



Engineering Specifications – SITRANS FM MAG 5100 W Electromagnetic Flowmeter *With MAG 5000 Signal converter*

GENERAL

Scope

This section describes the requirements for an electromagnetic flow meter and microprocessor-based signal converter. Under this item, the contractor shall furnish and install the magmeter equipment and accessories as indicated on the plans and as herein specified.

Submittals

The following information shall be included in the submittal for this section:















- Data sheets and catalog literature for the magmeter and the microprocessor-based signal converter.
- Connection diagrams for equipment wiring.
- List of spare parts and optional equipment.

Products

ELECTROMAGNETIC FLOWMETER (MAGMETER)

The electromagnetic flow meter shall consist of a flow sensor based on Faraday's Law of Electromagnetic Induction and microprocessor-based signal converter, type MAG 5000.

Sensor:

-  Operating principle: Utilizing Faraday's Law of Electromagnetic Induction, the flow of liquid through the sensor induces an electrical voltage that is proportional to the velocity of the flow.
-  Construction: (choose based on sensor size)
-  The sensor flow tube shall be 304 stainless steel surrounded by two coils. Liner material shall be EPDM or NBR rubber. Measurement and grounding electrodes shall be Hastelloy C. Connecting flanges shall be carbon steel
-  Installation: A minimum of 5 pipe diameters up stream and 3 pipe diameters down stream are recommended (Consult the factory for any variations.). Meter shall be verified according to MI-001 for 0 diameter inlet and 0 diameter outlet installation
-  Operating Temp: -20 to +160° F.
-  Size: 1" to 88" diameter (see instrument schedule)
-  Submergence: The sensor shall be pedestal sealed against accidental submersion to 3 feet for 30 minutes standard, or permanently submerged to 30 feet when the terminal box is backfilled with a non-setting, transparent potting material.
-  Signal converter: Type MAG 5000.
-  Enclosure: NEMA 4X enclosure
-  Display: Background illumination with alphanumeric 3-line, 20-character display to indicate flow rate, totalized values, settings, and faults (a blind version of the MAG 5000 signal converter is available).
-  Power supply: 115/230 VAC or 11-24VDC.
-  Operating temperature: -5 to +120 degrees F.
-  Outputs: 0-20 mA or 4-20 mA into 800 ohms max. One relay rated at 42 VAC/2 A, 24 DC/1 A. Digital (frequency or pulse) for external display of flow rate or totalizer.
-  Communications: Optional HART available.



Sensor and signal converter performance:

1. Flow Range: 1.5 fps to 33 fps for accuracies stated below.
2. Accuracy: 0.4% of actual flow. Meter shall be verified according to MI-001 for 0 diameter inlet and 0 diameter outlet installation with accuracy of 1% of actual flow or better
3. Separation: Maximum distance of 900 feet between signal converter and sensor without the use of any additional equipment.
4. Bi-directional flow capabilities shall be standard



Totalizer: Two eight-digit counters for forward, net, or reverse flow



The electromagnetic flow meter shall be a Siemens Model MAG 5100 W flow sensor with a Siemens Model MAG 5000 signal converter. Insertion type flow meters will not be accepted.

Spare Parts

Spare parts for the equipment shall include the following, unless otherwise noted:



One set of manufacturers recommended spare parts.



Extra operation manuals as required.

OPERATOR FUNCTIONS

Calibration



Each flow sensor shall be wet calibrated and all of the calibration information and factory settings matching the sensor shall be stored in an integrally mounted SENSORPROM® memory unit. The SENSORPROM® shall store sensor calibration data and signal converter settings for the lifetime of the product. At initial commissioning, the flowmeter commences measurement without any initial programming. Any customer specified settings are downloaded to the SENSORPROM®. Should the signal converter need to be replaced, the new signal converter will upload all previous settings and resume measurement without any need for reprogramming or rewiring.



A certificate of calibration shall accompany each flow sensor.

Signal Converter Function Details

The following functions shall be provided:



All programming shall be accomplished through an integral keypad and all programming shall be protected by a user-defined password.



The signal converter shall be integrally mounted or remotely mounted using a remote-mount kit provided by the manufacturer.



The signal converter shall provide a 0/4-20 mA DC signal proportional to flow rate into 800 ohms max. Output selectable as unidirectional or bi-directional.



The relay shall be programmable as error indicator, limit alarm or pulsed output.



The signal converter system shall be equipped with an error and status log with 4 groups of information.

1. Information without a functional error involved.
2. Warnings which may cause malfunction in the application
3. Permanent errors, which may cause malfunction in the application.
4. Fatal error, which is essential for the operation of the flowmeter.



A system error shall be indicated by a flashing icon on the display or activation of the relay when set as an error alarm.



The first nine standing errors shall be stored in the error pending log. A corrected error is removed from the error pending log. A status log shall be provided to store the last 9 error messages received for 180 days regardless of correction.

REVERIFICATION

External Verification

- ✎ Verification using a stand-alone Siemens SITRANS Vericator to measure a number of selected parameters in the flow sensor and signal converter, which affects the integrity of the flow measurement, shall be available through a factory verification service.

Parameters

Verification of the Flowmeter shall consist of the following test routines:

- ✎ Insulation test of the entire flowmeter system and cables.
- ✎ Test of sensor magnetic properties.
- ✎ Signal converter gain, linearity, and zero point tests.
- ✎ Digital output test.
- ✎ Analog output test.

Certificate

- ✎ A certificate of verification shall be issued if the flowmeter passes all of the tests within 2% of the original factory test parameters.

Internal Verification

- ✎ Verification using Siemens PDM software v9.2 or higher utilizing HART communication protocol to measure a number of selected parameters in the flow sensor and signal converter, which affects the integrity of the flow measurement, shall be available.

Certificate

- ✎ A certificate of verification shall be issued if the flowmeter passes all of the tests within the original factory test parameters.

EXECUTION

Installation

- ✎ Follow manufacturer's recommendation for the minimum upstream and downstream installation requirements for the flow sensor.
- ✎ Wiring between flow sensors and remote mounted signal converters shall use cable type and procedures as per the manufacturers' recommendations.

MANUFACTURER'S ASSISTANCE

Warranty

- ✎ The manufacturer of the electromagnetic flow meter shall guarantee for 18 months of operation that the equipment shall be free from defects in design, workmanship, or materials. Optional extended warranty shall be offered as required.
- ✎ In the event a component fails to perform as specified, or is proven defective in service during the guarantee period, the manufacturer shall promptly repair or replace the defective part at no cost to the owner.