

# SM9001



## Magnetic-inductive flow meter

SMR21XGXFRKG/US



| Product characteristics      |                                                                       |              |
|------------------------------|-----------------------------------------------------------------------|--------------|
| Number of inputs and outputs | Number of digital outputs: 2; Number of analogue outputs: 1           |              |
| Measuring range              | 80...4800 gph                                                         | 1.3...80 gpm |
| Process connection           | threaded connection G 2 external thread DN50 flat seal                |              |
| Application                  |                                                                       |              |
| Special feature              | Gold-plated contacts                                                  |              |
| Application                  | totaliser function; empty pipe detection; for industrial applications |              |
| Installation                 | connection to pipe by means of an adapter                             |              |
| Media                        | conductive liquids; water; hydrous media                              |              |



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|                                          |       |                                                 |
|------------------------------------------|-------|-------------------------------------------------|
| Note on media                            |       | conductivity: $\geq 20 \mu\text{S/cm}$          |
|                                          |       | viscosity: $< 70 \text{ mm}^2/\text{s}$ (40 °C) |
| Medium temperature                       | [°F]  | 14...194                                        |
| Pressure rating                          | [bar] | 16                                              |
| MAWP (for applications according to CRN) | [bar] | 16                                              |

## Electrical data

|                             |      |                            |
|-----------------------------|------|----------------------------|
| Operating voltage           | [V]  | 18...32 DC; (to SELV/PELV) |
| Current consumption         | [mA] | $< 150$                    |
| Protection class            |      | III                        |
| Reverse polarity protection |      | yes                        |
| Power-on delay time         | [s]  | 5                          |
| Measuring principle         |      | magnetic-inductive         |

## Inputs / outputs

|                              |                                                             |
|------------------------------|-------------------------------------------------------------|
| Number of inputs and outputs | Number of digital outputs: 2; Number of analogue outputs: 1 |
|------------------------------|-------------------------------------------------------------|

## Inputs

|        |               |
|--------|---------------|
| Inputs | counter reset |
|--------|---------------|

## Outputs

|                                                 |                                                                                            |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| Total number of outputs                         | 2                                                                                          |
| Output signal                                   | switching signal; analogue signal; pulse signal; frequency signal; IO-Link; (configurable) |
| Electrical design                               | PNP/NPN                                                                                    |
| Number of digital outputs                       | 2                                                                                          |
| Output function                                 | normally open / normally closed; (parameterisable)                                         |
| Max. voltage drop switching output DC           | 2                                                                                          |
| Permanent current rating of switching output DC | 250; (per output)                                                                          |
| Number of analogue outputs                      | 1                                                                                          |
| Analogue current output                         | [mA] 4...20; (scalable)                                                                    |
| Max. load                                       | [Ω] 500                                                                                    |
| Analogue voltage output                         | [V] 0...10; (scalable)                                                                     |
| Min. load resistance                            | [Ω] 2000                                                                                   |
| Pulse output                                    | flow rate meter                                                                            |
| Short-circuit protection                        | yes                                                                                        |
| Type of short-circuit protection                | pulsed                                                                                     |
| Overload protection                             | yes                                                                                        |
| Frequency of the output                         | [Hz] 0.1...10000                                                                           |

## Measuring/setting range

|                          |                  |                |
|--------------------------|------------------|----------------|
| Measuring range          | 80...4800 gph    | 1.3...80 gpm   |
| Display range            | -5760...5760 gph | -96...96 gpm   |
| Resolution               | 5 gph            | 0.1 gpm        |
| Set point SP             | 105...4800 gph   | 1.7...80 gpm   |
| Reset point rP           | 80...4775 gph    | 1.3...79.6 gpm |
| Analogue start point ASP | 0...3840 gph     | 0...64 gpm     |
| Analogue end point AEP   | 960...4800 gph   | 16...80 gpm    |



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|                                     |                                                                                                                                                                                                                                                                        |         |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Low flow cut-off LFC                | < 240 gph                                                                                                                                                                                                                                                              | < 4 gpm |
| In steps of                         | 5 gph                                                                                                                                                                                                                                                                  | 0.1 gpm |
| Measuring dynamics                  | 1:60                                                                                                                                                                                                                                                                   |         |
| Volumetric flow quantity monitoring |                                                                                                                                                                                                                                                                        |         |
| Pulse value                         | 0.02...80 E06 gal                                                                                                                                                                                                                                                      |         |
| In steps of                         | 0.02 gal                                                                                                                                                                                                                                                               |         |
| Pulse length [s]                    | 0,016...2                                                                                                                                                                                                                                                              |         |
| Temperature monitoring              |                                                                                                                                                                                                                                                                        |         |
| Measuring range [°F]                | -4...176                                                                                                                                                                                                                                                               |         |
| Display range [°F]                  | -40...212                                                                                                                                                                                                                                                              |         |
| Resolution [°F]                     | 0.5                                                                                                                                                                                                                                                                    |         |
| Set point SP [°F]                   | -2...176                                                                                                                                                                                                                                                               |         |
| Reset point rP [°F]                 | -3...175                                                                                                                                                                                                                                                               |         |
| Analogue start point [°F]           | -4...140                                                                                                                                                                                                                                                               |         |
| Analogue end point [°F]             | 32...176                                                                                                                                                                                                                                                               |         |
| In steps of [°F]                    | 0.5                                                                                                                                                                                                                                                                    |         |
| Accuracy / deviations               |                                                                                                                                                                                                                                                                        |         |
| Flow monitoring                     |                                                                                                                                                                                                                                                                        |         |
| Accuracy (in the measuring range)   | ± (0,8 % MW + 0,5 % MEW)                                                                                                                                                                                                                                               |         |
| Repeatability                       | ± 0,2% MEW                                                                                                                                                                                                                                                             |         |
| Temperature monitoring              |                                                                                                                                                                                                                                                                        |         |
| Temperature drift                   | ± 0,0185 °F / K                                                                                                                                                                                                                                                        |         |
| Accuracy [K]                        | ± 1 (77 °F; Q > 4 gpm)                                                                                                                                                                                                                                                 |         |
| Response times                      |                                                                                                                                                                                                                                                                        |         |
| Flow monitoring                     |                                                                                                                                                                                                                                                                        |         |
| Response time [s]                   | 0.35; (dAP = 0)                                                                                                                                                                                                                                                        |         |
| Delay time programmable dS, dr [s]  | 0...50                                                                                                                                                                                                                                                                 |         |
| Damping process value dAP [s]       | 0...5                                                                                                                                                                                                                                                                  |         |
| Temperature monitoring              |                                                                                                                                                                                                                                                                        |         |
| Dynamic response T05 / T09 [s]      | T09 = 3 (Q > 4 gpm)                                                                                                                                                                                                                                                    |         |
| Software / programming              |                                                                                                                                                                                                                                                                        |         |
| Parameter setting options           | Flow monitoring; quantity meter; Preset counter; Temperature monitoring; hysteresis / window; normally open / normally closed; switching logic; current/voltage/frequency/pulse output; start-up delay; display can be deactivated; Display unit; empty pipe detection |         |
| Interfaces                          |                                                                                                                                                                                                                                                                        |         |
| Communication interface             | IO-Link                                                                                                                                                                                                                                                                |         |
| Transmission type                   | COM2 (38,4 kBaud)                                                                                                                                                                                                                                                      |         |
| IO-Link revision                    | 1.1                                                                                                                                                                                                                                                                    |         |
| SDCI standard                       | IEC 61131-9 CDV                                                                                                                                                                                                                                                        |         |
| Profiles                            | Smart Sensor: Process Data Variable; Device Identification                                                                                                                                                                                                             |         |
| SIO mode                            | yes                                                                                                                                                                                                                                                                    |         |
| Required master port type           | A                                                                                                                                                                                                                                                                      |         |

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|                              |                          |                 |
|------------------------------|--------------------------|-----------------|
| Process data analogue        | 3                        |                 |
| Process data binary          | 2                        |                 |
| Min. process cycle time [ms] | 5                        |                 |
| Supported DeviceIDs          | <b>Type of operation</b> | <b>DeviceID</b> |
|                              | default                  | 392             |

| Operating conditions |      |              |
|----------------------|------|--------------|
| Ambient temperature  | [°F] | 14...140     |
| Storage temperature  | [°F] | -13...176    |
| Protection           |      | IP 65; IP 67 |

| Tests / approvals            |                                                                                       |                    |
|------------------------------|---------------------------------------------------------------------------------------|--------------------|
| EMC                          | DIN EN 60947-5-9                                                                      |                    |
| Shock resistance             | DIN EN 60068-2-27                                                                     | 20 g (11 ms)       |
| Vibration resistance         | DIN EN 60068-2-6                                                                      | 5 g (10...2000 Hz) |
| MTTF [years]                 | 85                                                                                    |                    |
| UL approval                  | UL Approval no.                                                                       | I008               |
|                              | File number UL                                                                        | E174189            |
| Pressure Equipment Directive | Sound engineering practice; can be used for group 2 fluids; group 1 fluids on request |                    |

| Mechanical data          |      |                                                                                          |
|--------------------------|------|------------------------------------------------------------------------------------------|
| Weight                   | [g]  | 26                                                                                       |
| Housing                  |      | rectangular                                                                              |
| Dimensions               | [mm] | 200 x 103 x 117                                                                          |
| Materials                |      | stainless steel (316L/1.4404); stainless steel (316Ti/1.4571); PEI; FKM; PBT-GF20; TPE-U |
| Materials (wetted parts) |      | stainless steel (316L/1.4404); stainless steel (316Ti/1.4571); PEEK; Centellen; FKM      |
| Process connection       |      | threaded connection G 2 external thread DN50 flat seal                                   |

| Displays / operating elements |                  |                                                                               |
|-------------------------------|------------------|-------------------------------------------------------------------------------|
| Display                       | Display unit     | 6 x LED, green (gpm, gph, gal, °F, 10 <sup>3</sup> , 1000 x 10 <sup>3</sup> ) |
|                               | switching status | 2 x LED, yellow                                                               |
|                               | measured values  | alphanumeric display, 4-digit                                                 |
|                               | programming      | alphanumeric display, 4-digit                                                 |

| Accessories    |                        |
|----------------|------------------------|
| Items supplied | sealings: 2, Centellen |
|                | Label                  |

| Remarks       |                                          |
|---------------|------------------------------------------|
| Remarks       | MW = measured value                      |
|               | MEW = Final value of the measuring range |
| Pack quantity | 1 pcs.                                   |

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## Magnetic-inductive flow meter

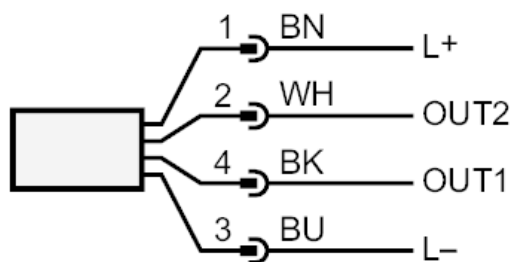
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### Electrical connection

Connector: 1 x M12; coding: A; Contacts: gold-plated



### Connection



|       |                                                                                                                                                                                                                                                                                    |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OUT1: | colours to DIN EN 60947-5-2<br>switching output empty pipe detection<br>switching output volumetric flow quantity monitoring<br>frequency output volumetric flow quantity monitoring<br>Pulse output quantity meter<br>signal output Preset counter<br>IO-Link                     |
| OUT2: | switching output empty pipe detection<br>switching output volumetric flow quantity monitoring<br>switching output Temperature monitoring<br>analogue output volumetric flow quantity monitoring<br>analogue output Temperature monitoring<br>input counter reset<br>Core colours : |
| BK =  | black                                                                                                                                                                                                                                                                              |
| BN =  | brown                                                                                                                                                                                                                                                                              |
| BU =  | blue                                                                                                                                                                                                                                                                               |
| WH =  | white                                                                                                                                                                                                                                                                              |

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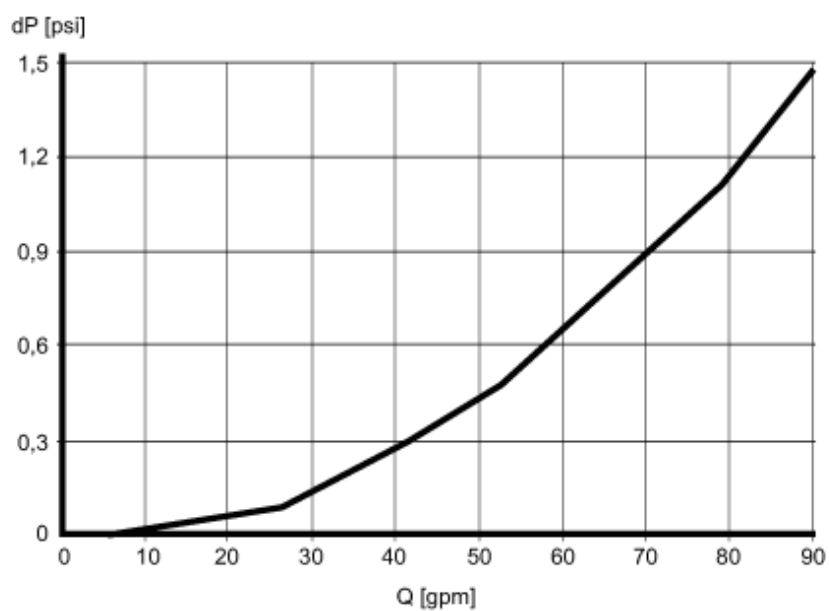
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### Diagrams and graphs

Pressure loss



dP Pressure loss

Q volumetric flow quantity