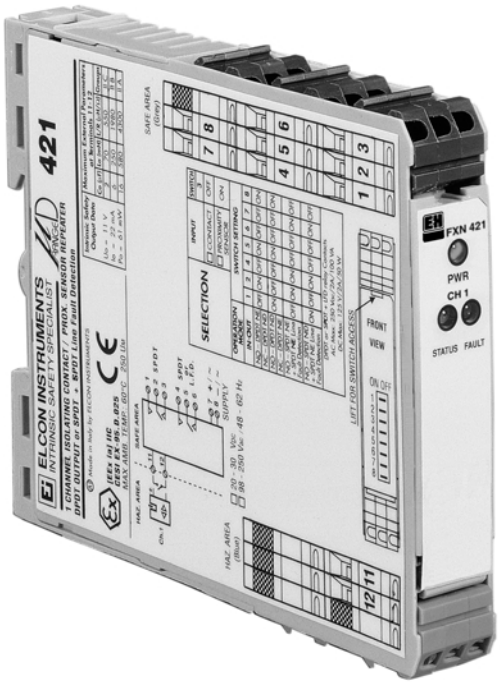
Technical
Information
TI 332F/00/en

System Components
Isolating switch repeaters FXN 421, FXN 422

With intrinsically-safe signal circuits for connecting to transmitters with NAMUR output (EN 50227)



Application
Intrinsically-safe power supply for limit switches (sensors) in explosion-hazardous areas, with signal evaluation.

FXN 421:
With one input signal circuit and two relay outputs, each with one change-over contact
– for limit signal or
– for limit signal and alarm.

FXN 422:
With two input signal circuits and two relay outputs, each with one change-over contact for limit signals.

Features and Benefits
- Compact housing (only 16.4 mm wide) for simple row mounting on a standard top-hat rail in the control cabinet
- Simple wiring with easily accessible front-mounted terminals
- Relay settings using front-mounted switches behind the front panel
- Signal cable monitoring for short-circuiting and breakage

Endress + Hauser
The Power of Know How

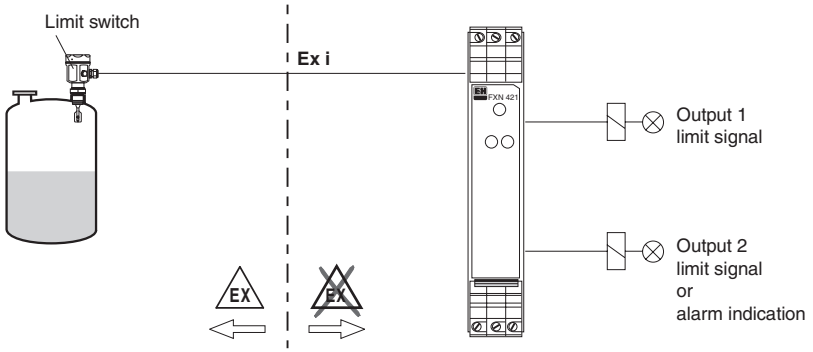
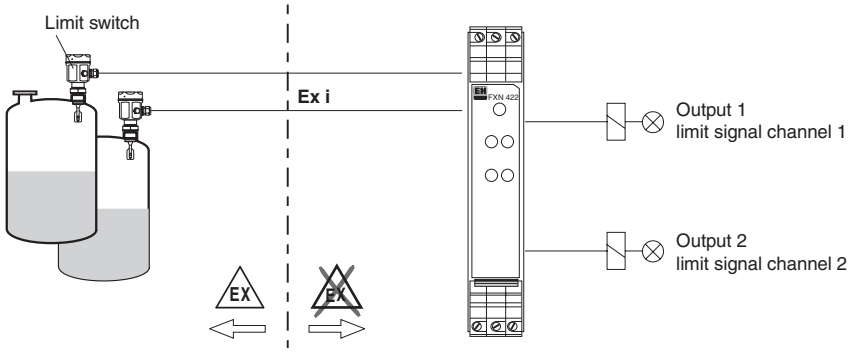
Identification

Manufacturer	Endress+Hauser
Instrument	Isolating switch repeater
Designation	FXN 421, FXN 422
Technical documentation Version	TI 332F/00/en 06.99
Technical data	in accordance with DIN 19259

Application

Limit signal evaluation	E.g. maximum or minimum level detection in vessels when connected to level sensors, including those operating in explosion-hazardous areas.

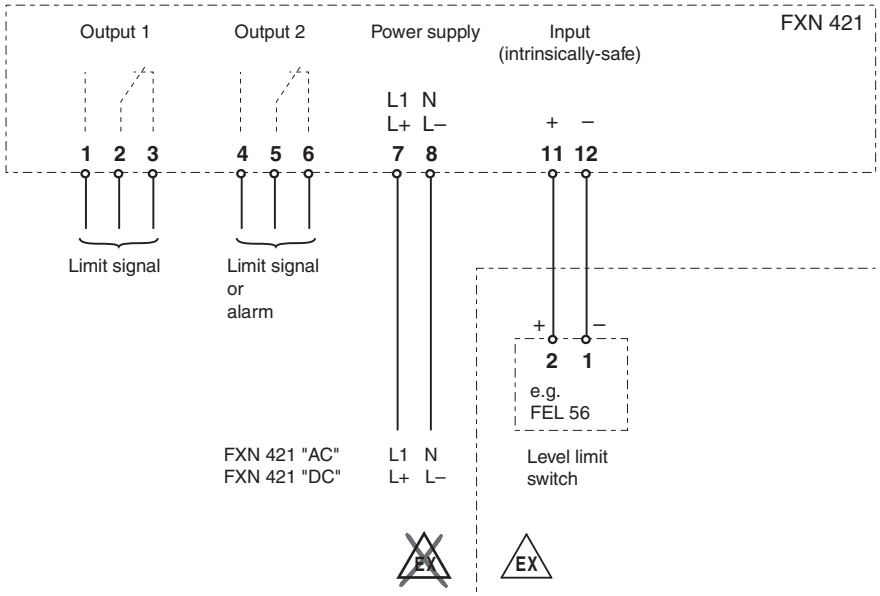
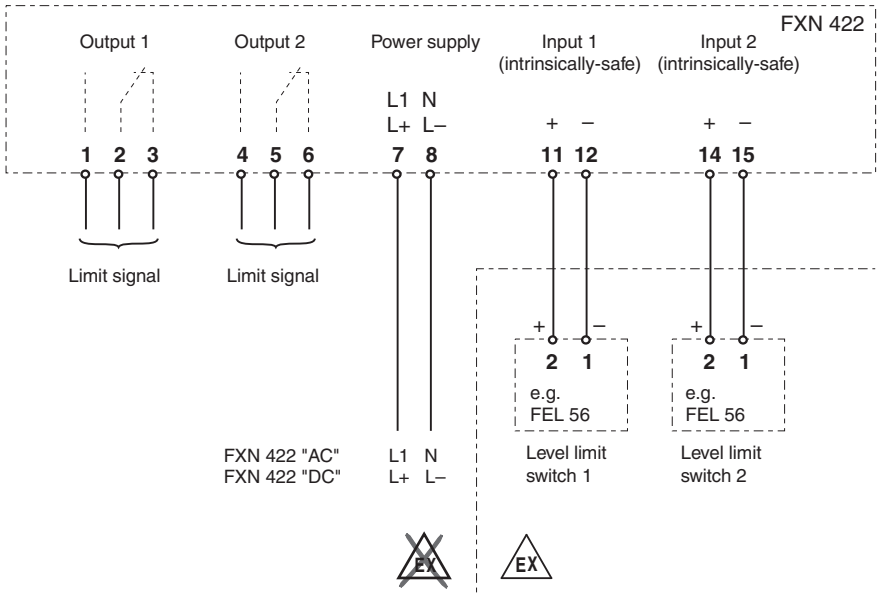
Function and System Design

Measurement system with FXN 421	Isolating switch repeater in the control room, one limit switch in the field (e.g. level sensor on the vessel)  FXN 421
Measurement system with FXN 422	Isolating switch repeater (two-channel unit) in the control room, two limit switches in the field (e.g. level sensors on vessels)  FXN 422
Measurement principle	The isolating switch repeater supplies power to the limit switch via a two-wire cable. Depending on whether it is covered or not, the limit switch outputs a predefined current along the same cable. Short-circuiting or cable breakage is identified when the current lies outside the predefined ranges.
Sensors	Limit switches with a NAMUR output (EN 50227): Signal transmission 0.35...1.2 mA / 2.1...6.5 mA along a two-wire cable. E.g. Liquiphant M level sensor with an FEL 56 electronic insert
Galvanic isolation	Between limit switch, the power supply for the isolating switch repeater and the relay contacts

Input

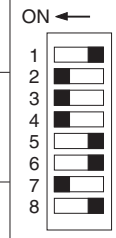
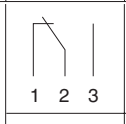
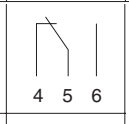
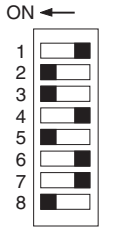
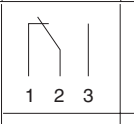
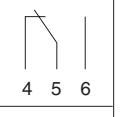
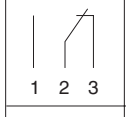
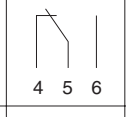
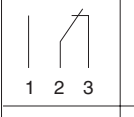
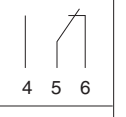
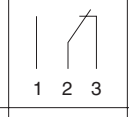
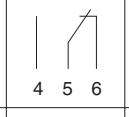
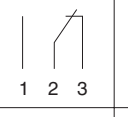
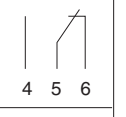
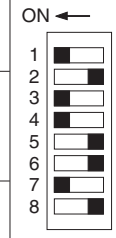
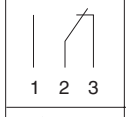
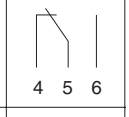
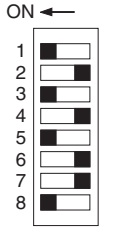
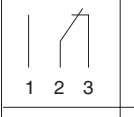
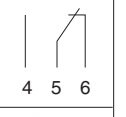
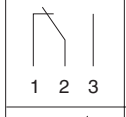
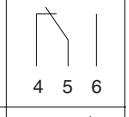
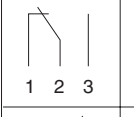
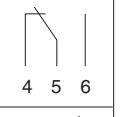
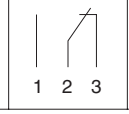
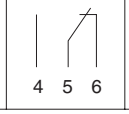
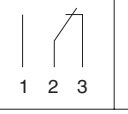
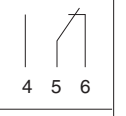
Variable	Current along the two-wire cable to the limit switch
Measuring range	Detection range for signal "Low" 0.2 mA … 1.2 mA Detection range for signal "High" 2.1 mA … 6.5 mA Detection range for cable breakage 0 mA … 0.2 mA Detection range for cable short circuit 6.5 mA … 20 mA
Specifications for operating the limit switch in explosion hazardous areas	Max. 11 V, max. 22 mA, max. 61 mW along the two-wire cable. Maximum permissible external capacitance C_o and inductivity L_o: Explosion group CENELEC, Groups CSA/FM, C_o, L_o IIC A-B 2 µF 70 mH IIB C-E 6 µF 250 mH IIA F-G 16 µF 580 mH

Output

Electrical connection FXN 421	
Electrical connection FXN 422	
Connecting cable	Cable section max. 2.5 mm², strands in end ferrules to DIN 46228
Power supply	FXN 421 (AC), No. 52002278: – AC 90 V … 250 V, 50/60 Hz – Current consumption 37 mA at 115 V or 75 mA at 230 V FXN 421 (DC), No. 52002276: – DC 20 V … 30 V; reverse polarity protection – Current consumption 18 mA at 24 V or 22 mA at 30 V FXN 422 (AC), No. 52002279: – AC 90 V … 250 V, 50 Hz or 98 V … 250 V, 60 Hz – Current consumption 37 mA at 115 V or 75 mA at 230 V FXN 422 (DC), No. 52002277: – DC 20 V … 30 V; reverse polarity protection – Current consumption 26 mA at 24 V or 32 mA at 30 V

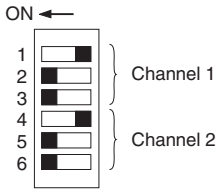
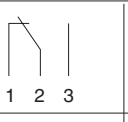
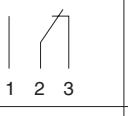
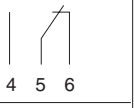
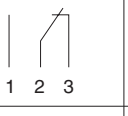
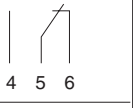
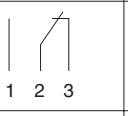
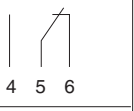
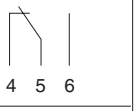
Output signal FXN 421

Depending on switch position in instrument:
A) One relay operates as a limit signal relay
in minimum or maximum fail-safe mode
and one as an alarm relay
or
B) Both relays operate simultaneously as limit signal relays
in minimum or maximum fail-safe mode
(alarm indication only by LED on front plate)
See also Section "Fail-safe mode".

	A			B		
Input signal	Switch positions	Limit signal	Alarm indication	Switch positions	Limit signal	Limit signal
0,35 … 1,2 mA						
2,1 … 6,5 mA						
Cable breakage < 0.2 mA Short-circuit > 6.5 mA	Max.			Max.		
0,35 … 1,2 mA						
2,1 … 6,5 mA						
Cable breakage < 0.2 mA Short-circuit > 6.5 mA	Min.			Min.		

Output signal FXN 422

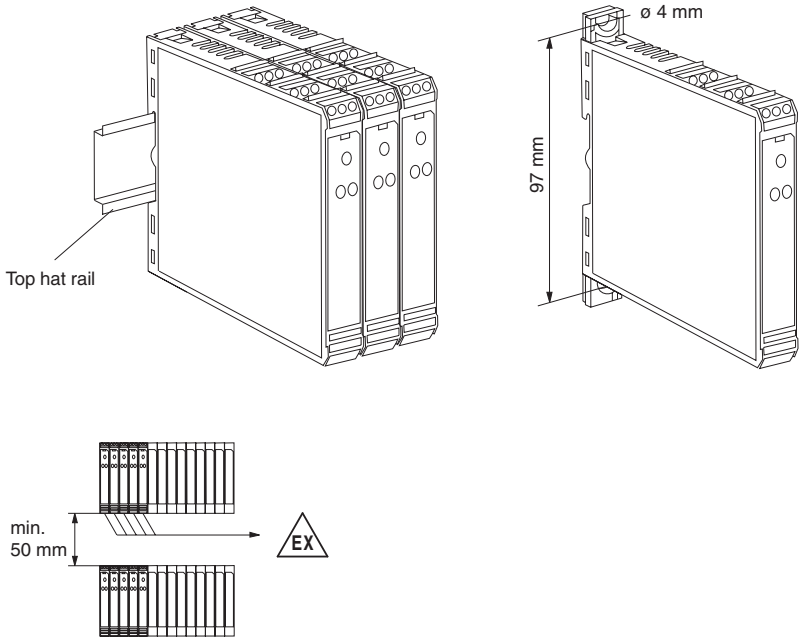
Each channel has one relay output for the limit signal.
The relays operate independently of each other in minimum or maximum fail-safe mode depending on switch position.
(Alarm indication only via the LED on the front plate).
See also Section "Fail-safe mode".

Input signal Channel 1/2	Switch positions	Output signal Channel 1	Output signal Channel 2
0,35 … 1,2 mA			
2,1 … 6,5 mA			
Cable breakage < 0.2 mA Short-circuit > 6.5 mA	Max.		
0,35 … 1,2 mA			
2,1 … 6,5 mA			
Cable breakage < 0.2 mA Short-circuit > 6.5 mA	Min.		

Signal on alarm	Output signal for power failure and for defective cable: relay de-energised
Load (connectable load)	Loads switched via the potential-free change-over contacts. I~ max. 2 A, U~ max. 250 V; P~ max.100 VA, cos φ = 1, P~ max. 70 VA, cos φ > 0,7; I– max. 2 A, U– max. 125 V, P– max. 50 W. In order to protect the relay contact, a spark quencher is to be used when connecting instruments with high inductivity. Depending on the load connected, a fine-wire fuse is used to protect the relay contact on short-circuiting.
Fail-safe mode	Minimum/maximum quiescent fail-safe current, can be switched over (switch behind front plate). Minimum fail-safe mode: The output relay de-energises when there is a "low" signal at the input, on alarm (↳) or when the power fails. Maximum fail-safe mode: The output relay de-energises when there is a "high" signal at the input, on alarm (↳) or when the power fails. **Important!** Note the output signal of the limit switch, especially when this has a switch-over mode for the current signal!
Switching time	Switching delay approx. 20 ms after change in the input signal
Power up response	When the power is switched on the output assumes the power fail signal. The correct switching mode is assumed after max. 2 s

Operating Conditions

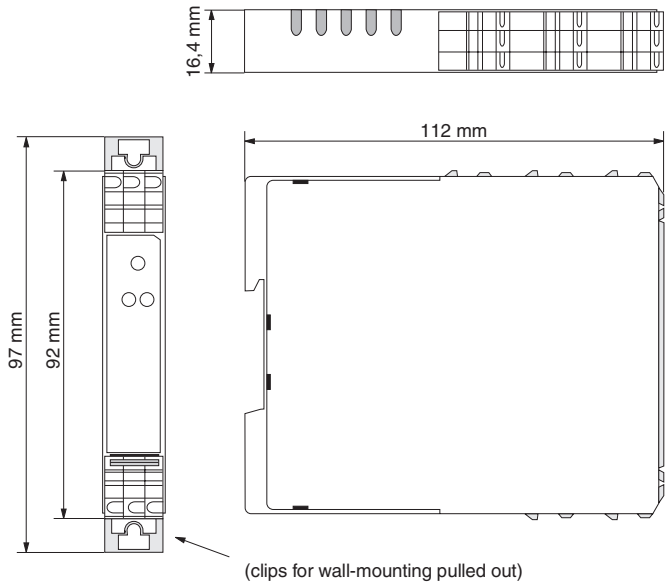
Installation

Mounting instructions	Mount in a control cabinet or protective housing. Row-mounting on a 35 mm top hat rail to EN 50022 or wall-mounting; no clearances to flanking instruments required. Min. 50 mm clearance above and below the instruments required for limit switches operating in explosion-hazardous areas. 

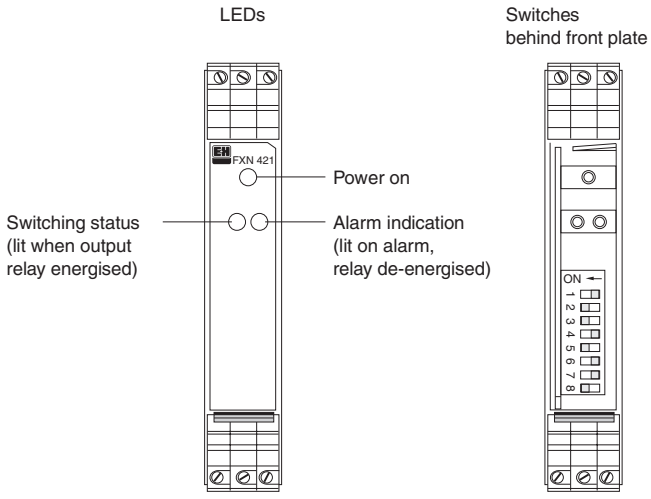
Environment

Ambient temperature range	0 … 60 °C
Storage temperature range	–20 °C … +70 °C
Climatic class	Relative humidity to 90 %, not condensing (up to 35 °C)
Degree of protection	IP 20 to EN 60529
Electromagnetic compatibility	Interference immunity: EN 50082-2 Interference emission: EN 50081-2

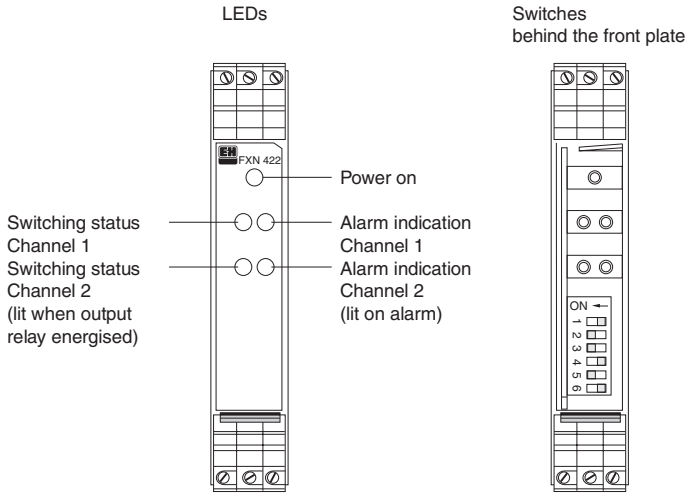
Mechanical Construction

Design	Dimensions 
Weight	approx. 0.15 kg
Material	Polyamide

Display and operating interface

Operation	Settings on switches behind the hinged front plate
Display and operating elements FXN 421	8 miniature switches for relay functions; green LED to indicate power on, yellow LED to indicate switching status, red LED to indicate alarm 

Display and operating elements FXN 422	6 miniature switches for relay functions; green LED to indicate power on, one yellow LED per channel to indicate switching status, one red LED per channel to indicate alarm



Certificates and Approvals

Electrical area classification	CSA	Cl. I,II,III, Div. 1, Gr. A-G
	CESI	[EEx ia] IIC
	FM	Cl. I,II,III, Div. 1, Gr. A-G
	VNIVE	[Ex ia] IIC
	SEV	[Ex ia] IIC
	SABS	[Ex ia] IIC
	SAA	[Ex ia] IIC
94/9/EG (ATEX) guidelines	In preparation	
Overspill protection to WHG (German Water Regulations)	In preparation	

Order Code

Isolating switch repeater	FXN 421, Single-channel unit for AC power supply	Order No. 52002278
	FXN 421, Single-channel unit for DC power supply	Order No. 52002276
	FXN 422, Two-channel unit for AC power supply	Order No. 52002279
	FXN 422, Two-channel unit for DC power supply	Order No. 52002277

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