

# INTELLI+

## controls handbook



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NR 1112 Rev.B GB

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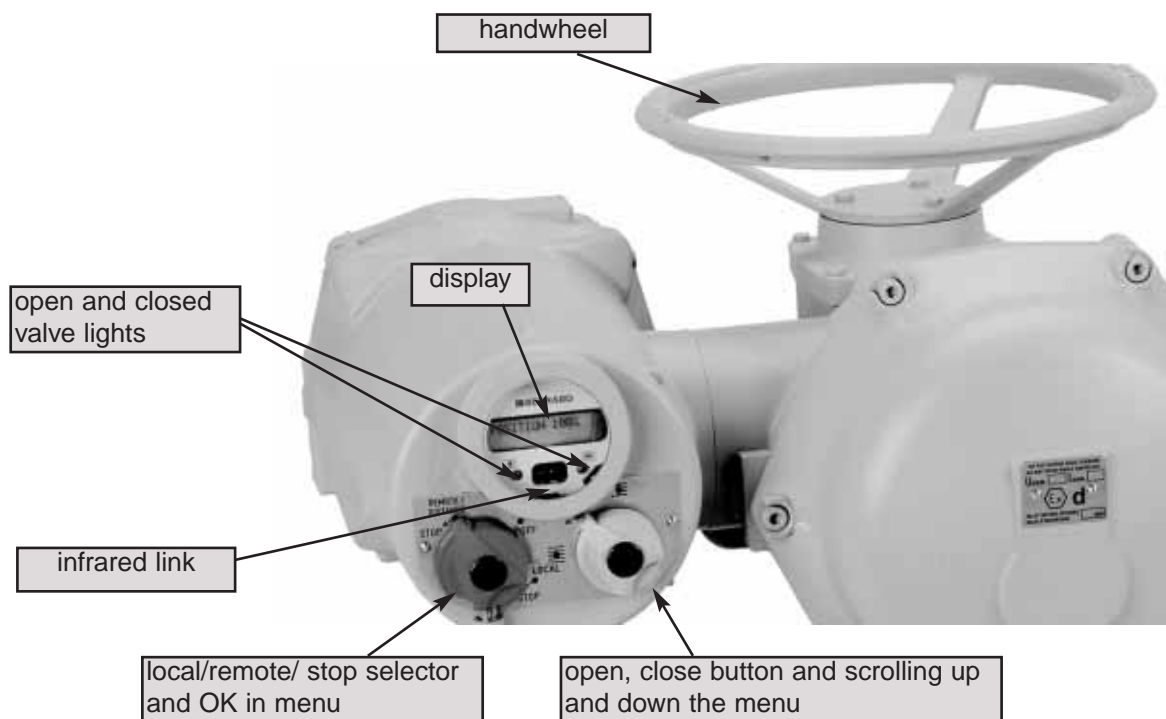
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## 1 PRESENTATION



## 2 CHECK BEFORE POWER UP

ST INTELLI+ motorization systems are multi-turn actuators resulting from many years of experience in valve systems remote control.

Functions to set up, check and control the actuator are included in INTELLI+.

All settings and configurations are carried out from outside without opening the covers.

Do not attempt to open covers so as to avoid humidity ingress in the control system. Only open terminal box cover (fig.2) just long enough to make connections.

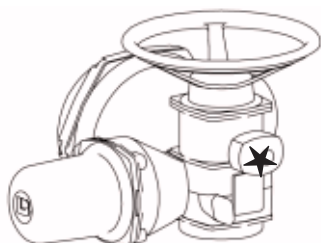
Every actuator is tested, adjusted and checked in works before delivery. It is lubricated for life and designed to operate in any position or location.

### MANUAL HANDWHEEL

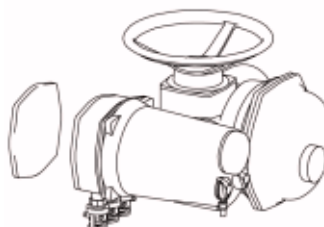
All ST INTELLI+ actuators are provided with an automatic declutching handwheel, with motor drive priority. Operating direction is normally indicated on the handwheel.

The ST6 actuator includes a handwheel clutch button. In order to operate the actuator manually, turn the arrow of the button opposite the triangular sign (fig. 1) on the housing (it could be necessary to turn the handwheel by a few degrees to position the claws). When the motor starts, the button automatically returns to its declutched position.

(fig 1)



(fig 2)



### ELECTRICAL CONNECTIONS

a) Check the power supply characteristics.

In 3 phase, the order in phase is not important. INTELLI+ automatically corrects the direction of rotation.

b) Open terminal box (fig. 2), connect power and control circuitry, check wiring.

### 3 LOCAL CONTROL

Local control is used to drive the actuator without the help of an external control circuit. A local selector allows to choose between remote or local and off. The button for local control open/close allows to operate the actuator in the appropriate direction. Local stop is done by a momentary rotation of the local/remote selector.

A display gives the valve open percentage.

A black square in right corner informs of presence of an alarm (see para. 16.2 how to read alarm type).



### 4 REMOTE CONTROL

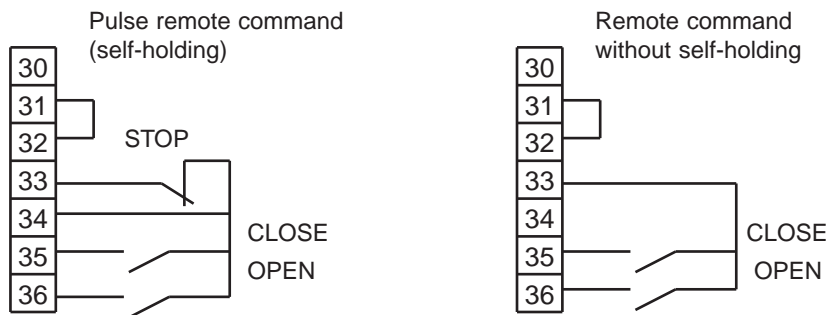
Remote control of an actuator equipped with the INTELLI+ can be done from an external voltage supply or an internal voltage supply.

Inputs on the board are completely isolated by opto-isolators.

Pulse commands (with self-holding) require 4 wires connected to the customer terminal board : Common, stop, open and close. If the stop button is not used, do not connect the STOP wire, open (or close) contact must be maintained to operate the actuator.

#### 4.1 Dry contact control

In case of dry contact control, a jumper must be fitted across customer terminals 31-32.



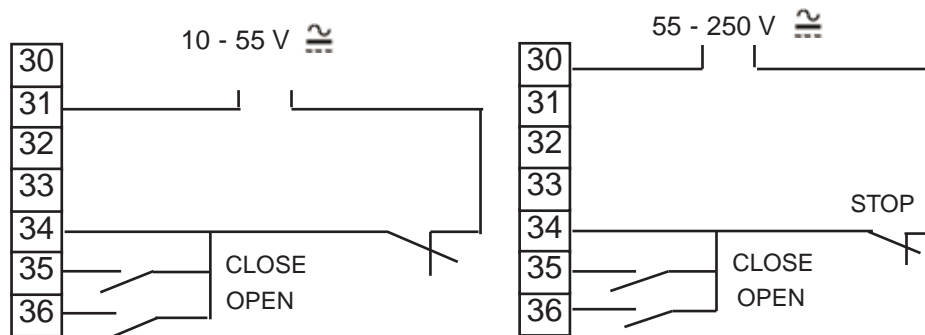
#### 4.2 Voltage control

Remote control can be done either in AC or DC voltage.

For lower voltages, from 10 to 55V, use common terminal 31.

For higher voltages, from 55 to 250V, use common terminal 30.

Caution : never connect voltages higher than 55V on common terminal 31.



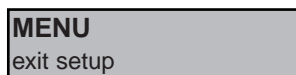
To cancel self-holding  
do not connect terminal 34

### 5 NAVIGATING IN THE MENU

Buttons are normally used to operate the actuator electrically. To set up and adjust the unit, go to MENU mode as follows :

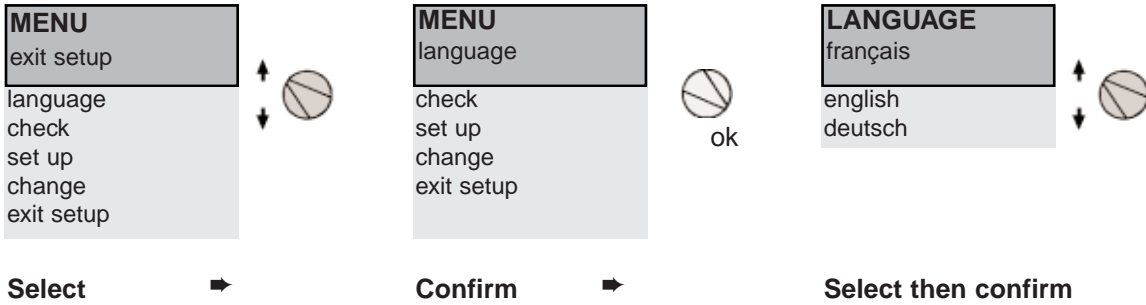
- set selector to **local**
- hold the button to local **stop** while simultaneously actuating the right-hand button upwards then downwards.

The display reads :



To read the menu, actuate the blue button upwards or downwards which causes the menu items to scroll on the bottom line of the display.





When the desired item is displayed, actuate the red button (local stop) to **OK**. The item is then displayed in upper case on the 1st line and the list of the sub-menu can be checked on the 2nd line.

### Main menu items :

**Language** : used to choose the display language.

**Check** : used to read all the parameters and configuration of the actuator. No change is possible. Access requires no password.

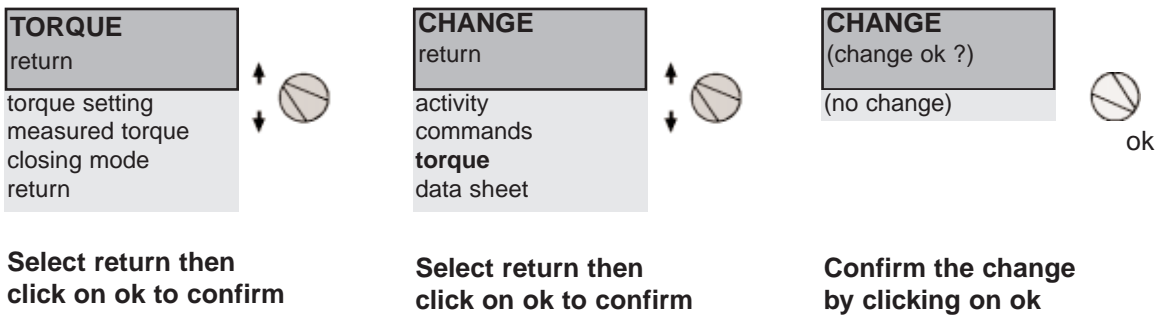
**Set up** : used to adjust the actuator on the valve. If a password has been stored, this password will be required for access.

**Change** : used to change the actuator configuration. If a password has been stored, this password will be required for access.

### Exiting the menu

It is possible to **exit the menu** at any time by setting the red button to **OFF**.

However, to **store** the changes made in the CHANGE menu, the menus must be exited by selecting **return** until the **(change ok ?)** message is displayed.



Select **(no change)** and confirm by **OK** to retain the original values.

## 6 SELECTING THE DISPLAY LANGUAGE

Select **language** in the MENU and confirm by **OK**.

Select the desired language and confirm by **OK**.

## 7 PASSWORD

To access the change or **set up** menus, a password is required to continue.

By default, no password is entered and confirming by **OK** provides access to the **change** or **set up** menus.

The user may decide to use a password to protect access to changes.

Creating a password

See section : creating or changing the password (para 18)

Entering the password

To enter the password, at the prompt

**CODE ?**

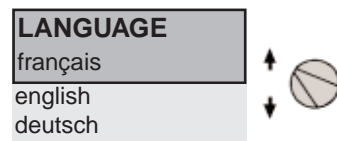
Enter the 1st digit using the blue button then confirm by **OK**.

Enter the 2nd digit using the blue button then confirm by **OK**.

Enter the 3rd digit using the blue button then confirm by **OK**.

If the code is correct, access is authorized.

Confirm by **OK**.



## 8 ADJUSTING AN ACTUATOR ON A VALVE

The **SET UP** menu is used to set the open and closed positions after the actuator is installed on the valve. Setting can be achieved manually by selecting the open and closed positions, or automatically. In automatic mode, the actuator operates and stops under the effect of a load limiter at the end positions. The INTELLI+ then determines the stop positions. To avoid a stop under the effect of the load limiter, or choose the stop positions, use the manual setting procedure.

### 8.1 Manual setting

Select **set up** in the MENU and confirm by **OK**.

Select **closing mode** in the SET UP menu and confirm by **OK**.

Choose to close the valve based on torque or based on position and confirm by **OK**.

Select **close direction** and confirm by **OK**.

Choose the normal closing direction (clockwise, generally) and confirm by **OK**.

Select **position setting** and confirm by **OK**.

Select **valve closed ?** to achieve setting in the closed position and confirm by **OK**.

When **(no)** is displayed confirm by **OK**.

The display is as follows :

Place the valve in the closed position either using the handwheel or electric control.

Observe the closing mode selected above, i.e. close up to the load limiter for closing based on torque, and without triggering the load limiter for closing based on position.

When the position is achieved, do a **local stop** to return to the menu.

When **(yes)** is displayed confirm by **OK**.

If in doubt, select **(no)** and repeat the procedure.

**Position ok** is displayed. Continue by **OK**.

The next step is setting of the open position.

When **valve open ?** is displayed, confirm by **OK**.

When **(no)** is displayed, confirm by **OK**.

The display is as follows :

Set the valve in open position either using the handwheel or using electric control. Check that the actuator will not go to mechanical stop.

When the position is achieved, do a **local stop** to return to the menu.

When **(yes)** is displayed, confirm by **OK**.

If in doubt, select **(no)** and repeat the procedure.

**Position ok** is displayed. Continue by **OK**.

Upon completing of setting, the stroke is displayed.

Return to control mode after confirming by **OK**.

### 8.2 Automatic setting

Select **set up** in the MENU and confirm by **OK**.

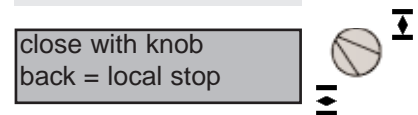
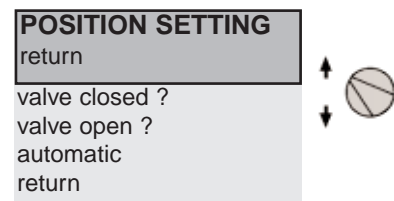
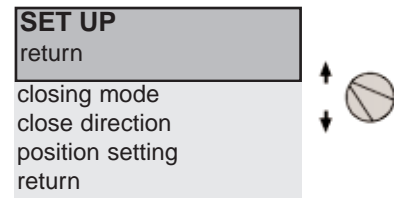
Select **closing mode** in the SET UP menu and confirm by **OK**.

Choose to close the valve based on torque or based on position and confirm by **OK**.

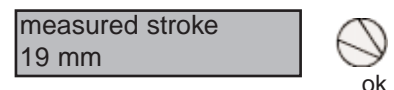
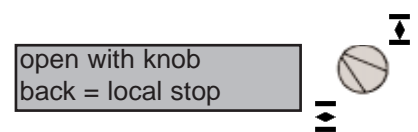
When **close direction** is displayed, confirm by **OK**.

Choose the normal closing direction (clockwise, generally)) and confirm by **OK**.

When **position setting** is displayed, confirm by **OK**.



**Remark :** At this stage of setting operations, the buttons used to navigate through the menu are again active to control the actuator. Hold the button until the desired position is achieved. No self-hold is provided during setting operations.



**Remark :** to **immediately stop** the cycle during automatic setting and return to the menu, use the **local stop** command. The setting procedure is then cancelled.

Select **automatic** in the POSITION SETTING menu.  
 After confirming by **OK** the automatic setting cycle starts.  
 The actuator detects the end positions by triggering the load limiter then positions itself at mid-stroke to test its inertia in both directions of rotation.  
 The INTELLI+ determines the 0 and 100% stop positions taking account of the set up closing type and the actuator inertia.  
 Upon completion of setting, the stroke is displayed.  
 Return to control mode after confirming by **OK**.

measured stroke  
19 mm



## 9 POSITION SIGNAL AND POSITIONER

### Position signal

According to the actuator equipment, a voltage or current position signal may be available.  
 No setting is necessary, as the signal is set automatically when setting the 0 to 100% position.  
 See para. 19 for more details.

### Positioner

According to the actuator equipment, it may be operated in regulation from a control signal ( e.g. : 4 - 20 mA).  
 No setting is necessary, as the signal is set automatically to the 0 to 100% position setting.  
 To check positioning locally, local control must be set up from 0 to 100% in increments (see para. 10.3).  
 After the setting up is completed and returning to local control mode, the display reads the opening position and the control in %.  
 Using the blue button, increase or decrease the control % and check that the actuator follows the requested position.  
 For remote control, either in automatic (e.g. : 4 - 20 mA) mode, or in on/off mode, use an auxiliary command programmed as AUTO/ON-OFF.  
 This auxiliary command enables you to select automatic or on/off control (see para. 10.2)  
 See para. 20 for more details, in particular for dead band setting, as required.

## 10 COMMANDS

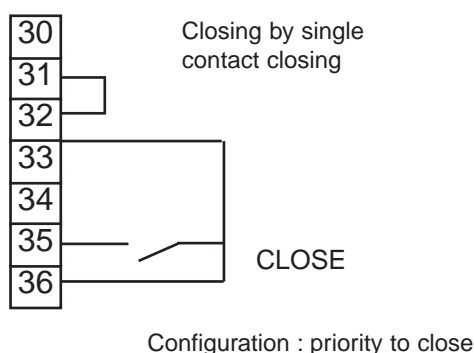
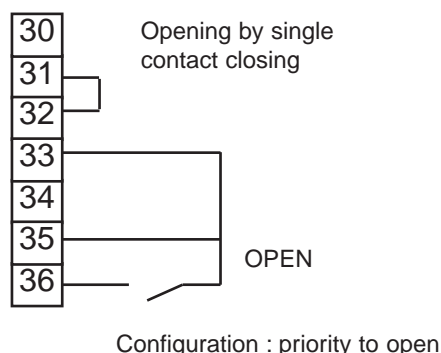
See above the description of standard remote commands (para. 4). A description of additional control facilities follows.

### 10.1 Remote control by single contact

The actuator can be controlled by a single external contact.

- Contact closed : valve opening
- Contact open : valve closing

The actuator must be set up as "priority to open" (see para. 10.4).



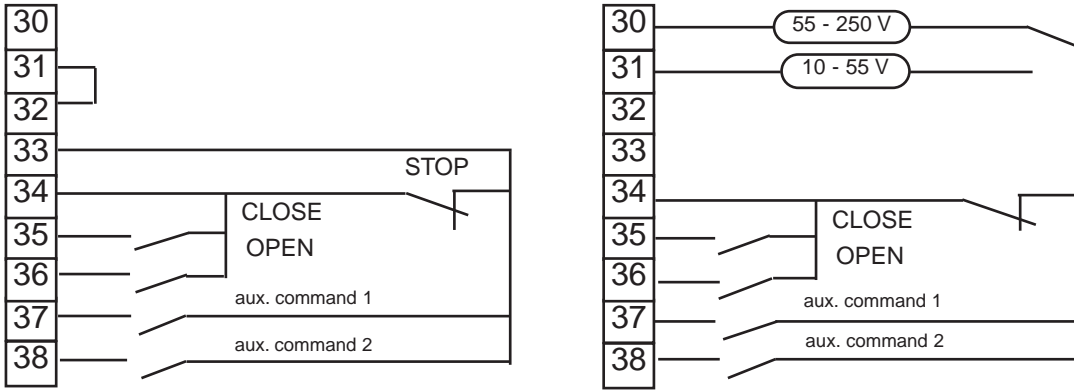
The reverse control setting is possible :

- Contact closed : valve closing
- Contact open : valve opening

In this case, the actuator must be set up as "priority to close" (see para. 10.4).

## 10.2 Auxiliary remote commands

Two additional remote commands are available and can be set up.



These commands can be assigned to special functions.

Select **change** in the MENU and confirm by **OK**.

Select **commands** in the CHANGE menu and confirm by **OK**.

Select **aux. command 1** or **aux. command 2** in the COMMANDS menu and confirm by **OK**.

Select a command using the blue button.

By default aux. command 1 is assigned to local command inhibition and aux. command 2 to emergency command close.

<b>AUX. COMMAND 1</b> (no assigned)	↑	⊗
(local/remote)	↓	⊗
(local + remote/remote)		
(local command inhibit)		
(open inhibit)		
(close inhibit)		
(auto/on-off)		
(ESD close)		
(ESD open)		
(ESD stop)		

### Description of commands :

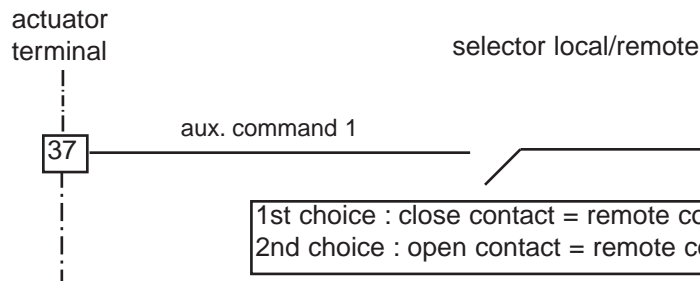
¶ **local/ remote** : substitutes for the local/remote selector of the actuator and is used to remotely enable either remote control or local control.

After confirming by **OK** the contact status must be selected for this command to be achieved :

Confirm by **OK**.

<b>LOCAL/REMOTE</b>	↑	⊗
contact (c) = remote	↓	⊗
contact (o) = remote		

To check the menu without making changes, in the main menu, select **check** instead of **change**.



¶ **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.

After confirming by **OK**, the operator needs to decide to retain local stop or not. As standard, local stop and general stop remain possible at the actuator. To also inhibit local stop and general stop, select **local off (no)**.

After confirming by **OK**, the contact status must be selected for this command to be achieved (as described above).

Confirm by **OK**.

¶ **open, close inhibit** : this command is used to inhibit opening or closing of the actuator.

For example, a main valve equipped with a by-pass valve must open only if the by-pass valve is already open. A by-pass valve opening limit-switch can then inhibit opening of the main valve as long as the limit-switch is not actuated.

After confirming by **OK**, the contact status must be selected for this command to be achieved (as described above).

Confirm by **OK**.

<b>LOC CMD INHIBIT</b>	↑	⊗
local off (yes)	↓	⊗
local off (no)		

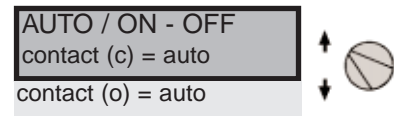
<b>LOC CMD INHIBIT</b>	↑	⊗
contact (c) = inhibit	↓	⊗
contact (o) = inhibit		

<b>OPEN INHIBIT</b>	↑	⊗
contact (c) = inhibit	↓	⊗
contact (o) = inhibit		

¶ **auto/on-off** : for an actuator used in regulation with positioner function, it is possible to issue remote commands via a continuous signal (ex : 4 - 20 mA) or via opening/closing/stop commands. The auto/on-off command is used to switch over from one type of command to another.

After confirming by **OK**, the contact status must be selected for this command to be achieved (as described above).

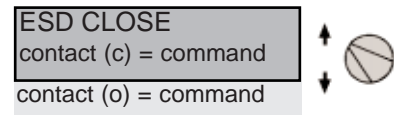
Confirm by **OK**.



¶ **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 immediate stop.

After confirming by **OK**, the contact status must be selected for this command to be achieved (as described above).

Confirm by **OK**.



Note : the emergency command is not possible when the local/remote selector is set to "OFF".

### 10.3 Local command

As standard, the local command is self-held (a pulse is enough to achieve an opening or closing command).

To override the self-hold feature (the opening or closing command must be held during actuation) :

Select **change** in the MENU and confirm by **OK**.

Select **commands** in the CHANGE menu and confirm by **OK**.

Select **local command** in the COMMANDS menu and confirm by **OK**.

Choose **(maintained)** and confirm by **OK**.

For local command by increments from 0 to 100 %, choose **(0 - 100%)**. In this case, the command assumes the current position value and will be displayed under the position. The blue button can then be used to change the command value in 1% increments.

### 10.4 Local stop

In standard, it is possible to stop the actuator locally, even if the selector local/remote is on remote position. To inhibit a local stop when the selector is on remote position, select **local stop** in the CHANGE menu and choose **(no)**.

### 10.5 Open or close priority

As standard, there are no open or close priorities. Priorities are used :

to reverse the direction of travel during actuation, without the need for a stop command. In this case an open and close priority is required.

give priority to a direction of travel : if the actuator receives 2 simultaneous open and close commands, and an open priority has been selected, the actuator operates in the open direction.

to achieve single contact commands (see para. 10.1).

Select **change** in the MENU and confirm by **OK**.

Select **commands** in the CHANGE menu and confirm by **OK**.

Select **priority** in the COMMANDS menu and confirm by **OK**.

Choose **(open)**, **(close)** or **(open and close)** and confirm by **OK**.

### 10.6 Fault tolerance ESD

As standard, the protection devices are active and therefore stop the actuator in case of defect.

In the case of an emergency command (see description of aux. commands 1 or 2), it is possible to bypass certain protection devices to achieve operation even in the presence of defects.

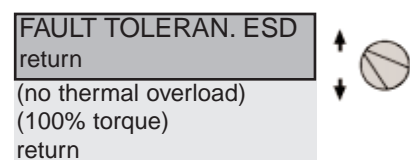
Select **change** in the MENU and confirm by **OK**.

Select **commands** in the CHANGE menu and confirm by **OK**.

Select **fault tolerance esd** in the COMMANDS menu and confirm by **OK**.

Several items can be selected. Each time a selection is made, the brackets disappear and a star appears opposite the selection.

To cancel the selection, confirm by **OK**.



## 11 LOCAL IR LINK COMMUNICATION

The actuator is equipped with a two-way (read and write) IR link used to communicate with a laptop computer by means of an IR module connected to the laptop RS232 port.

An IR kit is available for this connexion. The kit also includes the CD-ROM for the communication program to be loaded in the PC.

This IR module can be clipped to the actuator window for easy communication even if the window orientation is not adequate.

The cable length is 2 m (an extension is available as an option).

The CD-ROM software provides on-screen access to all the INTELLI+ functions. It is also used to load instantaneously preset configurations and to acquire the torque/position graph of the last electrical actuation.

For more details, see the software handbook enclosed with the CD-ROM.

Access by IR communication is only possible if the actuator is **not in menu** mode. To CHANGE or SET UP, the unit must be set to **local** mode (i.e. the **local / remote** selector must be set to **local**). In this case, the IR link overrides control by buttons.

After communication is established, **IR** (for infrared) is displayed in the upper right-hand corner of the actuator display.

## 12 SETTING AND READING TORQUE VALUES

### 12.1 Closing mode

As standard, the actuator closes based on position. The settings for the actuator to close based on torque can be changed in the SET UP menu, however, it is possible to do so in the CHANGE menu :

Select **change** in the MENU and confirm by **OK**.  
Select **torque** in the CHANGE menu and confirm by **OK**.  
Select **closing mode** in the TORQUE menu and confirm by **OK**.  
Choose **on (torque)** and confirm by **OK**.

To check the menu without making changes, in the menu, select **check** instead of **change**.

### 12.2 Setting the torque

The actuator is delivered with a torque limiting system set in accordance with the order.

If the torque limiter is triggered in operation, check :

- ⚡ that the valve stem is clean and well lubricated
  - ⚡ that the valve stem does not jam in the actuating nut
  - ⚡ that the packing gland of the valve is not too tight
- If the torque needs to be increased, and further to the valve manufacturer's approval, proceed as follows :

Select **change** in the MENU and confirm by **OK**.  
Select **torque** in the CHANGE menu and confirm by **OK**.  
Select **torque setting** in the TORQUE menu and confirm by **OK**.  
Select the desired setting and confirm by **OK**.  
Increment or decrement the value using the blue button. When holding the button, the digit scrolling motion is accelerated.

TORQUE SETTING  
return  
closing %  
close tight %  
open breakout %  
opening %  
return

CLOSING %  
(100)

#### Description of the torque limiting feature :

All torque values are expressed in percent. 100 % corresponds to the actuator max. setting. The corresponding value in Nm is indicated on the actuator identification plate.

- **closing %** : limits the torque during closing
- **close tight %** : this option only appears if closing must be based on torque. In this case, the sealing torque applied to the valve seat may be different from the torque limiting during closing.
- **open breakout %** : this option only appears if closing must be based on torque. In this case, torque limiting at valve seat separation may be different (in general greater) than torque limiting during opening. If setting is greater than 100%, the display reads **no limitation** which amounts to shunting the load limiter at beginning of opening.
- **opening %** : limits torque during opening

**Remark** : after changing the sealing torque (valves closing based on torque) the actuator must be reset.

**Reminder** : to store changes, exit the menus by hitting return until the **(change ok ?)** message is displayed.

## 12.3 Reading the measured torque values and comparing them with original torque values

At each electrical actuation, the max. resistive torque values are measured and may be checked.

It is possible to store the torque values from an actuation to subsequently compare them to the torque values from the last electrical actuation.

Select **change** in the MENU and confirm by **OK**.

Select **torque** in the CHANGE menu and confirm by **OK**.

Select **measured torque** in the TORQUE menu and confirm by **OK**.

Select the desired torque and confirm by **OK**.

The display provides the max. torque measured during the last electrical actuation.

*(nota: actuations during setting are not stored)*

If the torque values of a previous electrical actuation have been stored, they may be read on the next line for reference.

**Example** : in the case shown above, the torque stored during an initial actuation was 12% and the torque during the last actuation was 18%. These two values can be compared to take preventive maintenance action, as required.

### Storing electrical actuation torque values

To store the torque values of an electrical actuation in the menu, select **save** then choose :

**torque ➔ ref (yes)**. torque values marked ref then take the last electrical actuation torque values. In case of error, select again

**torque ➔ ref (no)**. The reference torque values will be restored.

The values will only actually be stored in memory after exiting the CHANGE menu and validating (**change ok ?**).

### Torque display

Select this option to read on the actuator display on a permanent basis the instantaneous torque simultaneously with the position.

## 13 CUSTOMIZING REMOTE INDICATIONS

### 13.1 Relays

Signals indicating the status of the actuator are transmitted by bistable relays. Each relay can be set up according to a list of available options. As standard, the INTELLI+ is equipped with 4 bistable relays. 3 additional monostable relays (the contact is open when the relay is de-energized) can be added as an option. The equipment is factory-set in accordance with the order. To change the setting, proceed as follows :

Select **change** in the MENU and confirm by **OK**.

Select **signaling** in the CHANGE menu and confirm by **OK**.

Select **the relay** in the SIGNALING menu and confirm by **OK**.

Choose the contact type, i.e. the contact status when no action and confirm by **OK**.

### Choose the desired function(s) :

Several items can be selected for the same relay.

Each time a selection is made, the brackets disappear and a star ★ appears opposite the selection.

To cancel the selection, confirm again by **OK**.

To check the menu without making changes, in the menu, select **check** instead of **change**.

MEASURED TORQUE  
return  
closing %  
close tight %  
open breakout %  
opening %  
save  
torque display  
return

CLOSING %  
18  
réf. 12

SAVE  
torque ➔ ref (no)  
torque ➔ ref (yes)

20 % OPEN  
TORQUE 12 %

Display in command mode

SIGNALING  
return  
relay 1  
relay 2  
relay ...

RELAY 1  
(open contact)  
(close contact)

RELAY 1  
return  
★ valve open  
(valve closed)  
(torque limit open)  
(....

List :

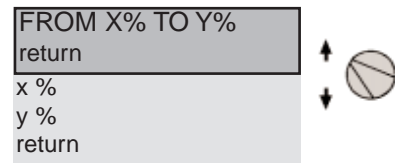
Détails

♣ valve open		<i>confirms that the valve is open</i>
(valve closed)		<i>confirms that the valve is closed</i>
(torque limit open)		<i>torque limiter action in the opening direction</i>
(torque limit closed)		<i>torque limiter action in the closing direction</i>
(from x% to y%)	( <sup>1</sup> )	<i>intermediate limit switch</i>
(selector in local)		<i>selector status</i>
(selector in remote)		<i>selector status</i>
(selector in off)		<i>selector status</i>
(running)	( <sup>2</sup> )	<i>the actuator is actuated</i>
(opening)	( <sup>2</sup> )	<i>the actuator is actuated in the opening direction</i>
(closing)	( <sup>2</sup> )	<i>the actuator is actuated in the closing direction</i>
(emergency command)		<i>the actuator receives an emergency command</i>
(stop mid-travel)		<i>the actuator is at a stop, neither open nor closed</i>
(power on)		<i>the actuator is normally powered</i>
(thermal overload)		<i>the motor thermal relay has tripped</i>
(jammed valve)		<i>actuation could not be completed due to excess torque</i>
(lost phase)		<i>in three-phase, a phase is missing</i>
(lost signal)		<i>4-20 mA lost signal (if positioner option installed)</i>
(handwheel action)		<i>the handwheel has been actuated since the last electrical actuation</i>
(bus command)	( <sup>3</sup> )	<i>if field bus option installed, this relay is assigned to an external command</i>

**Certain selections offer additional options :**

(<sup>1</sup>) **(from x% to y%)**

After confirming by **OK**, choose the contact action range :  
Select **x%** and confirm by **OK**.



Increment or decrement the value using the blue button.



Select **y%** and confirm by **OK**.

Increment or decrement the value using the blue button.  
Confirm by **OK**.



(<sup>2</sup>) **(running)**  
**(opening)**  
**(closing)**

After confirming by **OK**, choose whether the contact must be held or blinking :  
Confirm by **OK**.



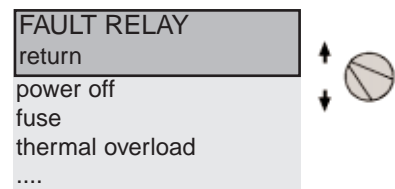
(<sup>3</sup>) **(bus command)**

This function is only applicable with the field bus communication option installed. In this case, relays are useless for signaling as signaling is routed over the field bus. These relays can however be used for commands in the actuator environment, with the commands sent from the control room over the field bus and relayed by the actuator.

**14 CUSTOMIZING THE FAULT RELAY**

Fault signaling is transmitted by a changeover relay normally energized, which breaks when de-energized or if the actuator is unavailable. This relay can be set up according to a list of options. The relay is factory set in accordance with the order. To change set-up, proceed as follows :

Select **change** in the MENU and confirm by **OK**.  
Select **signaling** in the CHANGE menu and confirm by **OK**.  
Select **fault relay** in the SIGNALING menu and confirm by **OK**.



## Including additional faults :

Non-modifiable included faults are shown without brackets, options are between brackets and selected options are denoted by a star ♣.

To cancel the selection again, confirm by **OK**.

List :	Détails :
power off	<i>control circuit power lost</i>
fuse	<i>fuse blown</i>
thermal overload	<i>thermal relay has tripped</i>
lost phase	<i>in three-phase, a phase is missing</i>
locked rotor	<i>the motor is locked</i>
(jammed valve)	<i>actuation could not be completed due to excess torque</i>
♣ selector in local	<i>local/remote select set to local</i>
♣ selector in off	<i>local/remote select set to off</i>
(emergency command)	<i>the actuator receives an emergency command</i>
(command inhibit)	<i>the actuator receives a command inhibit</i>
(overtravel)	<i>position overshoot &gt; 5% after motor shutdown</i>
(lost signal)	<i>4 - 20 mA signal lost (if positioner option installed)</i>

## 15 TIMING CONTROL DURING ACTUATION

The INTELLI+ contains a timing module used to reduce the actuator operating speed, for example to protect a pipe against pressure surges.

When an opening or closing command is sent, a timer alternately turns the motor on and off. The valve actuation time may therefore be very long. This time is adjustable on site.

Settings in the opening and closing directions are independent.

It is also possible to apply timing only on part of the stroke, and the rest of the stroke is covered at normal speed.

The setting only consists in indicating the total desired time, and the INTELLI+ calculates the on and off times.

Select **change** in the MENU and confirm by **OK**.

Select **timer** in the CHANGE menu and confirm by **OK**.

Select **operating time** and confirm by **OK**.

Indicate the actuation time at normal actuator speed.

Increment or decrement the value using the blue button.

When holding the button, the digit scrolling motion is accelerated.

Confirm by **OK**.

Select **timer open time** and confirm by **OK**.

Indicate the total time desired for valve opening and confirm by **OK**.

Select **timer close time** and confirm by **OK**.

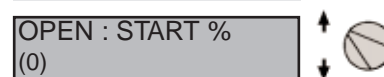
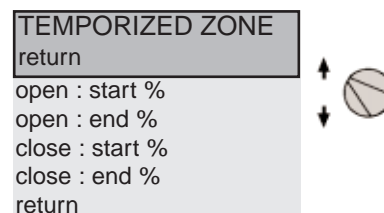
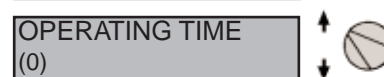
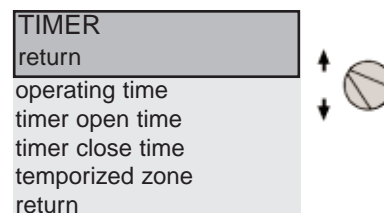
Indicate the total time desired for valve closing and confirm by **OK**.

**To cancel the timer function** : check that the timer opening and timer closing times are not greater than the travel time.

**To apply timing only to part of the stroke** : select **temporized zone** and confirm by **OK**.

In order to start opening timing at a given position only select **open : start %** and confirm by **OK**. Increment or decrement the value using the blue button until the desired position is achieved between 0 and 100 % and confirm by **OK**. Proceed in the same way with the other values, which determines an opening **temporized zone** and a closing **temporized zone**.

**To apply timing to the complete stroke**, check the default values :



**open : start % (0) close : start %(100)**

**open : end %(100) close : end % (0)**

## 16 MONITORING ACTUATOR ACTIVITY

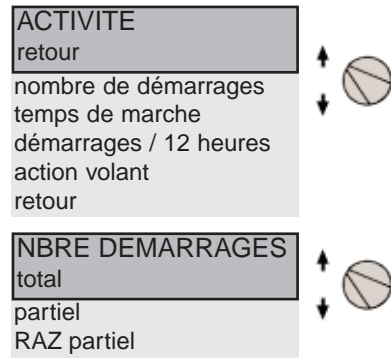
### 16.1 Activity

Select **change** in the MENU and confirm by **OK**.  
Select **activity** in the CHANGE menu and confirm by **OK**.

Select **number of starts** or **running time** to obtain the accumulated figures since actuator manufacturing. A partial counter is available and can be reset by the user.

Select **total** to obtain the total number of starts.  
To reset the partial counter, select **reset partial** (only appears when in the **change** menu), then choose **yes** or **no**.

To check the menu without making changes, in the menu, select **check** instead of **change**.



**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.

**handwheel action** : indicates whether the handwheel has been actuated since the last electrical actuation (only deviations in excess of 10% of stroke are stored).

### 16.2 Alarms

Alarms are used for fault location purposes. They are not permanent and disappear when the fault is cleared. A black square is displayed in the right-hand corner of the display to indicate the presence of an alarm.  
To read the alarms :

Select **check** in the MENU and confirm by **OK**.  
Select **alarms** in the CHECK menu and confirm by **OK**.  
Using the blue button, scroll through any alarms present.

List of alarms :

*Détails :*

locked motor open	<i>motor locked in the opening direction</i>
locked motor close	<i>motor locked in the closing direction</i>
torque sensor	<i>torque sensor power supply fault</i>
position sensor	<i>position sensor power supply fault</i>
direc of rot open	<i>opening direction of rotation discrepant</i>
direc of rot close	<i>closing direction of rotation discrepant</i>
overtravel	<i>position overshoot &gt;5% after motor shutdown</i>
too many starts	<i>starting rate exceeding the actuator class average</i>
lost phase	<i>in three-phase, a phase is missing</i>
lost signal	<i>4 - 20 mA signal lost (if positioner option installed)</i>
thermal overload	<i>the motor thermal relay has tripped</i>
too long travel	<i>the total stroke requested exceeds the encoder capacity</i>
pumping	<i>actuator pumping detected</i>
config. memory	<i>configuration data memory fault</i>
activity memory	<i>activity data memory fault</i>
base memory	<i>base memory fault</i>
torque switch	<i>electrical contact fault (according to equipment)</i>
travel switch	<i>electrical contact fault (according to equipment)</i>
24V auxiliary	<i>auxiliary power supply fault for external circuits (terminals 32-33)</i>

## 17 ACCESSING THE DATA SHEET

Select **change** in the MENU and confirm by **OK**.  
Select **data sheet** in the CHANGE menu and confirm by **OK**.

To check without making changes, in the menu, select **check** instead of **change**.

## Valve tag number :

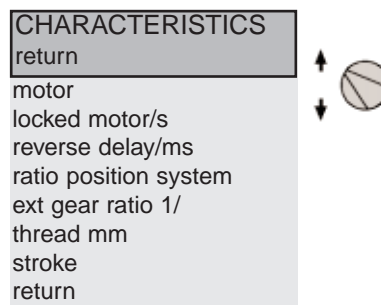
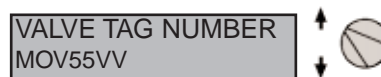
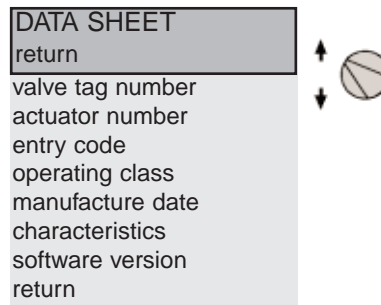
Select **valve tag number** to read or write the valve tag number.  
Use the blue button to change the 1<sup>st</sup> character and confirm by **OK**.

Then change each character in the same way.  
After all characters have been entered, confirm by **OK** until the system returns to the menu.

**actuator number** : this is the actuator serial number.  
**entry code** : used to create or change the password : see below "Creating or changing the password"  
**characteristics** : parameters necessary for correct operation for the actuator (see details below)

The following data only appear in the CHECK menu.

**operating class** : indicates whether the actuator is designed for off/on operation, class III regulation or class II regulation  
**manufacture date** : indicates the ex-works manufacturing date  
**software version** : installed software release

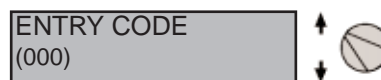


## Details of the characteristics menu

**motor** : this option specifies whether the motor is three-phase, single-phase or DC (manufacturer data)  
**locked motor/s** : indicates the time the motor is locked while energized before removal of power supply (manufacturer data)  
**reverse delay/ms** : indicates the stop timeout following reversion of direction of rotation (manufacturer data)  
**ratio position system** : indication of the reduction ratio between output shaft and position sensor, to display the stroke in number of revolutions (manufacturer data)  
**ext gear ratio 1/** : indicates the reduction ratio of an additional reduction gear. For example, a gear with ratio 1/120, enter 120. Stroke will be now in degrees.  
**thread mm** : indicates the pitch of a linear system allowing the stroke to be displayed in mm, rather than in number of revolutions  
**stroke** : indicates the stroke measured when adjusting the valve

## 18 CREATING OR CHANGING THE PASSWORD

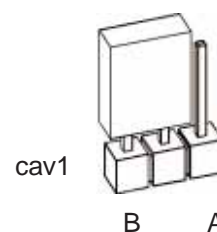
Select **change** in the MENU and confirm by **OK**.  
Select **data sheet** in the CHANGE menu and confirm by **OK**.  
Select **entry code** in the DATA SHEET menu and confirm by **OK**.  
Enter the 1<sup>st</sup> digit using the blue button  
Then confirm by **OK**.  
Enter the 2<sup>nd</sup> digit using the blue button  
Then confirm by **OK**.  
Enter the 3<sup>rd</sup> digit using the blue button  
Then confirm by **OK**.



The new code will only be taken into account after exiting the **change** menu and confirming the request (**change ok?**).  
Take note of this code to be capable to access again the **change** menu.

**If the code has been lost or forgotten** : after turning the unit off, open the control unit

- Remove the connexion box cover
- Unscrew the 4 screws adjacent to the cover screws
- Extract the electrical block by a few centimeters to gain access to the side of the printed circuit board
- Move jumper 1 on the printed circuit board from position A to position B then turn the unit back on. **This operation resets the password to zero.**
- Fit the jumper back to original position A otherwise entering a new password will be impossible.



## 19 USING THE ANALOG SIGNAL POSITION AND TORQUE REMOTE INDICATION (ACCORDING TO EQUIPMENT)

### 19.1 position remote indication

According to the equipment, the actuator can remotely indicate its position (0 - 100 %) by sending an analog signal. The output signals are set automatically to the actuator 0 - 100 % stroke which eliminates the need for setting the remote indication signal.

The remote indication signals are fully isolated from the INTELLI+ circuits.

The available signals are :

**4 - 20 mA, 0 - 20 mA, 4 - 12mA or 12 - 20 mA** and **0 - 10 V** (distinct output)

To choose the signal variation direction and the type :

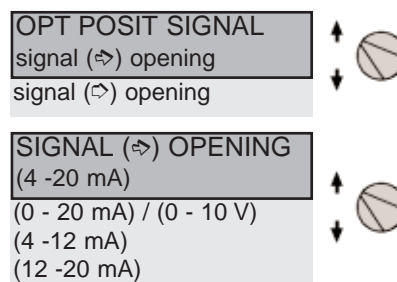
Select **change** in the MENU and confirm by **OK**.

Select **position** in the CHANGE menu and confirm by **OK**.

Select **opt position signal** in the POSITION menu and confirm by **OK**.

Choose the signal variation direction and confirm by **OK**.

Choose the type of signal and confirm by **OK**.



### 19.2 Torque signal

The signal representing the 0 to 100 % actuator torque is also available in 4 -20 mA (0% = 4mA, 100% = 15 mA). The torque signals are fully isolated from the INTELLI+ circuits, except that the minus is common with the position remote indication signal.

See electrical diagram for connection of these signals.

## 20 USING THE EQUIPMENT AS A POSITIONER FROM AN ANALOG CONTROL SIGNAL (ACCORDING TO EQUIPMENT)

### 20.1 Input signal

According to the equipment, the actuator can operate as a positioner, from an analog signal (4 - 20 mA for example). The input signals are set automatically to the actuator 0 - 100 % stroke which eliminates the need for setting the actuator operating range.

The input signals are fully isolated from the INTELLI+ control circuits and the torque and position remote indication signals.

Control signal :

4 - 20 mA, 0 - 20 mA, 4 - 12mA ,12 - 20 mA ou 0 - 10 V

To choose the signal direction of variation and the type :

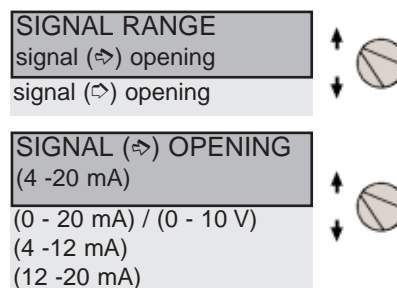
Select **change** in the MENU and confirm by **OK**.

Select **positioner** in the CHANGE menu and confirm by **OK**.

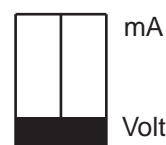
Select **signal range** in the POSITIONER menu and confirm by **OK**.

Choose the signal direction of variation and confirm by **OK**.

Choose the type of signal and confirm by **OK**.



In the case of 0 - 10 V signal, also check on the GAMB board located in the FPX control unit that the microswitches are set to Volt.



## 20.2 Dead band setting

This is a factory setting, but it is possible to adjust the dead band.

If the dead band is too narrow, the actuator may pump. If the dead band is too wide, positioning is less accurate. In the POSITIONER menu, select **dead band %** and confirm by **OK**.

Increment or decrement the value using the blue button.

Confirm by **OK**.

## 20.3 Fail-safe position

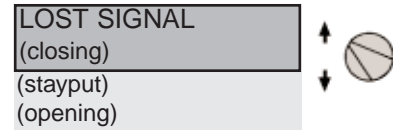
With a 4-20 mA input signal, it is possible to set up a fail-safe position in case the control signal is lost.

As standard, the function is active and the actuator remains in position in the case of signal loss.

It is possible to choose opening or closing.

In the POSITIONER menu, select **lost signal** and confirm by **OK**.

Select the desired function and confirm by **OK**.



## 20.4 Proportional pulses

This is a control mode where the position is reached by pulses. This mode is used for relatively stable regulations allowing the actuator inertia to be partly compensated. The actuator is cycled more often than by a conventional command.

In the POSITIONER menu, select **proportional pulse** and confirm by **OK**.

Select **(no)** or **(yes)** and confirm by **OK**.

## 21 USING FIELD BUS CONTROL (ACCORDING TO EQUIPMENT)

The field bus interface can be used to control and transmit all data over a single line. A specific documentation specifies how each actuator can be addressed and provides a list of addresses for accessing each command or data.

### Fail-safe position

In case of loss of communication, it is possible to set up a fail-safe position.

As standard, the function is active, and the actuator remains in position in the case of a loss of communication.

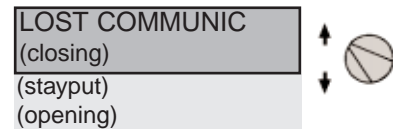
It is possible to choose opening or closing.

Select **change** in the MENU and confirm by **OK**.

Select **fieldbus** in the CHANGE menu and confirm by **OK**.

Select **lost communication** in the FIELDBUS menu and confirm by **OK**.

Select the desired function and confirm by **OK**.



## 22 PROTECTION BY FUSES

### Accessibility :

- turn the actuator off
- remove the connexion box cover
- unscrew the 4 screws adjacent to the cover screws
- extract the electrical block by a few centimeters to gain access to the side of the fuse holders
- unscrew the caps and replace the fuses as required

### Characteristics of the fuses :

FU1 : transformer primary fuse	6,3 x 32mm - 0,5A - 500V
FU2 : transformer secondary fuse	5 x 20mm - 0,5A
FU3 : transformer secondary fuse	5 x 20mm - 0,05A

## 23 OPERATING FAULTS

### 23.1 INTELLI+

In case of doubt as to correct operation of the unit, first set the local/remote selector to local, and actuate the opening and closing commands.

PROBLEM	CAUSE	CORRECTIVE ACTION
The display is off	Actuator power supply	Check the power supply voltage (terminals L1, L2, L3 in three-phase). The voltage is indicated on the identification plate.
	Fuse blown	Check the fuses and replace as required.
No operation	The display is in menu mode	Set the local/remote selector to off then to local to switch to control mode (display : %position)
	An IR link is established	If an IR link has been established (IR is displayed in the upper right-hand corner of the display) it is not possible to use the control buttons. Remove the IR link.
	Motor thermal relay has tripped	A black square is displayed in the upper right-hand corner of the display to indicate the presence of an alarm. Go to menu/check/alarms to check whether a motor thermal relay alarm is present. The actuator will again be available after the motor has cooled down.
No operation and an icon as a key or the acronym ESD is displayed	A local control inhibit command or an emergency command is present	In the commands/aux. commands 1 or 2 menu, check whether an inhibit command (or emergency command) is set up or not, as well as the status of the contact (open or closed) to perform this command remotely. Then check that the connexion made on the client terminal strip does not correspond to an inhibit command (or emergency command). Ex. : if the configuration is set to aux. command 1, <b>loc cmd inhibit</b> and <b>contact (o) = inhibit</b> it is then necessary to establish a remote contact on terminal 37 to cancel the inhibit.
The actuator is operating in local, not in remote mode	Local/remote selector set to local or off	Set the local/remote selector to remote.
	Contact control : no voltage across terminals 32 and 33	Check the client terminal strip for a shunt across terminals 31 and 32. Check presence of an alarm "24V auxiliary" Check fuse FU3 on the INTELLI+ board.
	Voltage control : voltage not adapted to input	Check voltage control connexion : 10 to 55 V voltage : terminal 31 55 to 250 V voltage : terminal 30
The actuator is operating in remote, not in local mode	Local/remote selector set to remote or off	Set the local/remote selector to local.
	A local control inhibit command is present or the local/remote selection is performed remotely	In the commands / aux. commands 1 or 2 menu, check whether an inhibit is set up, as well as the contact status (open or closed) to perform this command remotely. Then check that the connection made on the client terminal strip does not correspond to a command inhibit. Ex. if the configuration is set to aux. command 1, <b>loc cmd inhibit</b> and <b>contact (o) = inhibit</b> it is then necessary to establish a remote contact on terminal 37 to cancel the inhibit.

PROBLEM	CAUSE	CORRECTIVE ACTION
The actuator is not rotating in the correct direction of rotation	Incorrect configuration	In the change / position / closing direction menu, check: Clockwise or counterclockwise closing.
	The motor has been reverse-wired and rotates in the reverse direction (when replacing the motor)	When replacing the motor, wire markings must be observed. In case of doubt, check that the motor is rotating in the correct direction. Reversing the motor direction of rotation is by switching over wires 2 and 3 of the motor terminal strip.
Entering the menu is impossible	Selector set to remote or off or presence of a local command inhibit	Access to the menu by means of the buttons is only possible in local mode, i.e. with the selector set to local, in the absence of a local command inhibit. Set selector to local and see above for checks to be performed on aux. commands 1 and 2.
The parameters in the menu can not be changed	No change can be made to the check menu.	Go to the change menu. Some parameters can only be checked.
The changes made have not been taken into account.	During modification, no change is actually made. To be stored, the modification must be validated	After changes have been made, select return then <b>OK</b> as many times as necessary to read : <b>(change ok?)</b> Confirm by OK to store the changes
The handwheel action has not been detected	The handwheel action has been detected since the last electrical actuation and provided the actuator remains normally powered. Detection only indicates a motion in excess of 10% of stroke	Repeat detection under correct conditions.
The excessive number of starts alarm is displayed	The INTELLI+ monitors the number of starts performed during the last 12 hours and compares it with that of the actuator operating class	This alarm does not limit actuator operation, but indicates intensive operation of the actuator. If the start rate again becomes compliant with the unit intended use, the alarm disappears.
Actuator jerky operation during actuation	The timing function has been set up	This function, set up in the timer menu is used, at the user's request, to increase the actuator actuation time.

## 23.2 OPTION POSITIONNEUR

Below are a few additions applicable to the control version by positioner analog signal.

The actuator is operating in local opening closing command mode, not in positioner mode	Local / remote selector set to local or off	Set the local / remote selector to remote to use the positioner.
	An Auto / On Off command is present and inhibits positioner use	In the commands / aux. commands 1 or 2, check whether auto / On Off is set up or not as well as the contact status (open or closed) to perform this command remotely. Then check that the connection made at the client terminal strip does not correspond to an On Off command. Ex.: if the configuration is set to aux. command 1, ( <b>auto / on-off</b> ) and <b>contact (c)= auto</b> it is then necessary to establish a contact remotely on terminal 37 to switch to auto command.
	Incorrect adaptation of the input signal	Check the configuration of the input signal in the menu and the setting of the switches on the positioner board (see para. 20.1)
The actuator is operating as a positioner in local mode, not in remote mode	The local / remote selector is set to local	Set selector to remote
	The input signal is defective	Check the reference signal using a milliammeter connected in series (terminal 70)
	The signal polarity is not compliant	Check that the signal (+) is present on terminal 70.

## 24 MAINTENANCE

All ST actuators are lubricated for life and therefore require no specific maintenance. The condition of the valve stem and its nut must nevertheless be checked periodically to make sure they are clean and well lubricated. We recommend that a program of periodic maintenance should be drawn up for actuators that are operated infrequently.

## 25 STORAGE

### Introduction

The actuator includes electric equipment as well as grease lubricated gear stages. In spite of the weatherproof enclosing, oxidation, jamming and other alterations are possible if actuator is not correctly stored.

### Storage

The actuators should be stored under a shelter in a clean, dry place and protected from constant changes in temperature.

Avoid placing the actuators directly on the floor. If the place of storage is humid it is recommended that you connect and give supply to the actuator to have the heater effect.

Check that the temporary sealing plugs of the cable entries are correctly installed. In case of humidity, use metal plugs. Make sure that the covers and the boxes are well closed to ensure weatherproof sealing.

### Control after storage

#### 1. Storage not exceeding one year :

- Maintain a visual check of electric equipment
- Operate manually the buttons, selectors, etc ... to insure the correct mechanical function
- Operate apparatus manually
- Verify the correct grease consistency
- Follow instructions included in the commissioning instructions heregiven

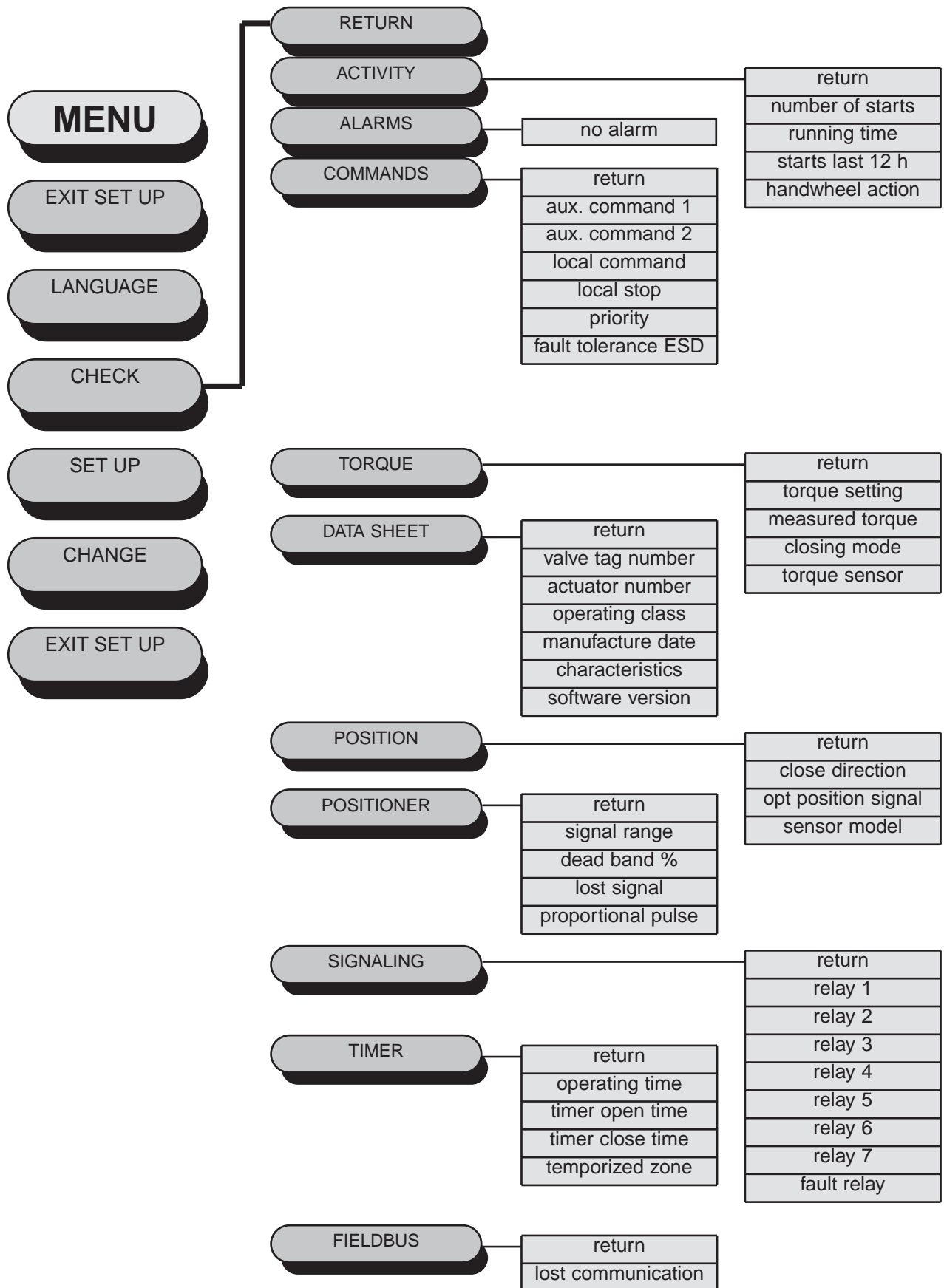
#### 2. Storage exceeding one year :

Long time stocking change grease consistency. The grease thin thickness on stem dries up. Remove all the old grease of the actuator mechanical parts and replace with new grease.

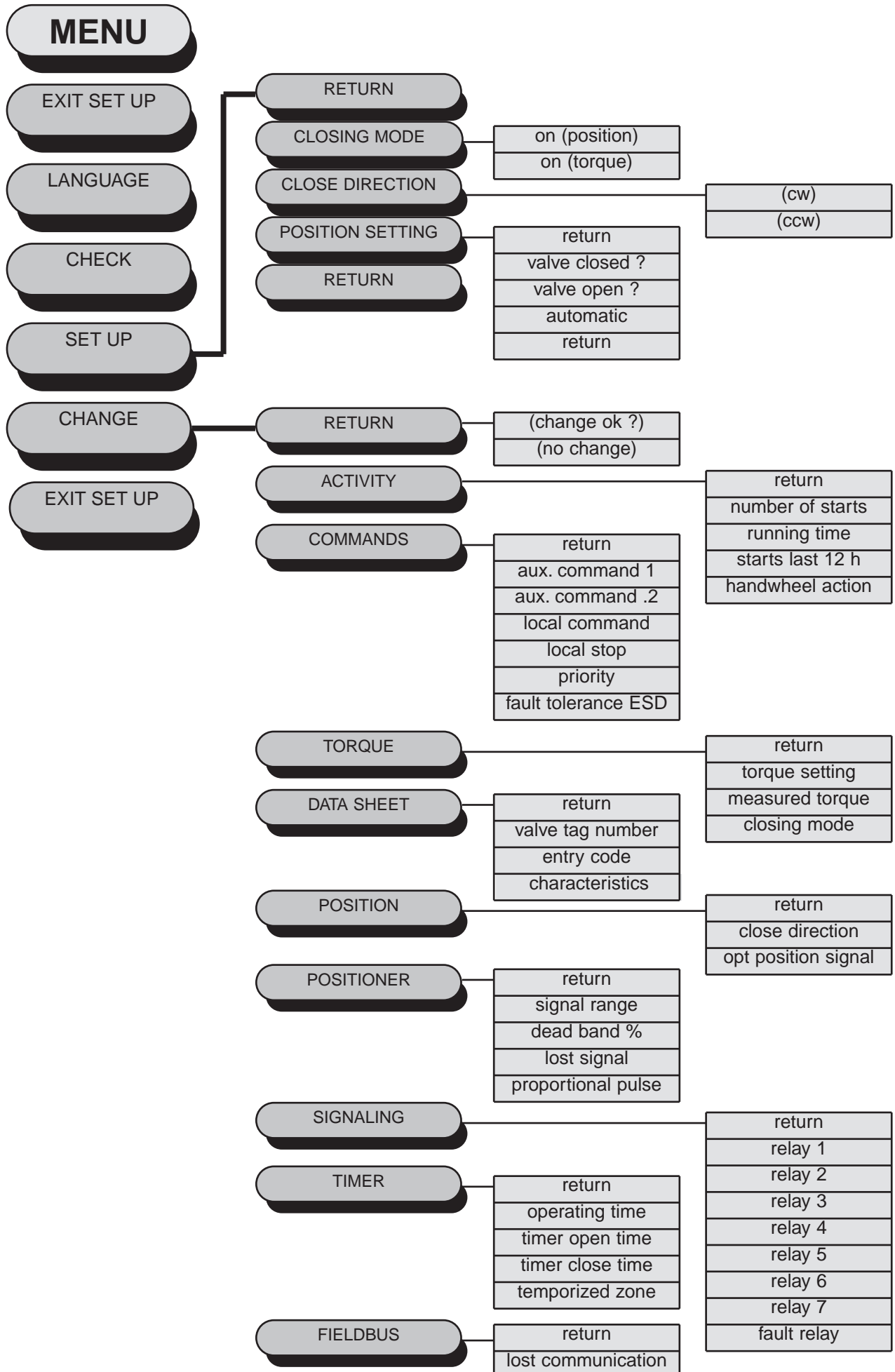
- Maintain a visual check of electric equipment.
- Operate manually the buttons, selectors, etc ... to insure the correct mechanical function.

Follow instructions included in the commissioning instructions heregiven.

## 26 CHECK MENU FLOWCHART



## 27 SET UP AND CHANGE MENU FLOWCHART



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