

ENTES

Product Catalogue 2018

www.entes.com.tr

Preface



ENTES is a technology brand, developing solutions Wherever Energy Is...

ENTES is an European technology company that works ardently since 1980 to manage the energy where energy is valuable and overcosting.

As one of the leading enterprises in shaping the way of conducting business, ENTES transforms energy into a manageable concept so that business can be conducted at the lowest cost, thus providing new economical opportunities.

Based on its own resources, ENTES takes advantages of qualified brain power and hard work with an aim of being pragmatic and also open to technological developments in the world. Hundreds of thousands of companies around the world manage the energy by using ENTES solutions.

- Consistent growth since 1980 the year it was founded,
- High quality standards and international certificates in world classification,
- Experience for overseas markets over 107 countries and a worldwide-recognized brand in the industry with office in Germany, Greece and India,
- Powerful and accredited "Research and Development Centre" in the fields of Energy Efficiency and Quality,
- Yearly 120 person/hour function, 2640 person/hour type, 480 person/hour field tests applied for each new device at R&D level,
- Yearly 2,000,000 devices production capability in production plants with 12,000 m² closed area where state-of-the-art technologies are used,
- OEM manufacturing for companies that are worldwide leaders in their areas.

Sister Companies

SISTER COMPANIES IN TURKEY

NETA ELEKTRONİK CİHAZLAR SAN. TİC. A.Ş.

Line of Business : Satellite Systems
Web : <http://www.neta.com.tr>

ENTES APART HOTEL

Line of Business : Tourism
Web : <http://www.entesapart.com>

GENTA A.Ş.

Line of Business : Marble & Granite Marketing and Contracting
Web : <http://www.gentagranit.com>

ENTPA A.Ş.

Line of Business : Electronic Security, Access, Video Doorphone System Distribution
Web : <http://www.entpa.com.tr>

SISTER COMPANIES ABROAD

ENTES GREECE

Line of Business : Marketing ENTES Products in Greece.
E-mail : infohellas@entes.eu

ENTES GERMANY

Line of Business : Marketing ENTES Products in Germany.
E-mail : kontakt@enteselektronik.com

ENTES INDIA

Line of Business : Marketing ENTES Products in India.
E-mail : info@entes.in

NETA-SAT Co. BULGARIA

Line of Business : Marketing NETA Products in Europe.
E-mail : netasat@mail.bg

R&D and Quality



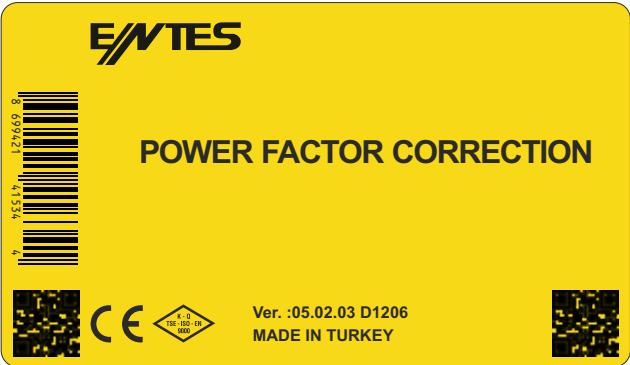
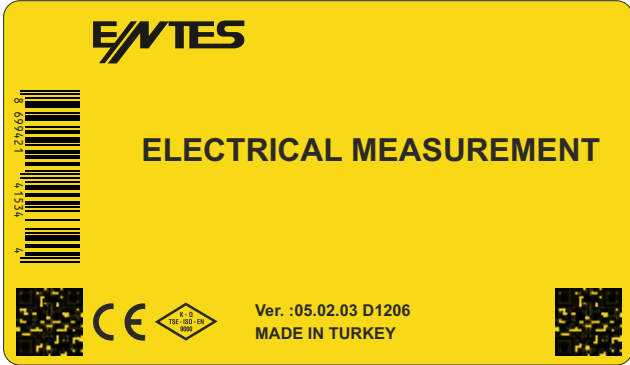
ENTES R&D Team, composed from nearly 50 employees, provides customer oriented solutions by designing devices at international standards and using state-of-the-art technology where they also develop software that are compatible with these devices. All products undergo 10 different testing phases including functionality, standard compliance and IEC EN 60255 model tests.

ENTES products complying with international standards have acquired various certificates including ISO 9001-2008, CE, TSE, KEMA CB, KEMA-KEUR, CSA-US, UL, MID B+D and GOST-R.






The materials and components used in production are controlled based on the sampling standard TS-2859-1. Production quality is being monitored continuously and further examinations are done with various process control according to strict Acceptable Quality Levels (AQL).



Entes Quality Is Under These Labels



Contents

	Power Quality and Energy	7
MPR-1 Series Network Analyzers		8-10
MPR-2 Series Network Analyzers		11-13
MPR-3 Series Network Analyzers		14-16
MPR-4 Series Network Analyzers		17-19
MPR-6 Series Network Analyzers		20-23
MPR-5 and EPM-07 Series Network Analyzers		24-27
EPR-04 and ES Series Power and Energymeters		28-31
	Electrical Measurement	33
EPM-04 - EPM-06 - EVM-05 Series Multimeters		34-36
EPM Series Ammeters		37-40
EVM Series Voltmeters		41-43
EFC-3 Frequency Meter / ECR-3 Coskometer		44
TA Series Current Transducers / TV Series Voltage Transducers		45-46
DC Ammeters / DC Voltmeters		47-50
	Power Factor Correction	51
RG Series Power Factor Controllers		52-60
ENT.C Series Capacitors		63-67
ENT.ERS Series Shunt Reactors (Inductive Load Reactor)		68-69
ENT.SRS Series Shunt Reactors (Inductive Load Reactor)		70-71
ENT.ERH Series Detuned Filter Reactor		72-75
ENT-KT Series Capacitor Duty Contactors		76-77
SC Series Thyristor Switches		78
SPD Series Surge Protection Device		79
ENT / ENS.AYC / ENS.AYS / ENS.CYS / ENS.3PM / ENS.3PMD / ENS.3PH / ENS.CCT/ CT Series Current Transformers		80-90
DU-3 Discharge Unit		91
	Remote Monitoring Hardware and Software	83
ENTBUS Pro - Energy Monitoring Software		84-86
ENTBUS Plus - Energy Monitoring Software		87
EMG / RS-USB Converter and RPT-1 / RS-485 Repeater		88
GEM-05/10/10SH GPRS/Ethernet Modbus Gateway		89
GEM-15 GPRS/Ethernet Modbus Gateway		90
EPC-12 Pulse Concentrator / System Schema		91-92
	Protection and Control	103
PS Series Power Supplies		104-105
MKC-MKS Series Phase Failure Relays		106-107
PT-01 / FR-02 Phase Sequence Relay - Thermistor Relay		108
AKC Series Current Monitoring Relays		109-110
GKRC Series - DGRC - MCC Series Voltage Monitoring Relays		111-112
SSRC Series Liquid Level Controllers and Electrodes		113-114
MCB-100/200 - ERTC-100 Series Multifunctional Time Relays		115-117
MCB / SER / ERTC / SSR / DG Series Time Relays		118-120
DTR Series - MCB-5X Series Astronomic Time Relays		121-122
FG Series Daylight Switches		123
CKR Series Overcurrent Monitoring Relays		124-125
ENT.PST Series Control Transformers		128-129
ENT.IST Series Isolating Transformers		130-131

Product Index

	Page		Page		Page
AKC-01A	109-110	ENT-KT-2,5-C10	76-77	GKRC-03	111-112
AKC-01D	109-110	ENT-KT-20-C11	76-77	GKRC-03F	111-112
AKC-03A	109-110	ENT-KT-25-C11	76-77	GKRC-20F	111-112
AKC-03D	109-110	ENT-KT-33-C12	76-77	GKRC-M2	111-112
CKR-92T	124-125	ENT-KT-40-C12	76-77	LLS-01, LLS-02	113-114
CKR-93T	124-125	ENT-KT-50-C12	76-77	MCB-100/200	115-117
CT-25 / CT-80	90	ENT-KT-5-C10	76-77	MCB-15	118-120
DCA-10/10S/10C/10CS	47-48	ENT-KT-60-C12	76-77	MCB-20 / MCB-25	118-120
DCA-11/11S/11C/11CS	47-48	ENT-KT-7,5-C11	76-77	MCB-30 / MCB-60	118-120
DCV-10/10S/10C/10CS	49-50	ENT-KT-75-C12	76-77	MCB-50/50T	121-122
DCV-11/11S/11C/11CS	49-50	EPC-12	100	MCB-7 / MCB-8 / MCB-9	118-120
DG-10/60	117-119	EPM-04-96/DIN	34-36	MCC-1D / MCC-3D	111-112
DGRC-01	111-112	EPM-04C-96	34-36	MKC-01	106-107
DTR-10	121-122	EPM-04C-DIN	34-36	MKC-03/03P	106-107
DTR-10t	121-122	EPM-04CS-96	34-36	MKC-04/MKC-04-U69	106-107
DTR-20/20S	121-122	EPM-04CS-DIN	34-36	MKC-05	106-107
DTR-20M	121-122	EPM-04h-96	34-36	MKC-05P	106-107
DTR-20TS	121-122	EPM-06-96	34-36	MKC-06/MKC-06-U69	106-107
DTR-25	121-122	EPM-06C-96	34-36	MKC-06P	106-107
DU-3	91	EPM-06C-DIN	34-36	MKC-20	106-107
ECR-3-48	44	EPM-06CS-96	34-36	MKS-01	106-107
ECR-3-72	44	EPM-06CS-DIN	34-36	MKS-03	106-107
ECR-3-96	44	EPM-06-DIN	34-36	MPR-14S	8-10
EF-10/10T	118-120	EPM-07-96	24-27	MPR-15S-22	8-10
EFC-3-48	44	EPM-07-DIN	24-27	MPR-16S-21	8-10
EFC-3-72	44	EPM-07S-96	24-27	MPR-17S-23	8-10
EFC-3-96	44	EPM-07S-DIN	24-27	MPR-24/24S-PM	11-13
EMG-02 / EMG-12	96	EPM-14-96	37-40	MPR-25S-22	11-13
ENS.3PH	88	EPM-34-96	37-40	MPR-26S-21 / 26S-21-PM	11-13
ENS.3PM	86	EPM-4A-72	37-40	MPR-27S-23	11-13
ENS.3PMD	87	EPM-4A-96	37-40	MPR-32 / MPR-32S	14-16
ENS.AYC	83	EPM-4C-48	37-40	MPR-34-11 / MPR-34S-11	14-16
ENS.AYS	84	EPM-4C-72	37-40	MPR-34-20 / MPR-34S-20	14-16
ENS.CCT-10/-16/-24/-36	89	EPM-4C-96	37-40	MPR-34S-11-PM	14-16
ENS-CYS	85	EPM-4C-OG-96	37-40	MPR-45 / MPR-45S / MPR-45S-L	17-19
ENT.100	80-81	EPM-4D-48	37-40	MPR-46 / MPR-46S / MPR-46S-L	17-19
ENT.30 / ENT.MN 30	80-81	EPM-4D-72	37-40	MPR-47S / MPR-47S-D	17-19
ENT.40 / ENT.MN 40	80-81	EPM-4D-96	37-40	MPR-47S-0,5 / MPR-47S-D-0,5	17-19
ENT.60	80-81	EPM-4P-96	37-40	MPR-47S-PM / MPR47S-L	17-19
ENT.80	80-81	EPM-R4C	37-40	MPR-53-96	24-27
ENT.A65-OG	62	EPR-04-96	28-31	MPR-53CS-96/53CS-OG-DIN	24-27
ENT.B	80-81	EPR-04-DIN	28-31	MPR-53CS-DIN	24-27
ENT.C100-400	67-68	EPR-04S-96	28-31	MPR-53-DIN	24-27
ENT.C100-440	67-68	EPR-04S-DIN	28-31	MPR-53S-96/53S-OG-DIN	24-27
ENT.C100-440-25	67-68	ERB-50	118-120	MPR-53S-DIN	24-27
ENT.C100-440-30	67-68	ERTC-01/72/DIN	118-120	MPR-60S-41	20-23
ENT.C100-440-50	67-68	ERTC-100	115-117	MPR-63-42	20-23
ENT.C10-400 / ENT.C10-450	64-66	ERTC-101	115-117	PS-242/361, PS-362/722	103-104
ENT.CF-230	64	ES-32L/32LS	29-31	PT-01, PTC-3	107
ENT.CF-400	64	ES-80L	29-31	RG-12B/BS	52-60
ENT.CM-400	64	EVM-05C-96	34-36	RG3-12C	52-60
ENT.ERH-14-400	72-75	EVM-05C-DIN	34-36	RG3-12CS	52-60
ENT.ERH-5,67-400	72-75	EVM-15-96	41-43	RG3-15C/CS	52-60
ENT.ERH-7-400	72-75	EVM-3-48	41-43	RG3-15CL/CLS	52-60
ENT.ERH-C-7-400	72-75	EVM-35-96	41-43	RG-6T/8T/12T	52-60
ENT.ERS1 230	68-69	EVM-3-72	41-43	RG-8B-96	52-60
ENT.ERS3 400	68-69	EVM-3-96	41-43	RG-8BS-96	52-60
ENT.IST.2324	130-131	EVM-3C-48	41-43	RGA-15/20/24,RGA-OG	53-60
ENT.IST.4024	130-131	EVM-3C-72	41-43	RGSR-15/20/24,RGA-OG	53-60
ENT.PST.2324	128-129	EVM-3C-96	41-43	RPT-1, RS-USB2	98
ENT.PST.4024	128-129	EVM-3S-48	41-43	SA-60	47-48
ENT.SRS1 230	70-71	EVM-3S-72	41-43	SC-225/250/325/350	78
ENT.SRS3 400	70-71	EVM-3S-96	41-43	SER-YU, SSR-2X	117-119
ENTBUS PLUS	97	FG-4/4A/4R/4T	123	SPD	79
ENTBUS PRO	94-96	FG-GOZ	123	SR-05E/-10E/-20E/-30E	61
ENT-CXD-400	64-66	FR-02	108	SSRC-04/04P	112-113
ENT-CXD-450	64-66	GEM-05/10/10SH	99	TA-111/112	45
ENT-CXD-500	64-66	GKRC-01	111-112	TV-111-113	46
ENT-CXD-525	64-66	GKRC-02	111-112		
ENT-KT-12-C11	76-77	GKRC-02F	111-112		
ENT-KT-16-C11	76-77	GKRC-02FA	111-112		



Power Quality and Energy

The products in “ENTES Power Quality and Energy” group are designed to measure various electrical parameters. With their communication features all measurements can be tracked from a single monitoring center. Energy quality and efficiency analysis can be performed with network analyzers in electrical distribution/transmission systems, such as industrial facilities and buildings.

Network Analyzers

- MPR-1 Series
- MPR-2 Series
- MPR-3 Series
- MPR-4 Series
- MPR-5 Series
- MPR-6 Series
- EPM-07 Series

Power and Energy Meters

- EPR-04 Series
- ES Series

Network Analyzers

MPR-1 Series



MPR-1 Series

MPR-1 Series Network Analyzers

MPR-1 Series DIN type network analyzers have been designed for the purpose of measurement of electrical parameters at machines and panels. By means of its design without a screen, it is a cost effective measurement device series for energy monitoring software.



Product Code	Dimensions	% THD - I	% THD - V	Individual Harmonics	Current / Voltage Unbalances	RS-485 Modbus	Tariff	Digital Input	Digital Output	Analog Output (mA/V)	Relay Output	Pulse Counter	Memory	Log Recording	Event Recording	X5/X1 Current Tr.	95-270 VAC/DC	12-50 VDC
95-270 VAC/DC Supply																		
MPR-14S	DIN4					●	1								●	●	●	
MPR-15S-22	DIN4	●	●			●	8	2	2			●	4 MB	●	●	●	●	
MPR-16S-21	DIN4	●	●	51	●	●	8	2			1	●	4 MB	●	●	●	●	
MPR-17S-23	DIN4	●	●	51	●	●	8	2	2	1		●	4 MB	●	●	●	●	
12-50 VDC Supply																		
MPR-14S-D	DIN4					●	1								●	●		●
MPR-15S-22-D	DIN4	●	●			●	8	2	2			●	4 MB	●	●	●	●	●
MPR-16S-21-D	DIN4	●	●	51	●	●	8	2			1	●	4 MB	●	●	●	●	●
MPR-17S-23-D	DIN4	●	●	51	●	●	8	2	2	1		●	4 MB	●	●	●	●	●

Remote Monitoring Software:

With the energy management software developed by ENTES, energy consumption and quality can be monitored in real time by reading the values measured by devices. As a result, comprehensive energy monitoring and data storage is provided. With the analysis of stored data, improvements in energy costs and sustainable savings are accomplished.



Log Reader Software

Thanks to the free Log Reader software developed by ENTES, data logs of parameters such as current, voltage, power, profile, temperature and THD recorded by MPR series devices can be transferred to the computer. The data that will be imported can be filtered according to time interval and parameter type. The obtained data can be imported as XLS, CSV etc. file formats. Log Reader Software can be downloaded from www.entes.com.tr.

Network Analyzers

MPR-1 Series

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Neutral Current (I_n)	Active Power (P)	Active Energy Import (kWh or MWh)
Phase - Phase Voltages (V_{LL})	Power Factor (P.F)	Reactive Power (Q)	Active Energy Export (kWh or MWh)
Average Phase-Neutral Voltage	$\cos\phi$	Apparent Power (S)	Reactive Energy Capacitive (kVarh or MVarh)
Average Phase-Phase Voltage	Frequency (Hz)	Total Active Power ($\sum P$)	Reactive Energy Inductive (kVarh or MVarh)
Demand / Max. Demand	Max. / Min. Values	Total Reactive Power ($\sum Q$)	Apparent Energy (kVAh or MVAh)
Phase Currents (IL)		Total Apparent Power ($\sum S$)	

MPR-14S



Total Harmonic Distortion for Voltage (THD-V)

Total Harmonic Distortion for Current (THD-I)

MPR-15S-22



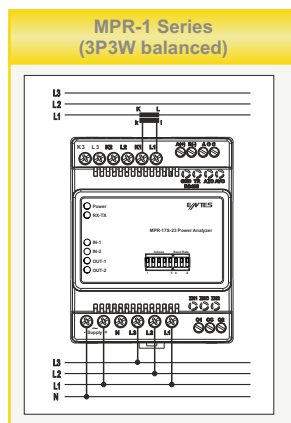
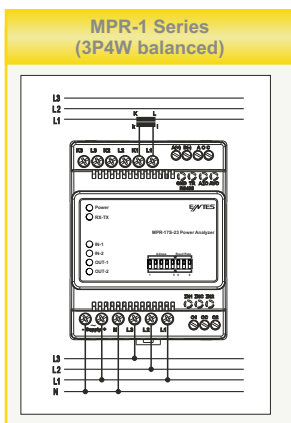
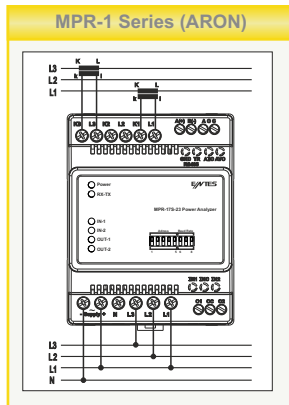
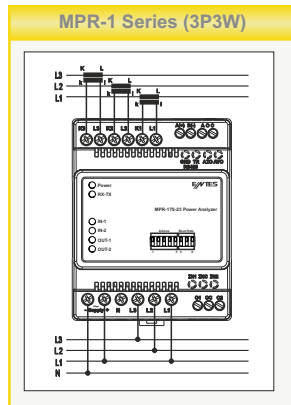
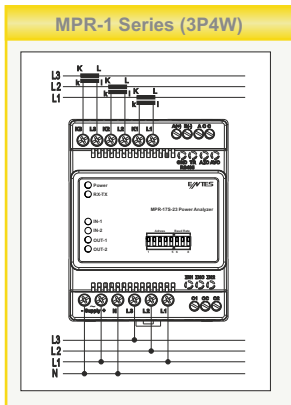
Voltage / Current Unbalances

1-51st Individual Voltage Harmonics

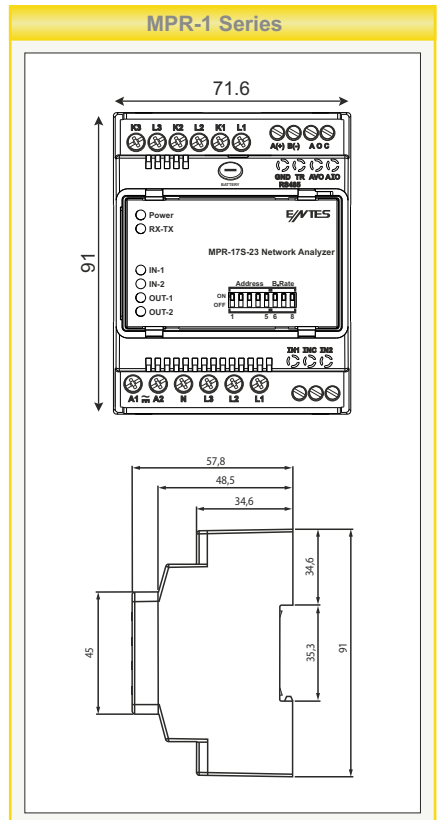
1-51st Individual Current Harmonics

MPR-16S-21 / MPR-17S-23

Connection Diagram DIN4 - MPR-1 Series



Dimensions



Network Analyzers

MPR-1 Series

SPECIFICATIONS

	MPR-14S	MPR-15S-22	MPR-16S-21	MPR-17S-23
ENCLOSURE				
Dimensions	DIN4 Rail Mounting, 24 Pcs/Box			
Protection Class	Terminals = IP20, Enclosure Protection Class = IP 40			
Indicator	LED indicator for Communication, Power and I/O			
MEASUREMENTS				
Voltage				
Measurement Range	10-300 VAC (L-N) 10 - 480 VAC (L-L)			
Measurement Range with Transformer	10V-999,9kV			
Accuracy	%0.5 ± 1 Digit			
Input Impedance	>1M Ω			
Burden (Input Load)	<0,5 VA			
Current				
Rated Current	In : 5A / 1A			
Minimum Current	5 mA			
Measurement Range	50 mA - 5,5 A Accuracy : %0.5 ± 1 Digit			
Measurement Range with CT	50 mA - 10000 A			
Burden	<1 VA			
Overload Current	1,2 In continuous			
Short Time Overload (1s)	10xIn			
Power/Energy				
Active Power	0 - 1 GW Accuracy : %1 ± 1 Digit			
Reactive Power	0 - 1 GVAr Accuracy : %2 ± 1 Digit			
Apparent Power	0 - 1 GVA Accuracy : %1 ± 1 Digit			
Power Factor	±1.00 Accuracy : ± 0,02			
Active Energy	0 - 99 999 999 kWh or MWh Accuracy : %1 Class 1			
Reactive Energy	0 - 99 999 999 kVAh or MVAh Accuracy : %2 Class 2			
Apparent Energy	0 - 99 999 999 kVAh or MVAh Accuracy : %1			
Total Harmonic Distortion (THD)	-	-	-	Voltage (%THD-V) , Current (%THD-I)
Individual Harmonics	-	-	-	1-51 Voltage (V) and Current (I)
Demand Period	1,5,10,15,20,30,60 min.			
Frequency	45-65 Hz			
Sampling Rate per Period	128			
SUPPLY				
Operating Voltage	95 - 270 VAC/DC (in MPR-1X-D Series 12-50 VDC)			
Operating Frequency	50/60 Hz			
Power Consumption	<5 VA			
DIGITAL INPUT / OUTPUT				
Digital Input Pulse Width	-	-	-	20/500 ms
Digital Input Operating Voltage	-	-	-	5...30 VAC/DC
Switching Current	-	-	-	Max 50mA
Digital Output Supply Voltage	-	-	-	5-30 VDC (open collector)
Pulse Duration	-	-	-	100ms pulse period 80ms pulse width
Pulse Width	-	-	-	20-500 ms (Adjustable)
ANALOG OUTPUT				
Current Output	-	-	-	0-20mA, 4-20mA, 0-24mA
Voltage Output	-	-	-	0-5V, 0-10V, ±5V, ±10V
RELAY OUTPUT				
Relay Output	-	-	-	1 NO Contact, 250 VAC/5A
MEMORY				
Internal Memory Capacity	-	-	-	4MB
COMMUNICATION				
Interface/Protocol	RS-485 / MODBUS RTU			
Transfer Rate	2400-115200 bps			
AMBIENT CONDITIONS				
Operating Temperature	- 10 / +55°C			
Storage Temperature	- 20 / +70°C			
Overvoltage Category	III			
Pollution Degree	II			
Ambient Humidity	%95			
STANDARDS				
Standards	EN 61557-12, EN 61326-1, EN 61000-6-2, EN 61000-6-4 EN 62053, EN 60068, EN 61010			
CONNECTIONS				
Mounting	Rail Mounting			
Connection Terminals	Screw Terminal			
Connection Types	3P4W, 3P3W, 3P3W Aron, 3P4W balanced, 3P3W balanced			

Network Analyzers

MPR-2 Series



MPR-2 Series

MPR-2 Series DIN rail type Network Analyzers

MPR-2 Series DIN Type network analyzers have been designed for detailed measurement and analysis of electrical parameters. With their communication features all measurements can be tracked from a single monitoring center.

MPR-2 series can detect the status and allow the control of devices (breakers, switches, contactors etc.) in the field via their digital inputs and outputs.



PRODUCT SELECTION TABLE

Product Code

3xV, 3xI, Frequency, W, VA, VA, TP, TQ, TS, kWh, kVAh, Demand, Max., Min, Cosφ, I neutral
 % THD-I
 % THD-V
 Individual Harmonics
 RS-485 Models
 Digital Input
 Digital Output
 Analog Output
 Relay Output
 Tariff
 Clock (RTC)
 Memory
 Current/Voltage Unbalances
 Pulse Counter
 Run/On Hour
 Alarm
 Event Recording
 Log Recording
 X/5, X/1 Current Tr.
 X/333 mV Current Tr.
 plug&meter
 95-270 VAC/DC
 12-50 VDC

95-270 VAC/DC Supply																							
Product Code	3xV, 3xI, Frequency, W, VA, VA, TP, TQ, TS, kWh, kVAh, Demand, Max., Min, Cosφ, I neutral	% THD-I	% THD-V	Individual Harmonics	RS-485 Models	Digital Input	Digital Output	Analog Output	Relay Output	Tariff	Clock (RTC)	Memory	Current/Voltage Unbalances	Pulse Counter	Run/On Hour	Alarm	Event Recording	Log Recording	X/5, X/1 Current Tr.	X/333 mV Current Tr.	plug&meter	95-270 VAC/DC	12-50 VDC
MPR-24	●									1	●				●				●			●	
MPR-24-PM	plug&meter	●								1	●				●				C	●	●	●	
MPR-24S-PM	plug&meter	●			●					1	●	4 MB		●	●	●	●	●	C	●	●	●	
MPR-25S-22	●	●	●		●	2	2			8	●	4 MB		●	●	●	●	●	●	●		●	
MPR-26S-21	●	●	●	51	●	2			1	8	●	4 MB	●	●	●	●	●	●	●	●		●	
MPR-26S-21-PM	plug&meter	●	●	51	●	2			1	8	●	4 MB	●	●	●	●	●	●	C	●	●	●	
MPR-27S-23	●	●	●	51	●	2	2	1		8	●	4 MB	●	●	●	●	●	●	●	●		●	
12-50 VDC Supply																							
MPR-24-D	●									1	●				●				●			●	
MPR-24-D-PM	plug&meter	●								1	●				●				C	●	●	●	
MPR-25S-22-D	●	●	●		●	2	2			8	●	4 MB		●	●	●	●	●	●	●		●	
MPR-26S-21-D	●	●	●	51	●	2			1	8	●	4 MB	●	●	●	●	●	●	●	●		●	
MPR-26S-21-D-PM	plug&meter	●	●	51	●	2			1	8	●	4 MB	●	●	●	●	●	●	C	●	●	●	
MPR-27S-23-D	●	●	●	51	●	2	2	1		8	●	4 MB	●	●	●	●	●	●	●	●		●	

C Can be used by X5PM converter

Log Reader Software:

Thanks to the free Log Reader software developed by ENTES, data logs of parameters such as current, voltage, power, profile, temperature and THD recorded by MPR series devices can be transferred to the computer.

The data that will be imported can be filtered according to time interval and parameter type.

The obtained data can be imported as XLS, CSV etc. file formats.

Log Reader Software can be downloaded from www.entes.com.tr.

Network Analyzers

MPR-2 Series

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Power Factor (P.F)	Active Power (P)	Active Energy Import (kWh or MWh)
Phase - Phase Voltages (V_{LL})	$\cos\kappa$	Reactive Power (Q)	Active Energy Export (kWh or MWh)
Demand / Max. Demand	Frequency (Hz)	Apparent Power (S)	Reactive Energy Capacitive (kVarh or MVarh)
Phase Currents (IL)	Max. / Min. Values	Total Active Power ($\sum P$)	Reactive Energy Inductive (kVarh or MVarh)
Neutral Current (In)		Total Reactive Power ($\sum Q$)	Apparent Energy (kVAh or MVAh)
		Total Apparent Power ($\sum S$)	

MPR-24



Total Harmonic Distortion for Voltage (THD-V)	Total Harmonic Distortion for Current (THD-I)
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MPR-25S-22



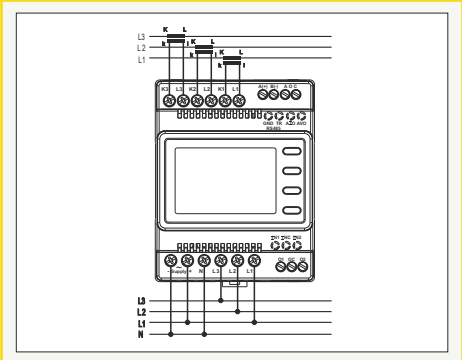
Voltage / Current Unbalances	1-51 st Individual Voltage Harmonics	1-51 st Individual Current Harmonics
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MPR-26S-21 / MPR-27S-23

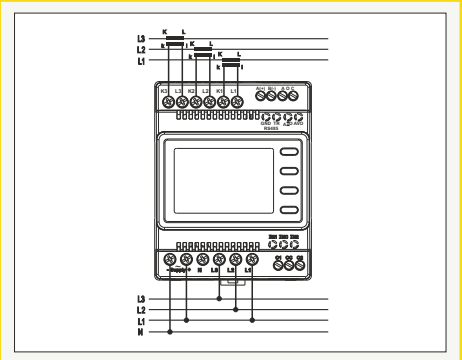
Connection Diagram DIN-4 - MPR-2 Series

The connection diagrams below are available for MPR-2. Please look for quick start manual for MPR-2-D.

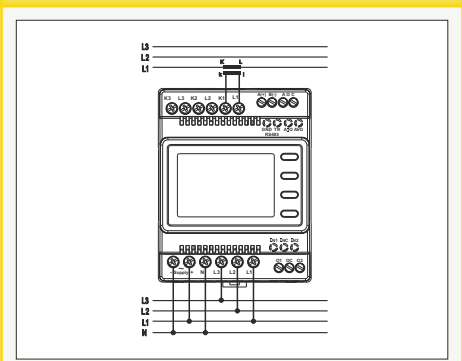
MPR-2 Series (3P4W)



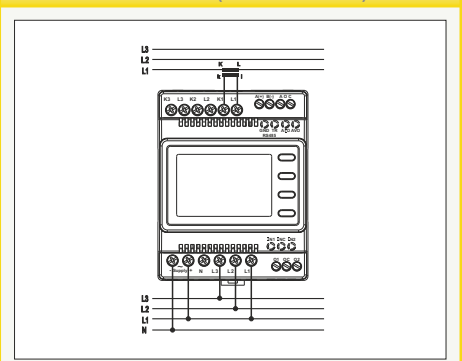
MPR-2 Series (3P3W)



MPR-2 Series (3P4W Balanced)

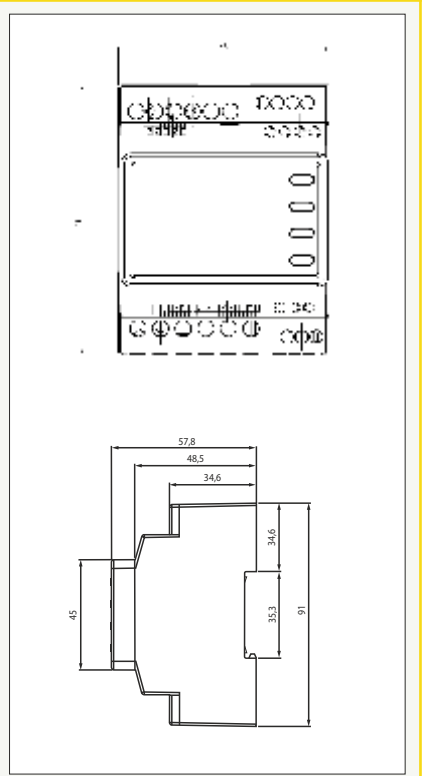


MPR-2 Series (3P3W Balanced)



Dimensions

MPR-2 Series



Network Analyzers

MPR-2 Series

SPECIFICATIONS

	MPR-24	MPR-25S-22	MPR-26S-21	MPR-27S-23	MPR-26S-21-PM	MPR-24-PM
ENCLOSURE						
Dimensions	DIN4 Rail Mounting, 24 Pcs / Box					
Protection Class	Terminals = IP20, Front: IP40					
Display	2,1" Segmented LCD					
MEASUREMENTS						
VOLTAGE						
Measurement Range	10-300 VAC (L-N) 10 - 480 VAC (L-L)					
Measurement Range with VT	10V-999.9kV					
Accuracy	%0.5 ± 1 Digit					
Input Impedance	>1M Ω					
Burden (Input Load)	<0,5 VA					
CURRENT						
Rated Current	In : 5A / 1A					
Minimum Current	5 mA					
Measurement Range	50 mA - 5,5 A Accuracy: %0.5 ± 1 Digit					
Measurement Range with CT	50 mA -10000 A					
Burden	<1 VA					
Overload Current	1,2 In continuous					
Short Time Overload (1sec)	10xIn					
POWER/ENERGY						
Active Power	0 - 1 GW Accuracy: %1 ± 1 Digit					
Reactive Power	0 - 1 GVAr Accuracy: %2 ± 1 Digit					
Apparent Power	0 - 1 GVA Accuracy: %1 ± 1 Digit					
Power Factor	±1.00 Accuracy: : ± 0,02					
Active Energy	0 - 99 999 999 kWh or MWh Accuracy: %1 Class 1					
Reactive Energy	0 - 99 999 999 kVAh or MVAh Accuracy: %2 Class 2					
Apparent Energy	0 - 99 999 999 kVAh or MVAh Accuracy: %1					
Tariffs	-				8	-
Total Harmonic Distortion (THD)	-				%THD-V, %THD-I	-
Individual Harmonics	-				1-51 Voltage (V) and Current (I)	-
Demand Period	1,5,10,15,20,30,60 min.					
Frequency	45-65 Hz					
Sampling Rate per Period	128					
SUPPLY						
Operating Voltage	95 - 270 VAC/DC (12-50 VDC in MPR-2X-D Series)					
Operating Frequency	50/60 Hz					
Power Consumption	<5 VA					
DIGITAL INPUT / OUTPUT						
Digital Input Pulse Width	-				20-500 ms	-
Digital Input Operating Voltage	-				5...30 VAC/DC	-
Switching Current	-				Max 50mA	-
Digital Output Supply Voltage	-				5-30 VDC (Open Collector)	-
Pulse Duration	-				100ms pulse period 80ms pulse width	-
Pulse Width	-				20-500 ms (Adjustable)	-
ANALOG OUTPUT						
Current Output	-				0-20mA, 4-20mA, 0-24mA	-
Voltage Output	-				0-5V, 0-10V, ±5V, ±10V	-
RELAY OUTPUT						
Relay Output	-		1 NO Contact, 250 VAC/5A	-		1 NO Contact, 250 VAC/5A
MEMORY						
Internal Memory Size	-				4MB	-
COMMUNICATION						
Interface/Protocol	-				RS-485 / MODBUS RTU	-
Transfer Rate	-				2400-115200 bps	-
AMBIENT CONDITIONS						
Operating Temperature	- 10 / +55°C					
Storage Temperature	- 20 / +70°C					
Overvoltage Category	III					
Pollution Degree	II					
Ambient Humidity	%95					
STANDARDS						
Standards	EN 61557-12, EN 61326-1, EN 61000-6-2, EN 61000-6-4 EN 62053, EN 60068, EN 61010					
CONNECTIONS						
Mounting	Rail Mounting					
Connection Terminals	Screw Terminal					
Connection Types	3P4W, 3P3W, 3 P4W, 3P4W Balanced, 3P3W Balanced					

Network Analyzers

MPR-3 Series



MPR-3 Series (72x72)

MPR-3 Series New Generation Mini Network Analyzers

With 72x72x50mm size, MPR-3 series mini network analyzers occupy smaller space. These analyzers are preferred in Rack type panels due to their compact design and used in applications such as UPS, machine control panels, data processing and system rooms and security control. MPR-3 series can detect the status and enable the control of the devices (circuit breaker, contactors, switches etc.) in the field with their digital inputs and outputs.



PRODUCT SELECTION TABLE

Product Code	Dimensions / mm	3xV, 3xI, Frequency, W, VAR, VA, TTP, TQ, TS, kWh, kVAh, kVAh Demand, Max.	Min. Cosφ, I neutral	% THD-I	% THD-V	RS-485 Modbus	Digital Input	Digital Output	Clock (RTC)	Pulse Counter	Working Hours	Alarm	Event Recording	Log Recording	X/5, X/1 Current Tr.	X/ 333mV Current Tr.	plug & meter	95-270 VAC/DC	Pcs/Box
MPR-32	72x72	●							●		●		●		●			●	24
MPR-34-11	72x72	●	●	●			1	1	●	●	●	●	●		●			●	24
MPR-34S-11	72x72	●	●	●	●		1	1	●	●	●	●	●	●	●			●	24
MPR-34S-11-PM	72x72	●	●	●	●		1	1	●	●	●	●	●	●	C	●	●	●	24
MPR-34-20	72x72	●	●	●			2		●	●	●		●		●			●	24
MPR-34S-20	72x72	●	●	●	●		2		●	●	●	●	●	●	●			●	24

C Can be used by X5PM converter

Remote Monitoring Software:

With the energy management software developed by ENTES, energy consumption and quality can be monitored in real time by reading the values measured by devices. As a result, comprehensive energy monitoring and data storage is provided.

With the analysis of stored data, improvements in energy costs and sustainable savings are accomplished.

* For more detailed information, see Page 94.



Log Reader Software

Thanks to the free Log Reader software developed by ENTES, data logs of parameters such as current, voltage, power, profile, temperature and THD recorded by MPR series devices can be transferred to the computer.

The data that will be imported can be filtered according to time interval and parameter type.

The obtained data can be imported as XLS, CSV etc. file formats.

Log Reader Software can be downloaded from www.entes.com.tr.

Network Analyzers

MPR-3 Series

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Neutral Current	Active Power (P)
Phase - Phase Voltages (V_{LL})	Phase Currents (IL)	Reactive Power (Q)
Max. / Min. Values	Total Active Power ($\sum P$)	Apparent Power (S)
Power Factor (P.F)	Total Reactive Power ($\sum Q$)	Active Energy- Import (kWh or MWh)
Cos ϕ	Total Apparent Power ($\sum S$)	Active Energy-Export (kWh or MWh)
Frequency (Hz)	Apparent Energy (kVAh or MVAh)	Reactive Energy Inductive (kVArh or MVArh)
Demand / Max. Demand		Reactive Energy Capacitive (kVArh or MVArh)

MPR-32



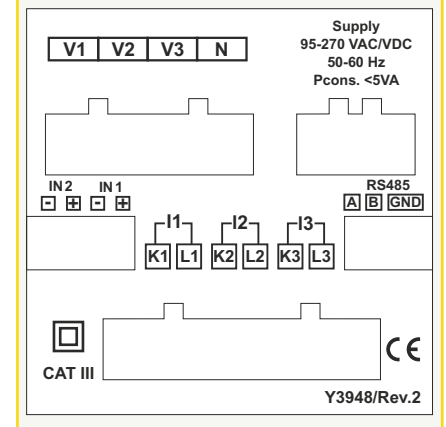
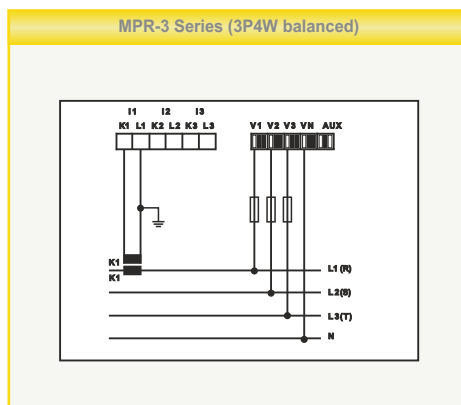
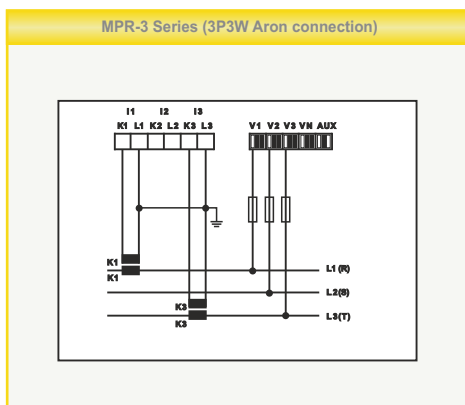
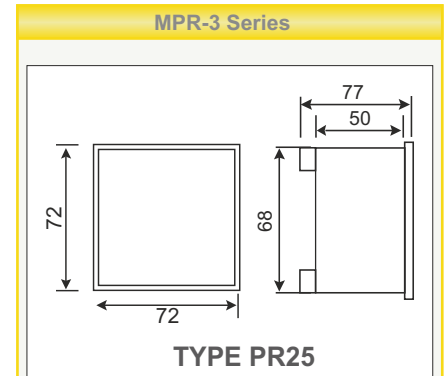
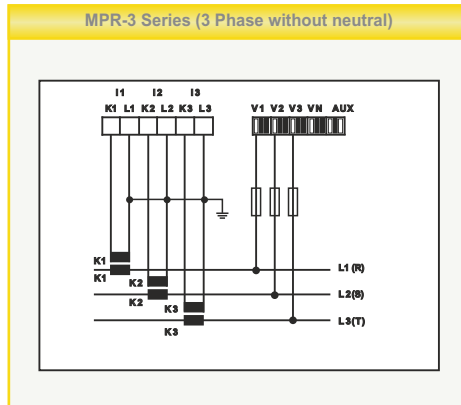
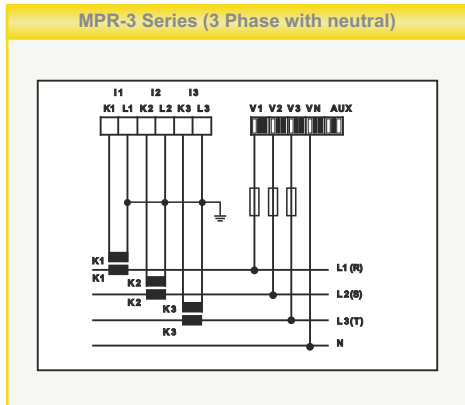
Total Harmonic Distortion for Voltage (THD-V)

Total Harmonic Distortion for Current (THD-I)

MPR-34-11 / MPR-34S-11 / MPR-34-20 / MPR-34S-20 / MPR-34S-11-PM

Connection Diagram PR25 - MPR-3 Series (72x72mm)

Dimensions



Network Analyzers

MPR-3 Series

SPECIFICATIONS

	MPR-32	MPR-34-11	MPR-34S-11	MPR-34-20	MPR-34S-20	MPR-34S-11-PM
ENCLOSURE						
Dimensions	72x72x50 mm, 24 Pcs / Box					
Protection Class	Terminals = IP20, Enclosure = IP51, IP54 (Optional)					
Display	2,6" Segmented LCD					
MEASUREMENTS						
VOLTAGE						
Measurement Range	10-300 VAC (L-N), 10-480 VAC (L-L)					
Measurement Range with VT	10V - 999.9 kV					
Accuracy Class	%0.5 ± 1 Digit					
Input Impedance	1,8 MΩ					
Burden (Input Load)	<0,5 VA					
CURRENT						
Accuracy Class	%0,5 ± 1 Digit					
Rated Current	1A,5A					
Minimum Current	5mA					
Measurement Range	50mA-5,5A 0,5% ±1 Digit					
Measurement Range with CT	50mA-10kA					
Burden	<1 VA					
Overload Current (continuous)	1,2 In					
Overload Current (1s)	10 x In					
POWER/ENERGY						
Active Power Accuracy	%1 ± 1 Digit					
Reactive Power Accuracy	%2 ± 1 Digit					
Active Energy	Class 1					
Reactive Energy	Class 2					
Total Harmonic Distortion	-	Voltage (%THD-V), Current (%THD-I)				
Active Power Measurement Range	0-1 GW					
Reactive Power Measurement Range	0-1 GVar					
Apparent Power Measurement Range	0-1 GVA					
Active Energy Measurement Range	0-99 999 999 kWh / MWh					
Reactive Energy Measurement Range	0-99 999 999 kVarh / MVarh					
Apparent Energy	0-99 999 999 kVAh / MVAh Accuracy %1					
Sampling Rate per Period	128					
Frequency	45-65 Hz					
Demand Period	1,5,10,15,20,30,60 min (adjustable)					
SUPPLY						
Operating Voltage	95-270 VAC/DC					
Operating Frequency	50/60 Hz					
Power Consumption	<5 VA					
INPUT/OUTPUT STRUCTURE						
Digital Input	-	1		2		1
Digital Output	-	1		-		1
Digital Input Pulse Width	-	20/500 ms (adjustable)				
Digital Input Operating Voltage	-	5...30 VAC/DC				
Switching Current	-	Maximum 50mA				
Switching Voltage	-	Maximum 30 VDC				
Pulse Duration	-	20-1000 ms (adjustable)				
Pulse Space	-	20-1000 ms (adjustable)				
AMBIENT CONDITIONS						
Operating Temperature	-10 / +55°C					
Storage Temperature	-20 / +70°C					
Ambient Humidity	%95					
STANDARDS						
Standards	EN 61326-1, EN 61557-12, EN 62053, EN 61010-1, EN 61000-6-2, EN 61000-6-4, EN 55011, EN 60068-2					
CONNECTIONS						
Mounting	Front Panel					
Connection Terminals	Socket type screw terminal					
Connection Types	3P4W, 3P3W, 3P3W Aron, 3P4W balanced, 3P3W balanced					
COMMUNICATION						
Interface / Protocol	-	RS-485/ MODBUS RTU	-	RS-485/ MODBUS RTU	-	RS-485/ MODBUS RTU
Transfer Rate (bps)	-	2400 - 115200	-	2400 - 115200	-	2400 - 115200

Compatible with Entes plug meter and X/333mV current transformers.

Network Analyzers

MPR-4 Series



MPR-4 Series Network Analyzers

With their compact design and 45mm depth, MPR-4 series new generation network analyzers occupy less space in the panels. Real-time monitoring is possible via large graphic screen. In addition up to 16 MB internal memory and communication feature they offer wide I/O solutions with their replaceable modular structure based on customer requirements and areas of application.

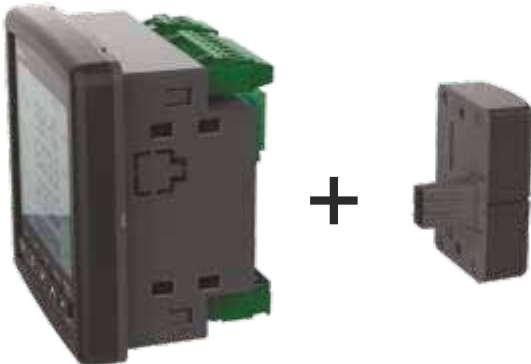


PRODUCT SELECTION TABLE	Dimensions / mm	3xV, 3xI, Frequency, W, VAR, VA, TP, TQ, TS, kWh, kVAh, kVArh, Demand, Max., Min. Cosφ, Inbr	Active Energy Class 0,5	Active Energy Class 1	% THD-I / % THD-V	Neutral Current Input	Individual Harmonics	RS-485	Digital Input	Digital Output	Temperature Input	Analog Output	Relay Output (Alarm)	Clock (RTC)	Memory (MB)	Voltage / Current Unbalances	Tariff	Pulse Counter	Run/On Hour Meter	Alarm	Event Recording	Log Recording	Fixed Current Terminal	X/5, X/1	X/333 mV	plug&meter	24-60 VAC/DC	50-270 VAC/DC
50-270 VAC/DC Supply																												
MPR-45	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-45S-L	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-45S	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-46	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-46S-L	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-46S	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-46S-PM ^{plug&meter}	96x96	●	●	●	*	*	*	*	*	●					16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S-L	96x96	●	●	●	31	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S-0,5	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S-PM ^{plug&meter}	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
24-60 VAC/DC Supply																												
MPR-47S-D	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S-D-0,5	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
OG Series (Fixed Current Terminals)																												
MPR-42-OGT-26	96x96	●	●	●	31	●	●	●	*	●	●	●			16	8	●	●	●	●	●	●	●	●	●	●	●	
MPR-42-OGT-26-0,5	96x96	●	●	●	31	●	●	●	*	●	●	●			16	8	●	●	●	●	●	●	●	●	●	●	●	
MPR-47-OG	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S-OG-D	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	
MPR-47S-OG-D-0,5	96x96	●	●	●	51	●	*	*	*	*	*	●			16	8	*	●	●	●	●	●	●	●	●	●	●	

C Can be used with X5PM converter * Modular structure ● Standard

MPR-4 series network analyzers can be customized for various applications with I/O modules.

I/O Modules:



MPR-4X I/O Module Selection Table					
	Digital Input	Digital Output	Relay Output	Analog Output (V/mA DC)	Temperature Input
MM-120	2				
MM-102		2			
MM-002			2		
MM-122	2	2			
MM-202				2	
MM-144	4	4			

MPR-4X-OG vs MPR-4X-PM I/O Module Selection Table					
	Digital Input	Digital Output	Relay Output	Analog Output (V/mA DC)	Temperature Input
MM-OG-26	2	2	2	2	
MM-OG-42T	2	2			4



Network Analyzers

MPR-4 Series

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Neutral Current (I_n)	Active Power (P)	Active Energy Import (kWh or MWh)
Phase - Phase Voltages (V_{LL})	Power Factor (P.F)	Reactive Power (Q)	Active Energy Export (kWh or MWh)
Average Phase-Neutral Voltage	$\cos\kappa$	Apparent Power (S)	Reactive Energy Capacitive (kVAh or MVAh)
Average Phase-Phase Voltage	Frequency (Hz)	Total Active Power ($\sum P$)	Reactive Energy Inductive (kVAh or MVAh)
Max. Demand	Max. / Min. Values	Total Reactive Power ($\sum Q$)	Apparent Energy (kVAh or MVAh)
Phase Currents (I_L)		Total Apparent Power ($\sum S$)	

MPR-45 / MPR-45S-L / MPR-45S



Total Harmonic Distortion for Voltage (THD-V)

Total Harmonic Distortion for Current (THD-I)

MPR-46 / MPR-46S-L / MPR-46S / MPR-46S-PM



Sag&Swell

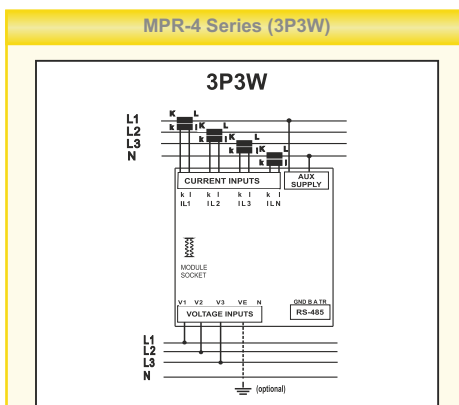
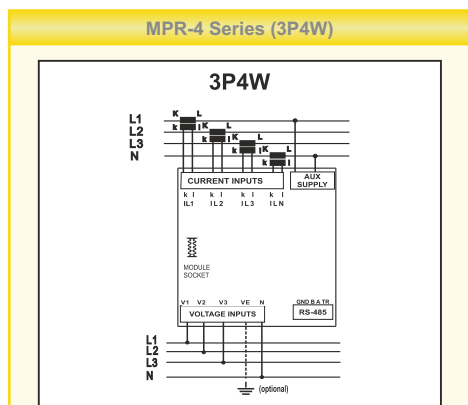
Voltage / Current Unbalances

1-51st Individual Voltage Harmonics

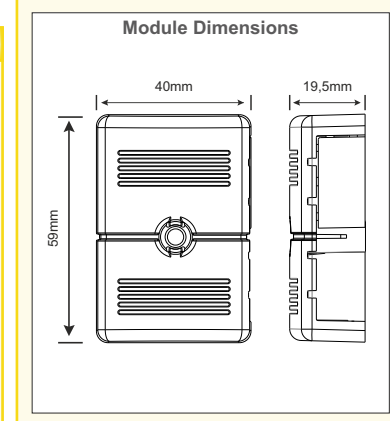
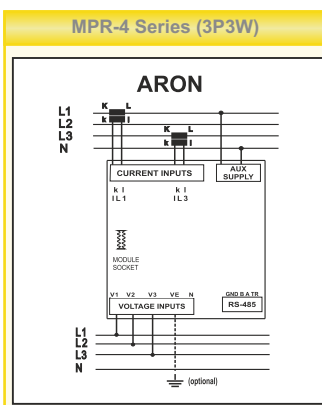
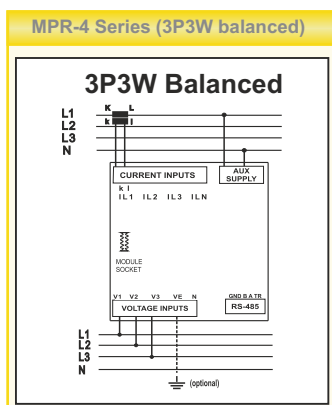
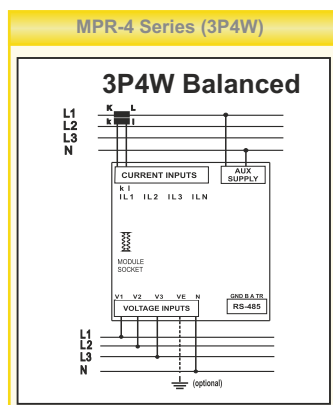
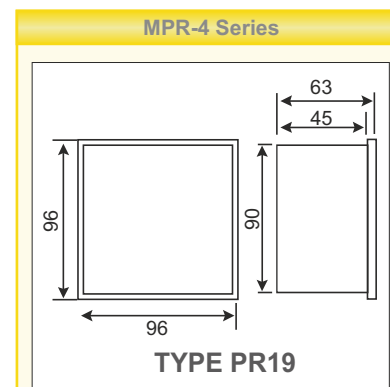
1-51st Individual Current Harmonics

MPR-47S / MPR-47S-D / MPR-47S-0,5 / MPR-47S-D-0,5 / MPR-47S-PM

Connection Diagram PR19 - MPR 4 Series (96x96mm)



Dimensions



Note: A current transformer on neutral current measurement input can be optionally connected, it does not affect the operation of the device.



Network Analyzers

MPR-4 Series

SPECIFICATIONS

	MPR-45	MPR-45S-L	MPR-45S	MPR-46	MPR-46S-L	MPR-46S	MPR-47S-L	MPR-47S	MPR-47S-OG	MPR-42-OGT	MPR-46S-PM	MPR-47S-PM		
ENCLOSURE														
Dimensions	96 x 96 x 45 mm; 24 Pcs/Box													
Protection Class (EN 60529)	Front: IP51 (IP54 optional), Terminal: IP20													
Display	3,5" Segmented LCD Display													
MEASUREMENTS														
Sampling Rate per Period	128													
VOLTAGE														
Measurement Range	5 - 300 VAC (L-N), 5 - 480 VAC (L-L)													
Measurement Range with Voltage Transformer	5 V - 999,9 kV													
Accuracy	0,5 % ± 1 digit (0,2 % for MPR-4X-0,5)													
Input Impedance	> 1 MΩ													
Burden	< 0,5 VA													
Neutral - Ground Voltage Measurement (PE-N)	2 - 300 VAC													
CURRENT														
Current Measurement Channels	4						3							
Nominal Current	In : 5A / 1A													
Minimum Current	5 mA													
Measurement Range	50 mA - 5,5 A													
Measurement Range with Current Transformer	50 mA - 10.000 A													
Accuracy	0,5 % ± 1 digit (0,2 % for MPR-4X-0,5)													
Burden	< 0,5 VA													
Overload Current	1,2 In													
Short Time Overload (1 sec)	10 In													
FREQUENCY														
Measurement Range	45 - 65 Hz													
Accuracy	0,1%													
POWER / ENERGY														
Power Measurement at Quadrants	4													
Active Power	0 - 1 GW; 0,5% ± 1 digit													
Reactive Power	0 - 1 GVAR; 1% ± 1 digit													
Apparent Power	0 - 1 GVA; 1% ± 1 digit													
Power Factor and Cos Φ Calculation	±1,00; Accuracy: ±0,02													
Active Energy	0 - 9.999.999,9 kWh or MWh, Class 1 (Class 0,5 for MPR-4X-0,5)													
Reactive Energy	0 - 9.999.999,9 kVarh or MVarh, Class 2 (Class 1 for MPR-4X-0,5)													
Apparent Energy	0 - 9.999.999,9 kVAh or MVAh													
MEASUREMENT OF POWER QUALITY														
Individual Harmonics up to							51			31			-	51
Total Harmonic Distorsion (THD-U/V/I)	-						L-L Voltage (THD-U%), L-N Voltage (THD-V%), Current (THD-I%)							
Voltage and Current Unbalances	-						●			-			-	●
Voltage Sag & Swell	-						●			-			-	●
SUPPLY														
Operating Voltage/Frequency	50 - 270 VAC/DC (24 - 60 VAC/DC for MPR-4X-D), 50/60 Hz													
Power Consumption	< 5 VA (< 10 VA with module)													
COMMUNICATION														
RS-485 Modbus RTU	-	●		-	-	-	-	-	-	-	-	-		
INPUTS AND OUTPUTS (with MODULES)														
DIGITAL INPUT														
Pulse Width	40 - 500 ms													
DIGITAL OUTPUT														
Energy Pulse Output	Active Energy (1 Pulse/Wh - 1 Pulse/MWh), Reactive Energy (1 Pulse/VArh - 1 Pulse/MVArh)													
Pulse Width / Space btw. Pulses	20 - 1000 ms													
Switching Current	max. 50 mA													
Switching Voltage	5 - 24 VDC, max. 30 VDC													
RELAY OUTPUT														
Type and Maximum Load	2 NO, 250 VAC / 5A													
ANALOG OUTPUT														
Current Output	0 - 20 mA, 4 - 20 mA, 0 - 24 mA													
Voltage Output	0-5 V, 0-10 V, ±5 V, ±10 V													
Load Resistance	< 600 Ω													
Accuracy	0,50%													
TEMPERATURE INPUT														
Supported RTD Sensors	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120													
Supported Thermocouples	B, J, K, N, R, S, T													
AMBIENT CONDITIONS														
Operating Temperature	- 5 / +55 °C													
Storage Temperature	- 20 / +70 °C													
Overvoltage Category	III													
Pollution Degree	II													
Ambient Humidity	max. 90%													
STANDARDS														
Standards	EN 61557-12, EN 61326-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 62053, EN 60068, EN 61010													
CONNECTIONS														
Mounting Type	Flush mount													
Connection Terminals	Screw terminal with socket (Fixed current input terminals on MPR-4X-OG/OGT)													
Connection Types	3 Phase-4 Wire (3P4W), 3 Phase-3 Wire (3P3W), 3 Phase ARON, 3P4W (balanced), 3P3W (balanced)													
AVERAGE VALUES														
Average Value Period	1 - 60 min (adjustable)													
Instantaneous, minimum, maximum	Voltage, Frequency, Reactive Power													
Instantaneous, minimum, maximum, Demand, max. demand	Current, Active Power, Apparent Power													
OTHER FEATURES														
Hour Counter	On Hour, Operating Hour													
Memory Size	-	16 MB		-	16 MB		-	-	-	-	-	16 MB		
Real Time Clock (RTC)	●													
Replaceable Battery	●													
Number of Tariffs	1+Gen	8+Gen		1+Gen	-	-	-	-	-	-	-	8+Gen		
Parameter Data Logging	-	●		-	-	-	-	-	-	-	-	-		
Event Recording	●													

Compatible with Entes plugometer and X/333mV current transformers.

Network Analyzers

MPR-60S / MPR-63



MPR-63

Power and Energy Measuring for all Series

MPR-60S: Network Analyser with THD Measurement RS-485 (MODBUS), Alarm Contact and 1MB Memory

MPR-63: Network Analyser with THD, up to 31st Harmonics Measurement, RS-485 (MODBUS), Alarm Contact and 1MB Memory



PRODUCT SELECTION TABLE

Product Code	3xV, 3xI, Frequency, W, VAR, VA, TP, TQ, TS, kWh, kVAh, kVAh Demand, Max., Min. Cosx, I neutral	THD-I, THD-V	Individual Harmonics	Neutral Current	Alarm Contact	Digital Input	Energy Pulse Output	RS-485 Modbus	0/2-10V Analog Output	0/4-20mA Analog Output	Memory (1 MB)	Real Time Clock	LCD Display	85-265 VAC/DC	Pcs/Box
MPR-60S-41	●	●		●	2		2	●		1	●	●	●	●	8
MPR-63-42	●	●	31	●	2	2		●		2	●	●	●	●	8

Remote Monitoring Software:

With the energy management software developed by ENTES, energy consumption and quality can be monitored in real time by reading the values measured by devices. As a result, comprehensive energy monitoring and data storage is provided. With the analysis of stored data, improvements in energy costs and sustainable savings are accomplished.



* For more detailed information, see Page 94.

Network Analyzers

MPR-60S / MPR-63

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Neutral Currents (I_n)	Active Power (P)	Active Energy Import (kWh or MWh)
Phase - Phase Voltages (V_{LL})	Power Factor (P.F)	Reactive Power (Q)	Active Energy Export (kWh or Mwh)
Average Phase-Neutral Voltage	$\cos\phi$	Apparent Power (S)	Inductive Reactive Energy (kVAh or MVAh)
Average Phase-Phase Voltage	Frequency (Hz)	Total Active Power ((P)	Capacitive Reactive Energy (kVAh or MVAh)
Max. Demand	Max. / Min. Values	Total Reactive Power ((Q)	
Phase Currents (IL)		Total Apparent Power ((S)	

Total Harmonic Distortion for Voltage (THD-V%)

Total Harmonic Distortion for Current (THD-I%)

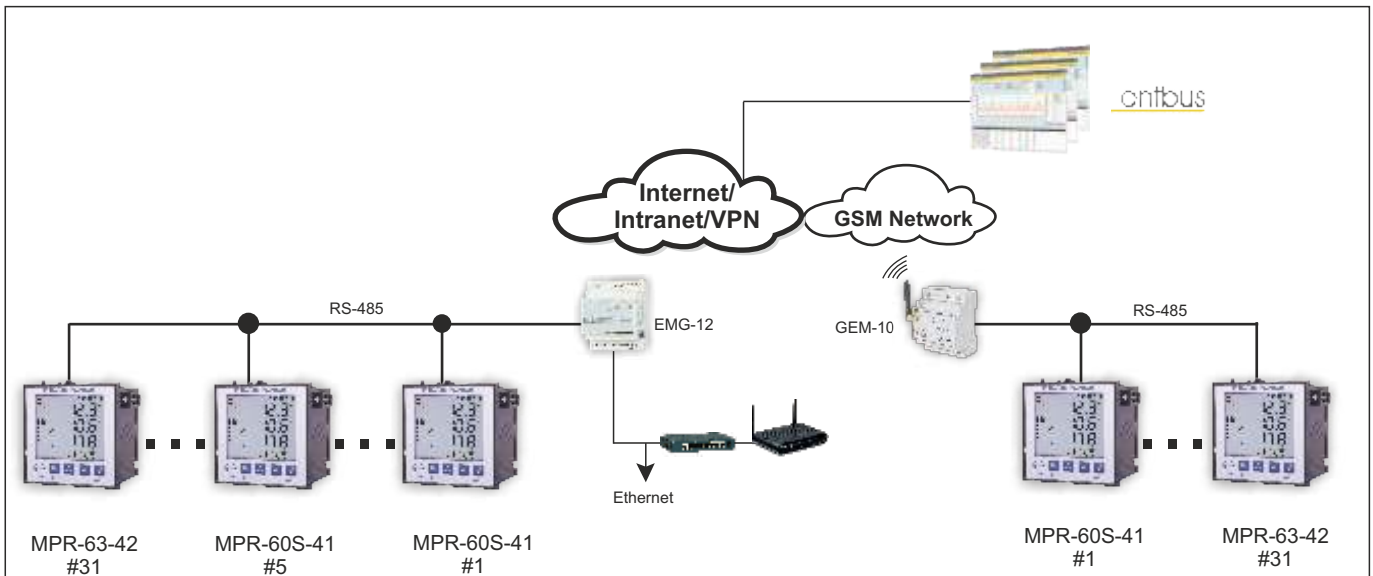
MPR-60S



1-31st Individual Voltage Harmonics

1-31st Individual Current Harmonics

MPR-63



Log Reader Software:

Thanks to the free Log Reader software developed by ENTES, data logs of parameters such as current, voltage, power, profile, temperature and THD recorded by MPR series devices can be transferred to the computer.

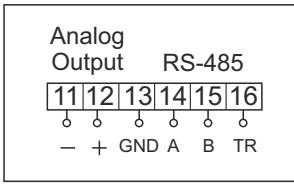
The data that will be imported can be filtered according to time interval and parameter type.

The obtained data can be imported as XLS, CSV etc. file formats.

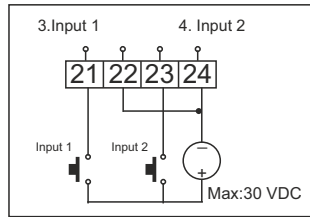
Log Reader Software can be downloaded from www.entes.com.tr.

Network Analyzers

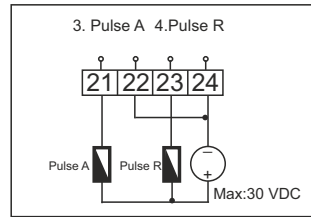
MPR-60S / MPR-63



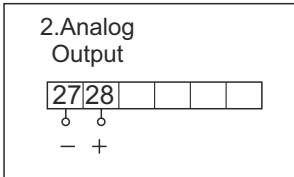
MPR-63-42 MPR-60S-41



MPR-63-42

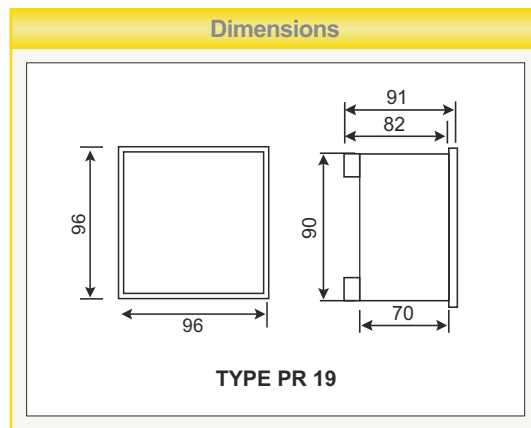
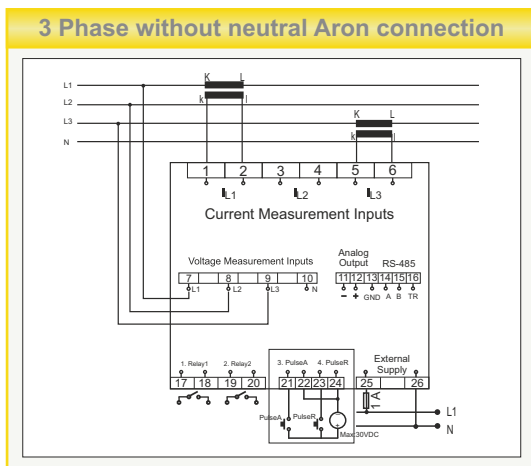
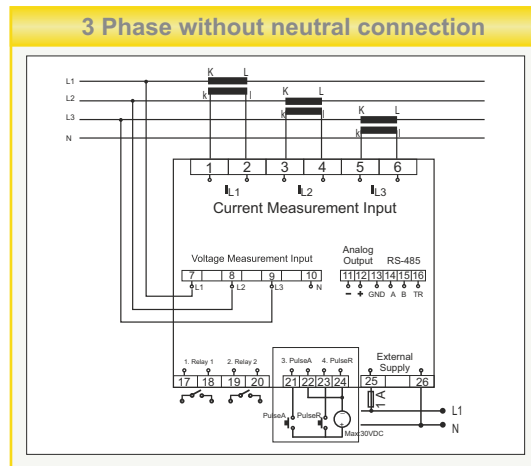
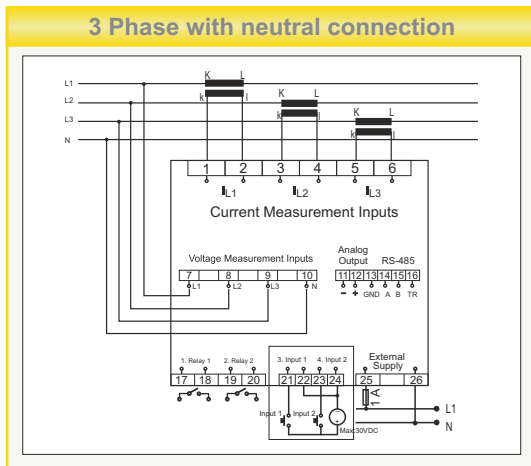


MPR-60S-41



MPR-63-42

Connection Diagram (PR19- 96x96mm)



Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entes.com.tr.

Network Analyzers

MPR-60S / MPR-63

SPECIFICATIONS

	MPR-60S	MPR-63
ENCLOSURE		
Dimensions	96x96mm PR19, 8 pcs / Box	
Protection Class	Front: IP40 (IP54 optional)	
Weight	0,75kg/pcs	
Display	3,6" Segmented LCD	
MEASUREMENTS		
Voltage		
Measurement Range	1.0-300 VAC (L-N); 2.0-500 VAC (L-L)	
Measurement Range with Transformer	1V-1,2MV Transformer Ratio: 0,1-4000,0	
Accuracy	0.5% ± 2 digits	
Input Impedance	1.8MΩ	
Burden (Input Load)	<0.5 VA	
Overload Voltage	1.2 x measurement range	
Current		
Nominal Current	In : 5A	
Minimum Current	5 mA	
Measurement Range with Transformer	5 mA - 5,5 A Accuracy : 0.5% ± 2 digits	
Measurement	5 mA-10000 A Transformer Ratio : 1- 2000	
Burden	0,5 VA	
Overload Current	2xIn	
Short-Time Overload	10xIn	
Power/Energy		
Active Power	Range: 0 - 4000 MW, Accuracy: 1% ± 2 digits	
Reactive Power	Range: 0 - 4000 MVar, Accuracy: 2% ± 2 digits	
Apparent Power	Range: 0 - 4000 MVA, Accuracy: 2% ± 2 digits	
Power Factor	Range: ±1.00 Accuracy: ± 0,01	
Active Energy	Range: 0 - 99 999 999 kWh or MWh Accuracy: 1% ± 2 digits	
Reactive Energy	Range: 0 - 99 999 999 kVarh or MVarh Accuracy: 2% ± 2 digits	
Total Harmonic Distortion (THD)	THD-V%, THD-I%	
Harmonics		2-31 Voltage(V) and Current(I)
Demand Period	15 min.	
Frequency	45-65 Hz	
Number of Samples In One Period	64	
SUPPLY		
Operating Voltage	85 - 265 VAC/DC	
Operating Frequency	50/60 Hz	
Power Consumption	<6 VA	
INPUT/OUTPUT/STRUCTURE		
Digital Input	-	2 (MPR-63-42)
Digital Output	2 (MPR-60S-41)	-
Analogue Output	0/4-20 mA (MPR-60S-41; MPR-63-42)	
Contact Output	2 NO contact 5A / 1250 VA cosφ=1.00	
Energy Pulse Output	Active energy output (1kWh/pulse - 50MWh/pulse) Reactive energy output (1kVarh/pulse - 50MVarh/pulse)	
Delay Time	Voltage Parameters 0-300 sec; Current and power parameters 0-900 sec; Frequency, PF, Cosφ and Harmonic parameters 0-600 sec	
PULSE OUTPUT		
Switching Current	Max. 50 mA	
Switching Voltage	5..24 VDC	
Pulse Width	100 ...2500 ms	
Maximum Voltage	Max. 30 VDC	
MEMORY		
Data Record	Selectable 28 parameters with time stamp (15000 recordings)	
Memory Size	1MB	
COMMUNICATION		
Communication Interface/Protocol	RS-485 / MODBUS RTU	
Transfer Speed	1200 - 38400 bps	
AMBIENT CONDITIONS		
Ambient Temperature	- 5 / +55°C	
Storage Temperature	- 25 / +70°C	
Overvoltage Category	III	
Pollution Degree	II	
Ambient Humidity	90%	
STANDARDS		
Applied Security Standards	EN-61010-1	
Applied EMC Standards	EN-61000-6-2, EN-61000-6-4	
Applied Mechanical Endurance Standards	EN 60529	
CONNECTIONS		
Mounting	Front Panel Mounting	
Connection Terminals	Screw Terminal with Socket, Fixed current input terminals	
Connection Types	3 Phase with Neutral (3P4W); 3 Phase without Neutral (3P3W); 3 Phase without Neutral (Aron)	



Network Analyzers

MPR-53 / EPM-07



Power and Energy Measuring for all Series

MPR-53 / EPM-07 series network analyzers allow monitoring more than 50 electrical parameters on their display

- EPM-07** : Network Analyzer
- EPM-07S** : Network Analyzer with RS-485 (MODBUS)
- MPR-53** : Network Analyzer with THD measurement
- MPR-53S** : Network Analyzer with THD measurement and RS-485 (MODBUS)
- MPR-53CS** : Network Analyzer with THD measurement , RS-485, Pulse Counter, Digital Hour Meter, Alarm Contact



PRODUCT SELECTION TABLE

Product Code

3xV, 3xI, Freqans, W, VAR, VA, TP, TQ, TS, kWh, kVArh, Demand, Max., Min., Cos φ, I nctr

THD-I %

THD-V %

Neutral Current

Digital Input

Energy Pulse Output

Dual Energy Meter

6 Different Energy Calculation Methods

CT-25 (120A) Current Tr.

X/1, X/5 Current Tr.

Relay Output

Run/On Hour Meter

Pulse Counter

Fixed Current Terminal

RS-485 Modbus

110/230 VAC

45-265 VAC/DC

10-56 VDC

Pcs/Box

Front Panel Mounting

EPM-07-96	●			●	2	2	●	●	○	●												12	
EPM-07S-96	●			●	2	2	●	●	○	●			●										12
MPR-53-96	●	●	●	●	2	2	●	●	○	●													12
MPR-53S-96	●	●	●	●	2	2	●	●	○	●			●	*									12
MPR-53CS-96	●	●	●	●	2	2	●	●	○	●	2	●	●										12

DIN Rail Mounting

EPM-07-DIN	●			●	2	2	●	●		●													12
EPM-07S-DIN	●			●	2	2	●	●	○	●			●	●									12
MPR-53-DIN	●	●	●	●	2	2	●	●	○	●													12
MPR-53S-DIN	●	●	●	●	2	2	●	●	○	●			●	●									12
MPR-53S-OG-DIN	●	●	●	●	2	2	●	●		●			●	●									12
MPR-53CS-DIN	●	●	●	●	2	2	●	●		●	2	●	●										12
MPR-53CS-OG-DIN	●	●	●	●	2	2	●	●		●	2	●	●	●	●								12

* Only models compatible with CT-25 ○ Optional



MPR-53S-DIN-CT25

CT-25

CT-25 is a unique solution to reduce measurement costs in low current systems (up to 120A).

* For CT-25, see page 90.

Remote Monitoring Software:

With the energy management software developed by ENTES, energy consumption and quality can be monitored in real time by reading the values measured by devices. As a result, comprehensive energy monitoring, data storage, optimum energy consumption control with the analysis of stored data, improvements in energy costs, and sustainable goals for energy systems are accomplished.



* For more detailed information, see Page 94.

Network Analyzers

MPR-53 / EPM-07

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	$\cos\phi$	Total Active Power (P)	Reactive Energy Inductive (kVArh or MVarh)
Phase - Phase Voltages (V_{LL})	Frequency (Hz)	Total Reactive Power (Q)	Reactive Energy Capacitive (kVArh or MVarh)
Average Phase-Neutral Voltage	Active Power (P)	Total Apparent Power (S)	Maximum Demand
Average Phase - Phase Voltage	Reactive Power (Q)	Active Energy-Import (kWh or MWh)	Maximum / Minimum Values
Phase Currents (IL)	Apparent Power (S)	Active Energy-Export (kWh or MWh)	
Neutral Current (In)			

EPM-07 / EPM-07S

+

Total Harmonic Distortion for Voltage (THD-V%)

Total Harmonic Distortion for Current (THD-I%)

MPR-53 / MPR-53S

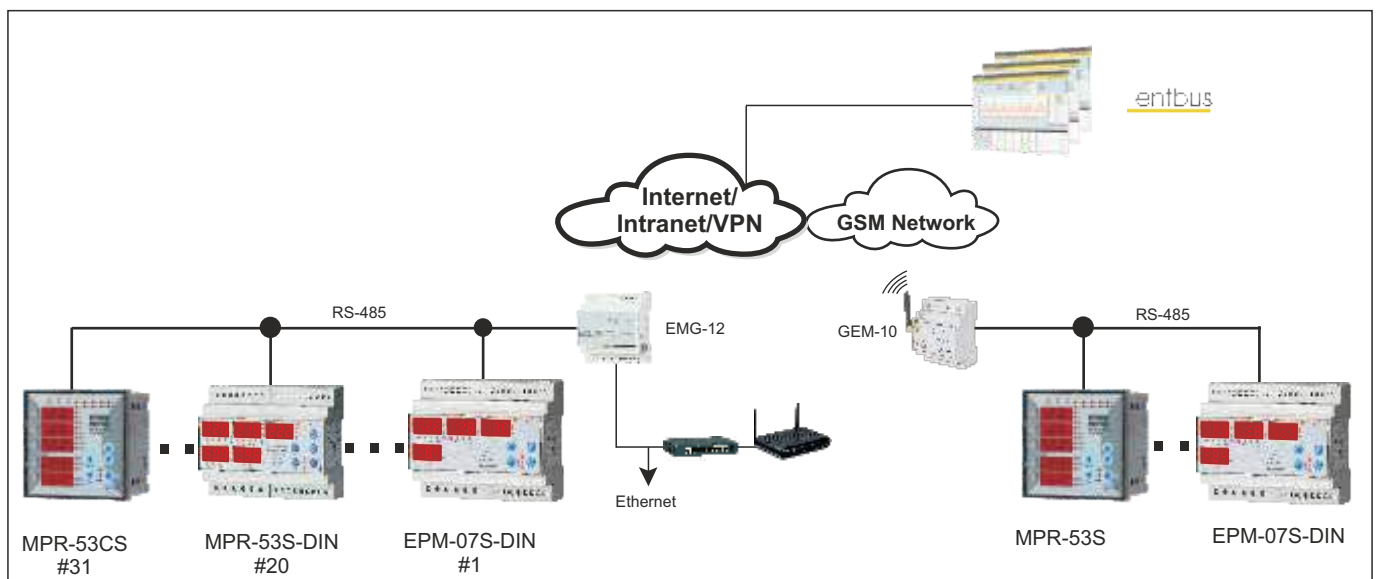
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Digital Hour Meter

Pulse Counter

Alarm Contacts

MPR-53CS



Network Analyzers

MPR-53 / EPM-07

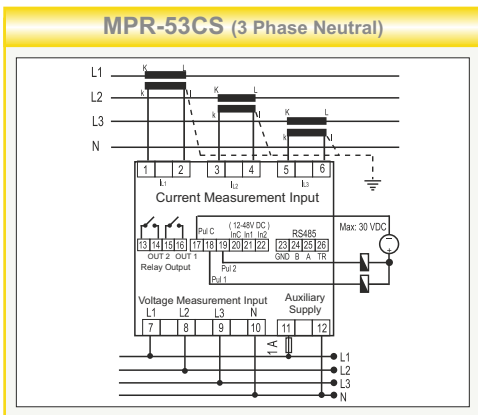
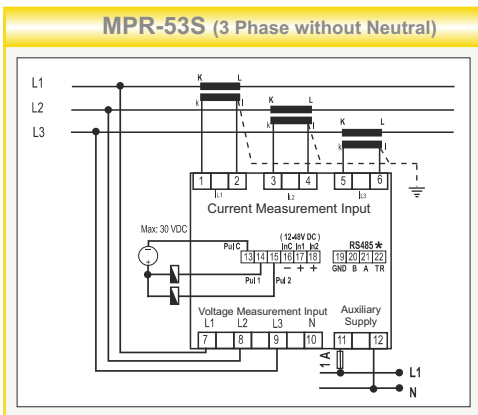
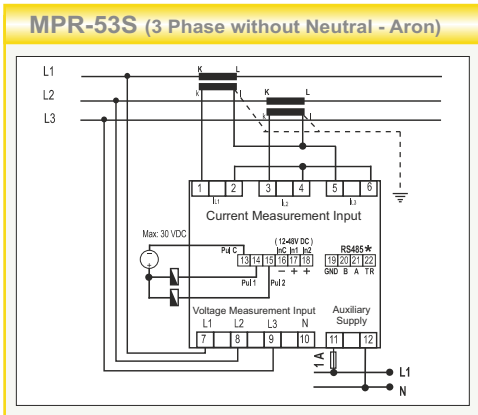
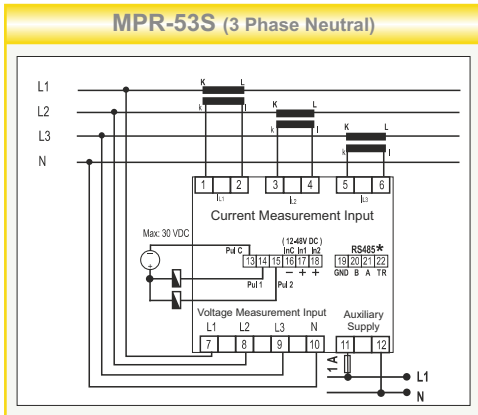
SPECIFICATIONS

	EPM-07	EPM-07S	MPR-53S/53S-OG	MPR-53CS/53CS-OG	MPR-53
ENCLOSURE					
Dimensions	96x96mm Pr19, DIN6 PK26, 12 pcs/box				
Protection Class	Front: IP40, Terminals: IP00				
Weight	0,6kg/pcs				
Display	Red LED; 10mm height				
MEASUREMENTS					
Voltage					
Measurement Range	10-300 VAC (L-N), 10-500 VAC (L-L)				
Measurement Range with Transformer	10-1,2MV, Voltage transformer ratio:0.1-4000.0				
Accuracy	1%±1 digit [(10%-110%)xFull scale]				
Input Impedance	1.8 MΩ				
Burden (Input Load)	<0.5 VA				
Current					
Nominal Current	In: 5A				
Minimum Current	50mA				
Measurement Range	50mA-5,5A Accuracy: 1%±1 digit [(10%-110%)xFull scale]				
Measurement Range with Transformer	50mA-10.000A Tranformer ratio:1-2000				
Burden	<1 VA				
Over Load Current	1,2 In				
Power/Energy					
Active Power	Range: 0-215 MW Accuracy: 1%±1 digit [(10%-110%)xFull scale]				
Reactive Power	Range: 0-215 MVAR, Accuracy: 1%±1 digit [(10%-110%)xFull scale]				
Apparent Power	Range: 0-215 MVA, Accuracy: 1%±1 digit [(10%-110%)xFull scale]				
Power Factor	4 Quadrant				
Active Energy	Range: 0-99 999 999 999,9 kWh				
Reactive Energy	Range: 0-99 999 999 999,9 kVArh				
Demand Period	1-60 minute (adjustable)				
Frequency	45-65 Hz				
Sampling Rate (per Period)	64				
SUPPLY					
Operating Voltage	110 VAC/230 VAC ±% 10 or 45-265 VAC/DC or 10-56 VDC (MPR-53S-OG/MPR-53CS-OG)				
Operating Frequency	50/60 Hz				
Power Consumption	<4VA				
INPUT/OUTPUT STRUCTURE					
Digital Input	2				
Digital Input Pulse Width	20ms				
Digital Input Operating Voltage	12...48 VAC/DC				
Digital Hour Meters	3 hourmeters HH HH HH HH.HH, total hours (non-resettable), run hours (resettable), setpoint hours (resettable). (for MPR-53CS)				
Delay Time	Delay on and delay off 0-999,9 sec (for MPR-53CS)				
Contact Output	2NO contact 5A / 1250VA (for MPR-53CS)				
Energy Pulse Output	NPN transistor				
Switching Current	Maximum 50 mA				
Switching Voltage	5..24VDC Maximum 30 VDC				
Pulse	100ms pulse period, 80ms pulse width				
COMMUNICATION					
Communication Interface/Protocol	-		RS-485 Modbus RTU		-
Parity	-		none, odd, even		-
Address	-		1-247		-
Transfer Speed	-		2400-38400 bps		-
AMBIENT CONDITIONS					
Ambient Temperature	-5 / +50°C				
Over Voltage Category	III				
Pollution Degree	II				
STANDARDS					
Applied Security Standards	EN 61010-1				
Applied EMC Standards	EN 61000-6-2, EN 61000-6-4				
Applied Mechanical Endurance Standards	EN 60529				
CONNECTIONS					
Mounting	Front Panel Mounting (PR 19) / Rail Mounting (PK 26)				
Connection Terminals	Screw Terminal with Socket, Fixed Current Input Terminals (for MPR-5X-OG)				
Connection Types	3 Phase w/ Neutral (3P4W), 3 Phase w/o Neutral (3P3W), 3 Phase w/o Neutral (ARON)				

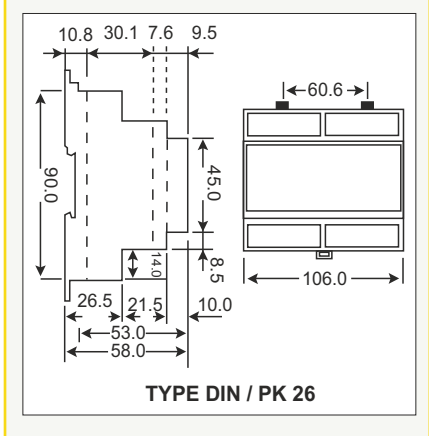
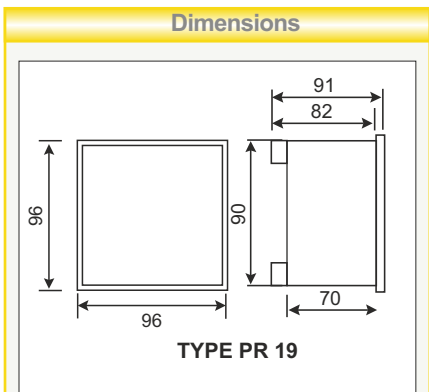
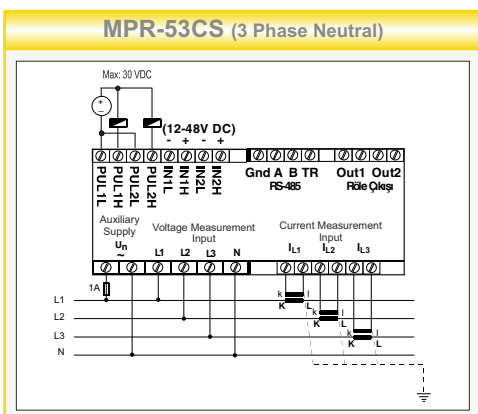
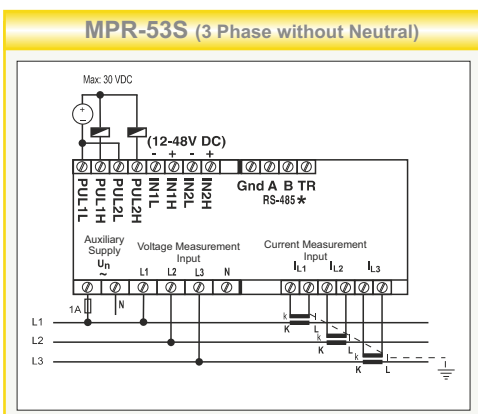
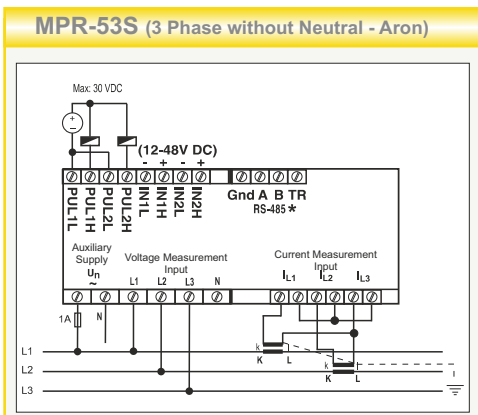
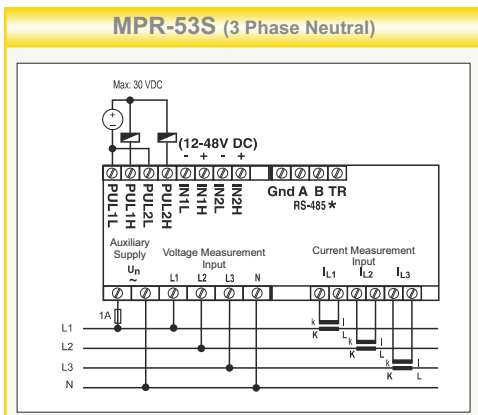
Network Analyzers

MPR-53 / EPM-07

Connection Diagram (PR19- 96x96mm)



(PK 26 - DIN6)



* RS-485 terminals are standard for EPM-07S and MPR-53S

Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entec.com.tr.

Power & Energy Meters

EPR Series / ES Series



EPR-04S-96



EPR-04S-DIN-CT25



CT-25 Current Transformers

EPR-04: Digital Power and Energy Meter

EPR-04 has been designed to measure power and energy values.

EPR-04S: Digital Power and Energy Meter with RS-485

EPR-04S has RS-485 communication feature in addition to the features of EPR-04.



PRODUCT SELECTION TABLE

Product Code	Dimensions	Cost	Active Power (W)	Reactive Power (VAr)	Apparent Power (VA)	TW-TVA, TVA	kWh Active Energy	kVAh Reactive Energy	Dual Energy Measurement	Demand	Digital Input	Energy Pulse Output	CT-25 (max. 120A) Current Tr.	RS-485 Modbus	230 VAC	45-265 VAC/DC	Pcs/Box
EPR-04-96	96x96	●	●	●	●	●	●	●	●	●	●	○		*	●	12	
EPR-04-DIN	DIN6	●	●	●	●	●	●	●	●	●	●	○		●		12	
EPR-04S-96	96x96	●	●	●	●	●	●	●	●	●	●	○	●	*	●	12	
EPR-04S-DIN	DIN6	●	●	●	●	●	●	●	●	●	●	○	●	●		12	

* For CT-25, please refer to page 90.

* Only models compatible with CT-25 ○ Optional

SPECIFICATIONS

EPR-04, EPR-04S

ENCLOSURE		SUPPLY	
Dimensions	96x96mm PR19, DIN6 Pk26, 12 pcs/box	Operating Voltage	110 VAC/230 VAC ±10% or 45-265 VAC/DC
Protection Class	Front: IP40, Terminals: IP00	Operating Frequency	50/60 Hz
Weight	0,5kg/pcs	Power Consumption	<4VA
Display	Red LED; 10mm Height	INPUT/OUTPUT STRUCTURE	
MEASUREMENT		Digital Input	2 pcs.
Voltage		Digital Input Pulse Width	20ms
Measurement Range	10-300 VAC (L-N), 10-500 VAC (L-L)	Digital Input Operating Voltage	12...48 VAC/DC
Measurement Range with Transformer	10V-1,2MV Ratio: 0,1-4000	Energy Pulse Output	NPN Transistor
Accuracy	1%±1 digit [(10%-110%)xFull scale]	Switching Current	Maximum 50mA
Input Impedance	1.8 MΩ	Switching Voltage	5...24 VDC Maximum 30 VDC
Burden (Input Load)	<0.5 VA	Pulse	100ms period 80ms width
Current		AMBIENT CONDITIONS	
Nominal Current	In:5A	Ambient Temperature	-5 / +55°C
Minimum Current	50mA	Over Voltage Category	III
Measurement Range	50mA-5,5A	Pollution Degree	II
Measurement Range with Transformer	50mA-10kA	Ambient Humidity	90%
Burden	<1 VA	STANDARDS	
Over Load Current	1,2 In	Applied Security Standards	EN 61010-1
Power/Energy		Applied EMC Standards	EN 61000-4-5, EN 61000-4-4, EN 61000-4-2, EN 61000-4-11
Active Power Range	0-215 MW	Applied Mechanical Endurance Standards	EN 60529
Reactive Power Range	0-215 MVAh	CONNECTIONS	
Apparent Power Range	0-215 MVA	Mounting	Front Panel Mounting (PR 19) / Rail Mounting (PK 26)
Active Energy Range	9 999 999,9 Mwh	Connection Terminals	Screw Terminal with Socket
Reactive Energy Range	9 999 999,9 MVAh	Connection Types	3 Phase w/ Neutral (3P4W), 3 Phase w/o Neutral (3P3W), 3 Phase w/o Neutral (ARON)
Sampling Rate (per Period)	64		

Power & Energy Meters

EPR Series / ES Series

MID
Compatible



ES-32L / ES-32LS / ES-80L : Watt-Hour Meter

ES series directly measure active kilowatt-hour (kWh) consumption with their compact, reliable and simple installation features. ES-32L and ES-80L also have has energy pulse output.

ES-32LS:

It communicates over the RS-485 port by storing energy measurements in the Modbus registers. ES-32 series have MID certificate which is accepted as a measurement standard in European countries.

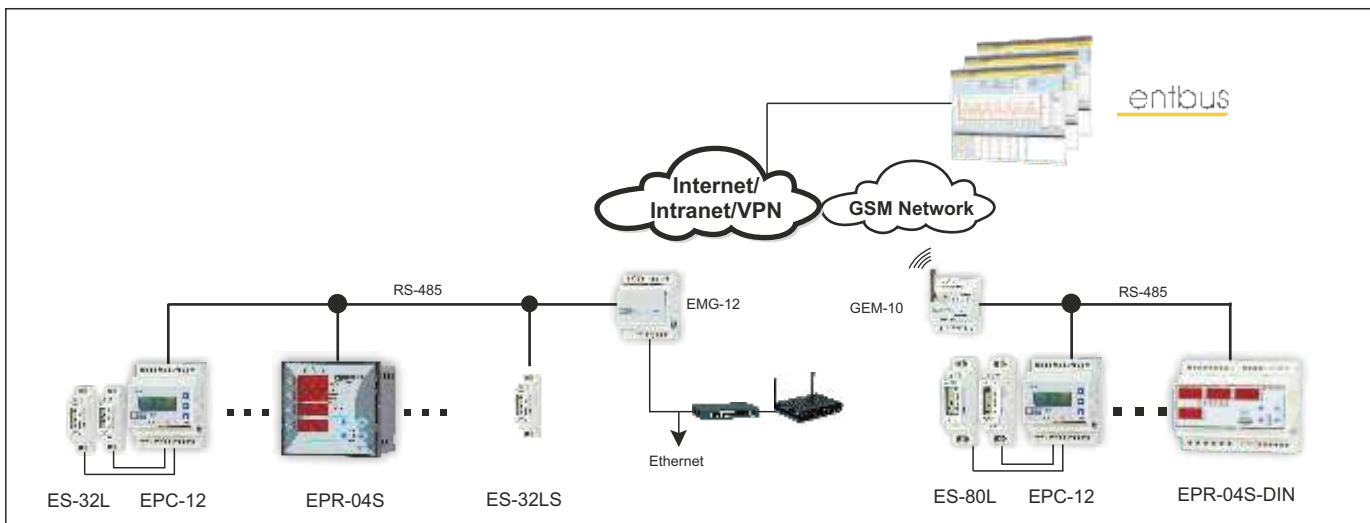


PRODUCT SELECTION TABLE

Product Code		Direct Current Measurement	CT-80D Current Tr.	MID Compatibility	kWh Active Energy	Energy Pulse Output	RS-485 Modbus	Pcs/Box
ES-32L	Digital Energy Meter 5(32)A	32A		<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		28
ES-32LS	Digital Energy Meter 5(32)A	32A		<input type="radio"/>	<input checked="" type="radio"/>		<input checked="" type="radio"/>	28
ES-80L	Digital Energy Meter 40(80)A		<input checked="" type="radio"/>		<input checked="" type="radio"/>	<input checked="" type="radio"/>		10

* For CT-80D, phase refer to page 90.

Optional



Power & Energy Meters

EPR Series / ES Series

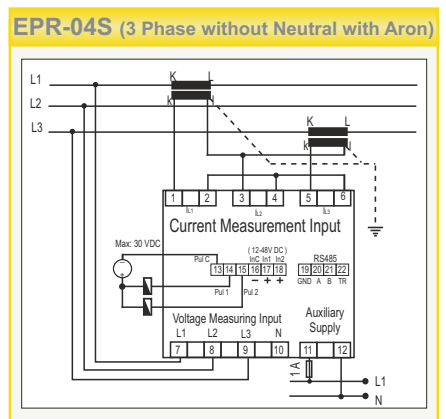
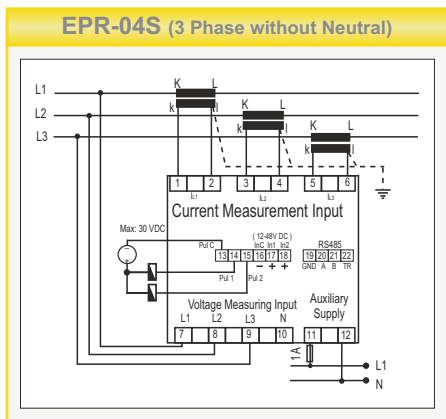
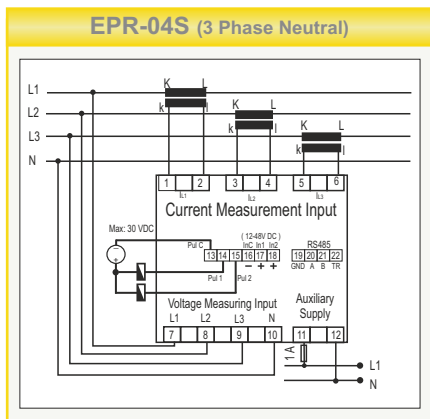
SPECIFICATIONS

	ES-32LS	ES-32L	ES-80L
ENCLOSURE			
Dimensions	DIN1, 28 pcs/box		
Protection Class	IP51		
Weight	60gr/pcs		60gr,74gr (CT-80D)/pcs.
Display	6+1 digit LCD		
MEASUREMENT			
Active Energy Range	0-999999.9 kWh		
Accuracy	± 1% Class 1		
Nominal Current	In=5A		In=40A
Starting Current	0,02A		0,08A
Minimum Current	0,25A		0,8A
Transfer Current	0,5A		2A
Highest Current	32A		80A
Burden (Input Load)	0,5 VA		
Surge Voltage Test	4kV 1.2/50 ms IEC 1000-4-5		
Burst Test	4kV IEC 61000-4-4		
SUPPLY			
Operating Voltage	230 VAC - 20%+15%		
Operating Frequency	50/60 Hz		
Power Consumption	<2W		
INPUT/OUTPUT STRUCTURE			
Pulse Output	-		1000Imp./kWh
Pulse Width	-		Ti=20ms.
AMBIENT CONDITIONS			
Operating Temperature	-25 / +55°C		
Over Voltage Category	III		
Pollution Degree	II		
Type	Indoor		
Ambient Humidity	90%		
STANDARDS			
Applied Standards	EN 62052-11, EN 62053-21		
Applied Certificates	MID measurement certificated		-
CONNECTIONS			
Mounting	Rail Mounting DIN EN 50022		
Connection Terminals	Screw type		
COMMUNICATION			
Interface/Protocol	RS-485 / Modbus RTU		-

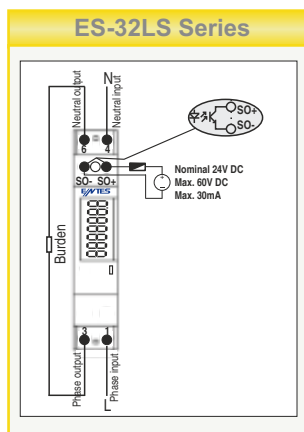
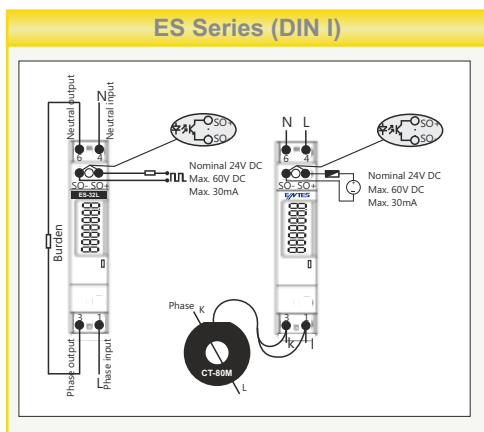
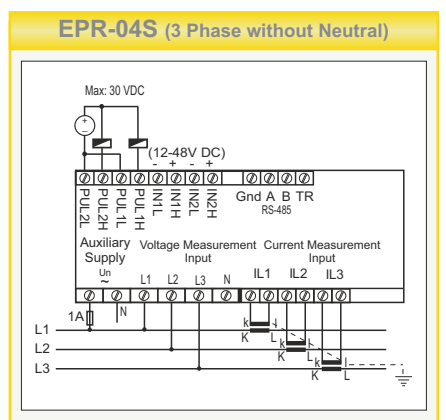
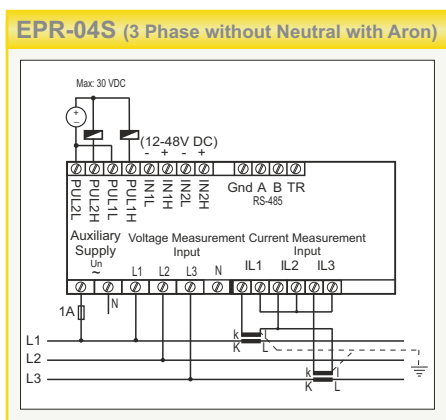
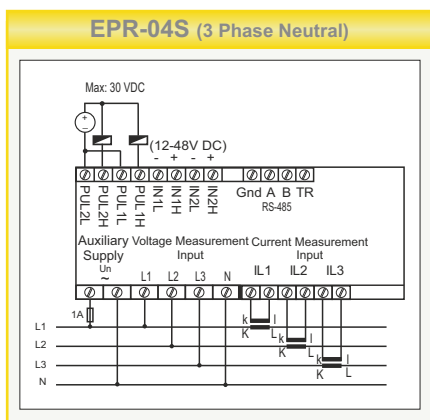
Power & Energy Meters

EPR Series / ES Series

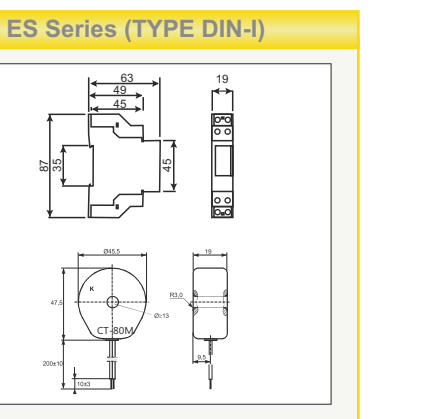
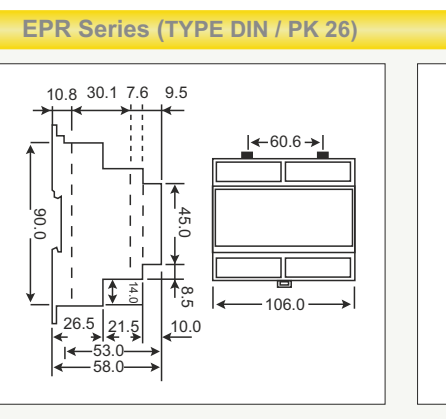
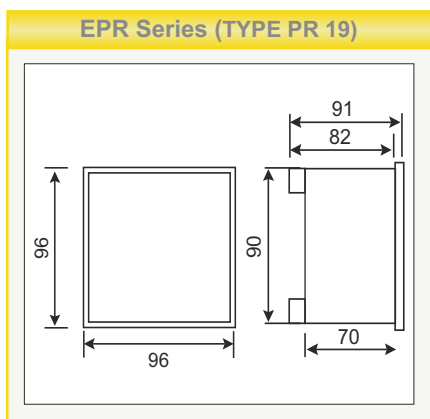
Connection Diagram (PR19- 96x96mm)



(PK 26 - DIN6)



Dimensions



Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entes.com.tr.

plug & meter

plug & meter technology that enables fast installation

plug & meter technology connects the **3-phase current transformer** and the analyzers with RJ45 cable without screwing. plug & meter technology provides **fast and easy installation** in electrical panels.

Advantages of plug & meter

Easy Panel Installation

Allows easy connection with a single cable without using a screwdriver.

Savings in Labor Costs

Saves approximately 85% of the installation time of current transformer and reduces labor costs.

No Connection Errors

Eliminates the common risk of wrong connection of current cables.

Prevents Workplace Accidents

plug & meter technology allows making the connection without the risk of accidents even when the system is under load.

Three Phase Current Transformer

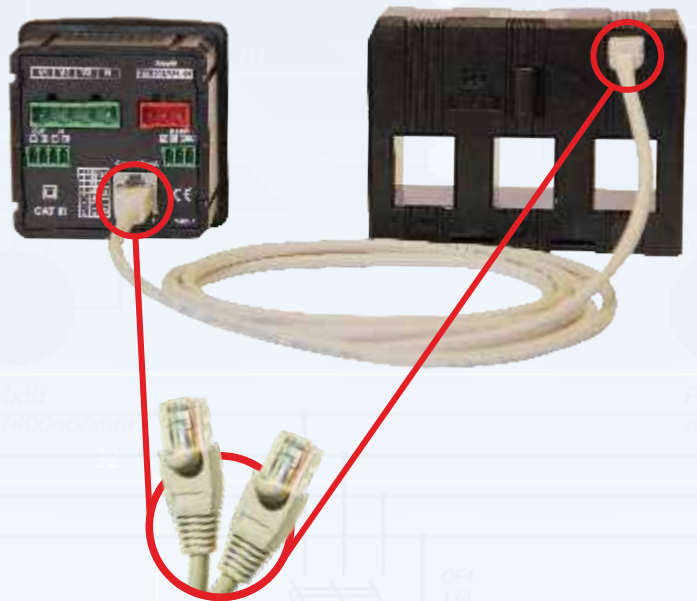
Thanks to the design that fits the output of MCCB's, extra labor cost for busbar modification is prevented.

Prevents User Errors

Prevents failures arising from when current transformers secondary ends left open.



3 phase plug & meter current transformer



plug & meter Compatible New Generation Network Analyzers



MPR-2
DIN4 Rail Mounting



MPR-3
72x72 mm



MPR-4
96x96 mm



Electrical Measurement

The products in ENTES Measurement group are designed to perform analysis for the efficient use of energy by measuring electrical parameters.

Multimeters, Ammeters, Voltmeters, Cos ϕ Meters, Frequency Meters, Transducers and DC Ammeters / Voltmeters offer solutions with broad measurement ranges and support different application types.

With the optional communication feature (RS-485), all measured data can be monitored remotely.

Multimeters

- EPM-04 Series
- EPM-06 Series
- EVM-05 Series

Ammeters

- EPM Series
- EPM-4X Series
- EPM-R4X Series

Voltmeters

- EVM Series
- EVM-3X Series

Cos ϕ Meter

- ECR-3 Series

Frequencymeter

- EFC-3 Series

Transducers

- TA Series
- TV Series

DC Ammeters

- DCA Series

DC Voltmeters

- DCV Series

Multimeters

EPM-04 / EPM-06 / EVM-05



EPM-04h-96



EPM-06-DIN

- Password security
- Operating hourmeter (resettable) and total operating hourmeter (not resettable) (for EPM-04h)

* EPM-04h is for generator applications.



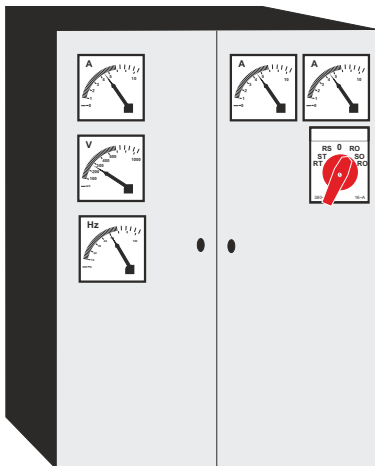
Electrical Measurement

230

PRODUCT SELECTION TABLE

Product Code	3 ~ Voltage	3 ~ Current	Cost	Frequency (Hz)	I neutral	Demand	Max. Values	Min. Values	Alarm Contact	Under / Over Voltage Protection	Under / Over Current Protection	Under / Over Frequency Protection	Phase Sequence Protection	RS-485 Modbus	CT-25 (120A) Current Tr.	X1/X15 Current Tr.	Operating Hourmeter (Resettable)	Total Operating Hourmeter (Non-resettable)	Front Panel Mounting	Rail Mounting	Pcs /Box
Front Panel Mounting																					
EPM-04-96	●	●		●	●	●	●	●							○	●			●		12
EPM-04h-96	●	●		●	●	●	●	●							○	●	●	●	●		12
EPM-04C-96	●	●		●	●	●	●	●	●	●	●	●	●		○	●			●		12
EPM-04CS-96	●	●		●	●	●	●	●	●	●	●	●	●	●	○	●			●		12
EPM-06-96	●	●	●	●	●	●	●	●								●			●		12
EPM-06C-96	●	●	●	●	●	●	●	●	●	●	●	●	●			●			●		12
EPM-06CS-96	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●			●		12
EVM-05C-96	●			●			●	●	●	●		●	●						●		12
DIN Rail Mounting																					
EPM-04-DIN	●	●		●	●	●	●	●								●				●	12
EPM-04C-DIN	●	●		●	●	●	●	●	●	●	●	●	●		○	●				●	12
EPM-04CS-DIN	●	●		●	●	●	●	●	●	●	●	●	●	●		●				●	12
EPM-06-DIN	●	●	●	●	●	●	●	●								●				●	12
EPM-06C-DIN	●	●	●	●	●	●	●	●	●	●	●	●	●		○	●				●	12
EPM-06CS-DIN	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●				●	12
EVM-05C-DIN	●			●			●	●	●	●		●	●							●	12

○ Optional



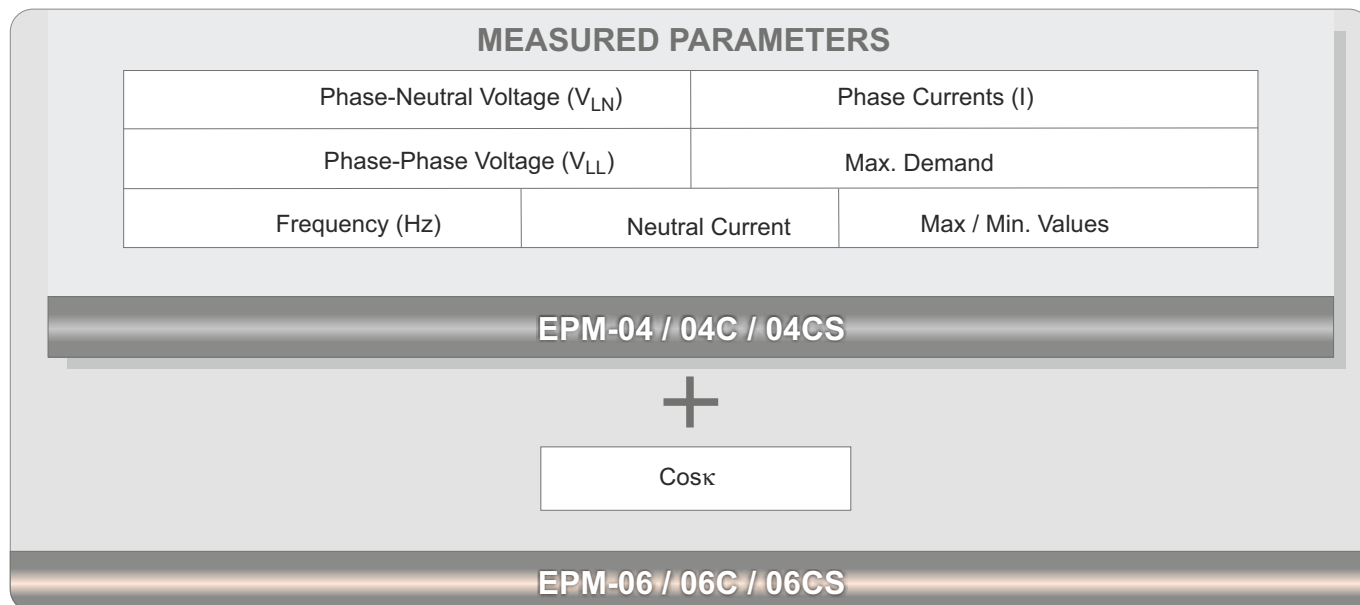
Multiple analogue devices can be replaced by a single multimeter.



=

Multimeters

EPM-04 / EPM-06 / EVM-05



△ EPM-04h also includes two hour meters (Operating and Total Operating).

Electrical Measurement



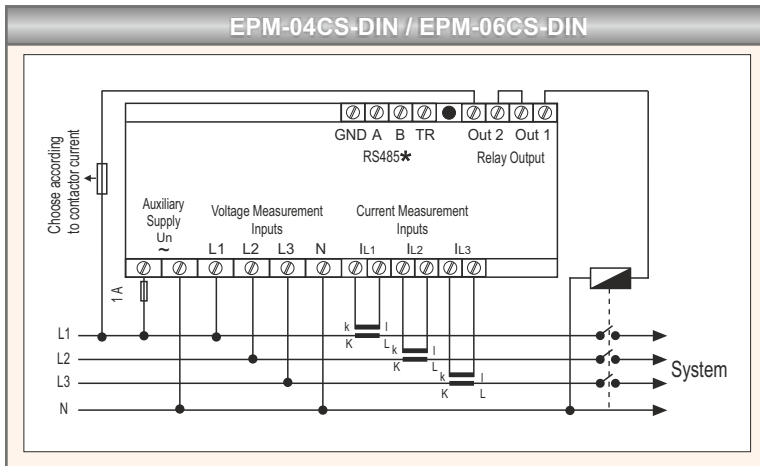
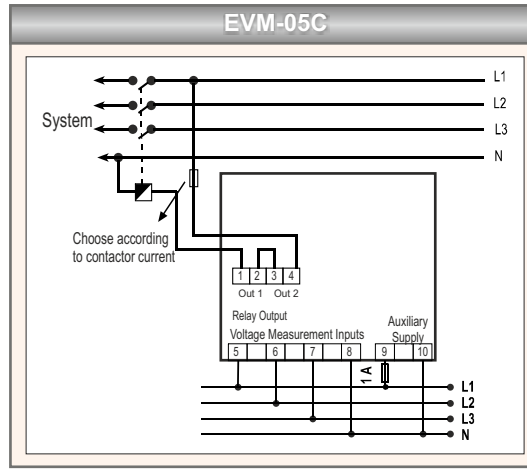
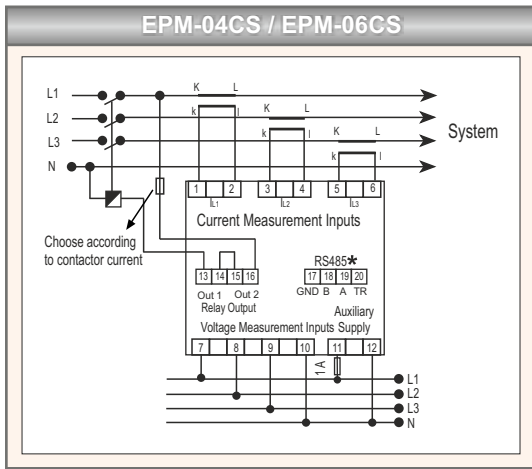
SPECIFICATIONS

	EPM-04	EPM-04h	EPM-04C	EPM-04CS	EPM-06	EPM-06C	EPM-06CS	EVM-05C
ENCLOSURE								
Dimensions	96x96mm PR19, DIN6 PK26, 12 pcs/Box							
Protection Class	Front: IP40, Terminals: IP00							
Weight	0,56kg/pcs; (PR19) / 0,52kg/pcs; (PK26)							0,45kg/pcs
Display	Red LED; Height: 10mm(PR19) / 9,2mm(PK26)							
MEASUREMENT								
Voltage								
Measurement Range	10-300 VAC (L-N), 10-500 VAC (L-L)							
Measurement Range with Transformer	10V-1,2MV							
Accuracy	1%±1 digit							
Input Impedance	1,8 MΩ							
Current								
Nominal Current	5A							
Measurement Range / Accuracy	50mA-5,5A Accuracy: 1% ±1 digit							
Measurement Range with Transformer	50mA-10kA							
Burden (Input Load)	<0,5 VA							
Over Current Load	1,2 In							
Demand/Demand Period	1-60 min. (Adjustable)							
Frequency	45-65 Hz							
SUPPLY								
Operating Voltage	110 VAC/230 VAC, ±10% or 45-265 VAC/DC							
Operating Frequency	50-60Hz							
Power Consumption	<4 VA							
INPUT/OUTPUT								
Delay Time	Delay on and delay off 0-999,9 sn							
Contact Output	-		2NO 5A/1250VA		-		2NO, 5A/1250VA	
AMBIENT CONDITIONS								
Operating Temperature	-5 / +50°C							
Overvoltage Category	III							
Pollution Degree	II							
Ambient Humidity	90%							
STANDARDS								
Applied Security Standards	EN 61010-1							
Applied EMC Standards	EN 61000-6-2, EN 61000-6-4							
Applied Mechanical Endurance Standards	EN 60529							
CONNECTIONS								
Mounting	Front Panel mounting(PR19), Rail mounting(PK26)							
Connection Terminals	Screw terminal with socket (PR19), Screw terminal(PK26)							
Connection Types	3 phase with neutral (3P4W) ve 3 phase without neutral (3P3W)							

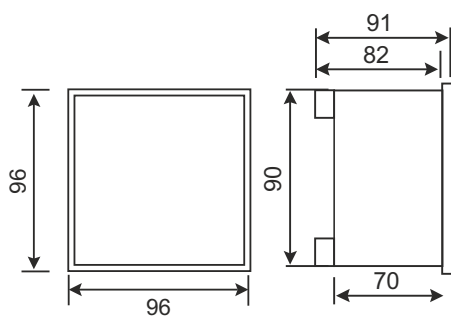
Multimeters

EPM-04 / EPM-06 / EVM-05

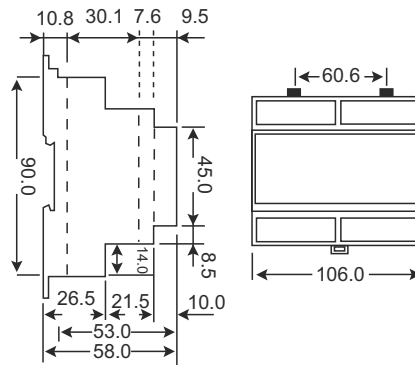
Connection Diagram (PR19- 96x96mm)



Dimensions



TYPE PR 19



TYPE DIN 4 / PK 26

Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entec.com.tr.

Ammeters

EPM / EPM-R Series



EPM-4P-96 (SLIM)

- True RMS Measurement
- Class 0,5 (for EPM 34/14)
- Adjustable Current Transformer Ratio (for EPM34/14 1...1000/5A 1...5000/1A)
- Double Insulation (□), Category III.
- Front Panel or Rail Mounting
- Operating Temperature: -5°C / +50°C, -5°C, +70°C (for EPM14/34)



EPM-R4C



EPM-34



CT-25

CT-25 is a unique solution to reduce measurement costs in low current systems (up to 210A).

* For CT-25, see Page 90.

PRODUCT SELECTION TABLE

Product Code

Product Code		3 ~ Current	1 ~ Current	CT-25 (210A)	Double Demand*	X1 Current Tr.	X5 Current Tr.	Demand	Output Contact	Front Panel Mounting	Rail Mounting	Fixed Current Terminal	24-250 VAC/DC	Pcs. / Box
EPM-4A-72	Direct Ammeter with CT-25 (210A) (CT-25 included)	●	●	●	●	●	●	●	●	●				16
EPM-4A-96	Direct Ammeter with CT-25 (210A) (CT-25 included)	●	●	●	●	●	●	●	●	●				12
EPM-4C-48	Ammeter (with Output Contact) (CT-25 not included)	●	●	●	●	●	●	●	●	●				20
EPM-4C-72	Ammeter (with Output Contact) (CT-25 not included)	●	●	●	●	●	●	●	●	●				16
EPM-4C-96	Ammeter (with Output Contact) (CT-25 not included)	●	●	●	●	●	●	●	●	●				12
EPM-4C-OG-96	Ammeter with Output Contact (for MV applications)	●				●	●	●	●	●		●		12
EPM-4D-48	Ammeter	●	●			●	●	●	●	●				20
EPM-4D-72	Ammeter	●	●			●	●	●	●	●				16
EPM-4D-96	Ammeter	●	●			●	●	●	●	●				12
EPM-4P-96	Ammeter (CT-25 not included)	●	●	●	●	●	●	●	●	●				12
EPM-R4C	Ammeter with Output Contact (Rail Mount) (CT-25 not included)	●	○			●	●	●	●	●	●			16
EPM-14-96	Ammeter (Class 0,5)		●		●	●	●	●	●	●		●	●	12
EPM-34-96	3 Phase Ammeter (Class 0,5)	●			●	●	●	●	●	●		●	●	12

* Double demand feature provides 2 separate displayed demand values according to 2 different periods.

○ Optional

CURRENT TRANSFORMERS (For ENTES panelmeters)

CT-25

Ratio: 1/2500, Inner Diameter : 15.5 mm, Outer Diameter : 43 mm

72

Ammeters

EPM / EPM-R Series

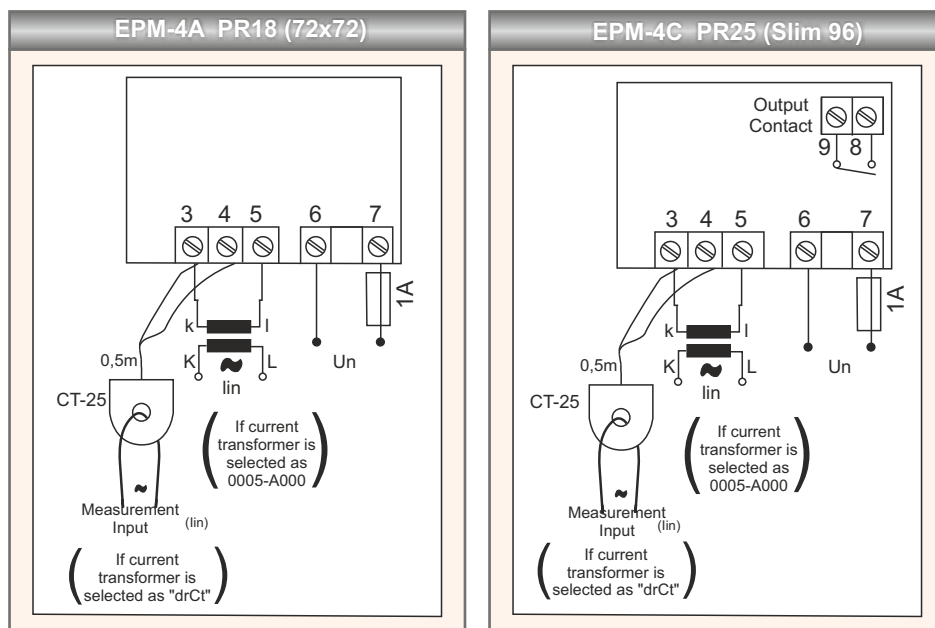
SPECIFICATIONS

	EPM-4D	EPM-4C	EPM-4P	EPM-34	EPM-14	EPM-4A	EPM-R4C
ENCLOSURE							
Dimensions	72x72mm PR18; Slim96 PR25, 48x96mm PR20		Slim96 PR25, 48x96mm PR20		96x96mm PR19		72x72mm PR18; Slim96 PR25
Weight	0,31kg/pcs. (PR18), 0,28kg/pcs. (PR20), 0,35kg/pcs. (PR25)		0,34kg/pcs		0,31kg/pcs.(PR18) 0,35kg/pcs.(PR25)		0,25kg/pcs
Display	Red LED; 14mm		Red LED;12mm		Red LED;14mm		Red LED;10mm
MEASUREMENT							
Accuracy	%1±1digit		%0,5±1digit		%1±1digit		
Current							
Measurement Range	50mA-5,5A	50mA-5,5A (70mA-210A with CT25)		5mA...5.5A (X/5A) 5mA...1.1A (X/1A)		50mA-5,5A (70mA -210A with CT25)	50mA-5,5A (70mA-210A with CT-25)
Measuring Range with Transformer	50mA...10kA		5mA...5500A		50mA...10kA		
Burden (Input Load)	<0.5VA						
Delay Time (Adjustable)	0-999,9 second				-		0-999,9 second
Demand/Demand Period	1-60 minute		1-60 min./1-60s.				1-60 minute
SUPPLY							
Operating Voltage	110/230 VAC±10%		24-250 VAC/DC		110/230 VAC±10%		
Power Consumption	<4VA						
Operating Frequency	45-65Hz						
OUTPUT / SETTINGS							
Output Contact	-	1NO,5A/1250VA		-		-	1NO,5A/1250VA
STANDARDS							
Applied Security Standards	EN 61010-1						
Applied EMC Standards	EN 61000-4-2, EN 61000-6-4						
Applied Mechanical Endurance Standards	EN 60529						
AMBIENT CONDITIONS							
Operating Temperature	-5 / +50°C		-5 / +70°C		-5 / +50°C		
Overvoltage Category	III						
CONNECTIONS							
Mounting	Front Panel Mounting					Rail Mounting	
Connection Terminals	PR18,PR19 Screw with socket ; PK20 Screw						
Connection Types	Single Phase, 2 wires		3 Phase, 6 wires		Single Phase, 2 wires		

Electrical Measurement



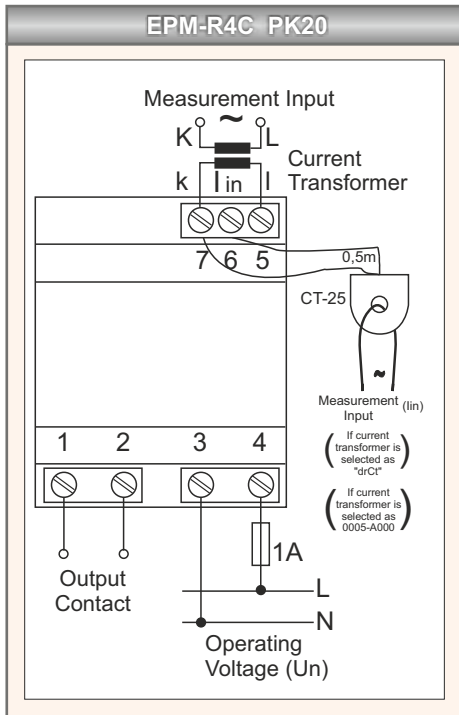
Connection Diagram



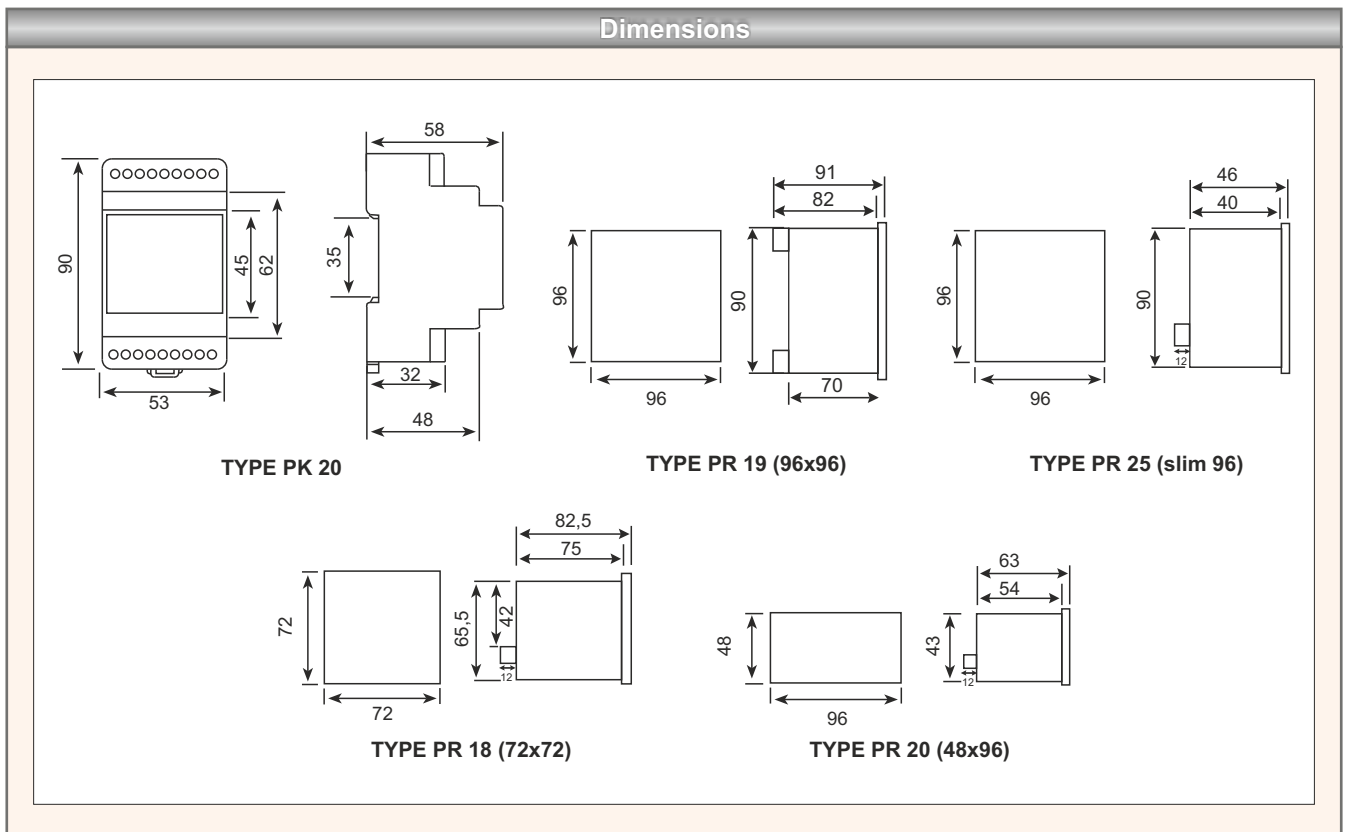
Ammeters

EPM / EPM-R Series

Connection Diagram



Dimensions

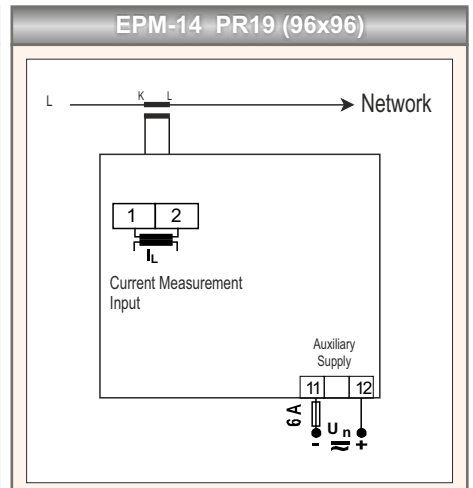
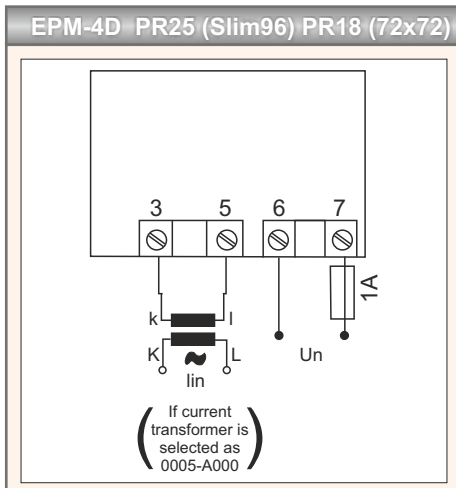
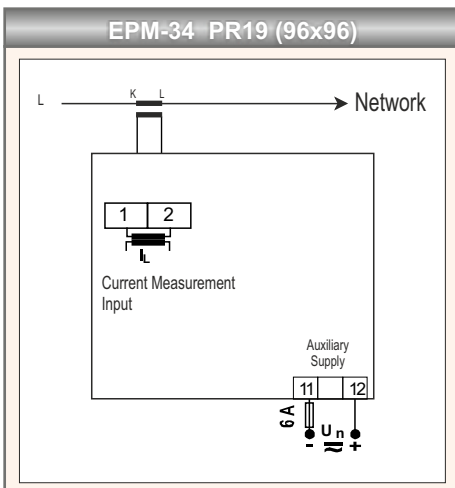
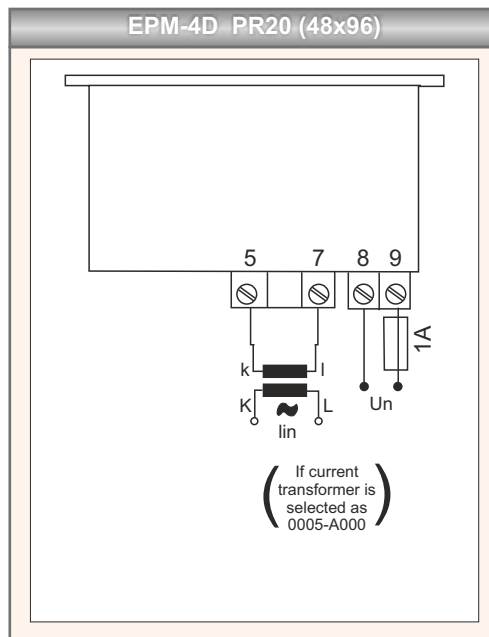
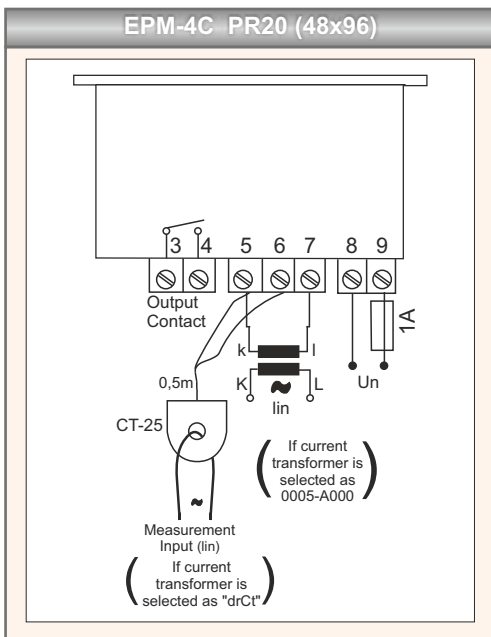
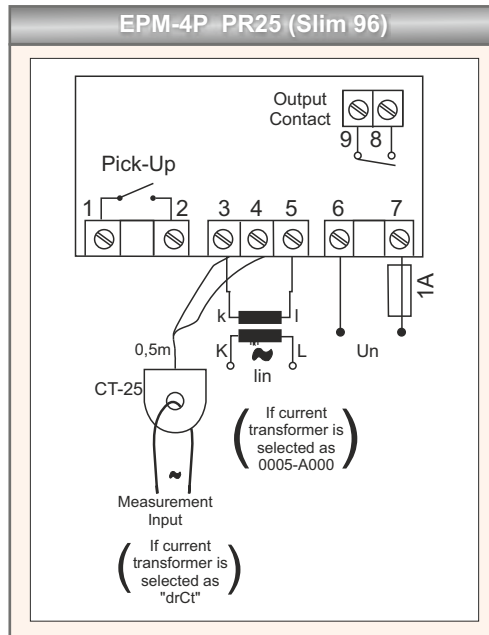
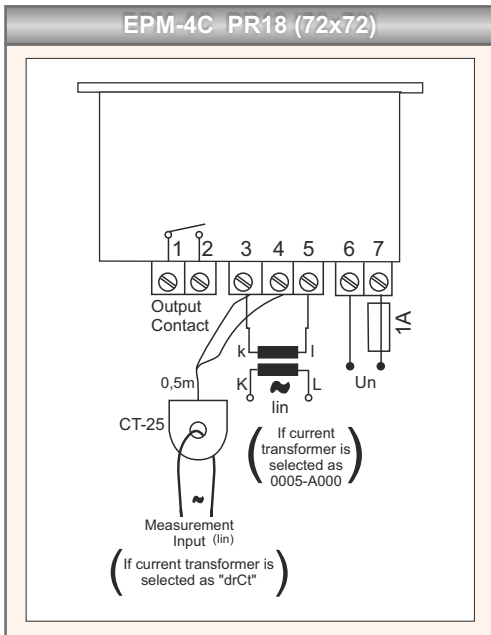


Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entec.com.tr.

Ammeters

EPM / EPM-R Series

Connection Diagram



Voltmeters

EVM / EVM-R Series



EVM-35

- 24 ~ 250 VAC/DC (for EVM-35/15)
- Measurement Range with Transformer 1-40 kV (for EVM-35/15)
- Class 0,5 (for EVM-35/15)
- IP54 (for EVM-35/15)
- True RMS Measurement
- Double Insulation (),
- Measurement Category III
- Operating Temperature : -5°C / +50°C, -5°C,+70°C (for EVM15/35)



EVM-3S-48
(VLL and VLN parameters
can be switched on display.)

PRODUCT SELECTION TABLE

Product Code		Selectable 3-phase	3 ~ Voltage	1 ~ Voltage	Max. Value	Min. Value	Output Contact	24 - 250 VAC/DC	Front Panel Mounting	Pcs / Box
EVM-3-48	Voltmeter			●	●	●			●	20
EVM-3-72	Voltmeter			●	●	●			●	16
EVM-3-96	Voltmeter			●	●	●			●	12
EVM-3C-48	Voltmeter (with Output Contact)			●	●	●	●		●	20
EVM-3C-72	Voltmeter (with Output Contact)			●	●	●	●		●	16
EVM-3C-96	Voltmeter (with Output Contact)			●	●	●	●		●	12
EVM-3S-48	3-Phase Selectable Voltmeter	●							●	20
EVM-3S-72	3-Phase Selectable Voltmeter	●							●	16
EVM-3S-96	3-Phase Selectable Voltmeter	●							●	12
EVM-15-96	Voltmeter (Class 0,5)			●				●	●	8
EVM-35-96	3-Phase Voltmeter (Class 0,5)		●					●	●	12

Voltmeters

EVM / EVM-R Series

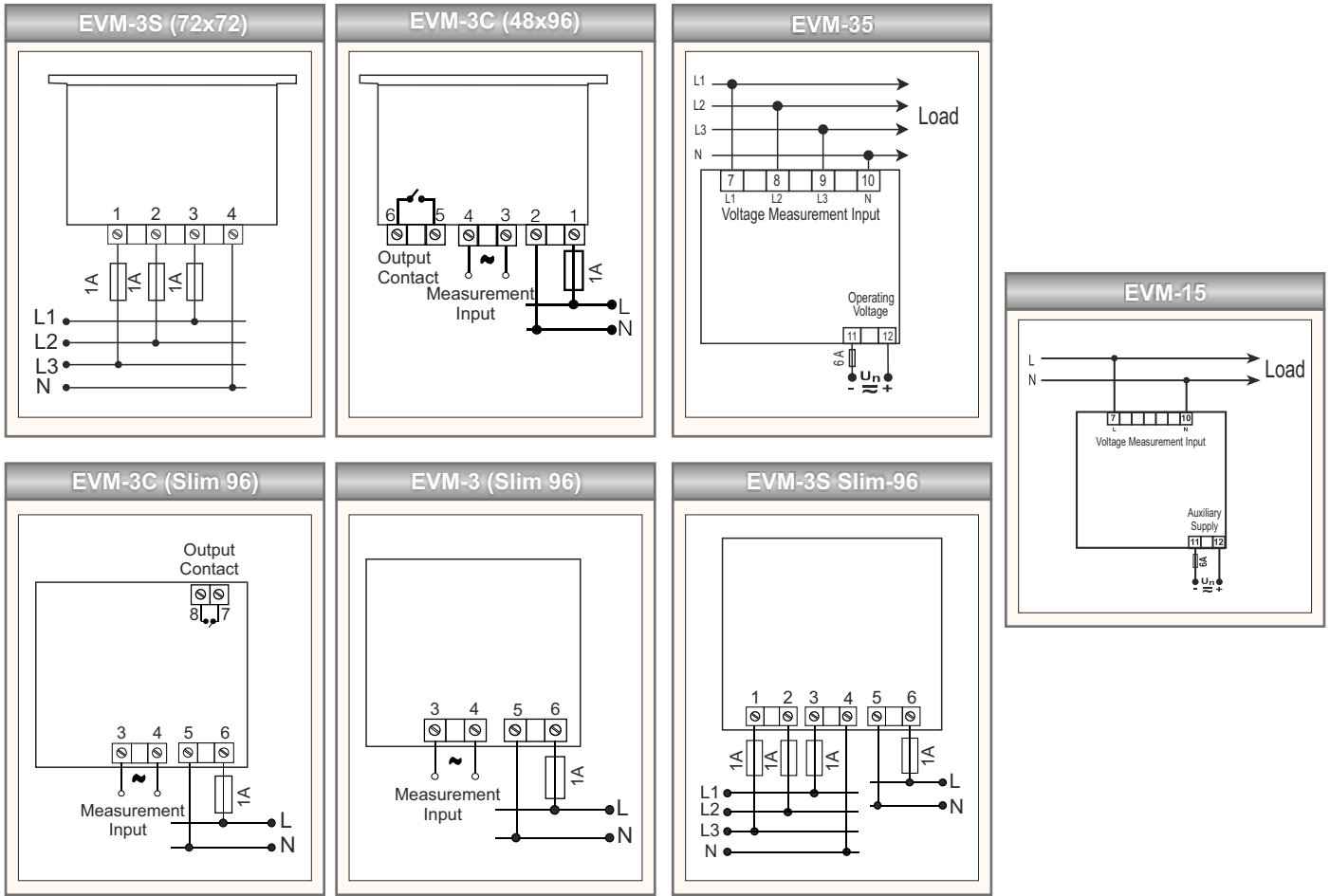
SPECIFICATIONS

	EVM-3	EVM-3C	EVM-3S	EVM-15	EVM-35
ENCLOSURE					
Dimensions	72x72mm PR18; Slim96 PR25, 48x96mm PR20			96x96mm PR19	
Protection Class	Front: IP40				
Weight	0,28kg/pcs (PR18), 0,30kg/pcs (PR25), 0,25kg/pcs (PR20)			0,30 kg/pcs	0,34kg/pcs
MEASUREMENT					
VOLTAGE					
Measurement Range	10-600VAC		10-300VAC(L-N) 10-500VAC(L-L)	1-300VAC	1-300VAC(L-N) 2-500VAC(L-L)
Accuracy	%1±1digit			%0,5±1digit	
Burden(Input)	<1VA				
Sampling Rate (per Period)	64				
SUPPLY					
Operating Voltage	110VAC/230V AC±%10			24-250VAC/DC	
Operating Frequency	45-65Hz				
Power Consumption	<4VA				
OUTPUT					
Output Contact	-	0-99,9 sec	-	-	-
Delay Time (adjustable)	-	1NO,5A 1250VA	-	-	-
STANDARDS					
Security Standards	EN 61010				
EMC Standards	EN 61000				
Mechanical Endurance	EN 60529				
AMBIENT CONDITIONS					
Operating Temperature	-5 / +50°C			-5 / +70°C	
Overvoltage Category	III				
CONNECTION					
Mounting	Front Panel				
Connection Terminals	Socket with screw				
Connection Types	1P2W		3PW(Star)	1P2W	3P4W (Star)

Voltmeters

EVM / EVM-R Series

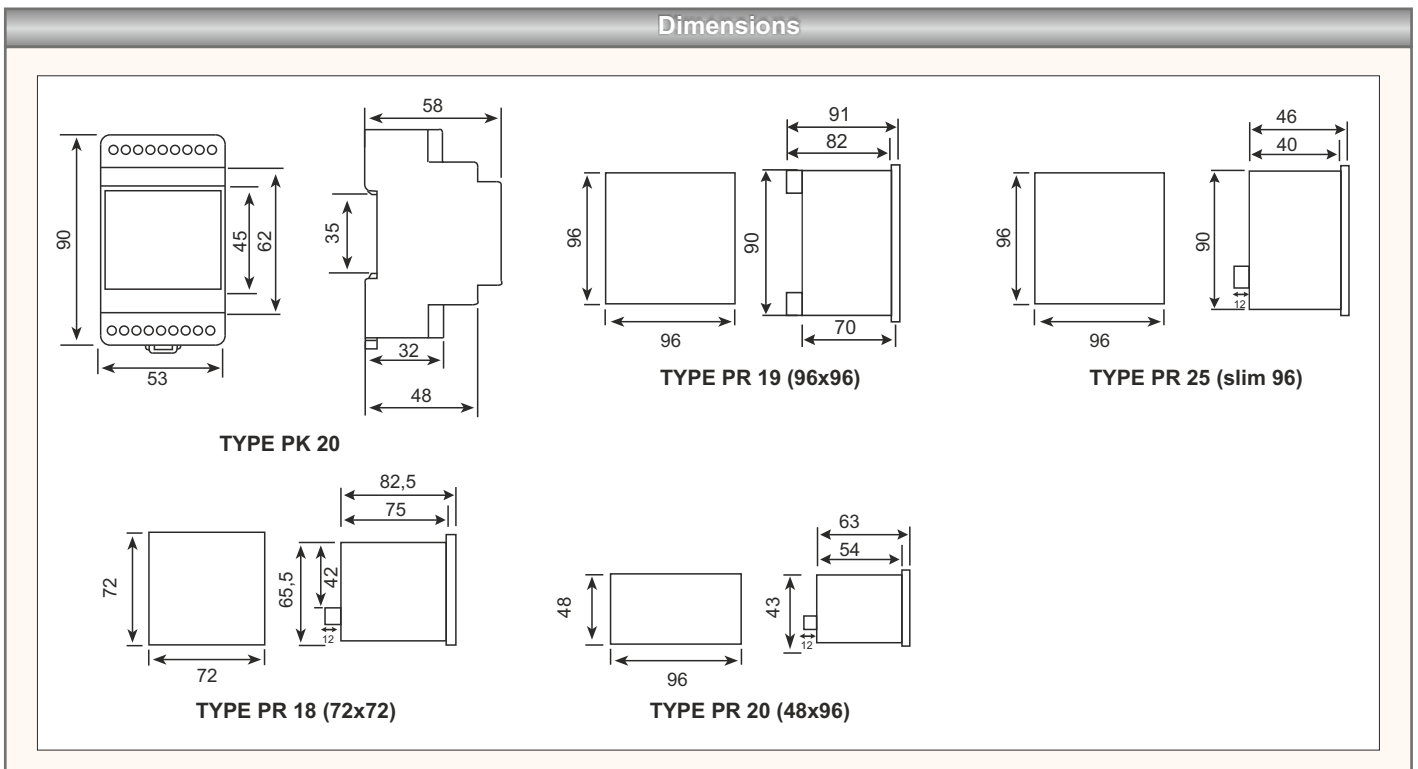
Connection Diagram



Electrical Measurement



Dimensions



Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.ent.es.com.tr.

Frequencymeter / Cosκmeter

EFC / ECR Series



ECR-3-72

EFC-3-72

ECR-3

Cosκmeter measures Cosκ of the energy received from the network. It also indicates whether the operating load is inductive or capacitive.

EFC-3

Frequency meter sensitively measures the frequency of the operating voltage at industrial sites.

- Double Insulation ()
- Measurement Category III
- IP 40 (Front Panel)

CE

PRODUCT SELECTION TABLE

Product Code

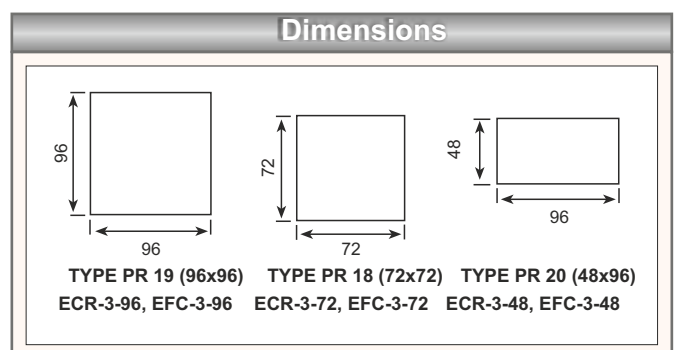
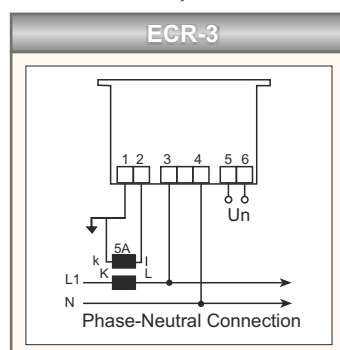
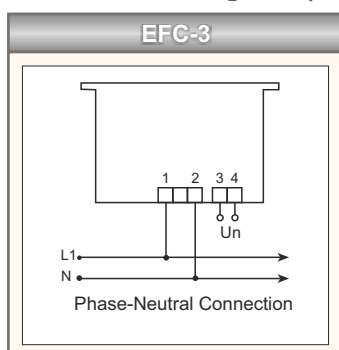
Pcs / Box

ECR-3-48	Cosκmeter (0 - 1,00 ind., cap.)	20
ECR-3-72	Cosκmeter (0 - 1,00 ind., cap.)	16
ECR-3-96	Cosκmeter (0 - 1,00 ind., cap.)	12
EFC-3-48	Frequencymeter (20-400 Hz.)	20
EFC-3-72	Frequencymeter (20-400 Hz.)	16
EFC-3-96	Frequencymeter (20-400 Hz.)	12

SPECIFICATIONS

	Frequency meter	Cosκmeter
	EFC-3	ECR-3
ENCLOSURE		
Dimensions	72X72mm(PR18), 96X96mm (PR19), 48X96mm (PR20)	
Protection Class	Front: IP40, Terminals: IP00	
Weight	0,3kg/pcs(PR18); 0,3kg/pcs (PR20), 0,3kg/pcs (PR19)	
Display	Red LED; Height 14,2mm	
MEASUREMENT		
Frequency / Cos κ		
Voltage Input	30-300 VAC (L-N)	50-300 VAC (L-N)
Measurement Range	20-400 Hz	0,00-1,00 (Inductive-Capacitive)
Accuracy	1%±1 digit	2%±1 digit
Current Measurement		100mA-5,5A
Current Transformer Ratio		.../5A
SUPPLY		
Operating Voltage	110 VAC, 230 VAC±10%	
Operating Frequency	45-65Hz	50/60Hz
AMBIENT CONDITIONS		
Operating Temperature	-5 / +50°C	
Over Voltage Category	III	
CONNECTIONS		
Mounting	Front Panel Mounting	
Connection Terminals	Terminal with screw	
Connection Types	Single Phase, 2 wires	

Connection Diagram (PR25- 96x96mm)



Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entec.com.tr.

Current Transducers

TA Series



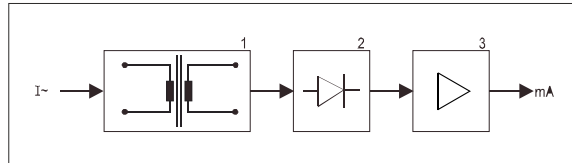
TA-112

Transducers convert the electrical signals reaching their inputs into analog signals. They are mainly used in automation systems.

TA-111 and TA-112 current transducers are input-supplied. No additional supply voltage is needed.

Output signal is 0-20mA. The transformer used in the input circuit of TA-111 and TA-112 current transducers provides galvanic isolation between input and output signals.

CE



PRODUCT SELECTION TABLE

Product Code

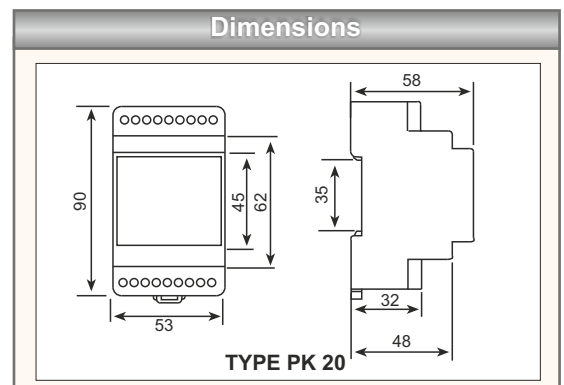
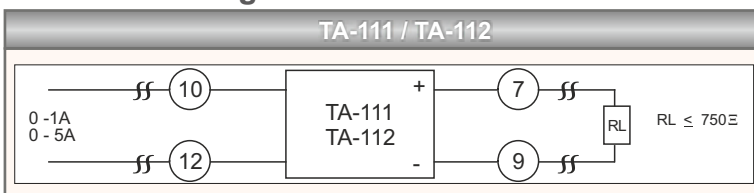
Pcs./Box

TA-111	Input : 0-1A AC, Output : 0-20mA DC	Current Transducer	16
TA-112	Input : 0-5A AC, Output : 0-20mA DC	Current Transducer	16

SPECIFICATIONS

	TA-111	TA-112
ENCLOSURE		
Dimensions	DIN III Type PK 20	
Protection Class	Double Insulation IP40 front panel	
Weight	0,3 kg/pcs	
MEASUREMENT		
Input current	0-1A	0-5A
Over Load Capacity	1,5xIn (continuous) 20xIn(1s)In=1A	1,5xIn (continuous) 20xIn(1s)In=5A
Power Consumption	<3VA	
Output Signal	0-20mA DC	
Linear Output Range	(0,05...1,1)xIn	
Load	0-750 ohm	
Transmission Error	<0,5% (Full scale)	
Response Time	<300 ms	
Frequency	50 Hz	
AMBIENT CONDITIONS		
Operating Temperature	-5 / +50°C	
Humidity	<75%	
CONNECTIONS		
Mounting	Rail Mounting	
Connection Terminals	Screw Type	

Connection Diagram



Connection diagrams are given as references. For the latest connection diagrams, please refer to the user manual or www.entec.com.tr.

Voltage Transducer

TV Series

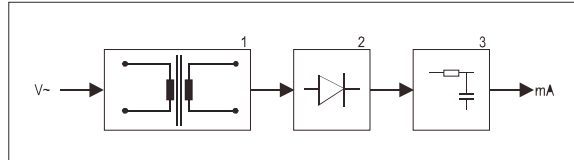


TV-111

Transducers convert the electrical signals into analog signals, and mainly used in automation systems.

TV-111 voltage transducers are input-supplied. No additional supply voltage is applied. Output signal is 0-20mA. The transformer used in the input circuit of TV-111 voltage transducers provides galvanic isolation between input and output signals.

CE



PRODUCT SELECTION TABLE

Product Code

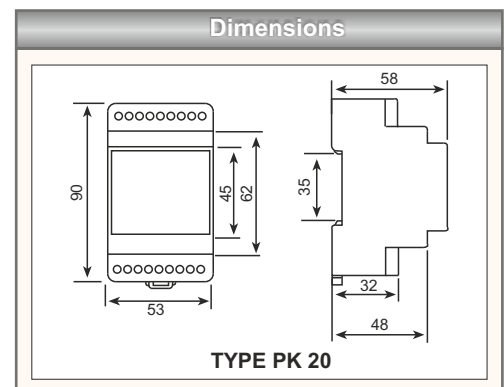
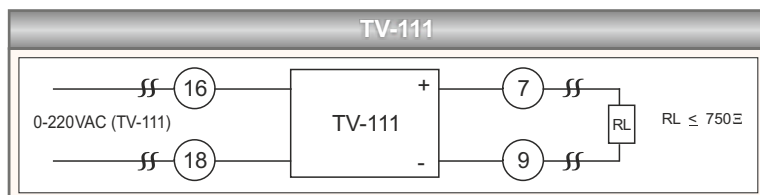
Pcs./Box

TV-111	Input : 0-220 VAC, Output : 0-20mA DC	Voltage Transducer	16
--------	---------------------------------------	--------------------	----

SPECIFICATIONS

	TV-111
ENCLOSURE	
Dimensions	DIN III PK 20, 16 pcs/box
Protection Class	Double Insulation IP40 front panel
Weight	0,25 kg/pcs
MEASUREMENT	
Input voltage	0-220 VAC
Over Load Capacity	1,2xUn (continuous) 2xUn(1s)Un=220V AC
Power Consumption	<4VA
Output Signal	0-20mA
Linear Output Range	(0,5...1,1)xUn
Load	0-750 Ω
Transmission Error	<0,5% (Full Scale)
Response Time	<300 ms
Frequency	50 Hz
AMBIENT CONDITIONS	
Operating Temperature	-5 / +50°C
Ambient Humidity	<75%
CONNECTIONS	
Mounting	Rail Mounting
Connection Terminals	Screw Type

Connection Diagram

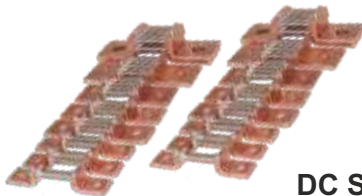


DC Ammeters

DCA Series



DCA-10S



DC Shunts

Features;

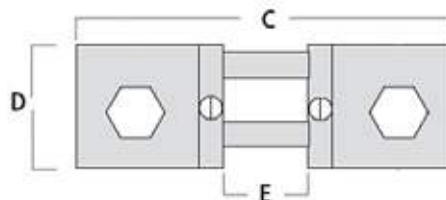
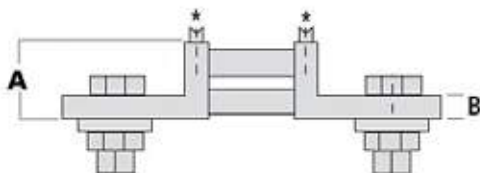
- Current is measured via an externally connected shunt resistance.
- Wide supply voltage range, 85-265 VAC/DC (DCA-10), 10-56 VDC (DCA-11)
- **Communication with the MODBUS RTU protocol over the RS-485 line**
- With 2 Programmable Alarm Relays, the range where the current rating in system is required to run can be determined and when the current goes out of this limit, it can be ensured to give warning signal by Alarm1 (C1) and Alarm2 (C2) contact outputs. (DCA-10C/10CS/11C/11CS)
- Saves maximum and minimum values,
- Easy access to the settings with the backlit LCD display
- Demand period adjustable between 1 to 600 seconds.

PRODUCT SELECTION TABLE

Product Code	1~Current	Max. Value	Min. Value	Class 0.5	Measurement Range +/-10kA DC	2 Output Contact	RS-485 Modbus	Panel Type	10-56 VDC	85-265 VAC/DC	Pcs/Box
DCA-10	●	●	●	●	●			●		●	20
DCA-10C	●	●	●	●	●	●		●		●	20
DCA-10S	●	●	●	●	●		●	●		●	20
DCA-10CS	●	●	●	●	●	●	●	●		●	20
DCA-11	●	●	●	●	●			●	●		20
DCA-11C	●	●	●	●	●	●		●	●		20
DCA-11S	●	●	●	●	●		●	●	●		20
DCA-11CS	●	●	●	●	●	●	●	●	●		20

PRODUCT SELECTION TABLE

Product Code		A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Fixing Bolt	Weight	Pcs/Box
SA60-30	30A, 60mV Shunt	12,5	3	100,28	15	45,25	M5	29,4	1
SA60-40	40A, 60mV Shunt	12,5	3	88,9	15	33,9	M5	28,2	1
SA60-50	50A, 60mV Shunt	12,5	3	90	15	35	M5	29,5	1
SA60-60	60A, 60mV Shunt	12,5	3	91,5	15	36,5	M5	30,6	1
SA60-100	100A, 60mV Shunt	12,5	5	105,4	20	39,4	M8	77	1
SA60-150	1500A, 60mV Shunt	17,5	5	104	20	38	M8	81,3	1
SA60-250	250A, 60mV Shunt	17,5	5	120,5	30	38,5	M10	141,8	1
SA60-500	500A, 60mV Shunt	20	5	137,4	50	39,4	M10	293,8	1
SA60-1000	1000A, 60mV Shunt	34	10	153,4	50	39,4	M16	738	1



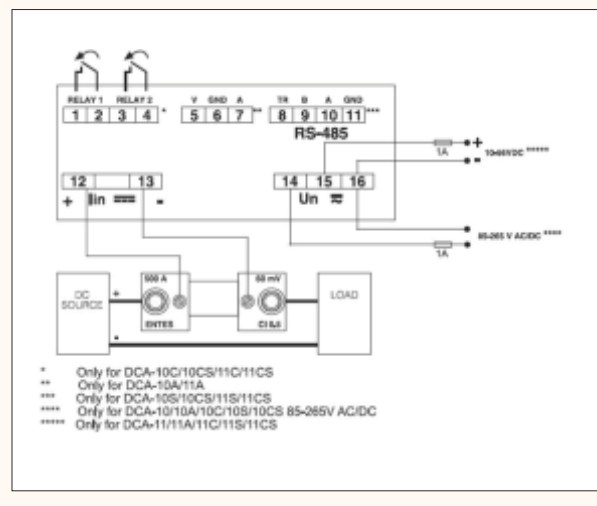
DC Ammeters

DCA Series

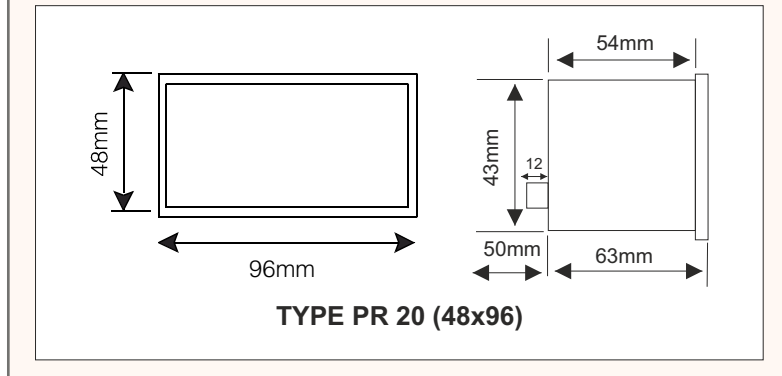
SPECIFICATIONS

	DCA-10	DCA-10S	DCA-10C	DCA-10CS	DCA-11	DCA-11S	DCA-11C	DCA-11CS
ENCLOSURE								
Dimensions	PR 20, 48x96 mm							
Protection Class	Front: IP40 / Terminals: IP00							
Weight	0,240 kg/pcs.							
Display	2.5" Backlighted LCD							
MEASUREMENTS								
Measurement Input Impedance	1K Ω							
Accuracy	%0.5 \pm 1 Digit [(%10 - %100) x full scale]							
Burden (Input Load)	< 1 VA							
Measurement Period	1-600 s							
Current								
Measurement Range	\pm 10000 A							
Shunt Current	1A - 10000A (10kA)							
Shunt Voltage	50mV - 150mV							
Supply								
Operating Voltage	85 - 265 VAC/DC				10 - 56 VDC			
Power Consumption	< 4 VA							
Operating Frequency	50-60 Hz							
OUTPUT								
Relay Output	2 NO, 5A/1250VA (DCA-10C/10CS/11C/11CS)							
STANDARDS								
Applied Security Standards	EN 61010-1							
Applied EMC Standards	EN 61000-4							
Applied Mechanical Endurance Standards	EN 60529, EN 60255							
Device Protection Class	Double Insulated - Class II							
AMBIENT CONDITIONS								
Operating Temperature	-20 / +70 $^{\circ}$ C							
Oversvoltage Category	III							
CONNECTIONS								
Mounting	Panel mounting (PR 20)							
Mounting Class	III							
Connection Terminals	PR 20 Sockets with screws							
Connection Types	Single Phase, 2 Wires							
Cable Cross-section (For Terminals)	2,5 mm 2							
COMMUNICATION								
Interface / Protocol	-	RS-485 Modbus RTU	-	RS-485 Modbus RTU	-	RS-485 Modbus RTU	-	RS-485 Modbus RTU
Parity	-	None, Odd, Even	-	None, Odd, Even	-	None, Odd, Even	-	None, Odd, Even
Address	-	1-247	-	1-247	-	1-247	-	1-247
Transfer Speed	-	2400-38400 bps	-	2400-38400 bps	-	2400-38400 bps	-	2400-38400 bps

Connection Diagram



Dimensions



DC Voltmeters

DCV Series



DCV-10S

The device has been designed to measure the voltage of a DC system.

- Wide supply range, 85-265 VAC/DC(DCV-10),10-56 DC (DCV-11)
- **Communication with MODBUS RTU protocol over RS485 line**
- With 2 Pieces of Programmable Alarm Relays, the range where the voltage rating in system is required to run can be determined and when the voltage goes out of this rating, it can be ensured to give warning signal by Alarm1 (C1) and Alarm2 (C2) contact outputs. (DCA-10C/10CS/11C/11CS)
- Saves maximum and minimum values
- Easy access to settings and best view under any lighting condition with the help of backlit LCD screen
- Adjustable demand period between 1 and 600 seconds

PRODUCT SELECTION TABLE

Product Code	1~Voltage	Max. Value	Min. Value	Class 0.5	Measurement +/- 200 VDC	2 Output Contact	Analog Output	RS-485 Modbus	Panel Type	10-56 VDC	85-265 VAC/DC	Pcs. / Box
DCV-10	●	●	●	●	●				●		●	20
DCV-10S	●	●	●	●	●	●			●		●	20
DCV-10C	●	●	●	●	●			●	●		●	20
DCV-10CS	●	●	●	●	●	●		●	●		●	20
DCV-11	●	●	●	●	●				●	●		20
DCV-11S	●	●	●	●	●	●			●	●		20
DCV-11C	●	●	●	●	●			●	●	●		20
DCV-11CS	●	●	●	●	●	●		●	●	●		20

DC Voltmeters

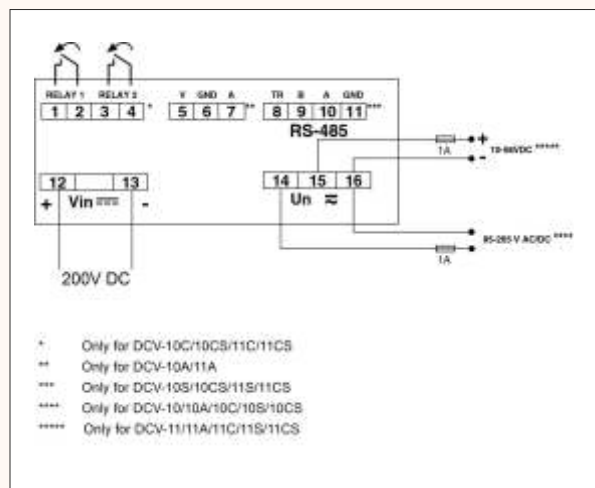
DCV Series

Electrical Measurement

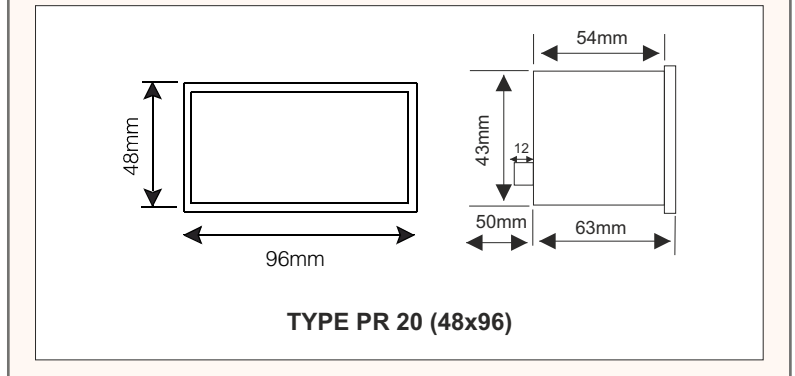
SPECIFICATIONS

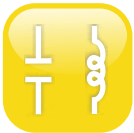
	DCV-10	DCV-10S	DCV-10C	DCV-10CS	DCV-11	DCV-11S	DCV-11C	DCV-11CS
ENCLOSURE								
Dimensions	PR 20 48x96 mm							
Protection Class	Front: IP40, Terminals: IP00							
Weight	0,240 kg/pcs							
Display	2.5" Backlighted LCD							
MEASUREMENTS								
Measurement Input Resistor	< 2MΩ							
Accuracy	%0.5 ± 1 Digit [(%10 - %100) x full scale]							
Burden (Input Load)	< 1 VA							
Demand Period	1 - 600 s							
Voltage								
Measurement Range	+/- 200 VDC							
Supply								
Operating Voltage	85 - 265 VAC/DC				10 - 56 VDC			
Power Consumption	< 4 VA							
Operating Frequency	50-60 Hz				-			
STANDARDS								
Applied Security Standards	EN 61010-1							
Applied EMC Standards	EN 60255							
Applied Mechanical Endurance Standards	EN 60529							
Device Protection Class	Double Insulated - Class II							
AMBIENT CONDITIONS								
Operating Temperature	-20 / 70°C							
Overvoltage Category	III							
CONNECTIONS								
Mounting	Panel mounting (PR 20)							
Mounting Class	III							
Connection Terminals	PR 20 Screw with socket							
Connection Types	Single Phase, 2 Wires							
Cable Cross-section (For Terminals)	2,5 mm ²							
COMMUNICATION								
Communication Interface / Protocol	-	RS-485 Modbus RTU	-	RS-485 Modbus RTU	-	RS-485 Modbus RTU	-	RS-485 Modbus RTU
Parity	-	None, Odd, Even	-	None, Odd, Even	-	None, Odd, Even	-	None, Odd, Even
Address	-	1-247	-	1-247	-	1-247	-	1-247
Transfer Speed	-	2400-38400 bps	-	2400-38400 bps	-	2400-38400 bps	-	2400-38400 bps

Connection Diagram



Dimensions





Power Factor Correction

ENTES Power Factor Correction products have been designed to prevent consumption of reactive energy (kVAh) over the values specified in regulations. Therefore, the users avoid paying reactive costs, and over all energy costs are reduced by decreasing losses in transmission/ distribution lines.

Power Factor Controllers

- RGA Series NEW
- RGSR Series NEW
- RGA / RGSR OG Series NEW
- RG3-C Series
- RG3-e Series
- RG-B Series
- RG-T Series

Inductive Load Drivers

- SR Series NEW

Shunt Reactors

- ENT.ERS Series
- ENT.SRS Series

LV. Capacitors

- ENT.CF Series
- ENT.CM Series
- ENT.C10 Series
- ENT.CXD Series
- ENT.CMD Series
- ENT.C100 Series

Detuned Filter Reactors

- ENT.ERH Series

Capacitor Duty Contactors

- ENT.KT Series

Thyristor Switches

- SC Series
- SPD Surge Voltage Protection Device

Current Transformers

- ENT Series
- ENS.AYC Series
- ENS.AYS Series
- ENS.CYS Series
- ENS.3PM Series ↪ plug&meter
- ENS.3PMD Series ↪ plug&meter
- ENS.3PH Series
- ENS.CCT Series
- CT Serisi

Discharge Units

- DU-3

Power Factor Controllers

RG / RG3 / RGA / RGSR Series

The compensation of the systems, where RG-T and RG-B/BS series reactive power control relays and balanced loads are present, is done by measuring the current info through single phase.

RG3 series devices ensure compensation of the systems with unbalanced loads by measuring voltage and current values of each 3 phases separately.

RG3-15CL/CLS relays provides exact solutions for compensation of inductive and capacitive loads by performing both capacitor and shunt reactor controls

New RGA & RGS series Power Factor Controllers provides superior compensation experience thanks to Graphic LCD screen and driver support.

RGSR series Power Factor Controller's Works with the inductive load driver's and solves the imbalance of each phase where the loads are rapidly changing and imbalanced.



Power Factor Correction

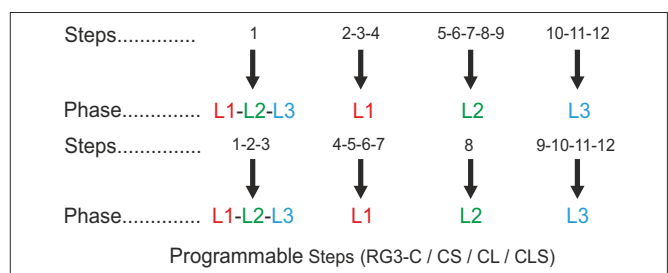
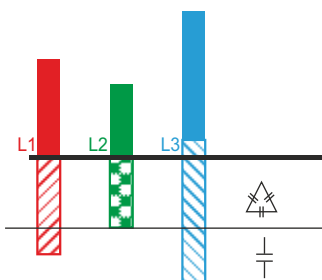
Product Selection Table

Product Code	Step	Size (mm)	Shunt Reactor	Smart Switching	SVC	M.V (Medium Voltage)	1 Phase, 1 Current Transformer	3 Phase, 3 Current Transformer	1-Phase Capacitor	3 Phase Capacitor	Total Active, Reactive and Apparent Power	Active and Reactive Energy	THD Protection	1-19. Current and Voltage Harmonics	1-51 Current and Voltage Harmonics	Dual Target Cosφ	Auto Setup	Password Protection	RS-485 Communication	Internal Thermal Control	Contact Output	External Thermal Control	Pcs / Box
RG-6T	6	144x144					●		●														4
RG-8T	8	144x144					●		●														4
RG-12T	12	144x144					●		●														4
RG-8B-96	8	96x96	●				●		●				●			●	●	●		●			8
RG-8BS-96	8	96x96	●				●		●				●	●		●	●	●		●			8
RG-12B	12	144x144	●				●		●				●			●	●	●					4
RG-12BS	12	144x144	●				●		●				●			●	●	●					4
RG3-12e	12	144x144	●					●	●	●			●				●	●					4
RG3-12C	12	144x144	●					●	●	●	●	●	●	●		●	●	●			●	○	4
RG3-12CS	12	144x144	●					●	●	●	●	●	●	●		●	●	●	●		●	○	4
RG3-15C	15	144x144	●					●	●	●	●	●	●	●		●	●	●			●		4
RG3-15CS	15	144x144	●					●	●	●	●	●	●	●		●	●	●	●		●		4
RG3-15CL	15	144x144	●	●				●	●	●	●	●	●	●		●	●	●			●		4
RG3-15CLS	15	144x144	●	●				●	●	●	●	●	●	●		●	●	●	●		●		4
RGA-15S	15	144x144	●	●				●	●	●	●	●	●		●	●	●		●		●		4
RGA-20S	20	144x144	●	●				●	●	●	●	●	●		●	●	●		●		●		4
RGA-24S	24	144x144	●	●				●	●	●	●	●	●		●	●	●		●		●		4
RGSR-15S	12 + SVC	144x144	●	●	●			●	●	●	●	●	●		●	●	●		●		●		4
RGSR-20S	16 + SVC	144x144	●	●	●			●	●	●	●	●	●		●	●	●		●		●		4
RGSR-24S	20 + SVC	144x144	●	●	●			●	●	●	●	●	●		●	●	●		●		●		4
RGA-20S-OG	24	144x144	●	●		●		●	●	●	●	●	●		●	●	●		●		●		4
RGSR-24S-OG	20 + SVC	144x144	●	●	●	●		●	●	●	●	●	●		●	●	●		●		●		4

* RG3-15CL/CLS can be ordered as 14C+1L or 12C+3L.

○ Optional

Performing power factor correction with three-phase capacitors while the loads are balanced and with single-phase capacitors at phases where unbalance loads occur, RG3 series offers a unique solution for balanced and unbalanced loads.



Power Factor Controllers

RGA Series

NEW



RGA Series

RGA series Power Factor Controllers have been designed to reply to every kind of compensation needs with innovative structure and superior feature.

New generation smart compensation algorithm, steps are easily and rapidly operated with the support of unbalanced load elimination feature also with quick and smart step management system; the faults of equipment's in compensation system easily detected for monitoring or warning.

Capacitor depreciation measurements and unwanted conditions like contact sticker can be simultaneously sensed by RGA devices.

RGA series, reply loads which are made by capacitive characters of devices with supporting of using shunt reactor and capacitors together.

Automatic identification of steps and organization of connections provided by advanced infrastructure and algorithm.



Product Selection Table

Product Code	Dimensions (mm)	2nd Current Transformers	Smart PFC Models	Graphical LCD	3 Phase Current	Maximum Step	Smart Step Management	Single Phase Capacitor	Shunt Reactor	Three Phase Capacitor	Voltage(V) Current(I)	Cosφ	Power Factor	Active Power (W)	Reactive Power (kVA)	Apparent Power(kVA)	kWh, kVAh, kVAh	%THD I, %THD V	Individual Harmonic	RS-485 Communication	Generator Cosφ3	85-315 VAC
RGA-15S	144x144	●	●	●	●	15	●	●	●	●	●	●	●	●	●	●	●	●	51	●	●	●
RGA-20S	144x144	●	●	●	●	20	●	●	●	●	●	●	●	●	●	●	●	●	51	●	●	●
RGA-24S	144x144	●	●	●	●	24	●	●	●	●	●	●	●	●	●	●	●	●	51	●	●	●

- 15, 20, 24 step options
- New generation algorithm for evaluating 1 million compensation possibility
- Shunt reactors and Capacitors are able to used at the same time
- Making efficient compensation configurations with Eco, Standard and Sensitive mode options
- Enhancing of compensation sensibility with second compensation current input.
- Fixed Group
- Harmonic distortions can be measured up to 51.
- By the V4 voltage input feature Neutral-Earth voltage can be measured.
- Automatic step recognition and connection fix
- Remote monitoring compensation with 240x160 graphic display

Power Factor Correction



Static VAr Compensation

RGSR Series

NEW



RGSR Series

RGSR series Power Factor Controllers have been designed to answer Static VAr Compensation (SVC) needs with innovative and high performance feature.

ENTES SVC compensation solutions are the ideal ENTES Static VAr Compensation(SVC) solving system for rapidly changing and unbalanced loads .

Ensure accurate compensation solution with fast replying to load changings shorter than 20 ms. in companies which have spot welding machine, rolling plan, crane, lift ,car industries and hospital applications.

In ENTES SVC solutions, inductive load drivers working with RGSR series power factor controllers are designed to work with full load with 3 pcs single phase shunt reactor simultaneously.

In this way, shunt reactors switching powers adjustably with thyristor by triggering in specific angles ENTES 5 kVAr,10 kVAr,20 kVAr, 30 kVAr inductive load drivers, replies very fastly even smallest loads with switching shunt reactors according to needs.

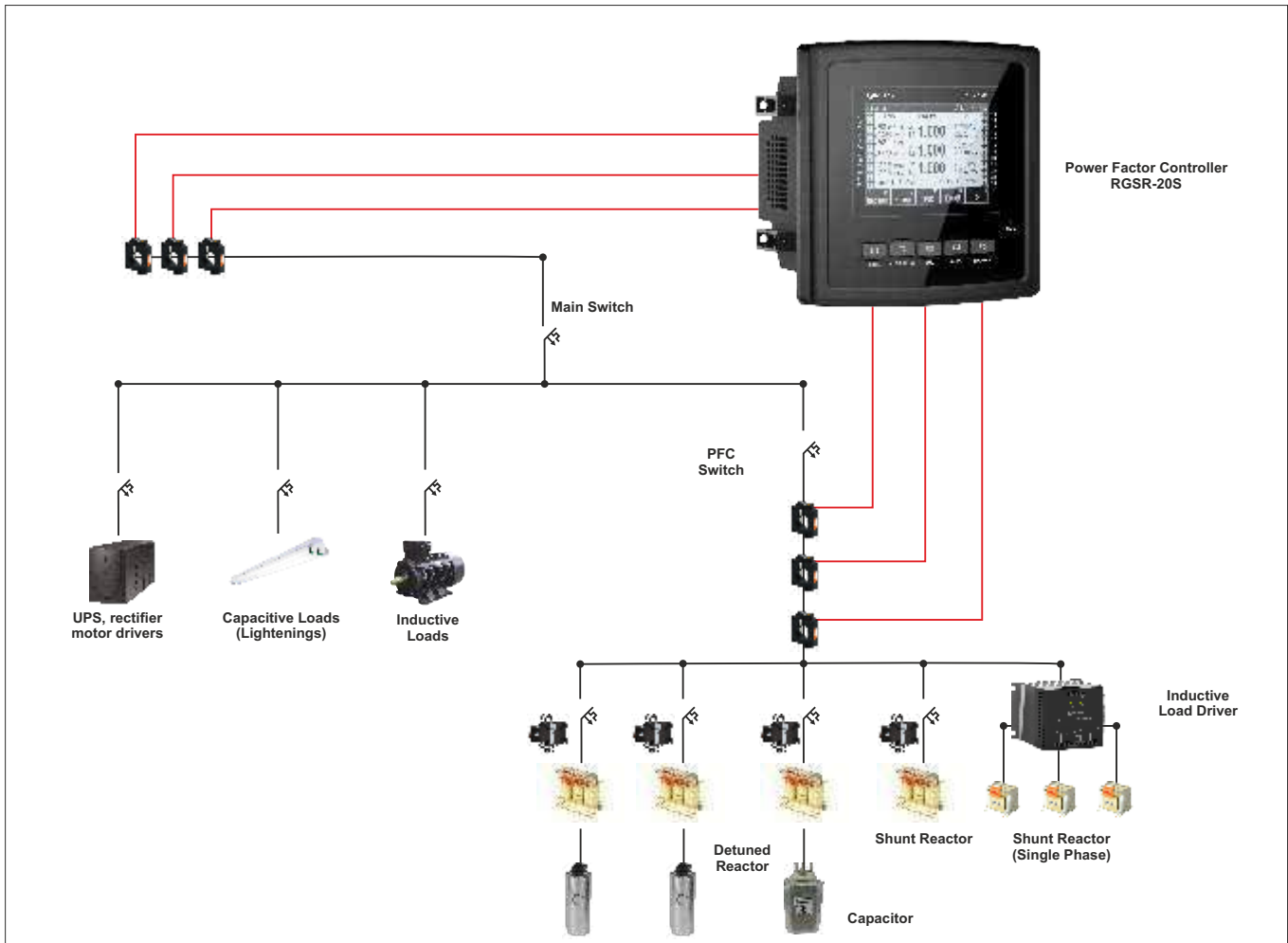
ENTES produced special SVC products, to make excellent solutions for capacitive loads by using 1,66 kVAr, 3,33 kVAr, 6,66 kVAr and 10 kVAr single phase shunt reactors.



Product Selection Table

Product Code	Dimensions (mm)	2nd Current Transformers	SVC	Smart PFC Models	Graphical LCD	3 Phase Current	Maximum Step	Smart Step Management	Single Phase Capacitor	Shunt Reactor	Three Phase Capacitor	Voltage Currnt	Cosk	Power Factor	Active Power	Reactive Power	Apparent Power	kWh, kVArh, kVAh	%THD I, %THD V	Individual Harmonic	RS-485 Communication	Generator Cosk3	85-315 VAC	
RGSR-15S	144x144	●	●	●	●	●	12+SVC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
RGSR-20S	144x144	●	●	●	●	●	16+SVC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
RGSR-24S	144x144	●	●	●	●	●	20+SVC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Power Factor Correction



M.V. Compensation

RGA / RGSR OG Series

NEW

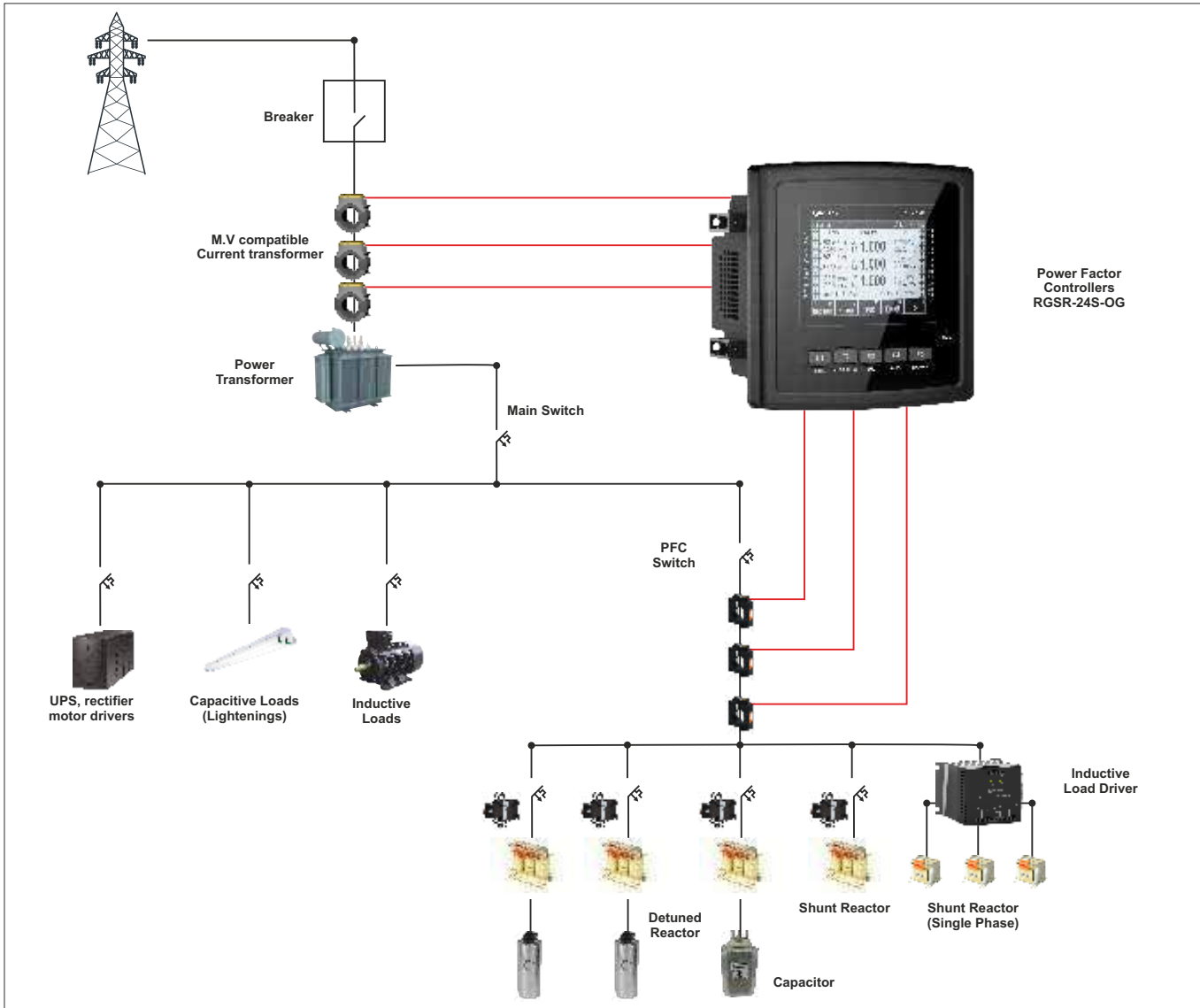


RGSR-24S-OG

Companies which has energy meters in M.V power transformation's primer side, has raised compensation rates and companies have to pay reactive costs because of changing transformer losses caused by changed fixed capacitor requirements especially in holidays that transformers are working in no-load running or in seasonal businesses where the season is closed. RGA&RGSR-OG series Power Factor Controllers, meeting needs which are described above and designed to reply all kind of compensation needs with innovative structure and superiors features which have M.V power transformers inside the companies facilities. RGA&RGSR-OG series Power Controllers consist of 2 current inputs. X/5 or X/1 (match with M.V) current transformers which are located in M.V should be connected into the first current input (CUR1),L.V current transformers should be connected to compensation circuit breaker output into the second current input (CUR2).It is recommended to connect second current transformer in RGSR-OG

PRODUCT SELECTION TABLE

Product Code	Dimensions (mm)	2nd Current Transformers	M.V.	SVC	Smart PFC Models	Graphical LCD	3 Phase Current	Maximum Step	Smart Step Management	Single Phase Capacitor	Shunt Reactor	Three Phase Capacitor	Voltage Currnt	Cos ϕ	Power Factor	Active Power	Reactive Power	Apparent Power	kWh, kVAh, kVAh	%THD I, %THD V	Individual Harmonic	RS-485 Communication	Generator Cos ϕ 3	85-315 VAC
RGA-20S-OG	144x144	●	●	●	●	●	●	20	●	●	●	●	●	●	●	●	●	●	51	●	●	●	●	●
RGSR-24S-OG	144x144	●	●	●	●	●	●	20+SVC	●	●	●	●	●	●	●	●	●	●	51	●	●	●	●	●



Power Factor Correction

Power Factor Controllers

RG / RG3 / RGA / RGSR Series

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Phase Current (I)	Active Power (P)	Apparent Power (S)
	$\cos\phi$	Reactive Power (Q)	

RG-T series



Individual Voltage Harmonics - up to 19th	Total Harmonic Distortion for Voltage (THD V)
Individual Current Harmonics- up to 19th	Total Harmonic Distortion for Current (THD I)

RG-B / RG-BS series



3-Phase Currents (I)	Total Active power ($\sum P$)	Total Apparent Power ($\sum S$)	Total Reactive Power ($\sum Q$)
Active Energy - Import (kWh)	Active Energy - Export (kWh)	Capacitive Reactive Energy (kVAh C)	Inductive Reactive Energy (kVAh L)

RG3-C / RG3-CS series



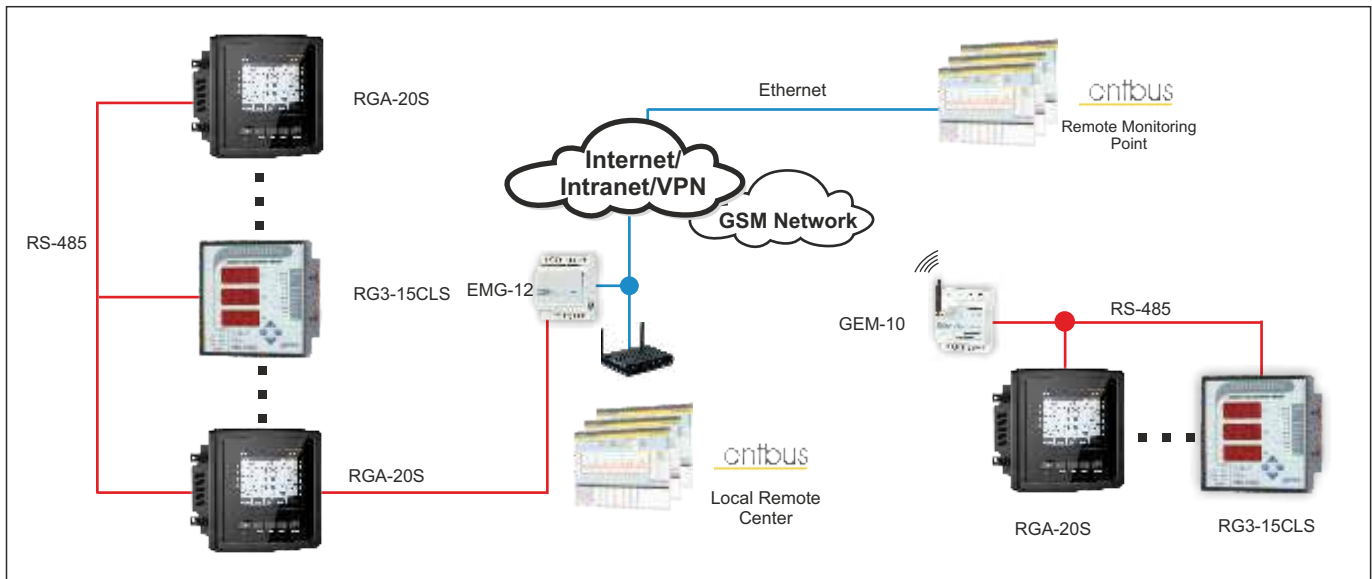
2,5, ... 51th Voltage Harmonics Individually	2,5, ... 51th Current Harmonics individually	Active Energy Index (Es)	Reactive Inductive Index (Erc)
Reactive Capacitive Index (Erc)	Apparent Energy Index (Es)	Generator Energy Index (Es)	PFC Current

RGA & RGSR series



Power Factor Controllers

RG / RG3 / RGA / RGSR Series



Remote Monitoring for PFC Systems

Specification

	RG-T	RG-B	RG-BS	RG3-C/CL	RG3-CS/CLS	RGA & RGSR
ENCLOSURE						
Dimensions	144x144mm PR16; 96x96mm PR19 (RG-8B/BS)					
Protection Class	IP40 front panel, IP54 optional					IP51
Weight	0,9kg/pcs (PR16); 0,6kg/pcs (PR19) (RG-8B/BS)					0,6kg/pcs
MEASUREMENTS / FUNCTIONS						
Accuracy	1%±1digit(V,I,cos); 2%±1digit (W,VAR,VA,harmonics)					%±5 digit(V,I,cos,w,VAR,VA, Harmonics)(3mA)
Over Voltage Setting	240-275VAC	0-500VAC		0-300VAC		
Current Range	50mA-5,5A					3mA, 60kA Transformer Ratio 1:10.000
Measurement Range with Transformer	50mA - 10kA Transformer Ratio 5...10000/5A	50mA-10kA Transformer Ratio:1-2000				<1VA current, <1VA voltage
Burden (Input Load)	<2VA Current, < 3VA Voltage					
cos κ Setting	0,8<cos κ <1 inductive	0,8<cos κ <1 inductive/capacitive				
C/k Setting	0,02-1,00					
Time Delay Between Steps	2-1800 s for switch on / off separately			1-1800 s for switch on / off separately		
Discharge Time Setting				2-1800sn.	1-1800sn.	
Programmable THD-V Alarm				●		
Programmable Discharge Time				●		
Programmable Over Voltage Alarm				●		
Automatic Step Calculation				●		
Energy Measurement	-				●	
Adjustable Energy Ratio Alarm	●					●
Displaying Parameters for Each Phase				●		
Alarm Contact Output	-				●	
SUPPLY						
Operating Voltage	230 VAC ± %10					90-270 VAC
Operating Frequency	50/60 Hz					
Power Consumption	<10 VA					<25 VA
INPUT/OUTPUT STRUCTURE						
Step Number	6,8,12	6,8,12		12,15		15, 20, 24, 12+SVC, 16+SVC, 20+SVC
Output Contact	3A, 750VA cos κ =1			5A, 1250VA cos κ =1		
AMBIENT CONDITIONS						
Operating Temperature	- 5 ... +55°C					-20+70
Ambient Humidity	%85					%55
CONNECTIONS						
Mounting	Front Panel Mounting / Socket with Screw Terminal					
Connection Types	Single Phase, Neutral, 1 Current Transformer			3 Phase, Neutral, 3 Current Transformer 4 Wires		

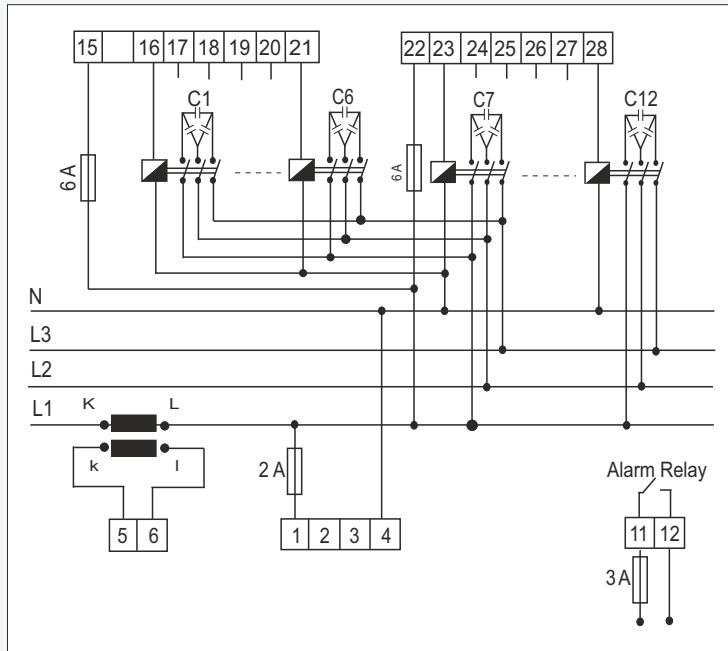


Power Factor Controllers

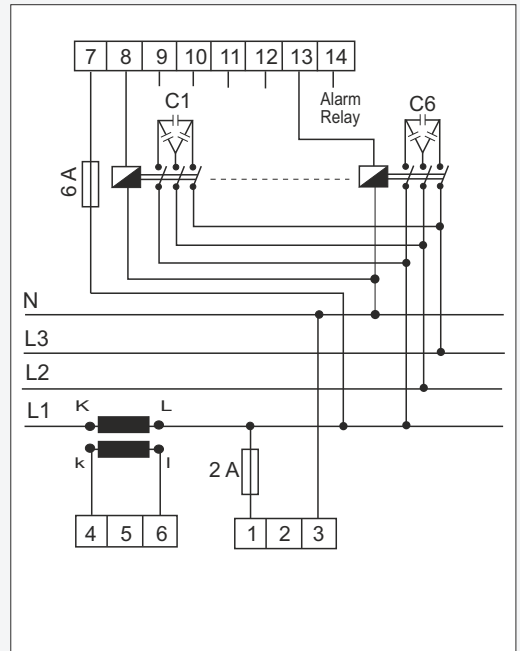
RG / RG3 / RGA / RGSR Series

Connection Diagrams

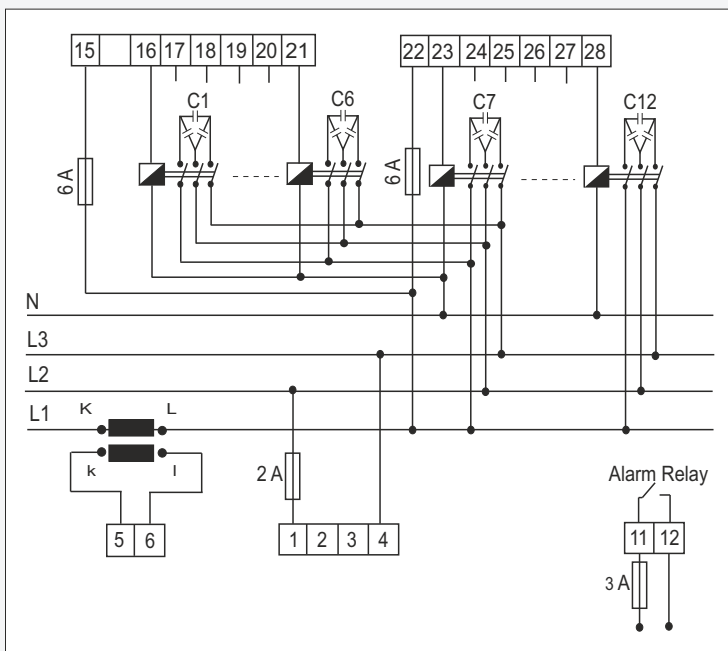
RG-T (144x144) (Phase - Neutral)



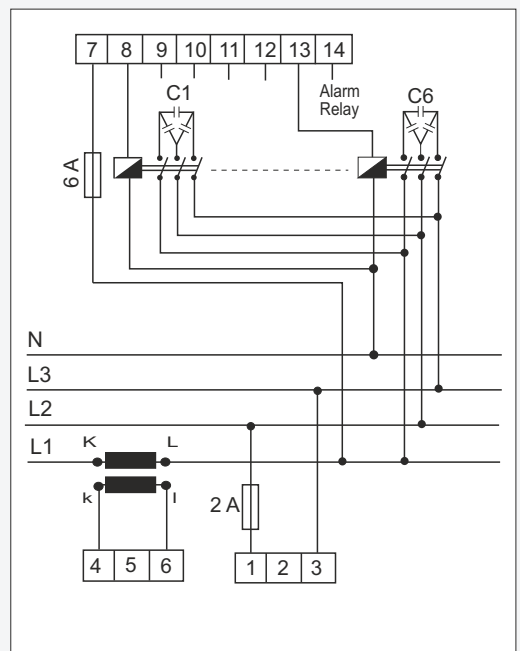
RG-T (96x96) (Phase - Neutral)



RG-T (Phase - Phase)



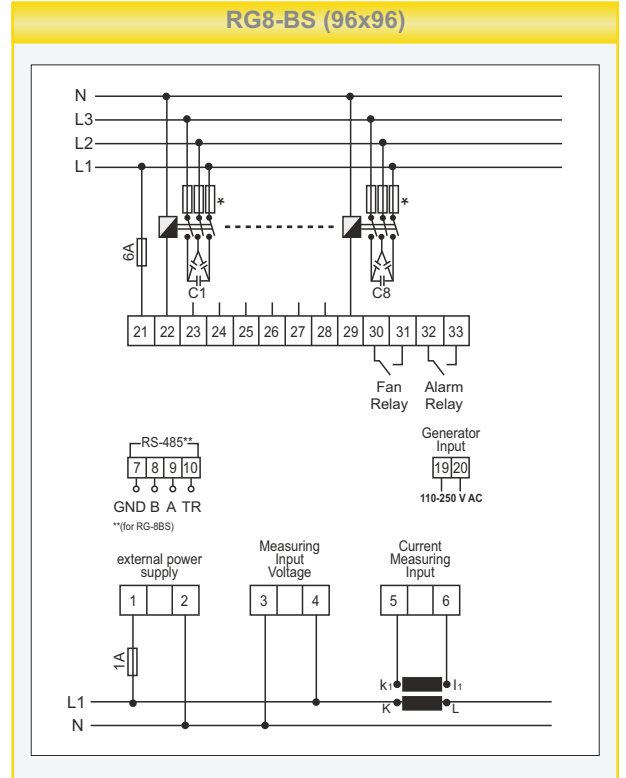
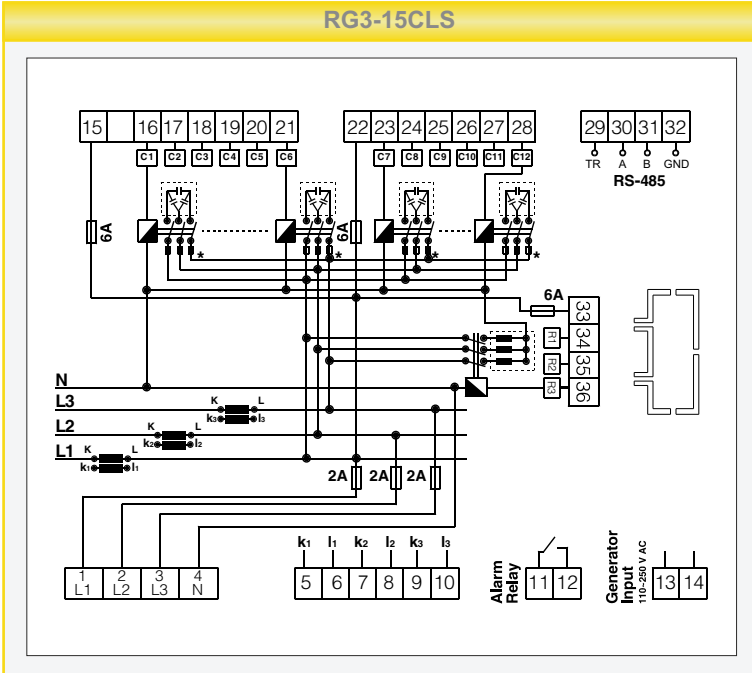
RG-T (96x96) (Phase - Phase)



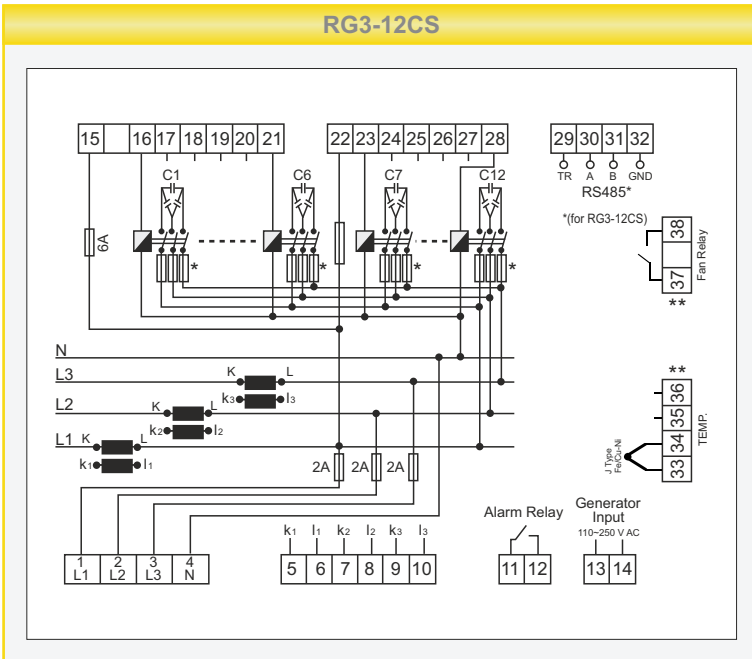
Power Factor Controllers

RG / RG3 / RGA / RGSR Series

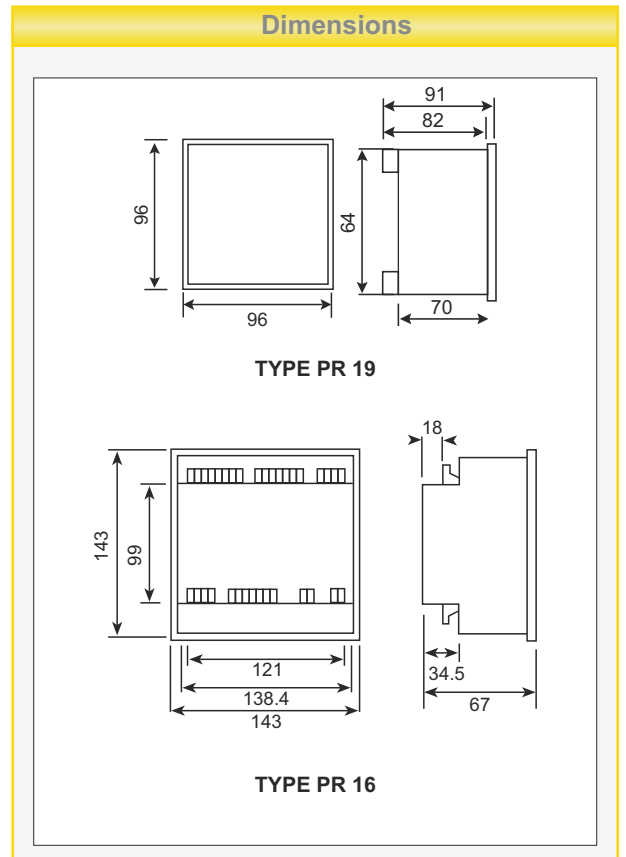
Connection Diagrams



* Current value of 3-Fuses, which are connected to protect the capacitors, is chosen according to the nominal current value of capacitors.



** Optional

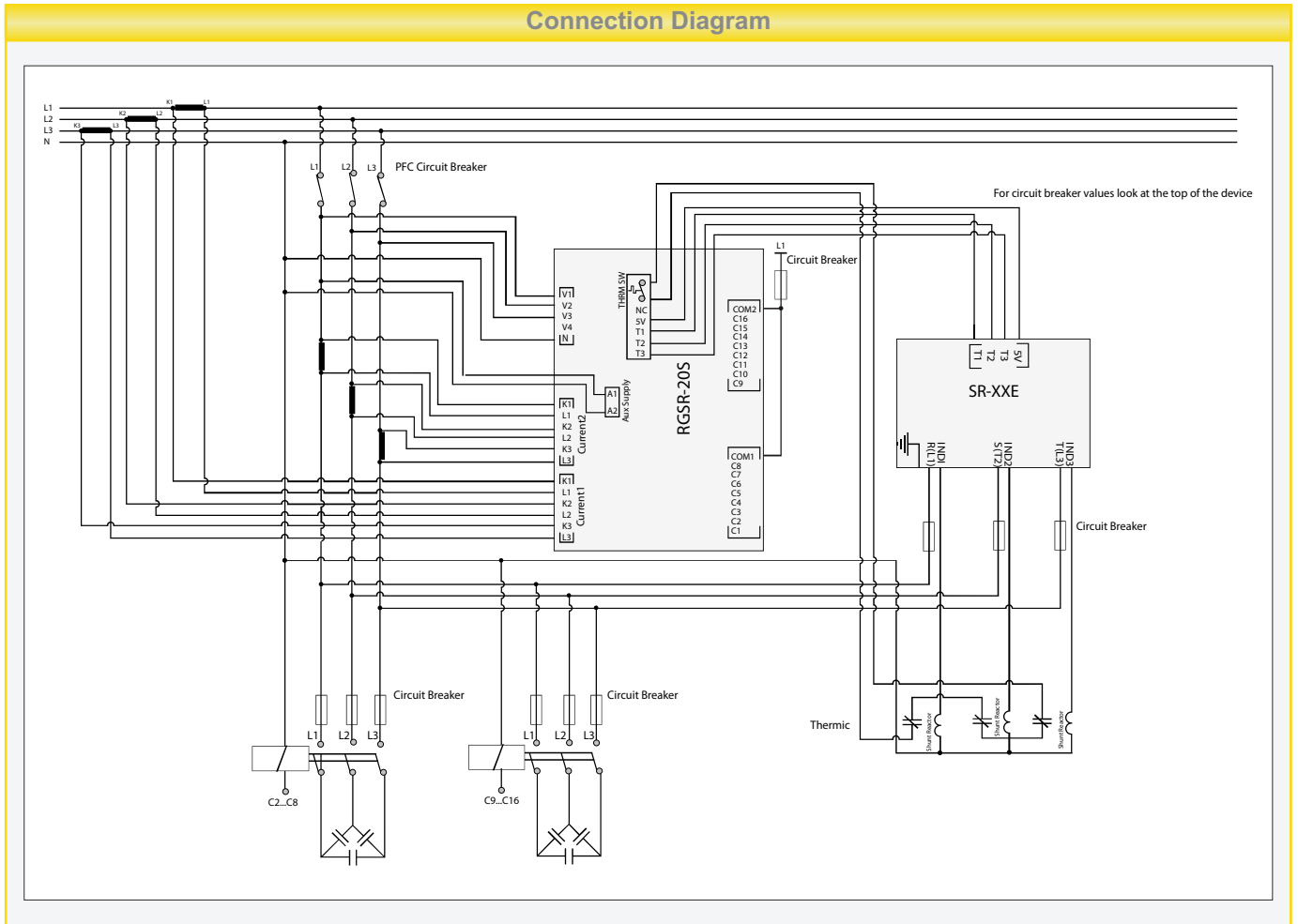


Power Factor Correction

Power Factor Controllers

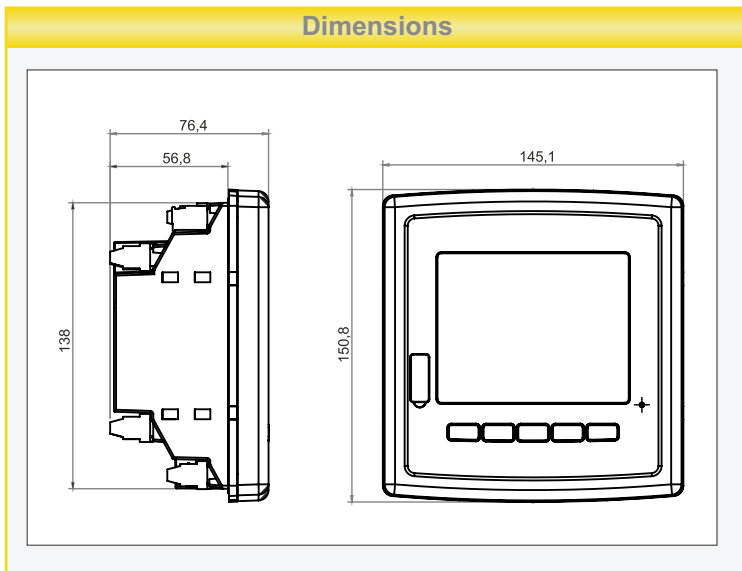
RGA / RGSR Series Connection Diagram

Connection Diagram



Power Factor Correction

Dimensions



Inductive Load Drivers

SR Series

NEW



ENTES, 5 kVAr, 10 kVAr, 20 kVAr, 30 kVAr inductive load drivers can fastly response and switching step by step to even smallest loads with connected to shunt reactors in phases . ENTES SVC special products finds superiors solutions for capacitive loads with 1,66 kVAr, 3,33 kVAr, 6,66 kVAr and 10 kVAr in single phase shunt reactors.

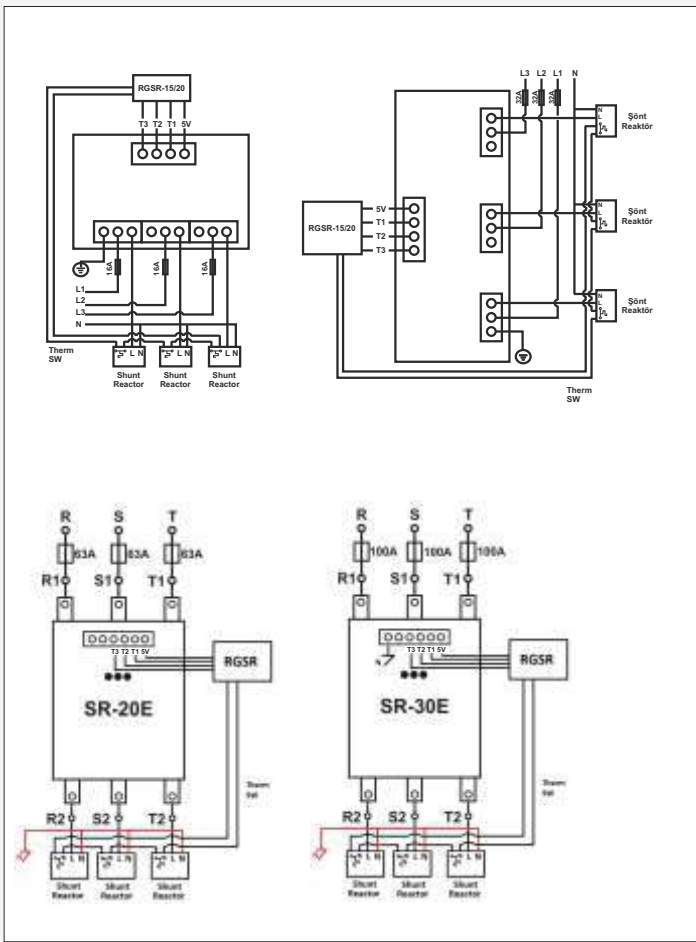
Technical Properties:

- Operating Temperature -10, +550C
- Storage Temperature -20, +700C
- Supply Voltage 210-250 VAC (L-N): $\sqrt{3} * Un$ (L-L)
- Frequency 45-65Hz
- Max. Humidity %95
- Less than 20 ms reaction time
- Easy installation
- Ventilator cool (SR-30E)

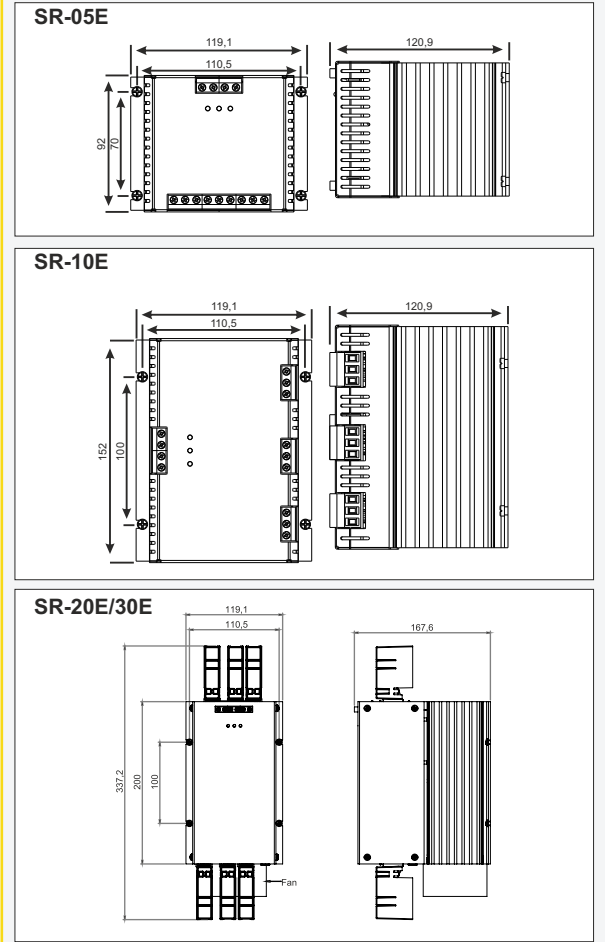
PRODUCT SELECTION TABLE

Product Code	Power (kVAr)	Shunt Reactor Number	Shunt Reactor Type	Operating Voltage	Conection Type	Dimensions (mm)	Weight (kg)	P.cst/Box
SR-05E	5	3	Single Phase	230	Star	119x121x92	0,9	1
SR-10E	10	3	Single Phase	230	Star	119x121x152	1,4	1
SR-20E	20	3	Single Phase	230	Star	119x167x337	2,29	1
SR-30E	30	3	Single Phase	230	Star	119x167x337	3,18	1

Connection Diagram



Dimensions



Power Factor Correction



Power Factor Correction on MV

MV-Compatible Current Transformers

NEW



ENT.A65-OG

Medium Voltage compatible current transformers work together with power factor controllers which obtain current information from medium voltage. Thanks to the improved isolation level, current measurement on MV-level is performed by installing on XLPE cable on the primary side of the medium voltage power transformer.

Area of Use

- Businesses and facilities whose electricity meter is located at the entrance of MV power transformer.

Technical Specifications

Primary Current (Ip)	100 A
Secondary Current	5 A
Nominal Power (Pn)	5 VA
Measurement Accuracy	Class 0,5
Operating Frequency	50 Hz
Isolation Test Voltage	3 kV eff, 1 min
Max. Operation Voltage	0,72 kV
Overcurrent Factor	n<5 (Ip ≤ 2000 A)
Overload Current (continuous)	1,2 x Ip
Thermal Short-Circuit Current (Ith)*	60 x Ip
Dynamic Rated Current (Idyn)	2,5 x Ith
Operating Temperature	-5 °C / +45 °C
Standards	TS EN 61869-2
Pcs/Box	3

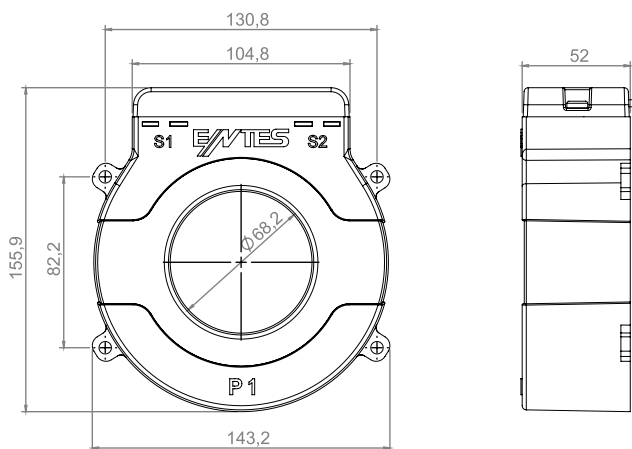
*** About the thermal short-circuit current (Ith) and the dynamic rated current (Idyn)**

Thermal current (Ith) is the highest primary current (effective value) that the CT can support for 1 second, without becoming damage, against excessive overloads due to short-circuits. Dynamic rated current (Idyn) is the highest primary peak primary current that the CT can support in the condition indicated above.

The low voltage current transformers designed for MV measurement should only be used with isolated XLPE cable. Direct installation on MV busbars must not be done.

Power Factor Correction

Dimensions



Low Voltage Power Capacitors



- Smooth operation under heavy conditions
- Safe operation with over pressure tear-off fuse
- Self-healing ability
- Durable enclosure and compact design
- Operating life of 130.000 hours (C100 Series)



ENTES series power capacitors have been designed for heavy and poor conditions that shorten operating life during operation. The over pressure tear-off fuse prevents capacitors from exploding when their operational life ends or extreme electrical thermal strains occur.

ENTES series capacitors are produced using metalized polypropylene film with self-healing ability.

ENT.C.100 series capacitors have superior durability with their ability to operate under heavy duty conditions and 130.000 hours operating life.

Deforming effects occur during the switching of capacitors. The inrush current of the capacitor reduces the operating life of both the switching capacitor and the other capacitors already connected. In order to avoid these negative effects capacitors should be used with capacitor duty contactors.



Low Voltage Power Capacitors

ENT.C10 / CXD / CMD Series (Three Phase)

Product Code	110.000 Hours	Qn (kVAr) for 400 VAC	Qn (kVAr) for 450 VAC	C (µF)	In (A)	DxH (mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.C10-400-1	●	1		3x6,6	1,4	55x165	195x390x255	-25°C+55°C	21	9
ENT.C10-400-1,5	●	1,5		3x9,9	2,2	55x165	195x390x255	-25°C+55°C	21	9
ENT.C10-400-2,5	●	2,5		3x16,6	3,6	55x165	195x390x255	-25°C+55°C	21	9
ENT.C10-450-1	●		1	3x5,2	1,3	55x165	195x390x255	-25°C+55°C	21	9
ENT.C10-450-1,5	●		1,5	3x7,9	1,9	55x165	195x390x255	-25°C+55°C	21	9
ENT.C10-450-2,5	●		2,5	3x13,1	3,2	55x165	195x390x255	-25°C+55°C	21	9

Product Code	80.000 Hours	400VAC for Qn (kVAr)	450VAC for Qn (kVAr)	C (µF)	In (A)	DxH(mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.CMD-400-0,5	●	0,5		3x3,32	0,7	50x150	195x390x255	-25°C+55°C	21	5,5
ENT.CMD-400-1	●	1		3x6,63	1,4	50x150	195x390x255	-25°C+55°C	21	6
ENT.CMD-400-1,5	●	1,5		3x9,95	2,2	50x150	195x390x255	-25°C+55°C	21	7,5
ENT.CMD-400-2,5	●	2,5		3x16,6	3,6	60x150	195x390x255	-25°C+55°C	18	8,8
ENT.CMD-400-5	●	5		3x33,2	7,2	75x175	190x285x325	-25°C+55°C	6	5,3
ENT.CMD-400-7,5	●	7,5		3x49,7	10,8	75x265	190x285x345	-25°C+55°C	6	7,6
ENT.CMD-400-10	●	10		3x66,3	14,4	75x265	190x285x345	-25°C+55°C	12	15
ENT.CMD-450-0,5	●		0,5	3x2,62	0,6	50x150	195x360x255	-25°C+55°C	21	5,5
ENT.CMD-450-1	●		1	3x5,24	1,3	50x150	195x360x255	-25°C+55°C	21	6
ENT.CMD-450-1,5	●		1,5	3x7,86	1,9	50x150	195x360x255	-25°C+55°C	21	7,5
ENT.CMD-450-2,5	●		2,5	3x13,1	3,2	60x150	195x360x255	-25°C+55°C	18	8,8
ENT.CMD-450-5	●		5	3x26,2	6,4	75x175	190x285x325	-25°C+55°C	6	5,3
ENT.CMD-450-7,5	●		7,5	3x39,3	9,6	75x265	190x285x345	-25°C+55°C	12	7,6
ENT.CMD-450-10	●		10	3x52,4	12,8	75x265	190x285x345	-25°C+55°C	12	15

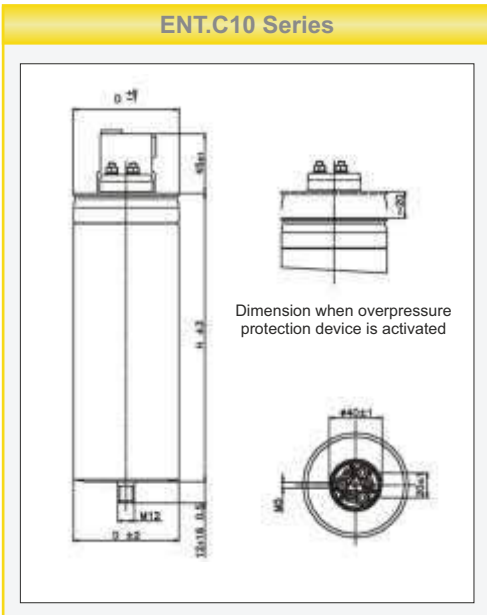
Product Code	110.000 Hours	400VAC for Qn (kVAr)	450VAC for Qn (kVAr)	525VAC for Qn (kVAr)	C (µF)	In (A)	DxH (mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.CXD-400-5	●	5			3x33	7,2	75x165	195x390x255	-25°C+55°C	6	5,4
ENT.CXD-400-7,5	●	8			3x49	10,8	75x255	185x290x270	-25°C+55°C	6	7,9
ENT.CXD-400-10	●	10			3x66	14,4	75x255	185x290x270	-25°C+55°C	6	7,9
ENT.CXD-400-12,5	●	13			3x83	18	85x255	185x290x270	-25°C+55°C	6	9,6
ENT.CXD-400-15	●	15			3x100	21,7	90x255	185x290x270	-25°C+55°C	6	10,8
ENT.CXD-400-20	●	20			3x133	28,9	100x255	225x340x225	-25°C+55°C	6	13,2
ENT.CXD-400-25	●	25			3x166	36,1	116x255	330x340x225	-25°C+55°C	4	11,9
ENT.CXD-400-30	●	30			3x199	43,3	116x290	330x340x225	-25°C+55°C	4	13,4
ENT.CXD-400-40	●	40			3x265	57,7	116x370	270x270x450	-25°C+55°C	4	15
ENT.CXD-400-50	●	50			3x332	72,2	125x370	270x270x451	-25°C+55°C	4	16
ENT.CXD-450-5	●		5		3x26	6,4	75x165	195x390x255	-25°C+55°C	6	5,4
ENT.CXD-450-7,5	●		7,5		3x39	9,6	75x255	185x290x270	-25°C+55°C	6	7,9
ENT.CXD-450-10	●		10		3x52	12,8	75x255	185x290x270	-25°C+55°C	6	7,9
ENT.CXD-450-12,5	●		12,5		3x66	16	85x255	185x290x270	-25°C+55°C	6	9,6
ENT.CXD-450-15	●		15		3x79	19,2	90x255	185x290x270	-25°C+55°C	6	10,8
ENT.CXD-450-20	●		20		3x104	25,7	100x255	225x340x270	-25°C+55°C	6	13,2
ENT.CXD-450-25	●		25		3x131	32,1	116x255	330x340x225	-25°C+55°C	4	11,9
ENT.CXD-450-30	●		30		3x157	38,5	116x290	330x340x225	-25°C+55°C	4	13,4
ENT.CXD-450-40	●		40		3x219	52,5	116x370	270x270x452	-25°C+55°C	4	15
ENT.CXD-450-50	●		50		3x274	65,6	125x370	270x270x453	-25°C+55°C	4	16
ENT.CXD-550-2,5	●			2,3	3x8,5	2,6	65x165	195x390x255	-25°C+55°C	14	5,4
ENT.CXD-550-5	●			4,6	3x17	5,2	75x165	195x390x255	-25°C+55°C	6	5,4
ENT.CXD-550-7,5	●			6,8	3x25	7,9	75x255	185x290x270	-25°C+55°C	6	7,9
ENT.CXD-525-10	●			10	3x38	12,1	85x255	185x290x270	-25°C+55°C	6	7,9
ENT.CXD-525-12,5	●			12,5	3x48	15	85x255	185x290x270	-25°C+55°C	6	9,6
ENT.CXD-525-15	●			15	3x58	18,2	100x255	225x340x270	-25°C+55°C	6	10,8
ENT.CXD-525-20	●			20	3x77	24,2	116x255	330x340x225	-25°C+55°C	4	13,2
ENT.CXD-525-25	●			25	3x96	30,2	116x255	330x340x225	-25°C+55°C	4	11,9
ENT.CXD-525-30	●			30	3x115	36,3	116x290	330x340x225	-25°C+55°C	4	13,4
ENT.CXD-525-40	●			40	3x154	44	116x370	270x270x454	-25°C+55°C	4	15
ENT.CXD-525-50	●			50	3x192	55	125x370	270x270x455	-25°C+55°C	4	16

Power Factor Correction

Low Voltage Power Capacitors

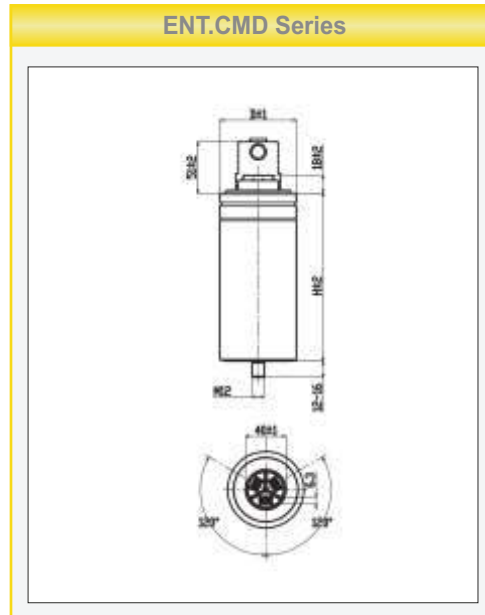
ENT.C10 / CXD / CMD Series (Three Phase)

ENT.C10 Series



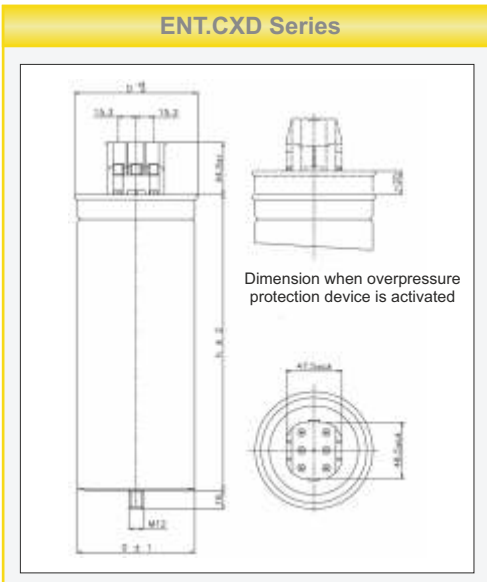
Screws and Mounting Studs	Screwing Torque
M 5	3 Nm
M 12	11 Nm

ENT.CMD Series



Screws and Mounting Studs	Screwing Torque
Screws	1,5 Nm
M12	11 Nm

ENT.CXD Series



Screws and Mounting Studs	Screwing Torque
Screws	1,5 Nm
M 12	11 Nm

* In order for the overpressure protection device to operate efficiently, a minimum height of 30 mm must be left above the element and flexible leads must be used for connection.

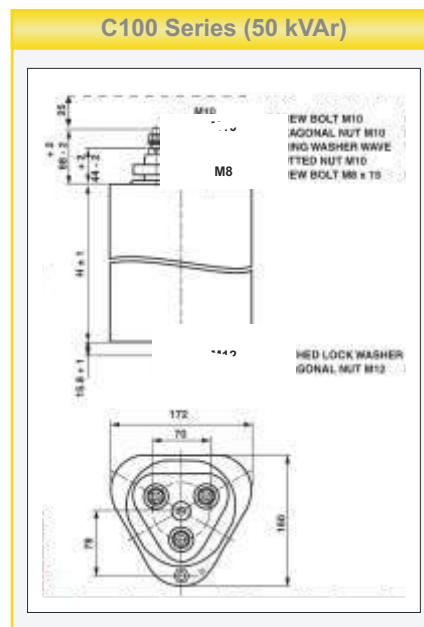
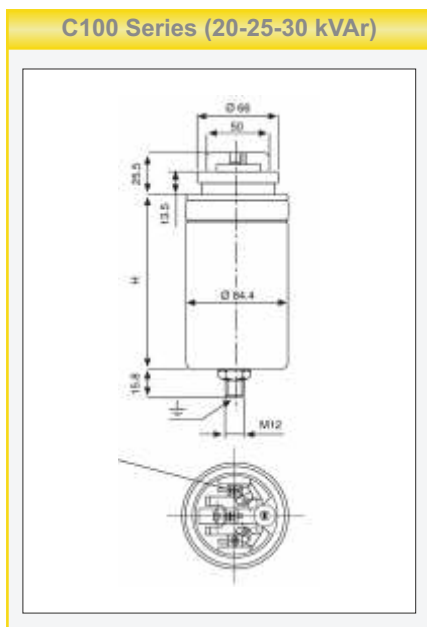
Low Voltage Power Capacitors

ENT.C100 Series (Three Phase)

C100 Series

Product Code	130.000 Hour	Qn (kVAr) for 400 VAC	Alternative Operating Voltage	C (vF)	In (A)	DxH(mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.C100-400-20	●	20	400-440 VAC	3x132,6	28,8	84x265	195x390x255	-25°C+55°C	4	7,6
ENT.C100-400-25	●	25	400-440 VAC	3x165,8	36,1	85x265	195x390x255	-25°C+55°C	4	7
ENT.C100-400-30	●	30	400-440 VAC	3x198,9	43,3	116x190	195x390x255	-25°C+55°C	4	9
ENT.C100-400-50	●	50	400-440 VAC	3x331,6	72,2	172x210	195x390x255	-25°C+55°C	1	5

Dimensions

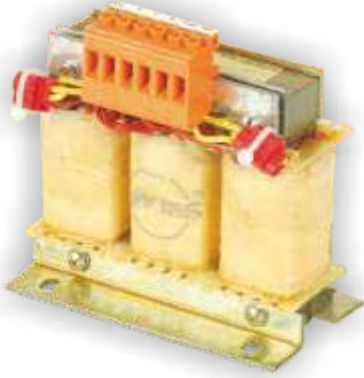


Power Factor Correction



Shunt Reactors (Inductive Load Reactors)

ENT.ERS Series



Shunt reactors have been designed to compensate the capacitive power used by long underground power lines, UPS, computers, electronic ballast, and energy saving lamps.

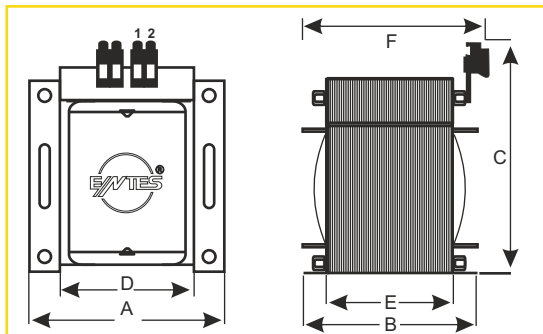
ENTES shunt reactors are designed in European standards to have long operating lives and endure difficult operating conditions. These devices which designed to provide inductive load requirements have the CE mark.

Features;

- Single or three-phase, highly conductive design with air gap
 - F isolation class insulation material on the windings resistant to 155°C
 - High quality copper or aluminum windings (copper coated terminal on aluminum windings)
 - Custom designs to meet customer specifications
 - Thermal protection against overload
 - Vacuum impregnated varnish method that improves efficiency by reducing heat losses, provides protection against humidity, and enables quiet operation
- CE mark and compatibility with EN 61558 2-20

Single Phase Shunt Reactors

Type	kVAr	L (mH)	I _{rms} (A)	Operating Voltage	Size	Weight (kg)
ENT.ERS1 230/0,1	0,1	1523	0,46	230V 50Hz	1	1,5
ENT.ERS1 230/0,25	0,25	672	1,1	230V 50Hz	1	2
ENT.ERS1 230/0,5	0,5	338	2,17	230V 50Hz	2	3,5
ENT.ERS1 230/1	1	168	4,35	230V 50Hz	3	8
ENT.ERS1 230/1,5	1,5	112	6,5	230V 50Hz	4	9
ENT.ERS1 230/1,66	1,66	103	6,82	230V 50Hz	7	10
ENT.ERS1 230/2,5	2,5	67	10,9	230V 50Hz	6	20
ENT.ERS1 230/3,33	3,33	50,5	14,4	230V 50Hz	8	22,7
ENT.ERS1 230/0,3-0,4-0,5 (Selective)	0,5	380	2,17	230V 50Hz	1	4,25



Size	A	B	C	D	E	F
1	84	76	91	64	64	65
2	96	102	99	84	87	89
3	150	113	141	122	89	90
4	150	129	141	122	104	105
5	150	153	141	122	128	130
6	192	166	299	130	148	150
7	200	117	130	-	-	-
8	256	137	165	-	-	-

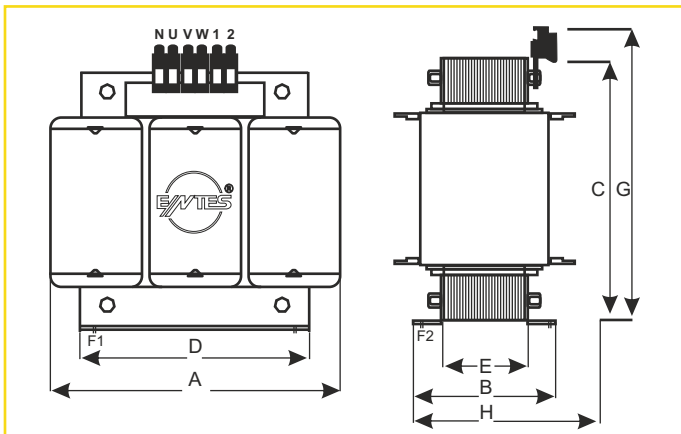


Shunt Reactors (Inductive Load Reactors)

ENT.ERS Series

Three Phase Shunt Reactors

Type	kVAr	L (mH)	I _{rms} (A)	Operating Voltage	Size	Weight (kg)
ENT.ERS3 400/0,25	0,25	2000	0,36	400V 50Hz	1	4
ENT.ERS3 400/0,5	0,5	1000	0,73	400V 50Hz	1	5
ENT.ERS3 400/1	1	505	1,45	400V 50Hz	1	8,3
ENT.ERS3 400/1,5	1,5	336	2,2	400V 50Hz	2	9,7
ENT.ERS3 400/2	2	252	2,9	400V 50Hz	3	11,6
ENT.ERS3 400/2,5	2,5	203	3,6	400V 50Hz	3	11,8
ENT.ERS3 400/3	3	168	4,35	400V 50Hz	4	15
ENT.ERS3 400/5	5	100	7,2	400V 50Hz	4	33,3
ENT.ERS3 400/7,5	7,5	68	10,9	400V 50Hz	5	34,9
ENT.ERS3 400/10	10	51	14,5	400V 50Hz	6	41,2
ENT.ERS3 400/15	15	34	21,74	400V 50Hz	6	54
ENT.ERS3 400/20	20	26	29	400V 50Hz	7	88,3
ENT.ERS3 400/25	25	20	36,3	400V 50Hz	7	115
ENT.ERS3 400/40	40	13	58	400V 50Hz	8	119,4

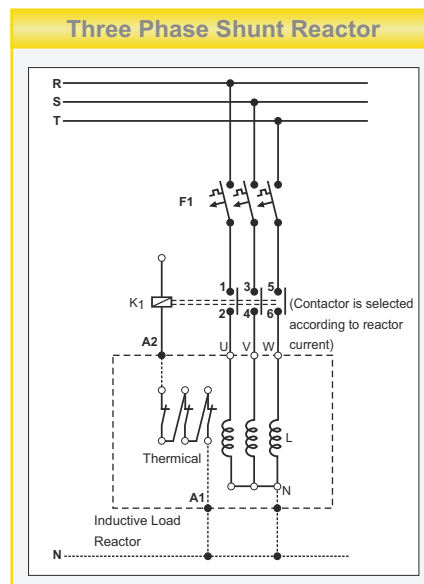
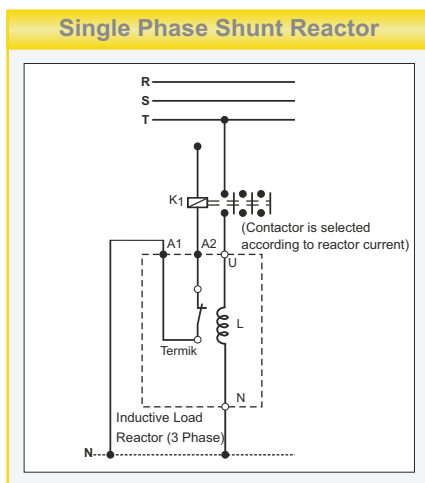


Size	A	B	C	D	E	G	H
1	180	102	150	132	82	220	202
2	180	120	150	132	100	220	220
3	240	102	200	175	76	270	202
4	240	126	200	175	100	270	226
5	300	140	250	225	104	320	240
6	360	163	300	265	118	370	263
7	420	247	350	315	187	420	347
8	480	250	400	360	190	470	350

Power Factor Correction



Connection Diagrams



Shunt Reactors (Inductive Load Reactors)

ENT.SRS Series

Single Phase Shunt Reactors

Type	kVAr	L (mH)	I _{rms} (A)	Operating Voltage	Size	Weight (kg)
ENT.SRS1 230/0,1	0,1	1660	0,43	230V 50Hz	1	1,4
ENT.SRS1 230/0,25	0,25	670	1,09	230V 50Hz	2	2,1
ENT.SRS1 230/0,3/0,4/0,5	0,3/0,4/0,5	553/415/338	1,3/1,74/2,17	230V 50Hz	7	4,3
ENT.SRS1 230/1	1	169	4,35	230V 50Hz	4	7
ENT.SRS1 230/1,5	1,5	105	6,52	230V 50Hz	5	9,1
ENT.SRS1 230/2	2	84,5	8,7	230V 50Hz	X	12,3
ENT.SRS1 230/2,5	2,5	67,5	10,87	230V 50Hz	6	15,3
ENT.SRS1 230/3	3	56,3	13	230V 50Hz	X	17,6
ENT.SRS1 230/5	5	33,68	21,74	230V 50Hz	X	30,5

SVC Shunt Reactor

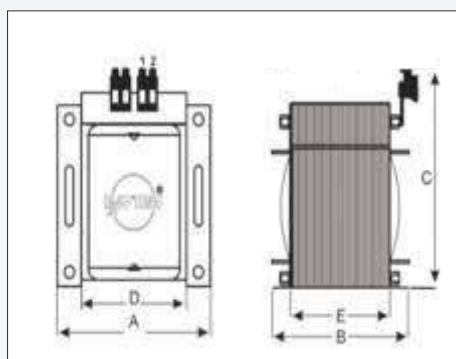
Type	kVAr	L (mH)	I _{rms} (A)	Operating Voltage	Size	Weight (kg)
ENT.SRS1 230/1,66	1,66	101	7,22	230V 50Hz	8	9,3
ENT.SRS1 230/3,33	3,33	50,2	14,48	230V 50Hz	9	20,8
ENT.SRS1 230/6,67	6,67	25,3	40	230V 50Hz	10	24,3
ENT.SRS1 230/10	10	10	43,48	230V 50Hz	11	32,4

Size	A	B	C	D	E
1	84	74	87	70	57
2	96	185	98	80	66
3	120	107	115	100	88
4	150	122	145	125	98
5	150	122	145	125	98
6	192	125	185	160	95
7	120	107	115	100	88
8	150	123	145	125	100
9	192	163	187	140	133
10	240	125	305	120	105
11	240	145	305	120	125

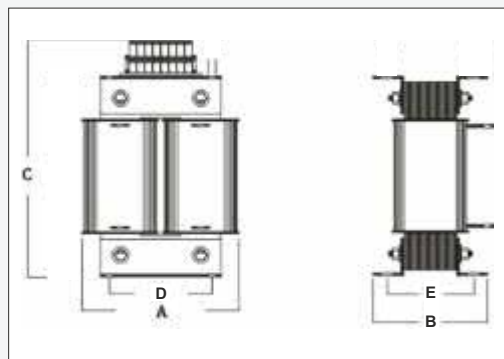
Power Factor Correction



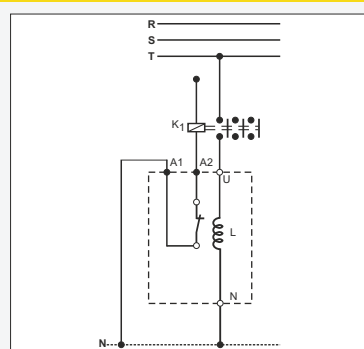
Drawing 1



Drawing 2



Single Phase Shunt Reactor Connection Diagram



Shunt Reactors (Inductive Load Reactors)

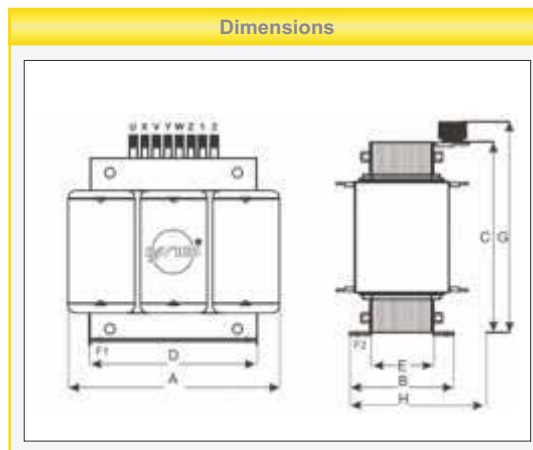
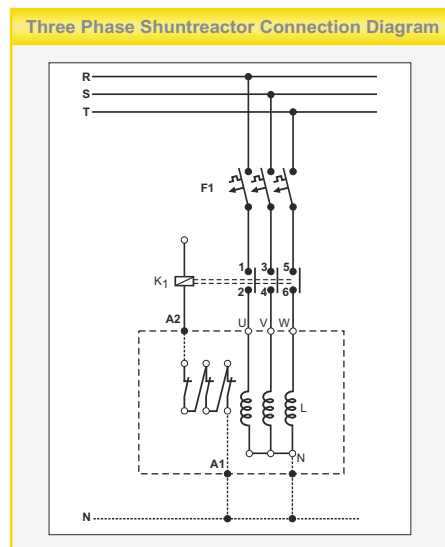
ENT.SRS Series

Three Phase Shunt Reactors

Type	kVAr	L (mH)	I _{rms} (A)	Operating Voltage	Size	Weight (kg)
ENT.SRS3 400/0,25	0,25	2040	0,36	400V 50Hz	1	2,3
ENT.SRS3 400/0,5	0,5	1020	0,72	400V 50Hz	2	3
ENT.SRS3 400/1	1	505	1,44	400V 50Hz	3	7,8
ENT.SRS3 400/1,5	1,5	336	2,17	400V 50Hz	4	9,5
ENT.SRS3 400/2	2	255	2,89	400V 50Hz	5	11,6
ENT.SRS3 400/2,5	2,5	203	3,61	400V 50Hz	6	11,9
ENT.SRS3 400/3	3	170	4,33	400V 50Hz	7	16,7
ENT.SRS3 400/5	5	102	7,22	400V 50Hz	8	22,5
ENT.SRS3 400/7,5	7,5	68	10,83	400V 50Hz	9	32
ENT.SRS3 400/10	10	51	14,43	400V 50Hz	10	44
ENT.SRS3 400/15	15	34	21,65	400V 50Hz	11	53
ENT.SRS3 400/20	20	25,5	28,87	400V 50Hz	12	70,5
ENT.SRS3 400/25	25	20,4	36,09	400V 50Hz	13	94
ENT.SRS3 400/40	40	12,75	57,74	400V 50Hz	14	127

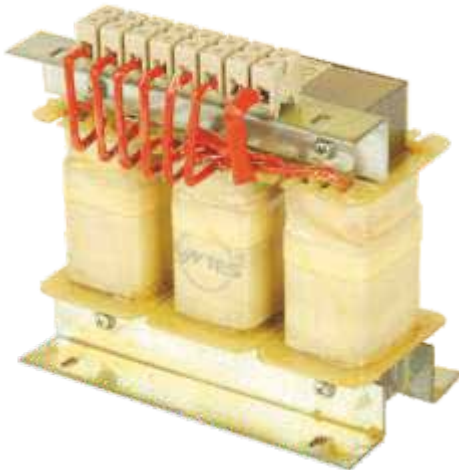
Size	A	B	C	D	E	F1	F2	G	H
1	120	68	102	100	53	12	7	125	75
2	150	63	127	125	48	12	7	150	70
3	180	93	152	150	77	12	7	175	100
4	180	103	152	150	87	12	7	175	110
5	240	93	203	200	87	12	7	225	210
6	240	103	203	200	87	12	7	225	220
7	240	103	203	200	87	12	7	225	220
8	300	125	253	250	105	17	9	275	145
9	300	135	255	250	115	17	9	275	155
10	360	136	305	300	112	17	9	305	200
11	420	146	355	350	122	20	13	355	260
12	420	166	355	350	142	20	13	355	260
13	480	166	405	400	136	20	13	405	260
14	480	206	405	400	176	20	13	405	300

Power Factor Correction



Detuned Filter Reactors

ENT.ERH Series



ENTES detuned filter reactors protect the power factor correction systems by suppressing the harmonics.

With the use of harmonic filters, the currents flowing through the capacitors are reduced by creating impedance in addition to capacitor impedance at harmonic frequencies (such as 250 Hz for 5th harmonic and 350 Hz for 7th harmonic).

As a result;

- When the capacitor is switched-on, capacitor heat is reduced because currents flowing at the harmonic frequencies over the capacitor will decrease.
- High currents occurring during the switching of capacitor groups are prevented.
- Eliminates overloading risk due to resonance.
- Capacitor life improves because overheating and isolation failure risks are reduced.
- Since harmonics will decrease throughout the establishment, it helps sensitive devices such as computers, medical systems and PLC to be protected against deforming effects caused by harmonics.

Features;

- Air gap design that minimizes the enclosure grounding resistance
- Iron core with high magnetic permeability
- Vacuum impregnated varnish method that improves efficiency by reducing heat losses, provides protection against humidity, and enables quiet operation
- Thermal protection switch in the middle coil against overloading and overheating
- CE mark and compatibility with EN 61000-2-2 and EN 61558 2-20

Harmonic Filter Reactor Selection

For harmonic filter reactor selection, firstly harmonic (THDV and THDI) measurement should be taken at different times and loading conditions while the power factor correction system is switched off.

* P factor depending on THDV an THDI values is selected as shown on the table below.

fr=P factor	THDV	THDI
%5,67	< %2	>%25
%7	All other cases	
%14	>%4	<%15

Reactors' Serial Resonance Frequency Table:

fr=P factor	Resonance Frequency for 50Hz	C Min. Voltage Value
%5,67	210Hz	424V
%7	189Hz	430V
%14	134Hz	465V

According to this; capacitors with a minimum 440V should be used for P factors of 5,67% and 7%, 500V capacitors should be used for a P factor of 14%.

*For more information on the next page Harmonic Filter Reactors refer to the Selection Table.

Reactors with filtering factors other than 5,67%, 7%, 14%; reactors for 60 Hz grids and reinforced harmonic filter reactors for different capacitors and facilities where voltage harmonics values are high are manufactured on special order.



Detuned Filter Reactors

ENT.ERH Series

Detuned Filter Reactor Selection Table
400V 50Hz, 210Hz Resonance Frequency (p=5,67%)

Type	kVAr	L (mH)	Irms (A)	Ith (A)	Ilin (A)	C* (uF)	Size	Weight (kg)	Suitable Capacitor
ENT.ERH-5,67-400-4	4	7,65	7,02	7,72	15,92	25,02	0	4	ENT.CXD-450-5
ENT.ERH-5,67-400-5	5	6,12	8,77	9,65	19,90	31,28	0	4,5	ENT.CXD-450-5+ENT.CXD-450-1
ENT.ERH-5,67-400-6,25	6,25	4,90	10,97	12,06	24,87	39,1	0	5	ENT.CXD-450-7,5
ENT.ERH-5,67-400-7,5	7,5	4,08	13,16	14,48	29,85	46,92	1	7	ENT.CXD-450-7,5+ENT.C10-450-1,5
ENT.ERH-5,67-400-10	10	3,06	16,8	18,48	35,13	62,55	13	6,5	ENT.CXD-450-12,5
ENT.ERH-5,67-400-12,5	12,5	2,45	21	23,1	43,91	78,19	19	8	ENT.CXD-450-15
ENT.ERH-5,67-400-16,6	16,6	1,84	27,88	30,67	58,32	103,84	15	9,9	ENT.CXD-450-20
ENT.ERH-5,67-400-20	20	1,53	33,6	36,95	70,26	125,11	4	12,2	ENT.CXD-450-25
ENT.ERH-5,67-400-22,4	22,4	1,37	37,63	41,39	78,69	140,12	5	14,9	ENT.CXD-450-25
ENT.ERH-5,67-400-25	25	1,53	38,11	41,92	73,52	154,18	5	15,2	ENT.CXD-450-30
ENT.ERH-5,67-400-30	30	1,02	50,39	55,43	105,39	187,66	6	16,9	ENT.CXD-450-15+ENT.CXD-450-20
ENT.ERH-5,67-400-40	40	0,77	67,19	73,91	140,53	250,22	16	18,7	ENT.CXD-450-25 2 pcs
ENT.ERH-5,67-400-44,4	44,4	0,69	74,58	82,04	155,98	277,74	17	19,1	ENT.C100-440-50
ENT.ERH-5,67-400-50	50	0,61	83,99	92,39	175,66	312,77	18	26,9	ENT.CXD-450-30 2 pcs
ENT.ERH-5,67-400-60	60	0,51	100,79	110,86	210,79	375,33	10	38,9	ENT.CXD-450-25 3 pcs
ENT.ERH-5,67-400-80	80	0,38	134,38	147,82	281,05	500,44	10	42,3	ENT.CXD-450-25 4 pcs
ENT.ERH-5,67-400-100	100	0,31	167,98	184,77	351,31	625,55	10	42,8	ENT.CXD-450-30 4 pcs

400V 50Hz, 189Hz Resonance Frequency (p=7%)

Type	kVAr	L (mH)	Irms (A)	Ith (A)	Ilin (A)	C* (uF)	Size	Weight (kg)	Suitable Capacitor
ENT.ERH-7-400-2,5	2,5	15,3	4	4,4	8,4	15	0	2,5	ENT.C10-450-1,5 2 pcs
ENT.ERH-7-400-4	4	9,58	6,4	7	13,4	24,7	0	3	ENT.CXD-450-5
ENT.ERH-7-400-5	7,6	7,67	8	8,85	17	30,8	0	5	ENT.CXD-450-5+ENT.C10-450-1
ENT.ERH-7-400-6,25	6,25	6,13	10,04	11,05	20,97	39,30	0	6	ENT.CXD-450-7,5
ENT.ERH-7-400-7,5	7,5	5,11	12,05	13,26	25,16	47,16	1	7	ENT.CXD-450-7,5+ENT.C10-450-1,5
ENT.ERH-7-400-10	10	3,83	15,24	16,77	29,41	61,67	19	8,1	ENT.CXD-450-12,5
ENT.ERH-7-400-12,5	12,5	3,07	19,06	20,96	36,76	77,09	3	9,3	ENT.CXD-450-15
ENT.ERH-7-400-16,6	16,6	2,31	25,31	27,84	48,82	102,38	4	11,4	ENT.CXD-450-20
ENT.ERH-7-400-20	20	1,92	30,49	33,54	58,82	123,35	4	11,7	ENT.CXD-450-25
ENT.ERH-7-400-22,2	22,2	1,71	34,15	37,56	65,88	138,15	4	11,9	ENT.C100-440-25
ENT.ERH-7-400-25	25	1,53	38,11	41,92	73,52	154,18	4	11,7	ENT.CXD-450-30
ENT.ERH-7-400-30	30	1,28	45,73	50,31	88,23	185,02	4	12,4	ENT.CXD-450-15+ENT.CXD-450-20
ENT.ERH-7-400-40	40	0,96	60,98	67,07	117,64	246,69	21	17,3	ENT.CXD-450-25 2 pcs
ENT.ERH-7-400-44,4	44,4	0,86	67,68	74,45	130,58	273,83	22	17,96	ENT.C100-440-50
ENT.ERH-7-400-50	50	0,77	76,22	83,84	147,05	308,36	23	21,2	ENT.CXD-450-30 2 pcs
ENT.ERH-7-400-60	60	0,64	91,47	100,61	176,46	370,04	24	26,5	ENT.CXD-450-25 3 pcs
ENT.ERH-7-400-80	80	0,48	121,95	134,15	235,28	493,38	8	30	ENT.CXD-450-30 4 pcs
ENT.ERH-7-400-100	100	0,38	152,44	167,69	294,1	616,73	26	42,5	

400V 50Hz, 134Hz Resonance Frequency (p=14%)

Type	kVAr	L (mH)	Irms (A)	Ith (A)	Ilin (A)	C* (uF)	Size	Weight (kg)	Suitable Capacitor
ENT.ERH-14-400-5	5	16,58	7,69	8,46	14,03	28,52	1	6,5	ENT.CXD-525-7,5
ENT.ERH-14-400-6,25	6,25	13,27	9,62	10,58	17,54	35,64	2	7,5	ENT.CXD-525-10
ENT.ERH-14-400-7,5	7,5	11,05	11,54	12,69	21,05	42,77	2	9	ENT.CXD-550-7,5+ENT.CXD-550-5
ENT.ERH-14-400-10	10	8,29	14,52	15,98	24,38	57,3	3	9,6	ENT.CXD-525-15
ENT.ERH-14-400-12,5	12,5	6,63	18,15	19,97	30,48	71,29	4	11,7	ENT.CXD-525-20
ENT.ERH-14-400-16,6	16,6	4,99	24,11	26,52	40,47	94,67	4	12,2	ENT.CXD-525-25
ENT.ERH-14-400-20	20	4,15	29,05	31,95	48,76	114,06	5	15,4	ENT.CXD-525-30
ENT.ERH-14-400-22,4	22,4	3,7	32,53	35,79	54,61	127,75	6	17,6	ENT.CXD-525-20+ENT.CXD-525-12,5
ENT.ERH-14-400-25	25	3,32	36,31	39,94	60,95	142,58	7	26,3	ENT.CXD-525-25+ENT.CXD-525-12,5
ENT.ERH-14-400-30	30	2,76	43,57	47,93	73,14	171,09	7	26,8	ENT.CXD-525-30+ENT.CXD-525-15
ENT.ERH-14-400-40	40	2,07	58,09	63,9	97,52	228,12	8	29,9	ENT.CXD-525-30 2 pcs
ENT.ERH-14-400-44,4	44,4	1,87	64,49	70,93	108,25	253,22	8		ENT.CXD-525-30 2 pcs
ENT.ERH-14-400-50	50	1,66	72,62	79,88	121,9	285,15	9	31,8	ENT.CXD-525-25 3 pcs
ENT.ERH-14-400-60	60	1,38	87,14	95,86	146,29	342,18	10	41	ENT.CXD-525-30 3 pcs
ENT.ERH-14-400-80	80	1,04	116,19	127,81	195,05	456,24	11	48,6	ENT.CXD-525-30 4 pcs
ENT.ERH-14-400-100	100	0,83	145,24	159,76	243,81	570,31	12	61,2	ENT.CXD-525-30 5 pcs

* Look at the next page for the dimensions

Power Factor Correction



Detuned Filter Reactors

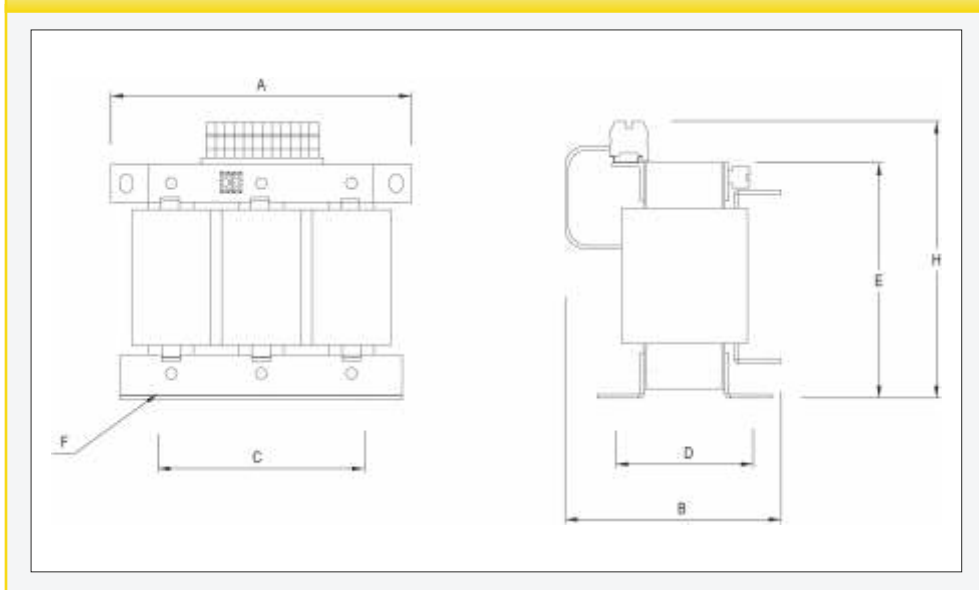
ENT.ERH Series

Dimensions Table

Size	A	E	H	B	C	D
0	120	100	120	45	-	-
1	150	-	160	105	110	56
2	180	-	270	120	185	78
3	180	160	-	155	135	97
4	240	210	-	140	185	79
5	240	210	-	150	185	89
6	240	210	-	160	185	99
7	264	248	-	190	200	121
8	300	260	-	185	224	116
9	300	260	-	190	224	121
10	360	310	-	205	265	126
11	360	310	-	215	265	138
12	360	310	-	235	265	156
13	180	160	-	135	135	78
14	180	160	-	145	135	88
15	180	-	185	120	135	97
16	240	210	-	165	185	104
17	264	248	-	170	200	101
18	300	260	-	180	224	111
19	180	160	-	145	135	88.5
20	180	160	-	145	135	97
21	240	210	-	160	185	99
22	240	210	-	160	200	106
23	264	250	-	155	200	106
24	264	250	-	170	200	121
25	300	365	-	185	224	116
26	360	310	-	195	265	126

Power Factor Correction

Dimensions



Detuned Filter Reactors

ENT.ERH Series

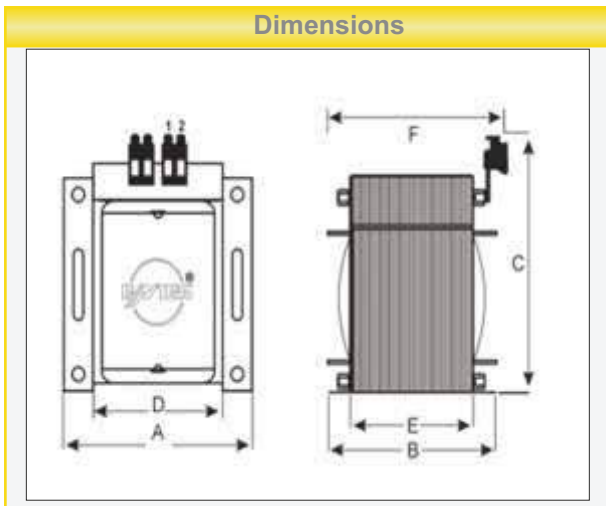
Single Phase Detuned Filter Reactors

230V 50Hz, 189Hz Resonance Frequency ($p=\%17$)

Type	kVAr	L (mH)	I _{rms} (A)	I _{th} (A)	I _{lin} (A)	C* (uF)	Size	Weight (kg)	Suitable Capacitor
ENT.ERH-E50-7-230-0,25	0,25	50	1,25	1,38	2,24	14,18	1	1,2	ENT.CF-230-0,26
ENT.ERH-E50-7-230-0,5	0,5	25,3	2,5	2,75	4,47	28,03	2	1,4	ENT.CF-400-1,67
ENT.ERH-E50-7-230-0,83	0,83	15	4,15	4,57	7,42	47,27	3	1,5	ENT.CF-230-2,5
ENT.ERH-E50-7-230-1,38	1,38	9,2	6,9	7,59	12,34	77,08	4	2	ENT.CF-400-4,17
ENT.ERH-E50-7-230-2,5	2,5	5,06	12,5	13,75	22,35	140,14	5	4,4	ENT.CF-400-2,5x3
ENT.ERH-E50-7-230-4,4	4,4	2,88	22	24,2	39,34	246,22	6	6,5	ENT.CM-400-8,33+ENT.CF-400-4,17
ENT.ERH-E50-7-230-5	5	2,5	25	27,5	44,7	283,65	7	7,4	ENT.CF-230-5
ENT.ERH-E50-7-230-10	10	1,28	49,1	53,91	99,3	559,59	8	13,1	ENT.CF230-10

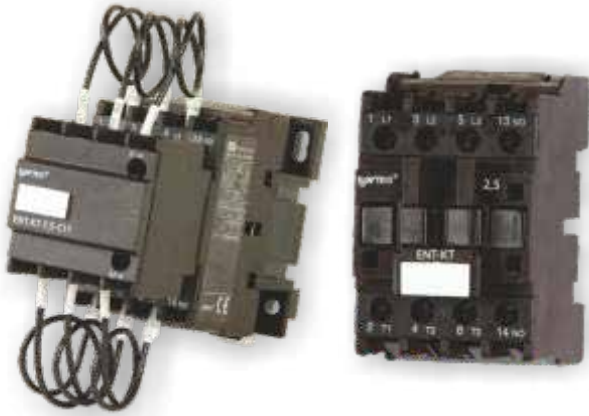
Size	A	B	C	D	E	F	G	H
1	0,9	66	50	63	50	80	85	0,25
2	1	66	50	65	52	80	85	0,5
3	1,5	84	64	76	64	85	95	0,83
4	1,8	84	64	99	87	85	95	1,38
5	2,5	96	84	102	86	95	110	2,5
6	4,6	120	90	122	104	115	105	4,4
7	5,2	120	90	130	112	115	105	5
8	8,5	130	100	121	95	160	190	10

Dimensions



Capacitor Duty Contactors

ENT-KT Series



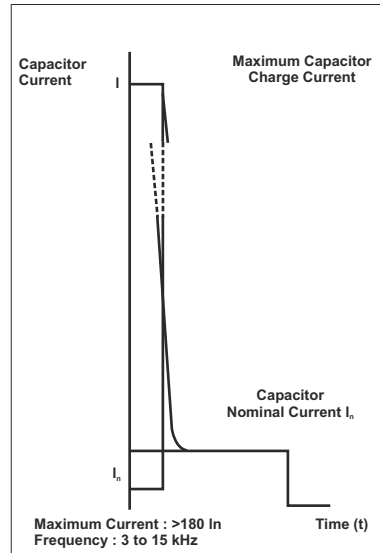
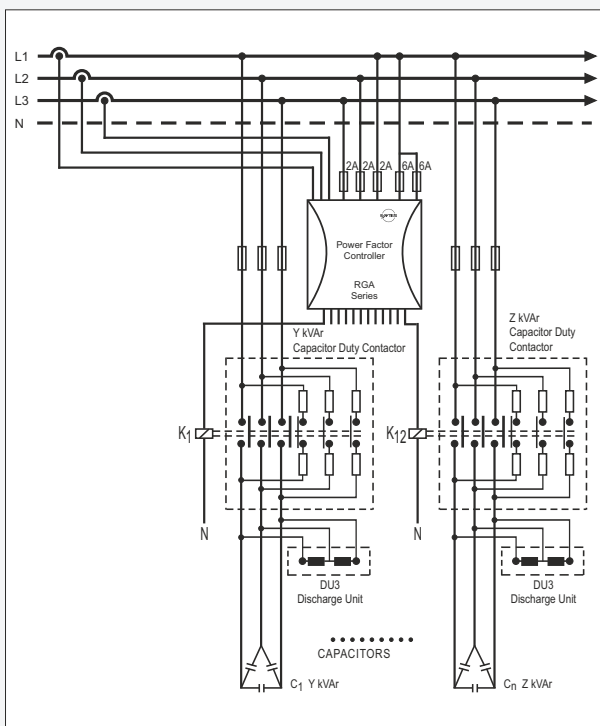
ENT-KT capacitor duty contactors are two-stage contactors designed to prevent high inrush currents.

With auxiliary contact block, ENT-KT transmits inrush currents over damping resistors and enables excess currents to stay within acceptable limits. (In 2.5 and 5kVAR models, the special reinforced contact alloy enables durability against inrush currents.)

Features;

- Auxiliary Contact Block
- Three Phase Connection
- Possibility to connect capacitors up to 60 kVAR
- Coil Voltage: 220-230 VAC 50/60 Hz
- In accordance with IEC-947
- Long electrical life
- UL Certified (12,16,20 and 25kVAR models)

Connection Diagram



Capacitor inrush current chart

With these features of ENT-KT Capacitor Duty;

- Contact life improves
- The risk of reactive penalties resulting from contactor faults (power factor correction error) decreases
- Capacitor faults decrease
- Energy quality improves with prevention of voltage fluctuations
- Since the maintenance interval of the power factor correction system is extended and unexpected fault situations are reduced, unplanned production stops are decreased

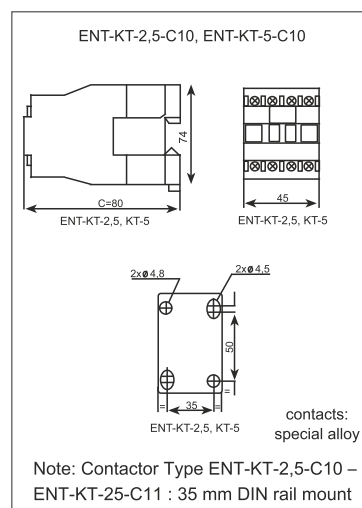
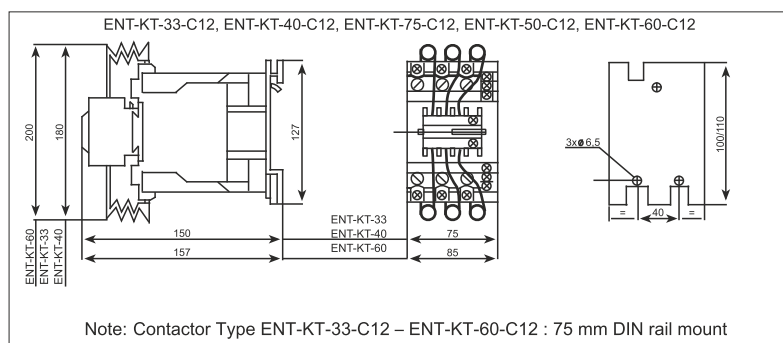
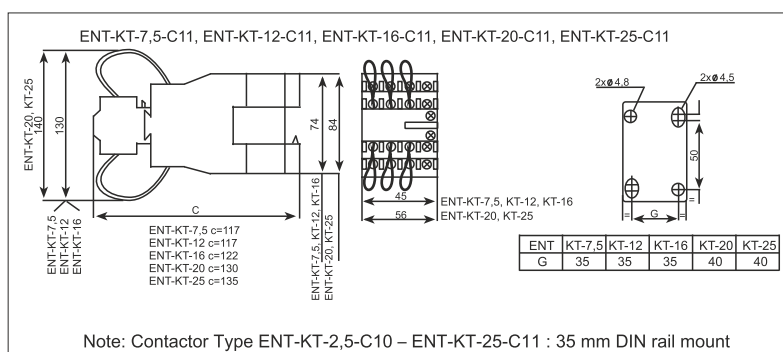


Capacitor Duty Contactors

ENT-KT Series

Product Code	Operating Power (kVar)		Auxiliary Contacts (Instantaneous)		Max. Hourly Operating Cycles Count	Switching Life (Operating Cycles)
	0 < 55 °C 50/60Hz		NO	NC		
	200V	400V				
ENT-KT-2,5-C10	1,4	2,5	1	0	240	150.000
ENT-KT-5-C10	2,8	5	1	0	240	150.000
ENT-KT-7,5-C11	4,0	7,5	1	1	240	200.000
ENT-KT-12-C11	6,7	12,5	1	1	240	200.000
ENT-KT-16-C11	8,5	16,7	1	1	240	200.000
ENT-KT-20-C11	10,0	20,0	1	1	240	100.000
ENT-KT-25-C11	15,0	25,0	1	1	240	100.000
ENT-KT-33-C12	20,0	33,3	1	2	240	100.000
ENT-KT-40-C12	25,0	40,0	1	2	240	100.000
ENT-KT-50-C12	30,0	50,0	1	2	240	100.000
ENT-KT-60-C12	40,0	60,0	1	2	240	100.000
ENT-KT-75-C12	45,0	75,0	1	2	240	100.000

Dimensions



Power Factor Correction



Thyristor Switches

SC-225 / SC-325 / SC-250 / SC-350



SC series thyristor switches are used in systems where fast-switching is required. With the use of SC series thyristor switches, capacitors can be switched on and off in a duration of 1 period (20ms).

As a result, power factor correction of fast-switching loads such as spot welding machines, cranes and arc furnaces can be done effectively.

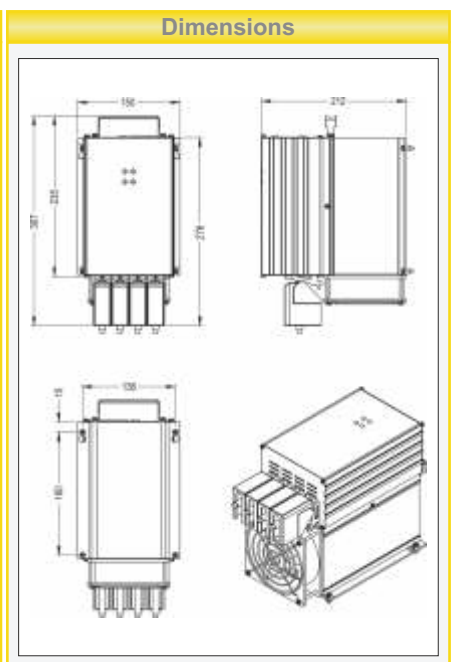
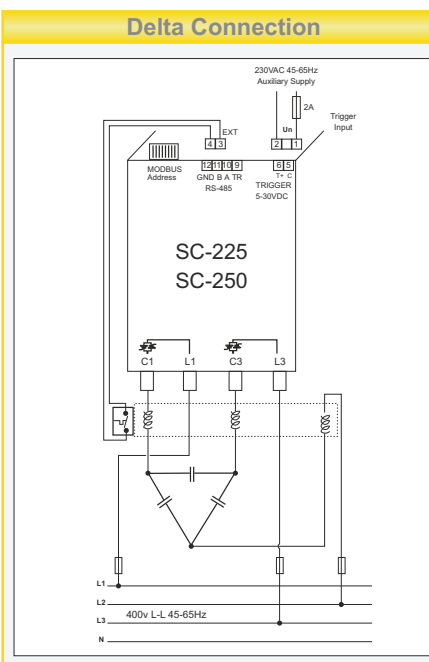
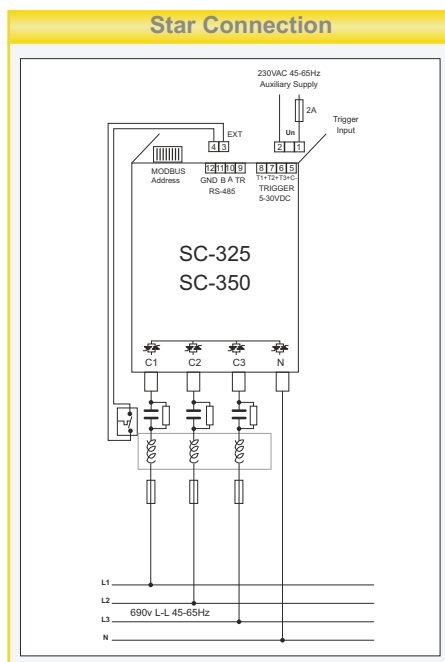
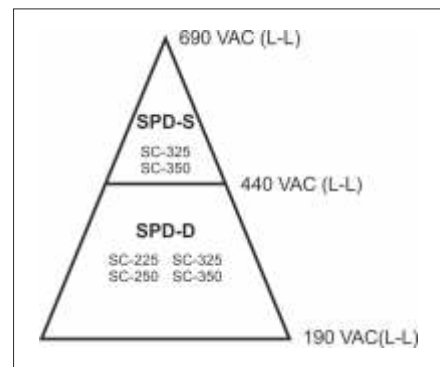
Features;

- Reaction time of less than 20ms
- Reactor thermal input
- Thermal protection
- Warning LEDs
- Easy mounting
- Quiet operation
- Triggering with RS-485 or DC signal
- Ability to trigger when the capacitor voltage is greater than the maximum voltage
- Cooling design that enables continuous operation under maximum temperature and load
- High safety with FFT in high harmonic environments
- Operating Voltage 440/690V
- Maximum Power 25/50 KVA
- Frequency 45-65 Hz
- Triggering 5-30 VDC
- Operating Temperature -10 C°, + 55C°
- Storage Temperature -10C°, + 75C°
- Humidity 95%
- Protection Class IP-00
- Standard EN 60947-1
- Dimensions; 276mmx150mmx212mm



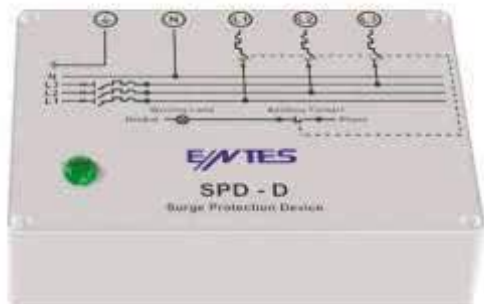
⚠ These products are advised to be used with ENTES SPD Series Surge Protection Devices.

	25 KVA	50 KVA
Delta with 2 Thyristors (440V)	SC-225	SC-250
Star with 3 Thyristors (690V)	SC-325	SC-350



Surge Protection Device

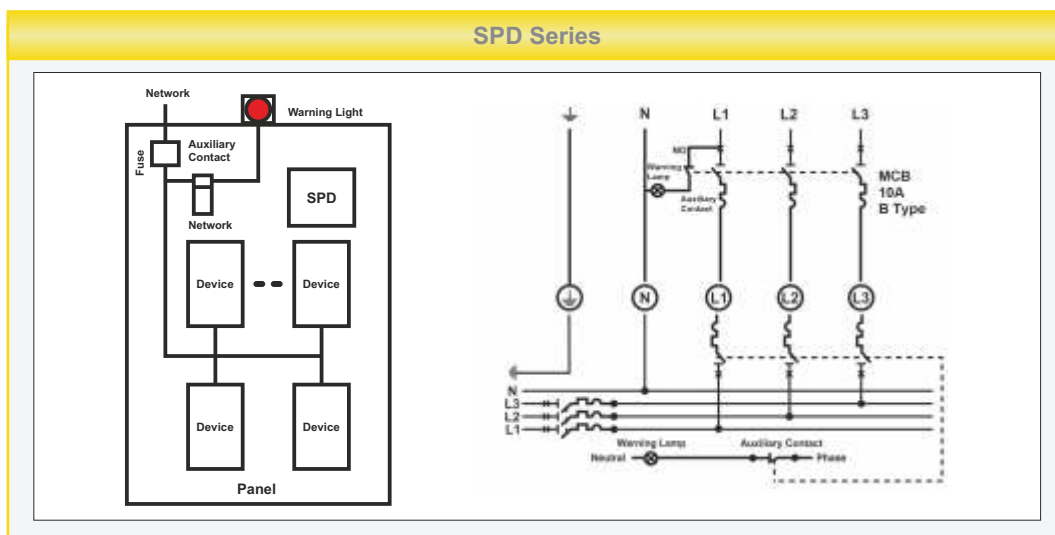
SPD Series



SPD device absorbs high energy surge voltages where they threaten sensitive devices and prevents them from being damaged. SPD device provides operation continuity. Also it can reduce repair costs.

	SPD-D	SPD-S
U_c	440 V~ (+10%) (L-L) 45 – 65 Hz	690 V~ (+10%) (L-L) 45 – 65 Hz
I_{max}	40 kA	40 kA
I_n	20 kA	20 kA
U_p	1,3 kV	1,3 kV
Protection	IP 20	IP 20
Dimension (mm)	171*121*80	171*121*80
Weight (gr)	746	634
Operation Temperature (°C)	-10...55 °C	-10...55 °C
Storage Temperature (°C)	-10...70 °C	-10...70 °C
Box piece	1	1

Connection Diagram



Power Factor Correction

L.V. Current Transformers

ENT Series



ENT.B



ENT.30



ENT.MN30



ENT.40



ENT.MN40



ENT.60



ENT.80



ENT.100

Current transformers are transformers with windings insulated from each other, which are used in applications where it is difficult or impossible to read current directly, and transforms high level primary currents to lower secondary currents.

The device prevents impacts of high voltage on devices or measurement tools by reducing high current at the primary side at the secondary side.

ENT series current transformers are divided into two types based on their production methods;

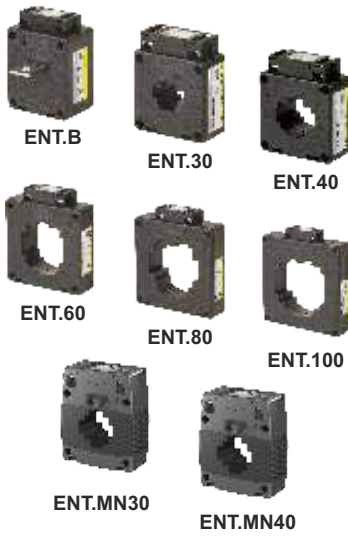
- **Wound type current transformers:** The primary and secondary windings of wound type current transformers consist of windings on a magnetic core. (ENT.30, ENT.MN 30, ENT.40, ENT.MN 40, ENT.60, ENT.80, ENT.100)
- **Bus-bar type current transformers:** The primary of the current transformer and the incoming line are conductive. (ENT.B)

Technical Specifications

Primary Current Range	5- 5000 A
Nominal Power	1,5-30 VA
Measurement Accuracy	Class 0,5 / Class 1
Isolation Test Voltage	3 kV eff, 1 min.
Rated Frequency	50/60Hz
Maximum Operating Voltage	$U_m \leq 0,72 \text{ kV}$
Nominal Permanent Thermal Current	$1,2 \times I_{pr}$
Nominal Thermal Short-Circuit Current	$60 \times I_{pr}$
Thermal Class	B(130°C)
Overcurrent Factor	$n < 5$
Operating Temperature	-5°..+40°C
Standards	IEC 61869-2, TS EN 61869-2
Usage Type	Indoor
Enclosure	Self-extinguishing plastic (UL94 V-0)

L.V. Current Transformers

ENT Series

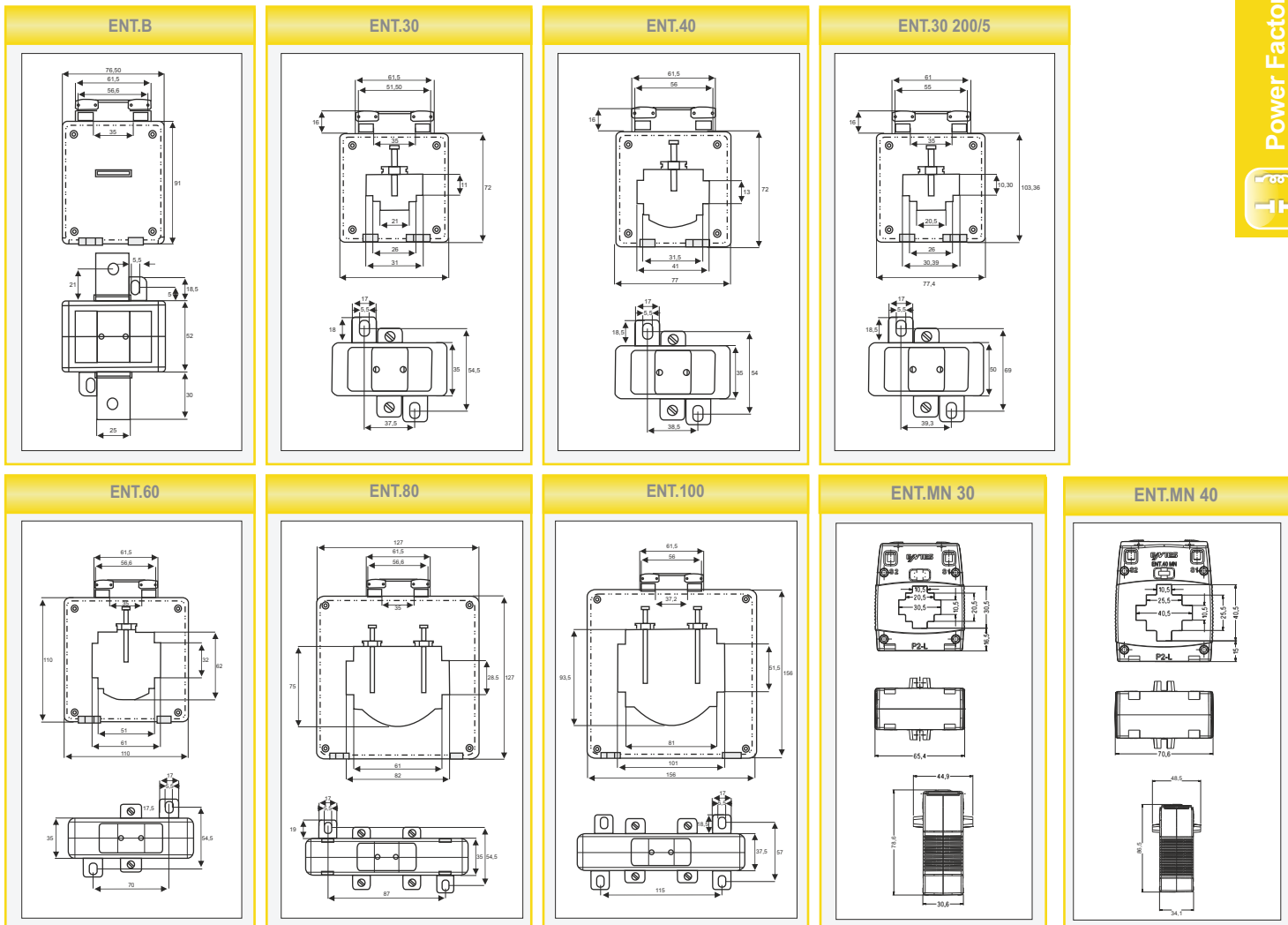


Product Code	Primary Current (A)	Nominal Power						Accuracy		Thermal Class
		1,5VA	2,5VA	5VA	10VA	15VA	30VA	Class 0,5	Class 1	B
ENT.B	5 - 10 - 15 - 20 - 25 - 30 - 40 - 50 60 - 75 - 80 - 100 - 125 - 150			●	●	●		●		●
ENT.30	20 - 25 - 30 - 40 - 50 - 60 - 75 80 - 100 - 125 - 150			●					●	●
	200			●	●			●		●
	250 - 300			●	●			●		●
ENT.MN 30	30 - 40 - 50 - 60 - 75 - 80	●	●						●	●
	100 - 125 - 150	●						●		●
	200		●					●		●
	250 - 300		●	●				●		●
ENT.40	300 - 400 - 500 - 600			●	●	●		●		●
ENT.MN 40	400 - 500 - 600		●	●	●				●	●
ENT.60	750 - 800 - 1000 - 1200 - 1250				●	●		●		●
ENT.80	1500 - 1600					●	●	●		●
ENT.100	2000 - 2500 - 3000 - 3200					●	●	●		●
	4000 - 5000					●	●	●		●

*Current transformers of class 0.5 are also supplied as sealed.
Please contact your sales representative for models with different specs.



Dimensions



Power Factor Correction

L.V. Current Transformers

ENS Series



- Split-core current transformers are used generally due to their ability to be easily mounted without detaching busbars and conductors in operating systems.
- Operating temperature $-5^{\circ}\text{C}/+50^{\circ}\text{C}$
- Storage temperature $-25^{\circ}\text{C}/+70^{\circ}\text{C}$
- Thanks to their 35mm and 45mm busbar openings that comply with the standard leg width of breakers, 3-Phase current transformers offer direct installation possibility at the breaker outputs. Thereby, they significantly improve the installation times.

Features;

- Thermal Continuous Nominal Current $I_{cth}=1.2 \times I_n$ (in ENS.AYS series)
- Thermal Instantaneous Nominal Current $I_{th}=60 \times I_n$, 1s
- Maximum Operating Voltage U_m : 0,72kV
- Insulation Test Voltage 3kV, U_{eff} , 50Hz, 1min
- Frequency: 50Hz
- Insulation Class: E
- Standards: TS EN 61869-2, VDE 0414-1



L.V. Current Transformers

ENS.AYC Series

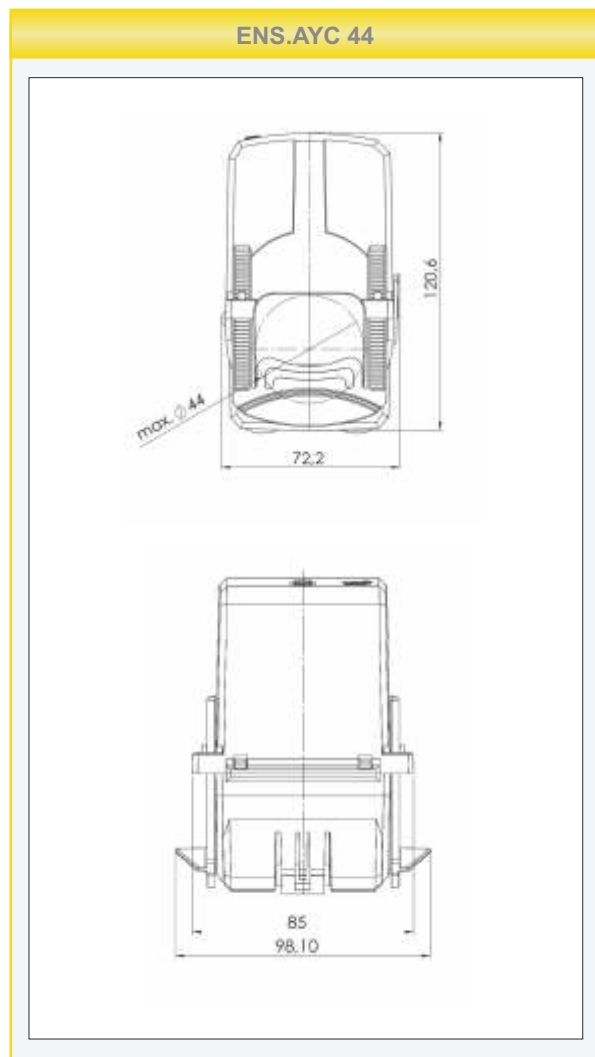
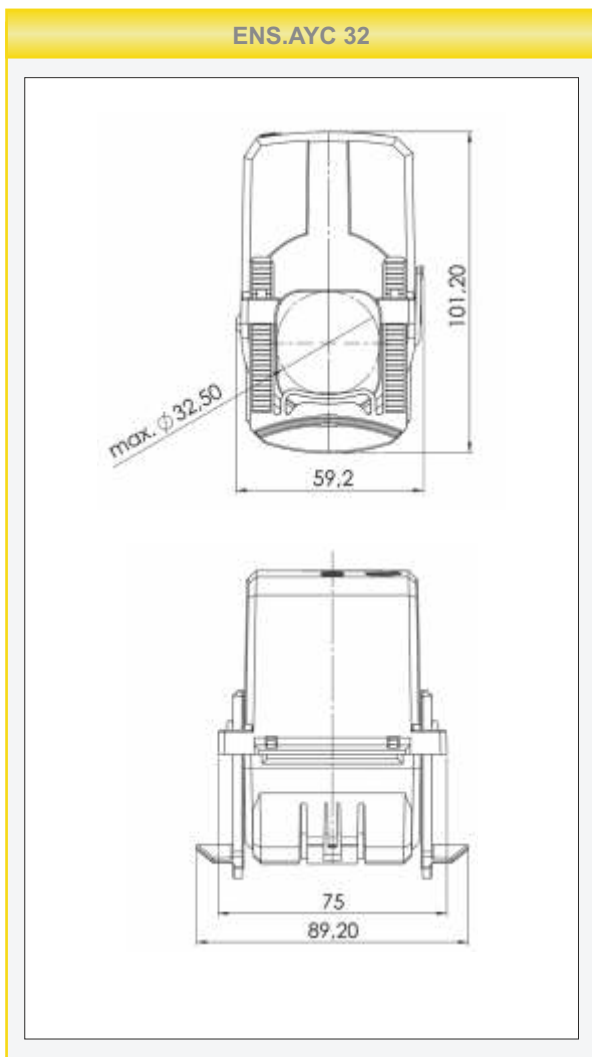
Compact Split-Core Current Transformers



ENS.AYC 32

Type	Primary Current (A)	Nominal Power (VA)	Class	Max Cable Dimensions (mm)
AYC 32 Secondary 5A				
ENS.AYC 32 100	100	1,5	3	Ø32
ENS.AYC 32 125	125	2,5	3	Ø32
ENS.AYC 32 150	150	3	3	Ø32
ENS.AYC 32 200	200	3	3	Ø32
ENS.AYC 32 250	250	3	3	Ø32
ENS.AYC 32 300	300	2,5	1	Ø32
ENS.AYC 32 400	400	5	1	Ø32
ENS.AYC 32 500	500	5	1	Ø32
ENS.AYC 32 600	600	5	1	Ø32
AYC 44 Secondary 5A				
ENS AYC 44 250	250	1,5	1	Ø44
ENS AYC 44 300	300	2,5	1	Ø44
ENS AYC 44 400	400	5	1	Ø44
ENS AYC 44 500	500	5	1	Ø44
ENS AYC 44 600	600	5	1	Ø44
ENS AYC 44 750	750	5	1	Ø44
ENS AYC 44 800	800	5	1	Ø44
ENS AYC 44 1000	1000	5	1	Ø44

Dimensions



Power Factor Correction



L.V. Current Transformers

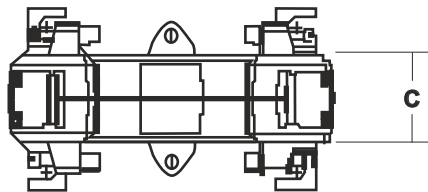
ENS.AYS Series

Split-Core Current Transformers

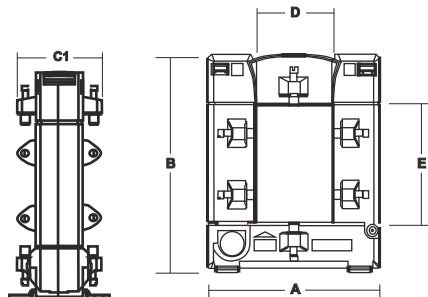
Product Code	Primary Current (A)	Nominal Power (VA)	Class 0,5	Class 1	Class 3	Internal Dimension (mm)
ENS.AYS 23	100	1,25			●	20x30
ENS.AYS 23	150	1,5			●	20x30
ENS.AYS 23	200	2,5			●	20x30
ENS.AYS 23	300	3,75		●		20x30
ENS.AYS 58	400	2,5		●		50x80
ENS.AYS 58	500	5		●		50x80
ENS.AYS 58	600	5		●		50x80
ENS.AYS 58	800	7,5		●		50x80
ENS.AYS 58	1000	10		●		50x80
ENS.AYS 812	400	2,5		●		80x120
ENS.AYS 812	500-600-800	2,5	●			80x120
ENS.AYS 812	1000	5	●			80x120
ENS.AYS 816	1200	10	●			80x160
ENS.AYS 816	1500-1600-2000	15	●			80x160
ENS.AYS 816	2500-3000	15	●			80x160
ENS.AYS 816	4000	30	●			80x160
ENS.AYS 816	5000	15	●			80x160



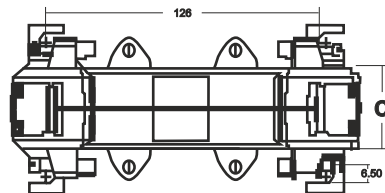
ENS.AYS 23



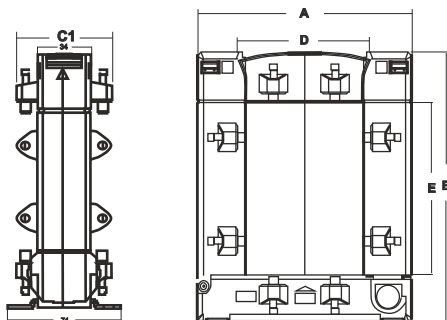
ENS.AYS 58



ENS.AYS 812



ENS.AYS 816



Type ENS.AYS 23 ENS.AYS 58

A	93	125
B	106	158
C/C1	34/58	34/58
D	20	50
E	30	80

Type ENS.AYS 812 ENS.AYS 816

A	155	195
B	198	243
C/C1	34/58	64/79
D	80	80
E	120	160

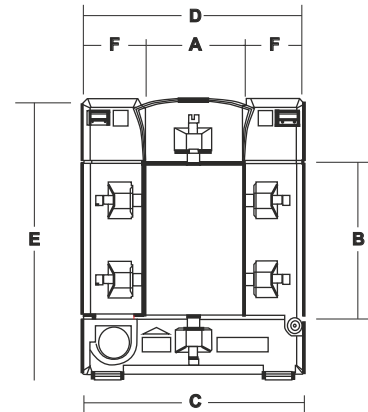
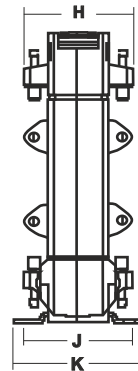


L.V. Current Transformers

ENS.CYS Seres

Split-Core Current Transformers

Product Code	Max. Busbar Dimensions (mm)	Primary Current (A)	Secondary Current (A)	Nominal Power (VA)	Class 3	Class 1	Class 0,5	Pcs/Box
ENS.CYS 23	20x30	100	5	1,5	●			16
	20x30	150-200	5	1,5		●		16
	20x30	300	5	2,5		●		16
ENS.CYS 58	50x80	400	5	2,5		●		16
	50x80	500-600	5	5		●		16
	50x80	800	5	7,5		●		16
ENS.CYS 88	80x80	1000	5	5			●	12
ENS.CYS 812	80x120	400	5	1,5			●	8
	80x120	500-600-800	5	2,5			●	8
	80x120	1000	5	5			●	8
	80x120	1200	5	10			●	4
ENS.CYS 816	80x120	1500-1600 2000-2500 3000	5	15			●	4
	80x120	4000	5	30			●	4
	80x120	5000	5	15			●	4



Power Factor Correction

Type / Dim.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
ENS.CYS 23	20	30	50	89	110	34	47	40	32	52,5	67,5
ENS.CYS 58	50	80	78	114	145	32	32	32	33	52,5	67,5
ENS.CYS 88	80	80	108	144	145	32	32	32	33	52,5	67,5
ENS.CYS 812	80	120	108	144	185	32	32	32	33	52,5	67,5
ENS.CYS 816	80	160	120	184	245	47	47	52	38	61	76

L.V. Current Transformers

ENS.3PM Series



ENS.3PM Series current transformers can deliver current data of 3 phases to plug&meter applicable devices developed by ENTES over a single RJ45 cable. Designed in accordance with standard MCCB's, ENS.3PM Series current transformers can operate in a current range up to 1600 A with its 3 different sizes.

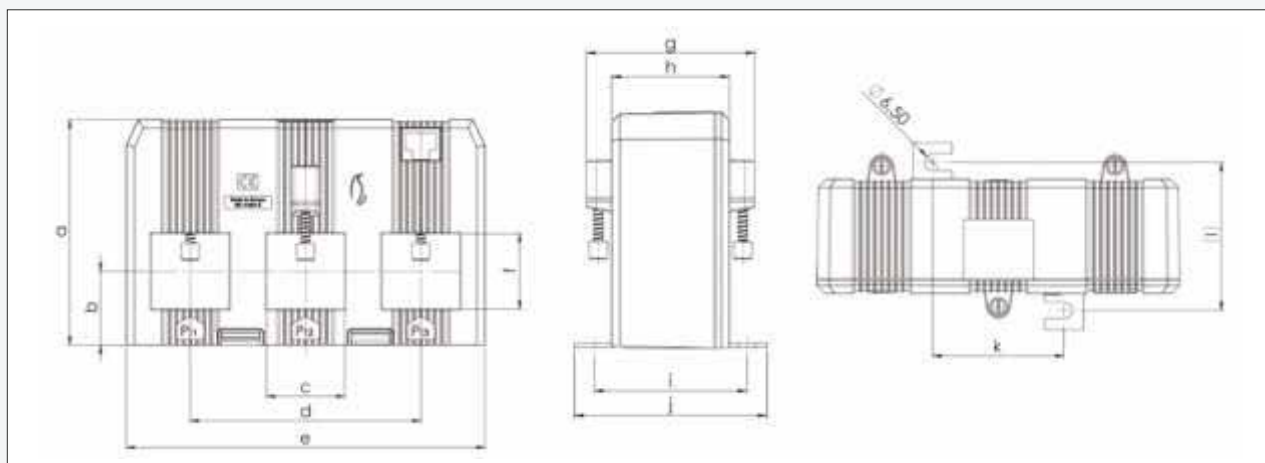
Current Transformer Series with 3-phase mV output

Product Code	Primary (A)	Secondary (mV)	Class 1	
ENS.3PM 25				
ENS.3PM 25 3X60	3x60	330	●	21x25
ENS.3PM 25 3X75	3x75	330	●	21x25
ENS.3PM 25 3X100	3x100	330	●	21x25
ENS.3PM 25 3X150	3x150	330	●	21x25
ENS.3PM 25 3X200	3x200	330	●	21x25
ENS.3PM 25 3X250	3x250	330	●	21x25
ENS.3PM 33				
ENS.3PM 33 3X250	3x250	330	●	30,5x29,5
ENS.3PM 33 3X330	3x300	330	●	30,5x29,5
ENS.3PM 33 3X400	3x400	330	●	30,5x29,5
ENS.3PM 33 3X500	3x500	330	●	30,5x29,5
ENS.3PM 33 3X600	3x600	330	●	30,5x29,5
ENS.3PM 55				
ENS.3PM 55 3X800	3x800	330	●	50,2x54
ENS.3PM 55 3X1000	3x1000	330	●	50,2x54
ENS.3PM 55 3X1250	3x1250	330	●	50,2x54
ENS.3PM 55 3X1600	3x1600	330	●	50,2x54

Power Factor Correction



Dimensions



Type / Dimension	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	j (mm)	k (mm)	
ENS.3PM 25	82,3	28,5	21	70	110,5	25	56	37	57	72	35	57
ENS.3PM 33	88	28,75	30,5	90	140	29,5	63	44	57	72	50,6	57
ENS.3PM 55	129	46	50,2	140	215	54	73	54	64	79	112,5	64

L.V. Current Transformers

ENS.3PMD Series



ENS.3PMD Series current transformers can deliver current data of 3 phases to plug&meter applicable devices developed by ENTES over a single RJ45 cable. Designed in accordance with standard MCCB's, ENS.3PMD Series current transformers can operate in a current range up to 1600 A with its 3 different sizes.

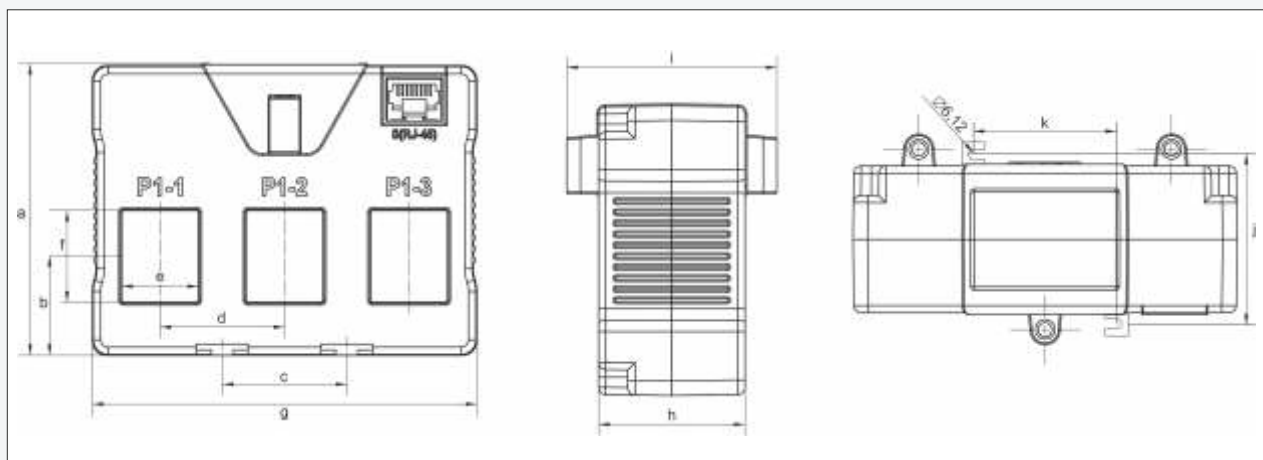
Current Transformer Series with 3-phase mV output

Product Code	Primary (A)	Secondary (mV)	Class 1	Dimensions (mm)
ENS.3PMD 25				
ENS.3PMD 25 3x60	60	330	●	21x25
ENS.3PMD 25 3x100	100	330	●	21x25
ENS.3PMD 25 3x150	150	330	●	21x25
ENS.3PMD 25 3x200	200	330	●	21x25
ENS.3PMD 25 3x250	250	330	●	21x25
ENS.3PMD 30				
ENS.3PMD 30 3x300	300	330	●	31x31
ENS.3PMD 30 3x400	400	330	●	31x31
ENS.3PMD 30 3x500	500	330	●	31x31
ENS.3PMD 30 3x600	600	330	●	31x31
ENS.3PMD 50				
ENS.3PMD 50 3x800	800	330	●	50x54
ENS.3PMD 50 3x1000	1000	330	●	50x54
ENS.3PMD 50 3x1250	1250	330	●	50x54
ENS.3PMD 50 3x1600	1600	330	●	50x54

Power Factor Correction



Dimensions



Type / Dimension	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	j (mm)	k (mm)
ENS.3PMD 25	79,5	27	34	34	21	25	105	40	58	57	34
ENS.3PMD 30	90	31,5	45,5	45,5	31	31	140	40	58	57	45
ENS.3PMD 50	125	49	70	70	54	50	214	40	58	57	69

L.V. Current Transformers

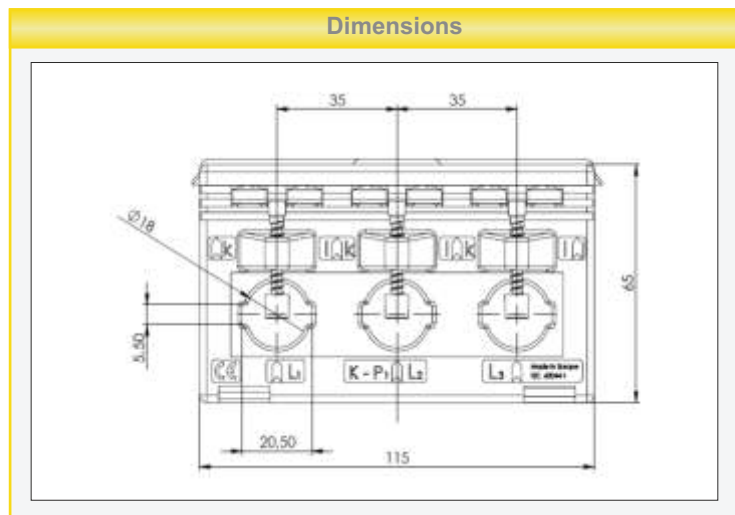
ENS.3PH Series

Three Phase Current Transformers

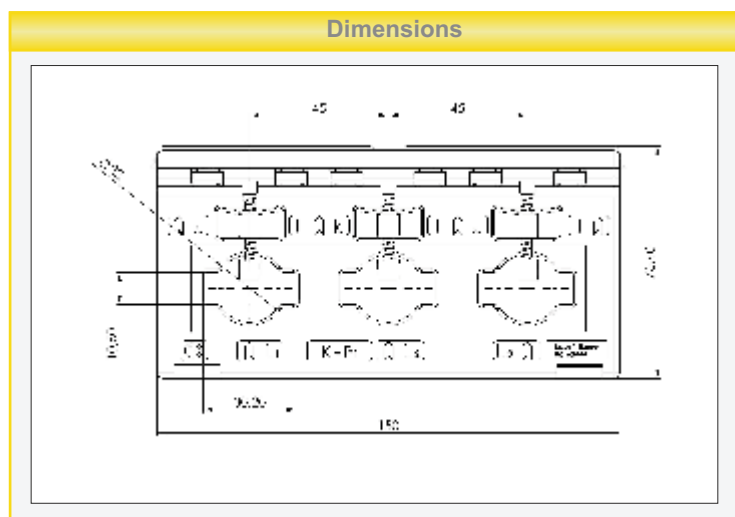
Product Code	Primary Current (A)	Nominal Power (VA)	Class	Internal Size-Bar Dimension (mm)
ENS.3PH 20				
ENS.3PH 20 3X100/5A	3x100	1	1	20x5
ENS.3PH 20 3X150/5A	3x150	1,25	1	20x5
ENS.3PH 20 3X160/5A	3x160	1,5	1	20x5
ENS.3PH 20 3X200/5A	3x200	1,5	1	20x5
ENS.3PH 20 3X250/5A	3x250	2,5	1	20x5
ENS.3PH 30				
ENS.3PH 30 3X250/5A	3x250	2,5	1	30x10
ENS.3PH 30 3X300/5A	3x300	3,75	1	30x10
ENS.3PH 30 3X400/5A	3x400	5	1	30x10
ENS.3PH 30 3X500/5A	3x500	5	1	30x10
ENS.3PH 30 3X600/5A	3x600	5	1	30x10



ENS.3PH 20



ENS.3PH 30



L.V. Clamp Type Current Transformers

ENS.CCT Series

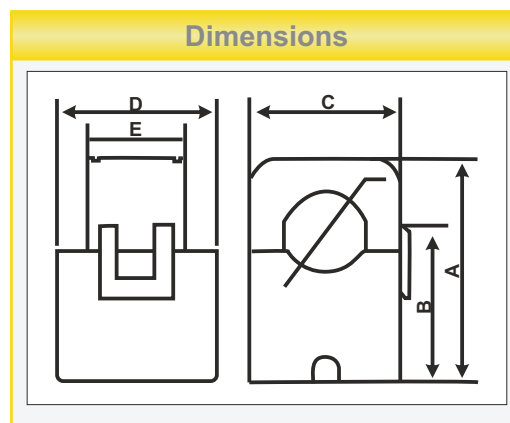


Compatible with plug & meter analyzers

The ENS.CCT series current transformers offer the advantage of one handed operation. In this way the series offer safe and easy mounting and demounting without interrupting the energy.

ENS.CCT series, which offers advantages in energy monitoring installations where energy cut-off is not possible, can be used in narrow and small panel applications due to its split-core and compact structure. They are preferred for mobile measurements in short-term measurement and test setups.

Model / Size	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Ø d (mm)
ENS.CCT-10	40.5	28.6	22	26	14.5	10
ENS.CCT-16	44	31	29	31	19	16
ENS.CCT-24	75	50	45	35	19.5	24
ENS.CCT-36	91.6	62	57.4	40.9	22.8	36



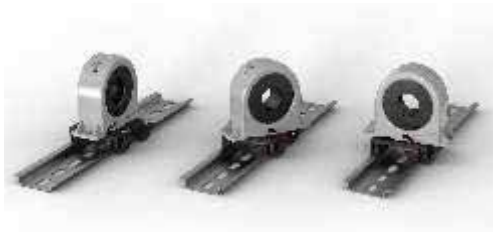
Model/Parameters	ENS.CCT-10	ENS.CCT -16	ENS.CCT -24	ENS.CCT -36
Rated Primary Current (In)	30A, 50A, 75A	100A, 120A	150A, 200A, 250A, 300A	400A, 500A, 600A
Rated Secondary Value	333mV (Compatible with plug&meter analyzers)			
Current Range	1A - In			
Max Withstand Current	1,2 In			
Accuracy Class	Class 1			
Working Frequency	50/60 Hz			
Phase Displacement	+ 1,5 ± 1°	+ 1,0 ± 1°	+ 0,5 ± 0,5°	+ 0,5 ± 0,5°
Linearty Error	-1 ± 1%	-1 ± 1%	-1 ± 1%	-1 ± 1%
Max. Voltage / Voltage Test	0,72 / 3 kV	0,72 / 3 kV	0,72 / 3 kV	0,72 / 3 kV
Overvoltage Category	CAT III			
Working Environment	Temperature: -10 / 70°C, Humidity ≤ 85%, Indoor			
Storage Condition	Temperature: -20 / 80°C, Humidity ≤ 85%			

Power Factor Correction



Current Transformer


CT Series



CT Series Current Transformers provide an economical solution for energy monitoring and electrical measurements with its compact design.



Power Factor Correction

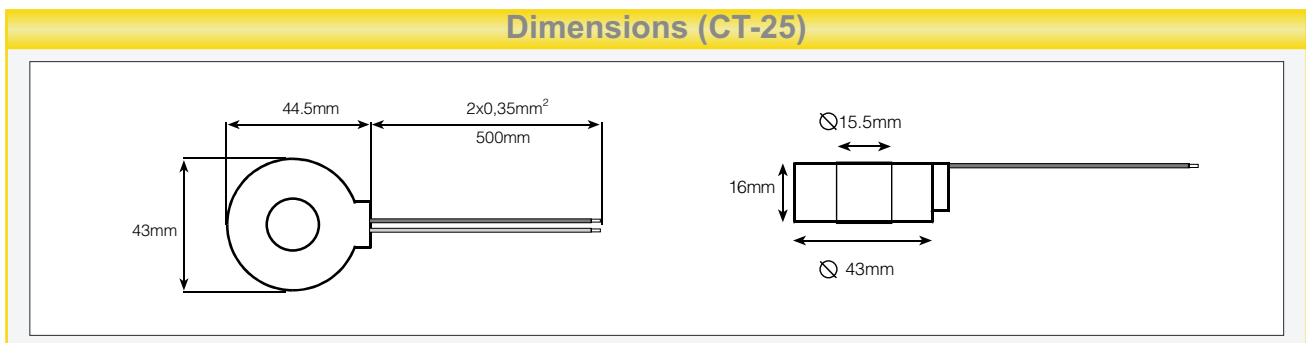
L.V. Current Transformer	Tip	Compatible ENTES Products*		
		Maximum Nominal Current		
		80 A	120 A	210 A
 (for ENTES For ENTES Digital Measuring Devices only)	CT-25		MPR-53 EPM-04h MPR-53S EPM-06 EPR-04 EPM-06C EPR-04S EPM-06CS EPM-04 EPM-07 EPM-04C EPM-07S EPM-04CS	EPM-4A EPM-4C EPM-4P EPM-R4C AKC-03
	CT-80D (only suitable for ES-80L)	ES-80L		

Technical Features

	CT-25	CT-80 D (Only suitable for ES-80L)
Transformer Ratio	1/2500	1/2500
Inner Diameter	15,5 mm (70 mm ² cable)	13 mm (35 mm ² cable)
Outer Diameter	43 mm	47,5 mm
Primer Nominal Current	210 A	80 A
Seconder Nominal Current	0,084 A	0,032 A
Operating Temperature	-40 °C ..+70 °C	-40 °C ..+70 °C
Frequency	50 Hz	50 Hz

* CT-25 current transformer can be used with only the versions compatible with CT-25 of the models mentioned on the table.
Please contact to your sales responsible for the compatibility of your selected product.

Dimensions (CT-25)



Discharge Unit

DU-3



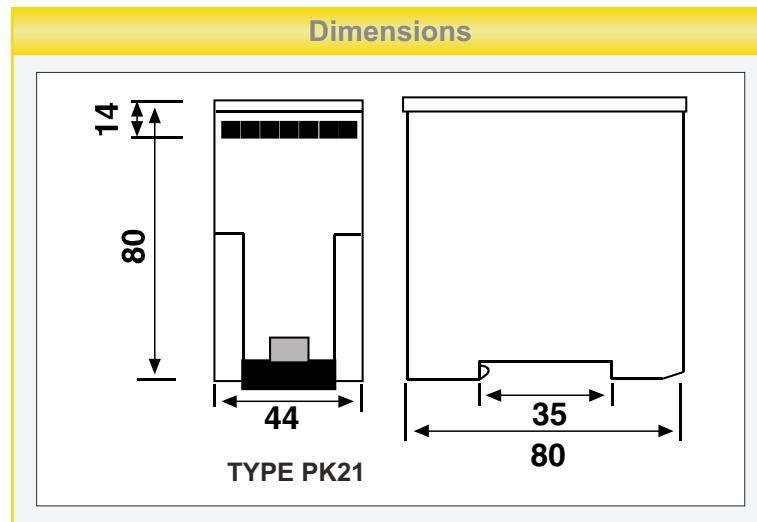
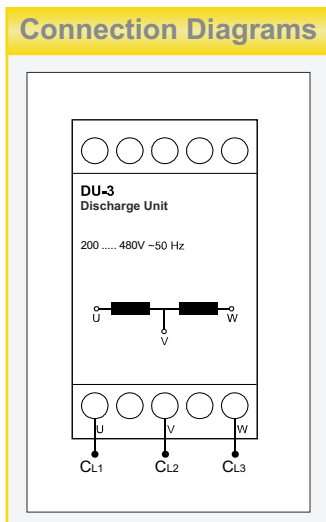
DU-3 discharging unit improves capacitor operating life and prevents internal heat losses by quickly discharging the capacitors.

Specifications	DU-3
Electrical Features	
Coil Resistance	3000 Ω
Operating Period	Continuous
Operating Voltage	230 ... 460 VAC
Operating Frequency	50 Hz
Number of Phases	3
LV Capacitor Power to be Discharged	5...50 kVAr
Losses	< 1 W
Mechanical Features	
Ambient Temperature	40°C
Protection Class	IP20
Dimensions	PK21
Weight	0,4 kg
Pieces per Box	20

	Continuous Current (mA)		
	230V	400V	500V
U	1	4	8
V	2	6	12
W	1	4	8

Q (kVAr)	Discharge Time (s)		
	230	400	450
10	4	2	2
20	8	3,5	3
25	10	4	4
30	12	5,5	5
50	20	8	6

Power Factor Correction





RGA/RGSR Power Factor Controllers



Measure

The new range of power factor controller that can perform detailed measurement up to the 51st harmonic also incorporates lots of features offered by the network analysers.



Monitor

Power Factor Correction can be remotely managed via ENTES cloud monitoring software, the system settings can be configured and kept under control all the time.



Correct the Power Factor Power

Power Factor Correction precision is taken to a unique level thanks to the next-generation smart power factor correction algorithm.



SVC

Offering optimal solutions in systems where there are rapid load changes, ENTES SVC instantly responds to the needs. It offers the exact power factor correction solution for rapid load changes.



Remote Monitoring Hardware and Software

ENTES Remote Monitoring Solutions enable the measured electrical parameters to be tracked and analyzed from a single center. With this method, a high number of devices can be accessed and controlled over the Internet with Ethernet and GPRS.

With “Entbus[®] Pro” and “Entbus[®] Plus” software, parameters on remote locations can be analyzed and compared. These systems can track power factor correction, compare energy consumptions on different locations, and improve energy costs.

In addition to these, it is possible to read meter measurements from a single monitoring center by means of Entbus software and if it is desired, they can also be monitored from distribution centers.

Areas of Application

- Electricity Distribution/Transmission Sites
- Industrial Sites
- Public Institutions
- Universities and Schools
- Shopping Malls
- Chain Stores
- Renewable Energy Production Sites
- Radio Transmitters, Base Stations
- Hospitals
- Banks
- Airports and Ports

Remote Monitoring Software

- Entbus[®] Pro
- Entbus[®] Plus

Ethernet & USB Converters

- EMG series
- RS-USB2

GPRS Modems

- GEM Series



The new-generation **Entbus®** Pro web based energy monitoring software enables improving energy consumption and operating costs and reaching goals in energy efficiency.

Entbus® Pro tracks the energy consumption of facilities regardless of time and location and enables users to control it. Parameters transferred over Ethernet/GPRS are instantly tracked, saved and archived.

OwaspTop10 Security Certificate

Entbus® Pro software has been tested for security gaps and successfully acquired OwaspTop10 certificate.



Features

- Online Monitoring
- Real-Time data collection
- Alarm management
- Remote configuration of measurement devices
- Reporting collected data, graphical display, and exporting in xls format
- Displaying device logs
- Tariff Setting
- Authorization infrastructure
- Access via Internet / Intranet
- Multilingual
- Adding devices of different brands and models compatible with Modbus
- Defining virtual device and virtual parameter
- Detailed filtering feature for reports
- Sending alarms via email and SMS
- Automatic report dispatch
- Billing
- Mimic Diagram

System Structure

Data of communicating devices are transmitted to the server via Ethernet converter or GPRS modem. Users access data by connecting to the server over the Internet.

• Monitoring Screen

It allows the electrical parameters of the devices to be tracked instantly and shows the hierarchical structures of devices on the device tree.

• Options Screen

It has user information and allows users to subscribe to defined alarms

• Reports Screen

Users can receive 27 different reports from data saved in the system. Reports can be displayed as graphs and/or tables and saved in PNG, BMP, XLS, CSV and XML formats.

• Device Commands

Enables remote configuration of devices. Can also display log records of the devices that have the function of recording logs.

Configuration

Basic Entbus configuration screens where Definitions including region, connection point, device, user and alarm are performed here.

• Alarm

When any parameter of devices exceed the specified limits, the system sends users email and/or SMS notifications.

• Virtual Device

For places where measurements cannot be taken, values are measured with virtual devices. All operations that can be performed mathematically are displayed on the tracking screen as if a real device is making measurements. As a result, losses and unrecorded usage can be easily detected.

• Billing

You can determine the devices identified in the system as "Billing Points" and you can issue invoices in desired periods and send these invoices to e-mails of your customers. You can display invoice points as "Customer", "Joint Section" and "Main Meter" breakdown and if you like, you can share consumptions identified in the joint section with your customers.



System Architecture

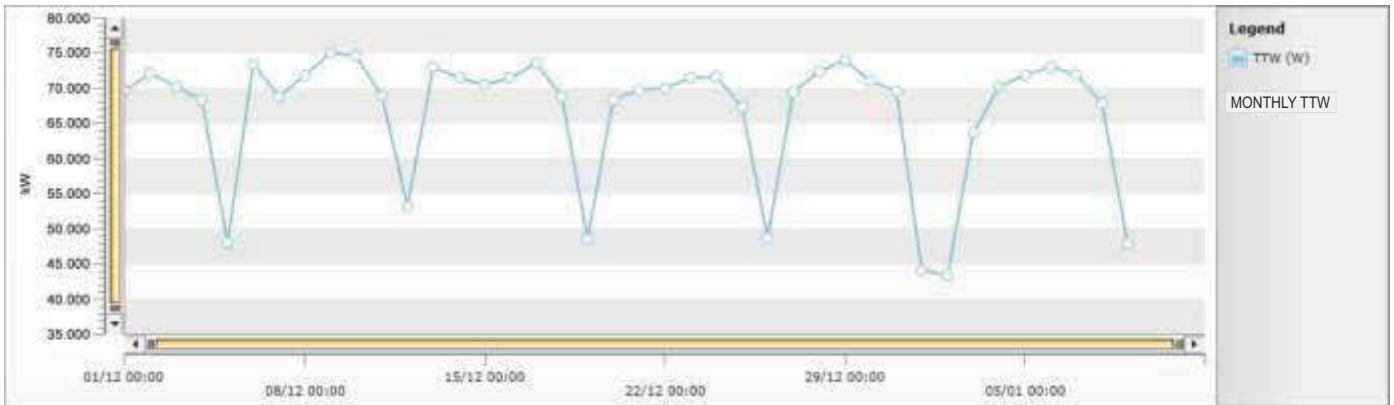
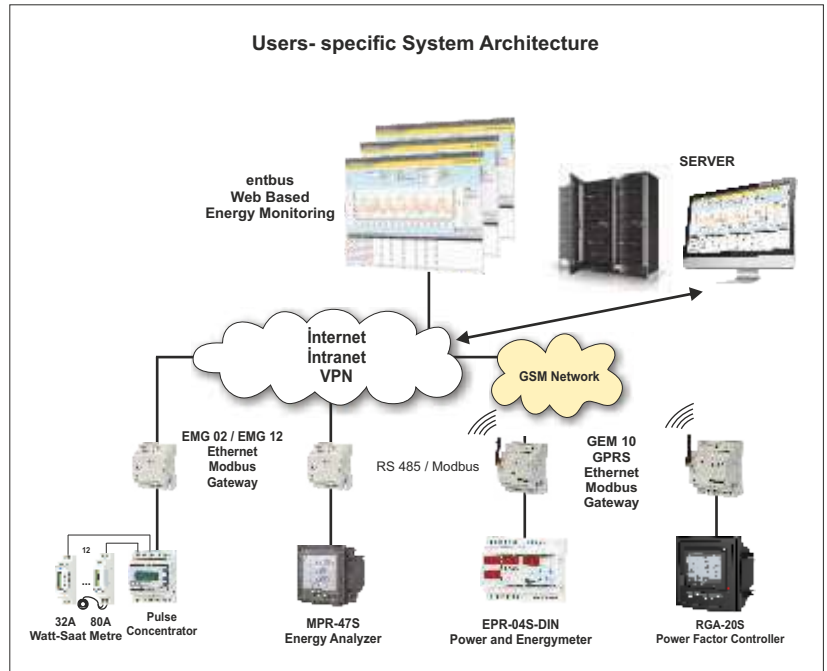
ENTBUS[®] Pro software can be utilized in two ways.

Application Model 1: Users can install the software on their own server.

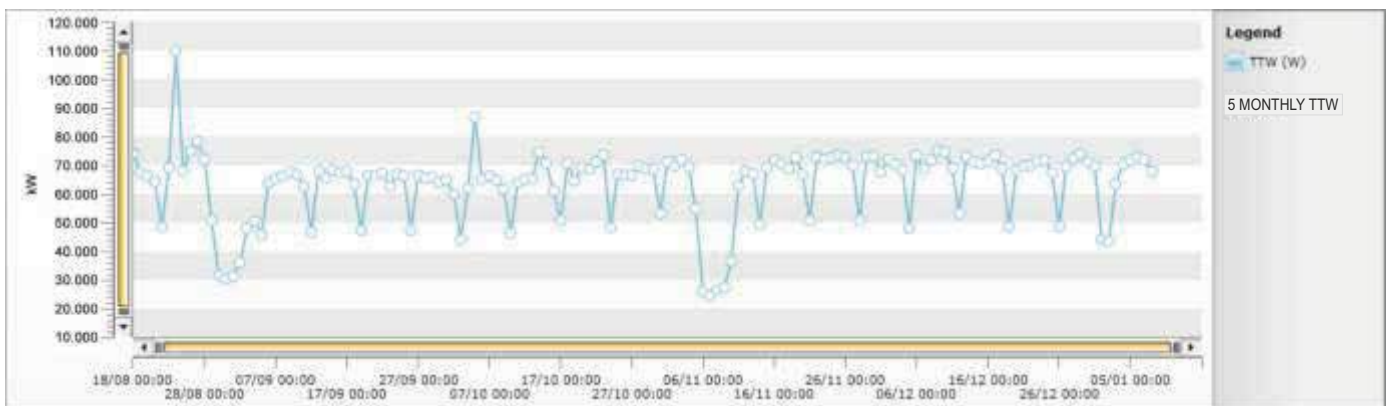
The software is installed in users server.

The data are collected by running the software on intranet or web.

The user can modify the settings of own devices also can analyze the data and perform reports.



Total monthly active power graphic



Total active power throughout five months graphic

Remote Monitoring Software

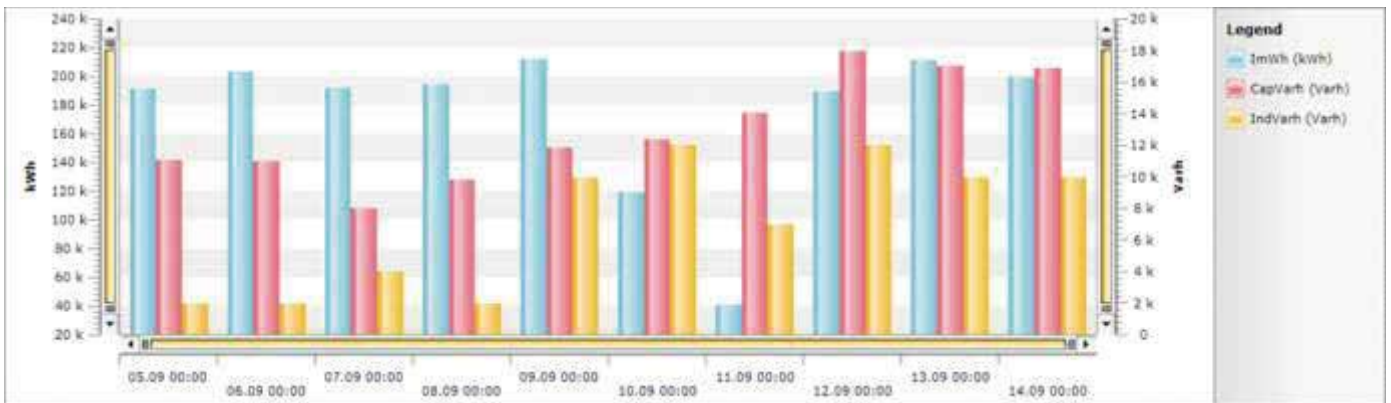
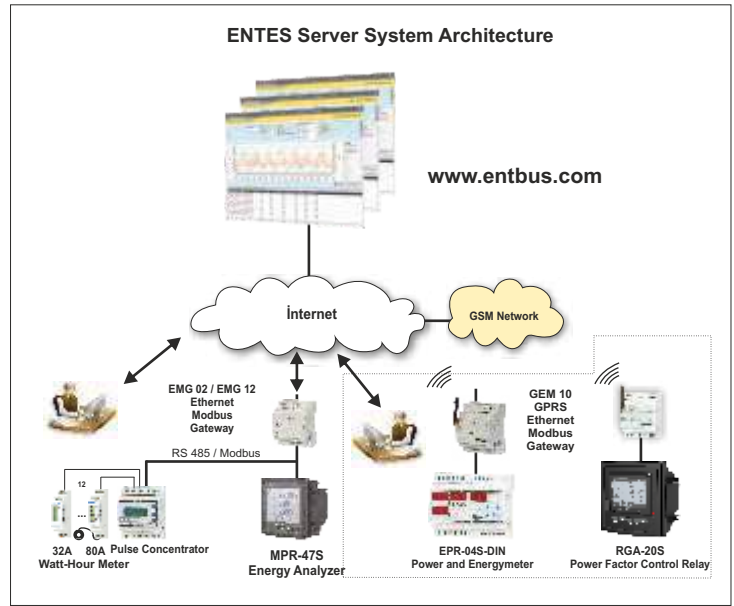
Entbus® Pro



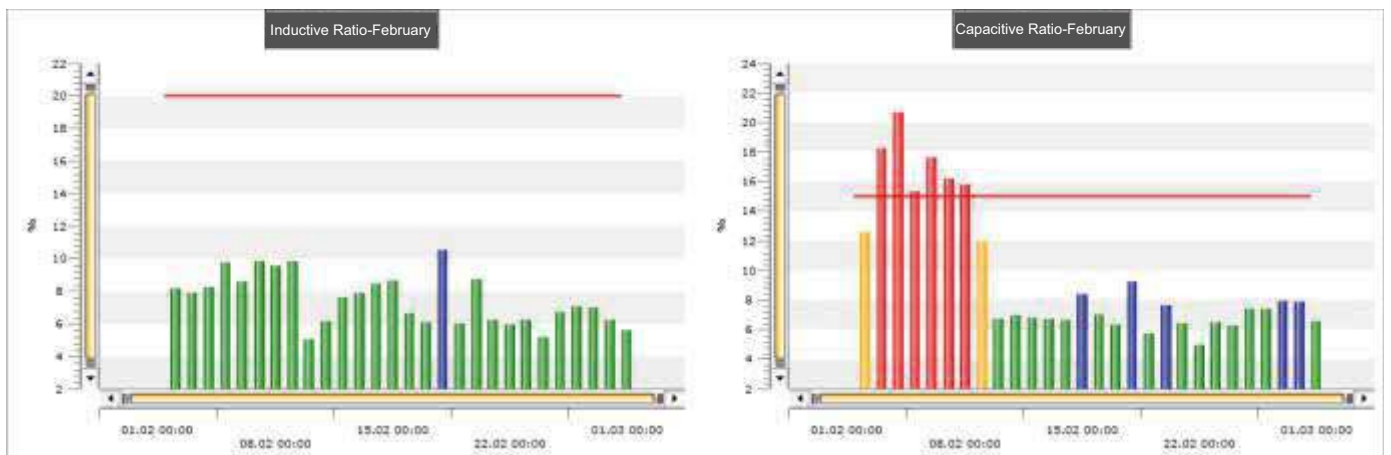
Application Model 2: Users can run software over www.entbus.com

In this application, the software is installed on the ENTES server. The users can identify their devices to the ENTES server without installing a software, purchasing a server, or using extra workforce.

These data are stored and processed on the ENTES server. The users can connect to the ENTES server over the web (www.entbus.com) at any time, reach their data with their own password, analyze these data, and receive the reports.



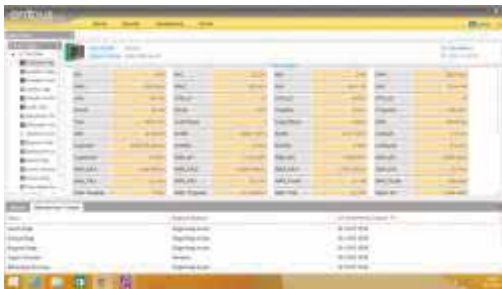
Active and reactive energy consumption of a PFC panel throughout 10 days



Monthly graph of inductive and capacitive rates of a power factor correction panel

Remote Monitoring

Monitoring Screen



Web Module



Graphical Design Screen



Entbus®Plus software basically reads and records data from ENTES devices with communication feature in intervals specified by users. Built-in Reports feature uses these data.

Structural Features

The software is composed of 3 modules. The server module collects data from devices in the field and records these database in preferred intervals. MS SQL is used as database.

In the monitoring module, the user monitors parameters measured by devices in the system. The user can form monitoring panels that also include front panel views of devices, and create personalized monitoring screens by drawing line diagrams.

In the web module, instant monitoring can be performed with the use of a web browser. User-friendly and easy configuration features facilitate performing desired analysis.

Functional Features

- Users can be defined at two levels.
- A user at the administrator level can reach any step of the software.
- A user at the operator level cannot reach remote device settings, diagram design, and software settings steps. Operator level can only perform monitoring and analysis functions.
- Depending on user preferences, the data from the devices can be monitored from a diagram or a table displaying all parameters.
- The parameters of the devices can be modified based on user authorization.
- Mimic diagram can be designed.
- Hourly, daily and monthly energy reports can be received.
- Hourly, daily, and monthly maximum values reports can be received.
- Periodical values report can be received in saving frequency intervals. Minimum saving interval is 1 minute.
- Total energy, power factor correction and regional energy reports can be received.

Optimum System Requirements

CPU	Intel Core 2 Duo 3.0 Ghz.
RAM	4GB
OS Version	Microsoft Windows Xp Sp3 Microsoft Windows 7 Pro/HomePremium/Ultimate Sp1 Microsoft Windows Server 2008 Sp2 Microsoft Windows Server 2008R2 Sp1 Microsoft Windows 8 Pro Sp1 Microsoft Windows 8.1 Microsoft Windows Server 2012 Sp1
OS Architecture	32 bit/64 bit
NET Framework Version	4
Disk Space	80 GB for 100 devices over 1 year with a recording period of 1 minute

Converters

EMG / RS-USB Series



EMG-12

EMG-02

EMG-02 / EMG-12

RS-485 / Ethernet Modem

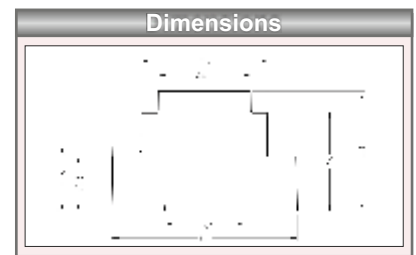
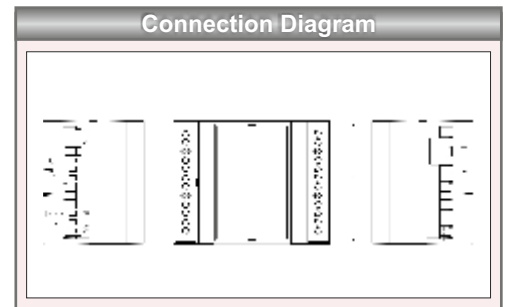
Ethernet / RS-485 Modbus Gateway for communication with MODBUS compatible devices via Internet (WAN) and Intranet (LAN).

PRODUCT SELECTION TABLE

Product Code		Number of max connections device	Power Supply	Pcs / Box
RS-USB2	RS-485/USB Converter	32		1
EMG-02	Ethernet-Modbus Gateway	2	*	1
EMG-12	Ethernet-Modbus Gateway	32	*	1

* 230V power supply is given included in device box.

Category	Description
Network Protocols	TCP/IP, ARP, ICMP, HTTP, Modbus TCP
Serial Ports	RS-485 -USB
Operation Modes	ModbusTCP/RTU ve Tunnelling
Network interface	10/100 Mbps auto-negotiation
Serial Interface	1200-115200 bps
Supply	12-20 VDC (with adapter)
Insulation and Protection	RS-485 port: 500V Ethernet port: 1500V 15KV ESD Protection on USB Port 10/1000 µs transient pulse protection on RS-485 port (600W)
Enclosure Type (EMG-12/02)	DIN 4 (rail mount)



RS-USB2

RS-485 USB Converter

Used for computer communication between devices and RS-485 / USB Converter.

Features

- Supports USB 1.1 and USB 2.0 / 300-115.200 bps transfer rate
- Automatic flow control for RS-485
- Minimum 3000 VDC isolation
- Activation LED
- Can be powered from a USB port and does not require external supply.
- Automatic "transfer rate" definition ESD (Electro-Static Discharge) protection

GPRS Modems

GEM-05 / GEM-10 / GEM-10SH



GEM-05 / GEM-10 / GEM-10SH

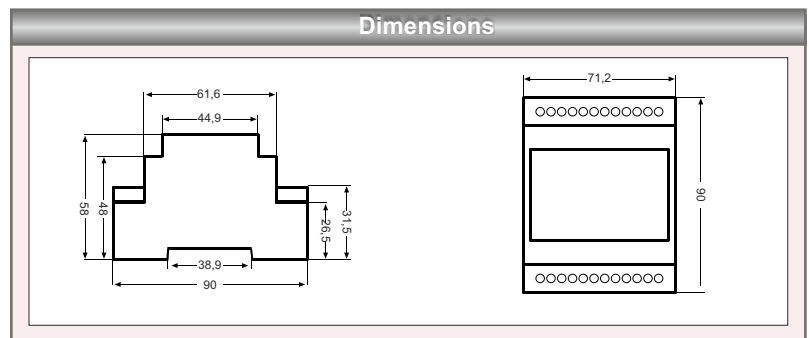
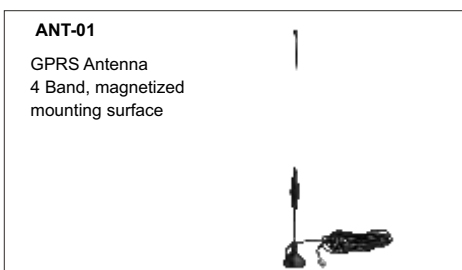
GEM-05 GPRS/Modbus Gateway (modem), enables accessing to devices that communicate with Modbus protocol over GPRS. With GEM-05, users can perform Modbus TCP communication over GPRS.

GEM-10 GPRS/Modbus Gateway (modem) enables accessing to devices that communicate with Modbus protocol over GPRS or Ethernet network. With GEM-10, users can perform Modbus TCP communication over GPRS or Ethernet as well as use these two connection options as backups for each other.

GEM-10SH, can read energy meters that support IEC 62056-61 OBIS (Object Identification System) protocol over the serial port. GEM-10SH is designed to read utility meters from a single center with Entbus software.

SPECIFICATIONS

	GEM-05	GEM-10	GEM-10SH
ENCLOSURE			
Dimensions	90x71x80 mm		
Protection Class	IP 40 Front Panel, IP54 Optional		
Weight	0,4kg/device; 12 pieces per package		
COMMUNICATION			
Communication Protocols	MODBUS TCP/RTU over TCP		
Network Protocols	TCP/IP, ARP, ICMP Modbus TCP	TCP/IP, ARP, ICMP, HTTP, Modbus TCP	
Ethernet	-	IEEE 802-3, 802-2	
Isolation Transformer	-	1,5kV	
GPRS			
Quadband	850/900/1800/1900 MHz		
Dowlink Speed	Max. 85.6 kbps		
Uplink Speed	Max. 21.4 kbps		
Online Connection	1		
Max. device number that can connect	32		
Ports	Modbus (RS-485), USB (minitype)	Modbus (RS-485), USB (minitype), Ethernet (RJ45)	
Configuration Interface	Mini USB port	Mini USB port, Ethernet (web interfaced configuration)	
Operating Modes	Modbus TCP/RTU and Modbus Tunnel		
Network Interface	10/100 Mbps auto-negotiation		
Serial Interface	1200-115200 bps		
STANDARDS			
Electricity Metering	-	IEC 62056-61 OBIS Protocol	
SUPPLY			
Operating Voltage	12-20 VDC		
Power Consumption	<5 W		
Operating Frequency	50/60Hz		
AMBIENT CONDITIONS			
Ambient Temperature	-20 / +60°C		
Storing Temperature	-30 / +70°C		
Humidity	10% - 85%		
Insulation and Protection	USB port 15kV ESD Ethernet 1500V Modbus/RS-485 500V insulation and short circuit GPRS mobile station class B Transient Pulse 10/1000µs (600W)		
CONNECTIONS			
Mounting	DIN Rail Mounting		
Connection Terminals	With Screws		



Pulse Concentrator

EPC-12



- Data collection from electricity, water and gas meters
- 12 different meter inputs
- Defining 8 different tariffs for each of the weekdays, Saturday, Sunday, and other holidays
- DST (Daylight Saving Time) feature
- RS-485 communication

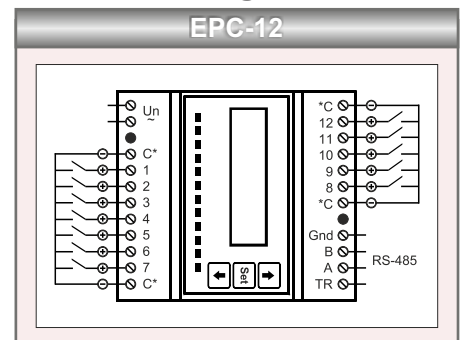
Configuration Software

- With the help of the configuration software, all device parameters can be modified and all consumption values (electricity, water, natural gas) measured by the device can be displayed on computer screen.
- All device settings can be modified
- Instant value page
- Tariff based total consumption
- Access to log records

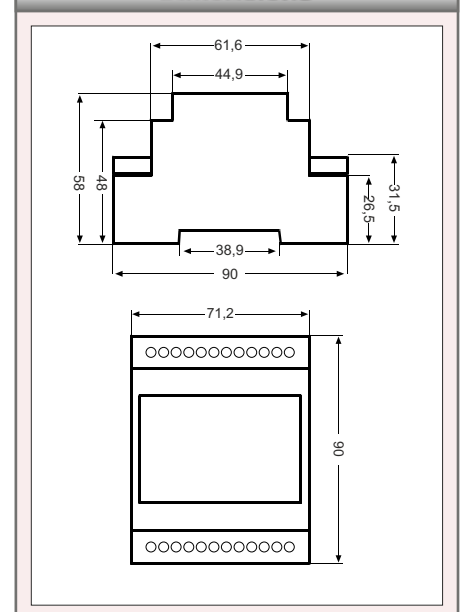
SPECIFICATIONS

	EPC-12
ENCLOSURE	
Dimensions	DIN 4 (PK27)
Protection Class	IP40
Weight	456,4 gr.
Display	2x12 LCD
PULSE	
Minimum Pulse Width	10ms
Minimum Time Between Pulses	30ms
Minimum Pulse Period	60ms
Maximum Pulse Frequency	16Hz
Maximum Contact Resistance	800 ohm
Pulse Voltage	10 V - 12V
Trigger Edge	Rising and Pulse Width Control
SUPPLY	
Operating Voltage	190-260 VAC
Power Consumption	< 5 VA
Operating Frequency	45-65 Hz
STANDARDS	
Applied Standards	EN 61010-1
Terminal Protection Class	IP 20
AMBIENT CONDITIONS	
Ambient Temperature	-25 / +55°C
Storing Temperature	-25 / +70°C
Humidity	95%
CONNECTIONS	
Mounting	Rail Mounting
Connection Type	Terminal Screw
Cross-Section for Voltage Connection	2,5mm ²
Cross-Section for Pulse Connection	1,5mm ²
Cross-Section for RS-485 Connection	Cat 5 cable
COMMUNICATION	
Communication Interface / Protocol	MODBUS RTU (RS-485)
Parity	None, odd, even
Address	1-247
Transfer Speed	1200-38400 bps
Max. communication distance (Wiring Distance)	1200m

Connection Diagram

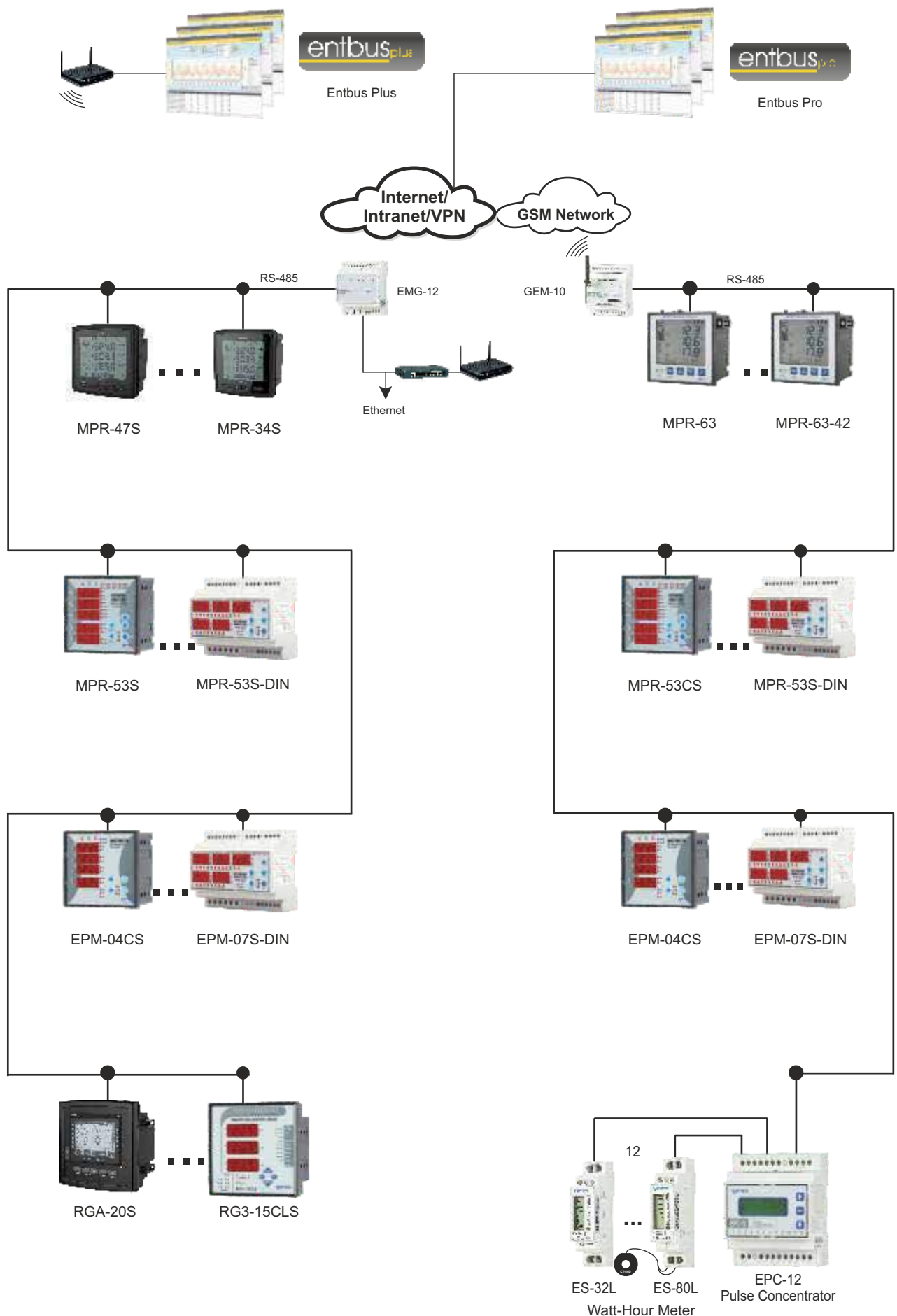


Dimensions



Remote Monitoring

System Diagram



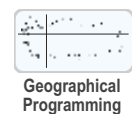
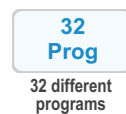
Remote Monitoring

DTR-20S/TS

Astronomic Time Relay with "Modbus RS-485 Communication"

DTR-20S/TS is an Astronomic Time Relay with "Modbus RS-485 Communication". It presents facilitative and easy control services to its users through its communication port such as remote starting, remote monitoring and programming. It can operate in compliance with Entbus for remote monitoring and control.

- Remote control with Modbus RS-485 communication port,
- Setting automatic sunrise and sunset times,
- Automatic time zone adjustments (Summer time - winter time)
- Programming in accordance with a city or geographical coordinates
- 32 different programs and accuracy of seconds
- Battery life display
- 1 contact output
- 7/24 relay programming
- Display Lighting
- Password Protection
- Summer mode





Protection & Control

ENTES Protection & Control product group includes a wide range of products that offering solutions for safe operation of systems and monitoring.

Power Supplies

- PS Series

Phase Failure Relays

- MKS Series
- MKC Series

Phase Sequence Relay

- FR-02

Thermistor Relay

- PT-01

Current Monitoring Relays

- AKC Series

Voltage Monitoring Relays

- DGRC-01
- GKRC Series
- MCC Series

Liquid Level Controllers

- SSRC Series

Multifunctional Time Relays

- MCB-100/200
- ERTC-100 Series

Time Relays

- ERTC Series
- ERB Series
- MCB Series
- EF Serisi
- DG Series
- SSR-2X
- SER-YU

Astronomic Time Relays

- DTR Series
- MCB-50 Series

Daylight Switches

- FG Series

Overcurrent Monitoring Relays

- CKR Series

Control / Isolating Transformers

- ENT.PST/ENT.IST Series

Power Supplies

PS Series



PS-362



PS-242

PS Series power supplies provide safe and accurate DC outputs at various power ranges, increasing the productivity of your automation solutions with wide supply voltage ranges and adjustable output voltages.

PRODUCT SELECTION TABLE

Product Code		Universal Input Voltage 85-265 VAC 110-350 VDC	1A Output Current	1,5A Output Current	3A Output Current	Contact Output	Parallel/Serial Connection	LED Indicator	Adjustable Output Voltage	High/Low Supply Voltage Protection	Overload Protection	Thermal Protection	Output Short-Circuit Protection	DIN 3 Enclosure	DIN 4 Enclosure	Pcs / Box
PS-242	24W-1A-24 VDC	●	●				●	●			●	●	●	●		20
PS-361	36W-3A-12 VDC	●			●		●	●		●	●	●	●		●	1
PS-362	36W-1,5A-24 VDC	●		●		●	●	●	●	●	●	●	●		●	1
PS-722	72W-3A-24 VDC	●			●		●	●	●	●	●	●	●		●	1

PS-242 Power Supply 24W-1A-24 VDC

- Wide supply voltage range (85-265 VAC/ 110-350 VDC)
- 24 VDC output voltage
- 1A rated output current
- Highly efficient operation with >82%
- Protection against overload, overheating, and output short circuit
- Class II protection that does not require ground connection

PS-362 Power Supply 36W-1,5A-24 VDC

- Wide supply voltage range (85-265 VAC/ 110-350 VDC)
- Flexibility to operate in a preferred voltage range with adjustable output voltage (21,6-27,6 VDC)
- 1,5A rated output current
- Highly efficient operation with >85%
- With auto-reset feature, automatically switching off to protect itself and the system in cases of overload, overheating, low/high input voltages and output short circuit, and automatic activation after the fault is corrected
- Remote monitoring of power supply status with 1 NC contact (10A -250 VAC/ 5A 30 VDC), ability to be integrated to automation
- Notification with the "Overload" LED
- Class II protection that does not require ground connection

PS-361 Power Supply 36W-3A-12 VDC

- Wide supply voltage range (85-265 VAC/ 110-350 VDC)
- 12 VDC output voltage
- 3A rated output current
- Highly efficient operation with >85%
- With auto-reset feature, automatically switching off to protect itself and the system in cases of overload, overheating, low/high input voltages and output short circuit, and automatic activation after the fault is corrected
- Class II protection that does not require ground connection

PS-722 Power Supply 72W-3A-24 VDC

- Wide supply voltage range(85-265 VAC/ 110-350 VDC)
- Ability to operate in a preferred voltage range with adjustable output voltage (21,6-27,6 VDC)
- 3A rated output current
- Highly efficient operation with >87%
- With auto-reset feature, protecting itself and the system by switching off the output voltage in cases of short circuit, overload, low/high input voltages and thermal danger, and automatic activation after the fault is corrected
- Class II protection that does not require ground connection



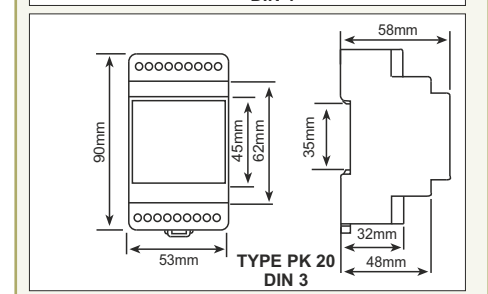
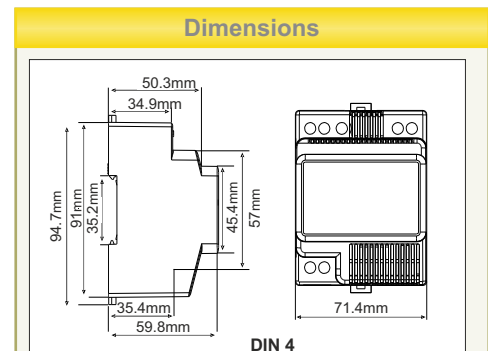
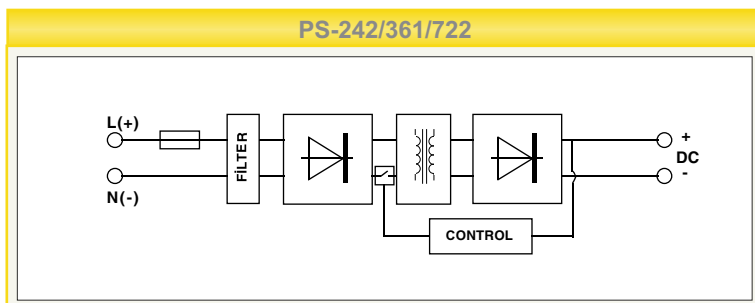
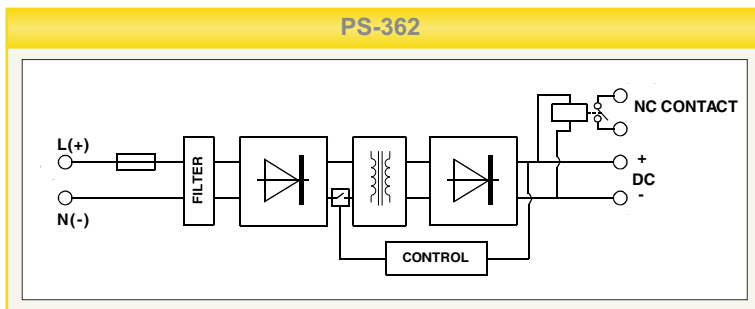
Power Supplies

PS Series

SPECIFICATIONS

	PS-242	PS-362	PS-722	PS-361
ENCLOSURE				
Dimensions	DIN3		DIN4	
Protection Class	IP20			
Indicator	Output OK LED	Output OK and Overload LEDs	Output OK LED	
INPUT				
Input Voltage Range	85-265 VAC / 110-350 VDC			
Frequency	50/60 Hz			
Current Consumption	0,25 - 0,6 A	0,4 - 0,9 A	0,8 - 1,7 A	0,4 - 0,9 A
Internal Fuse	2,5 A	1,6 A	3,15 A	1,6 A
OUTPUT				
Nominal Output Voltage	24 VDC			12 VDC
Output Voltage Range	21,6 V...27,6 VDC			
Nominal Output Current	1 A	1,5 A	3 A	3 A
Maximum Output Current	2 A	3 A	4 A	5 A
Efficiency	>%81(265 VAC) >%82(220 VAC) >%79(85 VAC)	>%85(265 VAC) >%85(220 VAC) >%82(85 VAC)	>%86(265 VAC) >%87(220 VAC) >%83(85 VAC)	>%85(265 VAC) >%85(220 VAC) >%82(85 VAC)
Overload Protection	2 A	3 A	4,4 A	6 A
OPERATING ENVIRONMENT				
Operating Temperature	-20 / +55°C			
Overvoltage Category	III			
Pollution Degree	II			
Ambient Humidity	95%			
STANDARDS				
Applied Security Standards	EN 60950			
Applied EMC Standards	EN 61000-4-5, EN 61000-4-4, EN 61000-4-2, EN 61000-4-11, EN 55022, EN 55011			
Applied Mechanical Endurance Standards	EN 60529			
CONNECTIONS				
Installation	Rail Mounting			
Connection Terminals	Fixed Terminals with Fixed Flathead Screws			

Connection Diagram



Phase Failure Relays

MKC - MKS Series



MKC-01



MKC-06

MKS-MKC phase failure relays are designed to monitor 3-phase motors against overheating and damage caused by phase faults and voltage unbalance at industrial sites.



PRODUCT SELECTION TABLE

Product Code		Neutral Failure	Phase Failure	Phase Seq. Failure	PTC Protection	Fixed Asymmetry	Adjustable Asymmetry	Without Neutral	Adjustable ON Delay	Adjustable OFF Delay	1 C/O Contact	1 N/O Contact	DIN1 Rail Mounting	DIN2 Rail Mounting	Pcs / Box
MK-01	Phase Failure Relay	●	●			●					●				20
MKC-01	Phase Failure Relay	●	●			●					●			●	16
MKS-01	Phase Failure Relay	●	●			●						●	●		28
MKC-03	Phase Failure Relay	●	●	●		●					●			●	16
MKC-03P	Phase Failure Relay (with PTC3)	●	●	●	●	●					●			●	16
MKS-03	Phase Failure Relay	●	●	●		●						●	●		28
MKC-04	Phase Failure Relay	●	●	●		●		●			●			●	16
MKC-04-U69	Phase Failure Relay	●	●	●		●		●			●			●	10
MKC-05	Phase Failure Relay	●	●	●			■		●	●	●			●	16
MKC-05P	Phase Failure Relay (with PTC3)	●	●	●	●		■		●	●	●			●	16
MKC-06	Phase Failure Relay	●	●	●			■	●	●	●	●			●	16
MKC-06P	Phase Failure Relay (with PTC3)	●	●	●	●		■	●	●	●	●			●	16
MKC-20	Phase Failure Relay	●	●				■			●	●		●		28

■ Adjustable and can be switched off.

1. Phase Failure

If all 3 phases are valid, the output relay is ON. In case of a fault in any of the phases, the output relay is switched to OFF.

2. Phase Sequence Failure

When the phase order is correct (L1, L2, L3 clockwise), the relay output is ON. However, if the order changes the output relay is switched to OFF.

3. PTC Protection

If coil temperatures in the motor exceed the value of PTC temperature limit, the output relay is automatically switched to OFF.

4. Fixed Asymmetry (Voltage Unbalance)

If Phase-Neutral voltage unbalance is above a fixed value (above 20% or 40%), the output relay is switched to OFF in 0,2 seconds.

5. Adjustable Asymmetry (Voltage Unbalance)

If Phase-Phase (MKC-06/06P) or Phase-Neutral (MKC-05/05P) voltage unbalance is below the adjusted value the output relay is switched to ON.

If the unbalance value exceeds the user-adjusted limit (5% - 15%), the output relay is switched to OFF after the user-defined delay time (0,1... 20s).

If the fault is over within the delay time, the output relay is not switched to OFF and the motor continues to operate. In addition to these features, if the L3 phase drops below 50% of the operating voltage of the device (MKC-05/05P), the relay is switched to OFF without delay. In this case, phase sequence and asymmetry LEDs start blinking.

* Please see page 107 for PTC Temperature graph

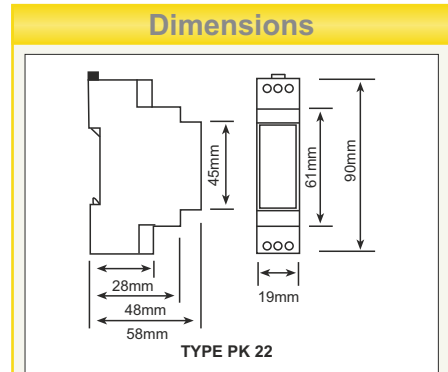
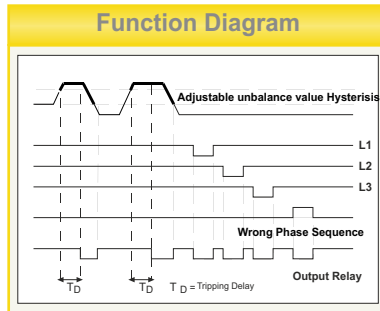
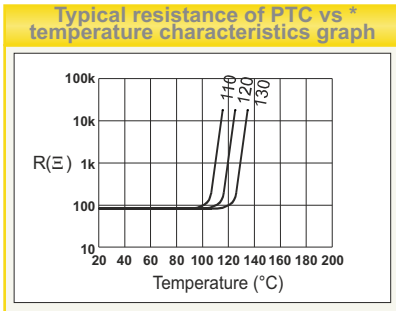


Phase Failure Relays

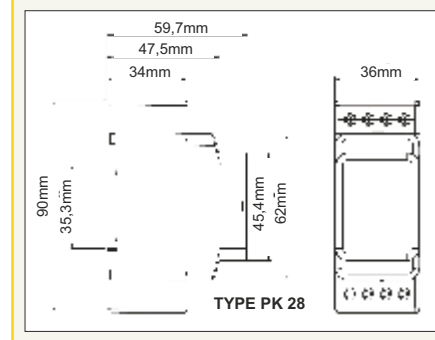
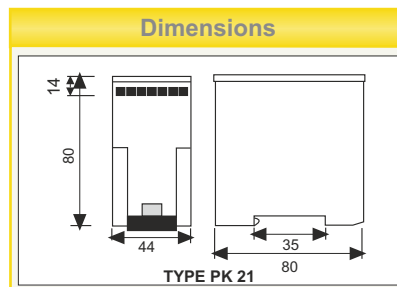
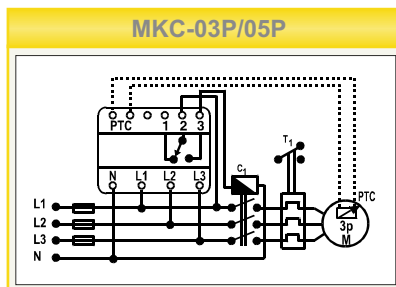
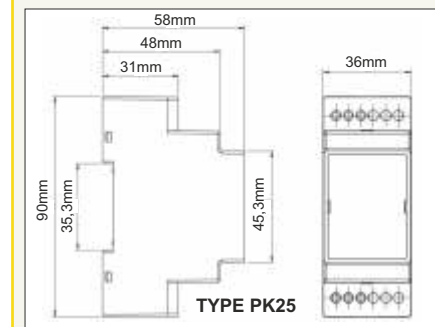
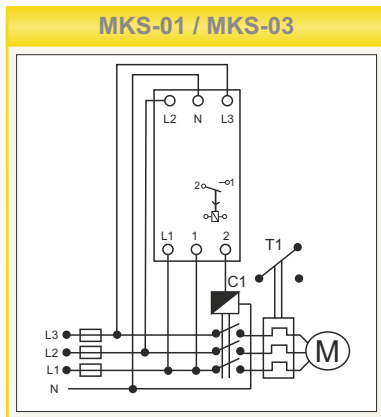
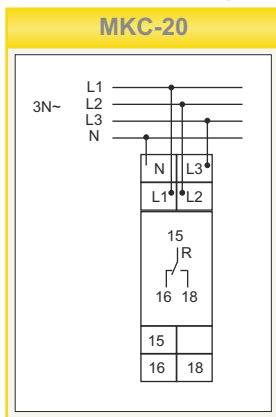
MKC - MKS Series

SPECIFICATIONS

	MKC-01	MKS-01	MKS-03	MKC-01	MKC-03	MKC-03P	MKC-04	MKC-04-U69	MKC-05	MKC-05P	MKC-06	MKC-06P	MKC-20
ENCLOSURE													
Dimensions	PK21	PK22		PK28			PK25			PK28			PK22
Weight	0,15kg/pcs	0,1kg/pcs					0,3kg/pcs						0,1kg/pcs
MEASUREMENT													
Voltage Unbalance	%20 fixed	%40 fixed	%20 fixed	%40 fixed	%10 fixed	%5-%15 adjustable and can be switched off		%5-%25 adjustable and can be switched off					
SUPPLY													
Operating Voltage	230 VAC					400 VAC	160-690 VAC	230 VAC	220 VAC	400 VAC	380 VAC	230 VAC	
Operating Frequency	50/60 Hz												
OUTPUT													
Output Contact	1CO,8A, 2000 VA (cos ϕ =1)	1NO,8A,2000 VA (cos ϕ =1)				1CO,8A,2000 VA (cos ϕ =1)							1CO 5A,1250 VA (cos ϕ =1)
ON Delay				0,2 sec. fixed						0,1-20 sec. adjustable			0,1 sec. fixed
OFF Delay				0,2 sec. fixed						0,1-20 sec. adjustable			0,1-20 sec. adjustable
AMBIENT CONDITIONS													
Ambient Temperature ; Humidity	-5 / +55 °C ; %90												
Over Voltage Category	III												
CONNECTIONS													
Mounting	Rail mounting; Terminal with screw												
Connection Types		3 phase+neutral				3 phase	3 phase+neutral	3 phase	3 phase+neutral				



Connection Diagram



No PTC input except MKC-03P/05P/06P

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr



Phase Sequence / Thermistor Relay

FR-02 / PT-01



FR-02

PT-01

FR-02

FR-02 Phase Sequence Relay controls the order of 3 phases feeding motors. If R, S and T phases are in correct order, the OUT LED on the front panel is turned on. If the phase order is wrong, the OUT LED is turned off and the output relay is switched to OFF.

PT-01

PT-01 Thermistor Relay is developed to protect motors with PTC. If coil temperatures in the motor exceed the value of PTC temperature limit, the output relay is automatically switched to OFF.

Please refer to the following graph to see the heat characteristics of PTC at 3 different turnoff temperature degrees (110°C, 120°C, and 130°C).



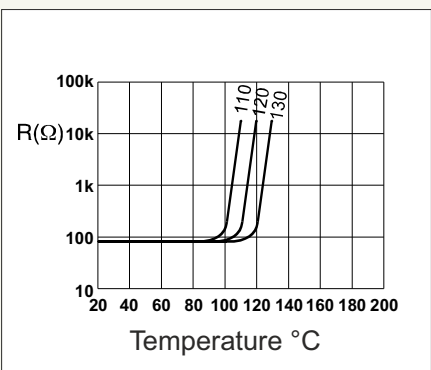
PRODUCT SELECTION TABLE

Product Code		Neutral Failure	Phase Failure	Phase Seq. Failure	PTC Protection	1 C/O Contact	DIN2 Rail Mounting	Pcs. / Box
FR-02	Phase Sequence Relay	●	●	●		●	●	16
PT-01	Thermistor Relay				●	●	●	16
PTC-3	Triple Thermistor Group							

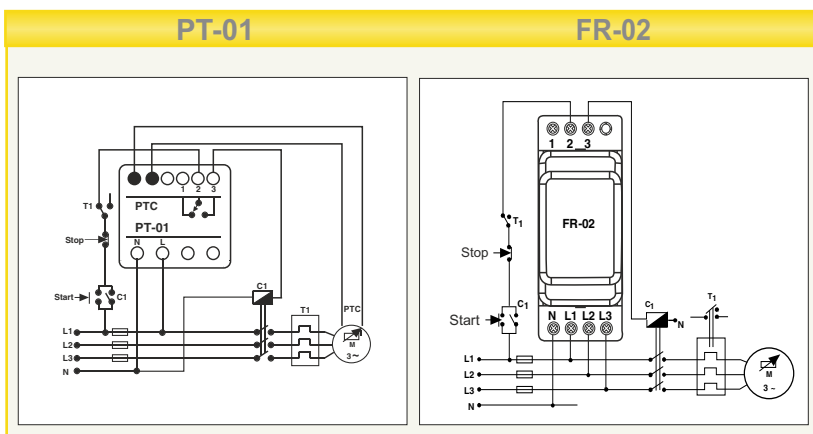
SPECIFICATIONS

Operating Voltage	230 VAC;
Operating Frequency	50/60 Hz
Operating Range	(0,9-1,1) x Un
Connection	3-phase / neutral (FR-02) / 1-phase/neutral (PT-01)
Output Contact	1 CO contact, 8 A, 2000 VA (FR-02) 5A, 1250 VA (PT-01)
Protection Class	IP 20
Ambient Temp. Range	-5 - +50°C
Dimensions	PK28 (FR-02, PT-01)
Mounting	Rail Mounting; Terminal with screw
Enclosure Weight	0,15 kg / pcs (FR-02) 0,2 / pcs (PT-01)

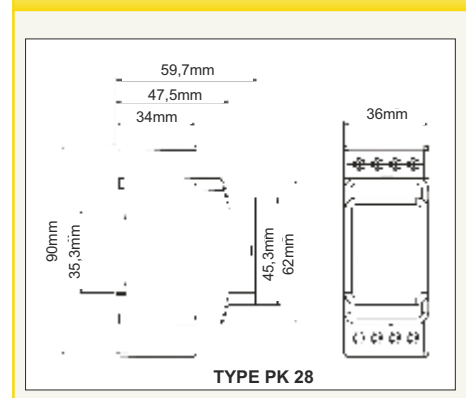
Typical resistance of PTC vs * temperature characteristics graph



Connection Diagrams



Dimensions



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr

Current Monitoring Relays

AKC Series



AKC series current monitoring relays measure system currents, and shut down systems when measured current values are below or above defined levels.



CT-25

Direct monitoring up to 60A with CT-25

PRODUCT SELECTION TABLE

Product Code		Under Current Protection	Over Current Protection	.../5A	CT-25	DIN2 Rail Mounting	Pcs / Box
AKC-01D	Under Current Protection (0,5-5A)	●		●		●	16
AKC-01A	Over Current Protection (0,5-5A)		●	●		●	16
AKC-03D	Under Current Protection (between 1,5 and 60A with CT-25)	●			●	●	12
AKC-03A	Over Current Protection (between 1,5 and 60A with CT-25)		●		●	●	12

* Please check page 90 for further information about CT-25.

SPECIFICATIONS

	AKC-01D	AKC-01A	AKC-03D	AKC-03A
ENCLOSURE				
Dimensions	PK28			
Weight	0,25kg / pcs.			
Protection Class	IP20			
MEASUREMENTS				
Current Adjustment Interval	0,5-5A		With 1 turn 6-60A / with 2 turn 3-30A With 3 turn 2-20A / with 4 turn 1,5-15A	
Current Transformer Ratio	.../5A		Defined ranges are for CT-25	
SUPPLY				
Operating Voltage	230 VAC±10%			
Operating Frequency	50/60 Hz			
OUTPUT				
Start-up Delay	1-6 sec adjustable			
Tripping Delay	0,5-2,5 sec adjustable			
Output Contact	1C/O 8A 2000VA (cosφ=1)			
AMBIENT CONDITIONS				
Ambient Temperature	-5 / +55°C ; 90%			
Over Voltage Category	III			
CONNECTIONS				
Mounting	Rail Mounting; Terminal with screw			
Connection Types	Single phase 2 wires (voltage) ; .../5A current transformer or with CT 25 (current)			
STANDARDS				
Applied Standards	EC 61010-1, IEC61000-6-2			

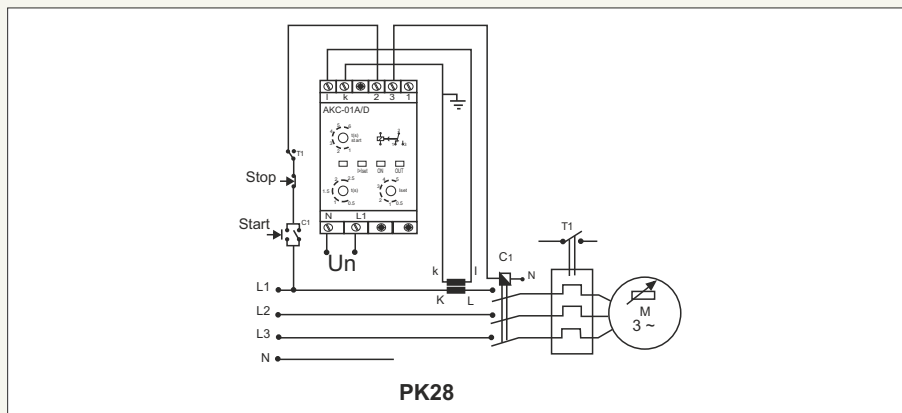


Current Monitoring Relays

AKC Series

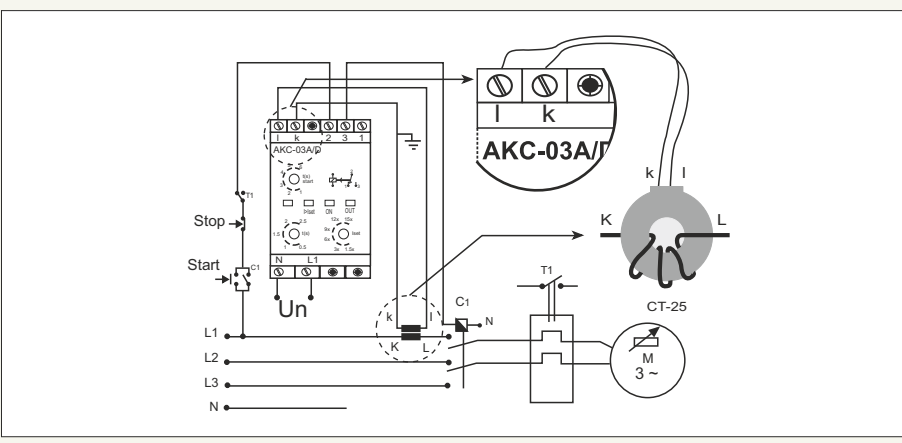
Connection Diagrams

AKC-01A/AKC-01D



AKC-3A / AKC-3D series must be used if current exceeds 5A.

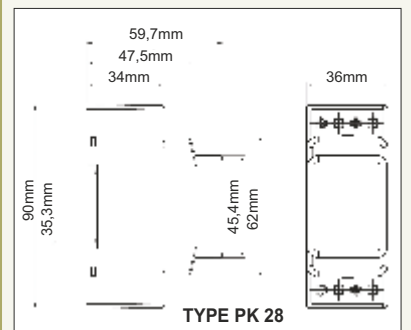
AKC-03A/AKC-03D



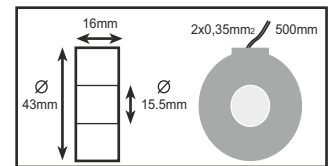
- 6 - 60A with 1 turn
- 3 - 30A with 2 turn
- 2 - 20A with 3 turn
- 1,5 - 15A with 4 turn

* Please check page 90 for further information about CT-25.

Dimensions

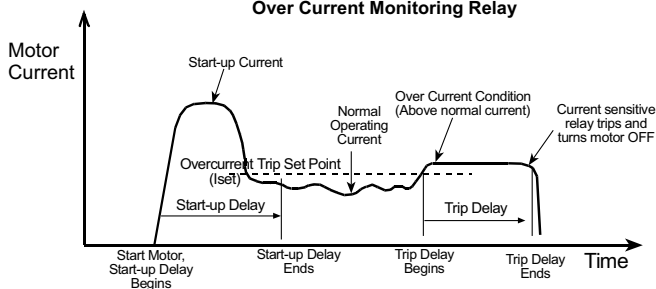


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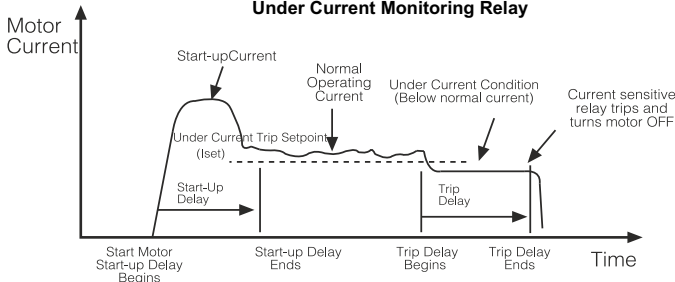


CT-25

Over Current Monitoring Relay



Under Current Monitoring Relay



Voltage Monitoring Relays

GKRC - DGRC - MCC Series



GKRC-02F

GKRC-20F

GKRC-01

GKRC series voltage monitoring relays are designed to protect single or three-phase systems against voltage changes and incorrect phase sequence. When the nominal voltage of any phase increases or decreases by 50%, the relay is switched to OFF without delay.

DGRC series voltage monitoring relay is designed to protect single or three-phase systems in cases of permanent voltage drops.



PRODUCT SELECTION TABLE

Product Code	Neutral Failure	3-Phase	Single Phase	Under Voltage	Over Voltage	Phase Failure	Phase Seq. Failure	ON Delay	OFF Delay	Without Neutral	Auxiliary Supply	DIN1 Rail mounting	DIN2 Rail mounting	Pcs / Box
DGRC-01	●	●		■				●	●				●	16
GKRC-01	●	●			■			●	●				●	16
GKRC-02	●	●		■	■			●	●				●	16
GKRC-02F	●	●		■	■	●	●	●	●				●	16
GKRC-02FA		●		■	■	●	●	●	●	●	●		●	16
GKRC-03		●		■	■			●	●	●			●	16
GKRC-03F		●		■	■	●	●	●	●	●			●	16
GKRC-M2	●		●	■	■			●	●				●	16
MCC-1D	●		●	●		●		●				●		28
MCC-3D	●	●		●		●		●				●		28
GKRC-20F		●		○	○	●	○		●			●		10

■ Adjustable and can be switched off.
○ Selectable.

SPECIFICATIONS

	GKRC-02	GKRC-02F	GKRC-20F	GKRC-02FA	GKRC-03	GKRC-03F	GKRC-M2	GKRC-01	DGRC-01	MCC-1D	MCC-3D	
ENCLOSURE												
Dimensions	PK28		PK22	PK28			PK28		Pk22			
Weight	0,3kg/pcs		0,1kg/pcs	0,3kg/pcs	0,25kg/pcs			0,1kg/pcs				
MEASUREMENTS												
Voltage												
Under Voltage Setting Range	150-210V*		(0,70-1,2)xUn	270-370 VAC*		150-210V*	- 150-210V*		-			
Over Voltage Setting Range	240-300V*		(0,8-1,30)xUn	410-510 VAC*		240-300V*	240-300V*		-			
Instant Tripping Value	0,5xUn 1,5xUn		-	0,5xUn 1,5xUn			1,5xUn 0,5xUn		168 VAC			
Instant Tripping Time	100ms.											
Hysteresis	3%											
SUPPLY												
Operating Voltage	230 VAC±10%		230 VAC, 400 VAC±30%	Auxiliary Supply 190-260 VAC	400VAC ±10%		230 VAC±10%					
Operating Frequency	50/60 Hz											
OUTPUT/SETTINGS												
Output Contact	1CO 8A 2000VA cosφ=1											
ON Delay	0,1 -20 sec adjustable		-	0,1 -20 sec adjustable			5-15 m. (1-5 m.) adjustable					
OFF Delay	0,1 -20 sec adjustable		0,1 -10 sec adjustable	0,1 -20 sec adjustable								
AMBIENT CONDITIONS												
Ambient Temperature/Humidity	-5 / +55°C ; 90%											
Over Voltage Category	III											
CONNECTIONS												
Mounting	Rail Mounting; Terminal with screw											
Connection Types	3 phase, neutral			3 phase, without neutral			1 phase, neutral	3 phase neutral		1 phase neutral	3 phase neutral	
STANDARDS												
Standards	EC 60255-3, EC 60255-6, EC 60870-5, EC 60529											

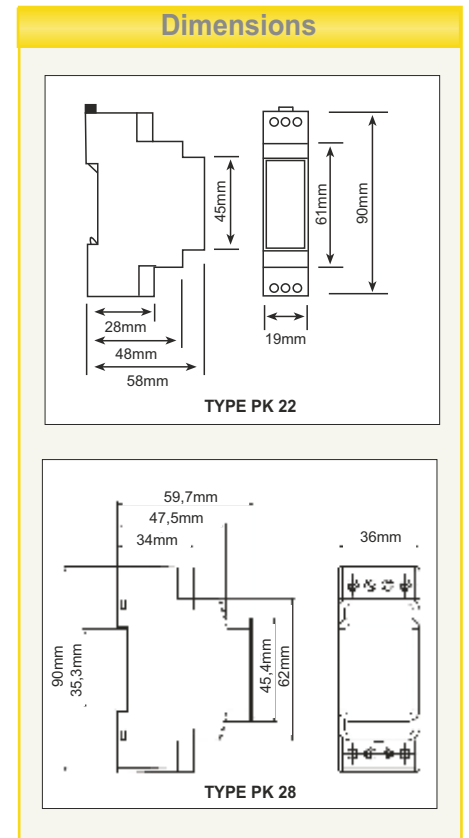
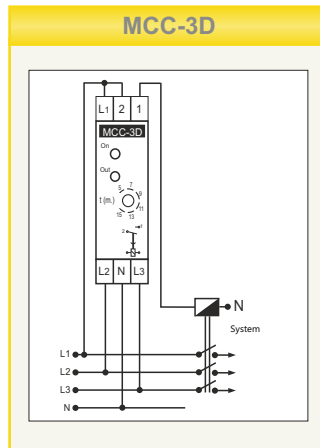
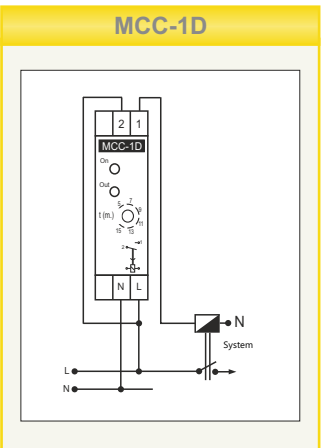
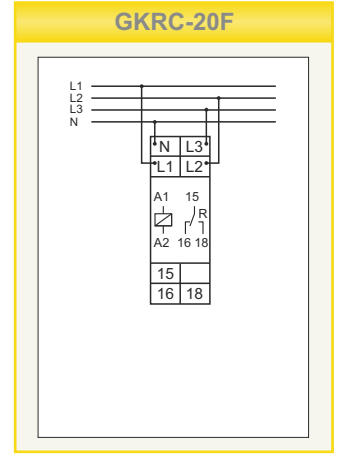
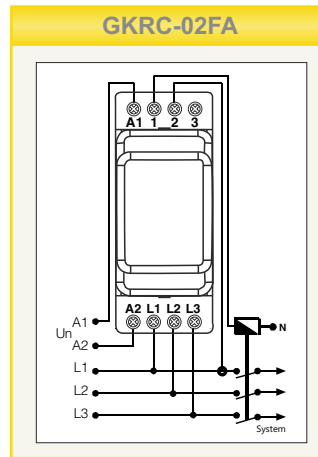
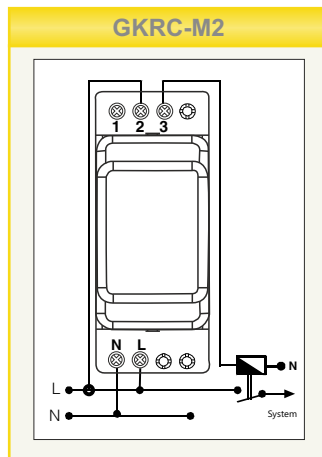
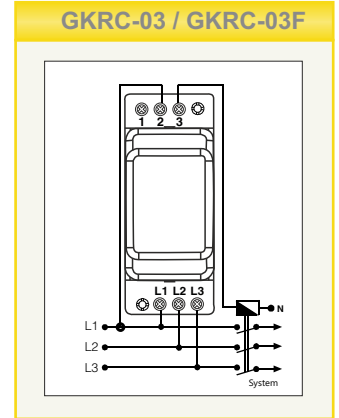
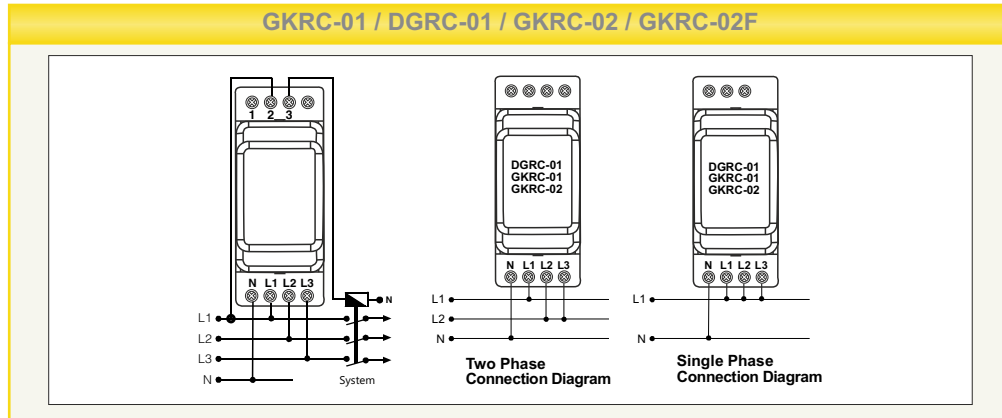
*These features can be switched-off by user



Voltage Monitoring Relays

GKRC - DGRC - MCC Series

Connection Diagram



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr



Liquid Level Controllers

SSRC Series

NEW



SSRC-04



SSRC-04P



PGS-108



LLS-02



LLS-01

SSRC series liquid level controllers are used for controlling liquid levels in wells and liquid tanks at industrial sites. Precision (resistivity/impedance between electrodes) can be adjusted between 5 - 50 kΩ or 5 - 100 kΩ for different liquids.



PRODUCT SELECTION TABLE

Product Code

Product Code		5-50 kΩ! Adjustable!	5-100 kΩ! Adjustable!	Small Electrode	Large Electrode	8 Pin Socket	DIN2 Rail Mounting	Socket Mounting	Pcs / Box
SSRC-04	Liquid Level Controller	●					●		16
SSRC-04P	Liquid Level Controller (8 Pin)		●					●	20
LLS-01	Liquid Level Electrode			●					100
LLS-02	Liquid Level Electrode				●				100
PGS-108	SSRC-04P Socket					●			20

⚠ Liquid level electrodes cannot be used with inflammable and corrosive liquids and food products. The liquids that will be controlled for their levels must have electrical conductivity.

SPECIFICATIONS

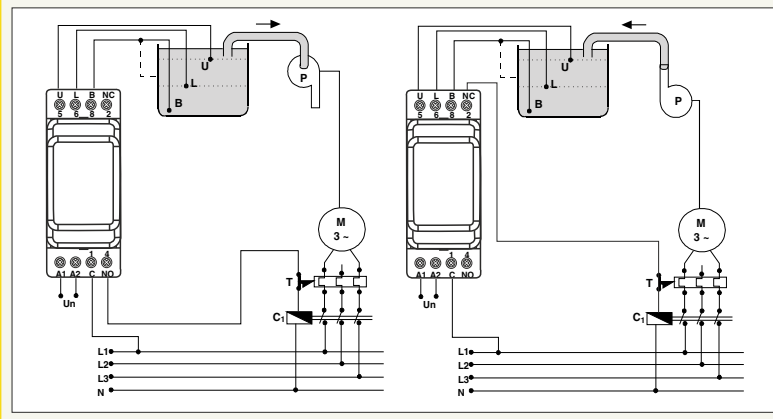
	SSRC-04	SSRC-04P
ENCLOSURE		
Dimensions	PK28	38,5 x 76 x 97
Protection Class		IP20
Weight		0,2kg/pcs
SUPPLY		
Operating Voltage	230 VAC±10%, 400 VAC±10%	230 VAC±10%
Operating Frequency		50/60 Hz
Operating Range		(0,9-1,1)xUn
Sensitivity	5-50k Ω adjustable	5-100k Ω adjustable
Warning Light		Front panel LED
OUTPUT		
Contact Output		1CO 8A 2000 VA (cosϕ=1)
AMBIENT CONDITION		
Ambient Temperature, Humidity		-5 / +50°C; 85 %
CONNECTIONS		
Mounting	Rail mounting; Terminal with screw	8 Pin Socket Mounting
Connection Types		Single Phase 2 Wires



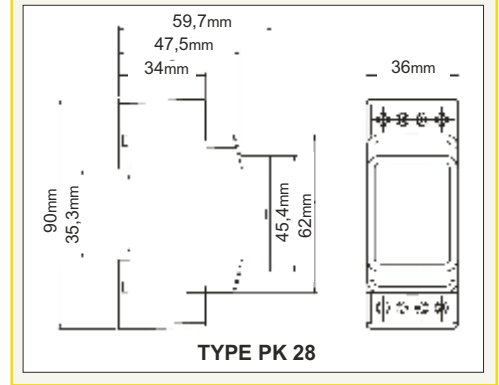
Liquid Level Controllers

SSRC Series

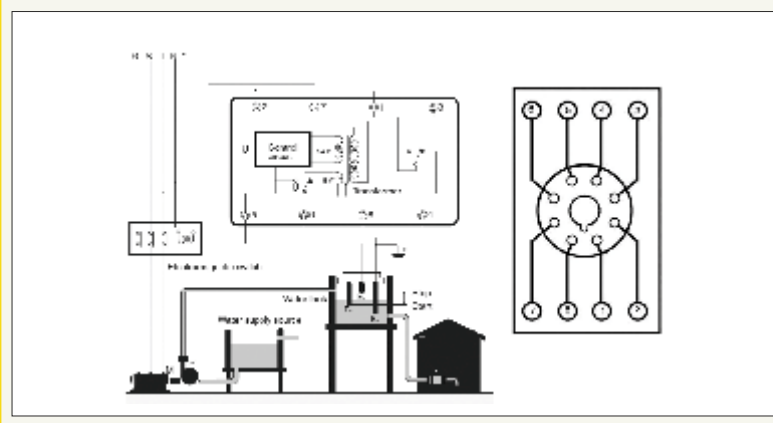
Connection Diagram



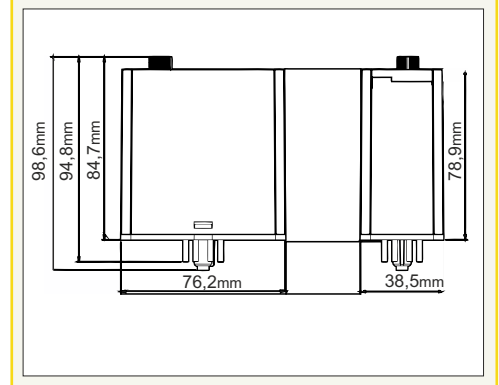
Dimensions



SSRC-04P



Dimensions



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr

Multifunctional Time Relays

MCB-100/200 - ERTC-100 Series



MCB-200

New Generation Multifunctional Digital Time Relays;

- **Self Supply: Operating with internal battery without power supply (MCB-200)**
- **Battery life of 1,000,000 switching (MCB-200)**
- Easy setup with user-friendly menu
- In addition to its main functions, offering flexible solutions that are tailored to objective with trigger-controlled rich sub-functions
- With memory feature, saving time and state information in the memory when supply is cut off, and resuming on when supply is back
- Performing functions based on real time clock with its digital time setting

PRODUCT SELECTION TABLE

Product Code	Time	Triggering Input	ON Delay	OFF Delay	Pulse	Asymmetrical Flasher	Symmetrical Flasher	Start/Stop	Counter	Left / Right	Star/Delta	2 Step ON Delay	2 Step OFF Delay	Memory	10-30 VAC/DC	85-315 VAC/DC	Self Supply	DIN II Enclosure	Pcs./Box
		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MCB-100	Multifunctional Time Relay	0,1sec-9999min.	●							●	●	●	●	*	●			●	16
MCB-101	Multifunctional Time Relay	0,1sec-9999min.	●							●	●	●	●	*	●			●	16
MCB-120	Multifunctional Time Relay	0,1sec-9999min.	●	●	●	●	●							*	●			●	16
MCB-121	Multifunctional Time Relay	0,1sec-9999min.	●	●	●	●	●							*	●			●	16
MCB-125	Multifunctional Time Relay	0,1sec-9999min.	●	●	●	●	●	●	●					*	●			●	16
MCB-126	Multifunctional Time Relay	0,1sec-9999min.	●	●	●	●	●	●	●					*	●			●	16
MCB-130	Multifunctional Time Relay	0,1sec-9999min.	●	●	●	●	●	●	●	●	●	●	●	*	●			●	16
MCB-131	Multifunctional Time Relay	0,1sec-9999min.	●	●	●	●	●	●	●	●	●	●	●	*	●			●	16
MCB-200	Multifunctional Time Relay (Battery operated)	0.2sec-9999sec-0,1min-9999min	●	○	○	○	○										●	●	16
ERTC-100	Counter / Pulse Time Relay	0,1sec-9999min.	●		●				●					*	●			●	16
ERTC-101	Counter / Pulse Time Relay	0,1sec-9999min.	●		●				●					*	●			●	16

△ Refer to the function table to see sub-functions included in main functions.

○ Functions with Triggering

SPECIFICATIONS	MCB-100	MCB-120	MCB-125	MCB-130	ERTC-100	MCB-200	MCB-101	MCB-121	MCB-126	MCB-131	ERTC-101
ENCLOSURE											
Dimensions	PK25										
Protection Class	IP 20										
INPUT											
Operating Voltage Range	85-315 VAC/DC					-	10-30 VAC/DC				
Power Consumption	<2.5VA										
Control Input	Dry Contact										
OUTPUT											
Repeat Accuracy	0.5%										
Reset Time	<120msec										
Contact Output	2CO 6A 2000VA	1CO 6A 2000VA	2CO 6A 2000VA	1CO 6A 2000VA	1CO 8A 2000VA	2CO 6A 2000VA	1CO 6A 2000VA	2CO 6A 2000VA	1CO 6A 2000VA	2CO 6A 2000VA	1CO 6A 2000VA
AMBIENT CONDITIONS											
Operating Temperature	-5...+55 °C ; 85%										
Humidity											
CONNECTIONS											
Mounting	Rail Mounts ; Terminals with Screw										
Connection Types	Single Phase Two Wires										

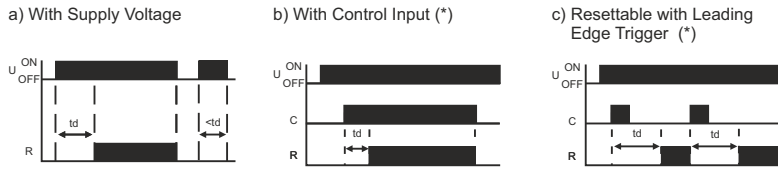


Multifunctional Time Relays

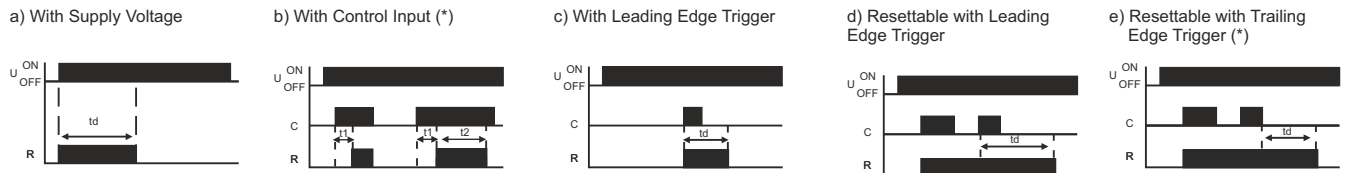
MCB-100/200 - ERTC-100 Series

Main Functions

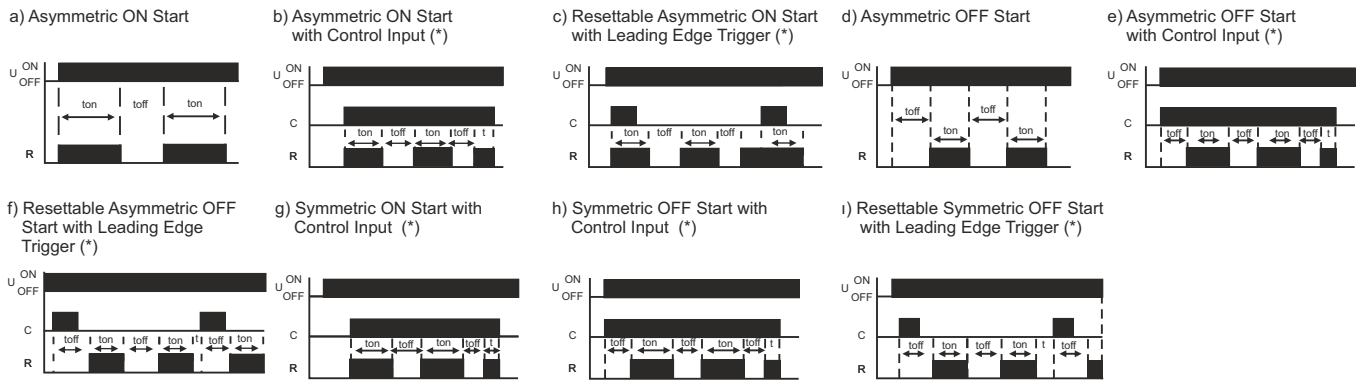
ON Delay



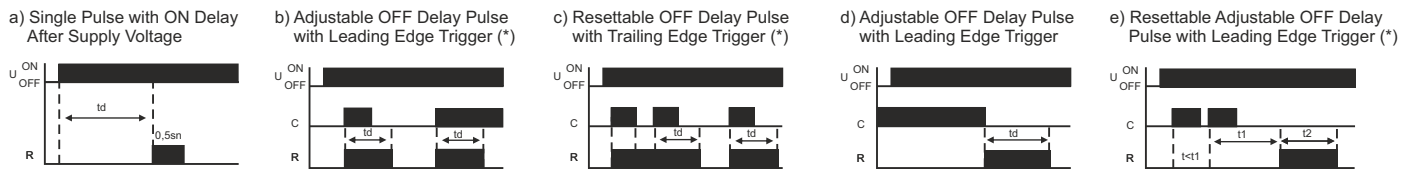
OFF Delay



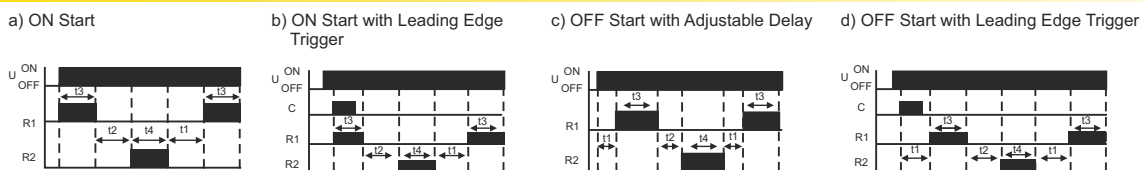
Flasher



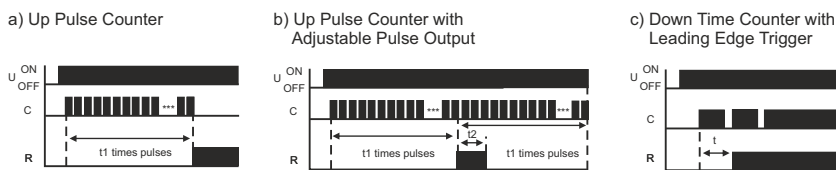
Pulse



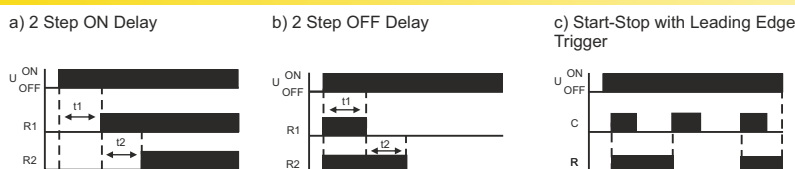
Right-Left Switcher (With Adjustable Time)



Counter



2 Step ON and OFF Delay / Start - Stop

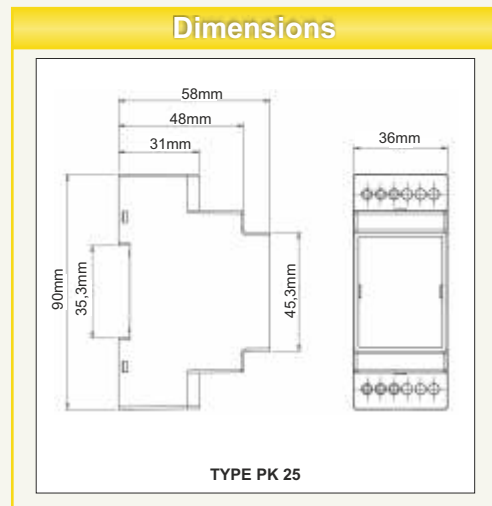
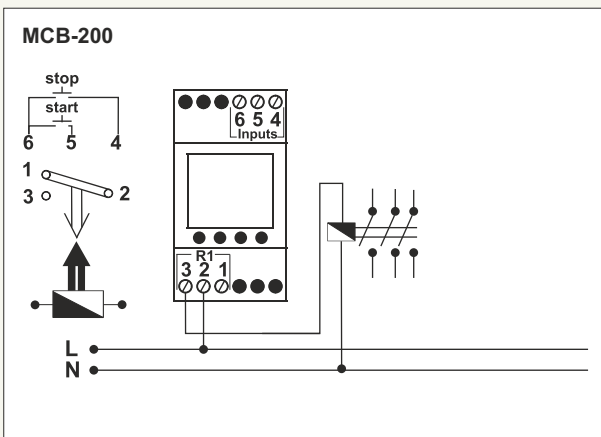
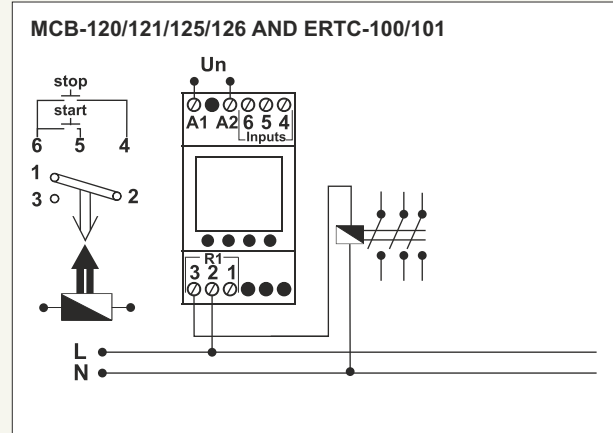
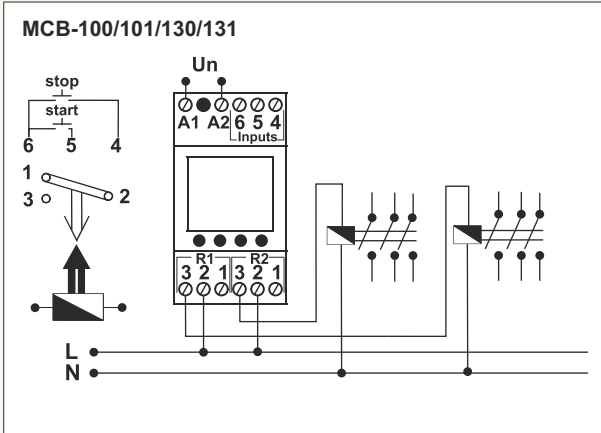


* MCB-200 contains only the functions marked with (*) under Main Functions.

Multifunctional Time Relays

MCB-100/200 - ERTC-100 Series

Connection Diagrams



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entel.com.tr



Time Relays

MCB - SER - ERTC - SSR - DG Series



SER-Y/U



DG-60



MCB-20



MCB-25



MCB-9



ERTC-01

PRODUCT SELECTION TABLE

Product Code	Time	ON Delay (Er)	OFF Delay (Em)	OFF Delay with Control Input (R)	ON Delay with Control Input (Es)	Single shot leading edge (Ts) with control input	Single shot trailing edge (Ta) with control input	Symmetric Flasher (Ef)	Control Input	ON Delay with Control Input Leading Edge	OFF Delay with Control Input Trailing Edge	Single Shot Leading and Trailing Edge with Control input Pulse	ON Flasher	OFF Flasher	Down-timer	Star-Delta	Left-Right	Power OFF Delay	Pcs / Box
ERT-01-72	Multi-function T. Relay	1 sec - 100 Hours	●	●					●				●	●	●				16
ERTC-01-DIN	Multi-function T. Relay	1 sec - 100 Hours	●	●					●				●	●	●				16
MCB-30	Time Relay	2-30 sec	●																28
MCB-60	Time Relay	4-60 sec	●																28
MCB-7	Time Relay	0.1 sec - 30 Hours	●	●															28
MCB-8	Time Relay (Fine Tuning)	0.1 sec - 999 min	●	●															28
MCB-9	Time Relay	0.5 sec - 30 Hours	●	●									●	●					28
MCB-15	4 functions T. Relay	0,05 sec - 100 Hours	●	●	●			●	●										10
MCB-20	7 functions T. Relay	0.1 sec - 100 Hours	●	●	●	●	●	●	●										10
MCB-25	LCD 8 functions T. Relay	0.1 sec - 999 Hours	●	●	●			●	●	●	●	●	●	●	●				10
SER-YU	Star - Delta Relay	(λ/U) 20-500 msec (λ) 1-60 sec														●			16
SSR-2X	Right - Left Relay	0,1 sec - 60 Hours															●		28
DG-10	Time Relay	0.6 sec - 10 min																●	16
DG-60	Time Relay	0,1 sec - 60 min																●	16
EF-10	Flasher Relay	1 - 10 sec / 0.5 sec											●						10
EF-10T	Flasher Relay	1 - 10 sec / 0.5 sec											●						10
ERB-50	Dishwasher Relay	Washing 30, 60, 90, 120,180 sec,Waiting 3sec, Rinsing 1-30 sec																	20

SPECIFICATIONS

	MCB-15	MCB-20	MCB-25	EF-10	MCB-7/8/9	MCB-30	MCB-60	SSR-2X	ERB-50	ERT-01	ERTC-01	SER-Y/U	DG-10/60	EF-10T
ENCLOSURE														
Dimensions	PK27		PK22					PK21	PR18	PK20	PK28		PK10	
Protection Class	IP40		IP20					IP40-IP20		IP20				
Weight	0.1kg/pcs							0.1kg/pcs	0.3kg/pcs	0.25kg/pcs	0.1kg/pcs	0.3kg/pcs		
SUPPLY														
Operating Voltage	24-240 VAC/DC	12-240 VAC/DC	24-240 VAC/DC	230 VAC 24 VAC/DC	12-240 VAC/DC		230 VAC		230 VAC 110 VAC	230 VAC 24 VAC/DC	230 VAC	230 VAC	230 VAC 24 VAC/DC	
Operating Range	for Un±%20(AC) ; for Un±%10(DC)													
Power Consumption	< 4 VA		< 8 VA					< 4 VA	< 3 VA	< 8 VA	< 3 VA			
OUTPUT														
Repeat Accuracy	±5ms.		±%0,5		±%0,1									
Reset Time	100 ms.		< 150 ms.				100 ms.	80 ms.	120 ms.	-				
Output Contact	1 CO; 8A, 2000 VA, cosϕ=1							2 CO; 10A, 2500VA, (cosϕ=1)	1 CO; 8A, 2000VA, (cosϕ=1)	2 NO; 5A,1250VA (cosϕ=1)	1 CO; 16A,4000VA (cosϕ=1)	Triyac; 8A,600VA		
AMBIENT CONDITIONS														
Ambient Temperature; Humidity	-5 / +55 C ; %85		-10 / +55 C ; %85		-5 / +55°C ; %85									
CONNECTIONS														
Mounting	Rail Mounting, Terminal with screw													
Connection Types	Single phase 2 wires													

Protection & Control

Time Relays

MCB - SER - ERTC - SSR - DG Series

Functions

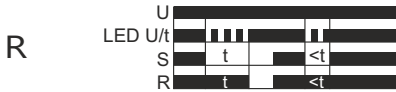
OFF Delay (Em) [MCB-15 & MCB-20 & MCB-7/8/9]



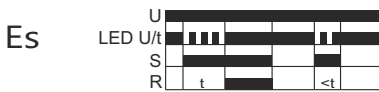
ON Delay (Er) [MCB-15 & MCB-20 & MCB-7/8/9/30/60]



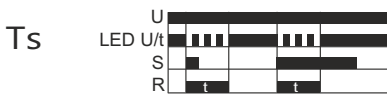
OFF Delay with control input (R) [MCB-15 & MCB-20]



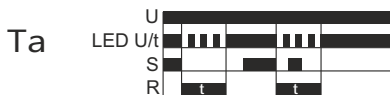
ON Delay with control input (Es) [MCB-20]



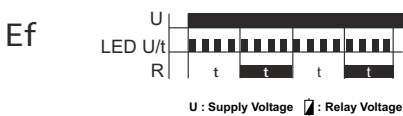
Single shot leading edge with control input (Ts) [MCB-20]



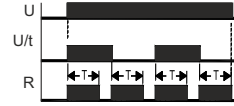
Single shot trailing edge with control input (Ta) [MCB-20]



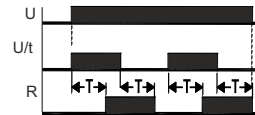
Flasher (Ef) [MCB-15 & MCB-20]



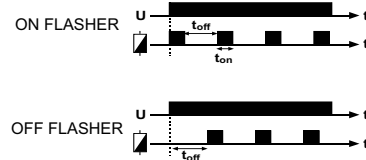
Single Shot Leading and Trailing Edge with control Input (MCB-25)



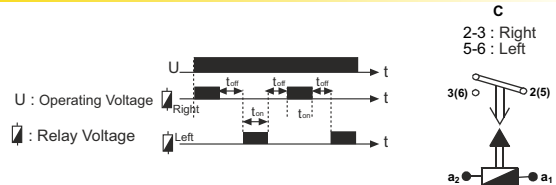
ON Delay with Control Input Leading Edge OFF Delay with Control Input Trailing Edge (MCB-25)



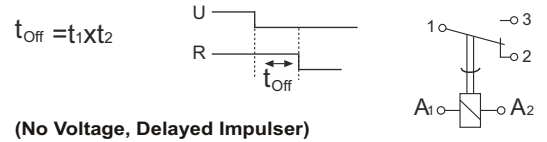
Flasher



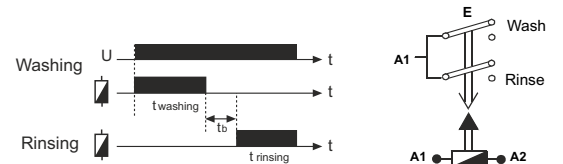
Right-Left Function (SSR-2X)



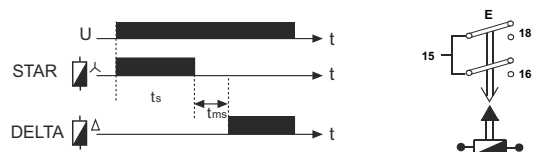
Power OFF Delay (DG-10/60)



Washing Machine Relay (ERB-50)



Star-Delta Function (SER-YU)

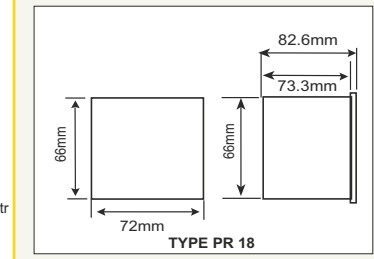
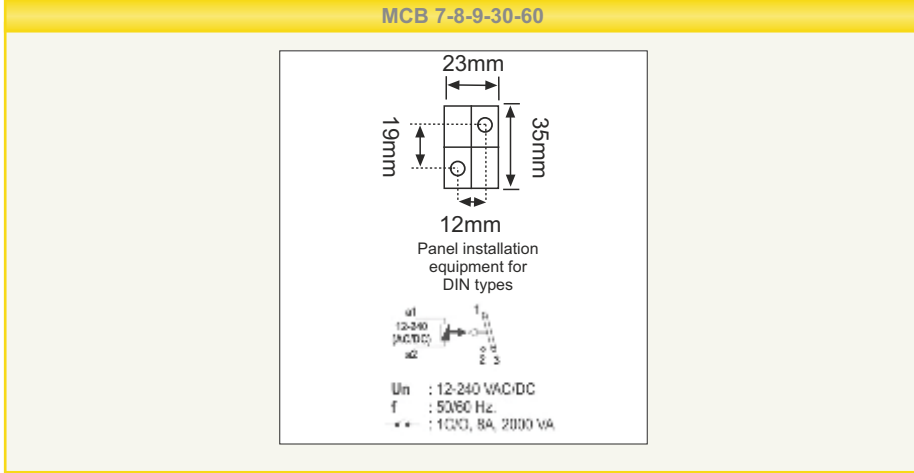
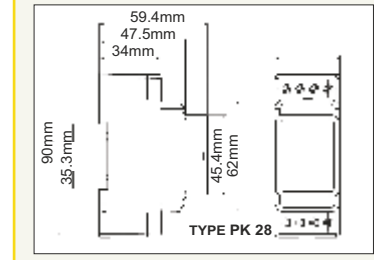
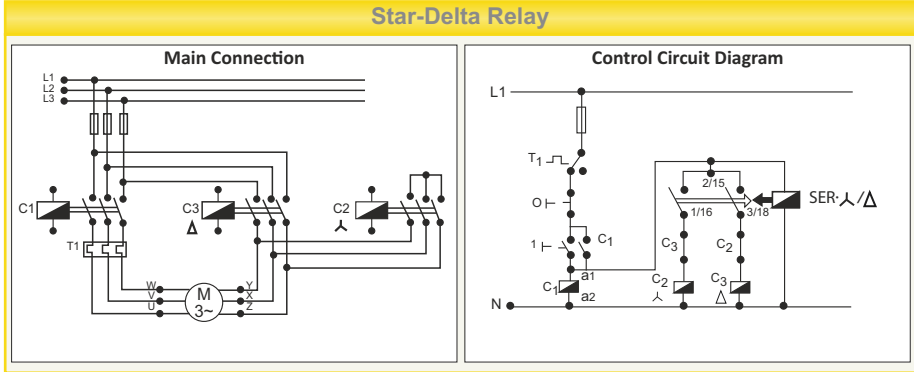
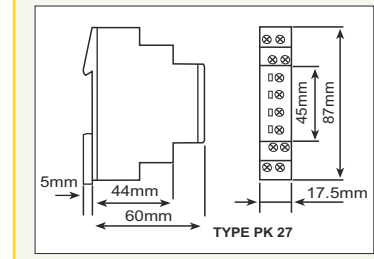
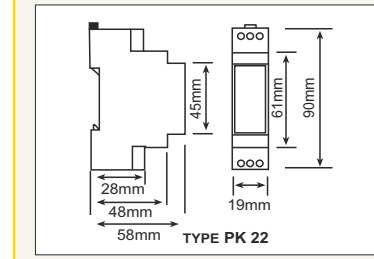
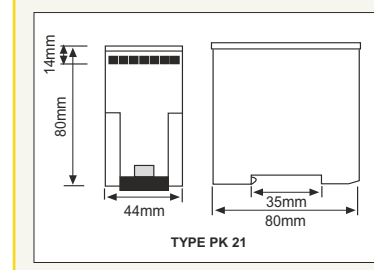
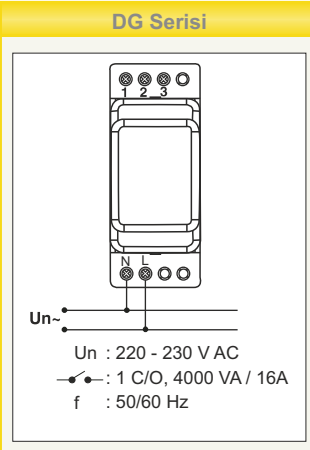
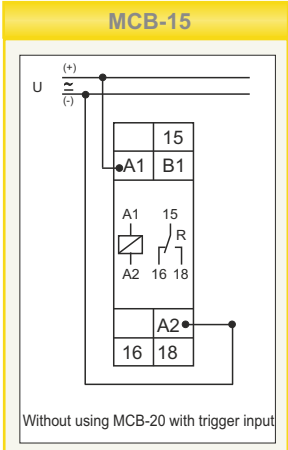
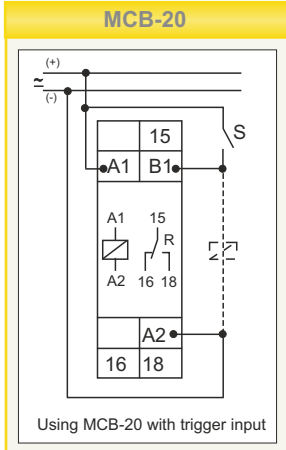
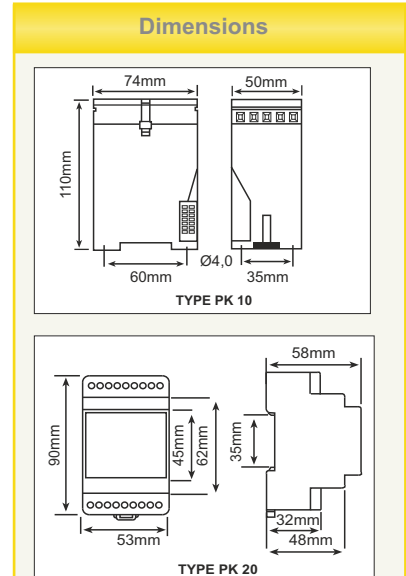
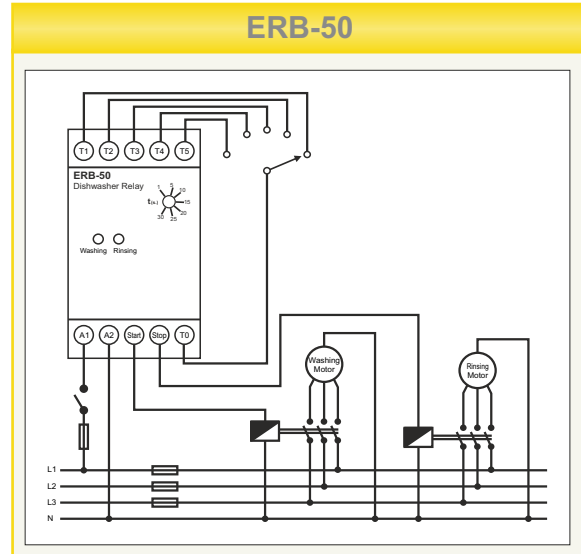
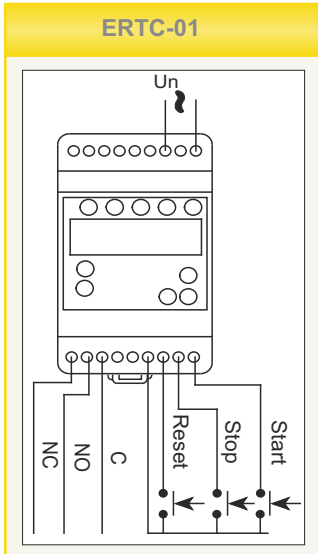


* 24 VAC/DC supply of SER - Y/U is applied between A2-A3



Time Relays

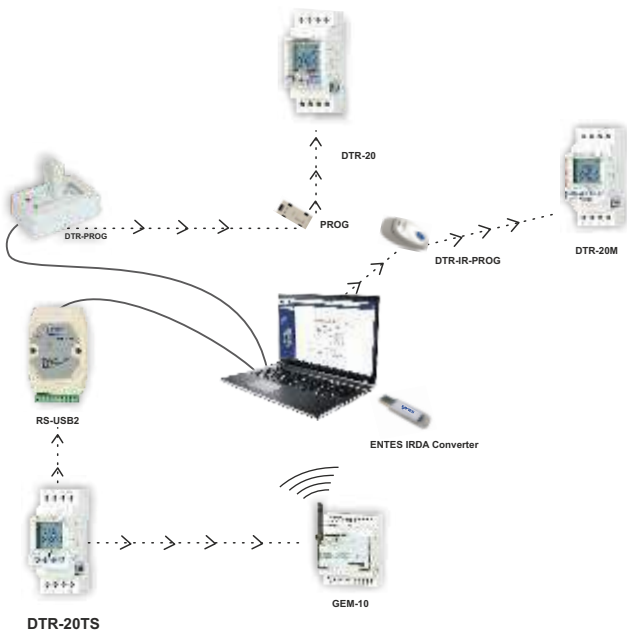
MCB - SER - ERTC - SSR - DG Series



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.com.tr

Astronomic Time Relays Electronic Timers

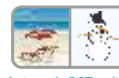
DTR Series / MCB-50/50t



- Automatic sunset and sunrise calculation
- Automatic DST (Daylight Saving Time) switching
- 24/7 programming based on city name and geographical coordinates
- 15 or 32 programs, and precise timing
- Vacation mode
- Backlight Display
- Password Protection
- Compliance with Entbus (DTR-20S/TS)
- Remote programming and control with Modbus RS-485 communication (DTR-20S/TS)
- Multi-device programming with DTR-PROG module for DTR-20 or DTR-IR-PROG device for DTR-20M



Communication



Automatic DST switch



32 Different Program Slots



Geographical Programming



Sunset/Sunrise

CE

Configuration Software

With DTR PROG configuration software, all parameters can be set easily and quickly in computer environment. After loading the configuration on the DTR-IR PROG device, these settings can be remotely transferred to multiple DTR-20M devices instantly with IR (Infrared), or can be transferred to multiple DTR-20 devices with PROG module.

PRODUCT SELECTION TABLE

Product Code		Data Transfer	Programmable Prayer Time	24h Time Programming	Geographical Coordinate Programming (Astronomic)	15 Programs	32 Programs	1 Relay Output (16A)	2 Relay Output (16A)	Pcs /Box
DTR-10	Astronomic Time Relay			●	●	●			●	16
DTR-10t	Astronomic Time Relay			●	●	●		●		16
DTR-20	Astronomic Time Relay, External Memory	PROG		●	●		●		●	16
DTR-20S	Astronomic Time Relay (Double-Contacted)	RS-485		●	●		●		●	16
DTR-20TS	Astronomic Time Relay (With Communication)	RS-485		●	●		●	●		16
DTR-20M	Astronomic Time Relay, IR Programming	IR		●	●		●		●	16
DTR-25	Astronomic Time Relay		●	●	●		●		●	16
MCB-50	Electronic Timer, 32 Programs			●			●		●	16
MCB-50t	Electronic Timer, 32 Programs			●			●	●		16
Programmer										
DTR-PROG	Programmer (for DTR20)									1
DTR-IR-PROG	IR Programmer (for DTR20M)									1



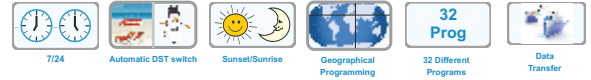
Astronomic Time Relays / Electronic Timers

DTR Series / MCB-50/50t

DTR-10/10t: Astronomic Time Relay



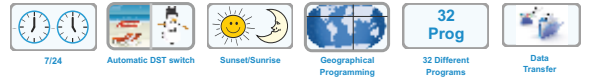
DTR-20: Astronomic Time Relay (External Memory)



DTR-20M: Astronomic Time Relay (IR Programming)



DTR-25: Astronomic Time Relay (Praying Time Calculation)



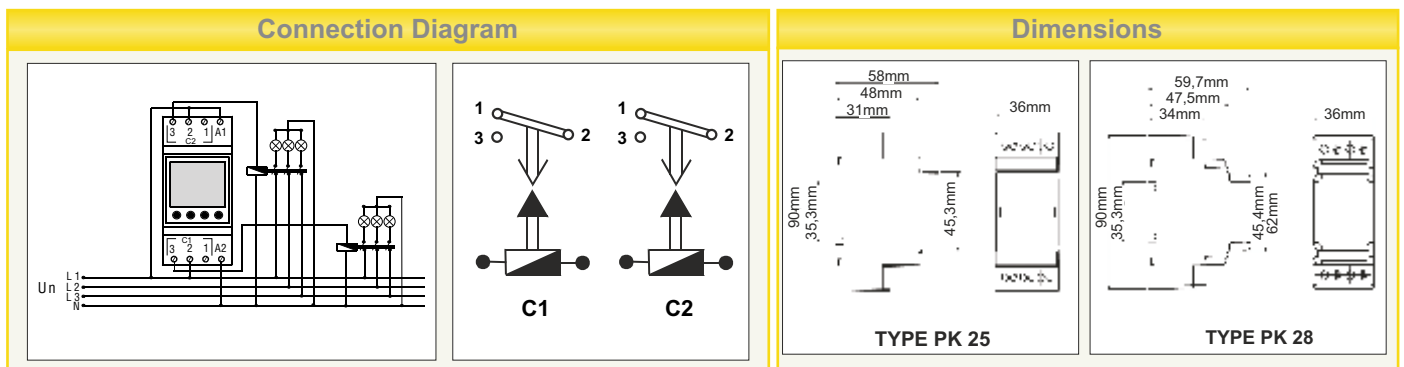
DTR-20S/DTR-20TS: Astronomic Time Relay
(Double Contact/Communication)



MCB-50/50t: Electronic Timer

SPECIFICATIONS

	DTR-10/25 MCB-50	DTR-10t/ MCB-50t	DTR-20	DTR-20M	DTR-20S	DTR-20TS
ENCLOSURE						
Dimensions	PK25		PK28		PK25	PK28
Protection Class	IP20					
Weight	0.2 kg					
Display	1.3" LCD					
SUPPLY						
Operating Voltage Range	230 VAC					
Operating Frequency	50/60 Hz					
Operating Range	190-260 VAC				85-265 VAC	
Power Consumption	<10VA				<3VA	
INPUT / OUTPUT / SETTINGS						
Output Contact	2CO 16A 250VAC 4000VA (cos ϕ =1)	1CO 16A 250VAC 4000VA (cos ϕ =1)	2CO 16A 250 VAC 4000VA (cos ϕ =1)		1 CO 16A 250 VAC 4000VA (cos ϕ =1)	
Refresh Time	1 sec					
Accuracy	<0.5sec./day					
COMMUNICATION						
Data Transfer			PROG	IR	RS-485	
AMBIENT CONDITIONS						
Ambient Temperature; Humidity	-10 / +55°C ; % 85					
CONNECTIONS						
Mounting	Rail mounting; Terminal with Screw					
Connection Type	Single Phase 2 Wires					



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr

Daylight Switches

FG Series



FG-4

FG series daylight switches control lighting systems according to environmental light levels.

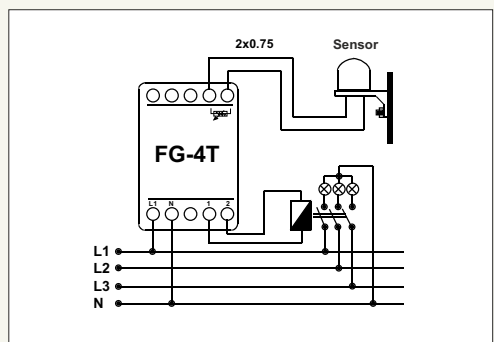
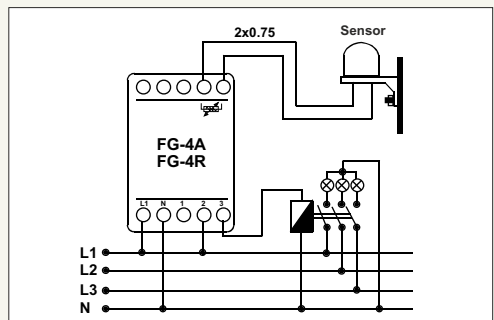
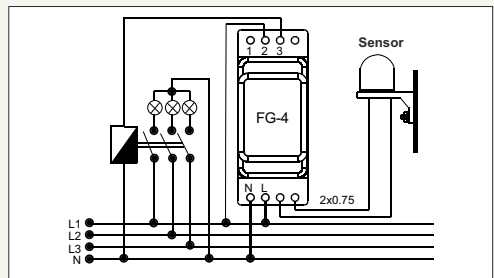
PRODUCT SELECTION TABLE

Product Code		1-3 Lux Adjustable	1-10 Lux Adjustable	Manual Control	Fuse Protection	Triac Output	Relay Output	Sensor	Pcs / Carton
FG-4	Daylight Switch	●					●		10
FG-4A	Daylight Switch		●				●		10
FG-4R	Daylight Switch		●	●	●		●		10
FG-4T	Daylight Switch (Triac output)		●	●	●	●			10
FG-SENSOR	Light Sensor							●	20

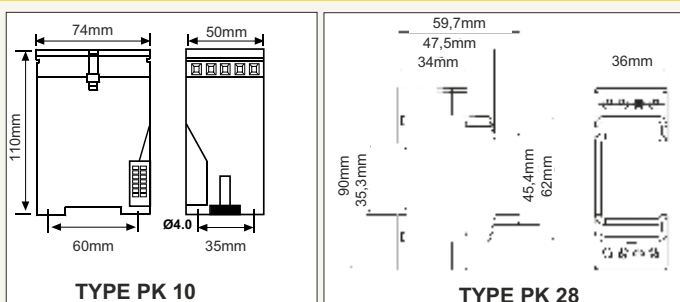
SPECIFICATIONS

	FG-4	FG-4A	FG-4R	FG-4T
ENCLOSURE				
Dimensions	PK28		PK10	
Protection Class		IP20		
Weight	0,2kg/pcs		0,5kg/pcs	
SUPPLY				
Operating Voltage Range		190-255 VAC		
Operating Frequency		50/60Hz		
OUTPUT				
On-Off delay	5-40 s.		25-45 s.	
Contact Output	1CO 8A/2000 VA (cosφ=1)		1CO 5A/1250 VA (cosφ=1)	-
Triac Output	-	-	-	8A/400V
PHOTOCELL INPUT				
Illuminance Setting	1-3 Lux		1-10 Lux	
Hysteresis Value		Min. 5% - Max. 30%		
Adjustment Tolerances	-		1 Lux (0,2 - 2 Lux) 10 Lux (7 - 12 Lux)	
AMBIENT CONDITIONS				
Ambient Temperature		-5 / +50°C		
CONNECTIONS				
Mounting		Rail Mounting, Terminal with screw		
Connection Types		Single phase 2 wires		

Connection Diagram



Dimensions



Overcurrent Monitoring Relays

CKR Series



CKR-93T

CKR series combine overcurrent relays and reverse/independent time relays in a single device. These relays are used to protect transformers, motors, generators, and energy transmission lines in the energy distribution system against short circuits and grounding faults.

In order to provide top level protection, "selective protection" should be implemented. The main purpose of the selective protection is to limit the fault at minimum and disconnect as soon as possible.



PRODUCT SELECTION TABLE

Product Code

Pcs / Box

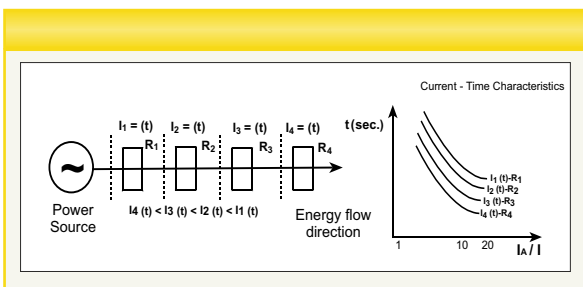
CKR-93T	3 Phase + Earth (Adjustable Inverse and Fixed Times for Phase & Earth) 85-265 VAC / DC, 24 VDC	4
CKR-92T	2 Phase + Earth (Adjustable Inverse and Fixed Times for Phase & Earth) 24 VDC	4

Correct protection for inverse time overcurrent relays can be achieved under the following conditions:

- 1) Relays with same operation characteristics must be connected in series.
- 2) OFF-delay of the relays used in the system must be set as "Current/time steps".

Current-based OFF delay of the relays must be set so that the "current/time steps" will decrease as they move away from the supply. By this manner, the relay at the end of the line (R4 in the following figure) should have the shortest OFF-delay time.

This situation can be observed from diagrams and current-time characteristics given below:




A. CKR series have the following I/t characteristics. According to IEC-255, BS-142 these are:

- a - Normal Inverse
- b - Very Inverse
- c - Extreme Inverse
- d - Long Time Inverse (CKR-93T)
- e - Independent Time 1 (2.5 sec)
- f - Independent Time 2 (5 sec)
- g - Independent Time 3 (10 sec)
- h - Independent Time 4 (15 sec)

Instant switch-off current, time multiplier, and current-time characteristic settings can be done separately for phase and neutral.

SPECIFICATIONS

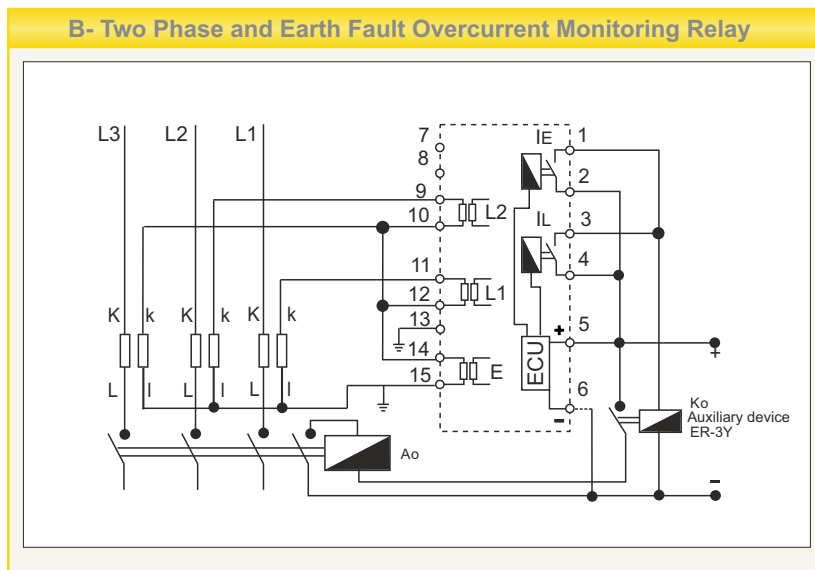
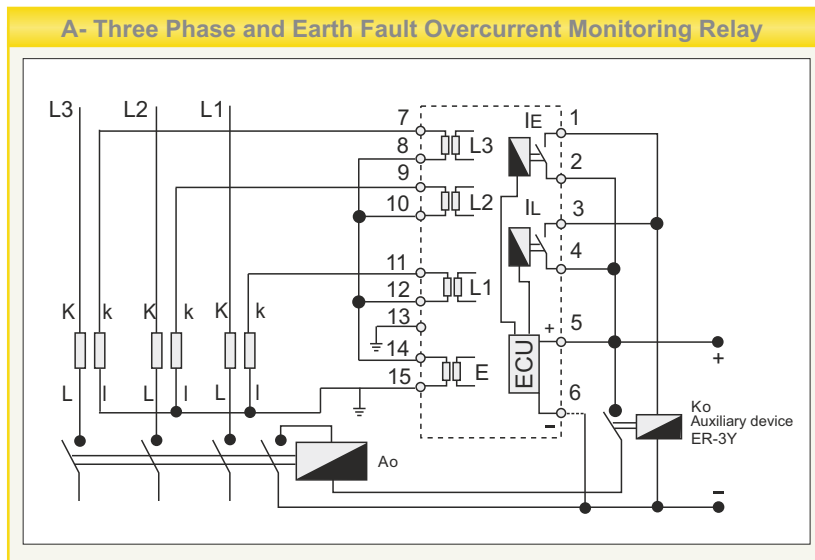
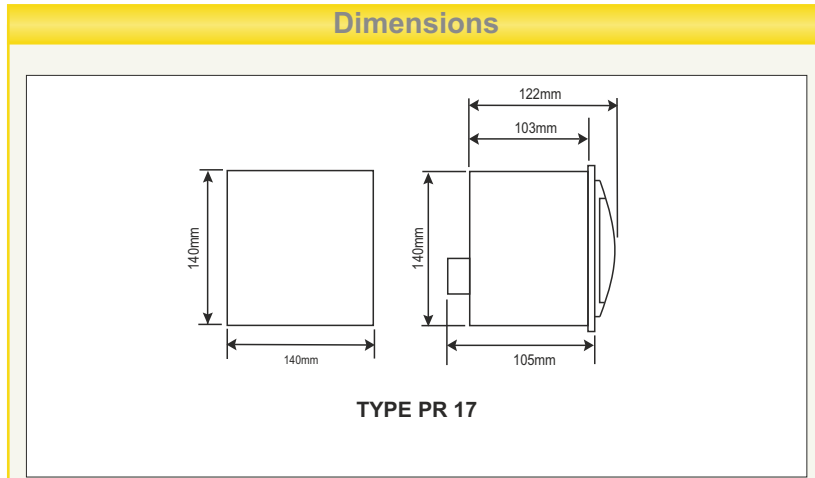
	CKR-92T	CKR-93T
ENCLOSURE		
Dimensions	144x144mm PR17	
Weight	1.3kg/pcs	
Three-phase protection		●
Earth fault protection	●	●
MEASUREMENTS		
Operating Current	1A earth, 5A phase	
Accuracy	Current In or Iset 5%; Time 7.5% or ±40ms	
Burden	<3VA	
Overcurrent pick-up	0,2 - 3,35 x In 0,25	
Overcurrent instant	2-17xI, step 1	
Definite Time	2,5.5.15 sec 0,1-1 step 0,1	
Inverse Time	According IEC255, ANSI (normal, very, extremely, longtime, moderately)CKR-9XT series don't have moderately inverse time.	
SUPPLY		
Operating Voltage	24VDC	24VDC, 85-265VAC/DC±10%
Operating Frequency	50/60 Hz	
Power Consumption	<2VA	
INPUT / OUTPUT		
Output Contact	1NO for phase; 1NO for neutral; 10A/1400VA	
AMBIENT CONDITIONS		
Ambient Temperature	-5 / +55°C	
CONNECTIONS		
Mounting	Front mounting; terminal with socket - screw	
Connection Types	2 phase + neutral ; 3 phase + neutral (for current input)	

- Double Insulation (),
- Measurement Category III
- Terminal Connection
- Front mounting with rear terminals
- IP40 (front panel)
- IEC 60255-3
- IEC 60255-6
- IEC 529

Overcurrent Monitoring Relays

CKR Series

Connection Diagram



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr



Function Tables



PHASE FAILURE RELAYS

Phase Failure + Asymmetry	MKC-01	MKS-01
Phase Failure + Asymmetry + Phase Sequence	MKC-03	MKS-03 MKC-04/04-U69
Phase Failure + Asymmetry + Phase Sequence + PTC	MKC-03P	
Phase Failure + Adj. Asymmetry + Phase Sequence + Adjustable ON/OFF delay	MKC-05	MKC-06 MKC-20
Phase Failure + Adj. Asymmetry + Phase Sequence + Adjustable ON/OFF delay + PTC	MKC-05P	MKC-06P
Phase Failure + Phase Sequence	FR-02	
PTC	PT-01	



VOLTAGE MONITORING RELAYS

Under Voltage + Adjustable ON/OFF delay	DGRC-01		
Under Voltage + Adjustable ON Delay	MCC-1D	MCC-3D	
Over Voltage + Adjustable ON/OFF delay	GKRC-01		
Under Voltage + Over Voltage + Adjustable ON/OFF delay	GKRC-02	GKRC-03	GKRC-M2
Phase Failure + Under Voltage+Over Voltage+Adjustable ON / OFF delay+Phase Sequence	GKRC-02F	GKRC-02FA	GKRC-03F GKRC-20F



CURRENT MONITORING RELAYS

Under Current	AKC-01D	AKC-03D
Over Current	AKC-01A	AKC-03A



TIME RELAYS

ON Delay	MCB-30	MCB-60
ON Delay + OFF Delay	MCB-7	MCB-8
ON Flasher	EF-10	EF-10T
ON Delay + OFF Delay + ON Flasher + OFF Flasher	MCB-9	
ON Delay + OFF Delay + ON Flasher + OFF Flasher + Down Timer	ERT-01	ERTC-01
ON Delay + OFF Delay + ON Delay, OFF Delay with Control Input + Control Input	MCB-15	
ON Delay + OFF Delay + ON Delay, OFF Delay with Control Input + Control Input + Symmetric Flasher	MCB-20	MCB-25
Single Shot Leading And Trailing Edge With Control Input	MCB-25	
ON Delay With Control Input Leading Edge Delay With Control Input Trailing Edge	MCB-25	
Power OFF Delay	DG-10	DG-60
Star - Delta	SER-YU	
Right - Left	SSR-2X	
Dish Washer Relay	ERB-50	

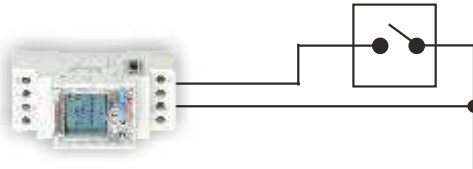


ASTRONOMIC TIME RELAYS

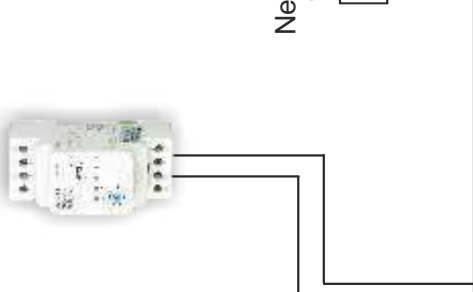
Astronomic + 15 program	DTR-10	DTR-10t		
Astronomic + 32 program	DTR-20	DTR-20S/TS	DTR-20M	DTR-25
Digital Time Relay + 32 program	MCB-50	MCB-50t		



Astronomic Time Relay



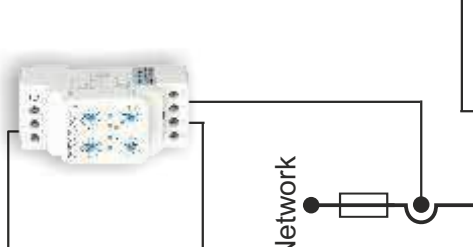
Liquid Level Controller



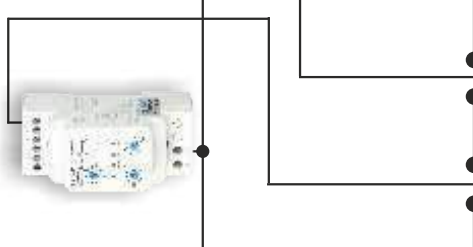
Time Relay



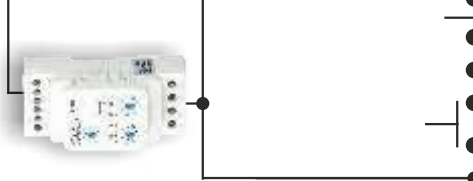
Voltage Monitoring Relay



Current Monitoring Relay

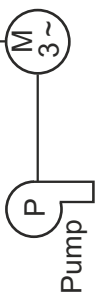


Phase Failure Relay



Network

Mp



Pump

Network

C

M 3~

MP

R



Control Transformers

ENT.PST Series



ENTES control transformers ensure safe operation of devices with their 24 VAC output voltage. In addition to products with 230 or 400 V constant voltage inputs, transformers with alternate input voltages (400; 230+15-15) are available. Control transformers are designed for continuous operation under 50°C ambient temperature. All ENTES control transformers have **CE** mark and are compatible with EN standards.



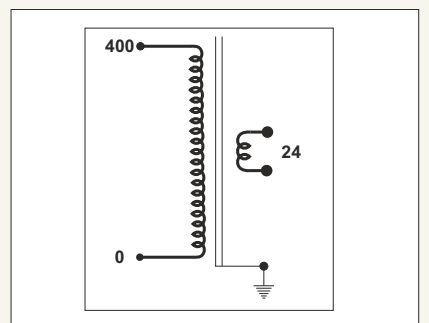
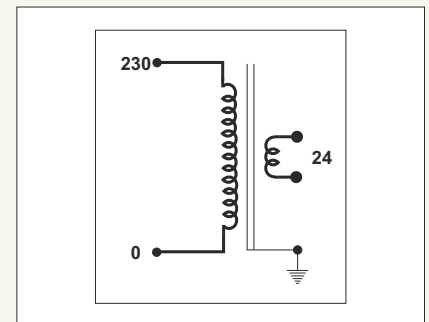
Features

- Compatible with TS.EN 61558-2-2
- Vacuum impregnated varnish method that improves efficiency by reducing heat losses, provides protection against humidity, and enables quiet operation.
- Welding of sheet metal with air gap that minimizes the enclosure grounding resistance
- Preserving its nominal output value up to 50°C ambient temperature
- Iron core with high magnetic permeability
- High quality copper winding
- Class 1 transformer
- Minimum primary-secondary isolation voltage values: 2200 VAC for 400V transformers, 1800 VAC for 230V transformers

	Nominal Power (VA) (at 50°C)	Short - Term Power	Weight (kg)	Terminal-Cross Section	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	H (mm)
230V / 24V											
ENT.PST.2324.25	25	51	1	4 mm ²	66	76	80	50	64	80	5*8
ENT.PST.2324.50	50	97	1,5	4 mm ²	84	76	91	64	64	82	5*8
ENT.PST.2324.100	100	209	1,9	4 mm ²	84	76	91	64	64	96	6*9
ENT.PST.2324.160	160	338	2,4	4 mm ²	96	89	99	84	74	100	6*9
ENT.PST.2324.200	200	419	3	4 mm ²	96	89	99	84	74	100	6*9
ENT.PST.2324.250	250	559	3,4	4 mm ²	96	102	99	84	87	114	6*9
ENT.PST.2324.320	320	689	4,4	4 mm ²	120	90	127	90	83	92	6*9
ENT.PST.2324.400	400	961	5,6	4 mm ²	120	102	127	90	95	106	7*13
ENT.PST.2324.500	500	1260	7,1	4 mm ²	120	122	127	90	109	126	7*13
ENT.PST.2324.630	630	1520	7,6	10 mm ²	150	113	141	122	89	120	7*13
400V / 24V											
ENT.PST.4024.25	25	51	1	4 mm ²	66	76	80	50	64	80	5*8
ENT.PST.4024.50	50	96	1,5	4 mm ²	84	76	91	64	64	82	5*8
ENT.PST.4024.100	100	218	2	4 mm ²	84	76	91	64	64	96	6*9
ENT.PST.4024.160	160	344	2,4	4 mm ²	96	89	99	84	74	100	6*9
ENT.PST.4024.200	200	460	2,9	4 mm ²	96	89	99	84	74	100	6*9
ENT.PST.4024.250	250	584	3,4	4 mm ²	96	102	99	84	87	114	6*9
ENT.PST.4024.320	320	749	4,4	4 mm ²	120	90	127	90	83	92	6*9
ENT.PST.4024.400	400	909	5,5	4 mm ²	120	102	127	90	95	106	7*13
ENT.PST.4024.500	500	1241	7,1	4 mm ²	120	122	127	90	109	126	7*13
ENT.PST.4024.630	630	1556	7,6	10 mm ²	150	113	141	122	89	120	7*13

*On-demand production in different voltage values up to 2500VA

ENT.PST Series



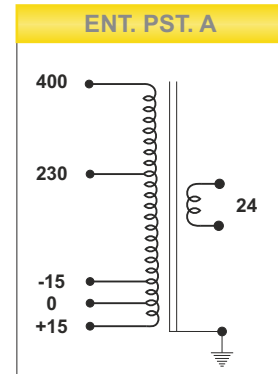
Control Transformers

ENT.PST Series

400 - 230 / 24 V With Alternative Input (15-0-15 V)

400-230/24V	Nominal Power (VA) (at 50°C)	Primary Voltage (V)	Short-Term Power	Weight (kg)	Terminal Cross-Section	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	H (mm)
ENT.PST.A4024.25	25	400	51	1	4 mm	66	76	80	50	64	80	5*8
ENT.PST.A4024.50	50	400	97	1,5	4 mm ²	84	76	91	64	64	82	5*8
ENT.PST.A4024.100	100	400	218	2	4 mm ²	84	76	91	64	64	96	6*9
ENT.PST.A4024.160	160	400	344	2,4	4 mm ²	96	89	99	84	74	100	6*9
ENT.PST.A4024.200	200	400	460	2,9	4 mm ²	96	89	99	84	74	100	6*9
ENT.PST.A4024.250	250	400	584	3,4	4 mm ²	96	102	99	84	87	114	6*9
ENT.PST.A4024.320	320	400	749	4,4	4 mm ²	120	90	127	90	83	92	6*9
ENT.PST.A4024.400	400	400	909	5,5	4 mm ²	120	102	127	90	95	106	7*13
ENT.PST.A4024.500	500	400	1241	7,1	4 mm ²	120	122	127	90	109	126	7*13
ENT.PST.A4024.630	630	400	1556	7,6	10 mm ² 4 mm ²	150	113	141	122	89	120	7*13

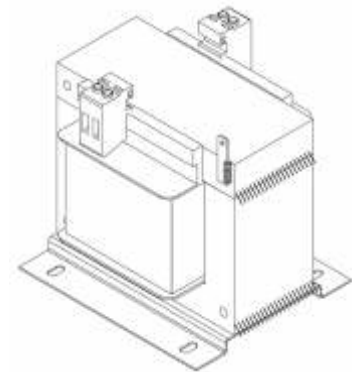
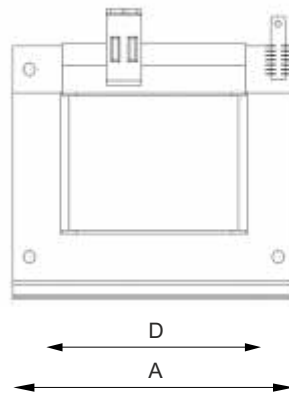
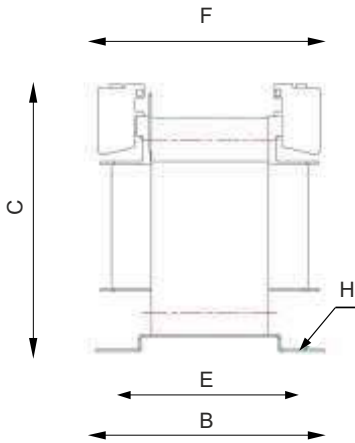
Connection Diagram



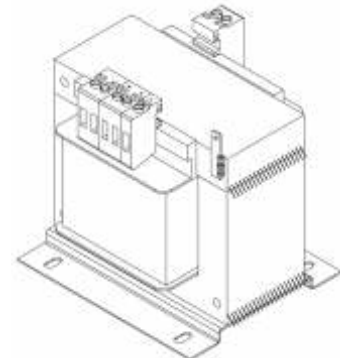
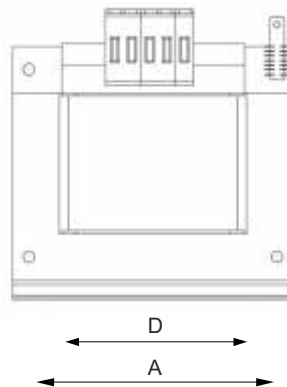
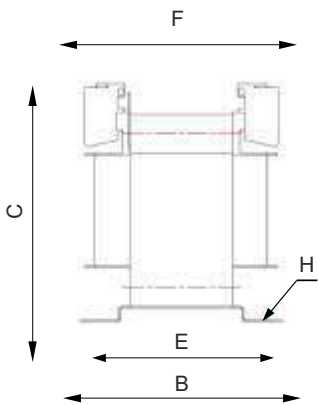
*On-demand production in different voltage values up to 2500VA

Dimensions

230/24V & 400/24V



400-230/24V With Alternative Input (15-0-15V)



Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entec.com.tr



Isolating Transformers

ENT.IST Series



ENTES isolation transformers enable safe operation of devices by isolating the secondary part from the primary voltage. Isolation transformers have constant input and output voltages. (230V or 400V) They are generally used at places requiring galvanic isolation and to obtain a star point in networks without star point.

All isolation transformers have CE mark and are compatible with EN standards.



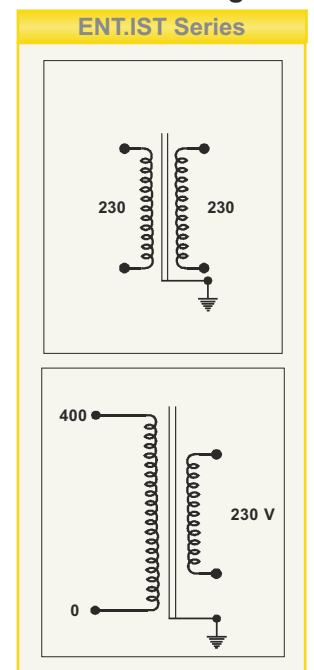
Features

- Compatible with TS.EN 61558-2-2
- Vacuum impregnated varnish method that improves efficiency by reducing heat losses, provides protection against humidity, and enables quiet operation.
- Welding of sheet metal with air gap that minimizes the trunk enclosure resistance
- High efficiency
- Reducing instant current fluctuations
- Preserving its nominal output value up to 50 C ambient temperature
- Iron core with high magnetic permeability
- High quality copper winding
- Class 1 transformer
- Minimum primary-secondary isolation voltage values: 4400 VAC for 400V transformers, 3600 VAC for 230V transformers

Isolating Transformers

230/230	Nominal Power (VA) (at 50 C)	Short Term Power (VA)	Weight (kg)	Terminal Diameter	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	H(mm)
ENT.IST.2323.25	25	51	1	4 mm ²	66	76	80	50	64	80	5*8
ENT.IST.2323.50	50	104	1,5	4 mm ²	84	76	91	64	64	82	5*8
ENT.IST.2323.100	100	199	2	4 mm ²	84	76	91	64	64	96	6*9
ENT.IST.2323.160	160	338	2,4	4 mm ²	96	89	99	84	74	100	6*9
ENT.IST.2323.200	200	428	2,9	4 mm ²	96	89	99	84	74	100	6*9
ENT.IST.2323.250	250	548	3,4	4 mm ²	96	102	99	84	87	114	6*9
ENT.IST.2323.320	320	701	4,4	4 mm ²	120	90	127	90	83	92	6*9
ENT.IST.2323.400	400	959	5,4	4 mm ²	120	102	127	90	95	106	7*13
ENT.IST.2323.500	500	1259	7,1	4 mm ²	120	122	127	90	109	126	7*13
ENT.IST.2323.630	630	1493	8,1	4 mm ²	150	113	141	122	89	102	7*13
400/230											
ENT.IST.4023.25	25	51	1	4 mm ²	66	76	80	50	64	80	5*8
ENT.IST.4023.50	50	95	1,5	4 mm ²	84	76	91	64	64	82	5*8
ENT.IST.4023.100	100	216	2	4 mm ²	84	76	91	64	64	96	6*9
ENT.IST.4023.160	160	330	2,5	4 mm ²	96	89	99	84	74	100	6*9
ENT.IST.4023.200	200	454	3	4 mm ²	96	89	99	84	74	100	6*9
ENT.IST.4023.250	250	555	3,6	4 mm ²	96	102	99	84	87	114	6*9
ENT.IST.4023.320	320	744	4,5	4 mm ²	120	90	127	90	83	92	6*9
ENT.IST.4023.400	400	942	5,6	4 mm ²	120	102	127	90	95	106	7*13
ENT.IST.4023.500	500	1174	7,1	4 mm ²	120	122	127	90	109	126	7*13
ENT.IST.4023.630	630	1555	8,3	4 mm ²	150	113	141	122	89	102	7*13

Connection Diagrams

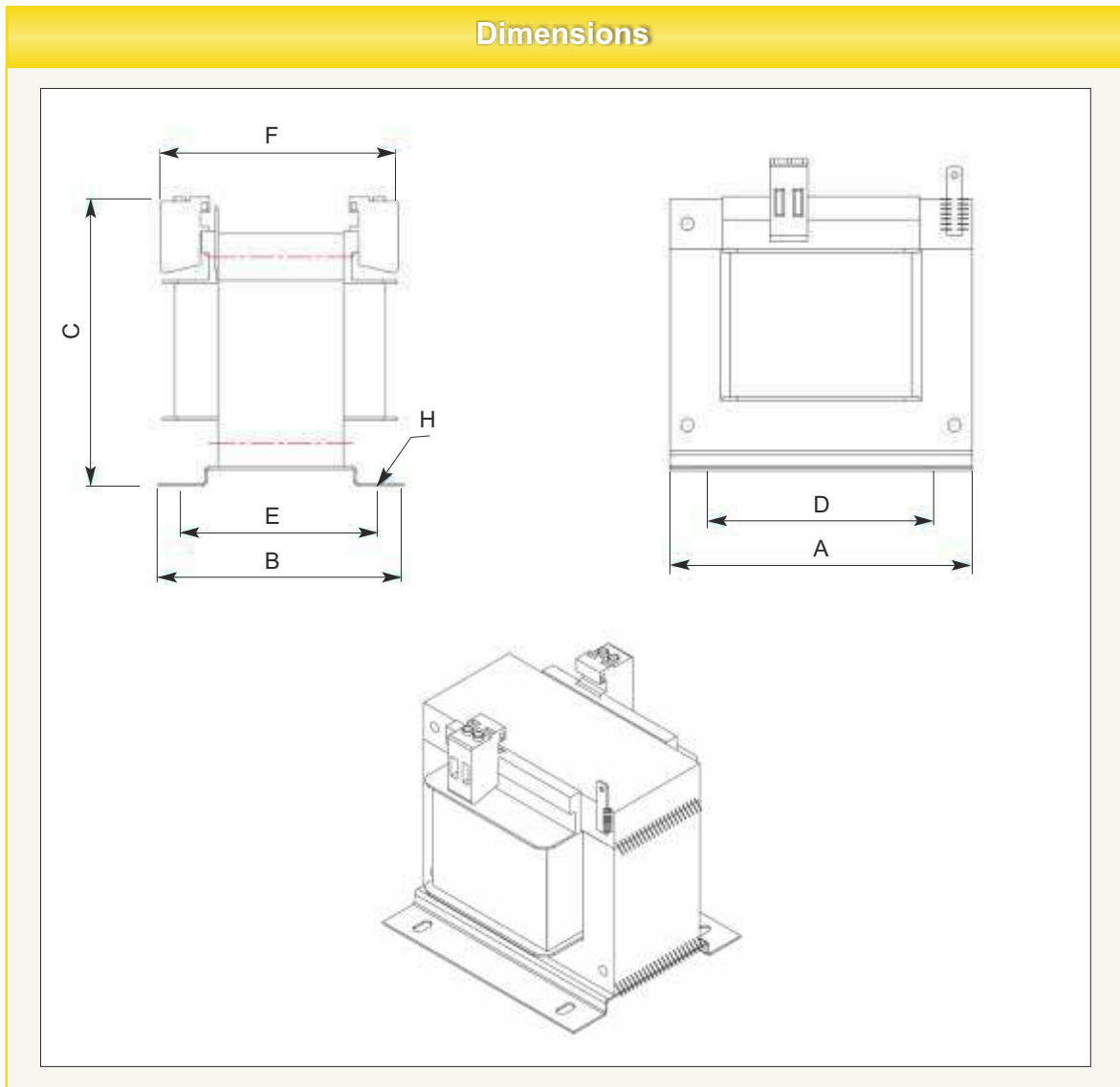


*On-demand production in different voltage values up to 2500VA

Isolating Transformers

ENT.IST Series

Dimensions





KALİTE YÖNETİM SİSTEMİ BELGESİ

QUALITY MANAGEMENT SYSTEM CERTIFICATE

Partner of



TÜRK STANDARDLARI ENSTİTÜSÜ
bu belge ile

ENTES ELEKTRONİK CİHAZLAR İMALAT VE
TİCARET A.Ş.
DUDULLU OSB 1. CAD. NO:23 ÜMRANIYE-
İSTANBUL / TÜRKİYE

kuruluşunun TS EN ISO 9001:2008 şartlarına uygun bir KALİTE
YÖNETİM SİSTEMİNE sahip olduğunu onaylar.

TURKISH STANDARDS INSTITUTION
hereby certifies that the organization

ENTES ELEKTRONİK CİHAZLAR İMALAT VE
TİCARET A.Ş.
DUDULLU OSB 1. CAD. NO:23 ÜMRANIYE-
İSTANBUL / TÜRKİYE

has a QUALITY MANAGEMENT SYSTEM which fulfills
the requirements of the TS EN ISO 9001:2008



Belge kapsamı Ek'te verilmiştir

TÜRK STANDARDLARI ENSTİTÜSÜ
TURKISH STANDARDS INSTITUTION

SİSTEM BELGELENDİRME GRUPO BAŞKANI
HEAD of SYSTEM CERTIFICATION GROUP

GÖKHAN BİRCAN DEĞERLİYURT

Bu belge belgelendirmeye ait kuruma
uygunluk seçilene kadar geçerlidir.

Türk Standardları Enstitüsü Türk Akreditasyon Kurumu TÜRKAK tarafından akredite edilmiştir.
Turkish Standards Institution, has been accredited by the Turkish Accreditation Agency TÜRKAK.

Belge No / Certificate No

KY-602-03/KG-97/10

Belge Tarihi / Date of Certificate

28.11.2016

Geçerlilik Tarihi / Valid Until

14.09.2018

Revizyon Tarihi / Date of Revision

29.11.2016

İlk Belge Tarihi / Initial Certification Date

28.04.1997

This certificate is valid provided that compliance
with the certification requirement is maintained.

060812201612310001



KALİTE YÖNETİM SİSTEMİ BELGESİ

QUALITY MANAGEMENT SYSTEM CERTIFICATE

EK / ANNEX

Partner of



Belge No / Certificate No: **KY-502-03/KG-97/10**

Belgeli Kuruluş Adı, Adresi:

Name and Address of the Certified Organization:

Belge Kapsamı:

TS EN ISO 9001:2008

- REAKTİF GÜÇ KONTROL RÖLELERİ
- KORUMA CİHAZLARI
- YARDIMCI CİHAZLARI
- ZAMAN CİHAZLARI
- FOTOSEL CİHAZLARI
- ELEKTRONİK TRANSFORMATÖR VE ELEKTRONİK BALAST
- DİJİTAL ÖLÇÜ ALETLERİ
- ELEKTRİK SAYAÇLARI

TASARIM VE ÜRETİMİ

Belge Tarihi / Date of Certificate: **29.11.2016**

ENTES ELEKTRONİK CİHAZLAR İMALAT VE
TİCARET A.Ş.
DUDULLU OSB 1. CAD. NO:23 ÜMRANIYE-
İSTANBUL / TÜRKİYE

Scope of the Certificate:

TS EN ISO 9001:2008

DESIGN AND PRODUCTION OF

- REACTIVE POWER CONTROL RELAYS
- PROTECTION DEVICE
- AUXILIARY DEVICE
- TIME DEVICE
- PHOTOCELL SWITCHES
- ELECTRONIC TRANSFORMERS AND BALASTS
- DIGITAL MEASURING INSTRUMENTS
- WATT HOUR METERS



060812201612310001



CERTIFICATE

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET ANONİM ŞİRKETİ

Yukarı Dudulu Organize Sanayi Bölgesi 1. Cad No:23 Ümraniye / İstanbul / TÜRKİYE

*TCS Belgelendirme tarafından denetlenmiş ve uygulamakta olduğu Çevre Yönetim Sisteminin
is audited by TCS Certification and applied Environment Management System meet the requirements of*

ISO 14001:2015

*standardına aşağıdaki kapsamda uymakta olduğu gözlenmiştir.
standard for the following activities:*

**Güç Kalitesi ve Enerji Ölçme, Kompansasyon, İzleme, Koruma, Kontrol Yazılım ve Cihazlarının,
Tasarım, Üretim, Satış ve Pazarlaması**

*Design, Production, Sales and Marketing of Software and Equipments on Power Quality and Energy Measurement,
Compensation, Monitoring, Protection and Control*

Sertifika No / Certificate No: EM-00 90 160250-TR

- Sertifika İlk Yayın Tarihi /
Certificate Date

Sertifika Son Basım Tarihi /
Certificate Last Issue Date

Mevcut Belgelendirmenin Geçerlilik Periyodu /
Validity Date of Current Certification Period

SERTİFİKA GEÇERLİLİK TARİHİ: 28.04.2019



Küçülmüş Cad. Yanardagı Sk. No: 9/11 Küçükçekircek Mahallesi / İstanbul
T: 0216 573 55 53 F: 0216 573 98 01 info@tscert.com www.tscert.com

Bu belge müşterinin TCS prosedürlerine ya da başka bir şekilde
This certificate is valid during the customer's audit and TCS procedures.

11/19.74 REV05

TCS



CERTIFICATE

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET ANONİM ŞİRKETİ

Yukarı Dudullu Organize Sanayi Bölgesi 1. Cad No:23 Ümraniye / İstanbul / TÜRKİYE

TCS Belgelendirme tarafından denetlenmiş ve uygulamakta olduğu İş Sağlığı ve Güvenliği Yönetim Sisteminin
is audited by TCS Certification and applied Occupational and Safety Management System meet the requirements of

OHSAS 18001:2014

standardına aşağıdaki kapsamda uymakta olduğu gözlenmiştir.
standard for the following activities.

Güç Kalitesi ve Enerji Ölçme, Kompansasyon, İzleme, Koruma, Kontrol Yazılım ve Cihazlarının,
Tasarım, Üretim, Satış ve Pazarlaması

Design, Production, Sales and Marketing of Software and Equipments on Power Quality and Energy Measurement,
Compensation, Monitoring, Protection and Control

Sertifika No / Certificate No: OHS-00 90 160250-TR

Sertifika İlk Yayın Tarihi / Certificate Date
28.04.2016

Sertifika Sonraki Basım Tarihi / Certificate Last Issue Date
14.03.2018

Mevcut Belgelendirmenin Geçerlilik Periyodu / Validity Date of Current Certification Period
28.04.2016 - 26.04.2019

SERTİFİKA GEÇERLİLİK TARİHİ: 28.04.2019



4_REV04



Kocasinan Cad. Yarıncıcağ Sok. No: 7/11 Kültürpark Köyü, Ataşehir / İstanbul
T: 0216 573 55 53 F: 0216 573 88 01 info@tcs-cert.com www.tcs-cert.com

Bu belge müşterinin TCS prosedürüne uyması süreci gösterir.
This certificate is valid during the customer's use of the TCS procedures.

TCS

CB TEST CERTIFICATE

CERTIFICAT D'ESSAI OC

Product

Produit

Name and address of the Applicant

Nom et adresse du demandeur

Name and address of the manufacturer

Nom et adresse du fabricant

Name and address of the factory

Nom et adresse de l'usine

Rating and principal characteristics

aleurs nominales et caractéristiques principales

Trademark (if any)

Marque de fabrique (si elle existe)

Type of manufacturer's Testing Laboratories used

Type de programme de laboratoire d'essais constructeur

Model / Type Ref.

Réf. de type

Additional information (if necessary may also be reported on page 2)

Les informations complémentaires (si nécessaire, peuvent être indiquées sur la 2ème page)

A sample of product was tested and found to be in conformity with IEC

Un échantillon de ce produit a été essayé et été considéré conforme à la CEI

Digital Panel Meters

Entes Elektronik Cihazlar Imalat ve Ticaret A.S.

Y.Dudullu Org. San. Böl. 1.

Cad. No.23 Ümraniye

istanbul

Turkey

Entes Elektronik Cihazlar Imalat ve Ticaret A.S.

Y.Dudullu Org. San. Böl. 1.

Cad. No.23 Ümraniye

istanbul

Turkey

Entes Elektronik Cihazlar Imalat ve Ticaret A.S.

Y.Dudullu Org. San. Böl. 1.

Cad. No.23 Ümraniye

istanbul

Turkey

1. Group: 220/230 V AC \pm 10 %; 50/60 Hz, < 6 VA; 110/115 V AC \pm 10 %; 50/60 Hz, < 6 VA

2. Group: 220-230 V AC \pm 10 %; 45-65 Hz, < 4 VA; 110-115 V AC \pm 10 %; 45-65 Hz, < 4 VA

3. Group: 24-250 V AC/DC; 45-65 Hz, < 4 VA

4. Group: 24-250 V AC/DC; 45-65 Hz, < 4 VA

5. Group: 220-230 V AC \pm 10 %; 45-65 Hz, < 4 VA; 110-115 V AC \pm 10 %; 45-65 Hz, < 4 VA

6. Group: 220-230 V AC \pm 10 %; 45-65 Hz, < 4 VA; 110-115 V AC \pm 10 %; 45-65 Hz, < 4 VA

7. Group: 220-230 V AC \pm 10 %; 45-65 Hz, < 4 VA; 110-115 V AC \pm 10 %; 45-65 Hz, < 4 VA

Entes

See annex Additional sheets

61010-1(ed.3)

This CB Test Certificate is issued by the National Certification Body:

DEKRA Certification B.V.
Meander 1051, 6825 MJ
Arnhem
The Netherlands

Ce Certificat d'essai OC est établi par l'Organisme National de Certification



Date: 2014-02-11

Signature: A.G.H. Bergervoet

page 1 of 2

Model/Type reference.....: Model MPR-xx, EPM-xx, EPR-xx, EVM-xx where xx can be one or more characters

All models part of this investigation:

1.Group: MPR-63 (96x96mm), MPR-63-10 (96x96mm)
MPR-60S (96x96mm),MPR-60S-10 (96x96mm)
MPR-50 (96x96mm),MPR-52S-10 (96x96mm)

2.Group: MPR-53CS (96x96mm), MPR-53 (96X96mm)
MPR-53 (DIN6), MPR-53S (96X96mm), MPR-53S (DIN6)
EPM-04 (96X96mm), EPM-04 (DIN6)
EPM-04C (96X96mm), EPM-04C (DIN6),
EPM-04CS (96X96mm), EPM-04CS (DIN6),
EPM-06 (96X96mm), EPM-06 (DIN6),
EPM-06C (96X96mm), EPM-06C (DIN6),
EPM-06CS (96X96mm), EPM-06CS (DIN6),
EPM-07 (96X96mm), EPM-07 (DIN6),
EPM-07S (96X96mm), EPM-07S (DIN6),
EPR-04 (96x96mm), EPR-04 (DIN6),
EPR-04S (96x96mm), EPR-04S (DIN6)

3.Group: EPM-34 (96x96mm), EPM-14 (96x96mm)

4.Group: EVM-35 (96x96mm), EVM-15 (96x96mm)

5.Group: EPM-4P (48x96mm), EPM-4P (72x72mm),
EPM-4C (96x96mmSLIM), EPM-4C (48x96mm),
EPM-4C (72x72mm), EPM-4C (96x96mm SLIM),
EPM-4D (72x72mm), EPM-4D (96x96mm SLIM),
EPM-4D (48x96mm), EPM-4A (72x72mm),
EPM-4A (96x96mm SLIM)

6.Group: EVM-3S (48x96mm), EVM-3S (96x96mm SLIM)
EVM-3S (72x72mm)

7.Group: EVM-3C (72x72mm), EVM-3 (48x96mm)
EVM-3 (96x96mm SLIM), EVM-3 (72x72mm)



TÜRK STANDARDLARI ENSTİTÜSÜ
TÜRK STANDARDLARINA UYGUNLUK BELGESİ
TURKISH STANDARDS INSTITUTION
CERTIFICATE OF CONFORMITY TO TURKISH STANDARDS



BELGE NUMARASI REFERENCE NUMBER OF LICENCE	001081-TSE-01/02
BELGENİN İLK VERİLİŞ TARİHİ DATE OF FIRST ISSUE OF LICENCE	09.01.2015
BELGENİN SON GEÇERLİLİK TARİHİ LICENCE VALID UNTIL	13.06.2019
BELGE SAHİBİ KURULUŞUN ADI NAME OF THE LICENCE HOLDER	ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET ANONİM ŞİRKETİ
BELGE SAHİBİ KURULUŞUN ADRESİ ADDRESS OF THE LICENCE HOLDER	Y. DUDULLU ORGANİZE SANAYİ BÖLGESİ 1.CAD. NO:23 34775 ÜMRANIYE İSTANBUL/TÜRKİYE
ÜRETİM YERİ ADI NAME OF THE MANUFACTURING PLACE	TRANSOVAK ELEKTRİK CİHAZLARI SAN. VE TİC A.Ş.
ÜRETİM YERİ ADRESİ ADDRESS OF THE MANUFACTURING PLACE	MALTEPE MAHALLESİ ÇİFTAHAVUZLAR YOLU ASLANER SANAYİ SİT. NO:7 F BLOK ZEYİTBURNU İSTANBUL / TÜRKİYE
İPTAL EDİLEN BELGE NUMARASI (Varsa) INDICATION OF SUPERSEDED LICENCE (if any)	001081-TSE-01/01
TESCİLLİ TİCARİ MARKASI REGISTERED TRADE MARK	ENTES
İLGİLİ TÜRK STANDARDI RELATED TURKISH STANDARD	TS EN 61869-2 / Ölçü transformatörleri - Bölüm 2: Akım transformatörleri için ek kurallar / 12.06.2013.
BELGE KAPSAMI SCOPE OF LICENCE	



Ölçü transformatörleri - Bölüm 2: Akım transformatörleri için ek kurallar.

1. ENT.B MODEL
Beyan Giriş Akımı: 5A 'den 300 A 'e kadar (300 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 5VA-10VA-15 VA
Beyan Frekansı: 50-60 Hz
Maksimum İşletme Gerilimi (Um): 0,72 kV
Beyan Doğruluk Sınıfı: Ölçü Sınıfı: 0,5 , 1
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 60xIn, 1 s
2. ENT.30 MODEL

e-İmza ile onaylanmıştır

06.06.2018

Belgelendirme Merkezi Başkanı Adına
AKDOĞAN BULUT

TSE İSTANBUL BELGELENDİRME MÜDÜRÜ V.

*Bu belge, belgelendirilen ürünün, üretim yerinin, Enstitümüzün belirlediği şartları karşıladığını da gösterir.
*Bu belge hiç bir suretle tahrif edilemez, kısmen veya okunmasını zorlaştıracak şekilde çoğaltılamaz, kopyası ve satışı yapılamaz.
*TSE İSTANBUL BELGELENDİRME MÜDÜRLÜĞÜ * Adres: Çayyova Tren İstasyonu Yanı ÇAYIROVA/GEBZE * Tel: 2627231273 * Faks: 2627231906
*TSE BELGELENDİRME MERKEZİ BAŞKANLIĞI Adres: Necatibey Cad. No:112 06100 Bakanlıklar/ANKARA - Tel: 0 312 416 64 81 / 416 64 27, Faks: 0 312 416 66 17.
e-posta : bmo@tse.org.tr , web : www.tse.org.tr



<https://cvrakkontrol.tse.org.tr/BelgeDogrulama.aspx?p=cttbanop> adresinden belgenin doğruluğunu ve geçerliğini sorgulayınız.

1 / 3



TÜRK STANDARDLARI ENSTİTÜSÜ
TÜRK STANDARDLARINA UYGUNLUK BELGESİ
TURKISH STANDARDS INSTITUTION
CERTIFICATE OF CONFORMITY TO TURKISH STANDARDS



BELGE KAPSAMI (001081-TSE-01/02nolu belge devamı) : ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET ANONİM ŞİRKETİ
İLGİLİ TÜRK STANDARDI(RELATED TURKISH STANDARD) TS EN 61869-2 / Ölçü transformatörleri - Bölüm 2: Akım transformatörleri için ek kurallar / 12.06.2013

Beyan Giriş Akımı: 100 A 'den 150 A 'e kadar (150 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 5 VA-10 VA
Beyan Frekansı: 50-60 Hz
Maksimum İşletme Gerilimi (Um): 0,72 Kv
Beyan Doğruluk Sınıfı: Ölçü Sınıfı: 1, 3
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 100xIn, 1 s

3. ENT.30 MODEL

Beyan Giriş Akımı: 200 A 'den 300 A 'e kadar (300 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 5 VA-10 VA
Beyan Frekansı: 50-60 Hz
Maksimum İşletme Gerilimi (Um): 0,72 kV
Beyan Doğruluk Sınıfı: Ölçü Sınıfı:0,5 , 1, 3
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 100xIn, 1 s

4. ENT.40 MODEL

Beyan Giriş Akımı: 300 A 'den 600 A 'e kadar (600 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 5 VA- 10 VA – 15VA
Beyan Frekansı: 50-60 Hz
Maksimum İşletme Gerilimi (Um): 0,72 kV
Beyan Doğruluk Sınıfı: Ölçü Sınıfı:0,5 , 1, 3
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 100xIn, 1 s

5. ENT.60 MODEL

Beyan Giriş Akımı: 750 A 'den 1600 A 'e kadar (1600 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 5 VA- 10 VA – 15VA
Beyan Frekansı: 50-60 Hz
Maksimum İşletme Gerilimi (Um): 0,72 kV
Beyan Doğruluk Sınıfı: Ölçü Sınıfı:0,5 , 1, 3
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 100xIn, 1 s

6. ENT.80 MODEL

Beyan Giriş Akımı: 1200 A 'den 2500 A 'e kadar (2500 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 10 VA- 15 VA – 30VA
Beyan Frekansı: 50-60 Hz

e-izmlenmiş

06.06.2018

Belgelendirme Merkezi Başkanı Adına
AKDOĞAN BULUT

TSE İSTANBUL BELGELENDİRME MÜDÜRÜ V.

*Bu belge, belgelendiren ürünün, üretim yerinin, Enstitümüzün belirlediği şartları karşıladığını da gösterir.

*Bu belge hiç bir suretle tahrif edilemez, kısmen veya tamamen zorlaştıracak şekilde değiştirilemez, kopyalı ve silinti yapılamaz.

*TSE İSTANBUL BELGELENDİRME MÜDÜRLÜĞÜ * Adres: Çayırova Tren İstasyonu Yanı ÇAYIROVA GEBZE * Tel: 2627231273* Faks: 2627231606

*TSE BELGELENDİRME MERKEZİ BAŞKANLIĞI Adres: Necatibey Cad. No 112 06100 Bakanlıklar/ANKARA – Tel: 0 312 416 64 61 / 416 64 27, Faks: 0 312 416 66 17.

e-posta : bmb@tse.org.tr / web : www.tse.org.tr



<https://evrakkontrol.tse.org.tr/BelgeDogrulama.aspx?p=ettbanop> adresinden belgenin doğruluğunu ve geçerliliğini sorgulayınız.

2 / 3



TÜRK STANDARDLARI ENSTİTÜSÜ
TÜRK STANDARDLARINA UYGUNLUK BELGESİ
TURKISH STANDARDS INSTITUTION
CERTIFICATE OF CONFORMITY TO TURKISH STANDARDS



BELGE KAPSAMI (001081-TSE-01/02nolu belge devamı) : ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET ANONİM ŞİRKETİ

İLGİLİ TÜRK STANDARDI(RELATED TURKISH STANDARD) : TS EN 61869-2 / Ölçü transformatörleri - Bölüm 2: Akım transformatörleri için ek kurallar / 12.06.2013.

Maksimum İşletme Gerilimi (Um): 0,72 kV
Beyan Doğruluk Sınıfı: Ölçü Sınıfı:0,5 , 1, 3
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 100xIn, 1 s

7. ENT.100 MODEL

Beyan Giriş Akımı: 1600 A 'den 5000 A 'e kadar (5000 A dahil)
Beyan Çıkış Akımı: 1A- 5A
Beyan Çıkış Güçleri: 10 VA- 15 VA – 30VA
Beyan Frekansı: 50-60 Hz
Maksimum İşletme Gerilimi (Um): 0,72 kV
Beyan Doğruluk Sınıfı: Ölçü Sınıfı:0,5 , 1, 3
Beyan Kısa Süreli Isıl Akım (Ith) kA ve süre : 100xIn, 1 s

e-*imzalı*/e-signed

06.06.2018

Belgelendirme Merkezi Başkanı Adına
AKDOĞAN BULUT

TSE İSTANBUL BELGELENDİRME MÜDÜRÜ V.

*Bu belge, belgelendirilen ürünün, üretim, yerinin Enstitümüzün belirlediği şartları karşıladığını da gösterir.

*Bu belge hiç bir suretle tahrif edilemez, kısmen veya okunmasını zorlaştıracak şekilde çoğaltılamaz, kopyalı ve sınıt yapılamaz.

*TSE İSTANBUL BELGELENDİRME MÜDÜRLÜĞÜ * Adres: Çayirova Tren İstasyonu Yanı ÇAYIROVA/GEBZE * Tel: 2627231273* Faks: 2627231806

*TSE BELGELENDİRME MERKEZİ BAŞKANLIĞI Adres: Necatibey Cad. No:112 06100 Bakanlıklar/ANKARA – Tel: 0 312 416 64 81 / 416 64 27. Faks: 0 312 416 66 17.

e-posta : bmb@tse.org.tr , web : www.tse.org.tr

<https://cvrakkontrol.tse.org.tr/BelgeDogrulama.aspx?p=cttbanop> adresinden belgenin doğruluğunu ve geçerliliğini sorgulayınız.



3 / 3

CERTIFICATE OF COMPLIANCE

Certificate Number 2017-5-22; 2017-06-21-E470375
Report Reference E470375-D1001-1/A0/C1-UL
Issue Date 2017-5-22; 2017-06-21
Issued to: ENTES ELEKTRONIK CIHAZLAR IMALAT VE TICARET A S
Applicant Company: Dudullu Osb 1
Cd. No. 23 Umraniye
Istanbul, 34775 TR
Listed Company: Same as Applicant

This is to certify that representative samples of Digital Panel Meter
MPR-1, MPR-2, MPR-3, MPR-4 Series

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 61010-1, 3rd Edition, May 11, 2012, Revised July 15 2015, CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated July 2015

Additional Standards: UL 61010-2-030 - Edition 1 - Issue Date 2012/05/11, CSA C22.2 NO. 61010-2-030-12 - Edition 1 - Issue Date 2012/05/01

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information.

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

B. Mahrenholz

Bruce Mahrenholz, Assistant Chief Engineer, Global Inspection and Field Services, UL LLC
Joseph Hookey, General Manager, Director of Sales - Canada, UNDERWRITERS LABORATORIES OF CANADA INC.

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CB TEST CERTIFICATE

CERTIFICAT D'ESSAI OC

Product
Produit

Digital Panel Meters

Name and address of the Applicant
Nom et adresse du demandeur

Entes Elektronik
Dudullu OSB, 1. Cd. No 23
Umraniye ISTANBUL
Turkey

Name and address of the manufacturer
Nom et adresse du fabricant

Entes Elektronik A.S.
Dudullu OSB, 1. Cd. No 23
Umraniye ISTANBUL
Turkey

Name and address of the factory
Nom et adresse de l'usine

Entes Elektronik
Dudullu OSB, 1. Cd. No 23
Umraniye ISTANBUL
Turkey

Rating and principal characteristics
Valeurs nominales et caractéristiques principales

MPR-1 Series; MPR-2 Series:
Supply: 95 – 270 Vac/dc, 50 – 60 Hz, 5 VA or
12 – 50 Vdc, 5 VA (for D-series)
Measurement Input: 10 – 300 Vac (L – N); 10 – 480 Vac (L – L), 50 – 60 Hz.

MPR-3 Series:
Supply: 205 – 270 Vac/dc, 50 – 60 Hz, 4 VA.
Measurement Input: 10 – 300 Vac (L – N); 10 – 480 Vac (L – L), 50 – 60 Hz.

MPR-4 Series:
Supply: 50 – 270 Vac/dc, 50 – 60 Hz, 5 VA or
24 – 60 Vac/dc, 5 VA (for D-series)
Measurement Input: 5 – 300 Vac (L – N); 5 – 480 Vac (L – L), 50 – 60 Hz.

Trademark (if any)
Marque de fabrique (si elle existe)

Entes

Type of manufacturer's Testing Laboratories used
Type de programme de laboratoire d'essais constructeur

Model / Type Ref.
Réf. de type

Model MPR-1 Series, MPR-2 Series, MPR-3 Series, MPR-4 Series
Model number may be followed by –xxx-yyy, where x and y are alphanumeric and
numeric values denoting non-critical options.
(See General Product Information for explanations).

Additional information (if necessary may also be reported on
page 2)
Les informations complémentaires (si nécessaire, peuvent être
indiquées sur la 2ème page)

This CB Test Certificate is issued by the National Certification Body:

Ce Certificat d'essai OC est établi par l'Organisme National de Certification

DEKRA Certification B.V.
Meander 1051, 6825 MJ
Arnhem
The Netherlands



Date: 2016-05-13

Signature: Wim Singewald

page 1 of 2



EC - TYPE EXAMINATION CERTIFICATE

SK 12-040 MI-003

Rev. 1 Add. 0

Issued by **Slovenská legálna metrologia, n. o.** Notified body **1432**
Hviezdoslavova 31
974 01 Banská Bystrica
Slovak Republic

In accordance with Government Ordinance of the Slovak Republic No 294/2005 Coll. on measuring instruments as amended by Government Ordinance No 445/2010 Coll., which implements, in the Slovakia, the Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments as later amended (MID).

Applicable essential requirements Annex I and Annex MI-003 to MID

Manufacturer **ENTES Elektronik Cihazlar Imalat ve Ticaret A.S.**
Dudullu OSB 1. Cadde, And Sitesi, No:23
34775 Ümraniye, İstanbul

Applicant **Manufacturer**

Measuring instrument **active electrical energy meter**

Type	ES-32L or ES-32LS or Countis E04
Trade mark	see Descriptive Annex
SW version	1.02 or 1.04 (see Descriptive Annex)

Environment classes

- climatic	-25°C to +55 °C
- mechanical	M1
- electromagnetic	E2

Description and documentation The principal technical and metrological data, characteristics, instrument description and approval conditions are set out in the Final Protocol to this EC - type examination certificate (10 pages), which is part of this EC - type examination certificate. The test reports, designs, schematic diagrams and documentation used during certification process are recorded under reference folder Entes_ES32_1_00.

Valid until **4 April 2022**

Date of issue **20 February 2015**



Ing. Štefan Král, PhD.
Representative of Notified Body

Where the instrument is subject to other Directives covering other aspects, this EC - type examination certificate is valid, assuming that the instrument conforms to the provisions of those Directives. Without written permission of the notified body this certificate may be reproduced only as a whole.





TÜRK STANDARDLARI ENSTİTÜSÜ
TURKISH STANDARDS INSTITUTION

**CERTIFICATION OF CONFORMITY TO TYPE BASED ON QUALITY
ASSURANCE ON THE PRODUCTION PROCESS**

Active Electric Energy Meters

Models ; ES-32L ES-32LS Countis E04

produced by

Entes Elektronik Cihazlar İmalat ve Ticaret A.Ş.

at the address

**Dudullu OSB 1. Cd. No:23
Ümraniye / İSTANBUL**

is audited and certified according to relevant requirements of below mentioned directive. TSE, confirms that the Quality System of the production process fulfills the relevant requirements of this directive and assures the conformity of the measuring instruments identified above to the approved EC Type.

**2014/32/EC– Measuring Instruments Directive/
Quality System Approval – Module D**

Notified Body Number:	1783
Certificate Issue Date:	14/09/2015
Valid Until:	14/09/2018
Examination Report Number:	749-MID-004/2015-01, 2016-01
Certificate Renewal Date/Reason:	25/11/2016 / Change of Directive

This certificate remarks that quality system meets requirements of technical / harmonised standards and with this certificate the company is authorized of affix CE Mark, as shown below, and Notified Body Number on the products in the scope of the examined quality system. The Notified Body has the right to carry out announced / unannounced visits.



Certificate No: 1783 - MID - 004



Sezai DOĞAN
Director of Directives
ANKARA, 25/11/2016, Rev.01

This certificate is only valid with TSE-Notified Body 1783 seal.



NLDX.E331258 Motor Controllers, Magnetic

If you notice a change to your NLDX Listing Card, click [here](#) to learn more.

[Page Bottom](#)

Motor Controllers, Magnetic

[See General Information for Motor Controllers, Magnetic](#)

ENTES ELEKTRONIK CIHAZLAR IMALAT VE TICARET A S

E331258

Dudullu Osb 1
Cad No 23
Umraniye
34775 Istanbul, TURKEY

Investigated to ANSI/UL 508

Capacitor switching contactors Model(s) ENT-KT-10-C02, ENT-KT-10-C11, ENT-KT-12-C02, ENT-KT-12-C11, ENT-KT-16-C02, ENT-KT-16-C11, ENT-KT-20-C02, ENT-KT-20-C11, ENT-KT-25-C02, ENT-KT-25-C11, ENT-KT-33-C12, ENT-KT-40-C12, ENT-KT-60-C12

[Last Updated](#) on 2015-07-06

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CYWT2.E340428 Capacitors - Component

[Page Bottom](#)

Capacitors - Component

[See General Information for Capacitors - Component](#)

ENTES ELEKTRONIK CIHAZLAR IMALAT VE TICARET A S

E340428

Dudullu Osb 1
Cad No 23
Umraniye
34775 Istanbul, TURKEY


Capacitors GP84, internally protected, Model(s) Series ENT.C80, followed by 220, 230, 240, 380, 400, 415, 440, 450, 460, 500, 525, 550, 690, or 800k, followed by 0.5, 0.8, 0,83, 1, 1.5, 1.67, 2, 2.5, 3, 3.33, 4, 4.17, 5, 7.5, 10, 12.5, 15, 20, 25, 30... or 30,00.

Capacitors, internally protected, Model(s) ENT.C100Dg Series, followed by -400 to -1000, followed by two or more numbers followed by blank or S.

Series ENT.C100 or Series ENT.C100g, followed by 230, 300, 330, 400, 415, 440, 480, 525, 550, 640 or 660, followed by two or more numbers, followed by blank or S.

Series ENT.CXD, followed by additional suffixes

Capacitors, internally protected, dry type, Model(s) Series ENT.CF, followed by 220, 230, 240, 380, 400, 415, 440, 450, 460, 500, 525, 550, 690, or 800k, followed by 0.5, 0.8, 0,83, 1, 1.5, 1.67, 2, 2.5, 3, 3.33, 4, 4.17, 5, 7.5, 10, 12.5, 15, 20, 25, 30... or 30,00.

Marking: Company name, model designation, and the Recognized Component Mark,  .
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QUYX.E470375

Process Control Equipment, Electrical

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[Page Bottom](#)

Process Control Equipment, Electrical

[See General Information for Process Control Equipment, Electrical](#)

ENTES ELEKTRONIK CIHAZLAR IMALAT VE TICARET A S

E470375

Dudullu Osb 1
Cad No 23
Umraniye
34775 Istanbul, TURKEY

Digital panel meters, Model(s) EPM-04 (96X96mm), EPM-04 (DIN6), EPM-04C (96X96mm), EPM-04C (DIN6), EPM-04CS (96X96mm), EPM-04CS (DIN6), EPM-06 (96X96mm), EPM-06 (DIN6), EPM-06C (96X96mm), EPM-06C (DIN6), EPM-06CS (96X96mm), EPM-06CS (DIN6), EPM-07 (96X96mm), EPM-07 (DIN6), EPM-07S (96X96mm), EPM-07S (DIN6), EPM-14 (96x96mm), EPM-34 (96x96mm), EPM-4A (72x72mm), EPM-4A (96x96mm SLIM), EPM-4C (48x96mm), EPM-4C (72x72mm), EPM-4C (96x96mm SLIM), EPM-4C (96x96mmSLIM), EPM-4D (48x96mm), EPM-4D (72x72mm), EPM-4D (96x96mm SLIM), EPM-4P (48x96mm), EPM-4P (72x72mm), EVM-15 (96x96mm), EVM-3 (48x96mm), EVM-3 (72x72mm), EVM-3 (96x96mm SLIM), EVM-3S (96x96mm), EVM-3C (72x72mm), EVM-3S (48x96mm), EVM-3S (72x72mm), EVM-3S (96x96mm SLIM)

Digital panel meters, Model(s) MPR-14S, MPR-15S-22, MPR-16S-21, MPR-17S-23, MPR-18S-32, MPR-14S-D, MPR-15S-22-D, MPR-16S-21-D, MPR-17S-23-D, MPR-18S-32-D

Digital panel meters, Model(s) MPR-14S,MPR-24, MPR-24-CT25, MPR-24-PM, MPR-24-D, MPR-24-D-CT25, MPR-24-D-PM, MPR-25S-22, MPR-25S-22-D, MPR-26S-21, MPR-26S-21-CT25,MPR 26S-21-D-CT25 , MPR-26S-21-PM, MPR-26S-21-D, MPR-26S-21-D-PM, MPR-27S-23, MPR-27S-23-D, MPR-28S-32, MPR-28S-32-D,

Digital panel meters, Model(s) MPR-32, MPR-32-CT25, MPR-32-PM, MPR-32S, MPR-34-11, MPR-34S-11, MPR-34S-11-CT25, MPR-34S-11-PM, MPR-34-20, MPR-34S-20,

Digital panel meters, Model(s) MPR-45, MPR-45-CT25, MPR-45-PM, MPR-45-D, MPR-45-D-CT25, MPR-45-D-PM, MPR-45S, MPR-45S-D, MPR-46, MPR-46-D, MPR-46S, MPR-46S-D, MPR-47S, MPR-47S-CT25, MPR-47S-PM, MPR-47S-D, MPR-47S-D-CT25, MPR-47S-D-PM, MPR-47S-D-0.5, MPR-47S-0.5, MPR-42-OGT, MPR-42-D-OGT, MPR-47S-OG, MPR-47S-D-OG

Digital panel meters, Model(s) MPR-50 (96x96mm), MPR-52S-10 (96x96mm), MPR-53 (96X96mm), MPR-53 (DIN6), MPR-53CS (96x96mm), MPR-53S (96X96mm), MPR-53S (DIN6), MPR-60S (96x96mm), MPR-60S-10 (96x96mm), MPR-63 (96x96mm), MPR-63-10 (96x96mm)

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**QUYX7.E470375****Process Control Equipment, Electrical Certified for Canada**

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Process Control Equipment, Electrical Certified for Canada

[See General Information for Process Control Equipment, Electrical Certified for Canada](#)

ENTES ELEKTRONIK CIHAZLAR IMALAT VE TICARET A S

E470375

Dudullu Osb 1
Cad No 23
Umraniye
34775 Istanbul, TURKEY

Digital panel meters, Model(s) EPM-04 (96X96mm), EPM-04 (DIN6), EPM-04C (96X96mm), EPM-04C (DIN6), EPM-04CS (96X96mm), EPM-04CS (DIN6), EPM-06 (96X96mm), EPM-06 (DIN6), EPM-06C (96X96mm), EPM-06C (DIN6), EPM-06CS (96X96mm), EPM-06CS (DIN6), EPM-07 (96X96mm), EPM-07 (DIN6), EPM-07S (96X96mm), EPM-07S (DIN6), EPM-14 (96x96mm), EPM-34 (96x96mm), EPM-4A (72x72mm), EPM-4A (96x96mm SLIM), EPM-4C (48x96mm), EPM-4C (72x72mm), EPM-4C (96x96mm SLIM), EPM-4C (96x96mmSLIM), EPM-4D (48x96mm), EPM-4D (72x72mm), EPM-4D (96x96mm SLIM), EPM-4P (48x96mm), EPM-4P (72x72mm), EVM-15 (96x96mm), EVM-3 (48x96mm), EVM-3 (72x72mm), EVM-3 (96x96mm SLIM), EVM-3S (96x96mm), EVM-3C (72x72mm), EVM-3S (48x96mm), EVM-3S (72x72mm), EVM-3S (96x96mm SLIM)

Digital panel meters, Model(s) MPR-14S, MPR-15S-22, MPR-16S-21, MPR-17S-23, MPR-18S-32, MPR-14S-D, MPR-15S-22-D, MPR-16S-21-D, MPR-17S-23-D, MPR-18S-32-D

Digital panel meters, Model(s) MPR-14S, MPR-24, MPR-24-CT25, MPR-24-PM, MPR-24-D, MPR-24-D-CT25, MPR-24-D-PM, MPR-25S-22, MPR-25S-22-D, MPR-26S-21, MPR-26S-21-CT25, MPR-26S-21-D-CT25, MPR-26S-21-PM, MPR-26S-21-D, MPR-26S-21-D-PM, MPR-27S-23, MPR-27S-23-D, MPR-28S-32, MPR-28S-32-D,

Digital panel meters, Model(s) MPR-32, MPR-32-CT25, MPR-32-PM, MPR-32S, MPR-34-11, MPR-34S-11, MPR-34S-11-CT25, MPR-34S-11-PM, MPR-34-20, MPR-34S-20,

Digital panel meters, Model(s) MPR-45, MPR-45-CT25, MPR-45-PM, MPR-45-D, MPR-45-D-CT25, MPR-45-D-PM, MPR-45S, MPR-45S-D, MPR-46, MPR-46-D, MPR-46S, MPR-46S-D, MPR-47S, MPR-47S-CT25, MPR-47S-PM, MPR-47S-D, MPR-47S-D-CT25, MPR-47S-D-PM, MPR-47S-D-0.5, MPR-47S-0.5, MPR-42-OGT, MPR-42-D-OGT, MPR-47S-OG, MPR-47S-D-OG

Digital panel meters, Model(s) MPR-50 (96x96mm), MPR-52S-10 (96x96mm), MPR-53 (96X96mm), MPR-53 (DIN6), MPR-53CS (96x96mm), MPR-53S (96X96mm), MPR-53S (DIN6), MPR-60S (96x96mm), MPR-60S-10 (96x96mm), MPR-63 (96x96mm), MPR-63-10 (96x96mm)

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CERTIFICATE OF COMPLIANCE

Certificate Number 20141008-E470375
Report Reference E470375-A1-UL
Issue Date 2014-OCTOBER-8

Issued to: ENTES ELEKTRONIK CIHAZLAR IMALAT
VE TICARET A S
Yukari Dudullu Osb 1
Cad No 23
Umraniye 34775 TURKEY

This is to certify that
representative samples of

PROCESS CONTROL EQUIPMENT, ELECTRICAL
See Addendum for Models

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety:

UL 61010-1 and CAN/CSA-C22.2 No. 61010-1 – ELECTRICAL
EQUIPMENT FOR MEASUREMENT, CONTROL, AND
LABORATORY USE - Part 1: General Requirements

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Bruce Mahrenholz, Assistant Chief Engineer, Global Inspection and Field Services
UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number 20141008-E470375
Report Reference E470375-A1-UL
Issue Date 2014-OCTOBER-8

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Digital Panel Meter

Model MPR-xx, EPM-xx, EVM-xx where xx can be one or more characters

All models part of this investigation:

- 1.Group: MPR-63 (96x96mm), MPR-63-10 (96x96mm), MPR-60S (96x96mm), MPR-60S-10 (96x96mm), MPR-50 (96x96mm), MPR-52S-10 (96x96mm)
- 2.Group: MPR-53CS (96x96mm), MPR-53 (96X96mm), MPR-53 (DIN6), MPR-53S (96X96mm), MPR-53S (DIN6), EPM-04 (96X96mm), EPM-04 (DIN6), EPM-04C (96X96mm), EPM-04C (DIN6), EPM-04CS (96X96mm), EPM-04CS (DIN6), EPM-06 (96X96mm), EPM-06 (DIN6), EPM-06C (96X96mm), EPM-06C (DIN6), EPM-06CS (96X96mm), EPM-06CS (DIN6), EPM-07 (96X96mm), EPM-07 (DIN6), EPM-07S (96X96mm), EPM-07S (DIN6),
- 3.Group: EPM-34 (96x96mm), EPM-14 (96x96mm)
- 4.Group: EVM-35 (96x96mm), EVM-15 (96x96mm)
- 5.Group: EPM-4P (48x96mm), EPM-4P (72x72mm), EPM-4C (96x96mm SLIM), EPM-4C (48x96mm), EPM-4C (72x72mm), EPM-4C (96x96mm SLIM), EPM-4D (72x72mm), EPM-4D (96x96mm SLIM), EPM-4D (48x96mm), EPM-4A (72x72mm), EPM-4A (96x96mm SLIM)
- 6.Group: EVM-3S (48x96mm), EVM-3S (96x96mm SLIM), EVM-3S (72x72mm)
- 7.Group: EVM-3C (72x72mm), EVM-3 (48x96mm), EVM-3 (96x96mm SLIM), EVM-3 (72x72mm)

B. Mahly

Bruce Mahly, Assistant Chief Engineer, Global Inspection and Field Services
UL LLC

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Notlar

A series of horizontal dotted lines for writing notes.

Since 1980 ENTES has become an internationally known manufacturer
in the fields of energy management, power factor correction,
electrical measurement, monitoring, protection and control.

ENTES Elektronik Cihazlar İmalat ve Ticaret A.Ş

Address: Dudullu OSB 1. Cad. No:23, 34776 Umraniye-Istanbul / TURKEY

Tel: +90 216 313 01 10 - **Fax:** +90 216 314 16 15 - **E-mail:** impex@entes.com.tr

Web: www.entes.com.tr - **Coordinates:** 40.996834 , 29.175125

INTERNATIONAL BRANCH OFFICES

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