



**ECPAS**

Electronic Multimeter

**User  
Manual**

**Klemsan<sup>®</sup>**



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## GENERAL INFORMATION

ECRAS is designed to measure/calculate current, voltage (L-L, L-N),  $\cos\phi$ , frequency, active, reactive and apparent power in three phase systems.

ECRAS has numerous features like;

- Existence/Non-existence of currents and voltages belonging to the related phases
- Minimum and maximum values for current, voltage(L-L, L-N),  $\cos\phi$  active, reactive and apparent power
- Demand values for current, active, reactive and apparent power
- Providing 4-digit password and user entry control.
- 2 programmable alarm relay outputs. (OPTIONAL)

## GENERAL WARNINGS

- Installation, operation and commissioning (putting into service) of ECRAS must be performed by qualified personnel.
- Do not work under live supply conditions. Before installation, turn off the power of the panel or any other related equipment.
- ECRAS 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.
- For cleaning, remove the dust with a dry cloth. Do not use abrasives, solvents or alcohol.
- The device must be put into service only after all connections are made.
- There are no user serviceable parts inside. Maintenance and calibration can only be carried out at manufacturer's end.
- Keep and store away from moisture, dust, vibration and wet environment.
- It is recommend connecting circuit breakers or automatic fuses (2 Amps) between voltage inputs and electrical network.



User/operator should follow the above instructions/recommendations. Otherwise no responsibility is assured by the manufacturer or any of its subsidiaries.

## CONNECTION TYPES

Star Connection (with neutral)

Delta Connection (no neutral)

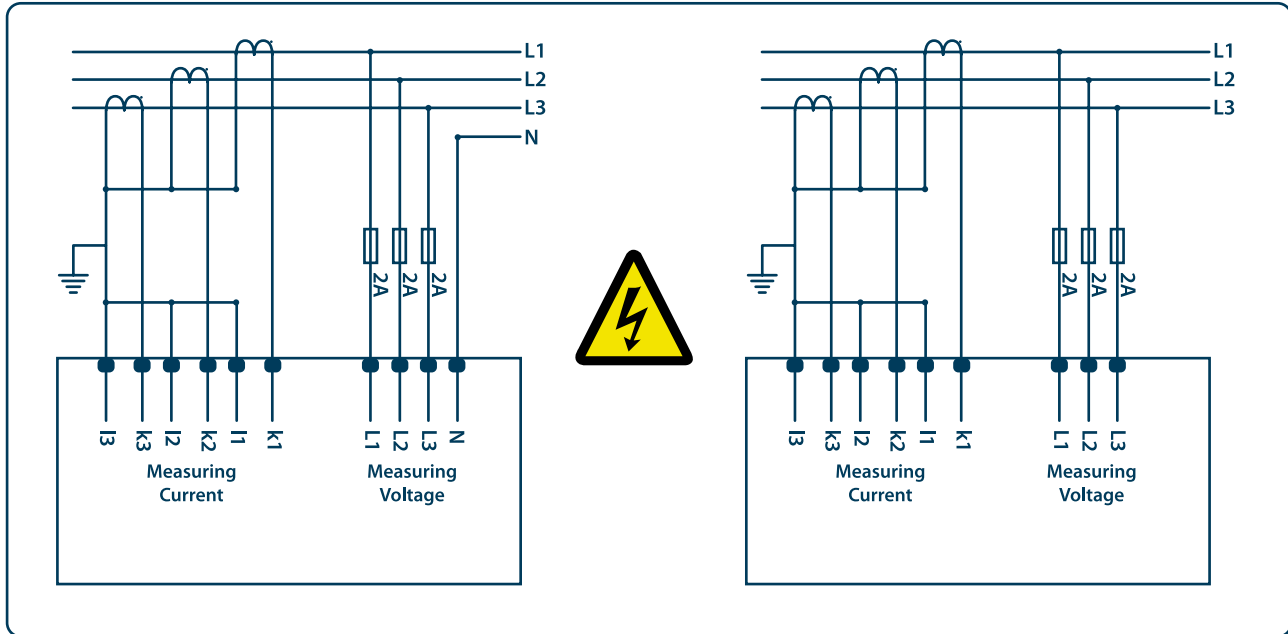


Figure 1

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

## FRONT PANEL

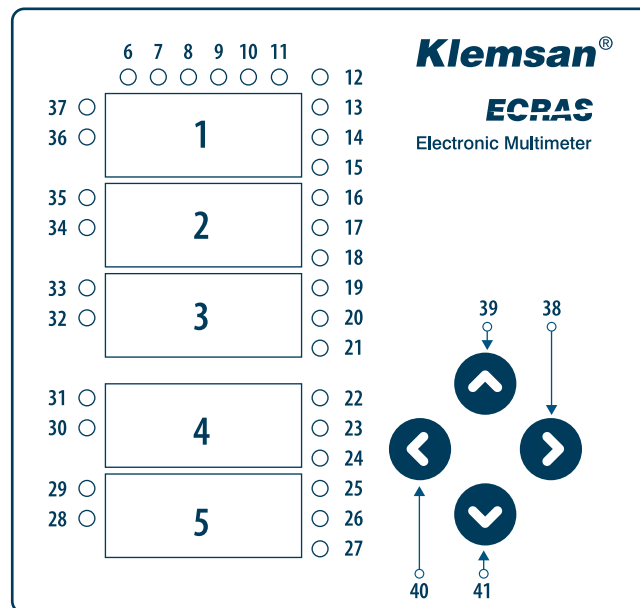


Figure 2

- 1, 2, 3, 4, 5 → 7 segments displays
- 6, 7, 8 → Existence/Non-existence of V1 (L-N), V2 (L-N), V3 (L-N), I1, I2 and I3.
- 9 → "ALM LED" for alarms. If alarm occurs, ALM LED will turn on.
- 10, 11 → "Out1 and Out2 LEDs" for relay output(s). Turn(s) on when the relay(s) activated.
- 12 → "V LED". Turns on when user monitors L1-N, L2-N, L3-N voltages.
- 13 → "VLL LED". Turns on when user monitors VLL12, VLL23, VLL31.
- 14 → "I LED". Turns on when user monitors I1, I2, I3 and In (neutral current) currents.
- 15 → "cosØ LED". Turns on when user monitors cosØ1, cosØ 2, cosØ 3 and system cosØ values.
- 16 → "P LED". Turns on when user monitors P1, P2, P3 and total active powers.
- 17 → "Q LED". Turns on when user monitors Q1, Q2, Q3 and total reactive powers.
- 18 → "S LED". Turns on when user monitors S1, S2, S3 and total apparent powers.
- 19 → "⊥ LED" for first phase. Turns on when reactive power value of phase1 is capacitive.
- 20 → "⊥ LED" for second phase. Turns on when reactive power value of phase2 is capacitive.
- 21 → "⊥ LED" for third phase. Turns on when reactive power value of phase3 is capacitive.
- 22 → "LED" for system. Turns on when reactive power value of system is capacitive.
- 23 → "H LED". Turns on when user monitors maximum value of a parameter.
- 24 → "L LED". Turns on when user monitors minimum value of a parameter.
- 25 → "D LED". Turns on when user monitors demand value of a parameter.
- 26 → "SET LED". Turns on when user enters into "SEt Menu".
- 27 → Δ LED". Turns on when user selects ECRAS connection as delta.
- 28, 30, ...,36 → "M LED". Measurement parameter is displayed in MEGA units when M LED is turned on.
- 29, 31, ...,37 → "k LED". Measurement parameter is displayed in KILO units when k LED is turned on.
- 38 → "Right key". It is used to enter into a submenu; also used to navigate between digits (when user enters/changes a value).
- 39 → "Up key". It is used to scroll up inside a menu; also used to change the value of any setting parameter.
- 40 → "Left key". It is used to go back to upper menu(s).
- 41 → "Down key". It is used to scroll down inside a menu; also used to change the value of any setting parameter.

## BACK PANEL

I1-k1, I2-k2, I3-k3 : Current measurement inputs  
 V1, V2, V3, N : Voltage measurement inputs  
 out1, out2 : Alarm relay outputs  
 Un : Input power

## INSTANTANEOUS MEASUREMENTS

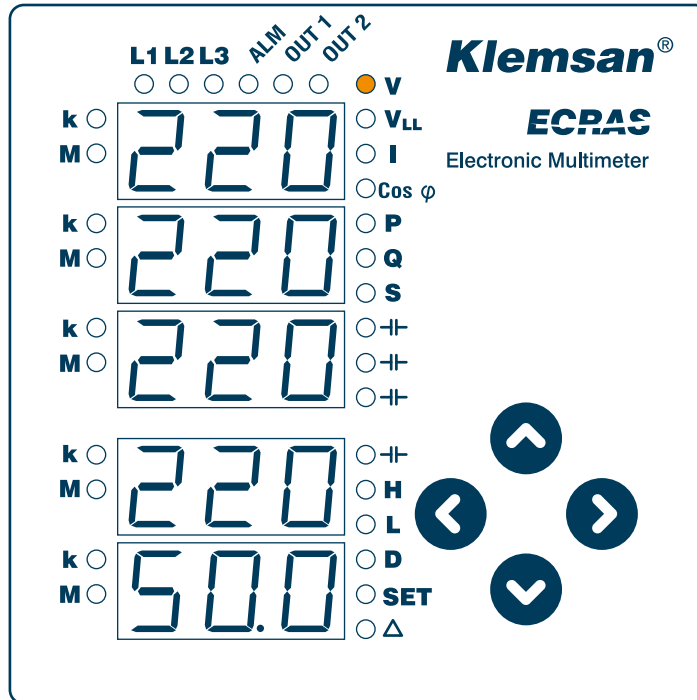


Figure 3

Operator can navigate inside instantaneous measurements menu by up and down keys.

### When "V LED" is turned on:

Line-neutral voltages (VLN1, VLN2, VLN3), their average and system frequency are monitored respectively. (Refer to Figure 3)

### When "VLL LED" is turned on:

Line-to-line voltages (VLL12, VLL23, VLL31), their average and system frequency are monitored respectively.

### When "I LED" is turned on:

Currents (I1, I2, I3), their total and neutral current (In) are monitored respectively.

### When "cosØ LED" is turned on:

Phase1 cosØ, phase2 cosØ, phase3 cosØ and system cosØ are monitored respectively.

### When "P LED" is turned on:

Active powers (P1, P2, P3) and their total are monitored respectively.

### When "Q LED" is turned on:

Reactive powers (Q1, Q2, Q3) and their total are monitored respectively.

### When "S LED" is turned on:

Apparent powers (S1, S2, S3) and their total are monitored respectively.

### When "-H- LED" of first phase is turned on:

Reactive power and cosØ of phase1 are capacitive.

**When “-H- LED” of second phase is turned on:**

Reactive power and  $\cos\phi$  of phase2 are capacitive.

**When “-H- LED” of third phase is turned on:**

Reactive power and  $\cos\phi$  of phase3 are capacitive.

**When “-H-” LED of system is turned on:**

Reactive power and  $\cos\phi$  of system are capacitive.



When Ecras 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 ECRAS. 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.

## MAXIMUM, MINIMUM AND DEMAND VALUES (L-H MENU)

Operator can reach to L-H menu by pressing up and down keys.

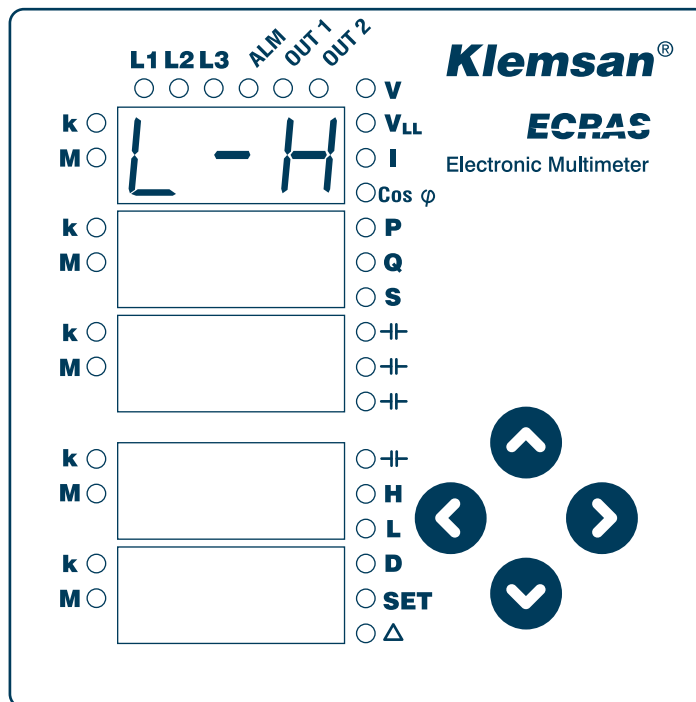


Figure 4

Press right key to enter into L-H menu. Operator can scroll inside L-H menu by pressing up and down keys. Further explanations are given as below.

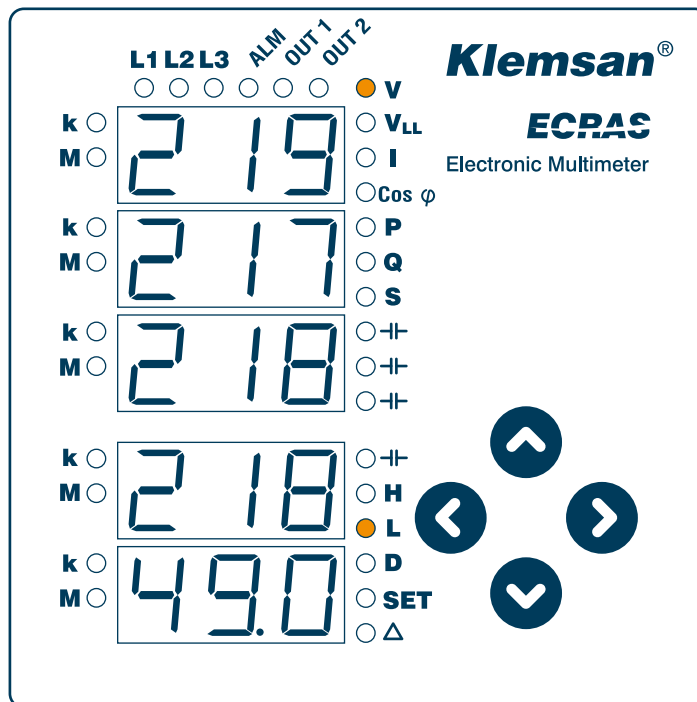


Figure 5

**If "V LED" and "H LED" are turned on:**

Maximum values of line-neutral voltages (VLN1, VLN2, VLN3), their average and system frequency are displayed respectively.

**If "V LED" and "L LED" are turned on:**

Minimum values of line-neutral voltages (VLN1, VLN2, VLN3), their average and system frequency are displayed respectively. (Refer to Figure 5)

**If "VLL LED" and "H LED" are turned on:**

Maximum values of line-to-line voltages (VLL12, VLL23, VLL31), their average and system frequency are displayed respectively.

**If "VLL LED" and "L LED" are turned on:**

Minimum values of line-to-line voltages (VLL12, VLL23, VLL31), their average and system frequency are displayed respectively.

**If "I LED" and "H LED" are turned on:**

Maximum values of currents (I1, I2, I3), their total and neutral current (In) are displayed respectively.

**If "I LED" and "L LED" are turned on:**

Minimum values of currents (I1, I2, I3), their total and neutral current (In) are displayed respectively.

**If "I LED" and "D LED" are turned on:**

Demand values of currents (I1, I2, I3), demand of total current and demand of neutral current (In) are displayed respectively.

**If "cosØ LED" and "H LED" are turned on:**

Maximum values of phase1 cosØ, phase2 cosØ, phase3 cosØ and system cosØ are displayed respectively.



**If "cosØ LED" and "L LED" are turned on:**

Minimum values of phase1 cosØ, phase2 cosØ, phase3 cosØ and system cosØ are displayed respectively.

**If "P LED" and "H LED" are turned on:**

Maximum values of active powers (P1, P2, P3) and their total are displayed respectively.

**If "P LED" and "L LED" are turned on:**

Minimum values of active powers (P1, P2, P3) and their total are displayed respectively.

**If "P LED" and "D LED" are turned on:**

Demand values of active powers (P1, P2, P3) and demand value of total active power are displayed respectively.

**If "Q LED" and "H LED" are turned on:**

Maximum values of reactive powers (Q1, Q2, Q3) and their total are displayed respectively.

**If "Q LED" and "L LED" are turned on:**

Minimum values of reactive powers (Q1, Q2, Q3) and their total are displayed respectively.

**If "Q LED" and "D LED" are turned on:**

Demand values of reactive powers (Q1, Q2, Q3) and demand value of total reactive power are displayed respectively.

**If "S LED" and "H LED" are turned on:**

Maximum values of apparent powers (S1, S2, S3) and their total are displayed respectively.

**If "S LED" and "L LED" are turned on:**

Minimum values of apparent powers (S1, S2, S3) and their total are displayed respectively.

**If "S" and "D" LEDs are turned on:**

Demand values of apparent powers (S1, S2, S3) and demand value of total apparent power are displayed respectively.



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.

## SETTINGS (SEt MENU)

Operator can accomplish ECRAS settings in this menu.

Press up and down keys to reach SEt menu. Then, press right key to enter into "SEt" menu. Under "SEt" menu, following submenus exist:

- bSc** : Basic settings
- Alr** : Alarm settings
- Out** : Settings for relay outputs
- dEt** : Demand period
- Pin** : Password
- CLr** : Clear page

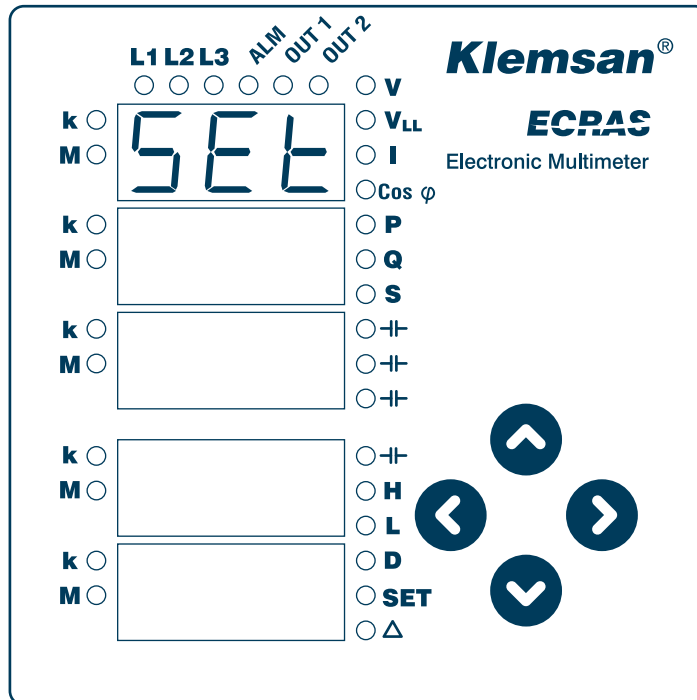


Figure 6

Operator can scroll inside SEt menu by pressing up and down keys.

bSc

## Basic Settings

Inside "SEt" menu, press up and down keys to reach "bSc". Press right key to enter into "bSc". Operator can scroll inside bSc menu again by pressing up and down keys.

"bSc" menu consists of "Ctr", "Utr" and "Con" pages. In order to enter into any submenu of "bSc", as before, operator should press right key.

Ctr

**Current Transformer ratio:** It can be adjusted 1...5000

### Example of Ctr:

Default (factory set) Ctr value is "0001". When Ctr page is selected, operator will notice that the most significant digit (0001) is blinking. In order to adjust Ctr as "0020"; press right key to till second digit blinks (blinking digit's value can be adjusted by pressing up and down keys). When navigating between digits, user should only press right key. Left key is used to move up to an upper menu.

Ctr  
0  
020

Press up and down keys to change the value of the second digit to "2". Press right key to move to the first digit (1st digit will blink). Press down key to decrement 1 to zero.

For saving or rejecting new settings, press left key until "SAU nO" is displayed. If it is preferred to reject the new settings; inside "SAU nO" page, operator should:

SAU  
nO

Press right key and "nO" display will start blinking. Then, press left key to exit from "SAU nO" page. If the operator exits from SAU page before accomplishing this action, when the operator enter into "SEt" menu, SAU page will be displayed directly. Submenus of SEt menu will not be reachable.

If it is preferred to accept (save) the new settings, operator should:

SAU  
YES

Press right key and "nO" display will start blinking. Press down key to change "nO" to "YES". Then, press left key to save new settings. Ecras will restart.

Utr

**Voltage Transformer ratio:** It can be adjusted 1...5000. (refer to Ctr)

Con

**Connection type:** Connection type can be selected as Star (StA) or Delta (dEL) in this menu. If Delta connection is selected, "Δ" LED will turn on.

# ALr

## Alarm Menu

Alarm limits, hysteresis value and delay time can be adjusted in this submenu. Explanation for high limit, low limit and hysteresis is given with an example (refer to alarm example).

**Delay:** When related alarm parameter exceeds the "Low limit" or "High Limit" value; before declaring an alarm, Ecras waits for delay time. After a time period of delay, "ALM LED" will turn on and alarm relay will activate.

### Line-to-neutral voltages:

H U	High limit
L U	Low limit
h U	Hysteresis
t U	Delay

### Line-to-line voltages:

HUL	High limit
LUL	Low limit
hUL	Hysteresis
tUL	Delay

### Currents:

H I	High limit
L I	Low limit
h I	Hysteresis
t I	Delay

### Neutral current:

H In	High limit
h In	Hysteresis
t In	Delay

### cosØ:

Hco.	High limit
Lco.	Low limit
hco.	Hysteresis
tco.	Delay

**Frequency:**

H F	High limit
L F	Low limit
h F	Hysteresis
t F	Delay



When operator enters a low limit value larger than the high limit value, Ecras will immediately declare an alarm.

**OUT****Alarm Relay Settings**

This setting is merely used to energize or not to energize a relay, when an alarm occurs. Relays can be energized for high limit (HI) and/or low limit (LO) values. Ecras has 2 relay outputs.

**Relay - 1:** Following options are available:

**HL1**

HI : When an alarm parameter exceeds high limit value, relay1 will activate.

LO : When an alarm parameter exceeds low limit value, relay1 will activate.

OFF: Relay1 is passive.

**RL2**

**Relay - 2:** Options are same as "rL1".

**When an alarm parameter exceeds the high limit or low limit value;**

- k" and "M" LEDs belonging to related parameter will simultaneously blink.
- After a time period of delay seconds; "ALM LED" will turn on, OUT1/ OUT2 LEDs will turn on and relays(s) will activate (if relay1/relay2 is/are assigned).

**Alarm example:**

It is assumed that delay is adjusted to be zero for this example.

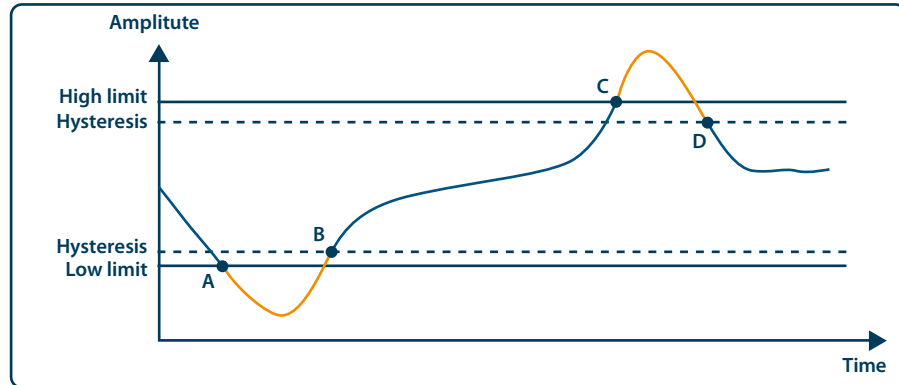


Figure 7

- At point A, alarm (for low limit) occurs
- At point B, alarm disappears
- At point C, alarm (for high limit) occurs
- At point D, alarm disappears

dEt

**Demand Period**

Demand period can be adjusted between 1 - 60 minutes.

P, n

**Password**

Default (factory set) password of Ecras is 0001.

Act

**Activate Password:** This menu is used for activating the user password.

P t

**Password Delay:** Time delay for the password to be active. It can be adjusted between 1-60 minutes.

CH9

**Change:** It can be adjusted between 0-9999.

CLr

**Clear page**

Explanations are as given as below:

OFF

=> exit out of "CLr" menu

HI

=> clear maximum values

LO

=> clear minimum values

dEd

=> clear demand values

SEt

=> return to factory default settings for "SEt" menu

ALr

=> return to factory default settings for "ALr" menu

All

=> all of the changes above are accomplished

## DIMENSIONS (mm)

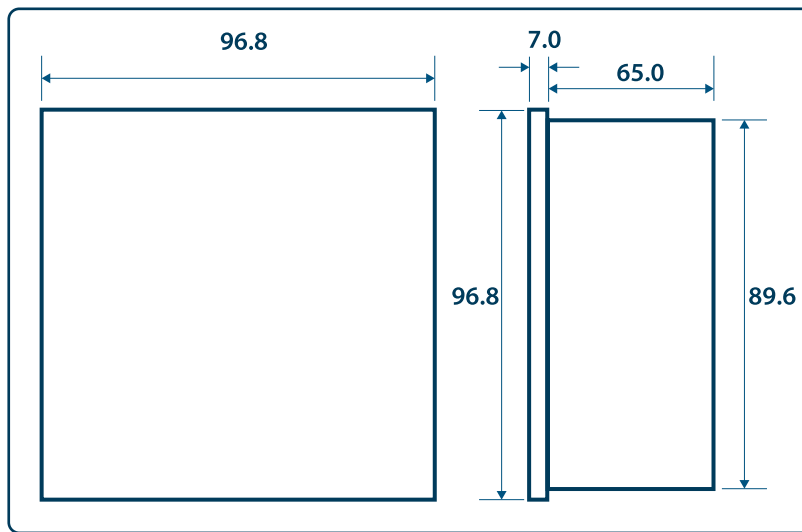


Figure 8

## TECHNICAL SPECIFICATIONS

### Supply

Voltage .....85...300V AC/DC

Frequency .....45...65 Hz

### Measurement Inputs

Voltage ..... 10...300 V RMS (L-N)

Current .....0.05...5.5 A RMS

Frequency .....45...65 Hz

### Measurement Accuracy

±1 digit

### Power Consumption:

≤ 6 VA

### Relay Outputs

2 pcs,

Max. switching current.....: 10A

Max. switching voltage .....: 250V AC

Max. switching power.....: 1250VA

### Connection Type

3 phase 4 wire (star)

3 phase 3 wire (delta)

### Operating Temperature

-20°C...+70°C

### Storage Temperature

-30°C...+80°C

### Relative Humidity

Max. 90%

### Protection Class

IP40



## FACTORY SETTINGS

Parameter	Default value	Unit	Range
<b>Basic settings</b>			
Current transformer ratio(Ctr)	1	-	1-5000
Voltage transformer ratio (Utr)	1.0	-	0.1-5000.0
Connection type(Con)	StA	-	StA/dEL
<b>Alarm settings</b>			
Voltage (L-N) high limit(H U) / low limit(L U)	0.0	V	0.0-1500000.0
Voltage (L-N) hysteresis (h U)	5.0	V	0.0-1500000.0
Voltage (L-L) high limit (HUL) / low limit (LUL)	0.0	V	0.0-2600000.0
Voltage (L-L) hysteresis (hUL)	5.0	V	0.0-2600000.0
Current high limit(H I) / low limit (L I)	0.0	A	0.0-27500.0
Current hysteresis (h L)	0.1	A	0.0-27500.0
Neutral current high limit (HIn)	0.0	A	0.0-27500.0
Neutral current hysteresis (hIn)	0.1	A	0.0-27500.0
CosØ high limit (Hco.) / low limit (Lco.)	0.00	A	0.00-1.00
CosØ hysteresis (hco.)	0.01	A	0.00-1.00
Frequency high limit (H F) / low limit (L F)	50.0	Hz	45.0-65.0
Frequency hysteresis	2.0	Hz	45.0-65.0
Alarm delay ("t U", "tUL", "t I", "tIn", "tco." and "t F")	5	sec	0-60
<b>Settings of alarm relays</b>			
Relay1	Off	-	Off/HI/LO
Relay2	Off	-	Off/HI/LO
<b>Demand setting</b>			
Demand period	15	min	1-60
<b>Password settings</b>			
Activating password (Act)	No	-	NO/YES
Change (CHg)	1	-	1-9999
Password delay (P t)	1	min	1-60
<b>Clear page</b>			
Clear	Off	-	Refer to "CLr" page.





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