



FM Approvals  
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Member of the FM Global Group

# CERTIFICATE OF COMPLIANCE

## HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

**BA454Da Batch Controller**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 60°C – CI450-12; Entity; Type 4X, IP66  
 I / 0 / Ex ia IIC T4 Ta = 60°C – CI450-12; Entity; Type 4X, IP66  
 IPA / I, II, III / 2 / ABCDEFG / T4 Ta = 60°C – CI450-13; NIFW; Type 4X, IP66

Intrinsic Safety Parameters

Input Parameters

Terminals	Vmax (V)	Imax (mA)	Pi (W)	Ci (nF)	Li (uH)
1 & 2	28	96	0.84	15	8
11 & 12	0	0	0	15	8
13, 14, 15, 16 & 17	28	100	0.66	18	20
18, 19 & 20	0	0	0	3.6	0
S1 to S7	0	0	0	0.54	300
A1 & A2; A3 & A4; A5 & A6; A7 & A8; A9 & A10; A11 & A12	28	200	0.85	0.04	20

Output Parameters

Terminals	Voc (V)	Isc	Po (W)	Co (μF)	Lo (mH)
11 & 12	10.6	20mA	0.05	2.3	90
13, 14, 15, 16 & 17	1.1	0.12mA	<0.001	0.018	0.02
18, 19 & 20	11.7	2.4mA	0.007	1000	1000
S1 to S7	14.7	146.7mA	0.58	0.08	1.1
A1 & A2; A3 & A4 A5 & A6; A7 & A8; A9 & A10; A11 & A12	1.49	1uA	0.003	1000	1000

Nonincendive Field Wiring Parameters

Input Parameters

Terminals	Vmax (V)	I <sub>max</sub> (mA)	Pi (W)	Ci (nF)	Li (uH)
1 & 2	28	-	-	15	8
13, 14, 15, 16 & 17	28	-	-	18	20
A1 & A2; A3 & A4; A5 & A6; A7 & A8; A9 & A10; A11 & A12	32	-	-	40	20

Output Parameters

Terminals	Voc (V)	Isc (mA)	Po (W)	Co (μF)	Lo (mH)
S1 to S7	14.7	146.7	-	0.08	1.1
11 & 12	10.6	20	-	2.3	90
18, 19 & 20	11.7	2.4	-	1000	1000

a = Parameter not affecting safety.

Special conditions of use

1. The BA454D shall be protected from direct exposure to sunlight.
2. Input connections shall only be made to terminals 11 and 12 or to terminals 13, 14, 15, 16 and 17. These inputs shall not be used at the same time.

**BA458Ca Batch Controller**

IS / I / 1 / ABCD / T4 Ta = 60°C – CI450-12; Entity: Type 4X\*, IP66\*

I / 0 / Ex ia IIC T4 Ta = 60°C – CI450-12; Entity: Type 4X\*, IP66\*

NI / I / 2 / ABCD / T4 Ta = 60°C – CI450-13: NIFW; Type 4X\*, IP66\*

\*Front panel only

Intrinsic Safety Parameters

Input Parameters

Terminals	Vmax (V)	I <sub>max</sub> (mA)	Pi (W)	Ci (nF)	Li (uH)
1 & 2	28	96	0.84	15	8
11 & 12	0	0	0	15	8
13, 14, 15, 16 & 17	28	100	0.66	18	20
18, 19 & 20	0	0	0	3.6	0
S1 to S7	0	0	0	0.54	300
A1 & A2; A3 & A4; A5 & A6; A7 & A8; A9 & A10; A11 & A12	28	200	0.85	0.04	20

Output Parameters

Terminals	V <sub>oc</sub> (V)	I <sub>sc</sub>	P <sub>o</sub> (W)	C <sub>o</sub> (uF)	L <sub>o</sub> (mH)
11 & 12	10.6	20mA	0.05	2.3	90
13, 14, 15, 16 & 17	1.1	0.12mA	<0.001	0.018	0.02
18, 19 & 20	11.7	2.4mA	0.007	1000	1000
S1 to S7	14.7	146.7mA	0.58	0.08	1.1
A1 & A2; A3 & A4; A5 & A6; A7 & A8; A9 & A10; A11 & A12	1.49	1uA	0.003	1000	1000

Nonincendive Field Wiring Parameters

Input Parameters

Terminals	Vmax (V)	I <sub>max</sub> (mA)	Pi (W)	Ci (nF)	Li (uH)
1 & 2	28	-	-	15	8
13, 14, 15, 16 & 17	28	-	-	18	20
A1 & A2; A3 & A4; A5 & A6; A7 & A8; A9 & A10; A11 & A12	32	-	-	40	20

Output Parameters

Terminals	Voc (V)	Isc (mA)	Po (W)	Co (µF)	Lo (mH)
S1 to S7	14.7	146.7	-	0.08	1.1
11 & 12	10.6	20	-	2.3	90
18, 19 & 20	11.7	2.4	-	1000	1000

a = Parameter not affecting safety.

Special conditions of use

1. To maintain the Type 4X enclosure rating the BA458C shall be installed in accordance with the mounting conditions provided on drawing numbers CI450-12 and CI450-13.
2. The BA458C shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
3. The BA458C shall be protected from direct exposure to sunlight.
4. Input connections shall only be made to terminals 11 and 12 or to terminals 13, 14, 15, 16 and 17. These inputs shall not be used at the same time.

Equipment Ratings:

**BA454D Batch Controller**

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 indoor and outdoor Hazardous Locations in accordance with the Entity Concept when installed according to Control Drawing CI450-12. Nonincendive for Class I and II Division 2, Groups A, B, C, D, E, F and G; Nonincendive for Class III, Divisions 1 and 2; indoor and outdoor Hazardous Locations in accordance with the NIFW Concept when installed according to Control Drawing CI450-13. Temperature Class T4 at an ambient of 60°C

**BA458C Batch Controller**

Intrinsically Safe for Class I, II and III, Division 1, Groups A, B, C, and D, and Class I, Zone 0 Group IIC indoor and outdoor Hazardous Locations in accordance with the Entity Concept when installed according to Control Drawing CI450-12. Nonincendive for Class I, Division 2, Groups A, B, C, and D; indoor and outdoor Hazardous Locations in accordance with the NIFW Concept when installed according to Control Drawing CI450-13. Temperature Class T4 at an ambient of 60°C

FM Approved for:

BEKA associates Limited  
Hitchin, United Kingdom

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

CSA-C22.2 No 157	1992
CSA C22.2 No. 1010.1	1992
CSA C22.2 No. 25	2004
CSA C22.2 No. 213-	2004
CSA C22.2 No. 94.02	2007
CSA C22.2 E60079-11	2002
CSA C22.2 60079-0	2007
CSA C22.2 60529	2005

Original Project ID: 3033262C

Approval Granted: *August 28, 2009*

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
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FM Approvals LLC

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

*28 August 2009*  
\_\_\_\_\_  
Date



THIRD ANGLE PROJECTION

DIMENSIONS IN mm

DO NOT SCALE

SUB-MASTER

HAZARDOUS (CLASSIFIED) LOCATION

UNCLASSIFIED LOCATION

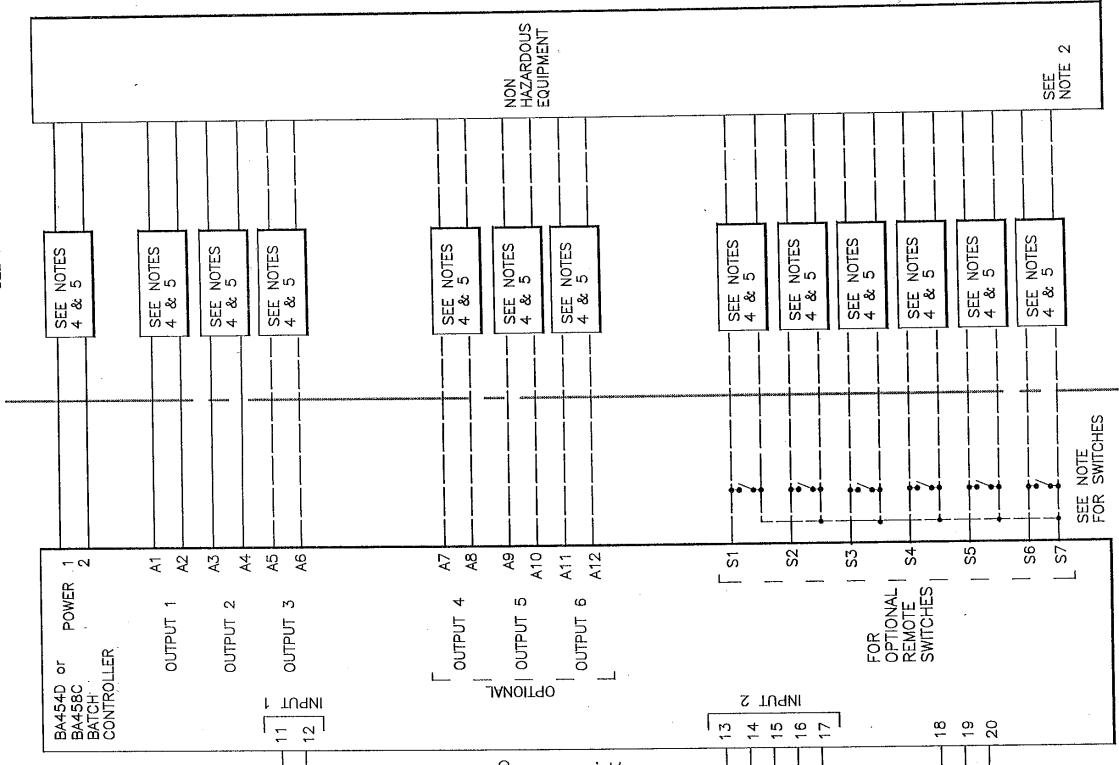
<b>BA454D and BA458C Entity Parameters</b>	
Terminals 1 & 2	
Uj = 28V	Uo = 14.7V dc
Ij = 96mA	Io = 146.7mA dc
Pj = 0.64W	Po = 0.58W
Ci = 15nF	Co = 0.08µF
Li = 6µH	Lo = 1.1mH
Terminals S1 to S7 (combined parameters)	
Uj = 0	Uo = 14.7V dc
Ij = 0	Io = 146.7mA dc
Pj = 0	Po = 0.58W
Ci = 0.54µF	Co = 0.08µF
Li = 0.3mH	Lo = 1.1mH
Terminals A1 & A2; A3 & A4; A5 & A6; A7 & A8; A9 & A10; A11 & A12 (for each output)	
Uj = 28V dc	Uo = 1.49V dc
Ij = 200mA dc	Io = 1µA dc
Pj = 0.85W	Po = 3µW
Ci = 0.04µF	Co = 1000µF
Li = 0.02mH	Lo = 1000mH
Terminals 11 & 12	
Uj = 0	Uo = 10.6V
Ij = 0	Io = 20mA
Pj = 0	Po = 50mW
Ci = 15nF	Co = 2.3µF
Li = 8µH	Lo = 90mH
Terminals 13, 14, 15, 16 & 17	
Uj = 28V dc	Uo = 1.1V
Ij = 100mA	Io = 0.12mA
Pj = 0.66W	Po = 35µW
Ci = 18nF	Co = 0.18µF
Li = 20mH	Lo = 0.02mH
Terminals 18, 19 & 20	
Uj = 0	Uo = 11.7V
Ij = 0	Io = 2.4mA
Pj = 0	Po = 7mW
Ci = 3.6nF	Co = 1000µF
Li = 0	Lo = 1000mH

**HAZARDOUS 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

**BA458C LOCATIONS:**  
 Class I, Division 1, Groups A, B, C, D  
 Class II, Zone 0, Group IIC

PROXIMITY DETECTOR, PHOTO DETECTOR, SWITCH CONTACT OR SIMILAR  
 SEE NOTES 6 & 7

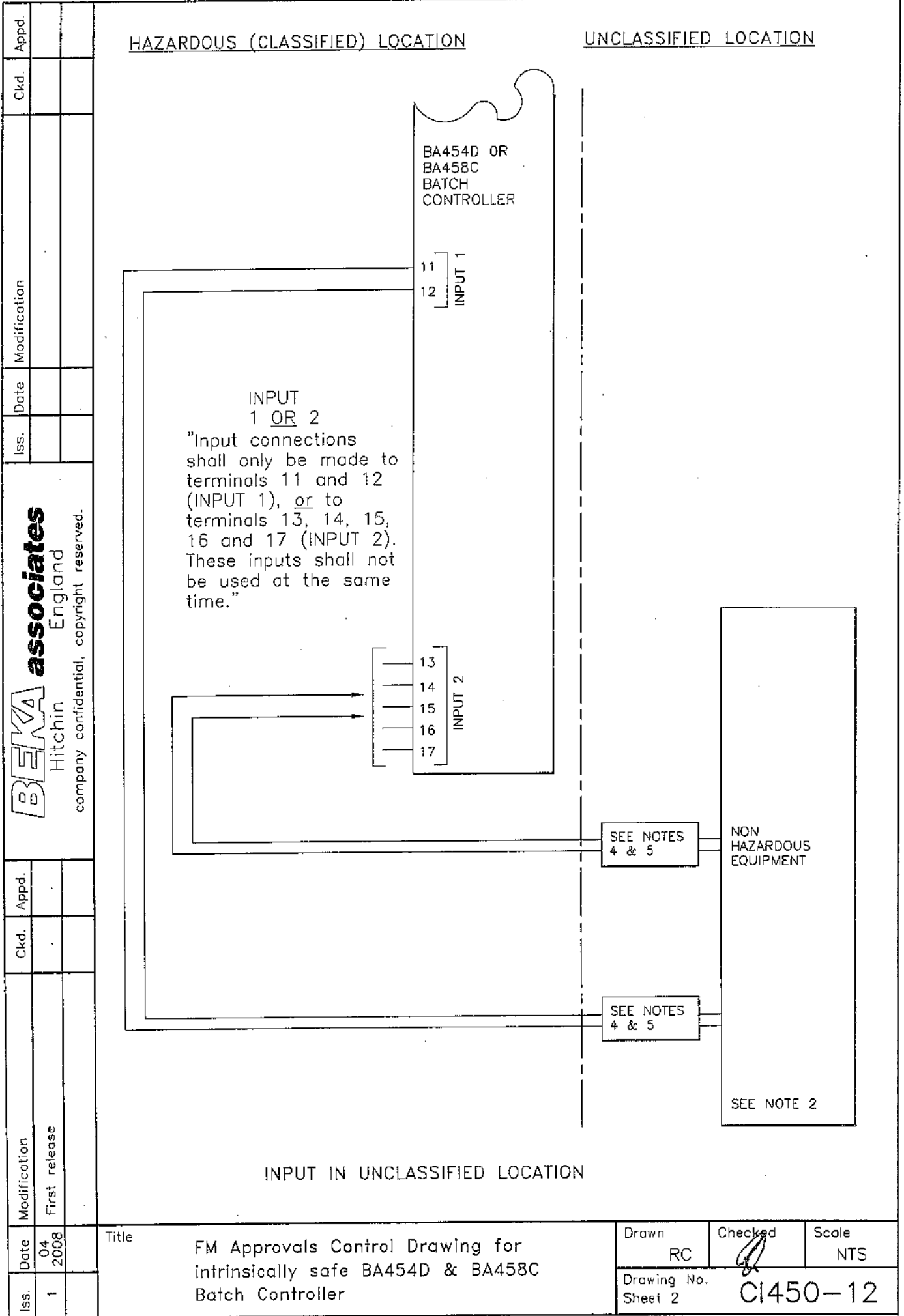
INPUT 1 OR 2  
 "Input connections shall only be made to terminals 11 and 12 (INPUT 1), or to terminals 13, 14, 15, 16 and 17 (INPUT 2). These inputs shall not be used at the same time."



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

INPUT IN HAZARDOUS (CLASSIFIED) LOCATION

1	26.03	First release	Iss.	Date	Modification	Ckd.	Appd.	Title			
	2008							FM Approvals Control Drawing for intrinsically safe BA454D & BA458C Batch Controller			
<p><b>BEKA associates</b>          Hitchin          England          company confidential, copyright reserved.</p>								Drawn	SH	Checked	Scale
								Drawing No.		NTS	
								Sheet 1 of 4		C1450-12	
								File No C1450-12s1 26.06.09			



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Notes:

1. The associated intrinsically safe barriers and galvanic isolators must be FM approved and the manufacturers' installation drawings shall be followed when installing this equipment.  
 For installations in Canada the associated intrinsically safe barriers and galvanic isolators must be cFM or CSA approved and the manufacturers' installation drawings shall be followed when installing the equipment.
2. The unclassified location equipment connected to the associated intrinsically safe Zener barriers or galvanic isolators shall not use or generate more than 250V rms or 250V dc.
3. Installation 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 C22.1
4. One single channel or one channel of a dual channel associated intrinsically safe barrier or galvanic isolator with entity parameters complying with the following requirements:
 

Uo or Vt	equal to or less than	Ui
Io or It	equal to or less than	Ii
Lo	equal to or greater than	Lcable + Li
Co	equal to or greater than	Ccable + Ci
5. All shunt Zener diode safety barriers and diode return barriers must be of like polarity.
6. The electrical circuit and the interconnecting cables in the hazardous (classified) location must be cable of withstanding an ac test voltage of 500Vrms to ground or frame of the apparatus for one minute.
7. Hazardous (classified) location equipment may be simple apparatus as defined in the National Electrical Code or the Canadian Electrical Code e.g. mechanically activated switches OR FM Approved equipment with entity parameters complying with following requirements:
 

Uo or Vt	equal to or less than	Ui
Io or It	equal to or less than	Ii
Lo	equal to or greater than	Lcable + Li
Co	equal to or greater than	Ccable + Ci

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Iss.	1	Date	26.03 2008	Modification	First release	Ckd.	Appd.
Iss.		Date		Modification		Ckd.	Appd.

Title	Drawn	Checked	Scale
FM Approvals Control Drawing for intrinsically safe BA454D & BA458C Batch Controller	RC	<i>[Signature]</i>	NTS
	Drawing No. Sheet 3		CI450-12



Iss.		Appd.	
Date	26.03 2008	Ckd.	
Modification	First release		
<p align="center"><b>BEKA associates</b> Hitchin England company confidential, copyright reserved.</p>			
Iss.		Date	
		Modification	
Ckd.		Appd.	

8. Optional switches which comply with the requirements for simple apparatus as defined in the National Electrical Code or the Canadian Electrical Code.

9. To maintain IP66 protection between the BA458C batch controller and the mounting panel:

Four panel mounting clips shall be used

Minimum panel thickness shall be      2mm (0.08inches) Steel  
  3mm (0.12inches) Aluminium

Outside panel finish shall be smooth, free from particle inclusions, 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)

10. When installed in a hazardous (classified) location the BA454D Batch Controller shall be fitted with cable glands/conduit hubs selected from the following table

Metallic glands and hubs must be grounded - see note 11.

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 / Gedfrey Hubs</b> CHM-50DT   CHMG-50DT</p> <p><b>Killark Glands</b> CMCXAA050   MCR050   MCX050</p>

11. In addition to the supplied bonding plate, when metallic 2 or 3 glands or conduit hubs are fitted to a BA454D Batch Controller, all metallic glands or conduit hubs must be connected together and grounded.

12. WARNING: The BA454D and BA458C Batch Controllers are manufactured from conductive plastic per Article 250 of the National Electrical Code or Section 10 of the Canadian Electrical Code as applicable. The enclosures shall be grounded using the 'E' terminal on the terminal block.

13. Input connections shall only be made to terminals 11 and 12 (INPUT 1), or to terminals 13, 14, 15, 16 and 17 (INPUT 2). These inputs shall not be used at the same time.

14. The terminals for the power supply, Input A or Input B, External Links, External Switches, and optional alarms are all considered to be different intrinsically safe circuits and shall be wired separately as required by the National Electrical Code or Canadian Electrical Code as applicable.

Iss.	Date	Title	Drawn	Checked	Scale
			RC	<i>[Signature]</i>	NTS
1	26.03 2008	FM Approvals Control Drawing for intrinsically safe BA454D & BA458C Batch Controller	Drawing No. Sheet 4	CI450-12	



THIRD ANGLE PROJECTION

DIMENSIONS IN mm

DO NOT SCALE

**HAZARDOUS (CLASSIFIED) LOCATION**

**BA454D LOCATIONS:**  
 Class I, Division 2, Groups A, B, C, D  
 Class II, Division 2, Groups E, F & G  
 Class III  
 Class I, Zone 2, Group IIC

**BA458C LOCATIONS:**  
 Class I, Division 2, Groups A, B, C, D  
 Class I, Zone 2, Group IIC

**BA454D and BA458C  
Maximum input and  
output parameters**

Terminals 1 & 2  
 $V_{max} = 28V$   
 $C_i = 15nF$   
 $L_i = 8\mu H$

Terminals S1 to S7  
 (combined parameters)  
 $V_{max} = 0$   
 $V_{oc} = 14.7V$  dc  
 $I_{sc} = 146.7mA$   
 $C_o = 0.08\mu F$   
 $L_o = 1.1mH$

Terminals A1 & A2; A3 & A4;  
 A5 & A6; A7 & A8; A9 & A10;  
 A11 & A12 (for each output)  
 $V_{max} = 32V$  dc  
 $C_i = 0.04\mu F$   
 $L_i = 0.02mH$

Terminals 11 & 12  
 $V_{oc} = 10.6V$   
 $I_{sc} = 20mA$   
 $C_o = 2.3\mu F$   
 $L_o = 90mH$

Terminals 13, 14, 15, 16 & 17  
 $V_{max} = 28V$  dc  
 $C_i = 18nF$   
 $L_i = 0.02mH$

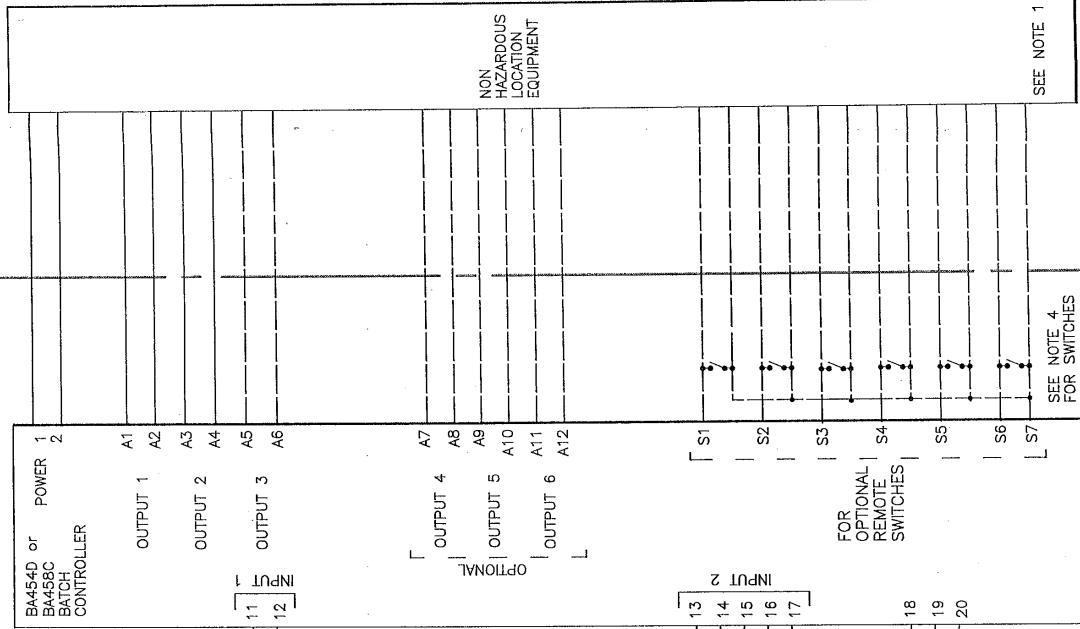
Terminals 18, 19 & 20  
 $V_{oc} = 11.7V$  dc  
 $I_{sc} = 2.4mA$   
 $C_o = 1000\mu F$   
 $L_o = 1000mH$

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

**UNCLASSIFIED LOCATION**

SEE NOTE 2

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**INPUT IN HAZARDOUS (CLASSIFIED) LOCATION**

1	26.03 2008	First release											Scale	NTS
													Checked	SH
													Drawn	SH
														Sheet 1 of 3
														Drawing No. CI450-13
														File No CI450-13s1 26.08.08

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Title  
 FM Approvals Control Drawing for  
 nonincendive BA454D & BA458C  
 Batch Controller

Iss.	Date	Modification	Appd.

# SUB-MASTER

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

1. The unclassified location equipment connected to the associated nonincendive field wiring apparatus must 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 Canadian Electrical Code C22.2

3. Apparatus connected to the outputs shall be FM, cFM or CSA Approved as Associated Nonincendive Field Wiring Apparatus and shall comply with the following requirements:

Voc	equal to or less than	Vmax
La	equal to or greater than	Lcable + Li
Ca	equal to or greater than	Ccable + Ci

4. Terminals S1 to S7 shall be connected to simple apparatus or volt free contacts of FM, cFM or CSA Approved Nonincendive Field Wiring Apparatus or FM, cFM or CSA Approved Associated Nonincendive Field Wiring Apparatus installed using Division 2 wiring methods.

5. To maintain IP66 protection between the BA458C and the mounting panel:

Four panel mounting clips shall be used

Minimum panel thickness shall 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)

Iss.	1	Date	04 2008	Modification	First release	Appd.	
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Iss.		Date		Modification		Appd.	
Iss.		Date		Modification		Appd.	

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Iss.	Date	Title	Drawn	Checked	Scale
			RC	<i>[Signature]</i>	NTS
			Drawing No.	CI450-13	
			Sheet 2		

# SUB-MASTER

6. When installed in a hazardous (classified) location the BA454D Batch Controller 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> SSTG-1 STG-1 STAG-1 MHUB-1</p> <p><b>O-Z / Gedfrey hub</b> CHMG-50DT</p> <p><b>REMKE hub</b> WH-1-G</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 BA454D Batch Controller, all metallic glands or conduit hubs must be connected together and grounded.
8. CAUTION: The BA454D and BA458C Batch Controller enclosures are manufactured from conductive plastic per Article 250 of the National Electrical Code the enclosures shall be grounded using the 'E' terminal on the terminal block.
9. Input connections shall only be made to terminals 11 and 12 (INPUT 1), or to terminals 13, 14, 15, 16 and 17 (INPUT 2). These inputs shall not be used at the same time.

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Iss.	Date	Modification	Ckd.	Appd.
1	04 2008	First release		

Title FM Approvals Control Drawing for nonincendive BA454D & BA458C Batch Controller	Drawn RC	Checked 	Scale NTS
		Drawing No. Sheet 3	CI450-13