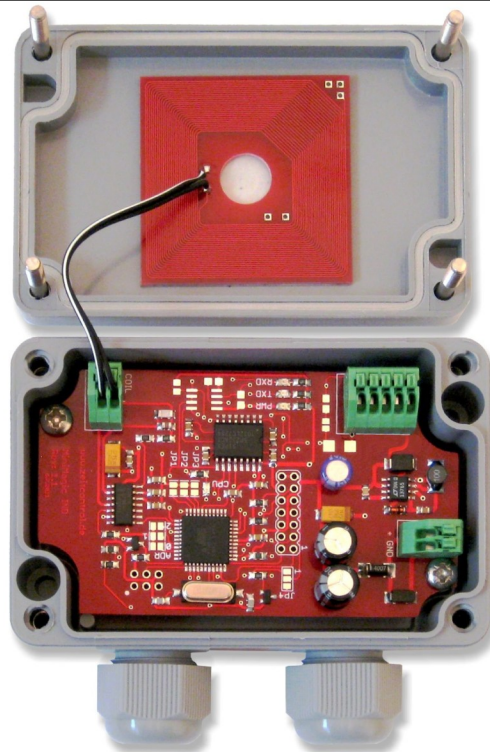




MiniMagic-485I

EM4102 Transponder - Reader



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Valid for board version 1.0 / software version 3.0.

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1. General description

The MiniMagic-485I is an industrial OEM reader for EM4102 transponders (125KHz), for integration into customer specific systems. Communication with the host system is done via an RS-485 interface. For connection to a PC an RS-485/ RS-232 converter, e.g. the ZeitControl Converter (serial/ USB), is required. The MiniMagic-485I requires a DC voltage supply of 9V – 24V.

1.1 Technical data

Power supply	9V – 24V DC
Power consumption	max. 150 mA (operation)
Relay	optional
External outputs	20mA per output, total 30mA.
Interfaces	RS-485
supported transponders	EM4102 (Unique) 48Bit read/ only.
Frequency	125KHz
Reading distance	Approx. 90 mm (ISO – cards)
Dimensioning (board)	44mm x 44mm x 15mm (w x d x h)
Dimensioning (Antenna)	37mm x 47mm x 2mm (w x d x h)

The required transponders can be obtained from ZeitControl GmbH in the following designs, among others:

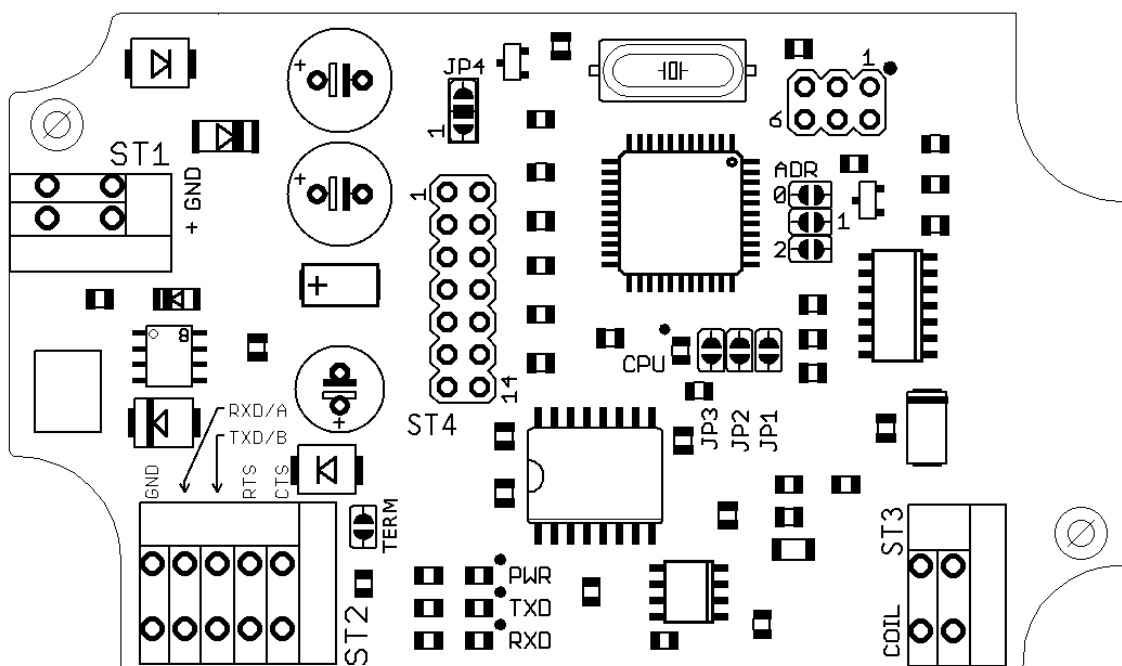
- ISO – card
- Disc tags, different diameters
- key fob
- Glass tags
- Customer-specific versions

2. Commissioning

The MiniMagic-485I is connected via plug-in terminals.

Terminal	Designation	Function
ST1	+	VCC (9V... 24V)
ST1	GND	GND
ST2	RXD/ A	A-wire RS-485
ST2	TXD/ B	B-wire RS-485
ST3	-	Antenna connection
ST3	-	Antenna connection

2.1 Board view



Front (component side)

2.2 Power supply

The MiniMagic-485I can be supplied with a DC voltage of 9V to 24V. A voltage regulator is integrated on the MiniMagic-485I circuit board, but no sieving.

The supply voltage must therefore be well screened.

2.3 Interface

Communication between MiniMagic-485I and a PC or Hosts system is done via an RS-485 interface. The interface parameters of the MiniMagic-485I are fixed to 9600 bps, 8 data bits, 1 stop bit, no parity.

2.4 RS485 termination

Next to ST2 there is a solder bridge marked 'TERM'. By bridging (0Ω / solder bridge) the end points of the RS-485 bus can be terminated with the prescribed 120Ω.

2.5 Addressing

The MiniMagic-485I works with an RS-485 interface. It is possible that several participants are connected via one bus. One participant (host/ PC) assumes a master function (i.e. communication is initiated by this participant), the other participants work as slaves (i.e. communication is only performed by the host). A unique address per bus must be used to select a station. This address is set on the MiniMagic-485I via 0Ω resistors/ bridges. The jumpers are located next to the processor and are marked with "ADR" (address) and the numbers "0" to "2". With the three possible jumpers, the addresses 1 to 7 can be set. The jumpers are queried when switching on the MiniMagic-485I.

Note: Switch off the power supply before soldering the jumpers.

Address	Adr 2	Adr 1	Adr 0
1	open	open	closed
2	open	closed	open
3	open	closed	closed
4	closed	open	open
5	closed	open	closed
6	closed	closed	open
7	closed	closed	closed

Note: The possible address space of the devices is shortened compared to the standard MiniMagic-485.

2.6 Configuration

There are 3 solder bridges on the circuit board for configuration. The solder bridges are located below the CPU and are marked JPn.

Designation	Name	Comment
JP1	HITAG	Turns on Hitag1 /2 /S detection.
JP2	-	Not used
JP3	-	Not used

2.7 Light emitting diodes

The LEDs on the board indicate corresponding operating states.

Designation	Color	Comment
PWR	green	Operating states
TXD	red	Serial transmission display
RXD	green	Serial reception indicator
CPU	yellow	Transponder detected. Deleted when the transponder is reported to the host via the 'Read' command.

2.8 Relay

No relay is provided on the board. However, the relay function can be tapped via pin 9 of the 14-pin header ST4. The signal can be inverted via solder bridge JP4. The solder bridge JP4 is not configured in the delivery state.

Pin	Name	Comment
12	VCC	Power supply, a maximum of 50mA can be drawn
13	GND	
14	GND	
9	RELAY	Relay output (maximum 20mA)

JP4 solder bridge	Signal
1-2	directly
2-3	Inverted

3. Communication protocol

MiniMagic-485I can be controlled for test purposes with a terminal program that allows the input of control characters (STX and ETX). Furthermore it must be able to switch the transmission direction of the RS-485 interface or work together with the used RS-485/ RS-232 converter.

The transmission parameters of the RS-485 interface are 9600 bits/s, 8 data bits, 1 stop bit, no parity.

The device is set to address 1 on delivery.

In general, when transmitting to the MiniMagic-485I an STX (ASCII 2) must be sent at the beginning of each transmission and an ETX (ASCII 3) at the end of each transmission. Each telegram is basically structured as follows:

<STX><Address>Comment<ETX>.

The address must be entered with 2 ASCII characters and a leading zero. For example, address 1 is represented as "01", i.e. by the characters "0" (ASCII 30_{hex}) and "1" (ASCII 31_{hex}).

The MiniMagic-485I reacts to the set address, as well as to the broadcast address "99". When using the broadcast address, make sure that only one device is active on the bus. The device always uses the set address in the reply.

In the following command description, spaces in the commands/ replies are indicated by ' _ '.

Example:

<STX>01relay_10<ETX>

is sent (in hexadecimal format):

02 30 31 72 65 6C 61 69 73 20 31 30 03.

3.1 Command 'ALIVE' or '?'

This command is used to determine if a MiniMagic-485I with the selected address is present and responds. This command can be used e.g. by a host program to determine which device addresses MiniMagic-485I on a bus is responding to. The command "Alive" and "?" are equal.

Syntax

```
command:      <STX><adr>alive<ETX>
answer:       <STX><adr>_0<ETX><CR><LF>
              <STX><adr>_1<ETX><CR><LF>
```

Depending on whether a transponder has been read, a "1" (transponder data available) or "0" (no transponder data available) is reported back.

3.2 Command 'READ'

With the READ command the ID of the last recognized transponder is read out. The MiniMagic-485I continuously reads the IDs of the transponders within reading range. This ID is stored in the internal memory of the MiniMagic-485I and is output with the next READ command and then deleted.

Syntax

```
command:      <STX><Adr>read<ETX>
answer:       <Adr>:_1122334455_LL_TT<CR><LF>
```

Where LL is the checksum in hexadecimal notation.

The transponder ID is also output in hexadecimal. The response is completed with Carriage Return (ASCII 13) and Line Feed (ASCII 10).

The value TT (without leading zeros, variable length, decimal) returns the time between the reading of the transponder and the reading of the transponder data, with the READ command. Units of about 10 ms each are used. A value of 15 corresponds to a time of 150 ms.

Special case: No transponder was read:

Syntax

```
command:      <STX><Adr>read<ETX>
answer:       <Adr>:_NO_TRANSponder<CR><LF>
```

Calculation of the checksum: Starting from 0, all 5 data bytes are XORed.

3.3 Command 'RELAY'

The relay can be activated via the interface.

The general syntax is "relay t", where t is the time in 100 ms steps. There are the special cases "0" (relay off) and "1" (relay on); values between 2 and 65535 are interpreted decimally as time (in 100 ms units). The relay time is processed in the background, the device is immediately ready for the next command.

Syntax

```
command:      <STX><Adr>relay_<t><ETX>
answer:      [none]
```

3.4 Command 'INFO'

A copyright notice is issued here. The version number/ date may be different.

Syntax

```
command:      <STX><Adr>info<ETX>
answer:      <ADR>:_(c)_ZeitControl_cardsystems_GmbH_1997-
              2009_V3.0a_04.11.2009,_RS485
```

4. HITAG

With the configuration solder bridge JP1, the recognition of transponders of the HITAG family can be activated. The output of the detected transponders is analogous to the EM4102 transponder, as a 5 byte number (10 characters). The first byte indicates the type of HITAG transponder.

1. Byte	Ascii-sign	Transponder type
48	'H'	HITAG 2
68	'h'	HITAG 1
73	's'	HITAG S

5. Annex

5.1 Document version

Datum	Change
11/2009	Initial version, previous version old Minimagic485
09/2011	Supplement <CR><LF> at "Alive" command.
10/2011	Transfer for MiniMagic-485I
03/2012	Correction power connection circuit board, plug.
12/2013	Minor inconsistencies/ spelling errors removed.
01/2020	Minor inconsistencies/ spelling errors removed.