SIEMENS

SIMATIC RTLS

Localization systems SIMATIC RTLS4040T

Operating Instructions

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05/2023

C79000-G8976-C596-04

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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C79000-G8976-C596-04
Ⓟ 05/2023 Subject to change

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Introduction

1

Purpose of the operating instructions

These operating instructions will assist you in commissioning the SIMATIC RTLS4040T transponder.

The configuration and the integration of the transponders in a network are not described in these operating instructions.

Validity of the operating instructions

These operating instructions apply to the following transponder:

- SIMATIC RTLS4040T (CE; article number: 6GT2700-5DA03)

Further documentation

You can find the complete documentation for all SIMATIC RTLS products at the following address:
Link: (https://support.industry.siemens.com/cs/us/en/ps/25277/man)

Trademarks

The following and possibly other names not identified by the registered trademark sign ® are registered trademarks of Siemens AG:

SIMATIC RTLS

Industry Online Support

In addition to the product documentation, you are supported by the comprehensive online information platform of Siemens Industry Online Support at the following Internet address:
Link: (https://support.industry.siemens.com/cs/de/en/)

Apart from news, there you will also find:

- Project information: Manuals, FAQs, downloads, application examples etc.
- Contacts, Technical Forum
- The option submitting a support query:
  Link: (https://support.industry.siemens.com/My/ww/en/requests)
- Our service offer:

  Right across our products and systems, we provide numerous services that support you in every phase of the life of your machine or system - from planning and implementation to commissioning, through to maintenance and modernization.

You will find contact data on the Internet at the following address:
Link: (https://www.automation.siemens.com/aspa_app/?ci=yes&lang=en)

SITRAIN - Training for Industry

The training offer includes more than 300 courses on basic topics, extended knowledge and special knowledge as well as advanced training for individual sectors - available at more than 130 locations. Courses can also be organized individually and held locally at your location.

You will find detailed information on the training curriculum and how to contact our customer consultants at the following Internet address:

Link: (http://sitrain.automation.siemens.com/DE/sitrain/default.aspx?AppLang=en)

Industrial Networks Education

Training and certification for Industrial Networks

In our Industrial Networks Education courses you'll learn to design and implement wired and wireless data networks and connect them to a corporate network. You will also receive instruction on how to secure, diagnose and optimize communication networks. Certification can also be offered to supplement almost all training courses.

Link: (https://www.siemens.com/industrial-networks-education)

RTLS Technology and Practice (ID-RTLS-TP)

Training and certification

After completing the RTLS certification training, you will be able to plan and implement small and medium-sized RTLS projects and provide efficient and multifaceted support in large projects. Your RTLS basics will be strengthened and, building upon them, you will receive new tools of the trade in order to offer customers the optimal solution for them. The complete project sequence is taken as a reference and important steps, resources and work results for each phase are presented. Comprehensive practical exercises in connection with troubleshooting techniques and a great deal of input from industrial projects allow you to internalize a confident approach to working with different types of localization projects. With the training documents, you also receive extensive reference material for your daily work.

Link: (https://www.sitrain-learning.siemens.com/EN/en/rw35251/Industrielle-Identifikation-RTLS-Technologie-und-Praxis)

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines, and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions form one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. These systems, machines and components should only be connected to the enterprise network or the Internet if and only to the extent necessary and with appropriate security measures (firewalls and/or network segmentation) in place.

You can find more information on protective measures in the area of industrial security by visiting: (http://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends performing product updates as soon as they are available and using only the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To ensure that you are always informed about product updates, subscribe to the Siemens Industrial Security RSS feed at: (https://www.siemens.com/cert)

Note on firmware/software support

Check regularly for new firmware/software versions or security updates and apply them. After the release of a new version, previous versions are no longer supported and are not maintained.

Security recommendations

General

Note the following security recommendations to prevent unauthorized access:

- Keep the firmware up to date. Check regularly for security updates for the device. You can find information on this at the Industrial Security (https://new.siemens.com/global/en/company/topic-areas/future-of-manufacturing/industrial-security.html) website.
- Inform yourself regularly about security recommendations published by Siemens ProductCERT (https://new.siemens.com/global/en/products/services/cert.html).
- Evaluate your plant as a whole in terms of security. Use a cell protection concept with suitable products.
- This product requires an additional security concept to prevent unauthorized access.
- Transponder and infrastructure can be configured for radio channels according to IEEE 802.15.4-2015. You will find details in the section "Technical specifications".
- Ensure that the radio frequencies are not used for other purposes and are not affected by other interfering signals. This should be ensured within the operating range of the localization system.
- Interference in the frequency band used can impair the system and, in extreme cases, lead to localization failure.

Physical access

- Restrict physical access to the device to qualified personnel.
- Disable unused physical interfaces of the device. Unused interfaces could be used to gain access to the operating site.

Recycling and disposal



The products are low in harmful substances, can be recycled and meet the requirements of the Directive 2012/19/EU for disposal of waste electrical and electronic equipment (WEEE).

Do not dispose of the products at public disposal sites.

For environmentally compliant recycling and disposal of your electronic waste, please contact a company certified for the disposal of electronic waste or your Siemens representative.

Note the different national regulations.

Device description

2

2.1 Characteristics

SIMATIC RTLS4040T	Characteristics	
	Setup	① Status indicators (LED) ② F1 function key
	General	The transponder is a mobile device for localization in the RTLS localization system. It sends data to gateways to determine its position. The gateways transmit the data to the Locating Manager Server.

2.2 Order data for RTLS4040T and accessories

Table 2- 1 Order data RTLS4040T

		Article number
SIMATIC RTLS4040T	CE	6GT2700-5DA03

Table 2- 2 Accessories order data (not included in scope of delivery)

	Article number
SIMATIC RTLS charging station for 10 transponders consisting of charging cradle, power supply unit and power plug for region: EU	6GT2790-0DD00
SIMATIC RTLS charging station for 10 transponders consisting of charging cradle, power supply unit and power plug for region: USA	6GT2790-0DD01
Charging cradle for 10 transponders	6GT2790-0DD10
Power supply device for charging cradle without power plug	6GT2790-0DD40
SIMATIC RTLS mounting clip for RTLS transponder	6GT2790-0DE00
Power plug for region: EU	6ES7900-0AA00-0XA0
Power plug for region: USA	6ES7900-0DA00-0XA0

2.3 LED operation display & function button

The operating states of the transponder are indicated by the LEDs. The states can be off □, on ■ and flashing ▣.

Table 2- 3 LED status indicator

LED	Meaning
	Briefly flashes green once when the F1 function key is pressed and the battery voltage is sufficient.
	Continuously flashes green when the transponder is fully charged and in the charging station.
	Lights up green when the transponder is fully charged and in the charging station.
	Briefly flashes red once when the F1 function key is pressed and the battery voltage is low.
	Continuously flashes red when the transponder is in the charging station and the battery is defective. Remove the transponder from the charging station immediately and do not recharge this transponder. Contact customer service.
	Lights up red if there is an error during charging. Please also refer to the description of the F1 function key.

Note

Refer to the information in the section "Charging instructions (Page 15)".

Table 2- 4 Function key

Display	Meaning
F1 function key	When this function key is pressed, 1 message is sent to the Locating Manager server. When the F1 function key is pressed, the charge state of the battery is evaluated and, depending on its voltage, the LED briefly flashes green or red. In the Locating Manager, you can configure a transponder parameter to define the threshold value below which the battery voltage is defined as too low for operation, a "low power" message is generated and the LED flashes red. Refer to the notes in the section "Operation (Page 15)".

2.4 Dimension drawing of RTLS4040T

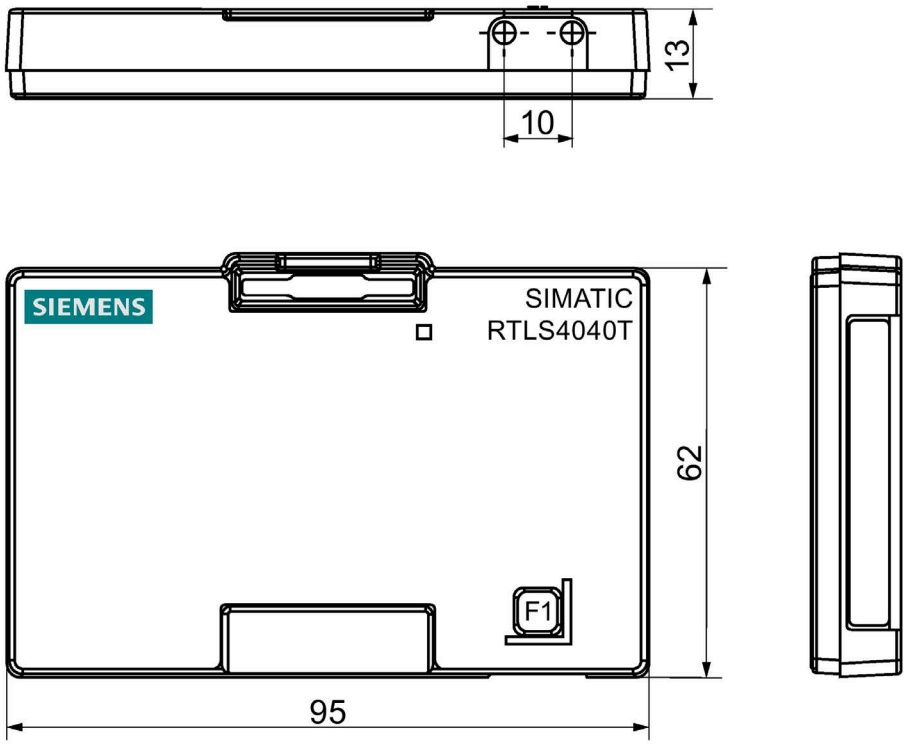


Figure 2-1 Dimension drawing SIMATIC RTLS4040T - All dimensions are given in millimeters

2.5 Dimension drawing of RTLS charging station

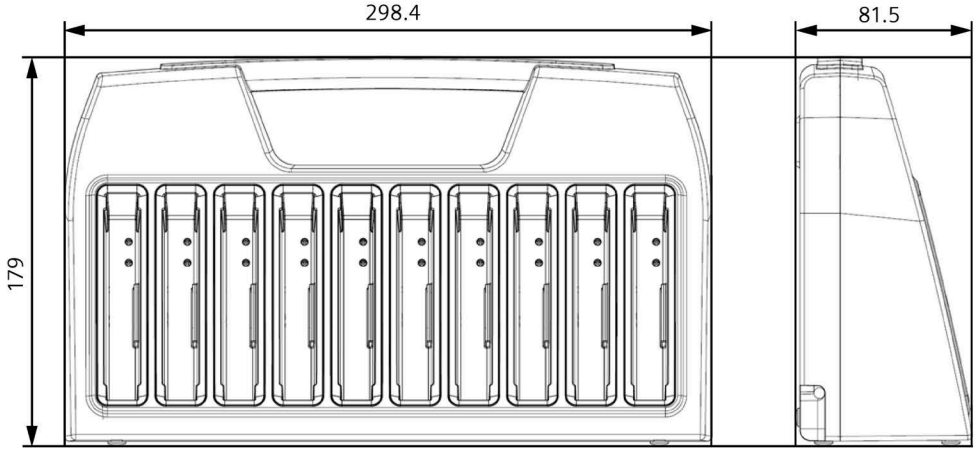
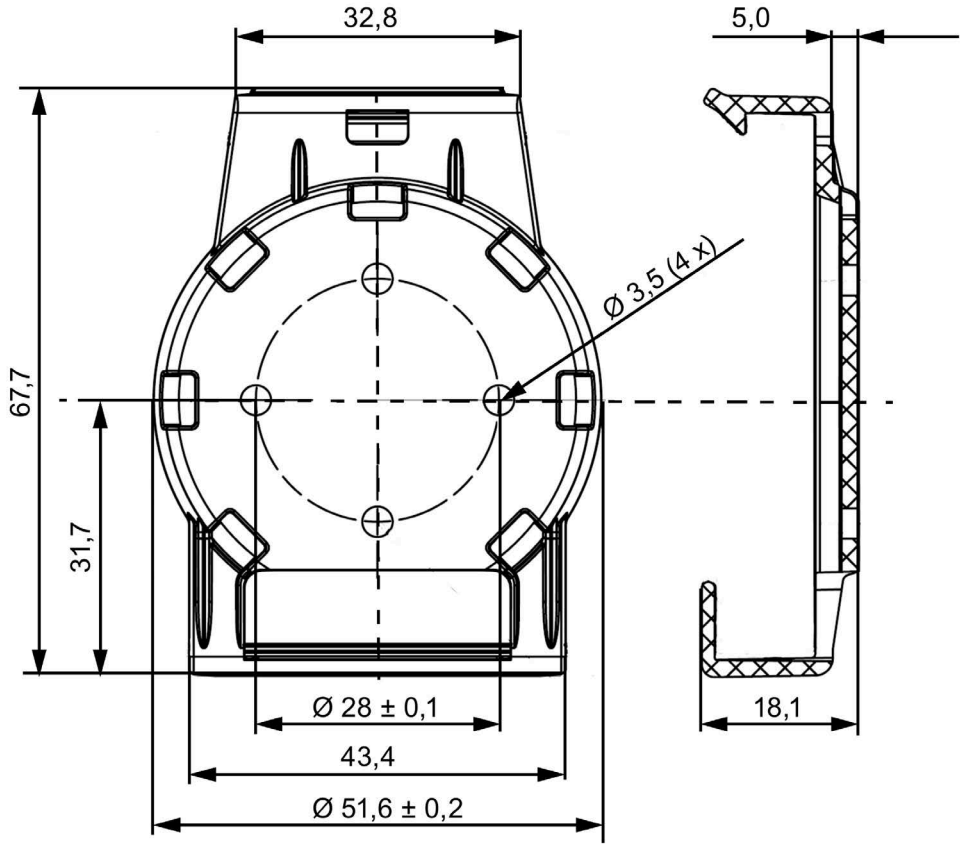


Figure 2-2 Dimension drawing of SIMATIC RTLS charging station (not included with the product) - All dimensions are given in millimeters

2.6 Dimension drawing of mounting clip for RTLS transponder



All dimensions in mm.

Installation & operation 3

3.1 Notes on installation

Note

Before you install the transponders, read this section carefully to ensure problem-free installation and commissioning.

The transponders can only be used in conjunction with the RTLS localization system.

Install the transponder in such a way that it has a direct line-of-sight connection to the gateways (360° panorama view). Any type of material can impact wireless localization. Wireless localization through metal is not possible. In this case, localization may be based on radio reflections and result in inaccurate localization.

Check the transponder for damage before you use it so that it is not damaged during operation. The specified operating temperature ranges must be observed.

The transponder contains one lithium ion battery.

⚠ CAUTION

Contact with the battery fluid

Incorrect handling of the transponder may damage the battery and cause fluid to leak out of the battery.

Avoid contact with the battery fluid. Rinse skin that comes into contact with battery fluid with water. If fluid from the battery gets into the eye, seek medical attention.

⚠ CAUTION

Handling batteries

There is a risk of fire and, in extreme cases, of explosion in the following cases:

- If the battery is improperly charged and discharged
- If the polarity is reversed
- If a short-circuit occurs

This applies to lithium-ion batteries:

- Do not squeeze
- Do not heat and do not burn
- Do not short-circuit
- Do not disassemble
- Do not immerse in liquid - the battery may crack or burst

CAUTION
Fires and burns Improper handling of the battery can lead to fire and skin injuries.

The enclosure of the transponder must not be squashed, punctured or exposed to other mechanical influences.

Never expose the transponder to fire or high temperatures or to direct sunlight for long periods of time in order to avoid exceeding the maximum permissible temperature.

Reflections and interferences

The antenna fields are weakened by absorbing materials and reflected by conducting materials. When electromagnetic fields are reflected or there are other radio sources, this will result in interferences. These circumstances will result in incorrect measurements; however, these can be largely detected and corrected with the appropriate software (e.g. SIMATIC RTLS Locating Manager). We still recommend that you prevent these influences. Especially objects that cannot be penetrated by radio waves can cause localization errors.

Note

Metal surfaces reflect radio waves more than any other types of surfaces. Water, on the other hand, attenuates radio waves. You should therefore evaluate your working environment and integration for these influences.

Coexistence and de-sensing

To prevent interfering with each other, radio applications will use different frequency bands. Use of these frequency bands is subject to state regulation. Because a frequency range is considered a finite good, technologies were developed over the years that enable a coexistence of different radio applications in the same frequency band. These technologies are also used by SIMATIC RTLS. However, interferences can still be caused by other radio devices. Arrangements are being made here, too, so that these interferences do not impact the operation of the RTLS localization system. To keep interferences to a minimum, the RTLS infrastructure components must not be installed in the close vicinity of other radio applications. Strong senders in close vicinity can interfere with the reception, even when they are located in neighboring frequency bands (de-sensing). This is true, for example, for the 2.4 GHz ISM band and PULSE in the UWB channel 5.

3.2 Operation

Note

Operate the transponder only with the accessories intended for this purpose, which are listed in the section "Order data for RTLS4040T and accessories (Page 9)".

The transponder is delivered switched off and must be activated for first-time use by plugging it into the charging station. The transponder is operated with the F1 function key on the front panel. The transponder switches off automatically if the battery voltage falls below 3.5 V. The limit above which the transponder sends a "low power" message to the Locating Manager can be configured via the "VoltageThresholdWarning" parameter. The value is given in millivolts and is 3.6V (3600mV) by default. If the transponder switches off automatically, it must be fully recharged within 3 months to avoid deep self-discharge and resulting damage to the battery.

3.3 Cleaning and maintenance

The enclosure of the transponder must not be opened.

The transponder may only be repaired or opened for other types of work by an authorized maintenance company.

Improper opening or repair of the transponder may result in serious risks for the user. Opening the transponder without permission renders the warranty of the Siemens AG null and void.

Do not clean the enclosure with liquids or abrasive, caustic or flammable cleaning products.

Note

Due to the integrated battery, the transponder is a hazardous good. Observe the applicable regulations when shipping.

3.4 Charging instructions

Mount the charging station in a location with cool ambient temperature. Then, fully charge the transponder using the charging station.

The temperature of the transponder and the ambient temperature must not exceed 40 °C for the transponder to be charged. The higher the temperature, the longer it takes to charge the transponder.

If the transponder exceeds 55 °C during charging (see status LED), remove the transponder from the charging station. Allow the transponder to cool down and try charging it again. If the transponder becomes too hot again, remove it from the charging station and contact customer service.

The battery has a natural self-discharge. When stored in a state not fully charged, the transponder is discharged after approximately 6 months and must be recharged. If the transponder is completely discharged, the integrated battery may be damaged.

To charge, insert the transponder fully in a charging bay of the charging station. The front of the transponder must face away from the side of the cable guide. The start and status of the charging process are signaled via the LED display on the transponder. A full charging process takes approximately 8.5 hours. To ensure correct operation of all 10 charging bays and to avoid damage to the transponders, only use the power supply unit provided with the charging station.

Read also the descriptions of the operating states of the transponder in section "LED operation display & function button (Page 10)".

Technical specifications

4

Table 4- 1 Technical specifications of the RTLS4040T transponder

	6GT2700-5DA03
Product name	SIMATIC RTLS4040T
PULSE radio frequencies (localization)	
Wireless method	IEEE 802.15.4-2015 UWB HRP PHY
Transmission speed	850 Kbps
Operating frequency rated value	3993.6 MHz (UWB channel 2; CE) 6489.6 MHz (UWB channel 5; CE)
Bandwidth	499.2 MHz
Frequency range	3100 MHz ... 4800 MHz (CE) 6000 MHz ... 7000 MHz (CE)
Transmit power	0.037 mW (-41.3 dBm/MHz)
Range	Maximum 50 m
Accuracy of the localization (typical)	0.1 m
Antennas	Built-in UWB antenna
PHASE radio frequencies (communication and optional localization)	
Wireless method	IEEE 802.15.4
Transmission speed	1 Mbit/s
Operating frequency rated value	2400 ... 2480 MHz ISM band
Bandwidth	2 MHz; data transmission on 802.15.4; channels configurable
Frequency range	2400 MHz ... 2483.5 MHz
Transmit power	Maximum 12.6 mW (configurable)
Range	Maximum 500 m
Accuracy of the localization (typical)	3 m
Antennas	Built-in 2.4 GHz antenna
Supply voltage, power consumption	
Supply voltage	3.7 V lithium ion rechargeable battery (1900 mAh)
Operating time of a full battery charge (at 20 °C)	Approx. 1 day
Permitted ambient conditions	
Ambient temperature	
• During operation	• -10 ... +50 °C
• During storage	• -10 ... +50 °C
• During transport	• -10 ... +50 °C
• During charging	• +10 ... +40 °C

	6GT2700-5DA03
Design, dimensions, weights and connectors	
Dimensions (L x W x H)	95 x 62 x 13 mm
Weight	76 g
Degree of protection	IP54
Fastening method	Mounting clip RTLS transponder (article number: 6GT2790-0DE00)
Enclosure	Plastic enclosure
Color	Titanium gray

4.1 RTLS charging station technical specifications

Table 4- 2 Technical specifications of the RTLS charging station (not included in the product package)

	6GT2790-0DD00, 6GT2790-0DD01
Product name	SIMATIC RTLS charging station
Power supply unit	110 V ... 220 V
Approvals for power supply unit	CE, FCC, NOM
Input voltage of RTLS charging station	5 V DC
Power loss of RTLS charging station	25 W
Permitted ambient conditions of RTLS charging station	
Ambient temperature	
• During operation	• -10 °C ... +50 °C
• During storage	• -10 °C ... +50 °C
Design, dimensions, weights and connectors of RTLS charging station	
Dimensions (L x W x H)	298.4 mm x 179mm x 81.5 mm
Weight	1092 g
Degree of protection	IP00
Enclosure	Plastic enclosure (PC 10 GF)
Color	Titanium gray

4.2 Technical specifications of the mounting clip for RTLS transponder

Table 4- 3 Technical specifications of the SIMATIC RTLS mounting clip for RTLS transponder (not included in product package)

	6GT2790-0DE00
Product name	SIMATIC RTLS mounting clip for RTLS transponder RTLS4083T: 6GT2700-5DC03, 6GT2700-5DC13, 6GT2700-5DC23, 6GT2700-5DC33 RTLS4040T: 6GT2700-5DA03
Material	Plastic (P12/Vestamid X7166)
Color	Titanium gray
Temperature range	-10 ... +55 °C
Dimensions (L x W x H)	51.6 x 67.7 x 18.1 mm; tolerances according to DIN 16742-TG5
Weight	7 g
Fastening method	4 x screws (max. Ø 3.5 mm) with washers (not included in product package) Ensure that the screw head does not damage the transponder.
Verification of suitability	CE

Approvals

5

Note

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

You can find the current EU Declaration of Conformity for these products on the Internet at Siemens Industry Online Support.

Link:

The products described in this document meet the requirements of the following EU directives:

- RoHS Directive 2011/65/EU
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EU L174, 1 July 2011, pages 88-110
- Radio Equipment Directive 2014/53/EU (RED)
  Directive of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the member states relating to placing radio equipment on the market; official journal of the EU L153, 22 May 2014, pages 62-106

UK Declaration of Conformity

The UK declaration of conformity is available to all responsible authorities at:

Siemens Aktiengesellschaft
Process Industries and Drives Division,
Process Automation
DE-76181 Karlsruhe
Germany

Importer UK:

Siemens plc,
Manchester M20 2UR

You can find the current UK Declaration of Conformity for these products on the Internet pages under Siemens Industry Online Support (https://support.industry.siemens.com/cs/en/en/view/109801531).

The SIMATIC RTLS products described in this document meet the requirements of the following directives/regulation:

- Radio Equipment Regulations:
  SI 2017/1206 Radio Equipment Regulations 2017, and related amendments
- RoHS Regulations:
  SI 2012/3032 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, and related amendments

RoHS directive (restriction of the use of certain hazardous substances)

The products described in these operating instructions meet the requirements of the EU directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Applied standard:

- IEC 63000
  Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The products described in this document meet the requirements of the applied standards:

Article 3 (1) a) Protection of health and safety

- EN 62368-1
  Equipment for audio/video, information and communication technology – Part 1: Safety requirements
- EN 62311
  Assessment of electronic and electrical equipment related to human exposure restrictions in electromagnetic fields (0 Hz - 300 GHz)

The products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" according to the designated standards for the following areas of application.

Article 3 (1) b) EMC

- ETSI EN 301 489-1
  Electromagnetic compatibility and radio spectrum matters (ERM) - Electromagnetic compatibility for radio equipment and services - Part 1: Common technical requirements
- ETSI EN 301 489-17
  Electromagnetic compatibility and radio spectrum matters (ERM) - Electromagnetic compatibility for radio equipment and services - Part 17:
  Specific conditions for broadband data transmission systems
- ETSI EN 301 489-33
  Electromagnetic compatibility and radio spectrum matters (ERM) - Electromagnetic compatibility for radio equipment and services - Part 33:
  Special conditions for ultra-wideband (UWB) devices
- EN 50121-3-2
  Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Devices

- EN 55011
  Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics – Limits and methods of measurement
- EN 55032 Class A, Class B
  Electromagnetic compatibility of multimedia equipment – Emission requirements
- EN 55035
  Electromagnetic compatibility of multimedia equipment - Immunity requirements
- EN 61000-6-1
  Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
- EN 61000-6-2
  Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-3
  Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
- EN 61000-6-4
  Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Article 3 (2) Efficient use of the radio spectrum

- ETSI EN 300 328
  Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using wide band modulation techniques. Harmonized standard covering the essential requirements of article 3.2 of the EU Directive 2014/53/EU
- ETSI EN 302 065-2
  Short Range Devices (SRD) using ultra-wideband technology (UWB); Harmonized standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 2: Requirements for UWB location tracking