Klemsan®

606210 ECRAS 100

3Ø Multimeter

General	Seven Segment Display	✓
	LCD Screen	-
	Language Support	-
	Battery	-
	Real Time Clock	-
	Password Protection	✓
	Current Transformer Ratio	1 - 5000
	Voltage Transformer Ratio	1 - 5000
	Demand Period	1-60 min. adjustable
	Connection Type	3F4T, 3F3T
	Measurements in Quadrants	4
	Number of Measurements in a Period	256
	LCD/Display Refresh Period	1 sec.
	Networks	TT, TN, IT
	Phasor Diagram	-
	Signal Waveforms	-
	Min./Max./Demand Values	✓
Energy Measurement	Number of Tariffs	1
	Multi Sub-Tariffs (Peak, Day and Off-Peak)	-
	1Ø Phase Energy Meters	✓
	3Ø Phase Energy Meters	✓
	4 Quadrant Reactive Energy Meters	-
Current Measurement Input	Measurement Range	10mA - 6A AC

	Overvoltage Category	300 V Cat II
	Measurement Surge Voltage	2 kV
	Power Consumption	<0.2 VA
	Intermittent Overload	100 A for 1 sec.
	Sampling Frequency between 45-65 Hz	12.8 kHz
Voltage Measurement Input	Overvoltage Category	300 V Cat III
	Measured Range L-N	1-300 Vrms
	Measured Range L-L	2-500 Vrms
	Measured Frequency Range	45-65 Hz
	Power Consumption	<0.1 VA
	Sampling Frequency between 45-65 Hz	12.8 kHz
Power Quality Measurements	Harmonics for Current and Voltage Phases	Up to 31st
	THD - Voltage in %	✓
	THD - Current in %	✓
Other Measurements	Run Hour (Operating Time for Load in Hours)	✓
	On Hour (Operating Time for Meter in Hours)	✓
	Int Counter (Number of Power Interruptions)	✓
According to IEC 61557-12	Total Active Power	Class 0.5
	Total Reactive Power	Class 1
	Total Apparent Power	Class 0.5
	Total Active Energy	Class 0.5
	Total Reactive Energy	Class 2
	Frequency	Class 0.1
	Current	Class 0.5
	Neutral Current	Class 0.5
	Voltage	Class 0.2
	Power Factor	Class 0.5
	THDV, THDI	Class 1
According to IEC 62053-22	Total Active Energy	Class 0.5S
According to IEC 62053-23	Total Reactive Energy	Class 2

Alarm Relay Outputs	Number of Outputs	-
	Type	
	Max. Switching Current	10 A
	Max. Switching Voltage	-
	Max. Switching Power	-
Digital Inputs	Number of Inputs	-
	Minimum Counting Frequency	-
	Input Present or Not	-
	Isolation Level	-
Digital Outputs	Number of Outputs	-
	Type	-
	Switching Voltage Range	-
	Minimum Switching Frequency	-
	Isolation Level	-
Analog Outputs	Number of Outputs	-
	Range of Outputs 0-5 V, 0-10 V, -5-5 V, -10-10V, 0-20 mA, 4-20 mA	-
	Isolation	-
Voltage	AC	85-300V
	DC	85-300V
Consumption	AC	<6VA
	DC	<3W
Supply	Frequency	45-65Hz
Min./Max./Avg. Values	Hourly Records	
	Daily Records	
	Monthly Records	
Data Logging with timestamp	Demand	
	Alarm Records	-
Communication	Protocol	-
	Baud Rate	-
	Parity Number	-

	Stop Bit	-
	Address	-
	Isolation	-
Mechanical Properties	Weight (g)	272 g
	Protection Class	Front IP40 / Rear IP20
	Mounting Type	Panel Mount
Supply, Voltage, Current, Relay Outputs	Stranded:	2.5mm² - 14AWG
	Solid:	4mm² - 12AWG, 2x1.5mm² - 2x16AWG
Digital I/O, RS 485, Analog Output	Stranded:	-
	Solid:	-
Ambient Conditions	Operating Temperature	-20°C +70°C
	Storing Temperature	-30°C +80°C
	Relative Humidity (No Condensation)	Max. 95%
EMC-EMI	300 VAC CAT II according to IEC 61010-1	✓
	EN 55011/A1:2010, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN61000-4-11	✓
Schematics	Network Connections	
	Digital I/O and Alarm Output Connections	
	3 wires with 3CTs	
	4 wires with 3CTs	
	3 wires with 2CTsNOTE: CTs can be connected any phase. They are connected to phase 1 and phase 3 in this figure.	
	Single Phase with 1CTNORE: CT and VT can be connected any phase. They are connected to phase 1 in this figure.	
	Digital Output Connection	
	Digital Input Connection	
	Alarm Output Connection	
	Analog Output Connection	
General		
	Dimensions	

Türk Standartlarına Uygunluk Belgesi - TSE Certificate

Avrupa standartlarına uygunluk belgesi - CE Certificate

Order Info

606210 3Ø Multimeter

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KLEA

Energy Analyzer

POWYS

Rail Mounted

Energy Analyzer

ECRAS

Electronic Multimeter

User Manual

Klemsan®

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SECTION 1
GENERAL INFORMATION

SECTION 1 GENERAL INFORMATION

1.1 Device Features and Model Selection

Ecras, Powys and Klea 110P are designed to measure current, voltage, harmonic etc. in 3 phase system. And also they have below features as optional.

- Modbus Communication
- Energy meters
- Two tariffs
- Saving maximum, minimum and demand values
- On hour, run hour and int counter features
- DIO (Digital input/output)
- Alarm relay outputs
- Error Leds for phase sequence and phase failure
- THDV, THDI
- 1-31 current and voltage harmonics

All models and their features are shown in below table. Users can select the most suitable one according to their demands.

Table 1-1 Model Comparison

	ECRAS 100	ECRAS 120	ECRAS 200	ECRAS 220	KLEA 110P	POWYS 3100	POWYS 3101	POWYS 3111
Type of device enclosure	panel	panel	panel	panel	panel	rail	rail	rail
Basic measurements (V,VLL, I, IN, F, Cos φ, PF, P, Q, S, THD)	●	●	●	●	●	●	●	●
1-31 Harmonics	-	●	-	●	●	●	●	●
Max-Min Value	●	●	●	●	●	●	●	●
Demand Values (I, P, Q, S)	●	●	●	●	●	●	●	●
On hour, Run Hour, Int Counter	●	●	●	●	●	●	●	●
Energy Meters	1 tariff	1 tariff	1 tariff	1 tariff	2 tariffs	1 tariffs	2 tariffs	2 tariffs
Assigning alarm to the parameters	-	●	-	●	●	-	●	●
Alarm Relay	-	2 pcs.	-	2 pcs.	2 pcs.	-	2 pcs.	2 pcs.
RS485	-	-	●	●	●	●	●	●
Digital Input	-	-	-	-	1 pc.	-	2 pcs.	2 pcs.
Digital Output	-	-	-	-	2 pcs.	-	2 pcs.	2 pcs.
Indicators and leds	●	●	●	●	●	-	-	●
Order no	606210	606211	606212	606213	606180	606300	606303	606304

1.2 Correct Usage and Conditions For Safety

- Installation and wiring must be performed by authorized technicians in accordance with the instructions in the user manual. Do not commission the device before proper wiring.
- Make sure the device is de-energized before connecting to the mains.
- Short circuit the k-l terminals of the current transformer in another location before disconnecting the current transformers. Failing to do so will cause dangerous high voltages in the secondary terminals of the current transformers.
- Use a dry cloth to clean the device. Do not use alcohol, thinner or any abrasive materials.
- Make sure all wiring is properly made before commissioning the device.
- Do not open the device. There are no serviceable parts by the user.
- Keep the device away from humidity, water, vibrations and dust.
- It is advisable to connect a circuit breaker or an automatic fuse between the current input of the device and the mains (2 amps).

The manufacturer does not assume any responsibility for any undesired consequences if the above measures are not adhered to.

1.3 Panel Definitions

1.3.1 Ecras Definitions

Front Panel

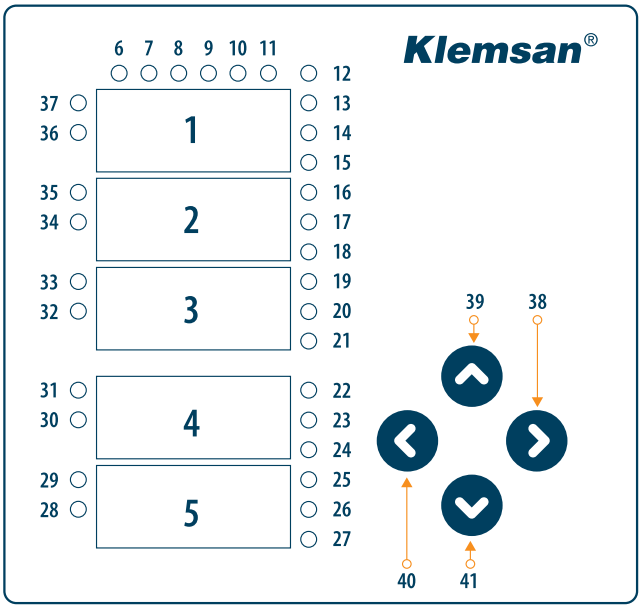


Figure 1-1 Ecras Front Panel

1, 2, 3, 4, 5 → Indicators (7 segment displays).
6, 7, 8 → Phase on/off LEDs. (L1, L2, L3)
9 → Alarm LED (ALM). Lights in case of an alarm. *(available for Ecras 120 and Ecras 220)*
10, 11 → Relay LEDs (OUT 1, OUT 2). Lights when the relay is engaged. *(available for Ecras 120 and Ecras 220)*
12 → VL-N LED (V). Lights when displaying the phase to neutral currents.
13 → VLL LED (VLL). Lights when displaying the phase to phase currents.
14 → Current LED (I). Lights when displaying the currents for the phases.
15 → CosØ LED (Cos Ø). Lights when displaying the cosØ for the phases.
16 → Power Factor LED (PF). Lights when displaying the PFs for the phases.
17 → Active power LED (P). Lights when displaying the active powers for the phases.
18 → Reactive power LED (Q). Lights when displaying the reactive powers for the phases.
19 → Apparent power LED (S). Lights when displaying the apparent powers for the phases.
20 → Total Harmonic Distortion LED (THD). Lights when displaying THDs for the phases.
21 → Demand LED (Dem). Lights when displaying the demand values.
22 → 1. Phase QCap. LED (^{1}⊣⊢).Lights when the load for the first phase is capacitive.
23 → 2. Phase QCap. LED (^{2}⊣⊢). Lights when the load for the second phase is capacitive.
24 → 3. Phase QCap. LED (^{3}⊣⊢). Lights when the load for the third phase is capacitive.
25 → System QCap. LED (^{T}⊣⊢). Lights when the total system load is capacitive.
26 → Maximum LED (Hi). Lights when displaying the maximum values.
27 → Minimum LED (Lo). Lights when displaying the minimum values.
28, 30, ..,36 → Mega LED (M). Lights when the indicated value is in MEGA units.
29, 31, ..,37 → Kilo LED (k). Lights when the indicated value is in KILO units.
38 → Right arrow key. Use this key to switch between the menus, enter submenus and move through the indicator digits.
39 → Up arrow key. Use this key to switch between the menus and change the numerical values.
40 → Left arrow key. Use this key to switch between the menus, return to the upper menu level and confirm the selected value.
41 → Down arrow key. Use this key to switch between the menus and change the numerical values.

Back Panel

I1-k1 , I2-k2 , I3-k3 : Current measurement inputs
V1, V2, V3, N : Voltage measurement inputs
D+, GND, D- : RS 485 *(available for Ecras 200 and Ecras 220)*
out1, out2 : Alarm relay outputs *(available for Ecras 120 and Ecras 220)*
Un : Power supply

1.3.2 KLEA 110P and POWYS 3111 Definitions

Front Panel

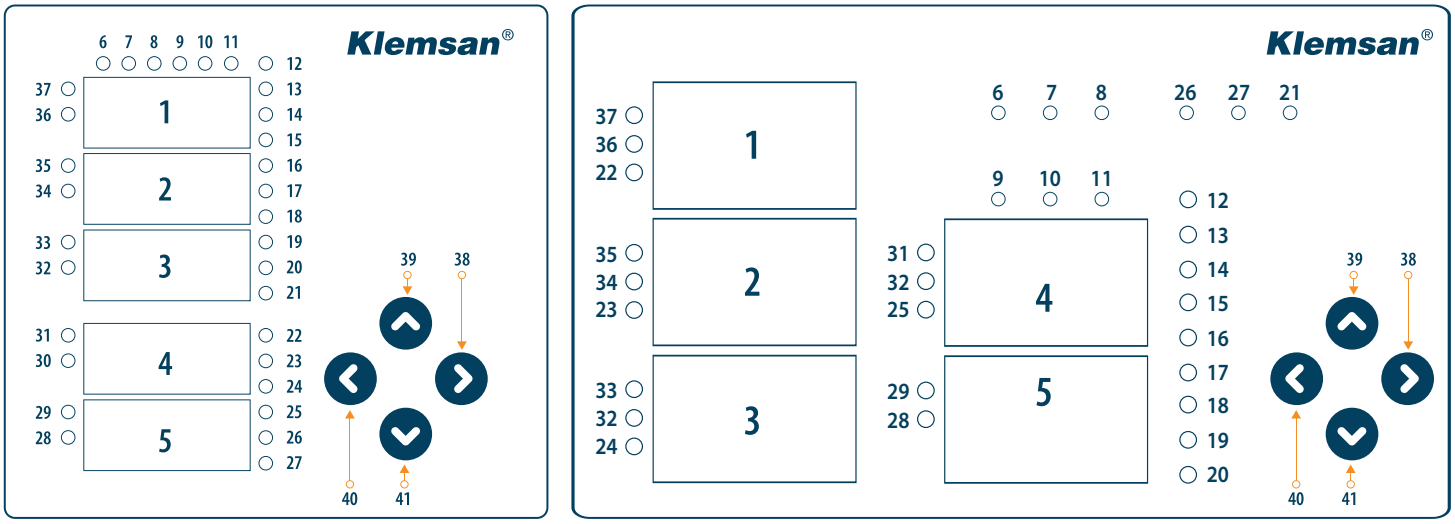


Figure 1-2 KLEA 110P and POWYS 3111 Front Panel

1, 2, 3, 4, 5 → Indicators (7 segment displays).
6, 7, 8 → Phase on/off LEDs. (L1, L2, L3)
9 → Alarm LED (ALM). Lights in case of an alarm.
10, 11 → Relay LEDs (OUT 1, OUT 2). Lights when the relay is engaged.
12 → VL-N LED (V). Lights when displaying the phase to neutral currents.
13 → VLL LED (VLL). Lights when displaying the phase to phase currents.
14 → Current LED (I). Lights when displaying the currents for the phases.
15 → CosØ LED (Cos Ø). Lights when displaying the cosØ for the phases.
16 → Power Factor LED (PF). Lights when displaying the PFs for the phases.
17 → Active power LED (P). Lights when displaying the active powers for the phases.
18 → Reactive power LED (Q). Lights when displaying the reactive powers for the phases.
19 → Apparent power LED (S). Lights when displaying the apparent powers for the phases.
20 → Total Harmonic Distortion LED (THD). Lights when displaying THDs for the phases.
21 → Demand LED (Dem). Lights when displaying the demand values.
22 → 1. Phase QCap. LED (^{1}⊣⊢). Lights when the load for the first phase is capacitive.
23 → 2. Phase QCap. LED (^{2}⊣⊢). Lights when the load for the second phase is capacitive.
24 → 3. Phase QCap. LED (^{3}⊣⊢). Lights when the load for the third phase is capacitive.
25 → System QCap. LED (^{T}⊣⊢). Lights when the total system load is capacitive.
26 → Maximum LED (Hi). Lights when displaying the maximum values.
27 → Minimum LED (Lo). Lights when displaying the minimum values.
28, 30, ..,36 → Mega LED (M). Lights when the indicated value is in MEGA units.
29, 31, ..,37 → Kilo LED (k). Lights when the indicated value is in KILO units.
38 → Right arrow key. Use this key to switch between the menus, enter submenus and move through the indicator digits.
39 → Up arrow key. Use this key to switch between the menus and change the numerical values.
40 → Left arrow key. Use this key to switch between the menus, return to the upper menu level and confirm the selected value.
41 → Down arrow key. Use this key to switch between the menus and change the numerical values.

Terminals **I1-k1 , I2-k2 , I3-k3** : Current measurement inputs
V1, V2, V3, N : Voltage measurement inputs
D+, GND, D- : RS 485
DO1+, DO1-, DO2+, DO2- : Digital Outputs
Un : Power Supply
DIN+, DIN- : Digital Inputs
out1, out2 : Alarm Relay Outputs

The menu structure of KLEA 110P and POWYS 3111 Energy Analyzer have same specifications. All descriptions are made for KLEA 220P.

1.3.3 POWYS Definitions

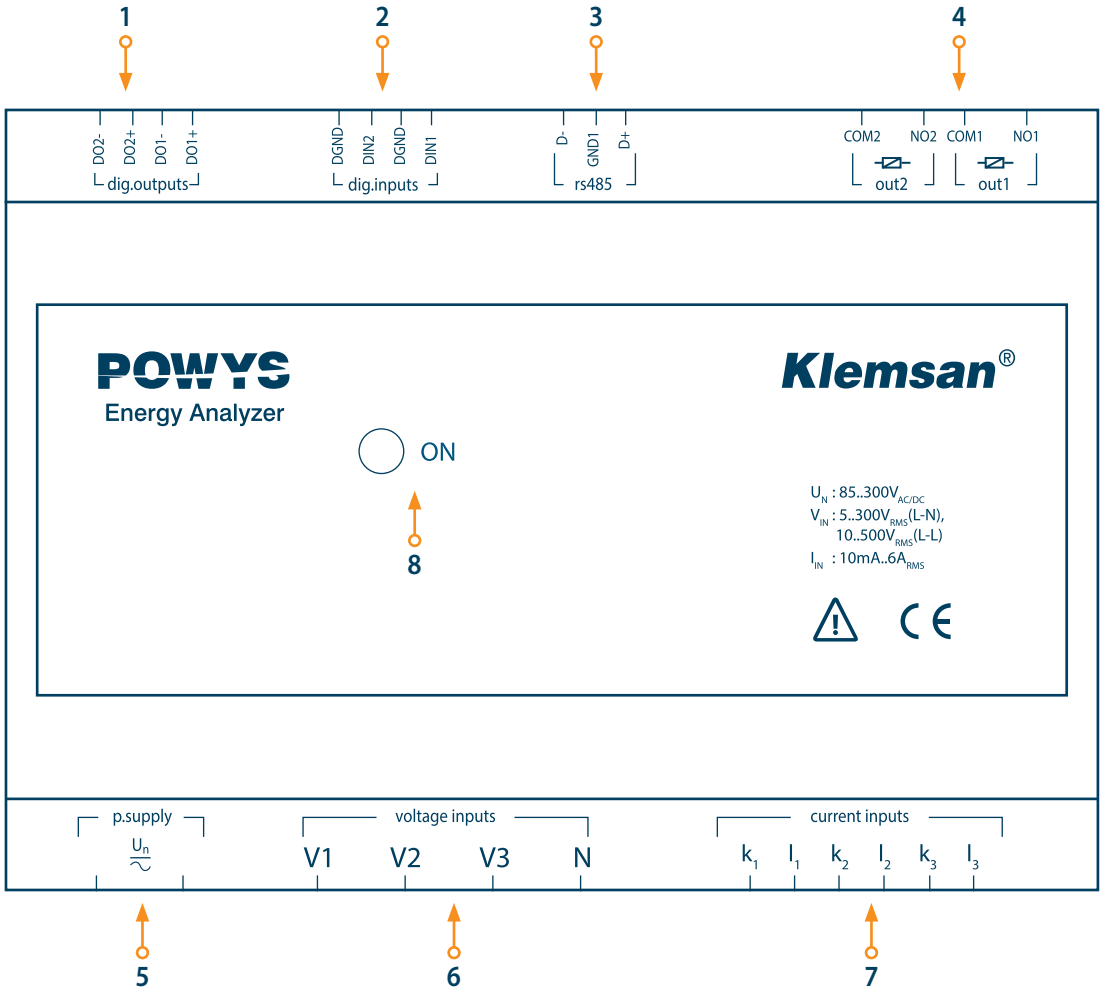


Figure 1-3 Powys Front Panel

1 → Digital Outputs: Output1; DO1- and DO1+, Output2; DO2- and DO2+ *(available for Powys 3101)*
2 → Digital Inputs. Input1:DIN1 and DGND, Input2:DIN2 and DGND *(available for Powys 3101)*
3 → RS485 Communication
4 → Relay Outputs: OUT 1 and OUT 2 *(available for Powys 3101)*
5 → Power supply (Un)
6 → Voltage Measurement Inputs (V1, V2, V3, N)
7 → Current Measurement Inputs (I1-k1, I2-k2, I3-k3)
8 → Power LED: It is turned on when the device is energized.

1.4 Menu Structure

Menus and moving through them are shown in the below table.

Table 1-2 Menu Structure

Instantaneous Values	Maximum Values	Minimum Values	Demand Values
Voltage (L- N)	Voltage (L- N) Maximum	Voltage (L- N) Minimum	…
Voltage (L- L)	Voltage (L- L) Maximum	Voltage (L- L) Minimum	…
Current	Current Maximum	Current Minimum	Current Demand
Cos φ	Cos φ Maximum	Cos φ Minimum	
Power Factor	Power Factor Maximum	Power Factor Minimum	
Active Power	Active Power Maximum	Active Power Minimum	Active Power Demand
Reactive Power	Reactive Power Maximum	Reactive Power Minimum	Reactive Power Demand
Apparent Power	Apparent Power Maksimum	Apparent Power Minimum	Apparent Power Demand
THDV	THDV Maximum	THDV Minimum	…
THDI	THDI Maximum	THDI Minimum	…
Energy Meters	…	…	…
Counters	…	…	…
Setting	…	…	…

Upper menu structure will be changed according to version of KLEA 110P, POWYS and ECRAS. POWYS 3100 and POWYS 3101 has not display or LCD screen. So upper menu is not valid for POWYS 3100 and POWYS 3101.

1.5 Four Quadrant Representation

The angle(Ø) between voltage and current provides us information about the direction of energy flow. A positive sign for active/reactive power indicates that active/reactive power is consumed. And also a negative sign for active/reactive power indicates that active/reactive power is generated.

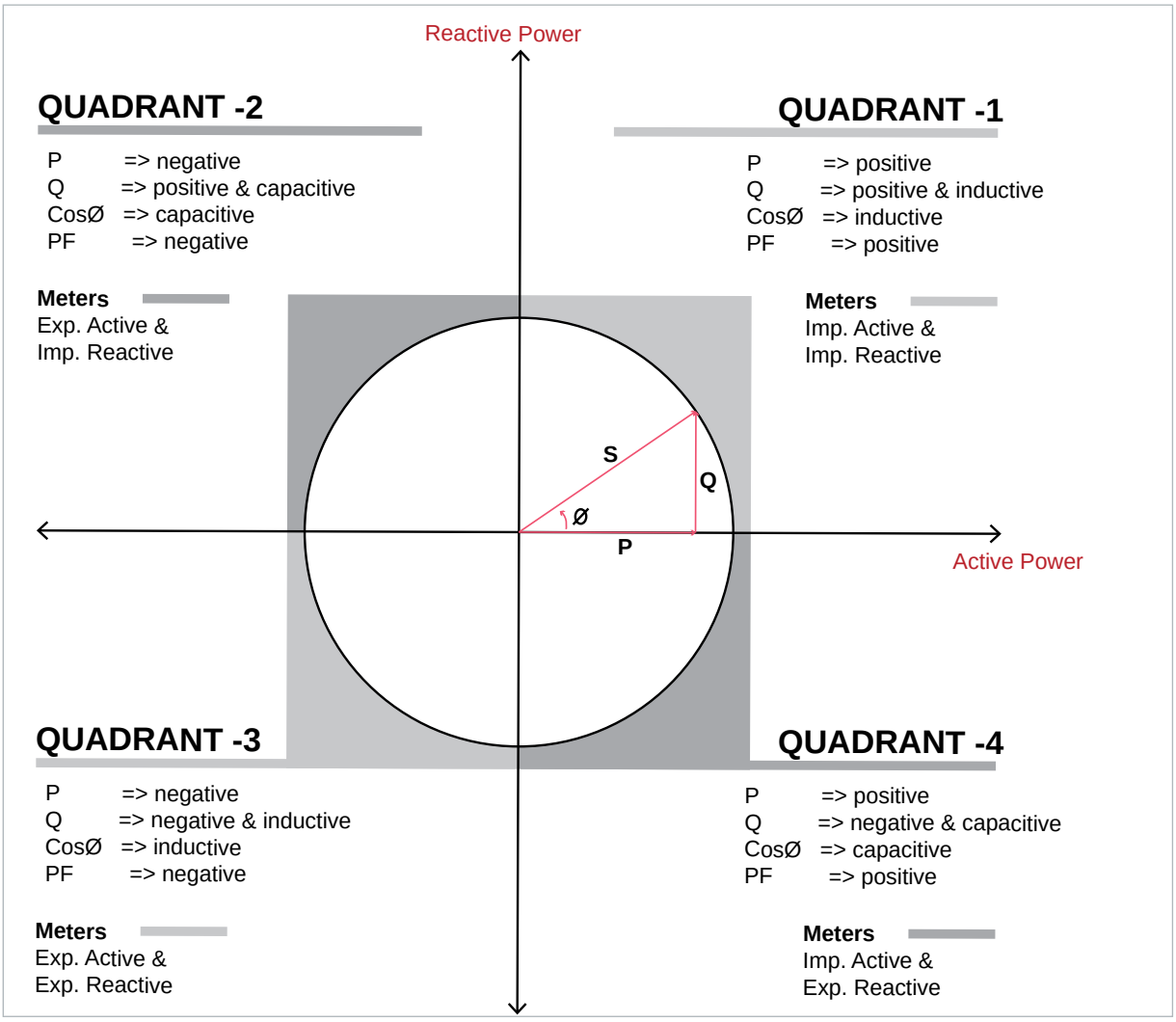


Figure 1-4 Four Quadrant Representation

NOTE: If the signs of active and reactive power are examined, it can be defined the quadrant that Klea measures.
In order to understand P and Q signs in Klea 110P and Ecras, instantaneous displays for P and Q must be checked.
If active power display is seem constantly, it means active power(P) is positive. If it is blinked, it means active power(P) is negative.
If reactive power(Q) display is seem constantly, it means reactive power(Q) is positive. If it is blinked, it means reactive power(Q) is negative.

NOTE: Signs of P and Q can be reached through modbus communication.

e.g.;

P= +10kW, Q= +5kVAr	=> Quadrant-1
P= -10kW, Q= +5kVAr	=> Quadrant-2
P= -10kW, Q= -5kVAr	=> Quadrant-3
P= +10kW, Q= -5kVAr	=> Quadrant-4


KLEA
Energy Analyzer
POWYS
Rail Mounted
Energy Analyzer
ECRAS
Electronic Multimeter
SECTION 2
INSTALLATION

SECTION 2 INSTALLATION

2.1 Preparing for Installation

The purchased product may not include all hardware options referred in this document. This situation does not constitute an impediment to the electrical installation.

Assembly and related connections of the product, must be implemented by authorized persons in accordance with the instructions of user manual.

The device must not be put into service if the operator is not sure that all connections are correctly accomplished.

2.2 Mounting

KLEA and Ecras are placed vertically into the gap located in the panel. After the product is placed into the panel, fixing brackets should be installed on the product. After that it should be fixed to the panel wall with the screws.

Powys is replaced onto 35mm standart rail.

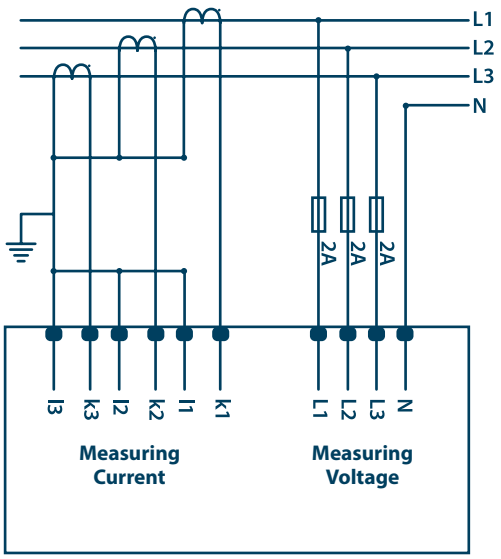
Before wiring up voltage and current ends to KLEA, you must be sure that the power is cut.

The product is connected to current transformer(s). Before disconnecting current transformer leads, be sure that they are short circuited elsewhere or connected to a parallel load which has sufficiently low impedance. Otherwise dangerously high voltages will be induced at the current transformer leads. Same phenomena also apply for putting into service.

2.3 Connection Diagrams

2.3.1 Star and Delta Connections

Star Connection (with neutral)



Delta Connection (no neutral)

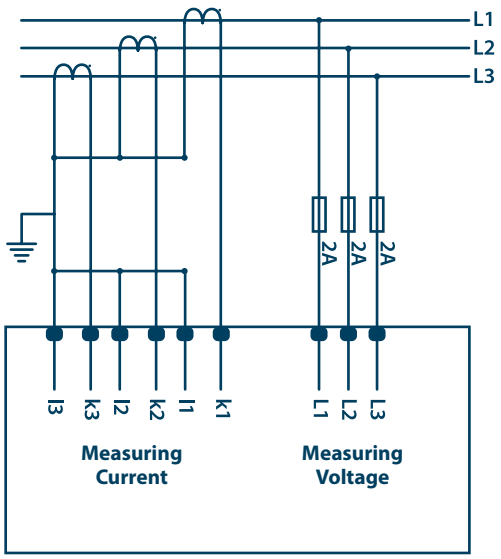


Figure 2-1 Connection Diagram

For ECRAS, KLEA and POWYS 3111;

L1, L2, L3 LEDs blink simultaneously and very slowly (per second) → phase sequence (voltage) error.

Any/All of L1, L2, L3 LED(s) blink(s) slowly (per 0.5 second) → voltage connection(s) of the related phase(s) is/are missing.

Any/All of L1, L2, L3 LED(s) blink(s) quickly (per 0.2 second) → current connection(s) of the related phase(s) is/are missing.

2.3.2 Digital Output Connection Diagram

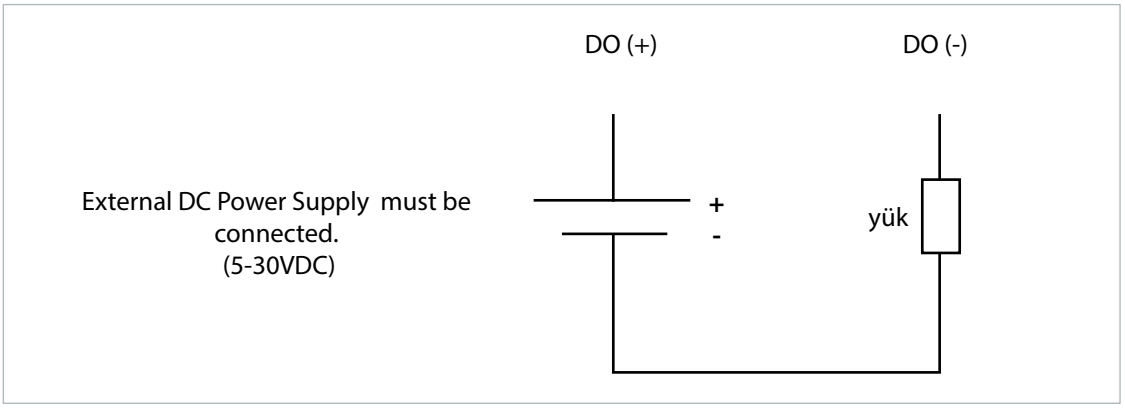


Figure 2-2 Digital Output Connection Diagram

2.4 Dimensions (mm)

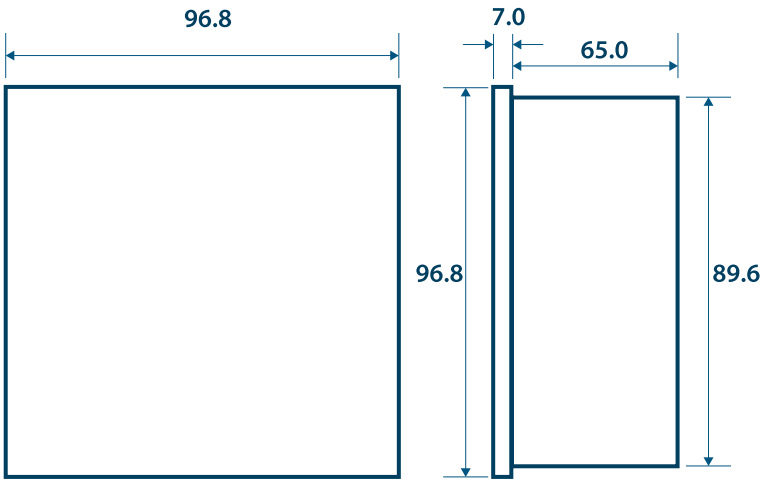


Figure 2-3 Dimensions for Klea and Ecras

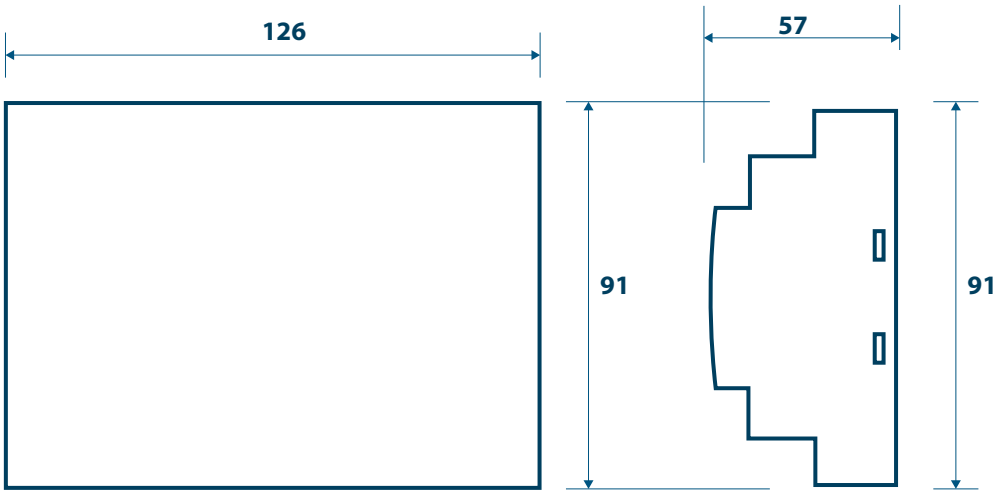


Figure 2-4 Dimensions for Powys


KLEA
Energy Analyzer
POWYS
Rail Mounted
Energy Analyzer
ECRAS
Electronic Multimeter
SECTION 3
MENUS

SECTION 3 MENUS

3.1 Instantaneous Measurement Menus

NOTE: In order to reach Powys measurement, operator should use modbus communication.

Voltage (L-N and L-L), current, neutral current, cosØ, power factor, active power, reactive power, apparent power, THDV and THDI values are shown in instantaneous menu. See Table 3-1 for parameters displayed in the menus and activated LEDs.

Table 3-1 Instantaneous Measurements

LED 1	LED 2	Active Menu	1st Indicator	2nd Indicator	3rd Indicator	4th Indicator	5th Indicator
V	-	Voltage (Phase-Neutral)	Voltage L1	Voltage L2	Voltage L3	Average Voltage (Phase-Neutral)	Network Frequency
VLL	-	Voltage (Phase-Phase)	Voltage L1-L2	Voltage L2-L3	Voltage L3-L1	Average Voltage (Phase-Phase)	Network Frequency
I	-	Current	Current L1	Current L2	Current L3	Total Current	Network Current
Cos φ	-	Cos φ	Cos φ1	Cos φ2	Cos φ3	-	-
PF	-	Power Factor	PF1	PF2	PF3	System PF	-
P	-	Active Power	Active Power L1	Active Power L2	Active Power L3	Total Active Power	-
Q	-	Reactive Power	Reactive Power L1	Reactive Power L2	Reactive Power L3	Total Reactive Power	-
S	-	Apparent Power	Apparent Power L1	Apparent Power L2	Apparent Power L3	Total Apparent Power	-
THD	**V**	Total Harmonic Distortion	THDV1	THDV2	THDV3	-	-
	I		THDI1	THDI2	THDI3	-	-
^{1}⊣⊢	**Q / Cosφ**	Cosφ and reactive power for the L1 phase is capacitive, otherwise is inductive.					
^{2}⊣⊢	**Q / Cosφ**	Cosφ and reactive power for the L2 phase is capacitive, otherwise is inductive.					
^{3}⊣⊢	**Q / Cosφ**	Cosφ and reactive power for the L3 phase is capacitive, otherwise is inductive.					
^{T}⊣⊢	**Q**	Total reactive power is capacitive, otherwise is inductive.					

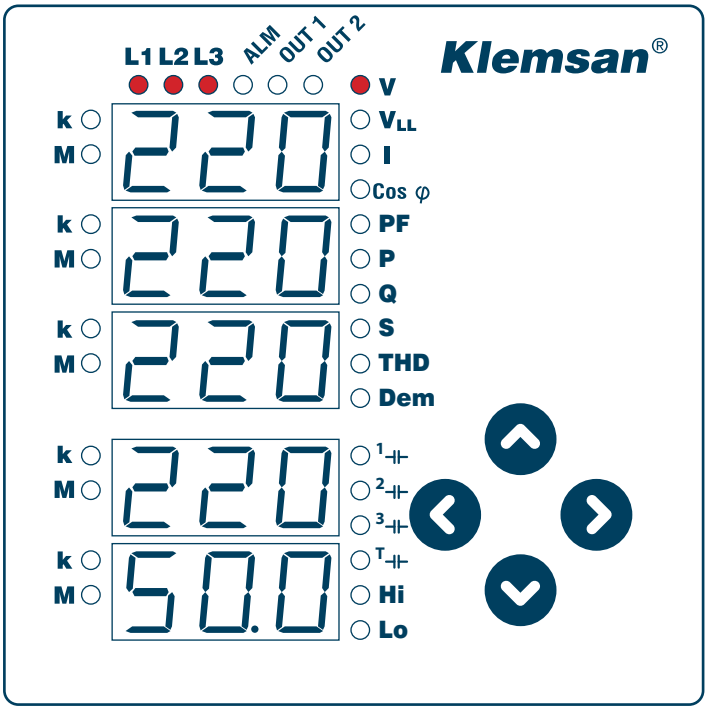


Figure 3-1 Voltage (Phase-Neutral) Display

e.g: When "V" LED is turned on:

- Device is in phase-neutral voltage menu.
- Line-1 phase-neutral voltage is monitored in the first display.
- Line-2 phase-neutral voltage is monitored in the second display.
- Line-3 phase-neutral voltage is monitored in the third display.
- Average phase-neutral voltage of three phase is monitored in fourth display.
- Network frequency is monitored in fifth display

For ECRAS KLEA and POWYS 3111;

L1, L2, L3 LEDs blink simultaneously and very slowly (per second) → phase sequence (voltage) error.

Any/All of L1, L2, L3 LED(s) blink(s) slowly (per 0.5 second) → voltage connection(s) of the related phase(s) is/are missing.

Any/All of L1, L2, L3 LED(s) blink(s) quickly (per 0.2 second) → current connection(s) of the related phase(s) is/are missing.

When the product is mounted on a panel which consumes power, active power (P) must be positive. If active power (P1, P2 or P3) display is blinking in L-H and/or instantaneous menu, operator should cross connect k-l leads of the current transformer.

999 000 000" (999 MEGA) is the highest number that can be displayed in 7 segment displays of the product. If this number is exceeded;

- Related "k", "M" LEDs will turn on (flash constantly).
- "888" number will be monitored in the related 7 segment display. This phenomenon applies for "Instantaneous" and "L-H" menus.

3.2 Maximum, Minimum ve Demand Menus

Minimum and maximum values are calculated and stored in the non-volatile memory for below parameters.

- Voltage (phase-neutral, phase-phase)
- Neutral current
- Frequency
- CosØ
- Power factor
- THDV
- THDI

Besides maximum and minimum values, demand values are calculated and stored in the non-volatile memory for below parameters.

- Current
- Active power
- Reactive power
- Apparent power

Use the left or right arrow keys to display the max. and min. measurements and demand values within the measurement menus. Table 3-1 shows the menu movements. Table 3-2 shows the indicated values and active LEDs in the corresponding menu.

Table 3-2 Maximum, Minimum and Demand Values

LED 1	LED 2	LED 3	1st Indicator	2nd Indicator	3rd Indicator	4th Indicator	5th Indicator
V	Hi	-	Voltage L1 Max.	Voltage L2 Max.	Voltage L3 Max.	Average Voltage Max. (Phase-Neutral)	Network Frequency Max.
	Lo	-	Voltage L1 Min.	Voltage L2 Min.	Voltage L3 Min.	Average Voltage Min. (Phase-Neutral)	Network Frequency Min.
VLL	Hi	-	Voltage L1-L2 Max.	Voltage L2-L3 Max.	Voltage L3-L1 Max.	Average Voltage Max. (Phase-Phase)	Network Frequency Max.
	Lo	-	Voltage L1-L2 Min.	Voltage L2-L3 Min.	Voltage L3-L1 Min.	Average Voltage Min. (Phase-Phase)	Network Frequency Min.
I	Hi	-	Current L1 Max.	Current L2 Max.	Current L3 Max.	Total Current Max.	Neutral Current Max.
	Lo	-	Current L1 Min.	Current L2 Min.	Current L3 Min.	Total Current Min.	Neutral Current Min.
	Dem	-	Current L1 Demand	Current L2 Demand	Current L3 Demand	Total Current Demand	-
Cos φ	Hi	-	Cos φ1 Max.	Cos φ2 Max.	Cos φ2 Max.	-	-
	Lo	-	Cos φ1 Min.	Cos φ2 Min.	Cos φ2 Min.	-	-
PF	Hi	-	PF1 Max.	PF2 Max.	PF3 Max.	System PF Max.	-
	Lo	-	PF1 Min.	PF2 Min.	PF3 Min.	System PF Min.	-
P	Hi	-	Active Power L1 Max.	Active Power L2 Max.	Active Power L3 Max.	Total Active Power Max.	-
	Lo	-	Active Power L1 Min.	Active Power L2 Min.	Active Power L3 Min.	Total Active Power Min.	-
	Dem	-	Active Power L1 Demand	Active Power L2 Demand	Active Power L3 Demand	Total Active Power Demand	-
Q	Hi	-	Reactive Power L1 Max.	Reactive Power L2 Max.	Reactive Power L3 Max.	Total Reactive Power Max.	-
	Lo	-	Reactive Power L1 Min.	Reactive Power L2 Min.	Reactive Power L3 Min.	Total Reactive Power Min.	-
	Dem	-	Reactive Power L1 Demand	Reactive Power L2 Demand	Reactive Power L3 Demand	Total Reactive Power Demand	-
S	Hi	-	Apparent Power L1 Max.	Apparent Power L2 Max.	Apparent Power L3 Max.	Total Apparent Power Max.	-
	Lo	-	Apparent Power L1 Min.	Apparent Power L2 Min.	Apparent Power L3 Min.	Total Apparent Power Min.	-
	Dem	-	Apparent Power L1 Demand	Apparent Power L2 Demand	Apparent Power L3 Demand	Total Apparent Power Demand	-
THD	Hi	V	THDV1 Max.	THDV2 Max.	THDV3 Max.	-	-
	Lo	V	THDV1 Min.	THDV2 Min.	THDV3 Min.	-	-
	Hi	I	THDI1 Max.	THDI2 Max.	THDI3 Max.	-	-
	Lo	I	THDI1 Min.	THDI2 Min.	THDI3 Min.	-	-

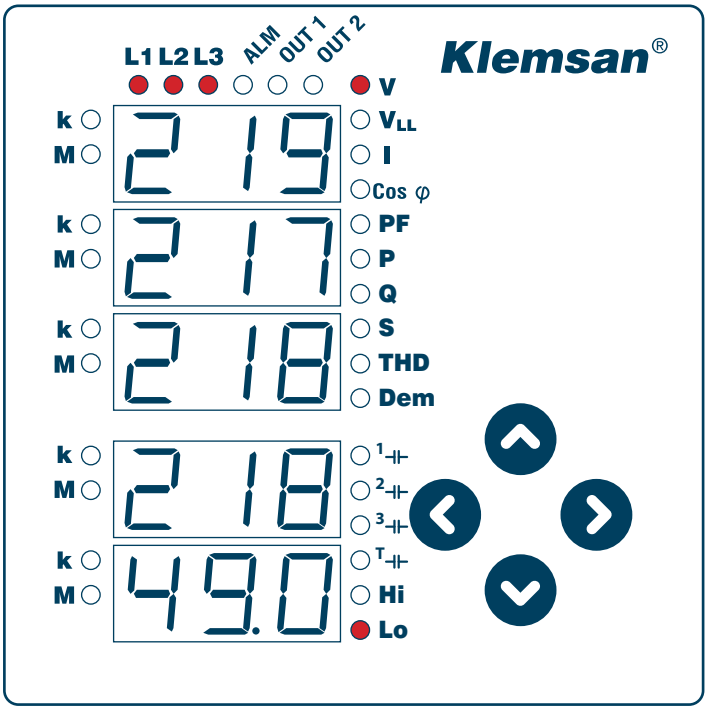


Figure 3-2 Minimum Voltage (Phase-Neutral) Display

e.g. : When "V" LED and "Lo" LED are turned on together:

- Line-1 minimum phase-neutral voltage is monitored in the first display.
- Line-2 minimum phase-neutral voltage is monitored in the second display.
- Line-3 minimum phase-neutral voltage is monitored in the third display.
- Minimum average phase-neutral voltage of three phase is monitored in fourth display.
- Minimum network frequency is monitored in fifth display

Minimum, maximum and demand values are stored in permanent memory. Refer to "CLr" menu to clear these values.

If current/voltage of any of the phases is not connected,

- maximum value of the related parameter will be "0" in maximum page of "L-H Menu".
- in minimum page of "L-H Menu; "k LED" and "M LED" belonging to current/voltage will turn on continuously.

Operator will monitor the number "888" in the related 7 segment display.

3.3 Energy Meters Menu (Enr)

The devices which have DIO option, have two tariff meters (Klea 110P, POWYS 3101). Rest of them have only one tariff meter (Ecras 100, Ecras 120, Ecras 200, Ecras 220, POWYS 3100).

These tariffs are shown in "Enr" menu. Each tariff has import active, export active, import reactive and export reactive meters.

- Import Active Energy Meter (I.Ac)
- Export Active Energy Meter (E.Ac)
- Import Reactive Energy Meter (I.rE)
- Export Reactive Energy Meter (E.rE)

To activate the tariff 2 counters, choose tariff 2 ("tr2") as the digital input type and activate the digital input. In order to activate digital input, DIN+ and DIN- must be short circuited. Otherwise, tariff 1 is activated.

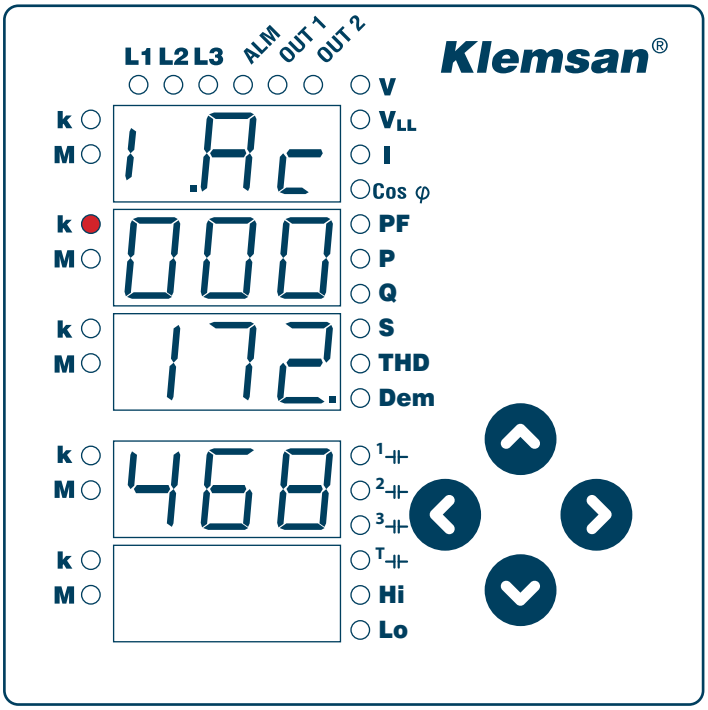


Figure 3-3 Import Active Energy Display

Counters are displayed in the format xxx xxx.xxx kWh / kVArh (See Fig. 3-3).
All counters are reset at 999 999.999 kWh / kVArh and then start over from zero.

Current transformer ratio (Ctr) and voltage transformer ratio (Vtr) are not incorporated in the energy calculations.

3.3.1 Assigning Predefined Value for Energy Meters

In any meter menu, press and hold the right key for at least 2 seconds and the respective menu title starts blinking. Using the right arrow key, move to the digit you want to change and enter the value using the up/down arrows. When you are done entering the value, confirm using the left arrow key. Move on to the storage procedure to store the changes you made. (See 3.6 Save Procedure)

If password protection is enabled, press and hold the right key for at least 2 sec to display the password authentication page. Enter the password to proceed to the counter assignment.

3.4 Counters Menu (Cnt)

The devices which have DIO option, have this menu. (Klea 110P, POWYS 3101).

The Counters (Cnt) menu contains the following counters:

Digital Input("dI") Counter: When a digital input is assigned to a counter, it counts the changes in the digital input. The menu is displayed only in device versions with digital inputs.

"On hour" Counter: Counts and displays the total "on" time for the device in hours.

"Run hour" Counter: If the digital input type was set to "run hour enable", it counts the time elapsed during the digital input is in active position. This counter requires signal from 3-phase voltage and 3-phase current inputs to function without connecting to a digital input. The measured value is displayed in hours.

"Int" Counter: Counts the power interruptions for the device.

Counters are indicated in the format xxx xxx. All counters are reset at 999 999 and then start over from zero.

Only the "dI" and "run hour" counters can be assigned values or reset. Use the procedure for assigning default values to assign values to counters. (See 3.6 Save Procedure)

3.5 Settings Menu (SEt)

Klea and Ecras setings are made in the SEt menu. Table 3-3 shows the Set menu tree.

The settings of Powys are made through modbus.

The menu tree is based on the fully equipped variant model. Some of the menus may be missing in less equipped models. Please see Table1-1 for a comparison of models.

Table 3-3 SEt Menu Tree

Menu	Sub Menu 1	Sub Menu 2	Sub Menu 3	Sub Menu 4	Description
Set					Settings
	bSc				Basic settings
		Ctr			Current transformer rate
		Utr			Voltage transformer rate
		Con			Connection type options
			StA		3P4W connection type
			dEL		3P3W connection type
	Alr				Alarm setup
		U			Voltage (phase-neutral) alarm setup
			HI		Voltage (phase-neutral) alarm high limit
			LO		Voltage (phase-neutral) alarm low limit
			hSt		Voltage (phase-neutral) alarm hysteresis value
			t		Voltage (phase-neutral) alarm delay time
		ULL			Voltage (phase-phase) alarm setup
			HI		Voltage (phase-phase) alarm high limit
			LO		Voltage (phase-phase) alarm high low limit
			hSt		Voltage (phase-phase) alarm hysteresis value
			t		Voltage (phase-phase) alarm delay time
		I			Current alarm setup
			HI		Current alarm high limit
			LO		Current alarm low limit
			hSt		Current alarm hysteresis value
			t		Current alarm delay time
		In			Neutral current alarm setup
			HI		Neutral current alarm high limit
			LO		Neutral current alarm low limit
			hSt		Neutral current hysteresis value
			t		Neutral current alarm delay time
		coS			Cos φ alarm setup
			HI		Cos φ alarm high limit
			LO		Cos φ alarm low limit
			hSt		Cos φ alarm hysteresis value
			t		Cos φ alarm delay time
		PF			Power factor alarm setup
			HI		Power factor alarm high limit
			LO		Power factor alarm low limit
			hSt		Power factor alarm hysteresis value
			t		Power factor alarm delay time
		F			Frequency alarm setup
			HI		Frequency alarm high limit
			LO		Frequency alarm low limit
			hSt		Frequency alarm hysteresis value
			t		Frequency alarm delay time

Menu	Sub Menu 1	Sub Menu 2	Sub Menu 3	Sub Menu 4	Description
Set	OUT				Relay output setup
		rL1			Relay 1 setup
			OFF		Relay 1 OFF
			LO		Assign relay 1 to level low alarms
			HI		Assign relay 1 to level high alarms
		rL2			Relay 2 setup
			OFF		Relay 2 OFF
			LO		Assign relay 2 to level low alarms
			HI		Assign relay 2 to level high alarms
	dEt				Demand time setup
	Pın				Password protection setup
		Act			Enable/disable password protection
		P t			Timeout for password protection. If you do press any keys after entering the password or do not change any settings via MODBUS, password protection is re-enabled after the time has elapsed.
		CHg			Change password
	485				RS485 setup
		bAU			Baud rate options
		Id			Slave ID setup
		Prt			Parity check setup
			nOn		Parity check off
			Eun		Even parity
			Odd		Odd parity
	dIn				Digital input setup
		In1			Digital input 1 setup
			tYP		Digital input 1 options
				OFF	Off
				tr2	Enable tariff 2
				Cnt	Enable counter
				run.	Enable Run Hour
			dLY		Digital input 1 detection delay time
			Edg		Digital input 1 detection edge
				rIS	Detection in rising edge
				FAL	Detection in falling edge (Only valid for counter)
				bot	Detection in both edges (Only valid for counter)
		In2			Digital input 2 setup
			tYP		Digital input 2 options
				OFF	Off
				tr2	Enable tariff 2
				Cnt	Enable counter
				run.	Enable Run Hour

Menu	Sub Menu 1	Sub Menu 2	Sub Menu 3	Sub Menu 4	Description
Set	dIn	In2	dLY		Digital input 2 detection delay time
			Edg		Digital input 2 detection edge
				rIS	Detection in rising edge
				FAL	Detection in falling edge (Only valid for counter)
				bot	Detection in both edges (Only valid for counter)
	PuL				Pulse output setup
		o1			Pulse output 1 setup
			out		Pulse output 1 parameter setup
				OFF	Off
				IA1	Assign to tariff 1 import active energy counter
				EA1	Assign to tariff 1 export active energy counter
				Ir1	Assign to tariff 1 import reactive energy counter
				Er1	Assign to tariff 1 export reactive energy counter
				IA2	Assign to tariff 2 import active energy counter
				EA2	Assign to tariff 2 export active energy counter
				Ir2	Assign to tariff 2 import reactive energy counter
				Er2	Assign to tariff 2 export reactive energy counter
				dI1	Assign to digital input 1 counter
				dI2	Assign to digital input 2 counter
			dur		Pulse duration of the pulse output 1
			rAt		Step range for pulse output 1
		o2			Pulse output 2 setup
			out		Pulse output 2 parameter setup
				OFF	Off
				IA1	Assign to tariff 1 import active energy counter
				EA1	Assign to tariff 1 export active energy counter
				Ir1	Assign to tariff 1 import reactive energy counter
				Er1	Assign to tariff 1 export reactive energy counter
				IA2	Assign to tariff 2 import active energy counter
				EA2	Assign to tariff 2 export active energy counter
				Ir2	Assign to tariff 2 import reactive energy counter
				Er2	Assign to tariff 2 export reactive energy counter
				dI1	Assign to digital input 1 counter
				dI2	Assign to digital input 2 counter
			dur		Pulse duration of the pulse output 2
			rAt		Step range for pulse output 2

Menu	Sub Menu 1	Sub Menu 2	Sub Menu 3	Sub Menu 4	Description
Set	CLr				Clear menu
		OFF			Clear abort
		All			Reset the device to factory settings
		Enr			Clear the energy counters
		Cnt			Clear the counters
		HI			Clear the max. values
		LO			Clear the min. values
		dEd			Clear the demand values
		SEt			Reset the setup to factory settings
		ALr			Reset the alarm setup to factory settings
	Uer				Firmware version information

3.5.1 Basic Settings Menu (bSc)

This is the menu item where you make the current transformer ratio, voltage transformer ratio and connection type settings. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

The calculated currents are multiplied by the current transformer ratio (Ctr) and the calculated voltages are multiplied by the voltage transformer ratio (Utr) to be indicated on the displays and the modbus addresses.

If "stA" (3-phase, 4-wire connection type) was specified for the network connection setup, the initial menu is "Voltage (Phase-Neutral)". This menu is displayed first when the device is energized.

If "dEL" (3-phase, 3-wire connection type) was specified for the network connection setup, the initial menu is "Voltage (Phase-Phase)". This menu is displayed first when the device is energized.

3.5.2 Alarm Settings Menu (ALr)

Use this menu item to set the alarm limits, hysteresis value and alarm delay time. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

Outside the alarm limits:

- "k" and "M" LEDs for the related parameter start flashing at the same time.
- The "ALM" LED lights after the alarm delay time elapses; and if a relay assignment was made, LEDs for the OUT1 and/or OUT2 light and related relays are energized.

Alarm example:

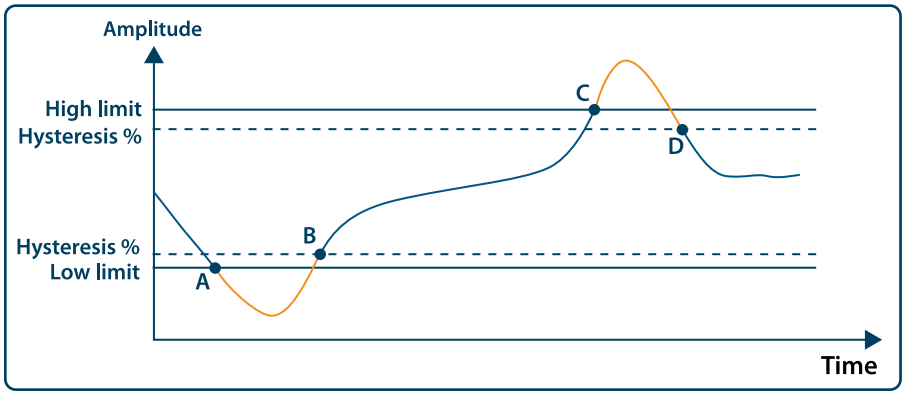


Figure 3-4 Alarm Example

(Alarm delay was set to zero)
- A low limit alarm occurs at point A.
- Alarm disappears at point B.
- A high limit alarm occurs at point C.
- Alarm disappears at point D.

3.5.3 Alarm Relay Settings Menu (OUt)

Use this menu item to set the conditions of the alarm relays. You can set both alarm relays to the following positions:

- **OFF** : Relay does not energize in an alarm condition.
- **LO** : Relay energizes when a low limit alarm occurs.
- **HI** : Relay energizes when a high limit alarm occurs.

Related relay is de-energized when the alarm condition ends. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

3.5.4 Demand Period Setting Menu (dEt)

Use this menu item to setup the demand period. At the end of the specified period, demand values are calculated in a periodic cycle. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

3.5.5 Password Settings Menu (Pın)

Use this menu item to turn the password protection on/off, set a password activation time and change password settings editing options. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

4 digit password protects the product setup and counter menus against unauthorized access and modifications. When activated, a password query screen is displayed if someone attempts to change the values. After a successful login, the device will not ask for a password until the "password activation time" has elapsed. You can set this value in the respective menu item. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

If you do not press any keys after entering the password or do not change the settings via MODBUS, password protection is re-enabled after the password activation time has elapsed.

3.5.6 RS485 Settings Menu (485)

Use this menu item to set the baudrate, slave ID and parity control settings in RS485 communication. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

3.5.7 Digital Input Settings Menu (DIn)

Use this menu item to set the on/off position, type, delay time and detection edge for the digital input. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings..

Digital input is based on dry contact detection principle. Never apply signal to inputs. Otherwise there is risk of damaging the device.

Digital input modes:

• Option to enable tariff 2 (tr2): If you choose this option for the digital input type, tariff 2 energy counters will be enabled when the digital input is active (dry contact must be applied from related DIN+ and DIN-).

• Option to enable the counter (Cnt) : If you choose this option for the digital input type, the counter will count the changes in the position of the digital input depending on the chosen detection edge.

- o If you choose rising edge detection (rIS) for the detection edge, the counter will increase by 1 on each activation of the dry contact that is connected to the digital input.
- o If you choose falling edge detection (FAL) for the detection edge, the counter will increase by 1 on each de-activation of the dry contact that is connected to the digital input.
- o If you choose both edges detection (bot) for the detection edge, the counter will increase by 1 on each activation and de-activaton of the dry contact that is connected to the digital input.

• Run Hour enable option (run.) : If you choose this option for the digital input type, the “run hour counter” start counting when the digital input is active.(Dry contact must be applied from related DIN+ and DIN-).

Detection delay time:

The input is enabled or disabled based on the detection delay time which is set to account for contact spikes or noise in the digital input.

Detection edge:

Use this menu item to choose the position where the digital input is detected active or passive. This menu is available only for the digital input mode “counter”. Other options always use the rising edge detection.

3.5.8 Pulse Output Settings Menu (PuL)

Use this menu item to specify the on/off position, output parameter, pulse duration and step range settings for the pulse outputs. You can freely choose the settings for each pulse output independent of each other. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

The pulse output is activated with an increase in the predefined output parameter that is equal to each step range and deactivates after the predefined time.

Output parameter setup (out):
Use this menu item to set the parameter dependency of the output. The respective output is closed when you choose "OFF".

Pulse duration setup (dur):
Use this menu item to specify the time the pulse is active.

Pulse step range (rAt):
Use this menu to specify the smallest possible increase for the input parameter that will output a pulse.

3.5.9 Clear Menu (CLr)

Use this menu to delete the stored values in the memory and restore the factory settings. Please see Table 3-3 for the menu tree and Section 5 for the factory default settings.

The following options are available in the clear menu:

- OFF : Disables the clear process.
- All : Clears all values stored in the memory and restores them to the default factory settings.
- Enr : Resets all energy counters.
- Cnt : Resets all counters.
- HI : Clears the maximum values stored in the memory.
- LO : Clears the minimum values stored in the memory.
- dEd : Clears the demand values stored in the memory.
- Set : Restores all settings to the factory settings.
- ALr : Restores the alarm settings to the factory settings.

In order to prevent an accidental deletion, "nO" / "YES" prompt is displayed if you choose any option other than "OFF".

- **To confirm the action:**

Press the right key to blink the "nO" sign. Use the up/down keys to change the "nO" to "YES". Then, press the left key to confirm the action.

- **To discard the action:**

Press the right key to blink the "nO" sign. Then, press the left key to confirm the "nO" option and exit the menu without making any deletions.

The device restarts if you choose SEt, ALr or All and confirm the action. It will not restart if you choose other options. It will clear the values and returns back to the CLr menu.

3.6 Save Procedure

3.6.1 Changing Value/Setting

There are 2 different menus for changing the values:

- Multiple choice menus: These menus contain predefined options. Press the right key to choose and blink the first variable of the menu. Press the up/down keys to choose and blink the desired option. Then press the left button to complete your choice.

- Menus with numerical input values: In these menus, move through the digits to set the desired value. Press the right key to choose and blink the first digit of the variable from the left. Use the right key to move through the digits. Use the up/down keys to increase/decrease the value of the active digit. Set the desired values for variables by setting the individual digit values and press the left key to complete your action.

Return to the SEt menu if you want to store the changes you made in the Setting menu. The storage procedure is activated in this menu. See Save Procedure. Device restarts if you store the changes.

3.6.2 Saving

Press the left key until you see the “SAU nO” display to confirm or discard the changes you made.
To confirm the changes :

Press the right key to blink the “nO” sign. Use the up/down keys to change the “nO” to “YES”. Then, press the left key to store the changes.

To discard the changes:

Press the right key to blink the “nO” sign. Then exit the menu using the left key without saving your changes.


KLEA
Energy Analyzer
POWYS
Rail Mounted
Energy Analyzer
ECRAS
Electronic Multimeter
SECTION 4
RS485
COMMUNICATION

SECTION 4 RS485 COMMUNICATION

Ecras 200, Ecras 220, Powys 3100 and Powys 3101 models support RS485 communication. The device that is bought may not support all the modbus address. Please see Table 1-1 for a comparison of models and Table 3-3 for the menu tree.

4.1 Readable and Writable Data

The following functions are supported:

- Function 03H: This function reads the readable addresses in the modbus table.
- Function 10H: This function writes to the writable addresses in the modbus table.

Definitions:
- R / W : Can read and write the value in this address.
- RO : Can only read the value in this address.
- WO : Can only write to this address.
- float : 32 bit floating number.

Related modbus table is given below:

Table 4-1 Readable and Writable Data

Address	Parameter	Type	Read/Write	Write Condition
Phase-1 Basic Measurements				
0	Phase 1 Voltage (L-N)	float	RO	
2	Phase 1-2 Voltage (L-L)	float	RO	
4	Phase 1 Current	float	RO	
6	Phase 1 Cosφ	float	RO	
8	Phase 1 Power Factor	float	RO	
10	Phase 1 Active Power	float	RO	
12	Phase 1 Reactive Power	float	RO	
14	Phase 1 Apparent Power	float	RO	
16	Phase 1 THDV	float	RO	
18	Phase 1 THDI	float	RO	
Phase-2 Basic Measurements				
20	Phase 2 Voltage (L-N)	float	RO	
22	Phase 2-3 Voltage (L-L)	float	RO	
24	Phase 2 Current	float	RO	
26	Phase 2 Cosφ	float	RO	
28	Phase 2 Power Factor	float	RO	
30	Phase 2 Active Power	float	RO	
32	Phase 2 Reactive Power	float	RO	
34	Phase 2 Apparent Power	float	RO	
36	Phase 2 THDV	float	RO	
38	Phase 2 THDI	float	RO	

Address	Parameter	Type	Read/Write	Write Condition
Phase-3 Basic Measurements				
40	Phase 3 Voltage (L-N)	float	RO	
42	Phase 3-1 Voltage (L-L)	float	RO	
44	Phase 3 Current	float	RO	
46	Phase 3 Cosφ	float	RO	
48	Phase 3 Power Factor	float	RO	
50	Phase 3 Active Power	float	RO	
52	Phase 3 Reactive Power	float	RO	
54	Phase 3 Apparent Power	float	RO	
56	Phase 3 THDV	float	RO	
58	Phase 3 THDI	float	RO	
Common Measurements (Phase-1, Phase-2, Phase-3)				
60	Average Voltage (L-N)	float	RO	
62	Average Voltage (L-L)	float	RO	
64	Total Current	float	RO	
66	System Power Factor	float	RO	
68	Total Active Power	float	RO	
70	Total Reactive Power	float	RO	
72	Total Apparent Power	float	RO	
74	System Frequency	float	RO	
76	Neutral Current	float	RO	
Phase-1 Voltage Harmonic Measurements				
78	Phase 1 Voltage Harmonics 1	float	RO	
80	Phase 1 Voltage Harmonics 3	float	RO	
82	Phase 1 Voltage Harmonics 5	float	RO	
84	Phase 1 Voltage Harmonics 7	float	RO	
86	Phase 1 Voltage Harmonics 9	float	RO	
88	Phase 1 Voltage Harmonics 11	float	RO	
90	Phase 1 Voltage Harmonics 13	float	RO	
92	Phase 1 Voltage Harmonics 15	float	RO	
94	Phase 1 Voltage Harmonics 17	float	RO	
96	Phase 1 Voltage Harmonics 19	float	RO	
98	Phase 1 Voltage Harmonics 21	float	RO	
100	Phase 1 Voltage Harmonics 23	float	RO	
102	Phase 1 Voltage Harmonics 25	float	RO	
104	Phase 1 Voltage Harmonics 27	float	RO	
106	Phase 1 Voltage Harmonics 29	float	RO	
108	Phase 1 Voltage Harmonics 31	float	RO	
Phase-1 Current Harmonic Measurements				
110	Phase 1 Current Harmonics 1	float	RO	
112	Phase 1 Current Harmonics 3	float	RO	
114	Phase 1 Current Harmonics 5	float	RO	
116	Phase 1 Current Harmonics 7	float	RO	
118	Phase 1 Current Harmonics 9	float	RO	
120	Phase 1 Current Harmonics 11	float	RO	
122	Phase 1 Current Harmonics 13	float	RO	
124	Phase 1 Current Harmonics 15	float	RO	

Address	Parameter	Type	Read/Write	Write Condition
126	Phase 1 Current Harmonics 17	float	RO	
128	Phase 1 Current Harmonics 19	float	RO	
130	Phase 1 Current Harmonics 21	float	RO	
132	Phase 1 Current Harmonics 23	float	RO	
134	Phase 1 Current Harmonics 25	float	RO	
136	Phase 1 Current Harmonics 27	float	RO	
138	Phase 1 Current Harmonics 29	float	RO	
140	Phase 1 Current Harmonics 31	float	RO	
Phase-2 Voltage Harmonic Measurements				
142	Phase 2 Voltage Harmonics 1	float	RO	
144	Phase 2 Voltage Harmonics 3	float	RO	
146	Phase 2 Voltage Harmonics 5	float	RO	
148	Phase 2 Voltage Harmonics 7	float	RO	
150	Phase 2 Voltage Harmonics 9	float	RO	
152	Phase 2 Voltage Harmonics 11	float	RO	
154	Phase 2 Voltage Harmonics 13	float	RO	
156	Phase 2 Voltage Harmonics 15	float	RO	
158	Phase 2 Voltage Harmonics 17	float	RO	
160	Phase 2 Voltage Harmonics 19	float	RO	
162	Phase 2 Voltage Harmonics 21	float	RO	
164	Phase 2 Voltage Harmonics 23	float	RO	
166	Phase 2 Voltage Harmonics 25	float	RO	
168	Phase 2 Voltage Harmonics 27	float	RO	
170	Phase 2 Voltage Harmonics 29	float	RO	
172	Phase 2 Voltage Harmonics 31	float	RO	
Phase-2 Current Harmonic Measurements				
174	Phase 2 Current Harmonics 1	float	RO	
176	Phase 2 Current Harmonics 3	float	RO	
178	Phase 2 Current Harmonics 5	float	RO	
180	Phase 2 Current Harmonics 7	float	RO	
182	Phase 2 Current Harmonics 9	float	RO	
184	Phase 2 Current Harmonics 11	float	RO	
186	Phase 2 Current Harmonics 13	float	RO	
188	Phase 2 Current Harmonics 15	float	RO	
190	Phase 2 Current Harmonics 17	float	RO	
192	Phase 2 Current Harmonics 19	float	RO	
194	Phase 2 Current Harmonics 21	float	RO	
196	Phase 2 Current Harmonics 23	float	RO	
198	Phase 2 Current Harmonics 25	float	RO	
200	Phase 2 Current Harmonics 27	float	RO	
202	Phase 2 Current Harmonics 29	float	RO	
204	Phase 2 Current Harmonics 31	float	RO	
Phase-3 Voltage Harmonic Measurements				
206	Phase 3 Voltage Harmonics 1	float	RO	
208	Phase 3 Voltage Harmonics 3	float	RO	
210	Phase 3 Voltage Harmonics 5	float	RO	

Address	Parameter	Type	Read/Write	Write Condition
212	Phase 3 Voltage Harmonics 7	float	RO	
214	Phase 3 Voltage Harmonics 9	float	RO	
216	Phase 3 Voltage Harmonics 11	float	RO	
218	Phase 3 Voltage Harmonics 13	float	RO	
220	Phase 3 Voltage Harmonics 15	float	RO	
222	Phase 3 Voltage Harmonics 17	float	RO	
224	Phase 3 Voltage Harmonics 19	float	RO	
226	Phase 3 Voltage Harmonics 21	float	RO	
228	Phase 3 Voltage Harmonics 23	float	RO	
230	Phase 3 Voltage Harmonics 25	float	RO	
232	Phase 3 Voltage Harmonics 27	float	RO	
234	Phase 3 Voltage Harmonics 29	float	RO	
236	Phase 3 Voltage Harmonics 31	float	RO	
	Phase-3 Current Harmonic Measurements			
238	Phase 3 Current Harmonics 1	float	RO	
240	Phase 3 Current Harmonics 3	float	RO	
242	Phase 3 Current Harmonics 5	float	RO	
244	Phase 3 Current Harmonics 7	float	RO	
246	Phase 3 Current Harmonics 9	float	RO	
248	Phase 3 Current Harmonics 11	float	RO	
250	Phase 3 Current Harmonics 13	float	RO	
252	Phase 3 Current Harmonics 15	float	RO	
254	Phase 3 Current Harmonics 17	float	RO	
256	Phase 3 Current Harmonics 19	float	RO	
258	Phase 3 Current Harmonics 21	float	RO	
260	Phase 3 Current Harmonics 23	float	RO	
262	Phase 3 Current Harmonics 25	float	RO	
264	Phase 3 Current Harmonics 27	float	RO	
266	Phase 3 Current Harmonics 29	float	RO	
268	Phase 3 Current Harmonics 31	float	RO	
	Phase-1 Maximum Measurements			
270	Phase 1 Max. Voltage (L-N)	float	RO	
272	Phase 1-2 Max. Voltage (L-L)	float	RO	
274	Phase 1 Max. Current	float	RO	
276	Phase 1 Max. Cosφ	float	RO	
278	Phase 1 Max. Power Factor	float	RO	
280	Phase 1 Max. Active Power	float	RO	
282	Phase 1 Max. Reactive Power	float	RO	
284	Phase 1 Max. Apparent Power	float	RO	
286	Phase 1 Max. THDV	float	RO	
288	Phase 1 Max. THDI	float	RO	
	Phase-2 Maximum Measurements			
290	Phase 2 Max. Voltage (L-N)	float	RO	
292	Phase 2-3 Max. Voltage (L-L)	float	RO	
294	Phase 2 Max. Current	float	RO	

Address	Parameter	Type	Read/Write	Write Condition
296	Phase 2 Max. Cosφ	float	RO	
298	Phase 2 Max. Power Factor	float	RO	
300	Phase 2 Max. Active Power	float	RO	
302	Phase 2 Max. Reactive Power	float	RO	
304	Phase 2 Max. Apparent Power	float	RO	
306	Phase 2 Max. THDV	float	RO	
308	Phase 2 Max. THDI	float	RO	
Phase-3 Maximum Measurements				
310	Phase 3 Max. Voltage (L-N)	float	RO	
312	Phase 3-1 Max. Voltage (L-L)	float	RO	
314	Phase 3 Max. Current	float	RO	
316	Phase 3 Max. Cosφ	float	RO	
318	Phase 3 Max. Power Factor	float	RO	
320	Phase 3 Max. Active Power	float	RO	
322	Phase 3 Max. Reactive Power	float	RO	
324	Phase 3 Max. Apparent Power	float	RO	
326	Phase 3 Max. THDV	float	RO	
328	Phase 3 Max. THDI	float	RO	
Maximum Common Measurements (Phase-1, Phase-2, Phase-3)				
330	Max. Average Voltage (L-N)	float	RO	
332	Max. Average Voltage (L-L)	float	RO	
334	Max. Total Current	float	RO	
336	Max. System Power Factor	float	RO	
338	Max. Total Active Power	float	RO	
340	Max. Total Reactive Power	float	RO	
342	Max. Total Apparent Power	float	RO	
344	Max. System Frequency	float	RO	
346	Max. Neutral Current	float	RO	
Phase-1 Minimum Measurements				
348	Phase 1 Min. Voltage (L-N)	float	RO	
350	Phase 1-2 Min. Voltage (L-L)	float	RO	
352	Phase 1 Min. Current	float	RO	
354	Phase 1 Min. Cosφ	float	RO	
356	Phase 1 Min. Power Factor	float	RO	
358	Phase 1 Min. Active Power	float	RO	
360	Phase 1 Min. Reactive Power	float	RO	
362	Phase 1 Min. Apparent Power	float	RO	
364	Phase 1 Min. THDV	float	RO	
366	Phase 1 Min. THDI	float	RO	
Phase-2 Minimum Measurements				
368	Phase 2 Min. Voltage (L-N)	float	RO	
370	Phase 2-3 Min. Voltage (L-L)	float	RO	
372	Phase 2 Min. Current	float	RO	
374	Phase 2 Min. Cosφ	float	RO	
376	Phase 2 Min. Power Factor	float	RO	
378	Phase 2 Min. Active Power	float	RO	
380	Phase 2 Min. Reactive Power	float	RO	

Address	Parameter	Type	Read/Write	Write Condition
382	Phase 2 Min. Apparent Power	float	RO	
384	Phase 2 Min. THDV	float	RO	
386	Phase 2 Min. THDI	float	RO	
	Phase-3 Minimum Measurements			
388	Phase 3 Min. Voltage (L-N)	float	RO	
390	Phase 3-1 Min. Voltage (L-L)	float	RO	
392	Phase 3 Min. Current	float	RO	
394	Phase 3 Min. Cosφ	float	RO	
396	Phase 3 Min. Power Factor	float	RO	
398	Phase 3 Min. Active Power	float	RO	
400	Phase 3 Min. Reactive Power	float	RO	
402	Phase 3 Min. Apparent Power	float	RO	
404	Phase 3 Min. THDV	float	RO	
406	Phase 3 Min. THDI	float	RO	
	Minimum Common Measurements (Phase-1, Phase-2, Phase-3)			
408	Min. Average Voltage (L-N)	float	RO	
410	Min. Average Voltage (L-L)	float	RO	
412	Min. Total Current	float	RO	
414	Min. System Power Factor	float	RO	
416	Min. Total Active Power	float	RO	
418	Min. Total Reactive Power	float	RO	
420	Min. Total Apparent Power	float	RO	
422	Min. System Frequency	float	RO	
424	Min. Neutral Current	float	RO	
	Alarm Flags			
426	Alarm Flags	32 bit integer	RO	
	Demand Measurements			
428	Phase 1 Current Demand	float	RO	
430	Phase 2 Current Demand	float	RO	
432	Phase 3 Current Demand	float	RO	
434	Total Current Demand	float	RO	
436	Phase 1 Active Power Demand	float	RO	
438	Phase 2 Active Power Demand	float	RO	
440	Phase 3 Active Power Demand	float	RO	
442	Total Active Power Demand	float	RO	
444	Phase 1 Reactive Power Demand	float	RO	
446	Phase 2 Reactive Power Demand	float	RO	
448	Phase 3 Reactive Power Demand	float	RO	
450	Total Reactive Power Demand	float	RO	
452	Phase 1 Apparent Power Demand	float	RO	
454	Phase 2 Apparent Power Demand	float	RO	
456	Phase 3 Apparent Power Demand	float	RO	
458	Total Apparent Power Demand	float	RO	

Address	Parameter	Type	Read/Write	Write Condition
	Digital Input			
460	Digital Input 1 Counter	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
462	Digital Input 2 Counter	32 bit integer	R / W	
464	Run Hour Counter	32 bit integer	R / W	
466	On Hour Counter	32 bit integer	RO	
468	Power Interruptions Counter	32 bit integer	RO	
	Energy Meters			
	Tariff 1 Total Energy Values (Phase1+Phase2+Phase3)			
470	Import Active Energy T1 (Tariff 1)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
472	Export Active Energy T1 (Tariff 1)	32 bit integer	R / W	
474	Import Reactive Energy T1 (Tariff 1)	32 bit integer	R / W	
476	Export Reactive Energy T1 (Tariff 1)	32 bit integer	R / W	
	Tariff 2 Total Energy Values (Phase1+Phase2+Phase3)			
478	Import Active Energy T2 (Tariff 2)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
480	Export Active Energy T2 (Tariff 2)	32 bit integer	R / W	
482	Import Reactive Energy T2 (Tariff 2)	32 bit integer	R / W	
484	Export Reactive Energy T2 (Tariff 2)	32 bit integer	R / W	
	Tariff 1 Phase1 Energy Values			
486	Import Active Energy T1-Phase1 (Tariff 1)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
488	Export Active Energy T1-Phase1 (Tariff 1)	32 bit integer	R / W	
490	Import Reactive Energy T1-Phase1 (Tariff 1)	32 bit integer	R / W	
492	Export Reactive Energy T1-Phase1 (Tariff 1)	32 bit integer	R / W	
	Tariff 1 Phase 2 Energy Values			
494	Import Active Energy T1-Phase2 (Tariff 1)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
496	Export Active Energy T1-Phase2 (Tariff 1)	32 bit integer	R / W	
498	Import Reactive Energy T1-Phase2 (Tariff 1)	32 bit integer	R / W	
500	Export Reactive Energy T1-Phase2 (Tariff 1)	32 bit integer	R / W	
	Tariff 1 Phase 3 Energy Values			
502	Import Active Energy T1-Phase3 (Tariff 1)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
504	Export Active Energy T1-Phase3 (Tariff 1)	32 bit integer	R / W	
506	Import Reactive Energy T1-Phase3 (Tariff 1)	32 bit integer	R / W	
508	Export Reactive Energy T1-Phase3 (Tariff 1)	32 bit integer	R / W	
	Tariff 2 Phase 1 Energy Values			
510	Import Active Energy T2-Phase1 (Tariff 2)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
512	Export Active Energy T2-Phase1 (Tariff 2)	32 bit integer	R / W	
514	Import Reactive Energy T2-Phase1 (Tariff 2)	32 bit integer	R / W	
516	Export Reactive Energy T2-Phase1 (Tariff 2)	32 bit integer	R / W	

Address	Parameter	Type	Read/Write	Write Condition
Tariff 2 Phase 2 Energy Values				
518	Import Active Energy T2-Phase2 (Tariff 2)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
520	Export Active Energy T2-Phase2 (Tariff 2)	32 bit integer	R / W	
522	Import Reactive Energy T2-Phase2 (Tariff 2)	32 bit integer	R / W	
524	Export Reactive Energy T2-Phase2 (Tariff 2)	32 bit integer	R / W	
Tariff 2 Phase 3 Energy Values				
526	Import Active Energy T2-Phase3 (Tariff 2)	32 bit integer	R / W	If password protection is active, enter the password in the "Settings Protection" field and then enter "2222" in the "Enable Counter Change" field. You can then enter the value.
528	Export Active Energy T2-Phase3 (Tariff 2)	32 bit integer	R / W	
530	Import Reactive Energy T2-Phase3 (Tariff 2)	32 bit integer	R / W	
532	Export Reactive Energy T2-Phase3 (Tariff 2)	32 bit integer	R / W	
Device Settings				
534	Current Transfer Rate (CTR)	32 bit integer	R / W	Enter the password in the "Settings Protection" field if password protection is enabled.
536	Voltage Transfer Rate (VTR)	float	R / W	
538	Connection Type	32 bit integer	R / W	
540	Relay 1 Function	32 bit integer	R / W	
542	Relay 2 Function	32 bit integer	R / W	
544	Demand Time	32 bit integer	R / W	
546	Password Enable	32 bit integer	R / W	
548	Password Activation Time	32 bit integer	R / W	
550	Password Value	32 bit integer	R / W	
552	Baud Rate	32 bit integer	R / W	
554	Slave ID	32 bit integer	R / W	
556	Parity Control	32 bit integer	R / W	
558	Digital Input 1 Type	32 bit integer	R / W	
560	Digital Input 1 Delay Time	32 bit integer	R / W	
562	Digital Input 1 Edge	32 bit integer	R / W	
564	Digital Input 2 Type	32 bit integer	R / W	
566	Digital Input 2 Delay Time	32 bit integer	R / W	
568	Digital Input 2 Edge	32 bit integer	R / W	
570	Pulse Output 1 Parameter	32 bit integer	R / W	
572	Pulse Output 1 Duration	32 bit integer	R / W	
574	Pulse Output 1 Rate	32 bit integer	R / W	
576	Pulse Output 2 Parameter	32 bit integer	R / W	
578	Pulse Output 2 Duration	32 bit integer	R / W	
580	Pulse Output 2 Rate	32 bit integer	R / W	
582	Reserve	32 bit integer	R / W	
584	Reserve	32 bit integer	R / W	
586	Reserve	32 bit integer	R / W	
588	Reserve	32 bit integer	R / W	
590	Reserve	32 bit integer	R / W	

Address	Parameter	Type	Read/Write	Write Condition
Alarm Settings				
592	Voltage (L-N) Alarm High Limit	float	R / W	Enter the password in the "Settings Protection" field if password protection is enabled.
594	Voltage (L-N) Alarm Low Limit	float	R / W	
596	Voltage (L-N) Alarm Hysteresis	float	R / W	
598	Voltage (L-N) Alarm Delay Time	32 bit integer	R / W	
600	Voltage (L-L) Alarm High Limit	float	R / W	
602	Voltage (L-L) Alarm Low Limit	float	R / W	
604	Voltage (L-L) Alarm Hysteresis	float	R / W	
606	Voltage (L-L) Alarm Delay Time	32 bit integer	R / W	
608	Current Alarm High Limit	float	R / W	
610	Current Alarm Low Limit	float	R / W	
612	Current Alarm Hysteresis	float	R / W	
614	Current Alarm Delay Time	32 bit integer	R / W	
616	Neutral Current Alarm High Limit	float	R / W	
618	Neutral Current Alarm Low Limit	float	R / W	
620	Neutral Current Alarm Hysteresis	float	R / W	
622	Neutral Current Alarm Delay Time	32 bit integer	R / W	
624	Cosφ Alarm High Limit	float	R / W	
626	Cosφ Alarm Low Limit	float	R / W	
628	Cosφ Alarm Hysteresis	float	R / W	
630	Cosφ Alarm Delay Time	32 bit integer	R / W	
632	Power Factor Alarm High Limit	float	R / W	
634	Power Factor Alarm Low Limit	float	R / W	
636	Power Factor Alarm Hysteresis	float	R / W	
638	Power Factor Alarm Delay Time	32 bit integer	R / W	
640	Frequency Alarm High Limit	float	R / W	
642	Frequency Alarm Low Limit	float	R / W	
644	Frequency Alarm Hysteresis	float	R / W	
646	Frequency Alarm Delay Time	32 bit integer	R / W	
Device Model				
648	Device Firmware Version	float	RO	
650	Device Model	32 bit integer	RO	
Password/Pin activation				
652	Setting Protection	32 bit integer	R / W	Address for the device password. It displays the enabled/disabled condition of the password protection when reading using the 03H function.
Reset Commands				
1000	Reset Energy Values	32 bit integer	WO	Enter the password in the "Settings Protection" field if password protection is enabled. Enter "1" into the respective address to reset the values. Enter "0" before saving to restore the values.
1002	Reset Counter Values	32 bit integer	WO	
1004	Reset Max. Values	32 bit integer	WO	
1006	Reset Min. Values	32 bit integer	WO	
1008	Reset Demand Values	32 bit integer	WO	
1010	Reset Settings	32 bit integer	WO	
1012	Reset Alarm Limits	32 bit integer	WO	
1014	Reset the Device to Factory Settings	32 bit integer	WO	

Address	Parameter	Type	Read/Write	Write Condition
Save The Changes				
2000	Save Changes	32 bit integer	WO	Enter the password in the "Settings Protection" field if password protection is enabled. Enter "1" to save the changes and restart.
Manual Output Relay Control				
4000	Enable Relay Control	32 bit integer	WO	Enter the password in the "Settings Protection" field if password protection is enabled. Enter "1111" here to enable the relay control. Enter "0" here to disable the relay control.
4002	Relay 1 Control	32 bit integer	WO	Enter the password in the "Settings Protection" field if password protection is enabled. Then, enter "1111" for the "Enable Relay Control" address. Enter "1" to activate, "0" to de-activate the relay.
4004	Relay 2 Control	32 bit integer	WO	Enter the password in the "Settings Protection" field if password protection is enabled. Then, enter "1111" for the "Enable Relay Control" address. Enter "1" to activate, "0" to de-activate the relay.
Enable/Disable to Assigning Predefined Value for Energy Meters				
5000	Enable Counter Change	32 bit integer	WO	Enter the password in the "Settings Protection" field if password protection is enabled. Enter "2222" here to enable assigning the relay control. Enter "0" here to disable the meter assignment.

4.1.1 Alarm Flags

"Alarm Flags" modbus address showing the alarm conditions and alarm conditions represented with bits are given below.

Table 4-2 Alarm Flags

458 Alarm Flags															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
DI2 Status	DI1 Status	Relay 2 Status	Relay 2 Status	DO2 Status	DO1 Status	Reserve					SEQ	I3 OFF	I2 OFF	I1 OFF	V3 OFF
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
V2 OFF	V1 OFF	Freq Low	Freq High	PF Low	PF High	Cosφ Low	Cosφ High	I(N) Low	I(N) High	I Low	I High	V(L-L) Low	V(L-L) High	V(L-N) Low	V(L-N) High

bit	description
31	: DI2 Status: Digitial input 2 signal condition (active or passive)
30	: DI1 Status: Digitial input 1 signal condition (active or passive)
29	: Relay 2 Status: Relay 2 active/pasive status
28	: Relay 1 Status: Relay 1 active/pasive status
27	: DO2 Status: Digital Output 2 active/pasive status
26	: DO1 Status: Digital Output 1 active/pasive status
25-21	:Reserve
20	: SEQ - Phase Order Alarm
19	: I3 OFF - 3. No current in Line-3
18	: I2 OFF - 2. No current in Line-2
17	: I1 OFF - 1. No current in Line-1
16	: V3 OFF - 3. No voltage in Line-3
15	: V2 OFF - 2. No voltage Line-2
14	: V1 OFF - 1. No voltage in Line-1
13	: Freq Low - Low frequency alarm
12	: Freq High - High frequency alarm
11	: PF Low - Low power factor alarm
10	: PF High - High power factor alarm
9	: Cos φ Low - Low Cos φ alarm
8	: Cos φ High - High Cos φ alarm
7	: I(N) Low - Low neutral current alarm
6	: I(N) High - High neutral current alarm
5	: I Low - Low current alarm
4	: I High - High current alarm
3	: V(L-L) Low - Low phase-phase voltage alarm
2	: V(L-L) High - High phase-phase voltage alarm
1	: V(L-N) Low - Low phase-neutral voltage alarm
0	: V(L-N) High - High phase-neutral voltage alarm

If the device was not restarted after entering the password or the “password activation time” has not elapsed, this will read “0” to indicate that password protection is disabled in the “Settings protection” address(modbus adr: 604). In this case, you don’t need to re-enter the password.
Password activation time resets and restarts each time a modbus write action is performed or a key is pressed.

4.2 Multiple Choice Settings via Modbus

Modbus addresses for the multiple choice settings, input values and their descriptions are given below.

Table 4-3 Description List

address	register name	write value	description name
538	Connection Type	0	StA
		1	dEL
540	Relay 1 Function	0	OFF
		1	LO
		2	HI
542	Relay 2 Function	0	OFF
		1	LO
		2	HI
546	Password Enable	0	OFF
		1	ON
552	Baud Rate	0	1200 baud
		1	2400 baud
		2	4800 baud
		3	9600 baud
		4	19200 baud
		5	38400 baud
		6	57600 baud
556	Parity Control	0	nOn
		1	Eun
		2	Odd
558	Digital Input 1 Type	0	OFF
		1	tr2
		2	Cnt
		3	run.
562	Digital Input 1 Edge	0	rIS
		1	FAL
		2	bot

address	register name	write value	description name
564	Digital Input 2 Type	0	OFF
		1	tr2
		2	Cnt
		3	run.
568	Digital Input 2 Edge	0	rIS
		1	FAL
		2	bot
570	Pulse Output 1 Parameter	0	OFF
		1	IA1
		2	EA1
		3	Ir1
		4	Er1
		5	IA2
		6	EA2
		7	Ir2
		8	Er2
		9	dI1
		10	dI2
576	Pulse Output 2 Parameter	0	OFF
		1	IA1
		2	EA1
		3	Ir1
		4	Er1
		5	IA2
		6	EA2
		7	Ir2
		8	Er2
		9	dI1
		10	dI2


KLEA
Energy Analyzer
POWYS
Rail Mounted
Energy Analyzer
ECRAS
Electronic Multimeter
SECTION 5
FACTORY
DEFAULT
SETTINGS

SECTION 5 FACTORY DEFAULT SETTINGS

The menu tree is based on the fully equipped variant model. Some of the menus may be missing in less equipped models. Please see Table 1-1 for a comparison of models.

Sub Menu 1	Sub Menu 2	Sub Menu 3	Description	Default Value	Unit	Setting Range
bSc	Ctr		Current transformer ratio	1	-	1 - 5000
	Utr		Voltage transformer ratio	1.0	-	0.1 - 5000.0
	Con		Connection type options	StA	-	StA/dEL
ALr	U	HI	Voltage (phase-neutral) alarm high limit	0.0	V	0.0 - 1500000.0
		LO	Voltage (phase-neutral) alarm low limit	0.0	V	0.0 - 1500000.0
		hSt	Voltage (phase-neutral) alarm hysteresis value	5.0	V	0.0 - 1500000.0
		t	Voltage (phase-neutral) alarm delay time	5	sec	0 - 60
	ULL	HI	Voltage (phase-phase) alarm high limit	0.0	V	0.0 - 2600000.0
		LO	Voltage (phase-phase) alarm high low limit	0.0	V	0.0 - 2600000.0
		hSt	Voltage (phase-phase) alarm hysteresis value	5.0	V	0.0 - 2600000.0
		t	Voltage (phase-phase) alarm delay time	5	sec	0 - 60
	I	HI	Current alarm high limit	0.0	A	0.0 - 30000.0
		LO	Current alarm low limit	0.0	A	0.0 - 30000.0
		hSt	Current alarm hysteresis value	0.1	A	0.0 - 30000.0
		t	Current alarm delay value	5	sec	0 - 60
	In	HI	Neutral current alarm high limit	0.0	A	0.0 - 30000.0
		LO	Neutral current alarm low limit	0.0	A	0.0 - 30000.0
		hSt	Neutral current hysteresis value	0.1	A	0.0 - 30000.0
		t	Neutral current alarm delay value	5	sec	0 - 60
	coS	HI	cos φ alarm high limit	0.00	-	0.00 - 1.00
		LO	cos φ alarm low limit	0.00	-	0.00 - 1.00
		hSt	cos φ alarm hysteresis value	0.01	-	0.00 - 1.00
		t	cos φ alarm delay time	5	sec	0 - 60

Sub Menu 1	Sub Menu 2	Sub Menu 3	Description	Default Value	Unit	Setting Range
	PF	HI	Power factor alarm high limit	0.00	-	0.00 - 1.00
		LO	Power factor alarm low limit	0.00	-	0.00 - 1.00
		hSt	Power factor alarm hysteresis value	0.01	-	0.00 - 1.00
		t	Power factor alarm delay time	5	sec	0 - 60
	F	HI	Frequency alarm high limit	50.0	Hz	45.0 - 65.0
		LO	Frequency alarm low limit	50.0	Hz	45.0 - 65.0
		hSt	Frequency alarm hysteresis value	2.0	Hz	0.0 - 20.0
		t	Frequency alarm delay time	5	sec	0 - 60
OUT	rL1		Relay 1 setup	OFF	-	OFF/HI/LO
	rL2		Relay 2 setup	OFF	-	OFF/HI/LO
dEt			Demand time setup	15	min	1 - 60
Pın	Act		Enable/disable password protection	NO	-	NO/YES
	P t		Timeout for password protection	10	min	1 - 60
	CHg		Change password	1	-	1 - 9999
485	bAU		Baud rate options	57600	Baud	1200/2400/4800/9600/19200/38400/57600
	Id		Slave ID setup	1	-	1 - 247
	Prt		Parity check setup	nOn	-	nOn/Eun/Odd
dIn	In1	tYP	Digital input 1 options	OFF	-	OFF/tr2/Cnt/run.
		dLY	Digital input 1 detection delay time	10	msec	10 - 2000
		Edg	Digital input 1 detection edge	rIS	-	rIS/FAL/bot
	In2	tYP	Digital input 2 options	OFF	-	OFF/tr2/Cnt/run.
		dLY	Digital input 2 detection delay time	10	msec	10 - 2000
		Edg	Digital input 2 detection edge	rIS	-	rIS/FAL/bot
PuL	o1	out	Pulse output 1 parameter setup	OFF	-	OFF/IA1/EA1/Ir1/Er1/IA2/EA2/Ir2/Er2/dI1/dI2
		dur	Pulse duration of the pulse output 1	50	msec	50 - 2500
		rAt	Step range for pulse output 1	1	Wh / Varh / Qty	1 - 999 999 999
	o2	out	Pulse output 2 parameter setup	OFF	-	OFF/IA1/EA1/Ir1/Er1/IA2/EA2/Ir2/Er2/dI1/dI2
		dur	Pulse duration of the pulse output 2	50	msec	50 - 2500
		rAt	Step range for pulse output 2	1	Wh / Varh / Qty	1 - 999 999 999
CLr			Clear menu	OFF	-	OFF/All/Enr/Cnt/HI/LO/dEd/SEt/ALr


KLEA
Energy Analyzer
POWYS
Rail Mounted
Energy Analyzer
ECRAS
Electronic Multimeter
SECTION 6
TECHNICAL
SPECIFICATIONS

SECTION 6 TECHNICAL SPECIFICATIONS

SUPPLY		
Voltage	85..300 V AC/DC	
Frequency	45..65Hz	
Power Consumption	< 6VA	
MEASUREMENT INPUTS		
Voltage	5..300V AC (L - N)	
	10..500V AC (L - L)	
Current	10mA .. 6A AC	
Frequency	45..65Hz	
Network Connection Type	3-phase 4-wire, 3-phase 3-wire	
DIGITAL INPUT		
Input Type	Dry Contact	
Isolation	5000V RMS	
DIGITAL OUTPUT		
Output Type	Transistor	
Switching Voltage	5..30V DC	
Switching Current	50mA	
Isolation	5000V RMS	
RELAY OUTPUT		
	AC	**DC**
Maximum Switching Voltage	250V	30V
Maximum Switching Current	10A	5A
Maximum Switching Power	1250VA	150W
GENERAL		
Operating Temperature	-20°C..+70°C	
Storage Temperature	-30°C..+80°C	
Protection Class	IP40	
Relative Humidity	95% non-condensing	

Measurement Accuracy

Function Symbol	Function	Function Performance Class According to IEC 61557-12	Measuring Range	Other Complementary Characteristics
P	Total active power	0,5	10 % $I_b \leq I \leq I_{max}$ 0,5 Ind to 0,8 Cap	-
Q_V	Total reactive power	1	5 % $I_b \leq I \leq I_{max}$ 0,25 Ind to 0,25 Cap	-
S_A	Total apparent power	0,5	10 % $I_b \leq I \leq I_{max}$ 0,5 Ind to 0,8 Cap	-
E_A	Total active energy	0,5	0 to 999999,999 kWh	IEC 62053-22 Class 0.5S
E_{rV}	Total reactive energy	2	0 to 999999,999 kVarh	IEC 62053-23 Class 2
f	Frequency	0,1	45 – 65 Hz	-
I	Phase current	0,5	20 % $I_b \leq I \leq I_{max}$	-
I_{Nc}	Neutral current (calculated)	0,5	20 % $I_b \leq I \leq I_{max}$	-
U	Voltage	0,2	$U_{min} \leq U \leq U_{max}$	-
PF_A	Power factor	0,5	0,5 Ind to 0,8 Cap	-
THDV	Total harmonic distortion voltage	1	0 % to 20 %	-
THDI	Total harmonic distortion current	1	0 % to 100 %	-

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Revision No: 25022016