E 018 Datasheet

Your success counts

FLUIDWELL

Flow rate Monitor / Totalizer

with linearization, high / low alarms, analog and pulse signal outputs and HART Communication

HART COMMUNICATION PROTOCOL

IEC IECEx FM APPROVED C SP US

Application examples: *Salty Off-Shore conditions*

Extreme cold weather at polar regions

Hot and sandy deserts

The E-Series provides unequalled safety and ease of use, opening covers is history. The through-glass keypad enables operability without interruptions. The E-Series saves time, money and hassle and delivers user-friendliness in the toughest conditions.

Advantages

- Save time and gain flexibility with the easy-to-operate through glass keypad: no need to remove the front cover or to arrange a work permit.
- Intuitive “Know one, know them all!” configuration menu, saving time, cost and aggravation.
- Cost saving with an easy to install, spacious chamber, plug and play connectors and 1” NPT thread for flow meter mounting.
- Durable high grade stainless steel 316L Ex d enclosure for extremely salty atmospheres (offshore).

Features

- Explosion proof according ATEX, IECEx, FM and CSA c-us.
- High and low flow rate alarm monitoring.
- Displays flow rate, total, alarm values, measuring units and a flow rate indicating speedometer.
- Bright LED backlight, red flashing in case of an alarm.
- 15 point linearization of the flow curve - with interpolation.
- Ability to process all types of signals: Sine wave (coil), NAMUR, NPN/PNP pulse, Reed-switch, Active pulse signals.
- 4 configurable digital outputs for high / low alarms or pulse output of the linearized accumulated total.
- Loop powered 4-20mA output acc. linearized flow rate.
- Integrated HART 7 communication protocol.
- Power requirements: Loop powered, battery or 9 - 27V DC.
- Sensor supply: 8.2 / 12 / 24V DC.
- Auto backup of settings and running totals.
- Easy configurable via PC with free downloadable software.

Introduction

The E018 is one of the top models in our range of explosion proof flow computers. The E-series distinguishes itself by its quality and functionality driven European design and manufacturing.
It is more than fulfilling the rules for explosion proof design, it is about safety during the daily operation. Often, the environment is much tougher than the explosion proof requirements demand. Thus dangerous conditions may be experienced due to a broken enclosure or a poorly made flame path. Ruggedness and reliability is where Fluidwell stands for and it is now available in a comprehensive well designed and purpose driven explosion proof flow monitor / totalizer.

Configuration

The E-Series uses the highly appreciated configuration structure of our F-, D- and N-Series product line. Each setting is clearly indicated with an alphanumerical description, which avoids confusing abbreviations. Once familiar with one E-series product, you will be able to program all models in all series without a manual. For example: an (intrinsically safe) F018 operates identical to an explosion proof E018 and has the same three buttons! In other words: know one, know them all.

Operation

Operation is done via the optical, easy-to-operate, through glass keypad without having to remove the front cover. If required, these optical keys can be disabled. For easy handheld configuration there are three mechanical push buttons on the bottom side of the display collar. All settings can be password protected.

Display

The unique LCD display provides multiple flow data at a glance. The main information is displayed with 7 digits (12mm, 0.47") to show total or flow rate and 11 digits (7mm, 0.28"), which can be set to show flow rate and accumulated total. On-screen engineering units are easily configured from a comprehensive selection, while different units for flow rate and total can be displayed simultaneously. The speedometer offers a quick impression of the actual flow rate. The E018 is provided with a bi-color backlight, which can be turned on to flashing red to indicate a flow rate alarm condition. When battery powered the backlight is only operational after a keypad touch, to extend battery lifetime.

Hazardous areas

The E-Series has been certified according ATEX, IECEx, FM and CSA c-us with an ambient temperature of -40°C to +70°C (-40°F to +158°F). The application range of the enclosure is very wide:

- The ATEX markings for gas and dust applications are:
  - **II 2 G Ex d IIC T6 Gb.**
  - **II 2 D Ex tb IIIC T85°C Db.**
- The IECEx markings for gas and dust applications are:
  - **Ex d IIC T6 Gb.**
  - **Ex tb IIIC T85°C Db**
- The FM and CSA c-us markings are:
  - **XP (Explosion-proof): Class I, Division 1, Grps A, B, C, D.DIP (Dust-Ignition-proof): Class II/III, Division 1, Groups E, F and G. Class I, Zone 1, AEx d IIc T6 Gb, Zone 21, AEx tb IIIC T85°C Db.**

All info at a glance
Easy to install
Easy to program
Know one know them all!
Reliable
User-friendly

Analog output

The linearized flow rate is transmitted with the galvanically isolated 4 - 20mA output signal. The E018 can even be loop powered via the isolated loop-current.

Pulse / Alarm outputs

Four digital outputs are available, which can be set as an alarm output to transmit the flow rate alarm or as a scaled pulse output. The alarm output can be set to switch for a low, high or all alarms! Scaled pulse output is according the linearized accumulated total. The pulse length is user defined from 1msec. up to 10 seconds. The output can be a passive NPN signal or a mechanical relay output.

Power requirements

Several power inputs are possible to power the E018 and sensor. As standard the E018 can be loop powered via the isolated, two-wire, analog output. The battery powered version with a long life lithium battery and the basic 9 - 27V DC can power the E018 including the backlight, but don't offer a real sensor supply. A real sensor supply of 8.2, 12 or 24V is optional available with type PD.

HART Communication

All process data and every single menu setting can easily be read and modified via the HART communication link with a free downloadable device-specific DD. This guarantees that they will operate hassle free with other registered DD enabled host systems. Fluidwell lifts the user-friendly configuration to the next level!

HART REGISTERED
Certificate of Registration
FieldComm Group Verified

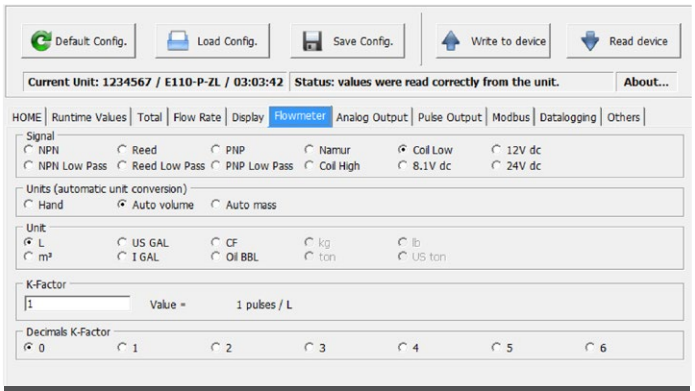
HART REGISTERED certificate

Enclosures

Two fundamental versions of our IP66/IP67, NEMA Type4X/7/9 explosion proof enclosures are available: a solid die cast aluminum or a high grade stainless steel 316L enclosure resistant to extremely salty atmospheres (offshore). The aluminum enclosure has an industrial two component coating and is better suitable for outdoor and chemical plant applications than powder coated alternatives. A major advantage for the installation engineer is the spacious mid-chamber for the cable entry in combination with the plug-and-play connectors. Especially for straight flow meter mounting a 1" NPT connection is available (see page 5 for available NPT and Metric threads sizes).

Remote configuration

Even more user-friendly is the remote configuration via a PC using the free downloadable E-Series Configuration Software. Just connect the E-Series to your PC with the special Configuration Cable (ACE02).



Screenshot Remote Configuration Software

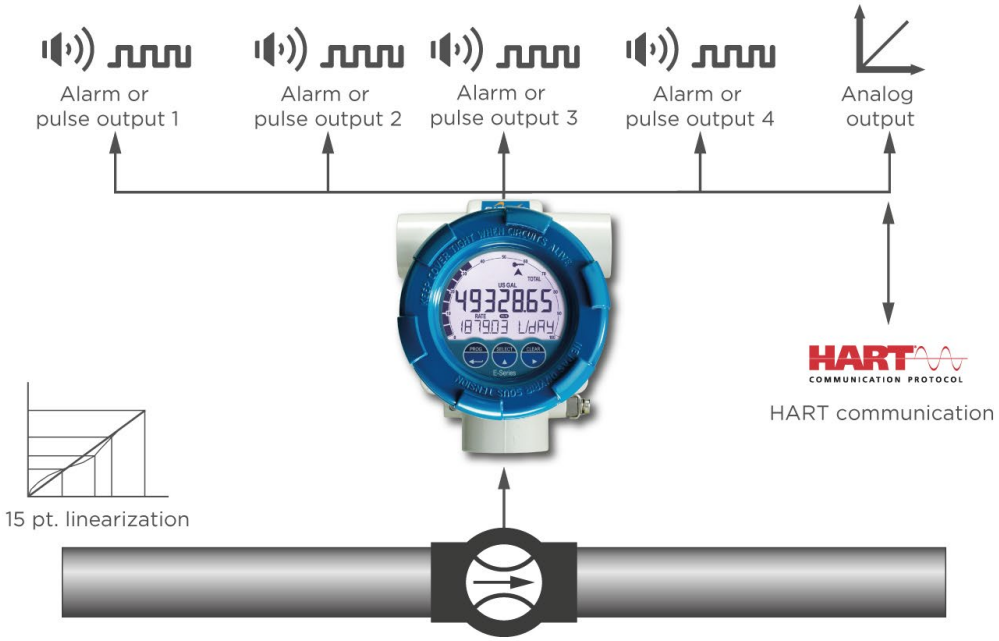
Easy-to-operate through glass keypad

High grade Stainless Steel 316L enclosure

USB communication

Overview application E018

Flow measurement in an explosion proof application with mechanical flow meters, where re-transmission of the totalizer, monitoring of the flow rate and HART communication is required. The E018 offers you a flow rate monitor / totalizer designed to be used in rough and tough applications, beyond being just explosion proof. Its sturdy design and ease of use are unequaled by any other explosion proof indicator in the market! The E-Series is always your first and safest choice in explosion proof applications. For intrinsically safe applications we offer our field mount F-Series indicators.



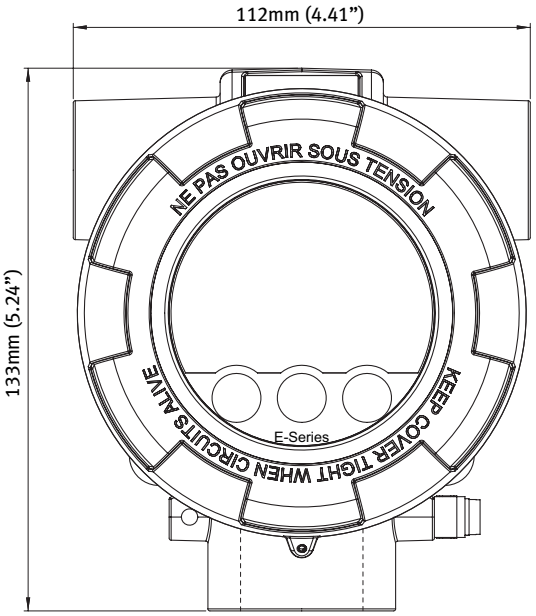
Signal input

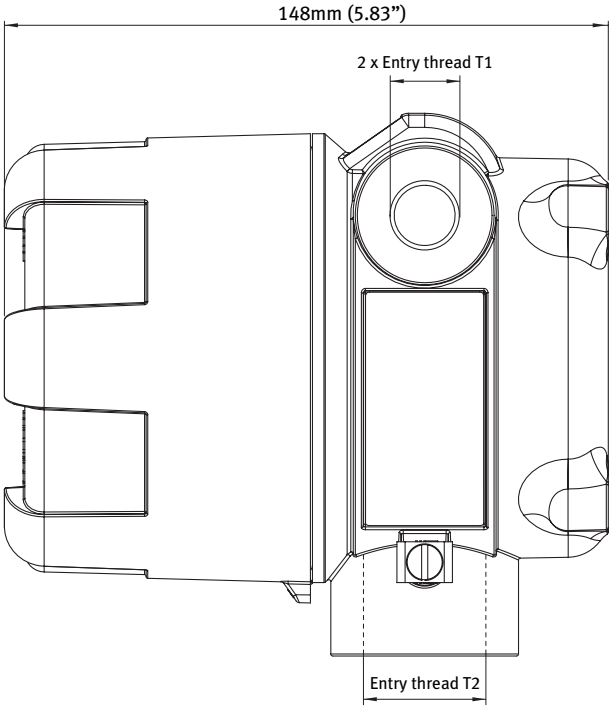
The E110 accepts most input signals for volume flow or mass flow meters. The pulse input signal type can be selected in the configuration menu without having to adjust any sensitive mechanical dip-switches or jumpers. The analog input is available with linear and square root calculation.

Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude P-P	Remark
NPN	100kΩ pull-up	100kΩ pull-up	6kHz Threshold 1.2V	2.2kHz		Open collector
REED	1MΩ pull-up	1MΩ pull-up	1.2kHz Threshold 1.2V	120Hz		
PNP	51KΩ pull-down	51KΩ pull-down	6kHz Threshold 1.2V	700Hz		
NAMUR	820Ω pull-down	-	4kHz	-		External power required
COIL LO	-	-		-	$90mV_{pp}$	Default sensitivity
COIL-HI	-	-	-	-	$20mV_{pp}$	Sensitive for interference!
COIL-HI (Type ZF)					$10mV_{pp}$	
COIL-HI (Type ZG)					$5mV_{pp}$	
ACTIVE 8.2V DC	3KΩ		10kHz Threshold 4V			External power required
ACTIVE 24V DC	3KΩ		10kHz Threshold 12V			External power required

Dimensions enclosures

Aluminum & Stainless Steel 316L enclosure





Enclosure types

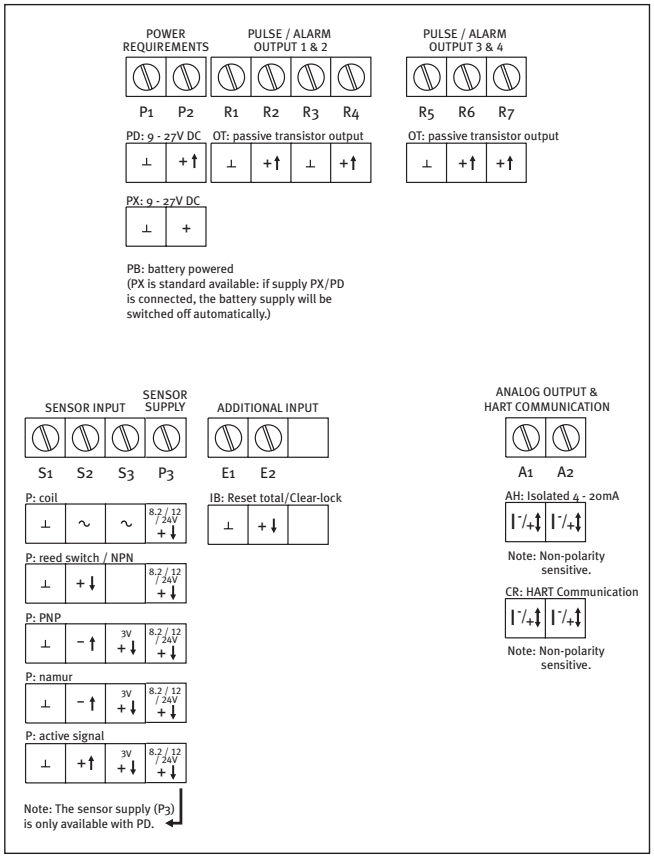
Type HA_	Aluminum Ex d enclosure.
Weight	1300 gr.
Type HS_	Stainless steel 316L Ex d enclosure.
Weight	3600 gr.

Enclosure drillings

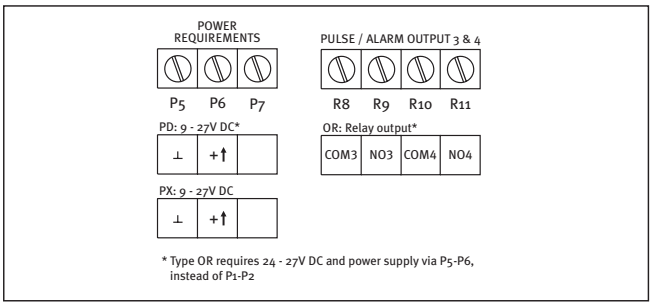
Type H_A	T1: 2 x ¾"NPT / T2: 1 x 1"NPT
Type H_B	T1: 2 x ¾"NPT / T2: 1 x ¾"NPT
Type H_C	T1: 2 x ½"NPT / T2: 1 x 1"NPT
Type H_D	T1: 2 x ½"NPT / T2: 1 x ¾"NPT
Type H_G	T1: 2 x M20 / T2: 1 x M25
Type H_H	T1: 2 x M25 / T2: 1x M25

Terminal connections

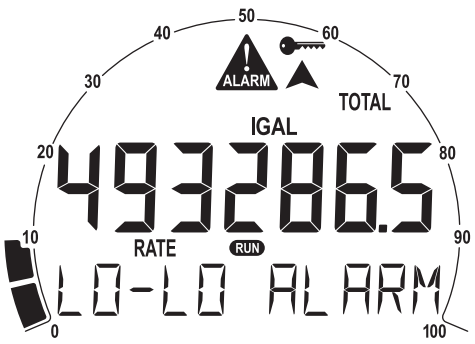
Main Electronics Module



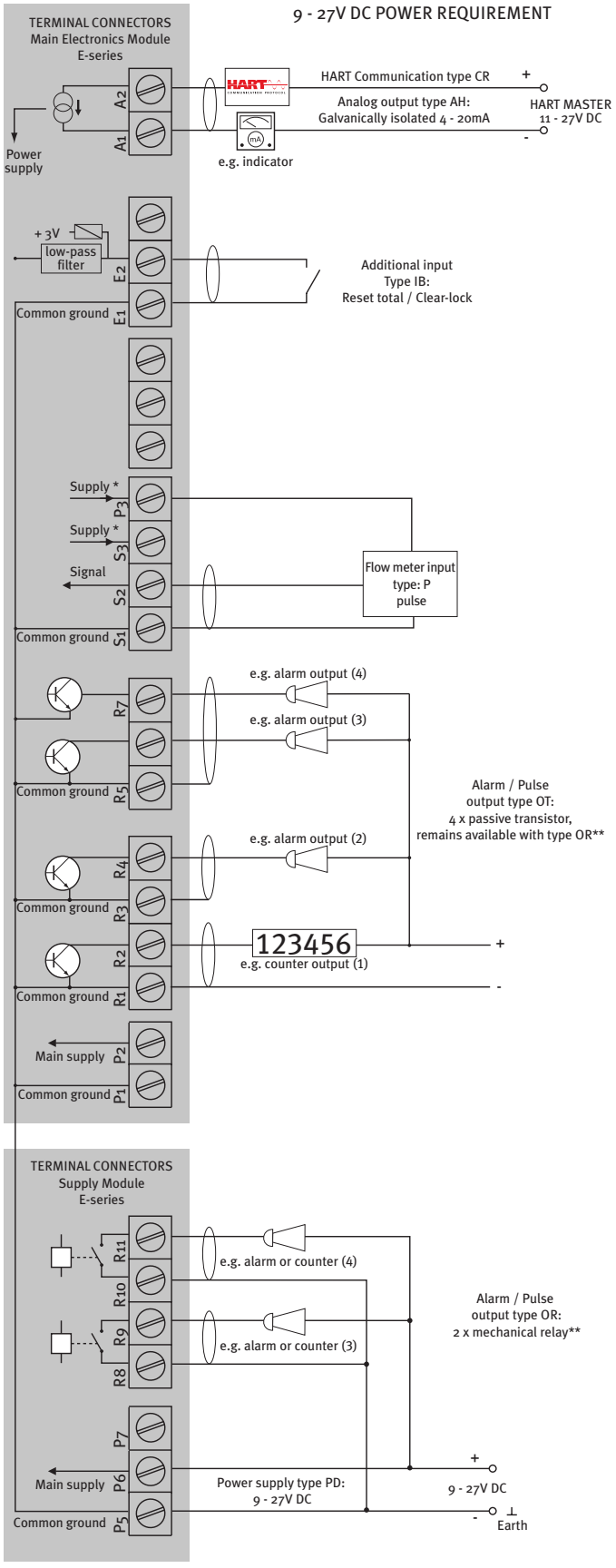
Supply Module



Display example

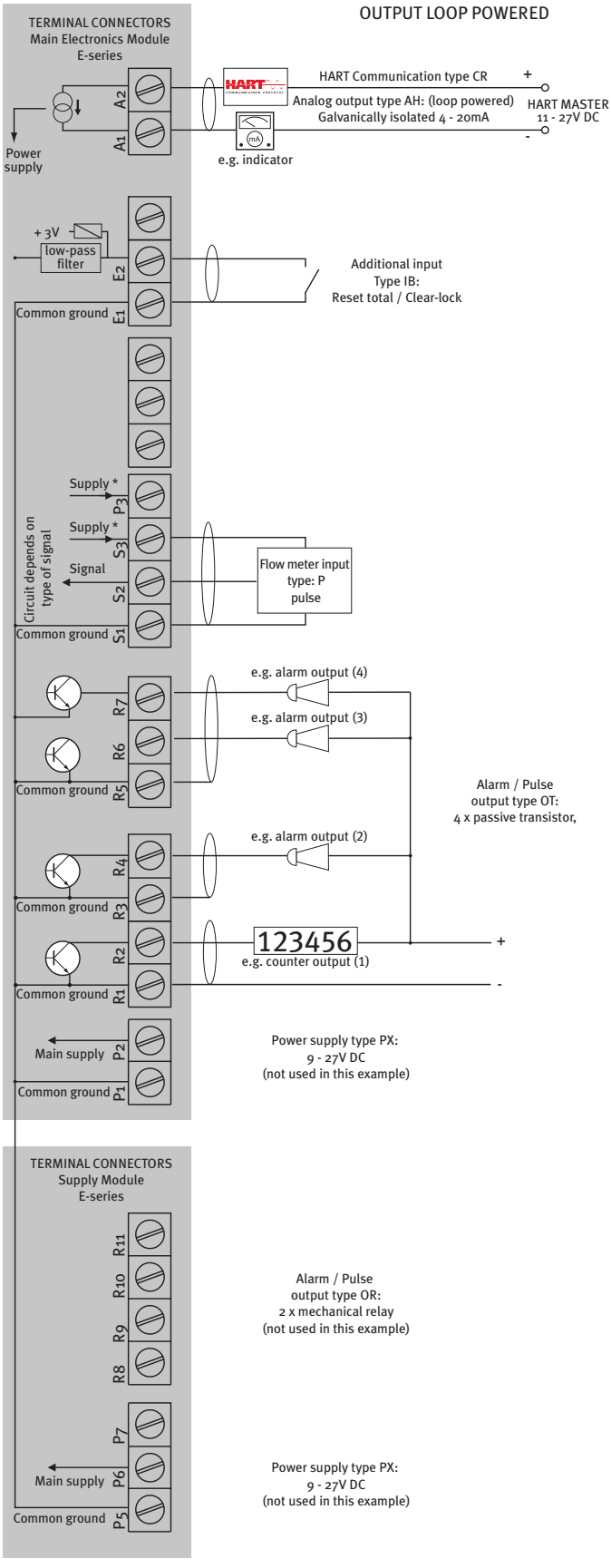


E018-P-AH-CR-IB-OR-PD-XD-ZB



* Supply voltage S3: 3V DC and supply voltage P3: 8.2 / 12 / 24V DC to sensor
** Type OR requires 24 - 27V DC and power supplied via P5-P6, instead of P1-P2

E018-P-AH-CR-IB-OT-PX-XD-ZB



*Supply voltage S3: 3V DC to sensor

Display

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

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.
Note PB	The battery can power the backlight for a short time after a keypad touch but cannot power the relay output (OR) or the real sensor supply (Terminal P3).
Type PD	9 - 27V DC. Consumption max. 4.5 Watt.
Type PX	9 - 27V DC. Consumption max. 3 Watt.
Type AH	Loop powered, analog output. 11 - 27V DC, Min. 3.5mA. Consumption max. 675mW (25mA @ 27VDC)
Note AH	The loop powered analog output cannot power the backlight, mechanical relay output (OR) or the real sensor supply (Terminal P3).

Sensor excitation

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

Terminal connections

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

Data protection

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

Directives & Standards

EMC	Directive 2014/30/EU, FCC 47 CFR part 15.
Low voltage	Directive 2014/35/EU
RoHS	Directive 2011/65/EU
ATEX / IECEx	Directive 2014/34/EU, IEC 60079-0, IEC 60079-1, IEC 60079-31.
FM	Class 3600, 3615, 3616, 3810.
CSA	CSA 22.2 No. 25, No. 30, No. 61010-1-12.
UL	UL 61010-1.
IP & NEMA	EN 60529 & NEMA 250.

Hazardous area - Explosion proof

Ambient Ta	-40°C to +70°C (-40°F to +158°F).	
ATEX certification	Gas: Dust:	II 2 G Ex d IIC T6 Gb. II 2 D Ex tb IIIC T85°C Db.
IECEx certification	Gas: Dust:	Ex d IIC T6 Gb. Ex tb IIIC T85°C Db.
FM & CSA c-us certification	Class I, Div. 1, Grps A, B, C, D. certification Class II/III, Div. 1, Grps E, F, & G. Class I, Zone 1, AEx d IIc T6 Gb, Zone 21, AEx tb IIIC T85°C Db.	

Enclosure - General

Window	Glass window.
Sealing	Silicone.
Control keys	Three infra-red keys with operation through the glass front window.
Rating	IP66, IP67 / NEMA Type4X / Type7 / Type9.
Dimensions	112 x 133 x 148mm (4.41" x 5.24" x 5.83") - W x H x D.

Enclosure - Types

Type HA_	Aluminum Ex d enclosure.
Weight	1550 gr. (3.41 lbs).
Type HS_	Stainless steel 316L Ex d enclosure.
Weight	3600 gr. (9.65 lbs).

Enclosure - Drillings

Type H_A	Entry threads: 2 x ¾"NPT / 1 x 1"NPT
Type H_B	Entry threads: 3 x ¾"NPT
Type H_C	Entry threads: 2 x ½"NPT / 1 x 1"NPT
Type H_D	Entry threads: 2 x ½"NPT / 1 x 3/4"NPT
Type H_G	Entry threads: 2 x M20 / 1 x M25
Type H_H	Entry threads: 3 x M25

General E-Series accessories

ABB01-07	Brass nickel plated blind plugs.
ABS01-07	Stainless steel blind plugs.
ARB01-04	Brass nickel plated reducers.
ARS01-04	Stainless steel reducers.
ACE03	Stainless steel wall mounting kit (inc. screws+plugs).
ACE04	Stainless steel pipe mounting kit.
ACE05	2 pins, 30cm (12") cable with Amphenol connector.
ACG08	MTL5541AS barrier - For hazardous area 4-20mA with HART Communication to safe area, with current sink for safe area connection.

Signal inputs - Flowmeter

Type P	Coil / sine wave (HI: 20mVpp or 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.

Signal inputs - Additional input

Function	Terminal input to reset total remotely or to lock the “clear total” button.
Type IB	Internally pulled-up switch contact - NPN.
Duration	Minimum pulse duration 100msec.

Signal outputs - Digital output

Function	• Pulse output - transmitting accumulated total. • Alarm output: Low, high or both alarms.
Note	All four outputs are user defined: pulse output, low-low, low, high, high-high or all alarm outputs.
Frequency	Max. 500Hz. Pulse length user definable between 1msec up to 10 seconds.
Type OR	Two isolated electro-mechanical relay outputs (NO). Maximum resistive load: 2A @ 250V AC / 30V DC. Maximum inductive load: 0,5A (pilot duty applications). Type OT remains also available.
Restrictions OR	Requires 24 - 27V DC and supplied via P5 - P6. Frequency max. 5Hz.
Type OT	Four passive transistor outputs (NPN) - not isolated. 300mA - 50V @ 25°C.

Signal outputs - Analog output

Function	Transmitting flow rate.
Type AH	Galvanically isolated, loop powered 4 - 20mA output
Accuracy	12 bit. Error 0.05% of full scale at 25°C (77°F), 40ppm/°C temperature drift. Analog output signal can be scaled to any desired range.

Signal outputs - Communication option

Function	Reading display information, reading / writing all configuration settings.
Type CR	HART Communication protocol, Revision 7.0.
Liftoff voltage	11V.
Loop resistance	250 Ohm.
Addressing	Selectable 0 - 63.
Type CX	No communication, remote configuration possible with accessory cable ACE02.

Operator functions

Displayed info	• Linearized flow rate and / or total. • Linearized total and accumulated total. • Low flow rate alarm value. • High flow rate alarm value. • Indicating speedometer for linearized flow rate. • Alarm values can be set (or only displayed). • Total can be reset to zero by pressing the CLEAR-key twice (password protected).

Remote configuration

Function	Easy remote configuration via our free downloadable software and a special communication cable.
Type CR/CX	Requires ACE02 cable for option CX to USB plug.

Total

Digits	7 digits.
Units	L, m^3, US gal, igal, cf, Oil bbl, kg, ton, US ton, lb or none.
Decimals	0 - 1 - 2 or 3.
Note	Total can be reset to zero.

Accumulated total

Digits	11 digits.
Units / decimals	According to selection for total.
Note	Can not be reset to zero.

Flow rate

Digits	7 digits.
Units	mL, L, m^3, mg, g, kg, ton, US ton, US gal, igal, Oil bbl, lb, cf, rev, none, scf, nm^3, or nL.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

Alarm values

Digits	7 digits.
Units	According to selection for flow rate.
Decimals	According to selection for flow rate.
Time units	According to selection for flow rate.
Type of alarm	Configurable low-low, low, high, high-high or all flow rate alarms. Includes alarm delay time.

Accessories

ABB01-07	Brass nickel plated blind plugs.
ABS01-07	Stainless steel blind plugs.
ARB01-04	Brass nickel plated reducers.
ARS01-04	Stainless steel reducers.
ACE03	Stainless steel wall mounting kit (inc.screws+plugs).
ACE04	Stainless steel pipe mounting kit.
ACE05	2 pins, 30cm (12”) cable with Amphenol connector.
ACG08	MTL5541AS barrier - For hazardous area 4-20mA with HART Communication to safe area, with current sink for safe area connection.

		Description								
Model	**E018**	**Flow Monitor / Totalizer with linearization, pulse/alarms and analog outputs and HART Communication.**								
Input	**P**	**Pulse input: coil, npn, pnp, namur.**	**-P**							
Analog output	**AH**	**Galvanically isolated, loop powered 4-20mA output.**	**-AH**							
Commu-nication	CR	HART communication, remote configuration is possible.	-CR							
	CX	**No communication, remote configuration is possible.**	**-CX**							
Enclosures	**HA_**	**Die-cast aluminum Ex d enclosure.**	**-HA_**							
	HS_	Stainless steel 316L Ex d enclosure.	-HS_							
	H_A	**Entry threads: 2 x ¾"NPT / 1 x 1"NPT.**	**-H_A**							
	H_B	Entry threads: 3 x ¾"NPT.	-H_B							
	H_C	Entry threads: 2 x ½"NPT / 1 x 1"NPT.	-H_C							
	H_D	Entry threads: 2 x ½"NPT / 1 x ¾"NPT.	-H_D							
	H_G	Entry threads: 2 x M20 / 1 x M25.	-H_G							
	H_H	Entry threads: 3 x M25.	-H_H							
Add.	**IB**	**Remote control input to reset total or to lock the "clear total" button.**	**-IB**							
Digital output	OR	2 mechanical relay outputs (OT remains available) - requires 24 - 27V DC.	-OR							
	OT	**4 passive transistor outputs.**	**-OT**							
Power	PD	9 - 27V DC + sensor supply.	-PD							
	PX	**Basic power supply 9 - 27V DC (no real sensor supply).**	**-PX**							
Battery	PB	Additional lithium battery powered (optional).	-PB -P_							
Hazardous	**XD**	**Explosion proof according ATEX, IECEx, FM and CSA c-us.**	**-XD**							
Options	**ZB**	**Backlight is included as standard.**	**-ZB**							
	ZF	Coil input 10mVpp.	-ZF							
	ZG	Coil input 5mVpp.	-ZG							
	ZM	Extra manual in German (-ZMde) or Spanish (-ZMes). English and French included as standard.	-ZM							
		E018	-P	-AH	-C_	-H_ _	-IB	-O_	-P_	-XD	-Z_

The **bold** marked text contains the standard configuration: E018-P-AH-CX-HAA-IB-OT-PX-XD-ZB.

HART COMMUNICATION PROTOCOL

Fluidwell bv
T: +31 (0) 413 - 343 786
E: displays@fluidwell.com
www.fluidwell.com

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