BanksiaControls

Flow rate Indicator / Totalizer

with linearization, analog and pulse signal outputs

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.
- Your crew is in control with our highly praised “know one, know them all” configuration structure, saving time, cost and aggravation.
- Easy installation with the spacious chamber and plug and play connectors.
- Cost saving with an easy to install, 1” NPT thread for flow meter mounting.
- Durable high grade stainless steel 316L Ex d enclosure for extremely salty atmospheres (offshore).
- Key information at a glance as the display shows flow rate, total, measuring units and a flow rate indicating speedometer.

Features

- Explosion proof according ATEX, IECEx and CSA c-us.
- Easy K-factor and engineering unit configuration for volumetric or mass.
- 7 digit flow rate / total and 11 digit accumulated total.
- 16 point linearization of the flow curve - with interpolation.
- Bright LED backlight.
- Power options: Loop powered, battery and 9 - 27V DC.
- Sensor supply 8.2 / 12 / 24V DC.
- Data logging to survey information.
- USB communication for remote configuration or local data extraction.
- Modbus communication option RS232 / RS485.
- Easy configurable via PC with free downloadable configuration tool.

Outputs

- Isolated, loop powered 4 - 20mA output according to linearized flow rate.
- Scaled pulse output according to linearized accumulated total.

Inputs

- Ability to process all types of volumetric or mass flow meter signals: Reed-switch, NAMUR, NPN/PNP pulse, Sine wave (coil), Active pulse signals. (o)4 - 20mA and o - 10V DC analog inputs are pending.

Applications

- Flow measurement with mechanical flow meters where a precise calculation over the full measurement range is required.
  Or if re-transmission of the flow rate and/or totalizer functions or serial communication is desired.
- The E112 offers you a flow rate indicator / 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.

General information

Introduction

The E112 is a popular model in our range of explosion proof flow rate indicators. 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 we stand for and it is now available in a comprehensive well designed and purpose driven explosion proof flow rate indicator / totalizer.

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. For good readings in full sunlight and darkness, the E112 is provided with a bright backlight. When battery powered the backlight is only operational after a keypad touch, to safe battery life.

Configuration

The E-Series uses the highly appreciated configuration structure of our F-, D- and N-Series product lines. 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) F112 operates identical to an explosion proof E112 and has the same three buttons! In other words: know one, know them all.
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 are accessed via a simple operator menu that can be passcode protected.

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 (ordernr.: ACE02)* or use the Modbus or USB communication link.

High grade Stainless Steel 316L enclosure

Easy-to-operate through glass keypad

Robust entry threads

USB communnication for local data extraction

Flow meter input

The E112 accepts most input signals for volume flow or mass flow meters. The input signal type can be selected in the configuration menu without having to adjust any sensitive mechanical dip-switches or jumpers. In addition to the average K-Factor, 16 linearization points can be entered with their frequencies or values. The unit will interpolate between these points greatly enhancing accuracy in any flow range.

Analog output

The linearized flow rate is transmitted with the galvanically isolated 4 - 20mA output signal. The E112 can even be loop powered via the isolated loop-current.

Pulse outputs

A scaled pulse output is available 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 E112 and sensor. As standard, the E112 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 E112 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.

Data logging

The data log function can hold up to 2824 logs. Each log contains the flow rate, total, acc. total, time stamp and log number. The log interval can be user defined from every minute up to once every 24 hours. Events like cleared total, changed menu settings or factory reset will also be logged. Once the log is full it will roll over, deleting the eldest data. The log data can be visualized on the LCD but is also easy accessible via Modbus or USB communication.

Enclosures

Two fundamental versions of our IP66/IP67, NEMA 4X/7/8/9 explosion proof enclosures are available: a solid die cast aluminum or a heavy duty 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. Various NPT and metric connections threads are available. Especially for use on top of Turbine meters a 1" NPT connection is available for straight flow meter mounting (see page 4 for available threads sizes).

Hazardous areas

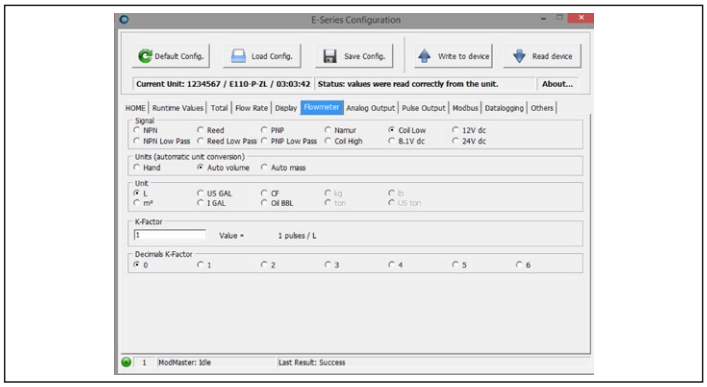
The E-Series has been certified according ATEX, IECEx and CSA c-us with an ambient temperature of -40°C to +70°C (-40°F to +158°F).
The application range of the enclosure is very wide:

- The **ATEX** markings are:
  Gas: **II 2 G Ex d IIC T6 Gb**
  Dust: **II 2 D Ex tb IIIC T85°C Db**
- The **IECEx** markings are:
  Gas: **Ex d IIC T6 Gb**
  Dust: **Ex tb IIIC T85°C Db**
- The **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.

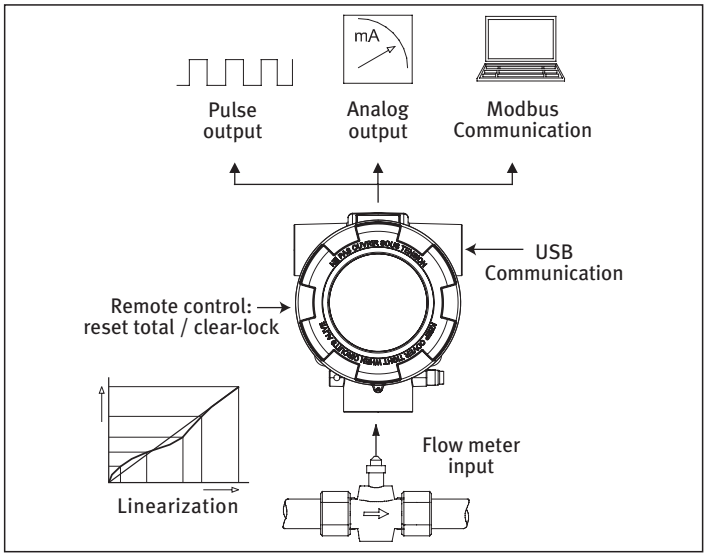
Communication

All processed data and settings can be read and modified through the Modbus link (RS232 / RS485) or the local USB communication which is located at the side entry plug. Under safe conditions, the plug can be removed for easy configuration or data log extraction.

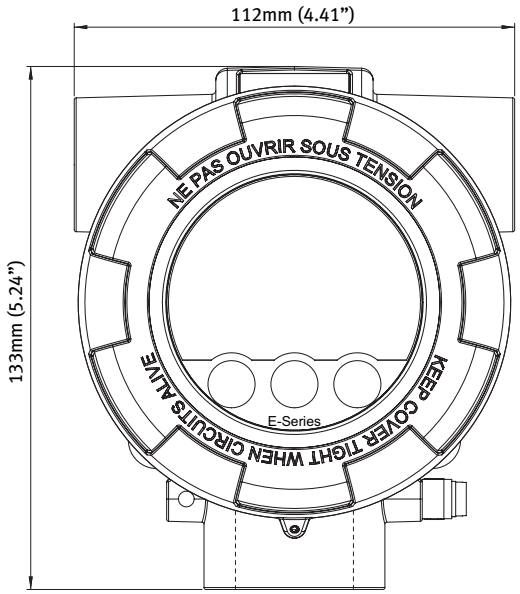
Screenshot Remote Configuration Software

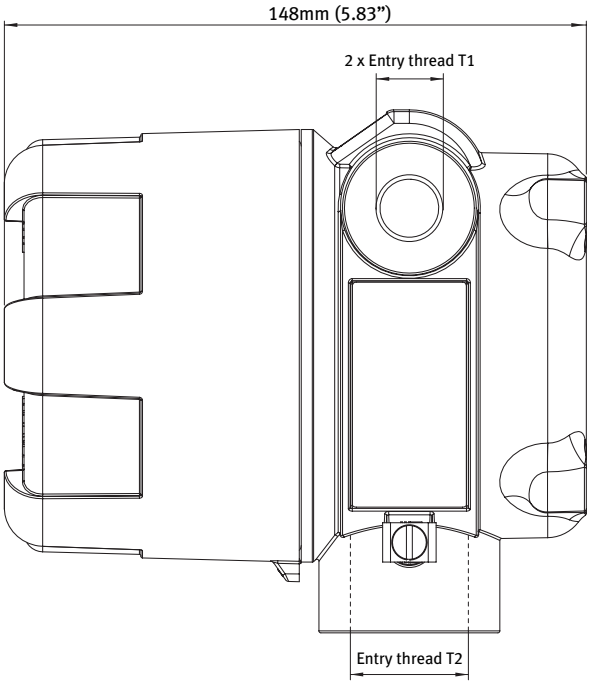


Overview application E112



Dimensions enclosures



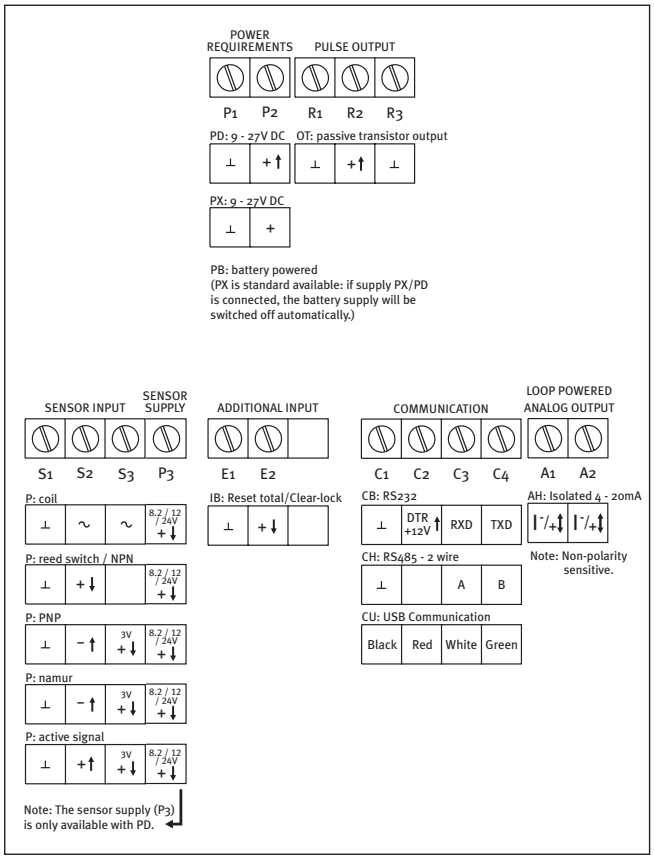


Enclosure types	
Type HA_	Die-cast aluminum Ex d enclosure.
Weight	1300 gr.
Type HS_	Stainless steel 316L Ex d enclosure.
Weight	3600 gr.

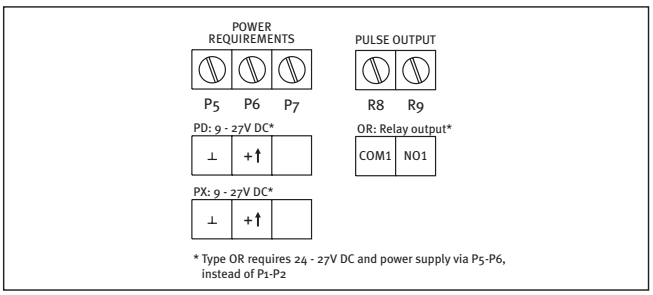
Enclosure drillings	
Type H_A	Entry threads: 2 x 3/4"NPT / 1 x 1"NPT
Type H_B	Entry threads: 3 x 3/4"NPT
Type H_C	Entry threads: 2 x 1/2"NPT / 1 x 1"NPT
Type H_D	Entry threads: 2 x 1/2"NPT / 1 x 3/4"NPT
Type H_G	Entry threads: 2 x M20 / 1 x M25
Type H_H	Entry threads: 3 x M25

Terminal connections

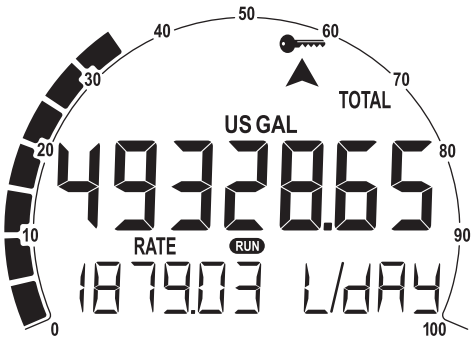
Main Electronics Module



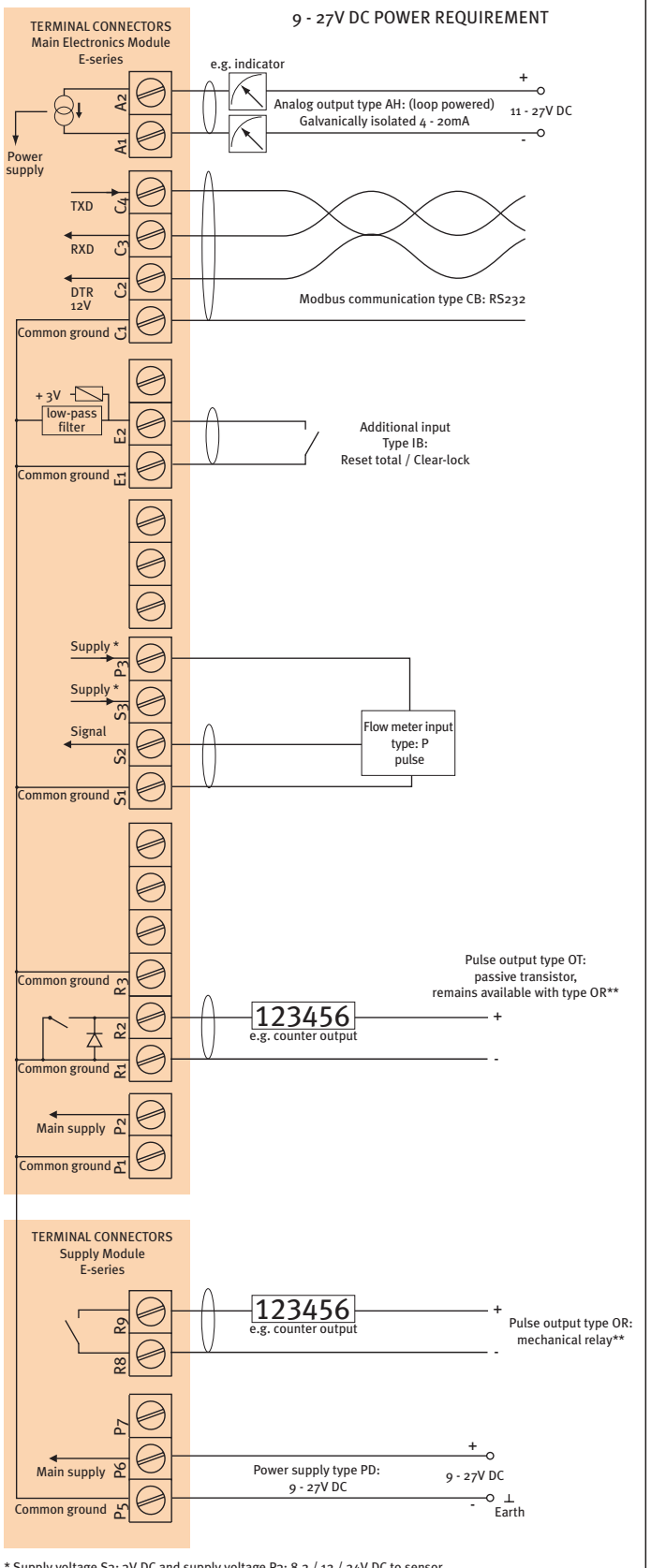
Supply Module



Display example - scale 1:1

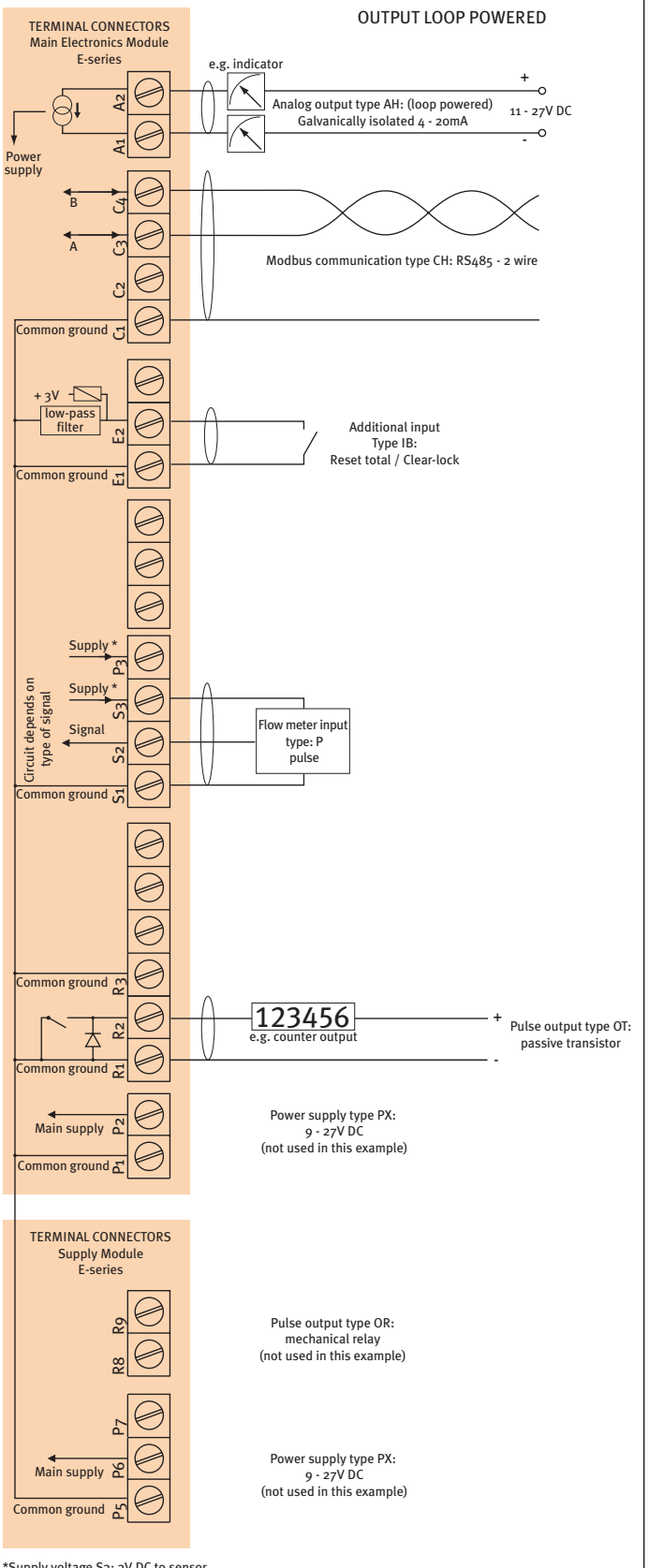


Typical wiring diagram E112-P-AH-CB-IB-OR-PD



* 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

Typical wiring diagram E112-P-AH-CH-IB-OT-PX



*Supply voltage S3: 3V DC to sensor

Technical specification

General

Display	
Type	High intensity transflective numeric and alpha-numeric LCD, UV-resistant, with bright backlight. Intensity can be adjusted via the keypad.
Note	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") 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. 4.5W.
Type PX	9 - 27V DC. Consumption max. 4.5W.
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	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, Iout max. 20mA. 12V DC, Iout max. 30mA. 24V DC, Iout 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.
Pass-code	Configuration settings can be pass-code protected.

Directives & Standards	
EMC	Directive 2004/108/EC, FCC 47 CFR part 15.
Low voltage	Directive 2006/95/EC.
ATEX / IECEx	Directive 94/9/EC, IEC 60079-0, IEC 60079-1, IEC 60079-31.
CSA	CSA 22.2 No. 25, No. 30.
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: Ⓔx II 2 G Ex d IIC T6 Gb. Dust: Ⓔx II 2 D Ex tb IIIC T85°C Db.
IECEx certification	Gas: Ex d IIC T6 Gb. Dust: Ex tb IIIC T85°C Db.
CSA C-US certification	XP (Explosion-proof): Class I, Div. 1, Grps A, B, C, D. DIP (Dust-Ignition-proof): 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 4X / NEMA 7 / NEMA 8 / NEMA 9.
Dimensions	112 x 133 x 148mm (4.41" x 5.24" x 5.83") - W x H x D.

Enclosure types	
Type HA_	Die-cast aluminum Ex d enclosure.
Weight	1300 gr. (3.48 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 ¾"NPT
Type H_G	Entry threads: 2 x M20 / 1 x M25
Type H_H	Entry threads: 3 x M25

Accessories

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.
ACE01	USB data logging and configuration cable.
ACE02	Remote configuration cable.
ACE03	Stainless steel wall mounting kit (inc. screws+plugs).
ACE04	Stainless steel pipe mounting kit.
ACE05	2 pins, 30cm (12") cable with Amphenol connector.

Signal input

Flow meter sensor	
Type P	Coil / sine wave (COIL-HI: 20mVpp or COIL-LO: 80mVpp sensitivity selectable), NPN, PNP, reedswitch, Namur, active pulse signals 8 or 24V DC.
Frequency	Minimum 0Hz - maximum 7kHz 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.
Type A	Pending: (0)4 - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.
Type U	Pending: 0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC.
Accuracy	Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS. Low level cut-off programmable.
Span	0.001 / 999,999 with variable decimal position.
Update time	Four times per second.
Voltage drop	Type A: max. 1V DC @ 20mA.
Load impedance	Type U: 3kOhm.
Relationship	Linear and square root calculation.
Note	For signal type A and U: external power to sensor is required; e.g. type PD.

Additional input signal	
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: Transmitting linearized accumulated total.
Frequency	Max. 500Hz. Pulse length user definable between 1msec up to 10 seconds.
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). Type OT remains also available.
Restrictions OR	Requires 24 - 27V DC and supplied via P5 - P6. Frequency max. 5Hz.
Type OT	One passive transistor output (NPN) - not isolated. 300mA - 50V @ 25°C.

Analog output	
Function	Transmitting linearized 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.

Communication option	
Function	Reading display information, reading / writing all configuration settings and data log extraction.
Protocol	Modbus ASCII / RTU.
Type CB	RS232
Type CH	RS485 2-wire
Type CU	Local USB communication for easy connection to a laptop incl. Ex d USB plug at the right-hand side entry.
Restriction CU	Requires 3/4"NPT or M25 side entry thread.

Data logging	
Function	Records process data over time.
Type ZL	Each log containing flowrate, total, acc. total, time/date stamp and log number.
Interval logs	Every: 1 min, 5 min, 10 min, 15 min, 30 min, 1 hr, 2 hr, 3 hr, 4 hr, 6 hr, 8 hr or disable. Max. 1500 interval logs
Daily logs	Configurable time once / twice per day or disable. Max. 600 daily logs.
Event logs	When settings change (manual/Modbus), restart / power failure, factory reset, cleared total or error event. Max. 724 event logs.
Clock	Real time clock with backup battery.
Extraction	USB or Modbus communication.

Operational

Operator functions	
Displayed functions	• Linearized flow rate and / or total. • Linearized total and accumulated total. • Indicating speedometer for flow rate. • Total can be reset to zero by pressing the CLEAR-key twice (passcode protected).

Total	
Digits	7 digits.
Units	L, m³, US gal, igal, cf, Oil bbl, kg, ton, US ton, lb or none.
Decimals	0 - 1 - 2 or 3.
Note	Total can be reset to zero.

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

Flow rate	
Digits	7 digits.
Units	mL, L, m³, mg, g, kg, ton, US ton, US gal, igal, Oil bbl, lb, cf, rev, none, scf, nm³, nL or p.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

Datasheet E112

Robust explosion proof indicator

BanksiaControls

Ordering information (in aphabetical order)

Standard configuration: E112-P-AH-CX-HAA-IB-OT-PX-XD-ZB.

Ordering information: E112	-P	-AH	-C _	-H _ _	-IB	-O_	-P _	-XD	-Z _
Flow meter input signal									
~~A~~ Pending: (0)4 - 20mA input.									
P Pulse input: coil, npn, pnp, namur, reed-switch.									
~~U~~ Pending: 0 - 10V DC input.									
Analog output signal									
AH Galvanically isolated, loop powered 4 - 20mA output.									
Communication									
CB RS232 communication - Modbus ASCII / RTU.									
CH RS485 communication - 2wire - Modbus ASCII / RTU.									
CU USB communication incl. Ex d plug - requires ¾"NPT or M25 entry thread.									
CX No communication.									
Enclosure types - IP66,IP67 / NEMA 4X / NEMA 7 / NEMA 8 / NEMA 9.									
HA_ Die-cast aluminum Ex d enclosure.									
HS_ Stainless steel 316L Ex d enclosure.									
Enclosure drillings									
H_A Entry threads: 2 x ¾"NPT / 1 x 1"NPT.									
H_B Entry threads: 3 x ¾"NPT.									
H_C Entry threads: 2 x ½"NPT / 1 x 1"NPT.									
H_D Entry threads: 2 x ½"NPT / 1 x ¾"NPT.									
H_G Entry threads: 2 x M20 / 1 x M25.									
H_H Entry threads: 3 x M25.									
Additional input signal									
IB Remote control input to reset total or to lock the "clear total" button.									
Digital output signal									
OR Mechanical relay output (OT remains available) - requires 24 - 27V DC.									
OT Passive transistor output - standard configuration.									
Power requirements									
PB Lithium battery powered.									
PD 9 - 27V DC + sensor supply.									
PX Basic power input 9 - 27V DC (no real sensor supply).									
Hazardous area									
XD Explosion proof enclosure according ATEX, IECEx and CSA c-us.									
Other options									
ZB Backlight is included as standard.									
ZF Coil input 10mVpp.									
ZG Coil input 5mVpp.									
ZL Data logging to survey information.									

The bold marked text contains the standard configuration.

BanksiaControls

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