



INTRODUCTION

The MFT is a solid-state TRANSDUCER Which accurately measures all quantities of the supply including all types of energies and gives corresponding Analog output 4-20mA or 0-10V w.r.t. electrical parameter measured except energies. It also has fully programmable Pulse output for all energies. The MFT is based on Microcontroller, with a high degree of programmability. The MFT meets the Accuracy requirements of IEC 60688. The MFT has been programmed to operate as an intelligent front end measuring and storing device and to communicate continuously to a Master, all the data relevant for the purpose of SCADA, through isolated RS-485 port using MODBUS-RTU protocol. The MFT is normally supplied readily pre-programmed for operation and can be directly installed in the usual manner. The MFT can be read manually or through a Master using MODBUS-RTU Protocol.

Note: For Operational Manual Please visit our website. www.masibus.com

Features

- Accuracy class 0.5 / 0.2 as per IEC 60688 standard
- Field programmable CT/PT Ratio
- True RMS, Microcontroller based
- 28 Electrical parameters can be mapped to Analog O/P
- Field programmable up to two analogue output
- Long range, site-configurable inputs and outputs
- Four quadrant measurement
- RS-485 Modbus-RTU communication protocol
- User assignable Modbus registers
- Energy pulse output
- Maximum demand & THD measurement up to 31st harmonics
- Old register to store the previously cleared energy values
- Last day energy & min. max. value measurement
- Finger touch proof terminals
- DIN-Rail & wall mount
- Front panel LED output for calibration & measurement of selected type of energy
- Four Quadrant measurement for Power factor, Power & Energy (Active & Reactive)
- life timer for energy
- ON hours, RUN hours & Auxiliary Power Interruption monitoring
- Easy configuration of different parameter through front fascia key. (optional)
- GUI based site configuration software

Specification

System type
3Ph4W/ 3Ph3W (Site selectable)

Input Voltage	
Direct Measuring Voltage	20VL-N to 300VL-N (34VL-L to 520VL-L) (Self-Powered: 63.5VL-N to 240VL-N)
PT Secondary (Nominal Voltage)	63.5VL-N to 240VL-N
Measurement Method	True RMS
Burden	<0.2VA per phase
PT Ratio	Programmable on site
Max continuous input voltage	1.3 x nominal value
Overload Withstand	2 x Nominal value for 5 s

Current	
Direct Measuring Current	0.01A to 6A
Secondary Current	1 to 5A
Measurement Method	True RMS
Burden	<0.2VA per phase
CT Ratio	Programmable on site
Max continuous input current	2 x nominal value
Overload	20 x Nominal value for 1 s

Frequency	45 to 65Hz
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Display	
Display (LCD)	16x2 Backlight LCD
Display (LED)	1 line 4 digit 0.32" RED 7-segment LED Display
Keys	UP, down

Measured Parameters	
Voltage	L1-L2, L2-L3, L1-L3 and Average (3Ph3W & 3Ph4W)
	L1-N, L2-N, L3-N & average (1Ph & 3Ph4W)
Current	All phase currents, average, sum Neutral Current (3P4W)
Frequency	System Frequency
Power Factor	Phase wise PF & Average PF
Phase Angle	Phase wise
Power (Phase wise & Total)	Active Power (W, KW & MW)
	Reactive Power (VAR, KVAR & MVAR)
	Apparent Power (VA, KVA & MVA)
Energy (Phase wise & Total)	Active Energy for Import & Export (Separate) (KWh, MWh & GWh)
	Reactive Energy for Import & Export (Separate) (KVARh, MVARh & GVARh)
	Apparent Energy (KVAh, MVAh & GVAh)
Energy Update Rate	500 mSec
Demand	Maximum Power Demand on KW/KVA Maximum Current Demand (Block/Sliding for 15/30 minutes window)
Power Quality	THD & Harmonics for each Voltage and Current (3rd to 31st odd) Phase wise DPF & Average DPF (Displacement Power Factor)

Modbus Communication	
Interface	RS485
Baud rate	2400, 4800, 9600, 19200, 38400 (Selectable)
Parity bit	None, with 1 or 2 stop bit

	Odd or even, with 1 or 2 stop bit
Protocol	Modbus-RTU

Analog output (Optional)	
No. of Outputs	Up to 2
Output type	4-20mA, 0-20mA, 0-10V, 0-5V, 1-5V DC
Response time	<600mS
Mapping	Field Selected from inputs parameters

O/P Impedance	<550 Ω for mA O/P >2 KΩ for V O/P
Ripple	<0.4% Peak to Peak
External magnetic field	0.5 mT
Common Mode Voltage	100 Vrms

Auxiliary Power Supply	
Power Supply	Standard: 85-265VAC, 50/60Hz or 100-300VDC Optional: 20-60 VD
Power Consumption	< 3VA (Without Analog o/p) < 7VA (With Analog o/p)

Standards Compliance	
Standard	IEC 60688, IEC 61326-1

Electromagnetic Interference / Compatibility (EMI/EMC)	
Electrostatic Discharge Test (ESD) [IEC 61000-4-2]	
Electromagnetic Field [IEC 61000-4-3, Level 1]	
Power Frequency Magnetic Field [IEC 61000-4-8]	
Voltage Dip and Short Interruptions [IEC 61000-4-11]	
Burst Test [IEC 61000-4-4]	
Surge [IEC 61000-4-5]	
Conducted RF [IEC 61000-4-6]	
Conducted Emission [CISPR 11]	
Radiated Emission [CISPR 11]	

Environmental	
Operating temperature	−10 to 60 °C
Storage temperature	-40° to 85°C
Usage Group	
I as per IEC60688	
Relative humidity	Up to 95% non-condensing
Warm up time	5 minutes
Installation Category	CAT III for < 300V AC
Protection Class	II
Pollution Degree	2
Ingress protection	Housing IP40, Terminals IP20

Physical	
Mounting Type	DIN-Rail mounting / Wall mounting
Dimension (in mm)	70H x 100W x 112D
Case Material	ABS
Weight	0.5 Kg
Terminations	Metal Screw can accept up to 2.5 mm ² wire or Single 4.0 mm ²

Safety/Warning Precautions

Safety Precautions

Dangerous voltages capable of causing death are sometimes present in this instrument. Before installation or beginning of any troubleshooting procedures the power to all equipment must be switched off and isolated. Units suspected of being faulty must be disconnected and removed first and brought to a

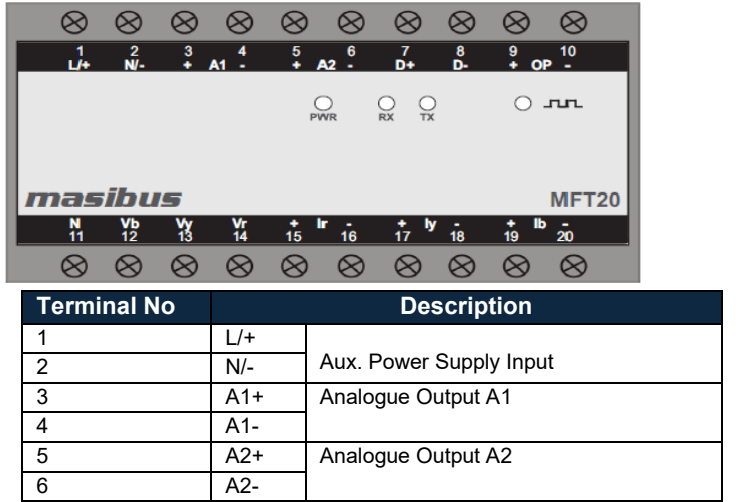
properly equipped workshop for testing and repair. Component replacement and interval adjustments must be made by a company person only.

Warning Precautions

All wiring must comply with proper standards, good practices, and local electrical codes. Ensure that wiring is suitable for the system's voltage, current, and temperature ratings. Before performing any work on the instrument, always turn off all incoming AC power and other power sources. Protect the AC voltage inputs (V1, V2, V3) with 2A external fuses and the power supply inputs with 5A external fuses, placed close to the equipment. Before connecting the instrument, verify that the power supply voltage, input voltages, and currents match the instrument's specifications. Do not connect a damaged instrument to a power source, and avoid exposure to moisture or rain to prevent fire or shock hazards. The secondary of a current transformer must never be open-circuited when the primary is energized, as this may result in dangerously high voltages and possible injury or equipment damage. Ensure CT wiring is properly secured to reduce mechanical strain, and avoid over-tightening terminal screws. Only qualified personnel should perform installation or maintenance. Upon receiving the unit, inspect it for any shipping damage and record the model and serial numbers for reference. Do not install the instrument in areas with excessive vibration, shock, dust, moisture, corrosive gases, or temperatures beyond specified limits.

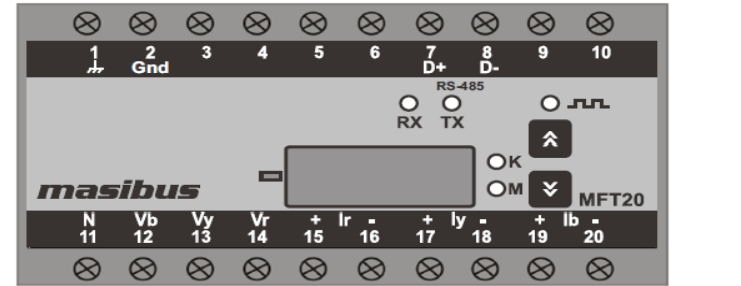
Mechanical Installation

Front View (AUX – POWERED MODEL)



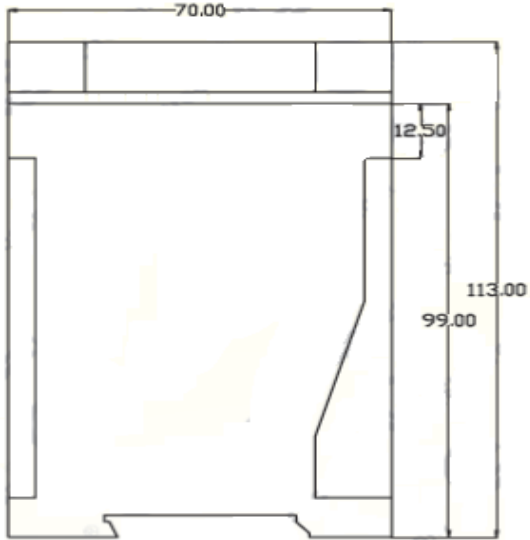
Front View (SELF – POWERED MODEL)

Self Powerd model is only available in LED Display.

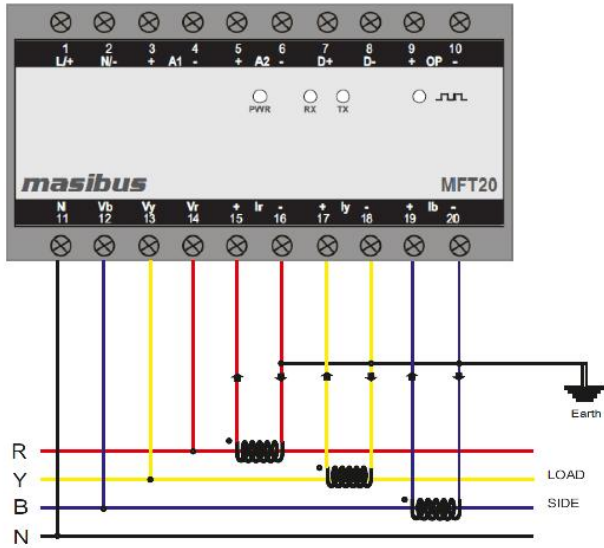


Terminal No	Description	
1	Earth	Earth Terminal
2	GND	RS-485 Ground
3		Not Applicable
4		
5		
6		

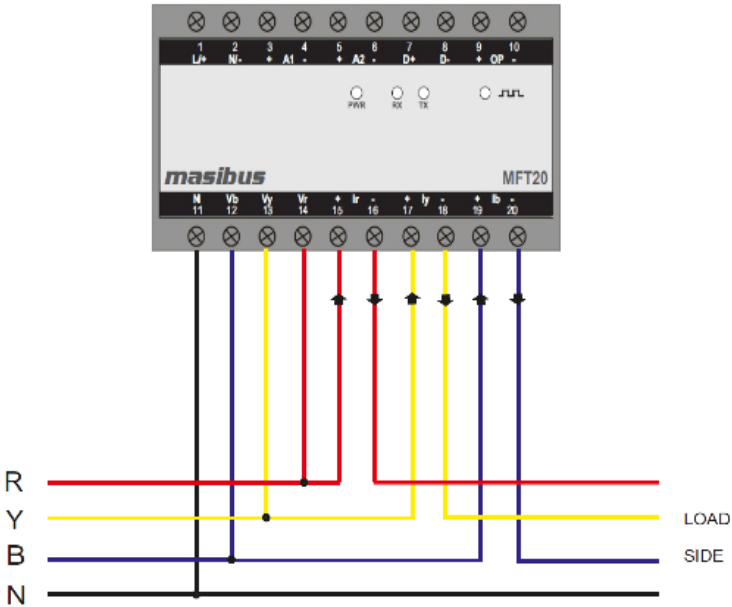
Side View



4-Wire Wye-3 Element Direct Connection Using 3CTs

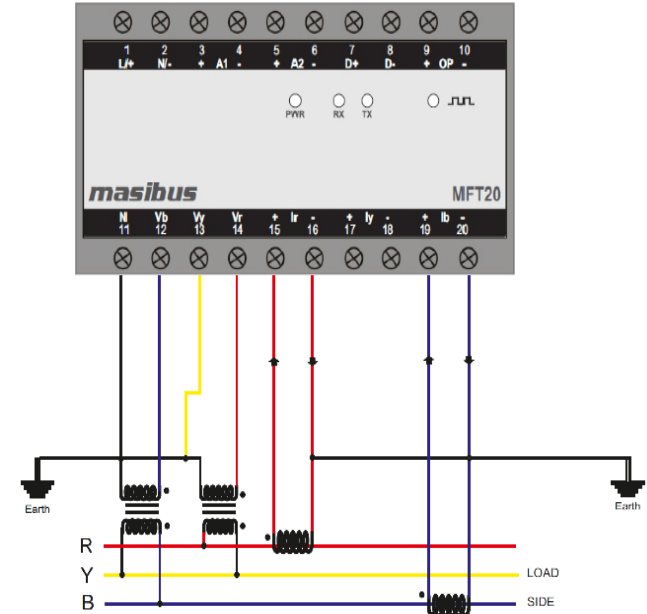


4-Wire Direct Connection

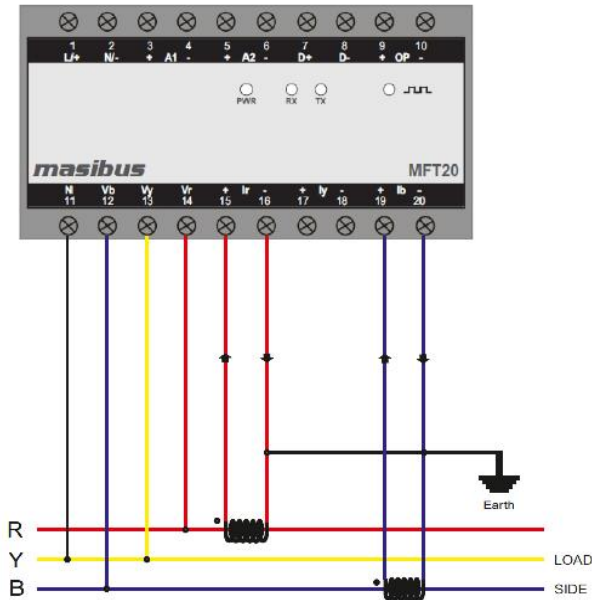


Three Phase Three Wire System

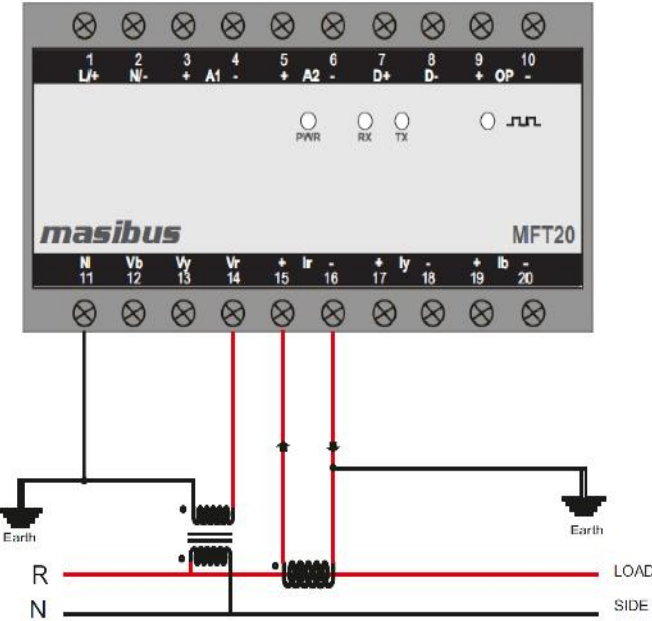
3-Wire 2- Element Open Delta Connection Using 2PTs, 2CTs



3-Wire 2- Element Direct Connection Using 2CTs



Single Phase Two Wire Configuration



Note: -For Single Phase Two Wire, system should be 3P4W and Do not consider Average Voltage, Average Current & Average PF on the display or MODBUS.

Key Function

Key Functions for LCD Display



UP key

RUN mode:

- To scroll pages in upward direction to look at different parameters.

PROGRAM mode:

- To select the value and accept the value (it act as shift key in programming mode)



DOWN key

RUN mode:

- To scroll pages in downward direction to look at different parameters.

PROGRAM mode:

- To edit the value / system types downward in edit mode and scroll through the parameters.

Key Functions for LED Display



UP key

RUN mode:

- To enter into the run mode groups.

PROGRAM mode:

- To scroll the value upward in edit mode and also work as shift key.



DOWN key

RUN mode:

- To scroll pages in downward direction to look at different parameters.

PROGRAM mode:

- To edit the value downward in edit mode and scroll through the parameters and also work as back key.



UP + DOWN key

RUN mode:

- To enter into the configuration mode.

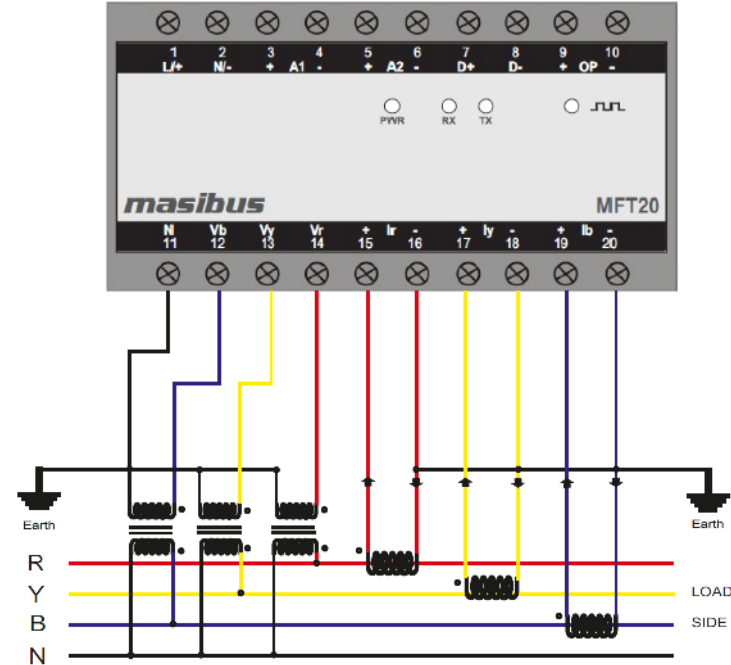
PROGRAM mode:

- To save the value in EEPROM

Wiring Details

Three Phase Four Wire System

4-Wire Wye-3 Element Connection Using 3PTs, 3CTs



Program Mode For LED

The Configuration Mode can be entered by pressing the INC & DEC key at same time. Once the key is pressed, the unit prompts for password (P50d) string as image.

S.NO	Display	Function	Range or selection	Default
1	PE.tn	Prev.Block Energy time	05 Min, 15 Min, 1Hr	15 Min
2	SYG	System Type	3P4W, 3P3W	3P4W
3	i.PEr	PT ratio (Integer Part)	Refer note	0001
4	F.PEr	PT ratio (Fractional Part)	Refer note	.000
5	i.CEr	CT ratio (Integer Part)	Refer note	0001
6	F.CEr	CT ratio (Fractional Part)	Refer note	.000
7	S-ID	Slave ID	1 - 247	1
8	bAUD	Baud rate	2400,4800,9600, 19200,38400	9600
9	S.b.t	Stop Bit	1 or 2	1
10	P.b.t	Parity Bit	None, odd, even	None
11	d.tYP	Data type	Real, long	Real
12	PSUD	Password Change	0001-9999	0001
13	rSt	Reset		
13.1	RE-I	Active energy import	No / Yes	Yes
13.2	rE-I	Reactive energy import	No / Yes	Yes
13.3	RE-E	Active energy export	No / Yes	Yes
13.4	rE-E	Reactive energy export	No / Yes	Yes
13.5	ENGY	All energy	No / Yes	Yes
13.6	HOUR	Hour	No / Yes	Yes
13.7	LO.HI	Low -high value	No / Yes	Yes
13.8	nd	Maximum Demand	No / Yes	Yes
13.9	Pb-E	Previous block Energy	No / Yes	Yes
13.10	ALL	ALL Reset	No / Yes	Yes

Note : For entering value of CTR and PTR

PT Ratio - Integer part (I.PTR) :

PT Ratio – Fractional part (F.PTR):

It is PT Ratio (Potential Transformer ratio). Its value are separated in two parts one is integer part (means value before the decimal point) and another is fractional part (means value after the decimal point).

By setting blinking cursor position using two keys: INC key to shift cursor position, DEC key to change the digit value. When the value is set and then press both the key at same time to save in EEPROM.

e.g.

PT Primary = 66KV, PT Secondary = 110V

Therefore **PTR** = 66KV / 110V = 600.000

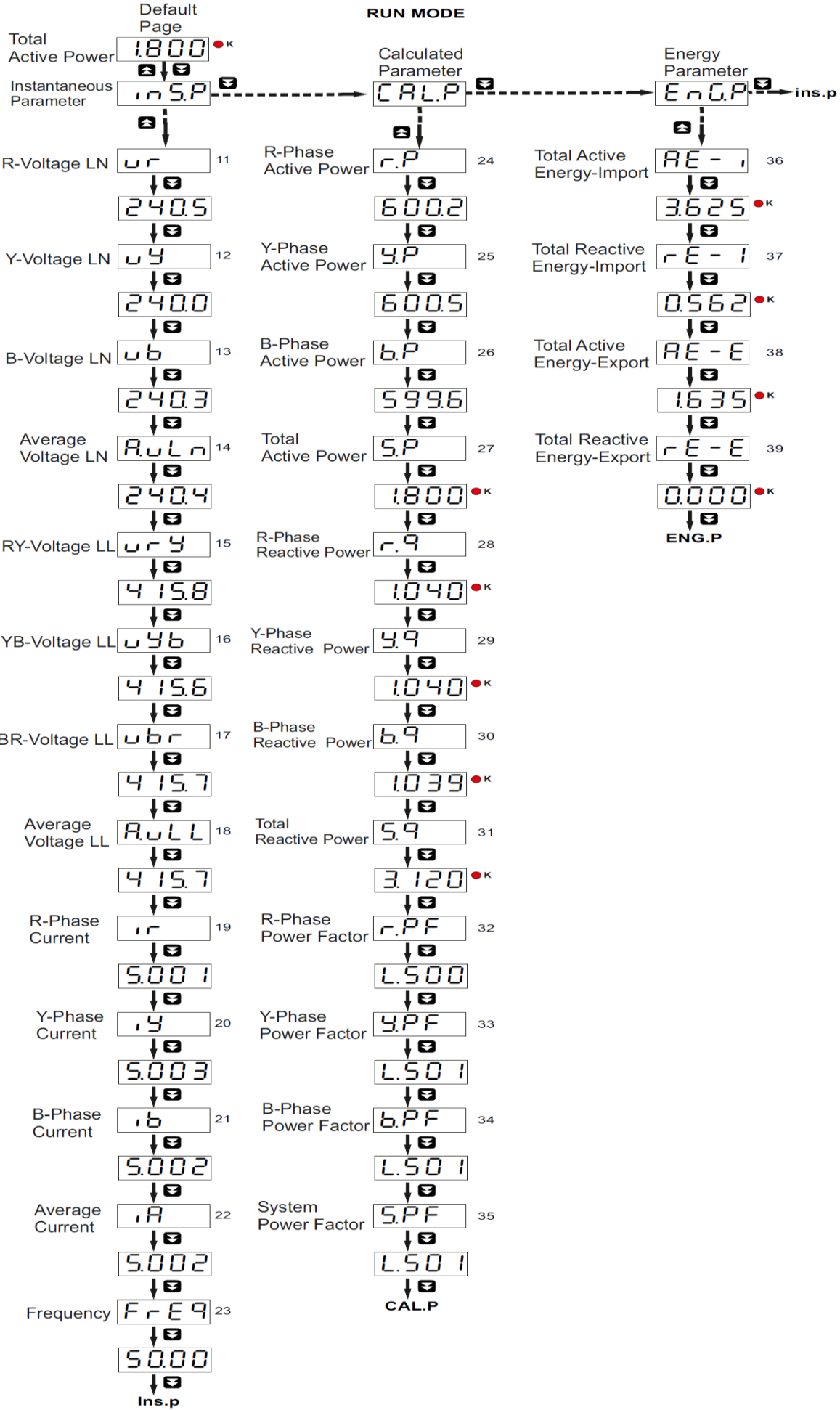
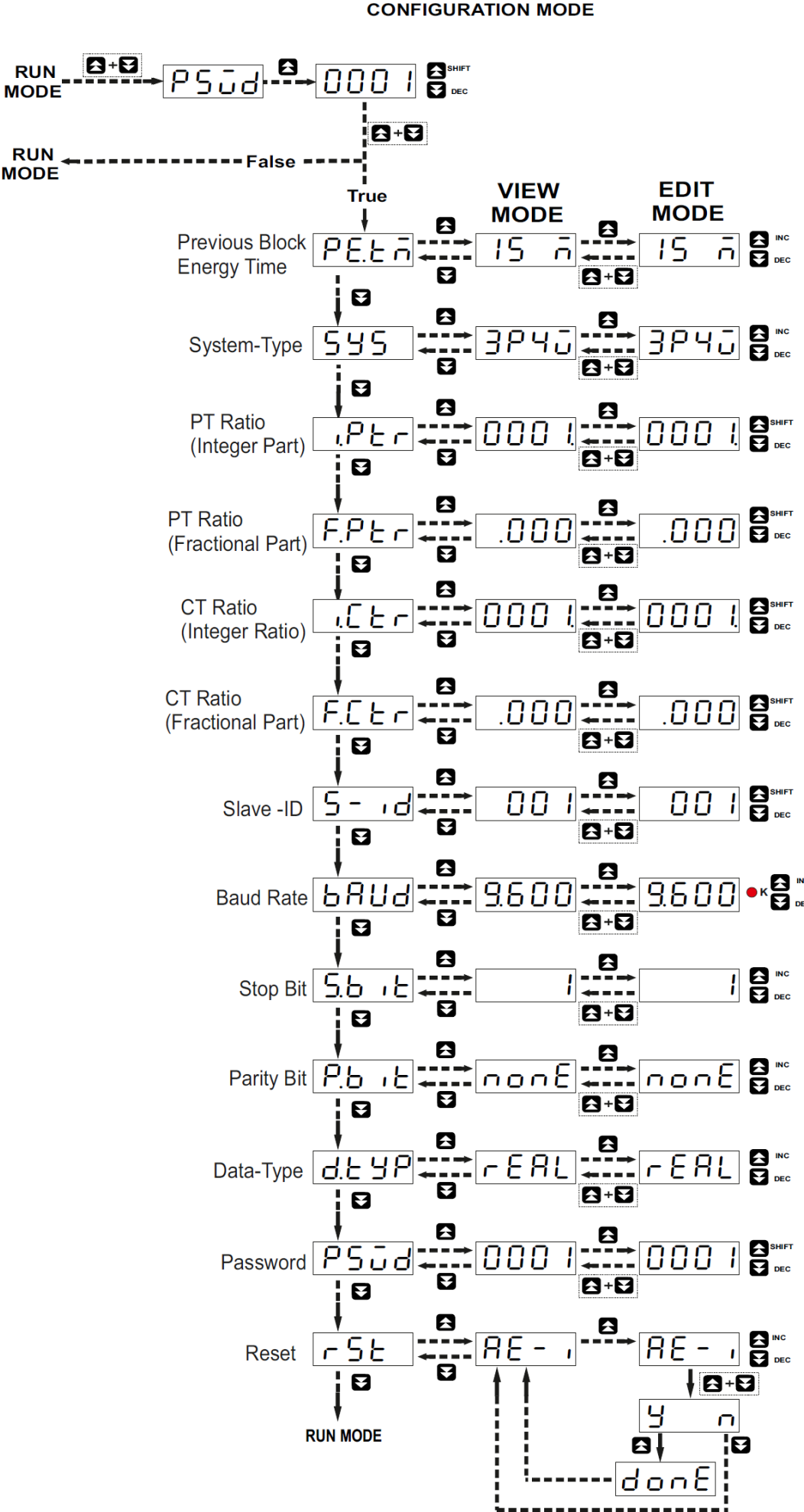
In this PTR value is separated in two parts

I.PTR = 600 and F.PTR=.000

CT Ratio - Integer part (I.CTR) :

CT Ratio – Fractional part (F.CTR):

It is CT Ratio (Current Transformer ratio). Same as PTR



Program Mode For LCD

The PROGRAM Mode can be entered by continuously pressing the UP key for 4 seconds. Once the key is pressed, the unit prompts for four-digit password as shown in Image.

S.NO	Parameter	Range or selection	Range or selection	Default
1	CT.PT RATIO	CTR	1-9999.999	0001.0000
		PTR	1-9999.999	0001.0000
2	PLS OUTPUT	Constant	1 - 60000	3600
		UNIT	Refer Table 1	
3	Serial Comm.	BAUD	2400,4800,9600 ,19200,38400	9600
		SLV ID	1-247	1
		DATATYPE	Real, long	Real
		PARITY	NONE, ODD, EVEN	NONE
		STOP BIT	1,2	1
4	System Setting	PSWRD	0001-9999	0001
		SYSTEM	3P4W,3P3W	3P4W
		TIME	HH:MM: SS	
		DATE	DD/MM/YY	
5	Maximum Demand	MD ON	W, VA	W
		METHOD	BLOCK, SLIDE	BLOCK
		IN. TIME	15,30	15
		SB. TIME	1, 2,3,5,610	5

Reset mode for LCD.

6	Reset Mode	Active energy imp	No / Yes	Yes
		Reactive energy imp	No / Yes	Yes
		Active energy exp	No / Yes	Yes
		Reactive energy exp	No / Yes	Yes
		All energy	No / Yes	Yes
		Hour	No / Yes	Yes
		Low -high value	No / Yes	Yes
		Maximum Demand	No / Yes	Yes
		Prev. block Energy	No / Yes	Yes
		ALL Reset	No / Yes	Yes

Table no 1:

Value	Energy Type	Value	Energy Type
0	KWhI (Active-Import)	10	100KVArI (Reactive-Import)
1	10KWhI (Active-Import)	11	MVarI (Reactive-Import)
2	100KWhI (Active-Import)	12	KVArE (Reactive-Export)
3	MWhI (Active-Import)	13	10KVArE (Reactive-Export)
4	KWh-E (Active-Export)	14	100KVArE (Reactive-Export)
5	10KWh-E (Active-Export)	15	MVarE (Reactive-Export)
6	100KWh-E (Active-Export)	16	KVAh (Apparent)
7	MWh-E (Active-Export)	17	10KVAh (Apparent)
8	KVArI (Reactive-Import)	18	100KVAh (Apparent)
9	10KVArI (Reactive-Import)	19	MVAh (Apparent)

Configuration Mode:

