

Installation and operating instructions for Westlock 3700 series valve control monitor with Magnum proximity switches



SIRA 08 ATEX 5348X

Ex mb e IIC T* Gb

Ex tb IIIC T*°C Db IP6X

All enclosures: -40°C to +50°C (T5 / T100°C); -40°C to +45°C (T6 / T85°C)

1 Product description

The equipment may be used in a CAT 2 & 3 environment in the presents of flammable gases / vapours and dusts.

The apparatus groups cover IIA, IIB and IIC with temperature classes of T1, T2, T3, T4 and T5 / T100°C with an ambient temperature range of -40 to +50°C and T6 / T85°C with an ambient temperature range of -40 to +45°C.

The 3700 series valve control monitor provides end of travel indication by the means of the Magnum proximity switch(es) mounted within the enclosure. These are activated by means of a magnetic trigger system mounted on the rotary shaft. To enable pneumatic control, the monitors are fitted with an additional, single, integral solenoid valve.

The 3700 series enclosure construction comprises of a shaft passing through the enclosure base and cover. The two part enclosure has an integral gasket seal. The shaft has upto two 'O'ring seals in both the cover and housing bearings

This product is available in three materials, Grilamid TR90 UV, aluminium or stainless steel 316.

The housing has the option of upto two cable entries for connection to an external power source via appropriate ATEX certified cable glands: M20 x 1.5p, M25 x 1.5p, 1/2" - 14 NPT, 3/4" - 14 NPT or Pg13.5.

The 3700 certification is compliant against the following standards:

EN 60079-0 : 2006	Electrical apparatus for explosive gas atmospheres – Part 0 - General requirements
EN 60079-7 : 2007	Electrical apparatus for explosive gas atmospheres – Part 7 - Encapsulation 'e'
EN 60079-18 : 2004	Electrical apparatus for explosive gas atmospheres – Part 18 - Encapsulation 'm'
EN 61241-0 : 2006	Electrical apparatus for use in the presence of combustible dust – Part 0 - General requirements
EN 61241-1 : 2004	Electrical apparatus for use in the presence of combustible dust – Part 1 - Protection by enclosures 'tD'
Inc Corri 1 + 2	
EC 60079-0:2007	was used as guidance in respect to marking.

Note: Before installation of this product, please ensure that the product and its certification is suitable for the intended application.

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection provided by the equipment is not compromised.

Installation of any cable entry devices, conduit entry devices or blanking devices shall not compromise the degree of ingress protection level IP6X for use in the presence of combustible dusts.

The unit has an ingress protection of IP66/67 and therefore any conduit device fitted must maintain this.



Warning

Electrostatic hazard, clean only with damp cloth.

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2 Mounting instructions

- 2.1 Attach the mounting bracket and adaptor (if required) to the Accutrak housing and shaft with the fasteners provided with the mounting kit.
- 2.2 To ensure that the Accutrak is mounted correctly, it may necessary to stroke the actuator to the fully closed position.



Warning

Before stroking the actuator to the fully closed position, please ensure that the process is safe to do so.

- 2.3 With the actuator in the correct position, attach the Accutrak / bracket to the actuator using the hardware provided in the mounting kit.
- 2.4 To release the cover, loosen the cover retaining screws. Twist the cover approx 45° and lift up. See Fig 1.
- 2.5 To set the switches, lift the bottom cam and turn until the switch has activated and then release. The spring will push the cam back onto the splined shaft.



Warning

Before stroking the actuator, please ensure that the process is safe to do so and that all hands are kept away from the moving shaft.

- 2.6 Stroke the actuator to the opposite end of travel. Set the top cam by pushing down and turning the cam until the switch is activated.



Warning

Before stroking the actuator, please ensure that the process is safe to do so and that all hands are kept away from the moving shaft.

- 2.7 Stroke the actuator from one end of stroke to the other several times to check the switch operation. If the switches require adjustment, repeat steps 2.5 to 2.7.

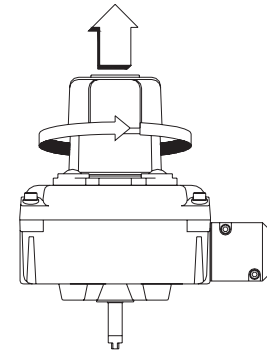
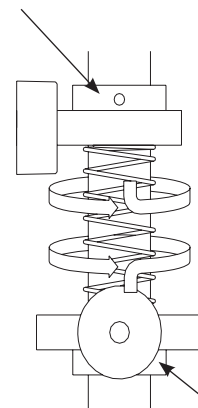


Figure 1

Top cam
Push down, turn
& release



Bottom cam
Lift up, turn
& release

Figure 2

3 Field wiring & installation



Warning

The 3700 series should always be handled with care when the cover is removed.

Note: Before electrical installation, please read and follow the wiring diagram located inside the cover. The electrical ratings can be found on the product I.D label.

- 3.1 Field wiring must be carried out in accordance with site, local and national electrical codes / requirements. This includes special attention to earth bond to the aluminium or stainless steel enclosure using the internal and external earth points provided.
- 3.2 Installation of this product shall be carried out by competent personnel in accordance with the applicable code of practice such as EN 60079-14.
- 3.3 The certification applies to equipment **without** cable glands. When mounting the enclosure in the hazardous area, only suitably rated IP66/67 ATEX certified Ex e glands **must be used**.
- 3.4 All unused cable entries **must** be plugged with a suitably rated IP66/67 ATEX certified blanking devices.

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- 3.5 The first two digits of the Westlock nomenclature signifies the series with the third digit defining whether the product has a visual beacon or not. The fourth digit identifies the Magnum switch. The fifth digit details the enclosure material: R = plastic, A = aluminium, S = stainless steel. The table below details the applicable ambient ranges:

Series code	Cover type	T class	Ambient range
3749*	Beacon	T6 / T85°C	-40°C to +45°C
3749*	Beacon	T5 / T100°C	-40°C to +50°C
3769*	Flat cover	T6 / T85°C	-40°C to +45°C
3769*	Flat cover	T5 / T100°C	-40°C to +50°C

- 3.6 The electrical rating of the Magnum proximity switches are:
Magnum ratings: 3 A / 120 V AC, 1.5 A / 240 V AC or 2 A / 24 V DC

Note: The series code signifies the maximum electrical rating of the product, suitable overloading protection must be provided to prevent these values being exceeded.

- 3.7 The electrical rating of the solenoid coil is:
12 to 240 V DC (max 3 W) or 12 to 240 V AC (max. 6.4 VA)
- 3.8 Before replace the enclosure cover, ensure that both of the housing and cover sealing surfaces are clean and undamaged. Tighten the cover screws hand tight using a standard metric A/F Allen key. For Grilamid enclosure use 4 mm A/F and for either stainless steel or aluminium use 5 mm A/F.

4 Product repair & service

- 4.1 Inspection of this product shall be carried out by periodically by suitably trained personnel in accordance with the applicable code of practice such as EN 60079-17 to ensure that it is maintained in a satisfactory condition.
- 4.2 The equipment is not intended to be repaired by the user. The repair of this equipment is to be carried out by the manufacturer, or their approved agents, in accordance with the applicable code of practice such as EN 60079-19.
- 4.3 The equipment contained within this product can be replaced with like for like parts / assemblies.
- 4.4 The certification of this product has been approved based on the material of construction as per the drawings listed in the schedule within this certificate. Any replacement parts that are not made in accordance to the listed drawing will invalidate the approval / certification.
- 4.5 Replacement parts must be purchased through Westlock Controls UK Ltd or via an approved Westlock Controls distributor.

5 Operating and maintenance instructions for Falcon & Falcon II solenoid valve

5.1 General description

- 5.1.1 The Falcon & Falcon II solenoid valve incorporates elastomer static seals through which a shaped spool moves and are manufactured for 3 or 5 way operation. 3 way is normally used for pilot control of the other relay valves or for the operation of single acting cylinders. 5 way is normally used to control the action of double acting cylinders. The seal spacer assembly forms individual annular chambers opposite each valve port and the grooved spool either closes or allows flow between adjacent chambers, hence the position of the spool determines which ports are open or closed.

The spool is moved by way of a manually or mechanically operated mechanism normally against a return spring. Operation may be by application or removal of a pilot air supply acting as a pilot piston. This form of control is utilized for electrical actuation where integral solenoid valves control the pilot air supply.

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5.1.2 Optional features - Falcon I

N - No-voltage release (latching)

With the coil first energized, the palm button is then manually moved and latched.

The inward movement of the palm button causes the valve to shift.

When the coil is de-energized, the palm button and latching mechanism are automatically tripped, allowing the valve to return to its original position. (1.2 C_v valves only) See Fig. 3A.

R - No-voltage release (non-latching)

With the coil first energized, the palm button is then manually moved. The inward movement of the palm button causes the valve to shift. When the coil is de-energized, the palm button automatically returns to its original position. (1.2 C_v Valves only) See Fig. 3B.

L - Manual locking override

Manually depress palm button and rotate clockwise for maintained condition, must manually disengage to return to original position. See Fig. 3C.

M - Momentary override

Spring return momentary push type, must hold in to actuate. See Fig. 3D.

H - Hex drive maintained override

Insert Allen key in hex head screw and rotate clockwise (4-5 turns) to shift spool. Valve will stay put until hex head screw is rotated counter clockwise (4-5 turns) back to original position. See Fig. 3E.

E - External pilot

The 1/8" NPT external pilot connection requires a separate auxiliary pressure line to the valve. This feature should be used when the controlled pressure is below the minimum 45 psi operating pressure.

D/C - Dual coil option

5 way valves are available with a coil/pilot valve on each end of the Falcon II valve, coil 'A' and coil 'B'. When coil 'A' is energized the valve will shift. If coil 'A' is then de-energized, the valve will remain in this position.

The valve will not return to the original state until coil 'A' is de-energized and coil 'B' is energized.

The process is the same for coil 'B'.

Notes - For dual coil valves

The valve may be in either position upon installation. Refer to the air flow diagrams and energize the appropriate coil (with air) to reset valve to the desired position.

Dual coil valves require both an electrical signal and air pressure to operate. See air flow diagram for air pressure requirements.

If either or both inputs are lost the valve will remain in it's current position.

Both coils should never be energized simultaneously.

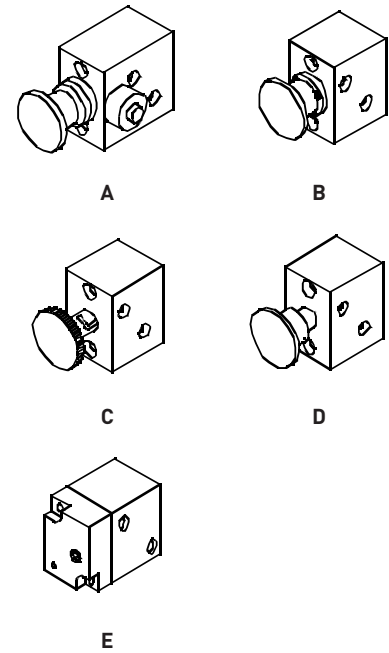


Figure 3

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5.1.3 Optional features - Falcon II

No-voltage release (latching)

With the coil first energized, the palm button is then manually moved and latched. The inward movement of the palm button causes the valve to shift. When the coil is de-energized, the palm button and latching mechanism are automatically tripped, allowing the valve to return to its original position. See Fig. 4A.

Manual locking override

Manually depress palm button and rotate clockwise for maintained condition, must manually disengage to return to original position. See Fig. 4B.

Momentary override

Spring return momentary push type, must hold in to actuate. See Fig. 4C.

Hex drive maintained override

Insert Allen key in hex head screw and rotate clockwise (4-5 turns) to shift spool. Valve will stay put until hex head screw is rotated counter clockwise (4-5 turns) back to original position. See Fig. 4D.

Dual coil option

5 way valves are available with a coil/pilot valve on each end of the Falcon II valve, coil 'A' and coil 'B'. When coil 'A' is energized the valve will shift. If coil 'A' is then de-energized, the valve will remain in this position.

The valve will not return to the original state until coil 'A' is de-energized and coil 'B' is energized.

The process is the same for coil 'B'.

Notes - For dual coil valves

The valve may be in either position upon installation. Refer to the air flow diagrams and energize the appropriate coil (with air) to reset valve to the desired position.

Dual coil valves require both an electrical signal and air pressure to operate. See air flow diagram for air pressure requirements.

If either or both inputs are lost the valve will remain in it's current position.

Both coils should never be energized simultaneously.

5.2 Specifications

Operating pressure: 45 - 120 psig / 3.1 - 8.2 bar

Operating temperature: -20°C to 65°C (I/S only)
-20°C to 82°C

Operating media: Non lubricated filtered air to 20 microns

5.3 Field wiring

Complete the electrical wiring in accordance with national and local electrical requirements.

The ground wire should be secure under the green screw. Check all screws for tightness.

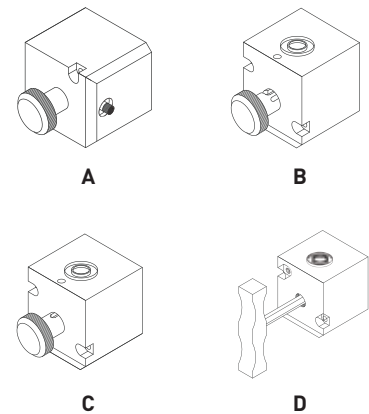
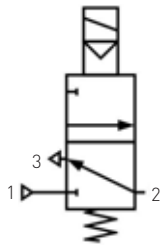


Figure 4

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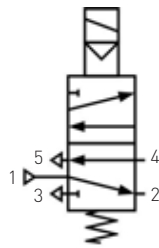


Spring return valve

Description of operation:

Solenoid de-energized - air flows from Outlet Port 2 to Exhaust Port 3.

Solenoid energized - air flows from Inlet Port 1 to Outlet Port 2.

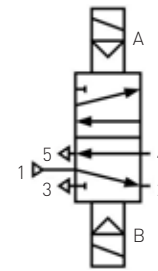


Spring return valve

Description of operation:

Solenoid de-energized - air flows from Inlet Port 1 to Outlet Port 2 and exhausts from Port 4 to Port 5.

Solenoid energized - air flows from Inlet Port 1 to Outlet Port 4 and exhausts from Port 2 to Port 3.



Dual coil valve

Description of operation:

Coil B de-energized - air flows from Inlet Port 1 to Outlet Port 2 and exhausts from Port 4 to Port 5.

Coil A energized - air flows from Inlet Port 1 to Outlet Port 4 and exhausts from Port 2 to Port 3.

Figure 5 - Air line designation, 1/4" NPT or BSP air ports for inlet, outlet and exhaust

5.4 (Air line) Installation considerations

Air mains and lines should be large enough to avoid excessive pressure loss under conditions of maximum flow. Air lines should be installed with as few restrictions as possible if the cost of compressed air is to be kept to a minimum. Sharp turns in piping should be avoided for more efficient air flow and economical air power. It is advisable to pitch the mains in the direction of air flow so that both gravity and air flow will carry the water to traps or water legs located at frequent intervals.

To help in preventing condensed moisture from reaching the point of usage, down pipes should never be taken directly from the bottom of air pipes or mains. Connection should be made at the top of the main and a long radius return bend used.

5.5 Air flow

Pipe sizes are normally determined on semi empirical lines, basis for selection being an acceptable pressure drop e.g. not more than 10% of the applied pressure. In sizing pipes, consideration should be given to likely future demands, as a system will be inefficient if the demand outgrows the supply. It is always better to over size mains as this will reduce air velocity and make water separation more effective.

5.6 Air service equipment

The importance of proper filtration (20 micron) and lubrication of the air supply to pneumatic equipment can never be over-emphasized as a means of decreasing friction and preventing corrosion and wear due to moisture and abrasive solids being present in the air supply.

At higher pressures than recommended, pneumatic equipment can wear excessively with no significant increase in output and compressed air is consequently wasted.

There is much to be gained, therefore, from providing pneumatic equipment with serviced air by including suitable air line filters, pressure regulators and lubricants in the installation.

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5.7 Tubes and fittings

The use of copper, stainless steel, nylon or polyethylene tube is recommended for piping up air circuits and equipment. As a general rule, pipe threaded fittings should not be assembled to a specific torque because the torque required for a reliable joint varies with thread quality, port and fitting materials, sealant used, and other factors. The suggested method of assembling pipe threaded connections is to assemble them finger tight and then wrench tighten further to a specified number of turns from finger tight. The assembly procedure given below is for reference only, the fitting should not be over tightened for this will lead to distortion and most likely, complete valve failure.

1. Inspect port and connectors to ensure that the threads on both are free of dirt, burrs and excessive nicks.
2. Apply sealant/lubricant or PTFE tape to the male pipe threads. With any sealant tape, the first one or two threads should be left uncovered to avoid system contamination.
3. Screw the connector into the port to the finger tight position.
4. Wrench tighten the connector approximately 1 - 2 turns (to seal) from finger tight. Again this is only reference – the fitting should NOT be over tightened.

Special notice

Delrin valve bodies are fitted with helicoils therefore an extra effort should be made NOT to overtighten pipe fittings or retaining screws (0.5 - 1 turns from finger tight to seal). Over tightening will result in valve failure or pull helicoils from valve body.

Maintenance

Routine maintenance is usually confined to the periodic replenishment of Dow Corning III lubricant or equivalent to spool and spring.

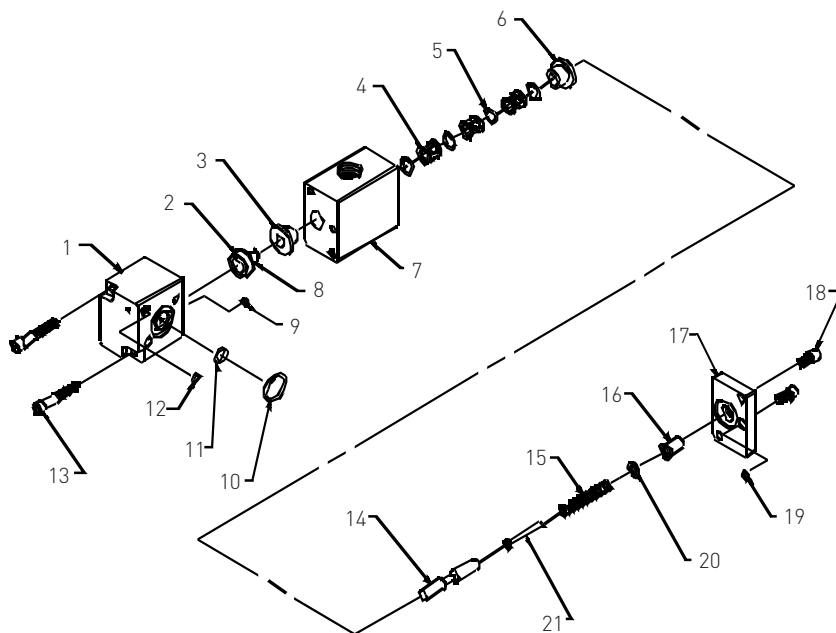


Figure 6 - Exploded assembly of 3 way 0.5 Cv Falcon

Parts list		
No.	Part name	
1.	Pilot end cap	VA-10036
2.	Pilot piston seal	GS-100 17
3.	Bushing	BU-10013
4.	Spacer	VA-10048
5.	O-ring	GS-20002
6.	Bushing	BU-10013
7.	Valve body	VA-10038
8.	Pilot piston	VA-10050
9.	O-ring	GS-20017
10.	O-ring	GS-20020
11.	O-ring	GS-20002
12.	O-ring	GS-20018
13.	SCKT HD cap screw	HD-10432
14.	Spool	VA-10477
15.	Spring	HD-10165
16.	Indicator cap	VA-10078
17.	End cap	VA-10063
18.	SCKT HD cap screw	HD-10348
19.	O-ring	GS-20017
20.	Indicator S/S washer	HD-10181
21.	Indicator pin	VA-10066

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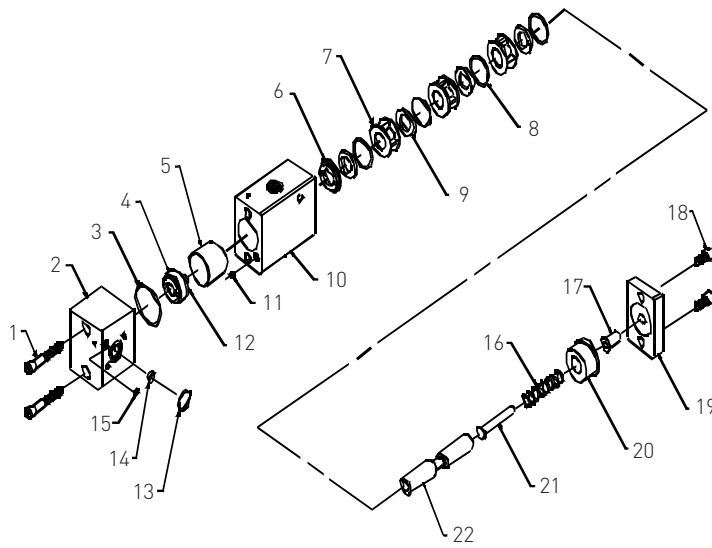


Figure 7 - Exploded assembly of 3 way 1.2 C_v Falcon

Parts list

No.	Part name	
1.	Pilot HD cap screw	HD-10431
2.	Pilot end cap	VA-10043
3.	O-ring	GS-20021
4.	Pilot piston seal	GS-10018
5.	Pilot piston sleeve	VA-10052
6.	Guide washer	VA-10056
7.	Spacer	VA-10049
8.	O-ring	GS-20022
9.	Bonded seal	GS-10019
10.	Valve body	VA-10041
11.	O-ring	GS-20017
12.	Pilot piston	VA-10051
13.	O-ring	GS-20020
14.	O-ring	GS-20002
15.	O-ring	GS-20018
16.	Spring	HD-10066
17.	Indicator cap	VA-10079
18.	SCKT HD cap crew	HD-10431
19.	End cap	VA-10065
20.	Bushing	BU-10014
21.	Indicator pin	VA-10068
22.	Spool	VA-10054

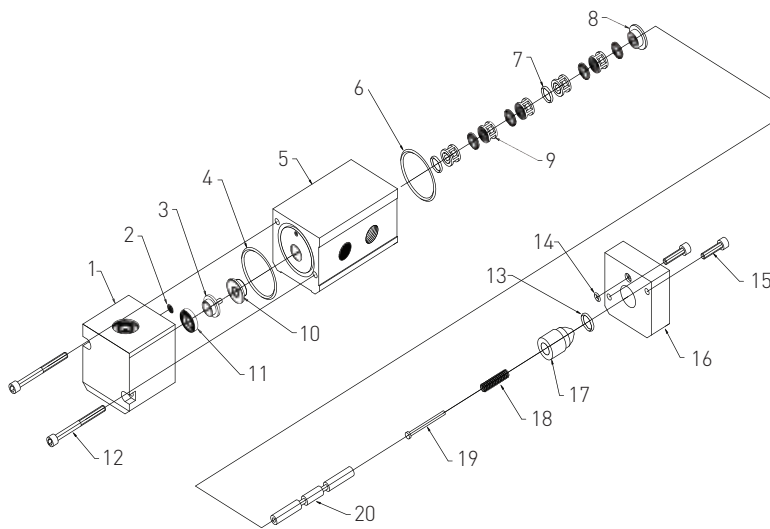


Figure 8 - Exploded assembly of 3 and 5 way 1.1 C_v Falcon II

Parts list

No.	Part name	
1.	Pilot piston end cap	V5243
2.	O-ring	OZOIN070/00125
3.	Pilot piston	V5119
4.	O-ring	OZOIN070/01062
5.	Valve body	5/2 V5246 5/3 V5314
6.	O-ring	OZOIN070/01062
7.	O-ring	5/2 V5042 6 off 3/2 V5042 4 off
8.	Bush	V5084
9.	Spacer	5/2 V4734 5 off 3/2 V4734 3 off
10.	Bush	V5084
11.	Pilot piston seal	V4163
12.	Cap screws	OSM04KS40
13.	O-ring	OZOIN010/0130
14.	O-ring	OZOIN070/00125
15.	Cap screws	OSM04KS16
16.	Spring end cap	V5244
17.	Tell-tale cover	V5247
18.	Spring	V4571
19.	Tell-tale pin	V5026
20.	Spool	5/2V5212 3/2 V5313