



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



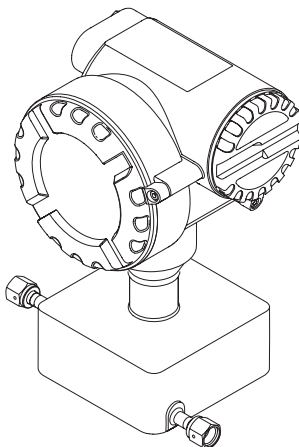
Solutions

Brief Operating Instructions

Cubemass

MODBUS RS485

Coriolis mass flow measuring system



These Brief Operating Instructions are **not** intended to replace the Operating Instructions provided in the scope of supply. Detailed information is provided in the Operating Instructions and the additional documentation on the CD-ROM supplied.

Depending on the device version, the complete device documentation consists of:

- Brief Operating Instructions (this document)
- Operating Instructions
- Description of Device Functions
- Approvals and safety certificates
- Safety instructions in accordance with the approvals for the device (e.g. explosion protection, pressure equipment directive etc.)
- Additional device-specific information

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1 Safety instructions

1.1 Designated use

The measuring device described in these operating instructions may only be used for measuring the mass flow of liquids. At the same time, the system also measures fluid density and fluid temperature. These parameters are then used to calculate other variables such as volume flow. Fluids with widely differing properties can be measured.

Resulting from incorrect use or from use other than that designated the operational safety of the measuring devices can be suspended. The manufacturer accepts no liability for damages being produced from this.

1.2 Installation, commissioning and operation

- The measuring device must only be installed, connected, commissioned and maintained by qualified and authorized specialists (e.g. electrical technicians) in full compliance with the instructions in these Brief Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).
- The specialists must have read and understood these Brief Operating Instructions and must follow the instructions they contain. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions (on the CD-ROM). The Operating Instructions provide detailed information on the measuring device.
- The measuring device may only be installed in a de-energized state, free from external loads.
- The measuring device may only be modified if such work is expressly permitted in the Operating Instructions (on the CD-ROM).
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- If performing welding work on the piping, the welding unit may not be grounded by means of the measuring device.

1.3 Operational safety

- The measuring device is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. Relevant regulations and European standards have been observed.
- The information on the warning signs, nameplates and connection labels must be observed. They contain important data on the permitted operating conditions, the operating range of the device and the material.
If the measuring device is not used at atmospheric temperatures, compliance with the relevant boundary conditions in accordance with the device documentation supplied (on the CD-ROM) is mandatory.
- The measuring device must be wired in accordance with the wiring diagrams and connection labels. Interconnection must be permitted.
- All parts of the measuring device must be included in the potential equalization of the plant.

- Cables, certified cable glands and certified dummy plugs must be suitable for the prevailing operating conditions, such as the temperature range of the process for example. Unused housing openings must be sealed with dummy plugs.
- The measuring device may only be used in conjunction with fluids to which all wetted parts of the measuring device are sufficiently resistant. With regard to special fluids, including fluids used for cleaning, Endress+Hauser will be happy to assist in clarifying the corrosion-resistant properties of wetted materials.

However, minor changes in temperature, concentration or in the degree of contamination in the process may result in variations in corrosion resistance.

For this reason, Endress+Hauser does not accept any responsibility with regard to the corrosion resistance of wetted materials in a specific application. The user is responsible for the choice of suitable wetted materials in the process.

- Hazardous areas


Measuring devices for use in hazardous areas are labeled accordingly on the nameplate.

Relevant national regulations must be observed when operating the device in hazardous areas.

The Ex documentation on the CD-ROM is an integral part of the entire device documentation.

The installation regulations, connection data and safety instructions provided in the Ex

documentation must be observed. The symbol and the name on the front page provide

information on the approval/certification body (e.g.  Europe, NEC/CEC, NEPSI). The

nameplate also bears the documentation number of this Ex documentation (XA***D/.../..).

- For measuring systems used in SIL 2 applications, the separate manual on functional safety (on the CD-ROM) must be observed.

- Hygienic applications

Measuring devices for hygienic applications have their own special labeling. Relevant national regulations must be observed when using these devices.

- Pressure instruments

Measuring devices for use in systems that need to be monitored are labeled accordingly on the nameplate. Relevant national regulations must be observed when using these devices. The

documentation on the CD-ROM for pressure instruments in systems that need to be

monitored is an integral part of the entire device documentation. The installation regulations,

connection data and safety instructions provided in the Ex documentation must be observed.

- Endress+Hauser will be happy to assist in clarifying any questions on approvals, their application and implementation.

1.4 Safety conventions



Warning!

"Warning" indicates an action or procedure which, if not performed correctly, can result in injury or a safety hazard. Comply strictly with the instructions and proceed with care.



Caution!

"Caution" indicates an action or procedure which, if not performed correctly, can result in incorrect operation or destruction of the device. Comply strictly with the instructions.



Note!

"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

2 Installation

2.1 Transporting to the measuring point

- Transport the measuring device to the measuring point in the original packaging.
- The covers or caps fitted on the process connections prevent mechanical damage to the sensors during transport and storage. For this reason, do not remove the covers or caps until immediately before installation.

2.2 Installation conditions

The measuring device is designed for mounting on tabletops, walls or pipes.

2.2.1 Dimensions

For the dimensions of the measuring device → see associated Technical Information on the CD-ROM.

2.2.2 Inlet and outlet runs

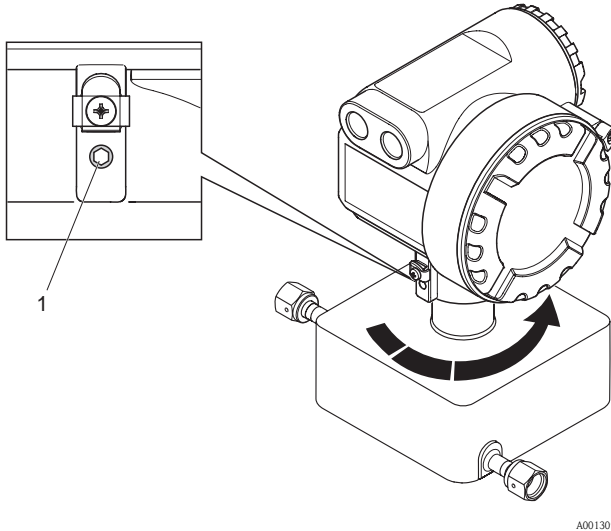
When mounting, no special precautions need to be taken for fittings which create turbulence (valves, elbows, T-pieces etc.).

2.2.3 Vibrations

The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not affected by plant vibrations. Consequently, no special attachment measures are required for the sensors.

2.3 Post-installation

2.3.1 Turning the transmitter housing



The transmitter housing can be rotated counterclockwise continuously up to 360°.

1. Loosen the Allen setscrew (1) partially, but do not unscrew it all the way.
2. Rotate the transmitter housing into the desired position.
3. Tighten the Allen setscrew (1).

1

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1 = Allen screw

2.4 Post-installation check

- Is the measuring device damaged (visual inspection)?
- Does the measuring device correspond to the specifications at the measuring point?
- Are the measuring point number and labeling correct (visual inspection)?
- Has the correct sensor orientation been selected in terms of type, fluid properties, fluid temperature?
- Does the arrow on the sensor point in the direction of the flow in the pipe?
- Is the measuring device protected against rain and sunlight?

3 Wiring



Warning!

Risk of electric shock! Components carry dangerous voltages.

- Never mount or wire the measuring device while it is connected to the power supply.
- Prior to connecting the power supply, connect the protective ground to the ground terminal on the housing.
- Route the power supply and signal cables so they are securely seated.
- Seal the cable entries and covers so they are airtight.



Caution!

Risk of damaging the electronic components!

- Connect the power supply in accordance with the connection data on the nameplate.
- Connect the signal cable in accordance with the connection data in the Operating Instructions or the Ex documentation on the CD-ROM.

In addition, for measuring devices with fieldbus communication:



Caution!

Risk of damaging the electronic components!

- Observe the cable specification of the fieldbus cable → Operating Instructions on the CD-ROM.
- Keep the stripped and twisted lengths of cable shield as short as possible.
- Screen and ground the signal lines → Operating Instructions on the CD-ROM.
- When using in systems without potential matching → Operating Instructions on the CD-ROM.

In addition, for Ex-certified measuring devices:



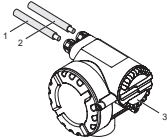
Warning!

When wiring Ex-certified measuring devices, all the safety instructions, wiring diagrams, technical information etc. of the related Ex documentation must be observed
→ Ex documentation on the CD-ROM.

3.1 Connecting the various housing types

Wire the unit using the terminal assignment diagram inside the cover.

3.1.1 Compact version (transmitter): non-Ex Zone, Ex Zone 1, Class I Div. 1



Transmitter connection:

- 1 Signal cable or fieldbus cable
- 2 Power supply cable
- 3 Connection diagram inside the connection compartment cover

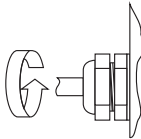
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3.2 Degree of protection

The devices meet all the requirements for IP 67.

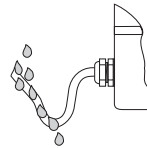
After mounting in the field or service work, the following points have to be observed to ensure that IP 67 protection is retained:

- Install the measuring device in such a way that the cable entries do not point upwards.
- Do not remove the seal from the cable entry.
- Remove all unused cable entries and plug them with suitable/certified drain plugs.
- Use cable entries and drain plugs with a continuous service temperature range according to the temperature data on the nameplate.



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Tighten the cable entries correctly.



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The cables must loop down before they enter the cable entries ("water trap").

3.3 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the information on the nameplate?
- Do the cables used comply with the necessary specifications?
- Do the mounted cables have adequate strain relief and are they routed securely?
- Is the cable type route completely isolated? Without loops and crossovers?
- Are all screw terminals firmly tightened?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Cable routed as a “water trap” in loops?
- Are all the housing covers installed and securely tightened?

In addition, for measuring devices with fieldbus communication:

- Are all the connecting components (T-boxes, junction boxes, connectors etc.) connected with each other correctly?
- Has each fieldbus segment been terminated at both ends with a bus terminator?
- Has the max. length of the fieldbus cable been observed in accordance with the specifications?
- Has the max. length of the spurs been observed in accordance with the specifications?
- Is the fieldbus cable fully shielded and correctly grounded?

4 Commissioning

4.1 Switching on the measuring device

On completion of the installation (successful post-installation check), wiring (successful post-connection check) and after making the necessary hardware settings, where applicable, the permitted power supply (see nameplate) can be switched on for the measuring device.

The measuring device performs a number of power on self-tests. Normal measuring mode commences as soon as startup completes.

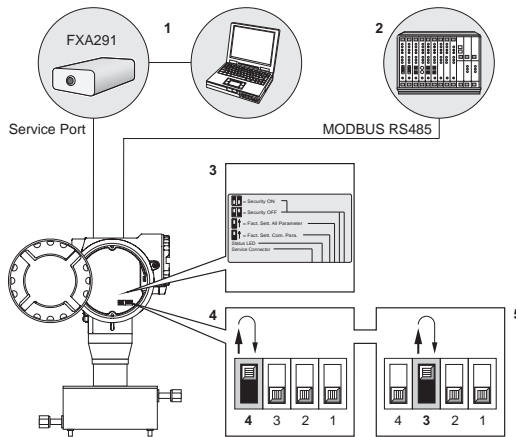


Note!

If the startup is not successful, depending on the cause, a corresponding message is displayed in the FieldCare operating program, or the status LED flashes correspondingly.

4.2 Operation

You have the following option for configuring and commissioning the device:



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- 1 Configuration/operating program for operating via the service interface FXA291 (e.g. FieldCare)
- 2 Operation via MODBUS RS485 process control system
- 3 Situation sticker of the various DIP switch positions and their function (explanations of DIP switches 2 and 1 → s. Operating Instructions)
- 4 Operation via device-internal DIP switch (4): If the DIP switch (4) is switched upwards, the device restores the factory settings of the communication parameters of the MODBUS RS485 (return it afterwards to its original lower position).
- 5 Operation via device-internal DIP switch (3): If the DIP switch (3) is switched upwards, the device restores the factory settings of all communication parameters of the MODBUS RS485 (return it afterwards to its original lower position).

4.3 Troubleshooting

The error messages that can occur most frequently when a measuring device is commissioned are described here.

A complete description of all the error messages → Operating Instructions on the CD-ROM.

Register 6859 Data type: Integer	Register 6821 Data type: String (18 byte)	No.	Error message / Type	Cause/remedy
39 to 42	RANGE CUR. OUT n	351 to 354	System error message (S)/ Notice message (!) CURRENT SPAN n # 351 to 354	Current output The current flow is outside the set range. 1. Change the upper range or lower range values entered. 2. Increase or reduce flow, as applicable.
112	EXC. CURR. LIM	701	Process error message (P)/ Notice message (!) EXC. CURR. LIM. # 701	The maximum current value for the measuring tube exciter coils has been reached since certain fluid characteristics, e.g. high gas or solid content, are in the limit range. The device continues to work correctly. In particular with outgassing fluids and/or increased gas content, the following measures are recommended to increase system pressure: 1. Install the measuring device downstream of a pump. 2. Mount the device at the lowest point in an ascending pipeline. 3. Install a valve or an orifice plate downstream from the measuring device.

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