BT302 - I

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AUG / 12
BT302

FOUNDATION™

INSTRUCTIONS AND INSTALLATION MANUAL

FIELDBUS TERMINATOR

BT302ME

smar

www.smar.com

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.

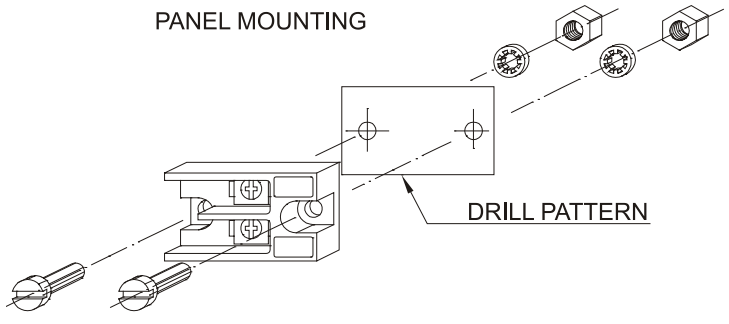


Fig. 1 – BT302 – Panel Mounting

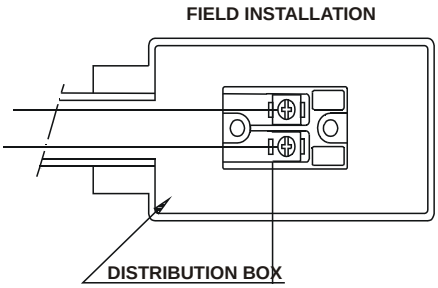


Fig. 2 – BT302 - Mounting in distribution box

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.

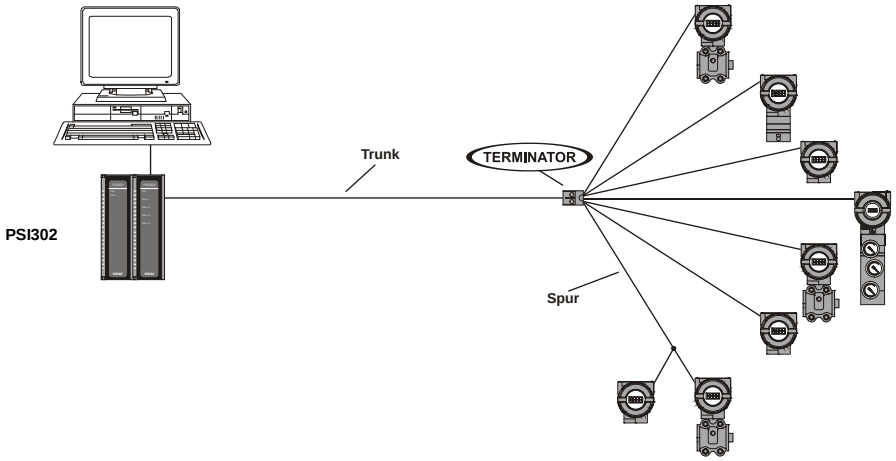


Fig. 3 - FOUNDATION fieldbus - Tree Topology

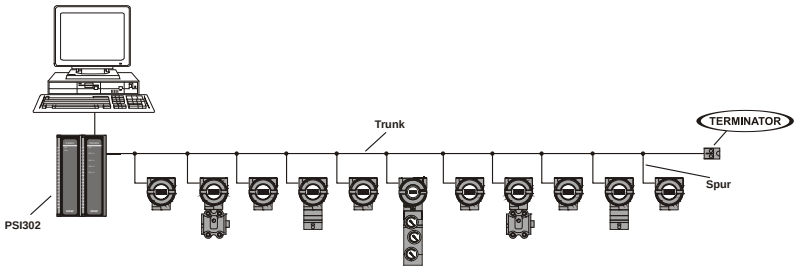


Fig. 4 – FOUNDATION fieldbus - Bus Topology

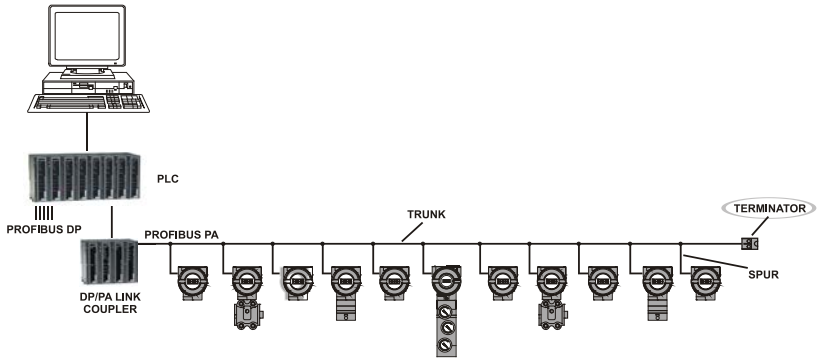


Fig. 5 - PROFIBUS PA - Bus Topology

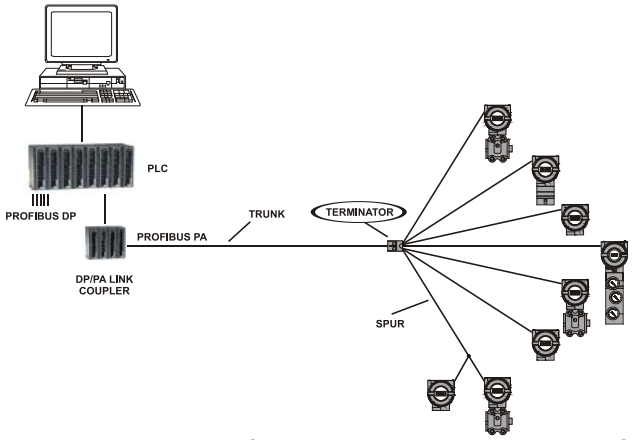


Fig. 6 - PROFIBUS PA - Tree Topology

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

Certification information

Approved Manufacturing Location

Smar Equipamentos Industriais Ltda – Sertãozinho, São Paulo, Brazil

Hazardous locations general information

Ex Standards:
IEC 60079-0 General Requirements
IEC 60079-11 Intrinsic Safety “i”
IEC 60079-27 Fieldbus intrinsically safe concept (FISCO)

Customer responsibility:
IEC 60079-10 Classification of Hazardous Areas
IEC 60079-14 Electrical installation design, selection and erection
IEC 60079-17 Electrical Installations, Inspections and Maintenance

Warning
Explosions could result in death or serious injury, besides financial damage.
Installation of this instrument in an explosive environment must be in accordance with the national standards and according to the local environmental protection method. Before proceeding with the installation match the certificate parameters according to the environmental classification.

General Notes

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

Marking Label
Once a device labeled with multiple approval types is installed, do not reinstall it using any other approval types. Scratch off or mark unused approval types on the approval label.

For Ex-i protection application
- Connect the instrument to a proper intrinsically safe barrier.
- Check the intrinsically safe parameters involving the barrier, equipment including the cable and connections.
- Associated apparatus ground bus shall be insulated from panels and mounting enclosures.
- When using shielded cable, isolate the not grounded cable end.
- Cable capacitance and inductance plus Ci and Li must be smaller than Co and Lo of the associated apparatus**.**

For FISCO System requirements (IEC 60079-27:2008)

Terminator
The line terminators required by the system shall comprise a resistor-capacitor combination, which presents at its terminals a circuit equivalent to a resistor of minimum value 90Ω in series with a capacitor of maximum value 2.2µF (including tolerances).

The terminator shall
a) be allocated a level of protection and be suitable for apparatus group IIC;
b) have an input voltage parameter Ui not less than 17.5V.
Note: If the capacitive component(s) are considered to be able to fail to create a short circuit then the required power rating of the resistor(s) is 5.1 W and the temperature class should be determined with a power dissipation of 3.4 W.
c) be isolated from the earth in compliance with IEC60079-11;
d) have a maximum unprotected internal inductance Li not greater than 10µH;
e) terminators intended to be installed within the hazardous area shall be temperature classified in compliance with IEC60079-11.

The terminators may be incorporated within field devices or power supplies.

Note: For safety assessment purposes, the effective capacitance (Ci) of the terminator is considered not to affect the intrinsic safety of the system.

Hazardous locations approvals

FM Approvals (Factory Mutual)

Intrinsic Safety (FM 0D7A9.AX)
IS Class I, Division 1, Groups A, B, C and D
IS Class II, Division 1, Groups E, F and G
IS Class III, Division 1

Non Incendive (FM 0D7A9.AX)
NI Class I, Division 2, Groups A, B, C and D

Maximum Ambient Temperature: 40 ºC (-20 to 40 ºC)

Special conditions for safe use:
Entity Parameters:
Vmax = 24 Vdc, Imax = 250 mA, Ci = 0 nF, Li = 0 uH

EXAM (BBG Prüf - und Zertifizier GmbH)

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

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)

CEPEL (Centro de Pesquisa de Energia Elétrica)

Intrinsic Safety (CEPEL 96.0013 X)
Ex ia, Group IIC, Temperature Class T5, EPL Gb

FISCO Terminator
Entity Parameters:
Ui = 24 Vdc, Ii = 380 mA, Pi = 5.32 W, Zi ≥ 100 Ω

Ambient Temperature: -20 to 60 ºC for T5

Special conditions for safe use:
The certificate number with “X” indicates that during equipment installation is responsibility of the user:
- Install the Fieldbus-Terminator type BT302 in an enclosure providing degree of protection IP20;
- Wiring shall satisfy the conditions of ABNT NBR IEC 60079-11:2009;
- Terminals or connectors for the intrinsically safe fieldbus supply and signal circuits shall satisfy the conditions of ABNT NBR IEC 60079-11:2009;
- Install the equipment in systems that assure the electric continuity of the earth, once the housing doesn’t have external earth.

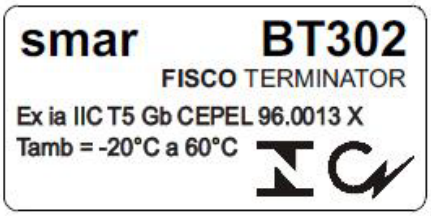
The Essential Health and Safety Requirements are assured by compliance with:
ABNT NBR IEC 60079-0:2008 General Requirements
ABNT NBR IEC 60079-11:2009 Intrinsic Safety “i”
IEC 60079-27:2008 Fieldbus intrinsically safe concept (FISCO)

For more information, see the certificates of this product on the website www.smar.com

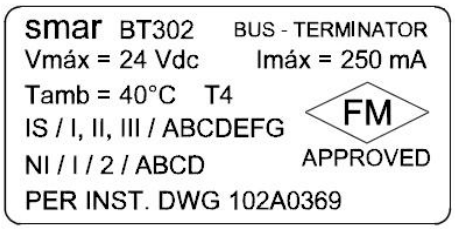
Identification label and control drawing

Identification label

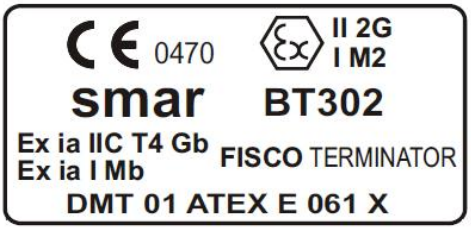
CEPEL



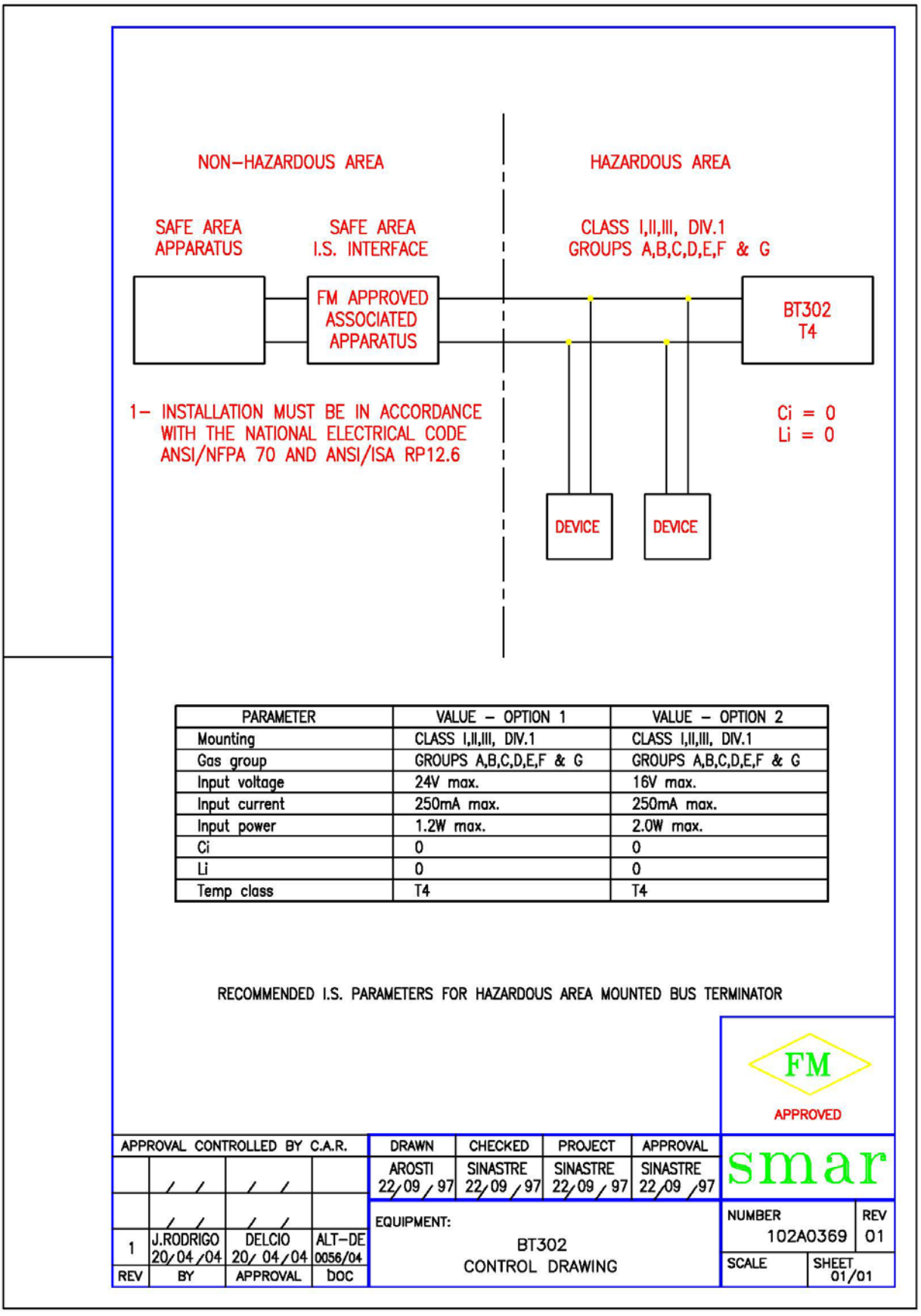
FM



DMT



Control drawing



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.			
	/ /	/ /	
	/ /	/ /	
1	J.RODRIGO 20/04/04	DELCIO 20/04/04	ALT–DE 0056/04
REV	BY	APPROVAL	DOC

DRAWN	CHECKED	PROJECT	APPROVAL
AROSTI 22/09/97	SINASTRE 22/09/97	SINASTRE 22/09/97	SINASTRE 22/09/97

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EQUIPMENT: BT302 CONTROL DRAWING

NUMBER 102A0369 | REV 01

SCALE | SHEET 01/01

Appendix A

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 **www.smar.com/contactus.asp**