



## RFID Safety switch with solenoid NG series

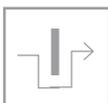


# NG series safety switches with solenoid and RFID technology

## Description



These switches are used on machines where the hazardous conditions remain for a while, even after the machines have been switched off, for example because of mechanical inertia of pulleys, saw disks, parts under pressure or with high temperatures. They can also be used when it is necessary to control machine guards allowing the opening of protections only under specific conditions.



The mode 1 (active safety outputs with closed and locked guard) versions are considered interlocks with locking in accordance with EN ISO 14119, and the product is marked on the side with the symbol shown.

## Maximum safety with a single device

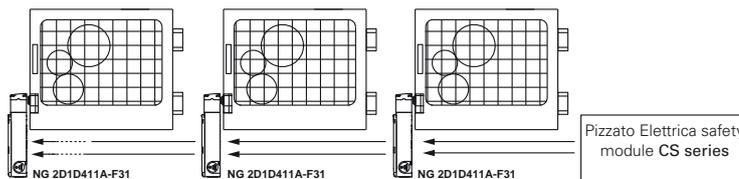
**PL e + SIL 3** Constructed with redundant electronic technology, the NG series switches make it possible to create circuits having maximum PL e and SIL 3 safety levels by installing just one device on the protection. This avoids expensive wiring on the field and allows quicker installation. Inside the panel, the two electronic safety outputs must be connected to a safety module with OSSD inputs or to a safety PLC.

## Connection of several switches in series

**PL e + SIL 3** One of the most relevant features of the NG line is the optional connection in series of several switches, up to a maximum number of 32 devices, while maintaining the maximum PL e safety level prescribed by the EN 13849-1 standard and the SIL 3 safety level according to the EN 62061 standard.

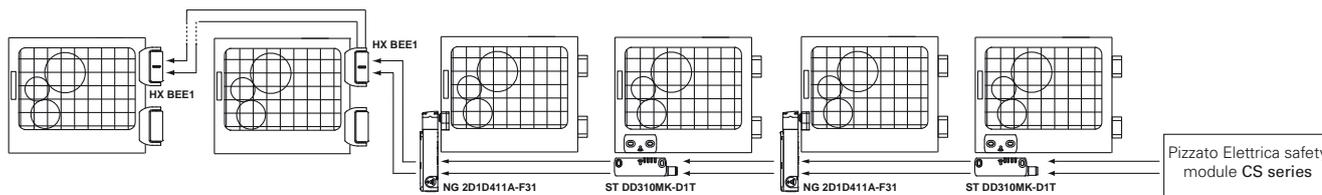
This connection method is permitted in safety systems which, at the end of the chain, feature a safety module evaluating the outputs of last NG switch.

The fact that the PL e safety level can be maintained even with 32 switches connected in series indicates the presence of an extremely safe structure inside each individual device.



## Series connection with other devices

**PL e + SIL 3** The NG series features two safe inputs and two safe outputs, which can be connected in series with other Pizzato Elettrica safety devices. This option allows the creation of safety chains containing various devices, for example the creation of circuits with connections in series, including stainless steel safety hinges (HX BEE1 series), transponder sensors (ST series) and door lock sensors (NG series), while maintaining maximum PL e and SIL 3 safety levels.



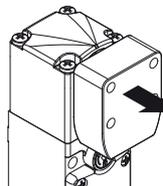
## RFID actuators with high coding level



The NG series features an electronic system based on RFID technology to detect the actuator. This system gives a different coding to each actuator and makes it impossible to tamper with a device by using another actuator belonging to the same series. The actuators may have millions of different coding combinations, and are therefore classified as actuators with a high coding level, according to EN ISO 14119.

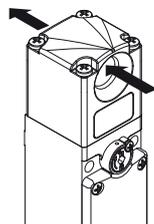
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## Holding force of the locked actuator



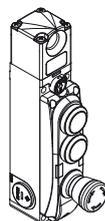
**9750 N** The sturdy interlocking system guarantees the actuator a maximum holding force  $F_{1max}$  of 9750 N. This is one of the highest values available on the market today, making this device suitable for severe heavy-duty applications.

## Dustproof



The switch is provided with a through hole for inserting the actuator and, thanks to this peculiarity, any dust which may go inside the actuator hole can always come out of the opposite side instead of being left there. Moreover, the lock pin is provided with an external diaphragm gasket which makes it suitable for any environment where dust is present.

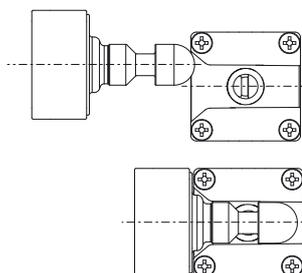
## Built-in control devices



The switch is also available with a raised cover, which make it possible to install control devices and the related contact blocks on it, such as buttons, emergency buttons, signalling lights and selectors.

The result is a compact switch, whose control devices do not need any additional installation on a panel or on dedicated boxes. The devices can be illuminated and are easy to wire, thanks to the terminal blocks with PUSH-IN spring connection.

## Centering



The switch is provided with a wide centering inlet for the actuator pin. Such solution makes it easier to align the actuator with the hole found in the head during the fitting stage. Moreover, this solution drastically reduces any probable collisions between the actuator and the switch, also allowing it to be fitted on inaccurate doors.

## Push-in spring connections



The switch is provided with a PUSH-IN type spring connection system on the inside. This technology allows a very handy quick wiring procedure, since the wire just needs to be inserted into the appropriate hole in order to be secured and to establish the electrical connection. The said operation can be carried out without the help of any tool, but simply using rigid or flexible wires with wire-end sleeves. Release is obtained by pressing the appropriate wire-releasing button.

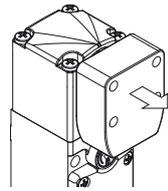


### Six LEDs for immediate diagnosis



As the LEDs have been designed for quick immediate diagnosis, the status of each input and output is highlighted by one specific LED. This makes it possible to quickly identify the interruption points in the safe chain, which device is released, which door is opened and any errors inside the device. All that in a straightforward way without needing to decode complex blinking sequences.

### Holding force of the unlocked actuator



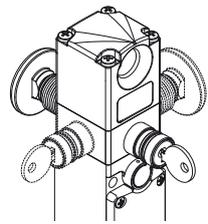
The inside of each switch features a device which holds the actuator in its closed position. Ideal for all those applications where several doors are unlocked simultaneously, but only one is actually opened. The device keeps all the unlocked doors in their position with a retaining force of 30 N~, stopping any vibrations or gusts of wind from opening them.

### Laser engraving



All the NG series switches are indelibly marked with a dedicated laser system that allows the marking to be also suitable for extreme environments. This system that does not use labels, prevents the loss of plate data and the marking is more resistant over time.

### Key release device and emergency release button



The auxiliary lock release device is used to permit unlocking of the actuator only by personnel in possession of the key. It also works with no power supply and once actuated, prevents the guard from locking. The emergency release button allows actuator release and immediate opening of the door. Generally used in machines

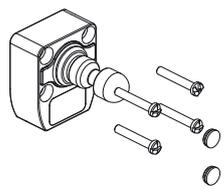
within which an operator could inadvertently become trapped, it faces towards the machine interior, to allow the operator to exit even in the event of a black out. Equipped with bistable function, it can be freely extended with suitable extensions (see accessories). Both these devices can be positioned on the four switch sides, thus allowing its installation both to the interior and to the exterior of the machine.

### Two safety output actuation modes

**CLOSED  
OR  
CLOSED & LOCK**

The switch can be selected from two different safety output activation modes: safety outputs active with protection closed and locked (mode 1) for machines with inertia or safety outputs active with protection closed (mode 2) for machines without inertia.

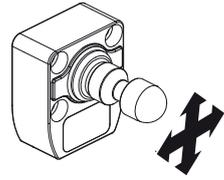
### Double anti-tampering safety



as they obstruct access to the tamper-proof screws.

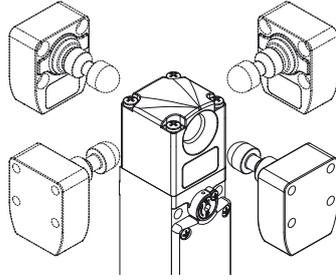
Each NG series actuator is supplied with four stainless steel tamper-proof screws, for it to be fitted on the protection. Four protection insert caps are also supplied together with the screws. Besides preventing any deposit from building up and making it easy to clean the actuator, these caps help to prevent any tampering

### Articulated joint for inaccurate doors



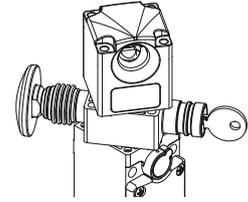
All the NG series actuators are jointed and allow the pin to match the centering hole of the switch. This way there is no need for precise actuator-switch aligning operations during the fitting stage. Moreover, thanks to its flexibility, this device can be used on doors with an activating range of 150 mm, without having to tilt the pin beforehand.

### Orientable heads and devices



The head can be quickly oriented in four different directions after unscrewing the 4 fixing screws. Also the key release device and the emergency release button can be positioned in 90° steps, thus obtaining as many as 16 different configurations with the same article.

### Not detachable head and devices



The head and the release device can be adjusted but cannot be detached from each other. This makes the switch more secure since the installer does not need to worry about how to assemble the various pieces, and the switch is less likely to become damaged (small parts being lost, dirt getting in etc.).

### High protection degree

**IP69K  
IP67**

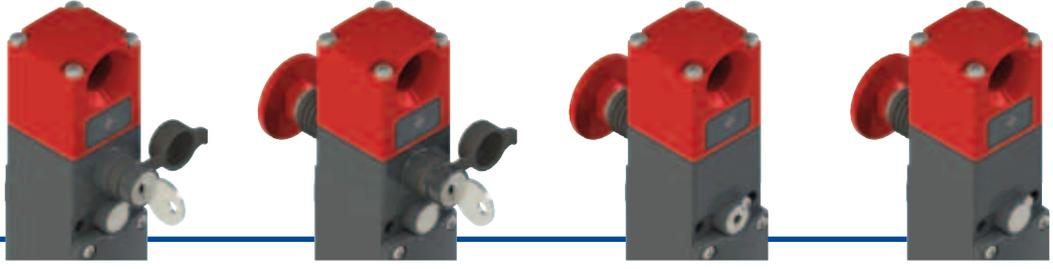
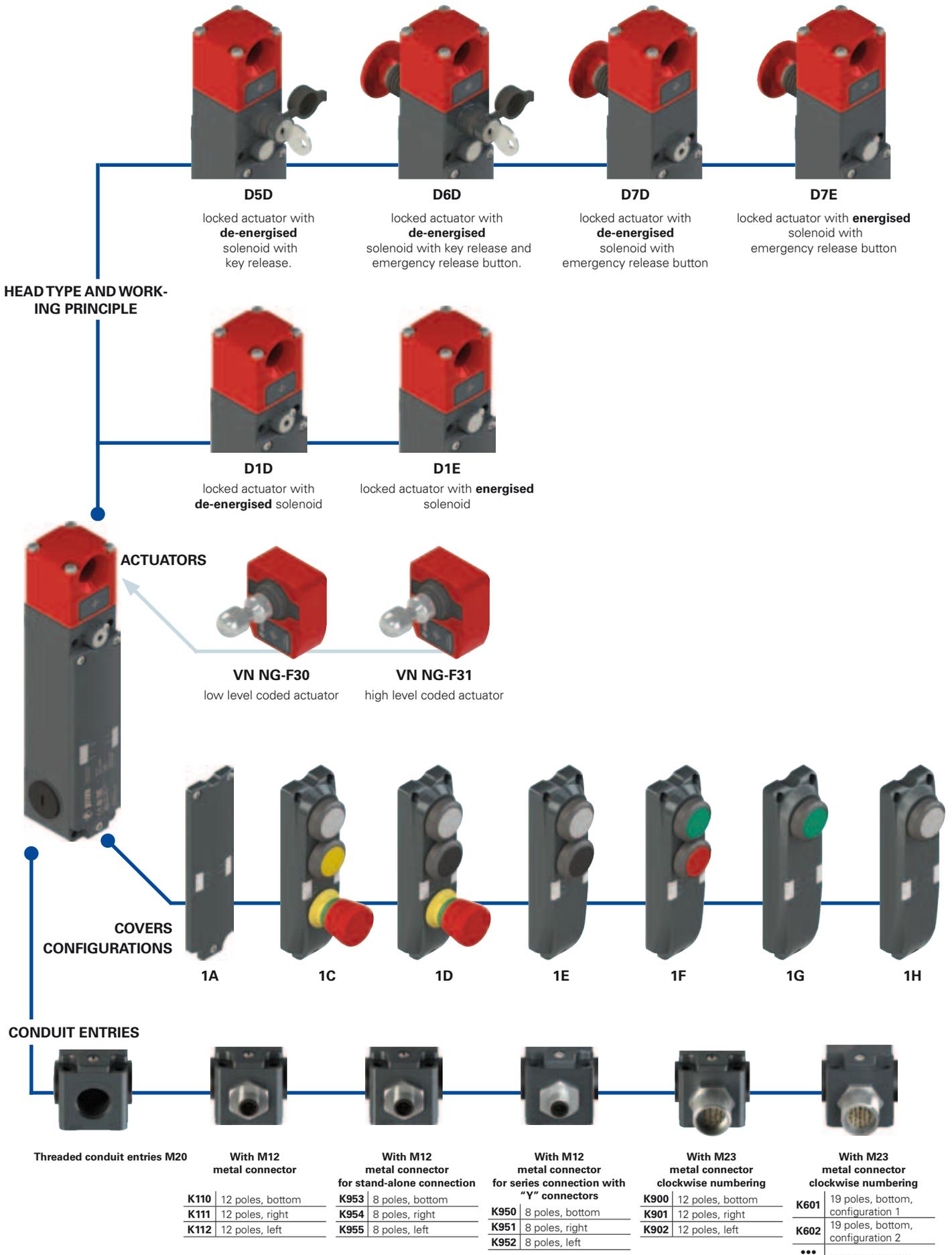
These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529. They can therefore be used in all environments where the maximum protection of the housing is required. Special measures also allow devices to be used even in machines which are subjected to washing with high pressure warm water jets. In fact these devices pass the IP69K test according to ISO 20653, using jets of water to 100 atmospheres at a temperature of 80°C.

### External device monitoring

**EDM**

On request we can supply the device with EDM (External Device Monitoring) function, so that the device itself can check the integrity of the relays connected to the safety outputs. These safety relays or safety contactors send a feedback signal to the EDM input, which verifies the consistency of the received signal with the safety outputs state.

## Selection diagram

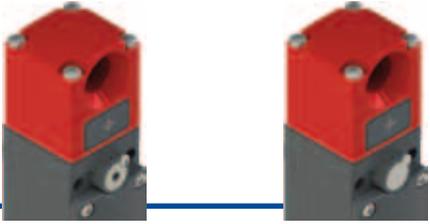


**D5D** locked actuator with **de-energised** solenoid with key release.

**D6D** locked actuator with **de-energised** solenoid with key release and emergency release button.

**D7D** locked actuator with **de-energised** solenoid with emergency release button

**D7E** locked actuator with **energised** solenoid with emergency release button



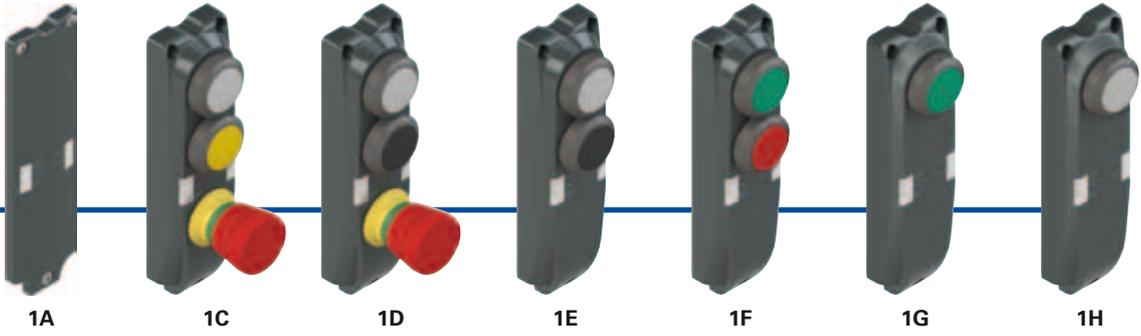
**D1D** locked actuator with **de-energised** solenoid

**D1E** locked actuator with **energised** solenoid



**VN NG-F30** low level coded actuator

**VN NG-F31** high level coded actuator



Threaded conduit entries M20		With M12 metal connector		With M12 metal connector for stand-alone connection		With M12 metal connector for series connection with "Y" connectors		With M23 metal connector clockwise numbering		With M23 metal connector clockwise numbering	
<b>K110</b>	12 poles, bottom	<b>K953</b>	8 poles, bottom	<b>K950</b>	8 poles, bottom	<b>K900</b>	12 poles, bottom	<b>K601</b>	19 poles, bottom, configuration 1	<b>K602</b>	19 poles, bottom, configuration 2
<b>K111</b>	12 poles, right	<b>K954</b>	8 poles, right	<b>K951</b>	8 poles, right	<b>K901</b>	12 poles, right	...	.....	.....	.....
<b>K112</b>	12 poles, left	<b>K955</b>	8 poles, left	<b>K952</b>	8 poles, left	<b>K902</b>	12 poles, left				



## Code structure

**Attention!** The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

article options  
**NG 2D1D411A-F31E34K900LP30**

Working principle	
<b>D1D</b>	locked actuator with de-energised solenoid
<b>D1E</b>	locked actuator with energised solenoid
<b>D5D</b>	locked actuator with de-energised solenoid. With key release
<b>D6D</b>	locked actuator with de-energised solenoid. With key release and emergency release button
<b>D7D</b>	locked actuator with de-energised solenoid. With emergency release button
<b>D7E</b>	locked actuator with energised solenoid. With emergency release button

Release button length	
	for wall thickness max. 15 mm (standard)
<b>LP30</b>	for wall thickness max. 30 mm
<b>LP40</b>	for wall thickness max. 40 mm
<b>LP50</b>	for wall thickness max. 50 mm
<b>LP60</b>	for wall thickness max. 60 mm
...	Other wall thicknesses on request

Inputs and outputs	
<b>3</b>	2 safety inputs IS1, IS2 2 safety outputs OS1, OS2 1 signalling output O3: closed protection 1 signalling output O4: locked protection 1 solenoid activation input I4 <i>The switch is only available with its actuator</i>
<b>4</b>	2 safety inputs IS1, IS2 2 safety outputs OS1, OS2 1 signalling output O3: closed protection 1 signalling output O4: locked protection 1 solenoid activation input I4 1 programming input I3
<b>5</b>	2 safety inputs IS1, IS2 2 safety outputs OS1, OS2 1 signalling output O3: closed protection 1 signalling output O4: locked protection 1 solenoid activation input I4 1 programming input I3 1 EDM input I5
<b>6</b>	2 safety inputs IS1, IS2 2 safety outputs OS1, OS2 1 signalling output O3: closed protection 1 signalling output FAULT O4 1 solenoid activation input I4 1 programming input I3

Activation of OS outputs	
<b>1</b>	mode 1: OS safety outputs active with locked protection
<b>2</b>	mode 2: OS safety outputs active with closed protection

Preinstalled connectors	
	without connector (standard)
<b>K110</b>	M12 metal connector, 12 poles, bottom
<b>K601</b>	M23 metal connector, 19 poles, bottom, configuration 1
<b>K900</b>	M23 metal connector, 12 poles, bottom
<b>K950</b>	M12 metal connector, 8 poles, bottom, for series connection
<b>K953</b>	M12 metal connector, 8 poles, bottom, for stand-alone connection
...	other connectors on request

Actuator extraction force	
	actuator extraction force 30 N (standard)
<b>E34</b>	actuator freely removable

Actuator	
<b>F30</b>	low level coded actuator VN NG-F30 the switch recognises any type F30 actuator
<b>F31</b>	high level coded actuator VN NG-F31 the switch recognises one single type F31 actuator

Covers configurations	
<b>1A</b>	standard cover
<b>1C</b>	cover with white button / yellow button / turn-to-release emergency button
<b>1D</b>	cover with white button / black button / turn-to-release emergency button
<b>1E</b>	cover with white button / black button
<b>1F</b>	cover with green button / red button
<b>1G</b>	cover with green button
<b>1H</b>	cover with white button

## Actuator code structure

**VN NG-F30**

Actuator	
<b>F30</b>	low level coded actuator the switch recognises any type F30 actuator
<b>F31</b>	high level coded actuator the switch recognises one single type F31 actuator



## Main features

- Actuation without contact, using RFID technology
- Digitally coded actuator
- Actuator holding force 9750 N
- SIL 3 and PL e with a single device
- Optional built-in control devices
- Metal housing, three conduit entries M20
- Protection degrees IP67 and IP69K
- Versions with key release and emergency release button
- PL e also in series of up to 32 devices
- Signaling LED

## Markings and quality marks:



UL approval: E131787  
 TÜV SÜD approval: Z10 15 01 75157 005  
 EAC approval: RU C-IT ДМ94.В.01024

## In conformity with standards:

EN ISO 14119, EN 60947-5-3, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 12100, IEC 60529, EN 60529, EN 61000-6-2, EN 61000-6-3, BG-GS-ET-19, IEC 61508-1, IEC 61508-2, IEC 61508-3, IEC 61508-4, SN 29500, EN ISO 13849-1, EN ISO 13849-2, EN 62061, EN 61326-1, EN 61326-3-1, EN 61326-3-2, ETSI 301 489-1, ETSI 301 489-3, ETSI 300 330-2, UL 508, CSA 22.2 No.14

## In conformity with the requirements of:

Machinery Directive 2006/42/EC  
 EMC Directive 2014/30/CE  
 Directive 2014/53/UE - RED  
 FCC Part 15

## Connection terminals

Connection system: PUSH-IN spring type  
 Cross-section of rigid wires and flexible wires with wire-end sleeve:  
 min. 1 x 0.34 mm<sup>2</sup> (1 x AWG 22)  
 max. 1 x 1.5 mm<sup>2</sup> (1 x AWG 16)  
 Wire cross-section with pre-insulated wire-end sleeve:  
 min. 1 x 0.34 mm<sup>2</sup> (1 x AWG 22)  
 max. 1 x 0.75 mm<sup>2</sup> (1 x AWG 18)  
 Cable stripping length (x):   
 min.: 8 mm  
 max.: 12 mm

## Technical data

### Housing

Metal head and housing, baked powder coating.  
 Three threaded conduit entries: M20x1.5  
 Protection degree: IP67 acc. to EN 60529  
 IP69K acc. to ISO 20653  
 IP65 acc. EN 60529  
 Degree of protection with control devices: with cable gland having equal or higher protection degree

### General data

SIL level (SIL CL): up to SIL 3 acc. to EN 62061  
 Performance Level (PL): up to PL e acc. to EN ISO 13849-1  
 Safety category: up to cat. 4 acc. to EN ISO 13849-1  
 Interlock with lock, no contact, coded: type 4 acc. to EN ISO 14119  
 Level of coding acc. to EN ISO 14119: Low with F30 actuator  
 High with F31 actuator

### Safety parameters:

MTTF<sub>d</sub>: 1883 years  
 PFH<sub>d</sub>: 8.07 E-10  
 DC: High  
 Mission time: 20 years  
 Ambient temperature: -20°C ... +50°C  
 Max. actuation frequency: 600 operating cycles<sup>1</sup>/hour  
 with actuator lock and release: 1 million operating cycles<sup>1</sup>  
 Mechanical endurance: 0.5 m/s  
 Max. actuation speed: 1 mm/s  
 Min. actuation speed: 9750 N acc. to EN ISO 14119  
 Maximum force before breakage F<sub>1max</sub>: 7500 N acc. to EN ISO 14119  
 Max. holding force F<sub>zh</sub>: 4 mm  
 Maximum play of locked actuator: 30 N  
 Released actuator extraction force:

(1) One operation cycle means two movements, one to close and one to open contacts, as defined in EN 60947-5-1.

### Electrical data of inputs IS1/IS2/I3/I4/I5/EDM

Rated operating voltage U<sub>e1</sub>: 24 Vdc  
 Rated current consumption I<sub>e1</sub>: 5 mA

### Electrical data of safety outputs OS1/OS2

Rated operating voltage U<sub>e2</sub>: 24 Vdc  
 Output type: OSSD, PNP  
 Maximum current per output I<sub>e2</sub>: 0.25 A  
 Minimum current per output I<sub>m2</sub>: 0.5 mA  
 Thermal current I<sub>th2</sub>: 0.25 A  
 Utilization category: DC13; U<sub>e2</sub>=24 Vdc, I<sub>e2</sub>=0.25 A  
 Short circuit detection: Yes  
 Protection against overcurrent: Yes  
 Internal self-resetting protection fuse: 1.1 A  
 Duration of the deactivation impulse at the safety outputs: < 300 μs  
 Permissible maximum capacitance between outputs: < 200 nF  
 Permissible maximum capacitance between output and ground: < 200 nF

### Electrical data of signaling output O3/O4

Rated operating voltage U<sub>e3</sub>: 24 Vdc  
 Output type: PNP  
 Maximum current per output I<sub>e3</sub>: 0.1 A  
 Utilization category: DC12; U<sub>e3</sub>=24 Vdc, I<sub>e3</sub>=0.1 A  
 Short circuit detection: No  
 Protection against overcurrent: Yes  
 Internal self-resetting protection fuse: 1.1 A

### RFID sensor data

Assured operating distance s<sub>ao</sub>: 2 mm  
 Assured release distance s<sub>ar</sub>: 4 mm (actuator not locked)  
 10 mm (locked actuator)  
 Rated operating distance s<sub>n</sub>: 2.5 mm  
 Repeat accuracy: ≤ 10 % s<sub>n</sub>  
 Differential travel: ≤ 20 % s<sub>n</sub>  
 Max. switching frequency: 1 Hz

### Electrical data

Rated operating voltage U<sub>e</sub> SELV: 24 Vdc ±10%  
 Operating current at voltage U<sub>e</sub>:  
 - minimum: 40 mA  
 - with activated solenoid: 0.4 A  
 - with activated solenoid and all outputs at maximum power: 1.2 A  
 Rated insulation voltage U<sub>i</sub>: 32 Vdc  
 Rated impulse withstand voltage U<sub>imp</sub>: 1.5 kV  
 External protection fuse: 1.5 A / 1.6 A type F or equivalent device  
 Overvoltage category: III  
 Electrical endurance: 1 million operating cycles  
 Solenoid duty cycle: 100% ED  
 Solenoid consumption: 9 W



## Characteristics approved by UL

Utilization categories: 24 Vdc, 0.25 A (resistive load).

Inputs supplied by remote class 2 source or limited voltage and limited energy.

In conformity with standard: UL 508, CSA 22.2 No.14

Please contact our technical service for the list of approved products.

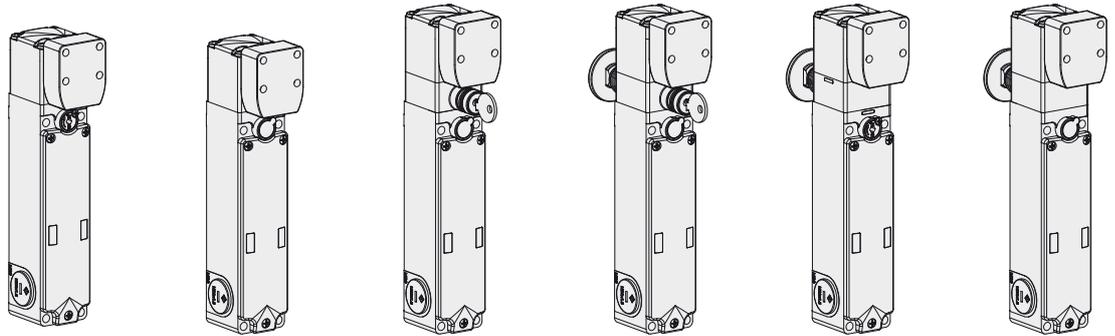
## Characteristics approved by TÜV SÜD

Protection degree: IP67, IP69K  
 Ambient temperature: -20°C ... +50°C  
 Storage temperature: -40°C ... +75°C  
 PL, category: PL e, Cat. 4.  
 SIL: SIL 3 / SIL CL 3

In conformity with standards: 2006/42/EC, EN 60947-1/A1:2011, EN 60947-5-2/A1:2012, EN 60947-5-3:2013, EN ISO 14119:2013, EN 61508-1:2010 (SIL 3), EN 61508-2:2010 (SIL 3), EN 61508-3:2010 (SIL 3), EN 61508-4:2010 (SIL 3), EN 62061/A1:2013 (SIL CL 3), EN ISO 13489-1:2008 (PL e, Cat 4).

Please contact our technical service for the list of approved products.

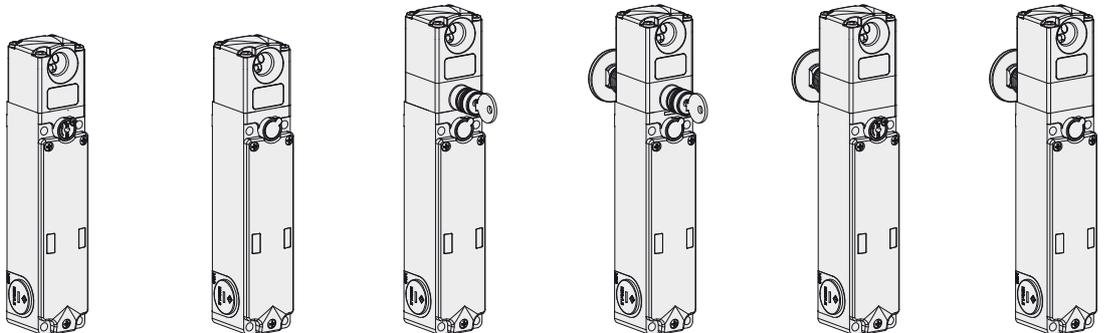
## Selection table for switches with high level coded actuator



	Working principle D, with sealable auxiliary release device	Working principle E	Working principle D, with key release	Working principle D, with key release and emergency release button	Working principle D, with emergency release button and sealable auxiliary release device	Working principle E, with emergency release button
<b>Mode 1</b>  OS safety outputs active with locked and closed protection	NG 2D1D411A-F31	NG 2D1E411A-F31	NG 2D5D411A-F31	NG 2D6D411A-F31	NG 2D7D411A-F31	NG 2D7E411A-F31
<b>Mode 2</b> OS safety outputs active with closed protection	NG 2D1D421A-F31	NG 2D1E421A-F31	NG 2D5D421A-F31	NG 2D6D421A-F31	NG 2D7D421A-F31	NG 2D7E421A-F31

To purchase a product with EDM input replace number 4 with number 5 in the codes shown above. Example: NG 2D1D411A-F31 → NG 2D1D511A-F31

## Switch selection table

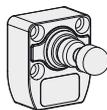


	Working principle D, with sealable auxiliary release device	Working principle E	Working principle D, with key release	Working principle D, supplied with key release and emergency release button	Working principle D, with emergency release button and sealable auxiliary release device	Working principle E, with emergency release button
<b>Mode 1</b>  OS safety outputs active with locked and closed protection	NG 2D1D411A	NG 2D1E411A	NG 2D5D411A	NG 2D6D411A	NG 2D7D411A	NG 2D7E411A
<b>Mode 2</b> OS safety outputs active with closed protection	NG 2D1D421A	NG 2D1E421A	NG 2D5D421A	NG 2D6D421A	NG 2D7D421A	NG 2D7E421A

To purchase a product with EDM input replace number 4 with number 5 in the codes shown above. Example: NG 2D1D411A → NG 2D1D511A

Legend:  interlock with lock monitoring in accordance with EN ISO 14119

## Actuator selection table



Level of coding acc. to EN ISO 14119	Article
low	VN NG-F30
high	VN NG-F31

The use of RFID technology in NG series devices makes them suitable for several applications. Pizzato Elettrica offers two different versions of actuators, in order to best suit customers' specific needs.

Type F30 actuators are all encoded with the same code. This implies that a device associated with an actuator type F30 can be activated by other actuators type F30.

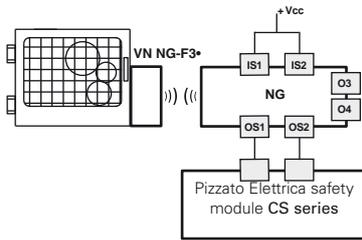
Type F31 actuators are always encoded with different codes. This implies that a device associated with an actuator type F31 can be activated only by a specific actuator. Another F31 type actuator will not be recognised by the device until a new association procedure is carried out (reprogramming). After reprogramming, the old actuator F31 will no longer be recognized.

Items with code on green background are stock items

# NG series safety switches with solenoid and RFID technology

## Complete safety system

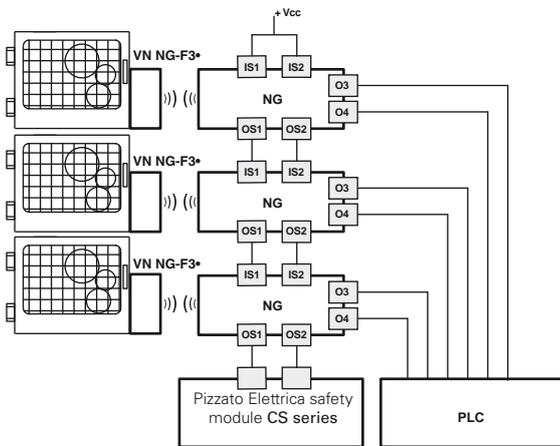
The use of complete tested solutions means that the customer can be certain of the electrical compatibility between the NG series switch and Pizzato Elettrica safety modules, thus ensuring greater reliability. In fact, these sensors have been tested for operation with the modules specified in the table shown on the side.



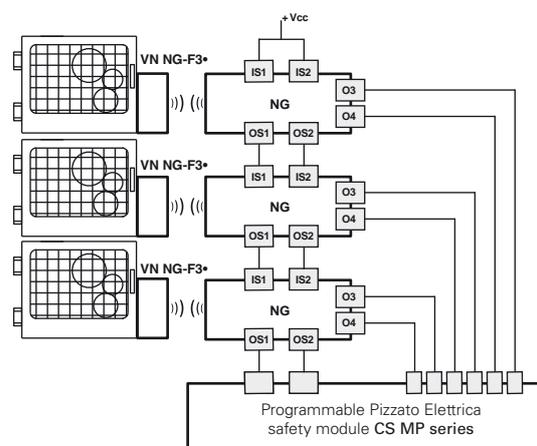
Switches	Compatible safety modules	Safety module output contacts		
		Instantaneous safety contacts	Delayed safety contacts	Signalling contacts
NG 2●●●●●●	CS AR-05●●●●●	3NO	/	1NC
	CS AR-06●●●●●	3NO	/	1NC
	CS AR-08●●●●●	2NO	/	/
	CS AT-0●●●●●	2NO	2NO	1NC
	CS AT-1●●●●●	3NO	2NO	/
	CS MP●●●●●●	page 243 - CATALOGUE SAFETY 2015/16		
	CS MF●●●●●●	page 271 - CATALOGUE SAFETY 2015/16		

Once their compatibility has been verified, all NG series safety switches can generally be connected to safety modules or safety PLCs recognising OSSD input signals.

The NG series switch can be used individually, prior evaluation of the safe outputs by means of a Pizzato Elettrica safety module (see table for safety modules to be combined).



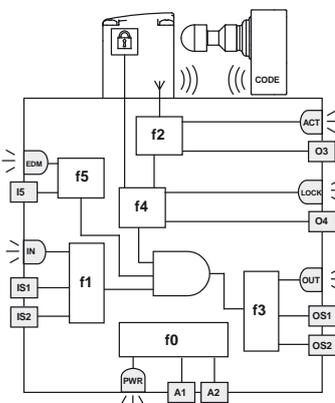
Possible connection in series of several switches in order to simplify the safety system wiring, after evaluating the outputs from the last switch in the chain by means of a Pizzato Elettrica safety module (table for safety modules to be combined). Each NG series switch is provided with two signalling outputs which are activated when the guard is closed (O3) or locked (O4). This piece of information can be managed by a PLC, depending on the specific requirements of the system installed.



Possible connection in series of several switches in order to simplify the safety system wiring, after evaluating the outputs from the last switch in the chain by means of a safety module from Pizzato Elettrica CS MP series, which allows management of both safety and signalling functions.

The examples listed above refer to applications with NG 2●●●4●●●.

## Internal diagram



The diagram on the side represents the 6 logic functions which interact inside the device.

Function f0 is a global function which deals with the device power supply and the internal tests which it cyclically undergoes. The task of function f1 is to evaluate the status of the device inputs, whereas function f2 checks the presence of the actuator inside the switch operating areas.

Function f4 checks the actuator lock condition.

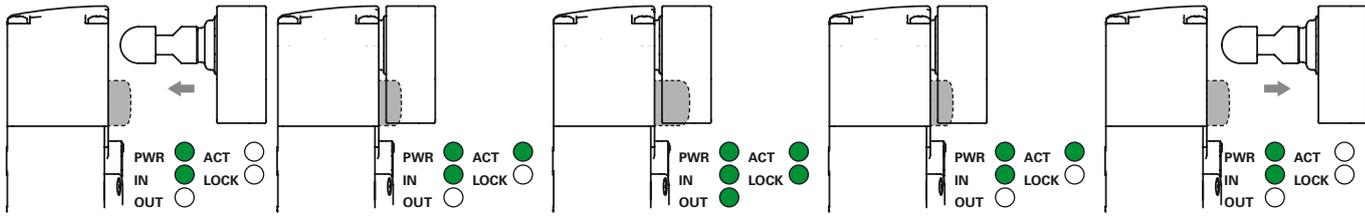
Function f3 is intended to activate or deactivate the safety outputs and check for any faults or short circuits in the outputs.

In the EDM versions, the f5 function verifies the consistency of the EDM signal during safety output state changes. The macro-function, which controls the above mentioned functions, enables the safety outputs only in the presence of active inputs, of the actuator within the safe zone, and where locking of the actuator has taken place, for mode 2 switches, the safety outputs enable only in the presence of active inputs and with the actuator within the safe zone. The status of each function is displayed by the corresponding LED (PWR, IN, OUT, ACT, LOCK, EDM), in such a way that the general device status becomes immediately obvious to the operator.

LED	Function
PWR	power supply/self-diagnosis
IN	status of safety inputs
OUT	status of safety outputs
ACT	actuator state
LOCK	actuator locked
EDM	state of EDM inputs (NG 2D●●5●●●)



## Actuation sequence in mode 1



The switch is supplied with power (PWR LED on, green), the IS1 and IS2 inputs are enabled (IN LED on, green), the OS1 and OS2 safety outputs are disabled (OUT LED off). The actuator is on the outside of the activation zone (LED ACT off).

When the actuator is brought inside the safe activation area (dark grey area), the switch turns on the ACT LED (green). In this position, the O3 door-closed signalling output is activated. The actuator is not locked (LOCK LED off).

The I4 input can be used to lock the actuator (LOCK LED on, green). The OS1 and OS2 safe outputs are enabled (OUT LED on, green). The O4 signalling output is activated at the same time. The safe activation area is extended in order to allow greater play for the actuator.

The I4 input can be used to unlock the actuator (LOCK LED off). The switch disables the OS1 and OS2 safety outputs and turns off the OUT LED. The O4 signalling output is deactivated at the same time. The safe activation area returns to the initial values.

When the actuator leaves the activation limit area, the device turns off the ACT LED and the O3 signalling output.

## Actuation sequence in mode 2

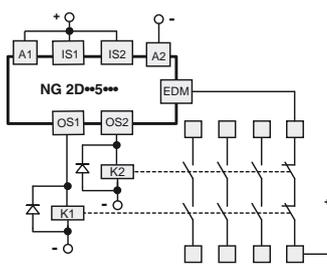
In contrast to the above mode 2 description, the safety outputs OS1 and OS2 enable when the actuator is detected, and disable when the actuator is no longer detectable.

### Operating states

PWR LED	IN LED	OUT LED	ACT LED	LOCK LED	EDM LED (a)	Device status	Description
○	○	○	○	○	○	OFF	Device switched off.
●	●	●	●	●	●	POWER ON	Internal tests upon activation.
●	○	○	*	*	●	RUN	Safety inputs of the device not active.
●	●	*	*	*	*	RUN	Activation of safety inputs.
●	◐	○	*	*	*	RUN	State of the safety inputs not coherent. Recommended action: check for presence and/or wiring of inputs.
●	*	*	●	*	*	RUN	Actuator in safe area. O3 signalling output active.
●	*	*	●	●	○	RUN	Actuator in safe area and locked; O3 and O4 outputs active.
●	●	●	●	●	○	RUN	<b>Mode 1</b> Activation of safety inputs IS1, IS2. Actuator in safe area and locked. O3, O4, OS1 and OS2 outputs active.
●	●	●	●	*	○	RUN	<b>Mode 2</b> Activation of safety inputs IS1, IS2. Actuator in safe area. O3, OS1 and OS2 outputs active.
●	*	◐	*	*	*	ERROR	Error on safety outputs. Recommended action: check for any short circuits between the outputs, outputs and ground or outputs and power supply, then restart the device.
●	○	○	◐	○	○	ERROR	Actuator detection error. Check for physical integrity of the device, if faulty replace the entire device. If undamaged, realign the actuator with the switch and restart the device.
●	○	○	○	○	○	ERROR	Internal error. Recommended action: restart the device. If the fault persists, replace the device.
●	*	○	*	*	●	RUN	EDM signal active (external relay off) <sup>a</sup>
●	●	●	●	●	○	RUN	EDM signal not active (external relay on) <sup>a</sup>
●	○	○	○	○	◐	ERROR	Error in function EDM <sup>a</sup>

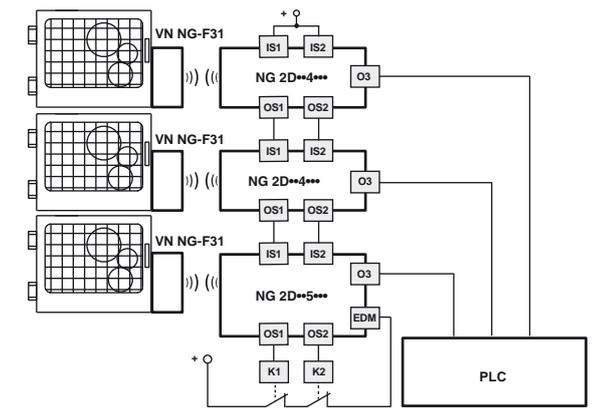
Legend: ○ = off ● = on ◐ = blinking ◑ = alternating colours \* = indifferent (a) Available only in versions NG 2D●●5●1A

### External device monitoring (EDM)



The NG 2D●●5●● version, in addition to maintaining the operating and safety characteristics of the NG series, allows control of **forcibly guided NC contacts of contactors or relays** controlled by the safety outputs of the switch itself. As an alternative to the relays or contactors you can use Pizzato Elettrica expansion modules CS ME-03. See page 235 - CATALOGUE SAFETY 2015/16. This check is carried out via the EDM input (External Device Monitoring as defined in EN 61496-1) of the switch.

This version, with the IS safety inputs, can be used at the end of a series of NG switches, up to a maximum number of 32 devices, while maintaining the maximum PL e safety level and acc. to EN ISO 13849-1 and SIL 3 safety level acc. to EN 62061.



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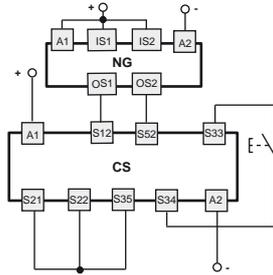
This solution allows you to dispense with the safety module connected to the last device in the chain.

# NG series safety switches with solenoid and RFID technology

## Connection with safety modules

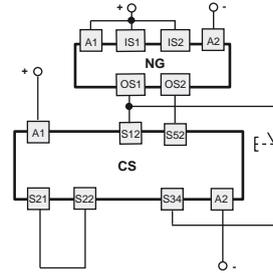
Connection with safety modules CS AR-08●●●●

Input configuration with monitored start  
2 channels / Category 4 / up to SIL 3 / PL e



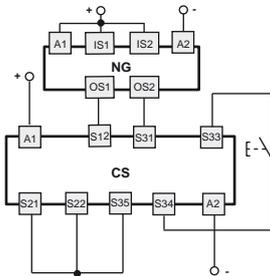
Connection with safety modules CS AR-05●●●● / CS AR-06●●●●

Input configuration with manual start (CS AR-05●●●●)  
or monitored start (CS AR-06●●●●)  
2 channels / Category 4 / up to SIL 3 / PL e



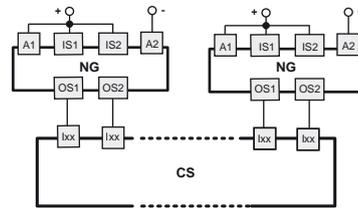
Connection with safety modules CS AT-0●●●●● / CS AT-1●●●●●

Input configuration with monitored start  
2 channels / Category 4 / up to SIL 3 / PL e



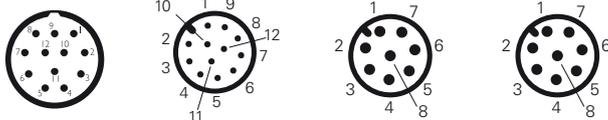
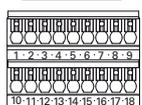
Connection with safety modules CS MF●●●●●, CS MP●●●●●

The connections vary according to the program of the module  
Category 4 / up to SIL 3 / PL e



## Internal connections (standard cover version NG 2D●●●1A)

Internal terminal strip	M23 connector 12 poles	M12 connector 12 poles	M12 connector 8 poles stand-alone connection	M12 connector 8 poles series connection with "Y" connectors	Connection
A2	3	3	3	3	A2 0 V supply input
B2	3	3	3	3	B2 0 V auxiliary supply output
I4	10	10	8	8	I4 Solenoid activation input
O3	5	5	2	/	O3 Signalling output, actuator inserted
O4	9	9	5	5	O4 Signalling output, actuator inserted and locked (b)
I3	8	8	6	/	I3 Actuator programming input
A1	1	1	1	1	A1 +24 Vdc supply input
B1	1	1	1	1	B1 Auxiliary supply output +24 Vdc, (Ith 8 A max)
IS1	2	2	/	2	IS1 Safety input
IS2	6	6	/	6	IS2 Safety input
I5	11	11	/	/	I5 EDM input (a)
OS1	4	4	4	4	OS1 Safety output
OS2	7	7	7	7	OS2 Safety output



Important: terminals 7, 8, 9, 17, 18 of the internal terminal strip cannot be used.

- (a) Available only in version NG 2D●●5●●●.
- (b) For NG 2D●●6●●● the output signals the device FAULT condition.

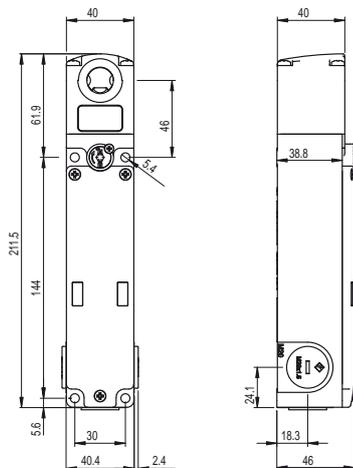


## Dimensional drawings

All measures in the drawings are in mm

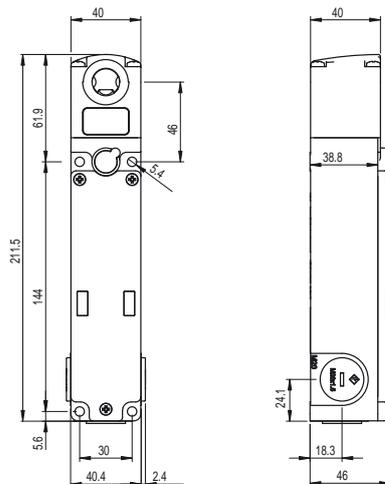
### Switch NG 2D1D●●1A

Working principle D, supplied with sealable auxiliary release device, without actuator



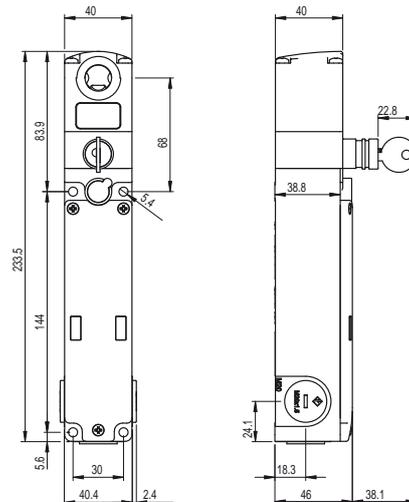
### Switch NG 2D1E●●1A

Working principle E, without actuator



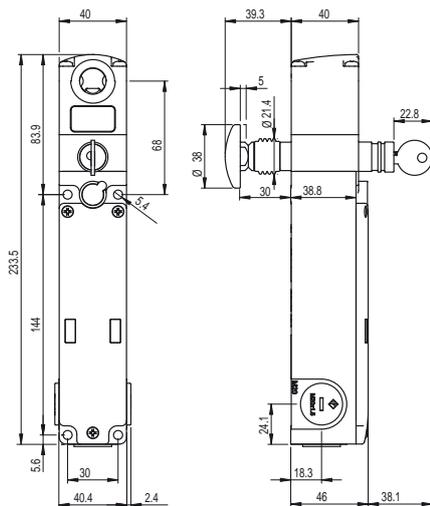
### Switch NG 2D5D●●1A

Working principle D, with key release, without actuator



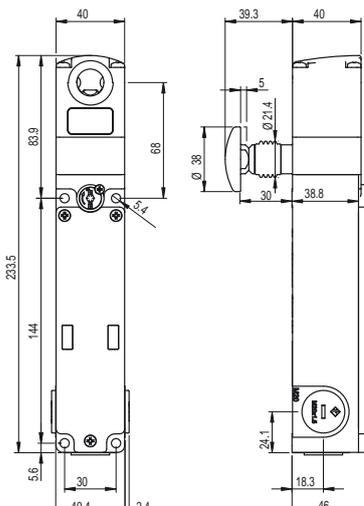
### Switch NG 2D6D●●1A

Working principle D, with key release, emergency release button, without actuator



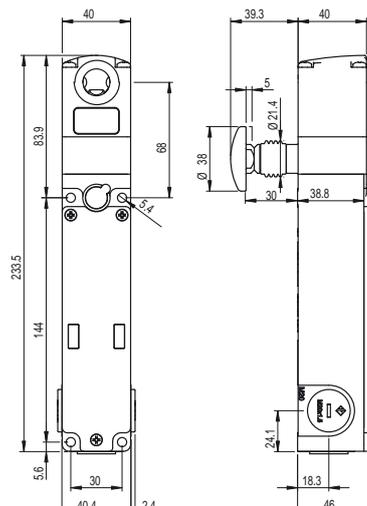
### Switch NG 2D7D●●1A

Working principle D, with emergency release button, without actuator

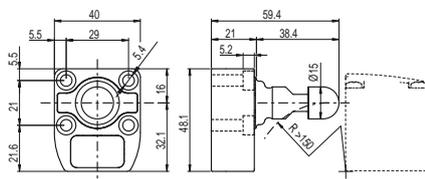


### Switch NG 2D7E●●1A

Working principle E, with emergency release button, without actuator



### Actuator VN NG-F3●

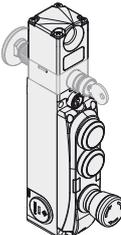


→ The 2D and 3D files are available at [www.pizzato.com](http://www.pizzato.com)

# NG series safety switches with solenoid and RFID technology

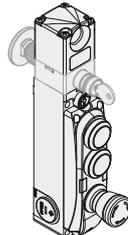
## Switch with built-in control devices to be wired

**NG 2D••••1C**



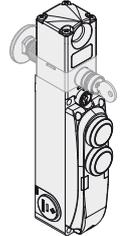
Description	Colour actuator	Terminals
illuminated light button 1NO+1NC	white	19 21 31 E-     ⊗ LED
illuminated light button 1NO+1NC	yellow	20 22 34 E-     ⊗ LED 23 25 32
turn-to-release, non-illuminated emergency button 2NC	red	24 26 34 27 29 E-     ⊗ LED 28 30

**NG 2D••••1D**



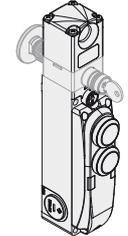
Description	Colour actuator	Terminals
illuminated light button 1NO+1NC	white	19 21 31 E-     ⊗ LED
non-illuminated light button 1NO+1NC	black	20 22 34 E-     ⊗ LED 23 25
turn-to-release, non-illuminated emergency button 2NC	red	24 26 27 29 E-     ⊗ LED 28 30

**NG 2D••••1E**



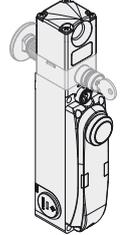
Description	Colour actuator	Terminals
illuminated light button 1NO+1NC	white	19 21 31 E-     ⊗ LED
non-illuminated light button 1NO+1NC	black	20 22 34 E-     ⊗ LED 23 25

**NG 2D••~1F**



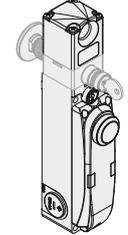
Description	Colour actuator	Terminals
illuminated light button 1NO+1NC	green	19 21 31 E-     ⊗ LED
illuminated light button 1NO+1NC	red	20 22 34 E-     ⊗ LED 23 25 32

**NG 2D••~1G**



Description	Colour actuator	Terminals
illuminated light button 1NO+1NC	green	19 21 31 E-     ⊗ LED 20 22 34

**NG 2D••~1H**



Description	Colour actuator	Terminals
illuminated light button 1NO+1NC	white	19 21 31 E-     ⊗ LED 20 22 34

## Internal wiring (version with built-in control devices)

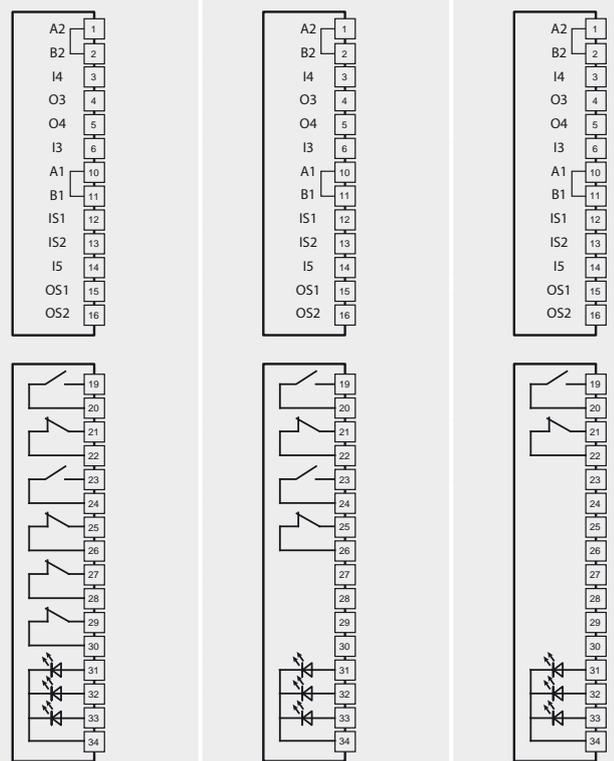
N°Terminals	Connection	NG 2D••~1C NG 2D••~1D	NG 2D••~1E NG 2D••~1F	NG 2D••~1G NG 2D••~1H
1	A2 0 V supply input	1	1	1
2	B2 0 V auxiliary supply output	2	2	2
3	I4 Solenoid activation input	3	3	3
4	O3 Signalling output, actuator inserted	4	4	4
5	O4 Signalling output, actuator inserted and locked (b)	5	5	5
6	I3 Actuator programming input	6	6	6
10	A1 +24 Vdc supply input	10	10	10
11	B1 Auxiliary supply output +24 Vdc, (Ith 8 A max)	11	11	11
12	IS1 Safety input	12	12	12
13	IS2 Safety input	13	13	13
14	I5 EDM input (a)	14	14	14
15	OS1 Safety output	15	15	15
16	OS2 Safety output	16	16	16

Important: terminals 7, 8, 9, 17, 18 of the internal terminal strip cannot be used.

(a) Available only in version NG 2D••~5•••.

(b) For NG 2D••~6••• the output signals the device FAULT condition.

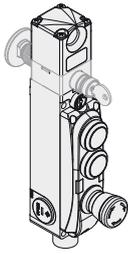
Internal terminal strip built-in control devices	Terminals	Device
19	Contact 1	Device 1
20	Contact 2	
21	Contact 1	Devices 2
22	Contact 2	
23	Contact 1	Devices 3
24	Contact 2	
25	Contact 1	Devices 3
26	Contact 2	
27	Contact 1	Devices 3
28	Contact 2	
29	Contact 1	Devices 3
30	Contact 2	
31	+24 Vdc supply input / LED Device 1	
32	+24 Vdc supply input / LED Device 2	
33	+24 Vdc supply input / LED Device 3	
34	0 V supply input / LED	





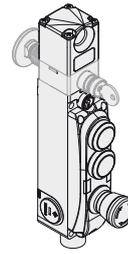
## Switch with built-in control devices to be wired with M23 connector, 19 poles

NG 2D••••1C-K603



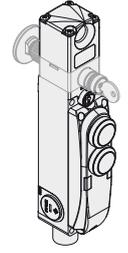
Description	Colour actuator	n° pin
illuminated light button 1NO	white	
illuminated light button 1NO	yellow	
turn-to-release, non-illuminated emergency button 2NC	red	

NG 2D••••1D-K603



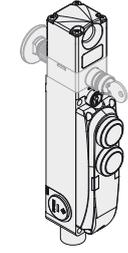
Description	Colour actuator	n° pin
illuminated light button 1NO	white	
non-illuminated light button 1NO	black	
turn-to-release, non-illuminated emergency button 2NC	red	

NG 2D••••1E-K602



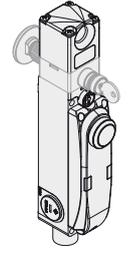
Description	Colour actuator	n° pin
illuminated light button 1NO	white	
non-illuminated light button 1NO	black	

NG 2D••••1F-K602



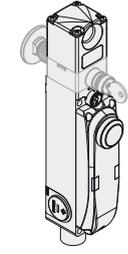
Description	Colour actuator	n° pin
illuminated light button 1NO	green	
illuminated light button 1NO	red	

NG 2D••••1G-K601



Description	Colour actuator	n° pin
illuminated light button 1NO	green	

NG 2D••~1H-K601



Description	Colour actuator	n° pin
illuminated light button 1NO	white	

## Internal wiring (version with built-in control devices)

M23 connector, 19 poles	Connection	NG 2D••~1C-K603 NG 2D••~1D-K603	NG 2D••~1E-K602 NG 2D••~1F-K602	NG 2D••~1G-K601 NG 2D••~1H-K601
19	A2 0 V supply input	19	19	19
19	B2 0 V auxiliary supply output	19	19	19
1	I4 Solenoid activation input	1	1	1
8	O3 Signalling output, actuator inserted	8	8	8
9	O4 Signalling output, actuator inserted and locked (b)	9	9	9
7	I3 Actuator programming input	7	7	7
6	A1 +24 Vdc supply input	6	6	6
6	B1 Auxiliary supply output +24 Vdc, (lth 8 A max)	6	6	6
2	IS1 Safety input	2	2	2
3	IS2 Safety input	3	3	3
12	I5 EDM input (a)	12	12	12
4	OS1 Safety output	4	4	4
5	OS2 Safety output	5	5	5

Important: terminals 7, 8, 9, 17, 18 of the internal terminal strip cannot be used.

(a) Available only in version NG 2D••~5•••.

(b) For NG 2D••~6••• the output signals the device FAULT condition.

Terminal	Device	Wiring
17	Contact 1	Device 1
6	Contact 2	
15	Contact 1	Devices 2
6	Contact 2	
10	Contact 1	Devices 3
11	Contact 2	
18	+24 Vdc supply input / LED Device 1	
16	+24 Vdc supply input / LED Device 2	
19	0 V supply input / LED	

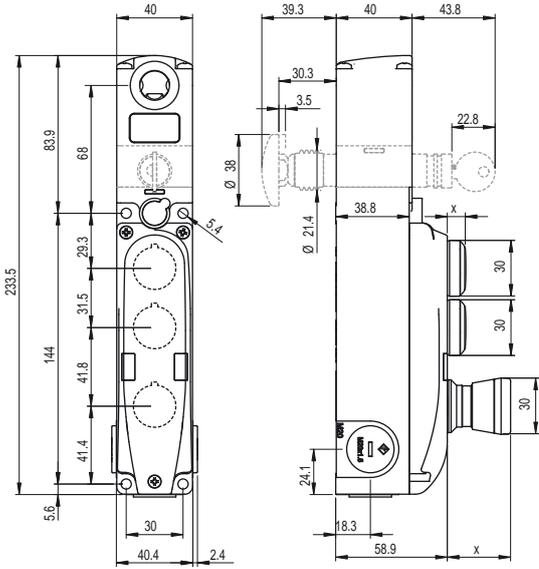


# NG series safety switches with solenoid and RFID technology

## Dimensional drawings

All measures in the drawings are in mm

Switches NG 2D..... with built-in control devices



## Available built-in control devices

	Description	Colour	Contacts	Size (x)
	Illuminated light button	white, red, green, yellow, blue	1NO+1NC or 1NO	10
	Non-illuminated light button	black	1NO+1NC or 1NO	10
	Indicator lights	white, red, green	/	9.7
	Emergency buttons with rotary release according to EN ISO 13850	red	2NC	33.4
	Illuminated selector switch with handle, 2 stable positions	black with transparent lens for LED	1NO+1NC or 1NO	23.8
	Key selector switch, 2 stable positions	black	1NO+1NC or 1NO	without key 25.5 with key 45.1

Legend: Maintained Spring-return Key extraction position

Other devices and contacts are available on request.

Please contact our technical service for the list of available products.

## Technical features of built-in control devices

### Housing

Protection degree: IP65 acc EN 60529  
 Mechanical endurance:  
 Spring-return button: 1 million operating cycles  
 Emergency buttons: 50,000 operating cycles  
 Selector: 300,000 operating cycles  
 Key selector: 50,000 operating cycles  
 Key selector: 30,000 operating cycles with key extraction

### Actuating force:

Spring-return button: 4 N min 100 N max  
 Emergency buttons: 20 N min 100 N max  
 Selector: 0.1 Nm min 1.5 Nm max  
 Key selector: 0.1 Nm min 1.3 Nm max

### Contact blocks of built-in control devices

Contact material: silver contacts  
 Contact design: self-cleaning contacts with double support point

### Electrical data:

Thermal current  $I_{th}$ : 1 A  
 Rated insulation voltage  $U_i$ : 32 Vac/dc  
 Rated impulse withstand voltage  $U_{imp}$ : 1.5 kV  
 LED Rated operating voltage: 24 Vdc  $\pm$  15%  
 LED Rated operating current: 10 mA each LED

### Utilization category:

Direct current: DC13  
 $U_e$  (V) 24  
 $I_e$  (A) 0.55

### In conformity with standards:

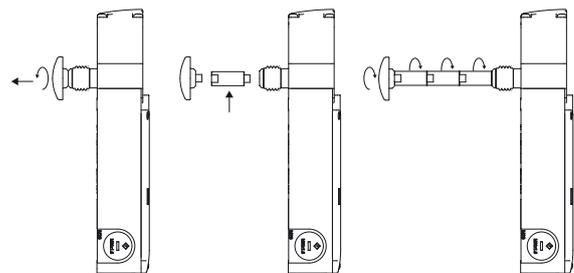
IEC 60947-5-1, IEC 60947-5-5, EN ISO 13850

### ⚠ Installation for safety applications:

Always connect the safety circuit to the **NC contacts** (normally closed contacts) as stated in standard EN 60947-5-1, encl. K, par. 2.

## Extensions for release button

Article	Description	Drawing
VN NG-LP30	Metal extension for release button. For max. wall thickness of 30 mm	
VN NG-LP40	Metal extension for release button. For max. wall thickness of 40 mm	
VN NG-LP50	Metal extension for release button. For max. wall thickness of 50 mm	
VN NG-LP60	Metal extension for release button. For max. wall thickness of 60 mm	



Metal extensions can be combined together until the required length is obtained. Do not exceed an overall length of 500 mm between the release button and the switch.



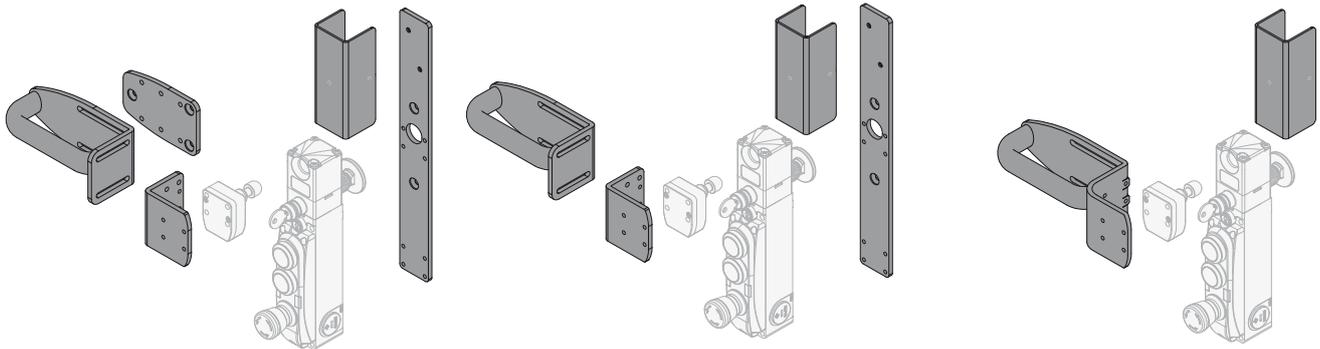
## Compatible with P-KUBE 2 safety handles

P-KUBE 2 safety handles are applied on doors or protections for perimetric safety barriers, where it is necessary to control the access to dangerous parts of machinery or installations.

When assembled with the lockable NG safety switch equipped with RFID technology, these handles create an integrated closing system and monitor the access to dangerous areas. You will obtain a robust metal body, compact and configurable, incorporating an RFID safety switch with a pin for the centering of the door, an anti-panic release, an adjustable handle with a lock-out device to be closed with a padlock and a control console.

You can use the same item on right-handed and left-handed doors, both swing and sliding.

Article	Description	Article	Description	Article	Description
AP G1A-111P	Safety handles with LOCK OUT device and configuration with 3 adjustable plates	AP G1A-011P	Safety handles with LOCK OUT device and configuration with 2 adjustable plates	AP G1Z-200P	Safety handles with LOCK OUT device and configuration with 1 fixed plate



## Adhesive labels for emergency release button



Polycarbonate yellow adhesive, rectangular 300x32 mm, red writing. Applied on the internal part of the jamb it helps finding the emergency release button.

Article	Description
VF AP-A1AGR01	PREMERE PER USCIRE
VF AP-A1AGR02	PUSH TO EXIT
VF AP-A1AGR04	ZUM OFFNEN DRUCKEN
VF AP-A1AGR05	POUSSER POUR SORTIR
VF AP-A1AGR06	PULSAR PARA SALIR
VF AP-A1AGR07	НАЖАТЬ ДЛЯ ВЫХОДА
VF AP-A1AGR08	NACISNAĆ ABY WYJŚĆ
VF AP-A1AGR09	PRESSIONAR PARA SAIR

## Accessories

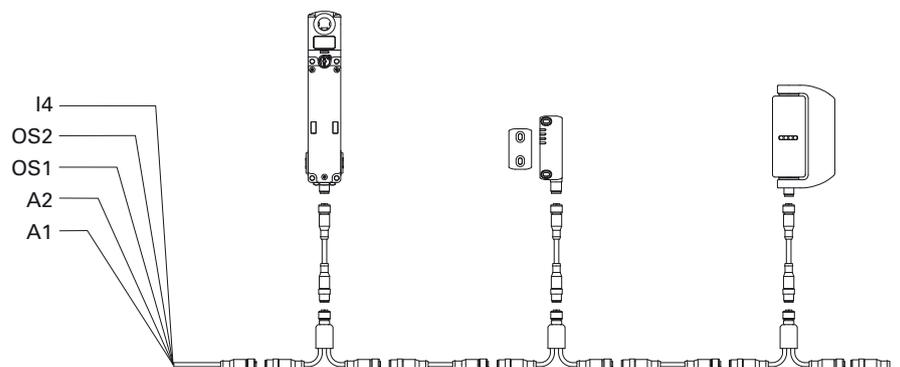
Article	Description
VF KLB300	Set of two locking keys
	Extra copy of the locking keys to be purchased if further keys are needed (standard supply 2 units). The keys of all switches have the same code. Other codes on request.

## Series connection

To simplify serial connections, a series of M12 connectors are available that allow complete wiring.

This solution significantly reduces installation times, whilst maintaining the maximum PL e and SIL 3 safety levels.

For further information see page 290 - CATALOGUE SAFETY 2015/16.



Items with code on **green** background are stock items

**Accessories** See page 287 - CATALOGUE SAFETY 2015/16



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