DATA SHEET

CUA32-XXX FAMILY BUILDING BLOCKS

NEWSON NV

TABLE OF CONTENTS

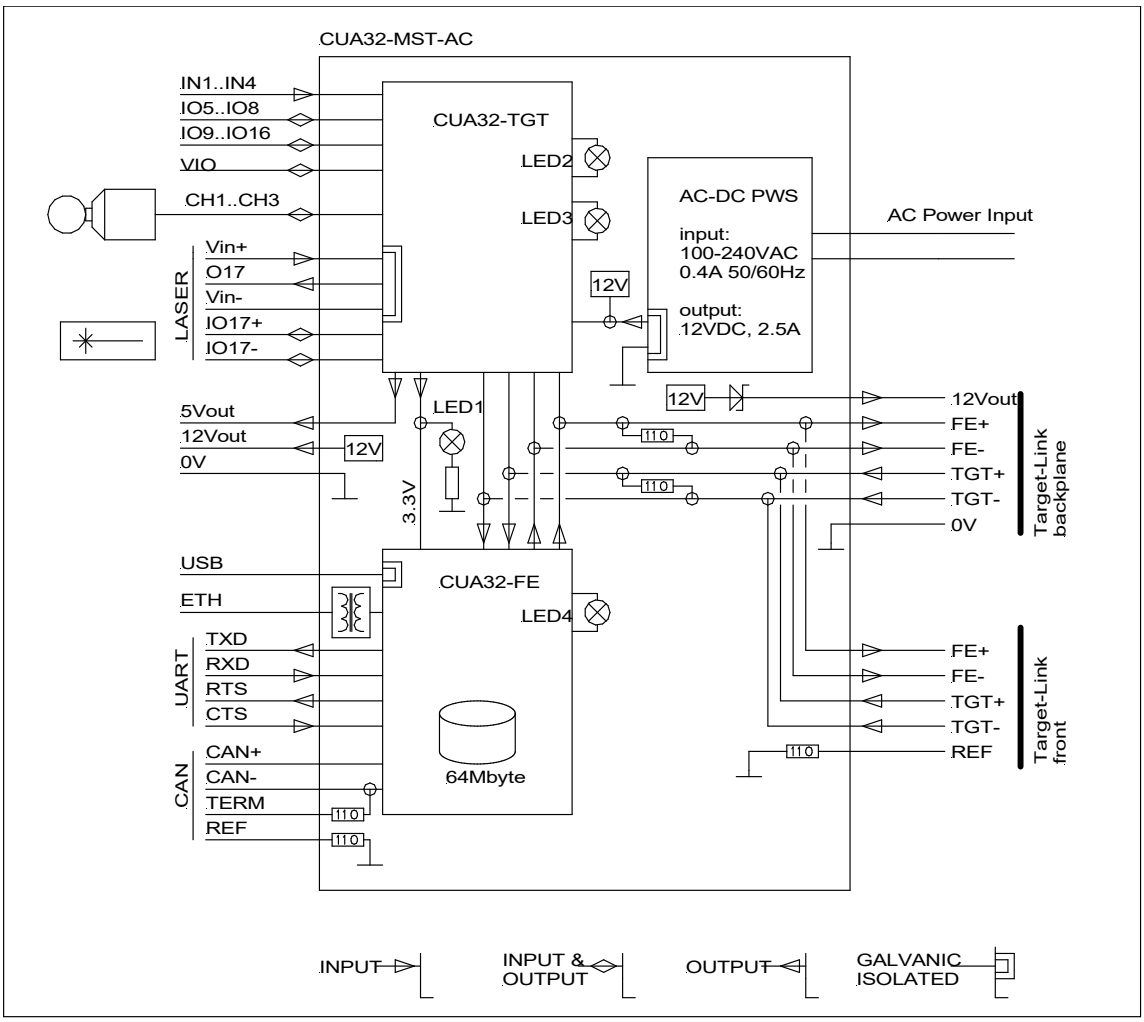
1 CUA32-XXX-AC

1.1 CUA32-MST-AC

The CUA32-MST is a complete laser beam steering unit. It communicates with a host computer, controls a deflection system, three table stages, triggers a laser and handles several IO events. Supporting streaming and stand-alone operation, as a DIN rail compatible system it is easy to integrate in any machine design. The CUA32 master device is constructed using two CUA32 modules, a power supply and industrial style connectors all mounted on a printed circuit board.

- The Target module (CUA32-TGT) controls a deflection system, laser and several IO signals. Over these IO's it's also possible to control up to three stepper motor drivers making it a full 6-axis controller.
- The Front-End module (CUA32-FE) provides connectivity with a host computer and other peripherals. It also comprises a flash disk for storing configuration and image files.
- The power supply provides direct connection of the device with mains.

The CUA32-FE module is connected to the CUA32-TGT module using a serial bus. This Target-Link is implemented like a full duplex multi drop RS485 system. The bus is also accessible over a back-side connector for expansion.

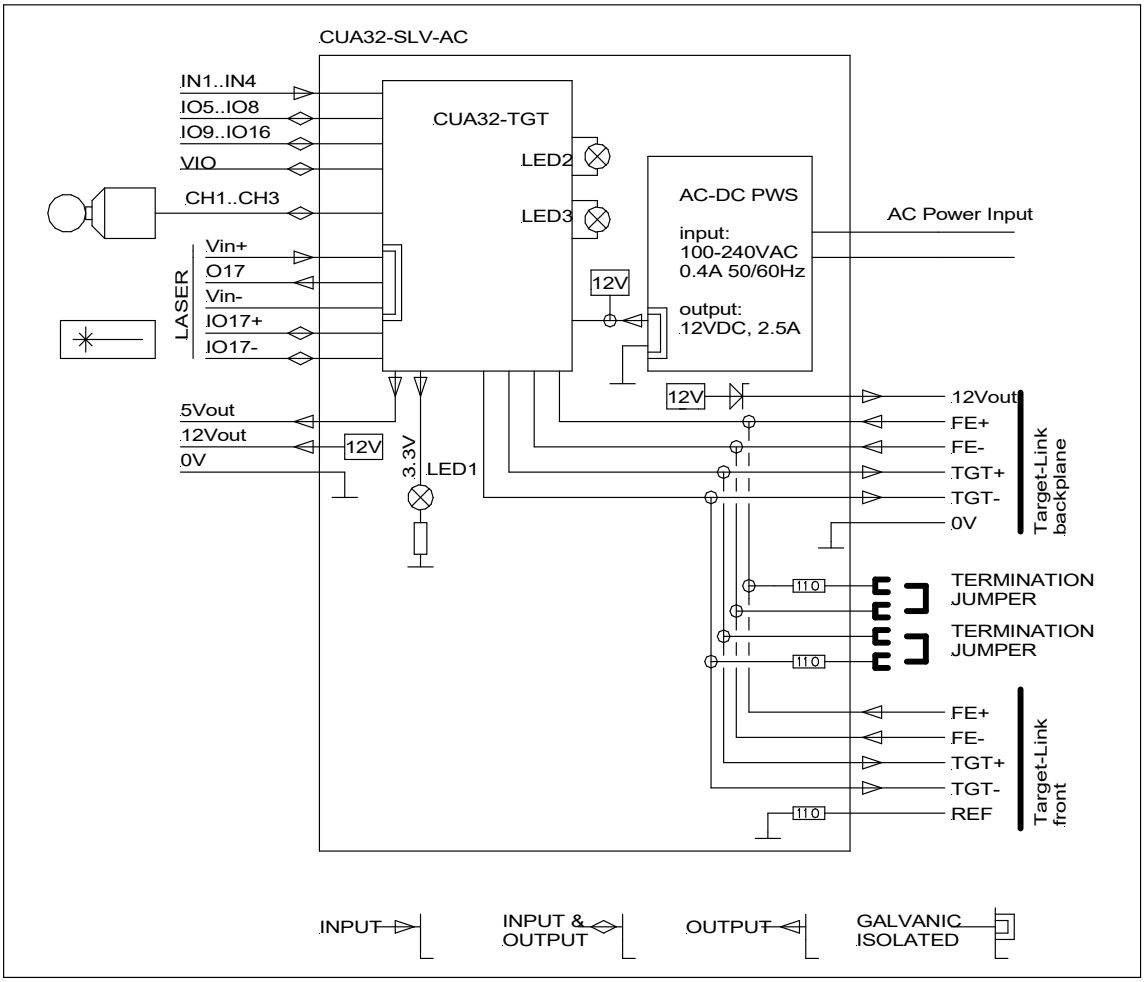


For information relating loading and use of IO's refer to chapters CUA32-TGT and CUA32-FE in this data sheet.

When used with rhothor™ deflectors, the CUA32-MST device also powers them and there is no need for additional power supplies. When the system is used to control third party deflection systems, refer to relevant data sheets for proper power supply setup and sequencing. A RTBE device will be needed to extract the setpoint data in the required data format. For more information refer to datasheet “RTBE-D25D.pdf”, which is downloadable from the website “www.newson.be”.

1.2 CUA32-SLV-AC

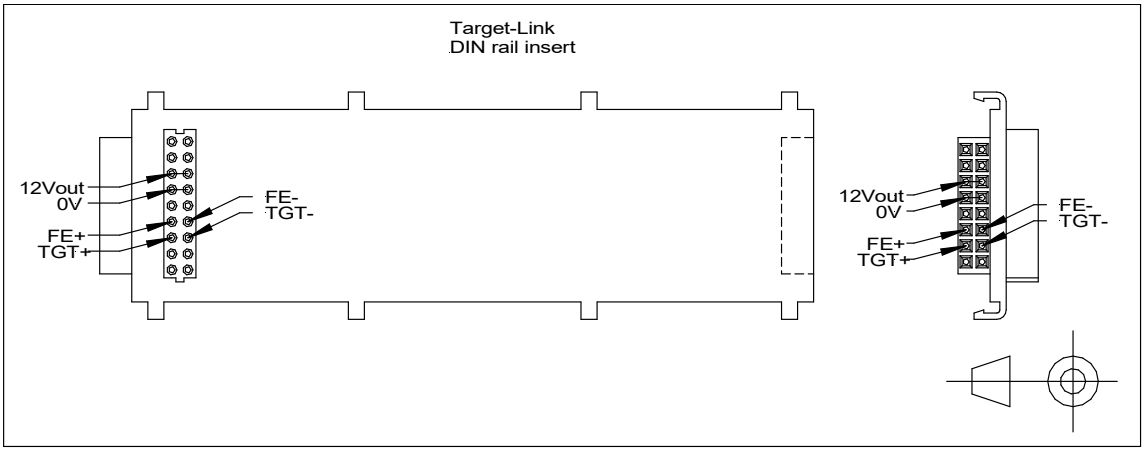
A CUA32-SLV (slave) device is constructed much like a master. Because it doesn’t comprise a Front-End module, a slave device has no flash memory and can’t be connected directly to a host computer. Configuration and host connectivity are provided over the external backplane by the connected master device. Up to seven CUA32-SLV devices can be attached to this backplane.



The target link is a 10 Mbit/sec serial connection. The termination jumpers should be installed on the slave device that is furthest away from the master device (CUA32-MSTR-AC).

1.3 TARGET LINK

CUA32-XXX-AC are DIN rail pluggable. In a setup where all devices are DIN rail mounted, the Target-Link connection between master and slaves can be realized by DIN rail inserts.

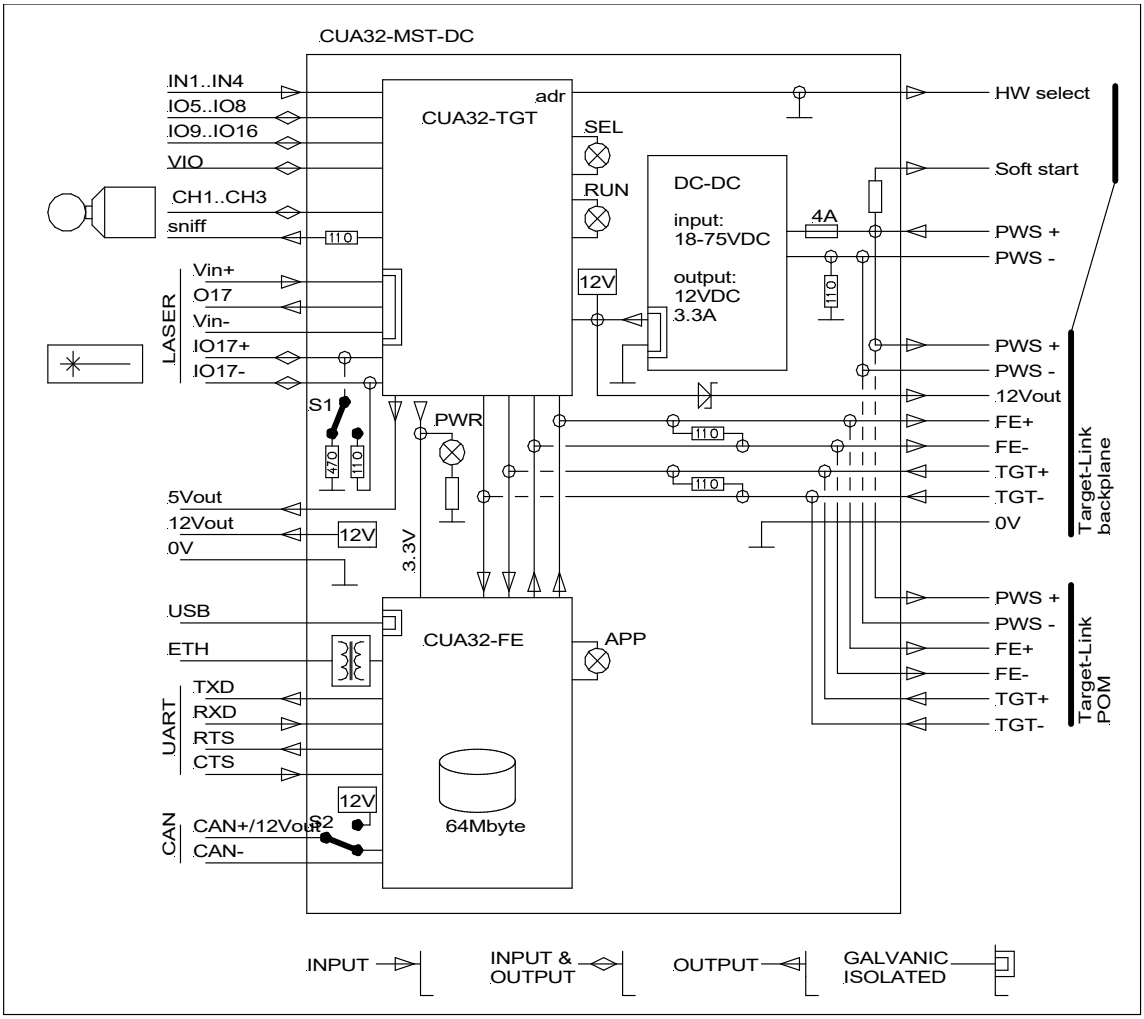


2 CUA32-XXX-DC

2.1 CUA32-MST-DC

The CUA32-MST-DC is a complete laser beam steering unit. It communicates with a host computer, controls a deflection system, three table stages, triggers a laser and handles several IO events. Supporting streaming and stand-alone operation, as a DIN rail compatible system it is easy to integrate in any machine design. The CUA32 master device is constructed using two CUA32 modules, a power supply and industrial style connectors all mounted on a printed circuit board.

- The Target module (CUA32-TGT) controls a deflection system, laser and several IO signals. Over these IO's it's also possible to control up to three stepper motor drivers making it a full 6-axis controller.
- The Front-End module (CUA32-FE) provides connectivity with a host computer and other peripherals. It also comprises a flash disk for storing configuration and image files.
- The power supply provides direct connection of the device with a 24V or 48V volt power supply. The return line is connected through a 110 resistor and a 10 nF capacitor to the internal 0V.



The CUA32-FE module is connected to the CUA32-TGT module using a serial bus. This Target-Link is implemented like a

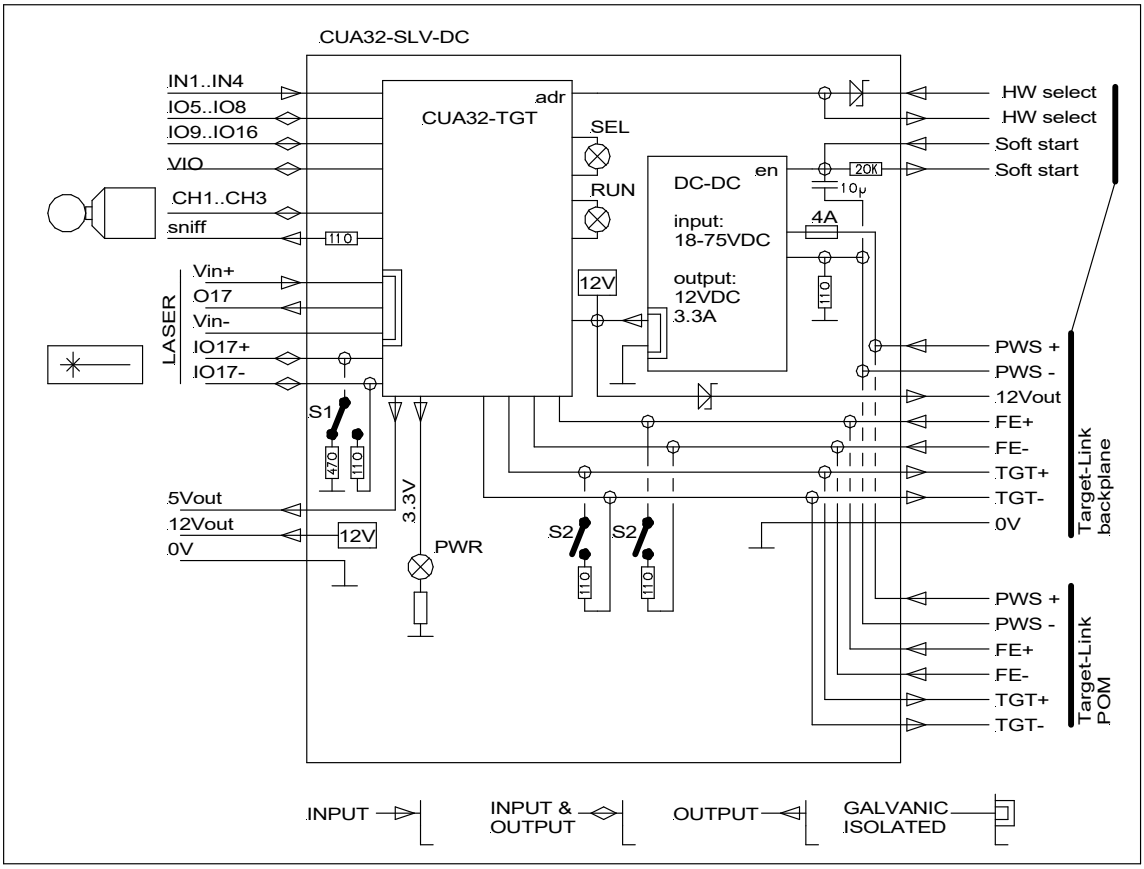
full duplex multi drop RS485 system and also accessible over a front and back-side connector for expansion. Said connectors also distribute the power supply. The connector at the back also outputs 12V, mapping and power up signals for CUA32_SLV_DC devices and IO extenders

The device comprises 2 manual switches. Switch 1 selects operation mode IO17+. IO17+ can be connected to IO17- over a 110-ohm termination resistor to provide a true differential interface or it can be connected to 0V over a 470-ohm resistor to provide a TTL like output.

For more information relating loading and use of IO's refer to chapters CUA32-TGT and CUA32-FE in this data sheet. When used with rhothor™ deflectors, the CUA32-MST device also powers them and there is no need for additional power supplies. When the system is used to control third party deflection systems, refer to relevant data sheets for proper power supply setup and sequencing. A RTBE device will be needed to extract the setpoint data in the required data format. For more information refer to datasheet "RTBE-D25D.pdf", which is downloadable from the website "www.newson.be".

2.2 CUA32-SLV-DC

A CUA32-SLV-DC (slave) device is constructed much like a master. Because it doesn't comprise a Front-End module, a slave device has no flash memory and can't be connected directly to a host computer. Configuration and host connectivity are provided over the external backplane by the connected master device.

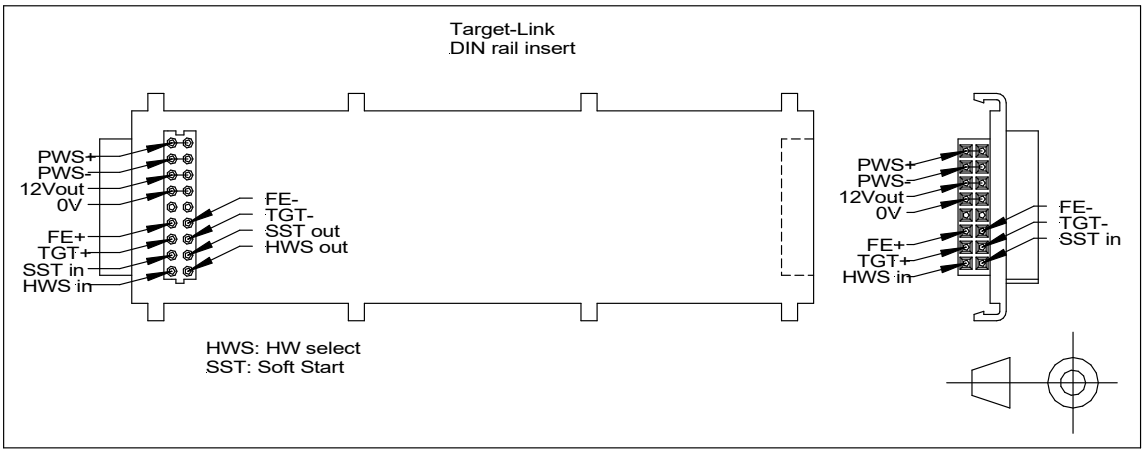


CUA32-SLV DC devices don't have a power supply connector. They are powered over the backplane or over the POM connector. Up to seven CUA32-SLV-DC devices can be attached to this backplane. To limit inrush current when powered

up, the systems are switched on sequentially. DC devices also have support for automatic device mapping. Before being used, all connected TGT devices need to be mapped to target numbers. This is normally done using the MAC numbers of the target devices (rhothor.exe). Automatic mapping uses a location based addressing scheme. The master, leftmost on the DIN rail is mapped to target 1. The first slave on the right is mapped on target 2, the second on target 3 and so on. For proper operation of said addressing and power up sequencing, the master must be the left most device on the DIN rail. When the system comprises a master and a single slave connected over the POM connection, the master will be mapped to target 1 and the POM device to target 2. Power up sequencing between devices connected over POM is disabled.

The device comprises 2 manual switches. Switch 1 selects operation mode IO17+. IO17+ can be connected to IO17- over a 110-ohm termination resistor to provide a true differential interface or it can be connected to 0V over a 470-ohm resistor to provide a TTL like output. Switch 2 enables the termination resistors. Only the right most slave device on the DIN rail or the device connected over POM interface must have his termination resistors switched on. Switches 2 must be open on all other slave devices.

2.3 TARGET LINK



3 CUA32-TGT

3.1 DESCRIPTION

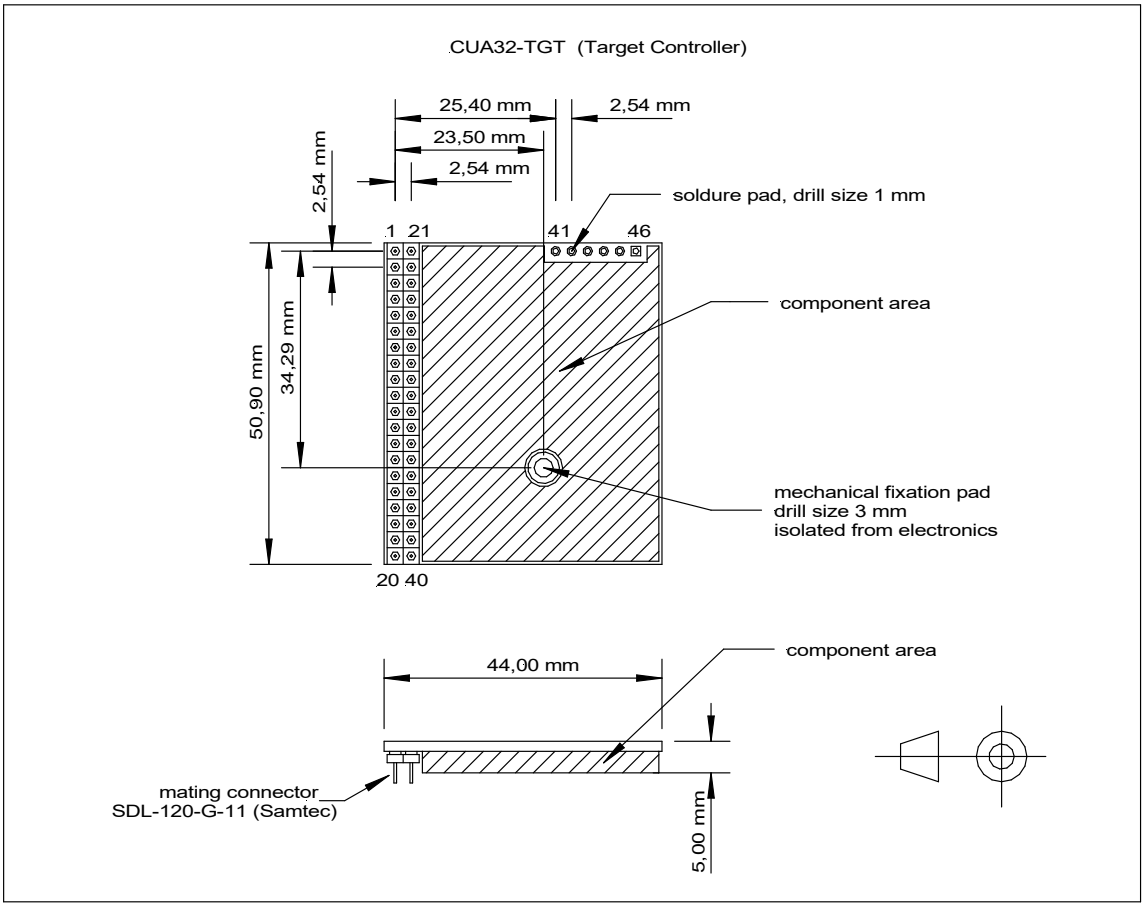
The target module (CUA32-TGT) is a printed circuit-based solution to control a 3D laser deflection system, three table stages, a laser and several IO signals. Combined with the CUA32-FE module, a 12 V DC power supply and a few cable style connectors a full 6 axis industrial controller system can be implemented. The number of axis's can be further increased by just adding target modules. Designed to be used with rhothor™ smart deflectors, the module can also control third party deflection systems using optional convertors. Through a dual row 40 pin connector the module can be clicked upon an application PCB. An additional 3 mm mounting hole serves as additional fixation.

- controls and powers up to 3 smart deflectors
- controls up to 3 stepper drivers (PULSE and DIR signals)
- galvanic isolated laser interfacing
- 8 x 350 mA outputs with short circuit protection
- 12 x logic inputs
- 4 x 5V logic and analog IO's
- ESD protection on all IO's
- sniffer outputs providing life position feedback
- powered by a single 12V, 2.5A power supply
- network style RS485 connection with CUA32-FE
- very small size

The module comprises two energy efficient DSP processors. Besides the normal marking functions, their firmware also supports great to have functions like:

- X-Y deflector on the fly
- X-Y-Z table functions
- X-Y-Z hybrid marking (full 6 axis control, combining 3D deflector and table movements)
- laser control supporting: gate, burst, CO2, first pulse compensation
- up to 40 MHz laser trigger frequency with automatic speed tuning to obtain constant dot densities
- in the field updatable firmware

3.2 PCB DIMENSIONS AND PIN LOCATIONS



3.3 PCB PIN DESCRIPTION

Pin No.	Name	Type	Description
1	VIO	VIO power supply	VIO power supply
2	IO9	IO type 3	VIO powered open emitter (1)
3	IO10	IO type 3	VIO powered open emitter (1)
4	IO11	IO type 3	VIO powered open emitter (1)
5	IO12	IO type 3	VIO powered open emitter (1)
6	IO13	IO type 4	VIO powered open emitter (1)
7	IO14	IO type 4	VIO powered open emitter (1)
8	Vin-	LASER	O17 power supply return
9	Vin+	LASER	O17 Power supply
10, 31	12V input	System power supply input	9-13V; I RMS < 2.5A (2)(3)
11, 30	0V	System power supply return	(3)
12	Ch1	SDP deflector	Deflector data and power supply output
13, 33	LED2+, LED2-	Connection dual color led 2	Led current 10 mA
14, 34	LED3+, LED3-	Connection dual color led 3	Led current 10 mA
15	IO5	IO type 2	5V logic and analog IO
16	IO6	IO type 2	5V logic and analog IO
17, 37	IO17+, IO17-	LASER	RS485 half-duplex, unterminated
18, 38	FE+, FE-	RS485 input, unterminated	
19, 39	TGT+, TGT-	RS485 output	
20	3.3 V output	Power supply output	V out +/- 5%, I out < 200mA
21	HWSelect	analog	Internally pull up 3.3V
22	I1	IN type 1	logic input
23	I2	IN type 1	logic input
24	I3	IN type 1	logic input
25	I4	IN type 1	logic input
26	IO16	IO type 4	VIO powered open emitter (1)
27	IO15	IO type 4	V powered open emitter (1)
28	O17	LASER	Galvanic isolated output O17
29	Ch3	SDP deflector	Deflector data and power supply output
32	Ch2	SDP deflector	Deflector data and power supply output
35	IO8	IO type 2	5V logic and analog IO
36	IO7	IO type 2	5V logic and analog IO
40	5V output	Power supply output	V out +/- 5%, I out < 200mA, ESD protected
41	Ch3	Sniffer	Deflector data sniffer
42	Ch1	Sniffer	Deflector data sniffer
43	Ch2	Sniffer	Deflector data sniffer
44, 45	NC		Do not connect, reserved for future use

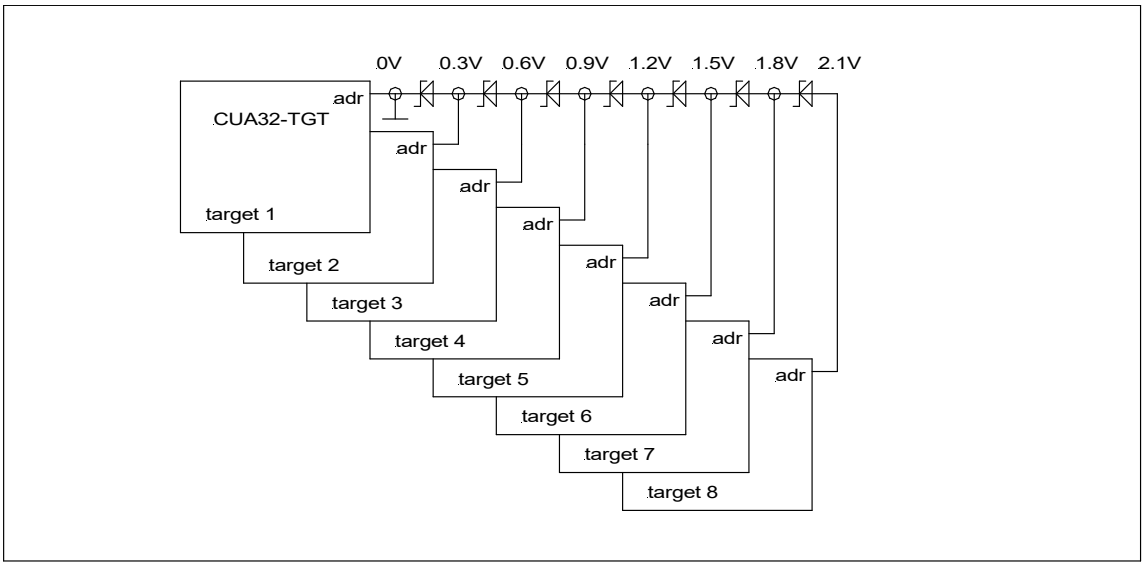
(1) Summation of all individual output currents must be lower than 600 mA,

(2) The CUA32-TGT module has to be powered by a 12V DC power source. Through the SDP connections, the module also powers up to three deflectors. The current loading of the power supply will depend on the actual amount and type of connected deflectors.

(3) Both pins need to be connected.

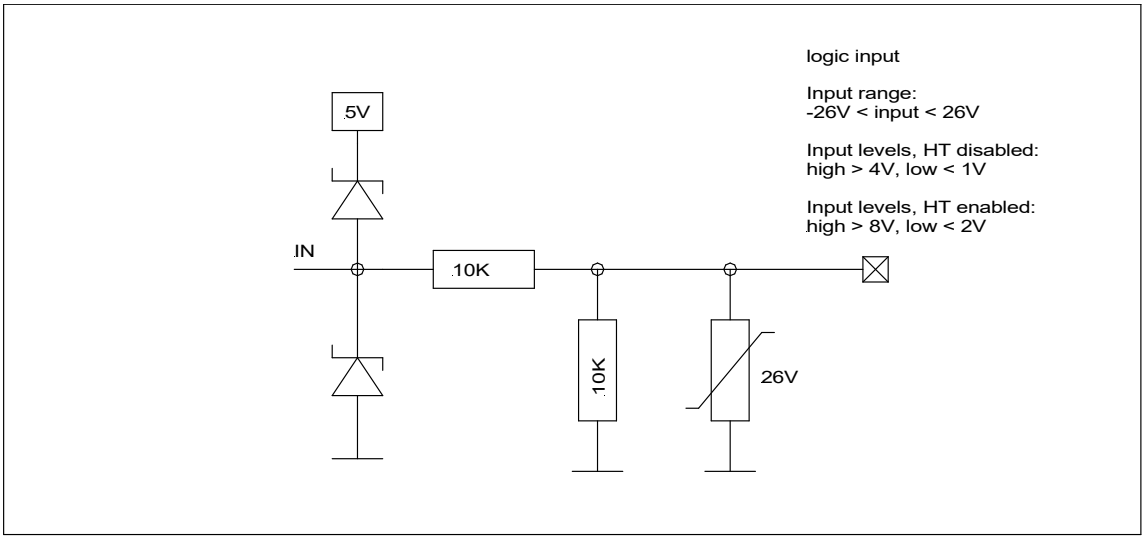
3.4 HWSELECT

During installation all target devices need to be assigned to target indexes. A system can comprise up to 8 targets. At first this mapping had to be done using the MAC addresses of the connected devices. Such a mapping scheme works well but, due to the unique MAC numbers, it can't be copied to other systems. This is different with hardware style addressing. Target index can be set by applying an analog value on the HWSelect pin. At power up, the FE scans all systems and maps the TGT with the lowest voltage on his HWSelect pin to target 1. The second lowest voltage gets target 2 and so on. When left open the HWSelect pin is pulled up over a 2K resistor. By placing several Schottky diodes in series, mapping voltages can easily be obtained.



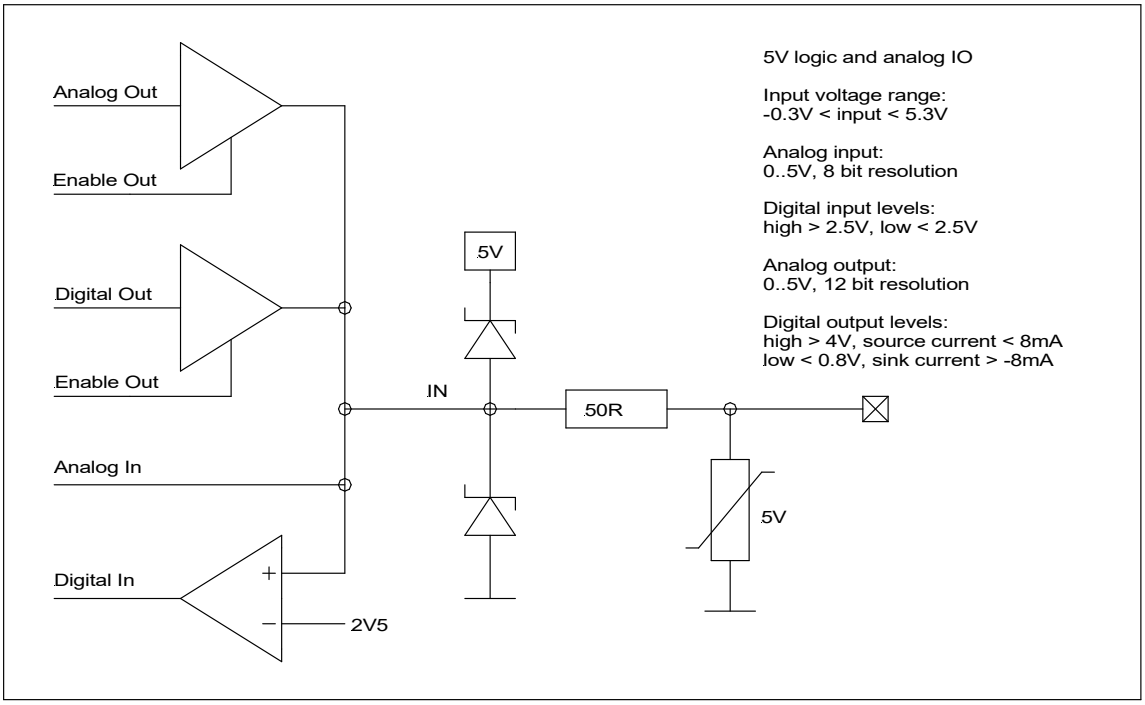
3.5 IN TYPE 1 (IN1, IN2, IN3, IN4)

IN1 to IN4 are 24V compatible inputs. When left open the input is read low (pull down resistor). To improve noise immunity, the input threshold can be doubled by selecting the HT (High Threshold) feature. IN1 to IN4 can also be paired with IO9 to IO12 to form differential inputs.



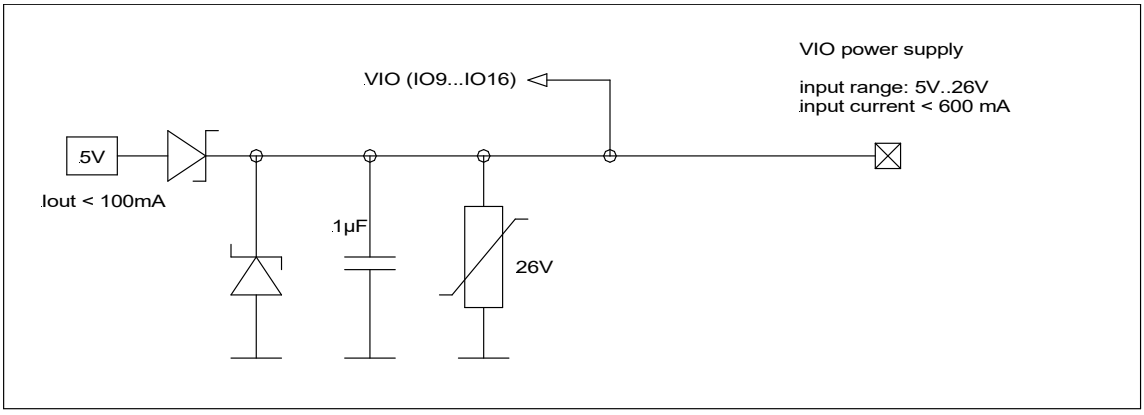
3.6 IO TYPE 2 (IO5, IO6, IO7, IO8)

IO5 to IO8 can be used as 5V logic or 5V analog IO's.
When enabled, the logic output driver will actively drive the pin low or high (totem pole). When the analog driver is enabled the voltage on the pin can freely be set between 0 and 5V at 12-bit resolution. When used as an input both drivers should be disabled. The pin voltage is available at any time as an 8-bit value while its logic value is the result of a mid-scale comparison.



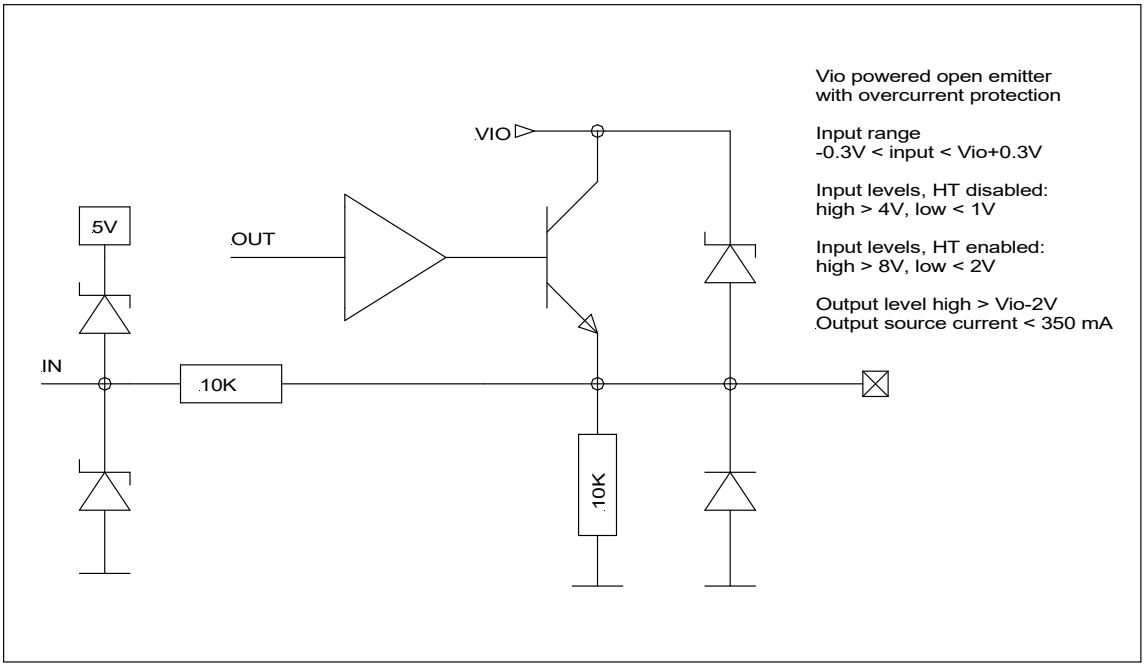
3.7 VIO POWER SUPPLY INPUT

IO9 to IO16 have short circuit protected open emitter output stages. To allow easy integration within the application, the emitter voltage can be set by connecting the VIO pin to the desired voltage. When connected with a 24V source, IO9 up to IO16 become true 24V logic IO's. When connected with a 5V source the IO pins can be connected with TTL compatible devices. When left unconnected, the IO pins will be powered by the internal 5V through a diode.



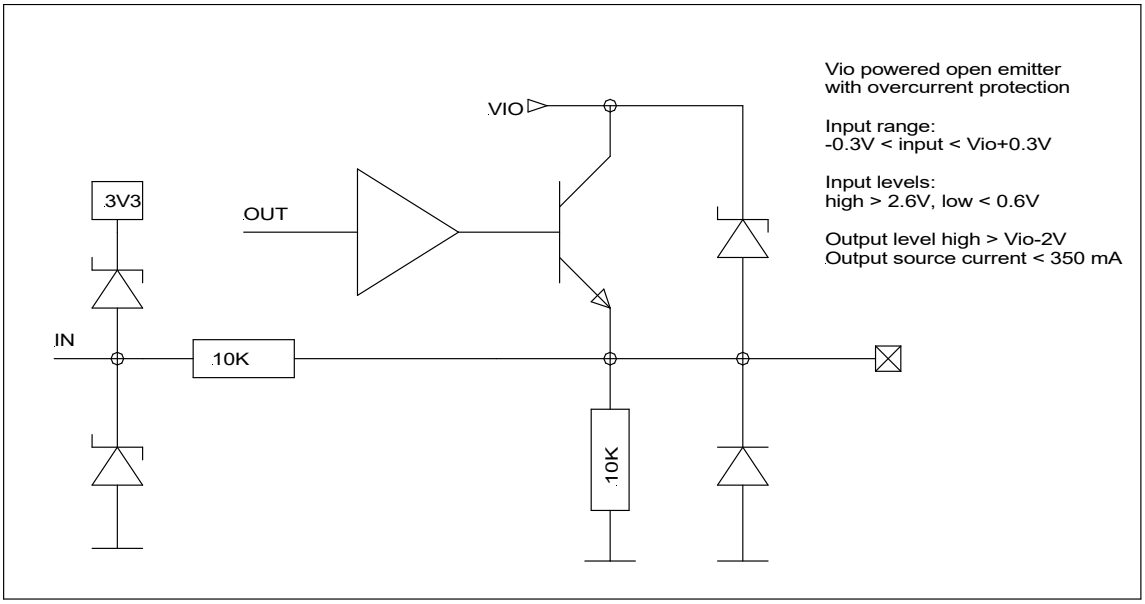
3.8 IO TYPE 3 (IO9, IO10, IO11, IO12)

IO9 to IO12 have short circuit protected outputs capable of sourcing 350 mA. When the output is set high, the pin gets connected with the VIO voltage through the output transistor. A fly back diode allows direct connection of inductive loads. When used to control stepper drivers (DIR and STEP signals) care should be taken to make sure that signals fall times are met. Most of the stepper drivers have resistor-emitter inputs (optocouplers) and can be directly connected. An external 1K pull down resistor should be added to minimize signal fall times when the driver has a high impedance input.
When the output is set low, the pin can be used as an input. The input is read low when left open (10K pull down resistor). To improve noise immunity, the input threshold can be doubled by selecting the HT (High Threshold) feature. When used as inputs they can be paired with IN1 to IN4 to form differential inputs.



3.9 IO TYPE 4 (IO13, IO14, IO15, IO16)

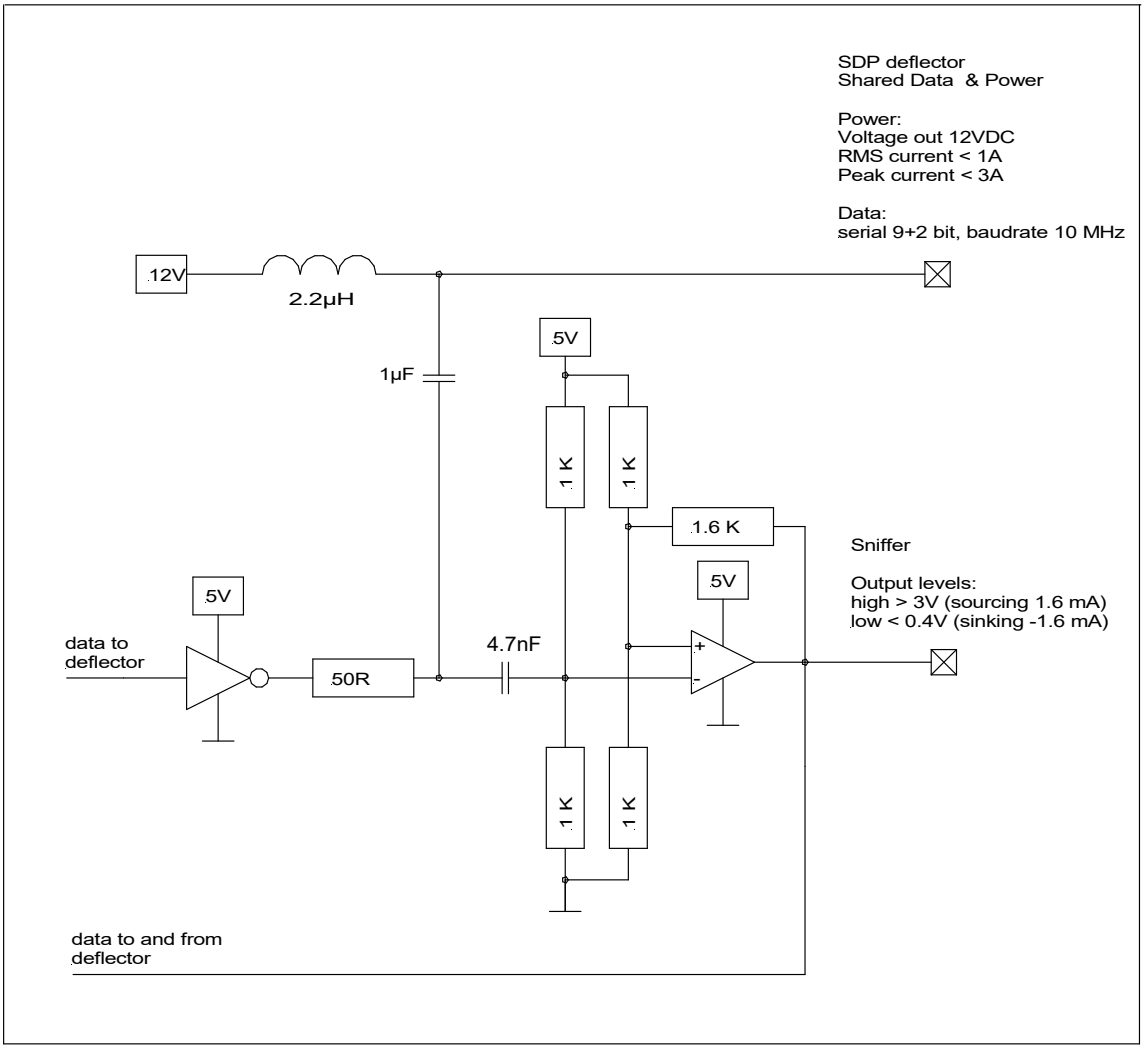
IO13 to IO16 have short circuit protected outputs capable of sourcing 350 mA. When the output is set high, the pin gets connected with the VIO voltage through the output transistor. A fly back diode allows direct connection of inductive loads. When used to control stepper drivers (DIR and STEP signals) care should be taken to make sure that signals fall times are met. Most of the stepper drivers have resistor-emitter inputs (optocouplers) and can be directly connected. An external 1K pull down resistor should be added to minimize signal fall times when the driver has a high impedance input.
When the output is set low, the pin can be used as an input. The input is read low when left open (10K pull down resistor). IO type 4 does not provide a high threshold feature to reduce noise immunity. When needed, noise immunity can be improved by adding a 1K pull down resistor.



3.10 SDP DEFLECTOR AND SNIFFER

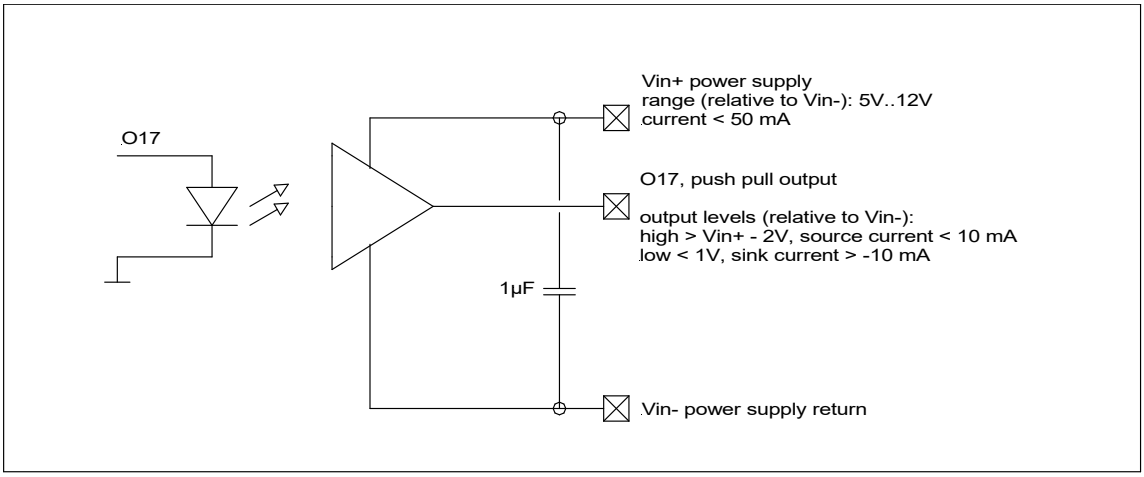
rhothor™ deflector are connected using a single coaxial cable. Through this cable the deflector is powered and exchanges setpoint and actual positions. A rhothor™ deflector can be directly connected with the CUA32-TGT module through the SDP pins. All modulation electronics needed to merge with and extract data from the power supply are integrated. When used to control third party deflection systems, the required data format for the setpoints (XY2-100) needs to be generated by additional electronics.

Besides easy connection, having a real time position signal is an additional feature only available when used with rhothor™ deflection systems. Every SDP pin has a sniffer output providing a TTL levelled image of the data traffic between CUA32-TGT module and deflector. For information about said data traffic, refer to datasheet “RTA-AXX-3G.pdf”, which is downloadable from the web site “www.newson.be”.



3.11 LASER

The laser main control functionality is allocated on IO17. This interface is available as a RS485 signal or as a galvanically isolated output (O17).



When the laser gate has TTL like interfacing, the galvanically isolated O17 output could be used. Powered by a 5V power supply (Vin+/Vin-), the O17 high level will be above 3V and the low will be below 0.3 V.
When the laser gate has an optocoupler style input, the RS485 (IO17) signals could be used. Those signals can be directly connected when the optocoupler input comprises a current limitation resistor and a reverse voltage protection, The IO17 differential signals also provide a direct connection with a laser link.

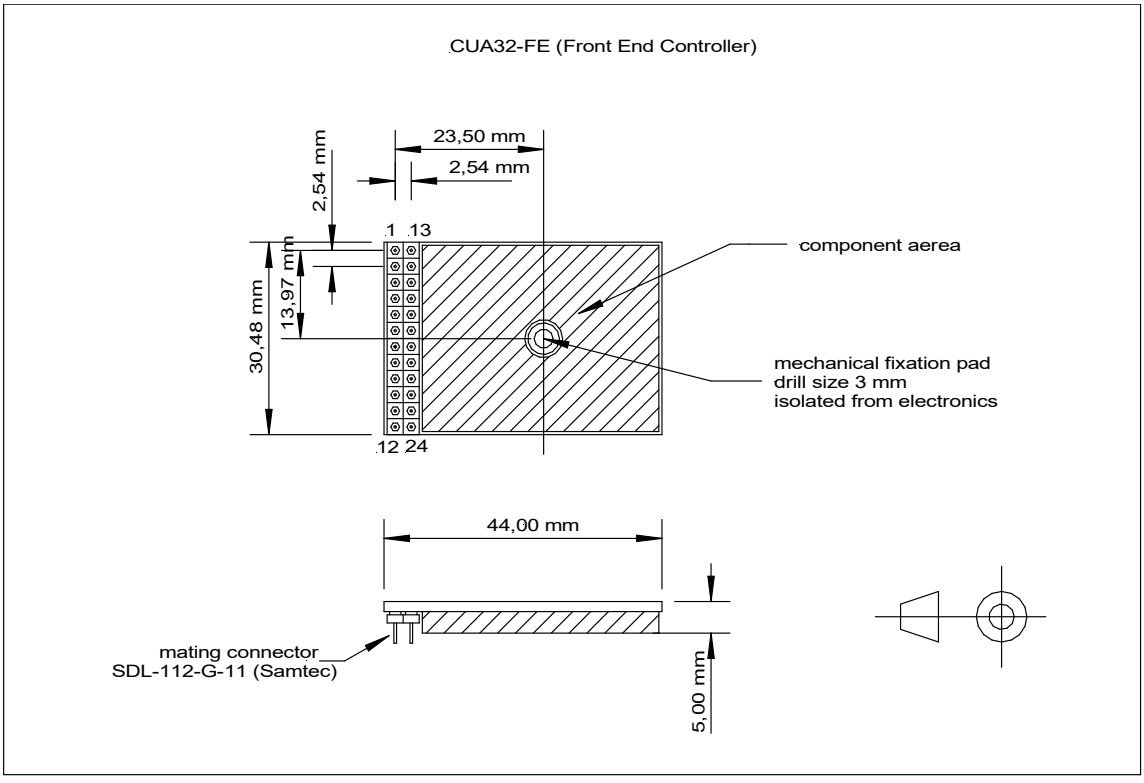
4 CUA32-FE

4.1 DESCRIPTION

The front-end module (CUA32-FE) provides connectivity with a host computer and peripherals. Combined with a target module (CUA32-TGT), a 12 V DC power supply and a few cable style connectors a full 6 axis industrial controller system can be implemented. Through a dual row 24 pin connector the module can be clicked upon an application PCB. An additional 3 mm mounting hole serves as additional fixation.

- Galvanic isolated USB 2.0
- Ethernet transceiver
- RS232 with CTS/RTS
- CAN
- ESD protection on all IO's
- flash disk to store configuration and image files
- full duplex multi drop RS485 connection with up to 8 CUA32-TGT's
- very small size
- in the field updatable firmware

4.2 PCB DIMENSIONS AND PIN LOCATIONS



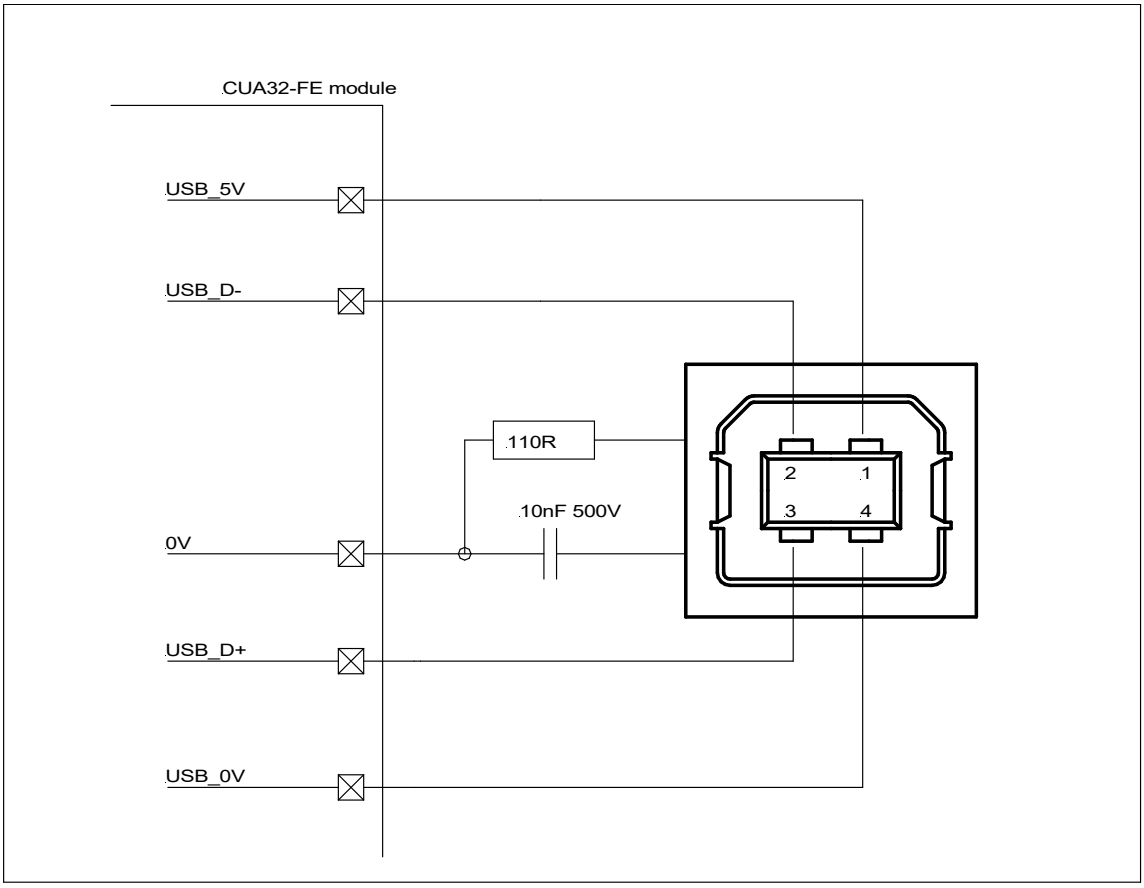
4.3 PCB PIN DESCRIPTION

Pin No.	Name	Type	Description
1	USB_0V	USB galvanic isolated	USB power supply return
2,14	USB_D+, USB_D-	USB galvanic isolated	USB data lines
3,15	ETH_TXD+, ETH_TXD-	Ethernet	Ethernet upload data lines
4,16	ETH_RXD+, ETH_RXD-	Ethernet	Ethernet download data lines
5	ETH_LED1	Ethernet	Status led, current 10 mA
6,18	LED4+, LED4-	Connection dual color led 4	Led current 10 mA
7	TXD	RS232 output	
8	RTS	RS232 output	
9,21	CAN+, CAN-	CAN, unterminated	
10,22	FE+, FE-	RS485 output	
11,23	TGT+, TGT-	RS485 input, unterminated	
12	3.3V PWS	System power supply input	3.3V +/- 5%, I < 200mA (1)
13	USB_5V	USB galvanic isolated	USB power supply
17	ETH_LED2	Ethernet	Status led, current 10 mA
19	RXD	RS232 input	
20	CTS	RS232 input	
24	0V	System power supply return	

(1) The CUA32_FE module can be powered by the 3V3 output of a CUA32_TGT module. In general, no decoupling capacitors will be needed.

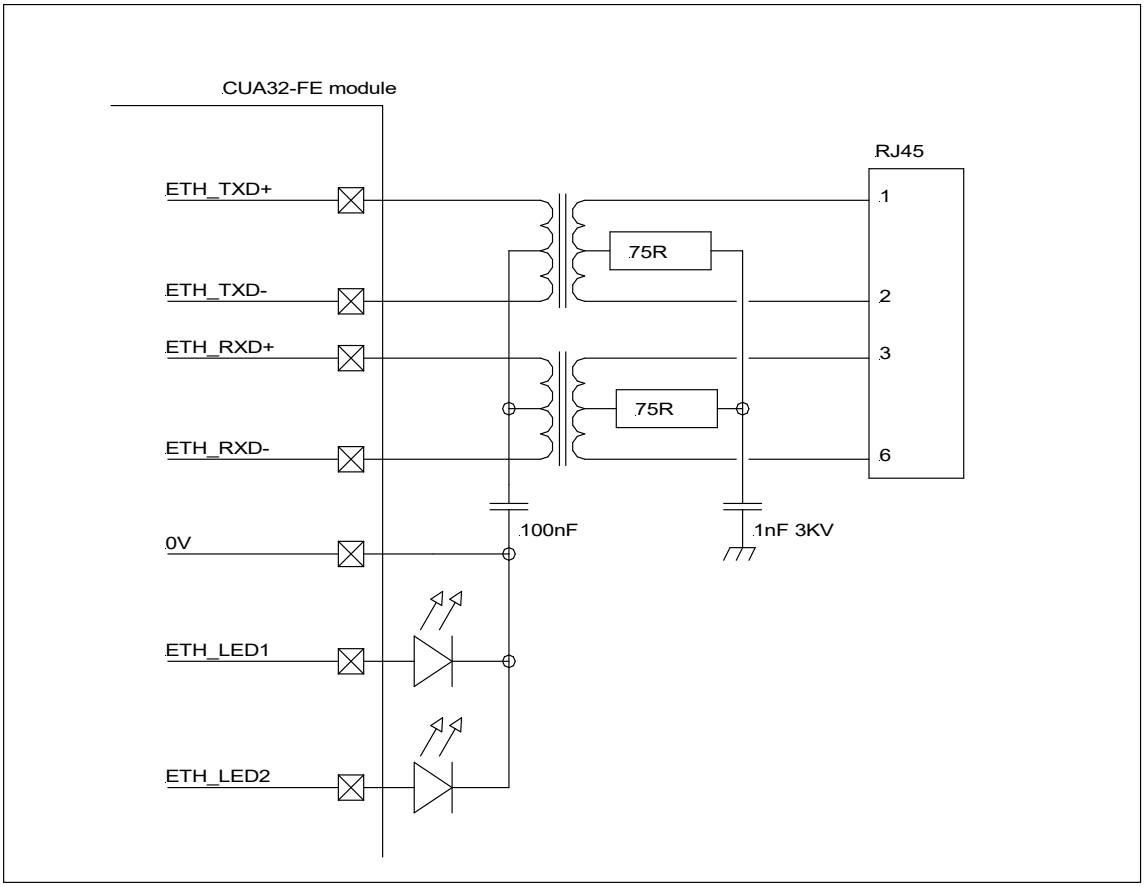
4.4 USB GALVANIC ISOLATED

The CUA32-FE module comprises all electronics needed to provide a galvanic isolated USB 2.0 connection running at 12Mbps. Powering is obtained through the USB connection. The USB control lines (USB_0V, USB_5V, USB_D+ and USB_D-) can be directly connected to a B-style USB connector,



4.5 ETHERNET

By adding magnetics and a RJ45 connector the front-end module can be connected with the internet. Besides TX and RX lines, two status lines are provided. They can be used to drive LEDs inside the RJ45 connector. Status line ETH_LED1 is driven active when a valid link is detected and blinks during activity. ETH_LED2 is driven active when operating speed is 100Mbps. Pins ETH_LED1 and ETH_LED2 should be left unconnected when status LEDs are not required.



5 DOCUMENT HISTORY

5.1 CUA32_XXX Rev 1.1

Release date 07/01/2019
Website rework

5.2 CUA32_XXX Rev 1.2

Release date 17/02/2023
Drawing RTFE-FE (corrected)
Drawing RFE-TGT (corrected)

5.3 CUA32_XXX Rev 1.3

CUA32_XXX_AC (corrected)

CUA32_XXX_DC (added)

HWSelect (added)