MEASUREMENT

A Group Brand | legrand

Supervision & measurement systems

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ANALOGUE/DIGITAL METERING INSTRUMENTS

F3VA   F2/...   F2/...S

- Digital voltmeters with reading of up to 500V, with direct connection
- 3 digit display
- Out of scale signalling with flashing decimal point
- Ammeter load selection
- 300 and 500V analogue voltmeters, with direct connection
- Ammeters to be connected to CT with secondary connection to 5A
- Devices made of 2 thin mild steel plates located inside the coil, and capable of absorbing any mechanical shocks

Item	DIGITAL VOLTMETERS/AMMETERS		
	Connection using 5A CT		
		Vn (Vac)	No. of modules
F3VA	Can be programmed	300	4
F3VA/Q	Can be programmed flush mounted (72x72 mm)	300	4

	ANALOGUE VOLTMETERS	
	Vn (Vac)	No. of modules
F1/300	300	4
F1/500	300	4

	ANALOGUE AMMETERS	
	Connection using 5A CT	
	In (Vac)	No. of modules
F2/5	5	4
F2/10	10	4
F2/15	15	4
F2/20	20	4
F2/25	25	4
F2/30	30	4
F2/40	40	4
F2/50	50	4
F2/60	60	4
F2/1000*	1000	4

Interchangeable scale ammeter (connection through C.T. with secondary from 5A).

	INTERCHANGEABLE SCALES
	For ammeter item F2/1000
	In (Vac)
F2/50S	50
F2/60S	60
F2/80S	80
F2/100S	100
F2/150S	150
F2/200S	200
F2/250S	250
F2/300S	300
F2/400S	400
F2/500S	500
F2/600S	600
F2/800S	800
F2/1000S	1000

FEATURES OF METERING INSTRUMENTS

	DIGITAL	ANALOGUE
Standards	CEI 85-3 IECEN 60051	
No. of modules/sizes (mm)	4/72x72	4
Rated aux voltage Vn (Vac)	230	-
Operating voltage (Vac)	500	300-500
Rated frequency (Hz)	47-63	40-60
Ammeter scale loads In (A)	5-8000	50-1000
Digital indicator (points)	1000 (3 digits)	-
Maximum display	999	-
Protection index	IP20	
Temperature range (°C)	-5 +55	5+40
Operating temperature (°C)	-20 +70	-25÷40
Storage temperature (°C)	-40 +70	-40÷80
Precision class	1+1 digit	±1.5 of the bottom scale value
Ammeter overload	2 In for 5s (max 50A)	10 In for 5s (max 50A)
	1.2 In permanent	1.2 In permanent
Voltmeter overload	2 Ue for 5s (max 660A)	
	1.2 Ue permanent	
Rated input value	0-500Vac /5A	-
	5A	-
Power supply auto-consumption (VA)	≤ 3,5	-
Voltmeter auto-consumption (VA)	≤ 0,1	≤ 3,5
Ammeter auto-consumption (VA)	≤ 0,6	≤ 1,1
Maximum section of connectable flexible/rigid cable (mm²)	Faston 6.3x0.8mm	3 (strumenti In<15A) 4 (strumenti In>15A)

Reading points: 1.000 (3 digits)

Energy count: 9 digit counter

Precision: (reading + 1 digit):
- Current: ±0.5% (10...120% In)
- Voltage: ±0.5% (100...450V phase - phase)*
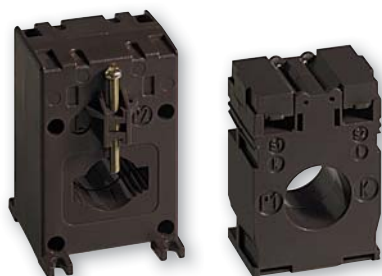
Input
Connection on dedicated Item
Type of measurement: real efficient value

Environmental conditions
Suitable for use in tropical climates

* for ARON connection the precision of the voltage measurement is guaranteed with dissymmetry – 5%.

CURRENT TRANSFORMERS (CT) 🌱

F8TE400   F8TB100

F8TG1000   F8TL400

Standards: CEI 38-1, IEC 185, VDE0414, BS3938, NFC42-502
Insulating voltage (Ui (Vac): 720
Testing voltage (kV): 3 (for 15A – 50Hz)
Rated frequency (Hz): 50
Rated current In (A) at the secondary: 5
Dynamic short circuit current: 2.5 Ith
Permanent heating current Ith: 1.2 In
Protection index (terminal zone): IP20
Relative humidity at limit (%): 85
Temperature range (°C): -20-70
Maximum section of connectable flexible/rigid cable (mm^2): 2.5
Thermal class: B
Secondary terminals with lamellar attack with screw tightening
Possibility of shorting the secondary for the replacement or the control of the ammeters without interruption of the primary current
Installable on DIN 35 rail or wall
Case in self-extinguishing resin

Item	CURRENT TRANSFORMERS					
	Secondary 5A					
	In (A)	Ø cable (mm)	Bar (mm)	Precision class		
				0,5 (VA)	1 (VA)	3 (VA)
F8TB50	50	21	16x12,5	-	1	1,5
F8TB75	75	21	16x12,5	-	1,5	2,5
F8TB100	100	21	16x12,5	1,5	2,5	-
F8TB125	125	21	16x12,5	2	3,5	-
F8TB160	160	21	16x12,5	3	4	-
F8TB200	200	21	16x12,5	4	5,5	-
F8TB250	250	21	16x12,5	5	6	-
F8TC250	250	26	40,5x12,5	3	4	-
F8TD400	400	26	32,5x15,5	6	8	-
F8TD600	600	26	32,5x15,5	6	8	-
F8TE250	250	32	40,5x10,5	3	5	-
F8TE300	300	32	40,5x10,5	5	8	-
F8TE400	400	32	40,5x10,5	8	10	-
F8TE600	600	32	40,5x10,5	12	15	-
F8TF800	800	40	50,5x12,5	8	12	-
F8TF1000	1000	40	50,5x12,5	10	12	-

Item	CURRENT TRANSFORMERS					
	Secondary 5A					
	In (A)	Ø cable (mm)	Bar (mm)	Precision class		
				0,5 (VA)	1 (VA)	3 (VA)
F8TG1000	1000		65x32	15	20	-
F8TJ1600	1600		127x38	10	15	-
F8TJ2000	2000		127x38	15	20	-
F8TJ3200	3200		127x38	25	30	-
F8TK1600	1600		127x54	20	30	-
F8TK2000	2000		127x54	25	40	-
F8TK2500	2500		127x54	30	50	-
F8TK3200	3200		127x54	30	50	-
F8TK4000	4000		127x54	30	50	-

Item	CURRENT TRANSFORMERS (OPEN TYPE)					
	Secondary 5A					
	In (A)	Ø cable (mm)	Bar (mm)	Precision class		
				0,5 (VA)	1 (VA)	3 (VA)
F8TL400	400		50x80	1,5	3	-
F8TL750	750		50x80	3	7	-
F8TL1000	1000		80x120	5	10	-

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CHANGEOVER SWITCHES 🌱　　POWER METERS 🌱

| F6A/4 | F6V/4 | F6V/7 | F20D32 | F41TMA | F4CON12 |
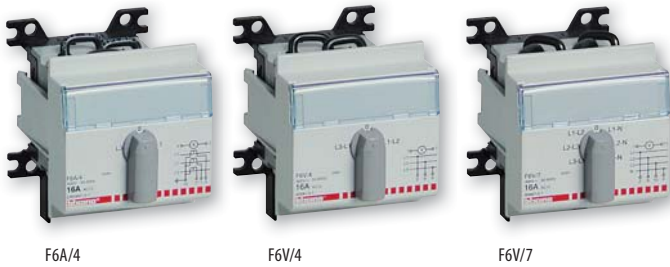
Standards: IEC EN 60947-5-1 IEC EN 60947-3
Rated voltage Vn (Vac): 400
Rated insulating voltage Ui (Vac): 660
Rated current In (A): 16 (6A for electromagnetic loads)
Utilization category: AC15
Protection index (terminal zone): IP20
Temperature range (°C): -20-70
Maximum section of connectable flexible/rigid cable (mm^2): 2.5
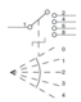
They measure the energy consumption in one-phase or three-phase circuits, downstream of the power meter. Display of power consumption in kWh and other values such as (depending on the item) current, active energy, reactive energy, power.
Conformity to standards IEC 62053-21/23, IEC 61010-1
MID: Certification guaranteeing the measurement precision in view of a re-billing of the power consumed.

Item	VOLTMETER SWITCHES		
	No. of positions	Connections	No. of modules
F6V/4	4	0	3
		L1/L2	
		L2/L3	
		L1/L3	
F6V/7	7	0	3
		L1/L2	
		L2/L3	
		L1/L3	
		L1/N	
		L2/N	
		L3/N	

	AMMETER SWITCHES		
	to be used with 5A CT		
	No. of positions	Connections	No. of modules
F6A/4	4	0	3
		L1	
		L2	
		L1	

	CHANGEOVER SWITCHES		
	No. of positions	Connections	No. of modules
F6C/3	2 + central 0	2P	3
F6C/5	4	1P	3
F6R/3	2 with automatic return to 0	2P	3

Item	ONE-PHASE METERS (DIRECT CONNECTION)			
	In (A)	No. of modules	Output	MID
F20D32	32	1	pulse	no
F20DM63	63	2	pulse	yes
F21DM63	63	2	RS485	yes

	THREE-PHASE METERS (DIRECT CONNECTION)			
	In (A)	No. of modules	Output	MID
F40DM63	63	4	pulse	yes
F41DM63	63	4	RS485	yes

Item	THREE-PHASE METERS (CONNECTION USING CT)			
	In (A)	No. of modules	Output	MID
F41TMA	5	4	RS485 and pulse	yes

CONCENTRATOR

F4CON12 It is a pulse concentrator equipped with 12 digital inputs and an RS485 connection to the MODBUS® protocol to communicate all datas to a PC or a Web Server.
It centralises and memorises pulses in the output of electrical, gas, heating oil, water and compressed air meters or measurement devices in order to:
• send them via the RS485 communication output to a remote energy management system
• display a large number of these items on its local display screen for direct reading of information
The F4CON12 pulse concentrator enables advanced customisation of all items, facilitating direct reading of information concentrated in this way:
• type of inputs (12 passive inputs, 6 passive inputs + 6 active inputs or 6 passive inputs + 6 inputs interfaced with the Electronic Measurement Group (GME) of the electrical supplier)
• metering unit per input: pulses, kWh, m^3, ...
• pulse weight
It is also possible to display, at any time:
• the physical status of each of the 12 digital inputs (contact open or closed, pulses present or not)
The communication interface of F4CON12 pulse concentrator is 3-wire half-duplex RS485 type using MODBUS® protocol and enables:
• remote access to all information produced and displayed by the pulse concentrator (cf. MODBUS table)
• management of the pulse concentrator from a PC, Web Server or Programmable logical controller (API/PLC)

MULTIFUNCTION METERING CONTROL UNITS

F4N200   F4N300   F4N400   F4N102   F4N104

Conformity to standards iEC EN 61557-12:
F4N200 - F4N300 - Active energy: class 0.5 - Reactive energy: class 1
F4N400 - Active energy: class 0.5 - Reactive energy: class 2

Item	METERING CONTROL UNIT FOR DIN35 RAIL
F4N200	Multifunction electronic metering control unit with data transmission via MODBUS RS485 - mounting on DIN35 rail; - width: 4 DIN modules; - LCD display; - usable on single-phase or three fase networks with or without neutral - it measures current, voltage, active, reactive and apparent energy ; - max and minimum values of voltage - average and peak values of the average values for current and power - 4-tariff count; - consumption of active energy (total and partial); - total active energy produced; - consumption of reactive energy (total and partial); - total reactive energy produced; - operating time; - power factor; - total harmonic distortion (THD) rate; - harmoni analysis up to 25th harmonic; - programmable alarms for all functions; - pulse count on the 2 inputs - output for the control of devices, alarm signalling and pulse count - Modbus communication port RS485 integrated

Item	TOP METERING CONTROL UNIT FOR INSTALLATION ON DOORS OR FULL PANELS
F4N400	Multifunction electronic metering control unit with data transmission via MODBUS RS485 - installation on doors or panels (window 92 x 92 mm); - dimension 96 x 96 mm; - LCD display; - usable on single-phase or three fase networks with or without neutral - it measures current, voltage, active, reactive and apparent energy ; - max and minimum values of voltage - average and peak values of the average values for current and power - 4-tariff count; - consumption of active energy (total and partial); - total active energy produced; - consumption of reactive energy (total and partial); - total reactive energy produced; - operating time; - power factor; - total harmonic distortion (THD) rate;; - programmable alarms for all functions;

	STANDARD METERING CONTROL UNIT FOR DOOR OR FULL PANEL INSTALLATION
F4N300	Multifunction electronic metering control unit with data transmission via MODBUS RS485 - installation on doors or panels (window 92 x 92 mm); - dimension 96 x 96 mm; - LCD display; - usable on single-phase or three fase networks with or without neutral - it measures current, voltage, active, reactive and apparent energy ; - max and minimum values of voltage - average and peak values of the average values for current and power - 4-tariff count; - consumption of active energy (total and partial); - total active energy produced; - consumption of reactive energy (total and partial); - total reactive energy produced; - operating time; - power factor; - total harmonic distortion (THD) rate; - harmoni analysis up to 25th harmonic; - programmable alarms for all functions; - Modbus communication port RS485 integrated

MODULES FOR METERING CONTROL UNIT ITEM F4N400	
F4N101	Module with 2 analogue outputs 0÷20 mA or 4÷20 mA
F4N102	Module with 2 inputs for pulse count / status display Inputs and 2 count on energy prices (only 1 input) and 2 outputs for control of equipment or for signaling an alarm on all sizes. Ability to install up to 2 modules (4 + 4 IN OUT).
F4N103	Module with 2 pulse outputs
F4N104	Modbus RS485 communication module
F4N105	Programmable Module, allows the storage of up to 5760 has values of: phase voltage and chained, phase current and neutral, frequency, active, reactive and apparent power, power factor, harmonic distortion, voltage and current, alarm status, positive and negative active energy, reactive energy positive and negative , average power and peak power average. The module comes in addition of the Modbus communication port RS485 integrated
F4N106	Module of temperature, allows connection of 2 probes Pt100 for measuring the outside temperature
F4N107	Harmonic analysis module, allows the analysis of the harmonic spectrum up to the 50th harmonic

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SUPERVISION DEVICES

| Ei. supervision | M7TIC/ELE | M7TIC/IO | M7TIC/RAV | M7000CB/EVO |

Item	ENERGY MEASUREMENT SOFTWARE
PM1SW	Software to display the electrical magnitudes acquired by the measurement devices. Analyses and prepares the history of the consumptions, consultation on PC. Manages up to 32 devices.
PM1SW1	Software to display the electrical magnitudes acquired by the measurement devices. Analyses and prepares the history of the consumptions, consultation on PC. Manages an unlimited number of devices.

	ENERGY MEASUREMENT WEB SERVER
PM1WS	Web server to display and manage the electrical magnitudes acquired by the measurement devices. Can consult these magnitudes via internet using devices such as: smart phone, tablet, PC, etc... Gestisce fino a 32 dispositivi.
PM1WS1	Web server to display and manage the electrical magnitudes acquired by the measurement devices. Can consult these magnitudes via internet using devices such as: smart phone, tablet, PC, etc... Manages an unlimited number of devices.

	INTERFACE FOR ELECTRONIC CIRCUIT BREAKERS
M7TIC/ELE	Interface for electronic M250 - 1600ES MEGATIKER, type "Lsi" or "Lsig", to be configured using a configurator set (item 3501K) – it converts the data on the electronic card of circuit breakers in MODBUS protocol data. Detection of the circuit breaker properties, chronological tripping log, last trip details - MODBUS protocol through RS485 physical connection. Vn = 24 Vac/dc - 2 DIN modules
M7COM	Interface for electronic M1 160, M2 250, M4 630 and M5 1600 MEGATIKER – it converts the data on the electronic card of circuit breakers in MODBUS protocol data. Detection of the circuit breaker properties, chronological tripping log, last trip details - MODBUS protocol through RS485 physical connection. Vn = 24 Vac/dc - 1 DIN module
M8COM	Communication option for MEGABREAK circuit breakers

	SIGNALLING AND CONTROL MODULE
M7TIC/IO	Module to be configured using a set of configurators (item 3501K) – 24 inputs for the detection of change of status of signals coming from clean contacts, 4 analogue inputs (4-20mA) for the connection of sensors (temperature, pressure etc...), 6 relay NO outputs with 230V contacts, 2A and side expansion port – communication network with MODBUS protocol through RS485 physical connection. Vn = 24 Vac/dc - 6 DIN modules

Item	VOLTAGE ABSENCE DETECTOR
M7TIC/RAV	Module for the detection of power missing condition on one or more phases, to be combined with the signalling and control module (item M7TIC/IO or M7TICPROG) – 12 inputs for 4 three-phase lines, side expansion ports (max 3 M7TIC/RAV) and the possibility of detecting up to a maximum of 12 three-phase lines (for each item M7TCI/IO) - Vn = 24 Vac/dc - 6 DIN modules

	SWITCHING CONTROL UNIT
M7000CB/EVO	Two power sources (primary and secondary) automatic power line switching control unit with communication function. Flush mounted installation 144x144mm. Vn = 230 Vac and 24-48 Vdc

	COMMUNICATION DEVICES FOR MEGABREAK
M7TICPROG	Programmable contact module for circuit breakers - 6 relay NO/NC outputs with 230V contacts, 16A and side expansion port - communication network with MODBUS protocol through RS-485 physical connection. Vn = 24 Vac/dc - 6 DIN modules

	CONFIGURATOR SET
3501K	Kit of configurators, from No. 0 to No. 9, for the configuration of items M7TIC/ELE and M7TIC/IO, M7COM and M7TICPROG
3501/...	Single configurators from No. 0 to No. 9 – enter the desired configurator value in the code section (for ex. 3501/0 configurator 0, 3501/2 configurator 2)

	CONVERTER
PM1AC	It enables the Modbus TCP/IP-Modbus RS485 conversion allowing the connection of the devices in the distribution board to a Ethernet network. 24 Vac/dc, 2 DIN modules

	VISUAL DISPLAY
	Description
PM1TS	Visual display. It allows to view different electrical parameters resulting from a number of devices of protection. It can handle up to 8 devices. Supply voltage: 18 ÷ 30Vdc. Mounting on panel or cabinet door (96x96mm)

TECHNICAL FEATURES

ITEMS			F4N200	F4N300	F4N400	F20DM63 - F21DM63	F40DM63 - F41DM63	F41TMA	F4CON12
Connections	terminals for current measurements	flexible cable	4 MM2			16 MM2	17 MM2	2,5 MM2	-
		rigid cable	6 MM2						-
	other terminals	flexible cable	2,5 MM2			2,5 MM2	2,5 MM3	2,5 MM2	2,5 MM2
		rigid cable	4 MM2			4 MM2	4 MM2	4 MM2	4 MM2
Protection index	Front		IP 54			IP 51	IP 51	IP 54	IP 50
	Back		IP 20			-	-	-	-
Weight			250 G	285 G	285 G	250 G	260 G	260 G	280 G
Display			backlightable LCD			LCD	LCD	LCD	LCD
	Update time		1 S			1.2 S	1.2 S	1.2 S	1.2 S
Measurements			«1P+N 3P (BALANCED OR UNBALANCED LOAD) 3P+N (BALANCED OR UNBALANCED LOAD)»			1P+N	3P+N, 3P, 2P, 1P+N	3P+N, 3P, 2P, 1P+N	-
Voltage measurement	direct	phase/phase	80 ÷ 500 V	80 ÷ 500 V	80 ÷ 690 V	-	328 ÷ 480 V	100 ÷ 480 V	-
		phase/neitral	50 ÷ 290 V	50 ÷ 290 V	50 ÷ 400 V	207 ÷ 264 V	190 ÷ 277 V	57 ÷ 278 V	-
	using VT	primary	MAX. 1200 V	MAX. 1200 V	MAX. 150 KV	-	-	-	-
		secondary	-	-	-	-	-	-	-
	Update time		0.2 S			1,2 S	1,2 S	1,2 S	-
Current measurement	direct		-	-	-	10 (63) A	10 (63) A	-	-
	using CT	primary	MAX.10KA (X/1A) O 50 KA (X/5A)			-	-	1 A 9999 A	-
		secondary	1 A O 5 A			-	-	5 A	-
	minimum measurement		5 MA			-	-	-	-
	input consumption		≤ 1 VA	≤ 1 VA	≤ 0,2 VA	≤ 0,5 VA	≤ 0,4 VA	≤ 0,5 VA	-
	display		«0,005 A ÷ 10 KA (X/1 A) O 0,005 A ÷ 50 KA (X/5 A) «			-	-	-	-
	permanent overload		1,2 IN			1,2 IN	1,2 IN	1,2 IN	-
	intemittent overload		20 IN / 0,5 S			20 IN / 0,5 S	20 IN / 0,5 S	20 IN / 0,5 S	-
	Update time		0.2 S			1,2 S	1,2 S	1,2 S	-
	max. ratio CT x VT		99990	99990	«10000000 (X/1 A) 2000000 (X/5 A)»	-	-	≤ 1000000	-
Power measurement	total		«0 ÷ 9999 KW / KVAR / KVA 0 ÷ 9999 MW / MVAR / MVA»			-	-	-	-
	Update time		0.2 S			1,2 S	1,2 S	1,2 S	-
Frequency measurement	measurement range		45,0 ÷ 65,0 HZ			47,0 ÷ 63,0 HZ	47,0 ÷ 63,0 HZ	47,0 ÷ 63,0 HZ	-
	Update time		0.2 S			1,2 S	1,2 S	1,2 S	-
Auxiliary power supply	50 / 60 HZ		80 ÷ 265 V ± 10%			230 V ± 10%	230 V ± 10%	230 V ± 15%	230 V (-15%) - (+10%)
	continues		100 ÷ 300 V ± 10%			-	-	-	-
	consumption	A.C.	≤ 2,5 VA	≤ 2,5 VA	≤ 2,5 VA				≤ 2,5 VA
		D.C.	≤ 2,5 W	≤ 3,5 W	≤ 3,5 W	< 4 VA	< 4 VA	< 5 VA	-
Operating temperature			(- 5 °C) - (+ 55 °C)			- 25°C ÷ + 55°C	- 25°C ÷ + 55°C	- 5°C ÷ +55°C	(0 °C) - (+ 45 °C)
Storage temperature			(- 25 °C) - (+ 70 °C)			- 40°C ÷ +70°C	- 40°C ÷ +70°C	- 25°C ÷ +70°C	(- 10 °C) - (+ 55 °C)

OPERATING TECHNICAL DATA OF SUPERVISION DEVICES

Item	Communication port	Default Modbus address	Transmission speed (Kbit/s)	Operating modes	Parity bit
M7TIC/ELE	Modbus RS485 3-wires	1 (no configurators)	1,2 - 2,4 - 4,8 - **9,6** - 19,2 - 38,4	**RTU** - ASCII	**none**
M7TIC/IO	Modbus RS485 3-wires	1 (no configurators)	1,2 - 2,4 - 4,8 - **9,6**- 19,2 - 38,4	**RTU** - ASCII	**none**
M7TICPROG	Modbus RS485 3-wires	1 (no configurators)	1,2 - 2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU** - ASCII	**none**
M7000CB/EVO	Modbus RS485 3-wires	1	2,4 - 4,8 - **9,6** - 19,2 - 38,4	**RTU** - ASCII	**none** - even - odd
M7COM	Modbus RS485 3-wires	1 (no configurators)	4,8 - 9,6 - **19,2** - 38,4	**RTU** - ASCII	none - **even** - odd
M8COM	Modbus RS485 3-wires	1	2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU** - ASCII	none - **even** - odd
F4N200	Modbus RS485 3-wires	5	2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU**	none - **even** - odd
F4N300	Modbus RS485 3-wires	5	2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU**	none - **even** - odd
F4N104	Modbus RS485 3-wires	5	2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU**	none - **even** - odd
F4N105	Modbus RS485 3-wires	5	2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU**	none - **even** - odd
F4CON12	Modbus RS485 3-wires	5	2,4 - 4,8 - 9,6 - **19,2** - 38,4	**RTU**	none - **even** - odd
F21DM63	Modbus RS485 3-wires	255	2,4 - 4,8 - **9,6**- 19,2	**RTU**	**none** - even - odd
F41DM63	Modbus RS485 3-wires	255	4,8 - **9,6** - 19,2	**RTU**	**none** - even - odd
F41TMA	Modbus RS485 3-wires	255	4,8 - **9,6** - 19,2	**RTU**	**none** - even - odd

Note: in bold the default values

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