English

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ENTES

Smart way to energy quality

Power Quality and Energy

Electrical Measurement

Power Factor Correction

Remote Monitoring

Protection & Control

Preface

ENTES, one of the leading companies of the sector founded in 1980, manufactures devices and software with next generation production systems in its 11.500m^2 modern facilities in Istanbul. With its 350 employees and strong R&D, ENTES ranks among the most competitive industrial companies in Turkey engaged in power quality and energy, electrical measurement, power factor correction, remote monitoring and protection-control fields.

In Turkey, ENTES provides sales and after sales services to customers with 8 region offices and an extensive distributor network to empower the sustainability of customer-oriented approach. Furthermore, it reaches the international users via its agencies in Netherlands, Greece and distributors in nearly 50 countries.

ENTES can provide the services of monitoring and recording electricity consumption and quality in one-stop. The productivity potential of industrial sites and commercial buildings can be calculated with the acquired data, which in turn leads to significant improvements in energy costs.

Sister Companies

SISTER COMPANIES IN TURKEY

NETA ELEKTRONİK CİHAZLAR SAN.TİC.A.S.
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.S.
Line of Business : Marble & Granite Marketing and Contracting
Web : http://www.gentagranit.com

ENTPA A.S
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 B.V. NETHERLANDS
Line of Business : Marketing ENTES Products in Benelux.
E-mail : entes@senta.net

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

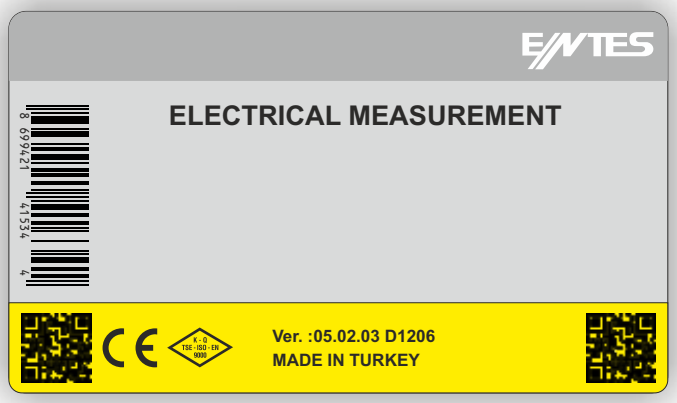
R&D and Quality

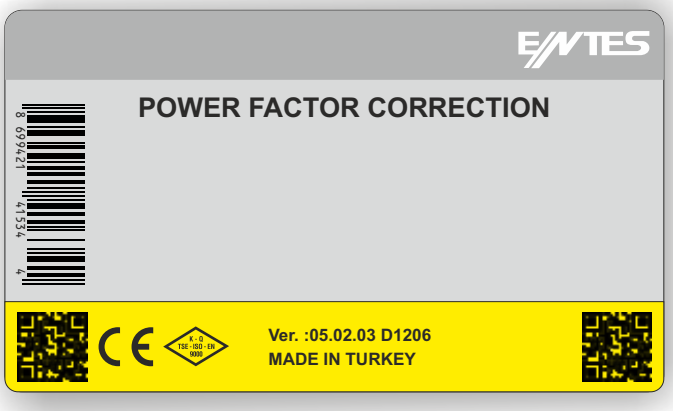
ENTES R&D Team, composed from nearly 50 employees, provides customer oriented solutions by designing devices at international standards and using state-of-the-art technology where they also develop software that are compatible with these devices. All products undergo 10 different testing phases including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

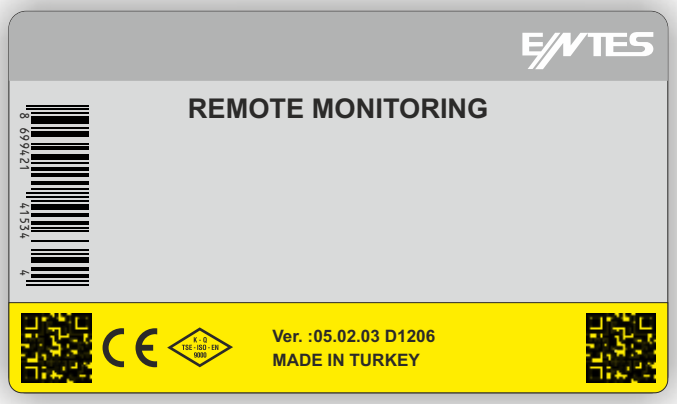
ENTES products complying with international standards have acquired various certificates including ISO 9001-2008, CE, TSE, KEMA CB, KEMA-KEUR, CSA-US, UL, MID B+D and GOST-R.

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

Product Index

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

Power and Energy Meters

- EPR-04 Series
- ES Series

Network Analyzers (LCD)

MPR-3 Series

NEW

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 (breakers, keys, switches etc.) in the field with their digital inputs and outputs.

PRODUCT SELECTION TABLE

Product Code	Dimensions / mm	3xV, 3xI, Frequency, W, VAr, VA, P, Q, S, kWh, kVArh, kVAh Demand, Max., Min. Cos , I neutral	THD-I %	THD-V %	RS-485	Digital Input	Digital Output	Pulse Output	Real Time Clock (RTC)	Operating Hour Meter	Alarm	Event Logs	Profile Records	Pcs/Box
MPR-32	72x72	●							●	●				24
MPR-34-11	72x72	●	●	●		1	1	●	●	●	●	●		24
MPR-34S-11	72x72	●	●	●	●	1	1	●	●	●	●	●	●	24
MPR-34-20	72x72	●	●	●		2			●	●	●	●		24
MPR-34S-20	72x72	●	●	●	●	2			●	●	●	●	●	24

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 68.*

Network Analyzers (LCD)

MPR-3 Series

MEASURED PARAMETERS

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

MPR-32

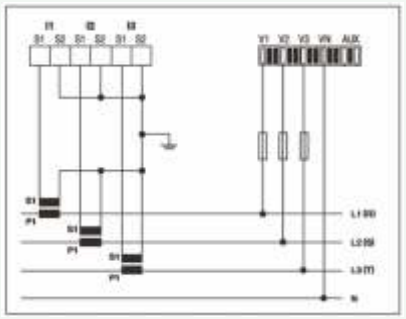
+

Total Harmonic Distortion for Voltage (THD-V)	Total Harmonic Distortion for Current (THD-I)

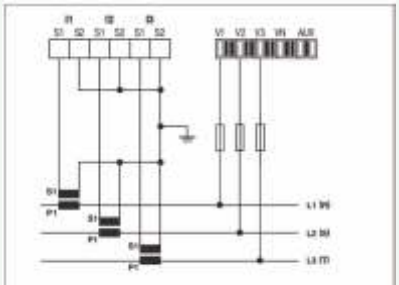
MPR-34-11 / MPR-34S-11 / MPR-34-20 / MPR-34S-20

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

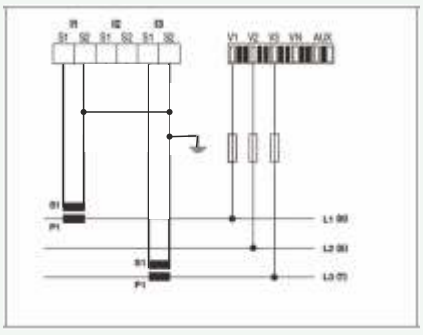
MPR-3 Series (3 Phase neutral 3P4W connection)



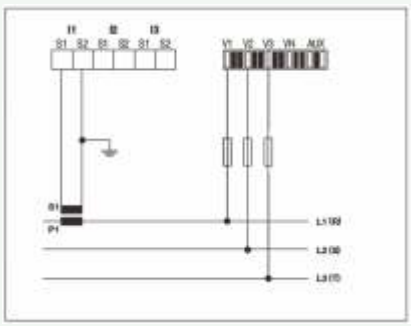
MPR-3 Series (3 Phase without neutral 3P3W connection)



MPR-3 Series (3 Phase without neutral 3P3W Aron connection)

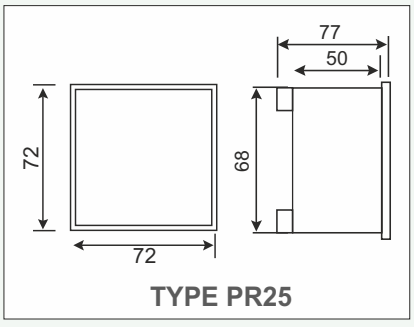


MPR-3 Series (3 Phase connection in balanced networks)

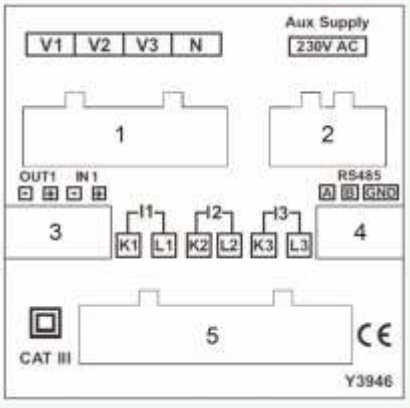


Dimensions

MPR-3 Series



TYPE PR25



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Network Analyzers (LCD)

MPR-3 Series

SPECIFICATIONS

	MPR-32	MPR-34-11	MPR-34S-11	MPR-34-20	MPR-34S-20
ENCLOSURE					
Dimensions	72x72x50 mm				
Protection Class	Terminals = IP20, Enclosure Protection Class = IP51				
Display	LCD				
MEASUREMENTS					
Voltage					
Measurement Range	10-400 VAC (L-N),10-690 VAC (L-L)				
Measurement Range with Transformer	10V - 999 kV				
Voltage Accuracy	0,5% ± 1 digit				
Input Impedance	1,8 MΩ				
Burden (Input Load)	<0,5 VA				
Current					
Current Accuracy	0,5% ± 1 digit				
Nominal Current	1A,5A				
Measurement Minimum Current	5mA				
Measurement Range	50mA-5,5A 0,5% ±1 digit				
Measurement with Transformer	50mA-10kA				
Burden (Input Load)	<1 VA				
Overload Current	1,2 x Inominal				
Power/Energy					
Active Power Accuracy	1% ± 1 digit				
Reactive Power Accuracy	1% ± 1 digit				
Active Energy Accuracy	Class 1				
Reactive Energy Accuracy	Class 2				
Active Power Range	0-1 GW				
Reactive Power Range	0-1 GVAr				
Apparent Power Range	0-1 GVA				
Active Energy Indicating Range	0 - 9 999 999,9 kWh				
Reactive Energy Indicating Range	0 - 9 999 999,9 kWh				
SUPPLY					
Operating Voltage	185-265 VAC/DC				
Supply Frequency	45-65 Hz				
Power Consumption	<4 VA				
INPUT/OUTPUT STRUCTURE					
Digital Input	-	1		2	
Digital Output	-	1		-	
Digital Input Pulse Width	-	20/500 ms			
Digital Input Operating Voltage	-	12...48 VAC/DC			
Switching Current	-	Max. 50mA			
Switching Voltage	-	Max. 30 VDC			
Pulse Width	-	20-500 ms (Adjustable)			
AMBIENT CONDITIONS					
Operating Temperature	-10 / +55°C				
Storage Temperature	-20 / +70°C				
Ambient Humidity	95%				
STANDARDS					
Applied 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 Mounting				
Connection Terminals	Screw Terminal with Socket				
Connection Types	3P4W , 3P3W, 3 Phase (Aron), 3P4W Balanced, 3P3W Balanced				
COMMUNICATION					
Communication Interface/Protocol	-	-	RS-485/ MODBUS RTU	-	RS-485/ MODBUS RTU
Transfer Speed	-	-	2400 - 115200 bps	-	2400 - 115200 bps

Network Analyzers (LCD)

MPR-4 Series

NEW

MPR-4 Series (96x96)

MPR-4 Series New-Generation Network Analyzers

With their compact design and 45mm depth, MPR-4 series new generation network analyzers occupy less space in the panels and have a wide range of operating voltage (45-265 VAC/DC). In addition up to 16 MB internal memory, they offer wide I/O solutions with their replaceable modular structure based on customer requirements and areas of application.
MPR-4 Series offer a wide range of analog and digital inputs/outputs and relay outputs with their I/O modules.

PRODUCT SELECTION TABLE

Product Code	Dimensions / mm	3xV, 3xI, Frequency, W, VAr, VA, P, Q, S, kWh, kVArh,kVAh Demand, Max., Min. Cos , I neutral	THD-I %	THD-V %	Individual Harmonics	RS-485	Digital Input	Digital Output	Temperature	Analog Output (mA/V)	Relay Output	Pulse Output	Real Time Clock	Memory	Voltage/Current Unbalances	Pulse Counter	Operating Hours Meter	Alarm	Event Logs	Profile Records
MPR-45	96x96	●					*	*	*	*	*	*	●				●	●	●	
MPR-45S	96x96	●				●	*	*	*	*	*	*	●	16MB			●	●	●	●
MPR-46	96x96	●	●	●			*	*	*	*	*	*	●			*	●	●	●	
MPR-46S	96x96	●	●	●		●	*	*	*	*	*	*	●	16MB		*	●	●	●	●
MPR-47S	96x96	●	●	●	51	●	*	*	*	*	*	*	●	16MB	●	*	●	●	●	●

* Modular structure ● Standard

I/O Modules;

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

I/O Module Selection Table
2 DI (2 Digital Input, 5-24 VDC)
2 DO (2 Digital Output, 5-24 VDC)
2 Relay (2 Relay, 5A /250 VAC; NO)
2 DI-2 DO (2 Digital Input + 2 Digital Output, 5-24 VDC)
2 AO [2 Analog Output, (0/2-10V); (0/4-20 mA)]
4 DI-4 DO (4 Digital Input + 4 Digital Output 5-24 VDC)
Temperature Measurement (4 therm + 2 RTD)+(1 Digital Input - 1 Digital Output)

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 68.*

Network Analyzers (LCD)

MPR-4 Series

MEASURED PARAMETERS

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

MPR-45 / MPR-45S

+

Total Harmonic Distortion for Voltage (THD-V)	Total Harmonic Distortion for Current (THD-I)

MPR-46 / MPR-46S

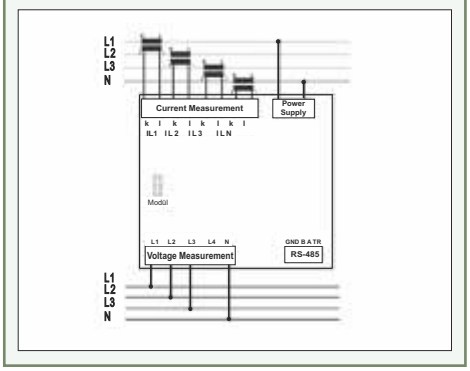
+

Voltage / Current Unbalances	1-51st Individual Voltage Harmonics	1-51st Individual Current Harmonics

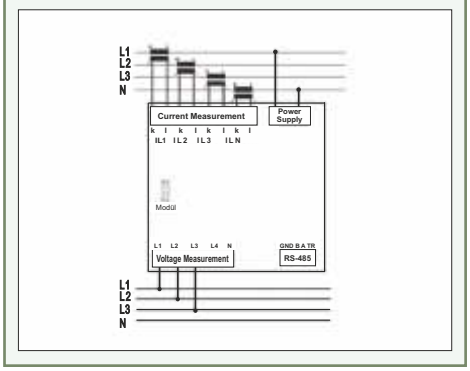
MPR-47S

Connection Diagram PR19 - MPR 4 Series (96x96mm)

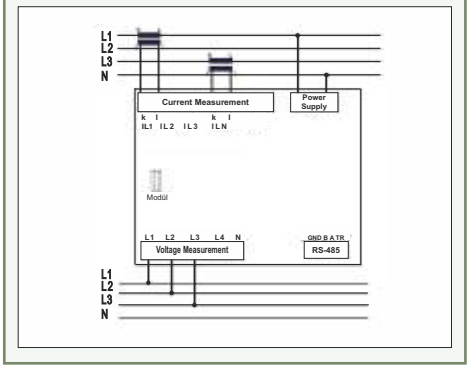
MPR-4 Series (3 Phase neutral 3P4W connection)



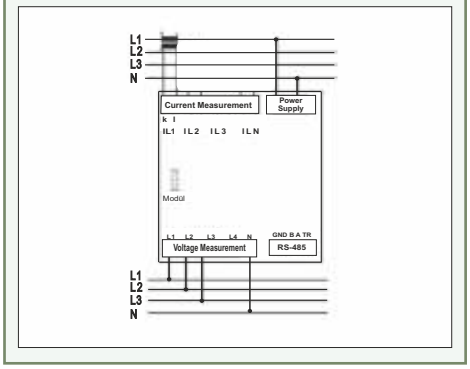
MPR-4 Series (3 Phase without neutral 3P3W connection)



MPR-4 Series (3 Phase, Aron connection)

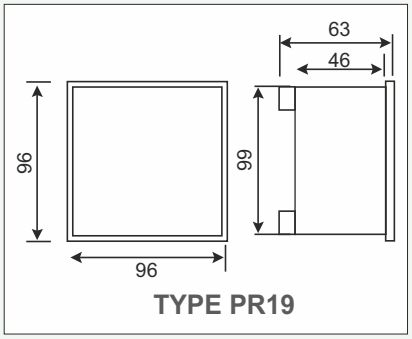


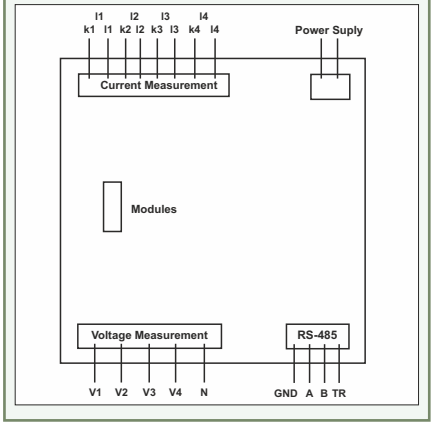
MPR-4 Series (3 Phase connection in balanced network)



Dimensions

MPR-4 Series





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Network Analyzers (LCD)

MPR-4 Series

SPECIFICATIONS

	MPR-45	MPR-45S	MPR-46	MPR-46S	MPR-47S
ENCLOSURE					
Dimensions	96x96x45mm				
Protection Class	Terminals = IP20, Enclosure Protection Class = IP 51				
Display	LCD				
MEASUREMENTS					
VOLTAGE					
Measurement Range	10 - 400 VAC (L-N) 10 - 690 VAC (L-L)				
Measurement Range with Transformer	1-400.0kV Transformer Ratio: 1-5000				
Accuracy	0,5% ±1 Digit				
Input Impedance	>1M Ω				
Burden (Input Load)	<0,5 VA				
CURRENT					
Nominal Current	In : 5A / 1A				
Minimum Current	5 mA				
Measurement Range	50 mA - 5,5 A Accuracy: 0.5% ± 1 Digit				
Measurement Range with Transformer	50 mA -10000 A				
Burden	0,5 VA				
Overload Current	1.2 x I nominal continuous				
Short Time Overload (1s)	10 x I nominal				
POWER/ENERGY					
Active Power	Range: 0 - 1 GW,Accuracy: 1 % ± 1 Digit				
Reactive Power	Range: 0 - 1 GVAr,Accuracy: 1% ± 1 Digit				
Apparent Power	Range: 0 - 1 GVA, Accuracy: 1% ± 1 Digit				
Power Factor	Range: ±1.00, Accuracy : ± 0,02				
Active Energy	Range: 0 - 99 999 999 kWh or MWh, Accuracy: 1% class 1				
Reactive Energy	Range: 0 - 99 999 999 kVArh or MVArh, Accuracy : 2% class 2				
Individual Harmonics	-				2-51 Voltage(V) and Current(I)
Demand Period	1,2,5,10,15,20,30,60 minute adjustable				
Frequency	45-65 Hz				
SUPPLY					
Operating Voltage	45 - 265 VAC/DC				
Operating Frequency	50/60 Hz				
Power Consumption	<5 VA				
PULSE OUTPUT					
Energy Pulse Output	* Active Energy Output (1kWh/pulse - 50MWh/pulse) *Reactive Energy Output (1kVArh/pulse - 50MVArh/pulse)				
Switching Current	* Max. 50 mA				
Switching Voltage	* 5..24 VDC				
Pulse Width	* 100 …2500 ms				
Maximum Voltage	* Max. 30 VDC				
MEMORY					
Internal Memory Size	-	16MB	-	16MB	
COMMUNICATION					
Communication Interface/Protocol	-	RS-485 / MODBUS RTU	-	RS-485 / MODBUS RTU	
Transfer Speed	-	2400-115200	-	2400-115200	
AMBIENT CONDITIONS					
Operating Temperature	- 5 / +55°C				
Storage Temperature	- 25 / +70°C				
Overvoltage Category	III				
Pollution Degree	II				
Ambient Humidity	90%				
STANDARDS					
Applied Security 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 Mounting with Rear Terminals				
Connection Terminals	Screw Terminal with Socket				
Connection Types	3P4W, 3P3W, 3 Phase (Aron), 3P4W Balanced, 3P3W Balanced				

* Provided with digital output I / O modules

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Network Analyzers

MPR-52S / MPR-60S / MPR-63

MPR-63

Power and Energy Measuring for all Series

MPR-50: Network Analyser
MPR-52S-10: Network Analyser with THD Measurement RS-485 (MODBUS) and Alarm Contact
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	THD-I, THD-V	2-31st Harmonics	Neutral Current	Alarm Contact	Digital Input	Energy Pulse Output	RS-485 Comm.	0/2-10V Analog Output	0/4-20mA Analog Output	Memory	Real Time Clock	LCD Display	Pcs/Box
MPR-52S-10	●		●	●	●		●					●	8
MPR-60S	●		●	●		●	●			●	●	●	8
MPR-60S-10	●		●	●	●		●			●	●	●	8
MPR-60S-20	●		●	●	●		●	●		●	●	●	8
MPR-60S-21	●		●	●		●	●	●		●	●	●	8
MPR-60S-40	●		●	●	●		●		●	●	●	●	8
MPR-60S-41	●		●	●		●	●		●	●	●	●	8
MPR-63	●	●	●	●		●	●			●	●	●	8
MPR-63-10	●	●	●	●	●		●			●	●	●	8
MPR-63-20	●	●	●	●	●		●	●		●	●	●	8
MPR-63-21	●	●	●	●		●	●	●		●	●	●	8
MPR-63-40	●	●	●	●	●		●		●	●	●	●	8
MPR-63-41	●	●	●	●		●	●		●	●	●	●	8
MPR-63-42	●	●	●	●	●		●		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, 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 68.*

Network Analyzers

MPR-52S / MPR-60S / MPR-63

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Neutral Currents (In)	Active Power (P)	Active Energy Import (kWh veya Mwh)
Phase - Phase Voltages (V_{LL})	Total Current (I)	Reactive Power (Q)	Active Energy Export (kWh veya MWh)
Average Phase-Neutral Voltage	Power Factor (P.F)	Apparent Power (S)	Inductive Reactive Energy (kVArh veya MVArh)
Average Phase-Phase Voltage	Cos	Total Active Power (P)	Capacitive Reactive Energy (kVArh veya MVArh)
Max. Demand	Frequency (Hz)	Total Reactive Power (Q)	
Phase Currents (IL)	Max. / Min. Values	Total Apparent Power (S)	

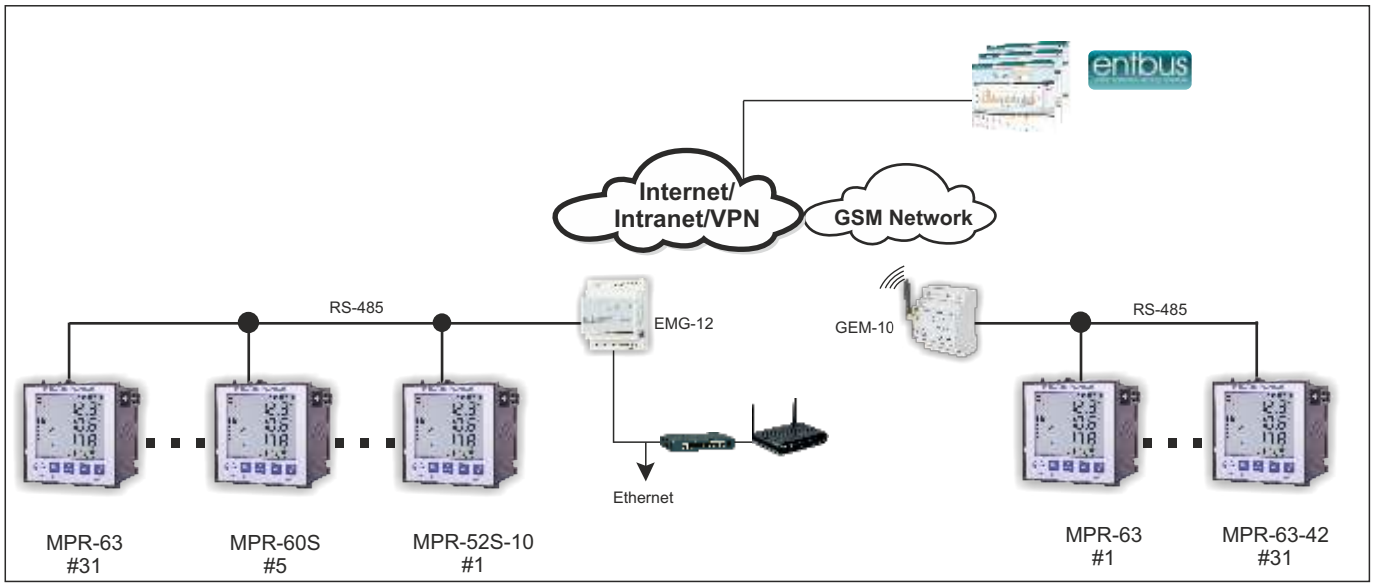
Total Harmonic Distortion for Voltage (THD-V)	Total Harmonic Distortion for Current (THD-I)

MPR-52S / MPR-60S

+

1-31st Individual Voltage Harmonics	1-31st Individual Current Harmonics

MPR-63



Network Analyzers

MPR-52S / MPR-60S / MPR-63

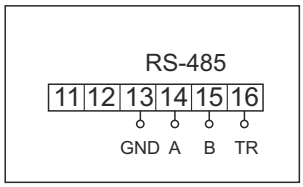
SPECIFICATIONS

	MPR-52S-10	MPR-60S	MPR-63
ENCLOSURE			
Dimensions	96x96mm PR19		
Protection Class	IP 40 front panel; IP 54 optional		
Weight	0,75kg/pcs		
Display	3,6" LCD		
MEASUREMENTS			
Voltage			
Measurement Range	1.0-300 VAC (L-N); 2.0-500 VAC (L-L)		
Measurement Range with Transformer	1-400,0kV Transformer Ratio: 1.0-4000.0		
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 - 5000.0		
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		
SUPPLY			
Operating Voltage	85 - 265 VAC/DC		
Operating Frequency	50/60 Hz		
Power Consumption	<6 VA		
INPUT/OUTPUT/STRUCTURE			
Digital Input	2	2 (MPR60S-10/20/40)	2 (MPR63-10/20/40/42)
Digital Output	-	2 (MPR60S-21/41)	2 (MPR63-21/41)
Analogue Output	-	0/4-20 mA (MPR60S-40/41; MPR63-40/41/42) 0/2-10 V (MPR60S-20/21; MPR63-20/21)	
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 record)	
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		
Connection Types	3 Phase Neutral (3P4W); 3 Phase (3P3W); 3 Phase (Aron)		

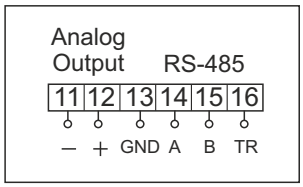
Print Date: 09.2014

Network Analyzers

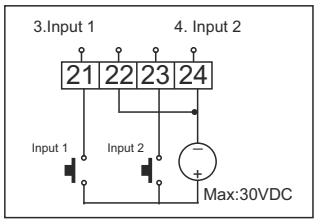
MPR-52S / MPR-60S / MPR-63



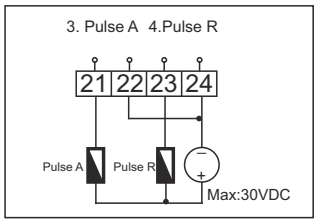
MPR63 MPR60S MPR52S-10
MPR63-10 MPR60S-10



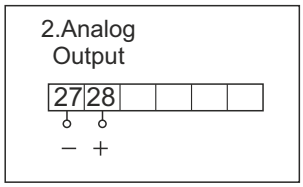
MPR63-20 MPR60S-20
MPR63-21 MPR60S-21
MPR63-40 MPR60S-40
MPR63-41 MPR60S-41
MPR63-42



MPR63-10 MPR52S-10
MPR63-20 MPR60S-10
MPR63-40 MPR60S-20
MPR63-42 MPR60S-40



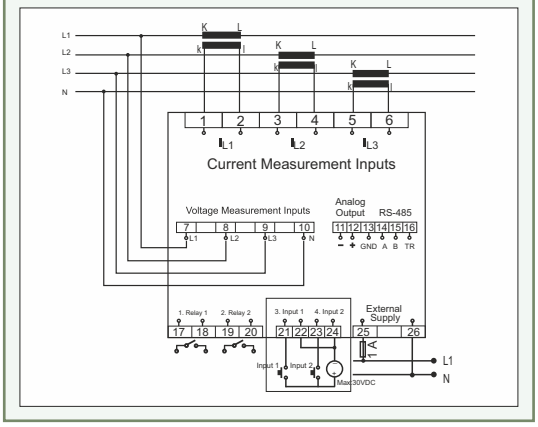
MPR63 MPR60S
MPR63-21 MPR60S-21
MPR63-41 MPR60S-41



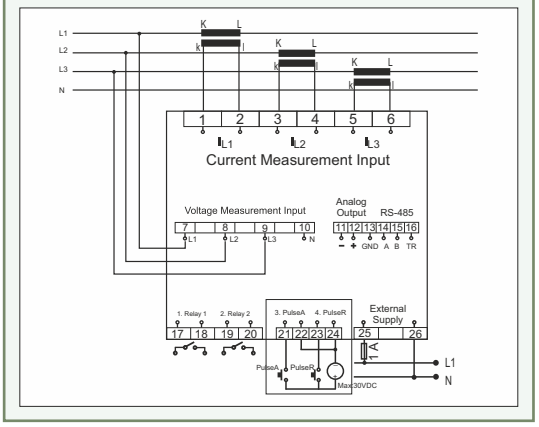
MPR63-42

Connection Diagram (PR19- 96x96mm)

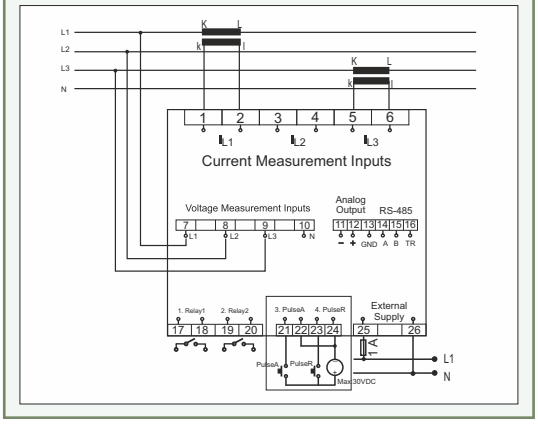
3 Phase with neutral connection



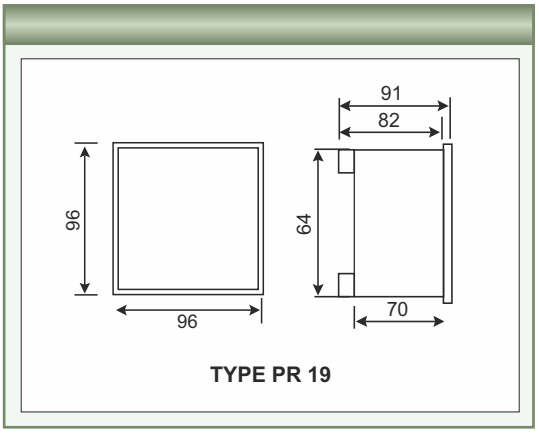
3 Phase without neutral connection



3 Phase without neutral Aron connection



Dimensions



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-53 / EPM-07

Power and Energy Measuring for all Series

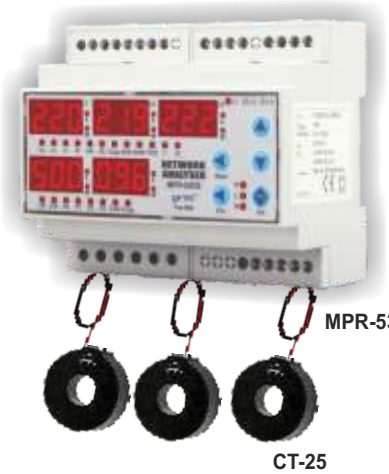
MPR-53 / EPM-07 series network analyzers allow monitoring more than 50 electrical parameters on their display

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	THD-I	THD-V	Neutral Current	Digital Input	Energy Pulse Output	Dual Energy Meter	6 Different Energy Calculation Methods	CT-25 (120A)	Alarm Contact	Digital Hour Meter	Pulse Counter	RS-485 Comm.	Pcs/Box
EPM-07-96			●	●	●	●	●	○					12
EPM-07-DIN			●	●	●	●	●	○					12
EPM-07S-96			●	●	●	●	●	○				●	12
EPM-07S-DIN			●	●	●	●	●	○				●	12
MPR-53-96	●	●	●	●	●	●	●	○					12
MPR-53-DIN	●	●	●	●	●	●	●	○					12
MPR-53S-DIN	●	●	●	●	●	●	●	○				●	12
MPR-53CS-DIN	●	●	●	●	●	●	●	○	●	●	●	●	12
MPR-53S-96	●	●	●	●	●	●	●	○				●	12
MPR-53CS-96	●	●	●	●	●	●	●	○	●	●	●	●	12
MPR-53S-DIN-CT25	●	●	●	●	●	●	●	○				●	12
EPM-07S-DIN-CT25			●	●	●	●	●	○				●	12

○ 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 66*

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 68.*

Network Analyzers

MPR-53 / EPM-07

MEASURED PARAMETERS

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

EPM-07 / 07S

+

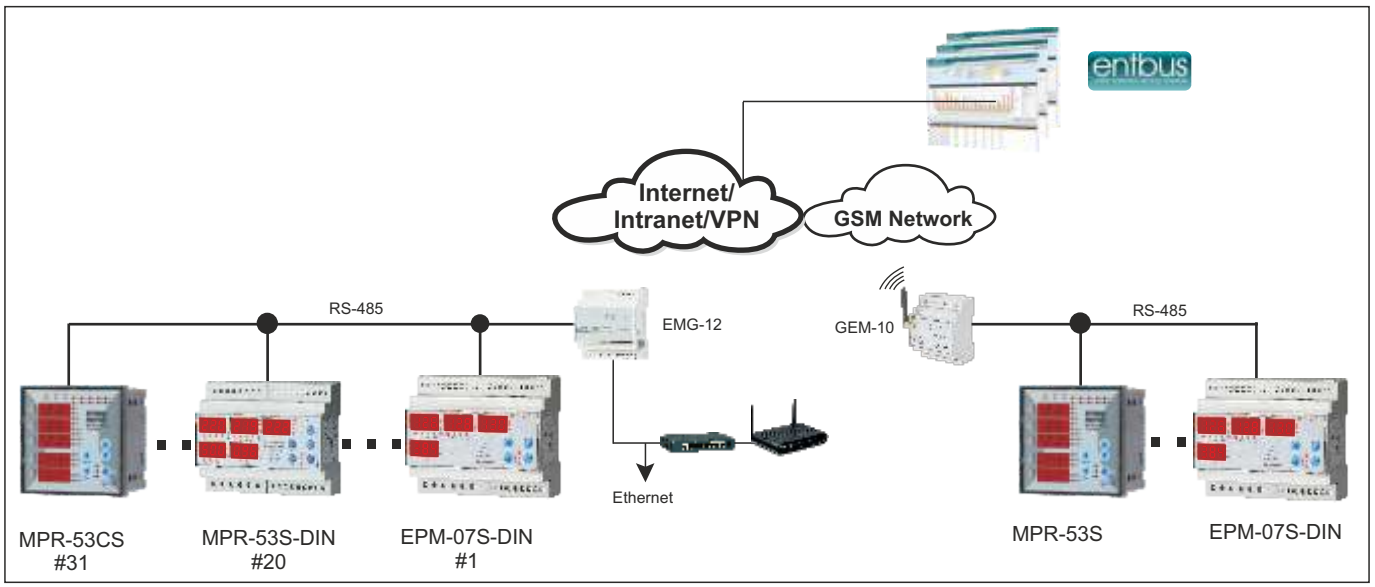
Total Harmonic Distortion for Voltage (THD-V)	Total Harmonic Distortion for Current (THD-I)

MPR-53 / MPR-53S

+

Digital Hour Meter	Digital Pulse (Counter)

MPR-53CS



Network Analyzers

MPR-53 / EPM-07

SPECIFICATIONS

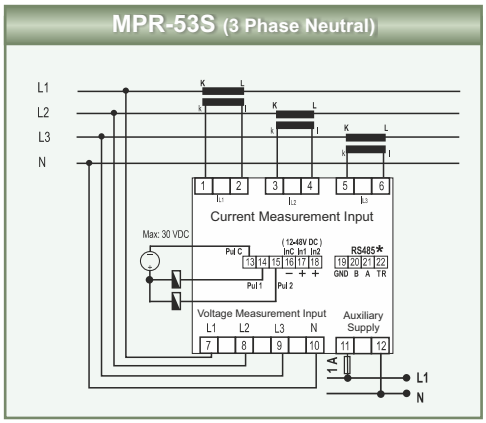
	EPM-07	EPM-07S	MPR-53S	MPR-53CS	MPR-53
ENCLOSURE					
Dimensions	96x96mm Pr19, DIN6 PK26				
Protection Class	IP40 Front Panel,IP54 Optional				
Weight	0,6kg/pcs				
Display	Red LED; height 10mm				
MEASUREMENTS					
Voltage					
Measurement Range	10-300 VAC (L-N), 10-500 VAC (L-L)				
Measurement Range with Transformer	10-200kV, 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:5,5A				
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				
Frequency	45-65 Hz				
SUPPLY					
Operating Voltage	110 VAC/230 VAC ±10% or 45-265 VAC/DC				
Operating Frequency	45-65 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 53 CS)				
Energy Pulse Output	NPN transistor				
Switching Current	Maximum 50 mA				
Switching Voltage	5..24VDC Maximum 30V DC				
Pulse	100ms pulse period, 80ms pulse width				
COMMUNICATION					
Communication Interface/Protocol	-	MODBUS RTU(RS-485)			-
Parity	-	no, 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				
Connection Types	3 Phase Neutral, 3 Phase, 3 Phase (Aron)				

Network Analyzers

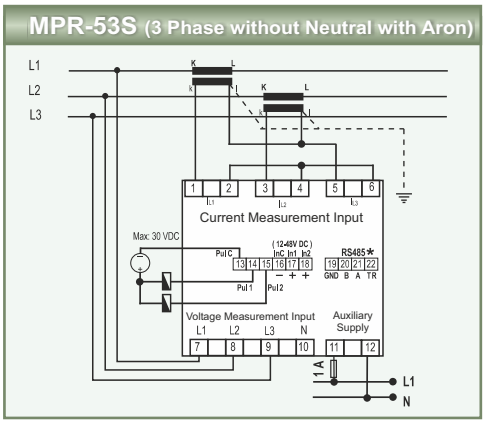
MPR-53 / EPM-07

Connection Diagram (PR19- 96x96mm)

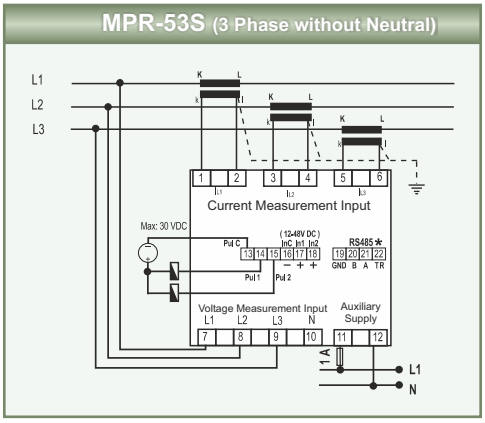
MPR-53S (3 Phase Neutral)



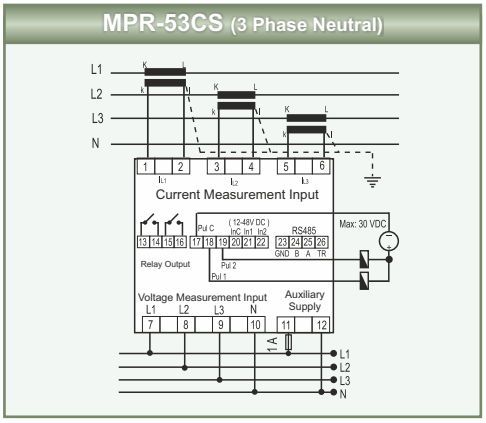
MPR-53S (3 Phase without Neutral with Aron)



MPR-53S (3 Phase without Neutral)

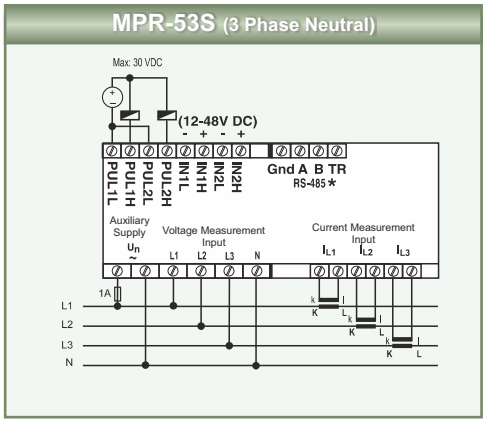


MPR-53CS (3 Phase Neutral)

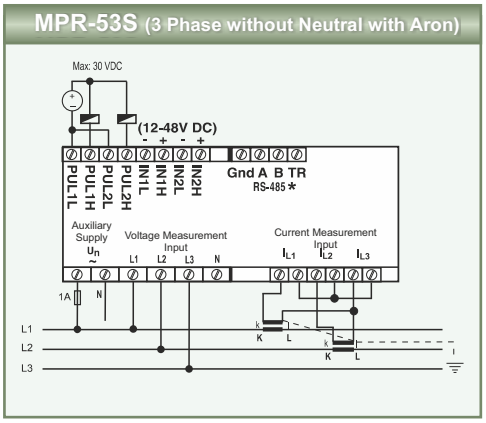


(PK 26 - DIN6)

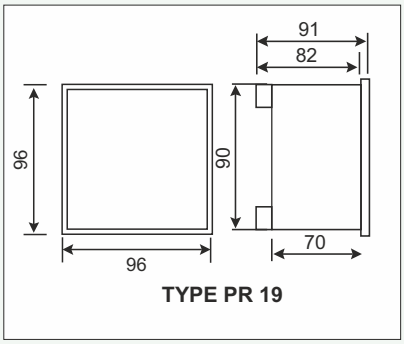
MPR-53S (3 Phase Neutral)



MPR-53S (3 Phase without Neutral with Aron)

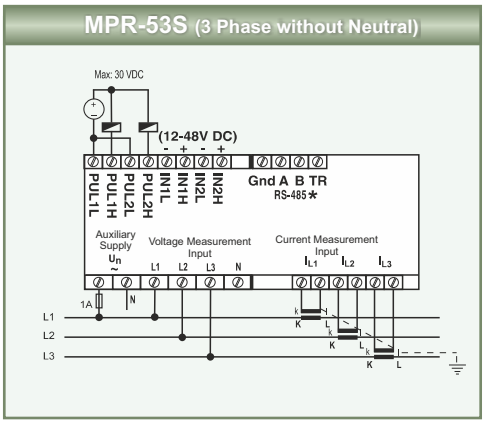


Dimensions

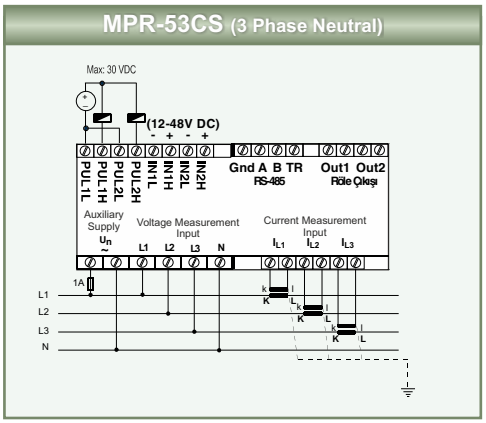


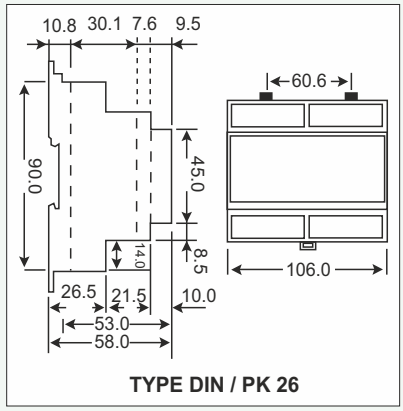
TYPE PR 19

MPR-53S (3 Phase without Neutral)



MPR-53CS (3 Phase Neutral)





TYPE DIN / PK 26

** 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.entes.com.tr.

Power & Energy Meters

EPR Series / ES Series

EPR-04S-96

EPR-04S-DIN-CT25

CT-25

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	Cos	Active Power (W)	Reactive Power (VAr)	Apparent Power (VA)	W	Σ VAr	Σ VA	A. Energy (kWh)	R. Energy (kVArh)	Dual Energy Measurement	Demand	Digital Input	Energy Pulse Output	CT-25 (max. 120A)	RS-485 Comm.	Pcs/Box
EPR-04-96	●	●	●	●	●	●	●	●	●	●	●	●	●	○		12
EPR-04-DIN	●	●	●	●	●	●	●	●	●	●	●	●	●	○		12
EPR-04S-96	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	12
EPR-04S-DIN	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	12
EPR-04S-DIN-CT25	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	12

** For CT-25, please refer to page 60.*

○ Optional

SPECIFICATIONS

EPR-04, EPR-04S

ENCLOSURE	
Dimensions	96x96mm PR19, DIN6 PK26
Protection Class	IP40 Front Panel,IP54 Optional
Weight	0,5kg/pcs
Display	Red LED; Height 10mm
MEASUREMENT	
Voltage	
Measurement Range	10-300 VAC (L-N), 10-500 VAC (L-L)
Measurement Range with Transformer	10-200kV
Accuracy	1%±1 digit [(10%-110%)xFull scale]
Input Impedance	1.8 MΩ
Burden (Input Load)	<0.5 VA
Current	
Nominal Current	5,5A
Minimum Current	50mA
Measurement Range	50mA-5,5A
Measurement Range with Transformer	50mA-10kA
Burden	<1 VA
Over Load Current	1,2 In
Power/Energy	
Active Power Range	0-215 MW
Reactive Power Range	0-215 MVAr
Apparent Power Range	0-215 MVA
Active Energy Range	9 999 999,9 Mwh
Reactive Energy Range	9 999 999,9 MVArh

SUPPLY	
Operating Voltage	110 VAC/230 VAC ±10% or 45-265 VAC/DC
Operating Frequency	45-65 Hz
Power Consumption	<4VA
INPUT/OUTPUT STRUCTURE	
Digital Input	2 pcs.
Digital Input Pulse Width	20ms
Digital Input Operating Voltage	12...48 VAC/DC
Energy Pulse Output	NPN Transistor
Switching Current	Maximum 50mA
Switching Voltage	5...24 VDC Maximum 30 VDC
Pulse	100ms period 80ms width
AMBIENT CONDITIONS	
Ambient Temperature	-5 / +55°C
Over Voltage Category	III
Pollution Degree	II
Ambient Humidity	90%
STANDARDS	
Applied Security Standards	EN 61010-1
Applied EMC Standards	EN 61000-4-5, EN 61000-4-4, EN 61000-4-2, EN 61000-4-11
Applied Mechanical Endurance Standards	EN 60529
CONNECTIONS	
Mounting	Front Panel Mounting (PR 19) / Rail Mounting (PK 26)
Connection Terminals	Screw Terminal with Socket
Connection Types	3 Phase Neutral,3 Phase, 3 Phase (Aron)

Power & Energy Meters

EPR Series / ES Series

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

ES series directly measure active watt-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.

** For CT-25, see Page 65*

CE

PRODUCT SELECTION TABLE

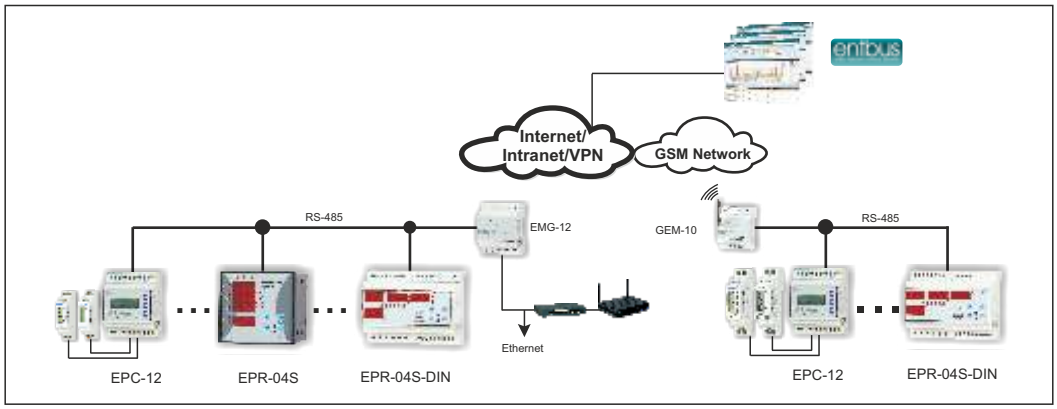
Product Code		MID	kWh Aktive Energy	Energy Pulse Output	RS-485 Comm.	Pcs/Box
ES-32L	Digital Energy Meter **(32 A)**	○	●	●		10
ES-80L	Digital Energy Meter **(80 A)**		●	●		10
ES-32LS	Digital Energy Meter **(32 A)**	○	●		●	10

○ Optional

SPECIFICATIONS

	ES-32LS	ES-32L	ES-80L
ENCLOSURE			
Class Protection Class	IP 51		
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
Minimum Current	0,02A		0,08A
Measurement Range	0,02-32A		0,08-80A
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	<2VA		
INPUT/OUTPUT STRUCTURE			
Pulse Output	-	1000Imp./kWh	
Pulse Width	-	Ti=20ms.	

	ES-32LS	ES-32L	ES-80L
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 certificate		-
CONNECTIONS			
Mounting	Rail Mounting DIN EN50022		
Connection Terminals	Screw type		
COMMUNICATION			
Communication Interface/ Protocol	RS-485 / MODBUS RTU	-	

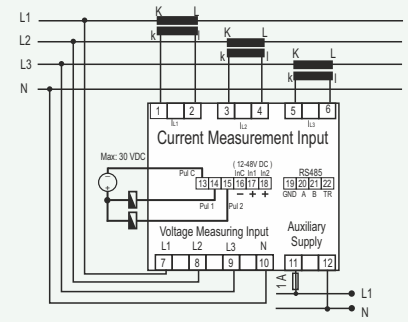


Power & Energy Meters

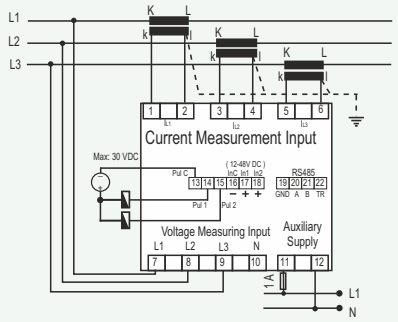
EPR Series / ES Series

Connection Diagram (PR19- 96x96mm)

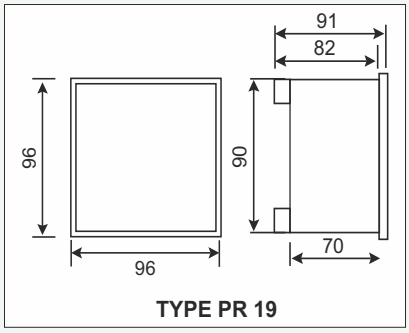
EPR-04S (3 Phase Neutral)



EPR-04S (3 Phase without Neutral)

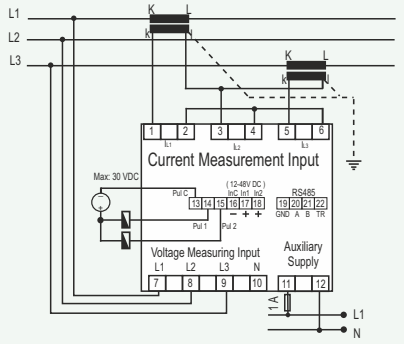


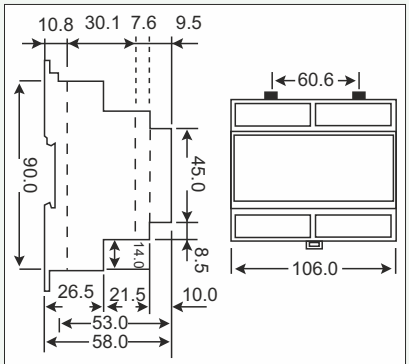
Dimensions



TYPE PR 19

EPR-04S (3 Phase without Neutral with Aron)

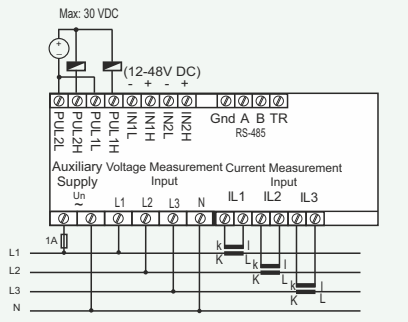




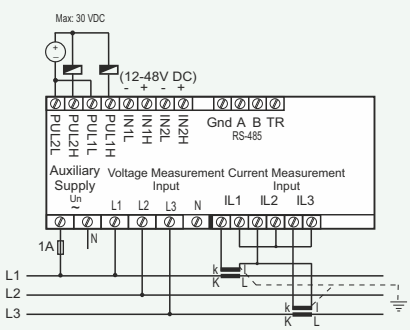
TYPE DIN / PK 26

(PK 26 - DIN6)

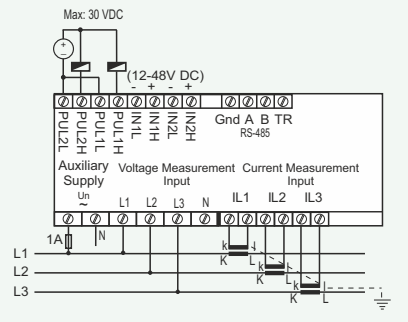
EPR-04S (3 Phase Neutral)

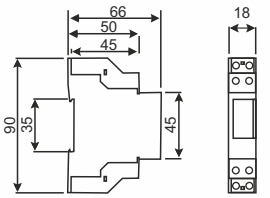


EPR-04S (3 Phase without Neutral with Aron)

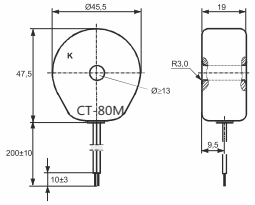


EPR-04S (3 Phase without Neutral)

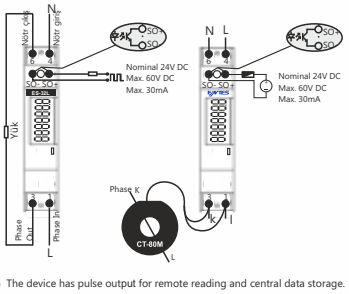




Note: Please select ES-32L with MID for billing purposes



Connection Diagram



- The device has pulse output for remote reading and central data storage.
- By flashing, the LED on the front panel makes it possible to observe whether the measuring is active or not.
- The LCD display on the front panel makes easy and accurate power reading possible.

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

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

Ammeters

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

Voltmeters

- EVM Series
- EVM-3X Series
- EVM-R3X Series

Cos Meter

- ECR-3

Frequencymeter

- EFC-3

Transducers

- TA
- TV

DC Ammeter

- DCA Series

DC Voltmeter

- DCV Series

Multimeters

EPM-04 / EPM-06 / EVM-05

EPM-04h

EPM-06

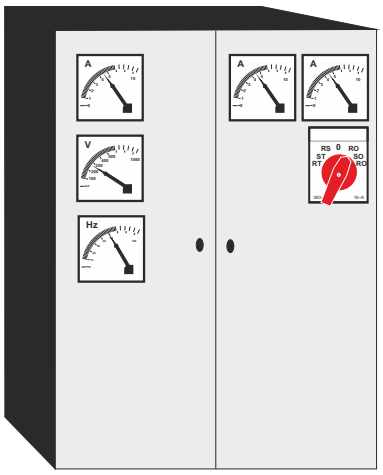
- Password security
- Operating hourmeter (resettable) and total operating hourmeter (not resettable) (for EPM-04h)

** EPM-04h is for generator applications.*

PRODUCT SELECTION TABLE

Product Code	3 ~ Voltage	3 ~ Current	Cos	Frequency (Hz)	I neutral	Demand	Max. Values	Min. Values	Alarm Contact	Under / Over Voltage Protection	Under / Over Current Protection	Under / Over Frequency Protection	RS-485 Comm.	CT-25 (120A)	Operating Hourmeter (Resettable)	Total Operating Hourmeter (Non-resettable)	Front Panel Mounting	Rail Mounting	Pcs / Box
EPM-04-96	●	●		●	●	●	●	●						○			●		12
EPM-04h-96	●	●		●	●	●	●	●						○	●	●	●		12
EPM-04h-96-CT25	●	●		●	●	●	●	●						○	●	●	●		12
EPM-04-DIN	●	●		●	●	●	●	●						○				●	12
EPM-04C-96	●	●		●	●	●	●	●	●	●	●	●		○			●		12
EPM-04C-DIN	●	●		●	●	●	●	●	●	●	●	●		○				●	12
EPM-04CS-96	●	●		●	●	●	●	●	●	●	●	●	●	○			●		12
EPM-04CS-DIN	●	●		●	●	●	●	●	●	●	●	●	●	○				●	12
EPM-06-96	●	●	●	●	●	●	●	●						○			●		12
EPM-06-DIN	●	●	●	●	●	●	●	●						○				●	12
EPM-06C-96	●	●	●	●	●	●	●	●	●	●	●	●		○			●		12
EPM-06C-DIN	●	●	●	●	●	●	●	●	●	●	●	●		○				●	12
EPM-06CS-96	●	●	●	●	●	●	●	●	●	●	●	●	●	○			●		12
EPM-06CS-DIN	●	●	●	●	●	●	●	●	●	●	●	●	●	○				●	12
EVM-05C-96	●			●			●	●	●	●		●					●		12
EVM-05C-DIN	●			●			●	●	●	●		●						●	12

○ Optional



* Multiple analogue devices can be replaced by a single multimeter.

=

Multimeters

EPM-04 / EPM-06 / EVM-05

MEASURED PARAMETERS

Phase-Neutral Voltage (V_{LN})		Phase Currents (I)
Phase-Phase Voltage (V_{LL})		Max. Demand
Frequency (Hz)	Neutral Current	Max / Min. Values

EPM-04 / 04C / 04CS

+

Cos

EPM-06 / 06C / 06CS

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

SPECIFICATIONS

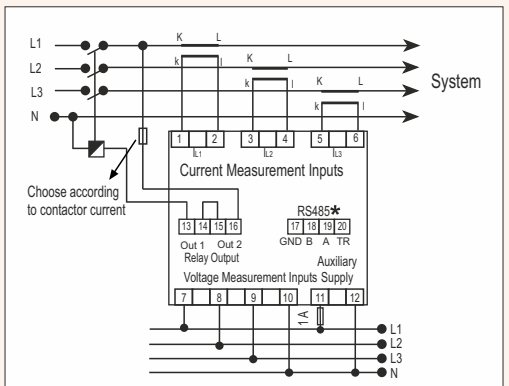
	EPM-04	EPM-04h	EPM-04C	EPM-04CS	EPM-06	EPM-06C	EPM-06CS	EVM-05C
ENCLOSURE								
Dimensions	96x96mm PR19, DIN6 PK26							
Protection Class	IP 40 Front Panel,IP54 Optional							
Weight	0,56kg/pcs; (PR19) / 0,52kg/pcs; (PK26)							0,45kg/pcs
Display	Red LED;Height 10mm(PR19) / 9,2mm(PK26)							
MEASUREMENT								
Voltage								
Measurement Range	10-300 VAC (L-N),10-500 VAC (L-L)							
Measurement Range with Transformer	10-400KV							
Accuracy	1%±1 digit							
Input Impedance	1,8 MΩ							
Current								
Nominal Current	5,5 A							
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	45-65Hz							
Power Consumption	<4 VA							
INPUT/OUTPUT								
Delay Time	Delay on and delay off 0-999,9 sn							
Contact Output	-		5A 1250VA		-	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 neutral (3P4W) ve 3 phase (3P3W)							

Multimeters

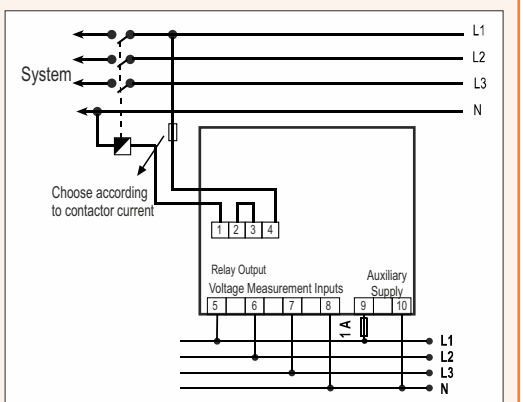
EPM-04 / EPM-06 / EVM-05

Connection Diagram (PR19- 96x96mm)

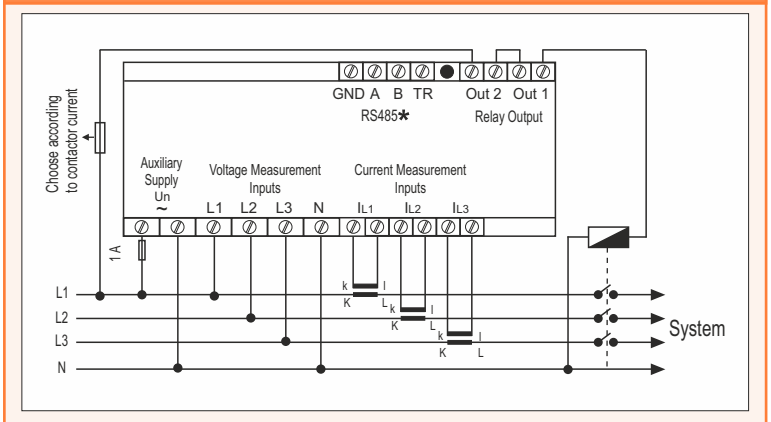
EPM-04CS / EPM-06CS



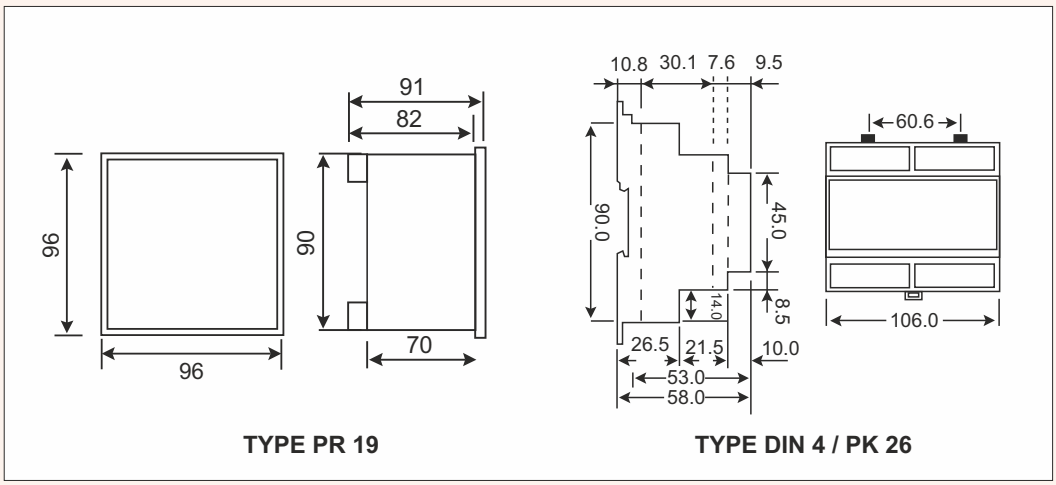
EVM-05C



EPM-04CS DIN / EPM-06CS DIN



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.entes.com.tr.

Ammeters

EPM / EPM-R Series

EPM-4P-96 (SLIM)

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

EPM-R4D

EPM-34

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

CT-25

** For CT-25, see Page 66*

PRODUCT SELECTION TABLE

Product Code		3 ~ Current	1 ~ Current	CT-25 (210A)	Double Demand*	X1 CT	X5 CT	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-R4D	Ammeter (Rail Mount)		●				●	●			●			16
EPM-14-96	Ammeter		●		●	●	●			●		●	●	12
EPM-34-96	Ammeter	●			●	●	●			●		●	●	12

CURRENT TRANSFORMERS (For ENTES panelmeters)

CT-25	Primary: 1/2500, Inner Diameter : 15.5 mm, Outer Diameter : 43 mm	72

Ammeters

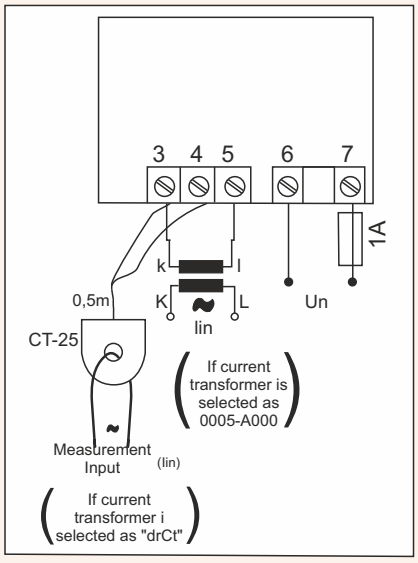
EPM / EPM-R Series

SPECIFICATIONS

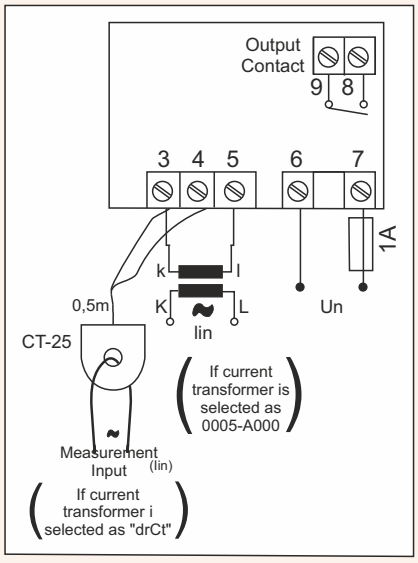
	EPM-4D	EPM-4C	EPM-4P	EPM-34	EPM-4A	EPM-R4D	EPM-R4C
ENCLOSURE							
Dimensions	72x72mm PR18; Slim96 PR25, 48x96mm PR20		Slim96 PR25, 48x96mm PR20	96x96mm PR19	72x72mm PR18; Slim96 PR25	DIN3 TYPE PK20	
Weight	0,31kg/pcs (PR18), 0,28kg/pcs (PR20), 0,35kg/pcs (PR25)			0,34kg / pcs	0,31kg/pcs(PR18) 0,35kg/pcs(PR25)	0,25kg/pcs=16	
Display	Red LED; 14mm			Red LED;12mm	Red LED;14mm	Red LED;10mm	
MEASUREMENT							
Accuracy	1%±1digit			0,5%±1digit	1%±1digit		
Burden(Input Load)	<1VA						
Voltage							
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	50mA-210A 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			Three Phases, 3 wires	Single Phase, 2 wires		

Connection Diagram

EPM-4A PR18 (72x72)



EPM-4C PR25 (Slim 96)

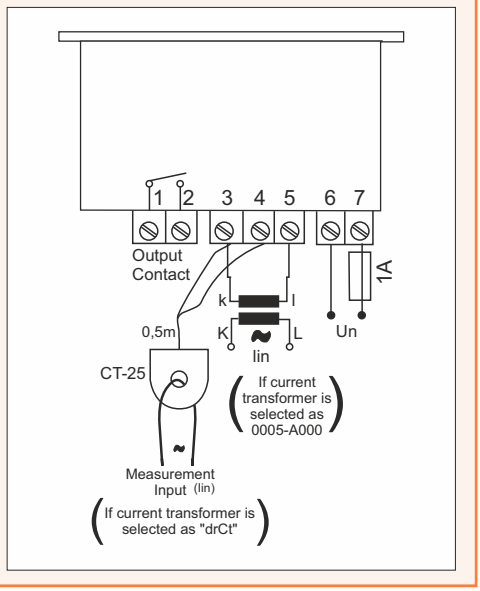


Ammeters

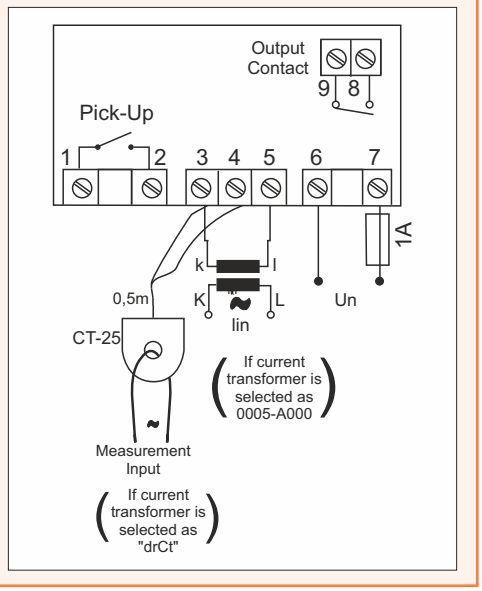
EPM / EPM-R Series

Connection Diagram

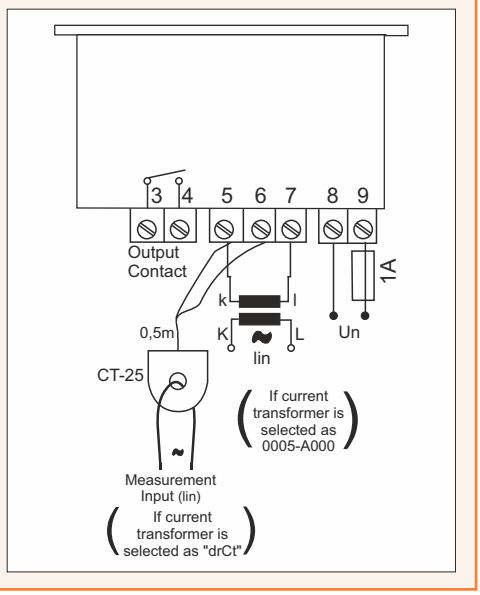
EPM-4C PR18 (72x72)



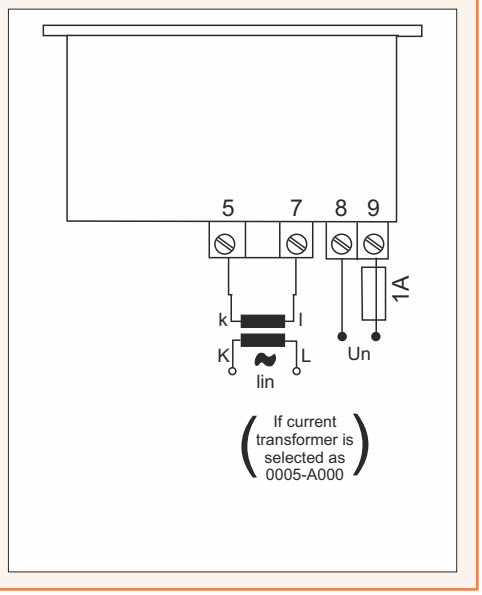
EPM-4P PR25 (Slim 96)



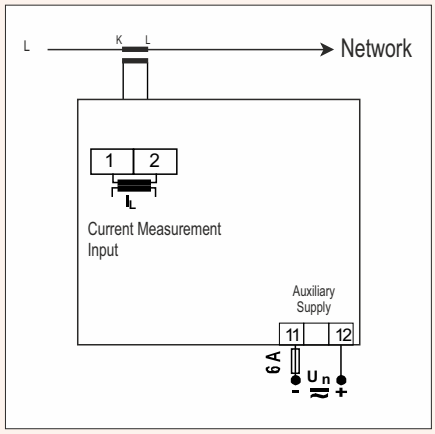
EPM-4C PR20 (48x96)



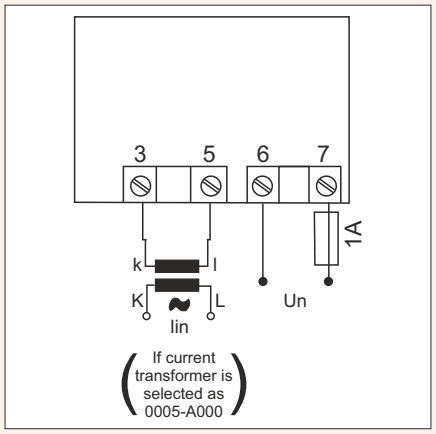
EPM-4D PR20 (48x96)



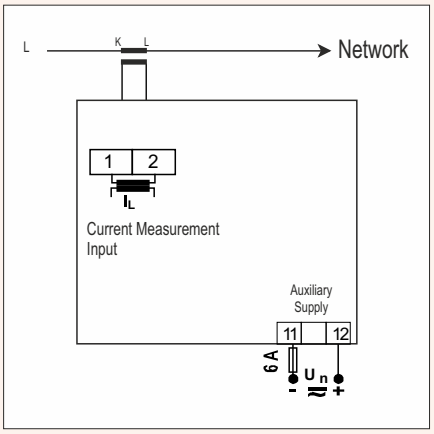
EPM-34 PR19 (96x96)



EPM-4D PR25 (Slim96) PR18 (72x72)



EPM-14 PR19 (96x96)

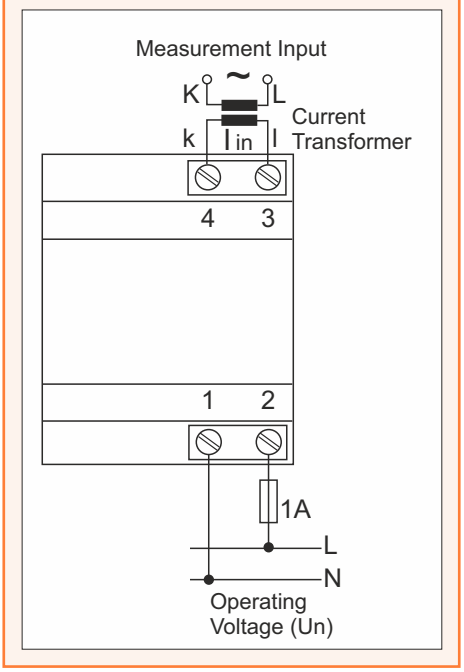


Ammeters

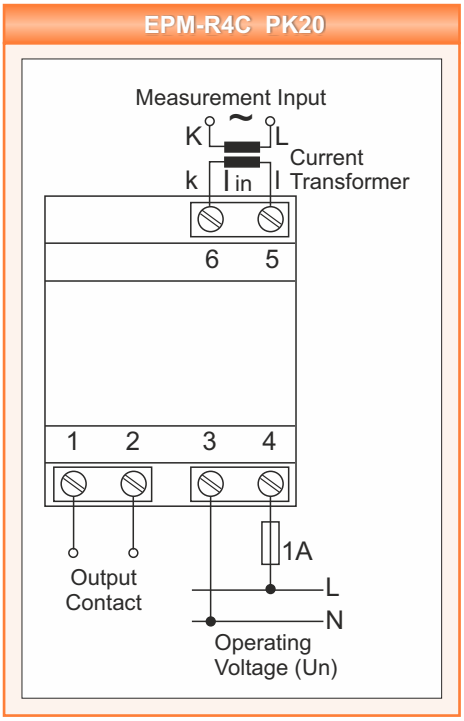
EPM / EPM-R Series

Connection Diagram

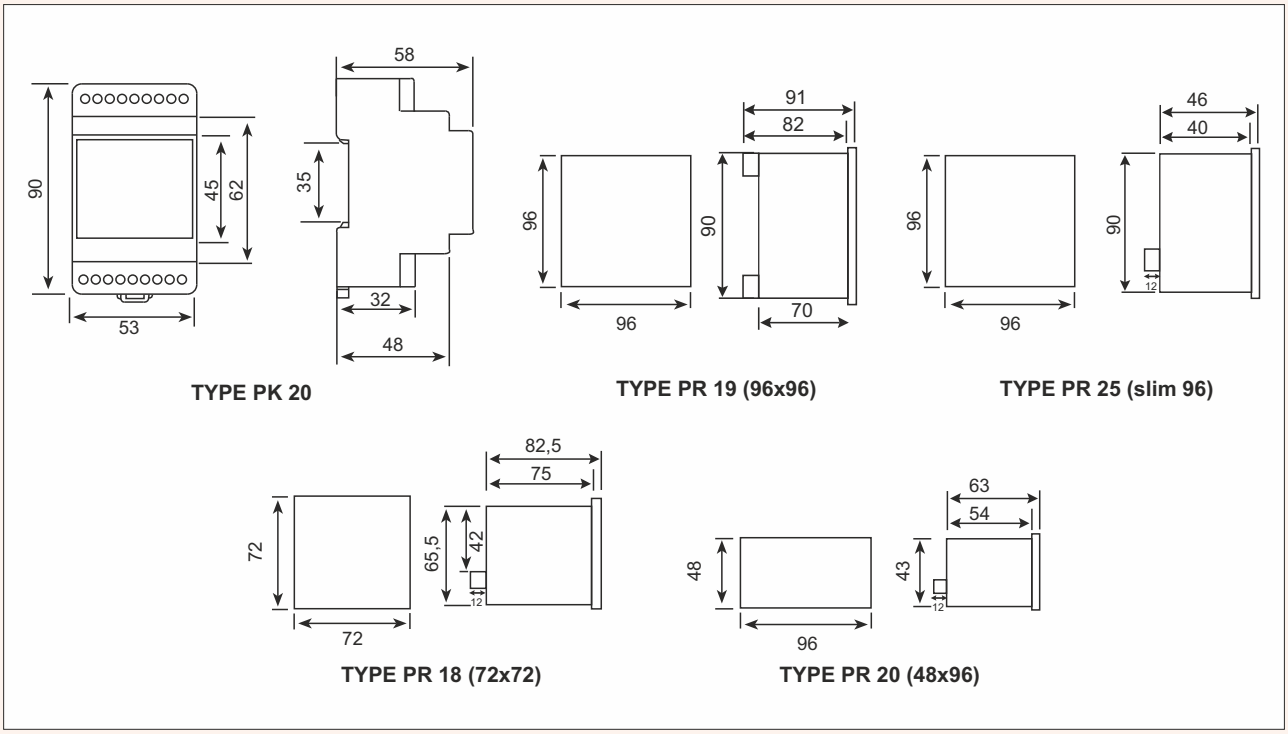
EPM-R4D PK20



EPM-R4C PK20



Dimensions



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

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

EVM-R3C

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	Rail 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-R3	Voltmeter (Rail Mounted)			●	●	●				●	16
EVM-R3C	Voltmeter with Output Contact (Rail Mounted)			●	●	●	●			●	16
EVM-R3S	3-Phase Selectable Voltmeter (Rail Mounted)	●								●	16
EVM-15-96	Voltmeter (Class 0,5)			●				●	●		12
EVM-35-96	3-Phase Voltmeter (Class 0,5)		●					●	●		12

Voltmeters

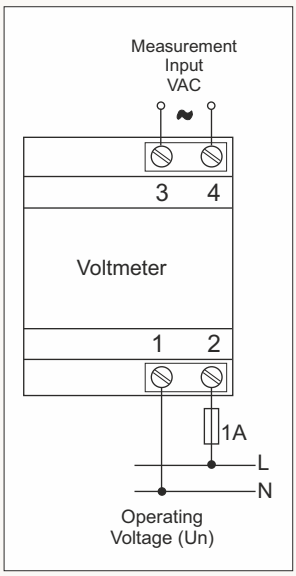
EVM / EVM-R Series

SPECIFICATIONS

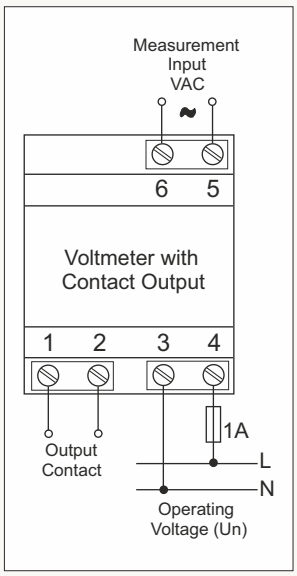
	EVM-3	EVM-3C	EVM-3S	EVM-35	EVM-R3	EVM-R3C	EVM-R3S
ENCLOSURE							
Dimensions	72x72mm PR18; Slim96 PR25, 48x96mm PR20			96x96mm PR19	DIN3 TYPE PK20		
Weight	0,28kg/pcs (PR18), 0,30kg/pcs (PR25), 0,25kg/pcs (PR20)			0,34kg/pcs	0,25kg/pcs PK20		
MEASUREMENT							
Voltage							
Measurement Range	10-600 VAC		10-300 VAC(L-N) 10-500 VAC(L-L)	1-300 VAC(L-N) 2-500 VAC(L-L)	10-600 VAC		10-300 VAC(L-N) 10-500 VAC(L-L)
Accuracy	1%±1digit			0,5%±1digit	1%±1digit		
Burden(Input Load)	<1VA						
SUPPLY							
Operating Voltage	110 VAC/230 VAC±10%			24-250 VAC/DC	110VAC/230 VAC±10%		
Power Consumption	<4VA						
Operating Frequency	45-65Hz						
OUTPUT							
Delay Time (adjustable)		0-99,9 s				0-99,9 s	
Output Contact		1NO,5A 1250VA				1NO,5A 1250VA	
STANDARDS							
Applied Security Standards	EN 61010						
Applied EMC Standards	EN 61000						
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	Screw with socket				DIN3 Screw		
Connection Types	Single Phase, 2 wires		Three Phases, 4 wires (star)		Single Phase, 2 wires		Three phases, 4 wires (star)

Connection Diagram

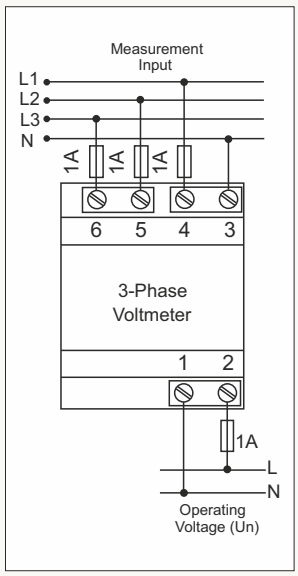
EVM-R3



EVM-R3C



EVM-R3S

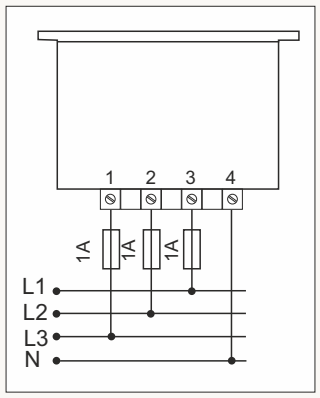


Voltmeters

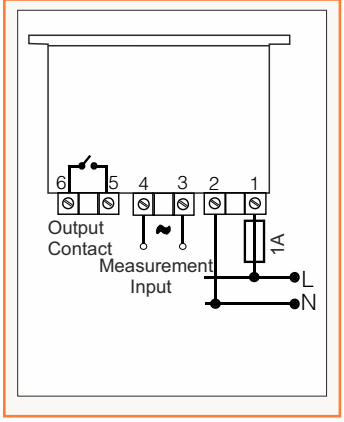
EVM / EVM-R Series

Connection Diagram

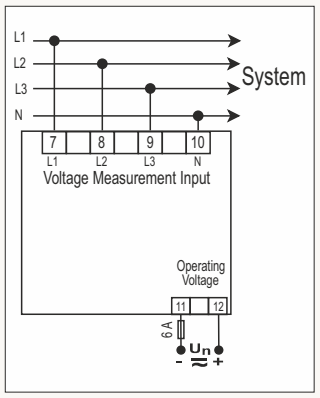
EVM-3S (72x72)



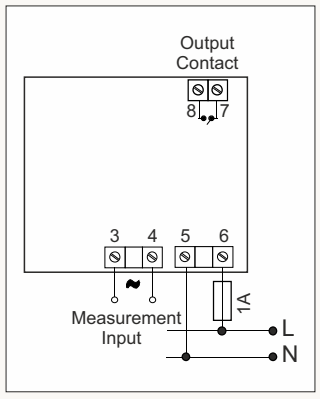
EVM-3C (48x96)



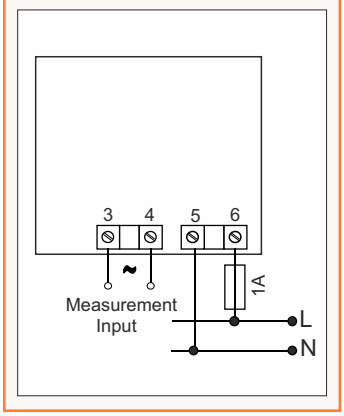
EVM-35



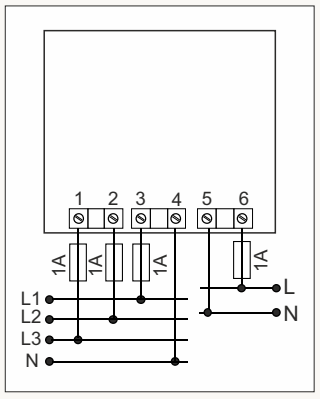
EVM-3C (Slim 96)



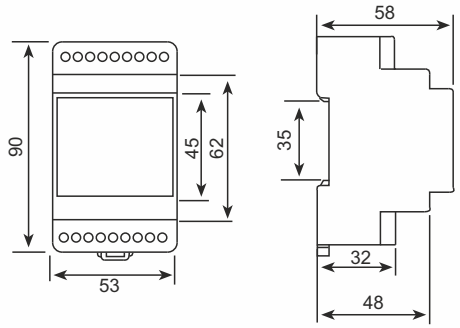
EVM-3 (Slim 96)



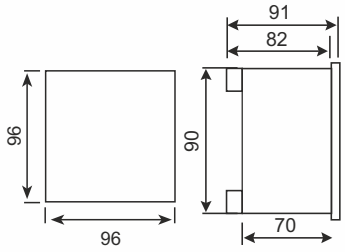
EVM-3S Slim-96



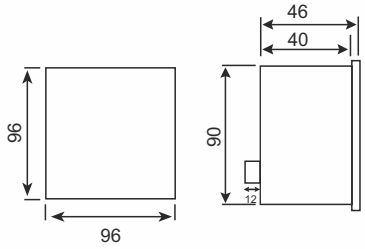
Dimensions



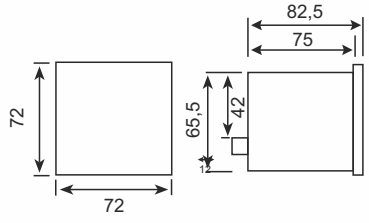
TYPE PK 20



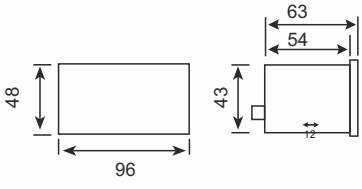
TYPE PR 19 (96x96)



TYPE PR 25 (slim 96)



TYPE PR 18 (72x72)



TYPE PR 20 (48x96)

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

Frequencymeter / Cos meter

EFC / ECR Series

ECR-3-72

EFC-3-72

ECR-3

Cos meter measures Cos 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)

PRODUCT SELECTION TABLE

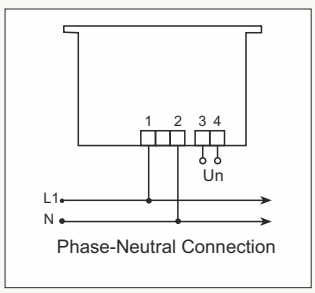
Product Code		Pcs / Box
ECR-3-48	Cos meter (0 - 1,00 ind., cap.)	20
ECR-3-72	Cos meter (0 - 1,00 ind., cap.)	16
ECR-3-96	Cos meter (0 - 1,00 ind., cap.)	12
EFC-3-48	Frequencymeter (20-400 Hz.)	20
EFC-3-72	Frequencymeter (20-400 Hz.)	16
EFC-3-96	Frequencymeter (20-400 Hz.)	12

SPECIFICATIONS

	Frequencymeter	Cos meter
	EFC-3	ECR-3
ENCLOSURE		
Dimensions	72X72mm(PR18), 96X96mm (PR19), 48X96mm (PR20)	
Weight	0,3kg/pcs(PR18); 0,3kg/pcs (PR20), 0,3kg/pcs (PR19)	
Display	Red LED; Height 14,2mm	
MEASUREMENT		
Frequency / Cos		
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	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	

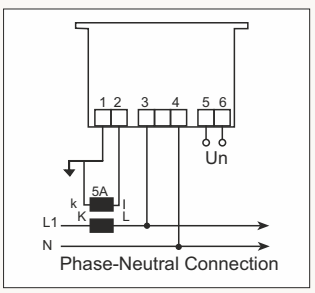
Connection Diagram (PR25- 96x96mm)

EFC-3



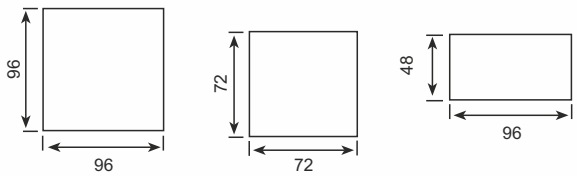
Phase-Neutral Connection

ECR-3



Phase-Neutral Connection

Dimensions



TYPE PR 19 (96x96) ECR-3-96, EFC-3-96

TYPE PR 18 (72x72) ECR-3-72, EFC-3-72

TYPE PR 20 (48x96) ECR-3-48, EFC-3-48

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

Current Transducer

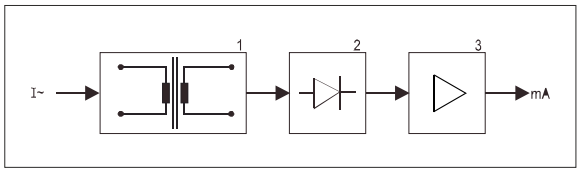
TA Series

TA-112

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

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

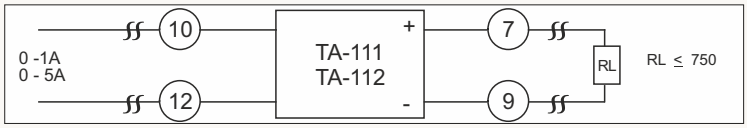
Product Code			Pcs./Box
TA-111	Input : 0-1A AC, Output : 0-20mA DC	Current Transducer	16
TA-112	Input : 0-5A AC, Output: 0-20mA DC	Current Transducer	16

SPECIFICATIONS

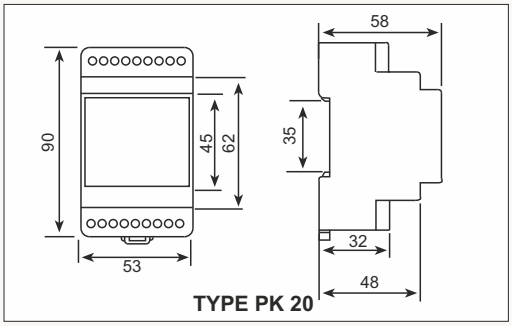
	TA-111	TA-112
ENCLOSURE		
Dimensions	DIN III Type PK 20	
Protection Class	Double Insulation IP40 front panel	
Weight	0,3 kg/pcs	
MEASUREMENT		
Input current	0-1A	0-5A
Over Load Capacity	1,5xIn (continuous) 20xIn(1s)In=1A	1,5xIn (continuous) 20xIn(1s)In=5A
Power Consumption	<3VA	
Output Signal	0-20mA 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	With Screw	

Connection Diagram

TA-111 / TA-112



Dimensions



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

Voltage Transducer

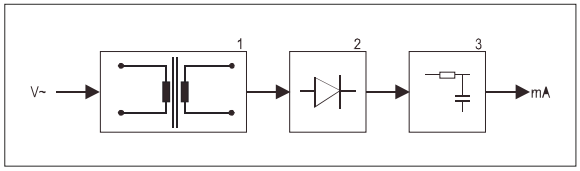
TV Series

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

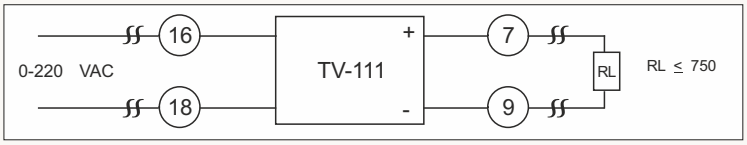
Product Code			Pcs./Box
TV-111	Input : 0-220 V AC, Output : 0-20mA DC	Voltage Transducer	16

SPECIFICATIONS

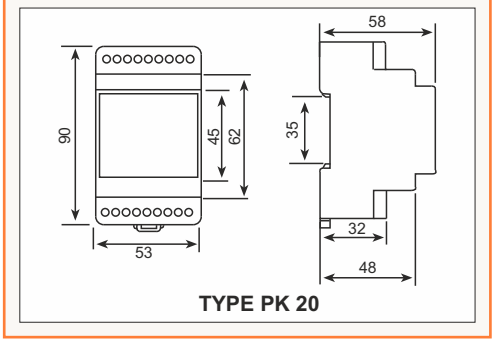
	TV-111
ENCLOSURE	
Dimensions	DIN III PK 20
Protection Class	Double Insulation IP40 front panel
Weight	0,25 kg/pcs
MEASUREMENT	
Input voltage	0-220 VAC
Over Load Capacity	1,2xUn (continuous) 2xUn(1s)Un=220V AC
Power Consumption	<4VA
Output Signal	0-20mA
Linear Output Range	(0,2...1,1)xUn
Load	0-750 Ω
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	With Screw

Connection Diagram

TV-111



Dimensions



TYPE PK 20

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

DC Ammeter

DCA Series

NEW

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**
- Saves maximum and minimum values,
- Easy access to the settings with the backlit LCD display
- Measurement period adjustable between 1 to 600 seconds.

PRODUCT SELECTION TABLE

Product Code	Current	Maximum Value	Minimum Value	Output Contact	RS-485 Communication	Analog Output (0/2 - 10V) (0/4 - 20mA)	85-265 VAC/DC	10-56 VDC	Pcs./Box
DCA-10	●	●	●				●		20
DCA-10A	●	●	●			○	●		20
DCA-10S	●	●	●		●		●		20
DCA-10C	●	●	●	●			●		20
DCA-10CS	●	●	●	●	●		●		20
DCA-11	●	●	●					●	20
DCA-11A	●	●	●			○		●	20
DCA-11S	●	●	●		●			●	20
DCA-11C	●	●	●	●				●	20
DCA-11CS	●	●	●	●	●			●	20

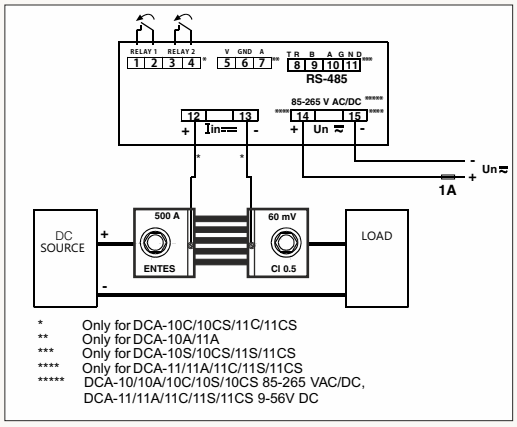
SPECIFICATIONS

	DCA-10	DCA-10S	DCA-11S	DCA-11
ENCLOSURE				
Dimensions	PR 20, 48x96 mm			
Protection Class	IP 40			
Weight	0,240 kg/pcs.			
Display	2.5" LCD			
MEASUREMENTS				
Measurement Input Impedance	1K Ω			
Accuracy	0.5% ± 1 Digit [(10% - 100%) x full scale]			
Burden (Input Load)	< 1 VA			
Measurement Period	1-600 s			
Current				
Measurement Range	-10000A - 10000A			
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			
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			
Terminal Protection Class	IP 00			
AMBIENT CONDITIONS				
Operating Temperature	-20 / +70°C			
Overvoltage 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 mm²			
COMMUNICATION				
Communication Interface / Protocol	-	Modbus RTU (RS-485) programmable		-
Parity	-	None, Odd, Even		-
Address	-	1-247		-
Transfer Speed	-	2400-38400 bps		-

○ Programmable

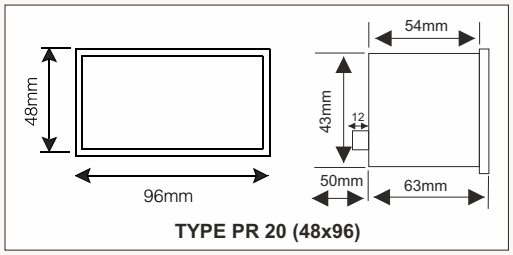
Connection Diagram

DCA-10 / DCA-10S / DCA-11 / DCA-11S



* Only for DCA-10C/10CS/11C/11CS
** Only for DCA-10A/11A
*** Only for DCA-10S/10CS/11S/11CS
**** Only for DCA-11/11A/11C/11S/11CS
***** DCA-10/10A/10C/10S/10CS 85-265 VAC/DC, DCA-11/11A/11C/11S/11CS 9-56V DC

Dimensions



TYPE PR 20 (48x96)

Shunts

SA60-30 (30A)
SA60-40 (40A)
SA60-50 (50A)
SA60-60 (60A)
SA60-100 (100A)
SA60-150 (150A)
SA60-250 (250A)
SA60-500 (500A)
SA60-1000 (1000A)

DC Voltmeter

DCV Series

NEW

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

- Wide supply range, 85-265 VAC/DC(DCV-10),10-56 VAC (DCV-11)
- **Communication with MODBUS RTU protocol over RS485 line**
- Saves maximum and minimum values
- Easy access to settings and best view under any lighting condition with the help of backlit LCD screen
- Adjustable measurement period between 1 and 600 seconds

PRODUCT SELECTION TABLE

Product Code	Voltage	Max. Value	Min. Value	Output Contact	RS-485 Communication	Analog Output (0/2 - 10V) (0/4 - 20mA)	85-265V AC/DC	10-56 VDC	Pcs. / Box
DCV-10	●	●	●				●		20
DCV-10A	●	●	●			○	●		20
DCV-10S	●	●	●		●		●		20
DCV-10C	●	●	●	●			●		20
DCV-10CS	●	●	●	●	●		●		20
DCV-11	●	●	●					●	20
DCV-11A	●	●	●			○		●	20
DCV-11S	●	●	●		●			●	20
DCV-11C	●	●	●	●				●	20
DCV-11CS	●	●	●	●	●			●	20

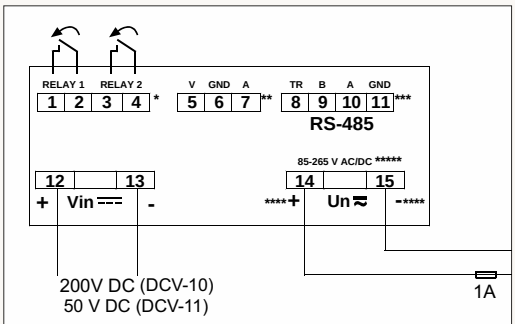
○ Programmable

SPECIFICATIONS

	DCV-10	DCV-10S	DCV-11S	DCV-11
ENCLOSURE				
Dimensions	PR 20 48x96 mm			
Protection Class	IP 40			
Weight	0,240 kg			
Display	2.5" LCD			
MEASUREMENTS				
Measurement Input Resistor	< 2M Ω			
Accuracy	0.5% ± 1 Digit [(10% - 100%) x full scale]			
Burden (Input Load)	< 1 VA			
Measurement Period	1 - 600 s			
Voltage				
Measurement Range	+/- 200V			
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			
Terminal Protection Class	IP 00			
AMBIENT CONDITIONS				
Operating Temperature	-20 / +70°C			
Overvoltage Category	III			
CONNECTIONS				
Mounting	Panel mounting (PR 20)			
Monting Class	III			
Connection Terminals	PR 20 Screw with socket			
Connection Types	Single Phase, 2 Wires			
Cable Cross-section (For Terminals)	2,5 mm²			
COMMUNICATION				
Communication Interface / Protocol	-	Modbus RTU (RS-485) programmable		-
Parity	-	None, Odd, Even		-
Address	-	1-247		-
Transfer Speed	-	2400-38400 bps		-

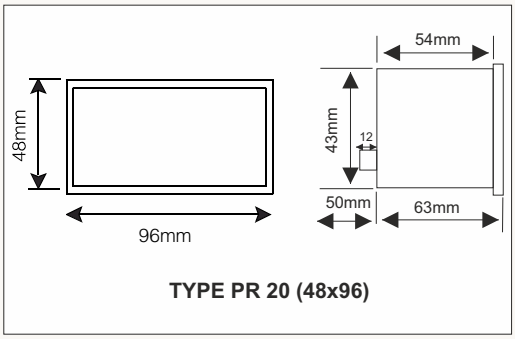
Connection Diagram

DCV-10 / DCV-10S / DCV-11 / DCV-11S



* Only for DCV-10C/10CS/11C/11CS
** Only for DCV-10A/11A
*** Only for DCV-10S/10CS/11S/11CS
**** Only for DCV-11/11A/11C/11S/11CS
***** DCV-10/10A/10C/10S/10CS 85-265V AC/DC, DCV-11/11A/11C/11S/11CS 9-56V DC

Dimensions



TYPE PR 20 (48x96)

Power Factor Correction

ENTES Power Factor Correction products are designed to prevent consumption of reactive energy (kVArh) 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

- RG3-C Series
- RG-B Series
- RG-T Series

LV. Capacitors

- ENT.CF Series
- ENT.CM Series
- ENT.C10 Series
- ENT.CXD Series
- ENT.C100 Series
- ENT.THN 40 Series
- ENT.THN 60 Series
- ENT.THN 100 Series
- ENT.THN 100N Series

Shunt Reactors

- ENT.ERS Series

Harmonic Filters

- ENT.ERH Series

Line Reactors

- ENT.SGR Series

Capacitor Duty Contactors

- ENT.KT Series

Thyristor Switches

- SC Series
- SPD Impulse Voltage Protection Device

Current Transformers

- ENT Series
- ENS.AYS Series
- ENS.AYC Series
- ENS.3PH 20 Series
- ENS.3PH 30 Series
- CT Series

Discharge Units

- DU-3

Power Factor Controllers

RG / RG3 Series

RG3-15/C/CS/CL/CLS

With RG-T and RG-B/BS series reactive power control relays, power factor correction is done by measuring the current from single phase. These devices are preferred in systems with balanced loads.

RG3 series, measure the voltage and current of the 3 phases individually thus the power factor correction in systems with unbalanced loads are done accurately.

RG3-15CL/CLS series provide the exact solution for power factor correction of inductive and capacitive loads by switching both capacitors and shunt reactors.

Features;

- Measuring the capacitor power in every step automatically
- Enabling and disabling required steps simultaneously
- Ability to connect single-phase and three-phase capacitors to the system together (RG3-12C/CS-RG3 15C/CS/CL/CLS)
- Adjustable switch-on, switch-off and discharge delay times
- Adjustable Cos value
- Selectable step number
- 10 different program options
- Equalizing energy values with the utility meters (RG3-12C/CS-RG3-15C/CS/CL/CLS)
- Ability to select on/off options in power cuts (RG3-12C/CS-RG3-15C/CS/CL/CLS)
- Energy rate ratio alarm adjustable between 1 and 240 hours

CE

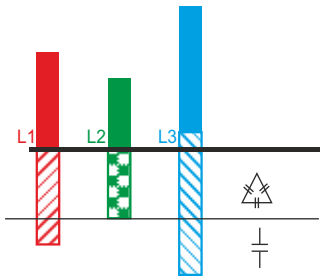
PRODUCT SELECTION TABLE

Product Code		Size (mm)	Shunt Reactor (3 steps)	Smart Switching	1 Phase, 1 Current Transformer	3 Phase, 3 Current Transformer	1-Phase Capacitor	Three Phase Capacitor	THD Protection	Dual Target Cos	Auto Setup	Password Protection	RS-485 Communication	Internal Thermal Control	External Thermal Control	Pcs / Box
RG-6T	6 Steps	144x144			●			●								4
RG-8T	8 Steps	144x144			●			●								4
RG-12T	12 Steps	144x144			●			●								4
RG-8B-96	8 Steps	96x96		●	●			●	●	●	●	●		●		12
RG-8BS-96	8 Steps	96x96		●	●			●	●	●	●	●	●	●		12
RG-12B	12 Steps	144x144		●	●			●	●	●	●	●				4
RG-12BS	12 Steps	144x144		●	●			●	●	●	●	●	●			4
RG3-12C	12 Steps	144x144		●		●	●	●	●	●	●	●			○	4
RG3-12CS	12 Steps	144x144		●		●	●	●	●	●	●	●	●		○	4
RG3-15C	15 Steps	144x144		●		●	●	●	●	●	●	●				4
RG3-15CS	15 Steps	144x144		●		●	●	●	●	●	●	●	●			4
RG3-15CL	15 Steps	144x144	●	●		●	●	●	●	●	●	●				4
RG3-15CLS	15 Steps	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.



Steps.....	1	2-3-4	5-6-7-8-9	10-11-12
Phase.....	L1-L2-L3	L1	L2	L3
Steps.....	1-2-3	4-5-6-7	8	9-10-11-12
Phase.....	L1-L2-L3	L1	L2	L3

Programmable Steps (RG3-C / CS / CL / CLS)

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Power Factor Controllers

RG / RG3 Series

MEASURED PARAMETERS

Phase - Neutral Voltages (V_{LN})	Phase Current (I)	Active Power (P)	Apparent Power (S)
	Cos	Reactive Power (Q)	

RG-T series

+

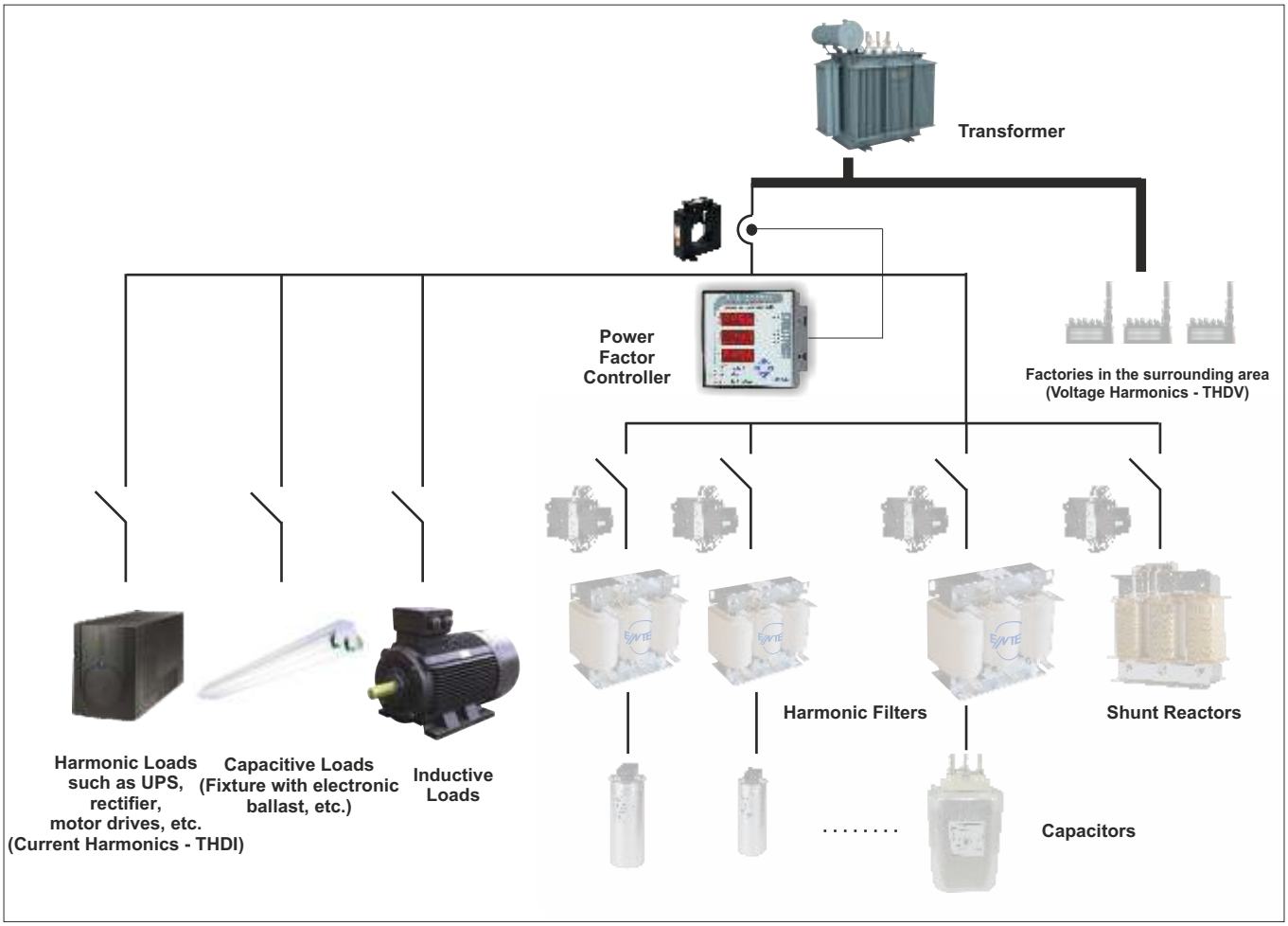
Individual Voltage Harmonics - up to 19th	Total Harmonic Distortion for Voltage (THD V)
Individual Current Harmonics- up to 19th	Total Harmonic Distortion for Current (THD I)

RG-B / RG-BS series

+

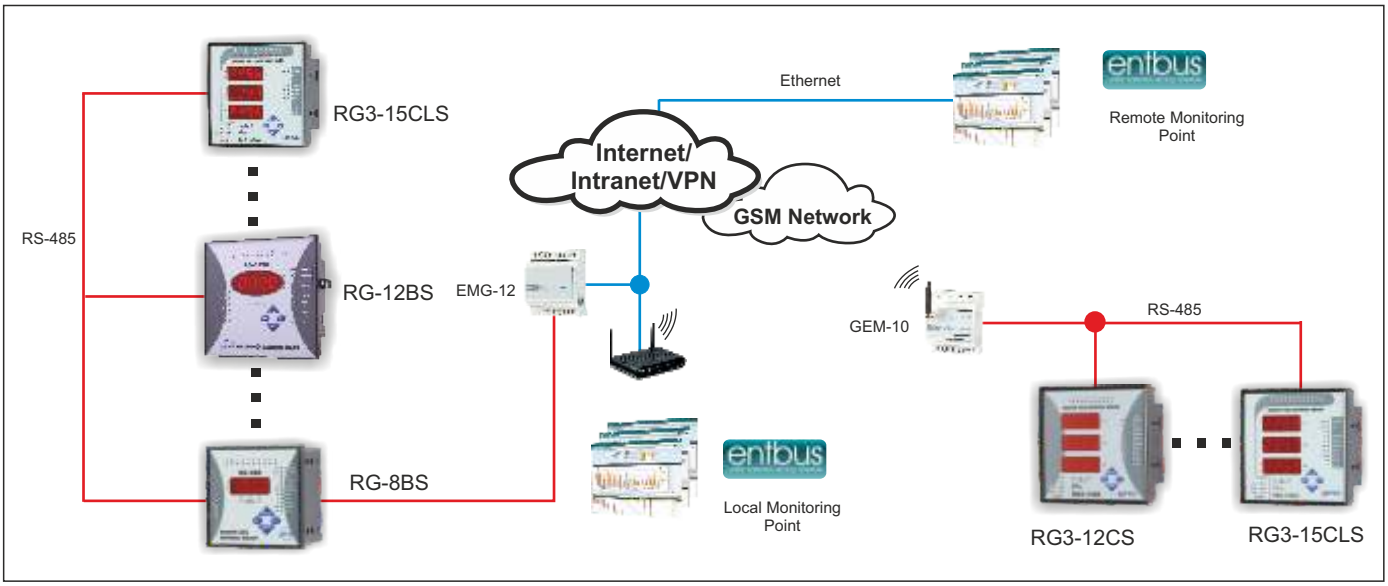
3-Phase Currents (I)	Total Active power (P)	Total Apparent Power (S)	Total Reactive Power (Q)
Active Energy - Import (kWh)	Active Energy - Export (kWh)	Capacitive Reactive Energy (kVArh C)	Inductive Reactive Energy (kVArh L)

RG3-C / RG3-CS series



Power Factor Controllers

RG / RG3 Series



Remote Monitoring for PFC Systems

SPECIFICATIONS

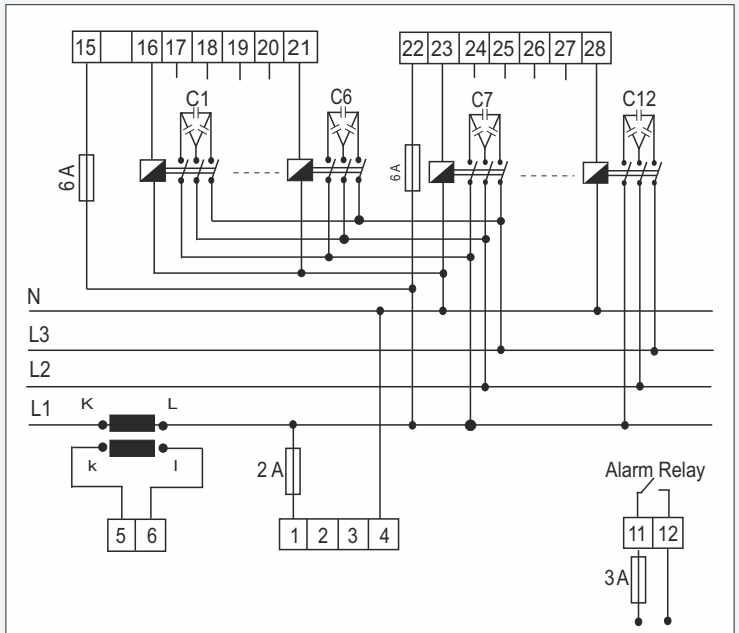
	RG-T	RG-B	RG-BS	RG3-C/CL	RG3-CS/CLS
ENCLOSURE					
Dimensions	144x144mm PR16; 96x96mm PR19 (RG-8B/BS)				
Protection Class	IP40 front panel, IP54 optional				
Weight	0,9kg/pcs (PR16); 0,6kg/pcs (PR19) (RG-8B/BS)				
MEASUREMENTS / FUNCTIONS					
Accuracy	1%±1digit(V,I,cos);2%±1digit (W,VAr,VA,harmonics)				
Over Voltage Setting	240-275 VAC	0-500 VAC		0-300 VAC	
Current Range	50mA-5,5A				
Measurement Range with Transformer	50mA-10kA Transformer Ratio 5...10000/5A	50mA-10kA Transformer Ratio:1-2000			
Burden (Input Load)	<2VA Current, < 3VA Voltage				
Cos Setting	0,8<cos <1 ınductive	0,8<cos <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		2-1800s		1-1800s	
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%				
Operating Frequency	50/60 Hz				
Power Consumption	<10 VA				
INPUT/OUTPUT STRUCTURE					
Step Number	6,8,12	6,8,12		12,15	
Output Contact	3A,750VA cos =1	5A,1250VA cos =1			
AMBIENT CONDITIONS					
Operating Temperature	- 5 ... +55°C				
Ambient Humidity	85%				
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

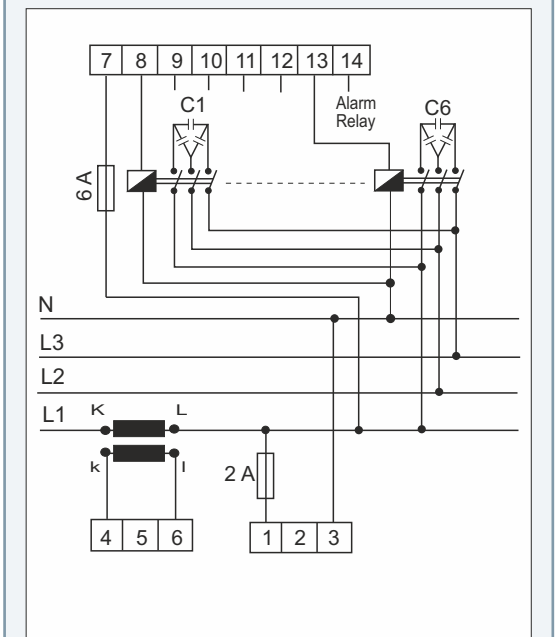
RG / RG3 Series

Connection Diagrams

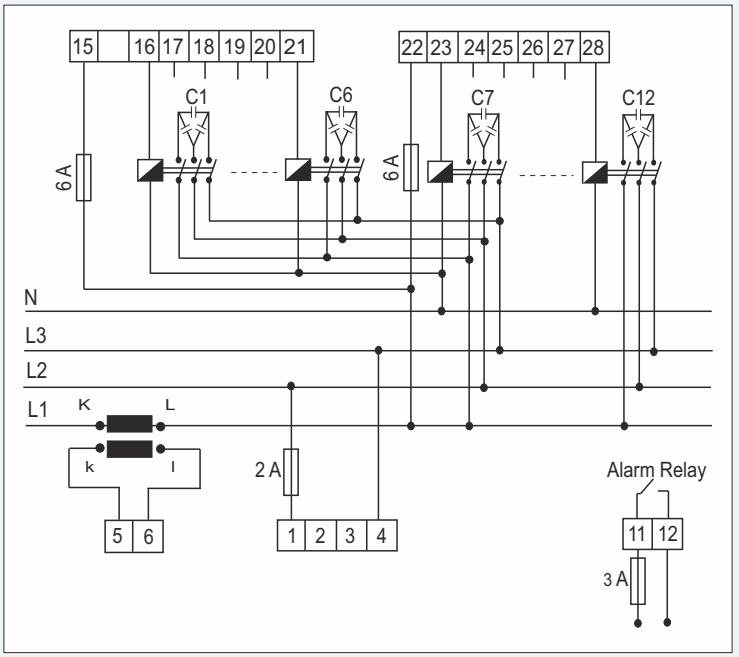
RG-T (144x144) (Phase - Neutral)



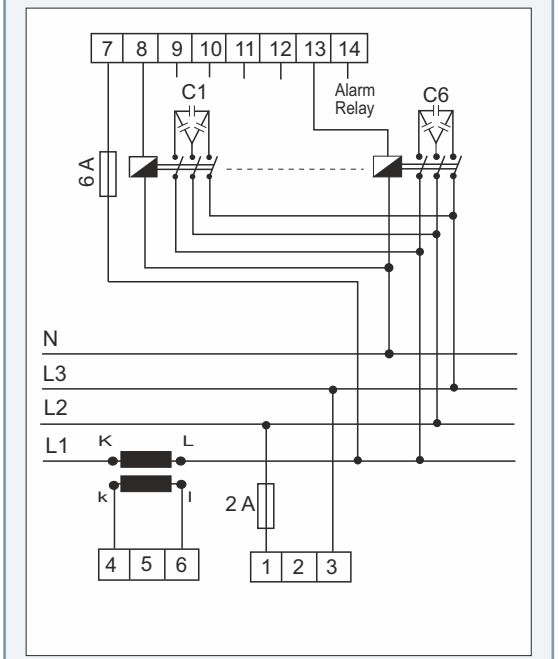
RG-T (96x96) (Phase - Neutral)



RG-T (Phase - Phase)



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



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

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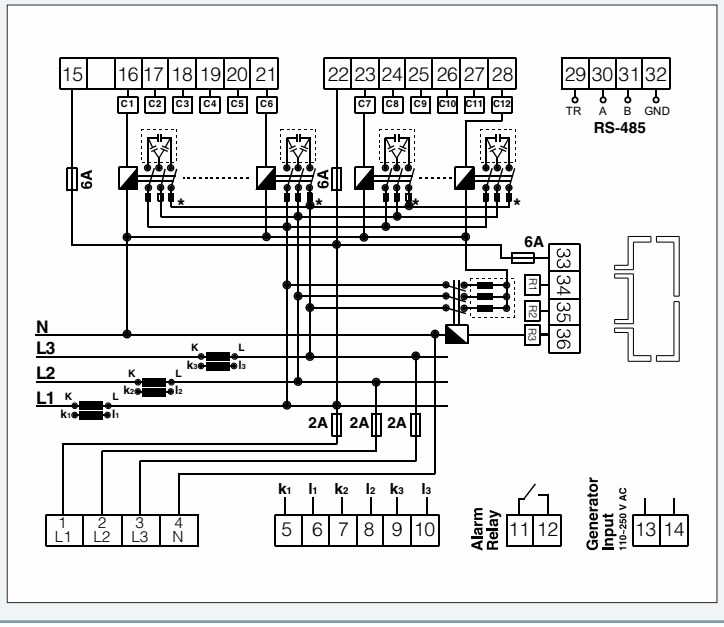
Power Factor Controllers

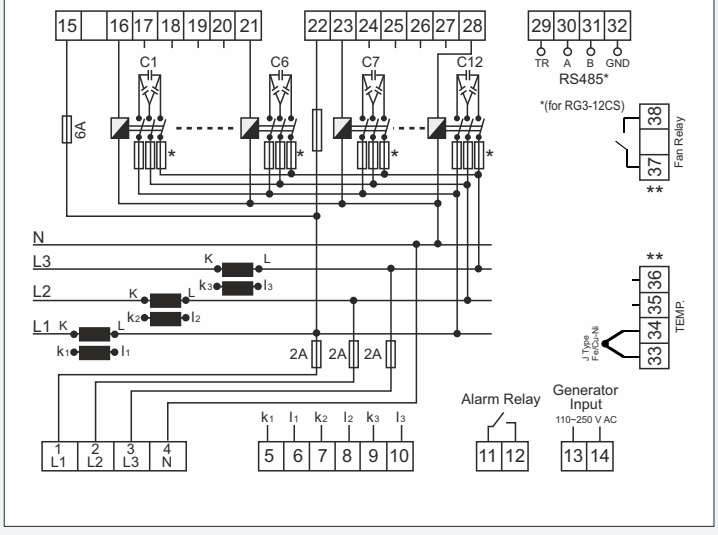
RG / RG3 Series

Connection Diagrams

RG3-15CLS

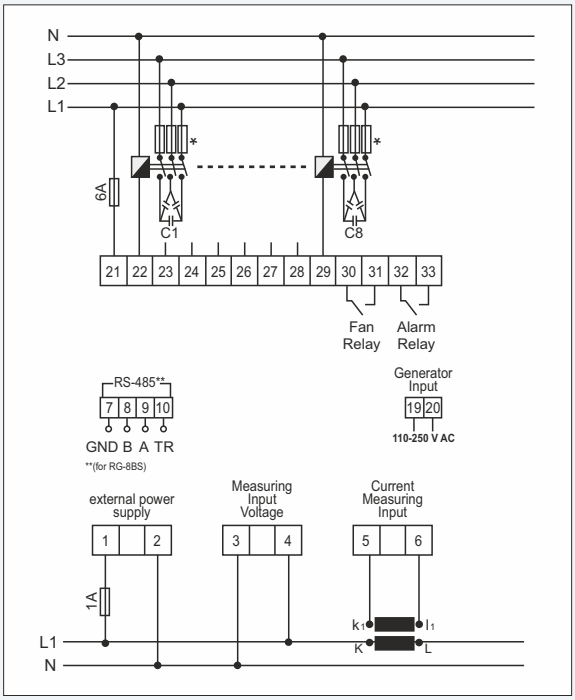


RG3-12CS



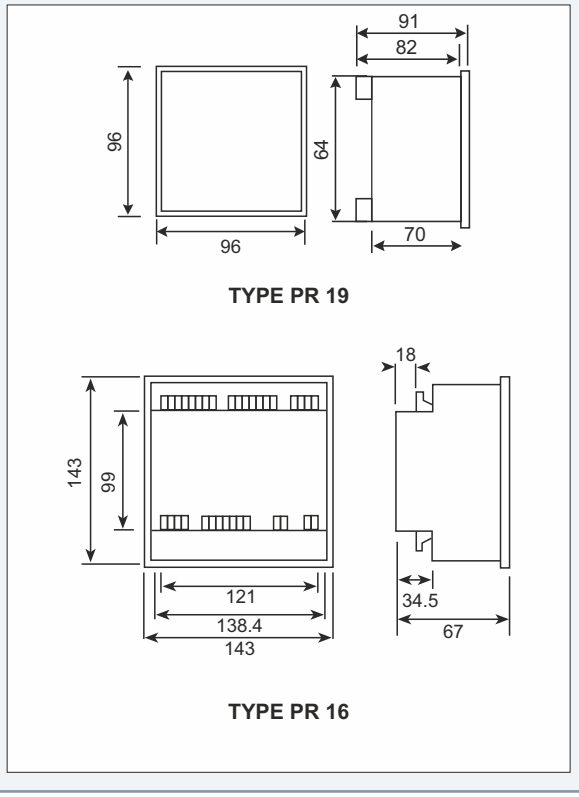
*** Optional*

RG8-BS (96x96)



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

Dimensions



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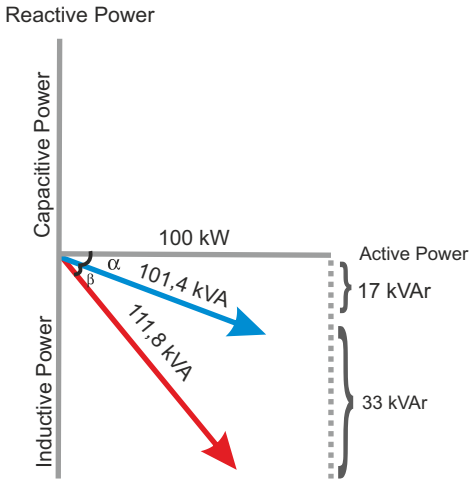
Low Voltage Power Capacitors

ENT.C Series 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 110.000 hours (130.000 hours in C100 series)



	Without Capacitor	With Capacitor
Active Power	100 kW	100 kW
Reactive Power	50 kVAr	17 kVAr
Apparent Power	111,8 kVA	101,4 kVA
Power Factor Ratio	0,894	0,986

ENTES ENT.C series power capacitors are 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.
ENT.C 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 of 130.000 hours.

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.CF / CM Series (Single Phase)

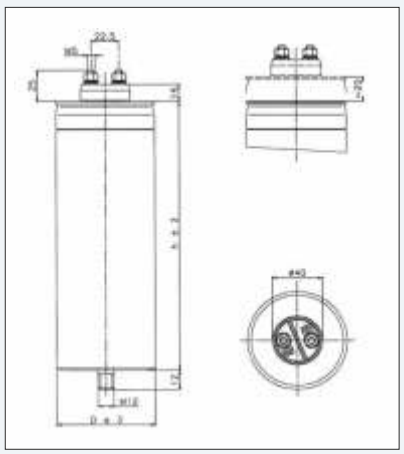
Models	ENT.CF	ENT.CM	ENT.C10	ENT.CXD	ENT.C100 (cylindrical profile)	ENT.C100 (triangle profile 50kVAr)
Operating Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Capacitance Tolerance	-5%+10%	-5%+10%	-5%+10%	-5%+10%	±5%	±5%
Dielectric Loss	0,3 W/kVAr	0,2 W/kVAr	0,3 W/kVAr	0,2 W/kVAr	0,4 W/kVAr	0,4 W/kVAr
Altitude	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
Test Voltage (Terminal-Terminal)	2,15 x Un, AC 2 s	2,15 x Un, AC 2 s	2,15 x Un, AC 2 s	2,15 x Un, AC 2 s	2,15 x Un, AC 2 s	2,15 x Un, AC 2 sn.
Test Voltage (Terminal-Case)	3 kV, AC 10 s	3 kV, AC 10 s	3 kV, AC 10 s	3 kV, AC 10 s	4,6 kV, AC 2 s	6 kV, AC 2 sn.
Operating Temperature	-25+55°C	-25+55°C	-25+55°C	-25+55°C	-25+55°C	-25+55°C
Max. Overvoltage	1,1xUn	1,1xUn	1,1xUn	1,1xUn	1,1xUn	1,1xUn
Max. Overload In	2 x In	4 x In	2 x In	4 x In	1,5 x In	1,5 x In
Max. Inrush Current	100 In	200 In	100 In	200 In	300 In	300 In
Protection Class	IP00	IP00	IP30	IP20	Figure 1-2: IP00 Figure 3-4: IP20	IP00
Discharge Resistance	External	External	Internal, 75V after 3min.		External	External, 50V after 60sec
Applied Standards	IEC 60831-1/2	IEC 60831-1/2	IEC 60831-1/2	IEC 60831-1/2	IEC 60831-1/2	IEC 60831-1/2

CM - CF Series

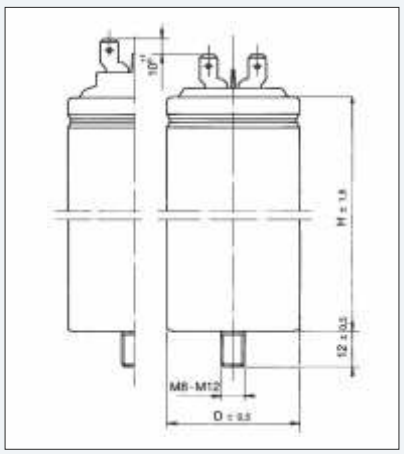
Product Code	80.000	110.000	Qn (kVAr) for 230 VAC	Qn (kVAr) for 400 VAC	C (F)	In (A)	Dimensions DxH (mm.)	Box Dimensions	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.CF-230-0,26	●		0,26	0,8	15	1,2	40x72	195x390x250	-40^0+70^0	100	10
ENT.CF-400-1,67	●		0,55	1,67	33,2	4,2	50x122	195x390x200	-25^0+55^0	25	9
ENT.CF-400-2,5	●		0,83	2,5	50	6,25	55x132	195x390x255	-25^0+55^0	25	9
ENT.CF-400-4,17	●		1,38	4,17	83	10,4	60x137	195x390x255	-25^0+55^0	25	9
ENT.CM-400-8,33		●	2,76	2,76	165,8	20,8	65x165	195x390x255	-25^0+55^0	18	9
ENT.CF-230-5		●	5		300	20,7	75x180	190x285x265	-40^0+70^0	6	5,4
ENT.CF-230-10		●	10		600	43	85x280	190x285x375	-40^0+70^0	6	10,4

Dimensions

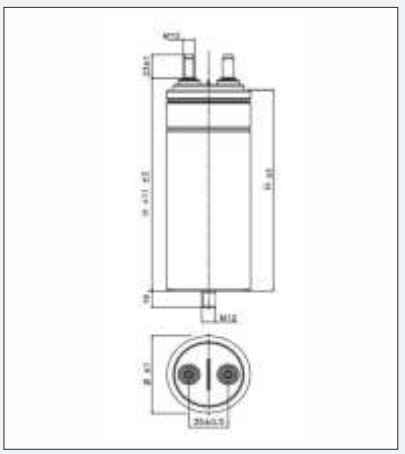
ENT.CM Series



ENT.CF Series



ENT.CF-230-5 / ENT.CF-230-10



** To enablethe over pressure tear-off fuse operate properly, it is necessary to leave a gap of at least 30 mm above the product and to use flexible wires for connection.*

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

Screws and Mounting Studs	Screwing Torque
M 12	11 Nm

Screws and Mounting Studs	Screwing Torque
M 10	6 Nm
M 12	10 Nm

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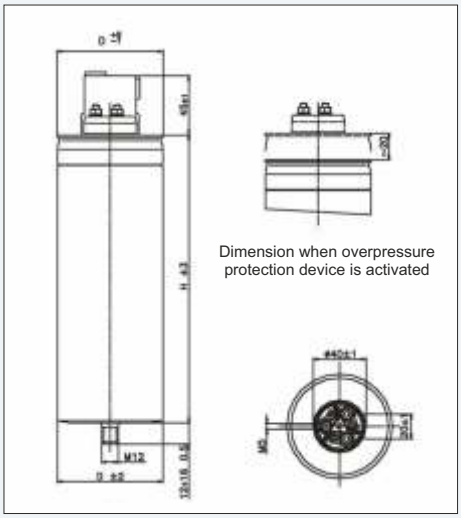
Low Voltage Power Capacitors

ENT.C10 / CXD Series (Three Phase)

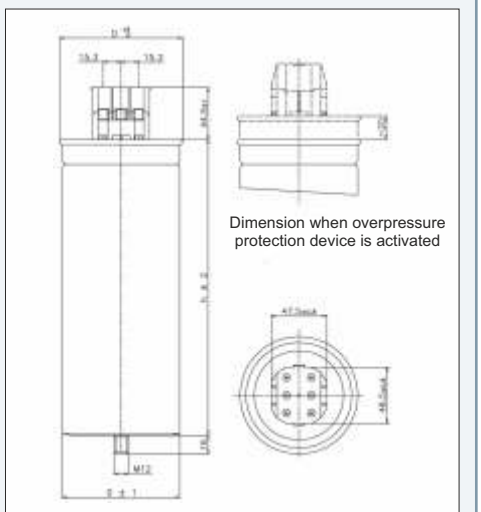
Product Code	110.000 Hours	Qn (kVAr) for 400 VAC	Qn (kVAr) for 450 VAC	C (F)	In (A)	DxH (mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.C10-400-1	●	1		3x6,6	1,4	55x165	195x390x255	-25^{0}C+55^{0}C	21	9
ENT.C10-400-1,5	●	1,5		3x9,9	2,2	55x165	195x390x255	-25^{0}C+55^{0}C	21	9
ENT.C10-400-2,5	●	2,5		3x16,6	3,6	55x165	195x390x255	-25^{0}C+55^{0}C	21	9
ENT.C10-450-1	●		1	3x5,2	1,3	55x165	195x390x255	-25^{0}C+55^{0}C	21	9
ENT.C10-450-1,5	●		1,5	3x7,9	1,9	55x165	195x390x255	-25^{0}C+55^{0}C	21	9
ENT.C10-450-2,5	●		2,5	3x13,1	3,2	55x165	195x390x255	-25^{0}C+55^{0}C	21	9

Product Code	110.000 Hours	Qn (kVAr) for 400 VAC	Qn (kVAr) for 450 VAC	Qn (kVAr) for 525 VAC	C (F)	In (A)	DxH (mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)
ENT.CXD-400-5	●	5			3x33	7,2	75x165	195x390xx255	-25^{0}C+55^{0}C	6	5,4
ENT.CXD-400-7,5	●	8			3x49	10,8	75x255	185x290x270	-25^{0}C+55^{0}C	6	7,9
ENT.CXD-400-10	●	10			3x66	14,4	75x255	185x290x270	-25^{0}C+55^{0}C	6	7,9
ENT.CXD-400-12,5	●	13			3x83	18	85x255	185x290x270	-25^{0}C+55^{0}C	6	9,6
ENT.CXD-400-15	●	15			3x100	21,7	90x255	185x290x270	-25^{0}C+55^{0}C	6	10,8
ENT.CXD-400-20	●	20			3x133	28,9	100x255	225x340x225	-25^{0}C+55^{0}C	6	13,2
ENT.CXD-400-25	●	25			3x166	36,1	116x255	330x340x225	-25^{0}C+55^{0}C	4	11,9
ENT.CXD-400-30	●	30			3x199	43,3	116x290	330x340x225	-25^{0}C+55^{0}C	4	13,4
ENT.CXD-450-5	●		5		3x26	6,4	75x165	195x390x255	-25^{0}C+55^{0}C	6	5,4
ENT.CXD-450-7,5	●		7,5		3x39	9,6	75x255	185x290x270	-25^{0}C+55^{0}C	6	7,9
ENT.CXD-450-10	●		10		3x52	12,8	75x255	185x290x270	-25^{0}C+55^{0}C	6	7,9
ENT.CXD-450-12,5	●		12,5		3x66	16	85x255	185x290x270	-25^{0}C+55^{0}C	6	9,6
ENT.CXD-450-15	●		15		3x79	19,2	90x255	185x290x270	-25^{0}C+55^{0}C	6	10,8
ENT.CXD-450-20	●		20		3x104	25,7	100x255	225x340x270	-25^{0}C+55^{0}C	6	13,2
ENT.CXD-450-25	●		25		3x131	32,1	116x255	330x340x225	-25^{0}C+55^{0}C	4	11,9
ENT.CXD-450-30	●		30		3x157	38,5	116x290	330x340x225	-25^{0}C+55^{0}C	4	13,4
ENT.CXD-550-2,5	●			2,3	3x8,5	2,6	65x165	195x390x255	-25^{0}C+55^{0}C	14	5,4
ENT.CXD-550-5	●			4,6	3x17	5,2	75x165	195x390x255	-25^{0}C+55^{0}C	6	5,4
ENT.CXD-550-7,5	●			6,8	3x25	7,9	75x255	185x290x270	-25^{0}C+55^{0}C	6	7,9
ENT.CXD-525-10	●			10	3x38	12,1	85x255	185x290x270	-25^{0}C+55^{0}C	6	7,9
ENT.CXD-525-12,5	●			12,5	3x48	15	85x255	185x290x270	-25^{0}C+55^{0}C	6	9,6
ENT.CXD-525-15	●			15	3x58	18,2	100x255	225x340x270	-25^{0}C+55^{0}C	6	10,8
ENT.CXD-525-20	●			20	3x77	24,2	116x255	330x340x225	-25^{0}C+55^{0}C	4	13,2
ENT.CXD-525-25	●			25	3x96	30,2	116x255	330x340x225	-25^{0}C+55^{0}C	4	11,9
ENT.CXD-525-30	●			30	3x115	36,3	116x290	330x340x225	-25^{0}C+55^{0}C	4	13,4

ENT.C.10 Series



ENT.CXD Series



** 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.*

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

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

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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 (F)	In (A)	DxH (mm.)	Box Dimensions (mm)	Operating Temperature	Pcs per Box	Box Weight (kg)	Figure No
ENT.C100-400-2,5	●	2,5	400-440 VAC	3x16,6	3,6	64x190	195x390x255	-25^{0}C+55^{0}C	9	7,1	1
ENT.C100-400-4	●	4	400-440 VAC	3x25	5,8	64x190	195x390x255	-25^{0}C+55^{0}C	9	7,1	1
ENT.C100-400-5	●	5	400-440 VAC	3x33,2	7,2	64x190	195x390x255	-25^{0}C+55^{0}C	9	7,1	1
ENT.C100-400-7,5	●	7,5	400-440 VAC	3x45	10,8	64x190	195x390x255	-25^{0}C+55^{0}C	9	7,1	1
ENT.C100-400-10	●	10	400-440-525-690 VAC	3x54,8	14,4	64x265	195x390x255	-25^{0}C+55^{0}C	9	9,4	1
ENT.C100-400-12,5	●	12,5	400-415-440 VAC	3x82,9	18	64x265	195x390x255	-25^{0}C+55^{0}C	9	9,4	1
ENT.C100-440-20	●	20	400-440 VAC	3x132,6	28,8	84x265	195x390x255	-25^{0}C+55^{0}C	4	7,6	2
ENT.C100-440-25	●	25	400-415-440-460 VAC	3x165,8	36,1	85x265	195x390x255	-25^{0}C+55^{0}C	4	7	2
ENT.C100-440-30	●	30	400-415-440-460 VAC	3x198,9	43,3	116x190	195x390x255	-25^{0}C+55^{0}C	4	9	2
ENT.C100-440-50	●	50	400-415-440-460 VAC	3x331,6	72,2	172x210	195x390x255	-25^{0}C+55^{0}C	1	5	5

Dimensions

Figure 1

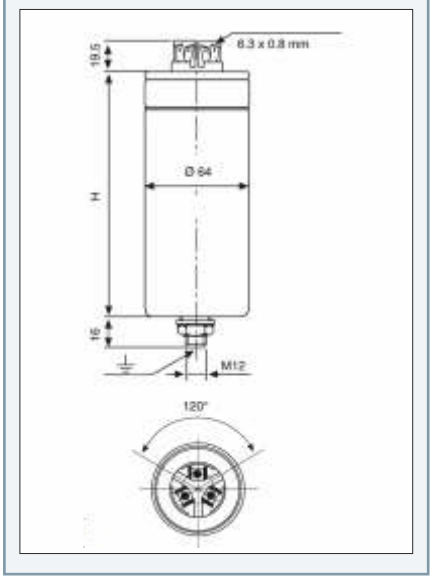


Figure 2

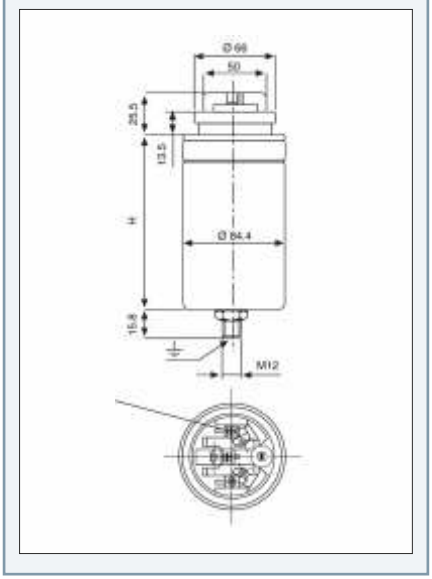
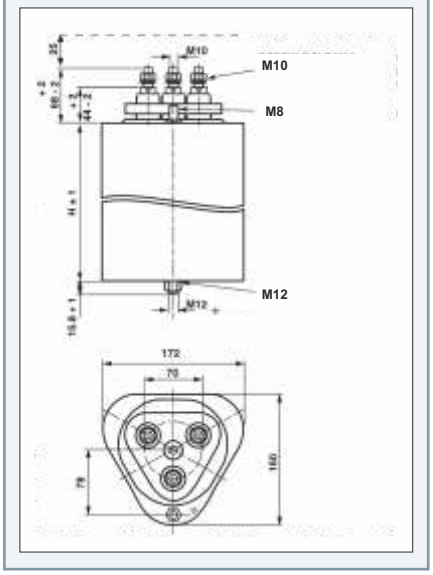


Figure 3



Shunt Reactors (Inductive Load Reactor)

ENT.ERS Series

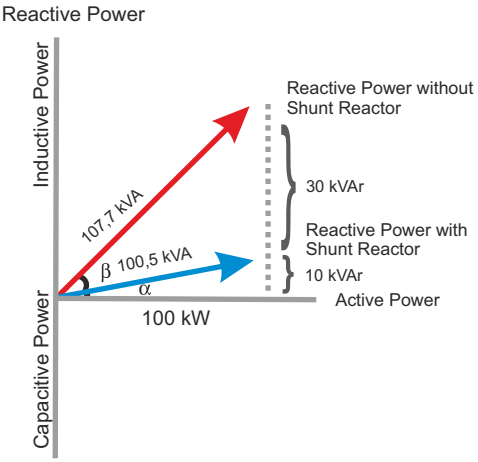
Shunt reactors are designed to compensate the capacitive power used by long underground power lines, UPS, computers, electronic ballast, and energy saving lamps.

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;

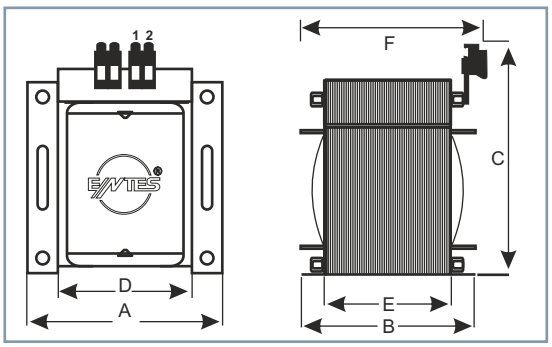
- Single or three-phase, highly conductive design with air gap
- F isolation class insulation material on the windings resistant to 155°C
- High quality copper or aluminum windings (copper coated terminal on aluminum windings)
- Custom designs to meet customer specifications
- Thermal protection against 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

	Without Shunt Reactor	With Shunt Reactor
Active Power	100 kW	100 kW
Reactive Power	40 kVAr	10 kVAr
Apparent Power	107,7 kVA	100,5 kVA
Power Factor Ratio	0,928	0,995



Single Phase Shunt Reactors

Type	kVAr	L (mH)	Irms (A)	Operating Voltage	Size	Weight (kg)
ENT.ERS1 230/0,1	0,1	1661	0,44	230V 50Hz	1	1,3
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	103	6,82	230V 50Hz	4	10
ENT.ERS1 230/2,5	2,5	67	10,9	230V 50Hz	6	20
ENT.ERS1 230/0,3-0,4-0,5 (SELECTIVE)	0,5	380	2,17	230V 50Hz	1	4,25



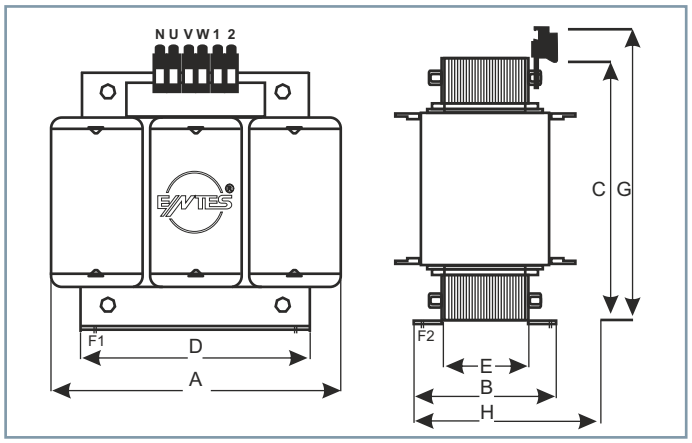
Size	A	B	C	D	E	F
1	84	76	91	64	64	65
2	96	102	99	84	87	89
3	150	113	141	122	89	90
4	150	129	141	122	104	105
5	150	153	141	122	128	130
6	192	166	299	130	148	150

Shunt Reactors (Inductive Load Reactor)

ENT.ERS Series

Three Phase Shunt Reactors

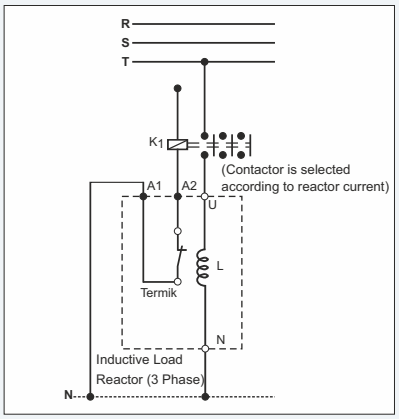
Type	kVAr	L (mH)	Irms (A)	Operating Voltage	Size	Weight (kg)
ENT.ERS3 400/0,25	0,25	2000	0,36	400V 50Hz	1	2
ENT.ERS3 400/0,5	0,5	1000	0,73	400V 50Hz	1	3,7
ENT.ERS3 400/1	1	505	1,45	400V 50Hz	1	5
ENT.ERS3 400/1,5	1,5	336	2,2	400V 50Hz	2	9,5
ENT.ERS3 400/2	2	252	2,9	400V 50Hz	3	9,5
ENT.ERS3 400/2,5	2,5	203	3,6	400V 50Hz	3	10
ENT.ERS3 400/3	3	168	4,35	400V 50Hz	4	15
ENT.ERS3 400/5	5	100	7,2	400V 50Hz	4	20
ENT.ERS3 400/7,5	7,5	68	10,9	400V 50Hz	5	26
ENT.ERS3 400/10	10	51	14,5	400V 50Hz	6	33,5
ENT.ERS3 400/15	15	34	21,74	400V 50Hz	6	54
ENT.ERS3 400/20	20	26	29	400V 50Hz	7	110
ENT.ERS3 400/25	25	20	36,3	400V 50Hz	7	115
ENT.ERS3 400/40	40	13	58	400V 50Hz	8	140



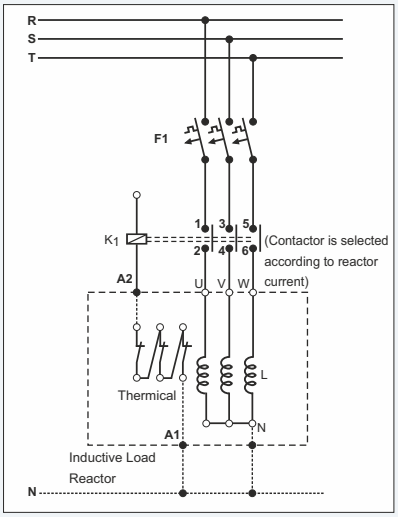
Size	A	B	C	D	E	G	H
1	180	102	150	132	82	220	202
2	180	120	150	132	100	220	220
3	240	102	200	175	76	270	202
4	240	126	200	175	100	270	226
5	300	140	250	225	104	320	240
6	360	163	300	265	118	370	263
7	420	247	350	315	187	420	347
8	480	250	400	360	190	470	350

Connection Diagrams

Single Phase Shunt Reactor

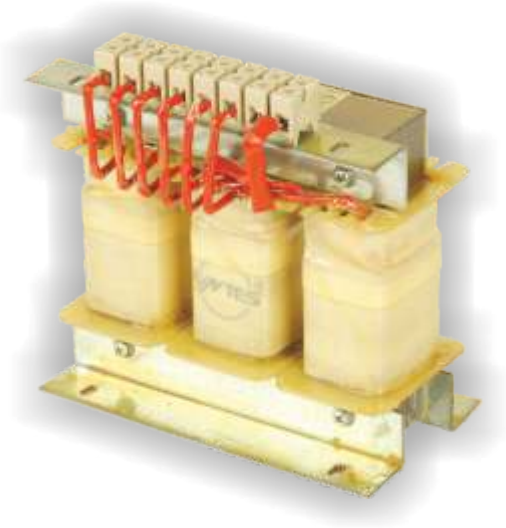


Three Phase Shunt Reactor



Detuned Filter Reactors

ENT.ERH Series



ENTES harmonic 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.

CE

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

Detuned Filter Reactors

ENT.ERH Series

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 is selected based on THDV and THDI values, as shown in the following table.

** 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%

Size	Size (mm)				
	A	B	C	G	H
0	120	45	100	120	-
1	150	67	125	195	-
2	150	82	125	195	-
3	180	92	150	220	-
4	180	102	150	220	-
5	225	100	190	-	200
6	225	124	190	-	224
7	240	130	200	-	230
8	265	126	220	-	226
9	265	140	220	-	240
10	265	152	220	-	252
11	300	132	250	-	232
12	300	140	250	-	240
13	360	163	300	-	263
14	420	168	350	-	288

** Dimensions may vary depending on design.*

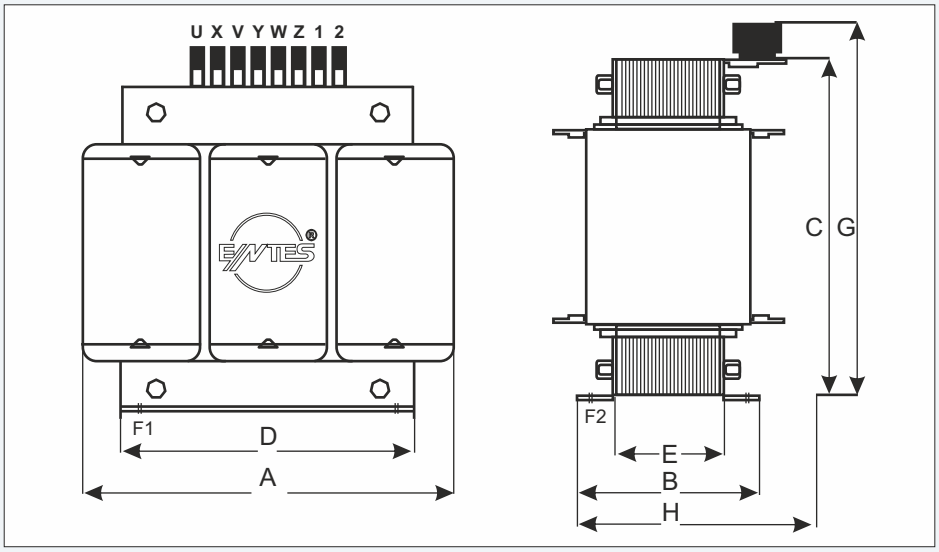
Reactors' Serial Resonance Frequency Table:

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.*

Detuned Filter Reactor Dimensions



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)	Iiin (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	17,55	19,30	39,79	62,55	1	8	ENT.CXD-450-12.5
ENT.ERH-5,67-400-12,5	12,5	2,45	21,93	24,13	49,74	78,19	2	10	ENT.CXD-450-15
ENT.ERH-5,67-400-15	15	2,04	26,32	28,95	59,69	93,83	2	11	ENT.CXD-450-10+ENT.CXD-450-7,5
ENT.ERH-5,67-400-20	20	1,53	35,09	38,60	79,59	125,11	3	12	ENT.CXD-450-25
ENT.ERH-5,67-400-22,4	22,4	1,37	39,31	43,24	89,14	140,12	4	15,5	ENT.CXD-450-25
ENT.ERH-5,67-400-25	25	1,22	43,87	48,26	99,49	156,39	4	16	ENT.CXD-450-30
ENT.ERH-5,67-400-30	30	1,02	52,64	57,91	119,38	187,66	5	20	ENT.CXD-450-15+ENT.CXD-450-20
ENT.ERH-5,67-400-40	40	0,77	70,19	77,21	159,18	250,22	5	23	ENT.CXD-450-25 2 pcs.
ENT.ERH-5,67-400-44,4	44,4	0,69	77,91	85,70	176,69	277,74	5	28	ENT.C100-440-50
ENT.ERH-5,67-400-50	50	0,61	87,74	96,51	198,97	312,77	5	30	ENT.CXD-450-30 2 pcs.
ENT.ERH-5,67-400-60	60	0,51	105,28	115,81	238,77	375,33	5	30	ENT.CXD-450-25 3 pcs.
ENT.ERH-5,67-400-80	80	0,38	140,38	154,42	318,36	500,44	6	34	ENT.CXD-450-25 4 pcs.
ENT.ERH-5,67-400-100	100	0,31	175,47	193,02	397,95	625,55	6	36	ENT.CXD-450-30 4 pcs.

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

Type	kVAr	L (mH)	Irms (A)	Ith (A)	Iiin (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 adet
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	3	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	16,07	17,67	33,55	65,50	2	8	ENT.CXD-450-12.5
ENT.ERH-7-400-12,5	12,5	3,07	20,08	22,09	41,94	78,60	2	9	ENT.CXD-450-15
ENT.ERH-7-400-15	15	2,56	24,10	26,51	50,33	91,69	2	10	ENT.CXD-450-10+ENT.CXD-450-7,5
ENT.ERH-7-400-20	20	1,92	32,13	35,35	67,11	130,99	3	13	ENT.CXD-450-25
ENT.ERH-7-400-22,2	22,2	1,72	35,7	39,3	75	137	4	15	ENT.C100-440-25
ENT.ERH-7-400-25	25	1,53	40,17	44,18	83,88	157,19	4	17,5	ENT.CXD-450-30
ENT.ERH-7-400-30	30	1,28	48,20	53,02	100,66	183,39	4	19	ENT.CXD-450-15+ENT.CXD-450-20
ENT.ERH-7-400-40	40	0,96	64,27	70,69	134,21	261,98	5	21	ENT.CXD-450-25 2 pcs.
ENT.ERH-7-400-44,4	44,4	0,86	71,4	78,6	141	274	5	23	ENT.C100-440-50
ENT.ERH-7-400-50	50	0,77	80,33	88,37	167,76	314,38	5	25	ENT.CXD-450-30 2 pcs.
ENT.ERH-7-400-60	60	0,64	96,40	106,04	201,32	392,98	5	30	ENT.CXD-450-25 3 pcs.
ENT.ERH-7-400-80	80	0,48	128,53	141,39	268,42	523,97	6	43	ENT.CXD-450-25 4 pcs.
ENT.ERH-7-400-100	100	0,38	160,67	176,73	335,53	628,76	6	45	ENT.CXD-450-30 4 pcs.

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

Type	kVAr	L (mH)	Irms (A)	Ith (A)	Iiin (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	15,38	16,92	28,07	57,03	2	10	ENT.CXD-525-15
ENT.ERH-14-400-12,5	12,5	6,63	19,23	21,15	35,08	71,29	3	12	ENT.CXD-525-20
ENT.ERH-14-400-15	15	5,53	23,08	25,38	42,10	85,55	4	13	ENT.CXD-525-10+ENT.CXD-525-12,5
ENT.ERH-14-400-20	20	4,15	30,77	33,85	56,13	114,06	5	21	ENT.CXD-525-30
ENT.ERH-14-400-22,2	22,2	3,70	34,46	37,91	62,87	127,75	5	22	ENT.CXD-525-20+ENT.CXD-525-12,5
ENT.ERH-14-400-25	25	3,32	38,46	42,31	70,17	142,58	5	25	ENT.CXD-525-25+ENT.CXD-525-12,5
ENT.ERH-14-400-30	30	2,76	46,15	50,77	84,20	171,09	5	27	ENT.CXD-525-30+ENT.CXD-525-15
ENT.ERH-14-400-40	40	2,07	61,54	67,69	112,27	228,12	5	32	ENT.CXD-525-30 2 pcs.
ENT.ERH-14-400-44,4	44,4	1,87	68,31	75,14	124,62	253,22	5	32	ENT.CXD-525-30 2 pcs.
ENT.ERH-14-400-50	50	1,66	76,92	84,62	140,33	285,15	5	40	ENT.CXD-525-25 3 pcs.
ENT.ERH-14-400-60	60	1,38	92,31	101,54	168,40	342,18	6	48	ENT.CXD-525-30 3 pcs.
ENT.ERH-14-400-80	80	1,04	123,08	135,38	224,54	456,24	6	55	ENT.CXD-525-30 4 pcs.
ENT.ERH-14-400-100	100	0,83	153,85	169,23	280,67	570,31	7	62	ENT.CXD-525-30 5 pcs.

Line Reactors

ENT.SGR Series

Entes ENT.SGR Series line reactors are used between the network and motor drives. Connecting these reactors serially between the network and motor drives provides many benefits to the system.

Advantages;

- Limits the peaks that occur in the current
- Prevents drive vibrations
- Limits harmonic currents
- Protects the motor drive from high voltages
- Prolongs the system's operating life

CE

Features

- Iron core with high magnetic permeability
- Voltage drop Uk=4%. Uk=2% type reactors can be manufactured on demand
- Impregnated with varnish under vacuum to ensure silent, efficient and moisture-free operation
- CE marked and complies with EN 61558-2-20 standard

Motor Current Selection Table

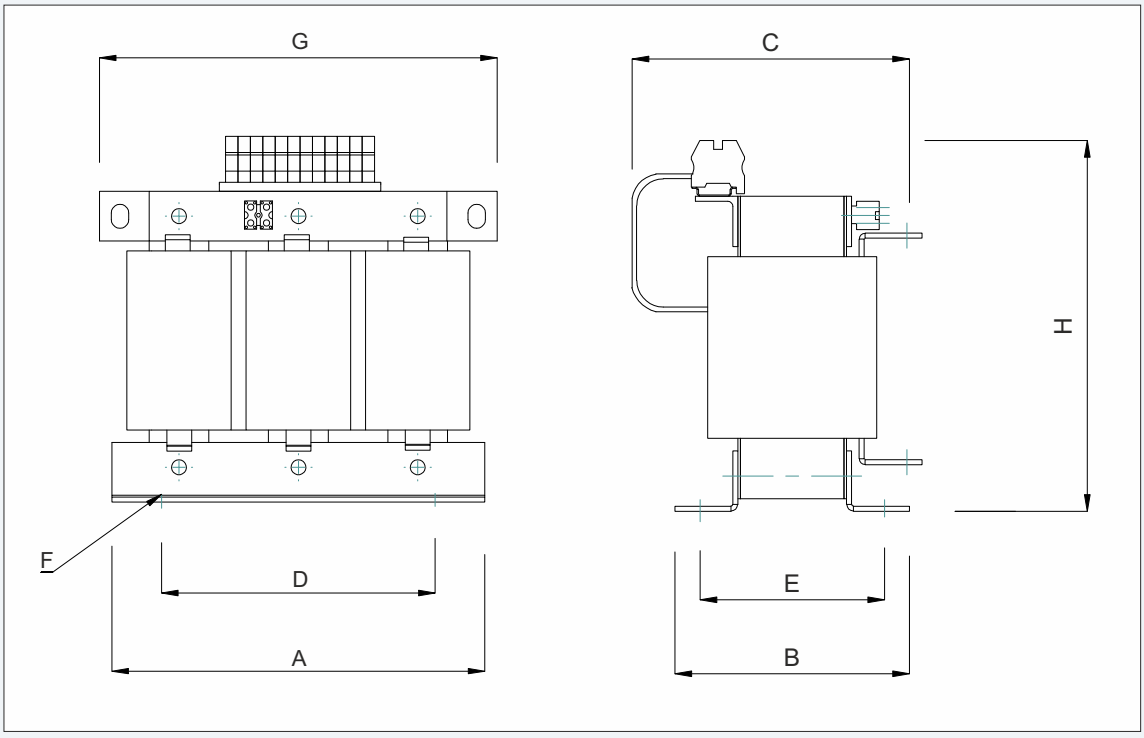
400V 50Hz 4%	cos φ					
Motor Power (kW)	0,6	0,65	0,7	0,75	0,8	0,85
1	3,2 A	2,5 A	2,5 A	2.0 A	2.0 A	2.0 A
1,25	3,2 A	3,2 A	3,2 A	2,5 A	2,5 A	2,5 A
1,6	4.0 A	4.0 A	4.0 A	3,2 A	3,2 A	3,2 A
2	5.0 A	5.0 A	5.0 A	4.0 A	4.0 A	4.0 A
2,5	6,3 A	6,3 A	6,3 A	5.0 A	5.0 A	5.0 A
3,2	8.0 A	8.0 A	8.0 A	6,3 A	6,3 A	6,3 A
4	10.0 A	10.0 A	10.0 A	8.0 A	8.0 A	8.0 A
5	12,5 A	12,5 A	12,5 A	10.0 A	10.0 A	10.0 A
6,3	16.0 A	16.0 A	16.0 A	12,5 A	12,5 A	12,5 A
8	20.0 A	20.0 A	20.0 A	16.0 A	16.0 A	16.0 A
10	25.0 A	25.0 A	25.0 A	20.0 A	20.0 A	20.0 A
12,5	32.0 A	32.0 A	32.0 A	25.0 A	25.0 A	25.0 A
16	40.0 A	40.0 A	40.0 A	32.0 A	32.0 A	32.0 A
20	50.0 A	50.0 A	50.0 A	40.0 A	40.0 A	40.0 A
25	63.0 A	63.0 A	63.0 A	50.0 A	50.0 A	50.0 A
32	80.0 A	80.0 A	80.0 A	63.0 A	63.0 A	63.0 A
40	100.0 A	100.0 A	100.0 A	80.0 A	80.0 A	80.0 A
50	125.0 A	125.0 A	125.0 A	100.0 A	100.0 A	100.0 A
63	160.0 A	160.0 A	160.0 A	125.0 A	125.0 A	125.0 A

Line Reactors

ENT.SGR Series

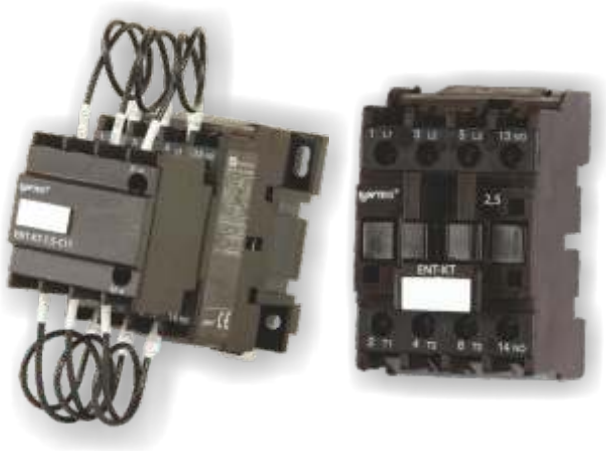
Product Code	Current (A)	Motor Power (KW) Cos =0,75	Inductance (mH)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	H (mm)	Weight (kg)
ENT.SGR.4.400 - 5A	5	2,5	5,704	120	61	90	44	100	5x10	125	2
ENT.SGR.4.400 - 6,3A	6,3	3	4,753	120	61	90	44	100	5x10	125	2,25
ENT.SGR.4.400 - 8A	8	3,75	3,565	120	61	90	44	100	5x10	125	2,75
ENT.SGR.4.400 - 10A	10	5	2,852	120	71	110	54	100	5x10	125	3
ENT.SGR.4.400 - 12,5A	12,5	6	2,377	150	75	110	55	125	5x10	150	3,25
ENT.SGR.4.400 - 16A	16	7,5	1,901	150	75	110	55	125	5x10	150	4
ENT.SGR.4.400 - 20A	20	10	1,426	150	90	110	70	150	5x10	150	4,5
ENT.SGR.4.400 - 25A	25	12	1,188	150	90	110	70	150	5x10	150	5
ENT.SGR.4.400 - 32A	32	15	0,951	180	94	135	74	150	6x12	181	6
ENT.SGR.4.400 - 40A	40	18	0,792	240	105	185	80	150	6x12	210	10
ENT.SGR.4.400 - 50A	50	25	0,570	240	105	185	80	200	6x12	252	13
ENT.SGR.4.400 - 63A	63	30	0,475	240	125	185	100	200	10x15	252	16
ENT.SGR.4.400 - 80A	80	37,5	0,380	240	125	185	100	205	10x15	262	20
ENT.SGR.4.400 - 100A	100	50	0,285	240	140	185	115	205	10x15	262	22
ENT.SGR.4.400 - 110A	110	55	0,259	240	126	186	106	205	10x15	262	23
ENT.SGR.4.400 - 125A	125	60	0,238	300	132	224	97	235	10x15	300	24
ENT.SGR.4.400 - 160A	160	75	0,190	300	157	224	122	255	10x15	325	28

Dimensions



Capacitor Duty Contactors

ENT-KT Series

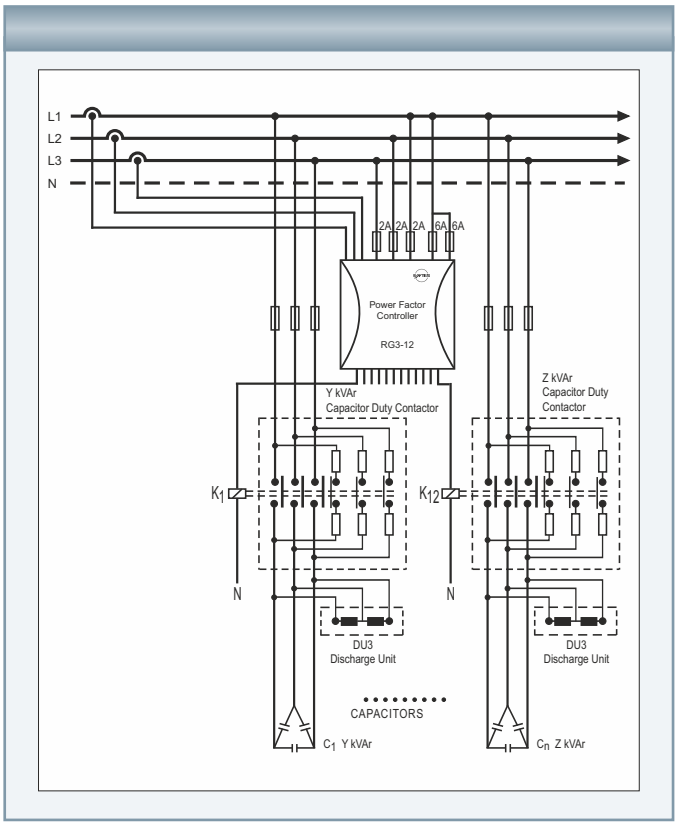


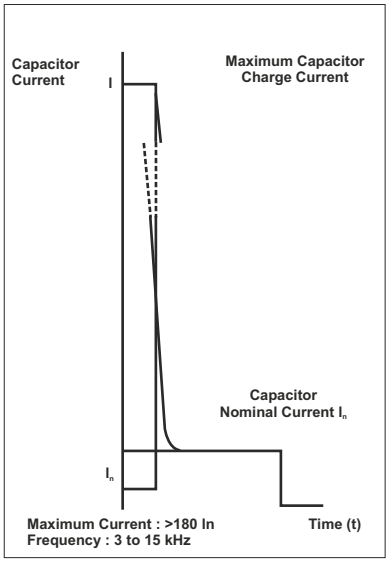
ENT-KT capacitor duty contactors are two-stage contactors designed to prevent high inrush currents.
With auxiliary ignition block, ENT-KT transmits inrush currents over damping resistors and enables excess currents to stay within acceptable limits. (In 2.5 and 5kVAr models, the special reinforced contact 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-497
- 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

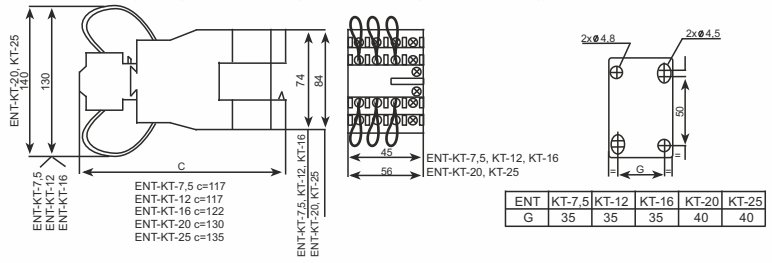
Capacitor Duty Contactors

ENT-KT Series

Product Code	Operating Power (kVAr) 0 < 55 °C 50/60Hz 200V 240V	400V 440V	Auxiliary Contacts (Instantaneous) NO	NC	Max. Hourly Operating Cycles Count	Switching Life (Operating Cycles)
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	40,0	75,0	1	2	240	100.000

Dimensions

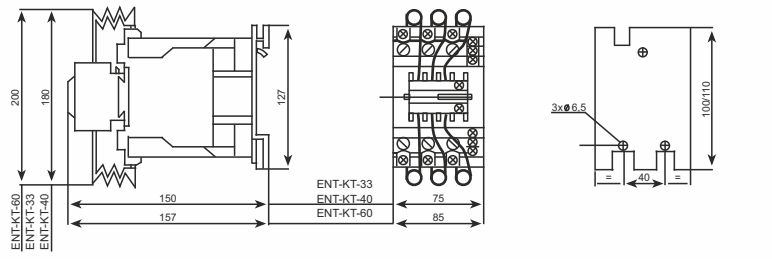
ENT-KT-7,5-C11, ENT-KT-12-C11, ENT-KT-16-C11, ENT-KT-20-C11, ENT-KT-25-C11



ENT	KT-7,5	KT-12	KT-16	KT-20	KT-25
G	35	35	35	40	40

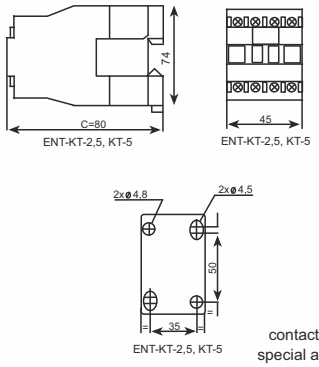
Note: Contactor Type ENT-KT-2,5-C10 – ENT-KT-25-C11 : 35 mm DIN rail mount

ENT-KT-33-C12, ENT-KT-40-C12, ENT-KT-60-C12



Note: Contactor Type ENT-KT-33-C12 – ENT-KT-60-C12 : 75 mm DIN rail mount

ENT-KT-2,5-C10, ENT-KT-5-C10



Note: Contactor Type ENT-KT-2,5-C10 – ENT-KT-25-C11 : 35 mm DIN rail mount

Thyristor Switches

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

NEW

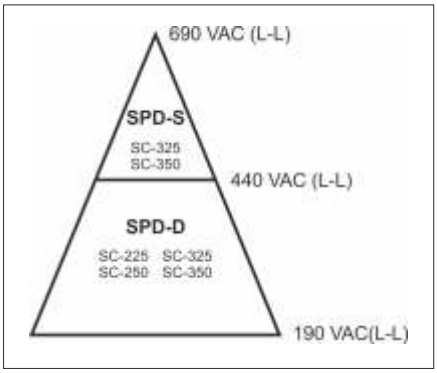
SC series thyristor switches are used in systems where fast-switching is required. With the use of SC series thyristor switches, capacitors can be switched on and off in a duration of 1 period (20ms).
As a result, power factor correction of fast-switching loads such as spot welding machines, cranes and arc furnaces can be done effectively.

Features;

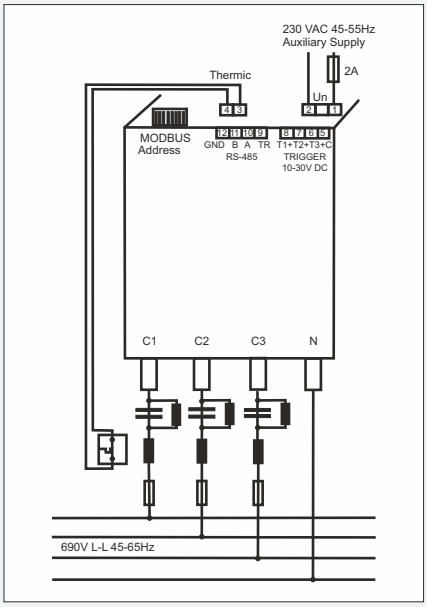
- Reaction time of less than 20ms
- Reactor thermal input
- Thermal protection
- Warning LEDs
- Easy mounting
- Quiet operation
- Triggering with RS-485 or DC signal
- Ability to trigger when the capacitor voltage is greater than the maximum voltage
- Cooling design that enables continuous operation under maximum temperature and load
- High safety with FFT in high harmonic environments
- Operating Voltage 440/690V
- Maximum Power 25/50 KVAr
- 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; 275,7mmx140mmx212,1mm

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

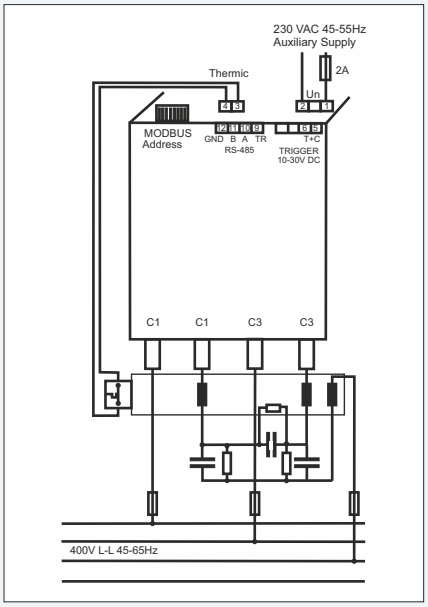
⚠ These products are advised to be used with ENTES SPD Series Surge Protection Devices.



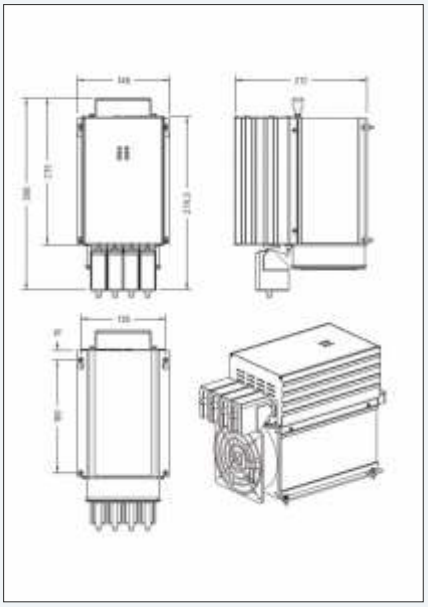
Star Connection



Delta Connection



Dimensions



L.V. Current Transformers

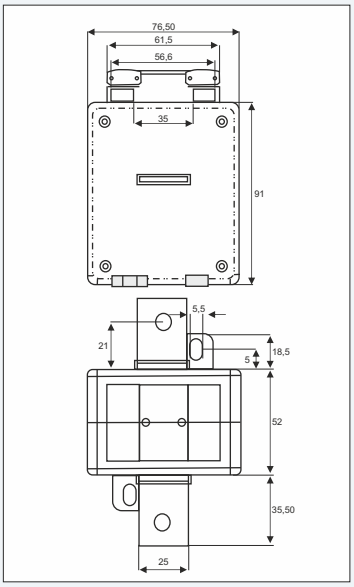
ENT Series

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

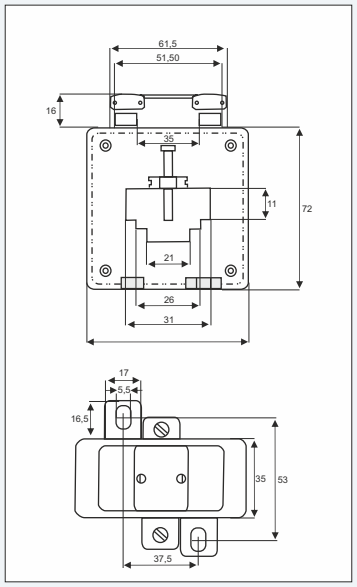
**Class 0.5 current transformers are supplied as sealed.*

Dimensions

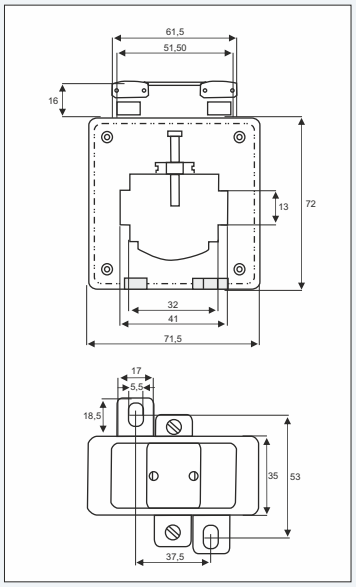
ENT.B



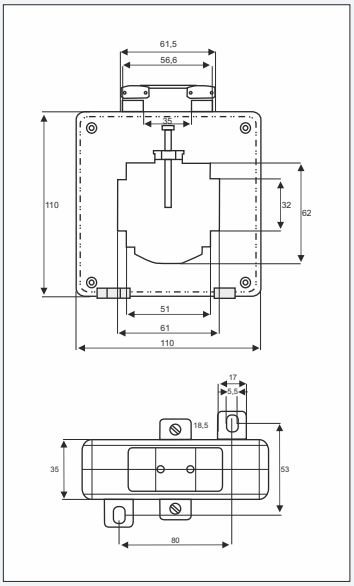
ENT.30



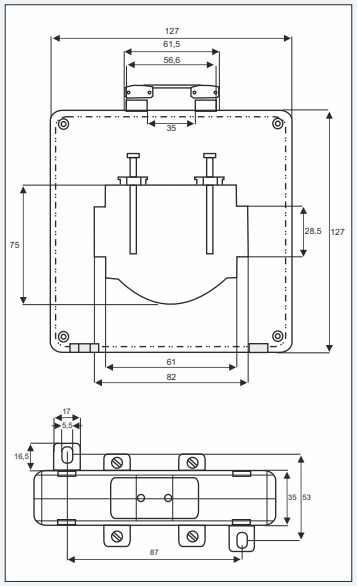
ENT.40



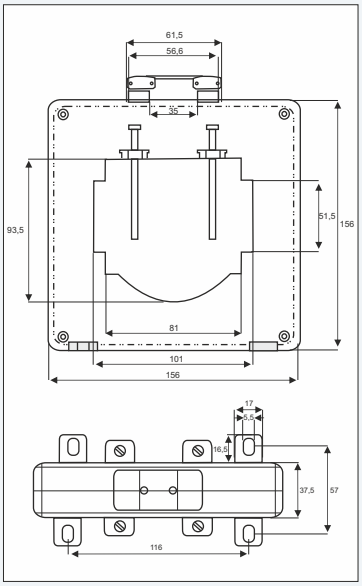
ENT.60



ENT.80

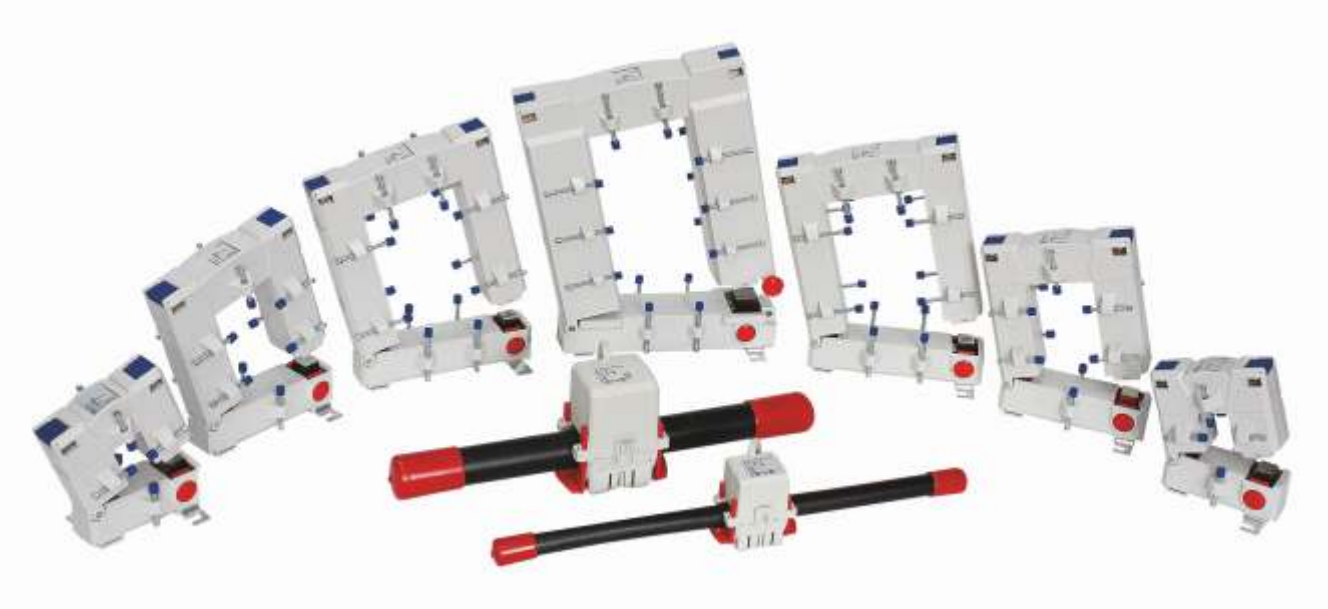


ENT.100



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^{0}C/+50^{0}C
- Storage temperature -25^{0}C/+70^{0}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 Icth=1.0xIn
- Thermal Instantaneous Nominal Current Ith=60xIn, 1s
- Maximum Operating Voltage Um: 0,72kV
- Insulation Test Voltage 3kV, Ueff, 50Hz, 1min
- Frequency: 50Hz
- Insulation Class: E
- Standards: DIN EN 60044/1, VDE 0414-1

L.V. Current Transformers

ENS.AYC Series

NEW

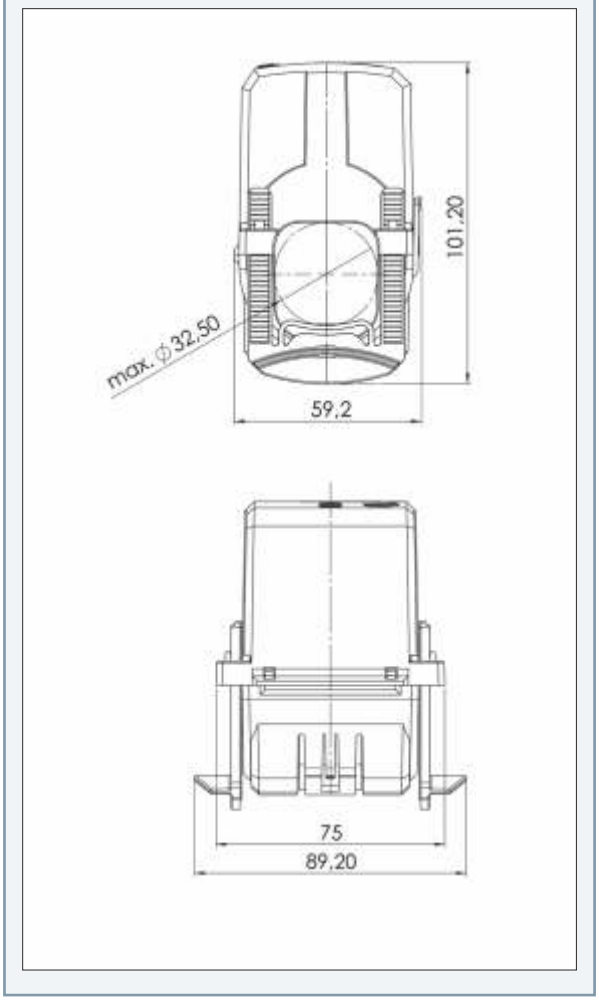
ENS.AYC 32

Compact Split-Core Current Transformers

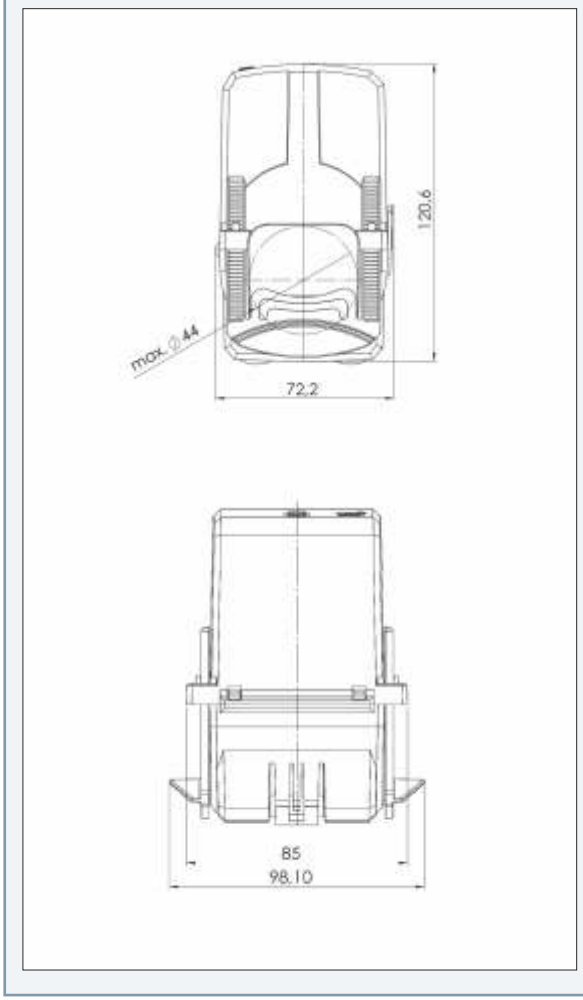
Type	Primary Current (A)	Nominal Power (VA)	Class	Internal Size- Bar Dimension (mm)
AYC 32 Secondary 5A				
ENS.AYC 32 100	100	1,5	3	20x30
ENS.AYC 32 125	125	2,5	3	20x30
ENS.AYC 32 150	150	3	3	20x30
ENS.AYC 32 200	200	3	3	20x30
ENS.AYC 32 250	250	3	3	20x30
ENS.AYC 32 300	300	2,5	1	20x30
ENS.AYC 32 400	400	5	1	20x30
ENS.AYC 32 500	500	5	1	20x30
ENS.AYC 32 600	600	5	1	20x30
AYC 44 Secondary 5A				
ENS AYC 44 250	250	1,5	1	30x40
ENS AYC 44 300	300	2,5	1	30x40
ENS AYC 44 400	400	5	1	30x40
ENS AYC 44 500	500	5	1	30x40
ENS AYC 44 600	600	5	1	30x40
ENS AYC 44 750	750	5	1	30x40
ENS AYC 44 800	800	5	1	30x40
ENS AYC 44 1000	1000	5	1	

Dimensions

ENS.AYC 32



ENS.AYC 44



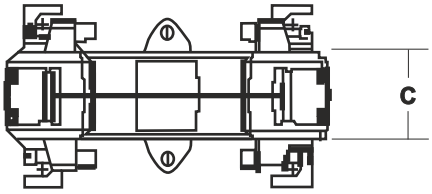
A.G. Current Transformers

ENS.AYS Series

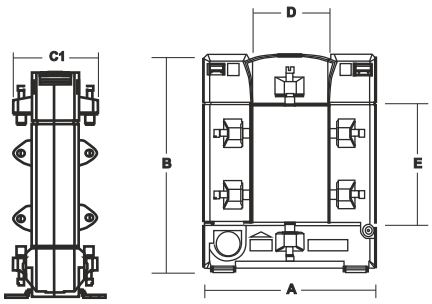
Split-Core Current Transformers

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	1,5			●	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	5		●		50x80
ENS.AYS 812	400	1,5	●			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	●			80x60
ENS.AYS 816	2500-3000	30	●			80x160
ENS.AYS 816	4000	15	●			80x160

ENS.AYS 23

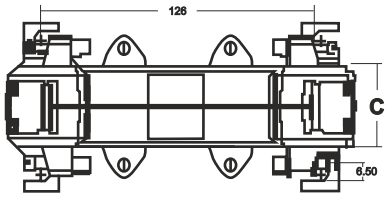


ENS.AYS 58

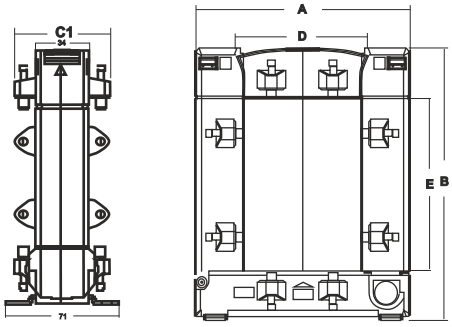


Type	ENS.AYS 23	ENS.AYS 58
A	93	125
B	106	158
C/C1	34/58	34/58
D	20	50
E	30	80

ENS.AYS 812



ENS.AYS 816



Tip	ENS.AYS 812	ENS.AYS 816
A	155	195
B	198	243
C/C1	34/58	64/79
D	80	80
E	120	160

A.G. Current Transformers

ENS.3PH Series

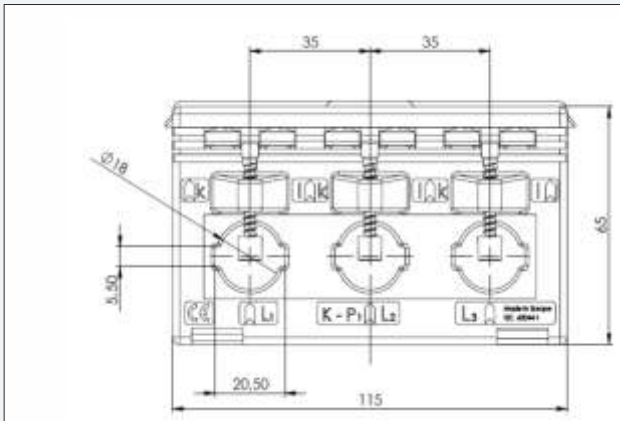
Three Phases Current Transformers

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	20
ENS.3PH 20 3X150/5A	3x150	1,25	1	20
ENS.3PH 20 3X200/5A	3x200	1,5	1	20
ENS.3PH 20 3X250/5A	3x250	2,5	1	20
ENS.3PH 30				
ENS.3PH 30 3X250/5A	3x250	2,5	1	30
ENS.3PH 30 3X300/5A	3x300	3,75	1	30
ENS.3PH 30 3X400/5A	3x400	5	1	30
ENS.3PH 30 3X500/5A	3x500	5	1	30
ENS.3PH 30 3X600/5A	3x600	5	1	30

NEW

ENS.3PH 20

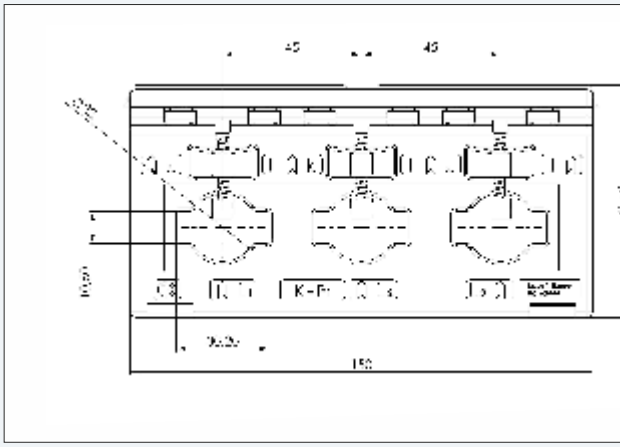
Dimensions



NEW

ENS.3PH 30

Dimensions



Print Date: 09.2014

Current Transformer / Discharge Unit

CT Series / DU-3

RMS-CT-25
(rail mounting kit)

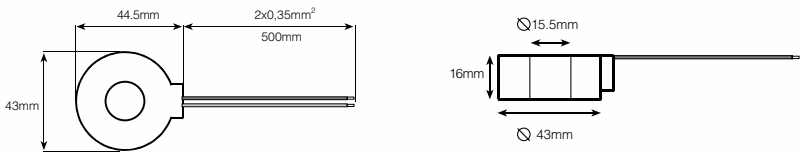
CE

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

L.V. Current Transformer	Type	Specifications	ENTES Products to be used with* 120 A	210 A
 (for ENTES For ENTES Digital Measuring Devices only)	**CT-25**	**Ratio :** 1/2500, Class:1 **Inner Diameter :** 15.5 mm **Outer Diameter :** 43 mm	MPR-53 MPR-53S EPR-04 EPR-04S EPM-04 EPM-04C EPM-04CS EPM-04h EPM-06 EPM-06C EPM-06CS EPM-07 EPM-07S	EPM-4A EPM-4C EPM-4D EPM-4P EPM-R4C
	CT-80D (only suitable for ES-80L)	**Ratio :** 1/2500, Class:1 **Inner Diameter :** 19 mm **Outer Diameter :** 47.5 mm		

*Must be specified with the order.

Dimensions

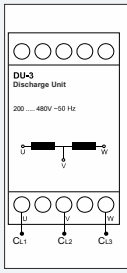


Discharge Unit

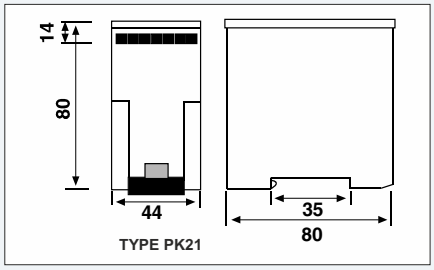
DU-3 discharging unit improves capacitor operating life and prevents internal heat losses by quickly discharging the capacitors.

Specifications	DU-3
Electrical Features	
Coil Resistance	3000
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

Connection Diagrams



Dimensions



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

Reactive Power	Discharge Time (s)		
Q (kVAr)	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

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 in graphic display. These systems can track power factor correction, compare energy consumptions on different locations, and improve energy costs.

Also all measurements can be read from a single monitoring center with Entbus software.

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
- RPT-1

GPRS Modems

- GEM-05/10/10SH
- GEM-15

Pulse Concentrator

- EPC-12

Remote Monitoring Software

Entbus® Pro

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 succesfully 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
- 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

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.

Remote Monitoring Software

Entbus® Pro

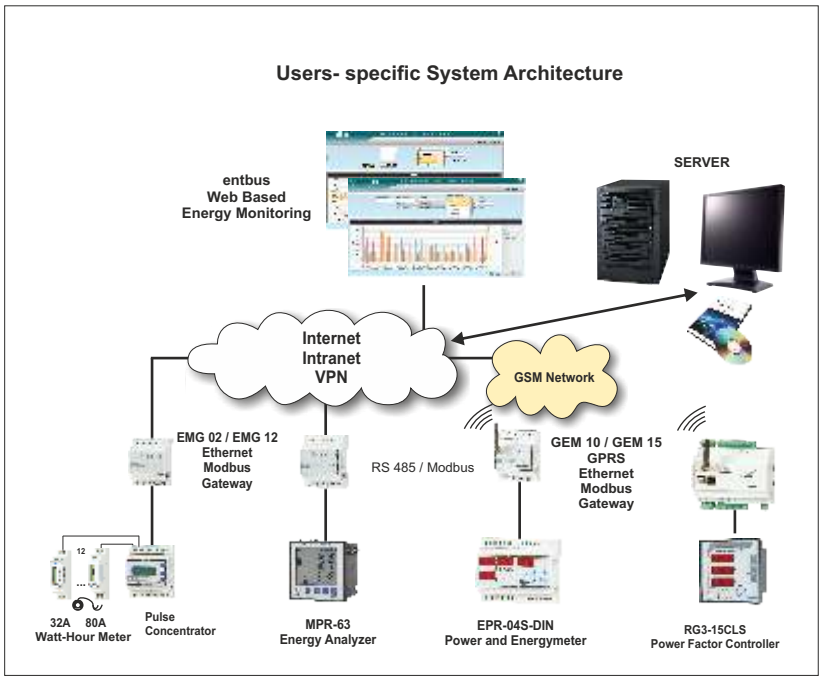
System Architecture

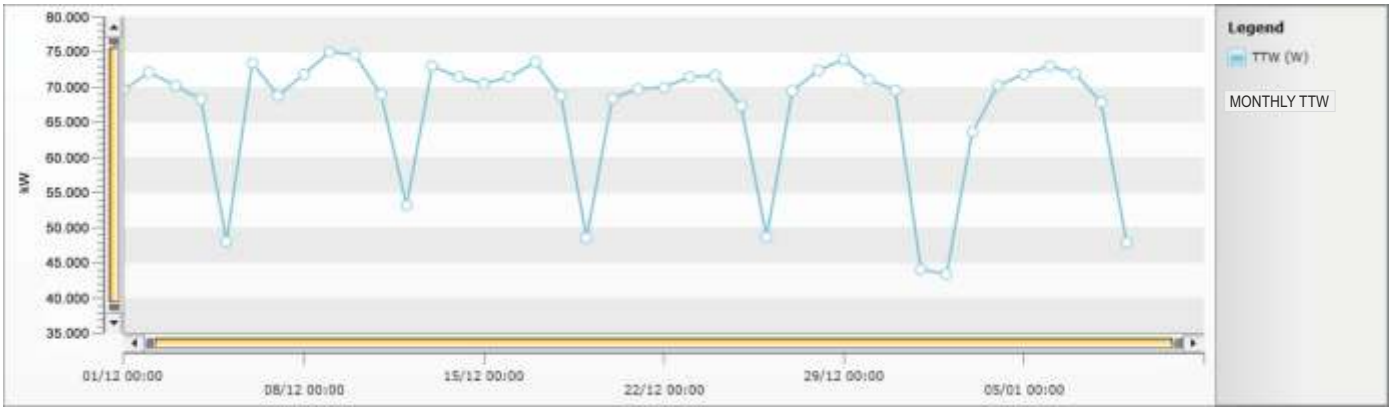
ENTBUS® Pro software can be utilized in two ways.

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

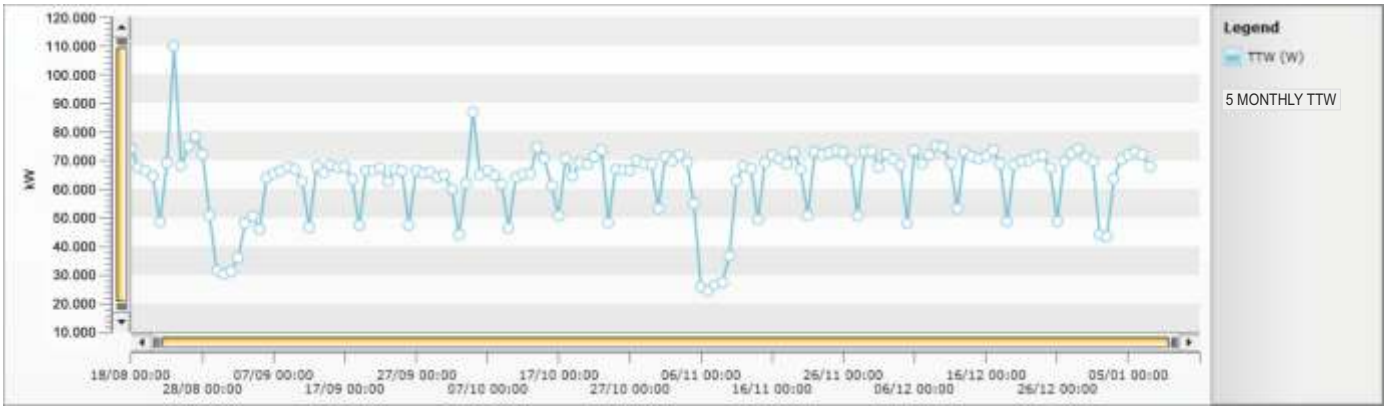
The software is installed in users server. The data are collected by running the software on intranet or web.

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

Print Date: 09.2014

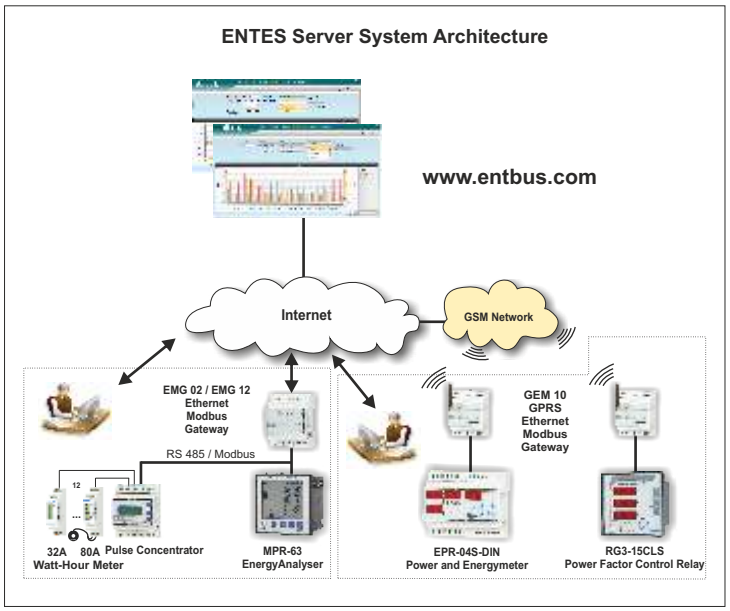
Remote Monitoring Software

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

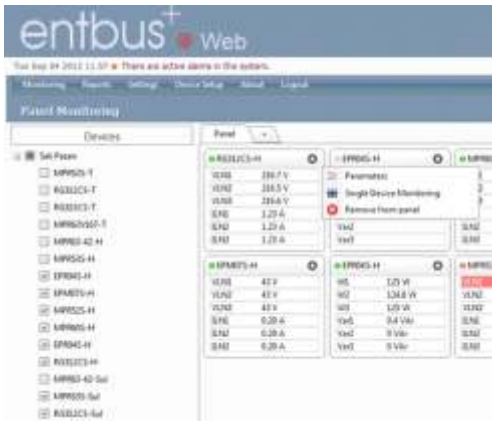
Remote Monitoring Software

Entbus® Plus

NEW

Monitoring Screen

Web Module



Graphical Design Screen

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

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 Sp1 Microsoft Windows Server 2008 Sp2 Microsoft Windows Server 2008R2 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
RPT-1	RS-485 to RS-485 Repeater	32	*	1

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

RS-USB2 RPT-1

RS-485 USB Converter

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

Features

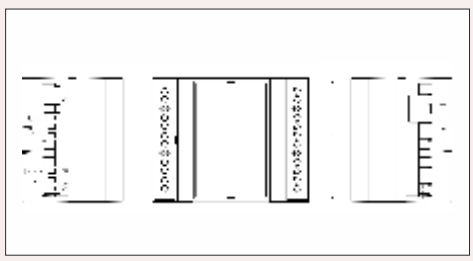
- Supports USB 1.1 and USB 2.0 / 300-115.200 bps transfer rate
- Automatic flow control for RS-485
- Minimum 3000 VDC isolation
- Activation LED
- Can be powered from a USB port and does not requireexternal supply.
- Automatic "transfer rate" definition ESD (Electro-static discharge) protection

RPT-1 RS-485 Repeater

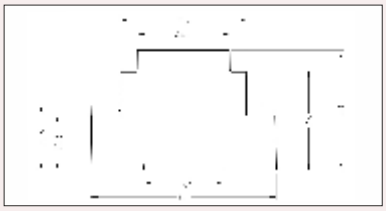
- Variable transfer rate 300,...9600,...115k
- Variable Data Format

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	9-24 VAC - 9-30 VDC (with adapter) or (~100 mA) by the USB Port
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)

Connection Diagram



Dimensions



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.

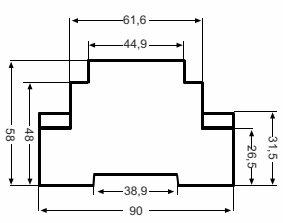
SPECIFICATIONS

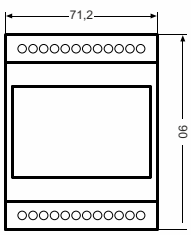
	GEM-05	GEM-10	GEM-10SH
ENCLOSURE			
Dimensions	90x71x80 mm		
Protection Class	IP 40 Front Panel,IP54 Optional		
Weight	0,4kg/device; 12 pieces per package		
COMMUNICATION			
Communication Protocols	MODBUS TCP/RTU over TCP		
Network Protocols	TCP/IP, ARP, ICMP Modbus TCP	TCP/IP, ARP, ICMP, HTTP, Modbus 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%		
Isolation and Protection	USB port 15kV ESD Ethernet 1500V Modbus/RS-485 500V isolation and short circuit GPRS mobile station class B Transient Pulse 10/1000µs (600W)		
CONNECTIONS			
Mounting	DIN Rail Mounting		
Connection Terminals	With Screws		

ANT-01

GPRS Antenna
4 Band, magnetized
mounting surface

Dimensions





Modem RTU

GEM-15

NEW

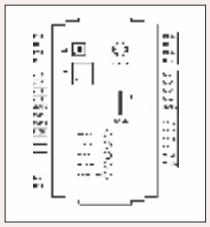
GEM-15 modem RTU, is a device that can use GPRS and Ethernet infrastructures as backups for each other for communication with advanced I/O features. It performs control operations by remotely monitoring values such as temperature, humidity, pressure, and electrical parameters with its analog and digital inputs/outputs.
It can communicate with all devices using Modbus RTU protocol, read information stored in their registers, assign alarms individually, and develop a control mechanism depending on all of these.
With its software, it can be remotely configured, its analog and digital inputs can be monitored, and reports can be created for analysis.
It sends user-defined alarms as SMS with its onboard SIM card.

SPECIFICATIONS

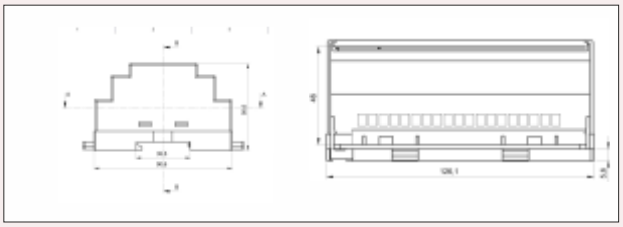
	GEM-15
GENERAL	
Operating Voltage	9-36V DC, protected
Power	< 5W
CPU	80 MHZ
RTC	Available
Input Filters	Median and mean filters are applied on analog inputs. Digital inputs contain analog low pass filter. There is a software debounce control filter.
Digital I/O Frequency	Digital outputs: OFF to ON Response 32 µs, ON to OFF Response 150 us Digital Inputs: OFF to ON Response < 2 ms, ON to OFF Response < 12 ms
ADC Sampling Period	Samples are collected at 640 SPS (samples per second) per each channel. Speed after filtering operations: 4 SPS
Program Loading	Firmware and application updating via USB
COMMUNICATION	
GSM	GPRS, MODBUS TCP support
Serial Port (RS-485)	15 kV ESD protection, galvanic insulation, MODBUS RTU
ENVIRONMENTAL CONDITIONS	
Operating Temperature	-20 / +50°C
Storing Temperature	-40 / +85°C
Humidity	5..95 RH
Operating Altitude	<2000m
INTEGRATED INPUTS OUTPUTS	
Digital Inputs	
Module Input	4 (Sink)
Voltage Range	0-50 VDC
ON Voltage Level	5VDC-50 VDC
OFF Voltage Level	0-3 VDC
Input Current	Typ 0.70 mA 24 VDC
Max. Input Current	1.50 mA 50 VDC
Input Impedance	>3.3 MΩ
Input GND Common Lead	1(4 points/common) Insulated
Max. drawn current (24VDC)	Max. 5.6 mA(All Inputs On)
Max. drawn current (50VDC)	Max. 12.04 mA(All Inputs On)
OFF to ON Response	< 2ms
ON to OFF Response	< 12ms
Insulation	1 KV

Digital Outputs	
Module Output	4 (Sink) Output with transistor
Voltage Range	3,3-50VDC
Max. Output Current	125 mA/point , 500 mA/common
Min. Output Current	0.42 mA/point , 1.68 mA/ common(3.3 V)
Max. Leakage Current	0.01 mA
Voltage Drop	2.3 VDC @ 0.76 mA
OFF to ON Response	32 µs
ON to OFF Response	150 µs
Input GND Common Lead	1 (4 points/common) Insulated
External Voltage Input	5- 50 VDC Max 48 mA(All Outputs On)
Max. drawn current	Max. 0.5 A (All Outputs On)
Analog Inputs	
Module Current Input	2
Module Voltage Input	2
Current Input Accuracy	1% accuracy, 12Bit resolution
Voltage Input Accuracy	1% accuracy, 12Bit resolution
Current Input	0(4)-20mA
Input Resistance (A)	120 OHM
Voltage Input	0(2)-10V
Input Resistance (V)	40 KOHM
Input GND Common Lead	1(4 points/common)
Relay Outputs	
Module Output	4 Relay
Relay Contact Outputs	Com-NO (Normally Open)
Max. Contact Current	3A@250VAC 3A@30VDC
LOG	
Log Record Time Resolution	1 sn
Log Record Capacity	Storing 19600 separate parameters with time stamp and parameter information
Alarm Log Recording	Storing parameters with time stamp at start and ending times

Connection Diagram



Dimensions



Remote Monitoring

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

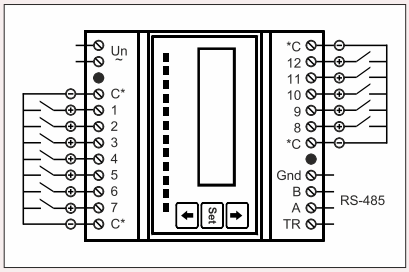
- With the help of the configuration software, all device parameters can be modified and all consumption values (electricity, water, natural gas) measured by the device can be displayed on computer screen.
- All device settings can be modified
- Instant value page
- Tariff based total consumption
- Access 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	2,5mm²
Cross-Section for Pulse Connection	1,5mm²
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

EPC-12



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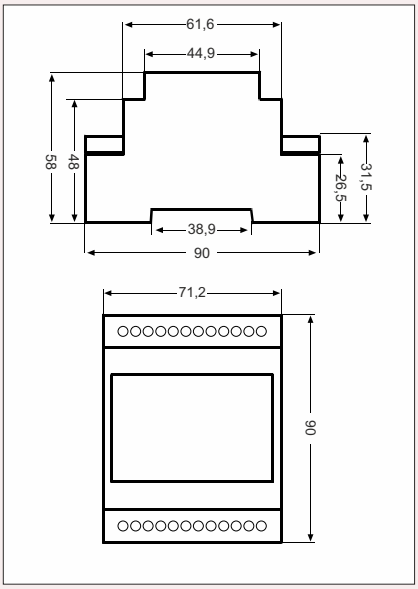
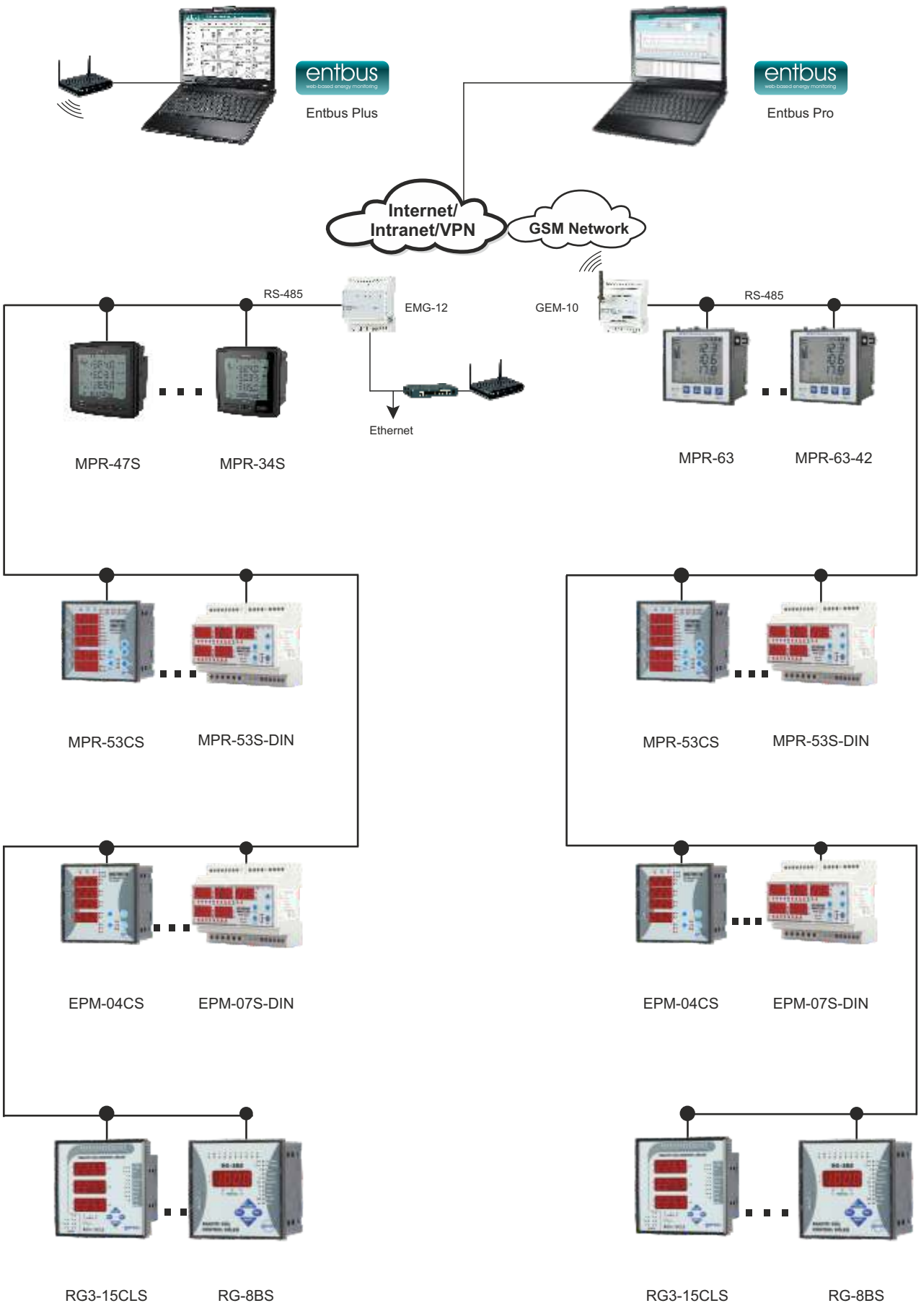


Remote Monitoring

Print Date: 09.2014

System Diagram



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-242/361/362/722

Control / Isolating Transformers
- ENT.PST / ENT.IST Series

Phase Failure Relays
- MKS Series
- MKC Series

Thermistor Relays
- PT-01

Phase Sequence Relays
- FR-02

Current Monitoring Relays
- AKC Series

Voltage Monitoring Relays
- DGRC-01
- GKRC Series
- MCC Series

Liquid Level Controller
- SSRC-04

Digital Time Relays
- MCB-100/200 - ERTC-100 Series

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

Astronomic Time Relays
- DTR Series
- MCB-50 Series

Daylight Switches
- FG Series

Overcurrent Monitoring Relays
- CKR Series

Power Supply

PS-242/361/362/722

NEW

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 temperature 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
PS-242	24W-1A-24 VDC	●	●				●	●			●	●	●	●	
PS-361	36W-3A-12 VDC	●			●		●	●		●	●	●	●		●
PS-362	36W-1,5A-24 VDC	●		●		●	●	●	●	●	●	●	●		●
PS-722	72W-3A-24 VDC	●			●		●	●	●	●	●	●	●		●

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 Supply

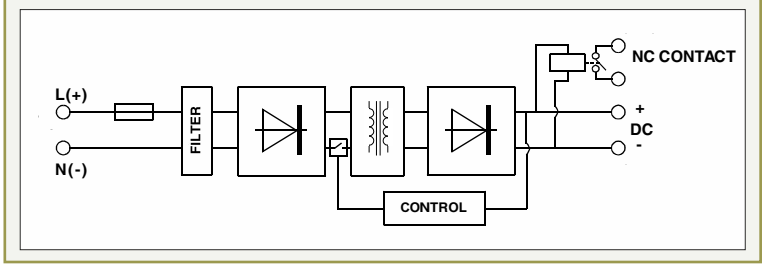
PS-242/361/362/722

SPECIFICATIONS

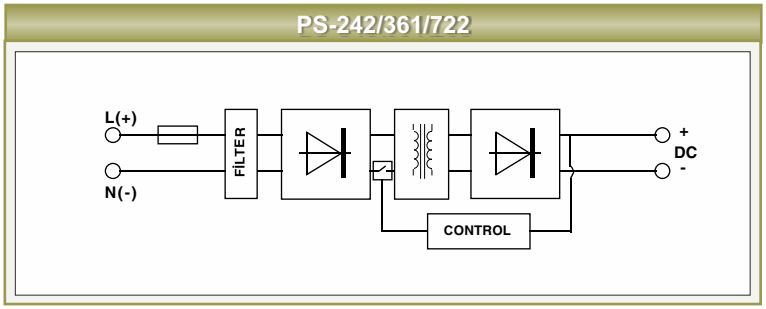
	PS-242	PS-362	PS-722	PS-361
ENCLOSURE				
Dimensions	DIN3	DIN4		
Protection Class	IP20			
Indicator	Output OK LED	Output OK and Overload LEDs	Output OK LED	
INPUT				
Input Voltage Range	85-264 VAC / 110-350 VDC			
Frequency	45-65 Hz			
Current Consumption	0,25 - 0,6 A	0,4 - 0,9 A	0,8 - 1,7 A	0,4 - 0,9 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	>82%(220 VAC) >79%(85 VAC)	>85%(220 VAC) >82%(85 VAC)	>87%(220 VAC) >84%(85 VAC)	>85%(220 VAC) >82%(85 VAC)
Overload Protection	2 A	3,2 A	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

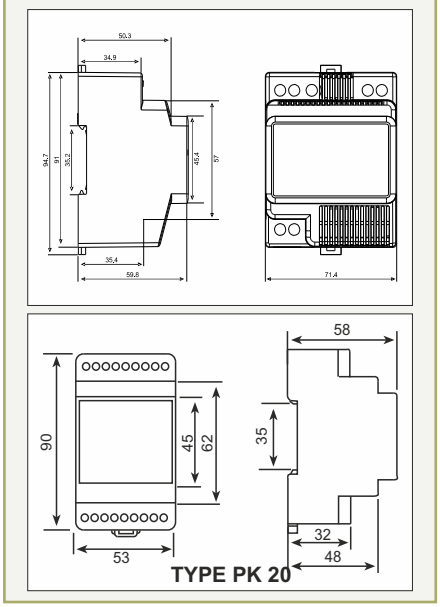
PS-362



PS-242/361/722



Dimensions



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.

CE

PRODUCT SELECTION TABLE

Product Code		Neutral Failure	Phase Failure	Phase Seq. Failure	PTC Protection	Fixed Asmmetry	Adjustable Asymmetry	Without Neutral	Switch On Delay	Switch Off Delay	1 C/O Contact	1 N/O Contact	DIN1 Rail Mounting	DIN2 Rail Mounting	Pcs / Box
MKC-01	Phase Failure Relay		●			●					●			●	10
MKS-01	Phase Failure Relay		●			●						●	●		10
MKC-03	Phase Failure Relay		●	●		●					●			●	10
MKC-03P	Phase Failure Relay	●	●	●	●	●					●			●	10
MKS-03	Phase Failure Relay		●	●		●						●	●		10
MKC-04	Phase Failure Relay		●	●		●		●			●			●	10
MKC-05	Phase Failure Relay	●	●	●			○		●	●	●			●	10
MKC-05P	Phase Failure Relay (with PTC3)	●	●	●	●		○		●	●	●			●	10
MKC-06	Phase Failure Relay	●	●	●			○	●	●	●	●			●	10
MKC-06P	Phase Failure Relay (with PTC3)	●	●	●	●		○	●	●	●	●			●	10
MKC-20	Phase Failure Relay		●	●			○			●	●		●		10

○ Can be switched off

1. Phase Absence
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 Error
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 shows voltage unbalance 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 value set the output relay is switched to ON.
If the unbalance value exceeds the user-specified limit (5% - 15%), the output relay is switched to OFF after the user-defined delay time (0,1... 10s).
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 81 for PTC Temperature graph*

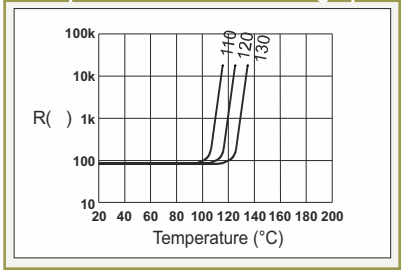
Phase Failure Relays

MKC - MKS Series

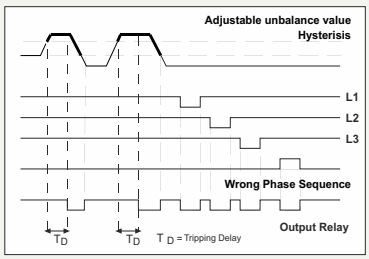
SPECIFICATIONS

	MKS-01	MKS-03	MKC-01	MKC-03	MKC-03P	MKC-04	MKC-05	MKC-05P	MKC-06	MKC-06P	MKC-20
ENCLOSURE											
Dimensions	PK22		PK25 - PK28								PK22
Weight	0,1kg/pcs		0,3kg/pcs								0,1kg/pcs
MEASUREMENT											
Voltage Unbalance	20% fixed	40% fixed	20% fixed	40% fixed			5%-15% adjustable Can be switched off				5%-25% adjustable Can be switched off
SUPPLY											
Operating Voltage	230 VAC±20%Un					400 VAC ±10%Un	230 VAC ±30%Un	220 VAC ±10%Un	400 VAC ±30%Un	380 VAC ±10%Un	230 VAC ±30%Un
Operating Frequency	50/60 Hz										
OUTPUT											
Output Contact	1NO,8A,2000 VA		1CO,8A,2000 VA								1CO 5A,1250 VA
On Delay	0,2 s fixed						0,1-20 s adjustable				0,1 sec. fixed
Off Delay	0,2 s fixed						0,1-20 s adjustable				0,1-20 sec. adjustable
AMBIENT CONDITIONS											
Ambient Temperature ; Humidity	-5 / +55°C ; 90%										
Over Voltage Category	III										
CONNECTIONS											
Mounting	Rail Mounting										
Connection Types	3 phase+neutral					3 phase	3 phase+neutral		3 phase		3phase+neutral

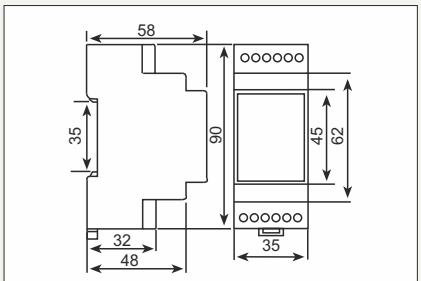
Typical resistance of PTC vs * temperature characteristics graph



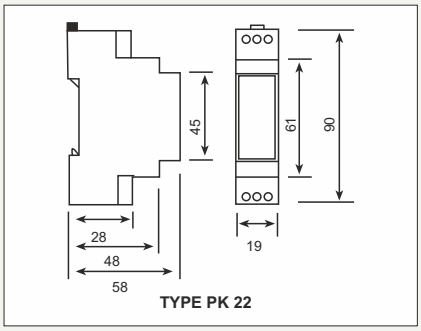
Function Diagram



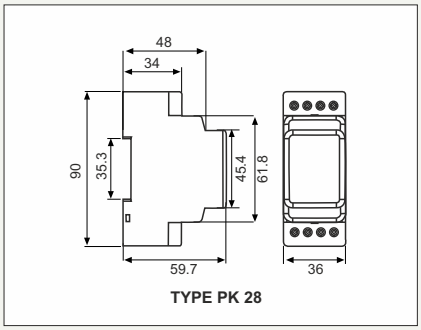
Dimensions



TYPE PK25



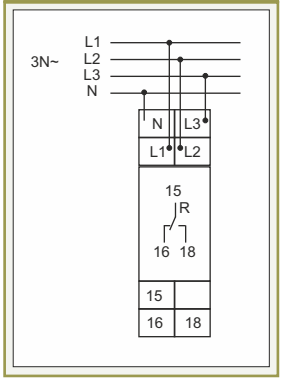
TYPE PK 22



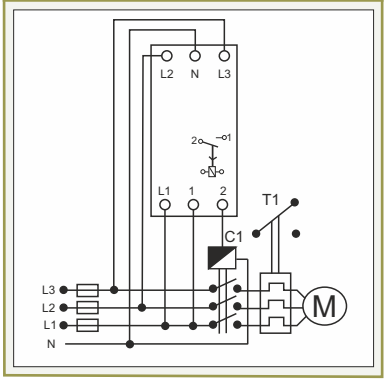
TYPE PK 28

Connection Diagram

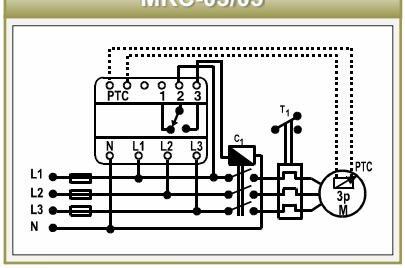
MKC-20



MKS-01 / MKS-03



MKC-03/05



No PTC input except MKC-05/06P

Connection diagrams are given for reference. Please always check the latest user manual given with product or download from www.entes.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 ON LED on the front panel is turned on. If the phase order is wrong, the ON 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).

CE

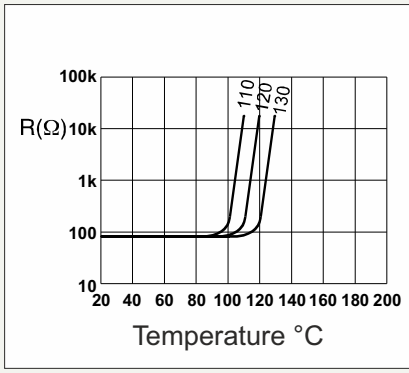
PRODUCT SELECTION TABLE

Product Code		Phase Failure	Phase Seq. Failure	PTC Protection	1 NO Contact	DIN2 Rail Mounting	Pcs. / Box
FR-02	Phase Sequence Protection Relay	●	●		●	●	
PT-01	Thermistor Relay			●	●	●	10
PTC-3	Triple Thermistor Group						

Specifications

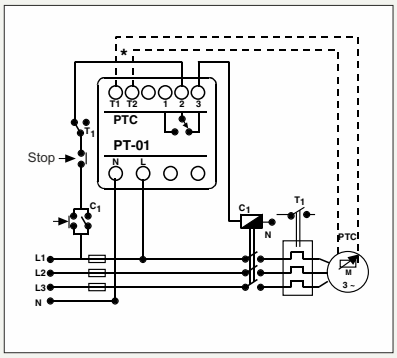
Operating Voltage	230 VAC; 50/60 Hz ±10%
Connection	3-phase / neutral (FR-02) / 1-phase/neutral (PT-01)
Output Contact	1 CO contact, 8 A, 2000 VA
Protection Class	IP 20
Ambient Temp. Range	-5 - +50°C
Dimensions	PK28 (FR-02, PT-01)
Mounting	Rail or Front Panel Mounting
Enclosure Weight	0,3 kg

Typical resistance of PTC vs * temperature characteristics graph

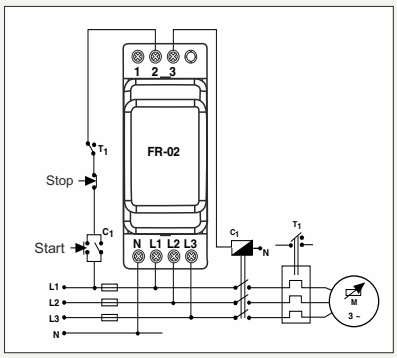


Connection Diagrams

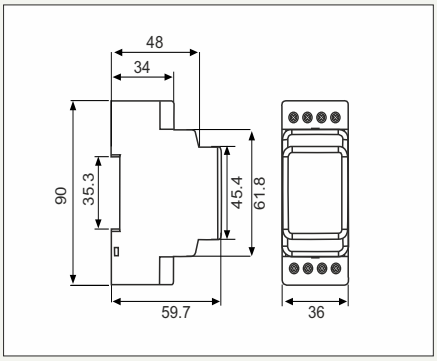
PT-01



FR-02



Dimensions



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

Current Monitoring Relays

AKC Series

AKC-01D AKC-03D CT-25

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

CE

Direct monitoring up to 60A with CT-25

PRODUCT SELECTION TABLE

Product Code		Under Current Protection	Over Current Protection	.../5A	CT-25	Pcs / Box
AKC-01D	Low Current Protection (0,5-5A)	●		●		10
AKC-01A	Over Current Protection (0,5-5A)		●	●		10
AKC-03D	Low Current Protection (between 1,5 and 60A with CT-25)	●			●	10
AKC-03A	Over Current Protection (between 1,5 and 60A with CT-25)		●		●	10

** Please check page 56 for further information about CT-25.*

SPECIFICATIONS

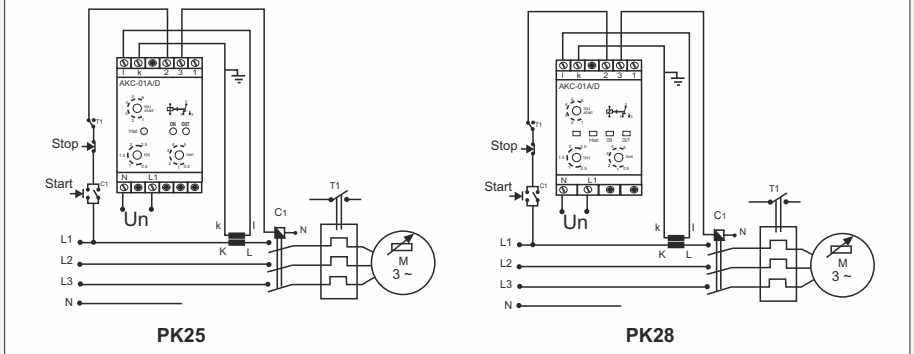
	AKC-01D	AKC-01A	AKC-03D	AKC-03A
ENCLOSURE				
Dimensions	DIN II TYPE PK25 and PK28			
Weight	0,25kg / pcs.			
Protection Class	IP20			
MEASUREMENTS				
Current Adjustment Interval	0,5-5A		With 1 turn 6-60A / with 2 turn 3-30A With 3 turn 2-20A / with 4 turn 1,5-15A	
Current Transformer Ratio	.../5A		Defined ranges are for CT-25	
SUPPLY				
Operating Voltage	230 VAC±10%			
Operating Frequency	50/60 Hz			
OUTPUT				
Start-up Delay	1-6 s.			
Tripping Delay	0,5-2,5 s.			
Output Contact	1C/O 8A 2000VA			
AMBIENT CONDITIONS				
Ambient Temperature	-5 / +55°C ; 90%			
Over Voltage Category	III			
CONNECTIONS				
Mounting	Rail Mounting			
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



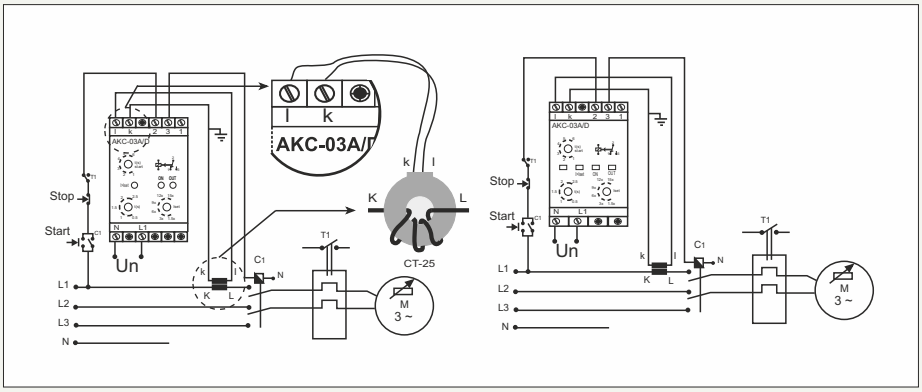
PK25 PK28

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

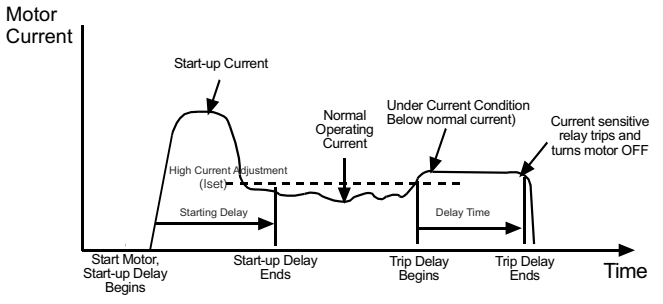
- 6 - 60A with 1 turn
- 3 - 30A with 2 turn
- 2 - 20A with 3 turn
- 1,5 - 15A with 4 turn

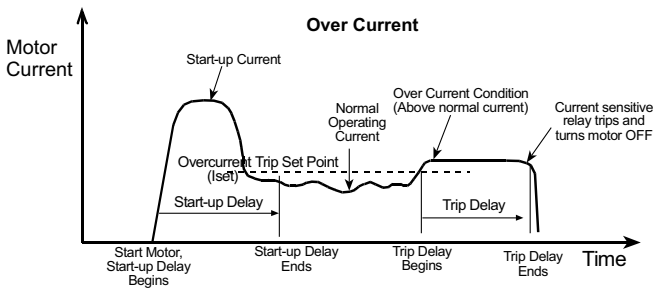
*Please check page 66 for further information about CT-25.

AKC-03A/AKC-03D

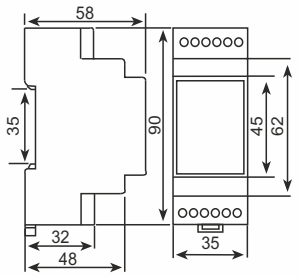


PK25 PK28

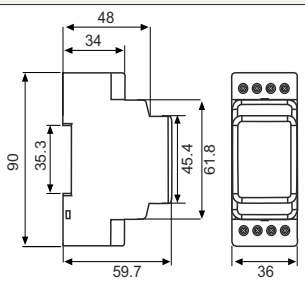




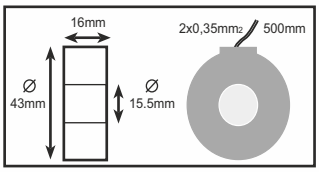
Dimensions



TYPE PK25



TYPE PK 28



CT-25

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

Voltage Monitoring Relays

GKRC - DGRC - MCC Series

GKRC-02FA

GKRC-20F

GKRC-01

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

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

CE

PRODUCT SELECTION TABLE

Product Code		Neutral Failure	3-Phase	Single Phase	Under Voltage	Over Voltage	Phase Failure	Phase Seq. Failure	Switch on Delay	Switch off Delay	Without Neutral	Auxiliary Supply	DIN1 Rail mounting	DIN2 Rail mounting	Pcs / Box
DGRC-01		●	●		○				●	●				●	10
GKRC-01		●	●			○			●	●				●	10
GKRC-02		●	●		○	○			●	●				●	10
GKRC-02F		●	●		○	○	●	●	●	●				●	10
GKRC-02FA			●		○	○	●	●	●	●		●		●	10
GKRC-03			●		○	○			●	●	●			●	10
GKRC-03F			●		○	○	●	●	●	●	●			●	10
GKRC-M2		●		●	○	○			●	●				●	10
MCC-1D	5-15 min OFF-Delay	●		●	●		●		●				●		24
MCC-3D	5-15 min OFF-Delay	●	●		●		●		●				●		24
GKRC-20F			●		●	●	●	●		●			●		10

○ Can be switched off.

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						Pk22	
Weight	0,25kg/pcs		0,1kg/pcs	0,25kg/pcs						0,1kg/pcs	
MEASUREMENTS											
Voltage											
Under Voltage Setting Range	150-210 VAC*		(0,70-1,2)xUn	270-370 VAC*			150-210 VAC*				
Over Voltage Setting Range	240-300 VAC*		(0,8-1,30)xUn	410-510 VAC*			240-300 VAC*				
Instant Tripping Value	0,5xUn 1,5xUn		-	0,5xUn 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 cos =1									1NO 8A 2000VA cos =1	
On Delay	0,1 -20 s.		-	0,1 -20 s.						-	
Off Delay	0,1 -20 s.										
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										

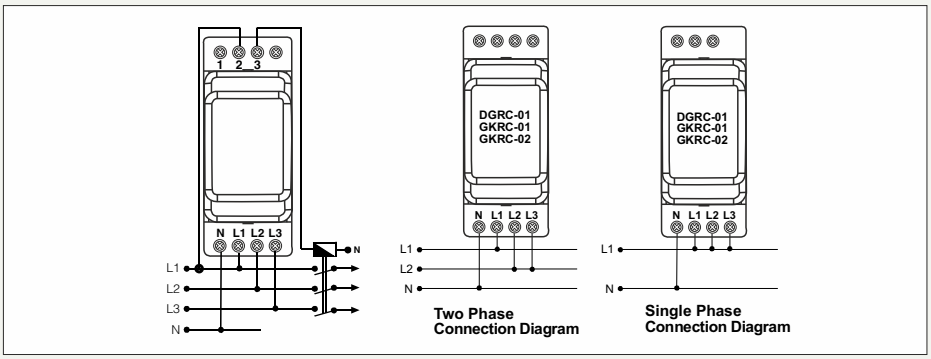
**These features can be switched-off by user*

Voltage Monitoring Relays

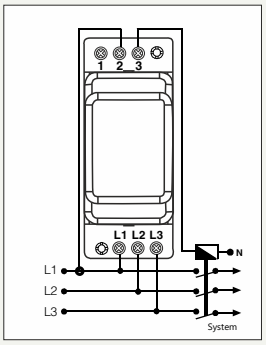
GKRC - DGRC - MCC Series

Connection Diagram

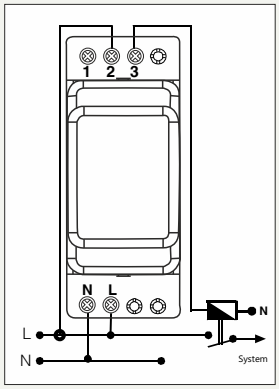
GKRC-01 / DGRC-01 / GKRC-02 / GKRC-02F



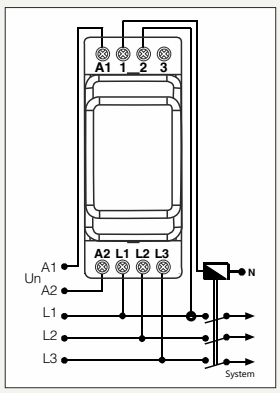
GKRC-03 / GKRC-03F



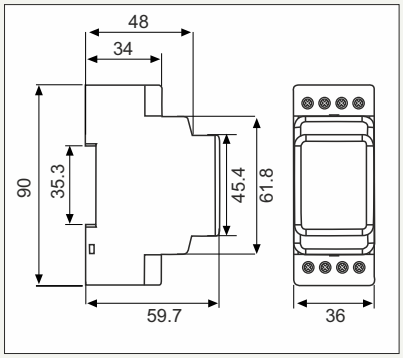
GKRC-M2

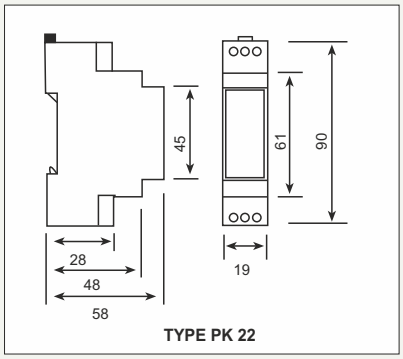


GKRC-02FA

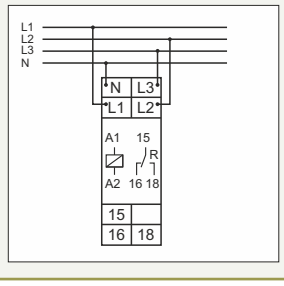


Dimensions

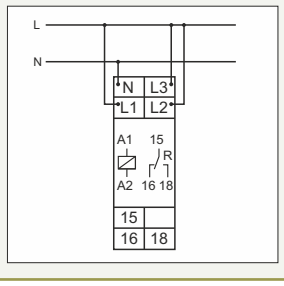




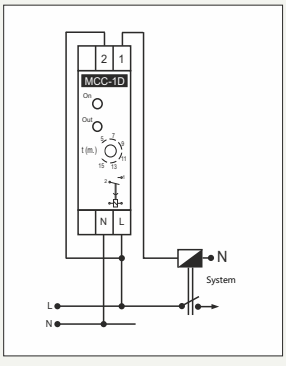
GKRC-20F



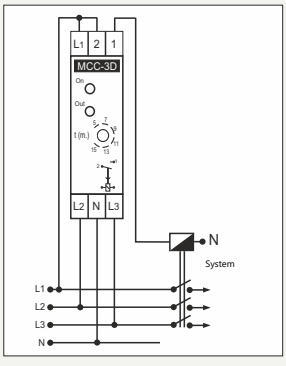
GKRC-20F



MCC-1D



MCC-3D



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

Liquid Level Controller

SSRC-04

SSRC-04

SSRC-04 is used for controlling liquid levels in wells and liquid tanks at industrial sites.
Precision (resistivity/impedance between electrodes) can be adjusted between 5 and 50 kΩ for different liquids.

CE

PRODUCT SELECTION TABLE

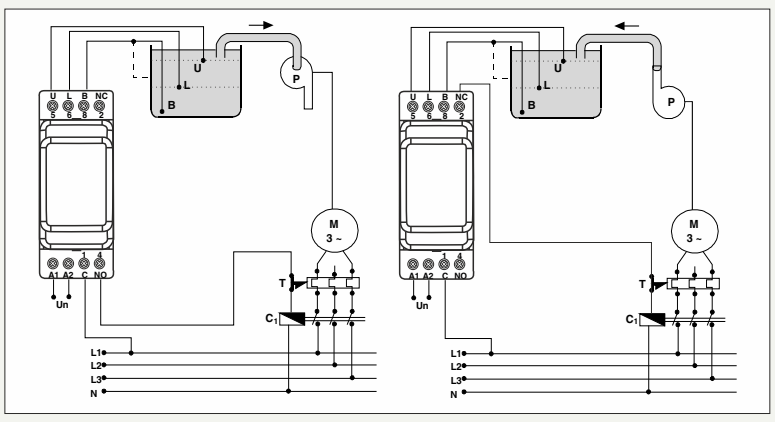
Product Code		5-50 k Adjustable	Small Electrode	Large Electrode	Pcs / Box
SSRC-04	Liquid Level Controller	●			10
LLS-01	Liquid Level Electrode		●		100
LLS-02	Liquid Level Electrode			●	100

⚠ *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.*

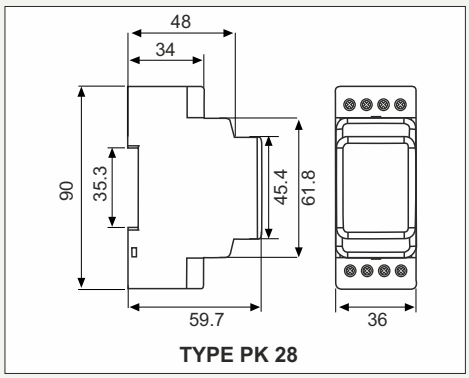
SPECIFICATIONS

	SSRC-04
ENCLOSURE	
Dimensions	PK25 - PK28
Protection Class	IP20
Weight	0,25kg/pcs
SUPPLY	
Operating Voltage	230 VAC±10%, 400 VAC±10%
Operating Frequency	50/60 Hz
Operating Range	(0,9-1,1)xUn
Sensitivity	5-50kΩ adjustable
Warning Light	Front panel LED
OUTPUT	
Contact Output	1CO 8A 2000 VA
AMBIENT CONDITION	
Ambient Temperature, Humidity	-5 / +50°C; 85 %
CONNECTIONS	
Mounting	Rail mounting; terminal with screw
Connection Types	Single Phase 2 Wires

Connection Diagram



Dimensions



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

Multifunctional Time Relays

MCB-100/200 - ERTC-100 Series

NEW

MCB-130

New Generation Multifunctional Digital Time Relays;

- **Self Supply: Operating with internal battery without power supply (MCB-200)**
- **Battery life of 10 years or 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

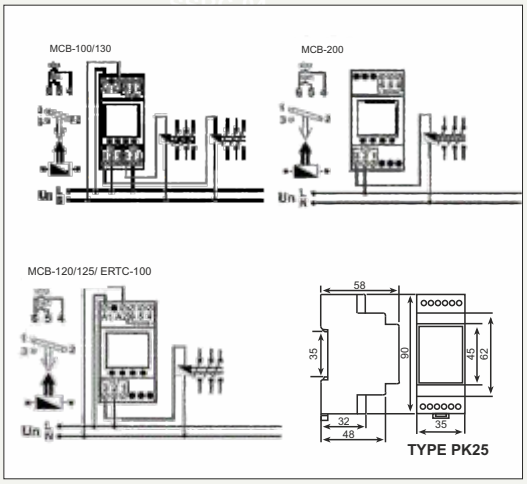
Product Code		Time	Triggering Input	ON Delay	OFF Delay	Pulse	Asymmetrical Flasher	Symmetrical Flasher	Start/Stop	Counter	Left / Right	Star/Delta	2 Step ON Delay	2 Step OFF Delay	85-315 VAC/DC	10-30 VAC/DC	Self Supply	DIN II Enclosure	Pcs./ Box
MCB-100	Multifunctional Time Relay	0,1s-9999min.	●								●	●	●	●	●			●	5
MCB-101	Multifunctional Time Relay	0,1s-9999min.	●								●	●	●	●		●		●	10
MCB-120	Multifunctional Time Relay	0,1s-9999min.	●	●	●	●	●								●			●	5
MCB-121	Multifunctional Time Relay	0,1s-9999min.	●	●	●	●	●									●		●	10
MCB-125	Multifunctional Time Relay	0,1s-9999min.	●	●	●	●	●		●	●					●			●	5
MCB-126	Multifunctional Time Relay	0,1s-9999min.	●	●	●	●	●		●	●						●		●	10
MCB-130	Multifunctional Time Relay	0,1s-9999min.	●	●	●	●	●		●	●	●	●	●	●	●			●	5
MCB-131	Multifunctional Time Relay	0,1s-9999min.	●	●	●	●	●		●	●	●	●	●	●		●		●	10
MCB-200	Multifunctional Time Relay (Battery operated)	0.2-9999min-0,1-9999min	●	○	○	○	○	○									●	●	5
ERTC-100	Counter / Pulse Time Relay	0,1s-9999min.	●			●				●					●			●	5
ERTC-101	Counter / Pulse Time Relay	0,1s-9999min.	●			●				●						●		●	10

⚠ *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
ENCLOSURE						
Dimensions	PK25(DIN II)					
Protection Class	IP 20					
INPUT						
Operating Voltage Range	85-315 VAC/DC					
Power Consumption	<2,5 VA					
Control Input	Dry Contact					
OUTPUT						
Repeat Accuracy	0,5%					
Reset Time	<120ms					
Contact Output	6A CO					
AMBIENT CONDITIONS						
Operating Temperature Humidity	-5...+55 °C ; 85%					
CONNECTIONS						
Mounting	Rail Mounts ; Screw Terminals					
Connection Types	Single Phase Two Wires					

Dimensions



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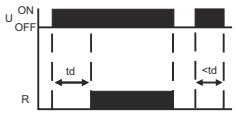
Multifunctional Time Relays

MCB-100/200 - ERTC-100 Series

Main Functions

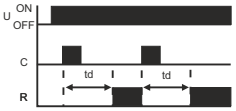
ON Delay

a) With Supply Voltage



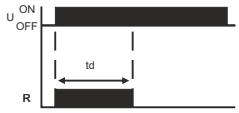
b) With Control Input (*)

c) Resettable with Rising Edge Trigger (*)

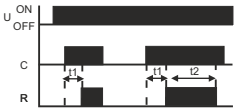


OFF Delay

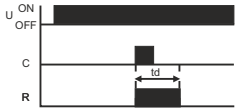
a) With Supply Voltage



b) With Control Input (*)

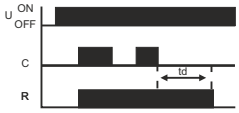


c) With Rising Edge Trigger



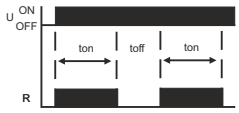
d) Resettable with Rising Edge Trigger

e) Resettable with Falling Edge Trigger (*)

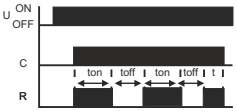


Flasher

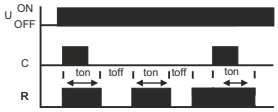
a) Asymmetric ON Start



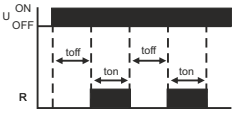
b) Asymmetric ON Start with Control Input (*)



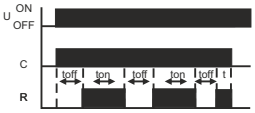
c) Resettable Asymmetric ON Start with Rising Edge Trigger (*)



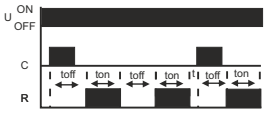
d) Asymmetric OFF Start



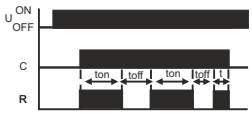
e) Asymmetric OFF Start with Control Input (*)



f) Resettable Asymmetric OFF Start with Rising Edge Trigger (*)

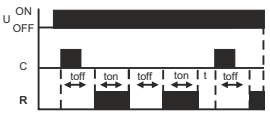


g) Symmetric ON Start with Control Input (*)



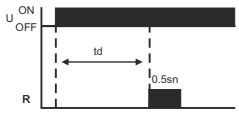
h) Symmetric OFF Start with Control Input (*)

ı) Resettable Symmetric OFF Start with Rising Edge Trigger (*)

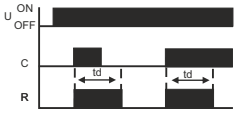


Pulse

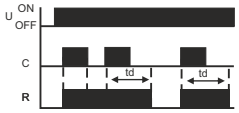
a) Single Pulse with ON Delay After Supply Voltage



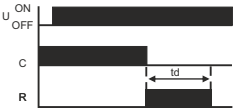
b) Adjustable OFF Delay Pulse with Rising Edge Trigger (*)



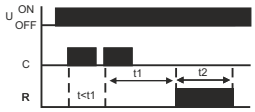
c) Resettable OFF Delay Pulse with Rising Edge Trigger (*)



d) Adjustable OFF Delay Pulse with Falling Edge Trigger

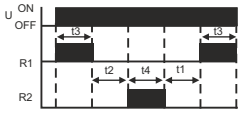


e) Resettable Adjustable OFF Delay Pulse with Rising Edge Trigger (*)

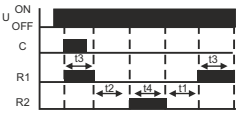


Right-Left Switcher (With Adjustable Time)

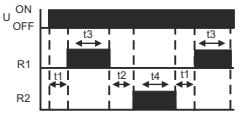
a) ON Start



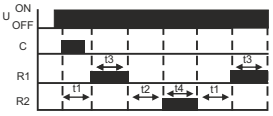
b) ON Start with Rising Edge Trigger



c) OFF Start with Adjustable Delay

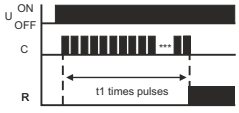


d) OFF Start with Rising Edge Trigger

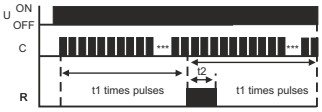


Counter

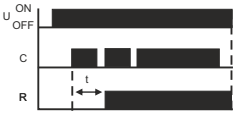
a) Up Pulse Counter



b) Up Pulse Counter with Adjustable Pulse Output

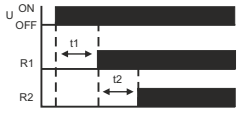


c) Down Time Counter with Rising Edge Trigger

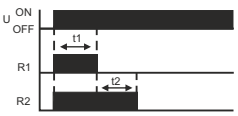


2 Step ON and OFF Delay / Start - Stop

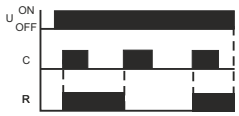
a) 2 Step ON Delay



b) 2 Step OFF Delay



c) Start-Stop with Rising Edge Trigger



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

Print Date: 09.2014

Time Relays

MCB - SER - ERTC - SSR - DG Series

SER-Y/U

DG-60

MCB-20

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 Flasher	OFF Flasher	Down-timer	Star-Delta	Left-Right	No Voltage, Delayed Impulse	24 VAC / DC	230 VAC	12 ~240 VAC / DC	24 ~240 VAC / DC	Pcs / Box
ERT-01	Multi-function T. Relay	1 s - 100 Hours	●	●	●	●				●	●	●	●					●			16
ERTC-01	Multi-function T. Relay	1 s - 100 Hours	●	●	●	●				●	●	●	●					●			16
MCB-7	Time Relay	0,1 s - 30 Hours	●	●													●	●			10
MCB-8	Time Relay	0,1 s - 999 min	●	●													●	●			10
MCB-9	Time Relay	0,1 s - 60 Hours	●	●							●	●					●	●			10
MCB-15	Multi-function T. Relay	0,05 s - 100 Hours	●	●	●				●	●										●	10
MCB-20	Multi-function T. Relay	0,1 s - 100 Hours	●	●	●	●	●	●	●	●									●		10
MCB-30	Time Relay	2-30 s	●														●	●			10
MCB-60	Time Relay	4-60 s	●														●	●			10
SER-YU	Star - Delta Relay	(⅄/U) 20-500 ms (⅄) 1-60 s												●			●	●			10
SSR-2X	Right - Left Relay	0,1 s - 60 Hours													●			●			24
DG-10	Time Relay	0,6 s - 10 min														●		●			10
DG-60	Time Relay	0,1 s - 60 min														●		●			10
EF-10	Flasher Relay	1 - 10 s / 0,5 s									●						●	●			10
EF-10T	Flasher Relay	1 - 10 s / 0,5 s									●						●	●			10
ERB-50	Dishwasher Relay	Washing 30, 60, 90,120,180 s, Waiting 3 s, Rinsing 1-30 s																●			20

SPECIFICATIONS

	MCB-15	MCB-20	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				PK15	PK21	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	230 VAC 24 VAC/DC				230 VAC		230 VAC 110 VAC		230 VAC 24 VAC/DC	230 VAC	
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.		±0.1%										
Reset Time	100 ms.		< 150 ms.				100 ms.	80 ms.			120 ms.	-	
Output Contact	1 CO; 8A, 2000 VA, cos =1						2 CO; 8A, 2000VA, cos =1	1 CO; 8A, 2000VA, cos =1			2 NO; 5A,1250VA	1 CO; 16A,4000VA	Triyac; 8A,600VA
AMBIENT CONDITIONS													
Ambient Temperature; Humidity	-5 / +55˚C ; 85%												
CONNECTIONS													
Mounting	Rail Mounting, Terminals with Screw												
Connection Types	Single phase 2 wires												

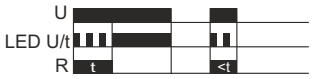
Time Relays

MCB - SER - ERTC - SSR - DG Series

Functions of MCB-15 and MCB-20 (12~240 VAC/DC)

Single shot leading edge voltage controlled input (Em) [MCB-20] :

Em-2

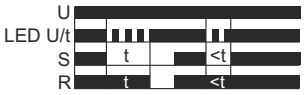


ON Delay (Er) [MCB-15 & MCB-20] :

Er

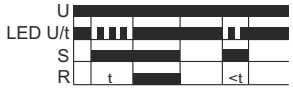
OFF Delay with control input (R) [MCB-15 & MCB-20] :

R



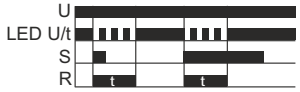
ON Delay with control input (Es) [MCB-20] :

Es



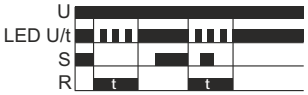
Single shot leading edge with control input (Ts) [MCB-20] :

Ts



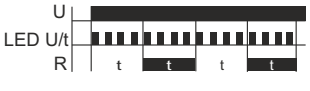
Single shot trailling edge with control input (Ta) [MCB-20] :

Ta



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

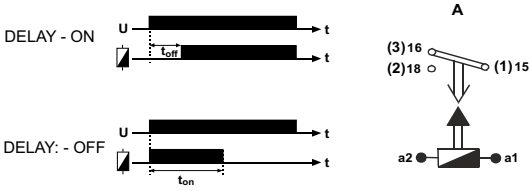
Ef



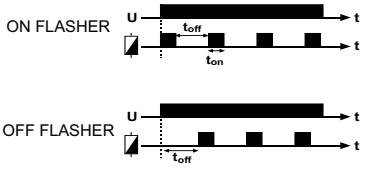
U : Supply Voltage : Relay Voltage

Common Functions of MCB-7/8/9; ERTC-01; EF-10/10T

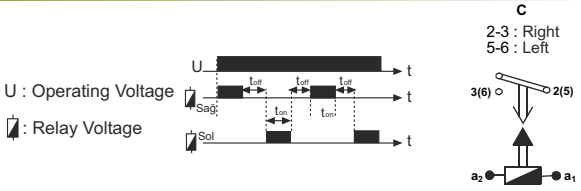
On Delay (Er)



Flasher

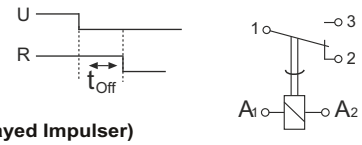


Functions of SSR-2x



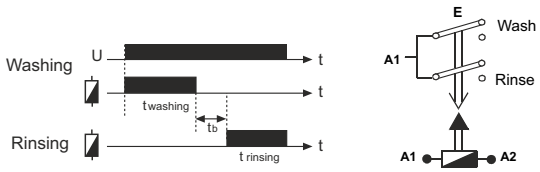
Functions of DG-06 / DG-10 / DG-60

$t_{Off} = t_1 x t_2$

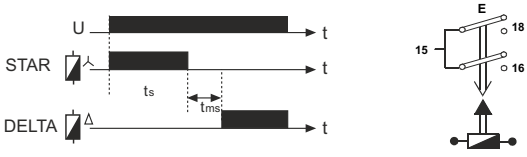


(No Voltage, Delayed Impulser)

Washing Machine Relay (ERB-30/50)



Functions of SER-Y/U



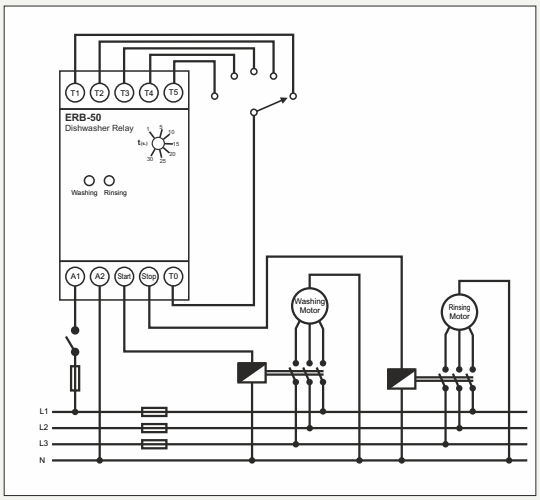
** 24 VAC/DC supply of SER - Y/U is applied between A2-A3*

Time Relays

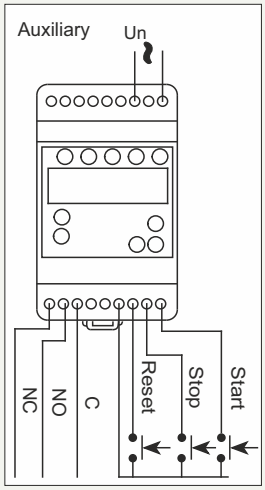
MCB - SER - ERTC - SSR - DG Series

Connection Diagrams

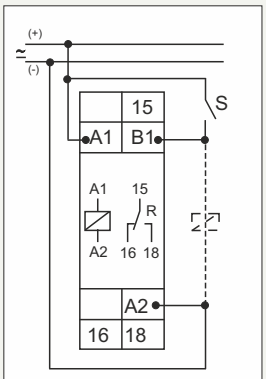
ERB-50



ERTC-01

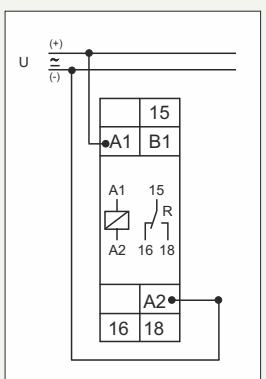


MCB-20



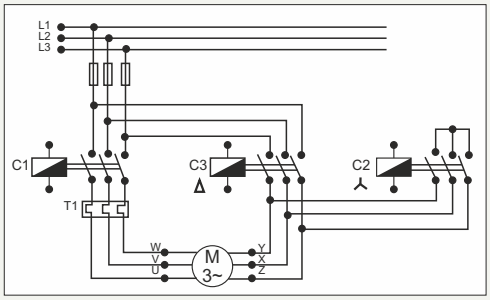
Using MCB-20 with trigger input

MCB-15

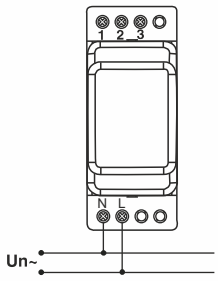


Without using MCB-20 with trigger input

SSRC-04

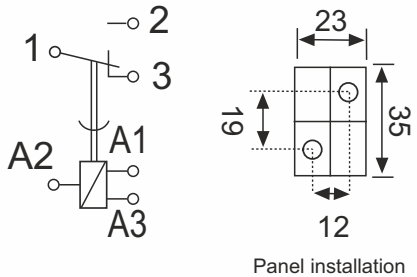


DG Series



Un : 220 - 230 V AC
: 1 C/O, 4000 VA / 16A
f : 50/60 Hz

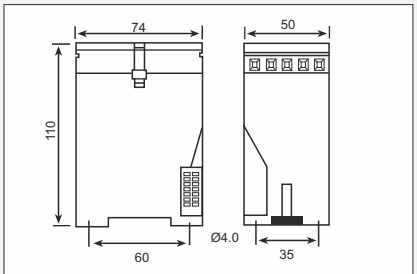
MCB 7-8-9



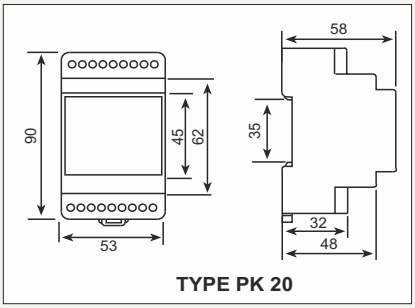
A1-A2 : 230 VAC
A3-A2 : 24 VAC/DC

Panel installation equipment for DIN types

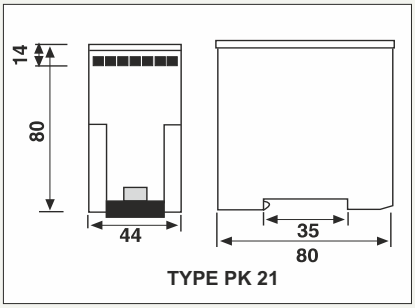
Dimensions



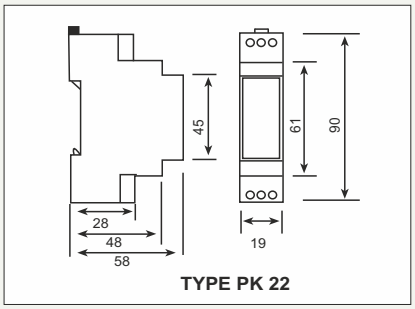
TYPE PK 10



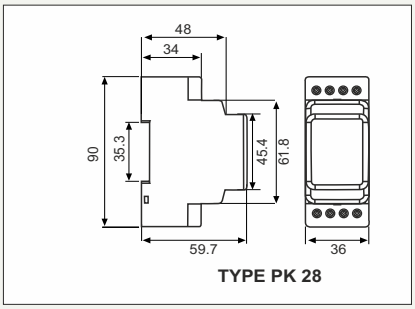
TYPE PK 20



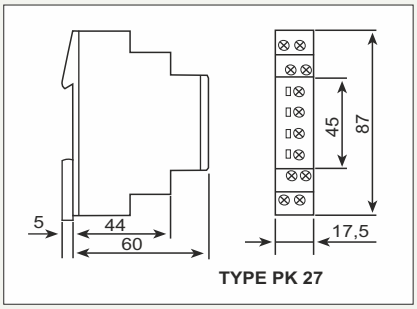
TYPE PK 21



TYPE PK 22



TYPE PK 28



TYPE PK 27

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

NEW

- Automatic sunset and sunrise calculation
- Automatic DST (Daylight Saving Time) switching
- Programming based on city name and geographical coordinates
- 2 relay outputs (16A)
- Battery life of 10 years
- 32 programs, and precise timing
- 24/7 relay programming
- Vacation mode
- Backlight Display
- Password Protection


Automatic DST switch

32 Prog
32 Different Program Slots


Geographical Programming


Sunset/Sunrise

10 Years
Battery Life

CE

Configuration Software

With DTR PROG configuration software, all parametres 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).

PRODUCT SELECTION TABLE

Product Code		Programmable Prayer Time	24h Time Programming	Geographical Coordinate Programming (Astronomic)	Photocell Sensor Input	15 Programs	32 Programs	1 Relay Output (8A)	1 Relay Output (16A)	2 Relay Output (8A)	2 Relay Output (16A)	Year Battery Life (Years)	Pcs / Box
DTR-10	Astronomic Time Relay		●	●		●					●	10	5
DTR-10t	Astronomic Time Relay		●	●		●			●			10	5
DTR-14	Astronomic Time Relay			●	●	●				●		3	5
DTR-20	Astronomic Time Relay, External Memory		●	●			●				●	10	5
DTR-20M	Astronomic Time Relay, IR Programming		●	●			●				●	10	5
DTR-25	Astronomic Time Relay	●	●	●			●				●	10	5
MCB-50	Electronic Timer, 32 Programs		●				●			●		10	5
MCB-50t	Electronic Timer, 32 Programs		●				●	●	●			10	5
FG-GOZ	Photocell Sensor (1-3 lux) for DTR-14												
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: Astronomic Time Relay

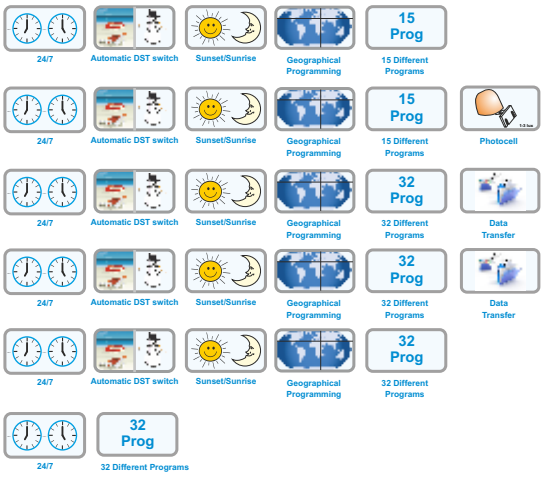
DTR-14: Astronomic Time Relay (with Photocell Input)

DTR-20: Astronomic Time Relay (External Memory)

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

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

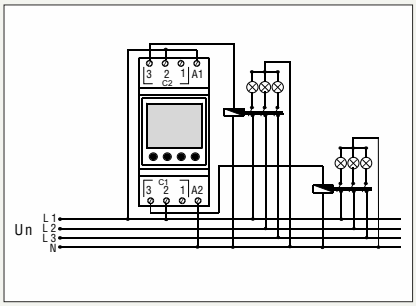
MCB-50 : Time Relay



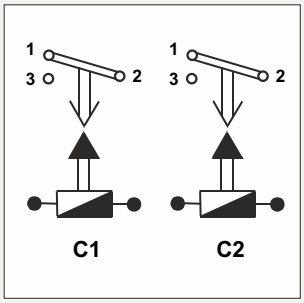
SPECIFICATIONS

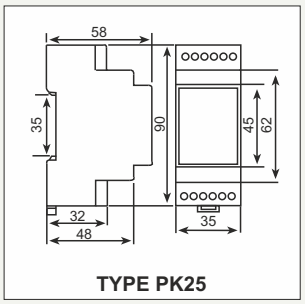
	DTR-14	DTR-10	MCB-50	DTR-20/25	DTR-20M
ENCLOSURE					
Dimensions	PK25 (DIN II)				PK28
Protection Class	Ip20				
Weight	0,2 kg/pcs				
Display	1,3" LCD				
SUPPLY					
Operating Voltage Range	190-260 VAC				
Operating Frequency	50/60 Hz				
Power Consumption	<3VA			<5VA	
INPUT / OUTPUT / SETTINGS					
Output Contact	2CO 8A 250 VAC 2000VA	2CO 8A 250 VAC 2000 VA 1C/0 16A 250VAC 4000VA (MCB-50t,DTR-10t)		2CO 16A 250 VAC 4000VA	
Refresh Time	60 s.	1 s.			
Accuracy	<1s/day				
Sensor	CdS(Light-sensitive photoresistor)	-			
Light Intensity	1-3 lux	-			
AMBIENT CONDITIONS					
Ambient Temperature; Humidity	-5 / +50°C ; 85%				
CONNECTIONS					
Mounting	Rail mounting; Screw Terminals				
Connection Type	Single Phase 2 Wires				

Connection Diagram

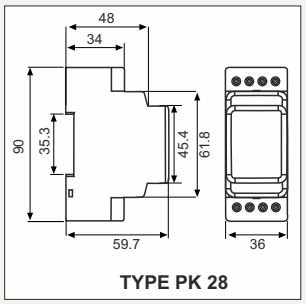


Dimensions





TYPE PK25



TYPE PK 28

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

Daylight Switches

FG Series

FG-4

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

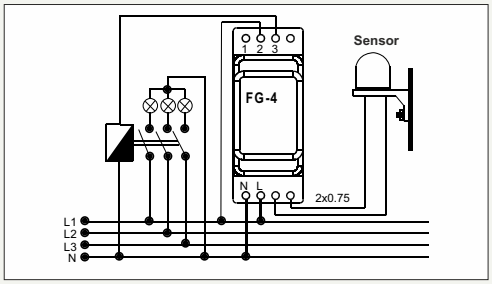
PRODUCT SELECTION TABLE

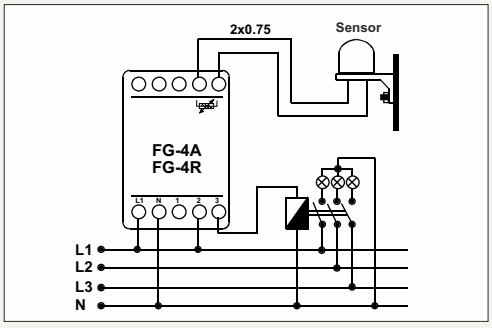
Product Code		1-3 Lux Adjustable	1-10 Lux Adjustable	Manual Control	Fuse Protection	Triac Output	Relay Output	Sensor	Pcs / Carton
FG-4	Daylight Switch	●					●		10
FG-4A	Daylight Switch		●				●		10
FG-4R	Daylight Switch		●	●	●		●		10
FG-4T	Daylight Switch (Triac output)		●	●	●	●			10
FG-SENSOR	Light Sensor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

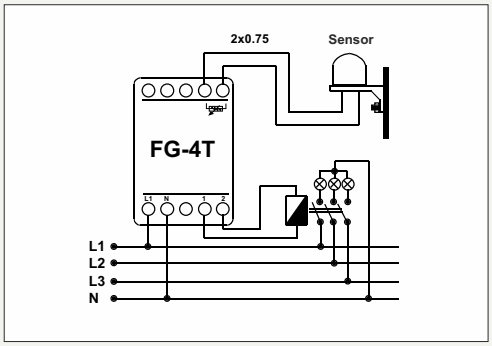
SPECIFICATIONS

	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			
OUTPUT				
On-Off delay	5-40 s.	25-45 s.		
Contact Output	1CO 8A/2000 VA	1CO 5A/1250 VA		-
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			

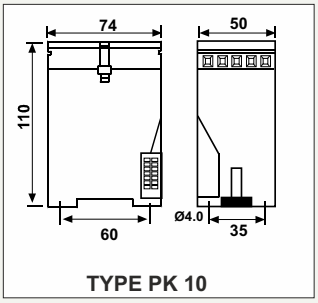
Connection Diagram



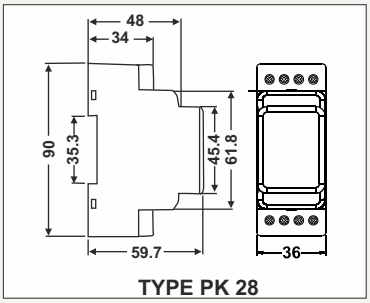




Dimensions



TYPE PK 10



TYPE PK 28

Overcurrent Monitoring Relays

CKR Series

CKR-93T (144x144mm)

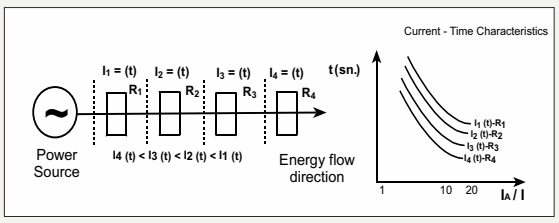
CKR series combine overcurrent relays and reverse/independent time relays in a single device. These relays are used to protect transformers, motors, generators, and energy transmission lines in the energy distribution system against short circuits and grounding faults.
In order to provide top level protection,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

CE

PRODUCT SELECTION TABLE

Product Code		Pcs / Carton
CKR-93T	3 Phase + Earth (Adjustable Inverse and Fixed Times for Phase & Earth) 85-265 VAC / DC	4
CKR-92T	2 Phase + Earth (Adjustable Inverse and Fixed Times for Phase & Earth) 85-265 VAC / DC	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 start-up 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 s)
f - Independent Time 2 (5 s)
g - Independent Time 3 (10 s)
h - Independent Time 4 (15 s)
Instant switch-off current, time multiplier, and current-time characteristicssettings 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, 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 with rear terminals	
Connection Types	2 phase + netural ; 3 phase + neutral (for current input)	

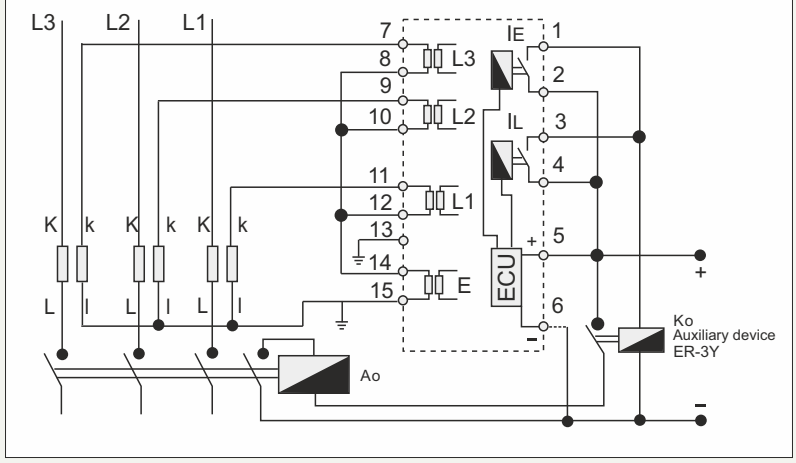
- Double Insulation (⧈),
- Measurement Category III
- Terminal Connection
- Flush mounting with rear terminals
- IP40 (front panel)
- IEC 60255-3
- IEC 60255-6
- IEC 529

Overcurrent Monitoring Relays

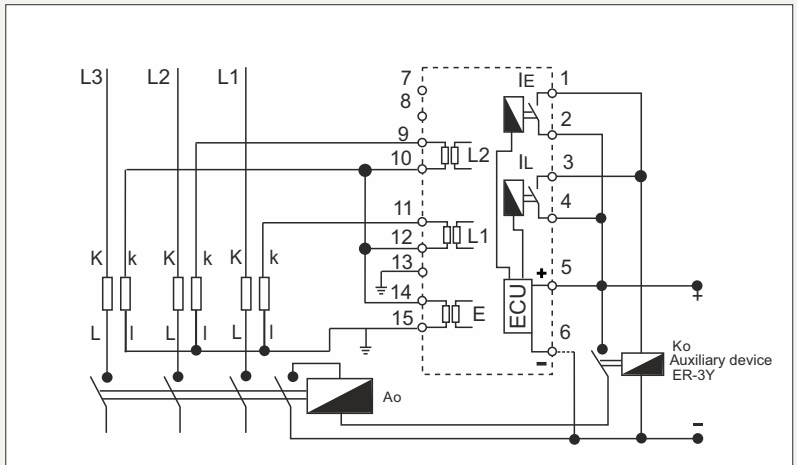
CKR Series

Connection Diagram

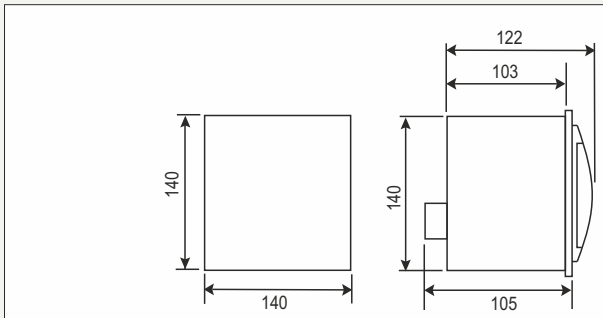
A- Three Phase and Earth Fault Overcurrent Monitoring Device



B- Two Phase and Earth Fault Overcurrent Monitoring Device



Dimensions



TYPE PR 17

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

Function Tables

PHASE FAILURE RELAYS

No phase + Asymmetry	MK-01	MKC-01	MKS-01
No phase + Asymmetry + Phase Sequence	MKC-03	MKS-03	MKC-04
No phase + Asymmetry + Phase Sequence + PTC	MKC-03P		
No phase + Adj. Asymmetry + Phase Sequence + Adjustable on / off delay	MKC-05	MKC-06	MKC-20
No phase + Adj. Asymmetry + Phase Sequence + Adjustable on / off delay + PTC	MKC-05P	MKC-06P	
No phase + Phase Sequence	FR-02		
PTC	PT-01		

VOLTAGE MONITORING RELAYS

Low Voltage + Adjustable on / off delay	DGRC-01			
Over Voltage + Adjustable on / off delay	GKRC-01			
Low Voltage + Over Voltage + Adjustable on / off delay	GKRC-02	GKRC-03	GKRC-M2	
No phase+Low Voltage+Over Voltage+Adjustable on / off delay+Phase Sequence	GKRC-02F	GKRC-02FA	GKRC-03F	GKRC-20F

CURRENT MONITORING RELAYS

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

TIME RELAYS

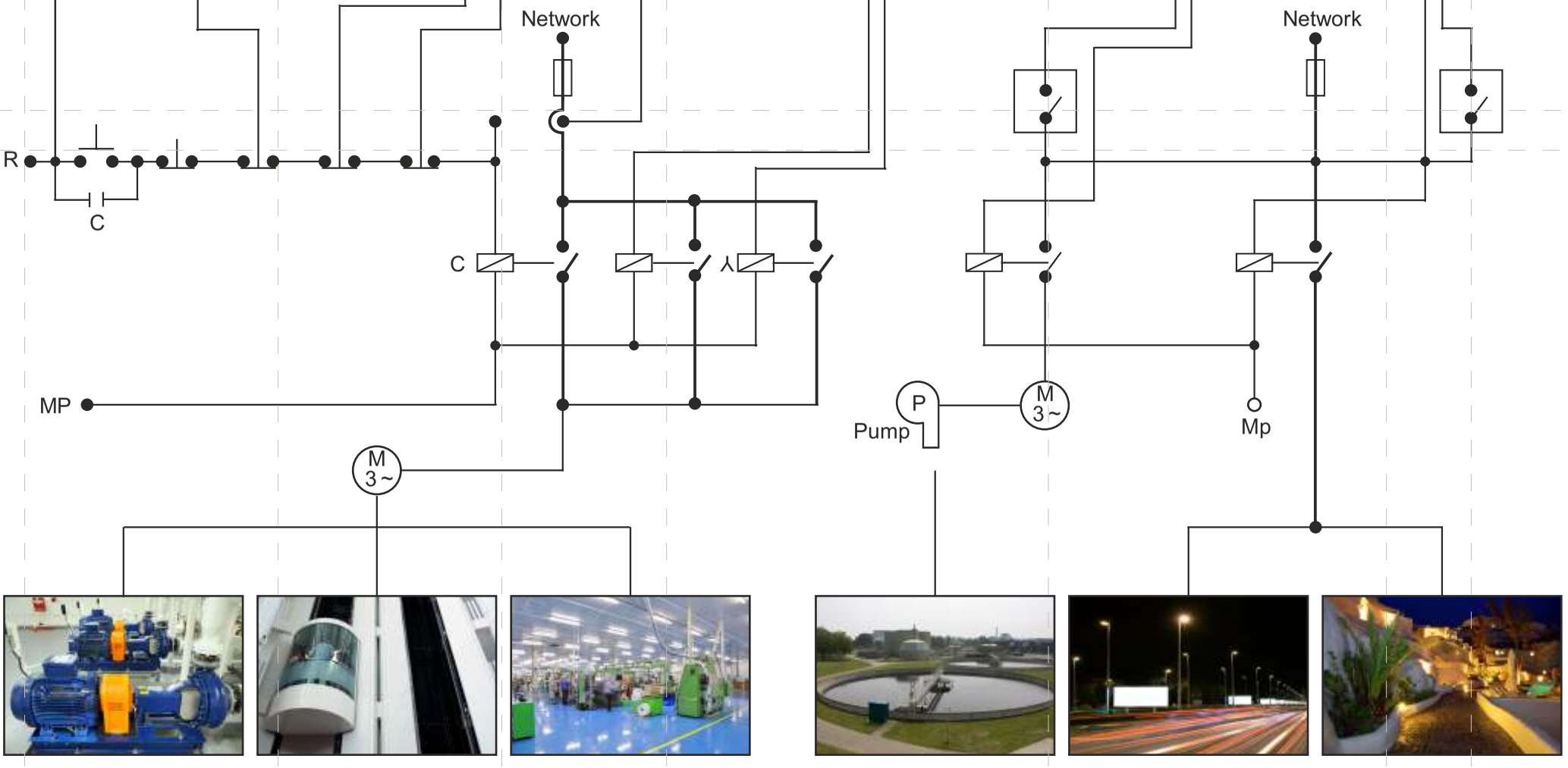
On Delay	MCB-30	MCB-60
On Delay + Off Delay	MCB-7	MCB-8
On Flasher	EF-10	EF-10T
On Delay + Off Delay + On Flasher + Off Flasher	MCB-9	
On Delay + Off Delay + On Flasher + Off Flasher + Down Timer	ERT-01	ERTC-01
On Delay + Off Delay + On Delay, Off Delay with Control Input + Control Input	MCB-15	
On Delay + Off Delay + On Delay, Off Delay with Control Input + Control Input + Symmetric Flasher	MCB-20	
Delayed Impulse	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	DTR-14	
Astronomic + 32 program	DTR-20	DTR-20t	DTR-20M	DTR-25
Digital Time Relay + 18 program	MCB-50	MCB-50t		







Network
R
C
C
MP
M
3~
P
Pump
M
3~
Network
Mp

Control Transformers

ENT.PST Series

NEW

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.

CE

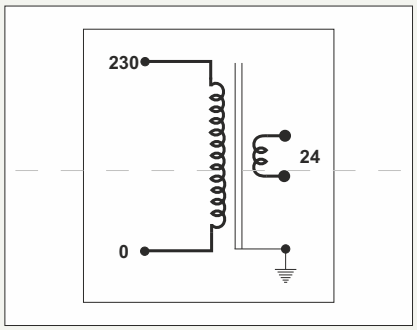
Features

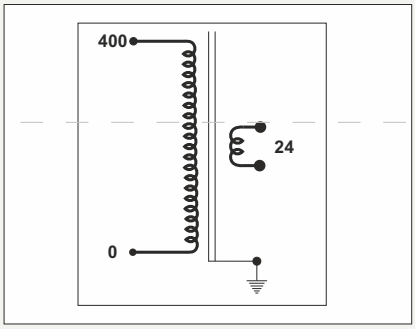
- Compatible with TS.EN 61558-2-2
- Vacuum impregnated varnish method that improves efficiency by reducing heat losses, provides protection against humidity, and enables quiet operation.
- Welding of sheet metal with air gap that minimizes the enclosure grounding resistance
- Preserving its nominal output 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 mm²	66	76	80	50	64	80	5*8
ENT.PST.2324.50	50	97	1,5	4 mm²	84	76	91	64	64	82	5*8
ENT.PST.2324.100	100	209	1,9	4 mm²	84	76	91	64	64	96	6*9
ENT.PST.2324.160	160	338	2,4	4 mm²	96	89	99	84	74	100	6*9
ENT.PST.2324.200	200	419	3	4 mm²	96	89	99	84	74	100	6*9
ENT.PST.2324.250	250	559	3,4	4 mm²	96	102	99	84	87	114	6*9
ENT.PST.2324.320	320	689	4,4	4 mm²	120	90	127	90	83	92	6*9
ENT.PST.2324.400	400	961	5,6	4 mm²	120	102	127	90	95	106	7*13
ENT.PST.2324.500	500	1260	7,1	4 mm²	120	122	127	90	109	126	7*13
ENT.PST.2324.630	630	1520	7,6	10 mm²	150	113	141	122	89	120	7*13
400V / 24V											
ENT.PST.4024.25	25	51	1	4 mm²	66	76	80	50	64	80	5*8
ENT.PST.4024.50	50	96	1,5	4 mm²	84	76	91	64	64	82	5*8
ENT.PST.4024.100	100	218	2	4 mm²	84	76	91	64	64	96	6*9
ENT.PST.4024.160	160	344	2,4	4 mm²	96	89	99	84	74	100	6*9
ENT.PST.4024.200	200	460	2,9	4 mm²	96	89	99	84	74	100	6*9
ENT.PST.4024.250	250	584	3,4	4 mm²	96	102	99	84	87	114	6*9
ENT.PST.4024.320	320	749	4,4	4 mm²	120	90	127	90	83	92	6*9
ENT.PST.4024.400	400	909	5,5	4 mm²	120	102	127	90	95	106	7*13
ENT.PST.4024.500	500	1241	7,1	4 mm²	120	122	127	90	109	126	7*13
ENT.PST.4024.630	630	1556	7,6	10 mm²	150	113	141	122	89	120	7*13

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

ENT.PST Series





Print Date: 09.2014

Control Transformers

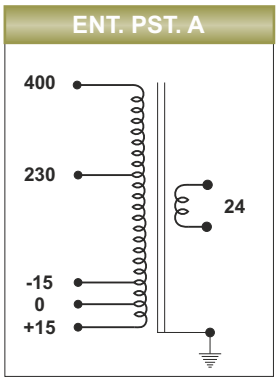
ENT.PST Series

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 mm²	66	76	80	50	64	80	5*8
ENT.PST.A4024.50	50	400	97	1,5	4 mm²	84	76	91	64	64	82	5*8
ENT.PST.A4024.100	100	400	218	2	4 mm²	84	76	91	64	64	96	6*9
ENT.PST.A4024.160	160	400	344	2,4	4 mm²	96	89	99	84	74	100	6*9
ENT.PST.A4024.200	200	400	460	2,9	4 mm²	96	89	99	84	74	100	6*9
ENT.PST.A4024.250	250	400	584	3,4	4 mm²	96	102	99	84	87	114	6*9
ENT.PST.A4024.320	320	400	749	4,4	4 mm²	120	90	127	90	83	92	6*9
ENT.PST.A4024.400	400	400	909	5,5	4 mm²	120	102	127	90	95	106	7*13
ENT.PST.A4024.500	500	400	1241	7,1	4 mm²	120	122	127	90	109	126	7*13
ENT.PST.A4024.630	630	400	1556	7,6	10 mm² 4 mm²	150	113	141	122	89	120	7*13

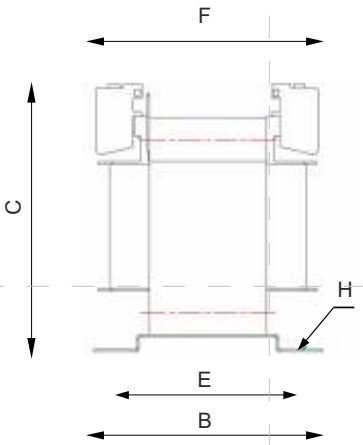
**On-demand production in different voltage values up to 2500VA*

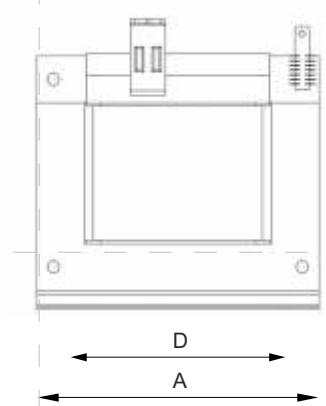
Connection Diagram

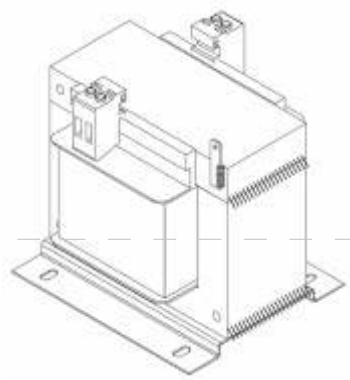


Dimensions

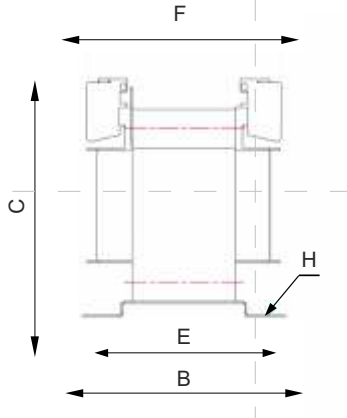
230/24V & 400/24V

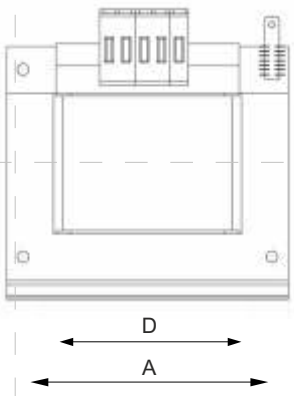


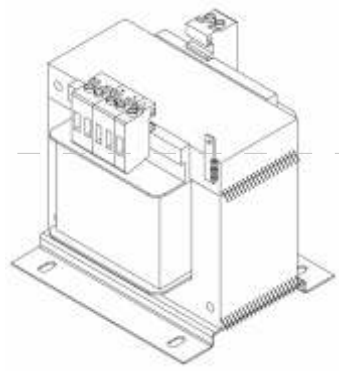




400-230/24V With Alternative Input (15-0-15V)







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

Isolating Transformers

ENT.IST Series

NEW

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 points.

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

CE

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
- 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

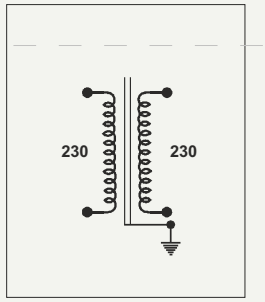
Isolating Transformers

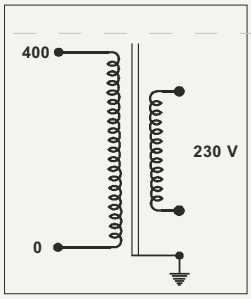
230/230	Nominal Power (VA) (at 50 C)	Short Term Power (VA)	Weight (kg)	Terminal Diameter	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	H(mm)
ENT.IST.2323.25	**25**	51	1	4 mm²	66	76	80	50	64	80	5*8
ENT.IST.2323.50	**50**	104	1,5	4 mm²	84	76	91	64	64	82	5*8
ENT.IST.2323.100	**100**	199	2	4 mm²	84	76	91	64	64	96	6*9
ENT.IST.2323.160	**160**	338	2,4	4 mm²	96	89	99	84	74	100	6*9
ENT.IST.2323.200	**200**	428	2,9	4 mm²	96	89	99	84	74	100	6*9
ENT.IST.2323.250	**250**	548	3,4	4 mm²	96	102	99	84	87	114	6*9
ENT.IST.2323.320	**320**	701	4,4	4 mm²	120	90	127	90	83	92	6*9
ENT.IST.2323.400	**400**	959	5,4	4 mm²	120	102	127	90	95	106	7*13
ENT.IST.2323.500	**500**	1259	7,1	4 mm²	120	122	127	90	109	126	7*13
ENT.IST.2323.630	**630**	1493	8,1	4 mm²	150	113	141	122	89	102	7*13
400/230											
ENT.IST.4023.25	**25**	51	1	4 mm²	66	76	80	50	64	80	5*8
ENT.IST.4023.50	**50**	95	1,5	4 mm²	84	76	91	64	64	82	5*8
ENT.IST.4023.100	**100**	216	2	4 mm²	84	76	91	64	64	96	6*9
ENT.IST.4023.160	**160**	330	2,5	4 mm²	96	89	99	84	74	100	6*9
ENT.IST.4023.200	**200**	454	3	4 mm²	96	89	99	84	74	100	6*9
ENT.IST.4023.250	**250**	555	3,6	4 mm²	96	102	99	84	87	114	6*9
ENT.IST.4023.320	**320**	744	4,5	4 mm²	120	90	127	90	83	92	6*9
ENT.IST.4023.400	**400**	942	5,6	4 mm²	120	102	127	90	95	106	7*13
ENT.IST.4023.500	**500**	1174	7,1	4 mm²	120	122	127	90	109	126	7*13
ENT.IST.4023.630	**630**	1555	8,3	4 mm²	150	113	141	122	89	102	7*13

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

Connection Diagrams

ENT.IST Series



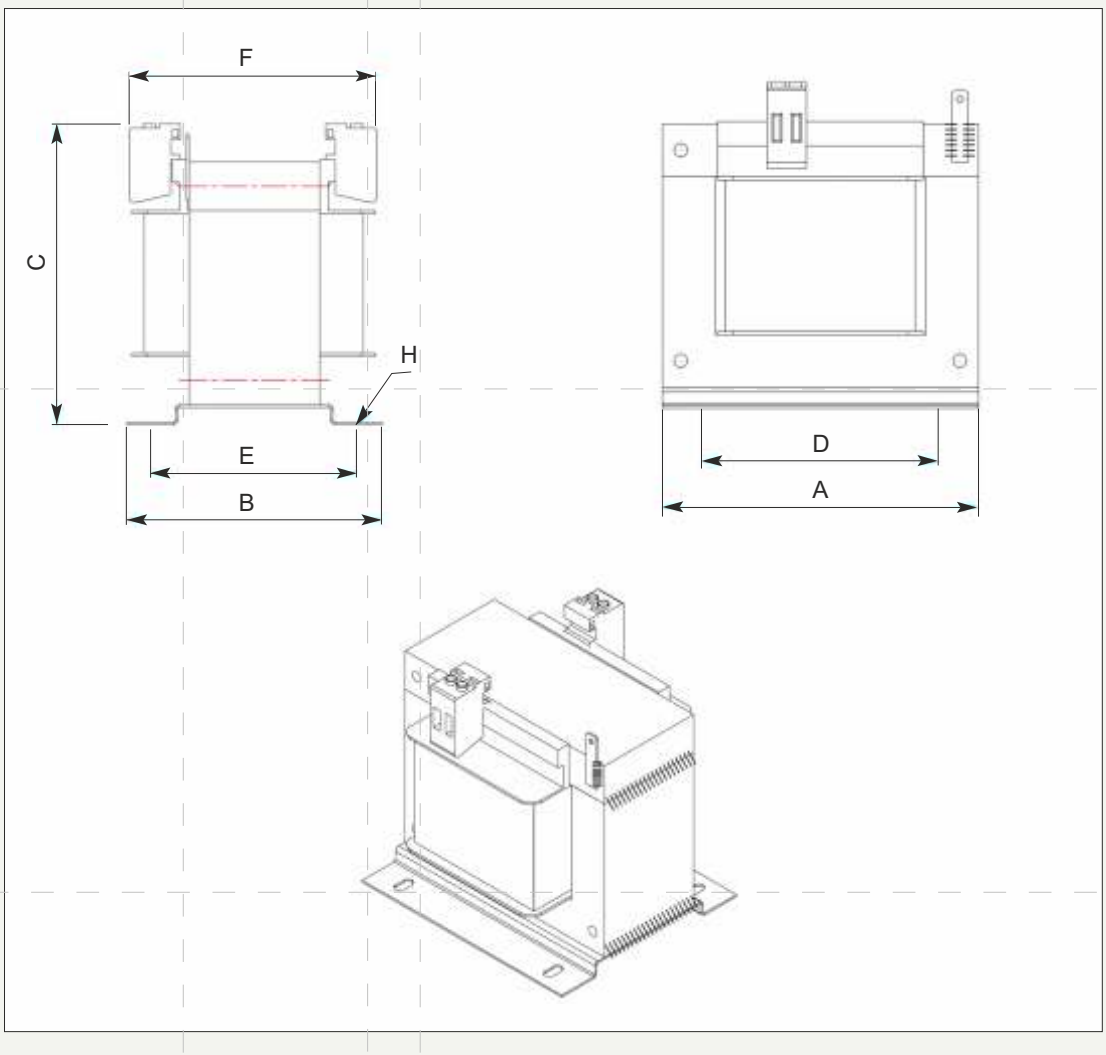


Print Date: 09.2014

Isolating Transformers

ENT.IST Series

Dimensions



TÜRKAK
Kalite Yönetim Sistemi
TS EN ISO/IEC 17021
AB-0002-YS

KALİTE YÖNETİM SİSTEMİ BELGESİ
QUALITY MANAGEMENT SYSTEM CERTIFICATE

Partner of IQNet
THE INTERNATIONAL CERTIFICATION NETWORK

TÜRK STANDARDLARI ENSTİTÜSÜ
bu belge ile

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET A.Ş.
YUKARI DUDULLU ORG. SAN. BÖLG. 1.CAD. NO: 23
ÜMRANİYE-
İSTANBUL / TÜRKİYE

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

Belge kapsamı Ek'te verilmiştir

K - Q
TSE-ISO-EN
9000

TÜRK STANDARDLARI ENSTİTÜSÜ
TURKISH STANDARDS INSTITUTION

İstanbul Belgelendirme Müdürü
İstanbul Certification Director

Hakan DENİZ

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

Bu belge belgelendirme şartlarına uygunluk sağlandığı sürece geçerlidir.

TURKISH STANDARDS INSTITUTION
hereby certifies that the organization

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET A.Ş.
YUKARI DUDULLU ORG. SAN. BÖLG. 1.CAD. NO: 23
ÜMRANİYE-
İSTANBUL / TÜRKİYE

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

Scope of the certificate is given in annex

Belge No / Certificate No
KY-502-03/KG-97/10-R

Belge Tarihi / Date of Certificate
18.11.2013

Geçerlilik Tarihi / Valid Until
18.11.2016

Revizyon Tarihi / Date of Revision
18.11.2013

İlk Belge Tarihi / Initial Certification Date
28.04.1997

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

340212201301212577

KALİTE YÖNETİM SİSTEMİ BELGESİ

QUALITY MANAGEMENT SYSTEM CERTIFICATE

EK / ANNEX

TÜRKAK
Kalite Yönetim Sistemi
TS EN ISO/IEC 17021
AB-0002-YS

Partner of IQNet
THE INTERNATIONAL CERTIFICATION NETWORK

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

Belge Tarihi / Date of Certificate: **18/11/2013**

Belgeli Kuruluş Adı, Adresi:

Name and Address of the Certified Organization:

ENTES ELEKTRONİK CİHAZLAR İMALAT VE TİCARET A.Ş.
YUKARI DUDULLU ORG. SAN. BÖLG. 1.CAD. NO: 23
ÜMRANİYE-
İSTANBUL / TÜRKİYE

K - Q
TSE-ISO-EN
9000

Belge Kapsamı:

TS EN ISO 9001:2008

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

TASARIM VE ÜRETİMİ

Scope of the Certificate:

TS EN ISO 9001:2008

DESIGN AND PRODUCTION OF

- POWER FACTOR REGULATORS
- PROTECTION DEVICE
- AUXILIARY DEVICE
- TIME DEVICE
- PHOTOCELL SWITCHES
- ELECTRONIC TRANSFORMERS AND BALASTS
- DIGITAL MEASURING INSTRUMENTS
- WATTHOUR METERS

340212201301212577

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 2194300 **Master Contract:** 247454

Project: 2194300 **Date Issued:** August 7, 2009

Issued to: ENTES Elektronik Cihazlar İmalat ve Ticaret A.S.
Y.Dudullu Organize San.Bölgesi AND Sanayi Sitesi No:6
34776 Ümraniye ISTANBUL,
Turkey
Attention: Mrs. Aysel Baris

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only

C US

Issued by: H.W. Zeller

Authorized by: M.H.J.Hoendervangers
Area Director, Europe

PRODUCTS

CLASS 3631-04 ELECTRICAL MEASUREMENT AND TEST EQUIPMENT
CLASS 3631-84 ELECTRICAL EQUIPMENT FOR MEASUREMENT USE-Certified to US Standards

For details related to rating, size, configuration, etc. reference should be made to the CSA Certification Record or the descriptive report.

Model MPR-xx, EPM-xx, EPR-xx, EVM-xx where xx can be one or more characters
220 – 230 Vac, 6 VA, 110 – 115 Vac, 6 VA, 220 – 230 Vac, 4 VA, 110 – 115 Vac, 4 VA or 24 – 250 Vac/dc 45 – 65 Hz

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 61010.1-04 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements

Ref. Certif. No.
NL-29924

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTEM CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

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 Cihazlar Imalat ve Ticaret A.S. Y.Dudullu Org. San. Böl. 1. Cad. No:23 Ümraniye stanbul Turkey
Name and address of the manufacturer Nom et adresse du fabricant	Entes Elektronik Cihazlar Imalat ve Ticaret A.S. Y.Dudullu Org. San. Böl. 1. Cad. No:23 Ümraniye stanbul Turkey
Name and address of the factory Nom et adresse de l'usine	Entes Elektronik Cihazlar Imalat ve Ticaret A.S. Y.Dudullu Org. San. Böl. 1. Cad. No:23 Ümraniye stanbul Turkey
Rating and principal characteristics aleurs nominales et caractéristiques principales	1.Group: 220/230 V AC ± 10 %; 50/60 Hz, < 6 VA; 110/115 V AC ± 10 %; 50/60 Hz, < 6 VA 2.Group: 220-230 V AC ± 10 %; 45-65 Hz, < 4 VA; 110-115 V AC ± 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 ± 10 %; 45-65 Hz, < 4 VA; 110-115 V AC ± 10 %; 45-65 Hz, < 4 VA 6. Group: 220-230 V AC ± 10 %; 45-65 Hz, < 4 VA; 110-115 V AC ± 10 %; 45-65 Hz, < 4 VA 7. Group: 220-230 V AC ± 10 %; 45-65 Hz, < 4 VA; 110-115 V AC ± 10 %; 45-65 Hz, < 4 VA
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	See annex Additional sheets
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	61010-1(ed.3)

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

DEKRA

Date: 2014-02-11

Signature: A.G.H. Bergervoet

ES CERTIFIKÁT TYPU

EC - type examination certificate

SK 12 - 040 MI-003 Rev. 0 Add. 0

V súlade s *In accordance with*	nariadením vlády Slovenskej republiky č. 294/2005 Z. z. o meradlách v znení nariadenia vlády č. 445/2010 Z. z., ktorým sa transponuje smernica Európskeho parlamentu a Rady 2004/22/ES z 31. marca 2004 o meradlách v platnom znení do právneho poriadku Slovenskej republiky *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*
Žiadateľ *Issued to (applicant)*	ENTES Elektronik Cihazlar Imalat ve Ticaret A.S. Yukarı Dudullu OSB 3. Cadde, And Sitesi, No:6 34775 Ümraniye, İstanbul
Druh meradla *In respect of* Obchodná značka/Typ *Trade mark/Type*	elektromer *active electrical energy meter* **ES-32L**
Základné požiadavky *Essential requirements*	príloha č. 1 a príloha MI-003 k nariadeniu vlády SR č. 294/2005 Z. z. *Annex No 1 and Annex MI-003 to SR Government Ordinance No 294/2005 Coll.*
Použité harmon. normy a normat. dokumenty *Harmonised standards and normative documents used*	EN 50470 - 1 EN 50470 - 3 -
Ďalšie použité dokumenty *Further applied documents*	OIML R 46 CD3 WELMEC 11.1
Popis a dokumentácia *Description and documentation*	Základné parametre, popis meradla a podmienky schválenia sú uvedené v záverečnom protokole číslo 017/1432/12 MI-003, ktorý je súčasťou tohto ES certifikátu typu. Všetky výkresy, diagramy a dokumentácia sú archivované v zložke označenej ENTES_ES32L. *The principal characteristics, instrument description and approval conditions are set out in the Final protocol No 017/1432/12 MI-003, which is part of this EC - type examination certificate. All the designs, schematic diagrams and documentation are recorded in reference folder ENTES_ES32L.*
Platný do *Valid until*	2022-04-04
Notifikovaná osoba *Notified Body*	1432
Vystavený dňa *Date of issue*	2012-04-04

SNAS Reg. No. 058/P-017

Ing. Štefan Kráľ, PhD.
zástupca notifikovanej osoby
Representative of Notified Body

Ak sa na meradlo vzťahujú aj ďalšie technické predpisy, ktoré zahŕňajú iné aspekty meradla, ES certifikát typu platí len za predpokladu zhody meradla s týmito predpismi.

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.

OSVEDČENIE

o schválení systému manažérstva kvality
Approval on a quality management system

SK 12 - 033 D Rev. 0 Add. 0

V súlade s *In accordance with*	prílohou D k nariadeniu vlády Slovenskej republiky č. 294/2005 Z. z. o meradlách, v znení nariadenia vlády SR č. 445/2010 Z. z., ktorým sa transponuje smernica Európskeho parlamentu a Rady 2004/22/ES z 31. marca 2004 o meradlách v platnom znení do právneho poriadku Slovenskej republiky *Annex D to Government Ordinance of the Slovak Republic No 294/2005 Coll. on measuring instruments as amended by Government Ordinance of the Slovak Republic 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*
Výrobca *Issued to (manufacturer)*	ENTES Elektronik Cihazlar İmalat ve Ticaret A.Ş. Yukari Dudullu OSB 3. Cadde AND Sitesi No:6 Ümraniye İstanbul, Turkey
Kategória meradiel *Meas. instrument category*	elektromery (MI-003) *active electrical energy meters (MI-003)*
Potvrdenie *Confirmation*	Týmto osvedčením sa potvrdzuje, že systém manažérstva kvality a procesu výroby meradla zabezpečuje - v rozsahu platnosti podľa prílohy - zhodu meradiel s príslušnými požiadavkami vyššie uvedených predpisov *This approval confirms that the quality management system and production process ensures - within the scope specified in the annex - compliance of the measuring instruments with the appropriate requirements of the directive mentioned above.*
Notifikovaná osoba *Notified Body*	1432
Príloha *Annex*	2 strany 2 pages
Platné do *Valid until*	2015-09-18
Vystavené dňa *Date of issue*	2012-09-18

SLOVAK LEGAL METROLOGY SLM 1432

SNAS
Reg. No. 058/P-017

Ing. Štefan Kráľ, PhD.
zástupca notifikovanej osoby
representative of notified body

Slovenská legálna metrológia, n. o., Hviezdoslavova 31, 974 01 Banská Bystrica, Slovakia

Notes

Notes

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.S.

Adress: Dudullu OSB 1. Cad. No:23, 34776 Umraniye-Istanbul / Türkiye

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

Web: www.entes.com.tr - **Join our communication net:** entes_friends@yahoogroups.com

Coordinates: 40.995852 , 29.178398

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Print Date: September 2014