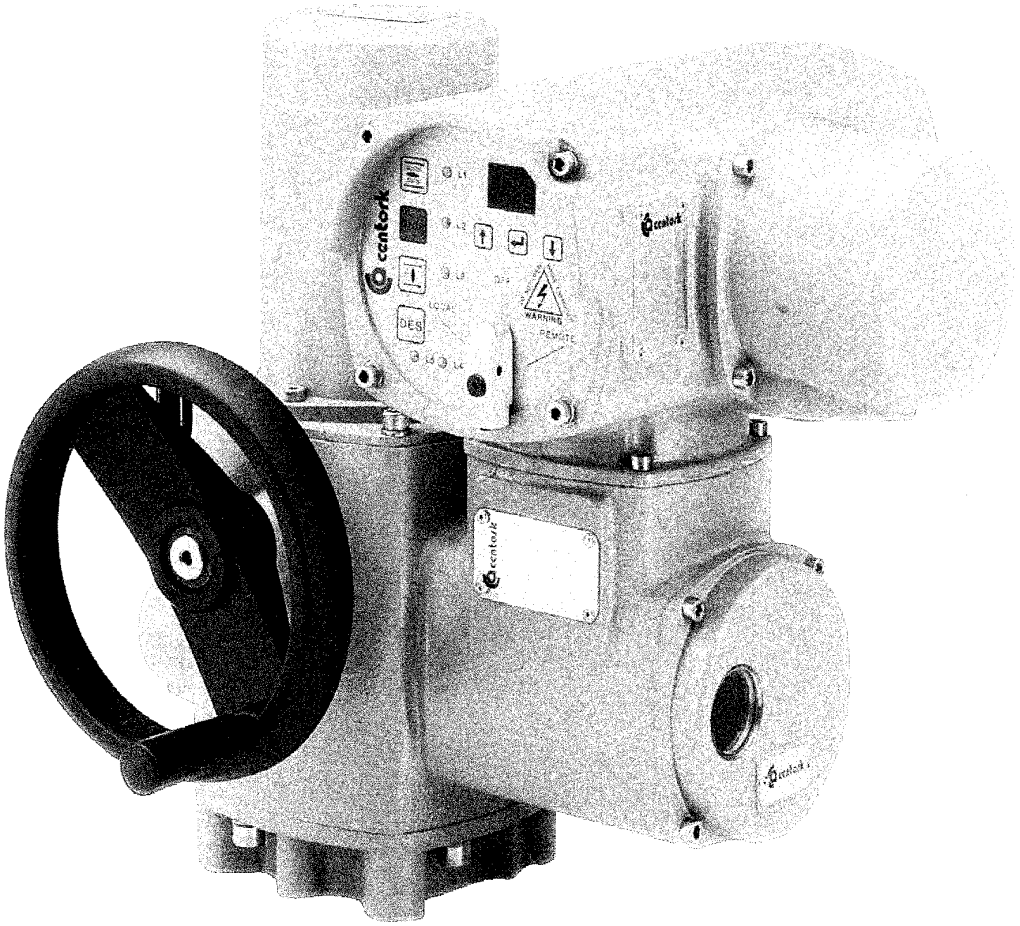
CENTRONIK MODULATING DUTY

USERS MANUAL



centork
VALVE CONTROL

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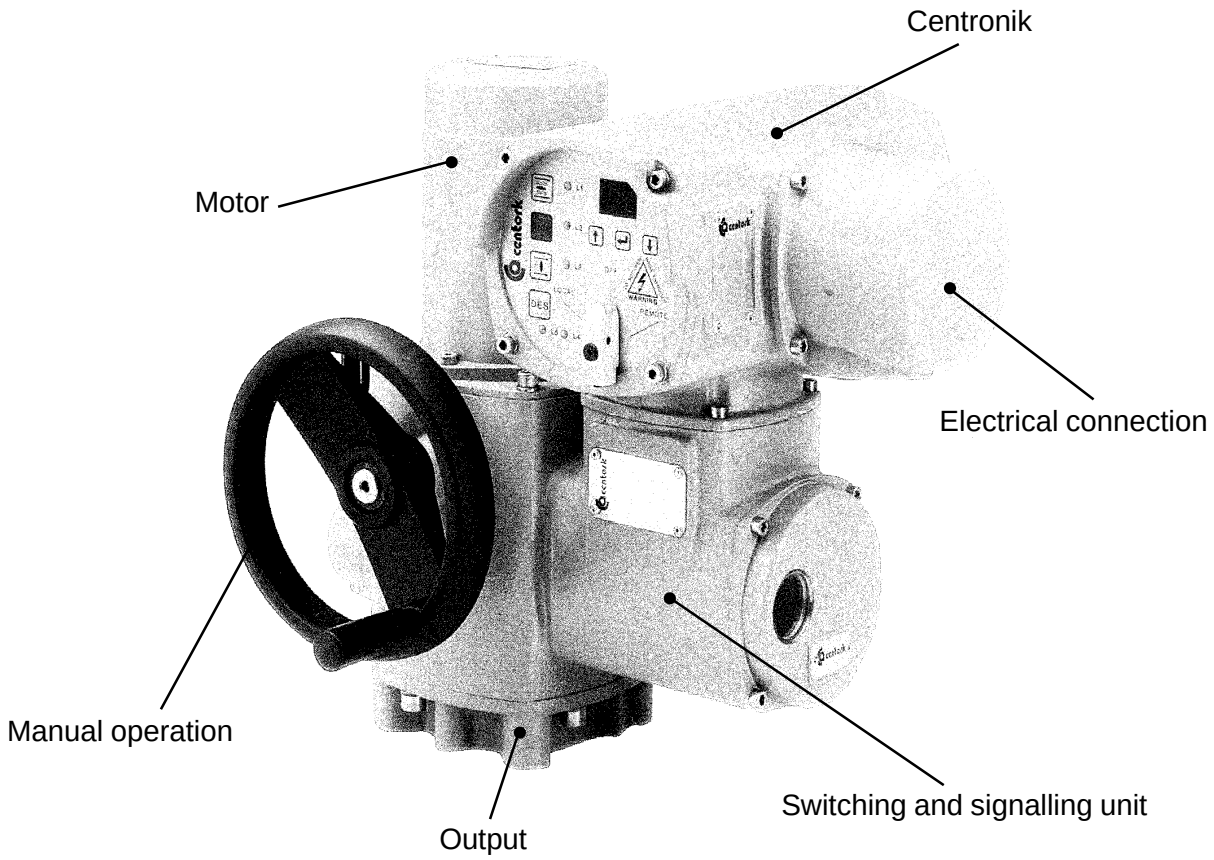
CAUTION

Electric actuators are high value devices. In order to prevent damage in their handling, setting and use, it is essential to follow all the points in this manual.

The actuator is an electrical device, therefore you should take into account the EN 60204, Directive 73/23/ECC safety standars.

The centork electric actuators must be handled with care and caution.



1. ELECTRIC ACTUATORS MODULATING DUTY

Modulation in electric actuators consists in positioning the actuated element according to a control input signal. This input signal can be a current signal (0/4-20 mA) or a voltage signal (0-10V.). The received input signal is compared with the signal received from the electronic postion transmitter, TPS. Once both signals are compared, it is determined whether is higher, equal or lower than the other, and according to this the motor is operated in the sense needed to reduce this difference.

2. CENTRONIK ELECTRIC ACTUATORS MODULATING DUTY DESCRIPTION.

The Centronik modulating duty is an electronic unit able to control any Centork electric actuator´s operation in modulating duty.
The unit consists of several PCBs containing a microprocessor, so the unit should be handled very carefully.
The Centronik modulating duty has three main operating modes selectable by the front panel selector: LOCAL, REMOTE and OFF.
In the OFF position, the actuator remains connected but does not work.
In the LOCAL mode, the Centronik modulating duty only follows the front panel pushbuttons operation, the same as in the Centronik On/Off Duty. In the REMOTE mode, the operation is made via the remote inputs received through the users connector, or via RS-485 serial line.

The CENTRONIK unit is part of a complete CENTORK ELECTRIC ACTUATOR. All the points stated in the “Electric actuators installation and maintenance manual” should be followed.
Both “CENTRONIK users manual” and “Electric actuators installation and maintenance manual” are supplied together.

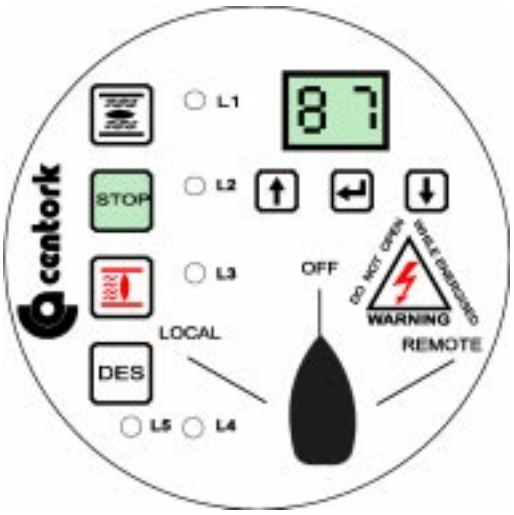
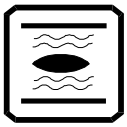


Fig. 1

In the front panel (fig. 1), the user will find the following described items:

Open pushbutton

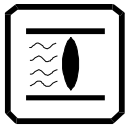


This is the pushbutton used to make the actuator run in the Open direction in LOCAL mode.

Stop pushbutton

This is the button used to stop any Open/Close operation in LOCAL mode.
It will be also used to reset the unit after any failure.

Close pushbutton



This is the pushbutton used to make the actuator run in the Close direction in LOCAL mode.

DES pushbutton

This is the pushbutton we will have to use to enable the actuator movement, after a torque dependant stop, in the same direction it stopped. Note that the actuator will stop as soon as the CENTRONIK detects shaft movement.

LED L1

Red:	The actuator has arrived to the OPEN position.
Red blinking:	The actuator is running in the OPEN direction.
Yellow blinking:	Failure, both FRC1 and FRA1 are switched.

LED L2

Yellow:	Blinker failure stop.
Red:	Overtemperature stop (TRM).
Red blinking:	Overtemperature happened and has dissapeared.

LED L3

Green:	The actuator has arrived to the CLOSE position.
Green blinking:	The actuator is running in the CLOSE position.
Yellow blinking:	Failure, bot FRC1 and FRA1 are switched.

LED L4

Red:	Torque dependant stop in OPEN direction.
Green:	Torque dependant stop in CLOSE direction.
Yellow blinking:	Failure, Both FPC1 and FPA1 are switched.

LED L5

Green:	Correct phase connection.
Red:	Phase missing.
Yellow:	Inverse phase connection.

"Down" pushbutton

This is the pushbutton used to move down through the menu in programming mode.

"Enter" pushbutton

This is the pushbutton used to select the desired option on the menu in programming mode.

"Up" pushbutton

This is the pushbutton used to move up through the menu in programming mode.

Indicator display

This is the display used to communicate with the CENTRONIK.
The displaying  corresponds to 99% and  to 100%.

3. ELECTRIC CONNECTION

CAUTION 

When handling electric equipment, take into account the safety standards (EN 60204, Direc. 73/23/EEC).

Check that the type of current, voltage and frequency suits the actuator according to motor nameplate.

When dismounting the electric connection cover, we find, inside this cover, the electric connection diagram for each actuator.

The IP67 degree of protection, IP68 (on request), is only guaranteed if the correct cable glands are used.

Make sure a proper ground (GND) connection of the unit is done.

CAUTION 

Do not attempt to lever off the cover with a screw driver as this will damage the "O" ring seal.
The wiring scheme fixed in the cover is particular to each actuator and must not be interchanged with any other actuator.

Types of connection :

1- Plug-socket connectors with screws:

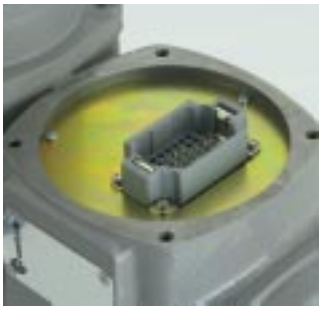
a) Unscrew the attachment plate from the connection cover.
b) Feed the cable(s) through the cable glands[1].
c) With a suitable screwdriver, connect the cables for the control signals according to the electric connection diagram.
d) Connect the 3 phases L1, L2, L3 to the connections 1, 2, and 3. Connect the earth cable to the earth connection of the plug.
e) Once you have checked that the connections have been carried out properly, screw the attachment plate back to the connection over respecting the direction of the connectors.
f) Close the connection cover and check the proper connection, the state of the o-ring seal and the proper installation of the latter, greasing it slightly. Fasten the 4 screws crosswise.
g) Tighten cable glands to ensure enclosure IP67 (IP68 on request).

2- Terminals connection :

a) Feed the cable(s) through the cable glands[1].
b) With a suitable screwdriver, connect the cables for the control signals according to the electric connection diagram.
c) Connect the 3 phases L1, L2, L3 to the connections 1, 2 and 3. Connect the earth cable to the earth connection.
d) Once you have checked that the connections have been properly carried out, close the connection cover and check the proper connection, the state of the o-ring seal and the proper installation of the latter, greasing it slightly. Fasten the 4 screws crosswise.
e) Tighten cable glands to ensure enclosure IP67 (IP68 on request).

[1] The cable glands are not supplied with the Standard version.

3- Plug-socket connectors with crimp:



a) Unscrew the attachment plate from the connection cover.
b) Feed the cable(s) through the cable glands[1].
c) With a suitable crimping tool (Harting (Ref. 0999 0000 110)), connect the cables to the control signals according to the electric connection diagram.
d) Connect the 3 phases L1, L2, L3 to the connections 1,2 and 3. Connect the earth cable to the earth connection of the plug.
e) Once you have checked that the connections are properly done, screw the attachment plate back to the connection cover respecting the direction of the connectors.
f) Close the connection cover and check the proper connection, the state of the o-ring seal and the proper installation of the latter, greasing it slightly. Tighten the 4 screws crosswise.
g) Tighten cable glands to ensure enclosure IP67 (IP68 on request).

CAUTION

CENTORK actuators are provided with thermoswitches mounted in the windings of the motor. The protection of the motor is only achieved with a proper connection for these thermostats. Centork guarantee for the motor is not valid if this connection is not properly done.

In the case of 1NO+1NC double microswitches, only the same potential can be connected through both circuits. For different potentials, two double microswitches must be used.

4. SWITCHES CONFIGURATION

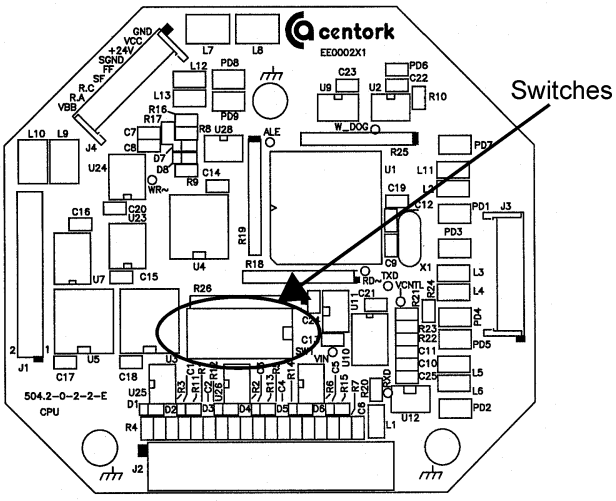
The configuration of switches needs to be done with the selector in the OFF position.

The CENTRONIK has several switches to configure its operation mode.

CAUTION

This is a very sensible electronic device. Manipulation of setting switches should be made very carefully, in a way that other electronic components are not damaged.

1- With the selector in the OFF position, take off the front cover of the unit.
2- In the PCB, the setting switches are located as indicated in the next figure



[1] The cable glands are not supplied with the Standard version.

3- The meaning of the switches and the different combinations are described in the following tables:

SW1	SW2	SW3	Operation modes
OFF	OFF	OFF	Not used
ON	OFF	OFF	Mode 1.
OFF	ON	OFF	Mode 2.
ON	ON	OFF	Mode 3.
ON	ON	ON	Mode Test.

SW4	Direction to close
OFF	Clockwise
ON	Anti-clockwise

SW8	Remote mode selection
OFF	Remote Serial
ON	Remote Paralel

SW6	TPS Indication
OFF	0 - 20 mA.
ON	4 - 20 mA.

Factory standard

- SW6 :

This is the switch used to indicate to the CENTRONIK unit the way the TPS card will be adjusted (4-20 mA or 0-20 mA). It´s important to configure it properly, otherwise, the CENTRONIK will not operate correctly.

- SW4 :

The possible directions of close choosable with this switch are:

OFF so that the actuator closes clockwise
ON so that the actuator closes anti-clockwise

-SW8 :

This switch will be used to select the input used for the control signal.

Description of the operation modes:

- Mode1 :

This is the Open by limit switching and Close by torque switching operation.

- Mode2 :

This is the Open and Close by limit switching operation.

- Mode3 :

This is the Open and Close by torque switching operation.

- Test mode :

This is not an operation mode. It is a test program to control the correct operation of the control hardware. Note that some internal connections have to be done before running the program.

CAUTION  **THE TEST PROGRAM SHOULD BE RUN ONLY UNDER THE AUTORISATION OF CENTORK**.

CAUTION  **Note that in the operation modes 1 and 3, the FRC limit switches will have to be set to operate shortly before reaching the end CLOSED position. If not, the incorrect indications of the CENTRONIK unit could cause malfunction in the process.**

5. MODULATING PARAMETERS SETTING PROCEDURE

Before programming the CENTRONIK, ensure that the switching and signalling unit and the position indicator TPS are adjusted correctly (See “Electric actuators installation and maintenance manual).
In order to enter the programming mode, ⏎ button must be pressed and remain pressed for more than 3 sec.

5.1 Introduction

Referring to the modulating characteristics, the programming procedure is as follows:
The configuration/programming is done in the LOCAL mode. For the entire programming of the CENTRONIK, the buttons used are ⇧ ⏎ ⇩ and the display indicator for the displaying.

The procedure is always to select the value with ⇧ ⇩(the displacement from one value to another will be fast if any of both keys remains pressed more than 0.5 sec.) on a blinking list. After positioning on the desired value, it´s selected with the ↵ . Once the value is selected, it stops blinking. After selecting the value, the CENTRONIK waits the user to press once again ↵ to record the option and leave the submenu. If ⇧ or ⇩ pushbuttons are pressed after selecting the value, the display blinks again.

If a step of the programming wants to be obviated, just press ⇧ or ⇩
In order to leave any parameter and reach the former level, DES pushbutton will be pressed. By pressing it successively, the programming mode is quitted.

After entering the programming mode, on the display the letters Pr are shown blinking and the CENTRONIK waits for the key ↵ to be pressed as a confirmation. If any other key is pressed, programming mode is quitted and the state of the valve is seen again.
Once confirming to enter the programming mode, the CENTRONIK will ask for the password by displaying the word Co dE

5.2 Security password.

Co dE will be displayed, press ↵ .

The password is selected from one list that goes from 00 to FF .

The factory configured password is CA .
If the password introduced is not the correct, 88 blinks on the display and ↵ has to be pressed again in order to gain a second try. If at the second try the correct password is not introduced, the CENTRONIK leaves programming mode and the state of the valve is displayed again.
Once the correct password is introduced, the programming mode of the CENTRONIK is accessed.

5.3. Control input signal.

On this submenu the type of control input signal that the CENTRONIK will receive is chosen.
Co will be displayed, then press ↵.

00 is shown blinking and the CENTRONIK waits for the password.
The password will only be provided if necessary. Consult CENTORK.
The control input signal is factory standard 4-20 mA.
Once the password is selected, press ↵ ,

choose between :

U for voltage input signal and I for current input signal.

If current input signal is selected, another submenu will appear and its options will be :

4 for 4...20 mA and 00 for 0...20 mA.

5.4. Polarity.

In this submenu the meaning for the minimum control input signal is determined.

Po will be displayed, then press ↵ ,

choose between :

oP for open or CL for closed. The factory standard configuration is CL .

5.5. Zero and span, minimun and maximum command signal and split range setting.

In this submenu, the control input signal range is fitted to the valve stroke. This section is also useful for programming the split range working mode.

AJ is displayed, then press ↵
Adjust of zero :

CE will be displayed, press ↵ and select the percentage of control input signal that corresponds to zero. Press ↵ , the following step is to select the % of opening of the valve desired for the zero, select between 00 and 99. Both values are configured, as factory standard, to 00 .

Adjust of span (this value will always be higher than the value selected for zero):

SP will be displayed, press ↵ and select the percentage of command signal that corresponds to span. Press ↵ , the following step is to select the percentage of opening desired for the span, select between the value selected for zero and 99. Both values are configured, as factory standard, to 99.

5.6. Remote indication outputs.

In this submenu, remote indication outputs are configured. The signal and the output can be both chosen. The configuration of remote outputs in LOCAL mode is the same than the one programmed in REMOTE mode. The output signals will always be normally open (NO) signals.

r1 is displayed, then press ↵ .

choose between :

oP	Valve Open	rE	Remote
CL	Valve Closed	Er	Failure
to	Torque tripped opening	Lo	Local/Remote
tC	Torque tripped closing	In	Indication for intermediate position
tr	Motor temperature	PA	Position reached
Ph	Phase failure	FC	Command signal failure
ot	Torque tripped	rt	Rest time
		ES	ESD (Emergency Shut Down) received

once chosen press ↵ to record the option selected

For remote outputs r2 r3 r4 r5 repeat the procedure previously described.

The factory default values for exits are

r1 = oP r2 = CL r3 = ot

r4 = rt r5 = tr

As standard. the CENTRONIK is supplied without relays. The output characteristic is 24 V_{DC} /100 mA(max.load capacity). If relays are supplied, the outputs are potential free contacts.

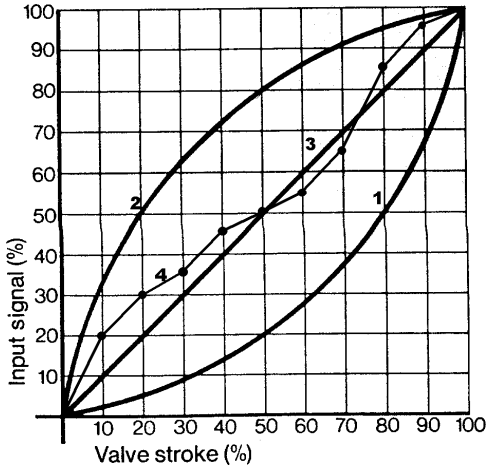
5.7. Rest time.

In this section, the user can configure the time, in seconds, the actuator will rest after the last stop ignoring any notice neither from the input remote signal nor from the pushbuttons.

rt is displayed, choose between 00 and 60. The value configured factory is 00.

5.8. Characterisation of the valve opening curve.

In this submenu, the opening curve of the valve is configured.



The modeled curves are:
1 Isopercentage curve
2 Quick opening curve
3 Linear curve
4 Customized curve (example)

CU will be displayed, then press ⏎,

choose between :

LI for linear curve

IS for isopercentage curve

Ar for quick opening curve and

PE for customized opening curve.

For customized opening, 10 points of alignment P0 ... P9 are displayed, for each of them choose the corresponding opening percentage between 00 and 99.

In order to enter the values of the personalized curve, the user should have previously modelized the curve to know to which opening percentage corresponds each step.
The curve configured as factory standard is LI.

5.9. ESD (Emergency Shut Down)

In this submenu, the operation of the actuator when receiving the ESD emergency signal, is configured. When the signal is received, the CENTRONIK will ignore all the securities except the security selection made by the user, the motor thermoswitches or the torque micro switches.

The goal for the actuator will be to reach the programmed emergency position.

ES will be displayed, then press ⏎.
choose between :

tr to considerer the thermoswitches or to to considerer the torque microswitches.

Next choose between:

oP for actuator in open position.

CL for actuator in close position.

SS for "standstill" position.

po ton open the valve up to the recorded proportion. Choose between 00 and 99.

The ESD signal will only be received in the remote mode. The CENTRONIK will then cancel any operation that it could be doing. It is activated with a logic level “0”; in this case this is done by joining the input ESD with the pin number 19.
The factory standard configuration is [tr] and [SS].

5.10. Modulating bands.

In this submenu, the modulating bands are adjusted. There are two dead bands for each operation sense, the outer dead band and the inner dead band. The outer dead band is the one out of which the actuator will start to search the control input signal and the inner dead band is the one in which the actuator will consider that the control input signal has been reached.

[br] will be displayed, the press ⏎.

choose between [oP] for open direction and [CL] for close direction, press ⏎,

in each of the cases it will be possible to choose between:

[0.5] and [2.0] for the inner dead band [In] in 0.5% steps and between

[0.5] and [5.0] for the outer dead band [En] in 0.5% steps.

If any of the inner dead bands is selected at a higher value than any of the outer dead bands, then the outer dead band will automatically be fixed at 1% higher than the inner dead band. As factory standard, the inner dead band is at 2% and the outer dead band is at 5%.

5.11. Autolearn

In this submenu, the CENTRONIK is allowed to check the overrun/ overtravel of the valve and, ignoring the modulating bands, to make a more accurate positioning.

[AL] will be displayed, press ⏎

choose between [On] to activate this option and [oF] to ignore it.

The factory standard configuration is [oF].

5.12. Close tightly

In this submenu the ‘close tightly’ function is activated: if the command signal brings the actuator to a position close to total closing, (being the value lower than 2% of the whole stroke) the actuator reachs automatically the end of the stroke.

[Ct] is displayed, press ⏎

choose between [On] to activate this option and [oF] to ignore it. The standard configuration is [oF].

If activating, choose between [00] and [2.0] in 0.5% steps.

5.13. Blinker

In this submenu the inclusion or not of the blinker signal in the actuator operation is decided.

[bL] will be displayed, press ⏎

choose between [On] to activate this option and [oF] to ignore it.The standard configuration is [oF] .

5.14. Control input signal and valve position setting.

In order to achieve a high overall accuracy, the maximum control input ignal and the valve open position have to be set together. Very important: the electronic position transmitter TPS should have been already adjusted correctly according to the " Electric Actuators Instalation and Maintenance Manual" in order to make a correct control input signal setting.
Before making the calibration, the valve should be brought to the maximum opening position, therefore the TPS should be supplying the maximum current.

[Cb] will be displayed, press ⏎
on the display indicator a blinking value will appear, next press ⇧+⏎ simultaneously and the value will stop blinking. Press ⏎ to record the value into the memory and return to displaying [Cb].

Note: Non calibration of input signal, will cause malfunction of the actuator.

5.15. Data Logging.

In this submenu it is possible to know the progression of a set of operational data referring to the actuator along its operating life.

[HI] is displayed and after pressing ⏎ the values of the stored data are displayed.
In order to display the different data, place on the option to be read and after pressing ⏎ the Centronik will start to display the value (as an example, if the number of closings have been 1.357, the control will display "13", "57", " ", "13", "57", " ", "13", "57", " ",) until ⏎ is pressed again; then the Centronik will display the next data to be read. There will always be a blank space to mark the beggining of a new data.

Data available:

[oL]	Nr. of openings by limit switching.
[ot]	Nr. of openings by torque switching.
[CL]	Nr. of closings by limit switching.
[Ct]	Nr. of closing by torque switching.
[tt]	Total running hours.
[tr]	Nr. of trippings of the motor thermoswitches.
[EC]	Nr. of starts

All these data can be obtained through the serial line. For more information refer to "Centronik operation. Serial line" brochure.

5.16. Change of password.

Each time we go through this section, the CENTRONIK switches on L1, L2, L3, L4 and L5 in red colour.

[Ch] will be displayed, press ⏎

choose between [00] and [FF]. In order to confirm ⏎ has to be pressed twice. If after the first time ⇧ or ⇩ is pressed, the new password can be chosen again.

CAUTION ⚠ **Password changing, is a delicate operation. Write it down.**

6. MODULATING DUTY CENTRONIK OPERATION.

The selector being in LOCAL mode, the Modulating CENTRONIK will operate as a ON/OFF duty CENTRONIK. To operate the actuator, use the front panel buttons OPEN, CLOSE, STOP an DES.

The selector being in REMOTE position, the CENTRONIK will operate on MODULATING duty.
The CENTRONIK can also be operated by a serial line. These are the communication´s characteristics:

Transmission speed: 9600 BPS
Character format: 1 start bit, 8 data bits, parity even and 1 stop bit.

For more information about the characteristic of the protocol used, such as message format and message sequence, refer to "Centronik operation. Serial line" brochure.

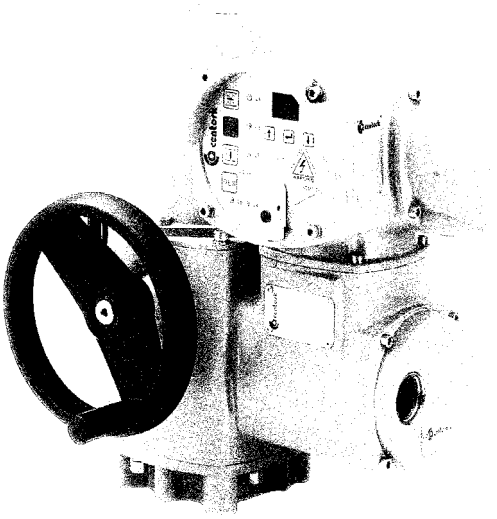
The CENTRONIK software has a "movement detection" funtion. If during the next 6 seconds after the last order no shaft movement is detected the unit will stop the operation. After correcting the problem, the STOP pushbutton be pressed to reset the unit.

The CENTRONIK also incorporates a phase missing and an inverse phase connection detection system. Both of them are indicated in the front panel LEDs, and it automatically adapts its operation to the order of the phases in such a way that the turning sense is correct.

Every CENTRONIK is provided with two main fuses. If needed, they should be changed as follows:

1- Unscrew the electrical connection cover.
2- Unscrew the correspondant fuseholder and change the fuse. Standard 20 x 5 mm 500 mA normal blow fuses are used.
3- Screw both fuseholder and electrical connection back. Check the proper connection, the state of the oring seal and the proper instalation of the latter, greasing it slightly. Fasten the 4 screws crosswise.
4- Tighten cable glands to ensure enclosure IP67 (IP68 on request).

CAUTION  **Make sure a proper ground (GND) connection og the unit is done.**



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VALVE CONTROL

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