


## 5.2 RF630R reader

### 5.2.1 Description

The SIMATIC RF630R is an active stationary reader in the UHF frequency range without an integrated antenna. Up to two external UHF RFID antennas can be connected via TNC reverse connections.

The maximum HF power output is 0.5 W on the reader output. The SIMATIC RF630R is connected to a SIMATIC S7 controller via an ASM interface module. The degree of protection is IP65.

	Item	Description
	(1)	TNCreverse interface for connection of antenna 1 (ANT 1)
	(2)	TNCreverse interface for connection of antenna 2 (ANT 2)
	(2)	LED status indicator
	(3)	RS 422 interface (8-pin M12 connector)

## Highlights

- The tags are read in accordance with the requirements of the EPCglobal Class 1, Gen 2 and ISO/IEC 18000-6C standards
- Supports low-cost SmartLabels as well as reusable, rugged data media
- High reading speed: Depending on the function block (multitag mode), many tags can be detected simultaneously (bulk reading), rapidly moving tags are reliably acquired.
- The RF630R (ETSI) "6GT2811-4AA00-0AA0" is suitable for the frequency band 865 to 868 MHz UHF (EU, EFTA, Turkey). The reader supports the ETSI EN 302 208 V1.1.1 standard as well as the new ETSI EN 302 208 V1.2.1 standard (4-channel plan).
- The RF630R (FCC) "6GT2811-4AA00-1AA0" is suitable for the frequency bands 920.25 to 924.75 MHz (Thailand) and 902 to 928 MHz (North America).
- Up to 2 external antennas can be connected and configured in operating mode
- IP65 degree of protection for reader
- Can be used for a high temperature range
- Dense Reader Mode (DRM) for environments in which many readers are operated in close proximity to each other
- TIA system interface:
  - RS 422

### 5.2.1.1 Ordering data

Device	Order No.
RF630R (ETSI) reader basic unit for EU, EFTA, Turkey	6GT2811-4AA00-0AA0
RF620A antennas for EU, EFTA, Turkey (868 MHz)	6GT2812-1EA00
RF660A antennas for EU, EFTA, Turkey (868 MHz)	6GT2812-0AA00
RF630R (FCC) reader basic unit for the USA	6GT2811-4AA00-1AA0
RF620A Antennas for the USA and China (915 MHz)	6GT2812-1EA01
RF660A Antennas for the USA and China (915 MHz)	6GT2812-0AA01

Accessories	Designation	Order No.
Antenna cable	3 m (cable attenuation: 1.0 dB)	6GT2815-0BH30
	10 m (cable attenuation: 2.0 dB)	6GT2815-1BN10
	10 m (cable attenuation: 4.0 dB)	6GT2815-0BN10
	20 m (cable attenuation: 4.0 dB)	6GT2815-0BN20
Connecting cable	RS 422, M12 plug, 8-pin socket: 2 m	6GT2891-0FH20
	RS 422, M12 plug, 8-pin socket: 5 m	6GT2891-0FH50
	RS 422, M12 plug, 8-pin socket: 10 m	6GT2891-0FN10
	RS 422, M12 plug, 8-pin socket: 20 m	6GT2891-0FN20
	RS 422, M12 plug, 8-pin socket: 50 m	6GT2891-0FN50
Software & Documentation	RFID CD-ROM	6GT2080-2AA10

### 5.2.1.2 Status display

The device is equipped with a three colored LED. The LED can be lit in green, red or yellow. The meaning of the indication changes in accordance with the color and state (on, off, flashing) of the LED:

Green LED	Red LED	Yellow LED	Meaning
Off	Off	Off	The device is starting up.
Flashing	Off	Off	The device is ready. The antenna is switched off.
On	Off	Off	The device is ready. The antenna is switched on.
Off	Off	On	"With presence": At least one tag is in the field. "Without presence": Communication with a tag is active.
Off	Flashing	Off	Reader is not active, a serious error has occurred. In addition, this LED also indicates the fault status through the number of flashing pulses. Reboot (operating voltage Off → On is necessary). The LED flashes once for the 'INACTIVE' status, rebooting is <b>not</b> necessary in this case.

For more detailed information on the flash codes of the reader see Chapter Error messages and flash codes for RF620R/RF630R (Page 330)

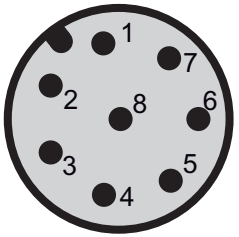
#### Note

##### LED not lit yellow?

If the LED does not light up yellow even though a tag is located within the field, common causes are:

- Incorrect configuration in the init\_run command, or init\_run command was not executed (see "Configuration Manual RF620R/RF630R")
- Antenna is switched off
- A tag is used, that is not compatible with the reader protocol (EPC Global Class 1 Gen 2).
- Tag is defective
- Reader or antenna has a defect
- Tag is not in the field of radiation of the transmit antenna

5.2.1.3 Pin assignment of the RS422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Free
	8	Earth (shield)

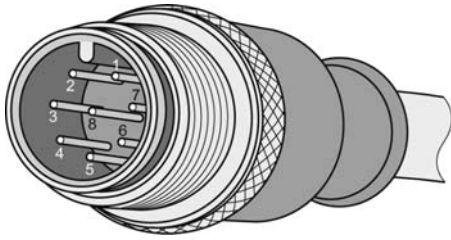
The knurled bolt of the M12 plug is not connected to the shield (on the reader side).

**Note**

You must therefore not use any SIMATIC connecting cables that use the angled M12 plug.

### 5.2.1.4 Pin assignment of the connecting cable

Table 5- 6 RS 422 - on reader side

M12 pin	Core color	Pin assignment	View of M12 connector
1	white	24 VDC	
2	brown	TX neg	
3	green	GND	
4	yellow	TX pos	
5	Gray	RX pos	
6	pink	RX neg	
7	blue	Not assigned	
8	red	Earth (shield)	

#### Comment

This cable has an 8-pin M12 connector at one end and the other cable end is 'open'. There are 8 color-coded single cores there for connecting to external devices. There are different cable lengths in the product range (3 m to 50 m). Long cables can be reduced if necessary.

#### Note

##### **For long cables: Adapt supply voltage and data rate accordingly**

Note that with long cables in particular, the supply voltage of 24 V DC must always be applied. Note also that the data rate on the serial interface must, if necessary, be reduced. (See "Configuration Manual RF620R/RF630R")

### 5.2.1.5 Grounding connection

The RF620R/RF630R can be electrically connected to the ground potential through a contact washer. The tightening torque must be increased in this case to ensure that electrical contact is made (2.7 Nm).

Ground connection	
	(a) Hexagon-head screw
	(b) Plain washer
	(c) Cable lugs
	(d) Contact washer: Use contact washers according to the Siemens standard SN 70093-6-FSt-flNnnc-480h for ground connection, Siemens item No.: H70093-A60-Z3

### 5.2.2 Planning application

#### 5.2.2.1 Minimum mounting clearances of two antennas of different readers

At 500 mW ERP radiated power, due to the opening angle of the antennas, their fields can overlap considerably. It is no longer possible to clarify in which antenna field access to the data of a tag is performed.

In order to avoid this, always keep a minimum distance of 3 m between two antennas of different RF630R readers with the maximum radiated power of 500 mW ERP.

#### Dense Reader Mode (DRM)

The readers can also interfere with each other (secondary fields), if the channels (Reader TX, Transponder TX) overlap. In order to prevent a transponder channel overlapping with a reader channel, we recommend that the Dense Reader Mode (DRM) is used.

### **5.2.2.2 Antenna/read point configurations**

You can connect up to two external antennas to the RF630R reader. The standard setting is that two antennas are connected when the reader is started.

You have 3 possibilities for aligning the antennas and covering the read point.

#### **One RF630R reader with two antennas and two read points**

If you connect two external antennas to the device and align them in different directions, you can read tags at two different read points. With this technique, a particular antenna must be switched off application-dependently to be able to establish which tags have been read from which antenna. The reader also provides a mode for this purpose in which the antennas can be switched on and off cyclically (both antennas must be connected). Note the minimum distances between the antennas for the antenna configuration (see Chapter Specified minimum and maximum spacing of antennas (Page 49) .

#### **One RF630R reader with two antennas and one read point**

If you connect two external antennas to the device and align them in the same direction (portal configuration), you can read tags at one read point. With this method, the reader automatically switches between the two antennas while the tags are being read. Note the minimum distances between the antennas for the antenna configuration (see Chapter Specified minimum and maximum spacing of antennas (Page 49) .


#### **One RF630R reader with one antenna and one read point**


If you connect an external antenna to the device, you can read tags at one read point.

### 5.2.3 Installing/Mounting

#### 5.2.3.1 Mounting/Installation

##### Requirement

 <b>WARNING</b>
Ensure that the wall or ceiling can hold four times the total weight of the device.

 <b>CAUTION</b>
<b>Emitted radiation</b> The transmitter complies with the requirements of Health Canada and the FCC limit values for subjecting persons to HF radiation, provided that a minimum spacing of 26 cm exists between antenna and person. When the antennas are installed, you must therefore ensure that a minimum spacing of 26 cm is maintained between personnel and antennas.

##### Mounting/installing the device

You can mount the reader directly onto a flat surface.

The positions of the fixing holes for the device are shown in the section Dimension drawings (Page 134).



## 5.2.4 Configuration/integration

The RS422 system interface is provided for integrating the device into system environments/networks. The system interface transfers data to SIMATIC controllers or PCs with the appropriate interface.

Apart from transmitting communication data from the reader to the controller and vice versa, the RS422 interface also supplies power to the reader (24 V DC).

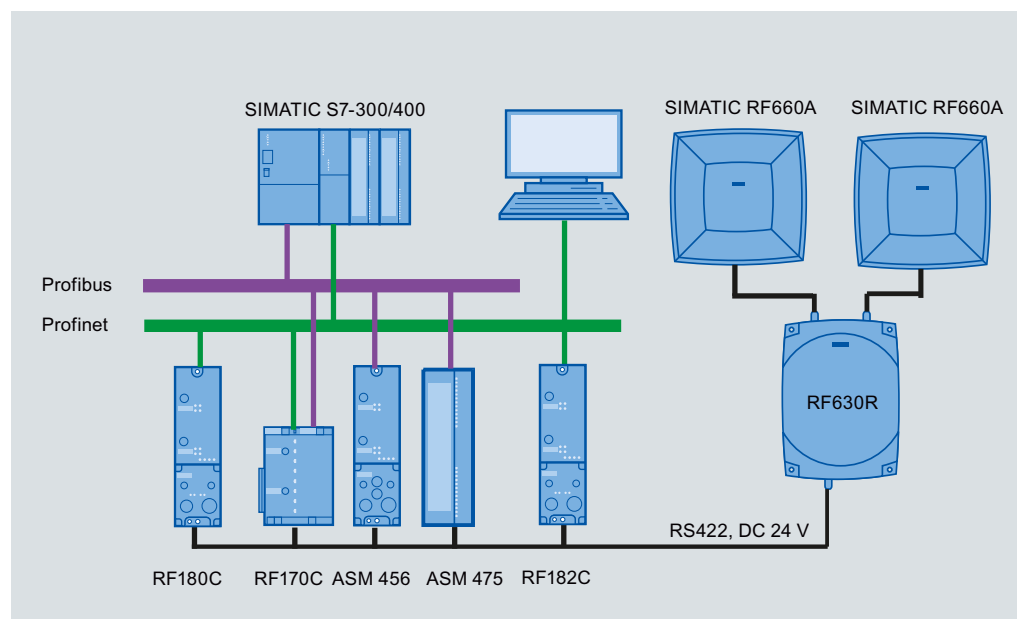


Figure 5-7 Overview of configuration of the RF630R reader

The RF630R reader can alternatively be connected to a SIMATIC controller via the ASM 456, ASM 475, RF170C and RF180C interface modules/communication modules.

The RF630R reader can alternatively also be connected directly to the PC via the RF182 communication module.

For further details on the interface modules used, see Chapter RF660R (Page 309) .

Further information about commissioning the readers can be found in the Configuration Manual "RF620R/RF630R" in the "Commissioning" section.

## 5.2.4.1 Transmission protocols

## RS 422 communication

	3964R protocol
Transmission rates	19.2 kbps 57.6 kbps 115.2 kbps
Start bits	1
Data bits	8
Parity	Odd
Stop bits	1

## 5.2.5 Technical data

## 5.2.5.1 Mechanical data

Mechanical data	
Weight	1640 g
Dimensions (L x W x H) in mm	252 x 193 x 52 mm, without connections
Material for housing top section	ABS (GF 20)
Material for housing bottom section	Aluminum
Color of housing top section	Anthracite
Color of housing bottom section	Silver
Status displays on the device	1 LED Colors: Red, yellow, green
Interfaces	
Antenna connections	2x RTNC plug
RS422	1 x plug (8-pin M12)
Software	SIMATIC S7

<b>Thermal and electrical properties</b>			
MTBF (Mean Time Between Failures)		16 years	
Supply voltage • Permitted range		21.6 to 30 V DC <sup>1</sup>	
Supply voltage		Current consumption (in standby mode, no transmit power)	Current consumption (in standby mode, no transmit power)
	20 V input voltage on the reader, typical	135 mA	2.7 W
	24 V input voltage on the reader, typical	115 mA	2.76 W
	30 V input voltage on the reader, typical	95 mA	2.85 W
Supply voltage		Current consumption (at 500 mW ERP)	Power requirement (at 500 mW ERP)
	20 V input voltage on the reader, typical	470 mA	9.4 W
	24 V input voltage on the reader, typical	395 mA	9.48 W
	30 V input voltage on the reader, typical	320 mA	9.6 W
Rampup time		7 s	

<sup>1)</sup> All supply and signal voltages must be safety extra low voltage (SELV/PELV according to EN 60950)  
24 V DC power supply: safe (electrical) isolation of extra-low voltage (SELV / PELV acc. to EN 60950)

<b>Mechanical environmental conditions</b>	
Shock resistant to EN 60068-2-27	50 g <sup>1</sup>
Vibration EN 60068-2-6	20 g <sup>1</sup>
Climatic Conditions	
Ambient temperature during operation	-25 °C to +55 °C (a 10-minute warm-up time must be observed at an operating temperature below -20 °C)
Ambient temperature for transport and storage	-40 °C to +85 °C

<sup>1)</sup> The values for shock and vibration are maximum values and must not be applied continuously.

EMC & approvals for ETSI variant	
Electromagnetic compatibility	ETSI EN 301 489-1 / -3 ETSI EN 302 208
Approvals	<ul style="list-style-type: none"> <li>• Radio to R&amp;TTE- guidelines EN 300 330, EN 301 489</li> <li>• CE</li> <li>• ETSI EN 302-208 V1.1.1</li> <li>• ETSI EN 302-208 V1.2.1</li> <li>• Reader degree of protection acc. to EN 60529 (IP65)</li> </ul>

EMC & approvals for FCC variant	
Electromagnetic compatibility	FCC Part 15
Approvals	<ul style="list-style-type: none"> <li>• FCC, cULus</li> <li>• IEC60950, including US and Canadian variants of it</li> <li>• FCC CFR47 Part 15.247</li> <li>• RoHS-compliant according to EU Directive 2002/95/EC</li> <li>• Industrial Canada, RSS-210, Issue 7, June 2007</li> </ul>

### 5.2.5.2 Technical data according to EPC and ISO

Technical data	
Frequency accuracy	max. ± 10 ppm
Channel spacing	EU, EFTA, Turkey: 200 kHz US: 500 kHz China: 250 kHz
Modulation methods	ASK: DSB modulation & PR-ASK modulation Encoding, Manchester or Pulse Interval (PIE)
Effective radiant power (the radiant power depends on the antennas and cables used, see Guidelines for selecting RFID UHF antennas (Page 169) )	≤ 0.5 W ERP

ETSI frequencies	
Frequency range EU, EFTA, Turkey according to ETSI EN 302 208 V1.1.1 (commissioning until December 31, 2009)	865 to 868 MHz (10 subchannels LBT at 2 W ERP, 12 subchannels at 0.5 W ERP, 15 subchannels LBT at 0.1 W ERP)
Frequency bands for EU, EFTA, Turkey: according to ETSI EN 302 208 V1.2.1 (valid since November 4, 2008, publication in the Official Journal of the European Union)	<ul style="list-style-type: none"> <li>• 865.7 MHz</li> <li>• 866.3 MHz</li> <li>• 866.9 MHz</li> <li>• 867.5 MHz</li> </ul> (4 channels LBT optional at max. 2 W ERP)

<b>Read distance for EU, EFTA, Turkey / China</b>	
Antennas mounted on opposing sides (portal configuration)	max. 3.5 m (recommended maximum value for configuration)
Antennas mounted on the same side	Max. 2 m (recommended maximum value for configuration; depending on the transponder)

<b>FCC frequencies</b>	
North American frequency band	902 ... 928 MHz (50 channels, frequency hopping)
Frequency band for China	920.125 to 924.875 MHz (16 subchannels at 2 W ERP, 20 subchannels at 0.1 W ERP)

<b>Read distance for USA</b>	
Antennas mounted on opposing sides (portal configuration)	max. 3.5 m (recommended maximum value for configuration)
Readers mounted on the same side	max. 2 m (recommended maximum value for configuration)

### 5.2.5.3 Maximum number of readable tags

The maximum number of readable tags depends on the following parameters:

- Size of the antenna field
- Readability of the tags

For a transmit power of 500 mW ERP, the following is read when the tag RF620T is used:

- Max. 40 tags in the antenna field (tags perpendicular to antenna at 1 m distance). If 2 antennas are used, up to 80 tags can be recognized.
- Max. 18tags per second

#### Note for 2-antenna operation

- If 2 antennas are connected to the SIMATIC RF630R, the antennas must be controlled using the SET-ANT command.
- If 2 antennas are configured as a gate, both antennas should be simultaneously switched on with the SET-ANT command. The reader multiplexes both antennas internally. The multiplexing time is 100 ms (internal changeover time from antenna to antenna).

### 5.2.6 Dimension drawings

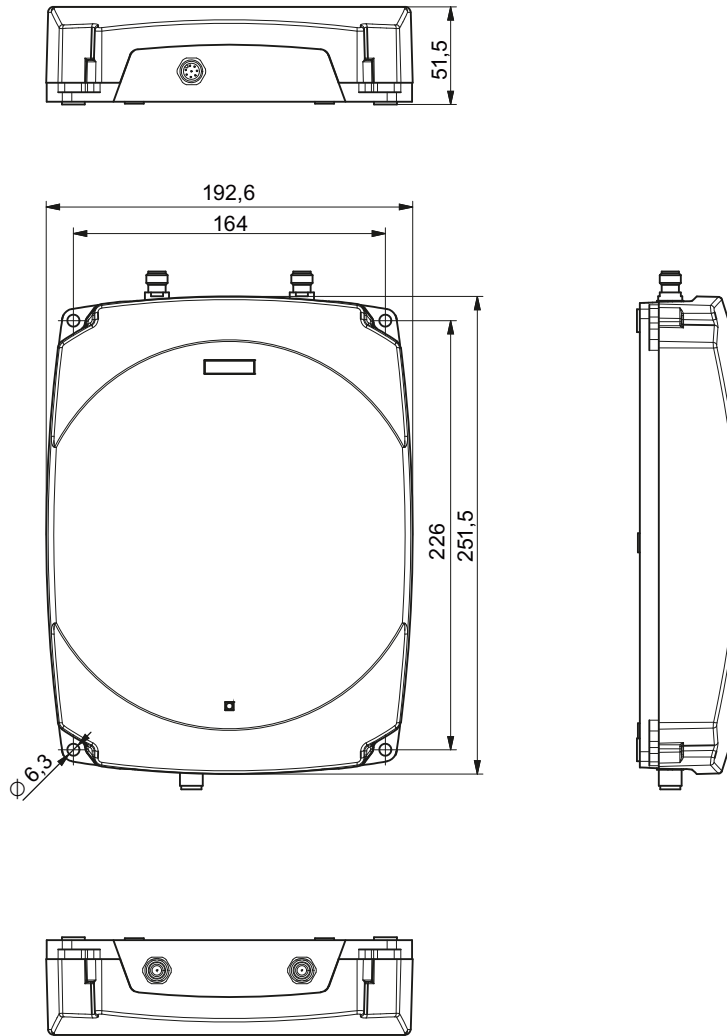


Figure 5-8 Dimension drawing for RF630R

All dimensions in mm

## 5.2.7 Certificates and approvals

Table 5- 7 6GT2811-4AA00-0AA0




Certificate	Designation
	CE approval according to R&TTE guideline

Table 5- 8 6GT2811-4AA00-1AA0

Standard	
 Federal Communications Commission	FCC CFR 47, Part 15 sections 15.247 Radio Frequency Interference Statement This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. FCC ID: NXW-RF630R
Industry Canada Radio Standards Specifications	RSS-210 Issue 7, June 2007, Sections 2.2, A8 IC: 267X-RF630
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment UL Report E 205089

### 5.2.7.1 FCC information

**Siemens SIMATIC RF630R (FCC): 6GT2811-4AA00-1AA0**

FCC ID: NXW-RF630R

This device complies with part 15 of the FCC rules.  
Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**Caution**

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Note**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**FCC Notice**To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification.

It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

**FCC Exposure Information**To comply with FCC RF exposure compliance requirements, the antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

### 5.2.7.2 IC-FCB information

**Siemens SIMATIC RF630R (FCC): 6GT2811-4AA00-1AA0**

IC: 267X-RF630

**Industry Canada Notice**To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

This device has been designed to operate with the SIMATIC RF620A antenna 902-928 as well as the SIMATIC RF660A antenna 902-928 listed below, and having a maximum gain of 5,5 dBi.

Other antennas or antennas having a gain greater than 5,5 dBi are strictly prohibited for use with this device.

The required antenna impedance is 50 Ohms.



## 5.3 RF660R reader

### 5.3.1 Description

SIMATIC RF660R is a stationary reader for connecting up to 4 external antennas. A rugged housing with high IP65 degree of protection means that the device is a universal and reliable partner in harsh environments such as production plants, conveyor systems, warehouses, or direct at the loading gate.



Figure 5-9 RF660R reader

### Highlights

- The tags are read in accordance with the requirements of the EPCglobal Class 1, Gen 1 and Gen 2, and ISO/IEC 18000-6B standards
- Supports low-cost SmartLabels as well as reusable, rugged data media
- High reading speed: many tags can be read simultaneously (mass recording), rapidly moving tags are reliably recorded
- Suitable for the 865 to 868 MHz UHF bands in Europe and the 920.125 to 924.875 MHz band in China as well as the 902 to 928 MHz UHF band in North America
- Up to 4 antennas can be connected and configured in operating mode
- Reader degree of protection IP65, antenna degree of protection IP67
- Can be used for a high temperature range
- Antenna switching for high tag reader probability
- Dense Interrogator Environment mode, (DIE mode) for environments in which many readers are operated in close proximity to each other
- Flexible system integration:
  - Serial (RS 232)
  - Ethernet (TCP/IP)

## 5.3.1.1 Ordering data

Device	Order No.
RF660R reader basic unit for ETSI and FCC	6GT2811-0AA01

Accessories	Description	Order No.
Antennas	RF620A for ETSI (868 MHz)	6GT2812-1EA00
	RF620A for FCC (915 MHz)	6GT2812-1EA01
	RF660A for ETSI (868 MHz)	6GT2812-0AA00
	RF660A for FCC (915 MHz)	6GT2812-0AA01
Antenna cable	3 m (cable attenuation: 1.0 dB)	6GT2815-0BH30
	10 m (cable attenuation: 2.0dB)	6GT2815-1BN10
	10 m (cable attenuation: 4.0dB)	6GT2815-0BN10
	20 m (cable attenuation: 4.0dB)	6GT2815-0BN20
Connecting cable	RS 232, 9-pin sub D female connector: 5 m	6GT2891-0GH50
	RS 232, 9-pin sub D female connector: 10 m	6GT2891-0GN10
	Digital I/O, M12 socket: 2m	6GT2891-0FH20
	Digital I/O, M12 socket: 5m	6GT2891-0FH50
	Digital I/O, M12 socket: 10m	6GT2891-0FN10
	Digital I/O, M12 socket: 20m	6GT2891-0FN20
	Digital I/O, M12 socket: 50m	6GT2891-0FN50
	Digital I/O, open cable ends, 5m	3RX8000-0CD81-1GF0
	Ethernet: 10 m (only for RF660R)	6GT2891-0HN10
Ethernet: 20m (only for RF660R)	6GT2891-0HN20	
Wide-range power supply unit for SIMATIC RF systems	With EU plug	6GT2898-0AA00
	With UK plug	6GT2898-0AA10
	With US plug	6GT2898-0AA20
24 V connecting cable	5 m between reader and power pack	6GT2491-1HH50
Software and documentation	CD-ROM	6GT2080-2AA10


**NOTICE****Loss of validity for type tests and certificates**


Note that when either the RF620A antenna, the 3 m antenna cable or the 10 m antenna cable (order no. 6GT2815-1BN10, cable attenuation: 2.0dB) is used, the certifications for operating the reader outside of the validity range of ETSI (EU, EFTA, Turkey), IC (Canada), FCC (USA) become void.

**NOTICE****Excessive radiated power**


Note that when the 3 m antenna cable is used, the antenna attenuation for the RF660R must be set at 1.0 dB. Otherwise, the result would be a radiated power that exceeds the permitted range.

5.3.1.2 Design of the RF660R reader

	Item	Description
	(1)	Status LED
	(2)	Industrial Ethernet (RJ45 socket)
	(3)	RS 422 interface (not assigned)
	(4)	RS 232 interface (5-pin M12 connector)
	(5)	Digital I/O (8-pin M12 connector)
	(6)	Power, 24 V DC; (4-pin M12 connector)

	Description
	<p>4 antenna connections ANT 1 to ANT 4 (RTNC plug)</p>

5.3.1.3 Status displays

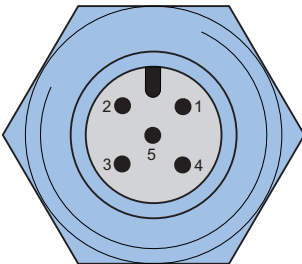
Status displays	LEDs	Color	Description
	Power on	Green	Power supply ON
	Tag Detect	Yellow	LED lit, as soon as at least one tag with a correct tag ID is within the field.
	System error	Red	Reader is not active, a more or less major fault has occurred In addition, this LED also indicates the fault status through the number of flashing pulses. Reboot (operating voltage Off → On is necessary). The LED flashes once for the 'INACTIVE' status, rebooting is <b>not</b> necessary in this case.

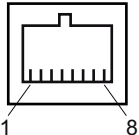
**Note**

If "Tag Detect" is not lit even though a tag is located within the field, common reasons include:

- Tag protocol has been set incorrectly (can be set with Configuration Software)
- Tag is defective
- Reader or antenna has a defect
- Tag is not in the field of radiation of the transmit antenna

### 5.3.1.4 Pin assignment of the serial interfaces

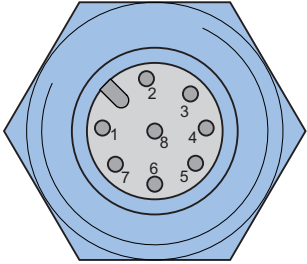
RS 232 connector (on reader side)	Pin	Pin assignment
	1 2 3 4 5	RS232_TX N.C. N.C. RS232_RX GND

Industrial Ethernet (on reader side)	Pin	Pin assignment
	1 2 3 4 5 6 7 8	Transmit Data (+) Transmit Data (-) Receive Data (+) Terminated Terminated Receive Data (-) Terminated Terminated

NOTICE
<p>We recommend that only original Siemens Ethernet connectors are used (10 m cable: Order No. 6GT2891-0HN10; 20 m cable: Order No. 6GT2891-0HN20) for connecting to the Ethernet socket of the reader. If plug-in connectors from other manufacturers are used, it may be difficult or even impossible to remove the plug from the reader</p>

5.3.1.5 Pin assignment and connections of the digital I/O interface

Pin assignment

Digital I/O socket (on reader side)	Pin	Pin assignment
	1	Input USER_IN (0)
	2	Input USER_IN (1)
	3	Input USER_IN (2)
	4	GND (IN)
	5	Output USER_OUT (0)
	6	Output USER_OUT (1)
	7	Output USER_OUT (2)
	8	Housing

Connections

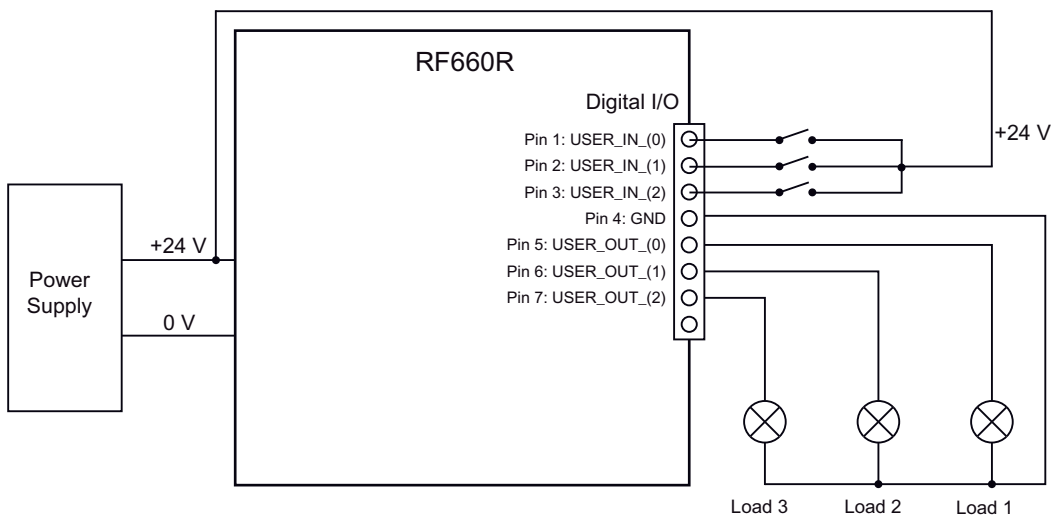


Figure 5-10 Connections for digital I/O

Output USER\_OUT (0), (1), (2)

- These are high-side switches that connect  $V_{cc}$  (+24 V) to the output ('active high').
- Each output is rated for 0.5 A current and is electronically protected.
- The 0 V rail is Pin 4 (GND).
- Three digital outputs can be operated simultaneously with up to 0.5 A each.
- The outputs are optically isolated through optocouplers.

### Input USER\_IN (0), (1), (2)

- The inputs are optically isolated through optocouplers.
- The 24 V voltage for the digital inputs (e.g. switches, proximity switches) must be supplied over a separate cable.
- The 24 V voltage for the digital inputs can alternatively be supplied from a digital output (USER-OUT). In the user program, however, the digital output must be permanently connected to "1" in this case.

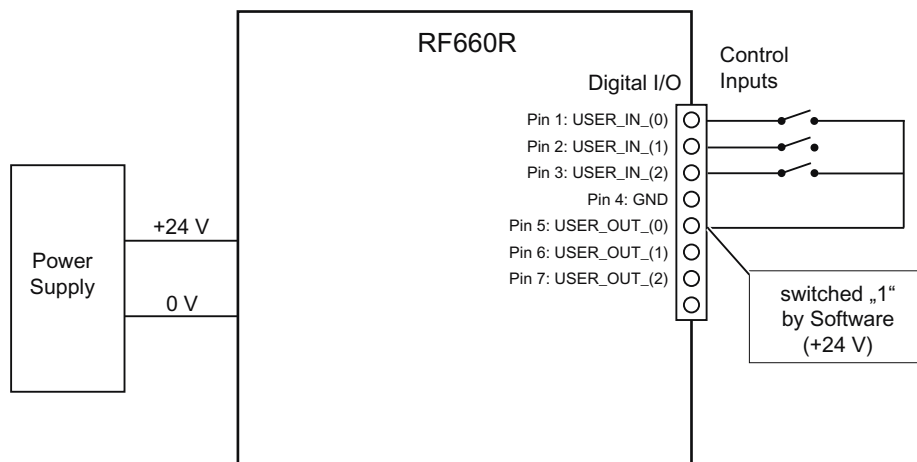


Figure 5-11 RF660R connection diagram

**NOTICE**

**It may be necessary to restart the reader**

The length of trigger pulses must be longer than 30 ms.

5.3.1.6 Pin assignment of the connecting cable

Table 5- 9 RS 232

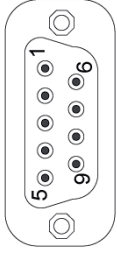
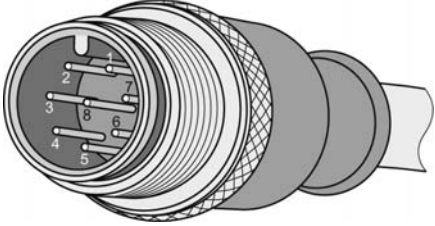
Signal	M12Pin	SUB-D pin	Image
TX (reader)	1	2	
-	2	-	
-	3	-	
RX (reader)	4	3	
GND	5	5	

Table 5- 10 Digital I/O, for cable with open cable ends

M12 pin	Core color	Pin assignment	View of M12 connector
1	white	Input USER_IN (0)	
2	brown	Input USER_IN (1)	
3	green	Input USER_IN (2)	
4	yellow	GND	
5	Gray	Output USER_OUT (0)	
6	pink	Output USER_OUT (1)	
7	blue	Output USER_OUT (2)	
8	red	Housing	
Shield	Shield		

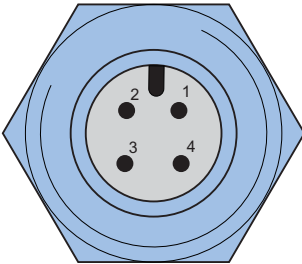
Comment

This cable has an 8-pin M12 connector at one end and the other cable end is 'open'. There are 8 color-coded single cores there for connecting to external devices. Cable length = 5m. The cable length can be reduced, if needed.




### 5.3.1.7 Power supply

#### Pin assignment of the power connections

Power connector (on reader side)	Pin	Pin assignment
	1	Ground (0 V)
	2	+24 V
	3	+24 V
	4	Ground (0 V)

### 5.3.1.8 Grounding connection

A low-impedance earth connection ensures that interference signals generated, for example, by external power supply cables or signal cables are safely discharged to earth.

Earthing connection	
	<p>The ground terminal (M4 threads) on the device (large surface, large-area contact) has to be connected with the ground conductor of the plant or the cabinet in which the reader is to be installed.</p> <p>The minimum conductor cross-section may not be less than 2.5 mm<sup>2</sup>.</p>

### 5.3.2 Planning application

#### Firmware and software compatibility

**CAUTION**

**Damage to the reader**

The SIMATIC RF660R reader with firmware version V1.2 must only be configured and operated with the relevant SIMATIC RF660R Configuration Software V1.2.

The SIMATIC RF660R reader with firmware version V1.3 must only be configured and operated with the relevant SIMATIC RF660R Configuration Software V1.2 (limited functionality) or V1.3.

No other combination of firmware and configuration software is permissible. The configuration software V1.3 recognizes if it has been connected to a SIMATIC RF660R reader with firmware version V1.3 or version 1.2.

Therefore always refer to the chapter "Firmware/Configuration Software Compatibility" of the Configuration Manual before you make any changes to the firmware version or the version of the SIMATIC RF660R Configuration Software.

#### Compatibility RF-MANAGER versions/reader firmware versions

Below you will find an overview of the compatibility of RF-MANAGER versions and RF660R reader firmware versions.

In the RF-MANAGER 2008 Service Pack 2, you can select the matching ETSI standard (ETSI standard EN 302 208 V1.1.1 or EN 302 208 V1.2.1) for your reader RF660R depending on the firmware version.

For additional information refer to the "RF-MANAGER 2008 Service Pack 2" documentation. This documentation can be downloaded via the portal .

Reader firmware version	Older RF-MANAGER versions	RF-MANAGER 2008 SP2	
	GR_XML_2.0	GR_XML_2.0	GR_XML_3.0
V1.1	X	X	-
V1.2	Restricted functionality	Restricted functionality	-
V1.3	X <sup>1)</sup>	-	X

<sup>1)</sup> No commands may be used that are no longer permitted in firmware V1.3.

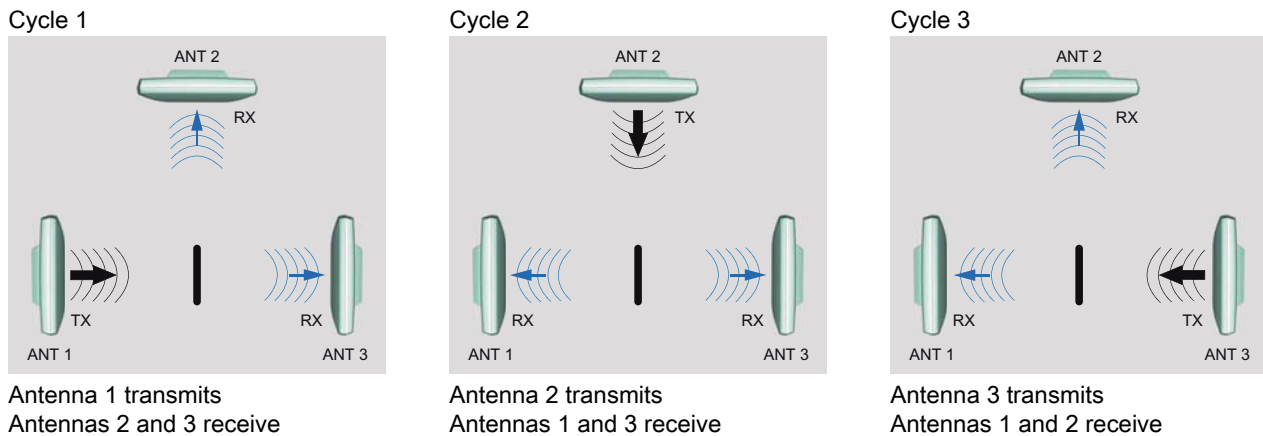
#### See also

Service & Support (Page 350)

### 5.3.2.1 Increasing the probability of identification for tags - Antenna switching


To achieve a high probability of reading tags, the antenna switching function has been implemented in the RF660R reader:


During a defined time period, the reader transmits on one antenna and receives on the other. As long as the antenna is receiving signals from further tags, the reader continues to transmit on the same transmitter antenna until all responding tags have been identified. Subsequently, or if no tags respond, the reader activates another antenna as the transmitter antenna. After all the antenna have transmitted at least once and no tag has responded, or when the settling time is excessively long, the reader activates frequency hopping (in the USA) or channel selection (in Europe).



### 5.3.3 Installation /Mounting

#### Requirement

 <b>WARNING</b>
Ensure that the wall or ceiling can hold four times the total weight of the device.

 <b>CAUTION</b>
<b>Emitted radiation</b>
The transmitter complies with the requirements of Health Canada and the FCC limit values for subjecting persons to HF radiation, provided that a minimum spacing of 26 cm exists between antenna and person. When the antennas are installed, you must therefore ensure that a minimum spacing of 26 cm is maintained between personnel and antennas.

#### Mounting/installing the device

The positions of the fixing holes for the device are shown in the section Dimension drawings (Page 154).

Examples of mounting types		
Material	Hole diameter	Mounting
Concrete	8 mm diameter 60 mm depth	Rawlplug: 8 mm diameter, 50 mm length Screws: 4 mm diameter, 50 mm length
Plasterboard (min. 13 mm thick)	14 mm diameter	Gravity toggle: 4 mm diameter, 50 mm length
Metal (min. 2 mm thick)	5 mm diameter	M4 metal screws: 4 mm diameter, 15 mm length

### 5.3.3.1 Configuration/integration

#### Configuration

Two communication interfaces are available for integrating the device into system environments/networks:

- Ethernet and
- RS 232

The communication interfaces transfer the data to IT, ERP and SCM systems on SIMATIC PLCs or PCs (also used for configuration and diagnostics).

Simple process controls (e.g. a traffic signal) can be directly implemented using the write/read device via three digital inputs and outputs with 24 V each.

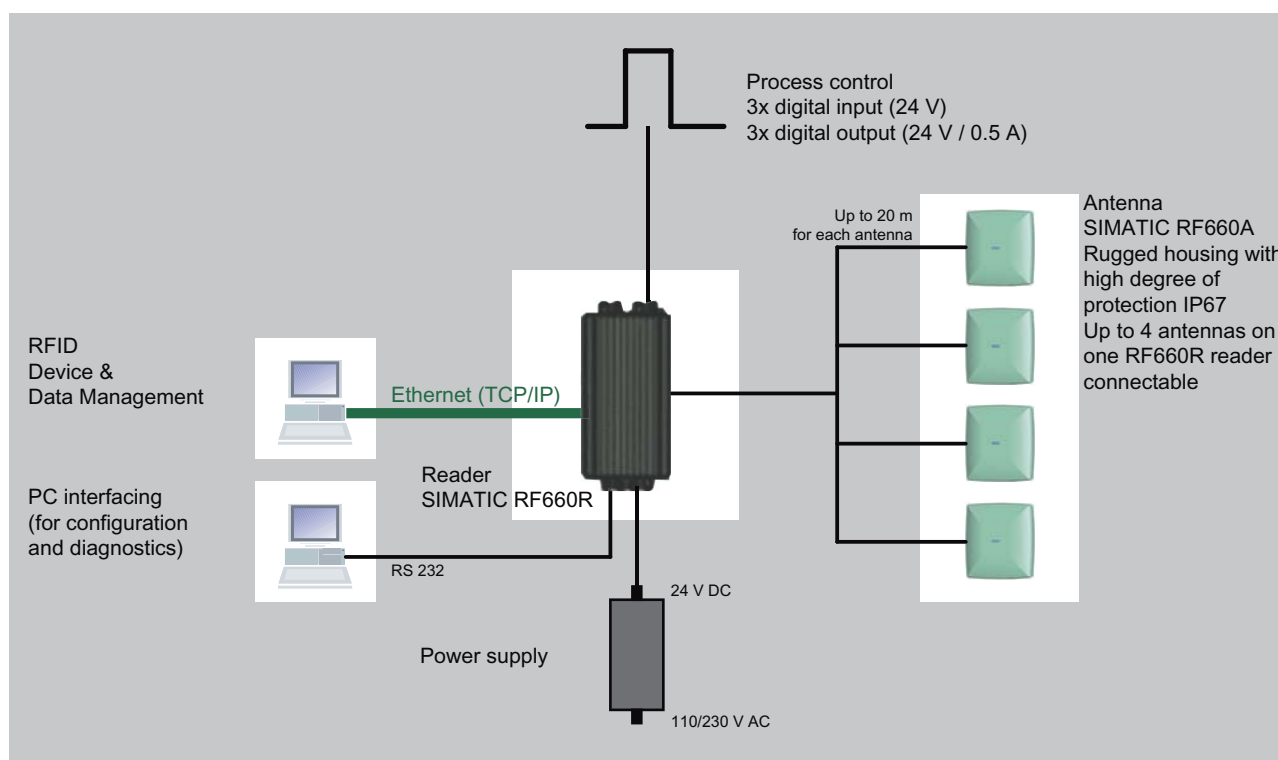


Figure 5-12 Configuration overview of the RF660R reader

#### Note

##### Maximum cable length for the RS232 interface

For secure and error-free data transmission, a data transfer rate of 115.2 kbit/s applies: maximum cable length 10 m.

## Transmission protocols

### RS232 communication

	XML protocol
Transmission rates	115200 bps
Start bits	1
Data bits	8
Parity	None
Flow control	Xon/Xoff
Stop bits	1

### Ethernet communication

The Ethernet interface offers automatic selection between 10BaseT and 100BaseTX.

Shielded Twisted-Pair patch cables with standard RJ45 connectors are recommended for a reliable connection.

## 5.3.4 Technical specifications

### 5.3.4.1 Mechanical data

Mechanical specification of RF660R		
Weight	3.7 kg	
Dimensions (L x W x H) in mm	320 x 145 x 100 without connections	
Material	Aluminum	
Color	Anthracite	
MTBF (Mean Time Before Failure)	27,2 years	
Power consumption, typical	24 V <ul style="list-style-type: none"> <li>• At 2 W transmit power</li> <li>• No digital outputs active</li> </ul>	800 mA

Mechanical environmental conditions	
Shock	ETSI EN 300 019-2-3 V2.1.2 IEC 60068-2-27
Total shock response spectrum	Type 3.3
Vibration	ETSI EN 300 019-2-3 V2.1.2 IEC 60068-2-64
Climatic Conditions	
Ambient temperature during operation	-25 °C to +55 °C
Ambient temperature for transport and storage	-40 °C to +85 °C
Electromagnetic compatibility	ETSI EN 301 489-1 / -3
	ETSI EN 302 208 V1.2.1
	FCC Part 15

<b>Status displays on the device</b>	
Power On	Green LED
Tag Detect	Yellow LED
System error	Red LED
<b>Interfaces</b>	
Antenna connections	4x RTNC connector
Maximum number of antenna channels operating independently of each other	2 (with 2 x 2 antennas, tags can be read by a reader at 2 independent locations)
Ethernet 10BaseT or 100BaseTx	1x RJ45 connection according to IEEE 802.3 and ISO 8802-3
RS422	Currently unassigned
RS232	1x connector (5-pin M12). Bit rate: 115200 bps
Digital inputs	3 (8-pin M12) log. "0": 0...7 V log. "1": 15...24 V
Digital outputs (short-circuit proof)	3 (8-pin M12) 24 V; 0.5 A each
Power supply	24 V DC (4-pin M12) 20 to 30 V (2.2 A)

<b>Approvals</b>	<ul style="list-style-type: none"> <li>• Radio to R&amp;TTE- guidelines EN 300 330, EN 301 489</li> <li>• CE, EMC, FCC, IC, cULus</li> <li>• IEC60950, including US and Canadian variants of it</li> <li>• FCC CFR47 Part 15.247</li> <li>• Industrial Canada, RSS-210, Issue 6, Sept. 2005</li> <li>• ETSI EN 302-208 V1.2.1</li> <li>• Reader degree of protection acc. to EN 60529 (IP65)</li> </ul>
------------------	---



## 5.3.4.2 Technical data according to EPC and ISO

Frequencies	
European frequency band	865 ... 868 MHz (4 channels 865.7 MHz; 866.3 MHz; 866.9 MHz; 867.5 MHz without LBT with up to 2 W ERP)
North American frequency band	902 ... 928 MHz (50 channels, frequency hopping)
Frequency band for China	920.125 to 924.875 MHz (16 subchannels at 2 W ERP, 20 subchannels at 0.1 W ERP)
Frequency accuracy	max. $\pm$ 10 ppm
Channel spacing	EU: 200 kHz US: 500 kHz China: 250 kHz
Modulation methods	ASK: DSB modulation & PR-ASK modulation Encoding, Manchester or Pulse Interval (PIE)

Effective radiant power	Europe / China	USA
Range	0.1 to 2 W ERP	0.4 to 4 W EIRP = 0.24 to 2.4 W ERP
Reading distance	Europe / China	USA
Antennas mounted on opposing sides (portal configuration)	max. 10 m (recommended maximum value for configuration)	max. 10 m (recommended maximum value for configuration)
Antennas mounted on the same side	max. 10 m (recommended maximum value for configuration)	max. 10 m (recommended maximum value for configuration)

### 5.3.5 Dimension drawings

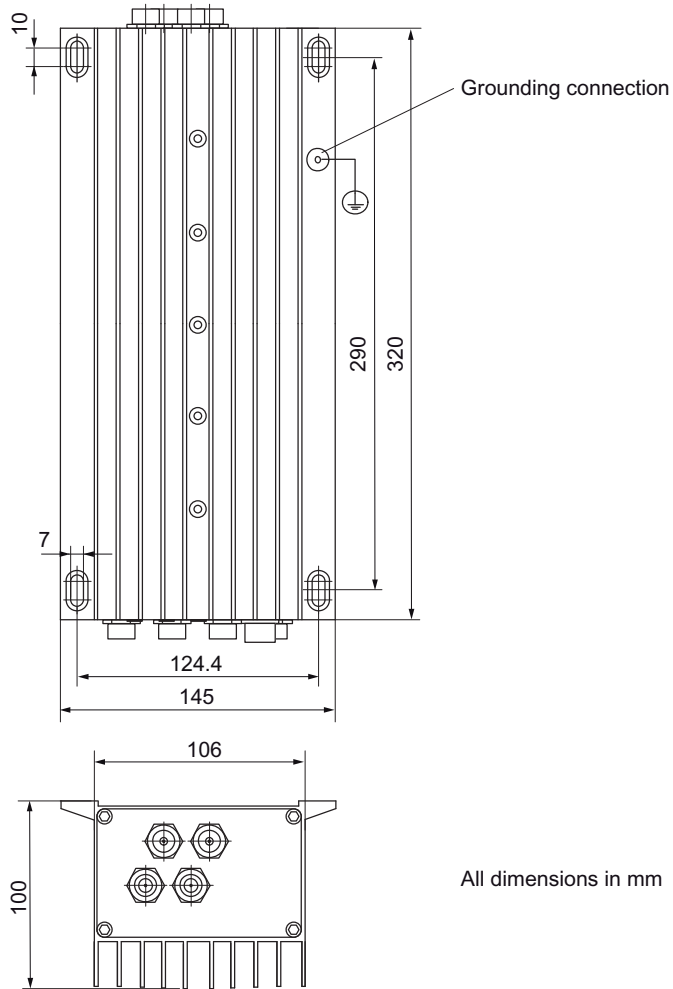


Figure 5-13 Dimension drawing of the reader

## 5.3.6 Certificates and approvals

### 5.3.6.1 CE mark

Table 5- 11 6GT2811-0AA01




Certificate	Description
	CE approval according to R&TTE guideline

Table 5- 12 FCC IDs: NXW-RF660; IC: 267X-RF660

Standards	
 Federal Communications Commission	FCC Title 47, Part 15.sections 15.247 Radio Frequency Interference Statement This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. FCC ID: NXW-RF660
Industry Canada Radio Standards Specifications	RSS-210 Issue 7, June 2007, Sections 2.2, A8 IC: 267X-RF660
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment UL Report E 205089

### 5.3.6.2 FCC information

#### Siemens SIMATIC RF660R

FCC ID: NXW-RF660

This device complies with part 15 of the FCC rules.  
Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

#### Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**FCC Notice**To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification.

It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

**FCC Exposure Information**To comply with FCC RF exposure compliance requirements, the antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

### 5.3.6.3 IC-FCB information

#### Siemens SIMATIC RF660R

IC: 267X-RF660

**Industry Canada Notice**To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

This device has been designed to operate with the SIMATIC RF620A antenna 902-928 as well as the SIMATIC RF660A antenna 902-928 listed below, and having a maximum gain of 5,5 dBi.

Other antennas or antennas having a gain greater than 5,5 dBi are strictly prohibited for use with this device.

The required antenna impedance is 50 Ohms.