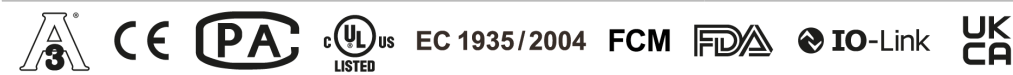
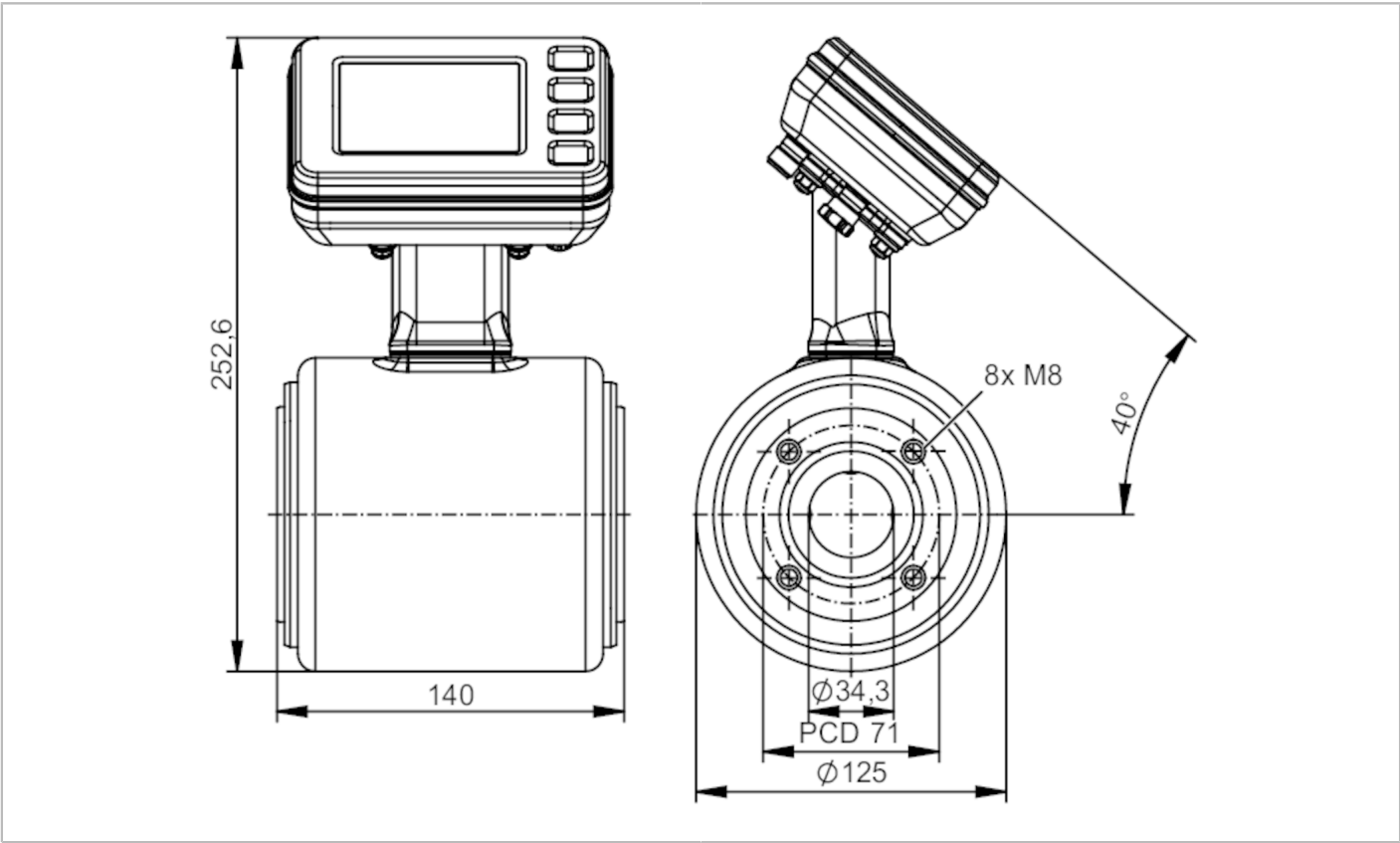


# SMF321



## Magnetic-inductive flow meter

SMG40KGFFRKG/USD



### Product characteristics

|                    |                            |                 |                 |                   |
|--------------------|----------------------------|-----------------|-----------------|-------------------|
| Measuring range    | 5...750 l/min              | 300...45000 l/h | 1.4...198.2 gpm | 0.22...32.42 ft/s |
| Nominal diameter   | DN40 (1 1/2")              |                 |                 |                   |
| Process connection | ifm-specific device flange |                 |                 |                   |

### Application

|                                                |                                                                                                          |             |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------|
| System                                         | gold-plated contacts                                                                                     |             |
| Application                                    | food and beverage industry                                                                               |             |
| Media                                          | Conductive liquids; water; water-based media                                                             |             |
| Note on media                                  | food products such as beer, milk, fruit juices, soft drinks, ketchup, yogurt, yogurt toppings, ice cream |             |
|                                                | conductivity: ≥ 5 μS/cm                                                                                  |             |
| Medium temperature                             | -20...150 °C                                                                                             | -4...302 °F |
| Min. burst pressure                            | 870 psi                                                                                                  | 6 MPa       |
| Pressure rating                                | 580.1 psi                                                                                                | 4 MPa       |
| MAWP (for applications according to CRN) [MPa] | 4                                                                                                        |             |

### Electrical data

|                             |            |
|-----------------------------|------------|
| Operating voltage [V]       | 18...32 DC |
| Current consumption [mA]    | 250; (24V) |
| Protection class            | III        |
| Reverse polarity protection | yes        |
| Power-on delay time [s]     | < 5        |

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|                                                      |                      |                                                                            |                      |                    |
|------------------------------------------------------|----------------------|----------------------------------------------------------------------------|----------------------|--------------------|
| Measuring principle                                  | magnetic-inductive   |                                                                            |                      |                    |
| Inputs / outputs                                     |                      |                                                                            |                      |                    |
| Total number of inputs and outputs                   | 2                    |                                                                            |                      |                    |
| Inputs                                               |                      |                                                                            |                      |                    |
| Inputs                                               | OUT2                 | external totalizer reset                                                   |                      |                    |
| Outputs                                              |                      |                                                                            |                      |                    |
| Total number of outputs                              | 2                    |                                                                            |                      |                    |
| Output signal                                        | OUT1                 | pulse signal; totalizer switching signal; diagnostic signal; IO-Link       |                      |                    |
|                                                      | OUT2                 | analog signal; pulse signal; totalizer switching signal; diagnostic signal |                      |                    |
| Electrical design                                    | PNP/NPN              |                                                                            |                      |                    |
| Pulse output                                         | flow rate meter      |                                                                            |                      |                    |
| Short-circuit protection                             | yes                  |                                                                            |                      |                    |
| Type of short-circuit protection                     | yes (non-latching)   |                                                                            |                      |                    |
| Overload protection                                  | yes                  |                                                                            |                      |                    |
| Analog                                               |                      |                                                                            |                      |                    |
| Number of analog outputs                             | 1                    |                                                                            |                      |                    |
| Analog current output [mA]                           | 4...20; (skalierbar) |                                                                            |                      |                    |
| Max. load [Ω]                                        | 500                  |                                                                            |                      |                    |
| Resolution of analog output                          | 0.38 μA              |                                                                            |                      |                    |
| Digital                                              |                      |                                                                            |                      |                    |
| Number of digital outputs                            | 2                    |                                                                            |                      |                    |
| Max. voltage drop switching output DC [V]            | 2                    |                                                                            |                      |                    |
| Permanent current rating of switching output DC [mA] | 100                  |                                                                            |                      |                    |
| Switching frequency DC [Hz]                          | 0...10000            |                                                                            |                      |                    |
| Measuring/setting range                              |                      |                                                                            |                      |                    |
| Measuring range                                      | 5...750 l/min        | 300...45000 l/h                                                            | 1.4...198.2 gpm      | 0.22...32.42 ft/s  |
| Display range                                        | -900...900 l/min     | -54000...54000 l/h                                                         | -237.75...237.75 gpm | -39.4...39.4 ft/s  |
| Resolution                                           | 0.01 l/min           | 50 l/h                                                                     | 0.01 gpm             | 0.01 ft/s          |
| Note on factory setting                              | 0...50 gpm           |                                                                            |                      |                    |
| Analog start point ASP                               | -750...600 l/min     | -45000...36000 l/h                                                         | -198.15...158.52 gpm | -32.8...26.24 ft/s |
| Analog end point AEP                                 | -600...750 l/min     | -36000...45000 l/h                                                         | -158.52...198.15 gpm | -26.24...32.8 ft/s |
| Low flow cut-off LFC                                 | 0...600 l/min        | 0...36000 l/h                                                              | 0...158.52 gpm       | 0...26.24 ft/s     |
| Pulse length [s]                                     | 0.00005...2          |                                                                            |                      |                    |
| Pulse value                                          | 0.004...99990000 l   |                                                                            |                      |                    |
| Temperature monitoring                               |                      |                                                                            |                      |                    |
| Measuring range                                      | -20...150 °C         |                                                                            | -4...302 °F          |                    |
| Display range                                        | -20...150 °C         |                                                                            | -4...302 °F          |                    |
| Resolution                                           | 0.01 °C              |                                                                            | 0.1 °F               |                    |
| Analog start point                                   | -20...116 °C         |                                                                            | -4...240.8 °F        |                    |
| Analog end point                                     | 14...150 °C          |                                                                            | 57.2...302 °F        |                    |

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## Magnetic-inductive flow meter

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|                                       |                                                                   |                                                              |
|---------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------|
| Conductivity monitoring               |                                                                   |                                                              |
| Measuring range                       | [μS/cm]                                                           | 100...100000                                                 |
| Display range                         | [μS/cm]                                                           | 0...10000000                                                 |
| Resolution                            | [μS/cm]                                                           | 1                                                            |
| Analog start point                    | [μS/cm]                                                           | 0...80000                                                    |
| Analog end point                      | [μS/cm]                                                           | 20000...100000                                               |
| Accuracy / deviations                 |                                                                   |                                                              |
| Volumetric flow monitoring            |                                                                   |                                                              |
| Accuracy (under reference conditions) | with optional factory calibration (availability is being planned) | ± (0,2 % MW + 2 mm/s)                                        |
|                                       | standard                                                          | ± (0,5 % MW + 1,5 mm/s)                                      |
| Repeatability                         |                                                                   | 0,1% MW                                                      |
| Temperature monitoring                |                                                                   |                                                              |
| Accuracy                              | [K]                                                               | ± 1                                                          |
| Repeatability                         | [K]                                                               | ± 0,5                                                        |
| Conductivity monitoring               |                                                                   |                                                              |
| Accuracy (in the measuring range)     | in the range of 100...20000 μS/cm                                 | ±10% MW                                                      |
|                                       | in the range of 20000...100000 μS/cm                              | ±20% MW                                                      |
| Repeatability                         |                                                                   | ± 5% MW                                                      |
| Reaction times                        |                                                                   |                                                              |
| Volumetric flow monitoring            |                                                                   |                                                              |
| Response time                         | [s]                                                               | < 0.3                                                        |
| Damping process value dAP             | [s]                                                               | 0...5                                                        |
| Temperature monitoring                |                                                                   |                                                              |
| Response time                         | [s]                                                               | < 3; (Flow velocity: ≥ 0,5m/s)                               |
| Conductivity monitoring               |                                                                   |                                                              |
| Response time                         | [s]                                                               | < 2                                                          |
| Software / programming                |                                                                   |                                                              |
| Diagnostic functions                  |                                                                   | direction of flow detection; liquid detection                |
| Interfaces                            |                                                                   |                                                              |
| Communication interface               |                                                                   | IO-Link                                                      |
| Transmission type                     |                                                                   | COM3 (230,4 kBaud)                                           |
| IO-Link revision                      |                                                                   | 1.1.3                                                        |
| SDCI standard                         |                                                                   | IEC 61131-9                                                  |
| Profiles                              | Smart Sensor - SSP 4.3.4                                          | Measuring and Switching Sensor, floating point, 4 channel    |
|                                       | BLOB                                                              | Binary Large Object transfer                                 |
|                                       | Common - I&D                                                      | Identification and Diagnosis                                 |
|                                       | Extension                                                         | Sensor Control Wide                                          |
|                                       | Extension                                                         | Quantity detection, switches when value exceeds the setpoint |
|                                       | Function                                                          | Locator                                                      |
|                                       | Function                                                          | ProductURI                                                   |
| SIO mode                              |                                                                   | yes                                                          |

# SMF321



## Magnetic-inductive flow meter

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|                                 |                                                                                                                    |                   |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------|
| Required master port class      | A                                                                                                                  |                   |
| Process data analog             | 6                                                                                                                  |                   |
| Process data binary             | 8                                                                                                                  |                   |
| Min. process cycle time [ms]    | 1.9                                                                                                                |                   |
| IO-Link process data (cyclical) | <b>Function</b>                                                                                                    | <b>bit length</b> |
|                                 | totalizer                                                                                                          | 32                |
|                                 | flow                                                                                                               | 32                |
|                                 | temperature                                                                                                        | 32                |
|                                 | conductivity                                                                                                       | 32                |
|                                 | status                                                                                                             | 4                 |
|                                 | binary switching information                                                                                       | 8                 |
| IO-Link functions (acyclical)   | direction of flow detection; totalizer; memory; operating hours counter; internal temperature; simulation function |                   |
| Supported DeviceIDs             | <b>Type of operation</b>                                                                                           | <b>DeviceID</b>   |
|                                 | default                                                                                                            | 1790              |

| Operating conditions |                                 |             |
|----------------------|---------------------------------|-------------|
| Ambient temperature  | -20...65 °C                     | -4...149 °F |
| Storage temperature  | -20...80 °C                     | -4...176 °F |
| Protection           | IP 67; IP 69; (to DIN EN 60529) |             |

| Tests / approvals            |                                                                                       |                   |
|------------------------------|---------------------------------------------------------------------------------------|-------------------|
| EMC                          | DIN 61326-1                                                                           |                   |
| CPA approval                 | model number                                                                          | SMF               |
|                              | accuracy class                                                                        | 0,5               |
| Shock resistance             | DIN IEC 68-2-27                                                                       | 20 g (18ms)       |
| Vibration resistance         | DIN IEC 68-2-6                                                                        | 5 g (10...2000Hz) |
| MTTF [years]                 | 81                                                                                    |                   |
| UL approval                  | UL approval number                                                                    | I031              |
| Pressure equipment directive | sound engineering practice; can be used for group 2 fluids; group 1 fluids on request |                   |

| Mechanical data                                   |                                                                                                                                                                                                                                               |  |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Weight [g]                                        | 5324.8                                                                                                                                                                                                                                        |  |
| Housing                                           | tubular                                                                                                                                                                                                                                       |  |
| Inlet pipe length                                 | 5 x DN                                                                                                                                                                                                                                        |  |
| Outlet pipe length                                | 2 x DN                                                                                                                                                                                                                                        |  |
| Dimensions [mm]                                   | Ø 125 / L = 140                                                                                                                                                                                                                               |  |
| Material                                          | housing: stainless steel (1.4404 / 316L); flange: stainless steel (1.4301 / 304); electronics fixture: stainless steel (1.4301 / 304); electronics: stainless steel (1.4404 / 316L); Display: polysulfone; Display-sealing: FKM; LED ring: PP |  |
| Materials (wetted parts)                          | Pipe section: PFA; electrodes: stainless steel (1.4435 / 316L)                                                                                                                                                                                |  |
| Nominal diameter                                  | DN40 (1 1/2")                                                                                                                                                                                                                                 |  |
| Process connection                                | ifm-specific device flange                                                                                                                                                                                                                    |  |
| Surface characteristics Ra/Rz of the wetted parts | Ra < 0.4 µm                                                                                                                                                                                                                                   |  |

SMF321



Magnetic-inductive flow meter

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| Displays / operating elements |                                                                                        |                                                             |
|-------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Display                       | process value                                                                          | full graphics TFT display, multi-color 3,5" 320 x 240 Pixel |
|                               |                                                                                        | display layouts: 4                                          |
|                               |                                                                                        | display rotation: 4 x 90°                                   |
|                               | operating status                                                                       | LED ring, three-color                                       |
| Display unit                  | l/min; l/h; hl/min; hl/h; m³/min; m³/h; m/s; gpm; gph; ft/s; °C; °F; µS/cm; S/m; ms/cm |                                                             |
| Factory setting               | gpm; °F; µS/cm                                                                         |                                                             |
| Language                      | German; English; Spanish; French; Italian; Japanese; Korean; Portuguese; Chinese       |                                                             |
| Operating elements            | 4                                                                                      | capacitive pushbuttons                                      |

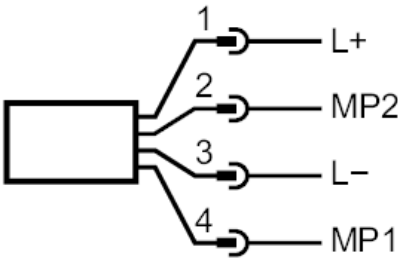
| Remarks       |                                                                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remarks       | MW = Measured value                                                                                                                                                     |
|               | MEW = Final value of the measuring range                                                                                                                                |
|               | pulse and totalizer signal are only available for one of the two outputs                                                                                                |
|               | reference conditions (1/2): water (free of gas bubbles), 15...35 °C, process connection: DIN32676 series A, pipe standard suitable for process connection               |
|               | reference conditions (2/2): inlet pipe length 10xDN, outlet pipe length 5xDN, device settling time: 30 minutes, device orientation: horizontal, display orientation: up |
|               | accuracy specifications according to factory certificate on delivery                                                                                                    |
|               | MAWP (for applications according to CRN) with VMQ sealing ring E40572, 3.4 MPa applies                                                                                  |
| Pack quantity | 1 pcs.                                                                                                                                                                  |

Electrical connection

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



Connection



# SMF321



## Magnetic-inductive flow meter

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### Electrical connection - plug

|   |     |                |
|---|-----|----------------|
| 1 | L+  |                |
| 2 | MP2 | DO2, AO, Reset |
| 3 | L-  |                |
| 4 | MP1 | DO1, IO-Link   |

AO: analog output; DO: digital output; MP: multi-function connection