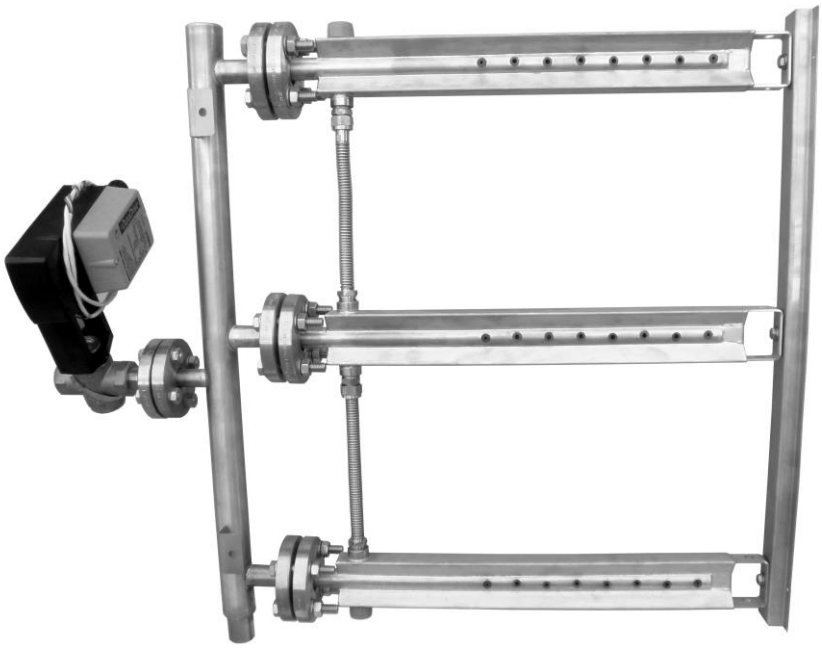
fisair
air humidity control



INSTALLATION AND MAINTENANCE MANUAL
ISOTHERMIC HUMIDIFIERS
BY DRY STEAM INJECTION
DIPHUSAIR-FSH

MFSH-EN-22-0

In compliance with the Rules and Standards of the European Union on Machine Safety, it is essential to read this protocol carefully before installing any equipment.

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AENOR Registered Company ISO 9001
RC-0529/2015
CERTIFIED IQNet MANAGEMENT SYSTEM

Contents

1 Introduction 5
1.1 Operation instructions 5
2 Safety Instructions 6
3 Transport and storage 9
4 Rating plate 10
5 Operating principle and components 12
6 General dimensions 15
6.1 Dispersion tubes and filter 15
6.2 FSH threaded valve 16
6.3 FSH flanged valve 18
7 FSH-SIMPLE TUBE Humidifier 20
7.1 Assembly and installation 22
7.2 FSH-SIMPLE TUBE assembly configuration 24
7.3 FSH-SIMPLE TUBE configuration: Chaining side 25
7.4 Installing recommended tubing for FSH-SIMPLE TUBE 26
7.5 Recommended electric installation for FSH-SIMPLE TUBE 27
8 FSH-MULTI TUBE Humidifier 28
8.1 Assembly and installation 30
8.2 Installing recommended tubing for FSH-MULTI TUBE 32
8.3 Recommended electric installation for FSH-MULTI TUBE 35
9 Recommended sensor location 36
10 Raising condensate 38
11 Operating environment temperature and humidity 38
12 Connection to boiler steam line 39
12.1 Connection to main line 39
12.2 Connecting secondary lines to each injection system 40
13 FSH located inside an AHU 41
14 FSH located inside a duct 43
15 Maintenance 46
16 Troubleshooting 47
17 Declaration of conformity 49
18 Guarantee 50

ANEX: ACTUATORS TECHNICAL INFORMATION

I. **Schneider MS51-7103-150 & MS51-7103-160**
II. **Siemens SKD62 & SKB62**
III. **Spirax AEL3E**

Threaded industrial valve → “Schneider MS51-7103-150 & MS51-7103-160” actuator

Threaded hygienic valve → “Schneider MS51-7103-150 & MS51-7103-160” actuator

Flanged industrial valve →“Siemens SKD62 & SKB62” actuator

Flanged hygienic valve →”Spirax AEL3E” actuator

1 Introduction

Dear Customer,

The DIPHUSAIR humidifier is our answer to current technical needs, due to its safe operation, its operational convenience and economic efficiency.

To ensure effective operation of your DIPHUSAIR humidifier, please read the Installation, Operation and Maintenance Instructions.

Use the steam humidifier only in appropriate and safe conditions, while paying attention to all the notes in these instructions.

If you have any questions... Please contact us:

FISAIR, S.L.U.
Tel.: (34) 916.921.514
Fax: (34) 916.916.456
www.fisair.com/contact

Or contact your local distributor.

1.1 Operation instructions

The correct use of the humidifier includes following our instructions for installation, set-up, operation and maintenance, as well as following the steps indicated in the instructions in the correct sequence as described.

This humidifier may only be used by persons who are fully qualified and authorized to do so.

Any person who transports and/or used the unit or who works with it must read and understand the relevant section of this manual, in particular the section entitled "Safety Instructions".

You are advised to keep a copy of the user manual in the place where the humidifier is going to operate (or nearby).

Ignoring these instructions may invalidate all applicable guarantees and warranties.

2 Safety Instructions

FISAIR disclaims any liability if not all the installation and operating instructions it has provided are complied with; if the products have been modified or altered without the written consent of FISAIR; or if the products have been subjected to improper use, mishandling, alteration, improper maintenance or show signs of negligent use or being involved in an accident. These situations could include an incorrect power connection, impacts with other objects, removal or disarming of security fittings/measures, etc.

Please read these safety notes carefully and examine the equipment to become familiar with it before installing, commissioning or servicing.

The following symbols or messages may appear in this document or on the equipment. They warn of potential hazards or provide information that may help you clarify or simplify a procedure.

See instructions

This manual should be read before installation by properly qualified personnel. Incorrect installation can cause personal and equipment damage. You must consult the manual before maintenance or start-up.

Attention

This is a safety alert symbol. It warns of the potential of bodily injury.

Observe all safety information with this symbol to avoid any situation that could lead to injuries and/or damage to the unit.

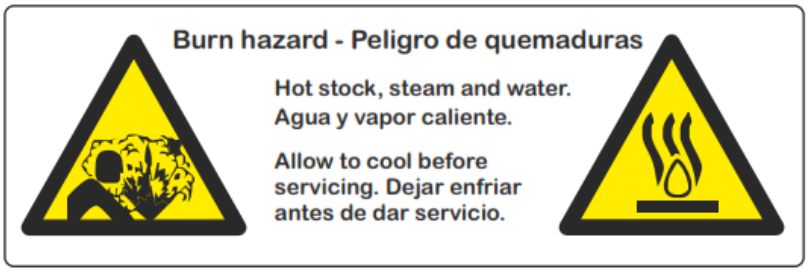
Attention, Live Current

The presence of this symbol on a hazard or warning label indicates that there is a risk of electrocution, which can lead to personal injury or life-threatening conditions if the instructions are not followed.

Turn off before opening

Turn off the power before opening the equipment to make new connections or perform maintenance in any part of it. Electric shock or fire may result if not turned off. Follow the equipment shutdown and control instructions to ensure the safety of the equipment and personnel.

Hot surface and danger of burns



This steam humidifier has extremely hot surfaces. Water in the tank, pipes and distribution assemblies can reach 100°C.

Contact with the equipment surfaces and boiler water inlets and outlets is very dangerous and can cause severe burns. Let the equipment cool down before maintenance or inspection of any part of the system. The steam injected/discharged may not be visible and is therefore dangerous.

Make sure that all threaded connections in the system are properly tightened so they cannot leak steam or condensed water. These can cause burns and/or serious injuries.

Contact with hot surfaces, with condensate water or air containing discharged steam can cause burns and/or serious injuries.

Insulation standards in equipment with hot surfaces:

According to the additional technical instructions standard, ITE 02.15.2 Hot Surfaces: *"Except for the surfaces of heat-emitting components, any equipment surface that can be touched accidentally must have a temperature lower than 60°C or be protected, where necessary ..."*

Appendix 03.1 of the same ITE, Minimum *thermal* insulation thickness: *"Equipment components (e.g. devices, appliances, pipes and accessories) must have a thermal insulation with the minimum thickness outlined below when they contain fluids at temperature: Lower than the environment, above 40°C and located in unheated rooms, including conduits, galleries, machine rooms and similar ..."* This type of equipment should be thermally insulated.

General points

- If you notice that something is not working properly, switch off the unit immediately and take steps to ensure that it does not switch on again. All faults must be corrected immediately.
- Use duly qualified personnel to carry out repair work. This will ensure that the unit operates safely.
- Use only original FISAIR replacement parts.
- Refer to local regulations that restrict or regulate the use of this humidifier.

How the unit works

- Do not jeopardise the safety of the unit.
- Periodically check the device's protection and alert devices.
- The unit's safety fittings must not be removed or disabled.

Installing, Disassembling, Maintaining and Repairing the unit

- Switch off the unit's power supply when conducting maintenance work or making repairs to the unit.
- Never add components to the unit without prior written approval from FISAIR.

About the electrical components

- Any work that affects the electrical components must be carried out by qualified electricians.
- Switch off the power supply and ensure that it does not re-connect while any electrical component is being handled.
- Switch off the unit immediately if any fault is detected in the electrical power supply.
- Use only original, correctly calibrated fuses.
- Carry out periodic checks of the electrical unit.
- All defects, such as loose connections or burnt cables, must be repaired immediately

3 Transport and storage

When in transit, the unit must be protected from impacts of any kind, and all possible measures must be taken to prevent malfunctions due to improper loading or unloading of the unit.

When lifting the equipment, always use a pallet truck or forklift.

Upon receipt of the unit, make sure that the type and serial number of the plate correspond to the order and delivery information. Check that the unit is complete and in perfect conditions. If there are components missing or damaged during transport, immediately inform your supplier in writing.

Keep the unit dry and protected from the elements while in storage. If it has to be stored for a long period before installation, choose a place where the equipment will not be damaged mechanically or be contaminated by dust or construction materials. If stored outdoors, protect it against the weather and atmospheric elements.

Attention

Avoid direct exposure to the sun and places that can exceed 50°C.

Note: Storage area temperature and humidity conditions:

- Temperature: [-20…+50ºC]
- Relative humidity: [5…95% RH] no condensation.

Check the merchandise upon receipt. Check that the type and serial number of the label corresponds to the order and supply information, and that the equipment is complete and in good condition.

Note: Immediately inform your carrier in writing if there is any transportation damage or missing components.

4 Rating plate

The rating plate provide essential information about the technical features of the machine.

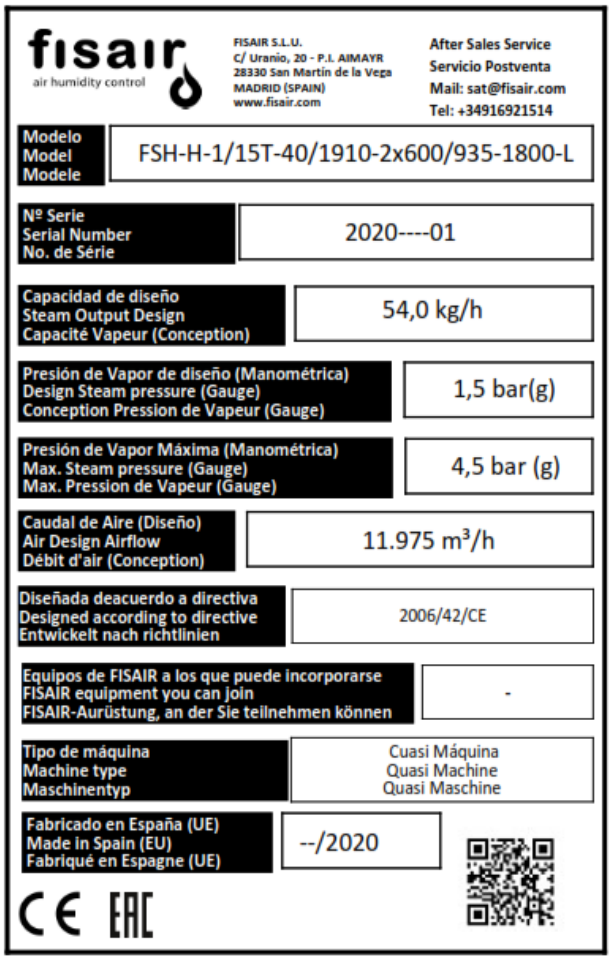
The EC Machinery Safety Regulation requires all machinery operated within the European Economic Community to have a rating plate indicating its main features, the machine serial number and the manufacturer's name inscribed in a durable manner.

According to article 2, section g of the Machinery Directive 2006/42/CE - RD 1644/2008, ‘partly completed machinery’ (quasi machine) means:

“Partly completed machinery” “an assembly which is almost machinery, but which cannot perform a specific application. A drive system is partly completed machinery. Partly completed machinery is intended only to be incorporated into or assembled with other machinery or other partly completed machinery or equipment, thereby forming machinery to which this Directive applies”

The DIPHUSAIR-FSH series incorporates the following information on its plate:

- Equipment model
- Equipment serial number
- Design capacity
- Design steam pressure (gauge)
- Maximum steam pressure (gauge)
- Design air flow
- Place and date of manufacture
- FISAIR devices it can be joined with
- Machine type: Partly completed machinery or interchangeable equipment
- Designed in accordance with directive
- QR code for technical assistance service and warranty activation



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air humidity control

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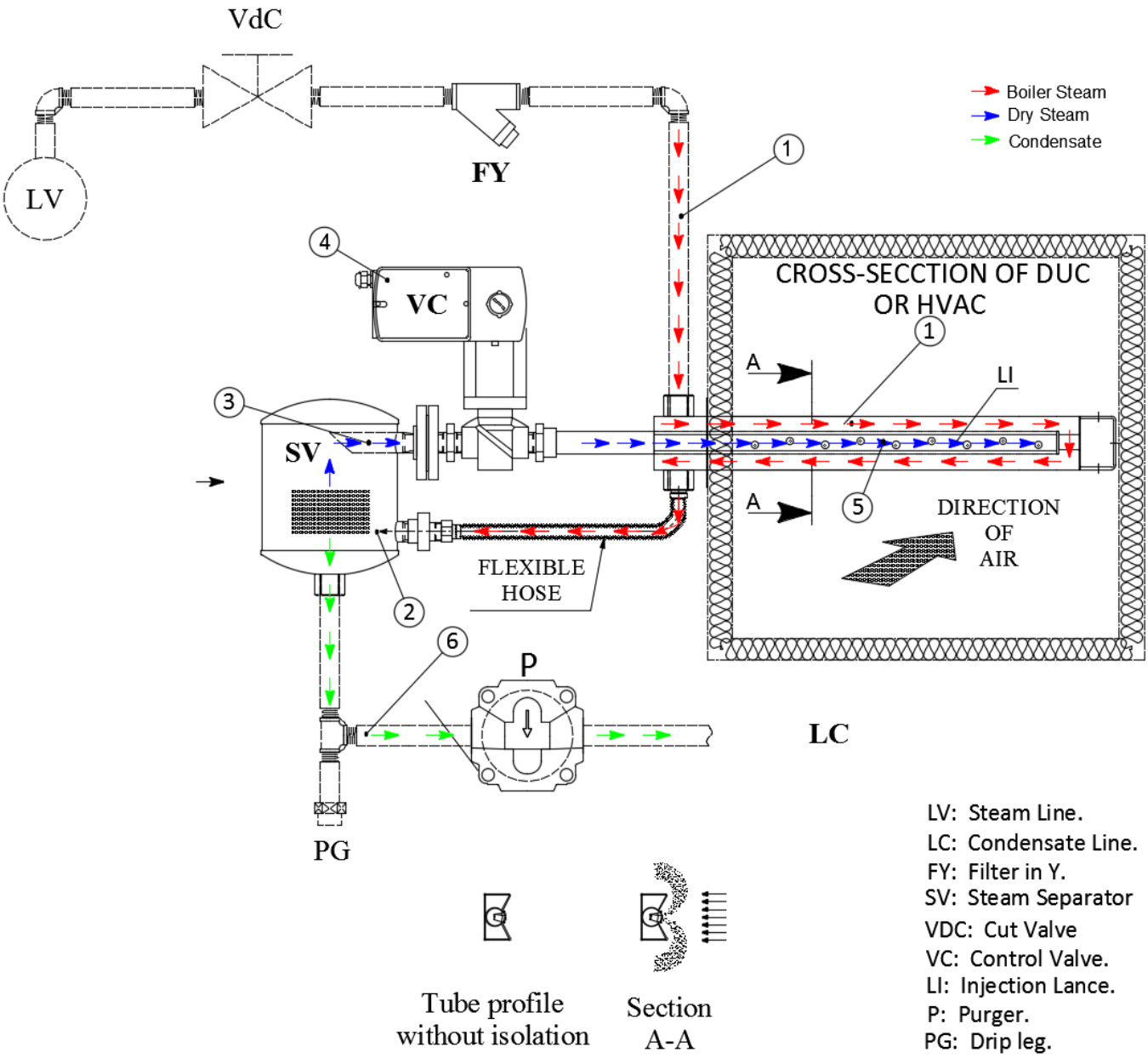
Modelo Model Modele	FSH-H-1/15T-40/1910-2x600/935-1800-L
Nº Serie Serial Number No. de Série	2020----01
Capacidad de diseño Steam Output Design Capacité Vapeur (Conception)	54,0 kg/h
Presión de Vapor de diseño (Manométrica) Design Steam pressure (Gauge) Conception Pression de Vapeur (Gauge)	1,5 bar(g)
Presión de Vapor Máxima (Manométrica) Max. Steam pressure (Gauge) Max. Pression de Vapeur (Gauge)	4,5 bar (g)
Caudal de Aire (Diseño) Air Design Airflow Débit d'air (Conception)	11.975 m^3/h
Diseñada deacuerdo a directiva Designed according to directive Entwickelt nach richtlinien	2006/42/CE
Equipos de FISAIR a los que puede incorporarse FISAIR equipment you can join FISAIR-Aurüstung, an der Sie teilnehmen können	-
Tipo de máquina Machine type Maschinentyp	Cuasi Máquina Quasi Machine Quasi Maschine
Fabricado en España (UE) Made in Spain (EU) Fabriqué en Espagne (UE)	--/2020

CE EAC

Example of a DIPHUSAIR-MT2(P) device specification plate

5 Operating principle and components

The FISAIR series DIPHUSAIR air humidifiers work by steam injection, to isothermally increase the absolute air humidity in a controlled manner, such as in an AHU. There are two configurations: FSH-SIMPLE TUBE (one jet) and FSH-MULTI TUBE (two or more jets).



1) The supply steam is filtered before entering the injection jet jacket, creating a heating jacket at the temperature of the supply steam, which ensures the re-evaporation of possible condensate in the inner discharge pipe.

2) The steam enters the separator and hits a baffle which gives it a centrifugal path, separating the thicker droplets, and an intermediate helix, which acts as a separator of the smaller drops.

3) The dry steam rises and exits through the centre of the separator through an inner tube to ensure that it does not drag any droplets with it.

4) The control valve regulates the passage of dry steam to the injection jets. Here, the steam expands at its output to atmospheric pressure, which also ensures the re-evaporation of any condensate.

5) The steam is discharged uniformly throughout the length of the injection jets through the nozzles. Any condensate formed from the valve is re-evaporated by the “heating jacket”.

6) The condensate collected by the separator drains and goes directly into the trap. The MULTI-TUBE FSH has one more trap: exclusively to drain the condensate formed in the “heating jackets”.

FSH REFERENCES:

- FSH-SIMPLE TUBO:

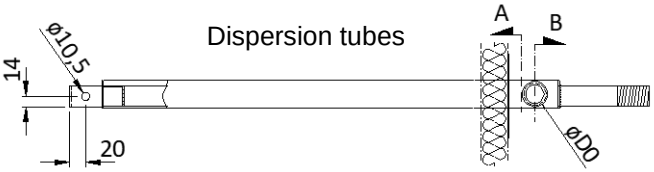
MODEL RANGE	(S) STANDARD (H) HYGIENIC	STEAM VALVE DIAMETER (DN)	VALVE AND TUBE CONECTION: THREADED(T) / FLANGED(F)	AHU/ DUCT AVAILABLE WIDTH (mm)	DISPERSION TUBES STANDARD INSERTION LENGTH (mm) (LI)
FSH -	S -	15	T -	/ XXXX -	FROM 300 TO 3000
	H	20	F		
		25			
		32			
		40			

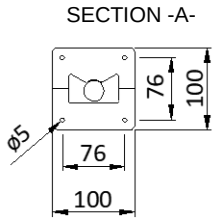
- FSH-MULTI TUBO:

MODEL RANGE	(S) STANDARD (H) HYGIENIC	STEAM VALVE DIAMETER (DN)	VALVE AND CONECTIONS TUBES-HEADER TYPE: THREADED / FLANGED	SQUARE COLLECTOR SIZE (C)	AHU/ DUCT AVAILABLE WIDTH (mm)	DISPERSION TUBES QTY.	DISPERSION TUBE PITCH (P)	AHU/ DUCT AVAILABLE HEIGHT (mm)	DISPERSION TUBES STANDARD INSERTION LENGTH (mm)(LI)
FSH -	S -	15	T -	40	/ XXXX -	FROM 2 TO 16	x 150	/ YYYY -	FROM 300 TO 3000
	H	20	F	50			300		
		25		80			450		
		32		100			600		
		40		125					

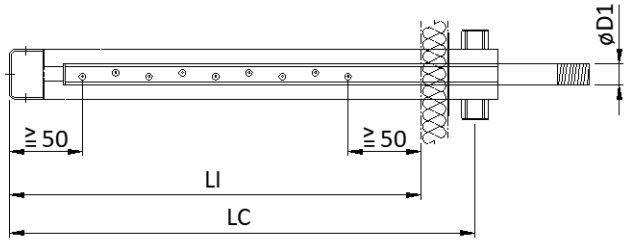
6 General dimensions

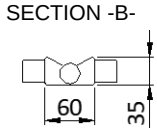
6.1 Dispersion tubes and filter



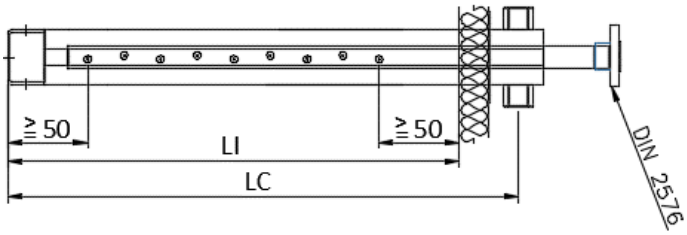


Case 1: Links and threaded valves



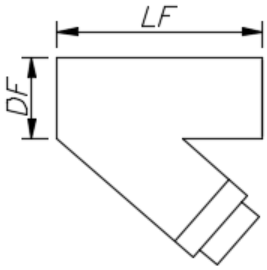


		Thread
∅D0	DN-20	MALE GAS
∅D1	DN-20	FEMALE GAS



Case 2: Flanges and flanged valves

Model	300	400	500	600	700	800	900	1000	1200
LI (mm)	300	400	500	600	700	800	900	1000	1200
LC (mm)	382	490	598	706	814	886	994	1102	1282
Model	1400	1600	1800	2000	2200	2400	2600	2800	3000
LI (mm)	1400	1600	1800	2000	2200	2400	2600	2800	3000
LC (mm)	1498	1678	1886	2110	2290	2506	2686	2902	3082

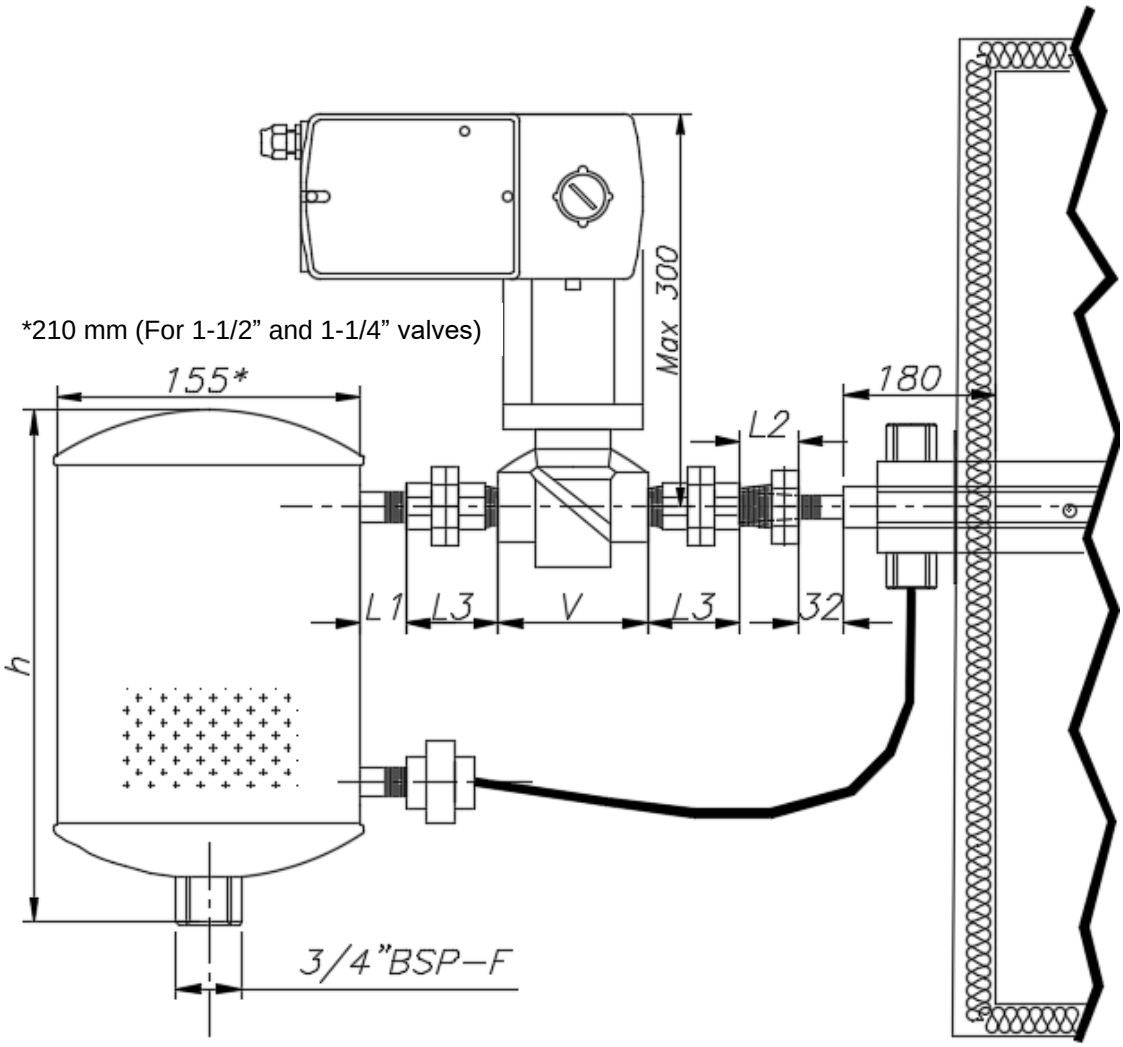


FST (*) Filter definition	DF (“)	LF (mm)
FF-INOX-1	½''	64
FF-INOX-2	¾''	80
FF-INOX-3	1''	90
FF-INOX-4	1 ¼''	106
FF-INOX-5	1 ½''	119
FF-INOX-6	2''	140

(*) Defined in the "Report" report of the FST (Fisair Selection Tool)

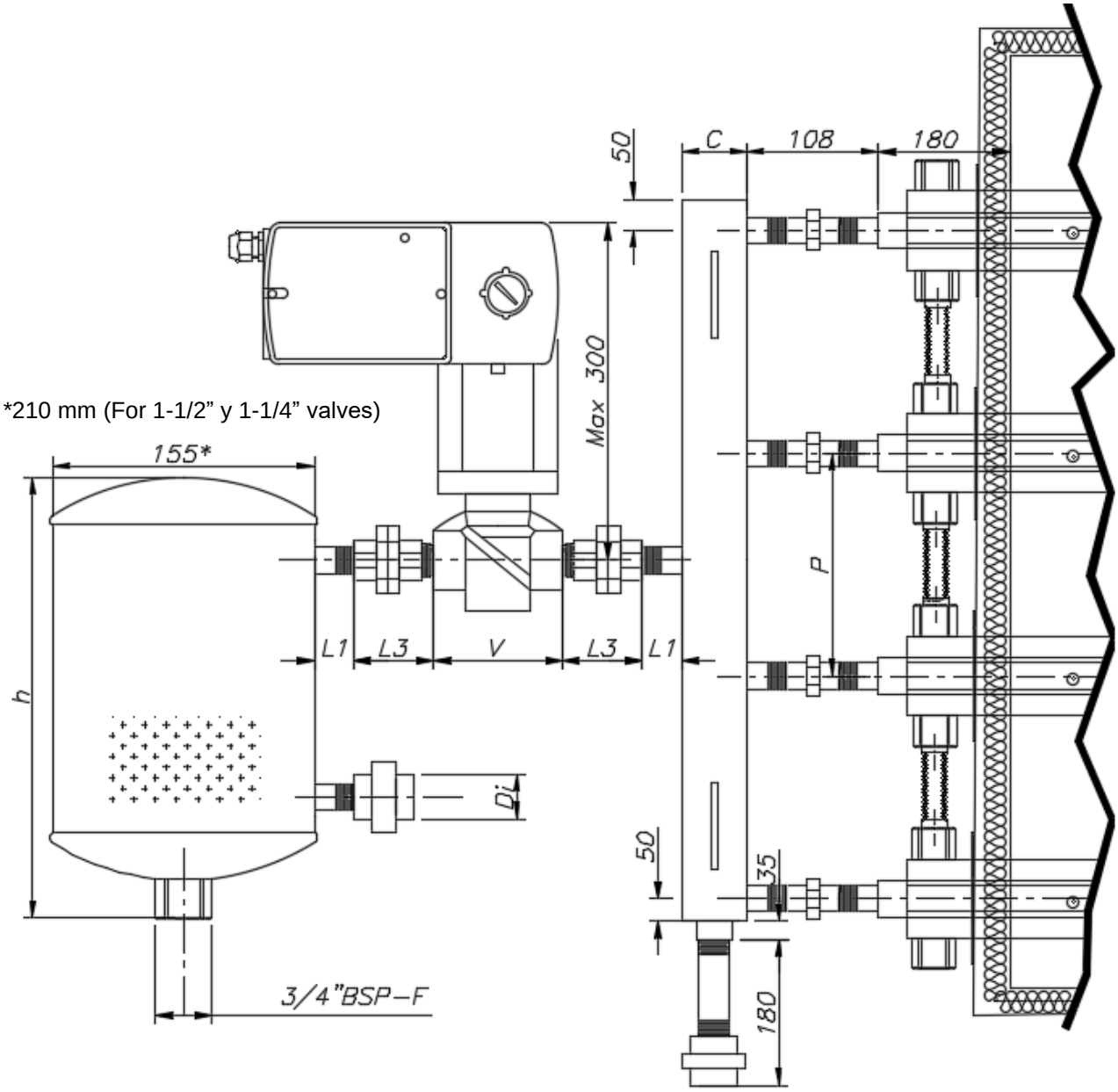
6.2 FSH threaded valve

- FSH SIMPLE-TUBE:



		VALVES: DISTANCE "V" (mm)		JOINT F-M	JUNCTION	REDUCER	STEAM SEPARATOR
		Threaded valve(T)		FIG 341	FIG 149	FIG 241	“h” (mm)
DN (mm)	DN (")	Bronze(S)	Stainless Steel(H)	"L3"(mm)	"L1"(mm)	“L2” (mm)	
15	1/2"	78	76	62	30	NOT NECESARY	213
20	3/4"	92	91	62	32	NOT NECESARY	293
25	1"	118	/	70	35	26	398
32	1-1/4"	118	/	78	38	29	410
40	1-1/2"	137	/	81	42	31	410

- FSH-MULTI TUBE:

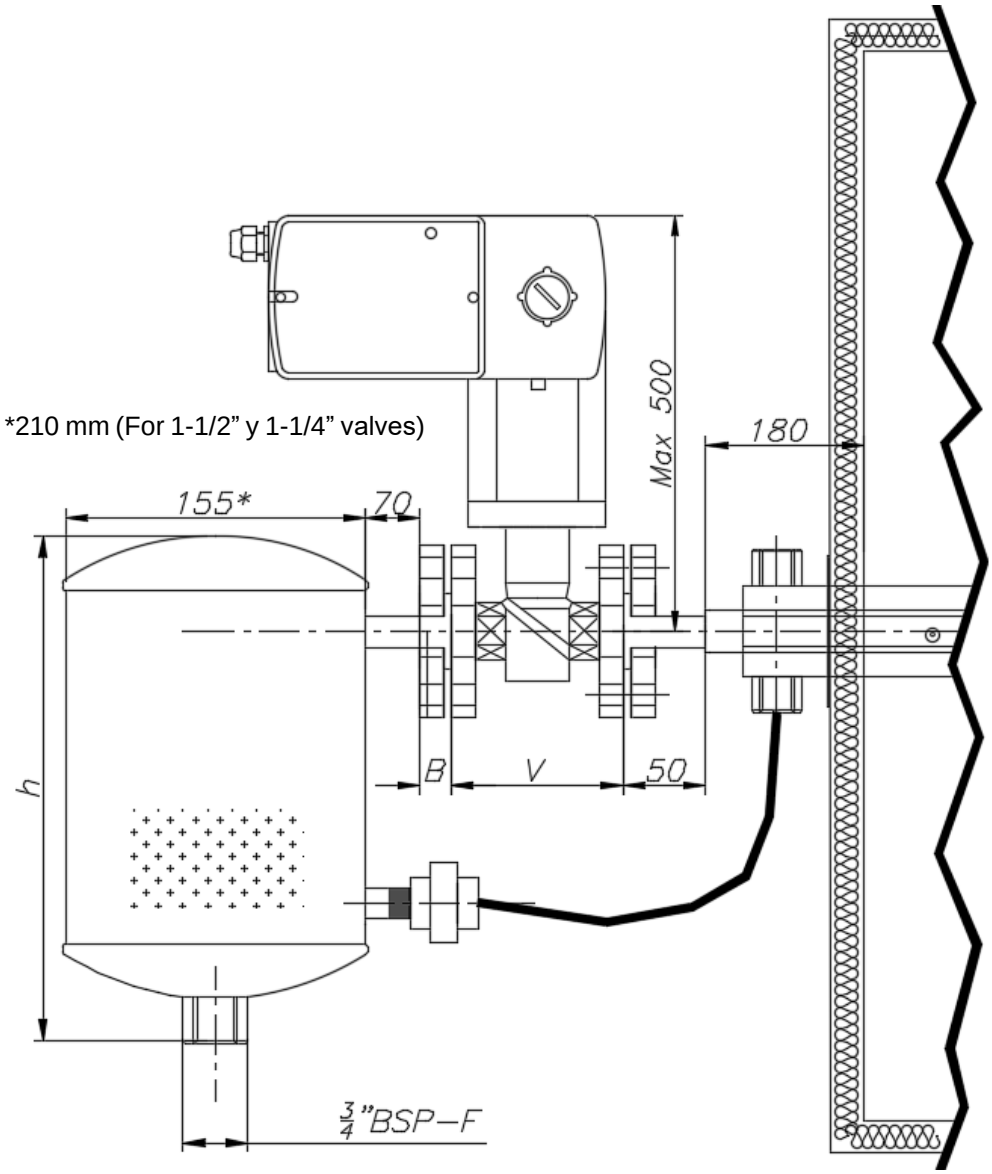


P: Dispersion tube pitch. “See FSH references”

		VALVES: DISTANCE "V" (mm)		JOINT F-M	JUNCTION	STEAM SEPARATOR		COLLECTOR
		Threaded (T)		FIG 341	FIG 149	“h” (mm)	“Di” (mm)	“C” diameter (mm)
DN (mm)	DN (")	Bronze(S)	Stainless Steel(H)	"L3"(mm)	"L1"(mm)			
15	1/2"	78	76	62	30	213	1/2”	40
20	3/4"	92	91	62	32	293	¾”	50
25	1"	118	/	70	35	398	1”	80
32	1-1/4"	118	/	78	38	410	1-1/2”	100
40	1-1/2"	137	/	81	42	410		125

6.3 FSH flanged valve

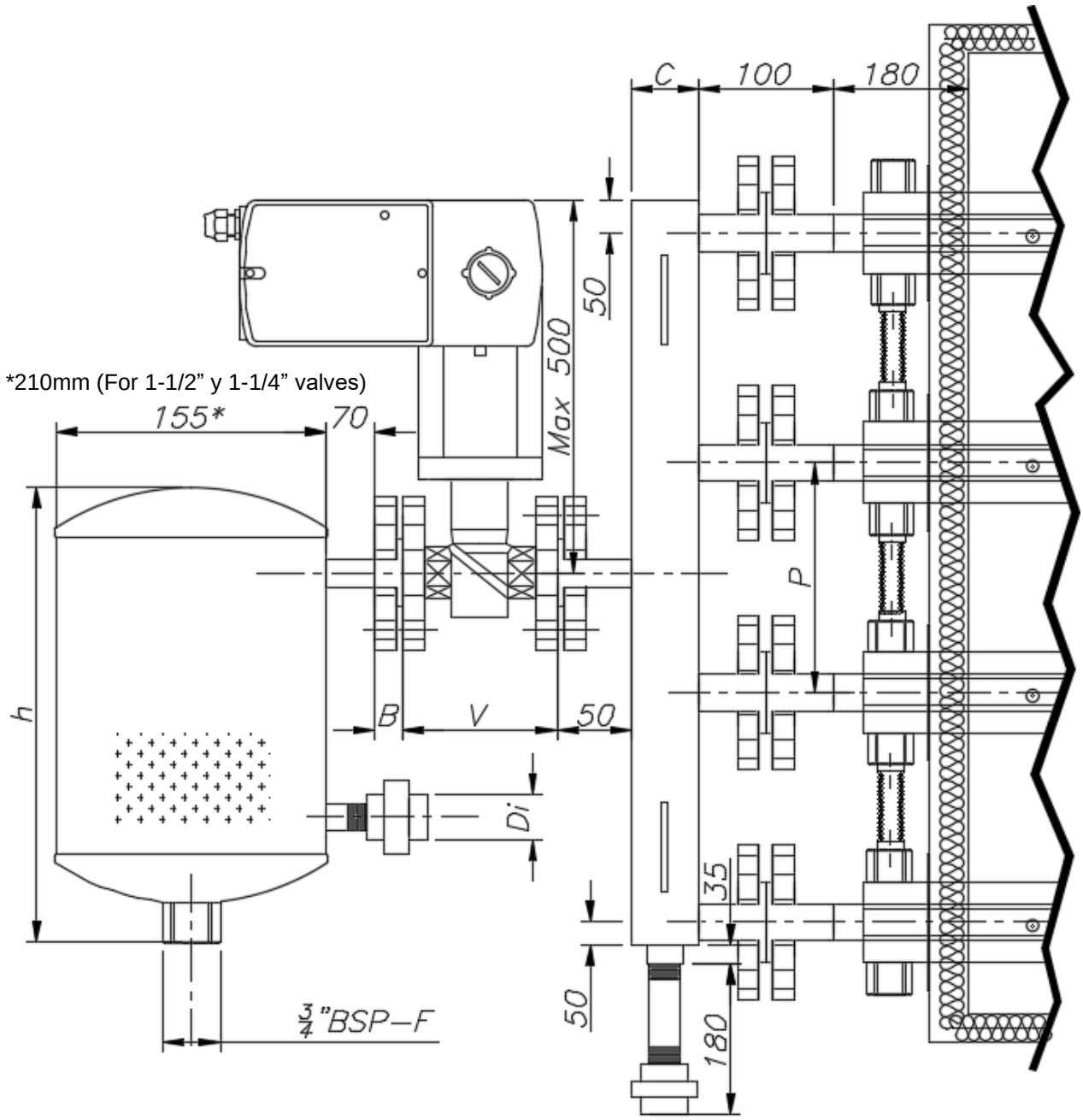
- FSH SIMPLE-TUBE:



		VALVES: DISTANCE "V" (mm)		FLANGE	STEAM SEPARATOR
		Flanged		DIN 2576	“h”(mm)
DN (mm)	DN (")	Cast Steel (S)	Stainless Steel (H)	"B"(mm)	
15	1/2"	130	184	14	213-293**
20	3/4"	150	184	16	293-398**
25	1"	160	184	16	398
32	1-1/4"	180	/	18	410
40	1-1/2"	200	222	18	410

** Depending on the capacity of the FSH

- FSH-MULTI TUBE



P: Dispersion tube pitch. “See FSH references”

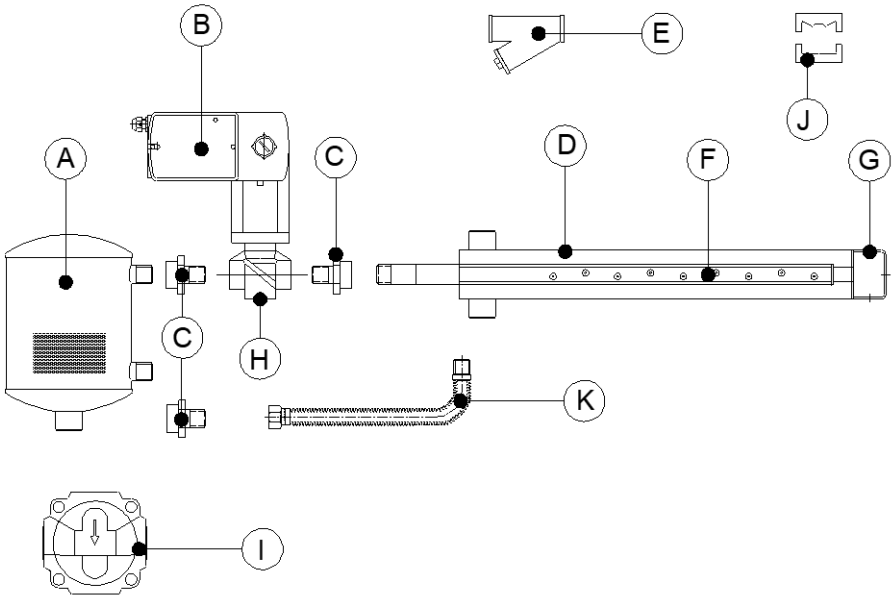
		VALVES: DISTANCE "V" (mm)		FLANGE	COLLECTOR	STEAM SEPARATOR	
		Flanged		DIN 2576			
DN (mm)	DN (")	Cast Steel (S)	Stainless Steel (H)	"B"(mm)	"C"(mm)	"h"(mm)	“Di” (mm)
15	1/2"	130	184	14	40	213	1/2"
20	3/4"	150	184	16	50	293	3/4"
25	1"	160	184	16	80	398	1"
32	1-1/4"	180	/	18	100	410	1-1/2"
40	1-1/2"	200	222	18	125	410	

7 FSH-SIMPLE TUBE Humidifier

- With threaded valve (for pressures less than 2.4 barG)

List of parts delivered by FISAIR:

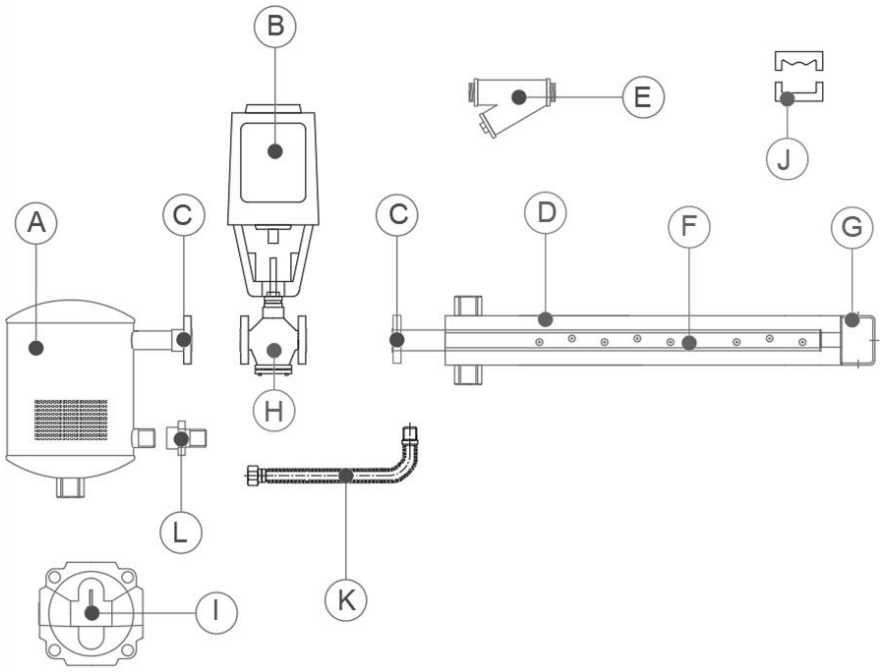
A	Separator
B	Actuator
C	Threaded link
D	Injection Line
E	Filter in “Y”
F	Nozzles
G	Clamping fork
H	Threaded valve
I	F&T trap
J	Seal cover
K	Flexible hose



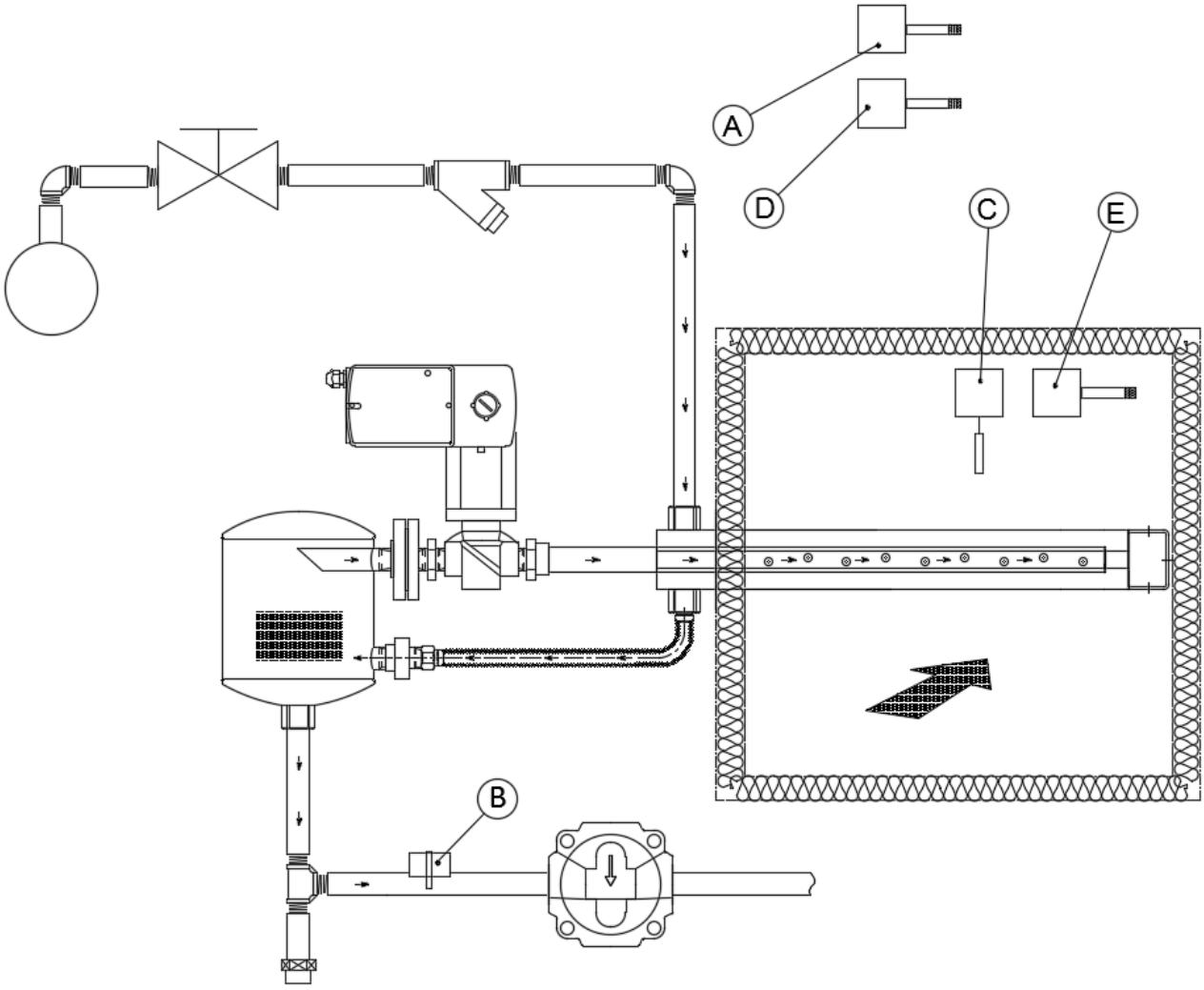
- with flanged valve (for pressures greater than 2.4 bar G or by customer request)

List of parts delivered by FISAIR:

A	Separator
B	Actuator
C	Loose flange
D	Injection Line
E	Filter in “Y”
F	Nozzles
G	Clamping fork
H	Flanged valve
I	F&T trap
J	Seal cover
K	Flexible hose
L	Threaded link



List of optional components:



A- HUMIDISTAT (R.H.) WITH ENVIROMENTAL/ROOM OR DUCT/AHU ACTIVE PROBE
B- NON-DRIP SAFETY THERMOSTAT
C- FLOW SWITCH
D- ACTIVE DOUBLE/TEMPERATURE AND HUMIDITY (H.R.) SENSOR, FOR DUCT/AHU OR ROOM
E- MÁXIMUN HUMIDITY CUT-OFF HYGROSTAT

7.1 Assembly and installation

Note: When the equipment is being handled for installation, some threads may loosen. Therefore, it is necessary to check at start-up if there is any small leakage in any of the threads and adjust them accordingly.

Assembly on site

Sometimes, large units are delivered without assembling to reduce transportation costs. Follow the instructions below for assembly:

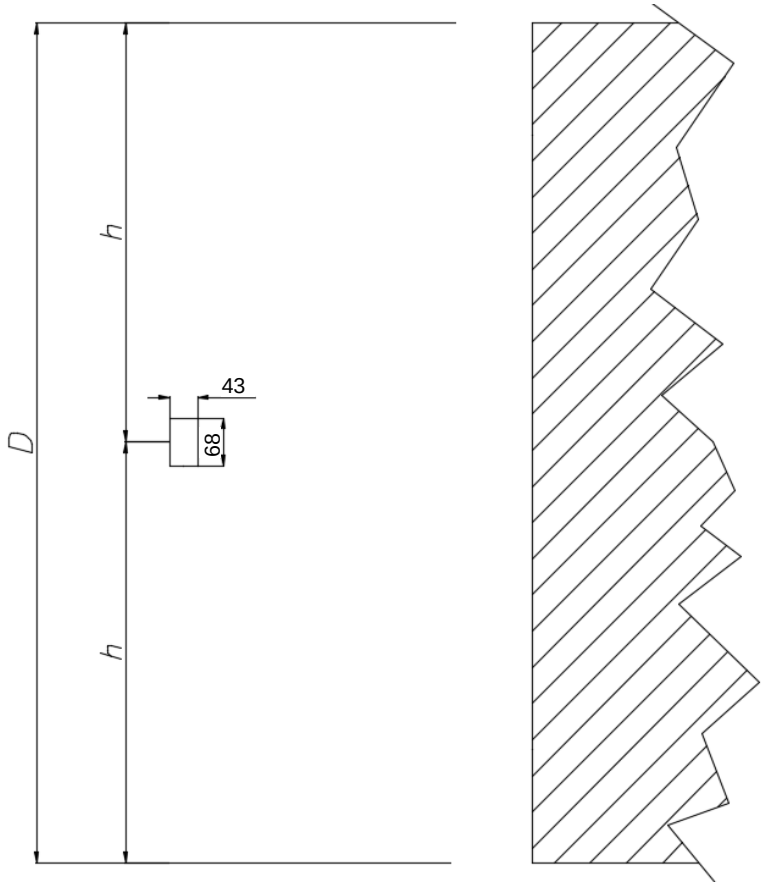
1) Unpack the equipment and check the parts list. If a component is missing, please contact us.
2) Attach the dispersion tube with its corresponding valve-separator assembly. The nozzles should be oriented against the air current.
3) Unscrew the union tubing by removing the elbow and nut and installing it in the socket of the tube sleeve. Before this point, you must have decided in which direction (left or right) the steam holes should be directed and installed it in the proper coupling.
4) Fasten the links. At the same time, tighten the silencer clamps (if applicable) and slide them into the adapters, allowing them to grip with the bottom of the connector. Join the halves of the joints, tightening the union of the nuts with plastic not too strongly. The unit is ready to be installed in the duct.

Installation

If you are unsure about positioning the equipment in the AHU or duct, see sections 13 and 14.

1) Insert the equipment in the air treatment unit on one side and position it crosswise to the duct.
2) Fasten the device by the clamping fork at the end of the jet on one side of the treatment unit. Fasten the other end of the jet to the other side of the treatment unit using the seal cover provided with the equipment.
3) Install the steam trap and the “Y” filter, see section 7.4.
4) Install the valve actuator electrical connections (see section 7.5). In addition, you should install a pressure switch to detect air flow, to prevent the valve from opening if there is no flow.

Recommended installation drills at Duct/AHU



D	Available height
h	Distance between injection tubes and duct/AHU

$$h = \frac{D}{2}$$

Practical example:

- D=700 mm

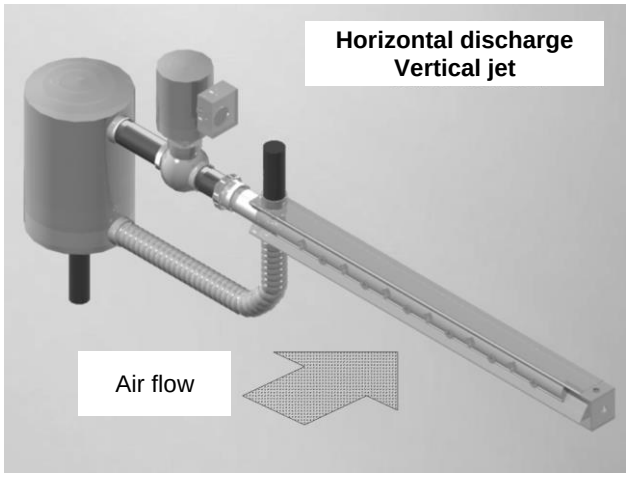
$$h = \frac{700}{2} = 350\ mm$$

Note: “h” minimum distance = 132, 5 mm

7.2 FSH-SIMPLE TUBE assembly configuration

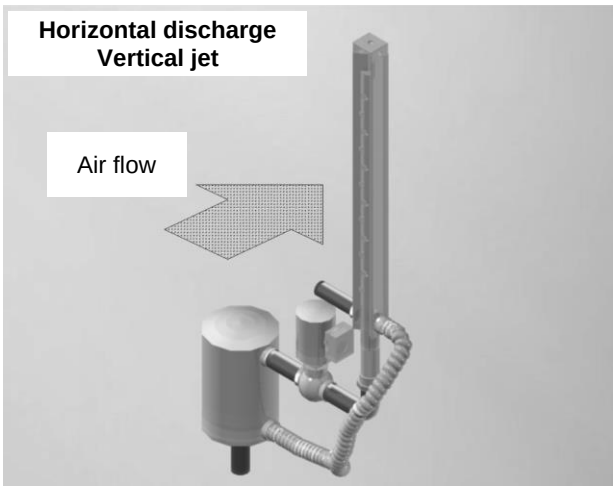
- Standard configuration (*)

Horizontal jet and horizontal steam discharge.
This configuration covers most uses.
This is how the units are delivered unless otherwise indicated.
The left-hand configuration is displayed. To change side, see section 7.3.



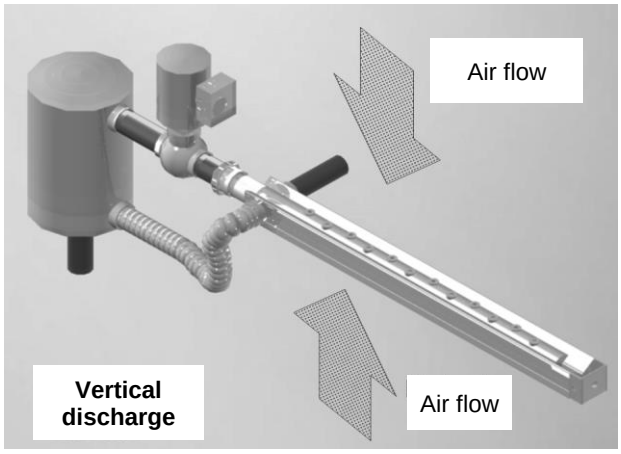
- Optional configuration A (*)

Vertical jet and horizontal steam discharge.
This is used when there is no access on one side of the duct.
Steam absorption will increase if the duct is high and narrow instead of deep and wide.



- Optional configuration B (*)

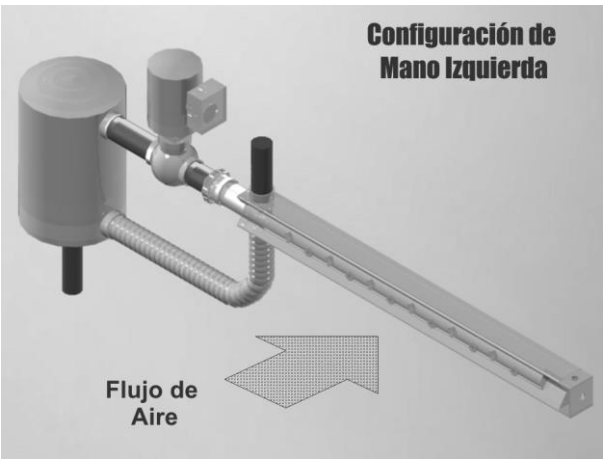
Horizontal jet and vertical steam discharge.
It is used in vertical ducts.
The nozzles should always point up, regardless of the direction of the air flow (up or down).



(*) Note: The steam must be discharged against the air flow. The insulated pipes must discharge in favour of the air flow to prevent condensation in the enclosure. A minimum speed of 1.5 m/s is recommended with the insulated dispersion tubes.

7.3 FSH-SIMPLE TUBE configuration: Chaining side

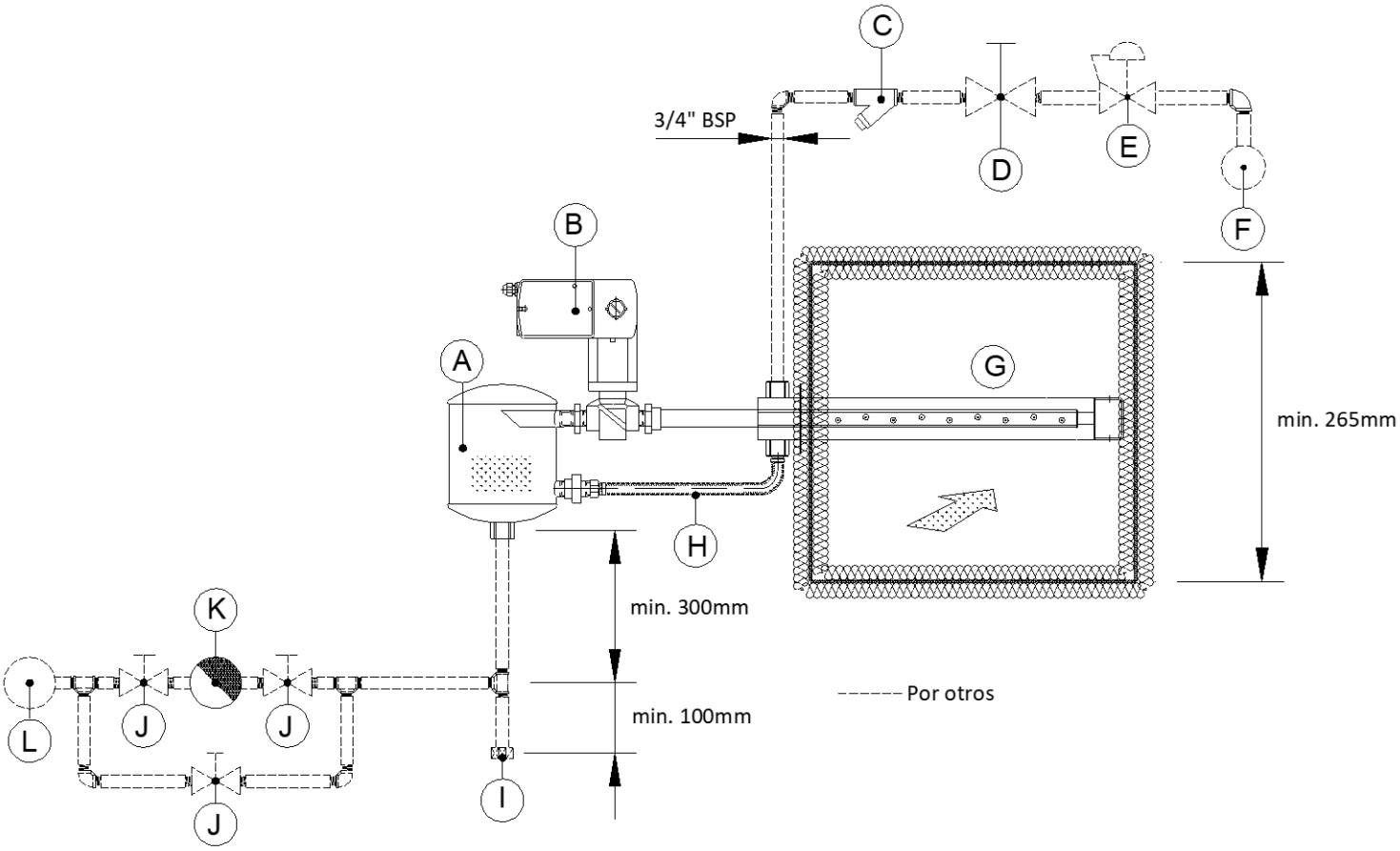
The two possible configurations are shown below.



To change from one configuration to another, follow these steps:

1. Unscrew the binding link.
2. Remove the elbow-sleeve assembly from the dispersion tube and install it in the opposite connection.
3. Rotate the dispersion tube 180° with respect to the steam separator.
4. Reassemble the two halves and tighten the union link.

7.4 Installing recommended tubing for FSH-SIMPLE TUBE

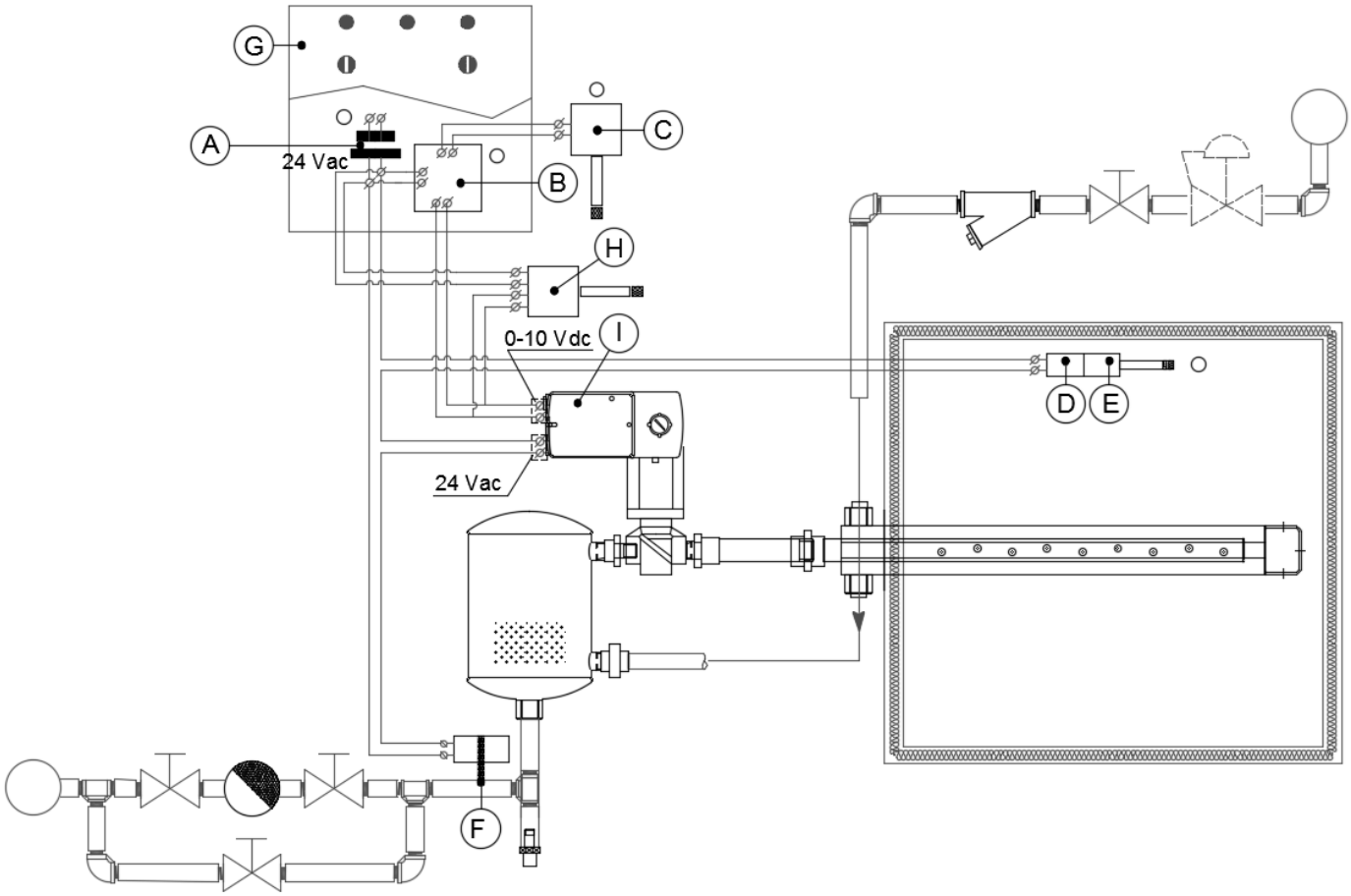


A	Steam Separator	G	Steam dispersion tube
B	Valve actuator	H	Flexible tubing
C	Filter in Y	I	Drip leg
D	Cut-off Valve	J	Bypass cut-off valve
E	Pressure regulator	K	F&T trap
F	Boiler steam	L	Condensate line (pressurised)

- The main steam supply for the humidifier must come from a height above or at the same level as the humidifier, not below, to ensure the driest steam. The main steam line supply must contain a condensate trap and drain according to the regulations.

- A hygrostat set to 80-90% RH should be installed when the temperature in the duct is below 21°C. The hygrostat must be placed downstream to ensure the air has absorbed the injected steam.
- The humidifier F&T steam trap must empty by gravity to the main return with little or no back pressure. If the condensate cannot be drained by gravity, it must be raised to return to the main return flow (see section 10).

7.5 Recommended electric installation for FSH-SIMPLE TUBE

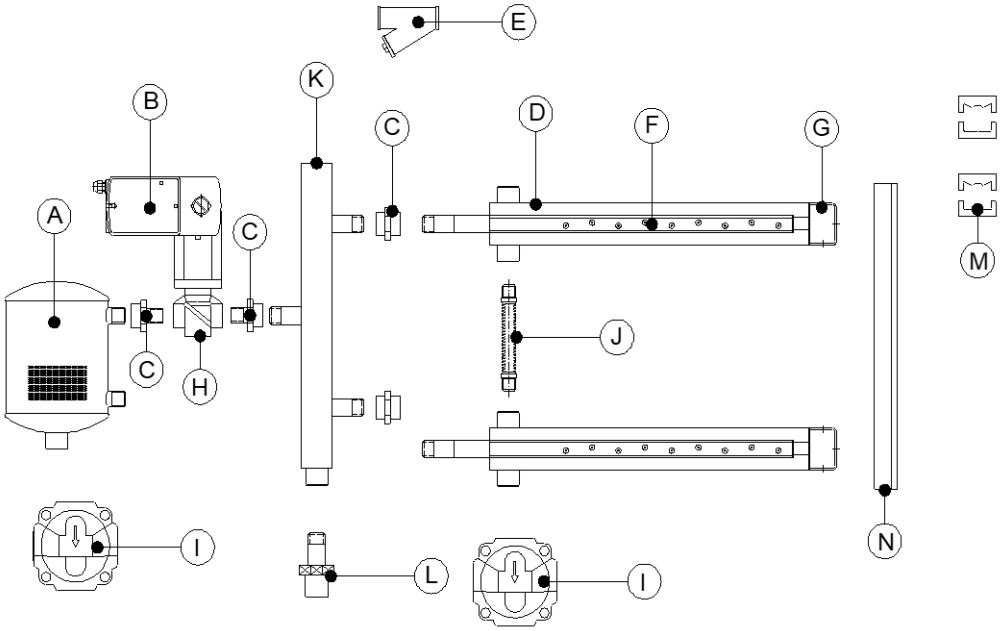


A	Transformer
B	Humidity Regulator (BMS/AHU)
C	Double active probe (temperature and humidity R.H.), for duct/ahu or room
D	Flow switch
E	Maximum humidity cut-off hygrostat
F	Non-Drip saeft thermostat
G	Control panel (BMS/AHU)
H	Humidistat (R.H.) with environmental/room or Duct/AHU active probe
I	Actuator valve

8 FSH-MULTI TUBE Humidifier

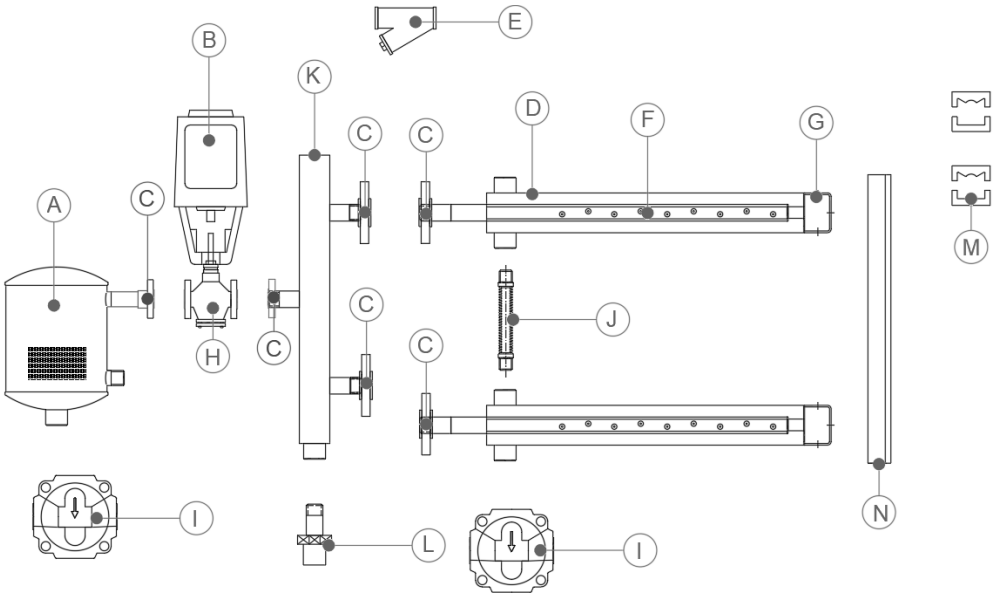
- with threaded valve (for pressures less than 2.4 barG)

A	Separator
B	Actuator
C	Threaded link
D	Jet
E	Filter in “Y”
F	Nozzles
G	Clamping fork
H	Threaded valve
I	F&T trap
J	Flexible hose
K	Collector
L	Thermostatic trap
M	Seal cover
N	Attachment fork

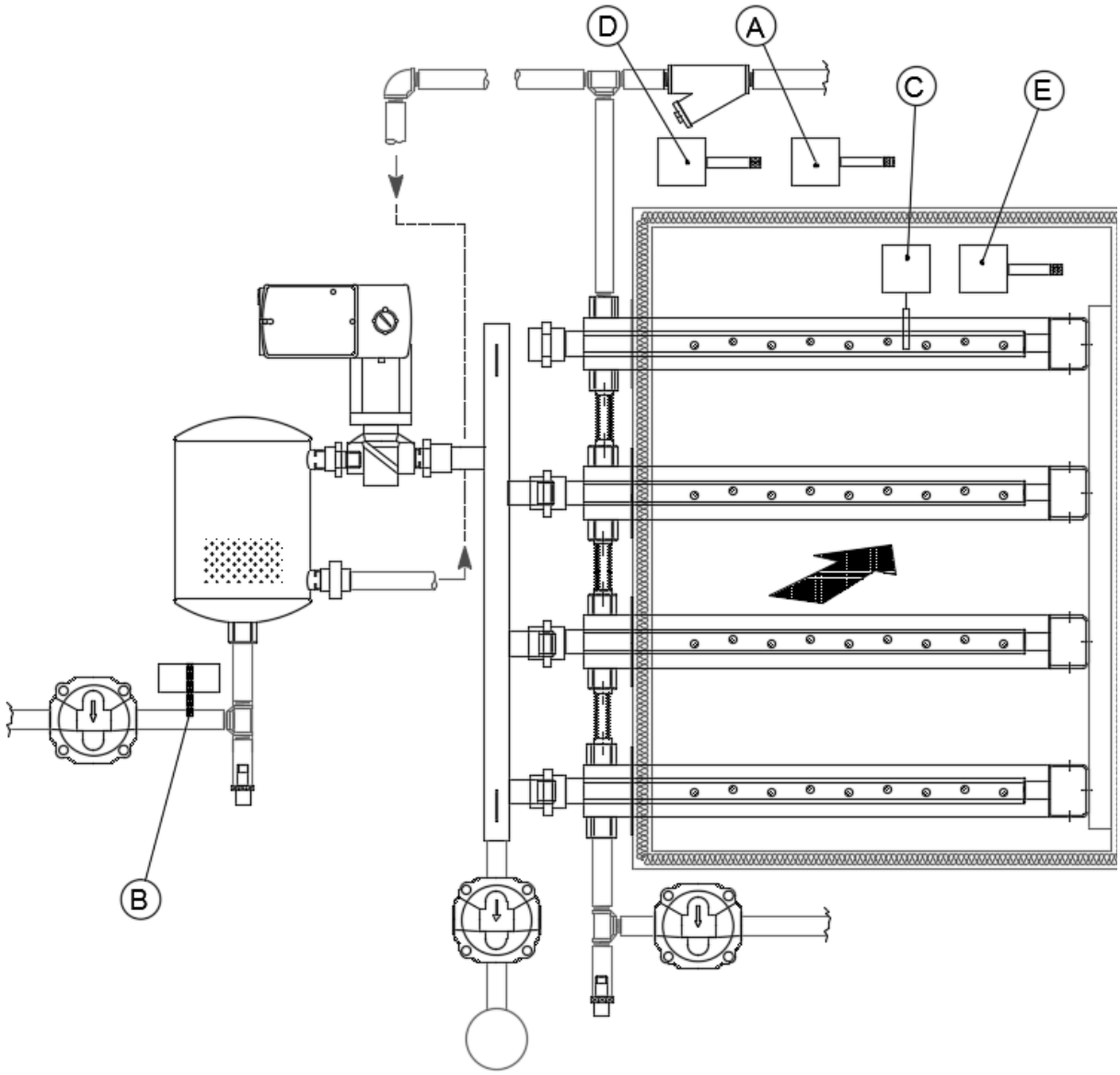


- with flanged valve (for pressures greater than 2.4 barG or by customer request)

A	Separator
B	Actuator
C	Loose flange
D	Jet
E	Filter in “Y”
F	Nozzles
G	Clamping fork
H	Valve
I	F&T trap
J	Flexible hose
K	Manifold
L	Thermostatic trap
M	Seal cover
N	Attachment fork



List of optional components:



A- HUMIDISTAT (R.H.) WITH ENVIROMENTAL/ROOM OR DUCT/AHU ACTIVE PROBE
B- NON-DRIP SAFETY THERMOSTAT
C- FLOW SWITCH
D- ACTIVE DOUBLE/TEMPERATURE AND HUMIDITY (H.R.) SENSOR, FOR DUCT/AHU OR ROOM
E- MÁXIMUN HUMIDITY CUT-OFF HYGROSTAT

8.1 Assembly and installation

Note: When the equipment is being handled for installation, some threads may loosen. Therefore, it is necessary to check at start-up if there is any small leakage in any of the threads and adjust them accordingly.

Assembly on site

Sometimes, large units are delivered without assembling to reduce transportation costs. Follow the instructions below for assembly:

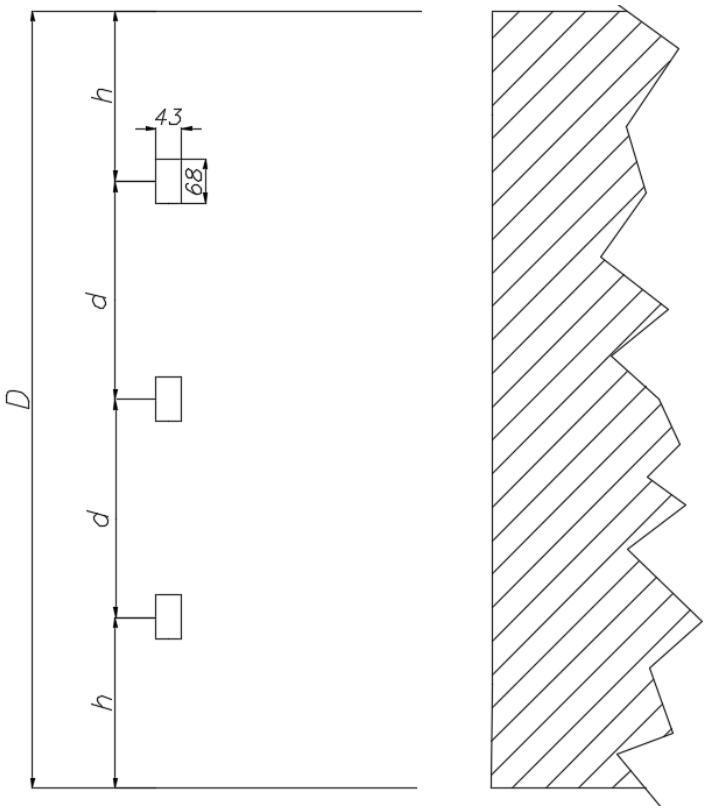
1) Unpack the equipment and check the parts list. If a component is missing, please contact us.
2) To make installation easier, we recommend first inserting the dispersion tubes into the manifold before the entire system is installed in the duct or air conditioner.
3) Install the manifold using threaded links or flanges.
4) Join the unions of the sleeves and fasten them by hand.

Installation

If you are unsure about positioning the equipment in the AHU or duct, see sections 13 and 14.

1) Place the assembly inside the duct or air conditioner and attach it or build a structure at the end.
2) Position and secure the collector by the attachment angles provided. Tighten the joints of the interconnecting pipes.
3) Fasten the device by the clamping fork at the end of the jet on one side of the treatment unit. Fasten the other end of the jet to the other side of the treatment unit using the seal cover provided with the equipment.
4) Install the separator and the valve assembly to the manifold, using threaded links or flanges.
5) Install the steam trap and the Y filter, see section 8.2.
6) Install the valve actuator electrical connections (see section 8.3). In addition, you should install a pressure switch to detect air flow, to prevent the valve from opening if there is no flow.

Recommended installation drills at Duct/AHU



D	Available height
d	Distance between injection tubes
h	Distance between injection tubes and duct/AHU
n	Number of injection tubes

Available internal distances between injection tubes:

$$h = \frac{D - (n-1) * d}{2}$$

d[mm]	150	300	400	600

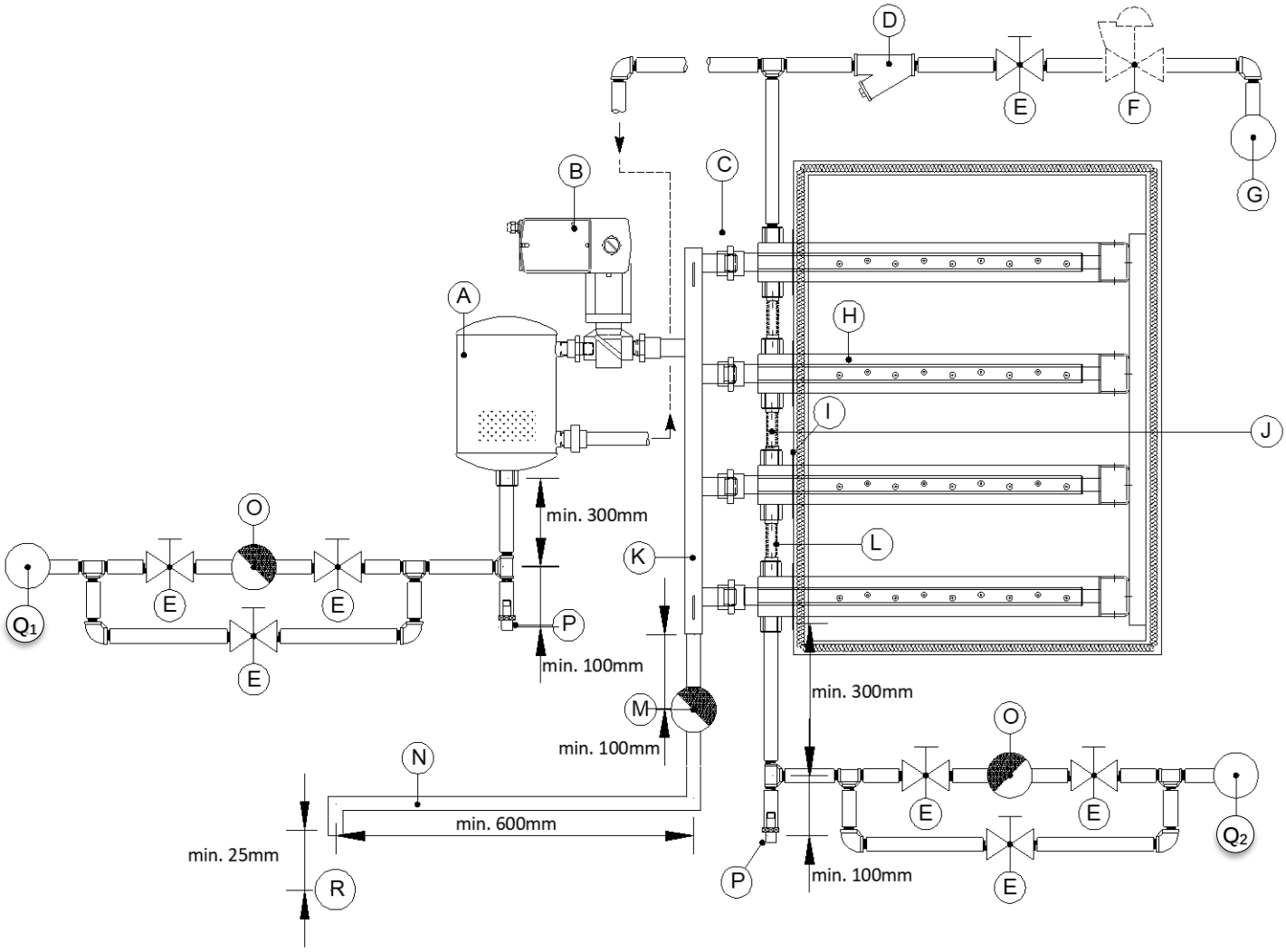
Practical example:

- D=700 mm
- d=150 mm
- n=3 injection tubes

$$h = \frac{700 - (3-1) * 150}{2} = 200\ mm$$

Note: “h” minimum distance = 100 mm

8.2 Installing recommended tubing for FSH-MULTI TUBE



A	Vapour Separator	J	Intermediate trap (see note) *
B	Valve actuator	K	Manifold
C	Links	L	Air flow switch
D	Filter in Y	M	Thermostatic trap
E	Cut-off Valve	N	Condensate line at atmospheric pressure
F	Pressure regulator	O	F&T trap
G	Boiler Water	P	Drip leg
H	Steam dispersion tubes	Q_1&Q_2	Differentiated pressurized condensate lines
I	Protective plates	R	Drain

- A hygrostat set to 80-90% RH should be installed when the temperature in the duct is below 21°C.The hygrostat must be placed downstream to ensure the air has absorbed the injected steam.

- The main steam supply for the humidifier must come from a height above or at the same level as the humidifier, not below. The main steam line supply must contain a condensate trap and drain according to the regulations.

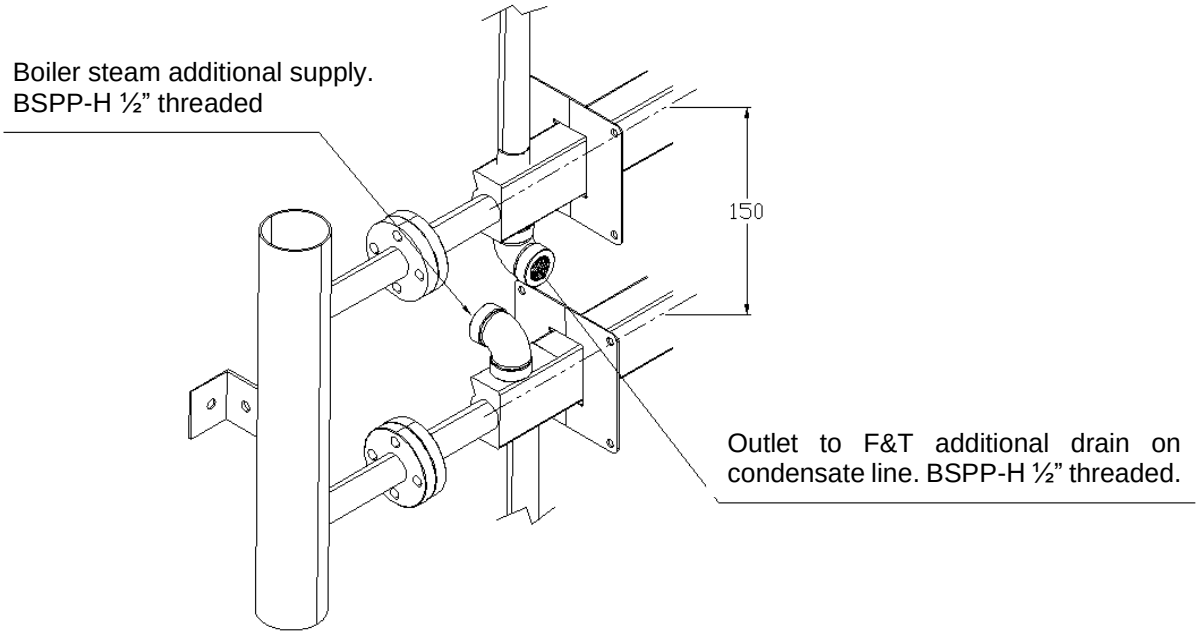
- The humidifier F&T steam trap must empty by gravity to the main return with little or no back pressure. If the condensate cannot be drained by gravity, it must be raised to return to the main return flow (see section 10).

- The manifold is drained into a thermostatic trap with a very low steam pressure inside, so it should not return to the pressurised condensate line, but to a line at atmospheric pressure.

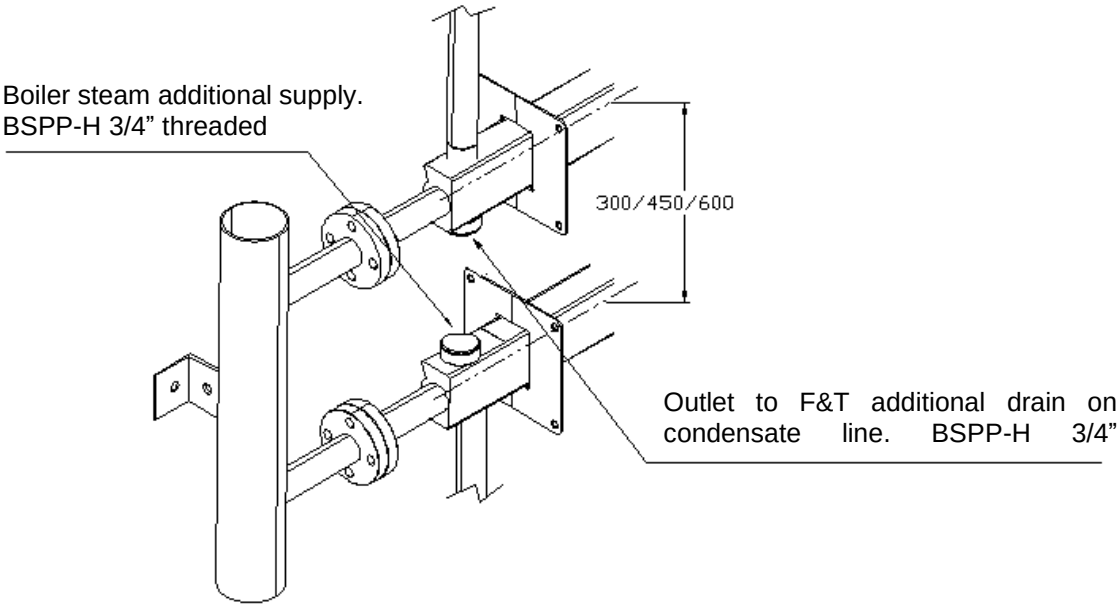
  ***(See note in the next page)**

*__NOTE:__ When the total length of the steam dispersion tubes exceeds 13m, an intermediate steam trap should be installed in the J position. (see previous page diagram). In the J position the connection hose will not be delivered.

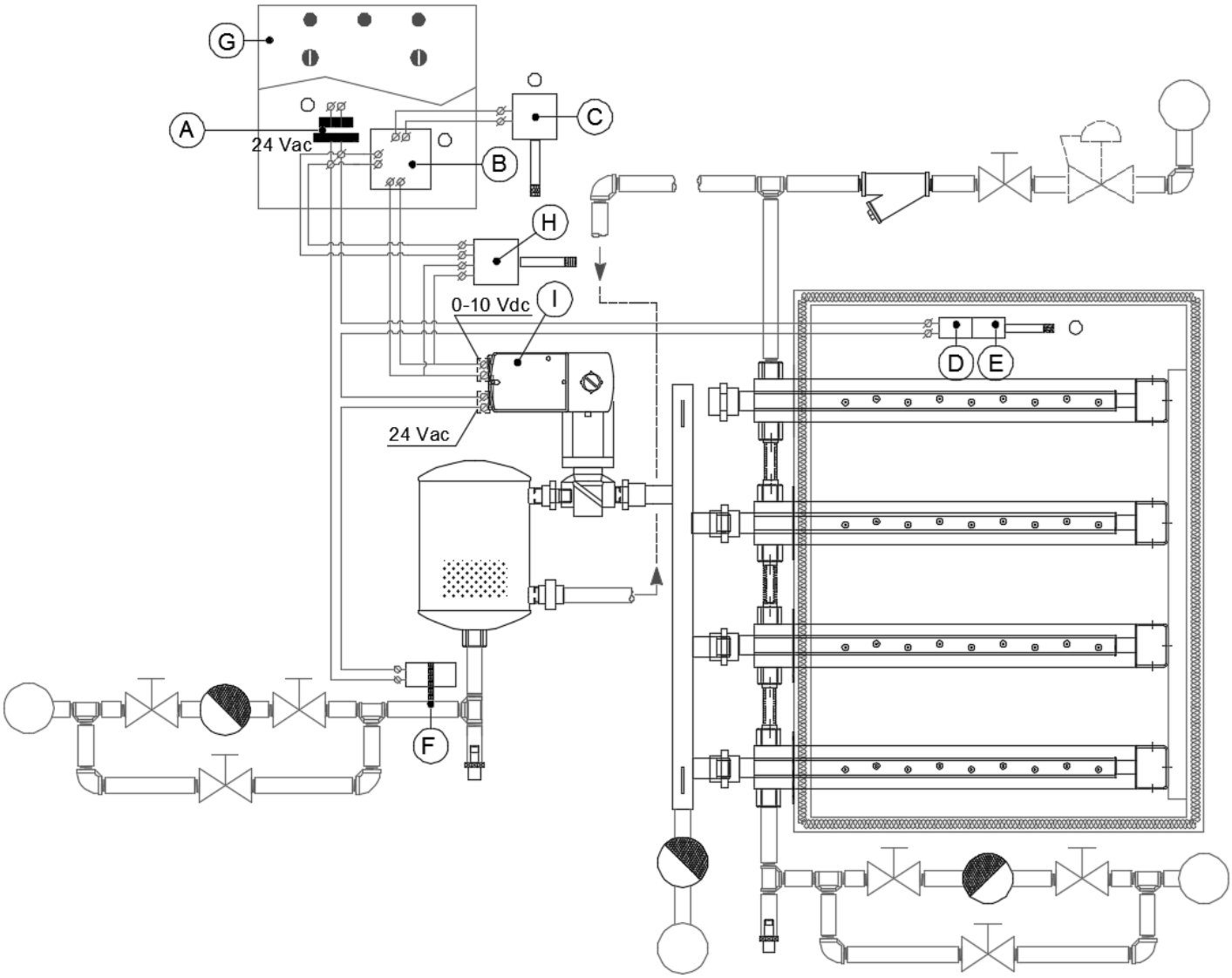
Case 1: Dispersion tube pitch **P=150 mm**



Case 1: Dispersion tube pitch **P=150 mm**



8.3 Recommended electric installation for FSH-MULTI TUBE



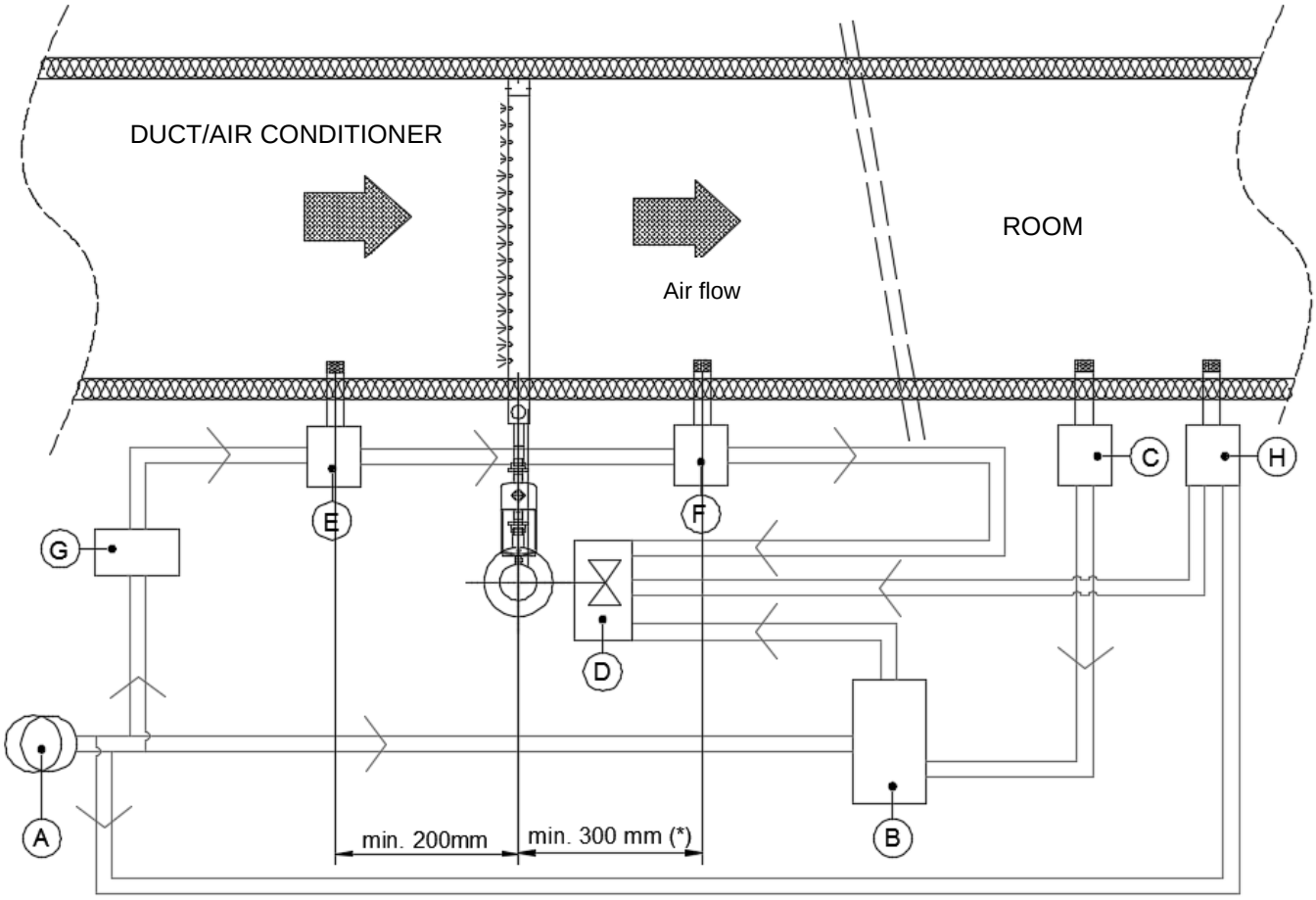
A	Transformer
B	Humidity regulator
C	Double active probe (temperature and humidity R.H.), for Duct/AHU or room
D	Flow switch
E	Maximum humidity Cut-Off hygrostat

F	Non-Drip safety thermostat
G	Control panel (BMS/AHU)
H	Humidistat (RH) with environmental/room or Duct/ATU active probe
I	Valve Actuator

9 Recommended sensor location

The location of the sensors has a significant impact on the operation of the humidifier. It is recommended not to exchange the duct sensors with the room sensors, since each is calibrated for a certain air velocity.

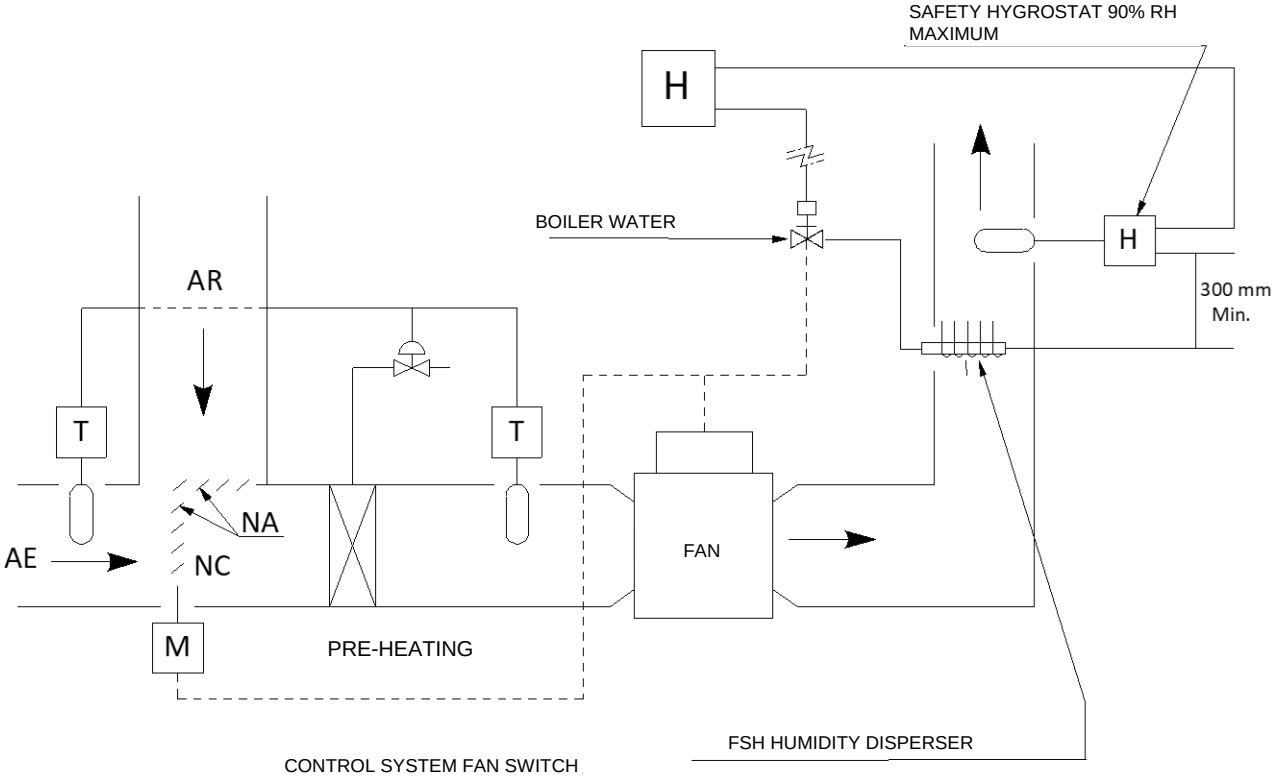
The proposed assemblies appear below. Some components must be supplied by the installer.



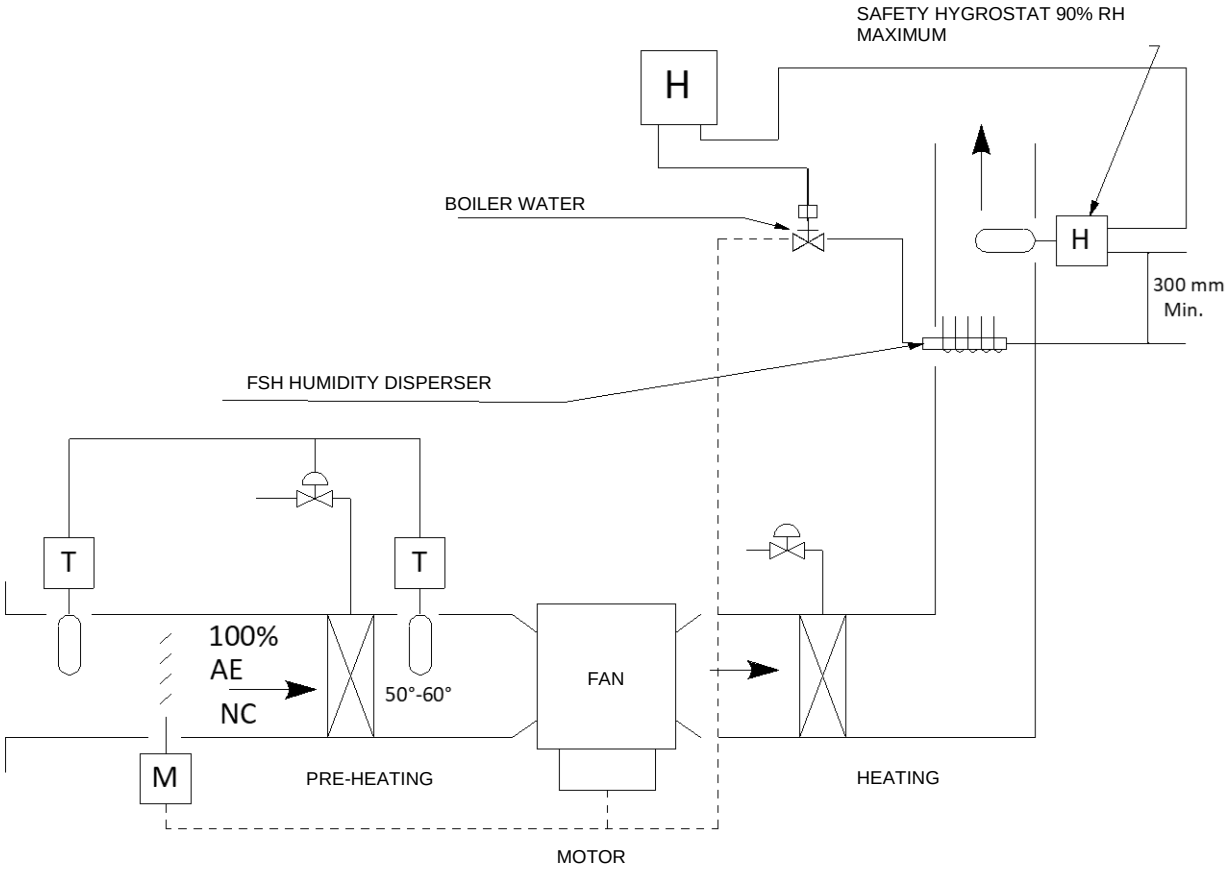
(*) Add to the absortion distance

A	Transformer	E	Flow switch
B	Humidity Regulator	F	Maximum humidity cut-off hygrostat
C	Double active probe (temperature and humidity R.H.), for duct/ AHU or room	G	Non-drip saefty thermostat
D	Valve actuator	H	Humidistat (R.H.) with environmental/room or duct/AHU active probe

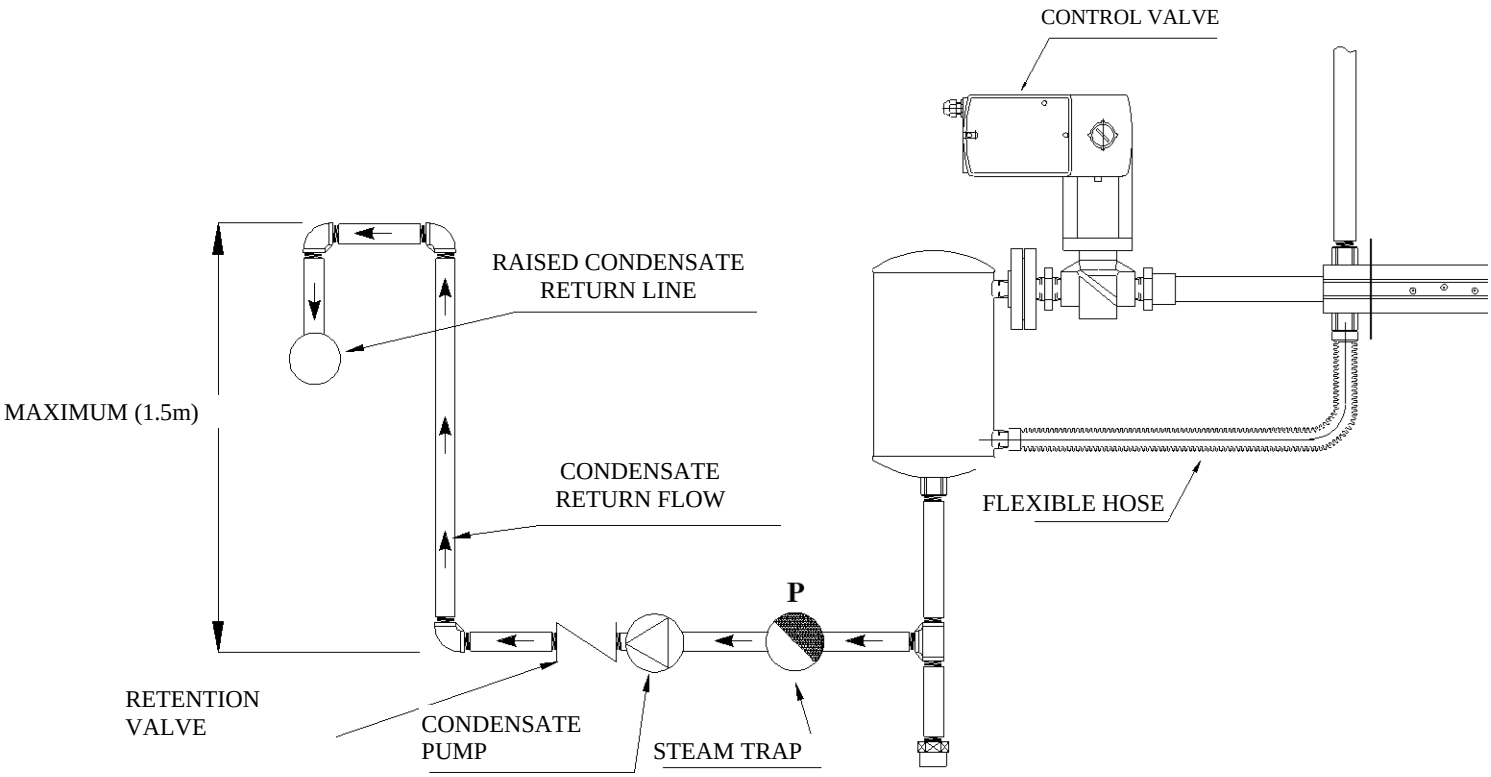
DUCT INSTALLATION WITH RETURN AND EXTERIOR AIR WITH PRE-HEATING



DUCT INSTALLATION WITH 100% EXTERIOR AIR AND 2 HEATING STATIONS



10 Raising condensate



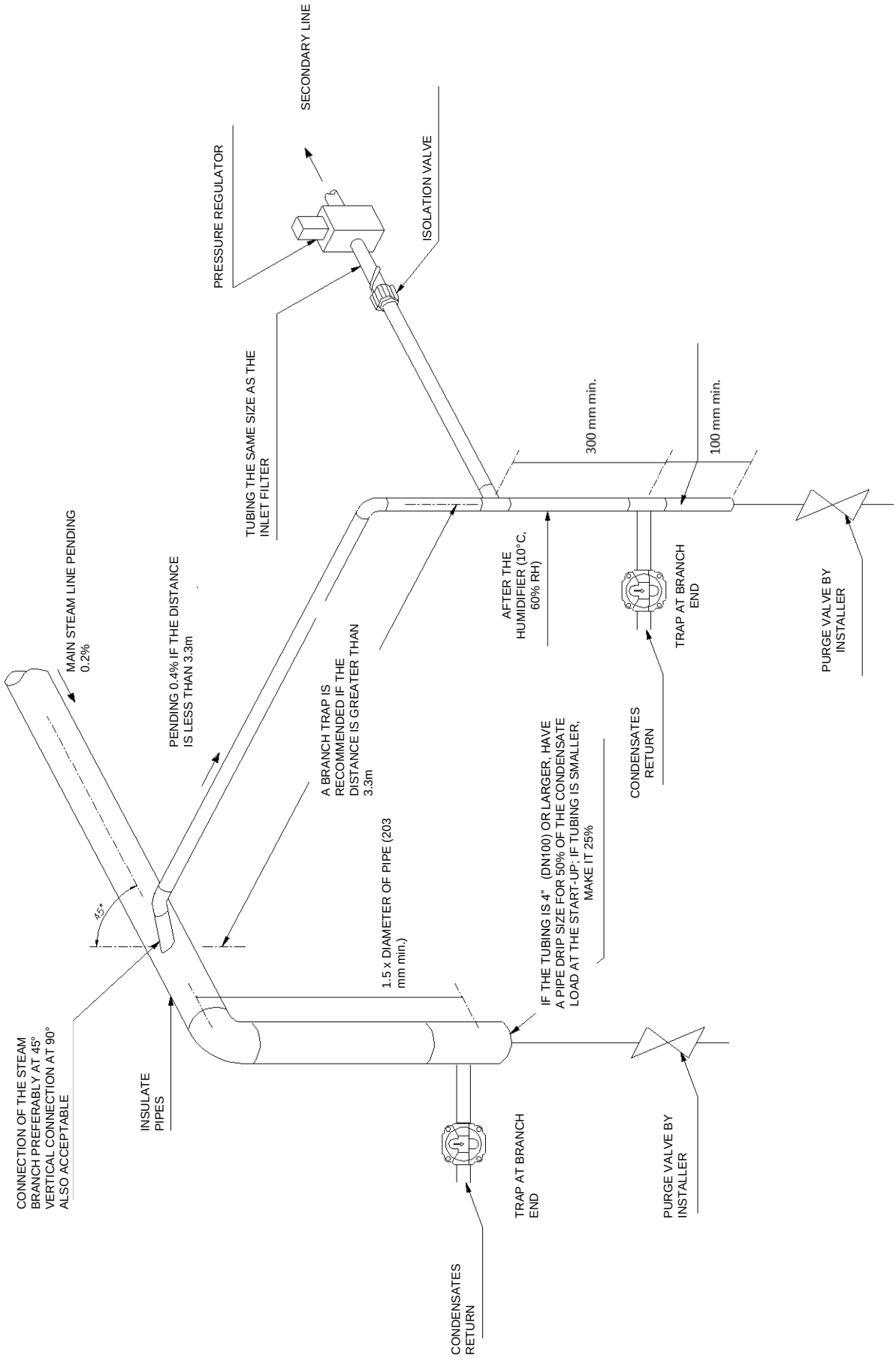
*Note: Use a condensate pump only if necessary, as the steam pressure itself can lift the condensate up to 1.5m; with a condensate pump, a check valve must be installed.

11 Operating environment temperature and humidity

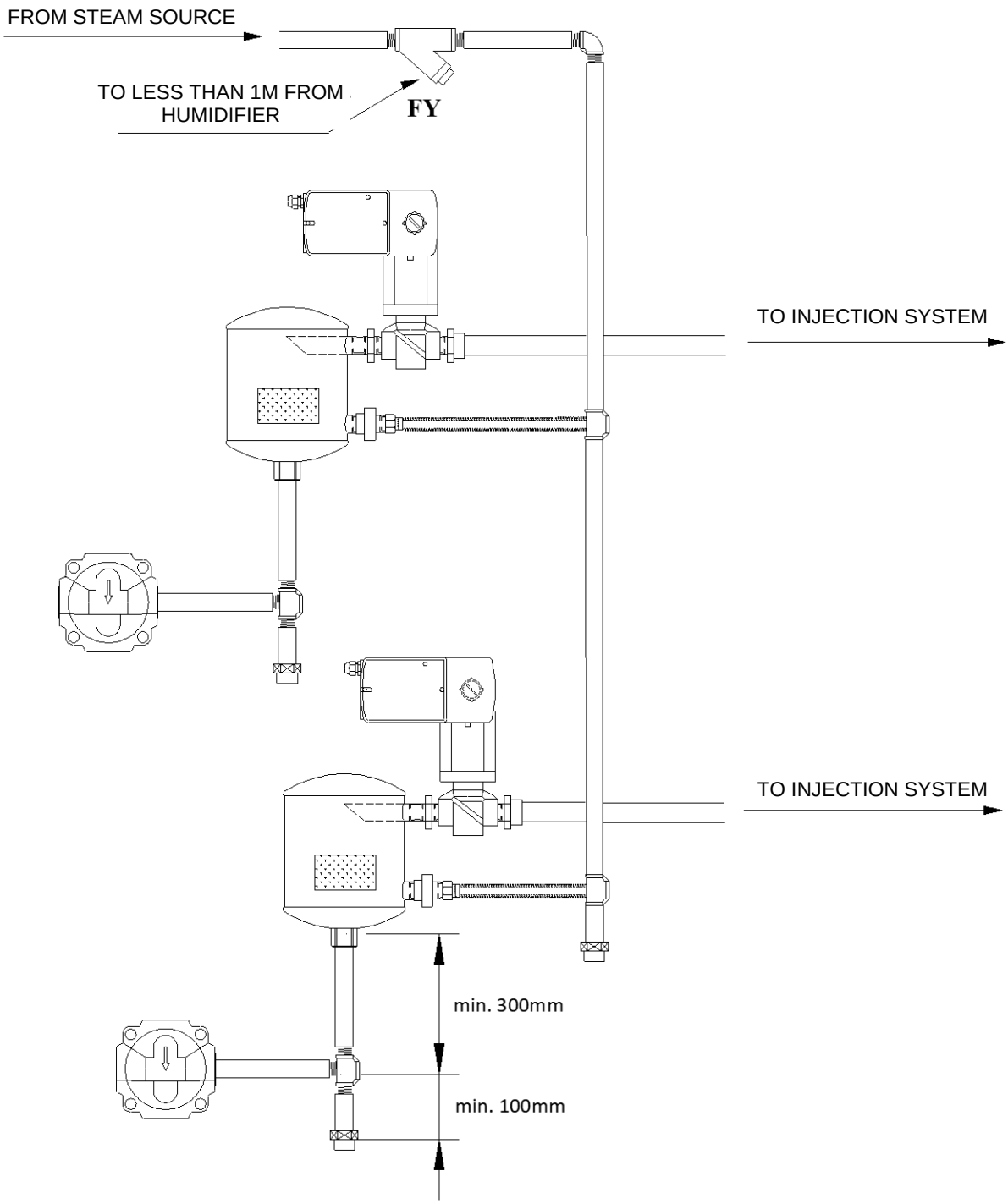
- Temperature: [-20…+50ºC]
- Relative humidity: [5…95% RH] no condensation.

12 Connection to boiler steam line

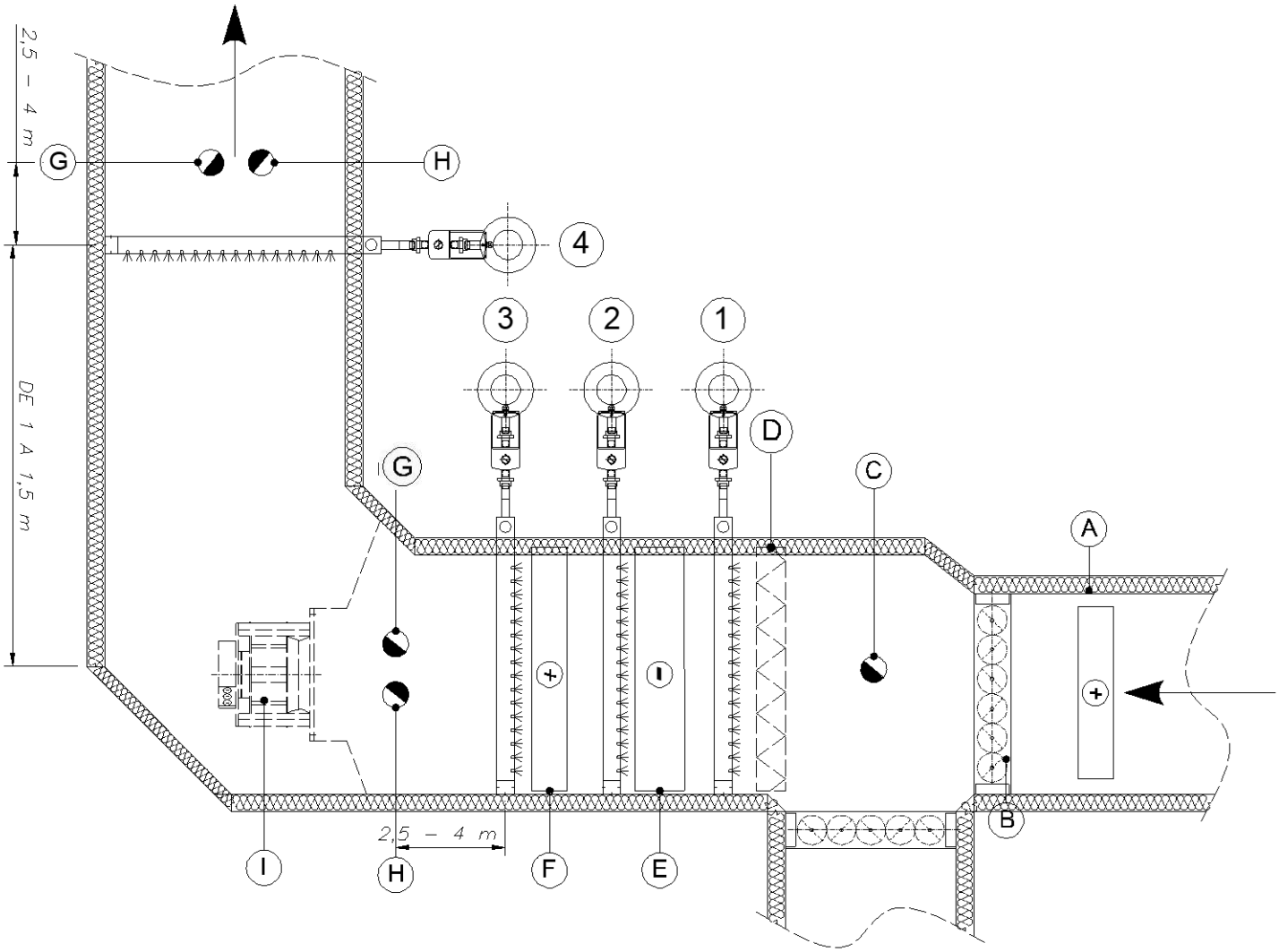
12.1 Connection to main line



12.2 Connecting secondary lines to each injection system



13 FSH located inside an AHU



A	Pre-heating coil	F	Heating coil
B	Gate	G	Safety hygrostat
C	Control device	H	Air flow switch
D	Filter	I	Fan
E	Cooling coil		

Location 3:

This is the best option. Installing downstream from the heating and cooling coils, as it provides laminar flow through the dispersion unit, and the heated air absorbs the steam better. It is recommended to use FSH-PT to ensure complete absorption before entering the fan.

Location 2:

This is the second best option, for overload periods, the cooling coil removes part of the moisture for humidification.

Location 4:

This is the third option. When the air leaves the fan, it is turbulent and the steam may not be absorbed within the established absorption distance. This gives more absorption distance if installing downstream from the fan.

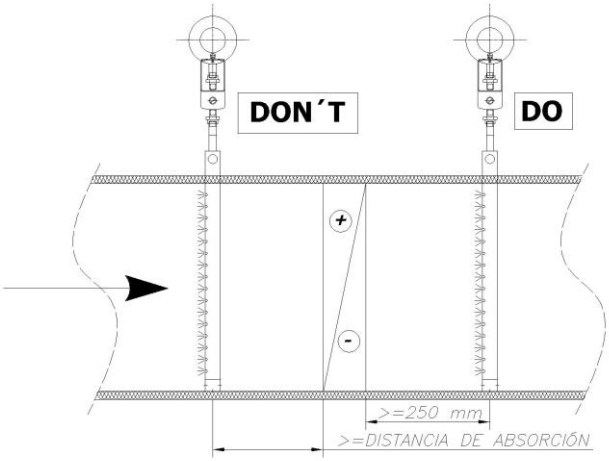
Location 1:

This is the least recommended position. The cooler air in this position requires a greater absorption distance.

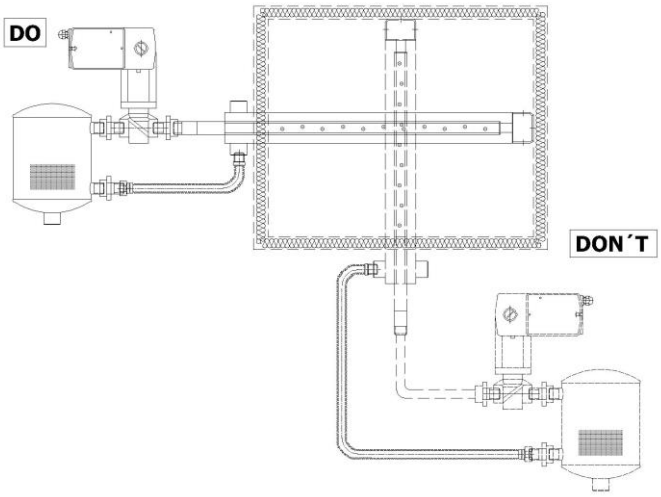
In conclusion, the best site options are locations 2 and 3, downstream of the coils, with the best option being location 3, downstream of the heating coil. Try, as far as possible, to avoid positions close to, downstream of fans and in locations where the air is too cold.

14 FSH located inside a duct

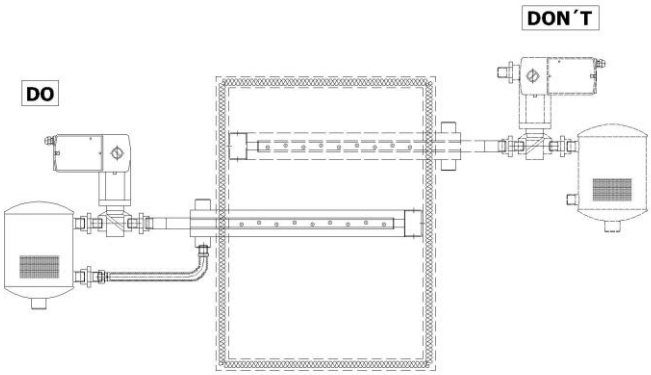
When possible, install the humidifier by injection downstream of the coils. If there is more than 90cm of available distance between the jets and the coil on the upstream side, the humidifier can be installed at that location.



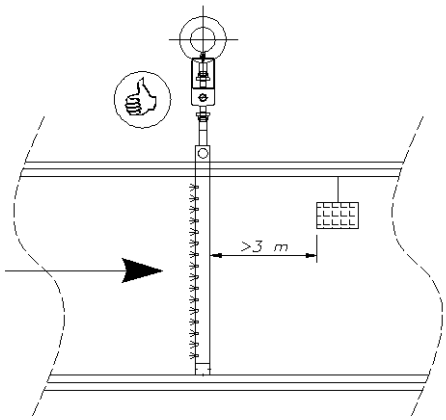
Always adjust and install the jet to cover the largest dimension of the duct section.



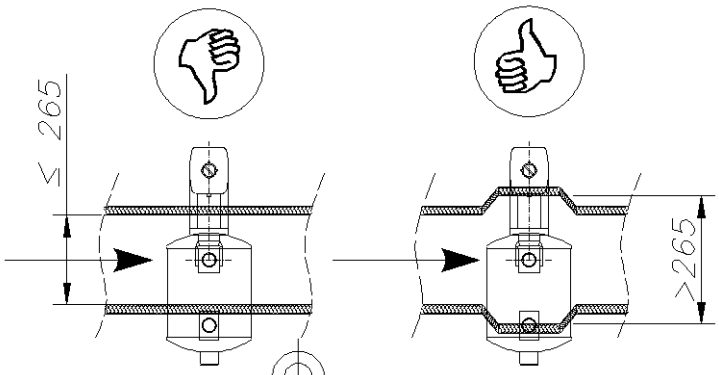
When possible, install the jet in the centre of the duct.



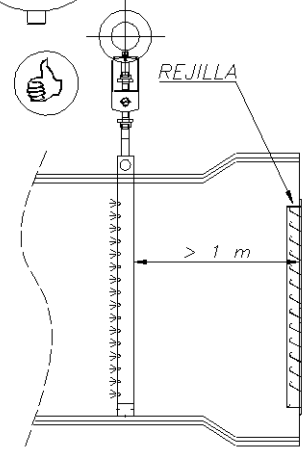
Do not install the jet less than 3m upstream of the temperature controller as it may give an erroneous signal.



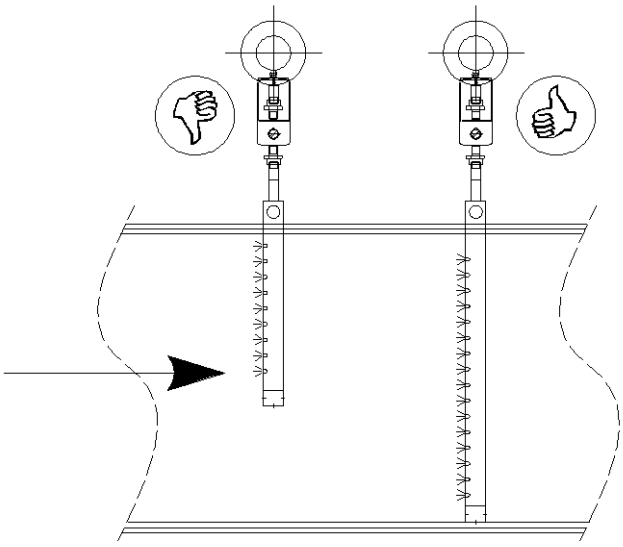
Do not risk restricting airflow in conduits of 265mm or less depth. Use an expansion section as shown in the image.



Always install the jet as far as possible upstream of the air discharge grilles, and never less than 1m upstream.



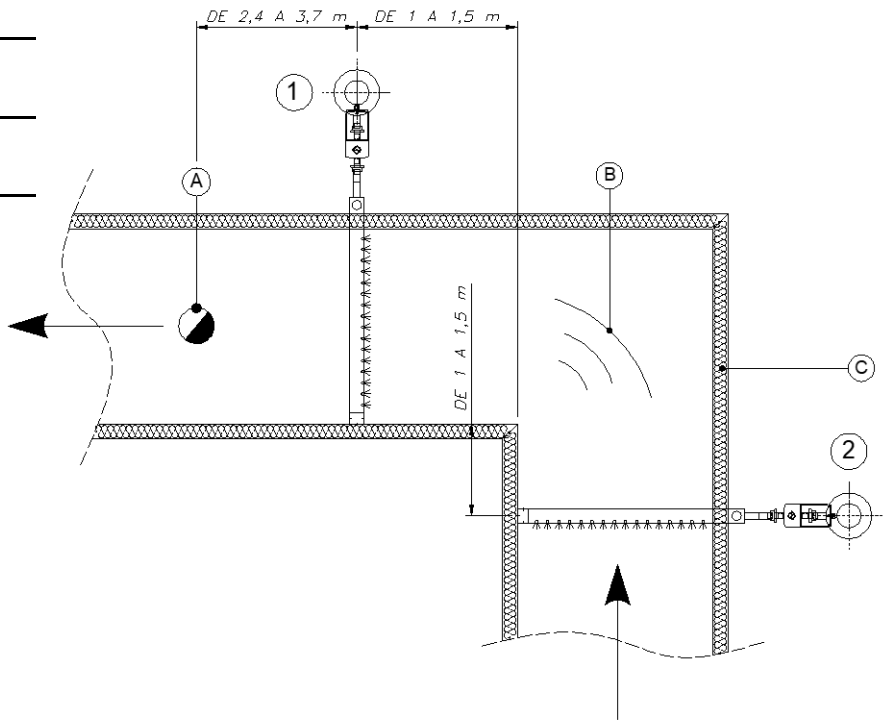
Always select the jet with the length that covers the width of the duct.



- Installing the humidifier near an elbow:

  Position 1: This is the best option. It leads to better absorption downstream from the elbow.
  Position 2: This is the second best option. Moisture may collect on the elbows of the duct. Where it is structurally impossible to avoid this position, use FSH-multitube to ensure complete absorption. Try to place it 1-1.5m from the elbow.

A	Hygrostat
B	Duct elbow
C	Duct



15 Maintenance

- The equipment requires regular inspection; if not, it could damage the components and invalidate the guarantee. Keep in mind that the equipment can be contaminated, and must be controlled to prevent this.
- The humidifier should be sterilised twice a year.
- The humidifier must be inspected monthly to ensure its proper operation, and that it has no difficulty requiring immediate correction.

COMPONENT	FREQUENCY AND PROCEDURE
Filter in Y	Inspect at least twice during the first year. If it is dirty, it should be inspected more frequently and cleaned as necessary.
Steam trap	At least twice a year, verify that it works correctly. - If it is blocked, the trap will be cold. - If a malfunction causes steam to escape, the trap will be hot and make a noise. - The trap is operating properly if it leads to a drop of approx 1°C through it.
Valve	Inspect annually to make sure: - The valve operates freely - The valve completely stops steam from passing - There are no leaks
Dispersion tube links	Replace every 2-3 years of service
Vapour Separator	Does not require maintenance
Steam jets	Do not require maintenance
Silencer (if applicable)	Inspect annually to ensure cleanliness. Clean or replace as needed.

IMPORTANT Request start-up of your units by contacting:

sat@fisair.com o service@fisair.com

https://fisair.com/es/servicio/puestas-en-marcha/ (application in Spanish)

https://fisair.com/service/start-ups/ (application in English)

16 Troubleshooting

PROBLEM	POSSIBLE CAUSE	ACTION
The humidifier discharges water into the duct.	Main steam line overloaded with water due to discharge of water and steam from the boiler or inadequate purging of the main steam line.	- Locate cause and correct it.
	The trap does not drain properly.	- Replace, clean or repair trap, as required. - Reduce condensate return line pressure.
	Steam pressure is very low.	- Check the shut-off valves are fully open. - Adjust the pressure regulator. - Adjust the boiler pressure.
	Condensates are being collected at low points, without purging, from the main steam line.	- Install drip legs or traps as required.
	The disperser sleeves are not at the right temperature.	- Excessive condensate lifting. Redirect pipes or increase steam pressure. - Short circuit within the sleeves. Replace tube. - Incorrect trap location. Reposition and/or add trap. - Condensate return line pressure is very high. Redirect tubes. - The dispersion tube is not level. Relocate.
	Condensate return line overload.	- Replace with larger tubes or redirect to ground water trap.
	Trap capacity inadequate.	- Replace with larger trap.
Water leaks from the humidifier.	Defective links.	- Replace links.
	Steam leaks in the dispersion tube outer sleeves.	- Repair leak or replace tube. Note: Check the installation to ensure that the tubes are not anchored; they must be able to expand/contract with the change in temperature.
Humidity exceeds the hygrostat value.	The automatic valve does not close completely.	- Something prevents the valve from closing. Clean it; check the filter. - The steam pressure exceeds the valve spring closing value. - The valve is installed in reverse. Re-install it. - Adjust the valve link.
	The control system does not work properly.	- Incorrect control voltage. Check and correct. - Incorrect control signal. Check and correct. - Incorrect connection. Check and correct. - Incorrect humidity sensor. Check and correct. - Humidity controller not calibrated. Calibrate.
	Steam leak inside the duct.	- Repair leak.
Humidity fluctuates around the desired humidity set point.	The control system does not work properly.	- Humidity controller defective or inaccurate. Calibrate or replace. - Control components poorly located. Reposition. - Incompatible control components. Change components.

The humidity of the space does not increase to the humidity point established.	Excessive external air volume.	- Check fans, gates, etc. - Reduce air volume.
	Steam pressure is very low.	- The manual steam valve is partially closed. Open. - Clean filter. - Boiler pressure is very low. Adjust. - Pressure regulator does not work properly. Repair or correct. - Check fans, gates, etc. - The tubes are too small. Change.
	The humidifier is too small.	- Replace valve with one of greater capacity. - Replace with larger humidifier. - Add additional humidifier.
	The automatic valve does not open completely.	- It is too tight. Release or replace tightening. - Adjust links. - Check pilot position settings.
	The control system does not work properly.	- Incorrect control voltage. Check and correct. - Incorrect control signal. Check and correct. - Incorrect connection. Check and correct. - Incorrect humidity sensor. Check and correct. - Humidity controller not calibrated. Calibrate. - Temperature switch works incorrectly. Replace or readjust.
	Foreign matter prevents the valve from opening.	- Clean or replace valve.
	Excessive external air volume.	- Reduce air volume.
Condensate forms in the ducts.	The humidifier is mounted very close to internal devices (e.g. gates or elbows) in the duct.	- Check fans, gates, etc. - Move the humidifier tubes to a point further from these devices upstream. - Add dispersion tubes to reduce absorption distance. Consult with FISAIR to determine the number of tubes required.
	An uninsulated duct passes through an unheated area (cold surface temperature).	- Insulate duct.
	The air cannot absorb the amount of steam discharged.	- The humidifier operates when the fan is off. Install flow switch. - The air temperature in the duct is very low for the amount of steam supplied.
	The steam pressure is very high, causing excess capacity.	- Reduce steam pressure.
The humidifier is noisy.	There is no silencer.	- Install silencer.
	Excessively high steam output from dispersion tubes.	- Install additional tubes.

17 Declaration of conformity

DECLARACIÓN CE DE CONFORMIDAD
EC CONFORMITY DECLARATION
EG KONFORMITÄTSERKLÄRUNG
DECLARATION CE DE CONFORMITÉ

Departamento de Dirección de Calidad
Quality Management Department

Qualitätsmanagement-Abteilung
Département de gestion de la qualité

FISAIR S.L.U.
C/ Ciudad de Frias,33-(P.L. Camino de Getafe)
28021 Madrid SPAIN
Tel.: (+34) 916921514
info@fisair.com

La presente declaración de conformidad se expide bajo exclusiva responsabilidad del fabricante.
This declaration of conformity is issued under the sole responsability of the manufacturer.
Diese konformitätserklärung wird in der alleinigen verantwortung des herstellers ausgestellt.
Cette déclaration de conformité est délivrée sous la seule responsabilité du fabricant.

Descripción/ Product description/ Produktbeschreibung/ Description du produit: **FSH**

Tipo de máquina/ Machine type/ Maschinetyp/ Type de machine: **CUASI MÁQUINA/ QUASI MACHINE/ QUASI MASCHINE/ QUASI MACHINE**

Marca/ Brand/ Marke/ Marque: **FISAIR**

Es conforme con la legislación de armonización pertinente a la unión europea:
It complies with the harmonization legislation relevant to the European Union:
Es entspricht den für die Europäische Union relevanten Harmonisierungsgesetzen

2006/42/CE
2014/30/UE
2014/35/UE

Es conforme con las siguientes normas:
It complies with the following standards:
Es entspricht den folgenden Normen:
Il est conforme aux normes suivantes:

UNE-EN ISO 12.100:2012
UNE-EN 60204-2:2019
UNE-EN 61000-6-6:2012
UNE-EN 61000-6-3:2012

FISAIR se exime de cualquier responsabilidad a menos que se cumplan con todas las instrucciones de instalación y funcionamiento proporcionadas por FISAIR, o si los productos han sido modificados o alterados sin el consentimiento por escrito de FISAIR, o si tales productos han sido sometidos a un mal uso, mala manipulación, alteración, mantenimiento inadecuado o muestran consecuencias de accidente o utilización negligente.
FISAIR disclaims any liability unless all installation and operating instructions provided by FISAIR are followed, or if products have been modified or altered without FISAIR's written consent, or if such products have been subjected to misuse. use, mishandling, alteration, improper maintenance or show consequences of accident or negligent use.

Lea el Manual de Instalación, Funcionamiento y Mantenimiento antes de utilizar este equipo.
La puesta en servicio de cuasi máquina estará prohibida hasta que la cuasi máquina sea montada en una máquina y esta cumpla las disposiciones de la Directiva 2006/42/CE y se disponga de la declaración de conformidad de acuerdo con lo dispuesto en el Anexo II A. En el manual se determinan medidas de seguridad que deberá cumplir la máquina en la que se monte la cuasi máquina. FISAIR no se responsabiliza de la seguridad.
Read the Installation, Use and Maintenance Manual before using this equipment.
The commissioning of the quasi-machine shall be prohibed until the quasi-machine is mounted on a machine and the machine complies with the provisions of Directive 2006/42/CE and the declaration of conformity is available in accordance with the provisions of Annex II A. The manual determines the safety measures that the machine on wich the quasi-machine is mounted must comply. FISAIR is not responsible for security.

Con exclusión de responsabilidades sobre las partes o componentes adicionados o montados por el cliente.
With no liability for the parts or components added or assembled by the customer.
Unter Ausschluß der Verantwortung über die vom Kunden bereitgestellten und/oder angebauten Teile.
Avec exclusion des responsabilités concernant les parties ou les composants ajoutés ou assemblés par le.

Juan Boeta Tejera
-Chairman and CEO- July 2020
Property of FISAIR

Rev01

18 Guarantee

FISAIR S.L.U. WARRANTY POLICY

Quality Department
Departamento de Calidad

FISAIR S.L.U.
C/ Uranio, 20 (Pol. Ind. Aimayr)
28330 San Martín de la Vega (Madrid) SPAIN
Tfº (34) 916921514
Fax (34) 916916456

Two-year Limited Warranty

FISAIR warrants to the original purchaser that its products will be free from defects in materials and parts for a period of two (2) years after installation or twenty-seven (27) months from the date FISAIR ships such product, whichever date is the earlier.

If any FISAIR product is found to be defective in material or assembly during the applicable warranty period, FISAIR's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product or part.

Warranty disclaimer

FISAIR shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product.

The Limited Warranty does not include any consumer part such as joints, pulleys, filters or media.

FISAIR's Limited Warranty shall not be effective or actionable if:

a) All related product invoices have been payed in time and terms.
b) Unless there is compliance with all installation and operating instructions furnished by FISAIR, or if the products have been modified or altered without the written consent of FISAIR, or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Such situations could be an incorrect power supply connection, crashed with inappropriate objects, security protection devices unblocked and so.
c) Components and/or manufactures are affected or damaged by the effects of corrosion (gradual wear of the metal bodies by the action of external actors not controlled by FISAIR).

Any warranty claim must be submitted to FISAIR in writing within the stated warranty period.

Parts Warranty

Defective parts may be required to be returned to FISAIR. In case any part is claimed as a faulty one, FISAIR will ask the customer to send the part back to the factory in order to analyze if the part is failing due to any of above referred actions (see warranty disclaimer) or due to effective part failing.

If the part must be replaced immediately, FISAIR will ship the part to the customer immediately and invoice the part with a 30 days delay payment for the faulty part to be returned. If the part is returned in this period, the part fail analysis would be made to emit a technical report for the warranty coverage based in this Warranty Statement document.

In case that the part is failing due to a lack of quality, FISAIR will credit this invoice in order to stop the payment. In case FISAIR does not receive the part in this period, or if the failure is due to the reasons covered in the Warranty disclaimer paragraph, the invoice will be effective.

In case any part from the product / shipment is missing, the customer should notify FISAIR before 3 days from the shipment date of arrival.

FISAIR S.L.U. WARRANTY POLICY

Quality Department
Departamento de Calidad

Service Covered by Warranty

In case that there is any FISAIR product that should be serviced in order to recover its proper used designed, FISAIR will select the person (s) in charge of this operation. These qualified technicians should have the enough knowledge to service FISAIR units.

No company should practice a warranty service without the writing FISAIR notice giving the authorization to do it and if any cost should be cover by FISAIR should be advised in advance to the service job. In case that FISAIR should send FISAIR staff to solve the solution, trip expenses are not covered by the warranty.

FISAIR's Limited Warranty is made in lieu of, and FISAIR disclaims all other warranties, whether express or implied, including but not limited to any implied warranty of merchantability, any implied warranty of fitness for a particular purpose, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

FISAIR shall not, under any circumstances be liable for any direct, indirect, incidental, special or consequential damages (including, but not limited to, loss of profits, revenue or business) or damage or injury to persons or property in any way related to the manufacture or the use of its products. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if FISAIR has notice of the possibility of such damages.

By purchasing FISAIR's products, the purchaser agrees to the terms and conditions of this Limited Warranty.

Extended Warranty

The original user may extend the term of the FISAIR Limited Warranty for a limited number of months past the initial applicable warranty period and term provided in the first paragraph of this Limited Warranty. All the terms and conditions of the Limited Warranty during the initial applicable warranty period and term shall apply during any extended term.

Each case should be valued in terms of type of product, equipment application, use and location of the product operation site.

Any extension of the Limited Warranty under this program must be in writing, signed by FISAIR, and paid for in full by the purchaser.

Quality Manager:

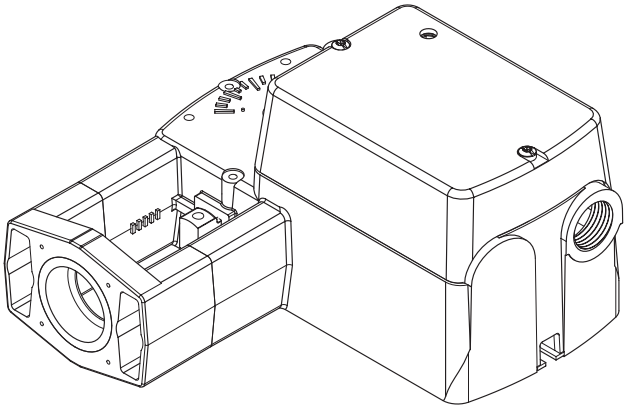
Hugo J. López Álvarez
San Martín de la Vega, February 2016

MA51-710x Two Position Series
MF51-7103 Floating Series
MS51-7103 Proportional Series

SmartX Actuators
Linear Spring Return
General Instructions

Application

Linear SmartX Actuators are designed to mount directly onto two-way or three-way globe valves without the use of linkages. They provide linear travel to operate valves from 1/2” to 2” VB-7xxx and discontinued 1/2” to 1-1/4” VB-9xxx in chilled water, hot water and steam applications up to 366 °F (186 °C). Linear spring return actuators provide either two position, floating or proportional modulation control (depending on model selection) of valves in HVAC systems.



Mx51-710x

Features

- Two position models controlled by SPST controller
- Floating models controlled by SPDT floating controllers
- Proportional models controlled by 0-3 Vdc, 6-9 Vdc, 0-10 Vdc, 0-20 mAdc, 2-10 Vdc, or 4-20 mAdc. Control function direct/reverse action is jumper selectable
- 105 lb force (467 newton) with 1/2” (13 mm) nominal linear stroke
- 24 Vac, 120 Vac, and 230 Vac models
- Rugged polymer housings rated for up to NEMA 2/ IP54
- Overload protection throughout stroke
- Automatically sets input span to match valve travel
- Compact size to allow installation in limited space
- Manual override to allow positioning of valve and preload
- Spring return operation
- Direct mount to valves without separate linkage
- Polymer housing rated for plenum use
- Five year warranty

Applicable Literature

F-Number	Description	Audience	Purpose
F-26080	EN-205 Water System Guidelines	– Application Engineers – Installers – Service Personnel – Start-up Technicians	Describes Schneider Electric approved water treatment practices.
F-27252	Vx-7xxx-8xx Series Vx-7xxx-59x Series Vx-9xxx-8xx Series Vx-9xxx-59x Series Selection Guide	– Sales Personnel – Application Engineers – Installers – Service Personnel – Start-up Technicians	Provides Mxx1-720x and Mx51-710x actuator, valve, and valve assembly selection data including specifications, close-off pressures, and dimensional information.
F-26895	AM-703 Input Scaling Module, AM-704 Pulse Width Modulation Interface, AM-705 Positioner, AM-706 Positioner, AM-708 Resistor	– Installers – Service Personnel – Start-up Technicians	Provides step-by-step mounting instructions
F-27175	AM-756 Metric Conduit Adapter, AM-763 Hexcrank, AM-770 Replacement Valve Linkage Parts Kit		Provides step-by-step mounting instructions
F-27382	TAC Electric/Electronic Products Catalog	– Sales Personnel – Application Engineers	Comprehensive catalog containing TAC's electric/electronic actuators, thermostats, controllers, sensors, transmitters, and accessories

SPECIFICATIONS

Actuator Inputs

Control Signal: See Table-1 for actuator models and control type.
Power Input: See Table-1. All 24 Vac circuits are Class 2. All circuits 30 VAC and above are Class 1.
Connections: 3 ft (91 cm) appliance wire or plenum cables, enclosure accepts 1/2" (13 mm) conduit connectors. For M20 Metric connector, use AM-756 adaptor.

Actuator Outputs

Electrical:
Position Feedback Voltage (proportional or floating only)
For voltage ranges, the feedback signal is the same range as the input signal. The 4-20 mAdc current range and floating actuators have a 2-10 Vdc position feedback signal. The position feedback signal can supply up to 0.5 mAdc to operate up to four additional slave actuators.
Mechanical:
Linear Stroke, 1/2" (13 mm) nominal.
Approx. Stroke Timing, See Table-1.
Manual Override, Allows positioning of valve and preload using manual crank.
Right/Left Jumper, Permits reverse acting/direct acting linear motion (MS51 only).
Environment:
Ambient Temperature Limits
Shipping & Storage, -40 to 160 °F (-40 to 71 °C).
Operating, -22 to 140 °F (-30 to 60 °C).
Temperature Restrictions, For maximum ambient 140 °F (60 °C) the maximum allowable fluid temperature should not exceed valve rating. See F-27252 Selection Guide for specific ratings.
Humidity: 5 to 95% RH, non-condensing.
Location:
NEMA 1. NEMA 2 (enclosure is air plenum rated), UL Type 2 (IEC IP54) with customer supplied water tight conduit connectors.

Agency Listings

UL 873: Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment).
CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.
European Community: EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
Australia: This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radio Communications Act 1992.

Note: All performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult Schneider Electric. Schneider Electric shall not be liable for damages resulting from misapplication or misuse of its products.

Table-1 Specifications.

Part Number	Control Signal	Actuator Power Input						Approximate Stroke Timing in Seconds @ 70F (21°C)	
		Voltage	Wiring System	Running 50/60 Hz VA	Running 50/60 Hz W	DC Amps	Holding 50/60 Hz W	Powered	Spring Return
MA51-7103-000	Two Position SPST	24Vac ±20% 20-30 Vdc	Appliance Wire	5.3	4.1	0.15	1.2	44	19
MA51-7103-100			Plenum Cable	5.3	4.1	0.15	1.2		
MA51-7100-000		120 Vac ±10% 50/60 Hz	Appliance Wire	7.9	6.2	n/a	2.1		
MA51-7101-000		230 Vac ±10% 50/60 Hz	Appliance Wire	7.4	5.4	n/a	2.1		
MF51-7103-000	Floating	24Vac ±20% 20-30 Vdc	Appliance Wire	6.9	4.7	0.16	2.1	60	16
MF51-7103-100			Plenum Cable	6.9	4.7	0.16	2.1		
MS51-7103-000	2-10 Vdc Proportional		Appliance Wire	6.6	4.2	0.14	1.5		
MS51-7103-100[b]			Plenum Cable	6.6	4.2	0.14	1.5		
MS51-7103-020[b]	0-3 Vdc Proportional		Appliance Wire	6.6	4.2	0.14	1.5		
MS51-7103-120[b]			Plenum Cable	6.6	4.2	0.14	1.5		
MS51-7103-030[b]	6-9 Vdc Proportional		Appliance Wire	6.6	4.2	0.14	1.5		
MS51-7103-130[b]			Plenum Cable	6.6	4.2	0.14	1.5		
MS51-7103-040[b]			Appliance Wire	7.8	4.9	0.16	3.4		
MS51-7103-140[b d]			Plenum Cable	7.8	4.9	0.16	3.4		
MS51-7103-050[b]	0-10 Vdc Proportional		Appliance Wire	6.6	4.2	0.14	1.5		
MS51-7103-150[b]			Plenum Cable	6.6	4.2	0.14	1.5		
MS51-7103-060[b]	4-20 mAdc		Appliance Wire	6.6	4.2	0.14	1.5		
MS51-7103-160[b]			Plenum Cable	6.6	4.2	0.14	1.5		

[a]Timing was measured with the actuator mounted on a VB-7xxx Series valve.
[b]Proportional (MS) models shipped with RA/DA jumper set for DA (actuator extends with increasing signal).
[c]4-20 mAdc with AM-708 500 ohm field-installed resistor.
[d]Has 20 Vdc power supply for System 8000 applications.

Globe Valve Close-Off Pressures:13 For close-off pressure ratings on globe valve assemblies, consult Linked Globe Valve Assemblies with SmartX Linear Series Actuators Selection Guide F-27252.x13

ACCESSORIES

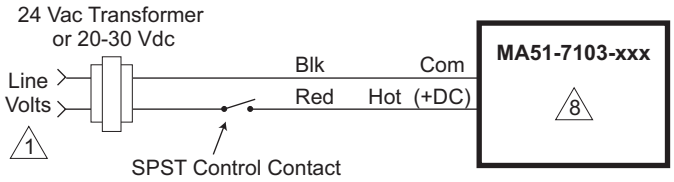
AM-756	Metric Conduit Adapter M20 x 1.5 to 1/2” NPT
AM-770	Replacement valve linkage parts kit
AM-764	Linkage kit for damper applications

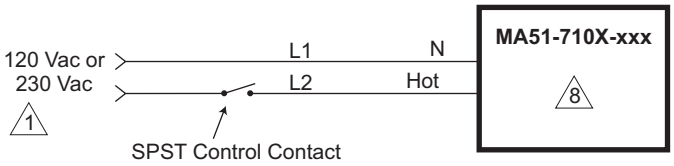
MS51-7103

AM-703	Input rescaling module, adjust signals to 2-10 Vac, zero and span adjust
AM-704	Interface, pulse width modulation (PWM)
AM-705	Positioner (NEMA 4 housing)
AM-706	Min and/or manual positioner for flush panel mount
AM-708	500 ohm resistor for 4 to 20 mA control signal

TYPICAL TWO POSITION CONTROL (wiring diagrams)

Figure-1 illustrates typical wiring diagrams for spring return **two-position MA51-710x** actuators. See Table-1 for model selection. See 8 for wiring diagrams notes guide.





Voltage	L1 N	L2 Hot
120 Vac	White	Black
230 Vac	Blue	Brown

Figure-1 Typical Wiring Diagrams for Two Position Actuators

TYPICAL FLOATING CONTROL (wiring diagrams)

Figure-2 through Figure-5 illustrates typical wiring diagrams for spring return **floating MF51-7103** actuators. See Table-1 for model selection. See 8 for wiring diagrams notes guide.

Caution: This product contains a half-wave rectifier power supply and must not be powered off transformers used to power other devices utilizing non-isolated full-wave rectifier power supplies. Refer to EN-206, Guidelines for Power Multiple Devices from a Common Transformer, F-26363 for detailed information.

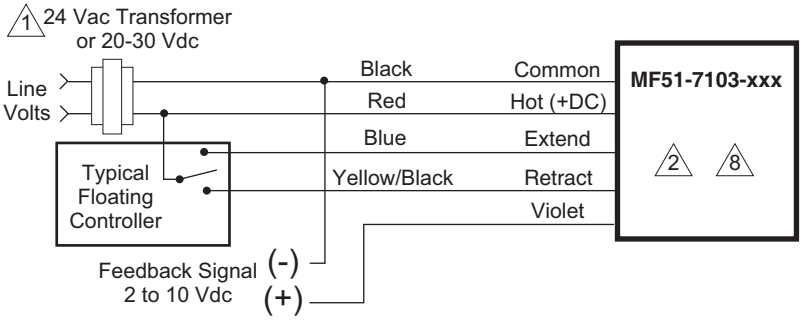


Figure-2 Floating Point Control

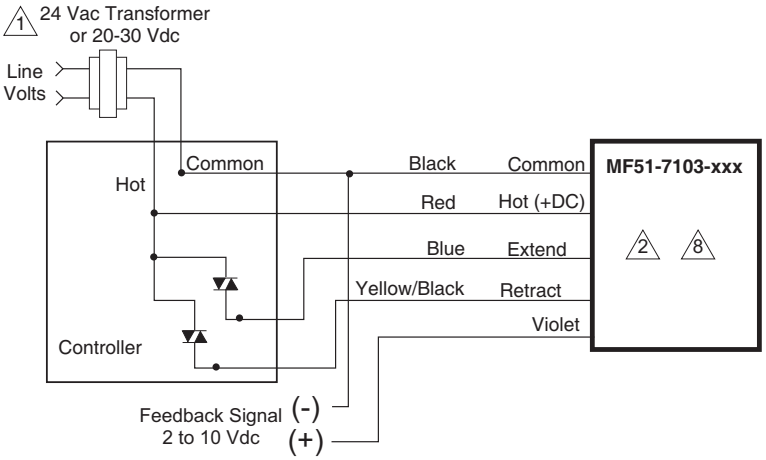


Figure-3 Triac Source

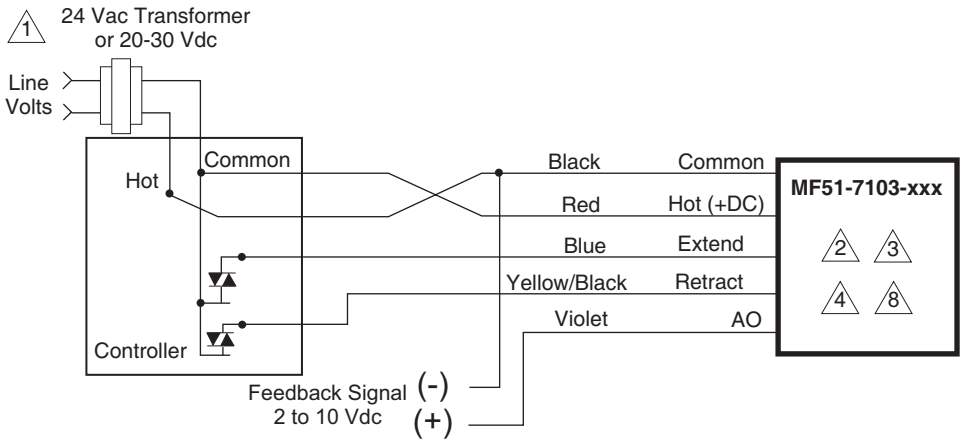


Figure-4 Triac Sink

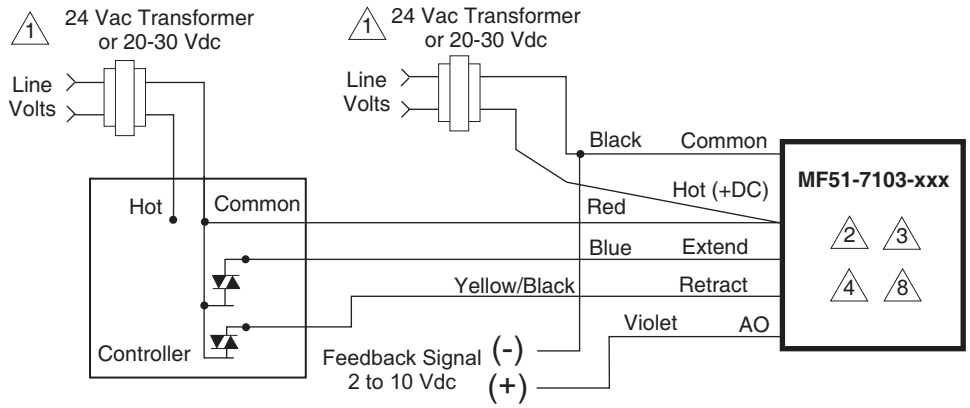


Figure-5 Triac Sink With Separate Transformers

TYPICAL PROPORTIONAL CONTROL (wiring diagrams)

Figure-6 illustrates typical wiring diagrams for spring return **proportional MS51-7103** actuators. See Table-1 for model selection. See 8 for wiring diagrams notes guide.

Caution: This product contains a half-wave rectifier power supply and must not be powered off transformers used to power other devices utilizing non-isolated full-wave rectifier power supplies. Refer to EN-206, Guidelines for Powering Multiple Devices from a Common Transformer, F-26363 for detailed information.

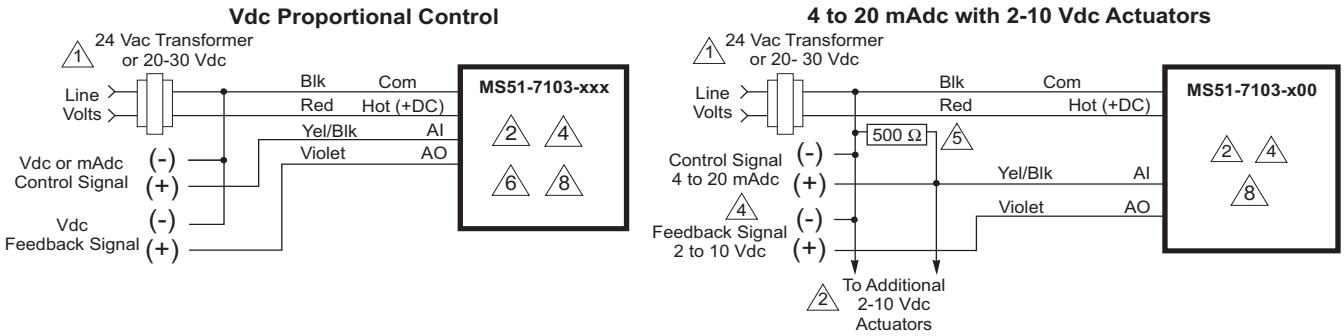


Figure-6 Typical Wiring Diagrams for Proportional Control 24 Vac Basic Models

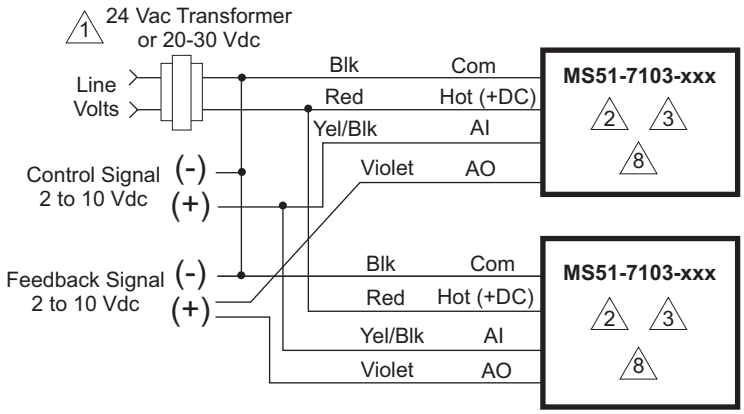


Figure-7a Typical Wiring Diagrams for Proportional Control 24 Vac Models Wired in Parallel

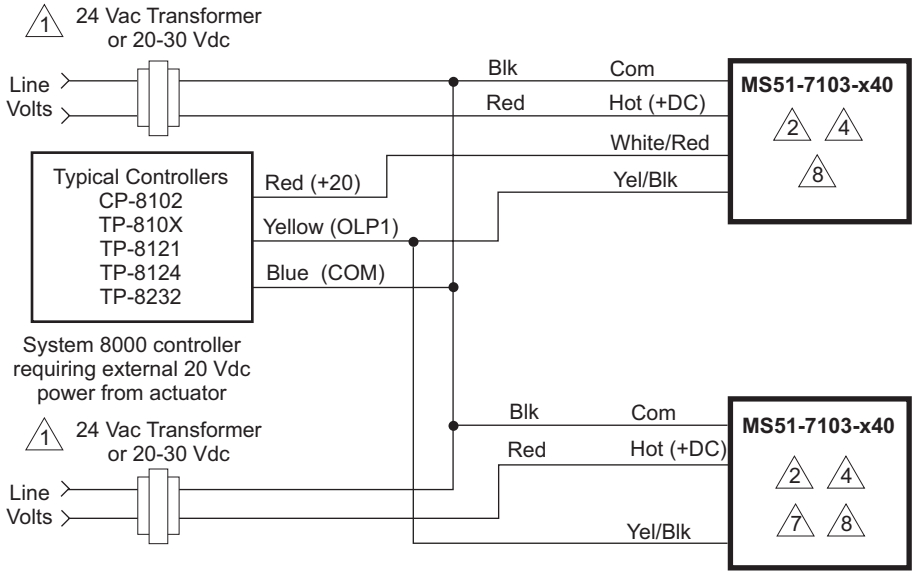


Figure-7b Typical Control Wiring for Two MS51-7103-x40 to System 8000 Controllers Requiring External 20 Vdc Power from Actuator

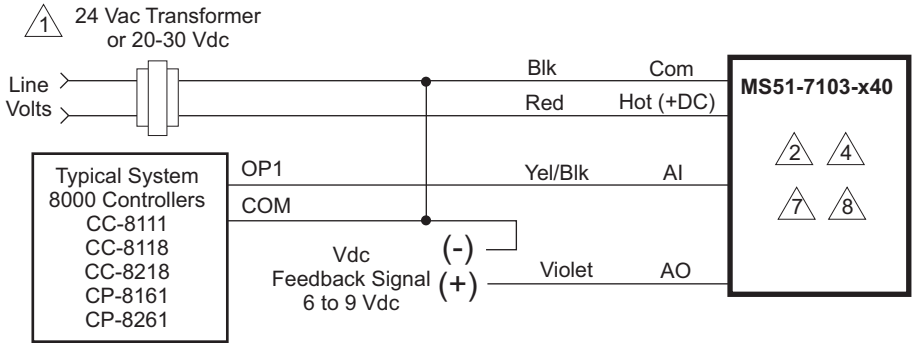


Figure-7c Typical Control Wiring for MS51-7103-x40 to Controllers not Requiring External 20 Vdc Power from Actuator

1. Provide overload protection and disconnect as required.
2. Actuators may be wired (120V mA does not have red wire and 230V mA does not have red or black wires) in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.
3. The Common connection from the actuator must be connected to the Hot connection of the controller. The actuator Hot must be connected to the controller Common.
4. If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.
5. A field-supplied 500 ohm resistor (AM-708) is required for this application.
6. On MS51-7103-X60 (4-20 mAdc) models a 500 ohm resister is incorporated in the product. Do not use an external resistor.
7. If using multiple MS51-7103-040's with TAC System 8000 controller requiring 20 Vdc power; tape off red +20 Vdc power supply leads on all but one actuator.
8. Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure-8 Wire Diagram Notes Guide

INSTALLATION

Inspection

Inspect the package for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the package and inspect the device for obvious damage. Return damaged products.

Requirements

- Job wiring diagrams
- Appropriate accessories
- Pliers for removing and inserting connecting pin
- Installer must be a qualified, experienced technician
- TOOL-37, 1 5/8” open end wrench for valve mounting nut
- 5/16” and 7/16” open-end wrench for stem jam nuts and stem extension
- #8 Torx screwdriver (not provided)

Precautions

General

Warning:

- Electrical shock hazard! Disconnect the power supply (line power) before installation to prevent electric shock and equipment damage.
- Make all connections in accordance with the job wiring diagram and in accordance with national and local electrical codes. Use copper conductors only.
- Floating and Proportional Models: These products contain a half-wave rectifier power supply. They must not be powered with transformers that are used to power other devices utilizing non-isolated full-wave rectifier power supplies. Refer to EN-206, Guidelines For Powering Devices From A Common Transformer, F-26363 for detailed information.

Caution:

- Avoid electrical noise interference. Do not install near large contactors, electrical machinery, or welding equipment.
- Manual override to be used only when power is not applied to unit.
- When operating manual override (observe position indicator), back off 5° from full extended mechanical stop to ensure proper release.
- Use with fluid temperatures above 100°C requires insulation on the pipe and control valve.

Federal Communications Commission (FCC)

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This

equipment generates, uses, and can radiate radio frequency energy and may cause harmful interference if not installed and used in accordance with the instructions. Even when instructions are followed, there is no guarantee that interference will not occur in a particular setting—Which can be determined by turning the equipment off and on—the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Canadian Department of Communications (DOC)

Note: This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe B respecte toutes les exigences du Reglement sur le material broilleur du Canada.

European Standard EN 55022

Warning: This is a Class B digital (European Classification) product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Location

Caution: Avoid locations where excessive moisture, corrosive fumes, vibration, or explosive vapors are present.

Mounting

- Mount the linear actuator directly on the valve in locations that clear the maximum dimensions of the actuator case (see Figure-12).
- Ensure that the valve body is installed correctly. The arrow must point in the direction of flow. With three-way valves observe stem position (stem up or stem down) for proper flow characteristics. See Table 3.
- It is preferable that the actuator is mounted above the valve body. This will minimize the risk of damage to the actuator in the event of condensation or a valve leak. Refer to Figure-10.

Changing Control Function (proportional units only)

These actuators are equipped with a jumper to control the function of the signal as received. See Figure-9. Factory setting is for direct acting. Remove cover to change jumper setting.

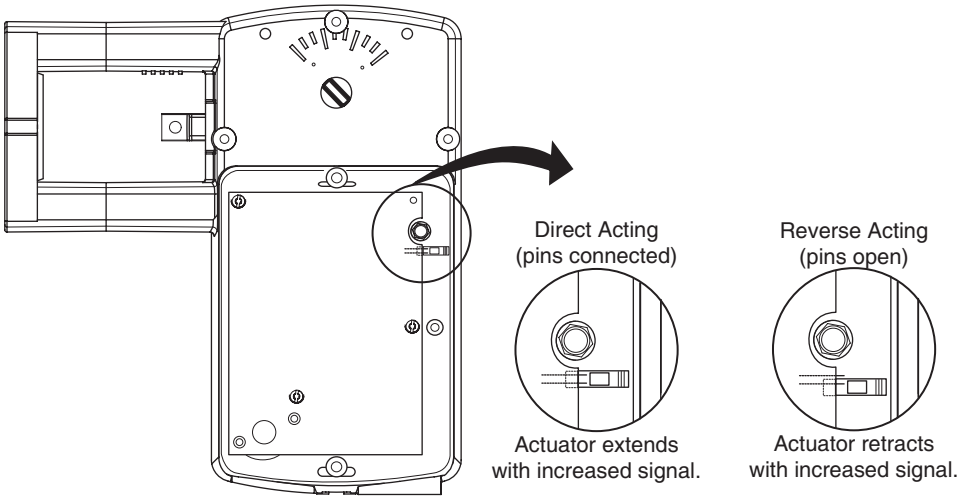


Figure-9 RA/DA Jumper Setting for Proportional Models

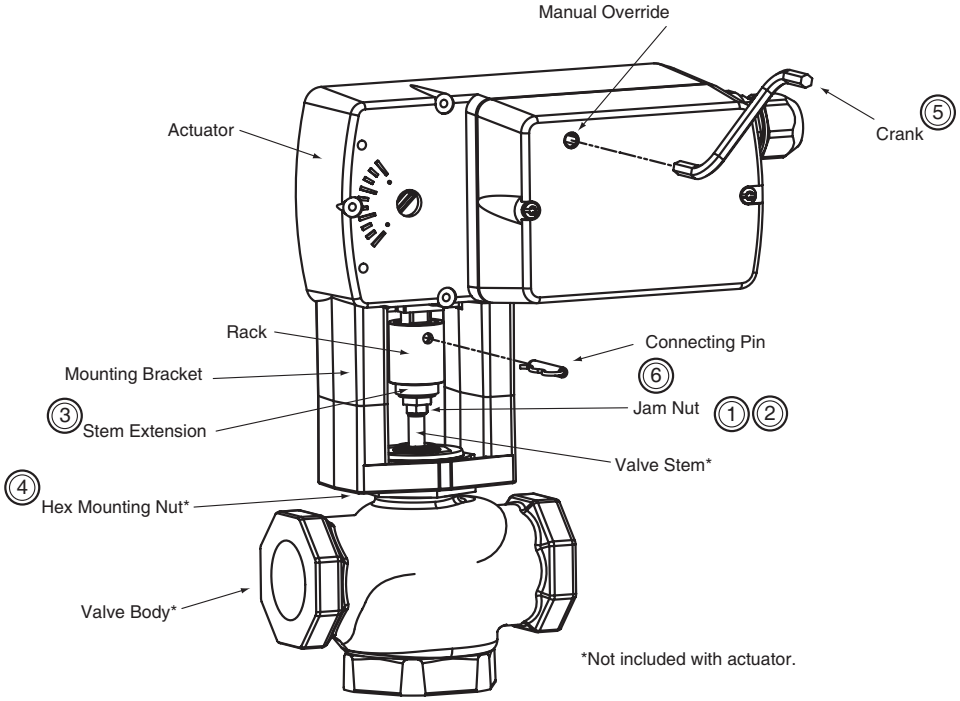


Figure-10 Mx51-710x Series Actuator Exploded View

Installation: Mx51-710x Series Actuator to 1/2" to 2" VB-7xxx Series Valve Bodies, 2-Way Stem-Up Closed and 3-Way Mixing or Diverting Applications

A. Preload the valve to insure proper close-off according to the numbered steps in Figure-10 and the text below. (Remove power before proceeding.)

1. Locate the steel jam nut that came packaged with the actuator. (Do not re-use the brass jam nut present on an existing valve.)
2. Screw the nut onto the valve stem all the way as far as it will go (you may need to use a TOOL-20-1 or a 5/16" open-end wrench). At least 1/2" of the valve stem should extend above the nut.
3. Thread the stem extension onto the valve stem, making contact with the jam nut. Raise the valve stem to the full up position.

4. Orient the actuator mounting bracket on the valve and tighten the hex mounting nut securely against the bracket using TOOL-37.
5. Insert the crank provided in the actuator cover. Wind two turns counterclockwise. Press in the turn crank 1/8 turn counterclockwise to lock in position.
6. Rotate the stem extension until the through holes in the stem extension and rack line up. Insert connecting pin to secure stem extension and tighten jam nut against stem extension using TOOL-20-1 or a 5I16" open end wrench.

B. Apply power to the actuator and check the system operation for heating or cooling output in response to the control signal.

Installation: Mx51-710x Series Actuator to 1/2" to 2" VB-7xxx Series Valve Bodies, 2-Way Stem-Up Open

A. Preload the valve to insure proper close-off according to the numbered steps to 10 and the text below. (Remove power before proceeding.)

1. Locate the steel jam nut that came packaged with the actuator. (Do not re-use the brass jam nut present on an existing valve.)
2. Screw the nut onto the valve stem as far as possible (use TOOL-20-1 or a 5/16"open-end wrench if needed). At least 1/2" of the valve stem should extend above the nut.
3. Thread the stem extension onto the valve stem, making contact with the jam nut. Push the valve stem to the full down position.
4. Orient the actuator mounting bracket on the valve and tighten the hex mounting nut securely against the bracket using TOOL-37.
5. Insert the crank provided in the actuator cover. Wind the crank counterclockwise until the actuator fully extends, then unwind 2 turns and press in and turn crank 1/8 turn counterclockwise to lock in position.
6. Rotate the stem extension until the through holes in the stem extension and rack lineup. Insert connecting pin to secure stem extension and tighten jam nut against stem extension using TOOL-20-1 or a 5I16" open end wrench.

B. Apply power to the actuator and check the system operation for heating or cooling output in response to the control signal.

Valve Mounting

The valve should be mounted in a weather-protected area, in a location that is within the ambient temperature limits of the actuator. The installation of the actuator assembly should provide clearance on all sides to allow for any maintenance that may be needed (see Figure-10 and Figure-11).

1. Following general piping practices is recommended.
2. Apply pipe sealant sparingly to all but the last two threads of a properly threaded, reamed, and cleaned pipe. Make sure the pipe chips, scale, etc. do not get into the pipe since this material may lodge in the valve seat and prevent proper closing and opening of the valve. The valve must be piped with an inlet and an outlet.
3. Start the joint hand-threading the pipe into the valve. If the thread alignment feels normal, continue to turn the pipe by hand as far as it will go.
4. Use a pipe wrench to fully tighten the pipe to the valve.

Caution: Do not over-tighten the pipe, which may cause stripped threads. Avoid twisting or crushing the valve while tightening the pipe.

---

5. Insulate only the valve body and associated piping, not the actuator.
6. In chilled or cold water systems where the environment is humid, use a drip pan under the valve to catch condensate.

Caution: The SmartX linear actuator is designed to effectively support its own weight. No load or weight should be resting on the actuator, long term damage may occur to the actuator, mounting connection or the valve.

- Do not insulate the actuator/linkage. Doing so will result in excess heat buildup within the actuator.

- For non-steam application the globe valve assembly must be mounted so that the actuator is at least 5° above the horizontal (Figure-11) to ensure that any condensate that forms will not travel into the mounting bracket or actuator.
- On steam applications, the globe valve assembly must be mounted approximately 45° from horizontal.
- Temperature Restrictions: For maximum ambient 140 °F (60 °C) the maximum allowable fluid temperature should not exceed valve rating. See F-27252 Selection Guide for specific ratings.

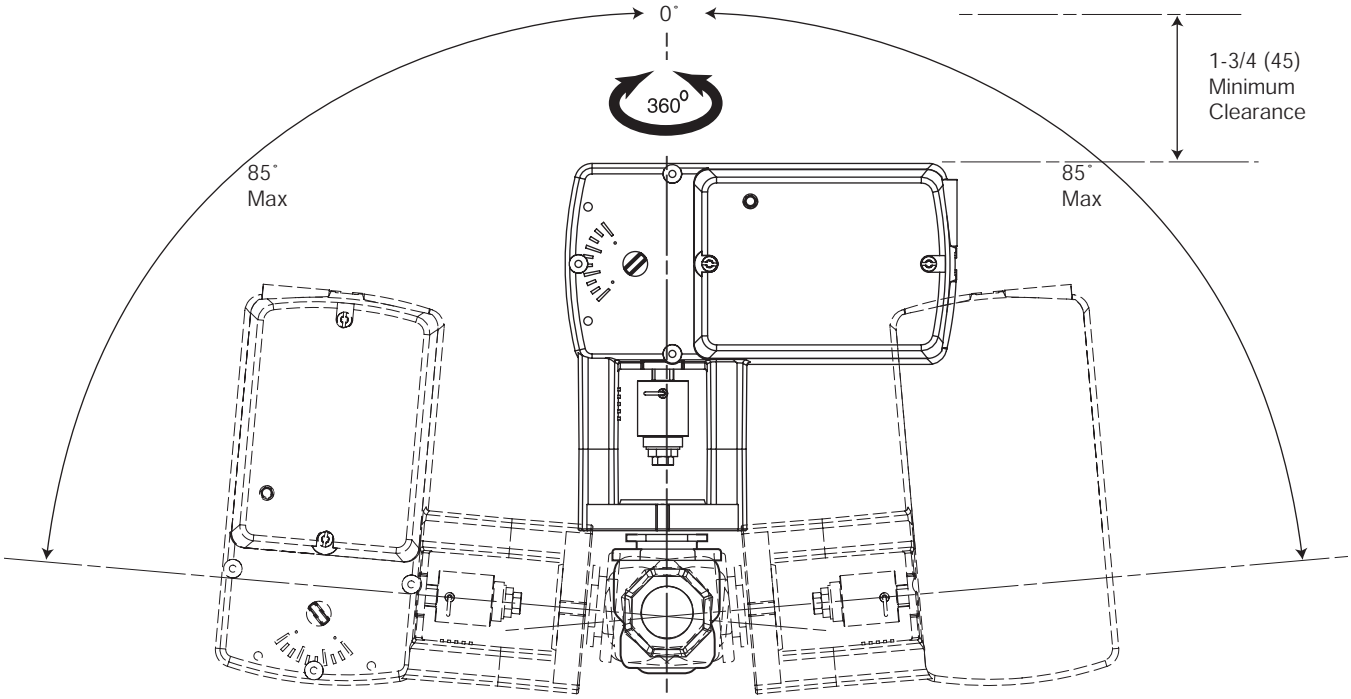


Figure-11 Acceptable Mounting Orientations for Non-Steam Applications

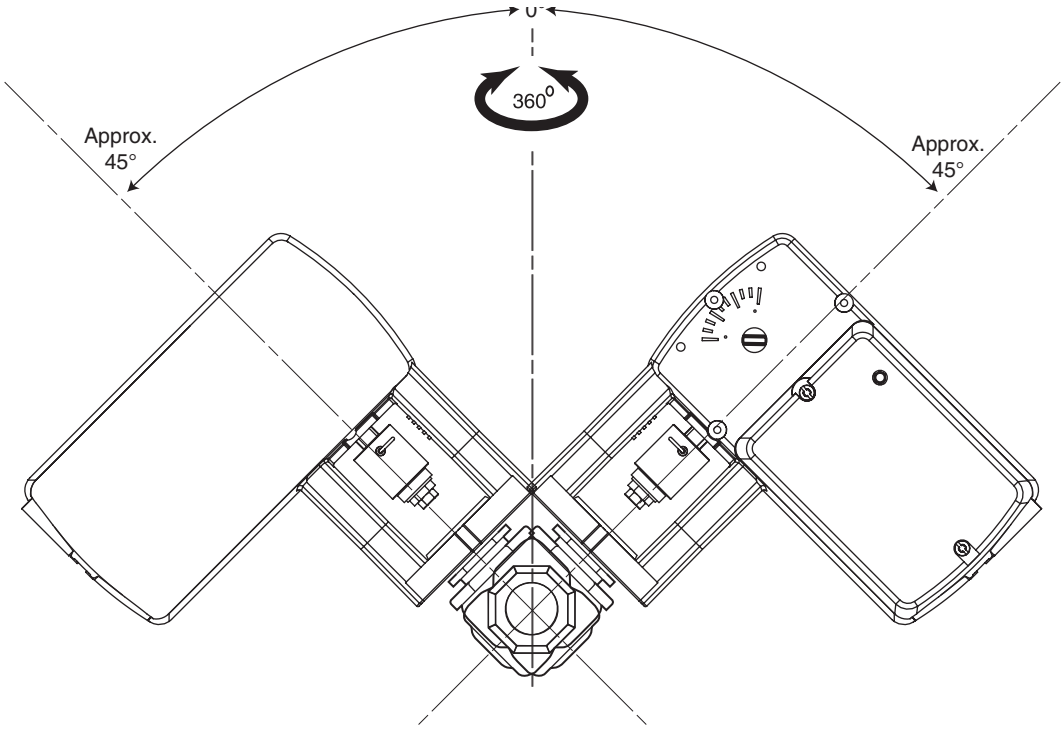


Figure-12 Acceptable Mounting Orientation for Steam Applications

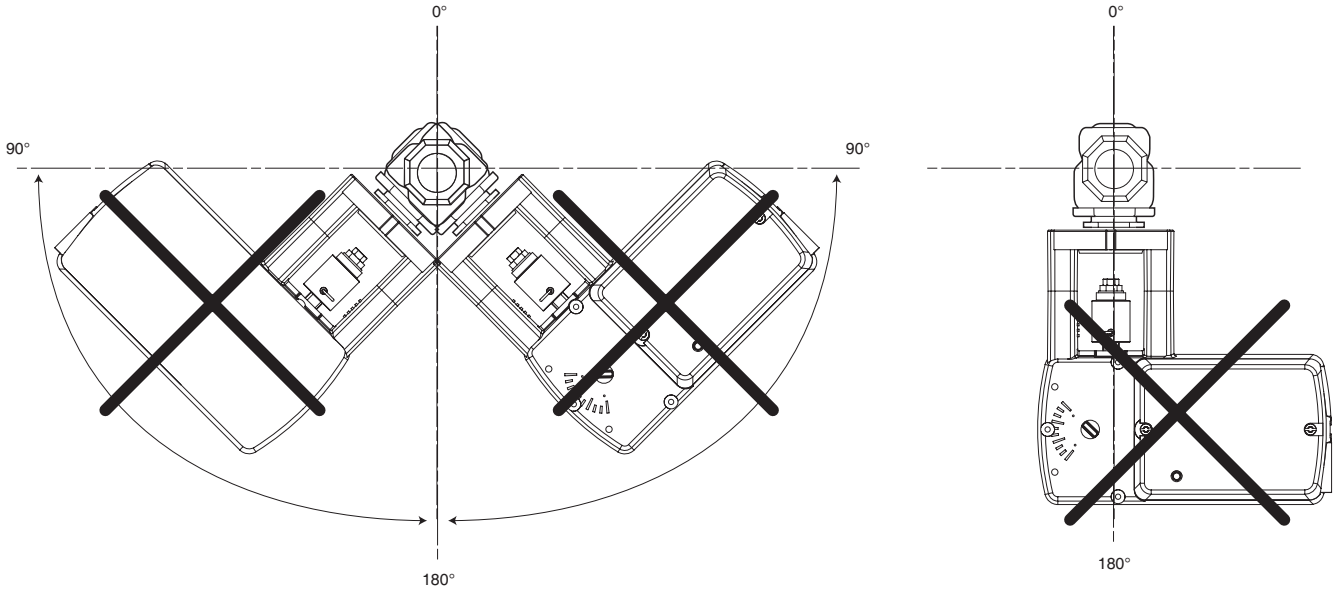


Figure-1 Unacceptable Mounting Orientation

MANUAL OVERRIDE OPERATION

When necessary, the actuator's output shaft can be repositioned using the manual override mechanism as follows:

1. Disconnect power from the actuator. The actuator will fully retract.
2. Without pushing down on the crank, crank the manual override counterclockwise until the actuator extends to the desired position. Push in until the mechanism locks in position. (The manual override lock will release the next time power is applied.)
3. If you desire to reposition the actuator manually from a locked position, turn the crank 1/8 turn counterclockwise and pull out to release. Adjust position as desired.

Caution:

- Only use manual override when the actuator drive motor is not powered.
- Engaging the manual override when the actuator is powered may cause damage to the gears.
- Using power tools to adjust the override will cause damage to the gears.

Wiring Requirements

Control Leads

See Table-2 for power wiring data. Refer to Figure-1 through Figure-7 for typical wiring.

Table-2 Power Wiring

Actuator Voltage	Part Number	Maximum Wire Run in ft. (m)					
		12 AWG	14 AWG	16 AWG	18 AWG	20 AWG	22 AWG
24 Vac 20-30 Vdc	MA51-7103	1678 (512)	1055 (322)	664 (202)	417 (127)	263 (80)	208 (63)
	MF51-7103	1289 (393)	810 (247)	510 (155)	321 (98)	202 (61)	160 (49)
	MS51-7103	1140 (348)	717 (219)	451 (137)	284 (86)	178 (54)	141 (43)

CHECKOUT

After the entire system has been installed and the actuator has been powered up, the following check can be made for proper system operation. Check for correct operation of the valve while actuator is being stroked.

1. Apply power to the actuator. Actuator and valve should be driven to their powered position as determined by the control signal. Refer to Table-3 for valve flow.

2. Break power to the actuator. Actuator and valve should return to the spring return position (retracted position).

Table-3 Assembly Configuration Chart

Valve Body	Valve Body Action	Normal Position		Action[a]
		Valve Stem	Flow	
VB-721x VB-921x	Two-Way Stem Up Open	Up	Open	A to AB flow decreases as actuator extends
VB-722x VB-922x[b]	Two-Way Stem Up Closed	Up	Closed	A to AB flow increases as actuator extends
VB-731x VB-931x[b]	Three-Way Mixing	Up	B to AB	A to AB flow increases as actuator extends B to AB flow decreases as actuator extends
VB-732x VB-932x[b]	Three-Way Diverting	Up	B to AB	B to A flow increases as actuator extends B to AB flow decreases as actuator extends

[a]Proportional models shipped with RA/DA jumper set for DA (actuator extends with increasing signal).

[b]Discontinued 1/2” to 1-1/4” VB-9xxx.

Note: Check that the transformer(s) are sized properly.

- If a common transformer is used with multiple actuators, make sure that polarity is observed on the secondary. This means connecting all black wires to one leg of the transformer and all red wires to the other leg of the transformer.
- If multiple transformers are used with one control signal, make sure all black wires are tied together and tied to control signal negative (-).
- If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.

THEORY OF OPERATION

The MA, MF and MS series actuators are directly mounted onto the valve without the use of a separate linkage. They are equipped with true mechanical spring return operation for reliable, positive close-off on valves. When power is applied, the actuator moves to its powered position, at the same time tensing the spring return safety mechanism. When the power is removed, the spring returns the actuator to its normal position (retracted position). The spring return system provides consistent close-off force to the valve.

MA series two-position actuators use a DC motor controlled by on board electronics. When the actuator encounters a stall or end of travel position, the motor current is automatically reduced, preventing damage to the actuator or motor.

MF or MS series floating or proportional actuators use a DC motor which is controlled by a microprocessor. The microprocessor supplies the intelligence to provide a constant speed and to know the actuator’s exact position. The microprocessor monitors and controls the DC motor’s rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition.

All actuators may be stalled anywhere in their normal rotation without the need of a mechanical end switch.

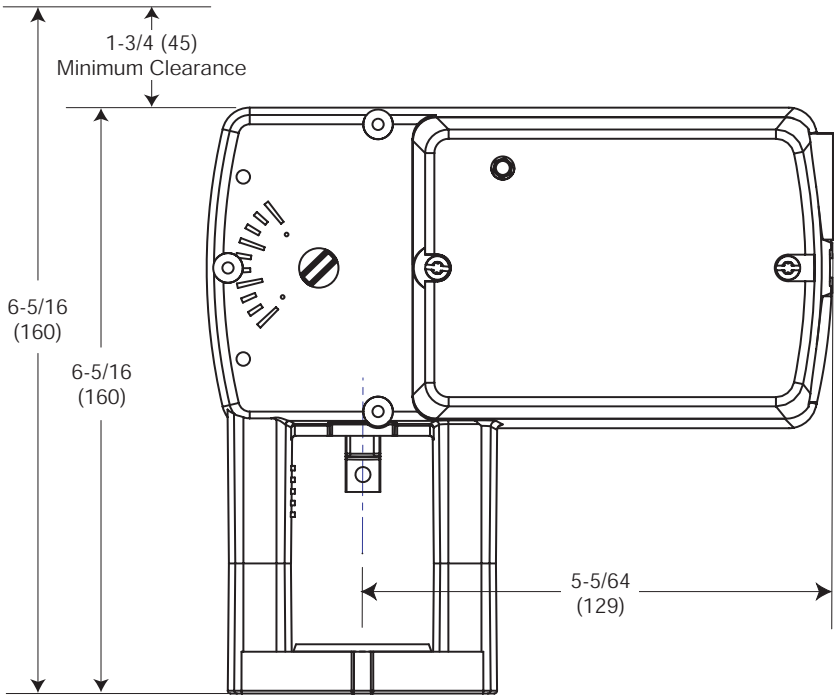
MAINTENANCE

Regular maintenance of the total system is recommended to assure sustained optimum performance. The Linear series actuators are maintenance free.

FIELD REPAIR

None. Replace with a functional actuator.

DIMENSIONAL DATA



Dimensions shown
are in inches (mm).

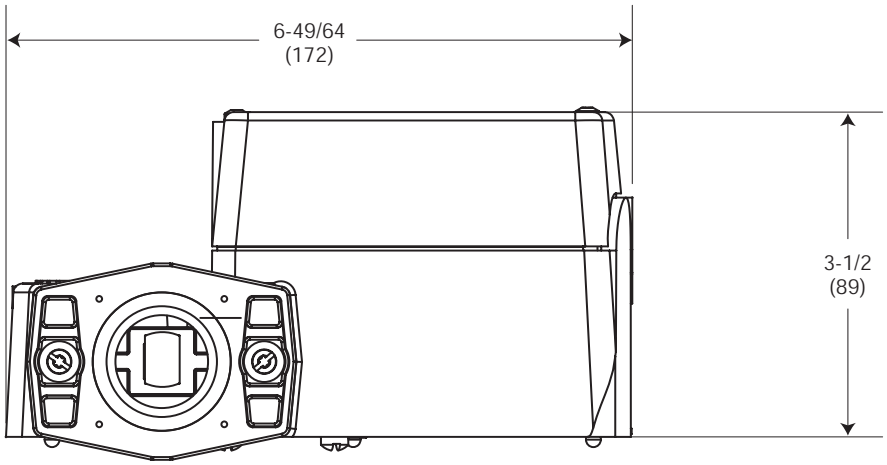


Figure-14 Mx51-710x Spring Return Valve Actuator Dimensions

Commercial Reference	Range Brand		Product Description			
MA51-71XX MS51-71XX MF51-71XX	SMARTX LINEAR ACTUATORS		MA51 2-POSITION LINEAR 105-INLBF SPRING-RETURN MS51 PROPORTIONAL LINEAR 105-INLBF SPRING-RETURN MF51 FLOATING LINEAR 105-INLBF SPRING-RETURN			
	有害物质 - Hazardous Substances					
部件名称 Part Name	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚(PBDE)
属部件 Metal Parts	X	O	O	O	O	O
塑料部件 Plastic Parts	O	O	O	O	O	O
电子件 Electronic	X	O	O	O	O	O
线缆和线缆附件 Cables & cabling accessories	O	O	O	O	O	O

本表格依据 SJ/T11364 的规定编制。
O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。
（企业可在此处，根据实际情况对上表中打 “X” 的技术原因进行进一步说明。）

This table is made according to SJ/T 11364.
O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.
X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572

SIEMENS

4563

acvatix

Actuadores electro-hidráulicos para válvulas

SKD62... SKD60

Con 20 mm de carrera

- **SKD62...: Tensión de servicio 24 V CA, señal de control 0…10 V CC, 4… 20 mA ó 0 ... 1000 Ω , con función muelle de retorno**
- **SKD60: como SKD62, pero sin función muelle de retorno**
- **SKD62U: como SKD62, pero con aprobación UL**
- **SKD62UA: como SKD62U, pero con funciones mejoradas (elección de dirección de funcionamiento, control de límite de carrera, secuenica de control con punto de arranque y rango de funcionamiento ajustables, y adición de señal para operación con monitores de protección antihielo QAF21... y QAF61...)**
- **Fuerza de posicionamiento 1000 N**
- **Elección de característica de flujo: isoporcentual o lineal**
- **Retroalimentación de posición**
- **Calibración de carrera**
- **LED de indicación de estado**
- **Control mando imperativo**
- **Ajuste manual e indicador de posición**
- **Para montaje directo en válvulas; sin necesidad de ajustes**
- **Funciones adicionales con conmutador auxiliar, calefactor de vástago e inversor mecánico de carrera**
- **SKD62U y SKD62UA con aprobación UL**

Aplicación

Para operación de válvulas Siemens de dos y tres vías (types VVF..., VVG..., VPF..., VXF... and VXG...) con una carrera de 20 mm, como válvulas de corte de control y seguridad en instalaciones de calefacción, ventilación y aire acondicionado.

Tipos

	Tipo	Tensión de servicio	Señal de control	Muelle de retorno		Tiempo de posicionamiento		Función mejorada
				Función	Tiempo	Abrir	Cerrar	
Versiones con electrónica estándar	**SKD62** **SKD62U ***	24 V CA	0 ... 10 V CC, 4 ... 20 mA ó 0 ... 1000 Ω	Sí	15 s	30 s	15 s	No
	SKD60			No	--			
Versión con electrónica mejorada	**SKD62UA ***	CA 24 V	0 ... 10 V CC, 4 ... 20 mA ó 0 ... 1000 Ω	Sí	15 s	30 s	15 s	Direc. de operación Control lím. carrera Control de secuencia Adición de señal

***** Versiones con aprobación UL

Accesorios

Tipo	Descripción
ASC1.6	Conmutador auxiliar
ASZ6.5	Calefactor de vástago 24 V CA
ASK50	Inversor mecánico de carrera

Pedidos

Cuando haga el pedido, por favor especifique el nombre y referencia del producto indicado en nuestra lista oficial de precios.

Entregas

El actuador, la válvula y los accesorios se entregan por separado, sin montar.

Compatibilidad

Controladores

Los actuadores pueden ser dirigidos con cualquier sistema de control de alimentación 24 V CA SELV/PELV y que opere con señales 0 ... 10 V CC ó 4 ... 20 mA.

Monitor de protección antihielo

Las señales añadidas de la QAF21... y QAF61... requieren el uso de actuadores SKD62UA.
Para saber más sobre la programación especial de la electrónica, remítase a “Electrónica mejorada” en las páginas 6 y 7.

Válvulas

Los actuadores son adecuados para la operación de las siguientes válvulas Siemens de dos y tres vías con 20 mm de carrera.

Válvula	DN	PN	Hoja técnica
Válvulas de 2 vías VV… (válvulas de control o válvulas de corte de seguridad):			
VVF21... (Bridas)	25 ... 80 mm	6 bar	4310
VVF31... (Bridas)	25 ... 80 mm	10 bar	4320
VVF40... (Bridas)	15 ... 80 mm	16 bar	4330
VVF41... (Bridas)	50 mm	16 bar	4340
VVG41... (Roscadas)	15 ... 50 mm	16 bar	4363
VVF52... (Bridas)	15 ... 40 mm	25 bar	4373
VVF61... (Bridas)	15 y 25 mm	40 bar	4382
Válvulas de 3 vías, VX... (válvulas de control para mezcla y distribución)			
VXF21... (Bridas)	25 ... 80 mm	6 bar	4410
VXF31... (Bridas)	25 ... 80 mm	10 bar	4420
VXF40... (Bridas)	15 ... 80 mm	16 bar	4430
VXF41... (Bridas)	15 ... 50 mm	16 bar	4440
VXG41... (Rosacadas)	15 ... 50 mm	16 bar	4463
VXF61... (Bridas)	15 y 25 mm	40 bar	4482

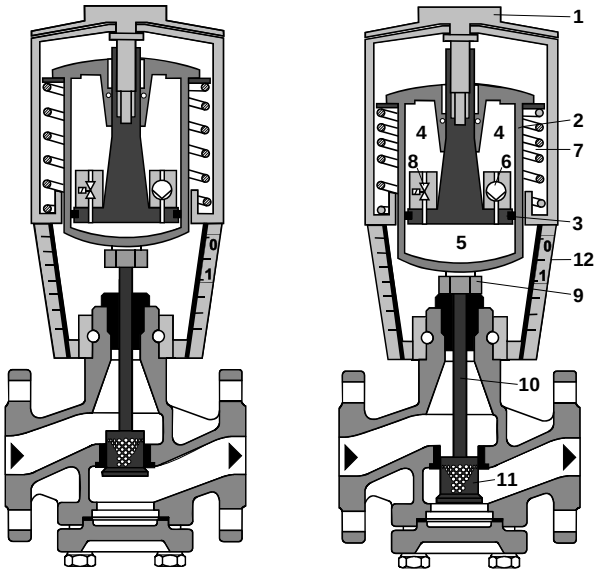
Para presiones diferenciales Δp_{max} y Δp_s admisibles, ver la hoja técnica de la válvula pertinente.

Nota

Pueden motorizarse válvulas de terceros de entre 6 y 20 mm de carrera, siempre que tengan un mecanismo de cierre de emergencia por fallo de tensión, y se disponga de los acoplamientos mecánicos necesarios.
Contacte con su oficina local de Siemens para solicitar la información necesaria.

Tecnología

Principio de operación



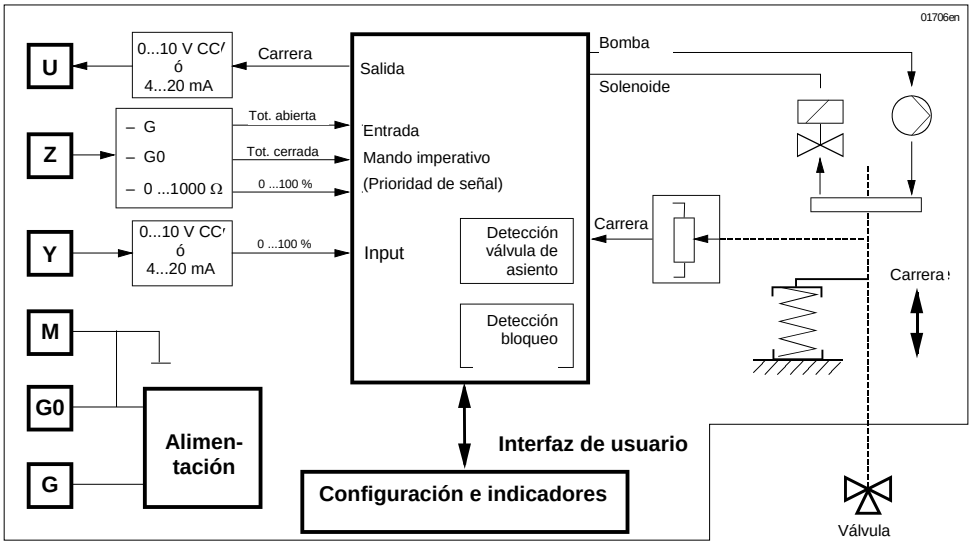
Válvula cerrada Válvula abierta

1 Selector manual
2 Cilindro de presión
3 Pistón
4 Reserva del cilindro
5 Cámara de presión
6 Bomba
7 Muelle de retorno
8 Válvula bypass
9 Acoplamiento
10 Vástago de válvula
11 Válvula interna
12 Indicador posición (0 a 1)

Entrada señal Y

- **Creciente:** La bomba (6) trasiega el aceite hidráulico de la reserva del cilindro (**4**) a la cámara de presión (**5**) generando así el desplazamiento del cilindro: el vástago (**10**) se retrae y el obturador (**11**) se abre.
- **Decreciente** La válvula de bypass (**8**) se abre, permitiendo que el aceite hidráulico fluya de nuevo de la cámara de presión (**5**) a la reserva del cilindro (**4**) mediante el muelle de retorno (**7**). El vástago de la válvula (**10**) se extiende y el obturador (**11**) se cierra.
- **Constante:** El actuador y la válvula permanecen en su posición de carrera actual.

Diagrama de principios

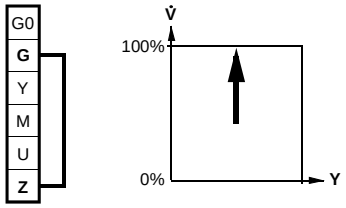
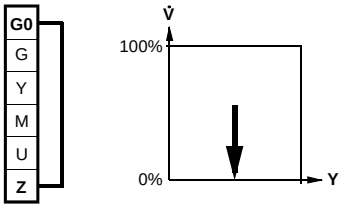
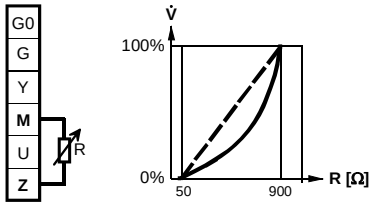
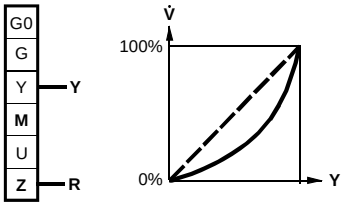


Función de muelle de retorno

Todos los actuadores SKD62… vienen de fábrica con una función de muelle de retorno, de modo que si falla la señal de control o la alimentación, el actuador volverá a la posición de carrera.
Los actuadores SKD60 no tienen función de muelle de retorno. En caso de un fallo de alimentación, estos actuadores permanecerán en su posición de carrera actual.

Control mando imperativo

La entrada del control de mando imperativo (Z) tiene cuatro modos de funcionamiento:

Válvula completamente abierta	**Válvula completamente cerrada**
 – Contacto Z conectado directamente a G – Entrada Y sin efecto	 – Contacto Z conectado directamente a GU – Entrada Y sin efecto
Mando imperativo con 0 ... 1000 Ω	**Adición de señal** (sólo SKD62UA)
 – Contacto Z conectado a M vía resistencia R – Característica isoporcentual o lineal – Posición inicial en 50 Ω / posición final en 900 Ω – Entrada Y sin efecto	 – Contacto Z conectado a R o al monitor de protección antihielo QAF21... o QAF61... – La carrera sigue las señales Y *y* R(Z)

Nota

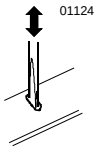
Los modos Z mostrados asumen el ajuste de fábrica “acción directa“.

Calibración de carrera

Para determinar las posiciones 0 y 100% de la carrera de la válvula, hay que hacer una calibración de la válvula / actuador al ponerlos en marcha por primera vez. Por ello, el actuador debe estar conectado mecánicamente a la válvula Siemens (ver “Compatibilidad”) y tienen que tener una alimentación de 24 V CA. El procedimiento de calibración puede repetirse tantas veces como sea necesario.

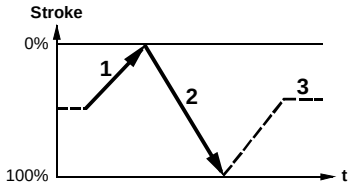
⚠ **Antes de empezar la calibración, verifique que el selector manual está en “Automático” para registrar los valores actuales.**

Hay una ranura en las placas de circuito impreso de los actuadores. Para iniciar el procedimiento de calibración, los contactos del interior de esta ranura cortocircuitarse (ej., con un destornillador).



La calibración automática procede del siguiente modo:

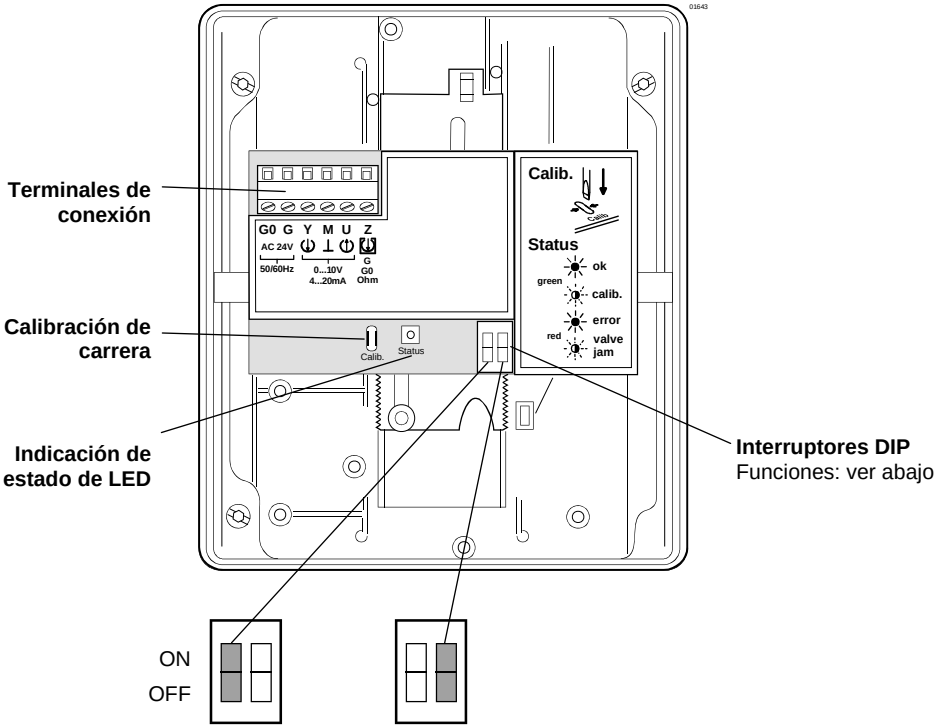
- El actuador se dirige a la posición de “carrera 0” (**1**), la válvula se cierra, el LED parpadea.
- Ahora el actuador se dirige hacia la posición de “carrera 100” (**2**), la válvula se abre, el LED verde parpadea.
- Se almacenan los valores de medida.
  El procedimiento de calibración ha terminado, y el LED verde sólo brilla, no parpadea (op. normal).
- Ahora el actuador se dirige hacia la posición definida por la señal de control Y o Z (**3**).
- Durante todo el proceso, la salida U permanece inactiva, i.e. los valores sólo representan posiciones reales si el LED verde deja de parpadear y permanece encendido.



Indicación de estado del LED

LED	Visualización	Función	Acción
Verde	**Encendido**	• Operación normal	Operac. automática, sin problemas
	Parpadea	• Calibración de carrera	Espere a que termine la calibración
Rojo	**Encendido**	• Calibración de carrera fallida • Error interno	Compruebe el montaje Reinicie la calibración (mediante corto en la ranura) Cambie la electrónica
	Parpadea	• Válvula interior gripada	Compruebe la válvula
Ambos	**Apagado**	• Sin alimentación • Electrónica defectuosa	Compruebe la red principal Sustituya la electrónica

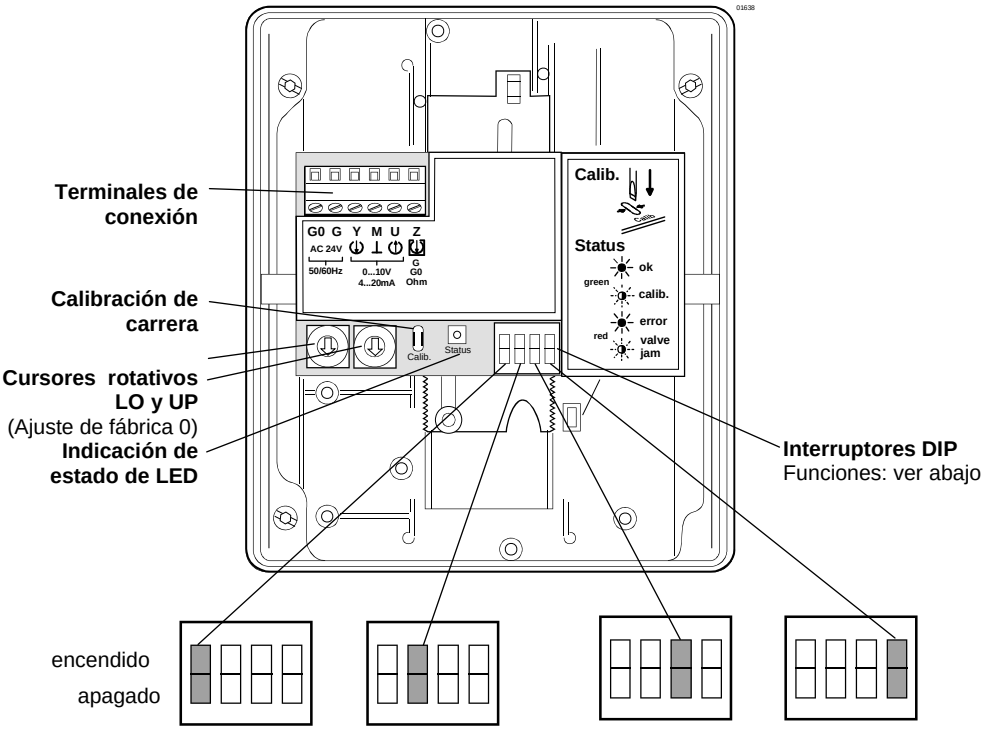
Electrónica estándar
SKD62
SKD60
SKD62U



Interrupt. DIP	Seleccione señal de control	Seleccione característica de flujo
Encendido	**4 ... 20 mA CC**	**Lineal**
* Apagado	**0 ...10 V CC**	**Isoporcentual**

***** Ajuste de fábrica: todos los interruptores OFF

Electrónica mejorada
SKD62UA



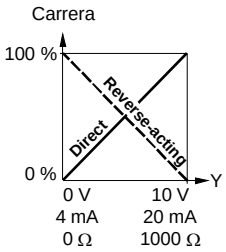
Interrup. DIP	Selección de direc. operación	Control de secuencia o control lím. de carrera	Selección de señal de control	Selección de característica de flujo
Encendido	**Inversa**	**Control secuencia** **Adición de señal** QAF21... / QAF61...	**4 ... 20 mA CC**	**Lineal**
***** Apagado	**Directa**	**Control lím. carrera**	**0 ...10 V CC**	**Isoporcentual**

***** Ajuste de fábrica: todos los interruptores OFF

Selección de la dirección de operación

- Con válvulas normalmente cerradas, “acción directa” significa que con una entrada de señal 0 V, la válvula se cierra (se aplica a todas las válvulas Siemens listadas en “Compatibilidad” en la página 3.
- Con válvulas normalmente abiertas, “acción directa” significa que con una entrada de señal de 0 V, la válvula se abre.

Acción directa	**Acción inversa**
0 % Y 100 % (10 V)	(10 V) 100 % Y 0 %
– Entrada 0 ... 10 V CC 4 ... 20 mA CC 0 ... 1000 Ω	– Entrada 10 ... 0 V CC 20 ... 4 mA CC 1000 ... 0 Ω

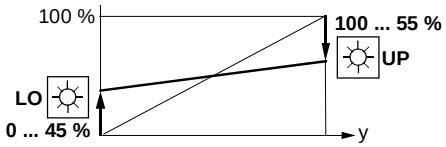


Nota La función mecánica de muelle de retorno no se ve afectada por la dirección de operación seleccionada.

Control de límite de carrera y control de secuencia

Configuración del control de límite de carrera

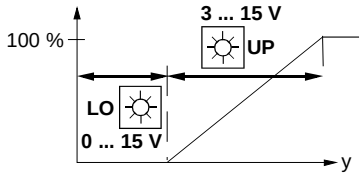
Con los cursores rotativos LO y UP se puede aplicar a la carrera un límite superior e inferior, en incrementos de un 3%, y hasta un máximo de 45%



Pos. LO	Límite inferior de carrera	Pos. UP	Límite superior de carrera
0	0 %	**0**	100 %
1	3 %	**1**	97 %
2	6 %	**2**	94 %
3	9 %	**3**	91 %
4	12 %	**4**	88 %
5	15 %	**5**	85 %
6	18 %	**6**	82 %
7	21 %	**7**	79 %
8	24 %	**8**	76 %
9	27 %	**9**	73 %
A	30 %	**A**	70 %
B	33 %	**B**	67 %
C	36 %	**C**	64 %
D	39 %	**D**	61 %
E	42 %	**E**	58 %
F	45 %	**F**	55 %

Configuración de control de secuencia

Con los cursores rotativos LO y UP se puede determinar el punto de arranque o el rango de operación de una secuencia



Pos. LO	Punto de inicio del control de secuencia	Pos. UP	Rango de op. del control de secuencia
0	0 V	**0**	10 V
1	1 V	**1**	10 V *
2	2 V	**2**	10 V **
3	3 V	**3**	3 V ***
4	4 V	**4**	4 V
5	5 V	**5**	5 V
6	6 V	**6**	6 V
7	7 V	**7**	7 V
8	8 V	**8**	8 V
9	9 V	**9**	9 V
A	10 V	**A**	10 V
B	11 V	**B**	11 V
C	12 V	**C**	12 V
D	13 V	**D**	13 V
E	14 V	**E**	14 V
F	15 V	**F**	15 V

***** Rango de operación de QAF21... (ver abajo)
****** Rango de operación de QAF61... (ver abajo)
******* El ajuste más pequeño es 3 V; el control con 0…30 V sólo es posible vía Y.

Control de carrera con adición de señal QAF21... / QAF61...

Configuración de la adición de señal

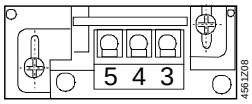
El rango de operación del monitor de protección antihielo (QAF21... o QAF61...) puede definirse con los botones rotativos LO y UP.

Pos. LO	Inicio de control de secuencia	Pos. UP	Rango de operac. QAF21... / QAF61...
0		**1**	**QAF21...**
0		**2**	**QAF61...**

Accesorios

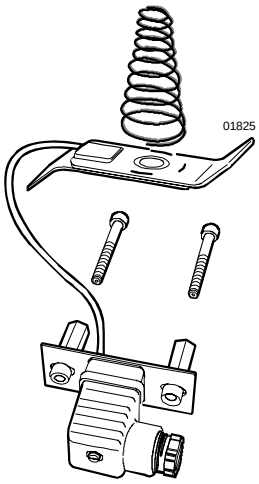
Conmutador auxiliar ASC1.6

– Punto conmutación 0 … 5 % de carrera



Calefactor de vástago ASZ6.5

– Para medios bajo 0°C
– Montar entre válvula y actuador



Notas de Ingeniería

Los actuadores deben estar conectados eléctricamente según la normativa local y según el diagrama de la página 11.

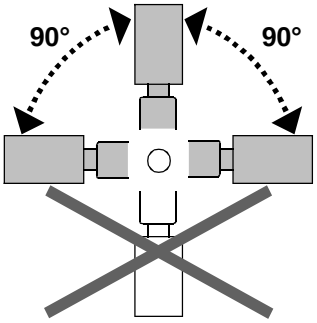
⚠ **Deben respetarse siempre la normativa y los requerimientos diseñados para la seguridad de personas y cosaspropiedades debe respetarse siempre.**

El calefactor de vástago ASZ6.5 tiene una salida de calor de 30 VA y es necesario para evitar que se congele el vástago en el rango de refrigeración 0 °C ... –25 °C. En este caso, para garantizar la circulación de aire adecuada, la escuadra y el vástago de la válvula no deben aislarse térmicamente. El contacto físico con los elementos calientes no protegidos puede producir quemaduras. No hacer caso de estos avisos puede dar lugar a accidentes o incendios.

Deben respetarse las temperaturas admitidas (ver “Aplicación” y “Datos técnicos”).

Instrucciones de montaje

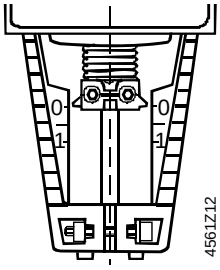
Orientación



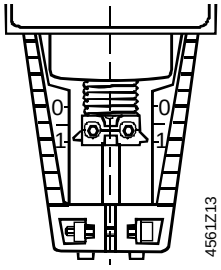
Las instrucciones para fijar el actuador a la válvula se adjuntan en el embalaje del actuador. Las instrucciones de los accesorios se entregan con éstos.

Notas de puesta en marcha

Cuando ponga en marcha el sistema, compruebe el cableado y las funciones.

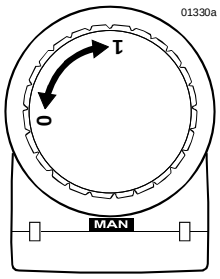


Cilindro con conector de vástago de válvula completamente retraído



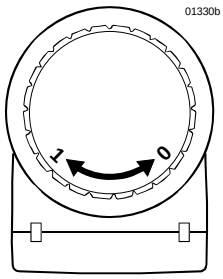
Cilindro con conector de vástago de válvula completamente extendido

⚠ **El selector manual debe rotarse en sentido contrario al de las agujas de reloj hasta el tope final, i .e. hasta que el indicador rojo rotulado „MAN“ ya no sea visible. Esto hace que las válvulas Siemens, tipos VVF..., VVG..., VPF..., VXF... y VXG... se cierren (carrera = 0%).**



« MAN »

Operación manual



« AUTO »

Operación automática

Mantenimiento

- Para los trabajos de servicio de válvula:
  Desconecte la bomba y la alimentación principal, cierre las válvulas de corte principales, despresurice las tuberías y permita que se enfríen. Si fuera necesario, desconecte las conexiones eléctricas de los terminales.
- Vuelva a poner la válvula en marcha sólo si el actuador se ha montado correctamente.
- Los actuadores y válvulas no requieren mantenimiento.

Reciclaje

El actuador contiene componentes eléctricos y electrónicos, y no puede eliminarse con la basura normal.
Debe respetarse la legislación local vigente.

Garantía

Los datos técnicos específicos de la aplicación son válidos para los actuadores Siemens usados en conjunción con las válvulas Siemens listadas en “Compatibilidad“ (subtitulado “Válvulas globales“)

Antes de usar estos actuadores con válvulas de terceros, deberá obtener una aprobación escrita por parte de Siemens Building Technologies. No tener esta aprobación invalida cualquier garantía.

Datos técnicos

Alimentación	Tensión de funcionamiento (SELV, PELV)	24 V CA20 % / +30 %
	Frecuencia	50 ó 60 Hz
	Consumo eléctrico	17 VA / 12 W
	Fusible de cable de alimentación externa	Mín. 1 A corto lento, máx. 10 A corto lento
Datos de funcionamiento	Tipo de control (proporcional)	0 ... 10 V CC, 4 ... 20 mA CC ó 0 ... 1000 Ω
	Tiempo de posicionamiento a 50 Hz	30 s (apertura), 15 s (cierre)
	Función de muelle de retorno	15 s (cierre)
	Carrera nominal	20 mm
	Fuerza de posicionamiento	1000 N
	Característica de flujo	Puede seleccionarse lineal / isoporcentual
	Máxima temperatura admisible del medio en la válvula conectada	−25 ... +140 °C < 0 °C: se requiere calentador de vástago tipo ASZ6.5

* en conjunción con las válvulas listadas en “Compatibilidad” en la página 3

Entradas de señal	Terminal Y	
	Tensión	0 ... 10 (30) V CC
	Impedancia de entrada	100 kΩ
	Corriente	4 ... 20 mA CC
	Impedancia de entrada	240 Ω
	Resolución de señal	<1 %
	Histéresis	1 %
	Terminal Z	
	Resistencia	0 ... 1000 Ω
	Funciones de control de mando imperativo	Sin función (prioridad en terminal Y)
	Z no conectado	Máx. carrera 100 %
	Z conectado directamente a G	Mín. carrera 0 %
	Z conectado directamente a G0	Carrera proporcional a R
	Z conectado a M vía 0 ... 1000 Ω	
Entradas de señal	Terminal U	
	Voltaje	0 ... 9,8 V CC ±2 %
	Impedancia de carga	>500 Ω
	Corriente	4 ... 19,6 mA CC ±2 %
	Impedancia de carga	<500 Ω
Estándares de fabricación	Cumple con requisitos de marcado **CE** en	
	Directiva EMC	89/336/EEC
	Directiva Baja Tensión	73/23/EEC
	Compatibilidad electromagnética	
	Interferencia emitida	EN 61000-6-3 Residencial
	Inmunidad de interferencia	EN 61000-6-2 Industrial
	Estándares de producto para controles eléctricos automáticos	EN 60730-2-14
	Conformidad ( )	N474
	Estándar de protección	IP54 según EN 60529
	Clase de protección	III según EN 60730
	Aprobación UL	UL 873 (SKD62U, SKD62UA)
Dimensiones / Peso	Dimensiones	Ver “Dimensiones”
Prensaestopas de cable	SKD62, SKD60	4 x Pg 11 (SKD62, SKD60)
	SKD62U, SKD62UA	4 x Pg 16 (SKD62U, SKD62UA)
	Peso (incluyendo embalaje)	3,60 Kg. (SKD62, SKD60) 3,85 Kg. (SKD62U, SKD62UA)
Materiales	Escuadra y carcasa de actuador	Aluminio inyectado
	Carcasa y selector manual	Plástico

Funciones mejoradas SKD62UA

Dirección de operación	Acción directa / Acción inversa	0 ... 10 V CC / 10 ... 0 V CC 4 ... 20 mA CC / 20 ... 4 mA CC 0 ... 1000 Ω / 1000 ... 0 Ω
Control de límite de carrera	Rango de límite inferior	0 ... 45 % ajustable
	Rango de límite superior	100 ... 55 % ajustable
Control de secuencia	Terminal Y	
	Punto de arranque de secuencia	0 ... 15 V ajustable
	Rango de funcionam. de secuencia	3 ... 15 V ajustable
Adición de señales	Z conectado a R del	
	Monitor de protec. antihielo QAF21...	0 ... 1000 Ω, añadidos a la señal Y
	Monitor de protec. antihielo QAF61...	1,6 V CC, añadidos a la señal Y

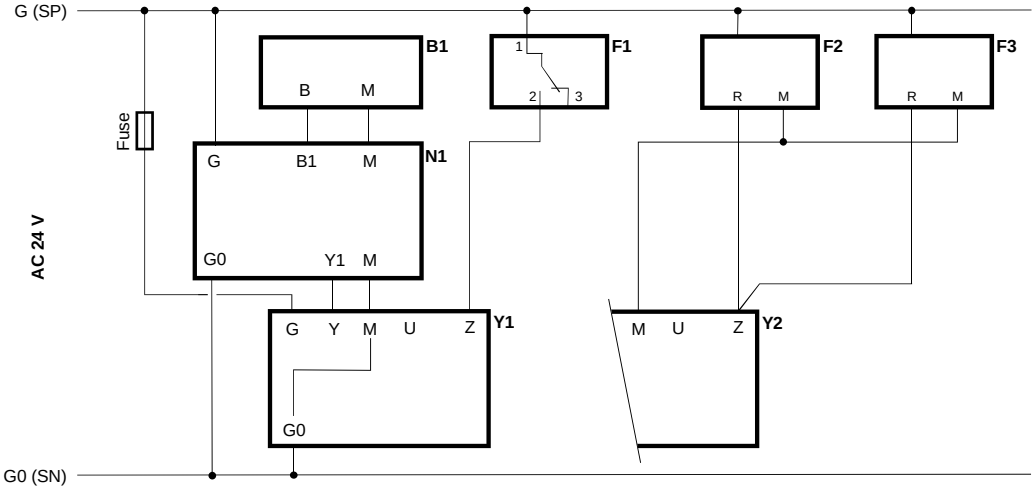
Accesorios

Interruptor auxiliar ASC1.6	Capacidad de conmutación del conmutador auxiliar	24 V CA, 10 mA ... 4 (2) A
Calefactor de vástago ASZ6.5	Tensión de servicio	24 V CA ±20 %
	Consumo eléctrico (salida de calor)	30 VA

Condiciones ambientales

	Operación IEC 721-3-3	**Transporte** IEC 721-3-2	**Almacenaje** IEC 721-3-1
Condiciones ambientales	Clase 3K5	Clase 2K3	Clase 1K3
Temperatura	–15 ... +55 °C	–30 ... +65 °C	–15 ... +55 °C
Humedad	5 ... 95 %h. r.	< 95 %h. r.	0 ... 95 % h.r.

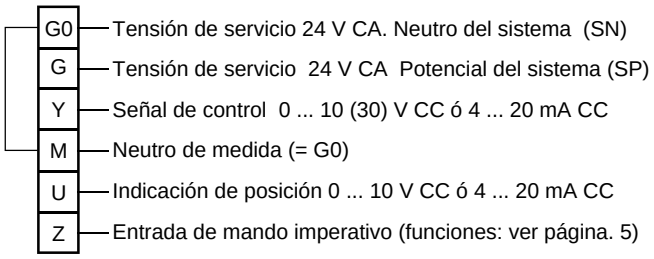
Diagrama de conexión



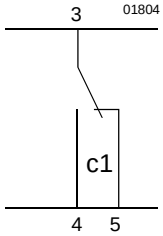
B1 Sonda
F1 Limitador de temperat.
F2 Monitor prot. antihielo QAF21... *
F3 Monitor prot. antihielo QAF61... *
N1 Controlador
Y1 Actuador
Y2 Actuador SKD62UA

* Sólo con control de secuencia y la configuración de selector apropiados (ver pág. 7)

Terminales de conexión

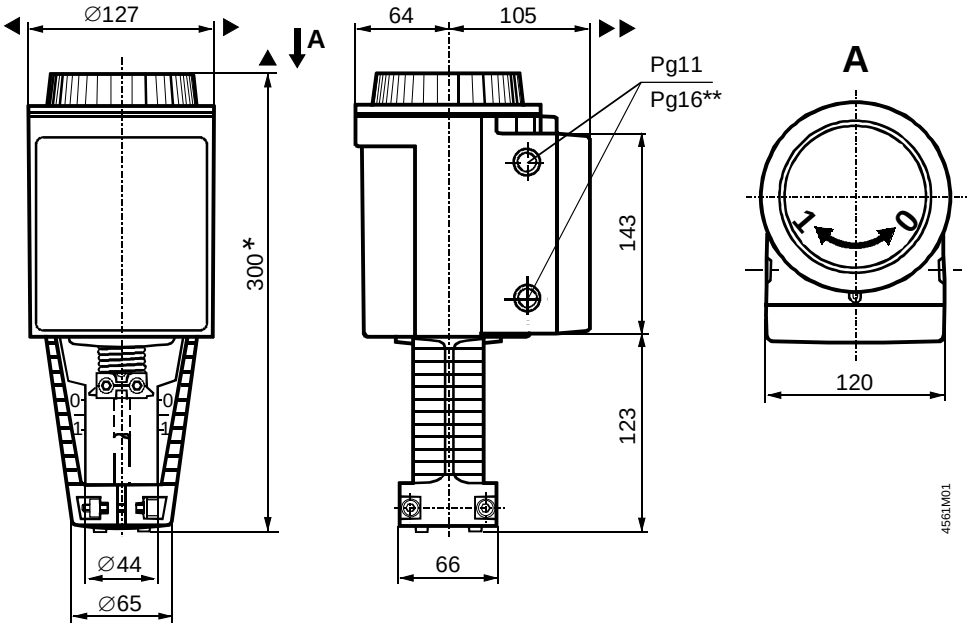


Interruptor auxiliar ASC1.6



Dimensiones

Todas las dimensiones están en mm

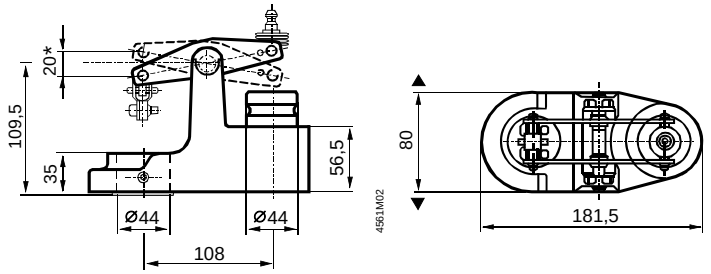


* Altura del actuador desde la placa de la válvula sin inversor de carrera **ASK50 = 300 mm**
Altura del actuador desde la placa de la válvula con inversor de carrera ASK50 = 357 mm

** El diámetro de orificio en los actuadores SKD62U... corresponde al racor Pg16.

σ = >100 mm } Espacio mínimo desde el techo o pared para montaje,
σσ = >200 mm } conexión, operación, mantenimiento, etc.

Inversor de carrera ASK50



* Máx. carrera = 20 mm

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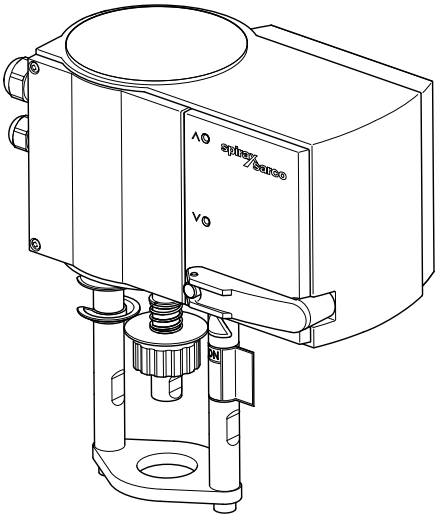
CTLS Issue 7

AEL3
Actuadores Eléctricos Lineales
Instrucciones de Instalación y Mantenimiento



1. Información de seguridad
2. Información general del producto
3. Instalación
4. Puesta en marcha
5. Mantenimiento

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1. Información de seguridad

El funcionamiento seguro de estos productos sólo puede garantizarse si la instalación, puesta en marcha, uso y mantenimiento se realiza adecuadamente y por personal calificado (ver el punto 1.13) siguiendo las instrucciones de operación. También debe cumplirse con las instrucciones generales de instalación y de seguridad de construcción de líneas y de la planta, así como el uso apropiado de herramientas y equipos.

Ver las instrucciones de Instalación y Mantenimiento de la válvula de control.

Si estos actuadores no se usan como se indica, puede causar:

- **Daños físicos al usuario o a terceras personas.**
- **Daños al actuador o a la planta.**
- **Reducir el rendimiento del actuador.**

1.1 Notas de cableado

Se han tomado todas las precauciones necesarias en el diseño del actuador para asegurar la seguridad del usuario, pero han de tomarse las siguientes precauciones:

i) **El personal de mantenimiento debe estar cualificado para trabajar con equipos que contengan voltajes peligrosos.**

ii) **Asegurar la correcta instalación. La seguridad puede verse comprometida si la instalación no se ha realizado de acuerdo con lo especificado en este manual.**

iii) **Aislar el actuador de la alimentación eléctrica antes de abrir la unidad.**

iv) **El actuador está diseñado como producto de instalación de categoría II, y depende de la instalación del edificio para la protección de exceso de corriente y aislamiento primario.**

v) **El cableado debe realizarse según la normativa IEC 60364 o equivalente.**

vi) **No se deben montar fusibles en el cable de toma de tierra. No se debe comprometer la integridad del sistema de toma de tierra por la desconexión o retirada de otro equipo.**

vii) **La instalación del edificio deberá contar con un equipo de desconexión (interruptor o magnetotérmico). Deberá estar próximo al equipo y al alcance del operario.**

- **Debe haber 3 mm de separación entre los contactos de todos los polos.**
- **Debe estar marcado como un equipo de desconexión del actuador.**
- **No debe interrumpir el conductor de toma de tierra.**
- **No debe estar incorporado en el cable de alimentación de corriente.**
- **Los requisitos del equipo de desconexión se especifican en las normas EN 60947-1 y EN 60947-3 o equivalente.**

viii) **El actuador no debe estar colocado de una manera que dificulte el acceso al equipo de desconexión.**

1.2 Directrices de Seguridad y Compatibilidad Electromagnética

Este producto lleva la marca CE. Cumple con la directiva de baja tensión 2014/35/EU, EN60730-1, EN60730-2-14.
Cumple con la directiva de emisiones 2014/30/EU, EN61000-6-2, EN6100-6-4.

Las siguientes condiciones deben evitarse ya que pueden crear interferencias superiores a los límites de las perturbaciones electromagnéticas y si:

- **El producto o su cableado se encuentran cerca de un radio transmisor.**
- **Exceso de ruido eléctrico en la red.**
- **Los teléfonos móviles y las radios pueden causar interferencias si se usan a una distancia inferior a un metro del producto o su cableado. La distancia necesaria dependerá de la potencia del transmisor.**
- **Se deberían instalar protectores de red (ca) si existe la posibilidad de ruidos en el suministro.**
- **Los protectores pueden combinar filtro y supresión de subidas y picos de tensión. Para una copia de la declaración de conformidad, contactar con Spirax Sarco.**

1.3 Aplicaciones

Refiriéndose a las Instrucciones de Instalación y Mantenimiento, placa de características y Hoja Técnica, comprobar que el producto es apto para el uso/aplicación previsto.

i) **Comprobar que el tipo de material, presión, temperatura y valores máximos y mínimos sean los adecuados. Si los valores de los límites máximos del producto son inferiores a los del sistema en el que está montado, o si el funcionamiento defectuoso del producto pudiera producir una situación peligrosa de exceso de presión o de temperatura, asegure de que dispone de un dispositivo de seguridad en el sistema para evitar tales situaciones de exceso.**

ii) **Determinar si la instalación está correctamente situada.**

iii) **Los productos Spirax Sarco no están diseñados para resistir tensiones externas que pueden ser inducidas por el sistema en el que están montados. Es responsabilidad del instalador considerar estas tensiones y tomar las precauciones adecuadas para minimizarlas.**

iv) **Estos actuadores no son adecuados para su uso como dispositivos de seguridad de acuerdo con la directiva de equipos a presión 2014/68/EU y directiva de maquinaria 2006/42/EU.**

1.4 Acceso

Antes de realizar cualquier trabajo en este equipo, asegúrese de que tiene buena accesibilidad y si fuese necesario una plataforma segura (con las barreras adecuadas). Prepare un equipo de elevación adecuado si se precisa.

1.5 Iluminación

Asegúrese de que tiene la iluminación adecuada, especialmente cuando el trabajo sea minucioso o complicado.

1.6 Condiciones medioambientales peligrosas

Considere áreas de riesgo de explosiones, falta de oxígeno (por ej. tanques o pozos), gases peligrosos, temperaturas extremas, superficies calientes, riesgos de incendio (por ej. mientras suelda), ruido excesivo o maquinaria trabajando.
Estos actuadores no están diseñados para trabajar en ambientes peligrosos según la directiva ATEX 2014/34/EU.

1.7 El sistema

Considere qué efecto puede tener sobre el sistema completo el trabajo que debe realizar. ¿Puede afectar la seguridad de alguna parte del sistema o a trabajadores, la acción que vaya a realizar (por ej. cerrar una válvula de interrupción, aislar eléctricamente)?
Los peligros pueden incluir aislar orificios de venteo o dispositivos de protección, también la anulación de controles o alarmas. Asegúrese de que las válvulas de interrupción se cierran y se abren de forma gradual para evitar shocks en el sistema.

1.8 Presión

Aislar (usando válvulas de aislamiento independientes) y dejar que la presión se normalice. Esto se puede conseguir montando válvulas de aislamiento y de despresurización aguas arriba y aguas abajo de la válvula. No asumir que el sistema está despresurizado aunque el manómetro de presión indique cero.

1.9 Temperatura

Dejar que se normalice la temperatura después de aislar para evitar quemaduras.

1.10 Herramientas y consumibles

Usar siempre las herramientas correctas, los procedimientos de seguridad y el equipo de protección adecuado. Utilizar siempre recambios originales Spirax Sarco.

1.11 Indumentaria de protección

Considere si necesitará indumentaria de protección para proteger de los riesgos de, por ejemplo, productos químicos, altas / bajas temperaturas, ruido, caída de objetos, daños a ojos / cara.

1.12 Permisos de trabajo

Todos los trabajos han de ser realizados o supervisados por personal competente. El personal de instalación y los operarios deberán tener conocimiento del uso correcto del producto según las Instrucciones de Instalación y Mantenimiento.
Donde se requiera, deberán estar en posesión de un permiso para realizar el trabajo. Donde no exista un sistema similar, se recomienda que una persona responsable sepa en todo momento los trabajos que se están realizando y, donde sea necesario, nombre una persona como responsable de seguridad.
Si fuese necesario, envíe notas de seguridad.

1.13 Manipulación

La manipulación de productos grandes y/o pesados puede presentar riesgos de lesiones. Alzar, empujar, tirar, transportar o apoyar una carga manualmente puede causar lesiones especialmente en la espalda. Deberá evaluar los riesgos que comporta la tarea, al individuo, la carga y el ambiente de trabajo y usar el método del manejo apropiado dependiendo de las circunstancias del trabajo a realizar.

1.14 Riesgos residuales

Durante el uso normal la superficie del producto puede estar muy caliente. Si se usa en sus condiciones máximas de trabajo puede alcanzar una temperatura de 90 °C (194 °F).
Muchos productos no tienen autodrenaje. Tenga cuidado al desmantelar o retirar el producto de una instalación (ver las 'Instrucciones de Mantenimiento').

1.15 Heladas

Deben hacerse las previsiones necesarias para proteger los productos que no tienen autodrenaje de los daños producidos por heladas en ambientes donde pueden estar expuestos a temperaturas por debajo de cero.

1.16 Eliminación

A menos que las Instrucciones de Instalación y Mantenimiento indiquen lo contrario este producto es reciclable y no es perjudicial para el medio ambiente si se elimina con las precauciones adecuadas.

1.17 Devolución de productos

Se recuerda que, de acuerdo con la legislación de la Comunidad Europea sobre la salud, seguridad e higiene, el cliente o almacenista que devuelva productos a Spirax Sarco para su reparación o control, debe proporcionar la necesaria información sobre los peligros y las precauciones que hay que tomar debido a los residuos de productos contaminantes o daños mecánicos que puedan representar un riesgo para la salud o seguridad medio ambiental. Esta información ha de presentarse por escrito incluyendo las documentación de seguridad e higiene de cualquier substancia clasificada como peligrosa.

2. Información general del producto

2.1 Uso

Los actuadores lineales eléctricos AEL3 están diseñados para trabajar con válvulas de dos vías Spira-trol y válvulas de tres vías QL. Los actuadores se suministran normalmente montados con la válvula de control. Cuando se suministran por separado, asegúrese de que el actuador elegido tiene la fuerza suficiente para cerrar la válvula venciendo las presiones diferenciales esperadas. Ver la hoja técnica de la válvula de control para ver más detalles.

Los actuadores AEL3 son actuadores accionados por motor para válvulas todo/nada, modulantes o de control especial para regular el flujo de agua fría o caliente, vapor o aire y aplicaciones equivalentes. El uso típico es para aplicaciones de HVAC.

Los actuadores AEL3 están disponibles con 3 suministros eléctricos, 24 Vca/cc de estándar, 230 Vca o 100-110 Vca, disponibles con módulos adicionales, todos adecuados para una señal de entrada servomotor (VMD), 4-20 mA o Señal de control 0-10 Vcc. El actuador tiene 3 opciones de velocidad, todas seleccionadas mediante microinterruptores en el actuador.
En la Tabla 1 se dan detalles sobre los tipos de actuador y los números de referencia:

Tabla 1. Nomenclatura actuador AEL3

Producto	**A**	=	Actuador
Tipo	**E**	=	Eléctrico
Movimiento	**L**	=	Lineal
Serie	**3**		
Modo a pruebe de fallos	**E**	=	Resorte extiende vástago
	R	=	Resorte retrae vástago
	X	=	Sin resorte
Par (kN)	**2**		
Carrera (mm)	**20**		
Velocidad seleccionable	2 s/mm = 0,5 mm/s seleccionable mediante microinterruptores en el actuador		
	4 s/mm = 0,25 mm/s		
	6 s/mm = 0,16 mm/s		
Alimentación	24 Vca y 24 Vcc 230 Vca o 100-110 Vca montado módulos de alimentación		
Señal de control	24 a 230 V VMD, 0 - 10 Vcc y 4 - 20 mA (2-10 Vcc accesorio rango partido solo para actuadores de 24 Vcc/cc).		

2.2 Operación

Dependiendo del tipo de conexión (ver diagrama de conexión), el actuador puede usarse como un actuador continuo (0-10 V y/o 4-20 mA), de 2 puntos (ABRIR / CERRAR) o de 3 puntos (V.M.D.) (ABRIR / DETENER / CERRAR).
El tiempo de funcionamiento del actuador se puede configurar con los interruptores S1 y S2 de acuerdo con los requisitos pertinentes. Los interruptores S3 y S4 se utilizan para configurar la característica (equiporcentual, lineal o cuadrático).

2.3 Accionamiento manual

La manivela externa permite el ajuste manual de posición. Cuando se despliega la manivela, el motor se desconecta. Después de que la manivela se pliega hacia atrás, se va nuevamente a la posición objetivo (sin inicialización). Cuando se despliega la manivela, el actuador permanece en esta posición. La manivela debe girarse lentamente para evitar daños al actuador.

3. Instalación

3.1 Emplazamiento

El actuador se montará sobre la válvula con espacio suficiente para poder quitar la tapa de terminales y tener un fácil acceso. Cuando elija su ubicación, asegúrese que el actuador no esté expuesto a temperaturas ambientes que excedan el rango -10 °C a + 55 °C. Humedad <95%. El índice de protección es IP66.

Advertencia
¡Evitar el acceso a personal no técnico!

Artículos suministrados sin instalar
1 prensacables M16 x 1,5
1 prensacables M20 x 1,5
1 adaptador
1 etiqueta de aviso
2 clips indicadores de carrera

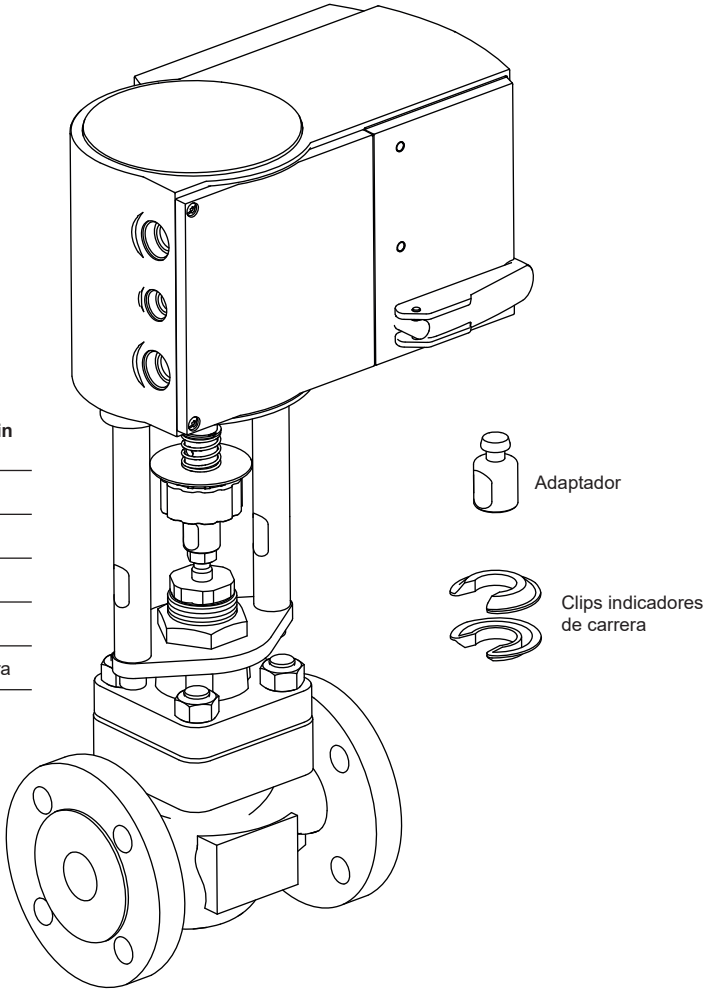
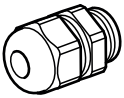


Fig. 1

Etiqueta de aviso

Prensacables M16 x 1,5
Prensacables M20 x 1,5



Software
A
EN 60730

IP66
EN 60529

Type
1AA
EN 60730

Solo actuadores sin accesorios

Fig. 2

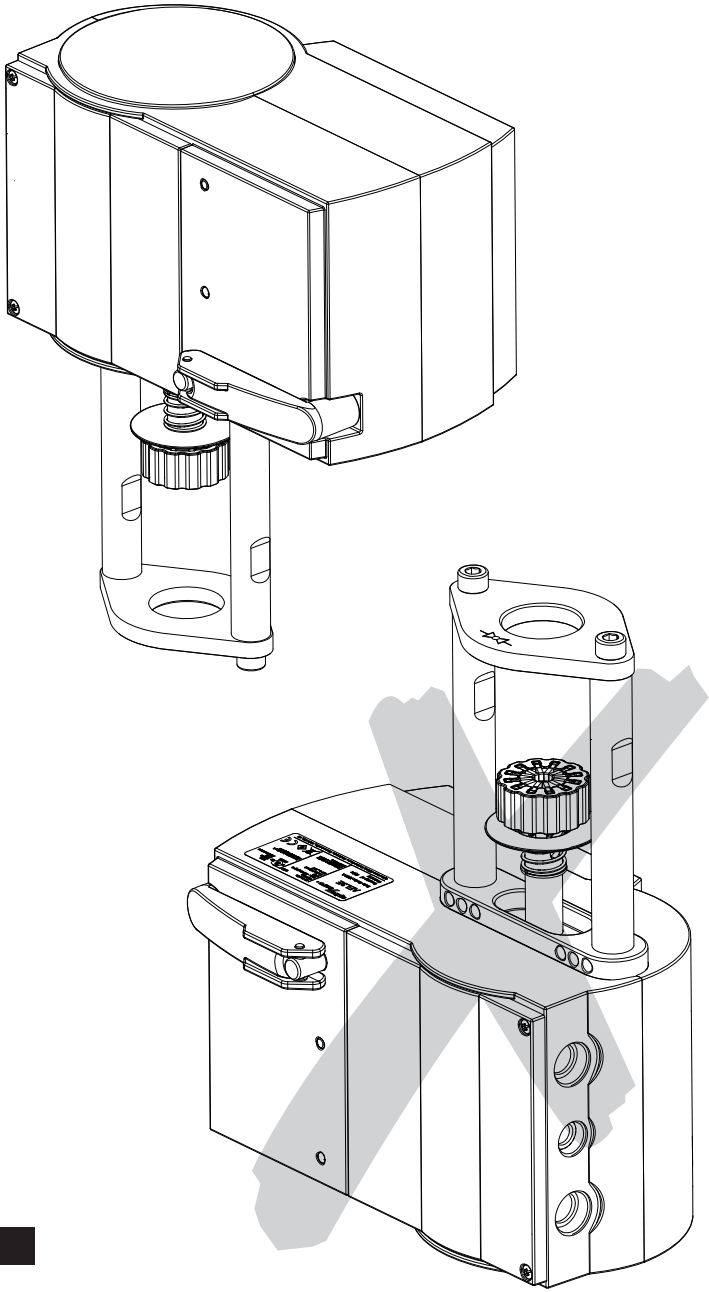


Fig. 3

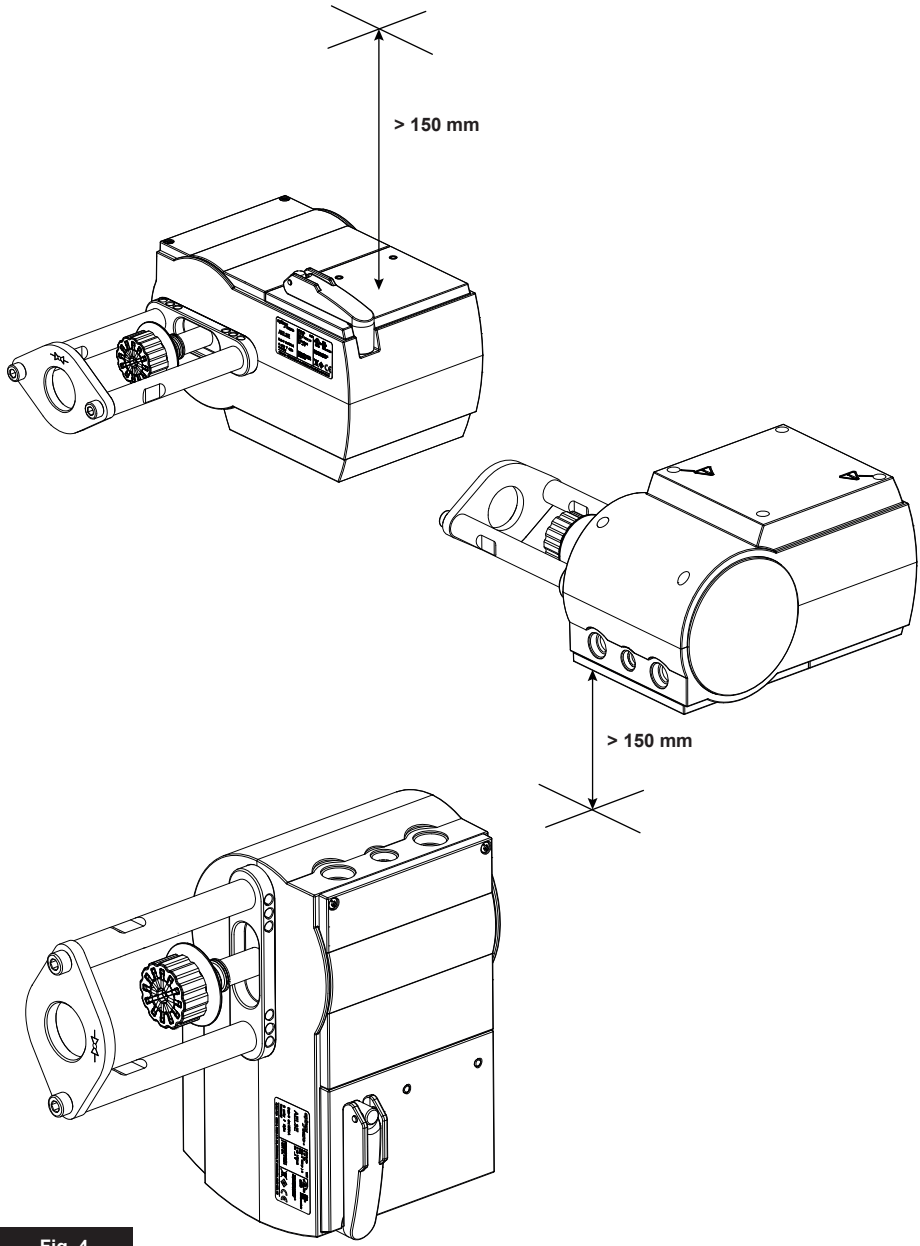
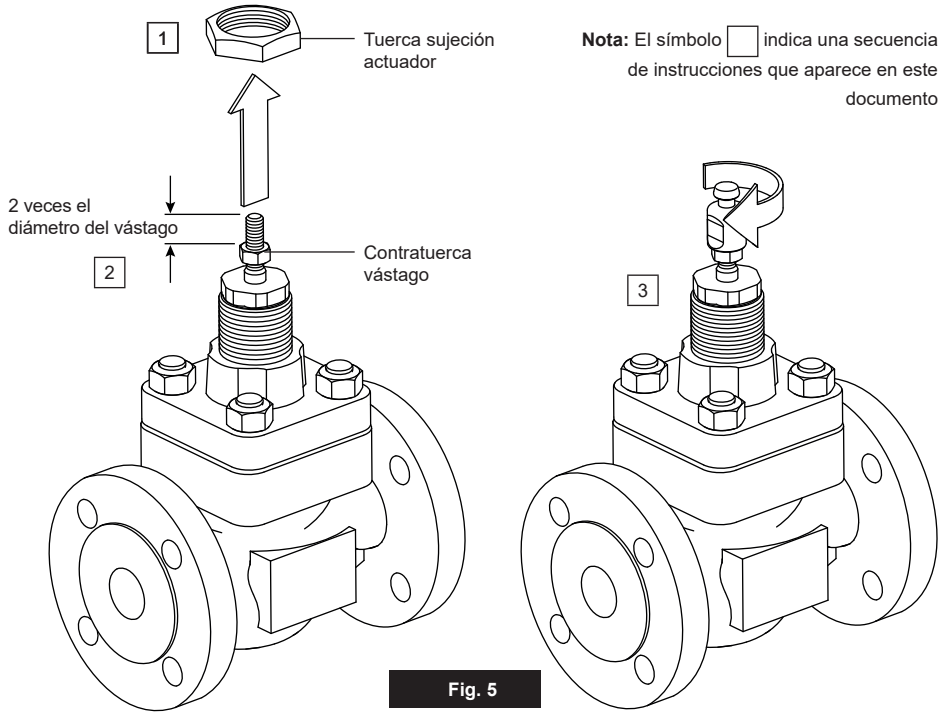


Fig. 4

3.2 Conexión del actuador a la válvula

3.2.1 Montaje a una válvula de dos vías Spira-trol

1. Retirar la tuerca de sujeción del actuador de la válvula.
2. Enroscar la tuerca del vástago de válvula dos veces el diámetro del vástago de válvula en dicho vástago.
3. Enroscar el adaptador en el vástago y apretar la contratuerca para fijarlo.



Nota: El símbolo ☐ indica una secuencia de instrucciones que aparece en este documento

Fig. 5

4. Tirar del anillo del clamp hacia arriba hasta que haga clic.

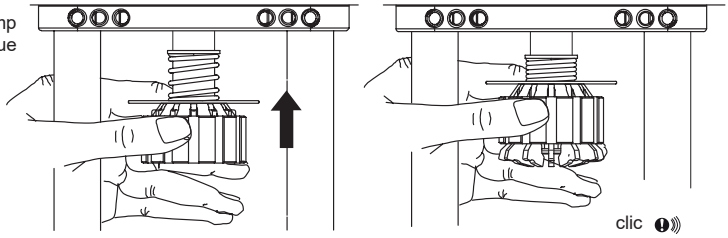


Fig. 6

5. Comprobar que el vástago esté completamente retraído y la manivela esté levantada para que el resorte se fije en su sitio.

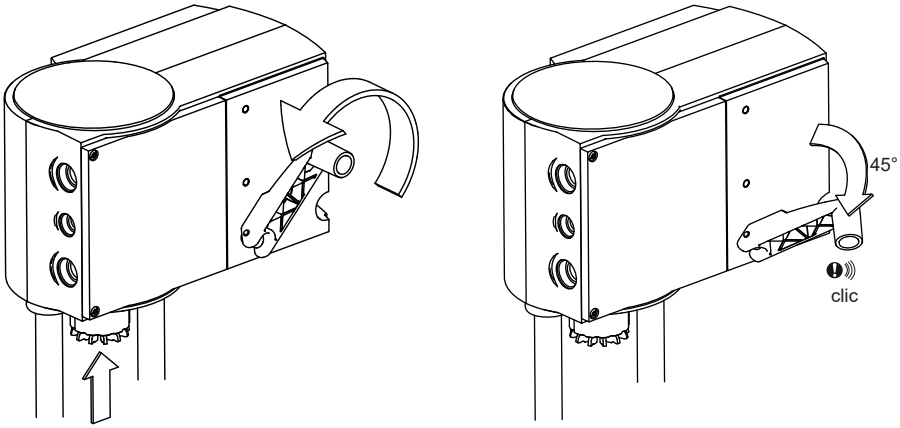


Fig. 7

6. Colocar la brida de montaje y actuador en la tapa de válvula.
7. Volver a montar la tuerca de retención y apretar (50 Nm para M34).

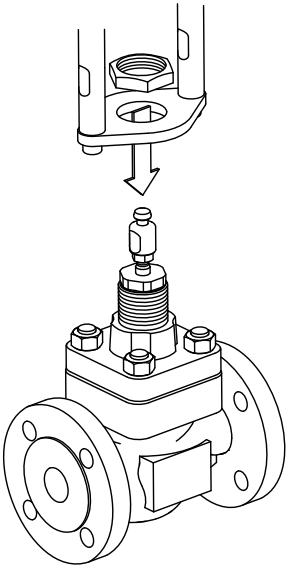


Fig. 8

Advertencia
Riesgo de lesiones por atrapamiento
- Evitar contacto con áreas peligrosas.

8. **Para AEL3R y AEL3X -** usar la manivela para bajar el vástago del actuador hasta que el clamp se apriete en el adaptador.

   Para AEL3E - plegar la manivela a su posición en el cabezal del actuador y el vástago bajará automáticamente.

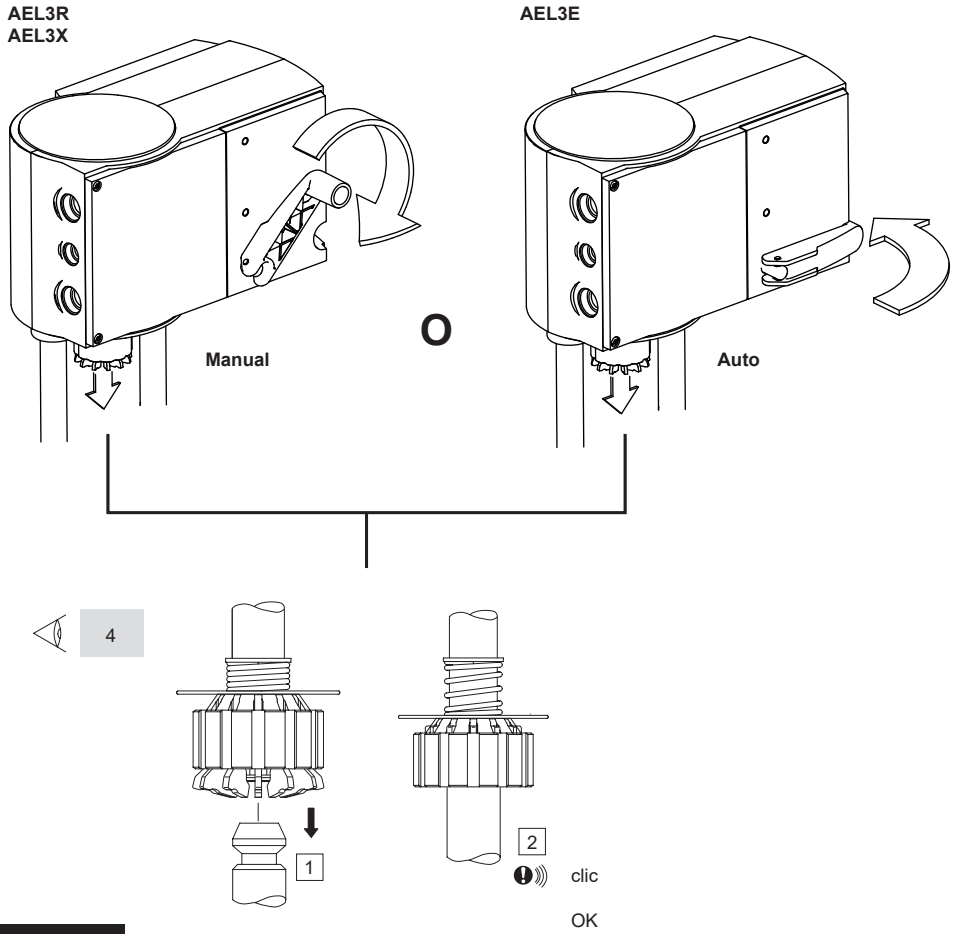


Fig. 9

9. Asegurar que la manivela está en su posición en el actuador.

Cuando se monta un actuador en una válvula, nunca accionar eléctricamente el actuador, siempre usar el volante.

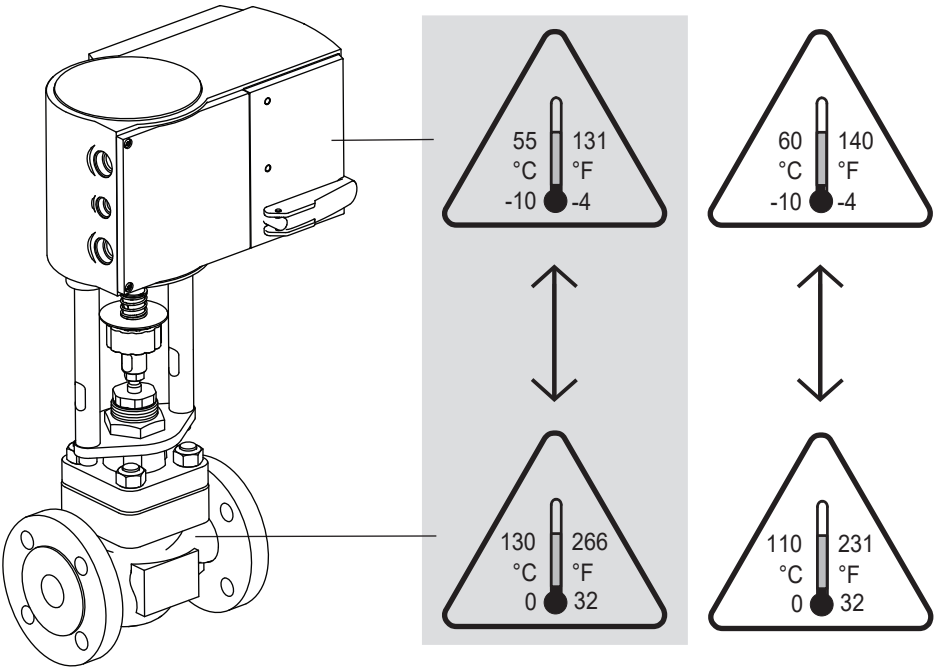


Fig. 10

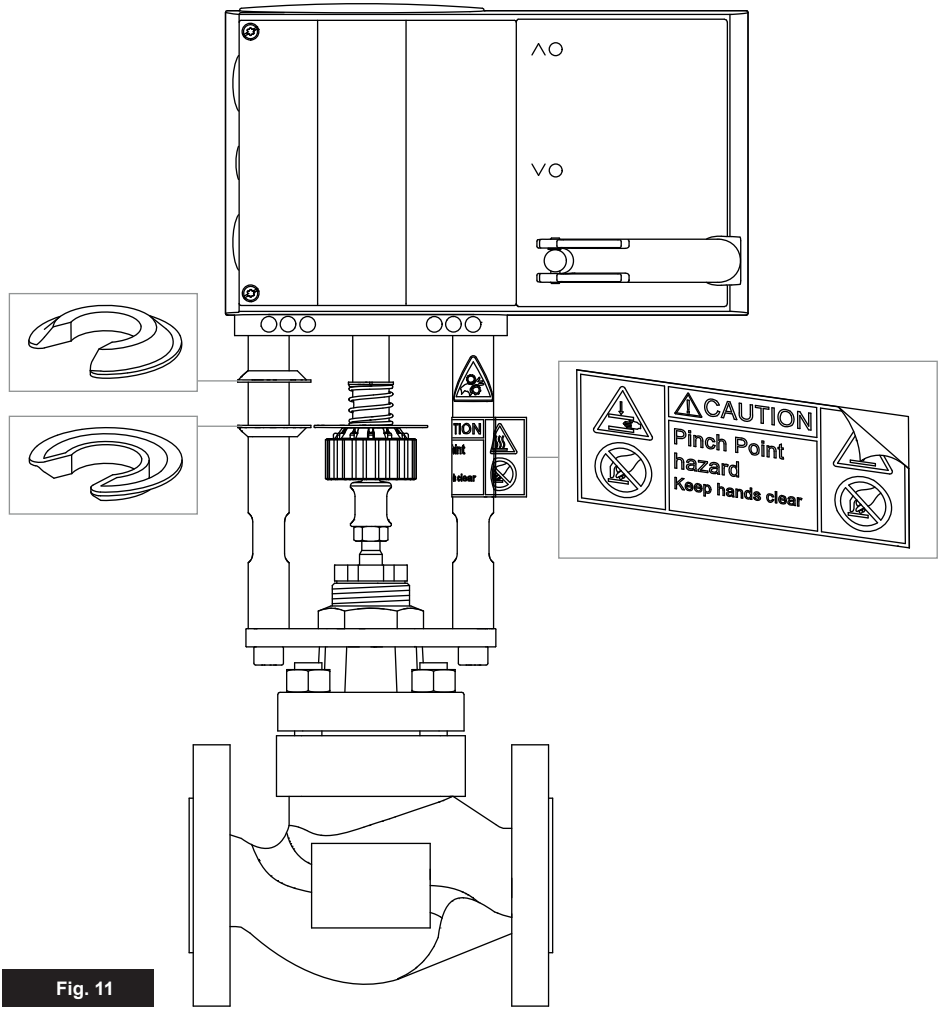


Fig. 11

3.2.2 Montaje a una válvula de tres vías QL

1. Retirar la tuerca de sujeción del actuador de la válvula.
2. Enroscar la tuerca del vástago de válvula dos veces el diámetro del vástago de válvula en dicho vástago.
3. Comprobar que el vástago esté completamente retraído y la manivela esté levantada para que el resorte se fije en su sitio.
4. Enroscar el adaptador en el vástago y apretar la contratuerca para fijarlo.
5. Asegurar que el adaptador de centrado esté en la rosca de la tapa (suministrado con la válvula QL).
6. Colocar la brida de montaje y actuador en la tapa de válvula/adaptador de centrado.
7. Volver a montar la tuerca de retención y apretar (50 Nm para M30).
8. Tirar del anillo del clamp hacia arriba hasta que haga clic.
9. Usar la manivela para bajar el vástago del actuador hasta que el clamp se apriete en el adaptador.
10. Asegurar que la manivela está en su posición en el actuador.

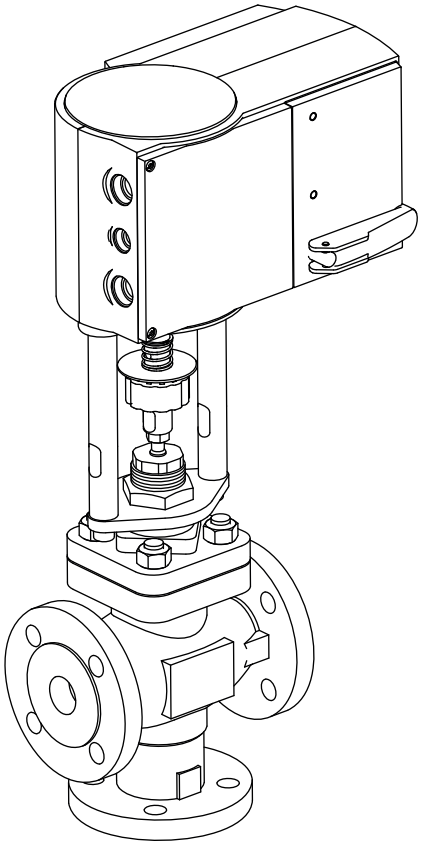


Fig. 12

3.3 Conexión eléctrica

Advertencia
Este es un equipo de clase A. Puede causar interferencias de radio, en cuyo caso se le puede solicitar al operador que realice la medición adecuada.

EE. UU., Canadá

Advertencia
Este equipo está destinado a ser alimentado por una "Fuente de energía Clase 2". Tamaño de cable permitido: AWG 14-15. **Todas las señales y salidas de control son de clase 2 CA/CC.**

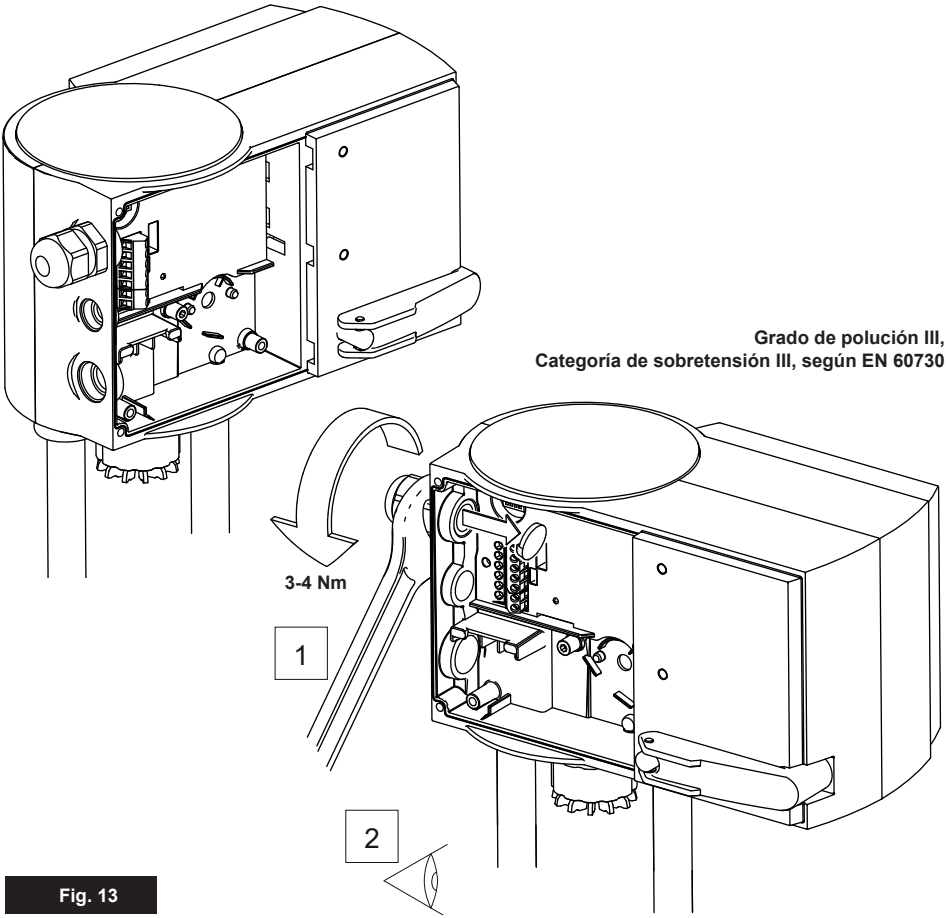


Fig. 13

Importante

1. Lea la sección 1 'Información de seguridad' antes de conectar la alimentación eléctrica al actuador.
2. Deben montarse fusibles de acción retardada en todas las fases excepto en el conductor protector de tierra.
3. La protección interna de tierra debe conectarse al sistema de protección de tierra de la instalación. No se debe comprometer la integridad del sistema de toma de tierra por la desconexión o retirada de otro equipo.
4. Para las conexiones de alimentación use cable de 1,5 mm², doblemente aislado según IEC 60364 (o equivalente), si los cables están expuestos.
5. Aumentar la sección del cable de acuerdo con la longitud del cable de alimentación.
6. Dimensione correctamente el transformador de seguridad en la línea de alimentación.
7. Las corrientes de irrupción no deben producir una caída de voltaje demasiado grande.

3.3.1 Conexión de servomotor para actuadores de 24V

AEL3E/AEL3R

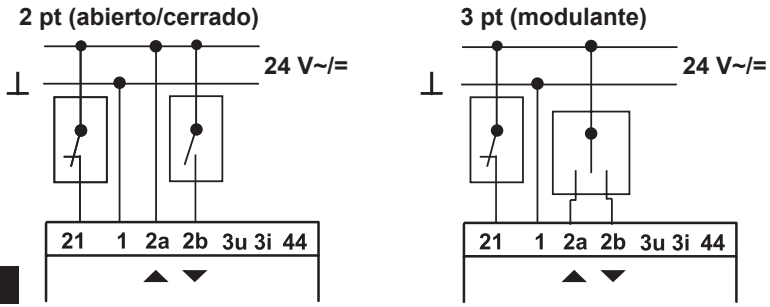


Fig. 14

AEL3X

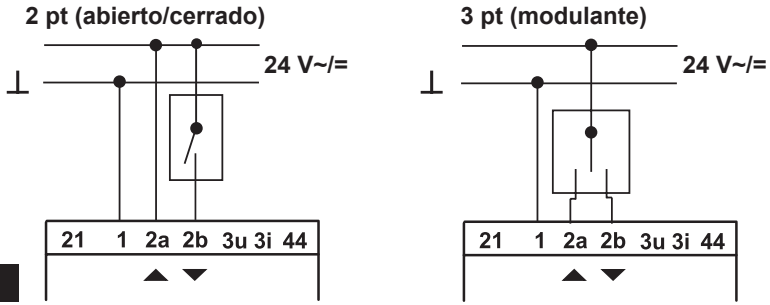


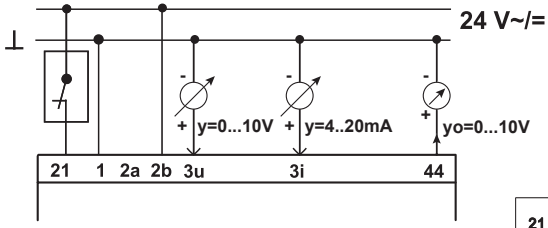
Fig. 15

3.3.2 Conexión de señal para actuadores de 24 V: 4-20 mA o 0-10 V

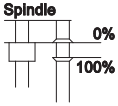
Conectar los cables según el diagrama.

Nota: la acción del actuador se puede invertir mediante los terminales 2a y 2b.

AEL3E/AEL3R



		3u	3i	44
2a	0%	0V	4mA	0V
	100%	10V	20mA	10V
2b	0%	10V	20mA	0V
	100%	0V	4mA	10V



		AEL3R	AEL3E
21		0%	100%
		2pt, 3pt, Cont.	

Fig. 16 **Señal para retraer el vástago**

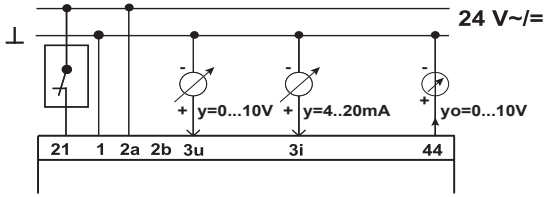
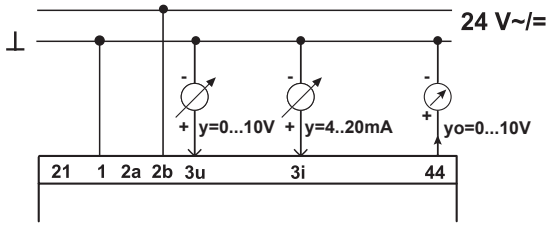


Fig. 17 **Señal para extender el vástago**

AEL3X



		3u	3i	44
2a	0%	0V	4mA	0V
	100%	10V	20mA	10V
2b	0%	10V	20mA	0V
	100%	0V	4mA	10V

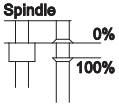


Fig. 18 **Señal para retraer el vástago**

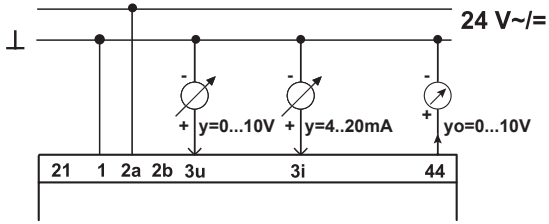


Fig. 19 **Señal para extender el vástago**

3.3.3 Configuración de interruptores

Solo aplicable a modo continuo

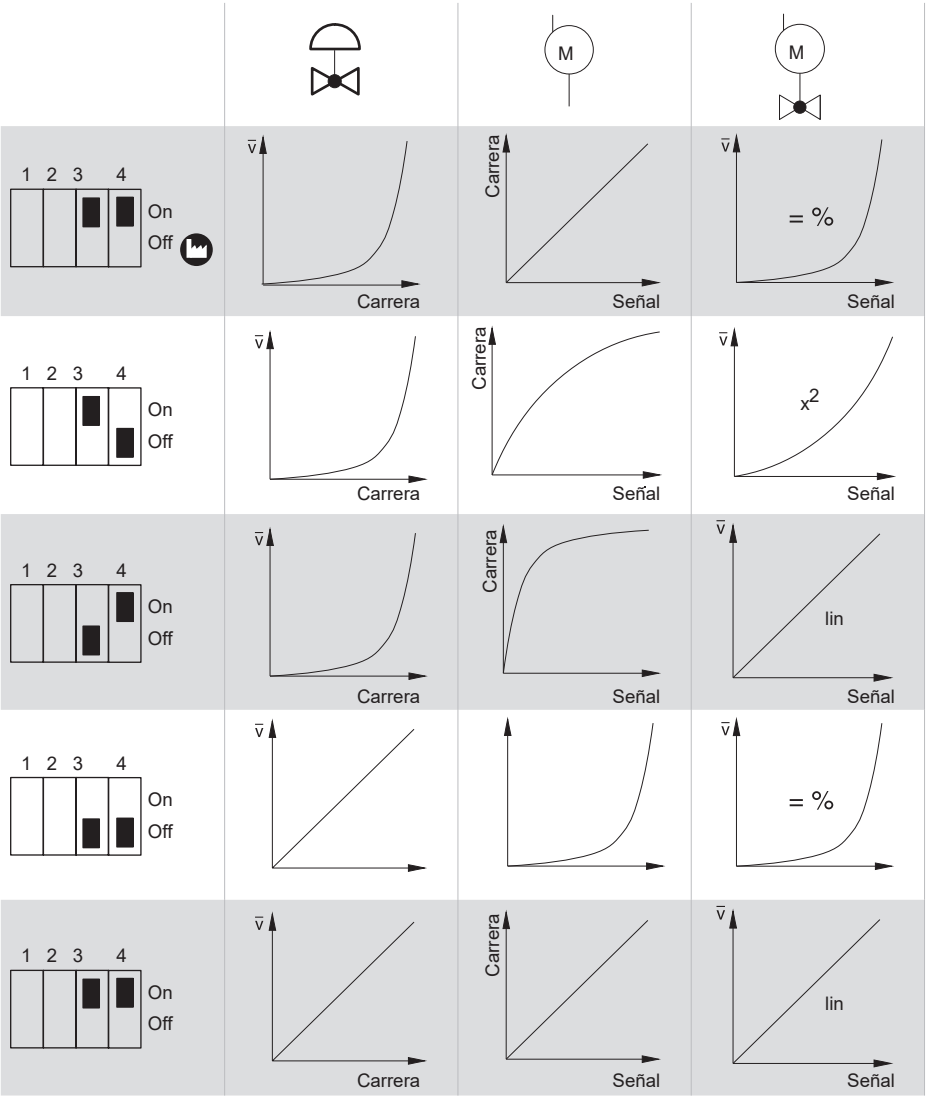


Fig. 20

	Carrera	1 mm	20 mm
1 2 3 4 On Off	Tiempo accionamiento	2 s	40 s ± 1
1 2 3 4 On Off		4 s	80 s ± 4
1 2 3 4 On Off 1 2 3 4 On Off		6 s	120 s ± 4

Fig. 21

3.4 Inicialización

Automático

Cuando se alimenta a la unidad de regulación por primera vez, se produce el acoplamiento automático con la válvula y una inicialización. Durante este proceso, los dos LEDs en la unidad parpadean en rojo.

1. El vástago se extiende hasta llegar al tope mecánico de la unidad de regulación.
2. Desde esta posición, el vástago se retrae hasta llegar al tope mecánico de la unidad de regulación.
3. La inicialización se ha completado. La unidad de regulación se moverá a la posición establecida por la señal de control.

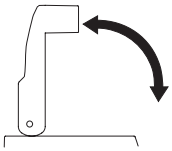


Fig. 22

Manual

Si fuese necesario, la inicialización siempre se puede activar manualmente.

- Sacar y meter la manivela dos veces en 4 segundos (ver el diagrama). Comenzará la inicialización.
- La inicialización se puede abortar sacando la manivela de nuevo.

3.5 Funciones LED

AEL3E y AEL3R	
LED:	**Descripción**
Ambos LED parpadean en rojo	Inicialización
El LED superior se ilumina en rojo	Tope de límite superior o posición "OPEN" alcanzada
El LED inferior se ilumina en rojo	Tope de límite inferior o posición "CLOSED" alcanzada
El LED superior parpadea en verde	El actuador está funcionando, moviéndose a la posición "OPEN"
El LED superior se ilumina en verde	El actuador se ha parado, última dirección de carrera "OPEN"
El LED inferior parpadea en verde	El actuador está funcionando, moviéndose a la posición "CLOSED"
El LED inferior se ilumina en verde	El actuador se ha parado, última dirección de carrera "CLOSED"
Ambos LEDs se iluminan en verde	Tiempo de espera después de puesta en marcha o después de retorno resorte
No se iluminan los LEDs	No ha alimentación (terminal 21)
Ambos LEDs parpadean en rojo y verde	El actuador está en modo manual

AEL3X	
LED:	**Descripción**
Ambos LED parpadean en rojo	Inicialización
El LED superior se ilumina en rojo	Tope de límite superior o posición "OPEN" alcanzada
El LED inferior se ilumina en rojo	Tope de límite inferior o posición "CLOSED" alcanzada
El LED superior parpadea en verde	El actuador está funcionando, moviéndose a la posición "OPEN"
El LED superior se ilumina en verde	El actuador se ha parado, última dirección de carrera "OPEN"
El LED inferior parpadea en verde	El actuador está funcionando, moviéndose a la posición "CLOSED"
El LED inferior se ilumina en verde	El actuador se ha parado, última dirección de carrera "CLOSED"
No se iluminan los LEDs	No ha alimentación (terminal 2a o 2b)
Ambos LEDs parpadean en rojo y verde	El actuador está en modo manual

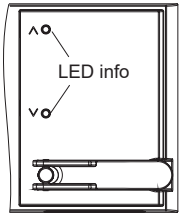


Fig. 23

Aviso
Este producto no debe ponerse en servicio hasta que la maquinaria o el sistema en el que se deba instalar el producto, o del que se pretenda que sea un componente, cumpla con las normativas y normas pertinentes. La responsabilidad recae en el ingeniero de planta o el instalador.

3.6 Cómo retirar el actuador

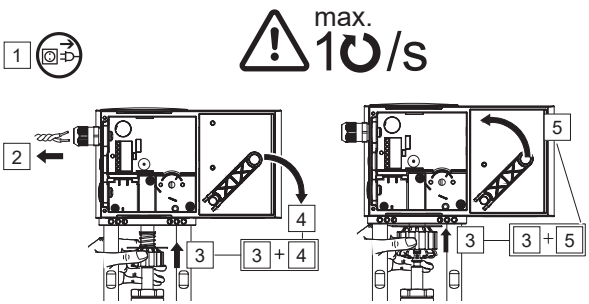


Fig. 24

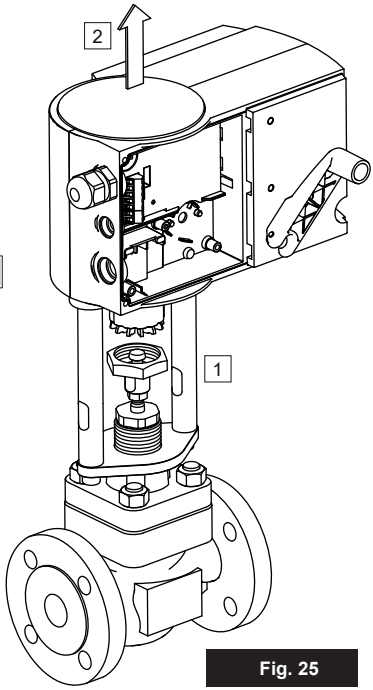


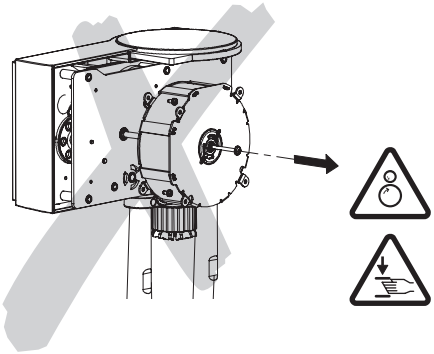
Fig. 25

¡Peligro!

Riesgo de lesiones en las manos causadas por el resorte en tensión.

- ¡No desmontar el resorte!

Fig. 26



3.7 Instalación de módulos de alimentación 100-110 V y 230 V

Nota: No compatible con opción unidad de rango partido

Hay 2 opciones disponibles para fuente de alimentación: 100-110 V y 230 V. Estas están disponibles conectando un módulo de alimentación auxiliar al modelo de actuador estándar. Se proporcionan etiquetas nuevas que reflejan el cambio realizado.

1. Abrir la tapa del actuador.
2. Insertar el módulo de alimentación en la ranura apropiada provista.
3. Reemplazar/cubrir la etiqueta de cableado original de 24 V en el interior de la tapa de la carcasa extraíble del actuador con una nueva etiqueta de cableado del módulo de alimentación.
4. Utilizar la etiqueta del módulo de alimentación provisto y pegarla encima de la etiqueta existente ubicada en la parte inferior de la carcasa del actuador, de modo que cubra la parte de la etiqueta que contiene las marcas de 24 V y UL.

Guía para electricista

Fig. 27

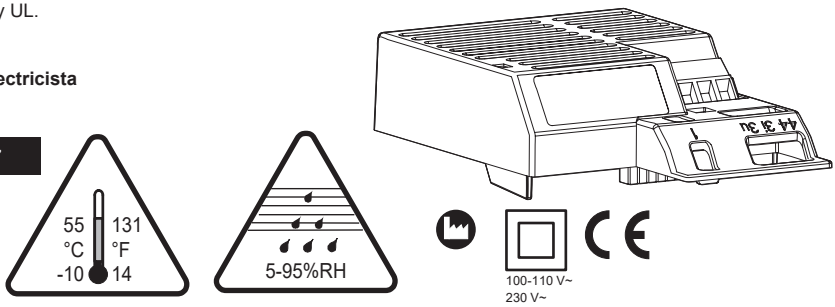
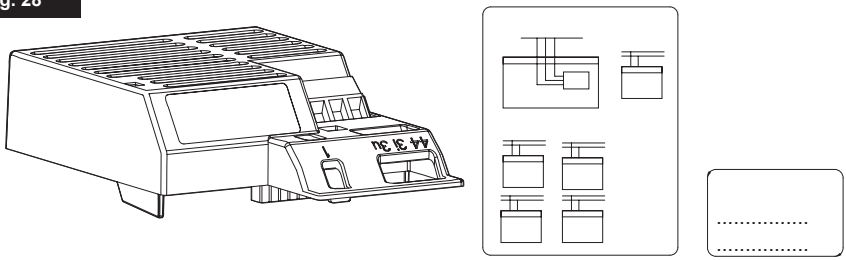


Fig. 28



1x	3x	1x

Fig. 29

	T15
	3
	1

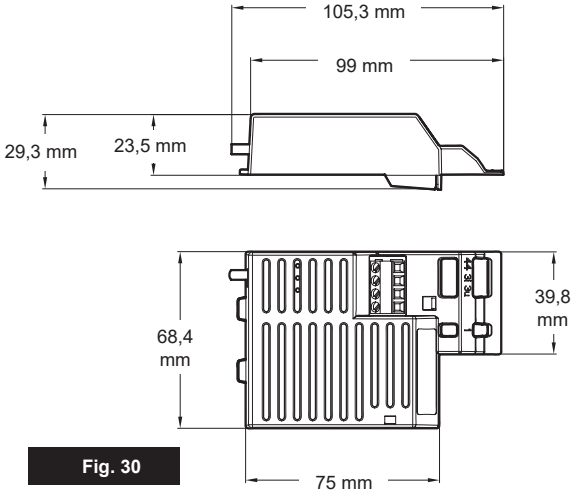


Fig. 30

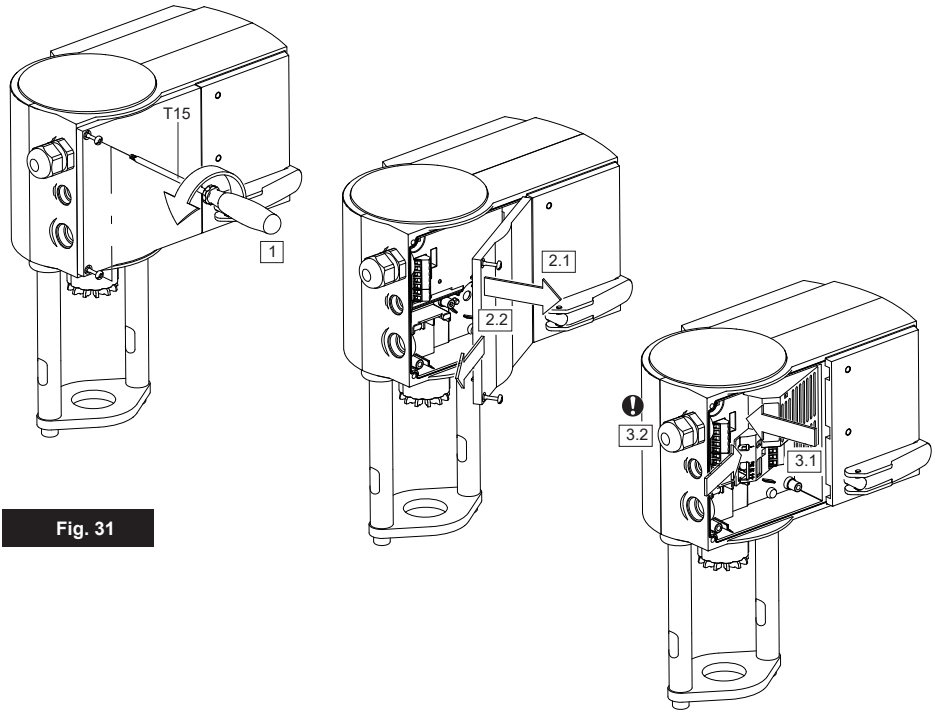


Fig. 31

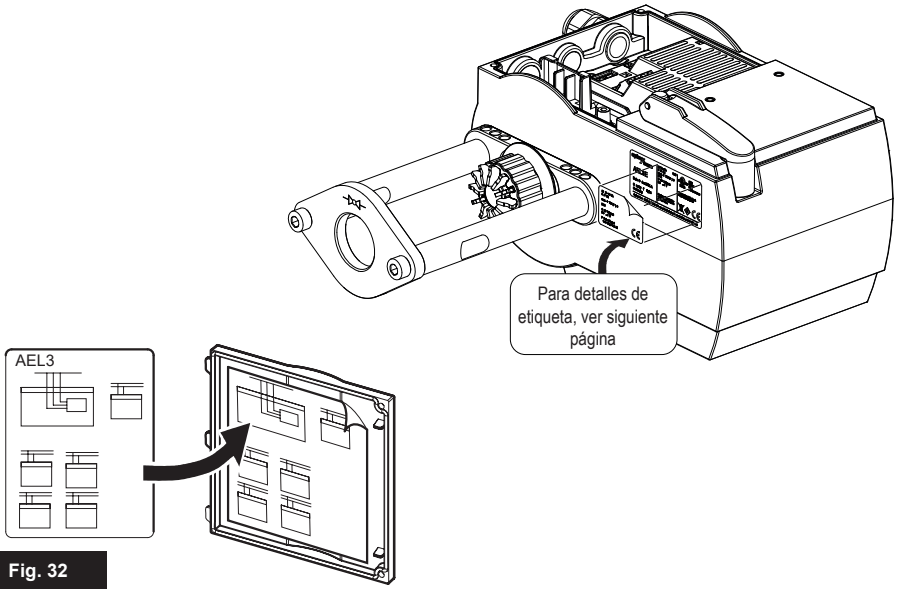


Fig. 32

Peligro de electrocución

- No hacer conexión entre los bloques de terminales X e Y.

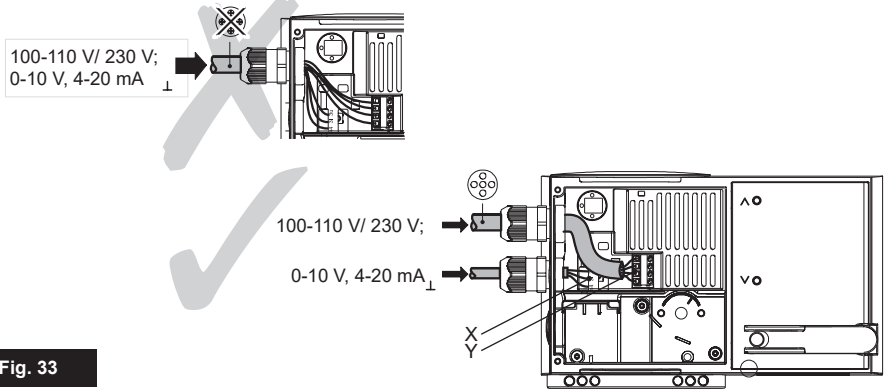


Fig. 33

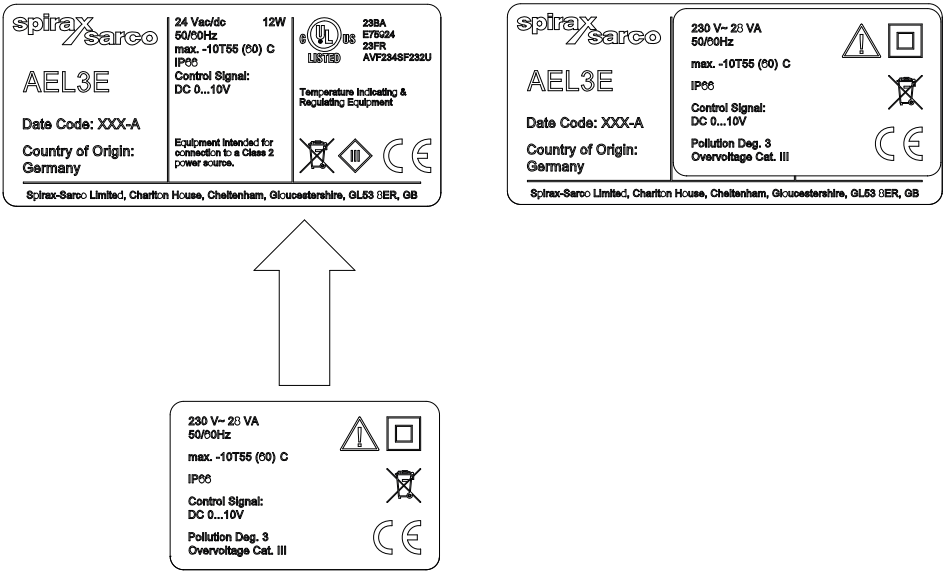

spirax sarco
AEL3E
Date Code: XXX-A
Country of Origin: Germany
24 Vac/dc 12W
50/60Hz
max. -10T55 (60) C
IP66
Control Signal:
DC 0...10V
Equipment intended for connection to a Class 2 power source.
23BA
E75024
23FR
AVF234SF232U
LISTED
Temperature Indicating & Regulating Equipment
Spirax-Sarco Limited, Charlton House, Cheltenham, Gloucestershire, GL53 8ER, GB
230 V~ 28 VA
50/60Hz
max. -10T55 (60) C
IP66
Control Signal:
DC 0...10V
Pollution Deg. 3
Overvoltage Cat. III

Fig. 34

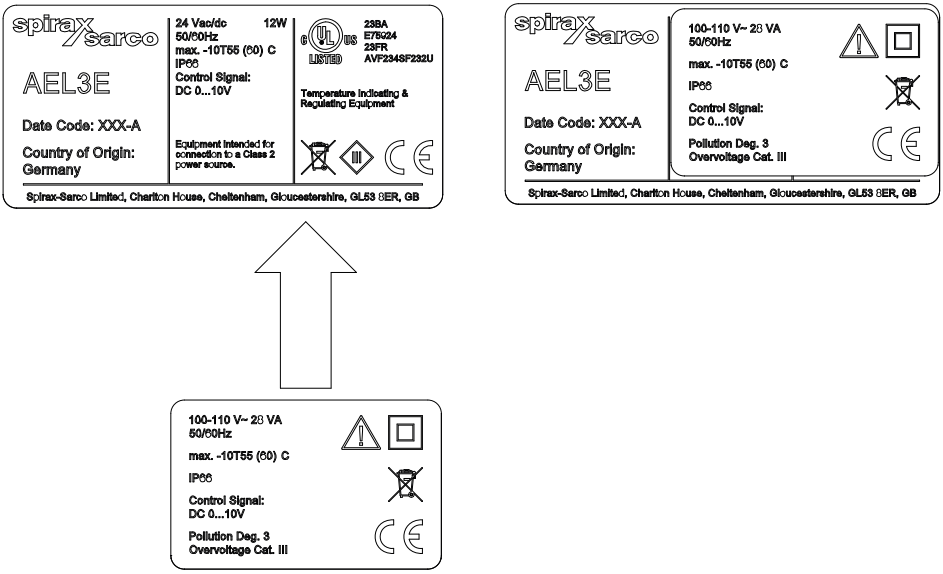

spirax sarco
AEL3E
Date Code: XXX-A
Country of Origin: Germany
24 Vac/dc 12W
50/60Hz
max. -10T55 (60) C
IP66
Control Signal:
DC 0...10V
Equipment intended for connection to a Class 2 power source.
23BA
E75024
23FR
AVF234SF232U
LISTED
Temperature Indicating & Regulating Equipment
Spirax-Sarco Limited, Charlton House, Cheltenham, Gloucestershire, GL53 8ER, GB
100-110 V~ 28 VA
50/60Hz
max. -10T55 (60) C
IP66
Control Signal:
DC 0...10V
Pollution Deg. 3
Overvoltage Cat. III

Fig. 35

3.7.1 Conexión de servomotor para actuadores equipados con módulo de alimentación

AEL3E/AEL3R

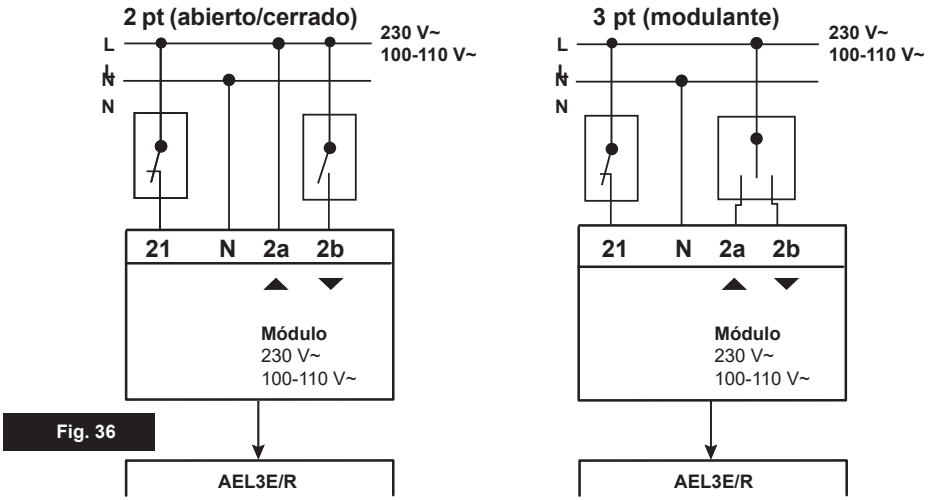


Fig. 36

AEL3X

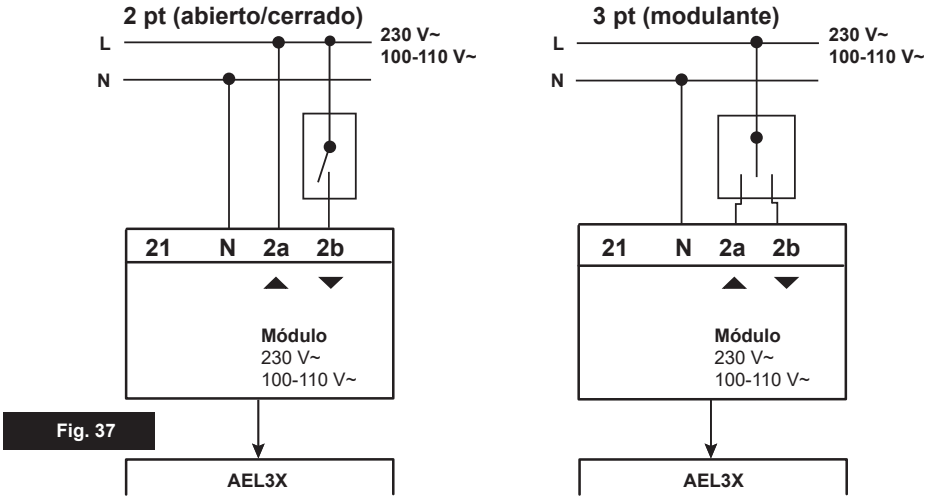
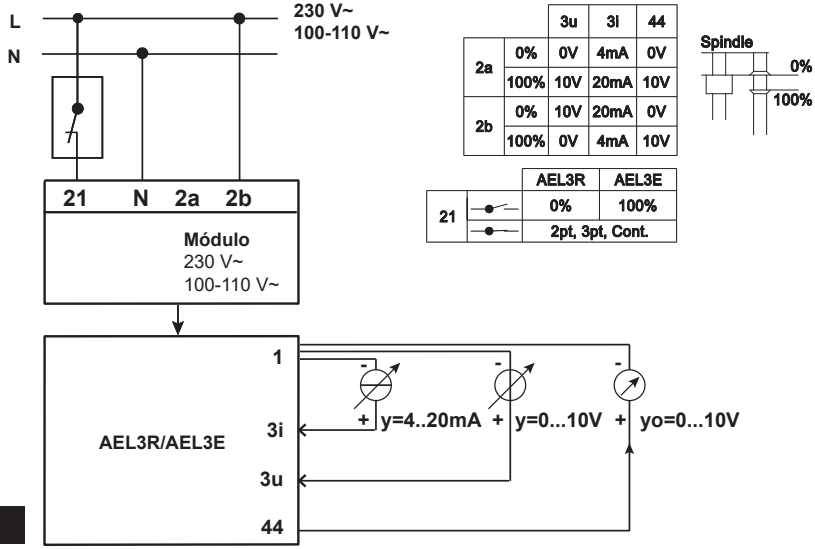


Fig. 37

3.7.2 Conexión de señal para actuadores equipados con módulo de alimentación: 4-20 mA o 0-10 V

Nota: La acción del actuador se puede invertir mediante los terminales 2a y 2b.

AEL3E/AEL3R



		3u	3i	44
2a	0%	0V	4mA	0V
	100%	10V	20mA	10V
2b	0%	10V	20mA	0V
	100%	0V	4mA	10V

		AEL3R	AEL3E
21		0%	100%
		2pt, 3pt, Cont.	

Fig. 38

Señal para retraer el vástago

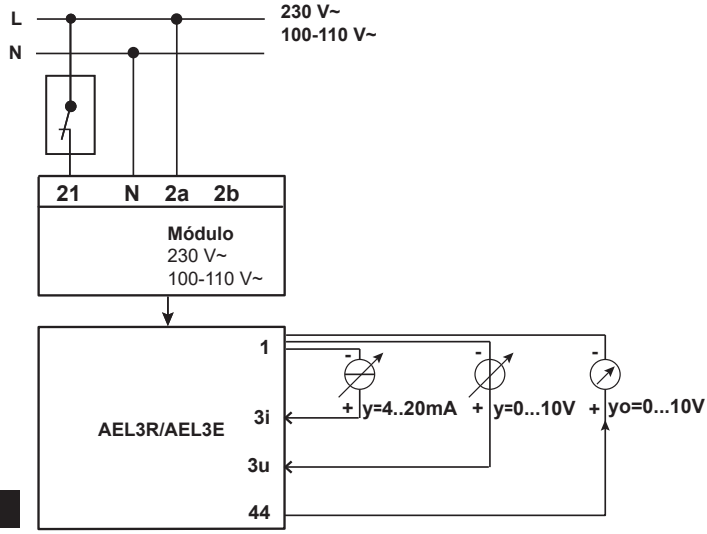
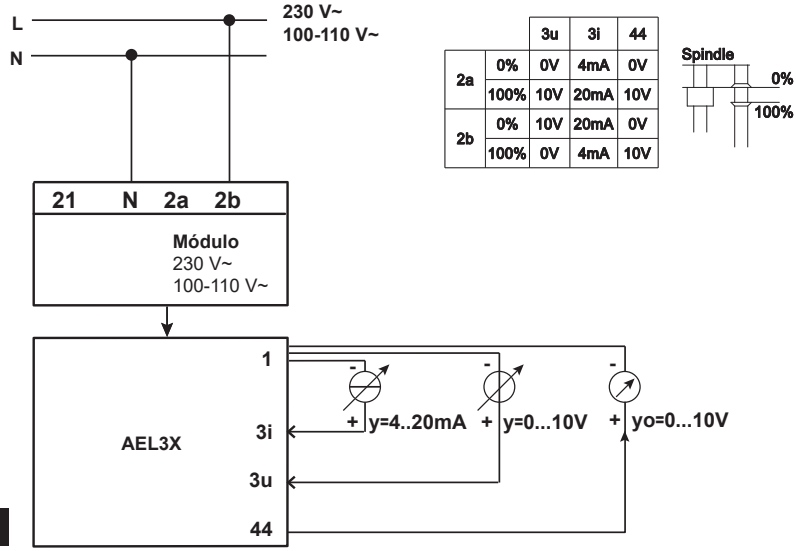


Fig. 39

Señal para extender el vástago

AEL3X



		3u	3i	44
2a	0%	0V	4mA	0V
	100%	10V	20mA	10V
2b	0%	10V	20mA	0V
	100%	0V	4mA	10V

Fig. 40

Señal para retraer el vástago

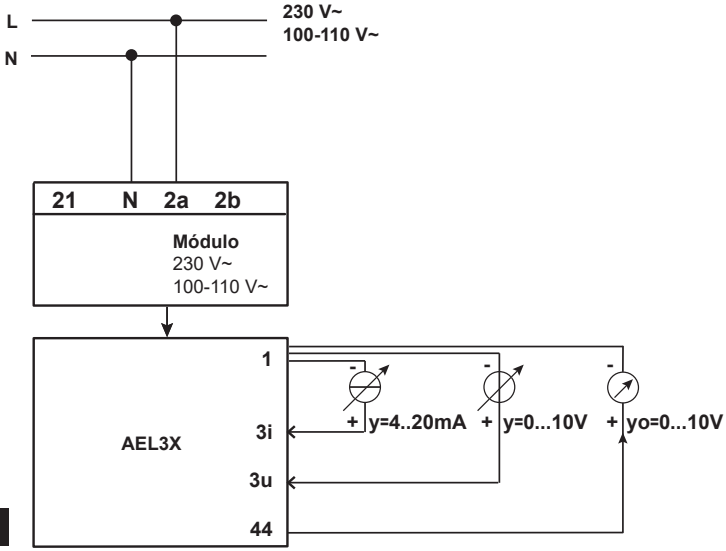


Fig. 41

Señal para extender el vástago

3.8 Cómo retirar el módulo de alimentación

1. Asegúrese de que el actuador esté desconectado de la alimentación.
2. Retirar todos los cables de los terminales.
3. Insertar un destornillador plano en la ranura como se muestra en el diagrama.
4. Presionar con el destornillador y empujarlo suavemente hacia la derecha para desbloquear el pestillo. Con cuidado de no romperlo.
5. Mientras aplica una presión suave sobre el cierre, sacar el módulo de alimentación del actuador.

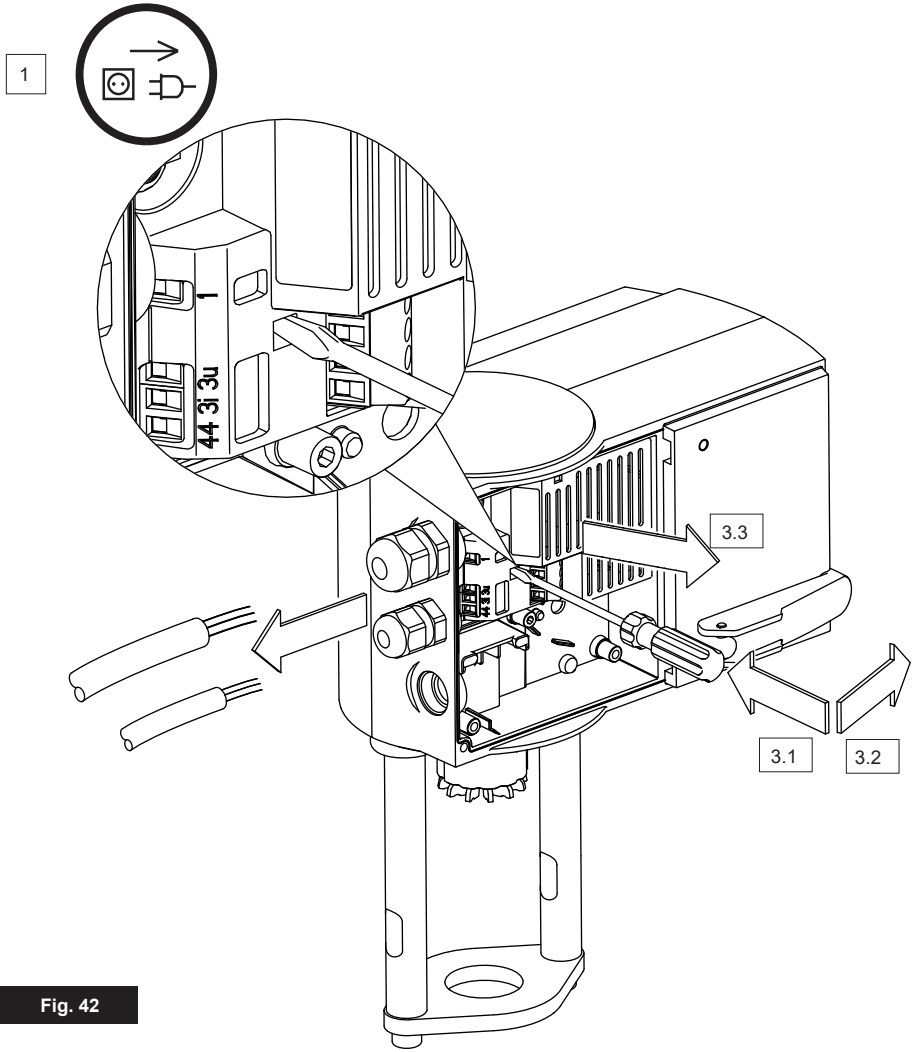


Fig. 42

3.9 Instalación de interruptores auxiliares

Para uso en ambientes normales

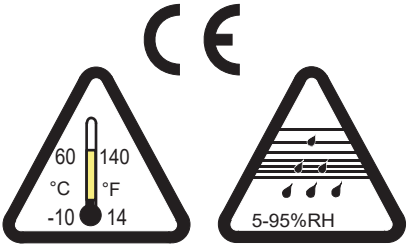


Fig. 43

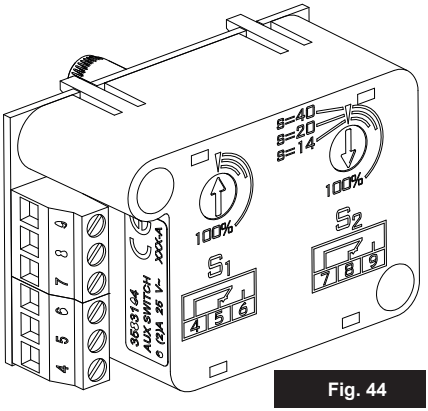


Fig. 44

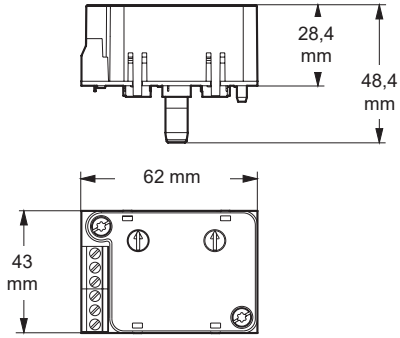


Fig. 45

	T15
	1
	3
	s24 (1×)

Fig. 46

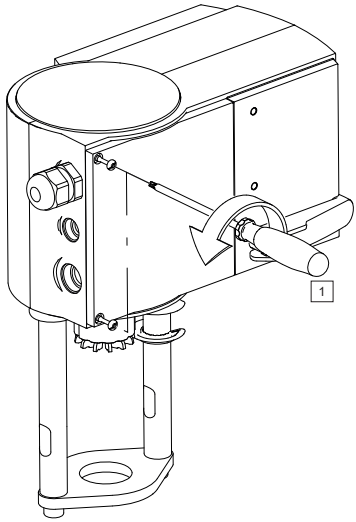


Fig. 47

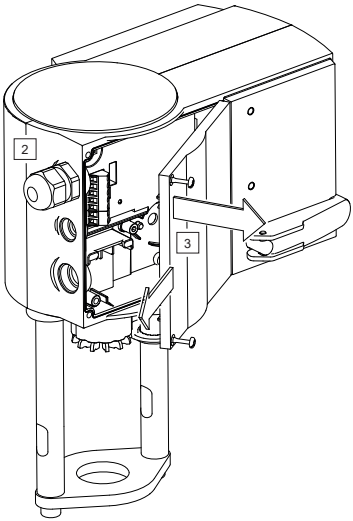


Fig. 48

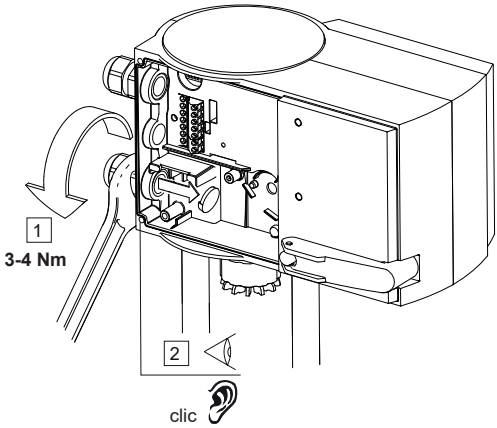


Fig. 49

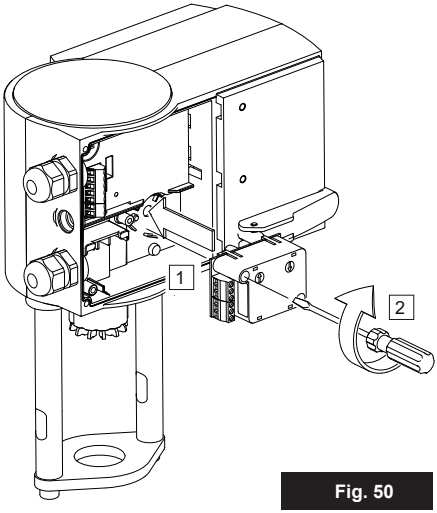


Fig. 50

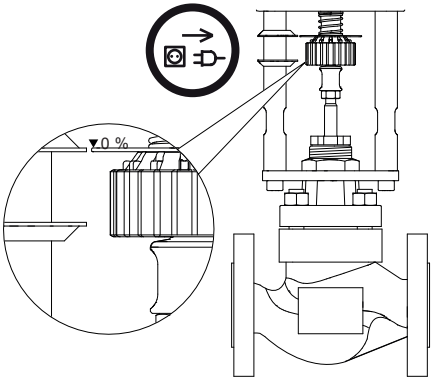


Fig. 51a

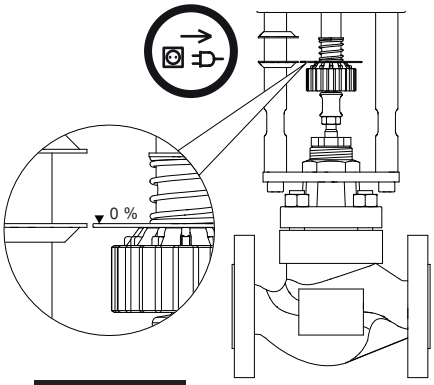


Fig. 52a

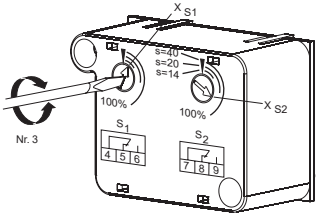
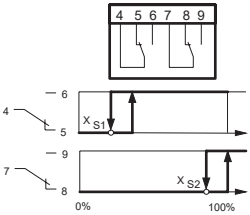


Fig. 51b



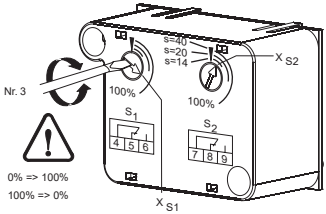


Fig. 52b

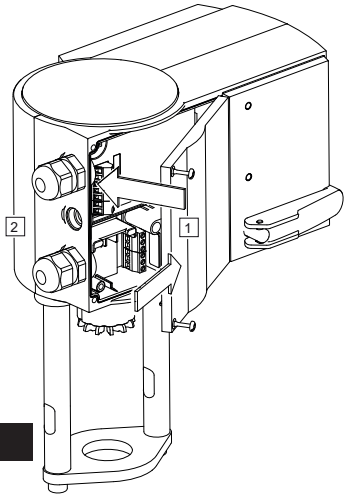


Fig. 53

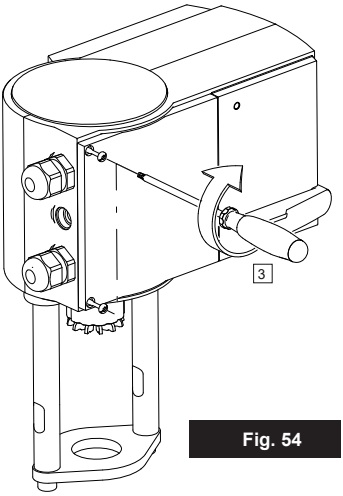
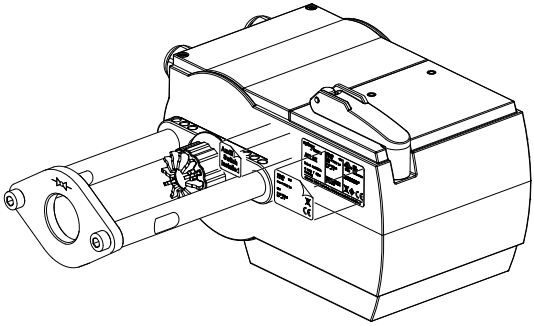
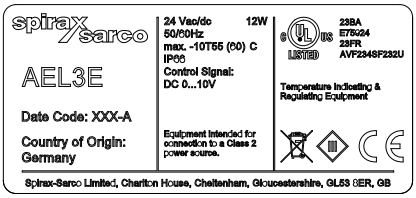
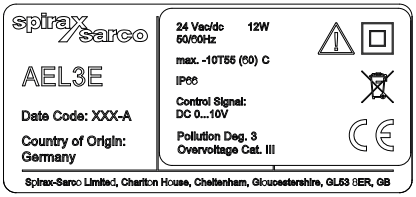


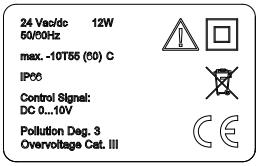
Fig. 54

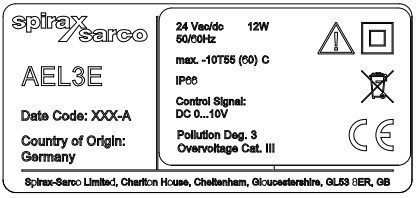


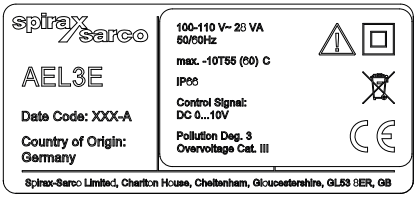




Nota: Solapar con la etiqueta de variante 24V ya que el interruptor auxiliar no tiene aprobación UL.







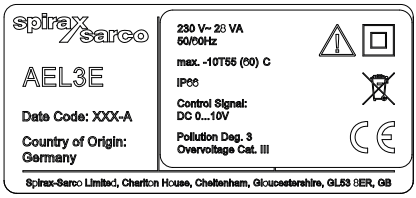


Fig. 55

3.10 Kits de extensión para alta temperatura

Se debe utilizar el kit de extensión en aplicaciones por encima de los 130 °C hasta 240 °C. Hay dos opciones de kit, hasta 180 °C y hasta 240 °C.

1. Desatornillar los tornillos de la placa de montaje del actuador.
2. Atornillar los pilares de extensión en los pilares del actuador y apretar a 12 Nm.
3. Atornillar los tornillos de la placa de montaje del actuador y apretar a 25 Nm.
4. Montar la extensión en el acoplamiento del actuador hasta que encaje.

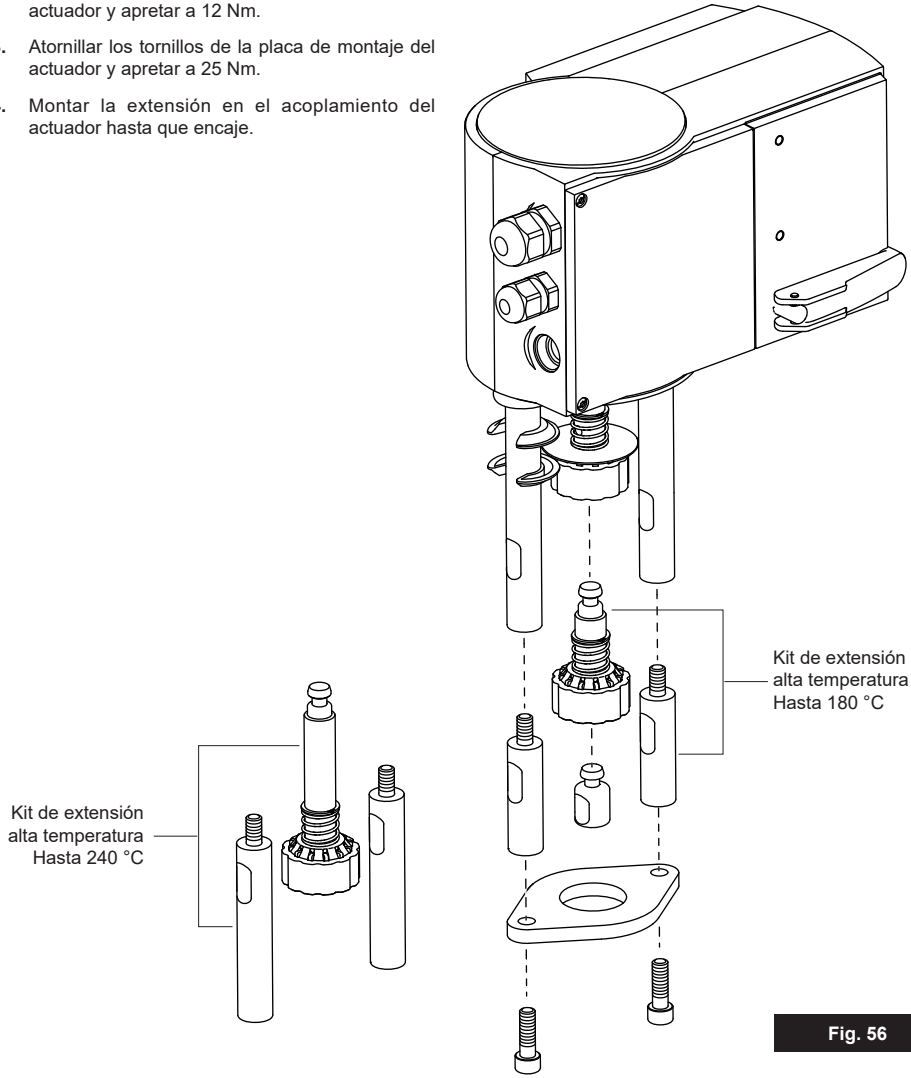


Fig. 56

3.11 Instalación unidad rango partido 2-10 Vcc

Instalación unidad rango partido.

Nota:
No compatible con módulos de alimentación

Para uso en ambientes normales

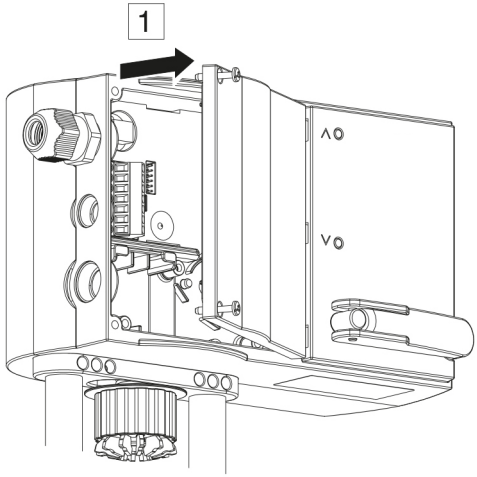


Fig. 57

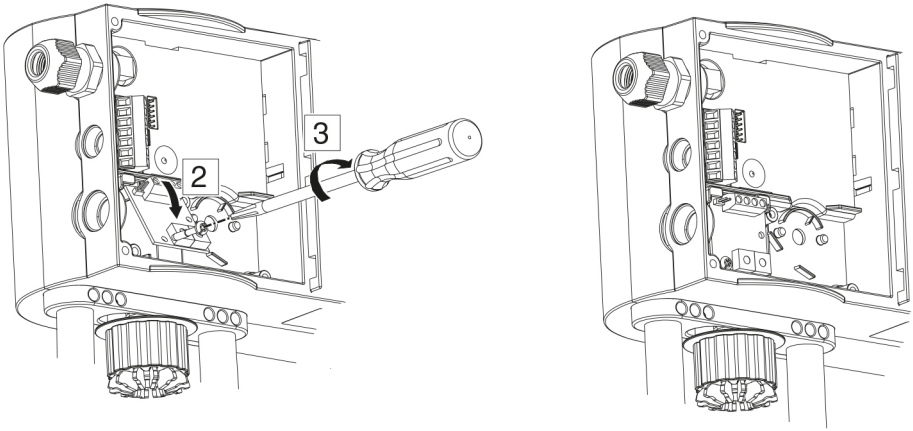


Fig. 58

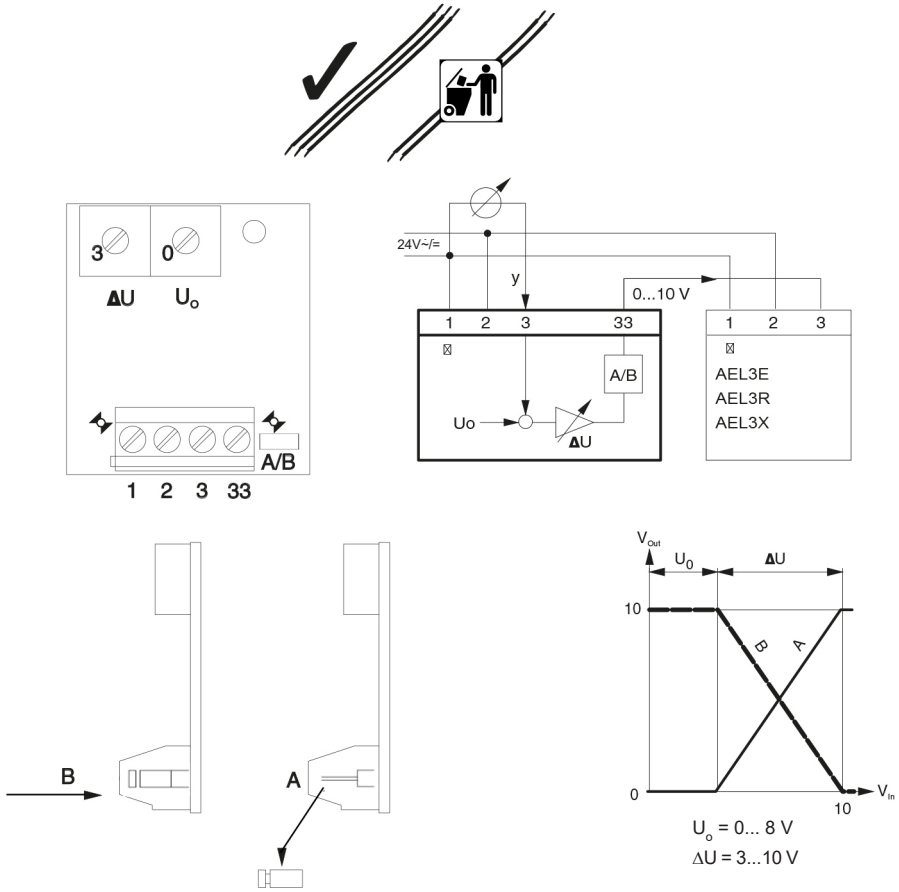
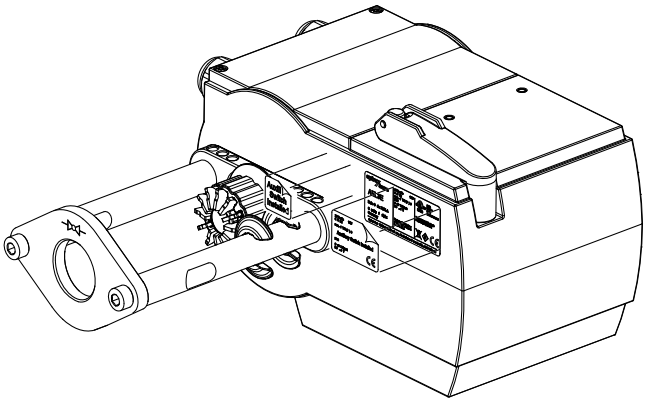
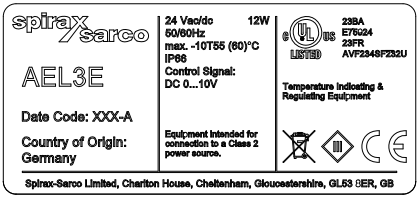
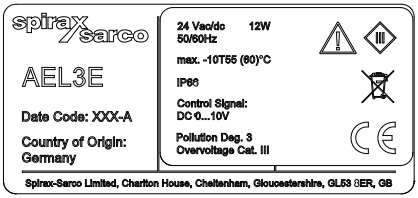
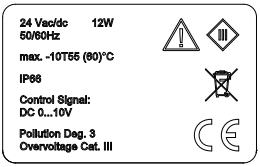

3
0
ΔU
Uo
A/B
1 2 3 33
24V~/=
y
0...10 V
1 2 3 33
A/B
Uo
ΔU
1 2 3
AEL3E
AEL3R
AEL3X
B
A
VOut
U0
ΔU
10
0
10
Vin
Uo = 0... 8 V
ΔU = 3...10 V

Fig. 59









Nota: Pegar la etiqueta solapada como se muestra, ya que la unidad de rango partido no tiene aprobación UL.

Si se instala un interruptor auxiliar, NO utilizar la pegatina solapada de la unidad de rango partido. Se aplica la clase de prevención del interruptor auxiliar y tiene prioridad.

Pegar etiqueta suministrada en posición Prominente cerca de la etiqueta de producto.

Nota: Si se muestra la etiqueta del interruptor auxiliar instalado, puede o no estar instalado y se muestra solo para la colocación de la etiqueta de la unidad de rango partido.

Fig. 60

4. Puesta en marcha

Los actuadores acoplados a una válvula de control se suministran con la puesta en marcha realizada. Sin embargo, en el caso de que sea necesario encargar un actuador, se debe adoptar el siguiente procedimiento:

4.1 Comprobaciones preliminares - Todos los actuadores

1. Comprobar que la tensión del actuador corresponda con la requerida.
2. Asegúrese de que el cableado corresponda al descrito en las secciones 3.3, 3.7 y 3.11.
3. Asegurarse de que el montaje de la válvula y el actuador se ha llevado a cabo de acuerdo con las instrucciones en la sección 3.2.

5. Mantenimiento

Siempre debe asegurarse de que el suministro eléctrico esté desconectado cuando se realice el mantenimiento del actuador o la válvula.

El actuador no tiene partes con mantenimiento.

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