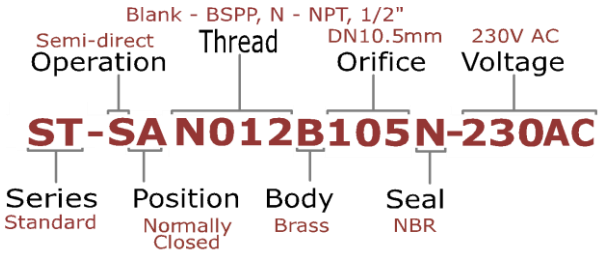
2/2-WAY
SEMI-DIRECT OPERATED
NORMALLY CLOSED

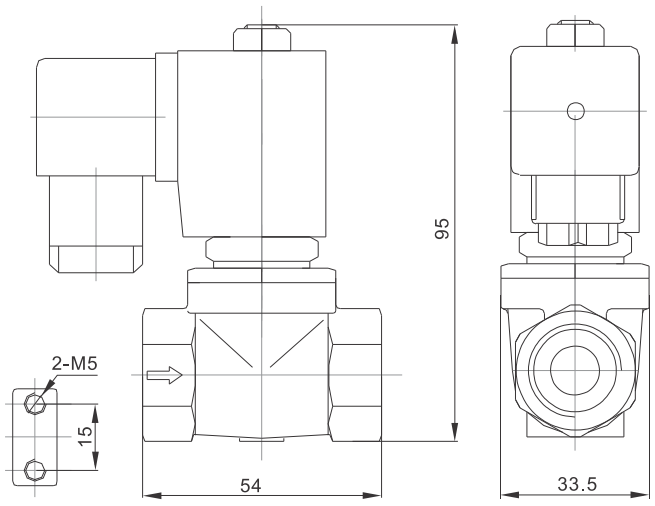
Solenoid Valve ST-SA-series

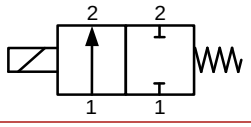
The ST-SA is a semi-direct operated 2/2-way solenoid valve. The valve is normally closed. The valves have an orifice of 10.5mm and can be used from a zero pressure difference. The body material can be brass or stainless steel with a NBR, EPDM or FKM seal. The ST-SA solenoid valves are compatible with all coils from the CS1-series.

Example of product code



Dimensions



Series	Standard (ST)	
Function	2/2 way	
Operation	Semi-direct (S)	
Position	Normally Closed (A)	
Body Material	Brass (B) / SS 316 (S)	
Seal & Media Temperature	NBR (N)	-10..+80°C
	EPDM (E)	-30..+130°C
	FKM (F)	-10..+120°C
Thread	BSPP / NPT (N)	
Ambient Temperature	Max +50°C	
Min. Pressure Difference	0 bar	
Max. Pressure	16/10 bar (AC/DC)	
Coil series	CS1	
Voltage	230V AC 50/60Hz (230AC)	
	24V AC 50/60Hz (024AC)	
	24V DC (024DC)	
	12V DC (012DC)	
Insulation Class	Class F	
Power	15 W	
Duty Cycle	100% ED	
Connector	EN 175301-803 (formerly DIN 43650A)	
Protection Class	IP 65 (with cable plug)	
Circuit Diagram		

Pipe	Body	Orifice	Kv (m3/h)
1/4" (014)	Brass (B)	10.5 mm (105)	1.25
1/4" (014)	Stainless Steel (S)	8 mm (080)	1.02
3/8" (038)	Brass (B)	10.5 mm (105)	1.43
3/8" (038)	Stainless Steel (S)	8 mm (080)	1.02
1/2" (012)	Brass (B)	10.5 mm (105)	1.49
1/2" (012)	Stainless Steel (S)	8 mm (080)	1.02

1. TECHNICAL SPECIFICATIONS

1.1. Principle of operation

A solenoid valve is a valve for neutral, clean liquids and gases, which is electrically controlled with the aid of a solenoid. 2/2 way means that the valve has two ports (input / output) and two positions (closed / open). The valve is normally closed, this means that the valve is closed when de-energized.

Semi-direct operated solenoid valves combine the properties of both direct and indirect operated solenoid valves. The force that is required to open and close the diaphragm is supplied by both the solenoid plunger as well as the pressure of the medium. This allows them to work from zero bar pressure differential. Furthermore, they can control a high flow rate with a relatively small solenoid core. They can be used in only one flow direction. This type of solenoid valves is used in systems that require a reasonable flow rate, but the pressure difference between input and output is low or unknown.

1.2. Area of application

Body material

The ST-SA series is available with a brass or stainless steel body material.

Body material	Allowed media
Brass (ASTM #37800)	Neutral and non-corrosive media.
Stainless Steel (S316)	Suitable for aggressive media and corrosive media like seawater.

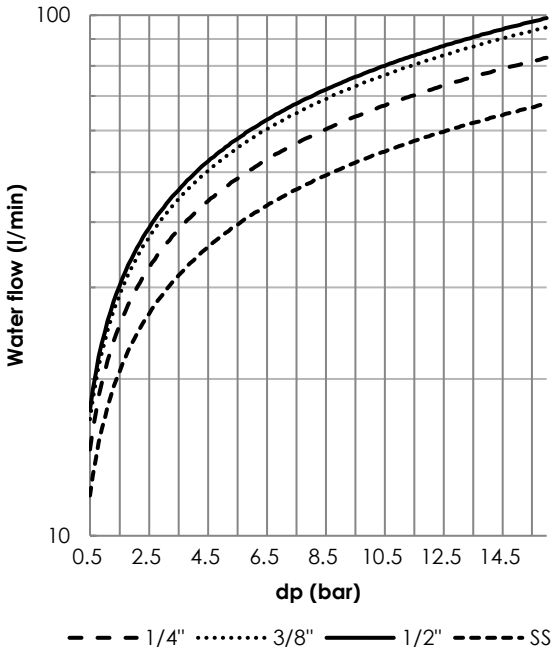
Diaphragm

The ST-SA series is available with several materials. In the following table a concise overview is presented of compatible media.

Diaphragm	Temperature	Allowed media	Not allowed
FKM	-10°C..120°C	Most fuels and oils, cold water, detergents, compressed air.	Glycol-based brake fluids, ammonia gas, hot water and steam, low molecular weight organic acids (such as acetic acid.
EPDM	-30°C..130°C	Water and steam, alcohol.	Oils, fats, fuels, solvents.
NBR	-10°C..80°C	Neutral media, like air, cold water, hydraulic oil.	Fuels, strong acids, brake fluid.

1.3. Flow chart

In the flow chart, the flow of water from 20°C is shown as a function of the positive pressure difference across the valve. The flow rate is expressed in liters per minute and the pressure in bar. The graph shows different pipe diameters. The stainless steel valves (SS) of the ST-SA series have a lower flow rate due to a smaller orifice.



1.4. Duty cycle

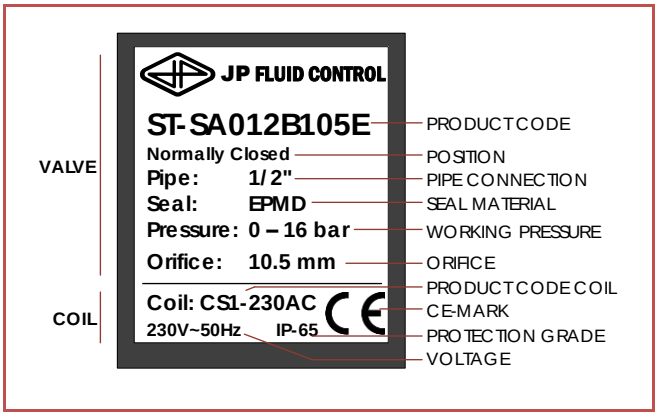
The solenoid valve is suitable for continuous use. High switching frequencies and high pressures can reduce the lifespan.

1.5. Compliance

The coils are CE and UCKCA marked and comply with the LVD Directive (2006/95/EC), Directive (2004/108/EC), and the Electrical Equipment (Safety) Regulations 2016, **provided that the cables and connectors are properly connected.**

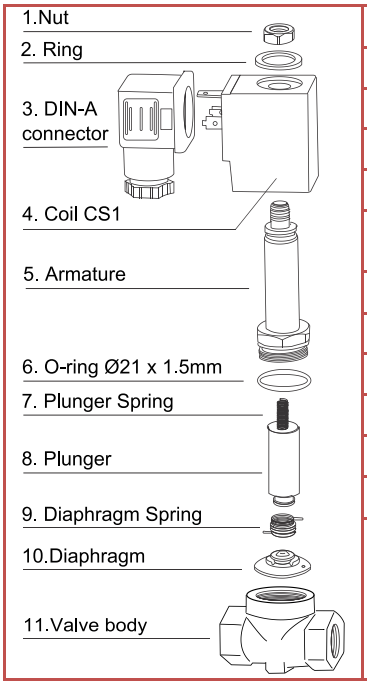
1.6. Type label

The properties of both the valve and the coil are displayed on a label on the coil. In the figure below, an example is shown.



1.7. Exploded view

In the figure below is an exploded drawing of the ST-SA series is displayed.



#	Brass (B)	Stainless Steel (S)
1	SS 302	SS 302
2	SS 302	SS 302
3	PA	PA
4	Epoxy	Epoxy
5	Top: 430F Rest: SS 304	Top: 430F Rest: SS 304
6	NBR/EPDM /FKM	NBR/EPDM /FKM
7	SS 302	SS 302
8	430F	430F
9	SS 302	SS 302
10	NBR/EPDM /FKM	NBR/EPDM /FKM
11	Brass #37800	SS 316

2. GENERAL SAFETY INSTRUCTIONS

► This product is not a safety device and may not be used as such.
► The product may not function properly as a result of dirt, wear, damage (for example, by dropping) or improper use. Therefore, the product should not be used in applications where a malfunction can cause danger or damage.
► Check the compatibility of the medium used, temperature and other operating conditions with the materials and specifications of the product. It is the responsibility of the user to select the right product for the application.
► This product is not intended or approved for medical applications, food and/or application in gas appliances.
► Solenoid valves can only be used with clean liquids or gases. It is recommended to install a filter before the solenoid valve.
► Never exceed the limits for pressure, temperature or voltage as indicated on the product and/or in the technical documentation.
► The temperature of a solenoid valve coil can rise during operation; this is normal. Overheating will cause smoke and a burning smell. In this case, the power supply must immediately be disconnected.
► A solenoid valve opens and closes quickly. Improper use can cause pressure waves (fluid hammer) in the pipes with possible damage as a consequence.
► Beware of electric shock when working with electrical equipment.

3. INSTALLATION AND MAINTENANCE

1.1. Safety instructions before starting

► It is recommended to install the product in a dry environment. In moist environments, make sure that no moisture can penetrate the coil, actuator or connector. Ensure that the solenoid valve is installed in an area with adequate ventilation to facilitate heat dissipation. Make sure the solenoid valve is not in contact with or in the vicinity of flammable materials. Ensure that the product is protected from frost. Frost may damage the product and/or block the moving parts, causing the product to malfunction.
► Operations may only be performed when the system is not pressurized, electrically disconnected and cooled down.
► Turn off the power supply before performing any work on the solenoid valve to prevent the risk of electrical shock and to prevent activation of the solenoid valve.
► The product is only safe when properly installed and operated by qualified persons. Please read the safety instructions and technical documentation carefully before installation, use or servicing. Always observe applicable and generally accepted safety
Measures.
► Ensure a safe startup after installation or maintenance.
► Water hammer is a typical consequence of a high flow rate and pressure in pipes with small diameters. There are several solutions to this problem:
► Reduce the pressure with a pressure reducing valve before the solenoid valve.
► Increase the pipe diameter if possible.
► Dampen the water hammer by using a flexible hose or buffer before the solenoid valve.

1.2. Installation

Clean fluids and gases

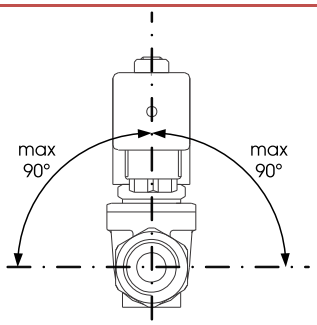
The solenoid valve can be used in combination with clean liquids or gases. Make sure that the pipe may contain dirt before installing the valve. It is recommended to install a filter (500 µm) before the solenoid valve.

Mounting the valve

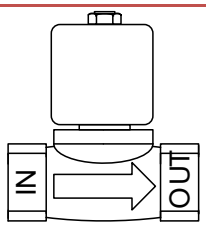
Be aware of the direction of flow of the medium when installing the valve. Solenoid valves with an arrow on the housing must be connected in the indicated direction. The pipes on both sides of the valve must be securely fastened. Use a wrench for both valve and pipe while tightening, to prevent unnecessary stresses in the system. The solenoid valve must be fixed via the provided connection points. Only exert force at the designated areas on the body such as the hexagon; never to the coil or armature. Avoid vibration in the pipes. Use a suitable sealant for threaded connections of the solenoid valve. Avoid the entry of sealing material in the valve, this can lead to malfunctioning of the valve.

Position

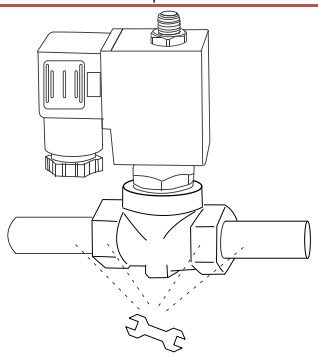
It is recommended to install the solenoid in vertical position with the coil facing upwards. This reduces the probability of the collection of debris in the solenoid valve. When the solenoid valve is mounted at an angle, it is recommended to deviate maximally 90° from the vertical position.



Maximum angle 90°.



Check the flow direction with the help of the indications on the valve body.



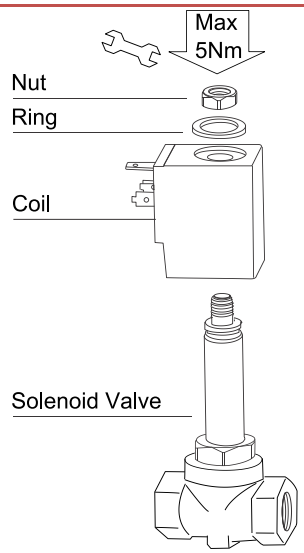
Only exert force at the designated faces, never at the coil or armature.

Installation of the coil

► Make sure the coil is labeled with the valve characteristics.The device can be damaged by the use of unsuitable tools.

► The temperature of the coil increases during use, this is normal. Overheating will cause smoke and a burning smell. In this case, the power supply must be shut down immediately.

► The coils can be rotated if the coil nut is loosened. After the determination of the correct position, the nut should be fastened with a torque of 5Nm.

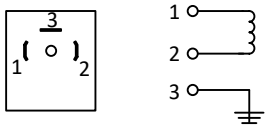


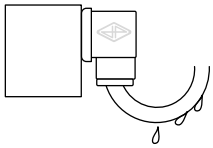
Installation of the cable plug

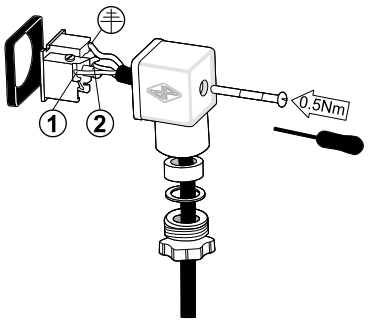
► Always connect the earth (3), which is provided with a ground fault at voltages above 50V. Never use liquid or gas for grounding electrical equipment. The power supply is connected to terminals (1) and (2). The polarity does not matter.

► Verify the voltage and frequency before connecting the coil.

► When mounting the connector, make sure that no moisture can ingress between the coil and connector. The connector screws should be fastened with a torque of 0.5Nm.







Connector: EN 175301-803 (formerly DIN 43650A).
The poles (1) and (2) should be connected to the power supply, polarity is not important. Pole (3) is the earth. Connect the connector thoroughly to avoid ingress of moisture. Ensure that drops in cannot slip along the cable and enter the connector.

Connecting the power supply

► Never connect power to the coil when it is not not attached to the solenoid valve! The coil may burn out.

► Only connect power if you are sure that there is no pressure in the system and no hazardous situations can occur.

4. SPARE PARTS

The coil can be replaced. The product codes of the coil are shown in the table below.

Product Code	Voltage
CS1-230AC	230V AC 50Hz
CS1-024AC	24VAC 50Hz
CS1-024DC	24V DC
CS1-012DC	12V DC

The diaphragm, springs and plunger of the solenoid valve can be replaced. The product codes of the diaphragms are shown in the table below:

Product Code	Housing	Seal
ST-SA-N-REV	Brass	NBR
ST-SA-E-REV	Brass	EPDM
ST-SA-F-REV	Brass	FKM
ST-SA-SN-REV	Stainless Steel	NBR
ST-SA-SE-REV	Stainless Steel	EPDM
ST-SA-SF-REV	Stainless Steel	FKM

Follow the drawing in 1.7 for the correct assembly of the solenoid valve.

5. DISPOSAL

The removal of the product should be performed in accordance with the applicable laws. Keep in mind the media that are still present in the valve.