Technical Documentation

for metraTec HF Multiplexer (4, 8 and 16 Port)

Date: December 2016

Version: 2.5

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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 hfMux-X Multiplexers where not designed for use in dangerous environments. Using these products in applications where a failure could directly result 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 these devices for such scenarios.

1.3 Export Restrictions

All metraTec hfMux-X Multiplexers contain components that underlie US Export restrictions. It is therefore forbidden to export these products 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

None

2 Product Description

The metraTec hfMux-X is an RFID multiplexer for HF systems with an operating frequency of 13.56 MHz and an RF output power of 2 W (-MP version) resp. 4 W (-HP version). It allows connecting up to four, eight or 16 antennas (depending on the product version) to a single antenna port. This reduces system complexity and setup costs in cases where many antennas are needed and also lowers hardware system costs as the number of RFID readers needed decreases.

The device works irrespective of the manufacturer of the antennas and readers used. Furthermore, the multiplexer has a very small size and a minimal power consumption which enables mobile operation. For compatibility of the multiplexer with any other HF RFID reader, please contact the metraTec Team.

Versions with 4, 8 and 16 antenna ports are available.

2.1 Intended Use

The hfMux-X HF Multiplexer is a device for switching between RFID antenna ports at a frequency of 13.56 MHz with an RF power of up to 2 Watt (-MP version) resp. 4 Watt (-HP version. The device is not specified for any other application or frequency.

2.2 Technical Specification

Operating Frequency	13.56 MHz
Antenna Connector	BNC
Voltage	24 V DC nom. (min 18 V DC – max 26 V DC)
Control Inputs	2-4 x 24 V DC, optically isolated
Power Consumption	60 mA
Switching Time	4 µs
Temperature Range	-20 °C to +70 °C
Dimensions	130 x 106 x 44 mm (hfMux-4) 190 x 104 x 39 mm (hfMux-8 and -16)
Housing/Protection	IP 40
Conformity	CE, eg. EN 60950-1

2.3 Product Drawing

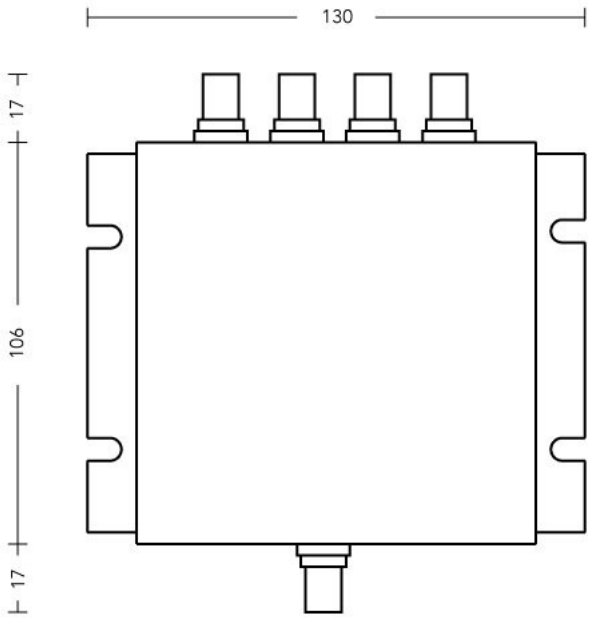

Fig. 1: Drawing of hfMux-4 Multiplexer, other models accordingly (all dimensions in mm)

2.4 Scope of Delivery

The hfMux-X Multiplexer comes with the following parts:

- hfMux-X HF Multiplexer
- Control Cable
- Documentation (available via download from metraTec's website: http://www.metratec.com → Support → Downloads)

3 Installation

Installing the hfMux-X is an easy task for experienced electrical personnel. Some important notes should be considered as listed at the end of the installation instructions.

Step 1:

Place the multiplexer in the desired installation location and attach it there if necessary. The device does not have a preferential mounting orientation.

Step 2:

Both the reader connection and the antenna connections are connected via BNC connectors. No special tools are necessary for this step.

Step 3:

Connect the control lines between reader (or any other device that controls the multiplexer) and the multiplexer. The device has optically isolated 24 V inputs which are used by many industrial devices, e.g. PLCs. Each input needs a 24 V line (e.g. hfMux-4: Inputs IN1+ and IN2+) as well as a ground line (IN1- and IN2- for hfMux-4) for the differential signal. If your devices doesn't have single GND lines, you can connect all of them to the ground of the controlling device.

If you use a metraTec RFID Reader to control the multiplexer, just connect the multiplexer control cable you should have received with the multiplexer.

Step 4:

Connect the multiplexer with a 24 V power source. This can come directly from the reader if it supports this (Pins 24V and GND).

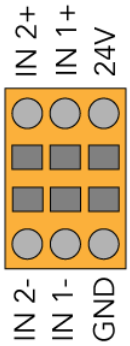

Fig. 2: Connector description of the hfMux-4

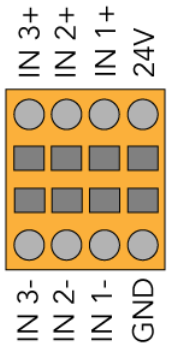

Fig. 3: Connector description of the hfMux-8

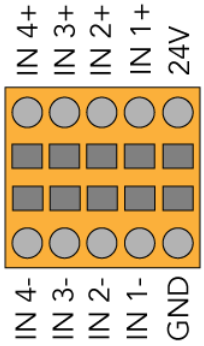

Fig. 4: Connector description of the hfMux-16

ATTENTION

The output power of the reader may not exceed the maximum input power of the multiplexer (2W resp. 4W). The RF in- and outputs may not be supplied with CD offsets greater than 10 V. Disregarding may result in a damaged device in both cases.

ATTENTION

The multiplexer is not terminated. If there is no 50 Ohm load connected to the selected antenna port, the signal will be reflected to the reader. This can potentially damage the reader permanently. Please observe the maximum voltage standing wave ration (VSWR) of your reader.

4 Antenna Selection

The active antenna is selected using the digital inputs of the multiplexer. Input 1 is LSB. See the following table for a complete overview. The multiplexer has a fail-safe feature. If there is no control signal, the multiplexer will connect antenna port one as active port.

Input 1	*Input 2*	*Input 3 (8x / 16x)*	*Input 4 (16x)*	*Active Antenna*
LOW	LOW	LOW	LOW	Antenna 1
HIGH	LOW	LOW	LOW	Antenna 2
LOW	HIGH	LOW	LOW	Antenna 3
HIGH	HIGH	LOW	LOW	Antenna 4
LOW	LOW	HIGH	LOW	Antenna 5
HIGH	LOW	HIGH	LOW	Antenna 6
LOW	HIGH	HIGH	LOW	Antenna 7
HIGH	HIGH	HIGH	LOW	Antenna 8
LOW	LOW	LOW	HIGH	Antenna 9
HIGH	LOW	LOW	HIGH	Antenna 10
LOW	HIGH	LOW	HIGH	Antenna 11
HIGH	HIGH	LOW	HIGH	Antenna 12
LOW	LOW	HIGH	HIGH	Antenna 13
HIGH	LOW	HIGH	HIGH	Antenna 14
LOW	HIGH	HIGH	HIGH	Antenna 15
HIGH	HIGH	HIGH	HIGH	Antenna 16

Furthermore, the multiplexer is hot switchable. This means that the antenna port can be switched without having to turn off the HF signal. The power supply has to be connected, however.

5 RF Specification

The following table shows the insertion loss (dampening of the signal when switched on) and the channel isolation between the antenna ports of the multiplexer. The values were measured in the standard version of the multiplexer with BNC connectors.

Frequency	*Insertion Loss*	*Channel Isolation*
13.56 MHz	0.45 dB	43 dB

The input reflection behavior depends strongly on the type of connector used and on the quality of the connection (e.g. dependent on connector wear).

6 Further Notes

6.1 Environmental

Electronic devices like the hfMux-X 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.

6.2 Declaration of Conformity

The hfMux-X 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.

7 Version Control

Version	*Change*	*edited by*	*Date*
1.0	created	KD	12.08.2009
2.0	Translated to English	KD	02.09.2012
2.1	Connector for -8 and -16 added	KD	04.02.2014
2.2	minor corrections	CS	18.09.2014
2.3	scope of delivery completed	CS	05.11.2014
2.4	conformity notes added, dimensions corrected, minor changes	CS	18.06.2015
2.5	update address	KS	01.12.2016

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