



ELECTRIC ACTUATORS SPECIALIST



User's Guide

B BERNARD



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L.BERNARD, electric actuators specialist

Thanks to 50 years experience in electric actuator technologies, L.BERNARD provides global solutions for valve automation.

L.BERNARD actuators provide control to the most challenging industries such as:

- Thermo/nuclear energy
- Oil, gas and petrochemical
- Water and waste water treatment
- Shipbuilding
- Heavy industry

The electric actuator, initially designed to operate valves and dampers, has now also evolved into a maintenance and control tool.

This User's Guide will support you to choose the right product range most suitable for your needs thanks to the following criteria:

- Type of movement for the device to be driven
- Type of environment
- Type of operation
- Safety position
- Type of control

From innovative technology, L.BERNARD products are produced to match your requirements without compromise on quality and with competitive prices.

The L.BERNARD product ranges meet all criteria of quality certification and are designed specifically following the customers requirements.



As the L.BERNARD products are constantly enhanced, please check the specifications when placing your orders.



Type of movement of the device to be driven

The type of device to be driven influences the choice of the actuator.

Type of device	Movement
 Butterfly valve	Quarter-turn
 Ball and plug valves	Quarter-turn
 Dampers and louvers	Quarter-turn
 Globe valves	Multi-turn/Linear
 Pinch and diaphragm valves	Multi-turn
 Gate, knife and penstock valves	Linear

Gear systems

Quarter-turn

Often installed in enclosed spaces, the quarter-turn electric actuator must be as compact as possible.

The actuator shall be self-locking to maintain valves position even when the power supply is switched off.

Moreover, for operation in environments generating strong vibrations, it is essential that the gear modules be well sized for better resistance. Lastly, even if the travel limitation provides for the stopping of the actuator, it shall also be equipped with mechanical stops in order to protect the driven device in the event of manual operation of the handwheel.

Our choice:

- **Compact**
- **Self-locking with a worm/quadrant gear**
- **Large gear modules**
- **Adjustable mechanical stops**



Linear

The L.BERNARD range of linear actuators is obtained by adding a special movement conversion system to the multi-turn actuator.



Multi-turn

The multi-turn electric actuators can either be mounted directly or with additional reduction gears.

In order to meet the requirements of numerous applications, a wide range of torque and speed values are required. Self-locking shall be secured whatever the operating speed, in order to maintain the valve position after the motor has been stopped.

For user's safety, it is highly recommended that the handwheel not rotate; priority must also be given to the electric operation.

For high torque values, our SERMATIC system combined with a differential gear on the output shaft enables driving either by a motor or a handwheel without any clutch system, thus providing for considerable enhancement and simplification of the geardrive.

Our choice:

- **Wide range of speed and torque values**
- **Easy-to-use**
- **Self-locking at all speed**
- **Non-rotating handwheel with priority to electric control**
- **Declutch-free manual override**



Type of environment

Actuator enclosure design changes according to working environment:

Sites of installation	Actuator enclosure protection
 Inside a building.....	Weatherproof to IP 65 or NEMA 4
 Outdoor under a shelter	Weatherproof to IP 65 or NEMA 4 + 
 Outdoor.....	Weatherproof to IP 67 or NEMA 6 + Epoxy paint +  Polyurethane finishing
 Risk of temporary submersion.....	Weatherproof to IP 67 or NEMA 6 +  (less than 30 min and less than 1 m deep)
 Risk of temporary submersion.....	Weatherproof to IP 68 or NEMA 6P +  (time lapse and depth to be defined)
 On-shore	Weatherproof to IP 67 or NEMA 6X + marine protection + 
 Off-shore.....	Weatherproof to IP 67 or NEMA 6X + offshore protection + 

 Anti-condensation heater

Special environments:

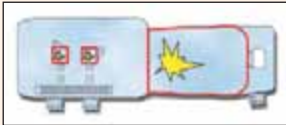
Sites of installation	Type of protection
 Hazardous areas	Explosion proof ATEX or NEMA
 Nuclear sites	Actuator qualified according to RCC-E or IEEE
 Corrosive environment (chemical products, alumina, etc,...)	Special

Protection for hazardous areas

ATEX European Directive

The European directive 94/9/CE states the conditions to be met for equipment items used under potentially explosive atmosphere.

It classifies the installation areas according to groups and categories:

EEx ed	or	EEx d	II C	T6
Equipment with electric connection in increased safety "e" (tight terminal box). The remaining parts of the electric equipment are in explosion proof "d" enclosure.		Protection by explosion proof enclosure. Connection is achieved inside the enclosure. Enclosure is resistant to internal explosion without flame path.	Group I : Equipment for underground mining. Group II : Equipment for explosive atmosphere other than mining. A: butane, propane,... B: ethylene,... C: hydrogen, acetylene	Maximum surface temperature T1 = 450 °C T2 = 300 °C T3 = 200 °C T4 = 135 °C T5 = 100 °C T6 = 85 °C
				
Explosion proof actuator EEx ed		Explosion proof actuator EEx d		

Our explosion proof products have been designed for use in GROUP II, Category 2 or 3 G (D) areas. These products shall, among other requirements, undergo a CE type examination corresponding to the sections of the CENELEC standards EN 50014, 50018, 50019 applicable for each product.

L.BERNARD can offer different levels of protection such as: EEx ed, EEx d, IIB, IIC, T4, T5, T6.

North American standards: NEMA ratings

NEMA	Class	Group	Division	T4
7	I Combustible gases and vapours	Group B: Hydrogen Group C: Ether, Ethylene,... Group D: Butane, Propane,...	1 Normal conditions	Maximum surface temperature T1 = 842 °F T2 = 572 °F T3 = 392 °F T4 = 275 °F T5 = 212 °F T6 = 185 °F
9	II Combustible dusts	Group E: Metal dust Group F: Coal dust Group G: Flour and other dusts	2 Abnormal conditions	
				
		Explosion proof actuator NEMA 7 or NEMA 9		

Type of operation of the device to be driven

Type of operation Modulating class



Open or close the full stroke, ...On-Off
on average 20 to 30 times/day.



Select intermediate positions, ...CLASS III modulating
with good precision (better than 2 %)
on average 360 times/day.



Select intermediate positions, ... CLASS II modulating
with high precision (better than 1 %)
on a permanent basis every 2 or 3 seconds.



Fast positioning CLASS I modulating
with an excellent precision (0.5 % or better)
and continuous movement.

What are the classes of modulating?

A modulating actuator has to be fully adapted to the operating duty of the modulating loop. Two points are important for enhancing the reliability of the actuator:

- The lifetime of equipment is related to the number of operations (motor, mechanism, electronic...) or to the change of positions,
- The motor must stand up to overheating.

Although the electric motor is important, it is not the only one element to take into account when choosing an actuator. Therefore, L.BERNARD proposes a classification of actuators according to four types of operations named MODULATING CLASSES.

Modulating classes

Durability and accuracy are the most important criteria during valve modulating. Depending on operation frequency and accuracy of positioning, L.BERNARD has defined four modulating classes.

	Modulating classes			
	ON/OFF	Class III Modulating	Class II Modulating	Class I Modulating
Maximum operation frequency recommended for ensuring the life time	20-30 per day	360 per day	Every 2-3 seconds	Continuous
Motor duty cycle	S4 - 30%	S4 - 50%	S4 - 100%	S4 - 100%
Startup rate of the motor at peaks of operation	360 starts/h (AC) 60 starts/h (DC)	1200 starts/h	1800 starts/h	No limit
Specific technology		Motor under limited heating	- High mechanical efficiency - Low inertie motor - Solid state contactors	- High mechanical efficiency - DC Brushless Motor with continuous speed control
General characteristics of AC motors		- SQUIRREL CAGE type - Insulation CLASS F - Weatherproof enclosure - Built-in thermal protection		

The choice of an operation type determines the selection of a motor for each function. According to CE134 Standard defining the electric motors standard duty cycles, L. Bernard has chosen the S4 duty rating, because it is the most representative duty cycle for actuators operations.

CEI 34 STANDARD

S1 CONTINUOUS DUTY

Operation with constant load over a sufficient duration for reaching a thermal equilibrium.

S2 SHORT TIME DUTY

Short time operation, total cooling between each start.

S3 INTERMITTENT PERIODIC DUTY

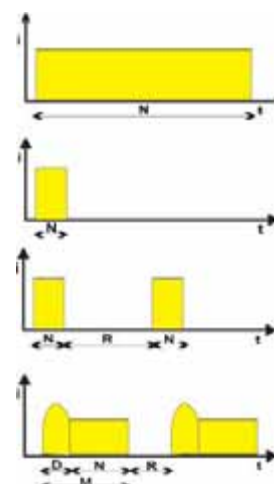
The starting current has no significant effect on temperature rise. To be followed by the maximum operating time.

S4 INTERMITTENT DUTY WITH STARTING

Repetition of cycles including:

- starting period D
- period of constant speed N
- rest period R

To be followed by the duty factor in %, as well as the number of starts per hour.



Our choice: **S4**

The only representative duty cycle for actuator operation is S4.

Safety position

The fail safe devices can ensure the safety of installations in event of loss of power supply or control signal.

Safety requirement	Type of actuator
 In case of loss of power supply, ...Standard the valve can stay put without any danger.	
 In case of loss of control signal, the actuator will move Standard the valve automatically to the safety position. (INTEGRAL+ or INTELLI+ versions)	
 In case of loss of a power supply, ...Fail safe the valve should move automatically to the safety position.	

What is FAIL SAFE?

The activation of an emergency signal triggers the immediate opening or closing of the backup device, without the need of any external power source.

This signal can be activated following:

- an **abnormal event** (fire, overflow ...)
- an **automatic control**
- an **operator's action**
- or the **lack of power supply**

Examples of applications: storage and distribution of gas and dangerous liquids, fire protection systems, protection of chemical facilities, air conditioning and ventilation of hazardous areas.

Technical solutions for fail safe actuators

SPRING RETURN ACTUATOR

The actuator operates under normal conditions, actuated by an electric motor, which simultaneously drives the device to be motorised including high resistance spiral spring.



A solenoid which is continuously power supplied releases the device + spring assembly when its power supply is interrupted, for whatever reason.

When power is restored, the actuator automatically returns to its position, according to the commands received.

ACTUATOR WITH INTEGRATED BATTERY

The actuator is a standard D.C. equipment item, to which is added an integrated control board and a battery. It is operated under normal conditions with an external power supply which charges the battery at the same time.

In case of power loss, the actuator automatically returns to its safe position with the help of the integrated battery.



Once the power is restored, the actuator can operate under normal conditions and the battery recharges.



Focus on

L.BERNARD technology

L.BERNARD offers innovative technical solutions for manual control clutches, limit switch system for position and torque... many points to take into account for choosing an actuator.

Manual override

Depending on the markets and types of facilities, the features of emergency manual control, key functions of the actuator, can be very different. However, several features have a prime significance.

The manual override must have:

- a well adapted gear ratio, in order to limit the number of turns required to operate the valve
- a reliable safety in order not to endanger the users
- full availability

Manual override with electrical priority is required in most of the technical specifications. However, the following two principles must be adhered to:

- it must be possible to operate the handwheel at any time
- the number of turns on the handwheel must not be too high.

Example 1: On a pressurised steam circuit, the valve closes on torque. When the torque is high, the use of a dog coupling is not safe enough as the force to be applied to the clutch lever for switching to manual mode is high.



Example 2: Depending on the technology used, the number of turns on the handwheel can vary from 30 to more than 500 turns, in order to drive a DN500 quarter-turn valve with a torque of approximately 2500 Nm. Thus, the stacking of reduction gears can inhibit the safety function of the manual control.

In conclusion, there is not one solution for all the applications but different techniques adapted to the real needs.

Correct sized handwheel gearing

Quarter-turn	
Type	Number of turns
OA	9 - 21
AS < 800 Nm	8 - 11
AS > 1 000 Nm	50 - 216
BS	14
UX	8 - 11

Multi-turn	
Torque	Rate
< 60 Nm	1/1
< 300 Nm	1/2
> 300 Nm	1/*
* According to torque	

Safety

QUARTER-TURN	• Rotating handwheel (for low torque) • Non rotating handwheel, with electrical priority, for high torque values
MULTI-TURN	
CLASSES II & I MODULATING	• Non rotating handwheel, with electrical priority.

Travel limitation

The use of patented L.BERNARD cam holder system brings the following advantages:

- Easy setting without any special tool
- Vibrationproof
- Precise adjustment of cams

The large diameter cam block includes four cams which can be adjusted separately on the overall travel.

By simply pushing the appropriate adjusting slot with a screwdriver, the cam is released and can be freely positioned (300 separated positions).



When the adjusting slot is released, the cam is automatically locked. As no screw tightening is needed, the system is not sensitive to vibration. In INTELLI+ versions, the cam block is replaced by an optical absolute position encoder.

Torque limiters

L. BERNARD design of torque limiters is using proven technology offering:

- Full reliability
- Ease of adjustment
- High precision & repeatability

The torque is always measured on non moving parts, thus avoiding risk of wear. In the case of gear systems with planetary gear drives, the torque is measured on the external crown by calibrated helical springs. The torque is no longer applied when the motor is stopped, thus releasing the mechanical parts. If the signal must be maintained, electrical or mechanical memorisation is available as an option.



In the case of differential gears, the torque is higher and will be measured directly on the actuator shaft, on the handwheel end.

On the ST range actuators, the torque limiter is always memorised mechanically and a proportional torque adjustment system which can be **adjusted locally or remotely** is available, depending on the type of control chosen.

Note: the memorised torque limiter function is always included in all our integrated controls, such as **INTEGRAL+**, **POSIGAM+**, **MODUGAM+** and **INTELLI+**.

Choosing the actuator range

Regarding to the type of the movement of the device to be driven, the type of environment, the operation type and the required safety mode, L.BERNARD offers a large choice actuators to fit your needs.

WITHOUT FAIL SAFE POSITION

WITHOUT FAIL SAFE POSITION			MOVEMENT					
			QUARTER-TURN		MULTI-TURN	LINEAR		
			TORQUE < 10 000 N.m.	TORQUE > 10 000 N.m.				
ENVIRONMENT	WEATHER PROOF	FUNCTION	ON/OFF & CLASS III MODULATING	SD Range 	ST Range 	ST Range 	ST Range 	
			CLASS II & I MODULATING	Modulating Range 	Modulating Range 	Modulating Range 	Modulating Range 	
			EXPLOSION PROOF	ON/OFF & CLASS III MODULATING	SD Range 	ST Range 	ST Range 	ST Range 
				CLASS II MODULATING	Modulating Range 	Modulating Range 	Modulating Range 	Modulating Range 
	NUCLEAR			NUCLEAR Range 				

WITH FAIL SAFE POSITION

WITH FAIL SAFE POSITION			MOVEMENT		
			QUARTER-TURN	LINEAR	
ENVIRONMENT	WEATHER PROOF	FUNCTION	ON/OFF		
			CLASS III MODULATING		
	EXPLOSION PROOF		ON/OFF		
			CLASS III MODULATING		

Choosing the controls

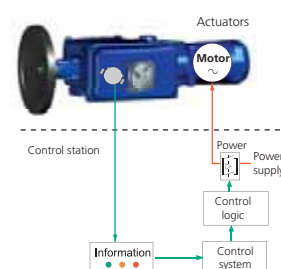
For installation, the user can choose between a control box integrated in the actuator, or to design their own control logic. Whatever the actuator range, different types of controls are available. Integrated versions, for on-off or modulating, are fitted with local controls buttons.

The intelligent versions combine the advantages of the traditional integrated controls together with the flexibility of microprocessor technology: user friendly interface, non-intrusive setting...

The communication with fieldbuses is available whatever the range for the type of control chosen.

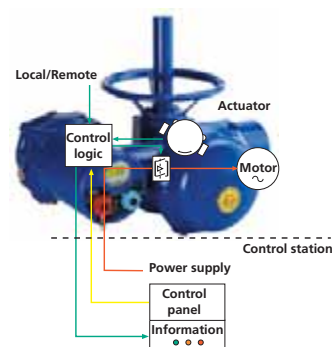
Standard version

The control unit is designed by the customer and located in a remote cabinet. All information sent by the actuator sensors (travel limit, torque limit, thermal overload, position feedback, ...) have to be processed by user's control logic.



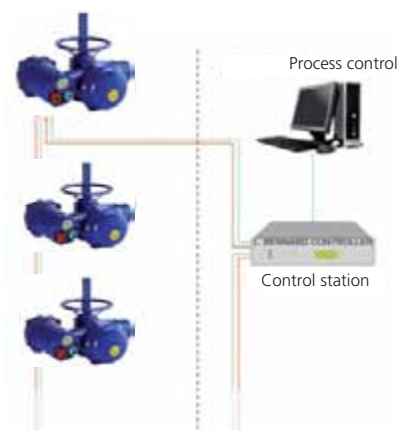
Integrated control

The control unit and power contactors are an integrated part of the actuators. It executes orders from the supervisor. In addition it offers local controls that can be disabled locally or remotely. It can also be managed by fieldbus.



Fieldbus control

Fieldbus controls allow you to manage a large number of actuators and other equipments, and exchange a lot of information by a simple two wires serial connection. Fieldbus communication also provides solutions for easy and effective preventative maintenance of installations.

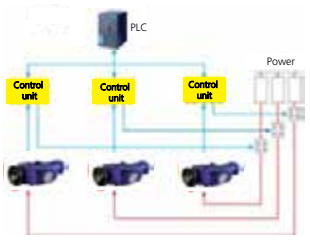
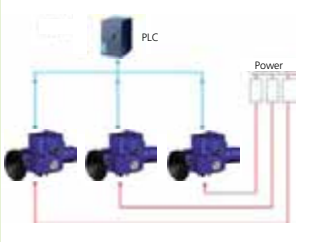
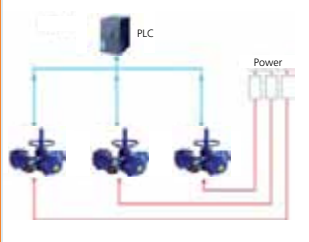
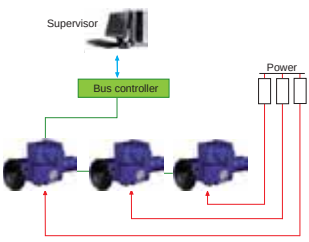
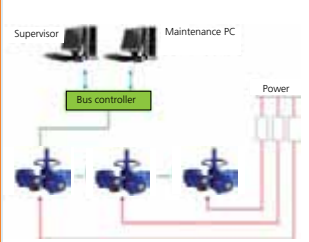


The integrated controls have the following advantages:

- **SIMPLE:** turn-key solutions
- **DEPENDABLE:** long experience and large installed base.
- **ECONOMICAL:** time and money saver at the design and commissioning stages

Comparative

The table below shows the various available control configurations, their characteristics, principles and advantages.

		STANDARD	INTEGRATED	INTELLIGENT
OPERATING PRINCIPLES	Position information	Contacts (ON/OFF) Potentiometer (modulating)	Contacts (ON/OFF) Potentiometer (modulating)	Absolute sensors
	Control logic	External (achieved by the client)	Integrated, analog	Integrated, digital
	Power contactors	External	Integrated	Integrated
	Actuator protection	Torque limit switches, motor thermal switch ... managed by the customer control logic	Integrated and managed (torque limit switches, motor thermal switch,...)	Integrated and managed (torque limit switches, motor thermal switch,...) Auto-diagnosis functions.
TYPE OF CONTROL	Hardwired			
	Fieldbus	Not applicable		
ADVANTAGES		Adapted for operation under extreme conditions (temperature, vibrations...)	- Economical turn-key solution - Proven reliability - Time and wiring saving during installation - Easy commissioning by local controls	- User friendly multi-language interface - Non intrusive settings - Absolute sensor for accurate and reliable control - Numerous data remotely available by fieldbus.

Our integrated controls

L.BERNARD proposes turn-key solutions for actuator controls in order to ease the design of the valve control logic and to provide additional features (see the table of main features next page).

MINIGRAL+

This control, fully integrated in the actuator, allows to control single-phase actuators with a power less than 300 W.

MINIGRAL+ & MINIGAM+ common functions:

- Stop on travel or torque limit switches (prohibits restarting)
- Configurable rotation direction (CW/CCW)

ON / OFF control: MINIGRAL+ version

Class III modulating: MINIGAM+ version



INTEGRAL+

This control allows to manage the actuator and offers a large choice of functions whatever the type of actuator power.

Common functions for the three versions:

- Stop on travel or torque limit switches (prohibits restarting)
- Signalling by 4 configurable relays
- Configurable fault relay
- Automatic phase monitoring (3 phase)
- Configurable direction of rotation
- Local control keypad

ON / OFF control: INTEGRAL+ version

Class III modulating: POSIGAM+ version

Class II modulating: MODUGAM+ version

Programmable timer to increase the travel time (to prevent hammerblow effect in the pipes).



Class I modulating: PRECIGAM version

Associated with a Class I actuator, the PRECIGAM unit enables fast and precise positioning. With this advanced technology, acceleration, speed and torque with the Samarium Cobalt magnets brushless DC motor can now be controlled. The power module uses the pulse width modulating technique for an optimum performance.

INTELLI+

The INTELLI+ control allows easy commissioning thanks to its user friendly interface and the non-intrusive setting.

Numerous functions are available to the users helping them in their diagnostics and to schedule their valve maintenance operations.

INTELLI+ also guarantees to the users an optimum availability of their industrial facilities.



Main functions:

- Multilingual interface built-in graphical display, laptop or Pocket PC.
- Actuator setting without any tool and without opening any cover (non-intrusive design)
- Monitoring of real torque transmitted to the valve by absolute sensor
- Signalling by 4 configurable relays
- 2 configurable auxiliary controls (example: ESD)
- Configurable fault monitoring relay
- Automatic phase monitoring (3 phase)
- Increase of the operating time
- Actuator auto-diagnosis, record of actuator activity and display of the alarms

Main features

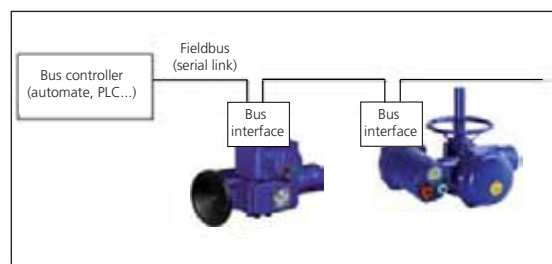
		MINIGRAL+	INTEGRAL+	INTELLI+
CLASSES OF MODULATING	ON/OFF	MINIGRAL+	INTEGRAL+	INTELLI+
	Class III	MINIGAM+	POSIGAM+	INTELLI+
	Class II	Not applicable	MODUGAM+	INTELLI+
	Class I	Not applicable	PRECIGAM+	Not applicable
REMOTE CONTROLS	Pulse command	-	■	■
	Maintained signal	■	■	■
	ESD (emergency command)	-	■	■
	Auxiliary	-	■ (Local control inhibited)	2 controls 9 possibilities
	Timer	-	Option	■
LOCAL CONTROLS	Pad-lockable selectors	-	■	■
	Graphic display	-	-	■
	Operation indicator	-	Option	■
INTERNAL PROTECTION	Fuses	■	■	■
	Automatic phase monitoring	Not applicable	■	■
	Motor thermal protection	■	■	■
	Torque limiter	■	■	■
SIGNALLING	Number of signalling relays	0 (contact at end of operation)	4 + 3 optional	4 + 3 optional
	Number of information	2 optional	16	23
	Number of defaults which can be reported	4 (option)	8	12
	Analogue position feedback	Option Standard for Minigam+	Option Standard for Modugam+ and Posigam+	Option
SETTINGS	Access to the configuration	Intrusive by bridges	Intrusive by bridges	Non intrusive By local control buttons By laptop By fieldbus By Pocket PC
	Setting method for torque and position	Mechanical	Mechanical	Digital Non intrusive
	Type of end of travel setting	On position On torque	On position On torque	On position On torque
	Download of complete setting	-	-	By laptop By fieldbus By Pocket PC
MONITORING AND MAINTENANCE	Auto-diagnosis	-	-	■
	Memorisation of valve torque/position curves	-	-	■
	Actuator activity status	-	-	■

Choosing the fieldbus

The fieldbus present on a large number of installation is used more and more to communicate information and commands with multiple actuators and contactors wired in series on a single pair of wires.

Thus, the number of informations available from each actuator can be multiplied while reducing the overall cost of wiring on the site.

L.BERNARD actuators can be connected to most of the standard fieldbus available on the market.



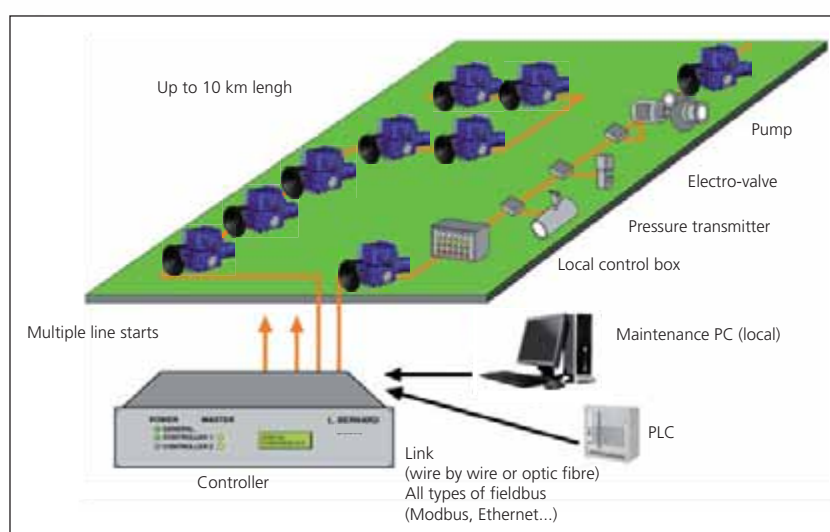
«Open» versus «Proprietary» Systems

Two physical concepts of fieldbus are available from various providers:

The «Proprietary» so-called system is a technology designed by a device manufacturer for his own needs.

A «Proprietary» system always includes the actuators with the specific bus interface, but also the bus controller located at the line head-end. Only the products proposed by the bus controller manufacturer can be installed on the bus. The communication with the DCS also uses a bus, most of time MODBUS or Ethernet TCP.

«Open» systems: one using standard international fieldbuses so various manufacturers can supply compatible controllers and interfaces.



Example of architecture:
Turn-key solution proposed
by L.BERNARD

Type of bus	MODBUS RTU	PROFIBUS		FOUNDATION FIELDBUS
		DP	DP V1	
Type of control	INTELLI+	INTEGRAL+	INTELLI+	INTELLI+
Number of actuators per line	30 *	30 *	30 *	32
Max number of actuators with extension	247	98	124	128
Max. distance of line	1200 m*	1200 m*	1200 m*	1900 m
Estimated scan speed for 30SM with 1.2km length	0.7 s	0.1 s	0.1 s	1 s
Redundancy	No	Option	Option	No
Emergency shutdown command (ESD)	Standard	Standard	Standard	Standard
Backup power supply	Standard	Standard	Standard	Not applicable
Number of ON/OFF commands	9	4	9	9
Number of signalling	39	8	39	39

* More with repeaters

«Open» standards proposed by L.BERNARD

The “OPEN” systems proposed by L.BERNARD are mainly:

- PROFIBUS DP
- FOUNDATION FIELDBUS
- MODBUS RTU
- Other fieldbuses on request

For more security, choose the redundant versions

To insure continuous operation in case of a bus line disruption, redundant systems have been developed. All elements of the bus loop (bus controller, lines, actuators interfaces) are doubled.

Each bus controller is independent and permanently has its database updated. Bus controller are continuously monitoring each other and in case of failure of one controller, the other one automatically takes over the communication. Each actuator receives the information, either by line A or by line B.

In case of faulty communication, the actuators are automatically switching to the available line. The default is immediately reported to the controller.

Emergency command (ESD)

An emergency command, which can be hardwired separately from the fieldbus, enables to send an emergency high priority command. This emergency command can be configured as an OPEN/CLOSE or STOP command.

Turn-key system based on master architecture

L.BERNARD proposes turn-key solutions to manage several fieldbus lines through a master station located between the DCS and the actuators.

For further information on our master station systems, please contact our Sales team.

Choosing the options

Contacts

STANDARD

DC rated

Voltage	Resistive load	Inductive load
24 V	16 A	5 A
48 V	2.5 A	1.2 A
127 V	0.8 A	0.35 A
230 V	0.6 A	2.2 A

AC rated

Voltage	Resistive load	Inductive load
Up to 250 V	16 A	2 A

OPTIONAL

- DPDT (selector switch without common point)
- Nitrogen filled
- Inductive
- Waterproof
- Explosion proof

Potentiometer

ON/OFF OR CLASS III

- Plastic track potentiometer

CLASS II OR CLASS I

- Plastic track potentiometer
- Monted on ball bearings
- Very high resolution & linearity
- Adapted to intensive operation



Position feedback transmitter

STANDARD

- The TAM transmitter provides a 4-20 mA or 0-20 mA signal proportional to the actual valve position. TAM signal is unaffected by line length and electromagnetic disturbances. The TAM includes a 1 KOhm potentiometer associated with an electronic module.

Technical data

- Supply voltage: 12 to 32 VDC (rectified, filtered or stabilised)
- Maximum admissible load: 750 Ohm at 24 V
- 2 wire connection: 4-20 mA signal
- 3 or 4 wire connection: 4-20 mA or 0-20 mA signal
- Linearity: 0.5%
- Operating temperature range: -40 °C to +70 °C



INDUCTIVE

- As the TAM, the output signal of the TIN transmitter is either 4-20 mA or 0-20 mA. The inductive type sensor is contactless and therefore does not suffer from mechanical wear.

Technical data

- Supply voltage: 18 to 33 VDC (rectified, filtered or stabilised)
- Maximum admissible load : 600 Ohm
- 2 wire connection : 4-20 mA signal
- 3 or 4 wire connection : 4-20 mA or 0-20 mA signal
- Linearity : 0.5%
- Operating temperature range: -10 °C to + 70 °C

Specialists

always available

Our local authorised service centres guarantee our customers a global spares source and services.

Installation and commissioning

Commissioning electric actuators requires specific & careful expertise.

This is specially true when the motorised valve is controlled by a complex system such as a fieldbus.

That is the reason why our specialists are available to provide the adequate support to our customers for:

- adaptation on the valve
- installation
- set-up
- start-up



Maintenance and repair

Everyday, our technicians are available to quickly go on site for:

- periodic actuator functional check-up
- preventative maintenance operations
- diagnosis and repair



Training

Regular training sessions are organised for our customers. These sessions are held either in France, at our local service centre or at customer site.

Actuator technology, setting, operating and maintenance are among the most popular topics covered.



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