

## Gripper Interface

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# Contents

<b>1</b>	<b>Main Page</b>	<b>1</b>
<b>2</b>	<b>Class Index</b>	<b>3</b>
2.1	Class List . . . . .	3
<b>3</b>	<b>File Index</b>	<b>5</b>
3.1	File List . . . . .	5
<b>4</b>	<b>Class Documentation</b>	<b>7</b>
4.1	Gripper::Finger Class Reference . . . . .	7
4.1.1	Detailed Description . . . . .	7
4.1.2	Member Function Documentation . . . . .	8
4.1.2.1	clear . . . . .	8
4.1.2.2	getCurrent . . . . .	8
4.1.2.3	getPosition . . . . .	8
4.1.2.4	getPositionReq . . . . .	8
4.1.2.5	isMoving . . . . .	8
4.1.2.6	setForce . . . . .	8
4.1.2.7	setPosition . . . . .	8
4.1.2.8	setSpeed . . . . .	8
4.1.3	Friends And Related Function Documentation . . . . .	8
4.1.3.1	Gripper . . . . .	8
4.2	Gripper Class Reference . . . . .	9
4.2.1	Detailed Description . . . . .	10
4.2.2	Member Enumeration Documentation . . . . .	10
4.2.2.1	Fault . . . . .	10
4.2.2.2	Mode . . . . .	11
4.2.2.3	Sync . . . . .	11
4.2.3	Constructor & Destructor Documentation . . . . .	11
4.2.3.1	Gripper . . . . .	11
4.2.3.2	~Gripper . . . . .	11
4.2.4	Member Function Documentation . . . . .	11

4.2.4.1	activate	11
4.2.4.2	clear	11
4.2.4.3	connect	12
4.2.4.4	deactivate	12
4.2.4.5	disconnect	12
4.2.4.6	emergencyRelease	12
4.2.4.7	getCurrent	12
4.2.4.8	getFaultMsg	12
4.2.4.9	getFaultStatus	12
4.2.4.10	getMode	12
4.2.4.11	getPosition	12
4.2.4.12	getPositionReq	13
4.2.4.13	go	13
4.2.4.14	isActivated	13
4.2.4.15	isConnected	13
4.2.4.16	isMoving	13
4.2.4.17	setForce	13
4.2.4.18	setIndividualCtrl	13
4.2.4.19	setPosition	14
4.2.4.20	setSpeed	14
4.2.4.21	synchronise	14
4.2.5	Member Data Documentation	14
4.2.5.1	a	14
4.2.5.2	b	14
4.2.5.3	c	14
4.2.5.4	s	14
<b>5</b>	<b>File Documentation</b>	<b>15</b>
5.1	demo.cpp File Reference	15
5.1.1	Macro Definition Documentation	15
5.1.1.1	ms	15
5.1.1.2	sec	16
5.1.2	Enumeration Type Documentation	16
5.1.2.1	Thread	16
5.1.3	Function Documentation	16
5.1.3.1	com	16
5.1.3.2	fault	16
5.1.3.3	launch	16
5.1.3.4	main	16
5.1.3.5	terminate	17

5.2	Gripper.cpp File Reference	17
5.3	Gripper.h File Reference	17
5.4	template.cpp File Reference	17
5.4.1	Macro Definition Documentation	18
5.4.1.1	ms	18
5.4.1.2	sec	18
5.4.2	Enumeration Type Documentation	18
5.4.2.1	Thread	18
5.4.3	Function Documentation	18
5.4.3.1	com	18
5.4.3.2	fault	18
5.4.3.3	launch	18
5.4.3.4	main	19
5.4.3.5	terminate	19
	<b>Index</b>	<b>20</b>



# Chapter 1

## Main Page

An Interface (C++ Linux Library - libgripper.a) to communicate with the Robotiq adaptive 3 Fingers gripper. This interface is a communication layer that are built on top of the Modbus TCP Protocol. It is advised that the Robotiq Instruction Manual be consulted before using this interface. A showcase ([demo.cpp](#)) and a template ([template.cpp](#)) is available.

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## Chapter 2

# Class Index

### 2.1 Class List

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

<a href="#">Gripper::Finger</a>	
Individual Data of fingers and scissor . . . . .	<a href="#">7</a>
<a href="#">Gripper</a>	
Interface to communicate with gripper . . . . .	<a href="#">9</a>



## Chapter 3

# File Index

### 3.1 File List

Here is a list of all files with brief descriptions:

<a href="#">demo.cpp</a>	15
<a href="#">Gripper.cpp</a>	17
<a href="#">Gripper.h</a>	17
<a href="#">template.cpp</a>	17



## Chapter 4

# Class Documentation

### 4.1 Gripper::Finger Class Reference

Individual Data of fingers and scissor.

```
#include <Gripper.h>
```

#### Public Member Functions

- void [setPosition](#) (int position)  
*Sets position (range: fully open=0 to fully closed=255) for finger.*
- void [setSpeed](#) (int speed)  
*Sets speed (range: min=0 to max=255) for finger.*
- void [setForce](#) (int force)  
*Sets force (range: min=0 to max=255) for finger.*
- void [clear](#) (void)  
*Sets position, speed and force back to 0 for finger.*
- bool [isMoving](#) (void) const  
*Returns true if finger is in motion.*
- int [getPositionReq](#) (void) const  
*Returns position requested (Echo) of finger.*
- int [getPosition](#) (void) const  
*Returns actual position of finger.*
- int [getCurrent](#) (void) const  
*Returns electric current consumption ( $0.1 * \text{getForce}()$ ) in mA) of finger.*

#### Friends

- class [Gripper](#)

#### 4.1.1 Detailed Description

Individual Data of fingers and scissor.

Definition at line 58 of file Gripper.h.

## 4.1.2 Member Function Documentation

### 4.1.2.1 void Finger::clear ( void )

Sets position, speed and force back to 0 for finger.

Definition at line 39 of file Gripper.cpp.

### 4.1.2.2 int Finger::getCurrent ( void ) const

Returns electric current consumption (0.1\*getForce() in mA) of finger.

Definition at line 68 of file Gripper.cpp.

### 4.1.2.3 int Finger::getPosition ( void ) const

Returns actual position of finger.

Definition at line 61 of file Gripper.cpp.

### 4.1.2.4 int Finger::getPositionReq ( void ) const

Returns position requested (Echo) of finger.

Definition at line 55 of file Gripper.cpp.

### 4.1.2.5 bool Finger::isMoving ( void ) const

Returns true if finger is in motion.

Definition at line 46 of file Gripper.cpp.

### 4.1.2.6 void Finger::setForce ( int *force* )

Sets force (range: min=0 to max=255) for finger.

Definition at line 33 of file Gripper.cpp.

### 4.1.2.7 void Finger::setPosition ( int *position* )

Sets position (range: fully open=0 to fully closed=255) for finger.

Definition at line 23 of file Gripper.cpp.

### 4.1.2.8 void Finger::setSpeed ( int *speed* )

Sets speed (range: min=0 to max=255) for finger.

Definition at line 28 of file Gripper.cpp.

## 4.1.3 Friends And Related Function Documentation

### 4.1.3.1 friend class Gripper [friend]

Definition at line 69 of file Gripper.h.

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

- [Gripper.h](#)
- [Gripper.cpp](#)

## 4.2 Gripper Class Reference

Interface to communicate with gripper.

```
#include <Gripper.h>
```

### Classes

- class [Finger](#)  
*Individual Data of fingers and scissor.*

### Public Types

- enum [Mode](#) { [Basic](#), [Pinch](#), [Wide](#), [Scissor](#) }  
*gripper operation Mode*
- enum [Sync](#) { [SendOnly](#), [ReadOnly](#), [Dual](#) }  
*Synchronisation Channel.*
- enum [Fault](#) { [NoFault](#), [ActionDelay](#), [Minor](#), [Major](#) }  
*Fault Status.*

### Public Member Functions

- [Gripper](#) ()  
*Constructs a [Gripper](#) Object.*
- virtual [~Gripper](#) ()  
*Guarantees that the gripper is deactivated and disconnected.*
- void [connect](#) (const char \*ip, int port)  
*Establishes a TCP Connection to the gripper.*
- void [disconnect](#) (void)  
*Disconnects from the gripper.*
- void [activate](#) ([Mode](#) mode=[Basic](#))  
*Activates gripper in Mode mode.*
- void [setIndividualCtrl](#) (bool rICF, bool rICS=false)  
*Enables/disables individual control of fingers/scissor.*
- void [deactivate](#) (void)  
*Deactivates gripper.*
- void [emergencyRelease](#) (void)  
*Automatic Release routine.*
- void [synchronise](#) ([Sync](#) Channel=[Dual](#))  
*Synchronises data between Interface and gripper according to the specified channel Sync.*
- void [setPosition](#) (int position)  
*Sets position (range: fully open=0 to fully closed=255) for gripper.*
- void [setSpeed](#) (int speed)  
*Sets speed (range: min=0 to max=255) for gripper.*
- void [setForce](#) (int force)  
*Sets force (range: min=0 to max=255) for gripper.*
- void [clear](#) (void)

- Sets position, speed and force back to 0 for all fingers and scissor.*
  - void [go](#) (bool flag)
    - Go2 requested position (flag=true) or Stop (flag=false)*
  - bool [isConnected](#) (void) const
    - Returns true if gripper is connected.*
  - bool [isActivated](#) (void) const
    - Returns true if gripper has been activated in the corresponding mode and ready for command.*
  - bool [isMoving](#) (void) const
    - Returns true if gripper is in motion towards requested position.*
  - [Gripper::Mode](#) [getMode](#) (void) const
    - Returns gripper operation Mode mode.*
  - int [getPositionReq](#) (void) const
    - Returns position requested (Echo) of gripper.*
  - int [getPosition](#) (void) const
    - Returns actual position of gripper.*
  - int [getCurrent](#) (void) const
    - Returns electric current consumption (0.1\*getForce()) in mA) of gripper.*
  - [Gripper::Fault](#) [getFaultStatus](#) (void) const
    - Returns Fault Status.*
  - string [getFaultMsg](#) (void) const
    - Returns fault message.*

## Public Attributes

- class [Gripper::Finger a](#)
  - class [Gripper::Finger b](#)
  - class [Gripper::Finger c](#)
  - class [Gripper::Finger s](#)
- objects of individual fingers and scissor*

### 4.2.1 Detailed Description

Interface to communicate with gripper.

Definition at line 29 of file Gripper.h.

### 4.2.2 Member Enumeration Documentation

#### 4.2.2.1 enum [Gripper::Fault](#)

Fault Status.

NoFault/ActionDelay (led off), Minor (led turns red), Major (led blinking red)

Enumerator

***NoFault***

***ActionDelay***

***Minor***

***Major***

Definition at line 51 of file Gripper.h.



#### 4.2.2.2 enum Gripper::Mode

gripper operation Mode

Enumerator

***Basic***

***Pinch***

***Wide***

***Scissor***

Definition at line 44 of file Gripper.h.

#### 4.2.2.3 enum Gripper::Sync

Synchronisation Channel.

Enumerator

***SendOnly***

***ReadOnly***

***Dual***

Definition at line 46 of file Gripper.h.

### 4.2.3 Constructor & Destructor Documentation

#### 4.2.3.1 Gripper::Gripper ( )

Constructs a [Gripper](#) Object.

Definition at line 76 of file Gripper.cpp.

#### 4.2.3.2 Gripper::~~Gripper ( ) [virtual]

Guarantees that the gripper is deactivated and disconnected.

Definition at line 88 of file Gripper.cpp.

### 4.2.4 Member Function Documentation

#### 4.2.4.1 void Gripper::activate ( Mode mode = Basic )

Activates gripper in Mode mode.

Definition at line 179 of file Gripper.cpp.

#### 4.2.4.2 void Gripper::clear ( void )

Sets position, speed and force back to 0 for all fingers and scissor.

[clear\(\)](#) is implemented in [Gripper::deactivate\(\)](#)

Definition at line 250 of file Gripper.cpp.

#### 4.2.4.3 void Gripper::connect ( const char \* *ip*, int *port* )

Establishes a TCP Connection to the gripper.

Definition at line 149 of file Gripper.cpp.

#### 4.2.4.4 void Gripper::deactivate ( void )

Deactivates gripper.

Definition at line 267 of file Gripper.cpp.

#### 4.2.4.5 void Gripper::disconnect ( void )

Disconnects from the gripper.

Definition at line 165 of file Gripper.cpp.

#### 4.2.4.6 void Gripper::emergencyRelease ( void )

Automatic Release routine.

usage: to disengage gripper after an emergency stop of robot  
not to be used under normal operating conditions

Definition at line 276 of file Gripper.cpp.

#### 4.2.4.7 int Gripper::getCurrent ( void ) const

Returns electric current consumption (0.1\*getForce() in mA) of gripper.

Definition at line 339 of file Gripper.cpp.

#### 4.2.4.8 string Gripper::getFaultMsg ( void ) const

Returns fault message.

Definition at line 388 of file Gripper.cpp.

#### 4.2.4.9 Gripper::Fault Gripper::getFaultStatus ( void ) const

Returns Fault Status.

Definition at line 370 of file Gripper.cpp.

#### 4.2.4.10 Gripper::Mode Gripper::getMode ( void ) const

Returns gripper operation Mode mode.

Definition at line 303 of file Gripper.cpp.

#### 4.2.4.11 int Gripper::getPosition ( void ) const

Returns actual position of gripper.

Definition at line 333 of file Gripper.cpp.

**4.2.4.12** `int Gripper::getPositionReq ( void ) const`

Returns position requested (Echo) of gripper.

Definition at line 327 of file Gripper.cpp.

**4.2.4.13** `void Gripper::go ( bool flag )`

Go2 requested position (flag=true) or Stop (flag=false)

go(false) is implemented in [Gripper::activate\(Mode\)](#), [Gripper::deactivate\(\)](#) and [Gripper::emergencyRelease\(\)](#)

Definition at line 261 of file Gripper.cpp.

**4.2.4.14** `bool Gripper::isActive ( void ) const`

Returns true if gripper has been activated in the corresponding mode and ready for command.

Definition at line 345 of file Gripper.cpp.

**4.2.4.15** `bool Gripper::isConnected ( void ) const`

Returns true if gripper is connected.

Definition at line 174 of file Gripper.cpp.

**4.2.4.16** `bool Gripper::isMoving ( void ) const`

Returns true if gripper is in motion towards requested position.

Definition at line 357 of file Gripper.cpp.

**4.2.4.17** `void Gripper::setForce ( int force )`

Sets force (range: min=0 to max=255) for gripper.

Definition at line 244 of file Gripper.cpp.

**4.2.4.18** `void Gripper::setIndividualCtrl ( bool rICF, bool rICS = false )`

Enables/disables individual control of fingers/scissor.

**Parameters**

<i>bool</i>	rICF: Individual control of fingers
<i>bool</i>	rICS: Individual control of scissor  caution: position request, speed and force for ALL fingers will be initialised, respectively to the current position, speed and force of gripper. option rICF is discarded by gripper if mode is set to Scissor and option rICS is set to false mode is discarded by gripper if option rICS is set to true

Definition at line 207 of file Gripper.cpp.

#### 4.2.4.19 void Gripper::setPosition ( int *position* )

Sets position (range: fully open=0 to fully closed=255) for gripper.

Definition at line 232 of file Gripper.cpp.

#### 4.2.4.20 void Gripper::setSpeed ( int *speed* )

Sets speed (range: min=0 to max=255) for gripper.

Definition at line 238 of file Gripper.cpp.

#### 4.2.4.21 void Gripper::synchronise ( Sync Channel = Dual )

Synchronises data between Interface and gripper according to the specified channel Sync.

data are NOT exchanged with the gripper until this method is called

this method does nothing until the gripper is connected.

usage: to be implemented in a real time communication thread

method can also be called in a one shot manner (i.e. threadfree/call at will)

maximum calling frequency: 1 millisecond

Definition at line 282 of file Gripper.cpp.

### 4.2.5 Member Data Documentation

#### 4.2.5.1 class Gripper::Finger Gripper::a

#### 4.2.5.2 class Gripper::Finger Gripper::b

#### 4.2.5.3 class Gripper::Finger Gripper::c

#### 4.2.5.4 class Gripper::Finger Gripper::s

objects of individual fingers and scissor

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

- [Gripper.h](#)
- [Gripper.cpp](#)

## Chapter 5

# File Documentation

### 5.1 demo.cpp File Reference

```
#include "Gripper.h"  
#include <pthread.h>
```

#### Macros

- `#define sec 1000000`  
*sec in microseconds*
- `#define ms 1000`  
*ms in microseconds*

#### Enumerations

- `enum Thread { Com, Fault, Com, Fault }`  
*thread purposes*

#### Functions

- `pthread_t launch (Gripper *, Thread)`  
*thread launcher*
- `void terminate (pthread_t)`  
*thread terminator*
- `int main ()`
- `void * com (void *gripper)`
- `void * fault (void *gripper)`

#### 5.1.1 Macro Definition Documentation

##### 5.1.1.1 #define ms 1000

ms in microseconds

Definition at line 10 of file demo.cpp.

#### 5.1.1.2 `#define sec 1000000`

sec in microseconds

Definition at line 9 of file demo.cpp.

### 5.1.2 Enumeration Type Documentation

#### 5.1.2.1 `enum Thread`

thread purposes

Enumerator

***Com***

***Fault***

***Com***

***Fault***

Definition at line 13 of file demo.cpp.

### 5.1.3 Function Documentation

#### 5.1.3.1 `void* com ( void * gripper )`

Definition at line 158 of file demo.cpp.

#### 5.1.3.2 `void* fault ( void * gripper )`

Definition at line 169 of file demo.cpp.

#### 5.1.3.3 `pthread_t launch ( Gripper * gripper, Thread type )`

thread launcher

Definition at line 183 of file demo.cpp.

#### 5.1.3.4 `int main ( )`

<start communication

<start fault monitoring

Connect

Activation

Mode Change

<set mode changing speed

Decelerate full close

Advanced feature

Restore and Deactivate

Definition at line 17 of file demo.cpp.

### 5.1.3.5 void terminate ( pthread\_t id )

thread terminator

Definition at line 194 of file demo.cpp.

## 5.2 Gripper.cpp File Reference

```
#include "Gripper.h"
```

## 5.3 Gripper.h File Reference

```
#include <stdio.h>
#include <unistd.h>
#include <string.h>
#include <stdlib.h>
#include <errno.h>
#include <bitset>
#include "modbus/modbus.h"
#include <iostream>
```

### Classes

- class [Gripper](#)  
*Interface to communicate with gripper.*
- class [Gripper::Finger](#)  
*Individual Data of fingers and scissor.*

## 5.4 template.cpp File Reference

```
#include "Gripper.h"
#include <pthread.h>
```

### Macros

- #define [sec](#) 1000000  
*sec in microseconds*
- #define [ms](#) 1000  
*ms in microseconds*

### Enumerations

- enum [Thread](#) { [Com](#), [Fault](#), [Com](#), [Fault](#) }  
*thread purposes*

## Functions

- pthread\_t **launch** (**Gripper** \*, **Thread**)  
*thread launcher*
- void **terminate** (pthread\_t)  
*thread terminator*
- int **main** ()
- void \* **com** (void \*gripper)
- void \* **fault** (void \*gripper)

### 5.4.1 Macro Definition Documentation

#### 5.4.1.1 #define ms 1000

ms in microseconds

Definition at line 10 of file template.cpp.

#### 5.4.1.2 #define sec 1000000

sec in microseconds

Definition at line 9 of file template.cpp.

### 5.4.2 Enumeration Type Documentation

#### 5.4.2.1 enum Thread

thread purposes

Enumerator

**Com**

**Fault**

**Com**

**Fault**

Definition at line 13 of file template.cpp.

### 5.4.3 Function Documentation

#### 5.4.3.1 void\* com ( void \* gripper )

Definition at line 86 of file template.cpp.

#### 5.4.3.2 void\* fault ( void \* gripper )

Definition at line 97 of file template.cpp.

#### 5.4.3.3 pthread\_t launch ( **Gripper** \* gripper, **Thread type** )

thread launcher

Definition at line 108 of file template.cpp.



#### 5.4.3.4 int main ( )

<start communication

<start fault monitoring

Connect

Activation

Deactivate

Definition at line 23 of file template.cpp.

#### 5.4.3.5 void terminate ( pthread\_t id )

thread terminator

Definition at line 119 of file template.cpp.

# Index

- a
  - Gripper, [14](#)
- ActionDelay
  - Gripper, [10](#)
- activate
  - Gripper, [11](#)
- b
  - Gripper, [14](#)
- Basic
  - Gripper, [11](#)
- c
  - Gripper, [14](#)
- clear
  - Gripper, [11](#)
- Com
  - demo.cpp, [16](#)
  - template.cpp, [18](#)
- connect
  - Gripper, [11](#)
- deactivate
  - Gripper, [12](#)
- demo.cpp
  - Com, [16](#)
  - Fault, [16](#)
- disconnect
  - Gripper, [12](#)
- Dual
  - Gripper, [11](#)
- Fault
  - demo.cpp, [16](#)
  - Gripper, [10](#)
  - template.cpp, [18](#)
- go
  - Gripper, [13](#)
- Gripper, [9](#)
  - a, [14](#)
  - ActionDelay, [10](#)
  - activate, [11](#)
  - b, [14](#)
  - Basic, [11](#)
  - c, [14](#)
  - clear, [11](#)
  - connect, [11](#)
  - deactivate, [12](#)
  - disconnect, [12](#)
  - Dual, [11](#)
  - Fault, [10](#)
  - go, [13](#)
  - Gripper, [11](#)
  - Major, [10](#)
  - Minor, [10](#)
  - Mode, [10](#)
  - NoFault, [10](#)
  - Pinch, [11](#)
  - ReadOnly, [11](#)
  - s, [14](#)
  - Scissor, [11](#)
  - SendOnly, [11](#)
  - Sync, [11](#)
  - synchronise, [14](#)
  - Wide, [11](#)
- Major
  - Gripper, [10](#)
- Minor
  - Gripper, [10](#)
- Mode
  - Gripper, [10](#)
- NoFault
  - Gripper, [10](#)
- Pinch
  - Gripper, [11](#)
- ReadOnly
  - Gripper, [11](#)
- s
  - Gripper, [14](#)
- Scissor
  - Gripper, [11](#)
- SendOnly
  - Gripper, [11](#)
- Sync
  - Gripper, [11](#)
- synchronise
  - Gripper, [14](#)
- template.cpp
  - Com, [18](#)
  - Fault, [18](#)
- Wide
  - Gripper, [11](#)