



GS 112-2

Guidance for Specification GS 112-2

**ELECTRIC MOTOR OPERATED
VALVE ACTUATORS FOR
INTERMITTENT OPERATION OF
ISOLATION VALVES**

November 1992

Amended May 1993

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BP GROUP RECOMMENDED PRACTICES AND SPECIFICATIONS FOR ENGINEERING															
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ELECTRIC MOTOR OPERATED VALVE ACTUATORS FOR INTERMITTENT OPERATION OF ISOLATION VALVES (Replaces BP Engineering Standard 152)															
APPLICABILITY Regional Applicability: International															
SCOPE AND PURPOSE This document specifies the general requirements for electric motor operated valve (MOV) actuators with integral control equipment, which are required to operate isolation valves. The derived Specification together with completed data sheets would form the technical basis for enquiry or purchase of electric MOV actuators.															
AMENDMENTS <table border="1"> <thead> <tr> <th>Amd</th> <th>Date</th> <th>Page(s)</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>May 1993</td> <td>2</td> <td>2.4.3 amended to clarify material requirements</td> </tr> <tr> <td>1</td> <td>May 1993</td> <td>10</td> <td>Data Sheet includes material exceptions</td> </tr> </tbody> </table>				Amd	Date	Page(s)	Description	1	May 1993	2	2.4.3 amended to clarify material requirements	1	May 1993	10	Data Sheet includes material exceptions
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Issued by:- Engineering Practices Group, BP International Limited, Research & Engineering Centre Chertsey Road, Sunbury-on-Thames, Middlesex, TW16 7LN, UNITED KINGDOM Tel: +44 1932 76 4067 Fax: +44 1932 76 4077 Telex: 296041															

CONTENTS

Section	Page
FOREWORD	iii
1. SCOPE.....	1
2. GENERAL	1
2.1 Explosion Protection Standards.....	1
2.2 Certification for Use in Hazardous Areas.....	1
2.3 Environmental Protection.....	2
2.4 Materials.....	2
2.5 Documentation	2
2.6 Spares 3	
3. DESIGN REQUIREMENTS	3
3.1 Motor 3	
3.2 Hammer Blow Feature	4
3.3 Motor Control	4
3.4 Motor Protection	4
3.5 Phase Sequence Detection.....	5
3.6 Short Circuit Protection	5
3.7 Control Circuit Protection.....	5
3.8 Hand Operation	5
3.9 Control Features	6
3.10 Indication.....	7
3.11 Remote Control	8
3.12 Integral Equipment.....	8
3.13 Mating Details.....	9
3.14 Lubrication	9
3.15 Gearbox.....	9
3.16 Anti-condensation Heater.....	9
3.17 Cables.....	9
3.18 Lifting Eyes.....	9
3.19 Painting.....	10
3.20 Labels10	
4. TESTING	11
4.1 Type Tests	11
4.2 Routine Tests.....	11
4.3 Test Certificates.....	11
5. DATA SHEET.....	12
APPENDIX A.....	14
DEFINITIONS AND ABBREVIATIONS.....	14
APPENDIX B.....	15



LIST OF REFERENCED DOCUMENTS	15
APPENDIX C	16
<i>SUPPLEMENTARY COMMENTARY</i>	16
C1 REMOTE INDICATION	16
C2 COMPLETION OF DATA SHEET	17
<i>C2.1 General</i>	17
<i>C2.2 Specific Items</i>	17
FIGURE 1 -	19
TYPICAL INDICATION UTILISING EXACT LIMIT SWITCHES	19
FIGURE 2 -	19
TYPICAL INDICATION UTILISING AUXILIARY SWITCHES.....	19



FOREWORD

Introduction to BP Group Recommended Practices and Specifications for Engineering

The Introductory volume contains a series of documents that provide an introduction to the BP Group Recommended Practices and Specifications for Engineering (RPSEs). In particular, the 'General Foreword' sets out the philosophy of the RPSEs. Other documents in the Introductory volume provide general guidance on using the RPSEs and background information to Engineering Standards in BP. There are also recommendations for specific definitions and requirements.

Value of this Guidance for Specification

Motor operated valve actuators are required for use in Zone 1, Zone 2 as well as non-hazardous areas. Experience indicates that a single type (Zone 1) is commonly used in all areas. This Guidance for Specification reflects this standardisation and will bring benefits in purchasing, installing, commissioning, operating and maintaining this equipment.

Application

This Guidance for Specification is intended to guide the purchaser in the use or creation of a fit-for-purpose specification for enquiry or purchasing activity.

Text in italics is Commentary. Commentary provides background information which supports the requirements of the Specification, and may discuss alternative options. It also gives guidance on the implementation of any 'Specification' or 'Approval' actions; specific actions are indicated by an asterisk (*) preceding a paragraph number.

This document may refer to certain local, national or international regulations but the responsibility to ensure compliance with legislation and any other statutory requirements lies with the user. The user should adapt or supplement this document to ensure compliance for the specific application.

Specification Ready for Application

A Specification (BP Spec 112-2) is available which may be suitable for enquiry or purchasing without modification. It is derived from this BP Group Guidance for Specification by retaining the technical body unaltered but omitting all commentary, omitting the data page and inserting a modified Foreword.

Principal Changes from Previous Edition

This Guidance for Specification is an update of BP Engineering Standard 152 (last revised in 1982). It has been revised to reflect the growing trend of specifying a single type of unit (Zone 1) for use in all hazardous areas. The revised document is based on current practices within BP, and reflects the principle designs of the major manufacturers of this equipment.



Feedback and Further Information

Users are invited to feed back any comments and to detail experiences in the application of BP RPSE's, to assist in the process of their continuous improvement.

For feedback and further information, please contact Standards Group, BP International or the Custodian. See Quarterly Status List for contacts.



1. SCOPE

This Specification gives BP general requirements for electric motor operated valve actuators with integral control equipment, which are required to operate isolation valves on an intermittent basis. It does not cover the valves themselves. BP Group [GS 130-6](#) entitled 'General Specification for Actuators for Shut-off Valves' gives requirements for actuators and ancillary equipment for shut-off valves.

A sample Data Sheet, for completion by purchaser and manufacturer(s), is attached to this Specification.

The Data Sheet for the valve actuator should be completed by the Purchaser. Information relating to the valve should be extracted from its specification.

2. GENERAL

2.1 Explosion Protection Standards

The minimum explosion protection standard for all electric MOV actuators covered by this specification shall be Ex d, gas group IIB, temperature class T3 in accordance with [IEC 79-1](#) (or EN 50014 and EN 50018). This is applicable to MOV actuators for use in safe, zone 2 and zone 1 hazardous areas.

This Specification assumes that the hazardous area in which the MOV actuator is to be installed is no more onerous than Zone 1, IIB, T3. Where the hazardous area is more onerous (e.g. hydrogen duty) then this should be specified in the Data Sheets.

The actuator type has been standardised to allow a single unit to be used almost universally across the whole of a plant. In doing this, time will be saved in its selection, purchasing and installation. The cost differential between Ex'd' actuators and Ex'n' or those for non-hazardous duties is marginal. The intent of this is aimed primarily at the bulk purchase of MOV's. Single units may be specified for their individual application requirements.

Maintenance routines for equipment should reflect the hazardous area in which the equipment is installed.

2.2 Certification for Use in Hazardous Areas

All types of motor valve actuator shall have been appropriately certified by a National Certifying Authority.

Copies of all the relevant certification documents shall be submitted by the manufacturer with the tender.



2.3 Environmental Protection

The actuator enclosure shall provide ingress protection to IEC 529 designation IP 65, as a minimum. Unless otherwise specified in the Data Sheet, the ambient temperature shall be taken as 40°C.

An IP 65 enclosure protection will meet the vast majority of applications. This is now the standard to which manufacturers conform to. It allows further standardisation of the MOV actuator across whole plant sites.

2.4 Materials

2.4.1 Materials used in the construction of the MOV actuator assembly shall be selected to prevent galvanic corrosion.

2.4.2 All materials in contact with the hydraulic fluid shall be compatible with the fluid and any additives contained within it.

2.4.3 The Vendor shall identify all their materials used in the construction of the actuators.

The data sheet will list materials which shall not form part of the actuator construction.

Consideration should be given to the materials used in the construction of MOV actuators.

Grey cast iron is vulnerable to shock loading and has low impact strength. It is however generally used as the standard material for the main actuator gearcase. This, in all but special applications, shall be acceptable.

Malleable iron has a better impact strength than grey cast iron due to heat treatment, but establishing whether heat treatment has been effective without destroying the component is very difficult. This material is however generally used for the actuator thrust base. This, in all but special applications, shall also be acceptable.

2.5 Documentation

Documentation requirements should be discussed and agreed with the manufacturer. This includes both scope and timing.

The minimum requirements are as follows:-

- (i) Completed data sheet.
- (ii) Wiring diagram.
- (iii) Installation, operation and maintenance instructions.



- (iv) Hazardous area certification.
- (v) Type test certificates.
- (vi) Routine test certificates.
- (vii) Spares.
- (viii) Valve/actuator assembly drawing.

The 'Installation, operation and maintenance instructions' should identify any critical tasks which have to be performed.

In cases where the actuator is purchased by the valve manufacturer, the valve manufacturer should be made responsible for providing the drawing showing the overall dimensions of the valve/actuator assembly.

2.6 Spares

The manufacturer shall forward to BP, within the time specified in the requisition, a full list of the recommended spares for the following two applications:-

- (i) initial installation, commissioning and 6 months operating spares
- (ii) 5 years operating spares.

3. DESIGN REQUIREMENTS

3.1 Motor

Actuator motors shall be suitable for direct-on-line starting. The minimum class of insulation shall be Class B and in all cases the temperature rise shall be limited to the value specified in [IEC 34-1](#) for Class B insulation. Motors shall be of the squirrel cage induction type unless agreed otherwise.

The motor shall be sized to provide the required seating torque of the valve with the incoming actuator terminal voltage assumed to be 10% less than the nominal supply voltage. The motor shall also be sized to ensure that actuator or valve damage cannot be incurred as a result of limit switch failure.

Actuator motor rating shall be Type S3 to [IEC 34-1](#) where $N = 15$ mins. or the time required to perform the specified number of consecutive complete operations, whichever is the greater, and $N + R = 60$ mins. A complete operation is defined as an OPEN/CLOSE movement of the valve with full operating pressure applied, and the load shall be that required by the valve.



In the vast majority of cases, squirrel cage induction type motors should be used. However, there is a growing trend for small (i.e. less than 1000 Nm torque output) part-turn valve actuator motors to be dc operated. Consideration should be given to this alternative.

Actuator motors are generally capable of delivering their rated performance under terminal voltage conditions of 90% of nominal voltage. The power supply should be designed therefore to limit the voltage drop at the valve actuator to 10% of the nominal value. Calculations should be based on the motor locked rotor current.

*

Where the actuator is to be enclosed by a fire protection package, the air temperature of the actuator enclosure will increase. The motor rating may thus differ from that for an unenclosed duty and a larger motor may be required. To ensure that adequate attention is paid to these factors, the specifying engineer should, in these circumstances, indicate clearly in the Data Sheet that the motor should be satisfactory for location in a fire protected enclosure. Additionally, consideration should be given to cases where process heat transfer via the valve yoke to the actuator may occur. In such cases cooling ribbons may be provided. However, these should not be enclosed in the fire protection package.

3.2 Hammer Blow Feature

The actuator shall include a lost-motion hammer blow feature to allow the motor or handwheel to accelerate and assist in unseating the valve.

3.3 Motor Control

Direct-on-line, triple pole, reversing type contactors with mechanical and electrical interlocks to prevent their simultaneous closure, shall be provided for actuator motor control, unless agreed otherwise. The contactors shall be in accordance with [IEC 947-4](#) minimum duty class 0.3 and minimum utilisation category AC-3.

An integral transformer shall be provided in the actuator to supply control circuit power to the contactor coils. The internal control voltage shall be 120/110 volts, unless agreed otherwise and the contactor shall incorporate an inherent undervoltage release feature.

*

In some cases, the control voltage for the plant in which the actuator will be installed, may differ from the Standard value of 120/110V. It is not sufficient, in this case, to make use of a 'remarks' item on the Data Sheet to modify the control voltage. A non-Standard control voltage must be detailed on the purchase requisition.

In exceptional cases where dc operated motors are used as detailed in 3.1 above, the control voltage may be 24 Vdc. Detailed consideration should be given to the acceptability of this, especially regarding the interfacing with remote control equipment.

3.4 Motor Protection

The actuator motor stator shall be provided with thermostats to open the contactors on excess winding temperature with self-resetting lockout features. (Hand resetting should be considered for exceptional cases only.)



The normal arrangement should be for thermostat protection of the motor to be self reset. In this manner, the hammer blow feature will be used repeatedly each time the motor automatically starts and 'sticky' valves may be freed. On less important duty applications or where the valve may be subject to serious sticking (and therefore frequent maintenance), motor life may be prolonged by making the thermostat hand reset. In this application the operation of the thermostat detection should be alarmed remotely.

3.5 Phase Sequence Detection

A facility shall be provided to inhibit actuator energisation if incorrect phase rotation exists, or if one phase is disconnected.

Phase sequence detection prevents any attempt at 'single phasing' of the actuator motor. Where large numbers of actuators are looped on a single supply cable, itself protected, phase sequence detection could be utilised to prevent sequential single phasing operation and subsequent thermal tripping of the actuator motors.

Looped supplies may also be more vulnerable to phase sequence reversal as additions or maintenance is carried out. Additionally, a reversed phase sequence supply would cause the motor to run in the opposite direction. Thus when a 'close' signal is given, the contactor would close and the motor would travel in the 'open' direction. Since the contactor is sealed in by contactor auxiliary switches and end-of-travel limit switches for the 'closed' direction, the motor could jam resulting in significant damage to the valve. A phase sequence detection relay may be used to eliminate these possibilities.

In some cases, manufacturers supply a device as standard which ensures that the motor runs with the correct rotation for the direction of valve travel, with either phase sequence of the three phase power supply connected to the actuator. This is preferred.

3.6 Short Circuit Protection

Actuator short circuit protection using HRC fuse-links complying with [IEC 269](#) will be provided by others at the remote end of the power supply cable.

3.7 Control Circuit Protection

The control circuit shall be provided with HRC fuse-links complying with [IEC 269](#).

3.8 Hand Operation

The actuator shall be suitable for hand operation and shall incorporate a device to disengage the handwheel automatically as electrical power operation is applied.

Hand operation may be used for checking the limit switch settings.



3.9 Control Features

Local/off/remote selector switches shall be provided. These shall be pad lockable.

The setting feature for all limit and additional auxiliary switches shall include means for checking the operating point against the valve position, without opening the Exd enclosure.

The actuator shall also include:-

- (a) Torque limiting switches for each direction of valve travel to ensure complete seating of the valve. They shall be adjustable over a small range and calibrated to suit the valve manufacturers safe loading torque. Means shall be provided to prevent the open torque protection tripping during initial unseating.
- * (b) End-of-travel switches (as required by the type of valve) and additional switches adjustable over a range (open and close) to suit the control and indication requirements specified in the Data Sheet.
- (c) For each direction of travel one normally open and one normally closed spare end-of-travel limit switch. These shall be additional to any other requirements.
- (d) Control circuits which shall be suitable for either maintained or fleeting initiation for open/close operation.

The control features specified above are consistent with those normally available from acceptable actuator manufacturers. Where a particular application requires control arrangements outside the provisions of the Specification, this may be best achieved in a separate control scheme, incorporating the manufacturer's normal provisions.

3.10 Indication

3.10.1 Local Indication

A local mechanical position indicator shall be provided, to indicate the valve position. The indicator shall show 'open', 'closed' or 'in transit' position.

Where local indication of the intermediate valve position is required, this shall be identified on the data sheet.



3.10.2 Remote Indication

The following features shall be available as an integral part of the actuator circuitry:-

- (a) Valve fully seated (preferred) or end position indication

*

Basic provisions for remote indication shall be 'valve open', 'valve closed', and 'valve in transit'. Contact sequence shall be as specified in the Data Sheet, and arranged for 4-wire connection.

Valve fully seated indication shall be provided whenever practicable. Where provision of this indication is not practicable, the manufacturer may employ end position indication by auxiliary limit switches. In such cases however, the manufacturer shall interconnect the valve end position switch contacts with the contactor auxiliary contacts, to ensure that a remote indication is delayed until the contactor has been opened by the travel limit or torque switches.

- (b) Valve intermediate position indication

*

Where specified in the Data Sheet, a potentiometer shall be provided to facilitate remote position indication at intermediate points during valve travel.

See Appendix C1 for Commentary.

3.10.3 Alarm Indication

The indication facilities of the actuator shall include a monitoring relay system, integral to the actuator, arranged to detect the following conditions:-

- (a) Loss of control supply.
- (b) Motor thermostat trip.
- (c) Local/remote switch set to 'local'.
- (d) Phase sequence detector operation.

Common remote alarm indication shall be provided by changeover contacts.

Where valves are on high security duty, individual alarm initiation can be arranged. Common alarm provision may be made for valves on general duty.



The remote alarm indication contact is standardised as a changeover type. Such provision ensures that the actuator can provide alarm contacts for either an 'open' or 'closed' indication.

All actuators should be standardised with the inclusion of indication monitoring relays. Their use at site needs to be considered for each installation. However it is recommended that as a minimum the facility be used wherever the position of the valve is indicated remotely.

3.10.4 The rated thermal/breaking capacities of all volt-free contacts (used for control, indication or alarm) need to be rated for their application.

Without additional information, they should be specified as:-

1A at 500 V ac and 0.3 pf

1A at 110 V dc inductive

2A at 60 V dc inductive

3.11 **Remote Control**

The power source for interposing relays shall be agreed with the actuator manufacturer.

*

Where interposing relays are specified in the Data Sheet to be energised from a remote supply, these relays shall be connected to interpose between that remote control circuit and the actuator control circuit.

Where interposing relays are specified in the Data Sheet to be energised from the actuator control circuit, reference shall be made to a separate data sheet or attachment to the Specification to identify the required quantity, configuration and rating of the relay contacts.

Interposing relay coils shall be suitable for continuous operation from -20% to +10% of the specified voltage.

3.12 **Integral Equipment**

All equipment shall be designed to provide adequate accessibility for maintenance. Where draw out components are used, access to components shall be possible without the need to disconnect incoming supply conductors.

3.13 **Mating Details**

All aspects for valve/actuator mating shall be in accordance with [ISO 5210 and 5211](#).

3.14 **Lubrication**

The actuator may be oil or grease lubricated without any restriction on mounting attitude.



3.15 Gearbox

Full details of any separate second stage gearbox shall be furnished by the manufacturer (if procured by the actuator supplier).

3.16 Anti-condensation Heater

An anti-condensation heater shall be provided only at the discretion of the actuator manufacturer to ensure satisfactory operation under the specified operating conditions.

When supplied, the anti-condensation heater shall operate from the control circuit transformer.

3.17 Cables

*

Full details of the external power, control and earthing cables will be specified by the purchaser in the Data Sheet. All glands will be provided by others.

In all cases, unused cable entries shall be provided with certified stopping plugs, to meet the requirements of clauses 2.2, 2.3 and 2.4. Other entries shall be sealed against environmental damage with disposable plastic plugs.

A secure means of terminating the bonding conductor shall be provided. Unless specified otherwise, the bonding conductor terminal shall be external to the terminal box. Where such provision is a threaded stud then nuts, washers and locking nuts/devices shall be provided.

Internal cables shall be clearly identified by a suitable numbering system which is cross referenced to the wiring diagrams.

3.18 Lifting Eyes

Where specified actuators shall be fitted with certified and tested lifting eyes. Alternatively, slinging points should be clearly identified such that over-stressing of the assembly does not occur during lifting and control components are not damaged.

EEC Directive 90/269/EEC 'On the minimum health and safety requirements for the manual handling of loads where there is a risk of back injury to workers' requires that hazardous manual handling should be avoided where possible.

3.19 Painting

External surfaces shall be prepared and painted in accordance with BP Group [GS 106-2](#)

Where a special environment is specified in the Data Sheet, the manufacturer shall identify those elements of the proposed paint specification which provide for this environment.



The manufacturer's standard painting system needs to be sought and wherever possible accepted.

Where large numbers of valves and actuators are being purchased, it may be economic to match closely the painting specifications for valve and actuator.

3.20 Labels

3.20.1 Labels shall be of a non-corrodible material and shall be fixed by stainless steel, brass or cadmium plated screws. (Adhesive is not acceptable).

3.20.2 A label shall be provided on the actuator, with the following data identified:-

- (i) type
- (ii) serial number
- (iii) hazardous area certification
- (iv) wiring diagram number
- (v) actuator speed
- (vi) maximum torque setting
- (vii) IP rating
- (viii) lubricant
- (ix) motor rating kW
- (x) supply voltage
- (xi) nominal motor current
- (xii) auxiliary switch rating - A,V
- (xiii) manufacturer's name

The data provided on the label is important, given that the equipment is often installed remotely from the location of the data sheets. Additionally, data sheets get lost. This information is standard for the principle MOV actuator manufacturer.

3.20.3 In addition a label shall be provided on each terminal box cover, engraved with the following warning:-

'This terminal box may contain supplies from several sources. All supplies must be isolated before removing the cover'.

3.20.4 Within the terminal compartment, all terminals shall be clearly identified.

4. TESTING

Testing requirements for MOV actuators should be discussed and agreed with prospective manufacturers at the earliest opportunity. The following are the minimum testing requirements:-



4.1 Type Tests

Evidence of the following type testing is required:-

- (i) Life test on complete actuator - to simulate satisfactory mechanical operation of whole assembly and envisaged operating life cycle. Test to check performance in terms of output torque, thrust and speed.
- (ii) Temperature rise tests on motors in accordance with BS 4999.

4.2 Routine Tests

- (i) Circuit continuity checks.
- (ii) Motor and control circuit high voltage test.
- (iii) Performance check on actuator assembly. Torques and motor amps to be checked during light running, stalled, opening and closing conditions. Voltage drop to be checked also.
- (iv) Visual inspection.
- (v) Mechanical operation.

4.3 Test Certificates

The manufacturer shall provide certificates for all tests. The test certificates are to include values of results of tests.

5. DATA SHEET

Completion of the items listed in the Data Sheet is effected in one of three ways:-

- (a) By deleting the pre-printed characteristics not required.
- (b) By entering the characteristics required if pre-printed options are not given.
- (c) By deleting all of the pre-printed characteristics given and entering the required characteristic in the space provided.

For guidance on completion of the Data Sheet, see Appendix C2.



INDENT/PURCHASE ORDER No									
TO BE COMPLETED IN BLOCK CAPITALS									
TO BE COMPLETED BY PURCHASER					TO BE COMPLETED BY VALVE MANUFACTURER				
VALVE DATA					VALVE DATA				
THIS DATA SHALL NOT BE USED FOR OVERALL SPECIFICATION OF THE VALVE. IT IS ONLY PROVIDED FOR THE INFORMATION OF THE ACTUATOR MANUFACTURER.									
1	MANUFACTURER				29	SHAFT DIAMETER		mm	
2	TYPE				30	LEAD		mm	
3	SIZE				31	FLANGE TYPE/ISO NO			
4	TAG NO(S)				32	MAX REQD ACTUATOR TORQUE		Nm	
5	FLUID				33	SEATING THRUST (inc friction)		N	
6	MAX DIFFL PRESSURE		bar(ab)		34	ACTUATOR MOUNTING		TOP	SIDE
7	MAX LINE PRESSURE		bar(ab)		35	SPINDLE DIRECTION FOR VALVE CLOSE		VIEWED FROM	
8	MAX FLUID TEMP.		°C		36	REMARKS:			
9	REQUIRED STROKE TIME	MAX MIN	OPEN OPEN	sec sec	CLOSE CLOSE	sec sec			
ACTUATOR GENERAL DATA					TO BE COMPLETED BY ACTUATOR MANUFACTURER				
10	TYPE OF PROTECTN.		EX'd IIBT3		ACTUATOR DATA				
11	NON-ALLOWED MATLS				37	MANUFACTURER			
12	INGRESS PROTECTION		IP 65		38	ACTUATOR TYPE			
13	ELECTRICAL POWER SUPPLY		v	wire	Hz	39	CERT AUTHY/CERT NO		
14	LOCATION	TROPICAL	MARINE	DESIGN	40	ACTUAL STROKE TIME		OPEN	SEC
	MAX AMBIENT TEMP	40°C		°C	41	MOTOR DATA			
	MAX RELATIVE HUMIDITY			% AT		(a) CLASS OF WINDING INSUL.			
	ALTITUDE	UNDER 1000 m		m		(b) SPEED		rpm	
	SPECIAL ENVIRONMENT					(c) LOCKED ROTOR CURRENT/PF		A	pf
15	NO OF CONSECUTIVE OPS					(d) FULL LOAD CURRENT/PF		A	pf
16	PAINT COLOUR				42	CONTROL DATA		RELAY	
ACTUATOR LOCAL CONTROL/INDICATION						(a) INTERFACE METHOD			
17	CONTROL PUSH BUTTONS		OPEN	CLOSE	STOP		(b) RATINGS		
ACTUATOR REMOTE CONTROL/INDICATION					6			PRIMARY Amp	SECONDARY Amp
18	REMOTE CONTROLS		OPEN	CLOSE	STOP		(d) ANTI-COND'NS'TN HEATER		SUPPLIED
19	LOCAL INTERMEDIATE POSITION INDICATOR		NOT REQ'D				(e) ANTI-CONDENSATION HEATER FUSE RATING		Amp
20	REMOTE CONTROL VOLTAGE						(f) POTENTIOMETER RESIST		ohms
21	REMOTE CONTROL POWER SOURCE		EXTERNAL		ACTUATOR	43	WIRING DIAGRAM		No.
22	REMOTE POSITION INDICATOR POTENTIOMETER		NOT REQ'D		REQUIRED	44	REMARKS:		issue
23	REMOTE INDICATION CONTACT SEQUENCE	VALVE POSITION	VALVE CLOSED	VALVE OPEN					
		OPEN	LIMIT SWITCH	LIMIT SWITCH					
		IN TRANSIT							
		CLOSE							
24	ADDITIONAL SWITCHES	ADDITIONAL SWITCH CONTACTS	1	2	3	45	MANUFACTURE		
		CONTACT POSITION WHEN VALVE CLOSED	CLOSE	CLOSE	CLOSE	46	TYPE		
			OPEN	OPEN	OPEN	47	RATIO		
		CONTACT CH-OVER POS'N % VALVE TRAVEL	%	%	%	48	REMARKS:		
ACTUATOR PROTECTION DATA					EXCEPTIONS				
25	MOTOR PROTECTION		SELF RESET	HAND RESET	49	SPECIFICATIONS MET IN FULL		YES	NO. (DETAILS ON SEPARATE SHEET)
ACTUATOR CABLE DATA					50	ALTERNATIVE PROPOSALS:			
26	POWER CABLES	ENTRY NO 1	ENTRY NO 2						
	(a) CONDUCTOR SIZE	mm ²	mm ²						
	(b) NO OF CORES								
	(c) GLAND THREAD DETAILS								
	CONTROL CABLES	ENTRY NO 3	ENTRY NO 4		51	REMARKS			
	(a) CONDUCTOR SIZE	mm ²	mm ²						
	(b) NO OF CORES								
	(c) GLAND THREED DETAILS								
27	PROTECTIVE CONDUCTOR SIZE		mm ²		REV	DATE	REMARKS	BY	APP
28	PROTECTIVE CONDUCTOR TERMINATION								



DEFINITIONS AND ABBREVIATIONS

Definitions

Standardised definitions may be found in the BP Group RPSEs Introductory Volume.

Abbreviations

BS	British Standard
IEC	International Electrotechnical Commission
MOV	Motor Operated Valve



LIST OF REFERENCED DOCUMENTS

A reference invokes the latest published issue or amendment unless stated otherwise.

Referenced standards may be replaced by equivalent standards that are internationally or otherwise recognised provided that it can be shown to the satisfaction of the purchaser's professional engineer that they meet or exceed the requirements of the referenced standards.

International Standards

IEC 34-1	Rotating Electrical Machines Part 1: Rating and Performance
IEC 79	Electrical Apparatus for Explosive Gas Atmospheres
IEC 269	Low Voltage Fuses
IEC 529	Degrees of Protection Provided by Enclosures (IP Code)
IEC 947-4	Low Voltage Switchgear and Controlgear Part 4: Contactors and Motor Starters
ISO 5210	Industrial Valves: Multi-turn Valve Actuator Attachment
ISO 5211	Part-turn Valve Actuator Attachment

European Standards

EN 50 014	Electrical Apparatus for Potentially Explosive Atmospheres. General Requirements
EN 50 018	Electrical Apparatus for Potentially Explosive Atmospheres. Flameproof Enclosure 'd'

British Standards

BS 4999	General Requirements for Rotating Electrical Machines
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BP Group Documents

BP Group GS 106-2	Painting of Metal Surfaces (replaces BP Std 141)
BP Group GS 130-6	General Specification for Actuators for Shut-off Valves.



SUPPLEMENTARY COMMENTARY

C1 REMOTE INDICATION

This Commentary relates to clause 3.10.2

Two limit switches are required for remote position indication and are located at the end of valve travel in each direction. Many combinations of contact configuration are possible and different arrangements may be applicable to individual applications or projects. Fig. 1 is an example of a typical configuration to give an indication of:-

- (i) 'valve open' when open limit switch closed (closed limit switch open),*
- (ii) 'valve in operation' when both limit switches open,*
- (iii) 'valve closed' when closed limit switch closed (open limit switch open).*

Item 23 of the Data Sheet would therefore be completed as follows:-

Valve Position	Valve Closed Limit Switch	Valve Open Limit Switch
<i>Open</i>	<i>Open</i>	<i>Closed</i>
<i>In transit</i>	<i>Open</i>	<i>Open</i>
<i>Closed</i>	<i>Closed</i>	<i>Open</i>

The individual external wiring is then connected in accordance with Figure 1.

This typical arrangement will not meet the requirements of every application but providing each limit switch has its contacts brought out to an individual terminal the required linking configuration may be achieved at the actuator terminal box.

Some limit switches are driven direct from a secondary drive with the limit switch contact operation calibrated to valve position by simulation. These limit switches are known as 'exact' limit switches and manufacturers frequently provide only one of these in each direction. Additional limit switches known as 'auxiliary' limit switches can be provided but these are subject to greater operating tolerance than the 'exact' type. To ensure compatibility of operation between 'exact' and 'auxiliary' limit switches it is manufacturers' normal practice to set the 'auxiliary' switches to operate before the 'exact' switches thus ensuring the same indicating position for both types of limit switch after full operation of the valve.

The use of 'auxiliary' limit switches for valve control by a remote control system which relies on position indication is not recommended. However, where this cannot be avoided the 'auxiliary' switch contact should be interconnected with an auxiliary contact of the actuator drive motor contactor, which in turn is stopped either via



torque or 'exact' end-position switches. There is risk that incorrect position may be indicated if the motor is stopped between 'auxiliary' limit switch operation and valve fully seated or fully open positions. However this risk is small provided the travel between the two positions is adjusted as short as possible.

Figure 2 is an example of the similar configuration to that used in Figure 1, with the addition of contactor auxiliary switches in accordance with the preceding paragraph.

The requirement for intermediate valve position indication at a remote location is infrequent but can be provided by a potentiometer driven by the valve actuator. The power supply for this circuit is normally derived from the remote location.

If required, the actuator should be specified with a sequence failure alarm contact - set up to operate when the valve has failed to complete its full travel. The trend is now to use remote logic at the control centre to determine sequence failure.

C2 COMPLETION OF DATA SHEET

This Commentary relates to clause 4.

C2.1 General

The Remarks sections in the Data Sheet are provided so that the specifying engineer can identify any information which is not covered by other Data Sheet items and which is relevant to a specific application. Typically this could be details of particularly saliferous or sulphurous operating environment, the use of a fire-protected enclosure, cross reference to drawings showing a special control scheme or interposing relay requirements, etc.

The specifying engineer should complete as many items as is possible. If it is impracticable for all items to be completed at the time of enquiry, those items for which information is not known shall be ruled through, not left blank. At the time of order, all items should be entered.

C2.2 Specific Items

(Valve Data Section (to be completed by purchaser))

Item 6 The maximum differential pressure should be specified for the valve closed position.

(Actuator General Data Section (to be completed by purchaser))

Item 14 The last entry shall be used when necessary to identify special environmental conditions such as presence of H₂S, high solar gain etc.



(Actuator Remote Control Section (to be completed by purchaser))

Item 19 *Remote control contacts can be of one of two forms referred to as 'maintained' contacts or 'fleeting' contacts. The form chosen for each application must be specified by the purchaser.*

'Maintained' contacts will remain in either an open or closed condition to initiate and retain a chosen function from the controlled device, in this case the actuator. The contact will revert to the alternative condition when a change in function is required from the controlled device. For example the external contacts can be closed to initiate a valve closed function and will remain closed until such time as a valve open function is required when the contact will revert to the open condition. This form will normally be employed when inching duty is required. Circuitry internal to the actuator may override the external circuit but the external circuit contact condition will remain in its maintained state until a positive decision is taken to change it.

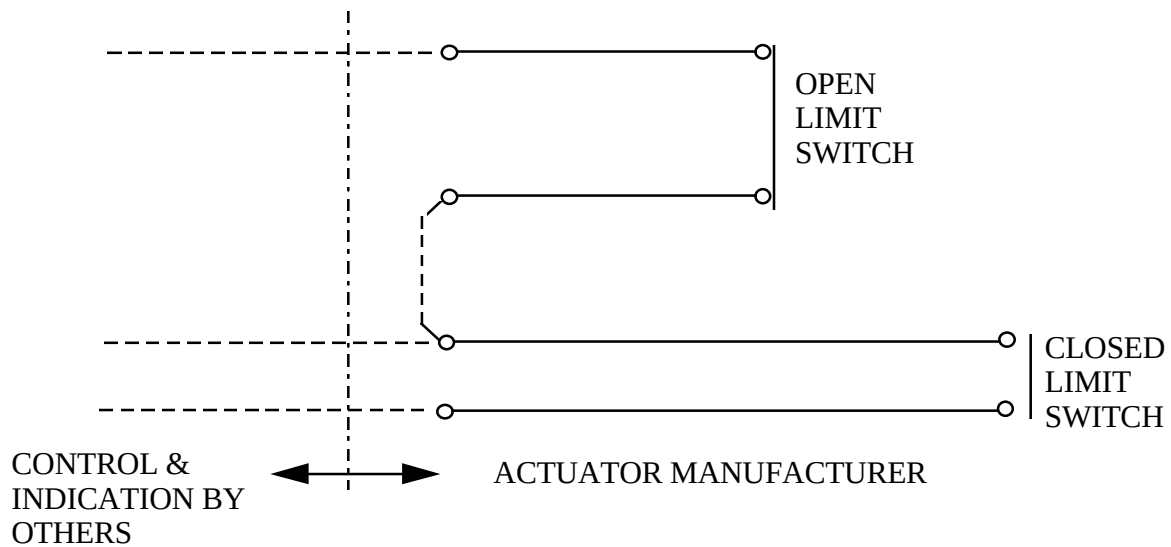
'Fleeting' contact action which can be either open or closed, may be of short duration. The corresponding action from the controlled device can only be ensured by the provision of latching circuitry internal to the device.

'Fleeting' contacts are thus inappropriate for inching duty control.

Valve Data Section (to be completed by Valve Manufacturer)

Item 32 *This item shall only be completed for torque seated valves such as gate valves.*

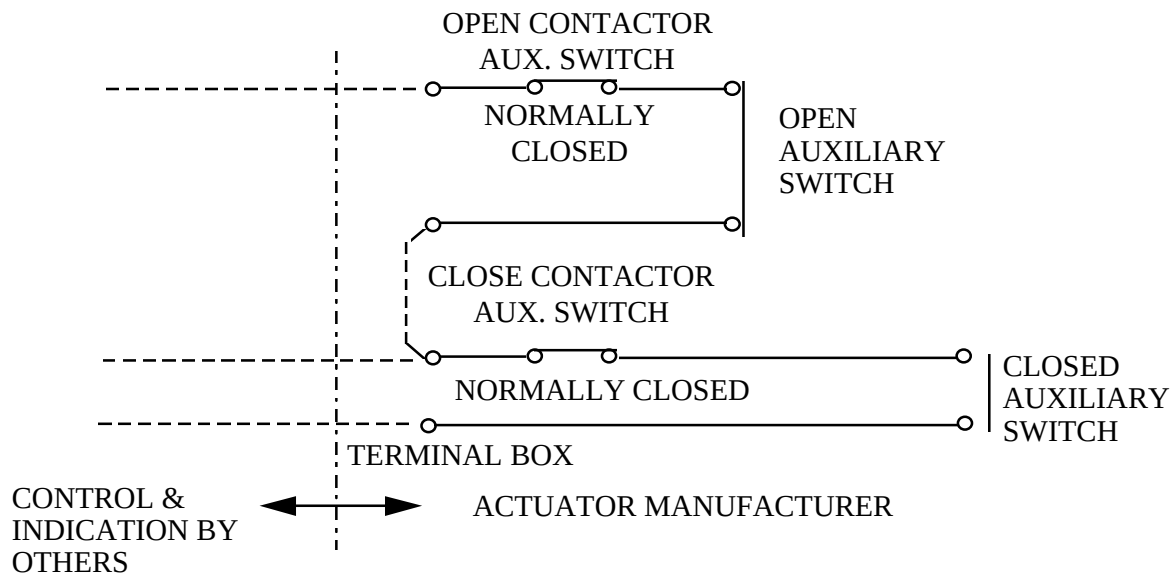




NOTES:- (a) VALVE SHOWN OPEN
 (b) WIRING SHOWN - - - - NOT WITHIN SCOPE OF ACTUATOR MANUFACTURER

FIGURE 1 -

TYPICAL INDICATION UTILISING EXACT LIMIT SWITCHES



NOTES:- (a) VALVE SHOWN OPEN
 (b) ACTUATION DRIVE MOTOR NOT OPERATING
 (c) WIRING SHOWN - - - NOT WITHIN SCOPE OF ACTUATOR MANUFACTURER

FIGURE 2 -

TYPICAL INDICATION UTILISING AUXILIARY SWITCHES

