



Intrinsically Safe Solutions INSTALLATION MANUAL

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Table of Contents

Section 1	About this Manual.....	2
1.1.	Notes, Cautions and Warnings	2
1.2.	Related Documentation	2
Section 2	Intrinsically Safe Solutions Overview.....	3
2.1.	Introduction	3
2.2.	Intrinsically Safe Area Classification	3
2.3.	Intrinsically Safe Solution System Diagram	5
Section 3	List of Recommended Devices	6
3.1.	Intrinsic Safety Barrier	6
3.2.	Intrinsic Safety Barrier Enclosure.....	6
3.3.	Intrinsically Safe Devices	6
Section 4	Installation Information	7
4.1.	Intrinsically Safe Solution for IS conventional devices.....	7
4.1.1	Wiring schematic for IS conventional devices	8
4.2.	Intrinsically Safe Solution for IS addressable devices.....	9
4.3.	Intrinsically Safe Solution for IS sounders and beacons.....	10

Section 1 About this Manual

1.1. Notes, Cautions and Warnings

This manual contains notes, cautions and warnings to alert the reader as follows:



NOTE: Supplement information for a topic such as tips and references.



CAUTION: Information about procedures that could cause programming errors, runtime errors, or equipment damage.



WARNING: Indicates information about procedures that could cause irreversible equipment damage, irreversible loss of programming data or personal injury.

1.2. Related Documentation

Related documentation:

Title	Document Number
CFP-16 Operation, Installation & Programming manual	DOC-01-022
AFP-2800-2802 Operation, Installation & Programming manual	DOC-01-010
MTL 5500 Series Instruction manual	INM5500
MTL 7700 Series Instruction manual	INM7700
Y72221 Intrinsically Safety Barrier for Addressable Detection technical datasheet	IDX-751-IMX-1-y72221-768-415
DX Enclosures for MTL5000/7000 Series	INM57ENC
System Sensor 1151EIS Installation and Maintenance Instructions	D100-59-00
System Sensor 5451EIS Product Specification	D400-50-00
IS-A105N Instruction manual	IS 4501
IS-L101L Instruction manual	IS 4601
IS-mA1 Instruction manual	IS 5001
IS-mB1 Instruction manual	IS 5002
IS-mC1 Instruction manual	IS 5003
WCP3-1 Technical datasheet	KAC_IS-WCP3-1

Section 2 Intrinsically Safe Solutions Overview

2.1. Introduction

This document outlines the intrinsically safe solutions which include a list of recommended intrinsic safety barriers and intrinsically safe devices that are compatible with the range of Notifier products with the installation information.

Intrinsically safety (IS) is a low-energy signalling technique applied to electrical equipment and wiring in hazardous areas for safe operation by limiting the energy available for ignition. A hazardous area may contain flammable gasses, vapours or combustible dusts which can cause a fire or explosion when a source of ignition is present.

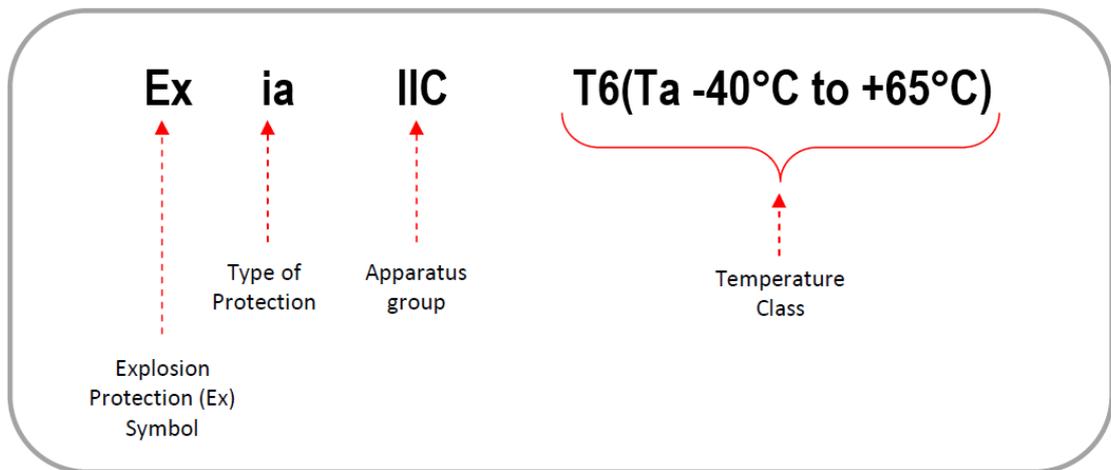
The intrinsically safe solutions require the installation of an intrinsic safety barrier with compatible intrinsically safe devices and in accordance with the manufacturer’s installation requirements.



NOTE: The intrinsically safe solution must be installed and tested by a qualified technical person in accordance with all appropriate standards which may include reference to AS60079.17 and in accordance with the instructions contained here.

2.2. Intrinsically Safe Area Classification

The intrinsically safe area classification in accordance with AS60079.0 is defined as below.



The explosion protection symbol Ex indicates that the electrical equipment corresponds to one or more of the types of protection.

Types of Protection

The types of protection for intrinsic safety “i” is subdivided into levels of protection “ia”, “ib” and “ic”; which correlate with equipment protection levels Ma and Mb (for installation in a mine susceptible to firedamp), Ga, Gb and Gc (for explosive gas atmospheres) and Da, Db and Dc (for explosive dust atmospheres). Refer to AS60079.0 for the equipment protection levels definitions.

Apparatus Group

The apparatus group is subdivided into group “I” (for electrical equipment intended for use in mines susceptible to firedamp) with “II” (for electrical equipment intended for use in explosive gas atmospheres other than mines susceptible to firedamp) and “III” (for electrical equipment intended for use in explosive dust atmospheres other than mines susceptible to firedamp).

Apparatus Group	Typical Gas	Ignitability
Group IIC	Acetylene Hydrogen	
Group IIB	Ethylene	
Group IIA	Propane	

Apparatus Group	Type of Dust
Group IIIC	Conductive dust
Group IIIB	Non-conductive dust
Group IIIA	Combustible flyings

Equipment marked IIC is suitable for applications requiring Group IIB equipment. Similarly, equipment marked IIB is suitable for applications requiring Group IIA equipment. This is applicable for both Apparatus groups II and III.

Temperature Class

The temperature class is determined by the highest surface temperature which can be measured from the equipment at the rated voltage and ambient temperature range.

Temperature Class	Maximum Surface Temperature (°C)
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Zone Definition

The zone definition is based upon the frequency of the occurrence and duration of the explosive gas or combustible dust atmospheres.

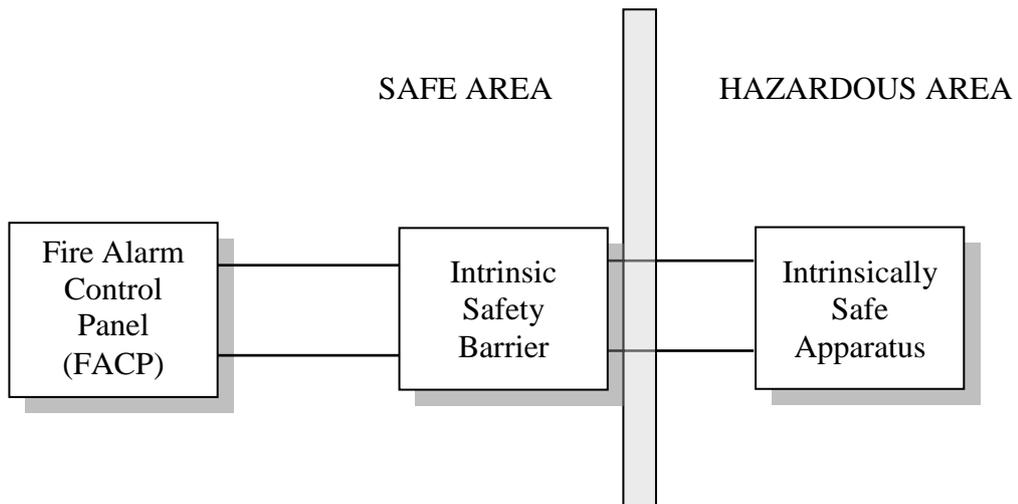
	Continuous Hazard	Intermittent Hazard	Possible Hazard
Explosive gas	Zone 0	Zone 1	Zone 2
Combustible dust	Zone 20	Zone 21	Zone 22
	Hazard is present continuously or for long period or frequently	Hazard is likely to occur in normal operation occasionally	Hazard is not likely to occur in normal operation but if occur, exists for a short period only

2.3. Intrinsically Safe Solution System Diagram

Fire protection applications often require signals to be sent between the fire panel and the fire protection devices such as detectors, sounders or strobes.

For an intrinsically safe solution system, the fire alarm control panel and the intrinsic safety barrier are usually installed in the safe area while the intrinsically safe fire protection devices are installed in the hazardous area.

The general intrinsically safe solution system diagram is shown below.



NOTE: The assumption of adding an intrinsic safety barrier to a circuit will result in an intrinsically safe solution is incorrect. The intrinsic safety barrier must be suitable with the type of intrinsically safe devices being installed.



NOTE: Always refer to the manufacturer's installation manual for installing the intrinsic safety barrier and intrinsically safe devices. This document is not intended to be used for installation but as a guideline only. Every care has been taken in the preparation of this document but no liability can be accepted for the use of the information therein.

Section 3 List of Recommended Devices

3.1. Intrinsic Safety Barrier

Model	Device Description	Intrinsic Safety Rating
MTL5561	2-channel galvanic isolator	[Ex ia] IIC (-20°C ≤ Ta ≤ +60°C) [Ex iaD] [Ex ia] I
MTL7728+	1-channel zener barrier	[EEx ia] IIC (-20°C ≤ Ta ≤ +60°C)
Y72221-L4	1-channel galvanic isolator	[Ex ia Ga] IIC (-20°C ≤ Ta ≤ +60°C) [Ex ia Ma] I [Ex ia Da] IIIC

3.2. Intrinsic Safety Barrier Enclosure

Model	Device Description	Ingress Protection Rating
DX070	DX enclosure for intrinsic safety barriers	IP65

3.3. Intrinsically Safe Devices

Model	Device Description	Intrinsic Safety Rating
1151EISE	Intrinsically safe conventional ionization smoke detector	[Ex ia] IIB T5 (-20°C ≤ Ta ≤ +40°C)
5451EISE	Intrinsically safe conventional thermal rate-of-rise detector	[Ex ia] IIB T5 (-20°C ≤ Ta ≤ +40°C)
IDX-751	Intrinsically safe addressable photoelectric detector	[Ex ia] IIC T5 Ga (-20°C ≤ Ta ≤ +40°C) [Ex ia] IIC T4 Ga (-20°C ≤ Ta ≤ +60°C)
IS-A105N	Intrinsically safe horn sounder	[Ex ia] IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)
IS-L101L	Intrinsically safe LED beacon	[Ex ia] IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)
IS-mA1	Intrinsically safe 'minialarm' sounder	[Ex ia] IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)
IS-mB1	Intrinsically safe 'minialite' beacon	[Ex ia] IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)
IS-mC1	Intrinsically safe 'minialert' combined sounder/ beacon	[Ex ia] IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)
WCP3A-IS	Intrinsically safe conventional outdoor manual call point	[Ex ia] IIB T4 Ga (-20°C ≤ Ta ≤ +70°C) [Ex iaD] T4 Da (-20°C ≤ Ta ≤ +40°C when Pi = 0.75W) and (-20°C ≤ Ta ≤ +40°C when Pi = 0.65W)

Section 4 Installation Information

4.1. Intrinsically Safe Solution for IS conventional devices

The intrinsically safe solution for the intrinsically safe conventional devices can be installed to meet **EEx ia IIB T5** (without WCP3A-IS) or **EEx ia IIB T4** (with WCP3A-IS).

The intrinsically safe conventional devices such as the 1151 EISE, 5451 EISE and WCP3A-IS shall be installed with the intrinsic safety barrier MTL5561 to the conventional zone on the CFP-16 fire panel or to the FZM-1/ XP6-MA monitoring input on the Notifier addressable fire panel.

The conventional zone shall be terminated using the End-Of-Line resistor with a resistance value of 3k9Ω. Refer to Clause 5.3.3 of AS60079.0-2012 for the surface area and the acceptable surface temperature exceeding the temperature classification.

The intrinsic safety barrier shall be housed in the intrinsic safety barrier enclosure DX070 for protection against excessive mechanical and thermal stresses, dust, moisture and other contaminants and be installed in the safe area only.

The maximum number of intrinsically safe addressable devices that can be installed on a circuit shall not exceed 2.02 mA.

IS Detector	Quiescent Current		
	Quantity	x [current draw] =	Total (mA)
1151EISE	[]	x [I _{DETECTOR} *]	
5451EISE	[]	x [I _{DETECTOR} *]	
WCP3A-IS	[]	x [I _{MCP} *]	
Total Quiescent Current shall be less than 2.02 mA			

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected to either channel of the intrinsic safety barrier must not exceed the following values[†]:

Group	Capacitance (μF)	Inductance (mH)	Or L/R Ratio (μH/Ω)
IIB	0.65	12.6	210
IIA	2.15	33.6	444



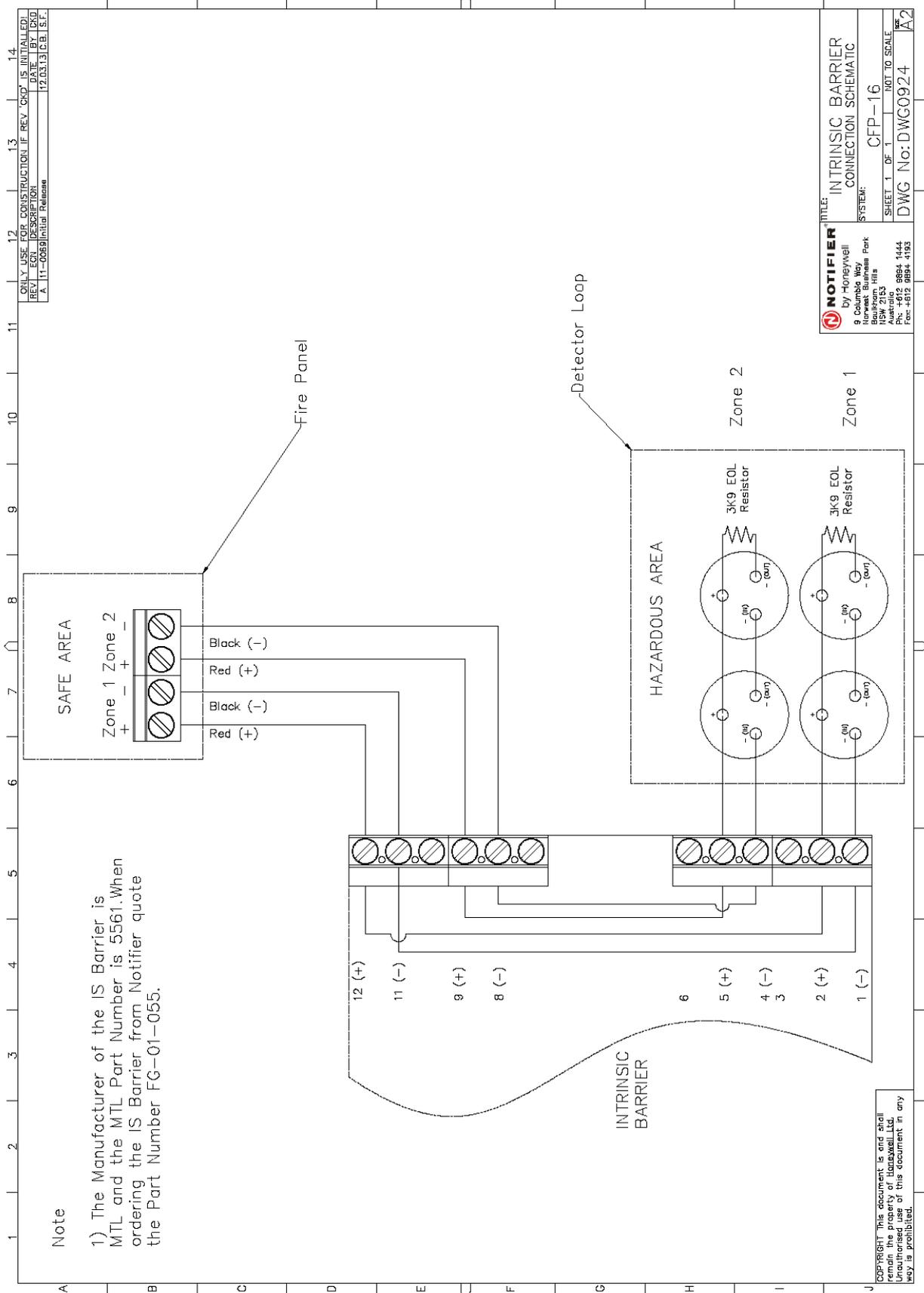
NOTE: The IS conventional devices 1151EISE and 5451EISE are rated as temperature class T5 (100°C) while the WCP3A-IS is rated as T4 (135°C). A combination of these devices will lower the intrinsically safe system temperature class from T5 to T4.

The interconnecting wiring between the intrinsic safety barrier and the intrinsically safe devices shall be installed in accordance with the cables requirements in AS60079.25.

* Refer to the product specifications to find the quiescent current draw for each intrinsically safe device.

† Baseefa (2012), IECEx BAS 09.008 issue number 2 – MTL 5561 two channel fire/ smoke detector interface.

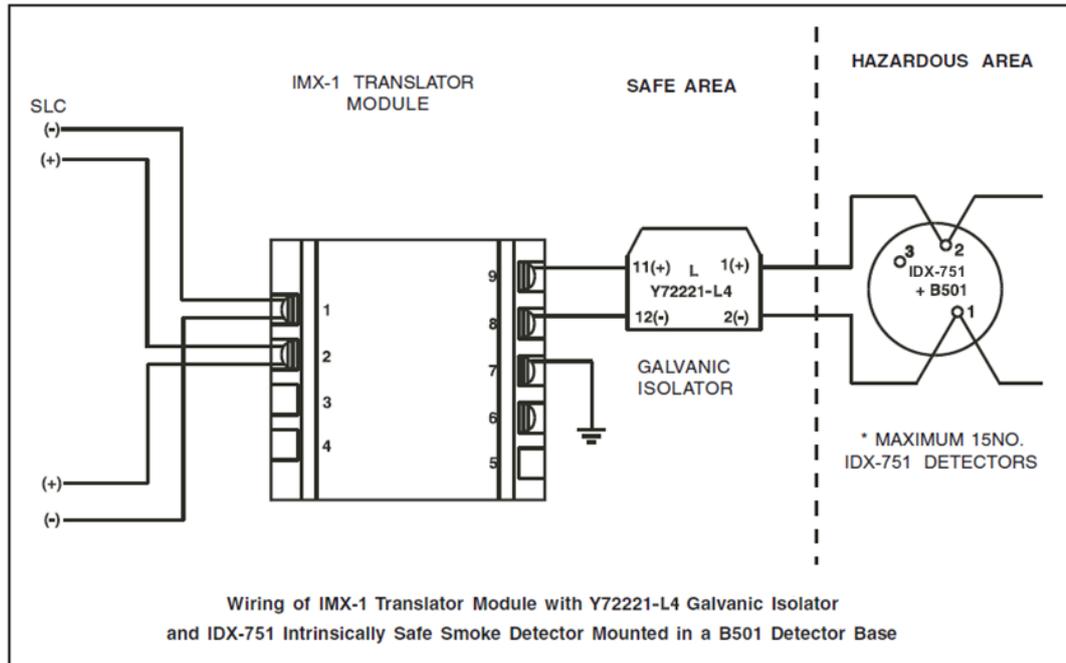
4.1.1 Wiring schematic for IS conventional devices



4.2. Intrinsically Safe Solution for IS addressable devices

The intrinsically safe solution for the intrinsically safe addressable devices can be installed to meet **EEEx ia IIC T5**.

The intrinsically safe addressable device such as the IDX-751 shall be installed with the intrinsic safety barrier Y72221-L4 and connected to the Notifier addressable fire panel using the translator module IMX-1.



The intrinsic safety barrier shall be housed in the intrinsic safety barrier enclosure DX070 for protection against excessive mechanical and thermal stresses, dust, moisture and other contaminants and be installed in the safe area only.

The maximum number of IDX-751 detectors that can be installed to the intrinsic safety barrier is 15 detectors.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected to the intrinsic safety barrier must not exceed the following values[‡]:

Group	Capacitance (μF)	Inductance (mH)	Or	L/R Ratio (μH/Ω)
IIC	0.083	4.2		55
IIB	0.65	12.6		165
IIA	2.15	33.6		440

The interconnecting wiring between the intrinsic safety barrier and the intrinsically safe devices shall be installed in accordance with the cables requirements in AS60079.25.

[‡] Notifier, Installation and maintenance instructions for model IDX-751 (I56-3383-004)

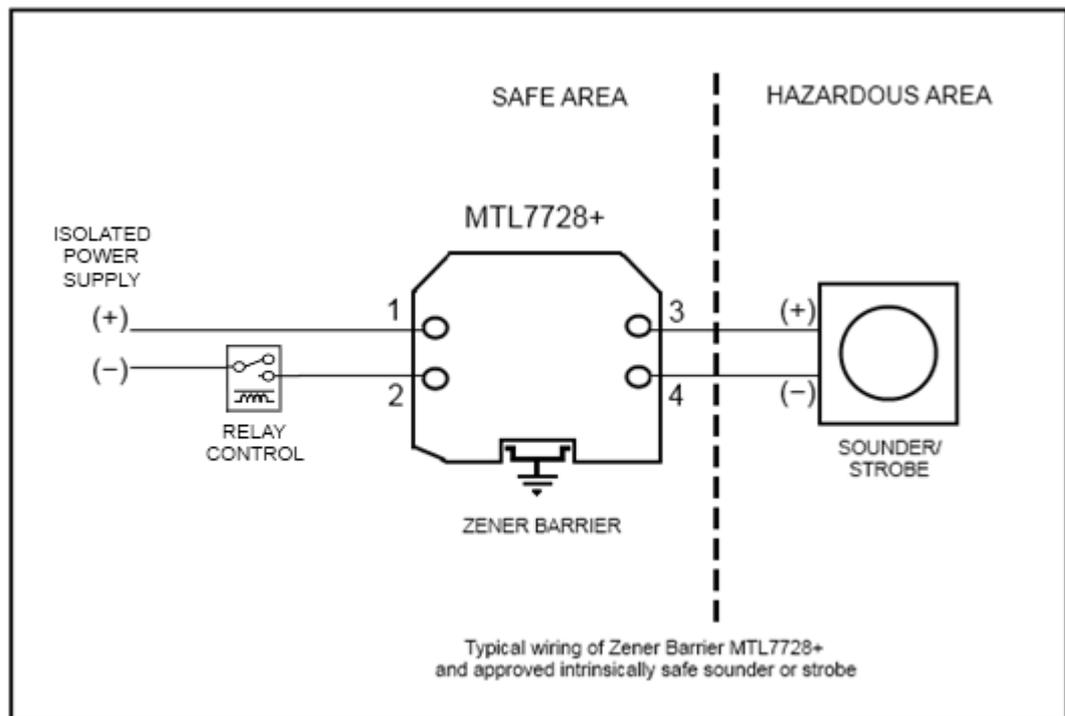
Intrinsically Safe Solution for IS sounders and beacons

The intrinsically safe solution for the intrinsically safe sounders and beacons can be installed to meet **EEEx ia IIC T4**.

The intrinsically safe beacons and sounders such as IS-A105N, IS-L101L, IS-mA1, IS-mB1 and IS-mC1 shall be installed with the intrinsic safety barrier MTL7728+ and connected to an isolated power supply. The intrinsically safe devices are controlled using the relay output on the CFP-16 fire panel or the FRM-1 relay control module on the Notifier addressable fire panel.



NOTE: The output devices are unmonitored and an isolated power supply is required. Refer to the manufacturer’s installation manual to determine the maximum number of devices that can be installed to the safety barrier circuit.



The intrinsic safety barrier shall be housed in the intrinsic safety barrier enclosure DX070 for protection against excessive mechanical and thermal stresses, dust, moisture and other contaminants and be installed in the safe area only.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the hazardous area load connected to the intrinsic safety barrier must not exceed the following values[§]:

Group	Capacitance (µF)	Inductance (mH)	Or	L/R Ratio (µH/Ω)
IIC	0.083	3.05 (4.2 ^{**})		56

The interconnecting wiring between the intrinsic safety barrier and the intrinsically safe devices shall be installed in accordance with the cables requirements in AS60079.25.

[§] MTL, Technical Datasheet – MTL7700 Series (EPS770 Rev 6 140410)

^{**} The cable inductance may be increased to the values within parentheses when the external circuit contains no lumped inductance greater than 10 µH.



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