

## TECHNICAL SPECIFICATION FOR COMMON METER READING INSTRUMENT (CMRI)

This specification covers supply and delivery of Common Meter Reading Instrument (CMRI) for reading (uploading) the data of different make of meters and to have a capability to dump (download) the same to the base computer system.

### 1.0 Standards:

The CMRI shall conform in all respects to the following standards.

- i) CBIP Technical Report no. 111 – Specification for common Meter reading Instrument.
- ii) IEC – 529 – Degree of Protection provided by enclosures
- iii) IS : 12063 : 1987 – Classification of Degree of Protection provided by enclosures of electrical items
- iv) IS 9000: 1979 – Basic environmental testing procedure for electronic & electronic items.
- v) IEC – 1000 – Electromagnetic compatibility
- vi) IEC – 1000-4-2 : 1995 – Electrostatic discharge immunity test
- vii) IEC – 1000-4-3 : 195 – Radiated, radio – frequency electromagnetic field immunity test, Magnetic immunity test
- viii) CISPAR 22 – Limits and method of measurement of radio disturbance characteristics of information technology equipment.

### 2.0 Climatic Conditions:

The CMRI shall be suitable for continuous satisfactory operation under climatic conditions listed below.

- i) Temperature range  
Specified temperature range - 10 deg. C to 50 deg. C  
Limit range for storage & transport - - 25 deg. C to 70 deg. C
- ii) Relative humidity annual mean - <75%  
For 30 days, these days being spared in a natural manner over 1 year – 95 %  
Occasionally on other days – 85 %  
Height above mean sea level – less than 1000M  
Dust storms are liable to occur during the period - March to July  
Average number of thunder storm days – 40 Days  
Average annual rain fall (mm) - 10 to 100cms (depending on area)  
Average number of month of tropical monsoon condition - 4

### 3.0 Principal Parameter

For downloading data of HT/LT Trivector meters, the offered meter reading device is portable, compact and battery powered. It shall be capable of reading

data from various make of Trivector meters equipped with suitable communication port and transferring them on to a base computer system such as an IBM compatible PC.

The offered CMRI compatible to read minimum 60 meters for billing & tamper data with 35 days load survey and CMRI shall be able to display phase / vector diagram of phase current, phase voltage with respective phase angles and phase sequence of voltage at side when these data are read from the meter.

#### 4.0 GENERAL TECHNICAL REQUIREMENT :

##### Physical Characteristics:

i. Size:

CMRI should be handy, light weight and small in size for ease of portability. The dimensions are (l x w x h) tolerance of +/- 5% .

Weight: Weight of CMRI including batteries shall be approximate 1kg.

ii. Enclosure:

The casing is of electrical insulating material of high thermal stability and mechanical strength. Its degree of protection confirms to IP 67 as per IS 12063 / IEC-529. The enclosure should be solvent resistant and shall be provided with a suitable holding Strap for proper gripping.

iii. Ruggedness: CMRI is able to withstand harsh field environment without physical damage or loss of data.

iv. Display: The display of CMRI is having the following characteristics.

- a) Easy readability in varying ambient light conditions.
- b) 4 lines and 20 characters per line on the screen
- c) The size of the character is 4 mm or more.
- d) The contrast and intensity control to get a clear display in varying ambient light.

v. Key Board: The keyboard of the CMRI is having the following attributes.

- a) Long operation life i.e. minimum 100000 operations (typical).
- b) Feed back for key press acknowledgement to user.
- c) Legible and non-fading keypad imprints for all alphanumeric characters/symbols.
- d) Each English alphabet shall have a separate key.

vi. Input / Output ports (I/O Ports) :

The CMRI is having two serial input/output Ports, one port shall be serial port RS 232C compatible. Another optional port can be used for convenience of connecting peripherals such as bar-code reader, printer, battery charger, loader charger etc.

- vii. The offered CMRI is able to provide power supply for optical sensor used for meter reading applications.

#### 5.0 Physical interface:

- i. Interface between meter and CMRI:

The interface between a meter and CMRI shall consist of 2 parts.

- a) Meter optical sensor terminating in to a 9 pin D type male connector with a cable of 500 mm +/- 10 mm. Length.

- b) The interface between a meter and the offered CMRI shall be with a flexible shielded cable of length 1500mm +/-10mm having 9 pin D-type female connector with electrical circuit. This cable shall be supplied along with CMRI. The two ends of the cable is stress relieved.

- ii. Interface between CMRI and Base computer station:

Suitable flexible shielded cable of sufficient length for communication between CMRI and base computer station shall be provided. This communication shall be serial RS232C. On the base computer station end of the cable a 9 pin D-type female connector shall be provided. The two ends of the cable are stress relieved.

This cable shall also be supplied along with the CMRI.

#### 6.0 Hardware and Software requirement:

- i. Operating system :

To facilitate use of various meters specific MRI programs in one CMRI, MS DOS version 6.22 higher system is used. The facility to upgrade the BIOS/OS by a CMRI supplier is available without exposing the hardware of the CMRI.

The additional program necessary to transfer application programs with serial port shall be provided.

- ii. Memory:

- a) The CMRI is having a minimum memory capacity of 8 MB Static RAM (SRAM) with battery backup and upgradeable.

b) BIOS/OS on FLASH memory

iii. Communication:

The CMRI should be capable of:

- a) Down loading / up loading data from / to the meter,
- b) Uploading / downloading data to / from the Base computer station,
- c) CMRI is capable to read bar code information using a bar code scanner from barcodes of ac static / electromechanical electricity meters by using appropriate scanner and bar code soft ware.
- d) CMRI supports flexible baud rate ranging from 300 Baud to 19200 (or higher) Baud rates to cater communication needs stated above.

iv. Real time clock :

A real time clock is provided in the CMRI, which have the following Features:

- Power requirement : The clock shall have a minimum of 15 days battery back up.
- Calendar : The clock shall have 20 years calendar.
- Time drift : The time drift is negligible and shall not exceed 20 seconds per day.

v. Time Setting Facility :

The CMRI shall have the facility to get its time set from Base computer station. Proper security for this is ensured using password

vi. Power supply (Battery) for CMRI:

The CMRI has the following features for its power requirements:

- a) The CMRI is powered by rechargeable battery housed within its enclosure.
- b) The average capacity of charged battery shall be sufficient to communicate with meters and base computer station for at least :
  - i) 4 –6 hours while communicating through optical interface of meters and
  - ii) 6 -8 hours without powering Input / Output ports for optical interface.
  - iii) Capable of retaining the charges for at least 24 hrs.
- c) To reduce the equipment down time and inventories, there shall be provision to charge the CMRI battery without being removed from the equipment. A suitable battery charger for charging of CMRI battery shall be provided.

- d) There is provision for AUTO POWER SAVE, which force the instrument in the power saving mode in case of no activity within 5 minutes.
- e) The battery used for data retention in SRAM has a minimum of 3 years backup capacity.
- f) The CMRI has battery low indication and automatic cutoff to avoid further drain of the battery.

#### 7.0 Communication Protocol and Software:

##### Software:

- a) The following software shall be provided in the offered CMRI.
  - i) Operating system compatible to MS DOS 6.22 or higher.
  - ii) Necessary software for loading application programs via a serial port for uploading and down loading between CMRI and Base computer Station (BCS)
- b)
  - i. Provision for loading the software into the CMRI of the specific makes of the meters for the purpose of reading and programming of the specific make(s) of static meters such S/ W shall be provided by respective meter manufacturers.
  - ii. BCS software accepting data from CMRI, processing generating reports and downloading instruction from BCS to CMRI.
  - iii. The CMRI has graphics capability in the display.
- c) **Special Requirement:**  
The offered MRI shall have provision for storing the third party software and can also be loaded for special applications such as manual meter reading, data entry through keyboard of CMRI, printing, display of balance memory etc.
- d) The CMRI shall have facility to draw/display vector diagram of the electrical conditions existing at site to check the healthiness of the connections.
- e) The CMRI shall have provision to read the energy registers so that accuracy testing can be done at site with standards calibrating equipments.

- f) The CMRI shall have the provision to read the various instantaneous electrical parameters at site like voltages, current, PF, phase angles, power (kW, KVA, and KVAR) frequency etc.
- g) The CMRI shall have facility to estimate the memory space available before reading the meter.

8.0 DATA SECURITY:

The meter manufacturers are responsible for maintaining the security of the data extracted from the meters using manufacturer specific algorithm in the software up to down loading to BCS.

9.0 SPECIAL FEATURES:

(A) Main Menu

- (1) Read Meter Data
- (2) Dump data
- (3) Read energy
- (4) Calibration
- (5) Terminal - Capable to display ph. Voltage, Current, PF, KVA Load (KW, KVAR, KVA), Ph Angle
- (6) Space
- (7) Meter - Summator
- (8) Identification No.
- (9) Load Survey days

(B) Installation - (1) Vector diagram /All Inst. electrical parameter in one page

- (2) Tamper Information
- (3) Meter Identification

© Battery – Quality should be good & capable of retaining the charges for at least 24 Hrs with interruption

(D) Accessories– I) All accessories like individual battery charger, Communication Chord suitable for different meters (Secure, L&T)

II) Group Battery charger capable of charging at least 12 batteries at a time.