

# SITRANS T

## SITRANS T Explosion protected temperature sensor

### Operating Instructions

<u>General information</u>	<b>1</b>
<u>Marking of the degree of protection</u>	<b>2</b>
<u>Range of uses</u>	<b>3</b>
<u>Installation</u>	<b>4</b>
<u>Assembly and disassembly</u>	<b>5</b>
<u>Commissioning</u>	<b>6</b>
<u>Maintenance</u>	<b>7</b>
<u>Appendix 1</u>	<b>8</b>
<u>Appendix 2</u>	<b>9</b>

Type \*X-\*\*\*\_\* or \*MX-\*\*\*\_\*  
with the order number 7MC1\*\*\* or 7MC2\*\*\*

---

## Safety notes

This manual contains instructions which must be complied with for the sake of your personal safety and also to prevent damage to property. The notes concerning your personal safety are indicated with a warning triangle; notes solely concerning damage to property are given without a warning triangle. Depending on the level of danger, the warnings are given in decreasing order, as follows:



---

### Danger

means that death or severe injury **will** result if the corresponding precautions are not taken.

---

---



---

### Warning

means that death or severe injury **may** result if the corresponding precautions are not taken.

---

---



---

### Caution

with a warning triangle means that slight injury may result if the corresponding precautions are not taken.

---

---

---

### Caution

without a warning triangle means that damage to property may result if the corresponding precautions are not taken.

---

---

---

### Notice

means that an undesirable event or condition may result if the corresponding note is not observed.

---

If more than one level of danger applies, warnings for the highest level will always be given. If a warning against personal injury is given with a warning triangle, it may contain an additional warning against damage to property.

## Qualified personnel

This device/system may only be installed and operated together with this document. Commissioning and operation of devices/systems are to be carried out only by **qualified personnel**. Qualified personnel is defined within the context of the safety information contained in this document as persons who have been authorized to operate, ground or mark devices, systems and electrical circuits in accordance with accepted technical safety standards.

## Correct usage

Observe the following:



---

### Warning

The device may only be used in the cases prescribed in the catalog and in the technical description and only in conjunction with third-party devices and components recommended or approved by Siemens. Proper shipping, storage, installation, operation and maintenance of the product are essential for ensuring correct and safe operation.

---

## Trademarks

All names marked with the © symbol are registered trademarks of Siemens AG. Other names in this document may be trademarks whose use by a third party for their own purposes may impinge on the rights of the owner.

## Exclusion of liability

We have checked to ensure that the information contained in this document corresponds to the characteristics of the actual hardware and software. Nevertheless, we cannot assume responsibility for any deviations that may arise. The information contained in this document is checked regularly for errors. Necessary corrections made to the text appear in later editions.

---

---

# Table of contents

<b>1</b>	<b>General information</b> .....	<b>1</b>
1.1	Intended use .....	1
1.2	Type marking .....	1
1.2.1	Type marking for versions of device group II .....	1
1.2.2	Type marking for measuring elements.....	2
1.3	Protection type .....	2
<b>2</b>	<b>Marking of the degree of protection</b> .....	<b>2</b>
<b>3</b>	<b>Range of uses</b> .....	<b>3</b>
3.1	Description .....	3
3.2	Parameters.....	3
3.2.1	Type *X-*D**-* or measuring element type *MX-D**-* .....	3
3.2.2	Type *X-*E**-*, type *X-*F**-* or measuring elements type *MX-E**-*, type *MX-F**-* .....	4
3.2.3	Thermometer type *X-*P**-* .....	4
3.2.4	Thermometer type *X-*O**-*, measuring element type *MX-O**-* .....	4
3.3	Thermal parameters.....	4
3.3.1	Range of ambient temperature and temperature class .....	4
3.3.2	Process temperature.....	5
3.4	Requirements and conditions for safe application .....	5
<b>4</b>	<b>Installation</b> .....	<b>6</b>
<b>5</b>	<b>Assembly and disassembly</b> .....	<b>6</b>
<b>6</b>	<b>Commissioning</b> .....	<b>6</b>
<b>7</b>	<b>Maintenance</b> .....	<b>6</b>
<b>8</b>	<b>Appendix 1</b> .....	<b>7</b>
<b>9</b>	<b>Appendix 2</b> .....	<b>8</b>



# 1 General information

## 1.1 Product information on the Internet

Manual is available on the Internet on the Siemens homepage.

Instructions and Manuals

<http://www.siemens.com/processinstrumentation/documentation>

## 1.2 Intended use

Temperature sensors, such as resistance thermometers and thermocouples, are used to measure temperatures in many industrial plants and test devices where explosion protected sensor units are used to convert temperature information into electrical signals.

## 1.3 Type marking

The type marking is \*X-\*\*\*\*-\*, or \*MX-\*\*\*-\* and includes the markings listed in the following tables.

### 1.3.1 Type marking for versions of device group II

**Table 1**

Type key for complete thermometers	#	X -	#	#	#	# -	#
<b>Sensor type</b>							
Resistance thermometer	W						
Thermocouple	T						
<b>Design of the protective fitting</b>							
Screw-in fitting			E				
Flanged fitting			F				
Flanged fitting without protective tube			A				
Without protective tube			O				
<b>Transmitter (installed in the cover)</b>							
Without				O			
SITRANS TH100 (PTB 05 ATEX 2049 X, type 7NG3211-0AN00)				D			
SITRANS TH200 (PTB 05 ATEX 2040 X, type 7NG3211-1AN00)				E			
SITRANS TH300 (PTB 05 ATEX 2040 X, type 7NG3212-0AN00)				F			
SITRANS T3KPA (ZELM 99 ATEX 0001, type 7NG3213-1NN00)				P			
<b>Number of sensors</b>							
Single					1		
Dual					2		
<b>Sensor</b>							
Pt 100						Pt100	
Pt 1000						Pt1000	
Ni 100						Ni100	
Ni – CrNi (K)						K	
Fe – CuNi (L)						L	
Fe – CuNi (J)						J	
NiCrSi – NiSi (N)						N	
Cu - CuNi (U)						U	
Cu – CuNi (T)						T	
NiCr – CuNi (E)						E	
Pt10%Rh – Pt (S)						S	
Pt13%Rh – Pt (R)						R	
Pt30%Rh – Pt6%Rh (B)						B	
<b>Diameter</b>							
8.0 mm							8
6.0 mm							6
3.0 mm							3

### 1.3.2 Type marking for measuring elements

**Table 2**

Type key for measuring elements	#	MX -	#	#	# -	#
<b>Sensor type</b>						
Resistance thermometer	W					
Thermocouple	T					
<b>Transmitter (installed on the round blank) <sup>1)</sup></b>						
Without			O			
SITRANS TH100 (PTB 05 ATEX 2049 X, type 7NG3211-0AN00)			D			
SITRANS TH200 (PTB 05 ATEX 2040 X, type 7NG3211-1AN00)			E			
SITRANS TH300 (PTB 05 ATEX 2040 X, type 7NG3212-0AN00)			F			
<b>Number of sensors</b>						
Single				1		
Dual				2		
<b>Sensor</b>						
Pt 100					Pt100	
Pt 1000					Pt1000	
Ni 100					Ni100	
NiCr – Ni (K)					K	
Fe – CuNi (L)					L	
Fe – CuNi (J)					J	
NiCrSi – NiSi (N)					N	
Cu - CuNi (U)					U	
Cu – CuNi (T)					T	
NiCr – CuNi (E)					E	
Pt10%Rh - Pt (S)					S	
Pt13%Rh - Pt (R)					R	
Pt30%Rh - Pt6%Rh (B)					B	
8.0 mm						8
6.0 mm						6
3.0 mm						3

1) Possible only in combination with single-sensors

### 1.4 Protection type

Thermometers listed here are in conformity with the intrinsically-safe protection type "i", category ia

## 2 Marking of the degree of protection

EEx ia IIC T4/T6

## 3 Range of uses

### 3.1 Description

The type **\*X-E\*\*\*-** or type **\*X-F\*\*\*-** thermometers are suitable for applications in areas of category II 1/2 G (installed in the divider of category II 1G, zone 0 areas) and areas of category II 2G.

Marking:







 II 1/2 G EEx ia IIC T4/T6

The type **\*X-A\*\*\*-** or type **\*X-O\*\*\*-** as well as type **\*MX-\*\*\*-** measuring elements are suited for applications in the areas of category II 2G.

Marking:

 II 2 G EEx ia IIC T4/T6

The temperature class (T4/T6) depends on the installed transmitters, as per the table.

Type	Marking	Ambient temperature
*X-ED**-, *X-FD**-	 II 1/2G EEx ia IIC T4/T6	- 40°C < Ta < + 85°C (T4) - 40°C < Ta < + 55°C (T6)
*X-EP**-, *X-EO**-, *X-FP**-, *X-FO**-	 II 1/2G EEx ia IIC T4/T6	- 40°C ≤ Ta ≤ + 80°C (T4) - 40°C ≤ Ta ≤ + 60°C (T6)
*X-EE**-, *X-EF**-, *X-FE**-, *X-FF**-	 II 1/2G EEx ia IIC T4/T6	- 40°C < Ta < + 85°C (T4) - 40°C < Ta < + 60°C (T6)
*X-OP**-, *X-OO**-, *MX-O**-, *X-AP**-, *X-AO**-	 II 2G EEx ia IIC T4/T6	- 40°C ≤ Ta ≤ + 80°C (T4) - 40°C ≤ Ta ≤ + 60°C (T6)
*X-AD**-, *X-OD**-, *MX-D**-	 II 2G EEx ia IIC T4/T6	- 40°C < Ta < + 85°C (T4) - 40°C < Ta < + 55°C (T6)
*X-AE**-, *X-AF**-, *X-OE**-, *X-OF**-, *MX-E**-, *MX-F**-	 II 2G EEx ia IIC T4/T6	- 40°C < Ta < + 85°C (T4) - 40°C < Ta < + 60°C (T6)

### 3.2 Parameters

#### 3.2.1 Type **\*X-D\*\*-** or measuring element type **\*MX-D\*\*-**

(Connection through a built-in or fitted SITRANS TH100 type 7NG3211-0AN00 transmitter, connections 1(+) and 2(-), certificate number: PTB 05 ATEX 2049 X)

Power supply and signal circuit (electrical specifications as per PTB 05 ATEX 2049 X)

Maximum input voltage	Ui	DC	30	V
Maximum input current	Ii		100	mA
Maximum input power	Pi		750	mW
Maximum internal capacitance		Ci		7.3 nF
Maximum internal inductance	Li		106	μH

### 3.2.2 Type \*X-E\*\*-\* , type \*X-F\*\*-\* or measuring elements type \*MX-E\*\*-\* , type \*MX-F\*\*-\*

(Connection through a built-in or fitted SITRANS TH200 type 7NG3211-1AN00 or SITRANS TH300 type 7NG3212-0AN00 transmitter, connections 1(+) and 2(-), certificate number: PTB 05 ATEX 2040 X)

Power supply and signal circuit (electrical specifications as per PTB 05 ATEX 2040 X)

Maximum input voltage	$U_i$	DC	30	V
Maximum input current	$I_i$		100	mA
Maximum input power	$P_i$		750	mW
Maximum internal capacitance		$C_i$		13 nF
Maximum internal inductance	$L_i$		106	$\mu$ H

### 3.2.3 Thermometer type \*X-P\*\*-\*

(Connection through a built-in or fitted SITRANS T3K PA type 7NG3213-1NN00 TH100 transmitter, terminals 5 and 6, certificate number: ZELM 99 ATEX 0001)

Power supply/signal circuit (electrical specifications as per ZELM 99 ATEX 0001)

	FISCO supply unit		Linear barrier	
Maximum input voltage	$U_i$	17.5 V	24	V
Maximum input power	$P_i$	--	1.2	W
Maximum internal capacitance	$C_i$		1.1	nF
Maximum internal inductance	$L_i$		5.5	$\mu$ H

### 3.2.4 Thermometer type \*X-O\*\*-\* , measuring element type \*MX-O\*\*-\*

Power/data flow circuit

Maximum input voltage	$U_i$	DC	30	V
Maximum input power	$P_i$		200	mW
Maximum internal capacitance	$C_i$		negligible	
Maximum internal inductance	$L_i$		negligible	
	$L_i$		15	$\mu$ H

## 3.3 Thermal parameters

### 3.3.1 Range of ambient temperature and temperature class

Thermometer type \*X-D\*\*-\* or measuring element type \*MX-D\*\*-\*

Temperature class T4, range of ambient temperature: - 40°C to + 85°C

Temperature class T6, range of ambient temperature: - 40°C to + 55°C

Thermometer type \*X-E\*\*-\* , type \*X-F\*\*-\* or measuring elements type \*MX-E\*\*-\* , type \*MX-F\*\*-\*

Temperature class T4, range of ambient temperature: - 40°C to + 85°C

Temperature class T6, range of ambient temperature: - 40°C to + 60°C

For thermometer type \*X-P\*\*-\* and thermometer type \*X-O\*\*-\* , measuring element type \*MX-O\*\*-\*

Temperature class T4, range of ambient temperature: - 40°C to + 80°C

Temperature class T6, range of ambient temperature: - 40°C to + 60°C

When measuring process temperatures deviating from these values, the determination of the range of ambient temperature and the temperature class exclusively refers to the connection head or connection terminals; the



effect of the process temperature on the temperature of the neck tube must be taken into account separately when operating the thermometer or the measuring element.

### 3.3.2 Process temperature

Depending on the design and other process conditions:

For resistance thermometers - 200°C to + 600°C

For thermocouples - 50°C to + 900°C

### 3.4 Requirements and conditions for safe application

Take suitable measures, e.g. by selecting a neck tube of adequate length, to ensure the decoupling of the connection head temperature from the process temperature in case of type \*X-\*\*\*\*-\* and the decoupling of the connection terminal temperature from the process temperature in case of type \*MX-\*\*\*-\*

Follow the manufacturer's application instructions regarding permissible process conditions.

Follow the requirements / conditions for safe operation that are listed in the corresponding transmitter certificates

The following also applies to the measuring elements of type \*MX-\*\*\*-\*:

Install the measuring element in a suitable housing that ensures at least an IP20 degree of protection. The internal wiring must fulfill conditions specified in section 6.4.11 of EN 50020.

Install it such that there is a gap of at least 3 mm between the bare parts of the intrinsically-safe electrical circuits and the metallic parts of the housing.

## 4 Installation

Adhere to standards such as EN 60079-14, "Electrical apparatus for explosive gas atmospheres" when carrying out the installation

If types # X - E # # # - # or # X - F # # # - # are installed in the boundary wall of the hazardous area having category 1 requirements, the installation must be sufficiently thick or flashover-proof.

## 5 Assembly and disassembly

The temperature sensors must be connected to the process equipment in a sealed, firm and secure manner, as per recognized technical standards. Also ensure that the thermometers have adequate "heat exchange surface" with the medium to be measured and that the error due to heat dissipation through the protective tube is kept to a minimum. The thermometers must be firmly connected to the connecting leads. Ensure correct connection of the circuit type in the case of resistance thermometers, and correct polarity in case of thermocouples. Notes regarding the use of cables and leads are given in chapter 9 of EN 60079-14. When exchanging measuring elements, ensure that they can be pulled out from the protective fitting slightly and re-installed. If complete protective fittings are to be replaced, the process should be shut down and the container should be empty and depressurized in order avoid risk of injuries due to escaping medium.

In general, damaged parts must be replaced with new parts.

## 6 Commissioning

Check all Ex-relevant parameters of connected components before commissioning. Check the correct connection of the circuit type in the case of resistance thermometers, and the correct polarity in the case of thermocouples.

## 7 Maintenance

Adhere to European and national directives for maintenance. As a rule, check the functioning of temperature sensors regularly. This is especially applicable for the parts that the type of protection depends upon. Only replace defective sensors with new ones of the same type.

## 8 Appendix 1

EC-type examination certificate page 1



- (1) **EG-Baumusterprüfbescheinigung**
- (2) **- Richtlinie 94/9/EG -**  
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung  
in explosionsgefährdeten Bereichen
- (3) **BVS 03 ATEX E 380 X**
- (4) **Gerät:** Thermometer Typ \*X-\*\*\*\*-\* bzw. Messeinsatz Typ \*MX-\*\*\*\*-\*
- (5) **Hersteller:** Siemens AG A&D PI
- (6) **Anschrift:** D - 76181 Karlsruhe
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Zertifizierungsstelle der Deutsche Montan Technologie GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.  
Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 03.2244 EG niedergelegt.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit  
EN 50014:1997 + A1 - A2 Allgemeine Bestimmungen  
EN 50020:2002 Eigensicherheit 'i'  
EN 50284:1999 Gerätegruppe II, Kategorie 1G
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.  
Für Herstellung und in Verkehr bringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.
- (12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

ergänzt je nach Ausführung durch die Kennzeichnung gemäß Tabelle unter 15.2

**Deutsche Montan Technologie GmbH**

Bochum, den 03. November 2003

Zertifizierungsstelle

Fachbereich

Seite 1 von 7 zu BVS 03 ATEX E 380 X  
Dieses Zertifikat darf nur unverändert weiterverbreitet werden.  
Dinnendahlstraße 9 44809 Bochum Telefon-Phone 0201/172-3947 Telefax-Fax 0201/172-3948  
(bis 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen)

# 9 Appendix 2

EC declaration of conformity

## SIEMENS

### EG-Konformitätserklärung EC Declaration of Conformity

No. A5E00289211 - 02

Hersteller: Siemens AG .....  
 Manufacturer: .....  
 Anschrift: Östliche Rheinbrückenstr. 50; 76187 Karlsruhe .....  
 Address: Bundesrepublik Deutschland .....  
 Produkt- Thermometer .....  
 bezeichnung: der Typen \*X-\*\*\*\*-\* bzw. \*MX-\*\*\*-\* .....  
 Product mit der Best.-Nr. 7MC1\*\*\*.\*\*\*\*\* bzw. 7MC2\*\*\*.\*\*\*\*\* .....  
 description

**Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:**  
*The product described above in the form as delivered is in conformity with the provisions of the following European Directives:*

- 89/336/EWG Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit.  
(geändert durch 91/263/EWG, 92/31/EWG und 93/68/EWG).  
 Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.  
 (amended by 91/263/EEC, 92/31/EEC and 93/68/EEC)
- 94/9/EG Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemässen Verwendung in explosionsgefährdeten Bereichen.  
Directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

CE-Kennzeichnung / CE marking : 11/2003

Karlsruhe, 24.03.2004

Siemens AG

Dr. Kobes, Entwicklung .....  
 Name, Funktion .....  
 Name, function .....  
 Unterschrift .....  
 signature

Dr. Schmidt, Fertigung .....  
 Name, Funktion .....  
 Name, function .....  
 Unterschrift .....  
 signature

Anhang A ist integraler Bestandteil dieser Erklärung  
*Annex A is integral part of this declaration*  
 Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften.  
 Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.  
*This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.*

Dokument: A5E00289211A/DS02

1 / 2

**SIEMENS**

## Anhang A zur EG-Konformitätserklärung Annex A to the EC Declaration of Conformity

No. A5E00289211 - 02

Produkt- Thermometer .....  
 bezeichnung: der Typen: \*X-\*\*\*\*\_\* bzw. \*MX-\*\*\*\_\* .....  
 Product mit der Best.-Nr. 7MC1\*\*\*\_\*\*\*\*\* bzw. 7MC2\*\*\*\_\*\*\*\*\* .....  
 description

Die Konformität mit den auf Blatt 1 angeführten Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen:  
 Conformity to the Directives indicated on page 1 is assured through the application of the following standards:

Richtlinie Direktive	Norm / Referenznummer Standard / Reference number	Ausgabedatum Edition	Kommentar Comment
89/336/EWG	EN 61326/A1 Anh. A.1	1998	nur für Varianten mit Messumformer only for versions with transmitter
94/9/EG	EN 50014	1997 + A1 – A2	nur für explosionsgeschützte Varianten only for explosion protected versions
94/9/EG	EN 50020	2002	
94/9/EG	EN 50284	1999	

Zertifikate:  
 Certificates:

Zertifikat Certificate
BVS 03 ATEX E 380 X

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften.  
 Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.  
 This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

Dokument: A5E00289211A/DS02

2 / 2

