

# SWITCHES & SENSORS FOR VALVES & ACTUATORS



- › Microswitches for Industrial applications
- › Limit switches for Explosive atmospheres
- › Limit switches for Nuclear environments



# ABOUT CROUZET SWITCHES

With over 60 years involvement in highly demanding markets where security and reliability are requested, Crouzet Switches, specialist in snap-action electrical switching brings peace of mind to design engineers through expert product support, in-depth knowledge of application design constraints and related standards and approvals issues.

Crouzet Switches is a brand of InnoVista Sensors™.

## MARKETS

Crouzet Switches has worked for decades with customers who design products for highly technical applications that demand superior quality, reliability and meet national and international regulatory standards. Crouzet's switches and sensors are utilized in a wide spectrum of applications in the following markets:

- › Industrial Valve & Pumps
- › Nuclear Industry
- › Energy Distribution
- › Trains
- › Specialty vehicles



InnoVista Sensors™: your trusted partner of choice to face industrial challenges of today and tomorrow.

InnoVista Sensors™ is a worldwide industrial specialist of sensors, controllers and actuators for automated systems.

Through its brands, Crouzet Aerospace, Crouzet Automation, Crouzet Control, Crouzet Motors, Crouzet Switches and Systron Donner Inertial, InnoVista Sensors™ offers a wide range of reliable, efficient and customizable components dedicated to the Aerospace & Defence, Transportation and Industrial market and segments.

Thanks to the recognized expertise of its teams and a strong innovation policy, InnoVista Sensors™ brings performance enhancing solutions to its customers worldwide.

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## Designs & Manufactures



Sensors



Controls



Actuators

## For



Aerospace & Defense



Transportation



Industry

## With commercial brands



# WHO ARE WE?

Crouzet Switches is a specialist in snap-action technology with its detection solutions, and offers ranges of microswitches, limit switches, manually operated switches and sensors.

Crouzet Switches contact elements are intended for machine manufacturers, parts manufacturers, OEM distributors and integrators.

Designed for the most severe environments they are used in domestic, industrial, explosive atmospheres and in nuclear valves & actuators.

Crouzet Switches works closely with its customers to design its products to meet their specific requirements, while complying with the most rigorous quality requirements, thus providing the best solution in terms of both technical features and cost.

For explosive atmospheres, nuclear environments, and harsh environments, Crouzet Switches offers 2 valve and actuator product ranges:

- › Snap-action microswitches
- › Limit switches

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# QUALITY

To support this demanding market, Crouzet Switches put in place and maintains the highest level of quality approval:

- › ISO 9001, ISO 14001
- › EDF certified
- › ATEX, IECEx
- › OHSAS 18001

Industry	ISO 9001, ISO 14001 / OHSAS 18001
Transportation	ISO / TS 16949
Aerospace	EN 9100, AS 9100, JIS Q 9100, Part 21G, Part 145, Nadcap (Welding)
Nuclear	EDF
Explosive atmosphere	ATEX, IECEx, EN/ISO/IEC 80079-34

# THE CROUZET SWITCHES OFFER FOR VALVES & ACTUATORS

Crouzet Switches has worked closely with its customers for many years in the design and production of switching and detection components.

With a presence in the valves field, Crouzet Switches makes its technical and industrial expertise available to its customers, that is based on a wide range of microswitches and limit switches. These are for use in the most demanding systems, in explosive atmospheres (ATEX/IECEX) and in nuclear environments (K1/K2/K3) complying with RCCE regulations.

From adapted components to specific products, Crouzet Switches has just the solution for the technical and economic requirements of applications ranging from switching high currents to integration into the latest generation mechatronic modules to the development of robust products for severe environments.

Throughout the lifetime of the application, Crouzet Switches conducts qualification/approval tests and monitors the characteristics of its products.

The Crouzet Switches laboratory is compliant with NF EN ISO 17025.

It is certified:

- › CTD (Client Test Data Program) by Underwriters Laboratory (UL) for electrical tests in accordance with UL1054 standard and CSA C22.2N°55.
- › SMT (Supervised Manufacturer's Testing) by Laboratoire Central des Industries Electriques (LCIE) for electrical tests in accordance with EN 61058-1 and IEC 61058-1.

Crouzet Switches currently supplies electromechanical components to more than 60 valve and actuator manufacturers worldwide, including the market leaders.



## MICROSWITCHES FOR INDUSTRIAL APPLICATIONS

83106	Double break bi-stable microswitch	UL, CCC
83133	Double break bi-stable microswitch	UL, CCC
83161	V3 standard miniature microswitch	UL, CCC
831607	V3 miniature microswitch with positive opening action	UL, CCC
83170	V4 standard subminiature microswitch	UL, CCC
83181	V4 sealed subminiature microswitch	UL, CCC
83200	V5 sealed sub-subminiature microswitch	UL, CCC
831395	Low temperature sealed double break microswitch	UL, CCC
831392	Double insulated sealed double break microswitch	UL, CCC
831398	2-pole synchronised switching microswitch	-

\* Approval pending

The application areas (industrial, explosive atmospheres, nuclear, etc.) require very high quality levels. Crouzet Switches products comply with the standards and certifications established by national and international bodies.



## LIMIT SWITCHES FOR EXPLOSIVE ATMOSPHERES

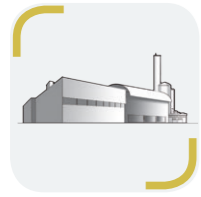
831391	Sealed double break microswitch	Ex, IECEx
8399 Ex	Family	Ex, IECEx
SP3941	Aluminium & bronze limit switches	Ex, IECEx
SP3969	Aluminium & bronze limit switches	Ex, IECEx
SP3990	Stainless steel limit switch	Ex, IECEx



## LIMIT SWITCHES FOR NUCLEAR ENVIRONMENTS

83151	Hermetically sealed cell	CCC*
8399 Nuc	Nuclear family	CCC*
SP4522	Nuclear limit switch, aluminium or bronze	CCC*
SP4813	Nuclear limit switch, cylindrical with cable output	CCC*
SP4863	Nuclear limit switch	CCC*

\* Approval pending



# DETECTION FOR INDUSTRIAL VALVES & ACTUATORS

There are several types of industrial valves:

- › Pneumatic
- › Electric
- › Hydraulic
- › Manual valves

For electrical operation totally integrated in the valve body, the position of the motorized device is detected mechanically by microswitches and their function is to directly cut the phases of the motor (for example, an asynchronous motor).

Regardless of the type of operation used, some valves are equipped with a positioning unit that is used to display the open/closed state of the valve and send this information electrically to its actuator control, and also to perform supervisory functions.

It is therefore necessary to have very precise detection. The switching directly effects the kinematics of the valve, and thus the flow of the fluid.

Crouzet Switches microswitches are designed to perform snap-action switching.

The switching from one state to another takes place in a few milliseconds, over several million cycles with excellent repeatability.



## DETECTION/SWITCHING FOR ELECTRIC VALVE ACTUATORS

For electric geared motors, Crouzet Switches offers mainly the 83139 microswitch and its variants.

With its special format and variety of fixings, it is easy to integrate in a mechanism that may require maintenance.

This microswitch can switch high currents (6 A max.), and has a dust and liquid proof casing.

- › IP 67
- › Double break switching
- › Low temperature version (-40 °C)
- › Double insulated version
- › 2-pole version with synchronized switching



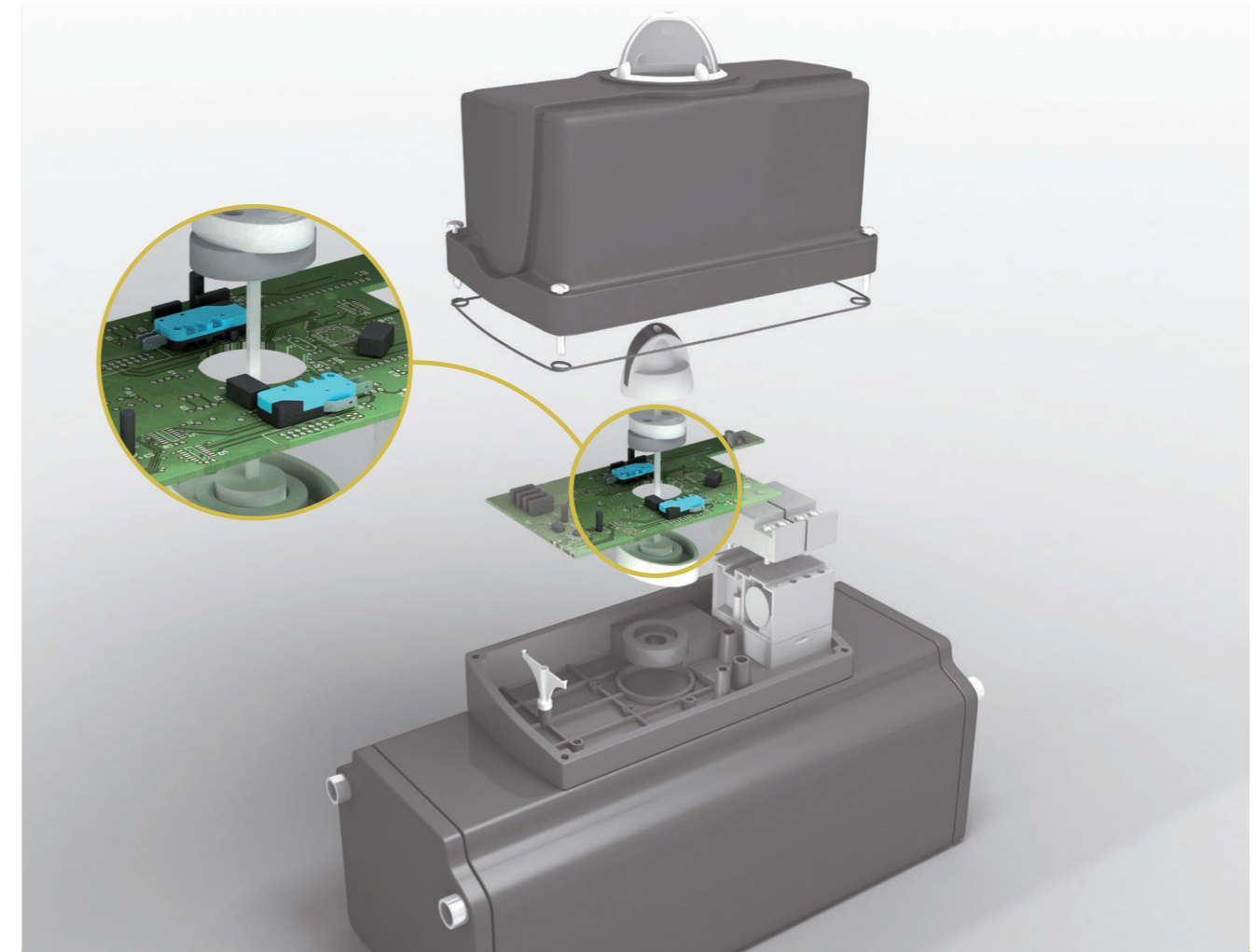
831395 low temperature



831392 double insulated



831398 2-pole with synchronized switching



Example of a positioning unit, with printed control circuit equipped with 83161 V3 miniature microswitches

## DETECTION/SWITCHING UNITS FOR POSITIONING

For positioning units, Crouzet Switches offers a range of compact microswitches and several connection configurations specially designed for electronic boards and wave soldering.

Crouzet Switches products have been qualified over millions of cycles to ensure their switching reliability even after many years of operation.

- › Compact size
- › Special connections for printed circuits
- › Wide range of levers
- › IP 67 sealed versions
- › UL approved, EN 60947-5-1 compliant

### › Microswitches



83106

83133

V3 83161



83181

83170

83200

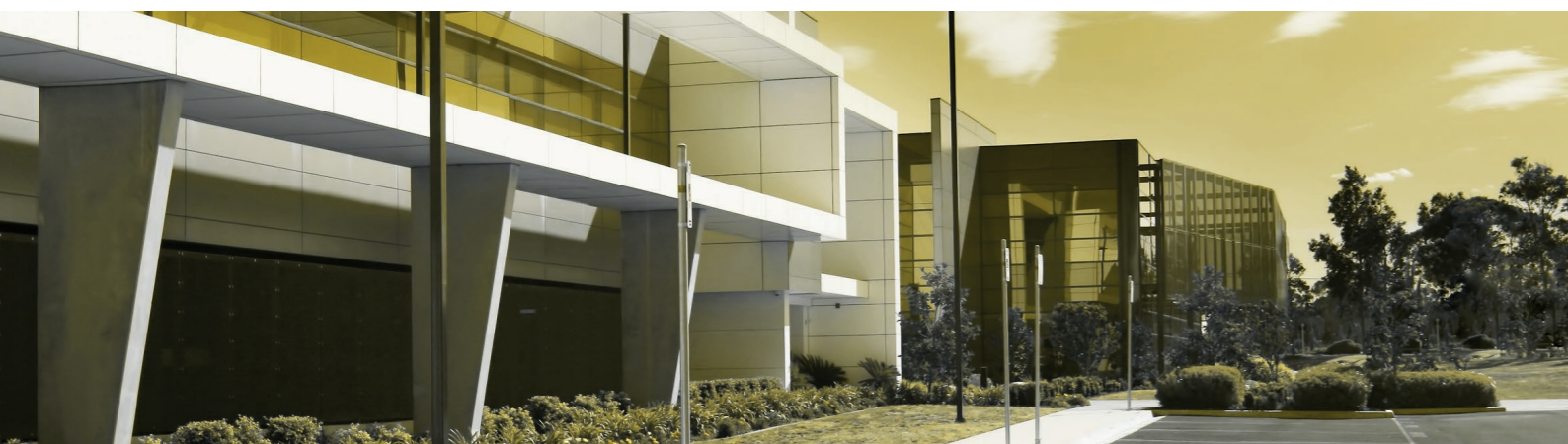
### › Sensors

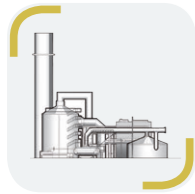
## NON-CONTACT DETECTION TECHNOLOGY

Crouzet Switches also offers detection components with non-contact action for even longer service lives.



Inductive proximity sensors





# DETECTION FOR EXPLOSIVE ATMOSPHERES VALVES & ACTUATORS

The family of 8399 Ex limit switches have been developed and certified for use in potentially explosive atmospheres, taking into account the standards:

- › EN60079-0 - EN60079-1 for the European zone (ATEX)
- › IEC 60079-0 and IEC 60079-1 for international area (IECEX).

It comes in three different types: SP3941, SP3969 and SP3990.

All types are built with the same hermetically sealed microswitch encapsulated in a sealed box and called a «hermetic cell».

All products have the same electrical characteristics. The mechanical properties vary depending on the type of SP.

Variations between each type of SP include:

- › Material: Stainless steel, aluminium and bronze
- › Typical operating style: linear or rotary
- › Typical output: wires or cable
- › The temperature ranges: different for ATEX and IECEX see tables on the right.

All materials can be combined with all models of operating and output connections. In these combinations, you can add different wires and cables that can be installed on the products.



## 8399 Ex LIMIT SWITCHES FOR EXPLOSIVE ATMOSPHERES

› **Electrical characteristics**  
Rating: 30VDC – 3A, 140VDC – 4mA, 250VAC – 1A

› **Certification**  
The 8399 Ex family is:  
ATEX certified by: LCIE 02 ATEX 6159X and marked: **CE 0081 II 2 G Ex d IIC T(\*) Gb**

IECEX certified by: IECEX LCIE 14.0032X and marked: **Ex d IIC T(\*) Gb**

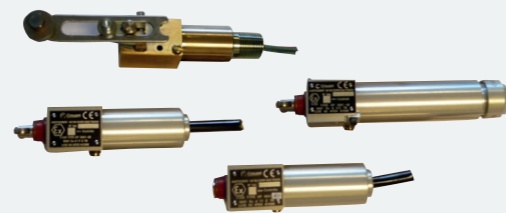
(\*) Temperature value by product, see appropriate ambient temperature table below.

### › Table for ATEX certification:

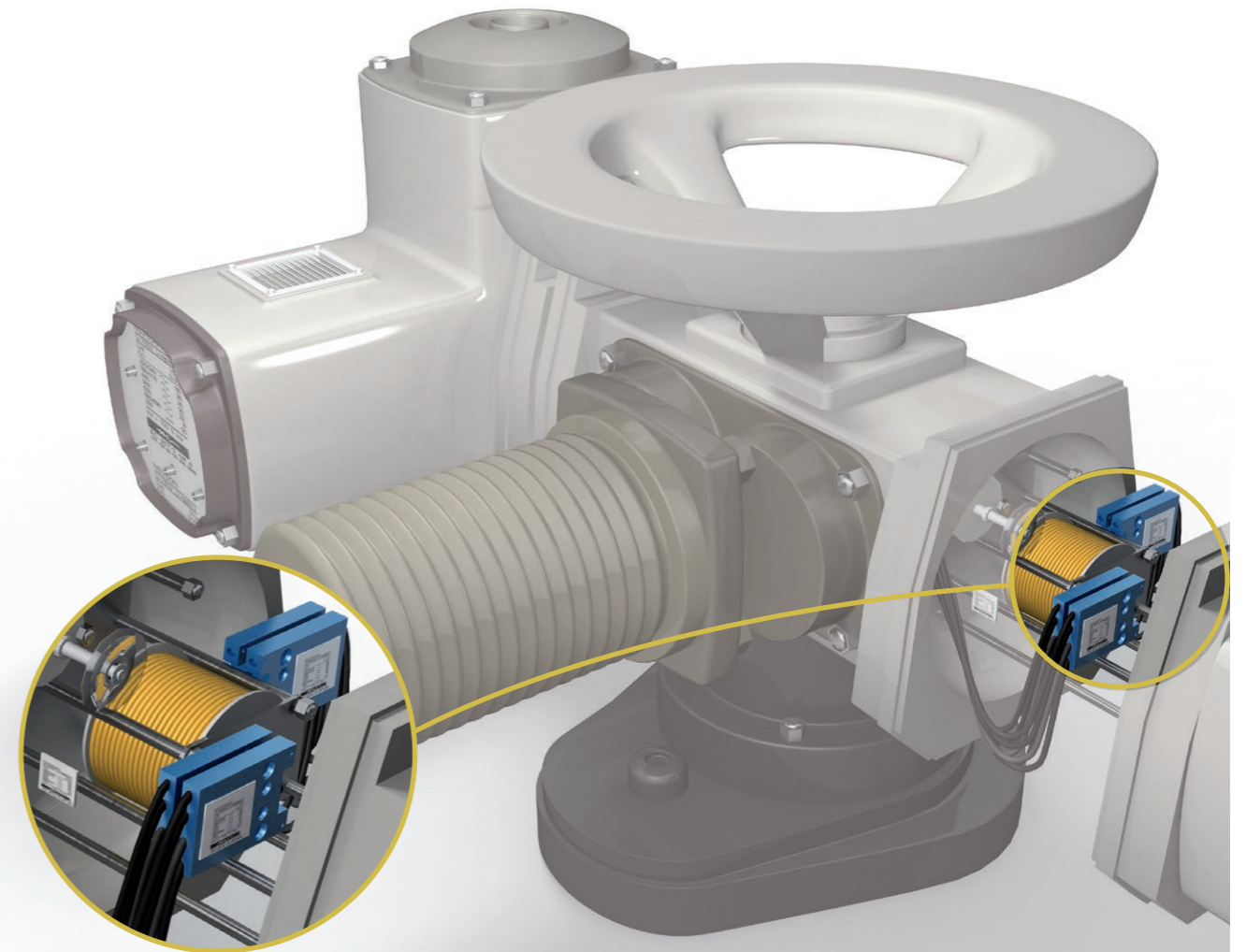
Ambient Temperature	Temperature Class
-40 °C to +60 °C	T6
-40 °C to +75 °C	T6
-40 °C to +90 °C	T5
-40 °C to +125 °C	T4
-40 °C to +190 °C	T3
-40 °C to +200 °C	T 210 °C

### › Table for IECEX certification:

Ambient Temperature	Temperature Class
-40 °C to +60 °C	T6
-40 °C to +75 °C	T6
-40 °C to +90 °C	T5
-40 °C to +125 °C	T4



8399 Ex limit switches ATEX family  
CE test certificate LCIE 02 ATEX 6159X



Example of 1/4 turn ATEX valve, equipped with 831391 ATEX microswitches on the electric geared motor to detect intermediate positions.

## DETECTION/SWITCHING FOR ATEX ELECTRIC VALVE ACTUATORS

For valves equipped with an electric geared motor subject to ATEX regulations, Crouzet Switches offers the 831391 ATEX microswitch and its variants.

› IP 67

**Ex II 2 G Ex d IIC Gb**

- › ATEX certificate N°: LCIE 02 ATEX 0034 U
- › IECEX certificate N°: IECEX LCIE 13.0035 U
- › Ambient temperature: -40 °C up to 70 °C
- › CCC certificate: 2011010304487383
- › Version cURus approved available
- › ROHS compliant



831391 with flat lever



831391 with threaded barrel and metal roller





# DETECTION FOR NUCLEAR ENVIRONMENTS VALVES & ACTUATORS

Crouzet Switches has been involved in the nuclear industry for 35 years, and offers a range of special limit switches. Classified as Electrical Safety Systems, these products are certified in accordance with the RCCE regulations (rules regarding the design and construction of electrical equipment for nuclear islands).



The limit switches comprise a hermetically sealed microswitch (83151) which combines a snap-action switching system, and a high degree of resistance to shocks and vibration. The hermetically sealed microswitch filled with an inert gas (hydrogenated nitrogen) protects the contacts and allows the limit switches to be used in low level circuits and also at higher currents.

This technology enables Crouzet Switches limit switches to be approved for severe environments inside and outside the reactor containment and to meet the requirements of the associated specific tests: Thermal ageing, relative humidity, seismic tests, irradiation ageing tests (K2), irradiation accident tests (K1), resistance tests to thermodynamic and chemical accident conditions (K1).

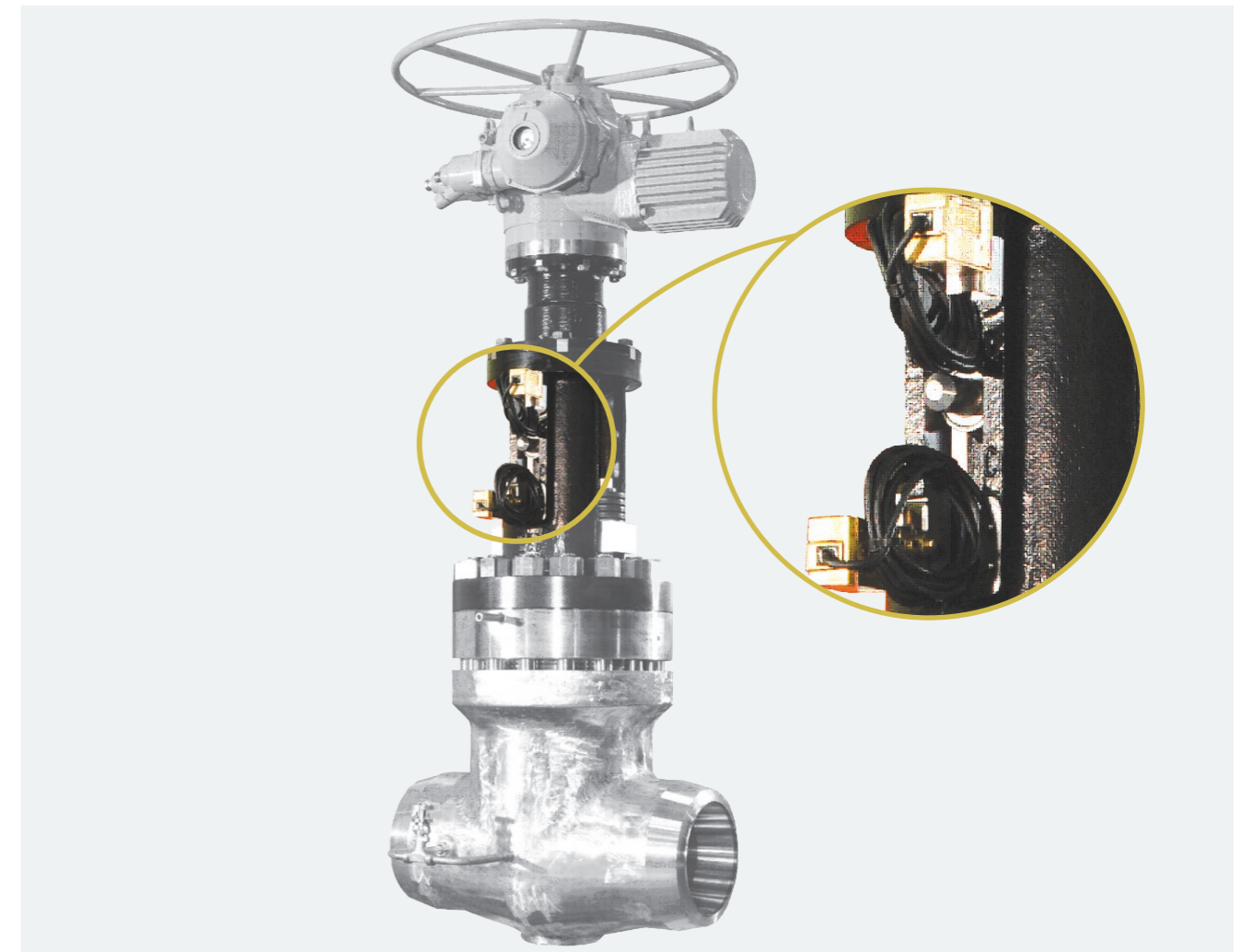
**LIMIT SWITCHES FOR VALVE MOTORIZATION IN K3 ENVIRONMENTS**

*SP 4863 limit switch*

- › Operates up to a pressure of 1 bar
- › Mechanically very robust
- › Flexible roller lever fixed to the body
- › High seismic resistance
- › Operating temperature -55 °C to +105 °C

**CLASSIFICATION SUMMARY**

8399 Nuc	K1-K2	K3	KBE-EP-154
SP4522	● Bronze	● Aluminium	
SP4813		●	
SP4863		●	
SP4816	●		
83999033			●



Example of a valve located close to a nuclear reactor, equipped with K1 SP4522 certified limit switches

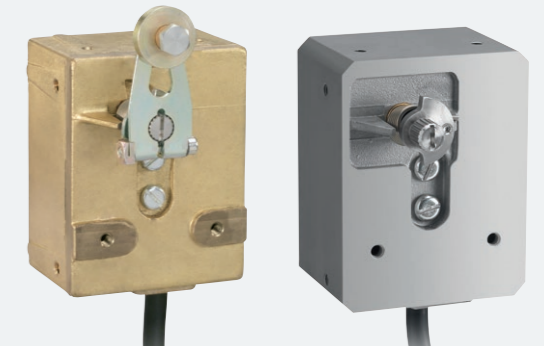
**POSITION DETECTION ON THE MAIN VALVE SHAFT IN K1/K2/K3 ENVIRONMENTS**

8399 Nuc (nuclear family) limit switches are mounted on the valve frame to detect the positions of the main shaft.

That includes 3 valve positions (open, closed, intermediate) which will provide a very high level of reliability.



*SP4816 and SP4813 limit switches*



*SP4522 limit switches*

- › Operates up to a pressure of 6 bar
- › Mechanically very robust with stainless steel body
- › Plunger or roller lever that is spring returned to rest position, providing excellent resistance to vibration
- › Single-pole or 2-pole circuit
- › Lever adjustable over 360°
- › Special cables
- › Operates within pressures of between 1 and 6 bar
- › CW / CCW actuation



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