Specification No.  CSC-71/DH/UH/P&D/2011-12

TECHNICAL SPECIFICATION

OF

DLMS Compliant COMMON METER READING INSTRUMENT

FOR VARIOUS MAKES OF

AC STATIC ELECTRICAL ENERGY METERS

Issue Month: Common Specifications Committee
(CSC approval date ) UHBVN & DHBVN\
TECHNICAL SPECIFICATIONS FOR COMMON METER READING INSTRUMENT FOR VARIOUS MAKES OF AC STATIC ELECTRICAL ENERGY METERS/ DLMS COMPLIANT

1. SCOPE:

This specification covers the design, assembly and testing at manufacturer's works and supply of Common Meter Reading Instrument (CMRI) for various makes of A.C. Static Electrical Energy Meter/DLMS Compliant. The objective of this specification is as per details given below:

1.1 This specification outlines the basic requirements of Common Meter Reading Instrument (CMRI) as a two-way communicating interface between various makes of static electrical energy meters and a base computer station for the purpose of exchange of data (uploading & downloading).

1.2 This specification presents hardware and software requirements for Common Meter Reading Instrument in separate section together with various input and output peripherals like bar-code readers and printers.

1.3 This specification applies to local electronic reading of static meters where a meter reading instrument is connected one to one, to A.C. Static electrical energy meter only through physical access to such a meter.

1.4 This specification also applies to use of the common meter reading instrument for manually entering readings from electromechanical/ electronic registers of static electrical energy meters without communication facility for the purpose of subsequent transfer to a base computer and / or to a printer.

1.5 The objective of this specification is to outline a single instrument suitable to carry in hand from one meter installation to the next in-order to download / upload data from/to meters manufactured by different meter manufacturers with adequate data security and facility of fraud prevention but without interfering the performance of any particular manufacturers system.
1.6 Considering the fact that several systems are in practical use already, particular care shall be taken to maintain compatibility with the existing systems and / or system components and their relevant protocols.

2 STANDARDS

The required relevant provisions from the following standards have been used in the specifications

2.1.1 CBIP Report no. 88 (July 96) – Specification for A.C. Static Electrical Energy Meters first Division and CBIP Report Mp. 111 (for software protocol)

2.1.2 IS:13010/1990 Specification for A.C. Watt hour meters class 0.5.1 & 2

2.1.3 IS : 13779/1992 Specification for A.C. Static Watt Hour meter Class 1 & 2

2.1.4 IEC 687/1992 Alternating Current Static Watt Hour meters for active energy class 0.5S and 0.2S

2.1.5 IS : 1036 : 1996 – Alternating Current Static Watt Hour meters for active energy (class 1 and 2)

2.1.6 IFC 529 Degree of protection provided by enclosures

2.1.7 IS: 12063/1987 Classification of degrees of protection provided by enclosures of electrical equipment.

2.1.8 IS: 9000/1979 Basic environmental testing procedure for electronic and electrical items.

2.1.9 IEC – 1000 – Electromagnetic compatibility

2.1.10 IEC – 1000-4-2 : 1995 – Electrostatic discharge immunity test

2.1.11 IEC – 1000–4-3 : 1995 – Radiated, radio – frequency electromagnetic field immunity test

2.1.12 CISPAR 22 – Limits and method of measurement of radio disturbance characteristics of information technology equipment.

3. CLIMATIC CONDITIONS:

The equipment/material to be supplied against this specification shall be suitable for satisfactory operation under the following climatic Conditions

<table>
<thead>
<tr>
<th>i)</th>
<th>Location</th>
<th>At various locations in the state of Haryana</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii)</td>
<td>Maximum Storage temperature (°C)</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Value</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>iii)</td>
<td>Minimum Storage temperature (°C)</td>
<td>-5</td>
</tr>
<tr>
<td>iv)</td>
<td>Maximum average daily ambient temperature (°C)</td>
<td>40</td>
</tr>
<tr>
<td>v)</td>
<td>Maximum yearly weighed average ambient temperature (°C)</td>
<td>32</td>
</tr>
<tr>
<td>vi)</td>
<td>Maximum altitude above mean sea level (m)</td>
<td>1000</td>
</tr>
<tr>
<td>vii)</td>
<td>Minimum Relative Humidity (%)</td>
<td>26</td>
</tr>
<tr>
<td>viii)</td>
<td>Maximum Relative Humidity (%)</td>
<td>95</td>
</tr>
<tr>
<td>ix)</td>
<td>Average no. of Rainy days/ year</td>
<td>120</td>
</tr>
<tr>
<td>x)</td>
<td>Average annual rainfall</td>
<td>900 mm</td>
</tr>
<tr>
<td>xii)</td>
<td>Maximum wind pressure</td>
<td>195 kg/m sq.</td>
</tr>
</tbody>
</table>

The equipment shall be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth

4 REQUIREMENTS:

4.1.1 **Physical Characteristics:** CMRI shall be handy and small in size for ease of portability. However, he display portion could be wider and weight of CMRI including batteries shall be minimum.

4.1.2 **Enclosure:** The casing shall be of electrical insulating material of high thermal stability and, mechanical strength its degree of protection shall be. 

**Level:** (1) IP 65 depending on requirements as per IEC 529 IS: 12063.

For details of this level of protection against penetration of dust and water references may be made to clause 5.2.1 of this document.

The CMRI enclosure shall be solvent resistant.

The CMRI shall be provided with suitable holding strap for proper gripping.

4.1.3 **RUGGEDNESS:**

CMRI shall be able to withstand harsh field environment without physical damage of loss of data. The tests for this requirement are given in the testing procedures as detailed in clause 5.0 of this specification.

4.1.4 **DISPLAY:**

The display of CMRI shall have the following characteristics.

a) Easy readability in varying ambient light conditions.

b) A minimum of 4 line and 16 characters per line on the screen.
4.1.5 KEYBOARD:

The Key Board of the CMRI shall have the following attributes:

(a) Any alphanumeric character shall be available with sequential operation of maximum 3 keys.

(b) Long operational life i.e. minimum 100,000 operations.

(c) Feedback for key press acknowledgement to user

(d) Legible and non-fading keypad imprints.

4.1.6 INPUT/OUTPUT PORTS (I/O PORTS):

The CMRI shall have Two RS 232C Compatible serial Input /Output port(s), using industry standard D-type connectors.

One port may be used for convenience of connecting peripherals such as bar code reader, printer battery charger, loader charger etc.

4.1.7 The CMRI shall be able to provide power supply for optical sensor used for meter reading applications.

4.1 PHYSICAL INTERFACE

4.2.1 INTERFACE BETWEEN METER AND CMRI:

a) Meter optical sensor terminating into a 9 pin D type male connector with a cable of 500 mm length with electrical circuit

Pin function listing (Mail connected)

01 N.C. (Not connected)
02 Transmit data (TXD)
03 Receive data (RXD)
04 N.C
05 Signal ground (SG)
06 N.C.
07 N.C
08 N.C
09 Power supply (+4.75V to 12.5V)
This cable will be supplied by the meter manufacture.

b) CMRI cable should have matching 9 pin D type female connector of 1500 mm length with electrical circuit.

Pin functional Listing (Female Connector)

<table>
<thead>
<tr>
<th>PIN</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Carrier Detector (CD)</td>
</tr>
<tr>
<td>02</td>
<td>Receive Data (R X D)</td>
</tr>
<tr>
<td>03</td>
<td>Transmit Data (T X D)</td>
</tr>
<tr>
<td>04</td>
<td>Data Terminal ready (DTR)</td>
</tr>
<tr>
<td>05</td>
<td>Signal Ground (SG)</td>
</tr>
<tr>
<td>06</td>
<td>Data Set ready (DSR)</td>
</tr>
<tr>
<td>07</td>
<td>Request to send (RTS)</td>
</tr>
<tr>
<td>08</td>
<td>Clear to send (CTS)</td>
</tr>
<tr>
<td>09</td>
<td>Power Supply (+4.5V to 12.5V)</td>
</tr>
</tbody>
</table>

This cable will be supplied by the CMRI manufacturer.

4.2.2 INTERFACE BETWEEN CMRI AND BASE COMPUTER STATION

Suitable cable for communication between CMRI and base computer station shall be provided. This communication shall be Serial RS 232 C. On the BCS end of the cable 9 pin D type female connector shall be provided.

The cable shall be supplied by the CMRI manufacturer.

4.2.3 Both connecting cables described above in 4.2.1 and 4.2.2 shall be made of flexible material and shall be shielded.

The two ends of each type of cable shall be stress relieved.

4.2 HARDWARE & SOFTWARE REQUIREMENTS

4.3.1 OPERATING SYSTEMS: To facilitate use of various meter specific MRI programs in one CMRI, MS-DOS version 6.0 or higher operating system which shall be preferred / used. No other OS is acceptable. The facility to upgrade the BIOS/OS by a CMRI supplier shall be available without exposing programs necessary to transfer application programs with Serial ports shall be provided by CMRI supplier.
4.3.2 Memory:

(a) The CMRI shall have a memory capacity of 16.5 MB SRAM (Static RAM) with battery back up for storage of data and meter reading software.

(b) BIOS/OS on FLASH/ EEPROM Memory.

4.3.3 Communication: The CMRI shall be required to communicate in three different modes:

a) Downloading/uploading data from/to the meter
b) Uploading/downloading data to/from the base computer station.
   a. The CMRI shall be able to read bar coded information using a bar code scanner from barcodes of AC static/ Electro-mechanical electricity meters.
   c) CMRI shall have flexible baud rate ranging from 300 baud to 19200 baud and optionally to higher baud rates to cater communication needs stated above.

4.3.4 Real time clock: A real time clock shall be provided in the common meter reading instrument and shall have the following features:

Power Requirement: The clock shall have a minimum of 15 days battery backup.

Calendar The clock shall have a 20 years calendar.

Time drift The time drift of the real time clock considering all influencing quantities shall not exceed 20 second per day.

4.3.5 TIME SETTING FACILITY: The Common Meter reading Instrument shall have the facility to get time set from the base computer station. Proper security for this shall be ensured.

The Meter specific MRI programs shall have the ability to use CMRI real time clock to tag all time –related events.

4.3.6 POWER SUPPLY (BATTERY): The common meter reading instrument shall have the following features for its power requirements.

a) The Common Meter Reading instrument shall be powered by rechargeable battery housed within its enclosure.
b) The average capacity of a charged battery shall be sufficient to communicate with meters and base computer station for at-least.
   i. FOUR HOURS while communicating through optical interface of meter and
   ii. Six Hours without powering I/O ports.

c) To reduce the equipment design tune and inventories, there shall be provision to charge the MRI battery, without being removed from the equipment. A suitable battery charger for automatic charging of MRI battery shall be provided to Loader charger.

d) There shall be a prevision for AUTO POWER SAVE which shall force the instrument in the proper saving mode in case of no activity within 5 minutes.

e) The battery used for data retention in SRAM shall have a minimum of three year back up capacity.

f) The MRI shall have battery law Indication and automatic cut off to avoid further drain of the battery.

4.4 Communication protocol and software

4.4.1 Protocol: The communication protocol is kept open considering the existing meter communication protocol in use. The compatibility of the existing and the future protocols is important. The open approach shall ensure development of newer and more effective communication methods.

4.4.2 Software

a) The CMRI supplier shall provide following software:
   i. Embedded MS- DOS 6.0 or higher operating system.
   ii. Necessary software for loading application programs via a serial port for uploading & downloading between CMRI and base computer station.

b) Nigam proposes to induct IEC-62056 (DLMS) compliant meters, with common protocol as per BIS. CMRI manufacturer shall provide the following software as per the BIS document. Towards this,
   i) CMRIs shall implement the DLMS/COSEM communication standard conforming to this specification to provide a DLMS/COSEM client protocol driver to communicate
with the meters to download billing data or perform other services available to the MR Association.

ii) CMRIs shall provide a DLMS/COSEM server interface to the BCS (Base Computer System – the Data collection software) over a suitable communication medium (local serial port implementing the DLMS/COSEM stack is suggested)

iii) CMRIs shall internally map the individual meter data to Logical Devices (one Logical Device for each meter). Inside each Logical Device the structure and naming of the data shall be the same as that retrieved from the meter

c) The following software shall be made available by each meter manufacturer, whose meters are not compliant to IEC-62056, to interface with the CMRI.

i Software to be incident in CMRI for the purpose of reading and programming the specific make(s) of static meters, which are non-compliant to IEC-62056.

ii BCS software for accepting data form CMRI processing generating reports and downloading instructions from BCS to CMRI

d) Special requirements:
A third party software may also be loaded for special applications such as manual meter reading data entry, printing, display of balance memory etc.

4.5 DATA SECURITY: The meter manufacturers are responsible for maintaining the security of the data extracted from the meters using manufacturer specific algorithms (non compliant to IEC-62056) in the software upto downloading to BCS

5.0. Type tests

5.1 Test(s) of Mechanical requirement:

5.1.1 Free fall test: The CMRI shall be subjected by the method specified in IS: 9000 (Part – VII-See-4) 1979 to free full detailed below:

a Number of falls 2
b Height of fall 1000mm
c Method of release To allow free fall from horizontal
position of normal suspension, with a minimum disturbance at the moment of release with LCD display facing upwards.

After conclusion of the test there shall not be any physical damage and loss/change of data. The functionality of the CMRI shall not be affected.

5.1.2 SHOCK TEST: The CMRI shall be subjected to shock test by method specified in section 1 of IS: 9000 (Part 7 sec 1) - 1979 to shocks as described below:

a) Peak acceleration: 400 m/s² x s ( 40 g )

b) Pulse shape: Half sine wave

c) Pulse duration: 18 ms

d) Number of shocks: Two in both directions of three mutual perpendicular axes (total of 12 shocks)

The test shall be conducted on a different test specimen for each direction of shock (also on a specimen different from one to be used for the vibration test).

After conclusion of the test there shall not be any physical damage and loss/change of data. The functionality of the CMRI shall not be affected.

5.1.3 Vibration test:
The CMRI shall be subjected by the method specified in IS 9000 (part 8): 1981 to vibrations as detailed below.

a. Range and sweep frequency: 10-150-10 Hz

b. Cut-off frequency: 16.7 Hz

c. Amplitude (between 10 Hz and 16.7 Hz): 4 mm peak to peak

d. Acceleration (between 16.7 Hz and 150 Hz): 2.2 g

e. Sweep rate: One octave per minute

f. Duration: 1 hour in each direction

g. Directions: Along three mutually perpendicular axis (in the directions of upper and lower, right and left, back and forth)

After Conclusion of the test, there shall not be any physical damage and loss/charge of data. The functionality of the CMRI shall not be affected.
5.2 Environmental Test

5.2.1 Cold Test: The test shall be carried out according to IS:9000 (Part II – Section III of 77), under the following conditions:

- CMRI: OFF
- Temperature: -25°C ± 3°C
- Duration of the test: 72 Hrs

After conclusion of the test, the CMRI shall show no damage or loss/change of the data. The functionality of the CMRI shall not be affected.

5.2.2 Damp Heat Cyclic Test: The test shall be carried out according to IS: 9000 (Part V of 81), under the following conditions:

- CMRI Powered up
- Variant 1
- Upper temperature: -50°C ± 3°C

No special precautions to be taken regarding the removal of surface moisture

- Duration of the test: 6 cycles.

24 hours after the conclusion of the test there shall not be any physical damage and loss/change of data. The functionality of CMRI shall not be affected.

5.3 Test for Electromagnetic Compatibility (EMC)

General Test Conditions: For all these tests the CMRI shall be in its normal working position.

5.3.1 After these tests the CMRI shall show no damage and operate correctly.

Test of Immunity to Electrostatic Discharges: The tests shall be carried out according to IEC: 1000-4-2 (1995), under the following conditions:

- Test voltage: 15 kV air discharge
- Number of discharges: 10
- Severity Level: 4
After application of the electrostatic discharge the CMRI shall show no
damage or change of data. The functionality of the CMRI shall not be
affected.

5.3.2 Test of Immunity to Electromagnetic HF Fields: The test shall be carried out according
to IEC: 1000-4-39/1995, under the following conditions:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMRI</td>
<td>ON</td>
</tr>
<tr>
<td>Frequency band</td>
<td>80 MHz to 1000 MHz</td>
</tr>
<tr>
<td>Test field strength</td>
<td>10 V/m</td>
</tr>
</tbody>
</table>

After conclusion of the test, the CMRI shall show no damage or loss/change of
the data. The functionality of the CMRI shall not be affected.

5.3.3 Radio Interference Measurement:

The test for radiated disturbance shall be carried out according to table 4, clause 6 of
CISPR 22 for frequency range of 30 MHz to 1000 MHz.

5.4 All the routine & acceptance lost and shall be carried out as per relevant ISS/IEC

5.5 Each CMRI shall be subjected to routine tests as specified in standards in the presence of
purchaser's representative, if so desired by the purchaser. All test reports should be
submitted and should be got approved from the purchaser before dispatch of the
equipment.

5.6 The tender shall also submit alongwith the tenders two copies of the type test certificates
and two copies of the drawings of the equipment actually tested (duly authenticated by the
testing agency) indicating the complete bill of material of various parts. Tenders not
accompanied with the type lost certificate shall be out rightly rejected. The type test should
not have been carried out earlier, than 3 years from the date of opening of tenders.

6 Markings:
In order to facilitate the equipment shall be suitably marked as per relevant 133/IEC. The
markings on the rating plate shall carry all the particulars, In addition P.O.No with date and
item No. of the P.O. will also be marked on the rating plate.

7 Packing:
All material shall be suitably packed for transportation and contractor shall be responsible for all damages/losses due to improper packing.

8 Drawings:

The tender should submit with the tender, dimensioned drawings of the equipment offered along with illustrated and description literature.

The successful tenderer shall submit two sets of the drawing of over all dimensions, connection diagram and rating plate etc. for approval of the CGM/MM UHBVN / DHBVN. One set of the above drawings if found in order will be returned duly approved. One set of the approved drawing along with three sets of relevant publications regarding erection, maintenance and operation of the equipment for operation Sub-division office shall be supplied. Any other drawing if required by the purchaser would also be supplied without any charges. The purchase order No. with date and item No. of the P.O. shall also be mentioned on each, drawing for easy reference.

9 Deviation from the specifications:

Any deviation from this specification shall be clearly brought out separately, in the absence of any specific mention, it shall be implied, that the equipment effect is entirely according to this specification.

10 Completeness of the Equipment:

Any fittings, accessories or apparatus which might not have been specifically mentioned in this specification but which are usual and necessary shall be deemed to have been included in the contract and shall be supplied by the supplier without any extra charges. All plants and equipment shall be complete in all details whether such details have been mentioned in the specification of not.

11. GUARANTEE / WARRANTEE

The supplier shall be responsible to replace, free of cost, with no transportation or insurance cost to the Purchaser, up to destination, the whole or any part of the material which in normal and proper use proves the defective in quality or workmanship, subject to the condition that the defect is noticed within 78 months from the date of receipt of material in stores or 72 months from the date of commissioning whichever period may expire
earlier. The consignee or any other officer of Nigam actually using the material will give prompt notice of each such defect to the supplier. The replacement shall be effected by the supplier within a reasonable time, but not, in any case, exceeding 45 days. The supplier shall, also, arrange to remove the defective within a reasonable period, but not exceeding 45 days from the date of issue of notice in respect thereof, failing which, the purchaser reserve the right to dispose of defective material in any manner considered fit by him (Purchaser), at the sole risk and cost of the supplier. Any sale proceeds of the defective material after meeting the expenses incurred on its custody, disposal handling etc., shall however be credited to the supplier's account and set off against any outstanding dues of the purchaser against the supplier. The warranty for 72/78 months shall be one time.

12. **CHALLENGE CLAUSE**

The material offered/received after the inspection by the authorized inspecting officer may again be subjected to the test for losses or any other parameter from any Testing House/in-house technique of the Nigam & the results if found deviating un-acceptable or not complying to approved GTP’s the bidder shall arrange to supply the replacement within thirty (30) days of such detection at his cost including to & fro transportation. In addition to this penalty @10% of cost of the inspected lot of material shall be imposed.

13. **FAKE INSPECTION CALLS**

In case the supplier makes a fake inspection call i.e., the material is not found ready by the Inspecting Officer deputed by the Nigam for inspection, the supplier shall be liable to pay the expenses incurred by the Nigam on this account in addition to the fixed penalty of Rs. 20,000/- for each such fake call made by him.
## GENERAL TECHNICAL PARTICULARS (GTP) – COMPLIANCE

### COMMON METER READING INSTRUMENT (CMRI)

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Requirement</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturer</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Make Model</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>This product (attach copy of certification)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Conformity to <em>Common Meter Reading Instrument (CMRI)</em> detailed in CBIP TR No. 111 of May 1997.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Degree of protection – IP65</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Display</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>character height : 4mm</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Display backlight</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Key Board: minimum 100000 operations life</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Key Board Feed back</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Key Board: Non-fading keypad imprints for all alphanumeric characters/ symbols with tactile keys.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Key Board: Each English alphabet and numbers shall have a separate key.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Input / Output ports: No. of RS-232 Serial Ports</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Baud Rate-300baud to 19200 Baud</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Hardware: Processor used</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Memory Requirement: 16.5 MB SRAM with battery backup</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Real Time Clock</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Operating System</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Data Security</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td><strong>Power supply (Battery)</strong></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Average capacity of charged battery</td>
<td></td>
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<tr>
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<td></td>
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<tr>
<td>---</td>
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<tr>
<td><strong>22</strong></td>
<td>Auto Power Save mode in 5 minutes</td>
<td></td>
</tr>
<tr>
<td><strong>23</strong></td>
<td>Capacity of battery used for SRAM backup</td>
<td></td>
</tr>
<tr>
<td><strong>Software &amp; OS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>24</strong></td>
<td>In-built software for Bar graph indication of battery status</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong></td>
<td>Operating System loaded in CMRI, with license sticker.</td>
<td></td>
</tr>
<tr>
<td><strong>26</strong></td>
<td>DLMS Communication Software</td>
<td></td>
</tr>
<tr>
<td><strong>27</strong></td>
<td>Software to estimate the memory space available at any time.</td>
<td></td>
</tr>
<tr>
<td><strong>Type tests</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>28</strong></td>
<td>Free fall test</td>
<td></td>
</tr>
<tr>
<td><strong>29</strong></td>
<td>Shock Test or Bump Test</td>
<td></td>
</tr>
<tr>
<td><strong>30</strong></td>
<td>Vibration test</td>
<td></td>
</tr>
<tr>
<td><strong>31</strong></td>
<td>Protection against penetration of dust and Water – IP-65</td>
<td></td>
</tr>
<tr>
<td><strong>32</strong></td>
<td>Dry Heat Test</td>
<td></td>
</tr>
<tr>
<td><strong>33</strong></td>
<td>Cold Test</td>
<td></td>
</tr>
<tr>
<td><strong>34</strong></td>
<td>Damp Heat Cyclic Test</td>
<td></td>
</tr>
<tr>
<td><strong>35</strong></td>
<td>Test of Immunity to Electrostatic Discharges</td>
<td></td>
</tr>
<tr>
<td><strong>36</strong></td>
<td>Test of Immunity to Electromagnetic HF Fields</td>
<td></td>
</tr>
<tr>
<td><strong>37</strong></td>
<td>Radio Interference Measurement</td>
<td></td>
</tr>
<tr>
<td><strong>38</strong></td>
<td>Warranty/Guarantee</td>
<td><strong>78/72 Months</strong></td>
</tr>
</tbody>
</table>