# StepMotor library for Arduino

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# Chapter 1

# Class Index

## 1.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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# Chapter 2

# File Index

## 2.1 File List

Here is a list of all files with brief descriptions:

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StepMotor.h
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# Chapter 3

# Class Documentation

## 3.1 StepMotor Class Reference

StepMotor Class.

`#include <StepMotor.h>`

### Public Member Functions

- StepMotor (SM_motortype_t motorType, SM_torqueforce_t torqueForce, uint8_t in1Pin, uint8_t in2Pin, uint8_t in3Pin, uint8_t in4Pin)

  *StepMotor Class constructor.*
- virtual void begin ()

  *Initialize StepMotor controller pins.*
- virtual void end ()

  *Release StepMotor controller pins.*
- virtual void setMov (uint16_t nSteps, SM_stepdelay_t delay_ms, SM_direction_t direction)

  *Rotate StepMotor by nSteps at the expected direction.*

### Private Member Functions

- void _setMotorType (SM_motortype_t motorType)

  *Set StepMotor type to be used controlled.*
- void _setTorqueForce (SM_torqueforce_t torqueForce)

  *Set torque force type to be used by StepMotor.*
- void _controlStepCmd (const uint8_t *stepSequenceMatrix, bool is4stepMatrix, uint16_t nSteps, SM_stepdelay_t delay_ms)

  *Control sequenced steps & speed applied to the StepMotor.*
- void _setStepCmd (uint8_t nibble_cmd)

  *Set a step command individually to the StepMotor pins.*

## Private Attributes

- SM_motortype_t _motorType
  *Defines StepMotor motor type.*
- SM_torqueforce_t _torqueForce
  *Defines StepMotor torque force.*
- uint8_t _pin1Port
  *PORT register for pin1.*
- uint8_t _pin2Port
  *PORT register for pin2.*
- uint8_t _pin3Port
  *PORT register for pin3.*
- uint8_t _pin4Port
  *PORT register for pin4.*
- uint8_t _pin1PortBit
  *Bit number in IO register for pin1.*
- uint8_t _pin2PortBit
  *Bit number in IO register for pin2.*
- uint8_t _pin3PortBit
  *Bit number in IO register for pin3.*
- uint8_t _pin4PortBit
  *Bit number in IO register for pin4.*

### 3.1.1 Detailed Description

StepMotor Class.

### 3.1.2 Constructor & Destructor Documentation

#### 3.1.2.1 StepMotor()

```
StepMotor::StepMotor (
            SM_motortype_t motorType,
            SM_torqueforce_t torqueForce,
            uint8_t in1Pin,
            uint8_t in2Pin,
            uint8_t in3Pin,
            uint8_t in4Pin )
```

StepMotor Class constructor.

### 3.1.3 Member Function Documentation

#### 3.1.3.1 _controlStepCmd()

```
void StepMotor::_controlStepCmd (
            const uint8_t * stepSequenceMatrix,
            bool is4stepMatrix,
            uint16_t nSteps,
            SM_stepdelay_t delay_ms )  [private]
```

Control sequenced steps & speed applied to the StepMotor.

#### 3.1.3.2 _setMotorType()

```
void StepMotor::_setMotorType (
            SM_motortype_t motorType )  [private]
```

Set StepMotor type to be used controlled.

#### 3.1.3.3 _setStepCmd()

```
void StepMotor::_setStepCmd (
            uint8_t nibble_cmd )  [private]
```

Set a step command individually to the StepMotor pins.

#### 3.1.3.4 _setTorqueForce()

```
void StepMotor::_setTorqueForce (
            SM_torqueforce_t torqueForce )  [private]
```

Set torque force type to be used by StepMotor.

#### 3.1.3.5 begin()

```
void StepMotor::begin ( )  [virtual]
```

Initialize StepMotor controller pins.

#### 3.1.3.6 end()

```
void StepMotor::end ( )  [virtual]
```

Release StepMotor controller pins.

#### 3.1.3.7 setMov()

```
void StepMotor::setMov (
            uint16_t nSteps,
            SM_stepdelay_t delay_ms,
            SM_direction_t direction )  [virtual]
```

Rotate StepMotor by nSteps at the expected direction.

- Following table documents how internal and external variables are mapped to set an adequate movement command.

| _motorType | _torqueForce | direction | cmd (BIN) |
|---|---|---|---|
| UNI_4PHASE | MIN_TORQUE | CLK | 0b0000 |
| UNI_4PHASE | MIN_TORQUE | CTR_CLK | 0b0001 |
| UNI_4PHASE | MAX_TORQUE | CLK | 0b0010 |
| UNI_4PHASE | MAX_TORQUE | CTR_CLK | 0b0011 |
| BI_2PHASE | MIN_TORQUE | CLK | 0b0100 |
| BI_2PHASE | MIN_TORQUE | CTR_CLK | 0b0101 |
| BI_2PHASE | MAX_TORQUE | CLK | 0b0110 |
| BI_2PHASE | MAX_TORQUE | CTR_CLK | 0b0111 |

### 3.1.4 Member Data Documentation

#### 3.1.4.1 _motorType

```
SM_motortype_t StepMotor::_motorType  [private]
```

Defines StepMotor motor type.

#### 3.1.4.2 _pin1Port

```
uint8_t StepMotor::_pin1Port  [private]
```

PORT register for pin1.

#### 3.1.4.3 _pin1PortBit

```
uint8_t StepMotor::_pin1PortBit  [private]
```

Bit number in IO register for pin1.

#### 3.1.4.4 _pin2Port

```
uint8_t StepMotor::_pin2Port  [private]
```

PORT register for pin2.

#### 3.1.4.5 _pin2PortBit

```
uint8_t StepMotor::_pin2PortBit  [private]
```

Bit number in IO register for pin2.

#### 3.1.4.6 _pin3Port

```
uint8_t StepMotor::_pin3Port  [private]
```

PORT register for pin3.

#### 3.1.4.7 _pin3PortBit

```
uint8_t StepMotor::_pin3PortBit  [private]
```

Bit number in IO register for pin3.

#### 3.1.4.8 _pin4Port

```
uint8_t StepMotor::_pin4Port  [private]
```

PORT register for pin4.

#### 3.1.4.9 _pin4PortBit

```
uint8_t StepMotor::_pin4PortBit  [private]
```

Bit number in IO register for pin4.

#### 3.1.4.10 _torqueForce

```
SM_torqueforce_t StepMotor::_torqueForce  [private]
```

Defines StepMotor torque force.

The documentation for this class was generated from the following files:

- StepMotor.h
- StepMotor.cpp

# Chapter 4

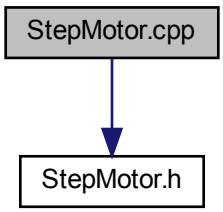
# File Documentation

## 4.1 StepMotor.cpp File Reference

StepMotor library source code for Arduino.

```
#include "StepMotor.h"
```

Include dependency graph for StepMotor.cpp:




### 4.1.1 Detailed Description

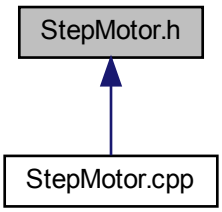
StepMotor library source code for Arduino.

Source: https://github.com/1lucas1gabriel/StepMotor CurrentVersion: 1.0 Date: Oct, 2023

## 4.2 StepMotor.h File Reference

StepMotor library header file for Arduino.

This graph shows which files directly or indirectly include this file:




## Classes

- class StepMotor

  *StepMotor Class.*

## Enumerations

- enum SM_motortype_t { UNIPOLAR_4PHASE = 0b00, BIPOLAR_2PHASE = 0b01 }
- enum SM_torqueforce_t { MIN_TORQUE = 0b00, MAX_TORQUE = 0b01 }
- enum SM_direction_t { CLOCKWISE = 0b00, COUNTER_CLOCKWISE = 0b01 }
- enum SM_stepdelay_t { SLOW_MS = 30, MEDIUM_MS = 15, FAST_MS = 5 }

## Variables

- static const uint8_t uni_4phase_fullstep_maxtorque_clk [4] = {0x9, 0x3, 0x6, 0xC}
- static const uint8_t uni_4phase_fullstep_maxtorque_ctr_clk [4] = {0xC, 0x6, 0x3, 0x9}
- static const uint8_t uni_4phase_fullstep_mintorque_clk [4] = {0x8, 0x1, 0x2, 0x4}
- static const uint8_t uni_4phase_fullstep_mintorque_ctr_clk [4] = {0x4, 0x2, 0x1, 0x8}
- static const uint8_t bi_2phase_fullstep_maxtorque_clk [4] = {0xA, 0x9, 0x5, 0x6}
- static const uint8_t bi_2phase_fullstep_maxtorque_ctr_clk [4] = {0x6, 0x5, 0x9, 0xA}
- static const uint8_t bi_2phase_fullstep_mintorque_clk [4] = {0x8, 0x1, 0x4, 0x2}
- static const uint8_t bi_2phase_fullstep_mintorque_ctr_clk [4] = {0x2, 0x4, 0x1, 0x8}

### 4.2.1 Detailed Description

StepMotor library header file for Arduino.

Source: https://github.com/1lucas1gabriel/StepMotor CurrentVersion: 1.0 Date: Oct, 2023

```
* ---------------------------------------------------------------
* StepMotor: v.1.0
* StepMotor library allows to drive stepper motors in a simple way.
* It can also be quickly re-used between diferent architectures by
* appling small changes in interface (hardware-dependent) functions.
*
* API functions are designed to include:
*
* 1. Control of step speed (discrete values), direction of rotation and applied torque.
* 2. Allows to choose any MCU digital pin for the Step Motor connections.
* 3. Allows usage of unipolar / bipolar step motors.
*
* ---------------------------------------------------------------
* Setup:
* StepMotor library always requires four-pins connection to drive
* step motors properly. It uses only FULL step method to command motors,
* allowing one or two phase to be activated simultaneously (MIN/MAX
* torque applied, respectively). It's highly recommended to use adequate
* drivers to drive those devices, see examples below.
*
* * Bipolar Step Motor (2 phase)
*       * Driver: L293 H-bridge
*       * Coils per phase: 2

* * Unipolar Step Motor (4 phase)
*       * Driver: ULN 2003
*       * Coils per phase: 1
*
*
```

## 4.2.2 Enumeration Type Documentation

### 4.2.2.1 SM_direction_t

```
enum SM_direction_t
```

Defines rotational direction for the StepMotor.

**Enumerator**

| | |
|---|---|
| CLOCKWISE | |
| COUNTER_CLOCKWISE | |

### 4.2.2.2 SM_motortype_t

```
enum SM_motortype_t
```

Defines the StepMotor type used.

**Enumerator**

| | |
|---|---|
| UNIPOLAR_4PHASE | |
| BIPOLAR_2PHASE | |

#### 4.2.2.3 SM_stepdelay_t

```
enum SM_stepdelay_t
```

Defines delay time applied to the StepMotor between each step command.

**Enumerator**

| | |
|---|---|
| SLOW_MS | |
| MEDIUM_MS | |
| FAST_MS | |

#### 4.2.2.4 SM_torqueforce_t

```
enum SM_torqueforce_t
```

Defines torque force type applied by the StepMotor.

**Enumerator**

| | |
|---|---|
| MIN_TORQUE | |
| MAX_TORQUE | |

### 4.2.3 Variable Documentation

#### 4.2.3.1 bi_2phase_fullstep_maxtorque_clk

```
const uint8_t bi_2phase_fullstep_maxtorque_clk[4] = {0xA, 0x9, 0x5, 0x6}  [static]
```

#### 4.2.3.2 bi_2phase_fullstep_maxtorque_ctr_clk

```
const uint8_t bi_2phase_fullstep_maxtorque_ctr_clk[4] = {0x6, 0x5, 0x9, 0xA}  [static]
```

#### 4.2.3.3 bi_2phase_fullstep_mintorque_clk

```
const uint8_t bi_2phase_fullstep_mintorque_clk[4] = {0x8, 0x1, 0x4, 0x2}  [static]
```

#### 4.2.3.4 bi_2phase_fullstep_mintorque_ctr_clk

```
const uint8_t bi_2phase_fullstep_mintorque_ctr_clk[4] = {0x2, 0x4, 0x1, 0x8}  [static]
```

#### 4.2.3.5 uni_4phase_fullstep_maxtorque_clk

```
const uint8_t uni_4phase_fullstep_maxtorque_clk[4] = {0x9, 0x3, 0x6, 0xC}  [static]
```

#### 4.2.3.6 uni_4phase_fullstep_maxtorque_ctr_clk

```
const uint8_t uni_4phase_fullstep_maxtorque_ctr_clk[4] = {0xC, 0x6, 0x3, 0x9}  [static]
```

#### 4.2.3.7 uni_4phase_fullstep_mintorque_clk

```
const uint8_t uni_4phase_fullstep_mintorque_clk[4] = {0x8, 0x1, 0x2, 0x4}  [static]
```

#### 4.2.3.8 uni_4phase_fullstep_mintorque_ctr_clk

```
const uint8_t uni_4phase_fullstep_mintorque_ctr_clk[4] = {0x4, 0x2, 0x1, 0x8}  [static]
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