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STP340e.DOC

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Step Motor Control Module STP-340
User Manual

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Stepping Motor Controller STP-340

General Information

Up to two unipolar stepping motors with up to 8 phases in total can be connected to the Stepping Motor Controller STP-340. The STP-340 has been designed to be used in combination with very sensitive measurement equipment as the Time Correlated Single Photon Counting Module SPC-300. To reduce the noise of the stepping device(s) to the lowest possible level the current flow through the motor coils is not controlled by Pulse Width Modulation (PWM). The current flow is "formed" by applying an initial high voltage peak at the beginning of each step, followed by a normal voltage for the remaining time of this step. The default high voltage is +12 V, the default normal voltage is +5 V. Other values can be achieved by applying external power through the external power connector. The maximum current per phase is 1 A.

Unipolar motors with 3-8 phases can be connected to the STP-340. If two motors are used following combinations of phase numbers are valid: 4-4, 3-5, 5-3. All motor coils must be connected to the STP-340 on one side (+) and to GND on the other side (-).

All timing parameters of the motors are defined in a configuration file "stp.cfg". The structure of this file is described in the chapter "Configuration file stp.cfg".

Two limit switch inputs are provided for each motor to prevent movements beyond specified limits. Either a TTL-compatible source or a simple switch can be connected to these inputs. The open input is pulled to +5 V (10kΩ). Therefore a switch should connect to GND when closed. The presence and the polarity of the limit switches must be defined in the configuration file "stp.cfg".

Connectors

There are three connectors at the STP-340 (from top to bottom):

- External Supply: Sub-D, 9-pin male
- Motor 1: Sub-D, 9-pin female
- Motor 2: Sub-D, 9-pin female

Connection Scheme:

Pin	Motor 1	Motor 2	External Supply
1	Phase 1 +	Phase 1 +	high voltage (max. +20 V)
2	Phase 2 +	Phase 2 +	high voltage (same as pin 1)
3	Phase 3 +	Phase 3 +	normal voltage (max. +15 V)
4	Phase 4 +	Phase 4 +	normal voltage (same as pin 3)
5	Phase 5 + (if Motor 2 has 3 phases)	Phase 5 + (if Motor 1 has 3 phases)	Open
6	lower limit input (connected to +5 V via 10 kΩ)	lower limit input (connected to +5 V via 10 kΩ)	Connect to GND (pin 7) to switch to external supply.
7	GND	GND	GND
8	GND	GND	GND
9	upper limit input (connected to +5 V via 10 kΩ)	upper limit input (connected to +5 V via 10 kΩ)	+5 V from computer

Installation

To install the device, switch off the computer and disconnect the power cord. Then insert the STP-340 module into a free PCI slot. To avoid damage due to electrostatic discharge we recommend to touch the module at the metallic back shield. Then touch a metallic part of the computer with the other hand. Then insert the module into a free slot of the computer.

During the next start of the computer Windows will detect the new hardware and, dependent on the Windows version may ask for drivers. Then insert the “BH driver disk” (Version 1.3 or higher required) into the floppy drive and be sure to present the correct directory (“WIN2K_NT” for Windows 2000 or Windows NT or “WIN_9X” for Windows 95 or Windows 98). Windows will load then the appropriate driver.

If the STP-340 should be controlled from SPC, PMS, PMM or MSA software no more actions are required if you have the latest updates installed. Following revisions (or higher) are required: SPC 7.6, PMS 2.5, PMM 1.5, MSA 2.3). To install the STP-DLL and Labview Instrument (LabView 6.0 or higher required) insert the disk “STP Software” to the floppy drive and execute “setup.exe” from there.

Configuration file "stp.cfg"

Configuration and timing are defined in the configuration file "stp.cfg". During the initialisation of the STP-340 by the library function "STP_init" these parameters are transferred to the module.

The structure of "stp.cfg" is similar to ".ini" files for Windows applications. Comments start with a ";" and end at the end of the line. The mentioned default values are used if the respective parameter is not defined in "stp.cfg".

"stp.cfg" has the following structure:

The first section contains general parameters:

```
[base]
baseadr = 0x3A0 ; base I/O address of the STP-240 Module, ignored for
                ; STP-340, default = 0x3A0
use_mot =     1 ; motors in use:
                ;            0 - none (default)
                ;            1 - Motor 1
                ;            2 - Motor 2
                ;            3 - both motors
                ; only motors in use are initialised!

use_dev =     1 ; device in use (for simulation only, if no motor is in use
                ;            0 - none (default)
                ;            1 - device 1
                ;            2 - device 2
                ; this parameter is used only if use_mot = 0.
```

The next two sections contain motor specific parameters:

```
[motor1]
; All times are multiples of 2 µs.
tpeak   =  1000 ; high voltage active, 1-65535,            default =  150
tmin    =  1500 ; min. time per step, tpeak-65535 (>= 50), default =  250
tmax    = 10000 ; max. time per step, tmin-65535,          default = 1500
tdelta  =   250 ; initial acceleration, 1-65535,           default =  250
                ; if a big number of steps should be executed the first
                ; step will take the time tmax. The next step will take the
                ; time (tmax-tdelta). The time per step for subsequent
                ; steps will be further reduced by the factor
                ; (tmax-tdelta)/tmax until half the steps are executed or
                ; tmin is reached.
                ; The deceleration works in the reversed order.
overlap =     0 ; full step mode (0 = default) oder half step mode (1)
phases  =     4 ; number of phases: 3-8, default = 3
min_lim =    -1 ; lower limit switch:
                ;    0 - not present (default),
                ;   -1 - present and used for stepping,
                ;         logical 0 (<0,8 V) when limit is reached
                ;   -2 - present and not used for stepping,
                ;         logical 0 (<0,8 V) when limit is reached
                ;    1 - present and used for stepping,
                ;         logical 1 (>2,4 V) when limit is reached
                ;    2 - present and not used for stepping,
                ;         logical 1 (>2,4 V) when limit is reached
max_lim =    -1 ; upper limit switch:
```

```
                ;   use the same values as for lower limit switch
                ;   default = 0
device  =     1 ; device, which is connected to this motor:
                ;    0 - none (default)
                ;    1 - device 1
                ;    2 - device 2
steps   =   100 ; number of steps per one whole motor turn
                ; default = 200

[motor2]
                ; as motor 1
```

The last two sections define the parameters of the devices which are connected to the motors:

```
[device1]

scale     = Wavelength[nm] ; Parameter of the experiment which is altered
                           ; by the device. This text (max. 16 characters)
                           ; will be used to name an axis in the display
                           ; (SPC-300).
unit      = nm             ; unit of the above Parameter (max. 3 chars.).
min       = 300.           ; min limit  (units)
max       = 800.           ; max limit  (units)
turn_incr =  10.           ; Alteration of the Parameter per motor turn
                           ; (units)

[device2]                  ; as device 1
```