LARSEN & TOUBRO

# INSTRUCTION MANUAL

Digital Panel Meter

Max Demand Controller

6000 LED Series

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During normal operation of this instrument ,hazardous voltages are present at the rear terminals, which can cause injury or death. Installation ,disconnection or removal of the meter should be carried out only by qualified, trained personnel, after de-energizing connected circuits. Improper installation , including improper grounding will void warranty. Product warranty void if seal is broken.

## 1.Features

- Accuracy class 1 as per IEC 62053-21 & Class 0.5S as per IEC 62053-22
- True RMS measurement
- Password protection provision
- Phase wise Voltage & Current wave forms in LCD meter
- Site selectable for 3 P 4 W, 3 P 3 W, 1 P
- Maximum demand measurement with Real time clock
- Time of Day (TOD) provision is available
- 6 Demand and 6 Energy option with MD occurrence captured for each TOD
- 4 relay outputs available for proper load control
- Data logging provision is available
- Freeze mode provision is available
- Terminals with sealing provision (optional)
- Direct access key for Basic parameters, Power and Energy parameters

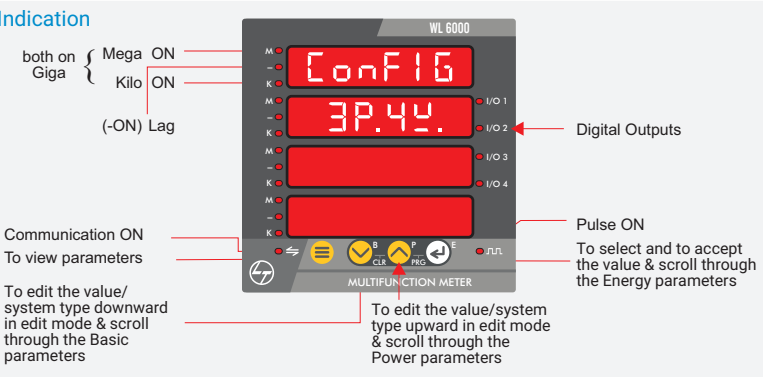
## 2. Technical Specification

| | | |
|---|---|---|
| Type of measurement | Type | 3 Ph 4 W, 3 Ph 3 W, 1 Ph |
| | | True RMS, 128 samples per cycle, 1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21 |
| | | Class 0.5, 0.5s as per IEC 62053-22 |
| Display type and resolution | LED | 4 digit for instantaneous and 6 digits for cumulative |
| Measuring circuit | Input voltage | 50 - 550 $V_{LL}$ |
| | | PT Primary and Secondary user programmable for LT and HT applications |
| | | Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable |
| | | Current range from 10% to 120% of In (50mA-6A), Starting current : 0.4% of full scale |
| | | CT Primary and Secondary user programmable for LT and HT applications |
| | Frequency | 40 - 70 Hz |
| Auxiliary circuit | Aux voltage | 80 - 300VAC/DC |
| | Aux burden | <5VA |
| | Freq range | 40 - 70 Hz |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62053-21 |
| | Short time over current protection | 10A max continuous, 20 times of In for 3 sec |

| | | |
|---|---|---|
| Electro-magnetic compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V/m as per IEC 61000-4-6 |
| | Surge immunity test | ±6 kV as per IEC 61000-4-5 |
| | Rated power frequency magnetic fields | 1 A/m as per IEC 61000-4-8 |
| | Emission | Class B as per CISPR 22 |
| Insulation properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| | Insulation resistance | 500 V DC as per IS 13779 |
| Operating conditions | Operating temperature | -10° C to +55° C |
| | Storage temperature | -25° C to +70° C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical conditions | Shock | As per standard IEC 60068-2 |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Safety | Measurement category | CAT III |
| | Pollution degree | 2 |
| | Protection | IP20 at terminals, IP51 on front |

| | | |
|---|---|---|
| Weight & dimensions | Product weight | 300 gms |
| | Bezel dimension (W x H x D) | 96 x 96 x 58 mm |
| | Panel cutout | 92 x 92 mm $^{+0.8}_{-0.0}$ |
| Outputs | | Meter constant: 10000/(external CT ratio x PT ratio) |
| Communication | Type | RS485 port Modbus RTU |
| | Baud rate | 2400, 4800, 9600, 19200 bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## 3. LED Indication




## 4. Display Of Parameters

| Display | Meaning | Display | Meaning | Display | Meaning | Display | Meaning | Display | Meaning | Display | Meaning |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LL | Voltage Line to Line | rPn | Revolution Per Minute | A.thd | Amps THD | Yh | Active Energy Received | Intr | Number of Interrupts | AL | Additional Load |
| Ln | Voltage Line to Neutral | V.Ph.Ang | Voltage Phase Angle | A.thd31 | Amps THD Ph.-wise upto 31st Level | VAh | Apparent Energy | V.thd03 | Voltage THD Ph-wise upto 31st level | Et | Elapse Time |
| rY | Voltage RY Phase | A.Ph.Ang | Current Phase Angle | t.FACt.V. | K-Factor V | VArh.L | Reactive Inductance Energy | On.Hr | On Hour | Hi | High Level of Parameter |
| Yb | Voltage YB Phase | Un.bAL.V | Unbalance Voltage | t.FACt.A. | K-Factor A | VArh.C | Reactive Capacitance Energy | 0 | Old | Lo | Low Level of Parameter |
| br | Voltage BR Phase | Un.bAL.A | Unbalance Current | Y | Watts Total | AVG | Average | CLEAr | Clear | b | Baud Rate |
| A | Current Average | V.thd | Voltage THD | VA | Total VA | Ld.Hr | Load Hour | rd | Rising Demand | d | Delivered |
| F | Frequency | Ah | Amps hour | Vr | Total VAR | L | Lagging Power Factor | Fd | Forecast Demand | c | Leading Power factor |
| An | Neutral Current | M1-M6 | No. of Demand Slots | PF | Power Factor | S1-S6 | No. of Energy Slots | nd | Maximum Demand | cLoc | Real Time Clock |

### Precautionary Measures to be taken while Wiring the Circuit :

- Turn OFF the power to the circuit, when wiring the circuit. Connecting or removing measurement cables while the power is turned ON is dangerous
- Take special caution not to wire a current measurement circuit to the voltage input terminal or vice-versa
- Strip the insulation cover of the measurement cable so that when it is wired to the input terminal, the conductive parts (bare wires) do not protrude from the terminal. It is recommended to use appropriate pre lug after crimping the wire. Also, make sure to fasten the input terminal screws securely so that the cable does not come loose
- Use cables with safety terminals that cover the conductive parts for connecting to the voltage input terminals. Using a terminal with bare conductive parts is dangerous if the terminal comes loose
- After connecting the measurement cable, attach the current input protection cover for your safety. Make sure that the conductive parts are not exposed from the protection cover
- Use the suitable star screw driver and apply optimum torque to prevent damage to the meter terminals

### Preventive Measures :

- Fuse : To avoid the possibility of short circuit, use a slow blow fuse that has a voltage rating VAC : 250V, Fuse current : 200 mA, Breaking capacity : 10kA@125 VAC. When replacing a fuse, turn OFF the power and unplug the power cord. Never short the fuse holder

### 5.1 Programming Mode
### Programming keys

ENTER - to enter Edit Mode and save parameter
DOWN - to decrement value or parameter
UP - to increment value or parameter

### 5.2 General Programming Guide

- Press UP + E to enter Programming Mode
- Press Down to enter Password (Default Value 0000)
- Digit blinking indicates Edit Mode is ON
- Press UP or DOWN to increment and decrement value 0/1/2/3/4/5/6/7/8/9
- Press E to edit the next digit till 4th digit
- If Password is correct, meter displays next parameter in editable mode
- If Password is incorrect, meter will display next parameter but cannot be edited

### 5.3 Setting or Configuration of Parameter

- Press E to enter Edit Mode
- Blinking of parameter/value indicates Edit Mode is ON
- Press UP or DOWN to increment/decrement values or to select from available options
- Press E to accept the value of the parameter
- Press DOWN to move to next parameters till end after configuration of last parameter display screen will prompt "SAVE", Display reads "y" (YES)
- Press Down if changes are not to be saved, display reads "n" (no)
- Press E to save the option

### 5.4 Display :

Row 1: Parameter
Row 2: Options/Set Option

Eg. Row 1: ConFIG
Row 2: 3P 4W


| Parameter | Default setup | Range |
|---|---|---|
| Configuration mode (ConFIG) | 3P 4W | 3Ph 4W/3Ph 3W/1 Phase |
| PT Primary (Pt.Pri) | 415.0 | 100V - 999kV |
| PT Secondary (Pt.SEC) | 415.0 | 50V - 550V |

| | | |
|---|---|---|
| CT Primary (Ct.Pri) | 5.000 | 0.5 A - 99kA |
| CT Secondary (Ct.SEC) | 5.000 | 0.5A - 6A |
| VA selection (VASEL) | VEC.HAr | Method of VA selection: Arithmetic/Vector harmonics/Vector |
| Year (YEAr) | 2012 | 2012 to 2052 |
| Date (dAtE) | 01.01 | 01.01 to 12.31 |
| Time (tiME) | 00.00 | 00.00 to 23.59 |
| Demand Type (dn.tYPE) | SLIdIn | SlidIn (sliding)/bLOC (block/fixed ) |

| | | |
|---|---|---|
| Demand Parameter (dn.PAr) | Watts | WAttS (Watts)/VAr /A.Avg (Amps Avg)/VA |
| Demand Period (dn.Prd) | 15.00 | 5 to 30 Minutes |
| Demand Control (dn.Cont) | Forc.dm | Forecast/step |
| Demand Slots (dnd.Slot) | 6.000 | 1 - 6 |
| Demand Slot1 (dnd.SL.1) | 06.00 | 00.00 - 23.59 |
| Demand Slot2 (dnd.SL.2) | 09.00 | 00.00 - 23.59 |
| Demand Slot3 (dnd.SL.3) | 12.00 | 00.00 - 23.59 |
| Demand Slot4 (dnd.SL.4) | 18.00 | 00.00 - 23.59 |
| Demand Slot5 (dnd.SL.5) | 22.00 | 00.00 - 23.59 |
| Demand Slot6 (dnd.SL.6) | 22.01 | 00.00 - 23.59 |

### If demand control type is programmed as Forecast demand following steps is applicable

| | | |
|---|---|---|
| Forecast interval (FC.Int) (FC.Int) | 7.000 | 20% to 50% of Demand period |
| Demand Slot1 highest value (SLt.1.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot1 second highest value (SLt.1.H1) | 1700 | 50% to 99% of highest limit (SLt.1.H) |
| Demand Slot1 lowest value (SLt.1.L) | 1300 | 50% to 99% of second highest limit (SLt.1.H1) |
| Demand Slot2 highest value (SLt.2.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot2 second highest value (SLt.2.H1) | 1700 | 50% to 99% of highest limit (SLt.2.H) |
| Demand Slot2 lowest value (SLt.2.L) | 1300 | 50% to 99% of second highest limit (SLt.2.H1) |
| Demand Slot3 highest value (SLt.3.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot3 second highest value (SLt.3.H1) | 1700 | 50% to 99% of highest limit (SLt.3.H) |
| Demand Slot3 lowest value (SLt.3.L) | 1300 | 50% to 99% of second highest limit (SLt.3.H1) |
| Demand Slot4 highest value (SLt.4.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot4 second highest value (SLt.4.H1) | 1700 | 50% to 99% of highest limit (SLt.4.H) |
| Demand Slot4 lowest value (SLt.4.L) | 1300 | 50% to 99% of second highest limit (SLt.4.H1) |
| Demand Slot5 highest value (SLt.5.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot5 second highest value (SLt.5.H1) | 1700 | 50% to 99% of highest limit (SLt.5.H) |
| Demand Slot5 lowest value (SLt.5.L) | 1300 | 50% to 99% of second highest limit (SLt.5.H1) |
| Demand Slot6 highest value (SLt.6.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot6 second highest value (SLt.6.H1) | 1700 | 50% to 99% of highest limit (SLt.6.H) |
| Demand Slot6 lowest value (SLt.6.L) | 1300 | 50% to 99% of second highest limit (SLt.6.H1) |

### If demand control type is programmed as Step demand following steps is applicable

| | | |
|---|---|---|
| Stepwise Demand Slot1 step1 value (tod.SL1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot1 step2 value (tod.1.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot1 step3 value (tod.1.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot1 step4 value (tod.1.S4) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step1 value (tod.1.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step2 value (tod.252) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step3 value (tod.253) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step4 value (tod.254) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step1 value (tod.351) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step2 value (tod.352) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step3 value (tod.353) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step4 value (tod.354) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step1 value (tod.3451) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step2 value (tod.452) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step3 value (tod.453) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step4 value (tod.454) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step1 value (tod.551) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step2 value (tod.552) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step3 value (tod.553) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step4 value (tod.554) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step1 value (tod.651) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step2 value (tod.652) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step3 value (tod.653) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step4 value (tod.654) | 1300 | 0.5% to 100% of Full scale |

| | | |
|---|---|---|
| Number of energy slots (no.Slot) | 5 | 1 - 6 |
| Slot1 energy accumulation time (tod.SL.1) | 06.00 | 00.00 - 23.59 |
| Slot2 energy accumulation time (tod.SL.2) | 09.00 | 00.00 - 23.59 |
| Slot3 energy accumulation time (tod.SL.3) | 12.00 | 00.00 - 23.59 |
| Slot4 energy accumulation time (tod.SL.4) | 18.00 | 00.00 - 23.59 |
| Slot5 energy accumulation time (tod.SL.5) | 22.00 | 00.00 - 23.59 |
| Slot6 energy accumulation time (tod.SL.6) | 22.01 | 00.00 - 23.59 |

| | | |
|---|---|---|
| Baud rate (bAUd) | 9600 | 2400 to 19.2k |
| Parity (PAritY) | Even | Even/ Odd/ no |
| Slave id (SL.id) | 1.000 | 1.000 to 247.0 |
| No of Poles (POLES) | 4.000 | 1.000 to 28.00 |
| Reverse lock (REV.LOC) | No | Yes/no |
| Password (PASSd) | 0000 | 0000 to 9999 |
| EnERGY (EnERGY) | rESOLU | rESOLU/COUNtr |
| StArt.A (StArt.A) | 0.400 | 0.2% to 10 % of fullscale |
| Display update time (diSP.Ut) | 1.000 | 1 to 5 seconds |
| Display increment time during autoscroll (Auto.t) | 5.000 | 1 to 10 seconds |
| Slot change over trip (S.CHG.tr) | no | Yes/no |

### 5.5. Enabling and Disabling Auto Scrolling

Press DOWN for 6 secs
Display Shows: EnAbLE Auto.sc
Again press DOWN for 6 sec
Display Shows: diSAbL Auto.sc

### 5.6.Clearing Parameter

- Press UP + DOWN to enter Clear Mode
- Press DOWN to enter Password (0000 Default)
- Press E to clear
- Select :
  - CLR. int to clear integrator (all energy parameter)
  - CLR. Hi. L clear max or min value
  - CLR. Md clear max demand
- Once parameter to be cleared is selected it prompt to "y" (YES) or "n" (no) for conformation

## 6. Memory Map

| Address | Parameter | Data Type |
|---|---|---|
| 40101 | Watts total | float |
| 40103 | Watts R phase | float |
| 40105 | Watts Y phase | float |
| 40107 | Watts B phase | float |
| 40109 | VAR Total | float |
| 40111 | VAR R phase | float |
| 40113 | VAR Y phase | float |
| 40115 | VAR B phase | float |
| 40117 | PF Ave. (Inst.) | float |
| 40119 | PF R phase | float |
| 40121 | PF Y phase | float |
| 40123 | PF B phase | float |
| 40125 | VA total | float |
| 40127 | VA R phase | float |
| 40129 | VA Y phase | float |
| 40131 | VA B phase | float |
| 40133 | VLL average | float |
| 40135 | Vry phase | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40137 | Vyb phase | float |
| 40139 | Vbr phase | float |
| 40141 | VLN average | float |
| 40143 | V R phase | float |
| 40145 | V Y phase | float |
| 40147 | V B phase | float |
| 40149 | Current Total | float |
| 40151 | Current R phase | float |
| 40153 | Current Y phase | float |
| 40155 | Current B phase | float |
| 40157 | Frequency | float |
| 40159 | Wh Received | float |
| 40161 | VAh Received | float |
| 40163 | VARh Ind. Received | float |
| 40165 | VARh Cap. Received | float |
| 40175 | PF average Received | float |
| 40177 | Amps average Received | float |
| 40183 | Neutral Current | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40185 | Voltage R Harmonics | float |
| 40187 | Voltage Y Harmonics | float |
| 40189 | Voltage B Harmonics | float |
| 40191 | Current R Harmonics | float |
| 40193 | Current Y Harmonics | float |
| 40195 | Current B Harmonics | float |
| 40197 | Rising Demand | float |
| 40199 | Forecast Demand | float |
| 40201 | Maximum Demand | float |
| 40215 | RPM | float |
| 40217 | Load Hours Received | Unsigned long |
| 40221 | No of interruptions | Unsigned long |
| 40223 | MD Occurrence time | Unsigned long |
| 40271 | Additional Load | float |
| 40285 | VLL max | float |
| 40287 | VLL min | float |
| 40289 | VLN max | float |
| 40291 | VLN min | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40293 | Amps max | float |
| 40295 | Amps min | float |
| 40297 | Frequency max | float |
| 40299 | Frequency min | float |
| 40301 | Watts max | float |
| 40303 | Watts min | float |
| 40305 | VAR max (absolute max) | float |
| 40307 | VAR min (absolute min) | float |
| 40309 | VA max | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40233 | Voltage R phase angle | float |
| 40235 | Voltage Y phase angle | float |
| 40237 | Voltage B phase angle | float |
| 40239 | Current R phase angle | float |
| 40241 | Current Y phase angle | float |
| 40243 | Current B phase angle | float |
| 40245 | Energy( Wh) TOD Slot1 | float |
| 40247 | Energy( Wh) TOD Slot2 | float |

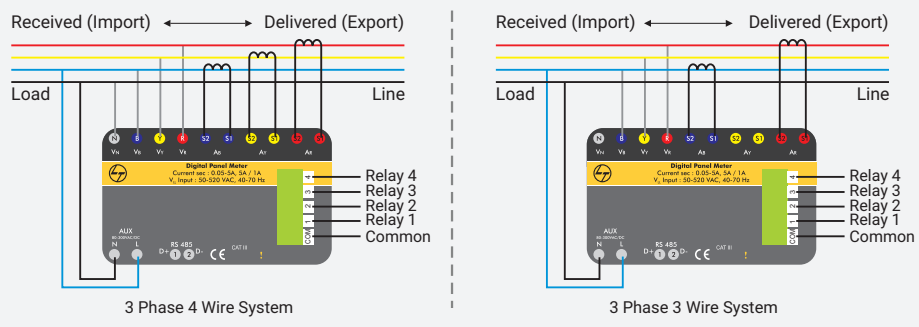
| Address | Parameter | Data Type |
|---|---|---|
| 40249 | Energy( Wh) TOD Slot3 | float |
| 40251 | Energy( Wh) TOD Slot4 | float |
| 40253 | Energy( Wh) TOD Slot5 | float |
| 40255 | Energy( Wh) TOD Slot6 | float |
| 40259 | Voltage Unbal R Phase | float |
| 40261 | Voltage Unbal Y Phase | float |
| 40263 | Voltage Unbal B Phase | float |
| 40265 | Current Unbal R Phase | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40267 | Current Unbal Y Phase | float |
| 40269 | Current Unbal B Phase | float |
| 40311 | VA min | float |
| 40313 | PF max (absolute max) | float |
| 40315 | PF min (absolute min) | float |
| 40325 | Maximum demand Slot1 value | float |
| 40327 | Maximum demand Slot2 value | float |
| 40329 | Maximum demand Slot3 value | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40331 | Maximum demand Slot4 value | float |
| 40333 | Maximum demand Slot5 value | float |
| 40335 | Maximum demand Slot 6 value | float |
| 40337 | Maximum demand TOD slot 1 occ Time | Unsigned long |
| 40339 | Maximum demand TOD slot 1 occ Date | Unsigned long |
| 40341 | Maximum demand TOD slot 2 occ Time | Unsigned long |
| 40343 | Maximum demand TOD slot 2 occ Date | Unsigned long |
| 40345 | Maximum demand TOD slot 3 occ Time | Unsigned long |
| 40347 | Maximum demand TOD slot 3 occ Date | Unsigned long |

| Address | Parameter | Data Type |
|---|---|---|
| 40349 | Maximum demand TOD slot 4 occ Time | Unsigned long |
| 40351 | Maximum demand TOD slot 4 occ Date | Unsigned long |
| 40353 | Maximum demand TOD slot 5 occ Time | Unsigned long |
| 40355 | Maximum demand TOD slot 5 occ Date | Unsigned long |
| 40357 | Maximum demand TOD slot 6 occ Time | Unsigned long |
| 40359 | Maximum demand TOD slot 6 occ Date | Unsigned long |
| 40491 | K factor Voltage R phase | float |
| 40493 | K factor Voltage Y phase | float |
| 40495 | K factor Voltage B phase | float |
| 40497 | K factor Current R phase | float |
| 40499 | K factor Current Y phase | float |
| 40501 | K factor Current B phase | float |

## 7. Wiring Diagram




## 8. MD Controller :

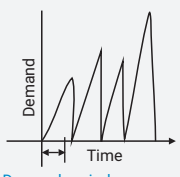
MD Controller 6000 series is a device that measures the maximum demand and intelligently trips/ restores loads based on the load priorities. The MD control feature helps to utilize load optimally, always ensuring not to cross the sanctioned demand, thereby avoiding heavy penalties imposed by electricity boards. It has a real time clock, which can be set in synchronization with EB meter.

MD controller monitors the demand of the plant and compares it to a set maximum value. Non-essential loads can be switched off automatically when the actual demand exceeds the set point.

Maximum Demand controller measures demand in the system and stores the maximum value recorded in non-volatile memory. Maximum Demand is the power consumed over a predetermined period of time. The most common integration period usually is 15 / 30 minutes.

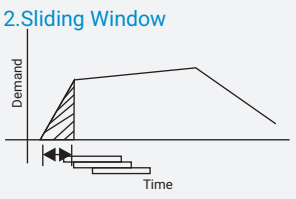
### Methods of calculating Max demand

#### 1.Block Window




In the block window method, user has the flexibility to select an integration period called 'block' i.e. time that the device takes for calculation of demand. This window slides with every demand period. The device calculates and updates the demand value at the end of the period. The timing has to be synchronized with EB meter manually. At the end of demand period it will return to zero. This method is usually selected for fairly stable load. The graphical representation of block window shows that the user can set the demand integration time.

#### 2.Sliding Window




This window slides every 1 second (update time), so it automatically synchronizes with EB meter. But at the end of the demand period it doesn't return to zero. This is the better method of measurement for the fluctuating load. The graphical representation of sliding window is shown below.

### Methods of demand control

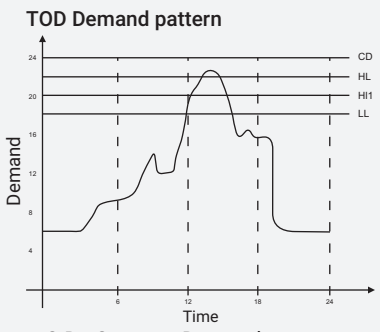
**1. Forecast Demand Control:**

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 proactive action. The user can then shed some non-critical loads. 4 relays are used to control the demand

1. If Forecast Demand > High Limit, relay 2 shall be activated and if Forecast Demand < High Limit relay 2 shall be OFF.
2. If Rising Demand > High Limit 1, relay 3 shall be activated and if Rising Demand < High Limit 1, relay 3 shall be OFF
3. If Rising Demand > High Limit, relay 4 shall be activated as a final trip and when Rising Demand < High Limit, relay 4 shall be OFF.
4. Once the rising demand comes down to the safe limit i.e Low Limit, relay 1 shall reconnect.

| Condition | Relay 1 | Relay 2 | Relay 3 | Relay 4 |
|---|---|---|---|---|
| Low limit | ON | OFF | OFF | OFF |
| Forecast Demand > Low Limit | OFF | OFF | OFF | OFF |
| Forecast Demand > High Limit | OFF | ON | OFF | OFF |
| Rising Demand > High Limit 1 | OFF | ON | ON | OFF |
| Rising Demand > High Limit | OFF | ON | ON | ON |
| Rising Demand <High Limit | OFF | Y | ON | OFF |
| Rising Demand <High Limit1 | OFF | Y | OFF | OFF |
| Forecast Demand <High Limit | OFF | OFF | X | X |
| Rising Demand < Low limit | ON | OFF | OFF | OFF |
| X – depends on Rising Demand | | | | |
| Y- depends on Forecast demand | | | | |

**TOD Demand pattern**




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

**2.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 (0.5% 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 2016 edit it to 2015).
4. Enter once again to setup and set the right password.
5. Press the down key until it reaches 'Year' page at the setup.
6. Edit the current year (Eg. edit to 2016 for the above example)
7. Press the DOWN Key, till the meter displays Save YES
8. Wait till the EB meter reads zero. Press the right key the moment EB meter displays zero.
9. 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.

## 9. Troubleshooting

1) Meter display does not turn ON.
   a) Check that there is power supply applied on Aux supply terminals.
   b) Check fuse connection (Use fuse connection of specified ratings).
2) Data displayed / reading incorrect.
   a) Check that CT /PT ratios are properly set.
   b) Check if proper configuration mode 3P4W, 3P3W, 1Phase is correctly set.
3) Pt reading are incorrect / Active Power reading is negative.
   a) CT connections may be reversed, check and correct CT connection.
   b) Check voltage and current phases are connected in proper sequence.
4) RS485 communication does not work.
   a) Check baud rate & parity maintained in the connected computers is same as Meter.
   b) Memory mapping in software is correct.
   c) Check Slave ID of meter is Unique & properly maintained.
   d) Check converter is working properly.

## 8. Mounting Dimensions





**In case of complaint please contact**

CUSTOMER INTERACTION CENTRE (CIC)
TOLL-Free: 1800 233 5858, 1800 200 5858
Telephone : 022 6774 5858
email: cic@LNTEBG.com


WL60000501A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LARSEN & TOUBRO

# INSTRUCTION MANUAL

Digital Panel Meter

Max Demand Controller

6000 LCD Series

Manufacturer assumes no responsibility for a hazard or damage caused by incorrect or non-application of any of the instructions attached herein. Under no circumstance shall Larsen & Toubro be liable for any consequential or resulting injury or for loss, damage or expense directly or indirectly from the use of this product. Sufficient care is taken to provide all information regarding the product but Larsen & Toubro does not claim any responsibility for the damage caused by using the product directly or indirectly.Use according to the operating instructions, professional practises, wiring rules, codes, safety regulations applicable to the given installation.

During normal operation of this instrument ,hazardous voltages are present at the rear terminals, which can cause injury or death. Installation ,disconnection or removal of the meter should be carried out only by qualified, trained personnel, after de-energizing connected circuits. Improper installation , including improper grounding will void warranty. Product warranty void if seal is broken.

## 1.Features

- Accuracy class 1 as per IEC 62053-21 & Class 0.5S as per IEC 62053-22
- True RMS measurement
- Password protection provision
- Phase wise Voltage & Current wave forms in LCD meter
- Site selectable for 3 P 4 W, 3 P 3 W, 1 P
- Maximum demand measurement with Real time clock
- Time of Day (TOD) provision is available
- 6 Demand and 6 Energy option with MD occurrence captured for each TOD
- 4 relay outputs available for proper load control
- Data logging provision is available
- Freeze mode provision is available
- Terminals with sealing provision (optional)
- Direct access key for Basic parameters, Power and Energy parameters

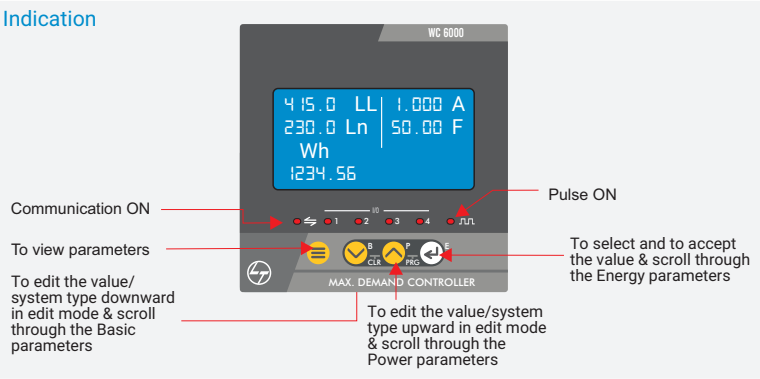
## 2. Technical Specification

| | | |
|---|---|---|
| Type of measurement | Type | 3 Ph 4 W, 3 Ph 3 W, 1 Ph |
| | | True RMS, 128 samples per cycle, 1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21 |
| | | Class 0.5, 0.5s as per IEC 62053-22 |
| Display type and resolution | LCD | 4 digit for instantaneous and 6 digits for cumulative |
| Measuring circuit | Input voltage | 50 - 550 $V_{LL}$ |
| | | PT Primary and Secondary user programmable for LT and HT applications |
| | | Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable |
| | | Current range from 10% to 120% of In (50mA-6A), Starting current : 0.4% of full scale |
| | | CT Primary and Secondary user programmable for LT and HT applications |
| | Frequency | 40 - 70 Hz |
| Auxiliary circuit | Aux voltage | 80 - 300VAC/DC |
| | Aux burden | <5VA |
| | Freq range | 40 - 70 Hz |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62053-21 |
| | Short time over current protection | 10A max continuous, 20 times of In for 3 sec |

| | | |
|---|---|---|
| Electro-magnetic compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V/m as per IEC 61000-4-6 |
| | Surge immunity test | ±6 kV as per IEC 61000-4-5 |
| | Rated power frequency magnetic fields | 1 A/m as per IEC 61000-4-8 |
| | Emission | Class B as per CISPR 22 |
| Insulation properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| | Insulation resistance | 500 V DC as per IS 13779 |
| Operating conditions | Operating temperature | -10° C to +55° C |
| | Storage temperature | -25° C to +70° C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical conditions | Shock | As per standard IEC 60068-2 |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Safety | Measurement category | CAT III |
| | Pollution degree | 2 |
| | Protection | IP20 at terminals, IP51 on front |

| | | |
|---|---|---|
| Weight & dimensions | Product weight | 300 gms |
| | Bezel dimension (W x H x D) | 96 x 96 x 58 mm |
| | Panel cutout | 92 x 92 mm $^{+0.8}_{-0.0}$ |
| Outputs | | Meter constant: 10000/(external CT ratio x PT ratio) |
| Communication | Type | RS485 port Modbus RTU |
| | Baud rate | 2400, 4800, 9600, 19200 bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## 3. LED Indication




## 4. Display Of Parameters

| Display | Meaning | Display | Meaning | Display | Meaning | Display | Meaning | Display | Meaning | Display | Meaning |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LL | Voltage Line to Line | RPM | Revolution Per Minute | A.thd | Amps THD | Wh | Active Energy Received | Intr | Number of Interrupts | AL | Additional Load |
| Ln | Voltage Line to Neutral | V.Ph.ANG | Voltage Phase Angle | A.thd31 | Amps THD Ph.-wise upto 31st Level | Vah | Apparent Energy | U.thd0. | Voltage THD Ph-wise upto 31st level | Et | Elapse Time |
| rY | Voltage RY Phase | A.Ph.ANG | Current Phase Angle | K.FACt.U. | K-Factor V | VArh.L | Reactive Inductance Energy | On.hr | On Hour | HI | High Level of Parameter |
| Yb | Voltage YB Phase | Un.BAL.V | Unbalance Voltage | K.FACt.A. | K-Factor A | VArh.C | Reactive Capacitance Energy | O | Old | Lo | Low Level of Parameter |
| br | Voltage BR Phase | Un.BAL.A | Unbalance Current | W | Watts Total | AVG | Average | CLr | Clear | b | Baud Rate |
| A | Current Average | V.thd | Voltage THD | VA | Total VA | Ld.Hr. | Load Hour | rd | Rising Demand | d | Delivered |
| F | Frequency | Ah | Amps hour | Vr | Total VAR | L | Lagging Power Factor | Fd | Forecast Demand | C | Leading Power factor |
| An | Neutral Current | M1-M6 | No. of Demand Slots | PF | Power Factor | S1-S6 | No. of Energy Slots | Md | Maximum Demand | cLoc | Real Time Clock |

### Precautionary Measures to be taken while Wiring the Circuit :

- Turn OFF the power to the circuit, when wiring the circuit. Connecting or removing measurement cables while the power is turned ON is dangerous
- Take special caution not to wire a current measurement circuit to the voltage input terminal or vice-versa
- Strip the insulation cover of the measurement cable so that when it is wired to the input terminal, the conductive parts (bare wires) do not protrude from the terminal. It is recommended to use appropriate pre lug after crimping the wire. Also, make sure to fasten the input terminal screws securely so that the cable does not come loose
- Use cables with safety terminals that cover the conductive parts for connecting to the voltage input terminals. Using a terminal with bare conductive parts is dangerous if the terminal comes loose
- After connecting the measurement cable, attach the current input protection cover for your safety. Make sure that the conductive parts are not exposed from the protection cover
- Use the suitable star screw driver and apply optimum torque to prevent damage to the meter terminals

### Preventive Measures :

- Fuse : To avoid the possibility of short circuit, use a slow blow fuse that has a voltage rating VAC : 250V, Fuse current : 200 mA, Breaking capacity : 10kA@ 125 VAC. When replacing a fuse, turn OFF the power and unplug the power cord. Never short the fuse holder

### 5.1 Programming Mode
### Programming keys

ENTER - to enter Edit Mode and save parameter
DOWN - to decrement value or parameter
UP - to increment value or parameter

### 5.2 General Programming Guide

- Press UP + E to enter Programming Mode
- Press Down to enter Password (Default Value 0000)
- Digit blinking indicates Edit Mode is ON
- Press UP or DOWN to increment and decrement value 0/1/2/3/4/5/6/7/8/9
- Press E to edit the next digit till 4th digit
- If Password is correct, meter displays next parameter in editable mode
- If Password is incorrect, meter will display next parameter but cannot be edited

### 5.3 Setting or Configuration of Parameter

- Press E to enter Edit Mode
- Blinking of parameter/value indicates Edit Mode is ON
- Press UP or DOWN to increment/decrement values or to select from available options
- Press E to accept the value of the parameter
- Press DOWN to move to next parameters till end after configuration of last parameter display screen will prompt "SAVE", Display reads "Y" (YES)
- Press Down if changes are not to be saved, display reads "n" (no)
- Press E to save the option

### 5.4 Display :

Row 1: Parameter
Row 2: Options/Set Option

Eg. Row 1: ConFIG
Row 2: 3P 4W


| Parameter | Default setup | Range |
|---|---|---|
| Configuration mode CONFIG | 3P 4W | 3Ph 4W/3Ph 3W/1 Phase |
| PT Primary (Pt.Pri) | 415.0 | 100V - 999kV |
| PT Secondary (Pt. sec) | 415.0 | 50V - 550V |

| | | |
|---|---|---|
| CT Primary (Ct.Pri) | 5.000 | 0.5 A - 99kA |
| CT Secondary (Ct.sec) | 5.000 | 0.5A - 6A |
| VA selection (UA.SEL) | VEC.HAr | Method of VA selection: Arithmetic/Vector harmonics/Vector |
| Year (YEAr) | 2016 | 2012 to 2052 |
| Date (dAtE) | 01.01 | 01.01 to 12.31 |
| Time (TiME) | 00.00 | 00.00 to 23.59 |
| Demand Type (dM.tYPE) | SLIdIn | SlidIn (sliding)/bLOC (block/fixed ) |

| | | |
|---|---|---|
| Demand Parameter (dM.PAR) | Watts | WAttS (Watts)/VAr /A.Avg (Amps Avg)/VA |
| Demand Period (dn.Prd) | 15.00 | 5 to 30 Minutes |
| Demand Control (dM.Cont) | Forc.dm | Forecast/step |
| Demand Slots (dM.Slot) | 6.000 | 1 - 6 |
| Demand Slot1 (dMd.SL.1) | 06.00 | 00.00 - 23.59 |
| Demand Slot2 (dMd.SL.2) | 09.00 | 00.00 - 23.59 |
| Demand Slot3 (dMd.SL.3) | 12.00 | 00.00 - 23.59 |
| Demand Slot4 (dMd.SL.4) | 18.00 | 00.00 - 23.59 |
| Demand Slot5 (dMd.SL.5) | 22.00 | 00.00 - 23.59 |
| Demand Slot6 (dMd.SL.6) | 22.01 | 00.00 - 23.59 |

If demand control type is programmed as Forecast demand following steps is applicable

| | | |
|---|---|---|
| Forecast interval (FC.Int) | 7.000 | 20% to 50% of Demand period |
| Demand Slot1 highest value (SLt.1.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot1 second highest value (SLt.1.H1) | 1700 | 50% to 99% of highest limit (SLt.1.H) |
| Demand Slot1 lowest value (SLt.1.L) | 1300 | 50% to 99% of second highest limit (SLt.1.H1) |
| Demand Slot2 highest value (SLt.2.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot2 second highest value (SLt.2.H1) | 1700 | 50% to 99% of highest limit (SLt.2.H) |
| Demand Slot2 lowest value (SLt.2.L) | 1300 | 50% to 99% of second highest limit (SLt.2.H1) |
| Demand Slot3 highest value (SLt.3.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot3 second highest value (SLt.3.H1) | 1700 | 50% to 99% of highest limit (SLt.3.H) |
| Demand Slot3 lowest value (SLt.3.L) | 1300 | 50% to 99% of second highest limit (SLt.3.H1) |
| Demand Slot4 highest value (SLt.4.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot4 second highest value (SLt.4.H1) | 1700 | 50% to 99% of highest limit (SLt.4.H) |
| Demand Slot4 lowest value (SLt.4.L) | 1300 | 50% to 99% of second highest limit (SLt.4.H1) |
| Demand Slot5 highest value (SLt.5.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot5 second highest value (SLt.5.H1) | 1700 | 50% to 99% of highest limit (SLt.5.H) |
| Demand Slot5 lowest value (SLt.5.L) | 1300 | 50% to 99% of second highest limit (SLt.5.H1) |
| Demand Slot6 highest value (SLt.6.H) | 1800 | 0.5% to 100% of Full scale |
| Demand Slot6 second highest value (SLt.6.H1) | 1700 | 50% to 99% of highest limit (SLt.6.H) |
| Demand Slot6 lowest value (SLt.6.L) | 1300 | 50% to 99% of second highest limit (SLt.6.H1) |

If demand control type is programmed as Step demand following steps is applicable

| | | |
|---|---|---|
| Stepwise Demand Slot1 step1 value (tod.1.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot1 step2 value (tod.1.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot1 step3 value (tod.1.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot1 step4 value (tod.1.S4) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step1 value (tod.2.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step2 value (tod.2.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step3 value (tod.2.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot2 step4 value (tod.2.S4) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step1 value (tod.3.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step2 value (tod.3.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step3 value (tod.3.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot3 step4 value (tod.3.S4) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step1 value (tod.4.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step2 value (tod.4.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step3 value (tod.4.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot4 step4 value (tod.4.S4) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step1 value (tod.5.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step2 value (tod.5.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step3 value (tod.5.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot5 step4 value (tod.5.S4) | 1300 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step1 value (tod.6.S1) | 17.97 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step2 value (tod.6.S2) | 1800 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step3 value (tod.6.S3) | 1700 | 0.5% to 100% of Full scale |
| Stepwise Demand Slot6 step4 value (tod.6.S4) | 1300 | 0.5% to 100% of Full scale |

| | | |
|---|---|---|
| Number of energy slots (no. Slot) | 5 | 1 - 6 |
| Slot1 energy accumulation time (tod.SL.1) | 06.00 | 00.00 - 23.59 |
| Slot2 energy accumulation time (tod.SL.2) | 09.00 | 00.00 - 23.59 |
| Slot3 energy accumulation time (tod.SL.3) | 12.00 | 00.00 - 23.59 |
| Slot4 energy accumulation time (tod.SL.4) | 18.00 | 00.00 - 23.59 |
| Slot5 energy accumulation time (tod.SL.5) | 22.00 | 00.00 - 23.59 |
| Slot6 energy accumulation time (tod.SL.6) | 22.01 | 00.00 - 23.59 |
| Baud rate (bAUd) | 9600 | 2400 to 19.2k |

| | | |
|---|---|---|
| Parity (ParitY) | Even | Even/ Odd/ no |
| Device Id (dEV.Id) | 1.000 | 1.000 to 247.0 |
| No of Poles (POLES) | 4.000 | 1.000 to 28.00 |
| Reverse lock (rEu.LOC) | No | Yes/no |
| Password (PASWd) | 0000 | 0000 to 9999 |
| ENERGY | RESOLU | RESOLU/COUNTR |
| Starting current (START.A) | 0.400 | 0.2% to 10% of full scale |
| Display update time (dISP.U.R) | 1.000 | 1 to 5 seconds |
| Display increment time during autoscroll (Auto.T) | 5.000 | 1 to 10 seconds |
| Power Save Mode | DISABL | DISABL/ENABLE |
| Slot change over trip (S.CHG.tr) | no | Yes/no |

### 5.5. Enabling and Disabling Auto Scrolling

Press DOWN for 6 secs
Display Shows: EnAbLE Auto.sc
Again press DOWN for 6 sec
Display Shows: diSAbL Auto.sc

### 5.6.Clearing Parameter

- Press UP + DOWN to enter Clear Mode
- Press DOWN to enter Password (0000 Default)
- Press E to clear
- Select :
  - CLR. int to clear integrator (all energy parameter)
  - CLR. Hi. L clear max or min value
  - CLR. Md clear max demand
- Once parameter to be cleared is selected it prompt to "Y" (YES) or "n" (no) for conformation

## 6. Memory Map

| Address | Parameter | Data Type |
|---|---|---|
| 40101 | Watts total | float |
| 40103 | Watts R phase | float |
| 40105 | Watts Y phase | float |
| 40107 | Watts B phase | float |
| 40109 | VAR Total | float |
| 40111 | VAR R phase | float |
| 40113 | VAR Y phase | float |
| 40115 | VAR B phase | float |
| 40117 | PF Ave. (Inst.) | float |
| 40119 | PF R phase | float |
| 40121 | PF Y phase | float |
| 40123 | PF B phase | float |
| 40125 | VA total | float |
| 40127 | VA R phase | float |
| 40129 | VA Y phase | float |
| 40131 | VA B phase | float |
| 40133 | VLL average | float |
| 40135 | Vry phase | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40137 | Vyb phase | float |
| 40139 | Vbr phase | float |
| 40141 | VLN average | float |
| 40143 | V R phase | float |
| 40145 | V Y phase | float |
| 40147 | V B phase | float |
| 40149 | Current Total | float |
| 40151 | Current R phase | float |
| 40153 | Current Y phase | float |
| 40155 | Current B phase | float |
| 40157 | Frequency | float |
| 40159 | Wh Received | float |
| 40161 | VAh Received | float |
| 40163 | VARh Ind. Received | float |
| 40165 | VARh Cap. Received | float |
| 40175 | PF average Received | float |
| 40177 | Amps average Received | float |
| 40183 | Neutral Current | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40185 | Voltage R Harmonics | float |
| 40187 | Voltage Y Harmonics | float |
| 40189 | Voltage B Harmonics | float |
| 40191 | Current R Harmonics | float |
| 40193 | Current Y Harmonics | float |
| 40195 | Current B Harmonics | float |
| 40197 | Rising Demand | float |
| 40199 | Forecast Demand | float |
| 40201 | Maximum Demand | float |
| 40215 | RPM | float |
| 40217 | Load Hours Received | Unsigned long |
| 40221 | No of interruptions | Unsigned long |
| 40223 | MD Occurrence time | Unsigned long |
| 40271 | Additional Load | float |
| 40285 | VLL max | float |
| 40287 | VLL min | float |
| 40289 | VLN max | float |
| 40291 | VLN min | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40293 | Amps max | float |
| 40295 | Amps min | float |
| 40297 | Frequency max | float |
| 40299 | Frequency min | float |
| 40301 | Watts max | float |
| 40303 | Watts min | float |
| 40305 | VAR max (absolute max) | float |
| 40307 | VAR min (absolute min) | float |
| 40309 | VA max | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40233 | Voltage R phase angle | float |
| 40235 | Voltage Y phase angle | float |
| 40237 | Voltage B phase angle | float |
| 40239 | Current R phase angle | float |
| 40241 | Current Y phase angle | float |
| 40243 | Current B phase angle | float |
| 40245 | Energy( Wh) TOD Slot1 | float |
| 40247 | Energy( Wh) TOD Slot2 | float |

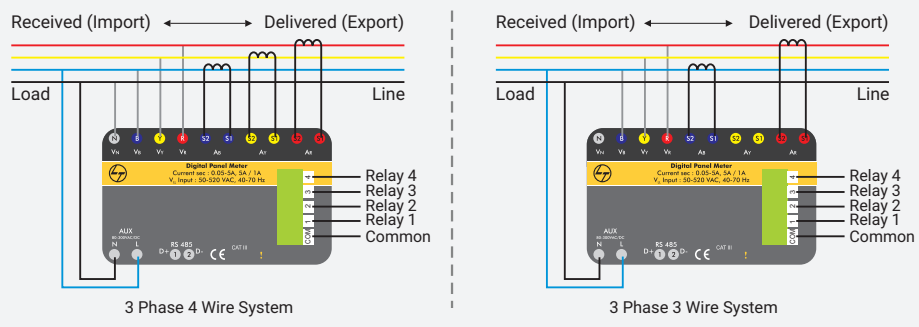
| Address | Parameter | Data Type |
|---|---|---|
| 40249 | Energy( Wh) TOD Slot3 | float |
| 40251 | Energy( Wh) TOD Slot4 | float |
| 40253 | Energy( Wh) TOD Slot5 | float |
| 40255 | Energy( Wh) TOD Slot6 | float |
| 40259 | Voltage Unbal R Phase | float |
| 40261 | Voltage Unbal Y Phase | float |
| 40263 | Voltage Unbal B Phase | float |
| 40265 | Current Unbal R Phase | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40267 | Current Unbal Y Phase | float |
| 40269 | Current Unbal B Phase | float |
| 40311 | VA min | float |
| 40313 | PF max (absolute max) | float |
| 40315 | PF min (absolute min) | float |
| 40325 | Maximum demand Slot1 value | float |
| 40327 | Maximum demand Slot2 value | float |
| 40329 | Maximum demand Slot3 value | float |

| Address | Parameter | Data Type |
|---|---|---|
| 40331 | Maximum demand Slot4 value | float |
| 40333 | Maximum demand Slot5 value | float |
| 40335 | Maximum demand Slot 6 value | float |
| 40337 | Maximum demand TOD slot 1 occ Time | Unsigned long |
| 40339 | Maximum demand TOD slot 1 occ Date | Unsigned long |
| 40341 | Maximum demand TOD slot 2 occ Time | Unsigned long |
| 40343 | Maximum demand TOD slot 2 occ Date | Unsigned long |
| 40345 | Maximum demand TOD slot 3 occ Time | Unsigned long |
| 40347 | Maximum demand TOD slot 3 occ Date | Unsigned long |

| Address | Parameter | Data Type |
|---|---|---|
| 40349 | Maximum demand TOD slot 4 occ Time | Unsigned long |
| 40351 | Maximum demand TOD slot 4 occ Date | Unsigned long |
| 40353 | Maximum demand TOD slot 5 occ Time | Unsigned long |
| 40355 | Maximum demand TOD slot 5 occ Date | Unsigned long |
| 40357 | Maximum demand TOD slot 6 occ Time | Unsigned long |
| 40359 | Maximum demand TOD slot 6 occ Date | Unsigned long |
| 40491 | K factor Voltage R phase | float |
| 40493 | K factor Voltage Y phase | float |
| 40495 | K factor Voltage B phase | float |
| 40497 | K factor Current R phase | float |
| 40499 | K factor Current Y phase | float |
| 40501 | K factor Current B phase | float |

## 7. Wiring Diagram




## 8. MD Controller :

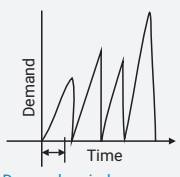
MD Controller 6000 series is a device that measures the maximum demand and intelligently trips/ restores loads based on the load priorities. The MD control feature helps to utilize load optimally, always ensuring not to cross the sanctioned demand, thereby avoiding heavy penalties imposed by electricity boards. It has a real time clock, which can be set in synchronization with EB meter.

MD controller monitors the demand of the plant and compares it to a set maximum value. Non-essential loads can be switched off automatically when the actual demand exceeds the set point.

Maximum Demand controller measures demand in the system and stores the maximum value recorded in non-volatile memory. Maximum Demand is the power consumed over a predetermined period of time. The most common integration period usually is 15 / 30 minutes.

### Methods of calculating Max demand

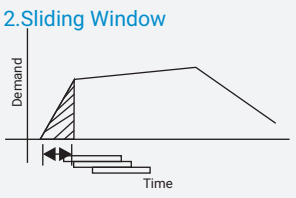
#### 1.Block Window



Demand period

In the block window method, user has the flexibility to select an integration period called 'block' i.e. time that the device takes for calculation of demand. This window slides with every demand period. The device calculates and updates the demand value at the end of the period. The timing has to be synchronized with EB meter manually. At the end of demand period it will return to zero. This method is usually selected for fairly stable load. The graphical representation of block window shows that the user can set the demand integration time.

#### 2.Sliding Window




This window slides every 1 second (update time), so it automatically synchronizes with EB meter. But at the end of the demand period it doesn't return to zero. This is the better method of measurement for the fluctuating load. The graphical representation of sliding window is shown below.

### Methods of demand control

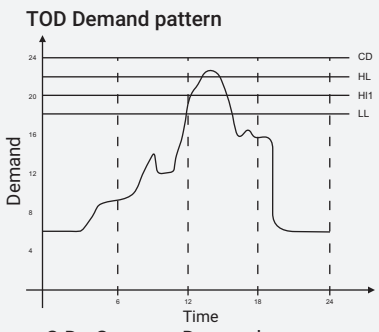
**1. Forecast Demand Control:**

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 proactive action. The user can then shed some non-critical loads. 4 relays are used to control the demand

1. If Forecast Demand > High Limit, relay 2 shall be activated and if Forecast Demand < High Limit relay 2 shall be OFF.
2. If Rising Demand > High Limit 1, relay 3 shall be activated and if Rising Demand < High Limit 1, relay 3 shall be OFF
3. If Rising Demand > High Limit, relay 4 shall be activated as a final trip and when Rising Demand < High Limit, relay 4 shall be OFF.
4. Once the rising demand comes down to the safe limit i.e Low Limit, relay 1 shall reconnect.

| Condition | Relay 1 | Relay 2 | Relay 3 | Relay 4 |
|---|---|---|---|---|
| Low limit | ON | OFF | OFF | OFF |
| Forecast Demand > Low Limit | OFF | OFF | OFF | OFF |
| Forecast Demand > High Limit | OFF | ON | OFF | OFF |
| Rising Demand > High Limit 1 | OFF | ON | ON | OFF |
| Rising Demand > High Limit | OFF | ON | ON | ON |
| Rising Demand <High Limit | OFF | Y | ON | OFF |
| Rising Demand <High Limit1 | OFF | Y | OFF | OFF |
| Forecast Demand <High Limit | OFF | OFF | X | X |
| Rising Demand < Low limit | ON | OFF | OFF | OFF |
| X – depends on Rising Demand | | | | |
| Y- depends on Forecast demand | | | | |

**TOD Demand pattern**




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

**2.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 (0.5% 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 2016 edit it to 2015).
4. Enter once again to setup and set the right password.
5. Press the down key until it reaches 'Year' page at the setup.
6. Edit the current year (Eg. edit to 2016 for the above example)
7. Press the DOWN Key, till the meter displays Save YES
8. Wait till the EB meter reads zero. Press the right key the moment EB meter displays zero.
9. 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.

## 9. Troubleshooting

1) Meter display does not turn ON.
   a) Check that there is power supply applied on Aux supply terminals.
   b) Check fuse connection (Use fuse connection of specified ratings).
2) Data displayed / reading incorrect.
   a) Check that CT /PT ratios are properly set.
   b) Check if proper configuration mode 3P4W, 3P3W, 1Phase is correctly set.
3) Pt reading are incorrect / Active Power reading is negative.
   a) CT connections may be reversed, check and correct CT connection.
   b) Check voltage and current phases are connected in proper sequence.
4) RS485 communication does not work.
   a) Check baud rate & parity maintained in the connected computers is same as Meter.
   b) Memory mapping in software is correct.
   c) Check Slave ID of meter is Unique & properly maintained.
   d) Check converter is working properly.

## 8. Mounting Dimensions





**In case of complaint please contact**

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