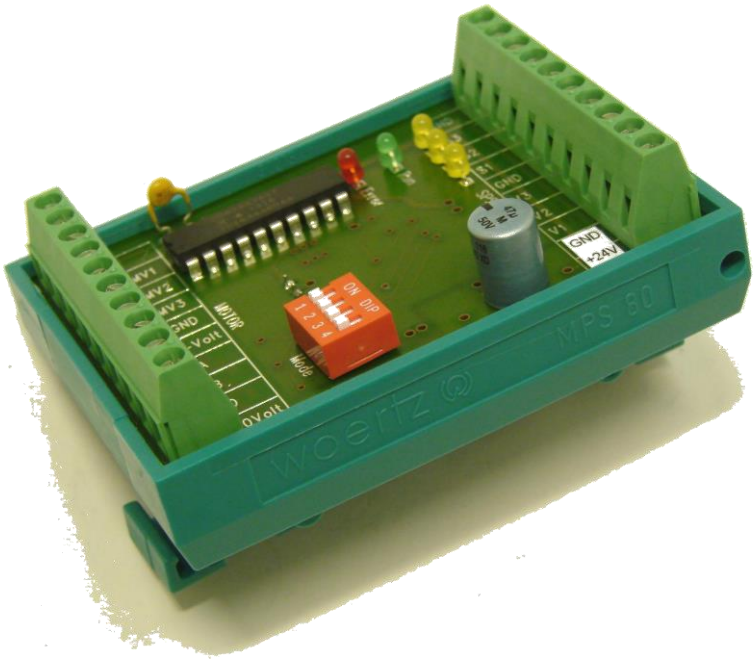
BPS Control Unit

Instruction manual

This document provides the necessary basis for instruction manual information on commissioning and safe operation of the above mentioned product.
It shall apply from the following model:

- Hardware version BPS.A1 (from Print Date 03.08.2010)
- Software Version 1.1



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Documents of reference

- BPS Realisation-Contract specification of 25.06.2010

Annex

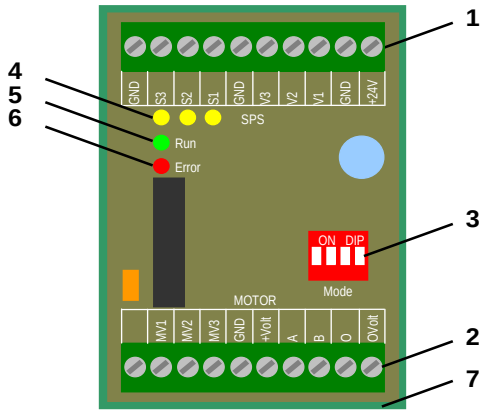
- Technical date stand 29.06.2010

1 Safety instructions

The BPS Control Unit is developed for the application in the control box. The product must be protected from electrostatic discharge ESD and is allowed to put in operation and be configurated. Only from experted staff in the company.

2 Description

The BPS Control Unit enables the regulation of the pneumatic Stepping Motors of the company Baumgartner AG. Several modes of operation enable the unit to switch as a component of rule between existing PLC and motor (with or without compensation of step) or to conduct as an autonomy control unit.



Legend

1. Screw-type terminal for cabling with PLC
2. Screw-type terminal for cabling with Stepping Motor and control rotating
3. Operating mode–selector switch
4. Position of valve LED
5. Operation LED
6. Error LED
7. Print holder

2.1 Screw-type terminal PLC

Pin Name	Function
+24V	Supply 24VDC
GND	Supply 0VDC
V1	Input PLC Valve signal 1
V2	Input PLC Valve signal 2
V3	Input PLC Valve signal 3
GND	GND of PLC Valve signals
S1	Output PLC Sensor display 1
S2	Output PLC Sensor display 2
S3	Output PLC Sensor display 3
GND	GND of PLC Sensor display

2.2 Screw-type terminal motor

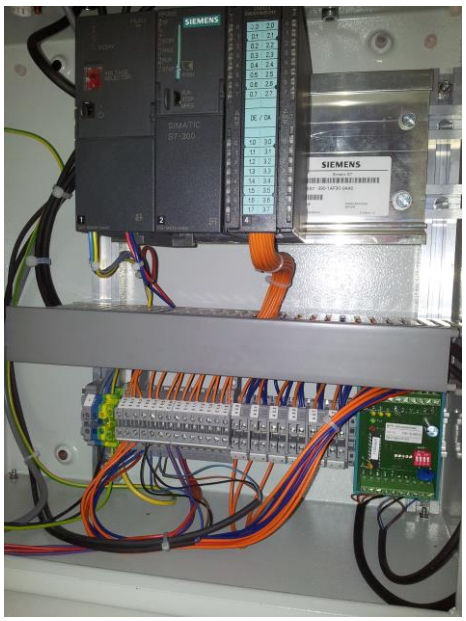
Pin Name	Function
MV1	Output Matrix valve 1
MV2	Output Matrix valve 2
MV3	Output Matrix valve 3
GND	GND of valve signal
+Volt	Feeding Control rotating 24VDC
A	Input Control rotating A- impulse
B	Input Control rotating B- impulse
0	Input Control rotating 0- impulse
0Volt	Feeding Control rotating 0VDC

3 Installation

- The print holder is furnished for assembly on a 35 mm cap rail according to EN50022.
- The type-screw terminals are constructed for lead cross sections of 0.14 mm2 to 1mm2.
- The BPS Control Unit has to be assembled in a control box or in an electrical cabinet. Is the BPS Control Unit conducted together with a PLC, the unit has to be installed as near as possible to the PLC.
- At the application as an autonomous unit it has to be ensured that the unit is protected of environmental impacts and electrostatic discharge. Ideally a clamping box is to be assembled.

3.1 Installation example

Installation of BPS-control unit in a plastic box as an autonomous unit (see 3.3 Application as autonomous unit).

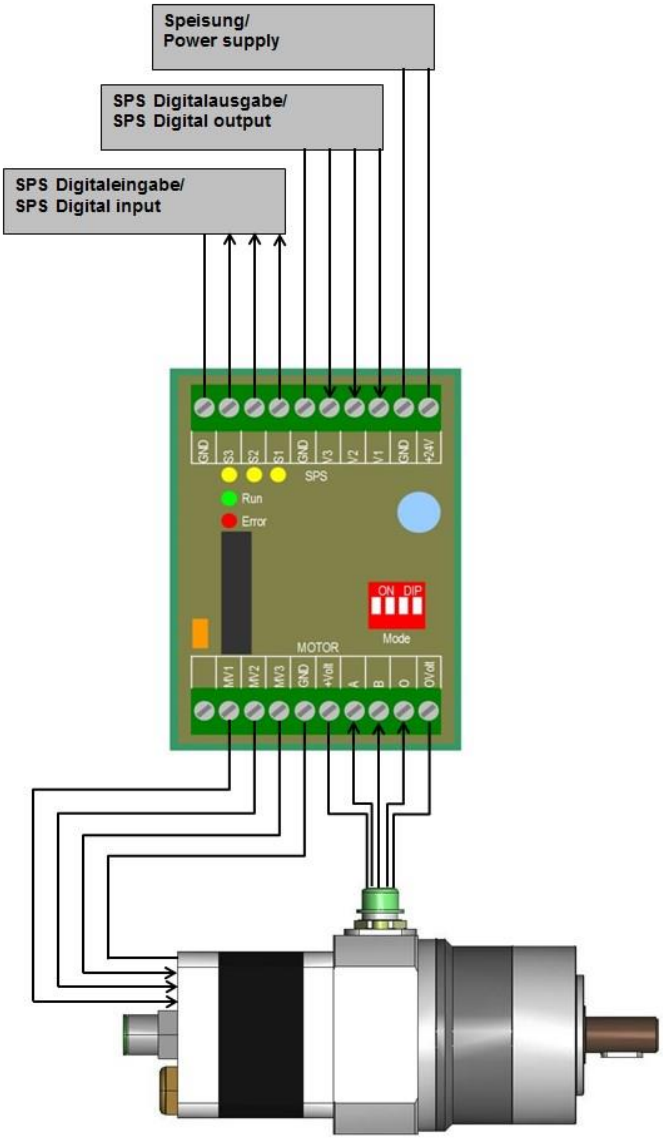


Installation of BPS-control unit in an electro cabinet in combination with a PLC (see 3.2 Application with PLC).

3.2 Application with PLC

At the application with a PLC the configuration according „5.1 modes of operation“has to be adjusted. There are available the **normal operating state** and the **1:1 mode (without control rotating).**

The control unit has to be connected as follows:



3.3 Application as autonomous unit

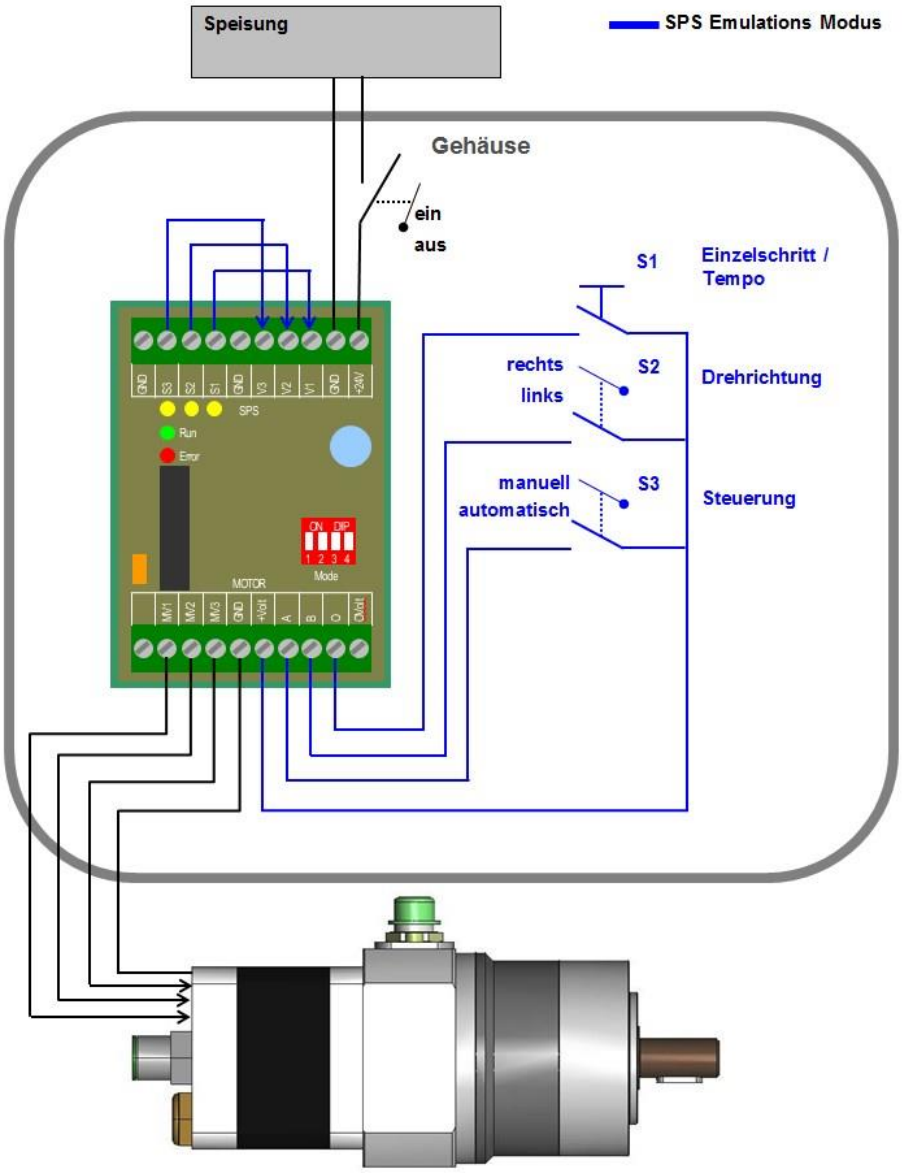
At the application without external PLC and without control rotating the Control Unit is conducted as an autonomous unit (Note: Step losses aren‘t completely compensated).The configuration according „5.1 Modes of operation“ has to be cessed. There’s the possibility to control the pneumatic Stepping motor in the mode of operation **permanent rotating** without additional components (without the below blue represented components and connections).

The Control Unit can also be configured and connected in the **PLC Emulations** mode, so that PLC is emulated.

In this mode, each of the Baumgartner pneumatic stepper motor can be operated without causing a PLC is required. A rotary control with encoder or sensor unit is in this mode not possible.

If the switch S3 mode manually is activated then you can run individual steps with S1. With switch S2 can be changed the direction of rotation.

If the switch S3 in positions automatically then you can regulation the speed with the button S1. By short pressing the button, the rotation speed of the stepper motor faster, by a long press of the button the speed of the stepper motor slowly. With switch S2 can be changed the direction of rotation. (see also 3.1 Installation example).



4 Commissioning

1. Make sure that all the components of periphery are currentless.
2. The control unit is according „3 Installation“ to assembly correctly and to connect.
3. The desired mode of operation is to select via the mode switcher.
4. Start the PLC, especially the external feeding.
5. Check that the operation LED glows green, the mistake LED doesn‘t glow.
6. The unit is ready for use.

5 Functions

5.1 Modes of operation

The BPS Control Unit can work in different modes of operation. The desired mode can be configured via the mode of operation mode selector switch.

				Operating mode	Installation
OFF	OFF	X	OFF	Normal mode	3.1 Application with PLC
OFF	OFF	X	ON	1:1 Operating mode (without control rotating)	3.1 Application with PLC
OFF	ON	X	OFF	Permanent rotating right	3.2 Application as autonomous unit
OFF	ON	X	ON	Permanent rotating left	3.2 Application as autonomous unit
ON	ON	OFF	OFF	PLC Emulation	3.2 Application as autonomous unit

5.1.1 (OFF = Switch below, ON = Switch above, X = Switch setting whatever

After each operating mode the control mode is to switch currentless, only this way it's guaranteed that the configuration has been taken over correctly.

5.1.2 Normal operating state

In the normal mode the control unit reads in the PLC signals for the valves (V1, V2, V3) and hands them on to the attached valves (MV1, MV2, MV3). The motor should now respond according the updated piston position. A control rotating attached on the motor alerts the control unit via A-, B-impulses the effecitve angle changing of the axle of motor. It corresponds in the unencumbered state to the theoretical single step angle of the attached motor. When the measured angle changing differs about 50% to the expected theoretical angle changing, the control unit tries to correct the anulgar offset. If it doesn't succeed, the control unit alerts an error (S1, S2, and S3 all to 0).

If the correction was successful or one didn't have to corrigate, the control unit of the PLC informs that the according valve has been switched (S1, S2 or S3 to 1).

Important

Starting the control unit and the PLC the valve of the motor can at the first piloting go on the left or right side about at step. Because neither to PLC nor to the control unit is known where the single pistons are.

5.1.3 1:1 Operating state (without control rotating)

In the 1:1 operating state the control unit reads in the PLC signals for the valves (V1, V2, V3) and hands them on the attached valves (MV1, MV2, MV3). The control unit doesn't intervent regulative and alerts the PLC, that the according valve (S1, S2, S3) has been switched independently if the axle of motor has now switched or not. This mode is choosed if no other control rotating is assembled.

5.1.4 Permanent rotating right / left

The operating mode permanent rotating allows the rotating autonomous of the motor without adaption of an external PLC and a control rotating. There is no other external wire connection necessary. The motor rotates with approximately 6 rounds/min. in the according direction.

5.1.5 PLC Emulation

The PLC Emulations mode allows the autonomous rotating of the motor without adaption of an external PLC and a control rotating. The motor can via external wire connection (see basic circuit diagram among „3.2 Application as autonomous unit “) be controlled. In this mode the control unit takes over the simplified functions of the PLC. The feeler and switcher have the following functions:

5.1.5.1 Manual control

Switcher	Position	Function
Control	manual	Manual control
Direction of rotation	right	Direction of motor rotation right
	left	Direction of motor rotation left
Single step / speed	1x push	Goes a single step to with switcher direction of change chosen direction

5.1.5.2 Automatical control

Switcher	Position	Function
Control	automatical	Automatical control
Direction of rotation	right	Direction of motor rotation right
	left	Direction of motor rotation left
Single step / speed	1 x push longer than 200 ms	Dicreases the driving speed
	1 x push shorter than 200 ms	Raises the driving speed

5.2 Error indication/-behaviour

- At the following errors the error LED glows red, additional the outputs S1, S2, S3 are switched on 0:
- Short circuit or crush load of the outputs (MV1, MV2, MV3, S1, S2, S3)
- Uncorrectable step losses of the motor
- The error can be restored by one of the following possibilities:
- Breaking/starting of the control
- Ordering of a new step, assumed the breakdown has been repaired (for example direction of rotation changing if the stepping motor has collided into a mechanical block).