

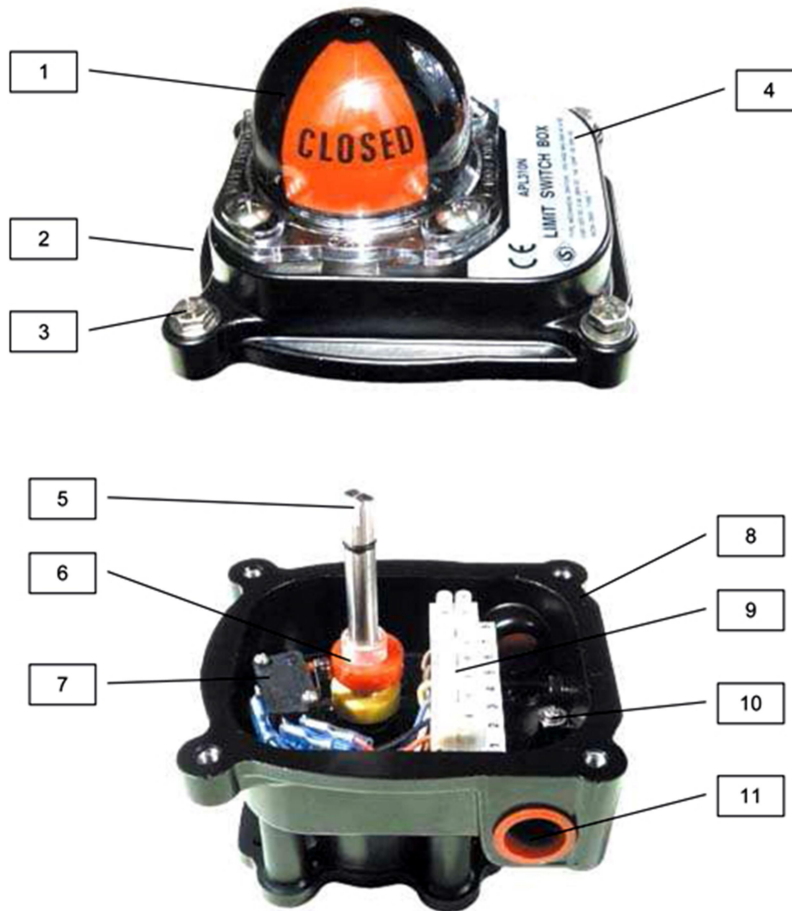


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## 6. Standard Features



No.	Part Name	Q'ty	Description
1	Window / Indicator	1	PC / ABS
2	Cover	1	Aluminum die-casting
3	Captive Cover Bolts	4	Stainless steel
4	Name Plate	1	Sticker
5	Shaft	1	Stainless steel
6	Cam	2	PC
7	Switch	2	Mechanical or Proximity type
8	Body	1	Aluminum die-casting
9	Terminal Strip	1	8P (9~14P available) --- 21 r0J
10	Earth Lug	1	Stainless steel
11	Blanking Element	2	Sticker

## 7. Initial Inspection

- 7.1. When the user take over the products, please check the condition of the products, and compares the contents of the order sheet with the name plate to check for any abnormality.
- 7.2. Carefully remove the packaging wrap or crate and inspect for physical damage that may have occurred during transportation.
- 7.3. Check the ordered products and its specification. If the wrong products have been delivered, please notify our representative immediately.

## 8. Installation

### 8.1. Mounting bracket

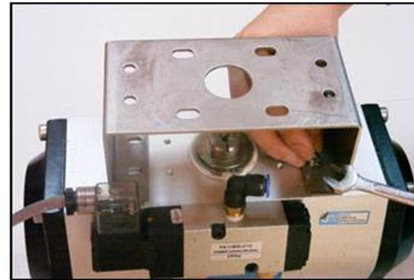
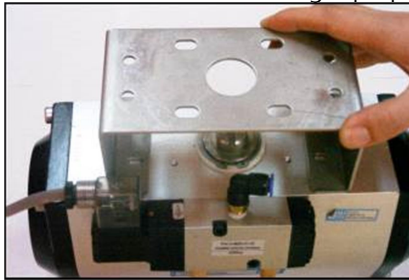


*Caution ;*

Where limit switch box or one of parts are to be moved, installed, disassembled, reassembled by a hand, care must be taken not to cause injury by the harmful sharp edges of corners or rough surfaces or residual electricity.

8.1.1. HKC shall supply a NAMUR VDI/VDE standards' bracket and a fixing stuff for mounting on actuator. Bracket shall be applicable to any type of valves ; manual valve, linear valve, pneumatic rotary valve.

- ① Ensure valve actuator alignment (fully open or closed).
- ② Place the mounting bracket on a horizontal plane of actuator
- ③ Tighten the bolts enclosed in a box using a proper tool.



### 8.2. Mounting limit switch box



*Caution ;*

Do not attempt to work on limit switch box without first shutting off incoming power.

8.2.1. Prior to mounting the limit switch box must be checked for any damage.

8.2.2. Damaged parts must be replaced by original spare parts.

8.2.3. Limit switch boxes are available with a NAMUR shaft that enables direct attachment to actuator pinion without a coupler. [This shaft features](#) a 4mm wide tang that engages the 4mm slot in NAMUR actuators.

- ① Check to be sure the drive slot on the top of the actuator and the shaft of switch box are the same direction.
- ② Insert the shaft of switch box carefully into the mounting bracket.
- ③ Tighten the bolts enclosed in a box using a proper tool.
- ④ Check the connection of shaft being assembled correctly.

### 8.3. Setting cam



*Note :*

Basically, cams shall be set by manufacturer before shipment.

8.3.1. The color of cams harmonized with position indicator help us to set the cams easily without wiring diagram. Cams shall be easily set without tool. APL series cams are splined and can be setting lift up or push down the cam from gear by hand in a seconds without setting tools. Self-locking, spring loading make never slip out of adjustment.

8.3.2. Un-tighten the captive cover bolts with an applicable tool. (Spanner.+ Driver recommended)

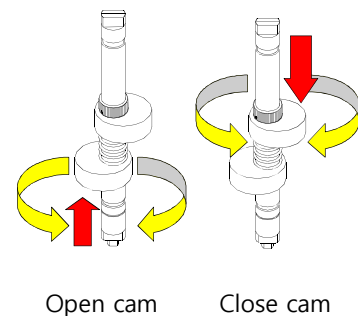
8.3.3. Remove the cover carefully.

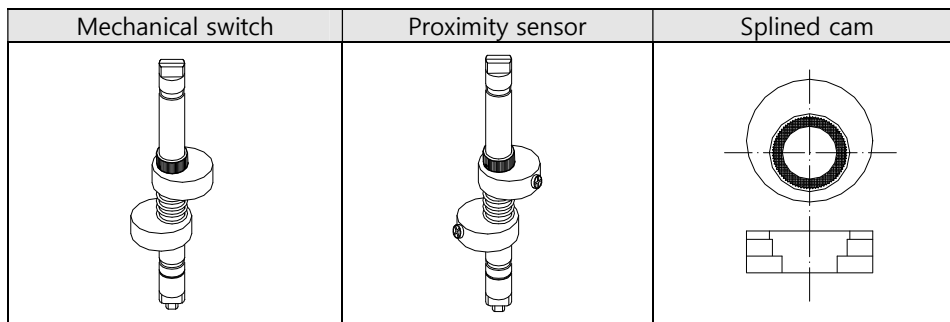
8.3.4. Open cam setting

- ① Electric power or air supply of valve actuator on to operate the actuator fully open
- ② Lift the bottom yellow cam (optional green) up and rotate it until the switch is activated.
- ③ And then release it. Cam shall be back into a stable position by itself.

8.3.5. Close cam setting

- ① Electric power or air supply of valve actuator off to operate the actuator fully close
- ② Push the upper red cam down and rotate it until the switch is activated.
- ③ And then release it. Cam shall be back into a stable position by itself.





8.4. Wiring



*Danger ; HAZARDOUS VOLTAGE. No electrical power should be connected until all wiring and limit switch adjustments have been completely.*

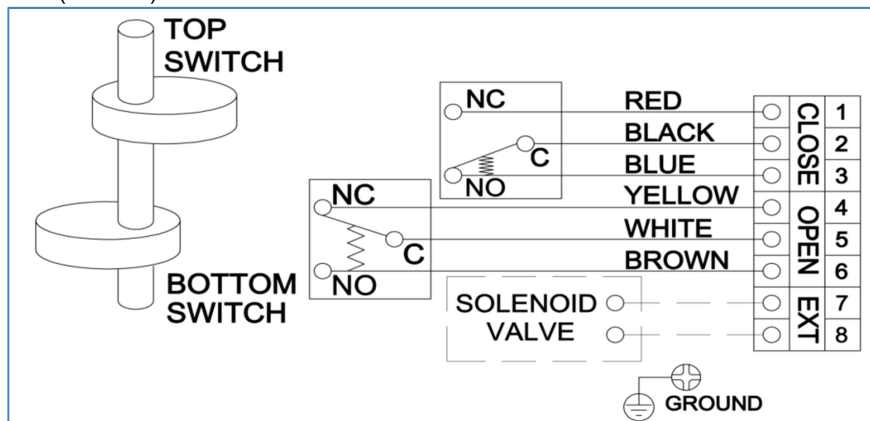
8.4.1. Turn off the power before opening the cover.

8.4.2. APL limit switch box enclosure feature prewired switches. All user connections are made at a numbered terminal strip. A wiring diagram, located inside the cover, indicates which terminal numbers correspond to switch contacts, such as normally open (NO), normally closed (NC), etc. Follow the wiring diagram and electrical code to connect the switches to your system.

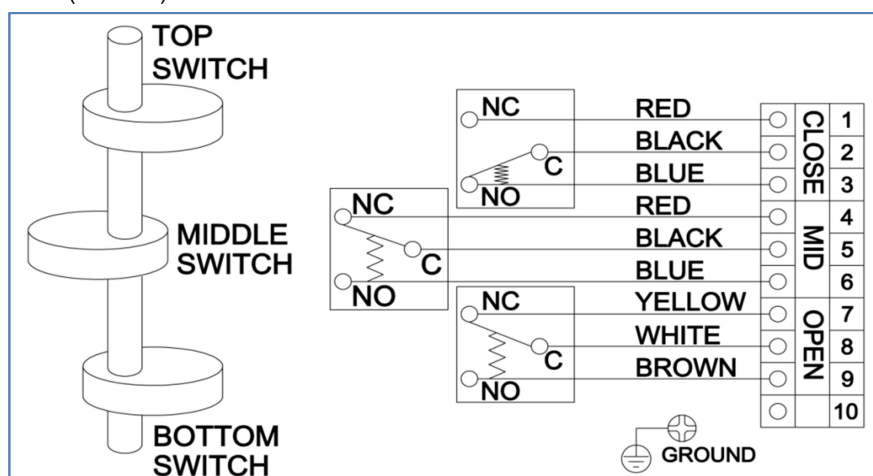
8.4.3. [The APL-3 limit switch box has two cable entries on the body, and is protected with a sticker to protect it from moisture and foreign matter penetration. User or installer shall be use cable gland that satisfy the protection grade and connect them through the cable entries.

8.4.4. If the cable entry remains after wiring, it must be strictly closed using a suitable blanking plug. The cable gland must be applied by installer or user. --- 20 r0]

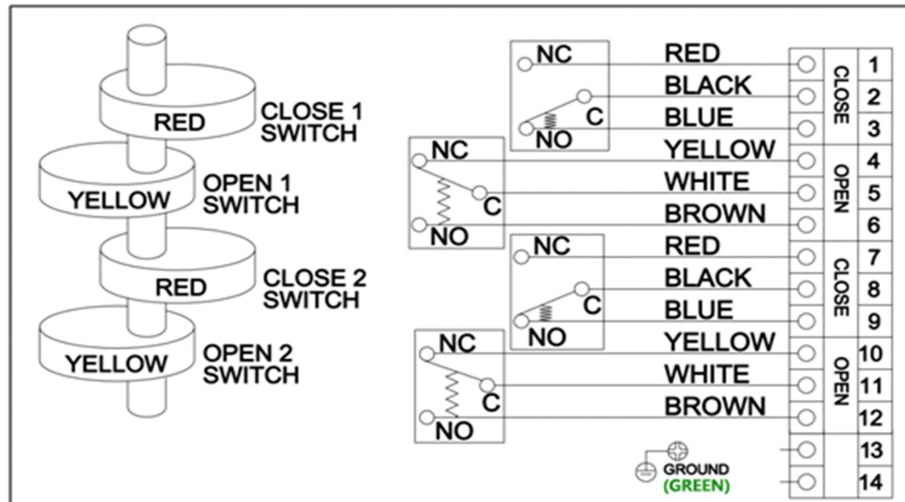
① Mechanical switch(2 SPDT)



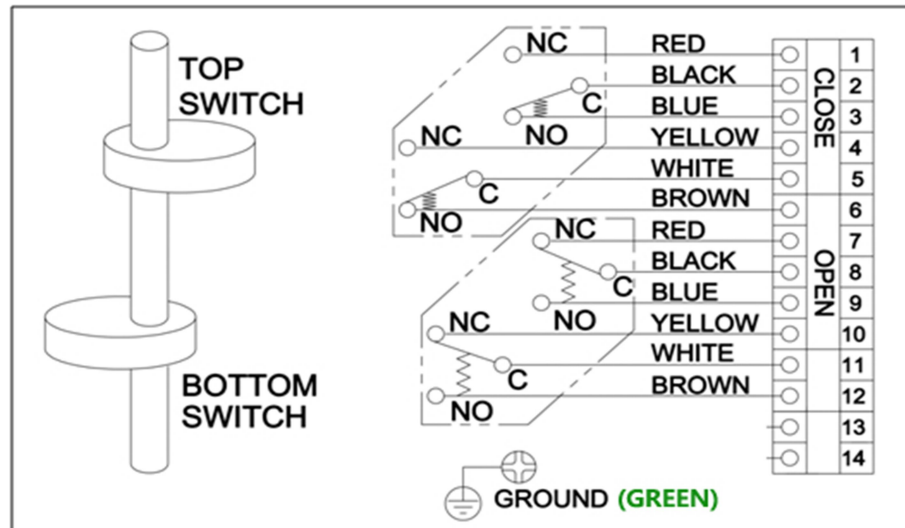
② Mechanical switch (3 SPDT)



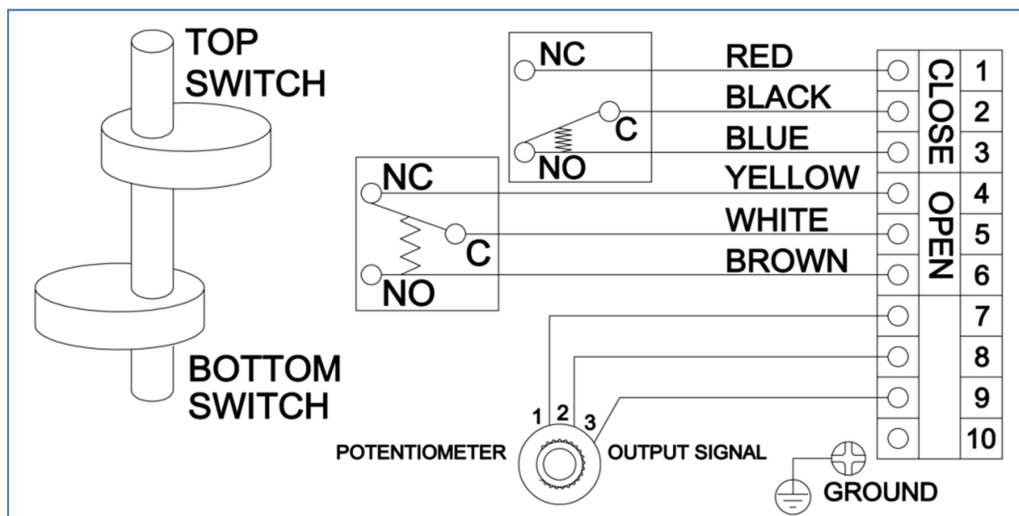
③ Mechanical Switch (4 SPDT)



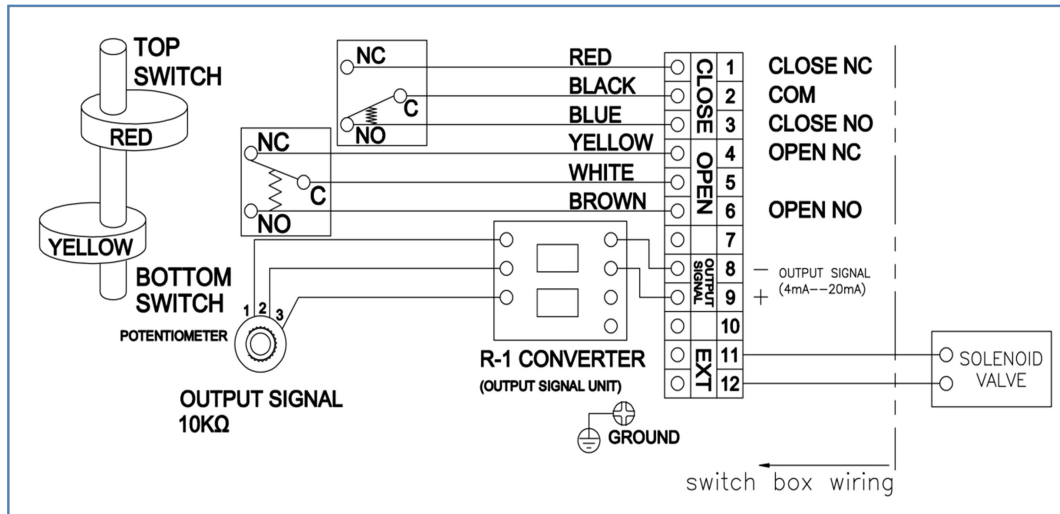
④ Mechanical Switch (2 DPDT)



⑤ Mechanical switch (2 SPDT), include Potentiometer



⑥ Mechanical switch (2 SPDT), include signal unit



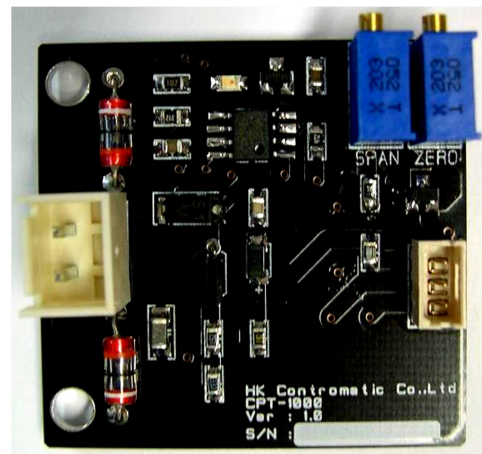
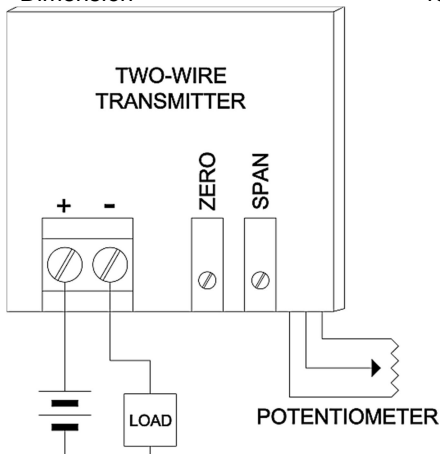
Caution ;  
Grounding should be connected until all wiring has been completed.  
Internal grounding wire square shall be min. 2SQ recommended.  
External grounding wire square shall be min. 4SQ recommended.

8.5. Setting Position Transmitter Unit (APL-3x6)

8.5.1. Potentiometer reads the current position of actuator and transfers a resistance value to a current position transmitter card. Transmitter indicates the actuator position throughout the stroke a 4~20mA output signal.

8.5.2. Technical features

- |                         |  |
|-------------------------|--|
| ① Power Supply Range    | 12.5 ~ 37VDC (25V typical)                             |
| ② Current Signal Output | 4~20mA   |
| ③ Max. Load Resistance  | Max. Resistance (ohm) = (Supply voltage - 12.5) / 0.02 |
| ④ Potentiometer         | 0~500 ohm / 10k ohm                                    |
| ⑤ Operation Temperature | -20 ~ 60°C   |
| ⑥ Dimension             | 40 * 60 * 15   |



8.5.3. Calibrating potentiometer

- ① Apply power or air to the actuator to operate fully closed position
- ② Connect an ohm meter to P1 and P3 resistance, the value shall be approximately 1kΩ
- ③ Loosen the shaft gear and connect the ohm meter to P1 and P3 and gently rotate until 80~120 ohm is achieved (100 ohm preferred). While maintaining the value, tighten a lock screw with a hex wrench.

8.5.4. Zero and Span Calibration

Zero and span setting has been calibrated by manufacturer. However, if re-calibration is required

- ① Operate an actuator to 50% position and then fully closed position.
- ② When the actuator is in the fully closed position, adjust the "zero" button on the card until a value of 20 mA is achieved.



## 9. Maintenance



**Caution :**

-Shut off incoming power or air supply on the valve actuator before maintenance limit switch box.



-Be sure that the area is clean before disassemble and maintenance limit switch box. Clean all parts and housing before re-assemble.

-Refers to the part list when ordering replacement or spare parts.

9.1. Maintenance, under normal conditions at six month intervals or 100,000 cycle operation. But when conditions are more severe, more frequent inspections may be required.

- 9.1.1. Ensure valve actuator alignment. [If the alignment is not correct, the shaft may be damaged by metallic fatigue during operation. --- 20 r0]
- 9.1.2. Ensure wiring is insulated, connected and terminated properly
- 9.1.3. Ensure all screws are present and tight
- 9.1.4. Check the cleanliness of the internal electrical system.
- 9.1.5. Ensure conduit connections are installed properly and are dry
- 9.1.6. Check internal devices for condensation
- 9.1.7. Check enclosure O rings seals and verify that the O ring is not pinched between housing
- 9.1.8. Visually inspect during open/close cycle
- 9.1.9. Inspect identification labels for wear and replace if necessary



**Warning ;**

*Before opening, you must ensure that there are no flammable gases and electrical power is off.*

*Treat cover with care. Gap surface must not be damaged or dirtied in any way*

## 10. Inspection

- 10.1. Check the item and quantity of products with packing list or related documents.
- 10.2. Check the limit switch box o-ring. Where a damage on it. It caused the corrosion of internal parts.
- 10.3. Check the adjustment of cams. Cams shall be released when those have been used for a long period of operating. If do so, they don't work correctly with switches.

## 11. Storage

The products must be stored in a clean, cool and dry area. The unit shall be stored with the cover installed and the cable entry openings sealed. Storage must be off the floor, covered with a sealed dust protector.

## 12. Trouble Shooting

The following instructions are offered for the most common difficulties encounter during installation and start-up.

**Signal fails to main control room.**

- ① Check the wiring of limit switch box in accordance with wiring diagram.
- ② Check whether the cams or switches are damaged or broken.
- ③ Check the main signal wire from the terminal strip.
- ④ Re-set the limit switch box
- ⑤ Check resistance value of the potentiometer.
- ⑥ Check potentiometer gear jamming
- ⑦ Check the zero and span calibration
- ⑧ Check whether the card is damaged or not.

## 13. Tools

- ① 1 Set Metric Allen key (Hex Wrench)
- ② 1 Set Screw driver
- ③ 1 Set Metric spanner
- ④ 1 Wire Stripper long nose
- ⑤ 1 Needle nose pliers
- ⑥ 1 Multi Meter (AC, DC, Resistance)
- ⑦ 1 Ohm Meter (0~25mA) : IF APL - . 16 adapted

## 14. Installation and Maintenance Tips



For any installation and maintenance work, the following should be observed :

**Caution :**

- ✓ *A regular inspection and maintenance performed by qualified and trained personnel*

- ✓ *Work at the open actuator under voltage must only be performed if it is assured that for the duration of the work there is no danger of explosion.*
  - ✓ *Observe additional national regulations.*
- 14.1. Check the limit switch box visually. Ensure that no outside damage or changes are visible.
  - 14.2. The electric connecting cables must be without damage and wired correctly.
  - 14.3. Cable entries, cable glands, plugs etc. have to be checked for correct tightness and sealing.
  - 14.4. Check whether enclosure connections are fastened correctly.
  - 14.5. Take care of possible discolorations of the terminals and wires.
  - 14.6. Check the enclosure gaps whether contaminated dirt and corrosion. Since the dimensions of all enclosure gaps are strictly defined and inspected, no mechanical work shall be performed on them.
  - 14.7. Ensure that all housing covers are handled carefully and that the seals are checked.
  - 14.8. All cables have to be checked.
  - 14.9. If defects which affect the safety are detected during maintenance, repair measures have to be taken immediately.
  - 14.10. Any kind of coating for the gap surface shall not be permitted.
  - 14.11. When exchanging parts, seals etc. only original spare parts shall be used.

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