ACDC™ DYNAMICS

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Monitoring Electricity Quality

ENERGY MANAGEMENT

Using the latest Design Technologies

E/NTES

THINK ELECTRICAL

DIGITAL PANEL METERS

DCV-10

DCA-10

Digital DC Voltmeters - 48 x 96mm

Code	Input/Measurement	Supply Voltage	Accuracy	Sampling Rate
DCV-10*	0 - 200VDC	85-265VAC/DC	0.5% ±1 Digit	1 - 600s
DCV-11*	0 - 50VDC	10-56VAC/DC	0.5% ±1 Digit	1 - 600s
Digital DC Ammeters - 48 x 96mm				
DCA-10*	0 - 10 000A Shunt Connected (50mV - 150mV)	85-265VAC/DC	0.5% ±1 Digit	1 - 600s
DCA-11*	0 - 10 000A Shunt Connected (50mV - 150mV)	10-65VAC/DC	0.5% ±1 Digit	1 - 600s

*Add **C** to code for relay contact output.

DIGITAL AMMETERS & VOLTMETERS

EPM-4D-48

EVM-3S-48

EPM-4C-72

EVM-3C-96

EVM-R3C

Type	Supply Voltage	Code 48 x 96	Code 72 x 72	Code 96 x 96	Code DIN Mount 3m
Voltmeter *1-Phase*	230VAC	**EVM-3-48 230V**	**EVM-3-72 230V**	**EVM-3-96 230V**	**EVM-R3 230V**
10-600VAC	110VAC	**EVM-3-48 110V**	**EVM-3-72 110V**	**EVM-3-96 110V**	**EVM-R3 110V**
Voltmeter *1-Phase with*	230VAC	**EVM-3C-48 230V**	**EVM-3C-72 230V**	**EVM-3C-96 230V**	**EVM-R3C 230V**
*contact output**	110VAC	**EVM-3C-48 110V**	**EVM-3C-72 110V**	**EVM-3C-96 110V**	**EVM-R3C 110V**
3 Phase Voltmeter (single display)	230VAC	**EVM-3S-48 230V**	**EVM-3S-72 230V**	**EVM-3S-96 230V**	**EVM-R3S 230V**
10-600VAC (L-L) 10-300VAC (L-N)	110VAC	**EVM-3S-48 110V**	**EVM-3S-72 110V**	**EVM-3S-96 110V**	**EVM-R3S 110V**
Ammeter *1-Phase*	230VAC	**EPM-4D-48 230V**	**EPM-4D-72 230V**	**EPM-4D-96 230V**	**EPM-R4D 230V**
	110VAC	**EPM-4D-48 110V**	**EPM-4D-72 110V**	**EPM-4D-96 110V**	**EPM-R4D 110V**
Ammeter *1-Phase with*	230VAC	**EPM-4C-48 230V**	**EPM-4C-72 230V**	**EPM-4C-96 230V**	**EPM-R4C 230V**
*contact output**	110VAC	**EPM-4C-48 110V**	**EPM-4C-72 110V**	**EPM-4C-96 110V**	**EPM-R4C 110V**

- True RMS measurement
- Non-flammable enclosure
- Programmable current transformer ratio (5-10,000/5A)
- Ammeters are CT-Driven with 5A ratio
- Class 1%

* Meters have a set point and contact output (1NO, 5A). Can be programmed for over or under voltage or current

3 Phase Ammeters & Voltmeters - 96 x 96mm

Code	Description
EPM-34	3 Phase ammeter programmable. CT 1...1000/5A and 1...5000/1A. Dual demand function (Time 0-60sec or 0-60min for max current demand display) Class 0.5%. Supply volts 24-250VAC/DC
EVM-35	3 Phase voltmeter. L-L & L-N. Class 0.5% Measurement voltage 0-600VAC. Supply volts 24-250VAC/DC

DIGITAL MULTIMETERS 3 PHASE

3 Phase
400VAC

Code	EMM-04*	EMM-04C*	EPM-04	EPM-04C*	EPM-06	EPM-06C*
Size			96 x 96			
3PH Voltage	✔	✔	✔	✔	✔	✔
3PH C	✔	✔	✔	✔	✔	✔
Cos	✔	✔			✔	✔
HZ	✔	✔	✔	✔	✔	✔
I Neutral	✔	✔	✔	✔	✔	✔
Max D	✔	✔	✔	✔	✔	✔
Max / Min Values	✔	✔	✔	✔	✔	✔
Alarm		✔		✔		✔
UND volt		✔		✔		✔
UND current		✔		✔		✔
UND frequancy		✔		✔		✔
Phase Sequance Protection		✔		✔		✔
5A	✔	✔		✔		✔
Total Run Hour	✔	✔	✔	✔	✔	✔

*For units with RS485 Modbus Communications ad 'S' to part number e.g EMM-04CS

MODULAR ENERGY METER (kWh)

- DIN Rail Mount
- Operating Temp: -20 to 50°C
- c/w tamper-proof terminal seal
- RS485 models are MID billing certified

c/w 80A CT

Code	ES-32L*	ES-80L
Supply Voltage Un	230VAC	230VAC
Current, (I max)	5 (32)A	40 (80)A
Operating Current	0.02-32A	0.08-80A
Frequency	50/60Hz	50/60Hz
Operating Voltage	230VAC	230VAC
Power Consumption	<2VA	<2VA
Precision accuracy class	Class1	Class1
Pulse transmission	1000Imp/kWh	1000Imp/kWh
Recorded harmonics	–	–
Size: 1M = (17.5mm)	1m	1m
Digits	6+1	6+1

COSϕ METER

- Non-Flammable Enclosure
- Flush Mounting with rear terminals
- Inductive or capacitive load indication

Code	ECR-3-72	ECR-3-96
Size	72 x 72	96 x 96
Operating Voltage	230VAC ±10%	230VAC ±10%
Accuracy	1% ±1 digit	1% ±1 digit
CT-Ratio	.../5A	.../5A
Range	0.00-0.99	0.00-0.99
Display	4-digit	4-digit
	14.2mm high	14.2mm high

* Add **5** to code for RS485 Comms

DIN MOUNT NETWORK ANALYSER

Class: 0,5

MPR-1

MPR-2

Measured Parameters	MPR-14S	MPR-15S-22	MPR-16S-21	MPR-17S-23	MPR-24	MPR-24-PM	MPR-25S-22	MPR-26S-21	MPR-26S-21-PM	MPR-27S-23
Voltages (L-N)(L-L)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Avg. Phase-Neutral V	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Avg. Phase-Phase V	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Phase Currents (IL)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Neutral Current (IN)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Total Current (ΣI)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cosϕ	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Frequency (Hz)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Power (P)(Q)(S)(ΣP)(ΣQ)(ΣS)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Power Factor (PF)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Active Energy-Import (kWh/MWh)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Active Energy-Export (kWh/MWh)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Reactive Energy Inductive (kVArh/MVArh)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Reactive Energy Capacitive (kVArh/MVArh)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Apparent Energy (kVAh/MVAh)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Max/Min Values / Max Demand	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Features										
% THD-I, THD-V		✔	✔	✔			✔	✔	✔	✔
Individual Harmonics			1-51	1-51				1-51	1-51	1-51
Alarm Contact					✔	✔	✔	✔	✔	✔
Digital Input		2	2	2			2	2	2	2
Digital Output		2		2			2			2
Relay Output			1					1	1	1
RS-485 Comm	✔	✔	✔	✔			✔	✔	✔	✔
Analogue Output				1						1
Memory		4MB	4MB	4MB			4MB	4MB	4MB	4MB
Real Time Clock	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Current/Voltage Imbalance			✔	✔				✔	✔	✔
/5A Ct-Driven	✔	✔	✔	✔	✔		✔	✔		✔
Plug & Meter CT-Driven						✔			✔	
Digital Hour Counter					✔	✔	✔	✔	✔	✔
Pulse Counter							✔	✔	✔	✔
Supply Voltage	85-300VAC/DC				85-300VAC/DC					
Size	DIN 4M Rail Mount				DIN 4M Rail Mount					

Plug & Meter 3 Phase mV Output Current Transformers

3PMD Series Current Transformers can deliver current data to 3 Phase Plug & Meter compatible devices over a single RJ45 cable.
Designed to be compatible with standard MCCB output spacing.
Easy, safe and error free installation.

Code 21 x 25mm	Primary (A)	Secondary (mV)	Code 31 x 31mm	Primary (A)	Secondary (mV)	Code 50 x 54mm	Primary (A)	Secondary (mV)
3PMD-25-360	3 x 60	330	3PMD-30-3300	3 x 300	330	3PMD-50-3800	3 x 800	330
3PMD-25-3100	3 x 100	330	3PMD-30-3400	3 x 400	330	3PMD-50-31000	3 x 1000	330
3PMD-25-3150	3 x 150	330	3PMD-30-3500	3 x 500	330	3PMD-50-31250	3 x 1250	330
3PMD-25-3200	3 x 200	330	3PMD-30-3600	3 x 600	330	3PMD-50-31600	3 x 1600	330
3PMD-25-3250	3 x 250	330	-	-	-	-	-	-

NETWORK ANALYSER

MPR-3

NEW plug&meter

MPR-4

I/O Module for **MPR-4**

NEW plug&meter

MPR-32	MPR-34S-11	MPR-34S-11-PM	MPR-45S	MPR-46S	MPR-47S	MPR-47S-PM	MPR-53S-DIN
✔	✔	✔	✔	✔	✔	✔	✔
			✔	✔	✔	✔	✔
			✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
			✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
✔	✔	✔	✔	✔	✔	✔	✔
	✔	✔		✔	✔	✔	✔
					1-51	1-51	
	✔	✔	✔	✔	✔	✔	
	1	1	Optional. See I/O Modules				2
	1	1	Optional. See I/O Modules				
			Optional. See I/O Modules				
	✔	✔	✔	✔	✔	✔	✔
			Optional. See I/O Modules				
			16MB	16MB	16MB	16MB	
✔	✔	✔	✔	✔	✔	✔	
					✔	✔	
✔	✔		✔	✔	✔		
		✔				✔	✔
✔	✔	✔	✔	✔	✔	✔	
	✔	✔	Optional. See I/O Modules				
	85-300VAC/DC		45-300VAC/DC				
	72 x 72 x 50mm		96 x 96 x 45mm				

IO modules for MPR-4

MPR-4 series network analyzers can be customized for various applications with I/O modules. These units have a compact modular design, making it very easy for installation and implementation into a current system.

Code	Supply Voltage	Digital Inputs	Digital Outputs	Relay Outputs	Analog Outputs (V/mA DC)
MM-120	5-24VDC	2	-	-	-
MM-102	5-24VDC	-	2	-	-
MM-002	5-24VDC	-	-	2x NO 5A 250VAC	-
MM-122	5-24VDC	2	2	-	-
MM-202	5-24VDC	-	-	-	2
MM-144	5-24VDC	4	4	-	-

NETWORK ANALYSER

Size:
96 x 96mm

MPR-50

MPR-63

EPM-07S

MPR-53

MPR-53S

MPR-53CS-96

Measured Parameters	MPR-50	MPR-60S	MPR-63	MPR-63-42	EPM-07-96	EPM-07S-96	MPR-53-96	MPR-53S-96	MPR-53CS-96
Phase-Neutral V (L-N)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Phase-Phase V (L-L)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Avg. Phase-Neutral V	✔	✔	✔	✔	✔	✔	✔	✔	✔
Avg. Phase-Phase V	✔	✔	✔	✔	✔	✔	✔	✔	✔
Phase Currents (IL)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Neutral Current (IN)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Total Current (ΣI)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cosφ	✔	✔	✔	✔	✔	✔	✔	✔	✔
Frequency (Hz)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Active Power (P)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Reactive Power (Q)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Apparent Power (S)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Total Active Power (ΣP)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Power Factor (PF)	✔	✔	✔	✔					
Tot. Reactive Power (ΣQ)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Tot. Apparent Power (ΣS)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Active Energy-Import (kWh/MWh)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Active Energy-Export (kWh/MWh)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Reactive Energy Inductive (kVArh/MVArh)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Reactive Energy Capacitive (kVArh/MVArh)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Max Demand	✔	✔	✔	✔	✔	✔	✔	✔	✔
Max / Min Values	✔	✔	✔	✔	✔	✔	✔	✔	✔
Features									
% THD-I, THD-V		✔	✔	✔			✔	✔	✔
2nd-31st Harmonics			✔	✔					
Alarm Contact		✔	✔	✔					✔
Digital Input				✔	✔	✔	✔	✔	✔
Energy Pulse Output		✔	✔		✔	✔	✔	✔	✔
RS-485 Comm		✔	✔	✔		✔		✔	✔
0(4)-20mA Output				✔ (x2)					
Memory		✔	✔	✔					
Real Time Clock		✔	✔	✔					
Type Display	LCD	LCD	LCD	LCD	LED	LED	LED	LED	LED
Dual Energy Meter					✔	✔	✔	✔	✔
6 Diff. Calc. Methods					✔	✔	✔	✔	✔
/5A Ct-Driven	✔	✔	✔	✔	✔	✔	✔	✔	✔
Digital Hour Counter									✔
Pulse Counter									✔
Supply Voltage	85-265VAC/DC, 50/60Hz				230VAC ±10%, 45-65Hz				
Size	96mm x 96mm								

POWER FACTOR CONTROLLERS

	Basic	Basic	Basic + Alarm	Comms + Alarm	Basic	With or Without Temperature Control Comms + Alarm	
Features	**RG-6T**	**RG-8T**	**RG-8B**	**RG-8BS**	**RG-12T**	**RG3-12CS**	**RG3-12CST**
Capacitor Steps	6	8	8	8	12	12	12
Size (mm)	144 x 144	144 x 144	96 x 96	96 x 96	144 x 144	144 x 144	144 x 144
Smart Switching			✔	✔		✔	✔
1 Phase, 1 Current Transformer	✔	✔	✔	✔	✔		
3 Phase, 3 Current Transformer						✔	✔
1-Phase Capacitor						✔	✔
Three Phase Capacitor	✔	✔	✔	✔	✔	✔	✔
THD Protection			✔	✔		✔	✔
Dual Target Cosϕ			✔	✔		✔	✔
Auto Setup			✔	✔		✔	✔
Password Protection			✔	✔		✔	✔
RS-485 Communication				✔		✔	✔
Internal Thermal Control			✔	✔			
External Thermal Control							✔
Compensation of Individual Phases						✔	✔
Measured Values							
Phase - Neutral Voltages (V_{LN})	✔	✔	✔	✔	✔	✔	✔
Phase Current (I)	✔	✔	✔	✔	✔	✔	✔
Cosϕ	✔	✔	✔	✔	✔	✔	✔
Active Power (P)	✔	✔	✔	✔	✔	✔	✔
Reactive Power (Q)	✔	✔	✔	✔	✔	✔	✔
Apparent Power (S)	✔	✔	✔	✔	✔	✔	✔
Individual Voltage Harmonics - up to 19th			✔	✔		✔	✔
Individual Current Harmonics - up to 19th			✔	✔		✔	✔
Total Harmonic Distortion for Voltage (THD V)			✔	✔		✔	✔
Total Harmonic Distortion for Current (THD V)			✔	✔		✔	✔
3-Phase Currents (I)						✔	✔
Total Active Power (ΣP)						✔	✔
Total Apparent Power (ΣS)						✔	✔
Total Reactive Power (ΣQ)						✔	✔
Active Energy - Import (kWh)						✔	✔
Active Energy - Export (kWh)						✔	✔
Capacitive Reactive Energy (kVArh C)						✔	✔
Inductive Reactive Energy (kVArh L)						✔	✔

ADVANCED SERIES POWER FACTOR CONTROLLERS

The RGA & RGSR is the top of our power factor range. It offers all the features and measurement parameters. These meters have been designed for every kind of compensation needed.

RGA

RGSR

Measured Parameters	RGA-15S	RGA-20S	RGA-20S-OG	RGSR-15S	RGSR-20S	RGSR-24S-OG
Number of Steps	15	20	24	12+SVC	16+SVC	20+SVC
SVC				✔	✔	✔
MV (Medium Voltage)				✔	✔	✔
Smart Switching	✔	✔	✔	✔	✔	✔
Auto Setup	✔	✔	✔	✔	✔	✔
Contact Output	✔	✔	✔	✔	✔	✔
RS485 Communication	✔	✔	✔	✔	✔	✔
Supply Voltage	100 - 270 VAC					
Operating Frequency	45 - 60Hz					
Cut out dimensions	138 x 138mm					
Front screen dimensions	144 x 144mm					
Measurement Accuracy	0.50%					
Operating Temperature	-20 +70°C					
Measured Values						
3- Phase Voltage (V)	✔	✔	✔	✔	✔	✔
3- Phase Current (I)	✔	✔	✔	✔	✔	✔
Power Factor (Cos&)	✔	✔	✔	✔	✔	✔
Real Power (W)	✔	✔	✔	✔	✔	✔
Reactive Power (Var)	✔	✔	✔	✔	✔	✔
Apparent Power (VA)	✔	✔	✔	✔	✔	✔
Total Harmomic Distortion % (I/V)	✔	✔	✔	✔	✔	✔
Current and voltage harmonics	1-51st	1-51st	1-51st	1-51st	1-51st	1-51st
Reactive Energy (KVARh)	✔	✔	✔	✔	✔	✔
Energy (kWh)	✔	✔	✔	✔	✔	✔

NEW

RGI SINGLE PHASE POWER FACTOR CONTROLLERS IP54

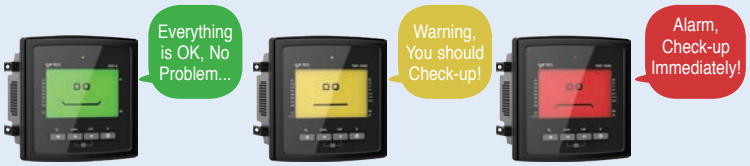
The next generation ENTES RGI Series power factor controllers are user-friendly with their plug & play and universal interface. These units are perfect for single phase system with precise measurement.

Features	RGI-4	RGI-6S	RGI-9S	RGI-12S
Number of Steps	4	6	9	12
RS485 Communication		✔	✔	✔
Alarm Output	✔	✔	✔	✔
Supply Voltage	150 -525 VAC			
Operating Frequency	45 - 60Hz			
Cut Out Dimensions	138 x 138mm			
Front Screen Dimensions	144 x 144mm			
Measurement Accuracy	0.50%			
Operating Temperature	-20 +70°C			
Measured Values				
Single Phase Voltage (V)	✔	✔	✔	✔
Single Phase Current (I)	✔	✔	✔	✔
Power Factor (Cos&)	✔	✔	✔	✔
Real Power (W)	✔	✔	✔	✔
Reactive Power (Var)	✔	✔	✔	✔
Apparent Power (VA)	✔	✔	✔	✔
Total Harmomic Distortion % (I/V)	✔	✔	✔	✔
Reactive Energy (KVARh)	✔	✔	✔	✔
Energy (kWh)	✔	✔	✔	✔

RGP POWER FACTOR CONTROLLERS IP54

SVC versions of RGP provide perfect power factor correction for both inductive and capacitive loads using inductive load driver and single phase shunt reactors.

RGP-9



Patented Easy Way Smiley Faces to Display PFC Status

Features	RGP-9	RGP-9S	RGP-12	RGP-12S	RGP-12SR	RGP-15SR
Number of Steps	9		12		9+SVC	12+SVC
SVC			✔	✔		
RS485 Communication		✔		✔	✔	✔
Supply Voltage	100 -270 VAC/VDC					
Operating Frequency	45 - 60Hz					
Cut out dimensions	138 x 138mm					
Front screen dimensions	144 x 144mm					
Measurement Accuracy	0.50%					
Operating Temperature	-20 +70°C					
Measured Values						
3- Phase Voltage (V)	✔		✔	✔		✔
3- Phase Current (I)	✔		✔	✔		✔
Power Factor (Cos&)	✔		✔	✔		✔
Real Power (W)	✔		✔	✔		✔
Reactive Power (Var)	✔		✔	✔		✔
Apparent Power (VA)	✔		✔	✔		✔
Total Harmomic Distortion % (I/V)	✔		✔	✔		✔
Reactive Energy (KVARh)	✔		✔	✔		✔
Energy (kWh)	✔		✔	✔		✔

SVC SOLUTION INDUCTIVE LOAD DRIVERS

Code	Power KVar	Shunt Reactors	Shunt Reactor Type	Dimensions (mm)	Weight
SR-05E	5	3	Single Phase	119 x 121 x 92	0.9kg
SR-10E	10	3	Single Phase	119 x 121 x 152	1.4kg
SR-20E	20	3	Single Phase	119 x 167 x 337	2.29kg
SR-30E	30	3	Single Phase	119 x 167 x 337	3.18kg

SVC SOLUTION SHUNT REACTORS

Code	Power KVar	L (mH)	Ims (A)	Dimensions (mm)	Weight
ENT.SRS1/230/1.66	1.66	101	7.22	150 x 123 x 145	9.3kg
ENT.SRS1/230/3.33	3.33	50.02	14.48	192 x 163 x 187	20.8kg
ENT.SRS1/230/6.67	6.67	25.3	40	240 x 125 x 305	24.3kg
ENT.SRS1/230/10	10	16.84	43.48	240 x 145 x 305	32.4kg

COMMUNICATION ACCESSORIES

Ethernet to RS-485 Modbus Gateway

Code	Description
EMG-02	Ethernet to Modbus gateway for communication between PC and Modbus compatible devices. (2 online connections)
EMG-12	Ethernet to Modbus gateway for communication between PC and Modbus compatible devices (up to 32 online connections)
Features:	• Network interface 10/100 Mbps (auto-negotiate) • 300-115200 bps baud rate (on serial port) • Power supply: 9-24V AC/DC

RS-485 to USB Converter

RS-USB2

Code	Description
RS-USB2	• RS-485 to USB converter for communication between PC & Modbus compatible devices. • USB 1.1 and USB 2.0 support • 300-115200 bps baud rate (auto-detect) • Powered from USB port

NEW

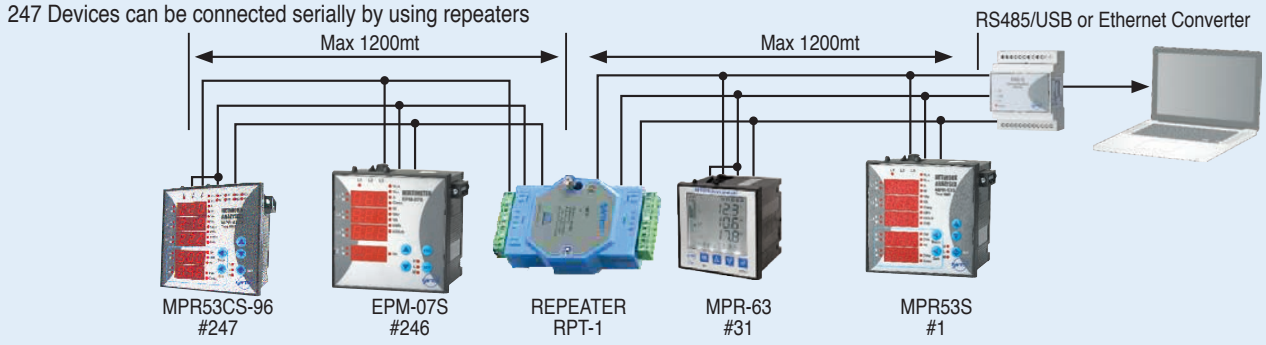
GEM 10 GPRS Gateway

Code	Description
GEM-10	• GPRS / Ethernet / RS-485 Modbus Gateway • Ports: Modbus (Terminal) Mini USB Ethernet (RJ45) • GPRS Quadband

GEM-10 GPRS/Modbus Gateway (modem) enables access to devices that communicate with Modbus protocol over GPRS or Ethernet networks. 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.

RS-485 Repeater

Code	Description
RPT-1	RS-485 to RS-485 Repeater for long distance (600m) or more than 32 devices • Variable transfer rate 300-115200Bps • Variable Data Format



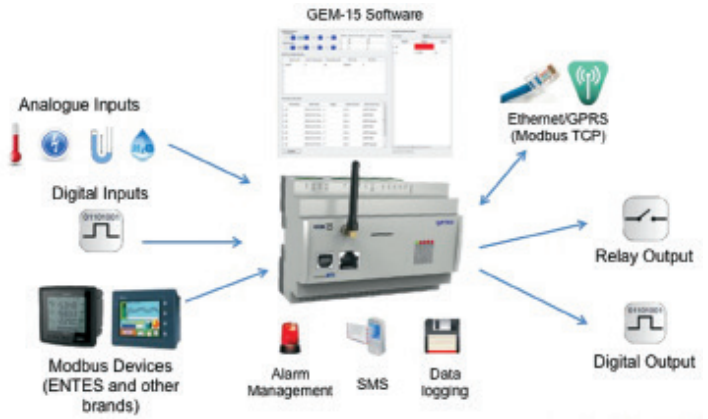
NEW

GSM CONTROLLERS

GEM-15 Gateway

Code	GEM-15
Supply	3-50VDC, < 5W
Inputs	4 x Analogue inputs (2 x 4-20mA, 2 x 0-10V) 4 x 0-50VDC Digital inputs
Outputs	4 x Transistor (3-50VDC,125mA), 4 x Relay(3A)
Coms	GSM, Modbus TCP, RS485, USB
Size (LxHxD)	126 x 58 x 90mm
Log Record Capacity	196 000 Seperate Parameters
Application	As Coms module for other equipment, Sending/receiving IO data over Modbus RTU, Controling outputs based on input status, Sending SMS status messages

The **GEM-15** modem RTU is an advanced I/O device using GPRS and Ethernet communications. It performs remote control and monitoring operations of values such as temperature, humidity, pressure and electrical parameters via analogue and digital inputs/outputs.
It can communicate with all devices using Modbus RTU protocol, read stored register information and assign alarms.
It can be remotely configured and the analogue and digital inputs can be monitored to produce reports for data analysis.
The on-board SIM card allows the device to send user defined SMS's programmed for alarms/alerts.
Configured through USB.



REMOTE MONITORING SOFTWARE

Monitoring Screen

ENTBUS PLUS - Standard Remote Monitoring Software

Code	Description
ENTBUS PLUS-5	Remote Monitoring Software Max. 5 Devices
ENTBUS PLUS-10	Remote Monitoring Software Max. 10 Devices
ENTBUS PLUS-25	Remote Monitoring Software Max. 25 Devices
ENTBUS PLUS-50	Remote Monitoring Software Max. 50 Devices
ENTBUS PLUS-75	Remote Monitoring Software Max. 75 Devices

Entbus Plus software basically reads and records data from ENTES devices with communication features in intervals specified by users. Built-in Reports feature uses this data to create comprehensive reports.

Web Module

Structural Features

The software is composed of 3 modules:

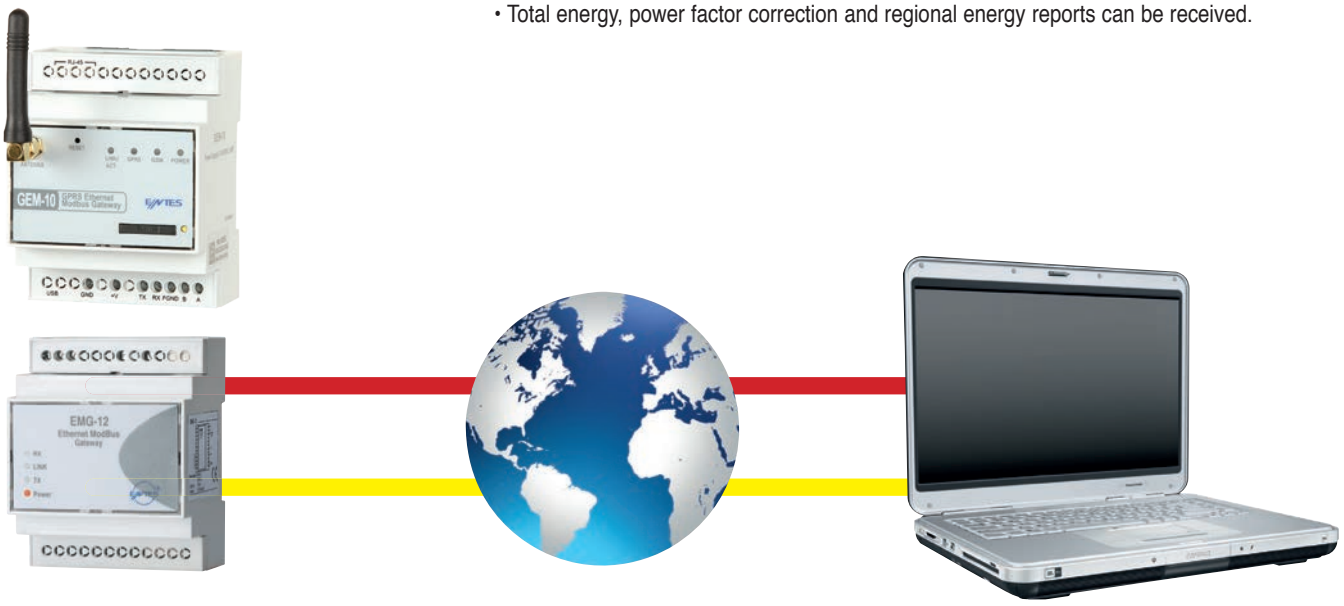
- The Server Module collects data from devices in the field and records this to the database in preferred intervals.
- In the Monitoring Module, the user monitors parameters measured by devices in the system. The user can form monitoring panels that also include front panel views of devices, and create 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 performance desired analysis.

Graphical Design Screen

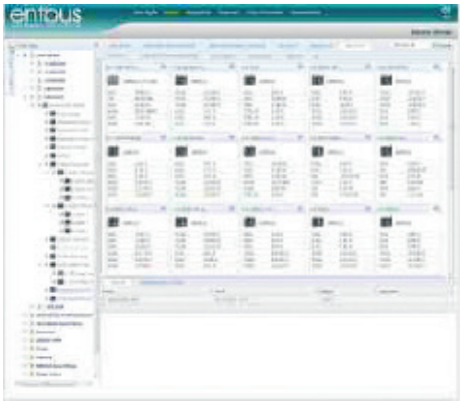
Functional Features

- 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. 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.
- A mimic diagram can be designed.
- Hourly, daily and monthly energy reports can be received.
- Hourly, daily, and monthly maximum values reports can be received.
- Total energy, power factor correction and regional energy reports can be received.



REMOTE MONITORING SYSTEM (100+ DEVICES)

The new-generation **ENTBUS PRO** web based energy monitoring software enables management of improvements in energy consumption and operating costs and assists in reaching energy efficiency goals. **ENTBUS PRO** tracks the energy consumption of facilities regardless of time and location and enables users to remotely control equipment. Parameters transferred over Ethernet/GPRS are instantly tracked, saved and archived.



Code	ENTBUS PRO
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 • Devices of different brands and models compatible with Modbus can be monitored & controlled • Defining virtual devices and virtual parameters • Detailed filtering feature for reports • Alarms sent via email and SMS

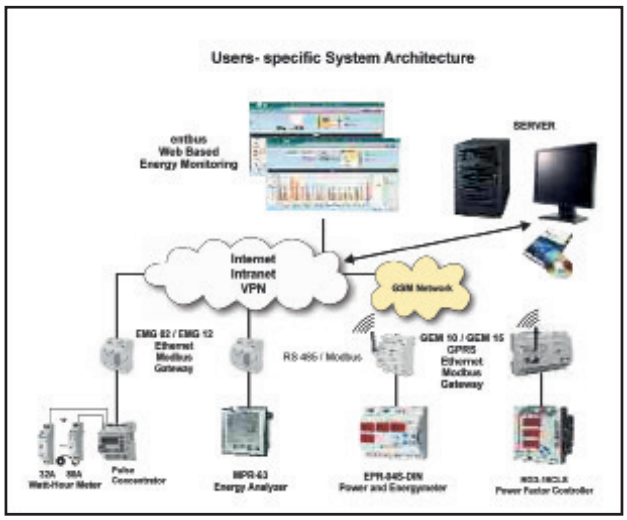
System Structure

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

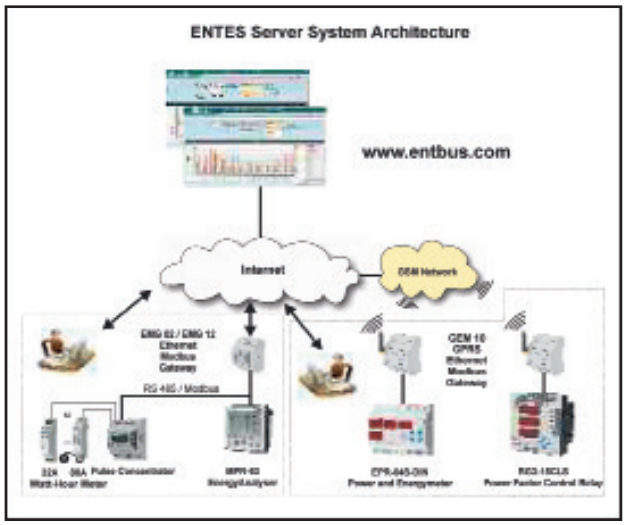
- **Monitoring Screen**
  Allows the electrical parameters of the devices to be tracked instantly and shows the hierarchical structures of devices on the device tree.
- **Options Screen**
  Displays and defines user information and allows users to subscribe to defined alarms
- **Reports Screen**
  Users 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 a device exceeds the specified limits, the system sends users an email and/or SMS notification.
- **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.

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 user's server.
The data is collected by running the software on the intranet or web.
The user can modify the settings of own devices also can analyze this data and perform reports.



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 software, purchasing a server, or using extra workforce.
This data is 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 their data, and receive the reports generated by the system.

Note: ENTBUS PRO Software is customized to each application. Please contact our ENTES brand specialist for more information and pricing.

AUTOMATION PRODUCTS

Digital Timer Switch

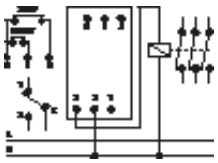
With triggering function. Independant self supply from internal battery.

NEW

Code	MCB200
Time Ranges	0.2-9999s/0.1-9999min
Supply Voltage	230V (85-315VAC/DC)
Output Type	1 C/O
Reset Time	<120ms
Rated Current	6A@230VAC
Mounting	DIN Rail
Battery Life	10 Years / 1000 000 operations

Triggering Input Functions

- Asymmetrical Flasher
- Symmetrical Flasher
- Delay
- OFF Delay
- Pulse



Connection Diagram

Liquid Level Relay

Code	SSRC-04*
Supply	***230VAC**, **400VAC** *Add voltage to code
Function	**SSRC-04** is used for the level and discharge control of conductive liquids in tanks located in industrial plants and domestic applications. The output relay switches ON when the liquid reaches the upper level electrode. The output relay switches OFF when the lower level electrode is no longer in contact with the liquid. The sensitivity (i.e. impedance between electrodes) can be adjusted to 5-50Ω for different liquids by means of the knob of the front panel. The LED on the front panel lights when the relay is ON position.
Output Relay	1C/O 8A
LED Indication	LED Green: Power LED LED Red: Relay on LED
Dimensions	35mm width DIN mounting

Astronomic Weekly Timer / Daylight Switch

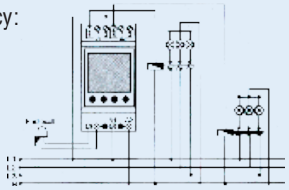
- 230VAC

Just program in your geographical co-ordinates and the unit will do the rest. Can also use a photocell to give additional control.

Code	Description	Relay Output
DTR-14	Astronomic timer with photocell	2C/O (8A)
DTR-10	Astronomic timer	2 C/O (8A)
DTR-10T	Astronomic timer	1 C/O (16A)
FG-GOZ	Photocell sensor for **DTR-14**	–

- Battery back-up: 5yrs.
- Super capacitor for additional 10hrs reserve
- No. of programs: 15
- Operating accuracy: ≤1 sec/day.

OR1



Connection Diagram

NEW

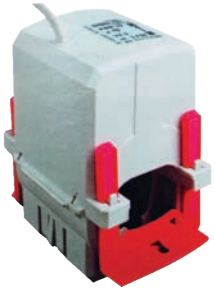
MEASURING TRANSDUCERS

DIN Rail Mount Transducer

Code	Input	Description	Power Supply	Output	Galvanic Isolation
TA-111	0-1A AC	1A Current Transducer	Self Powered	0-20mA	✔
TA-112	0-5A AC	5A Current Transducer	Self Powered	0-20mA	✔
TV-111	0-230VAC	1PH Voltage Transducer	Self Powered	0-20mA	✔

NEW

CURRENT TRANSFORMERS



Compact Split Core CT (5A secondary) - Direct clipping onto cables

Code	ENS-AYC-32-100	ENS-AYC-32-125	ENS-AYC-32-150	ENS-AYC-32-200	ENS-AYC-32-250	ENS-AYC-32-300
Primary	100A	125A	150A	200A	250A	300A
Class / VA	3/1.5VA	3/2.5VA	3/3VA	3/3VA	3/3VA	1/2.5VA
Window Size	20 x 30mm					

Code	ENS-AYC-44-400	ENS-AYC-44-500	ENS-AYC-44-600	ENS-AYC-44-750	ENS-AYC-44-800	ENS-AYC-44-1000
Primary	400A	500A	600A	750A	800A	1000A
Class / VA	1 / 5VA					
Window Size	30 x 40mm					

Table 1 CAPACITOR kVAr REQUIRED FOR INDIVIDUAL MOTOR COMPENSATION

motor kW	Capacitor rating in kVAr @ 400V					
	2 pole 3000rpm	4 pole 1500rpm	6 pole 1000rpm	8 pole 750rpm	10 pole 600rpm	12 pole 500rpm
1.5	0.5	1	1	1.5	1.5	1.5
2.2	0.75	1	1	1.5	1.5	1.5
4	1.0	1.5	2	2.5	3	3
5.5	1.5	2	3	3.5	4	4
7.5	2.5	3	3.5	4	5	5
11	4	4	4.5	6	6	6
15	5	5	6	8	8	10
18.5	6	6	7	8	10	12
22	7	8	9	10	12	14
30	9	10	11	14	14	16
37	12	12	14	16	18	18
45	14	14	15	18	20	22
55	15	16	18	20	22	26
63	16	18	20	22	24	28
75	20	22	24	26	28	32
90	25	26	30	32	35	38
110	28	30	32	35	38	45
132	30	32	36	38	45	60

Table 2 FACTOR FOR kVAr REQUIRED PER kW INPUT FOR POWER FACTOR CORRECTION

PF load before applying capacitors	Power Factor Required										
	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0
0.52	1.160	1.188	1.130	1.249	1.281	1.315	1.353	1.393	1.441	1.417	1.644
0.53	1.116	1.144	1.090	1.205	1.237	1.271	1.309	1.349	1.397	1.377	1.600
0.54	1.075	1.103	1.051	1.164	1.196	1.230	1.268	1.308	1.356	1.338	1.559
0.55	1.035	1.063	1.013	1.124	1.156	1.190	1.228	1.268	1.316	1.300	1.519
0.56	0.996	1.024	0.976	1.085	1.117	1.151	1.189	1.229	1.277	1.263	1.480
0.57	0.958	0.986	0.939	1.047	1.079	1.113	1.151	1.191	1.239	1.226	1.442
0.58	0.921	0.949	0.905	1.010	1.042	1.076	1.114	1.154	1.202	1.192	1.405
0.59	0.884	0.912	0.870	0.973	1.005	1.039	1.077	1.117	1.165	1.157	1.368
0.60	0.849	0.878	0.836	0.939	0.971	1.005	1.043	1.083	1.131	1.123	1.334
0.61	0.815	0.843	0.804	0.904	0.936	0.970	1.008	1.048	1.096	1.091	1.299
0.62	0.781	0.809	0.771	0.870	0.902	0.934	0.974	1.014	1.062	1.058	1.265
0.63	0.749	0.777	0.740	0.838	0.870	0.904	0.942	0.982	1.030	1.027	1.233
0.64	0.716	0.744	0.709	0.805	0.837	0.871	0.909	0.949	1.997	1.996	1.200
0.65	0.685	0.713	0.679	0.774	0.806	0.840	0.878	0.918	0.966	0.966	1.169
0.66	0.654	0.682	0.650	0.743	0.775	0.809	0.847	0.887	0.935	0.937	1.138
0.67	0.624	0.652	0.620	0.713	0.745	0.779	0.817	0.857	0.905	0.907	1.108
0.68	0.595	0.623	0.591	0.684	0.716	0.750	0.788	0828	0.876	0.878	1.079
0.69	0.565	0.593	0.563	0.654	0.686	0.720	0.758	0.798	0.840	0.850	1.049
0.70	0.536	0.564	0.534	0.625	0.657	0.691	0.729	0.769	0.811	0.821	1.020
0.71	0.508	0.536	0.507	0.597	0.629	0.663	0.701	0.741	0.783	0.794	1.992
0.72	0.479	0.507	0.480	0.568	0.600	0.634	0.672	0.712	0.754	0.767	0.963
0.73	0.452	0.480	0.453	0.541	0.573	0.607	0.645	0.685	0.727	0.740	0.936
0.74	0.425	0.453	0.426	0.514	0.546	0.580	0.618	0.658	0.700	0.713	0.909
0.75	0.398	0.426	0.400	0.487	0.519	0.553	0.591	0.631	0.673	0.687	0.882
0.76	0.371	0.399	0.374	0.460	0.492	0.526	0.564	0.604	0.652	0.661	0.855
0.77	0.345	0.373	0.347	0.434	0.466	0.500	0.538	0.578	0.620	0.634	0.829
0.78	0.319	0.347	0.321	0.408	0.440	0.474	0.512	0.552	0.594	0.608	0.803
0.79	0.292	0.320	0.295	0.381	0.413	0.447	0.485	0.525	0.567	0.582	0.776
0.80	0.266	0.294	0.269	0.355	0.387	0.421	0.549	0.499	0.541	0.556	0.750
0.81	0.240	0.268	0.243	0.329	0.361	0.395	0.433	0.473	0.515	0.530	0.724
0.82	0.214	0.242	0.217	0.303	0.335	0.369	0.407	0.447	0.489	0.504	0.698
0.83	0.188	0.216	0.191	0.277	0.309	0.343	0.381	0.421	0.463	0.478	0.672
0.84	0.162	0.190	0.167	0.251	0.283	0.317	0.355	0.395	0.437	0.450	0.645
0.85	0.136	0.164	0.141	0.225	0.257	0.291	0.329	0.369	0.417	0.424	0.620
0.86	0.109	0.140	0.112	0.198	0.230	0.264	0.301	0.343	0.390	0.395	0.593
0.87	0.083	0.114	0.086	0.172	0.204	0.238	0.275	0.317	0.364	0.369	0.567
0.88	0.054	0.085	0.058	0.143	0.175	0.209	0.246	0.288	0.335	0.341	0.538
0.89	0.028	0.059	0.027	0.117	0.149	0.183	0.230	0.262	0.309	0.310	0.512
0.90	-	0.031	-	0.089	0.121	0.155	0.192	0.234	0.281	0.283	0.484
0.91	-	-	-	0.058	0.090	0.124	0.161	0.203	0.250	0.252	0.453
0.92	-	-		0.031	0.063	0.097	0.134	0.176	0.223		0.426
0.93	-	-		-	0.032	0.066	0.103	0.145	0.192		0.395

kVAr Selection formula: kWx Factor required = kVAr required

Example:

Load of 400kVA at 0.7PF, correct to 0.96PF
From the above table factor is 0.729
Convert kVA to kW (Useful Power): kva x PF = kW
400 x 0.7 = 280kW (usefull power)
Therefore size of capacitance required:
Useful Power (kW) x Factor = kVar
280 x 0.729 = **204.1kVAr**

Savings for this example:
280kW ÷ 0.7pf = 400kVA
280kW ÷ 0.96pf = 291.7kVA
Reduction = 108.3kVA
Saving = 27%

ACDC™ DYNAMICS

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