



**Summary**

The R065 is a Modbus TCP to DMX512 (further referred to as DMX) for control of up to 2× 512 light sources or other DMX compatible devices. Alternatively, it works as a DMX sniffer, reading packets transmitted to a DMX bus by a DMX controller, and providing the data as Modbus TCP server registers.

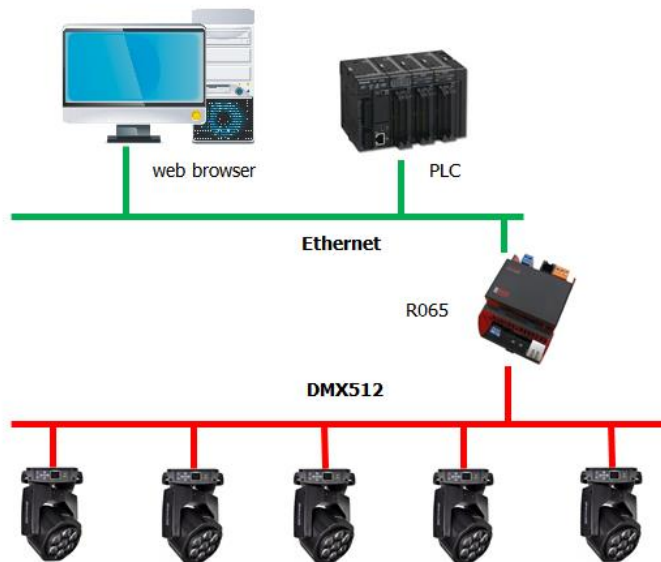
**Applications**

- intelligent light control, control of other DMX compatible devices, such as fog machines
- integration of 3rd party devices into DMX-controlled systems
- testing and diagnostics of DMX systems

**Function**

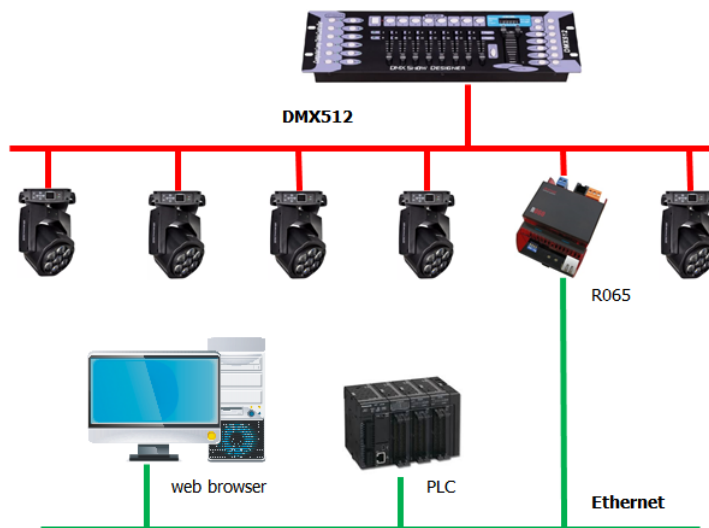
The R065 is a Modbus slave (server) device, receiving commands from a Modbus master (client). The client is a PLC or another supervisory system. The Modbus data are translated to DMX commands for 2 independent DMX channels and sent to the RS485 buses with DMX512-A protocol. The DMX telegram is sent immediately after writing into the Modbus registers, and optionally on a periodical basis according to the *Period* Modbus register setting. The period time is configurable in the range of 0.1 to 65.5 s.

At the DMX bus, the converter acts as a master device (note that there may only be one master at the bus). For the sake of simplicity, only one DMX bus is displayed at the image below. The R065 contains two independent DMX interfaces, and can control up to 2 × 512 DMX addresses.



The PLC then controls the DMX lights according to data written into the R065 Modbus registers.

If a R065 channel is set to Sniffer mode, it does not send any data to DMX, and only reads telegrams from the DMX controller (master device). The data are written into the Modbus table. A Modbus TCP client, e.g. a PLC, can read these data from the converter's Modbus table and process them as necessary. The Sniffer mode then makes possible to control 3rd party devices, connected to the PLC, over a DMX controller.



In this mode, the expected DMX telegram length should be set in the *Size* Modbus register.

If the packets are shorter than specified in the *Size* register, the converter learns the end of the telegram according to the start byte of the next telegram, or space between telegrams longer than 1 s.

**A DMX channel always works in one of the modes only. There may be only one Master device on a DMX bus. The Master and Sniffer modes can be combined deliberately at both channels (Master – Master, Sniffer – Sniffer, Master – Sniffer, Sniffer - Master).**

The Modbus table is divided into five segments:

- system part at registers 1 to 17 (DMX bus 1), and 2005 to 2017 (DMX bus 2),

which are used to set up the converter and for internal diagnostics

- registers 128 to 385, and 2128 to 2185, to write data in Master mode: the DMX channels are in LSB and MSB bytes of each register, so for each 512 DMX channels there is 256 Modbus registers used (the Modbus TX area)
- registers 512 to 768, and 2512 to 2768, to read data from DMX: this is where the received telegrams from the DMX controller are stored in the Sniffer mode (Modbus RX area)
- register 1003 which contains (unique) serial number of the R065
- registers 1024 to 1280, and 3024 to 3280, with default values to be sent to the DMX buses after power outage and restoration (Modbus Default TX area), see below.

All parameters and functions of the converter are set up over its web interface (http protocol) at TCP port 80. Set the USR switch to ON and restart the device to disable the web interface and FTP server for security reasons. A green LED (PWR) indicates power presence, a flashing red LED (RUN) means processor activity. The Ethernet socket hosts another pair of LEDs: Link and Network activity. The Ethernet interface switches automatically between 10 and 100 Mbps.

The module mounts on a standard DIN rail and is 4 DIN modules (68 mm) wide.

## Technical data

|                        |   |
|------------------------|---|
| Power                  | 24 V AC/DC ± 15 %   |
| Consumption            | 3 VA  |
| Ethernet               | 1 × Ethernet 10/100 Mbit/s (automatic detection)<br>RJ45, 2 LED (link, data) integrated in the socket   |
| DMX interfaces (RS485) | 2 independent interfaces (DMX512 K1 and DMX512 K2)<br><br>Protocol DMX512-A (ESTA, ANSI E1.11-2008)<br>Fixed baudrate 250 kbit/s<br>Physical layer EIA-485-A, removable connector with three M3 screw terminals (recommended wire cross-section 0.75 mm <sup>2</sup> )<br>Galvanic separation 1 kV (according to DMX512-A, Annex A)<br>Permanent short-circuit resistant<br>Bus terminator (DIP switch) |
| DMX bus                | Max. cable length 300 m<br>Line or daisy chain topology (no star). A splitter for 250 kbit/s according to the EIA-485 standard can be used  |
| LED                    | Power: PWR – green, permanent light<br>Activity: RUN – red, flashing  |
| Hardware               | ARM Cortex M4 168 MHz, 2 MB FLASH, 256 KB SRAM  |
| Cover                  | polycarbonate box (UL94V0 certified)  |
| Dimensions             | 70.4 × 61.4 × 98.6 – see drawing below  |
| Protection degree      | IP20 (according to EN 60529)  |
| Power terminals        | removable with M3 screw terminals, wire cross-section max. 2.5 mm <sup>2</sup> (recommended wire cross-section 0.35...1.5 mm <sup>2</sup> )   |
| Operating conditions   | 5...40 °C; 5...85 % relative humidity; no aggressive compounds, condensing vapours and fog (according to EN 60721-3-3 climatic class 3K3)   |
| Storage conditions     | 5...40 °C; 5...85 % relative humidity; no aggressive compounds, condensing vapours and fog (according to EN 60721-3-1 climatic class 1K2)   |

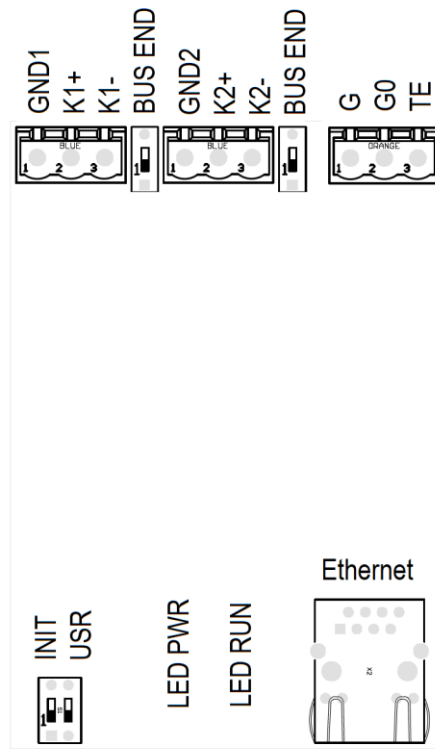
Conformance with standards    EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010  
 (industrial environment)  
 Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 +  
 A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016  
 RoHS EN 50581:2012

## Connection

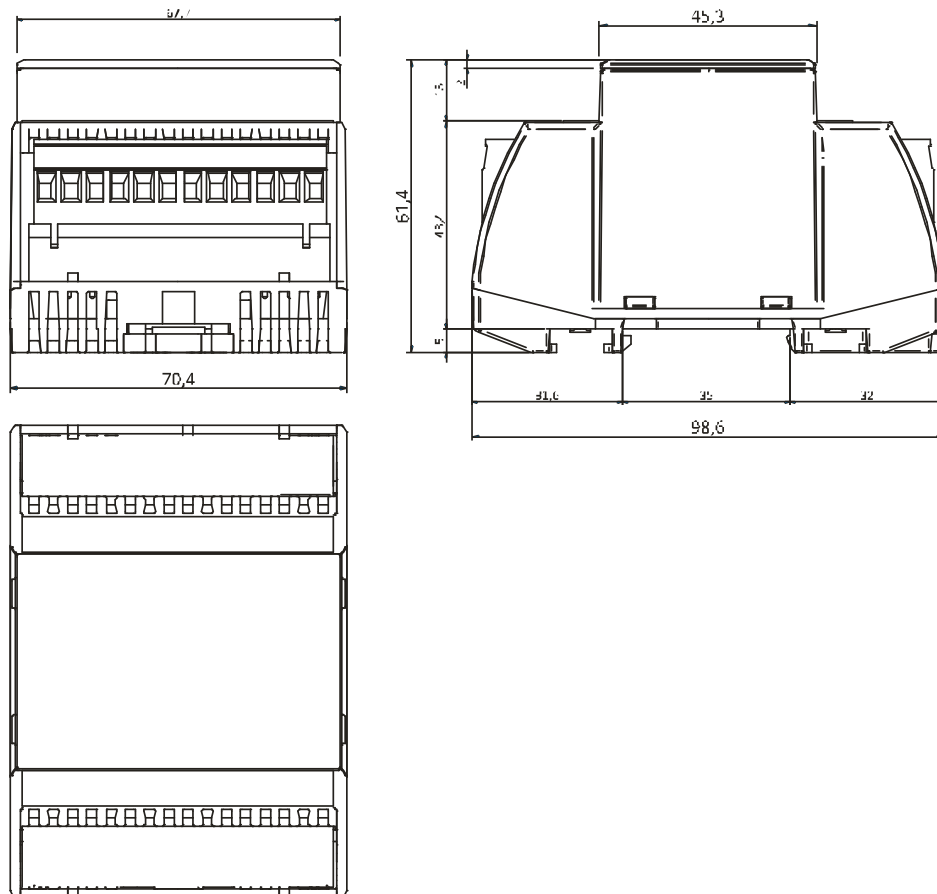
### Terminals and connectors

|                         |  |
|-------------------------|--|
| <b>G/+24 V (orange)</b> | power  |
| <b>G0/GND (orange)</b>  | power – reference  |
| <b>TE (orange)</b>      | technical ground – conductable parts of the device   |
| <b>K1+</b>              | DMX512 - RS485, bus 1, positive  |
| <b>K1-</b>              | DMX512 - RS485, bus 1, negative  |
| <b>GND1</b>             | DMX512 - RS485, bus 1, reference (ground)  |
| <b>K2+</b>              | DMX512 - RS485, bus 2, positive  |
| <b>K2-</b>              | DMX512 - RS485, bus 2, negative  |
| <b>GND2</b>             | DMX512 - RS485, bus 2, reference (ground)  |
| <b>Ethernet</b>         | network (RJ45)   |
| <b>LED indicators</b>   |  |
| <b>PWR</b>              | green LED – power (ON: power is OK; OFF: power not connected, weak or bad power supply, ...)   |
| <b>RUN</b>              | red LED – operation<br><b>flashes with 50:50 duty cycle:</b> correct function,<br><b>flashes with another pattern:</b> error code indicated with periodic flashing:<br>- code 1.1, 1.2, 1.3: memory low<br>- code 1.5: FW update failed<br>- code 3.1: processor hard fault<br>- code 4.x: watchdog expired<br>- code 5.x: file system corrupted<br>- code 6.x: file system full,<br><b>permanently on or off:</b> error |
| <b>Switches</b>         |  |
| <b>INIT</b>             | if On at restart, the device is brought into factory settings with IP address 192.168.1.99 and mask 255.255.255.0  |
| <b>USR</b>              | if On at restart, disables web server and FTP server   |

## Terminal positions



## Dimensions



All dimensions in *mm*.

|                      |  |
|----------------------|--|
| <b>Communication</b> | Default network settings are:<br>IP address 192.168.1.99<br>network mask 255.255.255.0<br>default gateway 192.168.1.1<br>Web access is available over TCP port 80.         |
| <b>Settings</b>      | All settings inclusive network configuration are accessible over web interface at TCP port 80. The web is not protected by password. It can be disabled by the USR switch. |

**How to open the web interface and set the IP address:**

1. Connect the R065 to the Ethernet network using the RJ45 connector and patch cable. Power the device (24 V AC/DC, G and G0 terminals, any polarity). Wait about 30 s for the device to boot up.
2. Set a fixed IP address in the 192.168.1.x network, e.g. 192.168.1.10, at your PC.
3. Enter the device IP address into your browser – the default address is 192.168.1.99.

|                                      |   |
|--------------------------------------|---|
| <b>Behaviour after power dropout</b> | The device has an internal battery to preserve the RAM contents. After power dropout and restoration the device acts depending on the power outage duration. The time limit is set in Modbus register 15 (see Modbus table), maximum configurable time is 1 hour. |
|--------------------------------------|---|

**Dropout below the configured limit (short dropout):** After power restoration the device sends to the DMX bus a single telegram with the last values preserved in the backed up RAM. Next telegrams are sent depending on writing into Modbus registers, and on the value of the *Period* parameter (configurable in Modbus register 8 and 2008 or over the web).

**Dropout above the configured limit (long dropout):** After power restoration the device sends to the DMX bus default values from Modbus registers 1024 to 1280 and 3024 to 3280 (Modbus Default TX). The default values are saved in EEPROM. (After the device boots, the default EEPROM values are copied to the RAM once. These values are then overwritten by writing into Modbus registers 128 to 385 and 2128 to 2385, Modbus TX.)

|                                |  |
|--------------------------------|--|
| <b>User control principles</b> | The converter contains, apart from Modbus areas for <ul style="list-style-type: none"> <li>- writing (Modbus TX),</li> <li>- reading (Modbus RX), and</li> <li>- keeping of default values (Modbus Default TX),</li> </ul> also a <i>web buffer</i> . This is a memory area where values from the above mentioned areas can be copied and edited. The edited values can be copied back to Modbus TX and Modbus Default TX areas, as well as directly to the memory (FPGA) from which the DMX packet is sent to the DMX bus. The web buffer is not mapped directly to any Modbus registers. The buffer data are stored in RAM only. |
|--------------------------------|--|

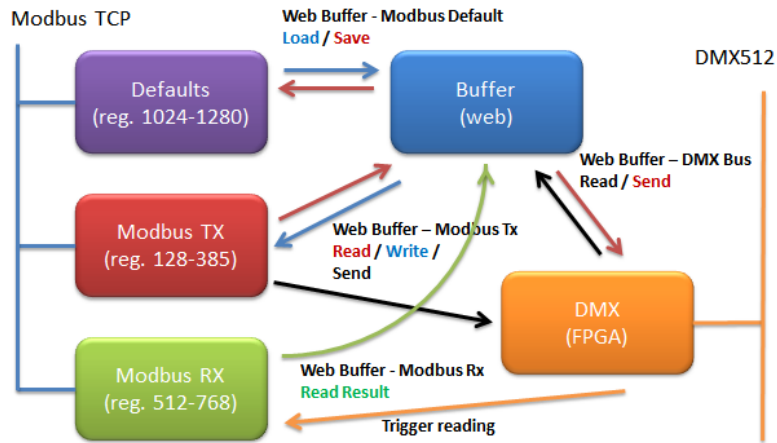
The web buffer for each channel can be edited either by manual entering of individual channel values to positions 1 to 512, or by semi-automatic filling of values for colour lights with RGB or RGBW (i.e. RGB + white) channels for a given number of lights.

The web interface is used for copying and editing. The description of control elements is given below at the **DMX 1** and **DMX2** web page description. These functions are useful mainly for system commissioning and testing at times when the control program of the Modbus master device has not been developed yet.

**Note:**

- some DMX devices may require also writing into other channels (called e.g. Master enable, Dimmer, Shutter) for correct functionality
- some DMX devices may require periodic sending of DMX telegrams. If a DMX packet is not received for a certain time, the lights go off. Therefore, the one-off commands (as sent using Web Buffer – DMX Bus: *Send*) may not work as expected.

Consult your lights supplier if necessary.



Function principle for DMX bus 1. See the „DMX“ screenshot below. (For DMX bus 2, add a offset of 2000 to all register numbers.)

## Web pages

The R065 web pages are used for configuration, setup of current and default values of the DMX channels, and for device diagnostics. The web server is not password-protected, it can be disabled by the USR switch.

## Statistics

DMX - R065 - Mozilla Firefox

DMX - R065

192.168.1.99/stats.html

domat control system

Web Page R065

Statistics

- Network config
- Administration
- Statistics
- DMX Channel 1
- DMX Channel 2

| RX                     |  | Number of frames |
|------------------------|--|------------------|
| <b>Incoming frames</b> |  |                  |
| ARP frames             |  | 0218             |
| ICMP frames            |  | 0000             |
| UDP frames             |  | 0009             |
| TCP frames             |  | 0117             |
| <b>TX</b>              |  |                  |
| ARP frames             |  | 0002             |
| ICMP frames            |  | 0000             |
| UDP frames             |  | 0000             |
| TCP frames             |  | 0085             |
| <b>DMX Channel 0</b>   |  |                  |
| Modbus TX              |  | 0000             |
| Regular TX             |  | 0000             |
| Web TX                 |  | 0000             |
| DMX errors             |  | 0000             |
| RX Packets             |  | 0000             |
| <b>DMX Channel 1</b>   |  |                  |
| Modbus TX              |  | 0000             |
| Regular TX             |  | 0000             |
| Web TX                 |  | 0000             |
| DMX errors             |  | 0000             |
| RX Packets             |  | 0000             |

Reset frame stats

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The page shows the number of received (RX) and sent (TX) telegrams for different Ethernet protocols. The *Reset frame stats* button resets all counters.

DMX: number of sent and received DMX packets.

## Network config

The screenshot shows a web browser window with the URL `192.168.1.99/lan.html`. The page title is "Web Page R065" and the main heading is "R065 Network config". On the left, there is a navigation menu with items: "Network config", "Administration", "Statistics", "DMX Channel 1", and "DMX Channel 2". The main content area shows the following configuration options:

- DHCP on/off**: OFF
- MAC address**: 000A14BE2540
- IP address**: 192.168.001.099
- Subnet mask**: 255.255.255.000
- Gateway IP address**: 192.168.001.001
- Ethernet speed**: 100M

Below these fields is a "Set IP\*" button. A note states: "\* Changes to DHCP, IP address and Subnet Mask require a reboot to take effect." At the bottom of the page, there is a copyright notice: "© Copyright 2017 Mikroklima s.r.o."

**DHCP on/off**: activation and deactivation of DHCP client. In technological networks, fixed IP addressing (DHCP off) is mainly used.

**MAC address**: Ethernet physical address, bytes are not separated by commas. The MAC address can not be edited.

**IP address**: set IP address, formatted XXX.XXX.XXX.XXX

**Subnet mask**: IP subnet mask

**Gateway IP address**: default network gateway address

**Ethernet speed**: automatically detected bitrate of the Ethernet card

**Set IP**: button to set IP address, mask, and gateway. Edit the parameters in the fields above, and click the *Set IP* button to confirm and write. The default parameters (IP address 192.168.1.99, mask 255.255.255.0) are set by setting the INIT switch to ON and device restart.

## Administration

The screenshot shows a web browser window with the URL `192.168.1.99/admin.html`. The page title is "Web Page R065" and the main heading is "Administration". On the left, there is a navigation menu with items: "Network config", "Administration", "Statistics", "DMX Channel 1", and "DMX Channel 2". The main content area shows the following information:

- Memory Utilisation**: Free Os Heap 10928 B, Free app Heap 53845 B
- Info**: SW version 1.0.0-rcA, Serial Number 135005, Uptime 00:00:31, Power On Time 06:36:10, Error state: 00: No error
- Buttons**: Reset error, Reset device, Format FTP
- Module Name**: DMX (input field), Save
- Upload new firmware**: Procházet... (Soubor nevybrán.), Check Version, Update FW

At the bottom of the page, there is a copyright notice: "© Copyright 2017 Mikroklima s.r.o."



**Memory utilisation:** Current memory usage for diagnostic purposes. (Free OS heap = operating system free memory, Free app heap = free memory for communication clients and servers)

**Info:** Firmware version, serial number, time since last reset, last error code.

**Reset error:** Resets the last error code.

**Reset device:** Restarts the R065.

**Format FTP:** Format of the FTP part of memory where files such as web pages are stored. Use carefully.

**Module name:** Free definable text (device location, name, etc., max. 20 chars)

**Upload new firmware:** Select the firmware file and click *Update FW*. After successful upload the device restarts automatically. *Check Version* checks the integrity of the firmware file, and returns firmware version of the file. Incompatible binary files cannot be uploaded into the device.

## DMX

The buttons are numbered in the screenshot below for better reference.

The screenshot shows the 'Web Page R065' interface for 'DMX channel 1'. It features several configuration sections with numbered callouts:

- Direct DMX Control:** 'Web Buffer <-> DMX Bus:' with 'Read' (1) and 'Send' (2) buttons.
- DMX configuration in Modbus:** 'Modbus mode:' with 'Sniffer' dropdown (3), 'Read' (4), and 'Write' (5) buttons. Below are input fields for 'Modbus Period (ms):' (6), 'Modbus Packet Size:' (7), 'Modbus Default Period (ms):' (8), 'Modbus Default Packet Size:' (9), and 'Modbus Default Timeout (s):' (10), each with 'Read' and 'Write' buttons.
- Modbus DMX Control:** 'Web Buffer <-> Modbus Tx:' with 'Read' (15), 'Write' (16), and 'Send' (17) buttons. 'Web Buffer <- Modbus Rx:' with 'Trigger reading' (18) and 'Read result' (19) buttons. 'Web Buffer <-> Modbus Default Tx:' with 'Load' (20) and 'Save' (21) buttons.
- RGB Color:** 'AB2567' (22) with 'Start at: 1' and 'Count of RGB lights: 16' and 'Fill Buffer' button.
- White:** 'AB2567' (23) with 'White: 255' and 'Start at: 1' and 'Count of RGBW lights: 4' and 'Fill Buffer' button.

The **Web Buffer** section shows a grid of data values:

|      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| 001: | 171 | 002: | 37  | 003: | 103 | 004: | 171 | 005: | 37  | 006: | 103 | 007: | 171 | 008: | 37  |
| 009: | 103 | 010: | 171 | 011: | 37  | 012: | 103 | 013: | 171 | 014: | 37  | 015: | 103 | 016: | 171 |
| 017: | 37  | 018: | 103 | 019: | 171 | 020: | 37  | 021: | 103 | 022: | 171 | 023: | 37  | 024: | 103 |
| 025: | 171 | 026: | 37  | 027: | 103 | 028: | 171 | 029: | 37  | 030: | 103 | 031: | 171 | 032: | 37  |
| 033: | 103 | 034: | 171 | 035: | 37  | 036: | 103 | 037: | 171 | 038: | 37  | 039: | 103 | 040: | 171 |
| 041: | 37  | 042: | 103 | 043: | 171 | 044: | 37  | 045: | 103 | 046: | 171 | 047: | 37  | 048: | 103 |
| 049: | 171 | 050: | 37  |      |     |      |     |      |     |      |     |      |     |      |     |

1: Reads a captured DMX packet and writes it into the web buffer.

2: Sends a DMX packet from web buffer to the DMX bus.

3,4: Reads and saves the Master/Sniffer mode configuration in the Modbus table. The Write command saves the change permanently.

5,6: Reads and saves the period for reading or writing of DMX packet in the Modbus table. The Write command saves the change permanently.

7,8: Reads and saves the DMX packet size parameter in the Modbus table. The Write command saves the change permanently.

9, 10: Reads and saves the default period size for reading or writing of DMX packet in the

Modbus table. The Write command saves the change permanently.

11,12: Reads and saves the default DMX packet size parameter in the Modbus table. The Write command saves the change permanently.

13,14: Reads and saves the default interval to distinguish between short and long power dropout. The Write command saves the change permanently.

15: Reads the DMX packet from Modbus TX registers to web buffer.

16: Writes the DMX packet from web buffer to Modbus TX registers.

17: Invokes a one-off write of the DMX packet from Modbus TX registers to DMX bus.

18: Reads the sniffed DMX packet to Modbus RX registers.

19: Reads packet from Modbus RX registers to web buffer.

20: Reads packet from Default Modbus TX registers to web buffer.

21: Writes packet from web buffer to Default Modbus TX registers. The values are written permanently.

22: Fills the web buffer by selected RGB colour for given number of lights.

23: Fills the web buffer by selected RGBW colour for given number of lights.

**Web Buffer:** A memory area for manual edit of a DMX packet for commissioning and service purposes. Enter the **Packet length**, DMX telegram length (number of channels) to display the corresponding number of positions for editing of DMX channels (1 to 512). **Start Byte** gives the first channel number, channels with lower numbers will not be displayed here and are not overwritten when copying the web buffer to Modbus registers.

Example of testing two RGB lights which use DMX channels 1,2,3 and 4,5,6 respectively:

- set Packet length = 6, Start byte = 1 (in the Web Buffer section the corresponding positions, or channels, are displayed)
- in the RGB Color field select the colour you want to set, it will be displayed together with its hex code
- set Start at = 1, Count of RGB lights = 2
- click *Fill Buffer*, the Web Buffer channels will be filled in by the required colours (channels can be edited also directly by manual entering of values into fields)
- click *Web Buffer - DMX bus: Send*, the buffer contents will be transferred to FPGA and the DMX telegram is sent to the bus.

## Modbus table

- Functions F01, F02, F03, F04, F05, F15, and F16 are supported.
- Max. number of registers in a single request is 128.
- Attempt to write to a read-only address is ignored (the telegram is accepted, but data are discarded).
- Bit access (functions F01, F02, F05, F15) is possible to addresses  $16 \times (\text{word}-1) + \text{bit offset}$ .

| Name                             | Register        | Type       | Description   | Note  |
|----------------------------------|-----------------|------------|---|---|
| Module LSB                       | 1 LSB           | R          | module ID lower byte  | 0x0193  |
| Module MSB                       | 1 MSB           | R          | module ID upper byte  |   |
| Firmware LSB                     | 2 LSB           | R          | firmware version lower byte   |   |
| Firmware MSB                     | 2 MSB           | R          | firmware version upper byte   |   |
| Status                           | 3 LSB           | R,W,RAM    | module status lower byte<br><br><b>bit 0</b> – write to EEPROM enabled<br><b>bit 4</b> – EEPROM initialisation  |   |
| Status                           | 3 MSB           | R,RAM      | module status upper byte<br><br><b>bit 0</b><br>- 0: normal mode<br>- 1: init mode<br><br><b>bit 1</b> (EEPROM protection)<br>- 1: at the next writing to EEPROM registers, all data will be stored to EEPROM<br>- 0: at the next writing to EEPROM registers, the received data will be written <b>to RAM only</b><br><br><b>bit 2</b> – 1: EEPROM initialised |   |
| Reserved                         | 4 LSB,<br>4 MSB |            |   |   |
| <b>DMX 1: General parameters</b> |                 |            |   |   |
| FW FPGA<br>DMX 1                 | 5 LSB           | R          | Version of FPGA firmware  |   |
| Reserved                         | 5 MSB           |            |   |   |
| Configuration<br>DMX1            | 6 LSB           | R,W,EEPROM | Master/Sniffer<br>0x00 – master<br>0x01 – sniffer   | See Master and Sniffer modes description above.<br>default = 0, Master                              |
| Reserved                         | 6 MSB           |            |   |   |
| Reserved                         | 7 LSB           |            |   |   |
| Reserved                         | 7 MSB           |            |   |   |
| Period DMX 1                     | 8 LSB, MSB      | R,W,RAM    | repeating in ms (if 0x0, telegram is not repeated, it is sent only on Modbus writing into the Modbus TX area)<br><br>for Master: sending of DMX telegram to DMX bus<br>for Sniffer: update of Modbus registers by values sniffed at the DMX bus   | in ms, 100...65535;<br>min 0.1 s, max 65.5 s<br><br>default = 0, or value in the last DMX TX packet |

|   |             |             |   |  |
|---|-------------|-------------|---|--|
| Size DMX 1  | 9 LSB, MSB  | R, W, RAM   | number of sent/received bytes<br>(without startByte and end byte)               | min=1, max=512<br>default = 0, or value in the last DMX TX packet  |
| Reserved  | 10 LSB, MSB | R, RAM      |   |  |
| MsgCount DMX 1  | 11 LSB, MSB | R, RAM      | DMX bus message counter   | just for diagnostics, the register increments with each Break+MAB on the DMX bus, starts again with 0 when overflows |
| TxStartByte DMX 1   | 12 LSB      | R, W, RAM   | start byte (start code) for Master.<br>Normally will be ignored, and set to 0x0 | Definition of the first (start) byte of the DMX TX telegram<br><br>default = 0, or value in the last DMX TX packet   |
| Reserved  | 12 MSB      |             |   |  |
| RxStartByte   | 13 LSB      | R, RAM      | start byte (start code), as read by Sniffer                                     |  |
| Reserved  | 13 MSB      |             |   |  |
| Default size DMX 1  | 14 LSB, MSB | R,W, EEPROM | default DMX packet length   | default = 0  |
| Default Timeout DMX 1                                       | 15 LSB, MSB | R,W, EEPROM | limit to specify the behaviour after power dropout and restoration, see above.  | in seconds, 1...3600<br>default = 600 s  |
| DEF TxStartByte DMX 1                                       | 16 LSB      | R,W, EEPROM | start byte (start code) for Master.<br>Normally will be ignored, and set to 0x0 | Definition of the first (start) byte of the DMX TX telegram<br><br>default = 0                                       |
| Reserved  | 16 MSB      | R,W, EEPROM |   |  |
| DEF Tx period DMX 1   | 17 LSB, MSB | R,W, EEPROM | period of repeating of TX messages when restored from defaults                  | in s*1000; min 0.1 s, max 65.5 s<br>default = 0  |
| <b>DMX 1: Tx channels – for data writing in Master mode</b> |             |             |   |  |
| TxChannel1  | 128 LSB     | R,W, RAM    | writing invokes transmitting of the DMX telegram to DMX                         | 0...255, function according to the controlled device documentation   |
| TxChannel2  | 128 MSB     | R,W, RAM    | writing invokes transmitting of the DMX telegram to DMX                         | 0...255, function according to the controlled device documentation   |
| TxChannel3  | 129 LSB     | R,W, RAM    | writing invokes transmitting of the DMX telegram to DMX                         | 0...255, function according to the controlled device documentation   |
| TxChannel4  | 129 MSB     | R,W, RAM    | writing invokes transmitting of the DMX telegram to DMX                         | 0...255, function according to the controlled device documentation   |
| ...   | ...         |             | ...   | ...  |
| TxChannel511  | 385 LSB     | R,W, RAM    | writing invokes transmitting of the DMX telegram to DMX                         | 0...255, function according to the controlled device documentation   |

|   |                   |            |  |   |
|---|-------------------|------------|--|---|
| TxChannel512  | 385 MSB           | R,W,RAM    | writing invokes transmitting of the DMX telegram to DMX                                    | 0...255, function according to the controlled device documentation              |
| <b>DMX 1: Rx channels – for data reading in Sniffer mode</b>                      |                   |            |  |   |
| RxChannel1  | 512 LSB           | R,RAM      | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel2  | 512 MSB           | R,RAM      | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel3  | 513 LSB           | R,RAM      | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel4  | 513 MSB           | R,RAM      | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| ...   | ...               |            | ...  | ...   |
| RxChannel511  | 768 LSB           | R,RAM      | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel512  | 768 MSB           | R,RAM      | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| Serial Number   | 1003-1004 LSB,MSB | R          | Displays device serial number  |   |
| <b>DMX 1: Default values – for power dropout longer than the configured limit</b> |                   |            |  |   |
| DefChannel1   | 1024 LSB          | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel2   | 1024 MSB          | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel3   | 1025 LSB          | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel4   | 1025 MSB          | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| ...   | ...               |            | ...  | ...   |
| DefChannel511   | 1280 LSB          | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel512   | 1280 MSB          | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| <b>DMX 2: General parameters</b>  |                   |            |  |   |
| Firmware FPGA DMX 2   | 2005 LSB          | R          | Version of FPGA firmware   |   |
| Reserved  | 2005 MSB          |            |  |   |

|   |               |             |   |  |
|---|---------------|-------------|---|--|
| Configuration DMX 2   | 2006 LSB      | R,W,EEPROM  | Master/Sniffer<br>0x00 – master<br>0x01 – sniffer   | See Master and Sniffer modes description above.<br>default = 0, Master   |
| Reserved  | 2006 MSB      |             |   |  |
| Reserved  | 2007 LSB      |             |   |  |
| Reserved  | 2007 MSB      |             |   |  |
| Period DMX 2  | 2008 LSB, MSB | R,W, RAM    | repeating in ms (if 0x0, telegram is not repeated, it is sent only on Modbus writing into the Modbus TX area)<br><br>for Master: sending of DMX telegram to DMX bus<br>for Sniffer: update of Modbus registers by values sniffed at the DMX bus | in ms, 100...65535;<br>min 0.1 s, max 65.5 s<br><br>default = 0, or value in the last DMX TX packet                  |
| Size DMX 2  | 2009 LSB, MSB | R, W, RAM   | number of sent/received bytes (without startByte and end byte)  | min=1, max=512<br><br>default = 0, or value in the last DMX TX packet  |
| Reserved  | 2010 LSB, MSB |             |   |  |
| MsgCount DMX 2  | 2011 LSB, MSB | R, RAM      | DMX bus message counter   | just for diagnostics, the register increments with each Break+MAB on the DMX bus, starts again with 0 when overflows |
| TxStartByte DMX 2   | 2012 LSB      | R, W, RAM   | start byte (start code) for Master. Normally will be ignored, and set to 0x0  | Definition of the first (start) byte of the DMX TX telegram<br><br>default = 0, or value in the last DMX TX packet   |
| Reserved  | 2012 MSB      |             |   |  |
| RxStartByte DMX 2   | 2013 LSB      | R, RAM      | start byte (start code), as read by Sniffer   |  |
| Reserved  | 2013 MSB      |             |   |  |
| Default size DMX 2  | 2014 LSB, MSB | R,W, EEPROM | default DMX packet length   | default = 0  |
| Default Timeout DMX 2                                       | 2015 LSB, MSB | R,W, EEPROM | limit to specify the behaviour after power dropout and restoration, see above.  | in seconds, 1...3600<br>default = 600 s  |
| DEF TxStartByte DMX 2                                       | 2016 LSB      | R,W, EEPROM | start byte (start code) for Master. Normally will be ignored, and set to 0x0  | Definition of the first (start) byte of the DMX TX telegram<br><br>default = 0                                       |
| Reserved  | 2016 MSB      | R,W, EEPROM |   |  |
| DEF Tx period DMX 2   | 2017 LSB, MSB | R,W, EEPROM | period of repeating of TX messages when restored from defaults  | in s*1000; min 0.1 s, max 65.5 s<br>default = 0  |
| <b>DMX 2: Tx channels – for data writing in Master mode</b> |               |             |   |  |
| TxChannel1  | 2128 LSB      | R,W, RAM    | writing invokes transmitting of the DMX telegram to DMX   | 0...255, function according to the controlled device documentation   |

|   |          |            |  |   |
|---|----------|------------|--|---|
| TxChannel2  | 2128 MSB | R,W,RAM    | writing invokes transmitting of the DMX telegram to DMX                                    | 0...255, function according to the controlled device documentation              |
| TxChannel3  | 2129 LSB | R,W,RAM    | writing invokes transmitting of the DMX telegram to DMX                                    | 0...255, function according to the controlled device documentation              |
| TxChannel4  | 2129 MSB | R,W,RAM    | writing invokes transmitting of the DMX telegram to DMX                                    | 0...255, function according to the controlled device documentation              |
| ...   | ...      |            | ...  | ...   |
| TxChannel511  | 2385 LSB | R,W,RAM    | writing invokes transmitting of the DMX telegram to DMX                                    | 0...255, function according to the controlled device documentation              |
| TxChannel512  | 2385 MSB | R,W,RAM    | writing invokes transmitting of the DMX telegram to DMX                                    | 0...255, function according to the controlled device documentation              |
| <b>DMX 2: Rx channels – for data reading in Sniffer mode</b>                      |          |            |  |   |
| RxChannel1  | 2512 LSB | R, RAM     | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel2  | 2512 MSB | R, RAM     | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel3  | 2513 LSB | R, RAM     | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel4  | 2513 MSB | R, RAM     | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| ...   | ...      |            | ...  | ...   |
| RxChannel511  | 2768 LSB | R, RAM     | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| RxChannel512  | 2768 MSB | R, RAM     | received byte from DMX (Sniffer), Modbus reading invokes reading of DMX telegram from FPGA | 0...255, function according to the controlled device documentation              |
| <b>DMX 2: Default values – for power dropout longer than the configured limit</b> |          |            |  |   |
| DefChannel1   | 3024 LSB | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel2   | 3024 MSB | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel3   | 3025 LSB | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel4   | 3025 MSB | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| ...   | ...      |            | ...  | ...   |

|               |          |            |  |   |
|---------------|----------|------------|--|---|
| DefChannel511 | 3280 LSB | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |
| DefChannel512 | 3280 MSB | R,W,EEPROM |  | 0...255, function according to the controlled device documentation, default = 0 |

**Changes  
in versions**

07/2017 – First datasheet version.

01/2018 – Terminal description added, translation into English.

05/2018 – 2 channels extension, extended Modbus table, new screenshots, new product image.

08/2021 – Stylistic adjustments, change of logo.