

Neles Easyflow™

K series limit switches

Exia KC and KS

Installation, maintenance and
operating instructions



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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 INTRODUCTION

This instruction manual contains important information regarding the installation, operation and maintenance of Neles Easyflow K series Exia limit switch. Please read these instructions carefully and save them for future reference.

The manual can be changed or revised without any prior notice. Any changes in product's specification, structure, and/or any components may not result immediate revised version of the manual. The latest version of this document can be found from www.valmet.com/flowcontrol at all times.

1.2 DEFINITIONS

The following definitions given here are used in this document.

WARNING:

If not observed, user incurs a high risk of severe damage to the product and/or injury to personnel.

CAUTION: If not observed, user may incur damage to the product and/or injury to personnel.

NOTE: Advisory and information comments provided to assist maintenance personnel and end users to carry out maintenance procedures and to ensure safe usage of the device.

1.3 MARKINGS

The device has a title label plate attached to the cover. The label plate markings identify e.g. Type code, ID-number, manufacturing serial number, ambient temperature range and electrical ratings of the switches of the device.

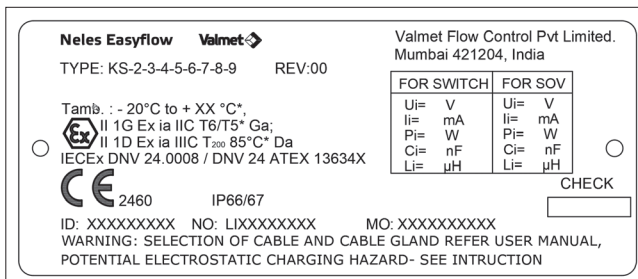


Fig. 1 KS title label

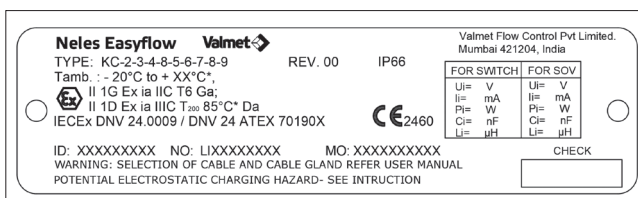


Fig. 2 KC title label

Manufacturing serial number format is TTYWWNNNN, where:

TT = Device and factory sign

YY = Year of manufacturing

WW = Week of manufacturing

NNNN = Consecutive number

Example: L19140001 = Limit switch, year 2019, week 14, consecutive number 1

Please refer below Ex-code for KC series.



For Inductive Proximity Sensor ($-20^{\circ}\text{C} \leq T_a \leq XX^{\circ}\text{C}^*$):

II 1G Ex ia IIC T6/T5 (*) Ga

II 1D Ex ia IIIC T₂₀₀ 85°C (*) Da (with Fluro silicon O-ring)

II 1D Ex ia IIIB T₂₀₀ 85°C (*) Da (with NBR O-ring)



Micro switch ($-20^{\circ}\text{C} \leq T_a \leq XX^{\circ}\text{C}^*$):

II 2G Ex ib IIC T6 Gb

II 2D Ex ib IIIC T85°C Db (with Fluro silicon O-ring)

II 2D Ex ib IIIB T85°C Db (with NBR O-ring)

* -Refer Table A1, A2 and A3 for relation between Temperature class and Maximum Ambient Temperature.



Please refer below Ex-code for KS series.

For Inductive Proximity Sensor ($-20^{\circ}\text{C} \leq T_a \leq XX^{\circ}\text{C}^*$):

II 1G Ex ia IIC T6/T5 (*) Ga

II 1D Ex ia IIIC T₂₀₀ 85°C (*) Da (with Fluro silicon O-ring)

II 1D Ex ia IIIB T₂₀₀ 85°C (*) Da (with NBR O-ring)



Micro switch and Reed Switch ($-20^{\circ}\text{C} \leq T_a \leq XX^{\circ}\text{C}^*$):

II 2G Ex ib IIC T6 Gb

II 2D Ex ib IIIC T85°C Db (with Fluro silicon O-ring)

II 2D Ex ib IIIB T85°C Db (with NBR O-ring)

* -Refer Table A1, A2 and A3 for relation between Temperature class and Maximum Ambient Temperature.

1.4 CE MARKING

The limit switch meets the requirements of the European Directives 2014/34/EU and has been marked according to the Directives.

1.5 SAFETY PRECAUTIONS

CAUTION: NO MECHANICAL REWORK ALLOWED BY CUSTOMER!

MECHANICAL REWORK INCREASES THE RISK OF DEVICE MALFUNCTION. ONLY TRAINED AND SKILLED SERVICE PERSONNEL OF VALMET MAY REWORK THE PRODUCT.

WARNING:

Dangerous currents and voltages inside depending on the switch type there are potentially dangerous currents and voltages inside the limit switch enclosure.

NOTE: ALL LAWS, GUIDELINES AND RULES APPLICABLE WITHIN THE COUNTRY OF USAGE MUST BE FOLLOWED. THERE ARE ALSO ADDITIONAL SAFETY REGULATIONS WHICH ARE PLANT OR AREA RELATED.

ABOVE MENTIONED ARE NOT COVERED BY THIS MANUAL.

1.6 WARRANTY

Warranty of the K series limit switches will be void with any misuse of the devices, lack of maintenance described in this document or other unintended use of the limit switches.

Warranty details are defined in Valmet Terms and Conditions.

2. OPERATION PRINCIPLE

Neles Easyflow K series limit switch is suitable for sensing the preset valve travel limits for rotary valves and actuators. The limit information can be wired out from the limit switch for information to user or monitoring devices.

The K series limit switches include from two to four inductive, mechanical or reed type switch elements. They are activated by cams that are directly driven by the actuator shaft through the limit switch shaft. As the actuator shaft turns the limit switch shaft follows the movement as it is mechanically attached to the actuator shaft. Cams are set by the customer to be activated at the desired rotary travel limits.

The switches are prewired to terminal strip in the enclosure, permitting easy connection of switch output to external electrical monitoring system or indication devices.

K series limit switches also include a visual indicator on top of the enclosure cover that indicates 90° rotary travel between open and closed valve position.

3. TRANSPORTATION AND STORAGE

Upon receiving the product check the limit switch and the accompanying devices for any damage that may have occurred during transportation.

WARNING:

DO NOT USE THE DEVICE IF IT IS DAMAGED DURING TRANSPORTATION!

If the device has suffered damage during transportation do not install or use it. In case of noticing damage to the device upon receiving it please contact the supplier.

Store the limit switch carefully. Storage indoors in a cool, dry place. Temperature limit for the storing is from 4 °C to 40 °C (39 °F – 104 °F). The limit switch should be left in its original packing until it is required for the use. Do not remove protective plugs until installing the limit switches.

4. TECHNICAL SPECIFICATION

Ambient temperature:

General: -20 ... +XX °C

(XX- Maximum ambient temperature as per switch/ sensors)

Protection class: IP66/67 - For KS

Protection class: IP66 - For KC

KS series: Epoxy powder coated, low copper die cast aluminum (LM6) / stainless steel (CF8M)

KC series: Epoxy powder coated, low copper die cast aluminum (LM6) / stainless steel (CF8M)

Internal parts:

Shaft: AISI304 / AISI316 (SS body)

Cams: ABS

PCB: Grade FR4

Fasteners: AISI304

Sealing: Nitrile rubber (NBR)
Fluorosilicon

Conduit entry:

KS series: 2 x M20 or 2 x 1/2 NPT or 2 x 3/4 NPT
4 x M20 or 4 x 1/2 NPT
or 4 x 3/4 NPT

KC series: 3 x M20 or 3 x 1/2 NPT

Weight:

KS series: Die cast aluminum 1.7 kg / 3.8 lbs,
stainless steel 4.5 kg / 9.9 lbs

KC series: Die cast aluminum 0.7 kg / 1.6 lbs,
stainless steel 2.5 kg / 5.5 lbs

Switches:

A1: Inductive proximity switch, P+F
NJ2-12GM-N 2-wire type, Namur NC

Supply voltage: 5 - 25 V DC, nominal 8 V DC
(Ri = approx. 1 kOhm)

Output current:

Active face free: > 3 mA

Active face covered: < 1 mA

Nominal sensing range: 2 mm

D1: Inductive proximity switch, P+F
NJ2-V3-N 2-wire type, Namur NC

Supply voltage: 5 - 25 V DC, nominal 8 V DC
(Ri = approx. 1 kOhm)

Output current:

Active face free: > 3 mA

Active face covered: < 1 mA

Nominal sensing range: 2 mm

F1: Inductive proximity switch, P+F
SJ3.5-N 2-wire type, Namur NC

Supply voltage: 5 - 25 V DC, nominal 8 V DC
(Ri = approx. 1 kOhm)

Output current:

Active face free: > 3 mA

Active face covered: < 1 mA

Slot width: 3,5 mm

F2: Inductive proximity switch, P+F
SJ3.5-SN 2-wire type, Namur NC

Supply voltage: 5 - 25 V DC, nominal 8 V DC
(Ri = approx. 1 kOhm)

Output current:

Active face free: > 3 mA

Active face covered: < 1 mA

Slot width: 3,5 mm

R1: Reed proximity switch, Neles R1
Supply voltage: 220 V AC/DC

Output current:

Operating current: 2000 mA

Off-state current: 0 mA

V1: Mechanical micro switch, Honeywell
V15S05-CZ100A05-01, SPDT type

Electrical values: 5 A @ 125/250 VAC, 100 mA @ 48 VDC or 125/250 VAC

Table A1 Temperature table for EPL Da

Sr. No.	Limit switch model	Switch type	Ci	Li	Type 1	Type 2	Type 3
			(nF)	(uH)	Ui=16 V Li= 25 mA Pi=34 mW	Ui=16 V Li= 25 mA Pi=64 mW	Ui=16 V Li= 52 mA Pi=169 mW
					Maximum permissible ambient temperature in °C for application temperature class		
					T85	T85	T85
1	A1	NJ2-12GM-N	30	50	80	80	63
2	A3	NJ5-18GM-N	70	50	80	80	63
3	A8	NJ4-12GK-N	45	50	80	80	62
4	A10	NJ5-18GK-N	70	50	80	80	62
5	A11	NJ3-18GK-N	70	200	80	80	62
6	A12	NJ3-18GK-S1N	120	200	80	80	62
7	A13	NJ8-18GM-N	70	50	80	80	63
8	A14	NJ2-12GK-SN	50	150	80	80	62
9	A15	NJ2-12GK-N	45	50	80	80	62
10	A16	NJ1,5-8GM-N	30	50	80	80	48
11	A17	NJ4-12GK-SN	70	150	80	80	62
12	A18	NJ4-12GM-N	45	50	80	80	48
13	A19	NJ8-18GK-N	70	50	80	80	62
14	A20	NJ10-30GM-N	140	100	80	80	63
15	D1	NJ2-V3-N	40	50	80	80	71
16	F1	SJ3,5-N	50	250	80	80	71
17	F2	SJ3,5-SN	30	100	80	80	71
18	F3	SJ3,5-S1N	30	100	80	80	71

Table A2 Temperature table for EPL Gb and Db

SR. NO.	LIMIT SWITCH MODEL	SWITCH TYPE	Ci [nF]	Li [uH]	ENTITY PARAMETER
					Ui=25.5V, Li=155mA, Pi=0.97W
					Maximum permissible ambient temperature in °C for application temperature class
					T85
1	V1	V15S05- CZ100A05-01	0.1	1	80
2	V2	V7-1C17E9-201	0.1	1	80
3	R1	GC1917	0.1	1	80

Table A3 Temperature table for EPL Ga

Sr. No.	Limit switch model	Switch type	Ci	Li	Type 1		Type 2		Type 3		Type 3	
			(nF)	(uH)	Ui=16 V Li= 25 mA Pi=34 mW		Ui=16 V Li= 25 mA Pi=64 mW		Ui=16 V Li= 52 mA Pi=169 mW		Ui=16 V Li= 72 mA Pi=242 mW	
					Maximum permissible ambient temperature in °C for application temperature class							
					T6	TS	T6	TS	T6	TS	T6	TS
1	A1	NJ2-12GM-N	30	50	76	91	73	88	62	77	54	63
2	A6	NJ5-18GM-N	70	50	76	91	73	88	62	77	54	63
3	A8	NJ4-12GK-N	45	50	73	88	69	84	51	66	39	54
4	A10	NJ5-18GK-N	70	50	73	88	69	84	51	66	39	54
5	A11	NJ3-18GK-S1N	70	200	73	88	69	84	51	66	39	54
6	A12	NJ5-18GK-SN	120	200	73	88	69	84	51	66	39	54
7	A13	NJ8-18GM-N	70	50	76	91	73	88	62	77	54	63
8	A14	NJ2-12GK-SN	50	150	73	88	69	84	51	66	39	54
9	A15	NJ2-12GK-N	45	50	73	88	69	84	51	66	39	54
10	A16	NJ1,5-8GM-N	30	50	73	88	68	83	49	64	36	42
11	A17	NJ4-12GK-SN	70	150	73	88	69	84	51	66	39	54
12	A18	NJ4-12GM-N	45	50	73	88	68	83	49	64	36	42
13	A19	NJ8-18GK-N	70	50	73	88	69	84	51	66	39	54
14	A20	NJ10-30GM-N	140	100	76	91	73	88	62	77	54	63
15	D1	NJ2-V3-N	40	50	73	88	66	81	45	60	30	45
16	F1	SJ3,5-N	50	250	73	88	66	81	45	60	30	45
17	F2	SJ3,5-SN	30	100	73	88	66	81	45	60	30	45
18	F3	SJ3,5-S1N	30	100	73	88	66	81	45	60	30	45

5. INSTALLATION

CAUTION: THE FOLLOWING MUST BE TAKEN INTO CONSIDERATION WHILE INSTALLING THE LIMIT SWITCHES!

- THE CURRENT AND VOLTAGE LIMITATION HAS TO BE OBSERVED AS PER THE ID PLATE
- THE WIRING AND CONNECTION SHOULD BE CARRIED OUT USING IP67 CERTIFIED CABLE GLANDS TO AVOID WATER INTRUSION TO THE ENCLOSURE
- ANY PLASTIC OR TEMPORARY PROTECTIVE PLUG ARE TO BE REMOVED AND IP67 CERTIFIED METALLIC PLUG TO BE USED INSTEAD

5.1 MOUNTING

K series limit switch mounting face follows the VDI/VDE 3845 standard. A suitable mounting kit is needed to mount the device on an actuator. Below are the instructions for mounting the limit switch to an actuator following the same VDI/VDE 3845 mounting standard. To mount the limit switch to other than VDI/VDE actuators the instructions for every case need to be considered separately.

The limit switch box is installed on the bracket, that suits the actuator, with fastener and left loose.

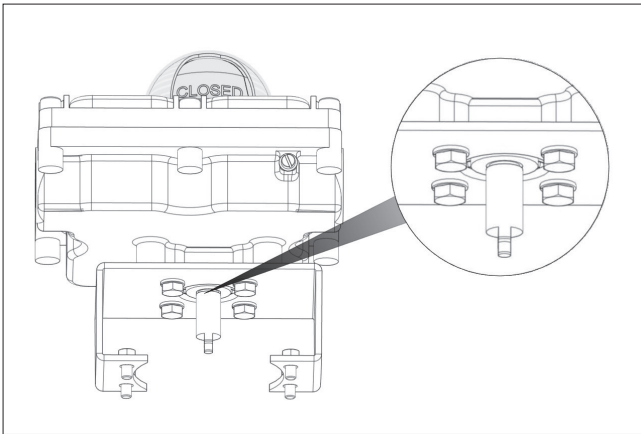


Fig. 3 Example of VDI/VDE mounting bracket

The box is then mounted on the actuator while taking care that the shaft enters in the slot of the actuator shaft.

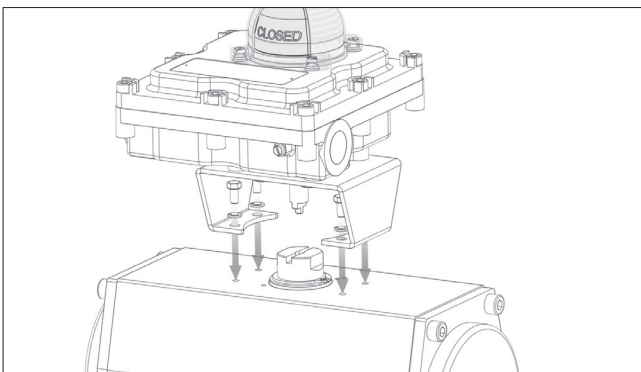


Fig. 4 Mounting on an actuator

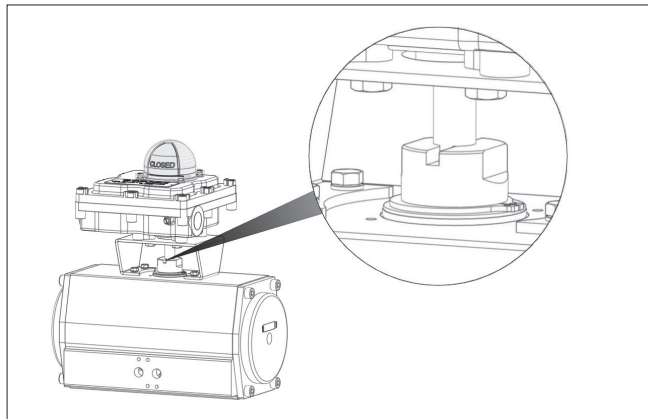


Fig. 5 Aligning the shaft

Bracket is attached to the actuator mounting holes, check the alignment of the limit switch shaft and actuator shaft. No radial or axial forces should be present. After alignment has been verified tighten the bracket properly on both actuator and limit switch side. Bracket should never be left loose. A clearance 'C' between the actuator shaft slot bottom and the limit switch shaft should be from 0,2 mm to 0,5 mm.

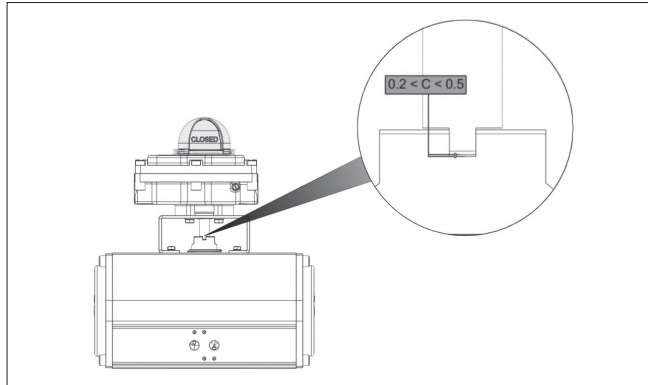


Fig. 6 Clearance of the shaft

Connect the wiring through a suitable cable gland and connect the wires to the terminal strip. Terminal strip connections are marked on the PCB separately for proximity and micro switches. For proximity switches as "V+", "V-", and for mechanical switches as "COM-1", "NO-1" and "NC-1" for the switch 1 and "COM-2", "NO-2" and "NC-2" for the switch 2. Switch 1 is the bottom switch and switch 2 is the top switch.

Connections:

V+: Positive voltage (proximity switch)

V-: Ground voltage (proximity switch)

COM: - Common terminal.

NC: - Normally closed contact, open when actuated.

NO: - Normally open contact, closed when actuated.

5.2 CAM SETTING

SWITCH TYPE V1 & D1

The rotary travel limits are adjusted by setting the cams to the desired positions. The cams in K series limit switches are easily adjustable due to their self-locking mechanism. Cams are also color coded to make the installation easier.

The top cam is red and is typically used for closed position indication and actuated with clockwise rotation of the shaft. The bottom switch is yellow and is typically used for open position indication and actuated with counterclockwise rotation.

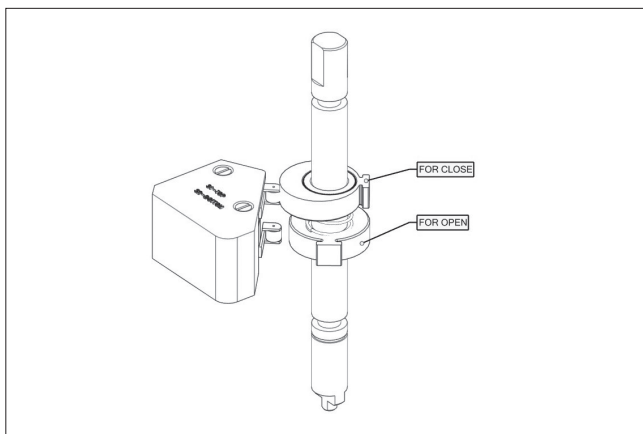


Fig. 7 Cam placement on devices with V1 & D1 switches

Operate the actuator to bring the valve in open position. Use the lower (yellow) cam to set the open position. Switch should not be actuated. Lift the cam up and rotate it to same direction as the actuator rotation while driving to open position (typically counterclockwise) until the switch is actuated. This can be heard as a click from the switch while the cam is rotated. Release the cam and make sure it is locked in place with the self-locking mechanism. The cam should engage fully to the splines.

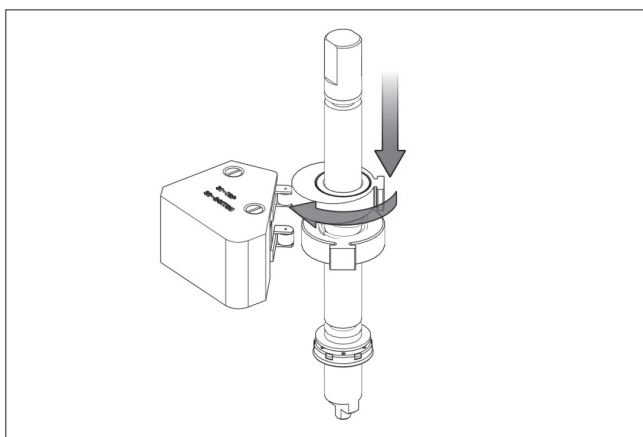


Fig. 8 Adjusting the upper cam

Operate the actuator to bring the valve in open position. Use the lower (yellow) cam to set the open position. Switch should not be actuated. Lift the cam up and rotate it to same direction as the actuator rotation while driving to open position (typically counterclockwise) until the switch is actuated. This can be heard as a click from the switch while the cam is rotated. Release the cam and make sure it is locked in place with the self-locking mechanism. The cam should engage fully to the splines.

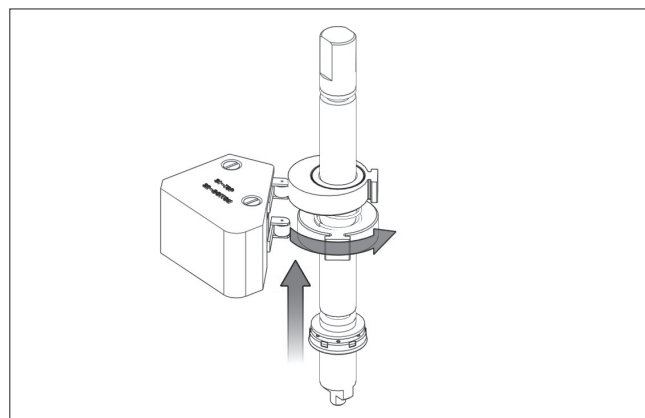


Fig. 9 Adjusting the lower cam

SWITCH TYPE A1

Operate the actuator to bring the valve in closed position. Turn the twin cam to bring one edge of it to close proximity of the closed sensor sensing head. Leave a gap of less than 2 mm between the cam and the sensor. Operate the actuator to bring the valve in open position and check that the other edge of the twin cam is close to the open sensor sensing head. If needed move the sensors forward or backward to ensure approximately 2 mm gap between the twin cam edges and the open and close sensors in respective positions of the valve.

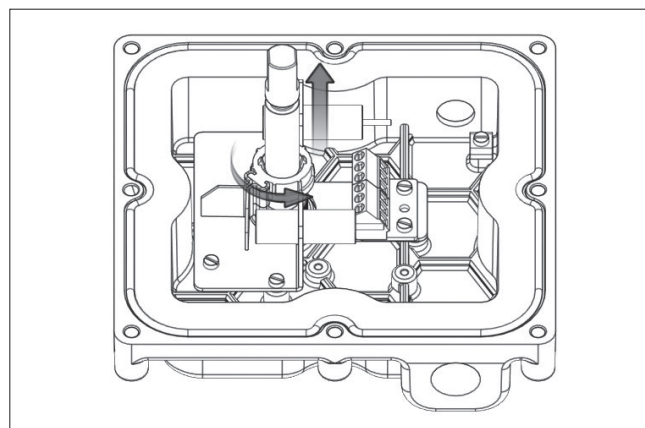


Fig. 10 Adjusting the twin cam

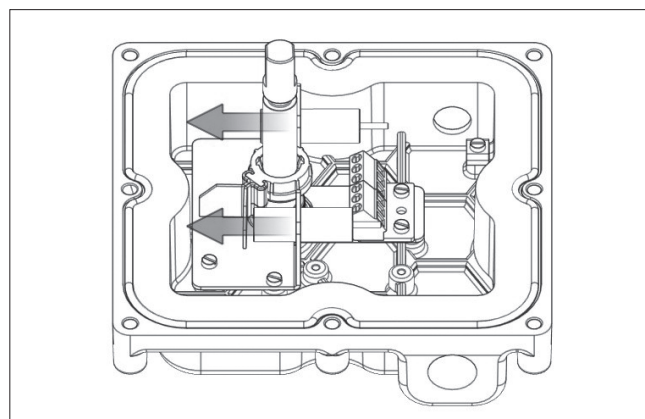


Fig. 11 Adjusting the inductive sensors

SWITCH TYPE F1

First loosen the locking screw. Now rotate the valve to ensure that cam rotation is right, if not adjust the cam accordingly. Operate the actuator to bring the valve in closed condition. Cam must be rotated (clock wise) till the multimeter gives sensation for fully closed valve position.

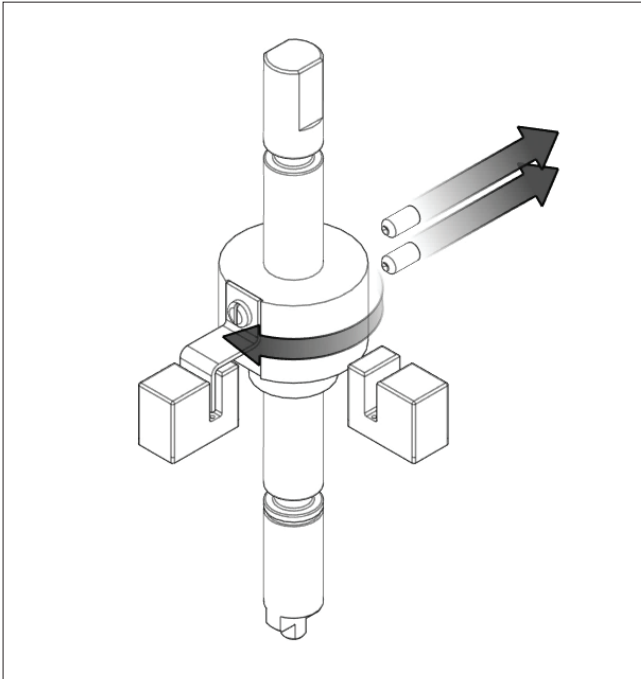


Fig. 12 Adjusting the cam clockwise

First loosen the locking screw. Now rotate the valve to ensure that cam rotation is right, if not adjust the cam accordingly. Operate the actuator to bring the valve in open condition. Cam must be rotated (counter clock wise) till the multimeter gives sensation for fully closed valve position.

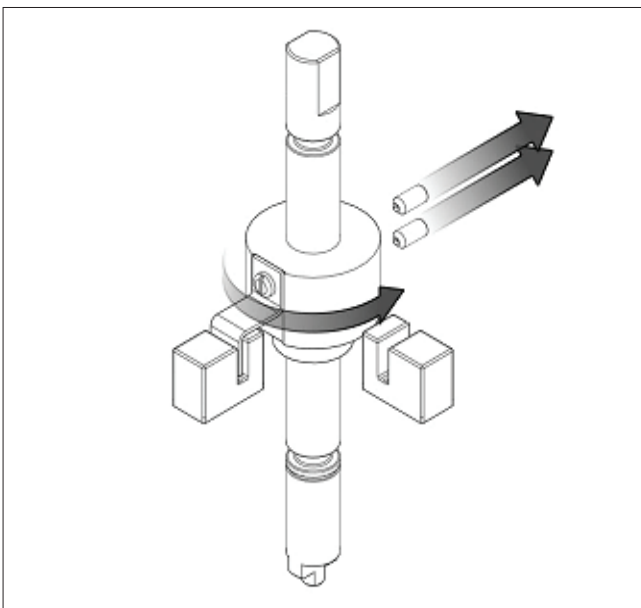


Fig. 13 Adjusting the cam Counter clockwise

SWITCH TYPE R1

Operate the actuator to bring the valve in closed condition. Use the red cam to set the closed position. The cam has to be depressed and rotated (clock wise) till the multimeter gives sensation for fully closed valve position.

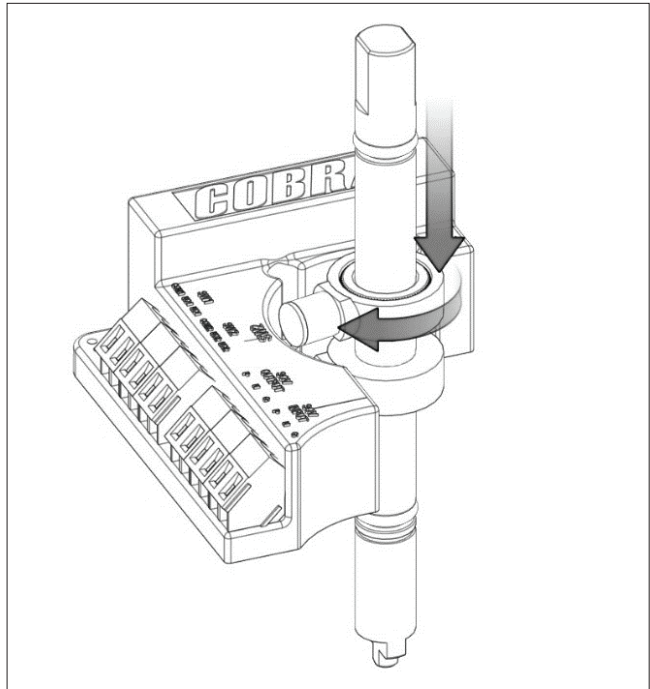


Fig. 14 Adjusting the upper cam

Operate the actuator to bring the valve in open condition. Use the yellow cam to set the open position. The cam has to be lifted and rotated (counter clock wise) till the multimeter gives sensation for fully open valve position.

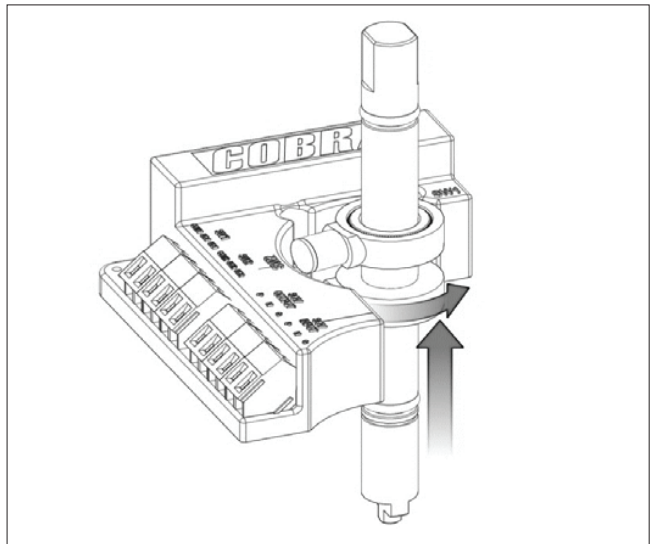


Fig. 15 Adjusting the lower cam

5.3 WIRING DIAGRAMS

All wiring diagrams are presented in normal state (not actuated) of the switches.

SWITCH TYPE V1

Below are the wiring diagram and the locations of the terminal strips on the PCB for limit switch type V1. SOV connection terminals are meant for terminating the solenoid valve inside the limit switch enclosure. The terminal with labels “COM1”, “NO1” and “NC1” is for the switch 1 (bottom switch) and the terminal with labels “COM2”, “NO2” and “NC2” is for the switch 2 (top switch).

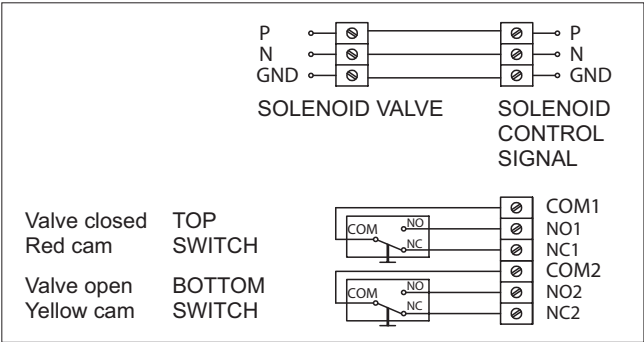


Fig. 16 Mechanical micro switch, V1

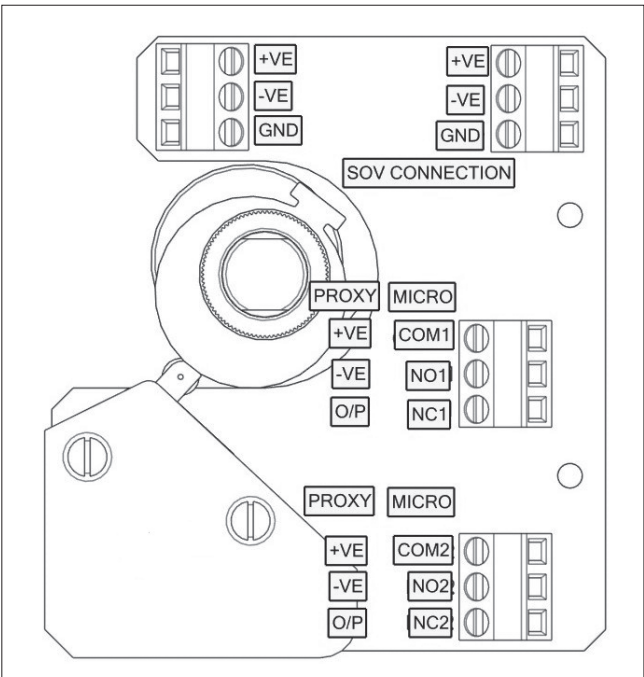


Fig. 17 PCB layout of devices with V1 switches

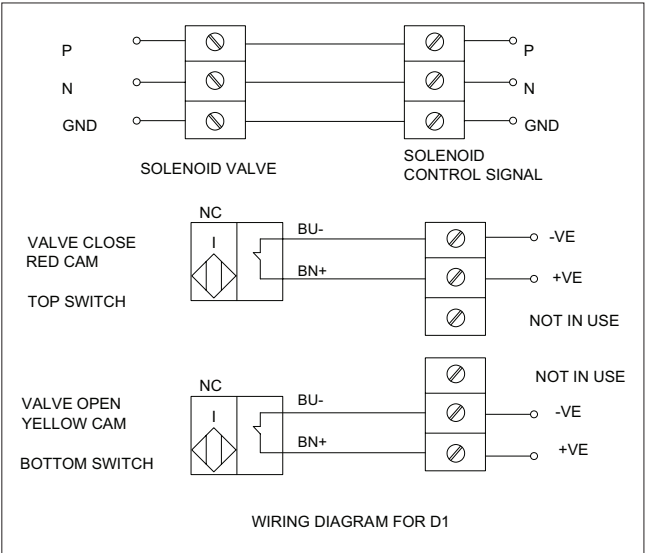


Fig. 18 Wiring diagram for D1

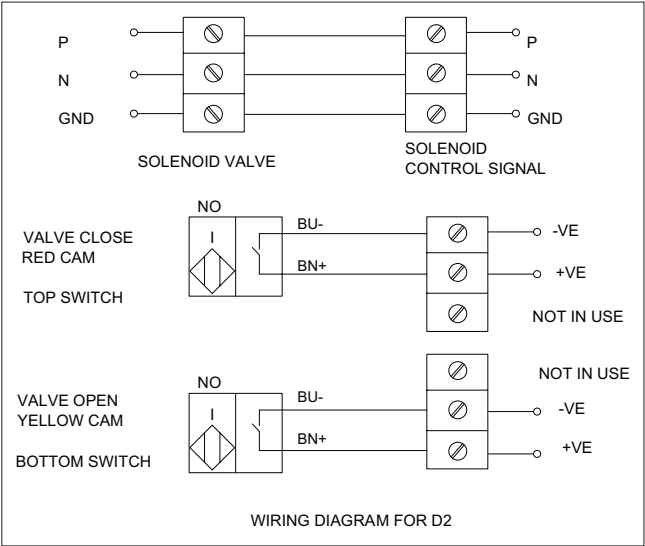


Fig. 19 Wiring diagram for D2

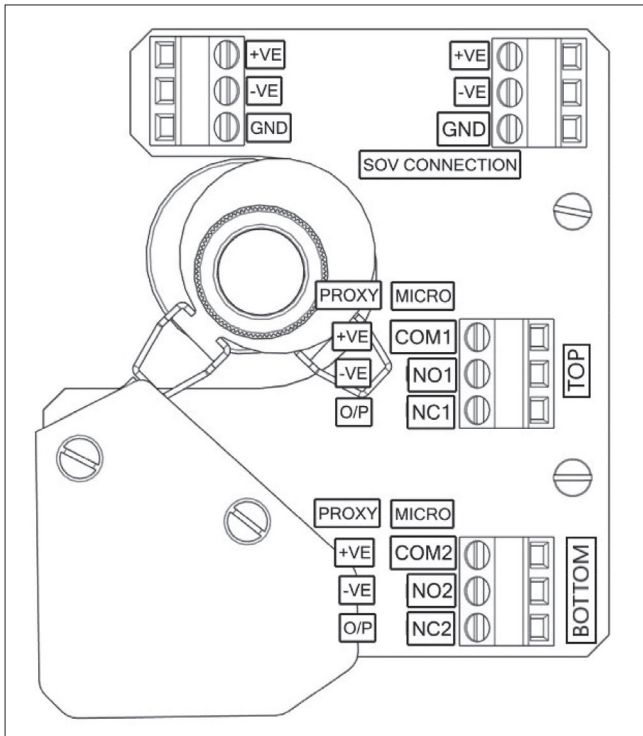


Fig. 20 PCB layout of devices with D1 switches

SWITCH TYPE A1

Below are the wiring diagram and the location of the terminal strip on the PCB for limit switch type A1.

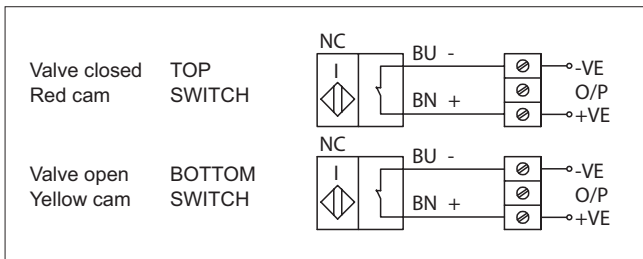


Fig. 21 Wiring diagram of A1 switches

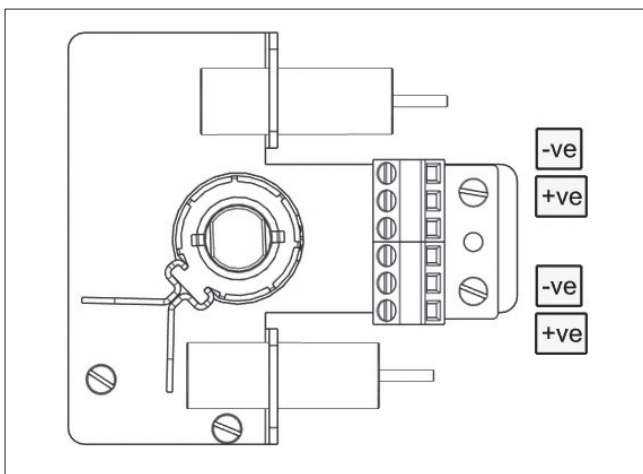


Fig. 22 PCB layout of devices with of A1 switches

SWITCH TYPE R1

Below are the wiring diagram and the location of the terminal strip on the PCB for limit switch type.

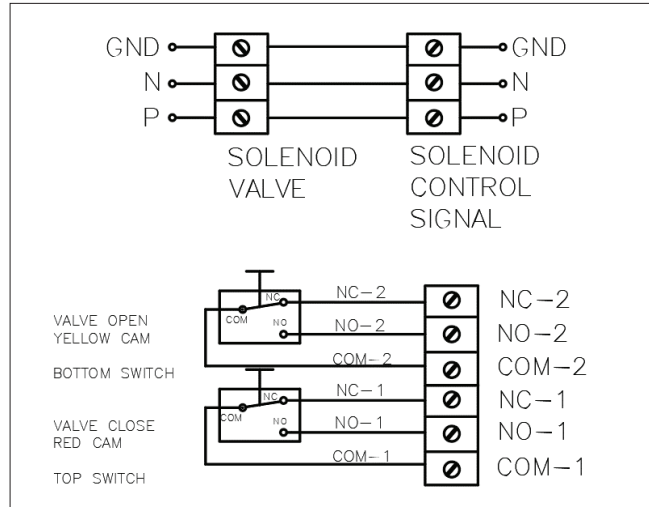


Fig. 23 Mechanical microswitch R1 switches

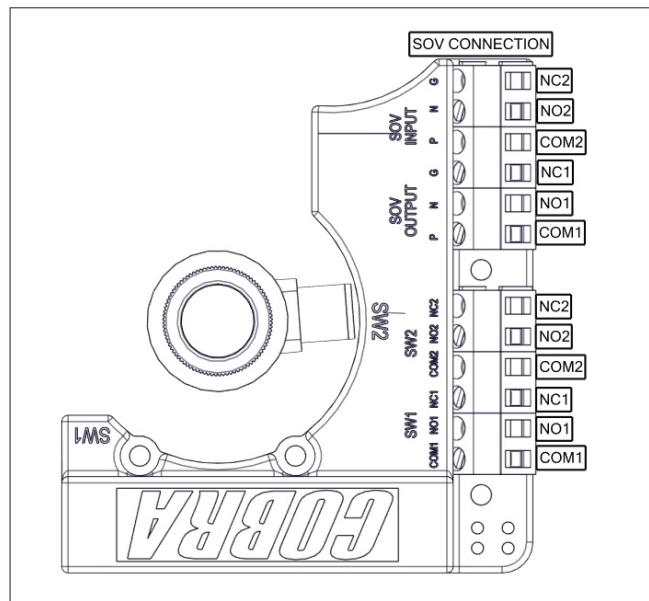


Fig. 24 PCB layout of devices with R1 switches

6. WARNINGS

- Ensure that Supply Voltage should not exceed more than > 20 % of Rated voltage. (for current and voltage ratings refer catalogue)
- No mechanical rework allowed by customer. Mechanical rework can increase clearance between Housing and cover.
- Do not open cover / cable gland when limit switch is under operation or in energized condition.
- Selection of cable and cable gland refer user manual.

CAUTION:

- The current and voltage limitation has to be observed as per the tag plate.
- The wiring and connection should be carried out with proper gland and care should be taken to avoid water seepage.
- Confirm the area is non-hazardous before opening the cover of the enclosure for making electrical connections.
- The plugs given along with box are to be removed and metallic plug to be used.
- Ensure cable gland is properly fitted using sound engineering practice ensuring that rain water / other fluids do not enter in the limit switch box.
- The person who operates the limit switch should have enough knowledge of electrical engineering.

CAUTION IP66/67 :

- Ensure cable gland and gasket is properly fitted using sound engineering practice ensuring that rain water / other fluids do not enter in the limit switch box.
- Tighten the cover bolts fully to avoid water seepage inside the limit switch box.
- Use UCIL SYNCHER make GRIP SEAL CABLE JOINING COMPOUND or equivalent to seal cable gland. For precaution & application of sealing compound use original manufacturers operational manual.

SPECIFIC CONDITIONS FOR USE OF Ex ia EQUIPMENT

- Intrinsically safe apparatus shall be used at atmospheric pressure between 0.6 bar and 1.1 bar
- equipment to be powered through an appropriately certified "Ex ia" barrier having compatible output ratings.
- If the equipment enclosure is made of aluminum alloy LM-6 and if it is mounted in an area where the use of EPL Ga apparatus is required, the equipment must be installed such that even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- To avoid an Potential electrostatic charges, wipe the surface of indicating cover with damp cloth only.
- ATEX/ IECEx certified cable glands and blanking elements shall be selected and installed by the end user complying with the safety parameters of the device as per IEC 60079-14 and the minimum requirements would be IP 66 / 67 rating.
- Correct routine test sentence as follows; Dielectric strength test conducted on insulation between input terminals of the equipment and the frame of the equipment at gradual application of test voltage at 500 Vrms or 700 Vdc for one minute. No evidence of flashover or breakdown shall be observed, the maximum leakage current flowing shall not exceed 5.0 mA

7. BENCH TESTING

To test the limit switch operation, follow these instructions.

7.1 TESTING OF MICRO SWITCH V1, D1 & F1

1. Connect multi-meter (ohm-meter) across COM & NO terminal.
2. Check micro switch operation with continuity test.

When the switch is not actuated continuity should not exist between COM and NO. As the switch is actuated there should be continuity.

7.2 TESTING OF THE PROXIMITY SWITCH A1

Initial check before testing proximity sensors:

3. Ensure voltage is 8 V DC in open wire (PLC/DCS output) before connecting to V+ and V- terminals.
4. Connect the wires to V+ and V- terminals with right polarity. Make sure the connections are not loose.
5. Ensure target (metal) is in front of the switch sensing area (adjust both cams accordingly with respect to valve operation).
6. Ensure distance between target & switch sensing area should be as specified (from 1 to 3 mm)

Testing of proximity sensors:

1. Connect multi-meter (milli-ammeter) in series with V+ and V- terminals

2. Measure the current from V+ to V-

Current should be lower than 1 mA when target is in front of the switch.

When target is not in front of the switch, the current should be higher than 3 mA.

8. MAINTENANCE

NOTE: THE LIMIT SWITCH MUST BE REMOVED FROM INSTALLATION AND WIRING MUST BE DISCONNECTED PRIOR TO MAINTENANCE. USE ONLY NELES ORIGINAL PARTS AS REPLACEMENTS.

The K series limit switches are designed to operate one million cycles without maintenance. It is recommended that preventive maintenance is done before reaching the one million cycles.

Verify the model and the version of the limit switch box and spares to be replaced.

Available spare part sets:

PCB assembly:

Sensors + PCB + terminals + screws

Seal kit:

Shaft seals + cover gasket

Shaft assembly:

Shaft + cam + O-rings

Select the correct spare part set ID from the table below

Table 1 Spare part kit ID-codes per device model

Limit switch model	PCB assembly kit	Shaft assembly kit	Seal kit
KC2A1...	H166867	H166871	H166875
KC2V1...	H166868	H166872	H166875
KS2A1...	H166869	H166873	H166876
KS2V1...	H166870	H166874	H166876

9. DISASSEMBLY

WARNING:

All electric and pneumatic connections should be removed before starting the disassembly.

CAUTION: MAKE SURE THE EXTRACTED PARTS WILL REMAIN CLEAN AND DO NOT GATHER ANY IMPURITIES WHILE DISASSEMBLING THEM.

NOTE: IT IS ADVISABLE TO REPLACE ALL THE RUBBER PARTS USING ORIGINAL NELES SPARE PART KIT (REFER TO CHAPTER 7 FOR THE RIGHT KIT).

9.1 COVER DISASSEMBLY

Open the cover screws and remove the cover by lifting it vertically.

For KS series refer to Figure 25 and for KC series refer to Figure 26.

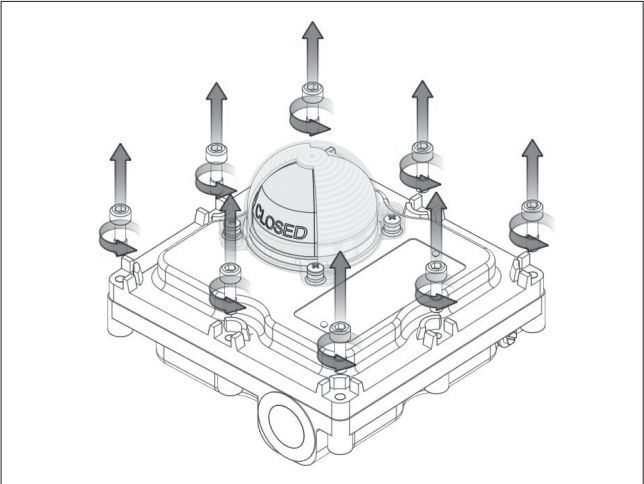


Fig. 25 Removing the cover of KS series

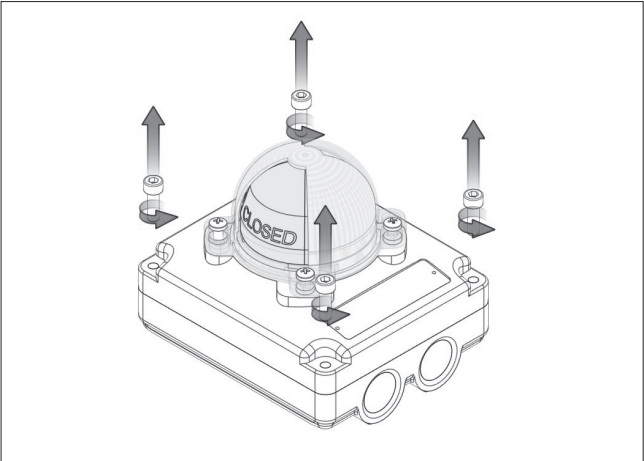


Fig. 26 Removing the cover of KC-series

To disassemble the visual indicator, remove the four screws holding it in place and lift the dome vertically.

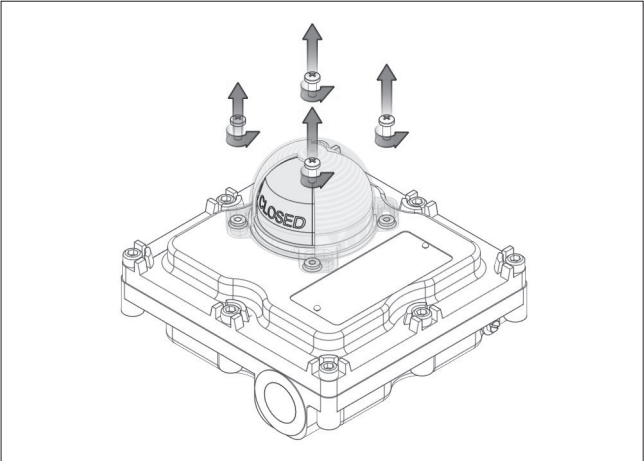


Fig. 27 Visual indicator screws

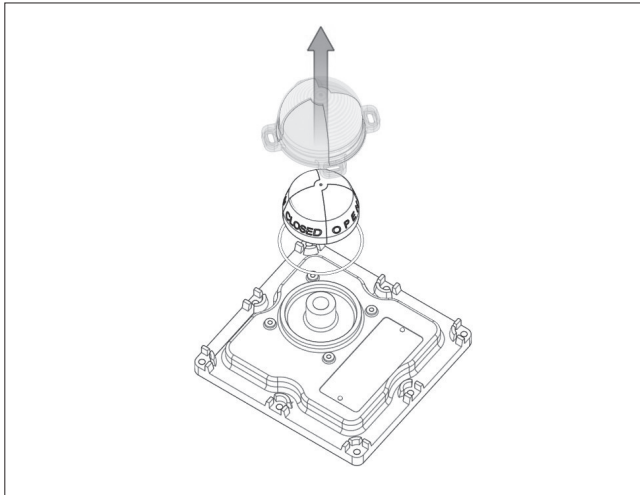


Fig. 28 Disassembly of the visual indicator

9.2 SHAFT DISASSEMBLY

When disassembling the shaft of the device, pay attention to the O-rings and cams for not damaging them. In case they are damaged replace the shaft assembly.

To remove the shaft from the housing the circlip needs to be removed first. Use pliers to remove the circlip. Remove the shaft like in Figures 29 - 34 for V1, W1, A1, D1, F1 and R1 switches.

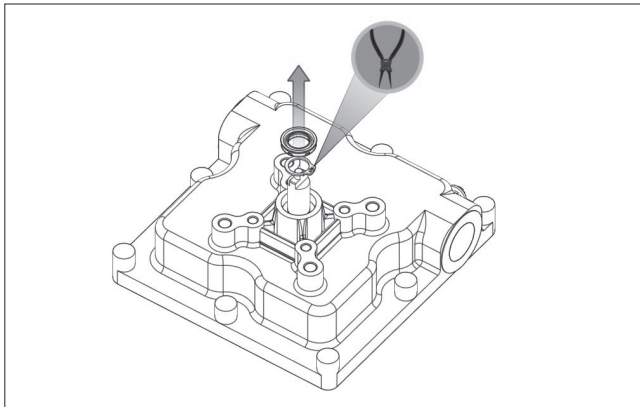


Fig. 29 Removing the circlip

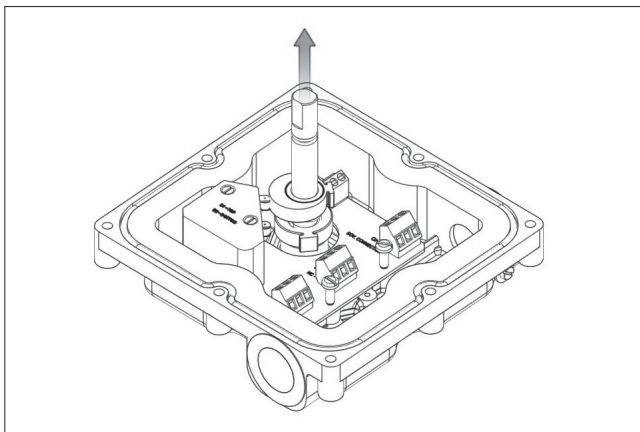


Fig. 30 Removing the shaft of devices with V1 and W1 switches

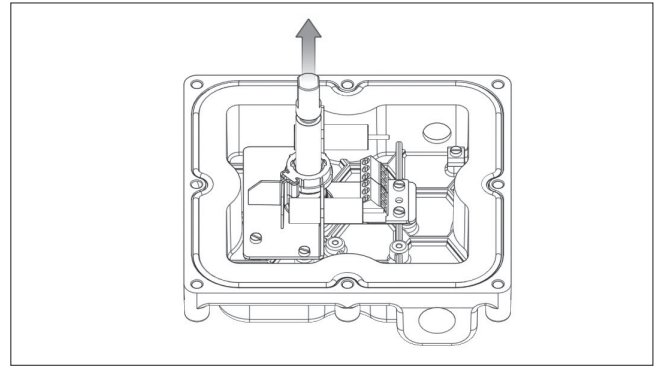


Fig. 31 Removing the shaft of devices with A1 switches

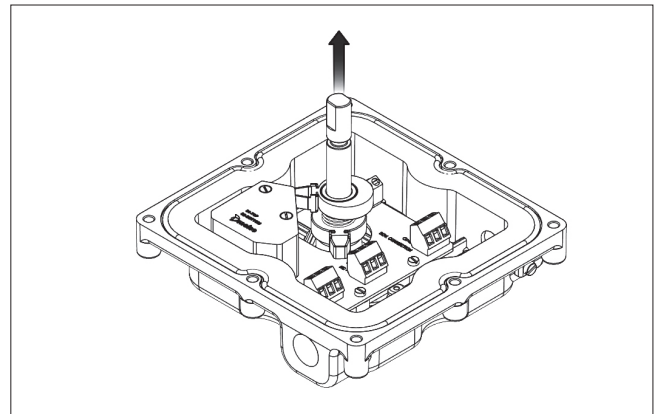


Fig. 32 Removing the shaft of devices with D1 switches

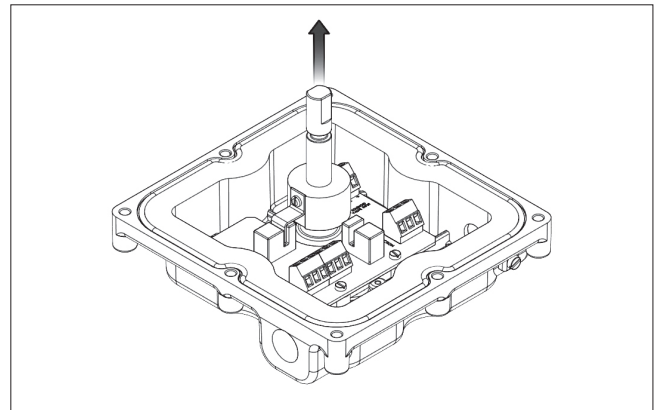


Fig. 33 Removing the shaft of devices with F1 switches

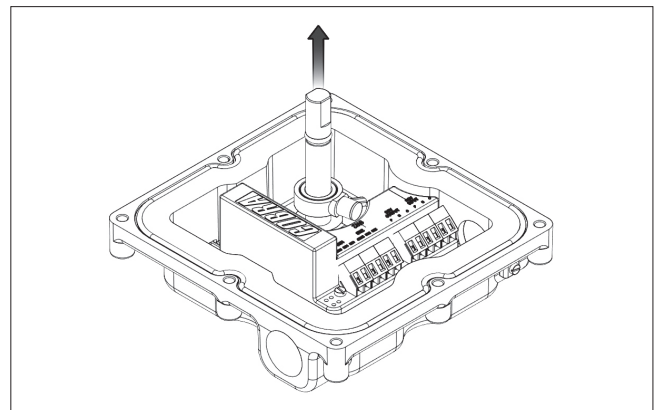


Fig. 34 Removing the shaft of devices with R1 switches

9.3 SWITCH DISASSEMBLY

DISASSEMBLY OF SWITCH SWITCH V1 & D1

Open the two screws holding the PCB in the housing and take out the PCB. Open the screws on top of the switch cover and lift the cover vertically to gain access to the switches.

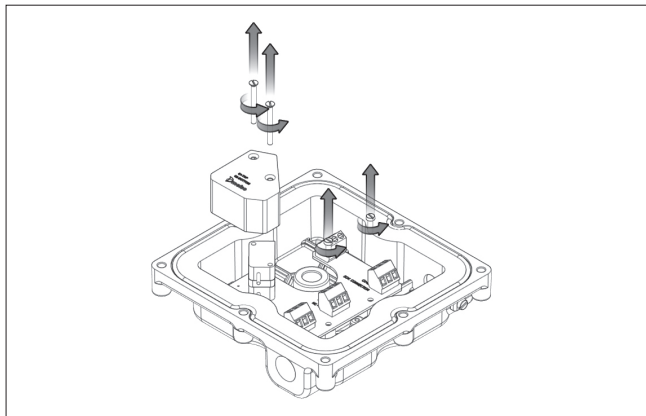


Fig. 35 Removing the PCB and switch cover of V1 and D1 switches

DISASSEMBLY OF SWITCH A1

Disconnect the switches from the terminal strip. Remove the screws holding the sensor mounting plate in place and remove the mounting plate from the housing. Remove the nuts holding the switches on the mounting plate and remove the switches.

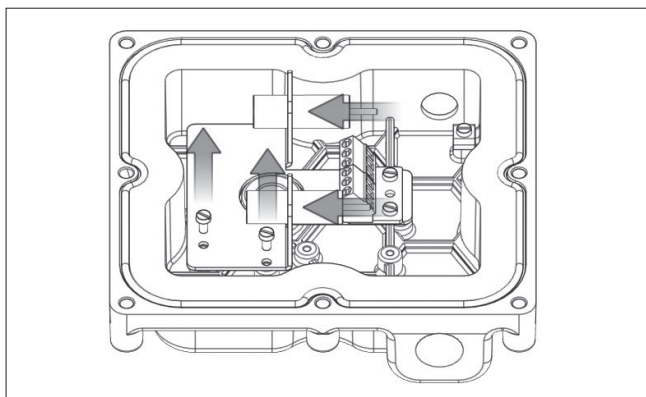


Fig. 36 Removing the switch mounting plate and A1 switches

DISASSEMBLY OF SWITCH F1

Open the two screws holding the PCB in the housing and take out the PCB.

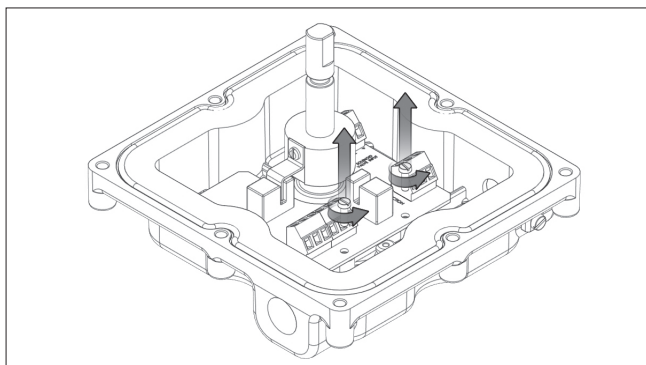


Fig. 37 Removing the switch mounting plate and F1 switches

DISASSEMBLY OF SWITCH R1

Dismantle the screw to take out the PCB. Dismantle the screw to take out the hermetically sealed micro switch. In case of burnt contact the contacts may show open contact. Replace the PCB completely with the switches.

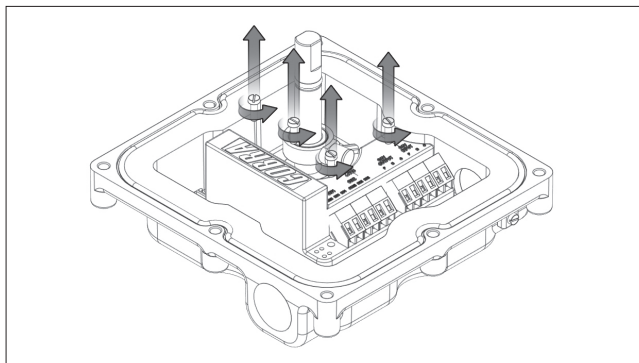


Fig. 38 Removing the switch mounting plate and R1 switches

10. ASSEMBLY

CAUTION: WHEN ASSEMBLING THE PARTS BACK TO THE DEVICE MAKE SURE THAT CABLE GLAND IS PROPERLY FITTED TO ENSURE THE IP67 INGRESS PROTECTION CLASS FOR THE UNIT.

10.1 ASSEMBLY OF V1 & D1 SWITCHES

1. Insert the PCB to the housing and install the shaft to the housing using grease as lubricant to avoid damage to the O-ring. Secure the shaft to the housing with the circlip and check the rotation and the vertical play of the shaft. The play should not exceed 0,05 mm.

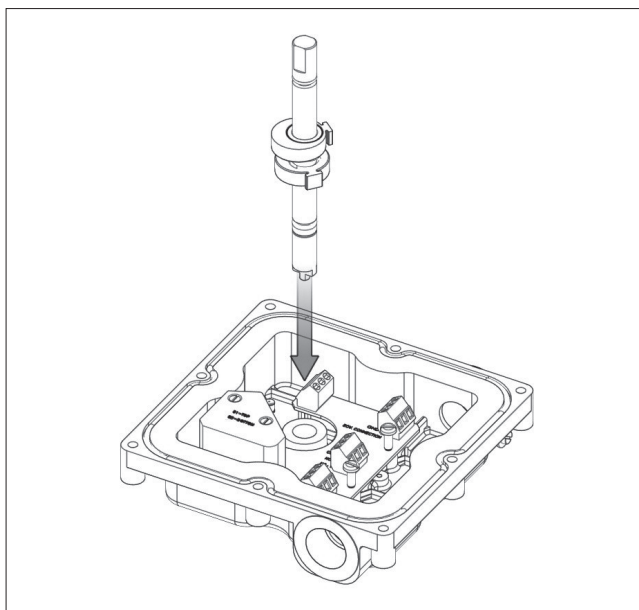


Fig. 39 Inserting the shaft to a device with V1 and D1 switches

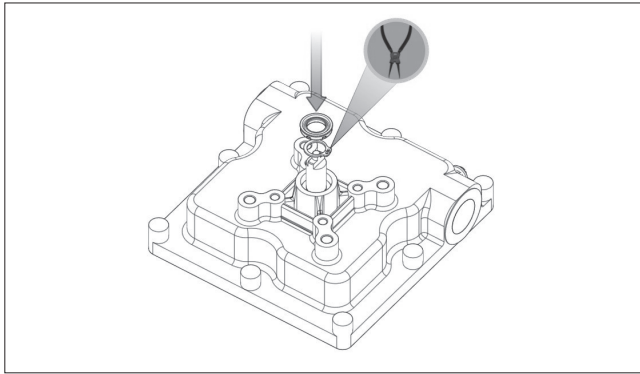


Fig. 40 Inserting the circlip

2. Secure the PCB with the screws and reapply the switch cover on top of the switches. Secure the switch cover with the two screws. Set the cams as instructed in section 5.2.1.

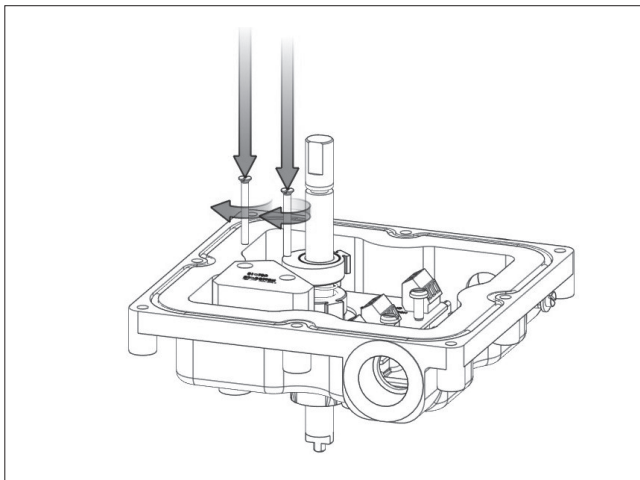


Fig. 41 Inserting the switch cover of V1 and D1 switches

3. Before reinserting the cover make sure the gasket between the housing and the cover is properly in its place and intact. Insert the cover on the unit by inserting the top end of the lubricated shaft to the indicator. If the shaft does not glide into the indicator, rotate the cover until it slides down on the shaft. Align the cover and housing and tighten the cover screws fully.

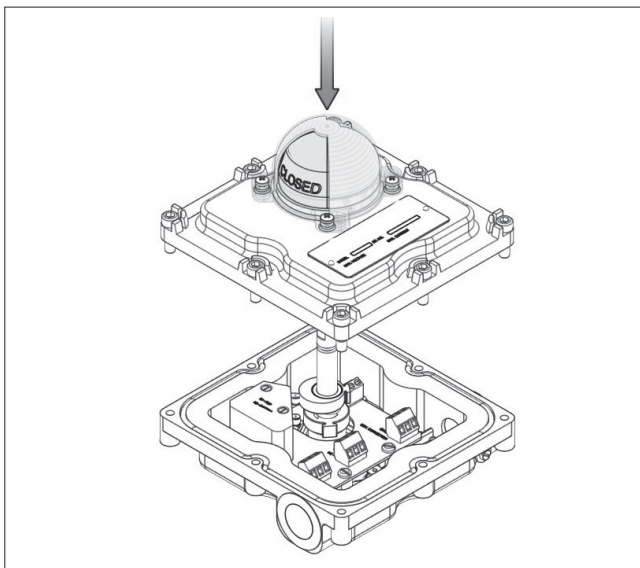


Fig. 42 Assembling the cover

10.2 ASSEMBLY OF A1 SWITCHES

1. Insert the switch mounting plate to the housing and install the shaft to the housing using grease as lubricant to avoid damage to the O-ring. Secure the shaft to the housing with the circlip and check the rotation and the vertical play of the shaft. The play should not exceed 0,05 mm.

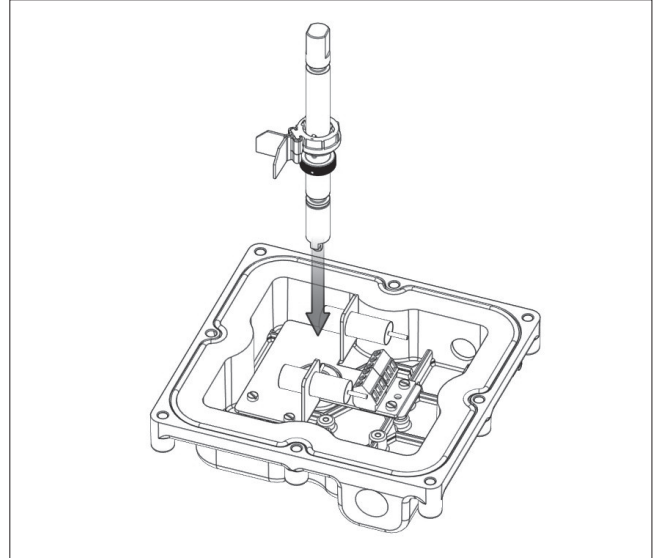


Fig. 43 Inserting the shaft to a device with A1 switches

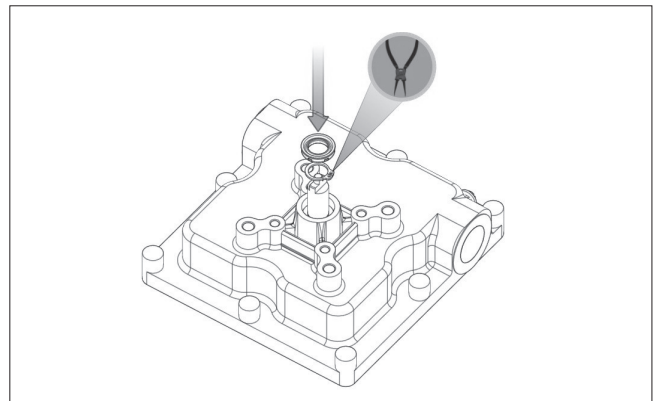


Fig. 44 Inserting the circlip

2. Secure the switch mounting plate with the screws and set the twin cam as instructed in section 5.2.2.
3. Before reinserting the cover make sure the gasket between the housing and the cover is properly in its place and intact. Insert the cover on the unit by inserting the top end of the lubricated shaft to the indicator. If the shaft does not glide into the indicator, rotate the cover until it slides down on the shaft. Align the cover and housing and tighten the cover screws fully.

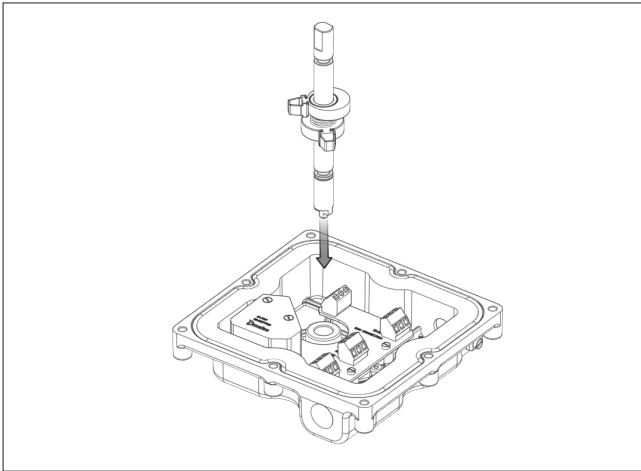


Fig. 45 Inserting the shaft to a device with D1 switches

10.3 ASSEMBLY OF F1 SWITCHES

1. Insert the PCB to the housing and Install the shaft to the housing using grease as lubricant to avoid damage to the O-ring. Secure the shaft to the housing with the circlip and check the rotation and the vertical play of the shaft. The play should not exceed 0,05 mm.

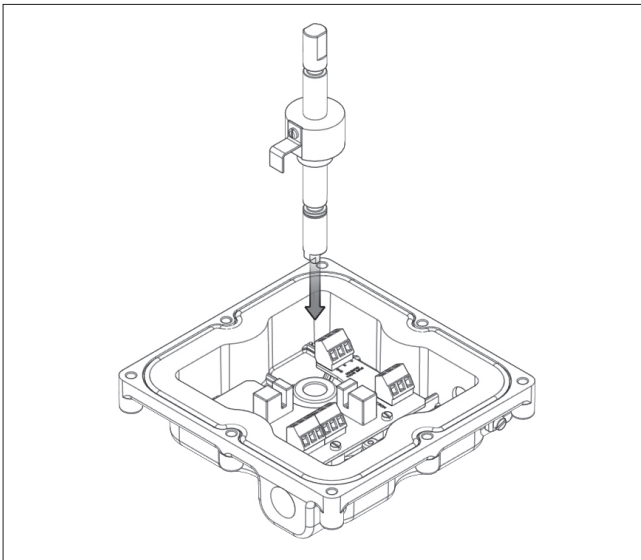


Fig. 46 Inserting the shaft to a device with F1 switches

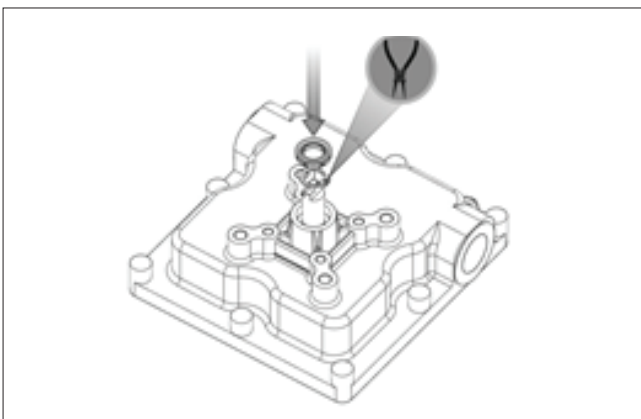


Fig. 47 Inserting the circlip

2. Secure the PCB with the two screws.
3. Before reinserting the cover make sure the gasket between the housing and the cover is properly in its place and intact. Insert the cover on the unit by inserting the top end of the lubricated shaft to the indicator. If the shaft does not glide into the indicator, rotate the cover until it slides down on the shaft. Align the cover and housing and tighten the cover screws fully.

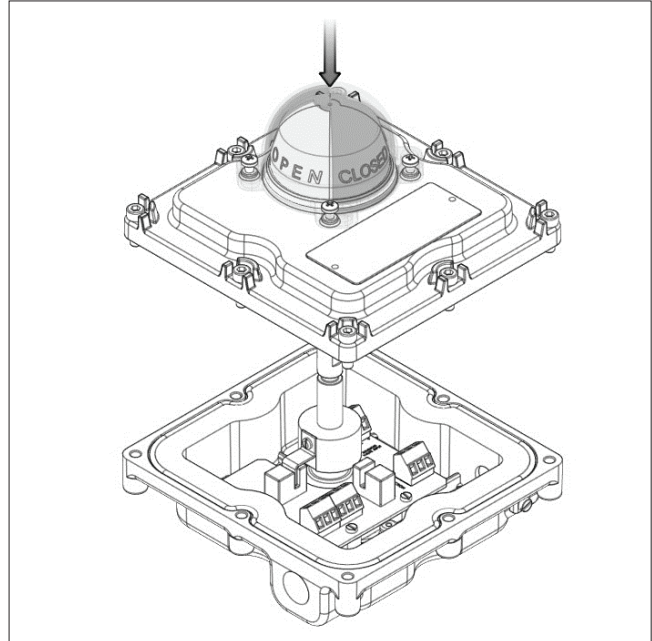


Fig. 48 Assembling the cover

10.4 ASSEMBLY OF R1 SWITCHES

1. Insert the PCB to the housing and Install the shaft to the housing using grease as lubricant to avoid damage to the O-ring. Secure the shaft to the housing with the circlip and check the rotation and the vertical play of the shaft. The play should not exceed 0,05 mm.
2. Secure the PCB with the two screws.
3. Before reinserting the cover make sure the gasket between the housing and the cover is properly in its place and intact. Insert the cover on the unit by inserting the top end of the lubricated shaft to the indicator. If the shaft does not glide into the indicator, rotate the cover until it slides down on the shaft. Align the cover and housing and tighten the cover screws fully.

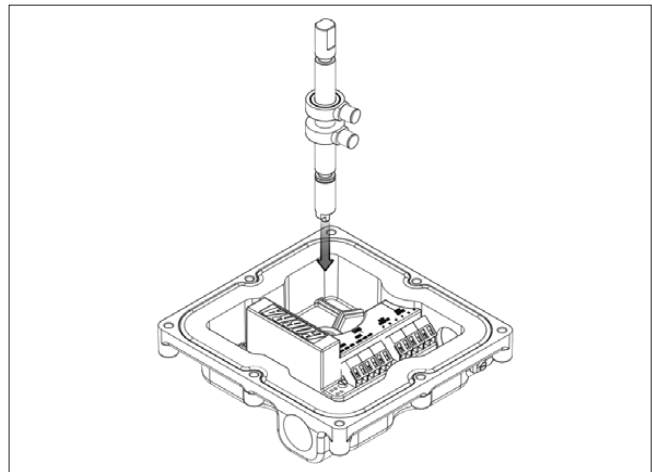


Fig. 49 Inserting the shaft to a device with R1

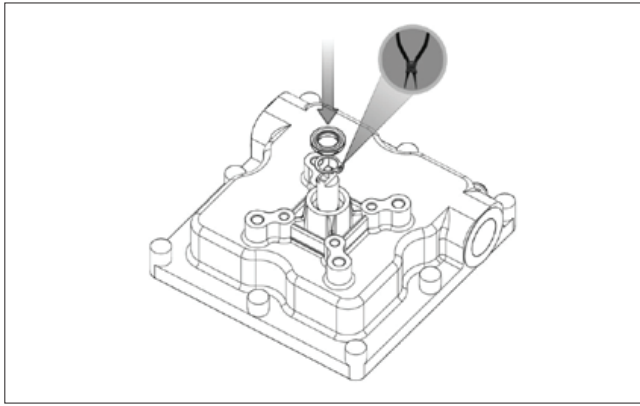


Fig. 50 Inserting the circlip

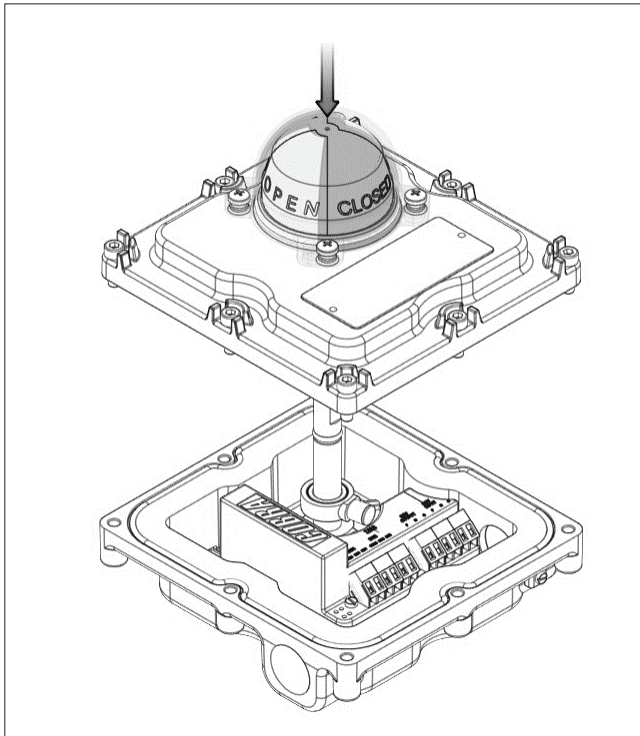


Fig. 51 Assembling the cover

11. TROUBLE SHOOTING

Table 2 Trouble shooting of mechanical V1 and W1 switches

Failure	Check list	Corrective action
No feedback	Check voltage & current	Make sure the DCS output is on a correct level / Tighten loose connections if found
	Check cam position	Adjust cam properly
	PCB soldering issue / PCB tack issue due to corrosion	Replace PCB
	Faulty micro switches	Replace micro switch

Table 3 Trouble shooting of inductive A1, D1, F1, R1 switches

Failure	Check list	Corrective action
No feedback	Check polarity	Change the polarity if needed
	Check voltage & current	Make sure the DCS output is on a correct level / Tighten loose connections if found
	Check target (twin cam) position and its distance from sensing the area of the switch sensor	Adjust cam properly (adjust target position as specified by max. 1 to 3 mm distance)
	PCB soldering issue / PCB tack issue due to corrosion	Replace PCB
	Faulty proximity sensors	Replace sensors

Table 4 Trouble shooting of inductive R1 switches

Failure	Check list	Corrective action
No feedback	Check polarity	Change the polarity if needed
	Check voltage & current	Make sure the DCS output is on a correct level / Tighten loose connections if found
	Check target (twin cam) position and its distance from sensing the area of the switch sensor	Adjust cam properly (adjust target position as specified by max. 1 to 3 mm distance)
	PCB soldering issue / PCB tack issue due to corrosion	Replace PCB
	Faulty proximity sensors	Replace sensors

12. TOOLS

Table 5 Needed tools for disassembling and assembling the devices

Tool	Tool specification
1. Screw driver (tip style - slotted) for switch	3 mm
2. Screw driver (tip style - slotted) for plug	6-8 mm
Screw driver (tip style - phillips) for dome indicator	4 mm
4. Allen key for cover	4 mm
5. Nose plier for external circlip	(5 inch) 127 mm

13. DIMENSIONS

KC series

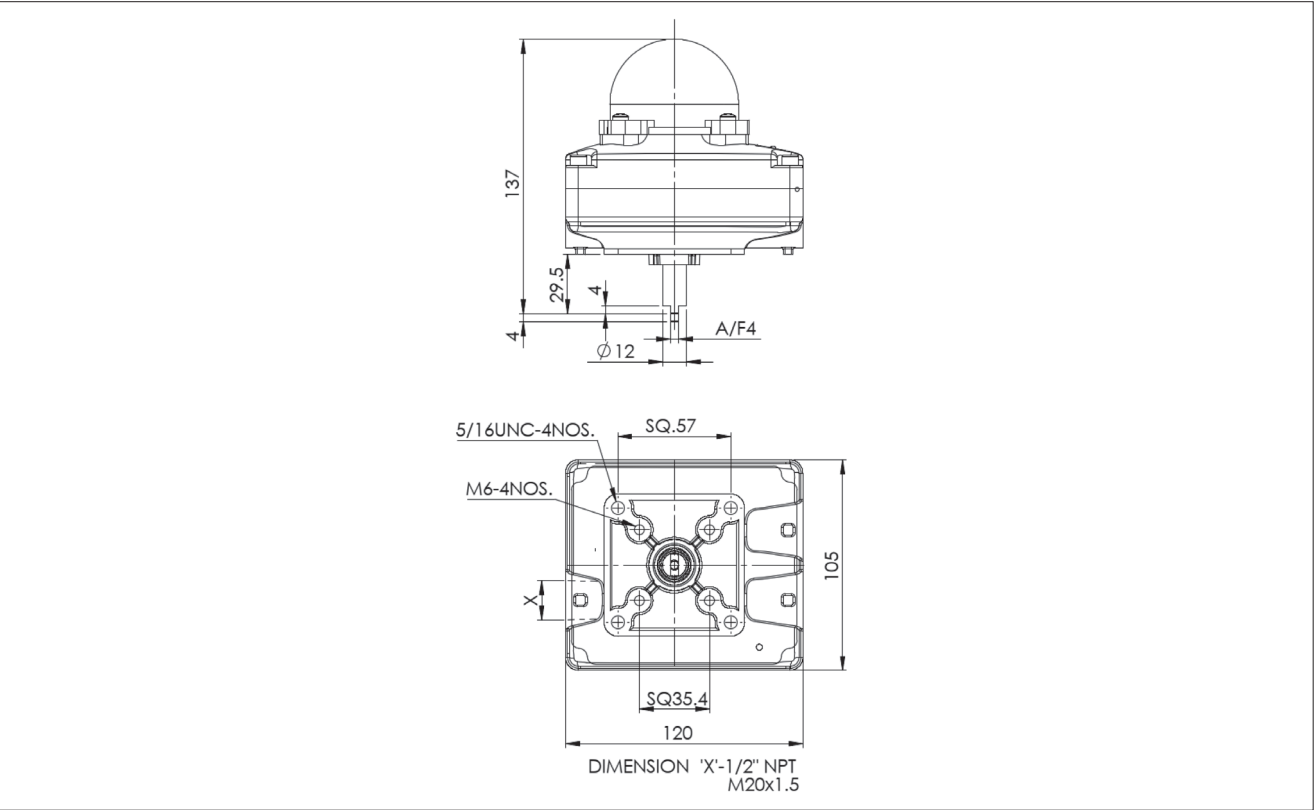


Fig. 52 Dimensional drawing of the KC series

KS series

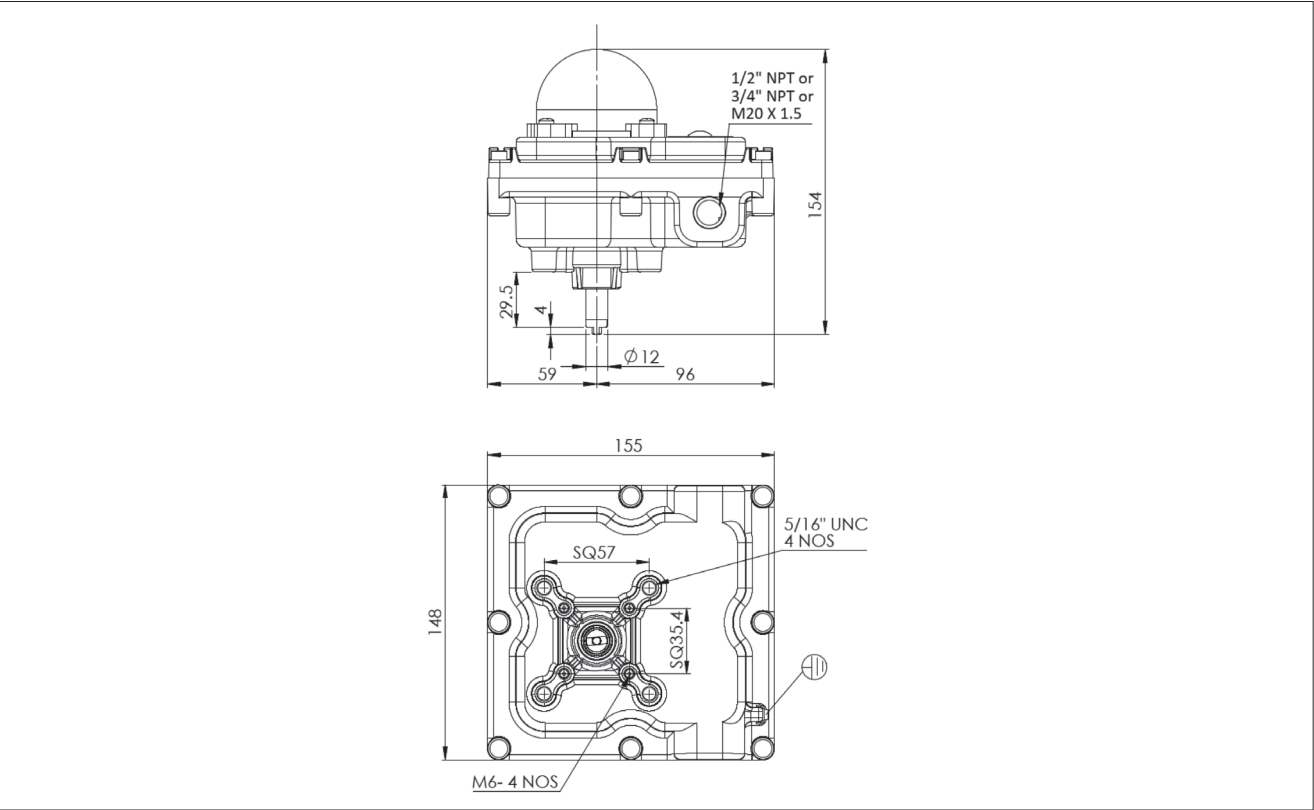


Fig. 53 Dimensional drawing of the KS series

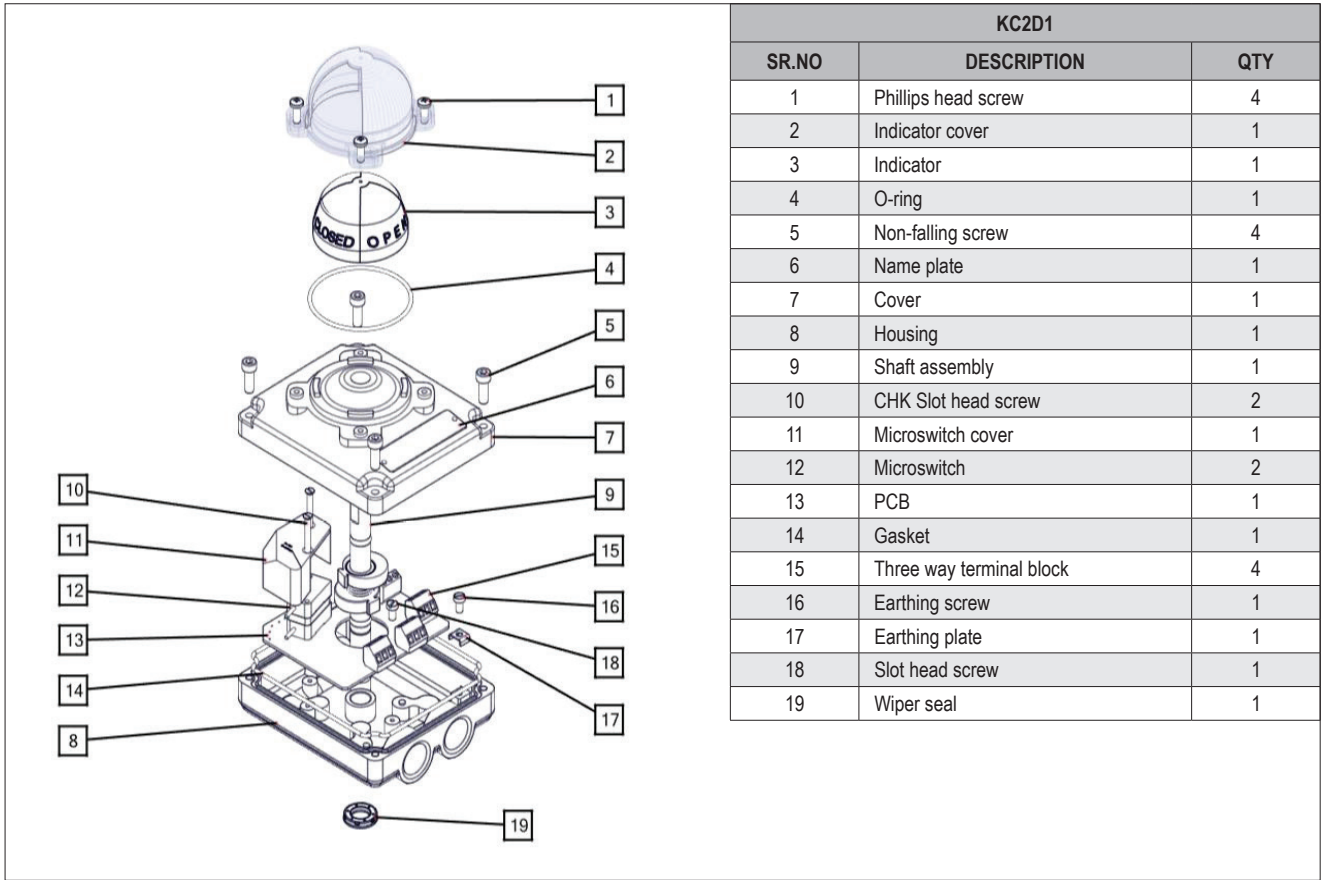
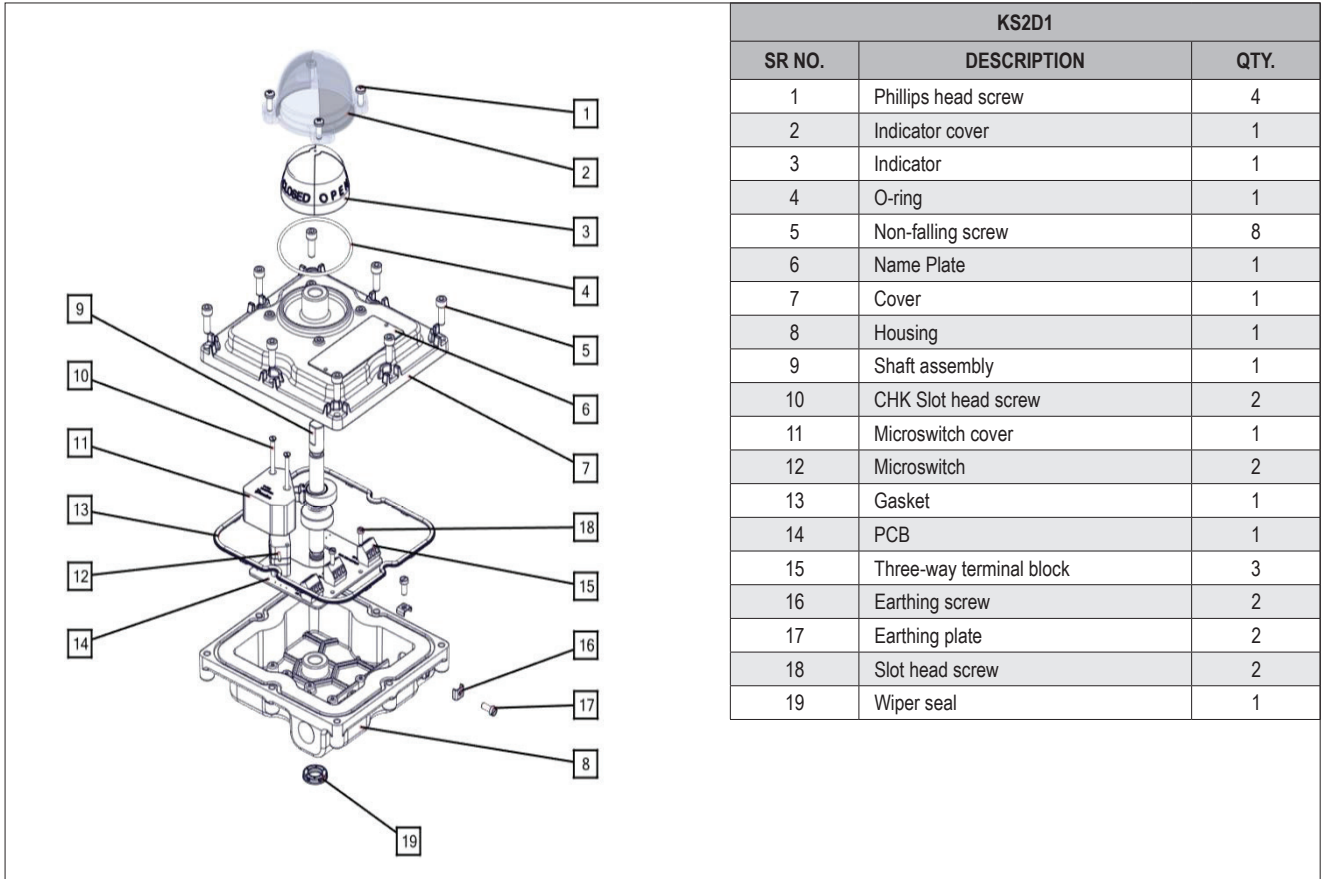
14. EXPLODED VIEW AND PART LISTS

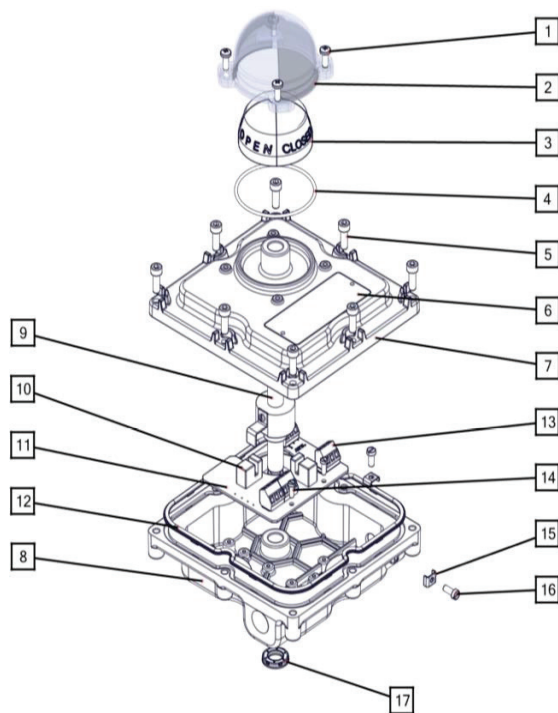
Exploded view diagram of the KS2A1 device. The diagram shows the assembly of various components, including a top cover with a 'CLOSED' indicator, a main housing, and internal components like a shaft assembly and proximity sensors. Numbered callouts 1 through 18 point to specific parts.

KS2A1		
SR NO.	DESCRIPTION	QTY.
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	8
6	Cover	1
7	Name Plate	1
8	Gasket	1
9	Earthing screw	1
10	Earthing plate	1
11	Slot head screw	4
12	Three-way terminal block	2
13	PCB	1
14	Shaft assembly	1
15	Proximity sensor bracket	1
16	Proximity sensor	2
17	Housing	1
18	Wiper seal	1

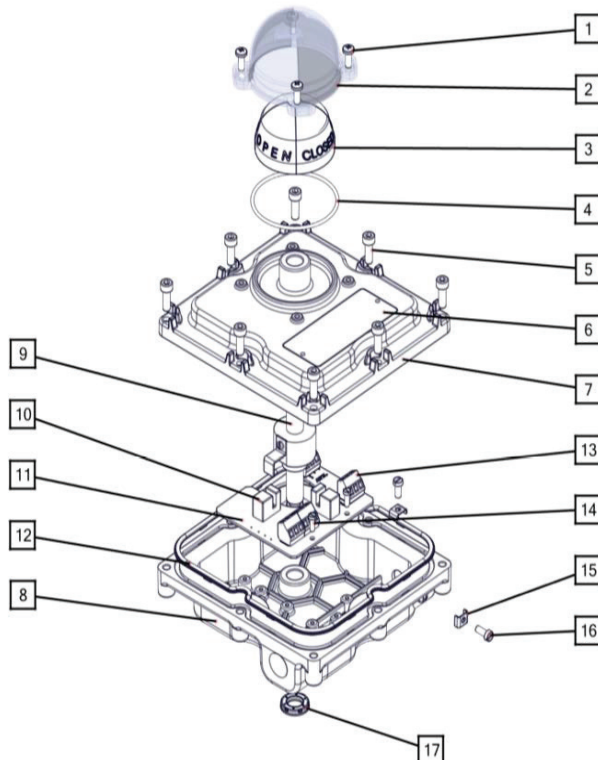
Exploded view diagram of the KC2A1 device. The diagram shows the assembly of various components, including a top cover with a 'CLOSED OPEN' indicator, a main housing, and internal components like a shaft assembly and proximity sensors. Numbered callouts 1 through 19 point to specific parts.

KC2A1		
SR NO.	DESCRIPTION	QTY.
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	4
6	Name plate	1
7	Cover	1
8	Shaft assembly	1
9	Slot head screw	4
10	Proximity sensor	2
11	Proximity sensor bracket	1
12	Gasket	1
13	Bush	1
14	Three-way terminal block	2
15	Earthing screw	1
16	Earthing plate	1
17	PCB	1
18	Housing	1
19	Wiper Seal	1

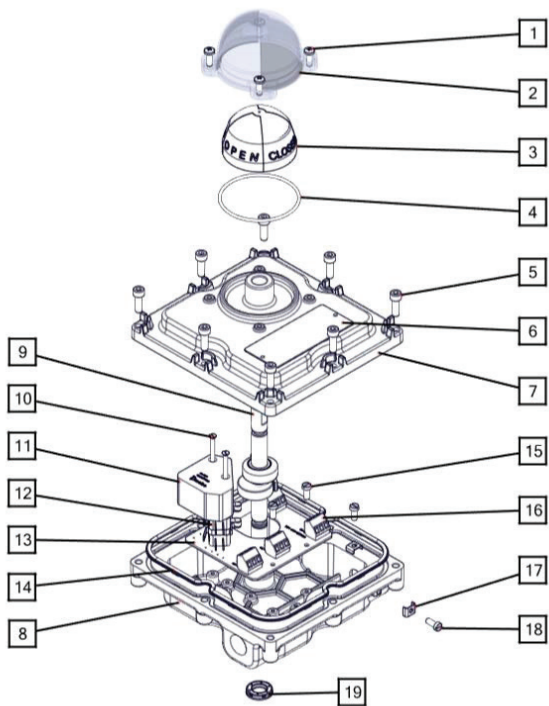




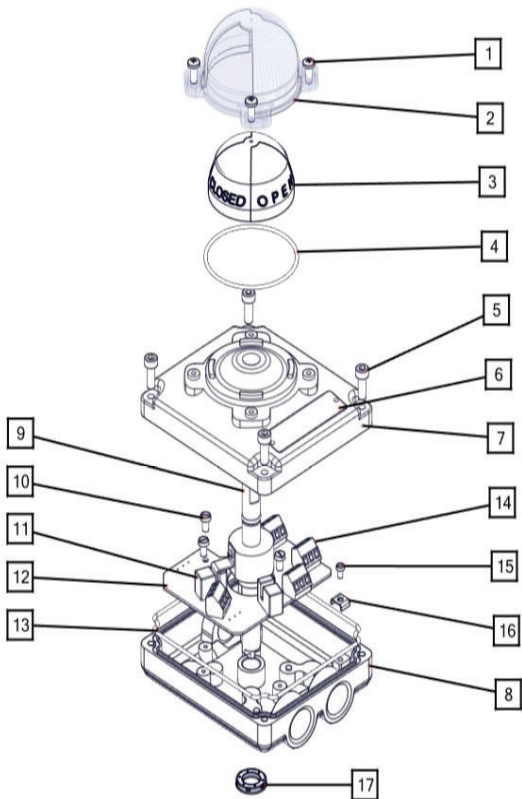
KS2F1		
SR.NO	DESCRIPTION	QTY
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	8
6	Name plate	1
7	Cover	1
8	Housing	1
9	Shaft assembly	1
10	Proximity sensor	2
11	PCB	1
12	Gasket	1
13	Three-way terminal block	4
14	Slot head screw	2
15	Earthing plate	2
16	Earthing screw	2
17	Wiper seal	1



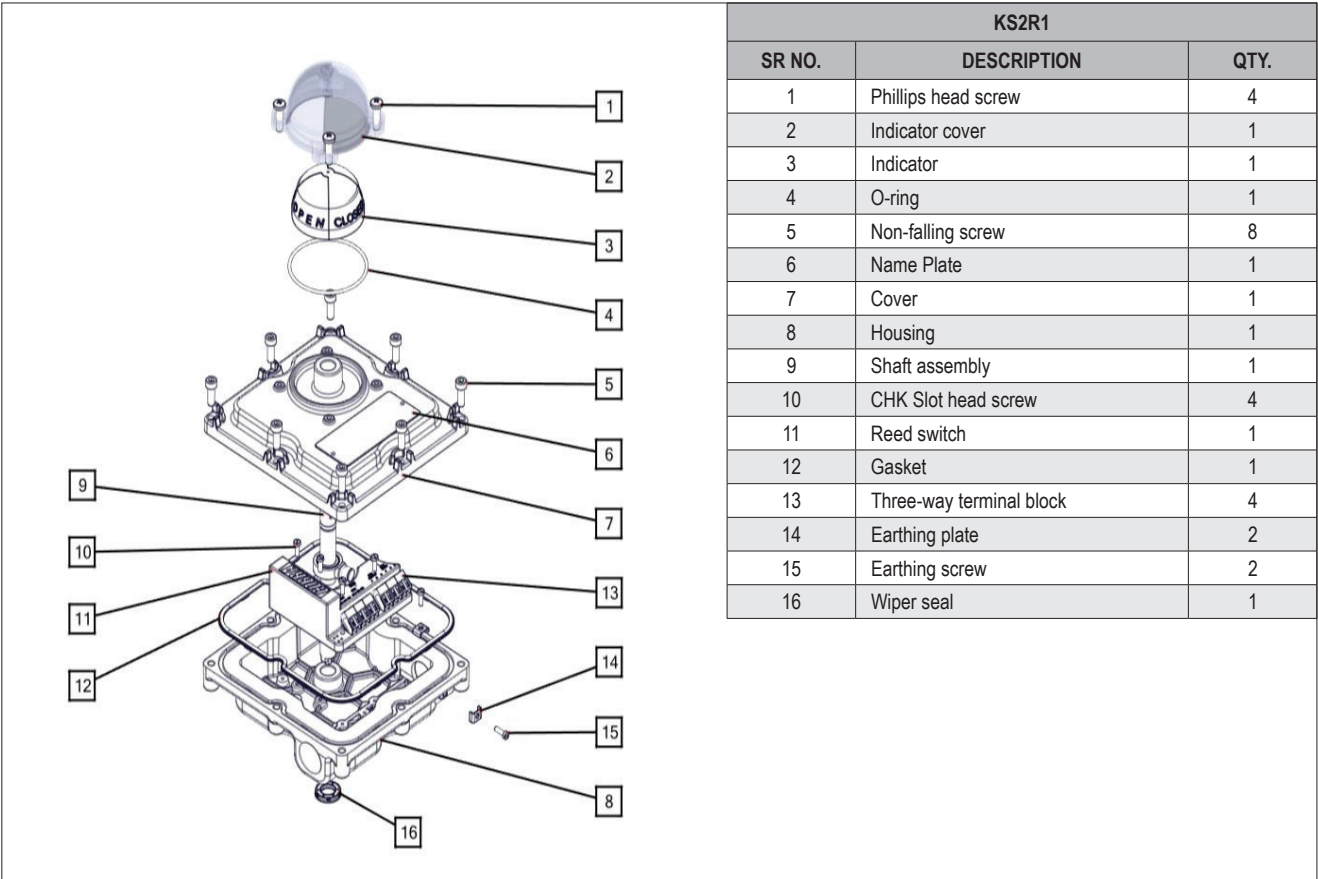
KC2F1		
SR.NO	DESCRIPTION	QTY
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	4
6	Name plate	1
7	Cover	1
8	Housing	1
9	Shaft assembly	1
10	Slot head screw	3
11	Proximity sensor slot type	2
12	PCB	1
13	Gasket	1
14	Three-way terminal block	4
15	Earthing screw	1
16	Earthing plate	1
17	Wiper seal	1



KS2V1		
SR NO.	DESCRIPTION	QTY.
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	8
6	Name Plate	1
7	Cover	1
8	Housing	1
9	Shaft assembly	1
10	CHK Slot head screw	2
11	Microswitch cover	1
12	Microswitch	2
13	PCB	1
14	Gasket	1
15	Slot head screw	2
16	Three-way terminal block	4
17	Earthing plate	2
18	Earthing screw	2
19	Wiper seal	1



KC2F1		
SR.NO	DESCRIPTION	QTY
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	4
6	Name plate	1
7	Cover	1
8	Housing	1
9	Shaft assembly	1
10	Slot head screw	3
11	Proximity sensor slot type	2
12	PCB	1
13	Gasket	1
14	Three-way terminal block	4
15	Earthing screw	1
16	Earthing plate	1
17	Wiper seal	1



KS2R1		
SR NO.	DESCRIPTION	QTY.
1	Phillips head screw	4
2	Indicator cover	1
3	Indicator	1
4	O-ring	1
5	Non-falling screw	8
6	Name Plate	1
7	Cover	1
8	Housing	1
9	Shaft assembly	1
10	CHK Slot head screw	4
11	Reed switch	1
12	Gasket	1
13	Three-way terminal block	4
14	Earthing plate	2
15	Earthing screw	2
16	Wiper seal	1

15. LIMIT SWITCH KS & KC SERIES- EXIA TYPECODE

Neles EasyFlow - K-series Exia limit switches type code													
1. sign	PRODUCT GROUP								Note				
KC	Compact enclosure, wheatherproof								Compact enclosure, wheatherproof				
KS	Standard enclosure, Ex d capable								Stcndard enclosure, Ex d capable				
	2. sign	QUANTITY OF SWITCHES							Note				
	2	2 Switches							2 Switches				
	3	3 Switches							Not applicable with 1.sign KC				
	4	4 Switches							Not applicable with 1.sign KC				
	3. sign	SWITCHTYPE							Note				
	INDCUTIVE PROXIMITY SWITCHES												
		Manufacturer	Model			Electrical values		Note					
	A1	P&F	NJ2-12GM-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A6	P&F	NJ5-18GM-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A8	P&F	NJ4-12GK-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A10	P&F	NJ5-18GK-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A11	P&F	NJ3-18GK-S1N			8 VDC, ≤1 mA; ≥3 mA (NO)		Cylindrical					
	A12	P&F	NJ5-18GK-SN			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A13	P&F	NJ8-18GM-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A14	P&F	NJ2-12GK-SN			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A15	P&F	NJ2-12GK-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A16	P&F	NJ1,5-8GM-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A17	P&F	NJ4-12GK-SN			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A18	P&F	NJ4-12GM-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	A19	P&F	NJ8-18GK-N			8 VDC, ≥3 mA ; ≤1 mA (NC)		Cylindrical					
	D1	P&F	NJ2-V3-N			8 VDC, >3 mA ; <1 mA (NC)		Flat					
	F1	P&F	SJ3,5-N			8 VDC, 0,2..1mA ; >3 mA (NO)		Slot					
	F2	P&F	SJ3,5-SN			8 VDC, >3 mA, 0,2..1mA (NC)		Slot					
	F3	P&F	SJ-3.5-SIN			8 VDC, 0,2..1mA ; >3 mA (NO)		Slot					
	REED TYPE PROXIMITY SWITHCES												
	R1	VALMET	R1			Ui = 25.2 V, li = 155 mA, Pi = 0.97 W, Lo = 1mH, Co= 0.1 µF		“SPDT, Not applicable with 1. sign KC Only applicabte with 7. sign G and C”					
	MECHANICAL MICROSWITHCES												
	V1/W1	Honeywell	V15S05-CZ100A05-01			Ui = 25.2 V, li = 155 mA, Pi = 0.97 W, Lo = 1mH, Co= 0.1 µF		SPDT/DPDT					
	V2/W2	Honeywell	V7-1C17E9-201			Ui = 25.2 V, li = 155 mA, Pi = 0.97 W, Lo = 1mH, Co= 0.1 µF		SPDT/DPDT					
		4.sign	ENCLOSURE MATERIAL							Note			
		A	Diecast aluminum										
		S	Stainless steel CF8M (316)										
			5.sign	QUANTITY OF CONDUIT ENTRIES							Note		
			2	2 entries							Only with 1. sign KS		
			3	3 entries							Only with 1. sign KC		
			4	4 eitries							Only with 1. sign KS		
			6. sign	CABLE ENTRY							Note		
				M	M20 X 1.5								
				N	1/2 NPT								
				L	3/4 NPT							Only with 1. sign KS	
				7. sign	TEMPERATURE RANGE							Note	
					G	General (-20 - +80 °C)							
					S	(-20 - +XX °C) Exia IIIB (DUST)							
			T		(-20 - +XX °C) Exia IIIC (DUST)							Only with fluorosilicon seats	
				8. sign	VISUAL INDICATOR							Note	
					R	Red and yellow							
					G	Red and green							
				9. sign	APPROVALS							Note	
			AN	ATEX / IECEx Exia Exib									
Typecode Sample													
KS	2	A1	A	2	M	T	R	AN	KS2A1A2MTRAN				

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