Communication Protocol
Relay-Board-RDP

Document:

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Revision History:

Rev.:	Date:	Name:	Changes:
100	2020.06.06	FLB	Initial version in German
101	2020.07.07	FLB	Corrective actions protocol USB and BUS

1. Interface overview

The Relay-Board-RDP comes with two interfaces

- USB0 PC
- Expansion-Header IC12 / UART

Both Interfaces are parameterized with the following values:

- Baud rate: 115200
- 8 Bit
- 1 Stop bit
- no parity bit
- no flow control

Both interfaces handle the following protocol identically. Answers to previous calls will be only transmitted at the interface it was received at. Events will also only be transmitted at the interface, at which events were activated on.

2. Communication

All messages end with the ASCII control character New Line '**\n**' (0x0A). To make the text more readable, this won't be specifically mentioned in the following chapters any more.

2.1 Error

If an Error occurs in a message, e.g. a wrong syntax, a notification will be send in any case. But it does not contain any error code.

2.1.1 Structure

ERROR

2.1.2 Value

-

2.1.3 Example

```
ERROR\n
```

2.2 Bootup

A bootup-message will be send at every boot of the microcontroller without request.

2.2.1 Structure:

^BOOTUP:<RESET REASON>

2.2.2 Value

<RESET REASON> may be one of the following values:

- 0: Option Byte Loader Reset
- 1: Hardware Reset (Reset at hardware button press or from FTDI)
- 2: Power Out Reset / Power Down Reset
- 3: Software Reset
- 4: Independent Watchdog Reset
- 5: Window Watchdog Reset
- 6: Low Power Reset

2.2.3 Example

Bootup-message after software reset (section 2.10 Software Reset)

```
^BOOTUP:3\n
```

2.3 Global Events

To monitor the inputs and events without polling, there is the possibility to enable **global** events for each interface separately. On every change of an input or output bit, a message will be send if global events were activated.

The structure of the particular event message will be given at the corresponding examples of the following chapters.

2.3.1 Structure

2.3.1.1 Set value:

EVT:<VALUE>

2.3.1.2 Get value:

EVT?

2.3.2 Value

<VALUE> can be one of the following values:

- 0: Deactivate events
- 1: Activate events

2.3.3 Example

Activate global events for the corresponding interface:

```
EVT:1\n
```

Response after activating the global events or at „get value“:

```
EVT:1\n
```

2.4 LED

There are 3 user LEDs on the Relay-Board-RDP which can be controlled individually.

- Label **LED1** – Schematic Led5
- Label **LED2** – Schematic Led6
- Label **LED3** – Schematic Led7

2.4.1 Structure

2.4.1.1 Set value:

LED<LED_NR>:<VALUE>

2.4.1.2 Get value:

LED<LED_NR>?

2.4.2 Value

<LED_NR> can be one of the following values:

- 1: LED1
- 2: LED2
- 3: LED3

<VALUE> can be one of the following values:

- 0: Deactivate LED
- 1: Activate LED

2.4.3 Example

Activate LED:

```
LED1:1\n
```

Response after activating or at “get value”:

```
LED1:1\n
```

Event message after the value of LED1 has changed:

```
^LED1:1\n
```

2.5 User Button

There is a user button on the Relay-Board-RDP which can be polled.

- Label **User** – Schematic SW1

2.5.1 Structure

2.5.1.1 Set value:

Not avaliable

2.5.1.2 Get value:

BTN?

2.5.2 Value

<VALUE> can be one of the following values:

- 0: Button not pressed
- 1: Button pressed

2.5.3 Example

Response on „get value“:

```
BTN:1\n
```

Event message after BTN value has changed:

```
^BTN:1\n
```

2.6 Input

There are the following 8 inputs on the Relay-Board-RDP which can be polled.

- Label **IN1** – Schematic X15 Pin 10 and X14 Pin 15
- Label **IN2** – Schematic X15 Pin 09 and X14 Pin 13
- …
- Label **IN8** – Schematic X15 Pin 03 and X14 Pin 01

2.6.1 Structure

2.6.1.1 Set value:

Not avaliable

2.6.1.2 Get value:

IN<VALUE>?

2.6.2 Value

<VALUE> can be one of the following values:

- 1-8: For input 1-8
- B: Display all inputs in binary format
- H: Display all inputs in hexadecimal format
- D: Display all inputs in decimal format

2.6.3 Example

For this example, there is a high signal at input 1, 3, 5 and 7. These are the responses for the “get value” requests with the following values:

Value = 1-8

```
IN6:0\n
```

Value = B

```
INB:0b01010101\n
```

Value = H

```
INH:0x55\n
```

Value = D

```
IND: 85
```

Event message, after value at input 6 has changed:

```
^IN6:0\n
```

2.7 Relays

There are the following 4 relays on the Relay-Board-RDP which can be controlled individually.

- Label **Relais 1** – Schaltplan K1A
- Label **Relais 2** – Schaltplan K1B
- Label **Relais 3** – Schaltplan K1C
- Label **Relais 4** – Schaltplan K1D

2.7.1 Structure

2.7.1.1 Set value:

REL<REL_NR>:<VALUE>

2.7.1.2 Get value:

REL<REL_NR>?

2.7.2 Value

<REL_NR> can be one of the following values:

- 1: Relay 1
- 2: Relay 2
- 3: Relay 3
- 4: Relay 4

<VALUE> can be one of the following values:

- 0: Relay de-energized
- 1: Relay energized

2.7.3 Example

Energize relay 2:

```
REL2:1\n
```

Response after energizing the relay of at „get value“:

```
REL2:1\n
```

Event message after value for relay 2 has changed:

```
^REL2:1\n
```

2.8 USB

There are signal relays for 2 USB signal lines on the Relay-Board-RDP which can be controlled individually.

- Label **USB1 IN** and **USB1 OUT** – Schematic X6/X5
- Label **USB2 IN** and **USB2 OUT** – Schematic X4/X3

2.8.1 Structrue

2.8.1.1 Set value:

USB<USB_NR>:<VALUE>

2.8.1.2 Get value:

USB<USB_NR>?

2.8.2 Value

<USB_NR> can be one of the following values:

- 1: USB1
- 2: USB2

<VALUE> can be one of the following values:

- 0: No connection at USB signal line
- 1: Connection at USB signal line

2.8.3 Example

Activate USB2:

```
USB2:1\n
```

Response after activating USB2 or at „get value“:

```
USB2:1\n
```

Event message after value of USB2 has changed:

```
^USB2:1\n
```

2.9 Bus

There is a switchable bus with signal lines on the Relay-Board-RDP which can be controlled.

- Label **BUS-IN** (X10) and **JTAG-IN** (X7) / **BUS-OUT** (X11) and **JTAG-OUT** (X8)

2.9.1 Structure

2.9.1.1 Set value:

BUS:<VALUE>

2.9.1.2 Get value:

BUS?

2.9.2 Value

<VALUE> can be one of the following values:

- 0: No connection of BUS lines
- 1: Connection of BUS lines

2.9.3 Example

Activate BUS:

```
BUS:1\n
```

Response after activating BUS or at “get value”:

```
BUS:1\n
```

Event message after value of BUS has changed:

```
^BUS:1\n
```

2.10 Software Reset

The microcontroller on the Relay-Board-RDP can be reset with a reset command.

2.10.1 Structure

2.10.1.1 Set value:

RST

2.10.1.2 Get value:

Not avaliable

2.10.2 Werte

Not avaliable

2.10.3 Example

Microcontroller reset:

```
RST\n
```

Response to reset command:

See section *2.2 Bootup*