Technical
Information
TI 044D/06/en
Nr. 50093220

Supplementary data for
TI 043D/06/en

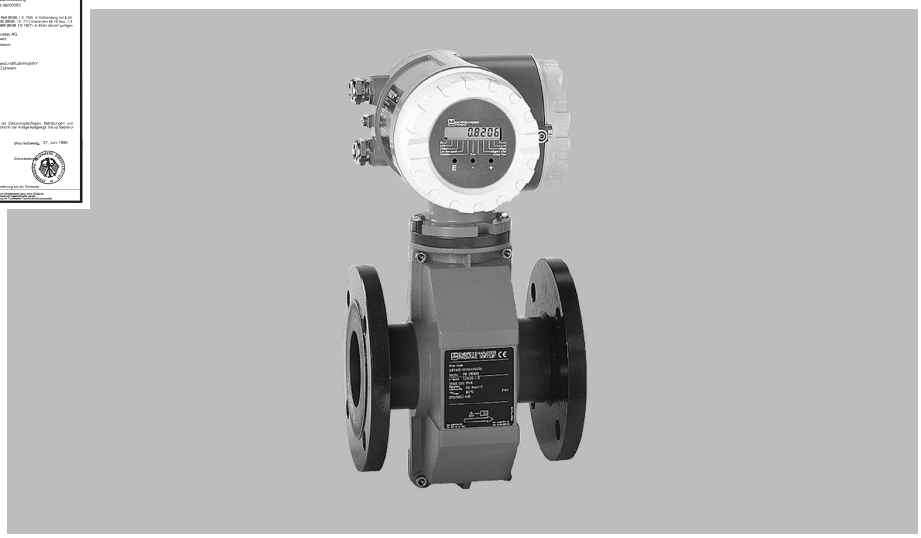
promag 31 F (Model '99)

For Custody Transfer with Cold Water (Wastewater)

Supplementary data for TI 043D “Promag 30 (Model '99)”


Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

Zulassungsschein











The technical data for Promag 31 F (Model '99) are identical with those for Promag 30 (Model '99) unless otherwise stated in this supplementary data brochure.

Introductory notes
Measuring points for custody transfer for water are considered or approved by the certifying authorities as “entire plants”. Promag 31 F including the inlet and outlet sections are, therefore, considered as a part of this entire plant.
To ensure correct measurement in custody transfer procedures, the piping and the measuring tube must always be filled with liquid.

When installing a certified measuring system, please also note the regulations for custody transfer (Deutscher Eichverlag GmbH – Braunschweig):
- “Allgemeine Vorschriften”
- “Vorschriften für Volumenmeßgeräte für strömendes Wasser (Anlage 6)”

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Measuring System

Fields of Application
The measuring system Promag 31 is PTB certified for custody transfer with cold water (wastewater):
- Water temperature: 0...+30 °C
- Minimum fluid conductivity:
  – Cold water ≥ 5 µS/cm
  – Demineralised water ≥ 20 µS/cm
- Metrological Classes A and B
- Continous operation at Q_{max} possible

The Promag 31 F is operated exclusively with a totalizer display suitable for custody transfer, e.g. in the supply of drinking water (monitoring, fiscal metering, etc.).

Measuring System
The measuring system consists of:
- Promag 31 (Model '99) transmitter
- Promag F sensor (DN 15...2000)

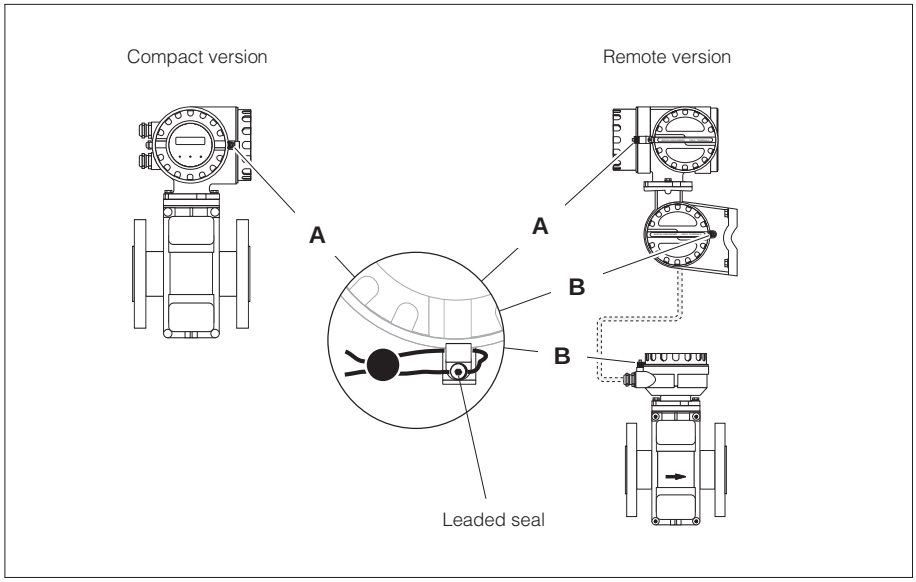
Ex Versions
Promag 31 (Model '99) is available as a remote version with the following Ex approvals:
– Sensor in Ex Zone 1
– Transmitter in Ex Zone 2

Custody Transfer Measurement

Suitability for Custody Transfer, Custody Transfer Approval
With flowmeters *suitable* for custody transfer, approval by the standards authorities has not yet been carried out. Therefore, flowmeters suitable for custody transfer may not be used for custody transfer procedures until approved. However, such flowmeters can either be approved at a later date by a test centre or, with the agreement of the authorities, calibrated for custody transfer on site. The leaded seal of the certified instruments confirms this status.

Reapproval
The operator of an approved Promag 31 measuring system is required to apply for *reapproval* and to comply with current regulations set by the standards authorities. The date for reapproval (year number) is given on a special seal.

Special Features of Custody Transfer
- Flowmeters suitable for custody transfer are technically identical to flowmeters approved for "custody transfer".
- Only flowmeters approved by the standard authorities may be used for regulatory fiscal metering.
- Flowmeters with a flow rate of $Q = 2 \times Q_n > 2000\ m^3/h$ are exempted from custody transfer approval. Such instruments are not approved but however can still be used for custody transfer measurement.
- In contrast to mechanical counters, magnetic flowmeters approved by the standards authorities may be in continuous operation at Q_{max} (= 100%).
- After official approval or leaded sealing, configuration can no longer be carried out using the local display.
- Approved flowmeters totalize bidirectional flow, while the pulse and current outputs only supply values when flow is in a positive (forwards) direction.
- The electrode cleaning circuitry (ECC) is not available during custody transfer measurements.
- The wiring of the status output and auxiliary input must be done by the user of the system.
- Instruments suitable for custody transfer and for certifying at a later date are normally removed from the piping.



Sealing of a certified Promag 31 by standards authorities:

A → Sealing of the electronics compartment
B → Sealing of the connection housing after installation (remote version)

In collaboration with the standards authorities, Promag 31 instruments are sealed before delivery. With the remote version, the connection between sensor and transmitter is to be sealed *on site*.

Custody Transfer – Definitions

Flow Ranges

Q_{max}

Maximum flow without damaging the flowmeter and without exceeding the maximum permissible error.

Q_n

Nominal flow rate is half the value of the maximum flow rate Q_{max} and characterises the flowmeter (see page 4).

Q_{min}

Minimum flow rate above which the totalizer is within the error limits.
It is dependent on the nominal flow rate (Q_n) and the Metrological Class.

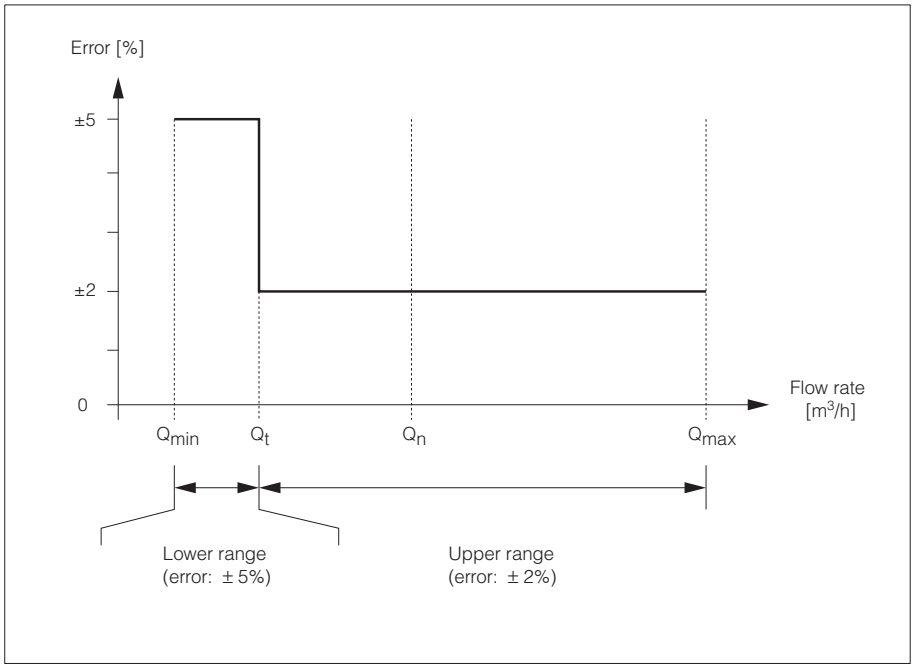
Q_t

"Transitional flow rate", which separates the lower from the upper maximum permissible range.
Lower or upper range differ from each other by the permitted error limits for custody transfer measurements (see Figure below):

- Lower range (Q_{min} ... Q_t)
  Error limit ± 5%
- Upper range (Q_t ... Q_{max})
  Error limit ± 2%

Cold Water

Fluid temperature lies between 0...+30 °C



Metrological Classes

Metrological Classes A / B indicate the range in which the approved custody transfer flowmeter can measure, from full scale value Q_{max} down to Q_{min}.

The error limits within this range are set by the standards authorities and must not be exceeded (see Figure above).

Metrological Class	Nominal flow rate Q_n	
	$Q_n < 15\ m^3/h$	$Q_n \geq 15\ m^3/h$
Class A	$Q_{min} = Q_n \times 0.04$ $Q_t = Q_n \times 0.10$	$Q_{min} = Q_n \times 0.08$ $Q_t = Q_n \times 0.30$
Class B	$Q_{min} = Q_n \times 0.02$ $Q_t = Q_n \times 0.08$	$Q_{min} = Q_n \times 0.03$ $Q_t = Q_n \times 0.20$

Selection of

Metrological Class
Nominal Diameter

Metrological Class
Please indicate the following data in all requests and orders:

Nominal flow rate (Q_n) for Class A or B:
This information is shown on the name-plate and must be given in the order text.

Note!
Q_n must lie between the corresponding Q_n (min) and Q_n (max) valid for Class A or B.

Full scale value of current output:
For scaling the current output, the full scale value and if required the pulse value must be given, and will then be set at the factory.

Note!
The full scale value and the value Q_n are two different values. For example, the full scale value can be higher than the defined Q_n. In extreme cases, it is double the value of Q_n (max) and lies at 10 m/s.

Nominal Diameter
The diameter of the pipe usually governs the nominal diameter of the sensor.
The plant should be designed so that under "normal" operating conditions, the optimum flow rate lies between 2...3 m/s.

If it is necessary to increase the flow velocity, this can be done by reducing the nominal diameter of the sensor resp. by using adapters when mounting into the piping.

Caution!
When using adapters, the inlet section (5 x DN) and the outlet section (2 x DN) must also have the same nominal width as the flowmeter!

Nominal flow rate Q_n in [m^3/h]

Diameter DN [mm]	Metrological Class A Qn (min)		Qn (max)	Metrological Class B Qn (min)		Qn (max)
15	0.8	Qmin : Qn = 1 : 25	3.0	1.6	Qmin : Qn = 1 : 50	3.0
25	2.2		8.8	4.4		8.8
32	3.6		14.0	7.2		14.0
40	5.6		22.6	11.3		22.6
50	9.0		35.0	15.0 *	Qmin : Qn = 1 : 33	35.0
65	15.0		60.0	20.0		60.0
80	15.0 *	Qmin : Qn = 1 : 12.5	90.0	30.0		90.0
100	18.0		140.0	46.0		140.0
125	28.0		220.0	73.0		220.0
150	40.0		320.0	105.0		320.0
200	70.0		550.0	190.0		550.0
250	110.0		880.0	290.0		880.0
300	160.0		1250	420.0		1250
350	215.0		1700	570.0		1700
400	280.0		2200	750.0		2200
500	440.0		3500	1170		3500
600	640.0		5000	1700		5000
700...2000	Diameters DN 700...2000 are also approved. However, measuring points with these diameters are not normally subject to inspection requirements (Q_{max} = 2 × Qn > 2000 m^3/h).					

* Limit range Q ≥ 15 m^3/h (see also Table on page 3)

Qn (min): lowest nominal flow rate with reference to $Q_{(min)}$, v = 0,05 m/s
Qn (max): highest nominal flow rate with reference to $Q_{(max)}$, v = 5 m/s

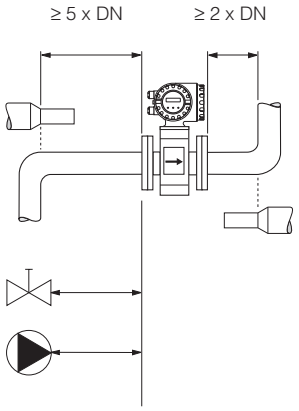
Definitions → see page 3

Technical Data

Application	
Instrument name	Flow measuring system “Promag 31 F (Model '99)” for custody transfer.
Instrument functions	Flow measurement of liquids for custody transfer with cold water (wastewater) in closed pipings.
Function and system design	
Measuring principle	see TI 043D/06/en
Measuring system	Instrument family “Promag 31 F (Model '99)” consisting of: • Transmitter: Promag 31 • Sensor: Promag F (DN 15...2000) Two versions are available: • Compact version • Remote version (FS or FL version)
Input variables	
Measuring variable *Measuring range* *Operable flow range*	see TI 043D/06/en
Auxiliary input	see TI 043D/06/en *Promag 31 F:* With custody transfer measurement, the auxiliary input can only be used for resetting error messages and starting the display test function!
Output variables	
Output signal	see TI 043D/06/en
Signal on alarm	see TI 043D/06/en *Promag 31 F:* • With custody transfer measurement, error messages can be reset via the auxiliary input once the fault has been cleared. • With custody transfer measurement, the status output is permanently configured to “Error”.
Load *Creep suppression*	see TI 043D/06/en
Accuracy	
Reference conditions *Measured error* *Repeatability*	see TI 043D/06/en

Operating conditions

Installation conditions

Installation instructions	see TI 043D/06/en
Inlet and outlet sections	The inlet and outlet section must have the **same** nominal width as the flowmeter: – Inlet section ≥ 5 x DN – Outlet section ≥ 2 x DN Caution! These data also apply to the use of adapters (reducers and expanders) for increasing the flow velocity.  ti044y06
Connection cable length for remote version	see TI 043D/06/en

Ambient conditions

Ambient temperature, storage temperature, degree of protection (EN 60529), shock and vibration resistance, electromagnetic compatibility (EMC)
→ see TI 043D/06/en

Process conditions

Ensure that the measuring tube of certified measurement systems (including the inlet and outlet sections) are always filled with fluid.

Fluid temperature	Custody transfer “certifiable” instruments: see TI 043D/06/en Certified instruments: 0...+30 °C (cold water)
Nominal pressure *Conductivity* *Pressure loss*	see TI 043D/06/en

Mechanical construction

Design / Dimensions *Weight* *Materials* *Electrodes fitted* *Process connections* *Electrical connection* *Cable entries*	see TI 043D/06/en *Electrical connection Promag 31 F:* With custody transfer measurement, the auxiliary input can only be used for resetting error messages and starting the display test function!

User interface	
Operation *Display* *Communication*	see TI 043D/06/en *Configuration of Promag 31 F:* After official approval or leaded sealing, configuration can no longer be carried out using the local display.
Power supply	
Supply voltage / Frequency *Power consumption* *Power supply failure*	see TI 043D/06/en
Certificates and approvals	
Ex approvals	see TI 043D/06/en
Custody transfer	PTB approval for custody transfer with cold water and wastewater. PTB Certificate → see page 8
CE mark	see TI 043D/06/en
Order information	
The following values are to be stated when ordering: – Nominal flow rate Q_n → see page 4 – Metrological Class → see page 3 The flowmeter is delivered with appropriate factory settings if no information is given on the full scale value for current output, the current range (0/4...20 mA), pulse value, display mode or totalizer units!	
Accessories, *Supplementary documentation*	see TI 043D/06/en
Other standards and guidelines	
see TI 043D/06/en	

PTB Certificate

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

Zulassungsschein

Innerstaatliche Bauartzulassung

Nr. 1.32-96000089

Auf Grund des § 9 des Eichgesetzes vom 11. Juli 1969 (BGBl. I S. 759) in Verbindung mit § 26 des Eichgesetzes in der Fassung vom 23. März 1992 (BGBl. I S. 711) sowie den §§ 16 Abs. 1-3 und 17 Abs. 1 der Eichordnung vom 12. August 1988 (BGBl. I S 1657) in ihren derzeit gültigen Fassungen wird der Firma:

Endress + Hauser Flowtec AG
Reinach, Schweiz

folgende Bauart zur innerstaatlichen Eichung zugelassen:

Magnetisch-induktiver Volumendurchflußintegrator
mit elektrischem Zählwerk

Die Bauart erhält folgendes Zulassungszeichen:

6.221
96.18

Die wesentlichen Merkmale und gegebenenfalls die Zulassungsauflagen, Befristungen und Bedingungen sowie inhaltlichen Beschränkungen sind in der Anlage festgelegt. Sie ist Bestandteil der Zulassung und umfaßt -05-Seite(n).

Physikalisch-Technische Bundesanstalt **Braunschweig,** 27. Juni 1996

Im Auftrag

Dr. M. Rinker

Dienststempel: PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 41

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Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Subject to modification

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