EASY2502

Embedded Automation System

frenzel + berg electronic

General description

The EASY2502 controller system is a compact and very flexible control module for industrial applications.

The module comes with a CoDeSys PLC operating system and supports programming with up to 5 programming languages according to the IEC 61131-3.

Besides the programmimg system for PC there are various software librarys available within the controllers firmware. This allows the user a faster entry into the programming of the controller.

The system has 12 digital inputs, 10 digital outputs and in addition to that 2 analog inputs. An extension of these I/O's via the CANopen network is possible.

Several special functions like pulse-width-modulation, stepper motor positioning, encoder inputs, counter inputs and others are also supported.

A CANopen Master and CANopen Slave functionality are implemented, too.

Features

- **fast 16 bit CPU-core (Infineon C167)**
- **IEC 61131-3 programmable (CoDeSys)**
- **16 kByte program memory**
- **32 kByte data memory**
- **cycle time 4ms/1000 operations**
- **12 digital inputs 24V**
- **10 digital outputs 24V**
- **2 analog inputs 0..10V**
- **CAN-Bus according ISO11898 (up 1 MBaud)**
- **CANopen Master acc. to CiA standards DS301 V4, DSP302 V3.0, DSP405 V2.0 supporting up to 32 CANopen slaves up to 250/250 receive/transmit PDOs**
- **CANopen slave according to CiA-Standard DS401 V2.1 up to 16/16 receive/transmit PDOs**
- **dynamic PDO mapping**
- **variable PDO identifier**
- **node guarding, life guarding, heartbeat**
- **sync**
- **galvanic separation of CAN bus**
- **temperature range 0°- 70°C**

ordering information

article name	description
EASY2502C	EASY2502 in aluminium housing black / RAL5021 for DIN rail mounting
EASY2502V	EASY2502 like above but with additional power supply card

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EASY2502

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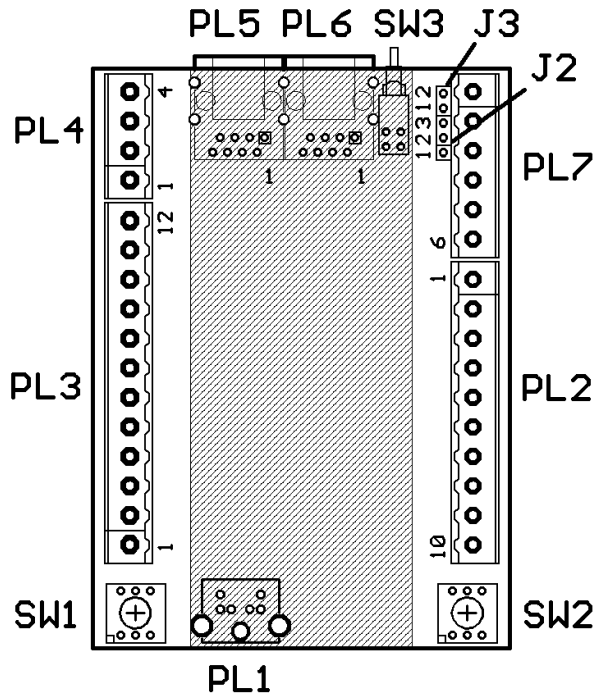
connectors

pin layout PL2

Connector for digital outputs.

pin no.	name	function
1	OUT1.1	digital output DC 24V
2	OUT1.0	digital output DC 24V
3	OUT0.7	digital output DC 24V
4	OUT0.6	digital output DC 24V
5	OUT0.5	digital output DC 24V
6	OUT0.4	digital output DC 24V
7	OUT0.3	digital output DC 24V
8	OUT0.2	digital output DC 24V
9	OUT0.1	digital output DC 24V
10	OUT0.0	digital output DC 24V

pin layout PL3

Connector for digital inputs.

pin no.	name	function
1	IN0.0	digital input DC 24V
2	IN0.1	digital input DC 24V
3	IN0.2	digital input DC 24V
4	IN0.3	digital input DC 24V
5	IN0.4	digital input DC 24V
6	IN0.5	digital input DC 24V
7	IN0.6	digital input DC 24V
8	IN0.7	digital input DC 24V
9	IN1.0	digital input DC 24V
10	IN1.1	digital input DC 24V
11	IN1.2	digital input DC 24V
12	IN1.3	digital input DC 24V

pin layout PL1

Connectors for CoDeSys programming and firmware updates. (RS232-interface)

frontal view of socket →
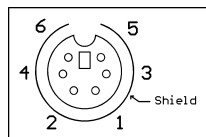
pin no.	name	function
1	RXD0	serial receive line (RS232-level)
2	N.C.	not connected
3	TXD0	serial transmit line (RS232-level)
4	G	CPU-ground
5	N.C.	not connected
6	FWU#	reserved (firmware update)

pin layout PL4

Connector for analog inputs.

pin no.	name	analog channel
1	AN2	analog input 0..10V
2	G	CPU ground
3	AN1	analog input 0..10V
4	G	CPU ground

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pin layout PL5, PL6

Connector sockets for CAN bus. The similar numbered pins of those two RJ-45 sockets are internally connected. (loop trough)

pin no.	name	function
1	-	loop trough
2	-	loop trough
3	CAN_GND	CAN-Ground
4	(CANL)	CAN-Low-Signal
5	(CANH)	CAN-High-Signal
6	-	loop trough
7	CAN_GND	CAN-Ground
8	V+CAN	CAN supply voltage

pin layout PL7

Power supply connector.

pin no.	name	function
1	M	CAN ground (+15 V ... +24) can be bridged with +24 V to CPU (signal G PIN 4) when the CAN interface is not powered from the CAN bus, but to be supplied from the system.
2	B	CAN supply (+15 V...+24) can be bridged with +24 V to CPU (signal C PIN5) when the CAN interface is not powered from the CAN bus, but to be supplied from the system.
3	S	shield
4	G	CPU ground
5	C	+24V for CPU
6	P	+24V for outputs (Power)

jumper settings for EASY2502

Jumper J2: pluggable jumper for the CAN power supply V+CAN via CAN bus!
If the galvanically separated CAN module shall be powered via the CAN bus itself, e.g. if there is no second power supply available, then jumper 2 has to be set as follows:
If the supply voltage of the CAN bus is in range of +7V up to +15V then the jumper must be in position 2-3.
If the supply voltage is in range of +15V up to +24V then the jumper has to be in position 1-2. An internal voltage regulator provides the right voltage for the CAN module.

ATTENTION: When powering the CAN Module on the EASY2502 via PL7 pin1 and pin2, that means NOT via CAN bus at PL5 and PL6, then Jumper J2 must NOT be set!

Jumper J3: jumper for CAN termination resistor

closed: an 120ohm resistor is connected between CAN high and CAN low! (= factory setting)
open: CAN bus is not terminated! A further CAN node should be connected. With the last CAN node, the CAN bus network must be terminated.

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pin description

power supply

The module has several connectors for the 24VDC (18..34V) power supply. The supply for the digital outputs, the CAN bus and the CPU are connected to separated connectors. The CPU must be powered via the the connectors PL7 pin5 (24V signal C) and pin4 (ground signal G). The digital outputs are supplied via pin6 at the PL7 connector (signal P 24V).

The power supply of the CAN bus is done with pin1 and pin2 oth the PL7 connector. If there is no galvanical separation of the CAN bus needed, then the CAN and the CPU's ground can be bridged. The same is for the 24V power supply if the voltage does not exceed the maximum CAN supply voltage of 24 Volt.

If the CAN bus module shall not be internally powered by the EASY2502 but via the CAN bus, then jumper J2 must be set as follows:
If the supply voltage is in range of +7V up to +15V, then the jumper should be in position 2-3. If the supply voltage is above +15V up to a maximum of +24 Volt, then the jumper J2 is to be set in position 1-2. An internal voltage regulator provides the right voltage for the CAN module.

Note: For internal supply of the CAN bus via the EASY2502 jumper J2 must not be set!

The shielding contacts of all connectors are connected to the PE (protection earth) connector.

digital inputs

The EASY2502 module offers 12 digital inputs. 4 of them (IN1.0…1.3) can be used for fast encoder or counter applications. All digital inputs are designed for 24V DC signal level. To protect the CPU from over voltage, all inputs are routed via an optocoupler. However there is no galvanic separation the the EASY's CPU.
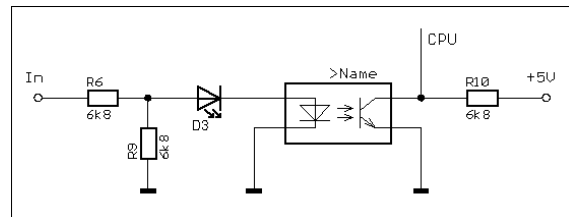
construction of the 8 standard digital inputs
(IN0.0..IN0.7)
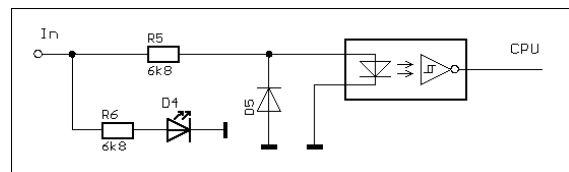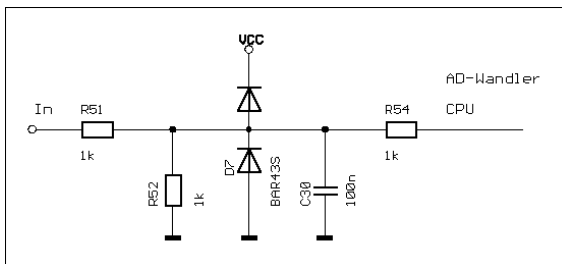

construction of the 4 fast digital inputs
(IN1.0..1.3)

the signal thresholds are:

input voltage / V	level
< 4	LOW
> 10	HIGH
4..10	UNDEFINED

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analog inputs

The module has two analog inputs. The analog input voltage is measured in the range of 0V to +10 V with 10 bit resolution and an accuracy of 1%. The input impedance is approximately 2 kOhms, and the conversion time is about 10us. Connecting voltages higher than +10 volts or negative voltages may cause irreparable damages to the device!

| analog inputs	
max. input voltage	+10 V
range	0 V ... +10 V
impedance	ca. 2 k?
resolution	10Bit
accuracy	1%

construction of the two analog inputs AN1 and AN2

digital outputs

The EASY2502 has a total of 10 digital outputs, 8 short-circuit proof standard outputs and two PWM outputs, which are equipped with a fast half-bridge driver. All 10 digital outputs are voltage-switching (high side switching) and drive 24V when in active state.

digital standard outputs

The output drivers of the 8 standard digital outputs (OUT0.0 OUT0.7 ..) are short circuit protected and have an over-temperature shutdown. Errors of this type are detected and signaled by a bus to the CPU.

| output voltage	18 .. 34V
RDS-On	0,1 ?
maximum current	1 A
peak current limit	8 A
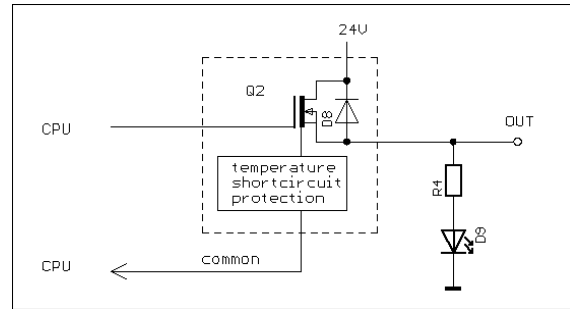
construction of the 8 standard digital outputs (OUT0.0..OUT0.7)

PWM outputs

The main drivers for the two PWM outputs (OUT1.0 and OUT1.1) are realized with two fast half-bridge drivers. **These are not short-circuit protected**. The maximum PWM frequency is at 50 kHz.

output voltage	18 .. 34V
RDS-On	0,3 ?
maximum current	1 A
peak current limit	2 A
max. PWM frequency	50kHz
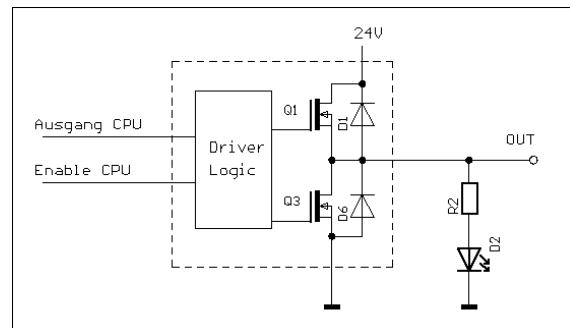
construction of the 2 fast PWM outputs (OUT1.0..OUT1.1)

rotary switch SW1 and SW2

The two rotary switches SW1 and SW2 are not currently used within the CoDeSys programming system and are reserved for future applications.

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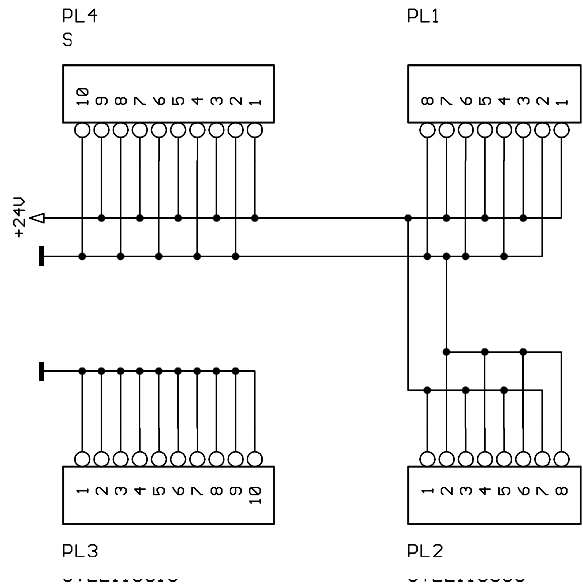
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power supply card

The module variant EASY2502V offers an additional power suplly card within the aluminium housing. This additional PCB-card provides 11 connectors for 24V DC 21 connectors for ground. With those additional connectors initiators can be supplied with 24V and actuators with ground.

It is recommended to supply the power connection for this supply card via PL2, e.g. pin7 (PVCC) and pin 8 for ground. (please see schematic on right side of this page)

It is important that the 24V and the ground are the same as for the CPU power supply.
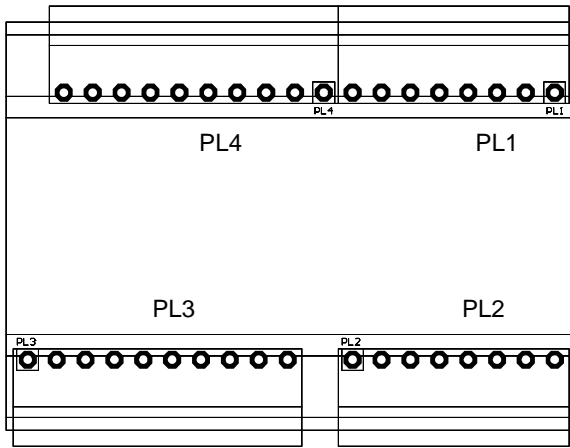
position of the connectors on the power supply card

electrical wiring of the connectors on the power supply card

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CoDeSys adjustments

For programming with CoDeSys the EASY2502 must be connected to the COM port of the PC. A corresponding programming cable is available for this purpose. The 6-pin mini-DIN connector of the programming cable is connected to the PL1 connector of the EASY2502. The 9-pin D-SUB must be connected to the COM port of the PC.

CoDeSys installation

- insert CoDeSys-CD
- choose CoDeSys-Version according to your OS:
  CoDeSys V23xx for Windows2000/XP
- execute the corresponding setup exe file and follow the instructions on screen

target installation

for using the EASY2502 under CoDeSys, the corresponding targets and libraries need to be installed. Therefore a programm called "installtarget" in the CoDeSys folder must be used. After starting "installtarget" open the FBE.tnf file from your CoDeSys CD. Now the available targets are shown on the left screen. Choose the path for the installation, which should be the main folder of your CoDeSys installation. C:\Programme\3S Software. Make sure your targets are installed into the sub folder: \Targets\FBE which should be the default setting of the „installtarget" program. Now the targets should be intalled to:
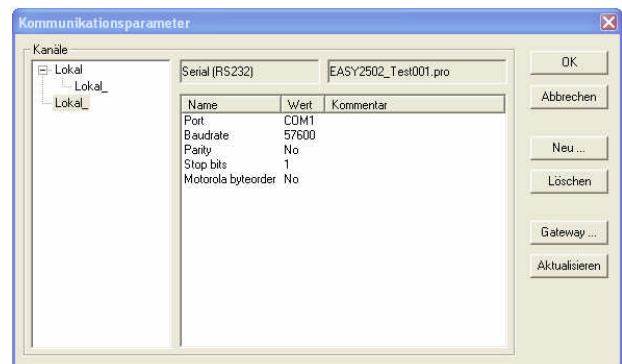C:\ Programme\3S Software\Targets\FBE .
At last choose the desired targets from the left screen an click on the install button. Installed targets are displayed in the right window.

baudrate and transmission mode adjustments

For runnung an EASY with CoDeSys the baudrate and transmission mode parameters of the COM interface need to be adjusted in CoDeSys. Therefore choose in the CoDeSys main menu the button "online->communication parameter". For your local COM serial (RS232) interface the following parameters have to be set:
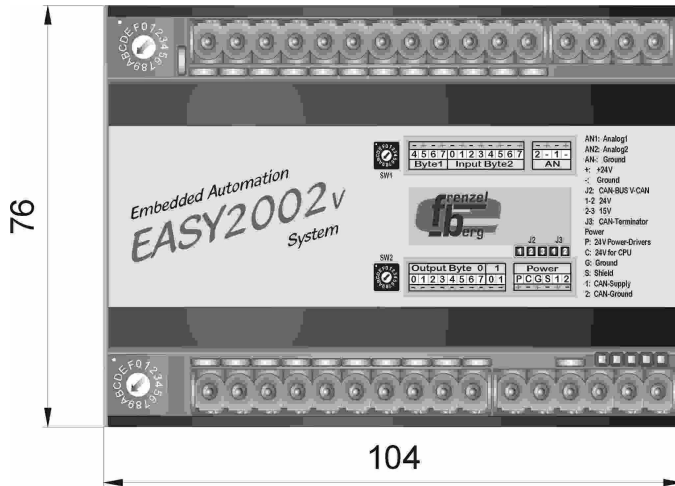
Port COMx
Baudrate 57600
Parity No
Stop Bits 1
Motorola Byteorder No

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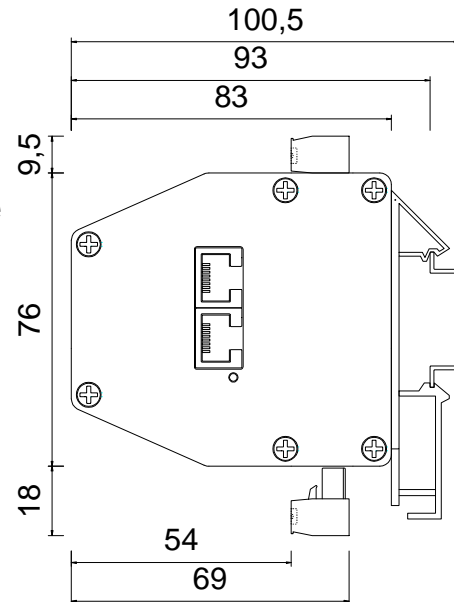
Measurement of the EASY2502C / EASY2502V without connection plugs (top view)

The connector plugs make another 9,5 mm at top and bottom at this top view.
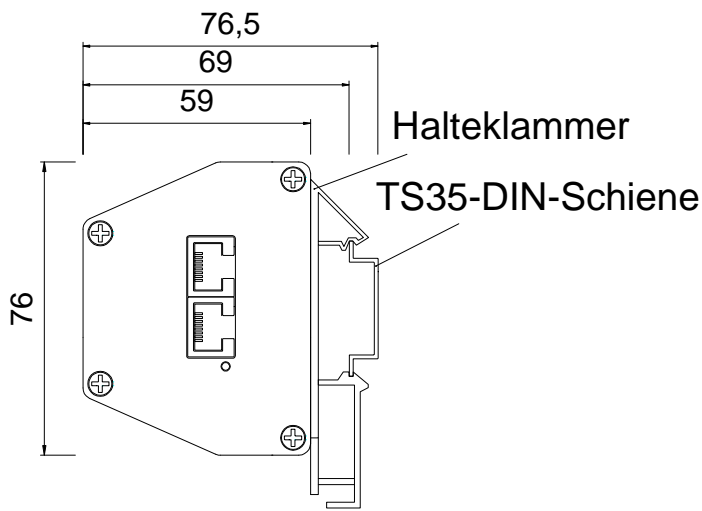
Side view of EASY2502
no connection plugs

side view of EASY2502V
with plugs connected to the power supply card

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