Stepper Motor Driver
Type: STM xx1

Two-phase stepper motors with 4, 6 or 8 leads.
Motor inductance must be greater than 0.5 mH.

Key Features

About the STM xx1

- Bipolar full bridge drive for 2 phase stepper motors with 4, 6 or 8 leads.
- 2 times 4QE: enhanced 4-quadrant amplifier producing precise current forms.
- Motor currents from 0.4 to 6 A or 0.26 to 4 A peak (selectable with HEX - switch).
- DC bus supply voltage: 60 to 120 VDC.
- Micro step range adjustable with DIL switch.
- True RMS phase current measurement.

Performance

- Selectable full and half step resolution (200 / 400 steps)
  expandable up to 600/800/1000/1200/1400/1600/1800/2000 micro steps.
- Maximum motor torque with BOOST function and optimum motor performance.
- Boost increases the motor current by 30% that could be used for example during acceleration.
- Both 4QE: four-quadrant current control, resulting in a sine shaped current form which reduces current ripple, eddy currents and resonance.

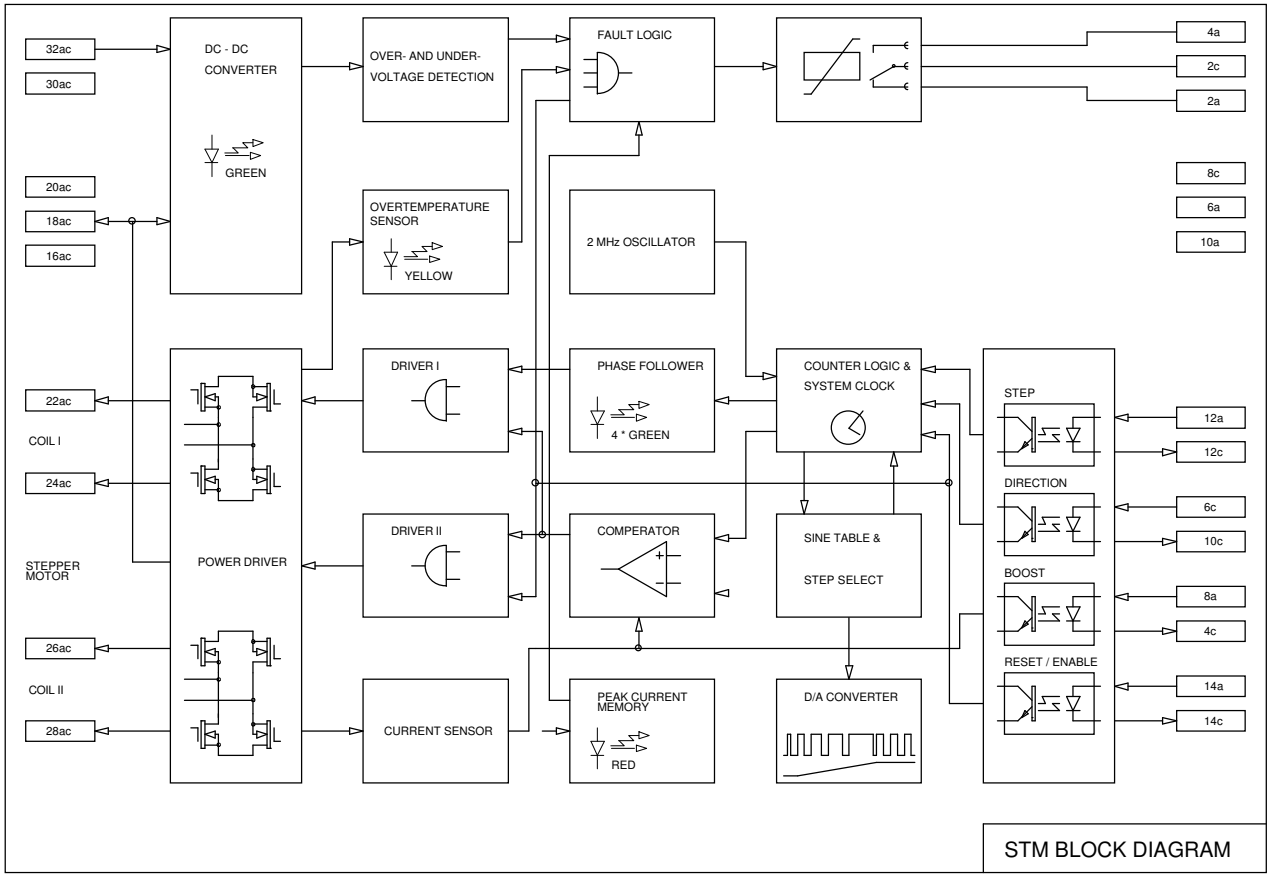
Safety

- Display LED's for: power status, no fault, over temperature, phase follow monitor.
- insulated opto-coupler inputs (step, direction, reset (enable), boost).

Installation

- Easy installation in a 3 HE 19" Rack.
- back plane with clamp connectors.
- AC/DC conversion card with or without regeneration available.

Block Diagram:



Parameter set-up of

- max. current
- boost current
- Direction (invertable)
- full, half Step / micro step resolution
- Step synchronisation: rising or falling edge

Diagnostic LED's of

- Power on
- no-fault, over-voltage, low voltage
- Short-circuit, over-current
- Over-temperature
- Phase following monitor LED's 1+, 1-, 2+, 2-

I/O Connector

- 32 pin card connector DIN41612 (a/c) D-type on servo amplifier
- Back plane with clamp connectors
- DC – bus line

Specifications	
Stepper motor type	Two-phase stepper motors with 4 leads. Motor inductance must be greater than 0.5 mH.
Current setting	Run, Stop and Boost currents can separately be set-up by HEX-switch in 1/15 increments of max RMS current.
Supply Voltage	60VDC Type 24-85 VDC 120VDC Type 48-160 VDC
Step Resolution	Set-up by DIL-switch: 1.8° motors: full step 200 step or 400 half step expandable up to: 600/800/1000/1200/1400/1600/1800/2000 micro steps
Amb. Temperature	Operating: 0 to +50°C; Storage -25 to +55°C; Transport: -25 to +70°C
Ventilation	STM can be operated without a fan up to 40°C ambient with 4 Amp. phase current.
Weight	0.9 kg
Mounting	in 19" 3HE Rack
Dimensions	single EURO-Rack card 12TE (100 x 160 x 60)

Inputs	The inputs are electrically isolated by opto-couplers.			
Input level	switch signal level	+2.5 VDC		
	High	+4.5 VDC	to	+30 VDC
	Low	0 VDC min.	to	+2 VDC max.
	Required current	min. 4 mA (at 3 V) protected current limited input		max. 8 mA (at 5 VDC)
PWM frequency	17 kHz			
Boost	When the opto-coupler is energised, the STM sets the current to the pre-selected Boost current value. This function can be used to increase the motor torque during speed change.			
Reset / Enable	When the opto-coupler is energised, the motor current is switched on.			
Outputs				
noFault	Is a relays contact. (Σ: over / under voltage, over-current, over-temperature)			

Options	
Transformer	Mains 230 VDC or 115 VDC if requested, AC/DC converter module is needed
Backplane 3HE/12TE	type: UVR-01 (drawing: STR01) with clamp connectors, fitting to STM xx1

DIP-Switch and LED Description

Frontpanel DIP switches

1. **STEP CODE (A, B, C, D) DIP switch**
The 4 DIP switches (A, B, C, D) determines the number of pulses generated per period. The recommended value is 400 steps, corresponding to a linear motor with a step with of 0,125 mm. The DIP Switch coding is binary. The following table explains the coding.

A	B	C	D	Number of Steps
1	1	1	1	200
0	1	1	1	400
1	0	1	1	600
0	0	1	1	800
1	1	0	1	1000
0	1	0	1	1200
1	0	0	1	1400
0	0	0	1	1600
1	1	1	0	1800
0	1	1	0	2000
All other combinations are not used				

2. **DIRECTION DIP switch**
Determines the motor move direction.

3. **CURRENT DIMINUATION DIP switch**
If the switch is set to 1 and the motor stands still, the current is reduced to the half of the nominal value set by phase current.
If switch is set: CLK-frequency is 4kHz.
If switch is not set: CLK-frequency is 20kHz.

4. **BOOST switch**
The boost mode is only supported during zero or slow RPM.

Frontpanel Boost DIL switch:
If switch is set to 1, the current is increased by 30% of the nominal value set by phase current during acceleration.

Boost Input on backplane:
The 2nd Boost mode is independent and can be set on the backplane connector. The phase current is increased by 30% of the nominal value set by phase current during acceleration up to the specified peak output current.

5. **STEP DIP switch**
Some controllers activates the direction- and the clock- signal at the same time *(theoretically the direction signal has to be activated minimum 20 µSec prior the clock signal)*. In order to prevent the stepper drive from erroneous counting, the Step DIP Switch allows to set the signal to the rising or falling edge as distributed by the controller.

6. **PHASE CONTROLLER rotatable HEX Switch**
The RMS phase current; can be set by 1/16 of the nominal current. *(Position 1 is 1/16, F is equal to the nominal current)*

LED

1. **OVERTEMPERATURE**
   when ON, the power module is over heated.

2. **POWER ON**
   when ON, the power supply is correct. *(No over or under voltage)*

3. **NO FAULT**
   when ON, no alarm is detected.

4. **OVERCURRENT**
   when ON, the power module has detected an over current.

5. **LED PHASE 1+, PHASE 1-, PHASE 2+, PHASE 2-**
   indicates which coil and in which current direction is activated.

PRECAUTIONS ON SAFETY (DEFINITIONS)

DANGER ***immediately and imminent DANGER for life and limb***

Possibility of an electric shock. The non observance of the instructions and the precautions on safety shall produce immediately and imminent danger for life and limb or for the STMxx1 or an object in its area. The handling including mounting, installation and operating has to be carried out by well trained and instructed personal.

WARNING ***possibility of a dangerous situation for life and limb***

Possibility of an electric shock. Measuring instruments has to be connected without electric power. To discharge the capacitors, the operator has to wait 2 minutes after switch off the power before any manipulation is carried out. To protect the operator the potentiometers has to be adjusted with an isolated screw driver (blade and shank).

ESD ***The device is sensitive to ESD events.***

Please use ESD packaging materials and / or personnel grounding equipment.

DECLARATION

Design : **Integrated transistor servo amplifier to operate in machines and controls**

Type : **STMxx1**

Serial number : **No. 110'000 and higher**

Description : **In this manual**

Manufacturer : ***LEAG* Antriebstechnik AG, CH-8200 Schaffhausen, Switzerland**

The construction of the STMxx1 and its mounting, installation, adjustment and operating written down in this manual fulfill not only the requirements for a world-wide operation but also the legal compliance in the EC (European Community):

Low tension guidelines:

-73/23/EWG dated 19.02.1973 (ABI. EG Nr. L 11/29 dated 26.03.1973)

changed by:

-93/68/EWG dated 22.07.1993 (ABI. EG Nr. L 220/1 dated 30.08.1993)

Electromagnetic compatibility:

-89/336/EWG dated 03.05.1989 (ABI. EG Nr. L 139/19 dated 23.05.1989)

changed by:

-91/263/EWG dated 29.04.1991 (ABI. EG Nr. L 128/1 dated 23.05.1991)
-92/31/EWG dated 28.04.1992 (ABI. EG Nr. L 126/11 dated 12.05.1992)
-93/68/EWG dated 22.07.1993 (ABI. EG Nr. L 220/1 dated 30.08.1993)

Use the integrated transistor servo amplifier STMxx1 only to operate in machines and controls. It is absolutely not allowed to put the STMxx1 into operation before it is noticed that the machine or the control are in compliance with the international and the national standards, requirements and law. The end user has to be informed of the instructions written down in this manual, this declaration and the specific product documents given by customer specific changes. The manual STMxx1 is part of this declaration and the STMxx1.

CH-8200 Schaffhausen
January 2000
the Manager of the Staff

Jürg Berger

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January 2000
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Lukas Egloff