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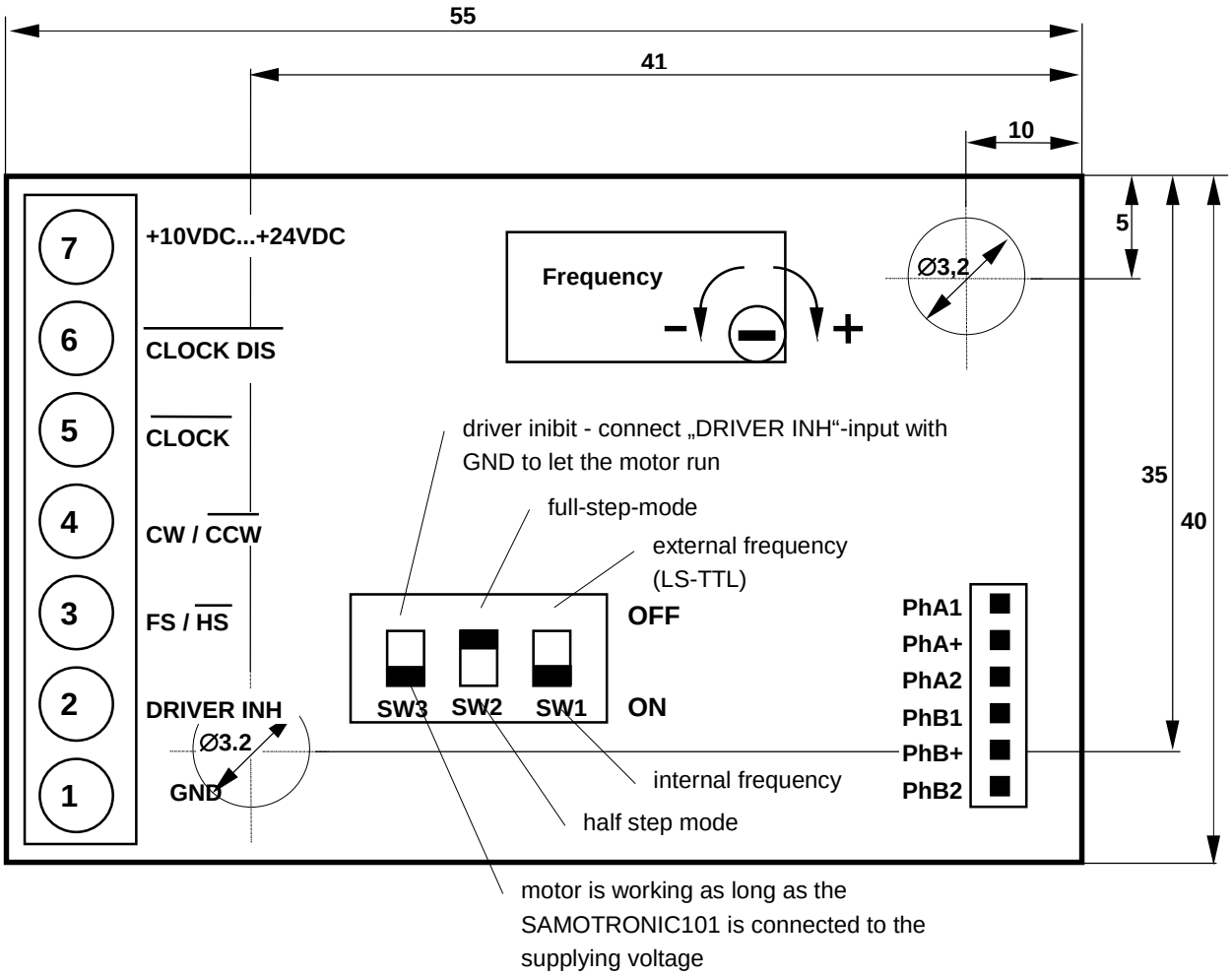
Smart solutions for comfort and safety

SAMOTRONIC101 (4 636 6608 0)

Short Reference Unipolar Stepper Motor Driver

1. Overview

All dimensions in mm. Tolerance of hole diameter ±0.1mm, of all other dimensions ±0.5mm.



- CW / FS / DRIVER INH... functions are logic HIGH active (LS-TTL-level >2 V to 5 V); they apply automatically when input is open (depending on the switch position)
- CLOCK DIS ... functions are logic LOW active (LS-TTL-level 0 V to <0.8 V); no HIGH signal allowed (leave open instead)
- CCW / HS ... functions are logic LOW active (LS-TTL-level 0 V to <0.8 V)
- CLOCK ... one step is generated for each negative edge of the clock signal (clock signal LS-TTL-level)

Take care on the input levels (LS-TTL-signals). For LOW a real ground connection is required. If an input is left open it is detected as HIGH. Input signals >5V may destroy the SAMOTRONIC101.

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- field of operation: unipolar stepper motors; I ≤ 350 mA/phase
- power supply : 10...24 (+10%) VDC
- connectors: plug connector for the motor
  screw connector for supplying voltage and external control signals

Functions

Logic level: LS-TTL LOW 0V to <0.8V
HIGH >2V to 5V

function	**external connector**	**setting on the PCB**	**variable via screw connector**
step frequency		S1 = On, adjustable via on-board potentiometer f_S = 50(± 20%)...390 Hz(±10%) (accuracy ±15%)	use port CLK to access the internal generated clock signal
	CLOCK	S1 = Off	connect to external clock (TTL) via shielded cable
full step mode		S2 = Off	
half step mode		S2 = On	
switching between full/half step mode	FS/HS	S2 = Off	HIGH or not connected ⇒ full step LOW ⇒ half step
stop signal		S3 = On, motor is working with step frequency as long as supplying voltage appears	
	DRIVER INH	S3 = Off	LOW ⇒ motor is working with step frequency HIGH or not connected ⇒ motor stands still, phases switched off
	CLK DIS		LOW ⇒ clock stopped, motor still under current HIGH is not allowed!
direction	CW/CCW		TTL-signal 0 V – CCW HIGH or not connected – CW

The single functions are fixable with help of the DIP switches or controllable with external signals. With fixed functions it is only necessary to connect the SAMOTRONIC101 to the supplying voltage and to change the direction if necessary.

Mounting: The unit must be installed in a case so that the user is not able to access it while working. Otherwise and for maintenance purpose the unit must be used in an antistatic environment and the user must be discharged with standard ESD-protection equipment. Take care to leave minimum distance to holes and gapes in the case to prevent electrostatic discharges. A typical value for 8kV (EN50082-1/2) is 8mm (DIN-VDE0110-1), depending on environment, humidity and temperature conditions.

Cables: Max. cable length for all control inputs (screw terminal port 2-6) is 3m. At the clock input (screw terminal port 5) shielded wires must be used.

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2. Truth Tables

2.1. Clock Signal Sources

SW1	CLOCK	CLOCK DIS	Reaction
ON	Output for internal generated clock signal	not connected	motor is working with the internal adjusted clock frequency
ON	Output for internal generated clock signal	LOW	internal clock is held, phases are still under current
OFF	Input for external clock signal	not connected	motor is working with the external clock frequency

No other combination of input-signals allowed!

2.2. Full- / Half-Step

SW2	FS/HS	Reaction
OFF	not connected	full step mode
ON	not connected	half step mode
OFF	LOW	half step mode
OFF	HIGH	full step mode

No other combination of input-signals allowed!

2.3. Direction

CW/CCW	Direction
not connected	CW
LOW	CCW
HIGH	CW

No other combination of input-signals allowed!

2.4. Stop Signal

SW3	DRIVER INH	SW1	CLOCK DIS	Reaction
ON	not connected or LOW	OFF	not connected	motor is working with the external clock frequency
ON	not connected or LOW	ON	not connected	motor is working with the internal clock frequency
ON	not connected or LOW	ON	LOW	internal clock is held, phases are still under current
OFF	HIGH	ON or OFF	LOW or not connected (HIGH not allowed!)	motor is stopped, phases are switched off (without current)
OFF	LOW	OFF	not connected	motor is working with the external clock frequency
OFF	LOW	ON	not connected	motor is working with the internal clock frequency
OFF	LOW	ON	LOW	internal clock is held, phases are still under current

No other combination of input-signals allowed!

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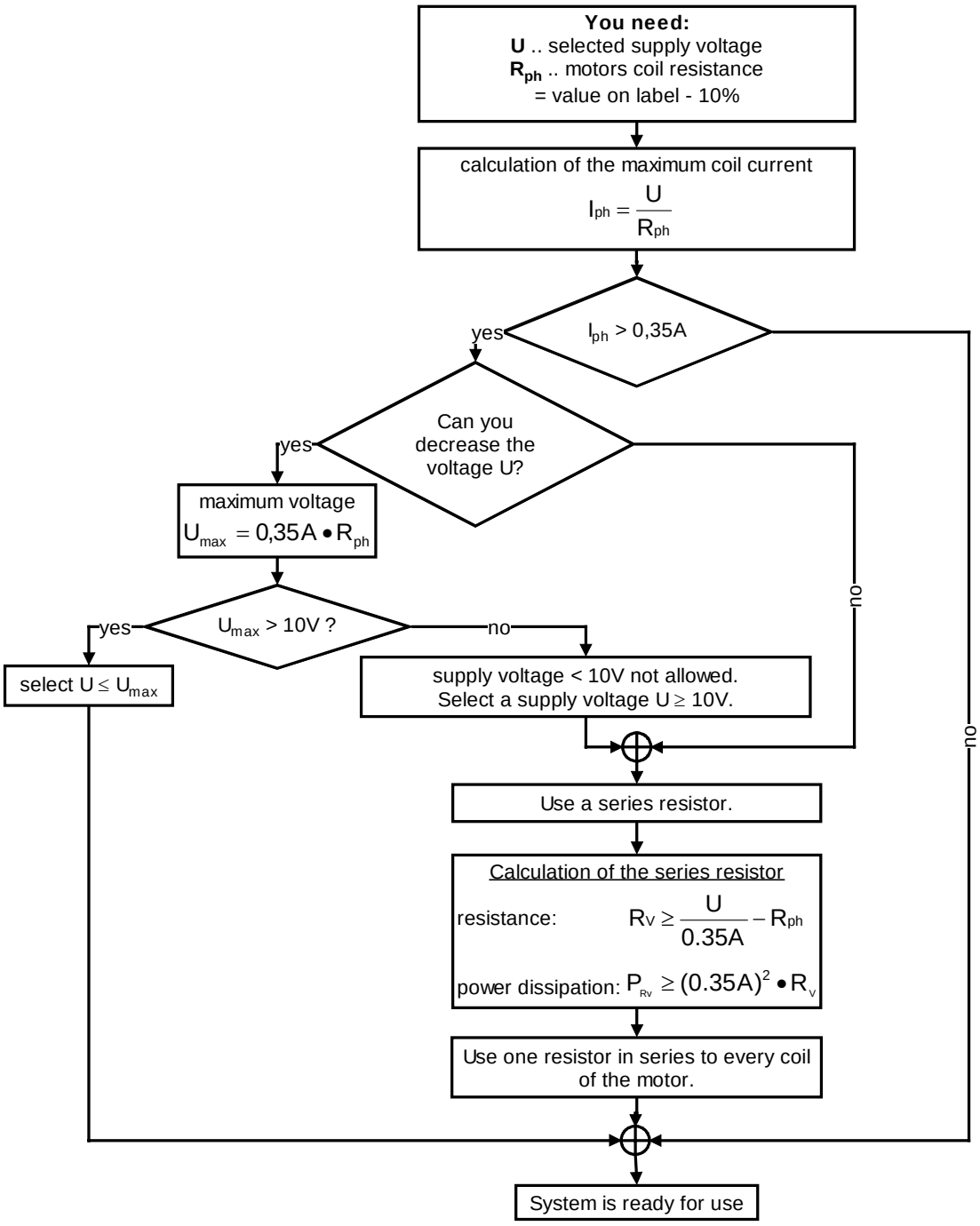
3. Recommended Operating Conditions

- Operating ambient temperature: -15°C - 50°C
- Supplying voltage: 10 VDC – 24VDC +10%
- Phase output current: 0 - 350 mA

4. Procedure to select the maximal possible voltage for the SAMOTRONIC101

- possible range of supplying voltages: U = 10VDC ... 24VDC +10%
- absolute maximum of the coil current: I_{max} = 350mA



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5. Simplified calculation of duty cycle and input power for the motor

(all values at f=0)

- Input power at 100% duty cycle:

$$P_{ED100} = \frac{U_k{}^2}{R_{ph}}$$

$U_{K\ ...}$ supplying voltage from catalog
R_{ph} ... phase resistance

- Input power at selected voltage U:

$$P = \frac{U^2}{R_{ph}}$$ without series resistor

$$P = \frac{R_{ph}}{(R_{ph} + R_v)^2} \bullet U^2$$ with series resisitor

- Real duty cycle:

$$ED = \frac{P_{ED100}}{P} \bullet 100\% = \left(\frac{U_k}{U_{350}} \right)^2 \bullet 100\%$$

Duty cycle is always based on a cycle time of 5 minutes!

6. Motor connector

- System: AMP MTA-100
- on PCB: straight post header 6pol. (AMP order-no. 640456-6)
- at motor side: receptacle 6pol. MTA-100 plug
  For motor cable AWG26 use AMP-No. 640442-6 (ASN 440848920) and for AWG24 use AMP-No. 640441-6 (ASN 440850420)