Technical Documentation

for metraTec QuasarMX HF RFID Reader

Date: December 2016

Version: 1.5

Table of Contents

1 General Information / Security Advice

1.1 Notes on the use of this documentation

This user manual and integration guide uses different symbols to point out potentially dangerous situations. The following signs and symbols are used throughout the document.

ATTENTION

Declares a potentially hazardous situation. If this is not avoided, the product or something in its surrounding could be damaged.

NOTE

Declares notes for the user as well as other useful information, where no harmful or dangerous situations can be expected.

1.2 Security Advice

The QuasarMX HF RFID Reader was not designed for use in dangerous environments. Using this product in applications where a failure could directly results in severe injuries or death ("high risk activities") is not permitted. This includes but is not limited to applications in nuclear facilities, flight control systems, life support systems or weapon systems. The manufacturer denies the suitability of this device for such scenarios.

1.3 Export Restrictions

The QuasarMX contains components that underlie US Export restrictions. It is therefore forbidden to export the product to countries that are on the US trade embargo list. The same applies to any countries that are on the EU embargo list.

1.4 Further Documents

While this documentation explains the electrical and mechanical characteristics of the QuasarMX RFID Reader, it might be useful to also read the metraTec Protocol Guide, which explains the ASCII protocols used to control the reader in full detail.

We also offer general information about how to set up the connection of the reader to the antenna for optimum system performance in our HF Antenna Integration Guide.

All further documents can be either found at the metraTec's product web page or are listed at: http://www.metratec.com → Support → Downloads → Documentation.

2 Product Description

The QuasarMX is an HF RFID reader/writer for demanding industrial applications, where high reading reliability, speed and extensive special tag features are needed.

Highlights include a reading rate of up to 100 tag-IDs/sec and reading and writing data on tags without needing to address them individually. This allows applications directly at conveyor belts, in production machinery and in electric control cabinets. The communication protocol can be used from a normal PC with a full operating system, with embedded systems as well as with a PLC.

2.1 Intended Use

RFID Reader/Writer for wireless communication with RFID transponders according to ISO 15693.

2.2 Technical Specification

|	
Operating Voltage	24 V DC
Digital Inputs/Outputs	optically isolated 24V DC Inputs (2x), 24 V DC Outputs (4x), 24 V DC Out (1x)
Operating Frequency	13.56 MHz
System Impedance	50 Ohm
RF Output	250 mW
Power Consumption	200 mA (without Ethernet) / 450 mA (with Ethernet)
Operating Temperature	-40°C to +85°C
Dimensions	130 x 105 x 44 mm
Protection	IP 40 (Other on Request)
Conformity	CE, e.g. EN 60950-1, ETSI 300 330

2.3 Product Drawing
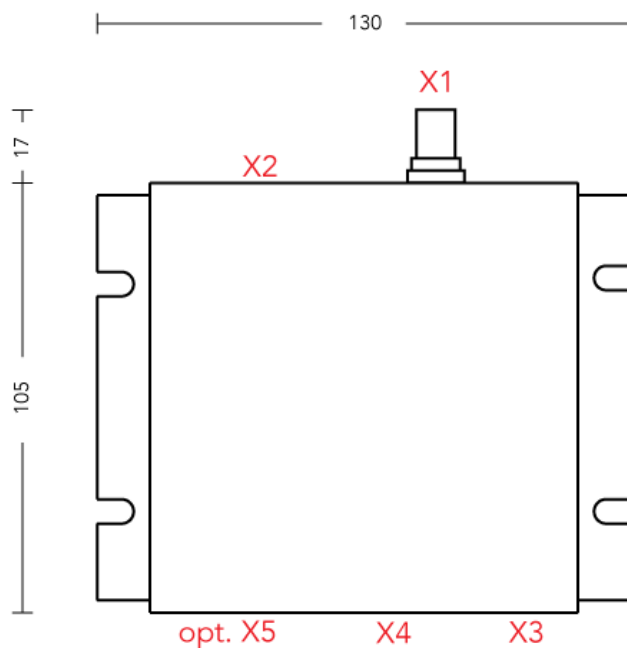
Fig. 1: Dimensions of QuasarMX RFID Reader (in mm)

2.4 Scope of Delivery

The QuasarMX RFID Reader comes with the following parts:

- QuasarMX RFID Reader
- 24V DC power supply
- Documentation, Drivers and Demo Software are available via download from metraTec's website (http://www.metratec.com → Support → Downloads)

2.5 Accessories

The following accessories and modules are available to extend and evaluate the functionality of the QuasarMX HF RFID Module:

- Multiplexer (4x, 8x and 16x)
- Various HF-Antennas
- Coaxial cable

3 Power Supply and Electrical Specification

The QuasarMX is powered using 24V DC which are connected at the front of the device (X3). If you do not use a power supply supplied by metraTec, please make sure that your own PSU provides a supply voltage of high quality. If possible, use a PSU with high precision/high speed linear regulator. If you use a switching PSU, please make sure that the switching frequency is > 500 kHz.
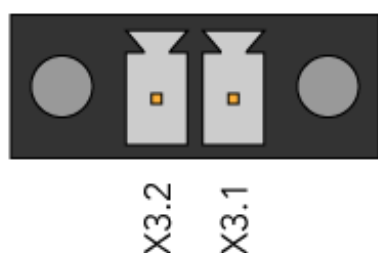

Fig. 2: Power Connector Description (ref. Tab. 1)

Connector	Description
X3.1	GND
X3.2	24V DC

Tab. 1: Description of Power Connector

Operating Voltage	24 V DC
Power Consumption[1], RF on	200 mA
Power Consumption[1], RF off	80 mA
Power Consumption[1], Sleep	20 mA
Voltage Inputs/Outputs	24 V

Tab. 2: Maximum Rating and Electrical Limits

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1   Note: For Ethernet power consumption is increased by 250 mA.

4 Communication

The QuasarMX offers two main options as a host interface – USB and optionally an Ethernet connection. The main advantage of the optional Ethernet interface lies in the very long cable length that Ethernet allows between the host computer or network switch and the reader in the field. Additionally, versions with WiFi and ZigBee are available on special request.

4.1 USB Driver Installation

The basic option for connecting the QuasarMX with your host PC is using the USB connection every reader has.

1. Connect the reader with a 24V DC power source as described before
2. Connect the reader with a PC using a USB cable.
3. Install the USB driver. metraTec offers the needed driver including Installation Guides for Windows XP and Windows 7 (as downloads from metraTec's website).

5 Antenna Connection

To send and receive data to and from the tags an appropriate HF RFID antenna (13.56 MHz, 50 Ohm) has to be connected to the reader. This is done via the BNC connector on the reader (X1).

Since the design of HF antennas can be a task requiring expert knowledge, metraTec RFID Solutions offers a range of standard antenna types for HF applications which are compatible to the QuasarMX. Further, we offer an antenna design service for custom designs. Most antennas come equipped with standard BNC connectors which can be directly connected to the QuasarMX. In cases in which a different antenna geometry or connector is needed please contact support@metratec.com.

To connect the antenna to the reader or multiplexer the devices are equipped with BNC jacks and the cables are equipped with BNC plugs at both ends. When connecting antennas with multiplexers or readers please keep in mind that the cable has a signal dampening effect reducing the RF power reaching the antenna. If long cables are to be used in connection with one or more multiplexers the reading range can be reduced measurably. Using higher quality cables can reduce the power loss in cases in which this is important. Recommended cables with different lengths can be ordered from metraTec as accessories.

> ⚠️ **ATTENTION**
>
> Always connect an 50 Ohm antenna as described above first, before powering the device. Powering the reader without an appropriate 50 Ohm load for a longer time could damage the reader permanently.

6 Digital Input/Outputs

The QuasarMX has 2 digital input pins and 4 digital output pins which can be be read or set via the reader. The input pins are optically isolated 24 V DC inputs as common in automation technology in general. Up to 25 mA are needed to set the input to "high".

The output pins are 24 V high side switch DC outputs with a maximum current of 250 mA per pin. These can be used to directly power e.g. signal towers. In total a maximum current of 1000 mA for all pins is allowed. Outputs are equipped with internal overcurrent and overtemperature shutdown.

The pins X2.1 and X2.2 are connected directly to the power supply input, i.e. the applied voltage is 24 V DC. This can be used for power supply of e.g. sensors, etc. The power of these pins is only limited by the power of the power supply used.
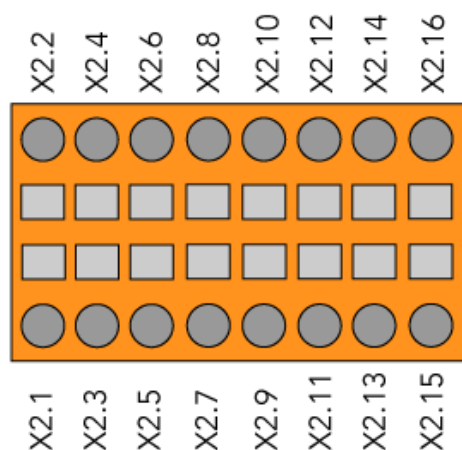

Fig. 3: Connector description of QuasarMX

| Connector	Description
X2.1	GND
X2.2	24V DC Out
X2.3	Out 1 -
X2.4	Out 1 +
X2.5	Out 2 -
X2.6	Out 2 +
X2.7	Out 3 -
X2.8	Out 3 +
X2.9	Out 4 -
X2.10	Out 4 +
X2.11	In 1 -
X2.12	In 1 +
X2.13	In 2 -
X2.14	In 2 +
X2.15	GND
X2.16	24 V DC

Tab. 3: Pin Description for digital IOs. Note: All "Out X -" are connected to ground internally!

7 Further Notes

7.1 Environmental

Electronic devices like the QuasarMX are covered by the (German) ElektroG (electronic waste law) as well as the European WEEE directive and as such may not be disposed of by way of the normal household trash. Instead they have to be recycled properly. For you as our customer this is no additional burden, however, as you can send the device back to us for proper recycling. We assure you that the devices received back will be recycled properly and in an environmentally friendly way. Our WEEE Registration ID is DE 56060482.

When selecting electronic components we additionally made sure that all components are free of heavy metals and other harmful substances as required by the RoHS Directive for many industries. Hence, our products are produced in the most environmentally friendly way possible.
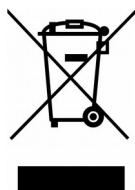
7.2 Declaration of Conformity

The QuasarMX complies with all directives and regulations applicable in the European Union for this kind of device. This especially includes all laws regarding use of spectrum and EMC. The product therefore bears the CE sign, as required by Directive 1999/5/EC (Radio & Telecommunication Terminal Equipment Directive).

The product is currently not registered for use in the US or Canada. However, metraTec is registered as a manufacturer of electronics at the FCC and IC. A certification of this product is therefore possible, if required. Please ask us or your system integrator for further information.

8 Version Control

Version	Change	by	Date
1.0	created	KD	22.03.2010
1.1	Drawing of 24V connector added	KD	22.10.2010
1.2	minor corrections and layout changes	CS	06.08.2014
1.3	corrected scope of delivery (German version)	CS	30.10.2014
1.4	HF Antenna Integration Guide mentioned, USB driver installation description removed, minor changes	CS	21.04.2015
1.5	update address	KS	07.12.2016

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