

ISOLATING REPEATER IRU-420



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USED SYMBOLS

To ensure maximum safety of control processes, we have defined the following safety instructions and information. Each instruction is labelled with the appropriate pictogram.



Alert, warning, danger

This symbol informs you about particularly important instructions for installation and operation of equipment or dangerous situations that may occur during the installation and operation. Not observing these instructions may cause disturbance, damage or destruction of equipment or may cause injury.



Information

This symbol indicates particularly important characteristics of the device.



Note

This symbol indicates helpful additional information.

SAFETY



All operations described in this instruction manual have to be carried out by trained personnel or by an accredited person only. Warranty and post warranty service must be exclusively carried out by the manufacturer.

Improper use, installation or set-up of the sensor can lead to crashes in the application.

The manufacturer is not responsible for improper use, loss of work caused by either direct or indirect damage, and for expenses incurred at the time of installation or during the period of use of the level sensors.

1. BASIC DESCRIPTION

Isolating repeaters IRU-420 are designed for supply intrinsically safe level meters in explosive areas and for conversion of input signal 0/4 ÷ 20 mA to output signal. Galvanic separation of current signal from explosive area to non-explosive area. Housing of units are made by polycarbonate and ready for mounting on DIN rail 35 mm. Is manufactured in variants for 24 V DC or 230 V AC.

2. RANGE OF APPLICATION

II (1)G [Ex ia Ga] IIB/IIC - can be used in a non-explosive area or in a solid enclosure "d". Their external intrinsically safe circuits with an intrinsic safety of ia can be used in dangerous areas zone 0, zone 1, zone 2 in the sense of EN 60079-10-1 (explosive gas atmospheres).

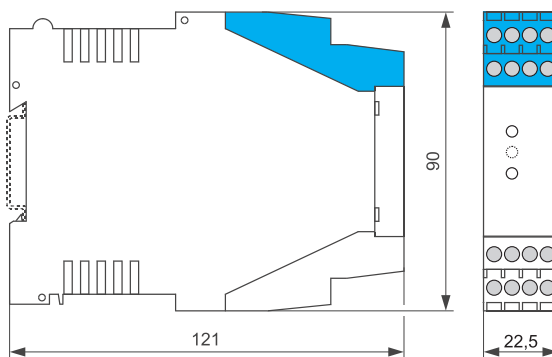
II (1)D [Ex ia Da] IIIC - can be used in a non-explosive area or in a solid enclosure "d". Their external intrinsically safe circuits with an intrinsic safety of ia can be used in dangerous areas zone 20, zone 21, zone 22 in the sense of EN 60079-10-2 (explosive atmospheres with flammable gas).

Ⓔ I (M1) [Ex ia Ma] I - can be used in a non-explosive area or in a solid enclosure "d". Their external intrinsically safe circuits with a intrinsic safety of ia can be used in underground parts of mines and surface installations of these mines, where there is a probability of a methane or flammable gas hazard occurring.

3. BASIC VARIANTS

- **IRU-420-I** converts signal 0/4 ... 20 mA to 0/4 ... 20 mA from explosive area to non-explosive area.
- **IRU-420-H** converts signal 0/4 ... 20 mA to 0/4 ... 20 mA from explosive area to non-explosive area, bidirectional transmission of communication signal HART®.
- **IRU-420-U** converts signal 0/4 ... 20 mA to 0 ... 10 V from explosive area to non-explosive area. Possibility of switching the two-state relay.

4. DIMENSIONAL DRAWING



5. INSTALLATION AND PUTTING INTO OPERATION

Please follow next 3 steps:

- **INSTALLATION INSTRUCTIONS**
- **ELECTRICAL CONNECTION**
- **COMMISSIONING**

6. INSTALLATION INSTRUCTIONS

Isolating repeaters IRU-420 are intended for installation on switchboards on DIN rail mounting 35mm. The DIN rail is closed shut by pushing down the flap on the front side. Removal is performed using a screwdriver to release the flap. We recommend installing the units in a vertical position.

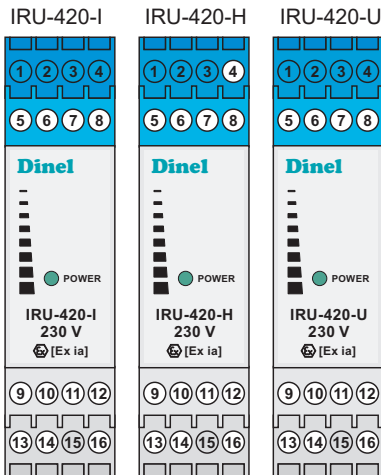
7. ELECTRICAL CONNECTION

The electrical connection is performed in a voltage-free state. The supply voltage (terminals 13 and 14) can be connected to mains power only via a fuse or a circuit breaker (max. 16 A)! On to terminals 5, 6 and 7 (blue terminal block, side IN) only an approved sensor with a current output of 0/4 ... 20 mA may be connected, conforming to the conditions of the given hazardous area. If the sensor is connected to terminals 5 and 6, then it is also powered from these terminals. If, however, the sensor is connected to terminals 6 and 7, an external power source must be used to power it. The output from the device is a current signal 0/4 ... 20 mA or a voltage signal 0 ... 10 V with working contacts 9, 10, 11 (grey terminal block, side OUT). Terminals no. 4, 8 and 12, 16 (on version IRU-420-H) are used for the connection of an external communicator HHC (HHC - Hand-Held-Communicator).

8. COMMISSIONING

Consists of turning on the power voltage supply. Verification of correct functionality of mains power circuits - the green (POWER) LED on the front panel is lit. The isolating repeater IRU-420 is not set in any way.

9. FRONT PANEL AND TERMINAL BLOCK

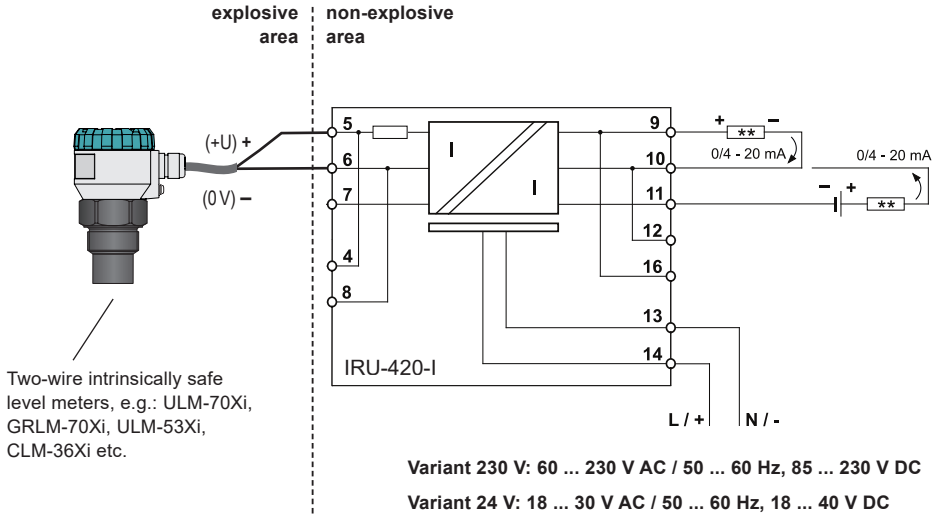


	IRU-420-I	IRU-420-H	IRU-420-U
1			
2			
3			
4		HHC	
5	IN	IN	IN
6	IN	IN	IN
7	IN	IN	IN
8		HHC	
9	OUT	OUT	OUT
10	OUT	OUT	OUT
11	OUT	OUT	OUT
12		HHC	
13	N / -	N / -	N / -
14	L / +	L / +	L / +
15			
16		HHC	

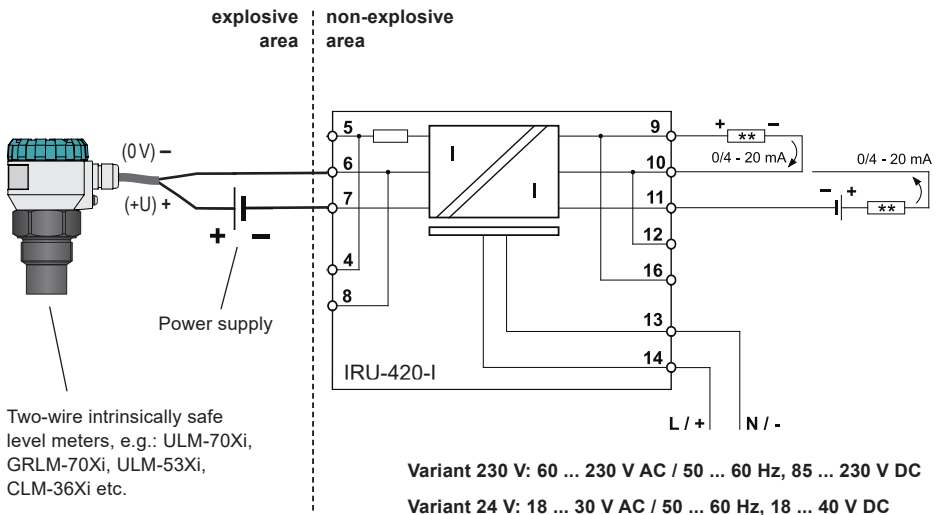
10. CONNECTION EXAMPLES

LEVEL METER CONNECTION (OUTPUT 0/4 ... 20 mA) IN AN EXPLOSION HAZARD AREA TO AN IRU-420-I UNIT WITH A CURRENT OUTPUT

A) VARIANT POWER SUPPLY THROUGH THE UNIT IRU



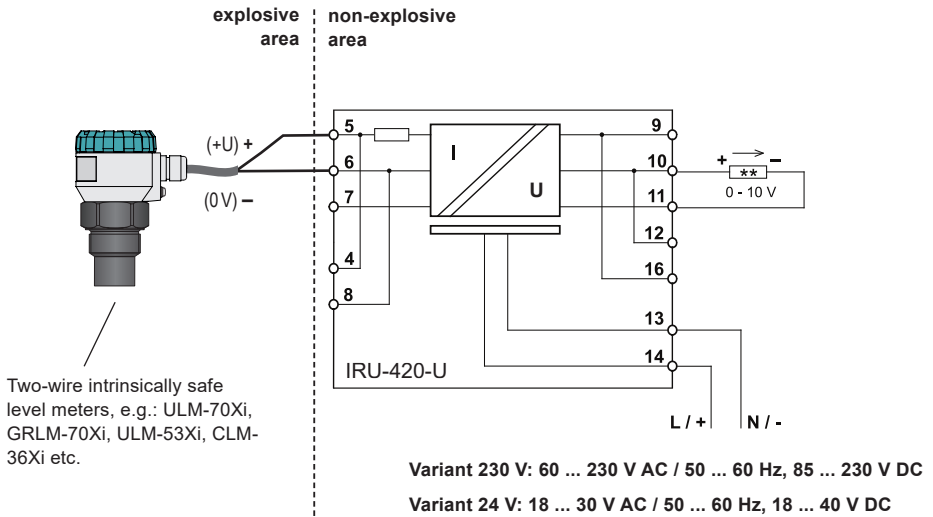
B) VARIANT WITH EXTERNAL POWER SUPPLY



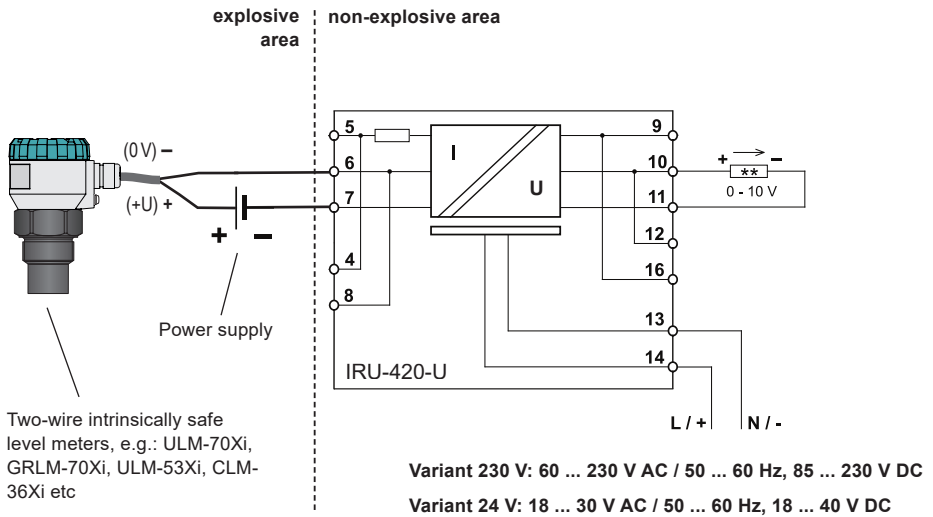
** - Output devices (e.g. programmable display unit PDU, analog input PLC etc.).

LEVEL METER CONNECTION (OUTPUT 0/4 ... 20 MA) IN AN EXPLOSION HAZARD AREA TO AN IRU-420-U UNIT WITH A VOLTAGE OUTPUT

A) VARIANT POWER SUPPLY THROUGH THE UNIT IRU

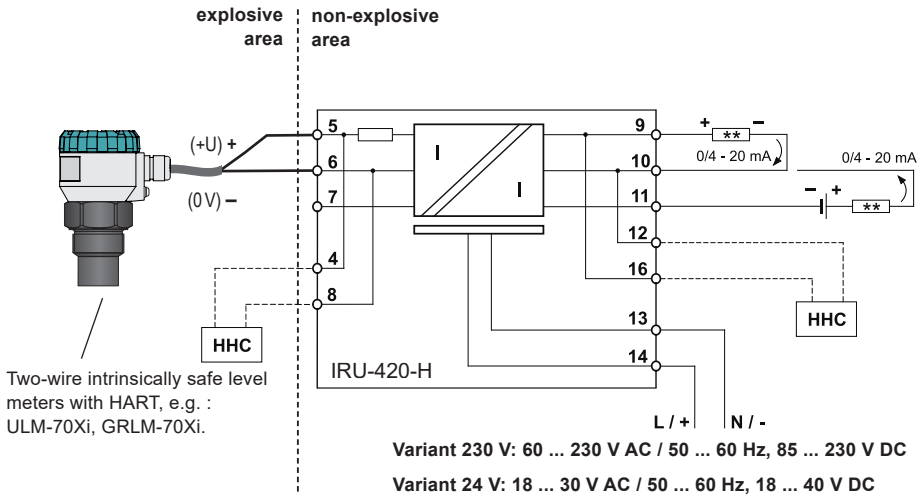


B) VARIANT WITH EXTERNAL POWER SUPPLY



** - Output devices (e.g. programmable display unit PDU, analog input PLC etc.).

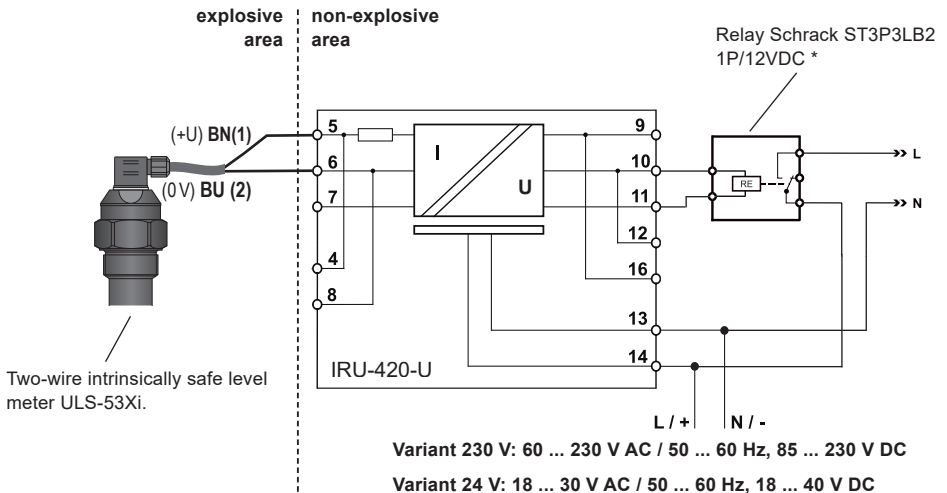
LEVEL METER CONNECTION (OUTPUT 0/4 ... 20 mA + HART) IN AN EXPLOSION HAZARD AREA TO AN IRU-420-H UNIT WITH A CURRENT OUTPUT AND HART COMMUNICATION



HHC - Hand-held communicator (communicator HART)

** - Output devices (e.g. programmable display unit PDU, analog input PLC etc.).

LIMIT LEVEL SENSOR (OUTPUT 4/20 mA) IN AN EXPLOSION HAZARD AREA, IRU-420-U UNIT WITH A VOLTAGE OUTPUT AND A TWO-STATE RELAY



* - Relay is connected to the unit via the IRU socket type ST3P3LB2 with LED indication.

11. FUNCTION AND STATUS INDICATION

LED indicator	colour	function
POWER	green	shines - connection to power supply, correct function dark - internal malfunction, output terminals 9 and 11 are overloaded

12. ORDER CODE

IRU – 420 – –

- power supply: **230 V** – 60...230 V AC (85...230 V DC)
24 V – 18...30 V AC (18...40 V DC)
- type of output: **I** – current output
H – current output with bidirectional communication HART
U – voltage output

13. SAFETY, PROTECTION, COMPATIBILITY AND EXPLOSION PROOF

Isolating repeater is equipped with protection against input and output current overload.

Connection to supply can be only through fuse or overcurrent circuit breaker (max. 16 A). Working areas according to EN 60079-10 non-explosive, or installation in flameproof enclosure "d".

Unit is sheltered by fuse T80 mA (variant 230 V) and T500 mA (variant 24 V).

Electrical equipment of protection group II. Electrical safety according to EN 61010 - 1.

Electromagnetic compatibility according to EN 55022, EN 61326, EN 61000-6-2, EN 61000-4-2, -3, -4, -5, -6 and -11.

The intrinsic safety of input terminals of the unit according to EN IEC 60079-0 and EN 60079-11. Explosion proof of Intrinsically safe supply units examined by FTZÚ-AO 210 Ostrava-Radvanice, certificate No.: FTZÚ 05 ATEX 0167X.

A declaration of conformity was issued for this device in the wording of Act No. 90/2016 Coll., as amended. Supplied electrical equipment matches the requirements of valid European directives for safety and electromagnetic compatibility.

Special conditions for safe use

When applied in mining conditions must IRU-420 units located either in a safe non-explosive area, or must be placed inside the flameproof enclosure type "d".

14. USE, MANIPULATION AND MAINTENANCE

The operator must check the functionality of the unit (green POWER LED is shining). Maintenance of the device consists of removing dust from the surface of the device and checking the integrity of the terminal box and terminals block. In the event that any visible defects are discovered, immediately inform the manufacturer or reseller of this equipment.

It is forbidden to make any changes to or to tamper with the device without the consent of the manufacturer. Any repairs must only be carried out by the manufacturer or by a service organisations authorised by the manufacturer. Assembly, installation, commissioning, service and maintenance of the device must be carried out in accordance with these technical conditions and the provisions of valid standards for the installation of electrical equipment must be complied with.

15. GENERAL CONDITIONS AND WARRANTY

Dinel, s.r.o. guarantees for the period of three (3) years that the product has the characteristics as mentioned in the technical specification.

Dinel, s.r.o. is liable for defects ascertained within the warranty period and were claimed in writing.

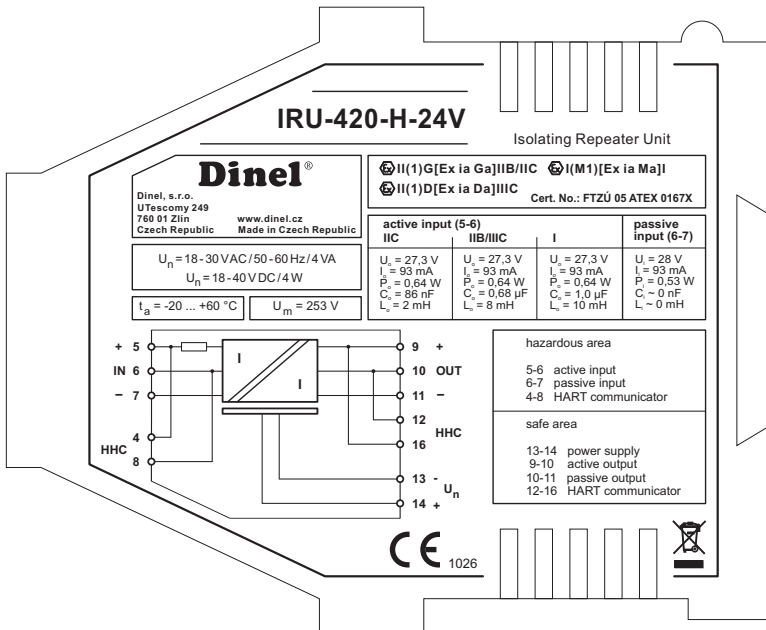
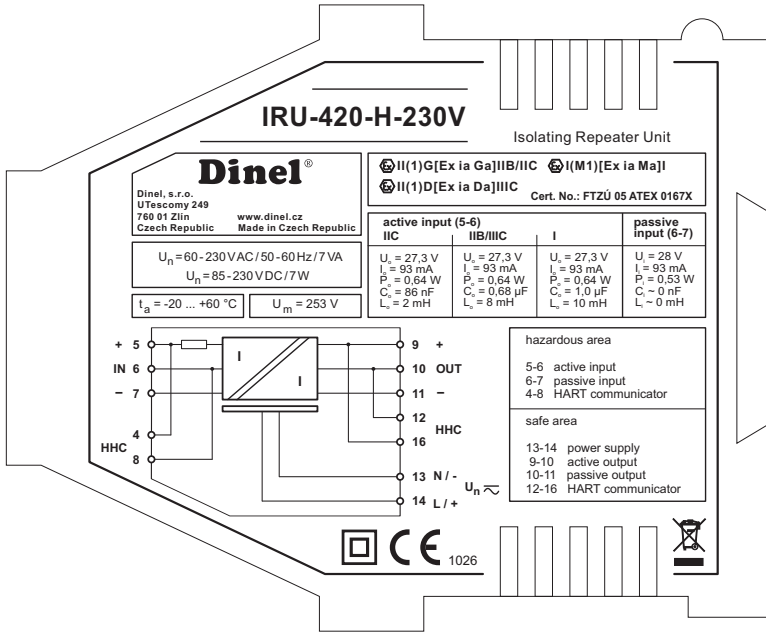
This guarantee does not cover the damages resulting from misuse, improper installation or incorrect maintenance.

This guarantee ceases when the user or the other person makes any changes on the product or the product is mechanically or chemically damaged, or the serial number is not readable.









The warranty certificate must be presented to exercise a claim.

In the case of a rightful complaint, we will replace the product or its defective part. In both cases, the warranty period is extended by the period of repair.

16. MARKING OF LABELS



Information on the side label of **IRU-420-H-230V, IRU-420-H-24V:**

- Symbol of producer: logo Dinel®
- Contact: Dinel, s.r.o., U Tescomy 249, 760 01 Zlín, Czech Republic, www.dinel.cz
- Type of unit:
 - IRU-420-H-230V
 - on 230 V version a double insulation symbol (class II protection device): 
 - IRU-420-H-24V
- Mark of non-explosive device: 
- Variant:  II (1) G [Ex ia Ga] IIB/IIC,  II (1) D [Ex ia Da] IIIC,  I (M1) [Ex ia Ma] I
- Number of certificate of intrinsic safety:: FTZÚ 05 ATEX 0167X
- Limit parameters:
 - Specifications IIC: $U_0 = 27,3 \text{ V}$; $I_0 = 93 \text{ mA}$; $P_0 = 0,64 \text{ W}$; $C_0 = 86 \text{ nF}$; $L_0 = 2 \text{ mH}$
 - Specifications IIB/IIC: $U_0 = 27,3 \text{ V}$; $I_0 = 93 \text{ mA}$; $P_0 = 0,64 \text{ W}$; $C_0 = 0,68 \text{ }\mu\text{F}$; $L_0 = 8 \text{ mH}$
 - Specifications: $U_0 = 27,3 \text{ V}$; $I_0 = 93 \text{ mA}$; $P_0 = 0,64 \text{ W}$; $C_0 = 1,0 \text{ }\mu\text{F}$; $L_0 = 10 \text{ mH}$
- Limit operating parameters - passive input:
 - $U_i = 28 \text{ V}$; $I_i = 93 \text{ mA}$; $P_i = 0,53 \text{ W}$; $C_i \approx 0 \text{ nF}$; $L_i \approx 0 \text{ mH}$
- Nominal power voltage
- Maximum effective value of alternating or direct voltage $U_m = 253 \text{ V}$
- Ambient temperature range: $t_a = -20 \dots +60 \text{ }^\circ\text{C}$
- Maximum load for output contacts
- Supply voltage range
- Serial number: Ser. No.: _____ – (from the left: production year, serial production number)
- Functional block diagram and table of functional states
- Compliance mark:   Number of authorized person supervising over the quality system: 1026
- Electro-waste take-back system mark: 

17. TECHNICAL SPECIFICATIONS

BASIC TECHNICAL DATA			
	IRU-420-I	IRU-420-H	IRU-420-U
Input value	0/4 ... 20 mA	0/4 ... 20 mA	0/4 ... 20 mA
Output value	0/4 ... 20 mA	0/4 ... 20 mA	0 ... 10 V (loading max. 20 mA)
Bidirectional transmission communication signal HART	NO	YES	NO
Nominal supply voltage variant 230 V variant 24 V	60...230 V AC (+10 %) 50÷60 Hz, 85...230 V DC (+10 %) 18...30 V AC (+10 %) 50+60 Hz; 18...40 V DC (+10 %)		
Nominal power demand (AC / DC)	7 VA / 4 W		
Maximum effective value of AC or DC voltage that can be connected to the terminals follow-up devices that are not intrinsically safe, without breaking the type of protection	Um = 253 V		
Voltage on active input (terminals 5 a 6)	typ. 24,1 V DC (0 mA) / min. 18 V DC (20 mA)		
Output auxiliary voltage (terminals 9 a 11)	24 V DC (max. 25 mA)		
Linearity	≤ 0,05 % (4 ... 20 mA) / ≤ 0,07 % (0 ... 20 mA)		≤ 0,05 %
Temperature error	≤ 0,05 % / K		
Allowed short circuit time (input and output)	unlimited (short on output is indicated by off LED)		
Ambient temperature	-20 °C ... +60 °C		
Protection class	IP 20		
Housing material	Polycarbonate		
Material of terminals	CuBe		
Max. conductor size	1 x 2,5 mm ²		
Isolating voltage (main terminals / input + output)	3500 V		
Isolating voltage (input / output)	3500 V		
Weight	cca 0,2 kg		

SPACE CLASSIFICATION AND LIMIT PARAMETERS (EN IEC 60079-0 a EN 60079-11)		
Classification	Limiting parameters of intrinsically safe circuit	
	Active input - terminals 5 and 6	Passive input - terminals 6 and 7
II C	$U_0 = 27,3 \text{ V}; I_0 = 93 \text{ mA}; P_0 = 0,64 \text{ W}; C_0 = 86 \text{ nF}; L_0 = 2 \text{ mH}$	$U_i = 28 \text{ V}; I_i = 93 \text{ mA}; P_i = 0,53 \text{ W}; C_i \approx 0 \text{ nF}; L_i \approx 0 \text{ mH}$
II B / III C	$U_0 = 27,3 \text{ V}; I_0 = 93 \text{ mA}; P_0 = 0,64 \text{ W}; C_0 = 0,68 \text{ }\mu\text{F}; L_0 = 8 \text{ mH}$	
I	$U_0 = 27,3 \text{ V}; I_0 = 93 \text{ mA}; P_0 = 0,64 \text{ W}; C_0 = 1 \text{ }\mu\text{F}; L_0 = 10 \text{ mH}$	

The maximum values listed above can be used as concentrated capacitance and inductance values.

CONNECTION CABLE REQUIREMENTS (EN 60079-25 a EN 60079-14)

maximum cable capacitance C_c	$C_c = C_o - C_i$
maximum cable inductance L_c	$L_c = L_o - L_i$
Attention: C_i is the maximum internal capacitance of the intrinsically safe device connected to terminals 5, 6.	
Attention: L_i is the maximum internal inductance of the intrinsically safe device connected to the terminals 5, 6.	

18. PACKING, SHIPPING AND STORAGE

Isolating repeater IRU-420 is packaged in a paper box, and the entire consignment is placed into a cardboard box. A suitable filler material is used in the cardboard box to prevent mechanical damage during transport. Remove the device from the packaging only just before using, thereby protecting it from potential damage.

A forwarding company will be used to ship goods to the customer. Upon prior agreement, ordered goods can be picked up in person at company headquarters. When receiving, please check to see that the consignment is complete and matches the order, or to see if any damage has occurred to the packaging and device during transport. Do not use a device clearly damaged during transport, but rather contact the manufacturer in order to resolve the situation.

If the device is to be further shipped, it must be wrapped in its original packaging and protected against impact and weather conditions.

Store the device in its original packaging in dry areas covered from weather conditions, with humidity of up to 85 % without effects of chemically active substances. The storage temperature range is -10°C to $+50^{\circ}\text{C}$.

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