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APPLIED ROBOTICS PALLETIZING GRIPPER (ARPG)

BAG GRIPPER

SHEET PICKER OPTION

95646, Rev 01

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REVISION

Revision	Date	Author	Description
00	02/19/2019	DS	Initial Release
01	04/01/2019	DS	Corrections

CONTENTS

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, such as ARPG and the conveyor/pallet.

⚠ 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 APPLIED ROBOTICS Palletizing Gripper (ARPG) Bag Gripper provides rapid pick-and-place palletizing of bagged products presented on a roller conveyor. The ARPG mounts directly to robot face plates utilizing an integral ISO 9409-1 125mm or 160mm bolt pattern. The gripper easily integrates with any robot system communicating with a network, only requiring a communication connection, a power connection, and an air supply to operate and utilize the full capability of the ARPG.

The ARPG Bag Gripper – Sheet Picker option allows for the picking and placing of sheets on the pallets or bags through the use of suction cups.

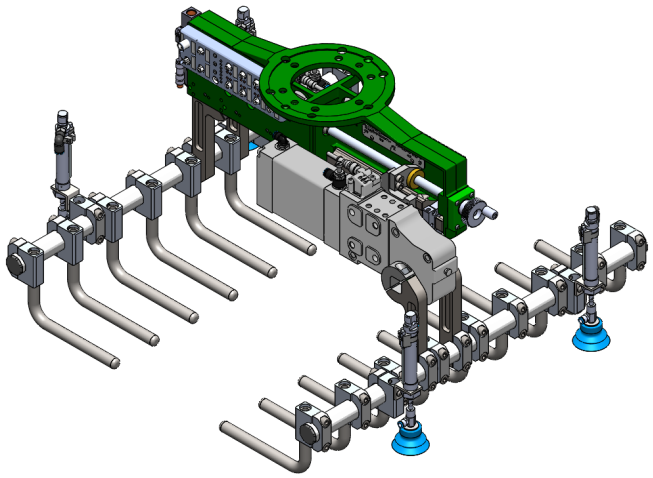


Figure 2.1-1. ARPG Bag Gripper with Sheet Picker Option

2.1 PALLETIZING GRIPPER DESCRIPTION

ARPG □- B## -□-□-□-□

Sheet Picker Option
- " " = No Sheet Picker Option
- SP = Sheet Picker

Pallet Picker Option
- " " = No Pallet Picker Option
- PP = Pallet Picker

Pusher Type
- S = Spring
- P = Pneumatic Cylinder

Controls/Communication
- D = Discrete
- DN = DeviceNet
- PN = Profinet
- PB = Profibus
- EIP = Ethernet/IP
- EIP/PN = Ethernet/IP and Profinet

Arm Attachment Style
- B## = Bag (w/ Roller Conveyor Pitch)
  - e.g., B75 = Bag w/ 75mm Pitch
- SP# = Single Actuating Paddle (Box)
  - e.g., SP1 = Single Actuating Paddle for 1 box at a time
- DP# = Double Actuating Paddle (Box)
  - e.g., DP2 = Double Actuating Paddles for 2 boxes at a time
- F# = Fork Style
  - e.g., F1 = Fork Style with 1 Cage

Gripper Size
- 15 = 15kg Payload w/ Manual Adjustment
- 30 = 30kg Payload w/ Manual Adjustment
- 50 = 50kg Payload w/ Manual Adjustment
- 15S = 15kg Payload w/ Servo Adjustment
- 30S = 30kg Payload w/ Servo Adjustment
- 50S = 50kg Payload w/ Servo Adjustment

Product Code
- ARPG = Applied Robotics Palletizing Gripper

Special: ARPG□-□-□-S####

Note: If " " (blank) is chosen, remove "-" (dash) if that is the only input between dashes.

3 TECHNICAL SPECIFICATIONS

The Tool Control Point (TCP) is used when programming the ARPG. Figure 2.1-1 depicts the dimensions from Table 3.1-2, Table 3.2-2, and Table 3.3-2. All values are measured from an origin located at the center of the 160mm bolt circle mounting interface with the X-axis and Y-axis in the plane of the interface and the positive Z-axis in the direction extending away from the mounting interface.

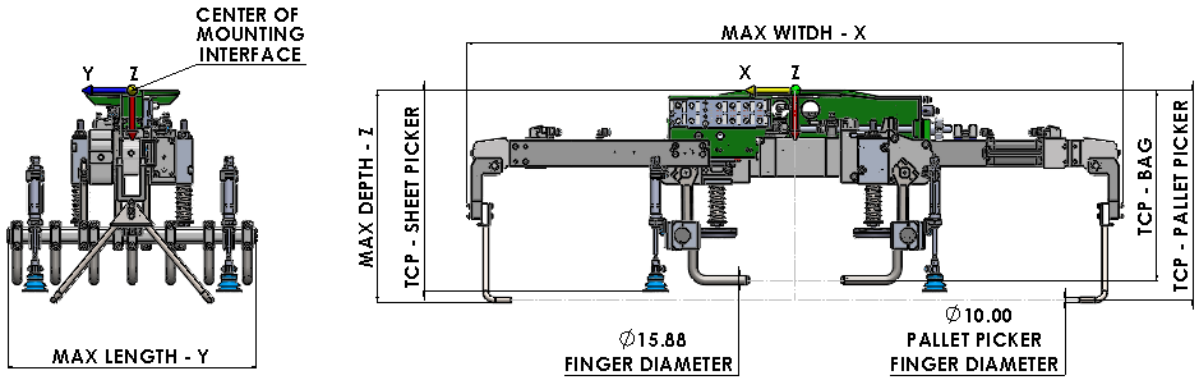


Figure 2.1-1. ARPG TCP Dimensions

3.1 ARPG15 & ARPG15S (15 KG)

Table 3.1-1. ARPG15 & ARPG15S Technical Specifications

Specification	Metric	English
Rated Payload	15 kg	33 lb
Recommended Maximum Bag Length	600 mm	23.62 in
Bag Width	200 to 375 mm	7.87 to 14.76 in
Bag Height	75 to 150 mm	2.95 to 5.91 in
Mass / Weight *	19.9 kg	43.9 lb
Bags Per Minute	30 BPM	
Operating Pressure	4 to 6 bar	58 to 87 psi
Operating Temperature	5 °C to 60 °C	41 °F to 140 °F
Transportation & Storage Temperature	-40 °C to 80 °C	-40 °F to 176 °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	
Bus Connection	4 Pin D-Coded M12 (Ethernet/IP & Profinet)	
Power Connection	5 Pin L-Coded M12	
Air Supply Connection	Push-to-Connect 6 mm Tube	

* Weight may vary depending on specific configuration.

Table 3.1-2. ARPG15 & ARPG15S TCP Specifications

Specification	No Options	With Pallet Picker	With Sheet Picker	With Pallet Picker and Sheet Picker
Mass / Weight ***	19.9 kg (43.9 lb)	22.6 kg (49.8 lb)	21.0 kg (46.3 lb)	23.7 kg (52.2 lb)
Center of Mass – X	5.5 mm (0.22 in)	4.5 mm (0.18 in)	4.6 mm (0.18 in)	3.7 mm (0.15 in)
Center of Mass – Y	-1.5 mm (-0.06 in)	-1.2 mm (-0.05 in)	-1.3 mm (-0.05 in)	-1.1 mm (-0.04 in)
Center of Mass – Z	162.5 mm (6.4 in)	161.8 mm (6.4 in)	166.5 mm (6.6 in)	165.3 mm (6.5 in)
Max Width – X	588.7 mm (23.2 in)	1303.0 mm (51.3 in)	612.3 mm (24.1 in)	1303.0 mm (51.3 in)
Max Length – Y	494.0 mm (19.4 in)	494.0 mm (19.4 in)	494.0 mm (19.4 in)	494.0 mm (19.4 in)
Max Depth – Z	383.9 mm (15.1 in)	420.1 mm (16.5 in)	397.5 mm (15.6 in)	420.1 mm (16.5 in)
TCP – Bag*	376.0 mm (14.8 in)	376.0 mm (14.8 in)	376.0 mm (14.8 in)	376.0 mm (14.8 in)
TCP – Pallet Picker*	N/A	414.2 mm (16.3 in)	N/A	414.2 mm (16.3 in)
TCP – Sheet Picker*	N/A	N/A	397.5 mm (15.6 in)	397.5 mm (15.6 in)

* TCP is measured from the Center of the Mounting Interface to the midplane of the fingers or vacuum cup surface.
** All Z values are measured using the 160mm bolt pattern. If using the 125mm bolt pattern, subtract 2 mm (0.08 in) from value.
*** Weight may vary depending on specific configuration.

3.2 ARPG30 & ARPG30S (30 KG)

Table 3.2-1. ARPG30 & ARPG30S Technical Specifications

Specification	Metric	English
Rated Payload	30 kg	66 lb
Recommended Maximum Bag Length	750 mm	29.53 in
Bag Width	300 to 500 mm	11.81 to 19.69 in
Bag Height	75 to 150 mm	2.95 to 5.91 in
Mass / Weight *	26.2 kg	57.8 lb
Bags Per Minute	30 BPM	
Operating Pressure	4 to 6 bar	58 to 87 psi
Operating Temperature	5 °C to 60 °C	41 °F to 140 °F
Transportation & Storage Temperature	-40 °C to 80 °C	-40 °F to 176 °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	
Bus Connection	4 Pin D-Coded M12 (Ethernet/IP & Profinet)	
Power Connection	5 Pin L-Coded M12	
Air Supply Connection	Push-to-Connect 6 mm Tube	

* Weight may vary depending on specific configuration.

Table 3.2-2. ARPG30 & ARPG30S TCP Specifications

Specification	No Options	With Pallet Picker	With Sheet Picker	With Pallet Picker and Sheet Picker
Mass / Weight ***	26.2 kg (57.8 lb)	29.0 kg (63.93 lb)	27.3 kg (60.2 lb)	30.0 kg (66.1 lb)
Center of Mass – X	4.2 mm (0.17 in)	3.1 mm (0.12 in)	3.6 mm (0.14 in)	2.6 mm (0.10 in)
Center of Mass – Y	-1.1 mm (-0.04 in)	-0.9 mm (-0.04 in)	-1.0 mm (-0.04 in)	-0.8 mm (-0.03 in)
Center of Mass – Z	176.3 mm (6.9 in)	174.3 mm (6.9 in)	179.0 mm (7.0 in)	176.9 mm (7.0 in)
Max Width – X	609.0 mm (24.0 in)	1303.0 mm (51.3 in)	726.1 mm (28.6 in)	1303.0 mm (51.3 in)
Max Length – Y	646.0 mm (25.4 in)	646.0 mm (25.4 in)	646.0 mm (25.4 in)	646.0 mm (25.4 in)
Max Depth – Z	380.7 mm (15.0 in)	420.1 mm (16.5 in)	398.7 mm (15.7 in)	420.1 mm (16.5 in)
TCP – Bag*	372.8 mm (14.7 in)	372.8 mm (14.7 in)	372.8 mm (14.7 in)	372.8 mm (14.7 in)
TCP – Pallet Picker*	N/A	415.1 mm (16.3 in)	N/A	415.1 mm (16.3 in)
TCP – Sheet Picker*	N/A	N/A	398.7 mm (15.7 in)	398.7 mm (15.7 in)

* TCP is measured from the Center of the Mounting Interface to the midplane of the fingers or vacuum cup surface.
** All Z values are measured using the 160mm bolt pattern. If using the 125mm bolt pattern, subtract 2 mm (0.08 in) from value.
*** Weight may vary depending on specific configuration.

3.3 ARPG50 & ARPG50S (50 KG)

Table 3.3-1. ARPG50 & ARPG50S Technical Specifications

Specification	Metric	English
Rated Payload	50 kg	110 lb
Recommended Maximum Bag Length	1,050 mm	41.34 in
Bag Width	400 to 600 mm	15.75 to 23.62 in
Bag Height	100 to 200 mm	3.94 to 7.87 in
Mass / Weight *	45.3 kg	99.9 lb
Bags Per Minute	30 BPM	
Operating Pressure	4 to 6 bar	58 to 87 psi
Operating Temperature	5 °C to 60 °C	41 °F to 140 °F
Transportation & Storage Temperature	-40 °C to 80 °C	-40 °F to 176 °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	
Bus Connection	4 Pin D-Coded M12 (Ethernet/IP & Profinet)	
Power Connection	5 Pin L-Coded M12	
Air Supply Connection	Push-to-Connect 6 mm Tube	

* Weight may vary depending on specific configuration.

Table 3.3-2. ARPG50 & ARPG50S TCP Specifications

Specification	No Options	With Pallet Picker	With Sheet Picker	With Pallet Picker and Sheet Picker
Mass / Weight ***	45.3 kg (99.9 lb)	48.2 kg (106.3 lb)	46.4 kg (102.3 lb)	49.4 kg (108.9 lb)
Center of Mass – X	3.3 mm (0.13 in)	2.7 mm (0.11 in)	3.0 mm (0.12 in)	2.4 mm (0.09 in)
Center of Mass – Y	-0.7 mm (0.03 in)	-0.6 mm (-0.02 in)	-0.7 mm (0.03 in)	-0.6 mm (-0.02 in)
Center of Mass – Z	205.2 mm (8.1 in)	208.7 mm (8.2 in)	208.2 mm (8.2 in)	211.8 mm (8.3 in)
Max Width – X	751.9 mm (29.6 in)	1322.9 mm (52.1 in)	826.1 mm (32.5 in)	1322.9 mm (52.1 in)
Max Length – Y	806.0 mm (31.7 in)	806.0 mm (31.7 in)	806.0 mm (31.7 in)	806.0 mm (31.7 in)
Max Depth – Z	471.8 mm (18.6 in)	529.4 mm (20.8 in)	503.5 mm (19.8 in)	529.4 mm (20.8 in)
TCP – Bag*	463.2 mm (18.2 in)	463.2 mm (18.2 in)	463.2 mm (18.2 in)	463.2 mm (18.2 in)
TCP – Pallet Picker*	N/A	524.5 mm (20.6 in)	N/A	524.5 mm (20.6 in)
TCP – Sheet Picker*	N/A	N/A	503.5 mm (19.8 in)	503.5 mm (19.8 in)

* TCP is measured from the Center of the Mounting Interface to the midplane of the fingers or vacuum cup surface.
** All Z values are measured using the 160mm bolt pattern. If using the 125mm bolt pattern, subtract 2 mm (0.08 in) from value.
*** Weight may vary depending on specific configuration.

4 INSTALLATION

4.1 MECHANICAL INSTALLATION

Follow these instructions for each of the four (2) Suction Cup Assemblies and applicable components of the ARPG Bag Gripper – Sheet Picker option:

1. Install Suction Cup Assembly with clamps and two (2) M8 socket head cap screws using Loctite 242 threadlocker or equivalent.

NOTICE

M8 SOCKET HEAD CAP SCREWS HAVE A RECOMMENDED TORQUE OF 19 Nm (170 in-lb).

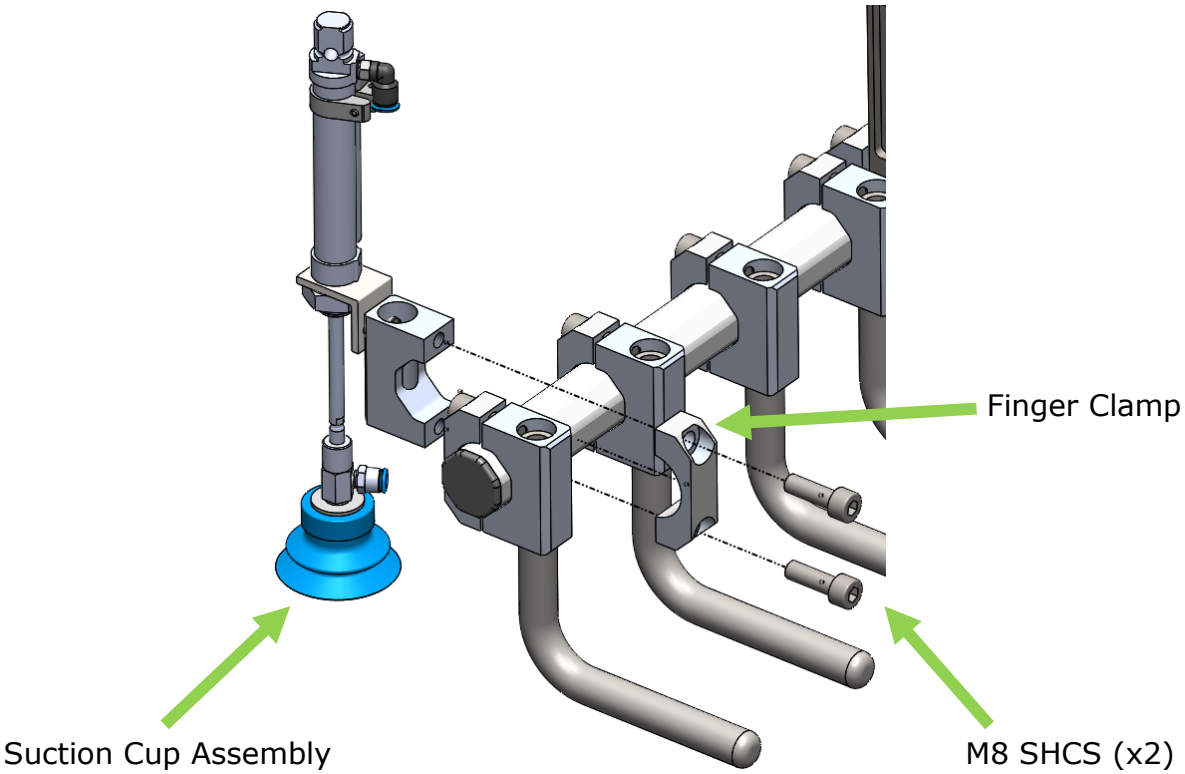


Figure 4.1-1. Suction Cup Assembly Installation

2. Install triple stack of Tee's with two (2) M3 socket head cap screws using Loctite 242 threadlocker or equivalent and tighten as required.
3. Install solenoid valve with fittings and silencers with two (2) M3 socket head cap screws using Loctite 242 threadlocker or equivalent and tighten as required.
4. Install input and output tubing and attach control cable to solenoid valve.
5. Install vacuum generator using two (2) M3 socket head cap screws using Loctite 242 threadlocker or equivalent and tighten as required.
6. Attach control cable to vacuum generator.

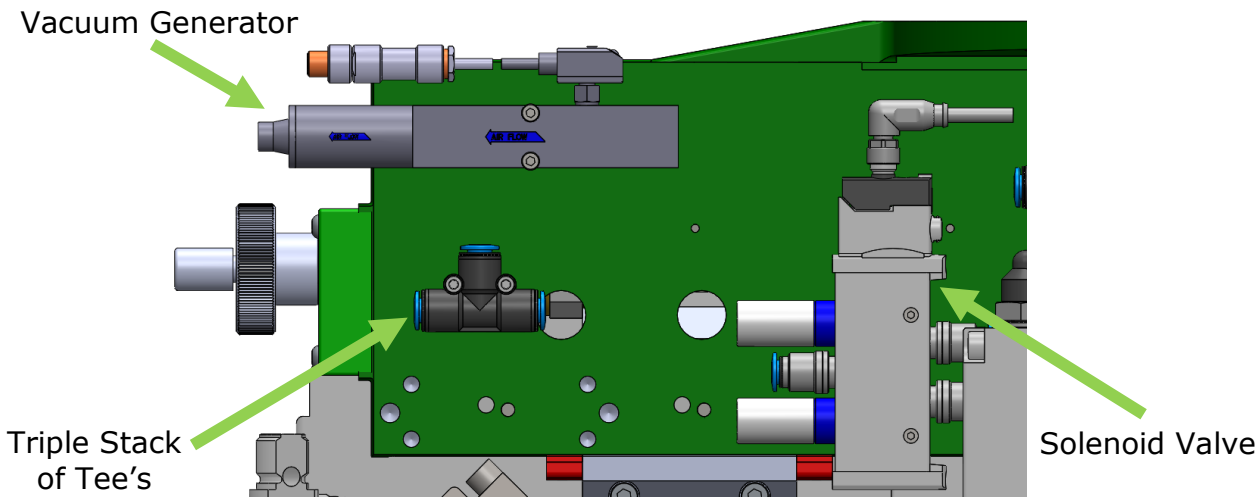


Figure 4.1-2. Components Installation

7. Connect double stack Tee's to Boom assembly via zip ties.
8. Install tubing to Tee's and Suction Cup Assembly.
9. Safely operate unit to test proper installation of components.

4.2 ELECTRICAL CONNECTIONS

4.2.1 Bus Module

The ARPG communicates with the Robot Controller using a MURR Multiprotocol (Ethernet/IP or Profinet) I/O Block. The electrical connections that are required to operate the ARPG are communications and power (See Table 4.2.1-2). Information listed refers to the ARPG standard bus module, MURR SOLID67 54503. Confirm information with appropriate bus module manual.

Alternative industrial protocols, including Discrete I/O and specific connections are available upon request. Contact APPLIED ROBOTICS Technical Support (Section 6.2) for details.

Reference most current Manual, Firmware, and Electronic Data Sheets (EDS) located on the MURR website: https://www.murrelektronik.com/. The EDS and GSD files as of 03/13/2019 are as follows:

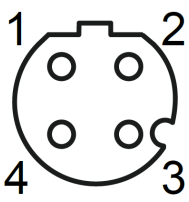
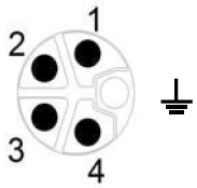
Ethernet: 54503_SOLID67_DIO16_60mm_M12L_5P.eds

Profinet: GSDML-V2.33-Murrelektronik-SOLID67_PNIO_0400-20180523.xml

Table 4.2.1-1. I/O Block Set-Up

I/O Block Set-Up	
Vendor Name	MURR ELEKTRONIK
Product Name	SOLID67 DIO16 60mm M12L 5P
Device Type	7
Product Code	54503
Vendor ID (VID)	640
Communications Type	PTP
Request Packet Interval (RPI)	10 ms
Output Assembly	100
Input Assembly	101
Configuration	110
Input Size	3 bytes
Output Size	2 bytes
Web Address Default	192.168.1.1

Table 4.2.1-2. Bus Network Electrical Connections

Bus Network	Communications Connection	Power Connection
Ethernet/IP and Profinet	4 Soc Female D-Coded M12  1 = TD + 2 = RD + 3 = TD - 4 = RD -	5 Pin Male L-Coded M12  1 = 24 V⎓ US 2 = 0 V UA 3 = 0 V US 4 = 24 V⎓ UA 5 = ⏚

* Confirm pin designation with appropriate wiring schematic (See Section 10).
** Additional network and connection options available upon request. Contact APPLIED ROBOTICS for details.

⚠ WARNING

BEFORE CONNECTING THE AIR SUPPLY, ENSURE THAT ALL ELECTRICAL CONNECTIONS ARE MADE AND THE ROBOT CONTROLLER IS COMMUNICATING PROPERLY WITH THE ARPG.

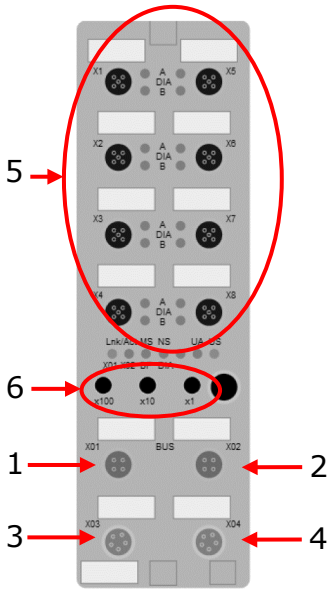
The electrical schematic can be found on APPLIED ROBOTICS Informational Documents (See Section 10) or the system schematic that corresponds to the equipment supplied. Ensure connection is firm and secure to avoid unnecessary stress during high dynamic moments. Unused ports should have an IP67 cap installed.

Table 4.2.1-3. Bitmapping

Byte	Ports	Channel A/Pin 4		Channel B/Pin 2	
0	X1	0.0	Bag Gripper Left Open	0.1	Bag Gripper Left Closed
	X2	0.2	Bag Gripper Right Open	0.3	Bag Gripper Right Closed
	X3	0.4	Bag Present	*0.5*	*Vacuum Present*
	X4	*0.6*	*Left Cups Down*	*0.7*	*Right Cups Down*
1	X5	1.0	Bag Gripper Open CMD	1.1	Reserved
	X6	*1.2*	*Pallet Gripper Open CMD*	*1.3*	*Vacuum ON CMD*
	X7	*1.4*	*Pallet Picker Left Open*	*1.5*	*Pallet Picker Left Closed*
	X8	*1.6*	*Pallet Picker Right Open*	*1.7*	*Pallet Picker Right Closed*

* I/O shown in *Italics* are application specific depending on selected options (Pallet Picker & Sheet Picker).

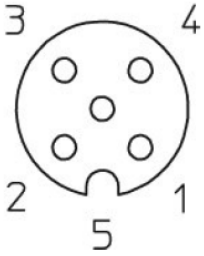
Key:
Input:
Output:



Legend
1 = X01, Port1 Ethernet/IP M12, 4 Soc, D-Coded
2 = X02, Port2 Ethernet/IP M12, 4 Soc, D-Coded
3 = X03, POWER IN M12, 5 Pin, L-Coded
4 = X04, POWER OUT M12, 5 Soc, L-Coded
5 = X1-X8, I/O Connection M12, 5 Soc, A-Coded
6 = Rotary Switches for Addressing

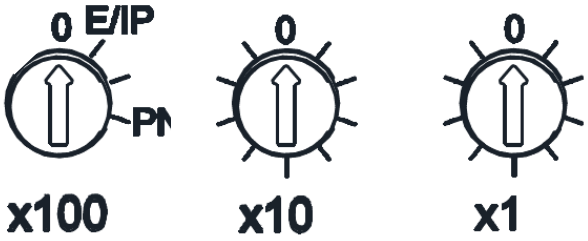
I/O Connection

M12 5 Soc, A-coded



1 = 24 V ⎓
2 = IN/OUT B
3 = 0 V
4 = IN/OUT A
5 = Shielding/⏚

Figure 4.2-1. Bus Module Structure

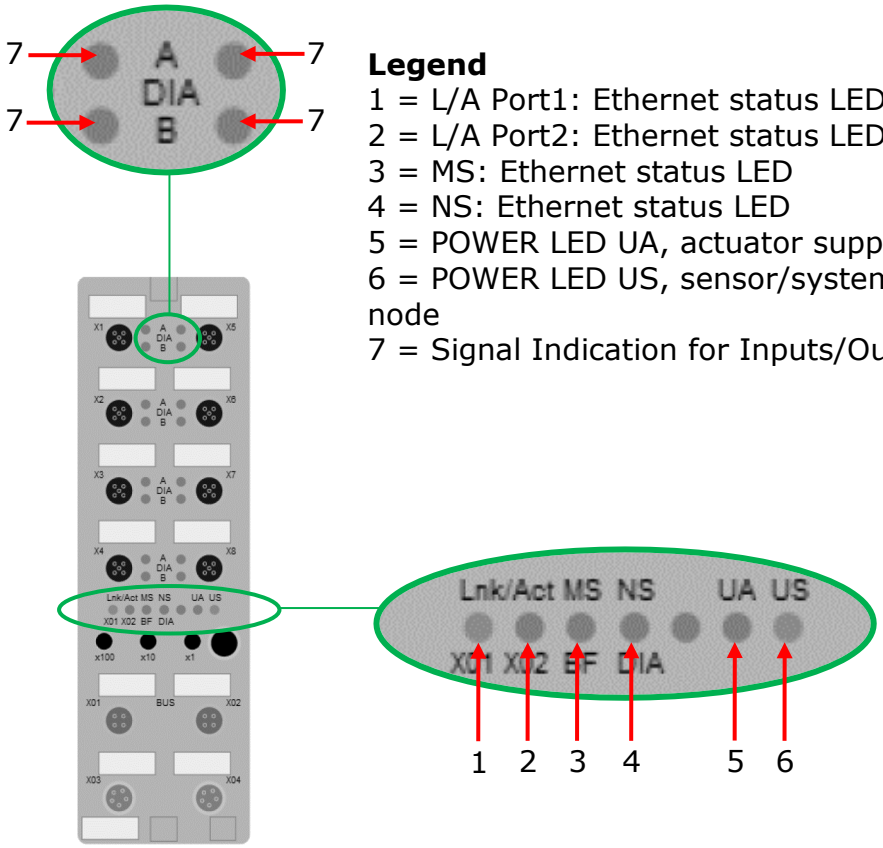


Address range: **1 to 254**
Default setting: **192.168.1.1**

Protocol	x100	x10	x1
Ethernet/IP	0-2	0-9	0-9
PROFINET	P	-	-

Figure 4.2-2. Protocol Settings

Figure 4.2-3. Bus Module Indicating Elements



Legend
1 = L/A Port1: Ethernet status LED
2 = L/A Port2: Ethernet status LED
3 = MS: Ethernet status LED
4 = NS: Ethernet status LED
5 = POWER LED UA, actuator supply
6 = POWER LED US, sensor/system supple bus node
7 = Signal Indication for Inputs/Outputs

US	Green	System/ sensor power supply, voltage level 18 V ≤ US ±1V ≤ 30 V
	Red	System/ sensor power supply, voltage level US < 18 V ±1V or US > 30 V ±1V
	Off	No system/ sensor power supply
UA	Green	Actuator power supply, voltage level 18 V ≤ UA ±1V ≤ 30 V
	Red	Actuator power supply, voltage level UA < 18 V ±1V or UA > 30 V ±1V
	Off	No actuator power supply
X1…X8 A	Yellow	Channel status A "On"
DIA	Red	Periphery error (sensor or actuator overload/short-circuit)
	Off	Not connected, status "Off", no error
X1 … X8 B	White	Channel status B "On"
	Red	Periphery error (actuator overload/short-circuit)
	Off	Not connected, status "Off", no error
P1 Lnk/Act	Green	Ethernet connection exists to another subscriber. Link connection created.
P2 Lnk/Act	Flashing yellow	Data exchange with another subscriber.
	Off	No connection to another subscriber. No link, no data exchange.
BF (PROFINET)	Red	No configuration, no or slow physical connection
	Red flashing at 2 Hz	No data exchange
	Off	No error
DIA (PROFINET)	Red	Watchdog timeout; diagnostics present; system error
	Red flashing at 2 Hz, 3 sec	DCP signal service is initiated via the bus
	Off	No error message exists
MS (Ethernet/IP)	Green	Device ready for operation
	Flashing green	Device ready but not configured
	Red	Serious error that cannot be resolved
	Flashing red	Minor error that can be resolved: An incorrect or contradictory configuration is classified as a minor error.
	Alternately flashing red/green	The device is performing a self-test.
	Off	Device is switched off.
NS (Ethernet/IP)	Green	Connected: The device has at least one connection.
	Flashing green	No connection: The device has no connections. IP address exists.
	Red	Duplicate IP address. The device has determined that the assigned IP address already exists.
	Flashing red	Connection has exceeded time limit or connection interrupted.
	Alternately flashing red/green	The device is performing a self-test.
	Off	The device is switched off or does not have an IP address.

Figure 4.2-4. Bus Module Indicating Elements States

4.3 CONNECTING THE AIR SUPPLY

4.3.1 Solenoid Valve

The pneumatic supply is provided via a push-to-connect 6mm tube fitting (See Figure 4.3.1-1). Ensure connection is firm with no leaks and secure to the tube/line/hose to avoid unnecessary stress during high dynamic movements.

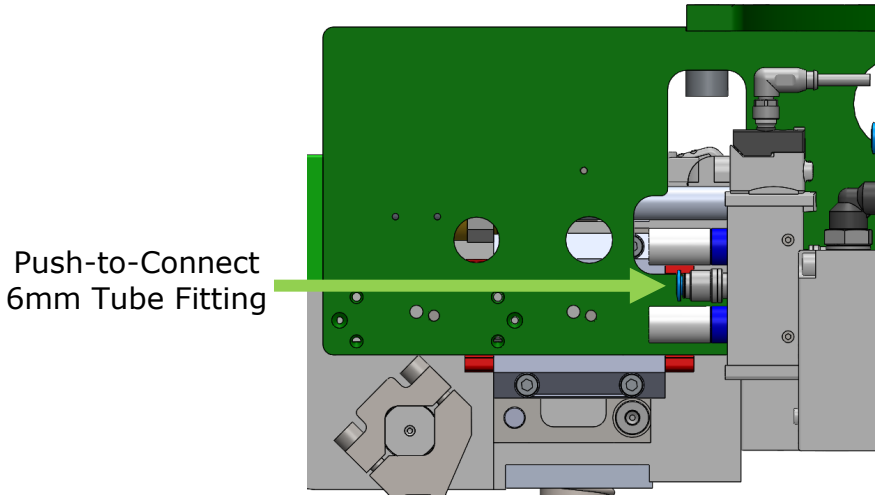


Figure 4.3.1-1. Valve Module Air Supply

5 GUIDE TO OPERATION

5.1 INITIAL TEST

Before continuing with testing and operation, verify all signals are transmitting properly when the ARPG Bag Gripper is open and closed and ensure that the actuation is smooth and synchronized between the finger assemblies.

NOTICE

THE ARPG SHOULD NEVER BE OPERATED WITHOUT FIRST VERIFYING ALL OF THE INPUTS AND OUTPUTS ARE FUNCTIONING PROPERLY.

NOTICE

AFTER VERIFYING THE SIGNALS ARE SETUP PROPERLY, TEST THE FUNCTIONALITY OF THE ARPG (AND ARPG OPTIONS) AND ENSURE PROPER OPERATION BEFORE RESUMING WORK.

5.2 PROGRAMMING THE PICKUP AND DROP OFF POINTS

Below is a list of suggested TCP Offset Positions for the ARPG Bag Gripper – Sheet Picker. These positions are also indicated in the Sequence of Operation – Sheet Pick (See Figure 5.3-1).

- **Sheet Pre-Pickup Position** – approximately 500mm directly above stack of sheets that are to be picked.
- **Sheet Pickup Position** – bottom of the Fingers resting flush on the top of the sheet with TCP in the center of the sheet.
- **Sheet Post Pickup Position** – approximately 100mm above stack of sheets.
- **Sheet Pre-Drop Off Position** – approximately 500mm above the pallet.
- **Sheet Drop Off Position** – bottom of the pallet is flush with the top of the pallet.

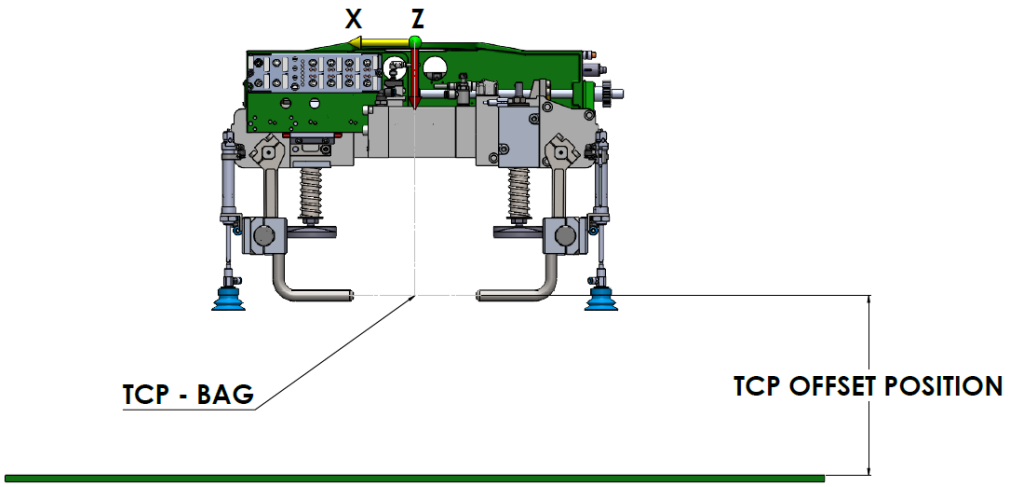


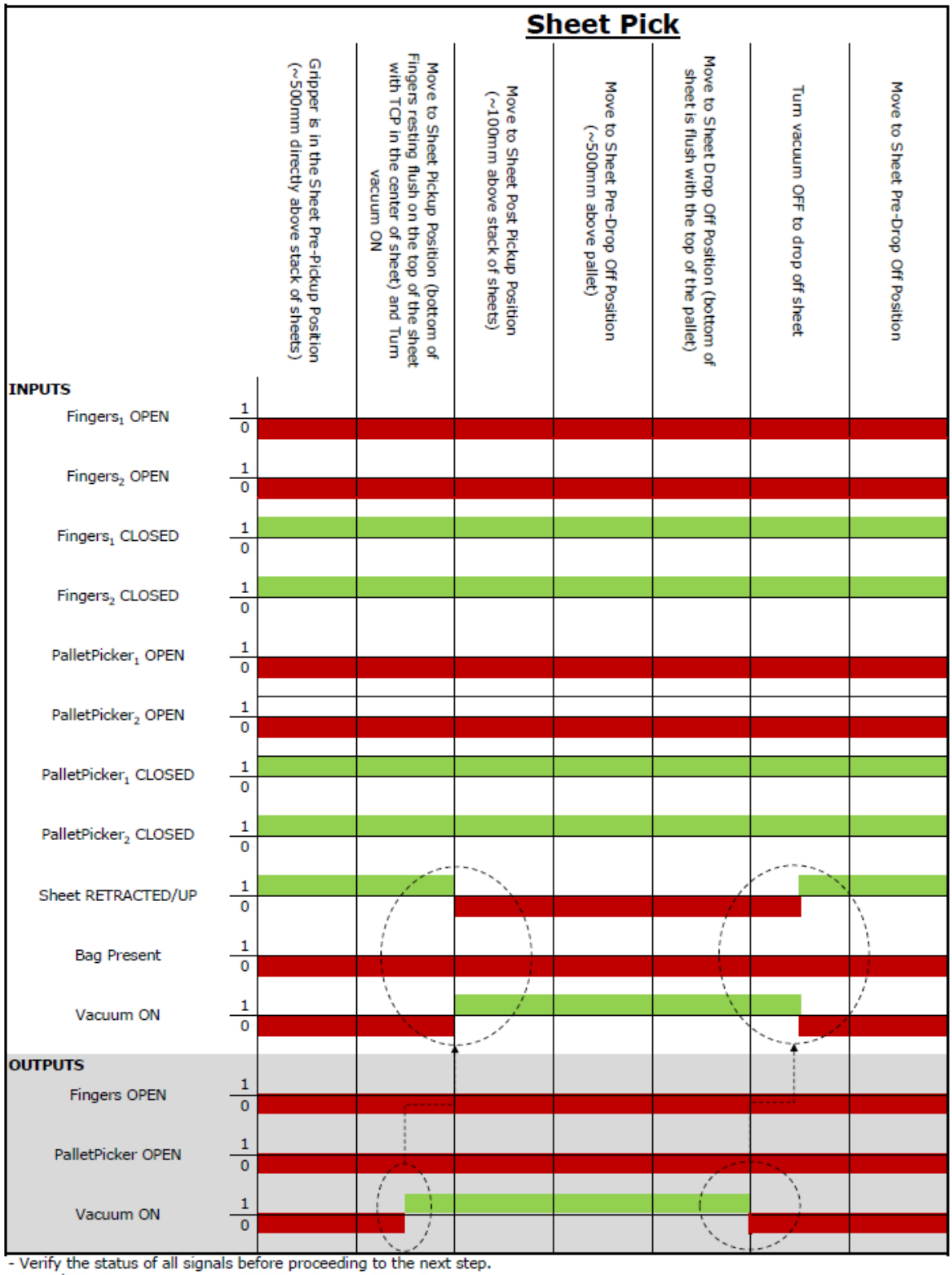
Figure 5.2-1. TCP Offset Position

5.3 RECOMMENDED SEQUENCE OF OPERATION

NOTICE

THE ARPG SHOULD NEVER BE OPERATED WITHOUT FIRST VERIFYING ALL OF THE INPUTS AND OUTPUTS ARE COMMUNICATING PROPERLY.

See Figure 5.3-1 for a graphical representation of the standard sequence of operation for a Robot equipped with the ARPG Bag Gripper – Sheet Picker.



- Verify the status of all signals before proceeding to the next step.
- Input/Output HIGH = 1 LOW = 0
- Dotted circles highlight the cause and effect of the OUTPUT command and the corresponding change in INPUT signals.

Figure 5.3-1. Sequence of Operation – Sheet Pick

6 TROUBLESHOOTING

6.1 TROUBLESHOOTING GUIDE

Fitting - Pneumatic		
Symptom	**Possible Cause**	**Resolution**
Bag or Pallet Fingers Do Not Open/Close	Not enough or NO air pressure	Check all air lines and connections and make sure there is 4-7 bar (58 – 101 PSI) available.
	Power Clamp Electronic Sensor is not receiving the output signal	Check to see that an output signal is sent to Power Clamp Electronic Sensor. If an output signal is being sent, check all cables and connections and that the Power Clamp Electronic Sensor is receiving the command on Pin 2 of the M12 5 PIN MALE Connector.
	Broken/Damaged signal cable	Replace cable

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 ARPG is a low maintenance assembly. Perform visual checks and functionality tests every 100,000 cycles or 3 months.

7.1 PREVENTIVE MAINTENANCE

7.1.1 Visual Inspection & Functionality Test

1. Inspect the Ethernet and power cables and clean dry air (CDA) supply tube for any cuts or abrasions.
2. With the ARPG in a safe position, cycle the unit several times to verify that it is working properly and the ARPG is operating properly. Check lights as per Figure 4.2-4.
3. With power to the unit off physically hold and shake fingers to check for looseness in any component back to the frame.

8 SPARE PARTS

The spare parts listed below are recommended to be maintained in stock for the life of the ARPG Bag Gripper – Sheet Picker. These quantities are based on a single unit. If higher quantities are purchased, please contact the Technical Support Department at +1 518 384 1000 or techsupport@appliedrobotics.com to determine the quantity of spares recommended for the size of your installation.

ARPG BAG GRIPPER – SHEET PICKER (PER GRIPPER)		
Description	**Part Number**	**Quantity**
SOLENOID VALVE ARPG	1700130P	1
SUCTION CUP, 53MM ARPG	1800326P	1
CYLINDER, SHEET ARPG	1800319P	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.

⚠ DANGER

TURN OFF AND DISCONNECT ALL POWER AND PRESSURIZED AIR FROM UNIT BEFORE REPLACING COMPONENTS ON UNIT.

9.1 SOLENOID VALVE

Figure 9.1-1 displays the items needed to be removed in order to replace the Solenoid Valve. Some items are hidden for clarity.

1. Remove control cable from solenoid input and disconnect the input and output tubing by releasing the clamp mechanism in the fitting.
2. Using a 2mm Allen wrench, remove the two (2) M3 socket head cap screws fastening the solenoid to the main frame.
3. Using a 4mm Allen wrench remove three (3) 6mm tubing fittings from the valve and install in the replacement valve.
4. Using pliers, remove two (2) silencers and install in the replacement valve.
5. Place the replacement valve and fittings in place. Reinstall two (2) M3 socket head cap screws and tighten as required.
6. Install input and output tubing and attach control cable.
7. Safely operate unit to test proper installation of replacement valve, cable, and tubing.

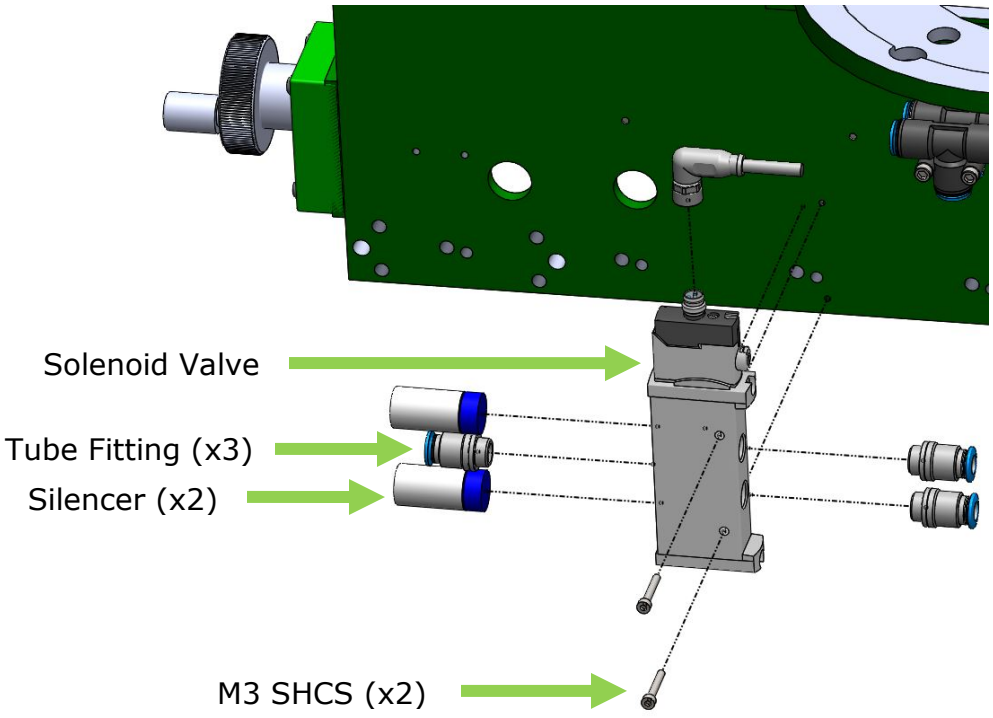


Figure 9.1-1. Solenoid Valve Replacement

9.2 SUCTION CUP

Figure 9.2-1 displays the items needed to be removed in order to replace each suction cup.

1. Remove suction cup from cylinder assembly by gripping onto the Tee and using a 3mm Allen wrench to remove the suction cup fastener. Washer will be loosened.
2. Place washer and replacement suction cup on Cylinder Assembly Tee.
3. Reinstall suction cup fastener using a 3mm Allen wrench and tighten as required.

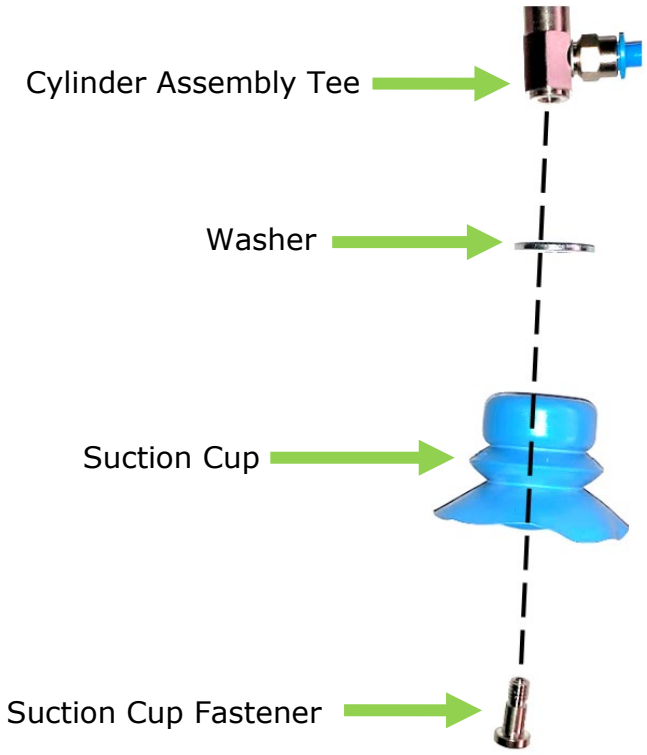


Figure 9.2-1. Suction Cup Replacement

9.3 CYLINDER

Figure 9.3-1 displays the items needed to be removed in order to replace each suction cup.

1. Disconnect two (2) 6mm tubing by releasing the clamp mechanism in the fitting.
2. Using adjustable wrench, grip onto cylinder shaft to hold it still. Manually unscrew and remove Tee from cylinder.
3. Using adjustable wrench, unscrew cylinder nut from cylinder. This should allow cylinder assembly to be removed from bracket.
4. Using adjustable wrench, unscrew fitting from cylinder assembly.
5. Using flat head screw driver, remove sensor mounting kit from cylinder assembly.

6. Using flat head screw driver, install sensor mounting kit onto new cylinder assembly.
7. Using adjustable wrench, install fitting onto new cylinder assembly.
8. Place cylinder assembly onto bracket and install cylinder nut onto cylinder using adjustable wrench.
9. Using adjustable wrench, grip onto cylinder shaft to hold it still. Manually screw and install Tee to new cylinder.
10. Attach two (2) 6mm tubes to appropriate fitting on cylinder. Test unit to insure proper function.

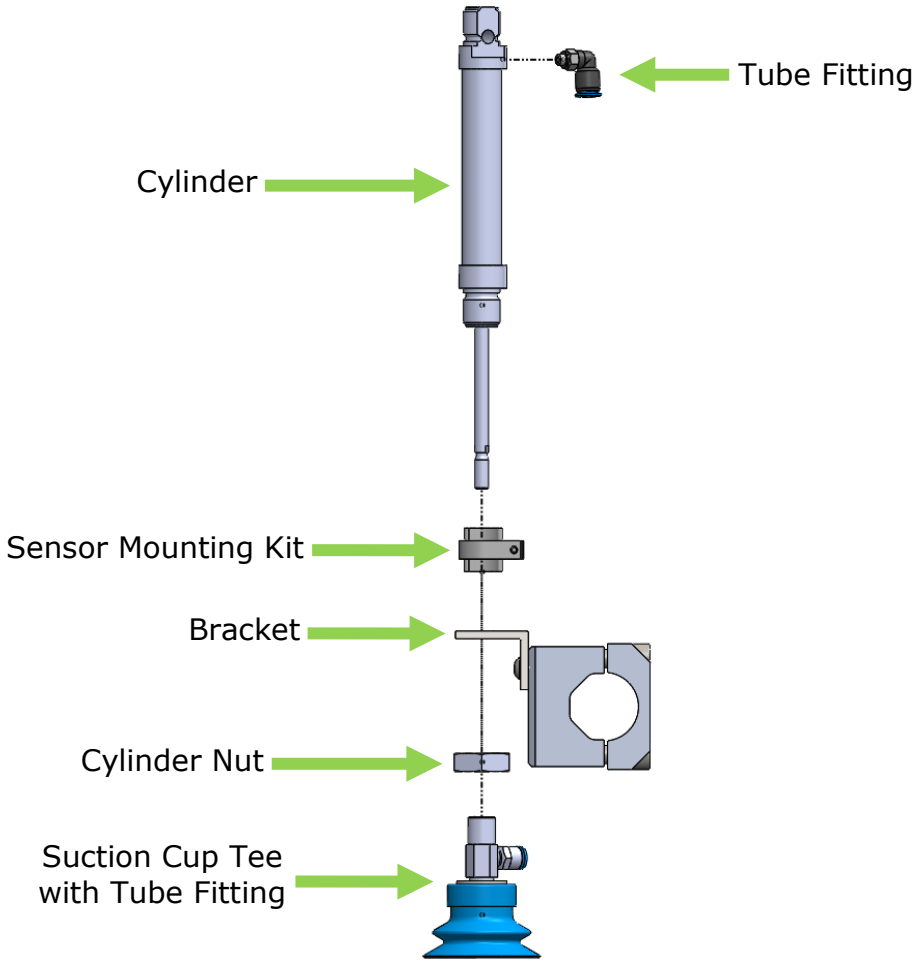


Figure 9.3-1. Cylinder Replacement

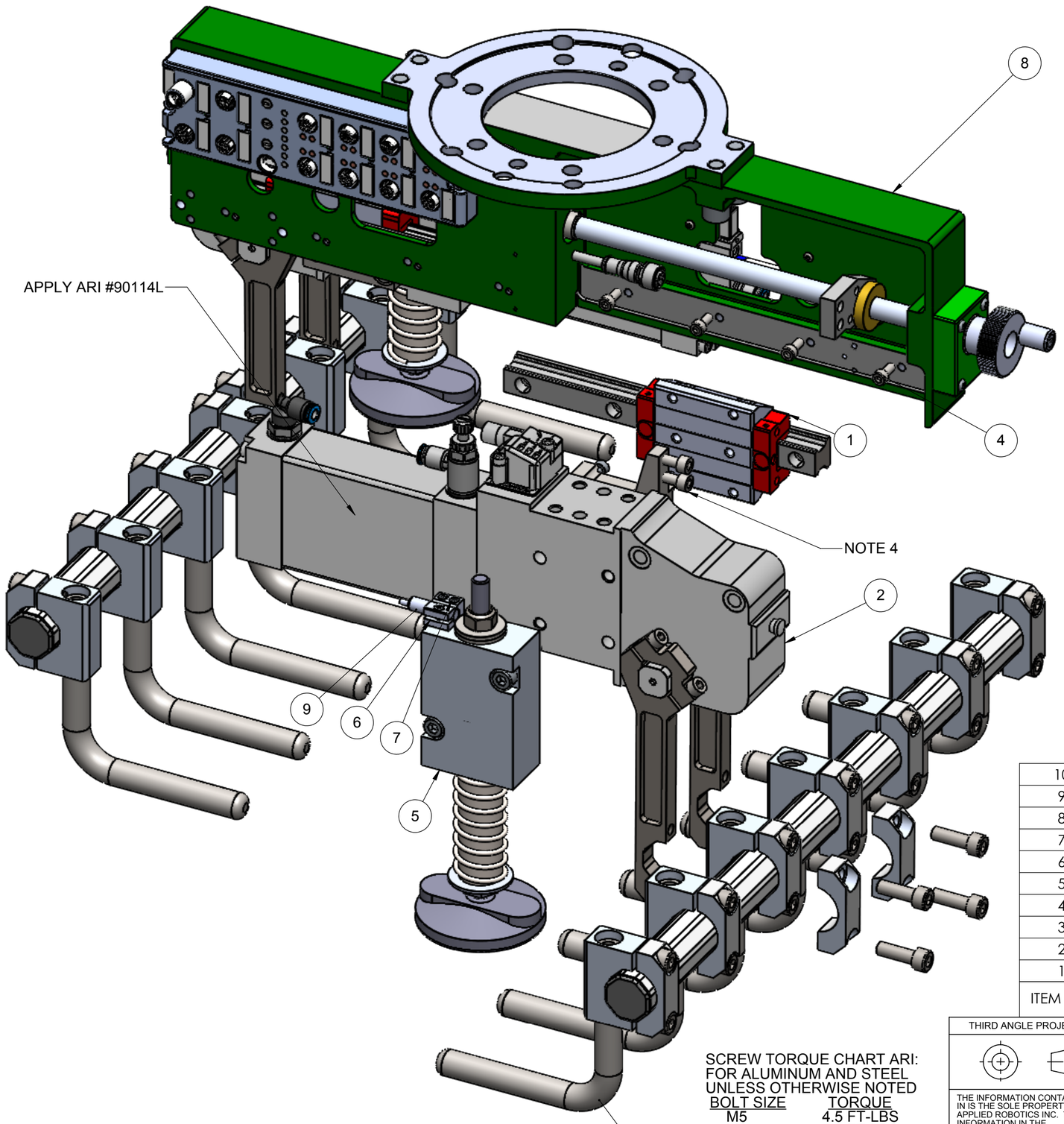
10 INFORMATIONAL DOCUMENTS

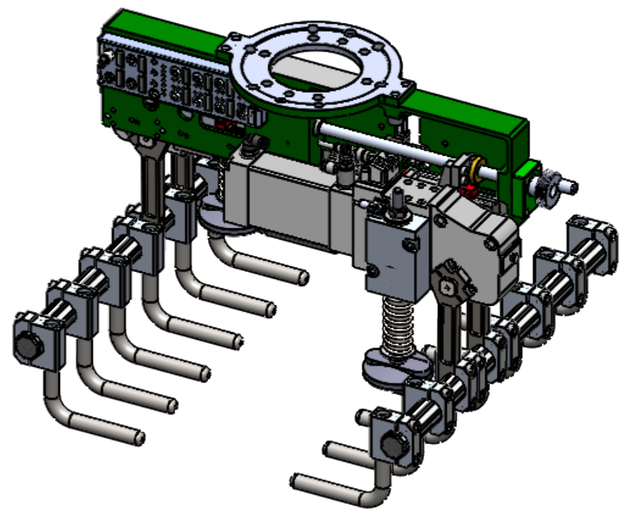
The documents in this section can assist with installation, use, and identification of replacement parts for the ARPG Bag Gripper. Please contact **APPLIED ROBOTICS Technical Support** if you have any questions.

DRAWINGS		
MODEL	**DRAWING NUMBER**	**DESCRIPTION**
ARPG15	1800246A	ARPG15-B76.2-EIP-S-N-N
ARPG30	1700090A	ARPG30-B76.2-EIP-S-N-N
ARPG50	1800250A	ARPG50-B76.2-EIP-S-N-N
ALL	1800314A	SUBASSY, SHEET PICKER ARPG
	1800256S	SCHEM, SYSTEM ARPG

SIZE	DRAWING NUMBER	REV
C	1800246A	00

REVISIONS						
ZONE	REV	DESCRIPTION	DR	CHK	DATE	ECR/ESR NO.
	00	RELEASE FOR MANUFACTURE	TS	TM	6-18	TSTG-AY6GR7





ITEM NO.	Gripper with no options/QTY.	PART NO.	DESCRIPTION
10	1	1800877M	TUBING, 6MM KIT ARPG
9	1	1800876P	PROX SW M8 2mm SENSE 0.4M CABLE
8	1	1700113A	SUBASSY, FRAME
7	2	49414	SCR, SOC HD CAP M3 X 14 (SS)
6	1	1800272P	BRACKET, PROX SWITCH
5	2	1800249A	SUBASSY, SPRING PUSHER
4	8	49116	SCR, SOC HD CAP M5 X 20 (STL)
3	2	1800248A	SUBASSY, BOOM
2	2	1800247A	SUBASSY, CLAMP
1	2	1800260P	RAIL ASSEMBLY, ARPG15

SCREW TORQUE CHART ARI:
FOR ALUMINUM AND STEEL
UNLESS OTHERWISE NOTED

BOLT SIZE	TORQUE
M5	4.5 FT-LBS
M6	7.7 FT-LBS
M8	19.0 FT-LBS
M10	37.0 FT-LBS
M12	65.0 FT-LBS

NOTE:
1. REFERENCE 1800256S SCHEM, SYSTEMARPG, PIPING AND ELECTRICAL SCHEMATIC
2. USE LOCTITE 290 ON M6 SCREWS FASTENING THE CLAMP AND NUT BRACKETS
3. AFTER LEAD SCREW ALIGNMENT IS COMPLETE
4. USE LOCTITE 242 ON ALL OTHER FASTENERS
5. ALL ITEMS RECEIVING LOCTITE ARE TO BE CLEANED, DEGREASED, AND HAVE PRIMER 'N' APPLIED PREVIOUS TO THE LOCTITE APPLICATION

PRINT DATE
12/31/2018

THIRD ANGLE PROJECTION

DIM. AND TOLERANCING IN ACCORDANCE WITH ASMEY 14.5-2009

METRIC

UNLESS OTHERWISE SPECIFIED:

UNTOLERANCED DIMS ARE BASIC

⌓ .25 A B C

⌖ ∅ .25Ⓜ 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: T. STRANG
CHK: T. MARCELLA
ENG: T. STRANG
MFG: M. DUDNATH
QC: M. DUDNATH

3D MODEL NUMBER:
1800246A

SCALE: 1:5
DO NOT SCALE DRAWING

ISO 9001 REGISTERED

Applied Robotics™
Solutions in reach
648 Saratoga Rd. Glenville, NY 12302
www.appliedrobotics.com

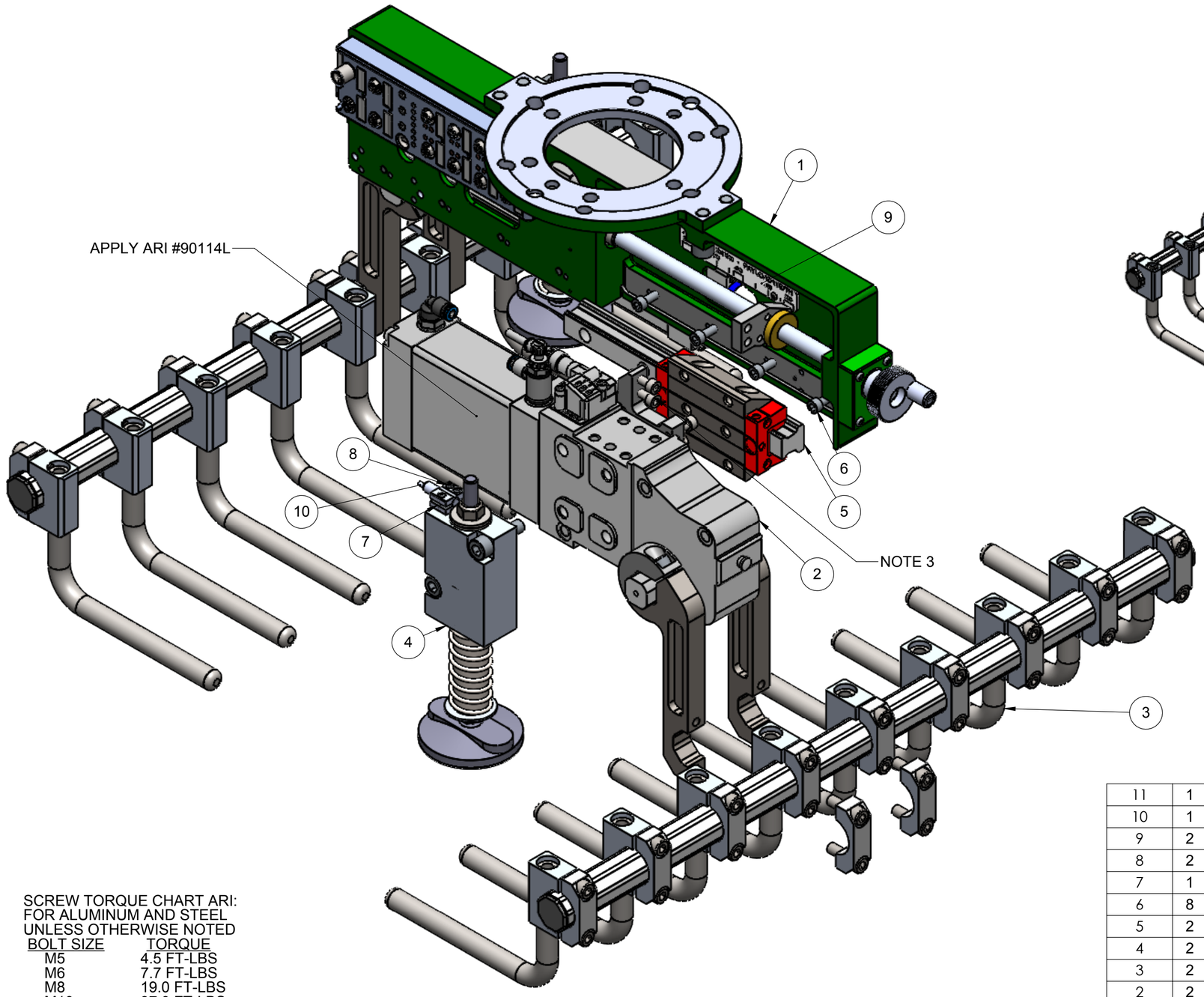
TITLE:
ARPG15-B76.2-EIP-S-N-N GRIPPER

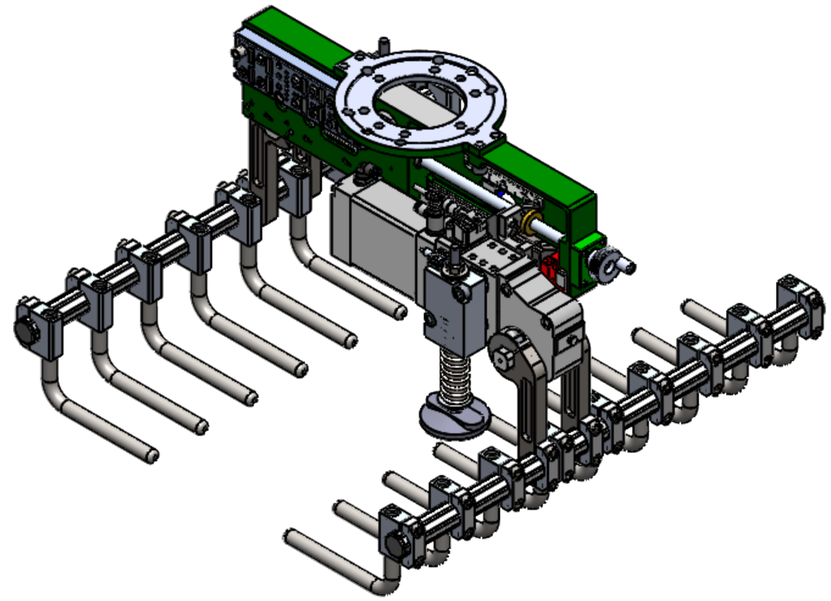
SIZE	DRAWING NUMBER	REV
C	1800246A	00

Weight: 19.68 kg | RoHs COMPLIANT: | SHT. 1 OF 1

SIZE	DRAWING NUMBER	REV
C	1700090A	00

REVISIONS						
ZONE	REV	DESCRIPTION	DR	CHK	DATE	ECR/ESR NO.
	00	RELEASE FOR MANUFACTURE	TS	TM	6-18	TSTG-AY6GR7





SCREW TORQUE CHART ARI:
FOR ALUMINUM AND STEEL
UNLESS OTHERWISE NOTED

BOLT SIZE	TORQUE
M5	4.5 FT-LBS
M6	7.7 FT-LBS
M8	19.0 FT-LBS
M10	37.0 FT-LBS
M12	65.0 FT-LBS

NOTE:
1. REFERENCE 1800256S SCHEM, SYSTEM ARPG PIPING AND ELECTRICAL SCHEMATIC
2. USE LOCTITE 290 ON M6 SCREWS FASTENING THE CLAMP AND NUT BRACKETS AFTER LEAD SCREW ALIGHMENT IS COMPLETE
3. USE LOCTITE 242 ON ALL OTHER FASTENERS
4. ALL ITEMS RECEIVING LOCTITE ARE TO BE CLEANED, DEGREASED, AND HAVE PRIMER 'N' APPLIED PREVIOUS TO THE LOCTITE APPLICATION

ITEM NO.	QTY	PART NO.	DESCRIPTION
11	1	1800877M	TUBING, 6MM KIT ARPG
10	1	1800876P	PROX SW M8 2mm SENSE 0.4M CABLE
9	2	1700112M	LABEL, WIDTH ARPG30
8	2	49414	SCR, SOC HD CAP M3 X 14 (SS)
7	1	1800272P	BRACKET, PROX SWITCH
6	8	48039	SCR, SOC HD CAP M6 X 25 (SS)
5	2	1700124P	RAIL ASSEMBLY
4	2	1700117A	SUBASSY, SPRING PUSHER
3	2	1700115A	SUBASSY, BOOM
2	2	1700114A	SUBASSY, CLAMP
1	1	1700113A	SUBASSY, FRAME

THIRD ANGLE PROJECTION

DIM. AND TOLERANCING IN ACCORDANCE WITH ASMEY 14.5-2009

METRIC

UNLESS OTHERWISE SPECIFIED:

UNTOLERANCED DIMS ARE BASIC

⌓ .25 A B C

⌖ ∅ .25Ⓜ 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:	T. STRANG
CHK:	T. MARCELLA
ENG:	T. STRANG
MFG:	M. DUDNATH
QC:	M. DUDNATH

3D MODEL NUMBER:
1700090A

SCALE: 1:10
DO NOT SCALE DRAWING

ISO 9001 REGISTERED

PRINT DATE
1/22/2019

Applied Robotics™
Solutions in reach
648 Saratoga Rd. Glenville, NY 12302
www.appliedrobotics.com

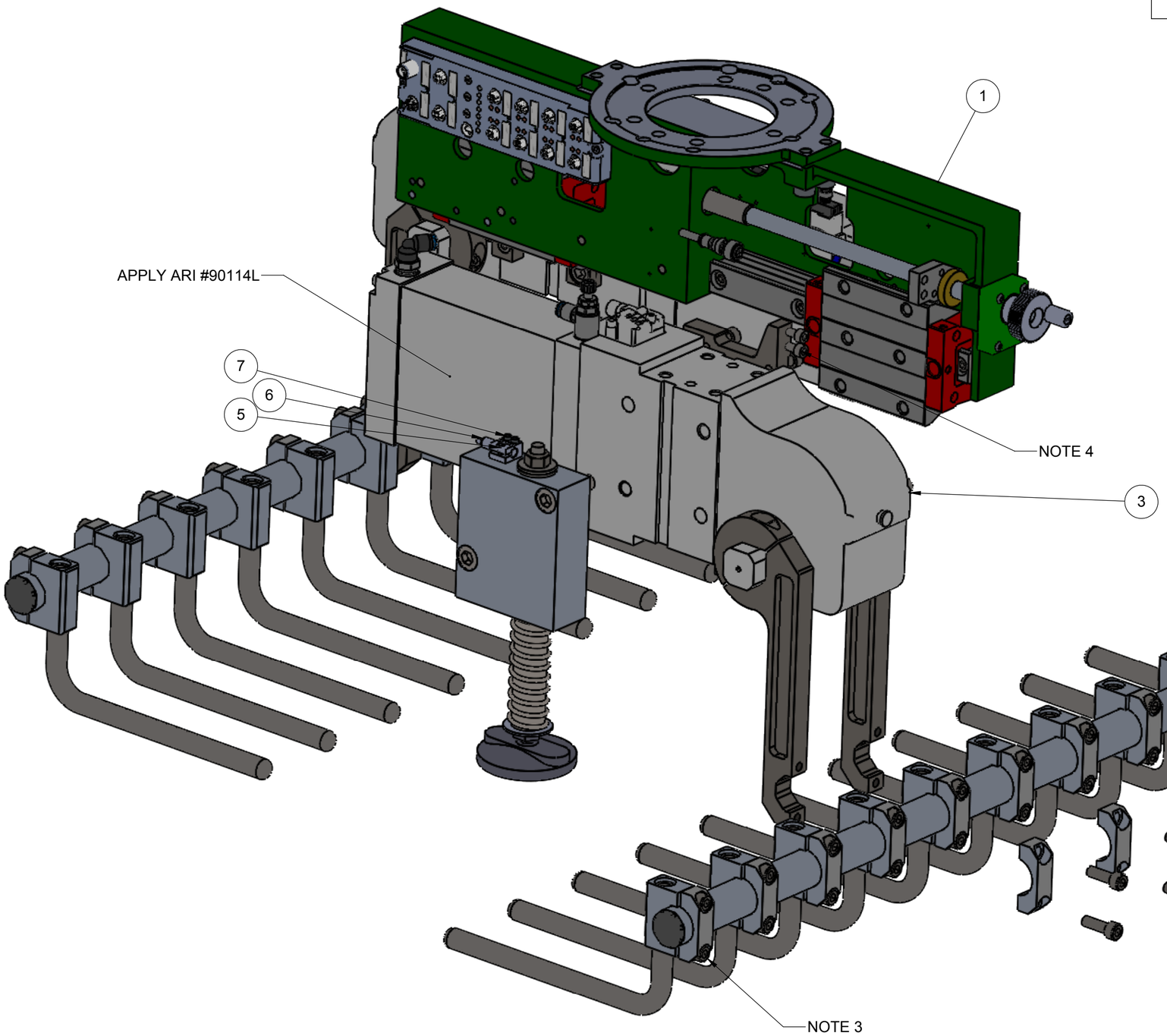
TITLE:
ARPG30-B76.2-EIP-S-N-N GRIPPER

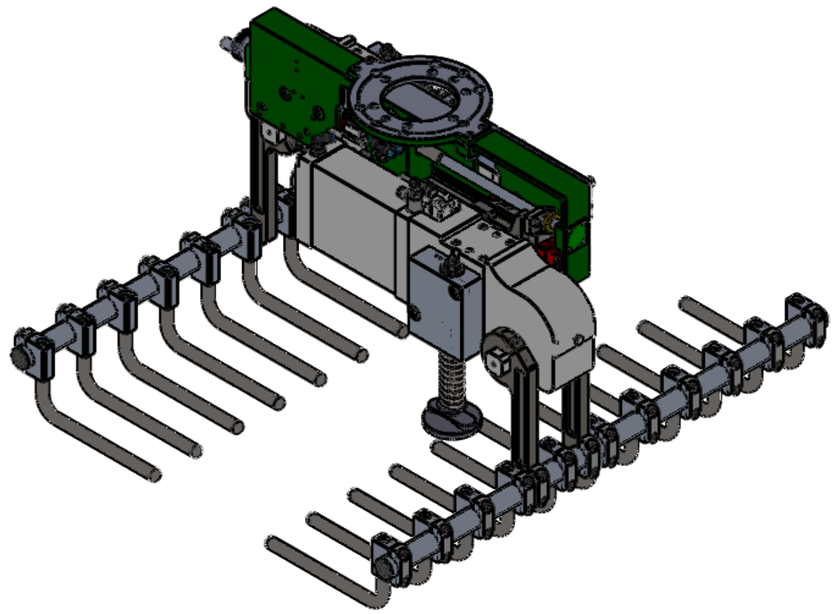
SIZE	DRAWING NUMBER	REV
C	1700090A	00

Weight: 26.15 kg | RoHs COMPLIANT: | SHT. 1 OF 1

SIZE	DRAWING NUMBER	REV
C	1800250A	00

REVISIONS						
ZONE	REV	DESCRIPTION	DR	CHK	DATE	ECR/ESR NO.
	00	RELEASE FOR MANUFACTURE	TS	TM	6-18	TSTG-AR6GR7





SCREW TORQUE CHART ARI:
FOR ALUMINUM AND STEEL
UNLESS OTHERWISE NOTED

BOLT SIZE	TORQUE
M5	4.5 FT-LBS
M6	7.7 FT-LBS
M8	19.0 FT-LBS
M10	37.0 FT-LBS
M12	65.0 FT-LBS

ITEM NO.	QTY	PART NO.	DESCRIPTION
8	1	1800877M	TUBING, 6MM KIT ARPG
7	2	49414	SCR, SOC HD CAP M3 X 14 (SS)
6	1	1800876P	PROX SW M8 2mm SENSE 0.4M CABLE
5	1	1800272P	BRACKET, PROX SWITCH
4	2	1800254A	SUBASSY, SPRING PUSHER
3	2	1800252A	SUBASSY, CLAMP
2	2	1800253A	SUBASSY, BOOM
1	1	1800251A	SUBASSY, FRAME

NOTE:
1. REFERENCE 1800256S SCHEM, SYSTEM ARPG FOR PIPING ELECTRICAL CONNECTIONS
2. USE LOCTITE 290 ON M6 SCREWS FASTENING THE CLAMP AND NUT BRACKETS AFTER LEAD SCREW ALIGNMENT IS COMPLETE
3. USE LOCTITE 242 ON ALL OTHER FASTENERS
4. ALL ITEMS RECEIVING LOCTITE ARE TO BE CLEANED, DEGREASED, AND HAVE PRIMER 'N' APPLIED PREVIOUS TO THE LOCTITE APPLICATION

PRINT DATE
12/31/2018

THIRD ANGLE PROJECTION

DIM. AND TOLERANCING IN ACCORDANCE WITH ASMEY 14.5-2009

METRIC

UNLESS OTHERWISE SPECIFIED:

UNTOLERANCED DIMS ARE BASIC

.25 A B C

⌀ .25 Ⓜ 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: T. STRANG
CHK: T. MARCELLA
ENG: T. STRANG
MFG: M. DUDNATH
QC: M. DUDNATH

3D MODEL NUMBER:
1800250A

SCALE: 1:10
DO NOT SCALE DRAWING

ISO 9001
REGISTERED

Applied Robotics™
Solutions in reach
648 Saratoga Rd. Glenville, NY 12302
www.appliedrobotics.com

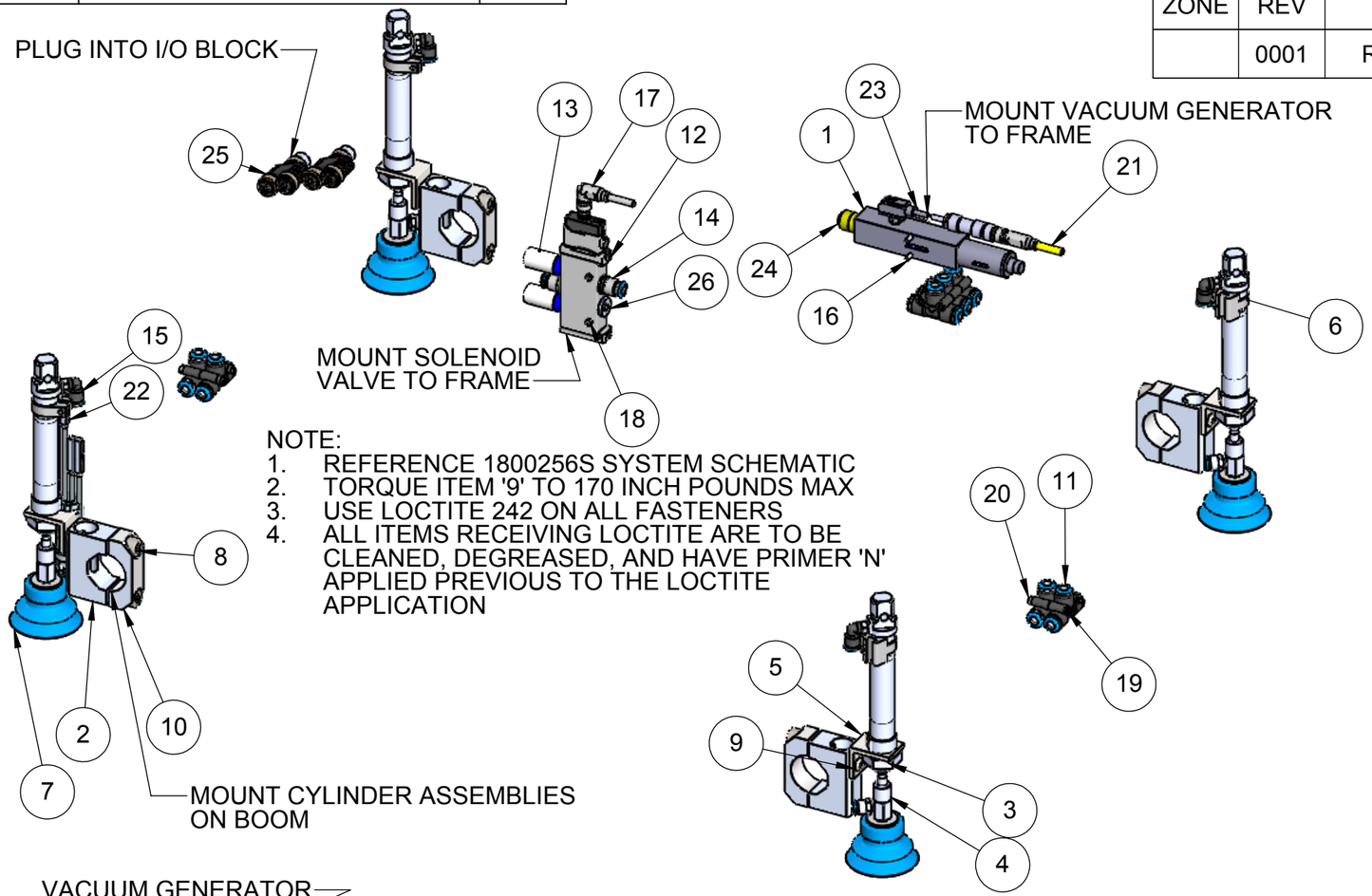
TITLE:
ARPG50-B76.2-EIP-S-N-N GRIPPER

SIZE	DRAWING NUMBER	REV
C	1800250A	00

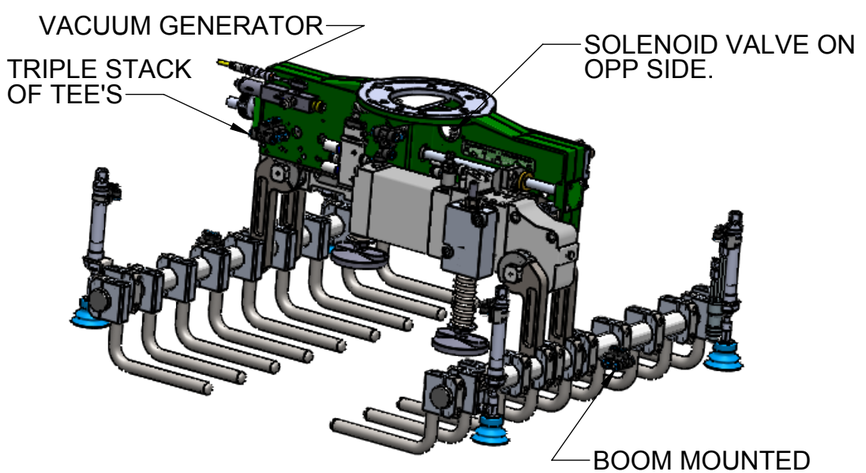
Weight: 45.01 kg | RoHs COMPLIANT: | SHT. 1 OF 1

SIZE	DRAWING NUMBER	REV
B	1800314A	01

REVISIONS						
ZONE	REV	DESCRIPTION	DR	CHK	DATE	ECR/ESR NO.
	0001	RELEASE FOR MANUFACTURE	TS	TM	6-18	TSTG-AY6GR7



NOTE:
1. REFERENCE 1800256S SYSTEM SCHEMATIC
2. TORQUE ITEM '9' TO 170 INCH POUNDS MAX
3. USE LOCTITE 242 ON ALL FASTENERS
4. ALL ITEMS RECEIVING LOCTITE ARE TO BE CLEANED, DEGREASED, AND HAVE PRIMER 'N' APPLIED PREVIOUS TO THE LOCTITE APPLICATION



PRINT DATE 12/27/2018

ITEM NO.	QTY	PART NO.	DESCRIPTION
26	1	1602-P63N	FITTING, PLUG 1/8 BSPP
25	2	1503-P99N	SPLITTER, M12 4 POLE
24	1	0407-P57N	FITTING 1/4NPT TO 6MM OD PUSH
23	1	1008-P03N	FITTING, 1/8NPT TO 6MM OD TUBE
22	1	1800884A	CABLE, ARPG SHEET PICK SET
21	1	1800882P	CABLE, M12 M C M8 F 0.5M LG
20	4	49404	SCR, SOC HD CAP M3 X 30 (SS)
19	4	0804-p93n	NUT,HEX,M3,18-8 SS
18	2	49659	SCR, SOC HD CAP M2.5 X 18 (SS)
17	1	1700135P	CABLE, M8 3 POLE ARPG
16	2	49405	SCR, SOC HD CAP M3 X 25 (SS)
15	4	1800274P	FITTING, 90 M5 6MM PUSH ARPG
14	2	1800318P	FITTING, G1/8 6MM PUSH
13	2	1700131P	SILENCER
12	1	1700130P	SOLENOID VALVE ARPG
11	9	1700122P	TEE, 6MM PUSH
10	4	1700092M	CLAMP,
9	8	49529	SCR, BUT HD SOC CAP M5 X 10 (SS)
8	8	48048	SCR, SOC HD CAP M8 X 25 (SS)
7	4	1800326P	SUCTION CUP
6	4	1800321P	MOUNT, POSITION SENSOR
5	4	1800325M	BRACKET,
4	4	1800271P	TEE, CYLINDER TO SUCTION CUP
3	4	1800319P	CYLINDER, ARPG SHEET PICKER
2	4	1800324M	BRACKET, SHEET
1	1	1800327P	VACUUM GENERATOR

THIRD ANGLE PROJECTION

DIM. AND TOLERANCING IN ACCORDANCE WITH ASMEY 14.5-2009

METRIC

UNLESS OTHERWISE SPECIFIED:

UNTOLERANCED DIMS ARE BASIC

⌓ .25 A B C

⌖ ∅ .25Ⓜ A B C

ALL HOLE DIAMETERS +/- 0.25

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

ALL SURFACE FINISHES 1.6Ra

MAT'L: Material <not specified>

SURFACE TREATMENT:

DR:	T. STRANG
CHK:	T. MARCELLA
ENG:	T. STRANG
MFG:	M. DUDNATH
QC:	M. DUDNATH

3D MODEL NAME: 1800314A

SCALE: 1:5

DO NOT SCALE DRAWING

ISO 9001 REGISTERED

Applied Robotics™ Solutions in reach
648 Saratoga Rd. Glenville, NY 12302
www.appliedrobotics.com

TITLE:

SUBASSY, SHEET PICKER ARPG

SIZE	DRAWING NUMBER	REV
B	1800314A	01

WEIGHT: 1.19 kg | RoHs COMPLIANT: | SHT. 1 OF 1

SIZE	DRAWING NUMBER	REV
D	1800256S	00

REVISIONS						
ZONE	REV	DESCRIPTION	DR	CHK	DATE	ECR/ESR NO.
-	00	RELEASED FOR MANUFACTURE	ML	TS	12/27/2018	TSTG-AY6GR7

ELECTRIC CABLE

PNUEMATIC LINE 6mm — ARI#1800883P

VACUUM LINE 6 mm — ARI#1800883P

INPUT \ OUTPUT TABLE

Bag Grip Left Open	DI 0.0	
Bag Grip Left Closed	DI 0.1	
Bag Grip Right Open	DI 0.2	
Bag Grip Right Closed	DI 0.3	
Bag Not present	DI 0.4	
Vac. Present	DI 0.5	
Left Vac. Cups UP	DI 0.6	
Right Vac. Cups UP	DI 0.7	
Bag Grip Open CMD		DO 1.0
Reserved		DO 1.1
Pal. Grip Close CMD		DO 1.2
Vac. On CMD		DO 1.3
Pal. Picker Left Open	DI 1.4	
Pal. Picker Left Closed	DI 1.5	
Pal. Picker Right Open	DI 1.6	
Pal. Pick. Right Closed	DI 1.7	

SOURCE CDA(CLEAN DRY AIR)
6 MM TUBE 6 BAR +/-10%

S1
Range = 2.0mm
1800876P

S1
OCN1-0802P-A3S0.7/P12
PORT X3A | PROX S1

R3
ARI #1800882P
PORT X3B | VAC GEN\ VS1

R4
1800884A
PORT X4 | 4x ARI#1800320P

R1
ARI#1700133P
PORT X0 | LEFT CLAMP CYL 1

R2
ARI#1700133P
PORT X1 | RIGHT CLAMP CYL 2

R5
ARI #1700135P
PORT X5 | SOL VALVE V1

R9
ARI #1700135P
PORT X6B | SOL VALVE V3

CUSTOMER SUPPLIED
M12 D-CODE ETHERNET

CUSTOMER SUPPLIED
M12 L-CODE 24 VDC POWER

ONLY USED WITH
SLIP PICK OPTION
ARI#1503-P99N

IO BLOCK
ARI#1700132P

X2

PT5
PT6
A
B
C

F1 - Pallet Picker Option

V2
Sol. Valve ARPG
ARI#1700130P
Pallet Clamp Close

ARI#1700131P
SILENCER
ES3

ES4
SILENCER
ARI#1700131P

PT3
ARI#1700122P

PT4

R6
ARI #1700135P
PORT X6A | SOL VALVE V2

R7
ARI#1700128P
PORT X7 | LEFT CLAMP CYL 3

R8
ARI#1700128P
PORT X8 | RIGHT CLAMP CYL 4

ARI#1800263P CLAMP CYLINDER, ARPG15
ARI#1700134P CLAMP CYLINDER, ARPG30
ARI#1800270P CLAMP CYLINDER, ARPG50

V1
Sol. Valve
ARI#1700130P
Bag Gripper Open Clamps

ARI#1700131P
SILENCER
ES5

ES6
SILENCER
ARI#1700131P

A

PT1
PT2

R1
ARI#1700133P
PORT X0 | LEFT CLAMP CYL 1

R2
ARI#1700133P
PORT X1 | RIGHT CLAMP CYL 2

R2

ARI#1800263P CLAMP CYLINDER, ARPG15
ARI#1700134P CLAMP CYLINDER, ARPG30
ARI#1800270P CLAMP CYLINDER, ARPG50

F1 F2 - SHEET PICK Option

Z1
1800327P
Venturi Vacuum Pump
VP10-90M-60-EP-ST4-VSMP-QD-6

PT7
PT8
PT9
PT10
PT11

V3
Sol. Valve
ARI#1700130P
Cups Extend\Vac. ON

ARI#1700131P
SILENCER
ES1

ES2
SILENCER
ARI#1700131P

PLUG WITH
ARI#1602-P63N

C

Festo 574335
SMT-8M-A-PS-24V-E-2,5-OE
ARI#800320P
CUPS UP SWITCH

C5
C6
C7
C8
PT12
PT13

EXTEND
VAC IN

CORPORATE CONFIDENTIAL

ENGLISH		
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SURFACE TREATMENT: NA	ISO 9001 REGISTERED	

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WWW.appliedrobotics.com

TITLE:
SCHEM, SYSTEM
ARPG

SIZE	DRAWING NUMBER	REV
D	1800256S	00

MASS: NA Kg | RoHs COMPLIANT: YES | SHT. 1 OF 1