

Energy meters

7E
SERIES



Panels for electrical
distribution



Control panels



Electrical
energy control



Industrial
robots



Road / tunnel
lighting



Elevators and lifts



kWh Energy meter 1-phase with electro-mechanical display and S0 pulse output

Type 7E.12.8.230.0002

10 (25) A, kWh, No MID, horizontal display

Type 7E.13.8.230.0010

5 (32) A, kWh, MID, 1 module wide

Type 7E.16.8.230.0010

10 (65) A, kWh, MID, horizontal display

- Complies with EN 62053-21 and EN 50470
- Accuracy class 1/B
- Protection class II
- S0 pulse output for remote energy monitoring according to EN 62053-31
- Tamper-proof cover with lead seal facility available as an accessory
- Space saving small size
- 35 mm rail (EN 60715) mount

7E.12/7E.13/7E.16
Box clamp



For outline drawing see page 10

Specification		7E.12.8.230.0002	7E.13.8.230.0010	7E.16.8.230.0010
Nominal/Maximum current	A	10/25	5/32	10/65
Minimum measured current	A	0.04	0.02	0.04
Current range (within accuracy class)	A	0.5...25	0.25...32	0.5...65
Maximum peak current	A	750 (10 ms)	960 (10 ms)	1950 (10 ms)
Supply (& monitored) voltage (U _N)	V AC	230	230	230
Operating range		(0.8...1.15)U _N	(0.8...1.15)U _N	(0.8...1.15)U _N
Frequency	Hz	50	50	50
Power consumption	W	< 0.5	< 0.4	< 0.5
Display (digit height 4 mm)		Six digit counter, red decimal digit	Seven digit counter, red decimal digit	
Max. totalising count/Min. increment	kWh	99 999.9/0.1	999 999.9/0.1	999 999.9/0.1
LED-Pulses per kWh		2000	2000	1000
Open collector- output specification (S0+/S0-)				
Voltage (external supply)	V DC	5...30	5...30	5...30
Maximum current	mA	20	20	20
Maximum leakage current @ 30 V/25 °C	µA	10	10	10
Pulses per kWh		1000	1000	1000
Pulse length	ms	50	50	50
Internal series resistance	Ω	100	100	100
Maximum cable length @ 30 V/20 mA	m	1000	1000	1000
Technical data				
Accuracy class		1	B	B
Ambient temperature (Within accuracy class)	°C	-10...+55	-10...+55	-10...+55
Protective class		II	II	II
Protection category: Housing/terminals		IP 50/IP 20	IP 50/IP 20	IP 50/IP 20
Approvals (according to type)		 	 	

**kWh Energy meter 3-phase
MID with electromechanical display and S0
pulse output**
Type 7E.36.8.400.0010
10 (65) A, kWh, MID
Type 7E.36.8.400.0012
10 (65) A, kWh, dual tariff, MID

- Complies with EN 62053-21 and EN 50470
- Accuracy class B
- Protection class II
- S0 pulse output for remote energy monitoring according to EN 62053-31
- Tamper-proof cover with lead seal facility available as an accessory
- 35 mm rail (EN 60715) mount

7E.36.8.400.00xx

Box clamp



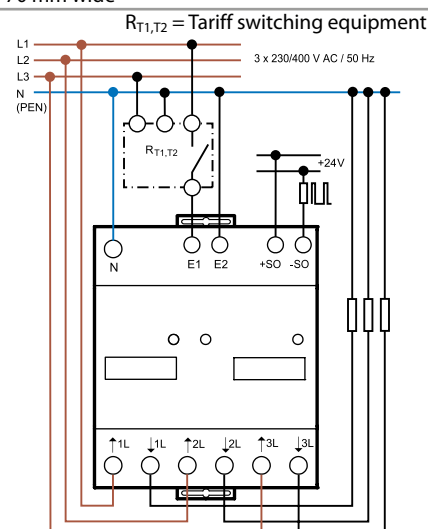
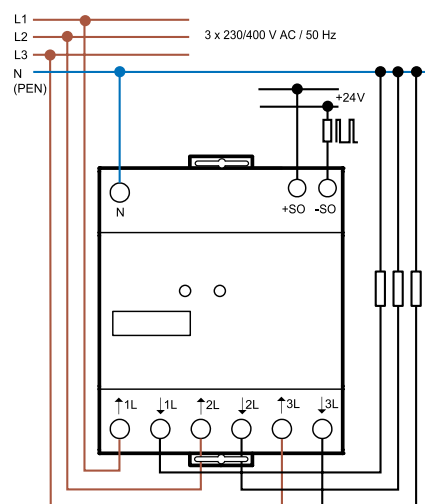
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7E.36.8.400.0010


- Nominal current 10 A (65 A Maximum)
- MID certified (50 Hz)
- 3-phase
- S0 pulse output
- 70 mm wide

7E.36.8.400.0012


- Nominal current 10 A (65 A Maximum)
- MID certified (50 Hz)
- 3-phase
- S0 pulse output
- Dual tariff (Day and Night)
- 70 mm wide



For outline drawing see page 10

Specification

Nominal/Maximum current	A	10/65	10/65
Minimum measured current	A	0.04	0.04
Current range (within accuracy class)	A	0.5...65	0.5...65
Maximum peak current	A	1950 (10 ms)	1950 (10 ms)
Supply (& monitored) voltage (U _N)	V AC	3 x 230	3 x 230
Operating range		(0.8...1.15)U _N	(0.8...1.15)U _N
Frequency	Hz	50	50
Power consumption per phase	W	< 1.5	< 1.5
Display (digit height 4 mm)		Seven digit counter, red decimal digit	
Max. totalising count/Min. increment	kWh	999 999.9/0.1	999 999.9/0.1
LED-Pulses per kWh		100	100
Open collector- output specification (S0+/S0-)			
Voltage (external supply)	V DC	5...30	5...30
Maximum current	mA	20	20
Maximum leakage current @ 30 V/25 °C	µA	10	10
Pulses per kWh		100	100
Pulse length	ms	50	50
Internal series resistance	Ω	100	100
Maximum cable length @ 30 V/20 mA	m	1000	1000
Technical data			
Accuracy class		B	B
Ambient temperature	°C	-10...+55	-10...+55
Protective class		II	II
Protection category: Housing/terminals		IP 50/IP 20	IP 50/IP 20
Approvals (according to type)			

Three-phase multifunction single or dual tariff energy meters Bi-directional, Class C, MID certified 70°C with M-Bus and RS485 Modbus integrated interface, single S0 output and backlit LCD display for 3 or 4 wire systems

Type 7E.85.8.400.0210

6 A direct connection, up to 10 000 A using current transformer, dual tariff (7E.85-0212)

Type 7E.85.8.400.0310

6 A direct connection, up to 10 000 A using current transformer, dual tariff (7E.85-0312)

- Display of total or partial (resettable) energy consumption: kWh, kVAh or kvarh - for both T1 and T2 tariffs - for the total system or per phase
- Scroll to view the following instantaneous values: V, A, PF, kW, kVA, kvar, Hz and direction of power flow
- For networks: single phase two wires (1p2w), three phase three wires (3p3w) and three phase four wires (3p4w)
- 8 digit backlit LCD display
- RS485 Modbus integrated communications port - 7E.85-021x
- M-Bus integrated communications port - 7E.85-031x
- Programmable** S0 pulse output for remote energy monitoring according to EN 62053-31
- Active power accuracy Class C according to EN 50470-3
- Reactive power accuracy Class 2 according to EN 62053-23
- Protection category II
- Accessories: sealable tamperproof terminal cover
- 35 mm rail (EN 60715) mount

* Default transmission baud rate: 9600 bps - 7E.85-021x
Default transmission baud rate: 2400 bps - 7E.85-031x

** S0 output can be associated with kWh or kvarh.

For outline drawing see page 10

Specification

Reference/Maximum current I_N/I_{max}	A
Starting current I_{st}	A
Minimum measured current I_{min}	A
Current range (within accuracy class)	A
Maximum peak current	A
Supply (& monitored) nominal voltage U_N	V AC
Operating range L-N	V AC
Operating range L-L	V AC
Frequency	Hz
Power consumption per phase	W/VA
CT burden (per phase)	VA

Display	Eight digit counter - backlit LCD display
Max. totalising count/Min. increment	kWh
LED pulses per kWh	
LED pulse length	ms

Aux Power input

Operating range	V AC
	V DC
Power consumption	VA
Nominal current	A

Protocol technical information

Bus system	RS485 Modbus
Max. bus length	m
Max. Modbus energy meters connectable	
Baud rate*	Baud

Output specification (S0+/S0-)

Number/Type	
Voltage range/Maximum current (conforming to EN 62053-31)	V DC/mA
Pulse for kWh**	Imp/kWh**
Pulse length	ms

Technical data

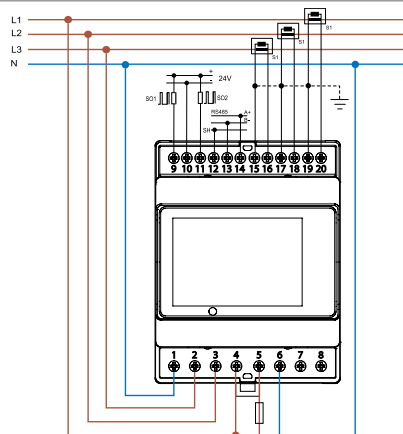
Accuracy class	
Ambient temperature (Within accuracy class)	°C
Protective class	
Protection category	

Approvals (according to type)

NEW 7E.85.8.400.021x



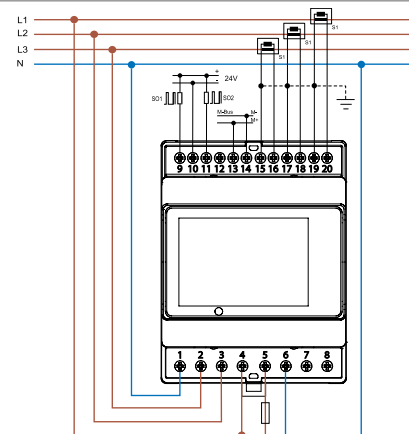
- Reference current 1 A (6 A Maximum)
- RS485 Modbus integrated interface
- Three-phase systems - 4 wire
- Usable with current transformer
- Programmable CT secondary
- Dual tariff
- MID certified



NEW 7E.85.8.400.031x



- Reference current 1 A (6 A Maximum)
- M-Bus integrated interface
- Three-phase systems programmable 3 or 4 wire
- Usable with current transformer
- Programmable CT secondary
- Dual tariff
- MID certified



E

Ordering information - Electromechanical meters

Example: Energy meter 32 A/230 V AC, with MID certification, Class B accuracy, for 35 mm rail (EN 60715) mounting.

Available with Tamper-proof lead sealed cover as accessory.

7 E . 1 3 . 8 . 2 3 0 . 0 0 1 0									
Series		Function		Current		Supply version		Option	
1 = 1-phase		1 = 1-phase		2 = 25 A		8 = AC 50 Hz		0 = S0 +/- pulse output	
3 = 3-phase		3 = 3-phase		3 = 32 A				Special version	
6 = 65 A								0 = Standard	
								1 = MID compliant versions	
								Option	
								0 = Standard	
								2 = Standard (7E.12)	
								2 = Dual tariff (7E.36)	
								Supply voltage	
								230 = 230 V AC 50 Hz	
								400 = 3 x 230/400 V AC 50 Hz	
								All versions/width	
								7E.12.8.230.0002/35 mm	
								7E.13.8.230.0010/17.5 mm	
								7E.16.8.230.0010/35 mm	
								7E.36.8.400.0010/70 mm	
								7E.36.8.400.0012/70 mm	

Technical data

Insulation EN 62053-21				7E.12, 7E.13, 7E.16		7E.36		
Insulation rated voltage				V	250	250		
Overvoltage category					IV	IV		
Insulation	between active parts and S0+ /S0– terminals	kV (1.2/50 μs)		6			6	
	between adjacent phases	kV (1.2/50 μs)		—			6	
Insulation	between supply and S0+ /S0–	V AC		4000			4000	
	between adjacent phases	V AC		—			4000	
Protection class					II	II		
EMC Specification				Reference standard				
Electrostatic discharge	contact discharge			EN 61000-4-2			8 kV	
	air discharge			EN 61000-4-2			15 kV	
Radio-Frequency Electromagnetic Field (80...1000)MHz					EN 61000-4-3	10 V/m		
Fast Transients (Burst) (5-50 ns, 5 kHz)	on Supply terminals			EN 61000-4-4			class 4 (4 kV)	
	on S0+ /S0– terminals			EN 61000-4-4			class 4 (2 kV)	
Surge (1.2/50 μs)	on Supply terminals			EN 61000-4-5			class 4 (4 kV)	
	on S0+ /S0– terminals			EN 61000-4-5			class 3 (1 kV)	
Radio-Frequency Common Mode (0.15...80)MHz on Supply terminals					EN 61000-4-6	10 V		
Radiated and Conducted Emission					EN 55022	class B		
Other data								
Pollution degree					2			
Vibration resistance	(10...60)Hz	mm		0.075				
	(60...150)Hz	g		1				
Vibration resistance of the internal mechanical counter (10...500)Hz					2			
Shock resistance				g/18 ms	30			
Shock resistance of the internal mechanical counter				g/18 ms	350			
Power lost to the environment				7E.12, 7E.13	7E.16	7E.36		
				without current	W	0.4	0.4	1.5
				with maximum current	W	1	2	6
Supply terminals				7E.12, 7E.13		7E.16, 7E.36		
Max. wire size		mm²	AWG	solid cable	stranded cable	solid cable	stranded cable	
				1...6	0.75...4	1.5...16	1.5...16	
				18...10	18...12	16...6	16...6	
 Screw torque for I _{max}			Nm	0.8...1.2		1.5...2		
Screw				Pozidriv No.1, Flat No.1, 2				
S0+ /S0– terminals								
Max. wire size		mm²	AWG	solid cable	stranded cable	solid cable	stranded cable	
				2.5	1.5	2.5	1.5	
				14	16	14	16	
 Screw torque for I _{max}			Nm	0.5		0.8		
Screw				Pozidriv No.0, Flat No.1		Pozidriv No.0, Flat No.2		

Ordering information - Multifunction digital energy meters

Example: 3-phase energy meter for current transformer operation (6 A/400 V AC), with MID certification, Class C accuracy, for 35 mm rail (EN 60715) mounting. Supplied accessories: Tamper-proof lead sealed cover as accessory.

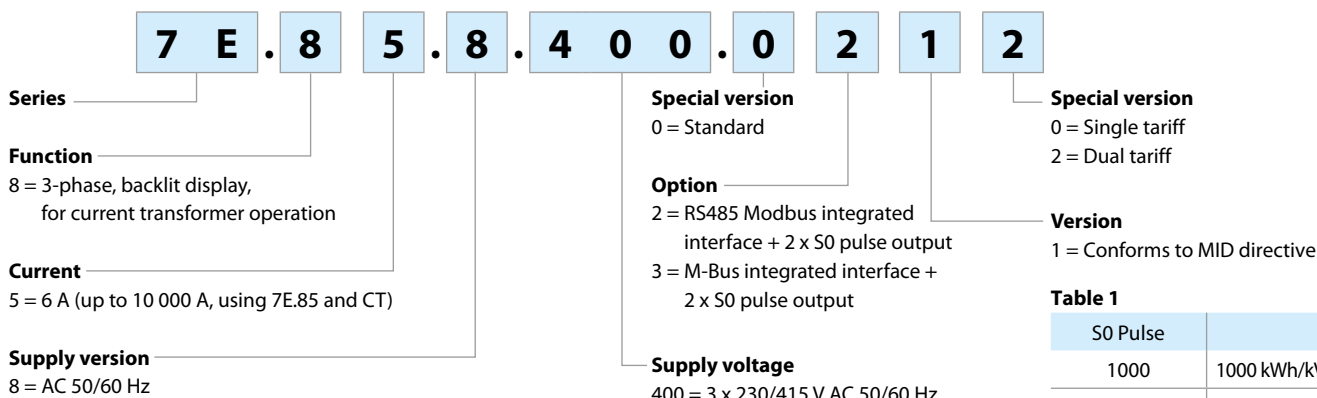


Table 1

S0 Pulse	
1000	1000 kWh/kVAh
100	100 kWh/kVAh
10	10 kWh/kVAh
1	1 kWh/kVAh
0.1	100 Wh/kVAh
0.01	10 Wh/kVAh

Available versions

Modbus	M-Bus
7E.85.8.400.0210	7E.85.8.400.0310
7E.85.8.400.0212	7E.85.8.400.0312

Technical data

Insulation		7E.85.8.400.0xxx
Insulation rated voltage	V	250
Insulation	between active parts and S0+/S0- terminals	kV (1.2/50 µs) 7.4
	between supply and Modbus, M-Bus terminal	kV (1.2/50 µs) 7.4
	between adjacent phases	kV (1.2/50 µs) 7.4
Insulation	between active parts and S0+/S0- terminals	V AC 4000
	between supply and Modbus, M-Bus terminal	V AC 4000
	between adjacent phases	V AC n/a
Protection class		II
EMC Specification according to 61000-4-(2/3/4)		7E.85.8.400.0xxx
Electrostatic discharge	contact discharge	8 kV
	air discharge	15 kV
Radio frequency Electromagnetic field (80...2000)MHz		30 V/m
Fast Transients (burst) (5-50 ns, 5 kHz)	on Supply terminals	4 kV
	on S0+/S0- terminals	4 kV
	Modbus, M-Bus terminal	4 kV
Surge (1.2/50 µs)	on Supply terminals	4 kV
	on S0+/S0- terminals	4 kV
	Modbus, M-Bus terminal	4 kV
Other data		7E.85.8.400.0xxx
Pollution degree		2
Vibration resistance		EN 60068-2-6
Shock resistance		EN 60068-2-27
Power lost to the environment	Max value per phase	1 W/7.5 VA
	CT burden	0.04 VA/per phase
Supply terminals		7E.85.8.400.0xxx
Max. wire size (Terminals from 1 to 8)	solid cable	stranded cable
	mm ² 0.5...2.5	0.5...2.5
	AWG 22...12	22...12
Screw torque	Nm 0.4	0.4
S0+/S0-, TA terminals, RS485 Modbus, M-Bus		7E.85.8.400.0xxx
Max. wire size (Terminals from 9 to 20)	solid cable	stranded cable
	mm ² 0.5...2.5	0.5...2.5
	AWG 30...14	30...14
Screw torque	Nm 0.4	0.4

Mechanical Display Type 7E.12, 7E.13, 7E.16, 7E.36

LED indication (Normal operation)

Type	Energy consumption			Pulses per kWh	Pulse space	The LED Pulse rate represents the instantaneous power being consumed, according to the following
	None	Low	High			
7E.12 7E.13				2000	100 ms	$kW = (\text{number of pulse per Minute}) / 33.3$
7E.16				1000	100 ms	$kW = (\text{number of pulse per Minute}) / 16.7$
7E.36				100	150 ms	$kW = (\text{number of pulse per Minute}) / 1.7$

LED indication (Abnormal operation)

Status indicates errors of installation, as below

Type 7E.12, 7E.13, 7E.16

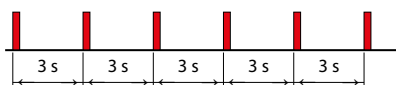
Device ON, incorrect connection (L-N inverted).

Mark = 600 ms, Space = 600 ms

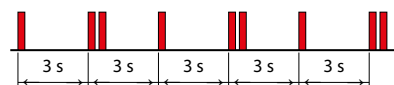


Type 7E.36

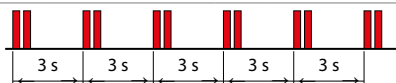
Mark = 100 ms,
Phase L1↑ L1↓ inverted
or loss



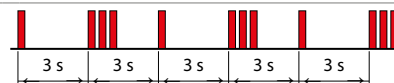
Phase L1↑ L1↓ and L2↑ L2↓
inverted or loss



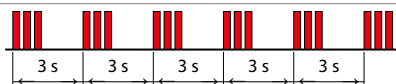
Phase L2↑ L2↓ inverted
or loss



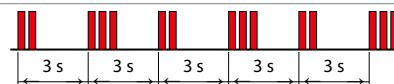
Phase L1↑ L1↓ and L3↑ L3↓
inverted or loss



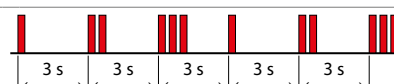
Phase L3↑ L3↓ inverted
or loss



Phase L2↑ L2↓ and L3↑ L3↓
inverted or loss

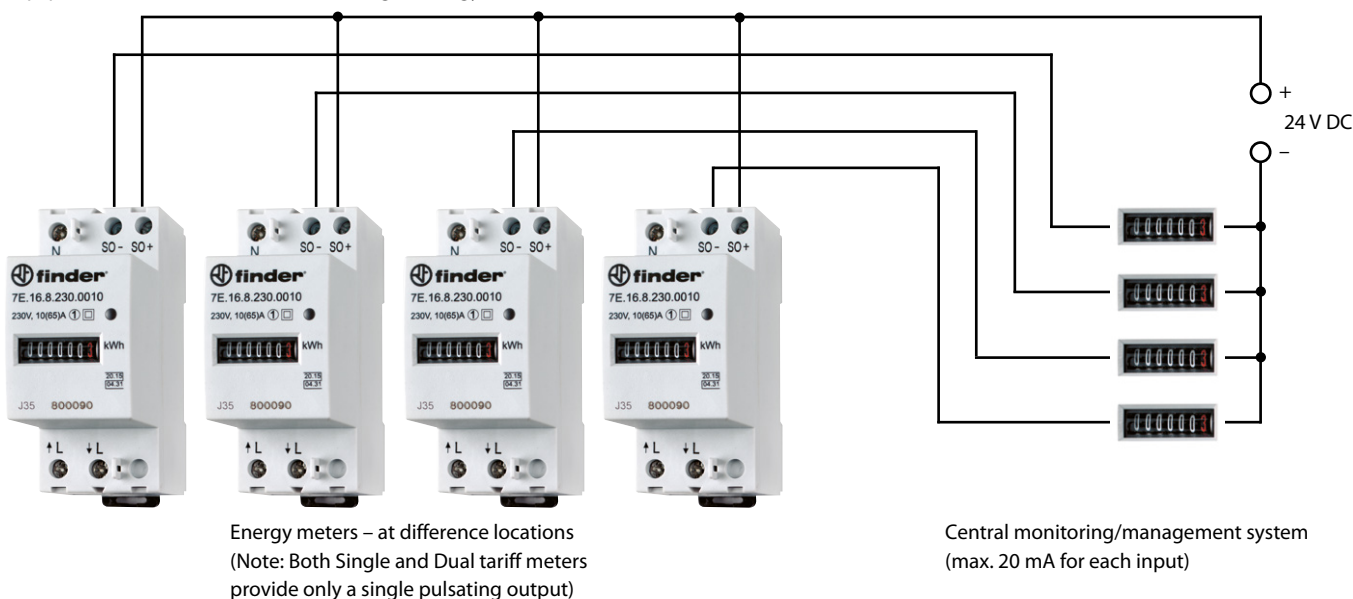


Phase L1↑ L1↓ and L2↑ L2↓
and L3↑ L3↓ inverted or loss

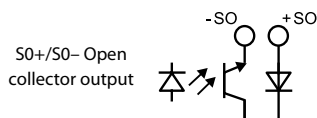


S0+/S0- Open collector output wiring diagram Type 7E.12, 7E.13, 7E.16, 7E.36

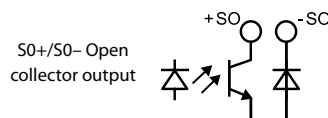
The pulsating open collector output available at terminals S0+ and S0- can be interfaced with the input of a computer, plc or other energy management equipment to allow the remote monitoring of energy consumed.



S0-Output Type 7E.12, 7E.13, 7E.16

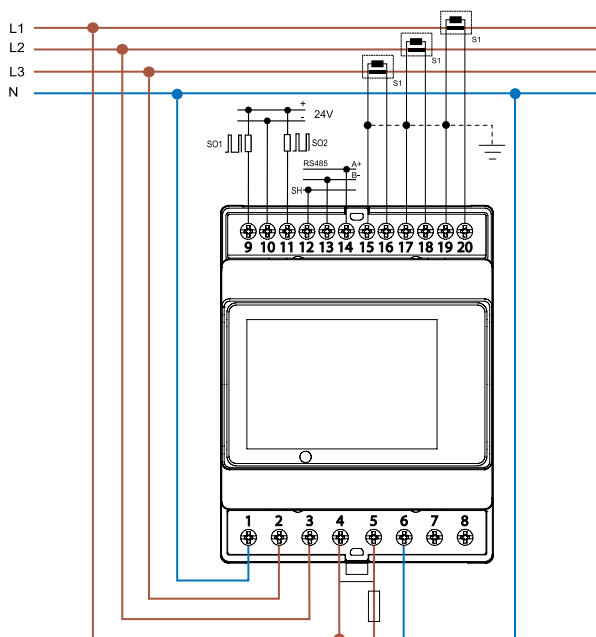


S0-Output Type 7E.36

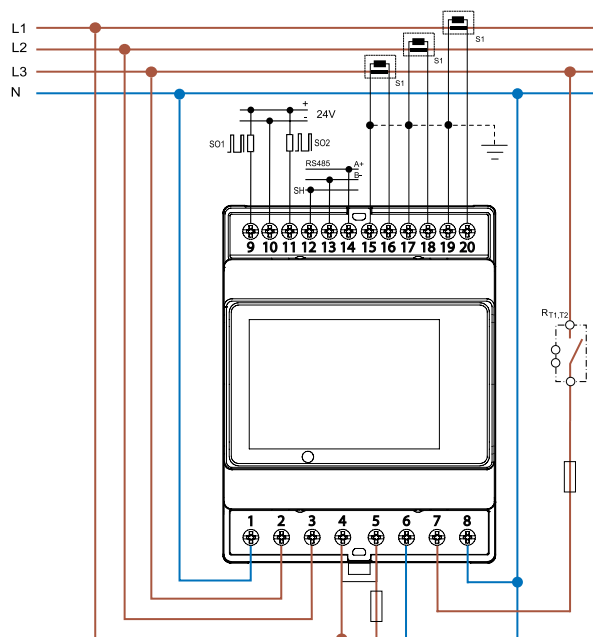


Wiring diagrams - 7E.85

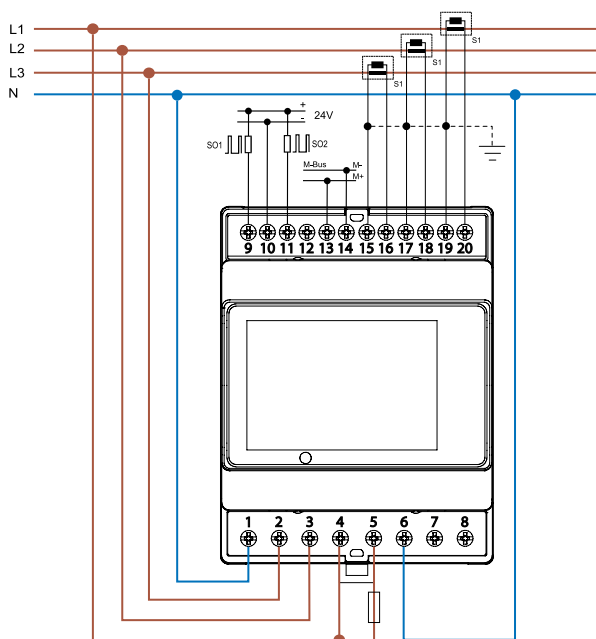
Type 7E.85.8.400.0210



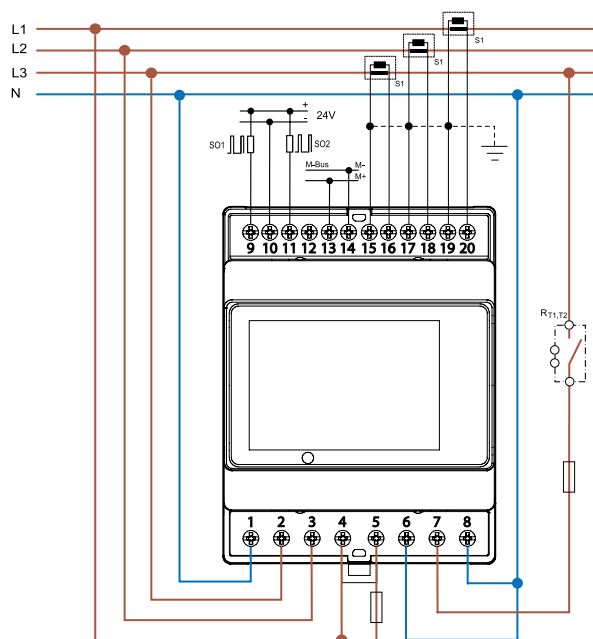
Type 7E.85.8.400.0212



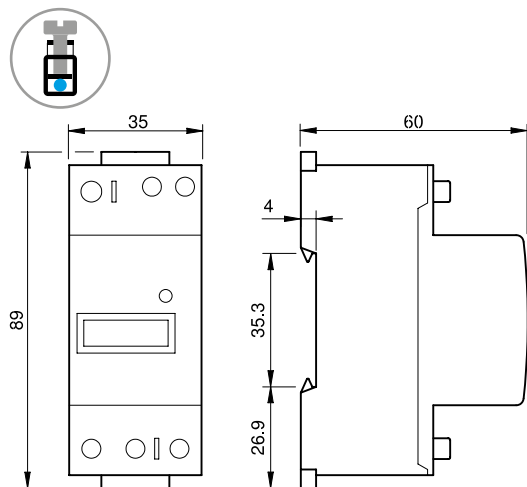
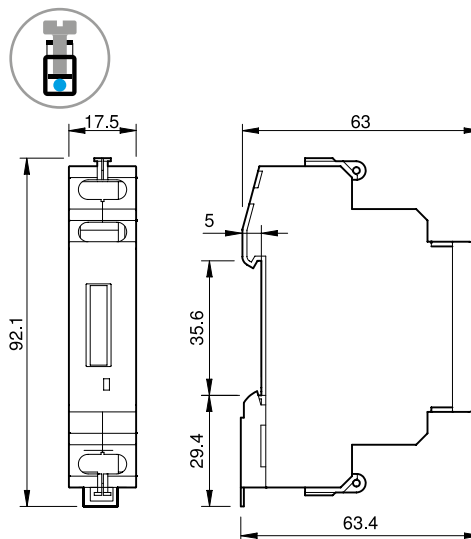
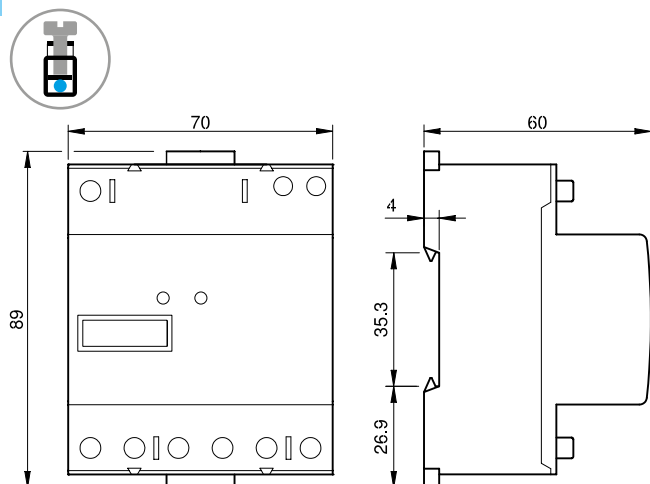
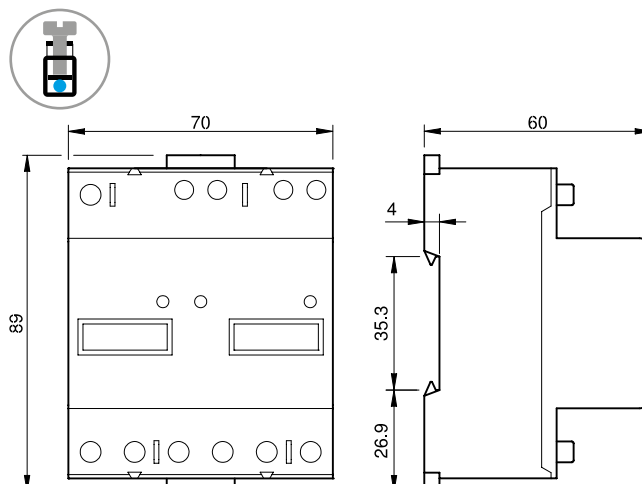
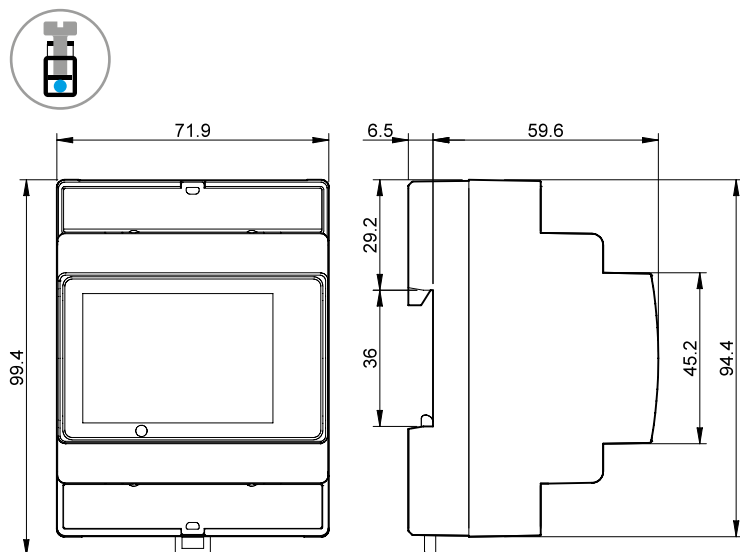
Type 7E.85.8.400.0310



Type 7E.85.8.400.0312



Outline drawings

Type 7E.12.8.230.0002/7E.16.8.230.0010
Box clampType 7E.13.8.230.0010
Box clampType 7E.36.8.400.0010
Box clampType 7E.36.8.400.0012
Box clampType 7E.85.8.400.021x/7E.85.8.400.031x
Box clamp

Accessories



07E.13



07E.16

Terminal cover for type 7E.13	07E.13
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For the tamper-proof lead seal use two terminal covers

Terminal cover for type 7E.12, 7E.16 and 7E.36	07E.16
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7E.12, 7E.16 - For the tamper-proof lead seal use two terminal covers
7E.36 - For the tamper-proof lead seal use four terminal covers

Terms and definitions

I	The electrical current flowing through the meter
I_n	The specified reference current for which the meter has been designed
I_{st}	The lowest declared value of " I " at which the meter registers active electrical energy at unity power factor (polyphase meters with balanced load)
I_{min}	The values of " I " above which the error lies within maximum permissible errors (MPEs) (polyphase meters with balanced load)
I_{tr}	The value of " I " above which the error lies within the smallest MPE corresponding to the class index of the meter
I_{max}	The maximum value of " I " for which the error lies within the MPEs

E

Detailed structure of the protocol is available on line

