

**Operating manual for the
electronic transmitter UMC3-FF
with Foundation-Fieldbus interface**

UMC3



Fieldbus
Foundation

**Supplement to the TM/UMC3, TMU/UMC3, TMR/UMC3 and
TME/UMC3**

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1 Identification

1.1 Supplier/manufacturer

Manufacturer Heinrichs Messtechnik GmbH
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Product type Coriolis Mass Flow meter

Product name UMC3-FF
Revision-No. 1.0 / 29.01.2021

1.2 Product

Coriolis mass flow meter with Foundation Fieldbus interface suitable for flow measurement of liquid and gaseous media.

2 Introduction

The Foundation Fieldbus interface of the UMC3-FF offers the possibility to read out the measured values. Parameters can be read and changed if needed. The interface fulfills the requirements of the IEC 1158-2 and the IEC61158. It is intrinsically safe according to FISCO model.

As a digital field bus device the communication via Foundation Fieldbus replaces all analogue outputs (current outputs and pulse outputs) of a standard UMC3 transmitter. Outputs described in the manual of the standard UMC3 transmitter are not available at a field bus device.

The Foundation Fieldbus interface is realized by a pluggable module. It contains an own memory chip to store the field bus specific parameters.

3 Characteristic Values

3.1 Supply voltage

9 V... 32 V between terminals 55 and 56
no influence of bus voltage to measuring quality

3.2 Basic current

app. 13 mA

3.3 Baud rate

31.25 kBaud

3.4 Electromagnetic compatibility (EMC)

Refer to operating manual UMC3

3.5 Safety data

Refer to additional operating manual for explosion-proof flow meters

FF- communications circuit (terminals 55 and 56)

For connecting a certified FF circuit in accordance with the FISCO model (EN 60079-27),

or for connection to intrinsic safe circuits which do not comply to the FISCO model.

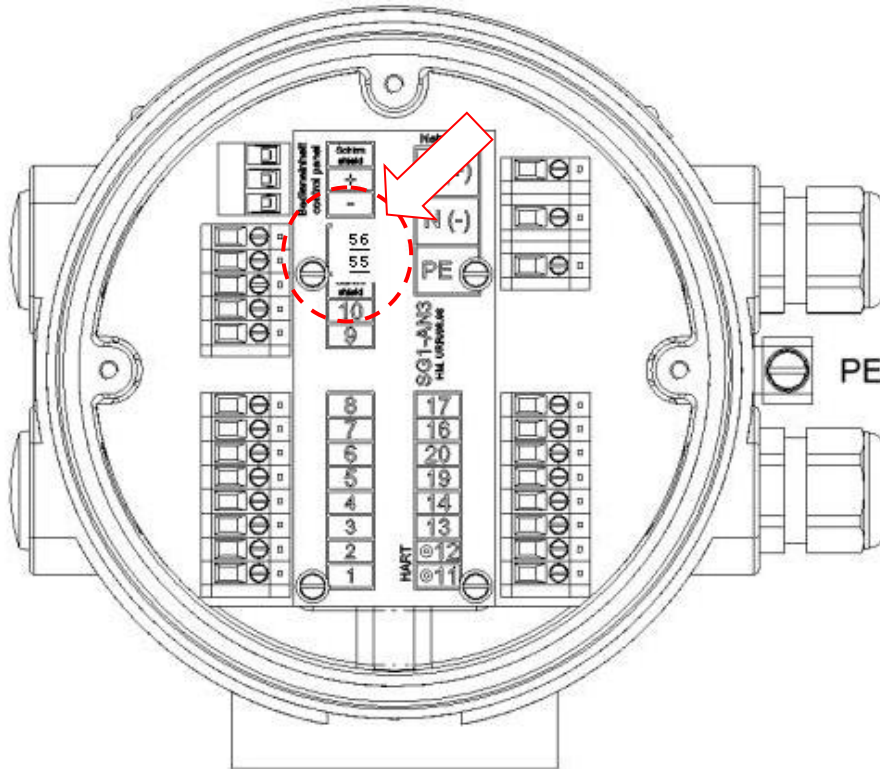
The maximum values satisfying safety requirements are the following:

Voltage	U _i	DC 32 V
Current	I _i	280 mA
Power	P _i	2 W
Effective inner inductance	L _i	negligible
Effective inner capacitance	C _i	1.2 nF

4 Electrical connection

4.1 Shielding

The shield of the lines at terminals 55 and 56 must be grounded at least at the PLC side.



5 Foundation Fieldbus Interface

The parameters required for integration of the device into the PLC are divided into functional groups.

The “Resource Block” contains information about the device (e. g. type of the device, manufacturer).

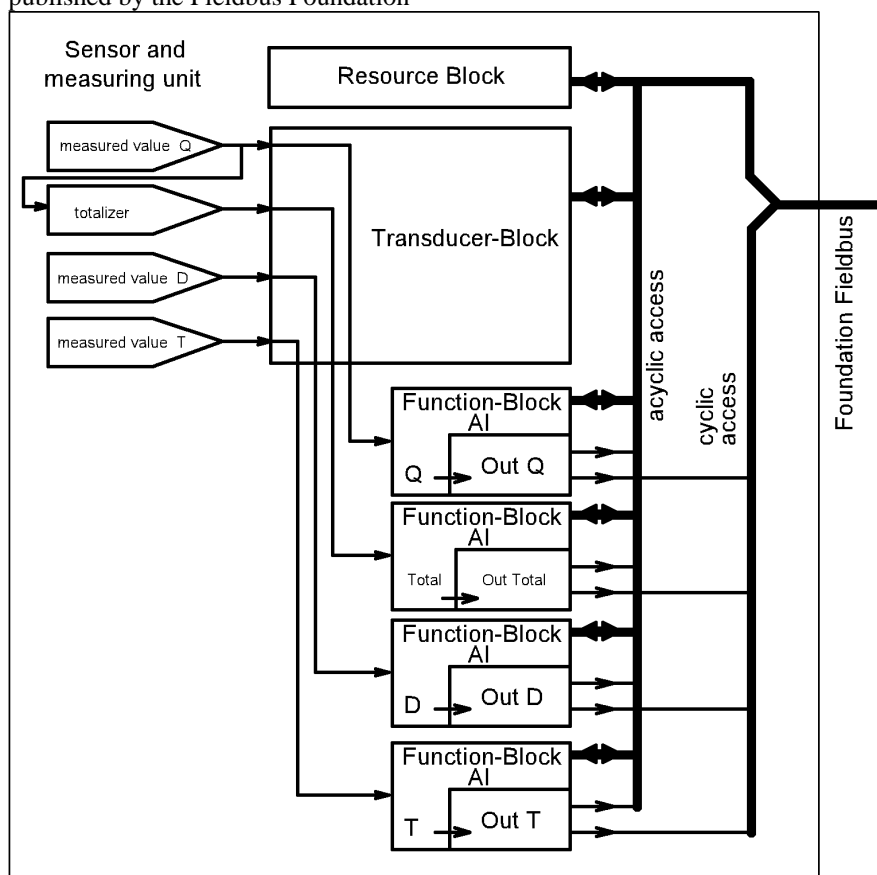
The “Transducer Block” contains sensor-specific parameters as well as the measured values (flow, density, temperature)

The “Analog Input function block” (AI) contains parameters forming the output value (limits, range, low flow cutoff, damping value, ...). The UMC3-FF contains 4 AI blocks:

- flow,
- density,
- temperature,
- forward totalizer

The UMC3-FF is capable of performing a LAS functionality. The device does not support any write protection.

A detailed description of the functions and the Foundation Fieldbus standardized parameters are published by the Fieldbus Foundation



Block model of UMC3-FF

5.1 Device description files

To declare the function of UMC3-FF to a PLC the device description files are needed. These files can be downloaded from the homepage of the Fieldbus Foundation:

http://www.fieldbus.org/index.php?option=com_mtree&task=search&Itemid=324&ffstatus=Registered&ffbmfg=Heinrichs+Messtechnik+GmbH&ffcategory=

- 010101.cff
- 0101.sym
- 0101.ffa

5.2 Device specific parameters of the Transducer block

SERIAL_NUMBER: device factory serial number

Flow unit: it can be chosen between units for mass flow or volume flow. Depending on this selection mass flow or volume flow will be forwarded to the AI. The output of volume flow is only possible if the density measurement has been calibrated and is switched on or a fixed density is preset. Otherwise the output of the AI will be marked as “bad“. Flow unit can be chosen from the following units:

Mass flow:

- kg/s, kg/min, kg/h, kg/d
- t/min, t/h, t/d,
- g/s, g/min, g/h,
- lbs/s, lbs/min, lbs/h, lbs/d,
- ston/min, ston/h, ston/d,
- lton/h, lton/d,

Volume flow:

- m³/s, m³/min, m³/h, m³/d,
- l/s, l/min, l/h,
- USG/min, USG/h, MG/d,
- UKG/s, UKG/min, UKG/h,
- ft³/s, ft³/min, ft³/h, ft³/d,
- USB/s, USB/min, USB/h, USB/d

Density unit: can be chosen from the following units:

- kg/m³
- kg/l,
- g/l,
- g/cm³,
- lb/ft³,
- lb/USG,

Temperature unit: can be chosen from the following units:

- °C,
- F,
- K.

Totalizer unit: depending on this unit it is accumulated mass or volume flow. The accumulation of volume is only possible if the density measurement has been calibrated and is switched on or a fixed density is preset. Otherwise the output of the AI will be marked as “bad“.

The unit can be chosen from the units following:

- g, kg, t,
- l, m³,
- USG,
- UKG,
- USB,
- lbs,
- shton,
- lton,

- ft3.

Sensor constant: the sensor constant of the transmitter can be read out and can be changed if necessary (e. g. at a re-calibration of the sensor)

Fixed density: If the measurement of the density is not possible you can preset a fixed factor for calculation mass flow into volume flow. Dimension g/l is always used as fixed density factor.

Density measurement: parameter to switch on or off the density measurement or to use the factor of the fixed density. If device is shipped with a factory density calibration, the parameter is set to on. If device is shipped without a density calibration, it is not possible to switch on the measurement. Only the fixed density can be used.

Empty pipe limit: below this limit it is assumed that there is no medium in the loops. The status of the output will be set to “uncertain“. This parameter is given in g/l.

Phase: display of the actual phase shifting (to be used for diagnosis)

Frequency: display of the actual frequency (to be used for diagnosis).

Sensor amplitude: display of the actual sensor amplitude (to be used for diagnosis).

Exciter current: display of the actual exciter current (to be used for diagnosis).

Max. electronic temperature: display of the highest measured temperature inside the transmitter.

Max. measured medium temperature: display of the highest measured temperature of the medium.

Totalizer forward flow: display of forward flow totalizer.

Totalizer reverse flow: display of reverse flow totalizer.

Reset totalizer: Set the parameter to “reset” and write into device. Both totalizer (forward and reverse) are reset to Zero.

Calibrate zero. Set the parameter to “calibrate“ and write into device. Phase shifting offset will be compensated by an automatically procedure (zero point adjustment). The procedure lasts app. 30seconds.

System error: system errors are serious malfunctions of the device and should never occur during normal processing. Please note the error number before clearing it. Please call Heinrichs Messtechnik Service and send this error number. The coding of these errors can be derived from the standard manual.

Reset system errors: Reset any system errors.

Status message: bit coded status of the transmitter. For diagnostic purpose only.

Status: in case of a malfunction you will get information about the reason of this malfunction.

5.3 Analog Input Function Block (AI)

The UMC3-FF contains 4 AI blocks:

- Flow (mass or volume flow, depending on the unit selected in the transducer block)
- Density (in case the density measurement is calibrated and switched on or if a fixed density is preset)
- Temperature
- Forward totalizer (internal totalizer of the UMC3 transmitter). This totalizer accumulates mass flow or volume flow depending of the totalizer unit selected in the transducer block.

The following parameters have to be set in order to map the measured value at the input of the AI to it's output (default setting when device is shipped)

- **CHANNEL:** "measured value"
- **L_TYPE:** "Indirect"
- **XD-SCALE** EU_100 corresponds with upper range value
EU_0 = 0

The "units index" must be set identical to the unit selected in the transducer block.

If output of AI shall be identically to its input (scaling = 1) following parameters have to be set to:

- **OUT-SCALE equal to XD-SCALE.**

Any unit of OUT value can be selected. There is no conversion between units (e. g. kg -> t) supported

- **LOW CUT (low flow cut off):** The low flow cutoff is given in % related to the OUT-SCALE. When going below this limit the output will be set to zero. In order to activate the low flow cut off additionally the parameter IO_OPTS has to be set to "low cutoff". The setting of the low flow cut off does not affect the reading of the mass flow in the local display. It also does not affect the totalizer. The Default setting is 1%. Please regard that the low flow cutoff will avoid negative readings.

The parameters for monitoring the limits will not be set by default.

PV_FTIME (Damping):

The damping is used to smooth the measured value. Set to 0 seconds by default. The damping value set by the local panel is still active even if this parameter is set zero.

6 Local operating with control unit BE2

The handling and all functions are identical to the standard design of the UMC3. However, not all parameters are mapped to Foundation Fieldbus.

MEASURED VALUES	Display of the measured values of the transducer block. Please regard: the measured values will be displayed independent of the settings of the associated AI block. If the field bus starts a simulation there will be no information about in the display .
PASSWORD	
COUNTER	Totalizer unit and totalizer reset are mapped to the field bus. But some selectable totalizer units of transmitter UMC3 are not available at Foundation Field bus. If such a unit is selected, an error message will be displayed.
MEASUREMENT-PROCESSING	The damping value can only be increased by the field bus. The damping value set by the local panel is still active even if PV_FTIME is set to zero. Low flow cutoff set by the local panel only affects the local display of the mass flow and the totalizer but not the output on the Foundation Fieldbus. The zero calibration can be started by the panel or by the bus.
FLOW	QM unit: the unit of the mass flow in the transducer block will be set. Attention: XD_SCALE unit in the AI must be set equal via Fieldbus settings! Some selectable units of transmitter UMC3 are not available at Foundation Field bus. If such a unit is selected, an error message will be displayed.
DENSITY	Measurement settings on/off/fix and empty pipe limit are mapped to the field bus. -Density unit: the unit of the density in the transducer block is set Attention: XD_SCALE unit in the AI must be set equal via Fieldbus settings! Some selectable units of transmitter UMC3 are not available at Foundation Field bus. If such a unit is selected, an error message will be displayed.
TEMPERATURE	Temperature unit: the unit of the temperature in transducer block is set. Attention: XD_SCALE unit in the AI must be set equal via Fieldbus settings!
PULSE OUTPUT	Not available
STATUS	Not available
CURRENT OUTPUT	Not available
SIMULATION	If the simulation is switched on with the setting “preset of Q, D, T” the measured values of the transducer block and AI will follow. The respective status is set to “GOOD” independent from real existing error messages. The parameter “status“ in the transducer block will show the message “Simulation initiated by local panel”
SELF-TEST	Parameters are not mapped to field bus. Detected errors are indicated by diagnostic bits.
TRANSMITTER SETTINGS	
SENSOR SETTINGS	- Sensor constant set mass flow transducer block parameter “Sensor constant“.