

**QuickConnect™ System
Tool Change System**

**MXC 5 - 20 – 75 - 160
& Modules**

**Users Guide
&
Preventative Maintenance and
Replacement Procedures**

GUIDE : 95005_english Rev 00

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APPLIED ROBOTICS INCORPORATED
GLENVILLE, NEW YORK
Quick Connect MXC 5 – 20 – 75 - 160

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XChange

This product is covered by the following patents: U.S. Patent No. 4,664,588 / JP Patent No. 1660259

1. PRECAUTIONS



DANGER NOTICE

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



CAUTION NOTICE

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



WARNING NOTICE

Indicates a potentially hazardous situation which, if not avoided, will or could result in minor or moderate injury; also used where the risk applies to only property damages.

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 MANUFACTURERS' EQUIPMENT WARRANTY.

HEED ALL PRECAUTION NOTICES

2. SYSTEM DESCRIPTION

There are two (2) main components in the basic system:

The Quick Connect Master Assembly

One assembly (Master adaptor and optional Universal adaptor plate) is needed for each manipulator changing tools.

The Quick Connect Tooling Assemblies

One assembly (Tooling adaptor and optional Universal adaptor plate) is needed for each tool.

The Quick Connect System provides a reliable method for the manipulator to connect to and release a number of Tooling Adaptor Assemblies (each equipped with different tooling). Attachment is through a mechanical linkage. To connect, air is ported to an actuating cylinder in the Master Adaptor Unit. A cam latching mechanism "pulls in" on a hardened ring in the Tooling Adaptor Unit and couples the two assemblies.

To release a Tooling Adaptor Assembly, air is ported to the other end of the actuating cylinder. The cams retract and the Tooling Adaptor Assembly is released from the Master Assembly, allowing the units to disconnect.

2.1. Quick Connect MXC5 – MXC20 – MXC75 – MXC160

1. The Quick Connect MXC5 & MXC20 Master units can only be ordered in one (1) configuration.
 - **MXC5M-02M3, MXC20M-M5**, without couple and uncouple sensors.
2. The Quick Connect MXC75 & MXC160 Master unit can be ordered in two different models.
 - **MXC75M-MCU-1/8BS, MXC160M-MCU-1/4BS** comes fitted with couple and uncouple sensors, which output a 24V signal for monitoring the state of the Master side of the MXC75 - 160. If an electrical module is purchased for this unit, it **MUST** be the MXC75EM-M-E-28.05-MS or MXC160EM-M-E-28.05-MS, and must be mounted on side one. (See drawing # & 0108-D59A & 0108-D55A in section 10)
 - **MXC75M-N-1/8BS, MXC160M-N-1/4BS**, with couple and uncouple sensors.

The overall heights of these units are different, see informational drawings at the end of this guide.

2.2. Quick Connect MXC System Components

2.2.1. Quick Connect Master Assembly

This assembly consists of the Master Unit and the Universal Adaptor Plate. You machine the Universal Adaptor Plate to match your manipulator's mounting pattern. Pre-machined Adaptor Plates may also be available for certain standard manipulator mounting patterns.

2.2.2. Quick Connect Tooling Assembly

This assembly consists of the Tooling Adaptor Unit and the Universal Adaptor Plate. Custom or work piece dedicated tooling is attached via either the Universal Adaptor Plate or the machining of the Universal Adaptor Plate mounting pattern directly into your tooling.

3. INSTALLATION

Please review these instructions thoroughly before installing your **Quick Connect System**.

3.1. Master Adapter Installation

Mount the Quick Connect Master Adaptor Assembly (consisting of Master Adaptor Unit and Universal Adaptor Plate) onto your manipulator faceplate or other mounting surface as follows:

Note: If you have a pre-machined adaptor plate to fit your application then go to step 2.

1. **Drill and countersink** the Universal Adaptor Plate **from the side stamped with the plate part number**
2. Mount the Universal Adaptor Plate to your robot faceplate using cap screws of the appropriate size and thread pitch to fit your faceplate. The heads of the mounting screws must be slightly below the Universal Adaptor Plate surface after mounting

WARNING

TIGHTEN FACEPLATE MOUNTING SCREWS TO ROBOT MANUFACTURER'S SPECIFICATIONS.

3. Attach the Master Adaptor body to the Universal Adaptor Plate using the (8) M6 X 50 mm socket head cap screws supplied with the Master Adaptor Unit. The two dowel pins must enter the mating holes in the Robot Adaptor Plate.
4. Install any electrical and/or pneumatic modules.
5. Install coupling, uncoupling and user air fittings and air lines as the application requires

Note: the unit will couple if the master side and the tool side are forced together by hand, use under these conditions is not recommended.

See Outline Drawing in the Informational Drawings Section for port locations and identification.

Both the coupling and uncoupling lines **must** be installed in order for the Quick Connect System to function properly. **A single solenoid spring-return 4-way pneumatic valve** is recommended to connect air to the couple and uncouple ports on the Master Adaptor Unit.

DANGER

PNEUMATIC PRESSURE SHOULD NEVER BE SUPPLIED TO THE VALVE UNTIL THE STATE OF THE VALVE (COUPLED OR UNCOUPLED) HAS BEEN CONFIRMED. FAILURE TO DO SO CAN RESULT IN SERIOUS INJURY OR DEATH FROM A DROPPED TOOL. THE ROBOT SHOULD NEVER BE RUN WITHOUT AIR PRESSURE SUPPLIED TO THE TOOL CHANGER. PRESSURE TO THE TOOL CHANGER MUST BE AT LEAST 4.9 BAR (72 PSIG) FOR PROPER OPERATION.

See drawing in the Informational Drawings Section for SUGGESTED COUPLING/UNCOUPLING PLUMBING schematic for proper valve plumbing to assure mechanism remains coupled in the event of electrical power loss.

Holding force up to the rated payload of the Robot Adaptor Assembly is provided in the event of all pneumatic pressure loss.

The (3) Coupling Cams should be in the coupled position when system air is applied and the valve is de-energized.

See drawing in the Informational Drawings Section for VALVE DE-ENERGIZED and VALVE ENERGIZED diagrams.

The "VALVE ENERGIZED" diagram depicts the position of the Coupling Cams when the valve is energized. They **must** be in this position before and during uncoupling of the Master and Tooling Adaptor Assemblies.

WARNING

IF A SINGLE SOLENOID SPRING-RETURN 4-WAY PNEUMATIC VALVE IS USED, THE FOLLOWING CONDITIONS MUST BE UNDERSTOOD AND ADHERED TO:

- **IN THE DE-ENERGISED STATE, THE VALVE MUST PROVIDE AIR TO THE COUPLE PORT ONLY.**

WARNING

IF A DOUBLE SOLENOID 4-WAY PNEUMATIC VALVE MODULE IS USED, THE FOLLOWING CONDITIONS MUST BE UNDERSTOOD AND ADHERED TO:

- **THE VALVE WILL REMAIN IN ITS PRESENT POSITION UNTIL ITS POSITION IS CHANGED BY EITHER ENERGIZING THE ALTERNATE SOLENOID OR MANUALLY PRESSING THE ALTERNATE SOLENOID OVERRIDE BUTTON LOCATED ON THE VALVE BODY.**
- **IF THE SOLENOID ON ONE SIDE OF THE VALVE IS ENERGIZED, THE CONDITION OF THE VALVE WILL NOT CHANGE BY ONLY ENERGIZING THE OTHER SOLENOID. YOU MUST ALSO DE-ENERGIZE THE FIRST SOLENOID.**
- **THE VALVE USED IS PILOT-ACTUATED. THE POSITION OF THE VALVE WILL NOT CHANGE UNLESS THERE IS AIR SUPPLY TO THE VALVE.**
- **THE POWER FLOW TO THE UNCOUPLE SOLENOID SHOULD ALWAYS BE ROUTED IN SERIES THROUGH ALL TOOL STORAGE FIXTURE "TOOL PRESENT" SWITCHES.**

CAUTION

COUPLE AND UNCOUPLE SENSOR SIGNALS SHOULD BE CONTINUALLY MONITORED ON UNITS MXC75 AND MXC 160 WITH MCU, TO VERIFY THAT THE TOOL CHANGER IS IN THE PROPER STATE BEFORE COMMANDING THE ROBOT TO MOVE

3.2. Tooling Adapter Installation

Attach Tooling to the Tooling Adaptor Assemblies

1. Mount tooling to a second Universal Adaptor Plate on the side with the stamped part number. If you choose to mount your tooling by using clearance holes in the Tooling Adaptor Plate, drill and countersink the plate from the opposite side of the stamped part number. The countersunk holes must be deep enough to insure that the screw heads will not protrude above the plate surface.

See drawing in the Informational Drawings Section for Adaptor Plate information.

If you choose to mount your tooling by tapping holes into the Universal Adaptor Plate, we advise using thread inserts.

CAUTION

THE ENDS OF INSERTS AND MOUNTING SCREWS MUST NOT PROTRUDE BEYOND THE TOOLING ADAPTOR PLATE SURFACE FACING THE TOOLING BODY

2. **Mount** your tooling to the Universal Adaptor Plate, then attach the Plate to the Tooling Adaptor Unit using (8) M6 X 50 mm socket head cap screws supplied with the Tooling Adaptor Unit.
3. Install any electrical and/or pneumatic modules as the application requires

3.3. Switch setting Procedure (only for MXC75 – MXC160)

THESE SWITCHES ARE SET IN THE FACTORY AND SHOULD NEED NO FURTHER ADJUSTMENT.

IN THE EVENT OF UNUSUAL CIRCUMSTANCES USE THE FOLLOWING PROCEDURE.

THIS NEEDS TO BE DONE ONLY IF A UNIT WITH COUPLE AND UNCOUPLE SENSING HAS BEEN PURCHASED.

MXC75M-MCU-1/8BS OR MXC160M-MCU-1/4BS

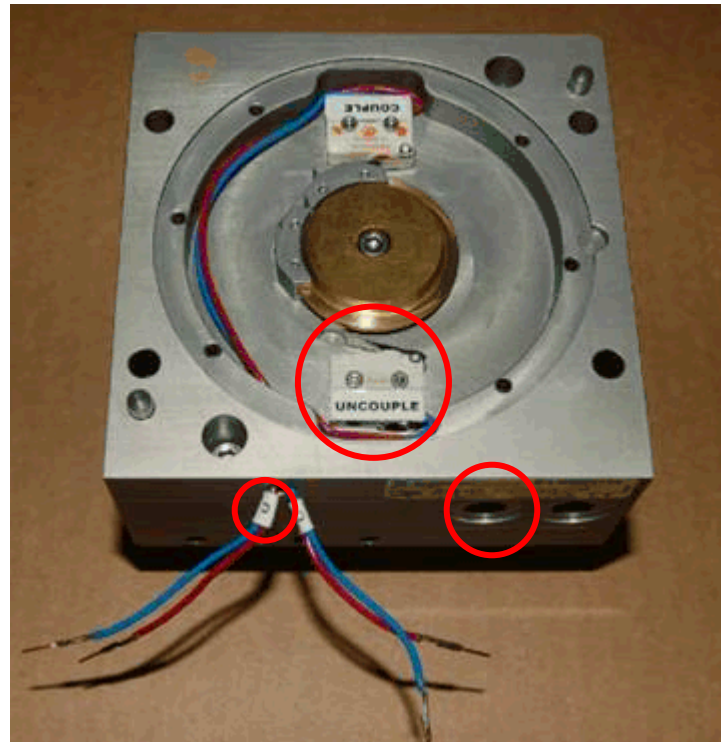
CAUTION

BE SURE HANDS ARE CLEAR OF MOVING PARTS BEFORE APPLYING AIR PRESSURE TO THE UNIT

3.3.1.To set the Uncouple switch

(The uncoupled switch is the one closer to the side where the switch wires exit out of the housing.)

1. Remove the cover from the master side of the MXC75 – MXC160 unit to expose the couple & uncouple switches
2. Place the Master unit together with the Tooling unit, making sure the alignment pins are in the correct position.
3. Apply 80 psi air pressure to the uncouple port of the master side. The port is labeled “uncouple”. (Shown below)



4. Next loosen the two set screws in the actuator, (Shown above), and slide the actuator into position actuating the uncouple switch. Be sure the rounded portion of the switch arm rests on the flat surface of the actuator. Retighten the set screws, use Loctite 222 and torque screws to 0.5 Nm (4in-lb)
5. Check that the switch is actuated by testing for electrical continuity between the two wires from the uncouple switch. Retighten the set screws to secure the actuator in place.
6. Cycle the unit several times, each time checking for signals from the switches to ensure repeatability.

3.3.2. To set the couple switch

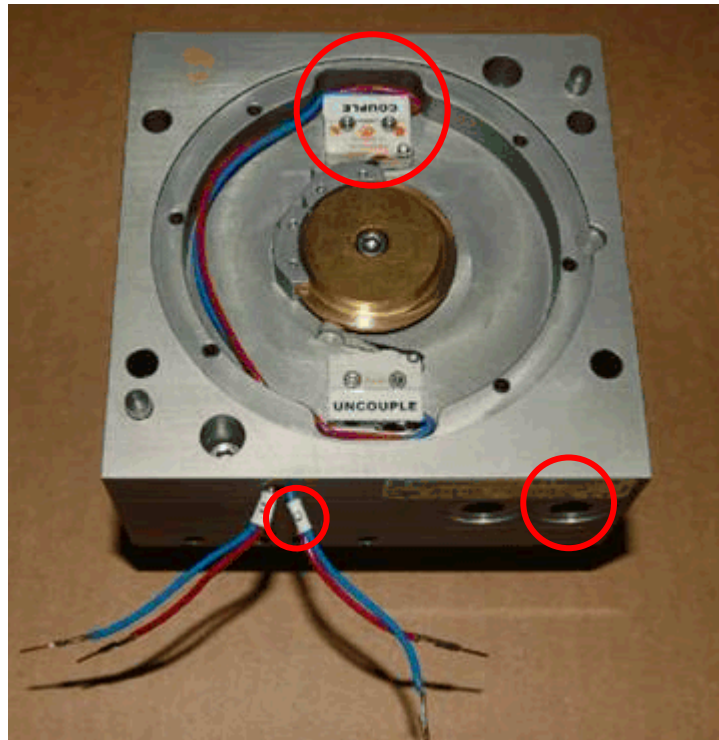
(The couple switch is the switch on the far side of the unit away from the switch wire exit hole. Shown below)

1. Remove the cover from the master side of the MXC75 – MXC160 unit to expose the couple & uncouple switches
2. Place the Master unit together with the Tooling unit, making sure the alignment pins are in the correct position.
3. Apply 80 psi air pressure to the couple port of the master side. The port is labeled "couple". (Shown below)

Note: This will couple the master side and the Tool side together

CAUTION

BE SURE HANDS ARE CLEAR OF MOVING PARTS BEFORE APPLYING AIR PRESSURE TO THE UNIT



4. Next loosen the two set screws in the actuator, (Shown above), and slide the actuator into position actuating the couple switch. Be sure the rounded portion of the switch arm rests on the flat surface of the actuator. Retighten the set screws, use Loctite 222 and torque screws to 0.5 Nm (4in-lb)
5. Check that the switch is actuated by testing for electrical continuity between the two wires from the uncouple switch. Retighten the set screws to secure the actuator in place.
6. Cycle the unit several times, each time checking for signals from the switches to ensure repeatability.

4. INITIAL TESTS

CAUTION

**DURING TESTING KEEP YOUR FINGERS CLEAR OF THE MECHANICAL COUPLING MECHANISM AND THE COUPLING INTERFACE.
IF QUICKCONNECT SYSTEM IS BEING USED ON A ROBOTIC MANIPULATOR,
KEEP OUT OF THE ROBOT WORK ENVELOPE
WHEN DRIVE POWER IS ON.**

4.1. Master Adapter check

See drawing in the Informational Drawings Section for VALVE DE-ENERGIZED diagram.

1. With the Tooling Adaptor Assembly uncoupled from the Robot Adaptor Assembly, **apply air** (no electrical power) to your system:
The Robot Adaptor coupling cams should be in a "coupled" position.
2. **Apply system air and power.**
No change in the above conditions should occur.
The Robot Adaptor coupling cams should be in a "coupled" position.
3. **Energize** the solenoid that controls the coupling mechanism. The coupling cams should move to the "uncoupled" position.
4. Alternately **de-energize and energize** the solenoid several times. The cam action should be smooth and quick.

5. GUIDE TO OPERATIONS

5.1. Usage Considerations

Programs should be written with all Quick Connect Tooling Adaptor Assemblies resting in support fixtures during start-up and manipulator calibration (if applicable).

CAUTION

THE COUPLING CAMS SHOULD BE IN THE "UNCOUPLED" POSITION (COUPLING SOLENOID ENERGIZED)

5.1.1. Identify and Record Couple and Uncouple Point

To identify the couple point of each Tooling Adaptor Assembly during the teaching phase, the Master Adaptor Assembly should be brought to a point directly on the centerline axis of the Tooling Adaptor Assembly. The Master Adaptor Assembly's face should be parallel to the Tooling Adaptor Assembly's face. The taper pins should enter the bushings in the Tooling Adaptor Assembly when the Master Adaptor Assembly is slowly moved toward it.

1. **Move** the Adaptor Assemblies slowly toward each other while visually checking the alignment of the taper pins and their bushings. Make whatever lateral corrections necessary to center the pins in the bushings. Exact alignment in either the horizontal or lateral positions is not required, although the pins should not interfere with the bushings inside diameters.
2. **Stop** the motion when the distance between the Robot Adaptor Face and the Tooling Adaptor Face is approximately 0,0 mm to 4,0 mm (.00 to 157 in).

CAUTION

THERE MUST BE APPROXIMATELY 0,0 TO 0,4 MM BETWEEN THE MASTER AND TOOLING ADAPTOR ASSEMBLIES. OTHERWISE THE MECHANISM THAT OPERATES THE COUPLING CAMS MAY INTERFERE WITH THE TOOLING ADAPTER BOTTOM PLATE. THE TWO (2) UNITS ARE PULLED TOGETHER WHEN THE COUPLING MECHANISM IS OPERATED.

3. **De-energize** the solenoid that controls the air pressure to the Quick Connect couple port. This will couple the Tooling Adaptor Assembly with the Master Adaptor Assembly. Any electrical or pneumatic connections are made at this time.
4. **Energize and de-energize** the coupling solenoid several times to verify that the Tooling Adaptor Assembly is properly connected and released from the Master Adaptor Assembly.
5. **Record** the position from Step 3 as the "pick-up" & "replacement" coordinates for this Tooling Adaptor Assembly.

5.1.2. Other Programming Considerations

Tooling Adaptors may be coded to verify connection to the correct tool. This may be accomplished by configuring the wiring such that two of the pins in the Tooling Adaptor Electrical Module are shorted together. This can produce a binary code (which can be read using your system controller inputs). The number of leads needed to allow a unique code for each Tooling Adaptor will depend upon the number of Tooling Adaptors used in your application.



PROGRAM A SHORT DELAY AFTER THE COUPLE AND UNCOUPLE COMMANDS TO ALLOW THE ACTUATOR TO COMPLETE THESE ACTIONS.

AIR PRESSURE TO THE “UNCOUPLING” PORT SHOULD BE AT LEAST 4.9 BAR (72 PSIG) TO INSURE QUICK UNCOUPLING.

5.2. Pneumatic and Electrical

Optional Electrical and Pneumatic External interface options are available for your modular Quick Connect system. Contact your Sales representative or consult our WEB site for available options.

5.2.1. Pneumatic Modules

5.2.1.1. MXC5

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC5EM-M-P6-03M3	MXC5EM-T-P6-03M3
Weight	0.01 kg	0.01 kg
Size LxWxH	34.5 x 8 x 14.75mm	34.5 x 8 x 11.75mm
Pass-through Utilities	(3) M3 Ports	
Pressure	0 - 8.5 bar	
Flow Rate	0.10 Cv	
Material	Aluminum	Aluminum/Stainless Steel

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC5EM-M-P6-04M3	MXC5EM-T-P6-04M3
Weight	0.01 kg	0.01 kg
Size LxWxH	34.5 x 8 x 14.75mm	34.5 x 8 x 11.75mm
Pass-through Utilities	(4) M3 Ports	
Pressure	0 - 8.5 bar	
Flow Rate	0.10 Cv	
Material	Aluminum	Aluminum/Stainless Steel

5.2.1.2. MXC20

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC20EM-M-P-02M5	MXC20EM-T-P-02M5
Weight	0.05 kg	0.04 kg
Size LxWxH	27.5 x 12 x 25mm	27.5 x 12 x 20.25mm
Pass-through Utilities	(2) M5 Ports	
Pressure	0 - 8.5 bar	
Flow Rate	0.12 Cv	
Material	Aluminum	

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC20EM-M-P-04M5	MXC20EM-T-P-04M5
Weight	0.05 kg	0.04 kg
Size LxWxH	59.5 x 12 x 25mm	59.5 x 12 x 20.25mm
Pass-through Utilities	(4) M5 Ports	
Pressure	0 - 8.5 bar	
Flow Rate	0.12 Cv	
Material	Aluminum	

5.2.1.3. MXC75

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC75EM-M-P1-03V1/4BS	MXC75EM-T-P1-031/4BS
Weight	0.25 kg	0.25 kg
Size LxWxH	108 x 27 x 35.5mm	108 x 27 x 45mm
Pass-through Utilities	(3) Check Valved 1/4 BSPP Ports	
Pressure	0 - 15 bar (0 - 220 psi)	
Flow Rate	1.11Cv	
Material	Aluminum	

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC75EM-M-C-03V1/4BS	MXC75EM-T-C-03V1/4BS
Weight	0.5 kg	0.46 kg
Size LxWxH	108 x 40 x 35.5mm	108 x 40 x 40.5mm
Pass-through Utilities	(3) Check Valved 1/4 BSPP Ports	
Pressure	0 - 6 bar (0 - 87psi)	
Flow Rate	1.54 Cv	
Material	Aluminum/Chrome plated brass	

5.2.1.4. MXC160

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC160EM-M-P1-04V3/8BS	MXC160EM-T-P1-04V3/8BS
Weight	0.34 kg	0.24 kg
Size LxWxH	139.5 x 30 x 35mm	139.5 x 25 x 35mm
Pass-through Utilities	(4) Check Valved 3/8 BSPP Ports	
Pressure	0 - 15 bar (0 - 220 psi)	
Flow Rate	1.11Cv	
Material	Aluminum	

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC160EM-M-C-04V3/8BS	MXC160EM-T-C-04V3/8BS
Weight	0.59 kg	0.59 kg
Size LxWxH	139.5 x 30 x 38mm	139.5 x 30 x 38mm
Pass-through Utilities	(4) Check Valved 3/8 BSPP Ports	
Pressure	0 - 6 bar (0 - 87psi)	
Flow Rate	1.54 Cv	
Material	Aluminum/Chrome plated brass	

5.2.2. Electrical Modules

Failure to remove electrical power from all circuits prior to connecting or disconnecting the Quick Connect system may result in permanent damage to the interface contacts.

None of the electrical interfaces contained within this tool change system are intended for interrupting electrical current exceeding control signal current (200mA). All power must be removed from all circuits (with the exception of tool changer status and control signals) prior to connection or disconnection of the system. Confirmation of proper Quick Connect system connection must be achieved prior to re-introducing electrical power to the circuit.

CAUTION

Please contact Applied Robotics, Inc. for information if a special application requires connecting & disconnecting under power

5.2.2.1. MXC5

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC5EM-M-E-16.02-00	MXC5EM-T-E-16.02-00
Weight	0.03 kg	0.03 kg
Size LxWxH	34.5 x 8 x 14.75mm	34.5 x 8 x 11.75mm
Connector	Solder Cups	Solder Cups
Pass-through Utilities	16 contacts @ 2 Amp, 0-24 VAC/DC	
Material	Delrin w/Silver plated contacts	

5.2.2.2. MXC20

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC20EM-M-E-25.05-00S	MXC20EM-T-E-25.05-00S
Weight	0.09 kg	0.08 kg
Connector	Solder Cups/Strain Relief	Solder Cups/Strain Relief
Size LxWxH	59 x 25 x 25.24mm	59 x 25 x 22mm
Pass-through Utilities	25 contacts @ 5 Amp 0-240 VAC/DC	
Material	Delrin w/Silver plated contacts	

5.2.2.3. MXC75 – MXC160

Note: The 28 pin electrical module is for use with the MXC75 or MXC160 units, which have couple and uncouple sensing. (MXC75M-MCU-1/8BS, MXC160M-MCU-1/4BS) , The tool side of this module is common to both the MXC75 and MXC160 sensing units) And can only be mounted on side “1”.

Note: The 32 pin electrical module is for use with the MXC75 and MXC160 units, which do not have couple and uncouple sensing. (MXC75M-N-1/8BS or MXC160M-N-1/4BS) And can also only be mounted on side “1”.

5.2.2.4. MXC75

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC75EM-M-E-28.05-MS	MXC75/160EM-T-E-28.05-MS
Weight	0.18 kg	0.15 kg
Connector	32 pin Mil Spec (MS3112E18-32P)	32 pin Mil Spec (MS3112E18-32P)
Size LxWxH	85.5 x 38 x 48.25mm	85.5 x 38 x 36mm
Pass-through Utilities	28 contacts @ 5 Amp 0-240 VAC/DC for use with MXC75M-MCU-1/8BS master adaptor	
Material	Delrin w/Gold plated copper contacts	

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC75/160EM-M-E-32.05-MS	MXC75/160EM-T-E-32.05-MS
Weight	0.15 kg	0.15 kg
Connector	32 pin Mil Spec (MS3112E18-32P)	32 pin Mil Spec (MS3112E18-32P)
Size LxWxH	85.5 x 38 x 39.25mm	85.5 x 38 x 36mm
Pass-through Utilities	32 contacts @ 5 Amp 0-240 VAC/DC	
Material	Delrin w/Gold plated copper contacts	

5.2.2.5. MXC160

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC160EM-M-E-28.05-MS	MXC75/160EM-T-E-28.05-MS
Weight	0.18 kg	0.15 kg
Connector	32 pin Mil Spec (MS3112E18-32P)	32 pin Mil Spec (MS3112E18-32P)
Size LxWxH	85.5 x 38 x 61mm	85.5 x 38 x 36mm
Pass-through Utilities	28 contacts @ 5 Amp 0-240 VAC/DC for use with MXC160M-MCU-1/4BS master adaptor	
Material	Delrin w/Gold plated copper contacts	

	Master Adaptor Module	Tool Adaptor Module
Order Code	MXC75/160EM-M-E-32.05-MS	MXC75/160EM-T-E-32.05-MS
Weight	0.15 kg	0.15 kg
Connector	32 pin Mil Spec (MS3112E18-32P)	32 pin Mil Spec (MS3112E18-32P)
Size LxWxH	85.5 x 38 x 39.25mm	85.5 x 38 x 36mm
Pass-through Utilities	32 contacts @ 5 Amp 0-240 VAC/DC	
Material	Delrin w/Gold plated copper contacts	

6. TROUBLESHOOTING

6.1. Assistance

If you require assistance, contact our Applications Engineers in our Technical Support Departments at :

USA Main Office : + 1 518 384-1000
 USA Michigan Office : + 1 248 358 3677
 Europe Belgium Office : + 32 65 80 38 41

7. MAINTENANCE

The unique design of the Quick Connect systems requires little maintenance.

CAUTION

FAILURE TO FOLLOW THE MAINTENANCE SCHEDULE DESCRIBED BELOW COULD ALTER OR VOID THE WARRANTY PROVIDED BY APPLIED ROBOTICS.

7.1. Maintenance schedule

The following table provides a schedule for preventative maintenance procedures to be performed for the MXC Quick Connect systems and associated modules.

COMPONENT	Frequency of Maintenance			
	Every 2 Weeks	250,000 Cycles	1,000,000 Cycles	3,000,000 Cycles
Robot Adaptor	Visual Checks	Lubrication		
Tool Adaptor	Visual Checks	Lubrication		
Electrical Module	Visual Checks	Contact Surface Inspection		
HIKVA Module	Visual Checks	Contact Spring Replacement (Tool Side)		
Universal Module (pneumatic/coolant)	Visual Checks	Lubrication	O-ring Replacement	Fitting Replacement

7.2. Preventative Maintenance

7.2.1. Visual Checks

7.2.1.1. Utility Lines (applicable to all components)

1. Inspect for abraded conductors.
2. Inspect for proper conductor lengths.
3. Inspect coolant conductors and fittings for leaks.
4. Ensure all harness ties are in good physical condition.

7.2.1.2. Master Adaptor

1. Inspect locating pins for rust, breakage, or wear.
2. Inspect latching cams for rust, breakage, or wear.
3. Inspect interface surface for raised material or dings that could prevent proper mating to Tool Adaptor.
4. Inspect signal cable connector for tightness

7.2.1.3. Tool Adaptor

1. Inspect interface pads (1 ring for MXC5/MXC20 or 3 dowels for MXC75/MXC160) for rust, breakage, or wear.
2. Inspect locating bushings for rust, breakage, or wear.
3. Inspect interface surface for raised material or dings that could prevent proper mating to Master Adaptor.

7.2.1.4. Electrical Modules

1. Inspect spring pins for excessive dirt, pitting, or bending. If excessive pitting of the contact surface is observed, replace the damaged spring pins. Bending of the spring pins will be found when spacing between contact surface appears to be uneven
2. Ensure spring pins return to their fully extended position when pressure is not longer applied. If spring pins do not move freely, replace them.
3. Inspect signal cable connector for tightness.

7.2.1.5. Coolant Modules (MXC75/MXC160 only)

1. Inspect universal fittings for leakage. If fitting is leaking due to o-ring damage, replace the o-ring. If leaking is due to damaged contact surfaces, replace the entire fitting.

7.2.1.6. Pneumatic Modules (MXC20)

1. Inspect o-rings on Master side module for damage. Replace the o-ring if necessary
2. Ensure seating surface on Tool side module is free of excessive dirt or raised material or dings that could prevent a proper seal

7.2.1.7. Pneumatic Modules (MXC75/MXC160 only)

1. Ensure o-rings on Tool side fittings are in place and in good physical condition. Replace the o-rings or fittings if necessary.

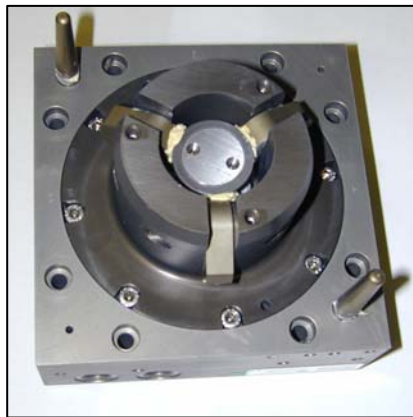
7.2.2. Lubrication

To extend the life expectancy of the Quick Connect System, apply the following lubricants according to the chart.

		Clean room	Non-Clean room
Wear Surfaces	Metal to Metal Parts	Apiezon – L or Equivalent	Multi-Purpose Grease
	O-Rings	Apiezon – L or Equivalent	Parker Lube-A-Cyl Lubricant

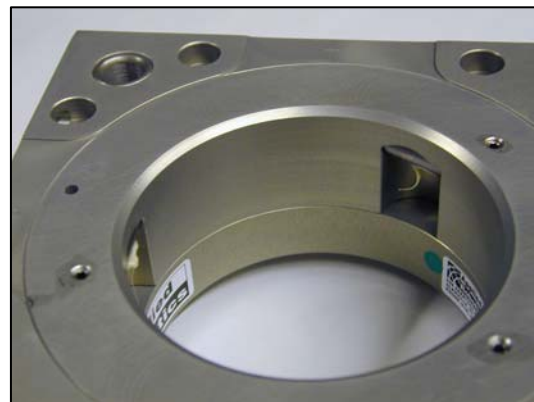
7.2.2.1. Master Adapter

1. Apply a liberal coating of white lithium grease to contact surface on latching cams.
2. Apply a liberal coating of white lithium grease to the upper cylindrical surface of the locating pins.



7.2.2.2. Tool Adapter

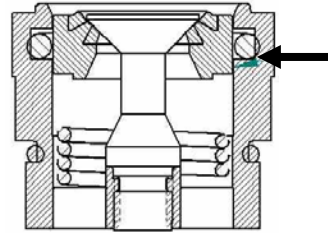
1. Apply a liberal coating of white lithium grease to the latching pads (1 ring for MXC5/MXC20 and 3 dowels for MXC75/MXC160).



2. Apply a liberal coating of white lithium grease to the inner surface of the locating bushings.

7.2.2.3. Coolant Modules

1. Apply a thin coat of DOW EP white bearing grease to the contact surface shown in the figure below.



DOW
EP WHITE
BEARING
GREASE

7.2.2.4. Pneumatic Modules

1. MXC20 No lubrication is necessary.



2. MXC5/MXC75/MXC160 Apply a liberal coating of Parker "Lube-a-cyl" to the tool side module fittings.



7.2.3. Lubrication specification

Lubricant	ARI Part #	Manufacturer	Manufacturer's Part Number
Lube A Cyl	51120	Parker	0766130000
White Lithium Grease	91504-P1037	Century Lubricants	ST-80
White EP Bearing Grease	96503-P1018	Dow Corning	White EP Bearing Grease

7.3. O-rings

If the air port interface O-rings are damaged, they can be easily replaced with new O-rings available from Applied Robotics, Inc.

Note: These are special precision O-Rings.

7.4. Replacement parts

See section 10 in the Informational Drawing section for Replacement Parts.

8. ENGINEERING DATA

8.1. MXC5

Specifications	Master Adaptor	Tool Adaptor
Model Code	MXC5M-02M3	MXC5T-02M3
Payload	5 kg	
Moment - Mx, My	17 N-m	
Moment - Mz	20 N-m	
Height	15 mm	12 mm
Width x Length	35 mm x 35 mm	35 mm x 35 mm
Weight	0.059 kg	0.032 kg
Couple/Uncouple Port	M3	N/A
Repeatability - X,Y	0.012 mm	
Repeatability - Z	0.005 mm	
Operating Temp.	5 - 60 Deg C	
Operating Pressure	6 bar \pm 1 (87 \pm 15 psi)	

8.2. MXC20

Specifications	Master Adaptor	Tool Adaptor
Model Code	MXC20M-M5	MXC20T-M5
Payload	20 Kg	
Moment - Mx, My	29 Nm	
Moment - Mz	34 Nm	
Height	26 mm	20.5 mm
Width x Length	60 mm x 60 mm	60 mm x 60 mm
Weight	0.28 kg	0.15 kg
Couple/Uncouple Port	M5	N/A
Repeatability - X,Y	\pm 0.025 mm	
Repeatability - Z	\pm 0.025 mm	
Operating Temp.	5 - 60 Deg C	
Operating Pressure	6 bar \pm 1 (87 \pm 15 psi)	

8.3.MXC75

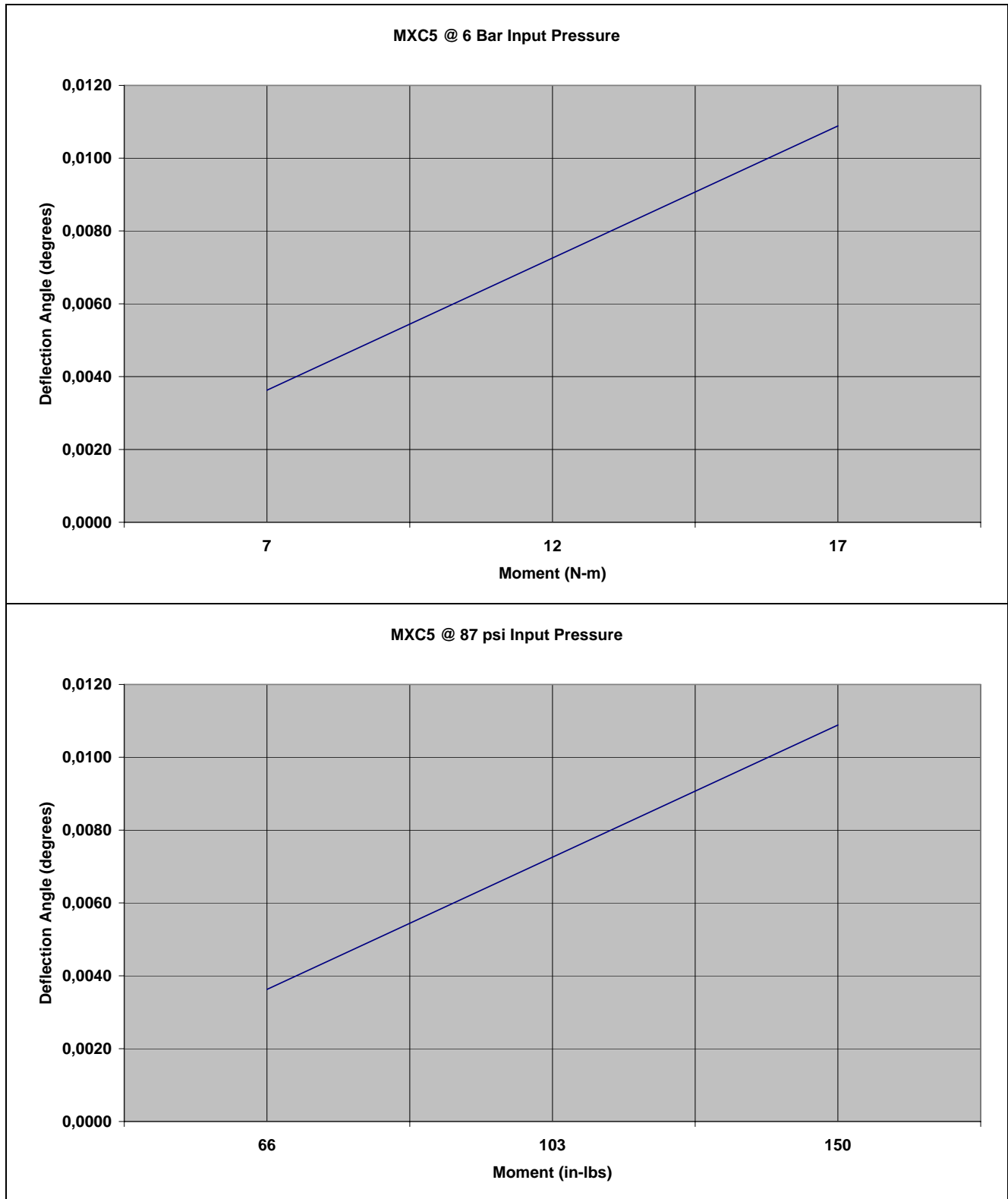
Specifications	Master Adaptor	Master Adaptor	Tool Adaptor
Model Code	MXC75M-MCU-1/8BS	MXC75M-N-1/8BS	MXC75T-N-N
Couple Status Sensor	Couple/Uncouple	N/A	N/A
Payload	75 Kg		
Moment - Mx, My	500 Nm		
Moment - Mz	550 Nm		
Repeatability - X,Y	±0.025 mm		
Repeatability - Z	±0.025 mm		
Height	50 mm	36 mm	36 mm
Width x Length	110 mm x 110 mm	110 mm x 110 mm	110 mm x 110 mm
Weight	1.7 kg	1.4 kg	0.9 kg
Operating Temp.	5 - 60 Deg C		
Operating Pressure	6 bar ±1 (87 ±15 psi)		
Couple/Uncouple Port	1/8BSPP	1/8BSPP	N/A

8.4.MXC160

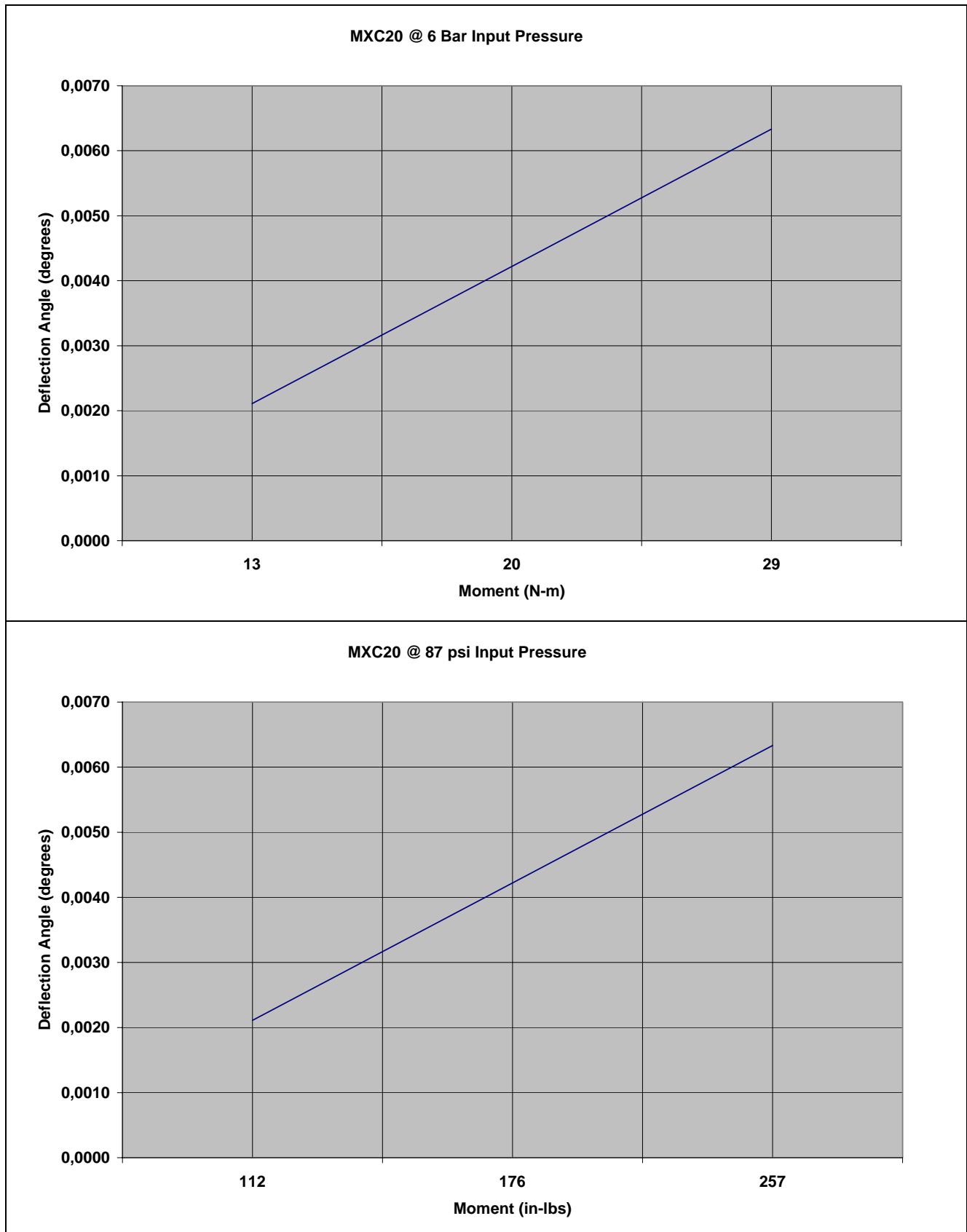
Specifications	Master Adaptor	Master Adaptor	Tool Adaptor
Model Code	MXC160M-MCU-1/4BS	MXC160M-N-1/4BS	MXC160T-N-N
Couple Status Sensor	Couple/Uncouple	N/A	N/A
Payload	160 kg		
Moment - Mx, My	1.000 Nm		
Moment - Mz	1.200 Nm		
Repeatability - X,Y	±0.04 mm		
Repeatability - Z	±0.04 mm		
Height	57.5 mm	45 mm	47 mm
Width x Length	140 mm x 140 mm	140 mm x 140 mm	140 mm x 140 mm
Weight	3.9 kg	3.5 kg	1.9 kg
Operating Temp.	5 - 60 Deg C		
Operating Pressure	6 bar ±1 (87 ±15 psi)		
Couple/Uncouple Port	1/4BSPP	1/4BSPP	N/A

9. MOMENT LOAD GRAPHS

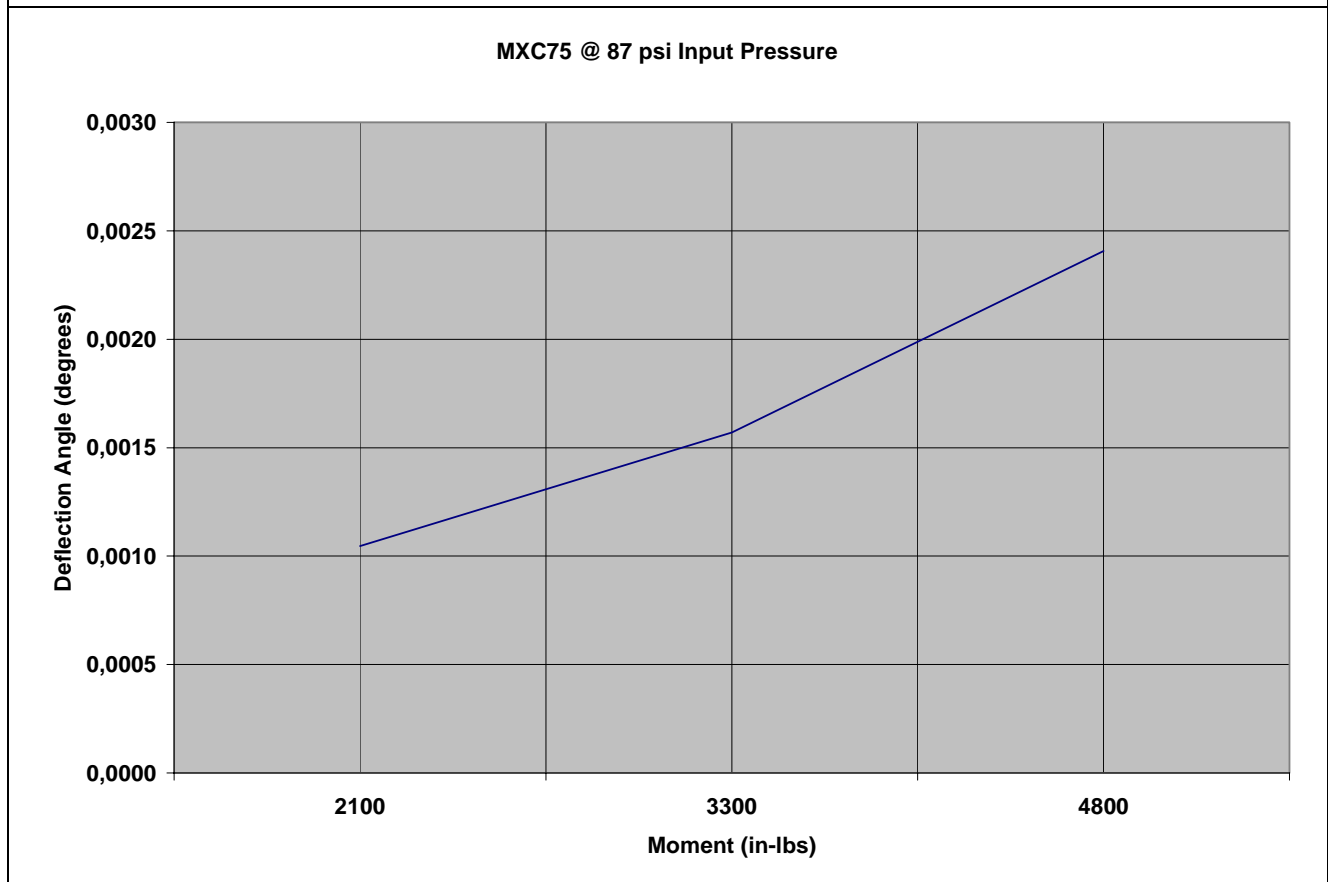
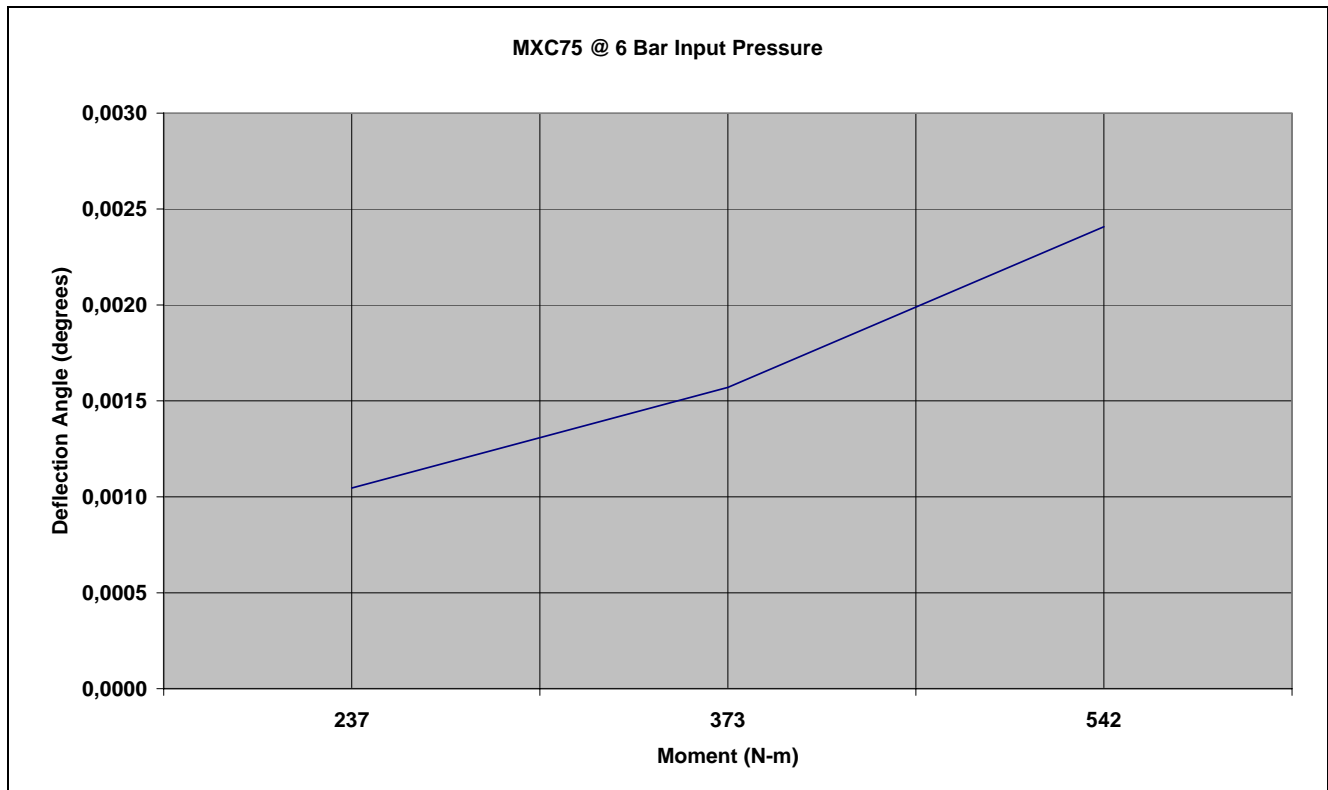
9.1.MXC5



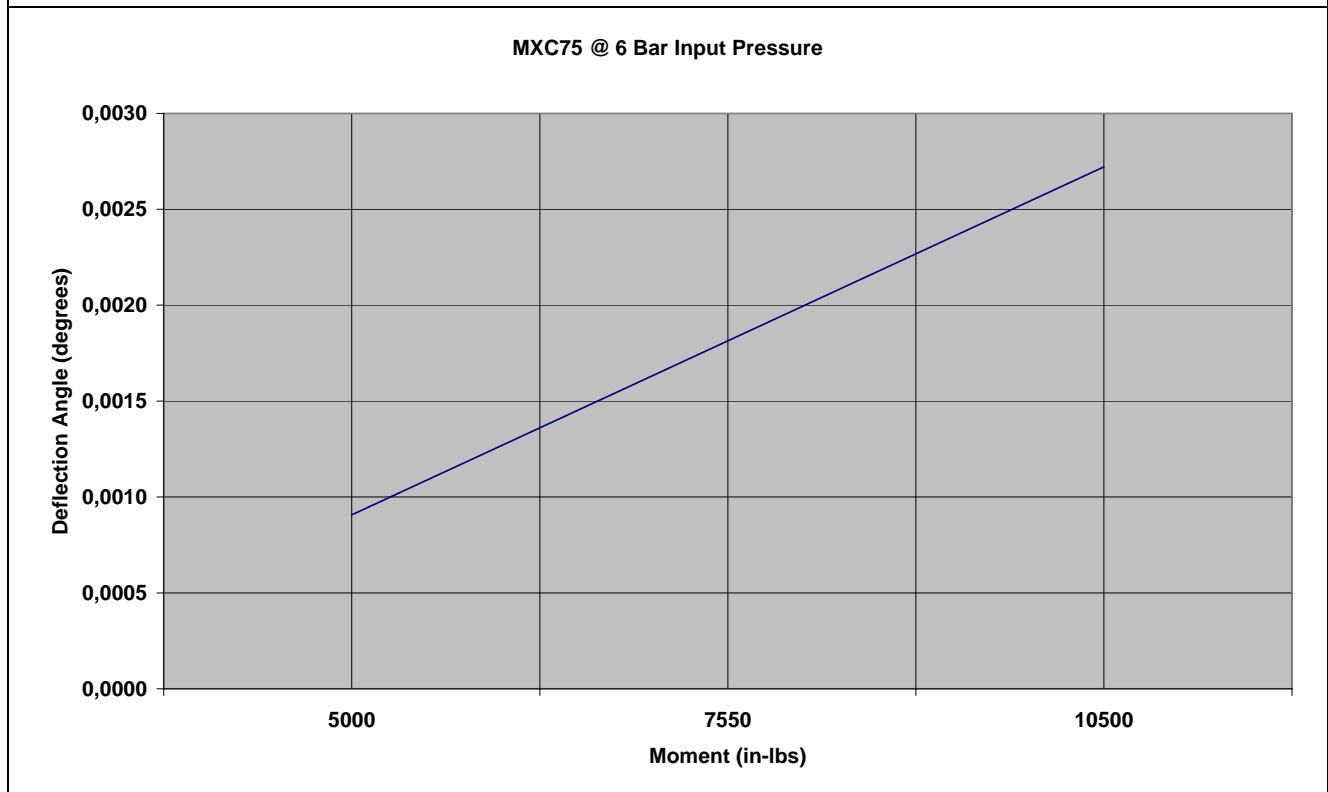
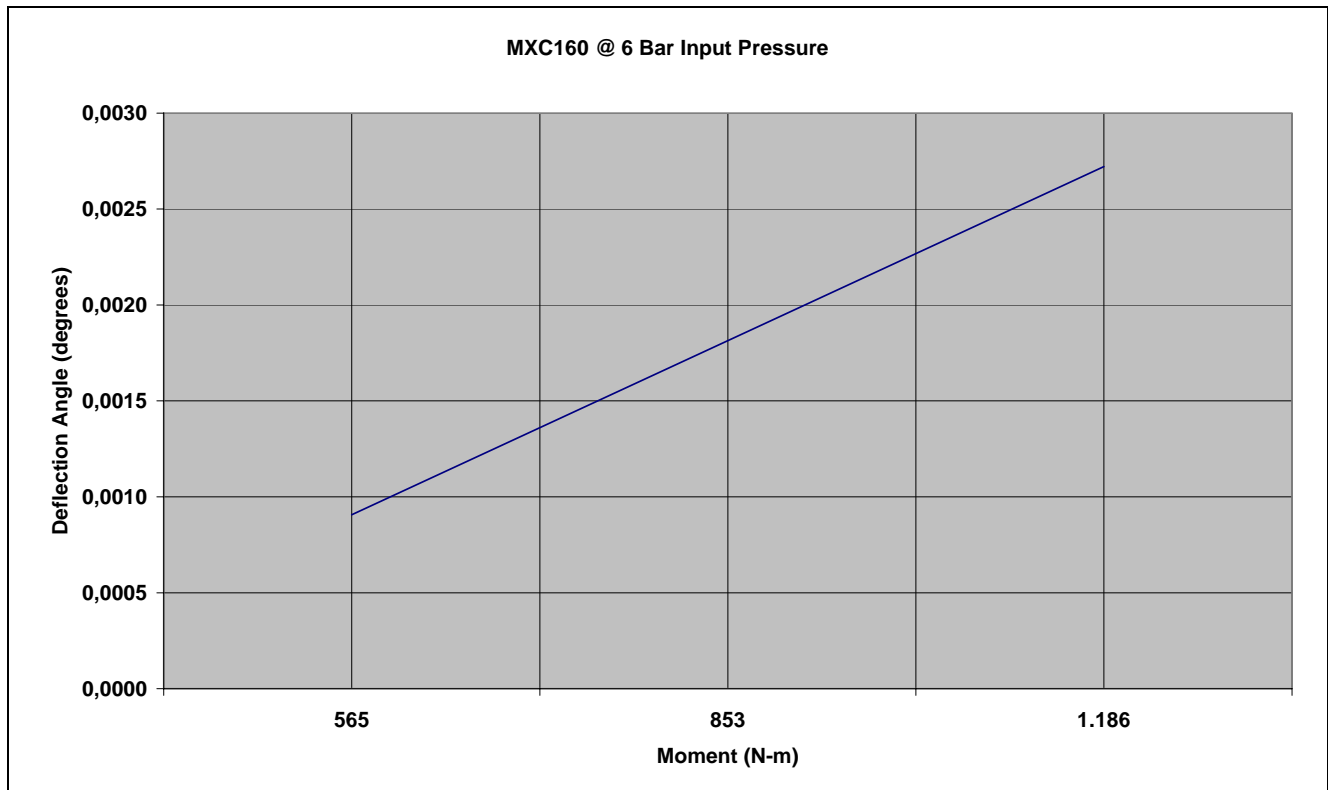
9.2.MXC20



9.3.MXC75



9.4. MXC160



10. INFORMATIONAL DRAWINGS

The drawings in this section can assist with installation, use and identification of replacement parts for MXC 5 – 20 – 75 – 160 Connection Systems. These drawings are a representative sample of the available. Please contact **Applied Robotics Technical Support** if you have any questions or need drawings for your specific modules. (See section 6.1)

10.1. MXC5 – MXC20 – MXC75 - MXC160

DRAWING NUMBER	DESCRIPTION
0201-D46A	Lubrication Key
87517-B1060A	Valve Diagram

10.2. MXC5

DRAWING NUMBER	DESCRIPTION
0201-C34A	MXC5 Coupling Sequence
0108-C57A	Outline MXC5 MASTER
0108-C58A	Outline MXC5 TOOL
0104-C22A	MXC5M Master Replacement Parts
0104-C23A	MXC5T Tool Replacement Parts
0104-C56A	MXC5UAP-BP
0104-C26A	Outline / repl. parts for 16 Contact Elec. Mod. (Mater Side)
0104-C27A	Outline / repl. part for 16 Contact Elec. Mod. (Tool Side)
0104-D54A	Electrical Schematic MXC5 Electrical
0104-C28A	Outline / repl. parts for MXC5EM-M-P6-03M3
0104-C29A	Outline / repl. parts for MXC5EM-T-P6-03M3
0104-C30A	Outline / repl. parts for MXC5EM-M-P6-04M3
0104-C31A	Outline / repl. parts for MXC5EM-T-P6-04M3

10.3. MXC20

DRAWING NUMBER	DESCRIPTION
0201-C35A	MXC20 Coupling Sequence
0007-D33A	Outline MXC20 MASTER
0007-D34A	Outline MXC20 TOOL
0003-C55A	MXC20M Master Replacement Parts
0003-C56A	MXC20T Tool Replacement Parts
0004-B30A	MXC20UAP-BP
0004-B28A	MXC20MAP-ISO40
0003-C69A	Outline / repl. parts for 25 Contact Elec. Mod. (Mater Side)
0003-C70A	Outline / repl. parts for 25 Contact Elec. Mod. (Tool Side)
0003-C59A	Outline / repl. parts for MXC20EM-M-P-02M5
0003-C60A	Outline / repl. parts for MXC20EM-T-P-02M5
0003-C57A	Outline / repl. parts for MXC20EM-M-P-04M5
0003-C58A	Outline / repl. parts for MXC20EM-T-P-04M5

10.4. MXC75 – MXC160

DRAWING NUMBER	DESCRIPTION
0104-C43A	Outline / repl. parts for 28 pin Elec. Mod. (Tool side)
0104-C40A	Outline / repl. parts for 32 pin Elec. Mod. (Master side)
0104-C41A	Outline / repl. parts for 32 pin Elec. Mod. (Tool side)
0104-D52A	Schematic for unit w/out couple uncouple sensing
0104-D53A	Schematic for unit w/ couple uncouple sensing

10.5. MXC75

DRAWING NUMBER	DESCRIPTION
0201-D36A	Coupling Sequence
0108-D59A	Outline MXC75 MASTER, w/ couple uncouple sensing
0104-D11A	Repl. parts for MXC75 MASTER, w/ couple uncouple sensing
0103-D88A	Repl. parts for MXC75 MASTER, w/out couple uncouple sensing
0103-C92A	MXC75 Sender replacement parts
0108-D60A	Outline MXC75 TOOL
0103-D89A	Replacement parts for MXC75 TOOL
0007-C56A	MXC75UAP-BP
0104-C42A	Outline / repl. parts for 28 pin Elec. Module (Master side)
0104-C74A	Outline / repl. parts for MXC75 3 Port pneu. Mod. (Master side)
0104-C75A	Outline / repl. parts for MXC75 3 Port pneu. Mod. (Tool side)
0104-C83A	Outline / repl. parts for MXC75 3 Port coolant Mod. (Master side)
0104-C82A	Outline / repl. parts for MXC75 3 Port coolant Mod. (Tool side)

10.6. MXC160

DRAWING NUMBER	DESCRIPTION
0201-D37A	Coupling Sequence
0108-D55A	Outline MXC160 MASTER
0108-D56A	Outline MXC160 TOOL
0105-D06A	MXC160M-MCU-1/4BS Replacement Parts
0104-D73A	MXC160M-N-1/4BS Replacement Parts
0104-D68A	Latching Mechanism Replacement Parts
0105-D09A	Coupling Sensor Replacement Parts
0105-D07A	MXC160 Tool Replacement Parts
0108-D53A	MXC160UAP-BP
0105-D25A	MXC160MAP-ISO160
0104-D52A	Schematic for unit w/out couple uncouple sensing
0104-D53A	Schematic for unit w/ couple uncouple sensing
0107-C40A	Outline / repl. Parts for 28 pin Elec. Mod. (Master side)
0105-C15A	Outline / repl. parts for MXC160 4 Port pneu. Mod. (Master side)
0105-C16A	Outline / repl. parts for MXC160 4 Port pneu. Mod. (Tool side)
0105-C18A	Outline / repl. parts for MXC160 4 Port coolant Mod. (Master side)
0105-C17A	Outline / repl. parts for MXC160 4 Port coolant Mod. (Tool side)