

General Description

1.2 Use / System Integration

The Power Drive WD5-008 is used for the drive and the rotation monitoring of a 5 phase stepping motor of the wall mounting series. It is the link between a positioning controller (e.g. PLC) and the stepping motor (see figure 1-2). The equipment is constructed for mounting in a cabinet.

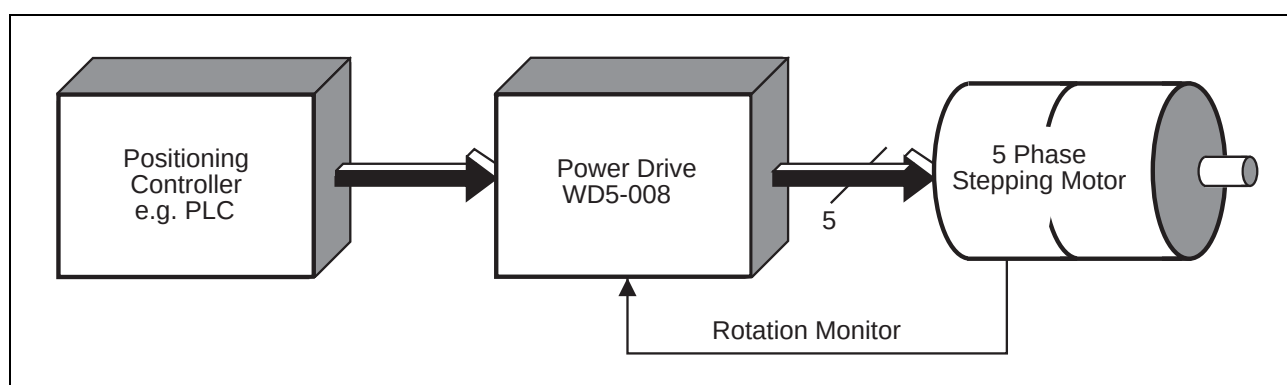


Figure 1-2 System Integration

Motor Types

The Power Drives of the WD5 series are constructed for the operation with special BERGER LAHR stepping motors. The special features of these motors are:



ATTENTION
Only the motors listed in the table underneath can be operated with WD5-008.

- 5 phase technique
- 5 wire connection
- Operating voltage of 325 V DC.

The table gives the appropriate motor sizes and motor models.

Series	Standard Operation SM	Rotation Monitor SM - DÜ	Servo Step Operation SSM
60	VRDM 568/50 LWC	VRDM 568/50 LWC	VRDM 568/50 LVC
90	VRDM 597/50 LWC	VRDM 597/50 LWC	VRDM 597/50 LVC
	VRDM 5910/50 LWC	VRDM 5910/50 LWC	VRDM 5910/50 LVC
	VRDM 5913/50 LWC	VRDM 5913/50 LWC	VRDM 5913/50 LVC
110	VRDM 51117/50 LWC	VRDM 51117/50 LWC	VRDM 51117/50 LWC
	VRDM 51122/50 LWC	VRDM 51122/50 LWC	VRDM 51122/50 LWC

General Description

1.3 Function

Figure 1-3 shows the most important function blocks of the equipment:

- In the *mains supply circuit* the mains voltage of 230 V AC or 115 V AC is transformed to a intermediate circuit voltage of 325 V DC.
- The *switch power supply* provides the supply voltage for the internal electronics modules.
- At the *signal interface* the In-/Output signal (see also section 3.1) between external control and internal electronic are optoencoupled. The base setting for the phase current, current reduction, boost, rotation direction and rotation monitoring is set on the parameter switch (see section 2.5).
- The *rotation sensor interface* is needed for the optoencoupling of the rotation sensor signals for the rotation monitor (recognition of contouring error).
- The regulator circuit *control electronics - output stage - current regulator* transforms the input signals *pulse* and *direction* into the output signals for the drive of the stepping motor. The block *control electronics* contains the *ring counter logic*, which defines the current pattern. The current regulator keeps the phase current on the predefined value.
- The status of the equipment is registered in the block *protection and monitoring*. Possible errors are shown via the status indicator as well as via the signal output (see section 3.1.2 and 4.1).

For further information on the meaning and function of the different drive/control signals see section 3.1.

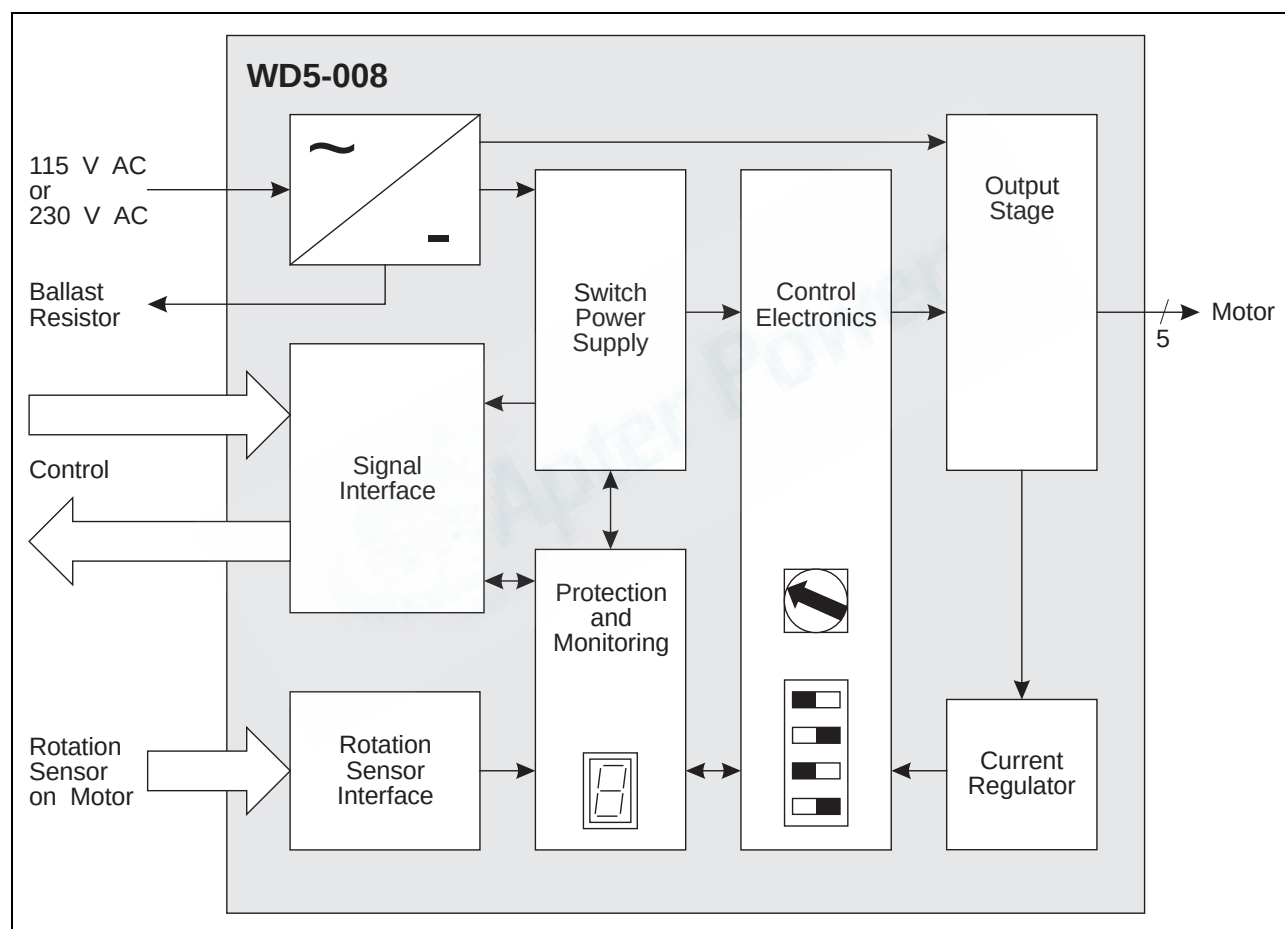


Figure 1-3 Function Connection Diagram WD5-008

General Description

1.4 Technical Data

1.4.1 Electrical Data

1.4.1.1 Mains Connection

Power connection voltage, adjustable for
115 V AC, -20% +15%
230 V AC, -20% +15%

Current at switch on (initial current) 30 A

Fuse 6.3 A slow

Frequency 50 - 60 Hz

Power consumption max. 1600 VA

Power dissipation max. 120 W

Electrical Characteristics of the Optocoupler-Inputs

Optoencoupled and protected against reverse polarity.

The signal voltage level is typespecific
TTL or **24 V**
Max. input voltage 5.25 V 30 V
Switch on point U_E 2.5 V 20 V
Switch off point U_A 0.4 V 3 V
Typical input current at nominal current 10 mA

1.4.1.2 Motor Connection

Protected in case of short circuit between motor phases

Max. cable length without filter 50 m
with filter 100 m

Cable diameter 0.75 mm²

Screen connection both sides

Motor voltage 325 V DC

Phase current in 16 stages from 0.75 to 4.5 A

Electrical Characteristics of the Optocoupler-Outputs

Optoencoupled, protected against reverse polarity, inductive resilient, short circuit protected.

Max. voltage drop U_R 28 V
Max. switch current I_L 10 mA
Voltage drop at 10 mA max. 2 V

1.4.1.3 Rotation Sensor Connexion

This connection must be safely isolated from the mains.

Max. voltage to earth 60 V DC

Max. cable length 100 m

Cable diameter 2 x 0.5 / 10 x 0.25 mm²

Screen connection both sides

1.4.1.5 Equipment Protection

System of protection IP 20 according to DIN 40050 / IEC 529

Protection class 1

Protection switches Short circuit monitoring
Excessive temperature recognition
Over- and undervoltage recognition
Motorwire interruption recognition

1.4.1.4 Signal Connection

This connection must be safely isolated from the mains.

Max. voltage (power resistance) to earth 60 V DC

Cable diameter 0.25 mm²

Screen connection the control side only

Installation

2.4.2 Connecting the Motor

1. Prepare the 5 wires of the motor cable and the screen which are to be connected to the plug with 'boot lace' ferrules.
2. Insert the six wires according to figure 2-4 into the cap of the mating plug and tighten the screws.
3. Join the plug shell halves together.
4. Set the plug onto the connection 06 and tighten screws.



ATTENTION

- To keep losses in the cable and in the power drive at a minimum, it is recommended to keep the wiring as short as possible.
- The maximum length of the motor cable is 100 m. From a cable length of 50 m onwards a motor rating filter (see Accessories) is to be connected in line between the motor connection and the beginning of the cable.



DANGER

Switch off mains power before releasing the lock of the motor plug.

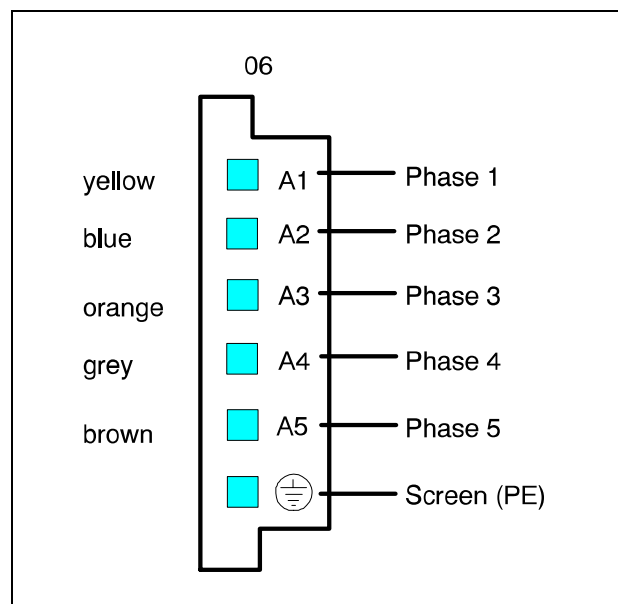


Figure 2-4 Motor Connection

2.4.3 Adjusting the Equipment to the Mains Voltage

The equipment can be adjusted to the mains voltage of 115 V AC or 230 V AC (works set up/adjustment see chapter 6.1 equipment variants):



ATTENTION

The setting up of the equipment to suit the Mains voltage is only to be carried out by, or under the guidance of BERGER LAHR service personnel.

Installation

2.4.6 Connecting the Rotation Sensor

Some motor types have a built-in rotation sensor (see table in section 1.2)

1. Connection on the side of the equipment:
Solder the wires of the rotation sensor cable onto the pins of the 15 pins Sub-D-socket, see figure 2-9.
2. Insert the screen into the cable entry clamp/strain relief and clamp it.
3. Put on the plug shell.
4. Plug the plug onto socket 05 and tighten screws. Attach the screen to plug shell.
5. Twist the wires of the rotation sensor cable in pairs according to figure 2-9.
6. Make the connection on the side of the motor with 12 pins+PE-circular connector according to figure 2-9. Also attach the screen to the cable entry clamp.
7. Switch the DIL switch 03 to: rotation monitor active (see section 2.5 Initial Operation).

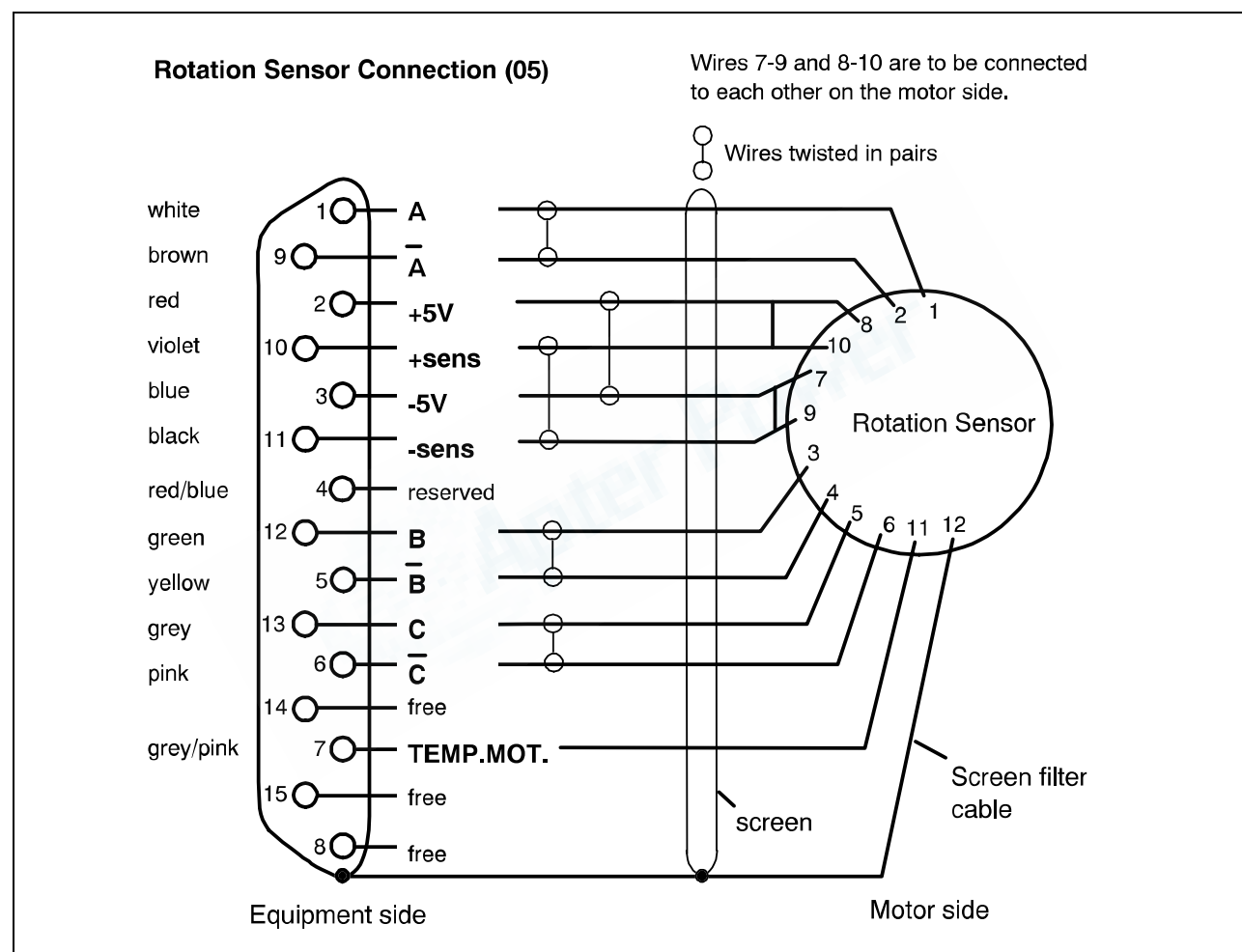


Figure 2-9 Wiring of the Rotation Sensor

Installation

2.5 Initial Operation

2.5.1 Checklist for Initial Operation

Before you make initial adjustments to the equipment check the following points:

- Has the mounting of the equipment and the heat-sink respectively been carried out correctly (see section 2.3)?
- Is the air supply and air removal ensured?
- Has the correct motor type been built in (see section 1.2)?
- Has the equipment been wired correctly (see section 2.4)?
- Has the equipment been adjusted to the given mains voltage?
- Have motor-, signal- and rotation sensor cable been wired so that there is a spacial distance between them?



NOTE

The wiring of the signal interface can be tested with the Interface Tester D 690 (see Accessories).

2.5.2 Basic Adjustments

The basic adjustments are made with the Current Selection Switch and the Parameter Switch (see figure 2-10) as follows:



DANGER

High Current – Switch off equipment before making any adjustments!

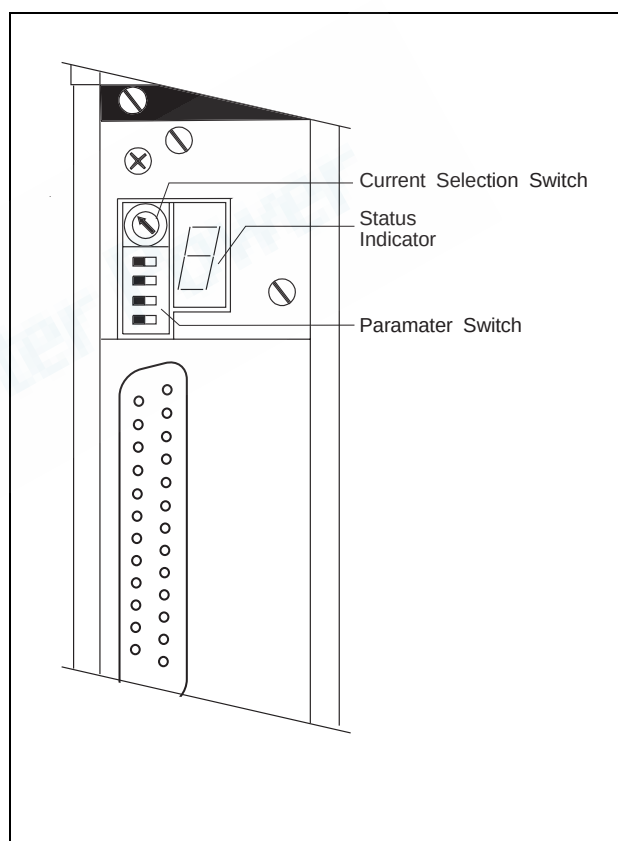


Figure 2-10 Adjustment Elements

Installation

Adjustment of the Phase Current

1. Unscrew and remove the plexiglass cover from the front panel of the equipment.
2. Adjust phase current at the rotary switch 01 (see figure 2-12) according to the motor data label. Pay attention to the diagram in figure 2-11.

For possible adjustments see figure 2-12. If the phase current which is stated on the motor data label should not be adjustable, choose the next smaller value.



ATTENTION

Never choose too high a current! The maximum phase current is not to be exceeded and if, then only for a short time (boost-signal), to avoid a motor overload. Ensure appropriate cooling (temperature on the housing of the equipment 100°C maximum)!

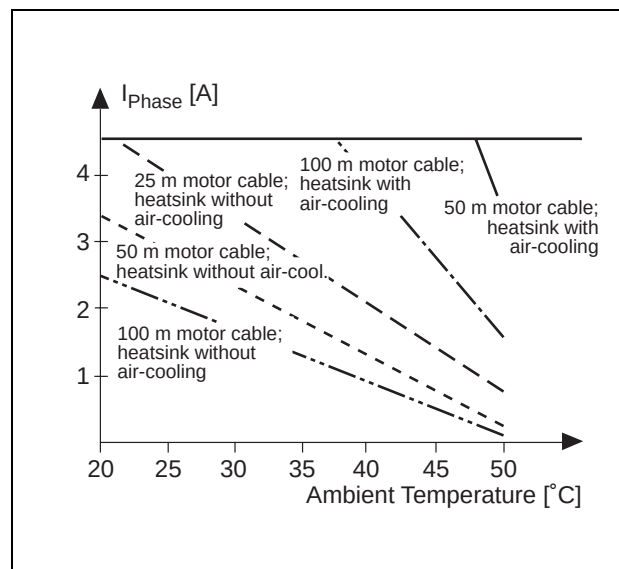


Figure 2-11 Permitted Phase Current Dependent on Ambient Temperature and Length of Motor Cable



NOTES

- Smaller phase currents are allowed but they reduce the rotation moment accordingly.
- The automatic power reduction should, if possible, always be switched on in order to reduce the power dissipation (see figure 2-13).

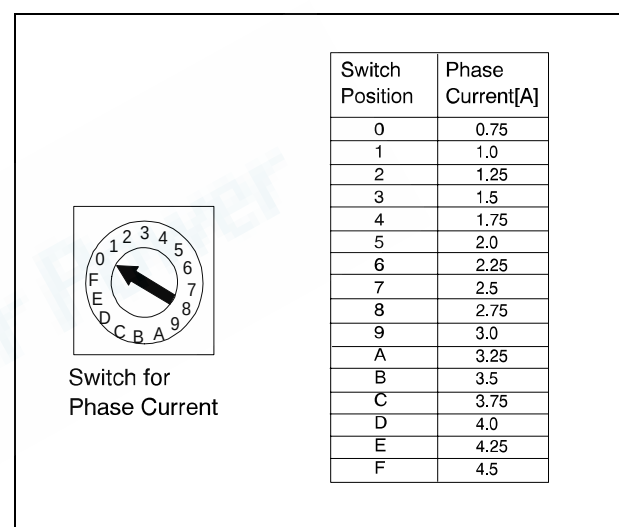


Figure 2-12 Switch Settings Phase Current Selection Switch

Installation

Parameter Adjustment

- Adjust desired parameters according to figure 2-13 with the DIL switch 03 (see figure 2-10). The basic adjustment as set by BERGER LAHR is depicted.
- After finishing the adjustments do not forget to put the plexiglass cover back on.

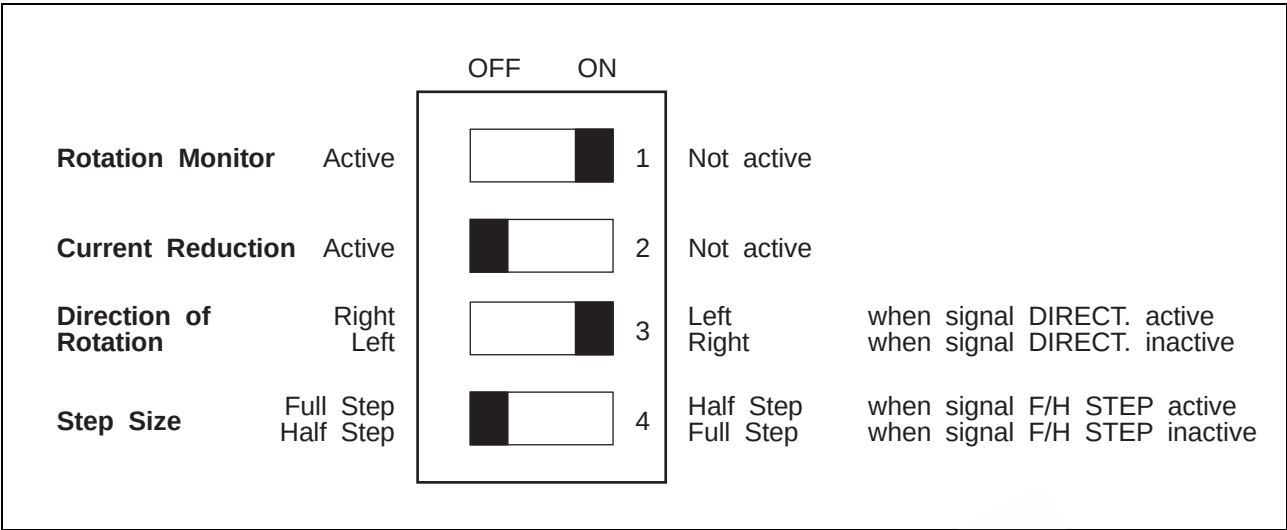


Figure 2-13 Switch Settings Parameter Switch



NOTES

- The effects of the signal inputs DIRECT and F/H STEP can be inverted with the parameter switches 3 (rotation direction) and 4 (step width) respectively.
- When current reduction is active, at a standstill (pulse frequency < 10 Hz) the motor phase current is reduced to 50%. This leads to a cooling of the motor and a reduction of the stopping moment by approximately 50%.



ATTENTION

- Caution mains current- operate the equipment only when the plexiglass cover is in place!
- For motors **with Rotation Sensor** the parameter switch 1 for the rotation monitoring must be set on **active**, for motors **without Rotation Sensor** the switch must be set on **not active**.