



VALVE CONTROL MODULE

95629, Rev 01

April 20, 2018

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REVISION

Revision	Date	Author	Description
00	3/23/2018	SC	Initial Release
01	4/20/2018	DS	- Formatting Updates - Updated and added to Section 10

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1 PRECAUTIONS



READ MANUAL

Do not start, operate or service machine until you read and understand operator's manual. Failure to do so could result in serious injury.



HAND CRUSH NOTICE

Indicates the possibility for a crush force between components during coupling of the Robot and Tool Adaptor.



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, could result in equipment damage and voiding the manufacturer's equipment warranty.

IGNORING INFORMATION ABOUT POTENTIAL HAZARDS CAN LEAD TO SERIOUS HARM TO PERSONNEL AND/OR DAMAGE TO THE EQUIPMENT, AND MAY RESULT IN THE NULLIFICATION OF THE MANUFACTURER'S EQUIPMENT WARRANTY.

HEED ALL PRECAUTION NOTICES

2 SYSTEM DESCRIPTION

The Valve Module is a pneumatic, single solenoid, spring-return control valve that mounts directly to Position 1 of the Tool Changer. This valve requires a single output signal from the robot to control the coupling and uncoupling of the Tool Changer.

Valve Module – The Valve Module is self-contained and only requires a pneumatic air supply and output signal to operate it (Figure 2-1).

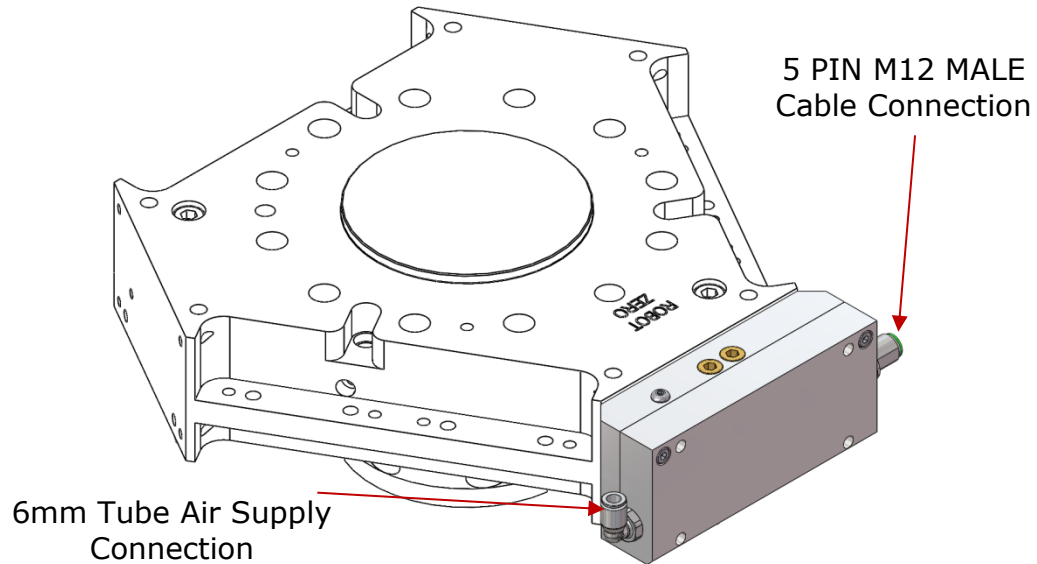
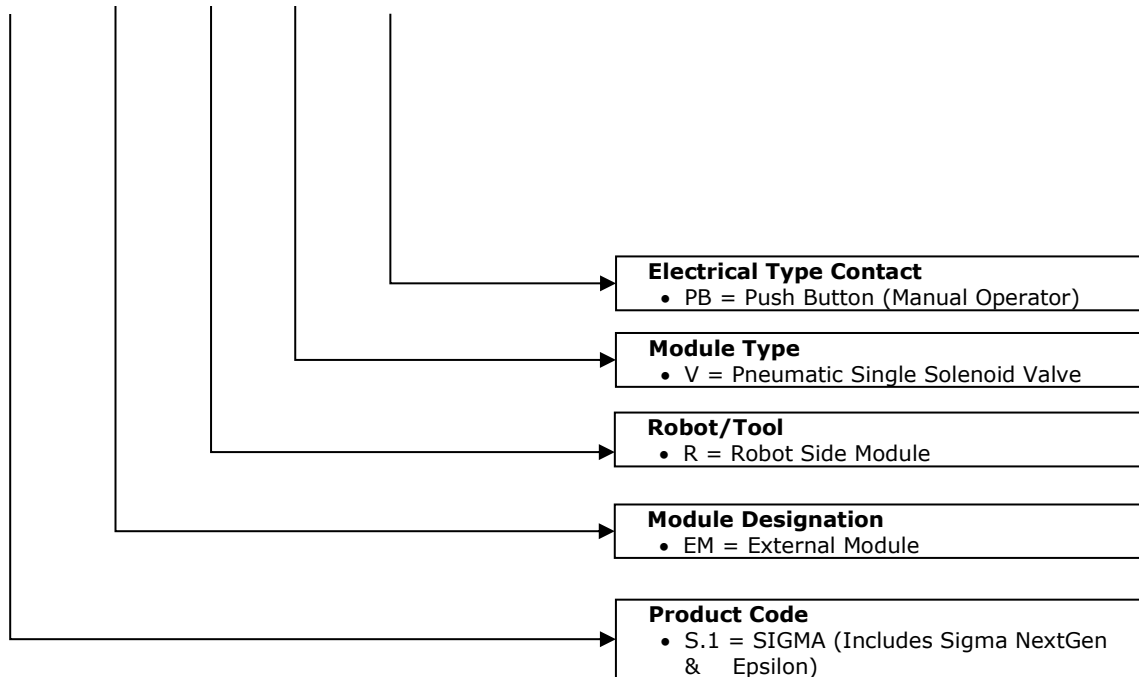


Figure 2-1. Valve Module Installation

2.1 VALVE MODULE

S.1 - EM - R - V - PB



3 TECHNICAL SPECIFICATIONS

Table 3-1. Valve Module Technical Specifications

Specification	Metric	English
Operating Voltage	24VDC $\pm$ 10%	
Power	1 Watt	
Mass / Weight *	0.72 Kg	1.59 lb
Operating Pressure	4 – 7 Bar	58 – 101 PSI
Standard Nominal Flow Rate	190 NLPM	6.7 SCFM
Operating Temperature	-5 °C to +50 °C	23 °F to 122 °F
Transportation & Storage Temperature	-5 °C to +50 °C	23 °F to 122 °F
Transportation & Storage Humidity	Up to 50%, Maximum Temperature 40 °C (104 °F)	
Noise Emission	<= 70 dB(A) in any direction	
Chemical Resistance	Contact APPLIED ROBOTICS Technical Support	
Cable Connection	M12 5 Pole Male	
Air Supply Connection	Push-to-Connect 6 mm Tube	

* Module weight may vary depending on specific configuration.

4 INSTALLATION

The Valve Module is designed to mount directly to APPLIED ROBOTICS' Sigma, Sigma NextGen, and Epsilon (E125, E160, ES160 & ES200) Tool Change Systems. The Valve Module can only be installed on Position 1 over the top of the Couple/Uncouple ports.

To install the Valve Module, place the furnished O-rings into the spot face of the Couple/Uncouple ports. Locate the module using the two installed M5 dowels and fasten the module to the mounting position using the four M5 socket head cap screws, supplied with the module (Figure 4-1).

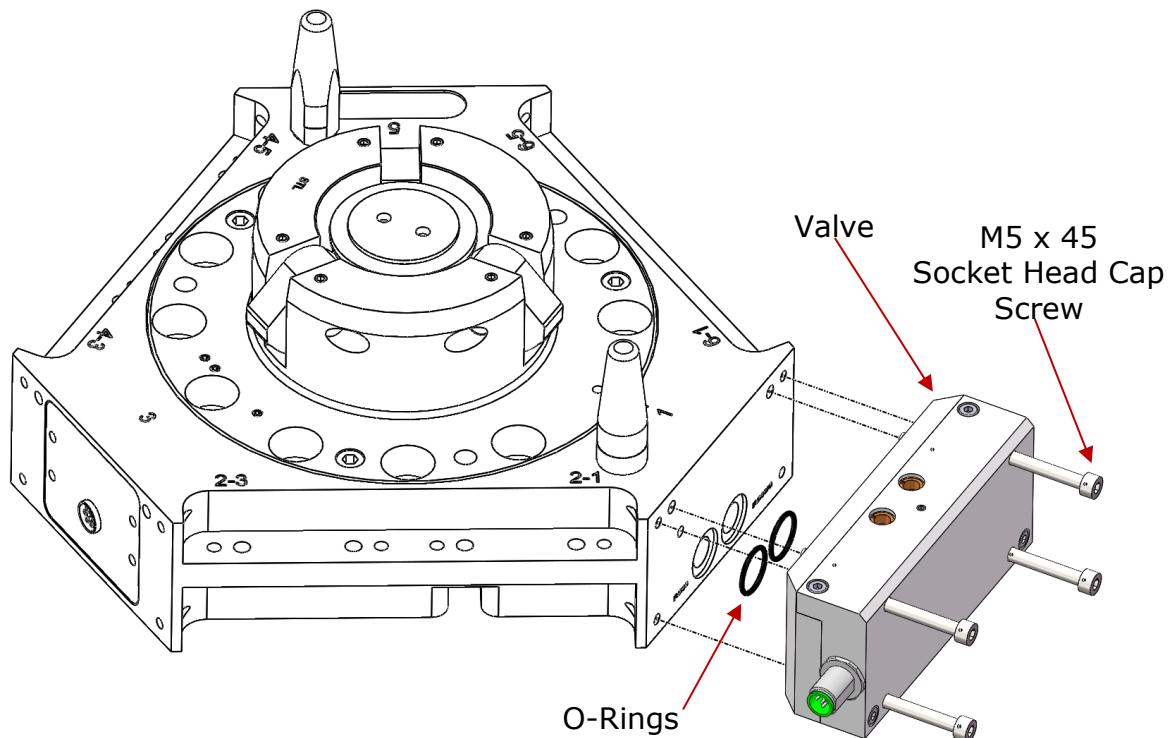


Figure 4-1. Valve Module Installation

4.1 CONNECTING THE AIR SUPPLY

The pneumatic supply is provided via a push-to-connect 6mm tube fitting on the side of the Valve Module (See Figure 4.1-1). The supply line can either come directly from the robot dress pack or plumbed from an APPLIED ROBOTICS Pneumatic Module with valve connection (e.g., S-EM-R-U-1V1/2BS-V).

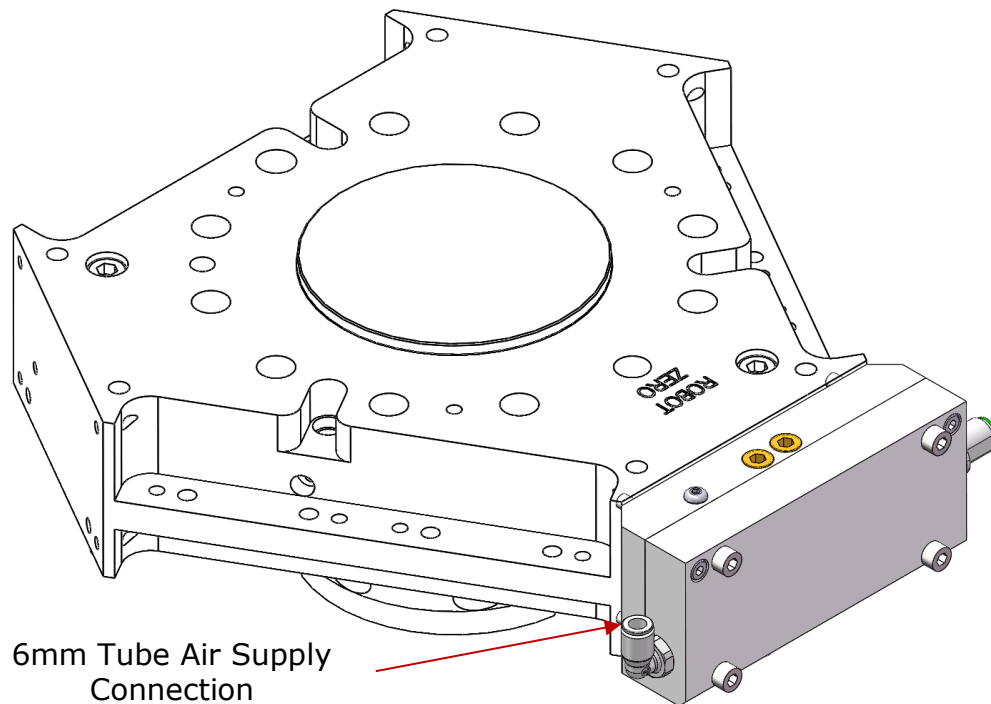


Figure 4.1-1. Valve Module Air Supply

4.2 ELECTRICAL CONNECTION

The Valve Module contains a single electrical connection via a M12 5 PIN MALE connector on the side of the Valve Module (See Figure 4.2-1).

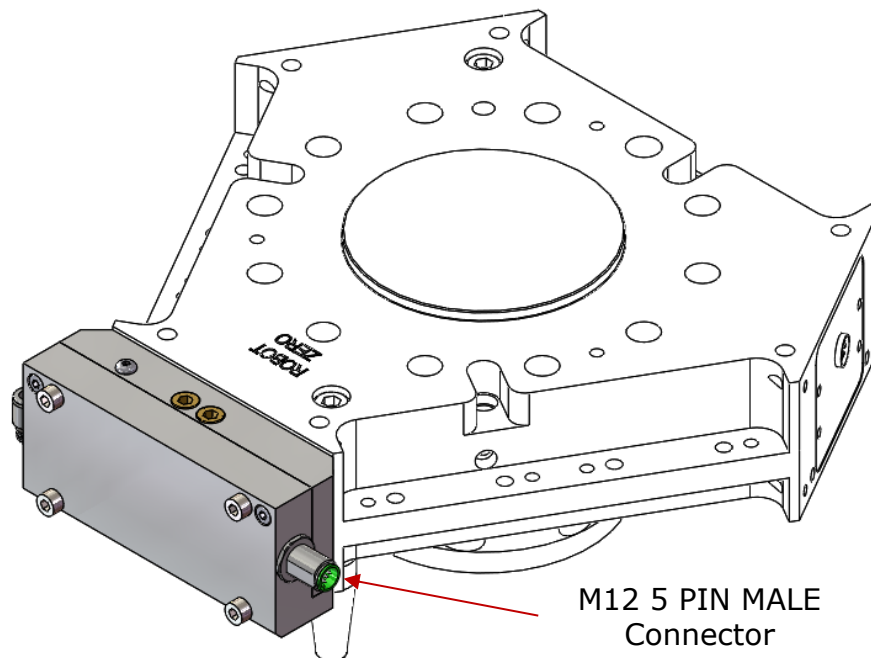


Figure 4.2-1. Valve Module Electrical Connection

The electrical schematic can be found in APPLIED ROBOTICS Informational Documents (See Section 10) or the system schematic that corresponds to the equipment supplied.

5 GUIDE TO OPERATION

The valve can be manually operated by removing the M4 button head cap screw on the top of the valve for access to the manual operator (See Figure 5-1). To Uncouple the Tool Changer, use a small tool or a 1.5 mm hex Allen key and push straight down to actuate.



MANUAL OPERATION SHOULD ONLY BE DONE WHEN THE TOOL CHANGER IS IN A SAFE CONDITION. A SAFE CONDITION IS EITHER A TOOL CHANGER WITH TOOL SAFELY SUPPORTED IN A TOOL STAND OR IN MOVEMENT WITHOUT A TOOL



AFTER USING THE MANUAL OPERATION, TEST THE COUPLE AND UNCOUPLE FUNCTIONALITY OF THE TOOL CHANGER AND ENSURE PROPER OPERATION BEFORE RESUMING WORK OR DOCKING A TOOL.

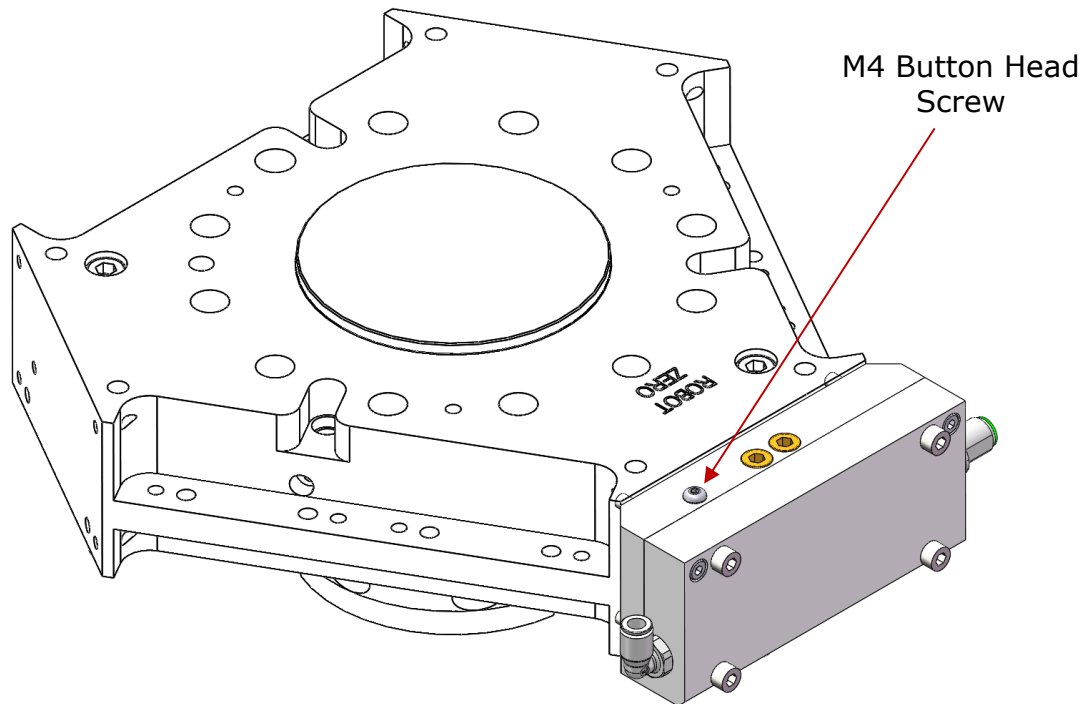


Figure 5-1. Manual Valve Operator

6 TROUBLESHOOTING

6.1 TROUBLESHOOTING GUIDE

Fitting - Pneumatic		
Symptom	Possible Cause	Resolution
Tool Changer Does Not Couple/Uncouple	Not enough or NO air pressure	Check all air lines and connections and make sure there is 4-7 bar (58 – 101 PSI) available.
	Valve is not receiving the output signal	Check to see that an output signal is sent to Couple/Uncouple the Tool Changer. If an output signal is being sent, check all cables and connections and that the Valve is receiving the command on Pin 2 of the M12 5 PIN MALE Connector.
	Broken/Damaged signal cable	Replace cable (See Section 9.2)

6.2 TECHNICAL SUPPORT

If you require assistance, contact APPLIED ROBOTICS Technical Support Department at:

Phone: +1 518 384-1000
E-mail: techsupport@appliedrobotics.com

7 MAINTENANCE

NOTICE

FAILURE TO FOLLOW THE MAINTENANCE SCHEDULE DESCRIBED IN THIS SECTION COULD ALTER OR VOID THE WARRANTY PROVIDED BY APPLIED ROBOTICS, INC.

The Valve Module is a low maintenance component. Perform visual checks every 250,000 cycles.

7.1 PREVENTIVE MAINTENANCE

7.1.1 Visual Inspection

1. Inspect the valve signal cable and pressure supply tube for any cuts or abrasions.
2. With the Tool Changer in a safe condition, cycle the valve several times to verify that it is working properly and the Tool Changer latching mechanism is operating smoothly.

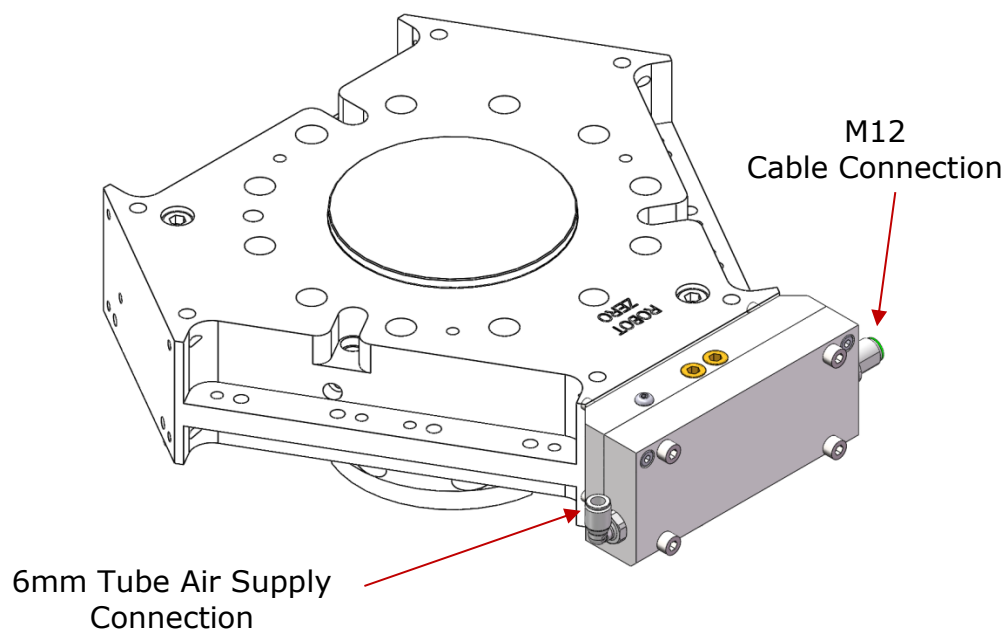


Figure 7.1.1-1. Valve Module Visual Inspection

8 SPARE PARTS

The spare parts listed below are recommended to be maintained in stock for the life of the Valve Module. These quantities are based on a single unit. If higher quantities are purchased, please contact the Technical Support Department at (518) 384-1000 or techsupport@appliedrobotics.com to determine the quantity of spares recommended for the size of your installation.

VALVE MODULE		
Description	Part Number	Quantity
O-RING, .614 ID X .070 VITON	91502-P1060	2
CABLE, M12 5 PIN M 90 F 90 .6M	1700391P	1

9 SPARE PARTS REPLACEMENT

The following procedures explain the correct method for removing and replacing the recommended spare parts listed in Section 8 of this manual.

9.1 O-RINGS

1. Remove the M5 socket head cap screws holding the Valve Module to the Robot Adaptor using a 4mm Allen wrench.
2. Remove the Valve Module from the face of the Tool Changer and discard the O-rings (91502-P1060).
3. Install replacement O-rings into the counterbored pockets on Position 1 of the Tool Changer.
4. Apply Loctite 242, or equivalent, to the threads of the socket head cap screws before installing.
5. Install the Valve Module onto Position 1 of the Tool Changer using the M5 socket head cap screws.

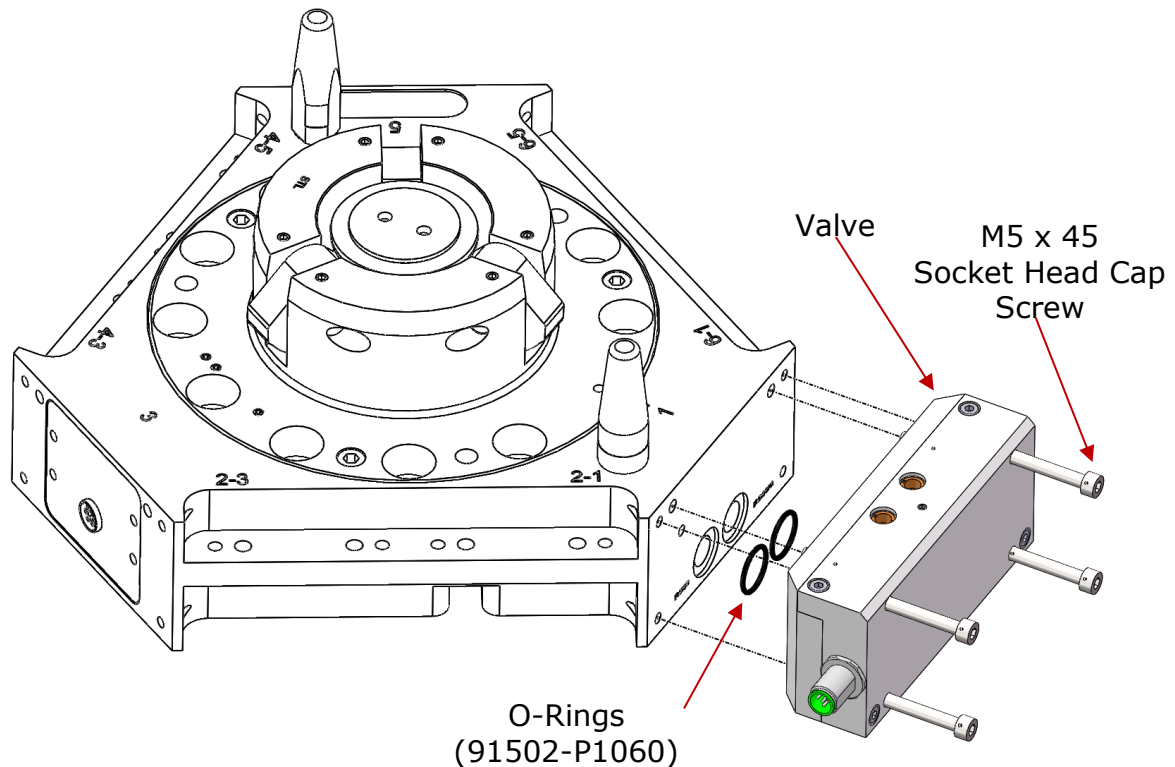


Figure 9.1-1. O-Ring Replacement

9.2 CABLE

1. Remove the M12 cable between the Valve Module and I/O Module and discard cable.
2. Install replacement cable (recommended torque 0.6 Nm).

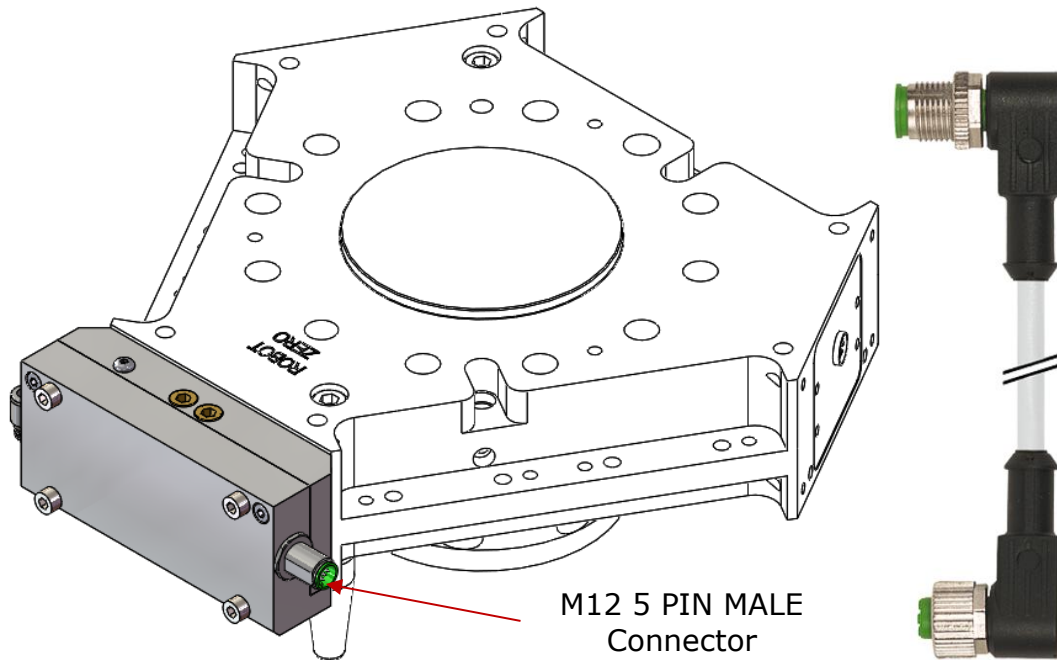


Figure 9.2-1. Cable Replacement

NOTICE

APPLIED ROBOTICS RECOMMENDS AN M12 MALE 90°/M12 FEMALE 90° 5-POLE, PUR CABLE.

10 INFORMATIONAL DOCUMENTS

The documents in this section can assist with installation, use, and identification of replacement parts for the Valve Module. Please contact **APPLIED ROBOTICS Technical Support** if you have any questions.

DECLARATIONS	
Declaration of Incorporation for Partly Completed Machinery	

DRAWINGS	
DRAWING NUMBER	DESCRIPTION
0610-C69A	S.1-EM-R-V-PB

Declaration of Incorporation of Partly Completed Machinery (Annex II 1 B of EC Machinery Directive 2006/42/EC)

Description and identification of the partly completed machinery:

XChange – EPSILON Series Tool Changers & Utility Modules

Fulfills the following function:

Allows industrial robots (and other automated equipment) to automatically change their end of arm tooling under programmed control without the need of human intervention. These products are intended to be incorporated into machinery supplied by others.

The following essential requirements of EC Machinery Directive 2006/42/EC (Annex I) have been applied and fulfilled:

Section 1.1.2.	Principles of safety integration
Section 1.1.3.	Materials and products
Section 1.1.5.	Design of machinery to facilitate its handling
Section 1.2.1.	Safety and reliability of control systems
Section 1.2.6.	Failure of the power supply
Section 1.3.2	Risk of break-up during operation
Section 1.3.3.	Risks due to falling or ejected objects
Section 1.3.4.	Risks due to surfaces, edges or angles
Section 1.3.7.	Risks related to moving parts
Section 1.3.9.	Risks of uncontrolled movements
Section 1.5.1.	Risks due to electricity supply
Section 1.5.3.	Risks due to energy supply other than electricity (air pressure)
Section 1.5.8.	Risks due to noise
Section 1.5.10.	Risks due to non-ionizing radiation
Section 1.6.4.	Operator intervention
Section 1.7.1.	Information and warnings on the machinery
Section 1.7.2.	Warning of residual risks
Section 1.7.3.	Marking of machinery
Section 1.7.4.	Instructions.

The partly completed machinery has been designed and manufactured according to the following harmonized standards:

EN ISO 12100-1	Safety of machinery - Basic concepts, general principles for design Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machinery - Basic concepts, general principles for design Part 2: technical principles

EN ISO 10218-2	Robots and robotic devices — Safety requirements for industrial robots — Part 2: Robot systems and integration
EN ISO 60204-1	Safety of machinery. Electrical equipment of machines. General requirements
EN 61000-6-2	Electromagnetic compatibility (EMC) - Generic standards. Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments
EN 61000-4-2	Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test
EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use -- Part 1: General requirements

The relevant technical documentation has been compiled in accordance with Annex VII, Part B of EC Machinery Directive 2006/42/EC. We undertake, in response to a reasoned request, to supply it in electronic form to the market surveillance authorities within a reasonable period.

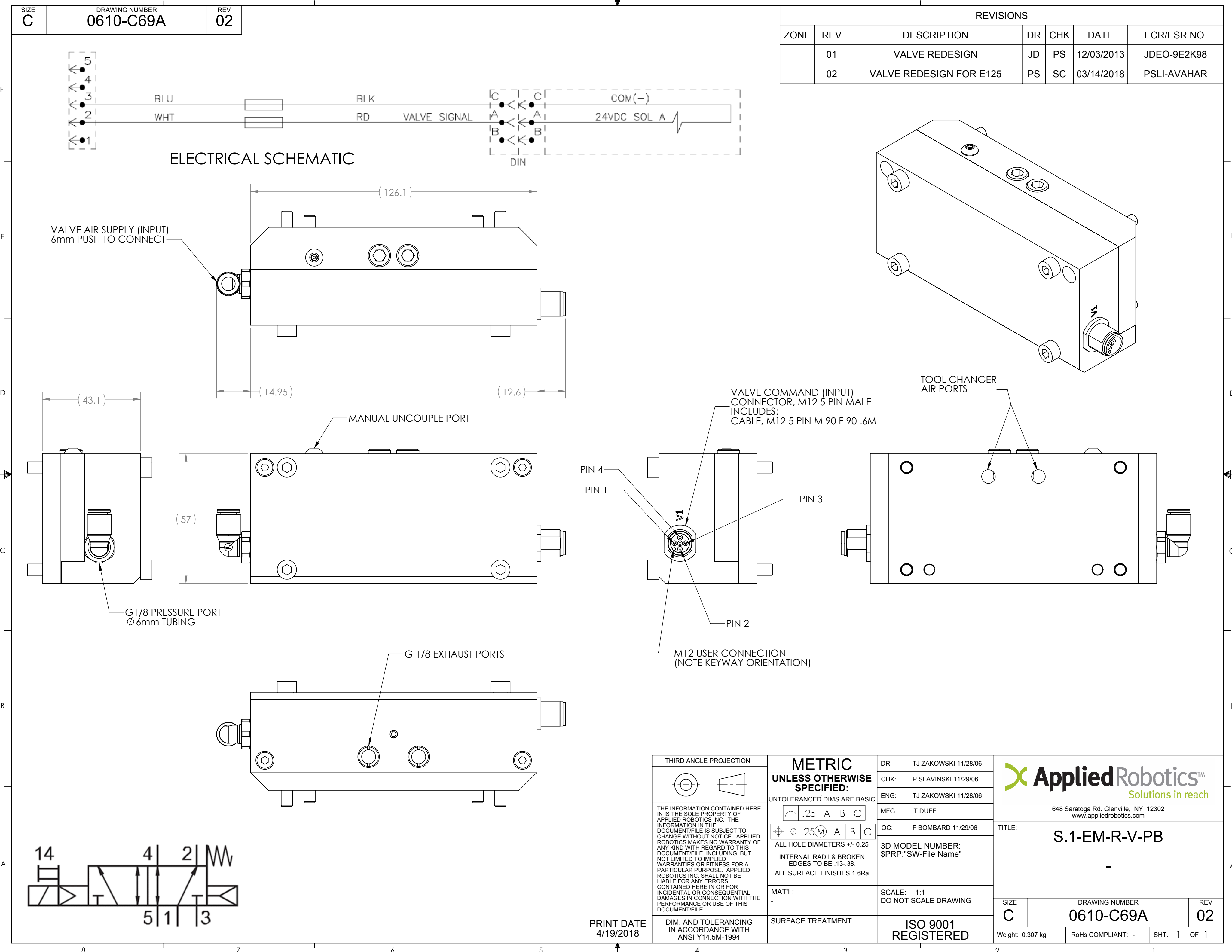
The party authorized to compile the technical documentation is:

Giovanni Patrini, at Effecto Group SpA

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.


Stefan Casey
Vice President, Engineering

APRIL 20, 2018
Date



REVISIONS						
ZONE	REV	DESCRIPTION	DR	CHK	DATE	ECR/ESR NO.
	01	VALVE REDESIGN	JD	PS	12/03/2013	JDEO-9E2K98
	02	VALVE REDESIGN FOR E125	PS	SC	03/14/2018	PSLI-AVAHAR

THIRD ANGLE PROJECTION

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METRIC

UNLESS OTHERWISE SPECIFIED:

UNTOLERANCED DIMS ARE BASIC

	.25	A	B	C
	Ø .25(M)	A	B	C

ALL HOLE DIAMETERS +/- 0.25

INTERNAL RADII & BROKEN EDGES TO BE .13-.38

ALL SURFACE FINISHES 1.6Ra

MAT'L:
-

SURFACE TREATMENT:
-

DR: TJ ZAKOWSKI 11/28/06

CHK: P SLAVINSKI 11/29/06

ENG: TJ ZAKOWSKI 11/28/06

MFG: T DUFF

QC: F BOMBARD 11/29/06

3D MODEL NUMBER:
\$PRP:"SW-File Name"

SCALE: 1:1
DO NOT SCALE DRAWING

ISO 9001
REGISTERED

648 Saratoga Rd. Glenville, NY 12302
www.appliedrobotics.com

TITLE:
S.1-EM-R-V-PB
-

SIZE C	DRAWING NUMBER 0610-C69A	REV 02
Weight: 0.307 kg	RoHs COMPLIANT: -	SHT. 1 OF 1

PRINT DATE
4/19/2018