BERNARD® CONTROLS

Invest in Confidence

BC PREMIUM

FQX
RANGE

Start Up Guide

SUG_22013_EN - Ind. B
Art : 5100883

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DEFINITIONS

	Tip or info.
	Warning requiring a check and/or a compulsory action.
!	Warning requiring a check and/or a compulsory action on the device because of risks of damages for the device or danger for the staff working on the device.
! Ex	Warning requiring a check and/or a compulsory action on the device because ignoring it may cause an explosion.

➔ **Instruction to follow to comply with explosion-proof rules**

1 SAFETY INFORMATION

!	Please carefully read this whole document before proceeding to installation and commissioning.

1.1 Reference standards and documents

The following documents should also be consulted:

a) IEC/EN60079-14 standard (electric installations in gaseous explosive atmosphere),

b) IEC/EN60079-17 standard (inspection and maintenance operations in dangerous areas),

c) Decrees, ministerial orders, laws, directives, standards, procedures, and any other document relative to the area where the actuator has to be installed.

BERNARD CONTROLS cannot be judged responsible for the non-respect of these rules.

Our equipment complies with IECEx and ATEX Standard and is therefore IECEx and ATEX marked.

They have been designed to be used in explosive atmospheres:

- **group II** - category 2 in presence of vapor, fog, or gas (G). Use in zone 1 or 2.

➔ **Please check the compatibility between the indications written on the identification plate and the explosive atmosphere type, the ambient and the admissible surface temperature of the installation area.**

➔ **The actuator installation and maintenance must be carried out by qualified, trained, and certified personnel. Final acceptance of this equipment after installation is subject to the jurisdiction of the local inspection authority.**

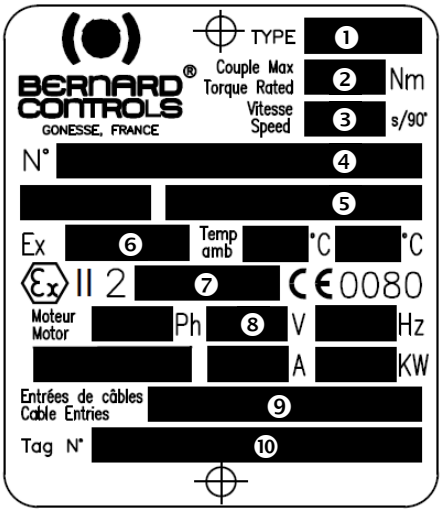
1.2 Marking

Please note that your actuator is either ATEX or IECEx.

	ATEX	IECEx
Name and address of the manufacturer	BERNARD CONTROLS 4 rue d'Arsonval 95505 Gonesse, France	
Actuator type	FQX	
Serial number	Serial n°XXXXXXXX.YYY	
Certificate number	INERIS 23ATEX0015X	IECEx INE 23.0024X
Specific marking	WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT	
	CABLE ENTRIES: SEE INSTRUCTIONS	
N° of notified audit body	CE 0080	
Gas marking	II 2 G Ex db h IIC T4/T5/T6 Gb Ex db h IIB T4/T5/T6 Gb	Ex db h IIC T4/T5/T6 Gb Ex db h IIB T4/T5/T6 Gb
Ambient temperature	-40 C to +60 C (T6) -40°C to +70°C (T4/T5)	

1.3 Nameplate

Ensure that the following references and characteristics appear on the nameplate of the actuator mounted on the casing corresponding to the purchase order.



① Model name: FQX

② Torque value max. transmitted to the valve

③ Duration in sec. to electrically perform a stroke

④ Bernard Controls serial number

⑤ Certificate and Certificate number

⑥ ATEX/IECEx marking

⑦ ATEX additional marking

⑧ Motor characteristics

⑨ Cable entries type & diameter

⑩ Customer valve tag number

1.4 SIL2 safety function

The only document proves that our material is SIL2 is its certificate.

All the models from the FQ/FQX range are covered by the certification SIL2, especially the kinematics of the spring-assisted safety return function.

1.4.1 Environment

Safety return function is considered SIL2 in the temperature range -25 to +60°C (-13 to 140°F) only.

1.4.2 Function check

Every 6 months, proceed to a safety return test by switching off the power supply from a position opposite to the safety position, then measuring the travel duration to the safety position.

If this duration is higher than the one measured during commissioning, please contact Bernard Controls for an upgrade of the actuator.

1.5 Installation area

This actuator is an explosion-proof equipment and can be used in the following areas:

Actuator type	FQX (ATEX/IECEx)
Protection modes	Ex db h
Category	2
Protection level	EPL Gb
Ex installation zones	Zone 1 or 2
Atmosphere	G Gas

Zone 1 (gas): the explosive atmosphere is likely to occur occasionally in normal operation.

Zone 2 (gas): the explosive atmosphere is not likely to occur in normal operation but if it does occur, it will persist for a short period of time only.

! Ex This device has not been designed to be operated in an area where explosive atmosphere occurs frequently or during long periods of time (Zone 0 according to ATEX / IECEx).

Groups

This actuator is designed for the surface industries and all types of gases including hydrogen and acetylene.

Temperature class

The temperature class corresponds to the actuator maximum surface temperature.

Class	Max surface temperature
T4	135°C / 275°F
T5	100°C / 212°F
T6	85°C / 185°F

! Ex Check group and temperature class on the actuator tag. Make sure it complies with the installation area.

1.6 Device integrity

! Ex Do not bring any modification of any kind to the actuator.

2 STORAGE

2.1 Packaging

The FQX actuator is delivered in a cardboard box equivalent to the size of the actuator and sits in a cardboard wedge.

2.2 Storage

It should be stored under a shelter, in a clean and dry place and protected from wide temperature variations.

- Avoid placing the actuator directly on the floor.
- Check that cable entry plugs are correctly tightened.
- Check that cover screws are correctly tightened.

What to check after storage

1. Visually check the electrical equipment.
2. Operate the actuator manually.

What to check on pre-installed actuators

If you expect a long period between actuator mounting and electrical wiring:

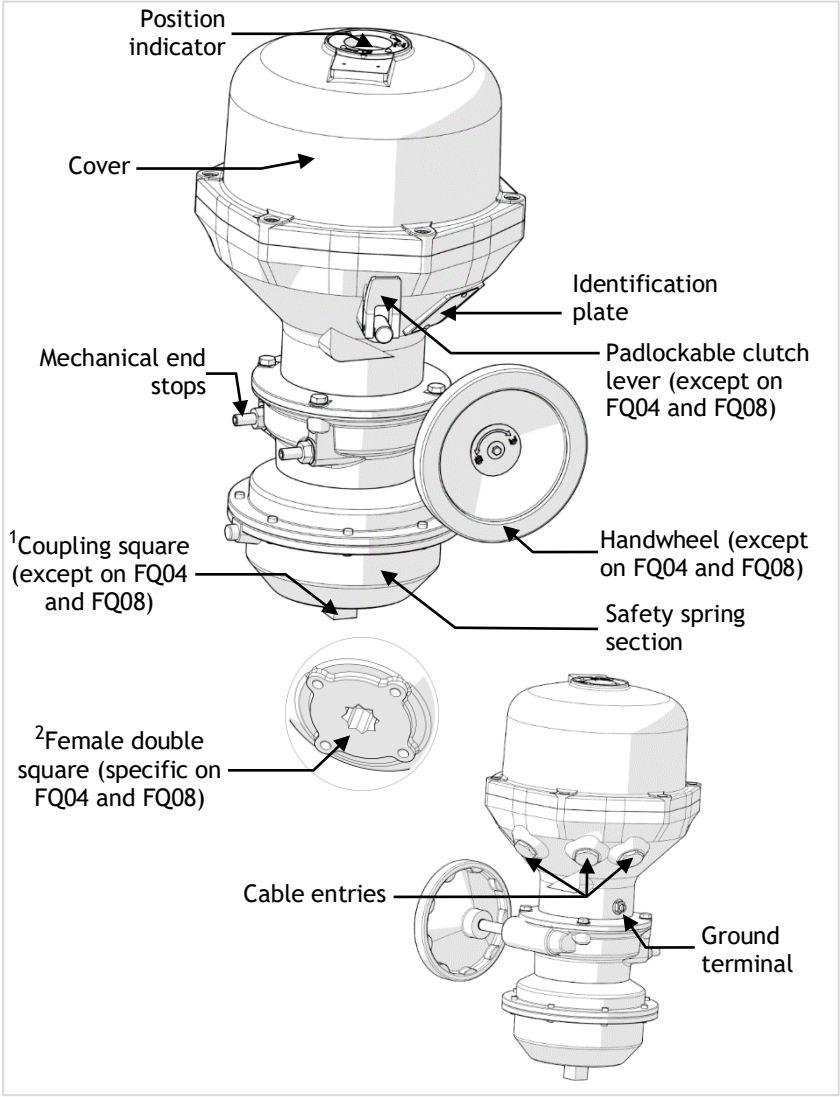
1. Visually check that cable entries and cover are tightly closed.
2. In case of outdoor installation, cover the unit with a plastic protective film.

An actuator consists of electrical components plus mechanical parts which have lifelong lubrication.

Although the assembly is contained in a waterproof housing, the actuators may suffer from oxidation, become clogged or seize during commissioning if it has not been stored correctly.

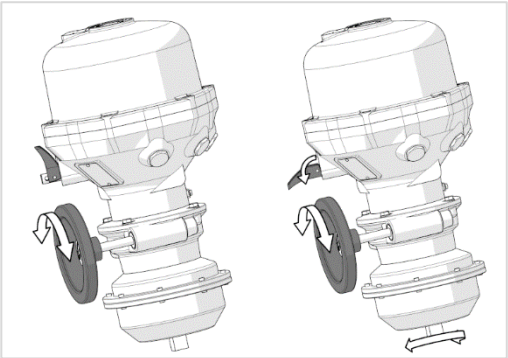
3 ACTUATOR COMPONENTS

3.1 Global view



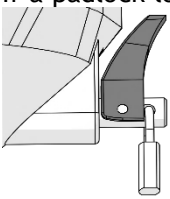
3.2 Manual operation clutching

FQ-range actuators are fitted with a handwheel (except for the FQ04 and FQ08). It allows to manually operate the actuator in case of loss of power supply.

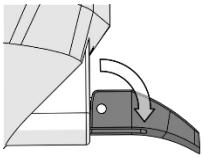


3.2.1 To clutch the manual control

1. If a padlock locks the clutch lever, remove it from the rod.



2. Tilt the clutch lever to operate the actuator with the handwheel, refer to the figure below.



! When the clutch lever is in its lowered position the manual control is engaged, therefore the safety spring return is not operational and fail-safe action is not available.

3.2.2 To retrieve the electrical control

1. Raise the clutch lever back to its initial position.
2. If a padlock locked the clutch lever, put it back on the rod.

4 ELECTRICAL WIRING AND TESTS

4.1 Opening cover

! Ex

Do not open the cover when the actuator is under power or if an explosive atmosphere is present.

! Ex

Be careful not to damage the flameproof joint surfaces of the cover at the opening of the cover. If these surfaces are damaged, you should change this cover by a spare one.

It is important not to degrade the explosion-proof protections (surfaces, cable entries, seals…).

➔ **Use the notches or bosses to keep sealing and cover integrity.**

Screws of explosion-proof actuator body must be made of stainless steel of class A2 or A4 of 80 daN/mm² minimum tensile strength.

4.2 Mounting cable glands and plugs

ⓘ

2 or 3 cable entries (M20 and/or M25) or (½'' and/or ¾4" NPT) are available

! Ex

For a maximum ambient temperature upper than 60°C, cables and cable glands or cable entry devices with a minimum operating temperature of 85°C shall be used.

1. Make sure that the cable glands you are about to use comply with the explosion-proof equipment standards and classification.

   ! Ex

   Cable glands must ensure an equal or upper protection level than the one mentioned on the identification plate of the actuator.

2. Remove all plastic plugs from unused cable entries.

3. Tighten the cable glands and plugs while ensuring the following minimum numbers of threads are screwed in the housing.

4. Put threadlock (Loctite 577 from Henkel or equivalent) on the threads of the cable glands and plugs as NPT threads are not IP68.
5. If one entry remains not used, seal it with a certified and suitable metal plug for the type of protection specified.

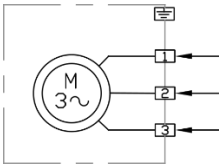
! Ex Plastic plugs are not explosion-proof and are used only for shipping and storage.

4.3 Wiring

4.3.1 Connecting the power supply

1. Make sure that power supply voltage matches information on the sticker on the side of the actuator.
2. When the power supply is OFF, check that the actuator is staying on one of its mechanical stops.
3. Check the direction of electrical rotation, as an incorrect rotation of the motor could damage the actuator:
   a. Do not energize the brake.
   b. When the actuator has a handwheel, pull down the clutch lever.
   c. Power ON the motor.
   d. Compare the rotation direction of the motor and the rotation direction as indicated by the arrow on the label. Make sure they rotate in the same direction.
   e. Power OFF the motor.

f. If the rotation direction is incorrect, re-wire the motor to obtain a rotation in the opposite direction, according to the following wiring diagram extract.



g. Check again the rotation direction of the motor to ensure the motor rotates in the correct direction.

4.3.2 Connecting the control wires

To perform electrical wiring, please refer to the wiring diagram supplied and follow the numbering of the terminals.

4.3.3 Grounding

A connection to the earth must be wired using the actuator internal and external grounding plugs. External grounding plug accepts wires with a cross-sectional area of maximum 4 mm² or 10 AWG).

4.4 Checking after wiring

Once the actuator wiring is completed, the following points must be checked:

1. Check that all connectors or cable glands are correctly tightened.
2. Move the valve using manual override to an intermediate position.
3. Electrically operate opening and closing travels and check that the actuator rotates in the right direction and stops at the desired position.

Never use a powered rotary equipment on manual override to operate the actuator.

If any fault is detected at this stage, please check all wiring.

4.5 Closing the cover

Never leave the cover open to avoid the risk of water entering the device.

! Ex

- Be careful not to damage the flameproof joint surfaces of the cover when closing the cover, otherwise you should replace the damaged cover by a spare one.
- Tighten each cover screw. The torque range of tightening cover screw is 6~10N.m.

5 COMMISSIONING

As a standard, FQX actuators close in the clockwise direction.

5.1 Travel limits setting

When the power supply is OFF, the actuator and valve sit on their fail-safe position, which is the resting position of the returning spring.

The mechanical stops limit the end of travel in fail-safe operation.

The cams limit the end of travel in normal operation.

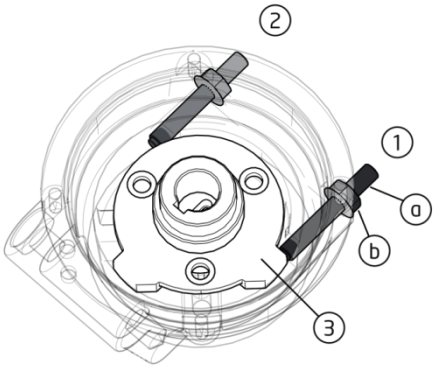
5.1.1 Setting fail-safe position

Required tools

Flat-blade screwdriver, open-end wrench, hexagonal key.

To set fail-safe position:

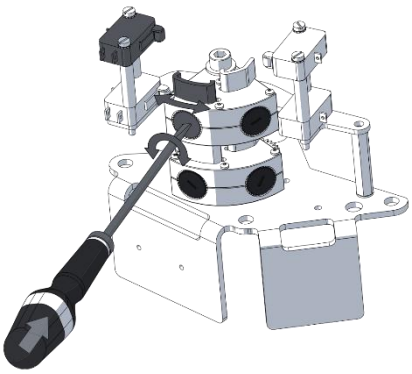
1. Cut the power supply off to get the actuator to fail-safe position if it is not already the case.
2. If the valve does not reach desired fail-safe position, set corresponding mechanical stop **(1 or 2)** until it is the case.
3. Hold stop screw (a) with hex. key and unlock counter-nut (b) with the open-end wrench.
4. Screw stop screw **(a)** until the desired valve position is reached, so that it touches the plate **(3)**.
5. Hold stop screw **(a)** in position while tightening the counter nut **(b)** with the open-end wrench.



5.1.2 Setting travel limits for normal operation

Required tools: Flat-blade screwdriver, Hexagonal key.

To set a cam:



1. Insert screwdriver in the slit of the setting head of the cam.
2. Slightly push along screwdriver axis to free rotation.
3. Turn screwdriver in one direction or the other to get the cam at the desired position.
4. Release screwdriver push while ensuring setting head got back to its original position and locks the cam movement.

To set cams for fail safe position:

1. Lower the clutch lever to engage manual control (except for the FQX04 and FQX08).
2. Slightly turn the handwheel (or operate electrically for the FQX04 and FQX08) in the direction opposite to the fail-safe position direction until the valve starts to open or close.
3. Turn the handwheel (or operate electrically for the FQX04 and FQX08) in the other direction towards the fail-safe position until the valve is fully open or closed.
4. Set the end-of-travel cam to trip the switch at this position.
5. If the actuator has a signaling cam, turn the handwheel 1/8th of a turn (or operate electrically for the FQX04 and FQX08) in the opposite direction of the fail-safe position.
6. Set the signaling cam to trip the signaling switch at this position.
7. Raise the clutch lever (except for the FQX04 and FQX08).

To set cams and mechanical stop at the opposite end

1. On the opposite mechanical stop, block screw **(a)** with hex. key and unblock counter nut **(b)** with open-end wrench.
2. Unscrew the screw **(a)** of a few millimeters with hex. key.
3. With electrical control, go close to the opposite position of the fail-safe position of the valve.
4. Lower the clutch lever to engage manual control and turn the handwheel until you reach this opposite position (or operate electrically for the FQX04 and FQX08).
5. Set end-of-travel cam at the activation point of the end-of-travel micro-switch.
6. With hex key, screw stop screw **(a)** to get it in contact with planet carrier.
7. Unscrew the stop screw **(a)** of a turn and a half to keep a clearance between planet carrier and screw.
8. Hold the stop screw **(a)** in position with the Hex. key and tighten the counter nut **(b)** with the open-end key.
9. Turn the handwheel of a turn and a 1/8th towards the fail-safe position (or operate electrically for the FQX04 and FQX08).
10. Set signaling cam at the activation point of the signaling micro-switch.
11. Raise the clutch lever (except for the FQX04 and FQX08).

To check opposite position settings

1. With electrical control, operate the actuator towards fail-safe position until you reach an intermediate position.
2. Operate the actuator to the opposite position.
3. Check:
    a. the correct activation of signaling micro-switch
    b. the correct activation of end-of-travel micro-switch and the stop of the operation
    c. the actuator does not lay on mechanical stop when stopped

4. If the actuator lays on mechanical stop, re-set it by slightly increasing the clearance between mechanical end and planet carrier until you validate 3.a., 3.b. and 3.c. conditions.

6 SETTINGS CHECK

6.1 Normal operation check

1. When completed, switch on the electro-brake supply.
2. Raise the clutch lever (except for the FQX04 and FQX08).
3. Operate the actuator electrically in the opposite direction of fail-safe position.
4. Check the activations of the signal and end-of-travel limit switches.
5. Operate the actuator towards fail-safe position.
6. Check again the activation of the signal and end-of-travel limit switches.

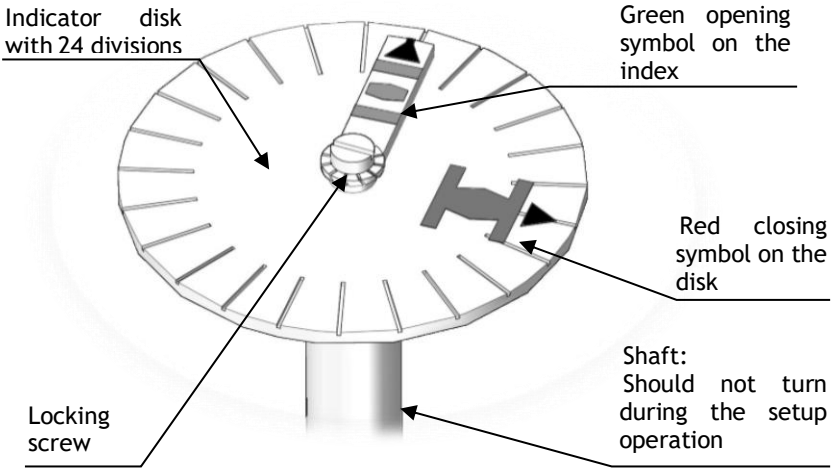
6.2 Safety operation check

Return duration measurement

The stored energy in the spring powers the automatic return to the fail-safe position.

1. Check that the clutch lever is raised (except for the FQX04 and FQX08).
2. Operate the actuator to reach the end-of-travel switch opposite to fail-safe position.
3. Prepare to measure the actuator travelling time.
4. Cut electro-brake supply to free the valve shaft. At the same time, write down the starting time.
5. Check that the valve returns to its fail-safe position.
6. When the actuator has returned to its fail-safe position.
7. Check that the safety return duration conforms to the expected duration.
8. Power the electro-brake back into operation.

7 POSITION INDICATOR



How to set up the position indicator

! While tightening or loosening the locking screw, always hold the shaft under the position indicator (see image above) so that it does not turn, as this may damage the mechanical parts.

With the cover removed:

1. Put the actuator in the closed position.
2. Loosen the locking screw (see image above) without removing it.
3. Turn the indicator disk so that the red closing symbol faces the arrow symbol on the cover of the actuator.
4. Tighten the screw.
5. Put the actuator in the open position.
6. Loosen the locking screw without removing it.
7. Hold the indicator disk so it does not move and turn the index so that the green opening symbol faces the arrow symbol on the cover of the actuator.
8. Tighten the screw.
9. Place back the cover.

8 OPERATION

8.1 Duty cycle

Motors are designed for an intermittent operation; it means that they should be stopped for a sufficient duration after each operation to enable them to cool down.

! Ex

Duty cycle has to be respected in order to prevent excessive temperature rise of the motor and damage.

➔ **Please refer to the duty cycle written on the actuator tag.**

9 MAINTENANCE

The actuator mechanical parts are greased for product lifetime and do not need any specific maintenance.

➔ **Regularly check that the actuator explosion-proof enclosure has not been degraded by a mechanical shock or any other type of aggression.**

➔ **If it is operating in a very wet atmosphere, you are advised to check once a year there is not condensation inside.**

➔ **Every 6 months, proceed to a safety return test by switching off the power supply from the opposite of safety position, then measuring the travel duration from this position to the safety position.**

If this duration is upper than the one measured during commissionning, please contact Bernard Controls for an upgrade of the actuator.

! Ex Any repair operation requires a manufacturer agreement.
Do not bring any modification of any kind to the actuator.

! Ex In case of a disassembly/reassembly operation, make sure that all moving parts are correctly greased to prevent any electric spark or hot point.

! Ex Explosionproof joint surfaces cannot be serviced. In case a joint is damaged, the corresponding part must be replaced.

NOTES

BERNARD CONTROLS GROUP

CORPORATE HEADQUARTERS

4 rue d'Arsonval - CS 70091 / 95505 Gonesse CEDEX France

Tel. : +33 (0)1 34 7 71 00 / Fax : +33 (0)1 34 07 71 01 /
mail@bernardcontrols.com

CONTACT BY OPERATING AREAS

> AMERICA

NORTH AMERICA
BERNARD CONTROLS UNITED STATES
HOUSTON
inquiry.usa@bernardcontrols.com
Tel. +1 281 578 66 66

SOUTH AMERICA
BERNARD CONTROLS LATIN AMERICA
inquiry.southamerica@bernardcontrols.com
Tel. +1 281 578 66 66

>ASIA

CHINA
BERNARD CONTROLS CHINA &
BERNARD CONTROLS CHINA NUCLEAR
BEIJING
inquiry.china@bernardcontrols.com
Tel. +86 (0) 10 6789 2861

KOREA
BERNARD CONTROLS KOREA
SEOUL
inquiry.korea@bernardcontrols.com
Tel. +82 2 553 6957

SINGAPORE
BERNARD CONTROLS SINGAPORE
SINGAPORE
inquiry.singapore@bernardcontrols.com
Tel. +65 65 654 227

> EUROPE

BELGIUM
BERNARD CONTROLS BENELUX
NIVELLES (BRUSSELS)
inquiry.belgium@bernardcontrols.com
inquiry.holland@bernardcontrols.com
Tel. +32 (0)2 343 41 22

FRANCE
BERNARD CONTROLS FRANCE &
BERNARD CONTROLS NUCLEAR FRANCE
GONESSE (PARIS)
inquiry.france@bernardcontrols.com
Tel. +33 (0)1 34 07 71 00

GERMANY
BERNARD CONTROLS DEUFRA
TROISDORF (KÖLN)
inquiry.germany@bernardcontrols.com
Tel. +49 2241 9834 0

ITALY
BERNARD CONTROLS ITALIA
RHO (MILANO)
inquiry.italy@bernardcontrols.com
Tel. +39 02 931 85 233

RUSSIA
BERNARD CONTROLS RUSSIA
inquiry.russia@bernardcontrols.com
Tel. +33 (0)1 34 07 71 00

SPAIN
BERNARD CONTROLS SPAIN
MADRID
inquiry.spain@bernardcontrols.com
Tel. +34 91 30 41 139

> INDIA, MIDDLE EAST & AFRICA

AFRICA
BERNARD CONTROLS AFRICA
ABIDJAN - IVORY COAST
inquiry.africa@bernardcontrols.com
Tel. + 225 21 34 07 82

INDIA
BERNARD CONTROLS INDIA
inquiry.india@bernardcontrols.com
Tel. +971 4 880 0660

MIDDLE-EAST
BERNARD CONTROLS MIDDLE-EAST
DUBAI - U.A.E.
inquiry.middleeast@bernardcontrols.com

BERNARD® CONTROLS

www.bernardcontrols.com