



WATER METERING



FLOQUA FL

ELECTROMAGNETIC
FLOW METERS



NEW

FLOQUA

FLOQUA electromagnetic flow meters are measuring devices designed to measure the flow of electrically-conductive liquids with a conductivity greater than $5 \mu\text{S}/\text{cm}$ in closed pipeline installations.

APPLICATION

FLOQUA electromagnetic flow meters find their use in water and wastewater management, heat supply systems and many sectors of the industry, e.g. in the chemical sector or food processing. They measure pure and contaminated liquids, sludge, pulp and aggressive liquids.

ADVANTAGES

- Wide range of nominal diameters
- Large choice of lining materials
- No moving parts
- The flow meters do not generate flow resistance and pressure loss
- High measurement accuracy
- Neither density nor viscosity affect the measurement accuracy
- Able to measure liquids with high concentrations of solid particles
- No need for mains power for battery-powered versions

KEY FEATURES

- Execution: compact or separate
- Connection: flanged (DN 25÷DN 2000) or flangeless "wafer" (DN 25-DN 400)
- Available versions of power supply: mains, mains with battery backup, battery-powered and solar-powered
- Communication protocols: HART, MODBUS, ProfiBus DP
- Able to transmit data: GSM/GPRS



Easy to install



Diagnostic functions



Legible graphic LCD display



Bi-directional flow measurement



Mains power



Empty pipe detection



Battery-powered



Dosing functions



Mains power supply with battery backup



Data transmission: GSM/GPRS

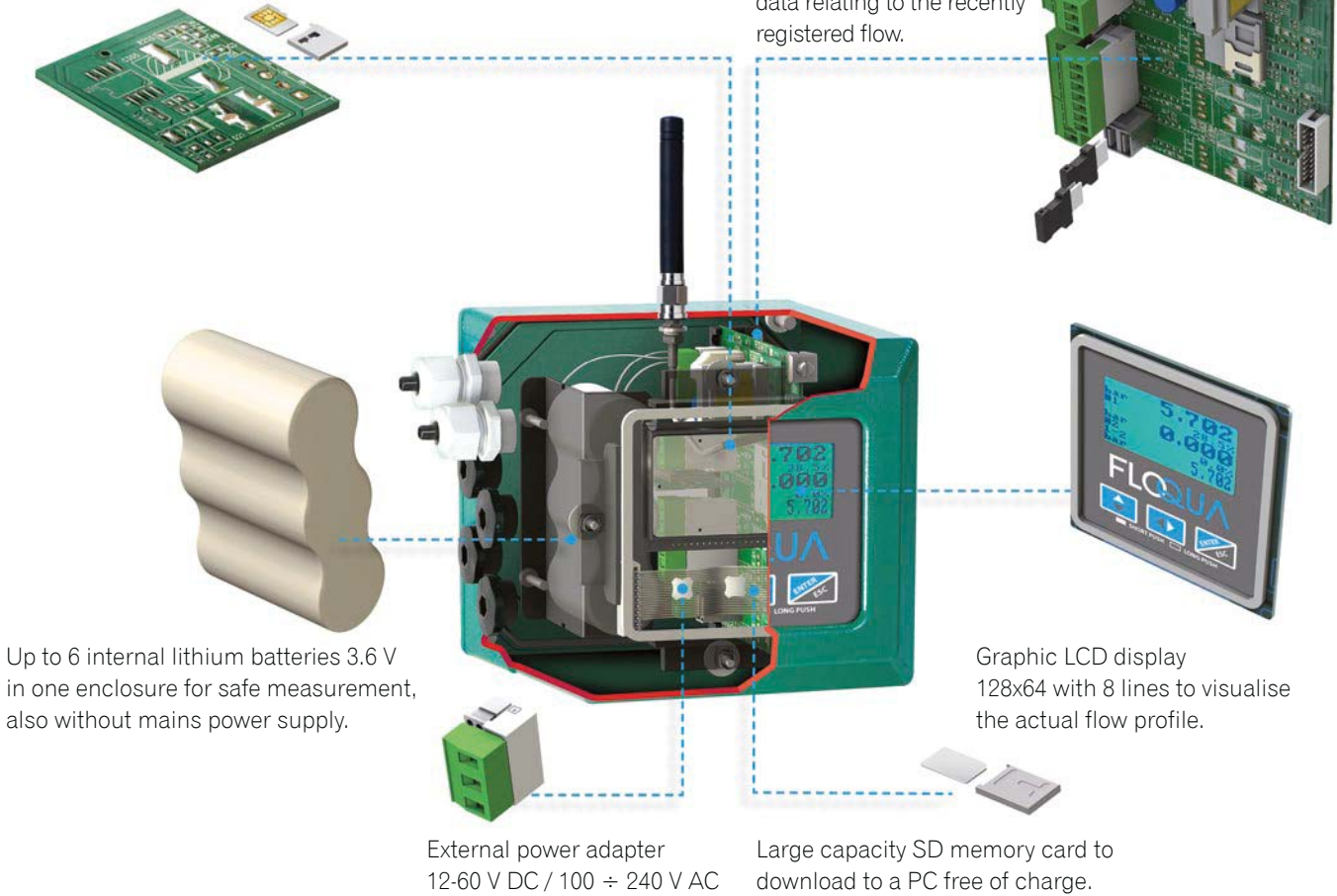


IP68 - optional protection rating

FLOQUA FL255 CONVERTER

Quad-band GSM/GPRS module for global data transmission by means of the standard protocol. E-mails are sent directly to the e-mail server with Excel files (.csv) as attachments.

Mother board.
DAT card
Two cards storing sensor and converter data.
The converter also stores data relating to the recently registered flow.



FLOQUA FL2500 SENSOR

Body:
Carbon steel optional
AISI 304 or 316

Electrodes
(2 measurement + 1 earthing)

Flanged connections
PN16 to PN64 (optional)

Lining: rilsan, polypropylene,
ebonite and PTFE





FLOQUA FL110

with flow sensor FL1000 or FL2500

KEY FEATURES

- Execution: compact or separate (option)
- Connection type: flanged (DN25÷DN2000) or flangeless "wafer" (DN25÷DN400)
- Mains power
- Bi-directional measurement
- Double measuring range
- Diagnostic function
- Empty pipe detection



FL110/FL1000

Table 1. TECHNICAL DATA FOR FLOQUA FL110/FL1000 AND FL110/FL2500

Converter	FL110	
	FL1000 (flangeless)	FL2500 (flanged)
Sensor		
Minimum electrical conductivity	5 µS/cm	
Version	compact	
Converter casing material / Protection class	NYLON PA6 reinforced with fibre glass / IP65	
Ambient temperature	-10...+50°C	
Display type	alphanumeric display, double line, without backlight, with 3 programmable keys (inside)	
Power supply	100-240 V AC 44-66 Hz	
Pulse/frequency output	2 outputs, 1250 Hz, 100 mA, 40 V DC	
Digital input/alarm output	Programmable function	
Protocol	ETP	
Data storage	EEPROM (storing data in case of power outage)	
Bi-directional measurement	yes	
Double measuring range	yes	
Diagnostic function	yes	
Empty pipe detection	yes	
Flow speed	0.4...10 m/s	
Tolerance of flow rate measurement	±0.1%	
Accuracy class (flow meter: converter + sensor)	±0.8%	
Connection type	Flangeless: "wafer" type	Flanged: Flanged acc. to UNI EN 1092-1
Material of the sensor body and flanges	Painted carbon steel	
Nominal diameter	DN25÷DN400	DN25÷DN2000
Nominal pressure	PN16	
Lining type	polypropylene (DN25÷DN150) ebonite (DN200÷DN400)	polypropylene (DN25÷DN150) ebonite (DN200÷DN2000)
Temperature of liquid	0÷60°C (polypropylene lining) -5÷80°C (ebonite lining)	
Electrode material	stainless steel AISI 316L	
Sensor protection rating	IP67	

FLOQUA FL210

with flow sensor FL1000 or FL2500

KEY FEATURES

- Execution: compact or separate (option)
- Connection type: flanged (DN25÷DN2000) or flangeless "wafer" (DN25÷DN400)
- Mains power
- Bi-directional measurement
- Double measuring range
- Diagnostic function
- Empty pipe detection
- Dosing function



FLOQUA
FL2500/FL210

Table 2. TECHNICAL DATA FOR FLOQUA FLOQUA FL2500/FL210 AND FLOQUA FL1000/FL210

Device type	FLOQUA	
Sensor	FL2500/FL210	FL1000/FL210
Minimum electrical conductivity	5 μ S/cm	
Version	compact	
Converter casing material / Protection class	painted aluminium casing / IP67	
Ambient temperature	-20...+60°C	
Display type	graphic LCD display, 8 lines, backlight, with 3 programmable keys	
Power supply	100-240 V AC (25VA) 44-66 Hz	
Digital output	2 outputs, programmable function (pulses, alarms) 1250 Hz, 100 mA, 40 V DC	
Digital input	1 input, programmable function (adder reset)	
Protocol	ETP	
Data storage	EEPROM (storing data in case of power outage)	
Data logger	32 values + 64 alarm events	
Bi-directional measurement	yes	
Double measuring range	yes	
Diagnostic function	yes	
Empty pipe detection	yes	
Dosing function	yes	
Flow speed	0.4...10 m/s	
Tolerance of flow rate measurement	\pm 0.05%	
Accuracy class (flowrate meter: converter + sensor)	\pm 0.2%	
Connection type	Flanged: Flanged acc. to UNI EN 1092-1	Flangeless: "wafer" type
Material of the sensor body and flanges	Painted carbon steel	
Nominal diameter	DN25÷DN2000	DN25÷DN400
Nominal pressure	PN16	
Lining type	polypropylene (DN25÷DN150) ebonite (DN200÷DN400)	polypropylene (DN25÷DN150) ebonite (DN200÷DN2000)
Temperature of liquid	0÷60°C (polypropylene lining) -5÷80°C (ebonite lining)	
Electrode material	stainless steel AISI 316L	
Sensor protection rating	IP67	



FLOQUA FL145

with flow sensor FL1000 or FL2500

KEY FEATURES

- Execution: compact or separate (option)
- Connection type: flanged (DN25÷DN800) or flangeless "wafer" (DN25÷DN400)
- Mains power supply with battery backup, battery-powered (option)
- Bi-directional measurement
- Double measuring range
- Diagnostic function
- Empty pipe detection



FL145/FL2500

Table 3. TECHNICAL DATA FOR FLOQUA FL145/FL1000 AND FL145/FL2500

Converter	FL145	
	FL1000 (flangeless)	FL2500 (flanged)
Sensor		
Minimum electrical conductivity	20 µS/cm	
Version	compact	
Converter casing material / Protection class	painted aluminium casting / IP67	
Ambient temperature	-20...+60°C	
Display type	alphanumeric display, double line, without backlight	
Power supply	mixed power supply system from battery or mains, 1 non-rechargeable type D lithium battery	
Protocol	ETP	
Data storage	F-Ram	
Data logger	2 GB MicroSD memory card	
Bi-directional measurement	yes	
Double measuring range	yes	
Diagnostic function	yes	
Empty pipe detection	yes	
Flow speed	0.4...10 m/s	
Tolerance of flow rate measurement	±0.1%	
Accuracy class (flow meter: converter + sensor)	±0.5%	
Connection type	Flangeless: "wafer" type	Flanged: Flanged acc. to UNI EN 1092-1
Material of the sensor body and flanges	Painted carbon steel	
Nominal diameter	DN25÷DN400	DN25÷DN800
Nominal pressure	PN16	
Lining type	polypropylene (DN25÷DN150) ebonite (DN200÷DN400)	polypropylene (DN25÷DN150) ebonite (DN200÷DN800)
Temperature of liquid	0÷60°C (polypropylene lining) -5÷80°C (ebonite lining)	
Electrode material	stainless steel AISI 316L	
Sensor protection rating	IP67	

FLOQUA FL255

with flow sensor FL1000 or FL2500

KEY FEATURES

- Execution: compact or separate (option)
- Connection type: flanged (DN25 ÷ DN2000) or flangeless "wafer" (DN25 ÷ DN400)
- Mains power supply with battery backup, battery-powered (option)
- Bi-directional measurement
- Double measuring range
- Diagnostic function
- Empty pipe detection



FL255/FL2500

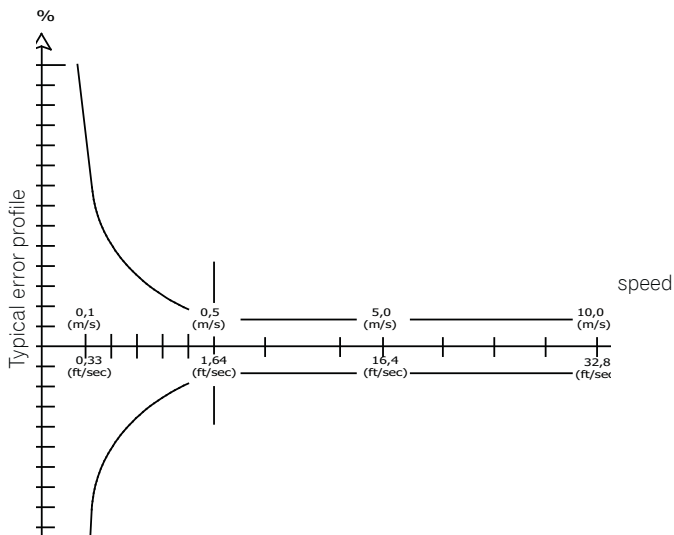
Table 4. TECHNICAL DATA FOR FLOQUA FL255/FL1000 AND FL255/FL2500

Converter	FL255	
	FL1000 (flangeless)	FL2500 (flanged)
Sensor		
Minimum electrical conductivity	5 μ S/cm	
Version	compact	
Converter casing material / Protection class	painted aluminium casting / IP67	
Ambient temperature	-20... +60°C	
Display type	graphic LCD display with 8 lines, backlit, with 3 programmable keys	
Power supply	mixed power supply system from battery or mains, 1 non-rechargeable type D lithium battery + power supply: 12-60 V DC/100 ÷ 240 V AC	
Protocol	ETP	
Data storage	F-Ram	
Data logger	2 GB MicroSD memory card	
Bi-directional measurement	yes	
Double measuring range	yes	
Diagnostic function	yes	
Empty pipe detection	yes	
Flow speed	0.4...10 m/s	
Tolerance of flow rate measurement	\pm 0.1%	
Accuracy class (flow meter: converter + sensor)	\pm 0.4%	
Connection type	Flangeless: "wafer" type	Flanged: Flanged acc. to UNI EN 1092-1
Material of the sensor body and flanges	Painted carbon steel	
Nominal diameter	DN25 ÷ DN400	DN25 ÷ DN2000
Nominal pressure	PN16	
Lining type	polypropylene (DN25 ÷ DN150) ebonite (DN200 ÷ DN400)	polypropylene (DN25 ÷ DN150) ebonite (DN200 ÷ DN2000)
Temperature of liquid	0 ÷ 60°C (polypropylene lining) -5 ÷ 80°C (ebonite lining)	
Electrode material	stainless steel AISI 316L	
Sensor protection rating	IP67	

Table 5. TECHNICAL DATA OF SEPARATE VERSION OF THE FLOQUA FLOW METER

Parameter	Optional manufacture of converter			
Converter	FL110	FL210	FL145	FL255
Version	Separate			
Casing material / Protection class	–	stainless steel type AISI 304/IP67 or IP68		
Power supply	18-45 V DC/AC (6W-7VA)	18-45 V AC (25 VA) 44-66 Hz 18-45 V DC (20 W) 10-35 V DC (20 W)	up to 6 non-rechargeable lithium type D batteries + power supply: 10-30V DC	up to 6 lithium type D batteries
Output: pulse / alarm	–	2 outputs with parameters: 1250 Hz, 100 mA, 40 V DC (optionally: 12.5 kHz); converter	2 outputs with parameters: 50 Hz, 100 mA, 40 V DC	
Current outputs	0/4-20 mA - RL=800 Ω	0/4-20 mA - RL=1000 Ω (+1 optional)	0/4-20 mA (available only with power adapter)	–
Digital input	–	1 input on/off		
Communication port	RS485	RS485 RS232	–	RS232 (protocols DPP/HTP)
Communication protocol	MODBUS RTU	MODBUS RTU; Profibus DP; HART	–	DPP/HTP
BlueTooth interface	–	yes	–	–
Module GSM / GPRS (SMS / CSD)	–	–	–	yes
Additional measurements	–	–	–	ability to connect two pressure sensors or a temperature sensor
Flow sensor	Optional sensor FL1000 / FL2500			
Material of the body and flanges	stainless steel AISI 304 or AISI 316			
Nominal pressure	PN10, PN25, PN40, PN 64			
Lining type	PTFE, rilsan			
Connection for FL2500	Flanges acc. to ANSI, DIN, JIS and other			
Temperature of liquid	0÷70°C (rilsan lining) -20÷100°C (PTFE lining / compact version) -20÷150°C (PTFE lining / separate version) -20÷180°C (PTFE lining / separate version)			
Electrode material	Hastelloy C, titanium, tantalum, platinum, other			
Protection class	IP68			

TYPICAL ERROR DIAGRAM



UNCERTAINTY CALCULATIONS

speed \geq 0.5 m/s \Rightarrow e = \pm A% readout value

speed < 0.5 m/s \Rightarrow e = \pm (B/V)% readout value

where:

e = uncertainty

V = operational speed

Converter	A	B (m/s)	B (ft/s)
FL110	0.8*	0.4**	1.31**
FL210	0.2	0.1	0.33
FL145	0.5	0.25***	0.82
FL255	0.4	0.2***	0.66

* =0.4 (option)

** =0.2(m/s); 0.66(ft/s) (option)

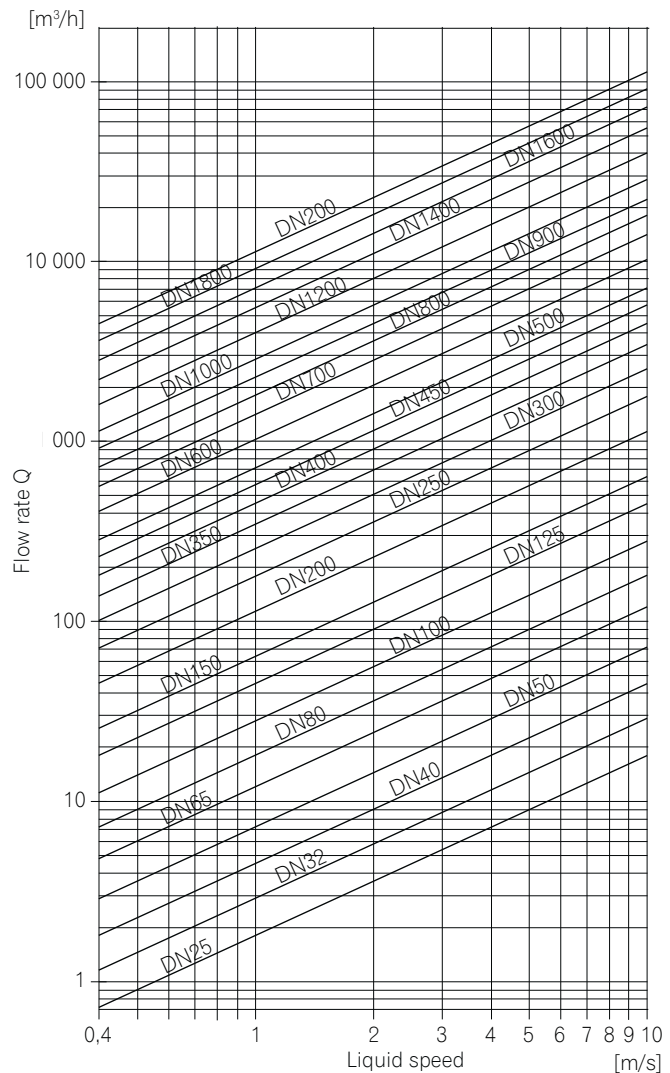
*** special accuracy on request

NOMINAL DIAMETER AND MEASURING RANGE

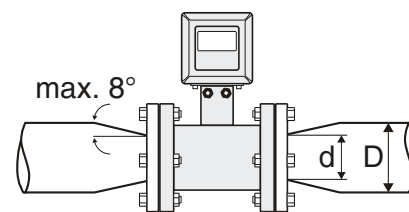
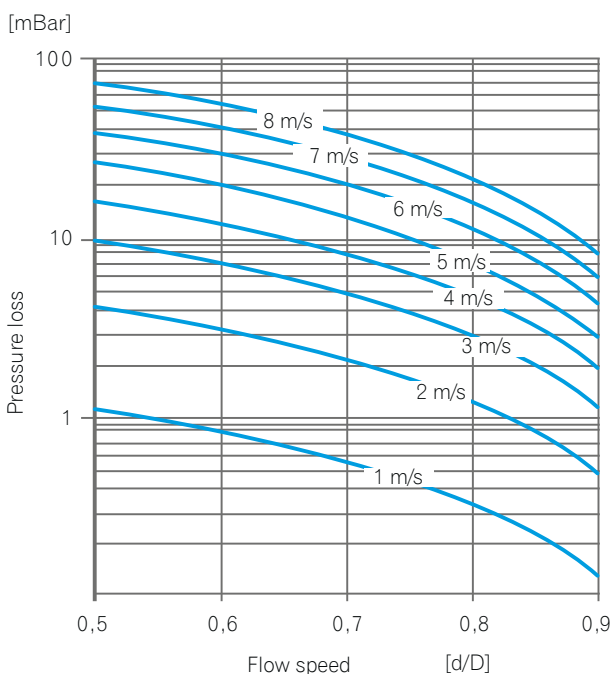
Minimum and maximum flow rates for individual sizes of flow meters with liquid speed 0.4÷10 m/s – acc. to the table.

DN	Qmin Vmin = 0.4 m/s	Qmax Vmax = 10 m/s
25	0.72 m³/h	18 m³/h
32	1.16 m³/h	29 m³/h
40	1.80 m³/h	45 m³/h
50	2.88 m³/h	72 m³/h
65	4.80 m³/h	120 m³/h
80	7.20 m³/h	180 m³/h
100	11.20 m³/h	280 m³/h
125	18.00 m³/h	450 m³/h
150	25.60 m³/h	640 m³/h
200	45.20 m³/h	1130 m³/h
250	70.80 m³/h	1770 m³/h
300	100.80 m³/h	2520 m³/h
350	138.00 m³/h	3450 m³/h
400	180.00 m³/h	4500 m³/h
450	228.80 m³/h	5720 m³/h
500	284.00 m³/h	7100 m³/h
600	408.00 m³/h	10200 m³/h
700	560.00 m³/h	14000 m³/h
800	720.00 m³/h	18000 m³/h
900	920.00 m³/h	23000 m³/h
1000	1140.00 m³/h	28500 m³/h
1200	1600.00 m³/h	40000 m³/h
1400	2200.00 m³/h	55000 m³/h
1600	2880.00 m³/h	72000 m³/h
1800	2640.00 m³/h	91000 m³/h
2000	4520.00 m³/h	113000 m³/h

DIAGRAM FOR THE SELECTION OF NOMINAL DIAMETER AGAINST LIQUID SPEED



NOMOGRAM FOR THE CALCULATION OF PRESSURE LOSS



CALCULATION OF PRESSURE LOSS

$$\Delta p = \left[0.10 + 0.20 \left(\left(\frac{d}{D} \right)^{-2} - 1 \right) \left(\frac{d}{D} \right)^4 \right] \left(\rho \frac{u^2}{2} \right)$$

where:

Δp = Pressure loss

ρ = Density of medium [kg/m³], default 1000 kg/m³

d = Sensor diameter [m]

D = Pipe diameter (bigger than sensor diameter) [m]

u = Average flow speed in sensor [m/s]



INQUIRY/ORDER FORM

FLOW METER MODEL - STANDARD VERSION*

Flanged connection	<input type="checkbox"/> FL110/FL2500	<input type="checkbox"/> FL210/FL2500	<input type="checkbox"/> FL145/FL2500	<input type="checkbox"/> FL255/FL2500
Flangeless connection	<input type="checkbox"/> FL110/FL1000	<input type="checkbox"/> FL210/FL1000	<input type="checkbox"/> FL145/FL1000	<input type="checkbox"/> FL255/FL1000
Nominal diameter DN	_____ [mm]			
Version	<input type="checkbox"/> Compact		<input type="checkbox"/> Separate	
Length of signal cable	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 5 <input type="checkbox"/> 10 <input type="checkbox"/> 20 [m]**			
Converter	FL110	FL210	FL145	FL255
Power supply	<input type="checkbox"/> 18-45 V AC <input type="checkbox"/> 18-45 V DC	<input type="checkbox"/> 18-45 V AC <input type="checkbox"/> 18-45 V DC <input type="checkbox"/> 10-35 V DC	<input type="checkbox"/> 1 battery <input type="checkbox"/> 2 batteries <input type="checkbox"/> 3 batteries <input type="checkbox"/> 4 batteries <input type="checkbox"/> 6 batteries <input type="checkbox"/> including power adapter	<input type="checkbox"/> 1 battery <input type="checkbox"/> 2 batteries <input type="checkbox"/> 3 batteries <input type="checkbox"/> 4 batteries <input type="checkbox"/> 5 batteries <input type="checkbox"/> 6 batteries <input type="checkbox"/> including power adapter
Output: pulse / alarm		<input type="checkbox"/> 1250 Hz, 100 mA, 40 V DC <input type="checkbox"/> 12.5 kHz, 100 mA, 40 V DC <input type="checkbox"/> converter	<input type="checkbox"/> 50 Hz, 100 mA, 40 V DC	<input type="checkbox"/> 50 Hz, 100 mA, 40 V DC
Current output	<input type="checkbox"/> 0/4-20 mA RL=800 Ω	<input type="checkbox"/> 0/4-20 mA RL=1000 Ω <input type="checkbox"/> +1 optional	<input type="checkbox"/> 0/4-20 mA (available only with power adapter)	
Digital input		<input type="checkbox"/> 1 input on/off	<input type="checkbox"/> 1 input on/off	<input type="checkbox"/> 1 input on/off
Communication port	<input type="checkbox"/> RS485	<input type="checkbox"/> RS485 <input type="checkbox"/> RS232		<input type="checkbox"/> RS232 (DPP/HTP)
Communication protocol	<input type="checkbox"/> MODBUS RTU	<input type="checkbox"/> MODBUS RTU <input type="checkbox"/> Profibus DP <input type="checkbox"/> HART		<input type="checkbox"/> DPP/HTP
Bluetooth interface		<input type="checkbox"/> yes <input type="checkbox"/> no		
Module GSM / GPRS (SMS / CSD)				<input type="checkbox"/> yes <input type="checkbox"/> no
Additional measurements				<input type="checkbox"/> ability to connect two pressure sensors or a temperature sensor
Flow sensor	Optional execution of flow sensor FL1000 / FL2500			
Material of body and flanges	<input type="checkbox"/> stainless steel AISI 304		<input type="checkbox"/> stainless steel AISI 316	
Nominal pressure	<input type="checkbox"/> PN10	<input type="checkbox"/> PN25	<input type="checkbox"/> PN40	<input type="checkbox"/> PN64
Lining type	<input type="checkbox"/> PTFE		<input type="checkbox"/> rilsan	
FL 2500: Flanges acc. to	<input type="checkbox"/> ANSI	<input type="checkbox"/> DIN	<input type="checkbox"/> JIS	<input type="checkbox"/> other
Temperature of liquid	<input type="checkbox"/> 0÷70°C (rilsan lining) <input type="checkbox"/> -20÷100°C (PTFE lining / compact manufacture) <input type="checkbox"/> -20÷150°C (PTFE lining / separate manufacture) <input type="checkbox"/> -20÷180°C (PTFE lining / separate manufacture)			
Electrode material	<input type="checkbox"/> Hastelloy C	<input type="checkbox"/> titanium	<input type="checkbox"/> tantalum	<input type="checkbox"/> platinum <input type="checkbox"/> other
Protection class	<input type="checkbox"/> IP68			

INQUIRER/ORDERER

Name _____
 Address _____
 Contact telephone _____

*) Important! When choosing the electromagnetic flow meter you should consider following parameters: the type of measured liquid, electric conductivity of measured liquid, temperature range of measured liquid and ambient temperature

***) Important! When choosing the length of the signal cable you should consider the dependency of the maximum allowable length of cable in a separate version from the conductivity of measured liquid (see Operational Manual FL1000 and Operational Manual FL2500).



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