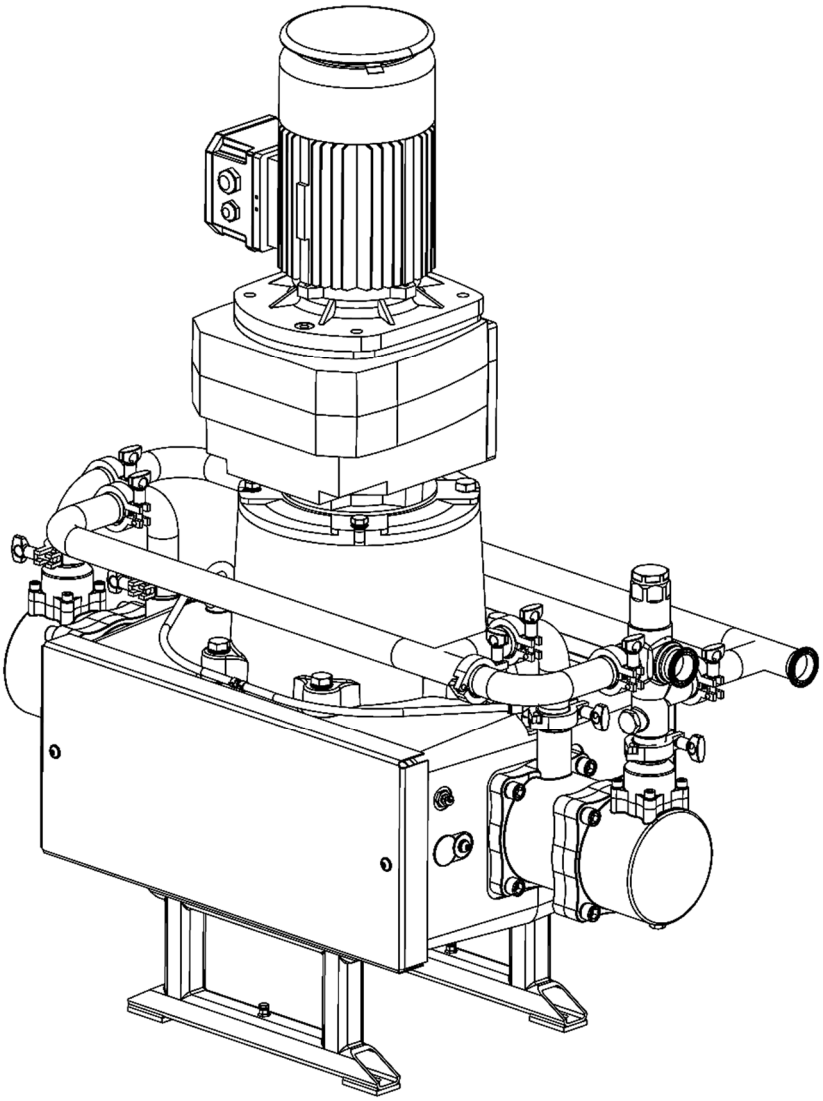
Service Manual
EN

E2-60
Electric Drive Pump

- 104085 (EU Model)
- 104086 (USA Model)
- 104087 (Japan Model)



Product Description / Object of Declaration:	**Electric Pump E2, E4, EV2**	**EN**
This Product is designed for use with:	Solvent and Water based materials	
Suitable for use in hazardous area:	Zone 1	
Protection Level:	II 2 G X IIB T4 (Pump) II 2 G Exd/Exde IIB T4 IP55 (Motor) CE0722 II 2 GD ck T4 (Gearbox)	
Notified body details and role:	Element Materials Technology (0891) Lodging of Technical file	
This Declaration of conformity / incorporation is issued under the sole responsibility of the manufacturer:	Carlisle Fluid Technologies UK Ltd, Ringwood Road, Bournemouth, BH11 9LH. UK	

EU Declaration of Conformity

CE

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Machinery Directive 2006/42/EC
ATEX Directive 2014/34/EU
EMC Directive 2014/30/EU
by complying with the following statutory documents and harmonized standards:
EN ISO 12100:2010 Safety of Machinery - General Principles for Design
EN 12621:+A1:2010 Machinery for the supply and circulation of coating materials under pressure - Safety requirements
EN 1127-1:2011 Explosive atmospheres - Explosion prevention - Basic concepts
EN 13463-1:2009 Non electrical equipment for use in potentially explosive atmospheres - Basic methods and requirements
EN 13463-5:2011 Non electrical equipment for use in potentially explosive atmospheres - Protection by constructional safety "c"
EN 13463-8:2003 Non-electrical equipment for potentially explosive atmospheres. Protection by liquid immersion 'k'
EN 60079-0:+A11:2013 Explosive atmospheres - Equipment. General requirements
EN 60079-1:2014 Explosive atmospheres - Equipment protection by flameproof enclosures "d"
EN 60079-7:2015 Explosive atmospheres. Equipment protection by increased safety "e"
EN 60034-1: 2010 Rotating electrical machines

Providing all conditions of safe use / installation stated within the product manuals have been complied with and also installed in accordance with any applicable local codes of practice.

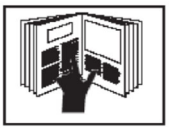
Signed for and on behalf of Carlisle Fluid Technologies UK Ltd:		D Smith 29/6/18	Director of Sales (EMEA) Bournemouth,BH11 9LH,UK

In this part sheet, the words WARNING, CAUTION and NOTE are used to emphasize important safety information as follows:

⚠ WARNING	⚠ CAUTION	NOTE
Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.	Hazards or unsafe practices which could result in minor personal injury, product or property damage	Important installation, operation or maintenance information.

⚠ WARNING

Read the following warnings before using this equipment.



READ THE MANUAL. Before operating finishing equipment, read and understand all safety, operation and maintenance information provided in the operation manual.

WEAR SAFETY GLASSES. Failure to wear safety glasses with side shields could result in serious eye injury or blindness.

DE-ENERGIZE, DE-PRESSURISE, DISCONNECT AND LOCK OUT ALL POWER SOURCES DURING MAINTENANCE. Failure to de-energize, disconnect and lock out all power supplies before performing equipment maintenance could cause serious injury or death.

NOISE LEVELS. The A-weighted sound level of pumping and spray equipment may exceed 85 dB(A) depending on equipment settings. Actual noise levels are available on request. It is recommended that ear protection is worn at all times while equipment is in use.

INSPECT THE EQUIPMENT DAILY. Inspect the equipment for worn or broken parts on a daily basis. Do not operate the equipment if you are uncertain about its condition.

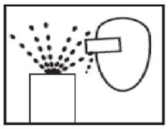
EQUIPMENT MISUSE HAZARD. Equipment misuse can cause the equipment to rupture, malfunction or start unexpectedly and result in serious injury.

HIGH PRESSURE CONSIDERATION. High pressure can cause serious injury. Relieve all pressure before servicing. Spray from the gun, hose leaks or ruptured components can inject fluid into your body and cause extremely serious injury.

STATIC CHARGE. Fluid may develop a static charge that must be dissipated through proper grounding of the equipment, objects to be sprayed and alll other electrically conductive objects in the dispensing area. Improper grounding or sparks can cause a hazardous condition and result in fire, explosion or electric shock and other serious injury.

PROP 65 WARNING. WARNING: This product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

AUTOMATIC EQUIPMENT. Automatic equipment may start suddenly without warning.



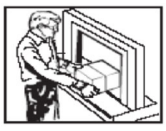
PROJECTILE HAZARD. You may be injured by venting liquids or gases that are released under pressure, or flying debris.

KNOW WHERE AND HOW TO SHUT OFF THE EQUIPMENT IN CASE OF AN EMERGENCY.

PRESSURE RELIEF PROCEDURE. Always follow the pressure relief procedure in the equipment instruction manual.

OPERATOR TRAINING. All personnel must be trained before operating finishing equipment.

PACEMAKER WARNING. You are in the presence of magnetic fields which may interfere with the operation of certain pacemakers.



KEEP EQUIPMENT GUARDS IN PLACE. Do not operate the equipment if the safety devices have been removed.

NEVER MODIFY THE EQUIPMENT. Do not modify the equipment unless the manufacturer provides written approval.

PINCH POINT HAZARD. Moving parts can crush and cut. Pinch points are any areas where ther are moving parts.

IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PROVIDE THIS INFORMATION TO THE OPERATOR OF THE EQUIPMENT.

SPECIFICATION

Nominal pump stroke:	50mm [1.97 ins]
E2-60* Maximum fluid pressure:	20 bar [290psi]
E2-60 Nominal flow volume / cycle:	1.50 l/m [0.40 US gal/m]
Fluid Output @ 20 HZ [10 cycles/min]	15 l/m [4.0 US gal/m]
Fluid Output @ 80 HZ [40 cycles/min]	60 l/m [16.0 US gal/m]
Fluid inlet connection: 'A'	1 ½" Sanitary
Fluid outlet connection: 'B'	1 ½" Sanitary
Gearbox Ratio:	61:1
Gearbox Oil (EU Model)	Synthetic 220 (typically Agip Blasia S)
Gearbox Oil (USA Model)	SHC 630 Synthetic Oil
AC Induction Electric Motor- EU Model	400V 3PH 3.0 kW @ 50HZ
3.0 kW 4Pole 1400 RPM	EEx d 11B T3
3.0 kW 4Pole 1400 RPM - Japan Model	Rated 20 to 80 Hz (c/w thermisters)
AC Induction Electric Motor - USA Model	460V 3PH 1 Hp @ 60HZ Class 1, Group D. Rated 20 to 80 Hz (c/w thermisters)
Total Weight of Pump (inc electric motor)	295kg [650lbs]
Max. Inlet Pressure	2 bar [29 psi]

NOTE

* Pressure when used in 'Smart Mode' (Closed Loop Pressure Mode)

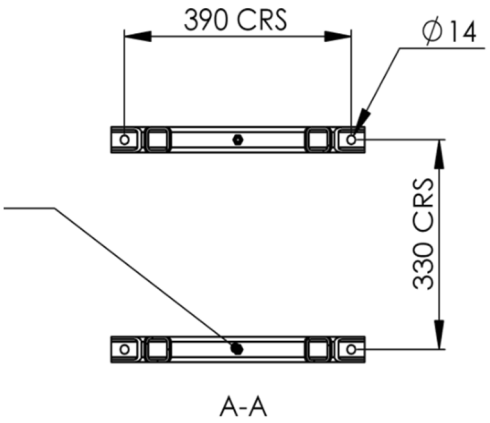
Reduce Maximum working pressure by 2 bar [29 psi] when using in Open Loop Flow Mode

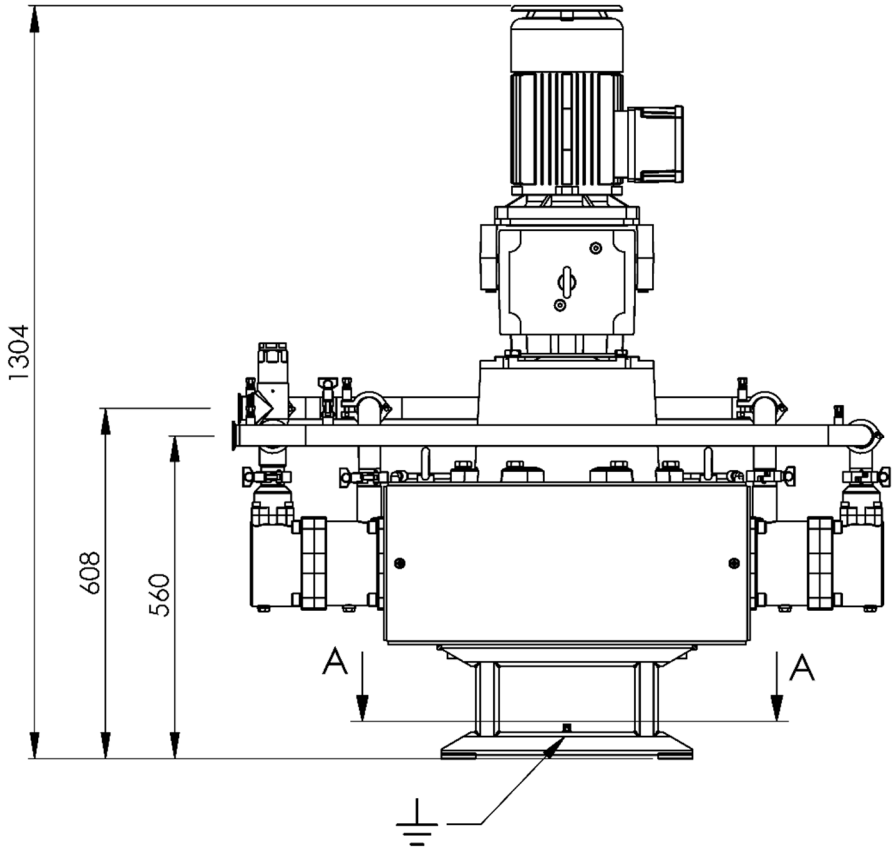
e.g. E2-60 Maximum Set Pressure of 18 bar to operate Pump on a 24/7 basis

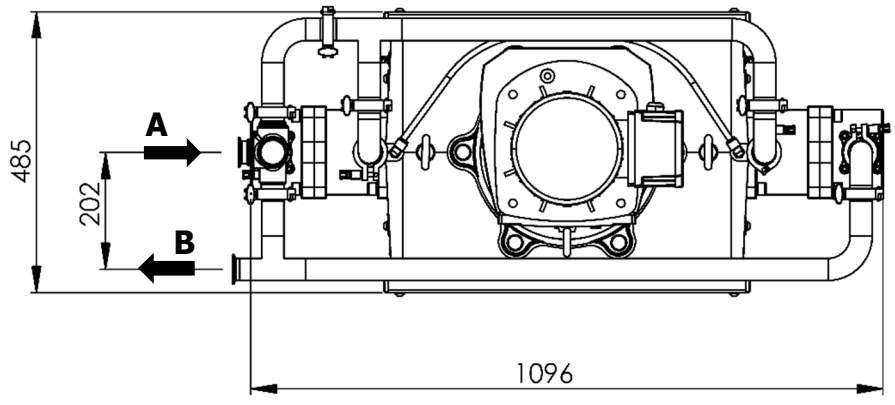
DIMENSIONS AND MOUNTING DETAILS

M6 HEX.
Head screw for pump earth grounding;

the Pump Frame must be wired to a suitable earth ground to ensure that there is no possibility of static build up.







INSTALLATION

The Pump Units are designed for location in Zone 1 Hazardous areas, ATEX Category 2.

Electrical connections must be in accordance with Local Regulations for installation in Hazardous Areas.

It is recommended that a Local Control Box is positioned in close proximity to the pump, as a convenient local Start / Stop facility and Junction box.

The main Pump Control Panel must be positioned within an Electrically Safe Area.

A Pressure switch (and/or Pressure relief valve) must be connected to the outlet manifold port and set to stop the pump (or relieve the fluid pressure) in the event of the system overpressure

e.g. blocked paint filter, otherwise Pump warranty may be invalidated.

This is necessary to protect the Pump mechanics from overload.

An adapter to mount a pressure switch and pressure sensor is available, see accessories.

It is recommended that the switch setting is set to 1 bar [14.5 psi] above the maximum required pressure.

The maximum pressure setting the Pressure Switch should be set to is 20 bar [305 psi] and 17 bar [246 psi] respectively.

The Pressure Switch is classified as simple apparatus and as such should be electrically connected as part of an intrinsically safe electrical circuit.

The Pressure Switch should be wired as a Normally Closed contact (fail safe) and be hard wired to stop the motor on operation, to minimise response time.

INSTALLATION

Electric Motor

The motor must be wired to provide a clockwise direction of the cam.

Electric Motors for hazardous areas are specially designed to comply with official regulations concerning the risk of explosion.

If improperly used, badly connected, or altered no matter how minor, their reliability could be in doubt.

Standards relating to the connection and use of electrical apparatus in hazardous areas must be taken into consideration.

Only trained personnel familiar with these standards should handle this type of apparatus.

The motor is fitted with PTC temperature sensors (Thermistors).

Once operating temperature is reached, this device quickly changes the resistance;

it must be connected to a suitable releasing device mounted within the control panel and wired to stop the motor if an over temperature occurs.

Inverter

Required Inverter Settings	Value
Maximum Hz Output	80 Hz
Mininmum Hz Output	20 Hz
Acceleration Ramp	5 Seconds
Deceleration Ramp	0.1 Seconds
Rated Motor Power	3.0 kW
Rated Motor Current	6.7 A
Rated Motor Power Factor	0.81
Rated Motor Efficiency	80%
Rated Motor Frequency	50 Hz
Rated Motor Voltage	400 V
Rated Motor Speed	1440 RPM

INSTALLATION

• Attach suitable flexible hoses to the inlet and outlet connections.

e.g.,
• Suction - Ø38 I.D. [-1 to 10 bar working pressure]

• Outlet - Ø32 - 38 I.D. [20 bar working pressure]

• Ensure adequate air space around the Pump for maintenance and electric motor cooling requirements.

• Check that the oil plug on top of Gearbox has been replaced with the correct venting plug.

The vent plug is supplied in a bag attached to the gearbox.

• Ensure the gearbox is filled with oil.
(The gearbox is filled with the correct amount of oil at the factory)

SYSTEM OPERATION

Before starting:-

• Ensure all electrical and mechanical connections are correctly made.

• All required interlocks are tested and operational.

• Suitable material for pumping is available at the suction hose.

• The outlet connection is not blocked or isolated by any valves.

• Check the gearbox oil level, please note the the gearbox is supplied with life lubricant and does not need any maintenance.

Set the pump speed to the minimum frequency 20 Hz and start the pump to remove any air from the circuit.

Inspect for any system leaks.

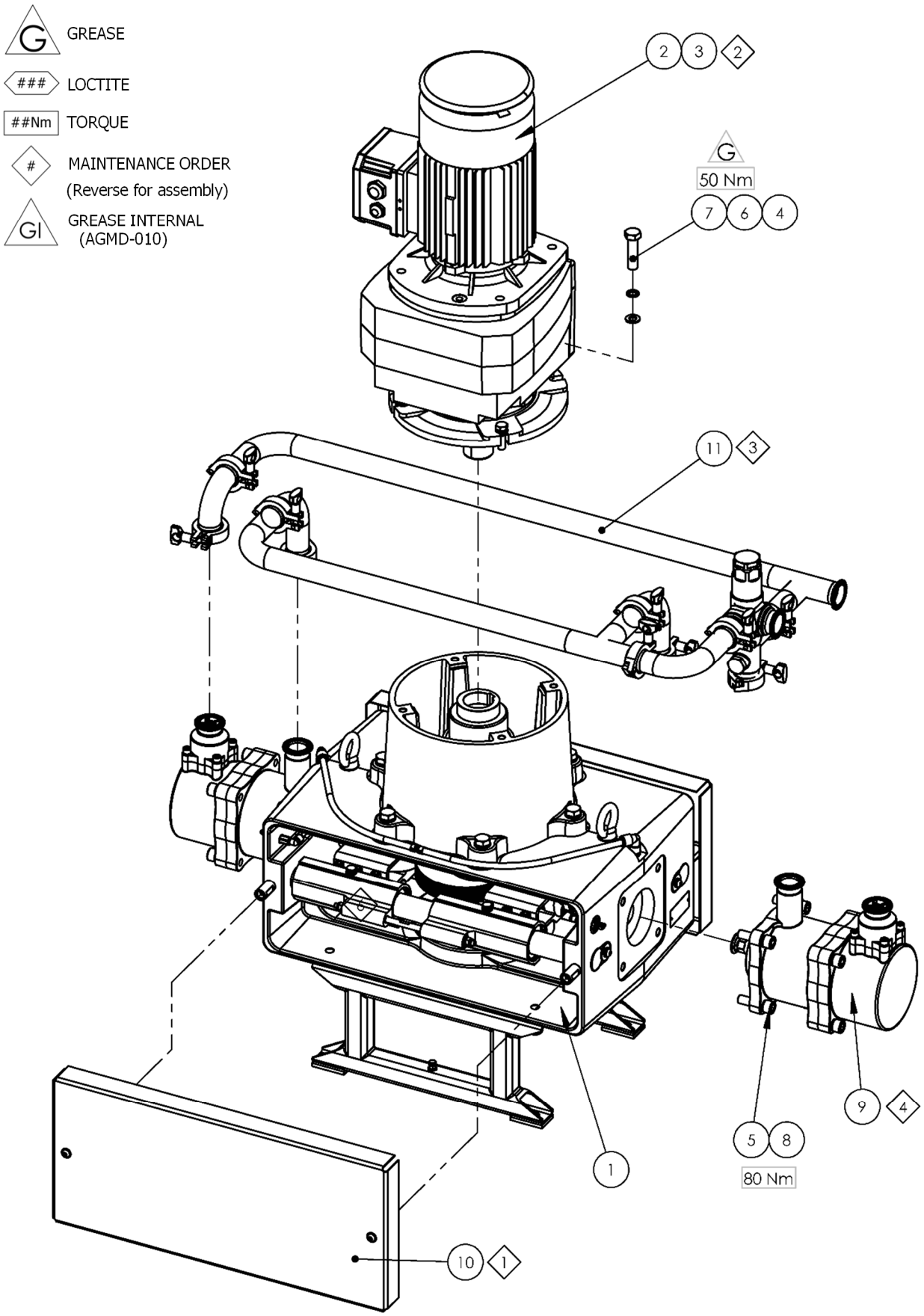
Set the pump cycle rate to achieve the required paint volume and then adjust the system back pressure regulator to achieve the desired system fluid pressure.

Smart Mode:

The return line 'back pressure' regulator responds to the changes in system fluid flow demand, (due to variable paint usage) by dynamically adjusting the paint flow rate returning to the system paint tank, thus maintaining the set pressure.

PARTS LIST - Pump Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	193710	E2-60 MECHANICAL ASSY	1	
2	194921	GEARBOX & ELECTRIC MOTOR	1	*EU MODEL*
2	192685	ELECTRIC MOTOR (Not Shown)	1	*USA MODEL*
3	192819	GEARBOX (Not Shown)	1	*JAPAN MODEL*
3	194946	ATEX GEARBOX	1	*JAPAN MODEL*
3	192687	GEARBOX (Not Shown)	1	*USA MODEL*
4	164470	M12 WASHER	4	
5	165077	M14 SPRING WASHER (ST ST)	8	
6	165137	M12 SPRING WASHER (ST ST)	4	
7	164469	M12 x 40 CAP HEAD SCREW	4	
8	164469	M14 x 40 CAP HEAD SCREW	8	
9	193456	FLUID SECTION	2	
10	194560	COVER C/W CAP FIXINGS	2	
11	194903	MANIFOLD & PRV ASSEMBLY	1	


G GREASE
LOCTITE
##Nm TORQUE
MAINTENANCE ORDER
(Reverse for assembly)
GI GREASE INTERNAL
(AGMD-010)
2 3 2
G
50 Nm
7 6 4
11 3
9 4
5 8
80 Nm
1
10 1

PARTS LIST - PRV and Manifold Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	104168	1.5" PRESSURE RELIEF VALVE	1	
2	192008	1.5" SANITARY GASKET	10	
3	192009	SANITARY CLAMP	10	
4	193746	1.5" ELBOW	1	
5	193747	INLET MANIFOLD	1	
6	193748	OUTLET MANIFOLD	1	
7	194591	1.5" ELBOW	1	
8	194593	1.5" ELBOW	1	

KEY

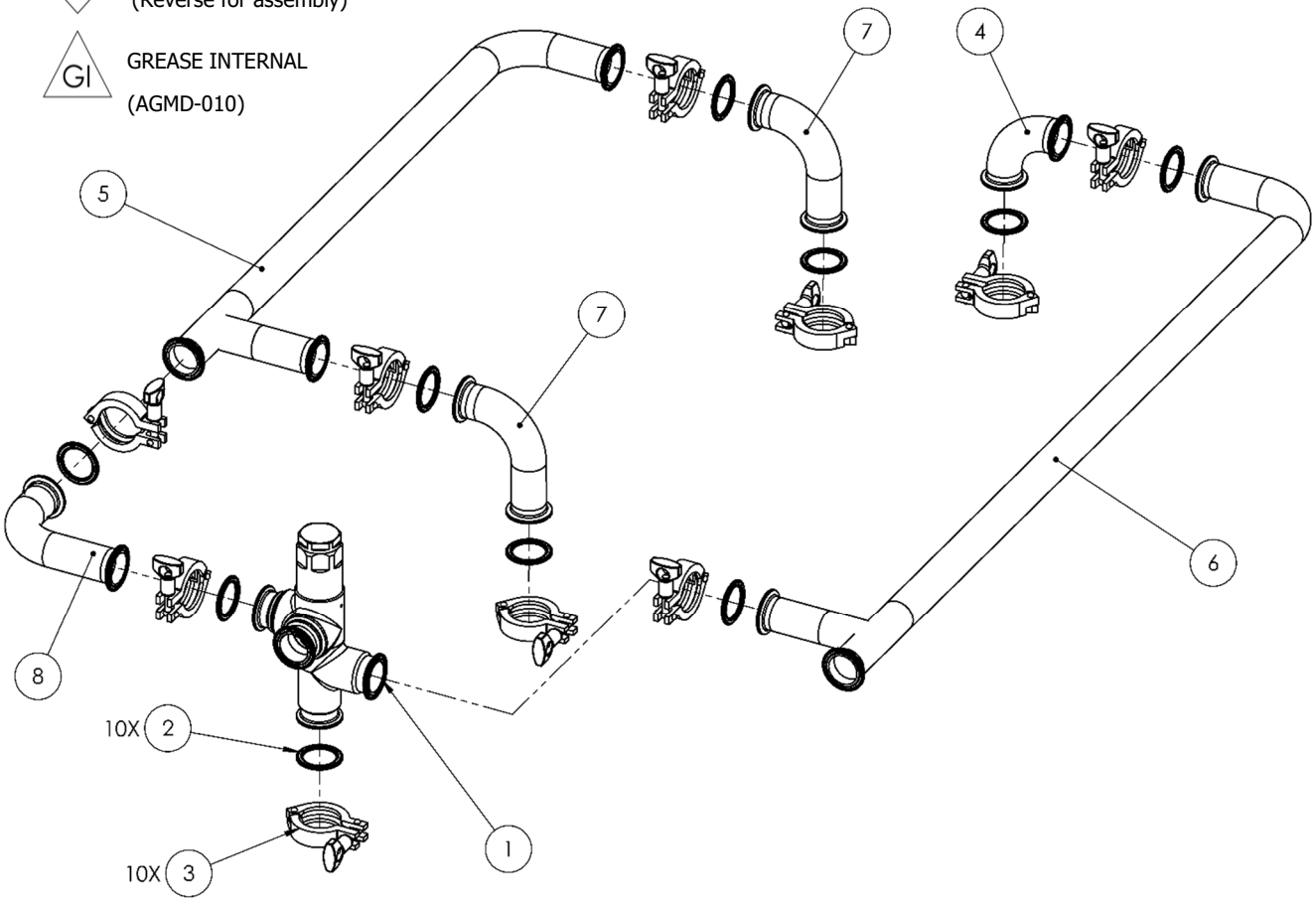
G GREASE

LOCTITE

##Nm TORQUE

MAINTENANCE ORDER
(Reverse for assembly)

GI GREASE INTERNAL
(AGMD-010)

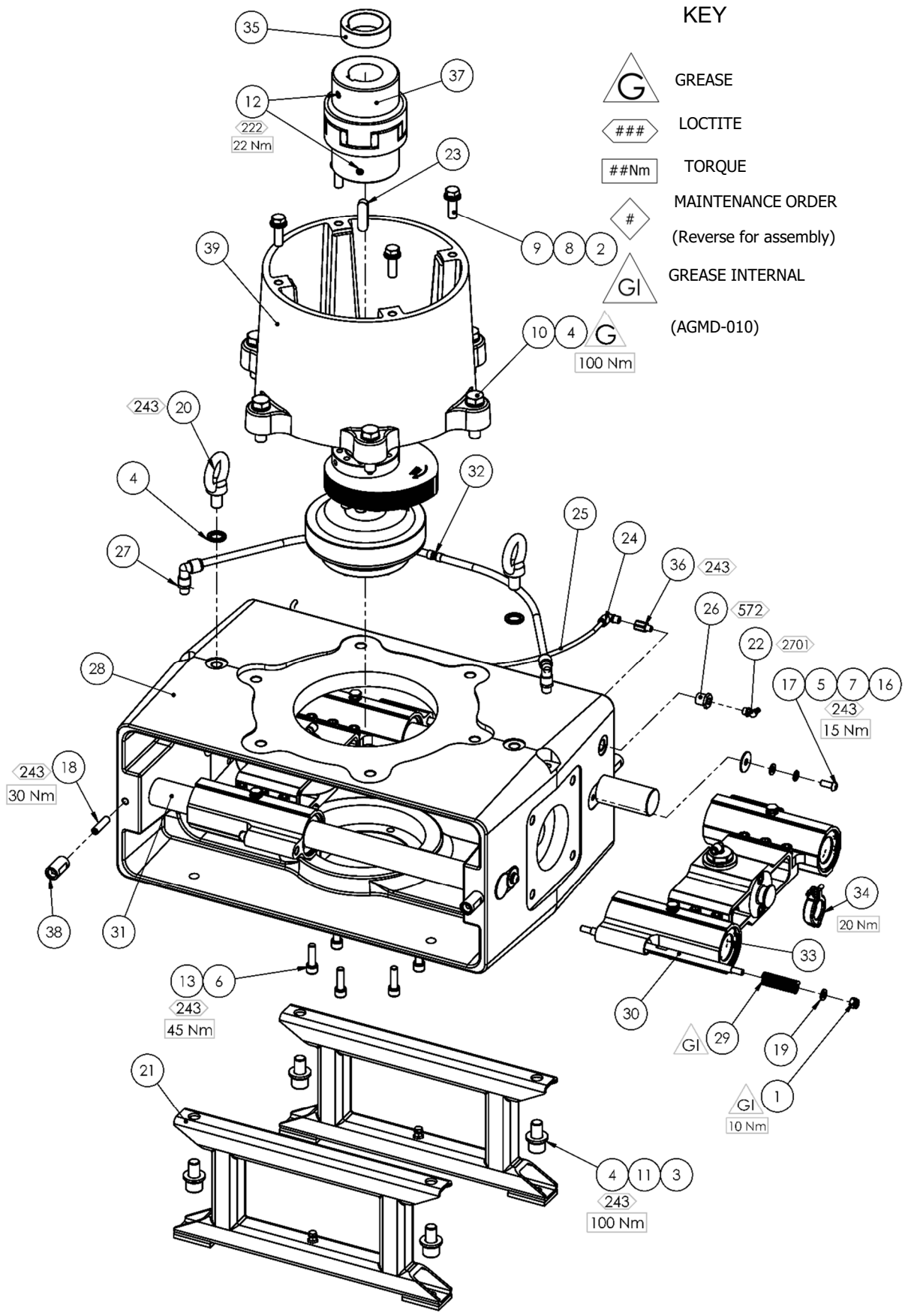


PARTS LIST - Mechanical Assembly

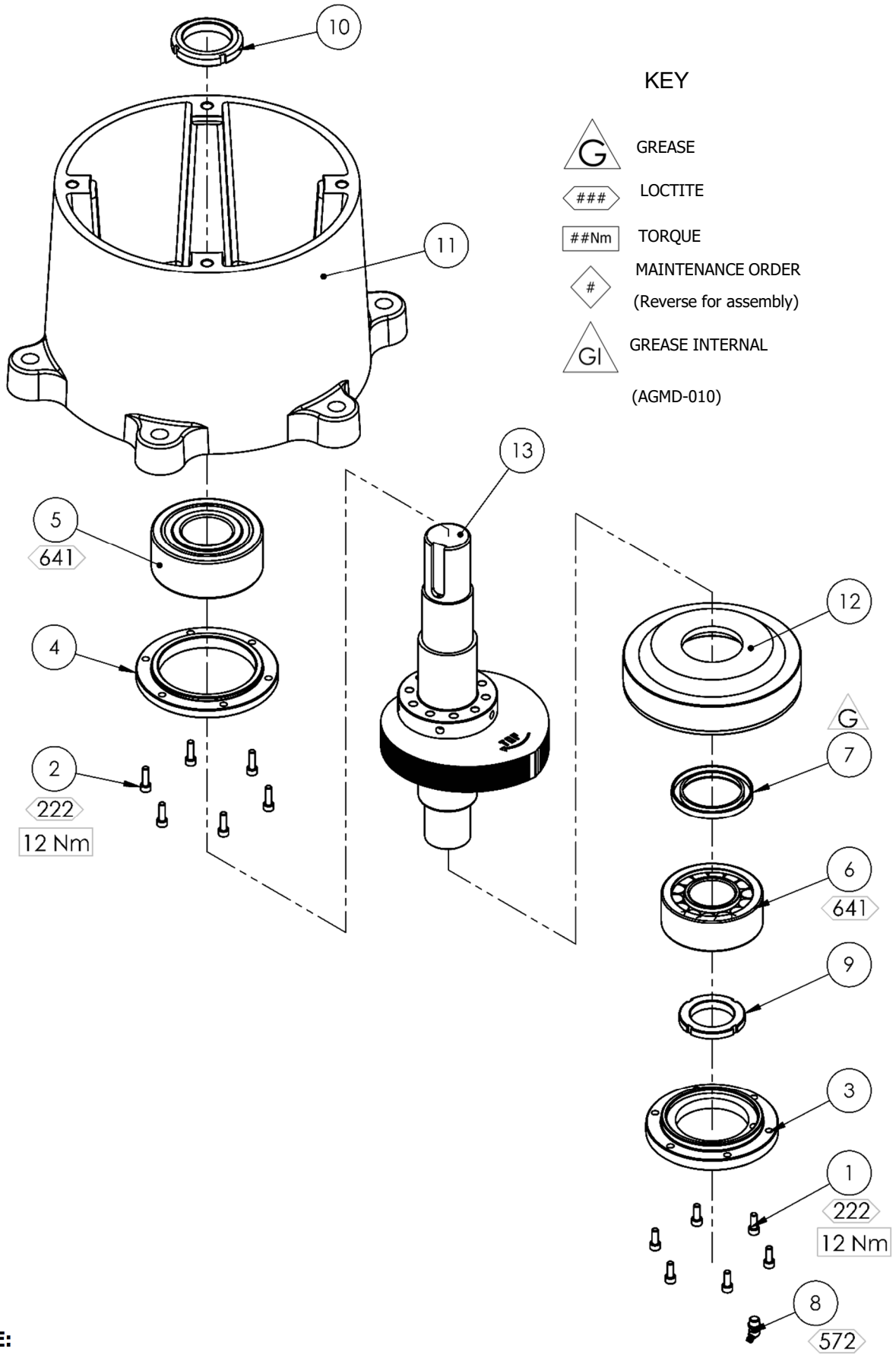
ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	163161	M8 NYLOC NUT	4	
2	164470	M12 WASHER	4	
3	165097	M16 WASHER	4	
4	165100	M16 SPRING WASHER	12	
5	165108	M8 SPRING WASHER	4	
6	165123	Ø10 SPRING WASHER	6	
7	165134	Ø8 WASHER	4	
8	165137	M12 SPRING WASHER	4	
9	164469	M12 x 40 HEX HEAD CAP SCREW	4	
10	165371	M16 x 60 SCREW	6	
11	165588	M16 x 30 CAP HEAD SCREW	4	
12	165671	M10 x 20 GRUB SCREW	2	
13	165948	M10 x 40 CAP HEAD SCREW	6	
14	165958	M6 x 20 HEX HEAD CAP SCREW	2	
15	165959	M6 WASHER (BRASS)	2	
16	177020	M8 MUD GUARD WASHER - STST	4	
17	177021	M8 x 20 SCREW	4	
18	177022	M10 x 40 GRUB SCREW	4	
19	192400	SPRING WASHER	4	
20	192441	M16 EYE BOLT	2	
21	192634	MOUNTING FRAME	2	
22	192650	GREASE NIPPLE	2	
23	192654	14 x 9 x 50 KEY	1	
24	192661	PUSH IN ELBOW	2	
25	192662	Ø6 GREASE HOSE	2	❺
26	192870	GREASE BULKHEAD	2	
27	193131	PUSH IN ELBOW	2	

Parts list continued.

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
28	193430	MAIN BODY MACHINING	1	
29	193434	CARRIAGE SPRING	4	
30	193442	LINEAR SPRING PIN	2	
31	193449	LINEAR BEARING ROD	2	❹
32	193454	LEAK DETECTION HOSE ASSY	2	
33	193455	CARRIAGE ASSEMBLY	2	
34	193457	SHAFT CLAMP ASSY	2	
35	193698	Ø50 COUPLING SPACER	1	
36	193750	ADAPTER	2	
37	193796	DRIVE SHAFT COUPLING	1	
38	194541	SPACER	4	
39	194585	BELL HOUSING CAM ASSY	1	



** Tighten bolts holding carriage ends once pump is fully assembled.



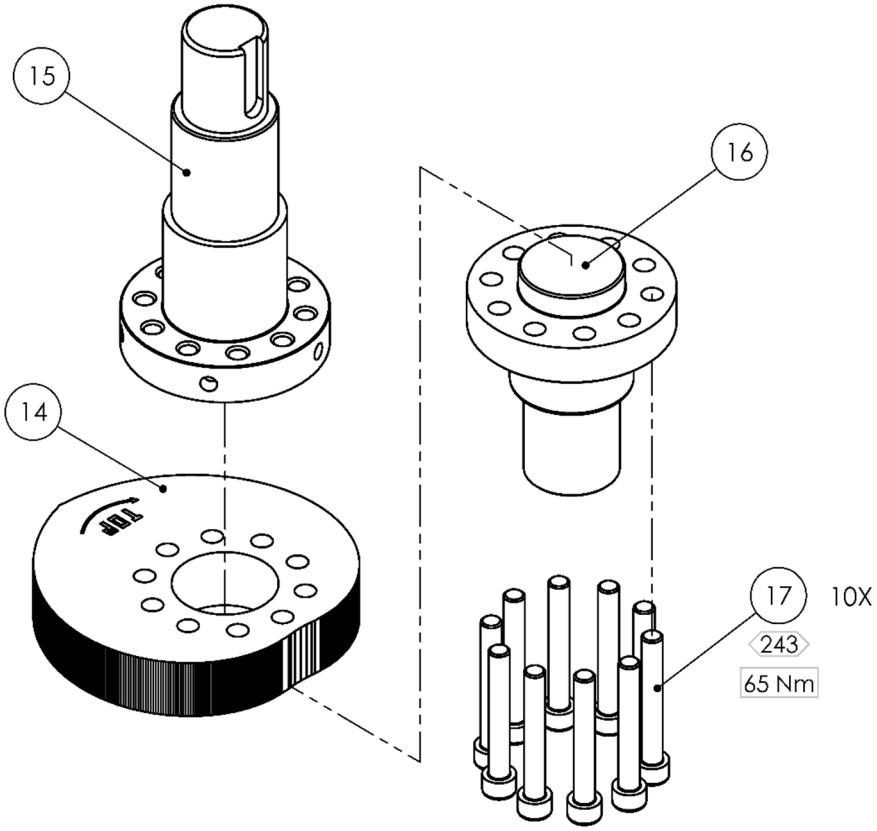
NOTE:

Part No. 5 To be pressed into housing using tool 502510

Part No. 6 To be pressed into housing using tool 502511

Part No. 9 To be tightened using tool 502509

Part No. 10 To be tightened using tool 502508



PARTS LIST - Bell Housing & Shaft Assemblies

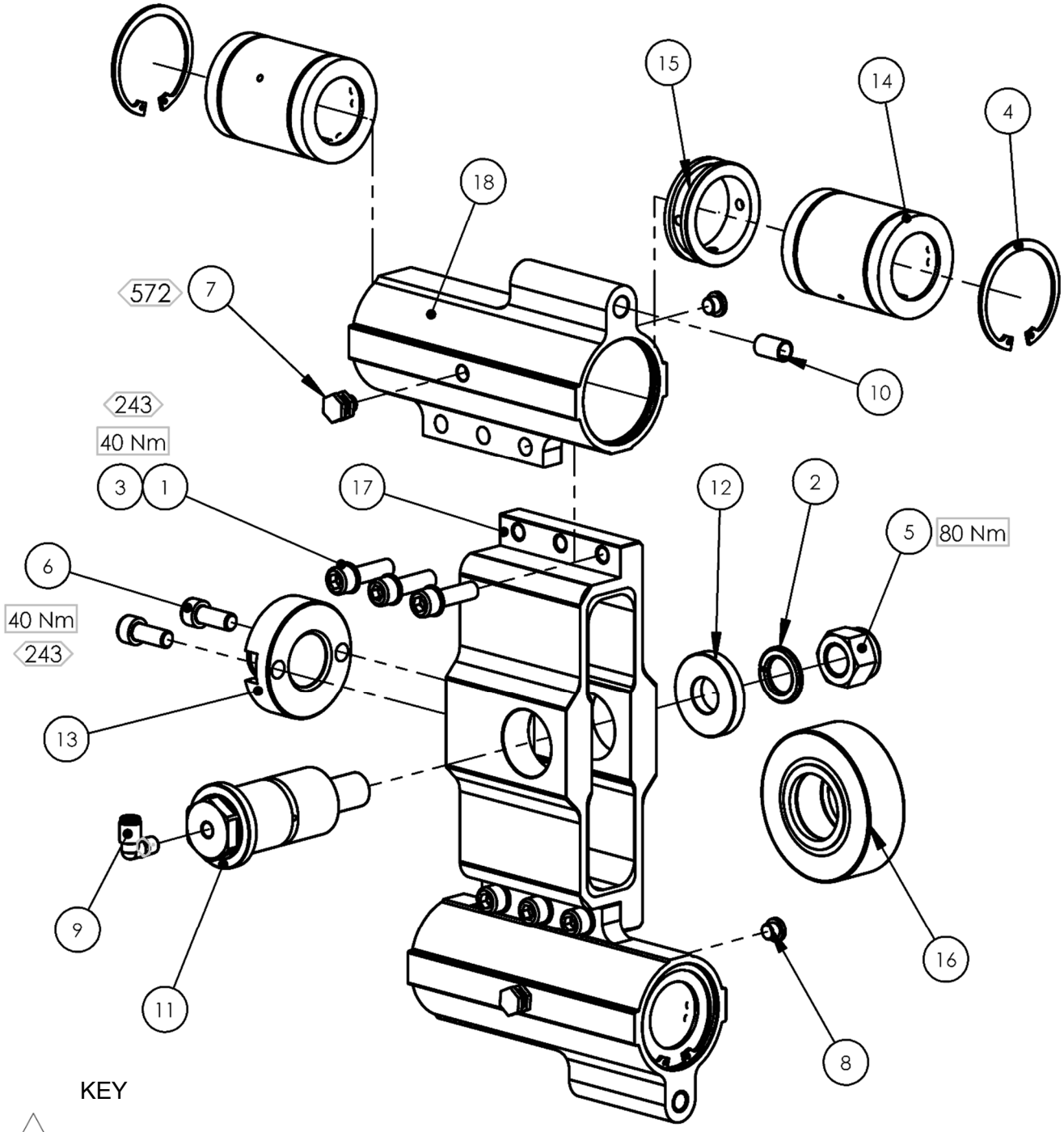
ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	163951	M6 x 16 CAP HEAD SCREW	6	
2	163952	M6 x 20 CAP HEAD SCREW	6	
3	192616	TOP BEARING CAP	1	
4	192617	BOTTOM BEARING CAP	1	
5	192639	Ø50 x Ø100 x 44.4 BALL BEARING	1	❸
6	192640	Ø45 x Ø100 x 36 BALL BEARING	1	❸
7	192644	Ø58 x Ø80 x 8 SEAL	1	❸
8	192650	GREASE NIPPLE	1	
9	192655	M45 BEARING LOCKNUT	1	
10	192656	M50 BEARING LOCKNUT	1	
11	193431	BELL HOUSING MACHINING	1	

Parts list continued.

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
12	193437	BOTTOM BEARING HOUSING	1	
13	194511	SHAFT ASSEMBLY	1	
14	193440	CONSTANT VELOCITY CAM	1	
15	193436	TOP SHAFT	1	
16	193435	BOTTOM SHAFT	1	
17	165571	M10 x 70 CAP HEAD SCREW	10	

PARTS LIST - Carriage Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	165123	M10 SPRING WASHER	6	
2	165139	M20 SPRING WASHER	1	
3	165947	CAP HEAD SCREW	6	
4	166158	CIRCLIP	4	❹
5	177011	M20 NYLOC NUT	1	
6	177012	M10 x 25 CAP HEAD SCREW	2	
7	192649	GREASE NIPPLE	2	
8	192651	PLUG	2	
9	192661	PUSH IN ELBOW	1	
10	193103	LINEAR BEARING	2	
11	193438	CAM FOLLOWER PIN	1	
12	193439	FOLLOWER NUT WASHER	1	
13	193441	CARRIAGE ADAPTOR	1	
14	193448	LINEAR BEARING	4	❹
15	193450	SPACER	2	❹
16	193451	CAM FOLLOWER	1	❺
17	193600	CARRIAGE CENTRE	1	
18	193601	CARRIAGE END	2	



KEY

G — GREASE

— LOCTITE

##Nm — TORQUE

— MAINTENANCE ORDER
(Reverse for assembly)

GI — GREASE INTERNAL
(AGMD-010)

PARTS LIST - Fluid Section

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	160513	SPRING	1	❶❷
2	164472	M8 x 25 SCREW	8	
3	165077	M14 SPRING WASHER	8	
4	165108	M8 SPRING WASHER	8	
5	171788	1 3/8" BALL	1	❷
6	177032	M14 x 45 CAP HEAD SCREW	4	
7	177033	M14 x 45 CAP HEAD SCREW	4	
8	192505	Ø12.42 X 1.78 O-RING	2	❶❷
9	192551	HEXAGON PLUG	2	
10	192595	OUTLET CHECK	1	
11	192626	OUTLET CAGE	1	
12	192629	INLET SPRING KEEP	1	❶❷
13	192632	SEAT	1	❷
14	192647	Ø50.5 X 2.62 O-RING	1	❶❷
15	192648	Ø41 X 1.78 O-RING	1	❶❷
16	193651	PISTON ASSEMBLY	1	
17	193690	OUTLET CYLINDER	1	
18	193691	INLET CYLINDER	1	
19	194177	SHAFT/BELLOWS ASSY	1	
20	194239	PISTON SEAL	1	❶❷

KEY

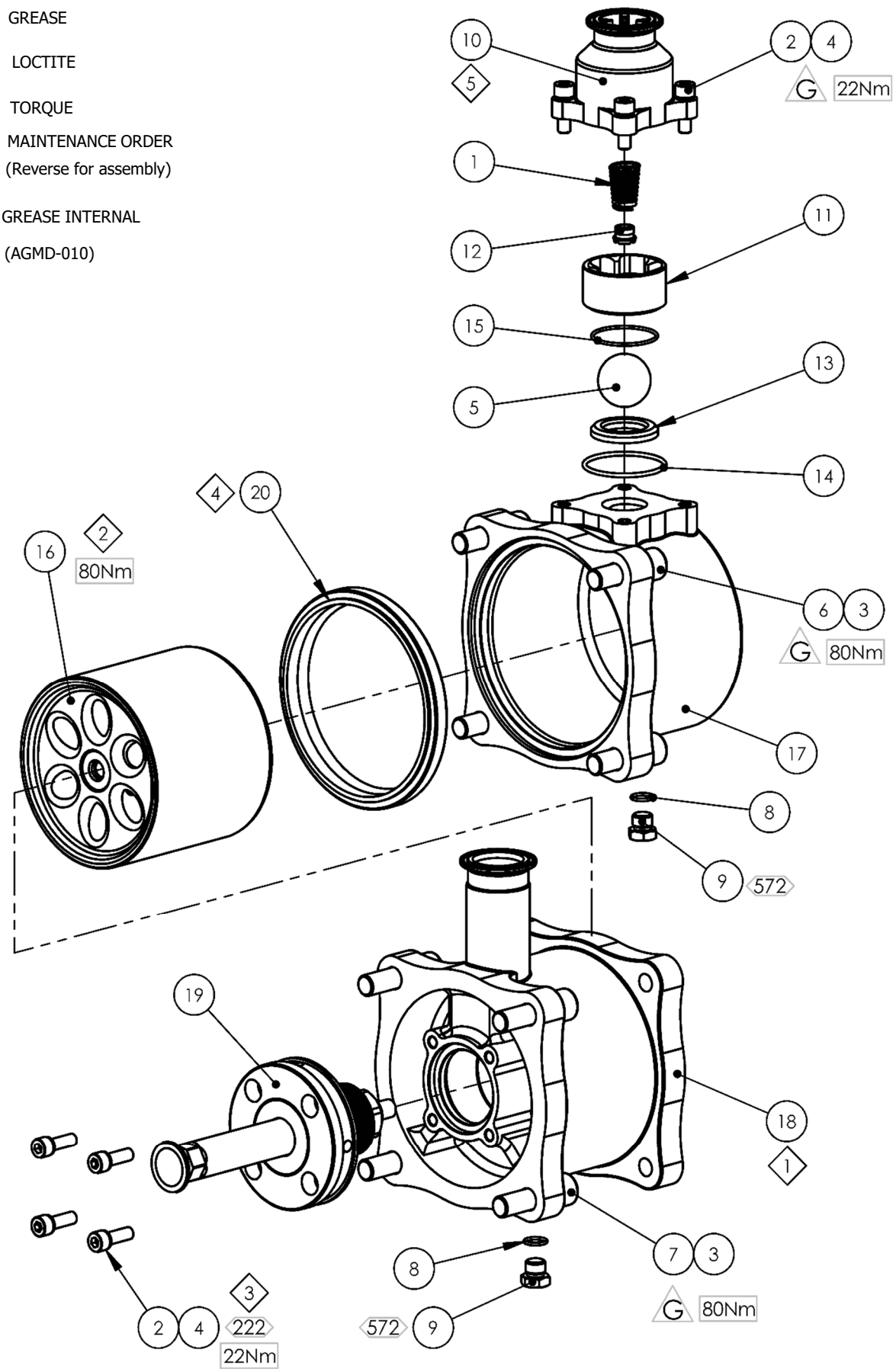
G GREASE

LOCTITE

##Nm TORQUE

MAINTENANCE ORDER
(Reverse for assembly)

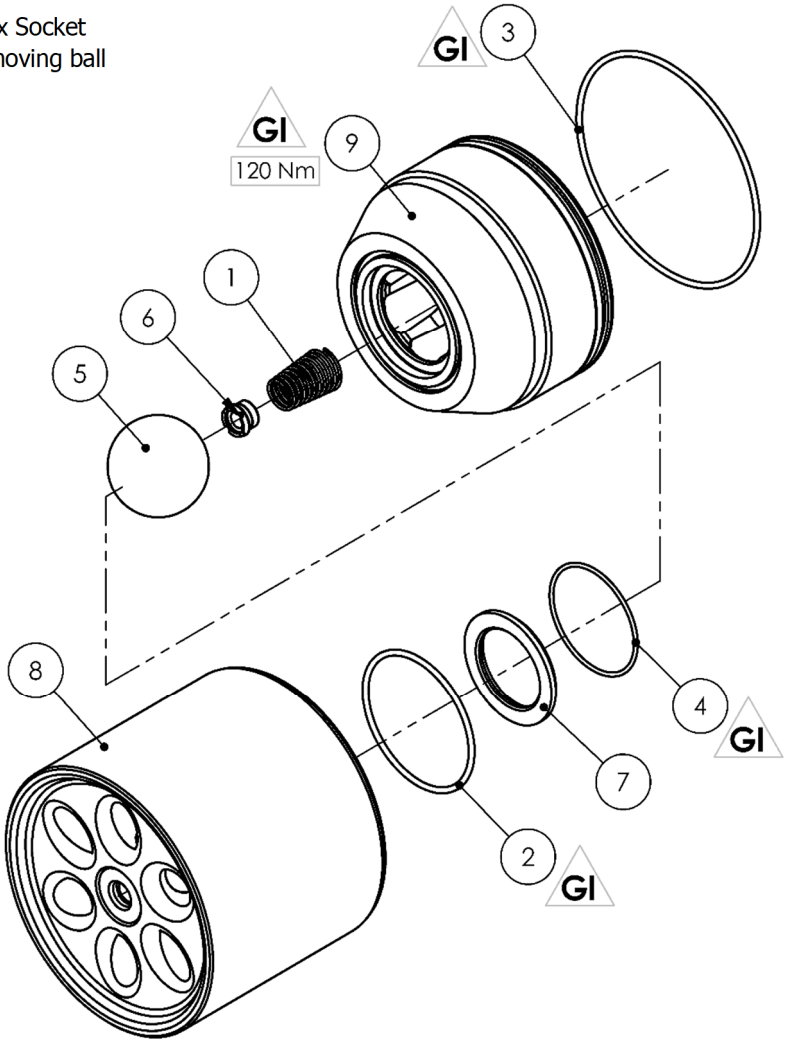
GI GREASE INTERNAL
(AGMD-010)



PARTS LIST - Piston Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	160513	PISTON BALL CHECK SPRING	1	❶❷
2	162805	Ø63.17 X 2.62 O-RING	1	❶❷
3	162806	Ø107.62 X 2.62 O-RING	1	❶❷
4	162807	Ø50.52 X 1.78 O-RING	1	❶❷
5	171784	1.75" BALL	1	❷
6	192629	INLET SPRING KEEP	1	❶❷
7	192631	SEAT	1	❷
8	193652	Ø128 FLUID PISTON	1	
9	193653	BALL CAGE	1	

Use a 36mm Single Hex Socket when tightening or removing ball cage from Piston.



KEY

G GREASE

LOCTITE

##Nm TORQUE

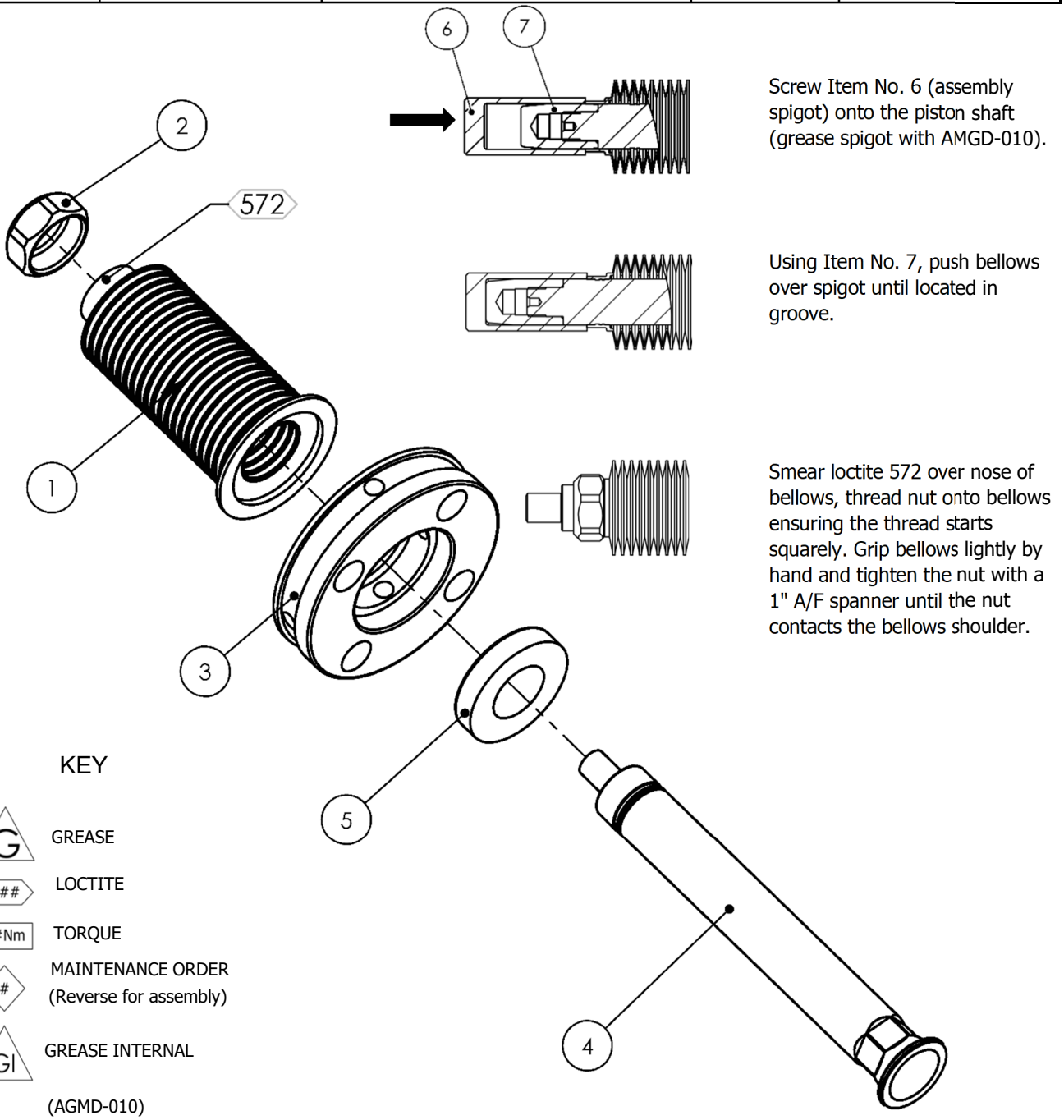
MAINTENANCE ORDER (Reverse for assembly)

GI GREASE INTERNAL

(AGMD-010)

PARTS LIST - Shaft & Bellows Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	REMARKS
1	192881	KNIFED BELLOWS		❷
2	192887	RETAINING NUT		
3	193445	BELLOWS SPACER		
4	193452	PISTON SHAFT		
5	193453	SHAFT SEAL		❷
6	502682	BELLOWS POSITIONING TOOL		TOOL
7	502681	BELLOWS ASSEMBLY SPIGOT		TOOL



Screw Item No. 6 (assembly spigot) onto the piston shaft (grease spigot with AMGD-010).

Using Item No. 7, push bellows over spigot until located in groove.

Smear loctite 572 over nose of bellows, thread nut onto bellows ensuring the thread starts squarely. Grip bellows lightly by hand and tighten the nut with a 1" A/F spanner until the nut contacts the bellows shoulder.

Maintenance

General Maintenance

The working life and thus the expected life prior to replacement of parts within a Paint Pump are greatly affected by three main factors: -

- Abrasiveness of Fluid Pumped
- Pump Duty Cycle
- Fluid Pressure Output Requirement

The two components which are more greatly affected by the above criteria than any other components in the pump are:

The Main Piston Seal and the Cam Follower ;

it is therefore recommended that these two items are stocked as spare parts in addition to the recommended spare parts kits.

NOTE

Before any maintenance always switch off the pump and secure against any unintentional start up.

Maintenance

Maintenance schedule	
Inspection	**Operation**
Daily	Check for any fluid leakage
Weekly	Check for any excessive mechanical noise Check for excessive fluid pressure pulsation Check oil level within gearbox
3 Monthly	While running, apply (502375) grease to cam follower bearings, 8 strokes of a standard 'cartridge' grease gun (502373).
6 Monthly	Grease Main Shaft Bearing with 502375 grease. Inspect Linear Bearings, Rod, Cam and Cam followers for excessive wear, replace if excessive wear can be felt or seen.
Annually	Inspect Piston and Replace Piston Seals / Bellows / Springs. Inspect Piston & Outlet Ball Checks, replace as necessary. Inspect Linear Guide Bearing and Guide Rails for excessive wear. Inspect Cam and Cam followers for excessive wear, replace if excessive wear can be seen.
Every 5 Years	Replace main shaft bearings. Linear Guide Bearings, Guide Rails and Cams if excessive wear can be seen.
Use only 502375 (KP2N-20 DIN 51825) Grease for Cam Follower Bearing.	

Maintenance - Gearbox

⚠ WARNING

Wait until the unit has cooled sufficiently after stopping and isolation.

Gearbox

Every 1000 hours verify the good condition of oil seals and gaskets

Maintenance

The gearbox is supplied factory fitted with oil and is a service free unit.

However if seals start to leak and oil level is reduced, both the affected seal and oil need to be replaced as a general overhaul of the unit.

The unit must be removed to be drained, maintained and filled with oil.

Note:

General overhauls must only be done by authorised certified service personnel or companies.

If changing the oil place a suitable container underneath the plug for draining.

It is recommended that the oil should be warm [40-50º C] to facilitate easier draining.

After filling with fresh oil, refit the level and/or drain plugs and clean up any oil spillage.

Maintenance - Motor

⚠ WARNING

Wait until the unit has cooled sufficiently after stopping and isolation.

Electric Motors

Maintenance of Ex Motors - are reported by EN 60079-17 standard, in particular:-

• The electric connections must be correctly locked to avoid resistance-increases, with consequent contact overheating.

• The insulation air-distance and the surface-distance between conductors, required by the standards, must be respected.

• All the screws, used to assemble the parts of the motors and of the terminal box, must be completely tightened.

• The replacement of seals and of components for cable entrance would be made using spare parts, supplied from the manufacturer, in order to guarantee the original type of protection.

• The Ex joint surfaces have not to be machined and it is not allowed to insert, between them, any kind of seals, not foreseen or supplied from the manufacturer.

The join surfaces have just to be cleaned and, in order to avoid corrosion or water entrance.

Repair procedures of the Ex motors - are reported by IEC 79-19 standard.

When it is not possible to make the repairs of Ex motors at the manufacturer's plant, the outside workshops, deputed to this task, must be endowed by the necessary capability, including:

• Sufficient technical knowledge of these motors.

• Factory equipment with tooling and facilities, suitable to make repairs.

• Quality control department, for the checks and the tests, requested after repairs.

• For the Ex motors the repairs of parts, directly involved on the protection against the explosion risk, must be done without any modification to the original motor design.

Fault Finding

Mechanics		
Symptom	**Possible Cause**	**Remedy**
Gearbox Output shaft does not rotate, even though the motor is running.	Drive between shafts in the gear unit interrupted	Return the unit for repair and replace gearbox
Gearbox Oil leaking • from the gear unit cover • from the motor flange • from the gear unit flange • from the output oil seal	a) Defective gasket on gear unit cover. b) Defective gasket. c) Gear unit not ventilated	a) Retighten screws on gear unit cover. b) Return gearbox c) Check vent is clean/fitted and not the transportation plug
Gearbox Oil leaking from ventilator	Unit overfilled with oil.	Check and correct the oil level
Cam Followers bearing generating heat / noise	Bearing needs lubrication	Grease bearing or replace if damage is too great
Carriage does not maintain contact with cam	a) Spring tension insufficient b) Fluid seal friction or piston movement prevented	a) Check and replace springs b) Check fluid section
Noisy Changeover	a) Spring tension insufficient b) Fluid seal friction or piston movement prevented	Replace green spider coupling

Fault Finding

Fluid Section		
Symptom	**Possible Cause**	**Remedy**
Pump will not 'Prime'	a) Air entering the suction hose/manifold b) Worn piston seals c) Ball checks not seating correctly.	a) Check o-rings and hose connections b) Replace piston seals. c) Inspect, clean and/or replace balls and seats.
Pump will not run	a) No power b) Inverter Unit or safety interlocks 'tripped'	a) Check electrical supply b) Check inverter and fault conditions
Pump runs, but lack of pressure	a) Worn piston seals b) Inverter Unit or safety interlocks 'tripped'	a) Replace piston seals. b) Inspect, clean and/or replace balls and seats.
Paint leaking from inside cover	Bellows seal failure	Replace bellows seal, check piston seal, replace as necessary
Excessive Pressure Pulsation	a) Ball checks not seating correctly. b) Main shaft bearings worn c) Cam follower worn d) Cam direction incorrect	Replace bellows seal, check piston seal, replace as necessary

Testing and Lubricating

Testing and Lubricating after major overhaul

⚠ WARNING

Testing and Lubricating - Qualified personnel only

1 Connect pump to paint system.

2 Connect electric motor to a suitable electrical supply.

3 Fit the gearbox vent plug.

4 Turn on paint system and set back pressure regulator to zero.

5 Turn the pump on at the local isolation mounted switch.

IMPORTANT

Never allow the pump to run with a closed ('valved off') inlet or outlet connection

6 Allow the pump to run for about 10 minutes between 60 to 80Hz to ensure any trapped air is correctly vented.

Check for any leaks and mechanical noises.

7 While running, apply (502375) grease to cam follower bearings, 8 strokes of a standard 'cartridge' grease gun (502373).

8 While running apply (502375) grease to main shaft bearing (40 strokes of a grease gun on a new bearing and 6 pumps on a bearing in current use).

9 Run the pump at 20 cycles/min [50 HZ] and increase the back pressure to 10 bar and run for 1 hour.

Check for any leaks and mechanical noises.

Fluid Drain Down

Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

1 Stop the pump (turn off the electric motor);
isolate the paint supply and place a suitable container underneath the hose to prevent spillage.

2 Disconnect the inlet & outlet hoses and position securely into a suitable container.

3 Start the pump and run at slow speed [20Hz] for 1 minute.

The pump will now have most of the paint removed;
however, some material will remain within the fluid cylinders and manifolds.

4 If required to finally remove any paint from the pump, place the supply hose in a compatible solvent and run the pump until sufficiently clean.

Spare Parts List

Recommended Replacement Spare Parts and Kits for E2-60 Pumps

KIT No.	PART NUMBER	DESCRIPTION	REMARKS
#	193440	CONSTANT VELOCITY CAM	
#	192891	PISTON	
#	193451	CAM FOLLOWER BEARING	
#	193448	LINEAR BEARING	
#	192881	BELLOWS (FLUID SECTION)	
❶	250632	FLUID SECTION SEAL KIT	
❷	250687	FLUID SECTION OVERHAUL KIT	
❸	250683	MAIN BEARING OVERHAUL KIT	
❹	250684	LINEAR GUIDE AND ROD KIT	
❺	250685	CAM FOLLOWER BEARING KIT	

Check Main Parts List for details of Individual Kit Contents

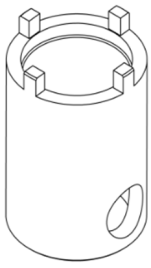
ACCESSORIES

PART NUMBER	DESCRIPTION	REMARKS
192800	SMART CARD	
502501	BPR CONTROL BOX	
502483	ELECTRICAL PANEL FOR SINGLE PUMP OPERATION	INC. SMART CARD
502373	GREASE GUN FOR CAM FOLLOWER (& MAIN BEARINGS)	COLLET CONNECTOR
502514	GREASE GUN FOR LINEAR BEARINGS (300mm EXTENSION)	HOOK CONNECTOR
502375	GREASE FOR CAM FOLLOWER (& MAIN BEARINGS)	
502376	GREASE FOR LINEAR BEARINGS	
192720	SENSOR MANIFOLD	
192547	[4 -20 mA / 0 - 25 bar] PRESSURE SENSOR	PRESSURE FEEDBACK
192008	1.5" SANITARY GASKET	
192009	1.5" SANITARY CLAMP	

ACCESSORIES

PART NUMBER	DESCRIPTION	REMARKS
192450	M8 TORX SECURITY SCREWDRIVER FOR COVER	FOC with a New Pump
502508	TOP BEARING LOCKNUT TOOL	
502509	BOTTOM BEARING LOCKNUT TOOL	
502510	TOP BEARING PRESS TOOL	
502511	BOTTOM BEARING PRESS TOOL	
502512	SHAFT ASSEMBLY TOOL	
502681	BELLOWS ASSEMBLY TOOL	
502682	BELLOWS ASSEMBLY SPIGOT	

502508



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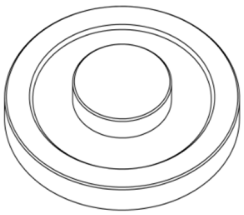

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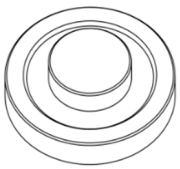

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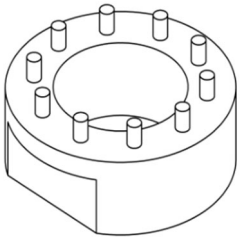

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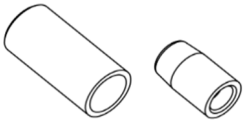

502681 & 502682

NOTES

WARRANTY POLICY

This product is covered by Carlisle Fluid Technologies' materials and workmanship limited warranty. The use of any parts or accessories, from a source other than Carlisle Fluid Technologies, will void all warranties. Failure to reasonably follow any maintenance guidance provided, may invalidate any warranty.

For specific warranty information please contact Carlisle Fluid Technologies.

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