



## Model Number

NCN3-F31K-N4-K-S

## Features

- Direct mounting on standard actuators
- Compact and stable housing with terminal compartment connection
- Fixed setting
- EC-Type Examination Certificate TÜV99 ATEX 1479X
- Screw terminals
- Usable up to SIL 2 acc. to IEC 61508
- LEDs for switching state of sensor and solenoid valve
- Valve LEDs disconnectable

## Application

### Note

The connections to this sensor are sealed with stopping plugs to protect against dirt and moisture. If not all of the connections are used in your application, then seal the remaining stopping plugs on the sensor permanently or check during initial installation and when performing regular maintenance work that the stopping plugs are secure and impermeable. If necessary, tighten the stopping plugs to a torque of 1 Nm.

## Accessories

### BT65A

Activator for F31 series

### BT65X

Activator for F31 series

### BT115A

Activator for F31 series

### BT115X

Activator for F31 series

### BT65B

Activator for F31 series

### BT115B

Activator for F31 series

## Technical Data

### General specifications

Switching function		2 x normally closed (NC)
Output type		NAMUR
Rated operating distance	$s_n$	3 mm
Installation		flush mountable
Assured operating distance	$s_a$	0 ... 2.4 mm
Actual operating distance	$s_r$	2.7 ... 3.3 mm typ.
Actuating element		Stainless steel 1.4305 / AISI 303 8.5 mm x 8.5 mm x 0.5 mm
Reduction factor $r_{Al}$		0.5
Reduction factor $r_{Cu}$		0.4
Reduction factor $r_{304}$		1
Reduction factor $r_{St37}$		1.3
Reduction factor $r_{Brass}$		0.6
Output type		2-wire

### Nominal ratings

Nominal voltage	$U_o$	8 V
Switching frequency	$f$	0 ... 3 kHz
Hysteresis	$H$	typ. 5 %
Reverse polarity protection		reverse polarity protected
Short-circuit protection		yes
Suitable for 2:1 technology		yes, Reverse polarity protection diode not required
Current consumption		
Measuring plate not detected		$\geq 3$ mA
Measuring plate detected		$\leq 1$ mA
Time delay before availability	$t_v$	$\leq 1.1$ ms
Switching state indicator		LED, yellow
Valve status indicator		LED, yellow

### Functional safety related parameters

Safety Integrity Level (SIL)	SIL 2
MTTF <sub>d</sub>	1470 a
Mission Time ( $T_M$ )	20 a
Diagnostic Coverage (DC)	0 %

### Valve circuit

Voltage	max. 32 V DC
Current	max. 240 mA
Short-circuit protection	no
Reverse polarity protection	yes, with reversed output LED is out of function, therefore more power for solenoid valve

### Ambient conditions

Ambient temperature	-25 ... 100 °C (-13 ... 212 °F)
Storage temperature	-40 ... 100 °C (-40 ... 212 °F)

### Mechanical specifications

Connection (system side)	Screw terminals, tightening torque min. 0.5 Nm Stripped length 7 mm
Core cross-section (system side)	rigid: 0.14 ... 2.5 mm <sup>2</sup> flexible: 0.14 ... 1.5 mm <sup>2</sup> flexible with core-end sleeve: 0.25 ... 1.5 mm <sup>2</sup> like connection (system side)
Connection (valve side)	like core cross section (system side)
Core cross-section (valve side)	like core cross section (system side)
Housing material	PBT
Sensing face	PBT
Degree of protection	IP67
Tightening torque, housing screws	1 Nm
Tightening torque, cable gland	M20 x 1.5 ; $\leq 7$ Nm M12 x 1.5 ; $\leq 3$ Nm
Note	LED switch-off

### General information

Use in the hazardous area	see instruction manuals
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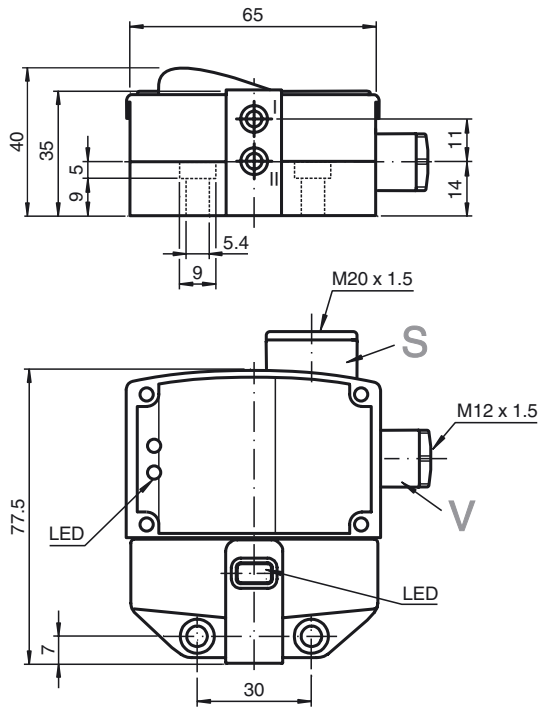
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Electromagnetic compatibility	NE 21:2007
Standards	EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012

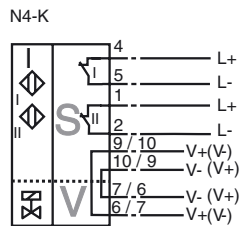
### Approvals and certificates

EAC conformity	TR CU 012/2011
UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose
CCC approval	CCC approval / marking not required for products rated $\leq 36$ V

Dimensions



Electrical Connection



Interruption of LED:

In the case of a polarity reversal of the valve circuit connection/s, the valve status display does not function, i.e. such that low power valves can (also) be connected.

**Data for application in connection with hazardous areas**

Equipment protection level	Ga , Gb , Gc (ic) , Mb	
<b>Equipment protection level Ga</b>		
Type of protection	intrinsic safety	
CE marking	CE 0102	
<b>Certificates</b>		
Appropriate type	NCN3-F31K-N4...	
ATEX certificate	TÜV 99 ATEX 1479 X	
ATEX marking	Ⓔ II 1G Ex ia IIC T6...T1 Ga	
Standards	EN 60079-0:2012+A11:2013 , EN 60079-11:2012	
IECEX certificate	IECEX TUN 17.0021X	
IECEX marking	Ex ia IIC T6...T1 Ga	
Standards	IEC 60079-0:2011 , IEC 60079-11:2011	
Effective internal inductivity	$C_i$	$\leq 100 \text{ nF}$ The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \text{ }\mu\text{H}$ The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{amb}$	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values.	
for ATEX	at $U_i = 15 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ , T6 : 55 °C (131 °F) T5 : 65 °C (149 °F) T4 : 95 °C (203 °F) T3 : 95 °C (203 °F) T2 : 95 °C (203 °F) T1 : 95 °C (203 °F) at $U_i = 15 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ , T6 : 55 °C (131 °F) T5 : 65 °C (149 °F) T4 : 95 °C (203 °F) T3 : 95 °C (203 °F) T2 : 95 °C (203 °F) T1 : 95 °C (203 °F) at $U_i = 15 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ , T6 : 45 °C (113 °F) T5 : 60 °C (140 °F) T4 : 85 °C (185 °F) T3 : 85 °C (185 °F) T2 : 85 °C (185 °F) T1 : 85 °C (185 °F)	
for IECEX	at $U_i = 15 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ , T6 : 70 °C (158 °F) T5 : 85 °C (185 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 15 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ , T6 : 70 °C (158 °F) T5 : 85 °C (185 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 15 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ , T6 : 65 °C (149 °F) T5 : 80 °C (176 °F) T4 : 90 °C (194 °F) T3 : 90 °C (194 °F) T2 : 90 °C (194 °F) T1 : 90 °C (194 °F)	
Maximum values of the valve circuit	The value applies to each valve circuit. A cable length of 10 m is considered.	
Voltage	$U_i$	$\leq 32 \text{ V}$
Current	$I_i$	$\leq 240 \text{ mA}$
Internal capacitance	$C_i$	$\leq 10 \text{ nF}$
Internal inductance	$L_i$	$\leq 20 \text{ }\mu\text{H}$

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## Equipment protection level Gb

Type of protection		intrinsic safety
CE marking		CE 0102
Certificates		
Appropriate type		NCN3-F31K-N4...
ATEX certificate		TÜV 99 ATEX 1479 X
ATEX marking		Ex II 1G Ex ia IIC T6...T1 Ga
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
IECEX certificate		IECEX TUN 17.0021X
IECEX marking		Ex ia IIC T6...T1 Ga
Standards		IEC 60079-0:2011 , IEC 60079-11:2011
Effective internal inductivity	$C_i$	$\leq 100 \text{ nF}$ The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \text{ }\mu\text{H}$ The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{amb}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 15 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ , T6 : 70 °C (158 °F) T5 : 85 °C (185 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 15 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ , T6 : 70 °C (158 °F) T5 : 85 °C (185 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 15 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ , T6 : 65 °C (149 °F) T5 : 80 °C (176 °F) T4 : 90 °C (194 °F) T3 : 90 °C (194 °F) T2 : 90 °C (194 °F) T1 : 90 °C (194 °F)
Maximum values of the valve circuit		The value applies to each valve circuit. A cable length of 10 m is considered.
Voltage	$U_i$	$\leq 32 \text{ V}$
Current	$I_i$	$\leq 240 \text{ mA}$
Internal capacitance	$C_i$	$\leq 10 \text{ nF}$
Internal inductance	$L_i$	$\leq 20 \text{ }\mu\text{H}$

**Equipment protection level Gc (ic)**

Type of protection		intrinsic safety
CE marking		CE
Certificates		
ATEX certificate		PF13CERT2895 X
ATEX marking		Ⓔ II 3G Ex ic IIC T6...T1 Gc
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
Effective internal inductivity	$C_i$	≤ 100 nF The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Effective internal inductance	$L_i$	≤ 100 μH The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{amb}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 20 V$ , $I_i = 25 mA$ , $P_i = 34 mW$ , T6 : 70 °C (158 °F) T5 : 85 °C (185 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 20 V$ , $I_i = 25 mA$ , $P_i = 64 mW$ , T6 : 70 °C (158 °F) T5 : 85 °C (185 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 20 V$ , $I_i = 52 mA$ , $P_i = 169 mW$ , T6 : 65 °C (149 °F) T5 : 80 °C (176 °F) T4 : 90 °C (194 °F) T3 : 90 °C (194 °F) T2 : 90 °C (194 °F) T1 : 90 °C (194 °F)
Maximum values of the valve circuit		The value applies to each valve circuit. A cable length of 10 m is considered.
Voltage	$U_i$	≤ 32 V
Current	$I_i$	≤ 240 mA
Internal capacitance	$C_i$	≤ 10 nF
Internal inductance	$L_i$	≤ 20 μH

**Equipment protection level Mb**

Type of protection		intrinsic safety
Certificates		
Appropriate type		NCN3-F31K-N4...
IECEX certificate		IECEX TUN 17.0021X
IECEX marking		Ex ia I Mb
Standards		IEC 60079-0:2011 , IEC 60079-11:2011
Effective internal inductivity	$C_i$	≤ 100 nF The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Effective internal inductance	$L_i$	≤ 100 μH The value is applicable for one sensor circuit. A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{amb}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 15 V$ , $I_i = 25 mA$ , $P_i = 34 mW$ : 100 °C (212 °F) at $U_i = 15 V$ , $I_i = 25 mA$ , $P_i = 64 mW$ : 100 °C (212 °F) at $U_i = 15 V$ , $I_i = 52 mA$ , $P_i = 169 mW$ : 90 °C (194 °F)
Maximum values of the valve circuit		The value applies to each valve circuit. A cable length of 10 m is considered.
Voltage	$U_i$	≤ 32 V
Current	$I_i$	≤ 240 mA
Internal capacitance	$C_i$	≤ 10 nF
Internal inductance	$L_i$	≤ 20 μH

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