BT302 - I

smar
FIRST IN FIELDBUS

INSTRUCTIONS AND INSTALLATION MANUAL

FIELDBUS TERMINATOR

FEB / 24
BT302

FOUNDATION™

BT302ME

smar
NOVA SMAR S/A
www.smar.com.br

Specifications and information are subject to change without notice.
Up-to-date address information is available on our website.

web: www.smar.com/contactus.asp

AVOIDING ELECTROSTATIC DISCHARGES

ATTENTION

Electrostatic discharges may damage semiconductor electronic components in printed circuit boards. They usually occur when touching components or connector pins from modules and racks, without wearing the appropriate equipment to prevent discharges. It is recommended to take the following precautions:

- Before handling modules and racks, remove the electrostatic charge from your body by wearing a proper wristband or touching grounded devices;
- Avoid touching electronic components or connector pins from racks and modules.

BT302 - FIELDBUS BUS TERMINATOR PROFIBUS-PA AND FOUNDATION FIELDBUS

Introduction

In fieldbus networks, a frame is transmitted by modulating current, and the frame reception is done by sensing voltage.

The primary function of the bus terminator is to avoid reflection of the signal. In an infinite signal transmission line whose characteristic impedance is Z0, the communication signal is a unidirectional flow. If the line has one junction, there is an impedance mismatch (input impedance is different from the characteristic impedance of the line). In such case, the signal meets a barrier which causes a signal reflection, whose amplitude is proportional to the impedance mismatch. This reflection, whose direction is opposite to the transmitted signal, will be superimposed on the transmitted signal, causing major distortions on the original signal. If in all line ends and junctions the impedances match, the reflection effect will be eliminated, as in an infinite line.

As per the standard, a fieldbus network shall present a characteristics impedance Z0 equal to 100 Ω ±20% @ 31.25KHz and the terminators shall present an impedance Z0 equal to 100 Ω ±2%, over the frequency range of 7.8 kHz to 39 kHz (0,25 x 31,25 KHz to 1,25 x 31,25 KHz).

Description

O BT302 is a fieldbus bus terminator for PROFIBUS-PA and FOUNDATION fieldbus in compliance with FISCO model and Entity model.

The terminator was specifically designed for industrial plant applications. This device complies with the requirements of IEC 61158-2 (ISA –S50.02-1992) and it may be used both in safe and hazardous areas, in accordance with the intrinsic safety standards requirements.

Its concept is extremely simple, consisting of a resistor of 100 Ω in series with capacitor of 1 µF. Only highly accurate components with a low drift to temperature are used. The circuit is inside and easy-to-install and completely tight enclosure.

Installation

The **BT302** device may be panel mounted or installed in distribution boxes. In order to fix it with screws, the product is supplied with a label (drilling template) showing the markings of the holes. Figure 1 shows the hook-up scheme using the drilling template, and Figure 2 shows the field installation in a distribution box.

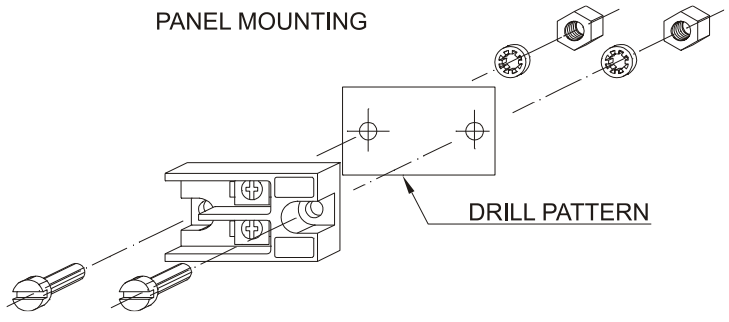


Fig. 1 – BT302 – Panel Mounting

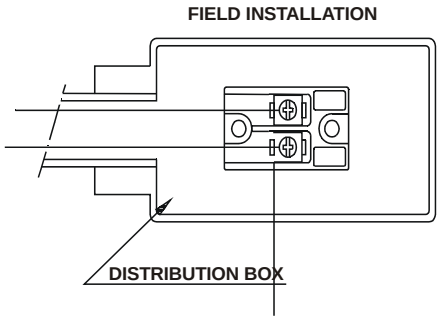


Fig. 2 – BT302 - Mounting in distribution box

A fieldbus network needs two terminators, one in each end of the main trunk. Therefore, if a terminator is already connected to the fieldbus power supply or power supply impedance, such as the device **DF53,** only one **BT302** is required as Figures 3 and 4 indicate, or when the field devices are connected to DP/PA link or coupler devices as you can see in the Figures 5 and 6. In topologies where DF53 redundancy or coupler redundancy is used, it is recommended not to use the internal terminator and install two BT302 externally, enabling the maintenance of these devices.

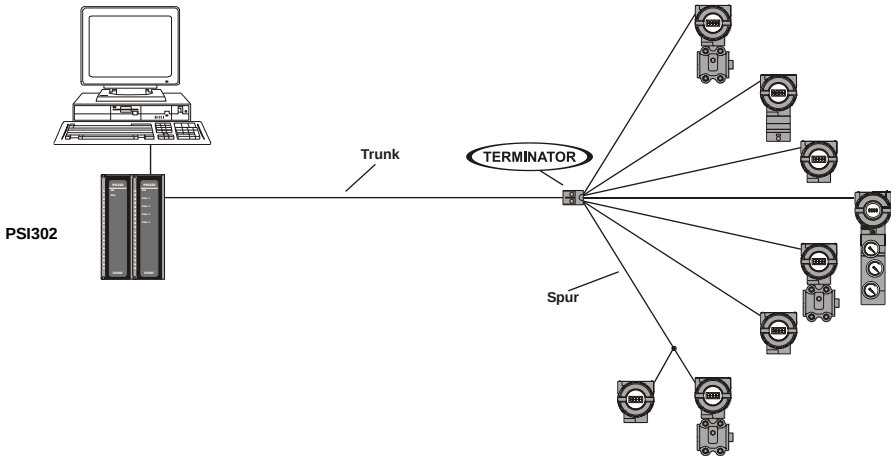


Fig. 3 - FOUNDATION fieldbus - Tree Topology

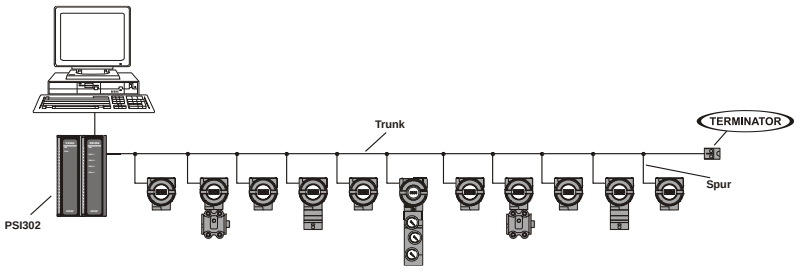


Fig. 4 – FOUNDATION fieldbus - Bus Topology

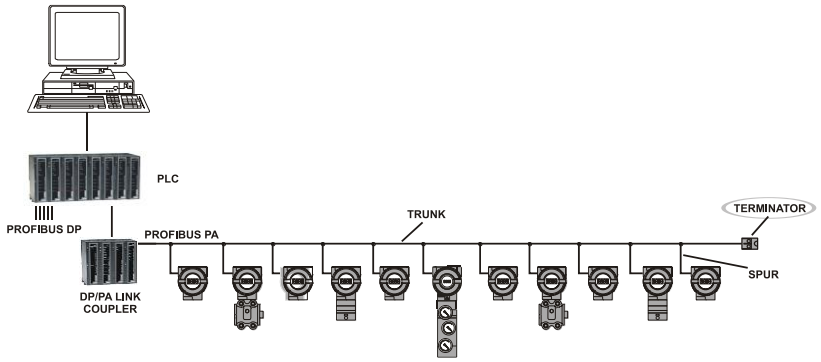


Fig. 5 - PROFIBUS PA - Bus Topology

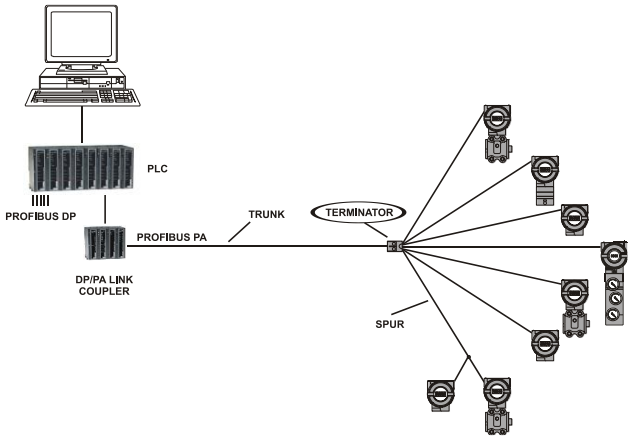


Fig. 6 - PROFIBUS PA - Tree Topology

Technical Specifications

ELECTRICAL CHARACTERISTICS	
Maximum Operation Voltage	35 Vdc
Input Impedance	100 Ω ± 2% @ 7.8 KHZ – 39KHZ

MECHANICAL CHARACTERISTICS	
Size (W x D x H)	19 x 23 x 40 mm
Weight	20g

ENVIRONMENTAL CHARACTERISTICS	
Operation (See Note)	$T_{AMB.}$ -40 ºC to 75 ºC @ RH 10% to 95%, without condensation
Storage	$T_{AMB.}$ -55 ºC to 85 ºC @ RH 5% to 95%, without condensation

SAFETY CHARACTERISTICS	
Intrinsic Safety	FM, CEPEL, DMT and CE.

NOTE
• Range operation limited to T_{amb} -20 ºC to 40 ºC for FM • Range operation limited to T_{amb} -40 ºC to 60 ºC for DMT • Range operation limited to T_{amb} -20 ºC to 60 ºC for CEPEL

Appendix A

CERTIFICATIONS INFORMATION

European Directive Information

Consult www.Smar.com for the EC declarations of conformity and certificates.

Authorized representative/importer located within the Community:
Smar Europe BV De Oude Wereld 116 2408 TM Alphen aan den Rijn Netherlands

Hazardous locations general information

Ex Standards:
IEC 60079-0 General Requirements
IEC 60079-1 Flameproof Enclosures “d”
IEC 60079-7 Increased Safe “e”
IEC 60079-11 Intrinsic Safety “i”
IEC 60079-18 Encapsulation “m”
IEC 60079-26 Equipment with Separation Elements or combined Levels of Protection
IEC 60079-31 Equipment dust ignition protection by enclosure "t"
IEC 60529 Classification of degrees of protection provided by enclosures (IP Code)
IEC 60079-10 Classification of Hazardous Areas
IEC 60079-14 Electrical installation design, selection and erection
IEC 60079-17 Electrical Installations, Inspections and Maintenance
IEC 60079-19 Equipment repair, overhaul and reclamation
ISO/IEC 80079-34 Application of quality systems for equipment manufacture

Warning:
Explosions could result in death or serious injury, besides financial damage.
Installation of this instrument in hazardous areas must be in accordance with the local standards and type of protection. Before proceedings with installation make sure that the certificate parameters are in accordance with the classified hazardous area.

Maintenance and Repair
The instrument modification or replaced parts supplied by any other supplier than authorized representative of Smar is prohibited and will void the Certification.

Marking Label
The instrument is marked with type of protection options. The certification is valid only when the type of protection is indicated by the user. Once a particular type of protection is installed, do not reinstall it using any other type of protection.

Intrinsic Safety / Non Incendive application
In hazardous areas with intrinsic safety or or non-incendive requirements, the circuit entity parameters and applicable installation procedures must be observed.
The instrument must be connected to a proper intrinsic safety barrier. Check the intrinsically safe parameters involving the barrier and equipment including the cable and connections. Associated apparatus ground bus shall be insulated from panels and mounting enclosures. Shield is optional, when using shielded cable, be sure to insulate the end not grounded.
Cable capacitance and inductance plus Ci and Li must be smaller than Co and Lo of the Associated Apparatus.
It is recommended do not remove the housing covers when powered on.

Hazardous Locations Approvals

FM Approvals
FM 0D7A9.AX
IS Class I, II, III Division 1, Groups A, B, C, D, E, F and G
NI Class I, Division 2, Groups A, B, C and D

Entity Parameters:
Vmax = 24 Vdc, Imax = 250 mA, Ci = 0 nF, Li = 0 uH
Ta = -20 ºC < Ta < 40 ºC

Drawing 102A-0369, 101A-3083

DEKRA
Intrinsic Safety (DMT 01ATEX E 061X)
Group I, Category M2, Ex ia, Group I, EPL Mb
Group II, Category 2 G, Ex ia, Group IIC, Temperature Class T4, EPL Gb

FISCO Terminator
Electrical Parameters were subjected to revision according to table 1 of EN 60079-27:2008 (FISCO Model).
Fieldbus Circuit:
Ui = 24 Vdc, Ii = 380 mA, Pi = 5.32 W, Zi ≥ 100 Ω
Ambient Temperature: -40ºC ≤ Ta ≤ +60ºC

Special conditions for safe use:
The Fieldbus-Terminator type BT302 shall be installed in an enclosure providing degree of protection IP greater or equal to IP 20 according to EN 60529.
Wiring shall satisfy the conditions of section 6.3.11 and clause 7.6.e of EN 60079-11:2007.
Terminals or connectors for the intrinsically safe fieldbus supply and signal circuits shall be arranged according to clause 6.2.1 or 6.2.2 of EN 60079-11:2007 respectively.
For Group I application interconnection of fieldbus-apparatus to an intrinsically safe electrical system shall be assessed in a System Certificate, if required in local installation rules.

The Essential Health and Safety Requirements are assured by compliance with:
EN 60079-0:2009 General Requirements
EN 60079-11:2007 Intrinsic Safety “i”
EN 60079-27:2008 Fieldbus intrinsically safe concept (FISCO)

Drawing 101A-5150

CEPEL

Segurança Intrínseca (CEPEL 96.0013X)

CEPEL 96.0013X

Terminador FISCO

Ex ia IIC T5 Gb

Ui = 24 V Ii = 380mA Pi = 5,32 W Zi ≥ 100Ω

Tamb: -20 a +60 °C para T5

Observações:
1) A validade deste Certificado de Conformidade está atrelada à realização das avaliações de manutenção e tratamento de possíveis não conformidades, de acordo com as orientações do Cepel, previstas no Regulamento de Avaliação da Conformidade. Para verificação da condição atualizada de regularidade deste Certificado de Conformidade deve ser consultado o banco de dados de produtos e serviços certificados do Inmetro.
2) O número do certificado é finalizado pela letra “X” para indicar que durante a instalação do equipamento, é

de responsabilidade do usuário:

- instalar o equipamento em um invólucro que garanta o grau de proteção IP20;
- utilizar uma fiação que atenda a Norma ABNT NBR IEC 60079-11:2013;
- utilizar terminais ou conectores para o circuito intrinsecamente seguro que atendam a Norma ABNT NBR IEC 60079-11:2013;
- instalar o equipamento em sistemas de eletroduto que garantam a continuidade elétrica do aterramento ou a equipotencialidade do sistema, uma vez que o invólucro não possui terminal de aterramento externo.

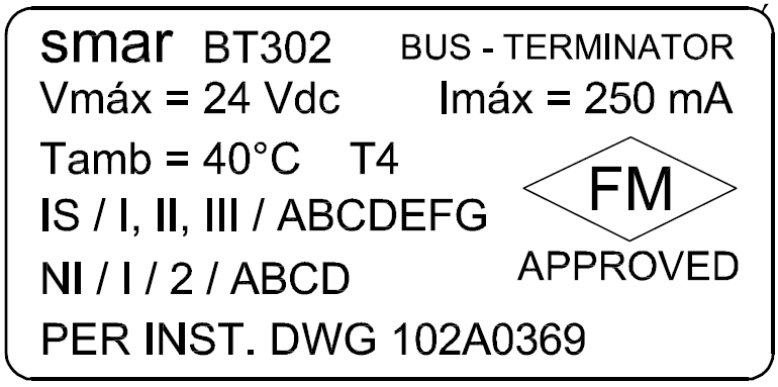
3) Este certificado é válido apenas para os produtos dos modelos avaliados. Qualquer modificação nos projetos, bem como a utilização de componentes ou materiais diferentes daqueles definidos pela documentação descritiva dos produtos, sem a prévia autorização do Cepel, invalidará este certificado.
4) É responsabilidade do fabricante assegurar que os produtos fornecidos ao mercado nacional estejam de acordo com as especificações e documentação descritiva avaliada, relacionadas neste certificado.
5) As atividades de instalação, inspeção, manutenção, reparo, revisão e recuperação dos equipamentos são de responsabilidade dos usuários e devem ser executadas de acordo com os requisitos das normas técnicas vigentes e com as recomendações do fabricante.
6) A marcação é executada conforme a Norma ABNT NBR IEC 60079-0:2020 e o Requisito de Avaliação da Conformidade de Equipamentos Elétricos para Atmosferas Explosivas nas Condições de Gases e Vapores Inflamáveis (RAC), e é fixada na superfície externa do equipamento, em local visível. Esta marcação é legível e durável, levando-se em conta possível corrosão química.

Normas Aplicáveis:
ABNT NBR IEC 60079-0:2020 Atmosferas explosivas - Parte 0: Equipamentos – Requisitos gerais
ABNT NBR IEC 60079-11:2013 Atmosferas explosivas - Parte 11: Proteção de equipamento por segurança intrínseca "i"

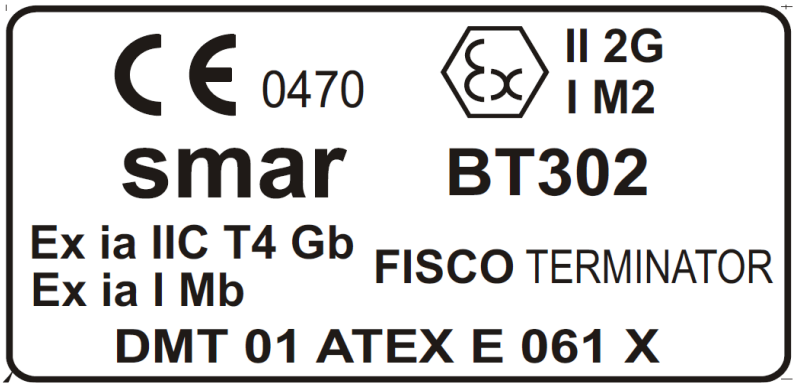
Desenhos 101A1876

Identification Plate

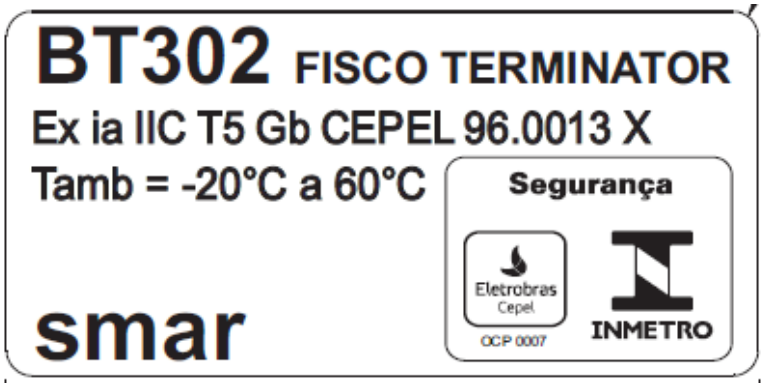
FM Approvals



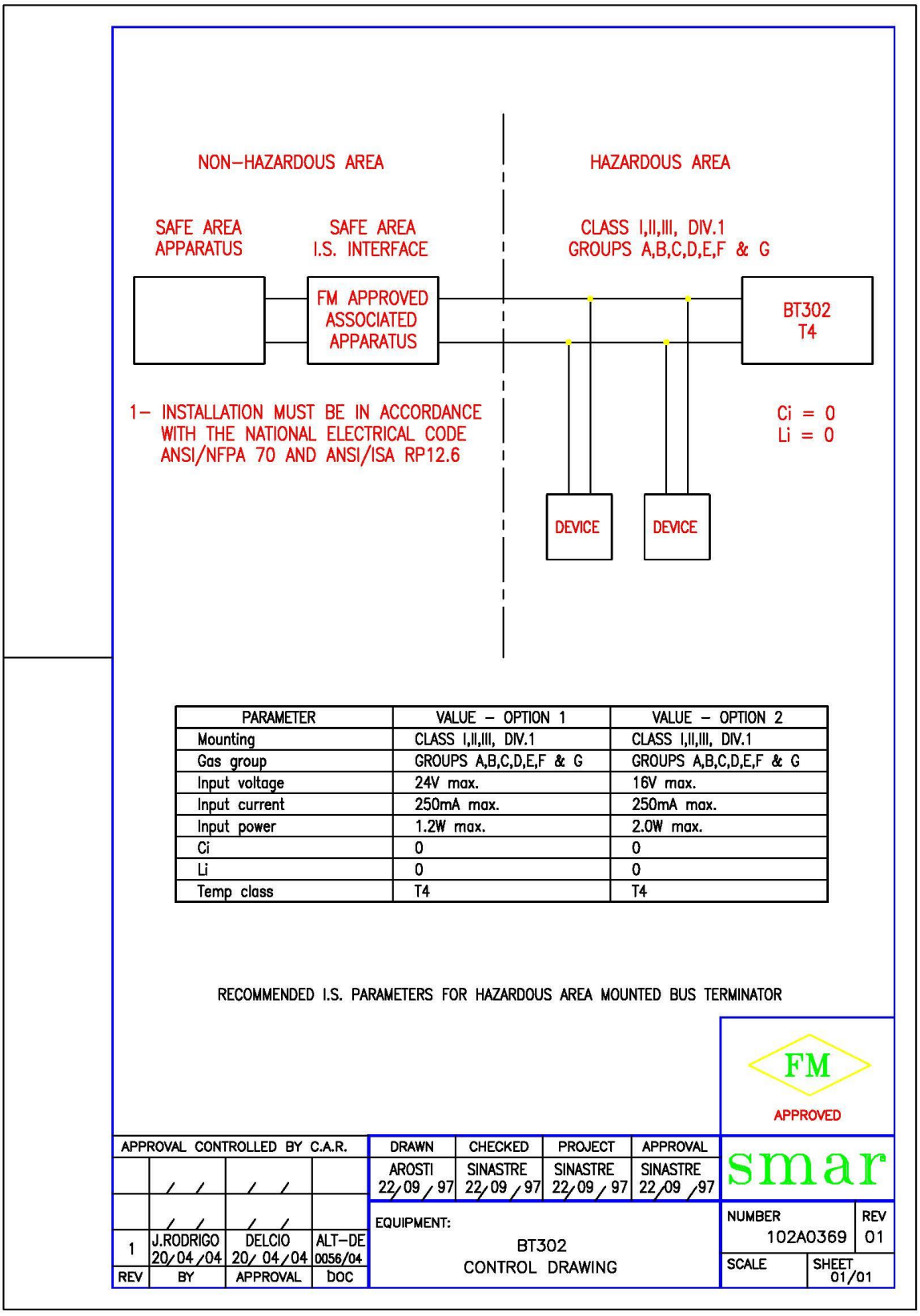
DEKRA



CEPEL



FM Approvals



PARAMETER	VALUE – OPTION 1	VALUE – OPTION 2
Mounting	CLASS I,II,III, DIV.1	CLASS I,II,III, DIV.1
Gas group	GROUPS A,B,C,D,E,F & G	GROUPS A,B,C,D,E,F & G
Input voltage	24V max.	16V max.
Input current	250mA max.	250mA max.
Input power	1.2W max.	2.0W max.
Ci	0	0
Li	0	0
Temp class	T4	T4

RECOMMENDED I.S. PARAMETERS FOR HAZARDOUS AREA MOUNTED BUS TERMINATOR

FM APPROVED

APPROVAL CONTROLLED BY C.A.R.				DRAWN	CHECKED	PROJECT	APPROVAL
	/ /	/ /		AROSTI 22/09/97	SINASTRE 22/09/97	SINASTRE 22/09/97	SINASTRE 22/09/97
	/ /	/ /					
1	J.RODRIGO 20/04/04	DELCIO 20/04/04	ALT–DE 0056/04	EQUIPMENT: BT302 CONTROL DRAWING			
REV	BY	APPROVAL	DOC				

smar

NUMBER 102A0369 REV 01

SCALE SHEET 01/01

Appendix B

smar	SRF – SERVICE REQUEST FORM	
	BT302 – Fieldbus Bus Terminator	Proposal Nº:

COMPANY INFORMATION

Company: _____
Unit: _____
Invoice: _____

COMMERCIAL CONTACT

Full Name: _____
Phone: _____ _____ _____ _____ **Fax:** _____
E-mail: _____

TECHNICAL CONTACT

Full Name: _____
Phone: _____ _____ _____ _____ **Extension:** _____
E-mail: _____

EQUIPMENT DATA

Model: _____
Serial Number: _____

PROCESS DATA

Process Type (Ex. boiler control)**:** _____
Operation Time: _____
Failure Date: _____

FAILURE DESCRIPTON

(Please, describe the failure. Can the error be reproduced? Is it repetitive?)

_____
_____
_____
_____

OBSERVATIONS

_____
_____
_____
_____

USER INFORMATION

Company: _____
Contact: _____
Section: _____
Title: _____ **Signature:** _____
Phone: _____ _____ _____ _____ **Extension:** _____
E-mail: _____ **Date:** _____/ _____/ _____

For warranty or non-warranty repair, please contact your representative.
Further information about address and contacts can be found on https://www.smar.com.br/en/support