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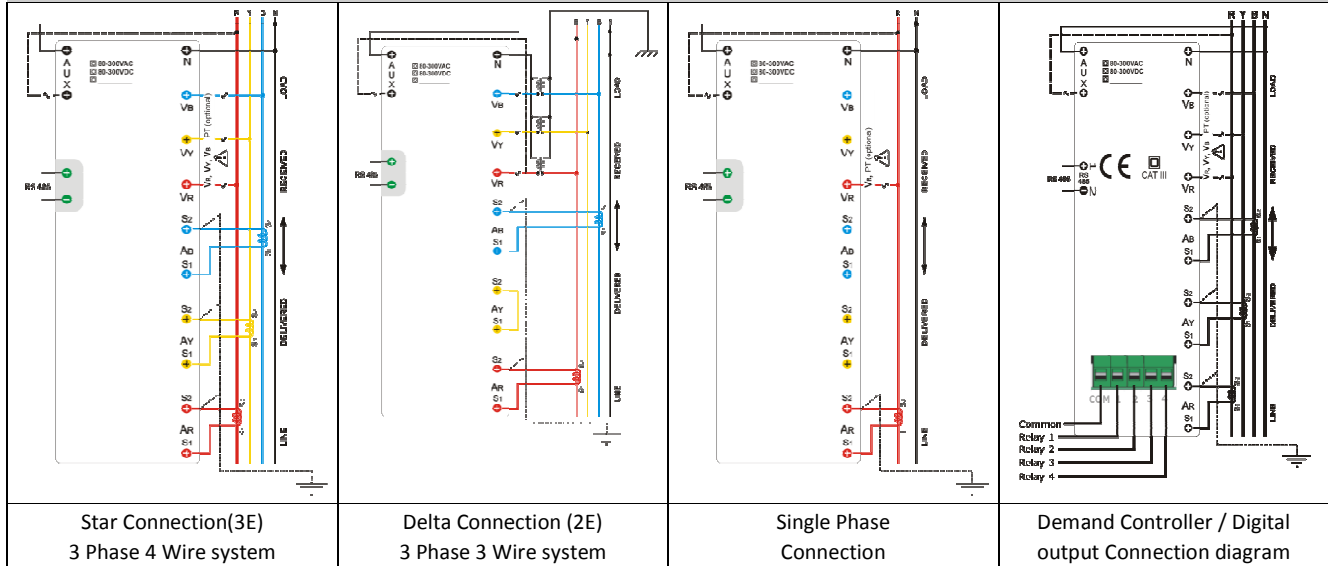# PROGRAMMING GUIDE – POWER   NAVIGATOR / eNAVIGATOR   PN 77xx / EN84xx Series

1. FEATURES

- STAR (Wye)/ DELTA/1 Phase Programmable
- Universal Auxiliary supply (80 - 300 VAC / DC) supply
- PT ratio / CT ratio programmable including CT secondary
- "OLD" Register for storing Cleared Energy and Load hours
- 6 digit 4 Rows LED/Graphical LCD(7 digit 4 Row) display with Auto scaling & Auto Scrolling
- Universal Voltage Input (50 - 550 VAC) and Current Secondary (0.05A to 6A)

- Two Energy readings in single page
- User configurable (Editable) password
- Clearance & Creepage distance meets IEC 61010 standard
- Compact size and Weight
- Dynamic communication (user selectable parameter sequence of register map)
- Multi-port communication (optional 2 maximum)

2. UNIQUE FEATURES

- True RMS measurements
- Simultaneous sampling of volts & amps
- Best parameters grouping/bright displays
- High/ low V, A, Hz, W, VA, VAr, PF value storage
- Data memory optional. (982080 records for 1 parameter)
- Upgradable to higher versions

- Auto-scaling of kilo, mega & giga decimal point
- 2 optional Analog Output(0-20mA) or (4-20mA)
- THD Measurement
- Individual Harmonics display up to 31st level
- 2 Programmable Parameters (only for PN series)
- Phase wise Voltage and Current waveforms (only for PN series)

3. WIRING DIAGRAM

| Star Connection(3E) 3 Phase 4 Wire system | Delta Connection (2E) 3 Phase 3 Wire system | Single Phase Connection | Demand Controller / Digital output Connection diagram |

4. KEY FUNCTIONS

Key	In SET (Programming) mode	In RUN (Measurement) mode
RIGHT/Energy	To select the value and to accept the value	To scroll energy pages to look at different parameters.
UP/Power	To edit the value/system type up-ward in edit mode and scroll through the parameters.	To scroll power pages to look at different parameters.
DOWN/Basic	To edit the value/system type down-ward in edit mode and scroll through the parameters.	To scroll basic pages to look at different parameters
OPTION	Jumps to save Page	To see the desired option (if any)

5. LED INDICATIONS: LED Indication for eNavigator and Display/LED Indication for Power Navigator

LED status / Display status		Meaning	LED status	Meaning
K – ON	K	Kilo	I/O 1 – ON	Relay status Safe Limit (low limit)/default / step1
M – ON	M	Mega	I/O 2 – ON	Relay status Forecast demand >Hi.L1 / step2
K & M – ON	G	Giga	I/O 3 – ON	Relay status Rising demand >Hi.L2 / step3
K & M – OFF	without K, M & G	Direct reading	I/O 4 – ON	Relay status Rising demand >Hi.L1 / step4
Minus (-) ON	L	Lag/Delivered	⊓⊔/T1 – Blink	Pulse LED
Minus (-) OFF	C	Lead	📶 – ON	Communication ON

6. DISPLAY OF PARAMETERS : Display of Parameters for eNavigator/Power Navigator

DISPLAY	Meaning	DISPLAY	Meaning	DISPLAY	Meaning
L L/LL	Voltage line to line	A.thd	Amps THD	Intr	Number of Interrupts
L n/Ln	Voltage line to Neutral	A.thd03	Amps THD Phase-wise up to 31st level	U.thd03	Voltage THD Phase-wise up to 31st level
r Y/ry	Voltage RY Phase	K.FACt.U	K-Factor V	On.Hr	On Hour
Yb/yb	Voltage YB Phase	K.FACt.A	K-Factor A	O	Old
br/br	Voltage BR Phase	Ut	Watts Total	CLr	Clear
A/A	Current Average	UA	Total VA	rd	Rising Demand
F/F	Frequency	Ur	Total VAR	Fd	Forecast Demand
An/An	Neutral Current	PF	Power Factor	n̄d	Maximum Demand
r P n̄/RPM	Revolution Per Minute	Uh	Active Energy Received	AL	Additional Load
U.Ph.ANG	Voltage Phase Angle	UAh	Apparent Energy	Et	Elapse Time
A.Ph.ANG	Current Phase Angle	UAr.hL	Reactive Inductance Energy	Hi	High Level of Parameter
Un.bAL.U	Unbalance Voltage	UAr.hC	Reactive Capacitance Energy	Lo	Low Level of Parameter
Un.bAL.A	Unbalance Current	AUG	Average	b	Baud Rate
U.thd	Voltage THD	Ld.Hr	Load Hour	d	delivered
Ah	Amps average Received	L	Lagging Power factor	C	Leading Power factor
M1-M6	No. of demand slots	S1-S6	No. of energy slots	cLoc	Real time clock

Conversions of alphabets used n̄ (M) Ụ (W) ⱶ (K)

7. ENTERING CONFIGURATION (SETUP) MODE

To configure the setup parameters in EN/PN series of meters through front panel keys, the following steps can be followed. For display readings refer block for EN, Square bracket for PN series.

Step	Actions	Display Reads	Range/Options/Comments
1	Press RIGHT & UP keys together to enter SETUP	SETUP [SETUP]	
2	Press DOWN key	Row 1 PASSWd [PASWD] Row 2 0000 with first digit "0" blinking.	Password page is displayed
3	Press UP key to increment the first digit to "1".	PASSWORD = 1000 (default/factory set).	If any other password is already set, press up and down key to set the correct password
4	Press RIGHT key four times to accept the password.	Row 1: ELEMnt [ELEMNT] Row 2: StAr [STAR] Displays last programmed system type	Element: Defines the power system configuration. Options: STAR / DELTA/ 1.Phase
5	Press RIGHT key to select required system type	Row 1: Element Row 2: Blinks StAr/dELtA/1 Phase	
6	Press UP/DOWN key to select required system type	Row 1: Element Row 2: StAr/dELtA/1 Phase	(selected system mode blinks)

7	Press RIGHT key to accept	Row 1: Element Row 2: selected system type stabilizes		
8	Press DOWN key	Row 1: [PtPri] [Pt.Pri.] Row 2 : 415.0	PT Primary: (415.0 -default/factory set)	
9	Press RIGHT key to set the PT primary value	Row 1 : PT Primary Row 2 : 415.0 First digit blinking	Value can be edited using UP/DOWN key.	
10	Press RIGHT key to accept the edited value for first digit.	Row 1 : PT Primary Row 2: Second digit blinking, can be edited using UP/DOWN key. Press RIGHT key to accept the edited value. Continue the same method till fourth digit.	Program Range for PT Primary : 100V to 999kV	
11	Press RIGHT key	Row 1: PT Primary Row 2: Decimal point blinking. Can be set at appropriate location using UP/DOWN key. Ascertain the correct scale (Kilo/Mega/Giga) is selected. Press RIGHT key to accept the edited value.	Eg: To set 11.00kV Set first four digits (1100) as explained above press UP/DOWN key to place decimal point at appropriate location. Letter K/M will indicate the Kilo/Mega. In PN series G indicate for Giga. In EN/TM M & K LED will glow for Giga	
12	Press DOWN key	Row 1: [PtSEC] [Pt.Sec.] Row 2 : 415.0 (Follow the procedure as described in steps 9 to 11)	PT Secondary Range: 50V to 550V	
13	Press DOWN key	Row 1: [CtPri] [Ct.Pri.] Row 2 : 5.000 (Repeat steps 9 to 11 to change the settings)	CT Primary Range: 0.5A to 99kA	
14	Press DOWN key	Row 1: [CtSEC] [Ct.Sec.] Row 2 : 5.000 (Repeat steps 9 to 11)	CT Secondary Range: 0.5A to 6A	
15	Press DOWN key	Row 1: [VASEL] [VA.SEL.] Row 2: [UECHAr] [UEC.HAr]	Method of VA Selection: Arithmetic / Vector harmonics / Vector	
16	Press DOWN key	Row 1: PARAM1 Row 2: WAttS	Options: WATTS/FREQ/A/VLL/VA/PF Option can be edited using RIGHT & UP/DOWN keys.	**Only in PN Series**
17	Press DOWN key	Row 1: PARAM2 Row 2: PF		
18.1.a	Press DOWN key	Row 1 : [YEAr] [YEAR] Row 2 : xxxx	Range: 2000 to 2040	**EN/PN with Data logger**
18.1.b	Press DOWN key	Row 1 : [dAtE] [DATE] Row 2: xx.xx. (Mm.dd)	Jan 01 (01.01) to December 31 (12.31)	
18.1.c	Press DOWN key	Row 1: [tinE] [TIME] Row 2: xx.xx. (HH.mm)	Min.Sec : 00:00 to 23:59 (24 hour format)	
18.2.a	Press DOWN key	Row 1: [dntYPE] [dM.TYPE] Row 2: [SLidin] [SLidin]	Demand type: Sliding	**EN8400/PN 7700 1 Relay DMC**
18.2.b	Press DOWN key	Row 1: [dnPAr] [dM.PAR] Row 2: [WAttS] [WAtts]	Demand parameter Options: Watts/ VA/ Amps Average/ VAr	
18.2.c	Press DOWN key	Row 1: [dnPrd] [dM.Prd.] Row 2: 15.00	Demand Period Range : 5 to 30 min	
18.2.d	Press DOWN key	Row 1: [Hi.Lt1] [Hi.Lt1] Row 2: xxxx	High Limit 1 Range: 1% to 100% of Full scale.	
18.2.e	Press DOWN key	Row 1: [LoLt] [Lo.Lt] Row 2: xxxx	Low Limit Range: 1% to 99% of Hi Limit1	
18.3.a	Press DOWN key	Row 1: [dntYPE] [dM.TYPE] Row 2: [SLidin] [SLidin]	Demand type: Sliding	**EN8400 LM /PN 7700 LM 2**
18.3.b	Press DOWN key	Row 1: [dnPAr] [dM.PAR] Row 2: [WAttS] [WAtts]	Demand parameter Options: Watts/ VA/ Amps Average/ VAr	
18.3.c	Press DOWN key	Row 1: [dnPrd] [dM.Prd.] Row 2: 15.00	Demand Period Range : 5 to 30 min	

18.3.d	Press DOWN key	Row 1: [Hi.Lt1] Row 2: xxxx	High Limit 1 Range : 1% to 100% of Full scale	
18.3.e	Press DOWN key	Row 1: [Hi.Lt2] Row 2: xxxx	High Limit 2 Range: 50% to 99% of Hi Limit2.	
18.3.f	Press DOWN key	Row 1: [Lo.Lt] Row 2: xxxx	Low Limit Range: 50% to 99% of Hi Limit1	
18.4.a	Press DOWN key	Row 1: [YEAR] Row 2: xxxx	Range: 2000 to 2040	**EN8410/PN7710 Demand Monitor**
18.4.b	Press DOWN key	Row 1: [DATE] Row 2: xx.xx. (Mm.dd)	Month. date Jan 01 (01.01) to December 31 (12.31)	
18.4.c	Press DOWN key	Row 1: [TIME] Row 2: xx.xx. (HH.mm)	Min.Sec : 00:00 to 23:59 (24 hour format)	
18.4.d	Press DOWN key	Row 1: [dM.TYPE] Row 2: [SLidin]	Demand type Options: Sliding / block (fixed	
18.4.e	Press DOWN key	Row 1: [dM.PAR] Row 2: [WAtts]	Demand parameter Options: Watts / VA/ Amps Average / VAr	
18.5.a	Press DOWN key	Row 1: [YEAR] Row 2: xxxx	Range: 2000 to 2040	**EN8410 /PN 7710 4 Relay DMC**
18.5.b	Press DOWN key	Row 1: [DATE] Row 2: xx.xx. (Mm.dd)	Month. date Jan 01 (01.01) to December 31 (12.31)	
18.5.c	Press DOWN key	Row 1: [TIME] Row 2: xx.xx. (HH.mm)	Min.Sec : 00:00 to 23:59 (24 hour format)	
18.5.d	Press DOWN key	Row 1: [dM.TYPE] Row 2: [SLidin]	Demand type Options: Sliding / block (fixed	
18.5.e	Press DOWN key	Row 1: [dM.PAR] Row 2: [WAtts]	Demand parameter Options: Watts / VA/ Amps Average / VAr	
18.5.f	Press DOWN key	Row 1: [dM.Prd.] Row 2: 15.00	Demand Period Range : 5 to 30 min	
18.5.g	Press DOWN key	Row 1: [dM.Cont] Row 2: [Forc.dM]	Demand controller Options: Forecast demand / step demand	
18.5.h	Press DOWN key	Row 1: [FC.Int] Row 2 : 7.000	Forecast Interval Range : 20% to 50% of demand period	
18.5.i	Press DOWN key	Row 1: [Hi.Lt1] Row 2: xxxx	High Limit 1 Range: 1% to 100% of Full scale.	
18.5.j	Press DOWN key	Row 1: [Hi.Lt2] Row 2: xxxx	High Limit 2 Range : 1% to 99% of Hi Limit1	
18.5.k	Press DOWN key	Row 1: [Lo.Lt] Row 2: xxxx	Low Limit Range: 50% to 99% of Hi Limit2	
At Sl.No. **18.5.g** if demand control type is programmed as **Step demand**				
18.5.l	Press DOWN key	Row 1: StEP1 [STEP1] Row 2: xxxx.	Step 1 Range : 1% to 100% of Full Scale	
18.5.m	Press DOWN key	Row 1: StEP2 [STEP2] Row 2: xxxx.	Step 2 Range : 1% to 100% of Full Scale	
18.5.n	Press DOWN key	Row 1: StEP3 [STEP3] Row 2: xxxx.	Step 3 Range : 1% to 100% of Full Scale	
18.5.o	Press DOWN key	Row 1: StEP4 [STEP4] Row 2: xxxx.	Step 4 Range : 1% to 100% of Full Scale	
18.6.a	Press DOWN key	Row 1: [d1.PAR.] Row 2: diSAbL	Digital Output 1 parameter Options: A.thd,V.thd,under(An.In2,An.In1(Analog input)),over(An.In2,An.In1(analog input))Single phasing/reverse Amps/Over (VLL/A/Freq/Watts/VA/Wh) under (VLL/A/Freq/ Watts/VA/Wh)	**Digital Output option**

18.6.b	Press DOWN key	Row 1: [d1.th] Row 2: 1000	Digital Output 1 threshold value Range: 0.001 to 9999 Mega (Displays only when d1.pAr is selected)	
18.6.c	Press DOWN key	Row 1: [d2.PAR] Row 2: diSAbL	Digital Output 2 parameter Options: A.thd,V.thd,under(An.In2,An.In1(Analog input)),over(An.In2,An.In1(analog input))Single phasing/reverse Amps/Over (VLL/A/Freq/Watts/VA/Wh) under (VLL/A/Freq/ Watts/VA/Wh)	
18.6.d	Press DOWN key	Row 1: [d2.th] Row 2: 1000	Digital Output 2 threshold value. Range: 0.001 to 9999 Mega (Displays only when d2.pAr is selected)	
18.6.e	Press DOWN key	Row 1: [d3.PAR] Row 2: diSAbL	Digital Output 3 parameter Options: A.thd,V.thd,under(An.In2,An.In1(Analog input)),over(An.In2,An.In1(analog input))Single phasing/reverse Amps/Over (VLL/A/Freq/Watts/VA/Wh) under (VLL/A/Freq/ Watts/VA/Wh)	
18.6.f	Press DOWN key	Row 1: [d3.th] Row 2: 1000	Digital Output 3 threshold value. Range: 0.001 to 9999 Mega (Displays only when d3.pAr is selected)	
18.6.g	Press DOWN key	Row 1: [d4.PAR] Row 2: diSAbL	Digital Output 4 parameter Options: A.thd,V.thd,under(An.In2,An.In1(Analog input)),over(An.In2,An.In1(analog input))Single phasing/reverse Amps/Over (VLL/A/Freq/Watts/VA/Wh) under (VLL/A/Freq/ Watts/VA/Wh)	
18.6.h	Press DOWN key	Row 1: [d4.th] Row 2: 1000	Digital Output 4 threshold value Range: 0.001 to 9999 Mega (Displays only when d4.pAr is selected)	
18.6.i	Press DOWN key	Row 1: [dIG.DEL] Row 2: 5.000 (Default: 5.000)	Digital delay Range: 1 to 180 Sec	
18.7.a	Press DOWN key	Row 1: [An1PAr] Row 2: diSAbL	Analog Input 1 parameter. Options: 0.t.1.V / 0.t.20mA/4.t.20mA	**Analog Input**
18.7.b	Press DOWN key	Row 1: [An1FS] Row 2: 1200	Analog Input 1 Full Scale. Range: 0.001 to 9999 Mega (Displays only when A1.PAr is selected)	
18.7.c	Press DOWN key	Row 1: [An2.PAr] Row 2: diSAbL	Analog Input 2 parameter 0.t.1.V/0.t.20mA/4.t.20mA	
18.7.d	Press DOWN key	Row 1: [An2FS] Row 2: 1200	Analog Input 2 Full Scale. Range: 0.001 to 9999 Mega (Displays only when A2.PAr is selected)	
19	Press DOWN key	Row 1: [BAUD] Row 2: xxxx (9600 default/factory set)	Baud Rate: Communication speed defines the baud rate. Option :1200, 2400, 4800, 9600, 19.20k	
20	Press DOWN key	Row 1: [PARITY] Row 2: [Even]	Internal communication error check Option : EVEn /odd/no(no parity)	
21	Press DOWN key	Row 1: [DEV.Id] Row 2: 1.000	Defines the (ID) communications identification number. Option: 1-247	
22	Press DOWN key	Row 1: [POLES] Row 2: 4.000	No. of Poles. Option : 1 to 28 (For rpm)	
23	Press DOWN key	Row 1: [REV.LOC] Row 2: [no.]	Reverse Lock. Option: NO/YES. If YES blocks energy accumulation in case the CT polarity is reverse.	
24	Press DOWN key	Row 1: [PASWD] Row 2: ----	Range: 1000 -9999. If password is forgotten the meter has to be reset and recalibrated at Elecon factory only.	
25	Press DOWN key	Row 1: [ENERGY] Row 2: [RESOLU]	Energy value format i.e., the energy accumulated in the meter to be displayed in resolution or counter format. Option: resolution/counter	

26	Press DOWN key	Row 1: StArt.A [START.A] Row 2: 0.400	Starting current value to be displayed in the meter Range: (0.2% to 10% of full scale)	
27	Press DOWN key	Row 1: di.SP.U.r (DISP.U.R) Row 2: 1.000	Update time for Displaying parameter. Range: 1 to 5 seconds.	
28	Press DOWN key	Row 1: Auto.t [Auto.T] Row 2: 5.000	Display increment during auto scroll. Range: 1 to 10 seconds.	
29	Press DOWN key	Row 1: POP.ON.t [POP.ON.T] Row 2: 250.0	Pulse width defined for pulse output occurrence. Range: 50 to 500m Sec.	
30	Press DOWN key	Row 1: AO.1P.Ar [AO.1.PAR] Row 2: disable [DISABL]	Analog Output 1 parameter Option :VLL/ A/ Freq/Watts/PF/VA	**Analog Output**
31	Press DOWN key	Row 1: AO.1o.FS [AO.1.OFS] Row 2: 0.t.20mA	Analog Output 1 OFFSET Option :0.t.20mA or 4.t.20mA	
32	Press DOWN key	Row 1: AO.2P.Ar [AO.2.PAR] Row 2: disable [DISABL]	Analog Output 2 parameters Option :VLL/ A/ Freq /Watts/PF/VA	
33	Press DOWN key	Row 1: AO.2o.FS [AO.2.OFS] Row 2: 0.t.20mA	Analog Output 2 OFFSET Option : 0.t.20mA or 4.t.20mA	
34	Press DOWN key (Only for PN series)	Row 1: [PWR.SAV] Row 2: [DISABL]	Defines Power Save of the LCD back light Option: ENABLE/DISABLE	PN series only
35	Press DOWN key	Row 1: bYt.Ord [bYt.Ord] Row 2: FLOAt [FLOAt]	Byte order Option: FLOAt/biG.End/LitLE.E	
36	Press DOWN key	Row 1: SAVE [SAVE] Row 2: Y blinking.	If "**n**"(no) is selected then Meter enters into Measurement mode without memorizing any edited Values in the setup	
36		Row 1 : xxxxLL Row 2 : xxxxLn Row 3 : xxxx A Row 4 : xxxx F		

Once the required parameter is programmed press the DOWN key continuously till it reaches SAVE page OR press the OPTIONS key to reach SAVE page directly.

7.1 The List of parameters can be configured and the range is given below

Sl.No.	Parameter	Default setup	Range	Remarks
1	Connection mode	**STAR**	STAR/ DELTA/ 1.Phase	
2	PT Primary	**415.0**	100V- 999kV	
3	PT Secondary	**415.0**	50V - 550V	
4	CT Primary	**5.000**	0.5A - 99kA	
5	CT Secondary	**5.000**	0.5A - 6A	
6	VA selection	**VEC.HAr**	Arith (Arithmetic) / Uector/ Uec.HAr (vector harmonics)	
7	Programmable Parameter – 1	**Watts**	WATTS/FREQ/A/VLL/VA/PF	Only in PN Series
8	Programmable Parameter – 2	**PF**	PF /FREQ/A/VLL/VA/ WATTS	
9	Year	**2011**	2000 to 2040	Meter with Data logger/ Demand Monitor/ Demand Controller
10	Date	**01.01**	(MM:DD format) Jan 01 to Dec 31	
11	Time	**00.00**	(HH:MM format) 00:00 to 23:99	
12	Demand Type	**Sliding**	SlidIn(sliding) /bLOC (block/fixed)	
13	Demand Parameter	**Watts**	uAttS (Watts)/VA/A.AVg (Amps Avg)/ VAr (Reactive pwr)	
14	Demand Period	**15.00**	5 to 30 Minutes	
15	Demand Control type	**Forc.dn**	Forc.dn (Forecast) or StEP. dn (step)	
15.1.a	Forecast interval	**7.000**	20% to 50% of demand period	
15.1.b	Hi Limit 1	**1800**	1% of Full scale to Full scale	
15.1.c	Hi Limit2	**1700**	1% to 99% of Hi limit 1	
15.1.d	Low Limit	**1300**	50% to 95% of Hi limit 2	
15.2.a	Step1 level	**35.94**	1% of Full scale to Full scale	
15.2.b	Step 2 level	**1800**	1% of Full scale to Full scale	
15.2.c	Step 3 level	**1700**	1% of Full scale to Full scale	

15.2.d	Step 4 level	**1300**	1% of Full scale to Full scale	
16.1	Digital Output 1 Parameter	**Disable**	A.thd,V.thd(Voltage & current Harmonics Distortion),under(An.In2,An.In1(Analog input)),over(An.In2,An.In1(analog input))Single phasing/reverse Amps/Over (VLL/A/Freq/Watts/VA/Wh) under (VLL/ A/Freq/ Watts/VA/Wh) **	Meter with Digital output option
16.2	Digital 1 Threshold Limit	**1000**	0.001 to 9999×10^6	
16.3	Digital Output 2 Parameter	**Disable**	**	
16.4	Digital 2 Threshold Limit	**1000**	0.001 to 9999×10^6	
16.5	Digital Output 3 Parameter	**Disable**	**	
16.6	Digital 3 Threshold Limit	**1000**	0.001 to 9999×10^6	
16.7	Digital Output 4 Parameter	**Disable**	**	
16.8	Digital 4 Threshold Limit	**1000**	0.001 to 9999×10^6	
16.9	Digital delay	**5.000**	1to 180 Sec	
17.1	Analog input 1	**Disable**	4 to 20 mA/0 to 20 mA/0 to 1 V	Meter with Analog Input option
17.2	Analog Input 1 full scale	**1200**	0.001 to 9999×10^6	
17.3	Analog input 2	**Disable**	4 to 20 mA/0 to 20 mA/0 to 1 V	
17.4	Analog Input 2 full scale	**1200**	0.001 to 9999×10^6	
18	Baud rate	**9600**	1200 /2400/ 4800 /9600/19200	
19	Parity	**Even**	Even/ Odd/ no	
20	Device Id	**1.000**	1.000 to 247.0	
21	No of Poles	**4.000**	1.000 to 28.00	
22	Reverse lock	**No**	Yes/no	
23	Password	**1000**	1000 to 9999	
24	Energy	**rESoLu**	Resolution / Counter	
25	Starting Current	**0.400**	0.2% to 10 % of full scale	
26	Display update time	**1.000**	1 to 5 seconds	
27	Display auto-scroll time	**5.000**	1 to 10 seconds	
28	Pulse output on time	**250.0**	50 to 500 milliseconds	
29	Analog Output 1 parameter	**diSAbL**	VLL/ A/Freq/Watts/PF/VA	Meter with Analog Output option
30	Analog Output 1 Offset	**0.t.20mA**	0.t.20mA/4.t.20mA	
31	Analog Output 2 parameter	**diSAbL**	VLL/ A/Freq/Watts/PF/VA	
32	Analog Output 2 offset	**0.t.20mA**	0.t.20mA/4.t.20mA	
33	Power Save Mode	**Disable**	Disable / Enable	Only in PN Series
34	Byte order	**FLOAt**	FLOAt/ biG.End/LitLE.E	

Note:

Options	Applicable steps
Data logger	9 to 11
Demand Monitor	9 to 15
Demand controller	9 to 15.2.d
Digital output	16.1 to 16.9
Analog input	17.1 to 17.4
Analog output	29 to 32

8. CLEARING PARAMETERS:

To Clear parameters from the front panel, Press UP and DOWN Keys together, and 'CLEAR' is shown on the display. Enter the Password (Default password is 1000. Set up and clear has the same password) and it will display "CLr.Int". Press DOWN Key for selecting **CLr.Int** (Clear Integrator)/**CLr.Hi.L** (Clear max. /min values) /**CLr.Md** (Clear Max. demand). Once the parameter to be cleared is selected, Press RIGHT key, display will prompt to '**n**' (no). Press UP/DOWN key for changing to 'Y'(Yes) or to 'n'(no) and Press the RIGHT key to do the operation.

Note: Once the data is cleared (except energy) the value will not be retained.

PG/ENP/OP/ R04 /0114

9. ENABLING AND DISABLING OF AUTO SCROLLING:

Enabling auto scrolling: Press UP/DOWN key continuously for 5 seconds or until display shows **EnAbLE Auto.Sc** for scrolling.

Disabling auto scrolling: Press any key (RIGHT/ UP/ DOWN/ OPTION), display show **dlSAbL Auto.Sc** and returns to normal mode.

10. Multiplication Factor:

Energy Display programmable for counter based or Resolution based

Multiplication factor for counter based energy mode							
• Full Scale kW $\sqrt{3}$ V_{Pri} LL x A_{Pri} / 1000	0.4 to 4.0	4.01 to 40	40.1 to 400	400.1 to 4000	4 Mega to 40 M	40 Mega to 400 M	400 Mega to 4000 M
• Multiplication Factor	0.01	0.1	1.0	10	100	1000	10000
• Unit of Display	KWh				MWh		GWh

Energy Reset: 999999kVAh x Multiplication Factor

10. DEMAND

Demand control is a method of controlling the consumption not to overload the grid. Demand is calculated in different ways, different parameters, depends on the region/country. There are two types of demand measurement namely Sliding window & Fixed (Block) window. Forecast demand control & Step wise demand Control.
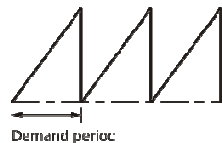
DEMAND CONTROLLER:

Demand controller is designed to control for loads to achieve the desired savings. The instrument measure the demand based on sliding or fixed (block) window. The demand calculations can be chosen based on Watts, VA or Amps (Average) or VAr parameters for the given time period (Demand Period).

Sliding Window: This window slides every 1 second (update time), so it automatically synchronizes with EB meter. But it will not return to zero at the end of the demand period. For the fluctuating load this is the better method of measurement. The graphical representation of sliding window is shown below.
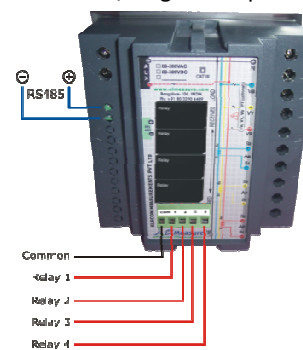

Demand period

Connection Diagram: Connection Diagram for Demand controller / Digital Output and RS 485

Note : Connections to the terminals located at the rear side of the unit is to be made by using preferably 12 to 14 SWG (2.6mm2 to 2.0mm2) industrial grade wire. Relay rating No contact SPST. 250VAC / 30VDC @ 2 Amps resistive.
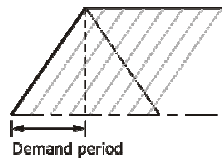
Block Window: This window slides every demand period. It has to be synchronized to EB meter manually. It will return to zero at the end of demand period. This can be used for the fairly stable load. The graphical representation of block window.

Demand period

Forecast Demand Control: Forecast demand control is more suitable for sliding window technique. This control predicts the rising demand before the set time (Forecast Interval) and gives the alarm/annunciation for pro active action. The user can then shed some non-critical loads. (Additional load information is available in Demand page). 4 relays are used to control the demand
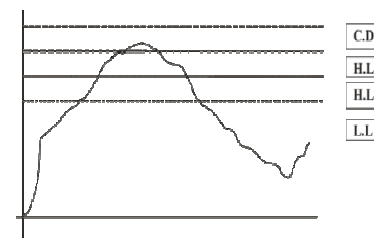
1. Relay 2 will be activated if Forecast Demand > High Limit 1.
2. Relay 3 will be activated if Rising Demand > High Limit 2
3. Relay 4 will be activated if Rising Demand > High Limit 1 as a final trip.
4. Relay 1 can reconnect, once the rising demand comes down to the safe limit (Low Limit).

Demand Pattern:

C.D - Contract Demand (sanctioned demand)
H.L1 - High Limit 1
H.L2 - High Limit 2
L.L - Low limit

Step demand control: Step demand control is suitable for sliding and fixed window.

4 loads or 4 set of loads can be connected to the relays for tripping. Each step tripping level can be programmed independently (1% to 100% of Full scale). In the step demand control the control is based on the rising demand only.

1. Relay 1 will be activated if Rising demand > Step1 Level.
2. Relay 2 will be activated if Rising demand > Step2 Level.
3. Relay 3 will be activated if Rising demand > Step3 Level.
4. Relay 4 will be activated if Rising demand > Step4 Level.

How to synchronize with EB meter:

1. Enter into setup mode and set the right password.
2. Press the down key until it reaches Year page at the setup.
3. Edit the year to lower year (i.e. if present year is 2012 edit it to 2011).
4. Press the OPTIONS key and save the setup.
5. Enter once again to setup and set the right password.
6. Press the down key until it reaches 'Year' page at the setup.
7. Edit the current year (Eg: edit to 2012 for the above example)
8. Press the OPTIONS Key, meter displays Save Y
9. Wait till the EB meter reads zero. Press the right key the moment EB meter displays zero.
10. Both should have the same power ON and OFF events. If there is any difference, synchronization should be re done manually in the same method mentioned above.

11. COMMUNICATION REGISTER MAP:

This Communication map is for EN/PN series. All the parameters declared in the communication map are either float or unsigned long and follows the standard Modbus RTU protocol.

Sl.No	Parameter	Data type	Address	Sl.No	Parameter	Data type	Address
1	Watts Total	float	40101	48	Current B Harmonics	float	40195
2	Watts R phase	float	40103	49	Rising Demand	float	40197
3	Watts Y phase	float	40105	50	Forecast Demand	float	40199
4	Watts B phase	float	40107	51	Maximum Demand	float	40201
5	VAR Total	float	40109	52	RPM	float	40215
6	VAR R phase	float	40111	53	Load Hours Received	Unsigned long	40217
7	VAR Y phase	float	40113	54	Load Hours Delivered	Unsigned long	40219
8	VAR B phase	float	40115	55	No of interruptions	Unsigned long	40221
9	PF Ave. (Inst.)	float	40117	56	MD Occurrence time	Unsigned long	40223
10	PF R phase	float	40119	57	Voltage R phase angle	float	40233
11	PF Y phase	float	40121	58	Voltage Y phase angle	float	40235
12	PF B phase	float	40123	59	Voltage B phase angle	float	40237
13	VA total	float	40125	60	Current R phase angle	float	40239
14	VA R phase	float	40127	61	Current Y phase angle	float	40241
15	VA Y phase	float	40129	62	Current B phase angle	float	40243
16	VA B phase	float	40131	63	TOD Slot-1	float	40245
17	VLL average	float	40133	64	TOD Slot-2	float	40247
18	Vry phase	float	40135	65	TOD Slot-3	float	40249
19	Vyb phase	float	40137	66	TOD Slot-4	float	40251
20	Vbr phase	float	40139	67	TOD Slot-5	float	40253
21	VLN average	float	40141	68	TOD Slot-6	float	40255
22	V R phase	float	40143	69	Voltage Unbal R Phase	float	40259
23	V Y phase	float	40145	70	Voltage Unbal Y Phase	float	40261
24	V B phase	float	40147	71	Voltage Unbal B Phase	float	40263
25	Current Total	float	40149	72	Current Unbal R Phase	float	40265
26	Current R phase	float	40151	73	Current Unbal Y Phase	float	40267
27	Current Y phase	float	40153	74	Current Unbal B Phase	float	40269
28	Current B phase	float	40155	75	Additional Load	float	40271
29	Frequency	float	40157	76	Analog input 1	float	40273
30	Wh Received	float	40159	77	Analog input 2	float	40275
31	VAh Received	float	40161	78	VLL Max	float	40285
32	VARh Ind. Received	float	40163	79	VLL Min	float	40287
33	VARh Cap. Received	float	40165	80	VLN max	float	40289
34	Wh Delivered	float	40167	81	VLN min	float	40291

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#	Description	Type	Register	#	Description	Type	Register
35	VAh Delivered	float	40169	82	Amps max	float	40293
36	VARh Ind. Delivered	float	40171	83	Amps Min	float	40295
37	VARh Cap. Delivered	float	40173	84	Frequency Max	float	40297
38	PF average Received	float	40175	85	Frequency Min	float	40299
39	Amps average Received	float	40177	86	Watts Max	float	40301
40	PF average Delivered	float	40179	87	Watts Min	float	40303
41	Amps average Delivered	float	40181	88	VAR max (absolute max)	float	40305
42	Neutral Current	float	40183	89	VAR min (absolute min)	float	40307
43	Voltage R Harmonics	float	40185	90	VA max	float	40309
44	Voltage Y Harmonics	float	40187	91	VA min	float	40311
45	Voltage B Harmonics	float	40189	92	PF max (absolute max)	float	40313
46	Current R Harmonics	float	40191	93	PF min (absolute min)	float	40315
47	Current Y Harmonics	float	40193	94	Maximum demand Slot1 value	float	40325
95	Maximum demand Slot2 value	float	40327	148	17th harmonics Voltage R phase	float	40587
96	Maximum demand Slot3 value	float	40329	149	17th harmonics Voltage Y phase	float	40589
97	Maximum demand Slot4 value	float	40331	150	17th harmonics Voltage B phase	float	40591
98	Maximum demand Slot5 value	float	40333	151	17th harmonics Current R phase	float	40593
99	Maximum demand Slot 6 value	float	40335	152	17th harmonics Current Y phase	float	40595
100	K factor Voltage R phase	float	40491	153	17th harmonics Current B phase	float	40597
101	K factor Voltage Y phase	float	40493	154	19th harmonics Voltage R phase	float	40599
102	K factor Voltage B phase	float	40495	155	19th harmonics Voltage Y phase	float	40601
103	K factor Current R phase	float	40497	156	19th harmonics Voltage B phase	float	40603
104	K factor Current Y phase	float	40499	157	19th harmonics Current R phase	float	40605
105	K factor Current B phase	float	40501	158	19th harmonics Current Y phase	float	40607
106	3rd harmonics Voltage R phase	float	40503	159	19th harmonics Current B phase	float	40609
107	3rd harmonics Voltage Y phase	float	40505	160	21st harmonics Voltage R phase	float	40611
108	3rd harmonics Voltage B phase	float	40507	161	21st harmonics Voltage Y phase	float	40613
109	3rd harmonics Current R phase	float	40509	162	21st harmonics Voltage B phase	float	40615
110	3rd harmonics Current Y phase	float	40511	163	21st harmonics Current R phase	float	40617
111	3rd harmonics Current B phase	float	40513	164	21st harmonics Current Y phase	float	40619
112	5th harmonics Voltage R phase	float	40515	165	21st harmonics Current B phase	float	40621
113	5th harmonics Voltage Y phase	float	40517	166	23rd harmonics Voltage R phase	float	40623
114	5th harmonics Voltage B phase	float	40519	167	23rd harmonics Voltage Y phase	float	40625
115	5th harmonics Current R phase	float	40521	168	23rd harmonics Voltage B phase	float	40627
116	5th harmonics Current Y phase	float	40523	169	23rd harmonics Current R phase	float	40629
117	5th harmonics Current B phase	float	40525	170	23rd harmonics Current Y phase	float	40631
118	7th harmonics Voltage R phase	float	40527	171	23rd harmonics Current B phase	float	40633
119	7th harmonics Voltage Y phase	float	40529	172	25th harmonics Voltage R phase	float	40635
120	7th harmonics Voltage B phase	float	40531	173	25th harmonics Voltage Y phase	float	40637
121	7th harmonics Current R phase	float	40533	174	25th harmonics Voltage B phase	float	40639
122	7th harmonics Current Y phase	float	40535	175	25th harmonics Current R phase	float	40641
123	7th harmonics Current B phase	float	40537	176	25th harmonics Current Y phase	float	40643
124	9th harmonics Voltage R phase	float	40539	177	25th harmonics Current B phase	float	40645
125	9th harmonics Voltage Y phase	float	40541	178	27th harmonics Voltage R phase	float	40647
126	9th harmonics Voltage B phase	float	40543	179	27th harmonics Voltage Y phase	float	40649
127	9th harmonics Current R phase	float	40545	180	27th harmonics Voltage B phase	float	40651
128	9th harmonics Current Y phase	float	40547	181	27th harmonics Current R phase	float	40653
129	9th harmonics Current B phase	float	40549	182	27th harmonics Current Y phase	float	40655
130	11th harmonics Voltage R phase	float	40551	183	27th harmonics Current B phase	float	40657
131	11th harmonics Voltage Y phase	float	40553	184	29th harmonics Voltage R phase	float	40659
132	11th harmonics Voltage B phase	float	40555	185	29th harmonics Voltage Y phase	float	40661
133	11th harmonics Current R phase	float	40557	186	29th harmonics Voltage B phase	float	40663

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#	Description	Type	Register	#	Description	Type	Register
134	11th harmonics Current Y phase	float	40559	187	29th harmonics Current R phase	float	40665
135	11th harmonics Current B phase	float	40561	188	29th harmonics Current Y phase	float	40667
136	13th harmonics Voltage R phase	float	40563	189	29th harmonics Current B phase	float	40669
137	13th harmonics Voltage Y phase	float	40565	190	31st harmonics Voltage R phase	float	40671
138	13th harmonics Voltage B phase	float	40567	191	31st harmonics Voltage Y phase	float	40673
139	13th harmonics Current R phase	float	40569	192	31st harmonics Voltage B phase	float	40675
140	13th harmonics Current Y phase	float	40571	193	31st harmonics Current R phase	float	40677
141	13th harmonics Current B phase	float	40573	194	31st harmonics Current Y phase	float	40679
142	15th harmonics Voltage R phase	float	40575	195	31st harmonics Current B phase	float	40681
143	15th harmonics Voltage Y phase	float	40577	196	2nd harmonics Voltage R phase	float	40683
144	15th harmonics Voltage B phase	float	40579	197	2nd harmonics Voltage Y phase	float	40685
145	15th harmonics Current R phase	float	40581	198	2nd harmonics Voltage B phase	float	40687
146	15th harmonics Current Y phase	float	40583	199	2nd harmonics Current R phase	float	40689
147	15th harmonics Current B phase	float	40585	200	2nd harmonics Current Y phase	float	40691
201	2nd harmonics Current B phase	float	40693	244	18th harmonics Voltage R phase	float	40779
202	4th harmonics Voltage R phase	float	40695	245	18th harmonics Voltage Y phase	float	40781
203	4th harmonics Voltage Y phase	float	40697	246	18th harmonics Voltage B phase	float	40783
204	4th harmonics Voltage B phase	float	40699	247	18th harmonics Current R phase	float	40785
205	4th harmonics Current R phase	float	40701	248	18th harmonics Current Y phase	float	40787
206	4th harmonics Current Y phase	float	40703	249	18th harmonics Current B phase	float	40789
207	4th harmonics Current B phase	float	40705	250	20th harmonics Voltage R phase	float	40791
208	6th harmonics Voltage R phase	float	40707	251	20th harmonics Voltage Y phase	float	40793
209	6th harmonics Voltage Y phase	float	40709	252	20th harmonics Voltage B phase	float	40795
210	6th harmonics Voltage B phase	float	40711	253	20th harmonics Current R phase	float	40797
211	6th harmonics Current R phase	float	40713	254	20th harmonics Current Y phase	float	40799
212	6th harmonics Current Y phase	float	40715	255	20th harmonics Current B phase	float	40801
213	6th harmonics Current B phase	float	40717	256	22nd harmonics Voltage R phase	float	40803
214	8th harmonics Voltage R phase	float	40719	257	22nd harmonics Voltage Y phase	float	40805
215	8th harmonics Voltage Y phase	float	40721	258	22nd harmonics Voltage B phase	float	40807
216	8th harmonics Voltage B phase	float	40723	259	22nd harmonics Current R phase	float	40809
217	8th harmonics Current R phase	float	40725	260	22nd harmonics Current Y phase	float	40811
218	8th harmonics Current Y phase	float	40727	261	22nd harmonics Current B phase	float	40813
219	8th harmonics Current B phase	float	40729	262	24th harmonics Voltage R phase	float	40815
220	10th harmonics Voltage R phase	float	40731	263	24th harmonics Voltage Y phase	float	40817
221	10th harmonics Voltage Y phase	float	40733	264	24th harmonics Voltage B phase	float	40819
222	10th harmonics Voltage B phase	float	40735	265	24th harmonics Current R phase	float	40821
223	10th harmonics Current R phase	float	40737	266	24th harmonics Current Y phase	float	40823
224	10th harmonics Current Y phase	float	40739	267	24th harmonics Current B phase	float	40825
225	10th harmonics Current B phase	float	40741	268	26th harmonics Voltage R phase	float	40827
226	12th harmonics Voltage R phase	float	40743	269	26th harmonics Voltage Y phase	float	40829
227	12th harmonics Voltage Y phase	float	40745	270	26th harmonics Voltage B phase	float	40831
228	12th harmonics Voltage B phase	float	40747	271	26th harmonics Current R phase	float	40833
229	12th harmonics Current R phase	float	40749	272	26th harmonics Current Y phase	float	40835
230	12th harmonics Current Y phase	float	40751	273	26th harmonics Current B phase	float	40837
231	12th harmonics Current B phase	float	40753	274	28th harmonics Voltage R phase	float	40839
232	14th harmonics Voltage R phase	float	40755	275	28th harmonics Voltage Y phase	float	40841
233	14th harmonics Voltage Y phase	float	40757	276	28th harmonics Voltage B phase	float	40843
234	14th harmonics Voltage B phase	float	40759	277	28th harmonics Current R phase	float	40845
235	14th harmonics Current R phase	float	40761	278	28th harmonics Current Y phase	float	40847
236	14th harmonics Current Y phase	float	40763	279	28th harmonics Current B phase	float	40849
237	14th harmonics Current B phase	float	40765	280	30th harmonics Voltage R phase	float	40851
238	16th harmonics Voltage R phase	float	40767	281	30th harmonics Voltage Y phase	float	40853

239	16th harmonics Voltage Y phase	float	40769	282	30th harmonics Voltage B phase	float	40855
240	16th harmonics Voltage B phase	float	40771	283	30th harmonics Current R phase	float	40857
241	16th harmonics Current R phase	float	40773	284	30th harmonics Current Y phase	float	40859
242	16th harmonics Current Y phase	float	40775	285	30th harmonics Current B phase	float	40861
243	16th harmonics Current B phase	float	40777				

Programmable Data Logging:

1 Minutes to 12 hours interval programmable. Data interval and parameter can be selected through communication.

No of Parameters	No of Records	
	1MB	8MB
1	121920	982080
2	81280	654720
4	48768	392839
9	24384	196416
14	16256	130944
29	8128	65472

CAUTION: Change in number of parameters causes the entire memory to erase.

For data logging option number of parameters, list of parameters and time interval can be programmed through PC using our ElMeasure software (EN_DLS).

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12. TECHNICAL SPECIFICATIONS

Parameter	Range
Accuracy	Class 1 (Default) IEC 61036, CBIP 88, Class 0.5, 0.2 (Option)
Sensing / Measurement	True RMS, 1 Sec update time 4 Quadrant Power & Energy (RD Option)
Input voltage (Measurement)	4 Voltage inputs (VR, VY, VB, N) Programmable 110 or 415V LL Nominal Primary Programmable up to 999 kV.
Burden	0.2VA Max. per phase
External Fuse Rating	2 Amps
Input Current (Measurement)	Current inputs (AR, AY, AB) 50mA - 6A (Field configurable 1A or 5A) Primary Programmable up to 99 kA
Overload	10A max continuous, 50A max for 3 Sec
Burden	0.2VA Max. per phase
Auxiliary Supply (Control Power)	80 to 300V AC, 40-70Hz 80 to 300V DC (Default)
Burden	5VA Max
External Fuse Rating	200mA
CT PT Ratio Max	2000 MVA Programmable
Protection Class	3
Display Resolution	EN: LED display - 4 Rows (10mm height), 4 digits for Instantaneous, 6 digits for Integrated PN: LCD display - 8 Rows, 4 digits for Instantaneous, 7 digits for Integrated
Humidity	5% to 95% non condensing
Pollution Degree	2 (As per IEC 61010)
Altitude	Below 2000 mts
Insulation	Double Insulation (As per IEC 61010-1)
Ingress Protection	IP 51 As per IEC 60529
Operating Temperature	$-10^{O}C$ to + $55^{O}C$ ($14^{O}F$ - $131^{O}F$)
Storage Temperature	$-25^{O}C$ to $+70^{O}C$ ($-13^{O}F$ - $158^{O}F$)
Measurement Category	CAT lll (As per IEC 61010)
Wire Gauge (Connecting wires)	12-14 swg (2.6 to $2.0mm^2$). $2.5mm^2$ U cut lugs to be used.
Communication	RS 485 serial channel connection Industry standard Modbus RTU protocol (RS232 optional)
Baud rate	2400 bps to 19200 bps (preferred 9600 bps)
Isolation	2000 volts AC isolation for 1 minute between communication and other circuits.
Dimension Bezel	96 x 96 mm - Depth 45mm behind bezel
Panel Cutout	92^{+0}_{-2} X 92^{+0}_{-2} mm

Mounting: The front bezel of the basic model is molded plastic. Bezel dimensions are 96x96mm. Depth 45mm behind the bezel.
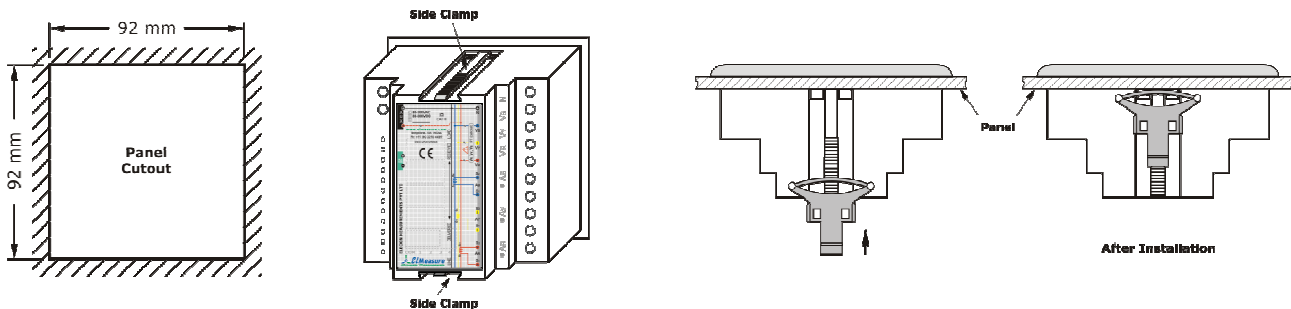
TROUBLESHOOTING

Due to programming error, site conditions, some problems can cause the Meter malfunction. The fault symptoms and their remedial action for correction is given below.

1. If the display does not turn ON:
    a) Check that there is at least 80 volts available to the power supply (L and N connections) on the Aux supply terminals. If the above steps do not solve the problem, Contact ElMeasure or your local ElMeasure representative and report the problem and results of the test.

2. If the voltage or current readings are incorrect:
    a) Check that the Connection mode (star/delta) is properly programmed.
    b) Check that the voltage and current ratios are properly set.
    c) Check the output of the CT's and PT's being used.

3. If the kW or Power Factor readings are incorrect but voltage and current readings are correct:
    a) Make sure that the phase relationship between voltage and current inputs are correct by comparing the wiring with the appropriate wiring diagram.
    b) CT reversal can be observed by either seeing the phase wise kW. Negative kW is shown where the current polarity is reversed, need to be corrected. Model where kW information is not available, you may check Amps Phase angle.

4. If RS-485 communication does not work:
    a) Check that the baud rate of the host computer/PLC is the same as Meter.
    b) Check that the device ID of the meter are unique and should not replicate.
    c) Check all communications wiring is complete.
    d) Check that the number of data bits is set to 8, with one stop bit and even parity.

If the symptom persists after performing the specified steps, or if the symptom is not listed above, contact your local ElMeasure representative or the technical support / customer support department.

WARRANTY AND REGISTRATION

Every product of ElMeasure is warranted for 18 months from the date of invoice for the defects in materials and workmanship when products are used in normal specified conditions.

The warranty is void to the product which has been damaged due to improper installation, improper handling, improper connections, neglect, misuse, accident, and abnormal conditions of operation and natural calamities or acts of god. Any attempt of dismantling and unauthorized repair or modifications shall also render the warranty null & void.

Calibration report, Warranty card, Programming guide with equipment will be provided.

1. **Failure of products during warranty In India**

    Customer shall report the failure to the nearest ElMeasure contact point or dealer at the earliest once noticed. ElMeasure shall replace the product failed due to workmanship or defects in materials against receipt of failed product. Burnt, blown, damaged products are not covered under warranty and hence no replacements shall be given.

    In the event of product un-available for replacement at ElMeasure or dealer, same shall be arranged at the earliest. Replacement of product is solely at the discretion of dealer or the ElMeasure representative who receive the failed product.

    ElMeasure SE may on a case to case basis, recommend for the advance replacement of product mentioning the reasons and justifications for doing so. Sales Manager shall approve advance replacement in genuine cases. The defective product shall be collected and sent to ElMeasure factory within 30 calendar days. Non compliance shall result in debiting cost of the product to the SE recommended for advance replacement.

    Burnt, abused, damaged products shall be forwarded to ElMeasure's factory at Bangalore for investigation, transportation pre-paid. Upon investigation, If found the rectification is possible, an estimation for servicing is sent to the customer. Rectification shall be done on receipt of approval for the charges with advance payment only.

2. **Failure of products outside warranty In India**

    The defective products shall be forwarded to ElMeasure factory at Bangalore for rectification, transportation pre-paid. Upon investigation, estimation for servicing is sent to the customer. Rectification shall be done on receipt of approval for the charges with advance payment only.

    ElMeasure, as a policy, do not provide replacement for the products outside warranty.

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