Selection of Samples

- Precise Manufacturing
- Accurate Measurement

Electromagnetic Flowmeter
SE11/12/13/14

SINIER

Sino British Joint Venture
Features

- No movable, choking parts in the pipe, nearly no extra pressure loss during measurement.
- Measuring results have nothing with velocity distribution, fluid pressure, temperature, density, viscosity, and other physical parameters.
- Available to modify measuring range according to user’s actual needs on the scene.
- Suitable to measure all kinds of conducting fluid, such as tap water, sewage, mud, all beverage, chemical materials, sticky fluid and suspension.
- Adopting SMD device and SMT technology, high circuit reliability, low consumption.
- Adopting 16 Bit embedded microprocessor, fast operating rate, high accuracy, programmable low frequency rectangular wave excitation, to increase stability of measurement.
- Digital value processing, strong anti-jamming ability, reliable measurement, high accuracy, range ability can reach 30:1.
- Low consumption EMI switching power, suitable for large range of supply voltage change, good EMC performance.
- Including three integrators, which can achieve forward total, reserve total and D-value total; including non-power-failure clock, which can record 16 times power failure.
- Easy to operate, only need to connect to power, no any other operations, it can output standard signal, suitable for non-professional users.
- Providing modification function of five nonlinearity of sensor.
- Providing automatic operation of average flow, easy for calibration.
- Damping: range 1-50s
- Power off protection, operation result of flowmeter and set parameter won’t disappear after power off, EEPROM can protect set parameter and total value.
- Small signal resection function. Users can set lower limit of voltage and flow by display panel, to remove interference of small flow.
- Password latch function. After power on, if need to set parameter, five bit password should be input to do parameter setting, and prevent irrelevant persons changing parameter.
- Having various kinds of protection grade and installation methods of converters and sensors, and submersible installation IP68 is available.
- Insertion electromagnetic flowmeter is suitable to measure in large diameter, easy installation, without cutoff, tapping with pipe pressure, having absolute advantage in installation and price.
- Measurement of insertion electromagnetic flowmeter only has matter with insertion depth, so it has good generality and compatibility. Only one mode can satisfy all specifications of pipe.
Electromagnetic Flowmeter

SE11/12/13/14

SINIER

Working principle

Faraday's law of induction (when conductor passes magnetic field, it will produce EMF in conductor), is basic principle of measurement of electromagnetic flowmeter. This principle can apply for conductive fluid, this fluid flows into magnetic field, which is perpendicular to direction of flow, and electric potential produced in fluid can be measured by two symmetrical electrodes. Signal voltage \( U_E \) is proportional to magnetic induction \( B \), electrode space \( D \), and average velocity \( V \). Because \( B \) and \( D \) is constant, \( U_E \) is proportional to \( V \). Equation used for calculating volume velocity shows \( U_E \) has a linear relation with volume flow.

Inductive signal voltage is transformed into indexing, analog and digital output signal in converter.

![Diagram of Electromagnetic Flowmeter](image)

\( U_E = \) Signal Voltage  
\( B = \) Magnetic Induction  
\( D = \) Electrode Spacing  
\( V = \) Average Velocity  
\( q_v = \) Volume Flow  

\[ U_E = \frac{B D V}{4} \]

\[ q_v = \frac{B D}{4} V \]

\[ U_E = q_v \]

Standard Technical Specification

1. Normal Working Condition
   Ambient Temperature: \(-25\text{°C} \to 60\text{°C}\)
   Relative Humidity: 5\%\text{±}90\%
   Power Supply: 85\text{~}250V \text{ AC}, 45\text{~}63Hz; 16\text{~}36V \text{ DC}
   Wasted Power: less than 20W
2. Accuracy

Standard SE11/Hygiene SE13: ±0.5%
High Accuracy SE12: ±0.2%
Insertion SE14: ±1.5%

![Measurement Error Graph]

3. Output Variable

3.1 Analog Current Output
- Load Resistant: when 0–10mA, 0–1.5kΩ;
  When 4–20mA, 0–750Ω.
- Basic Error: 0.1%=10μA.

3.2 Digital Frequency Output
- Frequency Output Range: 1–5000Hz;
- Output Electric Isolation: photoelectric isolation, isolation voltage: >1000VDC;
- Frequency Output Driver: field-effect tube output, max voltage is 36VDC, max load current is 250mA.

3.3 Digital Pulse Output
- Output Pulse Range: 0–100pulse/s (if higher than upper limit, pulse will be lost);
- Output Pulse Equivalent:
  - (0.001–1.000)m3/cp;
  - (0.001–1.000)LTR/cp;
  - (0.001–1.000)USG/cp;
  - (0.001–1.000)UKG/cp;
- Output Pulse width: set by software of users
- Output Electric Isolation: photoelectric isolation, isolation voltage: >1000VDC;
- Pulse Output Driver: field-effect tube output, max voltage is 36VDC, max load current is 250mA.

3.4 Alarm Output
- Alarm output interface: ALMH---- higher limit alarm; ALML---- lower limit alarm;
- Output Electric Isolation: photoelectric isolation, isolation voltage: >1000VDC;
- Alarm Output Driver: Darlington tube output, max voltage is 36VDC, max load current is 250mA.

3.5 Digital Communication Interface and Communication Protocol
- MODBUS Interface: RTU format, physical interface: RS485, electric isolation: 1000V
- HART Interface: supporting standard HART protocol, having HART communicator, showing measuring values online, and modifying parameter;
## Main Technical Parameter

<table>
<thead>
<tr>
<th></th>
<th>SE11</th>
<th>SE12</th>
<th>SE13</th>
<th>SE14</th>
</tr>
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<tbody>
<tr>
<td>Measuring fluid</td>
<td>Conductive fluid</td>
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<tr>
<td>Accuracy</td>
<td>±0.5%</td>
<td>±0.25%</td>
<td>±0.5%</td>
<td>±1.5%</td>
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<tr>
<td>Repeatability</td>
<td>±0.25%</td>
<td>±0.125%</td>
<td>±0.25%</td>
<td>±0.75%</td>
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<tr>
<td>Fluid temperature</td>
<td>-25 C~200 C</td>
<td>-25 C~200 C</td>
<td>-25 C~200 C</td>
<td>-25 C~130 C</td>
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<tr>
<td>Conductivity</td>
<td>≥5μs/cm (if softened water ≥20μs/cm)</td>
<td></td>
<td></td>
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<tr>
<td>Diameter range</td>
<td>(10~2000)mm</td>
<td>(10~2000)mm</td>
<td>(10~125)mm</td>
<td>(200~3000)mm</td>
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<tr>
<td>Working pressure</td>
<td>0.6Mpa/1.0Mpa/1.6Mpa/2.5Mpa/4.0Mpa/Others</td>
<td></td>
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<tr>
<td>Velocity range</td>
<td>(0.5~10)m/s</td>
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<tr>
<td>Direction of flow</td>
<td>Forward/Backward</td>
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<tr>
<td>Electrode material</td>
<td>316L/Hastelloy B, C/Ta/Ti/Pt/Tungsten Carbide/Others</td>
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<tr>
<td>Lining material</td>
<td>Rubber/PTFE/T46/PFA</td>
<td>PFA</td>
<td>PTFE</td>
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<tr>
<td>Electrode form</td>
<td>Standard</td>
<td></td>
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<tr>
<td>Quantity of electrodes</td>
<td>Two pairs (measuring, ground)</td>
<td>One pair (measuring)</td>
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<tr>
<td>Measuring tube material</td>
<td>304SS</td>
<td></td>
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<td>/</td>
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<td>Port material</td>
<td>Carbon steel/SS</td>
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<td>Installation form</td>
<td>Wafer/flange</td>
<td>Hoop/thread</td>
<td>Flange/hotplug online</td>
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<td>Protection grade</td>
<td>IP65/IP67/IP68 (Divided type)</td>
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<td>Power supply</td>
<td>220VAC±20% 50HZ/24VDC</td>
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<tr>
<td>Signal output</td>
<td>(4-20)mA Active</td>
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<tr>
<td>Communication</td>
<td>HART Communication/Modbus Protocol/Profibus Protocol</td>
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<td>Electric connection</td>
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<td>Anti-explosion form</td>
<td>Non-anti-explosion/explosion suppression</td>
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<tr>
<td>Structure form</td>
<td>Integrated type/divided type</td>
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</tr>
<tr>
<td>Working condition</td>
<td>Ambient temperature(-25~60)°C Humidity 5%~90%</td>
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</table>