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H. Other Modules

Stand-Alone Dust Cover

1. Product Overview

If the Tool Changer's tool side is not in use, a stand-alone dust cover protects the Tool plate's locking components, mating face, and optional module mating faces:

CAUTION: The aluminum bearing race is not intended for load bearing. Do not use the aluminum bearing race with the Tool Changer Master to lift or transport tooling.

Using the Tool Changer's locking mechanism, the stand-alone dust cover's anodized aluminum bearing race couples with the locking components of the Master side, and the dust cover's male coupling and spring plungers attach to the bearing race on the tool side. To remove the dust cover from the Master side, uncouple the cover's bearing race from the Master's locking mechanism.

1.1 Materials of Construction

The Dust Cover Assembly incudes the following features:

Table 1.1—Materials of Construction

Item Number	Description
1	Stainless Steel Tool Cover
2	Aluminum Tool Cover Bearing Race
3	Aluminum Interface Coupling
4	Alloy Steel Socket Head Cap Screw
5	EPDM Rubber Skirt
6	Stainless Steel Ball Plunger
7	Alloy Steel SHSS
Note: Ball plunger material can be made of nylon. Refer to *Table 4.1*.	

Figure 1.1—Materials of Construction

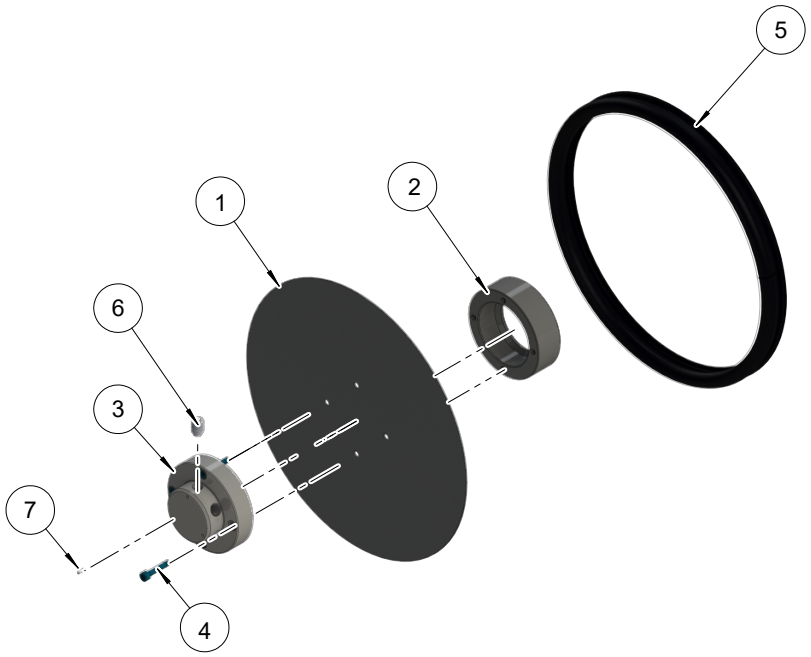
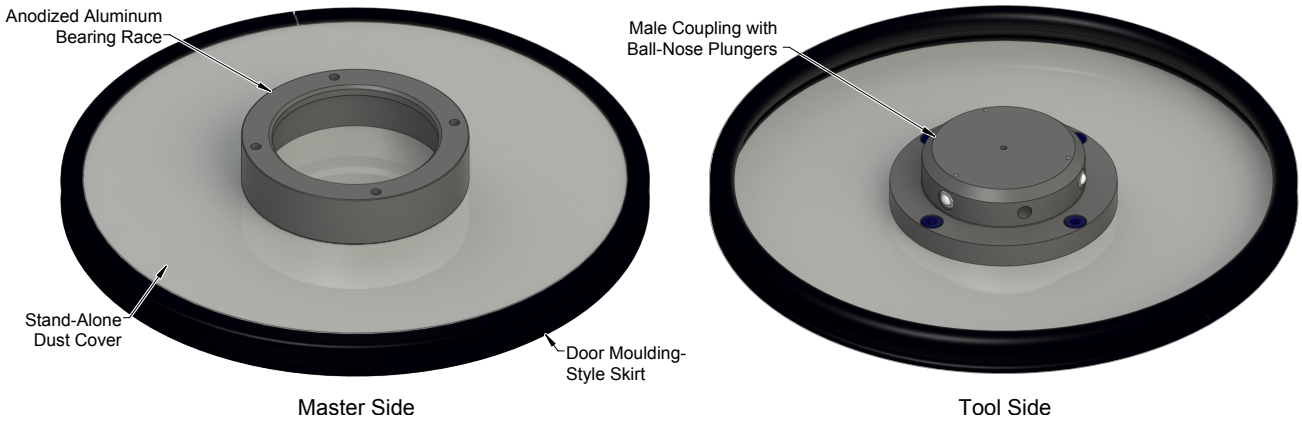


Figure 1.2—Stand-Alone Dust Cover Overview



A variety of dust covers are available to accommodate the size, shape, and fittings of a Tool Changer. For a description of each dust cover, refer to the following table:

Table 1.2—Stand-Alone Dust Covers

Part Number	Description
9120-DC-40-01	QC-40 Series Stand Alone Dust Cover, 11 x 8 inch
9120-DC-60-3	QC-62 Stand-Alone Tool Cover, Dynamic Application with Pin Block Feedback[1]
9120-DC-76-1	QC-76 Series Stand Alone Dust Cover
9120-DC-100-1	QC-100 Series Stand-Alone Dust Cover
9120-DC-150-1	QC-150 Series Stand-Alone Tool Cover
9120-DC-201-1	QC-200 Series Stand-Alone Tool Cover
9120-DC-201-2	QC-200 Series Stand-Alone Tool Cover (PN2 Version)
9120-DC-201-9	QC-200 Series Stand-Alone Tool Cover, with SST Ball Plungers, also compatible with QC-160
9120-DC-201-13	QC-200 Series Stand Alone Dust Cover, Spacer for JL5 or 6
9120-DC-201-15	QC-200 Series Stand Alone Cover, Alignment Pin & Boss
9120-DC-201-17	QC-210 Stand Alone Dust Cover, 189 mm Shield, Integrated QC-210T Features, Pin Blocks for DKL with Dual Double Valve
9120-DC-300-1	QC-300 Series Stand-Alone Dust Cover
9120-DC-300-5	300 Series Dust Cover with Spacer for JL5 or 6
9120-DC-300-14	QC-310 Stand Alone Dust Cover, 457 mm shield with integrated QC-310 Tool plate features, pin blocks for DKL control and signal module with a dual double valve
9120-DC-500-1	QC-500 Series Stand Alone Tool Cover
9120-DC-500-2	QC-500 Series, Stand Alone Dust Cover, Rectangular

Note:
1. Dynamic Application dust covers are rated for acceleration up to 10 G.

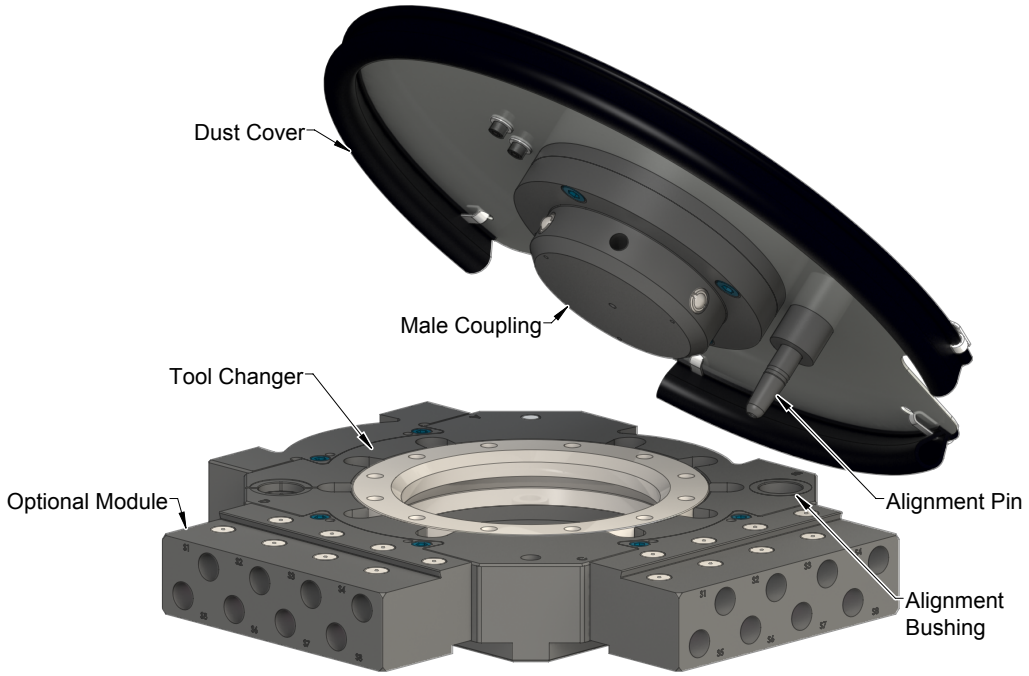
DANGER: Dynamic stand-alone dust covers are the only dust covers that have been tested in dynamic applications up to 10 G acceleration. All other dust covers can potentially detach if used in a dynamic application.

Most dust covers are not rated for applications that require rapid acceleration. The 9120-DC-60-3 stand-alone dust cover is approved for applications with up to 10 G acceleration.

2. Installation

Most stand-alone dust covers do not require special installation other than the initial placement of the cover on the Tool Changer tool. Some models require alignment with Tool Changer alignment features, as in the following example. The alignment pin in the dust cover aligns with the alignment bushing in the Tool plate.

Figure 2.1—Dust Cover with Alignment Pin



3. Operation

CAUTION: In most cases, if the dust cover does not remain parallel to the Tool Changer tool side, the dust cover and Tool Changer Tool plate incur binding and damage.

CAUTION: 9120-DC-60-3 dust cover must remain perpendicular to the Tool Changer tool side face at all times. Otherwise, the dust cover and Tool Changer Tool plate incur binding and damage.

In a typical tool change scenario, the robot removes the dust cover from a tool, places it in a storage location or on another tool, and picks up the required tool. There are generally two options for storing the stand-alone dust cover:

- Move the stand-alone dust cover from the tool that is to be used to another tool.
- Use an aluminum bearing race as a storage location that is separate but near to the tool. Bearing races that are used for stand-alone dust cover storage should be mounted in locations that do not interfere with the operation of the equipment. If you are using a stand-alone aluminum bearing race to store the stand-alone dust cover, additional sensors can be used.

The robot must be taught to pick-up and drop-off the stand-alone dust cover.

3.1 Operational Notes for Non-Standard Stand-Alone Dust Covers

Due to electrical contact sealing features, the 9120-DC-60-3 dust cover requires specific alignment settings and that the dust cover remains perpendicular to the Tool Changer tool side face at all times.

3.2 Use of Sensors with Stand-Alone Dust Covers

The standard lock and unlock sensor input signals can be used to confirm coupling and uncoupling with the stand-alone dust cover.

NOTICE: Only the 9120-DC-201-17 stand-alone dust cover incorporates additional control signals and is compatible with the Ready-to-Lock (RTL) sensor on the Tool Changer Master.

4. Maintenance

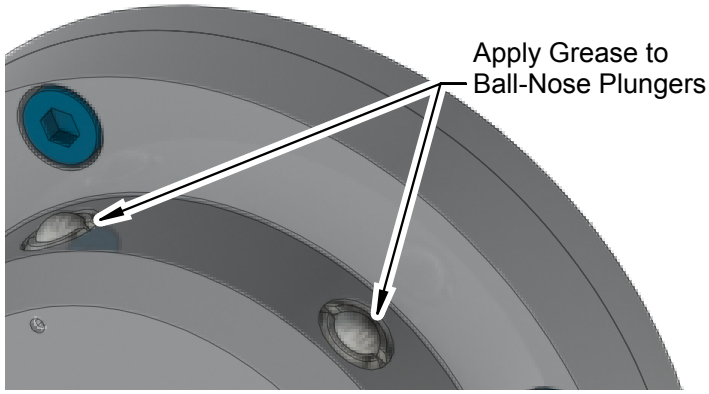
DANGER: If the ball-nose plungers of the dynamic dust covers are not replaced at 50,000 cycles, the dust cover can detach from the Tool Changer during operation.

At every 10,000 cycles, inspect all stand-alone dust covers with the following:

- The aluminum bearing race is free of debris.
- The ball-nose plungers of the male coupling do not show signs of excessive wear.

Stand-alone dust covers with nylon ball-nose plungers do not require lubrication, but stainless steel ball-nose plungers require that lubricant be reapplied periodically.

Figure 4.1—Apply Grease to Stainless Steel Ball-Nose Plunger



Dynamic dust covers require the periodic replacement of ball-nose plungers (refer to *Section 5.2.1—Plunger Replacement*). For preventive maintenance guidelines, refer to the following table:

Table 4.1—Ball-Nose Plungers Preventive Maintenance Schedule

Part Number	Type	Action Required	Cycle period
9120-DC-40-01	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-60-3	Dynamic	Replace ball-nose plungers	50,000 cycles
9120-DC-76-1	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-100-1	Nylon	Lubrication not required	*
9120-DC-150-1			
9120-DC-201-1			
9120-DC-201-2			
9120-DC-201-9	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-201-15	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-201-17	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-300-1	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-300-5	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-300-14	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-500-1	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles
9120-DC-500-2	Stainless steel	Reapply Mobilgrease XHP-222 Special	100,00 cycles

Note:
1. Applications with spot welding or in dirty environments may require a more frequent maintenance schedule.

5. Troubleshooting and Service Procedures

Troubleshooting and service information to help diagnose conditions and make repairs are in the following sections.

5.1 Troubleshooting

Troubleshooting information is provided in the following table.

Table 4.2—Troubleshooting Procedures

Symptom	Possible Cause	Correction
No Lock confirmation for stand-alone dust cover.	Debris on aluminum bearing race.	Clean the debris from the mating face on the aluminum bearing race.
Stand-alone dust cover detaches from tool after drop off.	Worn ball-nose plungers.	Adjust the depth of ball-nose plungers and/or replace ball-nose plungers.

5.2 Service Procedures

Component replacement and adjustment procedures are provided in the following section.

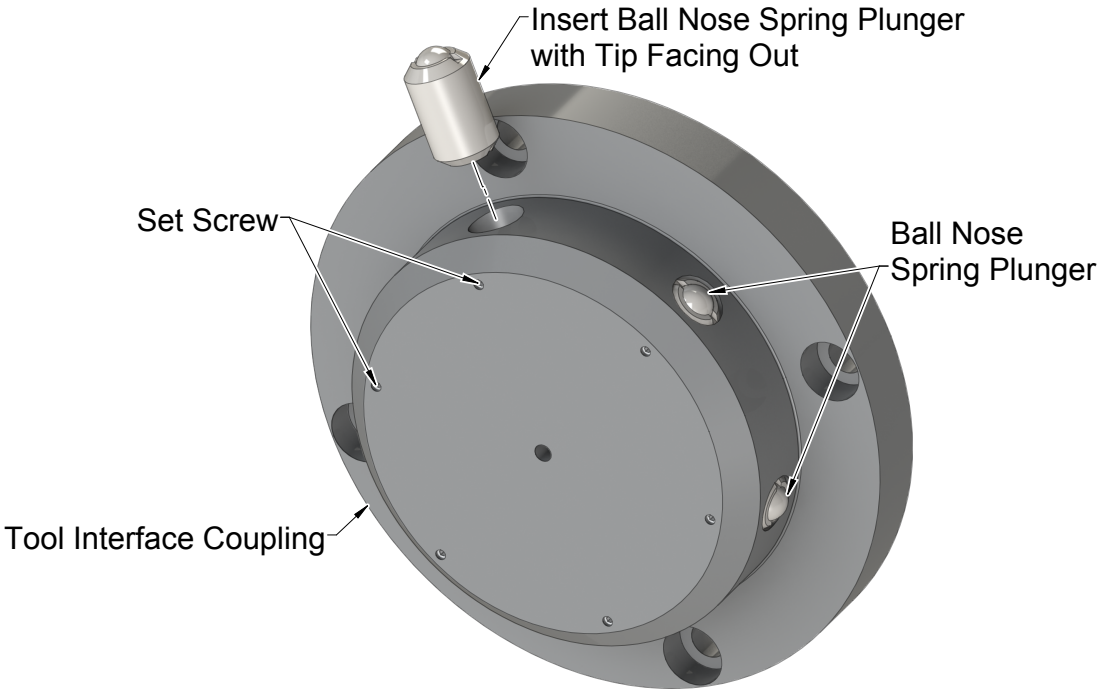
5.2.1 Plunger Replacement

DANGER: If the ball-nose plungers of the dynamic dust covers are not replaced at 50,000 cycles, the dust cover can potentially detach from the Tool Changer tool side during operation.

Tools required: *1.5 mm hex key, flat-head screwdriver (1/4” blade width and 6” length), tool 3810-20-1329*

1. Using a 1.5 mm hex key, loosen the set screws one turn.
2. Using a flat-head screwdriver, remove the ball-nose plungers. The following models require specific tools:
   - 9120-DC-201-17 dust cover requires tool 3810-20-1329, because the backside of the plunger is inaccessible using a screwdriver.
   - 9120-DC-60-3 dust cover requires tool 3810-20-1828.
3. Insert the ball nose spring plungers into the holes on the side of the tool interface coupling. Insert the plungers so that the ball-nose tips face outward. See *Figure 4.2*.

Figure 4.2—QC Series Tool Interface Coupling (Shown)



4. Screw in each plunger so that its metal casing is flush with the outer diameter of the tool interface coupling. To check, use a thin, straight edge and sweep it across the interface coupling's surface towards the ball-nose tip. Ensure that the plunger's metal casing barely contacts the straight edge during the sweep. Check from both directions of each plunger and adjust for the highest side. See *Figure 4.3* and *Figure 4.4*.

> **CAUTION:** If the metal on the plunger casing protrudes past the male interface's cylindrical surface, the bearing race of the Tool Changer tool side might be damaged when the dust cover engages.

Figure 4.3—Using a Straight Edge to Test Ball-Nose Plunger

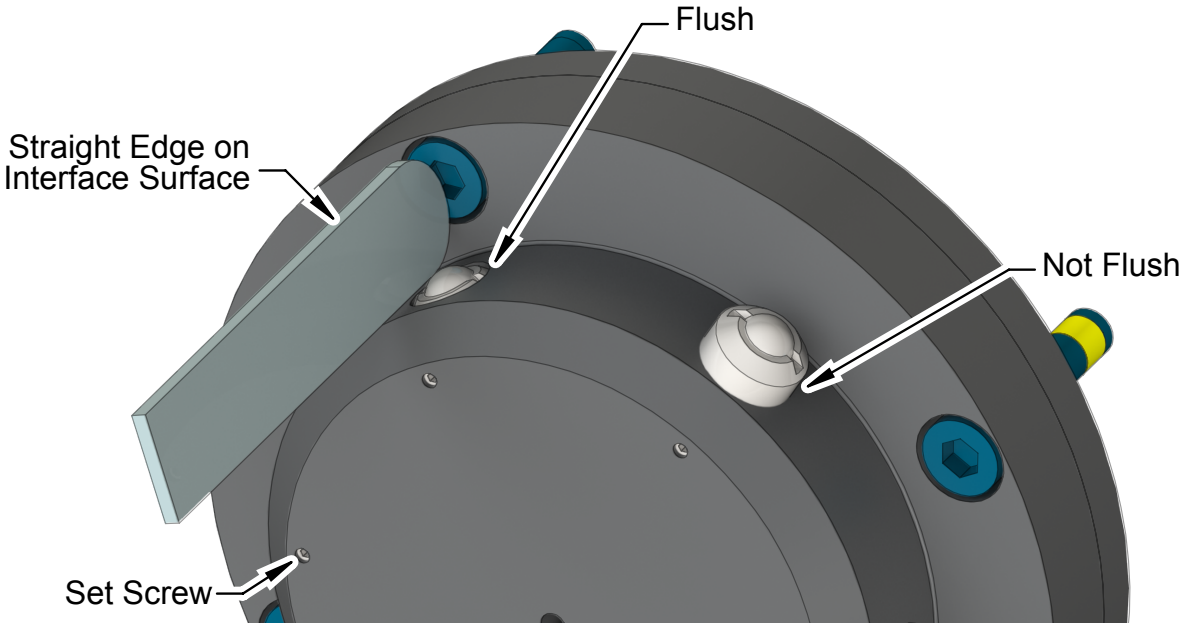
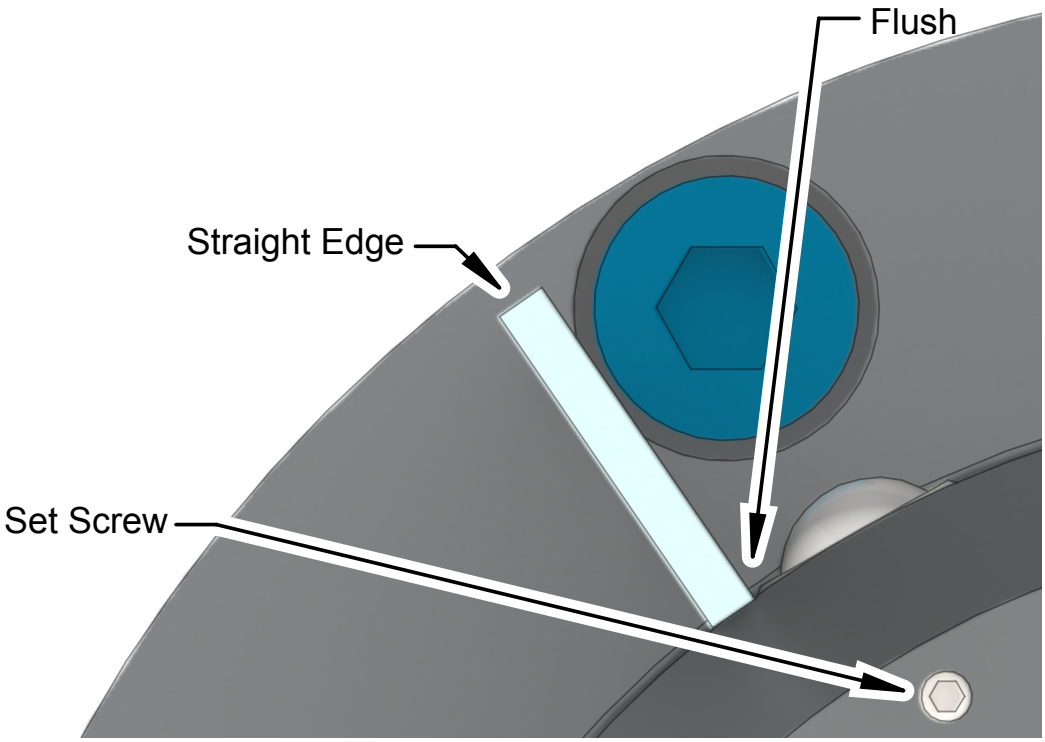


Figure 4.4—Side View of Straight Edge Test for Ball-Nose Plunger



5. Tighten the set screws to the torque specified on the dust cover's drawing. See *Section 8—Drawings*. Use the screwdriver [or tool 3810-20-1329 (3810-20-1828 for 9120-DC-60-3)] to check that the ball plungers are secured.
6. For stainless steel ball-nose plungers, apply a 1/16" film of Mobilgrease XHP-222 Special. For nylon ball nose-plungers, no lubricant is required (refer to *Table 4.1*).

6. Serviceable Parts

Also see: *Section 8—Drawings.*

Table 5.1—9120-DC-40-01	
Part Number	**Description**
0290-70-0000-50-002	½ oz. Tube of Mobilgrease XHP 222 Special
3500-1265020-15	M6 x 20 Flat Head Socket Cap Screw, Class 10.9, Blue dyed Magni-565
3500-1962004-12	Socket Set Screw, ISO 4026-M4x4, Flat Point
3606-1005801-10	Spring Plunger, 5/16-18, Steel Body, SS Ball
3700-20-9174	QC-40 Tool Cover Interface Coupling
3700-20-9173	Tool Cover, 40 Series–11 x 8 inch
3700-20-9172	QC-40 Tool Cover Bearing Race (Aluminum)

Table 5.2—9120-DC-60-3	
Part Number	**Description**
0290-70-0000-50-002	½ oz. Tube of Mobilgrease XHP 222 Special
3500-1962004-21	M4x4 Set Screw, SS
3606-1057800-20	Ball Nose Spring Plunger, SST w/SS Ball, 17 lb. No Locking Element
3810-20-1828	Installation Tool for 5/18 and 8 mm Spring Plunger
4010-0000017-01	V-Ring Seal, V-16A, Nitrile
4010-0000076-01	V-Ring Seal, V-18A, Nitrile
4010-0000030-01	V-Ring Seal, V-22A, Nitrile

Table 5.3—9120-DC-76-1	
Part Number	**Description**
0290-70-0000-50-002	½ oz. Tube of Mobilgrease XHP 222 Special
3500-1066030-15A	M6-1 x 30mm Socket Head Cap Screw MB w/ND Microspheres Epoxy
3500-1958008-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1007500-21	Ball Nose Spring Plunger w/SS Ball, 1/2 Thread, No Lock Element, 12lb.
3700-20-11385	QC-76 Tool Interface Coupling
3700-20-11386	QC-76 Tool Cover
9120-DC-11384	QC-76 Series Bearing Race (Aluminum)

Table 5.4—9120-DC-100-1	
Part Number	**Description**
3500-1068030-15A	M8x30 Socket Head Cap Screw, MB, Pre
3500-1958008-12E	M3x8 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710002-20	Ball Nose Spring Plunger SST w/Nylon Ball, 5/8 Thread, No Lock Element
3700-20-4796	Tool Interface Coupling, QC-100
3700-20-4797	Tool Cover
9120-DC-4795	QC-100 Series Alum. Bearing Race

Table 5.5—9120-DC-150-1	
Part Number	**Description**
3500-1068025-15A	M8 Socket Head Cap Screw, MB, Pre
3500-1958006-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710002-20	Ball Nose Spring Plunger SST w/Nylon Ball, 5/8 Thread, No Lock Element
3700-20-3268	Tool Cover
3700-20-5487	Tool Interface Coupling, QC-150
3700-20-5498	QC-150 Series Alum. Bearing Race

Table 5.6—9120-DC-201-1	
Part Number	**Description**
3500-1068030-15A	M8x30 Socket Head Cap Screw, MB, Pre
3500-1958006-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710002-20	Ball Nose Spring Plunger SST w/Nylon Ball, 5/8 Thread, No Lock Element
3700-20-3267	Tool Interface Coupling
3700-20-3268	Tool Cover
9120-DC-3266	QC-200 Series Alum. Bearing Race

Table 5.7—9120-DC-201-2	
Part Number	**Description**
3500-1068055-15	M8x55 mm Socket Head Cap Screw , MB
3500-1958006-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710002-20	Ball Nose Spring Plunger SST w/Nylon Ball, 5/8 Thread, No Lock Element
3700-20-3267	Tool Interface Coupling
3700-20-3268	Tool Cover
3700-20-3269	Interface Coupling Spacer PN2
9120-DC-3266	QC-200 Series Alum. Bearing Race

Table 5.8—9120-DC-201-9	
Part Number	**Description**
0290-70-0000-50-002	1/2 Oz Tube of Mobilgrease XHP 222 Special
3500-1068030-15A	M8x30 mm Socket Head Cap Screw MB w/ND Microspheres Epoxy
3500-1958006-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710001-20	Ball Nose Spring Plunger w/SS Ball, 5/8 Thread, No Lock Element, 50lb.
3700-20-3267	Tool Interface Coupling
3700-20-11916	Tool Cover
9120-DC-3266	QC-200 Series Alum. Bearing Race

Table 5.9—9120-DC-201-13	
Part Number	**Description**
0290-70-0000-50-002	1/2 Oz Tube of Mobilgrease XHP 222 Special
3500-1958006-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710001-20	Ball Nose Spring Plunger w/SS Ball, 5/8 Thread, No Lock Element, 50lb.
3810-20-1329	.375” Ball Nose Plunger Removing Tool

Table 5.10—9120-DC-201-15	
Part Number	**Description**
3500-1068035-15A	M8-1.25 x 35 mm Socket Head Cap Screw, Blue, Pre-Applied
3500-2265025-15	M6X25 Flat Head Socket Cap Screw, Class 12.9, Blue-Dyed Magni-565
3500-1958006-12E	M3-0.5 x 6, Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710001-20	Ball Nose Spring Plunger SST w/SS Ball, 50 lb, No Lock Element
3700-20-5265	Spacer, Interface Coupling PA2
3700-20-8936	Shield, 200 Series Dust Cover, 14.5
7710-8969900-00	EPDM Rubber Molding

Table 5.11—9120-DC-201-17	
Part Number	**Description**
3500-1068035-15A	M8-1.25 x 35 mm Socket Head Cap Screw, Blue, Pre-Applied
3500-2265025-15	M6X25 Flat Head Socket Cap Screw, Class 12.9, Blue-Dyed Magni-565
3500-1958006-12E	M3-0.5 x 6, Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1710001-20	Ball Nose Spring Plunger SST w/SS Ball, 50 lb, No Lock Element
3700-20-5265	Spacer, Interface Coupling PA2
3700-20-10285	Shield, 200 Series Dust Cover, 14.625 Dia.
7710-8969900-00	EPDM Rubber Molding
9005-20-8609	Dummy Module for SADC Interface with DKL and Dual Double Valve

Table 5.12—9120-DC-300-1	
Part Number	**Description**
0290-70-0000-50-002	1/2 Oz Tube of Mobilgrease XHP 222 Special
3500-1068050-15	M8x50 Socket Head Cap Screw, MB
3500-1958006-12E	M3x6 Socket Set Screw, Flat Point, Black Oxide, Nylon Patch
3606-1-20	Ball Nose Spring Plunger w/SS Ball, 5/8 Thread, No Lock Element, 50lb.
3700-20-4552	Tool Interface Coupling, QC-300
3700-20-4553	Tool Cover, QC300
3700-20-4561	Spacer, Tool Cover, QC-300
9120-DC-4551	Tool Cover Bearing Race, QC-300

Table 5.13—9120-DC-300-5	
Part Number	**Description**
0290-70-0000-50-002	1/2 Oz Tube of Mobilgrease XHP 222 Special
3500-1068050-15	M8x50 Socket Head Cap Screw, MB
3500-1958006-12	M3-0.5 x 6, Socket Set Screw, Flat Point, Black Oxide
3606-1710001-20	Ball Nose Spring Plunger w/SS Ball, 5/8 Thread, No Lock Element, 50lb.
3700-20-4552	Tool Interface Coupling, QC-300
3700-20-4553	Tool Cover, QC300
3700-20-5310	Spacer 3/16", QC-300 Series Tool Cover
9120-DC-4551	Tool Cover Bearing Race, QC-300

Table 5.14—9120-DC-300-14	
Part Number	**Description**
0290-70-0000-50-002	1/2 Oz Tube of Mobilgrease XHP 222 Special
3500-1068030-15A	M8x30 Socket Head Cap Screw, Class 12.9, ISO4762/DIN912, Corrosion Protection Coating, YL M-spheres/IFI 525
3500-1958006-12E	M3-0.5 x 6, Socket Set Screw, Flat Point, Black Oxide
3606-1710001-20	Ball Nose Spring Plunger w/SS Ball, 5/8 Thread, No Lock Element, 50lb.
3700-20-8847	Tool Interface Coupling, QC-300, 6 Detent
3700-20-11269	Shield, 18” Diameter with holes for (1) Alignment Pin
3700-20-5310	Spacer 3/16", QC-300 Series Tool Cover
3700-20-5313	7/8” Alignment Pin (Guide Pin), Flange Mount
3500-1066014-15	M6X14 Socket Head Cap Screws for the alignment pin, Class 12.9, ISO4762/DIN912, Corrosion Protection Coating
3700-20-11265	QC-310 SADC Interface Plate with Integrated Race, Alignment Bores, RTL Targets, and Ledgemount
9005-20-8609	DKL Cover Module

Table 5.15—9120-DC-500-1	
Part Number	**Description**
0290-70-0000-50-002	½ oz. Tube of Mobilgrease XHP 222 Special
3500-1070030-15A	M10x30 mm Socket Head Cap Screw, Blue Dyed Magni-565 w/ND Microspheres Epoxy
3500-1958006-12	M3-0.5x6, Socket Set Screw, Flat Point
3606-1710001-20	Ball Nose Spring Plunger SST w/SS Ball, 50 lb, No Lock Element
3700-20-5726	Bearing Race, QC-510 Stand Alone Dust Cover
3700-20-5727	Master Coupling, QC-510 Stand Alone Dust Cover
3700-20-5728	Dust Cover, QC-510

Table 5.16—9120-DC-500-2	
Part Number	**Description**
0290-70-0000-50-002	½ oz. Tube of Mobilgrease XHP 222 Special
3500-1066012-15A	M6x12 Socket Head Cap Screw, Blue Dyed Magni ND Microspheres
3500-1070030-15A	M10x30 mm Socket Head Cap Screw, Blue Dyed Magni-565 w/ND Microspheres Epoxy
3500-1958006-12	M3-0.5x6, Socket Set Screw, Flat Point
3606-1710001-20	Ball Nose Spring Plunger SST w/SS Ball, 50 lb, No Lock Element
3700-20-5726	Bearing Race, QC-510 Stand Alone Dust Cover
3700-20-5727	Master Coupling, QC-510 Stand Alone Dust Cover
3700-20-8289	Dust Cover, 500 Series – Square
3700-20-8290	Alignment Pin, 500 Series Dust Cover
3700-20-8291	Guide Boss, 500 Series Dust Cover

7. Specifications

Table 6.1—Stand-Alone Dust Cover Weights	
Part Number	**Weight**
9120-DC-40-01	2.3 lbs (1.1 kg)
9120-DC-60-3	4.0 lbs (1.8 kg)
9120-DC-76-1	4.5 lbs (2.1 kg)
9120-DC-100-1	6.5 lbs (2.9 kg)
9120-DC-150-1	6.2 lbs (2.8 kg)
9120-DC-201-1	6.4 lbs (2.9 kg)
9120-DC-201-2	7.0 lbs (3.2 kg)
9120-DC-201-9	8.2 lbs (3.7 kg)
9120-DC-201-13	7.3 lbs (3.3 kg)
9120-DC-201-17	9.8 lbs (4.4 kg)
9120-DC-300-1	13.3 lbs (6.0 kg)
9120-DC-300-5	14.8 lbs (6.7 kg)
9120-DC-300-14	18.8 lbs (8.5 kg)
9120-DC-500-1	17 lbs (7.7 kg)
9120-DC-500-2	15.8 lbs (7.2 kg)

Table 6.2—Stand-Alone Bearing Race Weights	
Part Number	**Weight**
QC-76 Series	0.7 lbs (0.35 kg)
QC-100 Series	1.0 lbs (0.5 kg)
QC-150 Series	1.3 lbs (0.6 kg)
QC-200 Series	1.3 lbs (0.6 kg)
QC-300 Series	3.1 lbs (1.4 kg)
QC-500 Series	5.0 lbs (2.3 kg)

8. Drawings

Drawings are available on the *ATI website* or by contacting an ATI representative.