

# *9468-ET*

## *10/100Mb Ethernet Isolator*



**Instruction Manual**



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## 1. FEATURES

- ◆ Intrinsically Safe ATEX / IECEx certified
- ◆ FM / FMC approved
- ◆ Ga Ex ia IIC T4 GD (surface), Ma Ex ia I M1 (mining)
- ◆ Zone 2 / Safe Area mounting with Hazardous Area connections into Zone 1 and 0.
- ◆ Interfaces Zone 2 and non-approved devices to the Intrinsically Safe 9400 series.
- ◆ Total galvanic isolation ( $U_m=253V_{ac}$ ) from Safe to Hazardous RJ45 ports
- ◆ Single Safe Area supply: 20...30V dc @ 220mA
- ◆ Extended temperature range (-20°C...+70°C)
- ◆ PoEx™ - "Power over Ethernet" power sourcing equipment - distributes device supplies via the RJ45 ports\*
- ◆ 10/100Mb Ethernet twisted pair (Cat5e) RJ45 Connections (100m max)
- ◆ Status LED's for:
  - 'Power On'
  - Safe Area UTP 'Link 10Mb' or 'Link 100Mb' Established
  - Safe Area UTP 'Tx/Rx Activity'
  - Hazardous Area UTP 'Link 10Mb' or 'Link 100Mb' Established
  - Hazardous Area UTP 'Tx/Rx Activity'
- ◆ Transparent operation – 10/100Mbps, Full/Half Duplex with Auto-Negotiation
- ◆ Supports IEEE 802.3: 10Base-T, 100Base-TX
- ◆ DIN-rail mounting module

*\*Note – PoEx is a simple adaptation of the IEEE 802.3af Power over Ethernet (PoE) standard to bring the benefits to the 9400 Range of Hazardous Area devices. This allows two spare pairs in the existing Cat5e cable to distribute the power supply from a 9466-ET Ethernet Switch (Power Sourcing Equipment – PSE) to each of the devices connected to its five ports (PD – Powered Device). This adaptation is necessary due to restrictions for Hazardous Area use. It is not implied that the device conforms to the 802.3af (PoE) standard.*

## 2 DESCRIPTION

The 9468-ET 10/100Mbps Ethernet Isolator allows the interconnection of a Zone 2 or un-certified Safe Area device to the Intrinsically Safe 9400 series of Ethernet networking products, operating in the Hazardous Area.

The isolator provides a compact alternative solution to fibre optic cable and media converters and for when it is desirable to use Cat5e cables in preference to fibre.

The module requires a single supply from the Safe Area of 20...30Vdc at approx 220mA.

## 3. INSTALLATION



**WARNING:** This equipment must be installed, operated and maintained only by trained competent personnel and in accordance with all appropriate international, national and local standard codes of practice and site regulation for intrinsically safe apparatus and in accordance with the instructions contained here. See also Sections 7, 8 & 9 for approvals and important conditions of safe use.

### 3.1 Protection

The module requires mounting within an enclosure providing a degree of protection of at least IP6x, in accordance with EN60529 and in a manner that does not impair the existing creepage and clearance distances. The enclosure must also comply with the requirements of Clauses 7 and 8 of EN50014 and be sealed to prevent the ingress of dust.

### 3.2 Mechanical mounting

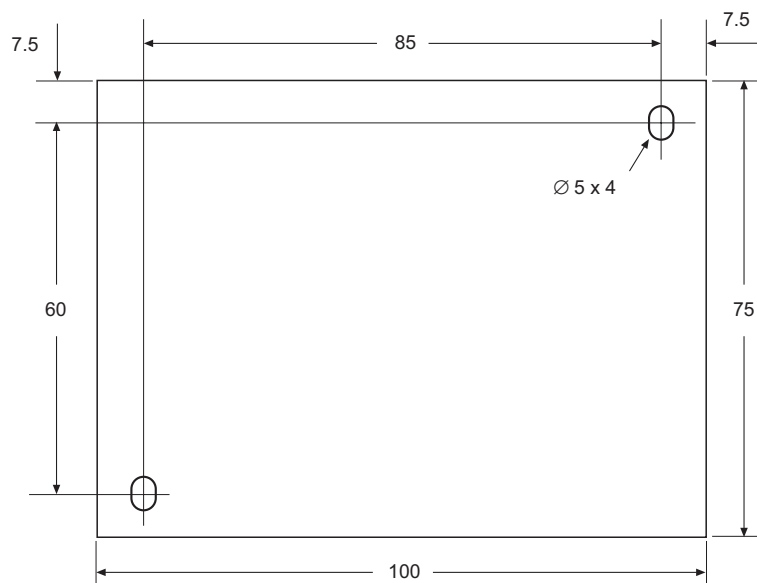
#### 3.2.1 DIN rail mounting

The module will 'snap-fit' onto standard DIN rail (TS35) to EN 50022. Height off rail - including any connectors but excluding cables = 106mm.

Tilt the module to engage the top DIN rail clips then rotate down and press to the DIN rail until the lower spring clip is properly engaged.

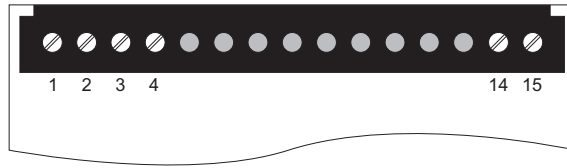
#### 3.2.2 Flat panel mounting

The module has two fixing holes to enable it to be mounted with two M3.5 screws. Use the following dimension diagram to establish the hole positions. Depth - including connectors but excluding cables = 111mm.



### 3.3. Electrical connections

#### 3.3.1 Screw Terminals



| Terminal No. | Function                |
|--------------|-------------------------|
| 1            | +20...30V dc in         |
| 2            | +20...30V dc in         |
| 3            | 0V                      |
| 4            | 0V                      |
| 5–13         | No connection           |
| 14           | Supply in +12V - PoEx † |
| 15           | Supply in 0V - PoEx †   |

Note: Terminal pairs 1+2 and 3+4 are linked internally.

† To use PoEx, connect IS supply to terminals 14 & 15 (marked blue).



**WARNING:** The supply for PoEx must be derived from a suitably certified, intrinsically safe supply.

#### 3.3.2 Front Panel Connectors

##### SAFE AREA - 10/100 BASE-T - Ethernet RJ45

(TX/RX crossed MDI-X)

| Pin No. | Function |
|---------|----------|
| 1       | RX +     |
| 2       | RX –     |
| 3       | TX +     |
| 4       |          |
| 5       |          |
| 6       | TX –     |
| 7       |          |
| 8       |          |

##### HAZARDOUS AREA - 10/100 BASE-T - Ethernet RJ45

(TX/RX crossed MDI-X) Connector marked blue

| Pin No. | Function            |
|---------|---------------------|
| 1       | RX +                |
| 2       | RX –                |
| 3       | TX +                |
| 4       | Supply 12V - PoEx † |
| 5       | Supply 12V - PoEx † |
| 6       | TX –                |
| 7       | Supply 0V - PoEx †  |
| 8       | Supply 0V - PoEx †  |

† When supply has been connected to screw terminals 14 & 15.

When connecting the Cat5e cable to another device a straight connected RJ45 cable is used, a crossover cable is not required as the RJ45 connector performs the X-over.

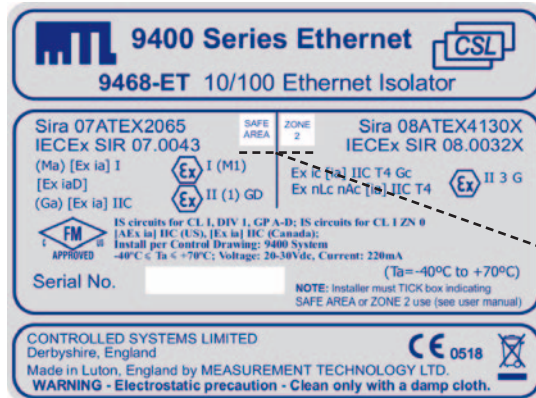
A Crossover cable *is required* when interconnecting two 9468 modules.

It is recommended that Cat5e cables for Hazardous Area Zone 1 use are 'Blue' in colour and are of good quality (see accessories section), the Safe Area cables being a colour other than blue to aid identification.

### 3.4 Label marking

After installation, the product label should be permanently marked to indicate the type of area (safe or Zone 2) in which it has been mounted. Two tick (check) boxes are provided on the product label.

Place a single tick (check), with an indelible marker, in the appropriate box to indicate whether the box is being mounted in a safe area or a Zone 2 hazardous area.



Tick (check) boxes

**Note:** When a 9468-ET isolator has been used in (and marked for) a safe area, it may NOT be used in future in a Zone 2 hazardous area.

## 4 ENVIRONMENTAL

|                       |                            |
|-----------------------|----------------------------|
| Operating Temperature | -20°C...+70°C              |
| Storage Temperature   | -20°C...+70°C              |
| Humidity              | 5...95% RH, non condensing |

## 5 WASTE REMOVAL INFORMATION



The electronic equipment within must not be treated as general waste. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment and human health, which could otherwise be caused by incorrect waste handling of this product.

For more detailed information about the take-back and recycling contact MTL.

## 6 ACCESSORIES

For interconnecting the 9460-ET range of products, we offer approved RJ45 Cat5e UTP cables in various standard lengths (0.5...100m)

Ordering details

Copper Twisted Pair UTP Patch Cable (Blue) pre-terminated RJ45-RJ45 connectors

Part No. CSL9405-xx (-xx is used to signify the length of the cable.)

## 7 APPROVALS

The operating parameters must not exceed those as detailed on the certificate.

- ◆ 2004/108/EC EMC Directive
- ◆ 2006/95/EC Low Voltage Directive

| Region       | Europe (ATEX)   | International IECEx   | USA  | Canada  |
|--------------|---|---|--|---|
| Authority    | SIRA  | SIRA  | FM   | CSA   |
| Standard     | EN 60079-0:2006,<br>EN 60079-11:2007,<br>IEC 60079-26:2006,<br>IEC 61241-0:2004,<br>IEC 61241-11:2005 | IEC 60079-0:2004,<br>IEC 60079-11:2006,<br>IEC 60079-26:2006,<br>IEC 61241-0:2004,<br>IEC 61241-11:2005 | 3600<br>3610<br>3810   | C22.2 No. 61010.1:2004<br>C22.2 No. 157:1992<br>CAN/CSA-E60079-0:2007<br>CAN/CSA-E60079-11:2002 |
| Approved for | ⊕ II (1) GD<br>⊕ I (M1)<br>(Ga) [Ex ia] IIC<br>[Ex iaD]<br>(Ma) [Ex ia] I<br>(Ta = -40°C to +70°C)*   | (Ga) [Ex ia] IIC<br>[Ex ia D]<br>(Ma) [Ex ia] I<br>(Ta = -40°C to +70°C)*                               | AIS/I/1/ABCD/T4<br>Ta=70°C<br>[I]/[O]/[AEx ia] IIC T4<br>Ta=70°C | AIS/I/1/ABCD/T4 Ta=70°C<br>[I]/[O]/[AEx ia] IIC T4<br>Ta=70°C                                   |
| Cert. no.    | Sira 07ATEX2065   | IECEx SIR 07.0043   | 3034995  | 3034995C  |

\* (see specification for operating temperature range)

| Region       | Europe (ATEX)  | International IECEx   | USA | Canada |
|--------------|--|---|-----|--------|
| Authority    | SIRA   | SIRA  | FM  | FMC    |
| Standard     | EN 60079-0:2006,<br>IEC 60079-0:2007†,<br>EN 60079-11:2007,<br>EN 60079-15:2005,<br>IEC 60079-26:2006          | IEC 60079-0:2004,<br>IEC 60079-11:2006,<br>IEC 60079-15:2005-03                                 |     |        |
| Approved for | ⊕ II 3 G<br>Ex ic (ia) IIC T4 Gc<br>(Ta = -40°C to +70°C)*<br>Ex nLc nAc (ia) IIC T4<br>(Ta = -40°C to +70°C)* | Ex ic [ia] IIC T4 Gc<br>(Ta = -40°C to +70°C)*<br>Ex nLc nAc [ia] IIC<br>(Ta = -40°C to +70°C)* |     |        |
| Cert. no.    | Sira 08ATEX4130X   | IECEx SIR 08.0032X  |     |        |

† (for guidance on the Gc, nLc & nAc marking) \* (see specification for operating temperature range)

## 8 FM CERTIFICATION INFORMATION

### Special Condition of Use - Factory Mutual (USA & Canada)

1. The Model 9468-ET shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

## 9 ATEX & IECEx CERTIFICATION INFORMATION

The following information is in accordance with the Essential Health and Safety Requirements (Annex II) of the EU Directive 94/9/EC [the ATEX Directive - safety of apparatus] and is provided for those locations where the ATEX Directive is applicable.

### General

- a. This equipment must only be installed, operated and maintained by competent personnel. Such personnel shall have undergone training, which included instruction on the various types of protection and installation practices, the relevant rules and regulations, and on the general principles of area classification. Appropriate refresher training shall be given on a regular basis. [See clause 4.2 of EN 60079-17].
- b. This equipment has been designed to provide protection against all the relevant additional hazards referred to in Annex II of the directive, such as those in clause 1.2.7.
- c. This equipment has been designed to meet the requirements of intrinsically safe electrical apparatus in accordance with EN 60079-0, EN 60079-11 and EN 60079-26.

## Installation

- a. reference to the IEC code of practice IEC 60079-14. In addition, particular industries or end users may have specific requirements relating to the safety of their installations and these requirements should also be met. For the majority of installations the Directive 1999/92/EC [the ATEX Directive - safety of installations] is also applicable.
- b. Unless already protected by design, this equipment must be protected by a suitable enclosure against:
  - i) mechanical and thermal stresses in excess of those noted in the certification documentation and the product specification.
  - ii) aggressive substances, excessive dust, moisture and other contaminants.
- c. This apparatus is intrinsically safe electrical apparatus and is normally mounted in a hazardous area. When mounted in a Zone1 location the apparatus must be provided with an enclosure, which offers an additional degree of protection appropriate to the area classification.

## Special conditions for safe use

- a. The non-metallic enclosure of the 'ic' certified 9468-ET 10/100 Ethernet Isolator module does not satisfy Table 4 of EN 60079-0:2006 for equipment protection level Gc and could be a potential electrostatic charging hazard, this must be taken into consideration during the installation of the modules.
- b. The 'nLc' 'nAc' certified 9468-ET 10/100 Ethernet Isolator module shall be installed in an ATEX Component Approved Ex 'e' enclosure that provides a level of protection appropriate for its intended environment of use. The minimum level of ingress protection provided shall be IP54.

## Inspection and maintenance

- a. Inspection and maintenance should be carried out in accordance with European, national and local regulations which may refer to the IEC standard IEC 60079-17. In addition specific industries or end users may have specific requirements which should also be met.
- b. Access to the internal circuitry must not be made during operation.

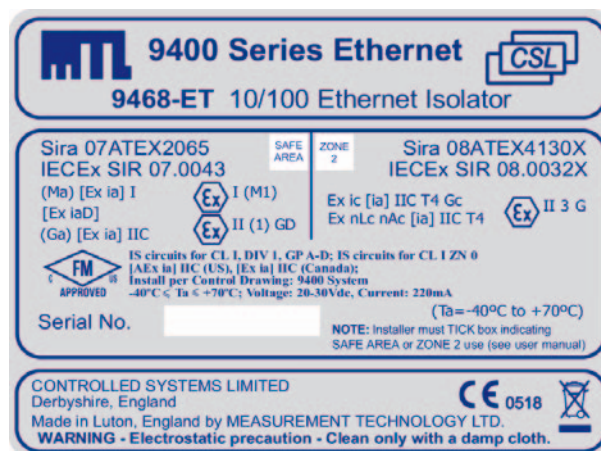
## Repair

This product cannot be repaired by the user and must be replaced with an equivalent certified product.

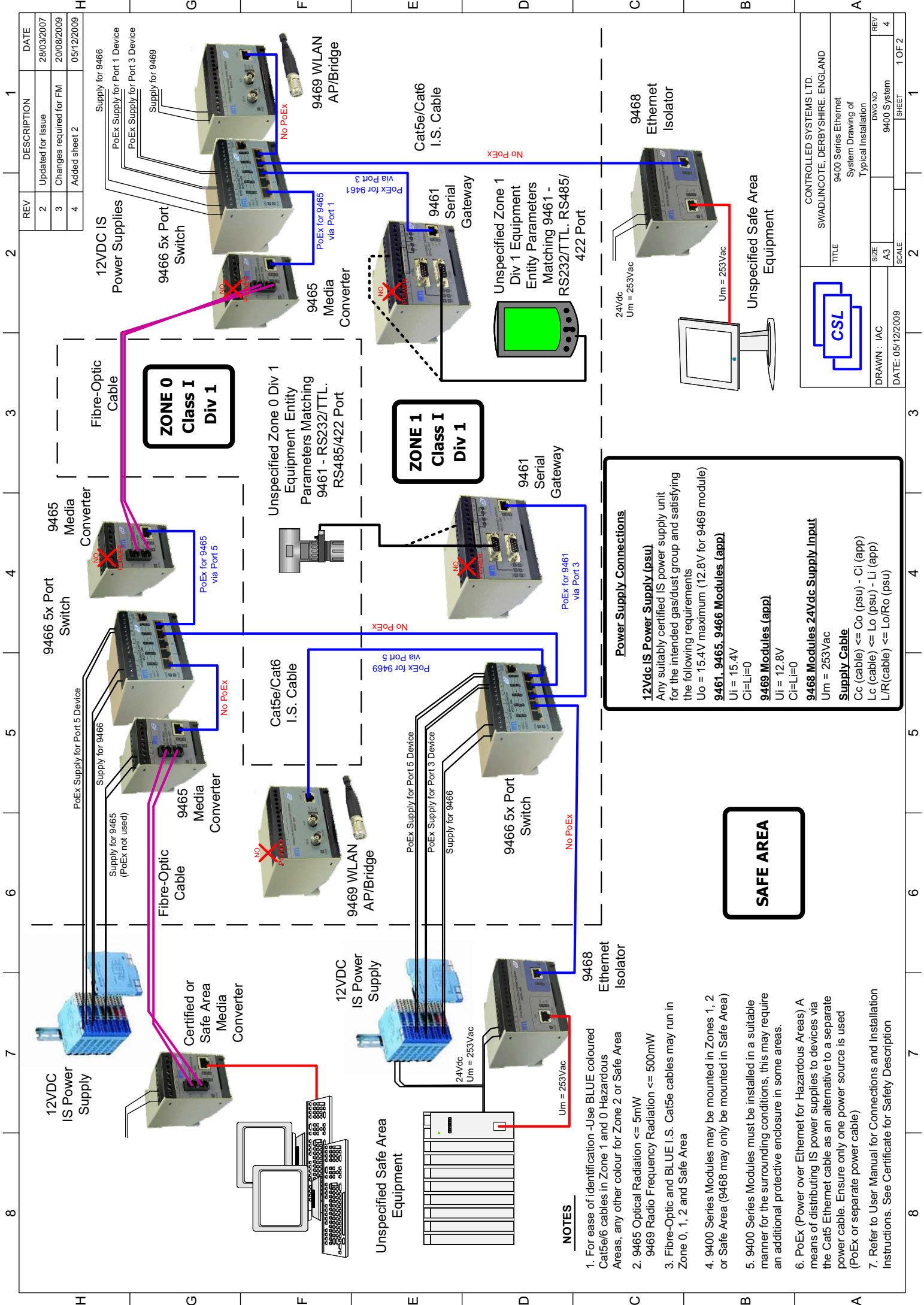
## Marking

Each device is marked in accordance with the Directive and CE marked with the Notified Body Identification Number.

This information applies to products manufactured during or after the year 2010.







| REV | DESCRIPTION             | DATE       |
|-----|-------------------------|------------|
| 2   | Updated for Issue       | 28/03/2007 |
| 3   | Changes required for FM | 20/08/2009 |
| 4   | Added sheet 2           | 05/12/2009 |

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| H | G | F | E | D | C | B | A |

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

- NOTES**
- For ease of identification - Use BLUE coloured Cat5e/6 cables in Zone 1 and 0 Hazardous Areas, any other colour for Zone 2 or Safe Area
  - 9465 Optical Radiation <= 5mW  
9469 Radio Frequency Radiation <= 500mW
  - Fibre-Optic and BLUE I.S. Cat5e cables may run in Zone 0, 1, 2 and Safe Area
  - 9400 Series Modules may be mounted in Zones 1, 2 or Safe Area (9468 may only be mounted in Safe Area)
  - 9400 Series Modules must be installed in a suitable manner for the surrounding conditions, this may require an additional protective enclosure in some areas.
  - PoEx (Power over Ethernet for Hazardous Areas) A means of distributing IS power supplies to devices via the Cat5 Ethernet cable as an alternative to a separate power cable. Ensure only one power source is used (PoEx or separate power cable)
  - Refer to User Manual for Connections and Installation Instructions. See Certificate for Safety Description

**Power Supply Connections**

**12Vdc IS Power Supply (psu)**  
Any suitably certified IS power supply unit for the intended gas/dust group and satisfying the following requirements  
Uo = 15.4V maximum (12.8V for 9469 module)  
**9461, 9465, 9466 Modules (app)**  
Ui = 15.4V  
Ci=Li=0

**9469 Modules (app)**  
Ui = 12.8V  
Ci=Li=0

**9468 Modules 24Vdc Supply Input**  
Um = 253Vac

**Supply Cable**  
Cc (cable) <= Co (psu) - Ci (app)  
Lc (cable) <= Lo (psu) - Li (app)  
L/R (cable) <= Lo/Ro (psu)

**SAFE AREA**

**ZONE 0  
Class I  
Div 1**

**ZONE 1  
Class I  
Div 1**

|   |   |
|---|---|
|   |   |
| CONTROLLED SYSTEMS LTD.<br>SWADLINCOTE, DERBYSHIRE, ENGLAND |   |
| TITLE   | 9400 Series Ethernet System Drawing of Typical Installation |
| SCALE   | 9400 System   |
| DRAWN - IAC   | DWG NO  |
| DATE: 05/12/2009  | REV   |
| DATE: 05/12/2009  | 4   |
| SCALE   | 1 OF 2  |

The 9461-ET Ethernet Gateway Module

| Description                                  | Location   | Input Parameters   | Output Parameters   |
|--|--|--|---|
|  |  | Ui (V)<br>Ci (uF)<br>Li (mH)<br>Uo (V)<br>Io (mA)<br>Po (mW)<br>Co (uF)<br>Lo (mH) |   |
| Optional Input Power Supply                  | T1, T2 w.r.t. T3, T4   | 15.4   | -   |
| RS485/422 Port 3                             | T5 w.r.t. T10<br>T8 w.r.t. T10<br>T17 w.r.t. T11<br>T18 w.r.t. T11<br>T19 w.r.t. T10   | 7.2  | 163   |
| RS485/422 Port 4                             | T11 w.r.t. T15<br>T12 w.r.t. T15<br>T13 w.r.t. T15<br>T14 w.r.t. T15   | 7.2  | 163   |
| TTLR5232 Port 1, CON 1                       | Pin 9 w.r.t. Pin 5<br>Pin 3 w.r.t. Pin 5<br>Pin 4 w.r.t. Pin 5<br>Pin 7 w.r.t. Pin 5<br>Pin 2 w.r.t. Pin 5<br>Pin 9 w.r.t. Pin 2<br>Pin 3 w.r.t. Pin 2<br>Pin 4 w.r.t. Pin 2<br>Pin 7 w.r.t. Pin 2<br>Pin 1 w.r.t. Pin 5 | 0<br>5.88<br>12.5<br>0<br>5.88<br>0<br>5.88<br>0<br>12.5                           | 276<br>20<br>138<br>24<br>20<br>50<br>20<br>2.26<br>2.26<br>138<br>20<br>1000 |
| RS485 Connector (10/100 Base T) Without PoE+ | Pin 1 w.r.t. Pin 5   | 15.4   | 50  |
| RS485 Connector (10/100 Base T) With PoE+    | Pin 1 w.r.t. Pin 5   | 15.4   | 50  |

The 9466-ET 10/100 5-Port Switch

| Desc.                        | Loc.   | Input Parameters   | Output Parameters |
|------------------------------|--|--|-------------------|
|                              |  | Ui (V)<br>Ci (uF)<br>Li (mH)<br>Uo (V)<br>Io (mA)<br>Po (mW)<br>Co (uF)<br>Lo (mH) |                   |
| Optional Supply Input        | T1, T2 w.r.t. T3, T4   | 15.4   | -                 |
| PoE 8-way Terminals*         | T5 w.r.t. T7<br>T8 w.r.t. T9<br>T10 w.r.t. T11<br>T12 w.r.t. T11<br>T13 w.r.t. T15<br>T14 w.r.t. T15 | 15.4   | -                 |
| MH-DIN 8-way Management Port | Pin 5 w.r.t. Pin 6<br>Pin 4, 3 & 4 w.r.t. Pin 5 & 6  | 12.5   | 3.4               |
| RJ45 Conn 10/100 Base T      | Pin 1, 3 & 4 w.r.t. Pin 5 & 6  | 0  | 5.88              |
| RJ45 Conn 10/100 Base T      | Pin 1, 3 & 4 w.r.t. Pin 5 & 6  | 0  | 72                |
| RJ45 Conn 10/100 Base T      | Pin 1, 3 & 4 w.r.t. Pin 5 & 6  | 0  | 20                |
| RJ45 Conn 10/100 Base T      | Pin 1, 3 & 4 w.r.t. Pin 5 & 6  | 0  | 15                |
| RJ45 Conn 10/100 Base T      | Pin 1, 3 & 4 w.r.t. Pin 5 & 6  | 0  | 50                |
| RJ45 Conn 10/100 Base T      | Pin 1, 3 & 4 w.r.t. Pin 5 & 6  | 0  | 1000              |

\* Not to be used if PoE+ is supplied at the 9466-ET Module.

The 9465-ET 10/100 Media Converter

| Description                                  | Location               | Input Parameters   | Output Parameters |
|--|------------------------|--|-------------------|
|  |                        | Ui (V)<br>Ci (uF)<br>Li (mH)<br>Uo (V)<br>Io (mA)<br>Po (mW)<br>Co (uF)<br>Lo (mH) |                   |
| Optional Supply Input                        | T1, T2 w.r.t. T3, T4   | 15.4   | -                 |
| RS485 Connector (10/100 Base T) Without PoE+ | Five-Optic Transmitter | -  | -                 |
| RS485 Connector (10/100 Base T) With PoE+    | Five-Optic Transmitter | 15.4   | 5 max             |

The 9468-ET Ethernet Isolator Module

| Description  | Location             | Um (Vdc) | Ui (V) | Ci (uF) | Li (mH) |
|--|----------------------|----------|--------|---------|---------|
| Safe area supply input RJ45 from safe area 10/100 Base T | T1, T2 w.r.t. T3, T4 | 253      | 15.4   | 0       | 0       |

The 9468-ET may be connected to a single IS power supply at T14 and T15 if power-over-Ethernet (PoE+) is required through pins 4, 5, 7 & 8 of the RJ45 connectors unless PoE+ is supplied at the 9466-ET Module.

| Description                               | Location       | Input Parameters   | Output Parameters |
|---|----------------|--|-------------------|
|   |                | Ui (V)<br>Ci (uF)<br>Li (mH)<br>Uo (V)<br>Io (mA)<br>Po (mW)<br>Co (uF)<br>Lo (mH) |                   |
| IS Power Supply (optional PoE+)*          | T14 w.r.t. T15 | 15.4   | 0                 |
| RJ45 by/for Intranet area 10/100 Base T** | T14 w.r.t. T15 | 15.4   | 0                 |


\* Power supply may only be connected if PoE+ is not already connected at the 9466-ET module.  
\*\* RJ45 by/for Intranet area 10/100 Base T connectors on other 9400 Series Ethernet modules, each powered from a single intranet safety supply. Connection to other Ethernet systems requires special consideration and is outside the scope of this certificate; see installation drawing for connection details.

The 9469-ET WLAN AP/Bridge

| Description                                 | Location  | Input Parameters   | Output Parameters |
|---|---|--|-------------------|
|   |   | Ui (V)<br>Ci (uF)<br>Li (mH)<br>Uo (V)<br>Io (mA)<br>Po (mW)<br>Co (uF)<br>Lo (uH) |                   |
| Optional Supply Input                       | Terminal T1, T2 w.r.t. T3, T4   | 12.8   | -                 |
| RJ45 Connector (10/100 Base T) Without PoE+ | Refer to parameters of IS power supply connected to T1, T2 w.r.t. T3, T4 for the output parameters. | 12.8   | 0                 |
| RJ45 Connector (10/100 Base T) With PoE+    | Refer to parameters of IS power supply connected to T1, T2 w.r.t. T3, T4 for the output parameters. | 12.8   | 0                 |
| Antenna A                                   | Antenna A   | -  | 900 max RF        |
| Antenna B                                   | Antenna B   | -  | 500 max RF        |

NOTE: RJ45 ETHERNET PORTS\* ARE INTENDED FOR CONNECTION ONLY TO OTHER 9400 SERIES MODULES SHOWN ON THIS DRAWING.

\*(With the exception of 9468-ET Safe Area port)



CONTROLLED SYSTEMS LTD.  
SWADLINCOTE, DERBYSHIRE, ENGLAND

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TITLE  
9400 Series Ethernet  
System Drawing of  
Typical Installation

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DRAWN : IAC      SCALE      REV  
DATE: 05/12/2009      A3      9400 System      4

SHEET 2 OF 2



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