



ELECTRONIC CONTROL EQUIPMENT



INTELLI+

B BERNARD

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Why an intelligent control?

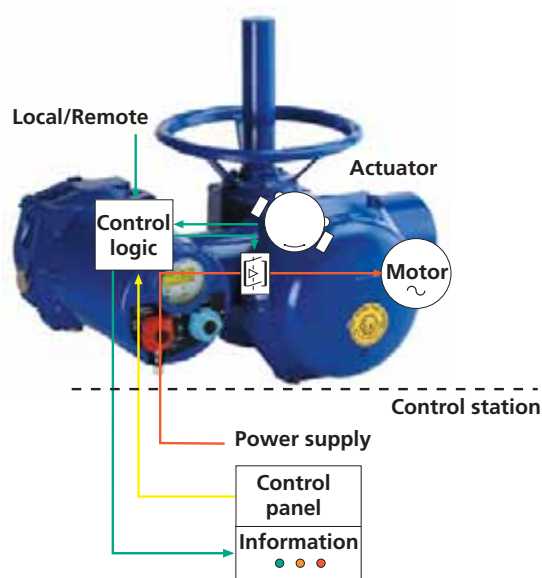
INTELLI+ is a turn-key solution which eases the design and implementation of the actuator control system.

Intelligent control

INTELLI+ includes a control logic as well as power contactors. It ensures the full control of the actuator including status reports, fault treatment and protections.

INTELLI+ control provides non-intrusive settings, up to date fieldbus communication, safety and full diagnosis (local and remote) capabilities.

INTELLI+ permanently monitors the required torque necessary to operate the valve, memorising these torque values generated during the last open and close operations.



Advantages of the INTELLI+ controls

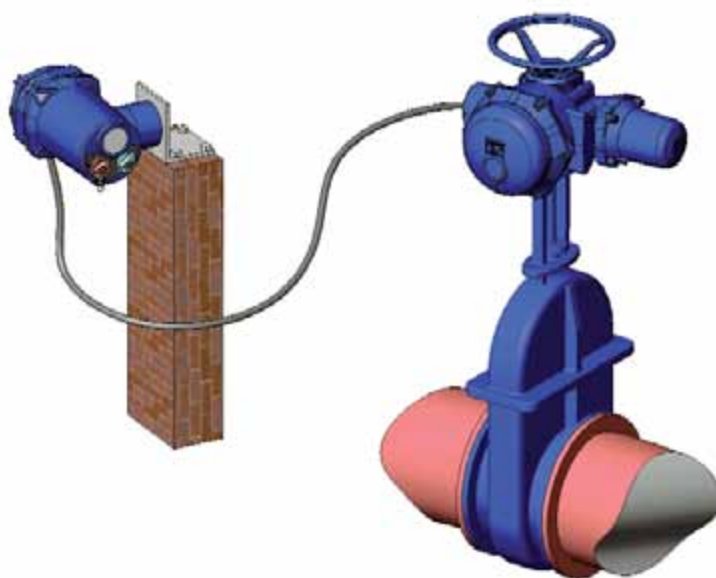
- **SECURITY & RELIABILITY** thanks to separated box and double-sealing protection
- **ACCURATE INFORMATION** with absolute sensors
- **USER FRIENDLY** with the graphical display and menu displayed in 8 languages
- **NON INTRUSIVE SETTING** with the local control buttons
- **DIAGNOSIS & PREVENTATIVE MAINTENANCE** many alarms indicate all faults locally or remotely
- **ADVANCED FUNCTIONS** such as ESD and partial stroking
- **FIELDBUS COMMUNICATION** with Modbus, Foundation Fieldbus or Profibus DP V1

Versatile enclosure

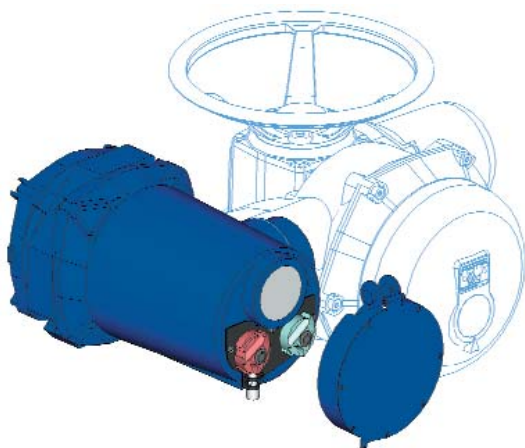
INTELLI+, available in weatherproof or explosionproof protection, is an intelligent control package which can be fitted on to both multi-turn and quarter turn Bernard actuators.

Separated box

- The new separated control box configuration can be specially useful when the actuator has to be mounted:
 - in a difficult access (manhole, in a high position,...)
 - on a highly vibrating device
 - in an excessively high or low temperature area
- The maximum distance between control and actuator is 50 meters.



Special cover



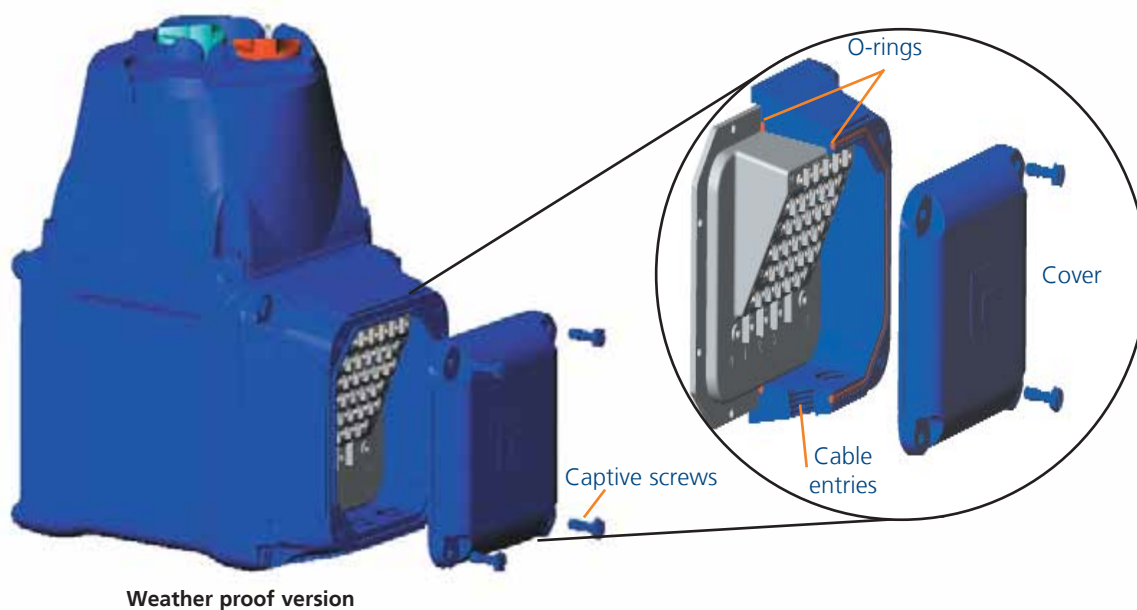
- A special cover can be added to protect INTELLI+ display and local control buttons in case of difficult environmental conditions such as desert sand blast.

Double-sealing protection

Two barriers fitted with O-rings insure an optimum protection against water ingress into the electronic compartment.

This protection remains effective even if the cover has not been closed properly or if the cable glands have not been tightened.

Protection is also ensured for the local control selectors thanks to internal reed switches which prevent moisture ingress.



Security

Partial stroking

Partial stroking is of interest when a critical valve is seldom operated. This test allows to checking the motorised valve availability on a regular basis. Partial stroking consists in the execution of a very short return travel. Starting position as well as partial stroke amplitude are programmable. This command can be either hardwired or sent by fieldbus. An alarm is generated in event of problems occurring during this test.

Emergency shutdown (ESD)

ESD (Emergency Shut Down) is a remote emergency control signal with priority over all other commands. Depending upon the valve operation, ESD can be configured as an Open, Close or Stop command. To increase the availability of the actuator in extreme conditions, ESD can also override the motor thermal protection and ignore any possible torque overload condition.

Alarms indication

INTELLI+ continuously monitors the actuator performances.

Up to 17 different types of faults and alarms can be reported. Refer to configuration on page 19 for the list of the alarms.

A black square on the local display indicates an alarm. The actuator can still operate normally in case of an alarm, for example there is an alarm after 'Too many starts'. The alarm will automatically reset when the fault no longer exists.

Protection by password

A password can be entered to protect access to the modification menu of parameters.

Phase monitoring

INTELLI+ includes an automatic phase correction device. In case of 3 phase power supply, whatever the power connection, the actuator always rotates in the correct direction.

If one of the phases is not present, the actuator stops automatically and the monitoring relay drops.

Protection of change in direction

An automatic delay protects the actuator and valve from all rapid rotational direction changes while limiting the effects of the mechanical pieces in inertia.

Signalling battery back-up

The actuator is totally autonomous and does not require a battery to operate. However, a battery back-up optional board can be added. This battery is activated in case of loss of power supply and allows:

- to use the INTELLI+ display
- to update remote signalling (valve position, alarms, ...)
- to refresh fieldbus information

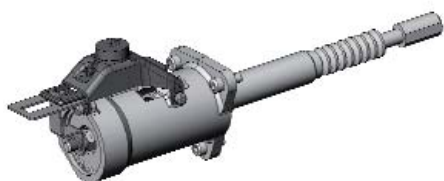
Low battery condition is automatically detected by the INTELLI+ and a warning message is sent.

Note: a 24VDC external power supply input is also present on the INTELLI+ board to achieve the same functionality.

Accurate information

Absolute sensors

- Easy setting with the user friendly interface.
- All the position and torque settings are recorded in the control logic.
- Curve of the torque value is available directly on INTELLI+ graphic display (refer to § Diagnosis and preventative maintenance).



Torque sensor

Precise measurement

- Position and torque information are measured constantly through ABSOLUTE SENSORS.
- Reliable and precise measurement are based on proven mechanical measurement and microprocessor management.
- Measure of the position is accomplished with a mechanical link directly on the output shaft.
- Measure of the torque is made by dynamometric balance on the actuator output (calibrated springs).
Thus, the system of control is instantaneously informed of the real torque transmitted to the valve. The particularly short response time allows a fast stop reducing the effect of torque applied to the valve.
- Thanks to absolute sensors, the position information will not be lost even in the case of power supply failure. There is no need to use a battery so that the actuator is autonomous.

Absolute sensor advantages

- Unaffected by manual operation while power supply is off
- Autonomous actuator, no need to use battery
- High vibration resistance (10g)
- Extremely reliable and precise torque and position sensors

User friendly

Graphical full text display

- Menu guided settings using clear messages. Language can be freely selected among: Chinese, English, French, German, Italian, Portuguese, Russian and Spanish.
- The LCD display gives a clear status of the actuator and of the control system:
 - position in percentage (for example 5% Open)
 - When the valve is fully closed, "closed" is displayed, when the valve is fully open, "open" is displayed
 - actual torque expressed as % of actuator maximum torque,
 - alarm/fault flag

Autonomous

- INTELLI+ is very user friendly, no commissioning instructions needed.
- INTELLI+ operation does not rely on a battery.
- No tool is needed to have access to the menu in any case

Local signalling

- 2 LEDs (red/green) indicate the position (close/open) when at ends of travel, and direction of running when blinking.
- Red and green LED can be freely assigned to open or closed positions.

Local commands

- The red selector enables the operator to choose remote control, local control function and stop during operation. It can also inhibit all use of the actuator (OFF position). This selector switch can be locked in each position (padlock not supplied).
- The blue selector allows local operation of the actuator in either direction: OPEN or CLOSE.



INTELLI+ user friendly

Main menu displayed

MENU
return
language
check
set up
change
exit setup



Selector to validate the choice

- To change the language of the information
- To read all the actuator parameters and torque, data sheet, position, positioner
- To setup the actuator on the valve (close/open)
- To modify the actuator configuration (positioner, signalling, timer, fieldbus)
- To exit the actuator setup



Display indications



5% Open
Torque 20%

Valve position in % of opening valve torque can also be displayed in % of actuator maximum torque.



Local controls inhibited by the remote controller.
Emergency shutdown signal received.



Infrared link is detected.
This icon is displayed in case of alarm.



In the case of battery option (only for subsidiaries functions), this icon is blinking if the battery voltage is getting low.



The control is modulating and the value is displayed in percentage.



This icon indicates that the fieldbus board is installed. The square displays the status of the communication: no communication, communication in progress or faulty module.



In case of redundant fieldbus interface, two squares are displayed. The squares display the status of each communication line: no communication, a channel is acting as primary or backup, communication in progress or a faulty module.

Locally menu

...e (ok)



Selector to navigate up and down into the menu

Information displayed (8 languages available)

and configuration (activity, alarms, commands, timer, signalling, timer, fieldbus)

closing mode, close direction, position setting)

on (activity, commands, torque, data sheet, position,

Infrared communication*

- All settings can be achieved with a laptop computer or a pocket PC.
- Settings and parameter modifications are made with the mouse, using scrolling menus and by selecting the requested options.



* Out of UK and Japan

Non intrusive setting

Thanks to INTELLI+, commissioning is simplified and can be performed in a non-intrusive way. Upon user's request the actuator parameters can be preset at the factory. In this case, start-up simply consists in setting an actuator on the valve.

Manual or automatic setting

The setting can be done automatically or manually by choosing the closed or open positions. In the automatic mode, the actuator runs and stops at the extreme positions using the torque limiter before choosing the current positions..

For certain valves, as an example gate valves equipped with back seat, INTELLI + can automatically perform this setting: the actuator detects the closed position, then the open position and finally tests the inertia in order to optimize this setting.

Infrared communication

INTELLI+ offers the possibility to communicate with a standard laptop through an infra-red link with INTELLIKIT or INTELLIPOCKET. All functions (use, settings/configuration, status, etc...) are available through the computer. Refer to next page for additional information.

Parameters modification

If necessary, operating parameters can be modified with the local control buttons by following information on the display.

During the actuator on valve setting procedure, the user is guided step by step by INTELLI+:

- choice of closing on torque or on position
- choice of direction to close
- to drive the actuator to the closed and the open position and validate the position

Software upgrade

To upgrade the actuator software package, no need to open the cover, this is performed through the infrared link.



INTELLI Pocket

The Intelli-Pocket has been designed to ease the engineer's on-site job:

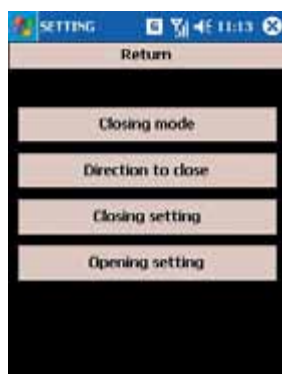
- At the installation / set-up stage:
 - program actuator parameters (signalling, alarms management, input-output ...). Data can be prepared in advance at the office and then downloaded to the actuators in the field
 - perform the actuator on valve setting
 - check actuator settings locally (open, close, stop, ...)



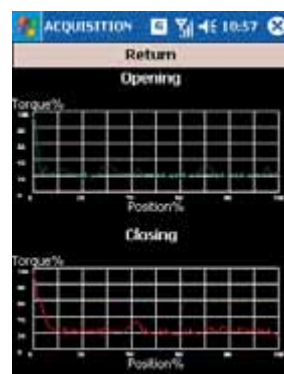
Multilingual interface



Easy access to parameters



Step by step actuator on valve setting



Valve torque curve for preventative maintenance

- Throughout product lifetime: change parameters when necessary, download actuator parameters and data for preventative maintenance purpose (number of motor starts, valve torque curves, alarm status, ...)

Intelli-Pocket is a real industrial pocket PC

- weatherproof or explosionproof (2 versions)
- rugged construction
- shock proof

The software has been developed on Windows operating system and therefore offers a very user-friendly interface.

INTELLIKIT

An INTELLIKIT communication kit is necessary for a computer to communicate with INTELLI+.

It is composed of :

- INTELLISOFT communication software developed by BERNARD on WINDOWS Operating System is available on CD-ROM and ready for use as delivered,
- An infra-red transmitter/receiver connected on the serial port (RS232) of the computer.

The computer must include an infra-red transmitter/receiver.



Intelligent functions

Timer

This function enables an increase in the operating time of the actuator, i.e. to avoid water-hammer effect in a pipe.

Travel time can be programmed independently in both opening and closing directions.

It is also possible to apply the timer function to a limited section of the stroke.

Position transmitter

INTELLI+ can be equipped with an analogue position feedback board. This module delivers a 0 / 4-20mA signal proportional to the percentage of the valve opening. A voltage signal (i.e. 0-10V) can also be obtained by connecting an external resistance. This signal is electrically isolated from the input signal. The board can be either supplied by an external (12 to 32 VDC) source of power or internally, by the INTELLI+ electronics.

Positioner

A positioner board can be installed into the INTELLI+ to allow the operator to drive the valve to intermediate positions.

The positioner module has been designed to work with either current (i.e. 4-20mA) or voltage (i.e. 0-10V) analogue signals:

- one input signal: the set-point
- one output signal: the actual valve position feedback

The setting procedure is fully automatic and is performed in a non-intrusive way.

The dead band can be adjusted by the user.

Torque memorisation

The maximum torques are memorised at each electric operation and can also be compared to a reference torque value (i.e. measured during start-up phases). The torque/position curve of the last operation can be displayed (refer to "Diagnosis and preventative maintenance" paragraph).

LED indication

Two LED's are located just below the INTELLI+ graphic display. Red led lit indicates a "valve in closed position" and green an "open valve".

This colour code can be reversed.

Battery option

The battery is not necessary to operate properly the actuator. In fact, all vital actuator parameters are measured by absolute sensors and stored in non-volatile memory.

However, the installation of the battery option brings some additional advantages to the user in case of loss of power supply:

- Possibility to get access to the display (information and menus)
- Remote signalling update (valve position after a hand-wheel operation, alarms, etc ...)

Signalling configuration

Local signalling can be modified:

- Opposite display: the display can be rotated in a half-turn. Depending on the control box, the display can also be rotated 90°
- Color of the signalling: in standard the red indicator displays "closed valve", the green indicator displays "open valve". The colors can be reversed.

Remote indications

Remote indication is done through 4 dual option relays, with the possibility of 23 available operating options. Voltage free relays maintain their positions without battery backup. Normally open or normally closed contact can be chosen.

An optional board with 3 single option relays allows reporting of 3 additional indications.

Fault monitoring relay

One changeover (SPDT) relay indicates the actuator is unavailable. The fault monitoring relay reports 5 operating values as a standard. This relay can be set-up according to a list of available options. The monitoring relay is always energized and drops out only in event of a fault.

Wire by wire command

Remote control can be achieved using a 10 to 250 V external voltage supply or by dry contacts, which uses the actuators internal 24 VDC voltage supply.

This control can be configured as a pulse or self-holding remote command during the operation. Inputs on the board are completely isolated by opto-isolators. It is also possible to control the actuator with a unique external contact, using one of the two functions "Priority to open" or "Priority to close".

Remote and local controls

REMOTE CONTROL

Commands

- Open, Close and Stop
- Proportional control
- Close on torque or on position
- 2 auxiliary commands available from 10
- Partial stroking

Means of control

- Maintained or pulse on-off commands
- Current loop or voltage proportional control
- Simple or redundant fieldbus

Signalling

- Up to 8 relays for signalling and alarms
- Current or voltage proportional position feedback signal

ESD

- Emergency shutdown command with priority over all other commands



2 selectors for:

- Remote/Local/Stop/Off
- Open/Close
- Menu selection

Selectors operating modes

- Maintained
- Pulse

Selectors lockout

- Local/Remote/Off selector is lockable
- Selectors can be remotely locked-out

Infrared

- Laptop with INTELLIKIT
- Pocket PC with INTELLI-Pocket

LOCAL CONTROL

Diagnosis and preventative maintenance

Thanks to its absolute sensors and its microprocessor technology, INTELLI+ continuously monitors its components as well as the actuator status and measures some important valve parameters.

INTELLI+ provides users with a great deal of information to help with system diagnosis and aid in scheduling their valves preventative maintenance.

INTELLI+ helps maximise process availability by reducing maintenance downtime.

Actuator activity

Parameters are available on the display through the menu to check the activity of the actuator:

- Number of starts: total starts since the actuator manufacturing. A partial counter can be selected.
- Running time: total running time since the actuator manufacturing. A partial counter can be selected.
- Starts last 12h: number of starts in the last 12 hours (to check the modulating activity).
- Handwheel action: indicates if the handwheel was actuated by manual operation since the last electrical command.

Data sheet memorised

INTELLI+ stores in its memory the data sheet of the actuator: customer tag number, BERNARD serial number, duty rating, classification level, manufacturing date, etc.

Self-monitoring functions

INTELLI+ checks the operation of its components, particularly torque sensor, position sensor, microprocessor and EEPROM memory.

INTELLI+ constantly monitors its performance in order to detect any problem of over-travel, jammed motor, rotation direction, lost phase, motor thermal overload and many others.

19 alarms indicate all faults locally or remotely (refer to Configuration paragraph for more details about the alarm description).

Valve torque curve

INTELLI+ memorizes the valve torque data during its last opening and closing operation.

This information can be recalled on the actuator display. The curve displays the position from 0 to 100% and the torque from 0 to 100 %.



The data can be uploaded in the computer with INTELLIKIT or by fieldbus (optional) in order to be displayed with the INTELLISOFT software curve form (torque vs. position) or to be used in a spreadsheet.

Torque monitoring

INTELLI+ measures in real time the applied torque from the actuator to the valve.

To protect the actuator and the valve, the user has the choice of 2 different values of torque limitation for each rotation direction. It is possible to retrieve:

- maximum torque to open
- maximum torque to close
- maximum torque to seat the valve
- maximum torque to unseat the valve

With a computer or a Pocket PC all the torque/position-curves can also be saved and compared.

It is possible to save a first measurement in the actuator memory (reference value) and each operation, to compare the last operation value with the reference value.

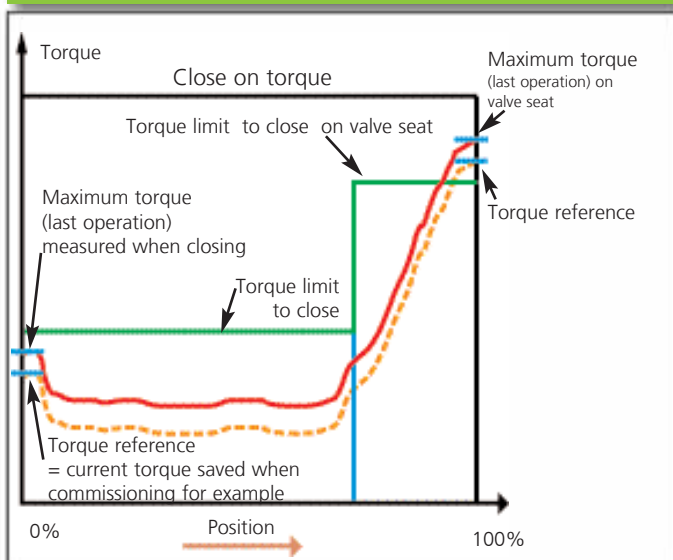
In particular cases where inertia is very important, INTELLI+ can be set to shunt the torque limit device during each start.

For example, for a gate-valve, one will limit the torque value necessary to seal the valve disc on the seat.

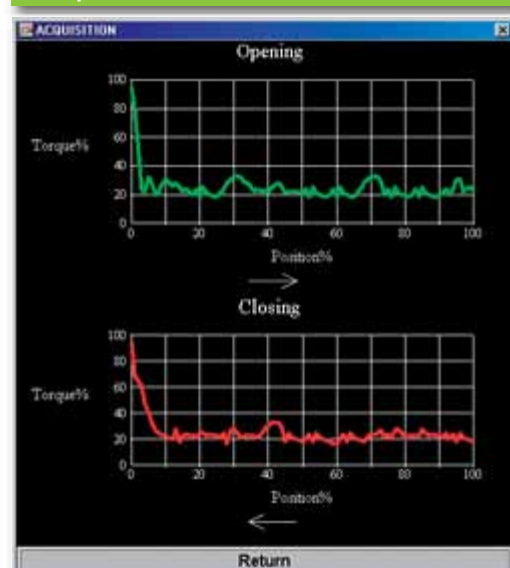
The other will choose a different setting for the remaining travel in order to protect the gate from any abnormal constraints.

To unseat the valve the torque limitation can be increased to prevent a premature stop. Just following unseating the torque limitation can be reduced to the rated value.

Torque monitoring example



Capture of INTELLISOFT software screen



Fieldbus communication

INTELLI+ can communicate with the user's system through a serial type fieldbus connection by adding an electronic board with the protocol of choice. All communications between the actuator and the system (commands and information) are transmitted on the same unique line.

INTELLI+ can be provided with an interface to communicate via the most important international fieldbus standards (PROFIBUS, MODBUS, FOUNDATION FIELDBUS...). All commands and remote signalling are available on the bus.

Open versus Proprietary systems

Different providers proposed two types of buses: "proprietary" or "open" system.

- The systems known as "proprietary" are developed by only one manufacturer for his own needs. A system known as "proprietary" always includes the actuators with the bus interface but also the bus controller located at the head of line. Only the products offered by this manufacturer can be installed on this bus. The communication with the DCS or PLC control system also uses a bus, generally MODBUS.
- The systems known as "open" are bus consortiums with international standards and for which various manufacturers can provide the controllers and the compatible interfaces. With an "open" system the actuator provider usually limits his offer to the material equipped with the bus interface. The bus controller is generally integrated in the PLC.

L.Bernard choose the "open" system

L.Bernard's choice of the "open" system allows the user:

- to connect several types of actuators or sensors
- to choose freely its equipment supplier

The "open" protocols proposed by L.Bernard are:

- **PROFIBUS**
- **MODBUS**
- **FOUNDATION FIELDBUS**

Profibus DP-V1

Profibus DP-V1, acyclic mode fieldbus, is a serial link (based on RS485) and all actuators are connected to the same pair of wires. Fieldbus status is displayed on the actuator.

Specific actuator file is available with the PDM software (Process Device Manager) that is used to configure and collect maintenance data on Profibus DP-V1.

Redundancy helps overcoming the risk of cut wires by doubling the cable. If the first one fails, the communication automatically switches to the second board.

The redundancy function is also secured by the implementation of two Profibus boards in the INTELLI+ box.

Foundation Fieldbus

The FOUNDATION fieldbus provides a broad spectrum of services and functions compared to other fieldbus systems:

- bus-powered field devices
- multi-master capable communication
- distributed data transfer (DDT)
- standardized block model for uniform device interfaces

The Foundation Fieldbus module is powered from the bus and is galvanically isolated from the actuator using opto-isolators.

Fieldbus status is displayed on the actuator.

Modbus RTU

A MODBUS line can control up to 30 actuators. Extra line repeaters are required to increase the number of actuators connected to a given line. Fieldbus status is displayed on the actuator.

Actuators can connect to any MODBUS RTU fieldbus even if other units are connected. Each actuator or sensor counts as a connection point, regardless of the amount of data transmitted.

Bus type	MODBUS RTU	PROFIBUS DP-V1	FOUNDATION FIELDBUS
Number of actuators per line	30*	30*	32**
Maximum number of actuators with repeaters	247	124	128**
Maximum line length without repeater	1 200 m* (1 313 yds)	1 200 m* (1 313 yds)	1 900 m** (2 079 yds)
Maximum line length with repeaters	10 000 m (10 940 yds)	9 200 m (10 065 yds)	9 500 m (10 393 yds)
Estimated scan speed for 30 actuators with 1,2 km length	0,7 s	0,1 s	1 s
Redundancy	No	Option	No
Emergency Shutdown (ESD)	Standard	Standard	Standard
External power supply	Standard	Standard	Standard
Number of commands in OFF-ON	9	9	9
Number of signalling	39	39	39

* More with repeaters

** The maximum length depends on the number of the actuators because each fieldbus interface is powered by the fieldbus (see Foundation Fieldbus handbook).

Configuration

INTELLI+ offers lots information, many of them can be configurable by the user as it is shown in the following table.

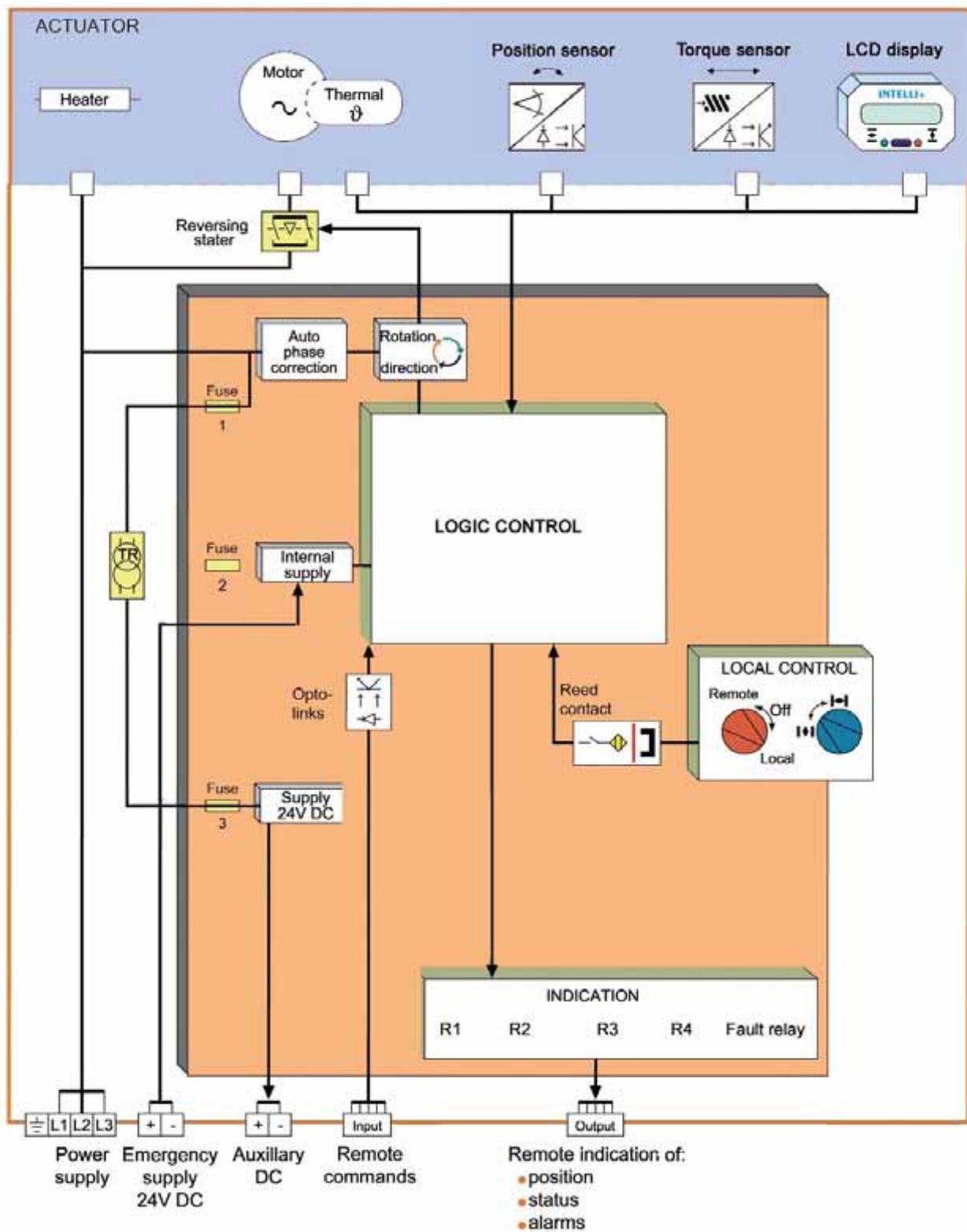
Information	Standard	Configurable
DATA SHEET	• Tag number (8 digits) • Actuator serial number (unchangeable) • Manufacturing date (unchangeable) • Password (3 digits)	
SETUP Close direction Closing mode Setting of torque limit system Closing torque Opening torque setting Only if closing the valve on torque Valve seat torque Torque to unseat the valve	• Clockwise • On position • 100% • 100% • 100% • 100%	• Counter-clockwise • On torque • Other values between 40 and 100% • Other values between 40 and 100% • Other values between 40 and 100% • Other values between 40 and 100% • Or without any limitation
COMMANDS Auxiliary remote commands (2 chosen from 10) Fault tolerance degradation (ESD) Auxiliary command activated by a contact	• Local command inhibit but local stop available (auxiliary command 1) • In emergency closing (ESD) (auxiliary command 2) • None • No thermal overload • Full torque (100%) • Normally open	• Local plus remote control or remote control only • Local or remote control • Local command inhibited • Open inhibited • Close inhibited • Auto / modulating / on-off • Emergency closing (ESD) • Emergency opening (ESD) • Emergency stopping (ESD) • Partial stroke • Normally closed
LOCAL COMMANDS Stop local, while remote command	• By pulse (a pulse is enough to achieve an opening or closing command) • Authorized	• Maintained (actuator operates while the operator holds the button) • Increments from 0 to 100% (actuator moves the valve to the position set in % of opening) • Inhibited
OPENING/CLOSING PRIORITY	• None	• Open priority • Close priority • Open and close priority

Configuration

Information	Standard	Configurable
ANALOG POSITION FEEDBACK BOARD (option) Position remote indication Type of signal	• 4-20mA	• 0-20mA and 0-10V* • 4-12 mA • 12-20 mA
Signal variation direction	• Signal increases in the open direction	• Signal decreases in the open direction
ANALOGUE CONTROL: POSITIONER (option) Auxillary command 1	• Switch: automatic control (proportional command) / On-Off (standard Open / Close command)	
Type of signal	• 4-20mA	• 0-20mA • 0-10V • 4-12mA • 4-20mA
Signal direction	• Signal increases in the open direction	• Signal decreases in the open direction
Dead band setting	• 1%	• Other values between 0.2 and 5%
In case of 4-20mA signal loss	• Remain in position	• Go to fully closed position • Go to fully open position

* Voltage signal with an external resistance

INTELLI+ layout



Technical specifications

Type of operation	On/off, modulating class III, modulating class II
Enclosure protection	Two types of enclosures are available to meet site operating conditions: FPI box (weatherproof design) • Standard: IP67 / NEMA 6 • On request: IP68 / NEMA 6P (are able to withstand to the pressure of 5m of water for 72 hours) FPx box (explosionproof design) • ATEX EEx d II B & II C T4 to T6 • NEMA 7 & NEMA 9 C.S.A. NRTL certification
Temperature	Ambiant temperature operating range: -40°C ...+70°C (-40°F ... +158°F)
External corrosion protection	Paint system and colour are the same as the actuator on which the INTELLI+ is mounted
Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz
Double-sealing protection	For protection of the electronics, the control compartment of the actuator can be fully isolated from the wiring compartment: • Standard with FPI box (weather proof design) • Option with FPx box (explosion proof design)
On-off control	• Isolated by opto-couplers • by voltage: 10 to 250 V DC/AC • by current: 10 mA at 24V • Dry contacts (use INTELLI+ auxillary DC supply) • Minimum pulse duration: 100ms • Time of rotational direction change: 50ms or 200ms (selectable)
Positioner (option)	• Standard input signal: 4-20 mA - output signal: 4-20mA • Input signal: 0-20 mA - output signal: 0-20 mA • Input signal: 0-10 V - output signal: 0-20 mA (0-10V with an external resistance)
Analog inputs	• In current: impedance of 160 Ohms • In voltage: impedance of 11 KOhms
Analog outputs	• In current: maximum acceptable load of 750 Ohms at 24 VDC supply • In voltage: minimum acceptable load of 50 KOhms (with a shunt resistance of 500 Ohms)
Signalling relays	• 4 relays: each information can be freely selected among a total of 13 available information (250 VAC-5A max.) • Contact configuration: normally open or normally closed
Output relays	• Minimum current 10mA at 5V • Inductive load 5A at 250V AC or 5A at 30V DC
Default relay	• SPDT contact (250VAC - 5mA)
Power supply	Same power supply as the actuator
Electrical connection	Screw type terminals or ring tongue terminals
Cable entries	Standard configurations (other on request): • Weatherproof: 3xM20 (2 for signalling, 1 for power supply) • Explosionproof: 2x3/4" +1x1" NPT
Power circuit	• Electromagnetic contactor for On-Off / Class III • Solid state relay for Class II
Fuse protection	Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer. Two automatic fuses for low voltages.
EU conformity	INTELLI+ controls comply with: • The 89/336/EEC directive modified by 93/68/EEC electromagnetic compatibility • The 73/23/EEC directive modified by 93/68/EEC Low Voltage • The following harmonized standards: Generic emission standard-Industrial environment EN 50081-2 Generic immunity standard - Industrial environment EN 50082-2 ; Rotating electrical machines EN 60034-1, Degrees of protection provided by enclosures (IP code) EN 60529
Options	• Additional 3 relays board. These voltage free relays are programmable and can be chosen to address one of the 23 possible remote indications. • Positioner • Separated box

Profibus DP-V1 (option)	• PROFIBUS-DP slave - RS 485 • Baud rate: autodetection • Communication protocol: PROFIBUS DP-V1 slave-cyclic • Type of connection: single (standard) or redundant (option) • Cable specification: Profibus certified cable only • Line connection - Actuators per line without repeater: 31 max. - Line length without repeater: 1.2 km max. (0.75 mi) - Number of repeaters per line: 9 max. 30 actuators and 1 Km max. per segment - Number of actuators per line with repeater: 124 maximum - Line length with 9 repeaters: 10 km max. (6.2 mi) • Scan speed (30 units & 1.2 km): 0.1s (at a baud rate of 93.75 Kbit/s) • Baud rate: 9.6 kbit/s up to 1.5 Mbit/s • Power supply: internal via INTELLI+ transformer, 24VDC external backup • Technical approval: operability approved by PNO (Profibus Nutzer Organisation)
Modbus (option)	• RS 485 type links • Transmission medium: 1 shielded pair cable • Functions: Half Duplex, asynchronous mode, multidrop • Baud rate: 1.2k to 115 Kbit/s • Format: 8 data bits, 1 stop bit, no parity (RTU mode) • Communication protocol: Modbus (slave) • Modbus address: configurable by the actuator menu
Foundation Fieldbus (option)	• H1 speed = 31.25kBit/s • Fully compliant with fieldbus standard IEC 61158 • Physical layer: IEC 61158-2, 2 wires communication • Current consumption: 20mA • Operating voltage: 9 to 32 VDC • Cable specification: Type A (for example: 3076F Belden) • Line connection - Actuators per line without repeater: 31 max. - Line length without repeater: 1.9 km max. (1.2 mi) - Number of repeaters per line: 4 max. - Maximum number of actuators and line length depends on consumption available • Technical approval: Foundation tested.
INTELLIKIT (option)	• INTELLISOFT cd-rom • Infrared module • RS232 cable (2 meters length maximum, other on request)
INTELLI Pocket (option)	• Protection: IP65 (option: ATEX II2G EEx ia IICT4, shock resistance : 1.2 m on concrete) • Communication: with Intelli+ : infrared link (40 cm maximum distance) with PC: bluetooth, IRDA, Wifi (802.11b) as a standard • Optional USB station. • Operating system: Windows Mobile 2003 • 64Mb RAM + 256Mb storage card • Compatibility: actuator equipped with Intelli+ controls, I.R interface and software.

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