



Dual-V



V-Port



ISA V-Port

## Section 1 - Storage

### 1.1. Preparation and preservation for storage

All valves should be properly packed in order to protect the parts that are subject to deterioration during transportation and storage on site. In particular, the following precautions should be taken:

- The valves must be packed with the ball in the open position.
- The flange sealing surface (raised face) shall be protected with suitable protective oil.
- The end faces of the valve must be protected with appropriate seal discs.
- The type of packing must be defined in the Customer's Order and be appropriate to ensure safe transportation to the final destination and eventual storage before installation. Wrapping and/or covers should be left in place until just prior to installation.

### 1.2. Handling requirements

#### 1.2.1. Packed valves

Crates: Appropriate crate handling equipment should be used to prevent damage to crated valves.

Boxes: Handling of valves packed in carton boxes should be done with extra caution, taking specific note to lifting points and the center of gravity.

The transportation of all packed valves and components must be carried out safely and in accordance with all local safety regulations.

#### 1.2.2. Unpacked valves

- The handling of valves unpacked from its original packing needs to be carried out with additional exterior protection in order to avoid damages to machined surfaces. Use pallets at all times, where appropriate.
- When handling large valves, appropriate tools (brackets, hooks, fasteners, ropes) should be used to secure valves firmly; and lifting loads should be balanced in order to prevent the valves from falling or moving during the handling process.



#### Caution

- When handling valves, the correct equipment and accessories (slings, fasteners, hooks, etc.) must be sized and selected, taking into consideration the individual and/or overall valves weight indicated in the packing list and/or delivery note.
- Lifting and handling must be made only by qualified personnel. Improper hoisting can cause valve deformation or damage from dropping the valve.
- Do not lift valves by using lifting points or lugs located on the actuator as these lifting points/lugs are for the actuator only.
- Do not lift the valve by its hand-lever as these levers are not designed to take the load of the whole valve. Doing so may cause the lever to break off or be disconnected from the valve, resulting in possible valve damage or injury.
- Avoid lifting over a worker's head or equipment, or any other thing that can possibly be damaged or cause of injury in the event that the lifted load falls off the handling equipment.
- All local safety regulations must be observed and complied with at all times.

### 1.3. Storage and preservation before installation

The storage of the valves should be in accordance with the following criteria:

- The valves have to be stocked in a closed, clean and dry storage room.
- The disc must be in the close position and the end faces must be protected with adhesive seal discs.
- Periodical checks have to be carried out in the storage area to verify that the above mentioned conditions are maintained.



#### Caution

The V-port valves are delivered with the disc in the close position and should be stored as they are.

#### Note

- Do not place consignment package directly on the ground.
- Do not expose consignment packages to the rain/wind or directly to the sun.
- Storage in an open area for a limited period can be considered only if the valves have appropriate packing (packed in cases covered with vinyl sheets protecting from rain, wind, dust etc, and contents well protected with barrier sacks).
- Store in a dry and well ventilated condition.
- If storage is anticipated for an extended period, the desiccant bags (if supplied) should be changed every 6 months.

# Installation and Maintenance Instructions

KTM Control Ball Valves Dual V (WA seat), V-port (VA series), ISA V-port (VS series)

## Section 2 - Installation

### 2.1. Preparation before installation

- Remove the valve from the shipping package (box or pallet) with care taken to avoid any damage to the valve and actuator (plus accessories where applicable).
- Before installation, remove the seal discs from the flange. Clean the inside of the valve using an air line that includes an appropriate air-filter. Ensure that there are no solid objects such as pieces of wood, plastic or packing materials within the valve or on the valve seat.
- Confirm that the materials of construction listed on the valve nameplates are appropriate for the service intended for and are as specified. When in doubt, contact to KTM, or your local Tyco facility.
- Define the preferred mounting orientation with respect to the system pressure. The arrow on the body helps to identify the upstream side (high pressure) and downstream side (low pressure).

### 2.2. Installation Instructions

- V-port valves are normally installed in horizontal pipes with the stem upright. However, there are no limitations regarding the pipe or stem orientation.
- Unless otherwise recommended by KTM, the valve should be installed with the disc in the close position, to ensure that the seat rings are not damaged during installation.
- For operating temperatures above 200oC (392oF), thermal insulation of the valve body is recommended to protect the actuator/accessories from heat beyond the recommended temperature range.
- Handling and lifting of the valves during installation MUST be performed following the same criteria and instructions described in "1.2 Handling Requirements" and "1.3 Storage and Preservation before installation".



#### Important

- It is recommended to perform pipe flushing before installation of the valve. If this is not possible, the installed valve must be in its open position before flushing takes place.
- When conducting pressure test of the pipe system, the valve should be in a full or half open position. Check for any leakage from the joint flange and gland portion during the pressure test.
- If the piping system is pressurized with water for testing, and if the piping system has been shut down for a long time after testing, the following recommendation should be adopted:
  1. Use corrosion inhibitor with water to pressurize the piping system.
  2. After testing, the piping system should be depressurized and the test water completely drained.
  3. Ensure that the corrosion inhibitor does not leave a residue within the system as the particulates may damage the valve sealing surfaces.

### 2.3. Valve verification before start-up

- Tighten the gland nut just enough to prevent stem leakage. Over-tightening will decrease packing life and increase operating torque. There is no need to over-tighten the stud bolts/nuts to assure gasket tightness.
- Check the operation of the valve by stroking it to "full open" and "full close". The valve ball travels clockwise to close.

## Section 3 - Operation instructions

Either the hand lever or the direction of the parallel flats on the top of the stem indicates the open or closed position of the KTM v-port valve. For gear operated valves, the position is indicated by the arrow-indicator.

The following instructions will help provide a satisfactory and long life service.

- Perform periodic valve verification.
- In the case of actuated valves, always follow the specific instructions given by the actuator's manufacturer.
- Never change the setting of torque and/or limit switches set during the final test by the manufacturer.
- Never change the setting of the mechanical stops of the gearbox.



#### Caution

- Verify that the direction of the flow in the line corresponds to the arrow indicated on the valve body.
- See the Actuator User Manual for the actuator preparation.



#### Caution

During the pipe system pressure test, care must be taken not to set the valve in the closed position to avoid overload pressure which may cause seat deformation or seat leakage.

### Section 4 - Maintenance

No routine maintenance is required other than periodic inspection to ensure satisfactory operation.

#### 4.1 Gland packing maintenance

If leakage is observed through the gland packing, tighten the gland nuts slowly and evenly until the leakage stops. Do not over-tighten gland nuts. Over-tightening will increase the torque required to operate the valve. Follow the torque table to ensure correct torque is used when tightening the gland nut.

Tightening torque (N.m) - Dual V

Dual V				
Size (mm)	Gland		Lower cover	
	Torque*	Bolt size	Torque	Bolt size
25	6	M8	20	M8
40	9	M10	41	M10
50	9	M10	41	M10
65	12	M12	69	M12
80	12	M12	69	M12
100	20	M14	41	M10
125	20	M14	41	M10
150	20	M14	41	M10
200	20	M14	69	M12

Tightening torque (N.m) - ISA V-port

ISA V					
Size (mm)		Gland		Lower cover	
Full	Red	Torque*	Bolt size	Torque	Bolt size
25	-	1.5	M8	41	M10
40	-	2.5	M10	69	M12
50	-	2.5	M10	69	M12
65	-	5.5	M14	41	M10
80	-	5.5	M14	41	M10
100	-	6.5	M14	41	M10
-	150	6.5	M12	69	M12
-	200	6.5	M12	69	M12

Tightening torque (N.m) - ISA V-port

V-port									
Size (mm)		Gland		Lower cover		Body joint (class 150)		Body joint (class 300)	
Full	Red	Torque*	Bolt size	Torque	Bolt size	Torque	Bolt size	Torque	Bolt size
25	40	3	M10	41	M10	52	M12	69	M12
40	50	4	M12	69	M12	52	M12	69	M12
50	65	4	M12	69	M12	52	M12	69	M12
65	80	7	M14	41	M10	52	M12	160	M16
80	100	7	M14	41	M10	120	M16	160	M16
100	125	7	M14	41	M10	120	M16	160	M16
125	150	10	M12	69	M12	120	M16	240	M20
150	200	10	M12	69	M12	120	M16	240	M20
200	250	14	M14	160	M16	240	M20	550	M24
250	300	14	M14	160	M16	240	M20	550	M24
300	350	20	M16	160	M16	240	M20		
	400	20	M16	160	M16	240	M20		
	450	36	M20	160	M16	410	M24		
	500	36	M20	160	M16	410	M24		

\*Torque for "Gland" are subject to variation due to conditions after valve assembly

#### Note

- Make sure not to damage the sealing surfaces on stem and body.
- Carefully clean all the sealing surfaces using proper remover products and visually check. If damaged, they should be repaired.
- If the stress relief of packing under the heat cycles of the line service is prospected, fasten the gland nut at regular intervals.

#### 4.2 Body seal maintenance

Any sign of leakage through the body joint seal should be addressed immediately by tightening the stud nuts until the leakage stops. Reference the torque table to ensure the correct torque is being used when tightening the body joint nut.



#### Caution

Before removing the valve from the piping, ensure that the system has been fully depressurized and any dangerous fluids have been drained off. Failure to do so may cause serious personal injury and/or damage to the valve.

### 4.3 Valve disassembling / re-assembling

Refer to the respective construction drawing(s) on the following page(s) of the valve(s) when disassembling. The number of parts varies slightly depending on the valve size, but the basic structures are identical.

Before disassembling the valve, ensure that it has been decontaminated from any harmful gasses or fluids and is within a safe temperature range for maintenance.

#### 4.3.1 Dual V valve

##### Disassembly

1. The valve shall be in the OPEN position.
2. Loosen Socket Head Screw (21B) to remove Body Cap (2), Spring (19), Locking Ring (25), Seal Ring (18) and Seat (5) from Body (1)
3. Remove Gland Nut (22A) , Gland Flange (15) and Gland (14)
4. Loosen out Socket Head Set Screw (21A) and disengage a Taper Pin (20), which connects Upper Stem (4) and Disc (3), by hitting through the pinhole from the untapped side.
5. Remove Nut (22B) , Lower Cover (6) , Gasket (17) and Thrust Bearing (9B)
6. Remove Stem (4) and Lower Stem (7) - (See Note below)
7. Disc (3) and other parts can be removed.

##### Re-assembly

This work shall be carried out by reversing the "Disassembly (Dual V)" procedures. Before assembling, confirm all parts are clean without any particles or rust. Further, the following points should be noted: check especially the Disc (3), Seat (5) and the sealing area, i.e. the joint of Body (1) /Lower Cover (6), and the area of Gland Packing (10)

##### Sub-assemblies

Before re-assembling the valve, make sub-assemblies for the following parts:

##### Sub-assembly A

After assembling two sets of Stem Bearing (8A) and Bearing Holder (13), let the one set through the Stem (4) and the other through the Lower Stem (7). Assemble two pieces of Thrust Bearing (9A) on both (upper and lower) ends of the Lower Stem Bearing (8A). A total of 4 pieces of Thrust Bearings are mounted for Lower Stem Bearing. For the Upper Stem Bearing (8A), one piece of Thrust Bearing (9A) is to be mounted at the bottom end.

##### Sub-assembly B

After assembling Locking Ring (25) into the groove of Body Cap (2), fasten Socket Head Set Screw (21B) lightly to the Body Cap (2).

##### Final-assembly

1. Feed Disc (3) into Body (1) and assemble the temporary assembly set (Assembly A) of Lower Stem (7) and Upper Stem (4). Fix Disc (3) and Upper Stem (4) firmly with Taper Pin (20) and Socket Head Set Screw (21A).
2. Assemble Disc (3) so that the spherical surface is placed in the Seat (5) side i.e. upstream side.
3. The stellited surface of Seat (5) shall be placed so as to touch with Disc (3) surface.
4. Assemble Locking Ring (25) after completion of mounting O-Ring or U-Ring
5. Note: When assembling O-Ring or U-Ring, use some grease.
6. Along with Thrust Bearing (9B) and Gasket (17), fix Lower Cover (6) with Nut (22B)
7. From the top of Stem (4), assemble in order of Shim (12), Thrust Washer (11), Gland Packing (10) and Gland (14) with Gland Bearing (8B)
8. Fasten Gland Nut (22A) lightly to fix Gland Flange (15)
9. From the upper-stream side i.e. Body Cap (2) side, assemble in order of Spring (19) which depresses the Seat (5) to the Disc (3), and the temporary assembly set (Assembly B) of the Body Cap (2)
10. Fasten additionally Gland Nut (22A) for adjustment of Gland Packing (10)

##### Note

- When removing Upper Stem (4) and Lower Stem (7), use an eyebolt by screwing in the tap thread which is provided at the top or the bottom of the stem to drag up briefly.
- Care must be taken not to hit or damage the spherical surface of the Disc (3) which is a crucial sealing area.

##### Note

Fasten Socket Head Set Screw (21A) until the tag end of the screw is in plane with the side face of the boss of Disc (3). Punch two points by caulking tools to prevent unfastening.

### Test and inspection after re-assembly (Dual V)

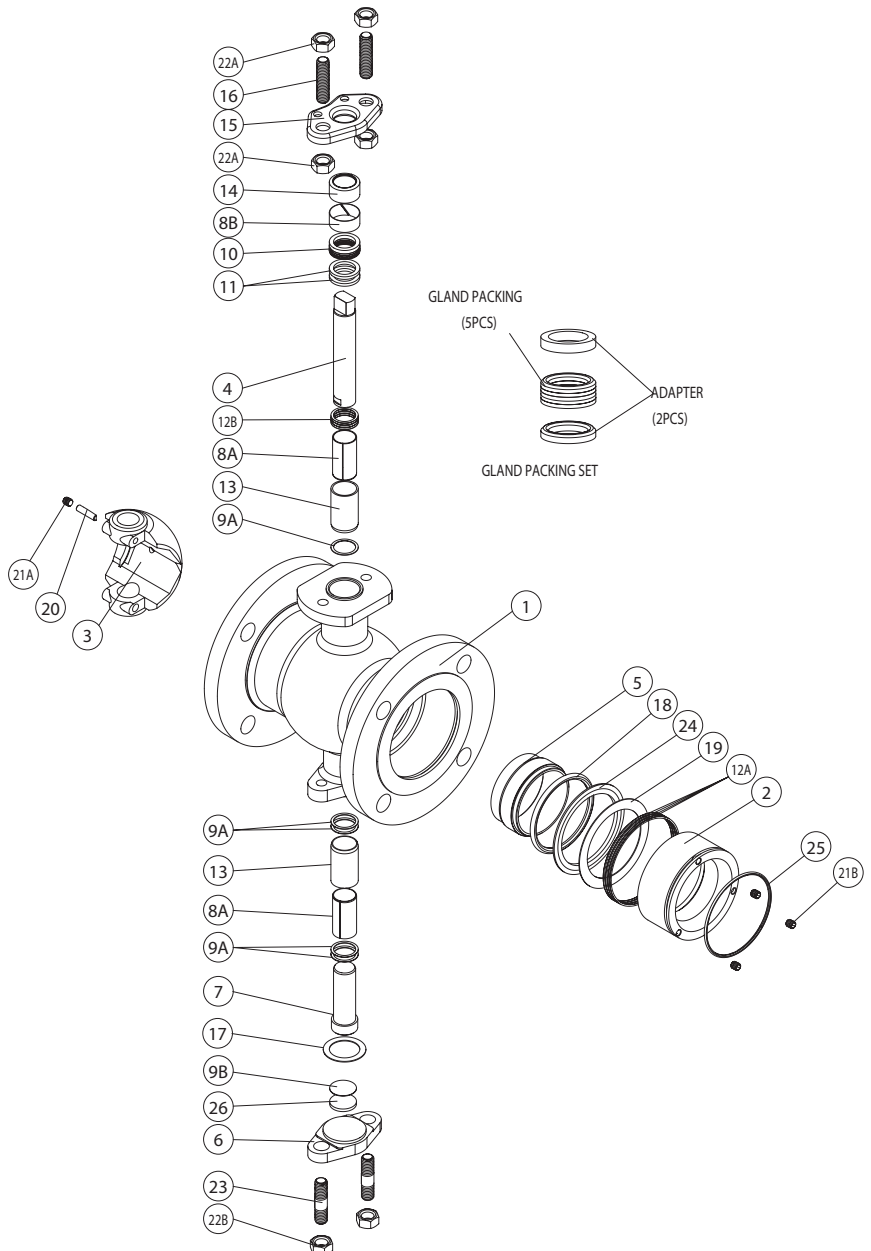
To confirm proper maintenance with the assembled valves, pneumatic body seal tests, seat leakage test and operational test shall be carried out using examples from the following table.

Item	Content	Evaluation
Body seal test	Test pressure: 1.1 times of the line pressure by Air or N2 gas  Duration : 10 minutes	No leakage visible from the Gasket, Gland Packing and other area
Seat leakage test	Test pressure: ANSI/FCI 70-2  Duration : 1 minute	Allowable leakage: Class 5 to ANSI/FCI 70-2 0.076ml/min/inch/ ΔP (Mpa) (water)
Operational test	Confirmation of operation by the lever handle	Smooth operation

### Construction - Dual V Valves (Model WA Series)

#### Parts List

No.	Parts Name	Qty
1	Body	1
2	Body Cap	1
3	Disk	1
4	Stem	1
5	Seat	1
6	Lower Cover	1
7	Lower Stem	1
8A	Stem Bearing	2
8B	Stem Bearing	1
9A	Thrust Bearing	5
9B	Thrust Bearing	1-2
10	Gland Packing	1 set
11	Thrust Washer	2
12A	Shim	2-5
12B	Shim	2-4
13	Bearing Holder	2
14	Gland	1
15	Gland Flange	1
16	Gland Bolt	2
17	Gasket	1
18	Seal Ring	1
19	Spring	1
20	Taper Pin	1
21A	Set Screw	1
21B	Set Screw	3
22A	Nut	4
22B	Nut	2-4
23	Stud	2-4
24	Stopper	1
25	Locking Ring	1
26	Thrust Washer	1



### 4.3.2 V-port valve

#### Disassembly

1. The valve shall be in the OPEN position.
2. Loosen Nut (20) to remove Body Cap (2), Gasket (6), Seat (4) and Disc (3) from the Body (1)
3. Remove Gland Nut (23) , Gland Flange (12) and Gland (11)
4. Remove Bolt (21) , Lower Cover (18) , Lower Gasket (7) ,Pivot (17) ,Shim (16) and Thrust Bearing (15)
5. Remove Upper Stem (5) with Stem Bearing (8), Thrust Washer (9) and Gland Packing (10), and also Lower Stem (13) with Stem Bearing (14)
6. Disc (3) and other parts can be removed.

#### Re-assembly

This work shall be carried out by reversing the "Disassembly (V-port)" procedures.

1. Feed Disc (3) into the Body (1), and assemble the Lower Stem (13) with the Stem Bearing (14) from the bottom of the Body (1). Also, assemble the Upper Stem (5) with the Stem Bearing (8) and the Thrust Washer (9) from the top.
2. Assemble the Disc (3) so that the spherical surface is placed in the Seat (6) side i.e. upstream side (Body Cap side)
3. The stellited surface of the Seat (4) shall be assembled so as to touch the Disc (3) surface.
4. Along with the Thrust Bearing (15), the Shim (16) and Pivot (17), fix the Lower Cover (18) with the Bolt (21)
5. From the top of the Stem (5), assemble in order of Thrust Washer (9), Gland Packing (10) and Gland (11)
6. Fasten the Gland Nut (23) lightly to fix Gland Flange (12) for the meantime.
7. Assemble Seat (4) along with Gaskets (6) and Body Cap (2). Fasten Nuts (20)
8. Fasten Gland Nut (23) additionally for adjustment of Gland Packing (10). Refer to the torque table.

#### Note

- Since old gaskets occasionally adhere to the Body (1) and Body Cap (2) when the valve is disassembled, the wastes of old gaskets should be completely scraped off and the sealing surfaces shall be cleaned before fitting new gaskets.
- Prior to re-assembling, clean up the spherical surface of the disc and the metal surface being in touch with gasket /packing.
- When assembling the Stem Bearing (8) with the Upper Stem (5), an instant adhesive is recommended to use for easy assembly.
- Shim (16) should be assembled in the correct quantities as built in the original valve.
- When assembling the thick seat, make adjustment for centering the seat to contact uniformly with the spherical surface of the Disc with the valve closed. Laminate seat is provided with the automatic self-centered function, no adjustment is required. Put the seat on Disc with the valve closed and assemble into Body (1).
- Gaskets (6) of 0.8mm thickness is standard, however, 0.4mm gasket might have been used for adjusting purpose but only on rare occasions. Therefore, care must be taken to ensure that gaskets of the same thickness as the original valve is being used when assembled.

#### Test and inspection after re-assembly

Pneumatic Body seal test, Seat leakage test and Operational test shall be carried out in reference to the following table.

Item	Content	Evaluation
Body seal test	Test pressure: 1.1 times of the line pressure by Air or N2 gas  Duration : 10 minutes	No leakage visible from the Gasket, Gland Packing and other area
Seat leakage test	Test pressure: 0.5MPa by Air or N2 gas Duration : 1 minute	Allowable leakage: Laminate seat: 1.5cc/min/inch Thick seat: Max.0.5% of the rated Cv
Operational test	Confirmation of operation by the lever handle	Smooth operation

#### Note

- When removing Upper Stem (5) and Lower Stem (13), use an eyebolt by screwing in the tap thread, which is provided at the top or the bottom of Stem to drag up briefly.
- Care must be taken not to hit or damage the spherical surface of the Disc (3) which is a crucial sealing area.
- It is required to measure the thickness of Gasket (6) so that the new gasket with the same thickness can be used when re-assembling. The gasket has two kinds of thickness, 0.8mm and 0.4mm.

**Construction - V-port Valves (Model VA Series)**

**Parts List**

No.	Parts Name	Qty
1	Body	1
2	Body Cap	1
3	Disc	1
4	Seat	1
5	Stem	1
6	Gasket	1
7	Gasket	1
8	Stem Bearing	1
9	Thrust Washer	1
10	Gland Packing	1 set
11	Gland	1
12	Gland Flange	1
13	Lower Stem	1
14	Stem Bearing	1
15	Thrust Bearing	1
16	Shim	0-4
17	Pivot	1
18	Lower Cover	1
19	Stud	6
20	Nut	6
21	Bolt	4
22	Gland Bolt	2
23	Nut	4



**Note**

- When removing Upper Stem (5) and Lower Stem (6), use an eyebolt by screwing in the tap thread, which is provided at the top or the bottom of Stem to drag up briefly.
- Care must be taken not to hit or damage the spherical surface of the Disc (3) which is crucial sealing area.
- It is required to measure the thickness of Gasket (6) so that the new gasket with the same thickness has been used when re-assembled. The gasket has two kinds of thickness, 0.8mm and 0.4mm.

**4.3.3 ISA V-port valve**

**Disassembly**

1. The valve shall be in the OPEN position.
2. Loosen Cross-recessed Head Screw (26) to remove Body Cap (2) along with O-ring (9), Seat (4) and Gasket (7) from Body (1)
3. Remove Gland Nut (18) and Gland Flange (16) with Gland Bearing (12)
4. Remove the lower Nut (25), Lower Cover (20), Lower Gasket (8), Pivot (23), Thrust Bearing (21) and Shim (22)
5. Remove Stem (5) with Stem Bearing (10), Packing Washer (15), Gland Packing (14) and Thrust Washer (13), and also remove Lower Stem (6) with Stem Bearing (11)
6. Disc (3) and other parts can be removed.

**Re-assembly**

This work shall be carried out by reversing the "Disassembly (ISA V-port)" procedures.

1. Feed Disc (3) into Body (1) and assemble Lower Stem (6) with Stem Bearing (11) from the bottom of Body (1) and also assemble Upper Stem (5) with Stem Bearing (10) from the top.
2. Assemble Disc (3) so that the spherical surface is placed in the Seat (4) side i.e. upstream side (Body Cap side)
3. The stellited surface of Seat (4) shall be assembled so as to touch with Disc (3) surface.
4. Along with Thrust Bearing (21), Shim (22) and Pivot (23), fix Lower Cover (20) with Nut (25)
5. Assemble in order of Thrust Washer (13), Gland Packing (14), Packing Washer (15) and Gland Flange (16) with Gland Bearing (12)
6. Fasten Gland Nut (18) lightly to fix Gland Flange (16) for the meantime.
7. Assemble Seat (4) along with Gaskets (7) and Body Cap (2). Fasten Cross-recessed Head Screw (26)
8. Fasten Gland Nut (18) additionally for adjustment of Gland Packing (14).

**Note**

Since old gaskets occasionally adhere to the Body (1) and Body Cap (2) when the valve is disassembled, the wastes of old gaskets should be completely scraped off and the sealing surfaces should be cleaned before fitting new gaskets.

# Installation and Maintenance Instructions

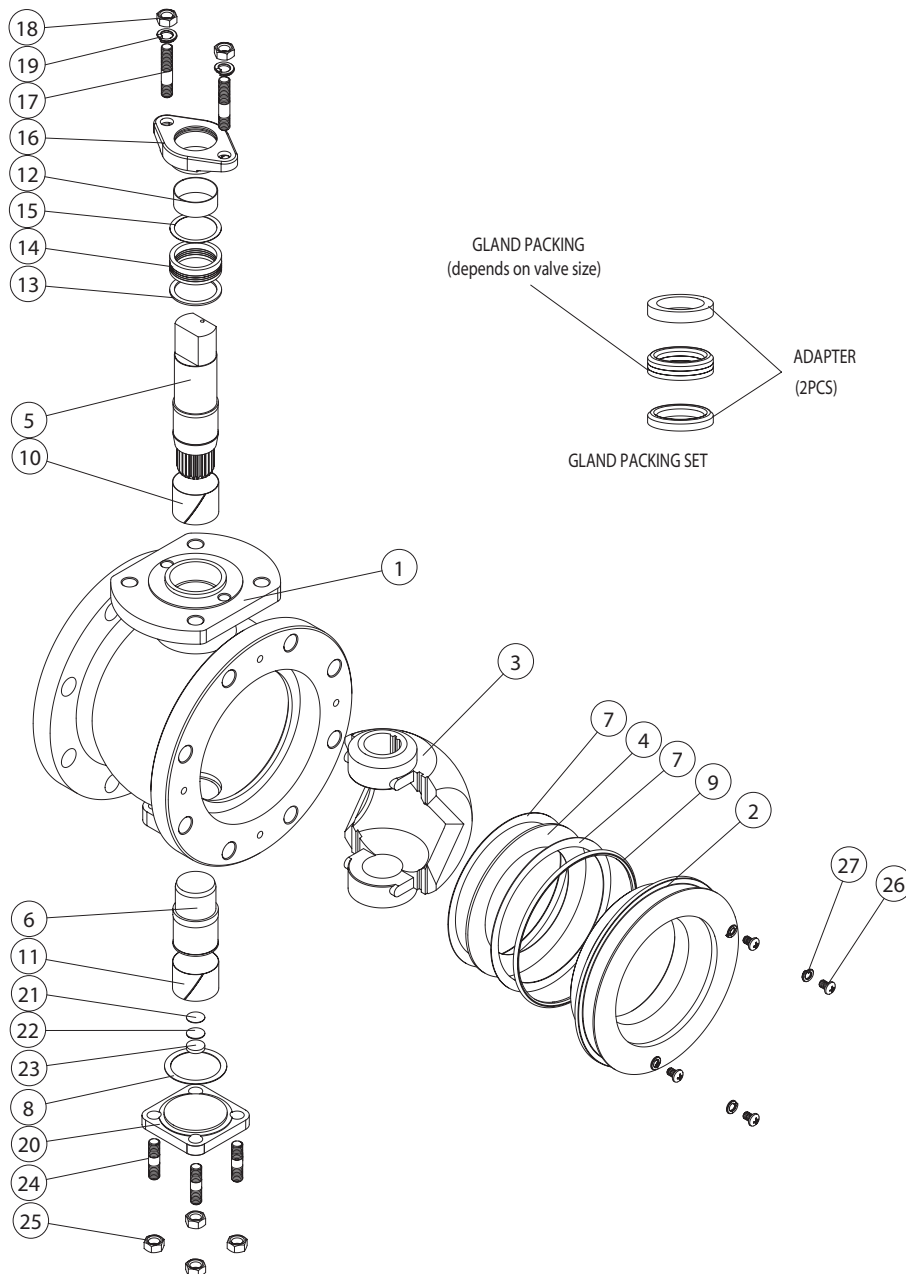
KTM Control Ball Valves Dual V (WA seat), V-port (VA series), ISA V-port (VS series)

## Test and Inspection after Re-assembly (ISA V-port)

Pneumatic Body seal test, Seat leakage test and Operational test shall be carried out using examples from the following table.

Item	Content	Evaluation
Body seal test	Test pressure: 1.1 times of the line pressure by Air or N2 gas  Duration : 10 minutes	No leakage visible from the Gasket, Gland Packing and other area
Seat leakage test	Test pressure: 0.5MPa by Air or N2 gas Duration : 1 minute	Allowable leakage: Laminate seat: 1.5cc/min/inch Thick seat: Max.0.5% of the rated Cv
Operational test	Confirmation of operation by the lever handle	Smooth operation

## Construction - ISA V-port Valves (Model VA Series)



## Parts List

No.	Parts Name	Qty
1	Body	1
2	Body Cap	1
3	Disc	1
4	Seat	1
5	Stem	1
6	Lower stem	1
7	Gasket	2
8	Gasket	1
9	O-ring	1
10	Stem Bearing	1
11	Stem Bearing	1
12	Stem Bearing	1
13	Thrust Washer	1
14	Gland Packing	1 set
15	Packing Washer	1
16	Gland Flange	1
17	Gland Bolt	2
18	Nut	2
19	Live Loaded Spring	2
20	Lower Cover	1
21	Thrust Bearing	1
22	Shim	0-4
23	Pivot	1
24	Stud	4
25	Nut	4
26	Cross-recessed Head Screw	4
27	Spring Washer	4