

EMV

Series of Electronic Meters offer all of the benefits associated with the very latest in design of Solid State Electricity Metering. Highly secure, reliable and extremely accurate, EMV Meter provides a comprehensive tariff structure suitable for the most complex commercial and industrial metering applications. EMV is Multi Rate (Time of day) total static (solid state) Poly- phase energy meters capable of measuring MDI-KW, KWH, & KVARH along with other quantities and built-in programmable features that make it Ideal for use at the High End Market where both accuracy and performance are vital.



SYED BHAIS

We Measure Energy



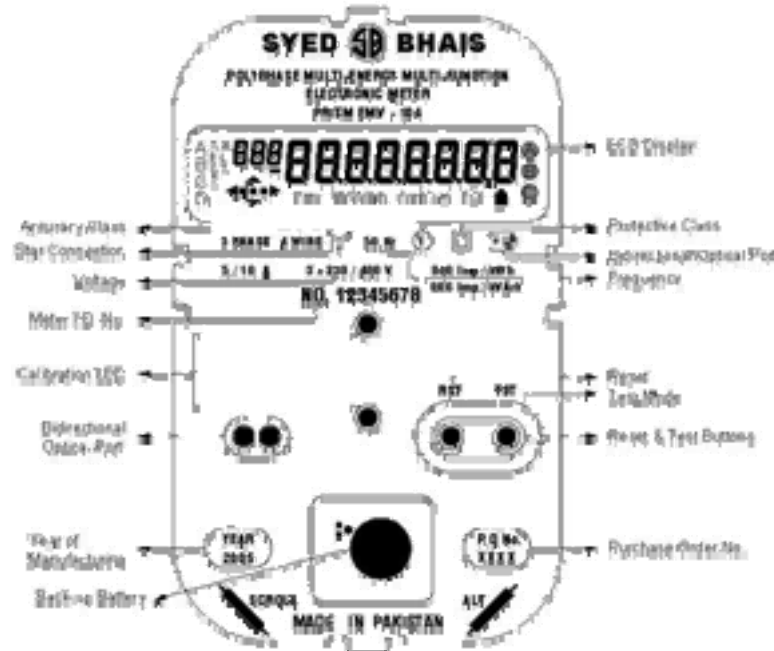
**POLYPHASE VECTOR ELECTRONIC METER
TYPE PRISM EMV – 104 (LT)
MULTI-ENERGY, MDI, MULTI-RATE METER**

Technical Specifications

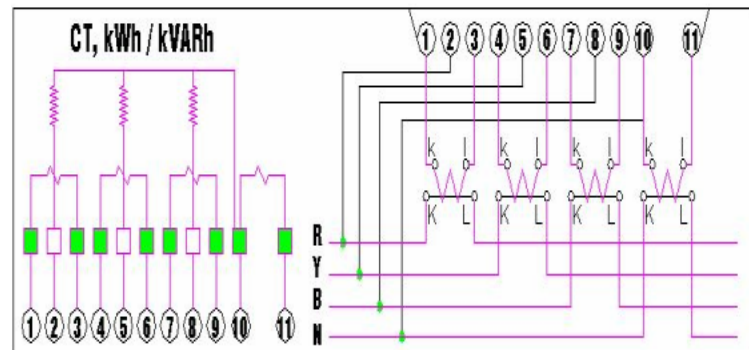
ELECTRICAL SPECIFICATIONS		INSULATION	
Voltage – Three Phase	3X230/400V	Impulse Voltage Test	8kV, IEC 62053 – 21
Frequency	50Hz±10% (45Hz - 55Hz)	AC Voltage Test	4kV rms, 1 min. IEC 60060 – 1
Basic Current	Ib = 5A	CONSUMPTION	
Maximum Current	I _{max} = 10A	Voltage Circuits	< 2W, 8VA
Starting Current	I _s ≤ 10 mA	Current Circuits	< 4VA (at Basic Current)
Accuracy	Class 1 according to IEC 62053-21, 062053-23	COMMUNICATIONS	
Meter Constant	800 Pulses / kWh & kVarh		• ANSI C12.18
Storage of Data	Non-volatile memory (EEPROM)		• Serial Interface RS-232
IMMUNITY TO EXTERNAL DISTURBANCES		ENVIRONMENTAL CONDITIONS	
Electrostatic Discharges	IEC 61000 – 4 – 2	Ambient Temperature	- 25 °C to + 60 °C (Normal Range)
Surge Immunity	IEC 61000 – 4 -5		- 25 °C to + 85 °C (limit Range)
Fast Transient Burst	IEC 61000 – 4 – 4		- 25 °C to + 85 °C (Storage Range)
Radio Interference	IEC 61000 – 4 – 3	Relative Humidity	Up to 95% Non-condensing
DC Magnetic Field	> 1,000 Atums	MECHANICAL DATA	
AC Magnetic Field	> 400 Atums	Dimensions (HxWxL)	(130mm x 210mm x 290mm)
		Weight	2.6 Kg.

Features

- IEC 62053-21 & 62053-23 Compliant
- Multi-Energy Measurement, Recording & Billing
- Phase Current, Voltage, Frequency & Power Factor
- Maximum Demand with programmable Demand integration period
- Facility to Reset MDI manually and automatically
- Optocom / Bi-Directional Communication Port
- Real-time Load Profiling
- Large Digit Liquid Crystal Display (LCD)
- Internal Real Time Clock and Calendar with Battery Back-up. Battery is field replaceable
- Annual Calendar Programmable for 4 seasons, 4 Tariffs/Rates daily, minimum 100 programmable dates/days to account for holidays and weekends are available
- Extensive Security Features Along with Diagnostics and Cautions Alerts
- Meter keeps on recording/operating as long as voltage exists on any two terminal of the meter with or without neutral
- Register full energy even if only two wires are connected; phase and neutral or phase and phase only
- 3 display modes are provided normal, alternate and test modes with indication
- Meter has a soft Meter Reading Multiplier to avoid complex calculations with Meter Output Data
- High Accuracy having No Tilt Error & High Environmental Stability
- More than 15 Years Product life with Upgradeability Options



Connection Diagram



Basic Data Recording and Storage

- Four TOD periods Energies (kWh)
- Four TOD periods Energies (kVarh)
- Four TOD periods Maximum Demand (kW)
- Four TOD periods Max. Demand History (kW)
- Four TOD periods Cumulative Maximum Demand (kW)
- No. of Resets along with Date and Time Stamp.
- Present Interval Demand
- Time Left in Interval
- Average Power Factor, Continuous and By Rate.
- Last Six Months Billing Data kWh, kVarh, kW continuous and by rate.
- Copy of last 16 Months Overall Energies and Maximum Demand.
- Reset of Maximum Demand available on
 - Automatic on pre-defined dates
 - Manual Reset

Security Features and Event Recording

Security Features

- Meter Possesses a Unique Meter Serial no. that is also stored in Non-Volatile Memory.
- Meter keeps record of Total No. of times Programmed and the identification of the last programmer along with Date and Time Stamp.
- A Programmable Meter ID Code is also available in the Meter Firmware.
- Three levels of access/security codes are available.
- Meter does keep on recording/operating as long as any voltage exists with or without neutral connection.
- No access to manual Programming of the Meter.
- User Name and Address can be programmed into meter.
- Magnetic Alternate Mode button provided to avoid user access to meter board
- Sealable Reset and Test Mode buttons.
- The meter is protected against external Strong Electromagnet/Radar Magnet, Mobile phones interference and complies with all relevant IEC standards for functional performance and loss of data.

Event Logs

150 total events are recorded in the meter at any one time before Roll Over. These include

- Log of Power Outages & Restoration.
- Reset Demand (Both Automatic and Manual)
- Low Battery & Off Battery

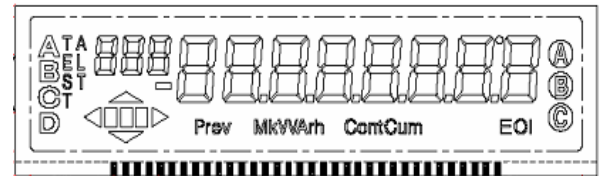
- Maximum Demand (total and of each TOU rate)
- Meter programmed
- Total No. of Power Outages.
- Phase Failure and Disconnection of wires excluding Neutral Wire.
- Reverse Energy Flow & Reverse Polarity.
- Meter Terminal Cover or Meter Casing Opened.
- Log of Optical Communication.
- Diagnostics and Cautions
- Sudden Unbalance of Current

The logged events can be downloaded from meter by reading meter through Optocom port. These events are arranged date-wise in generated report.

Load Profiling/Recording

- Two Channels are available for recording any of the two quantities (including Energies, Power Factor, Currents and Voltages per Phase and Cumulative) for the duration of 90 Days with 30 Minutes Interval.
- Load Profile is permanently available in the meter memory and can be downloaded any time through optical communication.

Display



- LCD type with 8 digits for Energy consumption.
- Three small digits for Sequence number of quantity being displayed
- Display scrolling time is programmable (1 to 255s). (Default is 7 seconds).
- Display unit is programmable (W/kW). (Default is kWh & kW).
- Three programmable Display modes are available. Normal Mode, Alternate Mode & Test Display Mode.
- Phase Indicators are permanently displayed in all Display modes.
- All Segment Check is provided upon power up to check functionality of all segments.
- Display Mode Indicator.
- Display Quantity Labels.
- Pulse Output for field testing of Meter is provided.
- TOU Tariff Rate indicators

Voltage & Current Annunciators

3 voltage Annunciators are provided on right side of LCD.

- A represents phase A (also called Red phase)
- B represents phase B (also called Yellow phase)
- C represents phase C (also called Blue phase)

These annunciators remain ON while voltage at corresponding terminal is greater than 180 volts. When voltage drops below this limit, corresponding annunciators starts blinking (1 Sec ON, 1 Sec OFF). This is the indication of Low voltage. If voltage is below 120 volts, corresponding annunciators blanks. This represents phase outage. There can be variation of + 5V in voltage range on which these phase annunciators operate.

Similarly the Circle around each Phase Voltage Annunciator indicates Current Flowing through the Phase. Current Annunciator Indicating Threshold is programmable.

End of Interval Indication (EOI)

At the end of each programmable interval of demand calculation EOI indicator will remain ON for five seconds. This indicates the completion of current demand interval and availability of new MDI calculation as previous interval. It will also update Maximum kW if current interval demand exceeds the previous Max. kW. (Scroll item 9 in normal display mode).

Tariff Indicators

On left side of LCD 4 letters are provided vertically as T1, T2, T3, and T4. One of these indicators is ON if meter is programmed for TOU metering. Each indicator represents current tariff rate.

Quadrant Wise Energy Flow Direction

Forward, Reverse, Up and Down arrows are provided along disk analog blocks. These show the Quadrant of energy flowing through meter. Forward arrow represents delivered Active energy flow and reverse arrow shows received Active energy flow through meter. Similarly the Up Arrow indicates, lagging Reactive Energy Flow and the Down Arrow indicates the Leading Reactive Energy Flow.

Zero Suppression

This is programmable feature for all scroll items. We can suppress leading zeroes or disable zero suppression. By default Zero suppression is ON.

Display Modes

Three display modes are provided in meter for flexible operation.

- Normal Mode
- Alternate Mode
- Test Mode

All modes can be further operated in three configurations.

- Auto Scroll Display
- Manual Scroll Display
- Fast Scroll Display

Display Quantities.

More than 150 Display Quantities are programmable in the Meter Programming Software. Default Display Items in Normal & Alternate Modes are given below:

Normal Mode

1. Current Date
2. Standard Time
3. Cumulative Active Energy (kWh)
4. Active Energy (kWh) Rate A
5. Active Energy (kWh) Rate B
6. Cumulative Reactive Energy (kVarh)
7. Reactive Energy (kVarh) Rate A
8. Reactive Energy (kVarh) Rate B
9. Maximum Demand (kW)
10. Maximum Demand (kW) Rate A
11. Maximum Demand (kW) Rate B
12. Cumulative Demand (kW)
13. Cumulative Demand (kW) Rate A
14. Cumulative Demand (kW) Rate B
15. No Of Resets
16. All Segment On
17. Instantaneous Active Power
18. Instantaneous Reactive Power
19. Average Power Factor (Optional)
Cautions (Optional) CAU 01 to CAU 15

Alternate Mode

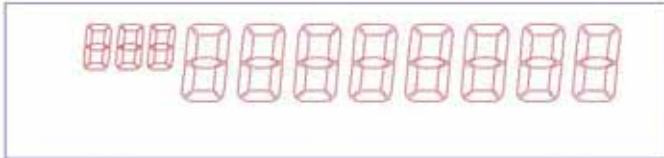
1. Voltage Phase A
2. Voltage Phase B
3. Voltage Phase C
4. Current Phase A
5. Current Phase B
6. Current Phase C
7. Instantaneous Power Factor Phase A
8. Instantaneous Power Factor Phase B
9. Instantaneous Power Factor Phase C
10. No Of Power Outages
11. Meter ID
12. kVarh Leading
13. kVarh Leading Rate A
14. kVarh Leading Rate B
15. Neutral Current
16. Battery Voltage
Diagnostics (Optional) DIAG 01 to DIAG 14

Maximum Demand Reset

There are two Maximum demand Reset (MDI Reset) mechanisms available.

1. Manual MDI Reset Mechanism

Manual MDI Reset mechanism is provided on the meter through a sealable Reset lever. If reset button is pressed once it will be disabled for 5 seconds in order to avoid multiple resets due to human error or mechanical vibrations. When reset is done LCD shows the indication of reset occurrence in form of all segments displayed for 5 seconds as shown in figure below. These all segments also show that for this period reset button is disabled. Upon reset, Rest counter is incremented by 1 which is shown as scroll item 15 in Normal Display Mode. Upon reset the maximum kW is reset to 0 which is scroll item 9 in Normal Display mode. The reading of maximum kW (just before reset) is added to cumulative kW which is displayed item 12 in Normal Display mode. The rate wise registers of Max. kW of Rate A and B (Scroll items 10&11) & respective cumulative kW register of rate A & B (Scroll items 13&14) are also updated in similar manner. Reset counter is capable of storing no of counts from **1 to 65,535** after which it will rollover to 0.



2. Automatic Maximum Demand Reset

Automatic Maximum Demand Reset is programmable on a specified date of each month. This event is executed even in case of Power Outage when battery is installed in meter. For WAPDA Automatic Maximum Demand Reset is programmed on 1st of each month so meter gets reset automatically on 1st of each month at 12.00AM (00.00 hrs).

Battery

- 3.6 Volt Replaceable Lithium-Ion Battery with standard connector is used to maintain real time clock in meter
- Battery has a casing for protection from UV (Ultraviolet) Radiations, the casing is fixed in a Battery enclosure
- Battery maintains time, calendar and Multi-Rate Program for a period of more than two years in case no power is applied to meter.
- Battery has Storage Life of about 20 years.

When battery is dropped to 25% of its rated Ampere Hours, it is considered as low. This is indicated by “CAU 04” indication in normal scroll of meter. The battery should be changed as soon as this indication is displayed. The meter keeps correct date and time even in Low battery condition. However if battery is not replaced over a long period then battery voltage drop to very low levels. This is indicated by “CAU 05” in normal display scroll. Under this condition meter may not be able to maintain correct date and time and as a result meter will disable TOU functionality. If battery is replaced after CAU 05 indication, then meter date and time should be reprogrammed.

Optical Communication

- Meter employs Bi-Directional communication port as per ANSI C12.18 protocol
- The meter can be programmed with DOS based Software through Optocom Port
- Meter Software is highly secure, it provides access as per user requirement
- Three levels of access are available:
 - Administrator
 - Writer
 - Reader
- MDI, TOU and Display entries can be programmed through software
- Optocom Reader can be connected to Serial Port as well as USB Port

EEPROM

Electrically erasable memory is provided to save billing data without use of battery backup. The data also includes last 16 months of billing data, event logs, current billing data and other parameters programmed through meter software.

Please note that for billing purpose one month is considered as interval between two successive Demand Resets (MDI) and not the normal standard month of 30 or 31 days.

Working Limit

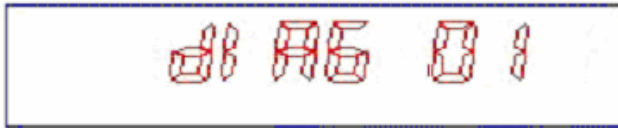
Meter can work accurately even below 120 volts on any phase. When voltage is OFF range on all phases then all metering functionality will be disabled at that stage and no calculation or measurement can be done. The meter goes in low power mode considering it as power outage. However a TOU programmed meter will keep its date and time while taking power from Back up battery.

Diagnostics

Diagnostics are conditions checked by Meter itself. These conditions are properly logged and reported. Each diagnostic is programmable and is displayed on LCD in Alternate Mode.

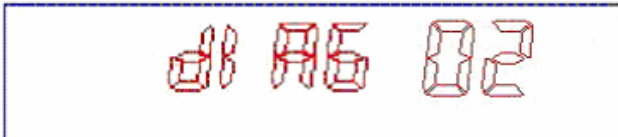
When the diagnostic is cleared, another Event of condition clear is logged and diagnostic is removed from Alt Mode Display.

Diagnostic 01 - Polarity, Cross Phase, Reverse Energy Flow Set/Cleared



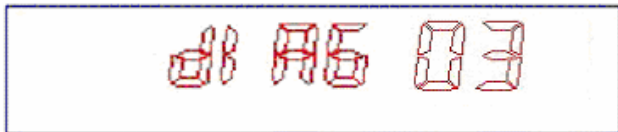
When the angle between current and voltage of each phase is reversed (Angle in 2nd or 3rd Quadrant), the Diagnostic 1 is detected. Another event of Diagnostic clear condition is logged when the diagnostic is cleared.

Diagnostic 02 - Voltage Imbalance Set/Cleared



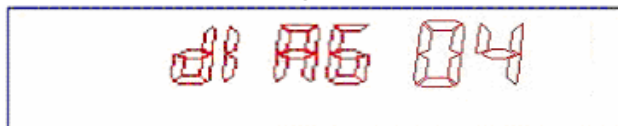
A Diagnostic 2 event is logged along with the voltage out of tolerance (element B or C). Likewise, a Diagnostic Condition Cleared event is logged when the diagnostic is cleared.

Diagnostic 03 - Inactive Phase Current Set/Cleared



A Diagnostic 3 event is logged along with the current out of tolerance (element A, B, or C). Likewise, a Diagnostic Condition Cleared event is logged when the diagnostic is cleared.

Diagnostic 04 - Phase Angle Alert Set/Cleared



A Diagnostic 4 event is logged along with the angle out of tolerance (element B or C voltage, element A, B, or C current). Likewise, a Diagnostic Condition Cleared event is logged when the diagnostic is cleared.

Diagnostic 05 - Under Voltage, Element A Set/Cleared



A Diagnostic 5 event is logged along with the element on which the under voltage occurred (element A only).

Diagnostic 06 - Over Voltage, Element A Set/Cleared



A Diagnostic 6 event is logged along with the element on which the over voltage occurred (element A only).

Diagnostic 07 - High Neutral Current Set/Cleared



A Diagnostic 7 event is logged when the meter detects Current Flowing through the Meter Neutral Wire greater than the threshold value set.

Cautions

The meter detects certain conditions that may affect the Energy Registration or may cross some limits defined by manufacturer or Power System Authority. The conditions are logged and displayed on the meter LCD in Normal Mode. These Cautions remain on LCD Display unless the Meter MDI is Reset.

Caution 01 – Received Energy (Phase A), Set/Cleared



When Energy is Received on Phase A, It is detected and the Meter Logs the Caution as an Event and Displays it on Meter LCD.

Caution 02 – Received Energy (Phase B), Set/Cleared



When the meter is programmed for Energy Delivered Only Mode & Energy Received on Phase B is detected then the Meter Logs the Caution as and Event and Displays it on Meter LCD.

Caution 03 – Received Energy (Phase C), Set/Cleared



When the meter is programmed for Energy Delivered Only Mode & Energy Received on Phase C is detected then the Meter Logs the Caution as and Event and Displays it on Meter LCD

Caution 04 – Low Battery, Set/Cleared



When the Battery Voltage drops below 3.2 Volts, the Low Battery Caution is Set. This Caution is displayed on the LCD Screen and Logged as an Event.

Caution 05 – Off Battery, Set/Cleared



When the Battery Voltages drop further down to 3.1 Volts, the Meter generates a Caution of Off Battery and Logs it as an event as there is no Guarantee of Data and Date/ Time logging after this threshold value

Caution 06 – kVA Overload, Set/Cleared



When the kVA of the meter exceeds the Threshold limit programmed, the Meter logs a Caution and Displays it on the Screen.

Caution 07 – kVar Overload, Set/Cleared



When the kVar of the meter exceeds the Threshold limit programmed, the Meter logs a Caution and Displays it on the Screen.

Caution 08 – kW Overload, Set/Cleared



When the kW of the meter exceeds the Threshold limit programmed, the Meter logs a Caution and Displays it on the Screen.

Caution 09 – Leading kVarh (Phase A), Set/Cleared



When the meter is programmed for Lagging Load Energy Measurement and the Meter detects a leading load, the Caution for leading load is generated and logged for Phase A.

Caution 10 – Leading kVarh (Phase B), Set/Cleared



When the meter is programmed for Lagging Loads Energy Measurement and the Meter detects a leading load, the Caution for leading load is generated and logged for Phase B.

Caution 11 – Leading kVarh (Phase C), Set/Cleared



When the meter is programmed for Lagging Loads Energy Measurement and the Meter detects a leading load, the Caution for leading load is generated and logged for Phase C.

Caution 12 – Terminal Cover Open, Set/Cleared (Optional)



The meter generates a caution if any of the Meter Terminal Cover is Opened.

Caution 13 – Casing Cover Open, Set/Cleared (Optional)



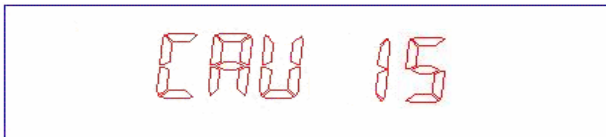
The meter generates a caution if any of the Meter Casing Cover is Opened.

Caution 14 – CT Bypass, Set/Cleared



The meter discriminates between High Neutral Current and CT Bypass Condition. When the Difference between Actual Neutral Current and Phasor Sum of Phase Currents exceeds 20% of Neutral Current, CT Bypass Caution is logged and displayed.

Caution 15 – Disconnection of Wire, Set/Cleared

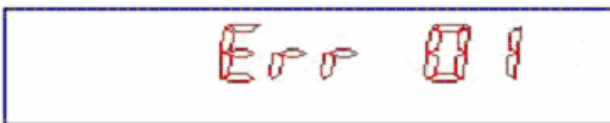


When the meter detects that the Phase Voltage is Zero but the Phase Current is flowing, it generated a caution of Disconnection of Phase Wire.

Errors

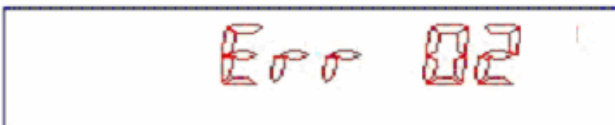
After power-up Meter performs all peripherals check to ensure proper operation. Any error is immediately displayed on LCD and frozen. Following errors can occur in meter. Possible remedy for each error is also suggested along with each error display.

Error 01 – RAM ERROR



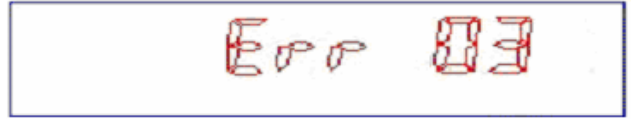
Program memory error or internal RAM error of Microcontroller cause this error to be displayed on LCD.

Error 02 - EEPROM COMMUNICATION ERROR



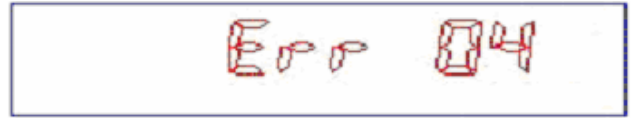
If the meter fails to communicate with the EEPROM, it generates EEPROM Communication Error.

Error 03 – UN PROGRAM METER ERROR



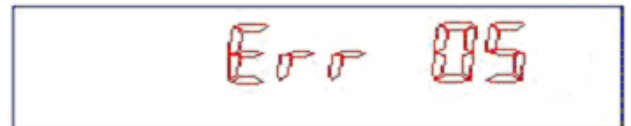
If the meter Program File Generated is not loaded into the Meter, the meter generates the Un-Program Error.

Error 04 – EEPROM CHECKSUM ERROR



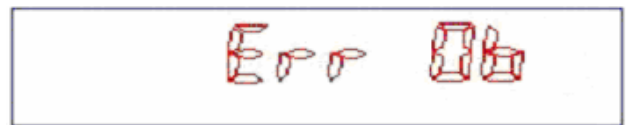
This error occurs when EEPROM does not respond to Microcontroller requests as expected. Possible reason may be EEPROM Checksum or some problem with the interconnection of Microcontroller & EEPROM.

Error 05 – CHECKSUM ERROR



This error indicates that there is some possible corruption of data stored in Flash Memory. If error occurs the meter will switch to a non-operational mode, where only instant values will be processed and no energy counting on demand calculation will be performed. This mode is indicated by freezing error code on LCD. The meter should then be removed from the field and returned for test / repair. It will still contain all measurement data which had been collected up until these errors occurred.

Error 06 – DSP ERROR



Any malfunctioning of DSP chip causes this error to be displayed. This indicates that DSP chip is not communicating with the Microcontroller & subsequently the energy measurement performed by it may also be false.

REMEDY for all Errors

REPLACE THE METER