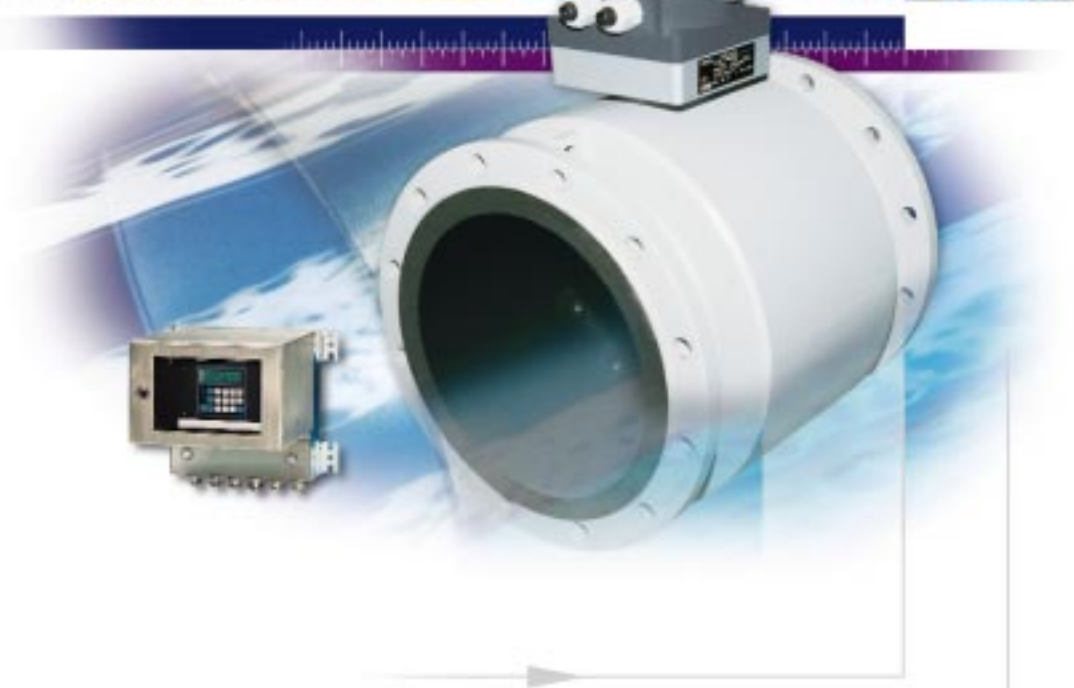


Electromagnetic flowmeter PARTI-MAG II

The system to meter waste water in full and partially full pipe lines



- Proven technology
- High accuracy
- Short in-/outlet sections
- EEx-certification
- Easy installation and quick start-up

Field^{IT}

Analyze^{IT} Control^{IT} Engineer^{IT} Field^{IT} Inform^{IT} Operate^{IT} Power^{IT} **Industrial^{IT}**

ABB

PARTI-MAG II – the electromagnetic flowmeter...

Metering flows in full pipe lines with electromagnetic flowmeters is today's state of the art. ABB Automation in Göttingen, formerly Fischer & Porter, has developed a meter for metering flows in partially full pipe lines – the PARTI-MAG. The second generation of this flowmeter has arrived: The PARTI-MAG II.

Its advantages:

- **Metering without inverts – even in pipe lines with large downward slopes**

An invert shaft is no longer necessary. The slopes of existing pipe lines remain unchanged. Your construction-costs are reduced. Back flows have no effect on the measurements. Therefore your system can be operated without limitations or restrictions.

- **Easy installation, no on-site calibrations required**

The metering system start-up time is minimal. This increases the applicability and reduces your start-up costs.

- **High accuracy – even for low fill levels**

- **Maintenance free metering system**
No mechanical wear, no added pressure drop, no moving parts or restrictions located in the meter.

- **Advantageous installation requirements**

Short in- and outlet straight sections (5x DN upstream and 3x DN downstream). Large downward pipe line slopes (up to 5%)

- **Process reliability**

The new PARTI-MAG II is well ahead of existing metering systems due to its high degree of user friendliness, high accuracy and maintenance free technology.

- Electromagnetic flow metering with flow rate indication and flow totalization.
- Wide flow ranges. Max. flow range value can be set between 0.5 and 10 m/s.
- Galvanically isolated pulse and current outputs.

- Large variety of output signals which increase system reliability and decrease down times.

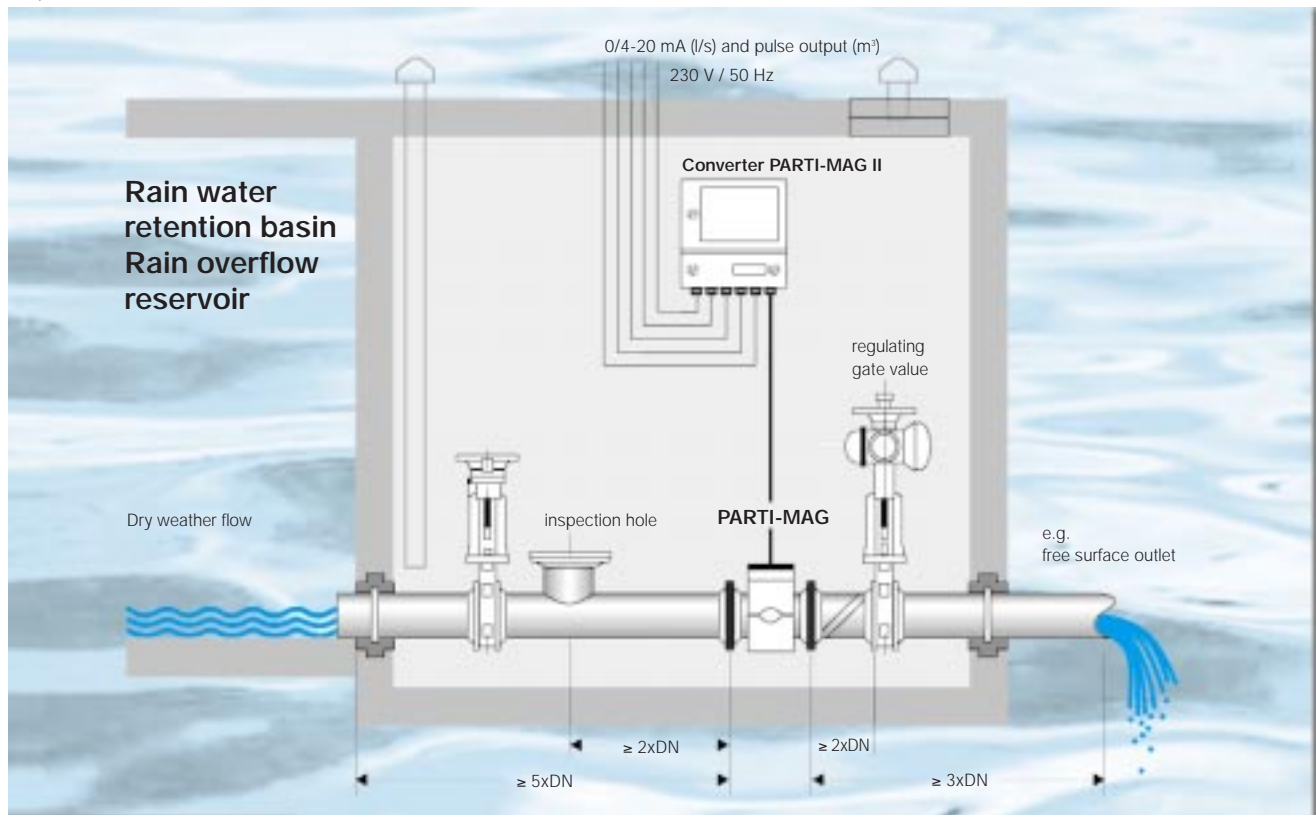
- Communication capability which provides for continuous system monitoring with automatic error diagnostics.

- Redundant measurement values are continuously monitored for plausibility by the system monitor in the converter. Messages appear in clear text on the display and are signaled over a contact output.

Our know-how

Technical advances combined with operating experience in electromagnetic flow metering in partially full pipe lines define the ABB Automation measurement technology.

Proposal for a PARTI-MAG II installation



...for full and partially full pipe lines

The measurement principle

Faraday's Law of Induction forms the basis for the electromagnetic flowmeter measurements. The conductive fluid flows through the metering tube perpendicular to the direction of magnetic field.

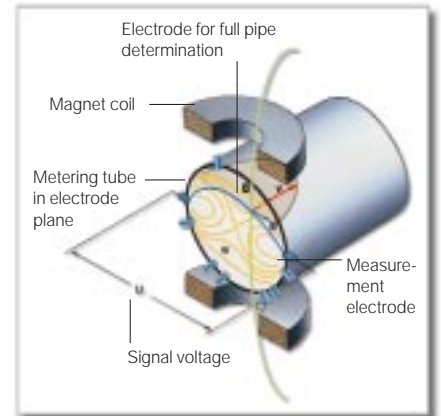
The voltage induced in the fluid is measured by a number of electrode pairs. These are arranged in the metering tube in such a manner that for each flow cross section (full or partially full) those electrodes with the optimally weighted signal potential are utilized for the flow measurements.

Another electrode is integrated to detect a full-pipe condition. This assures high accuracy when the pipe line is full.

The four electrode pairs also provide an accurate level measurement in addition to measuring the flow rate.



PARTI-MAG II converter in field mount housing and 19" insert



PARTI-MAG II, 2 meters DN 800 for dry weather flow metering and for outflow control of storage channels



Installation areas

The PARTI-MAG II is used primarily for metering flow rates of waste- and mixed water in pipe lines with free surfaces.

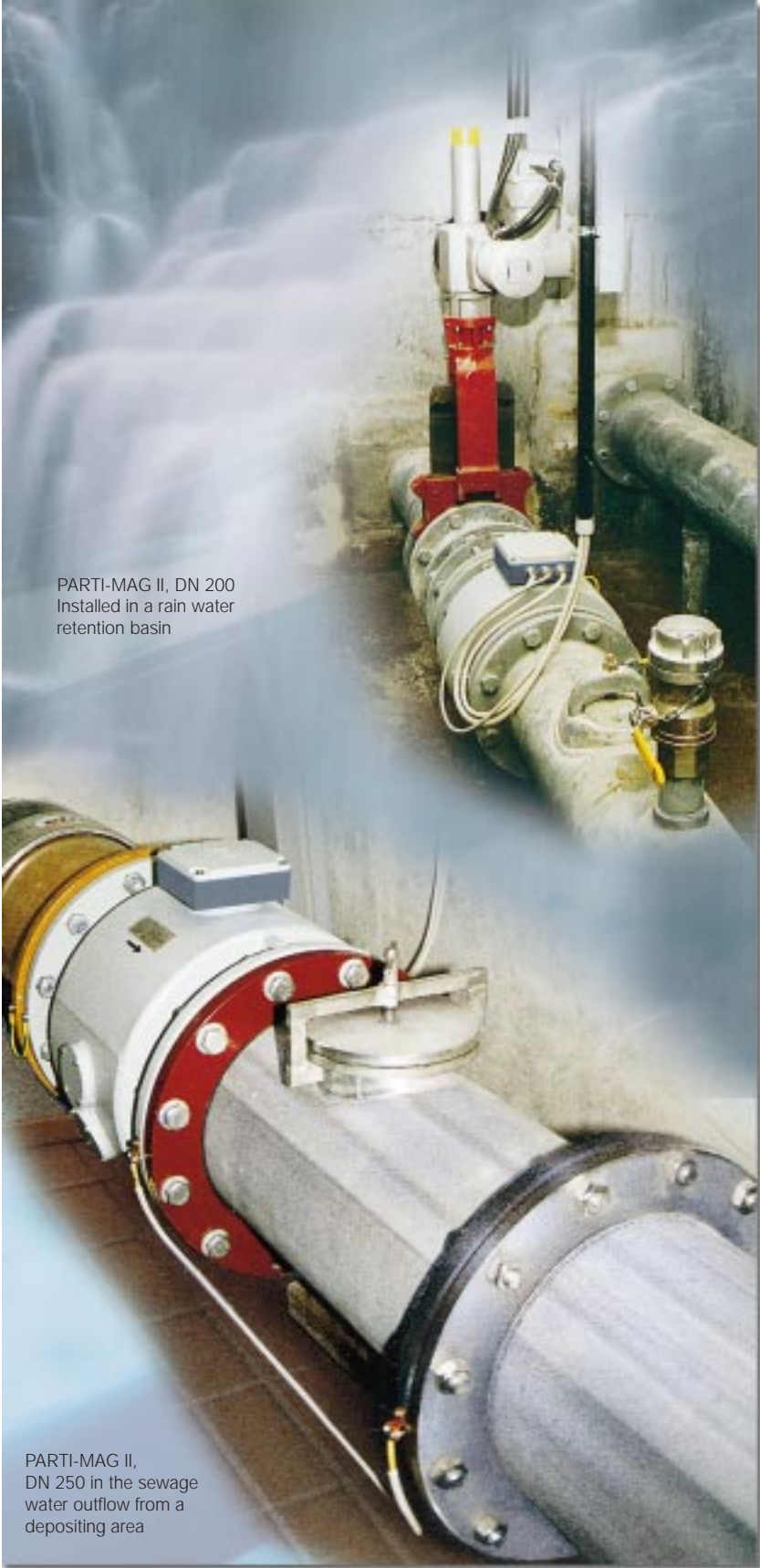
The meter requires only short straight sections and assures accurate measurements in case of subcritical flow as well as in case of supercritical flow in pipe lines with downward slopes as large as 5%.

The high accuracy of the PARTI-MAG II at very low pipe line fill levels (dry weather flow) cannot be achieved with other metering systems.

The metering system is calibrated on factory test rigs certified by PTB. An additional calibration at the site is not necessary. PARTI-MAG II is ready for immediate operation.

PARTI-MAG II is utilized in a large variety of applications (free surface pipe lines).

- For drainage control in rain water retention basins, rain overflow reservoirs and storage channels.
- For drainage metering in municipal and industrial waste water treatment facilities.
- For flow rate metering from depositing areas.
- For channel monitoring and management.
- For intake metering to waste water treatment plants.



PARTI-MAG II, DN 200
Installed in a rain water
retention basin

PARTI-MAG II,
DN 250 in the sewage
water outflow from a
depositing area

PARTI-MAG II overview

Primary

Design

DN 150 to DN 250
Two parts housing: Cast aluminum
DN 300 to DN 2000
All welded steel construction: painted

Liner materials

Hard rubber DN 150 to 2000
Soft rubber DN 150 to 2000
PTFE DN 150 to 600
PFA DN 150 to 250

Ex-protection Primary DP 46

II 2 G EEx em [ib] II C T4,
TÜV 97 ATEX 1219X
Category 2 G (Zone 1)



Process connections

Flange

Electrical connections

Screw terminals,
Conduit fitting: PG 13.5; PG 21

Installation requirements

(Straight pipe sections)
Upstream $\geq 5x$ DN
Downstream $\geq 3x$ DN
DN = Meter size

Converter

Flow Range

Continuously adjustable from
0-0.5 to 0-10 m/s

Minimum conductivity

$\geq 50 \mu\text{S/cm}$

Power

DN 150 to DN 2000 < 40 VA
(Flowmeter primary and converter)

Supply Power

115 Vac, 230 Vac, 24 Vac (50/60 Hz)

Output Signals

Isolated input and output signals

All in- and outputs are galvanically
isolated from the signal circuit and
each other.

Current Output

0/4–20 mA, load < 2000 Ω
Software selectable

Scale Pulse Output

Separate for each flow direction,
pulse width selectable

Active

Voltage pulse 24 V rectangular
Load $\geq 150 \Omega$ $f_{\text{max}} 5 \text{ kHz}$

Passive Optocoupler

$5V \leq U_{\text{CE}} \leq 30 V$
 $2 \text{ mA} \leq I_{\text{CE}} \leq 220 \text{ mA}$; $f_{\text{max}} = 5 \text{ kHz}$

Display

2 line x 16 character dot matrix
display with background lighting
Separate 7 digit totalizer for each flow
direction with overflow register.

Parameter settings

Menu controlled from the keypad

Contact Outputs for System Monitoring (Alarm)

Optocoupler or relay contact

2 Programmable Outputs (Optocoupler)

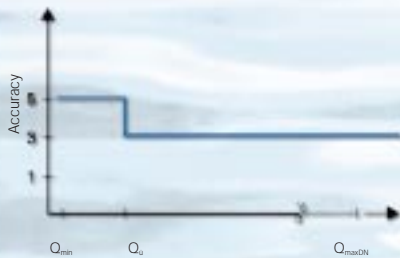
Fwd./rev. flow direction signal
Max. alarm or min. alarm

Serial Data Link

RS 232, RS 485

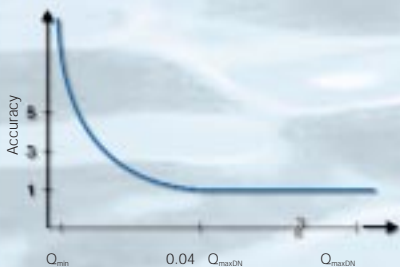
Accuracy

Partially full pipe accuracy



DN	Q_{minDN} l/s	Q_{maxDN} l/s	Q_0 (0,02 Q_{maxDN}) l/s	Q_{min} (0,001 Q_{maxDN}) l/s
150	8,3	167	3,3	0,1
200	15,0	300	6,0	0,3
250	25,0	500	10,0	0,5
300	33,3	667	13,3	0,6
350	45,8	917	18,3	0,9
400	62,5	1250	25,0	1,2
500	91,6	1833	36,6	1,8
600	133,3	2667	53,3	2,6
700	183,3	3667	73,3	3,6
800	272,2	5000	100,0	5,0
900	333,3	6667	133,3	6,6
1000	375,0	7500	150,0	7,5

Full pipe accuracy



Accuracy

• Full meter

- $Q > 0.04$ range 1% of rate
- $Q < 0.04$ range 0.0004 x range

• Partially full meter ($v > 0.2 \text{ m/s}$)

- $Q > Q_0$ 3% of rate
- $Q_{\text{min}} < Q < Q_0$ 5% of rate

where $Q_0 = 0.02 \times \text{range}$
and $Q_{\text{min}} = 0.001 \times \text{range}$



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