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APPROVAL REPORT

302/303 SERIES TRANSMITTERS FOR USE IN HAZARDOUS (CLASSIFIED) LOCATIONS

Prepared for:

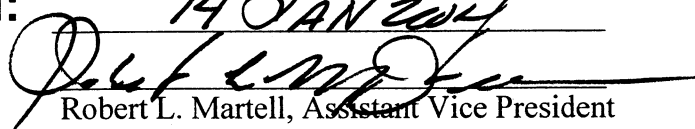
SMAR Equipamentos Industriais Ltda
Av Dr Antonio Furlan Jr. 1028
14160-000
Sertaozinho SP Brasil

Project ID: 3015629

Class: 3610

Date of Approval:

Authorized by:

14 JAN 2004

Robert L. Martell, Assistant Vice President

FM Approvals
1151 Boston-Providence Turnpike
PO Box 9102
Norwood, MA 02062

**302/303 SERIES TRANSMITTERS
FOR USE IN
HAZARDOUS (CLASSIFIED) LOCATIONS**

from

**SMAR Equipamentos Industriais Ltda
Av Dr Antonio Furlan Jr. 1028
14160-000
Sertaozinho SP Brasil**

I INTRODUCTION

- 1.1 SMAR Research Corp. requested an examination of their 302/303 product line for compliance with the following standards under the entity concept when used with the following output parameters:

$V_{oc} \leq 16V$, $I_{sc} \leq 250mA$, $P_o \leq 2.0 W$.

- 1.2 This Report may be freely reproduced only in its entirety and without modification.

1.3 Standards

Title	Class Number	Date
Electrical Equipment for Use in Hazardous (Classified) Locations, General Requirements	3600	November 1998
Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III Division 1, and Class I, Zone) and 1 Hazardous (Classified) Locations	3610	October 1988
Electrical Equipment for Use in Class I, Division 2, Class II, Division 2 and Class III, Division 1 and 2 Hazardous Locations	3611	October 1999
Explosionproof Electrical Equipment, General Requirements	3615	March 1989
Electrical and Electronic Test, Measuring and Process Control Equipment	3810 Including Supplement #1	March 1989 July 1995
Enclosures for Electrical Equipment	ANSI/NEMA 250	1991

- 1.4 **Listing:** The 302/303 product line will appear in the FM Approval Guide, a publication of FM Approvals, as follows:

FI302ab-c-d, FI303ab-c-d. Fieldbus to Current Converter Profibus PA.

XP / I / 1 / ABCD / T4Ta =60°C; DIP / II,III / 1 / EFG / T4Ta =60°C; IS / I,II,III / 1 / ABCDEFG / T4Ta = 60°C - 102A0080; NI / I / 2 / ABCD / T4Ta =60°C; Type 4X, Type 6P.

Entity Parameters Fieldbus Power Supply Input:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W, Ci =5nF, Li =12μH

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5nF, Li = 12 μH.

4-20 mA Current Loop:

V Max = 30 V dc, I Max = 110mA, Pi = 0.825 W; Ci =5nF, Li = 12 μH.

a = Local indicator 0 or 1.

b = Mounting bracket 0, 1 or 2.

c = Electrical connections 0, A or B.

d = Options H1 or A1.

IF302ab-c-d, IF303ab-c-d. Current to Fieldbus Converter Profibus PA.

XP / I / 1 / ABCD / T4Ta =60°C; DIP / II,III / 1 / EFG / T4Ta =60°C; IS / I,II,III / 1 / ABCDEFG / T4Ta = 60°C — 102A0081; NI / I / 2 / ABCD / T4Ta =60°C; Type 4X, Type 6P.

Entity Parameters Fieldbus Power Supply Input:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W; Ci =5nF, Li = 12 μH;

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5nF, Li = 12 μH.

Entity Parameters 4-20 mA Current Loop:

V Max = 30 V dc, I Max = 110 mA, Pi = 0.825 W; Ci =5nF, Li = 12 μH.

a = Local indicator 0 or 1.

b = Mounting bracket 0, 1 or 2.

c = Electrical connections 0, A or B.

d = Options H1 or A1.

LD302 abc-defg-hj, LD303 abc-defg-hj. Pressure Transmitter Profibus PA.

XP / I / 1 / ABCD / T4Ta =60°C; DIP / II,III / 1 / EFG / T4Ta =60°C; IS / I,II,III / 1 / ABCDEFG / T4Ta = 60°C - 102A0078 - Entity; NI / I / 2 / ABCD / T4Ta =60°C; Type 4X, Type 6P

Entity Parameters:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W, Ci =5 nF, Li =12 μH.

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5nF, Li = 12 μH.

a = Type and range D1,D2,D3,M1,M2,M3,M4,M5,A2,A3,A4,A5,H2,H3,H4 or H5.

b = Diaphragm material and fill fluid 1,2,3,4,5,6,7 or 8.

c = Flanges, adapters and drain/vent Valve materials C, I, H, M or N.

d = Wetted O-ring materials 0,B,V or T.

e = Drain/vent position 0, U or D.

f = Local indicator 0 or 1.

g = Process connections 0,1 or R.

h = Electrical connections 0, A or B. (A or B for int. safe version only).

j = Mounting bracket 0,1,2 or 7.

TT302 ab-c, TT303 ab-c. Temperature Transmitter Profibus PA.

XP / I / 1 / ABCD / T4Ta =60°C; DIP / II,III / 1 / EFG; IS / I,II,III / 1 / ABCDEFG / T4 Ta = 60°C -
102A0079 — Entity; NI / I / 2 / ABCD / T4Ta =60°C; Type 4X, Type 6P

Entity Parameters:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W, Ci =5 nF, Li =12 μH.

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5nF, Li = 12 μH.

a = Local indicator 0 or 1.

b = Mounting bracket 0, 1 or 2.

c = Electrical connections 0, A or B. (A or B for int. safe version only).

TP301-ab-cd/e, TP302-ab-cd/e, TP303-ab-cd/e. Position Transmitter.

IS / I,II,III / 1 / ABCDEFG / T4 Ta = 60°C; Entity — 102A0604, 102A0605; DIP / II,III / 1 / EFG
/T4Ta =60°C;NI / I / 2 / ABCD / T4Ta =60°C; Type 4X

Entity Parameters:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W, Ci =5 nF, Li =12 μH.

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5 nF, Li = 12 μH.

a = Digital indicator 1 (with Digital Indicator).

b = Mounting bracket 0 or 1.

c = Electrical connections 0 (1 .2-14 NPT), A(M20x 1 .2) or B (Pg 13.5 DIN).

d = Type of actuator (not included) 1,3,5,7 or Z.

e = Optional items H1 (316 SST Housing).

FP302ab0c and FP303ab0c. Pressure Converter.

IS / I,II,III / 1 / ABCDEFG / T4 Ta = 60°C; Entity; 102A0440; DIP / II,III / 1 / EFG /T4Ta =60°C;
NI / I / 2 / ABCD / T4Ta =60°C; Type 4X

Entity Parameters:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W, C i =5 nF,L i =12 μH.

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5nF,Li = 12 μH.

a = Local indicator: 0 or 1.

b = Mounting bracket: 0, 1 or 2.

c = Option: H1 and / or A1.

FY302ab-cd-e and FY303ab-cd-e. Fieldbus Positioner.

IS / I,II,III / 1 / ABCDEFG / T4 Ta = 60°C; Entity; 102A0440; DIP / II,III / 1 / EFG /T4Ta
=60°C;NI / I / 2 / ABCD / T4Ta =60°C; Type 4X

Entity Parameters:

V Max = 24 V dc, I Max = 250 mA, Pi = 1.2 W, C i =5 nF,L i =12 μH.

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci =5nF,Li = 12 μH.

a = Local indicator 0 or 1.

b = Mounting bracket 0, 1 or 2.

c = Electrical connections 0, A or B.

d = Valve 0 or 1.

e = Option H1 or blank.

DT302 / DT303 I-abc-def-g/h. Density Transmitter.

*XP / I / 1 / ABCD / T4 Ta = 60 °C; IS / I,II,III / 1 / ABCDEFG / T4 Ta = 60°C; Entity — 102A0925; DIP / II,III / 1 / EFG / T4 Ta = 60°C; NI / I / 2 / ABCD / T4 Ta = 60°C; Type 4X / 6.

Entity Parameters:

V Max = 25 V dc, I Max = 250 mA, Pi = 1.2 W, Ci = 5nF, Li = 8 μH.

V Max = 16 V dc, I Max = 250 mA, Pi = 2.0 W, Ci = 5nF, Li = 8 μH.

a = Range 1, 2 or 3.

b = Diaphragm material H, I, or T.

c = Fill fluid A, S, D, G, T or Z.

d = Indicator local 0 (without) or 1 (with Digital Indicator) .

e = *Electrical connection 0 (1/2-14 NPT), A (M20×1/2), B (Pg 13.5 DIN): {Options A and B not rated as explosion proof}

f = Mounting 1 (Top) or 2 (Side).

g = Process connection Size, Rating and Standard 41, 42, 43 or 9C.

h = Optional items H1 (316 SST Housing) or * (blank).

II DESCRIPTION

- 2.1 Transmitters: These transmitters are used in process control applications. They consist of a sensor assembly threaded to a housing for the electronics. Electrical supply for these are provided by associated apparatus with entity parameters corresponding to the control drawings.
- 2.2 Enclosures: An identical housing is used for all position transmitters. The housing consists of a die-cast aluminum enclosure and thread-on blank covers over the terminal and electronics compartment of the housing. An internal wall divides the enclosure into two compartments, one for the electronics and one for the field wiring. The internal wall contains threaded RFI feed-through filters. An optional thread-on meter window cover is available for the electronics compartment. The field wiring terminal compartment portion of the housing is provided with two ½ “ – 14 NPT conduit entries for customer supply connections. There are three ground terminals, one inside the cover and two externally located near the conduit entries. The electronics compartment portion of the housing has an opening to which the various sensor assemblies thread into. O-rings are provided between the enclosure base and the various sensor assemblies, for outdoor protection.
- 2.3 Sensor Assemblies: The sensor assemblies are comprised of die cast aluminum components that bolt together. The sensor threads to the neck of the housing. O-rings are provided between the sensor die cast aluminum components to provide outdoor protection.
- 2.4 Electronics: The electronic assemblies are identical to the previously approved models, no changes have been made.

III EXAMINATIONS AND TESTS

- 3.1 The 302/303 product line was assessed to determine the suitability of the new parameters. All data is on file at FM Approvals along with other documents and correspondence applicable to this program.
- 3.2 Resistive Assessment: Power to the apparatus is supplied through intrinsic safety barriers. Therefore field wiring between power source and I.S. apparatus is intrinsically safe when installed in accordance with the control drawing.

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Project ID: 3015629

- 3.3 Capacitance Assessment: There have been no changes to the products, therefore the capacitance assessment in previous test reports remain valid. This is satisfactory.
- 3.4 Inductance Assessment: There have been no changes to the products, therefore the inductance assessment in previous test reports remain valid. This is satisfactory.
- 3.5 Protective Component: The protective components as listed in previous test reports have not changed as a result of the use of the new parameters. Examination verified these components meet the requirements when the devices are powered by the new barrier parameters. This is satisfactory.
- 3.6 Other Component Requirements: The requirements for other components as listed in previous test reports have not changed as a result of the use of the new parameters. Examination verified these components meet the requirements when the devices are powered by the new barrier parameters. This is satisfactory.
- 3.7 Spacing (Creepage/Clearance) and Construction Evaluation: The spacing requirements as listed in previous test reports have not changed as a result of the use of the new parameters. Examination verified these devices continue to meet the requirements. This is satisfactory.
- 3.8 Temperature Evaluation: The original assessment did not use small component thermal relaxation based on the power available to the components. Instead, the worst case temperature rise for each component was determined from the thermal impedance of the components. The increased power available from the new barrier parameters was used in these calculations to determine the maximum temperature rise for the different parameters. This verified the temperature code, $T_4 T_a = 60^{\circ}\text{C}$ is still applicable. This is satisfactory.

IV MARKING

The following information appears on the apparatus identified in Section 1.5 and meets Standard requirements:

- Manufacturer's name and manufacturing location.
- Type number and date code
- Maximum input and output ratings
- Maximum ambient temperature
- Control Drawing Reference
- The FM Approval Mark

V REMARKS

- 5.1 Installations shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).
- 5.2 Installations shall comply with the manufacturer's instruction manual.
- 5.3 Control room equipment connected to intrinsically safe associated apparatus should not use or generate more than 250 V rms or DC.
- 5.4 See ANSI/ISA RP12.06.01, Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations for guidance on the installation of intrinsically safe apparatus and systems.

VI FACILITIES AND PROCEDURES AUDIT

The manufacturing site in Sertaozinho, Brazil is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

VII MANUFACTURERS RESPONSIBILITIES

- 7.1 Documentation considered critical to this Approval is on file at FM Approvals and listed in the Documentation File, Section VIII of this report. No changes of any nature shall be implemented unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The Approved Product Revision Report, Form 797, shall be forwarded to FM Approvals as notice of proposed changes.
- 7.2 The manufacturer shall make available to users of the subject equipment the installation drawings. The manufacturer shall make additional copies available upon request.
- 7.3 On 100 percent of production the manufacturer shall subject each final assembly to a test voltage between the power supply circuit terminals connected together and accessible conductive parts of 500 V rms, 45 to 60 Hz, or 707 Vdc, between the input and output windings for a period of not less than 1 minute. Alternatively, the test potential may be 20% higher applied for a period of not less than one second. No breakdown shall occur.

WARNING: The dielectric test required may present a hazard of injury to personnel and/or property and should only be performed under controlled conditions, and by persons knowledgeable of the potential hazards of such testing to minimize the likelihood of shock and/or fire

VIII DOCUMENTATION

The following drawings describe the Transmitters and are filed under Project Id. 3015629.

Drawing No.	Revision	Description
102A0078	5	LD292/293/302/303 CONTROL DRAWING
102A0079	4	TT302/303 CONTROL DRAWING
102A0080	5	FI302/303 CONTROL DRAWING
102A0081	5	IF 302/303 CONTROL DRAWING
102A0119	2	FP302/FP303 CONTROL DRAWING
102A0440	2	FY302/FY303 CONTROL DRAWING
102A0605	1	TP302/TP303 CONTROL DRAWING
102A0925	1	DT302/303 CONTROL DRAWING

IX CONCLUSION

The apparatus described in 1.5 meets FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

EXAMINATION PERFORMED BY: Kevin Fletcher

PROJECT DATA RECORD: 3015629

ORIGINAL TEST DATA: 0D7A9.AX, 4Y3A4.AX, 3006959, 3010145, 3014223, 3D9A2.AX, 3015610.

FM APPROVALS
Project ID: 3015629

**ATTACHMENTS: control drawings, 102A0078, 102A0079, 102A0080, 102A0081, 102A0119,
102A0440, 102A0605, 102A0925.**

REPORT BY:

REPORT REVIEWED BY:



**Kevin Fletcher
Engineer
Hazardous Locations**




**Nicholas Ludlam
Technical Team Manager
Hazardous Locations**

HAZARDOUS AREA

NON HAZARDOUS OR DIVISION 2 AREA

REQUIREMENTS:

- 1 - INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND ANSI/ISA-RP12.6
- 2 - TRANSMITTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
- 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
- 4 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
- 5 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
- 6 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_o AND L_o OF THE ASSOCIATED APPARATUS.

SAFE AREA APPARATUS

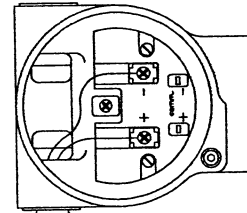
UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS

INTRINSICALLY SAFE APPARATUS
 ENTITY VALUES: C_i = 5nF L_i = 8uH
 V_{max} ≤ 24V
 I_{max} ≤ 250mA

OPTIONAL SHIELDING

POWER SUPPLY



COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.



APPROVED

ENTITY PARAMETERS FOR ASSOCIATED APPARATUS

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G

C_o ≥ CABLE CAPACITANCE + 5nF

L_o ≥ CABLE INDUCTANCE + 8uH

OPTION 1: V_{oc} ≤ 24V I_{sc} ≤ 250mA P_o ≤ 1,2W
 OPTION 2: V_{oc} ≤ 16V I_{sc} ≤ 250mA P_o ≤ 2W

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 MODELS LD292, LD293, LD302 AND LD303 - SERIES
 ABSOLUTE, GAGE AND DIFFERENTIAL
 PRESSURE AND LEVEL TRANSMITTERS.

APPROVAL CONTROLLED BY C.A.R.

5	MOACIR 05/05/03	CASSIOLATO 05/05/03	ALT DE 0043/03
4	MOACIR 08/02/02	CASSIOLATO 08/02/02	ALT DE 0013/02
3	MOACIR 08/02/00	CASSIOLATO 08/02/00	ALT DE 0015/00
2	MOACIR 25/02/97	EUGENIO 25/02/97	ALT DE 0021/97
REV.	DESIGN	APPROVED	AREA


DRAWING	DESIGN	VERIFIED	APPROVED
MELONI 23/03/95	M.MISSAWA 23/03/95	SINASTRE 23/03/95	PELUSO 23/03/95
CUSTOMER:			
EQUIPMENT: LD292/293/302/303			
CONTROL DRAWING			

O.S.	
DRAWING N. 102A0078	REV 05
SH. 01/01	

smar

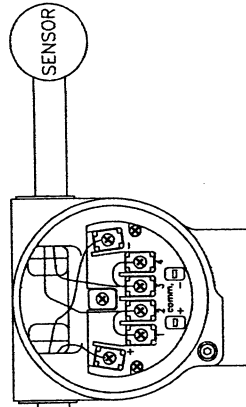
HAZARDOUS AREA

REQUIREMENTS:

- 1 - INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND ANSI/TIA-RP12.6
- 2 - TRANSMITTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
- 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
- 4 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
- 5 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
- 6 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_o AND L_o OF THE ASSOCIATED APPARATUS.
- 7 - ONLY SIMPLE APPARATUS CAN BE CONNECTED TO THE SENSOR TERMINALS 1,2,3,4. SIMPLE APPARATUS IS A DEVICE THAT WILL NOT GENERATE OR STORE MORE THAN 1.2V, 0.1A, 25mW, OR 20uJ. EXAMPLES ARE SWITCHES, THERMOCOUPLES AND RESTANCE TEMPERATURE DETECTORS.

ENTITY PARAMETERS FOR TEMPERATURE SENSOR TERMINALS:

V_t=8.25V I_t=85.3mA C_o=5.5uF L_o=4.8mH



INTRINSICALLY SAFE APPARATUS

ENTITY VALUES: C_i=5nF L_i=8uH
V_{max} ≤ 24V
I_{max} ≤ 250mA

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
MODELS TT302 AND TT303 - SERIES
TEMPERATURE TRANSMITTERS.

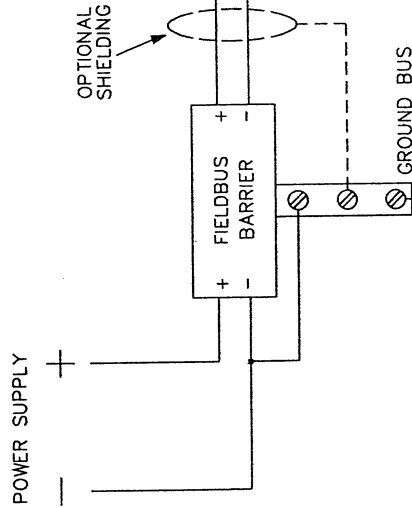
COMPONENTS CAN NOT
BE SUBSTITUTED WITHOUT
PREVIOUS MANUFACTURER
APPROVAL.

NON HAZARDOUS OR DIVISION 2 AREA

SAFE AREA APPARATUS

UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS



ENTITY PARAMETERS FOR ASSOCIATED APPARATUS

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
C_o ≥ CABLE CAPACITANCE +5nF
L_o ≥ CABLE INDUCTANCE +8uH
OPTION 1 V_{oc} ≤ 24V I_{sc} ≤ 250mA P_o ≤ 1.2W
OPTION 2 V_{oc} ≤ 16V I_{sc} ≤ 250mA P_o ≤ 2W


APPROVAL CONTROLLED BY C.A.R.



APPROVED

4	MOACIR 05/05/03	CASSIOLATO 05/05/03	ALT DE 0043/03
3	MOACIR 08/02/00	CASSIOLATO 08/02/00	ALT DE 0015/00
2	MOACIR 25/02/97	EUGENIO 25/02/97	ALT DE 0022/97
1	AROSTI 30/12/96	EUGENIO 30/12/96	ALT DE 0077/96
REV.	DESIGN	APPROVED	AREA

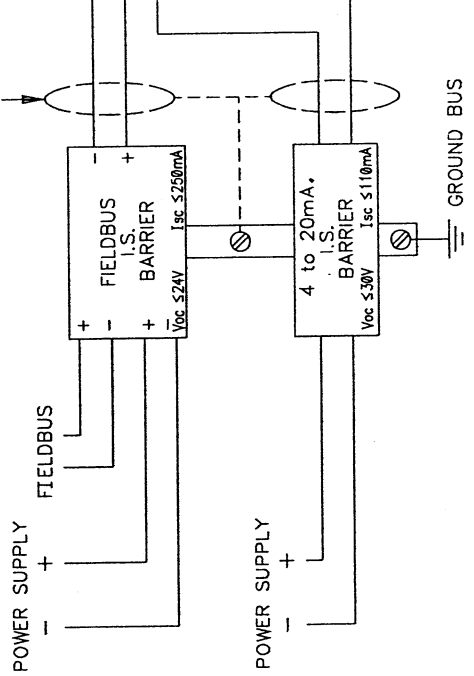
DRAWING	DESIGN	VERIFIED	APPROVED
MELONI 24/03/95	M.MISSAWA 24/03/95	SINASTRE 24/03/95	PELUSO 24/03/95
CUSTOMER: EQUIPMENT: TT302/303			
CONTROL DRAWING			

	
O.S.	
DRAWING N. 102A0079	04
SH. 01/01	

NON HAZARDOUS OR DIVISION 2 AREA

SAFE AREA APPARATUS
UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS



ENTITY PARAMETERS FOR ASSOCIATED APPARATUS
CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
Ca ≥ CABLE CAPACITANCE +5nF
Lo ≥ CABLE INDUCTANCE +12uH

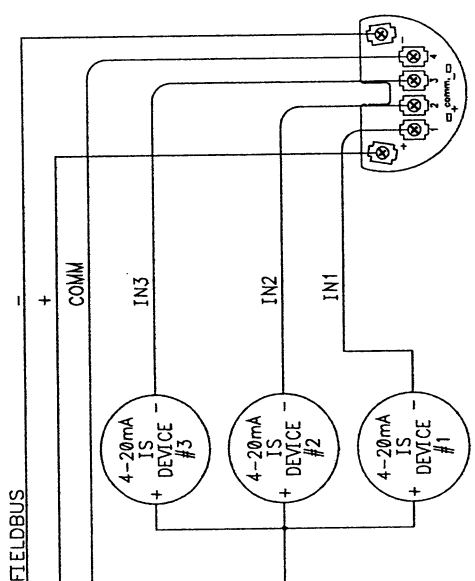
FIELDBUS

4-20mA
Voc ≤ 24V
Vsc ≤ 30V
Isc ≤ 110mA
Po ≤ 1.2W

HAZARDOUS AREA

- REQUIREMENTS:
- 1 - INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND ANSI/ISA-RP12.6
 - 2 - TRANSMITTER SPECIFICATION MUST BE IN ACCORDANCE TO APPROVAL LISTING.
 - 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
 - 4 - ASSOCIATED APPARATUS GROUND BUS RESISTANCE TO EARTH MUST BE SMALLER THAN 1(OH)M, IF NOT ISOLATED.
 - 5 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
 - 6 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
 - 7 - CABLE CAPACITANCE AND INDUCTANCE PLUS Ci AND Li MUST BE SMALLER THAN Co AND Lo OF THE ASSOCIATED APPARATUS.

COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.



MODELS F1302 AND F1303 - SERIES
CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G

ENTITY VALUES:

FIELDBUS

4-20mA
Ci=5nF Li=12uH
Vmax ≤ 30V
Imax ≤ 110mA

REV.	DESIGN	APPROVED	AREA
5	MOACIR 07/05/03	CASSIOLATO 07/05/03	ALT DE 0043/03
4	MOACIR 08/02/00	CASSIOLATO 08/02/00	ALT DE 0015/00
3	MELONI 18/08/97	EUGENIO 18/08/97	ALT DE 0095/97
2	MOACIR 05/03/97	EUGENIO 05/03/97	ALT DE 0029/97


APPROVAL CONTROLLED BY C.A.R.			
DRAWING	DESIGN	VERIFIED	APPROVED
MELONI 28/03/95	M.MISSAWA 28/03/95	SINASTRE 28/03/95	PELUSO 28/03/95
CUSTOMER:			
EQUIPMENT: F1302/303			
CONTROL DRAWING			

APPROVED


O.S.	
DRAWING N. 102A0080	REV 05
SH. 01/01	

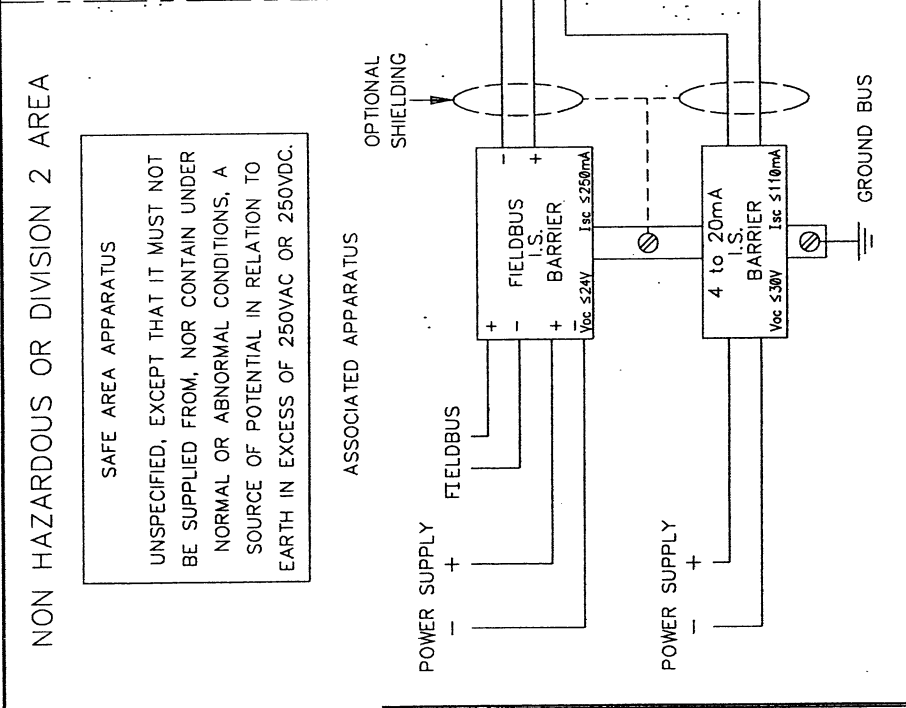
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4	MOACIR 08/02/00	CASSIOLATO 08/02/00	ALT DE 0015/00
3	MELONI 18/08/97	EUGENIO 18/08/97	ALT DE 0095/97
2	MOACIR 05/03/97	EUGENIO 05/03/97	ALT DE 0030/97
REV.	DESIGN	APPROVED	AREA


APPROVAL CONTROLLED BY C.A.R.			
DRAWING	DESIGN	VERIFIED	APPROVED
MELONI 28/03/95	M.MISSAWA 28/03/95	SINASTRE 28/03/95	PELUSO 28/03/95
CUSTOMER:		O.S.	
EQUIPMENT:		DRAWING N.	
IF302/303		102A0081	
CONTROL DRAWING		REV	
		05	
		SH. 01/01	



APPROVED





- NON HAZARDOUS OR DIVISION 2 AREA**
- SAFE AREA APPARATUS
- UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.
- ASSOCIATED APPARATUS
- HAZARDOUS AREA
- REQUIREMENTS:
- 1 - INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND ANSI/ISA-RP12.6
 - 2 - TRANSMITTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
 - 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
 - 4 - ASSOCIATED APPARATUS GROUND BUS RESISTANCE TO EARTH MUST BE SMALLER THAN 1(ONE) OHM.
 - 5 - OBSERVE TRANSMITTER POWER SUPPLY LOAD CURVE.
 - 6 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
 - 7 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
 - 8 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_o AND L_o OF THE ASSOCIATED APPARATUS.
- COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.

ENTITY PARAMETERS FOR ASSOCIATED APPARATUS

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G

C_o ≥ CABLE CAPACITANCE +5nF

L_o ≥ CABLE INDUCTANCE +12uH

FIELDBUS

V_{oc} ≤ 24V

V_{oc} ≤ 16V

I_{sc} ≤ 250mA

I_{sc} ≤ 110mA

P_o ≤ 2W

P_o ≤ 1.2W

ENTITY VALUES:

FIELDBUS

4-20mA

C_i=5nF

L_i=12uH

V_{max} ≤ 24V

I_{max} ≤ 110mA

MODELS IF302 AND IF303 - SERIES

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G

ENTITY VALUES:

FIELDBUS

4-20mA

C_i=5nF

L_i=12uH

V_{max} ≤ 30V

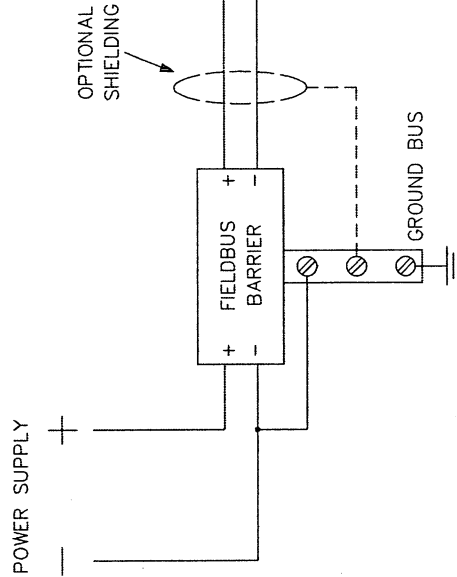
I_{max} ≤ 110mA

NON HAZARDOUS OR DIVISION 2 AREA

SAFE AREA APPARATUS

UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS



ENTITY PARAMETERS FOR ASSOCIATED APPARATUS

CLASS I,II,III DIV.1

GROUPS A,B,C,D,E,F & G


$C_a \geq$ CABLE CAPACITANCE +5nF

$L_a \geq$ CABLE INDUCTANCE +12uH

OPTION 1 } $V_{oc} \leq 24V$ } $V_{oc} \leq 16V$
 $I_{sc} \leq 250mA$ } $I_{sc} \leq 250mA$
 $P_o \leq 1,2W$ } $P_o \leq 2W$

HAZARDOUS AREA

REQUIREMENTS:

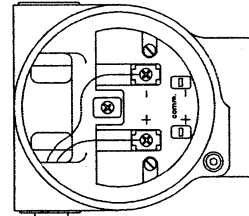
- 1 - INSTALLATION TO BE IN ACCORDANCE WITH ANSI/ISA RP12-6
- 2 - CONVERTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
- 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
- 4 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
- 5 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
- 6 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_a AND L_a OF THE ASSOCIATED APPARATUS.

INTRINSICALLY SAFE APPARATUS

ENTITY VALUES: $C_i=5nF$ $L_i=12uH$

$V_{max} \leq 24V$

$I_{max} \leq 250mA$



COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 MODEL FP302 & FP303 - SERIES
 FIELDBUS TO PRESSURE CONVERTER

APPROVAL CONTROLLED BY C.A.R.



APPROVED

	/ /	/ /	
2	MARCIAL 05 / 05 / 03	EMBOABA 05 / 05 / 03	ALT-DE- 0043/03
1	MOACIR 08 / 11 / 00	MISSAWA 08 / 11 / 00	ALT-DE- 0104/00
REV.	DESIGN	APPROVED	AREA

DRAWING	DESIGN	VERIFIED	APPROVED
MELONI 08 / 12 / 95	GUILHERME 08 / 12 / 95	GUILHERME 08 / 12 / 95	GORINI 08 / 12 / 95
CUSTOMER:			
EQUIPMENT: FP302/FP303			
CONTROL DRAWING			


O.S.	
DRAWING N. 102A0119	REV 02
SH. 01/01	

smar

NON HAZARDOUS OR DIVISION 2 AREA

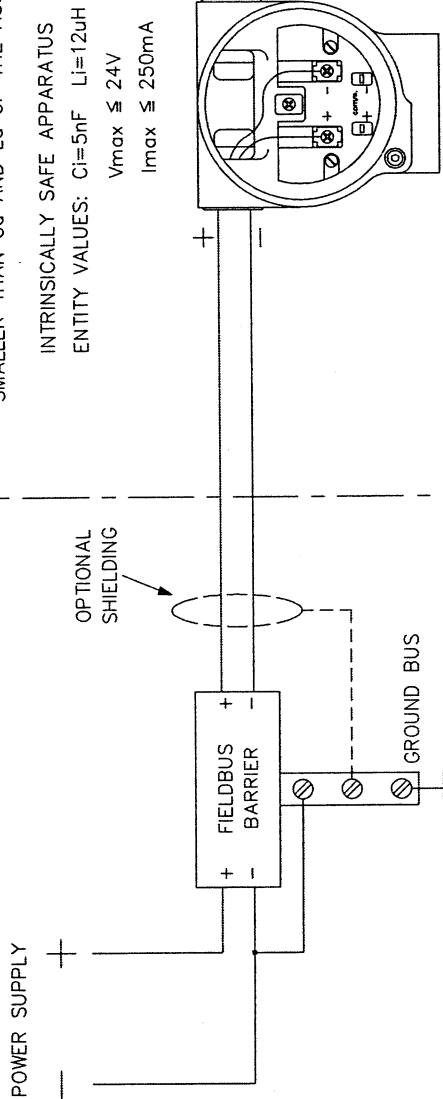
HAZARDOUS AREA

REQUIREMENTS:

- 1 - INSTALLATION TO BE IN ACCORDANCE WITH ANSI/ISA RP12-6
- 2 - CONVERTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
- 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
- 4 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
- 5 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
- 6 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_a AND L_a OF THE ASSOCIATED APPARATUS.

SAFE AREA APPARATUS
UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS




COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.

ENTITY PARAMETERS FOR ASSOCIATED APPARATUS

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 $C_a \geq$ CABLE CAPACITANCE +5nF
 $L_a \geq$ CABLE INDUCTANCE +12uH
 FIELDBUS
 OPTION 1 $V_{oc} \leq 24V$ $I_{sc} \leq 250mA$ $P_o \leq 1,2W$
 OPTION 2 $V_{oc} \leq 16V$ $I_{sc} \leq 250mA$ $P_o \leq 2W$

CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 MODEL FY302 & FY303 - SERIES POSITIONER

APPROVAL CONTROLLED BY C.A.R.				DRAWN	CHECKED	PROJECT	APPROVAL
2	MARCIAL 05/05/03	EMBOABA 05/05/03	ALT-DE-0043/03	MOACIR 29/12/97	SINASTRE 29/12/97	BASÍLIO 29/12/97	EUGÊNIO 29/12/97
1	MOACIR 08/11/00	MISSAWA 08/11/00	ALT-DE-0104/00	EQUIPMENT: FY302/FY303			
REV	BY	APPROVAL	DOC	CONTROL DRAWING			


APPROVED


smar

NUMBER 102A0440	REV 02
SCALE	SHEET 01/01

NON HAZARDOUS OR DIVISION 2 AREA

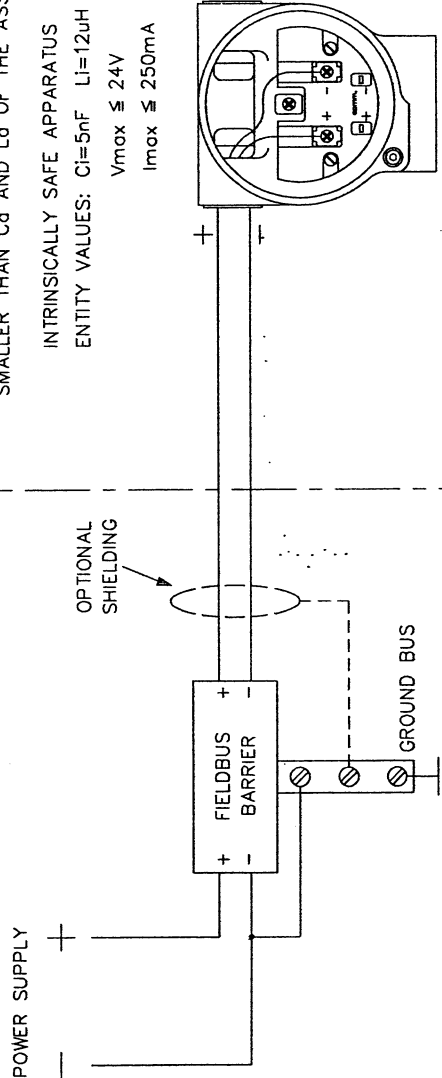
HAZARDOUS AREA

REQUIREMENTS:

- 1 - INSTALLATION TO BE IN ACCORDANCE WITH ANSI/ISA RP12-6
- 2 - CONVERTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
- 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
- 4 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
- 5 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
- 6 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_o AND L_o OF THE ASSOCIATED APPARATUS.

SAFE AREA APPARATUS
 UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS



INTRINSICALLY SAFE APPARATUS
 ENTITY VALUES: C_i=5nF L_i=12uH
 V_{max} ≤ 24V
 I_{max} ≤ 250mA

COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.


ENTITY PARAMETERS FOR ASSOCIATED APPARATUS
 CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 C_o ≥ CABLE CAPACITANCE +5nF
 L_o ≥ CABLE INDUCTANCE +12uH
 FIELDBUS

OPTION 1 { V_{oc} ≤ 24V
 I_{sc} ≤ 250mA
 P_o ≤ 1.2W

OPTION 2 { V_{oc} ≤ 16V
 I_{sc} ≤ 250mA
 P_o ≤ 2W


CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 MODEL TP302 & TP303 - SERIES POSITIONER



APPROVAL CONTROLLED BY C.A.R.				DRAWN	CHECKED	PROJECT	APPROVAL		
				MOACIR 08/11/00	SINASTRE 08/11/00	BASÍLIO 08/11/00	MISSAWA 08/11/00		
01	MOACIR 08/05/03	CIRO 08/05/03	ALT-DE 0043/03	EQUIPMENT: TP302/TP303 CONTROL DRAWING					NUMBER 102A0605
REV	BY	APPROVAL	DOC					SCALE	SHEET 01/01

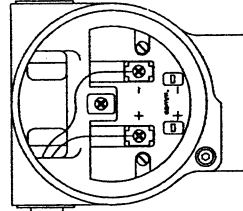
HAZARDOUS AREA

REQUIREMENTS:

- 1 - INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND ANSI/ISA-RP12.6
- 2 - TRANSMITTER SPECIFICATION MUST BE IN ACCORDANCE TO  APPROVAL LISTING.
- 3 - ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
- 4 - WIRES: TWISTED PAIR, 22AWG OR LARGER.
- 5 - SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
- 6 - CABLE CAPACITANCE AND INDUCTANCE PLUS C_i AND L_i MUST BE SMALLER THAN C_o AND L_o OF THE ASSOCIATED APPARATUS.

INTRINSICALLY SAFE APPARATUS

ENTITY VALUES: C_i = 5nF L_i = 8uH
 V_{max} ≤ 24V
 I_{max} ≤ 250mA



COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.

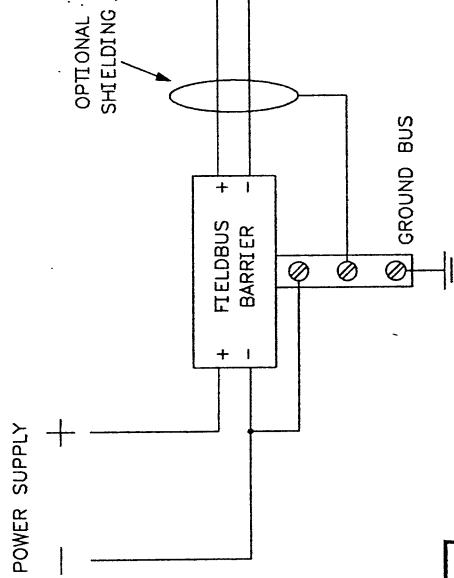
CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
 MODELS DT302 AND DT303 - SERIES
 CONCENTRATION / DENSITY TRANSMITTERS

NON HAZARDOUS OR DIVISION 2 AREA

SAFE AREA APPARATUS

UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.

ASSOCIATED APPARATUS



ENTITY PARAMETERS FOR ASSOCIATED APPARATUS

CLASS I,II,III DIV.GROUPS A,B,C,D,E,F & G
 C_o ≥ CABLE CAPACITANCE +5nF
 L_o ≥ CABLE INDUCTANCE +8uH
 [V_{oc} ≤ 16V
 I_{sc} ≤ 250mA]
 [P_o ≤ 1.2W]



APPROVED

APPROVAL CONTROLLED BY C.A.R.				DRAWN	CHECKED	PROJECT	APPROVAL
				ROGERIO 27 / 11 / 02	M.MISSAWA 27 / 11 / 02	M.MISSAWA 27 / 11 / 02	CIRO 27 / 11 / 02
01	MARCIAL 05 / 05 / 03	CIRO 05 / 05 / 03	ALT-DE- 0043/03	EQUIPMENT: DT302/DT303 CONTROL DRAWING			
REV	BY	APPROVAL	DOC				

smar

NUMBER
102A0925 01

SCALE : SHEET 01/01