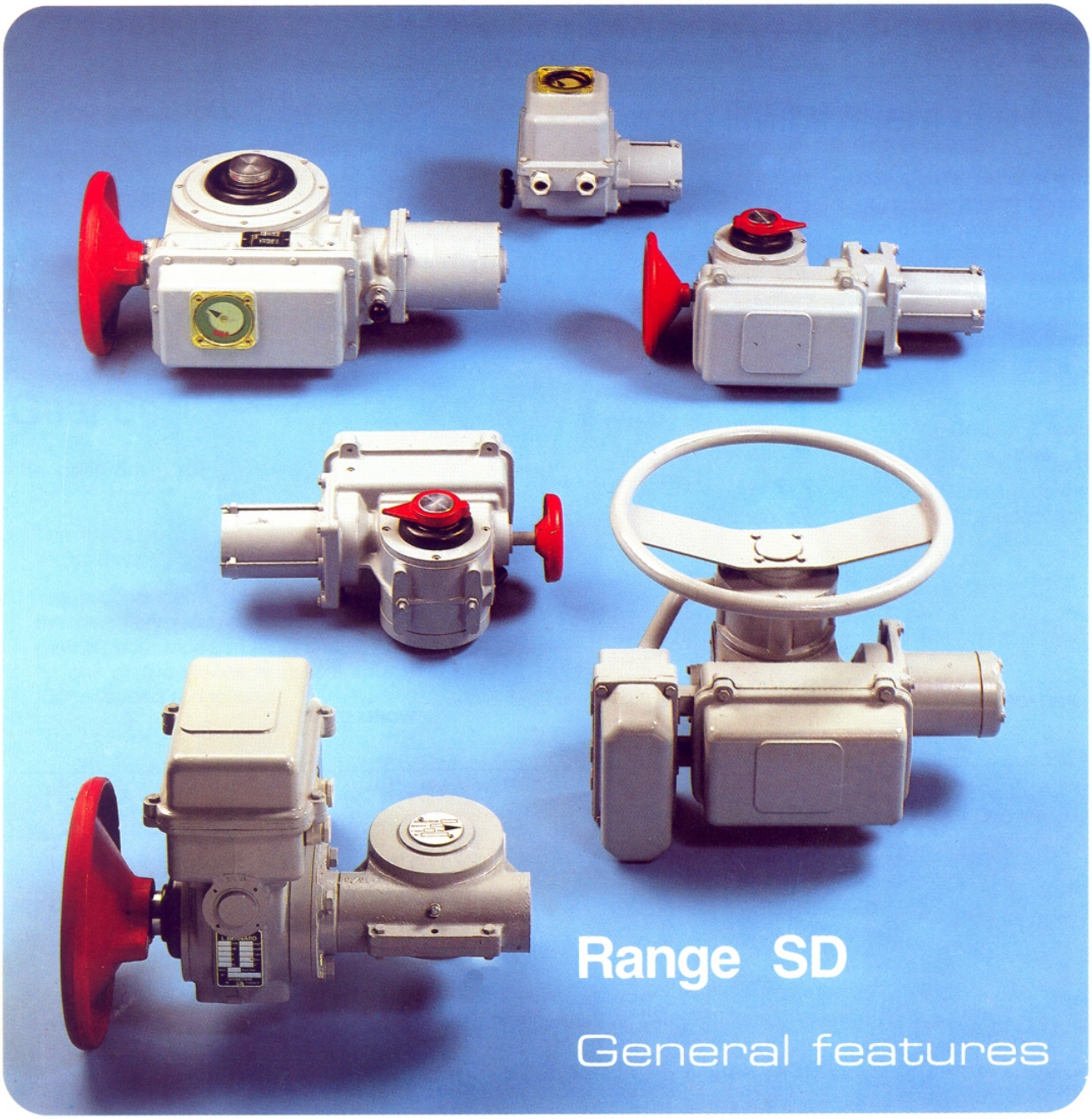
BERNARD

Electric Actuators

Manufactured in India by

Instrumentation Limited, Palghat



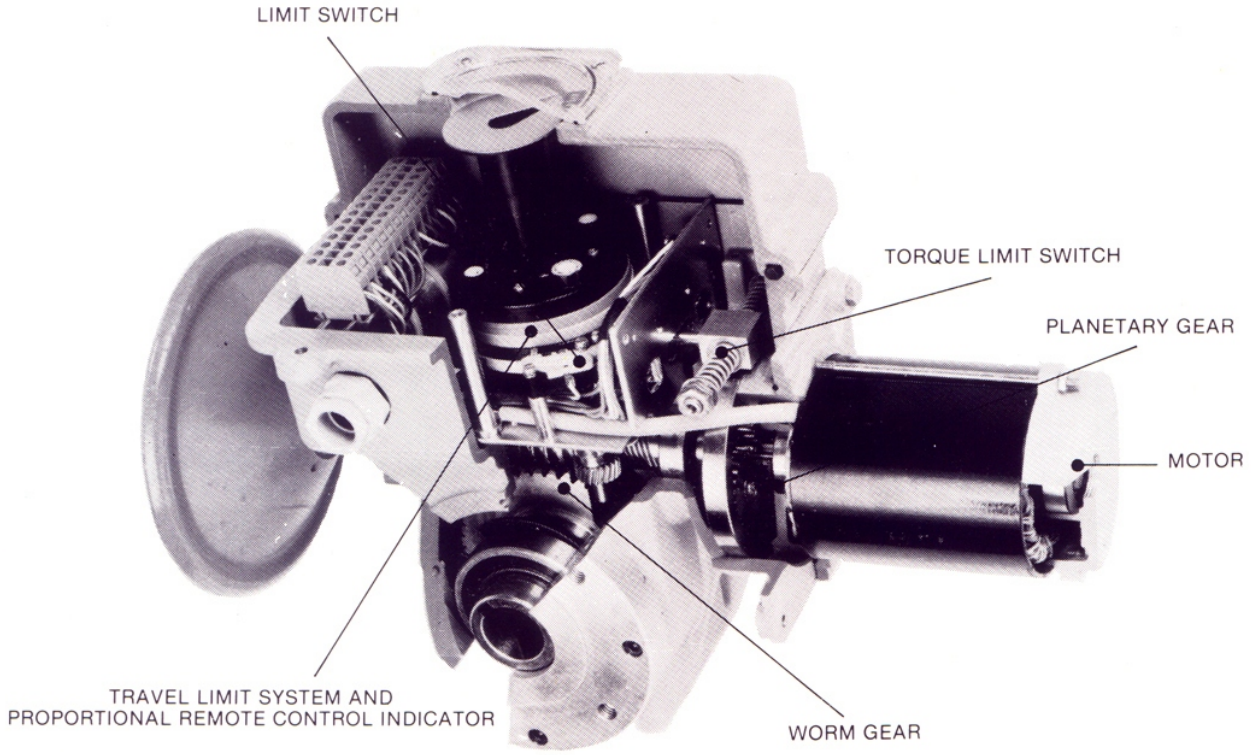
Range SD

With 40 years experience in the automatisation of control devices, Ets L. BERNARD is able to supply a most comprehensive range of actuators for part-turn, multiturn and modulating application.

Due to advanced technical developments, these actuators offer to their users numerous advantages:

- Excellent price-performance ratio.
- Highly sensitive and accurate torque limiting, thanks to a unique torque measurement device: a planetary gear system acting as first stage reduction provides a dynamometric balance allowing full power starts in either direction from any point of travel with complete safety.
- Easy to set travel limit system allows precise, continuous adjustment of all switches at any point of valve travel independently of each other.
- Lightweight construction and compact design minimize structural support and offer a high output relative to size.

THE COMBINATION OF THESE FEATURES ENSURES THE RELIABILITY AND LONG SERVICE LIFE OF BERNARD ELECTRIC ACTUATORS



Summary

As we are continually our products the design of BERNARD actuators and the information contained in this brochure is subject to change without prior notice.

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DESIGN FEATURES

Enclosure protection

BERNARD electric actuators are supplied in 3 versions:

- Weatherproof.
- Weatherproof and explosionproof (refer to page 6 for approvals, protection classes and standards).
- Special construction for difficult environments: nuclear, marine, agressive chemicals...

Electric motors

Three phase squirrel cage motors that can be connected either star or delta for 110, 220, 380, 415 or 440V, 50 or 60Hz are standard.

These motors are designed either for intermittent or continuous duty depending on the application: on-off or modulating/positioning.

On request actuators can be powered by single phase or DC motors.

Gear design

The gear drive system has typically two reduction stages:

- The first stage, driven directly by a pinion on the motor drive shaft, is a planetary system.
- The second stage, driven by the satellite wheels of the planetary gear consists of a worm and wheel gear type for models OA, A and B. For models C to E1 one or two stages of helical spur gear provide further speed reduction.

Since the planetary system permits a high speed reduction with an excellent efficiency the subsequent gear is driven at a relatively low speed which ensures a better overall efficiency than normal standard gear designs.

The gear design permits lifelong lubricatrion by grease thus simplifying maintenance and commissioning considerably.

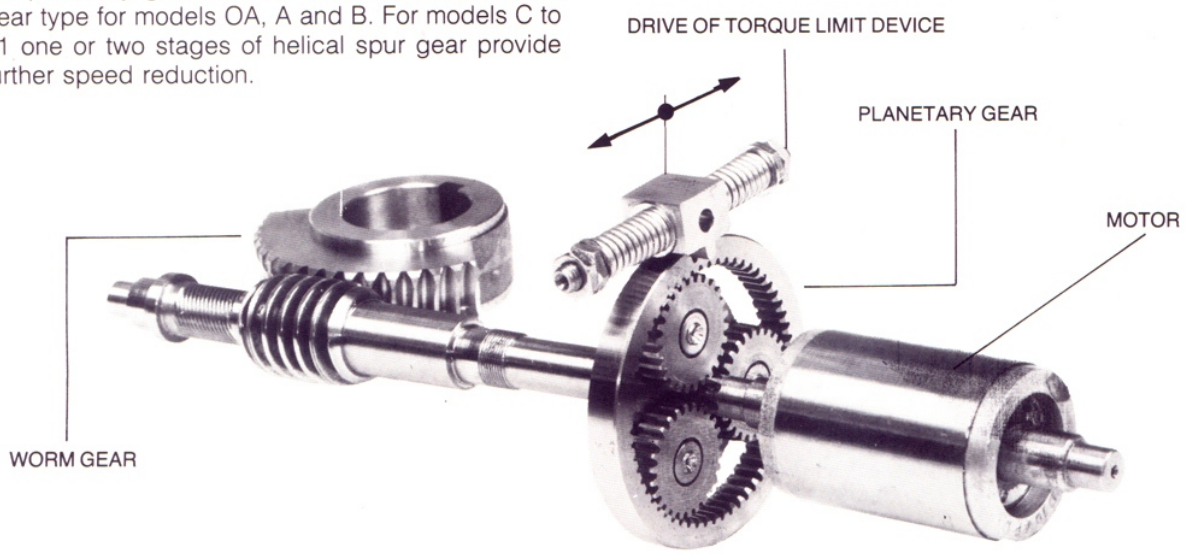
Torque limit system

The planetary gear represents also a precise and reliable torque limiter. The output torque is permanently measured by the lever deflection of the external crown of the planetary gear. This crown is maintained in position by springs which can be set independently to a different torque value for each rotational direction.

In the event the adjusted torque is reached the crown lever compresses the spring to a point where a microswitch is tripped.

The inertia of the motor rotor is absorbed to a large extent by the springs and not by the driven valve.

This system is particularly suitable for valves requiring to be torque seated such as globe and wedge gate valves.



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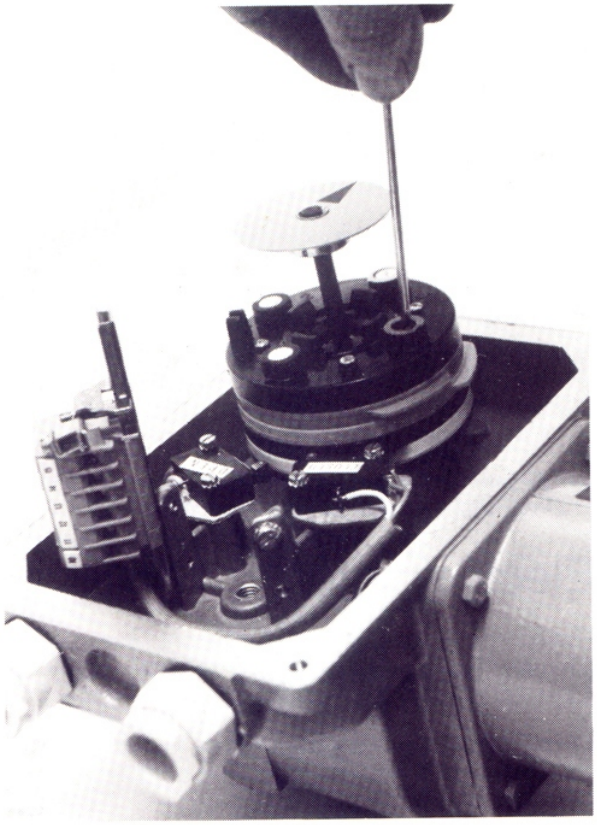
Range SD



Travel limit switches

Two cam discs, one for each direction trip the limit switches. They are mounted on a circular plate which is driven by a set of reduction gears ensuring a rotation of less than one turn for the total travel of the driven equipment.

Adjustment is achieved quite easily without tools by positioning cam with respect to its switch when the corresponding position is attained. The cams are linked to the rotating plate by a drive pin so that after setting the cams cannot be accidentally unsettled even in case of vibration.

The addition of extra switches or remote position indicating devices is very simple even after installation on site.

Position indication

All part turn actuators are supplied with continuous visual position indication, which is also available on request on multiturn and linear actuators.

Electrical indication of final positions is provided by the travel switches. If intermediate position indication is required additional switches can be set in any intermediate position as well as potentiometer or current transmitter for remote position.

Manual operation

All actuators are fitted with a handwheel for manual emergency operation which rotates at a low speed. Depending on the required torque the handwheel is directly acting or has a reduction gear.

Several types of declutching handwheels are also available:

- Declutching handwheel with priority to the electric motor: in case of motor start the handwheel is automatically declutched.
- Declutching handwheel with electric safety: when the handwheel is operated a switch prevents motor operation.
- Declutching handwheel with removable key: efficient and simple.

Mounting details

All actuators are available with ISO 5210/5211 or DIN 3210 flanges. Coupling through bore with keyway is standard. Other types of coupling can be made and are available on request.

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GENERAL TECHNICAL SPECIFICATION OF BERNARD STANDARD ACTUATORS

Temperature acceptance

For on-off or modulating duty ambient temperature −20°C to +70°C.

Other ranges of temperature are available (see options)

Enclosure protection

Weatherproof enclosure IP 65 per IEC 144 recommandations (BS 5420). Other protection classes are available on request (for example IP 67 or IP 68 for submerged service.)

Power supply

Motor voltage is 3 phase 110V, 220V, 380V, 415V or 440V 50 or 60Hz.

Other voltages and frequencies as well as single phase and DC motors are available.

Motor duty rating

Normally, the actuators are fitted with a motor for short-time operation. After each operation (opening and closing) which can last a maximum of 10 minutes, a shut-down period is necessary. These shut-down periods can be calculated as follows:

For a 30% duty rating:

Operation time in seconds × 2.3 = shut-down time in seconds.

In addition to the duty rating, the number of starts and ambient temperature are limiting factors (refer to the table below).

Ambient temperature	Number of cycles/hour
− 20° to 40°C	360
40° to 60°C	190
60° to 70°C	155

Motor insulation

Insulation of motor winding is class F (better than E and B classes tropicalized.)

Electrical connection

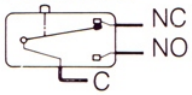
- A terminal strip with numbered screw clamps terminals permit connection of control and power cables. The terminals are in control compartment of the actuator.
- The cables are introduced through cable glands fitted to the actuator. There are 2 cables glands of PG16 size provided but other types can be fitted.

Switches

Microswitches for travel limit, signalling and torque limit are normally single pole double throw (SPDT) type. They are standard microswitches readily available worldwide.

Rating = 15 A at 250 V AC
0.6 A at 215 V DC

PRINCIPLE



Lubrication

All actuators are lubricated for life (100 000 operations) with grease.

If it becomes necessary to renew the grease, use a product which is at least equivalent (see table below.)

NOTE: when changing the grease, first remove all the old grease.

General characteristics of lubricant (for normal condition)

- Penetration ASTM at 25°C: 265/295
- Drop point 180°C

Equivalence table
(normal condition: −20°C to +70°C)

ELF	TOTAL	SHELL	MOBIL	ESSO
EPEXA 2	MULTIS EP2	ALVANIA EP2	MOBILUX EP2 or MOBILPLEX 47	BEACON EP2

Paint

All actuators are supplied with a primer coating allowing final coating on site. This primer is compatible with epoxy, polyurethan or vinyl finishing coating.

A finishing coating can be applied on request.

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Range SD

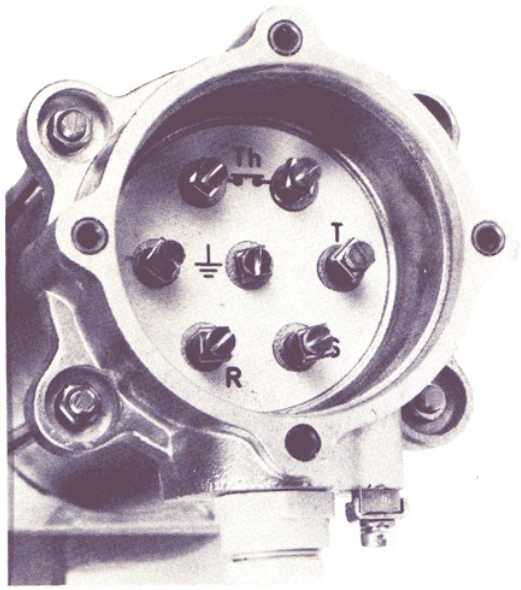
Explosionproof design

Protection

Weatherproof (class IP 65) and explosion (flame)-proof enclosure (see protection classes in table below.)

These units comply with European standards CENELEC EN 50 014 to 50 020 and meet the requirements of the highest protection: group II C. So, they can be installed in explosive atmosphere (other than fire-damp) including hydrogen.

Note: Our actuators can comply with other standards than those shown in the table. Please, contact us.



Detail of motor terminal box

Detail of construction

- Motor:

  It is protected by a weatherproof and explosion (flame)-proof enclosure. The motor terminal box is completely separated from the motor by a wall. Weatherproofing (internal and external) is ensured by o'rings.

- Cable glands:

  Cable entries are provided with approved "EEx-e" cable glands for non-armoured cables. Other types of cables glands can be fitted on request.

- Limit switches:

  The limit switches which are used for these actuators are explosionproof according to EEx-d II CT6 and weatherproof to IP 66.

  They are fitted into the control box of the actuator and wired to "screwed-screwed" approved terminals according to EEx-e.

NOTE: Construction and components in accordance with intrinsically safe protection (EEx-i) are available on request.

APPROVALS

Actuator type	CENELEC standards	Trial organisations	No of approvals	Protection class
OA Motor Control box	EN 50014 to 50 020	 CERCHAR CERCHAR	 80.1051 84.5051	 EEx de II CT 5 EEx de II CT 6
A, AS Motor Control box	EN 50014 to 50 020	 CERCHAR CERCHAR	80.1050 80.1051 84.5054	 EEx de II CT 5 EEx de II CT 5 EEx de II CT 6
B, BS Motor Control box	EN 50014 to 50 020	 CERCHAR CERCHAR	80.1050 80.1051 84.5052	 EEx de II CT 5 EEx de II CT 5 EEx de II CT 6
C, C3, D1, E1	Information transmitted on request for these types			
Common components Switch Terminal Cable gland Heating resistance Potentiometer	EN 50014 to 50 020	 P.T.B. P.T.B. L.C.I.E. P.T.B. P.T.B.	 79.1015 U 80.3114 U 81.2061X 83.1059 U 81.1050 U	 EEx de II CT 6 EEx e II EEx e II EEx d II CT 5 EEx d II CT 6

LCIE : Laboratoire Central de l'Industrie Electrique (Industrial Electricity Central Laboratory) — France.
PTB : Physikalische Technische Bundesanstalt — Germany.
CERCHAR: Centre d'Etudes et de Recherches des Charbonnages de France.

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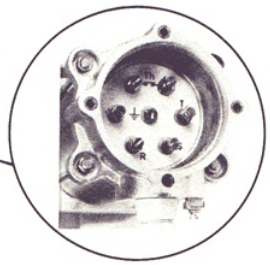
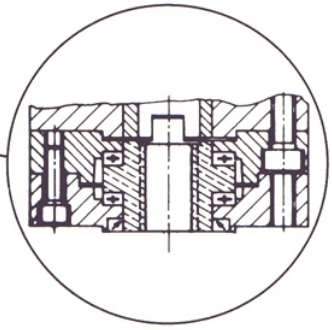
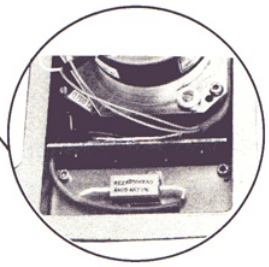
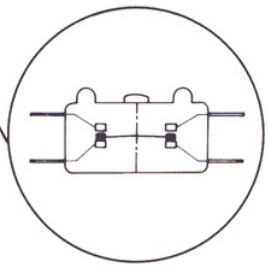
OPTIONAL EXTRAS

REF.	
H1	■ Explosion (flame)-proof enclosure (see page 6). This construction is defined with an "EX" after the REF.
H2	■ Design for low temperature. Ambient temperature −40°C to +70°C for on-off modulation duty.
H3	■ Design for high temperature 0°C to +90°C.
H4	■ Design for marine service for nuclear environments.
H5	■ Submersible construction IP 67 accepting occasional immersion.
H6	■ Submersible pressure resistant construction IP68 (duration time to be defined).
H7	■ Built-on mechanical position indicator for multi-turn actuators (standard if 1/4 turn actuator).
H8	■ Declutchable handwheel.
H9	■ Thrust acceptance bushing.
H10	■ Built-in heater resistance for humid environment: 6 to 10W according to actuator type. Ref. for explosionproof: H10EX.
H11	■ Limit switches with 4 poles DPDT type. Ref. for explosionproof: H11EX.
H12	■ Motor with built-in thermal protection embedded in winding connected to terminals for use in control circuitries. When motor becomes too hot the contact is interrupted. Ratings at 250V 50/60Hz: 1.6 Amps for cos φ = 0.6 2.5 Amps for cos φ = 1.
H13	■ Motor with winding insulation class H.
H14	■ 3 phase motor for voltage other than standard: 24 to 660V.
H15	■ Single phase motor: voltage 48 to 250V.
H16	■ DC motor, voltage 12 to 220V.
H17	■ Motor for modulating and positioning applications, continuous duty 100% until 1200 starts per hour.
H18	■ Extra travel limit switches (e.g. for independent remote signalling). Ref. for explosionproof: H18EX.









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Range SD

OPTIONAL EXTRAS

H19 ■ Flashing contact, remote indication of actuator running. Ref. explosionproof: H19EX.

H20 ■ Model INTEGRAL: built-on control box with reversing contactor starter with thermal protection OPEN/STOP/CLOSE push button and remote/local selector switch.

H21 ■ Potentiometer, single or double for position indication. Standard 1000 ohms. Linearity ±0.25%. Power 4 watts.

H22 ■ Potentiometer as H21 but for modulating duty. Ref. explosionproof: H21EX, H22EX.

H23 ■ Voltage stabilizer for 6-12V in case of position indication by potentiometer. (Supplied separately)

H24 ■ Voltmeter for position indication (supplied separately).

TAM ■ Electronic position transmitter, Type TAM, output signal 4-20mA.

H25 ■ Voltage stabilizer 24V for TAM, supplied separately.

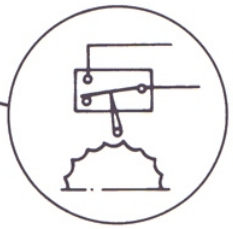
H26 ■ Milliammeter for position indication, supplied separately.

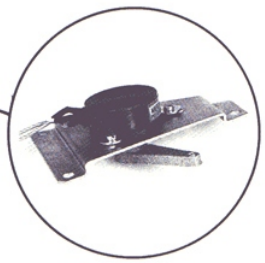
GAM ■ Electronic positioner Type GAM for modulating and positioning applications, input signal 4-20mA, (others possible), necessary to add potentiometer of Ref. H22.

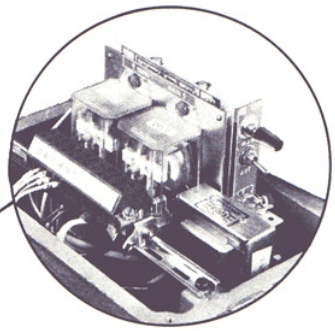
H27 ■ Additional cable glands.

H28 ■ Built-on and wired multipin plug for easy and safe connection.

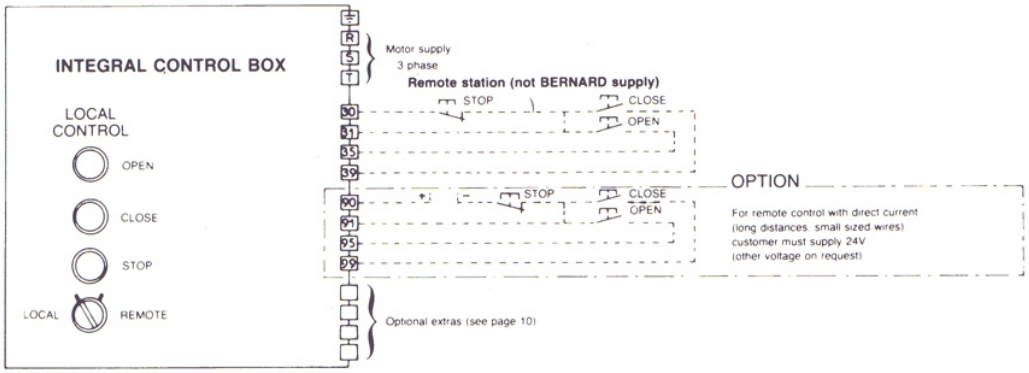
H29 ■ Foot mounting with operating lever and ball joints (for damper operation).







WIRING DIAGRAM FOR CONNECTION OF OPTION H20



NOTE: This list has been limited to the most usually requested extras.
Consult our office
- for all option not described above.
- to check if the requested option is available on selected actuator and in the case of several options if they are compatible among themselves.

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HOW TO ORDER

When ordering please supply the following information necessary for exact specification of the actuators.

BERNARD actuator, Type

Enclosure: ☐ weatherproof IP 65 ☐ submersible IP 67 ☐ submersible IP 68 with pressure ☐ explosion (flame)-proof

Output speed: RPM

Output torque max: Nm or thrust: N

Output shaft: ☐ bore + keyway ☐ claw coupling ☐ inside square ☐ special (to be defined)
☐ incorporated bush ☐ enlarged sleeve ☐ hexagonal hollow shaft

Mounting flange: ☐ standard ☐ special

Motor type: ☐ 3 phase ☐ single phase ☐ direct current - Duty ☐ on-off (30%)
☐ modulating (100%)

Supply voltage: V and frequency : Hz
Stroke: ☐ 1/4 turn ☐ multiturn - number of turns to close valve

Valve stem travel: mm length

Closing time: seconds

Electric connection: ☐ standard (2 cable glands PG16) ☐ special (to be defined).

OPTIONAL EXTRAS IF ANY

☐ Additional travel limit switch (H18) - Quantity:

☐ Anticondensation heater (H10) standard 220V - Other: V

☐ Thrust acceptance unit (H9)

☐ Standard potentiometer 1000 ohms ☐ position indication (H21) ☐ modulating purpose (H22)
Other value ohms ☐ double potentiometer (pos. indication + modulating)

☐ Built-in positioner GAM 4-20mA (add optional potentiometer ref. H22)
other signal: mA.

☐ Electronic position transmitter TAM

☐ Foot mounting with lever and ball joints (H29)

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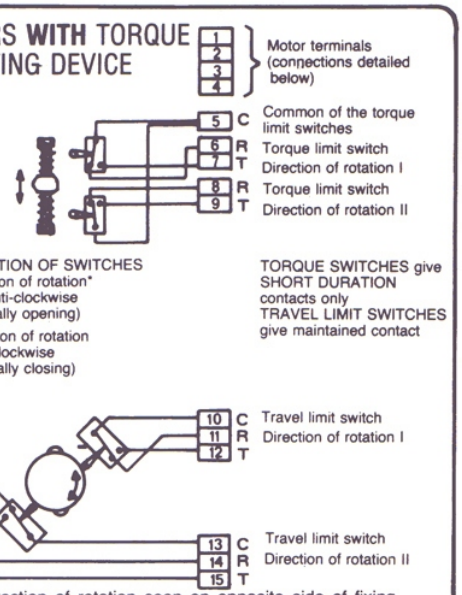
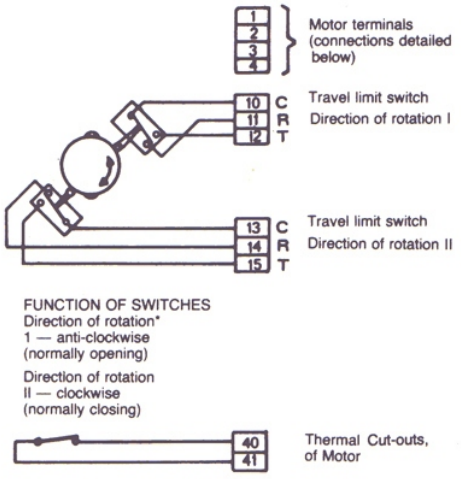
STANDARD INTERNAL WIRING DIAGRAM

ACTUATORS **WITH** TORQUE LIMITING DEVICE



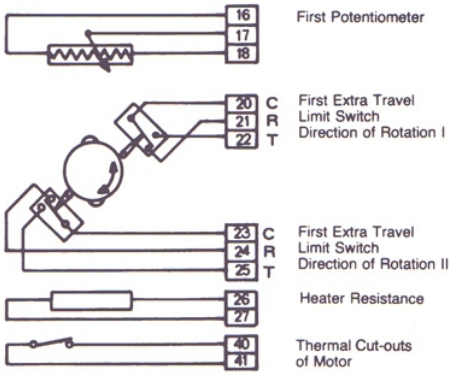
* Direction of rotation seen on opposite side of fixing flange of actuator.

ACTUATORS **WITHOUT** TORQUE LIMITING DEVICE (types OA)

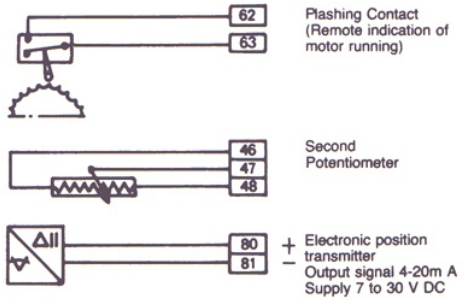


* Direction of rotation seen on opposite side of fixing flange of actuator.

OPTIONAL ACCESSORIES

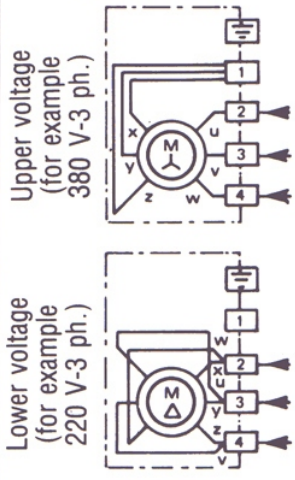


Torque limiting device available on OA-6, OA-8, OA-P

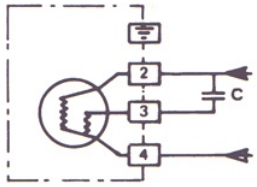


MOTOR

THREE PHASE

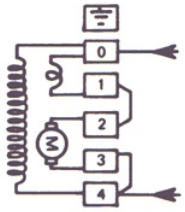


SINGLE PHASE



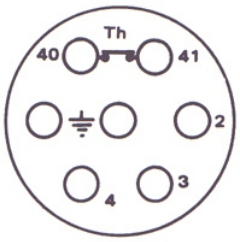
Note:
The capacitor is enclosed in the types OA and supplied separately for the other types of actuators.

DIRECT



EXPLOSIONPROOF

Th : Thermal cut-out



Independant terminal box of motor

To change direction	Interchange terminals 2 and 3	Supply either therminal 2 or terminal 3	Connect terminal 1 with 3 and supply terminals 2 and 4

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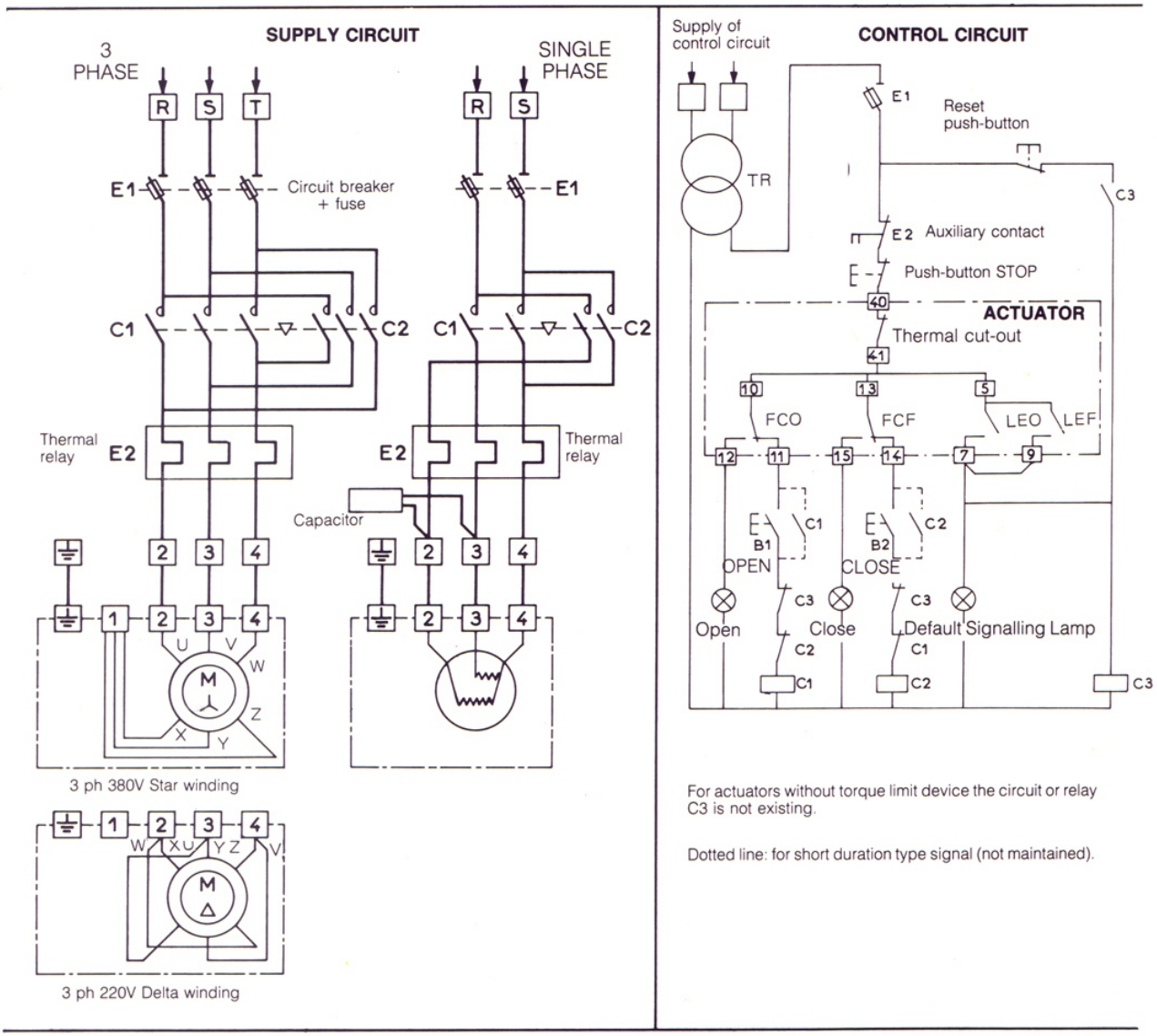
EXAMPLE OF WIRING DIAGRAM FOR STANDARD ACTUATOR

Function

- Stop in open and close positions on travel limit switch
- Torque limit in safety action, with manual reset.

NOTE: We can supply other types for any function on request.



For actuators without torque limit device the circuit or relay C3 is not existing.

Dotted line: for short duration type signal (not maintained).

E1 : circuit breaker with fuse
E2 : thermal relay
C1 : contactor OPEN
C2 : contactor CLOSE
C3 : relay of torque limit device
FCO : travel limit switch OPEN
FCF : travel limit switch CLOSE
LEO : torque limit switch OPEN
LEF : torque limit switch CLOSE
} These are part of actuator
Limitherm: thermal cut-out in motor (optional)
TR : transformer

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