Shortform SMC *pollux / SMC pollux NT*

Venus-2 commands consist of ASCII- signs which are interpreted in the controller and immediately executed.
A software development surrounding to produce the control programs is not needed.
The commands can be produced by any Host and whatever programming language you are using, on condition that there is an access to the RS- 232 interface. In the simplest way the commands are directly transmitted to the controller via an ASCII terminal.

Command syntax

The commands are assembled following this scheme:
[parameter] _ [axis index] _ [command] _ blank, (space) or (SP) blank

Command ending character while transmitting

The Venus- 2 command must be terminated with a blank (SP). [Parameter] SP [Axes index] SP [Venus- 2 command] SP

Command ending character while receiving

[1st parameter] SP [2nd parameter] SP [n- parameter] CR LF
Data which are delivered by the controller are always terminated with ASCII (CR) and (LF).

RS-232 Interface Configuration

Data bits	8
Stop bits	1
Parity	no
Handshake	no
Baudrate	19200

Error numbers:

1.... 4	Internal error
1001	Wrong parameter type
1002	parameter stack underrun
1003	parameter out of range
1004	Movement range should be exceeded caused by limit switch
1008	See 1002
1010	RS-232 input buffer lacking space (<30 para left)
1015	Parameter out of the movement area (softlimit)
1100	Both Limit Switches are active
2000	Unknown command

First steps:

Normaly the controller is configured for the delived stage. If delivery contains more then one controller, the controllers are labeled with an axisnumber (the address of the controller)

The actual settings are documented in a *.txt file, which is downloadable with our demo-application SMC-Pollux xxx.exe, also documented as pdf-file.

For the first step, hyperterminal, any other terminal-program, or the program smc-pollux xxx.exe could be a good choice.

Due to the fact that the controller is ready configured, the main commands for customers use
are the basic move commands, homing and position and status query:

If a communication is established just type following commands: (axis 1 must be connected)

```
1 np            ; controller returns the actual position, after reset always 0.00000
1 ncal          ; axis searches the limit reverse the release point is the physical zero-position
                of the system
2.0 1 nr        ; axis moves 2 unit relative (usually 2 mm or 2 degree)
1 np            ; returns the actual position, now 2.00000
4.0 1 nm        ; axis moves to absolute 4.0 units
1 nst           ; if stage is just moving return value =1
                ; if stage not moving, means at target, return value = 0
```

Multiple Axis Application:

Please verify that all daisy-chained controller do have different axis-addresses. If no address labled you should assume that the address is **'1'.**

Assigning new controller address:

Assigning a new controller address is very easy, connect **only one controller to the RS-232**, connect with program *Polluxterm.exe* and change the address with via venus-commandline.

newaddress setaxisno

The address is active immediately! After this save the new settings with Button *'nsave'*
or command : *newaddress nsave*.

Command-Overview:

Command	Description	Parameters	R/W	Range	Example
nrmove (nr)	move relative, without query status	*relpos axisid*	w	-1000.0 ..+1000.0	1.0 1 nr
nmove (nm)	move absolute without query status	*abspos axisid*	w	-1000.0 ..+1000.0	5.1 1 nm
npos (np)	returns actual position	*axisid*	r		1 np
npush	loads targets on stack (for synchronized start)	*position axisid*	w	-1000.0 ..+1000.0	10.0 1 npush
npop	removes values from stack	*axisid*	w		1 npop
setnpos	redefines the actual position	*abspos axisid*	w	-1000.0 ..+1000.0	0.0 1 setnpos
nstatus (nst)	returns actual status	*axisid*	r		1 getaxis
getnerror (gne)	returns actual error number	*axisid*	r		1 gne
getmerror (gme)	returns machine error number	*axisid*	r		1 gme
nabort	stops a move	*axisid*	w		1 nabort
<CtrlC>	stops move of all connected axes		w		<CTRL-C> hex 3
speed	starts a constant velocity move	*+/-speed axisid*	w		2.5 1 speed
stopspeed	stops constant velocity move	*axisid*	w		1 stopspeed
setnpowerup	defines startup behaviour	*value axisid*	w		0 1 setnpowerup
getnpowerup	returns startup behaviour	*axisid*			1 getnpowerup
ncal	homing (search limit reverse)	*axisid*	w		1 ncal
nrm	rangemeasure (search limit forward)	*axisid*	w		1 nrm
nversion	returns the firmware-version	*axisid*	r		1 nversion
nidentify	returns the controller identification	*axisid*	r		1 nidentify
getnserialno getserialno	returns the serial-number	*axisid*	r		1 getnserialno 1 getserialno
getnoptions	returns the options-code	*axisid*	r		1 getnoptions
getaxis	returns the wether axis is active or not	*axisid*	r		1 getaxis
setaxis	defines if axis active or not	*status axisid*	w	0..2	0 1 setaxis
getswst	returns the status of limit-inputs	*axisid*	r		1 getswst
getsw	returns the setting of limit-inputs	*axisid*	r		1 getsw
setsw	defines the limit-switch-status	*status 0 axisid* *status 1 axisid*	w	0..2	1 0 1 setsw 1 1 1 setsw
getmotiondir	returns the setting of the direction of motion	*axisid*	r		1 getmotiondir
setmotiondir	defines the direction of motion	*value axisid*	w	0..1	0 1 setmotiondir
getncalswdist	returns the calswitch-distance	*axisid*	r		1 getncalswdist
setncalswdist	defines the calswitch-distance	*distance axisid*	w	0..1.0	0.5 1 setncalswdist
getpitch	returns the pitch of the stage	*axisid*	r		1 getpitch
setpitch	defines the pitch of the stage	*pitch axisid*	w	0.1..50	1.0 1 setpitch
getnvel (gnv)	returns the velocity for move	*vel axisid*	r		1 gnv

setnvel (snv)	defines the velocity for move	*axisid*	w	0.0001...2000.0	12.0 1 snv
getnaccel (gna)	returns the acceleration for move	*axisid*	r		1 gna
setnaccel (sna)	defines the acceleration for move	*acc axisid*	w	1..2000	120.0 1 sna
getnstopdecel	returns the acceleration for a commanded stop or limit-switch activation	*axisid*	r		1 getnstopdecel
setnstopdecel	defines the acceleration for a commanded stop or limit-switch activation	*acc axisid*	w	1..2000	400.0 1 setnstopdecel

getncalvel	returns the speed for cal-move	*axisid*	r		1 getncalvel
setncalvel	defines the speed for cal-move	*value 1 axisid* *value 2 axisid*	w		5.0 1 1 setncalvel 0.1 2 1 setncalvel
getnrmvel	returns the speed for rm-move	*axisid*	r		
setnrmvel	defines the speed for rm-move	*value 1 axisid* *value 2 axisid*	w		50 1 1 setnrmvel 0.1 2 1 setnrmvel
getumotmin	returns the motor-umotmin	*axisid*	r		1 getumotmin
setumotmin	defines the motor-umotmin (*)	*value axisid*	w	see table	500 1 setumotmin
getumotgrad	returns the motor-umotgrad	*axisid*	r		1 getumotgrad
setumotgrad	defines the motor-umotgrad (*)	*value axisid*	w	see table	20 1 setumotgrad
getnlimit	returns the travel-limits	*axisid*	r		1 getnlimit
setnlimit	defines the travel-limits	*low high axisid*	w	-1000.0 ..1000.0	0.0 100.0 1 setnlimit
nsave	save all parameters in flash-memory	*axisid*	w		1 nsave
nrestore	restores the last saved parameters	*axisid*	w		1 nrestore
ngsp	returns the stack-counter	*axisid*	r		1 ngsp
nclear	clear controllers internal stack	*axisid*	w		1 nclear
setaxisno	define address of the controller	*axisid*	w	1..16	2 setaxisno
getaxisno	returns address of the controller	*axisid*	r	1..16	2 getaxisno
nreset	resets the controller	*axisid*	w		1 nreset

setuv	stores uservalue (32-bit int) to memory	*value Id axisid*	w		12222 1 2 setuv
getuv	load uservalue (32-bit int) from memory	*id axisid*	r		1 2 getuv

Pollux NT (closed-loop) specific commands:

getcloop	returns if closed loop active or not	*axisId*	r		1 getcloop
setcloop	defines if closed loop active or not	*status axisId*	w	0..1	1 1 setcloop
getclwindow	returns the defined closed-loop in-target window	*axisId*	r		1 getclwindow
setclwindow	defines the closed-loop in-target window	*size axisId*	w	0.0-1.0	0.001 1 setclwindow
getclwintime	returns the defined closed-loop in- window time [ms]	*axisId*	r		1 getclwintime
setclwintime	defines the defined closed-loop in- window time [ms]	*time axisId*	w	0-8191	10 1 setclwintime
getnrefvel	returns the speed for refmove (index search)	*axisId*	r		1 getnrefvel
setnrefvel	defines the speed for refmove (index search)	*value 1 axisid* *value 2 axisid*	w		1.0 1 1 setnrefvel 2.0 2 1 setnrefvel
nrefmove	starts a refmove (index-search)	*abstarget axisId*	w		5.0 1 nrefmove
getrefst	returns the status of refmove (index-search)	*axisId*	r		1 getrefst
getref	returns the transition of the index mark	*axisId*	r		1 getref
setref	defines the transition of the index mark	*transition axisId*	w		0 1 setref
getemergency	returns the configuration of emergency shortcuts	*axisId*	r		1 getemergency
setemergency	defines the configuration of emergency shortcuts	*config axisId*	w	0-3	3 1 setemergency
getscaleinterface	returns the type of encoder	*axisId*	r		1 getscaleinterface
setscaleinterface	defines the type of encoder	*type axisId*	w	0-2	1 1 setscaleinterface

Some motorsettings for motors used by PI miCos:

The values could vary, dependent on the desired load and application!

Motor	Nominal Current [Amp]	Coil resistance [Ohms]	commonly used with stages	*umotmin*	umotgrad
Pollux Motor I and II	1.2		VT80,DT80	*2000..2300*	110
Pollux Motor III	1.2		VT80,DT80	*2000*	110
4H4018	1.7	1.7	VT80, DT80 , HT90	*3200*	90
PK-245-01B halfcoil	1.2	3.3	LS110, PLS85, DT65N, ES65, MA35	*3000..3500*	150
PK-245-01B fullcoil	0.85	6.6		*4000..5000*	400
PK-244-01B halfcoil	1.2	3.3	ES-100	*3500*	140
PK-244M-01B fullcoil	0.85	6.6	DT-50R DT-80R	*4000-5000*	140
ZSS-43-200-1.2-E parallel	1.2	2.6	LS110, PLS85, PRS110, HPS170, MS8,DT65N, WT90	*4300*	150
ZSS-42-200-1.2-E parallel	1.2	1.6	NPE200, MA35	*3500*	140
ZSS-52-500-2.5E parallel	2.5	0.6	LS180. UPM160	*3400-4000*	*140*
AM1524-A0.25	0.25	12.5	MP20S MP20L, MT55, MT60,MT40, ASS5/ADS5	*2500 –3500*	140
ZSS-25-200-1.2 parallel	1.2	0.95	WT85, WT100, MT40,MTS-70	*2000*	24
ZSS-32-200-1.2 parallel	1.2	1.3	MT60	*3300*	60
PK266-E2.0 parallel	2	0.9	DT120, UPL-160, WT120	*3000..3200*	160..250
PK264-JB half-coil	2	1.46		*3500..4500*	160..200
PK264-JB full-coil (low speed)	1.4	2.92		*6000..6500*	400..500
CTP11-13	1.3	3.3		*3500*	140
ST-2818S1006	0.95	3.4		*4000*	100
LIN-208-17-1	0.8	5.4		*3800-5400*	20
LIN-211-18-02	1.3	1.3	VT-40 MP-20	*2400*	60
PI miCos 2Ph-018	0.24	20.4	VT-21, MP-21, ES-50	*6500*	45

Nominal Current:	motors rated continues current, not the real current with the documented settings
Coil resistance:	motor single phase resistance (varies depending on wiring type, fullcoil, halfcoil , serial or parallel)

Please note: Without damper motors get stuck in the resonance area of the motor, which is mainly in the range of 4 rev/sec (200 fullstep motor). A damper (oriental) eliminates perfectly!

Read the actual parameters:	*axisId getumotmin* and *axisId getumotgrad*
Write new parameters:	*value axisId setumotmin* and *value axisId setumotgrad*
If parameters ok, save flash-memory	*axisId nsave*

Power-Connector:

Manufacturer	Binder Connector
Type	Kabeldose gerade Serie 719 3pol
Art.Nr (manufacturer)	09 9748 70 03
Art.Nr.(PI miCos)	K3110252

Binder 3 pin	Function
1	+24 V
2	-
3	GND

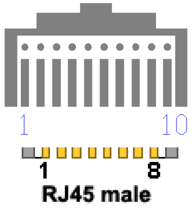
Motor Interface: DSub9 standard

DSub9emale	Function
1	Phase A+
2	Phase A-
3	Phase B+
4	Phase B-
5	Gnd limit-common
6	cal-switch (limit reverse)
7	rm-switch (limit forward)
8	+ 5V for active sensors
9	nc.

Interface-Cable RS-232:

DSub9f	function	color	RJ45 male 10 pin
2	RxD	yellow	5
3	TxD	green	6
5	GND	brown	8

Caution: PC-side :   connect pin 1+4+6
connect pin 7+8



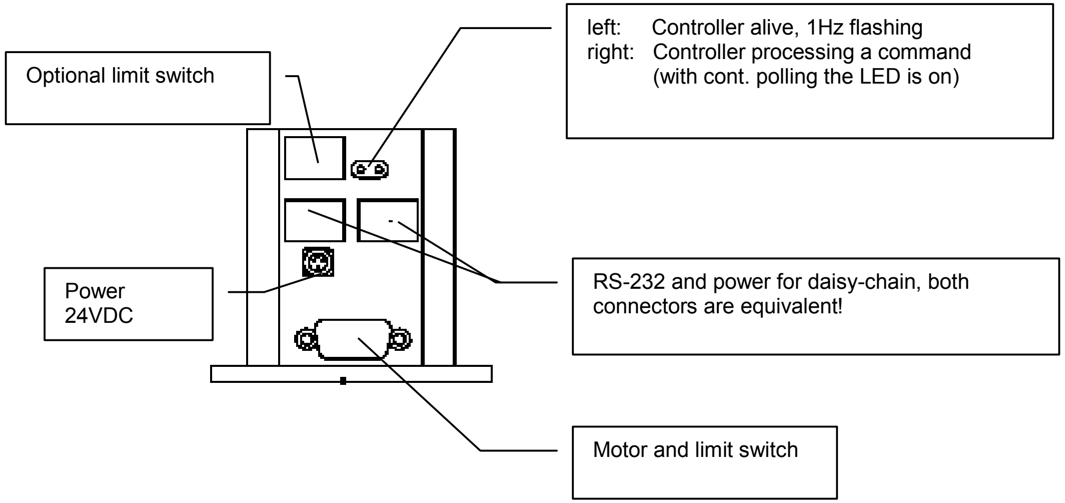
RJ45 10 pin
front view to contacts

Pollux-Motor Limit Switch Connection

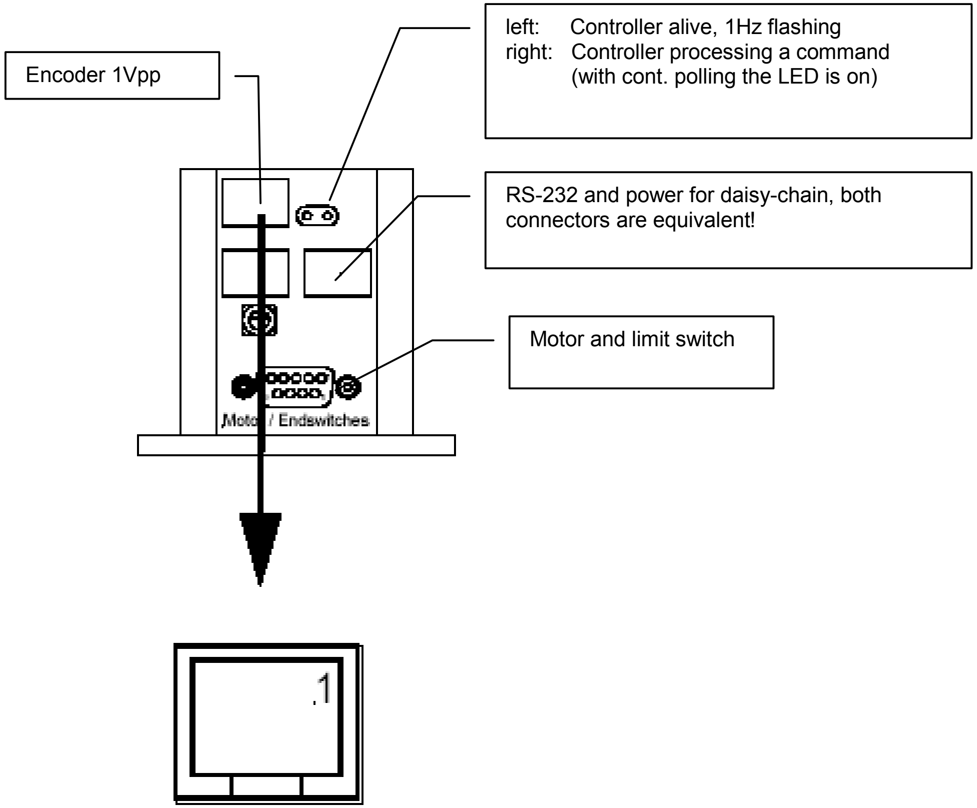
Open-leads to connect directly to the switches (active and passive)

lead-color	Function
white	+ 5V for active sensors
yellow	cal-switch (limit reverse)
green	rm-switch (limit forward)
brown	Gnd limit-common

Pollux:


left: Controller alive, 1Hz flashing
right: Controller processing a command (with cont. polling the LED is on)
Optional limit switch
Power 24VDC
RS-232 and power for daisy-chain, both connectors are equivalent!
Motor and limit switch

Pollux NT (closed-loop):



Encoder 1Vpp

left: Controller alive, 1Hz flashing
right: Controller processing a command
(with cont. polling the LED is on)

RS-232 and power for daisy-chain, both connectors are equivalent!

Motor and limit switch

RJ-45 10 pin	Function 1Vpp Encoder
1	5V
2	
3	Sin + (A+)
4	Sin – (A-)
5	Cos + (B+)
6	Cos – (B-)
7	Ref + (Index+
8	Ref- (Index-)
9	Gnd
10	