Field Barrier Ex d/Ex i

Type 3770

⟨Ex⟩ II 2 G EEx d [ia] IIC T6

Application

Field barrier with flameproof enclosure serving as an interface between intrinsically safe and non-intrinsically safe circuits in hazardous areas.

The field barrier is suitable for operating positioners, smart positioners with HART® communication, i/p converters, solenoid valves or limit switches.

Devices with HART® communication need an adaptation, which is available e.g. with Type 3730-3 and Type 3730-6 Positioners.

Upstream connection and direct attachment to intrinsically safe field devices enable the intrinsically safe circuits of these devices to be connected with the circuits of upstream input and output units that are not intrinsically safe. In this way, the advantages of intrinsic safety, such as commissioning and operation when connected to a voltage source, are still in effect within the hazardous area.

The connecting cable of the non-intrinsically safe circuit is introduced in the housing of the field barrier either via pipeline systems or via design-certified cable or conduit entries.

The field barrier transmits the analog reference variable to i/p converters and positioners. The use of HART protocol is also possible.

The field barriers must be connected to the equipotential bonding system either via the negative conductor (non-floating) or via the line between the positive and the negative conductor (floating). The selection of the appropriate version (with grounding via negative conductor or via connecting line) must correspond to the grounding method of the analog output of the controller or control system.

The version with three channels allows the connection of two limit switches according to EN 60947-5-6 or one intrinsically safe solenoid valve and one limit switch.

An M20 x 1.5 adapter allows for a direct connection through the cable entry of the field devices.

Principle of operation

Channel 1 of the field barrier is especially designed for transmitting analog signals in the range of 4 to 20 mA, but it also transmits the HART protocol.

Channels 2 and 3 are intended for controlling limit switches according to EN 60947-5-6 or Ex i solenoid valves (e.g. Type 3767 Positioner with a solenoid valve coil for 6 V).

Fig. 1 · Type 3770 Field Barrier, attached to positioner

Attachment

The field barrier possesses a connecting adapter with an M20 x 1.5 male thread, allowing direct mounting on an intrinsically safe field device, such as a Type 3730-3 Positioner. If the wiring method is used, the cable ends must be connected to an Ex i junction box.

The input is fitted with a ½" female thread or an M20 x 1.5 female thread connection.

Table 1 · Technical data

Type of protection		**EEx d [ia] IIC T6**	
Connection		Channel 1: Ch 1 +/–	Channels 2 and 3: Ch 2 +/– and Ch 3 +/–
Operational values		(0) 4 ... 20 mA or U_N ... 15 V or limit switches acc. to EN 60947-5-6 not suitable for transmitter supply	(0) 4 ... 20 mA or U_N ... 10 V or limit switches acc. to EN 60947-5-6 not suitable for transmitter supply
Input		U_m = 250 V	
Fuse rating		I_N = 80 mA (slow-acting)	
Output circuit		EEx ia IIC	
Max. values acc. to EC Type Examination Certificate	U_0 I_0 P_0 C_0 L_0	≤ 17.2 V ≤ 110 mA ≤ 473 mW 360 nF/IIC · 2.1 µF/IIB 3 mH/IIC · 12 mH/IIB	≤ 12.6 V ≤ 49 mA ≤ 154 mW 1.15 µF/IIC · 7.4 µF/IIB 15 mH/IIC · 56 mH/IIB
Series resistance	R_{Lmax}	190 Ω	285 Ω
Load impedance		3.8 V at 20 mA	5.7 V at 20 mA
Permissible ambient temperature		–45 °C ≤ t_a ≤ 60 °C T6	
Enclosure material		Die-cast aluminum, painted or stainless steel (AISI 316)	
Degree of protection		IP 65 according to IEC 529	

Electrical connections

The individual current circuits of the Type 3770 Ex d/Ex i Field Barrier are electrically connected with internal and external equipotential bonding terminals.

For safety reasons, the intrinsically safe circuits must be connected to the equipotential bonding system. The connection between the equipotential bonding terminal and the equipotential bonding system must be as short as possible.

The selection of the grounding method of the barrier must correspond to the grounding method of the analog output of the controller or control system, i.e. either the connecting line between the negative and the positive conductor of Channel 1 (Fig. 2) or the negative conductor of Channel 1 (Fig. 3) has to be connected to the equipotential bonding system.

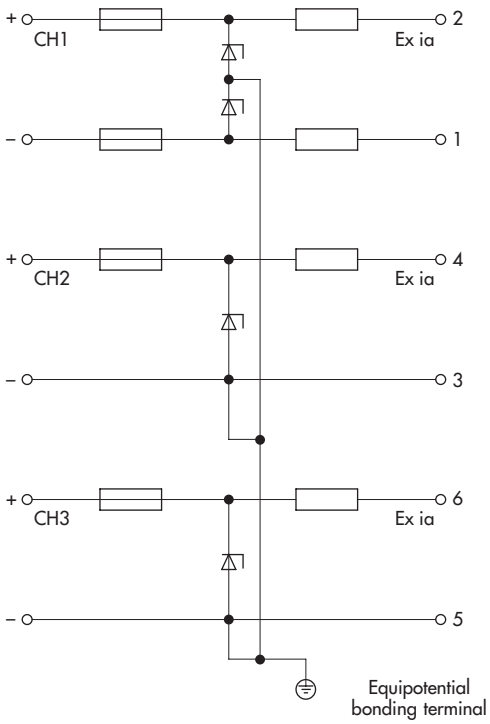


Fig. 2 · Circuit diagram for Type 3770-1310
Channel 1 floating

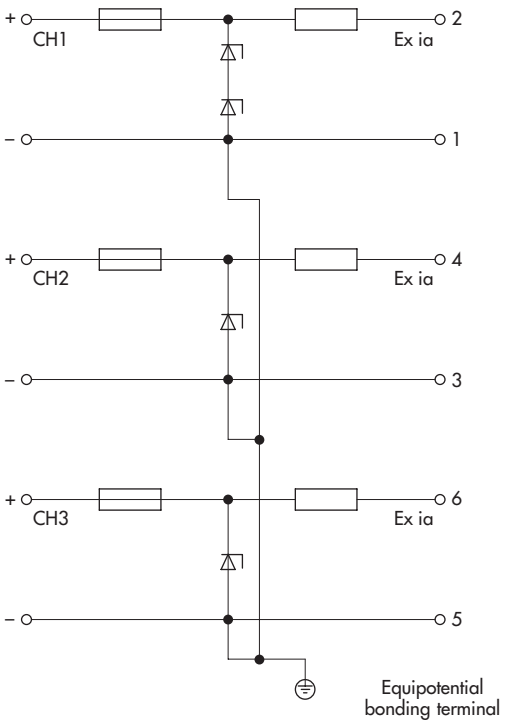


Fig. 3 · Circuit diagram for Type 3770-1410
Channel 1 non-floating

Circuitry

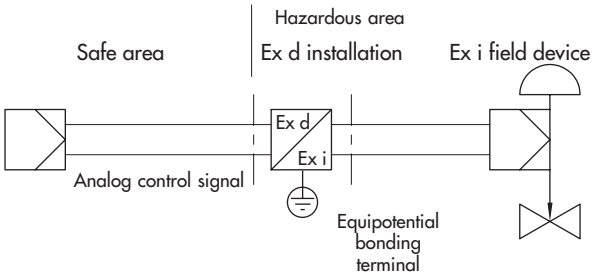


Fig. 4 · Field barrier (one channel interconnected) with positioner and pneumatic control valve

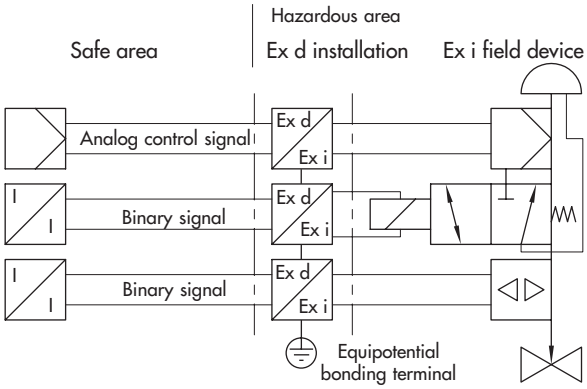
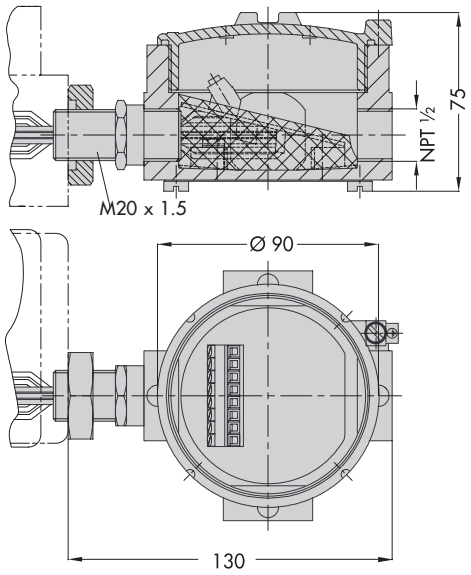
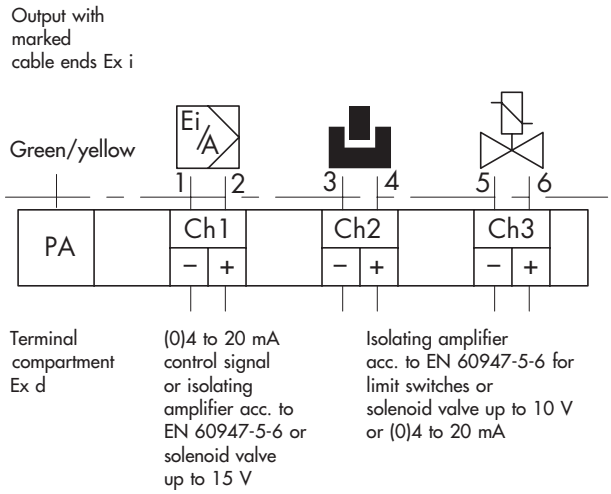


Fig. 5 · Field barrier (three channels interconnected) with positioner, solenoid valve and limit switch mounted on a pneumatic control valve

Dimensions in mm



Electrical connections



Explosion protection certificates for Type 3770 Field Barrier

Type of approval	Certificate number	Date	Comments
EC Type Examination Certificate	PTB 98 ATEX 1025X	1998-06-08	Ⓔx II 2 G EEx d [ia] IIC T6
First Addendum		2000-10-10	Channel 1 non-floating
GOST approval	B 02637	2009-02-26	1 Ex d [ia] IIC T6

Article code

Field barrier acc. to ATEX	**Type 3770-**	1	x	x	x	0	x	x	x
Three channels 4 to 20 mA, floating and two 2 circuits acc. to EN 60947-5-6			3						
Three channels 4 to 20 mA, non-floating and two 2 circuits acc. to EN 60947-5-6			4						
Electrical connection									
Female thread ½ NPT (aluminum)				1	0				
Female thread M20 x 1.5 (stainless steel)				3	1				
Housing material									
Die-cast aluminum					0				
Stainless steel AISI 316					1				
Special version									
None							0	0	0
GOST approval							0	0	1

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