MATERIAL AND EQUIPMENT STANDARD

FOR

INDUSTRIAL AND FLAMEPROOF MOTOR REMOTE

CONTROL STATIONS

ORIGINAL EDITION

MAY 1993

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APPENDICES:

1. SCOPE

This Standard Specification covers the minimum technical requirements for design, manufacture, quality control, testing and finishing of industrial and flame-proof motor remote control stations for the control of nonautomatic (3 wire) contactor type starters and electrically operated circuit breakers controlling "LV" and "MV" 3 phase cage induction motors in production plants, utility and process areas.

Only the general requirements of motor remote control stations are given in this Standard Specification, the specific requirements of individual control station will be given in pertinent data sheet.

It may be assumed that normally remote control is required from only one location i.e. one adjacent to motor.

When control is required from more than one remote location additional facilities, such as selector switches, extra terminals and cable or conduit entries have to be incorporated in which case these special requirements are given in data sheets.

Motor remote control stations may be associated to any of the following equipment:

Industrial a.c. switchgear and controlgear parts 1 and 2 reference standard: IPS-M-EL-140

- Low voltage industrial and explosion-proof a .c. motor starters, reference standard: IPS-M-EL-142.

- Low voltage industrial and explosion-proof a .c. motor control centers, reference standard: IPS-M-EL-165.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION)

IEC 27	"Letters Symbols to be used in Electrical Technology"
IEC 50	"International Electro technical Vocabulary"
IEC 51	"Recommendation for Indicating Electrical Measuring Instruments and their Accessories"
IEC 73	"Color of Indicating Lights and Push Buttons"
IEC 79	"ElectricalApparatusforExplosiveGas Atmospheres"
IEC 144	"Degree of Protection of Enclosure for LV Switchgear and Controlgear"
IEC 158-1	"Low Voltage Controlgear Contactors"
IEC 337	"Control Switches (LV Switching Device for Control and Auxiliary Circuit Including Contactor Relays)"
IEC 391	"Marking of Insulated Conductors"
IEC 445	dentification of Equipment Terminals and Terminations of Certain Designated Conductors ncluding General Rules of an Alphaneumeric System"
IEC 446	dentification of Insulated and Bare Conductors by Color"

IEC 617 raphical Symbols for Diagram

Notes:

1) Where standards other than "IEC" are used manufacturer/supplier shall submit the applied equivalent standard and the ertinent deviations from IEC standards specified.

2) Departures from or addition to this Standard Specification requirements with alternative proposals and or recommendation ith reasons, must be stated by the manufacturer/supplier at the time of tendering.

3. UNITS

International System of Units (SI) in accordance with IPS-E-GN-100 shall be used.

4. SERVICE CONDITIONS

4.1 Environmental Conditions

See Attachment 1.

4.2 Motor Remote Control Station in Potentially Explosive Atmospheres

Where the installation of motor starters has to be carried out in hazardous areas, additional requirements described in ppendix C shall be fully complied with.

4.3 Variation of Electric Supply in Site

Voltage : 10% (IEC 38)

Frequency: 5% (IEC 242)

For actual circuit voltage see data sheet in Appendix A.

5. BASIC DESIGN AND CONSTRUCTION

5.1 Enclosure

Remote control stations may be installed in safe areas, or in zone 1 or zone 2 of hazardous areas as defined in IEC ublication No. 79.10 (1986) and the Part 15 (1990) of the Institute of Petroleum Model Code of Safe Practice in the etroleum industry.

5.1.1 In the interests of standardization, zone 2 “approved” or certified remote control stations shall be used for industrial urposes in ’safe’ areas within the boundary limits of the production unit or process plant.

5.1.2 All enclosures to be of robust metallic construction, and suitable for outdoor use without any further protection. he unit to be arranged for wall mounting or for fitting to structural steelwork.

5.1.3 All internal steel parts to be of stainless steel.

5.1.4 Particular attention is drawn to the requirement for reliability under the arduous climatic conditions and all materials, specially gaskets, plastic mouldings, insulation, etc., to be able to withstand these conditions without undue deterioration.

5.1.5 The weatherproofing design aspects of the enclosure shall not contravene the BASEEFA certification or similar pproval for use in hazardous areas.

Note:

For explosion and ingress protection see data sheet in Appendix A.

5.2 Push Buttons

Contacts of push buttons to be of silver faced copper and of the double break type with a minimum a.c. continuous urrent taking of 10A and a d.c. continuous inductive current rating of 0.25A suitable for use on voltages up to and ncluding 400 Volt a.c. or 110 Volt d.c.

5.2.1 The contact switch arrangement shall be as follows:

MOTOR CONTROLLED BY	CONTROL FUNCTION	CONTACTS
NON-AUTOMATIC CONTACTOR STARTER	STOP	NORMALLY CLOSED
NON-AUTOMATIC CONTACTOR STARTER	START	NORMALLY OPEN
ELECTRICALLY OPERATED CIRCUIT BREAKER	STOP	NORMALLY OPEN
ELECTRICALLY OPERATED CIRCUIT BREAKER	START	NORMALLY OPEN

5.2.2 All push buttons shall be spring loaded and the push button assemblies to be readily removeable for maintenance purpose.

5.2.3 Start push button to be shrouded or of inset design to avoid accidental operation and to be colored green.

Stop push buttons to be of the stayput reset type i.e. the stop button remains in the stop position until released by a twist and pull action and to be colored red.

5.2.4 At the discretion of the company engineer a pad-locking facility may be specified for the stop button. (See data sheet Appendix A).

All stop buttons to be colored red.

5.2.5 The push button functions to be clearly marked either by deep engraving on the front of the button or by a stainless steel engraved label on the enclosure.

The engraving to be in English.

5.3 Clearances and Creepage Distances

The clearances and creepage distances shall be as large as practicable and creepage distances shall, whenever practicable, incorporate ridges in order to break the continuity of any dust deposits which may form.

Note:

Minimum values for clearances and creepage distances shall be the ones appearing in Appendix B of IEC Publication 158-1 (second edition).

5.4 Temperature Rise

No part of a control switch shall attain a temperature which may cause damage to the part itself or to adjacent parts, when the control switch is installed and operated in accordance with the instructions of the manufacturer.

In particular, the temperature rise of the terminals shall not exceed 70C when tested under the conventional conditions laid down in Clause 8.1.1 of IEC publication No. 337.1.

Operating Conditions For mechanical details of the operating conditions refer to Clause 3 of IEC

publication 337.2 Part 2.

5.5 Condition of Use

The principal application of control station will be switching of electromagnets.

The normal use of the control switch is to close, maintain and open circuits which contain an electromagnet, the magnetic circuit of which is open at the time when the coil current is made and closed when the coil current is broken. The control switches are required to be able to break the current corresponding to abnormal conditions when an electromagnet although energised has failed to close.

Note:

When Programmable Logic Control (PLC) is used with motor starter(s), this will be specified in pertinent data sheet.

5.6 Ammeters

5.6.1 Ammeters shall be provided for motors rated 4 kw and above. Ammeters shall be normally direct operated upto 30A (site) the ammeter above 30A to be current transformer operated.

5.6.2 Ammeters shall be of flush mounted industrial grade, enclosed in a dust and damp proof casing, non-projecting dial, with non-glare non-reflecting window and in compliance with the requirements of pertinent parts of IEC publication 51, and the accuracy shall be class 2.5.

5.6.3 Ammeters shall have a compressed overload end scale of at least 6 to 8 times the full load motor current. Indication shall be of the actual values and the pointer shall be adjustable.

5.6.4 The limit of current range shall be 60% to 70% of full scale.

5.6.5 The dial to be marked with the:

- Current transformer ratio.
- Accuracy class.
- Serial No. particular.

Notes:

1) Low voltage and medium voltage motors in process areas shall be provided with a local (on starter) and a remote (adjacent to the motor) ammeter, where the motor rating is above 4 kw.

2) Where the remote control stations are equipped with ammeters, coordination shall be made with the manufacturer of switching devices which are controlled by remote control stations.

5.7 Indicating Lamps

5.7.1 Indicating lamps with flat lens either with connecting lead or screw terminals shall be flash mounted, low wattage long life type with the degree of ingress protection (IP) 65 adequate for temperature ranging from -20 degree centigrade to 80 degree centigrade.

5.7.2 Color of indicating lights shall comply with the requirements of IEC publication No. 73.

5.7.3 When indicating lamps are used in potentially explosive atmospheres, it shall comply with the requirements of explosion code specified in data sheet in Appendix A.

Note:

Indicating lamps data are given in data sheet.

5.8 Cable and Core Termination

5.8.1 Each motor remote control station shall be complete with terminal blocks; the terminal being adequately rated sized, and spaced.

The terminals shall allow the conductors of dimensions compatible with the current rated values to be connected by means assuring a reliable and efficient contact.

5.8.2 The terminals shall not allow the conductors to be displaced, or be displaced themselves, in a manner detrimental to the operation or to the insulation. (For clearance and creepage distance see Appendix B IEC publication 158.1).

5.8.3 All terminals shall be marked to requirements of IEC publication No. 446.

Terminal marking shall be clear and unmistakeably identificable with respect to the operating diagram.

5.8.4 Conduit entries to be normally tapped for 20 mm2 conduit preferably on the bottom of the enclosure. Unused conduit entries shall be plugged. conduit threads to be 1.5 mm pitch with a minimum of at least five engage threads.

5.8.5 A weatherproof compression type cable gland to be included as part of the supply.

The normal requirement is 600/1000 volt grade 2.5 mm2 PVC armored cable, with or without lead sheath 2, 3, or 7 core.

5.8.6 Cable glands for use in hazardous areas shall be certified by BASEEFA or similar Authority.

The particular cabling requirements shall be specified in data sheet.

5.9 Earthing Terminal

5.9.1 Earthing terminal shall be provided for each remote control station where necessary.

5.10 Safety and Reliability

5.10.1 Since in the low voltage release circuits, commonly referred to as automatic or two wire control, automatic restarting is inherent: its use shall be limited only to places, where restarting will not endanger the operator life or safety of process or machines.

5.10.2 The control circuit from the push button with low voltage protection (i.e.3 wire nonautomatic) shall assure maximum operation, or process safety by eliminating the possibility of sudden automatic restarting of a motor upon return of voltage after an interruption of service.

5.11 Rated Quantities for Contact Element

5.11.1 Rated voltages, rated currents, rated frequency, utilization category and rated making and breaking capacity of the contact element shall comply with the requirements of Clauses 4.2.1 to 4.2.5 of IEC publication No. 337.1 part 1 in conjunction with the information given in data sheet.

5.12 Nameplates and Labels

5.12.1 The nameplates, labels and their fixing materials shall be proven, durable under the service conditions specified for the motor remote control stations in Attachment 1, they shall be corrosion and moisture resistant and provided with indelible inscription in the language specified in Attachment 8.

5.12.2 Stainless nameplates and traffolite labels are acceptable.

5.12.3 Holes for fixing of nameplate or labels shall not influence in any way the degree of ingress protection of enclosure

.**Note:**

For material layout and lettering of labels see Attachment 13.

5.12.4 Marking shall be visible and they may be on a nameplate or on a major or essential part of the contact element. The following shall be marked on nameplate(s):

a) Purchaser's name and order No.

b) The manufacturer's name or trade mark.

c) Designation or serial No. that makes it possible to get the relevant information concerning the contact element on the entire push button station from the manufacturer or catalogue.

d) The rated insulation voltage.

e) The rated thermal current.

f) The utilization category.

g) Operational characteristic, and if possible the corresponding electrical endurance.

6. INSPECTION, QUALITY CONTROLS AND QUALITY RECORDS

See Attachment 2.

7. TESTS AND CERTIFICATION

7.1 General Requirements for Tests

See Attachment 3.

7.2 Specific Requirements for Tests

The tests shall consist of but shall not necessarily be limited to:

7.2.1 Type test

Type tests certificates shall be verified in compliance with the IEC Publication No. 337.1 Part 1 Clause 8.1 for:

a) Temperature rise tests: (Clause 8.1.1)

b) Dielectric tests: (Clause 8.1.2)

*** c)** Switching performance tests: (Clause 8.1.3**)**

7.2.2 Routine tests

Routine tests shall consist of:

a) Mechanical check.

b) Verification of the mechanical operation.

8. FINISH

The metallic enclosure and covers to be painted internally and externally with a rust preventive primer and finished with two coats of hard gloss paint.

Colors shall be as per manufacturer standard or light grey color No. 631 to BS 381C.

*** See also Clause 4 of IEC 337.2 Part 2 for making and breaking capacity tests.**

9. INFORMATION FOR MANUFACTURER/SUPPLIER

See Appendix 1.

10. DOCUMENTATION/LITERATURE TO BE SUPPLIED BY MANUFACTURER/SUPPLIER

For list of drawings, documents manuals and certificates to be submitted by suppliers at quotation and ordering stage also their number and time of submission. See Appendix E.

11. PACKING

See Attachment 4.

12. SHIPMENT

See Attachment 5.

13. GUARANTEE

See Attachment 6.

14. SPARE PARTS

See Attachment 7.

15. LANGUAGE

See Attachment 8.

16. COORDINATION RESPONSIBILITY WITH OTHERS

See Attachment 9.

APPENDICES

APPENDIX A
EXAMPLE OF TYPICAL DATA SHEET FOR
MOTOR REMOTE CONTROL STATION

PROJECT NAME.....

LOCATION.....

AREA CLASSIFICATION: (To IEC 79.10)

Safe…….....Zone2…….....Zone 1….....

Explosion Protection Code.....

INGRESS PROTEC-

TION……

CONSTRUCTION :

Polyster.....lightalloy…….....sheetsteel.....

CABLE:

Type.....size…….....No.ofcores.....entry…….

CONDUIT :

Type.....size.....entry.....

Conduit seal with filling point.....

(See Appendix C for components)

CIRCUITVOLTAGE.....a.c.....d.c.....

AMMETERS :

For schedule of ammeteres on remote control stations see Table 1.

INDICATING LAMPS :

Volt-

age…….....a.c…….....d.c.....watt.....color.....

MECHANICAL ENDURANCE

(to be continued)

APPENDIX A (continued)

TABLE 1 - SCHEDULE OF AMMETERS ON REMOTE CONTROL STATIONS

CIRCUIT No.	MOTOR kw	MOTOR F.L.CURRENT	AMMETER RANGE	CURRENT TRANSFORMERRATIO	FOR USEIN SAFE AREA	FOR USE INZONE2	FOR USE IN ZONE1

(to be continued)

APPENDIX A (continued)

DETAILS OF EACH STATION :

(Select from Figs. "1b" to "6b" in Appendix B which follows and their application are shown on their left sides in Figs.1a to6a)……..

……
……

OPTIONS :

STOP BUTTON PAD-LOCKINGFACILITY.....

C. T. SECONDARY CURRENT OTHER THAN 1A (e. g. 5A).....

DIRECT READING AMMETER……

DELETION OF CABLE GLAND FROM THE EXTENT OF THE SUPPLY ……

SPECIAL LABEL ENGRAVING REQUIREMENTS.....

SPECIAL REQUIREMENT SUCH AS :

colored pilot LAMP…….....

.....

MULTI GANG ASSEMBLY OF REMOTE CONTROL STATION

.....

.....

Note:.....

For schedule of control stations see Table 2 which follows.....

.....

(to be continued)

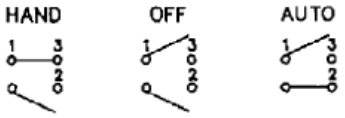
APPENDIX A (continued)

TABLE 2 - SCHEDULE OF CONTROL STATIONS REQUIRED

DESCRIPTION OF PUSHBUTTON STATION	ENCLOSURE		
	Table 0-1 SAFE AREA INDUSTRIAL WEATHERPROOF	ZONE 2 WEATHERPROOF BASEEFA CERTIFIED	ZONE 1 FLAMEPROOF/ WEATHERPROOF
STOP PUSHBUTTONS			
START/STOP PUSHBUTTONS			
START/STOP PUSHBUTTONS WITH AMMETER			
START/STOP PUSHBUTTONS WITH MOTOR STOPPED INDICATION			
START/STOP PUSHBUTTONS WITH MOTOR RUNNING INDICATION			
START/STOP PUSHBUTTONS WITH AMMETER, AND MOTOR STOPPED AND RUNNING INDICATION			

APPENDIX B

EXAMPLE OF MOTOR REMOTE CONTROL STATIONS SCHEMATIC DIAGRAMS



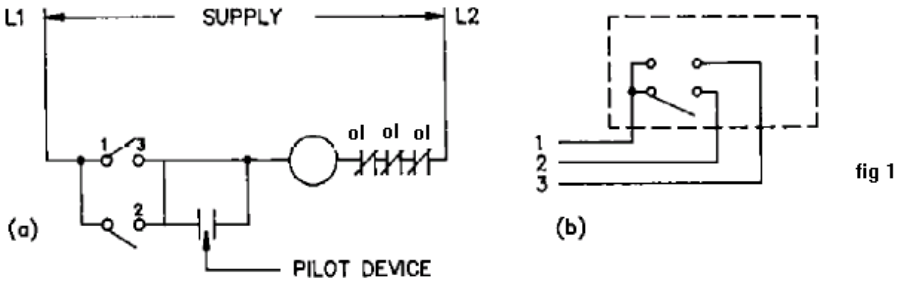


fig 1

automatic control by oilot device maintoined cotact selector

3- position hand-off-auto. (subject to exterme safty precaution)

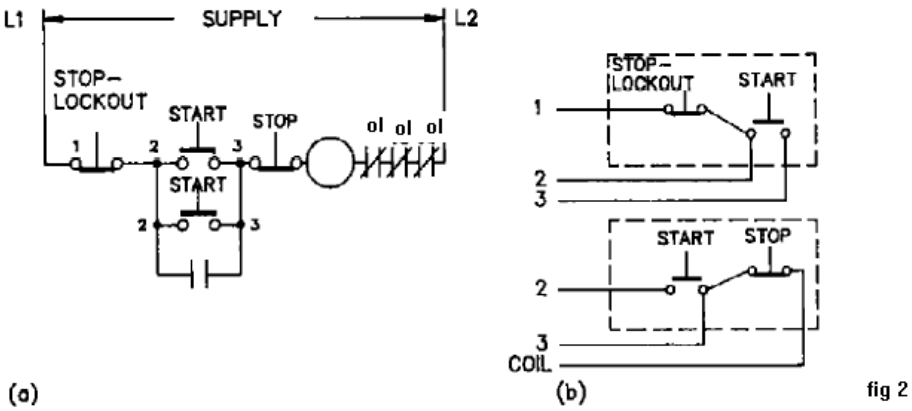


fig 2

there_ wire momentary contact 2 seprate stations

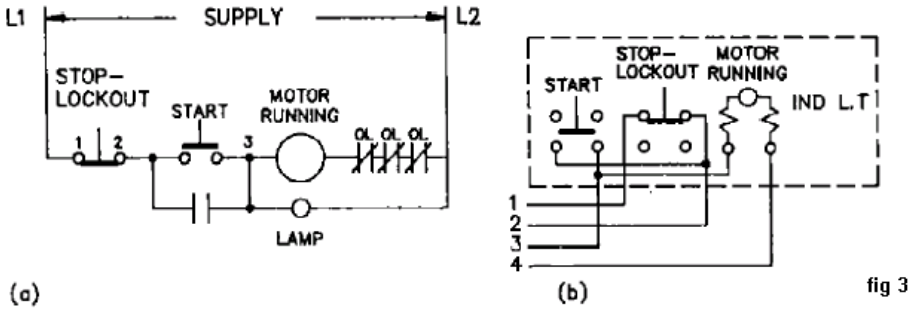


fig 3

Motor Running Indicating Light, Mornentary Contact.

(to be continued)

APPENDIX B (continued)

EXAMPLES OF MOTOR REMOTE CONTROL STATIONS SCHEMATIC DIAGRAMS

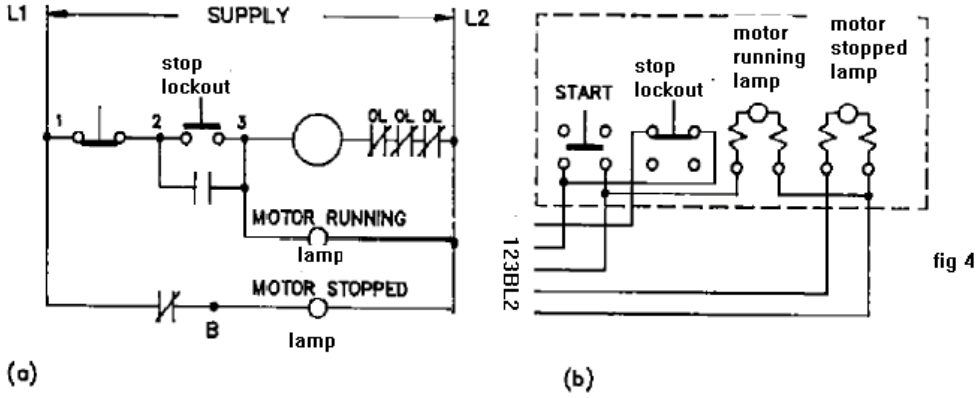


fig 4

Motor running ,Motor Stopped indicating lights, Momentary Contact, Extra .N.C Interiock on Starter.

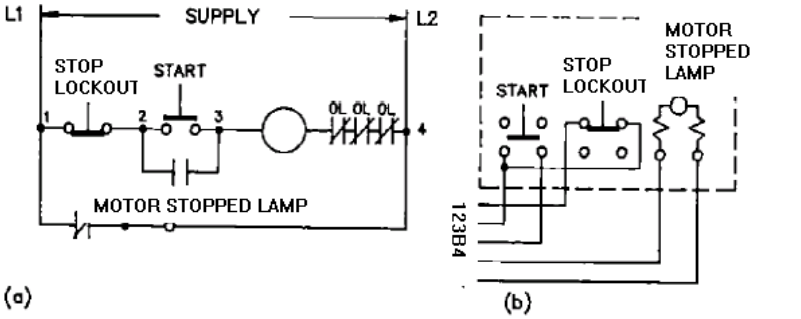


FIG.5

MOTOR STOPPED LAMP MOMENTARY COTACT EXTRO N.C. INTERLOCK ON STARTER

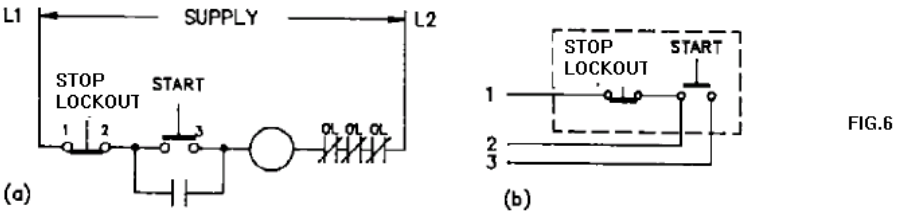


FIG.6

Three – Wire Momentary contact, Low Voltage Protection ,basic diagram.

APPENDIX C

ADDITIONAL REQUIREMENTS FOR MOTOR REMOTE CONTROL STATIONS TO BE INSTALLEDIN POTENTIALLY EXPLOSIVE GAS ATMOSPHERES

1. Enclosure of equipment shall be certified to requirements of:

1.1 IEC Publication 79-0 part 0: General requirements.

1.2 IEC Publication 79-0 part 1: Construction and test of flameproof enclosure of electrical apparatus Type "Exd" (EExd).

1.3 IEC Publication 79-0 Part 7: Construction and test of electrical apparatus type "Exe" (EExe).

2. Components for cable glands, conduit fittings and stopping plugs shall be subject to BASEEFA or similar Authority (U.L., PTb) approval.

3. Ammeters and selector switches, shall be located in flameproof chamber, with type of explosion protection "Exd".

4. Where indirect cable entry is dictated by design, terminal compartment shall have the type of protection "Exe" (EExe).

5. When single core wires through explosion-proof conduit are connected to terminals of explosion-proof equipment, sealing fittings shall be incorporated at the entrance point to prevent transmission of flame or gas/vapor to other parts of the plant.*****

6. Compliance with data in conjunction with the:

- Grouping of released gas/vapor in site.
- Ignition temperature of released gas/vapor in site.
- Temperature class of equipment.

7. Prevention of condensation in potentially explosive atmosphers

- Manufacturer/supplier shall state in his quotation the measures that have been adopted to prevent the harmful accumulation of moisture inside the remote control due to condensation.
- However breathing and draining devices shall be so constructed that they are not likely to become unsafe in service.
- Provision for breathing or draining shall not be made by delibrately increasing the gap of joints.
- The dimensions of the openings constituting the vent shall provide a margin of safety in relation to the dimensions that can be shown by test certificate to be explosion-proof.
- If the device is constructed so that it can be taken to pieces, it shall be designed so that it will not be possible to reassemble the parts in such a way as either to reduce or enlarge the vents.

Note:

When flamepath trap is provided full detail of it shall be given by manufacturer or supplier.

*** Illustration for two types of connection of explosion protected electrical equipment to external circuit (cable entries) are given in Figs. 1 and 2 in Appendix D.**

to be continued)

APPENDIX C (continued)

8. Nameplate on individual remote control station for installation in potentially explosive atmospheres, shall include the following information in conjunction with explosion protection:

Explosion Protection Code

.....

Standard

No.....

Certification No. and

date.....

Maximum vol

age.....

Type

No.....

Maximum permissible ambient

temp…….°C

Gas/vapor group.....

Maximum surface temp. of equip-

Ment……..…….°C

CERTIFICATION AUTHORITY AND MARK :

.....

.

.....

.

Tradeagent mark…….....

Note:

Requirements of Clause 5.12.4 of this Standard Specification shall also be implemented where applicable.

APPENDIX D

EXAMPLE OF CABLE ENTRIES IN POTENTIALLY EXPLOSIVE ATMOSPHERE

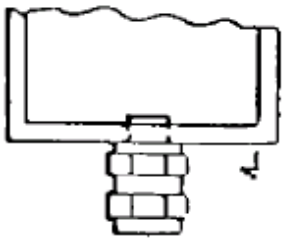


FIG2 METAL CABLE GLAND FOR UNARMOURED AND METAL ARMOURED CABLE

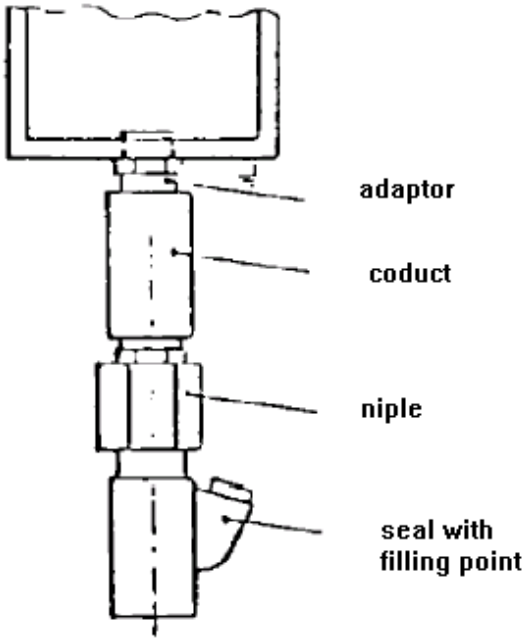


FIG.2 CODUCT SYSTEM FOR ENTRY TO FLAMEPROOF ENCLOSURE

APPENDIX E

LIST OF DRAWINGS, DOCUMENTS, MANUALS AND CERTIFICATES TO BE SUBMITTED BYSUPPLIER IN NUMBERS AND THE TIMES INDICATED BELOW:

	DESCRIPTION	REQUIRED WITH QUATATION	CERTIFIED INFORM. REQ. WITH ORDER			NUMBER OF WEEKS BEFORE DELIVERY
			N0. OF COPIES		NUMBER OF WEEKS AFTER ORDER	
			REPRO-DICIBLES	PRINTED MATTER		
A	**DRAWING AND OTHER DOCUMENTS:**					
	a) ELECTRICAL EQUIPMENT:					
	1. DIMENSIONED OUTLINES AND FOUNDATION DETAILS					
	INCLUDING: CABLE ENTRIES AND CLEARANCES					
	2. DETAILS AND CROSS-SECTIONAL ARRANGEMENT					
	3. MOUNTING DETAILS					
	4. PERFORMANCE DATA (TYPICAL)					
	5. PARTS / MATERIAL LIST					
	6. RELEVANT CATALOGUES					
	7. NAME PLATES					
	8. LIST OF FINAL LABELS					
	b) TERMINATION:					
	1. CONNECTION DIAGRAM					
	2. TERMINAL BOX ARRANGEMENT					
	3. CONNECTION AND TERMINAL DESIGNATION					
	c) ELECTRICAL REFERENCE DOCUMENTS:					
	1. GENERAL DESCRIPTION					
	2. EQUIPMENT SPECIFICATION					
	3. PERFORMANCE DATA (ACTUAL)					
	4. DRAWINGS / PARTS / MATERIALS LIST					
B	**INSTRUCTION MANUALS : (FOR ALL REQUIRED** ITEMS)					
	1. INSTALLATION, COMMISSIONING AND INSPECTION					
	2. OPERATION AND MAINTENANCE					
C	**SPARE PARTS REQUIREMENTS:**					
	1. ILLUSTRATED SPARE PARTS					
	2. RECOMMENDED COMMISSIONING SPARE LIST					
	3. RECOMMENDED SPARES FOR THREE YEARS OPARATION					
D	**CERTIFICATION:**					
	1. PERFORMANCE TEST, MATERIALS CERTIFICATES AND					
	CURVES					

ATTACHMENTS (GENERAL)

ATTACHMENT 1

ENVIRONMENTAL CONDITIONS

1.1 Site elevation : ----- meters above sea level.

1.2 Maximum ambient air temperature : ----- degrees centigrade. Bare metal directly exposed to the sun can at times

reach a surface temparature of ----- degrees centigrade.

1.3 Minimum air temperature : ----- degrees centigrade.

1.4 Relative humidity : ----- percent.

1.5 Atmosphere : saliferrous, dusty corrosive and subject to dust storms with concentration of 70-1412 mg/cubic meter, H_2S may be present, unless otherwise specified in data sheet.

1.6 Lightning storm isoceraunic level : ----- storm days/year.

1.7 Maximum intensity of earthquake ----- richters.

Note:

Blanks to be filled by client.

ATTACHMENT 2

INSPECTION, QUALITY CONTROL AND QUALITY RECORDS

2.1 Inspection, Quality Control

2.1.1 The purchaser's inspector, or his authorized representative shall have free access to the manufacturing plant engaged in the manufacture of the equipment, to carry out necessary inspection at any stage of work.

2.1.2 Inspection may include the visit to quality control laboratories, work shops, testing bay etc.

2.1.3 The supplier shall make available technical data, test pieces and samples that the purchaser's representative may require for verification in conjunction with pertinent equipment.

If required the supplier shall forward the same to any person or location that the purchaser's representative may direct.

2.2 Quality Records

2.2.1 The supplier shall maintain appropriate inspection and test records to substantiate conformance with specified requirements.

2.2.2 Quality record shall be legible and relevant to the product involved.

2.2.3 Quality records that substantiate conformance with the specified requirements, shall be retained by manufacturer and made available on request by purchaser.

2.2.4 The supplier shall establish and maintain procedure for identification collection, indexing, filing, storage, maintenance and disposition of quality records.

2.2.5 Supplier shall submit to purchaser: reports, test schedules, and test certificates (in ----- copies) on completion of tests.

Note:

Blanks to be filled by client.

ATTACHMENT 3

TESTS AND CERTIFICATION

3.1 General Requirements

3.1.1 Test procedure as proposed by the supplier shall be agreed upon, and approved by the purchaser before any test is carried out.

3.1.2 Purchaser may require witnessed tests to be carried out in the presence of his nominated representative who should be informed at least ----- weeks in advance of the date of the tests and confirmed ----- weeks before the tests.

3.1.3 Test certificates and test reports shall refer to the serial No. of the equipment tested and must bear the purchaser's name, order No. and manufacturer's name and seal.

The certificates shall be approved by the purchaser before shipment instruction are given.

3.1.4 Approval by the purchaser's inspector or representative shall not relieve the vendor of his commitments under the terms of this specification or any associated order.

3.1.5 The equipment may be rejected if measurement and inspection reveal any discrepancies between quoted figures resulting in purchase order and those measured actually.

3.1.6 Any charges incurred by the tests quoted under heading of specific requirements for tests to be quoted as a separate item and are not to be included in the cost of the equipment.

Note:

Blanks to be filled by client.

ATTACHMENT 4

PACKING

4.1 Equipment must be carefully packed to provide necessary protection during transit to destination and shall be in accordance with any special provision contained in the order.

4.2 Special attention must be given to protection against corrosion during transit, and silica gel or similar dehydrating compound shall be enclosed.

4.3 The method of cleaning preserving and the details of packing including moisture elimination, cushioning, blocking and crating shall be such that to protect the product against all damages or defects which may occur during handling, sea shipment to the port and rough road haulage to site and extended tropical open air storage generally as client general conditions of purchase see Attachment 10.

4.4 All bright and machined parts must be given the protection against corrosion.

4.5 Ancillary items forming an integral part of the equipment should be packed preferably in a separate container if the equipment is normally cased or crated.

Alternatively the ancillary items should be fixed securely to the equipment and adequate precautions taken to ensure that the item do not come loose in transit or be otherwise damaged.

4.6 The supplier shall provide methods of handling to prevent damage and or deterioration during transit.

4.7 Where deemed necessary each shipping section shall be furnished with removable steel angles.

4.8 The requirements of above items shall not relieve the supplier of any of his responsibilities and his obligations for delivery of equipment in a sound undamaged and operable conditions at site.

4.9 Identification for Shipment

The marking and labels of products should be legible, durable and in accordance to specification.

Identification should remain intact from the time of initial despatch at work to the final destination.

Marking shall be adequate for identifying a particular equipment in the event that a recall or inspection becomes necessary.

ATTACHMENT 5

SHIPMENT

5.1 Motor remote control stations package shall be provided with a permanently attached readily visible identification tag(s) bearing the equipment number of the remote control station to which it belongs.

5.2 The greatest care must be taken to ensure that shipping and associated documents with exact description for custom release are accompanied with the shipment.

ATTACHMENT 6
GUARANTEE

6.1 Clearance or Defects

The supplier shall guarantee his equipment during commissioning and for one year operation starting from the completion of seven days continuous service test in site at full load against the following defects:

- All operational defects.
- All material defects.
- All constructional and design defects.

6.2 Replacement of Defective Parts

All defective parts shall be replaced by the supplier in the shortest possible time free of charge including dismanteling reassembling at site and all transportation cost. The above mentioned period shall not however be longer than 18 months from the date of dispatch from the manufacturer's works.

6.3 Supply of Spare Parts

Furthermore the supplier shall guarantee the provision of spare parts to the purchaser for a minimum period of ----- years from the date of despatch.

6.4 After Sale Technical Services

6.4.1 Commissioning

6.4.1.1 The supplier shall quote if required for the services of competent engineer(s) and or technician(s) to assist in installation commissioning and testing of the equipment at site on a per diem basis.

6.4.1.2 The quoted rates shall be irrespective of duration and frequency and the supplier shall guarantee the services of the engineer(s) and technician(s) on the specified date within a minimum of ----- weeks advance notice by the purchaser.

6.4.2 Training

6.4.2.1 The purchaser may require the supplier to arrange for training of his personnel in the manufacturing plant and or in site for the operation and maintenance of the equipment offered.

6.4.2.2 The supplier shall quote (if required) for the cost of any of above mentioned services on a per person per diem basis. The program for the training shall be prepared by mutual agreement. An advance notice of----------weeks minimum, is required by purchaser for the commencement of training program.

Note:

Blanks to be filled by client.

ATTACHMENT 7

SPARE PARTS

7.1 All spare parts shall comply with the same standards, specification and tests of the original equipment and shall be fully inter changeable with the original parts without any modification at site.

7.2 They shall be correctly marked in accordance with client reference and manufacturer part numbers, giving also the purchaser's order number.

7.3 Spare parts shall be preserved to prevent deterioration during shipment and storage in humid tropical climate.

7.4 List of recommended spare parts and interchangeability with spare parts of similar equipment shall be submitted by supplier.

ATTACHMENT 8

LANGUAGE

8.1 All correspondence drawings, documents, certificates, including testing, operation and maintenance manuals and spare part lists etc. shall be in English.

8.2 Offers in other languages will not be considered.

ATTACHMENT 9

COORDINATION RESPONSIBILITY WITH OTHERS

9.1 In case the equipment ordered should be mounted on, aligned, connected, adjusted, or tested with the equipment of other manufacturer(s) the supplier shall contact directly the said manufacturer(s) and supply and obtain all dimensional and technical informations and arrange for any interconnecting equipment and combined test that may be required.

9.2 The supplier shall be responsible for correct and timely communication with the said manufacturer(s) and for any delay and/or cost claims arising from such communications.

9.3 Copies of all correspondence should be sent to purchaser.

9.4 The name and address of the manufacturer(s) will be given as soon as their orders have been confirmed.

ATTACHMENT 10

GENERAL CONDITIONS OF PURCHASE

This document will be submitted by purchaser at the time of ordering.

ATTACHMENT 11

SAMPLE OF PURCHASER'S DRAWING TITLE BLOCK

DRAWING NO.	**DESCRIP TION**

REFERENCE DRAWINGS					
D					
C					
B					
A					
REV	**DATE**	**DESCRIP TION**	**REF**	**CHK**	**APP**

THE NAME
OF
RELEVANT COMPANY

DRAWING TITLE:

DRN.BY	**SCALE**	**MICRO FILM CODE**	**PROJECT NO.**	**CHK.BY**	**APP.BY**

JOB NO.	**AREA CODE**	**DWG NO.**	**SHEET**	**REV.**

Note:

Appropriate Nomenclature and Registered mark shall be used for quotation and order.

ATTACHMENT 12

INSTRUCTIONS OF PURCHASER ABOUT DRAWINGS

12.1 Purchaser's drawing title block, "the sample of which is given in Attachment 11 shall be shown in the right lower corner of the drawings.

12.2 Drawings are to be protected and packed. Negatives must be dispatched in a strong card board cylinder.

12.3 Drawings must be rolled and not folded.

12.4 All drawings, documents and literatures shall be forwarded under cover of a fully detailed letter to purchaser whose addresses are given in Attachment 14.

Note:

Blank to be filled by client.

ATTACHMENT 13

MATERIAL, LAYOUT AND LETTERING OF LABELS

Lable material to be "Traffolite" 5 mm. thick having two outer layers. Letter to be engraved into the white layer to give black lettering on a white background.

LETTER TYPE

TYPE	HEIGHT	WIDTH	STROKE	CASE		LETTERS / 25 mm	SAMPLE
		mm					
A	5	WIDE	LIGHT	UPPER	CASE	7½ ± 1.2mm. TOL	ABCDEFGHIJKLM
B	5	WIDE	HEAVY	"	"	7½ ± 1.2mm. TOL	
C	5	NARROW	LIGHT	"	"	11 ± 2.5mm. TOL	
D	5	NARROW	HEAVY	"	"	11 ± 2.5mm. TOL	
E	3	WIDE	LIGHT	"	"	10 ± 1.2mm. TOL	
F	3	WIDE	HEAVY	"	"	10 ± 1.2mm. TOL	
G	3	NARROW	LIGHT	"	"	15 ± 1.2mm. TOL	
H	10	WIDE	HEAVY	"	"	3½	
j	12	WIDE	HEAVY	"	"	2½	

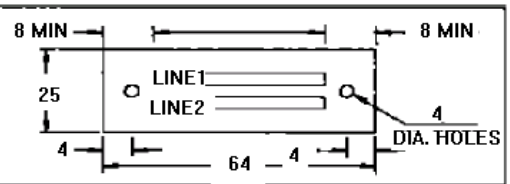
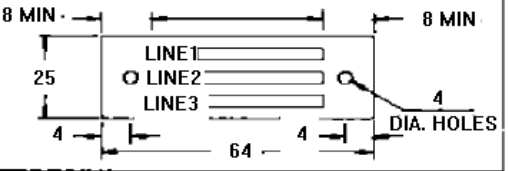
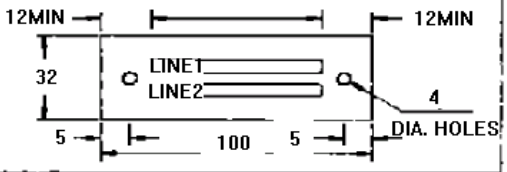
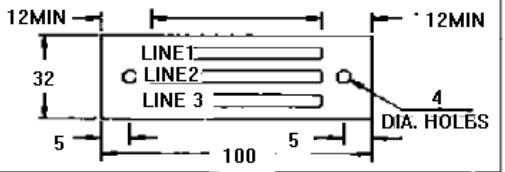
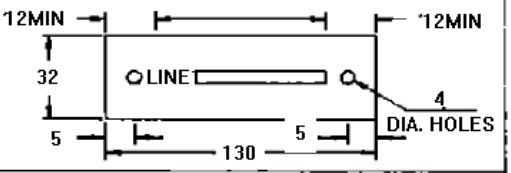
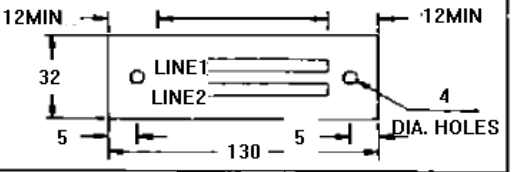
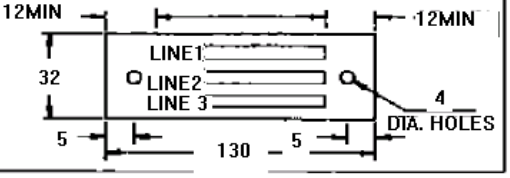
Note:

Height is in millimeters.

(to be continued)

ATTACHMENT 13 (continued)

LAYOUTS

LAYOUT 1 LETTER TYPE	G E _F	LETTERS MAX/ LINE 28 19	
LAYOUT2 LETTER TYPE	G E _F	LETTERS MAX/ LINE 28 19	
LAYOUT3 LETTER TYPE	A _B C _D E _F G	LATTERS MAX/LINE 22 23 30 45	
LAYOUT4 LETTER TYPE	A _B C _D E _F G	LATTERS MAX/LINE 22 23 30 45	
LAYOUT5 LETTER TYPE	H J	LATTERS MAX/LINE 15 10	
LAYOUT6 LETTER TYPE	A _B C _D E _F G	LATTERS MAX/LINE 28 40 40 58	
LAYOUT7 LETTER TYPE	A _B C _D E _F G	LATTERS MAX/LINE 28 40 40 58	

Note:

All dimensions are given in mm.

min = minimum.

ATTACHMENT 14

FULL ADDRESS OF PURCHASER

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P.O.BOX	**No. .....**	**CODE No. .....**
TELEPHONE	**No. .....**	
TELEX	**No. .....**	
FACSIMILE	**No. .....**	

Note:

Blank to be filled by client.