

FM Approvals 1151 Boston Providence Turnpike P.O. Box 9102 Norwood, MA 02062 USA

Member of the FM Citolad Group

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# 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 - Cl470-12; Entity; Type 4X, IP66 I / 0 / AEx ia/ IIC / T4 Ta = 70°C - Cl470-12; Entity; Type 4X, IP66 NI / I, II, III / 2 / ABCDEFG / T4 Ta = 60°C - Cl470-13; NIFW; Type 4X, IP66 I / 2 / IIC / T4 Ta = 60°C - Cl470-13; NIFW; Type 4X, IP66 AIS / I, II, III / ABCDEFG - Cl470-12; Entity; Type 4X, IP66 [I / 0] / [AEx ia] IIC - Cl470-12; Entity; Type 4X, IP66

## Intrinsic Safety Parameters

Input Parameters

Terminals	Vmax (V)	Imax (mA)	Pi (W)	Ci (uF)	Li (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** 

Catpati alamote.					
Terminals	Voc	Isc	Po	Co	Lo
TB 3 (BA474D) or TB 601	0.7V	1.3uA	4uW	46nF	0.69mH
(BA478C): 8 & 9: 11 & 12					
TB1: 1, 2, 3 & 4	6V	30.3mA	46mW	23.84uF	3mH



## Nonincendive Field Wiring Parameters

Input Parameters

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Terminals	Vmax (V)	Imax (mA)	Pi (mW)	Ci (uF)	Li (mH)
TB 1: 1, 2, 3 & 4	6	100	1		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	$M_{OC}(M) = 1$	Isc (mA)	Po (mW)	Co (µF)	Lo (mH)
TB 1: 1, 2, 3 & 4	6	30.3	46		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 Um = 250 V

Special conditions of use

The BA474D shall be protected from direct exposure to sunlight.

## BA478Ca Indicating Temperature Transmitter

IS / I / 1 / ABCD / T4 Ta = 70°C - Cl470-12; Entity; Type 4X, IP66 I / 0 / AEx ia/ IIC / T4 Ta = 70°C - Cl470-12; Entity; Type 4X, IP66 NI / I / 2 / ABCD / T4 Ta = 60°C - Cl470-13; NIFW; Type 4X, IP66 I / 2 / IIC / T4 Ta = 60°C - Cl470-13; NIFW; Type 4X, IP66

### Intrinsic Safety Parameters

Input Parameters

Terminals	Vmax (V)	Imax (mA)	Pi (W)	Ci (uF)	Li (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	Voc	Isc	Po	Co	Lo
TB1: 1, 2, 3 & 4	6V	30.3mA	46mW	23.84uF	3mH

### Nonincendive Field Wiring Parameters

Input Parameters

Terminals	Vmax (V)	Imax (mA)	Pi (mW)	Ci (uF)	Li (mH)
TB 1: 1, 2, 3 & 4	. 6	10	0 194	16.16	0
TB 2; 5 & 6	28	20	0	0.046	0.01
TB 3: 8 & 9; 10 & 11	32	20	0	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 Global Group with the mounting conditions provided on drawing numbers Cl470-12 and Cl470-13.
- 2. The BA478C shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
- 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 Cl470-12; 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 Cl470-13; 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 Cl470-13. 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 Cl470-13; 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 Cl480-13. 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



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

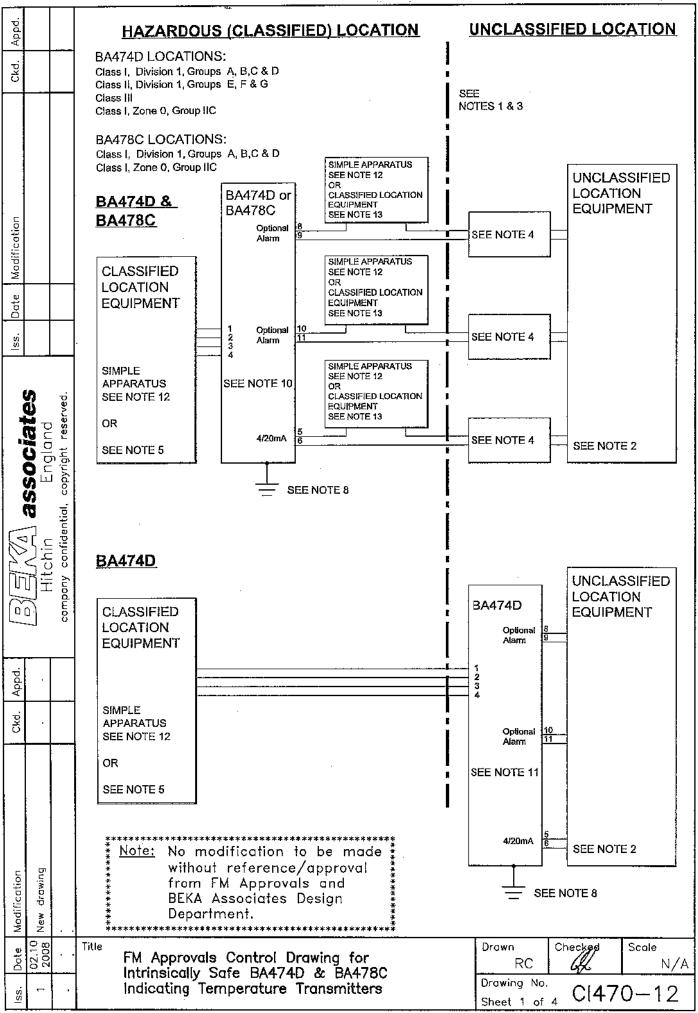
Subsequent Revision Reports / Date Approval Amended

Report Number Date Report Number Date

FM Approvals LLC

Group Manager, Electrical

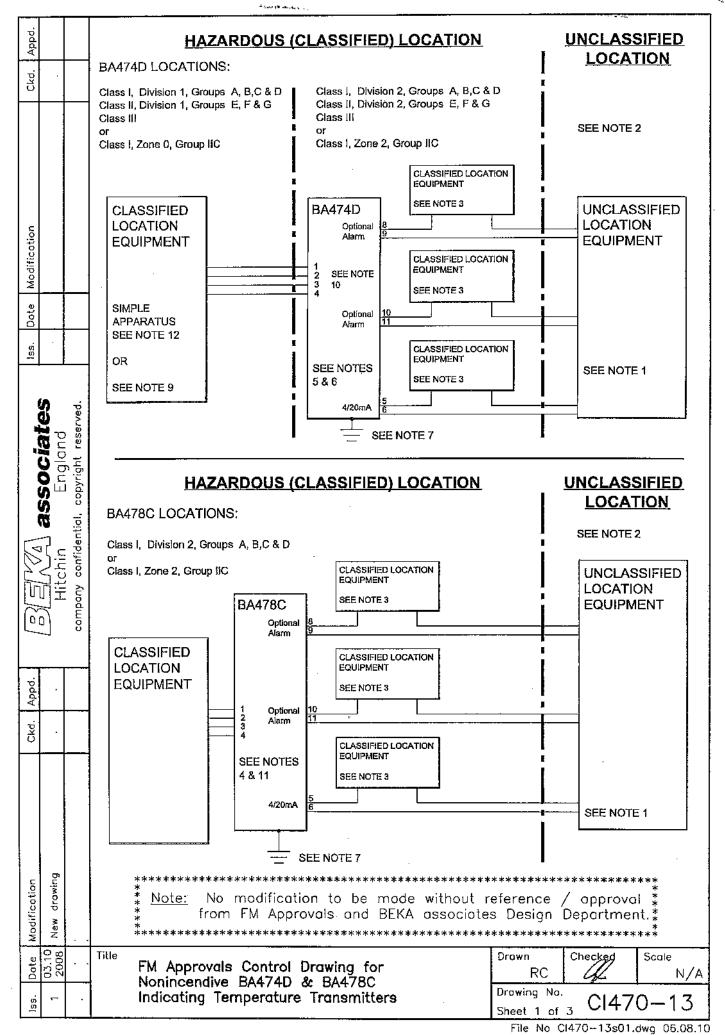
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Appd.					-					:
			No	otes	edu um ministrativa e					
Ckd.			1.		tective barriers and teallation drawings sh					
,				manufacturers' installation drawings shall be followed when installing this equipment. For installations in Canada the associated 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 ic	cation equipment sh	all not u	se or generate i	more than 25	60V rms or 2	50V dc.
Modification			3.	Systems for Hazar	pe in accordance with rdous (Classified) Lo nada shall be in acco	cations"	and the Nationa	al Electrical (	Code ANSI/N	VÉPA 70.
			4.		el or one two channe! complying with the fo			arrier or galv	/anic isolato	r with
lss. Date				Uo or Vt	equal or less than		The lowest Ui approved appr			p.
<u>s</u>	<u> </u>			lo or It	equal to or less tha	an	The lowest li o			p.
	<b>1216</b> 5	reserved		Po	equal to or less tha	an	The lowest Pilapproved approved			p.
	associat England ial, copyright rese			Lo	equal to or greater	than	The sum of the internal inducts or CSA approv	ances Li of e	ach FM, cFl	М
	ريت / ريد /	confidential,		· Co	equal to or greater	than	The sum of the internal capaci or CSA approv	itance Li of e	ach FM, cFl	М
	可 う	company	5.	Simple apparatus	or					
[0		o U			Uo or Vt Io or It	equal	or less than to or less than	UI li		
Appd.					Po Li + Lcable Ci + Ccable	equal	to or less than	Pi Lo		
					OI + OCADIe	equai	to or less than	Со		
Ckd	·									
							• •			
1									•	
Modification	New drawing								Cont,	
·—	02.10 2008		Title	FM Approvals	Control Drawing afe BA474D & E	for		Drown RC	Checked	Scale N/A
lss. (	_			Intrinsically S Indicating Te	afe BA474D & E mperature Transr	3A4/80 nitters	;	Drawing No.	('171 /	0-12

		, ——-							<u> </u>			
Appd.			6.	When installed i	n a hazardous (	(classit	fied)	location the B/	4474D Ind	icatir	ng Temperat	ure
Ckd.				Transmitter shal	l be fitted with o	cable g	land	s / conduit hub	s selected	i fron	n the followir	ng table
				Metallic glands a	and hubs must	be gro	unde	ed – see note 7	,			
				Class		Permi	itted	gland or con	duit hub			
				Class	Any metallic or the required er			le gland or con Il protection.	duit hub th	at pro	ovides	
sation				Class II and III	Crouse - Hin ST-1 STA MHUB-1 HUI	<del>\</del> -1		hubs FG-1 STG-1	STAC	3-1		
Modification					O-Z / Gedrey CHM-50DT			SODT				
Date					Killark Gland CMCXAA050		:R05	0 MCX050				
lss.												
	III VII ASSOCIATOS	confidential, co		CAUTION The Emanufactured frenclosures shall The BA474D and they are shielded.	BA474D and BA om conducting be grounded u	A478C plastic sing the	Indic per ne 'E Tem	cating Tempera Article 250 of t terminal on th	he Nationa e terminal	al Ele bloc	ectrical Code k.	, the
	<u>)</u> 1	company	10.	<b>Terminals 1, 2,</b> Ui = 6V		<b>Termi</b> Ui	nals =	5 and 6 28V	Termii Ui	nals =	<b>8, 9, 10 and</b> 30V	11
		δ		ii = 10	0mA	łj.	=	200mA	Fi	=	200mA	
		$\dashv$		Uo = 6V		Pi	=	0.85W	Pi Uo	=	0.85W 0.7V	
Appd.					.3mA mW	Ci Li	=	46.42nF 0.01mH	lo Po	=	1.3µA 4.0µW	
Ckď.				Ci = 16	.16µF	Co Lo	=	36.58nF 0.69mH	Ci	=	20nF	
				Li = 0	.84µF				Li Co	=	0.01mH 46nF	
				Lo = 3n					Lo	=	0.69mH	
Modification	// drowing											
$\vdash$	New 8		Title						Drawn		Checked	Scale
Dote	02.10	3		FM Approvals Intrinsically S	Control Dra afe BA474D	wing & B	for A47	вс		RC	l de	N/A
lss.	-			Indicating Ter					Drawin Sheet		(14.7	0-12
_	•		•									

			·	-		
Appd.						. 4
Ckd.			11. Terminals 1, 2, 3 and 4 Terminals 5, 6, 8, 9, 10 Ui = 6V Um = 250 Ii = 100mA			
			Pi = 194mW Uo = 6V Io = 30.3mA Po = 46mW			
Modification			Ci = 16.16µF Li = 0 Co = 23.84µF Lo = 3mH			
Date Mo			12. Simple Apparatus shall be as defined in the National Electrical Co- or for installations in Canada by the Canadian Electrical Co-		SI/NFPA 70	•
188.			-    -			
	a A	j.	13. Simple apparatus or:			
	associates Fredand	confidential, copyright reserved.	Uo or Vtlo or Itlo or Itlo or Itlo or BA478C + Classified Location Equipment) + Loable Ci (BA474D or BA478C + Classified Location Equipment) + Coable	equal or les equal to or equal to or equal to or equal to or	less than less than less than	Ui Ii Pi Lo Co
	7	identîal	14. When mounting the BA478C in an enclosure to maintain Ty	/pe 4 front pa	nel rating:	
	Titchin	,		nches) Steel nches) Alumi	nium	
		company	Outside panel finish should be smooth, free from particle in build-up around cut-out.	ıclusions, run	s or	
Appd.				0mm -0.0 +0. 5 inches -0.00		
Ckd.			Edges of panel cut-out should be deburred and clean			
0			Four panel mounting clips are required and each should be			
			20 and 22c	Nm (1.77 to 1	1.95 inLb)	
	6					
Modification	New drawing					
	02.10 2008 N		Title FM Approvals Control Drawing for Intrinsically Safe BA474D & BA478C	Drown RC	Checked	Scale N/A
, vi	-		Indicating Temperature Transmitters	Drawing No.	CI47	0-12



Appd.	Notes				
Ска	The unclassified location equipment shall not use or generate more than     250V rms or 250V dc.				
	2. 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.				
Modification	<ol> <li>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.</li> </ol>				
Date Mod	4. To maintain IP66 protection between the BA474C Indicating Temperature Transmitter and the mounting panel:				
	Four panel mounting clips shall be used				
<u> </u>	Minimum panel thickness should be 2mm (0.08inches) Steel 3mm (0.12inches) Aluminium				
ates nd reserved.	Outside panel finish shall be smooth, free from particle inclusions, runs or build-up around cut-out.				
associates England id., copyright reserved.	Panel cut-out shall be 66.2 x 136.0mm -0.0 +0.5 (2.60 x 5.35 inches -0.00 +0.02)				
SS	Edges of panel cut-out shall be deburred and clean				
Chin confidential,	Each panel mounting clip shall be tightened to between: 20 and 22cNm (1.77 to 1.95 inLb)				
Hito company o	5. 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				
8	Metallic glands and hubs must be grounded – see note 6.				
b	Class Permitted gland or conduit hub				
Ckd. Appd.	Class I Any metallic or plastic cable gland or conduit hub that provides the required environmental protection.				
	Class II and III Crouse – Hinds Myler hubs ST-1 STA-1 SSTG-1 STG-1 STAG-1 MHUB-1 HUB 1				
	O-Z / Gedrey Hubs CHM-50DT CHMG-50DT				
Modification New drawing	Kiliark Glands CMCXAA050 MCR050 MCX050				
0.00					
Date 03.10 2008	FM Approvals Control Drawing for Nonincendive BA474D & BA478C				
188.	Indicating Temperature Transmitters  Drawing No.  Sheet 2 of 3 C1470—13				
	File No Cl470-13s01.dwg 06.08.10				

		}
. Pd	<ul> <li>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.</li> <li>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.</li> </ul>	
Ckd. Appd.		
	<ol> <li>The BA474D and BA478C Indicating Temperature Transmitted are shielded from direct sunlight.</li> </ol>	ers shall be mounted where they
	9. Simple apparatus or	
Modification	Uo or Vt equal or less than lo or It equal to or less than Po equal to or less than Li + Lcable equal to or less than Ci + Ccable equal to or less than	n <b>Pi</b> n Lo
Date	10. Terminals 1, 2, 3 and 4 Terminals 5 and 6	Terminals 8, 9, 10 and 11
<u>8</u>	Ui = 6V Ui = 28V Ii = 100mA II = 200mA	Ui = 32V Ii = 200mA
associates England tiol, copyright reserved.	Pi = 194mW	Ci = 20nF Li = 0.01mH
	Ci = 16.16µF Li = 0 Co = 23.84µF Lo = 3mH	
ESELVE A A Hitchin company confidential,	11. Terminals 1, 2, 3 and 4  Ui = 6V Ui = 28V Ii = 100mA Ci = 16.16µF Ci = 46.42nF Li = 0  Terminals 5 and 6 Ui = 28V Ii = 200mA Ci = 46.42nF Li = 0.01mH	Terminals 8, 9, 10 and 11  Ui = 32V  ii = 200mA  Ci = 20nF  Li = 0.01mH
00 8	<ol> <li>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</li> </ol>	
Аррd.	Minimum panel thickness should be 2mm (0.08inches) Steel	
Ckd.		
		0mm -0.0 +0.5 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)	
Modification New drowing		
s. Date 03.10 1 2008	FM Approvals Control Drawing for Nonincendive BA474D & BA478C Indicating Temperature Transmitters	Drown         Checked         Scale           RC         N/A           Drowing No.         CI470-13
SS T	Sheet 3 of 3 01470-13	