Rail Type
Power Analyzer
User Manual

**ADDRESS: Ikitelli OSB Mah. Cevre 14.
Blok Sok. Telas Blok Dis Kapi No: 1
Kat: 1-2 Basaksehir/Istanbul**

**Phone: +90 212 438 80 24
Fax: +90 212 438 80 25**

info@gruparge.com

V.25.1

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PROPER USE AND SAFETY REQUIREMENTS

Cut all the power when connecting and disconnecting the device to a panel.

Do not clean the device with a solvent or similar material. Only use a dry cloth.

Please do not intervene to the device when a technical problem is encountered and get in contact with a technical service within the shortest time.

If the warnings are not taken into account, our company or the authorized dealer shall not be held responsible for the negative consequences.

Do not dispose in the trash, the device must be delivered to the collection centers (electronic device recycling centers). It should be recycled or disposed of without harming human health and environment.

The installation, assembly, activation and operation of the device should be done and used by only expert professionals and in accordance with safety regulations and instructions

The device operates with current transformers. Do not strictly leave current transformer tips unattached. Dangerous high voltage can occur.

1. INTRODUCTION

1.1. General Features

The Rail Type Power Analyzer allows you to measure and monitor 3-phase current, phase-neutral and phase-phase voltages, frequency, active and reactive powers, angle difference between current and voltage, power factor values. In addition, it reads and records active and reactive energies.

Demand and peak values for these measured quantities can also be monitored. Many necessary adjustments related to the device (Current Transformer, Voltage Transformer etc.) can be made via www.enerjitakibi.com.

All read parameters can be monitored remotely via standard MODBUS protocol and various adjustments can be made.

1.2 Technical Features

- Microprocessor based.
- It supports RS-485 Standard Modbus RTU protocol communication channel.
- The operating ambient temperature of the device is between -10 ÁC and+55 ÁC.
- The power consumption of measuring input is under 1 VA.
- The line voltage between phase-phase can be adjusted between 190-36200 V.
- The measurement voltage between phase-phase is between 100-480 V AC (45-65 Hz) and the measurement voltage between phase-neutral is 10-280 V AC (45-65 Hz).
- The current transformer ratio can be adjusted between 5/5 and 10000/5.
- Optionally, it can be used with CT30 type current transformers.
- The working frequency is 45-65 Hz.
- Minimum measurement values are 2 mA and 10 V.
- The measurement precision is %1.

- It periodically records the peak values of energy, demand and all parameters in non-volatile memory. Even if the energy is cut off, it continues to record the values where it left when the device is open again.
- Demand measurement time can be adjusted to between 1-60 minutes.
- Active, reactive powers and all electrical parameters can be monitored remotely through RS-485 communication channel.
- Energy, demand and peak values of all parameters can be reset via www.enerjitakibi.com via our technical support team.
- Rail Type Power Analyzer power consumption is in the range of 1.7-2.5 VA.
- Rail Type Power Analyzer can be mounted on the rail inside the panel.
- Device dimensions are 36 x 109 x 70.75 mm.
- Rail Type Power Analyzer operates under 180-230 V AC voltage.
- Rail Type Power Analyzer has IP40 protection class.
- Rail Type Power Analyzer has LEDs indicating POWER (Power), RS-485 (Communication), L1-L2-L3 and error conditions.

1.3. Technical Drawing

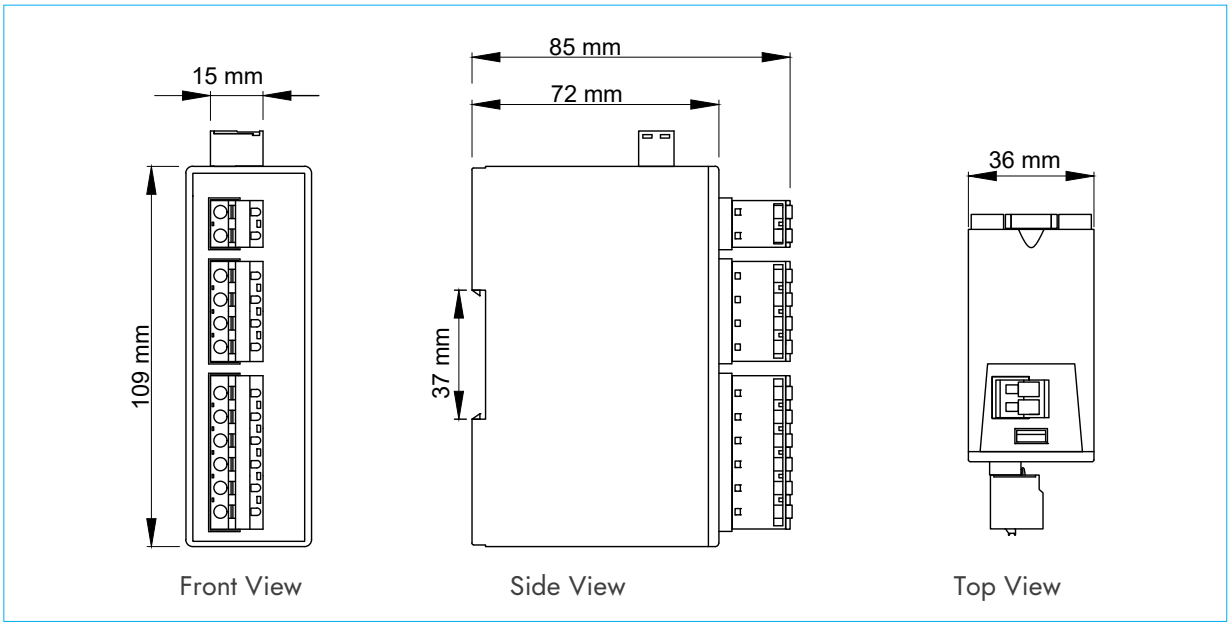


Figure 1.1

1.4. Connection Diagram

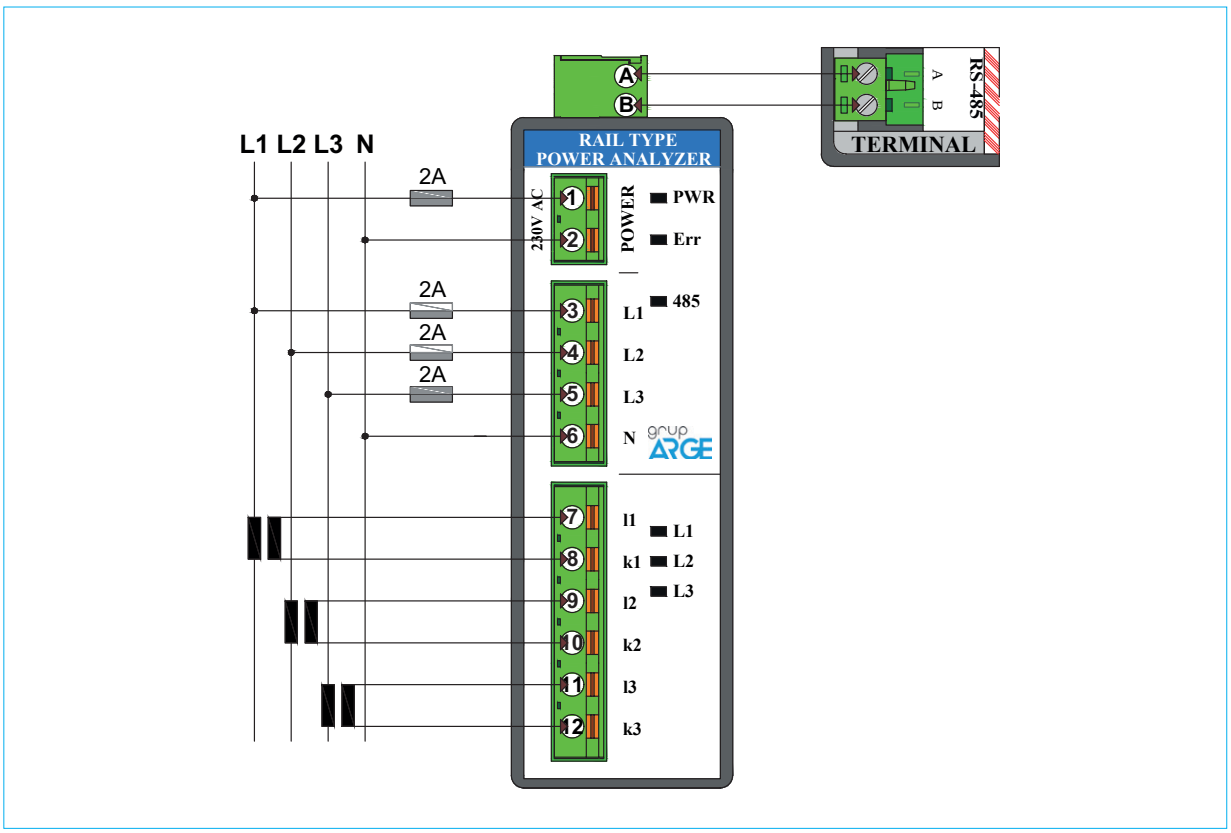


Figure 1.2

1.5. Measurable Line Parameters

Rail Type Power Analyzer, L1-L2-L3 phases; Phase-neutral currents, active power, reactive power, cosÏ and tanÏ , power factors, voltage-current-frequency averages, total active energy, total inductive energy, total capacitive energy, average inductive and capacitive ratios, frequencies, voltage demand, current demand, active power demand, inductive power demand, capacitive power demand and total power demand.

1.6. Error Conditions and Solutions

1.6.1. Voltage Error

If the following conditions occur, it indicates a voltage fault.

- ERR (Error) LED is flashing.
- The LED connecting to a phase without voltage is flashing.

For example, if the L1 LED is off and the ERR LED is flashing continuously, there is no voltage on the L1 phase.

Solution; firstly, control the voltage of the related phase. Then, verify connection of the input of the device.

1.6.2. Current Direction Error

If the following conditions occur it indicates that the current directions are faulty.

- The LED belonging to the phase with current input error is flashing.

For example, if L1 is flashing, it is indicated that the current inputs for phase L1 are faulty.

Solution; the register must be fixed in 1904 address by reading via Modbus communication protocol or else erroneous phase or the inputs of I ï K current belonging the phases must be changed.

NOTE: : That error condition occurs for 3 minutes after the device is switched on. After 3 minutes, the error display is switched off.

1.6.3. Current Voltage Matching Error

If the following conditions occur, it indicates that the phases are faulty.

- ERR(Error) LED is flashing constantly.
- The LED of the faulty phase flashes.

For example, if the L1 and L2 LEDs are flashing and the ERR LED is on continuously, this indicates that the L1 and L2 connections are reversed and a phase error has occurred.

Solution; the connection of current and voltage phase is made by matching them in accordance with connection diagram.

1.6.4. MODBUS Communication Error

In the case of Modbus connection error, you need to check the followings:

- Make sure that RS-485 A and B communication tips are matched correctly.
- Check whether Modbus address is typed correctly. (Factory default Modbus address of Rail Type Power Analyzer is found by adding 100 to the last two digits of the device. Example; the Modbus address of a device with serial number GA31421176913 is 113.)
- Check whether 120 Ohm terminating resistor is installed or not.

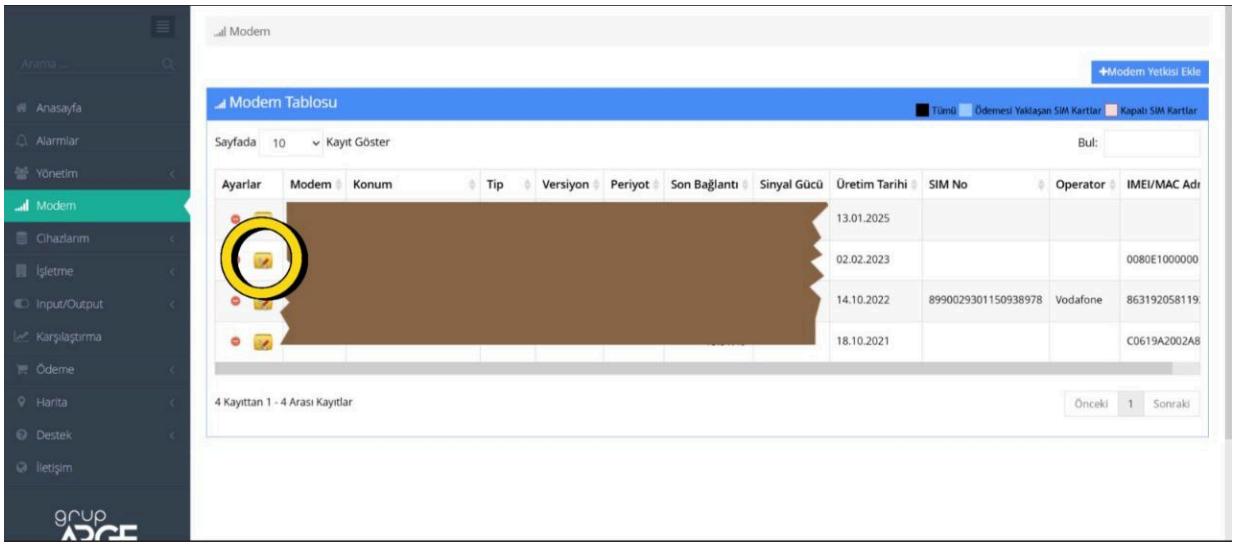
2. INSTALLATION

2.1. Device Installation

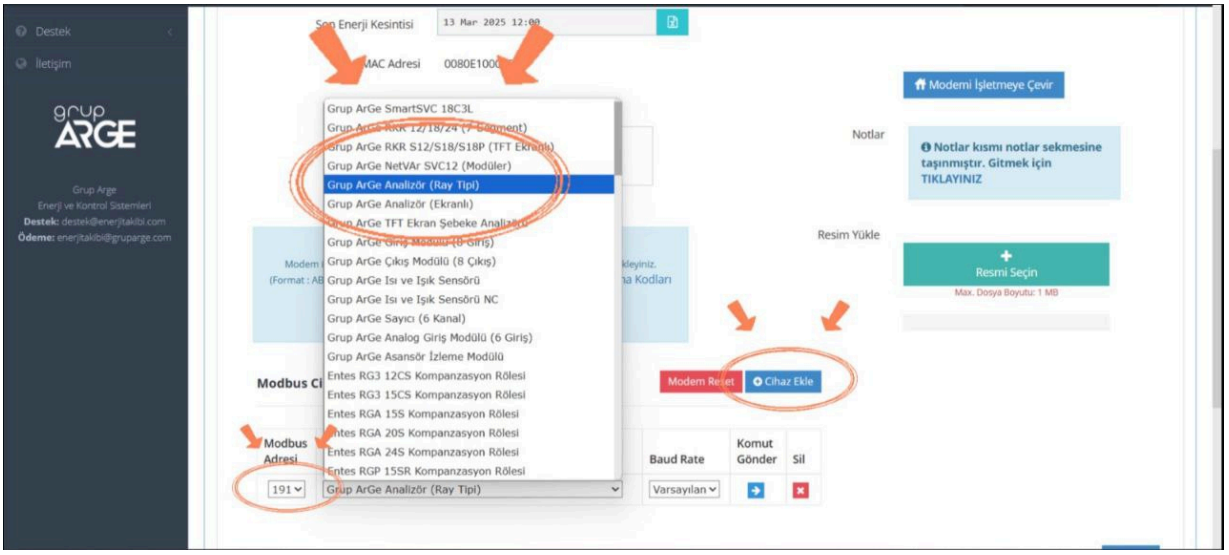
Make the current and voltage inputs connection of the device in accordance to diagrams in Figure 1.2.

Make sure that the inputs of current and voltage are matched correctly when connecting the device.

Give energy to the device after checking and verifying the connections.

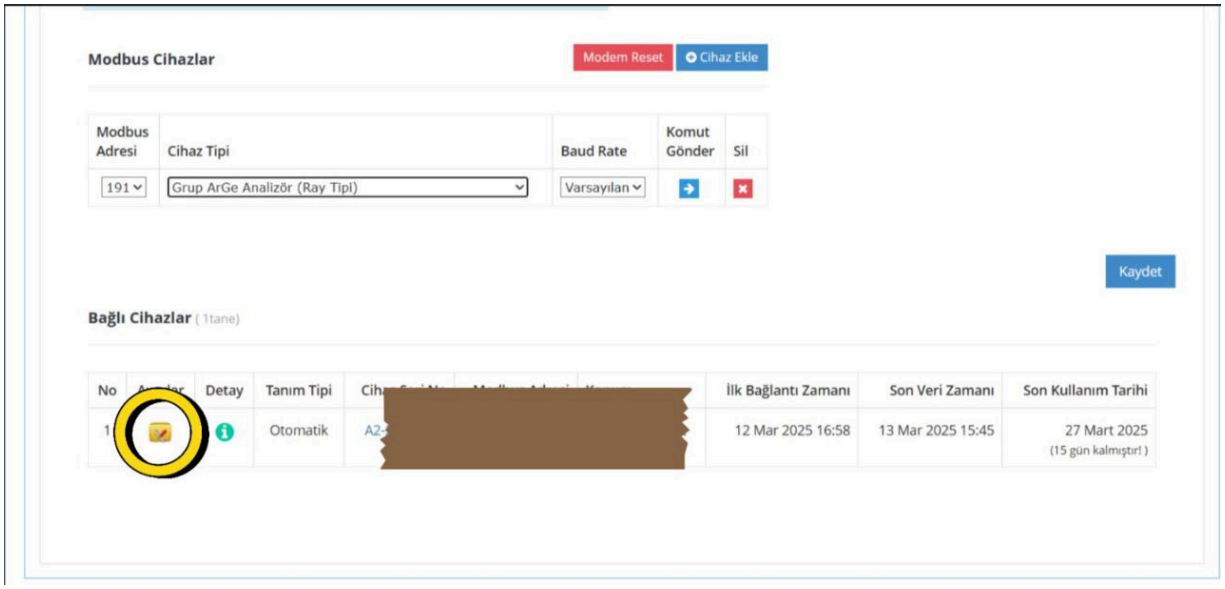


Login **"Modem Settings"** from the Modem section.

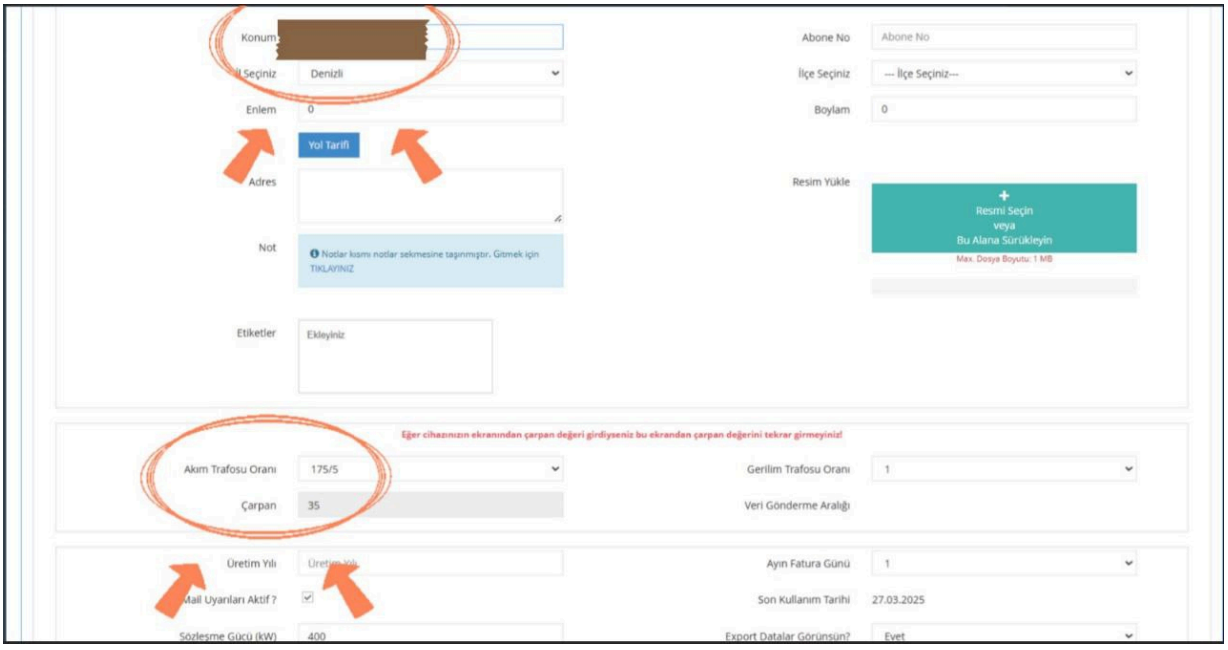


In the modem settings respectively;

1. Press the **"Add Device"** button
2. Select **"GroupArGe Analyzer (Rail type)"** from the list
3. Login the **"Modbus Address"** by adding the last 2 digits of the serial number of the analyzer with 100 and press the **"Save"** button.



On the settings page of the modem, the **“Connected Devices”** section will appear and the analyzer will appear in this section.
By pressing the **"Settings"** button, login to the settings of the analyzer.



In the settings section of the analyzer, sections will appear where information such as **"Location"** and **"Current Transformer Ratio"** can be entered. Here, you can make the settings and monitor it over the system.

We recommend that the cable to be used for RS-485 communication be selected according to the table below.

Cable Distance	Recommended Cable	Alternative Recommendation
Up to 30 m	3*0,22 Shielded and Twisted Signal Cable	CAT-5 Ethernet Cable
Over 30 m	3*0,50 Shielded and Twisted Signal Cable	CAT-6 Ethernet Cable

3. MODBUS COMMUNICATION

The parameters that the user can read, write and clear are shown in the table below. In the R/W/C column of the table;
R → indicates that the parameter can be read,

W→ indicates that the parameter can be written,

C → indicates that the parameter can be cleared.

Note: A parameter can have more than one property at the same time. For example, if R/W is written in the column, it indicates that the parameter can be both read and written.

Communication Parameters	
Baud Rate (bps)	9600
Data Bits	8
Parity Bit	None
Stop Bit	1

Figure 3.1

Default Modbus Address

Rail Type Analyzers without Display (ANL 31/32) => It is obtained by adding 100 to the last 2 digits of the serial number. Therefore, it takes values ranging between 100 and 199.

For example, the MODBUS address of an analyzer with serial number GA4131185247 would be 100 + 47 = 147.

Modbus Speed

Modbus speed is determined by indices between 0-5. The table below shows the modbus speeds according to the indices.

Index	0	1	2	3	4	5
Modbus Speed (bps)	4800	9600	19200	38400	57600	115200

Figure 3.2

Output Type

Output type is determined by indices between 0-7. Outputs are taken according to the selected index. For example; If index 1 is selected, output control is according to voltage (V). The table below shows the output types according to the indices.

Index	0	1	2	3	4	5	6	7
Output Type	None	Voltage (V)	Current (A)	Active Power (P)	Reactive Power(P)	Tangent	Ratio	Bus Control

Figure 3.3

Current Transformer Ratio

Current transformer ratio is determined by an index between 0-38.
The table below shows the current transformer ratios according to the indices.

Index	A.T.O	A.T.O (X/5)
0	1	5/5
1	2	10/5
2	3	15/5
3	4	20/5
4	5	25/5
5	6	30/5
6	8	40/5
7	10	50/5
8	12	60/5
9	15	75/5
10	16	80/5
11	20	100/5
12	25	125/5
13	30	150/5
14	32	160/5
15	40	200/5
16	50	250/5
17	60	300/5
18	80	400/5
19	100	500/5
20	120	600/5
21	150	750/5
22	160	800/5
23	200	1000/5
24	240	1200/5
25	250	1250/5
26	300	1500/5
27	320	1600/5
28	360	1800/5
29	400	2000/5
30	500	2500/5
31	600	3000/5
32	640	3200/5
33	800	4000/5
34	1000	5000/5
35	1200	6000/5
36	1500	7500/5
37	1600	8000/5
38	2000	10000/5

Figure 3.4

3.1. Modbus Map

RAIL TYPE POWER ANALYZER MODBUS MAP								
PARAMETER NAME	ADDRESS(dec	UNIT	MULTIPLIER	DATA TYPE	R/W/C	Min	Max	Default
Serial number	100	-	-	32 Bit Long	R			
Product ID and Version	102	-	-	32 Bit Long	R			
Card ID and Version	104	-	-	32 Bit Long	R			
Parameter-System Version	106	-	-	16 Bit Int	R/W	1	247	1
Parameter Version	200	-	-	16 Bit Int	R	-	-	-
Working Hours	201	-	-	16 Bit Int	R	-	-	-
Modbus Address	206	-	-	16 Bit Int	R/W	1	247	1
Bus Speed	207	bps	0.1	16 Bit Int	R/W	0	8	0
Read Protection Bit	208	-	-	16 Bit Int	R/W	0	1	0
Write Protection Bit	209	-	-	16 Bit Int	R/W	0	1	0
Modbus Read Password Confirm	210	-	-	16 Bit Int	R	0	1999	0
Modbus Write Password Confirm	211	-	-	16 Bit Int	R	0	1999	0
*Current Transformer Ratio	214	-	-	16 Bit Int	R/W	0	38	0
*Line Voltage	215	V	-	16 Bit Int	R/W	0	8	0
*Measuring Voltage	216	V	-	16 Bit Int	R/W	0	4	1
Demand Period	219	dk	-	16 Bit Int	R/W	1	60	15
Modbus Current Sensitivity	220	-	-	16 Bit Int	R/W	1	1000	1
1.Phase Voltage Calib.Offset Value	229		-	16 Bit Int	R	-	-	0
2.Phase Voltage Calib.Offset Value	230		-	16 Bit Int	R	-	-	0
3.Phase Voltage Calib.Offset Value	231		-	16 Bit Int	R	-	-	0
1.Phase Current Calib.Offset Value	232		-	16 Bit Int	R	-	-	0
2.Phase Current Calib.Offset Value	233		-	16 Bit Int	R	-	-	0
3.Phase Current Calib.Offset Value	234		-	16 Bit Int	R	-	-	0
1.Phase Voltage Calib. Offset Constant	235	-	-	16 Bit Int	R	-	-	0
2.Phase Voltage Calib. Offset Constant	236	-	-	16 Bit Int	R	-	-	0
3.Phase Voltage Calib. Offset Constant	237	-	-	16 Bit Int	R	-	-	0
1.Phase Current Calib. Offset Constant	238	-	-	16 Bit Int	R	-	-	0
2.Phase Current Calib. Offset Constant	239	-	-	16 Bit Int	R	-	-	0
3.Phase Current Calib. Offset Constant	240	-	-	16 Bit Int	R	-	-	0
INSTANT ELECTRICAL VALUES	ADDRESS	UNIT	MULTIPLIER	DATA TYPE	R/W/C	Min	Max	Default
1. Phase Neutral Voltage	1000	V	0,1	16 Bit Int	R	-	-	-
1. Phase Current	1001	A	0,001	16 Bit Int	R	-	-	-
1. Phase Active Power	1002	W	1	16 Bit Int	R	-	-	-
1. Phase Reactive Power	1003	VAr	1	16 Bit Int	R	-	-	-
1. Phase Apparent Power	1004	VA	1	16 Bit Int	R	-	-	-
1. Frequency of Phase	1005	Hz	0,01	16 Bit Int	R	-	-	-
2. Phase Neutral Voltage	1006	V	0,1	16 Bit Int	R	-	-	-

2. Phase Current	1007	A	0,001	16 Bit Int	R	-	-	-
2. Phase Active Power	1008	W	1	16 Bit Int	R	-	-	-
2. Phase Reactive Power	1009	VAr	1	16 Bit Int	R	-	-	-
2. Phase Apparent Power	1010	VA	1	16 Bit Int	R	-	-	-
2. Frequency of Phase	1011	Hz	0,01	16 Bit Int	R	-	-	-
3. Phase Neutral Voltage	1012	V	0,1	16 Bit Int	R	-	-	-
3. Phase Current	1013	A	0,001	16 Bit Int	R	-	-	-
3. Phase Active Power	1014	W	1	16 Bit Int	R	-	-	-
3. Phase Reactive Power	1015	VAr	1	16 Bit Int	R	-	-	-
3. Phase Apparent Power	1016	VA	1	16 Bit Int	R	-	-	-
3. Frequency of Phase	1017	Hz	0,01	16 Bit Int	R	-	-	-
INSTANT ELECTRICAL VALUES	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
1. Phase cos(phi)	1018	-	0,001	16 Bit Int	R	-	-	-
1. Phase tan(phi)	1019	-	0,001	16 Bit Int	R	-	-	-
1. Phase PF	1020	-	0,001	16 Bit Int	R	-	-	-
1. Phase THD	1021	%	0,001	16 Bit Int	R	-	-	-
1. Phase THDI	1022	%	0,001	16 Bit Int	R	-	-	-
1. Phase THVD	1023	%	0,001	16 Bit Int	R	-	-	-
2. Phase cos(phi)	1024	-	0,001	16 Bit Int	R	-	-	-
2. Phase tan(phi)	1025	-	0,001	16 Bit Int	R	-	-	-
2. Phase PF	1026	-	0,001	16 Bit Int	R	-	-	-
2. PhaseTHD	1027	%	0,001	16 Bit Int	R	-	-	-
2. Phase Faz THDI	1028	%	0,001	16 Bit Int	R	-	-	-
2. Phase THDV	1029	%	0,001	16 Bit Int	R	-	-	-
3. Phase cos(phi)	1030	-	0,001	16 Bit Int	R	-	-	-
3. Phase tan(phi)	1031	-	0,001	16 Bit Int	R	-	-	-
3. Phase PF	1032	-	0,001	16 Bit Int	R	-	-	-
3. Phase THD	1033	%	0,001	16 Bit Int	R	-	-	-
3. Phase THDI	1034	%	0,001	16 Bit Int	R	-	-	-
3. Phase THDV	1035	%	0,001	16 Bit Int	R	-	-	-
PHASE-TO-PHASE VOLTAGES	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
L1-L2 Phase to Phase Voltage	1036	V	0,1	16 Bit Int	R	-	-	-
L2-L3 Phase to Phase Voltage	1037	V	0,1	16 Bit Int	R	-	-	-
L3-L1 Phase to Phase Voltage	1038	V	0,1	16 Bit Int	R	-	-	-
TOTAL VALUES	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
Total Active Power (Imp)	1039	W	1	16 Bit Int	R	-	-	-
Total Inductive Power (Imp)	1040	VAr	1	16 Bit Int	R	-	-	-
Total Capacitive Power (Imp)	1041	VAr	1	16 Bit Int	R	-	-	-
Total Reactive Power (Imp)	1042	VAr	1	16 Bit Int	R	-	-	-
Total Apparent Power (Imp)	1043	VA	1	16 Bit Int	R	-	-	-
Total Current (Imp)	1044	I	0,001	16 Bit Int	R	-	-	-
Total Active Power (Exp)	1045	W	1	16 Bit Int	R	-	-	-
Total Inductive Power (Exp)	1046	VAr	1	16 Bit Int	R	-	-	-
Total Capacitive Power (Exp)	1047	VAr	1	16 Bit Int	R	-	-	-
Total Reactive Power (Exp)	1048	VAr	1	16 Bit Int	R	-	-	-

Total Apparent Power (Exp)	1049	VA	1	16 Bit Int	R	-	-	-
Total Current (Exp)	1050	I	0,001	16 Bit Int	R	-	-	-
AVERAGES	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
Average Current (Imp)	1051	I	0,001	16 Bit Int	R	-	-	-
Average Active Power (Imp)	1052	W	1	16 Bit Int	R	-	-	-
Average cos(phi) (Imp)	1053	-	0,001	16 Bit Int	R	-	-	-
Average tan(phi) (Imp)	1054	-	0,001	16 Bit Int	R	-	-	-
Average PF (Imp)	1055	-	0,001	16 Bit Int	R	-	-	-
Average Current (Export)	1056	I	0,001	16 Bit Int	R	-	-	-
Average Active Power (Exp)	1057	W	1	16 Bit Int	R	-	-	-
Average cos(phi) (Exp)	1058	-	0,001	16 Bit Int	R	-	-	-
Average tan(phi) (Exp)	1059	-	0,001	16 Bit Int	R	-	-	-
Average PF (Exp)	1060	-	0,001	16 Bit Int	R	-	-	-
Average THD (Imp/Exp)	1061	%	0,001	16 Bit Int	R	-	-	-
Average THDI (Imp/Exp)	1062	%	0,001	16 Bit Int	R	-	-	-
Average THDV (Imp/Exp)	1063	%	0,001	16 Bit Int	R	-	-	-
Average Voltage (Imp/Exp)	1064	V	0,1	16 Bit Int	R	-	-	-
MIN-MAX'S	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
1. Phase Min Voltage (Imp)	1065	V	0,1	16 Bit Int	R/C	-	-	-
1. Phase Max Voltage (Imp)	1066	V	0,1	16 Bit Int	R/C	-	-	-
1. Phase Min Current (Imp)	1067	I	0,001	16 Bit Int	R/C	-	-	-
1.Phase Max Current (Imp)	1068	I	0,001	16 Bit Int	R/C	-	-	-
1. Phase Min Active Power (Imp)	1069	W	1	16 Bit Int	R/C	-	-	-
1. Phase Max Active Power (Imp)	1070	W	1	16 Bit Int	R/C	-	-	-
1. Phase Min Reactive Power (Imp)	1071	VAr	1	16 Bit Int	R/C	-	-	-
1. Phase Max Reactive Power (Imp)	1072	VAr	1	16 Bit Int	R/C	-	-	-
1. Phase Min Apparent Power (Imp)	1073	VA	1	16 Bit Int	R/C	-	-	-
1. Phase Max Apparent Power (Imp)	1074	VA	1	16 Bit Int	R/C	-	-	-
2. Phase Min Voltage (Imp)	1075	V	0,1	16 Bit Int	R/C	-	-	-
2. Phase Max Voltage (Imp)	1076	V	0,1	16 Bit Int	R/C	-	-	-
2. Phase Min Current (Imp)	1077	I	0,001	16 Bit Int	R/C	-	-	-
2. Phase Max Current (Imp)	1078	I	0,001	16 Bit Int	R/C	-	-	-
2. Phase Min Active Power (Imp)	1079	W	1	16 Bit Int	R/C	-	-	-
2. Phase Max Active Power (Imp)	1080	W	1	16 Bit Int	R/C	-	-	-
2. Phase Min Reactive Power (Imp)	1081	VAr	1	16 Bit Int	R/C	-	-	-
2. Phase Max Reactive Power(Imp)	1082	VAr	1	16 Bit Int	R/C	-	-	-
2. Phase Min Apparent Power(Imp)	1083	VA	1	16 Bit Int	R/C	-	-	-
2. Phase Max Apparent Power (Imp)	1084	VA	1	16 Bit Int	R/C	-	-	-
3. Phase Min Voltage (Imp)	1085	V	0,1	16 Bit Int	R/C	-	-	-
3. Phase Max Voltage (Imp)	1086	V	0,1	16 Bit Int	R/C	-	-	-
3. Phase Min Current (Imp)	1087	I	0,001	16 Bit Int	R/C	-	-	-
3. Phase Max Current (Imp)	1088	I	0,001	16 Bit Int	R/C	-	-	-
3. Phase Min Active Power (Imp)	1089	W	1	16 Bit Int	R/C	-	-	-
3. Phase Max Active Power (Imp)	1090	W	1	16 Bit Int	R/C	-	-	-
3. Phase Min Reactive Power (Imp)	1091	VAr	1	16 Bit Int	R/C	-	-	-

3. Phase Max Reactive Power(Imp)	1092	VAr	1	16 Bit Int	R/C	-	-	-
3. Phase Min Apparent Power (Imp)	1093	VA	1	16 Bit Int	R/C	-	-	-
3. Phase Max Apparent Power (Imp)	1094	VA	1	16 Bit Int	R/C	-	-	-
1. Phase Min Voltage (Exp)	1095	V	0,1	16 Bit Int	R/C	-	-	-
1. Phase Max Voltage (Exp)	1096	V	0,1	16 Bit Int	R/C	-	-	-
1. Phase Min Current (Exp)	1097	I	0,001	16 Bit Int	R/C	-	-	-
1. Phase Max Current (Exp)	1098	I	0,001	16 Bit Int	R/C	-	-	-
1. Phase Min Active Power (Exp)	1099	W	1	16 Bit Int	R/C	-	-	-
1. Phase Max Active Powerr (Exp)	1100	W	1	16 Bit Int	R/C	-	-	-
1. Phase Min Reactive Power (Exp)	1101	VAr	1	16 Bit Int	R/C	-	-	-
1. Phase Max Reactive Power (Exp)	1102	VAr	1	16 Bit Int	R/C	-	-	-
1. Phase Min Apparent Power (Exp)	1103	VA	1	16 Bit Int	R/C	-	-	-
1. Phase Min Apparent Power (Exp)	1104	VA	1	16 Bit Int	R/C	-	-	-
2. Phase Min Voltage (Exp)	1105	V	0,1	16 Bit Int	R/C	-	-	-
2. Phase Max Voltage (Exp)	1106	V	0,1	16 Bit Int	R/C	-	-	-
2. Phase Min Current (Exp)	1107	I	0,001	16 Bit Int	R/C	-	-	-
2. Phase Max Current (Exp)	1108	I	0,001	16 Bit Int	R/C	-	-	-
2. Phase Min Active Power (Exp)	1109	W	1	16 Bit Int	R/C	-	-	-
2. Phase Max Active Power (Exp)	1110	W	1	16 Bit Int	R/C	-	-	-
2. Phase Min Reactive Power (Exp)	1111	VAr	1	16 Bit Int	R/C	-	-	-
2. Phase Max Reactive Power (Exp)	1112	VAr	1	16 Bit Int	R/C	-	-	-
2. Phase Min Apparent Power (Exp)	1113	VA	1	16 Bit Int	R/C	-	-	-
2. Phase Max Apparent Power (Exp)	1114	VA	1	16 Bit Int	R/C	-	-	-
3. Phase Min Voltage (Exp)	1115	V	0,1	16 Bit Int	R/C	-	-	-
3. Phase Max Voltage (Exp)	1116	V	0,1	16 Bit Int	R/C	-	-	-
3. Phase Min Current (Exp)	1117	I	0,001	16 Bit Int	R/C	-	-	-
3. Phase Max Current (Exp)	1118	I	0,001	16 Bit Int	R/C	-	-	-
3. Phase Min Active Power (Exp)	1119	W	1	16 Bit Int	R/C	-	-	-
3. Phase Max Active Power (Exp)	1120	W	1	16 Bit Int	R/C	-	-	-
3. Phase Min Reactive Power (Exp)	1121	VAr	1	16 Bit Int	R/C	-	-	-
3. Phase Max Reactive Power (Exp)	1122	VAr	1	16 Bit Int	R/C	-	-	-
3. Phase Min Apparent Power (Exp)	1123	VA	1	16 Bit Int	R/C	-	-	-
3. Phase Max Apparent Power (Exp)	1124	VA	1	16 Bit Int	R/C	-	-	-
DEMANDS	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
1. Phase Demand Voltage (Imp)	1125	V	0,1	16 Bit Int	R/C	-	-	-
1. Phase Demand Current (Imp)	1126	A	0,001	16 Bit Int	R/C	-	-	-
1. Phase Demand Active Power (Imp)	1127	W	1	16 Bit Int	R/C	-	-	-
1. Phase Demand Reactive Power (Imp)	1128	VAr	1	16 Bit Int	R/C	-	-	-
1. Phase Demand Apparent Power (Imp)	1129	VA	1	16 Bit Int	R/C	-	-	-
2. Phase Demand Voltage(Imp)	1130	V	0,1	16 Bit Int	R/C	-	-	-
2. Phase Demand Current (Imp)	1131	A	0,001	16 Bit Int	R/C	-	-	-
2. Phase Demand Active Power (Imp)	1132	W	1	16 Bit Int	R/C	-	-	-
2. Phase Demand Reactive Power (Imp)	1133	VAr	1	16 Bit Int	R/C	-	-	-
2. Phase Demand Apparent Power(Imp)	1134	VA	1	16 Bit Int	R/C	-	-	-
3. Phase Demand Voltage (Imp)	1135	V	0,1	16 Bit Int	R/C	-	-	-

3. Phase Demand Current (Imp)	1136	A	0,001	16 Bit Int	R/C	-	-	-
3. Phase Demand Active Power (Imp)	1137	W	1	16 Bit Int	R/C	-	-	-
3. Phase Demand Reactive Power (Imp)	1138	VAr	1	16 Bit Int	R/C	-	-	-
3. Phase Demand Apparent Power (Imp)	1139	VA	1	16 Bit Int	R/C	-	-	-
1. Phase Demand Voltage (Exp)	1140	V	0,1	16 Bit Int	R/C	-	-	-
1. Phase Demand Current (Exp)	1141	A	0,001	16 Bit Int	R/C	-	-	-
1. Phase Demand Active Power (Exp)	1142	W	1	16 Bit Int	R/C	-	-	-
1. Phase Demand Reactive Power (Exp)	1143	VAr	1	16 Bit Int	R/C	-	-	-
1. Phase Demand Apparent Power (Exp)	1144	VA	1	16 Bit Int	R/C	-	-	-
2. Phase Demand Voltage (Exp)	1145	V	0,1	16 Bit Int	R/C	-	-	-
2. Phase Demand Current (Exp)	1146	A	0,001	16 Bit Int	R/C	-	-	-
2. Phase Demand Active Power (Exp)	1147	W	1	16 Bit Int	R/C	-	-	-
2. Phase Demand Reactive Power (Exp)	1148	VAr	1	16 Bit Int	R/C	-	-	-
2. Phase Demand Apparent Power (Exp)	1149	VA	1	16 Bit Int	R/C	-	-	-
3. Phase Demand Voltage (Exp)	1150	V	0,1	16 Bit Int	R/C	-	-	-
3. Phase Demand Current (Exp)	1151	A	0,001	16 Bit Int	R/C	-	-	-
3. Phase Demand Active Power (Exp)	1152	W	1	16 Bit Int	R/C	-	-	-
3. Phase Demand Reactive Power (Exp)	1153	VAr	1	16 Bit Int	R/C	-	-	-
3. Phase Demand Apparent Power (Exp)	1154	VA	1	16 Bit Int	R/C	-	-	-
ENERGIES	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
1. Phase Active Energy (Imp)	1200	Wh	1	32 Bit Long	R/C	-	-	-
1. Phase Inductive Energy (Imp)	1202	VArh	1	32 Bit Long	R/C	-	-	-
1. Phase Capacitive Energy (Imp)	1204	VArh	1	32 Bit Long	R/C	-	-	-
1.Phase Active Energy (Exp)	1206	Wh	1	32 Bit Long	R/C	-	-	-
1. Phase Inductive Energy (Exp)	1208	VArh	1	32 Bit Long	R/C	-	-	-
1. Phase Capacitive Energy (Exp)	1210	VArh	1	32 Bit Long	R/C	-	-	-
2. Phase Active Energy (Imp)	1212	Wh	1	32 Bit Long	R/C	-	-	-
2. Phase Inductive Energy (Imp)	1214	VArh	1	32 Bit Long	R/C	-	-	-
2. Phase Capacitive Energy (Imp)	1216	VArh	1	32 Bit Long	R/C	-	-	-
2. Phase Active Energy (Exp)	1218	Wh	1	32 Bit Long	R/C	-	-	-
2. Phase Inductive Energy (Exp)	1220	VArh	1	32 Bit Long	R/C	-	-	-
2. Phase Capacitive Energy (Exp)	1222	VArh	1	32 Bit Long	R/C	-	-	-
3. Phase Active Energy (Imp)	1224	Wh	1	32 Bit Long	R/C	-	-	-

3. Phase Inductive Energy (Imp)	1226	VArh	1	32 Bit Long	R/C	-	-	-
3. Phase Capacitive Energy (Imp)	1228	VArh	1	32 Bit Long	R/C	-	-	-
3. Phase Active Energy (Exp)	1230	Wh	1	32 Bit Long	R/C	-	-	-
3. Phase Inductive Energy (Exp)	1232	VArh	1	32 Bit Long	R/C	-	-	-
3. Phase Capacitive Energy (Exp)	1234	VArh	1	32 Bit Long	R/C	-	-	-
Total Active Energy (Imp)	1236	Wh	1	32 Bit Long	R/C	-	-	-
Total Inductive Energy (Imp)	1238	VArh	1	32 Bit Long	R/C	-	-	-
Total Capacitive Energy (Imp)	1240	VArh	1	32 Bit Long	R/C	-	-	-
Total Active Energy (Exp)	1242	Wh	1	32 Bit Long	R/C	-	-	-
Total Inductive Energy (Exp)	1244	VArh	1	32 Bit Long	R/C	-	-	-
Total Capacitive Energy (Exp)	1246	VArh	1	32 Bit Long	R/C	-	-	-
DEVICE SPESIFIC COMMANDS	**ADDRESS**	**UNIT**	**MULTIPLIER**	**DATA TYPE**	**R/W/C**	**Min**	**Max**	**Default**
Device Restart	1900	-	-	-	R	-	-	-
Reset Factory Settings	1901	-	-	-	R	-	-	-
Reset Energies	1902	-	-	-	R	-	-	-
Reset Peak Values	1903	-	-	-	R	-	-	-
Learn Current Directions	1904	-	-	-	R	-	-	-

Figure 3.5

NOTE: Device specific commands must be written to the relevant register with 0xAA55 data.