Pollux

high resolution positioning drive

Manual

Contents

About this documentation

This documentation provides detailed informations on the hardware features of Pollux Drive or Pollux Box.

Software informations about the Venus-2 command language are provided in a additional manual.

Symbols in this documentation

To clarify the content following symbols are used.

Symbol	Description
	Warning. The informations beside this sign must be observed strictly
	Hint
	This function can be released with a release code
Venus-2	Venus-2 command, see handbook

Chapter 1

Introduction

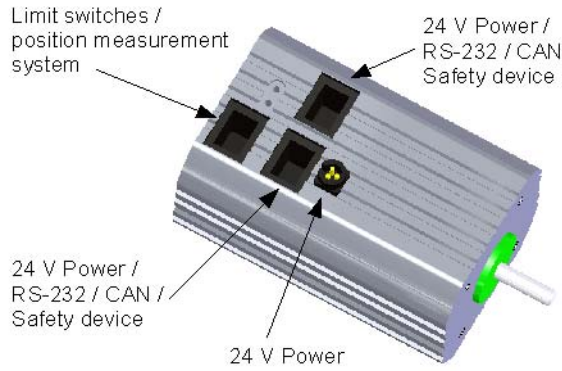
Presentation of the controller

Pollux is an extremely compact combination of a high torque stepper motor and an intelligent positioning controller.

The 1.8° / 0.9°, 42 mm sq. motor is combined with a powerful motor electronic that provides a calculational step resolution of minimum 0.001µm and a maximum speed of 40 rev./s.

Controller programming and configuration is executed via an RS232 interface which allows velocity moves, point-to-point moves and multiple unit control with only one communication port.
The ASCII programming language is termed Venus-2.
An On-Board flash memory enables non volatile parameterizing and software updates via the serial line.
Your dealer will support you if a firmware update is necessary.
Pollux is available in different variants, which differ from motor speed, holding torque and the motor assembly.

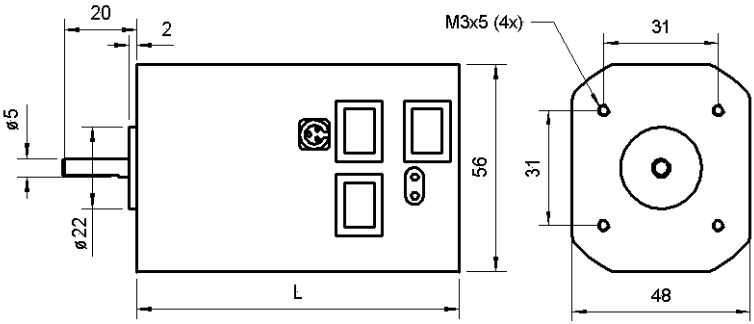
Provided with Pollux NT model exclusively:
- position measurement support for closed loop operation (software option with activation code)
- CAN-Bus interface (software option with activation code)



Function survey

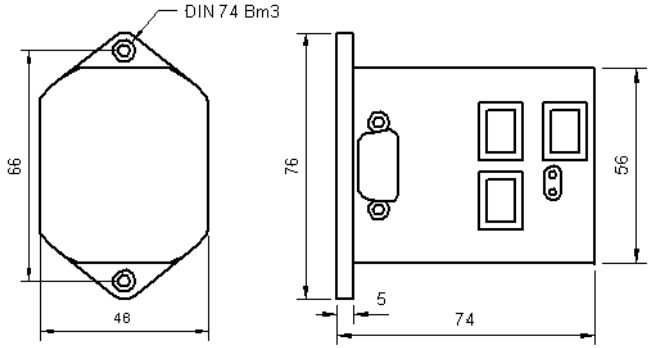
Functions
• Multiple connection, up to 16 devices
• Phase current max 1.2A/Phase
• Velocity: 12.5, 25, 40 rev/s
• Minimum step resolution = 0.001µm
• Limit switch inputs Homing command and range measure
• RS-232 Interface, 19200 Baud
• Command language (Venus-2 for Pollux)
• Positioning modes: Absolute, relative, velocity controlled, synchronous,
• Power Up functions
• Safety device (Motor disable function)
• Firmware update via RS-232 (115000 Baud)
• CAN-Bus Interface (Option)

Dimensions Pollux Drive



Pollux Type 1: L=87mm
Pollux Type 2: L=87mm
Pollux Type 3: L=100mm
Pollux Type HT: L=120mm

Dimensions Pollux Box



Chapter 2

Installation

Safety notice

The controller is developed, produced, checked and documented in consideration of the relevant standards.
If it is used according to regulations, there are no dangers for persons and things.
Use according to regulations implies that the device is solely used in the way that is described in here and that the stated safety advices are followed.

Declaration by the manufacturer

The company

PI|miCos GmbH
Freiburger Strasse 30
D-79427 Eschbach

declares that the product:

Pollux Box, Pollux Drive

intended use:

Positioning Controller

meet the following directives and standards:

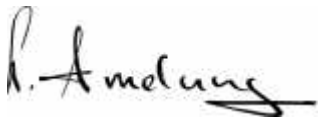
2006/95/EC	**2004/108/EC**
Low Voltage Directive	EMC Compatibility Directive

European Standards:

EN61010-1
EN61326-1
EN61000-3-2, EN61000-3-3

Remarks:

Initial operation of the Pollux Controller sold by us is not permitted until it has been assured that the machine/system, in which our Controller is installed, complies with the EU machine guidelines.



L.Amelung (Managing Director)
Eschbach, 09.07.2012

Power supply

A stabilized 24V (+/-5%) power supply is required. The necessary power depends on the load and speed. Each unit requires a power supply with minimum 24V (+/-5%) /10 W.

Important:
Do not plug in the power cable while the power is On.

Programming via RS-232 interface

Pollux is controlled via the RS-232 interface, therefore a 9 Pin serial cable with a standard wiring on host side and a 8 pin RJ45 plug on Pollux side is included in the delivery.
For a daisy chain operation additional cables are necessary.
The command language is "Venus-2 for Pollux".

For simple programming a VT100 ASCII Terminal could be used to send Venus-2 commands to the controller.

The Venus-2 command language is described in the second part of this manual.

Important notices about the RS-232 interface

- **Preferably use the delivered RS-232 cable**
- **The RS-232 interface settings of the control unit has to correspond accurately with the settings of Pollux, shown in the following table.**
- **The RS-232 interface of the control unit should not be be occupied by other programs**

RS-232 interface configuration

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

Motor characteristic adjustments

The typical motor parameter are determined from the holding torque, the step angle, the maximum phase current and the motor pole pairs.

Commands to adjust the speed torque and holding torque

The adjustment is accomplished by the following Venus-2 commands.

setumotmin	This command affects the phase current if the motor is in position. As a result the holding torque and power consumption is affected.
setumotgrad	This command affects the phase current and motor torque if the motor is moving.

For the Pollux Box Version:

The adjustment to the different motor types is accomplished with the following Venus-2 commands:

- ***setphases***
- ***setumotmin***
- ***setumotgrad***
- ***setpolepairs***

Speed-Torque characteristic

The following diagramms are representing the order of magnitude of the motor torque.

Pollux-1

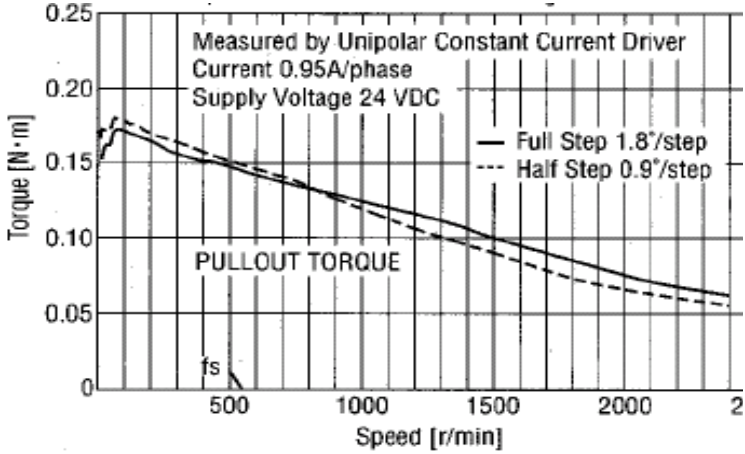


Figure 1: Speed Toque characteristic Pollux-1

Pollux-2

The following diagramms are representing the order of magnitude of the motor torqe.

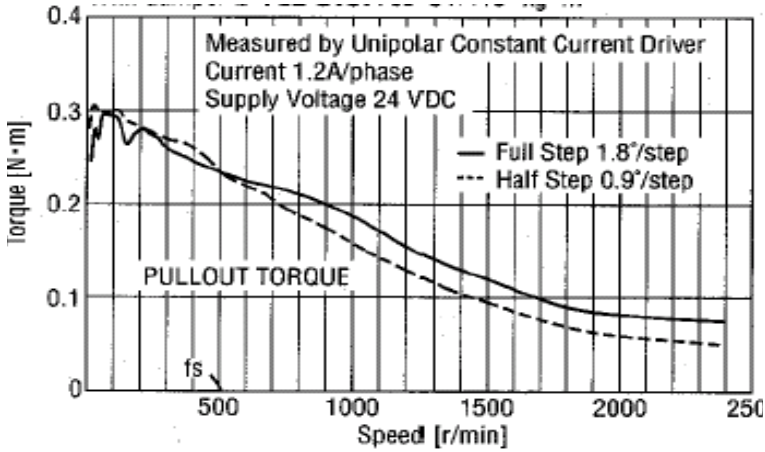


Figure 1: Speed Torque characteristic Pollux-2

Pollux Box with seperated motor

The following diagramms are representing the order of magnitude of the motor torqe.

Motor example.

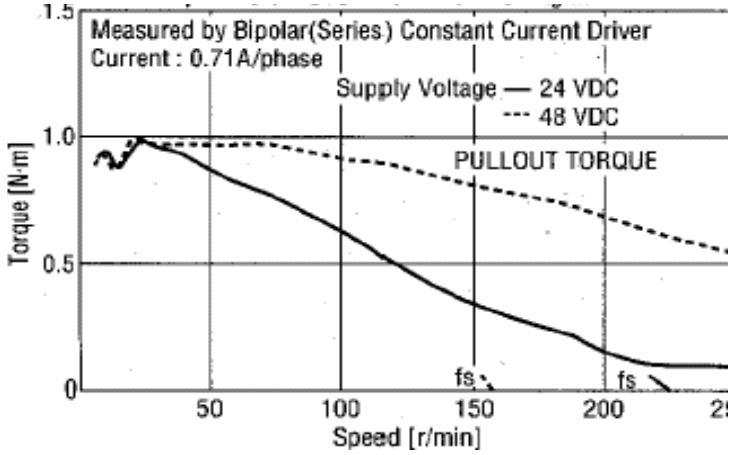


Figure 2: Example Speed-Torque characteristic Pollux-Box

Limit switches

Limit switch inputs

Pollux provides two endswitch inputs within the 10pin RJ45 connectors or the "D" Type connector of Pollux-Box. The switch inputs are termed cal-Input and rm-Input.
Herewith also the function of these inputs is described.
The limit switch functions supported by Pollux are linked to these inputs; no other function can be assigned to them.

Limit switch functions

Following limit switch functions are provided.

- **move to the cal-switch (Venus-2 command *ncal*)**

The controller moves in negative position until the cal-endswitch is pressed and released.

- **move to the rm-switch (Venus-2 command *nrm*)**

The controller moves in positive position until the rm-switch is pressed and released again.

Switch types

Pollux supports the following endswitch types:

- **mechanical switches (*opener* / *closer*)**
- **inductive proximity switches NPN**
- **photo sensors**

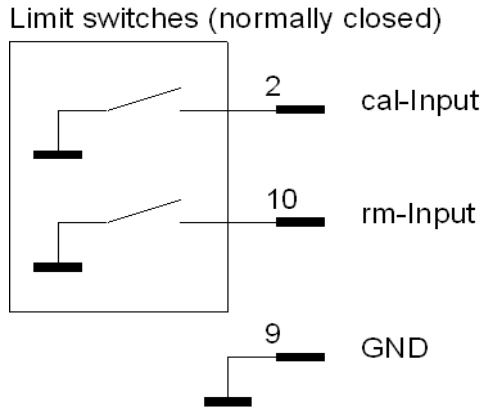
The function *opener* or *closer* is determined with the Venus-2 command ***setsw*** and is saved with ***nsave***.

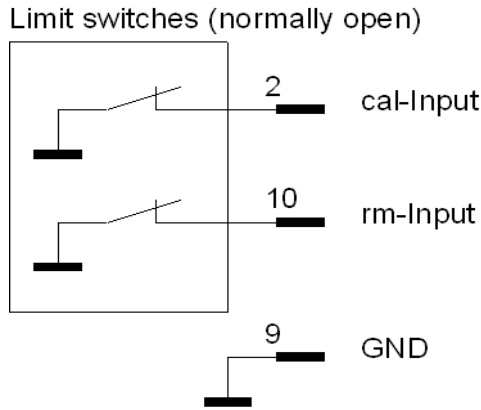
Procedure to configure the limit switch inputs

Go through following steps:

1. Define the switch type settings, see command ***setsw***
2. Store the settings, see command ***nsave***
3. Perform a softreset, see command ***nreset***

Limit switch wiring via RJ45 connector





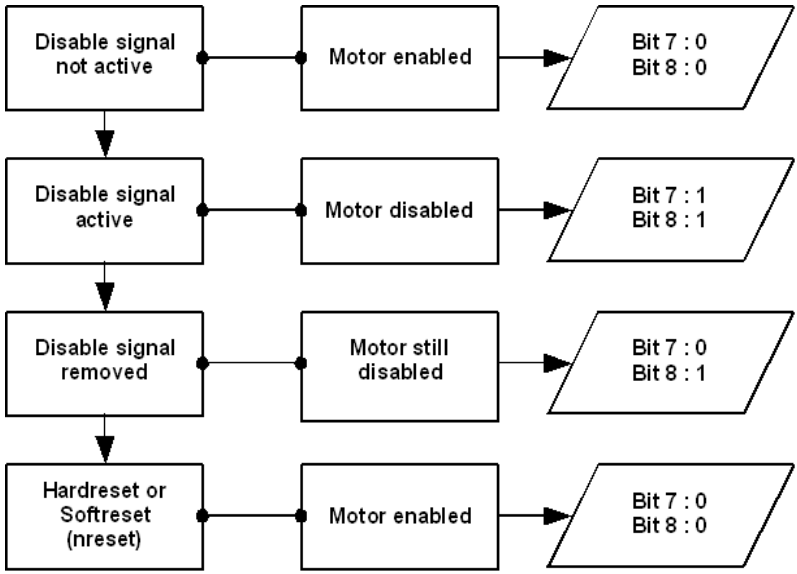
Pollux-Box uses the same wiring schemes.
The pin numbers are different. See chapter "Connectors".

Safety device (Option)

For safety reasons Pollux can be equipped with an additional input to disable motor power. In this state the motor has no holding torque.
Nevertheless the Pollux controller is able to communicate via the RS-232 Interface, so the motor disable status can be read out from the software.
To start the motor driver after a motor disable condition, first the disable input signal must be removed and a hard reset or software reset must be performed.
The reply of Venus-2 command ***nstatus*** is reflecting the safety device condition in Bit 7 and Bit 8
See Venus-2 command language.

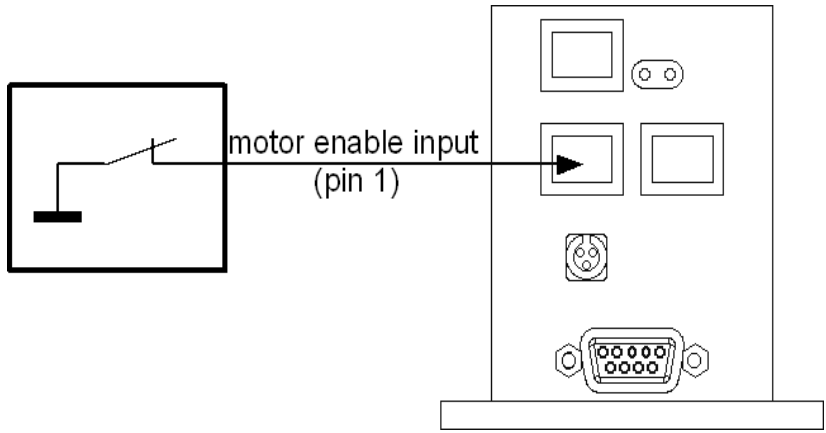
Principal function

Following chart demonstrates the effect of the motor disable input onto motor driver and controller status replies.

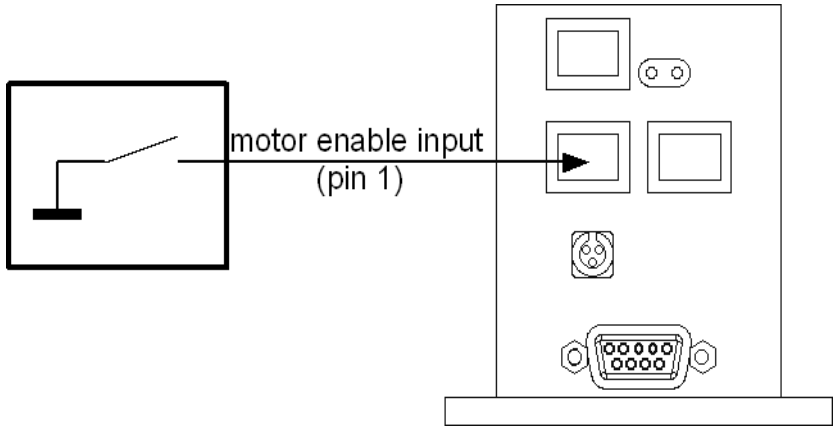


Safety switch wiring (Option)

Motor driver enabled



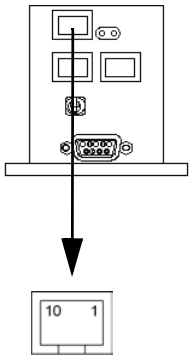
Motor driver disabled



Chapter 3

Connectors

Limit switch connector (1 x 10 pin RJ45)



Pin	Name	Description
1	+5V	Power output (100 mA max.)
2	cal-Input *getmotiondir* = 0 rm-Input *getmotiondir* = 1	Limit switch input "cal" or "rm", Depends on the settings of ***setmotiondir***
3	Ua+	Position sensor sine signal inputs (+/-) *
4	Ua-	
5	Ub+	Position sensor cosine signal inputs (+/-) *
6	Ub-	
7	Ref+	Position sensor reference signal inputs *
8	Ref-	
9	GND	Ground
10	rm-Input *getmotiondir* = 0 cal-Input *getmotiondir* = 1	Limit switch input "cal" or "rm", Depends on the settings of ***setmotiondir***

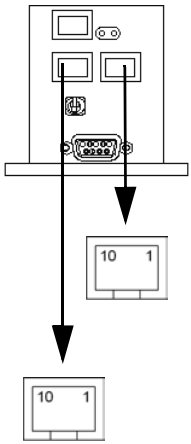
* with Pollux NT only; otherwise do not connect!

Important:
Do not plug in any cable while the system is running.

RS-232 connectors (2 x 10 pin RJ45 connector)

To simplify daisy chain operation, the Pollux 24V power input is also integrated in the RS-232 connectors.
This allows for daisy chaining the power supply of two Pollux devices maximum.

- If more than two Pollux devices have to be connected to the RS-232 line, it is recommended to supply them via the additional circular power connector separately.
- If a device is supplied via the power connector, the voltage is also impressed at the RJ45 connectors.



Pin	Name	Description
1		Motor enable *
2	CAN_H	CAN high signal **
3	CAN_L	CAN low signal **
4	GND	Ground
5	RxD	Pollux RS-232 receive input
6	TxD	Pollux RS-232 transmit output
7	nc	nc
8	GND	Ground
9	24V	Power
10	24V	Power

* Hardware option
** Software option, available with Pollux NT only

Important:
Do not plug in any cable while the system is running.

Motor enable function:

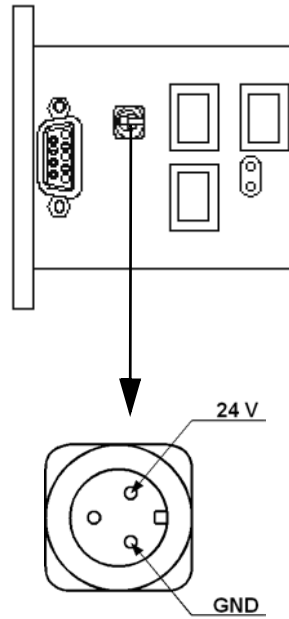
- **If motor enable input is set to GND, the motor is enabled.**
- **If motor enable input is open or VCC, the motor is disabled.**

Power Input (3 Pin circular connector)

With this connector Pollux is provided to connect a power supply separately.

If the power is connected via the RJ45 connector, the 24V input voltage is also impressed at the circular connector pins.

Important:
Do not plug in the power cable while the power is On.



Motor connector Pollux-Box with D" Type 9 (Standard)

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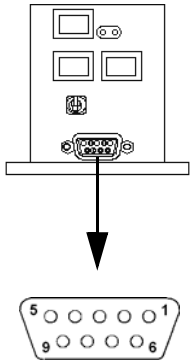

Pin	Name	Description
1	Ph 1A	Motor phase 1
2	Ph 1B	
3	Ph 2A	Motor phase 2
4	Ph 2B	
5	GND	Ground
6	cal-Input if *getmotiondir* = 0 rm-Input if *getmotiondir* = 1	Limit switch input "cal" or "rm". Depends on the settings of ***setmotiondir***
7	rm-Input if *getmotiondir* = 0 cal-Input if *getmotiondir* = 1	Limit switch input "cal" or "rm", Depends on the settings of ***setmotiondir***
8	+5V	Power output
9	nc	not connected

For your notices: