

# इंटरनेट

# मानक

## Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 6756 (2001): Electrical and Electronic Measuring Equipment - Documentation [LITD 8: Electronic Measuring Instruments, Systems and Accessories]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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भारतीय मानक

विद्युत एवं इलैक्ट्रॉनिकी मापन उपकरण — प्रलेखन  
( पहला पुनरीक्षण )

*Indian Standard*

ELECTRICAL AND ELECTRONIC MEASURING  
EQUIPMENT — DOCUMENTATION  
( *First Revision* )

ICS 17.220.20

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical with IEC 1187 (1993) ‘Electrical and electronic measuring equipment — Documentation’ issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of Electronic Measuring Instruments, Systems and Accessories Sectional Committee and approval of the Electronics and Telecommunication Division Council.

This standard applies to the technical documentation to be supplied with electrical and electronic measuring equipment for use in laboratories and for testing and servicing.

This standard was first published in 1972 and was identical to IEC 278 (1968) ‘Electronic measuring equipment — Documentation’. IEC 278 has been withdrawn and replaced by IEC 1187 (1993). In view of the technological advances at the international level this Indian Standard is being revised to align it with the latest international practices.

The text of the IEC has been approved as suitable for publication as Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

CROSS REFERENCES

In the adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
IEC 68 Environmental testing	IS 9000 Basic environmental testing procedures for electrical and electronics items	Technically equivalent
IEC 359 (1987) Expression of the performance of electrical and electronic measuring equipment	IS 9176 : 2001 Expression of the performance of electrical and electronic measuring equipment ( <i>under print</i> )	Identical
IEC 414 (1973) Safety requirements for indicating and recording electrical measuring instruments and their accessories	a) IS 9249 (Part 1) : 1979 Safety requirements for indicating and recording electrical measuring instru-ments and their accessories: Part 1 Common safety requirements for instruments b) IS 9249 (Part 2) : 1982 Safety requirements for indicating and recording electrical measuring instru-ments and their accessories: Part 2 Safety requirements for instruments using a mains supply	Technically equivalent

(Continued on third cover)

*Indian Standard*  
**ELECTRICAL AND ELECTRONIC MEASURING  
EQUIPMENT — DOCUMENTATION**  
*( First Revision )*

## **1 Scope and object**

This standard applies to the technical documentation to be supplied with electrical and electronic measuring equipment for use in laboratories.

The object of this standard is:

- to achieve an acceptable level of uniformity,
  - to prevent the use of incorrect expressions,
  - to determine in general terms the basic contents and structure,
- of the documentation supplied with the equipment in order to give the user sufficient information on installation, use, safety, application, technical specification, principle of operation, testing, servicing and lists of options, accessories and replaceable parts.

NOTE - This documentation may be contained in one manual or in a set of separate manuals covering the various topics. In the latter case, each volume should contain a list of contents of the other volumes.

## **2 Normative references**

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68, *Environmental testing*

IEC 113, *Diagrams, charts, tables*

IEC 359: 1987, *Expression of the performance of electrical and electronic measuring equipment*

IEC 414: 1973, *Safety requirements for indicating and recording electrical measuring instruments and their accessories*

IEC 417: 1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets*

IEC 617, *Graphical symbols for diagrams*

IEC 801, *Electromagnetic compatibility for industrial-process measurement and control equipment*

IEC 950: 1991, *Safety of information technology equipment, including electrical business equipment*

IEC 1010-1: 1990, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*  
Amendment 1 (1992)

CISPR 11: 1990, *Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment*

CISPR 14: 1985, *Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus*

ISO 216: 1975, *Writing paper and certain classes of printed matter – Trimmed sizes – A and B series*

### **3 Definitions**

For the purposes of this International Standard the following definitions apply. Some of these definitions have been taken from the International Electrotechnical Vocabulary (IEV), from IEC 359, or from other applicable IEC standards.

**3.1 address:** A unique code identifying the equipment when it is used in remote control operations.

**3.2 assembly:** A number of basic parts or subassemblies, or any combination thereof, joined together to perform a specified function.

**3.3 adjustments:** The process of making the equipment conform to its technical specification.

**3.4 block diagram:** A relatively simple diagram to facilitate understanding of the principle of operation. It is a diagram in which the main functional units of the equipment (or part thereof) together with the mutual relationships between them are represented by symbols or simple figures without necessarily showing all the connections.

**3.5 calibration:** All the operations for the purpose of determining the values of the errors and, if necessary, other metrological properties of a measuring instrument. After calibration and possible adjustment, the residual errors can be noted to produce correction values if required.

**3.6 circuit diagram:** An explanatory diagram intended to facilitate the understanding of the details of the operation of the equipment. It shows by symbols all the components of the equipment (or part(s) of the equipment) and all their interconnections, particularly all the electrical connections.

- 3.7 communication protocol:** A formal statement of the procedures (a set of rules) that are adopted by the interconnected equipment to ensure an orderly and correct transfer of information between the devices.
- 3.8 component location illustration:** A diagram or photograph in which the elements are displayed in a possibly simplified, but well recognizable form, showing their places in the equipment or subassemblies.
- 3.9 correction table or graph:** Table or graph containing data which provide for corrections on equipment displays, taking into account errors found during calibration, but which shall be disregarded when assigning a class index (accuracy) to the equipment.
- 3.10 data bus (Instrumentation bus):** A set of signal lines used by an interface system to which a number of instruments or parts of an instrument are connectable and over which messages can be carried.
- 3.11 preset value (default):** The initial settings of the equipment or function, for example, after a "power-on" or a general clear action.
- 3.12 device dependent codes:** The set of codes, specific to a given equipment, intended for sending and receiving messages to and from the outside world.
- 3.13 error codes:** Codes indicating the possible causes of abnormal operation such as malfunctioning of the equipment, programming errors or measuring errors.
- 3.14 flow chart:** A graphical representation of the definition, analysis, or solution of a problem in which symbols are used to represent the operation, data flow, sequence of events and decisions related to the operation of the equipment.
- 3.15 functional drawing of moving parts:** A drawing in which, by means of perspective and/or conventional pictures, symbols, signs and inscriptions, the functioning of the moving parts and mechanisms belonging to the equipment is identified and, where necessary, explained.
- 3.16 instruction card:** A card listing, in condensed form, the operating instructions for manual and, if applicable, remote control.
- 3.17 interface:** A common boundary between one system and another, or between parts of a system, through which information is conveyed.
- 3.18 manual control:** A method whereby the equipment is set by means of its local (front or rear panel) controls in order to enable it to perform its tasks (also called local control).
- 3.19 operating manual:** A technical document, which may be in more than one volume, containing the information necessary for the proper operation and application of the equipment and for a basic understanding of its functions.



**3.20 options:** Additional features or functions of the equipment which have to be specified or ordered separately.

**3.21 preventive maintenance:** Routine work carried out on the equipment – according to the manufacturer's instructions – in order to keep it in good working condition.

**3.22 programmable equipment:** Measuring equipment which performs specified operations on command from the system and may transmit the results of the performed function to the system.

**3.23 remote control:** A method whereby the equipment is programmable via its interface connection in order to enable it to perform its tasks.

**3.24 repair:** Work carried out on equipment which is no longer functioning, or which no longer complies with its specification, with the purpose of restoring its specified performance.

**3.25 service manual:** A technical document, which may be in more than one volume, containing the information necessary for both maintenance and repair of the equipment.

**3.26 signature analysis:** A technique which generates compressed, normally four-digit, codes, called signatures, of the digital data flow at logic nodes, facilitating accurate, logical fault finding.

**3.27 soft control:** A method of setting the operating conditions of the equipment from the control panel indirectly by interaction with internally stored software.

**3.28 status reporting:** A method of reporting the internal states, conditions and errors of the equipment to the system controller.

**3.29 storage:** The action of keeping the equipment, its accessories and the spare parts in an inoperative state under specified conditions.

**3.30 storage (long-term):** Any storage of equipment, its accessories, and the spare parts which requires some preliminary and/or continuous observation of special protective measures stated by the manufacturer.

**3.31 syntax:** Set of rules stating the arrangement of the data sent via the databus.

**3.32 system (measuring system):** A set of interconnected instruments combined to achieve a given objective.

**3.33 wiring diagram:** A diagram intended to show the internal and/or external connections of the equipment (or part of it). It may show the layout of the different parts and accessories such as connectors and the wiring between them.

## **4 General requirements**

### **4.1 *Mandatory documents***

#### **4.1.1 Operating manual (clause 5)**

The operating manual is a mandatory document to be supplied with each device.

#### **4.1.2 Packing list**

The packing list shall indicate all separate packages with details of the accessories and/or parts transported together with the equipment, including the operating manual if it is enclosed in the package.

#### **4.1.3 Correction tables and graphs (if applicable)**

Correction tables and graphs may be included in the operating manual or may be supplied as separate documents.

### **4.2 *Optional documents***

#### **4.2.1 Service manual (clause 6)**

The service information may be included in the operating manual or may be available separately.

#### **4.2.2 Instruction/programming card**

A brief instruction or programming card (local/remote) may be provided, preferably attached to the instrument, to give basic operator guidance.

## **5 Detailed contents of the operating manual**

The operating manual shall contain the following information, according to the nature and complexity of the equipment. The preferred sequence is given below.

### **5.1 *Introduction***

#### **5.1.1 Title page**

Type (model) number, version number, software release and full name of the equipment. Manufacturer's name and address.

#### **5.1.2 Illustration(s)**

Optional photograph or drawing.

### **5.1.3 Safety precautions and procedures**

A clear statement shall be given of all measures for safeguarding personnel and all precautions to be observed so that the user will not accidentally damage the equipment. All safety measures to be observed before, during and after using the equipment, its accessories or any other connected part or equipment, in order to avoid electric shocks, other hazards or any damage, shall be clearly described.

Safety warnings may have to be repeated in corresponding sections of the manual where such danger may occur.

Attention shall be directed to any danger, and to the corresponding warning symbols and inscriptions on the equipment. Pictures or suitable representations of these symbols shall be given and explained. Where possible, symbols as defined in IEC 417 shall be used.

The operation and use of any protective device shall be described.

Reference shall be made to IEC safety standards, for example, IEC 1010-1, IEC 414, IEC 950, etc.

Instructions regarding the handling and safe disposal or safe storage of any hazardous materials used shall be given.

### **5.1.4 Amendments**

In the case of functional or specification amendments it is preferable to produce a new edition of the manual. If this is not practicable, separate sheets may be used, which are clearly marked (e.g. with a different colour), and added to the manual. In this instance, it is advisable to add a stick-on label to the front cover of the manual, drawing attention to date, version number and software release of the amendment.

### **5.1.5 Table of contents and index**

Optional, depending on the length of the documentation. If useful, an alphabetical index can be provided at the end of the manual.

## **5.2 General description**

A brief description should be given of the capabilities of the equipment, the measurements or functions for which it is intended and relevant additional features.

Depending on the complexity of the equipment, based on one or more functional block diagrams, flow charts, state diagrams or other illustrations, a description of the equipment should be given in sufficient detail to allow a skilled user to understand the basic principles of operation.

### 5.3 *Preparations for use*

#### 5.3.1 Initial

Instructions shall be given for the removal of packaging material and locking devices used for protecting the equipment during transportation.

A guideline for initial inspection and damage detection shall also be given.

#### 5.3.2 Assembly

Directions shall be given for assembling the equipment when its parts are transported separately.

If applicable, instructions shall also be given for the fitting of optional units and accessories as well as the loading of software.

If necessary, directions shall be given on the necessary clearance for ventilation, working space and access to connectors.

#### 5.3.3 Supply voltage

##### *Mains supply:*

Instructions shall be given for setting the mains voltage.

##### *Battery supply:*

The type of battery and method of insertion shall be given. For rechargeable batteries, information such as charge/discharge time, recharging intervals, overcharging/discharging danger, methods of determining charge status, etc. should be provided.

Information shall be given about the type and characteristics of fuses used and their replacement.

#### 5.3.4 Installation

Further installation instructions, such as earthing (grounding), power supply and signal cable connections shall be given.

#### 5.3.5 Functional verification

Instructions shall be given for a functional check (without the use of special test equipment), including testing of the remote operation (if applicable).

#### **5.3.6 Calibration**

The time interval between successive calibrations (if applicable) shall be stated. Information shall be included on the traceability to measurement standards and on the skill of personnel.

Instructions shall be given for carrying out correct calibration.

#### **5.3.7 Storage**

Measures to be taken after storage, under limiting conditions, as well as the recovery time, shall also be stated.

### **5.4 *Operating instructions***

#### **5.4.1 General**

This part shall outline the procedures and precautions necessary for correct operation.

Because much equipment possesses the capability of both manual and remote control, it is possible to merge the operation commands for manual as well as remote control in the functional (operational) description. It should be noted, however, that all controls (or functions) which do not have a manual counterpart (e.g. status reporting, addressing etc.), should be described clearly as defined in 5.4.3.

Detailed instructions shall be given on the loading and use of additional functional software.

Information shall be given about reset functions and default control settings.

#### **5.4.2 Manual control**

This section shall identify, and briefly describe, the positions and functions of the various panel controls, indicators and connectors, preferably by means of illustrations.

Detailed information shall be given on how to use the equipment for each function. Where possible, examples shall be included of the various possible settings and functions.

A list of the various errors and the meaning of the error codes generated by the equipment shall be given, together with the actions to be taken.

Instructions shall be given on how to install and operate, options which do not have their own manual.

#### **5.4.3 Remote control**

This part shall specify the various possible interfaces which can be used for remote control of the equipment. For interfaces not adequately defined in International Standards, the manual shall briefly describe the positions and pin allocation of all the connectors used. All information shall be given about the interface aspects for hardware as well as software (for example, addresses, communication protocols, switch settings, defaults, etc).

Reference shall be made to International Standards, if available.

Detailed data shall be given on the device dependent codes and the coding syntax used. A complete list of the various commands and their meaning shall be included.

Elaborate examples for sending programming instructions and retrieving information shall also be given.

A complete description of status reporting e.g. operation completed, command error, functional error, measurement error, etc shall be given.

Any other system aspect not covered in the above paragraphs shall be given.

#### **5.5 *Preventive maintenance***

This part shall give instructions on preventive maintenance (if applicable) to ensure proper operation of the equipment, including periodic calibration and adjustment. (Reference may be made to the service manual.)

#### **5.6 *Technical specification***

##### **5.6.1 General**

This part shall specify the properties of the equipment. The specifications shall be given in accordance with IEC 359 and/or other IEC publications including product standards for the particular type of equipment.

This section shall include the following statement: "Only values with tolerances or limits are guaranteed data. Values without tolerances are for information only."

#### **5.6.2 Characteristics**

##### ***Functional performance***

The specification of the equipment shall include the information indicated below, with a stated range of influence quantities and the related tolerances and accuracies:

- functions and ranges;
- reference conditions;
- stability, drift, linearity, etc;
- period of time for which the accuracy is valid;
- parameters for remote control;
- other data of importance for the user.

##### ***Safety***

Reference to IEC publications or other international documents, for example, IEC 1010-1, IEC 414 and IEC 950.

##### ***General data***

Such as dimensions, weight, power requirements (mains and battery), operating position (if critical), etc.

#### **5.6.3 Environmental conditions**

The operating manual shall include all relevant information concerning the use of the equipment under the following conditions:

- *climatic conditions* such as temperature, humidity, pressure (altitude) (see IEC 68);
- *mechanical properties* such as vibration, shock, drop (see IEC 68);
- *electromagnetic compatibility* (see IEC 801);
- *electromagnetic interference* (see CISPR 11 or 14).

The above conditions should be defined in such a way that they can be verified, if required, by reference to the above IEC/CISPR publications.

#### **5.6.4 Storage and transport**

Instructions shall be given for repackaging and reinserting locking devices. Any limiting conditions for storage and transportation shall be stated.

#### **5.6.5 Accessories and options**

A list of accessories and options, both supplied and available separately, shall be given.

#### 5.6.6 Sales and service

A list of names and addresses shall be supplied (if necessary as a separate leaflet).

### 6 Detailed contents of the service manual

The service manual, which is optional, is intended for qualified users and, if provided, shall contain, preferably in the sequence given below, the following information, according to the nature and complexity of the equipment.

If the service manual is separate from the operating manual, the introductory part should include type (model) number, version number, manufacturer, etc.

#### 6.1 *Introduction*

##### 6.1.1 General

Information about the circuits, construction, software and test programs which may be required when maintaining and repairing the equipment should be given, together with the necessary drawings.

The service manual must give a technical overview of the complete equipment, based on block diagrams, flow charts and state diagrams or equivalents, including the functional description. Each basic circuit and, as far as necessary, each component, shall be explained.

It will facilitate servicing if the manual is so arranged that the service engineer can quickly be led to a faulty block and then has all information needed in one part of the manual to repair that block. That also means that information (voltages, levels, frequencies, impedances, waveforms, signatures, etc.) about signals entering or leaving this block shall be available in the corresponding part of the manual. The service engineer shall, if possible, be able to find faults in a block and repair them without requiring detailed information from other parts of the manual.

If computer-generated diagnostic programmes, for example, expert systems etc., are available, the service manual shall supply information on how these can be utilized.

##### 6.1.2 Amendments

In the case of functional or specification amendments it is preferable to produce a new edition of the manual. If this is not practical, separate sheets may be used, which are clearly marked (e.g. with a different colour) and added to the manual. In this instance it is advisable to add a stick-on label to the front cover of the manual, drawing attention to date, version number and software release of the amendment.



### **6.1.3 Table of contents and index**

Optional depending on the length of the documentation. If useful, an alphabetical index can be provided at the end of the manual.

## **6.2 *Safety instructions***

**Safety precautions and procedures:**

A clear statement shall be given of all measures for safeguarding personnel and all precautions to be observed so that the service engineer will not accidentally damage the equipment. All safety measures to be observed before, during and after handling the equipment, its accessories or any other connected part or equipment, in order to avoid electric shocks, other hazards or any damage, shall be clearly described.

It may be necessary to repeat the safety instructions in the appropriate sections of the manual where such danger may arise.

Attention shall be drawn to any danger, and to the corresponding warning symbols and inscriptions on the equipment. Illustrations or suitable representations of these symbols shall be given and explained. Where possible, symbols as defined in IEC 417 shall be used.

The operation and use of any protective device shall be described.

Reference shall be made to IEC safety standards such as IEC 1010-1, IEC 414, IEC 950, etc.

Instructions shall be given for the handling and safe disposal or safe storage of any hazardous material used.

## **6.3 *Dismantling and reassembling***

The following information shall be given:

- safety measures to be observed before dismantling and during work within the dismantled equipment. A list of any special tools required shall be given;
- how to obtain access to the interior of the equipment (method of disassembly) and how to remove subassemblies, functional parts or connectors while noting their location;
- how to reassemble parts and covers;
- how to carry out non-electrical maintenance work such as cleaning and lubricating the moving parts, replacing air filters (recommended solvents and lubricants should be specified);
- safety measures to be observed after reassembling the equipment.

#### 6.4 *Performance verification and adjustment*

The manual shall contain information on:

- how to verify that the equipment is within its specification, taking into account warm-up time (if relevant);
- the recommended characteristics of the test equipment to be used and its connection for each verification stage;
- the sequence in which these measurements shall be carried out;
- what to do if the test result is outside the scope of specification;
- how to make adjustments.

Because of their special importance to the service engineer, the legend and adjustment points must be clearly marked on the component location illustrations.

A form for calibration and/or test results, giving nominal values and tolerances, may be provided.

#### 6.5 *Preventive (routine) maintenance*

In order to avoid premature failures, the service manual shall contain information on recommended time intervals between calibrations, scheduled maintenance and indications showing the necessity for maintenance (e.g. a preset control turned fully one way may indicate that a particular component is near the end of its life).

Reference can be made to the preventive maintenance section in the operating manual.

#### 6.6 *Repair*

Repair instructions shall be sufficiently complete to enable a qualified service engineer to carry out all repairs in a safe manner (see clause 6.2). The only exceptions are those repairs stipulated to be performed by the manufacturer or his authorized representative. This shall be emphatically stated in the service manual.

In order to meet the above requirements, the following information shall be provided:

##### *Functional description*

- technical circuit description of each element repairable by the user, cross-referenced to schematics with values of voltages, waveforms, timing diagrams, etc. for normal operation of the equipment at all main points of the circuit diagrams;
- data bus connections between blocks given in a special drawing;
- the function of all integrated circuits (including customized integrated circuits). This can be done, for example, by means of a simple block diagram with input and output signals indicated and commented.

*Test equipment and tools*

- the essential characteristics of test equipment needed for servicing;
- a list of all service kits required or recommended;
- methods and special tools (e.g. hot-air pistols for changing surface-mounted devices).

*Methods of trouble-shooting*

- when there is a built-in fault-reporting system, it shall be clearly stated which sort of fault this system is able to indicate;
- trouble-shooting flowcharts and/or tables for methodical location of faults;
- databus connections with information for systematic location of faulty blocks;
- methods and aids for verification of the correct functioning of processors and other LSI devices;
- accurate specification of addresses and commands required when using automatic fault finding equipment, where feasible;
- when advanced fault-indicating equipment (e.g. functional trouble-shooters, signature analyzers, expert systems, etc.) can be used, all relevant information shall be easily accessible in the manual as well as support for understanding the results.

**6.7 List of parts, list of spare parts and replacement of parts**

The following information shall be given:

- list of components with name, type number, description, values and rated tolerances;
- list of replaceable moving parts subject to wear or other failures;
- instructions for the replacement of components. If a component can only be replaced by an exact equivalent of the original one, and not by any other having the same characteristic function or rated value, this should be clearly stated, also indicating how such components can be obtained. If necessary, instructions should be given for the ageing of replacement components.

## 6.8 *Schematics, flow charts and layout diagrams*

In order to facilitate the understanding of the functional principles of the equipment and to make it easier for the service engineer, the service manual shall contain:

- complete circuit diagrams with component values and/or functions; the functions of switches and adjustable components shall be marked on them adjacent to the components;
- complete wiring diagrams should be provided if they are necessary to assist in servicing. When a wiring colour code is used in cabling, this code should be indicated;
- flow charts or other graphical methods to explain the data paths and data flow;
- illustrations of the location of components in the equipment (including those on printed circuit boards) by means of which any component, connection or test point can be easily found or identified;
- connections between separate units, if the circuit diagram is divided into a number of units.

## 7 **Presentation of the manual(s)**

### 7.1 *Cover and bindings*

A size of A4 (or smaller, but in accordance with ISO 216) for the manuals is recommended. Where a separate service manual is provided, preference is for loose-leaf ring binders with four rings at the standard 8 cm. spacing, which enables pages to be added for easy changes or updating. The spine should be placed on the longer side. Wire or plastic bindings which allow the manual to be folded back at the spine may be used, in particular when there is no need for updating.

Where there is sufficient width, the title should be clearly shown on the spine.

The title should also appear on the front cover, either directly printed on the cover or visible through a window.

### 7.2 *Pages*

All pages should carry a page number which is sequential within each part and section of the manual(s).

The title of the manual (abbreviated if necessary) or other identification should be shown on every page of the document as well as the related version number(s).

In general, the page height should be not greater than that of A4. Larger diagrams can be accommodated on facing pages or on larger sheets folded to A4 ("fold-out"). If the diagram is on the outer extremity of the sheet, it can be consulted whilst reading the accompanying text elsewhere in the manual ("fold-clear").

It is advisable to include an amendment record sheet, a tear-off card for receiving further amendments and modifications and a set of cards for feedback information from the user to the manufacturer.

### **7.3 *Diagrams, charts and tables***

All diagrams shall be drawn according to IEC 113 and IEC 617.

### **7.4 *Illustrations***

Illustrations can make a considerable contribution to the clarity of a text.

Photographs and line drawings (retouched and annotated as appropriate) should be incorporated in the text wherever they are likely to be of assistance.

### **7.5 *Abbreviations***

If necessary, an explanatory list of the abbreviations used in the text or on the diagrams should be included.

### **7.6 *Contents list and index***

When applicable, each manual shall begin with a table of contents which also lists diagrams, illustrations and tables. When the manual is divided into several volumes, each should include a table of contents of the other volumes.

If the manual contains an index, this should be placed at the back of the volume.

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<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
IEC 801 Electromagnetic compatibility for industrial-process measurement and control equipment (since withdrawn and replaced by IEC 61000-4)	IS 14700 (Part 4) Electromagnetic compatibility (EMC): Part 4 Testing and measurement techniques	Identical to IEC 61000-4
CISPR 11 (1990) Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment (since revised in 1997)	IS 6873 (Part 4) : 1999 Limits and methods of measurement of radio disturbance characteristics: Part 4 Industrial, scientific and medical (ISM) radio-frequency equipment ( <i>first revision</i> )	Identical to CISPR 11 (1997)
CISPR 14 (1985) Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus (since revised in 1993)	IS 6873 (Part 2) : 1999 Limits and methods of measurement of radio disturbance characteristics: Part 2 Electrical motor-operated and thermal appliances for household and similar purpose electrical tools and electrical apparatus ( <i>first revision</i> )	Identical to CISPR 14 (1993)

The concerned Technical Committee responsible for preparation of this standard has reviewed the provisions of the following International publications and has decided that they are acceptable for use in conjunction with this standard:

IEC 113	Diagrams, charts, tables
IEC 417 (1973)	Graphical symbols for use on equipment. Index, survey and compilation of single sheets
IEC 950 (1991)	Safety of information technology equipment, including electrical business equipment (since revised in 1999)
IEC 1010-1 (1990)	Safety requirements for electrical equipment for measurement, control and laboratory use — Part 1: General requirements
ISO 216 : 1975	Writing paper and certain classes of printed matter — Trimmed sizes — A and B series

Only the English language text of the International Standard has been retained while adopting it in this Indian Standard.

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**BUREAU OF INDIAN STANDARDS**

**Headquarters:**

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002  
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha  
(Common to all offices)

Regional Offices :

Telephone

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg  
NEW DELHI 110002

{ 323 76 17  
323 38 41

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi  
CALCUTTA 700054

{ 337 84 99, 337 85 61  
337 86 26, 337 91 20

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 60 38 43  
60 20 25

Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600113

{ 235 02 16, 235 04 42  
235 15 19, 235 23 15

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