be. Below, several filter levels with their response times are indicated:			
FILTER VALUE	RESPONSE TIME ON STEP CHANGE OF ANALOG VALUE. TIME IN SECONDS			
	50% INFLUENCE	75% INFLUENCE	90% INFLUENCE	99% INFLUENCE
01	filter disabled	filter disabled	filter disabled	filter disabled
02	0.1 second	0.2 second	0.4 second	0.7 second
03	0.2 second	0.4 second	0.6 second	1.2 seconds
05	0.4 second	0.7 second	1.1 seconds	2.1 seconds
10	0.7 second	1.4 seconds	2.2 seconds	4.4 seconds
20	1.4 seconds	2.8 seconds	4.5 seconds	9.0 seconds
30	2.1 seconds	4 seconds	7 seconds	14 seconds
50	3.5 seconds	7 seconds	11 seconds	23 seconds
75	5.2 seconds	10 seconds	17 seconds	34 seconds
99	6.9 seconds	14 seconds	23 seconds	45 seconds

7 - PULSE

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

PULSE WIDTH 71	<p>The pulse width determines the time that the output will be switched on; in other words the pulse length. The time between two pulses (when the output is switched off) is at least as long as the pulse width time (50/50 duty cycle).</p> <p>The pulse width is set in milliseconds in the range 0.001 - 9.999 sec. Value "zero" disable the pulse output.</p> <p>Note: <i>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></p>
DECIMALS 72	<p>This setting determines the decimal position for setting 73.</p> <p>Note: the measuring unit is according to setting 11 (for total)</p>
AMOUNT 73	<p>According to the measurement unit settings for total, a pulse will be generated every X-quantity. Enter this quantity here while taking the displayed decimal position and measuring unit into account.</p>



Note !



Note !

8 - COMMUNICATION (OPTIONAL)

The functions described below deal with hardware that is not part of the standard delivery. Programming of these functions does not have any effect if this hardware has not been installed. Consult Appendix C and the Modbus communication protocol description for a detailed explanation.	
BAUDRATE 81	For external control, the following communication speeds can be selected: 1200 - 2400 - 4800 - 9600 baud
BUS ADDRESS 82	For communication purposes, a unique identity can be attributed to every ERAX. This address can vary from 1-255.
MODE 83	The communication protocol is Modbus ASCII or RTU mode. Select OFF, to disable this communication function.

9 - OTHERS

TYPE OF MODEL 91	For support and maintenance it is important to have information about the characteristics of the ERAX. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
VERSION SOFTWARE 92	For support and maintenance it is important to have information about the characteristics of the ERAX. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
SERIAL NUMBER 93	For support and maintenance it is important to have information about the characteristics of the ERAX. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
PASSWORD 94	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.
TAGNUMBER 95	For identification of the unit and communication purposes, a unique tag number of maximum 7 digits can be entered.

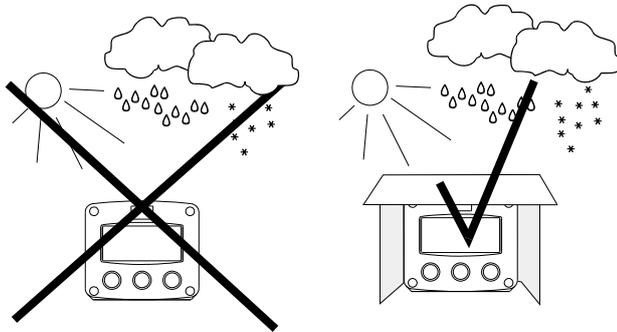
4. INSTALLATION

4.1. GENERAL DIRECTIONS



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

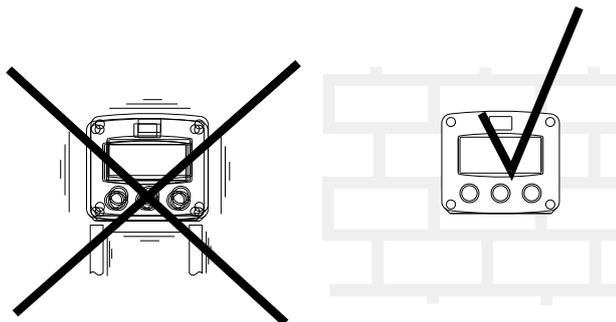
4.2. INSTALLATION / SURROUNDING CONDITIONS



Take the relevant IP classification of the casing into account (see manufactures plate). Even an IP67 (NEMA 4X) casing should NEVER be exposed to strongly varying (weather) conditions.

When panel-mounted, the unit is IP65 (NEMA 4X)!

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



Mount the ERAX on a solid structure to avoid vibrations.

4.3. DIMENSIONS- ENCLOSURE

Aluminum enclosure ERAX-HA/HU

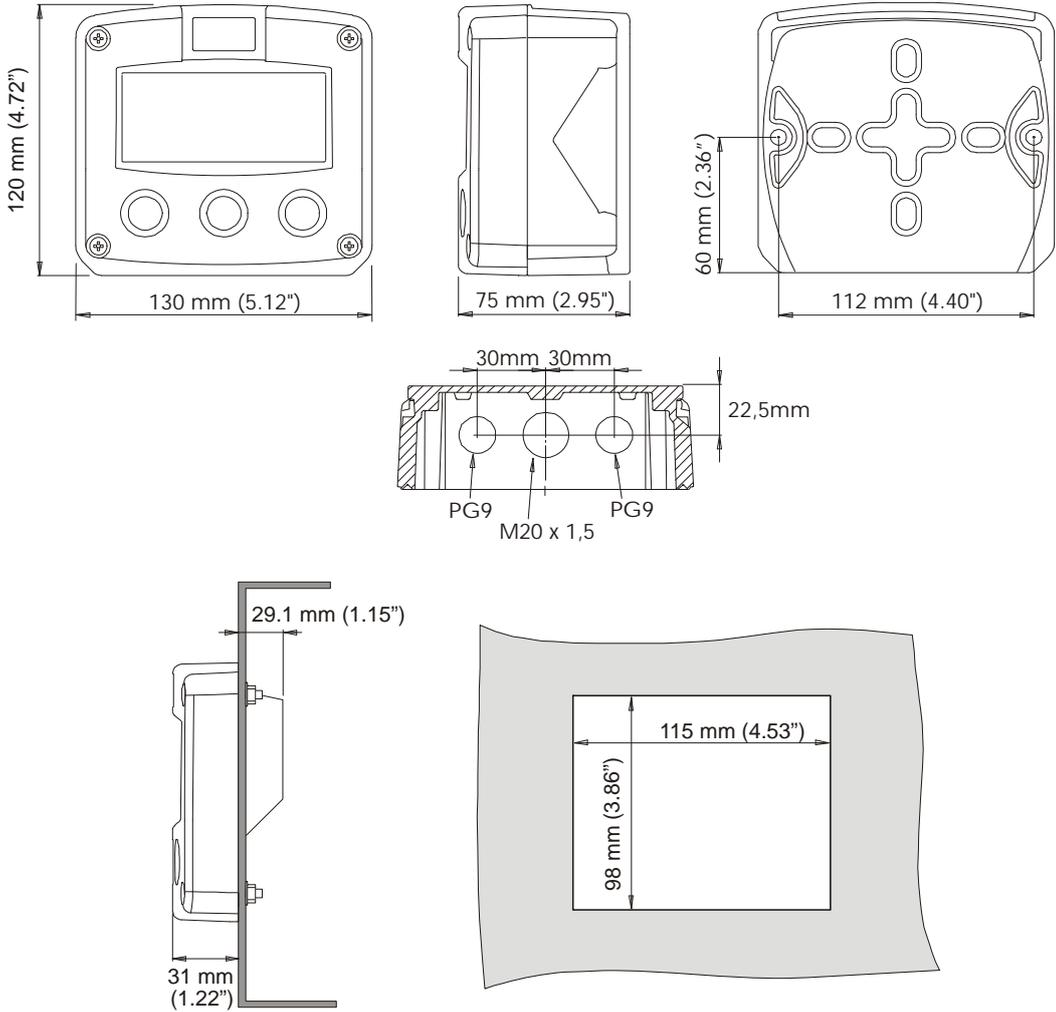


Fig. 5: Dimensions Aluminum enclosure ERAX-HA/HU

Plastic (GRP) enclosure ERAX-HE:

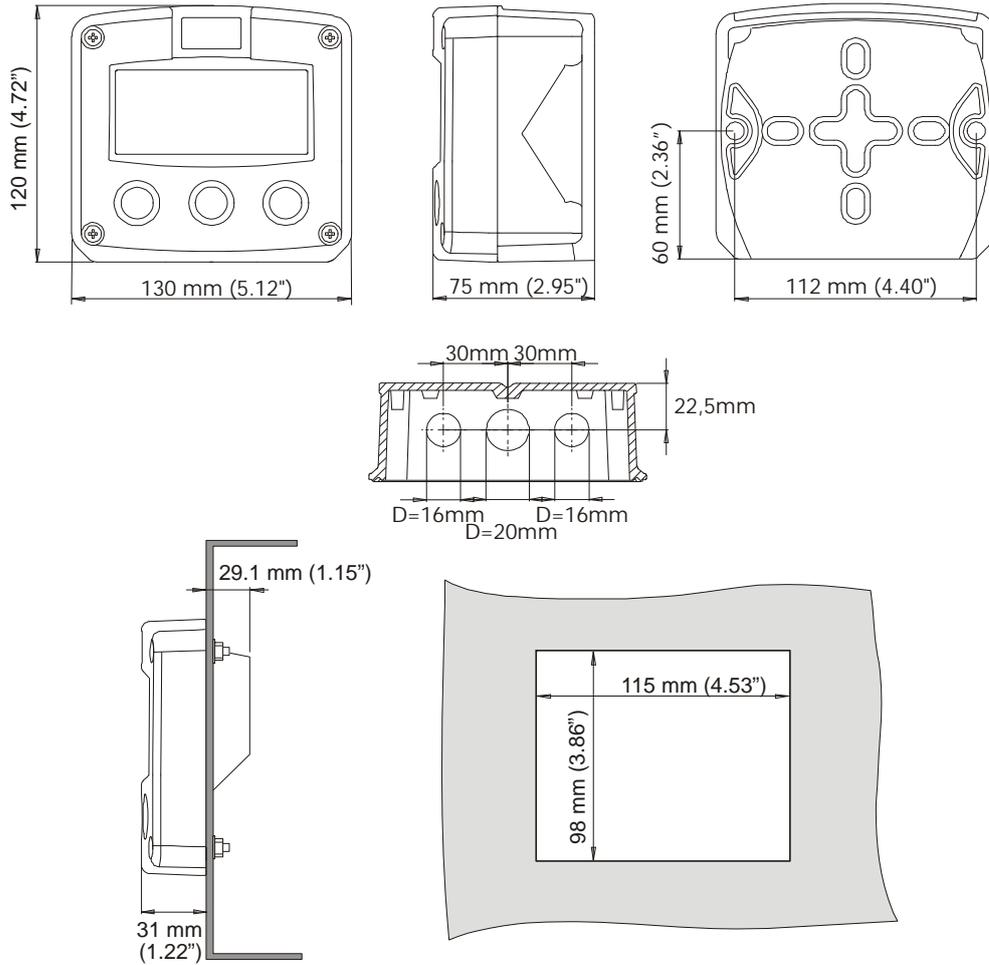


Fig. 6: Dimensions GRP enclosure ERAX-HE.

Meter Mount enclosure ERAX-HR:

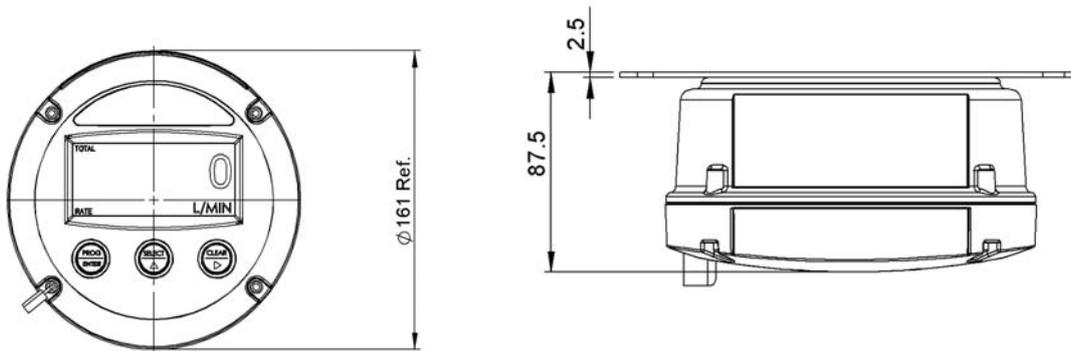


Fig. 7: Dimensions ERAX-HR series Meter mount enclosure

4.4. INSTALLING THE HARDWARE

4.4.1. INTRODUCTION



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

Aluminum enclosures



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

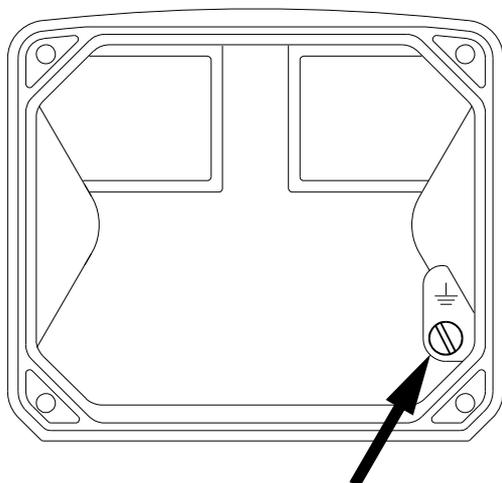


Fig. 7: Grounding aluminum enclosure

FOR INSTALLATION, PAY EMPHATIC ATTENTION TO:

- Separate cable glands with effective IP67 (NEMA4X) seals for all wires.
- Unused cable entries: ensure that you fit IP67 (NEMA4X) plugs to maintain rating.
- A reliable ground connection for both the sensor, and if applicable, for the metal casing.
- An effective screened cable for the input signal, and grounding of its screen to terminal 9 (GND) or at the sensor itself, whichever is appropriate to the application.

Please read chapter 5: Intrinsically safe applications for electrical installation of the hardware.

5. INTRINSICALLY SAFE APPLICATIONS

5.1. GENERAL INFORMATION AND INSTRUCTIONS

The Macnaught Intrinsically safe flowrate indicator / totalizer ERAX is certified under the Macnaught product certificate for the F1xx-P range of indicators. Therefore the marking on the unit shows the Macnaught certificate details and references the models shown in the relevant certification data.



Caution !

Cautions

- **Mounting, electrical installation, start-up and maintenance of this device 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.**
- **This device 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 cabinet has been opened (danger of electric shock). The housing may only be opened by trained personnel.**
- **To maintain the degree of protection of at least IP65 in accordance with IEC 60529, certified cable entries in accordance with IEC 61241-0 must be used and correctly installed. Unused openings must be closed with suitable blanking elements.**
- **When the enclosure of the Indicator is made of aluminum alloy, when used in a potentially explosive atmosphere requiring apparatus of equipment protection level Ga and Da, the unit must be installed such that, even in the event of rare incidents, an ignition source due to impact or friction sparks between the enclosure and iron/steel is excluded.**
- **Take careful notice of the " Safety rules, instructions and precautionary measures " in the front of this manual.**



Safety Instructions

- **When two or more active intrinsically safe circuits are connected to the indicator, in order to prevent voltage and/or current addition, applicable to the external circuits, precautions must be taken to separate the intrinsically safe circuits in accordance with IEC 60079-11.**
- **For the combined connection of the different supply, input and output circuits, the instructions in this manual must be observed.**
- **From the safety point of view the circuits shall be considered to be connected to earth.**
- **For installation under ATEX directive: this intrinsically safe device must be installed in accordance with the ATEX directive 94/9/EC and the product certificate KEMA 03ATEX1074 X.**
- **For installation under IECEx scheme: this intrinsically safe device must be installed in accordance the product certificate IECEx DEK 11.0042X.**
- **Exchange of Intrinsically Safe battery MS493XS with certificate number KEMA 09ATEX0017 U or IECEx KEM 09.0003U is allowed in Hazardous Area. See paragraph 5.4. for detailed battery replacement instructions.**



Note !

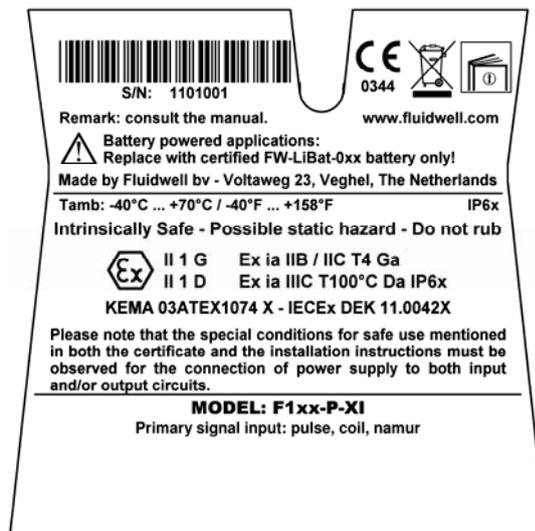
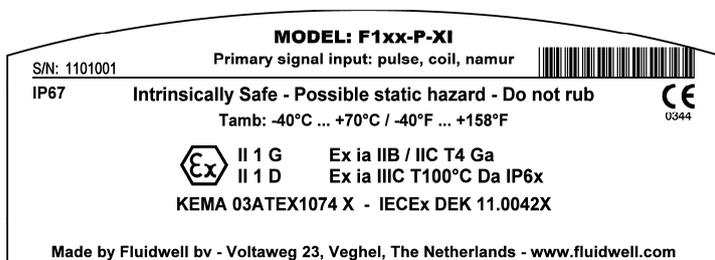
Please Note

- **Certificates, safety values and declaration of compliance can be found in the document named: "Macnaught H61...-P-XI Documentation for Intrinsic Safety".**
- **Special conditions for safe use mentioned in both the certificate and the installation instructions must be observed for the connection of power to both input and / or output circuits.**
- **When installing this device in hazardous areas, the wiring and installation must comply with the appropriate installation standards for your industry.**
- **Study the following pages with wiring diagrams per classification.**

Label information (inside and outside the enclosure)

Indicated labels on the back cover (below) and on the inside cover (right) show the type labels for intrinsically safe certified units.

For details on usage see the separate “Macnaught H61..-P-XI Documentation for Intrinsic Safety”.



Serial number and year of production

This information can be looked-up on the display:
 See setup function (par. 3.2.2.) for details.



5.2. TERMINAL CONNECTORS INTRINSICALLY SAFE APPLICATIONS

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



Note !

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

- The indicator is either supplied by
 - the internal supply (option -PC); or
 - the external supply connected to terminals 0 and 1 (option -PD); or
 - the circuit supply connected to terminals 7 and 8 (option -AP);
 The maximum values for any of those circuits are those as defined for group IIB/IIIC;
- No other active external intrinsically safe circuits may be connected to the indicator, with exception of circuits connected to terminals 3 and 4 and/or terminals 5 and 6; the maximum values for any of those circuits are those as defined for group IIB/IIIC

Terminal connectors ERAX-XI:

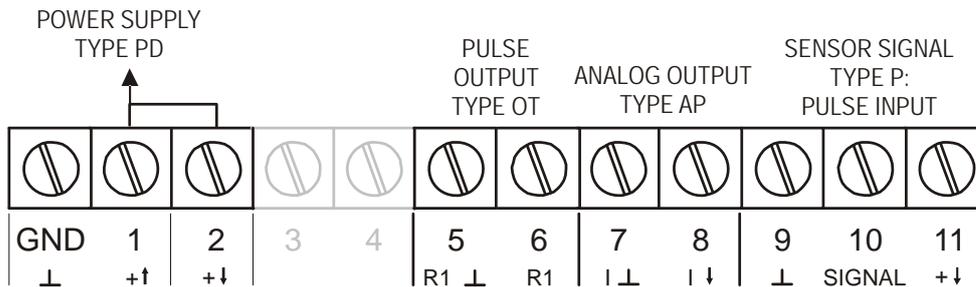


Fig. 12: Overview terminal connectors XI - Intrinsically Safe applications.

5.3. HARDWARE FUNCTIONS AND OPTIONS INTRINSICALLY SAFE APPLICATIONS

Terminal GND-02 and 11: Power supply and sensor supply

Type PD - Intrinsically Safe power supply and sensor supply - Terminal GND- 01 and 11.

TYPE	SENSOR SUPPLY	Terminal		
		GND	01	02
PD Input voltage: 8-30V DC	3,2 - 8,1V	L-	L+	internally linked with terminal 01.

Terminal 02: this terminal offers the same voltage as connected to terminal 01.

Terminal 11: this terminal offers a 3.2V or 8.1V to power the sensor.

This voltage is selected with the switch(es) inside the enclosure. First, remove the terminals after which the internal plastic cover can be removed.

Switch position terminal 11		Switch position no function	
SWITCH 1	VOLTAGE	SWITCH 2	
on	8.1 V DC	not available	
off	3.2 V DC		

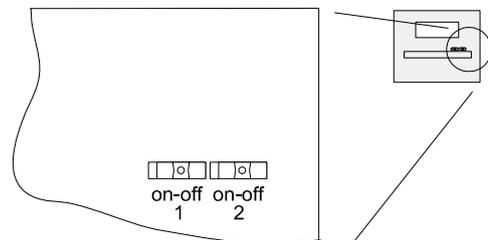


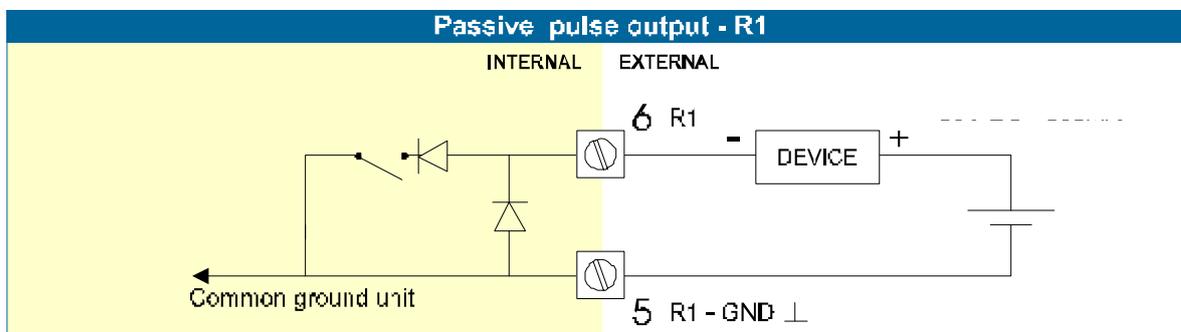
Fig. 13: Switch position voltage selection type PD-XI.

Terminal 05-06; scaled pulse output R1:

Setup 7 (par. 3.4.4.) determines the pulse output function. The maximum pulse frequency of this output is 500Hz. If a relay output option has been supplied, be sure that the output frequency does not exceed 5Hz or else the life-time of the relay will be reduced significantly.

Type OT:

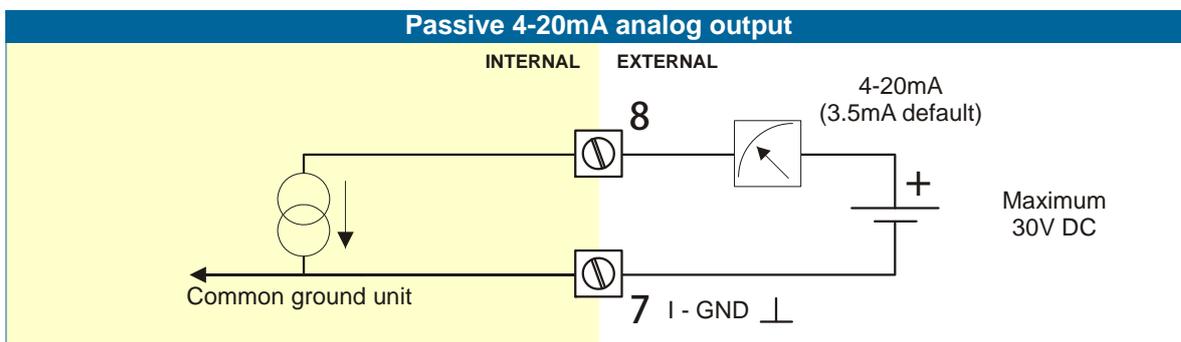
A passive transistor output is available with this option. Max. driving capacity 100mA@30V DC.

**Terminal 07-08 analog output (SETUP 7) :**

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

Type AP - Intrinsically Safe loop powered passive 4-20mA analog output - Terminal 7-8:

A passive 4-20mA signal proportional to the flowrate is available with this option. When a power supply is connected but the output is disabled, a 3.5mA signal will be generated. Max. driving capacity 1000 Ohm. This output does loop power the unit as well.



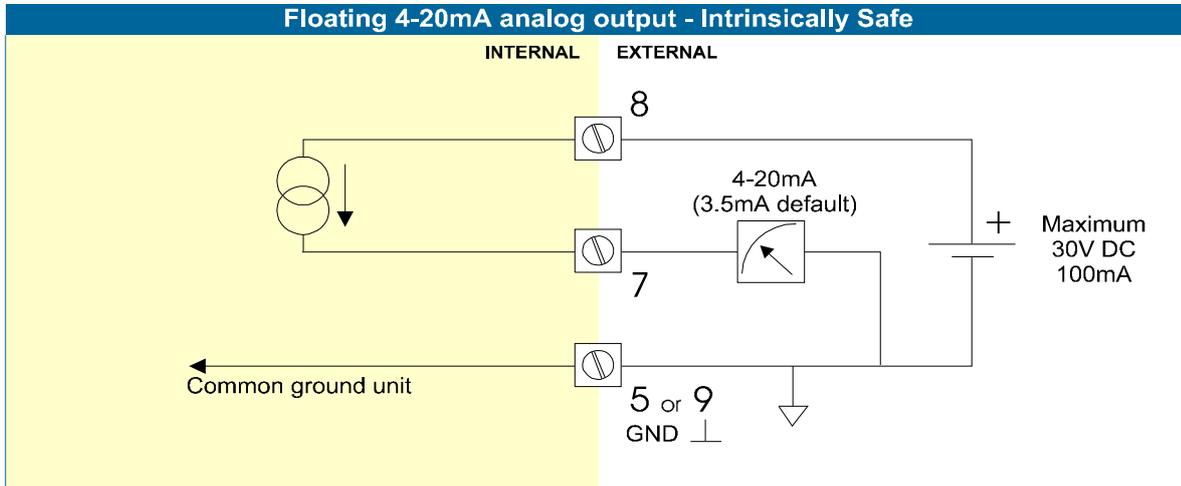
Type AF - Intrinsically Safe floating 4-20mA analog output - Terminal 7-8:

A floating 4-20mA signal proportional to the flowrate is available with this option.

When the output is disabled, a 3.5mA signal will be generated.

Max. driving capacity 1000 Ohm @ 30V DC.

 **Note!** It is required to link the minus from the analog output - terminal 7 - with a ground terminal of the unit; terminal: GND, 3, 5, 9, 12 or 15.



Terminal 09-11; Flowmeter input:

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

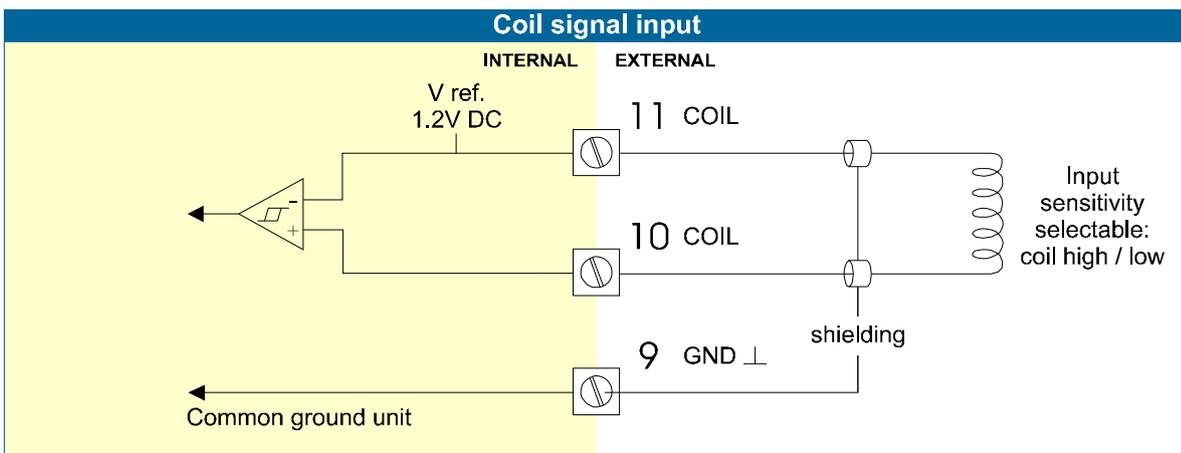
The maximum input frequency is approximately 10 kHz (depending on the type of signal). The input signal type has to be selected with the correct SETUP-function (read par. 3.2.3.)

Sine-wave signal (Coil):

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

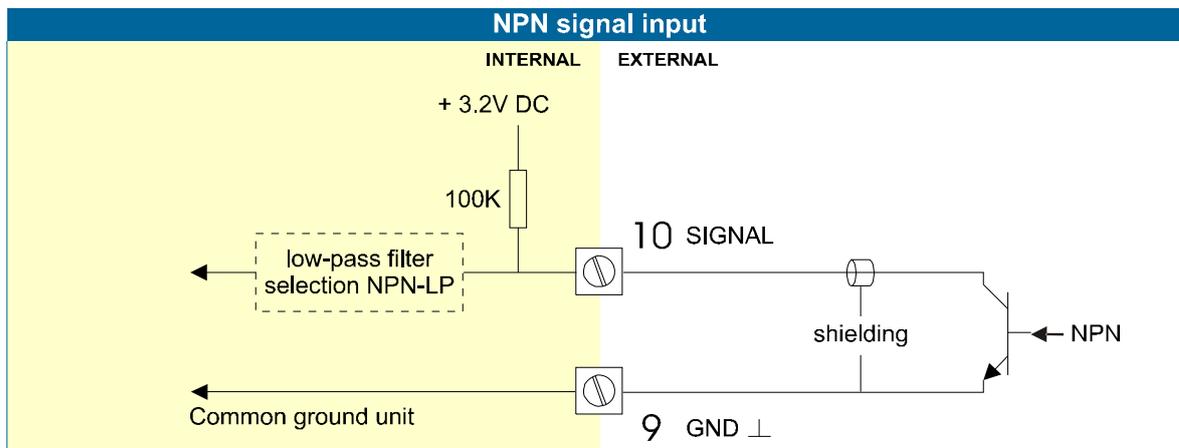
COIL LO: sensitivity from about 120mVp-p.

COIL HI: sensitivity from about 20mVp-p.



Pulse-signal NPN / NPN-LP:

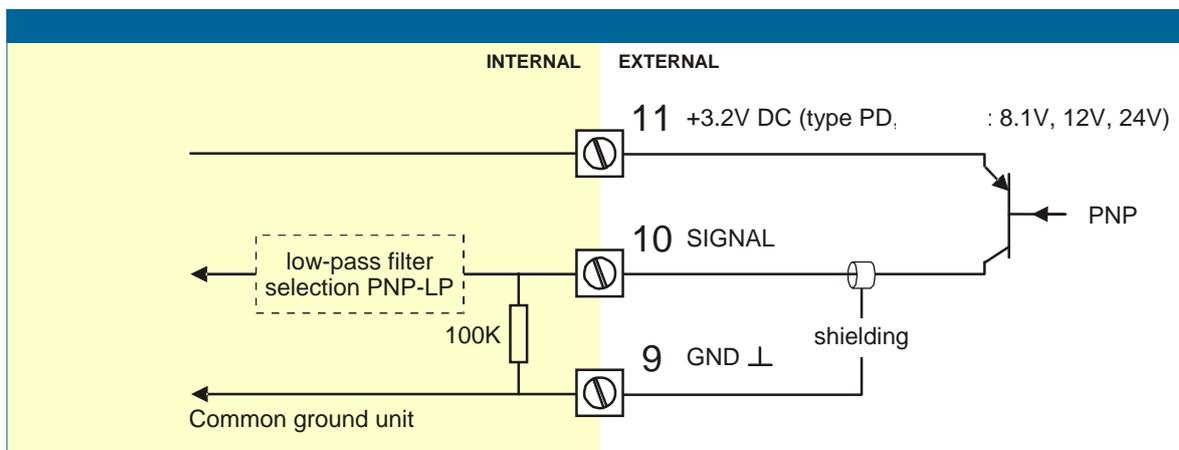
The ERAX is suitable for use with flowmeters which have a NPN output signal. For reliable pulse detection, the pulse amplitude has to go below 1.2V. Signal setting NPN-LP employs a low-pass signal noise filter, which limits the maximum input frequency - read par. 3.2.3.

**Pulse-signal PNP / PNP-LP:**

The ERAX is suitable for use with flowmeters which have a PNP output signal. 3.2V is offered on terminal 11 which has to be switched by the sensor to terminal 10 (SIGNAL). For a reliable pulse detection, the pulse amplitude has to go above 1.2V. Signal setting PNP-LP employs a low-pass signal noise filter, which limits the maximum input frequency - read par. 3.2.3.

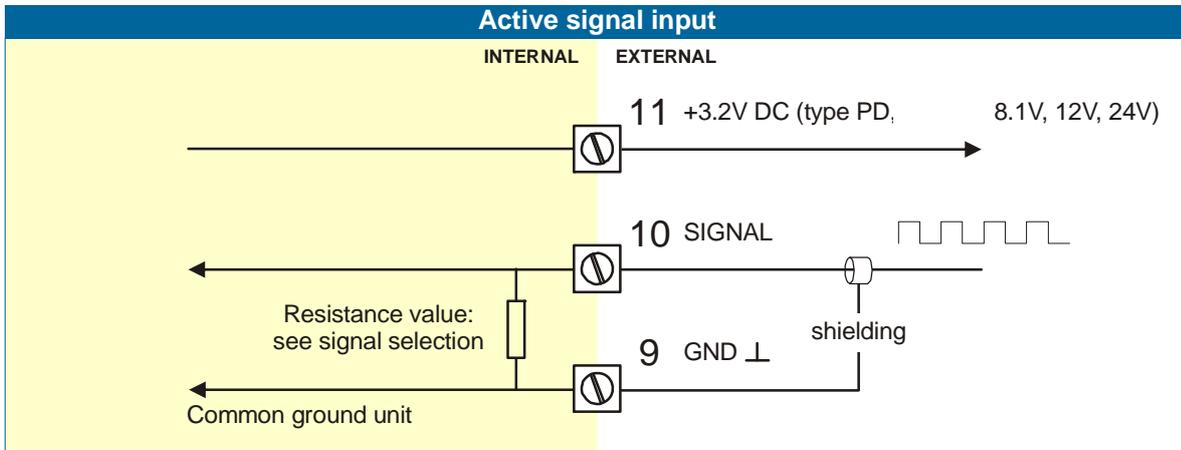
A sensor supply voltage of 8.1V DC can be provided with power supply type PD.

For a signal detection level of 50% of the supply voltage: please refer to "active signals".



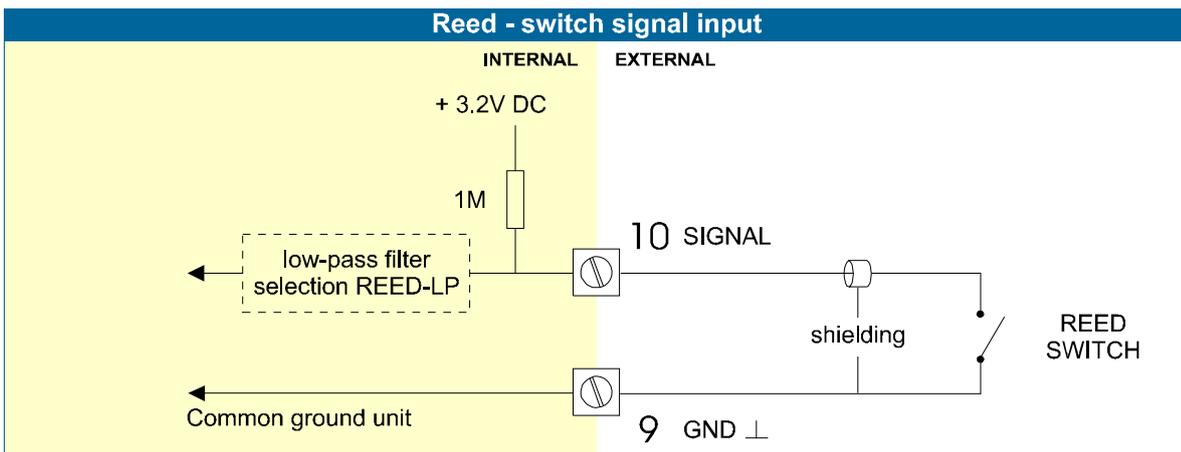
Active signals 8.1V, 12V and 24V:

If a sensor gives an active signal, please read par. 3.2.3. The detection levels are 50% of the selected supply voltage; approximately 4V (ACT_8.1 and ACT_12) or 12V (ACT_24). Active signal selection may well be desired in the case of power supply type PD being used for sensor supply.



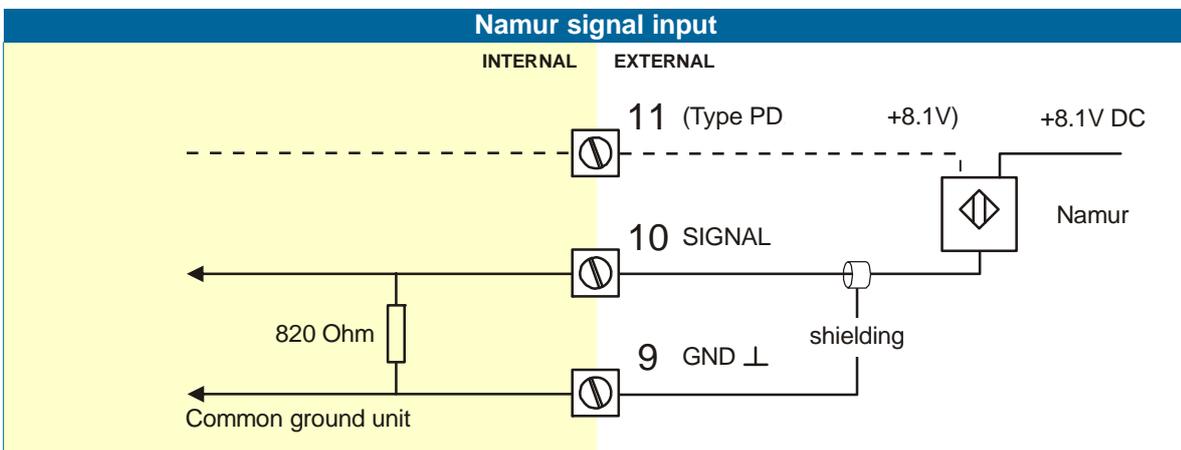
Reed-switch:

The ERAX is suitable for use with flowmeters which have a reed-switch. To avoid pulse bounce from the reed-switch, it is advised to select REED LP - low-pass filter (read par. 3.2.3.)



NAMUR-signal:

The ERAX is suitable for flowmeters with an Namur signal. The standard ERAX is not able to power the Namur sensor, as an external power supply for the sensor is required. However, a 8.2V sensor supply voltage (terminal 11) can be provided with power supply type PD.



Terminal 4-5: POWER SUPPLY UNIT

To power the unit an internal battery can be used and / or an external DC power supply of 16-30V DC.

Connect the "-" to terminal 9 and the "+" to terminal 10. When power is applied to these terminals, the optional internal battery will be disabled / enabled automatically to extend the battery life time.

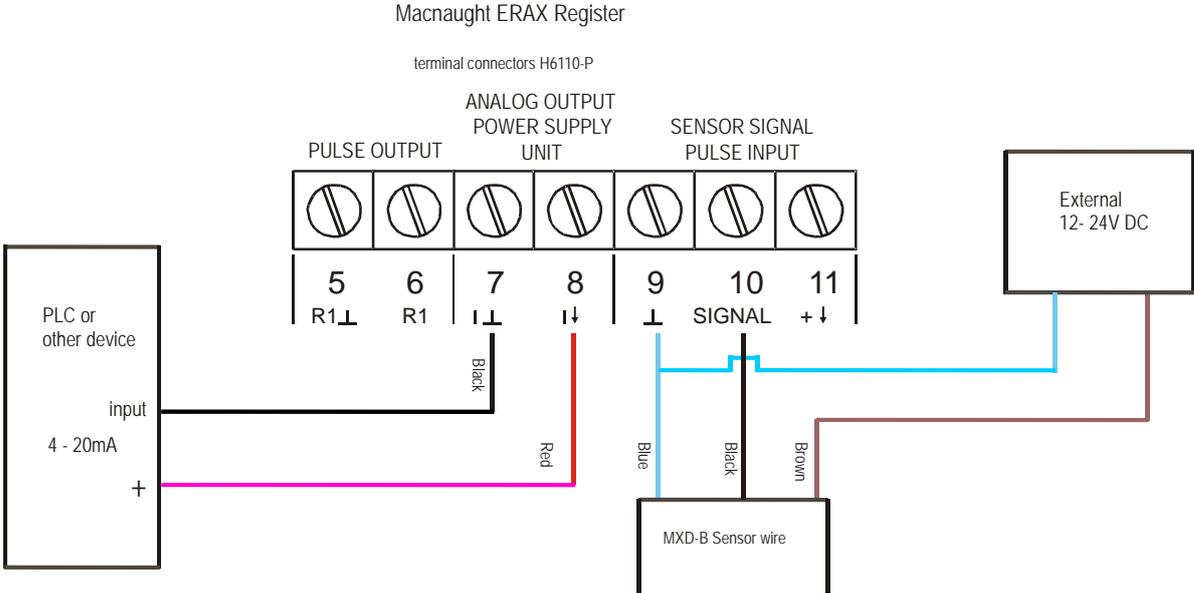


Fig. 13: ERAX MXD-B Wiring instructions

5.4. CONFIGURATION EXAMPLES INTRINSICALLY SAFE APPLICATIONS

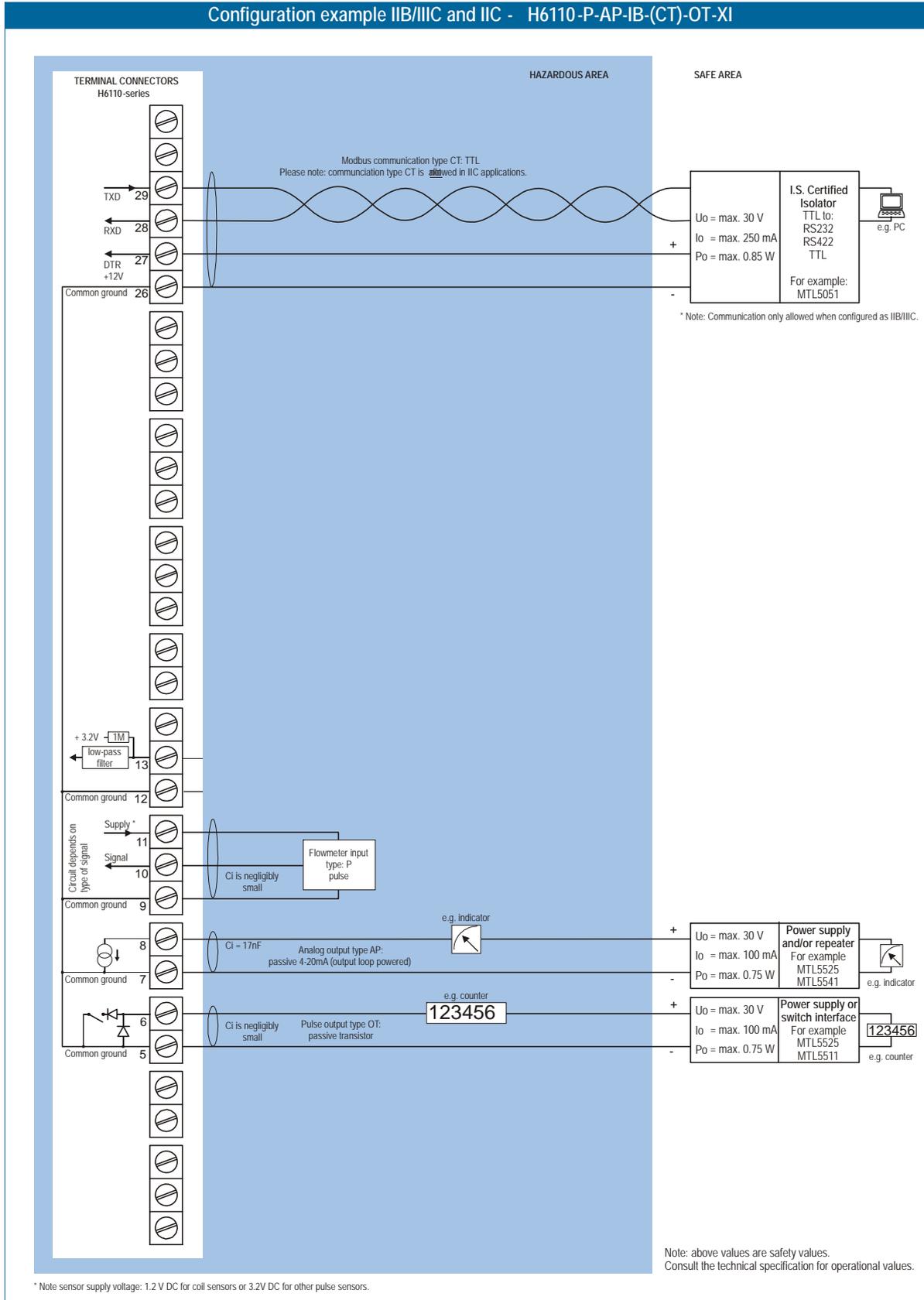


Fig. 14: Configuration example 1 Intrinsically Safe.

5.5. BATTERY REPLACEMENT INSTRUCTIONS

INSTRUCTION SHEET BATTERY REPLACEMENT MS493XS

Manufacturer
 Macnaught PTY Ltd. - Australia
 41-49 Henderson Street - Turrella NSW 2205
 www.macnaught.com - sales@macnaught.com.au

SAFETY INSTRUCTIONS GENERAL
WARNING: Fire, explosion or severe burns may result if mistreated.
 Do not recharge, crush, disassemble, incinerate, heat above 100°C (212°F) or expose contents to water.
 Mounting, electrical installation, start-up and maintenance of this device may only be carried out by trained personnel authorized by the plant operator. Personnel must read and understand this Instruction Sheet before carrying out this procedure.

SAFETY INSTRUCTIONS FOR HAZARDOUS AREAS
CAUTION: Verify the correct battery is supplied: Only batteries with above Ex label are certified for replacement and use in hazardous areas. Batteries for use in safe areas have no Ex label. **DO NOT EXCHANGE.**
Using the wrong type of battery can pose a SERIOUS RISK.
 For use in hazardous areas Macnaught advises MAC-LiBAT batteries only.

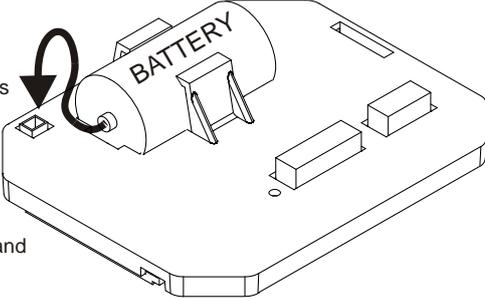
BATTERY REPLACEMENT INSTRUCTIONS
 To replace, unplug the battery connector, loosen the optional Velcro strap and lift the old battery from its retainer. Install the new battery in reverse order.

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

MS493XS battery label for hazardous area use

CE 0344	II 1 G Ex ia IIC Ga Ex ia IIC	KEMA 09ATEX0017 U IECEX KEM 09.0003U	
Macnaught PTY Ltd Australia Intrinsically Safe Battery		Consult manual for replacement instructions.	
Part. no.: MS483XS		WARNING: Fire, explosion or severe burns may result if mistreated. Do not recharge, crush, disassemble, incinerate, heat above 100°C (212°F) or expose contents to water.	
Uo = 3.5V	Co = 100µF		
Io = 35mA	Lo = 25mH		
Po = 35mW	Ta = -40°C to +70°C		
Primary Lithium Battery - Only replace with Macnaught I.S. battery pack !			

H5-series:



MS493XS - INST001

Fig. 16: Battery replacement instructions Intrinsically Safe Battery

6. MAINTENANCE

6.1. GENERAL DIRECTIONS



- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by authorized and trained personnel. Personnel must read and understand this Operating Manual before carrying out its instructions.
- The ERAX may only be operated by personnel who are authorized and trained. 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" in the front of this manual.

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

Battery life-time:

It is influenced by several issues :

- Type of sensor: read chapter 3.2.3. NPN and PNP inputs consume more energy than coil inputs.
- Input frequency: the higher the frequency, the shorter the battery life-time.
- Flowrate calculation: the lower number of pulses (SETUP 26) the shorter the battery life-time.
- Analog output signal; be sure that an external power supply is connected or that the function is disabled if not in use; or else it will have a influence on the battery life-time (SETUP 61).
- Display update: fast display update uses significantly more power; SETUP 41.
- Pulse output and communications .
- Low temperatures; the available power will be less due to battery chemistry.



Note !

Note: *It is strongly advised to disable unused functions.*

Check periodically:

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

6.2. REPAIR

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

APPENDIX A: TECHNICAL SPECIFICATION

GENERAL

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Digits	Seven 17mm (0.67") and eleven 8mm (0.31"). Various symbols and measuring units.
Refresh rate	User definable: 8 times/sec - 30 secs.
Type ZB	Transflective LCD with green LED backlight. Good readings in full sunlight and darkness. Note: only available for safe area applications. Power requirements: 12-24V DC + 10% or type PD, PF, PM. Power consumption max. 1 Watt.

Enclosures	
General	Die-cast aluminum or GRP (Glassfibre Reinforced Polyamide) enclosure with Polycarbonate window, silicone and EPDM gaskets. UV stabilized and flame retardant material.
Control Keys	Three industrial micro-switch keys. UV-resistant silicone keypad.
Painting	Aluminum enclosure only: UV-resistant 2-component industrial painting.
Panel-mount enclosures	Dimensions: 130 x 120 x 60mm (5.10" x 4.72" x 2.38") – LxHxD.
Classification	IP65 / NEMA4X
Panel cut-out	115 x 98mm (4.53" x 3.86") LxH.
Type HC	GRP panel-mount enclosure
Type HB	Aluminum panel-mount enclosure
Field/wall-mount enclosures	Dimensions: 130 x 120 x 75mm (5.10" x 4.72" x 2.95") – LxHxD.
Classification	IP67 / NEMA4X
Aluminum enclosures	
Type HA	Drilling: 2x PG9 – 1x M20.
Type HU	Drilling: 3x ½"NPT.
GRP enclosures	
Type HE	Drilling: 2x 16mm (0.63") – 1x 20mm (0.78").

Operating temperature	
Operational	-40°C to +80°C (-40°F to +176°F)
Intrinsically Safe	-40°C to +70°C (-40°F to +158°F)

Power supply	
Type PC	Intrinsically Safe lithium battery - life-time depends upon settings - up to 5 years.
Type PD	8-24V AC / DC \pm 10%. Power consumption max. 10 Watt. Intrinsically safe: 16-30V DC; power consumption max. 0.75 Watt.
Type PL	Input loop powered from sensor signal 4-20mA (type A, non IS).
Type PX	Output loop powered: 8-30V DC. Power consumption max. 0.5 Watt.
Note I.S. applications	For intrinsically safe applications, consult the safety values in the certificate.

Sensor excitation	
Type PC / PX	3.2V DC for pulse signals and 1.2V DC for coil pick-up. Note: This is not a real sensor supply. Only suitable for pulse sensors with a very low power consumption like coils (sine wave) and reed-switches.
Type PD-XI	Intrinsically safe: Pulse signals: 1.2 / 3.2 / 8.2 - max. 7mA@8.2V DC. Analog signals: the sensor supply voltage is according to the power supply voltage connected to terminal 1. Also terminal 2 offers the same voltage.

Terminal connections	
Type:	Removable plug-in terminal strip. Wire max. 1.5mm ² and 2.5mm ²

Data protection	
Type	EEPROM backup of all setting. Backup of running totals every minute. Data retention at least 10 years.
Pass code	Configuration settings can be pass code protected.

Hazardous area (option)	
Intrinsically safe Type XI	ATEX approval:  II 1 G Ex ia IIB/IIC T4 Ga II 1 D Ex ia IIIC T100°C Da IP6x IECEX approval: Ex ia IIB/IIC T4 Ga Ex ia IIIC T100°C Da IP6x
Explosion proof Type XD/XF	ATEX approval ref.: <EX> II 2 GD EEx d IIB T5. Weight appr. 15kg. Dimensions of enclosure: 350 x 250 x 200mm (13.7" x 9.9" x 7.9") LxHxD.

Environment	
Electromagnetic compatibility	Compliant ref: EN 61326 (1997), EN 61010-1 (1993)
Low voltage directive	Compliant ref: EN60950.

INPUTS

Flowmeter	
Type P	Coil/sine wave (minimum 20mVp-p or 80mVp-p - sensitivity selectable), NPN/PNP, open collector, reed-switch, Namur, active pulse signals 8 - 12 and 24V.
Frequency	Minimum 0 Hz - maximum 7 kHz for total and flowrate. Maximum frequency depends on signal type and internal low-pass filter. E.g. Reed switch with low-pass filter: max. frequency 120 Hz.
K-Factor	0.000010 - 9,999,999 with variable decimal position.
Low-pass filter	Available for all pulse signals.
Note	<i>For coil signal input: higher sensitivity is available - type ZF (10mVpp) / type ZG (5mVpp).</i>

OUTPUTS

Analog output	
Function	transmitting flowrate.
Accuracy	10 bit. Error < 0.05% - update 10 times a second. Software function to calibrate the 4.00mA and 20.00mA levels precisely within set-up.
Load	max. 1 kOhm
Type AF	Passive floating 4-20mA output for Intrinsically Safe applications (requires PC or PD).
Type AP	Passive 4-20mA output - output loop powered (type PX).

Switch output(s)	
Function	One pulse output - transmitting accumulated total.
Pulse output	Max. frequency 500Hz. Pulse length user definable between 1,0msec up to 9.999 seconds.
Type OT	Passive transistor output - not isolated. Load max. 50V DC - 300mA.

Communication option	
Functions	reading display information, reading / writing all settings.
Protocol	Modbus ASCII or RTU
Speed	1200 - 2400 - 4800 - 9600 baud
Addressing	maximum 255 addresses.
Type CX	no communication.

OPERATIONAL
Operator functions

Displayed functions	<ul style="list-style-type: none"> total and/or flowrate. total and accumulated total. total can be reset to zero by pressing the CLEAR-key twice.
---------------------	---

Total

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

Accumulated total

Digits	11 digits.
Units / decimals	according to selection for total.

Flowrate

Digits	7 digits.
Units	mL, L, m3, Gallons, KG, Ton, lb, bl, cf, RND, ft3, scf, Nm3, NI, igal - no units.
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 ERAX is going to be installed or while it is in operation.

Flowmeter does not generate pulses:

Check:

- Signal selection SETUP - 51,
- 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 11-14 and 21-27,
- Type of signal selected with actual signal generated - SETUP - 51,
- Sensitivity of coil input - SETUP - 51 and par. 4.4.3.
- Proper grounding of the ERAX - par. 4.4.1.
- Use screened wire for flowmeter signals and connect screen to terminal 9. (unless connected at sensor)

Analog output does not function properly:

Check:

- SETUP 61 - is the function enabled?
- SETUP 62 / 63: are the flow-levels programmed correctly?
- Connection of the external power-supply according to the specification?

Pulse output does not function:

Check:

- SETUP 73 - pulse per "x" quantity; is the value programmed reasonable and will the maximum output be under 20Hz?

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

Check:

- SETUP 22 / 25: are the K-factor and time unit correct?
- SETUP 26 / 27: The unit has to count the number of pulses according to SETUP 26 within the time according to SETUP 27. Make sure that 27 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 26.

The pass code is unknown:

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

ALARM

When the alarm flag starts to blink an internal alarm condition has occurred. Press the "select button" several times to display the 5-digit error code. The codes are:

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

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

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NOTES

DECLARATION OF CONFORMITY

MS318
0809
0002



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EC Declaration of Conformity

Directive 94/9/EC - Equipment and Protective systems Intended for use In potentially explosive atmospheres.

Product Description: Indicator possibly

Type: H6XX Series

Protective System: II 1 G D EEx ia IIB/IIC T4 T 100°C

Standards:	EN 50020	2002	(expired)
	EN 50284	1999	(expired)
	EN 50014	1997 + A1, A2	(expired)
	EN 50281-1-1	1998 + A1	(expired)
	EN 60079-0	2006	
	EN 60079-11	2007	
	EN 60079-26	2007	
	EN 61241-0	2006	
	EN 61241-11	2006	

Notified Body: KEMA 0344
KEMA Quality bv
Utrechtseweg 310 Arnhem, The Netherlands

EC type examination certificate: KEMA 09ATEX0018 X

S Gavin
Operations Director

Date 20/7/2010

LIST OF CONFIGURATION SETTINGS			
SETTING	DEFAULT	DATE :	DATE :
1 - TOTAL		Enter your settings here	
11 unit	L		
12 decimals	0000000		
13 K-factor	0000001		
14 decimals K-factor	0		
2 - FLOWRATE			
21 unit	L		
22 time unit	/min		
23 decimals	0000000		
24 K-factor	0000001		
25 decimals K-factor	0		
26 calculation / pulses	010		
27 cut-off time	30.0 sec.		
3 - DISPLAY			
31 function	total		
32 light	100%		
4 - POWERMANAGEMENT			
41 LCD-new	1 sec.		
42 mode	operate		
5 - FLOWMETER			
51 signal	coil lo		
6 - ANALOG OUTPUT			
61 output	disable		
62 min. flowrate 4-mA	0000000		
63 max. flowrate 20mA	9999999		
64 cut off percentage	0.0%		
65 tune min - 4mA	0160		
66 tune max - 20mA	6656		
67 filter	0 (off)		
7 - PULSE			
71 pulse width	000 periods		
72 decimals	0		
73 pulse per	0001000		
8 - COMMUNICATION			
81 baud-rate	9600		
82 address	1		
83 mode	RTU		
9 - OTHERS			
91 model	F110-P	F110-P	F110-P
92 software version	03.01.xx		
93 serial number			
94 pass code	0000		
95 tagnumber	0000000		



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