



FM Approvals  
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Member of the FM Global Group

# CERTIFICATE OF COMPLIANCE

## HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

**BA474Da Indicating Temperature Transmitter**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 70°C – CI470-12; Entity; Type 4X, IP66  
 I / 0 / AEx ia / IIC / T4 Ta = 70°C – CI470-12; Entity; Type 4X, IP66  
 NI / I, II, III / 2 / ABCDEFG / T4 Ta = 60°C – CI470-13; NIFW; Type 4X, IP66  
 I / 2 / IIC / T4 Ta = 60°C – CI470-13; NIFW; Type 4X, IP66  
 AIS / I, II, III / ABCDEFG - CI470-12; Entity; Type 4X, IP66  
 [I / 0] / [AEx ia] IIC - CI470-12; Entity; Type 4X, IP66

**Intrinsic Safety Parameters  
 Input Parameters**

Terminals	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>i</sub> (W)	C <sub>i</sub> (uF)	L <sub>i</sub> (mH)
TB 2: 5 & 6	28	200	0.85	0.046	0.01
TB 3 (BA474D) or TB 601 (BA478C): 8 & 9: 11 & 12	30	200	0.85	0.02	0.01
TB1: 1, 2, 3 & 4	6	100	0.194	16.16	0

**Output Parameters**

Terminals	V <sub>oc</sub>	I <sub>sc</sub>	P <sub>o</sub>	C <sub>o</sub>	L <sub>o</sub>
TB 3 (BA474D) or TB 601 (BA478C): 8 & 9: 11 & 12	0.7V	1.3uA	4uW	46nF	0.69mH
TB1: 1, 2, 3 & 4	6V	30.3mA	46mW	23.84uF	3mH



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**Nonincendive Field Wiring Parameters**

**Input Parameters**

Terminals	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>i</sub> (mW)	C <sub>i</sub> (uF)	L <sub>i</sub> (mH)
TB 1: 1, 2, 3 & 4	6	100	194	16.16	0
TB 2; 5 & 6	28	200		0.046	0.01
TB 3: 8 & 9; 10 & 11	32	200		0.02	0.01

**Output Parameters**

Terminals	V <sub>oc</sub> (V)	I <sub>sc</sub> (mA)	P <sub>o</sub> (mW)	C <sub>o</sub> (uF)	L <sub>o</sub> (mH)
TB 1: 1, 2, 3 & 4	6	30.3	46	23.84	3

a = Parameter not affecting safety.

Maximum r.m.s. a.c. or d.c. voltage (For AIS/[AEx ia] application)

Terminals TB 2: 5 & 6; TB 3: 8 & 9; 10 & 11

U<sub>m</sub> = 250 V

*Special conditions of use*

1. The BA474D shall be protected from direct exposure to sunlight.

**BA478Ca Indicating Temperature Transmitter**

IS / I / I / ABCD / T4 Ta = 70°C – CI470-12; Entity; Type 4X, IP66

I / 0 / AEx ia / IIC / T4 Ta = 70°C – CI470-12; Entity; Type 4X, IP66

NI / I / 2 / ABCD / T4 Ta = 60°C – CI470-13; NIFW; Type 4X, IP66

I / 2 / IIC / T4 Ta = 60°C – CI470-13; NIFW; Type 4X, IP66

**Intrinsic Safety Parameters**

**Input Parameters**

Terminals	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>i</sub> (W)	C <sub>i</sub> (uF)	L <sub>i</sub> (mH)
TB 2: 5 & 6	28	200	0.85	0.046	0.01
TB 3 (BA474D) or TB 601 (BA478C): 8 & 9; 11 & 12	30	200	0.85	0.02	0.01
TB1: 1, 2, 3 & 4	6	100	0.194	16.16	0

**Output Parameters**

Terminals	V <sub>oc</sub>	I <sub>sc</sub>	P <sub>o</sub>	C <sub>o</sub>	L <sub>o</sub>
TB1: 1, 2, 3 & 4	6V	30.3mA	46mW	23.84uF	3mH

**Nonincendive Field Wiring Parameters**

**Input Parameters**

Terminals	V <sub>max</sub> (V)	I <sub>max</sub> (mA)	P <sub>i</sub> (mW)	C <sub>i</sub> (uF)	L <sub>i</sub> (mH)
TB 1: 1, 2, 3 & 4	6	100	194	16.16	0
TB 2; 5 & 6	28	200		0.046	0.01
TB 3: 8 & 9; 10 & 11	32	200		0.02	0.01

a = Parameter not affecting safety.



*Special conditions of use*

1. To maintain the Type 4X and IP66 enclosure rating the BA478C shall be installed in accordance with the mounting conditions provided on drawing numbers CI470-12 and CI470-13.
2. The BA478C shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
3. The BA478C shall be protected from direct exposure to sunlight.

**Equipment Ratings:**

***BA474D Indicating Temperature Transmitter***

Intrinsically safe for Class I, II and III, Division 1, Groups A, B, C, D, E, F and G and Class I, Zone 0, Group IIC Hazardous (Classified) Locations when installed in accordance with the entity concept in accordance with Control Drawings CI470-12; Nonincendive for Class I, Division 2, Groups A, B, C and D and Class I, Zone 2, Group IIC, Hazardous (Classified) Locations when installed in accordance with the nonincendive field wiring concept in accordance with Control Drawings CI470-13; Suitable for Class II and III, Division 2, Groups E, F and G Hazardous (Classified) Locations when installed in accordance with the nonincendive field wiring concept in accordance with Control Drawings CI470-13. Temperature class T4 at an ambient of 60°C. Enclosure Type 4X and IP66.

Associated intrinsically safe apparatus for connection to Class I, II and III, Division 1, Groups A, B, C, D, E, F and G and Class I, Zone 0, Group IIC Hazardous (Classified) Locations when installed in accordance with the entity concept in accordance with Control Drawings CI470-12. Enclosure Type 4X and IP66.

***BA478C Indicating Temperature Transmitter***

Intrinsically safe for Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC Hazardous (Classified) Locations when installed in accordance with the entity concept in accordance with Control Drawings CI470-13; Nonincendive for Class I, Division 2, Groups A, B, C and D and Class I, Zone 2, Group IIC, Hazardous (Classified) Locations when installed in accordance with the nonincendive field wiring concept in accordance with Control Drawings CI480-13. Temperature class T4 at an ambient of 60°C. Front panel Type 4X and IP66.

**FM Approved for:**

**BEKA associates Ltd**  
Hitchin, Hertfordshire, SG5 2DD. United Kingdom



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This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3610	2010
Class 3611	2004
Class 3810	2005
ANSI/IEC 60529	2004

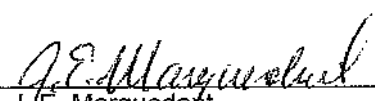
Original Project ID: 3035396

Approval Granted: *August 16, 2010*

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
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FM Approvals LLC

  
\_\_\_\_\_  
J.E. Marquardt  
Group Manager, Electrical

*16 August 2010*  
\_\_\_\_\_  
Date

Appd.	
Ckd.	
Modification	
Date	
Iss.	
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Appd.	
Ckd.	
Modification	
Date	02.10 2008
Iss.	1

### HAZARDOUS (CLASSIFIED) LOCATION

### UNCLASSIFIED LOCATION

**BA474D LOCATIONS:**  
 Class I, Division 1, Groups A, B, C & D  
 Class II, Division 1, Groups E, F & G  
 Class III  
 Class I, Zone 0, Group IIC

SEE  
 NOTES 1 & 3

**BA478C LOCATIONS:**  
 Class I, Division 1, Groups A, B, C & D  
 Class I, Zone 0, Group IIC

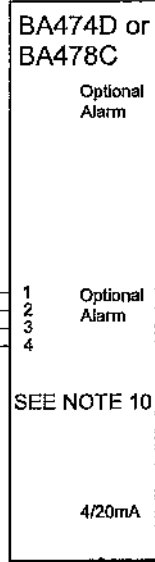
#### BA474D & BA478C

CLASSIFIED  
 LOCATION  
 EQUIPMENT

SIMPLE  
 APPARATUS  
 SEE NOTE 12

OR

SEE NOTE 5



SIMPLE APPARATUS  
 SEE NOTE 12  
 OR  
 CLASSIFIED LOCATION  
 EQUIPMENT  
 SEE NOTE 13

SEE NOTE 4

UNCLASSIFIED  
 LOCATION  
 EQUIPMENT

SEE NOTE 2

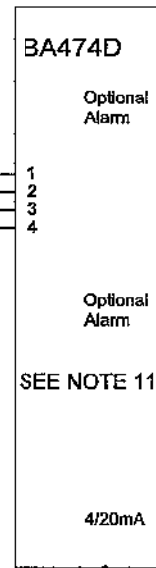
#### BA474D

CLASSIFIED  
 LOCATION  
 EQUIPMENT

SIMPLE  
 APPARATUS  
 SEE NOTE 12

OR

SEE NOTE 5




UNCLASSIFIED  
 LOCATION  
 EQUIPMENT

SEE NOTE 2

\*\*\*\*\*  
 Note: No modification to be made  
 without reference/approval  
 from FM Approvals and  
 BEKA Associates Design  
 Department.  
 \*\*\*\*\*

Title		Drawn	Checked	Scale
FM Approvals Control Drawing for Intrinsically Safe BA474D & BA478C Indicating Temperature Transmitters		RC		N/A
		Drawing No. CI470-12		
		Sheet 1 of 4		

Iss.	Date	Modification	Ckd.	Appd.
1	02.10.2008	New drawing		
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Iss.	Date	Modification	Ckd.	Appd.

**Notes**

1. The associated protective barriers and galvanic isolators shall be FM approved and the manufacturers' installation drawings shall be followed when installing this equipment. For installations in Canada the associated protective barriers and galvanic isolators shall be cFM or CSA approved and the manufacturers' installation drawings shall be followed when installing the equipment.
2. The unclassified location equipment shall not use or generate more than 250V rms or 250V dc.
3. Installations shall be in accordance with ANSI/ISA RP 12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code ANSI/NFPA 70. Installations in Canada shall be in accordance with the Canadian Electrical Code C22.2.
4. One single channel or one two channel associated protective barrier or galvanic isolator with entity parameters complying with the following requirements:

Uo or Vt      equal or less than      The lowest Ui of the FM, cFM or CSA approved apparatus installed in the loop.

Io or It      equal to or less than      The lowest li of the FM, cFM or CSA approved apparatus installed in the loop.

Po      equal to or less than      The lowest Pi of the FM, cFM or CSA approved apparatus installed in the loop.


Lo      equal to or greater than      The sum of the cable inductances and the internal inductances Li of each FM, cFM or CSA approved apparatus in the loop.

Co      equal to or greater than      The sum of the cable capacitance and the internal capacitance Li of each FM, cFM or CSA approved apparatus in the loop.

5. Simple apparatus or

Uo or Vt	equal or less than	Ui
Io or It	equal to or less than	li
Po	equal to or less than	Pi
Li + Lcable	equal to or less than	Lo
Ci + Ccable	equal to or less than	Co

Cont.

Iss.	Date	Title	Drawn	Checked	Scale
1	02.10.2008	FM Approvals Control Drawing for Intrinsically Safe BA474D & BA478C Indicating Temperature Transmitters	RC		N/A
			Drawing No. CI470-12		
			Sheet 2 of 4		

Iss.	Date	Modification	Ckd.	Appd.
1	02.10 2008	New drawing		

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6. When installed in a hazardous (classified) location the BA474D Indicating Temperature Transmitter shall be fitted with cable glands / conduit hubs selected from the following table
- Metallic glands and hubs must be grounded – see note 7.

Class	Permitted gland or conduit hub
Class I	Any metallic or plastic cable gland or conduit hub that provides the required environmental protection.
Class II and III	<p><b>Crouse – Hinds Myler hubs</b> ST-1 STA-1 SSTG-1 STG-1 STAG-1 MHUB-1 HUB 1</p> <p><b>O-Z / Gedrey Hubs</b> CHM-50DT CHMG-50DT</p> <p><b>Killark Glands</b> CMCXAA050 MCR050 MCX050</p>

7. In addition to the supplied bonding plate, when 2 or 3 metallic glands or conduit hubs are fitted to a BA474D Indicating Temperature Transmitter, all metallic glands or conduit hubs shall be connected together and grounded.
8. **CAUTION** The BA474D and BA478C Indicating Temperature Transmitter enclosures are manufactured from conducting plastic per Article 250 of the National Electrical Code, the enclosures shall be grounded using the 'E' terminal on the terminal block.
9. The BA474D and BA478C Indicating Temperature Transmitters shall be mounted where they are shielded from direct sunlight.

10. **Terminals 1, 2, 3 and 4**

Ui	=	6V
Ii	=	100mA
Pi	=	194mW
Uo	=	6V
Io	=	30.3mA
Po	=	46mW
Ci	=	16.16µF
Li	=	0
Co	=	23.84µF
Lo	=	3mH

**Terminals 5 and 6**

Ui	=	28V
Ii	=	200mA
Pi	=	0.85W
Ci	=	46.42nF
Li	=	0.01mH
Co	=	36.58nF
Lo	=	0.69mH

**Terminals 8, 9, 10 and 11**

Ui	=	30V
Ii	=	200mA
Pi	=	0.85W
Uo	=	0.7V
Io	=	1.3µA
Po	=	4.0µW
Ci	=	20nF
Li	=	0.01mH
Co	=	46nF
Lo	=	0.69mH

Title  
FM Approvals Control Drawing for  
Intrinsically Safe BA474D & BA478C  
Indicating Temperature Transmitters

Drawn RC	Checked 	Scale N/A
Drawing No. Sheet 3 of 4		C1470-12

Iss.					
Date	02.10 2008				
Modification	New drawing				
Ckd.					
Appd.					

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**11. Terminals 1, 2, 3 and 4**

- U<sub>i</sub> = 6V
- I<sub>i</sub> = 100mA
- P<sub>i</sub> = 194mW
- U<sub>o</sub> = 6V
- I<sub>o</sub> = 30.3mA
- P<sub>o</sub> = 46mW
  
- C<sub>i</sub> = 16.16μF
- L<sub>i</sub> = 0
- C<sub>o</sub> = 23.84μF
- L<sub>o</sub> = 3mH

**Terminals 5, 6, 8, 9, 10 and 11**

- U<sub>m</sub> = 250V

12. Simple Apparatus shall be as defined in the National Electrical Code ANSI/NFPA 70, or for installations in Canada by the Canadian Electrical Code C22.2

13. Simple apparatus or:

U <sub>o</sub> or V <sub>t</sub> _____	equal or less than	U <sub>i</sub>
I <sub>o</sub> or I <sub>t</sub> _____	equal to or less than	I <sub>i</sub>
P <sub>o</sub> _____	equal to or less than	P <sub>i</sub>
L <sub>i</sub> (BA474D or BA478C + Classified Location Equipment) + L <sub>cabl</sub>	equal to or less than	L <sub>o</sub>
C <sub>i</sub> (BA474D or BA478C + Classified Location Equipment) + C <sub>cabl</sub>	equal to or less than	C <sub>o</sub>

14. When mounting the BA478C in an enclosure to maintain Type 4 front panel rating:

- Minimum panel thickness should be
  - 2mm (0.08inches) Steel
  - 3mm (0.12inches) Aluminium
- Outside panel finish should be smooth, free from particle inclusions, runs or build-up around cut-out.
- Panel cut-out should be
  - 66.2 x 136.0mm -0.0 +0.5
  - (2.60 x 5.35 inches -0.00 +0.02)
- Edges of panel cut-out should be deburred and clean
- Four panel mounting clips are required and each should be tightened to between:
  - 20 and 22cNm (1.77 to 1.95 inLb)

Iss.	1	Date	02.10 2008	Title	FM Approvals Control Drawing for Intrinsically Safe BA474D & BA478C Indicating Temperature Transmitters	Drown	Checked	Scale
						RC		N/A
						Drawing No.	CI470-12	
						Sheet 4 of 4		



Iss.	Date	Modification	Ckd.	Appd.
1	03.10 2008	New drawing		

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### HAZARDOUS (CLASSIFIED) LOCATION

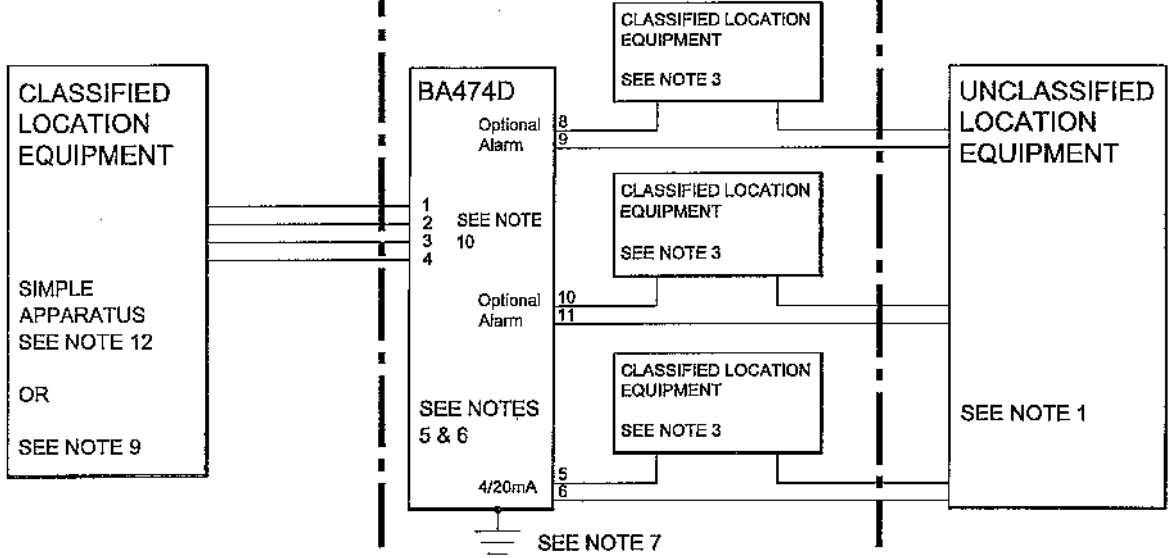
### UNCLASSIFIED LOCATION

BA474D LOCATIONS:

Class I, Division 1, Groups A, B, C & D  
Class II, Division 1, Groups E, F & G  
Class III  
or  
Class I, Zone 0, Group IIC

Class I, Division 2, Groups A, B, C & D  
Class II, Division 2, Groups E, F & G  
Class III  
or  
Class I, Zone 2, Group IIC

SEE NOTE 2



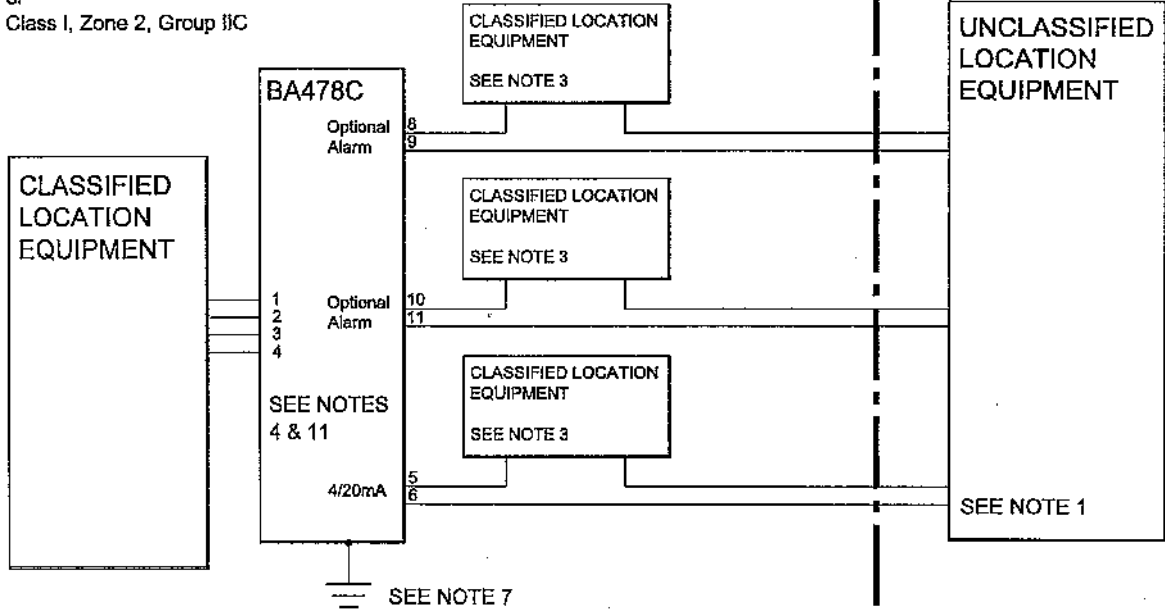
### HAZARDOUS (CLASSIFIED) LOCATION

### UNCLASSIFIED LOCATION

BA478C LOCATIONS:

Class I, Division 2, Groups A, B, C & D  
or  
Class I, Zone 2, Group IIC

SEE NOTE 2



\*\*\*\*\*  
\*\* Note: No modification to be made without reference / approval \*\*  
\*\* from FM Approvals and BEKA associates Design Department. \*\*  
\*\*\*\*\*

Title		Drawn	Checked	Scale
FM Approvals Control Drawing for Nonincendive BA474D & BA478C Indicating Temperature Transmitters		RC	<i>[Signature]</i>	N/A
		Drawing No. CI470-13		
		Sheet 1 of 3		

Iss.	Date	Modification	Ckd.	Appd.
1	03.10.2008	New drawing		

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**Notes**

- The unclassified location equipment shall not use or generate more than 250V rms or 250V dc.
  - Nonincendive field wiring installations shall be in accordance with the National Electrical Code ANSI/NFPA 70. The Nonincendive Field Wiring concept allows interconnection of Nonincendive Field Wiring Apparatus with Associated Nonincendive Field Wiring Apparatus using any of the wiring methods permitted for unclassified locations. Installations in Canada shall be in accordance with the Canadian Electrical Code C22.2.
  - Classified location equipment shall be FM Approved Nonincendive Field Wiring Apparatus or simple apparatus as defined ANSI/NFPA 70. For Canadian installations classified location equipment shall be cFM or CSA Approved Nonincendive Field Wiring Apparatus.
  - To maintain IP66 protection between the BA474C Indicating Temperature Transmitter and the mounting panel:
    - Four panel mounting clips shall be used
    - Minimum panel thickness should be
      - 2mm (0.08inches) Steel
      - 3mm (0.12inches) Aluminium
    - Outside panel finish shall be smooth, free from particle inclusions, runs or build-up around cut-out.
    - Panel cut-out shall be
      - 66.2 x 136.0mm -0.0 +0.5
      - (2.60 x 5.35 inches -0.00 +0.02)
    - Edges of panel cut-out shall be deburred and clean
    - Each panel mounting clip shall be tightened to between:
      - 20 and 22cNm (1.77 to 1.95 inLb)
  - When installed in a hazardous (classified) location the BA474D Indicating Temperature Transmitter shall be fitted with cable glands / conduit hubs selected from the following table
- Metallic glands and hubs must be grounded – see note 6.

Class	Permitted gland or conduit hub
Class I	Any metallic or plastic cable gland or conduit hub that provides the required environmental protection.
Class II and III	<p><b>Crouse – Hinds Myler hubs</b>  ST-1 STA-1 SSTG-1 STG-1 STAG-1  MHUB-1 HUB 1</p> <p><b>O-Z / Gedrey Hubs</b>  CHM-50DT CHMG-50DT</p> <p><b>Killark Glands</b>  CMCXAA050 MCR050 MCX050</p>

Iss.	Date	Title	Drawn	Checked	Scale
			RC	<i>[Signature]</i>	N/A
		FM Approvals Control Drawing for Nonincendive BA474D & BA478C Indicating Temperature Transmitters	Drawing No.	CI470-13	
			Sheet 2 of 3		

Iss.	Date	Modification	Ckd.	Appd.
1	03.10 2008	New drawing		

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6. In addition to the supplied bonding plate, when 2 or 3 metallic glands or conduit hubs are fitted to a BA474D Indicating Temperature Transmitter, all metallic glands or conduit hubs must be connected together and grounded.
7. **CAUTION** The BA474D and BA478C Indicating Temperature Transmitter enclosures are manufactured from conducting plastic per Article 250 of the National Electrical Code, the enclosures shall be grounded using the 'E' terminal on the terminal block.
8. The BA474D and BA478C Indicating Temperature Transmitters shall be mounted where they are shielded from direct sunlight.
9. Simple apparatus or
- |                   |                       |       |
|-------------------|-----------------------|-------|
| $U_o$ or $V_t$    | equal or less than    | $U_i$ |
| $I_o$ or $I_t$    | equal to or less than | $I_i$ |
| $P_o$             | equal to or less than | $P_i$ |
| $L_i + L_{cable}$ | equal to or less than | $L_o$ |
| $C_i + C_{cable}$ | equal to or less than | $C_o$ |
10. **Terminals 1, 2, 3 and 4**                      **Terminals 5 and 6**                      **Terminals 8, 9, 10 and 11**
- |                    |                 |                |
|--------------------|-----------------|----------------|
| $U_i = 6V$         | $U_i = 28V$     | $U_i = 32V$    |
| $I_i = 100mA$      | $I_i = 200mA$   | $I_i = 200mA$  |
| $P_i = 194mW$      | $C_i = 46.42nF$ | $C_i = 20nF$   |
| $U_o = 6V$         | $L_i = 0.01mH$  | $L_i = 0.01mH$ |
| $I_o = 30.3mA$     |                 |                |
| $P_o = 46mW$       |                 |                |
| $C_i = 16.16\mu F$ |                 |                |
| $L_i = 0$          |                 |                |
| $C_o = 23.84\mu F$ |                 |                |
| $L_o = 3mH$        |                 |                |
11. **Terminals 1, 2, 3 and 4**                      **Terminals 5 and 6**                      **Terminals 8, 9, 10 and 11**
- |                    |                 |                |
|--------------------|-----------------|----------------|
| $U_i = 6V$         | $U_i = 28V$     | $U_i = 32V$    |
| $I_i = 100mA$      | $I_i = 200mA$   | $I_i = 200mA$  |
| $C_i = 16.16\mu F$ | $C_i = 46.42nF$ | $C_i = 20nF$   |
| $L_i = 0$          | $L_i = 0.01mH$  | $L_i = 0.01mH$ |
12. Simple Apparatus shall be as defined in the National Electrical Code ANSI/NFPA 70, or for installations in Canada by the Canadian Electrical Code C22.2
13. When mounting the BA478C in an enclosure to maintain Type 4 front panel rating:
- |                                   |                            |
|-----------------------------------|----------------------------|
| Minimum panel thickness should be | 2mm (0.08inches) Steel     |
|                                   | 3mm (0.12inches) Aluminium |
- Outside panel finish should be smooth, free from particle inclusions, runs or build-up around cut-out.
- |                         |                                  |
|-------------------------|----------------------------------|
| Panel cut-out should be | 66.2 x 136.0mm -0.0 +0.5         |
|                         | (2.60 x 5.35 inches -0.00 +0.02) |
- Edges of panel cut-out should be deburred and clean
- Four panel mounting clips are required and each should be tightened to between:
- 20 and 22cNm (1.77 to 1.95 inLb)

Date	Title	Drawn	Checked	Scale
		RC	<i>[Signature]</i>	N/A
Iss.	1	Drawing No.		<b>C1470-13</b>
		Sheet 3 of 3		