

## Instructions for start-up

### INTELLIMODBUS

### MODBUS RTU FOR INTELLI+ (Intelli+ 2801)



***Instructions for start-up*****SUMMARY**

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## **1 INTRODUCTION**

Modbus RTU is an industrial fieldbus which allows connecting actuators and other devices (sensors ...) to a Distributed Control System (DCS) or a Programmable Logic Controller (PLC). Many actuators and other devices can be connected on a single fieldbus line provided they are all equipped with a compatible Modbus interface.

The Modbus RTU interface described in this document has been specially designed for the Bernard actuators with INTELLI+ control.

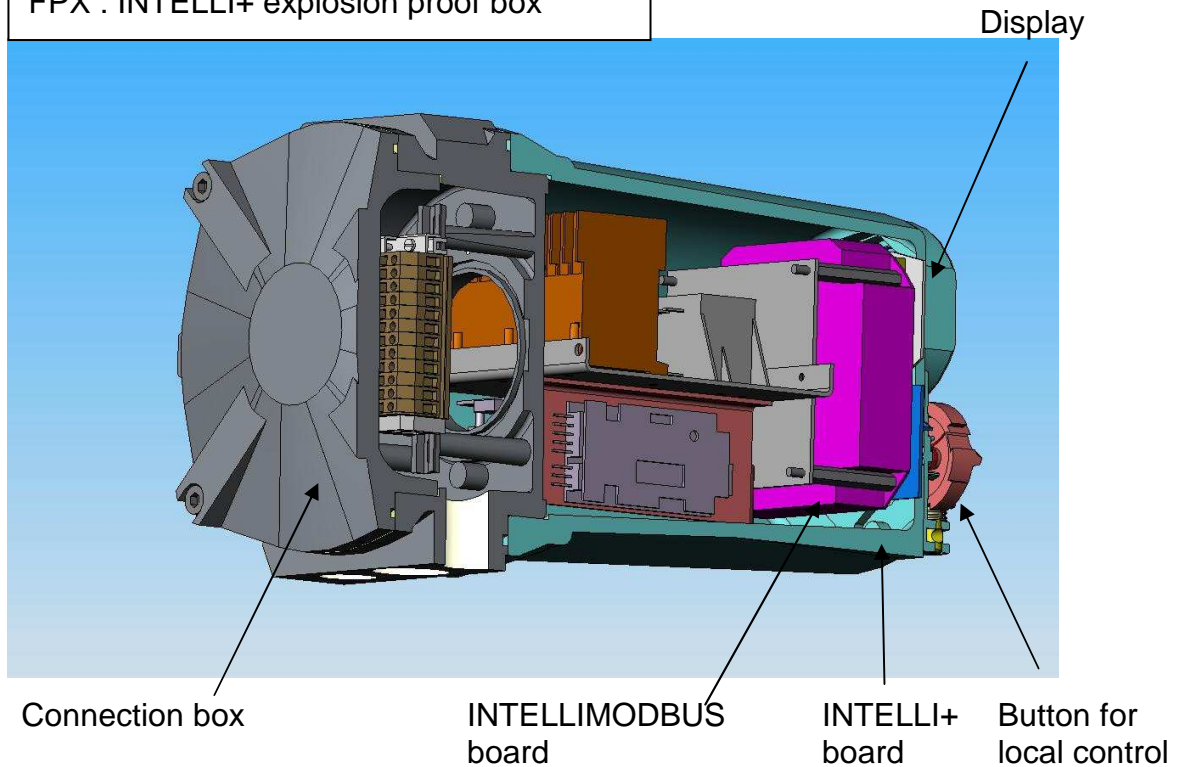
## **2 TECHNICAL SPECIFICATIONS**

- The INTELLIMODBUS, a MODBUS RTU slave module, can be controlled by a master MODBUS RTU: PLC, PC, DCS, interface boards... from various suppliers.
- Hardware communication standard: RS 485.
- Baud rate to configure in the actuator bus menu: 1200, 2400, 4800, 9600, 19200, 38400, 57800, 115200 Bauds.
- Parity to configure in the actuator bus menu: None, odd, even.
- Maximum Total amount of master or slave modules on the line: 32 (247 with repeaters).
- Slave address to configure (1 to 247) in the actuator bus menu.
- On the line, data code is binary.
- Modbus functions supported:
  - Function 3 and 4: read n words
  - Function 6: write 1 word
  - Function 16: write n word
- Fieldbus is electrically totally isolated from the actuator circuitry.
- CE Conformity.

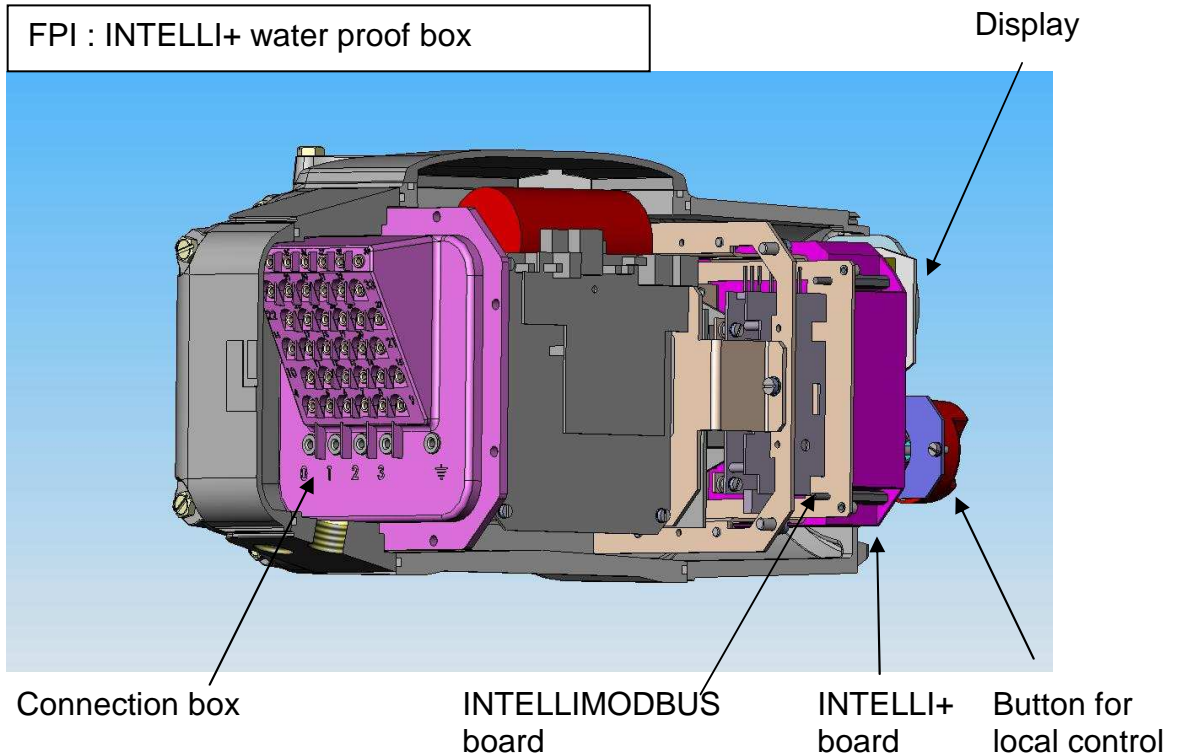
**Instructions for start-up****3 MODBUS INTERFACE****3.1 Hardware description**

The Modbus module "IntelliModbus" located in the actuator is plugged on to the main Intelli+ board and no access is needed.

FPX : INTELLI+ explosion proof box



FPI : INTELLI+ water proof box



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**3.2 Cable type**

Use exclusively a shielded twisted-pair cable.

Modbus cable has to be separated from the other cables with a distance of at least 20cm. It will use a specific cable path and be connected to the earth.

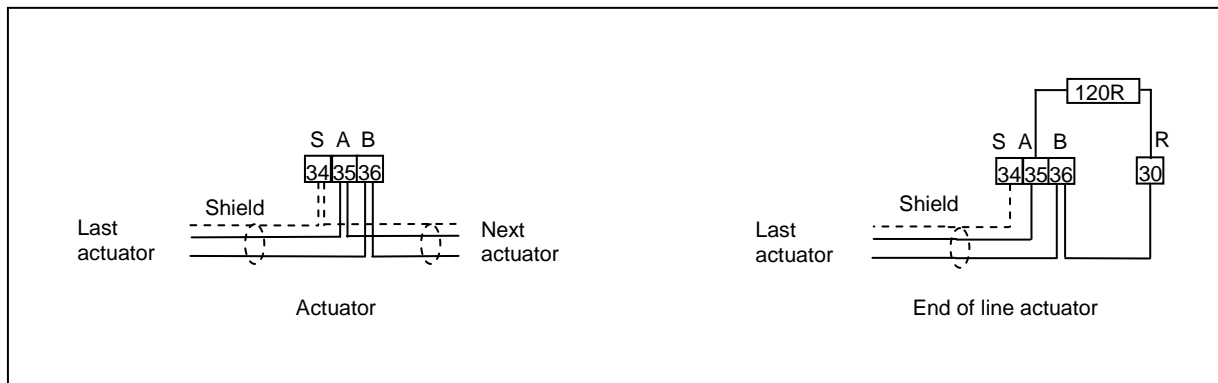
It is also necessary to check that all actuators are at the same earth electrical potential.

**3.3 Fieldbus connection**

Junction box terminals:

A, B: Modbus line

Shield: Cable shielding



End of line termination:

A termination has to be installed at each end of line. To ease user's job, this termination is built in the connection box.

A link must be done between terminals 30 and 36 to connect the end of line resistor.

**3.4 Set-up**

The INTELLIMODBUS module is only acting as a Modbus slave. The default setting address is 01.

**To change this address**, use the local control button of the actuator. (Refer: NR1151).

In the menu select Change  
 then select Fieldbus  
 then select Slave Nr.  
 With the blue button modify the address.  
 Confirm OK with the red button.  
 To save, select return in each submenu until to read:  
 RETURN  
 (Change OK?)  
 Confirm OK with the red button.



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Other configuration:

In case of loss of communication it is possible to set up a fail safe position: stay put, closing or opening. By default the actuator stay put in the case of loss of communication. It is possible to change the desired function locally at the actuator or through the fieldbus (see §4.3 Address 17).

**Caution:** Loss of communication is detected when there is no valid communication with the actuator after more than 10 sec.

**3.5 Display indication of fieldbus communication status**

An indication of the fieldbus communication status is available on the actuator display.

- |   |     |   |
|---|-----|---|
| Data exchange (rotating triangle)           | BUS |   |
| IntelliModbus module fault (blinking cross) | BUS |  |



**3.6 Emergency supply**

The actuator Intelli+ is normally supplied by the mains but in case of loss of power supply an emergency supply could be used to continue to communicate through the fieldbus. This emergency supply needs 24V direct current 4W.

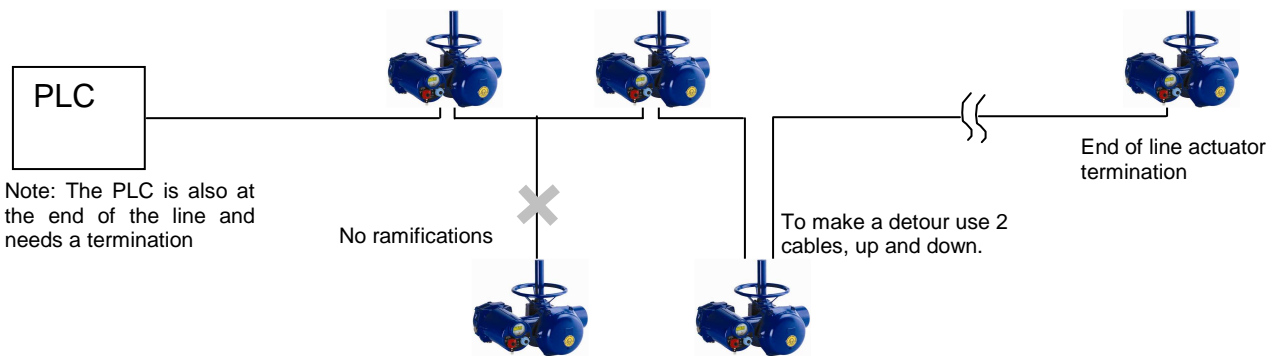
This emergency supply is not useful if the actuator is equipped with the battery option. In this case, a position change is taken into consideration when the actuator is powered on. The IntelliModbus board is supplied during 5 seconds to report the change position.

**3.7 Modbus architecture**

- **Single line**

The Modbus cable coming from the PLC is connected to the first actuator then the Modbus cable links this actuator with the next one and so on. All actuators are connected to the line one after the other until the last one. No return to the PLC is required. To avoid reduced performance in transmission don't add ramifications on the line.

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Maximum line length is 1200m (3600ft). Maximum number of actuators by line is 30. Maximum line length is reduced according to the communication speed.

The estimated scan time for 30 actuators with 1200m (3600ft) length is 0.7s.

An end of line termination must be connected at each end of line actuator (see § 3.3).

Transmission baud rate	≤19.5 kbit/s	38.4 kbit/s	57.8 kbit/s	115.2 kbit/s
Maximum line length	1200m	1000m	750m	500m

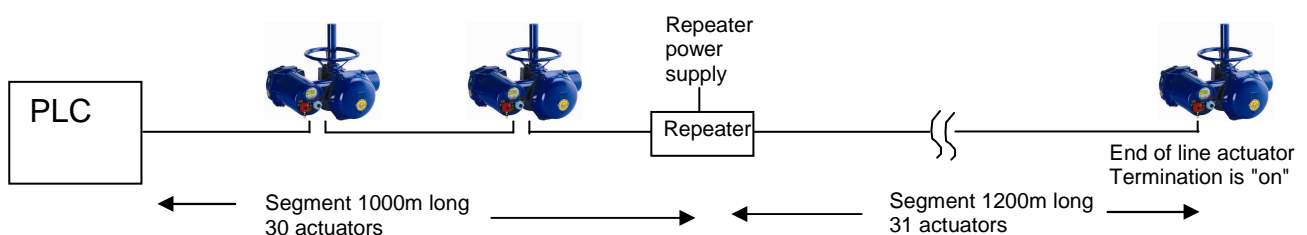
**• Repeaters**

Adding repeaters modules allows increasing both the number of actuator on the line and total line length. Each repeater uses one connection point therefore this limits the number of actuators by segment to 30 units and allows to lengthen the line by 1000m.

According to the type of repeater, it is possible to use until 9 serials repeaters and to extend the line as long as 10 km.

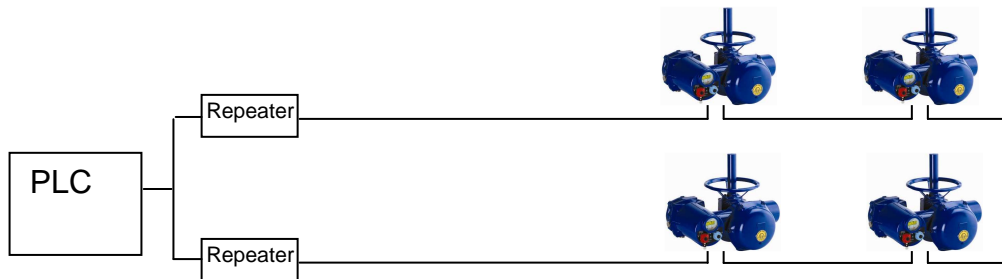
Maximum number of actuators depends of PLC capacity, addressing capacity and number of segment with repeaters. The maximum on one Modbus line is 247.

The important advantage of the repeater compared to other technologies is to keep the communication speed unaffected and therefore to get a very short response time.



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Repeaters can also be used to get additional fieldbus lines at a low cost if placed at PLC output. Each line is independent from the others and therefore a problem on a line does not affect the others.



L. Bernard can supply weatherproof or explosion proof repeaters.

## 4 CONTROL, INDICATION AND CONFIGURATION OF THE ACTUATOR

### 4.1 Actuator command

Valve control by the Modbus fieldbus is possible only if the actuator rotating selector is on the "remote" position.

Conditions which can prevent a command to be executed:

- Actuator rotating selector on "local" or "OFF".
- Alarm tripped (motor thermal overload)
- Emergency command received (ESD)

- Control byte description

Actuators commands are located to the following addresses:

#### Address 0:

Bit n°	Value	Description
Bit 0	0	Auxiliary command 1 is not active
	1	Auxiliary command 1 is active
Bit 1	0	Auxiliary command 2 is not active
	1	Auxiliary command 2 is active
Bit 2 to 7		Not used
Bit 8	0	No opening command
	1	Opening
Bit 9	0	No closing command
	1	Closing
Bit 10	0	Stop or Maintained commands mode
	1	No stop or Pulse mode
Bit 11 to 15		Not used



***Instructions for start-up*****AUXILIARY COMMAND 1, AUXILIARY COMMAND 2:**

By default, auxiliary command 1 is assigned to local control (actuator selector) inhibited.

By default, auxiliary command 2 is not assigned to a Modbus command but to an emergency command (ESD): This command is hardwired (separate wiring) and directly connected to the control box main strip.

These commands depend of actuator configuration (refer to NR1151) and can be assigned to the following functions:

LOCAL / REMOTE: substitutes for the local/remote selector of the actuator and is used to remotely enable either remote control or local control.

LOCAL+REMOTE / REMOTE: same definition as above, but local and remote control can be enabled simultaneously.

LOCAL COMMAND INHIBIT: the local command inhibit is remotely controlled. This command inhibits the local opening and closing commands, and enables remote commands, even if the local/remote selector of the actuator is set to local.

OPEN, CLOSE INHIBIT: this command is used to inhibit opening or closing of the actuator.

AUTO/ON-OFF: for an actuator used in modulation with positioner function, it is possible to issue remote commands via proportional control (equivalent to 4-20mA) or via opening/closing/stop commands. The auto/on-off command is used to switch over from one type of command to another.

ESD CLOSE, OPEN, STOP: the ESD (Emergency Shut Down) is an emergency remote command, which overrides all other commands. According to the valve operation, the emergency command will be an opening, closing or intermediate stop. This ESD command is assigned to a Modbus command for auxiliary command 1 and assigned to a hardwired (separate wiring) for auxiliary command 2.

Note: The hardwired ESD has a higher priority than Modbus ESD. The emergency command is not possible when the local /remote selector is set to "OFF".

PARTIAL STROKE: This command performs automatically a test to confirm that the actuator is still operational. The test consists to operate the actuator on a partial stroke and return. The start position and the stroke % can be configured. An alarm is emitted if the stroke is not performed in a predetermined delay.

OPEN / CLOSE: Open and close command. According to the actuator configuration, it is possible to select a priority to the opening or to the closing command (refer to NR1151)

By default there is no priority given to either opening or closing.

Priority can be used to:

- Allow to reverse the actuator rotation direction during a manoeuvre without having to use the stop command. In this case it is necessary to set a priority to the opening or to the closing direction.

- Give priority to one or the other rotation direction: if the actuator receives the open and close commands simultaneously and the priority has been given to the opening, the actuator will run the open position.

STOP: if this command is maintained at 0 (most common case), the open and close commands have to be maintained. If this command is set to 1, a short duration open / close command pulse is sufficient to drive the valve to the open or closed position. In this case, the stop command (0) can be used to stop the actuator during the travel in its current position.

**Instructions for start-up**
**Address 1: Proportional control (set-point)**

Bit n°	Value	Description
Bit 0 to 15		Increment 0.1%. Range 0 to 1000. 0 = closed, 1000 = open.

This is the positioner function with proportional control.

To choose between proportional and ON-OFF control, assign an auxiliary command to the function AUTO/ ON-OFF then select the control mode required from the control.

**Address 2: Relay output**

Bit n°	Value	Description
Bit 0 to 7		Not used
Bit 8	0	Relay 1 contact open
	1	Relay 1 contact closed
Bit 9	0	Relay 2 contact open
	1	Relay 2 contact closed
Bit 10	0	Relay 3 contact open
	1	Relay 3 contact closed
Bit 11	0	Relay 4 contact open
	1	Relay 4 contact closed
Bit 12	0	Relay 5 contact open (according to equipment)
	1	Relay 5 contact closed (according to equipment)
Bit 13	0	Relay 6 contact open (according to equipment)
	1	Relay 6 contact closed (according to equipment)
Bit 14	0	Relay 7 contact open (according to equipment)
	1	Relay 7 contact closed (according to equipment)
Bit 15		Not used

The relays could be used to have an output indication (wired as a non fieldbus actuator) or to drive outside devices through Modbus. These optional relays could be configured in Intelli+ menu for actuator indication or output controls.

#### 4.2 Actuator feedback indication

The 5 first addresses give the actuator position and status.

**Address 0:**

Bit n°	Value	Description
Bit 0	0	Actuator not opening
	1	Actuator opening
Bit 1	0	Actuator not closing
	1	Actuator closing
Bit 2	0	No handwheel action
	1	Handwheel action
Bit 3	0	No ESD command
	1	Actuator receives an emergency command ESD
Bit 4	0	The actuator is not running
	1	Actuator running
Bit 5	0	Actuator available
	1	Actuator fault indication
Bit 6	0	No position sensor power supply fault
	1	Position sensor power supply fault

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Bit 7	0	No torque sensor power supply fault
	1	Torque sensor power supply fault
Bit 8	0	Valve not open
	1	Valve Open
Bit 9	0	Valve not closed
	1	Valve closed
Bit 10	0	No action
	1	Torque limiter action in open direction
Bit 11	0	No action
	1	Torque limiter action in close direction
Bit 12	0	Selector not to local position
	1	Selector to local position
Bit 13	0	Selector not to remote position
	1	Selector to remote position
Bit 14	0	Selector not to OFF position
	1	Selector to OFF position
Bit 15	0	Actuator powered off
	1	Actuator powered on

**ACTUATOR OPENING/CLOSING:** the actuator is operated in opening/closing direction

**HANDWHEEL ACTION:** the handwheel has been actuated since the last electrical operation.

**ACTUATOR RECEIVES AN EMERGENCY COMMAND ESD:** The actuator is not available because it receives an emergency command which overrides all other commands.

**ACTUATOR RUNNING:** the actuator is operated in opening or closing direction

**ACTUATOR FAULT INDICATION:** The actuator is not available due to a following event, motor thermal overload, lost phase (in case of 3ph supply) or locked rotor.

Including additional faults (refer to NR1151 to configure):

**POSITION OR TORQUE POWER SUPPLY FAULT:** Intelli+ receives no information from the position or torque sensor.

**VALVE OPEN/CLOSE:** confirms the valve is open or closed

**TORQUE LIMITER ACTION OPEN/CLOSE:** torque limiter action in opening/closing direction. This information is transmitted even if the valve stops normally on torque.

**SELECTOR TO LOCAL:** No command allowed from Modbus. Indications are always available.

**SELECTOR TO DISTANCE:** command allowed from Modbus. Indications are always available.

**SELECTOR TO OFF:** no command allowed in local or from Modbus. Indications are always available.

**ACTUATOR POWERED ON:** The actuator is normally powered.

**Address 1: Alarms**

Bit n°	Value	Description
Bit 0 to 7	0 to 150	Running torque in %
Bit 8	0	No locked motor open alarm
	1	Locked motor open alarm
Bit 9	0	No locked motor close alarm
	1	Locked motor close alarm
Bit 10	0	No motor thermal overload
	1	Motor thermal overload
Bit 11	0	No lost phase alarm
	1	Lost phase

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Bit 12	0	No overtravel alarm
	1	Overtravel alarm
Bit 13	0	No direction of rotation open alarm
	1	Direction of rotation open alarm
Bit 14	0	No direction of rotation close alarm
	1	Direction of rotation close alarm
Bit 15	0	No battery fault
	1	Battery low or is not present

**RUNNING TORQUE:** Indication of the instantaneous torque. 100% is the maximum actuator rated torque.

**LOCKED MOTOR OPEN/CLOSE:** The actuator locked in the opening/closing direction.

**MOTOR THERMAL OVERLOAD:** The motor thermal contact tripped. The actuator will be again available as soon as the motor will cool.

**LOST PHASE:** In 3 phase, a phase is missing. No start allowed.

**OVERTRAVEL ALARM:** Position overshoot > 5% after motor shut down.

**DIRECTION OF ROTATION OPEN/CLOSE:** Opening/closing direction of rotation discrepant

**BATTERY LOW OR IS NOT PRESENT:** In case of battery option the battery should be replaced because of low voltage or the battery is missing.

**Address 2: Hardwired inputs (option) and IntelliModbus indication**

Bit n°	Value	Description
Bit 0	0	Indication is not active on terminal 8
	1	Indication is active on terminal 8
Bit 1	0	Indication is not active on terminal 9
	1	Indication is active on terminal 9
Bit 2	0	Indication is not active on terminal 10
	1	Indication is active on terminal 10
Bit 3	0	Indication is not active on terminal 11
	1	Indication is active on terminal 11
Bit 4	0	Indication is not active on terminal 12 (ESD input by default)
	1	Indication is active on terminal 12 (ESD input by default)
Bit 5	0	No valve jammed alarm
	1	Valve jammed
Bit 6	0	No auxiliary 24V fault alarm
	1	Auxiliary 24V fault
Bit 7	0	no alarm too many starts
	1	Too many starts
Bit 8 to 15	0 to 100	Actuator position in % of opening

Indications of wired inputs: allows communicating through the fieldbus, indications coming from outside devices.

**JAMMED VALVE:** Actuation could not be completed due to excess torque.

**AUXILIARY 24V FAULT:** Auxiliary power supply fault for external circuits

**TOO MANY STARTS:** Starting rate exceeding the actuator class average.

**ACTUATOR POSITION FEEDBACK:** 0%= closed, 100%= open

**Address 3:**

Bit n°	Value	Description
Bit 0 to 7	0-150	Close tight max torque in %
Bit 8 to 15	0-150	Open breakout max torque in %

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**CLOSE TIGHT MAX TORQUE:** Close tight max torque recorded during the last electrical actuation (in %). This indication is available only if closing is based on torque.

**OPEN BREAKOUT MAX TORQUE:** Open breakout max torque recorded during the last electrical operation (in %). This indication is available only if closing is based on torque.

**Address 4:**

Bit n°	Value	Description
Bit 0 to 7	0-150	Opening max torque in %
Bit 8 to 15	0-150	Closing max torque in %

**OPENING MAX TORQUE:** Opening max torque recorded during the last electrical actuation (in %)

**CLOSING MAX TORQUE:** Closing max torque recorded during the last electrical actuation (in %)

**Address 5:**

Bit n°	Value	Description
Bit 0 to 7	MSB	Starts last 12 hours
Bit 8 to 15	LSB	

**STARTS LAST 12 HOURS:** this data corresponds to the number of actuator starts during the last twelve hours and provides information on the actuator recent activity. It is of interest to know whether the actuator has not been excessively operated, when used for regulation purposes, for example.

**Address 6 and 7:**

Address n°	Bit n°	Value	Description
Address 6	Bit 0 to 15	MSB	Total number of starts
Address 7	Bit 0 to 15	LSB	

**TOTAL NUMBER OF STARTS:** to obtain the accumulated figures since actuator manufacturing.

**Address 8 and 9:**

Address n°	Bit n°	Value	Description
Address 8	Bit 0 to 15	MSB	Total running time
Address 9	Bit 0 to 15	LSB	

**TOTAL RUNNING TIME:** to obtain the accumulated figures since actuator manufacturing (in 1/10 sec).

**Address 10 and 11:**

Address n°	Bit n°	Value	Description
Address 10	Bit 0 to 15	MSB	Partial number of starts
Address 11	Bit 0 to 15	LSB	

**PARTIAL NUMBER OF STARTS:** number of starts since the last reset.

**Instructions for start-up****Address 12 and 13:**

Address n°	Bit n°	Value	Description
Address 12	Bit 0 to 15	MSB	Partial running time
Address 13	Bit 0 to 15	LSB	

PARTIAL RUNNING TIME: total running time since the last reset (in 1/10 sec).

**Address 14:**

Bit n°	Value	Description
Bit 0 to 9	0 to 1000	Current actuator position in ‰
Bit 10	0	No partial stroke in progress
	1	Partial stroke in progress
Bit 11	0	No partial stroke in fault
	1	Partial stroke in fault
Bit 12 to 15		Not used

ACTUATOR POSITION: this indication is the actuator position feedback (same as address 2) but with a high resolution. Actuator position expressed in 0.1% of opening (0 = closed to 1000 = open).

PARTIAL STROKE IN PROGRESS: a partial stroke command has been issued and this test is not ended.

PARTIAL STROKE FAULT: the partial stroke test has detected a fault.

**Address 15:**

Bit n°	Value	Description
Bit 0	0	No pumping (in positioner function)
	1	actuator pumping (in positioner function)
Bit 1	0	No configuration memory fault
	1	Configuration memory fault
Bit 2	0	No activity memory fault
	1	Activity memory fault
Bit 3	0	No base memory fault
	1	Base memory fault
Bit 4	0	No stop mid travel
	1	Stop mid travel
Bit 5	0	No lost signal
	1	Lost signal
Bit 6 and 7		Not used
Bit 8 to 15	0 to 256	Analogue signal input

ACTUATOR PUMPING: positioning is unstable

CONFIGURATION/ACTIVITY/BASE FAULT: memory fault

STOP MID TRAVEL: the actuator is at a stop, neither open nor closed.

LOST SIGNAL: 4 to 20mA lost signal (In case of analogue and hardwired input signal)

PARTIAL STROKE IN PROGRESS: a partial stroke command has been issued and this test is not ended.

PARTIAL STROKE FAULT: the partial stroke test has detected a fault. The actuator is not fully available.

ANALOG SIGNAL INPUT: a hardwired signal (for example 4 to 20mA) allows controlling the positioner. The actuator Modbus interface stays active to communicate.

**Instructions for start-up**
**4.3 Actuator configuration**

- Read / Write

Note: Addresses 16 to 33 are used for actuator configuration, be careful not to write incorrect value.

**Address 16:**

Bit n°	Value	Description
Bit 0 to 3		Set-up for auxiliary command 1 coming through the fieldbus ( ) Bit state for active command (see 4.1 address 0) 0 = not used 1 = local (0) / remote (1) 2 = local + remote (0) / remote (1) 3 = local command inhibit (1) 4 = open inhibit (1) 5 = close inhibit (1) 6 = On-off (0) / AUTO (1) 7 = fieldbus emergency closing (1) 8 = fieldbus emergency opening (1) 9 = fieldbus emergency stop (1) 10 = partial stroke (1)
Bit 4 to 7		Set-up for auxiliary command 2 coming through the fieldbus but for emergency commands wired separately from the fieldbus. ( ) Bit state for active command (see 4.1 address 0) 0 = not used 1 = local (0) / remote (1) 2 = local + remote (0) / remote (1) 3 = local command inhibit (1) 4 = open inhibit (1) 5 = close inhibit (1) 6 = On-off (0) / AUTO (1) 7 = wired emergency closing (1) 8 = wired emergency opening (1) 9 = wired emergency stop (1) 10 = partial stroke (1)
Bit 8	0	In case of local command inhibit, local stop is active
	1	In case of local command inhibit, local stop is not active
Bit 9	0	No timing control
	1	Timing control
Bit 10	0	Local stop active in remote mode
	1	Local stop is not active in remote mode
Bit 11	0	No priority
	1	Opening priority
Bit 12	0	No priority
	1	Closing priority
Bit 13	0	In case of emergency command, torque limit is not 100%
	1	In case of emergency command, torque limit is 100%
Bit 14	0	In case of emergency command, thermal overload is not by-passed
	1	In case of emergency command, thermal overload is by-passed
Bit 15		Not used

**Instructions for start-up**
**Address 17:**

Bit n°	Value	Description
Bit 0 to 2		Fail safe position in case of loss of communication 0= stay put 1= closing 2= opening
Bit 3	0	The partial stroke start position is close
	1	The partial stroke start position is open
Bit 4 to 7		Not used
Bit 8 to 15	2 to 50	Dead band for positioner function (pitch: 0.1%; mini: 0.2%; maxi: 5%)

**Address 18: Closing temporised zone**

Bit n°	Value	Description
Bit 0 to 7		Start of closing temporised zone (0 to 100%)
Bit 8 to 15		End of closing temporised zone (0 to 100% but lower than start value)

**Address 19: Opening temporised zone**

Bit n°	Value	Description
Bit 0 to 7		Start of opening temporised zone (0 to 100%)
Bit 8 to 15		End of opening temporised zone (0 to 100% but higher than start value)

**Address 20: Timer open time expected**

Bit n°	Value	Description
Bit 0 to 15		Timer open time expected (in seconds)

**Address 21: Timer close time expected**

Bit n°	Value	Description
Bit 0 to 15		Timer close time expected (in seconds)

**Address 22: Operating time without timer**

Bit n°	Value	Description
Bit 0 to 15		Operating time without timer (in seconds)

**Address 23 and 24: User password**

Address n°	Bit n°	Value	Description
Address 23	Bit 0 to 7		Not used
Address 23	Bit 8 to 15	MSB	User password (3 bytes)
Address 24	Bit 0 to 15	LSB	ASCII characters "000" to "999"

**Address 25 to 28: Valve tag number**

Address n°	Value	Description
Address 25 to 28		Valve tag number (8 bytes) ASCII characters ex: "MOV55VV"

**Address 29: Open breakout torque setting**

Bit n°	Value	Description
Bit 0 to 7	40 to 100	Open breakout torque setting in % (if closing based on torque)
Bit 8 to 15	1 to 100	Partial stroke %

**Address 30: Close tight torque setting**

Bit n°	Value	Description
Bit 0 to 7	40 to 100	Close tight torque setting in % (if closing based on torque)
Bit 8 to 15		Not used



**Instructions for start-up**
**Address 31: Opening torque setting**

Bit n°	Value	Description
Bit 0 to 7	40 to 100	Opening torque setting in %
Bit 8 to 15		Not used

**Address 32: Closing torque setting**

Bit n°	Value	Description
Bit 0 to 7	40 to 100	Closing torque setting in %
Bit 8 to 15		Not used

- Write only

**Address 33:**

Bit n°	Value	Description
Bit 0	1	Reset partial running time
Bit 1	1	Reset partial number of start
Bit 2 to 15		Not used

PARTIAL RUNNING TIME: running time since the last reset.

PARTIAL NUMBER OF STARTS: number of starts since the last reset.

- Read only

**Address 33:**

Bit n°	Value	Description
Bit 0 and 1		Operating class 1 = On-Off 2 = Modulating Class III 3 = Modulating Class II
Bit 2		Motor supply type 0 = 3 phases 1 = single phase or DC
Bit 3 and 4		Closing mode 0 = close on position 1 = close on torque 3 = open and close on torque
Bit 5 and 6		Stroke unit 1 = number of turns 2 = degrees 3 = mm
Bit 8 to 15		Nut thread (If linear system) In mm (to calculate the stroke but only during set-up). Value is zero if no linear system.

**Address 34: Locked motor timing**

Bit n°	Value	Description
Bit 0 to 7		Locked motor timing (In seconds)
Bit 8 to 15		Reverse delay time Unit is 50ms, ex: 3 = 150ms

**Instructions for start-up****Address 35: External gear ratio**

Bit n°	Value	Description
Bit 0 to 15		External gear ratio Format: 1/....., ex: 200 = 1/200

**Address 36: Stroke measured during set-up**

Bit n°	Value	Description
Bit 0 to 15		Stroke measured during set-up

**Address 37 to 39: Software version**

Address n°	Value	Description
Address 37 to 39		Software version (6 bytes) ASCII characters ex: "1.03"

**Address 40 to 45: Manufacture date**

Address n°	Value	Description
Address 40 to 45		Manufacture date (12 bytes) ASCII characters

**Address 46 to 53: Actuator number**

Address n°	Value	Description
Address 46 to 53		Actuator number (16 bytes) ASCII characters

**Address 54 to 104: Opening torque curve (101 bytes)**

Address n°	Bit n°	Value	Description
Address 54	Bit 0 to 7		Data 1 = torque percentage in closed position
Address 54	Bit 8 to 15		Data 2 = torque percentage in 1% open position
...	...		...
...	...		...
Address 104	Bit 0 to 7		Data 101 = torque percentage in 100% open position
Address 104	Bit 8 to 15		Not used

**Address 105 to 155: Closing torque curve (101 bytes)**

Address n°	Bit n°	Value	Description
Address 105	Bit 0 to 7		Data 1 = torque percentage in closed position
Address 105	Bit 8 to 15		Data 2 = torque percentage in 1% open position
...	...		...
...	...		...
Address 155	Bit 0 to 7		Data 101 = torque percentage in 100% open position
Address 155	Bit 8 to 15		Not used