INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

CONTROL HEAD

C-TOP S

10.426.32.0013

Original Instructions
10.426.30.03EN
(0) 2022/01

EC Declaration of Conformity

INOXPA S.A.U.
Telers, 60
17820 - Banyoles (Spain)

hereby declare under our sole responsibility that the

Machine:	**CONTROL HEAD**
Model:	**C-TOP S**
Type:	**C-TOP S 24V DC 0E, C-TOP S 24V DC 1E, C-TOP S 24V DC 2E, C-TOP S 24V DC 3E, C-TOP S AS-I 1E, C-TOP S AS-I 2E, C-TOP S AS-I 3E**
Serial number:	**IXXXXXXXXX** to **IXXXXXXXXX** **XXXXXXXXXIINXXX** to **XXXXXXXXXIINXXX**

fulfills all the relevant provisions of the following directive:

Electromagnetic Compatibility Directive 2014/30/EU

and with the following harmonized standards and/or regulations:

EN 61326-1:2013

The technical file has been prepared by the signer of this document.

David Reyero Brunet
Technical Office Manager
15th December 2021

Document: 10.246.30.05EN
Revision: (0) 2021/12

Declaration of Conformity

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fulfills all the relevant provisions of these regulations:

Electromagnetic Compatibility Regulations 2016

and with the following designated standards:

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David Reyero Brunet
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15th December 2021

UK CA

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1. Table of Contents

2. Generalities

2.1. INSTRUCTIONS MANUAL

This manual contains information about the reception, installation, operation, assembly and maintenance of the control head C-TOP S.

Carefully read the instruction before starting the control head, familiarize yourself with the installation, operation and correct use of the control head and strictly follow the instructions. These instructions should be kept in a safe location near the installation area.

The information published in the instruction manual is based on updated data.

INOXPA reserves the right to modify this instruction manual without prior notice.

2.2. COMPLIANCE WITH THE INSTRUCTIONS

Not following the instructions may impose a risk for the operators, the environment and the machine, and may cause the loss of the right to claim damages.

This non-compliance may cause the following risks:
- failure of important machine/plant functions,
- failure of specific maintenance and repair procedures,
- possible electrical, mechanical and chemical hazards,
- the risk to the environment due to the type of substances released.

2.3. WARRANTY

The conditions of the warranty are specified in the General Sales Condition that has been delivered at the time of placing your order.

The machine may not undergo any modification without prior approval from the manufacturer.
For your safety, only use original spare parts and accessories. The usage of other parts will relieve the manufacturer of any liability.
Changing the service conditions can only be carried out with prior written authorization from INOXPA.

Please do not hesitate to contact us in case of doubts or if further explanations are required regarding specific data (adjustments, assembly, disassembly, etc.).

3. Security

3.1. WARNING SYMBOLS

Safety hazard for people in general and/or for the control head

Electrical hazard

ATTENTION Important instruction to prevent damage to the equipment and/or its function

3.2. GENERAL SAFETY INSTRUCTIONS

Read the instruction manual carefully before installing and starting the control head. Contact INOXPA in case of doubt.
For a reliable and without problems function follow the instructions of this manual.
This control head cannot be used in atmospheres where exist explosion hazards.
The installation and the use of the control head always must be following the health and safety applicable regulations.

3.2.1. During installation

Always take into account the Technical Specifications in chapter 8.
Use the device only for its intended use and only with the recommended equipment by INOXPA.
Before performing the installation ensure that the compressed air and the power supplies are switched off and that the actuator of the process valve is pressureless.
Ensure that the power supply does not restart.

All the electrical work should be carried out by specialised personnel.
Only use power supplies that guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1.
Observe the general requirements for PELV circuits in accordance with IEC/DIN EN 60204-1.
Installation errors can damage the electronics or cause malfunctions.
The C-TOP S contains electrostatically sensitive components. Electrostatic discharge caused by improper handling or incorrect earthing can damage the internal electronics.

3.2.2. During operation

Always take into account the Technical Specifications in chapter 8.
Only use the product if it is in perfect technical condition.
NEVER exceed the specified limit values.
Do not touch the inside of the control head when it is in operation.

All the electrical work should be carried out by specialised personnel.
The C-TOP S contains electrostatically sensitive components. Electrostatic discharge caused by improper handling or incorrect earthing can damage the internal electronics.

3.2.3. During maintenance

Always take into account the Technical Specifications in chapter 8.
Before starting the maintenance work, make sure that the compressed air supply is switched off and that the air supply hoses are pressureless. Secure the system against accidental restarting.

All the electrical work should be carried out by specialised personnel.
Before starting the maintenance work, make sure that the power supplies are switched off. Secure the system against accidental restarting.

4. General Information

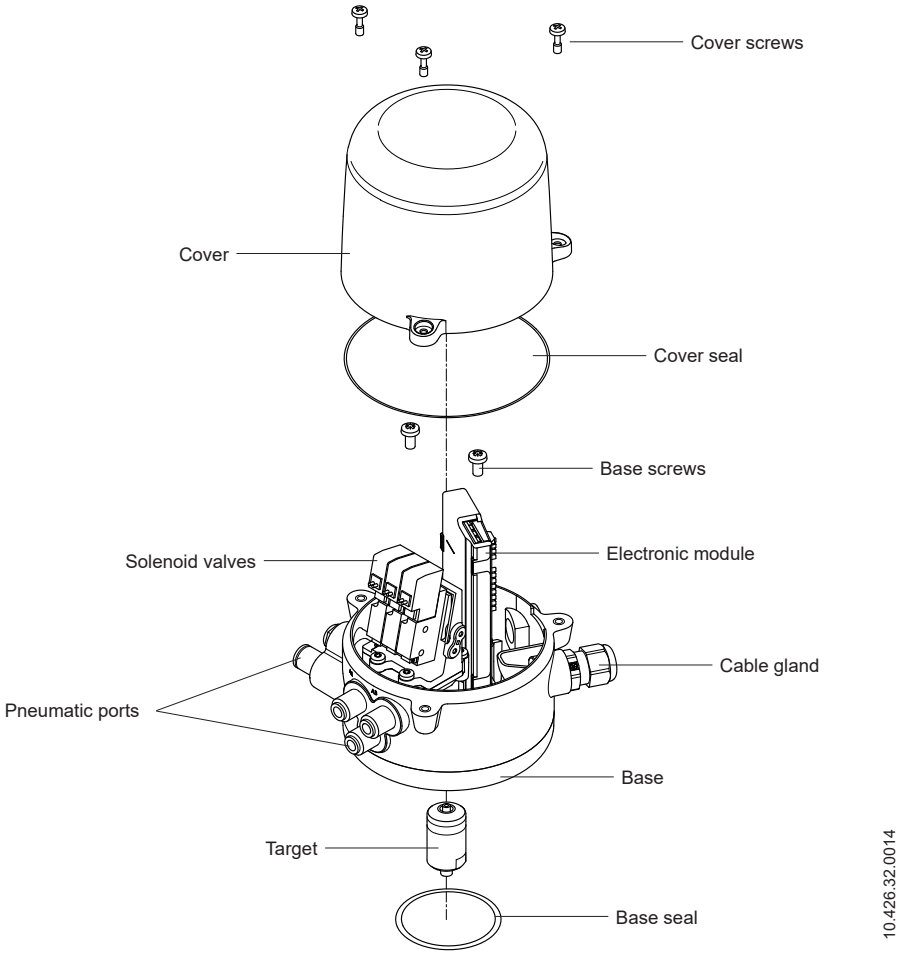
4.1. DESCRIPTION

The C-TOP S is a control head that adapts to all of the INOXPA actuators to automate pneumatic drive process valves. To automate the process valves, the control head can have up to three solenoid valves.

The control head contains a linear detection electronic module comprised of several hall-effect sensors. A PLC system sends signals to the solenoid valves of the control head through the unit's electronic module to control and operate the main valve. At the same time, the electronic module sends feedback signals to the PLC to indicate the current position valve. A particular colour for each valve position lights up to indicate its current status at all times.

The control head is set using the electronic module.

The control head main parts are:



4.2. APPLICATION

The C-TOP S can install on any process valve (butterfly, ball, diaphragm and single or double seat valves) of the food, beverage, chemical or pharmaceutical industry.

5. Installation

5.1. RECEPTION OF THE CONTROL HEAD

INOXPA is not liable for any deterioration of the material caused by its transport or unpacking.

When receipt the control head, check to see whether all the parts listed on the delivery slip are present:

- control head,
- instruction manual.

INOXPA inspects all control heads before packaging. However, it cannot guarantee that the merchandise arrives at the user intact.

When unpacking the valve:

- take all possible precautions against damage to the control head and its components,
- inspect the valve or the parts that comprise it for possible damage incurred during shipping.

5.2. TRANSPORT AND STORAGE

The buyer or user shall be liable for assembly, installation, start-up and operation of the control head.

Take all possible precautions when transporting and storing the control head to avoid damaging it and its components.

5.3. IDENTIFICATION OF THE CONTROL HEAD

Each control head is inscribed a fabrication number for its identification. indicate the fabrication number on all documents to refer to the control head.

5.4. LOCATION

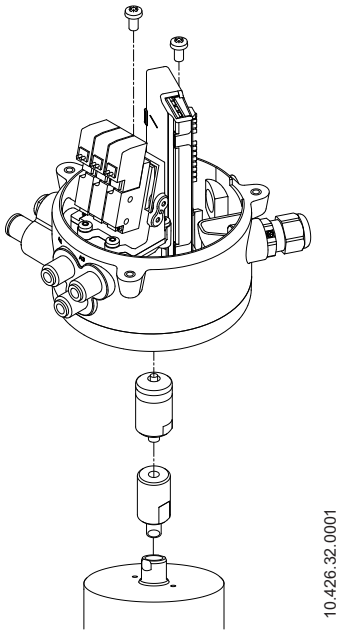
Place the control head leaving enough space around it to realize easily the dismantling, the inspection and the review of the control head. The installation should allow that the removable parts are could remove easily.

5.5. MECHANICAL INSTALLATION OF THE CONTROL HEAD

All the installation work of the control head should be carried out by specialised personnel.
Always follow the instructions of the present manual.
Check that the compressed air and power supply are switched off and the actuator is pressureless before starting the assembly or disassembly works.

To mount the control head on the actuator of the valve follow the next process:

1. If necessary, fit the shaft adapter on the actuator shaft.
2. Place the target (10) on the shaft adapter.
3. Remove the cover screws (01).
4. Position the C-TOP S on the actuator.
5. Tighten the base screws (04) which join the head with the actuator.
6. Place the cover (02) and tighten the cover screws (01).



5.6. PNEUMATIC INSTALLATION OF THE CONTROL HEAD

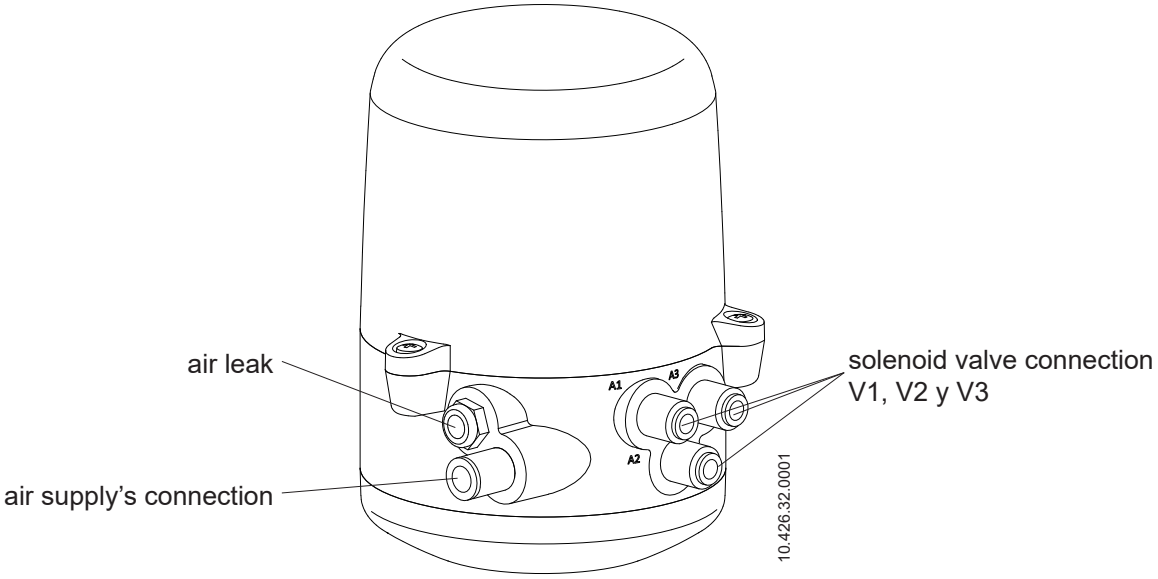
All the installation work of the control head should be carried out by specialised personnel.
Always follow the instructions of the present manual.
Check that the compressed air and power supply are switched off and the actuator is pressureless before starting the assembly or disassembly works.

The identification of the connections is on the control head.

Cut the air hoses at the needed length before starting the pneumatic installation.
To perform the pneumatic installation follow the next process:

1. Connect the air hoses between the necessary air connections A1, A2 and/or A3 of the C-TOP S and the valve's air connections.
2. Connect the air supply hose to the air intake 1 of the control head.
3. Connect the compressed air supply.

Connection	Description	tube outer Ø	Thread
1	supply port for operating pressure	8 mm	
3	exhaust air connection	-	
A1	working port of solenoid valve V1		G 1/8"
A2	working port of solenoid valve V2	6 mm	
A3	working port of solenoid valve V3		



Use only approved air supply's connections and suitable quality for the installation.
Cut the air connections with a suitable cutter to avoid damage to them.
Use the air supply's connections with sufficient length to avoid tensions on them and to avoid its disassemble if separate the control head of the valve is needed.

5.7. ELECTRICAL INSTALLATION OF THE CONTROL HEAD

All the electrical work should be carried out by specialised personnel.
Check that the power supplies are switched off.
Secure the installation to prevent unintentional activation.
The C-TOP contains electrostatically sensitive components. The electrostatic discharge caused by improper handling or incorrect earthing can damage the internal electronics.

The control head C-TOP S is available in three versions of the electronic module with three systems of communication:

1. Digital 24V DC communication for 2 or 3 solenoid valves.
2. Digital 24 V DC communication for 0 or 1 solenoid valves.
3. AS-interface communication.

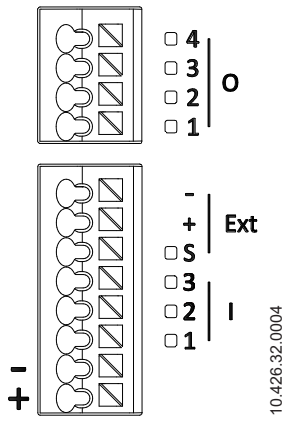
5.7.1. Electrical installations with digital communication 24V DC

To perform the electrical installation of the control head with digital 24V DC communications follow the next steps:

1. Remove the cover screws (01).
2. Lift and remove the cover (02).
3. Route the electrical cable through the cable gland.
4. Connect the cables to the terminal according to the wiring diagram.
5. Tighten the cable gland (08).
6. Place the cover (01) and fix it with the cover screws (01).

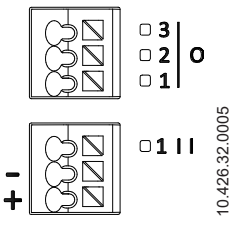
Wiring diagram digital 24 V DC communication for 2/3 solenoid valves and 4 outputs:

Printing		Description
O	4	output position 4
	3	output position 3
	2	output position 2
	1	output position 1
Ext	-	0V (GND) external sensor
	+	24V DC external sensor
	S	input external sensor
I	3	input 3 (solenoid valve 3)
	2	input 2 (solenoid valve 2)
	1	input 1 (solenoid valve 1)
-		0V (GND)
+		24V DC



Wiring diagram digital 24 V DC communication for 1 solenoid valve and 3 outputs:

Printing		Description
O	3	output position 3
	2	output position 2
	1	output position 1
I	1	input 1 (solenoid valve 1)
-		0V (GND)
+		24V DC

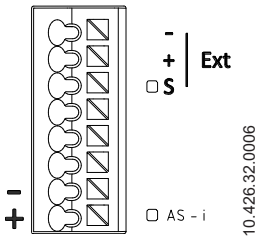


5.7.2. Electrical installation with AS-interface communication

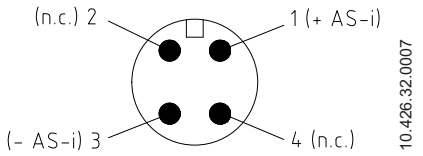
The C-TOP S with AS-interface communication includes a cable with a multipole connector so it is not needed to perform any internal wiring.

Wiring diagram AS-interface communication:

Printing		Description
	-	0V (GND) external sensor
Ext	+	24V DC external sensor
	S	input external sensor
-		- AS-i (M12, pin 3)
+		+ AS-i (M12, pin 1)



M12 male multi-pole connector:



6. Setup

The control head leaves the factory without configuration. Perform a previous setting that consists of memorizing different positions of the shaft of the valve actuator is needed to be able to use it. Once it is installed and is switched on for the first time, the C-TOP S flashes with a white and pink light to indicate that it has not any position memorized.

The control head C-TOP S has two setting modes:

- autotune
- manualtune

The different setting modes of the control head are performed through the of pulsations the "I" and "II" buttons which are in the top part of the electronic module of the control head, so to configure it will be necessary to lift its cover.

The "I" y "II" buttons of the electronic module answer to three types of pulsations according to the following table:

	Pulsation	short pulsation	long pulsation
Time (s)	< 1	1 - 3	> 3
Signalling		light green continuous light	light green flashing light

6.1. AUTOTUNE

The autotune configuration allows an automatic configuration and it works well for most applications. This configuration mode is recommended whenever possible.

With this configuration, the control head activates the solenoid valves sequentially and memorize the different positions of the valve.

The autotune configuration can be carried out in two ways:

- by external signals
- by the internal signals generated by the control head itself

In the autotune configuration by the external way, when the control head receives a signal, the corresponding solenoid valve will be activated and memorize the new position. The control head will be pending to receive new signals for 10 minutes maximum. When the control head receives the external signal, the new position will activate the corresponding digital output and will light the control head according to the configured colour for this position. The control head configuration will finish if, during these 10 minutes, all the possible input signals have been received. Otherwise, is possible to configure the control head by internal signals generated by the control head itself.

To perform the autotune configuration by internal signals follow the next steps:

1. Do a long press on the "I" button. The end of the long press will be indicated by a light green flashing illumination and the start of the configuration by a white flashing light for 2 seconds.
2. The control head's configuration will start automatically activating and memorising the different positions of the valve. The transitions between different positions will be indicated by a pink flashing light. When memorizing each position, the control head will be illuminated by the configured colour for such position, it will activate the corresponding outlet and it will start the transition to the next position.
3. To indicate the end of the autotune configuration the control head will be illuminated by a white continuous light for 5 seconds.

Do a short press on the "II" button to cancel the process of the autotune configuration.

Consult chapter 7. Operating problems if an error occurs during the autotune configuration.

6.2. MANUALTUNE

The manualtune programming allows the manual configuration of the control head. This mode is used in cases where the autotune mode is not possible. For example, it is recommended in case of double effect actuators or if you want to activate, simultaneously, more than one solenoid valve.

In this configuration mode, the positions associated with each output must be memorized one by one.

To perform the manualtune configuration follow the next steps:

1. Do a long press on the "II" button. The end of the long press will be indicated by a light green flashing illumination and the start of the configuration by a white flashing light for 2 seconds.
2. Perform the following steps for each possible valve's position that have to be memorized:
   - place the valve on the position to be memorized. To do this you can use the manual locking of the solenoid valves.
   - the control head will be illuminated by the corresponding configured colour.
   - do a long press on the "II" button to memorize the position or press "I" to discard it.
     - If the position is memorized, the control head will be illuminated continuously light by the corresponding configured colour for 5 seconds. Once the position is saved the control head will be illuminated by a flashing light of the colour of the next position which has to memorize.
     - If the position is discarded the control head illuminates by a flashing light of the colour of the next position which has to memorize.

   The maximum time to memorize the valve's position or discard it is 120 seconds. After this time, the configuration process will be cancelled.
   - to indicate the end of the manualtune configuration the control head will be illuminated by a white continuous light for 5 seconds.

Do a short press on the "I" button to cancel the process of the manualtune configuration.
Consult chapter 7. Operating problems if an error occurs during the manualtune configuration.

6.3. AUXILIARY MODES

The control head has two additional modes which can be useful to do check and maintenance tasks:

- test
- maintenance

6.3.1. Test mode

The test mode allows checking the control head's configuration. Only if you create a configuration previously, manually or automatically, you can access the test mode.

To perform the test mode follow the next steps:

1. Do a short press on the "I" button. The start of the test mode will be indicated by a white flashing light.
2. A test sequence is executed for each solenoid valve. If the target's position is the memorized position is checked for each solenoid valve. If the target's position is correct, the control head will be illuminated by the corresponding configured colour for each solenoid valve.
3. The control head's light is closed during the change of the solenoid valve.
4. To indicate the end of the test mode the control head will be illuminated by a white flashing light for 2 seconds.

During the performance of the test mode, you can pass from checking one solenoid valve to another by doing a short or long press on the "I" button.
Do a short or long press on the "II" button to cancel the test mode.

6.3.2. Maintenance mode

The maintenance mode is used to activate the solenoid valves manually.

To entry to the maintenance mode, situate the DIP switch 4 in the ON position.

The entry to the maintenance mode is indicated with a white flashing light for 2 seconds.

Once inside the maintenance mode, the solenoid valves can be activated manually doing pressing the "I" and "II" buttons according to the combinations of the following table:

"I" button	"II" button	Activate solenoid valve
Pressed	Not pressed	1
Not pressed	Pressed	2
Pressed	Pressed	3
Not pressed	Not presseg	None

If the control head is configured for each solenoid valve that is activated manually, the control head will be illuminated by the corresponding configured colour. If instead, the control head has not any configuration, the control head will be illuminated by a white light.

To finalize the maintenance mode, situate the DIP switch 4 in the OFF position. The end of the maintenance mode will be indicated by a flashing light for 2 seconds.

6.4. RESET

To restore the default settings, reset the control head pressing the "I" and "II" buttons until the control head illuminates by a white continuous light.

6.5. COLOUR CODING

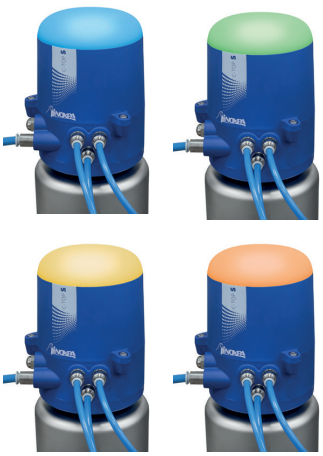
The control head is illuminated by different colours to inform the status of the valve and the control head. There are some default colours and other ones that be chosen to configure the different positions of the valve.

The default colours to operate the C-TOP S are:

- White: to get in and out of the different operating modes. If no change has occurred at the exit of the setting mode, the light of the control head will be flashing. Instead, if any changes have occurred, the light of the control head will be continuous.
- Pink: to indicate transition.
- Red: to indicate an electronic fault.

Other colours can be configured for each outlet according to the following table:

DIP 1	DIP 2	DIP 3	OUT 1	OUT 2	OUT 3	OUT 4
0	0	0	blue	green	yellow	orange
1	0	0	green	blue	yellow	orange
0	1	0	green	yellow	blue	orange
1	1	0	blue	yellow	green	orange
0	0	1	yellow	blue	green	orange
1	0	1	yellow	green	blue	orange
0	1	1	blue	green	orange	yellow
1	1	1	green	blue	orange	yellow



7. Operating problems

Before doing a fault diagnosis check that the control head is correctly connected.

Fault description	Possible causes	Action
The electrical signal is NOT sent or received	The cables are defective or improperly connected	Check the electric connection and the power supply
	The electronic module is defective	Replace the electronic module
The electrical signal is NOT sent or received and the control head NOT be illuminated	The control head is in maintenance mode. The rest position light saved flashes	Move the “DIP Switch 4” to the right to exit the maintenance mode. See chapter 6.3.2. Autotune
The electrical signal is NOT sent or received and the control head FLASHES alternatively with WHITE and PINK light	There is not any saved configuration in the control head	Perform the configuration process according to chapter 6.1. Autotune or 6.2. Manualtune
	The magnet (target) is defective or is not installed	Check that the magnet is installed. If yes, check its state
The electrical signal is NOT sent or received and the control head be illuminated with a CONTINUOUSLY LIGHT	The control head has a configuration that does not correspond with the valve/s	Perform the configuration process according to chapter 6.1. Autotune or 6.2. Manualtune
The process valve does NOT act and the light of the current position FLASHES	The control head is receiving a signal to act but it has not compressed air supply	Check the compressed air supply arrives at the control head
	The external sensor is defective or is not correctly configured or installed	Check that the external sensor is installed and/or is not defective. Then, perform the configuration according to chapter 6.1. Autotune or 6.2. Manualtune
The control head can not act two internal solenoid valves at a time	The control head has not compressed air supply	Check that pneumatic pressure arrives at the control head
The control head does NOT respond at the autotune configuration through external signals. It flashes alternatively with WHITE and PINK light	10 minutes have passed after that the control head has been connected to the power supply	At the end of this time, perform the autotune configuration by internal signs or the manualtune configuration
Wrong operation of the process valves	The pneumatic connections are not correctly connected	Check that each pneumatic hose is connected to the corresponding output of the control head

8. Technical Specifications

8.1. MATERIALS

Plastic parts	PA6
Screws	A2
Seals	NBR
Air fittings	nickel-plated brass

8.2. ENVIRONMENT

Working temperature	C1 - protected areas
Storage temperature	-20ºC to 50ºC
Environment temperature	-5ºC to 50ºC
Degree of protection	IP65, IP67

8.3. CONTROL HEAD

Stroke	≤ 80 mm
Maximum shaft diameter	22 mm
Assembly type	screws
Fluid	filtered compressed air, filtration degree 40 µm lubricated or not lubricated
Measuring principle	HALL sensor without contact
Measured quantity	position
Accuracy	± 0,8 mm
Visual indicators	LED

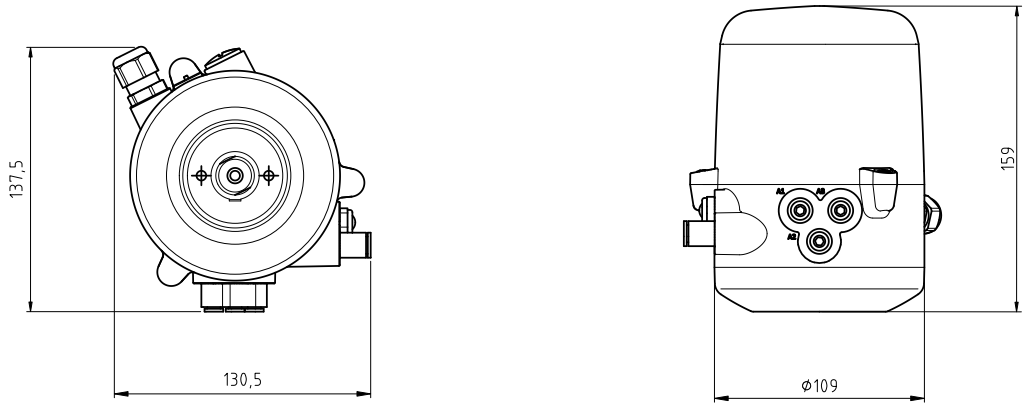
8.4. SOLENOID VALVES

Quantity	0 - 3
Type	3/2 way, normally closed with manual locking
Operating pressure	3 -7 bar
Operating voltage	24 V DC ±10%
Power consumed	0,35 W

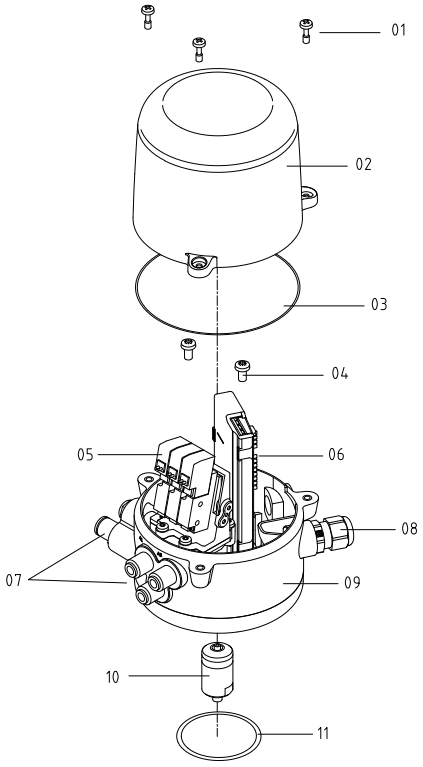
8.5. COMUNICATION

	Digital 24 V DC	AS-interface
Operatin voltage	24 V DC ± 10%	by wire AS-i de 29,5 to 31,6 V DC
Outlets	PNP normally open	-
Terminal	type push-in, nominal cable section 0,2 a 1,5 mm^2 (22 AWG a 16 AWG)	type push-in, nominal cable section 0,2 a 1,5 mm^2 (22 AWG a 16 AWG)
Main input	cable gland M16 x 1,5 (4 to 10 mm diameter cable)	cable gland M16 x 1,5 with 2 m cable and M12 4 pole male connector
External sensor input	M16 x 1,5 plug	M16 x 1,5 plug
Version	-	v 3.0 (A/B addressing and up to 62 nodes)
Slave profile	-	7A77

8.6. DIMENSIONS OF THE C-TOP S



8.7. EXPLODED DRAWING AND PARTS LIST



Position	Description
01	cover screws
02	cover
03	cover seal
04	base screws
05	solenoid valves
06	electronic module
07	pneumatic ports
08	cable gland
09	base
10	target
11	base seal

NOTES

NOTES

NOTES

How to contact INOXPA S.A.U.:
Contact details for all countries are continually updated on our website
Please visit www.inoxpa.com to acces the information.

INOXPA S.A.U.
Telers, 60 - 17820 - Banyoles - España

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