



# DT 17\_016

# **INSTALLATION OPERATION MAINTENANCE**

# MANUAL QTP / QTPS ACTUATORS RANGE

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#### **GENERAL INFORMATION** 1

This document provides installation, operation, maintenance and general information for the QTPS actuators range.

This manual contains safety cautions and warnings related to the use of these actuators.

WORKING FLUID: it is recommended to operate the actuator only with dry instrument air or nitrogen.



WARNING: rated working fluid for the actuator is always indicated on nameplate. Different types of fluids may be used only after DVG verification

WARNING: lubricated fluids are not required for QTP actuators and could create damages to equipment (e.g. positioners).

WORKING TEMPERATURE: It is recommended to always respect the minimum and maximum allowable temperatures indicated on the actuator nameplate.

Working temperature range rules actuator seals material selection which is summarized by below cross reference table:

TEMPERATURE RANGE	SEALS MATERIALS	LUBRICANTS
(°C)		
-30 / +93	NBR (BUNA)	ENI MU EP2
-60 / +93	FLUOROSILICONE (FVMQ)	AEROSHELL GREASE 7

Grease data sheets are attached in ANNEX B.





**WORKING PRESSURE:** It is recommended to always respect the minimum and maximum allowable temperatures indicated on the actuator nameplate.

Only qualified personnel, authorized by responsible for the safety of the plant, should perform installation, operation or maintenance activities.

To avoid injury to personnel or damage to products, safety precautions must be strictly adhered to. Modifying this product, substituting non-OEM parts, or using maintenance procedures other than as outlined in this instruction could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties. Also, original spare parts supplied by DVG must always be used. Maintenance / replacement intervals as stated in this document must be respected. If DVG products (especially sealing materials) have been in storage for long periods, their

correct status and remaining service life must be checked before use.

**WARNING:** before products are returned to DVG for repair or service, DVG must be provided with a certificate which confirms that the product has been decontaminated and is clean. DVG will not accept deliveries if a certificate has not been provided (a form can be obtained from DVG ).





### 1.1 INCOMING GOODS INSPECTION

- 1. Each delivery includes a packing slip. When unpacking, check all delivered actuators and accessories using this packing slip.
- 2. Report transportation damage to the carrier immediately.
- 3. In case of discrepancies, contact your nearest DVG location.

### 1.2 STORAGE

The service life of the actuator starts the moment the actuator is manufactured.

Any storage time is also regarded as service life.

In order to keep the actuator warranty before the actuator is commissioned on the plant, it is necessary to observe and take appropriate measures during the storage period.

- 1. Restore the paintworks according to the applicable painting procedure of the components that have damaged during transportation
- 2. Make sure that plugs are fitted in the pneumatic connections and in the cable entries. The plastic plugs, which close the inlets, do not have a weatherproof function, but are only a means of protection against the entry of foreign matter during transport. If longterm storage is necessary and especially if the storage is outdoors, metal plugs must replace the plastic protection plugs, which guarantee a complete weatherproof protection.
- 3. If the actuators are supplied separately from the valves, they must be placed onto a wooden pallet so as not to damage the coupling flange to the valve. In case of long-term storage (more than four months), the coupling parts (flange, drive sleeve, insert bush) must be protected from any mechanical damage and by corrosion with protective oil or grease.

If possible, blank off the flange with a protection disk/plate.

- 4. In case of long-term storage, it is recommended to keep the actuators in a dry place and to provide at least some means of weather protection in the form of a cover or tarpaulin.
- 5. In case the actuator is equipped with a microswitch housing and/or a control panel the electrical enclosures shall be sealed, clean and dry with no traces of oxidation. In case insert a bag with desiccant silica gel and close accurately.





#### **PRE-INSTALLATION INSPECTIONS** 1.3

- 1. To verify absence of leakage in the cylinder across the piston it is recommended to apply pressure to the cylinder chamber.
- 2. Stroke the actuator with correct working fluid as stated on actuator nameplate every 12 months.
- 3. In case the actuator is equipped with manual override (i.e. handwheel or hand pump) the override functionality shall be checked as well.
- 4. After such operations all the threaded connections of the actuator and the exhaust port of pneumatic components on the control panel should be carefully plugged.





### 2 ACTUATOR LIFTING

In order to prevent damage to actuator accessories, before starting the lifting operations, ensure that the lifting tools, like chain and clevis hook, are in the correct position and don't interfere with the control panel and pneumatic tubing.

Lifting and handling of the actuator should be done by qualified personnel and in compliance with the laws and regulations in force.

The actuator should be in the normal mounting position on a level surface and with sufficient capacity for the load to be supported.



**WARNING:** the lifting lugs or eyebolts are appropriate for actuator lifting only. They are not designed to support the combined weight of the valve and actuator assembly together. An adhesive label is applied onto all DVG actuators giving clear evidence to this safety statement.







During the lifting operations do not stand under the lifted actuator. The actuator should be handled with appropriate lifting equipment. The weight of the actuator is reported on the packing slip.

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**WARNING:** always check the overall weight of the actuator and the position of centre of gravity on applicable overall dimensions drawings





### 2.1 ACTUATOR LIFTING POINTS

Lifting points on QTP (double acting) / QTPS (spring return) actuators are normally located on the housing cover

Four lifting points are provided as a standard.

On spring return actuators an additional lifting point is provided on the spring module.



Figure 1: typical lifting arrangement for spring return QTPS actuators



Figure 2: typical lifting arrangement for double acting QTP actuators





### **3** INSTALLATION



WARNING: always check spring assisted stroke direction on the relevant label on actuator



If not differently explicitly required by as a standard clockwise failure is associated to fail-toclose actuators and counter clockwise failure is associated to fail-to-open actuators.



**WARNING:** always check pneumatic supply ports through dedicated labels on the cylinder, applied close to the ports themselves.

Labelling of pneumatic supply ports is shown in:

- Figure 3 shows typical labelling for pneumatic connection on spring return actuators
- Figure 4 shows typical labelling for pneumatic connection on double acting actuators.
  According to ISO 5599 ports are identified with numbering
- "2" for pneumatic port TO OPEN
- "4" for pneumatic port TO CLOSE







Figure 3: typical supply port marking for QTPS spring return actuators



Figure 4: typical supply ports marking for QTP double acting actuators

WARNING: be careful to operate the actuator with cover properly installed. A warning label is installed on the actuator housing. Operation of the actuator with cover removed or not correctly / completely fitted to the actuator can drive to injury to personnel and damage to the actuator.







#### INSTALLATION ONTO THE VALVE 3.1

This section is relevant to valve integrators and to the situation where the actuators is mounted onto the valve at site.

The actuator can be assembled on top of the valve flange either by using the actuatorhousing flange with threaded holes, or by the interposition of a proper closed spool / open bracket.

When the spool or the bracket are foreseen they are assembled to the actuator by means of dowel pins.

The actuator drive sleeve is generally connected to the valve stem by an insert bush or a stem extension. The assembly position of the actuator, with reference to the valve, must comply with the plant requirements (cylinder axis parallel or perpendicular to the pipeline axis).

To assemble the actuator onto the valve proceeds as follows:

- 1. Check that the coupling dimensions of the valve flange and stem, or of the relevant extension, meet the actuator coupling dimensions.
- 2. Move the valve to the CLOSED position in case it must be fit with a spring return actuator FAIL TO CLOSE or to the OPEN position in case it must be fit with a spring return actuator FAIL TO OPEN.

For double acting of fail last actuator secure the valve in the same position as the actuator is.

- 3. Lubricate the valve stem with oil or grease in order to make the assembly easier. Be careful not to pour any of it onto the flange.
- 4. Clean the valve flange and remove anything that might prevent a perfect adherence to the actuator flange and especially all traces of grease, since the torque is transmitted by friction.
- 5. If a stem adaptor or stem extension for the connection to the valve is supplied separately, assemble it onto the valve stem and fasten it by tightening the proper stop dowel(s).
- 6. Move the actuator to its failure position.





- Clean the actuator flange and remove anything that might prevent a perfect adherence to the valve flange and especially all traces of grease.
- 8. Lift the actuator through the eyebolts: using a safe and proper lifting system move the actuator onto the valve and lower it to fit the stem adaptor already assembled onto the valve stem.

This coupling must take place without forcing and only with the weight of the actuator.

- 9. Continue to lower until the spool / bracket sits on the valve flange.The actuator mounting bolts (or stud bolts) must easily fit the valve flange mating holes.
- 10. If needed move the actuator few degrees relevant to valve flange and / or adjust end stops (see next Paragraph)
- 11. Tighten the mounting nuts (or bolts) connecting the base of the spool to the valve flange according to the torque table in ANNEX A of this document.
- 12. If pneumatic supply pressure is available, operate the actuator to check that it moves the valve smoothly.





### 3.2 INITIAL OPERATION

- 1. Check that all electrical supply, control and signal are properly connected to the actuator and / or the control group.
- 2. Check that the supply pressure and the operating fluid in accordance with the actuator nameplate data.
- 3. Check the absence of leaks in the pneumatic connections.
- 4. Check the environmental conditions are compatible with the actuator design condition.





### 3.3 END-STOPS SETTING OF QTPS ACTUATORS

The adjustment of the end-stops of QTPS actuators is performed through the following steps, which are described separately for the end-stop located on the power cylinder and on the spring module.

The power cylinder end-stop allows adjustment of the spring assisted stroke end position. The spring module end-stop allows adjustment of the air assisted stroke.

### 3.3.1 POWER CYLINDER END STOP

Reference must be made to below Figure 5.

- 1. Remove plug (1) with a proper flat spanner
- 2. Loosen cap (2) with a proper flat spanner
- Screw or unscrew the dowel (3) through a socket wrench, while keeping the cap (2) stationary with a flat spanner
- 4. Once the adjustment is completed, tighten end cap (2)
- 5. Install again plug (1)



Figure 5: cylinder end stop adjustment







### 3.3.2 SPRING MODULE END STOP (QTPS 10 TO QTPS 30 SIZE)

Reference must be made to below Figure 6

- 1. Remove plug (1) with a proper flat spanner
- 2. Loosen cap (2) with a proper flat spanner
- 3. Screw or unscrew the dowel (3) through an Allen wrench while keeping the cap (2) stationary with a proper flat spanner.
- 4. Once the adjustment is completed, tighten end cap (2)
- 5. Install again plug (1)



Figure 6: spring module end stop adjustment

### 3.3.3 SPRING MODULE END STOP (QTPS 60 TO QTPS 300 SIZE)

Reference must be made to below Figure 7

- 1. Unscrew bolts (1) with a proper flat spanner
- 2. Remove cover (2): bolts (1) and cover (2) can be temporarily fixed as per Figure 7 during end stop adjustment not to lose any item.
- 3. Screw or unscrew the dowel (3) through an Allen wrench: the radial PTFE bar (4), providing friction between threads, prevents loosening of the dowel itself.
- 4. Once the adjustment is completed, install again the cover (2) and fix its tightening bolts (1).

### **TECHNICAL SPECIFICATION**







Figure 7: spring module end stop adjustment







#### **END-STOPS SETTING OF QTP ACTUATORS** 3.4

The adjustment of the end-stops of QTP actuators is performed through the following steps, which are described separately for the end-stop located on the power cylinder and on the housing side flange.

The power cylinder end-stop allows adjustment of the CLOSING stroke end position. The housing closure flange end-stop allows adjustment of the OPENING stroke.

### 3.4.1 POWER CYLINDER END STOP

Reference must be made to Paragraph 3.3.1 for operations to be performed.

### 3.4.2 HOUSING CLOSURE FLANGE END STOP

Reference must be made to below Figure 8

- 1. Remove plug (1) with a proper flat spanner
- 2. Screw or unscrew the dowel (2) through an Allen wrench
- 3. Once the adjustment is install again plug (1)



Figure 8: housing side flange end stop adjustment





Adjust the end stops of the actuator for the proper OPEN and CLOSED valve positions, per valve manufacturer's recommendations.

Pneumatically stroke the actuator several times to ensure proper operation.

If the actuator is equipped with a switch, positioner or other accessories, perform

adjustment of the device.





### 4 MAINTENANCE

QTP / QTPS actuators do not need maintenance for long periods, even if they are working in severe conditions.

The QTP / QTPS actuators can withstand a 25 years or 10<sup>6</sup> cycles design life based on correct service conditions, proper installation, operation and maintenance.

In order to achieve this industry-leading design life, in-field maintenance is prescribed to be performed every five years for applications in High Demand Mode to IEC 61508 Part 4.

This interval can be extended to six years of operations for a Low Demand Mode application.

The piston seal and the wear rings replacement should be performed every twelve years.

It is recommended to periodically check the functionality of the actuator, performing the following steps at 1 year interval:

- 1. Check the pneumatic accessories on the actuator for leaks. Use soapy water (or similar) if necessary.
- 2. Check the datasheet and data plate on the actuator to ensure correct pneumatic pressure is available and set.
- 3. Check pressure gauges are working properly.
- 4. Check analog position feedback linkage and cabling if fitted.
- 5. Check the actuator cylinder and housing for signs of external pneumatic leakage using soapy water.
- 6. Check whether the actuator holds position while isolating the air supply.
- 7. Check the atmospheric vent port of the cylinder for internal leaks around the piston seal.
- 8. Check the electrical connections to the solenoid-operated valve, position feedback and limit switches.
- 9. Check the electrical housings for tightness.
- 10. Clean any dirt and foreign material from the actuator stem.





In case of scheduled preventive maintenance, or following accidental events, refer to the following maintenance instructions regarding the main actuator components (pneumatic cylinder and housing).

### NOTICE

This document describes the procedures intended for the ordinary (standard) maintenance of the actuators, for extraordinary maintenance please contact DVG After Sales Office





### 4.1 GENERAL DISASSEMBLY INSTRUCTIONS

The QTP / QTPS actuators are made of three main parts , as described by below Figure 9



Figure 9: main modules of QTPS actuators series

**WARNING:** before performing any disassembly / maintenance activity on the actuator it is mandatory to remove the pressure from the cylinder.

Also check that all pneumatic and power supplies to the actuator are disconnected.

**WARNING:** in case of spring return actuators make sure the end stop located on the cylinder is fully unscrewed to avoid the spring is still in the compressed position.

**WARNING:** make sure the pneumatic cylinder is horizontally supported during operations.





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**WARNING:** make sure the spring module is hooked and properly held in tension through the lifting point located on the module itself.

Alternatively make sure the spring module is horizontally supported during operations.

To disassemble the actuator in its main modules the following instructions must be followed:



Remove all accessories (e.g. position indicator) from the actuator

Remove the washers, the hexagon screws, the eyebolts and the eyebolts fixing screws

### **TECHNICAL SPECIFICATION**









Lift the cover from the housing using flat screwdrivers inserted between gasket and cover.

This operation normally leads to permanent damage of gasket: in order not to jeopardize the protection degree of the housing internals it is mandatory to replace the gasket during housing reassembly.

Refer to Paragraph 4.3 for details. Damage to cover painting could occur in the contact areas: as components of the actuator are individually primer coated before assembly, painting repair can be performed according to applicable procedure

Unscrew the nuts locking the spring module stud bolts to the housing











Pull out horizontally the spring module from the housing until the spring module rod is completely outside the housing

## Unscrew the nuts locking the cylinder stud bolts to the housing

Pull out horizontally the cylinder from the housing to achieve clearance between the cylinder head flange and the housing flange

Remove the socket head screws fixing the piston rod flange to the sliding block. Use holes on the housing side flange to access the socket head through the Allen wrench.









Pull out the piston rod fixing flange to achieve access to the piston rod retaining ring and remove it



Remove the cylinder from the housing





### 4.2 SPRING MODULE MAINTENANCE

The spring module does not require maintenance.

The spring module internals are greased for life during assembly and it is not necessary during the service life of the actuator.

The spring module replacement is not recommended / foreseen during the service life of the actuator.

In case accidental damages should lead the necessity of spring module replacement the below steps must be followed.

WARNING: make sure stud bolts thread are free of any dirt and correctly deburred.

**WARNING:** before assembling the spring module to the housing deburr and clean with a cloth the groove machined on the housing side (Figure 10) and fill it with LOXEAL 59-20 G sealant through the applicator supplied along with the sealant itself.

Data sheet of sealant is attached in ANNEX B



Figure 10: housing side flange sealant groove (spring module side)







**WARNING:** make sure the spring module is hooked and properly held in tension through the lifting point located on the module itself.

Alternatively make sure the spring module is horizontally supported during operations.

Pull horizontally the spring module in the housing until the spring module rod is completely outside the housing

## Screw the nuts locking the spring module stud bolts to the housing

Replace the cover gasket as per Paragraph 4.3 instructions and apply the cover to the housing









Install and tighten again the hexagon screws, the eyebolts and the eyebolts fixing screws, duly fitted with relevant washers.



Once completed the above operation, adjustment of the spring module travel stop must be performed as per Paragraph 3.3.2 and Paragraph 3.3.3 instructions, and adjustment of the cylinder end stop must be performed as per Paragraph 3.3.1 instructions.





#### HOUSING MAINTENANCE 4.3

Standard maintenance of the housing can be performed without disassembly the actuator from the valve and without removal of the spring module and of the pneumatic cylinder from the housing.

Standard maintenance consists in the inspection and replacement of the elements that can degrade over time.

These components are the environmental seals as the indicator shaft o-ring and the housing gasket.

It is possible that standard maintenance takes place in the field as the actuators components are primer coated before assembly.

Additionally, the use of flat washers under the tie rods nut allows for painting repair after maintenance completion as no damage to the primer coating is occurring.



**WARNING:** before performing any maintenance activity on the housing it is mandatory to remove the pressure from the cylinder.

Also check that all pneumatic and power supplies to the actuator are disconnected.

WARNING: in case of spring return actuators make sure the end stop located on the cylinder is fully unscrewed to avoid the spring is still in the compressed position.

The following steps describe operations to be performed for standard maintenance of the housing.







Q C C Remove all accessories (e.g. position indicator) from the actuator Remove the washers, the hexagon screws, the eyebolts and the eyebolts fixing screws Lift the cover from the housing using flat screwdrivers inserted between gasket and cover.

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This operation normally leads to permanent damage of gasket: in order not to jeopardize the protection degree of the housing internals it is mandatory to replace the gasket during housing reassembly.

Refer to Paragraph 4.3 for details. Damage to cover painting could occur in the contact areas: as components of the actuator are individually primer coated before assembly, painting repair can be performed according to applicable procedure

Replace the housing to cover gasket (A). Grease the gasket with proper lubricant as per Paragraph 1 instructions









Replace the o-ring (B) on the position indicator shaft and then fit the position indicator shaft in the housing cover



Clean all cover and housing surfaces and install again the cover onto the housing.

Install and tighten again the hexagon screws, the eyebolts and the eyebolts fixing screws, duly fitted with relevant washers.





Restore all accessories (e.g. position indicator) on the actuator

Recommended housing spare parts are summarized by below table, along with standard time interval for replacement.

Number	Description	Maintenance interval	Actuator Removal from the Valve
A	Gasket	maximum	
В	O-Ring	[6 years, 2000 cycles]	NOT REQUIRED

To get housing spare parts specific for each actuator please forward to DVG After Sales Office the complete actuator serial number.







To get housing spare parts / spare parts lists specific for each job please forward to DVG After Sales Office the complete reference to job / purchase order.

WARNING: for extraordinary maintenance please contact DVG After Sales Office for assistance and instruction





#### PNEUMATIC CYLINDER MAINTENANCE 4.4

Standard maintenance of the pneumatic cylinder consists in the replacement of the parts that can degrade over service life of the actuator.

These parts are all the pneumatic cylinder o-rings (static seals) and the piston o-rings (dynamic seals) and wear rings (PTFE guide sleeves).

If the maintenance is limited to the pneumatic cylinder static seals and piston dynamic seals and guide sleeves the maintenance can be carried out without removal of the pneumatic cylinder from the actuator and therefore without removal of the housing cover.

A complete standard maintenance of the pneumatic cylinder involving piston rod dynamic seal implies removal of the cylinder from the actuator.

The below procedure describe the steps to be followed for the complete maintenance of the cylinder



WARNING: before performing any maintenance activity on the cylinder it is mandatory to remove the pressure from the cylinder.

Check that the pneumatic cylinder chambers are vented to atmospheric pressure



Unscrew the nuts from the cylinder tie rods and, where possible, retain the tie rods on the cylinder in order to avoid corrosion and damage

Remove the blank flange from the power cylinder: the end stop assembly can be left screwed to the flange and disassembled later

Remove the blank flange o-ring (#1) from relevant groove



![](_page_37_Picture_0.jpeg)

![](_page_37_Picture_1.jpeg)

![](_page_37_Picture_2.jpeg)

Remove the cylinder tube from the cylinder

Pull out the piston rod assembly from the cylinder head flange and the tie rods (if still engaged to the flange).

![](_page_37_Picture_5.jpeg)

WARNING: If maintenance is performed with the cylinder not removed from the actuator this step can / must be omitted

![](_page_37_Picture_7.jpeg)

![](_page_37_Figure_8.jpeg)

Remove the central seal (#2) and the wear rings (#3A and #3B) from the pneumatic piston

![](_page_37_Figure_10.jpeg)

![](_page_38_Picture_0.jpeg)

![](_page_38_Picture_2.jpeg)

![](_page_38_Figure_3.jpeg)

![](_page_38_Picture_4.jpeg)

![](_page_38_Figure_5.jpeg)

Unscrew the end stop plug from the end stop cap and the cap from the dowel and remove orings (#7A and #7B)

Remove o-ring (#5) from the cylinder head

flange outer groove and o-ring (#6) from the

head flange piston rod bore groove

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![](_page_39_Picture_1.jpeg)

![](_page_39_Picture_2.jpeg)

Before performing reassembly of the power cylinder clean the surfaces and grease all the components.

To reassemble the power cylinder use the reverse procedure as above described.

The tie rods nuts must be tightened using a torque wrench, applying a torque as listed in ANNEX A of this document.

Before assembling the head flange of the cylinder to the housing deburr and clean with a cloth the groove machined on the housing side (Figure 11) and fill it with LOXEAL 59-20 G sealant through the applicator supplied along with the sealant itself.

Data sheet of sealant is attached in ANNEX B

![](_page_39_Picture_8.jpeg)

Figure 11: housing side flange sealant groove (cylinder side)

The pneumatic cylinder main spare parts and the interval time for standard ON / OFF applications are listed in below table.

Standard time interval for standard ON / OFF applications is described by below table.

![](_page_40_Picture_0.jpeg)

![](_page_40_Picture_2.jpeg)

Number	Description	Maintenance interval	Actuator Removal from the Valve
1	O-Ring		
2	(*)		
3	Wear Ring	maximum	
4	O-Ring	[5 years, 2000	NOT REQUIRED
5	O-Ring	cycles] (**)	
6	O-Ring		
7A/B	O-Ring		

(\*):

X-Ring for standard temperature range actuators

O-Ring for low temperature range actuators

(\*\*) low demand application: maximum [6 years, 2000 cycles]

To get cylinder spare parts specific for each actuator please forward to DVG After Sales Office the complete actuator serial number.

To get cylinder spare parts / spare parts lists specific for each job please forward to DVG

After Sales Office the complete reference to job / purchase order.

![](_page_41_Picture_1.jpeg)

![](_page_41_Picture_2.jpeg)

### 5 TROUBLESHOOTING

To prevent the actuator from not functioning properly or a reduction in performance, first ensure that the installation and the adjustment operations are carried out completely in accordance with this manual.

WARNING: when attempting to identify faults, it is very important to observe all the regulations and instructions about safety.

If in doubt choose **SAFETY FIRST** and / or contact DVG After Sales Office for instructions and assistance

PROBLEM	POSSIBLE	SOLUTION
	CAUSE	
		Check that all the pneumatic
		connections and that all the pneumatic
		components have been installed
	Actuator has not been	correctly, and are in accordance with
	properly installed	the actuator operating mode
		Check that the actuator is properly
		connected to the valve and that there
		aren't problems in the mounting kit.
		Check that sufficient supply pressure is
The actuator		available at actuator inlet port. if
does not move	Problems with supply	possible, place a gauge in line and
	pressure	monitor the pressure level, in order to
		discover unexpected pressure drops.
		Check the correct functioning of the
		control panel. In particular, check all
	Problems with control group	the pneumatic and electric connections
		Check the correct level of supply
		voltage for solenoid valves and other
		electrical/electronic components.

![](_page_42_Picture_0.jpeg)

![](_page_42_Picture_2.jpeg)

		Check that valve is free to rotate. If
	The valve is blocked	necessary, disassemble the actuator
		from the valve.
		Check vent port(s) are free.
	Exhaust port(s) obstructed	If not clean them or replace bug screen /
		dust excluders
		Ensure that the actuator is properly
		lubricated, and that there is no solidified
		grease among sliding parts or rotating
		parts.
		If actuator lubrication is too poor, restore
	Problems with lubricants.	proper greasing.
		Follow the instructions for housing and
		cylinder maintenance.
		Only grease listed in this manual and / or
		alternative grease authorized by DVG
		After Sales Office must be used
	Problems with seized parts of the actuator	Check if any moving part is blocked.
		If so, follow the maintenance
		instructions given in this manual to
		perform maintenance or contact DVG
		After Sales Office for further assistance
		Check the cylinder for absence of leakage
		through outer seals
	Leakages of the pneumatic cylinder	Check leakage across the piston through
		cylinder vent port.
		If leakages are occurring follow the
		cylinder maintenance instructions
		included in this manual
		Check the proper working of the springs
		(i.e. absence of noise or mechanical
	Problems with springs	docking during movement).
		In case of problems contact DVG After
		Sales Office

![](_page_43_Picture_0.jpeg)

![](_page_43_Picture_2.jpeg)

The valve does not shut off properly and there are leaks.	The actuator is not correctly adjusted.	Adjust the end stops of the pneumatic cylinder and of the spring, following the instructions included in this manual.
	The actuator is not correctly adjusted.	Adjust the end stops of the pneumatic cylinder and of the spring, following the instructions included in this manual.
The valve does not compete the	Problems with supply	Check that sufficient supply pressure is
stroke, either in OPEN or CLOSE	pressure	available at actuator inlet port. If
direction		possible, place a gauge in line and
		monitor the pressure level, in order to
		discover unexpected pressure drops.
		Check vent port(s) are free.
	Exhaust port(s) obstructed	If not clean them or replace bug screen /
		dust excluders
		Follow the maintenance instructions
During the stroke the actuator	Problems with seized parts of	given in this manual to perform
exhibits excessive backlash	the actuator	maintenance or contact DVG After Sales
		Office for further assistance

![](_page_44_Picture_0.jpeg)

![](_page_44_Picture_1.jpeg)

![](_page_44_Picture_2.jpeg)

#### ACTUATOR DECOMMISSIONING 6

After end of service life of the actuator the actuator needs to be decommissioned.

WARNING: before disassembling the actuator from the valve and before any decommissioning activity ensure that the pneumatic connection ports of the cylinder are disconnected and the cylinder is vented to atmospheric pressure.

WARNING: make sure that power and pneumatic supplies are turned off, and any parts of the actuator, the control system and all the pneumatic tubing are depressurized.

WARNING: verify that the actuator is in fail safe position, i.e., that it is not locked in a position with the spring compressed by means of locking devices.

QTPS actuators that are to be decommissioned permanently must have the stored energy in the spring neutralized.

For QTPS actuators, in order to proceed with permanent decommissioning, the supply pressure must be removed and the actuator must be in its fail safe position: in fact, in this condition, any residual spring preload is not transmitted to the actuator.

**WARNING:** decommissioning of the spring implies use of Oxygen / Acetylene torch and it must be performed by qualified personnel only.

Operations must be done in compliance with the laws and provisions in force.

![](_page_45_Picture_1.jpeg)

![](_page_45_Picture_2.jpeg)

Ţ

**WARNING:** during decommissioning of the spring(s) all metal parts will get hot and sparks will fly around spring module

The following steps must be followed to decommission the spring(s):

![](_page_45_Picture_6.jpeg)

Cut a window in the spring module with a torch

Verify complete access to spring coils is available

![](_page_46_Picture_0.jpeg)

![](_page_46_Picture_1.jpeg)

![](_page_46_Picture_2.jpeg)

Cut spring(s) coils with a torch until spring(s) is completely lose in the spring module

![](_page_46_Picture_4.jpeg)

![](_page_46_Picture_5.jpeg)

![](_page_46_Picture_6.jpeg)

Cut additional coils until the spring(s) is lose

![](_page_46_Picture_8.jpeg)

![](_page_46_Picture_9.jpeg)

![](_page_47_Picture_1.jpeg)

![](_page_47_Picture_2.jpeg)

![](_page_47_Picture_3.jpeg)

**WARNING:** please contact DVG After Sales Office for instructions in case a more detailed procedure or further information are required .

<u>\_!</u>

**WARNING:** failure to neutralize the spring contained in the actuator's spring module or to follow these instructions could lead to injury to personnel or property damage.

- 1. All disassembled parts of the actuator shall be separated according to their material type (metal, rubber, plastic, oil and grease, electric and electronic equipment ...).
- 2. Remove the lubricants taking care not to pollute the environment
- 3. Clean the frame internally using a mixture of water and degreasing soap
- 4. Dispose of the cleaning fluid and lubricants extracted from the actuator, according to the local laws regarding the disposal of waste material
- 5. After the actuator's decommissioning, all carbon steel materials/stainless bare material must be send to the scrapping service.
- 6. In case of dismounting of any electric/electronic component, cable, and other accessories, it must be handled and disposed of as described in the owner's manual, and according to the local laws regarding the disposal of waste material.

![](_page_48_Picture_1.jpeg)

![](_page_48_Picture_2.jpeg)

### **ANNEX A - TIGHTENING TORQUE TABLE -**

TIE RODS DIAMETER	TORQUE (Nm)
M10	20
M12	45
M16	60
M20	110

SCREW / STUD BOLT DIAMETER	TORQUE (Nm)
M3	0.8
M4	1.9
M5	3.8
M6	6.6
M8	16
M10	32
M12	54
M14	88
M16	136
M20	268
M22	369
M24	461
M27	683
M30	926
M33	1257
M36	1814
M39	2095
M42	2586

![](_page_49_Picture_0.jpeg)

![](_page_49_Picture_2.jpeg)

#### **ANNEX B - DATA SHEETS -**

#### LOXEAL SEALANT DATA SHEET

![](_page_49_Picture_5.jpeg)

### **Technical Data Sheet** LOXEAL 59-20

#### Description

One component moisture curing silicone based sealant and adhesive releasing non corrosive and low-odour by products. Provides an extremely flexible gasket between surfaces made of various materials (metal, plastics, glass, ceramics). Suitable for sealing gear boxes, pumps and motors flanges, oil and water containers, air forced pipes. Resistant to vibrations, thermal shocks, pressurized air, water, oils and several chemicals. Keeps its sealing properties within temperatures of - 50°C and + 180°C. Sealed parts can be disassembled using normal tools.

#### Physical properties

Composition :	silicon neutral curing
Colour :	black, grey
Appearance :	paste
Specific weight (g/ml) :	1,40 - 1,50
Shelf life @ +25° C : 12	months in original unopened packaging

#### **Curing properties**

Tack free time :	15 - 30 minutes
Functional curing time :	3 - 6 hours
Final curing time :	24 - 36 hours

## Physical properties after curing 7days/+23°C/UR 50% (typical)

Hardness Shore A (ASTM D-2240) :	25 ± 5
Tensile strength (ASTM D-412) :	0, 5 - 1,0 MPa
Elongation at break (ASTM D-412) :	400 - 600 %
Temperature range :	-65°C/ +180°C
Joint Movement Capability (ASTM C-290)	: ± 25%
Dielectric strength (DIN 53481) :	18 kV/mm
Surface resistivity :	3 x 10 <sup>15</sup> Ω
Dielectric constant (1MHz) (DIN 53482) :	2,7

#### Directions for use

DVG AUTOMATION S.p.A

Clean and degrease parts to bond with Loxeal Cleaner 10. Apply enough product to fill the gap. The product is moisture curing therefore pieces shall be assembled rapidly. Allow full cure before putting stress on pieces assembled.

#### Storage

Keep product in a cool and dry room at no more than +25°C. To avoid contaminations do not refil containers with used product. For further information on applications, storage and handling contact Loxeal Technical Service.

#### Safety and handling

Consult Material Safety Data Sheet before use.

#### Note

The data contained herein, obtained in Loxeal laboratories, are given for information only; if specifics are required, please contact Loxeal Technical Department. Loxeal ensures abiding quality of supplied products according to its own specifics. Loxeal cannot assume responsibility for the results obtained by Loxeal cannot assume responsibility for the results obtained by others which methods are not under Loxeal control. It is user's responsibility to determine suitability for user's purpose of any product mentioned herein. Loxeal disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loxeal products. Loxeal specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits. profits.

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Legal & Operative HQ: 29016 Cortemaggiore (Piacenza) Italy, Via G. Rossetti n° 2 Tel. (+39) 0523 255811; Fax (+39) 0523 255890; Fully Paid In Capital: Euro 1.000.000,00= ISO 9001, ISO 14001, OHSAS 18001 CERTIFIED REA 167410 - VAT 01494460338 COMPANY SUBJECT TO MANAGEMENT AND COORDINATION BY G.I.V.A. S.P.A. WITH HEADQUARTERS IN RHO (MILAN), RECORDED UNDER NUMBER 02917180172 IN MILAN'S REGISTER OF COMPANIES info@dvgautomation.it www.dvgautomation.it

![](_page_50_Picture_0.jpeg)

![](_page_50_Picture_2.jpeg)

#### ENI MUEP2 DATA SHEET

![](_page_50_Picture_4.jpeg)

### eni Grease MU EP

eni Grease MU EP are high performance multipurpose yellow-brown, slightly-fibrous, smooth-textured lithium-base greases containing EP (Extreme Pressure) additives. The grade NLGI 00 contains a special tackyfier that makes the product specially suitable for lubrication for enclosed gear reducers.

#### CHARACTERISTICS (TYPICAL FIGURES)

GREASE MU EP	00	0	1	2	3	
NLGI consistency		00	0	1	2	3
Worked penetration	dmm	425	370	325	280	230
ASTM dropping point	°C	180	180	185	185	185
Base oil viscosity at 40°C	mm²/s	160	160	160	160	160

#### **PROPERTIES AND PERFORMANCE**

- The presence of EP (Extreme Pressure) additives ensures that eni Grease MU EP greases form a tenaciously adhering lubricating film which resists displacement even when subjected to heavy pulsating loads, thus preventing metal-to-metal contact of the lubricated surfaces. The typical value of **eni Grease MU EP 2** at the Timken test is of 45 lbs.
- The multipurpose characteristics of eni Grease MU EP greases facilitate lubrication planning and reduce the range of stocks to be held.
- Their good physical and chemical stability and their outstanding oxidation resistance ensures that these greases remain unaltered even after long exposure to high mechanical loads and thermal stresses.
- Their high dropping point allows the products to be used over a wide range of temperatures. eni Grease MU EP 2 passes the following performance tests: FAG FE 9 (DIN 51821-02) and SKF R2F at 120°C.
- They ensure effective rust-protection even where the most yellow metals are concerned and further they adhere extremely well to metal surfaces resisting displacement by vibrations.
- eni Grease MU EP greases are water-resistant and can be used in moist conditions and in contact with water, while good pumpability facilitates dispensing even at low temperatures.

#### APPLICATIONS

eni Grease MU EP are suitable for use in all cases where conditions call for a grease with EP (Extreme Pressure) properties. For example, plain bearings, heavily loaded ball and roller bearings even when operating at high temperatures and for all lubrication requirements in general where operating conditions are especially difficult. Their ability to withstand loads widens their range of application to embrace many fields of

technology.

eni S.p.A. Refining & Marketing

Via Laurentina 449, 00142 Rome Standard Phone +39 06 5988.1 eni.com

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![](_page_50_Picture_22.jpeg)

T DAT

![](_page_51_Picture_0.jpeg)

![](_page_51_Picture_2.jpeg)

![](_page_51_Picture_3.jpeg)

### eni Grease MU EP

eni Grease MU EP 00 is especially suitable for the lubrication of enclosed steel cylindrical, conical and helical gears, such as for gear reduction units working at medium temperatures and loads, or for any gear where the oil application is difficult and the grease remains in service for a very long period.

eni Grease MU EP 00 can be employed also in centralized lubrication systems installed on industrial trucks, agricultural machinery, industrial plants and for lubrication of slide ways of machine tools.

#### SPECIFICATIONS

PRODUCT DATA

eni Grease MU EP meets the following classifications:

GREASE MU EP	00	0	1	2	3
ISO 6743-9	L-X-BCHB 00	L-X-BCHB 0	L-X-BCHB 1	L-X-BCHB 2	L-X-BCHB 3
ISO 6743-6	L-CKG 00	L-CKG 0	L-CKG 10	22	
DIN 51 825	KP00K -20	KP0K -20	KP1K -20	KP2K -20	KP3K -20
DIN 51 826	GP00G	GP0K	GP1K	. <del>.</del>	-
MAG (CINCINNATI)		P-79	P-72	P-64	

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![](_page_52_Picture_0.jpeg)

#### **AEROSHELL GREASE 7 DATA SHEET**

## AeroShell Grease 7

AeroShell Grease 7 is an advanced multi-purpose grease, composed of a synthetic oil thickened with Microgel®, possessing good load carrying ability over a wide temperature range. It is inhibited against corrosion and has

The useful operating temperature range is -73°C to +149°C.

#### DESIGNED TO MEET CHALLENGES

#### Main Applications

excellent resistance to water.

 AeroShell Grease 7 satisfies nearly all the airframe grease requirements of turbine engined aircraft and also those of

Grease 7 as a general purpose grease either by brand name or by specification. It is recommended for lubricating highly Compatibility & Miscibility loaded gears, actuator screw mechanisms, etc., also for instrument and general airframe lubrication within the temperature range of -73°C to +149°C.

#### Specifications, Approvals & Recommendations

- · U.S. : Approved MIL PRF-23827C (Type II ) French : Equivalent DCSEA 354/A
- piston engined aircraft provided that seal incompatibility does . For a full listing of equipment approvals and recommendations, not occur. Most civil aircraft manufacturers approve AeroShell please consult your local Shell Technical Helpdesk, or the OEM Approvals website.

Technical Data Sheet

- · AeroShell Grease 7 contains a synthetic ester oil and should not be used in contact with incompatible seal materials
- AeroShell Grease 7 is a clay-based grease approved to MIL-PRF-23827C Type II; it should not be mixed with soap-based greases approved to MILPRF-23827C Type I.

#### Typical Physical Characteristics

Properties		MIL-PRF-23827C Type II	Typical	
Oil type			Synthetic	Synthetic ester (Diester)
Thickener type			Clay	Microgel
Base Oil viscosity	@-40°C	mm²/s		1150
Base Oil viscosity	@40"C	mm²/s	- ti	10.3
Base Oil viscosity	@100°C	mm²/s		3.1
Useful operating temperature range		°C	54	-73 to +149
Drop point		°C	165 min	260+
Worked penetration	@25*C		270 to 310	296
Unworked penetration	@25*C		200 min	283
Bomb Oxidation pressure drop 100 hrs	@99"C	kPa	70 max	62
Bomb Oxidation pressure drop 500 hrs	@99°C	kPa	105 max	96.5
Oli separation 30 hrs	@100°C	% m	5 max	3
Water resistance test loss	@38°C	% m	20 max	0.8
Evaporation loss 22 hrs	@100*C	% m	2.0 max	0.5
Mean Hertz Load		: kg	30 min	60
Copper corrosion 24 hrs	@100°C		Must pass	Passes
Bearing protection 2 days	@52*C		Must pass	Passes
Anti-friction bearing performance	@121°C	hrs	- 24	2460
Colour			*:	8uff

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AeroShell Grease 7, v 1

26.04.2013.09.21

![](_page_53_Picture_0.jpeg)

![](_page_53_Picture_2.jpeg)

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

#### Health, Safety & Environment

Health and Safety

Guidance on Health and Safety is available on the appropriate Material Safety Data Sheet, which can be obtained from http://www.epc.shell.com/

Protect the Environment

Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Additional Information

· Advice

Advice on applications not covered here may be obtained from your Shell representative.

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AeroShell Grease 7, v 1

26.04.2013.09.21

![](_page_54_Picture_0.jpeg)

![](_page_54_Picture_2.jpeg)

### ANNEX C - ACTUATOR CODING PLAN -

QTPS-	XXX	Y	-	КККК	-	TT	VV	-	ZZ
-------	-----	---	---	------	---	----	----	---	----

where

XXX: numbers that identify the size of the actuator housing

10	60	00
16	120	450
30	180	

Y: letter that identifies the scotch yoke type

S	SYMMETRIC
С	CANTED

KKKK: numbers that identify the pneumatic cylinder bore

CYLINDER BORE QTPS-10	CYLINDER BORE QTPS-16	CYLINDER BORE QTPS-30	CYLINDER BORE QTPS-60	CYLINDER BORE QTPS-120	CYLINDER BORE QTPS-180	CYLINDER BORE QTPS-300	CYLINDER BORE QTPS-450
200	235	335	385	585	685	785	1000
235	280	385	435	635	735	835	1050
280	300	435	485	685	785	885	1100
300	335	485	535	735	835	935	1150
335	385	535	585	785	885	1000	1200
385	435	585	635	835	935	1050	1300
	485		685	935	1000	1100	1400
	535		735	1000	1050	1150	1500
			785		1100	1200	1600
					1150	1300	1700
					1200	1400	

![](_page_55_Picture_1.jpeg)

![](_page_55_Picture_2.jpeg)

TT: alphanumeric code that identify the spring(s) size

SPRING CODE QTPS-10	SPRING CODE QTPS-16	SPRING CODE QTPS-30	SPRING CODE QTPS-60	SPRING CODE QTPS-120	SPRING CODE QTPS-180	SPRING CODE QTPS-300	SPRING CODE QTPS-450
A1	B1	C1	D1	E1	F1	G1	H1
A2	B2	C2	D2	E2	F2	G2	H2
A3	B3	C3	D3	E3	F3	G3	H3
A4	B4	C4	D4	E4	F4	G4	H4
			D5	E5			

VV: letters that identify the spring assisted operation

CL	SPRING TO CLOSE
OP	SPRING TO OPEN

ZZ: letters that identify if a manual override is fitted

[VOID]	NO MANUAL OVERRIDE
MO	HANDWHEEL
MH	HAND PUMP