

## Quick Start Manual • January 2005

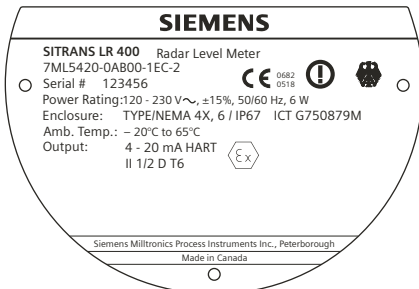
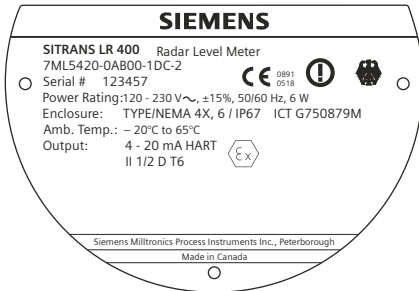
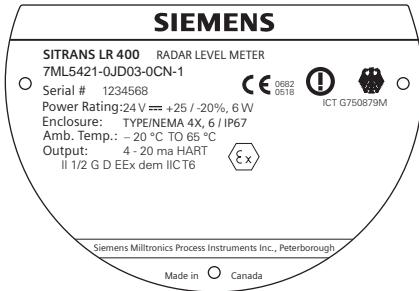
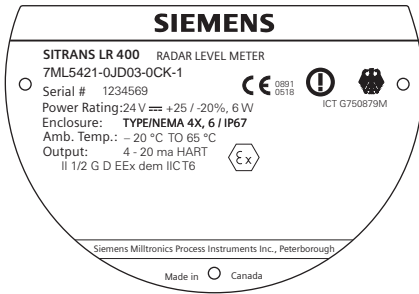


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# sitrans

## LR 400

**SIEMENS**



Nameplates shown  
are typical.  
Please check  
your device for  
specific nameplate  
configuration.

# SITRANS LR 400 Quick Start Manual

This manual outlines the essential features and functions of the SITRANS LR 400 Solids and Liquids versions. We strongly advise you to acquire the detailed version of the manuals so you can use your device to its fullest potential. The complete manuals are available on our web site: <https://pia.khe.siemens.com/index.asp?Nr=4936>.

The printed manual is available from your local Siemens Milltronics representative.

Questions about the contents of this manual can be directed to:

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**Disclaimer of Liability**

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While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

Technical data subject to change.

## Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

**!** **WARNING: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.**

**Note:** Process temperature and pressure capabilities are dependent upon information on the process device tag (liquids version only). The reference drawing listed can be downloaded from the Siemens Milltronics web site at [www.siemens.com/processautomation](http://www.siemens.com/processautomation).

**!** **WARNING:** This product is designated as a Pressure Accessory per Directive 97/23/EC and is not intended for use as a safety device.

## SITRANS LR 400

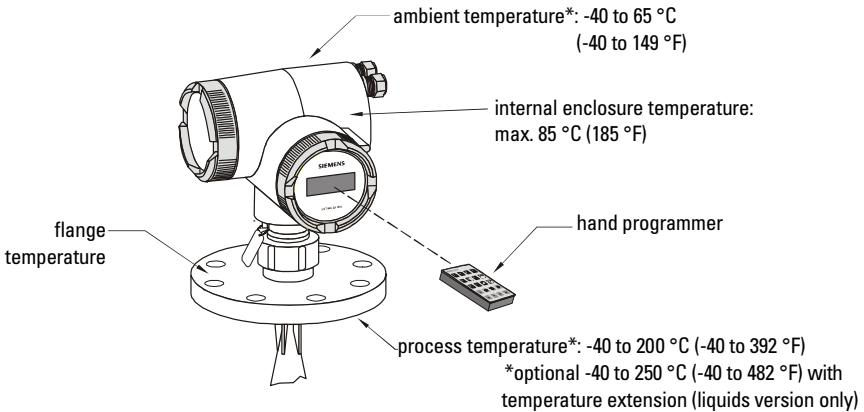
The SITRANS LR 400 is to be used only in the manner outlined in this manual, otherwise protection provided by the equipment may be impaired.

The SITRANS LR 400 is a long-range FMCW radar level instrument. A liquids version (7ML5421) is available for use in liquids storage, performing well on low dielectric liquids or sticky materials requiring a purging unit. A solids version (7ML5420) incorporates the Easy Aimer design for use in solids, especially conditions of extreme dust.

The SITRANS LR 400 supports HART<sup>1</sup> or PROFIBUS PA (optional).

## Specifications

### Ambient/Operating Temperature



**! WARNING: Internal temperature must not exceed 85 °C (185 °F)!**

### Power

- 120 to 230 V AC,  $\pm 15\%$ , 50/60 Hz, 6 W (12 VA)  
or
- 24 V DC, +25/-20%, 6 W (optional)

<sup>1</sup> HART® is a registered trademark of the HART Communications Foundation.

\* -20 °C (-4 °F) temperature rating available on SITRANS LR 400 with ATEX rating.

## Installation Conditions

- location: indoor/outdoor
- altitude: 2000 m (6,562 ft) max.
- installation category: II
- pollution degree: 4
- range: up to 50 m (164 ft)

### **! WARNINGS:**

- The user is responsible for the selection of bolting and gasket materials which will fall within the limits of the flange and its intended use and which are suitable for the service conditions.
- Never attempt to loosen, remove, or disassemble process connection or instrument housing while vessel contents under pressure.

## Approvals (verify against device nameplate)

The following are possible approvals:

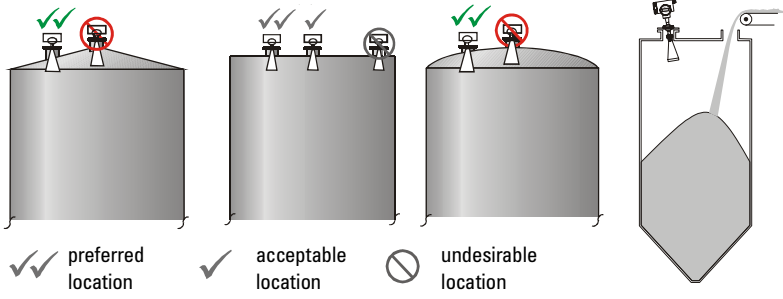
- |                        |                                      |
|------------------------|--------------------------------------|
| • General              | CSAus/c, CE, FM                      |
| • Radio                | FCC, Industry Canada, European Radio |
| • Explosion Protection | CSA, FM, ATEX                        |

**Note:** Approval certification manual 7ML19985FP82 will be included with ATEX approved Liquids versions (7ML5421) with Gas approvals. ATEX approval information for SITRANS LR 400 with Dust approvals is included on page 8.

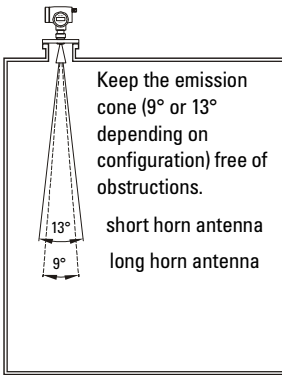
### **! WARNINGS:**

- This product is designated as a Pressure Accessory per Directive 97/23/EC and is not intended for use as a safety device.
- Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.

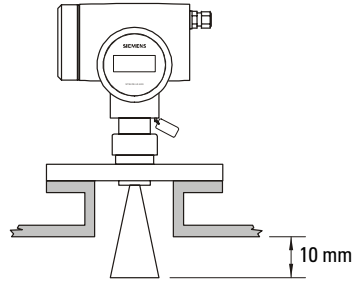
# Mounting



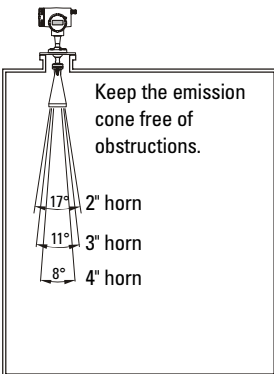
## Liquids Version



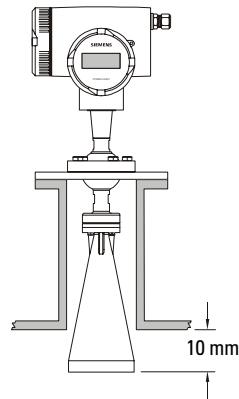
Installation in Mounting Nozzle



## Solids Version



Installation in Mounting Nozzle



**! WARNING:** Improper installation may result in loss of process pressure.

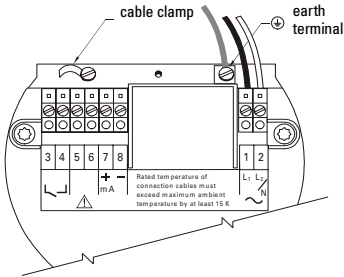
# SITRANS LR 400 Wiring Requirements

- All field wiring must have insulation suitable for the applied input voltage.
- 4-20 mA, PROFIBUS PA, DC input circuits, 14-20 AWG, shielded copper wire
- AC input circuit, minimum 14 AWG copper wire
- Recommended torque on terminal clamping screws, 0.5-0.6 Nm
- The 24 V DC version must only be connected to SELV or PELV circuits.

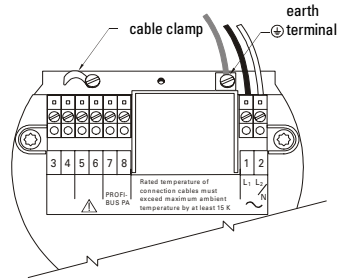
## SITRANS LR 400 Wiring

AC

HART Wiring

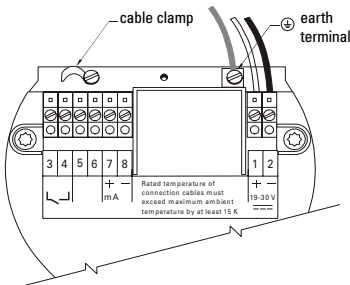


PROFIBUS Wiring

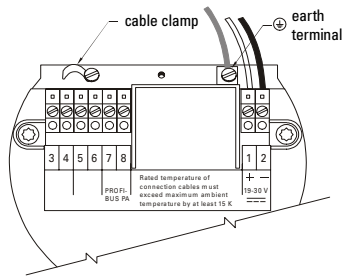


DC

HART Wiring



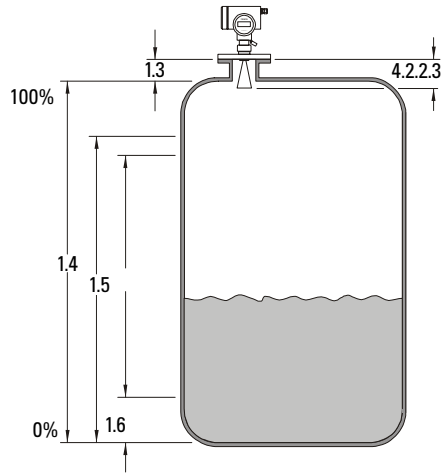
PROFIBUS Wiring




## Functional Dimensions

Parameters:





- 1.3 Nozzle height
- 4.2.2.3 Dead band
- 1.6 Lower range value (LRV)
- 1.5 Upper range value (URV)
- 1.4 Vessel height




## Local Programming

To begin parameter changes, use the hand programmer and press LEFT  once. Main Menu is displayed in the first line of the LCD. Then program the unit beginning with the Auto-Setup parameters.

## Functions of Hand Programmer Keys

- 
  - Changes display from RUN mode to PROGRAM mode
  - Operates as a CANCEL key when programming input position is at the far left
  - Moves input position to the left during PROGRAM mode
- 
  - Operates as an ENTER key when input position is at the far right
  - Moves input position to the right during PROGRAM mode
-  
  - Changes input variable up or down

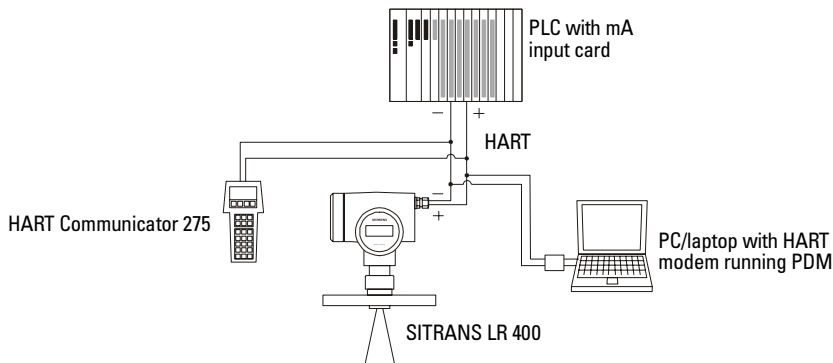
## Auto-Setup

After switching on the SITRANS LR 400, and after a successful self test, press LEFT  to access the parameters. Set the Auto-Setup parameters to make the system operational:

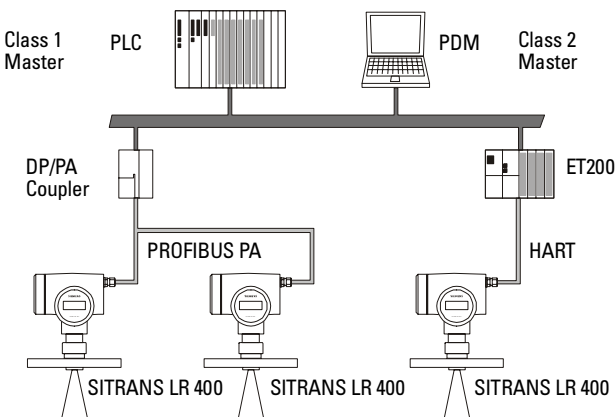
- language of the local user interface
- unit of length of the measured level (cm,m,mm,ft,in)
- nozzle height in the selected unit of length
- vessel height in the selected unit of length
- LRV as a distance from the bottom of the vessel
- URV as a distance from the bottom of the vessel
- damping of the measured level in seconds
- application type
- bus-address by PROFIBUS PA communication (on PROFIBUS models)

# SITRANS LR 400 Communications

## HART/mA Connections



## PROFIBUS PA Connections



## HART or PROFIBUS PA

- You will need the full manual to acquire the list of applicable parameters.
- The HART Device Descriptor (DD) may be obtained from the HART Communications Foundation at [www.hartcomm.org](http://www.hartcomm.org)
- Many software packages can be used to program the instrument, but we recommend that you use Simatic Process Device Manager (PDM) to program your instrument on a network. This software package is designed to permit easy configuration, monitoring and troubleshooting of HART and PROFIBUS PA devices.
- The GSD file for PROFIBUS PA can be downloaded it from our web site at [www.siemens.com/processautomation](http://www.siemens.com/processautomation)

## Maintenance

The SITRANS LR 400 requires no maintenance or cleaning under normal operation conditions. Under severe operating conditions, the antenna may require periodic cleaning using a brush or high pressure air cleaning.

## Unit Repair and Excluded Liability

For detailed information, please see the inside back cover.

# Instructions specific to hazardous area installations (Reference European ATEX Directive 94/9/EC, Annex II, 1/0/6)

The following instructions apply to equipment covered by certificate number DMT 01 ATEX E 038:

1. For use and assembly, refer to the main instructions.
2. The equipment is certified for use as Category 1/2 D equipment. The Essential Health and Safety Requirements are assured by compliance with EN 50281-1-1:1998; Dust Explosion Protection.
3. The equipment may be used with dust and fibers with apparatus temperature class T. See table below.
4. Thermal Data:
  - a. For 7ML5421 Series (Liquids version)
    - Permitted ambient temperature at the horn antenna (Category 1D):  
 $-20\text{ °C} \leq T_{\text{amb}} \leq +250\text{ °C}$
    - Permitted ambient temperature at the electronic enclosure (Category 2D):  
 $-20\text{ °C} \leq T_{\text{amb}} \leq +65\text{ °C}$
    - Maximum permitted temperature within electronic enclosure (Category 1D):  
 $85\text{ °C}$

Ambient temperature at the horn antenna (Category 1D)	Maximum surface temperature at the horn antenna (Category 1D)	Maximum surface temperature Category 2D (electronic enclosure resp. flange)
$-20\text{ °C} \leq T_{\text{amb}} \leq +60\text{ °C}$	72 °C	70 °C at $T_{\text{amb}} \leq 65\text{ °C}$ in Category 2
$-20\text{ °C} \leq T_{\text{amb}} \leq +100\text{ °C}$	112 °C	100 °C independent from $T_{\text{amb}}$ in Category 2
$-20\text{ °C} \leq T_{\text{amb}} \leq +250\text{ °C}$	262 °C	250 °C independent from $T_{\text{amb}}$ in Category 2

- b. For 7ML5420 Series (Solids version)
- Permitted ambient temperature at the horn antenna (Category 1D):  
 $-20\text{ °C} \leq T_{\text{amb}} \leq +200\text{ °C}$
  - Permitted ambient temperature at the electronic enclosure (Category 2D):  
 $-20\text{ °C} \leq T_{\text{amb}} \leq +65\text{ °C}$
  - Maximum permitted temperature within electronic enclosure (Category 1D):  
 $85\text{ °C}$

Ambient temperature at the horn antenna (Category 1D)	Maximum surface temperature at the horn antenna (Category 1D)	Maximum surface temperature Category 2D (electronic enclosure resp. flange)
$-20\text{ °C} \leq T_{\text{amb}} \leq +60\text{ °C}$	72 °C	70 °C at $T_{\text{amb}} \leq 65\text{ °C}$ in Category 2
$-20\text{ °C} \leq T_{\text{amb}} \leq +100\text{ °C}$	112 °C	100 °C independent from $T_{\text{amb}}$ in Category 2
$-20\text{ °C} \leq T_{\text{amb}} \leq +200\text{ °C}$	212 °C	200 °C independent from $T_{\text{amb}}$ in Category 2

5. The equipment has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
6. Installation and inspection of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (EN 60079-14 and EN 60079-17 in Europe).
7. Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN 60079-19 within Europe).
8. Components to be incorporated into or used as replacements in the equipment shall be fitted by suitably trained personnel in accordance with the manufacturer's documentation.
9. It is the responsibility of the user to ensure that manual override is possible in order to shut down the equipment and protective systems incorporated within automatic processes, which deviate from the intended operating conditions, provided that this does not compromise safety.
10. Equipment Marking:  
 The equipment marking contains at least the information on the product label, shown on the inside front cover of this manual.

**Note: ATEX approval information for SITRANS LR 400 Gas approvals is found in the ATEX certificate manual 7ML19985FP82.**



## Unit Repair and Excluded Liability

All changes and repairs must be done by qualified personnel, and applicable safety regulations must be followed. Please note the following:

- The user is responsible for all changes and repairs made to the device.
- All new components must be provided by Siemens Milltronics Process Instruments Inc.
- Restrict repair to faulty components only.
- Do not re-use faulty components

## Reparation af enheden og ansvarsbegrænsning:

Alle ændringer og reparationer skal udføres af kvalificeret personale, og de gældende sikkerhedsbestemmelser skal overholdes.

Bemærk venligst følgende:

- Brugeren er ansvarlig for alle de på apparatet udførte ændringer og reparationer.
- Alle nye komponenter skal være leveret af Siemens Milltronics Process Instruments Inc.
- Reparer kun defekte komponenter.
- Defekte komponenter må ikke genbruges

## Geräte-reparatur und Haftungsausschluss:

Alle Änderungen und Reparaturen müssen von qualifiziertem Personal unter Beachtung der jeweiligen Sicherheitsbestimmungen vorgenommen werden. Bitte beachten Sie:

- Der Benutzer ist für alle Änderungen und Reparaturen am Gerät verantwortlich.
- Alle neuen Bestandteile sind von Siemens Milltronics Process Instruments Inc. bereit zu stellen.
- Reparieren Sie lediglich defekte Bestandteile.
- Defekte Bestandteile dürfen nicht wiederverwendet werden.

## Επισκευή μονάδας και αποκλειόμενη ευθύνη:

Όλες οι αλλαγές και οι επισκευές πρέπει να πραγματοποιούνται από εξειδικευμένο προσωπικό, και πρέπει να τηρούνται όλοι οι σχετικοί κανόνες ασφαλείας. Σημειώστε τα παρακάτω:

- Ο χρήστης είναι υπεύθυνος για όλες τις αλλαγές και επισκευές που γίνονται στη συσκευή.
- Όλα τα καινούργια εξαρτήματα πρέπει να παρέχονται από τη Siemens Milltronics Process Instruments Inc.
- Περιορίστε τις επισκευές μόνο στα ελαττωματικά εξαρτήματα.
- Μην επαναχρησιμοποιείτε ελαττωματικά εξαρτήματα.

## Reparación del dispositivo y límite de responsabilidad:

Las modificaciones y reparaciones deberán ser efectuadas por personal calificado de acuerdo con las normas de seguridad aplicables. Notas importantes:

- El usuario es el único responsable de las modificaciones y reparaciones del dispositivo.
- Recomendamos utilizar sólo recambios originales Siemens Milltronics Process Instruments Inc.
- Reparar sólo los componentes defectuosos.
- Los componentes defectuosos no se deben reutilizar.

## Réparation de l'unité et limite de responsabilité :

Les modifications et réparations doivent être effectuées par un personnel qualifié en accord avec les consignes de sécurité applicables.

Remarques importantes :

- L'utilisateur est seul responsable des modifications et réparations effectuées sur l'unité.
- Utiliser seulement des composants fournis par Siemens Milltronics Process Instruments Inc.
- Réparer uniquement les composants défectueux.
- Les composants défectueux ne doivent pas être réutilisés.

## Riparazioni dell'apparecchiatura e limiti di responsabilità:

Le modifiche e le riparazioni devono essere effettuate solo da personale qualificato, rispettando le normative sulla sicurezza. Note importanti:

- L'utente è responsabile delle eventuali modifiche e riparazioni effettuate sull'apparecchiatura.
- Utilizzare solo pezzi di ricambio originali forniti da Siemens Milltronics Process Instruments Inc.
- Riparare solo i componenti difettosi.
- È importante non riutilizzare i componenti difettosi.

## Reparatie van apparatuur en uitsluiting van aansprakelijkheid:

Alle modificaties en reparaties moeten worden uitgevoerd door gekwalificeerd personeel en de geldende veiligheidsvoorschriften moeten worden aangehouden. Let op:

- De gebruiker is verantwoordelijk voor alle modificaties en reparaties die worden uitgevoerd aan het apparaat.
- Alle nieuwe onderdelen moeten zijn geleverd door Siemens Milltronics Process Instruments Inc.
- Beperk de reparatie uitsluitend tot de defecte componenten.
- Defecte componenten niet opnieuw gebruiken.

## Reparação da Unidade e Responsabilidade Excluída

Todas as alterações e reparações devem ser realizadas por pessoal qualificado e devem ser seguidas as regras de segurança aplicáveis. Por favor, note o seguinte:

- O utilizador é responsável por todas as alterações e reparações efectuadas no dispositivo.
- Todos os novos componentes devem ser fornecidos pela Siemens Milltronics Process Instruments Inc.
- Reparação restrita apenas a componentes danificados.
- Não reutilize componentes danificados.

## Yksikön korjaaminen ja vastuuvapaus:

Muutos- ja korjaustyöt saa suorittaa ainoastaan pätevä henkilökunta, ja voimassa olevia turvallisuusmääräyksiä on noudatettava. Pyydämme ottamaan huomioon seuraavat seikat:

- Käyttäjän vastuussa kaikista laitteeseen tehdystä muutoksista ja korjauksista.
- Kaikki uudet osat on hankittava Siemens Milltronics Process Instruments Inc.:ltä.
- Korjaukset on kohdistettava ainoastaan viallisiin osiin.
- Viallisia osia ei saa käyttää uudelleen.

## Reparation och ansvarsfrihet:

Alla ändringar och reparationer måste utföras av kompetent personal och under iakttagande av gällande säkerhetsbestämmelser. Observera att:

- Användaren ansvarar för alla ändringar och reparationer som görs på enheten.
- Alla nya delar måste komma från Siemens Milltronics Process Instruments Inc.
- Reparera endast med fel behäftade delar.
- Delar behäftade med fel får ej återanvändas.



[www.siemens.com/processautomation](http://www.siemens.com/processautomation)

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