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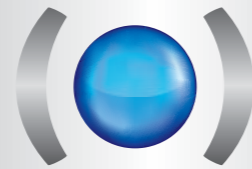
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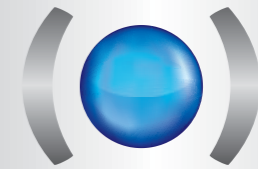
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**INTELLI+**  
Intelligent control



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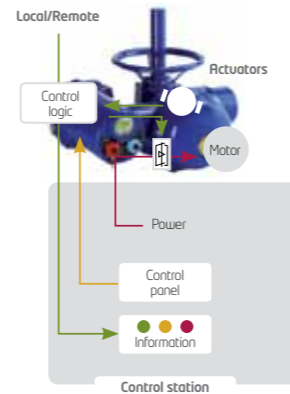
# Why an intelligent control?

## > INTELLI+

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

**NON INTRUSIVE SETTING**

with the local control buttons

**SECURITY & RELIABILITY**

thanks to a battery-free technology

**ACCURATE INFORMATION**

with absolute sensors

**ADVANCED FUNCTIONS**

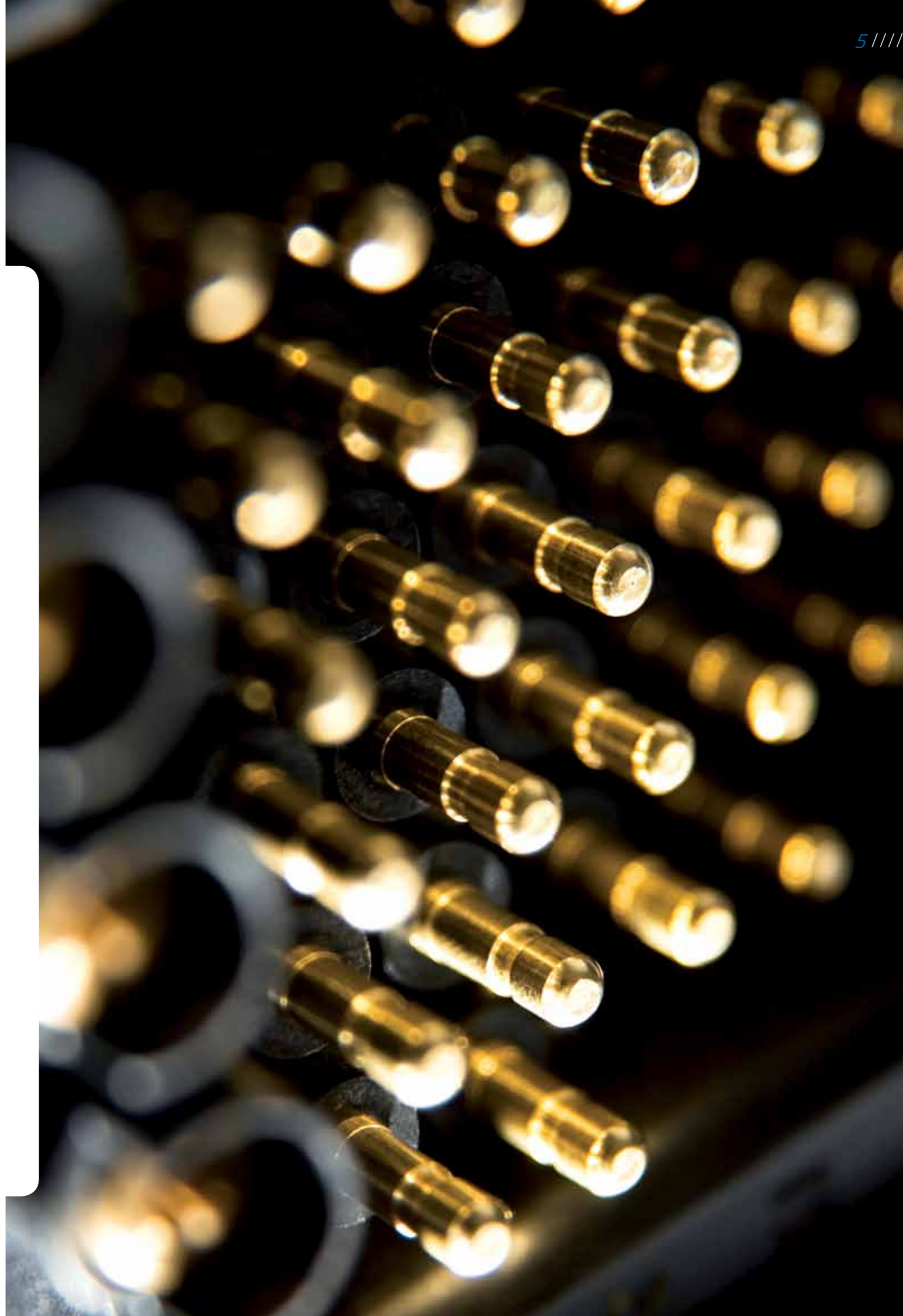
such as ESD, partial stroking, diagnosis and data for preventive maintenance

**USER FRIENDLY**

with the graphical display and menu displayed in 8 languages

**FIELDBUS COMMUNICATION**

with Modbus, Foundation Fieldbus or Profibus DP V1



## 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

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

The setting can be done automatically or manually by choosing the closed or open 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 (using the torque limiter) 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.

### > Parameters modification

Refer to next page for additional information.

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

### > 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, ...)
- 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, ...)



Multilingual interface

Easy access to parameters

Step by step actuator on valve setting

Valve torque curve for preventative maintenance

## > INTELLIKIT

An INTELLIKIT communication kit is necessary for a computer to communicate with INTELLI+. It is composed of :

- > INTELLISOFT communication software developed by BERNARD CONTROLS on WINDOWS Operating System is available on CD-ROM and ready for use as delivered,
- > An infrared transmitter/receiver connected on a USB port of the computer.



INTELLI-Pocket is a real industrial pocket PC

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

The software has been developed on Windows Mobile Operating System and therefore offers a very user-friendly interface.



## Versatile enclosure

*INTELLI+, available in weatherproof or explosion proof protection, is an intelligent control package which can be fitted on to both multiturn and quarter turn BERNARD CONTROLS actuators.*

### > Separated box

- The 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 protector

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.



## 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 preventive 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 Sensors advantages

- > Unaffected by manual operation while power supply is off
- > Autonomous actuator, no need to use battery
- > High vibration resistance (1g)
- > Extremely reliable and precise torque and position sensors



## 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 (weatherproof version only) and ignore any possible torque overload condition.

### > Alarms indication

INTELLI+ continuously monitors the actuator performances. Up to 12 different types of faults and alarms can be reported (refer to Configuration on page 22 for the list of the alarms).

An exclamation mark in a triangle 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 parameters modification and actuator on valve setting.

### > 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 fault 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 for signalling purpose only. 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.



# User friendly

## > Autonomous

- INTELLI+ user interface is intuitive.
- 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) at ends of travel, and direction of running (blinking).
- Red and green LED can be freely assigned to open or closed positions.

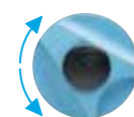
## > Local commands

- 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.
- Local commands can be inhibited remotely.

## > User friendly menu



Selector to validate the choice (ok)



Selector to navigate up and down into the menu

4 submenus are available with INTELLI+ interface:

**LANGUAGE:** to change the language of the information displayed (8 languages available as standard)

**CHECK:** to read all the actuator parameters and configuration (activity, alarms, commands, torque, data sheet, position, positioner, signalling, timer, fieldbus)

**SET UP:** to set up the actuator on the valve (closing mode, close direction, position setting)

**CHANGE:** to modify the actuator configuration (activity, commands, torque, data sheet, position, positioner, signalling, timer, fieldbus)

**EXIT SETUP:** to exit the actuator setup



## > Graphical 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

## > Display indications

5% Open  
Torque 20%

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

Indications below are shown at the bottom of the display:



Local controls inhibited by the remote controller.

ESD

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

0%↕

The control is modulating and the value is displayed in percentage. In case of loss setpoint signal, this indication is blinking.

BUS□

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

1□2□

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, a faulty module, communication in progress or in stand by.



## 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. 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 input and output signals are fully isolated from each other. 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" page 18).

### ➤ 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...)*

### ➤ Remote indications

Remote indication is done through 4 relays, with the possibility of 23 available information. 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

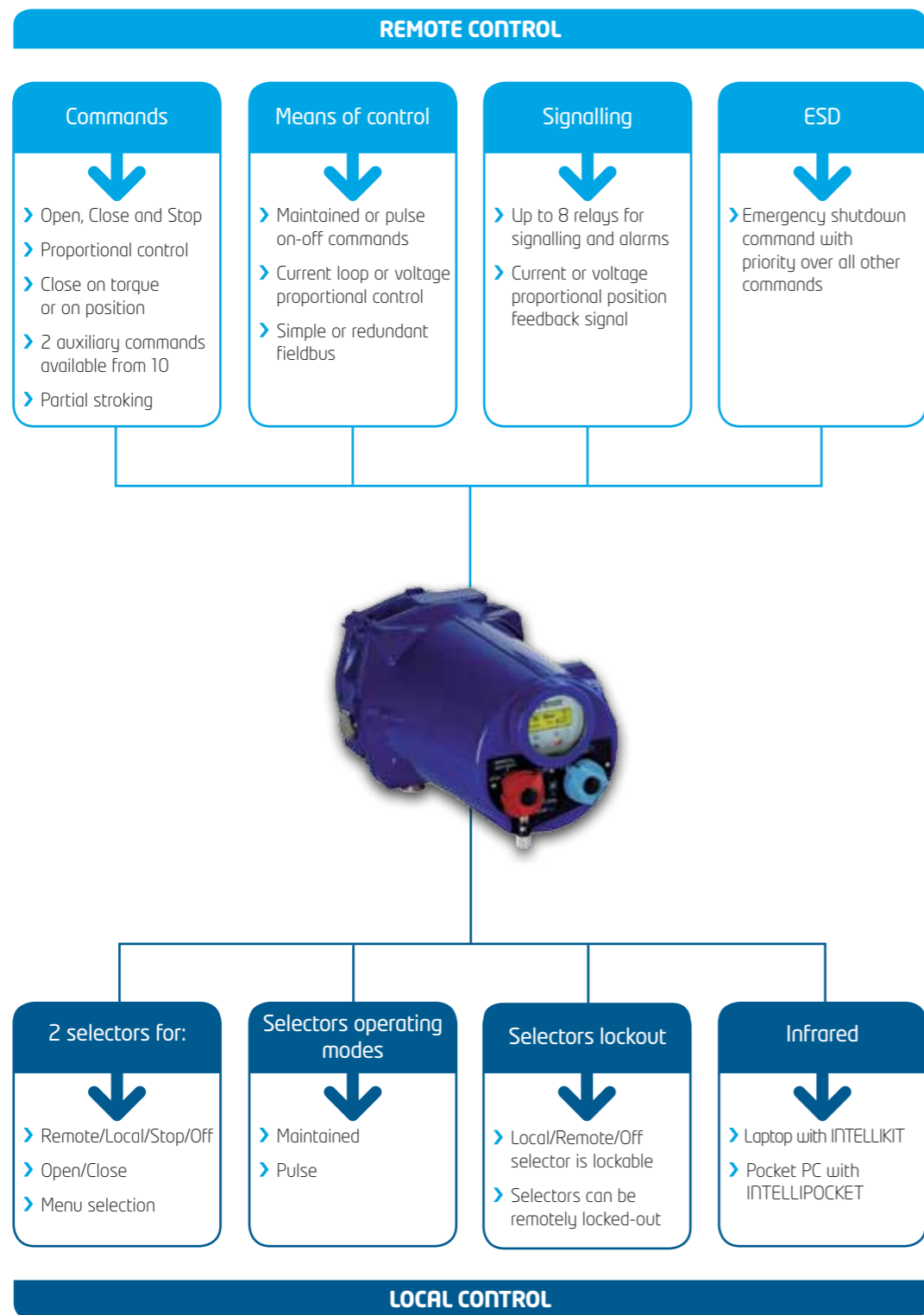
Remote control can be achieved using a 10 to 250 V external voltage supply or by dry contacts, which uses the actuators internal 24 VDC voltage supply.

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 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 maximize 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 i.e.).*
- > *Handwheel action: indicates if the handwheel was operated by manual operation since the last electrical command.*

## > Data sheet memorized

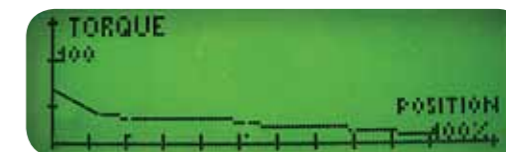
INTELLI+ stores in its memory the data sheet of the actuator: customer tag number, BERNARD CONTROLS serial number, duty rating, classification level, manufacturing date, etc.

## > 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. 12 alarms indicate all faults locally or remotely (refer to Configuration page 22 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 on the INTELLIPOCKET 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*

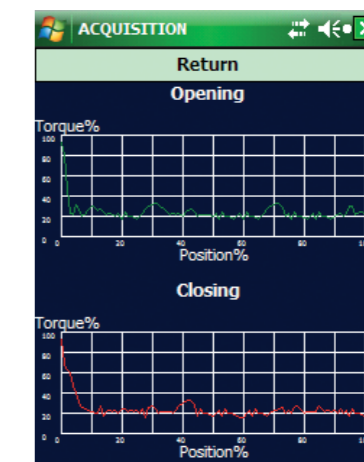
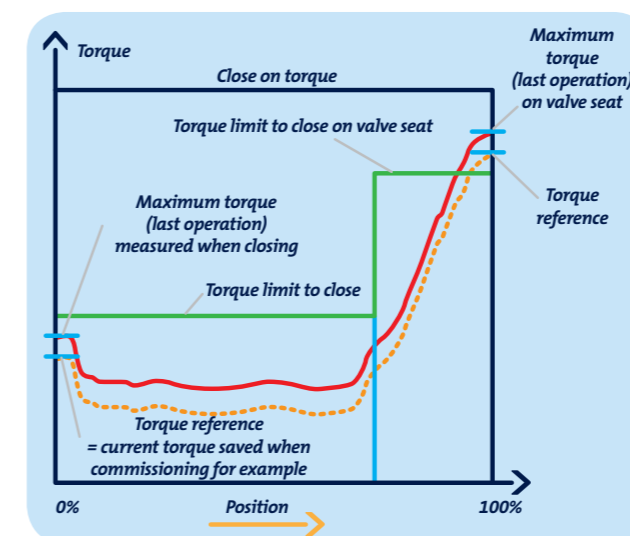
For example, for a gate-valve, one will limit the torque value necessary to seal the valve disc on the seat.

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.

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



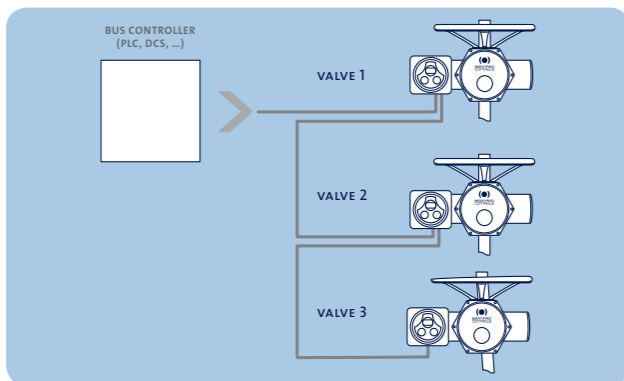
Capture of INTELLI-POCKET software screen

Torque monitoring example

# Fieldbus

*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.*

The fieldbus present on a large number of installation is used more and more to communicate information and commands with multiple actuators and contactors connected in series on a single pair of wires. Thus, the number of information available from each actuator can be multiplied while reducing the overall cost of wiring on the site.



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)	10 200 m (11 159 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 ON-OFF	9	9	9
Number of signalling	39	39	39

### Open versus Proprietary systems :

Two physical concepts of fieldbus are available from various providers.

#### > The «Proprietary» so-called system:

This 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.

#### > «Open» systems:

One using standard international fieldbuses so various manufacturers can supply compatible controllers and interfaces. The actuator supplier restricts usually its offer to devices equipped with bus interfaces. The bus controller is usually included in the PLC.

BERNARD CONTROLS chooses the «open» system for all its fieldbus solutions.

BERNARD CONTROLS actuators can be connected to most of the standard fieldbus available on the market:

- PROFIBUS DP,
- FOUNDATION FIELDBUS,
- MODBUS RTU,
- Other fieldbus on demand.

For more security, redundant fieldbus ensures continuous operation, even in case of a bus line disruption. Indeed, all elements of the bus loop (bus controller, lines, actuators interfaces) are doubled.

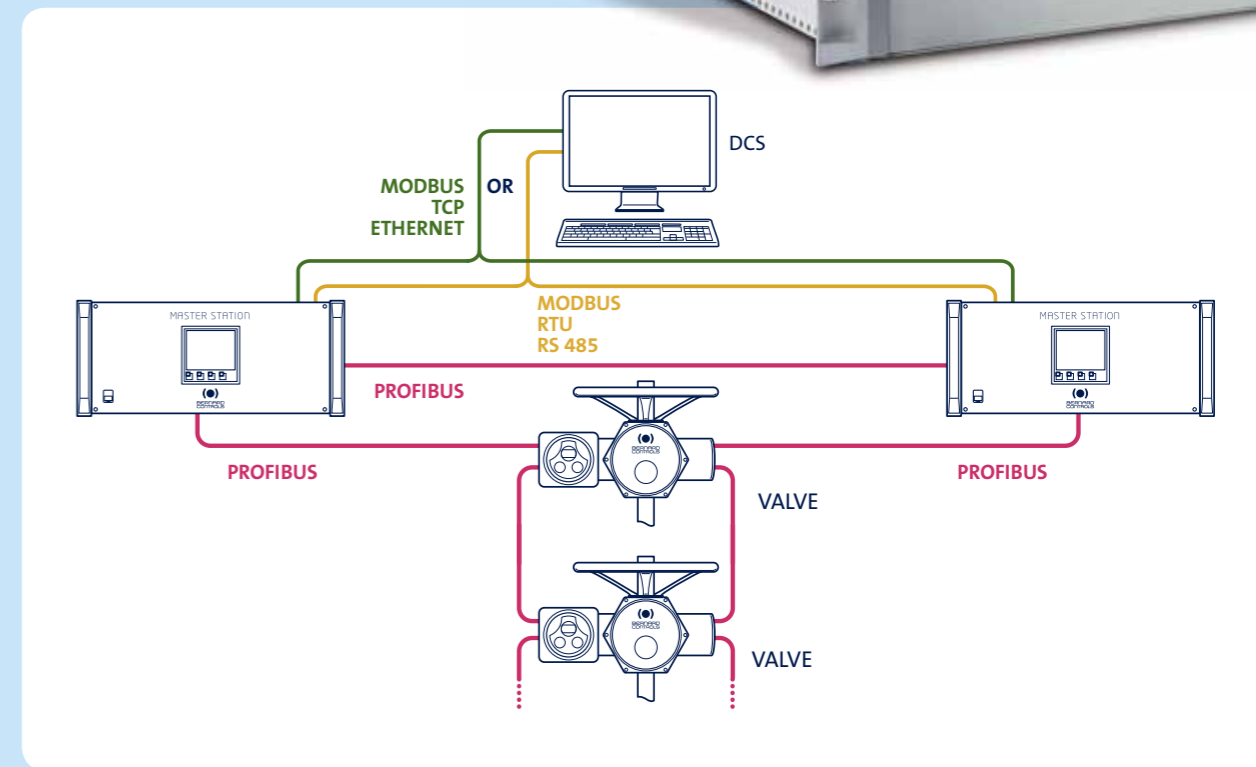
\* More with repeaters - \*\* The maximum length depends on the number of the actuators because each fieldbus interface is powered by the fieldbus (see Foundation Fieldbus handbook - \*\*\* ESD can be transmitted through the fieldbus or through a separated cable

# Master Station

The Master Station is a fieldbus communication solution developed by BERNARD CONTROLS. It is a turn-key solution which eases the command and control of large quantities of MOVs through a fieldbus. Overall time of setting up on site is reduced to the minimum.

This system allows not only to set up, command and get information from the actuators easily and rapidly, but it is also a tool for effective and preventative maintenance.

BERNARD CONTROLS Master Station is based on an open communication system.



Each Master Station can pilot up to 120 MOVs, at a distance of up to 10.2km, and within very fast response time.

The Master Station is usually located between the DCS and the actuators. Order coming from the DCS are transferred by

the Master Station to the actuators. Piloting can be done locally as well, thanks to the digital touch screen.

For better availability of the process, the Master Station is conceived to be integrated easily and effectively in a redundant architecture.



# Configuration

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

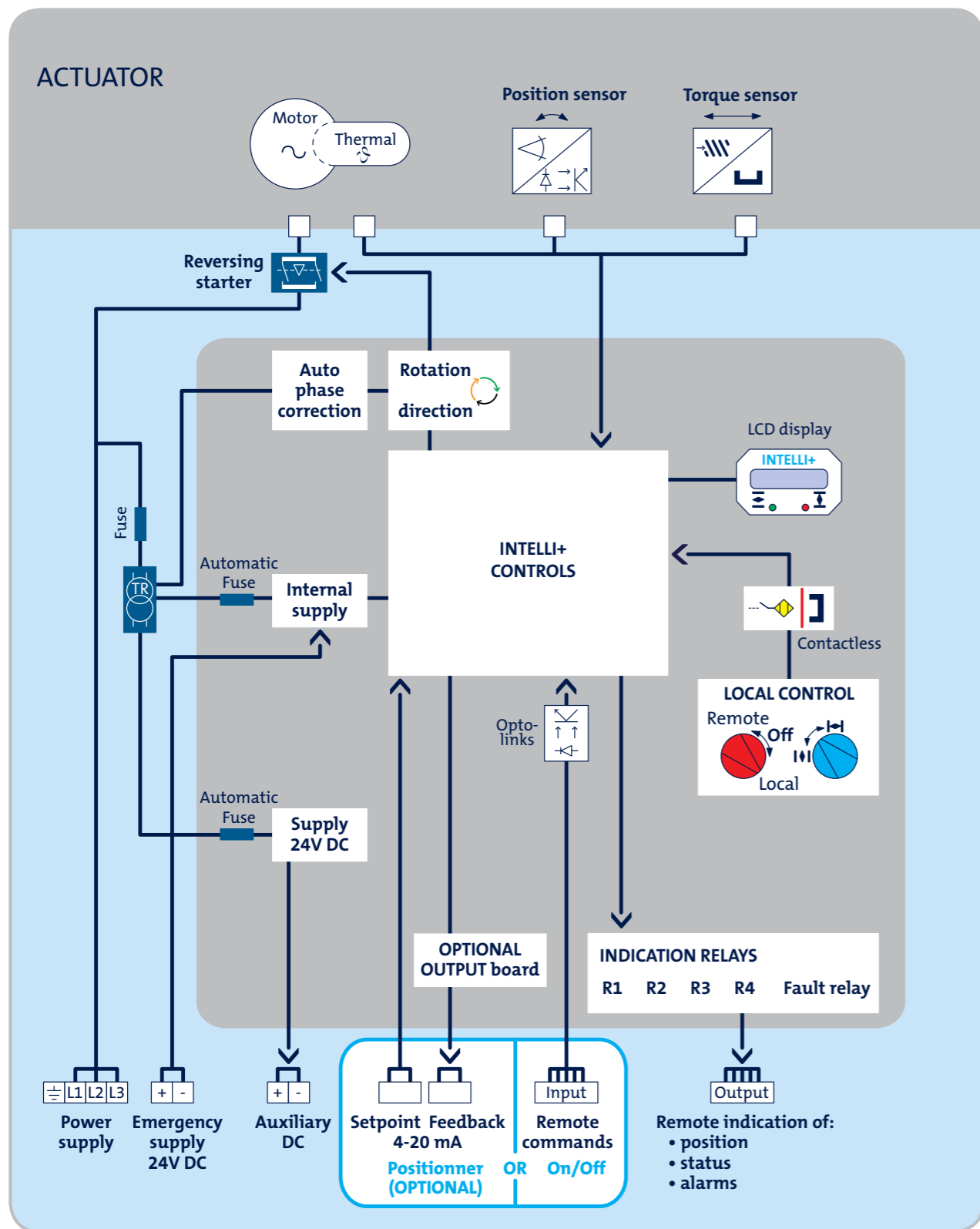
	INFORMATION	STANDARD	CONFIGURABLE
DATA SHEET		<ul style="list-style-type: none"> <li>Tag number (8 digits)</li> <li>Actuator serial number (unchangeable)</li> <li>Manufacturing date (unchangeable)</li> <li>Password (3 digits)</li> </ul>	
SET UP	<b>Close direction</b> <b>Closing mode</b> <b>Setting of torque limit system</b> Closing torque Opening torque setting <b>Only if closing the valve on torque</b> Valve seat torque Torque to unseat the valve	<ul style="list-style-type: none"> <li>Clockwise</li> <li>On position</li> <li>100%</li> <li>100%</li> <li>100%</li> <li>100%</li> </ul>	<ul style="list-style-type: none"> <li>Counter-clockwise</li> <li>On torque</li> <li>Other values between 40 and 100%</li> <li>Other values between 40 and 100%</li> <li>Other values between 40 and 100%</li> <li>Other values between 40 and 100%</li> <li>Or without any limitation</li> </ul>
COMMANDS	<b>Auxiliary remote commands (2 chosen from 10)</b>	<ul style="list-style-type: none"> <li>Local command inhibit but local stop available (auxiliary command 1)</li> <li>In emergency closing (ESD) (auxiliary command 2)</li> </ul>	<ul style="list-style-type: none"> <li>Local plus remote control or remote control only</li> <li>Local or remote control</li> <li>Open/Close inhibited</li> <li>Auto / modulating / On-Off</li> <li>Emergency opening (ESD)</li> <li>Emergency stopping (ESD)</li> <li>Partial stroke</li> <li>No thermal overload (weatherproof versions only)</li> <li>Full torque (100%)</li> </ul>
	<b>Fault tolerance degradation (ESD)</b>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>Normally closed</li> </ul>
	<b>Auxiliary command activated by a contact</b>	<ul style="list-style-type: none"> <li>Normally open</li> </ul>	<ul style="list-style-type: none"> <li>Normally closed</li> </ul>
LOCAL COMMANDS	<b>Blue selector operating mode</b>	<ul style="list-style-type: none"> <li>By pulse (a pulse is enough to achieve an opening or closing command)</li> </ul>	<ul style="list-style-type: none"> <li>Maintained (actuator operates while the operator holds the button)</li> <li>Increments from 0 to 100% (actuator moves the valve to the position set in % of opening)</li> </ul>
	<b>Stop local, while remote command</b>	<ul style="list-style-type: none"> <li>Authorized</li> </ul>	<ul style="list-style-type: none"> <li>Inhibited</li> </ul>
OPENING/CLOSING PRIORITY		<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>Open priority</li> <li>Close priority</li> <li>Open and close priority</li> </ul>
FAULT RELAY	<b>Faults reported on fault relay</b>	<ul style="list-style-type: none"> <li>Control circuit power lost (always included)</li> <li>Fuse blown (always included)</li> <li>Thermal relay has tripped (always included)</li> <li>Lost phase (always included)</li> <li>Locked rotor (always included)</li> <li>Local / remote selector set to local</li> <li>Local / remote selector set to off</li> </ul>	<ul style="list-style-type: none"> <li>Jammed valve</li> <li>Actuator receives an emergency command (ESD)</li> <li>The actuator receives an inhibit command</li> <li>Overtravel</li> <li>4 - 20 mA signal lost (if positioner option installed)</li> </ul>

	INFORMATION	STANDARD	CONFIGURABLE
SIGNALLING RELAYS	<b>Informations reported on signalling relays</b>	<ul style="list-style-type: none"> <li>Valve open (for R1 and R3)</li> <li>Valve closed (for R2 and R4)</li> </ul>	<ul style="list-style-type: none"> <li>Torque limiter action in the opening / closed direction</li> <li>Valve in intermediate position, between x% and y% of opening (for example: 10% to 50%)</li> <li>Selector in local/remote/off</li> <li>The actuator is moving (fixed signal)</li> <li>The actuator is moving (blinking signal)</li> <li>Moving in the open/close direction (fixed signal)</li> <li>Moving in the open/close direction (blinking signal)</li> <li>Emergency command (ESD)</li> <li>Stop mid-travel</li> <li>The actuator is normally powered</li> <li>The motor thermal relay has tripped</li> <li>Jammed valve</li> <li>In three-phase, a phase is missing</li> <li>4-20 mA signal lost (if positioner option installed)</li> <li>The handwheel has been activated since the last electrical movement</li> <li>If fieldbus option is installed, this relay is assigned to an external command</li> <li>Battery low (if installed)</li> <li>Partial stroking in progress</li> <li>Partial stroking in fault</li> </ul>
	<b>Each contact can be:</b>	<ul style="list-style-type: none"> <li>Normally open (when something occurs, contact is closed)</li> </ul>	<ul style="list-style-type: none"> <li>Normally closed</li> </ul>
	<b>In case of communication loss</b>	<ul style="list-style-type: none"> <li>Remain in position</li> </ul>	<ul style="list-style-type: none"> <li>Go to closed position</li> <li>Go to open position</li> </ul>
	<b>Position remote indication</b> <b>Type of signal</b>	<ul style="list-style-type: none"> <li>4-20mA</li> </ul>	<ul style="list-style-type: none"> <li>0-20mA and 0-10V*</li> <li>4-12 mA</li> <li>12-20 mA</li> </ul>
FIELD BUS (option)	<b>Signal variation direction</b>	<ul style="list-style-type: none"> <li>Signal increases in the open direction</li> </ul>	<ul style="list-style-type: none"> <li>Signal decreases in the open direction</li> </ul>
ANALOGUE CONTROL: POSITIONER (option)	<b>Auxiliary command 1</b>	<ul style="list-style-type: none"> <li>Switch: automatic control (proportional command) / On-Off (standard Open / Close command)</li> </ul>	
	<b>Type of signal</b>	<ul style="list-style-type: none"> <li>4-20mA</li> </ul>	<ul style="list-style-type: none"> <li>0-20mA</li> <li>0-10V</li> <li>4-12mA</li> <li>4-20mA</li> </ul>
	<b>Signal direction</b>	<ul style="list-style-type: none"> <li>Signal increases in the open direction</li> </ul>	<ul style="list-style-type: none"> <li>Signal decreases in the open direction</li> </ul>
	<b>Dead band setting</b>	<ul style="list-style-type: none"> <li>1%</li> </ul>	<ul style="list-style-type: none"> <li>Other value between 0.2 and 5%</li> </ul>
<b>In case of 4-20mA signal loss</b>	<ul style="list-style-type: none"> <li>Remain in position</li> </ul>	<ul style="list-style-type: none"> <li>Go to fully closed position</li> <li>Go to fully open position</li> </ul>	

\* Voltage signal with an external resistance



# INTELLI+ layout





# Technical specifications

<b>Type of operation</b>	On/Off, modulating Class III, Class II and Class I
<b>Enclosure protection</b>	Two types of enclosures are available to meet site operating conditions: Weatherproof design: FPI: box <ul style="list-style-type: none"> <li>Standard: IP67 / NEMA 6</li> <li>On request: IP68 / NEMA 6P (are able to withstand to the pressure of 5m of water for 72 hours)</li> </ul> Explosion proof design: refer to Explosion proof actuators catalogue
<b>Temperature</b>	Ambiant temperature operating range: -40°C ...+70°C ( -40°F ... +158°F)
<b>External corrosion protection</b>	Paint system and colour are the same as the actuator on which the INTELLI+ is mounted
<b>Vibration resistance</b>	1g (9.8 m/s²) at 10-500 Hz
<b>Double-sealing protection</b>	For protection of the electronics, the control compartment of the actuator can be fully isolated from the wiring compartment: <ul style="list-style-type: none"> <li>Weather proof design: standard</li> <li>Explosion proof design: standard (except in case of separated box)</li> </ul>
<b>On-Off control</b>	<ul style="list-style-type: none"> <li>Isolated by opto-couplers</li> <li>by voltage: 10 to 250 V DC/AC</li> <li>by current: 10 mA at 24V</li> <li>Dry contacts (use INTELLI+ auxillary DC supply)</li> <li>Minimum pulse duration: 100ms</li> <li>Time of rotational direction change: 50ms or 200ms (selectable)</li> </ul>
<b>Positioner (option)</b>	<ul style="list-style-type: none"> <li>Standard input signal: 4-20 mA - output signal: 4-20mA</li> <li>Input signal: 0-20 mA - output signal: 0-20 mA</li> <li>Input signal: 0-10 V - output signal: 0-20 mA (0-10V with an external resistance)</li> </ul>
<b>Analog inputs</b>	<ul style="list-style-type: none"> <li>in current: impedance of 160 Ohms</li> <li>in voltage: impedance of 11 KOhms</li> </ul>
<b>Analog outputs</b>	<ul style="list-style-type: none"> <li>in current: maximum acceptable load of 750 Ohms at 24 VDC supply</li> <li>In voltage: minimum acceptable load of 50 KOhms (with a shunt resistance of 500 Ohms)</li> </ul>
<b>Signalling relays</b>	<ul style="list-style-type: none"> <li>4 relays: each information can be freely selected among a total of 23 available information</li> <li>Contact configuration : normally pen or normally closed</li> <li>Minimum current 10mA at 5V</li> <li>5A at 250V AC or 5A at 30V DC max. (resistive load)</li> </ul>
<b>Fault relay</b>	<ul style="list-style-type: none"> <li>SPDT contact</li> <li>Minimum current 10mA at 5V</li> <li>5A at 250V AC or 5A at 30V DC max. (resistive load)</li> </ul>
<b>INTELLI+ Power supply</b>	Same power supply as the actuator
<b>Electrical connection</b>	Screw type terminals or ring tongue terminals
<b>Cable entries</b>	Standard configurations (other on request): <ul style="list-style-type: none"> <li>Weatherproof: 3xM20</li> <li>Explosion proof: 1"1/2NPT + 2x1"NPT</li> </ul> Cable entries are delivered with plugs in standard
<b>Power circuit</b>	<ul style="list-style-type: none"> <li>Electromagnetic contactor for On-Off / Class III</li> <li>Solid state relay for Class II</li> </ul>
<b>Fuse protection</b>	Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer. Two automatic fuses for low voltages
<b>EU conformity</b>	INTELLI+ controls comply with: <ul style="list-style-type: none"> <li>The 2004/108/EC electromagnetic compatibility</li> <li>The 2006/95/EC C Low Voltage</li> <li>The following harmonized standards: Generic emission standard-Industrial environment EN 61000-6-4 Generic immunity standard - Industrial environment: EN 61000-6-2 ; Rotating electrical machines EN 60034-1, Degrees of protection provided by enclosures (IP code) EN 60529</li> </ul>

<b>Proportional control Modulating Class III (option)</b>	Input (setpoint) and output (feedback) signals are fully isolated from each other. Signal configurations (selectable): <ul style="list-style-type: none"> <li>Input signal: 4-20 mA - output signal: 4-20mA</li> <li>Input signal: 0-20 mA - output signal: 0-20mA</li> <li>Input signal: 0-10 V - output signal: 0-20mA (0-10V with an external resistance)</li> </ul> Analogue inputs: <ul style="list-style-type: none"> <li>in current: impedance of 160 Ohms</li> <li>in voltage: impedance of 11 KOhms</li> </ul> Analogue outputs: <ul style="list-style-type: none"> <li>in current: maximum acceptable load of 750 Ohms at 24 VDC supply</li> <li>In voltage: minimum acceptable load of 50 KOhms (with a shunt resistance of 500 Ohms)</li> </ul>
<b>Transmitter (option)</b>	Proportional position (0/4-20 mA) and torque (4-20 mA) feedback board
<b>Signalling battery (option)</b>	Allows to use the display and update the open and closed position information (through the signalling relays or Profibus DP) in case of lack of power supply
<b>Profibus DP-V1 (option)</b>	<ul style="list-style-type: none"> <li>PROFIBUS-DP slave - RS 485</li> <li>Baud rate: autodetection</li> <li>Communication protocol: PROFIBUS DP-V1 slave-cyclic &amp; acyclic</li> <li>Type of connection: single line (standard) or redundant line (option)</li> <li>Cable specification: Profibus certified cable only</li> <li>Line connection without repeater Actuators per line: 31 max. Line length: 1.2 km max. (0.75 mi)</li> <li>Line connection with repeaters 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: 10.2 km max. (6.2 mi)</li> <li>Scan speed (30 units &amp; 1.2 km): 0.1s (at a baud rate of 93.75 Kbit/s)</li> <li>Baud rate: 9.6 kbit/s up to 1.5 Mbit/s</li> <li>Power supply: internal via INTELLI+ transformer, 24VDC external backup</li> <li>Technical approval: operability approved by PNO (Profibus Nutzer Organisation)</li> </ul>
<b>Modbus (option)</b>	<ul style="list-style-type: none"> <li>RS 485 type links</li> <li>Transmission medium: 1 shielded pair cable</li> <li>Functions: Half Duplex, asynchronous mode, multidrop</li> <li>Baud rate: 1.2k to 115 Kbit/s</li> <li>Format: 8 data bits, 1 stop bit, no parity (RTU mode)</li> <li>Communication protocol: Modbus (slave)</li> <li>Modbus address: configurable by the actuator menu</li> </ul>
<b>Foundation Fieldbus (option)</b>	<ul style="list-style-type: none"> <li>H1 speed = 31.25kBit/s</li> <li>Fully compliant with fieldbus standard IEC 61158</li> <li>Physical layer: IEC 61158-2, 2 wires communication</li> <li>Current consumption: 20mA</li> <li>Operating voltage: 9 to 32 VDC</li> <li>Cable specification: Type A (for example: 3076F Belden)</li> <li>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</li> <li>Technical approval: Foundation tested. Several DCS manufacturer operability checked.</li> </ul>
<b>INTELLIKIT (option)</b>	<ul style="list-style-type: none"> <li>INTELLISOFT cd-rom</li> <li>Infrared module</li> <li>USB cable (2 meters length maximum, other on request)</li> </ul>
<b>INTELLIPOCKET (option)</b>	<ul style="list-style-type: none"> <li>Protection: IP65 (option: ATEX II2G EEx ia IICT4) shock resistance : 1.2 m on concrete</li> <li>Communication: with INTELLI+ : infrared link (40 cm maximum distance) with PC: bluetooth, IRDA, Wifi (802.11b) as a standard</li> <li>Optional USB station.</li> <li>Operating system: Windows Mobile 2005</li> <li>64Mb RAM + 256Mb storage card</li> <li>Compatibility: actuator equipped with INTELLI+ controls, I.R interface and software.</li> </ul>