



tyco flow control

Checks to be carried out on receipt of the actuator

1. If the actuator arrives already assembled onto the valve, the setting of the mechanical stops and of the electric limit switches (if existing) has already been made by the person who assembled the actuator onto the valve. If the actuator arrives separately from the valve, the setting of the mechanical stops and of the electric limit switches (if existing) must be checked and, if necessary, carried out while assembling the actuator onto the valve.
2. Check that the actuator has not been damaged during transport. If necessary, repair all damages to the paint-coat, etc.
3. Check that the model, the serial number of the actuator and the performance data written on the data-plate are in accordance with those described on the order acknowledgement, test certificate and delivery note.
4. Check that the fitted accessories comply with those listed in the order acknowledgement and the delivery note.

Storage

The actuators leave the factory in excellent working conditions and with an excellent finish (these conditions are guaranteed by an individual inspection certificate); in order to maintain these characteristics until the actuator is installed on the plant, it is necessary to observe a few rules and take appropriate measures during the storage period.

1. Make sure that plugs are fitted in the oil 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 long-term storage is necessary and especially if the storage is outdoor, the plastic protection plugs must be replaced by metal plugs, which guarantee a complete weatherproof protection. If the actuator has been delivered with an empty cylinder, fill it with hydraulic oil compatible with the oil which will supply the actuator on field.
2. 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 the coupling parts (flange, drive sleeve, insert bush) must be coated with protective oil or grease. If possible, blank off the flange by a

protection disk.

3. In case of long-term storage, it is advisable to keep the actuators in a dry place or to provide at least some means of weather protection. If a hydraulic control unit is present on the actuator, it is advisable, if possible, to periodically operate the actuator with filtered proper oil. After such operations all the threaded connections of the control unit should be carefully plugged by keeping the valves of the unit filled with as much oil as possible.

Assembling the actuator onto the valve

The actuator can be assembled onto the valve flange either by using the actuator housing flange with threaded holes, or by the interposition of an adaptor flange or a spool piece. 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 proceed 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. bring the valve to the "Closed" position
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 an insert bush or stem extension for the connection to the valve stem is supplied separately, assemble it onto the valve stem and fasten it by tightening the proper stop dowels
6. bring the actuator to the "Closed" position
7. connect a sling to the support points of the actuator and lift it: make sure the sling is suitable for the actuator weight. When possible, it is easier to assemble the actuator to the valve if the valve stem is in the vertical position. In this case the actuator must be lifted while keeping the flange in the horizontal position
8. clean the actuator flange and remove anything that might prevent a perfect adherence to the valve flange and especially all traces of grease

9. lower the actuator onto the valve in such a way that the insert bush, assembled on the valve stem, enters the actuator drive sleeve. This coupling must take place without forcing and only with the weight of the actuator. When the insert bush has entered the actuator drive sleeve, check the holes of the valve flange. If they do not meet with the holes of the actuator flange or the stud bolts screwed into them, the actuator drive sleeve must be rotated; feed the actuator cylinder with oil at the proper pressure or actuate the manual override, if existing, until coupling is possible
10. tighten the nuts of the connecting stud bolts evenly with the torque prescribed in the table. The stud bolts must be made of ASTM A320 L 7 steel, the nuts must be made of ASTM A194 grade 2 steel

Thread size	Recommended tightening torque (Nm)
M 8	20
M10	40
M12	70
M14	110
M16	160
M20	320
M22	420
M24	550
M27	800
M30	1100
M33	1400
M36	1700

11. if possible, operate the actuator to check that it moves the valve smoothly.

Setting of the angular stroke

It is important that the mechanical stops of the actuator (and not those of the valve) stop the angular stroke at both extreme valve positions (fully open and fully closed), except when this is required by the valve operation (e.g. metal seated butterfly valves).

The setting of the open valve position is performed by adjusting the travel stop screw in the left wall of the mechanism housing, or in the end flange of the manual override, if existing.

The setting of the closed valve position is performed by adjusting the travel stop screw which is in the cylinder end flange. For the adjustment of the travel stop screws proceed as follows:

- loosen the lock nut
- if the actuator angular stroke is stopped before reaching the end position (fully open or closed), unscrew the stop screw by turning it

anticlockwise, until the valve reaches the correct position. When unscrewing the stop screw, keep the lock nut still with a wrench so that the sealing washer does not withdraw together with the screw

- tighten the lock nut
- If the actuator angular stroke is stopped beyond the end position (fully open or closed), screw the stop screw by turning it clockwise until the valve reaches the correct position
- tighten the lock nut.

Preparation for start-up

1. Hydraulic connections

Connect the actuator to the oil feed and return lines with fittings and pipes in accordance to the plant specifications. They must be sized correctly in order to guarantee the necessary oil flow for the operation of the actuator, with pressure drops not exceeding the maximum allowable value. The shape of the connecting piping must not cause excessive stress to the inlets of the actuator. The piping must be suitably fastened so as not to cause excessive stress or loosening of threaded connections, if the system undergoes strong vibrations. Every precaution must be taken to ensure that any contaminants which may be present in the hydraulic pipework to the actuator are removed to avoid possible damages to the unit or loss of performance. The inside of the pipes used for the connections must be well cleaned before use: wash them with suitable substances and blow through them with air or nitrogen. The ends of the tubes must be well deburred and cleaned. Once the connections are completed, operate the actuator and check that it functions correctly, that the operation times meet the plant requirements and that there are no leakages in the hydraulic connections.

2. Electrical connections

Connect the electrical feed, control and signal lines to the actuator, by linking them up with the terminal blocks of the electrical components. In order to do this, the housing covers must be removed without damaging the coupling surfaces, the O-rings or the gaskets. Remove the plugs from the cable entries. For electrical connections use components (cable glands, cables, hoses, conduits) which meet the requirements and codes applicable to the plant specifications (mechanical protection and/or explosionproof protection). Screw the cable glands tightly into the threaded inlets, so as to guarantee the weatherproof and

explosionproof protection (when applicable). Insert the connection cables into the electrical enclosures through the cable glands, and connect the cable wires to the terminals according to the applicable wiring diagram. If conduits are used, it is advisable to carry out the connection to the electrical enclosures by inserting hoses so as not to cause any anomalous stress on the housing cable entries. Replace the plastic plugs of the unused enclosure entries by metal ones, to guarantee perfect weatherproof tightness and to comply with the explosionproof protection codes (where applicable).

Once the connections are completed, check that the controls and signals work properly.

Start-up

During the start-up of the actuator, proceed as follows:

- check that the pressure and quality of the oil supply (type, filtering degree) are as prescribed. Check that the feed voltage values of the electrical components (solenoid valve coils, microswitches, pressure switches, etc.) are as prescribed
- check that the actuator controls work properly (remote control, local control, emergency controls, etc.)
- check that the required remote signals (valve position, oil pressure, etc.) are correct
- check that the setting of the components of the actuator control unit (pressure switches, flow control valves, etc.) meet the plant requirements
- check that there are no leakages in the hydraulic connections. If necessary tighten the nuts of the pipe fittings
- remove all rust and, in accordance with the applicable painting specifications, repair the paint-coat that has been damaged during transport, storage or assembly.

Maintenance

Important: before carrying out any maintenance operation, it is necessary to close the oil supply line and relieve the pressure from the actuator and from the control unit, to ensure the safety of maintenance staff.

a. Routine maintenance

OLGA actuators have been designed to work for long periods in the severest conditions with no need for maintenance. It is, however, advisable to periodically check the actuator as follows:

- check that the actuator operates the valve correctly and with the required

operating times. If the actuator operation is very infrequent, carry out a few opening and closing operations with all the existing controls (remote, local, emergency controls, etc.), if this is allowed by the plant conditions

- check that the signals to the remote control desk are correct
- check that the oil supply pressure value is within the required range
- if there is an oil filter on the actuator, disassemble the cup and wash it; disassemble the filter: if it is a cleanable type (metal fibre or wire mesh element), wash it with nitrate solvent and blow through it with air. If the filter is a throw-away type (element based on inorganic fibres or polyester or paper) it must be replaced when clogged
- check that the external components of the actuator are in good conditions
- check all the paint-coat of the actuator. If some areas are damaged, repair the paint-coat according to the applicable specification
- check that there are no leakages in the hydraulic connections. If necessary tighten the nuts of the pipe fittings.

b. Special maintenance

If there are oil leaks through the seals or a malfunction in the mechanical components, or in case of scheduled preventive maintenance, the actuator must be disassembled and seals must be replaced with reference to the attached sectional drawing and adopting the following procedures:

b1. Replacement of cylinder seals

(see sectional drawing)

Disassembly:

- remove the nuts (25) and the washers (24) from the tie rod (18) at the end flange (22) side
- slide off the end flange (22) and the tube (21)
- remove the screws (2) and the cover (1)
- unscrew the piston rod (17) threaded end from the adaptor bush (30) of the guide block (14)
- slide off the piston rod (17) from the head flange (42)
- disassemble the head flange (42) from the mechanism housing (8) by removing the screws (31) only if the gaskets (37) and (39) have to be replaced because damaged.

Seals replacement

Prior to reassembly check that the actuator components are in good condition and clean. Lubricate all the surfaces of the parts which move in contact with other components by a

recommended grease (see paragraph b2). If the O-ring must be replaced, remove the existing one from its groove, clean the groove carefully and lubricate it with a protective oil or grease film. Assemble the new O-ring into its groove and lubricate it with a protective oil or grease film.

- Replace the O-ring (43) of the head flange (42).
- Replace the O-ring (43) of the end flange (22).

To replace the piston rod seal ring (40) and the O-ring (41) proceed as follows:

- remove the existing teflon seal ring (40) and the O-ring (41) from their groove
- clean the groove carefully and lubricate it with a protective oil or grease film
- assemble the new O-ring into its groove and lubricate it with a protective oil or grease film
- assemble the new teflon seal ring (40) into the flange groove, on the rubber O-ring (41), by bending it: take care that the bending radius is as large as possible to avoid damaging the seal. Then enlarge the seal ring (40) with your fingers so as to restore its round shape: pay attention not to utilise any tools which could damage the seal ring.

To replace the piston seal ring (46) and the O-ring (45) proceed as follows:

- remove the existing teflon seal ring (46) and the O-ring (45) from their groove
- clean the groove carefully and lubricate it with a protective oil or grease film
- assemble the new O-ring into its groove and lubricate it with a protective oil or grease film
- assemble the new teflon seal ring (46), on the rubber O-ring (45), by introducing one side of it into the groove, then enlarge it with your fingers so as to fit it into the groove: take care to enlarge it uniformly without any tools which could possibly damage it. The elastic memory of the kind of teflon the seal ring is made of allows the ring to shrink back to its previous dimension after a short time.

If the sealing washer (47) has to be replaced, measure the protrusion of the stop screw (20) with reference to the end flange (22) surface, so as to be able to easily restore the setting of the actuator mechanical stop in the closed valve position, once the maintenance procedures have been completed.

- Loosen the lock nut (23) and unscrew the stop screw (20) until it is removed together with the nut (23) and the sealing washer (47).
- Remove the sealing washer (47) from the stop screw (20). Carefully clean and

lubricate the stop screw thread and the surface of the end flange area, on which the sealing washer is.

- Screw the new sealing washer onto the stop screw until it touches the nut (23).
- Screw the stop screw into the threaded hole of the end flange until it reaches its original position (the same protrusion with reference to the flange surface).
- Check that the sealing washer (47) is inside the groove in the end flange and in contact with the groove bottom surface.
- Tighten the lock nut (23).

Reassembly:

- assemble the new gaskets (37) and (39) after cleaning the surfaces of the housing (8), the flange (38) and the head flange (42), which are in contact
- assemble the head flange (42) and tighten the screws (31) to the recommended torque (see table)
- clean and lubricate the piston rod (17) surface, particularly that of the bevel, with a protective oil or grease film and introduce it into the head flange hole, taking care not to damage the teflon seal ring (40): the piston rod bevel has to smoothly enlarge the seal ring
- carefully clean the threaded end of the piston rod (17) and the threaded hole of the adaptor bush (30) of the guide block (14). Spread some sealant LOCTITE 542, or equivalent, on the rod threaded end and screw it into the adaptor bush (30) threaded hole, then tighten
- carefully clean the inside of the tube (21) and check that the entire surface, particularly that of the bevels, is not damaged. Lubricate with a protective oil or grease film the tube internal surface and the bevels. Slide the tube onto the piston taking care not to damage the teflon seal ring (46): the tube bevel has to smoothly compress the seal ring; take care also not to damage the head flange O-ring (43)
- assemble the end flange (22) by centering it on the inside diameter of the tube, taking care not to damage the O-ring (43)
- assemble the washers (24) and the nuts (25) onto the tie rods (18). Tighten the nuts alternating between opposite corners to the recommended torque (see table)
- restore a generous coating of grease on the contact surfaces of the yoke (11) and the bushings (33), on the yoke grooves, on the sliding blocks (5), on the guide bar (9)
- assemble the new gasket (10) after cleaning the surfaces of the housing (8) and cover (1)

- lubricate the O-ring (32) with protective oil or grease
- assemble the cover (1) and the screws (2). Tighten the screws to the recommended torque
- carry out a few actuator operations to check that movement is regular and that there is no oil leakage through the seals.

b2. Lubrication of mechanism

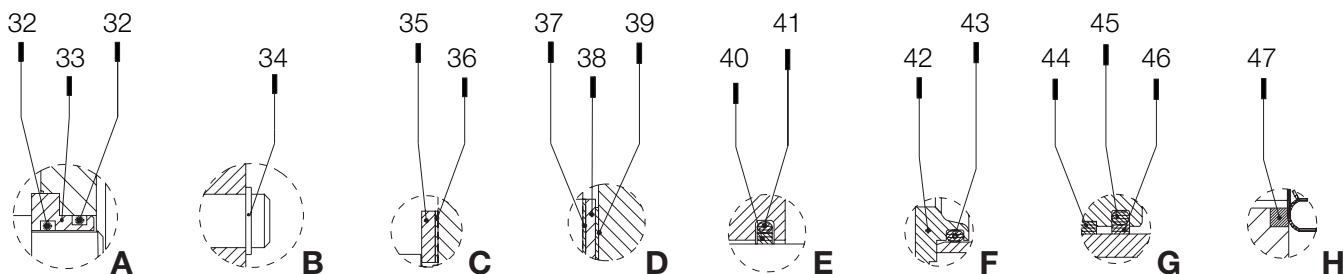
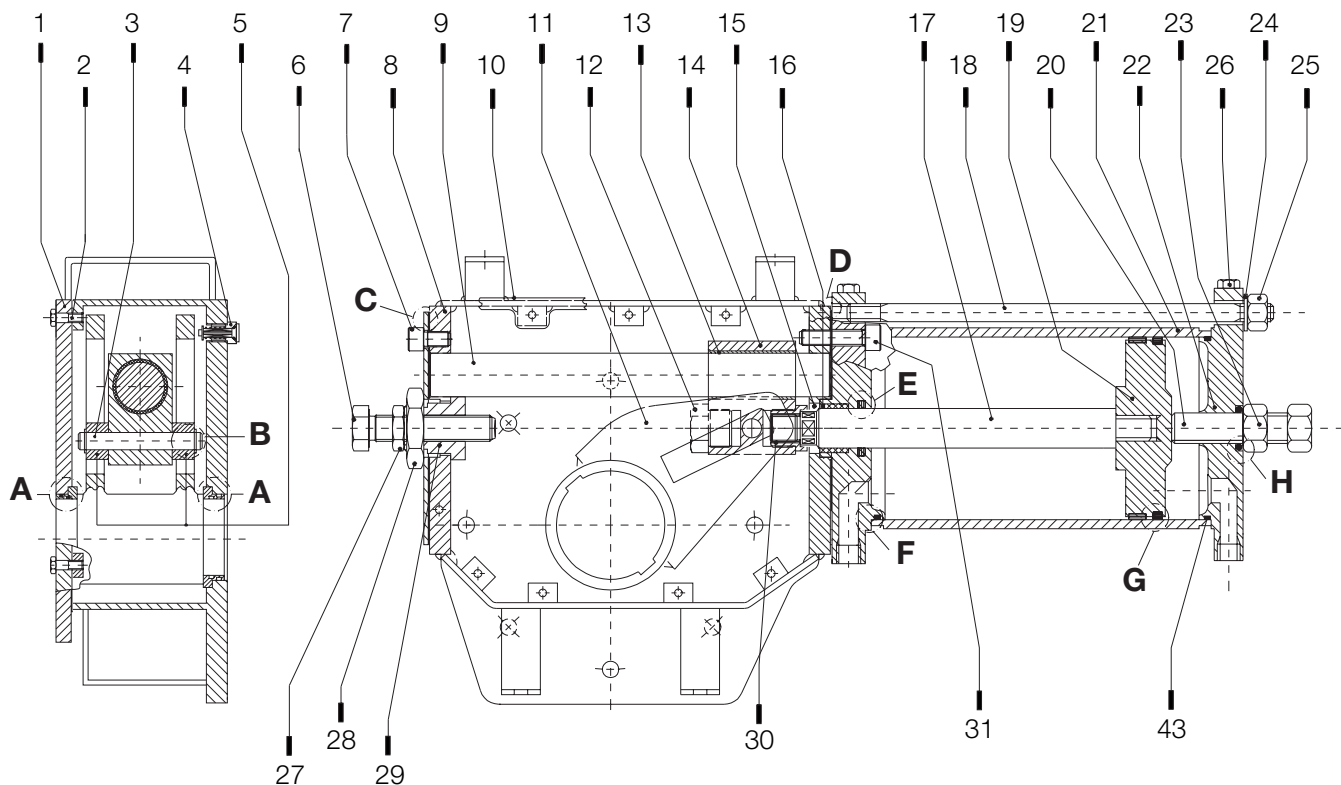
For normal duty the scotch yoke mechanism of the actuator is lubricated "for life". In case of high load and high frequency of operation it may be necessary to periodically restore lubrication: it is advisable to apply a generous coating of grease on the contact surfaces of the yoke and bushings, on the yoke link grooves, on the sliding blocks, on the guide bar. For this operation it is necessary to disassemble the mechanism cover. In larger actuators the lubrication can be performed through the inspection holes of the cover after removing the plugs.

The following grease is used by BIFFI for standard working temperature and suggested for relubrication:

Manufacturer	: AGIP
Type	: GR MU/EPI
NLGI grade	: 1
Worked penetration (dmm)	: 325
Drop point ASTM (°C)	: 185
ISO grade	: X1
Equivalent greases:	
	ESSO BEACON EP1
	BP LTX 1
	SHELL ALVANIA GREASE R1

For special working conditions and for working temperatures beyond the standard range consult BIFFI.

After maintenance operations carry out a few actuator operations to check that movement is regular and that there is no oil leakage through the seals.



OLGA hydraulic actuator

Item	Name	Item	Name	Item	Name
1.	Cover	17.	Piston rod	33.	Yoke bushing
2.	Screw	18.	Tie rod	34.	Retainer ring
3.	Guide block pin	19.	Piston	35.	Flange
4.	Vent valve	20.	Travel stop screw	36.	Gasket
5.	Sliding block	21.	Cylinder tube	37.	Gasket
6.	Travel stop screw	22.	End flange	38.	Flange
7.	Screw	23.	Nut	39.	Gasket
8.	Housing	24.	Spring washer	40.	Piston rod seal ring
9.	Guide bar	25.	Nut	41.	O-ring
10.	Cover gasket	26.	Plug	42.	Head flange
11.	Yoke	27.	Nut	43.	O-ring
12.	Plug	28.	Nut	44.	Guide sliding ring for piston
13.	Bushing	29.	Stopper bush	45.	O-ring
14.	Guide block	30.	Adaptor bush	46.	Piston seal ring
15.	Washer	31.	Screw	47.	Sealing washer
16.	Piston rod bushing	32.	O-ring		