



Member of the FM Global Group

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# CERTIFICATE OF COMPLIANCE

## HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

### **BA405C Setpoint Display**

IS // / 1 / ABCD / T4 Ta = 60°C – CI405-27; Entity; IP65

NI // / 2 / ABCD / T4 Ta = 60°C – CI405-27; NIFW; IP65

### Intrinsic Safety Parameters

#### Input Parameters

Terminals	Ui (V)	Ii (mA)	Pi (W)	Ci (µF)	Li (mH)
1 & 3; 1 & 2; 1 & 13	30	200	0.85	0.04	0.01
12 & 13	28	159	0.8	0.03	0.01

#### Output Parameters

Terminals	Uo (V)	Io (mA)	Po (W)	Co (µF)	Lo (mH)
3 & 4	30	200	0.85	0.026	0.99

a = Parameter not affecting safety.

### Special conditions of use

1. To maintain the IP65 enclosure rating the BA405C shall be installed in accordance with the mounting conditions provided on drawing number CI405-27.
2. The BA405C shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.
3. The BA405C shall be protected from direct exposure to sunlight.

### Equipment Ratings:

Intrinsically safe for Class I Division 1 Groups A, B, C and D and Class I Zone 1 Group IIC Hazardous (Classified) Locations using the Entity Concept when installed in accordance with Control Drawing CI405-27



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Nonincendive for Class I Division 2 Groups A, B, C and D and Class I Zone 2 Group IIC Hazardous (Classified) Locations using the nonincendive field wiring concept when installed in accordance with Control Drawing CI405-27.

**FM Approved for:**

BEKA associates  
Hitchin, Hertfordshire SG5 2DA, 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
IEC 60529	1991

Original Project ID: 3026081

Approval Granted: January 19, 2007

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
101217	March 16, 2011		

FM Approvals LLC

Timothy J. Adam  
Technical Team Manager

March 16, 2011  
Date

# INTRINSICALLY SAFE INSTALLATIONS

## HAZARDOUS (CLASSIFIED) LOCATION

## UNCLASSIFIED LOCATION

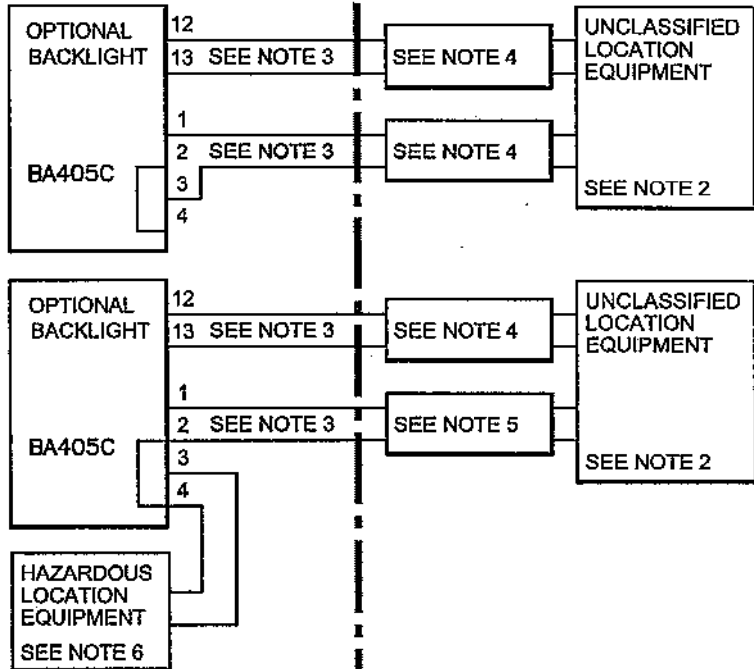
LOCATION:  
Class I, Division 1, Groups A, B, C & D

**BA405C**  
Entity Parameters

Terminals 1 & 3; 1 & 2  
 $U_i = 30V$   
 $I_i = 200mA$   
 $P_i = 0.85W$   
 $C_i = 0.04\mu F$   
 $L_i = 0.01mH$

Terminals 3 & 4  
 $U_o = 30V$   
 $I_o = 200mA$   
 $P_o = 0.85W$   
 $C_o = 0.26\mu F$   
 $L_o = 0.99mH$

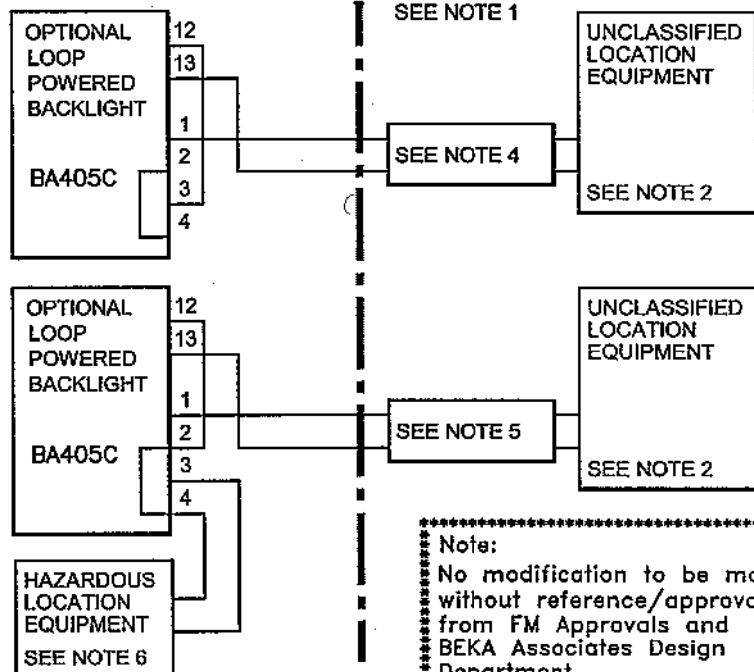
Terminals 12 & 13  
 $U_i = 28V$   
 $I_i = 159mA$   
 $P_i = 0.8W$   
 $C_i = 0.03\mu F$   
 $L_i = 0.01mH$



**BA405C**  
Entity Parameters

Terminals 1 & 13;  
12 & 13  
 $U_i = 30V$   
 $I_i = 200mA$   
 $P_i = 0.85W$   
 $C_i = 0.04\mu F$   
 $L_i = 0.01mH$

Terminals 3 & 4  
 $U_o = 30V$   
 $I_o = 200mA$   
 $P_o = 0.85W$   
 $C_o = 0.26\mu F$   
 $L_o = 0.99mH$



Notes:

1. The associated intrinsically safe barriers or galvanic isolators must be FM approved and the manufacturers' installation drawings must be followed when installing this equipment.
2. The unclassified location equipment connected to the associated intrinsically safe barriers or galvanic isolators must not use or generate more than 250V rms or 250V dc.

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

Iss.		Date		Iss.		Date		Modification		Ckd.		Appd.	
1		10.01 2006						First release					

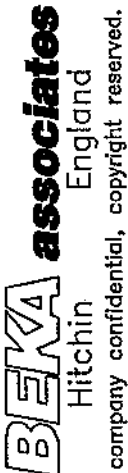
BEKA associates

Hitchin  
England  
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Title

## FM Control Drawing for BA405C

Drawn RC	Checked 	Scale N/A	
Drawing No. Sheet 1 of 4		CI405-27	

Iss.	1	Date	10.01 2006	Modification	First release	Ckd.		Appd.	
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Iss.		Date		Modification		Ckd.		Appd.	

3. Installation should 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.

4. One single channel or one channel of a dual channel barrier or galvanic isolator with entity parameters complying with the following requirements:

Uo or Vi	equal to or less than	Ui
Io or It	equal to or less than	li
Po	equal to or less than	Pi
La	equal to or greater than	Lcable + Li
Ca	equal to or greater than	Ccable + Ci

5. One single channel or one channel of a dual channel barrier or galvanic isolator with entity parameters complying with the following requirements:

**CAUTION: THESE REQUIREMENTS MUST BE FOLLOWED FOR NEW INSTALLATIONS OR MODIFICATIONS TO EXISTING INSTALLATIONS**

Voc or Vt	equal to or less than	The lowest Vmax of the FM Approved apparatus installed in the respective loop.
Isc or It	equal to or less than	The lowest Imax of the FM Approved apparatus installed in the respective loop.
Po	equal to or less than	Pmax
La	equal to or greater than	The sum of the cable inductances and the internal inductance Li of each FM Approved apparatus installed in the respective loop.
Ca	equal to or greater than	The sum of the cable capacitance and the internal capacitance Ci of each FM Approved apparatus in the respective loop.

6. Hazardous (classified) location equipment may be simple apparatus or FM Approved equipment with entity parameters meeting the requirements of note 5.

7. When mounting BA405C in an enclosure to maintain IP65 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 43.5 x 90.0mm -0.00 +0.5  
(1.71 x 3.54 inches -0.00 +0.02)

Edges of panel cut-out should be deburred and clean

Each panel mounting clip should be tightened to between: 20 and 22cNm (1.77 to 1.95 inLb)

Title

FM Control Drawing for BA405C

Drawn

RC

Checked



Scale

N/A

Drawing No.  
Sheet 2 of 4

CI405-27

## NONINCENDIVE INSTALLATIONS

### HAZARDOUS (CLASSIFIED) LOCATION

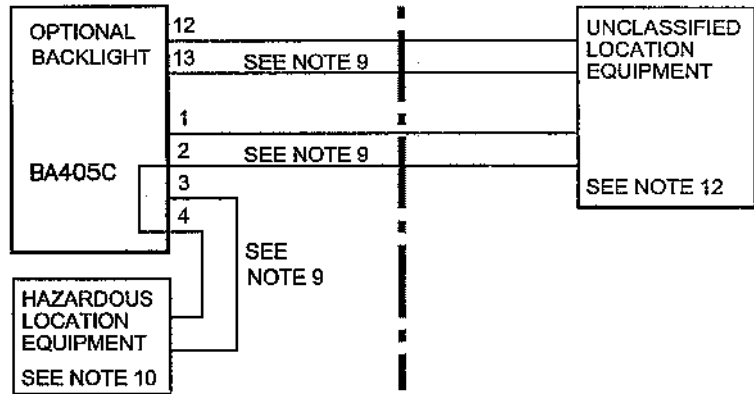
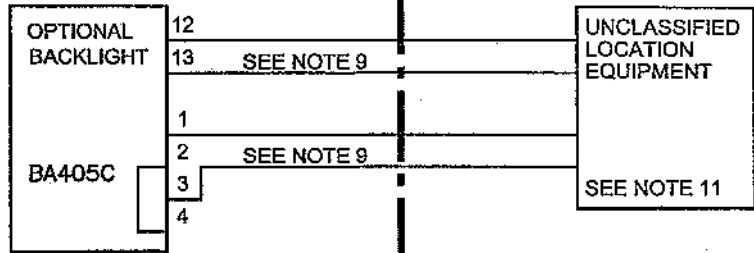
### UNCLASSIFIED LOCATION

LOCATION:  
Class I, Division 2, Groups A, B, C & D

**BA405C**

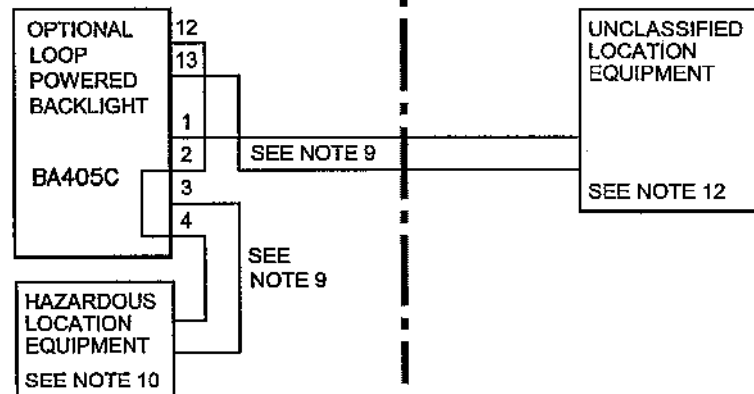
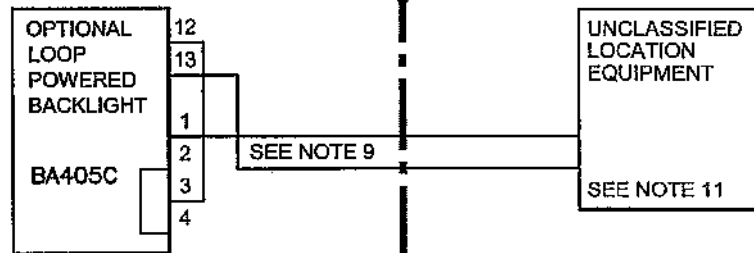
Terminals 1, 2, 3 & 4  
 $V_{max} = 32V$   
 $C_i = 0.04\mu F$   
 $L_i = 0.01mH$

Terminals 12 & 13  
 $V_{max} = 32V$   
 $C_i = 0.03\mu F$   
 $L_i = 0.01mH$



**BA405C**

Terminals 1, 2, 3, 4,  
12 & 13  
 $V_{max} = 32V$   
 $C_i = 0.04\mu F$   
 $L_i = 0.01mH$



Iss.		Date		Modification		Ckd.		Appd.	
1		10.01 2006		First release					

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Title

## FM Control Drawing for BA405C

Drawn RC	Checked 	Scale N/A
Drawing No. Sheet 3 of 4 <b>CI405-27</b>		

Iss.	Date	Modification	Ckd.	Appd.
1	10.01 2006	First release		

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8. The BA405C is FM Approved as Nonincendive Field Wiring Apparatus for Class I, Division 2, Groups A, B, C and D Hazardous (Classified) locations without connection to associated protective barriers or galvanic isolators when installed per the National Electrical Code ANSI/NFPA 70.
9. 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.
10. Hazardous location equipment must be FM Approved Nonincendive Field Wiring Apparatus or simple apparatus, as defined in ANSI/NFPA 70.
11. Associated apparatus shall be FM Approved Associated Nonincendive Field Wiring Apparatus installed in the unclassified location with parameters complying with the following requirements, or FM Approved Nonincendive Field Wiring Apparatus with nonincendive field wiring output(s) installed in the classified location complying 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

12. Associated apparatus shall be FM Approved Associated Nonincendive Field Wiring Apparatus installed in the unclassified location with parameters complying with the following requirements, or FM Approved Nonincendive Field Wiring Apparatus with nonincendive field wiring output(s) installed in the classified location complying with the following requirements:

Voc	equal to or less than	The lowest Vmax of the FM Approved apparatus installed in the respective loop.
La	equal to or greater than	Sum of the cable inductances and internal inductances Li of each FM Approved apparatus installed in the respective loop.
Ca	equal to or greater than	Sum of the cable capacitance and the internal capacitance Ci of each FM Approved apparatus in the respective loop.

Iss.	Date	Title	Drawn	Checked	Scale
1	10.01 2006	FM Control Drawing for BA405C	RC		N/A
			Drawing No. Sheet 4 of 4 CI405-27		