Pulsed DC technology incorporates benefits of AC systems

Keypad configurable
- A choice of engineering parameters in engineering units e.g. flowrate, flow units, all outputs

Empty pipe detection
- Ensures units read zero on empty pipe

Interchangeable
- Converter/sensor can be changed without affecting performance

Advanced switching power supply
- 95 to 240V ac and 11 to 40V dc

Test mode and Self diagnostics
- provides powerful start up tool. Exercises all outputs and displays, even without a sensor connected

Multi-lingual
- English, Spanish, plus others upon request

Three internal totalizers: forward, reverse, net; Forward and reverse flowrates and comprehensive range of outputs : current, pulse, data, HART
- single package satisfying all user display requirements
- insures compatibility with user’s control system requirements

Two-Year Warranty

FM / CSA Approved

CalMaster enabled
Assured Quality

MagMaster converters are designed and manufactured in accordance with international quality procedures (ISO 9001) and all flowmeters are calibrated on nationally traceable calibration rigs to provide the end user with complete assurance of both quality and performance of the meter. An indication of the quality is the two year warranty which is offered as standard.

Fully Featured Converters

The MagMaster Flowmeter is available with integral or remote converters, each being available with a choice of display, configuration and communication options to suit the application. Standard features include forward, reverse and net flow totalizers, flow rate, alarm monitoring, and automatic self diagnostics to insure integrity. All data and values are in customer-defined units of measurement. System compatibility is assured with a choice of current, pulse, serial data and Smart (HART) communications.

MagMaster operating parameters may be set via local keypad or computers as appropriate. The software features multi-level password protection capability to prevent inadvertent program or setting changes. Data is stored in non-volatile memory for 10 year retention.

In the non-keypad variant, display data can only be changed using a magnetic wand. No operational parameters can be changed without the use of computer and appropriate passwords.

International Approvals

Alternative versions of MagMaster are available for general locations with FM Approval/CSA certification and for hazardous area locations to CENELEC, FM, CSA and SAA Standards. No external safety barriers are required.

GENERAL SPECIFICATION

Programming Options

- Integral keypad with 3 line display (Standard)
- Local VA Laptop Computer

Environmental Protection: IP65/NEMA 4X.

EMC Specification: Conforms to – EMC Directive 89/336/EEC to 10V/m

Enclosure: Glass loaded polypropylene, polycarbonate window. UL94VO rated. (Fire Retardant)

Electrical connections: Accepts 1/2 in NPT connections.

Sensor Cable: ABB supplied standard and waterproof versions.

Converter/Sensor Separation: 330 ft. (100m) max.

High Input Impedance

10\(^{15}\) ohm performance allows non-conductive coatings on the electrodes to be ignored. Eliminates the need for removable electrodes or electrode cleaners.

Temperature Ranges:

<table>
<thead>
<tr>
<th>Operating</th>
<th>Storage</th>
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</thead>
<tbody>
<tr>
<td>-60°C (140°F)</td>
<td>75°C (167°C)</td>
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<tr>
<td>-95°C (-31°F)</td>
<td>-15°C (5°F)</td>
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</table>

Supply Voltage *:

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<thead>
<tr>
<th>Voltage Type</th>
<th>Voltage Range (V) Absolute rating</th>
<th>Frequency (Hz)</th>
<th>VA with sensor</th>
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</thead>
<tbody>
<tr>
<td>a.c.</td>
<td>85 to 265</td>
<td>47 to 440</td>
<td>&lt; 2.0</td>
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<tr>
<td>d.c.</td>
<td>11 to 40</td>
<td>-</td>
<td>&lt; 2.0</td>
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</table>

* Power supply fully isolated
SPECIFICATIONS

Configuration:
Converter may be integral with sensor for sizes 1/2 to 16-inches (400mm) or remote from sensor for all sizes.

Separation (remote transmitters):
The maximum cable length is 330 feet (100m) or 15 x the conductivity (µS/cm). Longer lengths are special order.

Accuracy (under reference conditions):
See separate specifications for MagMaster sensors.

Display, Serial comms, Frequency output:
with MFE Series Sensors: ±0.2% of reading
with MFF Series Sensors: ±0.15% of reading
or ±0.003 ft/sec (0.001m/s) (whichever is greater)
up to a maximum velocity of >49 ft/sec (15m/s).

Analog output:
As Frequency output plus ±0.008mA.

Temperature effect:
Converter: Display, frequency output, Serial comms <±0.08% of reading per 10°C.
Analog output – as frequency plus <±0.08% of reading per 10°C.

Repeatability & Reproducibility:
±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater.

Power Supply Variation:
Negligible effect—within published specification.

Conductivity:
Liquids and slurries having a minimum conductivity of 5µS/cm (5µmho/cm).

Power consumption:
Less than 20VA.

Warm-up Time:
1 minute.

Calibration:
3 point, 8 point, witnessed, NIST/UKAS (8- to 66-inch only), slurry calibration options.

Prime cable connection:
1/2 inch NPT—single opening. A single cable is available that provides for the coil drive and electrode signals.

Hazardous Area Certification (Remote mount only):
FM approved and CSA certified for Class I, Div. 2, Groups A, B, C, D hazardous locations, 1/2-24 inches (15-600 mm).

Note: FM approved sensors for hazardous locations include an intrinsic safety shunt circuit for the electrodes allowing for a Div.1 rating inside the pipe. The circuit is located in the larger than standard terminal box housing. CSA certified sensors for hazardous locations may or may not include the circuit, depending on the rating inside the pipe. Appropriate approved sensor must be selected.

Meets:
Electrical safety: BS4743 Class 1. (IEC 348).

Configuration Methods:
All configurations are user defined and password protected. The configuration is stored in non-volatile memory with a 10 year retention. The transmitter is fully programmed before shipping. Reprogramming can be easily done on site using the following methods:

Keypad: Can be used to access and change all menu parameters using four membrane keys and 3-line display.

2-Line: Local via Laptop Computer

Displays:

Keypad: 3-Line, 16 character, backlit display with large 1/2" numerals for flowrate and two lines for engineering units, totalizers, alarm status, velocity and percent of range.

2-Line: 16-character, read only display for flowrate (in a choice of engineering units and % of range), totalized flow, forward, reverse and net totals, alarm conditions, flow velocity, and percent of range. Display is scrolled and reset by magnetic reed switches actuated by a magnetic wand. Data can be read through serial communications of HART.

Blind: no display, but data can be read through serial communications of HART.

Internal Totalizer:
Resettable 9-digit totalizers for forward, reverse and net totals. Can be programmed to reset via external input.

HART® is a registered trademark of the HART Communication Foundation
Electro-Magnetic Flowmeters
Converters MagMaster

Test Mode and Output Circuit Loop Verification:
After converter has been programmed, operation of the test mode will drive all outputs to programmed value to provide total system test.

HART Communications:
The MagMaster converter HART option allows communications via the HART field communications protocol using a communications device connected to points located anywhere in the 4-20mA current output circuit wiring. MagMaster also supports a multi-drop system and permits up to 15 MagMasters on a single pair of wires without losing the 4-20mA signals on the individual meters.

Self Diagnostic:
Converter confirms correct operation of hardware with fault diagnosis, eg. coil drive problems.

Empty Pipe Detection:
Programmable for conductivity trip point. Liquid level sensing results in drive to zero (i.e., empty pipe zero when electrodes are no longer covered with fluid). For process mode only. Also can drive output to zero via external input in process or slurry mode.

Interchangeability:
Converters are fully interchangeable with all sizes of MagMaster sensors and configurable on site. System specifications are not affected by converter change.

Time Constant:
Fully programmable from 1 to greater than 100 secs.

Test Equipment:
(MFE-SIM, Cal Master)
Flow signal simulators for testing and checking the calibration electronically of the MagMaster converter are available.

Retrofit:
The MagMaster converter can be used to upgrade earlier version magnetic flowmeters, including the 1100L/1210L series. In addition, the MagMaster converter can be used as a replacement on other manufacturers sensing heads.

Outputs:
Standard:
1. Analog:
   Fully programmable for zero, full scale, up to 21mA and flow direction.
   Fully isolated. Output capability ≤16V.
   (800 ohm, 4-20mA). Secondary range enabled by external input or programmed alarm condition as a percent of full scale.

2. Pulse / Frequency:
   One frequency/pulse output for forward and one for reverse flow.
   Forward and reverse flows 0 to 800 Hz squarewave or fixed pulse width up to 2.5 sec.
   Fully programmable for pulse rate, pulse factor, low flow cutoff, pulse width, etc. Minimum frequency/resolution < 0.1 pulse/day. Frequency limit settable 1Hz - 800Hz in 1Hz steps. Isolated protected transistor switch capable of sinking > 250mA. Voltage < 35V.

3. Dual Alarms (2 separate outputs):
   Isolated protected transistor switch capable of sinking <250mA. Voltage <35V.
   Note: Not isolated from frequency output. Fully programmable for high/low flow rates, % of range, empty-pipe zero, fault conditions, forward/reverse, polarity (normally open/close), analog over-range, pulse overrange, pulse cutoff, etc.

4. RS232C:
   9-pin data connector for local handheld configurator or any computer with serial communications.

Optional:
1. Dual Analog:
   Additional analog outputs for rearranging (provides two separate inputs to a recorder/controller). Only one output is active at a time. Non-active output is 4mA.

2. Serial communication RS423/RS-422:
   Compatible data link (via terminal block).

3. HART Communications:
   See separate description

Input:
An external input such as contact closure, open collector, voltage or logic signal can be used to:
1. Reset totalizer
2. Change range (span)
3. Hold the output constant
4. Drive the output to zero (i.e. empty pipe or partial filled pipe conditions)
5. Settable for low flow cut off.

Note: Not isolated from pulse and alarm outputs.

Isolation:
Galvanic separation to 50V dc. between analog, pulse/alarm, and earth/ground.
Electro-Magnetic Flowmeters
Converters MagMaster

TRANSMITTER DIMENSIONS

Note: Sensor dimensions and Terminal Box dimensions in sensor specifications.
## Ordering Information

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<td>Dual current output (Not Available with Class I, Div 2 - 10th Characters 5, 6, 7 or 8)</td>
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<td>HART Communications (Not available with RS422/423)</td>
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<td>RS423/422 serial data communications (Not Available with HART)</td>
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<td>RS423/422 serial data communications and dual current output (Not Available with HART)</td>
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<td><strong>Transmitter Build Standard</strong></td>
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<td>General Purpose (non-FM/CSA approved) (Note 5)</td>
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<td>General Purpose Slurry (non-FM/CSA approved) (Notes 1 &amp; 5)</td>
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<td>FM approved, CSA certified, General Purpose (Notes 4 &amp; 7)</td>
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<td>FM approved, CSA certified, General Purpose Slurry (Notes 1, 4 &amp; 7)</td>
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<tr>
<td>FM approved, CSA certified, Class I, Div 2, Groups A, B, C, D. Remote Mount Only, (Notes 4 &amp; 6)</td>
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<td>FM approved, CSA certified, Class I, Div 2, Groups A, B, C, D. Remote Mount Only. Slurry (Notes 1, 4 &amp; 6)</td>
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<tr>
<td>CSA certified, Class I, Div 2, Groups A, B, C, D (Notes 1 &amp; 4) Non-incendive electrode circuit in sensor for Hazardous location.</td>
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<td>CSA certified, Class I, Div 2, Groups A, B, C, D Slurry (Notes 1 &amp; 4) Non-incendive electrode circuit in sensor for Hazardous location.</td>
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<td><strong>Display Orientation</strong></td>
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### Accessories:
- Mounting Bracket - Pipe or Wall Mount 155S997
- Instruction Manuals (One copy supplied with order at no charge) IM/MAGMAS

### Notes:
1. A slurry mode transmitter system must have a slurry electrode option (see sensor ordering codes).
4. FM approved, CSA certified sensors or transmitter must be part of an approved/certified MagMaster system. (Not approved/certified when transmitter is used with 1100L and 1210L series sensors.)
5. For MFF Series sensors, only Transmitter Build Standard 1 or 2 is available.
6. Sensor must have FM/CSA hazardous location rating with intrinsically safe electrodes.
7. Sensor must have FM/CSA non-hazardous location rating
8. Cable must be priced separately. See P-FMZ-10D9000 for current price information.

Standard Product =
Notes