

Technical Documentation

for metraTec DMI15 IoT HF RFID Reader



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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 DMI15 IoT 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 DMI15 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 DMI15 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 DMI15 is an IoT HF RFID reader/writer for demanding industrial applications, where high reading reliability, speed and extensive special tag features are needed.

The DMI15 communicates via LAN and can be powered over Ethernet (PoE) making the integration in IoT systems real plug and play, especially when used in conjunction with the metraTec IoT Engine software.

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.

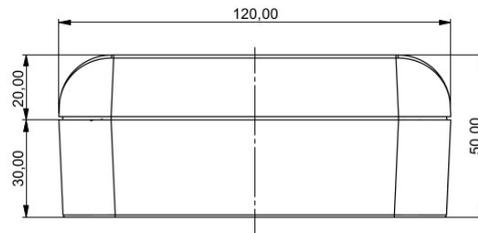
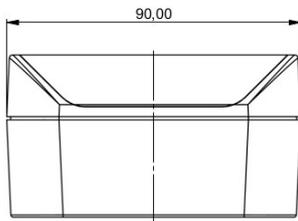
2.1 Intended Use

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

2.2 Technical Specification

Operating Voltage	24 V DC in PoE class 0 (13W max., isolated)
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
Max. Power Consumption	5W (RF ON)
Operating Temperature	-40°C to +85°C
Dimensions	120 x 90 x 50 mm
Protection	IP 40
Conformity	CE, ETSI EN 300 330

2.3 Product Drawing



The DMI15 features 4 mounting holes on a 99 x 34 m grid. The housing may be used as drilling template using a deep hole marker.

2.4 Scope of Delivery

The DMI15 RFID Reader comes with the following parts:

- DMI15 RFID Reader
- 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 DMI15 RFID Reader:

- 24V 1A power supply
- Transponders

3 Power Supply Electrical Specification

The preferred method of powering the DMI15 is using PoE. Simply connect the DMI15 to a PoE enabled Ethernet switch using a standard Ethernet cable. The DMI15 will be detected as a PoE class 0 device by the ethernet switch. The switch will deliver up to 13W available for the DMI15 itself shared with devices connected to the 24V outputs as well as the 24V DC out of the DMI15. Exceeding the 13W overall power rating will result in shut down of the power supply by the ethernet switch.

Alternatively the DMI15 can be powered using the 24V DC input which are available at the IO connector at the front of the device (X2). 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.

The DMI15 uses internal diode power OR-ing at the 24V level. The PoE power input is converted to 24V and compared to the voltage at the 24V DC input. The higher voltage will be used to supply the DMI as well as the IOs.

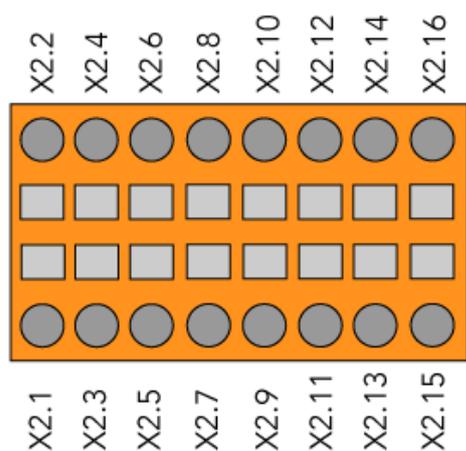


Fig. 1: Connector description of DMI15

Connector	Description
X2.1	GND
X2.2	24V DC

Tab. 1: Pinout of DC Input at IO Connector X2

Operating Voltage	24 V DC
Power Consumption, RF on	200 mA
Power Consumption, RF off	80 mA
Power Consumption, Sleep	20 mA

Tab. 2: Typical Current Consumption at 24V DC

4 Ethernet configuration

The DMI15 offers a 100 MBit Ethernet connection as communication interface via a RJ-45 jack.

The DMI15 incorporates a metraTec TCP to UART Converter (TUC) for ethernet communication.

The default IP setting is static 192.168.2.239.

The interface configuration is available at this address using a web browser (port 80).

The serial ASCII data stream is available at port 10001 using a terminal program. We strongly recommend metraTerm available as free download on our website.

For more details and options see the metraTec TUC user guide.

5 RFID Antenna

To send and receive data to and from passive RFID tags the DMI15 includes a HF RFID antenna (13.56 MHz, 50 Ohm) The antenna is located centered at the front of the housing. The antenna center is indicated by the top print.

The transponder should be aligned parallel to the top cover of the box.

The reading range can be up to 10cm for credit card size transponders.

The reading range will depend to a great extent on the size, power consumption and quality of the transponder and needs to be evaluated for each application individually. Make sure to have enough margin to allow for deviations in transponder read range.

Make sure there is enough distance to other HF RFID readers and other devices using the 13.56 MHz ISM frequency band.

6 Digital Input/Outputs

The DMI15 has 2 digital inputs and 4 digital outputs which can be read or set via the reader. The input pins are optically isolated 24 V DC inputs as is common in automation technology. Up to 10 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 output current of 1000 mA for all pins is allowed when 24V DC power is supplied at the IO connector. Otherwise the 13W PoE power limit will apply. Outputs are equipped with internal overcurrent and overtemperature protection.

Parameter	min	typ	max
Supply voltage Vcc/ V	12	24	30
Vin High / V	12	24	30
Vin Low / V	-0.7	0	3
Vout High / V	Vcc-2	Vcc-0,5	Vcc
Vout Low / V	0	0,5	3V
Iout High / mA	200	250	270
Iin High / mA	4	10	25

The pins X2.1 and X2.2 are used as an alternative power supply input. The applied voltage is 24 V DC. Pins X2.15 and X2.16 are directly connected to X2.1 and X2.2 respectively. These can be used as power supply outputs to supply e.g. sensors, etc. The power of these pins is limited by the power of the power supply used or the PoE power limit.

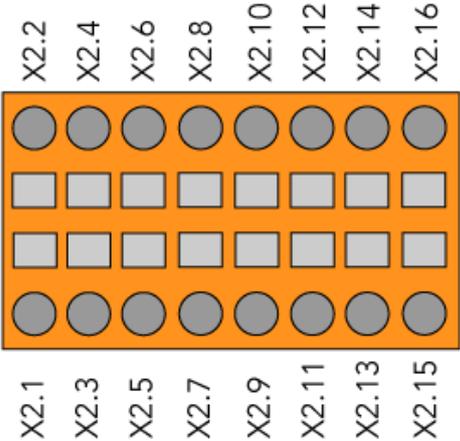


Fig. 2: Connector description of DMI15

Connector	Name	Description
X2.1	GND	power input, directly connected to X2.15
X2.2	24V DC	power input, directly connected to X2.16
X2.3	Out 1 -	Return for Out1 +, internally connected to GND
X2.4	Out 1 +	24V out, internal high side switch, 250mA max.
X2.5	Out 2 -	Return for Out2 +, internally connected to GND
X2.6	Out 2 +	24V out, internal high side switch, 250mA max.
X2.7	Out 3 -	Return for Out3 +, internally connected to GND
X2.8	Out 3 +	24V out, internal high side switch, 250mA max.
X2.9	Out 4 -	Return for Out4 +, internally connected to GND
X2.10	Out 4 +	24V out, internal high side switch, 250mA max.
X2.11	In 1 -	Optically isolated input 1, negative
X2.12	In 1 +	Optically isolated input 1, positive
X2.13	In 2 -	Optically isolated input 1, negative
X2.14	In 2 +	Optically isolated input 1, positive
X2.15	GND	power output, directly connected to X2.1
X2.16	24 V DC	power output, directly connected to X2.2

Tab. 3: Pin Description for digital IOs.

7 LEDs

The DMI15 features 5 LEDs.

The three top LEDs indicate the status of the RFID engine.

Two more LEDs on the RJ45 socket show the Ethernet status.

Name	Number	Color	Function
Power	1	green	Indicates that a valid power supply is connected to the DMI15
RF_On	2	amber	Indicates that the RF field is turned on
Tag_Detect	3	blue	Indicates that a transponder inventory, read or write operation was carried out successfully
Link	4	amber	Left LED on RJ-45 Ethernet connector, is permanently on when a link is established
Data	5	green	right LED on RJ-45 Ethernet connector, flashes on send and receive of data packets

8 Further Notes

8.1 Environmental

Electronic devices like the DMI15 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 and REACH Directives for many industries. Hence, our products are produced in the most environmentally friendly way possible.



8.2 Declaration of Conformity

The DMI15 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.

9 Version Control

<i>Version</i>	<i>Change</i>	<i>by</i>	<i>Date</i>
1.0	created	TM	22.12.2020

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