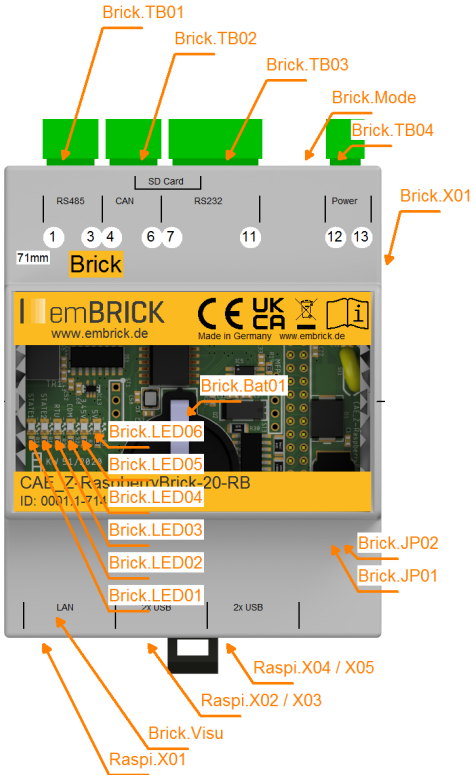
CAE_Z-RaspberryBrick-20-RB

1.1 Description

ID: 1-703
Order No.: CAE_Z-RaspberrypBrick-1#-RB
Terminal: push-in (for ≤ 1.5mm²)
Size: (72mm x 90mm)
BBFCP: 2-1-1
Weight: 200g

This is an adaption board for the Raspberry-Pi which becomes an important education tool and more and more professional industrial platform for many measure and control applications. By keeping the standard brick sizes, it is possible to use this board in all given mounting types.
The unit is driven by 24Vdc and also serves as power-supply unit that delivers 3.45V and 24V for the connected emBRICK slave modules. This brick acts as a combination of a remote and local master. Here is the Raspberry Pi the remote master and a separate MCU as a coupling brick (local master). The Pi and MCU communicates with a fast internal ModBUS-RTU.

1.2 Connectors and Indication-/Operation-Elements



1.2.1 Connectors (X)

Hereinafter the necessary connections, connectors and there specification for operation are listed. The location of a specific connector is documented with the ID (left coloumn) in the previous Illustrations.

ID	Model	Usage	Num. of term.	Model / Series	connection	elec. usage
Brick.Visu	Pin connector	PC visualisation	4	2,54mm	only for service	TTL-Level (3.3V) 38400 Baud
Brick.X01	Box connector	emBRICK I/O-Bus	10		-	brickBUS master

1.2.2 Terminal block (TB)

The following Illustration the technical details for Terminal blocks are listed. The location of a specific block is documented with the ID (left coloumn) in the preavious Illustrations.

ID	Model	Model / Series	Grid	Num. of term.	connection	elec. usage
Brick.TB01	Steckerwanne	PTR STL1550	3.5mm	3	up to 1.5mm²	RS485 interface
Brick.TB02	Steckerwanne	PTR STL1550	3.5mm	3	up to 1.5mm²	CAN interface
Brick.TB03	Steckerwanne	PTR STL1550	3.5mm	5	up to 1.5mm²	RS232 interface

Brick.TB04	Steckerwanne	PTR STL1550	3.5mm	2	up to 1.5mm²	power supply input 24V dc

1.2.3 Terminal assignment

Here the assignment of individual terminals and there affilation to terminal blocks (Te block), terminal numbers (Te no.) and short description (T.desc.) aswell as there electrical function and usage are explained.
The associated mechanical and electrical properties are stated with the specific terminal block in the previous chapter. The position of a terminal is dedicated through the "Te block" and the actual terminal number (Te no.) or the therminal description (T.descr.) in the previous Illustration respectivly.
In the coloumn "usage" the technical-/ device-functional use is listed.

Te block	Te no.	T. descr.	Function	Usage
Brick.TB01	1	GND	Ground	RS485 Bus
Brick.TB01	2	B	RS485 B	RS485 Bus
Brick.TB01	3	A	RS485 A	RS485 Bus
Brick.TB02	4	GND	Ground	CAN Bus
Brick.TB02	5	CAN H	CAN H	CAN Bus
Brick.TB02	6	CAN L	CAN L	CAN Bus
Brick.TB03	7	GND	Ground	RS232
Brick.TB03	8	RX	RS232 RX debug only	RS232
Brick.TB03	9	TX	RS232 Tx debug only	RS232
Brick.TB03	10	RX	RS232 Rx	RS232
Brick.TB03	11	TX	RS232 Tx	RS232
Brick.TB04	12	+24V	Supply	Supply
Brick.TB04	13	GND	Ground	Supply

1.2.4 Jumper overview (JP)

The individuell jumpers, their combination to logical jumper groups and their usage are stated below. The location of individual jumpers is determined through the jumper ID (left coloumn) in the previous Illustrations.

ID	Jumper Block	Usage
Brick.JP01	Brick.JP-RemoteBUS	Choose a UART for the remoteBUS (ModBUS)
Brick.JP02	Brick.JP-RemoteBUS	Choose a UART for the remoteBUS (ModBUS)

1.2.5 Jumpergroups and configuration

Hereafter possible jumper groups settings are described. They refer to jumper-ID of the previous listings. A "o" symbolises a disconnected jumper, a "x" symbolises a connected jumper.

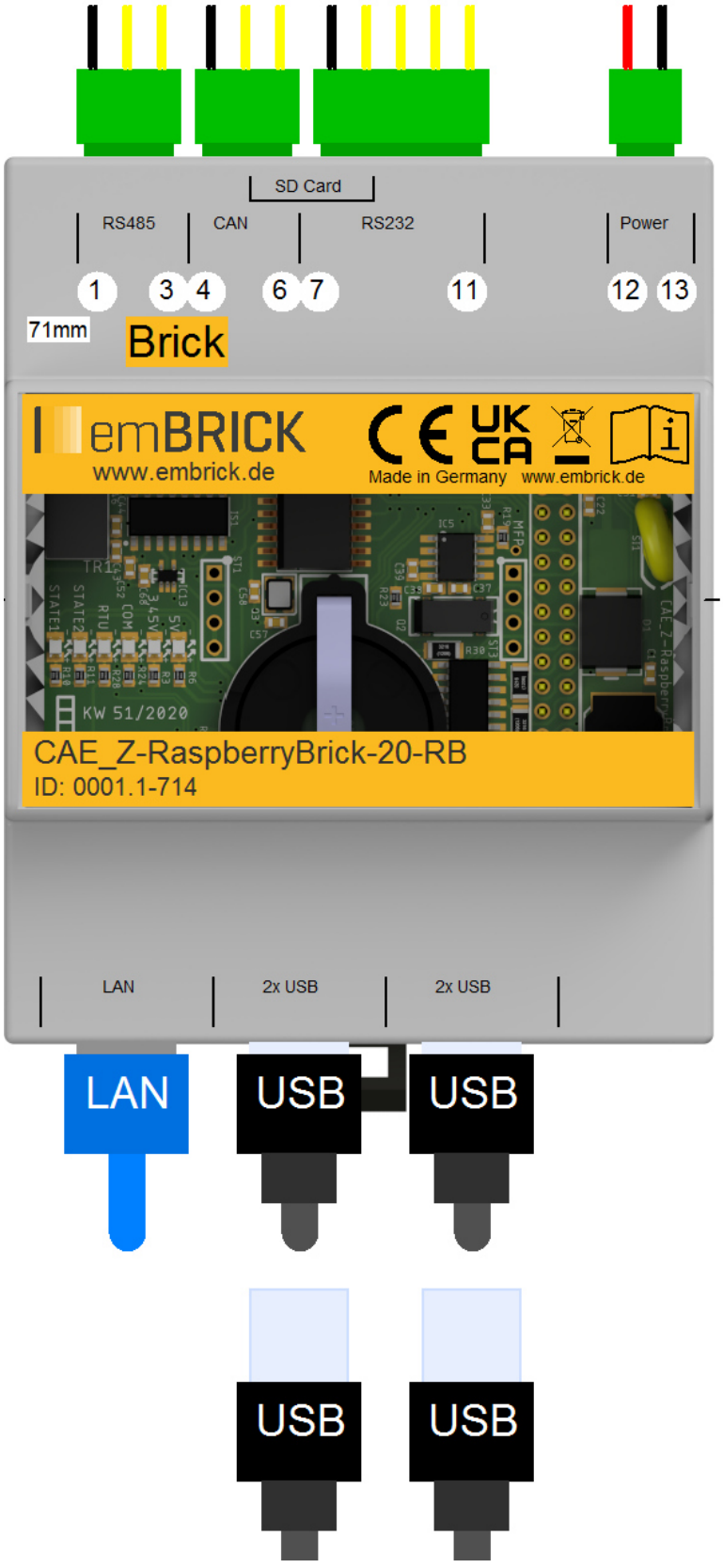
Jumper Block	Selections	Effect
Brick.JP-RemoteBUS	A: JP1=1-2 JP2=1-2 B: JP1=2-3 JP2=2-3	The communication between the Raspberry Pi and the also mounted PIC32 (local master) works over ModBUS RTU (UART). This means that you must program your Raspberry Pi as a remote master to send query commands to the PIC32 (local master). The LWCS answers to these commands the same way like a normal coupling brick (uniBridge, patBridge) and regulate the communication with the BrickBUS. You have two different UARTs to communicate between the Raspberry Pi and the PIC32. One is over an SPI to UART converter (standard) and the other way is over the UART port of the Raspberry Pi. You can choose between these two options A: over SPItoUART converter B: UART 0 (GPIO14+15)

1.2.6 LED Indications

ID	Type	Specification	Type / Usage
Brick.LED01	SMD-LED	yellow	Shows state of 5V
Brick.LED02	SMD-LED	yellow	Shows state of 3,45V
Brick.LED03	SMD-LED	green	Shows state of PIC32 brickBUS
Brick.LED04	SMD-LED	yellow	Shows state of PIC32 ModBUS RTU Slave
Brick.LED05	SMD-LED	yellow	Shows state of RasPi State 2 (GPIO12)
Brick.LED06	SMD-LED	yellow	Shows state of RasPi State 1 (GPIO5)

1.3 Input-/Output Scheme

The following diagram shows the adaption of the control unit. To avoid overlapping, some wires are displayed interrupted and dashed.



1.4 Technical Data

1.4.1 User Notes

• Blinking behavior StateLED:
Each Morse code is 3 seconds long!
not initialized = flashing continuously at approx. 5Hz
no communication = short-long-short
too little communication = short-short-short
disturbed communication = short-long-long
OK = continuous flashing at approx. 1Hz (0.6-1.5Hz)

1.4.2 Developer Notes

Raspberry Pi GPIO assignment to the functions

On **TB01** is the RS485 interface with this connections to the RaspberryPI pin:
MOSI = 19; MISO = 21; CLK = 23; SEL = 26; INT = 11
Onboard is the SC16IS740 a SPI to UART transfer Chip - on the same SPI with RS232 & remoteBUS.

On **TB02** is the CAN interface with this connections to the RaspberryPI pin:
MOSI = 19; MISO = 21; CLK = 23; SEL = 24; INT = 11
Onboard is the MCP2515 a SPI to CAN transfer Chip.

On **TB03** are two RS232 Interfaces one only for debug and one for common use.
common use
MOSI = 19; MISO = 21; CLK = 23; SEL = 24; INT = 11
Onboard is the SC16IS740 a SPI to UART transfer Chip - on the same SPI with RS485 & remoteBUS.
only debug
TX = 8; RX = 10

internal interfaces

RemoteBUS
MOSI = 19; MISO = 21; CLK = 23; SEL = 24; INT = 11
Onboard is the SC16IS740 a SPI to UART transfer Chip - on the same SPI with RS485 & RS232.

I²C
SDA = 2; SCL = 5
EEProm (24C256) with I²C Adress = 50h
RTC (MCP7940N) with I²C Adress = 6Fh

State LEDs pin low = LED on
State 1 = 29; State 2 = 32

1.5 History

On the following page you will find a list of changes that have been made to the product.

1.5.1 History

Date	Entry scope (HW, SWappl, SWapi, Release)	Entry type (Enhancement, Improvement, Bugfix, Release)	Version	Status (development, implemented, tested)	Responsible	Reason for the modification	Items of the modification	Impact for (end-)customer	Comment	location in model/source
xxxx-xx-xx		Release	0.99	tested	NSt					

For questions please contact:

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