Paladon Italia s.r.l.

Società Unipersonale

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INSTALLATION, COMMISSIONING AND MAINTENANCE MANUAL

SINGLE AND DOUBLE ACTING

DIRECT GAS ACTUATORS

Rev.	Description	Pages	Date	Issued by	Approved by
00	Issue	16	12.12.03	RF	EB

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SUMMARY TABLE

Paladon Italia s.r.l.
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DESCRIPTION OF DGS/D/C SERIES ACTUATORS

The DGS/D/C series actuators are direct gas double or single acting actuators specifically designed to provide efficiency and reliability in heavy duty services.

These actuators can be fitted with an emergency manual override suitable to operate the actuator in the event of supply failure. On all models this device can be hydraulic type, operated by means a hydraulic hand pump. Handweel type is available on smaller size only.

The main components of these units are the following:

1.1 A scotch-yoke mechanism which transforms the linear movement of the direct gas cylinder into a rotary movement suitable to operate quarter turn valves such as ball valves, butterfly valves or plug valves.
The scotch-yoke mechanism is included into a perfectly sealed housing, made of welded carbon steel, that protects it against corrosion and that guarantees safety to the personnel during the operations. It is also fitted with a guide bar suitable to support the transverse forces and to ensure the proper alignment of the piston rod, and with bronze sliding blocks and yoke bushing suitable to reduce the friction and to guarantee a long working life. In particular, the guide bar is chromium plated in order to guarantee its protection against corrosion.

1.2 Direct gas cylinder

Cylinder in rolled carbon steel provides robust pressure containment for all conditions.
Chromium plated piston rod nichel plated cylinder I.D. ensure excellent sealing surface with superior corrosion resistance.
Self lubricating composite guide sleeves on piston and piston rod provide low friction guidance and support.
Cap seal assembly for dynamic applications provides a durable seal extended, maintenance free operation.
The cylinder is provided of a cushion dumper in order to avoid the impact force due to the fast speed of operation achievable (2 secs).

1.3 The spring container, consisting of a welded container, which includes the spring assembled into a proper frame that does not allow it to extend beyond a given value.

1.4 Two mechanical stops to allow the adjustment of the valve angular stroke by means of the stop screws, which are screwed into the end flange of the direct gas cylinder and of the closing flange of the housing or into the mechanical manual override (Double acting version) or into spring container end flange or mechanical manual override (spring return version).

1.5 Mechanical visual indicator of the position shows the valve position during all the stroke of the actuator.

1.6 Manual override devices: if the torques to be overcome are below 5900 Nm a jackscrew override devices may be used. An hydraulic cylinder will be added if torques exceed above value. Cylinder will be acted by an adequate hand pump.
Handweel for double acting version: a handweel turns a split nut which pushes (or pulls) a threaded bar permanently connected to the actuator sliding block. A lever, acting an the split nut can disengage the same allowing for free automatic operation.

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Jacksrew for spring return version: a jackscrew handweel operator put on the spring acts on the yoke, which can operate the valve bypassing spring compression. To enable the automatic operation jacksrew shall be unscrewed at end position.

CHECKS TO BE CARRIED OUT AT THE RECEIPT OF THE ACTUATOR

DAMAGE DURING TRANSPORT

On receipt of actuator, check that it has not been damaged during the transport and, if necessary, proceed with repair of the possible damages to the paint-work.

The following information are mentioned on the actuator data plate and/or test certificate.

- Serial number of the actuator
- Model
- Maximum torque
- Supply pressure range
- Valve tag

Please check that the information printed on the data-plate conforms with those specified on the order, on the test certificate and on the delivery note.

SETTING OF MECHANICAL STOPS

In the event that the actuator has been delivered already assembled onto the valve, the mechanical stops have already been set during the relevant assembling operations.

In the event that the actuator has been delivered separately from the valve, the setting of the mechanical stops has to be checked and, if necessary, carried out after the assembling of the actuator onto the valve according to the instructions stated in this manual under the applicable sections .

STORAGE

GENERAL INSTRUCTIONS

The actuators leave the Paladon Italia S.r.l. factory in excellent finish and working conditions which are guaranteed by the inspection certificate issued for each single actuator.

In order to keep the actuators in good conditions until they are assembled on the plant, it is recommended to follow the rules listed here below, during the storage period:

- check that the plugs are properly assembled on the direct gas connections , in order to avoid entry of foreign matters and water during transport and storage.

- the actuators, which are not yet assembled onto the valves, must be placed onto a wooden pallet, in order to prevent any damage to the valve coupling flange.

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LONG-TERM STORAGE

In the event of a long-term storage, the following rules are also recommended:

- protect the coupling parts (adapter and coupling joint, flange, etc.) with grease or protective oil.

- Keep the actuators in a dry place or provide some means of protection against the direct action of weather agents.

- If possible, we also recommend to operate periodically the actuators. After this operation all the threaded connections of the actuator, of the valves must be carefully closed.

INSTRUCTION TO ASSEMBLE THE ACTUATOR ONTO THE VALVE

The assembling of the actuator onto the valve can be performed by:

- using the actuator housing flange with threaded holes
- interposing an adapter and a coupling joint

The assembly position of the actuator must be in accordance with plant requirements (cylinder axis parallel or perpendicular to the pipeline axis) and with the valve model.

In order to assemble the actuator onto the valve, proceed as follows:

1- Check that the coupling dimensions of the valve flange and those of the valve stem meet the coupling dimensions of the actuator.

2- Arrange the valve in the open or closed position according to the current position of the actuator.

3- Clean the coupling flanges of the valve and of the actuator and remove whatever might prevent their perfect adherence. Take care to remove grease perfectly.

4- Lubricate the valve stem with oil or grease, in order to make the assembling easier

5- Lift the actuator, by connecting hooks, chains or ropes, to the supporting points of the actuator. If possible, place the valve stem in the vertical position in order to make the assembling easier.

6- If the assembling operation is carried out by means of an adapter with a coupling joint (supplied with the actuator as a separate part), assemble it onto the valve stem, before proceeding with the assembling of the actuator.

7- Lower the actuator onto the valve so that the valve stem slips in the actuator yoke. Fasten the actuator to the valve by means of the stud bolts, which are screwed to its coupling flange.

8- Tighten the nuts of the connecting stud bolts by following the recommended tightening torque listed here below:

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THREAD SIZE	TORQUE
M8	20 Nm
M10	40 Nm
M12	70 Nm
M14	110 Nm
M16	160 Nm
M20	320 Nm
M22	420 Nm
M24	550 Nm
M27	800 Nm
M30	1100 Nm
M33	1400 Nm
M36	1700 Nm

9- If possible, operate the actuator in order to check that it actuates smoothly the valve

SETTING OF ANGULAR STROKE

SETTING OF END STOP SCREWS

The setting of the open or close valve position is performed by adjusting the screws which are inserted into the end flange of at both sides of the actuator.

- Loosen the protection nut.
- Screw the stop screw to reduce the actuator angular stroke. Unscrew the stop screw to increase the actuator angular stroke.

Verify, carrying out opening and closing strokes the new angular position, obtained. Repeat this operation until the desired angle is obtained.
During this operation there will be a small loss of gas through the thread of the stop screw.

- Tighten the protection nut.

ARRANGEMENT FOR START-UP

DIRECT GAS CONNECTIONS

1- Before connecting the actuator to the direct gas supply line, check that pipes and fittings are according to the applicable plant specifications, in order to guarantee the required gas flow for the actuator operation and to avoid that the supply pressure drops below the minimum allowable value.

2- Fasten the piping in a right way, in order not to cause loosening of threaded connections, in case that the system undergoes strong vibrations.

3- After the completion of the direct gas connections, operate the actuator and check that it works correctly.
Also check that its operating times are in accordance with those specified in the test certificate and that there are not leakages in the direct gas connections.

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START-UP

During the start-up of the actuator, it is necessary to check that:

- The pressure of the gas supply, are as prescribed.

- The direct gas connections do not show any leakage. If necessary, tighten the nuts of the pipe fittings.

- The painted parts have not been damaged during the transport, assembling or storage operations. After having removed rust, repair the damaged parts by following the applicable painting specification.

PERIODIC MAINTENANCE

As the actuators have been designed to work for long periods in the most severe conditions, they do not need any specific maintenance.
However, we recommend to periodically check that:

- The actuators operates the valve correctly and with the required operating time.
Carry out some opening and closing operations, if the working conditions of the plant allow to do this and if the actuator is not frequently operated.

- The process supply pressure value is within the required range.

- The direct gas connections do not show any leakage. If necessary, tighten the nuts of the pipe fittings.

- The painting work of the actuator has not been damaged, because it could happen that some areas need a touch-up according to the applicable painting specifications.

REMPLACEMENT OF THE CILINDER SEALS

When the cylinder seals must be replaced, because of a leakage or of a preventive scheduled maintenance, proceed as described here below:

1. DIRECT GAS CYLINDER SEALS

- Unscrew the nuts

- Remove the bottom flange

- Slide off the cylinder tube

- Unscrew the screws

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- Remove the cover of the mechanism

- Loosen the dowels

- Unscrew the piston rod and slide it off

- Unscrew the screws

- Remove the head flange

- Remove the o-rings, the piston gasket, the sliding rings and the gaskets.
  Carefully clean the relative grooves.

- Replace all the above mentioned seals and lubricate them with a grease film.

- By taking care not to damage the seals, proceed with reassembling operation as follows:

- Reassemble the head flange after restoring the paste gasket.

- Screw the screws

- Reassemble the piston rod screwing it onto the guide block

- Tighten the dowel

- Reassemble the cylinder tube and the bottom flange

- Uniformly screw the nuts

- Restore the paste gasket of the mechanism cover

- Reassemble the cover of the mechanism

- Screw the screws

- Carry out a few stroke operations with the actuator, in order to check that its movement is regular and that there are no leakages through the seal.

LUBRICATION

Usually it is not necessary to lubricate the actuator, because its mechanism is lubricated -for life-.

The following grease is used by Paladon Italia Srl to lubricate the mechanical components and it is recommended for a possible lubrication:

MANUFACTURER:	AGIP
TRADE NAME:	AGIP GR MU EP

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COLOR:	YELLOW/BROWN
OIL TYPE:	MINERAL
CONSISTENCY (NLGI GRADE)-ASTM D217:	1
WORKED PENETRATION AT 25°C-ASTM D217:	325 dmm
DROPPING POINT–ASTM D2265	185°C
VISCOSITY OF BASE OIL AT 40°C-ASTM D445:	160 mm2/s

NOTE:
The above descripted grease type is the Paladon Italia S.r.l. standard for lubrication of scotch yoke actuators

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DRAWINGS

SYMMETRIC SCOTCH YOKE MECHANISM ASSEMBLY DRAWING :
CARTER_PNS_7 (*)

DIRECT GAS CYLINDER ASSEMBLY DRAWING :
CIL320_PNS7

DIRECT GAS CYLINDER WITH CUSHION DUMPER ASSEMBLY DRAWING :
Cylinder with cushion dumper (*)

SPRING ENCLOSURE ASSEMBLY DRAWING:
CMY

HANDWHEEL FOR DOUBLE ACTING ACTUATORS:
COMANDO_MANUALE_DA

SPRING ENCLOSURE WITH JACKSCREW ASSEMBLY DRAWING :
CMY-JS (*)

(*) COMPONENTS FOR DGS-6-314-SRC10-HW-CD-LS-45

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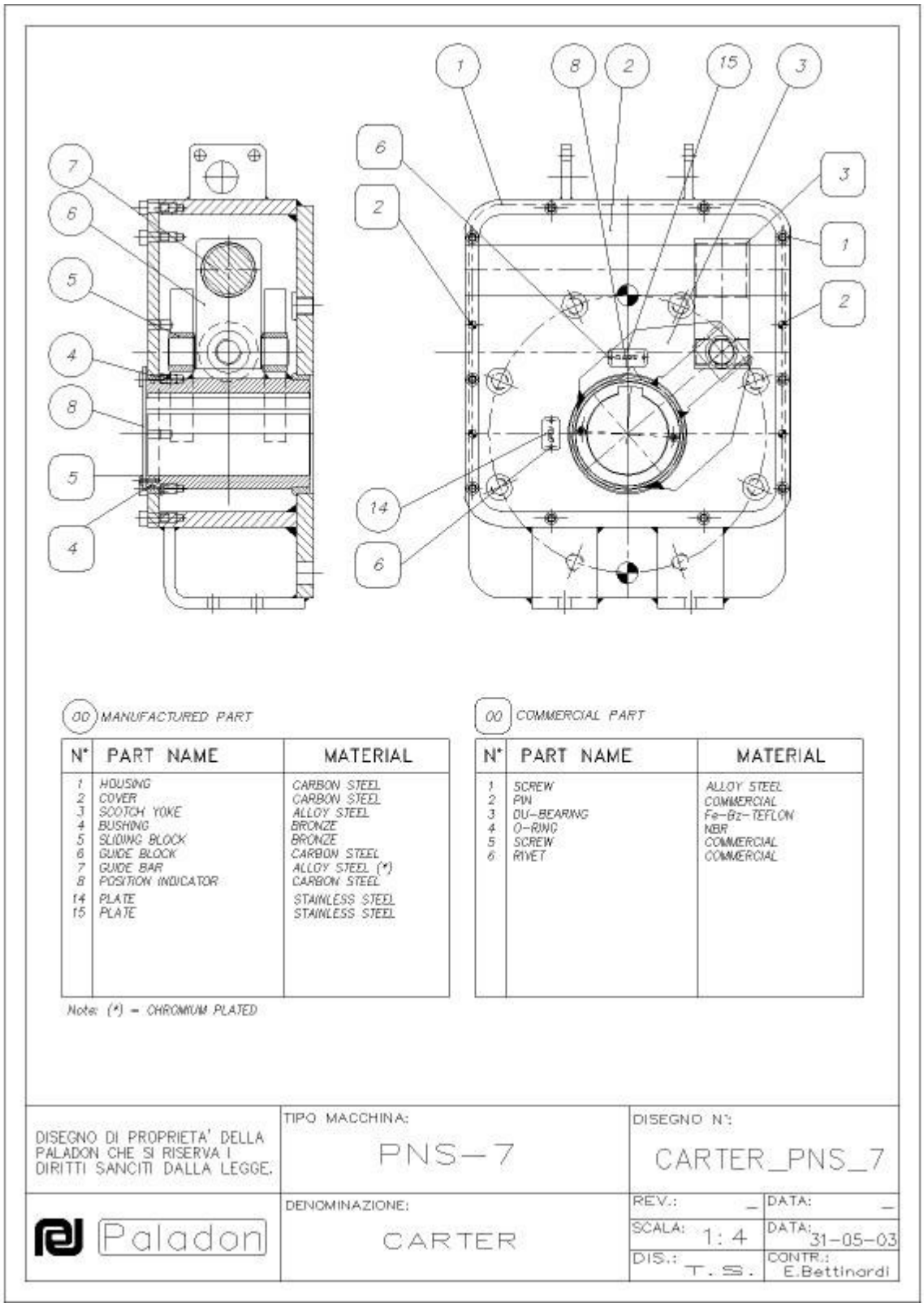

00 MANUFACTURED PART

N°	PART NAME	MATERIAL
1	HOUSING	CARBON STEEL
2	COVER	CARBON STEEL
3	SCOTCH YOKE	ALLOY STEEL
4	BUSHING	BRONZE
5	SLIDING BLOCK	BRONZE
6	GUIDE BLOCK	CARBON STEEL
7	GUIDE BAR	ALLOY STEEL (*)
8	POSITION INDICATOR	CARBON STEEL
14	PLATE	STAINLESS STEEL
15	PLATE	STAINLESS STEEL

00 COMMERCIAL PART

N°	PART NAME	MATERIAL
1	SCREW	ALLOY STEEL
2	PIN	COMMERCIAL
3	DU-BEARING	Fe-Bz-TEFLON
4	O-RING	NBR
5	SCREW	COMMERCIAL
6	RIVET	COMMERCIAL

Note: (*) = CHROMIUM PLATED

DISEGNO DI PROPRIETA' DELLA PALADON CHE SI RISERVA I DIRITTI SANCITI DALLA LEGGE.

TIPO MACCHINA: PNS-7

DISEGNO N°: CARTER_PNS_7

Paladon

DENOMINAZIONE: CARTER

REV.: _ DATA: _

SCALA: 1:4 DATA: 31-05-03

DIS.: T.S. CONTR.: E.Bettinardi

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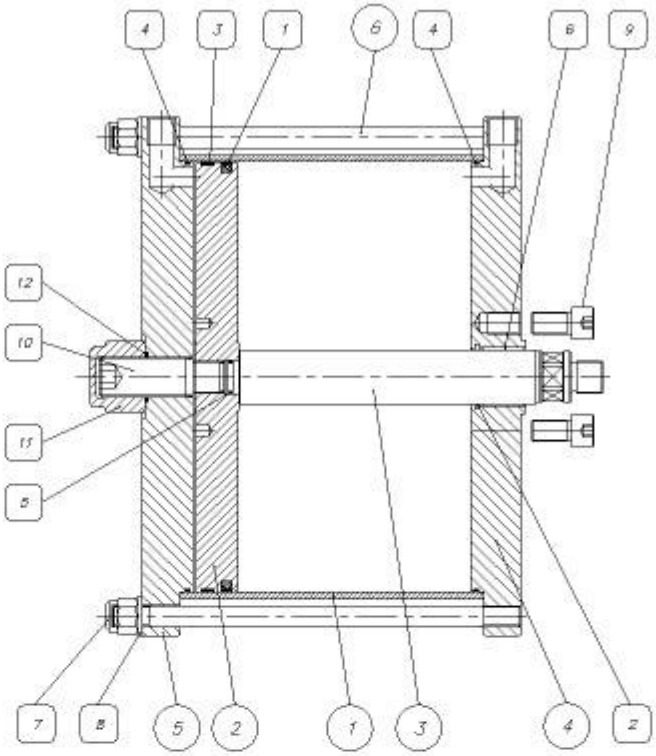

(00) MANUFACTURED PART

N°	PART NAME	MATERIAL
1	CYLINDER LINER	CARBON STEEL
2	PISTON	CARBON STEEL
3	PISTON ROD	ALLOY STEEL (*)
4	ROD HEAD FLANGE	CARBON STEEL
5	BLANK HEAD FLANGE	CARBON STEEL
6	TIE ROD	CARBON STEEL

(00) COMMERCIAL PART

N°	PART NAME	MATERIAL
1	GLIDER + O-RING	COMMERCIAL
2	GLIDER + O-RING	COMMERCIAL
3	GUIDE SLIDER	TEFLON+15% GRAPHITE
4	O-RING	NBR
5	O-RING	NBR
6	DU-BEARING	Fe-Bz-TEFLON
7	HEX. NUT	ALLOY STEEL
8	WASHER	COMMERCIAL
9	SCREW	COMMERCIAL
10	DOWEL	CARBON STEEL
11	CUP	CARBON STEEL

Note: (*) = CHROMIUM PLATED

TIPO MACCHINA: PNS-7

DISEGNO N°: CIL320_PNS7

Paladon

DENOMINAZIONE: CILINDRO 320

REV.: _ DATA: _

SCALA: 1:4 DATA: 31-05-03

DIS.: T. S. CONTR.: E.Bettinardi

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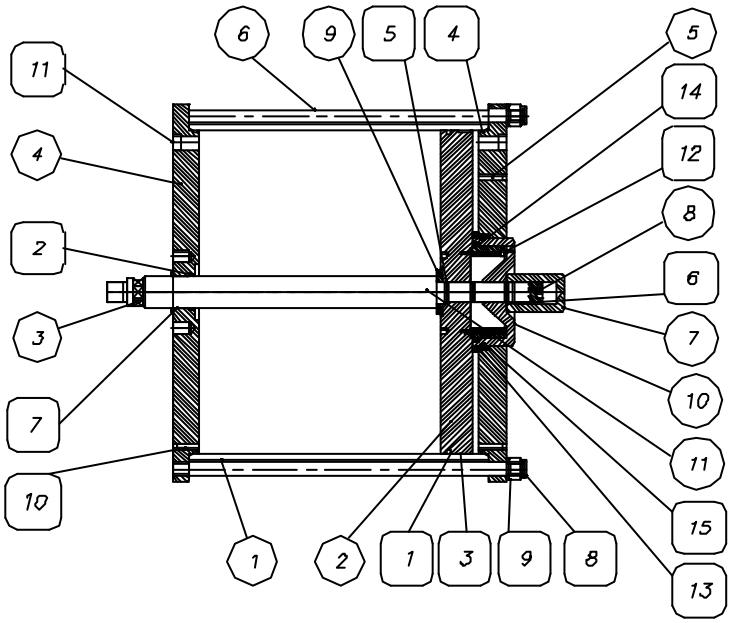

00 MANUFACTURED PART

N°	PART NAME	MATERIAL
1	CYLINDER LINER	CARBON STEEL
2	PISTON	CARBON STEEL
3	PISTON ROD	ALLOY STEEL (*)
4	ROD HEAD FLANGE	CARBON STEEL
5	BLANK HEAD FLANGE	CARBON STEEL
6	TIE ROD	CARBON STEEL
7	CUP	CARBON STEEL
8	DOWEL	CARBON STEEL
9	WASHER	CARBON STEEL
10	CUSHION DUMPER LINER	CARBON STEEL
11	CUSHION DUMPER PISTON	CARBON STEEL

Note: (*) = CHROMIUM PLATED

00 COMMERCIAL PART

N°	PART NAME	MATERIAL
1	GLIDER + O-RING	COMMERCIAL
2	GLIDER + O-RING	COMMERCIAL
3	GUIDE SLIDER	TEFLON+15% GRAPHITE
4	O-RING	NBR
5	O-RING	NBR
6	O-RING	NBR
7	DU-BEARING	Fe-Bz-TEFLON
8	HEX. NUT	ALLOY STEEL
9	WASHER	COMMERCIAL
10	PLUG	CARBON STEEL
11	PLUG	CARBON STEEL
12	SCREW	CARBON STEEL
13	SCREW	CARBON STEEL
14	GLIDER + O-RING	COMMERCIAL
15	O-RING	NBR

TIPO MACCHINA: CYLINDER WITH CUSHION DUMPER	DISEGNO N°: CYLINDER
DENOMINAZIONE: CYLINDER	REV: _ DATA: _
	SCALA: 1:12 DATA: 30-05-03
	DIS.: T.S. CONTR.: E.B.

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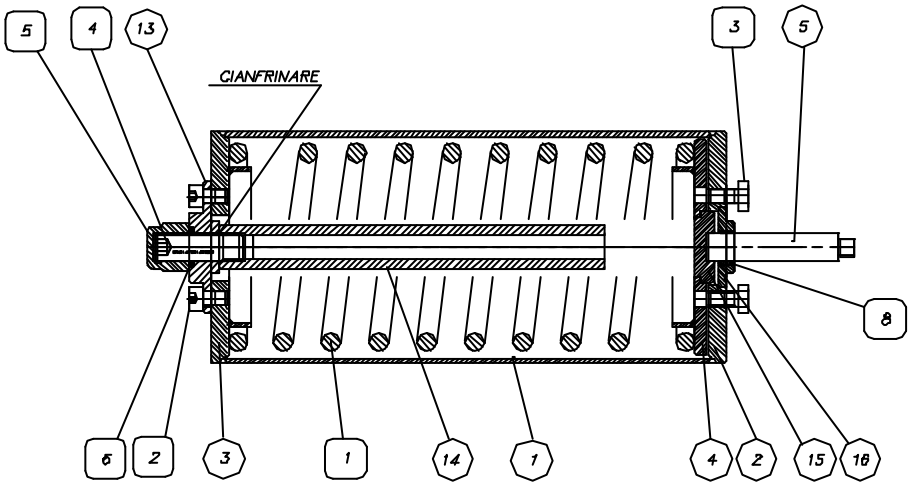

00 MANUFACTURED PART

N°	PART NAME	MATERIAL
1	SPRING LINER	CARBON STEEL
2	SPRING HEAD FLANGE	CARBON STEEL
3	SPRING END FLANGE	CARBON STEEL
4	DISK	CARBON STEEL
5	PUSH BAR	ALLOY STEEL (*)
13	FLANGE	CARBON STEEL
14	STOP GRAIN	CARBON STEEL
15	DISK ADAPTOR	STAINLESS STEEL
16	FLANGE ADAPTOR	STAINLESS STEEL

Note: (*) = CHROMIUM PLATED

00 COMMERCIAL PART

N°	PART NAME	MATERIAL
1	SPRING	SPRING STEEL
2	SCREW	COMMERCIAL
3	SCREW	COMMERCIAL
4	DOWEL	CARBON STEEL
5	CUP	CARBON STEEL
6	O-RING	NBR
7	SCREW	COMMERCIAL
8	DU-BEARING	Fe-Bz-TEFLON

DISEGNO DI PROPRIETA' DELLA PALADON CHE SI RISERVA I DIRITTI SANCITI DALLA LEGGE.

TIPO MACCHINA: CMY

DISEGNO N°: CMY

Paladon

DENOMINAZIONE: CONT. MOLLA N.1

REV.: _ DATA: _

SCALA: 1:4 DATA: 03/12/2003

DIS : RF CONTR.: E Bettinardi

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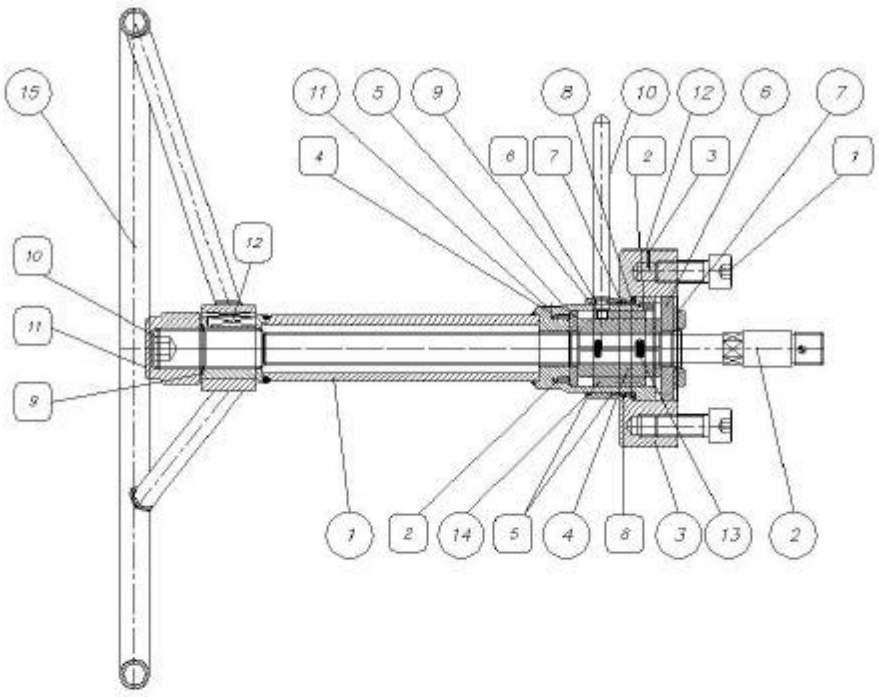

(00) MANUFACTURED PART

N°	PART NAME	MATERIAL
1	SLEEVE	CARBON STEEL
2	SCREW	CARBON STEEL
3	FLANGE	CARBON STEEL
4	SPLIT NUT	CARBON STEEL
5	FLANGE	CARBON STEEL
6	DISK	CARBON STEEL
7	BUSHING	BRONZE
8	BUSHING	BRONZE
9	RING	CARBON STEEL
10	HAND GRIP	CARBON STEEL
11	NAME PLATE	AISI303
12	NAME PLATE	AISI303
13	SPRING	CARBON STEEL
14	ECCENTRIC	AISI 420F
15	WHEEL	CARBON STEEL

Note: (*) = CHROMIUM PLATED

(00) COMMERCIAL PART

N°	PART NAME	MATERIAL
1	SOCKET HEAD SCREW	COMMERCIAL
2	PIN	COMMERCIAL
3	RIVET	COMMERCIAL
4	RIVET	COMMERCIAL
5	O-RING	NBR
6	O-RING	NBR
7	O-RING	NBR
8	O-RING	NBR
9	O-RING	NBR
10	STOP GRAIN	CARBON STEEL
11	STOP NUT	CARBON STEEL
12	KEY	COMMERCIAL

DISEGNO DI PROPRIETA' DELLA PALADON CHE SI RISERVA I DIRITTI SANCITI DALLA LEGGE.	TIPO MACCHINA: PNS—DA—HW	DISEGNO N°: COMANDO_MANUALE_DA	
Paladon	DENOMINAZIONE: ASSIEME	REV.: -	DATA: -
		SCALA: 1:2.5	DATA: 04.05.03
		DIS.: T. S.	CONTR.: E.Bettinardi

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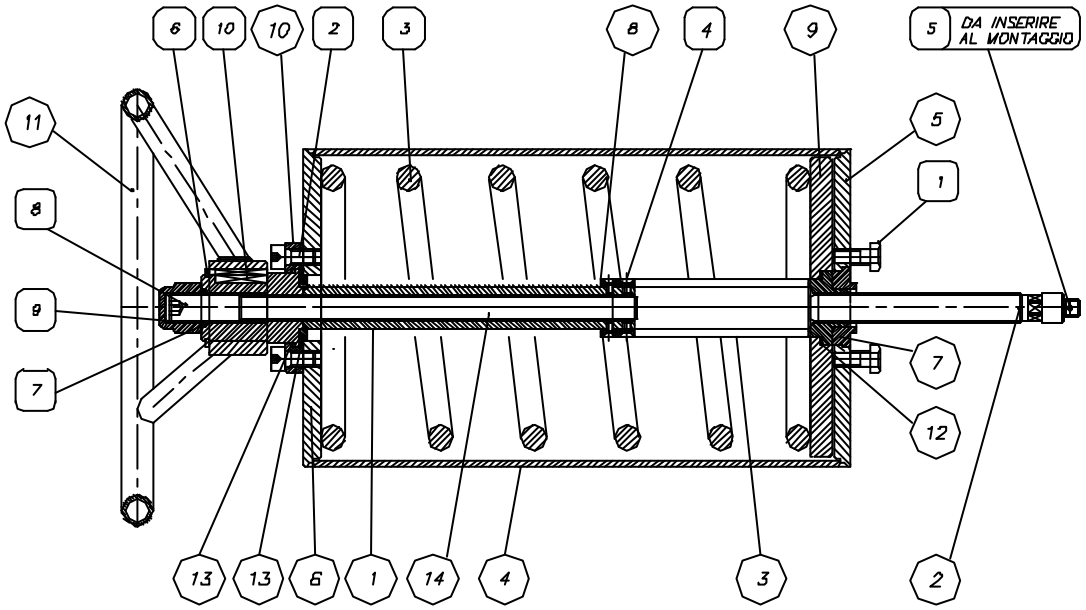

00 MANUFACTURED PART

N°	PART NAME	MATERIAL
1	BODY	CARBON STEEL
2	SCREW	CARBON STEEL
3	TUBE	CARBON STEEL
4	SPRING LINER	CARBON STEEL
5	SPRING HEAD FLANGE	CARBON STEEL
6	SPRING END FLANGE	CARBON STEEL
7	BUSHING	BRONZE
8	KEY	CARBON STEEL
9	DISK	CARBON STEEL
10	END FLANGE	CARBON STEEL
11	HANDWHEEL	CARBON STEEL
12	BUSHING	BRONZE
13	BUSHING	BRONZE
14	STOP PIN	CARBON STEEL

Note: (*) = CHROMIUM PLATED

00 COMMERCIAL PART

N°	PART NAME	MATERIAL
1	SCREW	COMMERCIAL
2	SCREW	COMMERCIAL
3	SPRING	SPRING STEEL
4	SCREW	COMMERCIAL
5	ELASTIC PIN	COMMERCIAL
6	SEEGER	COMMERCIAL
7	O-RING	NBR
8	STOP GRAIN	COMMERCIAL
9	NUT	COMMERCIAL
10	KEY	COMMERCIAL

DISEGNO DI PROPRIETA' DELLA PALADON CHE SI RISERVA I DIRITTI SANCITI DALLA LEGGE.

TIPO MACCHINA: CMY-JS

DISEGNO N°: CMY-JS

Paladon

DENOMINAZIONE: CONT. MOLLA N.1

REV: _ DATA: _

SCALA: 1:4 DATA: 03/12/2003

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