Manual

for

SMC-*corvus*

Contend

Introduction

Dear user,

thank you for ordering our high-resolution positioning controller SMC. For the first steps, it's a good idea using our demo-program *Winpos.exe.* It's a 16 bit application, running under Win-3.1 up to Win2000 This program supports the serial interface RS-232.

Default settings:

baudrate	57600
dataformat	8 bit
stopbit	1
parity	none
protocol	no

Please run the *setup.exe* from the floppy. After the install procedure please start the system (check all connections, motor and interface!) and select <controller|connect>.The system is completely configured for your system!

The actual settings are documented on the separate printout , *configuratio*n'. After this you are able to send commands (venus-1 commands) with the dialog <controller|venus commandline>, or sending position-commands with <controller|move dialog>.

Good luck, with friendly regards

The MICOS-Team

Technical Support

For all technical questions please use our **email** or **fa**x.
Of course we are help on the phone!
Here are the addresses for the contact .

adress:	tel	fax	email
MICOS GmbH	+49-7634-5057-0	-99	info@micos-online.com
Freiburger Straße 30			
D-79427 Eschbach			

What's the new corvus

Corvus is a complete new development and will replace the previous generation smc-compact.

Due to a new very powerful 32-bit processor, the positioning resolution is now increased to 600000 Steps per motor-revolution. The position-resolution now is 1nm. Due to the increased performance of the processor the maximum velocity of a 200 fullstep-motor is now 45 rev/s

For the programmed position control, the well known VENUS-1 interpreter language is used. This will keep the compatibility to existing applications and experience.
New is the Touch-Display, which could be located in the hosuing of the controller or outside in the analog joystick.
Some basic functions will be executable without PC

For the communication with the controller, we do have several interfaces
The RS-232 interface up to 115200 Baud, a CAN-Bus interface and as absolute peculiarity a 10MBit Ethernet interface with integrated TCP/IP Stack.

Some main-datas

- number of axes: 2 or 3
- phase-currente: up to 2.5A
- internal voltage: 48V
- velocity   up to 45 revolutions/s
- resolution   :   600000 / Microsteps/revolution
- total-power: 50W, 100W, 150, 250 and 500W*
- sin²-acceleration
- closed Loop function (Option)**
- position correction 1D (Option)**
- security interface (Option)
- firmware-update per RS-232
- temperature-input (Option)**
- motor-break-output (Option)
- digitale I/O (Option)**
- analog I/O (Option)**
- position-display with tough-terminal 10 key (Option)
- joystick with/without display (Option)
- RS-232 interface
- Ethernet interface(Option)**
- CAN-Bus interface (Option)

**These options will be available with a release-code!

Powersupply

The corvus is ready for all usual AC-power ratings without any change

Corvus front/rear-view
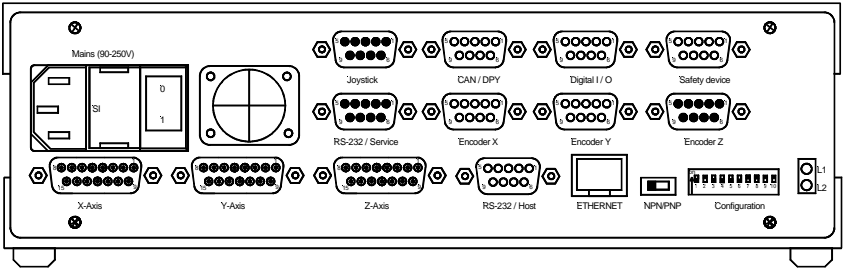
picture 1: Corvus in standard desktop,rear
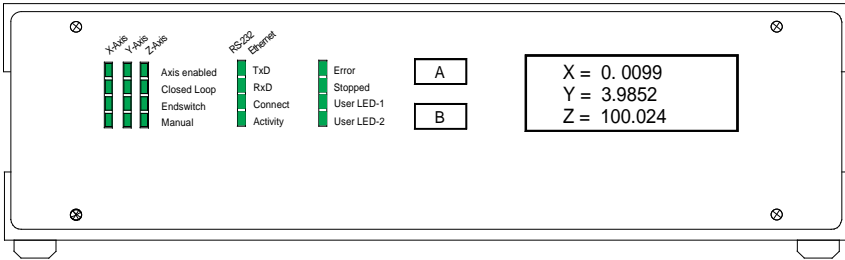
picture 2: Corvus with Touch Display, front

RS232 Interface

The standard programming with the controller caused by the serial interface or via the Ethernet. The IEEE (GPIB) interface is in preparation.

The RS-232 settings datenbits, stopbits, parity und protocol are fixed, the baudrate is configurable with 2 DIP-switches on the rear of the controller.

RS-232 Settings

databits	8
stopbits	1
parity	keine
protocol	kein
baudrate	9600, 19200, 57600, 115200

Table 1: RS232 settings

These switches determine the baudrate
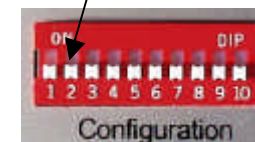
Dip-Switch for Baudrate

Dip-Switch1	Dip-Switch 2	Baudrate
OFF	OFF	9600
OFF	ON	19200
ON	OFF	57600
ON	ON	115200

Ethernet Interface and TCP/IP

The corvus supports a Ethernet-Interface with a TCP/IP stack. This allows the user the implementation in a world-wide well defined interface-standard.

Ethernet Hardwareadress

Every Corvus has his own Ethernet-hardware-adress which is permanently stored in the controller, which allows a unique identification of the controller.

The Ethernet-hardwareadress is called the macadress. To query the macadress please use Venus-1 Kommando getmacadr .

IP-Adress

Like every telefone-connection is
The IP-adress is defined with Venus-1 command *setipadr* .

Example:

```
192 168 128 41 setipadr
save
```

(Caution : Instead of the dot as separator please use the blanc !

getipadr returns the actual setting

Ports
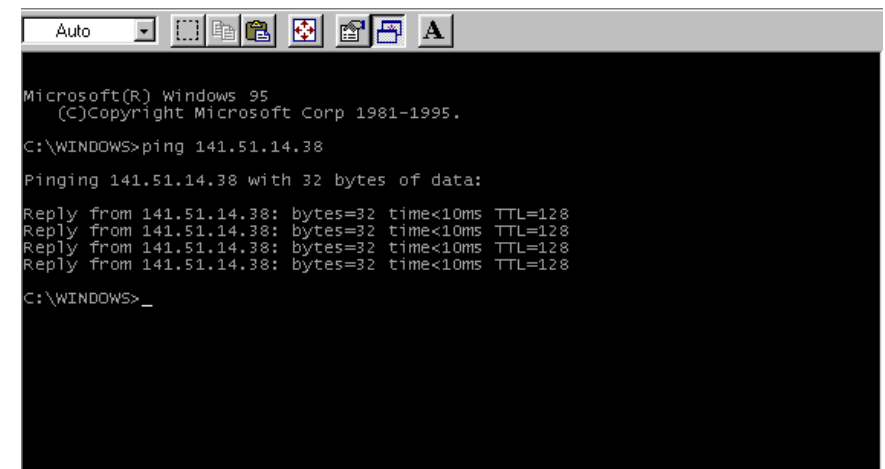
The corvus supports in the moment only one port , the **Port 23**, also called the TELNET-port .

Testfunction Ping

For the first test of a connection please use the program PING.EXE which is installed by the standard netware-software on your PC Ping.exe sends data-packets to an IP-adress.

Please open a DOS-box, type the command ping followed by the IP-adress. If the installation and connection is ok the corvus will reply like shown in the screenshoot.

Example: ping `192.168.128.41`


```
Microsoft(R) Windows 95
   (C)Copyright Microsoft Corp 1981-1995.

C:\WINDOWS>ping 141.51.14.38

Pinging 141.51.14.38 with 32 bytes of data:

Reply from 141.51.14.38: bytes=32 time<10ms TTL=128
Reply from 141.51.14.38: bytes=32 time<10ms TTL=128
Reply from 141.51.14.38: bytes=32 time<10ms TTL=128
Reply from 141.51.14.38: bytes=32 time<10ms TTL=128

C:\WINDOWS>_
```

picture 3: screen after ping

Modes of motion

■   For the manual mode there is a analog joystick interface included

■   The programmed mode uses the serial interface RS-232 or the
    Ethernet interface. The commands are send as ASCII-strings, they are
    interpreted in the controller. The command-language is
    called **Venus**-**1**. For a detailed description please use the second part
    of the manual, *Venus-1command language.*

Manual mode by joystick

Joystick-mode in Venus-1

In manual mode the controller is able to work without a host computer.
The movement of the axis is initiated with the analog joystick (velocity
proportional). The maximum velocity is programmable with the command
setjoyspeed. So it's possible to adjust the sensitivity of the move!
With command *1j* resp. *0j the* user is able to switch on or off the joystick!

Hint to the manual mode:

■   The joystick must be plugged in while power on!
■   While the power-on procedure please do not move the joystick!

Programmed-mode

Host-Mode

If the controller should work under programmed control via a software, the controller must run under host-mode
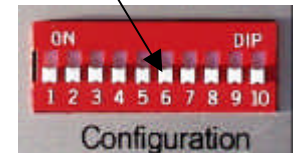In contrast to the terminal-mode, the controller just replies if a command is send by the host!
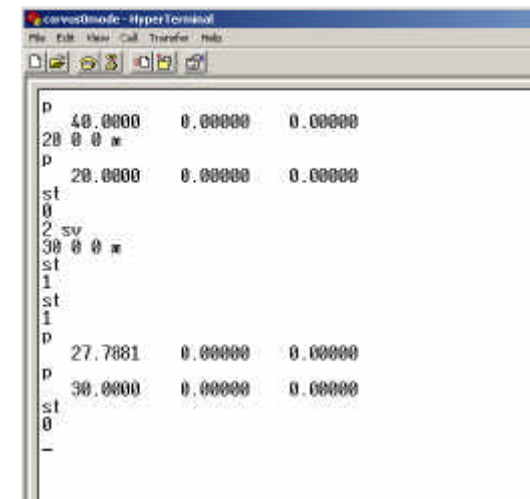 Dip- 6 determines in which mode the controller boots after power-on.
 A change while controller is running is possible with command *mode*

Dip-Switch for host- and terminal-mode

Dip-switch 6	Baudrate
OFF	Host-Mode
ON	Terminal Mode

The picture shows the some replies of several commands in the host mode!

picture 4: Host-Mode

Terminal-Mode

This mode supports ASCII terminals with the VT100 compatibility! The controller sends :
■   screen-mask
■   data-echo
■   readable replies

After power-on the controller send automatically a screen-masc. This consist of an info-line, position-area, command-line and reply-line.
Please input the command with the keyboard, the execution starts with the <CR>. You are able to edit a commandline (delete and backspace)
After power-on the controller send automatically a screen-masc. This consist of an info-line, position-area, command-line and reply-line.
Please input the command with the keyboard, the execution starts with the <CR>.
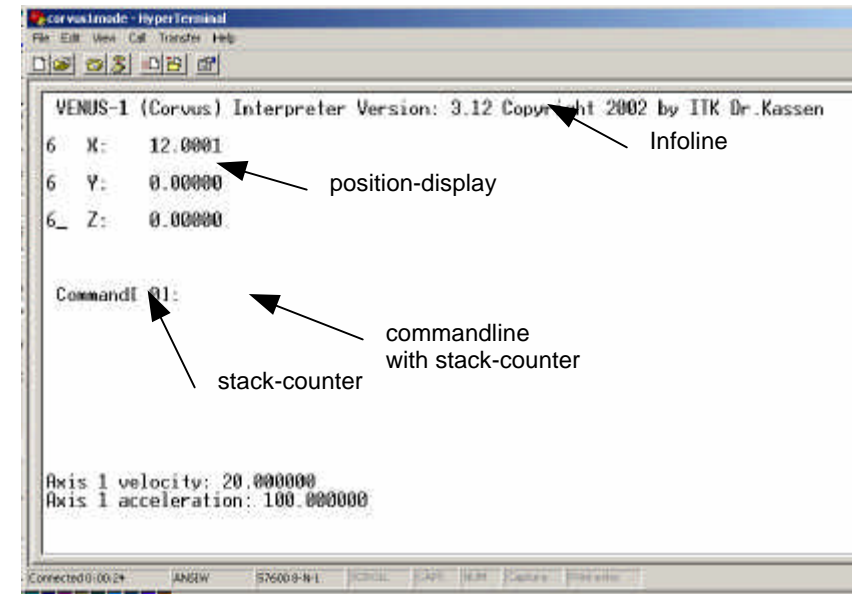
picture 5 : Screen in terminal-mode

Hyperterminal Settings

Settings for Host- and Terminal-Mode:
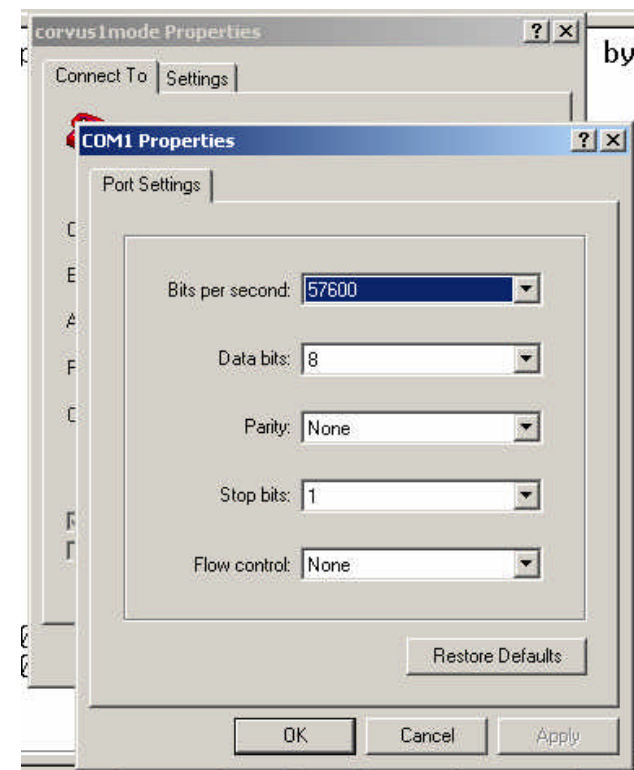
picture 6 : RS232-hyperterminal-settings

Properties for Host-Mode:
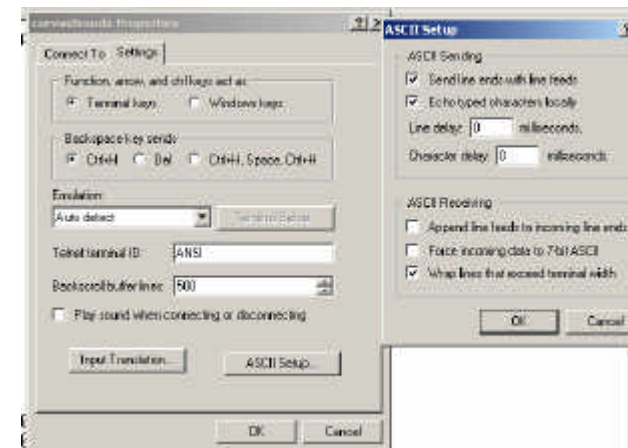
picture 7 : RS232-hyperterminal-properties host-mode

Properties for Terminal-Mode:
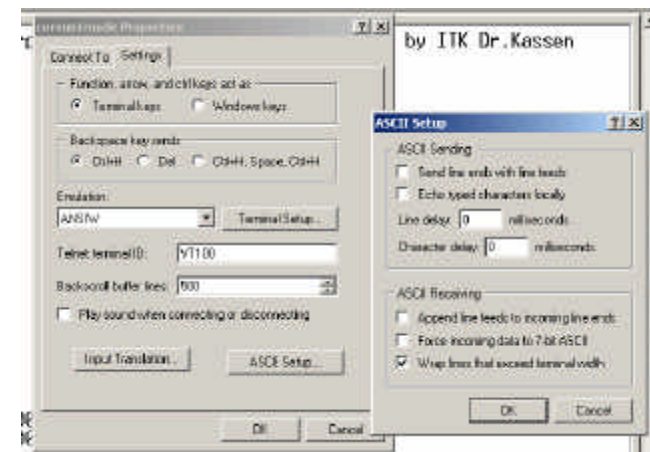
picture 8 : RS232-hyperterminal-properties terminal-mode

Encoders

Corvus supplies following encoder-systems for a real closed-loop mode:

■   **linear encoders with analog signals
    (sin/cos, 1Vss ***

■   **rotational encoders with analog signals
     (sin/cos, 1Vss) ***

■   **linear encoders with RS-422 signals
    (A/B, quadrature) ***

■   **rotational encoders with analog signals
    (A/B, quadrature)**

* in preparation

Encoders with RS-422 quadrature signals

These encoders are most common. The controller works with line-receivers
and 4 times evaluation of the signals

Example:

Encoder-Scale :	20µm	(LIE4 and 5)
integrated interpolation	50	
internal 4 times evaluation	4	
resulting resolution:	**20µm / (50x4) = 0,1µm**	

Limit-switch

Each axis has 2 limit-inputs. The limit-switches could be wired as normal-closed or normal-open (we recommend normal-closed). The configuration of the inputs is carried out with command ***setsw*** !
The limit-switch-1 also called cal-switch, is used for the homing of an axis (see command *calibrate cal).* With this command the axis is moving in ccw-direction!
The limit-switch-2 also called rm-switch, is used for the positive limit of the positioning-range. (see command *rmeasure rm).*
The controller stores the position-limits ("Hard-Limit"). Each position-command, which cross this limits, will cause an error-message, the move stops at the limits!

Configuration of the limit-switches

Each input is configurable with command ***setsw*** !

- **Switch as normal open**
- **Switch as normal-closed**
- **Ignore switch** The controller didn't react on an activated switch!
- **With a wrong configured switch the controller can't work properly**
- **Please take in consideration, that a "ignored" limit-switch is not able to prevent your mechanics!**

All limit inputs are debounced and immune against electrical noise.
Corvus supports active and passive sensors with NPN or PNP outputs.

PNP configuration

Passive switch in PNP
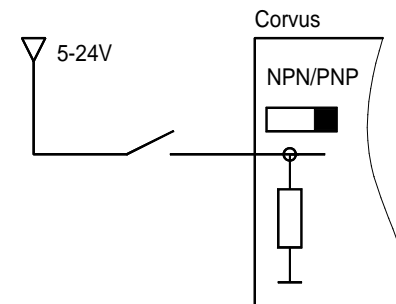
picture 9: Passive Switch (normal open)   PNP configuration

NPN configuration

Passiv switch in NPN

picture 10: Passive Switch (normal-closed) NPN configuration

Limit with linear and rotary stages

Limits of the travel-range

The travel-range is limited by
• limit-switches (hard-limits)
• programmed travel-limits (soft-limits see command *setlimit)*
• maximum travel-range limited by the controller
The maximum travel is limited by the maximum counts of revolutions .
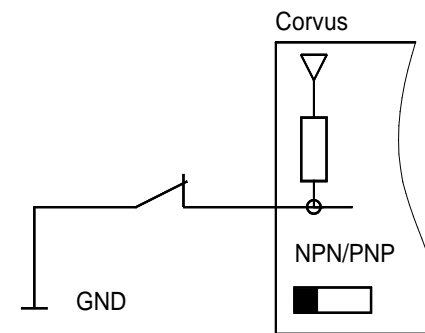A endless move in one direction is not possible!

Homing in detail

The controller moves all axes in ccw direction (to smaller positions) until the cal-switch (limit-switch 1) is activated. Then all axes move in cw direction until the cal-switch is deactivated. This position is the new 'zero-position' also called home-position.
The procedure for the **rm** command is the same with the limit-switch 2!
After **cal** and **rm** the travel-range is determined, it's never possible to cross this limits! The coordinate-origin can be shifted with the command *setpos.*
+Rotation stages normally do not have 2 limit-switches. They use only the **cal** switch! Please do not use the **rm-** command!!
After a **cal** command with a rotation stage, it's a good idea to deactivate the cal-switch with the command *2 0 n setsw!* Then it's possible to move 360 ° and more.

Diagnostics

The corvus is equipped with a extensive diagnostics which allows the actual status of the controller

Axis-1 Axis-2 Axis-3   RS-232 Ethernet

Axis   TxD   Error   A

Closed-Loop   RxD   Stopped

Endswitch   Connect   User LED1   B

Manual   Activity   User LED2
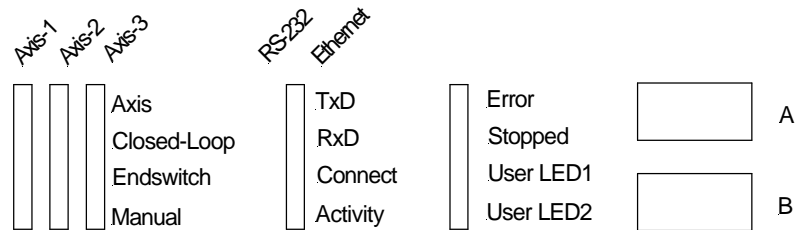
picture 11: LED diagnostics

Switch A

Toggles the Bit 2 in the status of the controller (Venus-1 Kommando *status*)
USER LED1 = active

Switch B

In actual firmware without function

Technical Datas

Dimensions and weights

Corvus desktop	70 x 240 x 305 , app. 3 kg
Corvus 2HE	90 x 440 x 300, app. 4kg
Corvus 3HE	130x440x300, app. 5kg

Table 2: dimensions and weights

Environment

operation	10° to 40 °
storage	-40 ° to 70 °

Table 3: Environment

Power-supply

Voltage	90-250 V (autorange)
Power	see type
Fuse	internal in power-pack
Power-Display	LED Diagnostics

Table 4: Power-supply

Controller and amplifier

amplifier	PWM, digital
processor	32 Bit

Table 5: controller

Motors

motortypes	2-Phase stepper-motors linear-motors*

* in preparation

Table 6:motortypes

Field-Voltages

5 V (fused)	max. 1 A per controller
12 V (fused)	max 300 mA per controller

Table 7: Field-voltages

The 5 V is mainly used by the encoder-system, these need about 150 mA per channel!
The 12 V is mainly used for inductive or hall-senors which need app.10-20 mA per switch

Velocity and Acceleration

max.velocity	45 rev/s
min.velocity	15 nm/s
max acceleration	1000mm /s³

Table 8: velocity and acceleration

Positioning-Resolution

resolution of the amplifier	600000 Positionen/rev.
interne position-resolution	32-Bit
absolute positioning resolution	<1nm
relative positioning resolution (smallest step)	15.62nm

Table 9: resolution of the controller

Interfaces

serial interface	RS232
CAN-Bus	Internal format CAN 2.0
Ethernet	10MBit, TCP/IP protocoll

Table 10:interfaces

Input/Outputs

Type	description
limits	2x PNP oder NPN, 5-24V
analoge inputs joystick	1x +/- 1.6V (Joystick)
digital In-/Out	3/3, TTL, 12V or 24V *
encoders	3x, inputs oder AB-Quadratur or 1 Vpp (03.2001) *
analog I/O	2x, analog inputs 0-10V or outputs 0-1V *
temperature-input	3x, for MICOS temperature-module *
emergency	2x, via Relais *
digitale inputs for motor-enable	3x *

Table 11: Inputs/Outputs

* option

Standards

Elektrische Sicherheit	IEC 1010-1, EN61010-1
Funkentstörung	EN55011
Störaussendung	IEC 801, EN50081-1 / EN50082-1

Table 12: Standards

Modes of motion

programmed	programming with ASCII command-interpreter in host-mode or terminal-mode
manual	joystick, wheeler *

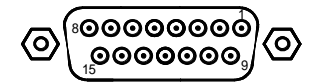** in preparation*
Table 73: Modes of motion

Security

|	
motor-enable	selectable motor-disable,
emergency relais	potential-free contact to connect the controller to a emergency -loop

Tabelle 84: Security

Connectors

Motor and limit

DSUB15 female	Function	Description
1	Ph1A	Motorphase A+
2	Ph1B	Motorphase A-
3	Ph2A	Motorphase B+
4	Ph2B	Motorphase B-
6	+5V	for active sensors (fused)
7	+12V	for active sensors (fused)
8	Temp	PWM temperatur-input
9	Ph1A	Motorphase A+
10	Ph1B	Motorphase A-
11	Ph2A	Motorphase B+
12	Ph2B	Motorphase B-
13	Endschalter cal	limit reverse (cal)
14	Endschalter rm	limit-forward (rm)
15	Masse	ground for limits

RS232 Interface
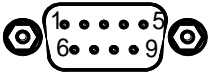
DSUB 9 male	function	description
2	RxD1	Receive Data
3	TxD1	Transmit Data
4/6	DTR/DSR	
5	Gnd	
7/8	RTS/CTS	

Encoder

DSUB9 female.	function	description
1	Ua1	channel A (positiv)
2	Ua2	channel A (positiv)
3	Ua0	index (positiv)
4	GND	
5	+5V	VCC
6	Ua1-	channel A (negativ)
7	Ua2-	channel B(negativ)
8	Ua0-	index (negativ)
9	Err	error of encoder

Joystick-Input
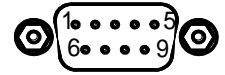
DSUB 9 male.	function	description
1	X	analog Input Axis 1
2	Y	analog Input Axis 2
3	Z	analog Input Axis 3
4	Joystick present	Joystickdetection must be connected to pin 7
5	NC	
6	SW	
7	GND	
8	Gnd (analog)	
9	+5V (analog)	

Digital I/O

DSUB9 female.	function	description
1	GND	GND
2	In2	Input 2 (0-24V)
3	User +5V	fused 5V
4	Out2	Output 2 (pnp,0-24V)
5	Schaltspannung	Output voltage (24V)
6	In1	Input 1 (0-24V)
7	In3	Input 3 (0-24V)
8	Out3	Output 3 (pnp,0-24V)
9	Out1	Output 1 (pnp,0-24V)

Safety device

DSUB9 female.	function	description
1	REL1	relais contact
2	GND	GND
3	User +5V	fused 5V
4	USER-EN3	Enable motor 3
5	USER-EN1	Enable motor 1
6	REL2	relais contakt
7	User GND	user GND isolated from GND
8	USER-EN2	Enable motor 2
9	User +12V	fused 12V
-	-	-

Brake-Power 24 V
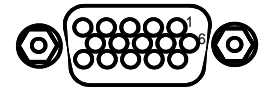
Pin	function	description
1	+24V	24V / 0.5 A *
2	+24V	
6	GND	
7	GND	

* minimum load>= 160mA

This output is normally used for motor-brakes. Please have a look to Venus-1command *setsout*

Index

For your notice: