



## 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-2 Series
- 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-2 Series



MPR-2 Series

**MPR-2 Series DIN rail type Network Analyzers**

MPR-2 Series DIN rail type Network analyzers are designed to measure and analyze various electrical parameters. With their communication features all measurements can be tracked from a single monitoring center.

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



Product Code	3xV, 3xI, Frequency, W, VA, VA, P, Q, S, kWh, kVAh, Demand, Max., Min. Cos, I neutral	THD I%	THD V%	Harmonics 1-51.	RS-485	Digital Input	Digital Output	Analog Output (mA/V)	Temperature Input	Relay Output	Hour (RTC)	Current - Voltage Unbalances	Operating Hours Meating	Alarm	Memory	Log Records	Event Logs	Tariff
MPR-24	●										●		●				●	
MPR-25S-22	●	●	●		●	2	2				●		●	●			●	●
MPR-26S-21	●	●	●	51	●	2				1	●	●	●	●	4 MB	●	●	●
MPR-27S-23	●	●	●	51	●	2	2	1			●	●	●	●	4 MB	●	●	●
MPR-28S-32	●	●	●	51	●	2	2		1		●	●	●	●	4MB	●	●	●

**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 76.

# Network Analyzers (LCD)

MPR-2 Serisi

## MEASURED PARAMETERS

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

**MPR-24**



Total Harmonic Distortion for Voltage (THD-V)

Total Harmonic Distortion for Current (THD-I)

**MPR-25S-22**



Voltage / Current Unbalances

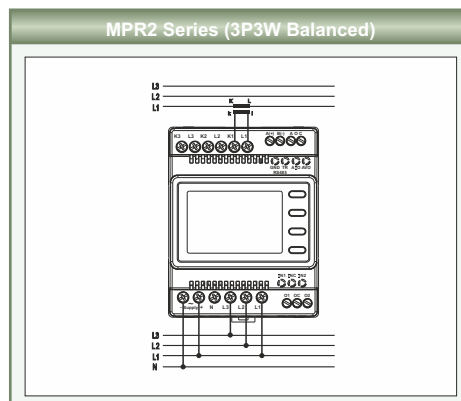
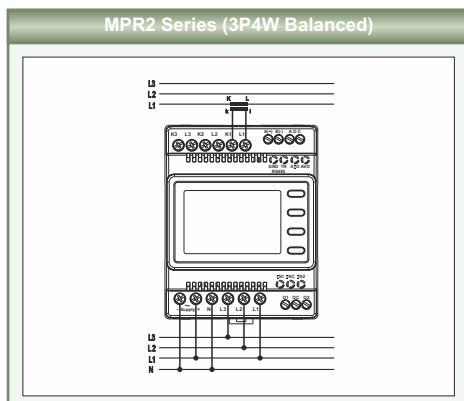
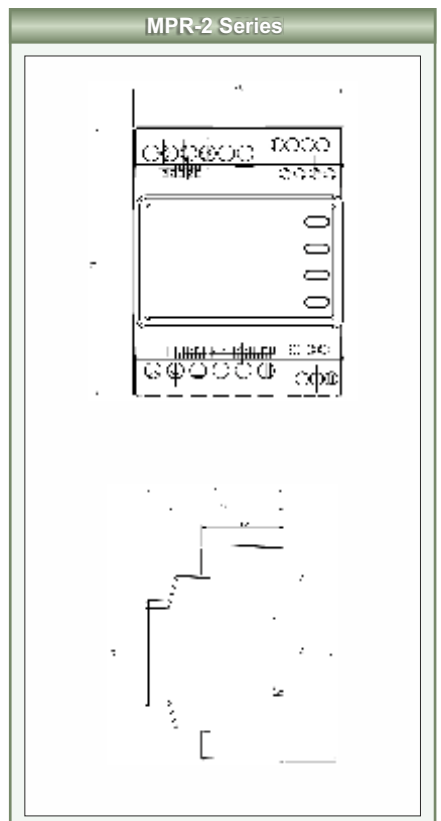
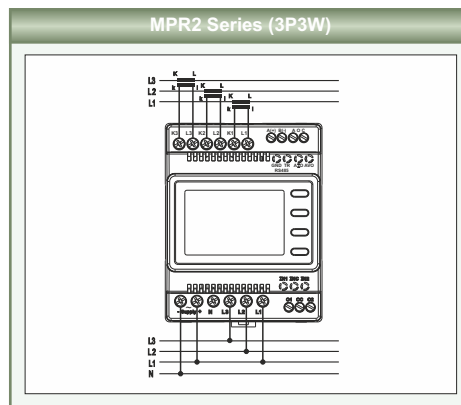
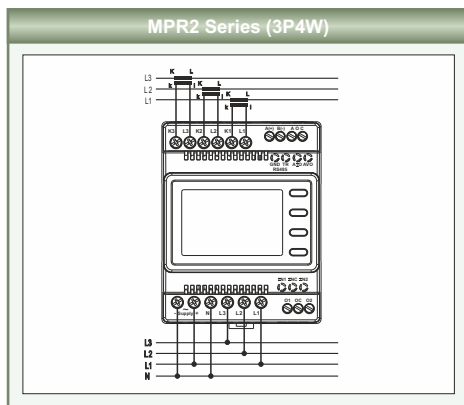
1-51<sup>st</sup> Individual Voltage Harmonics

1-51<sup>st</sup> Individual Current Harmonics

**MPR-26S-21 / MPR-27S-23 / MPR-28S-32**

## Connection Diagram DIN4 - MPR-2 Series

## Dimensions



# Network Analyzers (LCD)

MPR-2 Series

## SPECIFICATIONS

	MPR-24	MPR-25S-22	MPR-26S-21	MPR-27S-23	MPR-28S-32
<b>ENCLOSURE</b>					
Dimensions	DIN4 Rail Mounting				
Protection Class	Terminals = IP20, Enclosure Protection Class = IP40				
Display	LCD				
<b>MEASUREMENTS</b>					
<b>VOLTAGE</b>					
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 ± 2 Digit				
Input Impedance	>1M Ω				
Burden (Input Load)	<0,5 VA				
<b>CURRENT</b>					
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	<1 VA				
Overload Current	1,2 In continuous				
Short Time Overload (1s)	10xIn				
<b>POWER/ENERGY</b>					
Active Power	0 - 1 GW Accuracy : %1 ± 1 Digit				
Reactive Power	0 - 1 GVAR Accuracy : %1 ± 1 Digit				
Apparent Power	0 - 1 GVA Accuracy : %1 ± 1 Digit				
Power Factor	±1.00 Accuracy : ± 0,02				
Active Energy	0 - 99 999 999 kWh or MWh Accuracy : %1 class 1				
Reactive Energy	0 - 99 999 999 kVarh or MVarh Accuracy : %2 class 2				
Total Harmonic Distortion (THD)	-	-	THD V%, THD I%		
Separate Harmonics	-	-	1-51 Voltage(V) and Current(I)		
Demand Period	1,2,5,10,15,20,30,60 min.				
Frequency	45-65 Hz				
<b>SUPPLY</b>					
Operating Voltage	85 - 300 VAC/DC				
Operating Frequency	50/60 Hz				
Power Consumption	<5 VA				
<b>DIGITAL INPUT / OUTPUT</b>					
Digital Input Pulse Width	-	20/500 ms			
Digital Input Operating Voltage	-	12...48 VAC/DC			
Switching Current	-	Max 50mA			
Digital Output Supply Voltage	-	5-30 VDC (open collector)			
Pulse Duration	-	100ms pulse period 80ms pulse width			
Pulse Width	-	20-500 ms (Adjustable)			
<b>ANALOG OUTPUT</b>					
Current Output	-	-	0-20mA, 4-20mA, 4-24mA	-	-
Voltage Output	-	-	0-5V, 0-10V, ±5V, ±10V	-	-
<b>RELAY OUTPUT</b>					
Relay Output	-	-	1 NO Contact, 250 AC/6A	-	-
<b>TEMPERATURE INPUT</b>					
Sensor Input Type	-	-	-	-	PTC or Thermocouple type
Thermocouple Type	-	-	-	-	B,C,K,R,S,T
<b>MEMORY</b>					
Internal Memory Size	-	-	4MB		
<b>COMMUNICATION</b>					
Communication Interface/Protocol	-	-	RS 485 / MODBUS RTU		
Transfer Speed	-	-	2400-115200		
<b>AMBIENT CONDITIONS</b>					
Operating Temperature	- 10 / +55°C				
Storage Temperature	- 20 / +70°C				
Overvoltage Category	III				
Pollution Degree	II				
Ambient Humidity	%95				
<b>STANDARDS</b>					
Standards	EN 61557-12, EN 61326-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4 EN 62053, EN 60068, EN 61010				
<b>CONNECTIONS</b>					
Mounting	Rail Mounting				
Connection Terminals	Screw Terminal				
Connection Types	3P4W, 3P3W, 3 Phase Aron, 3P4W Balanced, 3P3W Balanced				

# Network Analyzers (LCD)

MPR-3 Series



MPR-3 Series (72x72)

## MPR-3 Series New Generation Mini Network Analyzers

With 72x72x50mm size, MPR-3 series mini network analyzers occupy smaller space. These analyzers are preferred in Rack type panels due to their compact design and used in applications such as UPS, machine control panels, data processing and system rooms and security control.

MPR-3 series can detect the status and enable the control of the devices (circuit breaker, contactors, switches etc.) in the field with their digital inputs and outputs.



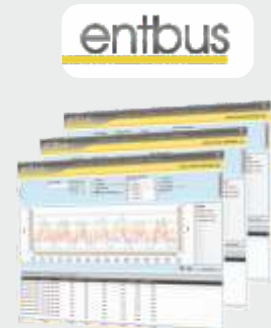
## PRODUCT SELECTION TABLE

Product Code	Dimensions / mm	3xV, 3xI, Frequency, W, VA, VA <sub>r</sub> , P, Q, S, kWh, kVAh, kVAh Demand, Max., Min. Cos φ, I <sub>neutral</sub>	THD-I %	THD-V %	RS-485	Digital Input	Digital Output	Real Time Clock (RTC)	Operating Hour Meter	Alarm	Event Logs	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 76.



# Network Analyzers (LCD)

MPR-3 Series

## MEASURED PARAMETERS

Phase - Neutral Voltages ( $V_{LN}$ )	Neutral Currents ( $I_n$ -calculated)	Active Power (P)
Phase - Phase Voltages ( $V_{LL}$ )	Phase Currents ( $I_L$ )	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 $\phi$	Total Apparent Power ( S )	Active Energy-Export (kWh or MWh)
Frequency (Hz)	Apparent Energy (kVAh or MVAh)	Reactive Energy Inductive (kVAh or MVAh)
Max. Demand	Apparent Energy	Reactive Energy Capacitive (kVAh or MVAh)

**MPR-32**

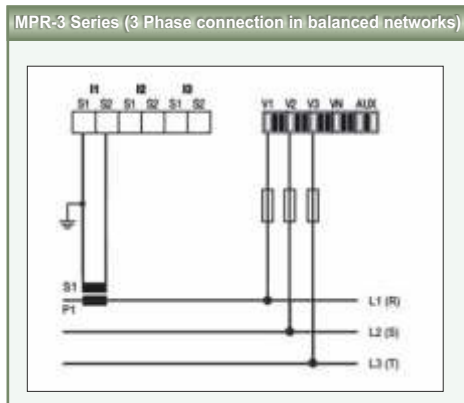
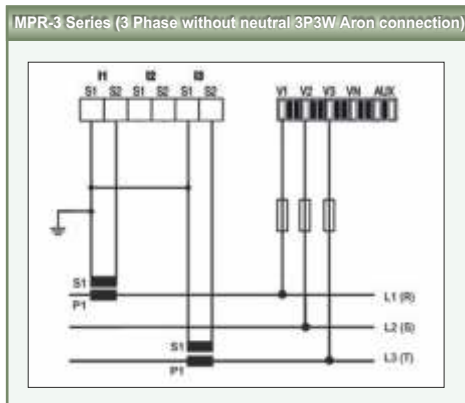
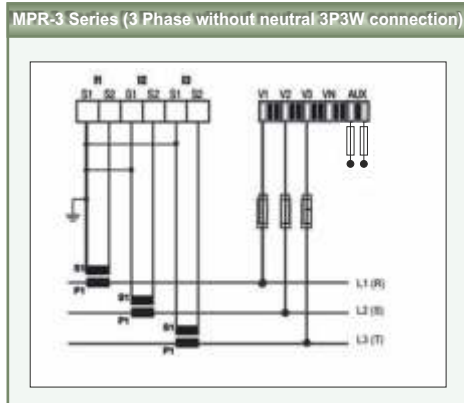
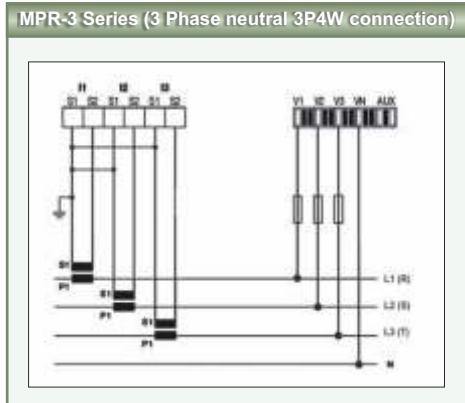


Total Harmonic Distortion for Voltage (THD-V)

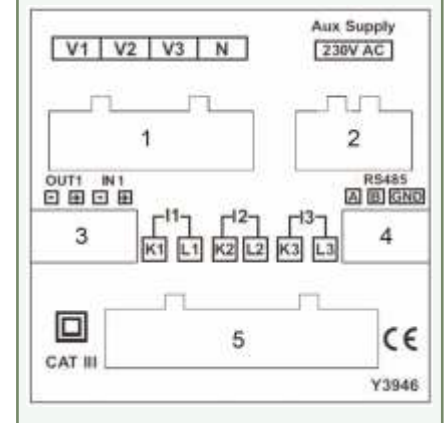
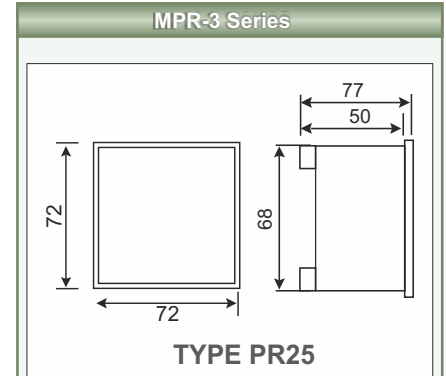
Total Harmonic Distortion for Current (THD-I)

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

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



## Dimensions



# Network Analyzers (LCD)

MPR-3 Series



## SPECIFICATIONS

	MPR-32	MPR-34-11	MPR-34S-11	MPR-34-20	MPR-34S-20
<b>ENCLOSURE</b>					
Dimensions	72x72x50 mm				
Protection Class	Terminals = IP20, Enclosure Protection Class = IP51				
Display	LCD				
<b>MEASUREMENTS</b>					
<b>Voltage</b>					
Measurement Range	10-400 VAC (L-N), 10-690 VAC (L-L)				
Measurement Range with Transformer	10V - 999 kV				
Measurement Class	0,5% ± 1 digit				
Input Impedance	1,8 MΩ				
Burden (Input Load)	<0,5 VA				
<b>Current</b>					
Measurement Class	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				
<b>Power/Energy</b>					
Active Power Measurement Class	1% ± 1 digit				
Reactive Power Measurement Class	1% ± 1 digit				
Active Energy Accuracy	Class 1				
Reactive Energy Accuracy	Class 2				
Active Power Measurement Range	0-1 GW				
Reactive Power Measurement Range	0-1 GVar				
Apparent Power Measurement Range	0-1 GVA				
Active Energy Indicating Range	0 - 9 999 999,9 kWh				
Max. Reactive Energy Indicating Range	0 - 9 999 999,9 kWh				
<b>SUPPLY</b>					
Operating Voltage	185-300 VAC/DC				
Supply Frequency	45-65 Hz				
Power Consumption	<4 VA				
<b>INPUT/OUTPUT STRUCTURE</b>					
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)	
<b>AMBIENT CONDITIONS</b>					
Operating Temperature	-10 / +55°C				
Storage Temperature	-20 / +70°C				
Ambient Humidity	95%				
<b>STANDARDS</b>					
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				
<b>CONNECTIONS</b>					
Mounting	Front Panel Mounting				
Connection Terminals	Screw Terminal with Socket				
Connection Types	3P4W , 3P3W, 3 Phase Aron, 3P4W Balanced, 3P3W Balanced				
<b>COMMUNICATION</b>					
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)

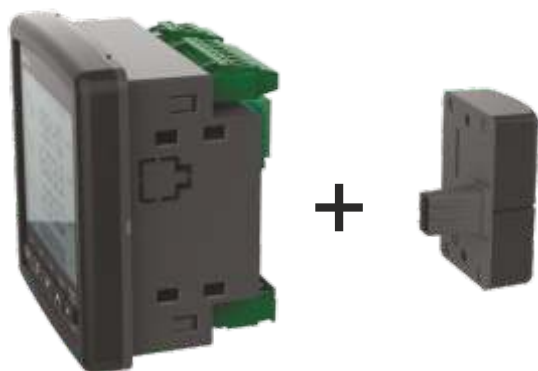
## MPR-4 Series Network Analyzers

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, kVAh, kVAh Demand, Max., Min. Cos φ, I neutral	THD-I %	THD-V %	Individual Harmonics	RS-485	Digital Input	Digital Output	Analog Output (mA/V)	Relay Output	Pulse Output	Real Time Clock	Memory	Voltage/Current Unbalances	Sag/Swell	Pulse Counter	Operating Hours Meter	Alarm	Event Logs	Profile Records	Pcs/Box
MPR-45	96x96	●					*	*	*	*	*	●					●	●	●		24
MPR-45S	96x96	●				●	*	*	*	*	*	●	16MB				●	●	●	●	24
MPR-46	96x96	●	●	●			*	*	*	*	*	●			*	●	●	●	●		24
MPR-46S	96x96	●	●	●		●	*	*	*	*	*	●	16MB			*	●	●	●	●	24
MPR-47S	96x96	●	●	●	51	●	*	*	*	*	*	●	16MB	●	●	*	●	●	●	●	24

\* Modular structure ● Standard



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 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 76.



# Network Analyzers (LCD)

MPR-4 Series

## MEASURED PARAMETERS

Phase - Neutral Voltages ( $V_{LN}$ )	Neutral Current ( $I_n$ )	Active Power (P)	Active Energy Import (kWh or Mwh)
Phase - Phase Voltages ( $V_{LL}$ )	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 (kVAh or MVAh)
Average Phase-Phase Voltage	Cos	Total Active Power ( P )	Reactive Energy Inductive (kVAh or MVAh)
Max. Demand	Frequency (Hz)	Total Reactive Power ( Q )	Apparent Energy (kVAh or MVAh)
Phase Currents ( $I_L$ )	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

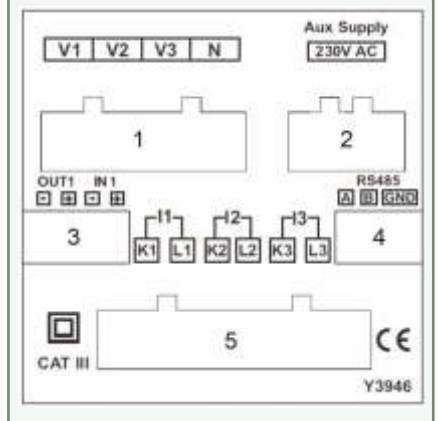
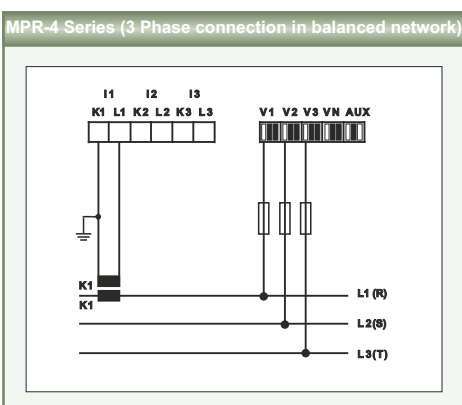
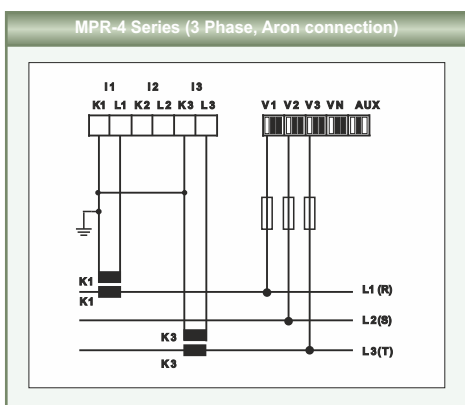
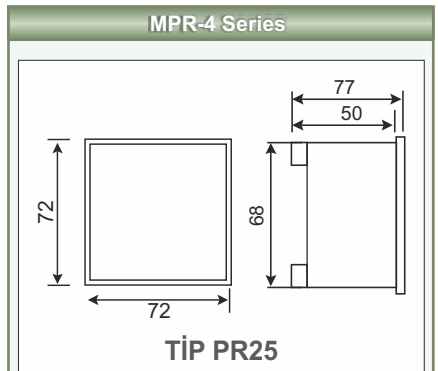
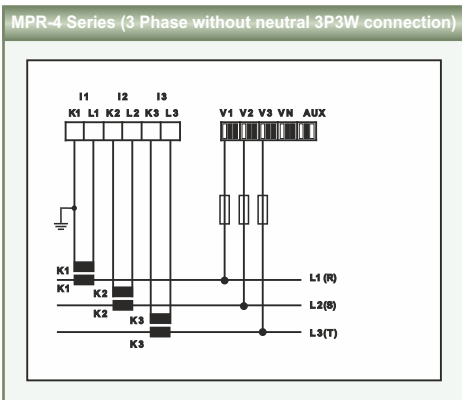
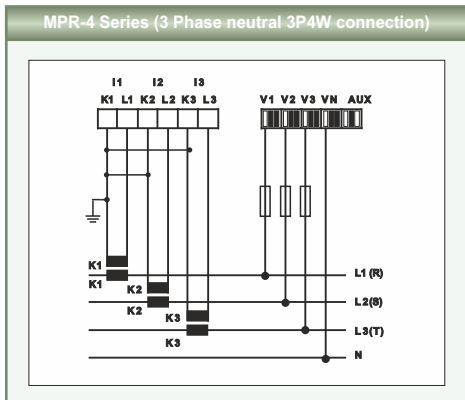
1-51<sup>st</sup> Individual Voltage Harmonics

1-51<sup>st</sup> Individual Current Harmonics

### MPR-47S

## Connection Diagram PR19 - MPR 4 Series (96x96mm)

## Dimensions



# Network Analyzers (LCD)

MPR-4 Series

## SPECIFICATIONS

	MPR-45	MPR-45S	MPR-46	MPR-46S	MPR-47S
<b>ENCLOSURE</b>					
Dimensions	96x96x45mm				
Protection Class	Terminals = IP20, Enclosure Protection Class = IP 51				
Display	LCD				
<b>MEASUREMENTS</b>					
<b>VOLTAGE</b>					
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				
<b>CURRENT</b>					
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				
<b>POWER/ENERGY</b>					
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	-				
Demand Period	1,2,5,10,15,20,30,60 minute adjustable				
Frequency	45-65 Hz				
<b>SUPPLY</b>					
Operating Voltage	45 - 300 VAC/DC				
Operating Frequency	50/60 Hz				
Power Consumption	<5 VA				
<b>PULSE OUTPUT</b>					
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				
<b>MEMORY</b>					
Internal Memory Size	-	16MB	-	-	16MB
<b>COMMUNICATION</b>					
Communication Interface/Protocol	-	RS-485 / MODBUS RTU	-	-	RS-485 / MODBUS RTU
Transfer Speed	-	2400-115200	-	-	2400-115200
<b>AMBIENT CONDITIONS</b>					
Operating Temperature	- 5 / +55°C				
Storage Temperature	- 25 / +70°C				
Overvoltage Category	III				
Pollution Degree	II				
Ambient Humidity	90%				
<b>STANDARDS</b>					
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				
<b>CONNECTIONS</b>					
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

