

**ELECTRIC BALL VALVE
MOTOR WITH CAN-BUS CONNECTION
AND SAE J1939 PROTOCOL
INTERNAL SENSOR AND POSITION INDICATOR**



853 SERIES

INSTALLATION, USE AND MAINTENANCE

 = Generic danger

 = Warning

ECU = IBX100 remote control unit

VT = Virtual Terminal

OP = Object Pool

TC = Task Controller

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• MANUAL USE MODES

The section of this manual dedicated to the installation contains information for installers. For this reason, we used technical terms without providing explanations which would be necessary for end users only.

THE INSTALLATION MUST BE CARRIED OUT BY AUTHORIZED AND SKILLED PERSONNEL ONLY. ARAG IS NOT RESPONSIBLE FOR ANY OPERATION SPECIFIED IN THIS MANUAL CARRIED OUT BY UNAUTHORIZED OR UNSKILLED PERSONNEL.

• RESPONSIBILITIES

The installer must carry out "workmanlike" installations and ensure to the end user the perfect operation of the whole system both with ARAG components only and other brands' components.

ARAG always recommends using its components to install control systems.

The installer will be held responsible for any malfunction if he decides to use other brands' components even without actually changing the system parts or harness.

The compatibility check with components and accessories of other manufacturers shall be carried out by the installer.

If the ARAG components installed together with other brands' components get damaged because of what stated above, no direct or indirect warranty will be provided.

1 SAFETY GUIDELINES



WARNING:

All installation and maintenance operations must be carried out by qualified personnel with circuit not under pressure and without power supply (connector disconnected).

CARRYING OUT INSTALLATION AND MAINTENANCE OPERATIONS WITHOUT DISCONNECTING THE VALVE FROM ITS POWER SUPPLY MAY CAUSE SEVERE INJURY.

Use suitable tools and any personal protective equipment deemed necessary.



ARAG IS NOT LIABLE FOR ANY DAMAGE RESULTING FROM INSTALLATION BY UNSKILLED PERSONNEL. ANY SYSTEM DAMAGE CAUSED BY A WRONG INSTALLATION AND/OR CONNECTION AUTOMATICALLY VOIDS THE WARRANTY.

- Use ONLY clean water for spraying tests, calibrations and simulations: using chemicals during simulated spraying runs can seriously injure persons in the vicinity.
- Do not operate the valve with no load for long periods of time, as this might damage the components inside the valve.
- ARAG declines any responsibility for direct or indirect damage caused by the type of fluids used in the system. The use of such substances is made under the full responsibility of the operator, who therefore must follow the safety measures indicated by the fluid manufacturer on the package and wear suitable personal safety equipment (gloves, coverall, boots, helmet, etc.) in compliance with the law provisions.
- ARAG may not in any way be held responsible for accidents or damage to persons, animals or objects caused by improper, unprotected, or non-recommended use of the products utilized.

2 FIELD OF APPLICATION

These valves are for professional use only.

They are designed for use in the agricultural sector and can be used as flow switches in a system under pressure for conveying liquids.

They differ in that they display the position of the valve thanks to a mechanical position indicator.

This device is designed to work on agricultural machinery for spraying and crop spraying applications.

The equipment is designed and manufactured according to:

- EMC Directive 2014/30/EC and following amendments;
- Machinery Directive 2006/42/EC and following amendments.

3 LIMITATIONS OF USE

The 853 series electric valves may not be used:

- as safety valves;
- in systems where gases, vapors, or similar pass through;
- in systems for explosive atmospheres;
- in contact with food stuff;
- in civil systems.

4 PRECAUTIONS



- Do not place the equipment under pressurized water.
- Do not use solvents or fuel to clean the outer surfaces.
- Do not clean equipment with direct water jets.
- Comply with the specified power voltage (12 VDC).
- In case of voltaic arc welding, remove connectors from the device and disconnect the power cables.
- Only use ARAG genuine spare parts and accessories.

5 INSTALLATION



• 853 valves are designed as standard components to be integrated into machines; no particular use of these valves within the machine can be defined.

The integrator must evaluate all safety aspects not explicitly covered that arise from the integration of the component into the machine.

• The components, pipes and valves that will be installed in the system must withstand a pressure higher than the maximum one of the system.

• Any constriction in the system may lead to a faulty over-pressure.

• Make sure that hoses, hose tails and valve flanges feature a suitable and compatible diameter.



WARNING: do not connect the electric connectors to the valves. This operation must be performed at a later stage and only by following the instructions in the SAE J1939 protocol specifications (to be requested from ARAG technical support at support-RUB@nordson.com).



OPERATING THE VALVE WITH ONE OR MORE INLETS/OUTLETS OPEN IS VERY DANGEROUS AND CAN CAUSE ACCIDENTS AND SERIOUS INJURIES TO THE INSTALLATION OR MAINTENANCE PERSONNEL: DO NOT INSERT ANY FOREIGN BODY OR YOUR HANDS INTO THE HOLE OF THE BALL WHILE THE VALVE IS CONNECTED TO THE POWER SUPPLY. THIS COULD LEAD TO CRUSHING OR AMPUTATION.



WARNING: TO AVOID DAMAGING THE SYSTEM, MAKE SURE THAT NONE OF THE PARTS COMES INTO CONTACT WITH MOVING PARTS OF THE FARMING MACHINE.

6 AVAILABLE COUPLINGS



1 Female threaded coupling



2 Male fork coupling



3 Clamp fastening

7 MAXIMUM OPERATING PRESSURE

The maximum operating pressure of the valve depends on the type of coupling it is fitted with.

Refer to the Arag catalog and the technical data sheet for the corresponding model.



If the valve is equipped with connections with different maximum pressures, the maximum allowed pressure is always the lowest value among the available connections.

WAYS	COUPLING	1 	2 
2-3	T5	12 bar / 180 psi	
	T6 DN32		
	1"		
	1" 1/4		
	T6 DN40	10 bar / 150 psi	
	1" 1/2		
	T7	8 bar / 120 psi	
	2"		
	T9	6 bar / 90 psi	
	2" 1/2		
	3"		
5	T4	16 bar / 230 psi	
	1"		
	T6	12 bar / 180 psi	
	1" 1/4		
	1" 1/2		
	T7	6 bar / 90 psi	
	2"		

WAYS	FLANGE	3 
2-3	2" standard port	10 bar / 150 psi
	2" full port	8 bar / 120 psi
	3" full port	6 bar / 90 psi
5	2" standard port	10 bar / 150 psi
	2" full port	8 bar / 120 psi

8 POSITION ON FARMING MACHINE

8.1 Overall dimensions

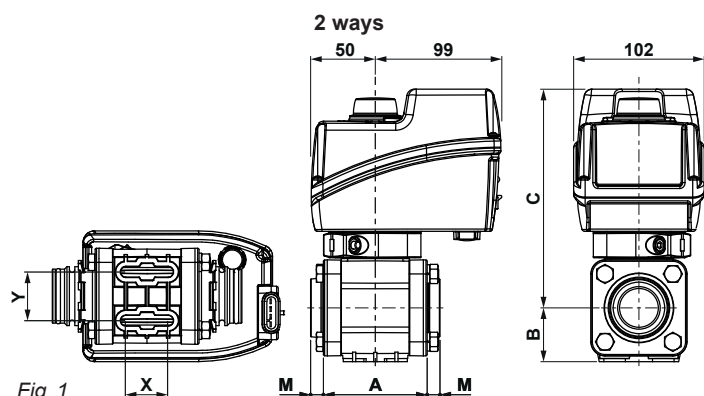


Fig. 1

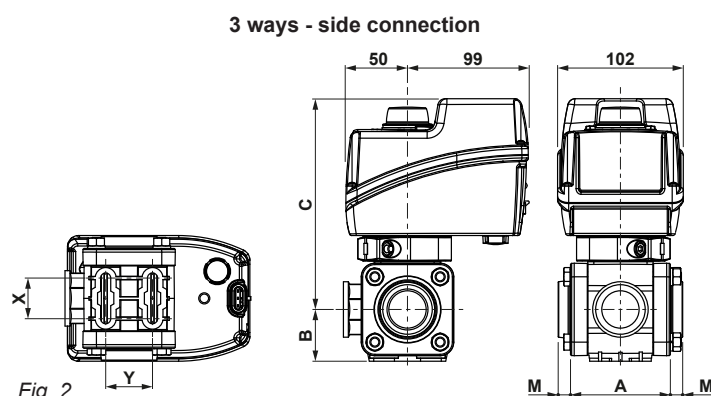


Fig. 2

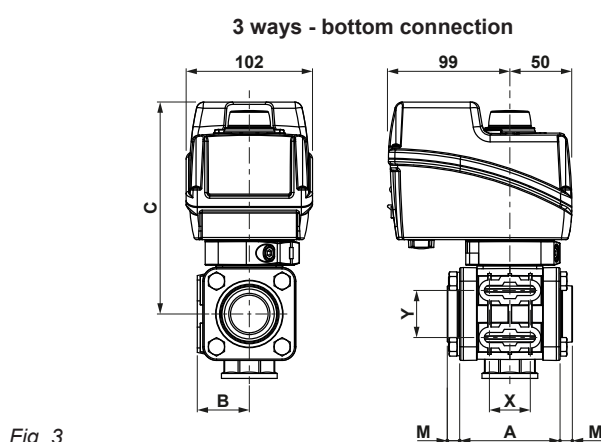


Fig. 3

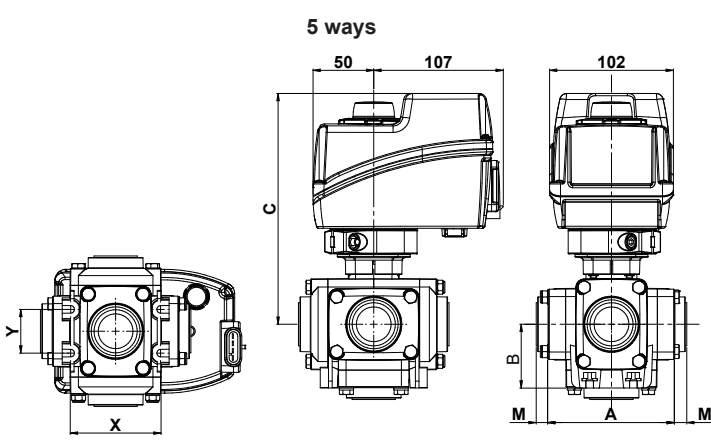


Fig. 4

WAYS	PART NO.	 mm	Coupling	Dimensions										Drilling template				Tightening torque			
							A		B		C		X		Y		Nm	lb-in			
				mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm			in		
2-3	853xxx4xxxE	32	T6	-	-	42	1.6"	-	-	81	3.2"	42	1.7"	186	7.3"	33	1.3"	38	1.5"	5	44
			1"	10	0.4"	-	-	25	1"												
			1" 1/4	12	0.5"	-	-	-	-												
	853xxx5xxxE	40	1" 1/2	12.5	0.5"	-	-	20	0.8"	93	3.7"	52	2"	192	7.6"	40	1.6"	49	1.9"	4	36
			853xxx6xxxE	50	T7	-	-	43	1.7"	-	-	118	4.6"	61	2.4"	210	8.3"	57	2.2"	60	2.4"
	2"	16			0.6"	-	-	26	1"												
	2" 1/2	16			0.6"	-	-	-	-												
	853xxx7xxxE	65	T9	-	-	48	1.9"	-	-	136	5.3"	71	2.8"	223	8.8"	72	2.8"	80	3.1"	4	36
3"			19	0.7"	-	-	28	1.1"													
5	853253x44E		20	T4	-	-	24	0.9"	-												
		1"		10	0.4"	-	-	-	-												
	853255xxxE	32	T6	-	-	33	1.3"	-	-	93	3.7"	72	2.8"	210	8.3"	100	3.9"	46	1.8"	10	89
			1" 1/4	12	0.5"	-	-	-	-												
			1" 1/2	12.5	0.5"	-	-	-	-												
	853x56x66E	40	T6	-	-	33	1.3"	-	-	159	6.3"	80	3.1"	191	7.5"	114	4.5"	55	2.2"	8	71
			1" 1/2	-	-	-	-	-	-												
			2"	-	-	-	-	18	0.7"												
	853x57x77E	50	T7	-	-	40	1.6"	-	-	168	6.6"	80	3.1"	223	8.8"	51	2"	101	4"	12	106
			2"	19	0.7"	-	-	26	1"												

8.2 Attachment

The valve is factory set to be attached using bolts of the indicated type (par. 8.2.1).

- Insert the bolts into the appropriate seats - drilling template X and Y, see overall dimensions par. 8.1 on page 5; then turn them to the stop position to prevent them from coming out.
- Screw on the nuts and tighten them firmly: depending on the model, use the appropriate tightening torque, indicated on page 5.



No other types of coupling are permitted than those described.

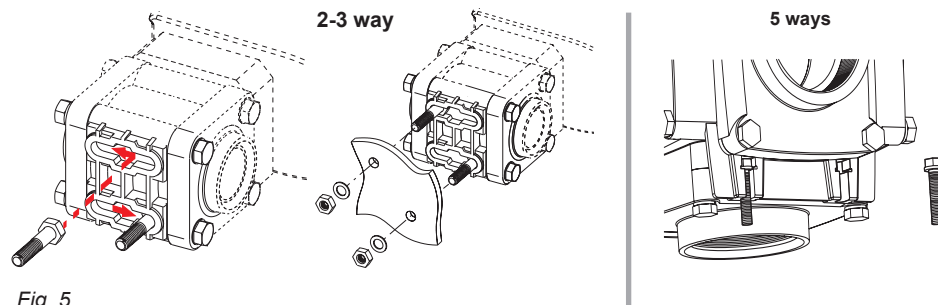


Fig. 5

8.2.1 Types of bolts

To attach the valve use bolts of the following types:

- M8 ISO 4014/4017
- 5/16" ANSI B18.2

On valves with 1" 1/2 or larger couplings:

- M8 ISO 4014/4017 + M8 ISO 7089 flat washer
- M8 ISO 4162
- 5/16" ANSI B18.2

9 HYDRAULIC CONNECTIONS

Remove the protective caps and connect the inlet/outlet hoses to the valve, using the correct connections for which it is set.

Take special care, where requested, to insert the supplied O-ring correctly.

If, for any reason, the pipes leak at connection points, apply unsintered PTFE tape to improve sealing.



WARNING:

For the maximum operating pressure for the chosen connection, refer to chap. 7 on page 4.

Once all the valve ports have been connected, and **ONLY** when all hydraulic connections of the circuit to the relevant pipes have been completed, put the system under pressure **ONLY WITH CLEAN WATER FIRST** to make sure that the connections are not leaking.

10 WIRING CONNECTIONS



- Connection and commissioning must be carried out by specialized personnel.
- Use only the wiring harnesses supplied by ARAG.
- Take care not to break, pull, tear or cut the cables.
- Periodically check the integrity of harness and single cables.
- Use of unsuitable cables not provided by ARAG automatically voids the warranty.
- ARAG is not liable for any damage to the equipment, persons or animals caused by failure to observe the above instructions.

10.1 General precautions for a correct harness position



- **Securing the cables:**
 - secure the harness so that it does not interfere with moving parts;
 - route the harnesses so that they cannot be damaged or broken by machine movements or twisting.
 - **Fitting the cables to the connection points:**
 - Do not force the connectors by pushing too hard or bending them: the contacts may be damaged and system operation may be compromised.
- Use ONLY the cables and accessories indicated in the catalog, having technical features suitable for the use to be made of them.**

10.2 CAN line - installation requirements



- Termination: insert 120 Ω resistors at both ends of the backbone.
- Stubs: maximum length less than or equal to 1 m / 3.3 ft.
- Recommended backbone length: less than 40 m / 131.2 ft (at 250 kbit/s).
- Cable: use twisted cable dedicated to the CAN line.

Failure to comply with these instructions may cause system malfunctions.

10.3 ID acquisition

Multiple valves can be connected to the same CAN bus by following the address acquisition procedure for gearmotors.

The valves do not have automatic acquisition, so:

- connect the valve to the bus;
- activate only one valve at a time;
- wait for the ID to be acquired.

This operation is only necessary when turning on for the first time.



WARNING: the electrical connection must only be made following the instructions in the SAE J1939 protocol specifications (to be requested from ARAG technical support at support-RUB@nordson.com).

10.4 Wiring connections



Fig. 6

The valve must be connected by means of the connector present on the geared motor.
To connect the valve, use suitable cables available on the Arag catalog.

Connect the valve connector to that of the relevant harness; make sure it is correctly fitted and push it until it locks in place (Fig. 6).



WARNING: CHECK THAT THE CONNECTOR IS FITTED CORRECTLY TO ENSURE A PROPER SEALING. If the gasket is not positioned correctly, there may be infiltrations of water in the connector and in the valve, with the consequent risk of damage to the device.

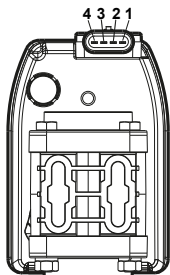
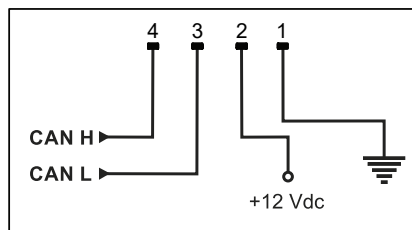


Fig. 7

1	GND
2	+12 Vdc
3	CAN L
4	CAN H



12 Vdc power supply always connected.

10.5 Power supply connection - requirements

- Comply with the specified power voltage (par. 14 Technical data on page 12).
 - **Disconnection system:** provide a system that allows the power supply to be disconnected from the vehicle (e.g., via a key switch) to prevent the battery from discharging during periods of inactivity.
 - Protect the power supply line between the machine and the valve block with a fuse on the positive pole.
- Reference value: 2 A for each connected valve.

11 USE

WARNING: Do not operate the valve without load for prolonged periods: the internal seals could be seriously damaged, causing the valve to jam or leak.

11.1 Commands

- For details on any operation or adjustment of the valves, ALWAYS refer to the use and maintenance manual of your control device.
- To send commands to the valve, refer to the SAE J1939 protocol specifications (available from ARAG technical support at support-RUB@nordson.com).
- Refer to the technical data section for the exact power consumption values.

11.2 Position indicator - SIGNALS

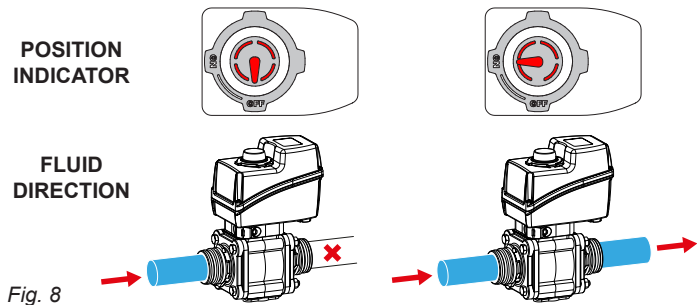
	OFF	The valve is not powered.
	GREEN BLINKING	Waiting to acquire a CAN-bus address. After 10 seconds, the indicator becomes green steady on.
	GREEN STEADY ON	The valve is configured and working.
	WHITE BLINKING	Valve moving to reach the required position.
	ORANGE STEADY ON	The valve is being turned on.
	ORANGE BLINKING	The valve firmware is being updated.
	RED STEADY ON	Hardware problem. See chap. 13 on page 11.
	RED BLINKING	ERROR. The error codes are indicated through blinks, which are described in chap. 13 on page 11.

**DURING THE 10 SECONDS AFTER
TURNING ON**

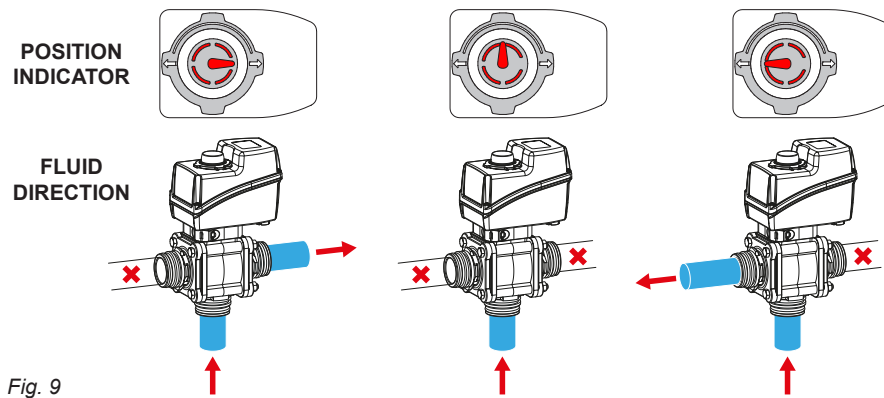
11.3 Position indicator - FLUID DIRECTIONS

The external position indicator allows viewing the orientation of the ball inside the valve, thus identifying the opening/closing status (2 ways) or the fluid direction (3 or 5 ways).

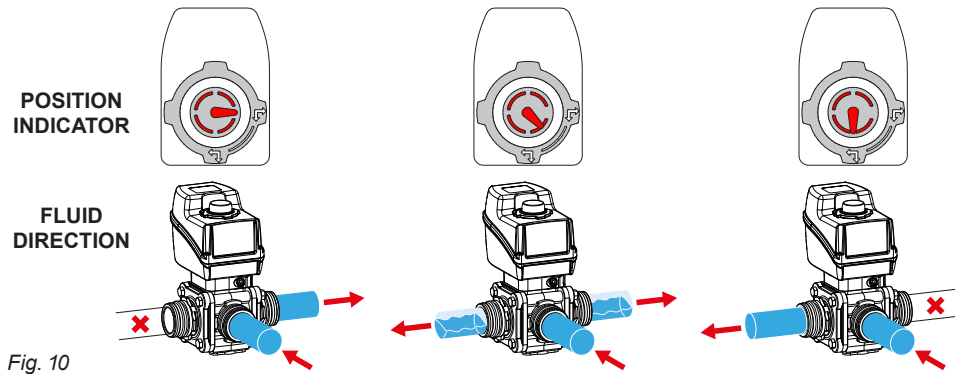
11.3.1 2 ways



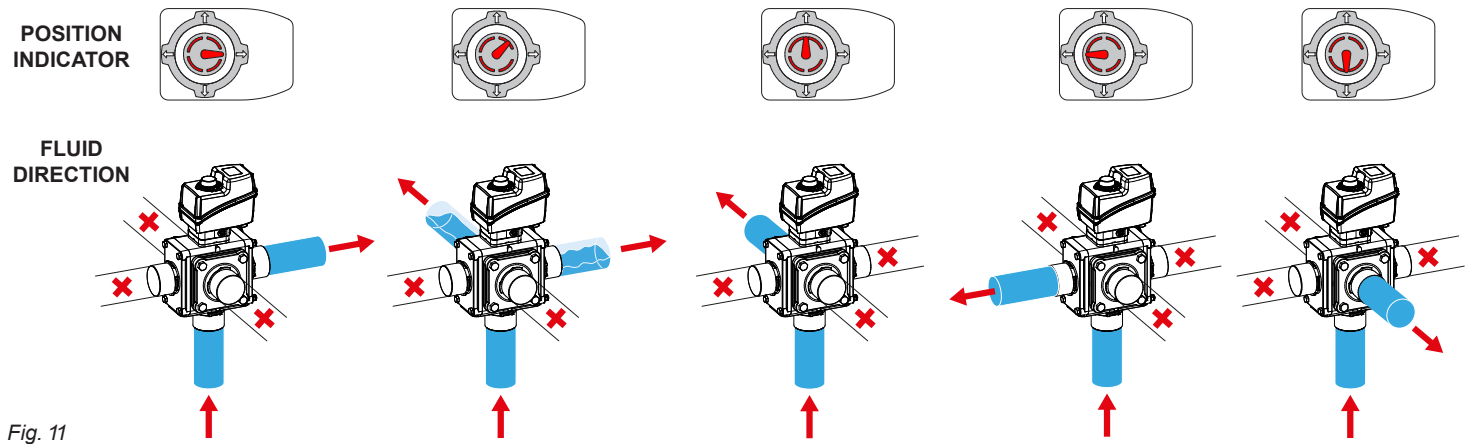
11.3.2 3 ways - bottom connection



11.3.3 3 ways - side connection



11.3.4 5 ways



12 MAINTENANCE

⚠ PRECAUTIONS FOR MAINTENANCE OPERATIONS AND FOR CLEANING THE EXTERNAL PARTS

- DISCONNECT THE POWER CABLES.
- WEAR SUITABLE PERSONAL PROTECTION EQUIPMENT, OVERALLS, GLOVES AND FACE MASK.
- DO NOT CARRY OUT ANY OPERATION ON THE SYSTEM IF INDOORS OR IN POORLY VENTILATED AREAS.
- DO NOT USE SOLVENTS OR FUEL TO CLEAN THE OUTER SURFACE.
- DO NOT USE AGGRESSIVE DETERGENTS OR PRODUCTS.
- DO NOT USE PRESSURIZED WATER JETS (PRESSURE WASHERS, ETC.).
- CLEAN ONLY WITH A SOFT WET CLOTH.

⚠ At the end of each work shift, perform a circuit cleaning cycle with clean water in the tank. WARNING: DISPOSE OF THE LIQUID USED FOR CLEANING ACCORDING TO THE REGULATIONS IN FORCE IN THE COUNTRY OF USE.

Internal cleaning can be carried out when the system to which the valve is connected is cleaned.

If the maintenance man needs to open the valve to check the seal or for extraordinary cleaning, before fitting it back you must replace the seal kit of the orifice that was opened.

⚠ CAUTION: Fitting back the valve without replacing the gasket kit can reduce the sealing on the internal ball and therefore cause leaks.

- Unscrew the bolts related to the orifice to be opened, then remove it and take out the inner gaskets and the O-ring inserted in the internal seat of the flange that has been removed.
- When disassembling the gear motor, ensure that the pin and ball are reassembled in the correct position, as described in paragraph 12.1. If the references do not match, rotate the pin until the position of the ball (red dot in Fig. 13) corresponds to the arrow on the indicator.
- Re-position all the gaskets in their seats, as shown in Fig. 12 (gasket (1) is not present on all models), then close the flange.
- Insert the bolts in the holes, fit back the washers and screw in the nuts by hand.
- To ensure correct operation, the nuts (2) must be tightened using a torque wrench calibrated as indicated in the technical data (chap. 14 on page 12).
- Reconnect all the hydraulic connections.
- Restore electric power supply.
- Put the system under pressure ONLY WITH CLEAN WATER and check that the connections are not leaking.

*Not present on all models

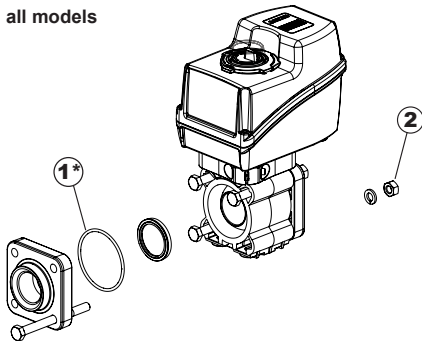


Fig. 12

Further information on the special maintenance operations can be downloaded free of charge from our Website www.aragnet.com.

12.1 Correspondence between pin and position indicator

The point marked on the pivot must coincide with the position of the arrow on the indicator ring.

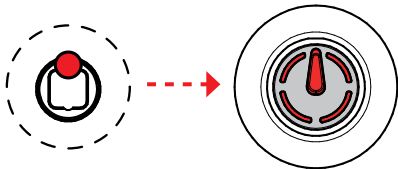


Fig. 13

13 TROUBLESHOOTING



If two or more alarms are present at the same time, the highest priority error code is displayed, CORRESPONDING TO THE LOWEST NUMBER OF BLINKS.

INDICATOR STATUS	PROBLEM	NUMBER OF BLINKS	CAUSE	SOLUTION
 Off	The valve does not respond to commands	-	No power supply.	- Check the connections and the cables. - Replace the cable. If the problem persists, contact your nearest Service Center.
			Wrong wiring harness connection.	Check the connections and the cables.
 Red steady on	The valve does not respond to commands	-	The connection between valve and control device is faulty or not suitable.	Check for the presence and conditions of terminating resistors.
			Hardware error.	Contact the nearest Service Center.
 Red blinking	The valve does not respond to commands	2	Memory error (factory data, setup data, or totalizers).	- Reset to default values. - Save the default values.
	The valve does not stop at the preset point.	3	Calibration has not been performed.	Contact the nearest Service Center.
	The valve works correctly, but the red indicator blinks	4	Too high temperature has been detected.	Position the valve away from heat sources.
		5	Power supply voltage too high.	Check power supply voltage.
			Power supply voltage too low.	
			Power supply battery defective.	
			Use in a 24 V system.	
	The valve does not stop at the preset point.	6	Calibration was not successful.	Contact the nearest Service Center.
		7	The sent commands are wrong or have been sent to the wrong address.	Check the commands sent by the control device.
			The CAN-bus address assigned to the valve is wrong.	Repeat the address assignment procedure.
	The valve does not respond to commands	8	Problem on the motor control circuit.	Restart the valve; if the problem persists, contact your nearest Service Center.
			Pin/gear motor block.	Check the coupling between the plug and the drain connection.
		9	Power supply voltage too low.	- Make sure that the harnesses are suitable for the system. - Check power supply voltage.
			Motor control PWM too low.	Check the PWM set for motor control.
			Geared motor broken.	Replace the geared motor.

14 TECHNICAL DATA

14.1 Electrical features

• Valve status	Yes
• Power supply voltage	9 ÷ 16 Vdc
• Protection against polarity inversion	Yes
• Protection against short-circuit	Yes
• Absorption @ 12 Vdc	3 A
• Connection port for valve control and diagnostics	CAN-bus J1939 protocol, speed 250 kbit/s
• Maximum number of valves addressable on the bus	20

14.2 Environmental features

• Operating temperature	0 °C ÷ +60 °C / 32 °F ÷ +140 °F
• Storage temperature	-20°C ÷ +70°C / -4°F ÷ +158°F

14.3 Physical features

• Gearmotor cover	fiberglass reinforced PA
• Gearmotor lower shell	fiberglass reinforced PA
• Body	fiberglass reinforced PP
• Ball	AISI 316 stainless steel / UHMW depending on model
• Actuation time	depending on model (see corresponding technical data sheet)
• Flowrate	depending on model (see corresponding technical data sheet)
• Maximum operating pressure	depending on model (par. 7 on page 4)

15 END-OF-LIFE DISPOSAL

Dispose of the system in compliance with the established legislation in the country of use.

16 GUARANTEE TERMS

Warranty conditions are available at www.aragnet.com, in the relevant TERMS AND CONDITIONS section.

17 EU DECLARATION OF CONFORMITY

The declaration of conformity is available on the website www.aragnet.com on the page relating to the product, in the download section.

Only use genuine ARAG accessories or spare parts to make sure manufacturer guaranteed safety conditions are maintained in time. Always refer to the Internet address www.aragnet.com

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