# FFRESW

Generated by Doxygen 1.9.8

# Chapter 1

# Namespace Index

## 1.1 Namespace List

Here is a list of all documented namespaces with brief descriptions:

# Chapter 2

# Hierarchical Index

## 2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

# Chapter 3

# Class Index

## 3.1 Class List

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

# Chapter 4

# File Index

## 4.1 File List

Here is a list of all documented files with brief descriptions:

# Chapter 5

# Namespace Documentation

## 5.1 calcModule Namespace Reference

Namespace for the calculation module.

### Classes

- class CalcModuleInternals

### Enumerations

- enum Type { **General** , **Pressure** , **Position** }

  *Enum for the different Types we want to extract from a response.*

### 5.1.1 Detailed Description

Namespace for the calculation module.

## 5.2 comModule Namespace Reference

Namespace for the communication module.

### Classes

- class ComModuleInternals
- class EthernetCommunication

  *Class to handle Ethernet communication.*
- class I2CCommunication

  *Class to handle I2C communication.*
- class SerialCommunication

  *Class to handle Serial communication.*
- class SPICommunication

  *Class to handle SPI communication.*

**Enumerations**

- enum class Service : uint8_t {
  **SET** = 0x01 , **GET** = 0x0B , **SET_COMPOUND** = 0x28 , **GET_COMPOUND** = 0x29 ,
  **SETGET** = 0x30 }

  *Enum class for the service types.*
- enum class Compound1 : uint32_t { **CONTROL_MODE** = 0x0F020000 , **TARGET_POSITION** = 0x11020000 , **TARGET_PRESSURE** = 0x07020000 , **NOT_USED** = 0x00000000 }

  *Enum class for the compound 1 types.*
- enum class Compound2 : uint32_t {
  **ACCESS_MODE** = 0x0F0B0000 , **CONTROL_MODE** = 0x0F020000 , **TARGET_POSITION** = 0x11020000 , **TARGET_PRESSURE** = 0x07020000 ,
  **ACTUAL_POSITION** = 0x10010000 , **POSITION_STATE** = 0x00100000 , **ACTUAL_PRESSURE** = 0x07010000 , **TARGET_PRESSURE_USED** = 0x07030000 ,
  **WARNING_BITMAP** = 0x0F300100 , **NOT_USED** = 0x00000000 }

  *Enum class for the compound 2 types.*
- enum class Compound3 : uint32_t {
  **CONTROL_MODE** = 0x0F020000 , **TARGET_POSITION** = 0x11020000 , **TARGET_PRESSURE** = 0x07020000 , **SEPARATION** = 0x00000000 ,
  **ACCESS_MODE** = 0x0F0B0000 , **ACTUAL_POSITION** = 0x10010000 , **POSITION_STATE** = 0x00100000 , **ACTUAL_PRESSURE** = 0x07010000 ,
  **TARGET_PRESSURE_USED** = 0x07030000 , **WARNING_BITMAP** = 0x0F300100 , **NOT_USED** = 0x00000000 }

  *Enum class for the compound 3 types.*
- enum class Error_Codes : uint8_t {
  **NO_ERROR** = 0x00 , **WRONG_COMMAND_LENGTH** = 0x0C , **VALUE_TOO_LOW** = 0x1C , **VALUE_TOO_HIGH** = 0x1D ,
  **RESULTING_ZERO_ADJUST_OFFSET** = 0x20 , **NO_SENSOR_ENABLED** = 0x21 , **WRONG_ACCESS_MODE** = 0x50 , **TIMEOUT** = 0x51 ,
  **NV_MEMORY_NOT_READY** = 0x6D , **WRONG_PARAMETER_ID** = 0x6E , **PARAMETER_NOT_SETTABLE** = 0x70 , **PARAMETER_NOT_READABLE** = 0x71 ,
  **WRONG_PARAMETER_INDEX** = 0x73 , **WRONG_VALUE_WITHIN_RANGE** = 0x76 , **NOT_ALLOWED_IN_THIS_STATE** = 0x78 , **SETTING_LOCK** = 0x79 ,
  **WRONG_SERVICE** = 0x7A , **PARAMETER_NOT_ACTIVE** = 0x7B , **PARAMETER_SYSTEM_ERROR** = 0x7C , **COMMUNICATION_ERROR** = 0x7D ,
  **UNKNOWN_SERVICE** = 0x7E , **UNEXPECTED_CHARACTER** = 0x7F , **NO_ACCESS_RIGHTS** = 0x80 , **NO_ADEQUATE_HARDWARE** = 0x81 ,
  **WRONG_OBJECT_STATE** = 0x82 , **NO_SLAVE_COMMAND** = 0x84 , **COMMAND_TO_UNKNOWN_SLAVE** = 0x85 , **COMMAND_TO_MASTER_ONLY** = 0x87 ,
  **ONLY_G_COMMAND_ALLOWED** = 0x88 , **NOT_SUPPORTED** = 0x89 , **FUNCTION_DISABLED** = 0xA0 , **ALREADY_DONE** = 0xA1 }

  *Enum class for the error codes.*

### 5.2.1 Detailed Description

Namespace for the communication module.

## 5.3 flybackModule Namespace Reference

Namespace for the Flyback module.

#### Classes

- class Flyback

  *Flyback class to manage the Flyback system This class provides methods for initializing the system, configuring the timer, measuring parameters, and handling different system states such as ON, OFF, HAND, and REMOTE modes.*
- struct Measurement

  *Structure to store the measured values of the system This structure holds the voltage, current, power, frequency and dutycycle values measured from the system.*

#### Typedefs

- typedef struct flybackModule::Measurement **meas**

#### Enumerations

- enum class SwitchStates : int { **HV_Module_OFF** , **HV_Module_MANUAL** , **HV_Module_REMOTE** , **HV_↩ Module_INVALID** }

  *enum for different SwitchStates of HVModule*

### 5.3.1 Detailed Description

Namespace for the Flyback module.

## 5.4 jsonModule Namespace Reference

Namespace for the JSON module.

#### Classes

- class JsonModuleInternals

### 5.4.1 Detailed Description

Namespace for the JSON module.

## 5.5 locker Namespace Reference

Namespace for the locker system.

#### Classes

- class ScopedLock

  *Scoped lock class for mutexes.*

### 5.5.1 Detailed Description

Namespace for the locker system.

## 5.6 reportSystem Namespace Reference

Namespace for the report system.

#### Classes

- class ReportSystem
  *Class for the report system.*

### 5.6.1 Detailed Description

Namespace for the report system.

## 5.7 sensorModule Namespace Reference

Namespace for the sensor module.

#### Classes

- class SensorModuleInternals
  *Class for the sensor module internals.*

#### Enumerations

- enum class SensorType {
  **TEMPERATURE** , **OBJECTTEMPERATURE** , **AMBIENTTEMPERATURE** , **PRESSURE** ,
  **DHT11** , **MCP9601_Celsius** , **MCP9601_Fahrenheit** , **MCP9601_Kelvin** ,
  **UNKNOWN** }
  *Enum class for the sensor types.*

### 5.7.1 Detailed Description

Namespace for the sensor module.

## 5.8 timeModule Namespace Reference

namespace for the timeModule

### Classes

- struct DateTimeStruct

  *Struct to hold the date and time.*
- class TimeModuleInternals

  *Class to handle Systemtime.*

### Typedefs

- typedef struct timeModule::DateTimeStruct **DateTimeStruct**

### 5.8.1 Detailed Description

namespace for the timeModule

## 5.9 vacControlModule Namespace Reference

Namespace for the VacControl module.

### Classes

- struct Pressure
- class VacControl

  *VacControl class to manage the vacuum control system This class provides methods for initializing the system, configuring the timer, measuring parameters, and handling different system states such as ON, OFF, HAND, and REMOTE modes.*

### Typedefs

- typedef struct vacControlModule::Pressure **meas**

### Enumerations

- enum class SwitchStates : int {
  **Main_Switch_OFF** , **Main_Switch_MANUAL** , **Main_Switch_REMOTE** , **Main_switch_INVALID** ,
  **PUMP_ON** , **PUMP_OFF** }

  *Enum to represent the states of the main switch and pump.*
- enum Scenarios {
  **Scenario_1** = 0 , **Scenario_2** = 1 , **Scenario_3** = 2 , **Scenario_4** = 3 ,
  **Scenario_5** = 4 , **Invalid_Scenario** = -1 }

  *Enum to represent the different operating scenarios of the VacControl system.*

### 5.9.1 Detailed Description

Namespace for the VacControl module.

# Chapter 6

# Class Documentation

## 6.1 calcModule::CalcModuleInternals Class Reference

### Static Public Member Functions

- static float calculateAverage (const float *data, int length)

  *Function to calculate the average of a data set.*
- static float findMaximum (const float *data, int length)

  *Function to calculate the maximum value of a data set.*
- static float findMinimum (const float *data, int length)

  *Function to calculate the minimum value of a data set.*
- static float calculateStandardDeviation (const float *data, int length)

  *Function to calculate the standard deviation of a data set.*
- static float findMedian (float *data, int length)

  *Function to calculate the median of a data set.*
- static float celsiusToFahrenheit (float celsius)

  *Function to convert celsius to fahrenheit.*
- static float fahrenheitToCelsius (float fahrenheit)

  *Function to convert fahrenheit to celsius.*
- static float celsiusToKelvin (float celsius)

  *Function to convert celsius to kelvin.*
- static float kelvinToCelsius (float kelvin)

  *Function to convert kelvin to celsius.*
- static float pascalToAtm (float pascal)

  *Function to convert pascal to atm.*
- static float atmToPascal (float atm)

  *Function to convert atm to pascal.*
- static float pascalToPsi (float pascal)

  *Function to convert pascal to psi.*
- static float psiToPascal (float psi)

  *Function to convert psi to pascal.*
- static float calculatePower (float voltage, float current)

  *Function to calculate the power.*
- static float calculateCurrent (float voltage, float resistance)

  *Funcion to calculate the current.*
- static float calculateResistance (float voltage, float current)

*Function to caculate the Resistance.*

- static float extractFloat (String response, int id)

  *Extract the float from a VAT uC eth frame.*

- static float extractFloatFromResponse (const String &response, Type type)

  *Extract the float from a VAT uC eth frame, specific for positions and pressures.*

## 6.1.1 Member Function Documentation

### 6.1.1.1 atmToPascal()

```
float CalcModuleInternals::atmToPascal (
            float atm )  [static]
```

Function to convert atm to pascal.

**Parameters**

| | |
|---|---|
| *atm* | -> The pressure in atm. |

**Returns**

float -> The pressure in pascal.

### 6.1.1.2 calculateAverage()

```
float CalcModuleInternals::calculateAverage (
            const float * data,
            int length )  [static]
```

Function to calculate the average of a data set.

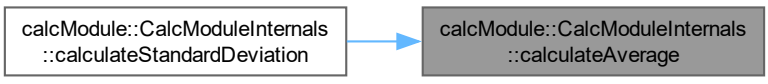
**Parameters**

| | |
|---|---|
| *data* | -> The data set to calculate the average from. |
| *length* | -> The length of the data set. |

**Returns**

float -> The average of the data set.

Here is the caller graph for this function:



#### 6.1.1.3 calculateCurrent()

```
float CalcModuleInternals::calculateCurrent (
            float voltage,
            float resistance )  [static]
```

Funcion to calculate the current.

**Parameters**

| | |
|---|---|
| *voltage* | -> The voltage. |
| *resistance* | -> The resistance. |

**Returns**

float -> The calculated current.

#### 6.1.1.4 calculatePower()

```
float CalcModuleInternals::calculatePower (
            float voltage,
            float current )  [static]
```

Function to calculate the power.

**Parameters**

| | |
|---|---|
| *voltage* | -> The voltage. |
| *current* | -> The current. |

**Returns**

float -> The calculated power.

#### 6.1.1.5 calculateResistance()

```
float CalcModuleInternals::calculateResistance (
            float voltage,
            float current )  [static]
```

Function to caculate the Resistance.

**Parameters**

| | |
|---|---|
| *voltage* | -> The voltage. |
| *current* | -> The current. |

**Returns**

float -> The calculated resistance.

#### 6.1.1.6 calculateStandardDeviation()

```
float CalcModuleInternals::calculateStandardDeviation (
            const float * data,
            int length )  [static]
```

Function to calculate the standard deviation of a data set.

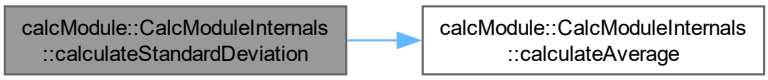
**Parameters**

| | |
|---|---|
| *data* | -> The data set to calculate the standard deviation from. |
| *length* | -> The length of the data set. |

**Returns**

float -> The standard deviation of the data set.

Here is the call graph for this function:




#### 6.1.1.7 celsiusToFahrenheit()

```
float CalcModuleInternals::celsiusToFahrenheit (
            float celsius )  [static]
```

Function to convert celsius to fahrenheit.

**Parameters**

| | |
|---|---|
| *celsius* | -> The temperature in celsius. |

**Returns**

float -> The temperature in fahrenheit.

Here is the caller graph for this function:


#### 6.1.1.8 celsiusToKelvin()

```
float CalcModuleInternals::celsiusToKelvin (
            float celsius )  [static]
```

Function to convert celsius to kelvin.

**Parameters**

| | |
|---|---|
| *celsius* | -> The temperature in celsius. |

**Returns**

float -> The temperature in kelvin.

Here is the caller graph for this function:


#### 6.1.1.9 extractFloat()

```
float CalcModuleInternals::extractFloat (
            String response,
            int id )  [static]
```

Extract the float from a VAT uC eth frame.

**Parameters**

| | |
|---|---|
| *response* | -> The response from the VAT uC. |
| *id* | -> The id of the compound. |

0 -> Simple GET/SET 1 -> Compound 1 1 -> Compound 2 1 -> Compound 3

**Returns**

float -> The extracted float.

#### 6.1.1.10 extractFloatFromResponse()

```
float CalcModuleInternals::extractFloatFromResponse (
            const String & response,
            Type type )  [static]
```

Extract the float from a VAT uC eth frame, specific for positions and pressures.

**Parameters**

| | |
|---|---|
| *response* | -> The response from the VAT uC. |
| *type* | -> The type to extract Pressure, Position, General |

**Returns**

float -> The extracted float.

#### 6.1.1.11 fahrenheitToCelsius()

```
float CalcModuleInternals::fahrenheitToCelsius (
            float fahrenheit )  [static]
```

Function to convert fahrenheit to celsius.

**Parameters**

| | |
|---|---|
| *fahrenheit* | -> The temperature in fahrenheit. |

**Returns**

float -> The temperature in celsius.

#### 6.1.1.12 findMaximum()

```
float CalcModuleInternals::findMaximum (
            const float * data,
            int length )  [static]
```

Function to calculate the maximum value of a data set.

**Parameters**

| | |
|---|---|
| *data* | -> The data set to calculate the maximum value from. |
| *length* | -> The length of the data set. |

**Returns**

float -> The maximum value of the data set.

#### 6.1.1.13 findMedian()

```
float CalcModuleInternals::findMedian (
            float * data,
            int length )  [static]
```

Function to calculate the median of a data set.

**Parameters**

| | |
|---|---|
| *data* | -> The data set to calculate the median from. |
| *length* | -> The length of the data set. |

**Returns**

float -> The median of the data set.

#### 6.1.1.14 findMinimum()

```
float CalcModuleInternals::findMinimum (
            const float * data,
            int length )  [static]
```

Function to calculate the minimum value of a data set.

**Parameters**

| | |
|---|---|
| *data* | -> The data set to calculate the minimum value from. |
| *length* | -> The length of the data set. |

**Returns**

float -> The minimum value of the data set.

#### 6.1.1.15 kelvinToCelsius()

```
float CalcModuleInternals::kelvinToCelsius (
            float kelvin )  [static]
```

Function to convert kelvin to celsius.

**Parameters**

| | |
|---|---|
| *kelvin* | -> The temperature in kelvin. |

**Returns**

float -> The temperature in celsius.

#### 6.1.1.16 pascalToAtm()

```
float CalcModuleInternals::pascalToAtm (
            float pascal )  [static]
```

Function to convert pascal to atm.

**Parameters**

| | |
|---|---|
| *pascal* | -> The pressure in pascal. |

**Returns**

float -> The pressure in atm.

#### 6.1.1.17 pascalToPsi()

```
float CalcModuleInternals::pascalToPsi (
            float pascal )  [static]
```

Function to convert pascal to psi.

**Parameters**

| | |
|---|---|
| *pascal* | -> The pressure in pascal. |

**Returns**

float -> The pressure in psi.

#### 6.1.1.18 psiToPascal()

```
float CalcModuleInternals::psiToPascal (
            float psi )  [static]
```

Function to convert psi to pascal.

**Parameters**

| | |
|---|---|
| *psi* | -> The pressure in psi. |

**Returns**

float -> The pressure in pascal.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/calcModule/calcModule.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/calcModule/calcModule.cpp

## 6.2 calcModuleInternals Class Reference

Class for the calculation module internals.

`#include <calcModule.h>`

### 6.2.1 Detailed Description

Class for the calculation module internals.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/calcModule/calcModule.h

## 6.3 comModule::ComModuleInternals Class Reference

**Public Member Functions**

- EthernetCommunication & getEthernet ()
  *Get the Ethernet object.*
- I2CCommunication & getI2C ()
  *Get the I2C object.*
- SPICommunication & getSPI ()
  *Get the SPI object.*
- SerialCommunication & getSerial ()
  *Get the Serial object.*

### 6.3.1 Member Function Documentation

#### 6.3.1.1 getEthernet()

```
EthernetCommunication & ComModuleInternals::getEthernet ( )
```

Get the Ethernet object.

**Returns**

EthernetCommunication&

#### 6.3.1.2 getI2C()

```
I2CCommunication & ComModuleInternals::getI2C ( )
```

Get the I2C object.

**Returns**

I2CCommunication&

#### 6.3.1.3 getSerial()

```
SerialCommunication & ComModuleInternals::getSerial ( )
```

Get the Serial object.

**Returns**

SerialCommunication&

#### 6.3.1.4 getSPI()

```
SPICommunication & ComModuleInternals::getSPI ( )
```

Get the SPI object.

**Returns**

SPICommunication&

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/comModule.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/comModule.cpp

## 6.4 comModuleInternals Class Reference

Class for the communication module internals.

`#include <comModule.h>`

### 6.4.1 Detailed Description

Class for the communication module internals.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/comModule.h

## 6.5 timeModule::DateTimeStruct Struct Reference

Struct to hold the date and time.

`#include <timeModule.h>`

#### Public Attributes

- int **year**
- int **month**
- int **day**
- int **hour**
- int **minute**
- int **second**

### 6.5.1 Detailed Description

Struct to hold the date and time.

The documentation for this struct was generated from the following file:

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/timeModule/timeModule.h

## 6.6 comModule::EthernetCommunication Class Reference

Class to handle Ethernet communication.

`#include <ETHH.h>`

### Public Member Functions

- void beginEthernet (uint8_t *macAddress, IPAddress ip)

  *Function to initialize the Ethernet communication.*
- void sendEthernetData (const char *endpoint, const char *data)

  *Function to send data over Ethernet.*
- void receiveEthernetData (char *buffer, size_t length)

  *Function to receive data over Ethernet.*
- void **handleEthernetClient** ()

  *Function to handle the Ethernet client.*
- String getRequestedEndpoint ()

  *Function to get the requested endpoint.*
- String getSpecificEndpoint (const String &jsonBody)

  *Function to get the specific endpoint.*
- void sendJsonResponse (const String &jsonBody)

  *Function to send the json response with the measurment data.*
- EthernetClient & getClient ()

  *Get the currently active Ethernet client.*
- bool isInitialized () const

  *Function to check if the Ethernet communication is initialized.*
- bool getSendDataFlag () const

  *Function to get the current status of the flag.*
- void setSendDataFlag (bool flag)

  *Function to get the current status of the flag.*
- void setCompound (Compound1 id, int index, String value)

  *Function to set a compound command for the valve uC Slave (Compound1)*
- void setCompound (Compound2 id, int index, String value)

  *Function to set a compound command for the valve uC Slave (Compound2)*
- void setCompound (Compound3 id, int index, String value)

  *Function to set a compound command for the valve uC Slave (Compound3)*
- void setCompoundInternal (String compoundType, unsigned long id, int index, String value)

  *Function to set the Interal compound command for the valve uC Slave.*
- String getCompound (Compound1 id, int index)

  *Getter for a compound command response from the valve uC Slave (Compound1)*
- String getCompound (Compound2 id, int index)

  *Getter for a compound command response from the valve uC Slave (Compound2)*
- String getCompound (Compound3 id, int index)

  *Getter for a compound command response from the valve uC Slave (Compound3)*
- String getCompoundInternal (String compoundType, unsigned long id, int index)

  *Getter for the internal compound command response from the valve uC Slave.*
- Vector< float > getParsedCompound (Compound1 id, int index)

  *Function to get a compound command response from the valve uC Slave (Compound1)*
- Vector< float > getParsedCompound (Compound2 id, int index)

  *Function to get a compound command response from the valve uC Slave (Compound2)*
- Vector< float > getParsedCompound (Compound3 id, int index)

  *Function to get a compound command response from the valve uC Slave (Compound3)*
- Vector< float > parseCompoundResponse (String response)

  *Function to parse a compound response into a vector (Compound1)*
- void setParameter (Compound2 id, String value)

  *Setter for a parameter from the VAT slave.*
- String getParameter (Compound2 id)

  *Getter for a parameter from the VAT slave.*
- void sendCommand (String command)

  *Helper function to send a command to the VAT slave controller.*

### 6.6.1 Detailed Description

Class to handle Ethernet communication.

### 6.6.2 Member Function Documentation

#### 6.6.2.1 beginEthernet()

```
void EthernetCommunication::beginEthernet (
            uint8_t * macAddress,
            IPAddress ip )
```

Function to initialize the Ethernet communication.

**Parameters**

| | |
|---|---|
| *macAddress* | -> The MAC address to use for the Ethernet communication |
| *ip* | -> The IP address to use for the Ethernet communication |

#### 6.6.2.2 getClient()

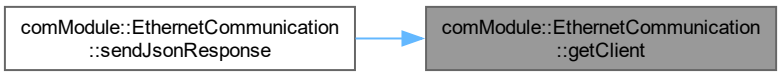
```
EthernetClient & EthernetCommunication::getClient ( )
```

Get the currently active Ethernet client.

**Returns**

EthernetClient& , Reference to the active Ethernet client

Here is the caller graph for this function:




#### 6.6.2.3 getCompound() [1/3]

```
String EthernetCommunication::getCompound (
            Compound1 id,
            int index )
```

Getter for a compound command response from the valve uC Slave (Compound1)

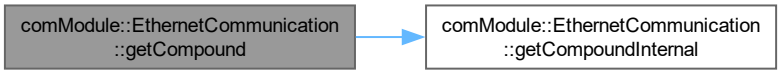
**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound1 |
| *index* | -> Index of the command |

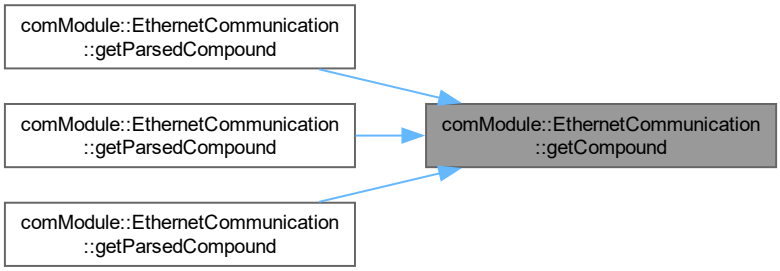
**Returns**

String -> Response from the valve uC slave

Here is the call graph for this function:




Here is the caller graph for this function:




#### 6.6.2.4 getCompound() [2/3]

```
String EthernetCommunication::getCompound (
            Compound2 id,
            int index )
```

Getter for a compound command response from the valve uC Slave (Compound2)

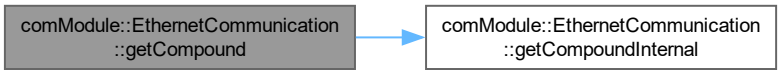
**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound2 |
| *index* | -> Index of the command |

**Returns**

String -> Response from the valve uC slave

Here is the call graph for this function:




#### 6.6.2.5 getCompound() [3/3]

```
String EthernetCommunication::getCompound (
            Compound3 id,
            int index )
```

Getter for a compound command response from the valve uC Slave (Compound3)

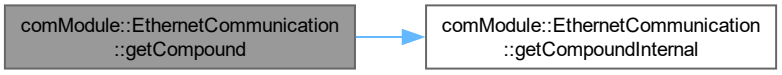
**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound3 |
| *index* | -> Index of the command |

**Returns**

String -> Response from the valve uC slave

Here is the call graph for this function:




#### 6.6.2.6 getCompoundInternal()

```
String EthernetCommunication::getCompoundInternal (
            String compoundType,
            unsigned long id,
            int index )
```

Getter for the internal compound command response from the valve uC Slave.

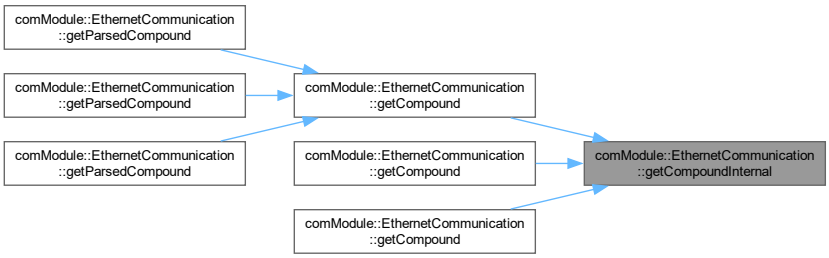
**Parameters**

| | |
|---|---|
| *compoundType* | -> The type of the compound |
| *id* | -> The ID of the compound |
| *index* | -> The index of the compound |

**Returns**

String -> Response from the valve uC slave

Here is the caller graph for this function:




### 6.6.2.7 getParameter()

```
String EthernetCommunication::getParameter (
            Compound2 id )
```

Getter for a parameter from the VAT slave.

**Parameters**

| | |
|---|---|
| *id* | -> The ID of the parameter to get |

**Returns**

-> String will return the value of the parameter as a string, otherwise an empty string or error message.

### 6.6.2.8 getParsedCompound() [1/3]

```
Vector< float > EthernetCommunication::getParsedCompound (
            Compound1 id,
            int index )
```

Function to get a compound command response from the valve uC Slave (Compound1)

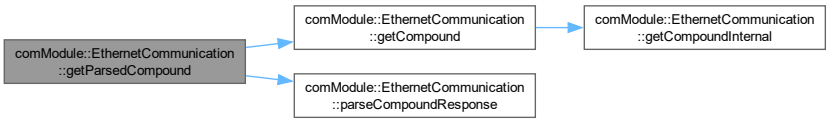
**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound1 |
| *index* | -> Index of the command |

**Returns**

Vector<float> -> Response from the valve uC slave

Here is the call graph for this function:




### 6.6.2.9 getParsedCompound() [2/3]

```
Vector< float > EthernetCommunication::getParsedCompound (
            Compound2 id,
            int index )
```

Function to get a compound command response from the valve uC Slave (Compound2)

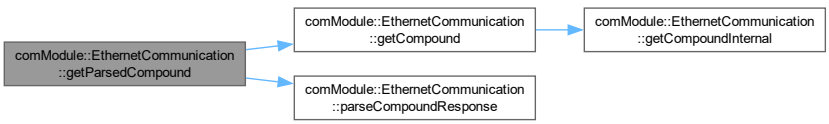
**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound1 |
| *index* | -> Index of the command |

**Returns**

Vector<float> -> Response from the valve uC slave

Here is the call graph for this function:



#### 6.6.2.10 getParsedCompound() [3/3]

```
Vector< float > EthernetCommunication::getParsedCompound (
            Compound3 id,
            int index )
```

Function to get a compound command response from the valve uC Slave (Compound3)

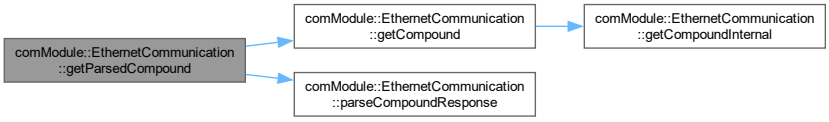
**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound1 |
| *index* | -> Index of the command |

**Returns**

Vector<float> -> Response from the valve uC slave

Here is the call graph for this function:




#### 6.6.2.11 getRequestedEndpoint()

```
String EthernetCommunication::getRequestedEndpoint ( )
```

Function to get the requested endpoint.

**Returns**

String -> The requested endpoint

#### 6.6.2.12 getSendDataFlag()

```
bool EthernetCommunication::getSendDataFlag ( ) const
```

Function to get the current status of the flag.

**Returns**

true -> if data should be sent

false -> if data should not be sent

#### 6.6.2.13 getSpecificEndpoint()

```
String EthernetCommunication::getSpecificEndpoint (
            const String & jsonBody )
```

Function to get the specific endpoint.

**Parameters**

| | |
|---|---|
| *jsonBody* | -> The json body to get the endpoint from |

**Returns**

String -> The specific endpoint

#### 6.6.2.14 isInitialized()

```
bool EthernetCommunication::isInitialized ( ) const
```

Function to check if the Ethernet communication is initialized.

**Returns**

true -> if the Ethernet communication is initialized

false -> if the Ethernet communication is not initialized

#### 6.6.2.15 parseCompoundResponse()

```
Vector< float > EthernetCommunication::parseCompoundResponse (
            String response )
```

Function to parse a compound response into a vector (Compound1)

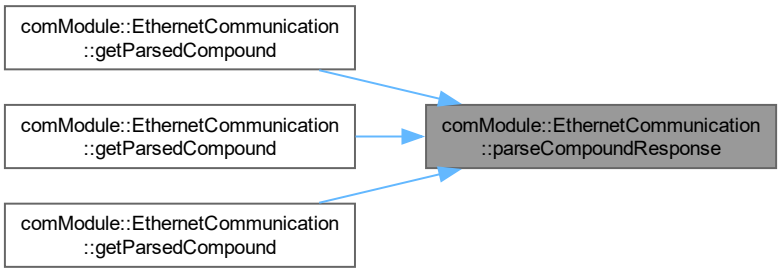
**Parameters**

| | |
|---|---|
| *response* | -> Raw response string containing IEEE-754 hex values. |

**Returns**

Vector<float> -> containing parsed float values.

Here is the caller graph for this function:



#### 6.6.2.16 receiveEthernetData()

```
void EthernetCommunication::receiveEthernetData (
            char * buffer,
            size_t length )
```

Function to receive data over Ethernet.

**Parameters**

| | |
|---|---|
| *buffer* | -> The buffer to read the data into |
| *length* | -> The length of the data to read |

#### 6.6.2.17 sendCommand()

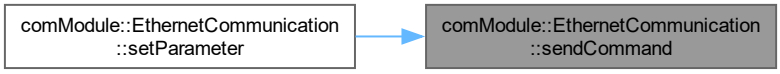
```
void EthernetCommunication::sendCommand (
            String command )
```

Helper function to send a command to the VAT slave controller.

**Parameters**

| | |
|---|---|
| *command* | -> The command to send to the VAT slave controller |

Here is the caller graph for this function:




#### 6.6.2.18 sendEthernetData()

```
void EthernetCommunication::sendEthernetData (
            const char * endpoint,
            const char * data )
```

Function to send data over Ethernet.

**Parameters**

| | |
|---|---|
| *endpoint* | -> endpoint to send data to |
| *data* | -> The data to send |

#### 6.6.2.19 sendJsonResponse()

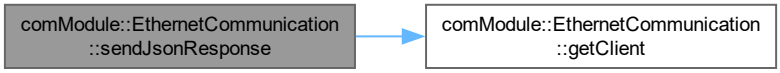
```
void EthernetCommunication::sendJsonResponse (
            const String & jsonBody )
```

Function to send the json response with the measurment data.

**Parameters**

| | |
|---|---|
| *jsonBody* | -> jsonstring with the content needed |

Here is the call graph for this function:




#### 6.6.2.20 setCompound() [1/3]

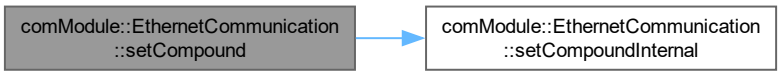
```
void EthernetCommunication::setCompound (
            Compound1 id,
            int index,
            String value )
```

Function to set a compound command for the valve uC Slave (Compound1)

**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound1 |
| *index* | -> Index of the command |
| *value* | -> Value of the command |

Here is the call graph for this function:




#### 6.6.2.21 setCompound() [2/3]

```
void EthernetCommunication::setCompound (
```

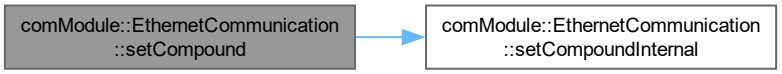
```
            Compound2 id,
            int index,
            String value )
```

Function to set a compound command for the valve uC Slave (Compound2)

**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound2 |
| *index* | -> Index of the command |
| *value* | -> Value of the command |

Here is the call graph for this function:




#### 6.6.2.22 setCompound() [3/3]

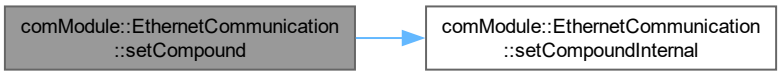
```
void EthernetCommunication::setCompound (
            Compound3 id,
            int index,
            String value )
```

Function to set a compound command for the valve uC Slave (Compound3)

**Parameters**

| | |
|---|---|
| *id* | -> Enum ID from Compound3 |
| *index* | -> Index of the command |
| *value* | -> Value of the command |

Here is the call graph for this function:




#### 6.6.2.23 setCompoundInternal()

```
void EthernetCommunication::setCompoundInternal (
```

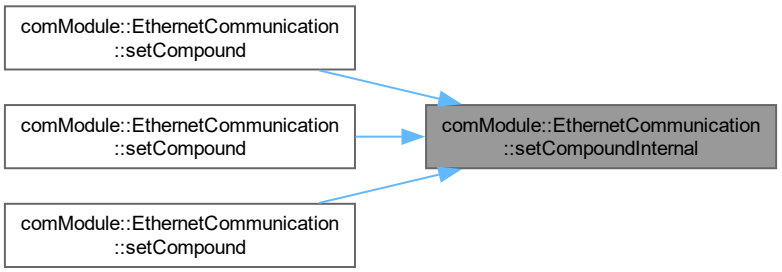
```
String compoundType,
unsigned long id,
int index,
String value )
```

Function to set the Interal compound command for the valve uC Slave.

**Parameters**

| | |
|---|---|
| *compoundType* | -> The type of the compound |
| *id* | -> The ID of the compound |
| *index* | -> The index of the compound |
| *value* | -> The value of the compound |

Here is the caller graph for this function:




#### 6.6.2.24 setParameter()

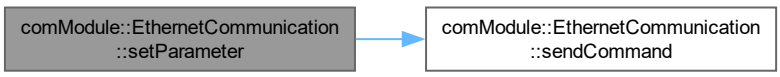
```
void EthernetCommunication::setParameter (
            Compound2 id,
            String value )
```

Setter for a parameter from the VAT slave.

**Parameters**

| | |
|---|---|
| *id* | -> The ID of the parameter to set |
| *value* | -> The value to set the parameter to |

Here is the call graph for this function:




#### 6.6.2.25 setSendDataFlag()

```
void EthernetCommunication::setSendDataFlag (
            bool flag )
```

Function to get the current status of the flag.

**Parameters**

| | |
|---|---|
| *flag* | -> set the flag to true if data sent, false otherwise |

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/ETHH/ETHH.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/ETHH/ETHH.cpp

## 6.7 flybackModule::Flyback Class Reference

Flyback class to manage the Flyback system This class provides methods for initializing the system, configuring the timer, measuring parameters, and handling different system states such as ON, OFF, HAND, and REMOTE modes.

```
#include <flyback.h>
```

### Public Member Functions

- void **initialize** ()

  *Initialize the Flyback system This method sets up the pins and prepares the system for operation.*
- void **deinitialize** ()

  *denitialize the Flyback System This method shuts down the pins and prepares graceful restart.*
- bool isInitialized () const

  *Get the state of the Flyback system.*
- bool getTimerState ()

  *Returns the state of the timer.*
- void setTimerState (bool state)

  *Sets the state of the timer.*
- SwitchStates getSwitchState ()

  *Get the state of the Main-Switch.*

- Measurement measure ()

  *Measures the voltage, current, power, digitalValue and frequency of the system.*
- void **run** ()

  *Executes logic depending on which Main-Switch state is active.*
- void setExternFrequency (uint32_t frequency)

  *Function to get the desired Frequency from HAS.*
- uint32_t **getExternFrequency** ()

  *Getter Function to get the Frequency.*
- void setExternDutyCycle (int dutyCycle)

  *Function to get the desired DutyCycle from HAS.*
- int **getExternDutyCycle** ()

  *Getter Function to get the DutyCycle ∗.*

## 6.7.1 Detailed Description

Flyback class to manage the Flyback system This class provides methods for initializing the system, configuring the timer, measuring parameters, and handling different system states such as ON, OFF, HAND, and REMOTE modes.

## 6.7.2 Member Function Documentation

### 6.7.2.1 getSwitchState()

```
SwitchStates Flyback::getSwitchState ( )
```

Get the state of the Main-Switch.

**Returns**

Enum -> The current state of the Main-Switch (e.g., "HV_Module OFF", "HV_Module MANUAL", "HV_Module REMOTE", "Invalid Switch Position")

### 6.7.2.2 getTimerState()

```
bool Flyback::getTimerState ( )
```

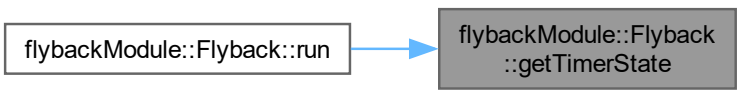
Returns the state of the timer.

**Returns**

true -> if the timer is initialized

false -> if the timer is not initialized

Here is the caller graph for this function:



#### 6.7.2.3 isInitialized()

```
bool Flyback::isInitialized ( ) const
```

Get the state of the Flyback system.

**Returns**

true -> Flyback is initialized

false -> Flyback is not initialized

#### 6.7.2.4 measure()

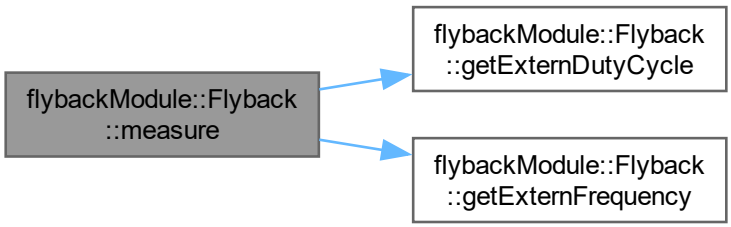
```
Measurement Flyback::measure ( )
```

Measures the voltage, current, power, digitalValue and frequency of the system.

**Returns**

Measurement -> A Measurement object containing voltage, current, and power

Here is the call graph for this function:




#### 6.7.2.5 setExternDutyCycle()

```
void Flyback::setExternDutyCycle (
            int dutyCycle )
```

Function to get the desired DutyCycle from HAS.

**Parameters**

| | |
|---|---|
| *dutyCycle* | -> the dutyCycle to change |

#### 6.7.2.6 setExternFrequency()

```
void Flyback::setExternFrequency (
            uint32_t frequency )
```

Function to get the desired Frequency from HAS.

**Parameters**

| | |
|---|---|
| *frequency* | -> the frequency to change |

#### 6.7.2.7 setTimerState()

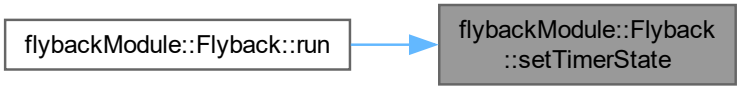
```
void Flyback::setTimerState (
            bool state )
```

Sets the state of the timer.

**Parameters**

| | |
|---|---|
| *state* | -> If true, the timer will be enabled, otherwise disabled |

Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/flyback/flyback.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/flyback/flyback.cpp

## 6.8 comModule::I2CCommunication Class Reference

Class to handle I2C communication.

```
#include <I2CC.h>
```

**Public Member Functions**

- void beginI2C (uint8_t address)

  *Function to initialize the I2C communication.*
- void **endI2C** ()

  *Function to end the I2C communication.*
- void i2cWrite (uint8_t deviceAddress, uint8_t *data, size_t length)

  *Function to write data to the I2C device.*
- size_t i2cRead (uint8_t deviceAddress, uint8_t *buffer, size_t length)

  *Function to read data from the I2C device.*
- bool isInitialized () const

  *Function to check if the I2C communication is initialized.*

## 6.8.1 Detailed Description

Class to handle I2C communication.

## 6.8.2 Member Function Documentation

### 6.8.2.1 beginI2C()

```
void I2CCommunication::beginI2C (
            uint8_t address )
```

Function to initialize the I2C communication.

**Parameters**

| | |
|---|---|
| *address* | -> The address of the I2C device |

### 6.8.2.2 i2cRead()

```
size_t I2CCommunication::i2cRead (
            uint8_t deviceAddress,
            uint8_t * buffer,
            size_t length )
```

Function to read data from the I2C device.

**Parameters**

| | |
|---|---|
| *deviceAddress* | -> The address of the I2C device |
| *buffer* | -> The buffer to read the data into |
| *length* | -> The length of the data to read |

**Returns**

size_t -> The number of bytes read

#### 6.8.2.3 i2cWrite()

```
void I2CCommunication::i2cWrite (
            uint8_t deviceAddress,
            uint8_t * data,
            size_t length )
```

Function to write data to the I2C device.

**Parameters**

| | |
|---|---|
| *deviceAddress* | -> The address of the I2C device |
| *data* | -> The data to write |
| *length* | -> The length of the data |

#### 6.8.2.4 isInitialized()

```
bool I2CCommunication::isInitialized ( ) const
```

Function to check if the I2C communication is initialized.

**Returns**

true -> if the I2C communication is initialized

false -> if the I2C communication is not initialized

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/I2CC/I2CC.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/I2CC/I2CC.cpp

## 6.9 jsonModule::JsonModuleInternals Class Reference

### Public Member Functions

- void createJson (const char *key, const char *value)

  *Create a Json object with a key and a value.*
- void createJsonFloat (const char *key, float value)

  *Create a Json Float object.*
- void createJsonInt (const char *key, int value)

  *Create a Json Int object.*
- void createJsonString (const char *key, String &value)

  *Create a Json String object.*
- void createJsonStringConst (const char *key, const String &value)

*Create a Json String Const object.*

- void **sendJsonSerial** ()

  *Function to send the Json object over the Serial connection.*

- void sendJsonEthernet (const char *endpoint)

  *Function to send the Json object over the Ethernet connection.*

- String getJsonString () const

  *Get the Json String object.*

- std::map< String, float > mapJsonToDoubles (const String &rawJson)

  *Map the Json object to a map of Strings and floats.*

- void **clearJson** ()

  *Clear the Json object.*

- void **printJsonDocMemory** ()

  *Prints information about the Json object.*

**Public Attributes**

- size_t **jsonBuffer**

## 6.9.1 Member Function Documentation

### 6.9.1.1 createJson()

```
void JsonModuleInternals::createJson (
            const char * key,
            const char * value )
```

Create a Json object with a key and a value.

**Parameters**

| | |
|---|---|
| *key* | -> The key of the Json object |
| *value* | -> The value of the Json object |

### 6.9.1.2 createJsonFloat()

```
void JsonModuleInternals::createJsonFloat (
            const char * key,
            float value )
```

Create a Json Float object.

**Parameters**

| | |
|---|---|
| *key* | -> The key of the Json object |
| *value* | -> The value of the Json object |

#### 6.9.1.3 createJsonInt()

```
void JsonModuleInternals::createJsonInt (
            const char * key,
            int value )
```

Create a Json Int object.

**Parameters**

| | |
|---|---|
| *key* | -> The key of the Json object |
| *value* | -> The value of the Json object |

#### 6.9.1.4 createJsonString()

```
void JsonModuleInternals::createJsonString (
            const char * key,
            String & value )
```

Create a Json String object.

**Parameters**

| | |
|---|---|
| *key* | -> The key of the Json object |
| *value* | -> The value of the Json object |

#### 6.9.1.5 createJsonStringConst()

```
void JsonModuleInternals::createJsonStringConst (
            const char * key,
            const String & value )
```

Create a Json String Const object.

**Parameters**

| | |
|---|---|
| *key* | -> The key of the Json object |
| *value* | -> The value of the Json object |

#### 6.9.1.6 getJsonString()

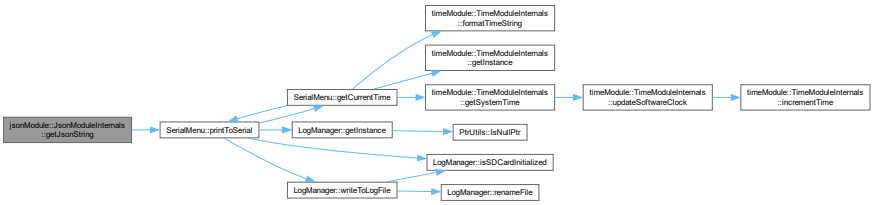
```
String JsonModuleInternals::getJsonString ( ) const
```

Get the Json String object.

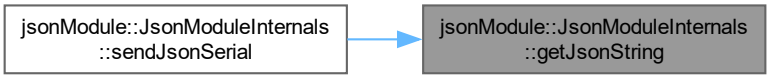
**Returns**

String -> The Json String object

Here is the call graph for this function:




Here is the caller graph for this function:




#### 6.9.1.7 mapJsonToDoubles()

```
std::map< String, float > JsonModuleInternals::mapJsonToDoubles (
            const String & rawJson )
```

Map the Json object to a map of Strings and floats.

https://github.com/mike-matera/ArduinoSTL/issues/84

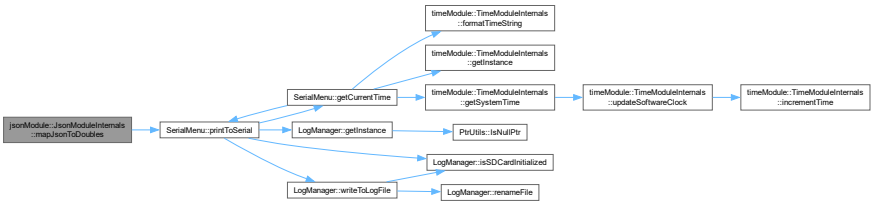
**Parameters**

| | |
|---|---|
| *rawJson* | -> The raw Json object |

**Returns**

std::map<String, float> -> The mapped Json object

Here is the call graph for this function:




#### 6.9.1.8 sendJsonEthernet()

```
void jsonModule::JsonModuleInternals::sendJsonEthernet (
            const char * endpoint )
```

Function to send the Json object over the Ethernet connection.

**Parameters**

| | |
|---|---|
| *endpoint* | -> The endpoint to send the Json object to |

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/jsonModule/jsonModule.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/jsonModule/jsonModule.cpp

## 6.10 jsonModuleInternals Class Reference

Class for the JSON module internals.

```
#include <jsonModule.h>
```

### 6.10.1 Detailed Description

Class for the JSON module internals.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/jsonModule/jsonModule.h

## 6.11 LockerBase Class Reference

Base class for the locker system.

`#include <lockerBase.h>`

### Public Member Functions

- locker::ScopedLock lockEthernetScoped ()
- locker::ScopedLock lockTemperatureScoped ()
- locker::ScopedLock lockSerialScoped ()

### 6.11.1 Detailed Description

Base class for the locker system.

### 6.11.2 Member Function Documentation

#### 6.11.2.1 lockEthernetScoped()

```
locker::ScopedLock LockerBase::lockEthernetScoped ( )  [inline]
```

**Returns**

locker::ScopedLock

#### 6.11.2.2 lockSerialScoped()

```
locker::ScopedLock LockerBase::lockSerialScoped ( )  [inline]
```

**Returns**

locker::ScopedLock

#### 6.11.2.3 lockTemperatureScoped()

```
locker::ScopedLock LockerBase::lockTemperatureScoped ( )  [inline]
```

**Returns**

locker::ScopedLock

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/lockerBase/lockerBase.h

# 6.12 LogManager Class Reference

### Public Member Functions

- void initSDCard (int cs)

  *Function to initialize the SD card.*
- void **shutdownSDCard** ()

  *Function to shut down the SD card.*
- void **flushLogs** ()

  *Function to flush the current Logs in special cases.*
- bool isSDCardInitialized () const

  *Function to check if the SD card is initialized.*
- void setLogFileName (const String &fileName)

  *Set the Log File Name object.*
- bool writeToLogFile (const String &logMessage)

  *Function to write a log message to the log file.*
- void renameFile (const String &oldName, const String &newName)

  *Function to rename the currently written to file.*

### Static Public Member Functions

- static LogManager * getInstance ()

  *Get the Instance object.*
- static String getCurrentTime ()

  *Getter for the current time.*

## 6.12.1 Member Function Documentation

### 6.12.1.1 getCurrentTime()

```
String LogManager::getCurrentTime ( )  [static]
```

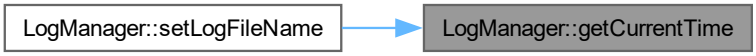
Getter for the current time.

**Returns**

The current time as a String

Here is the call graph for this function:


Here is the caller graph for this function:



#### 6.12.1.2 getInstance()

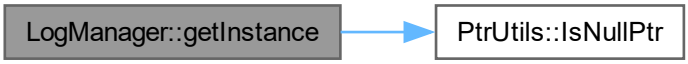
```
LogManager * LogManager::getInstance ( )  [static]
```

Get the Instance object.

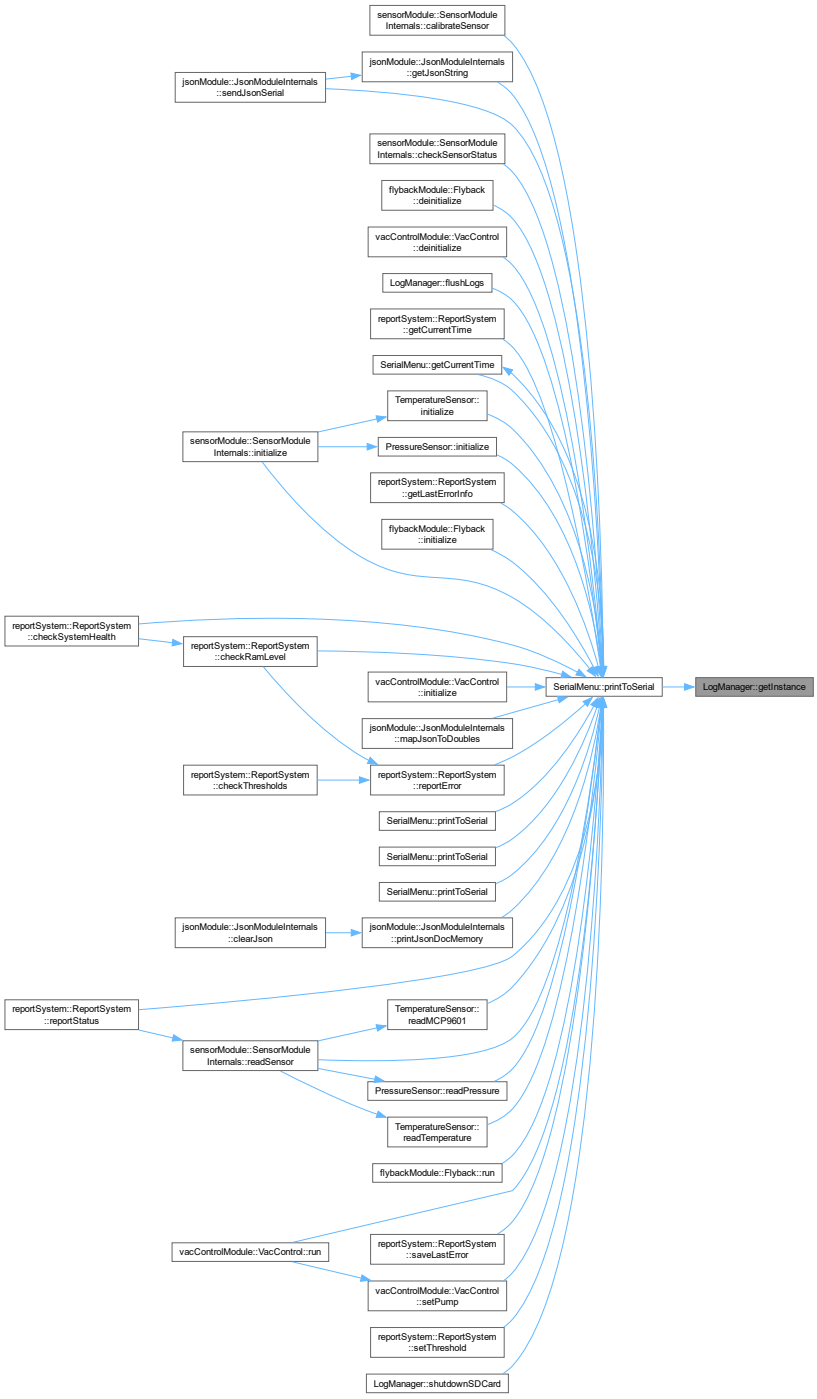
**Returns**

LogManager*

Here is the call graph for this function:



Here is the caller graph for this function:




### 6.12.1.3 initSDCard()

```
void LogManager::initSDCard (
            int cs )
```

Function to initialize the SD card.

**Parameters**

| | |
|---|---|
| *cs* | -> The chip select pin for the SD card. |

#### 6.12.1.4 isSDCardInitialized()

```
bool LogManager::isSDCardInitialized ( ) const
```

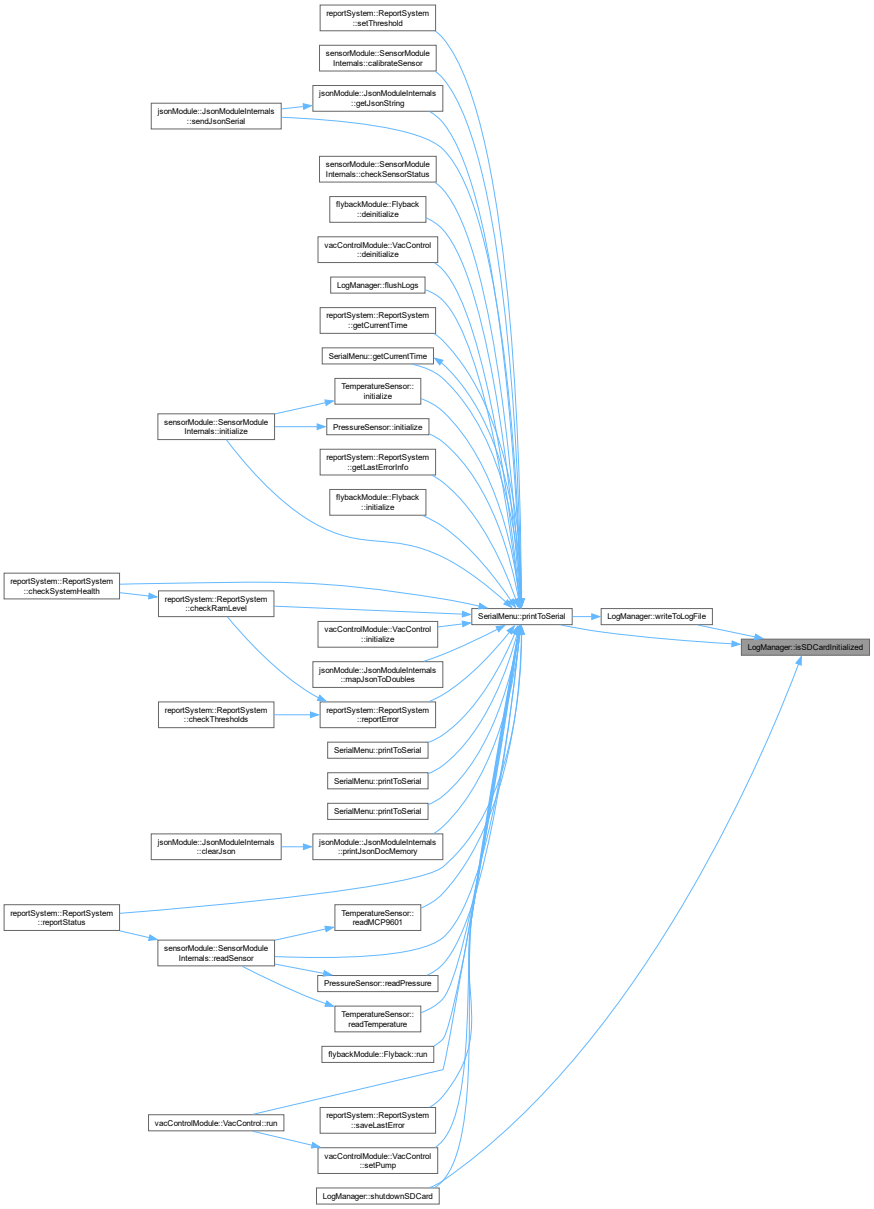
Function to check if the SD card is initialized.

**Returns**

true -> if the SD card is initialized

false -> if the SD card is not initialized

Here is the caller graph for this function:



#### 6.12.1.5 renameFile()

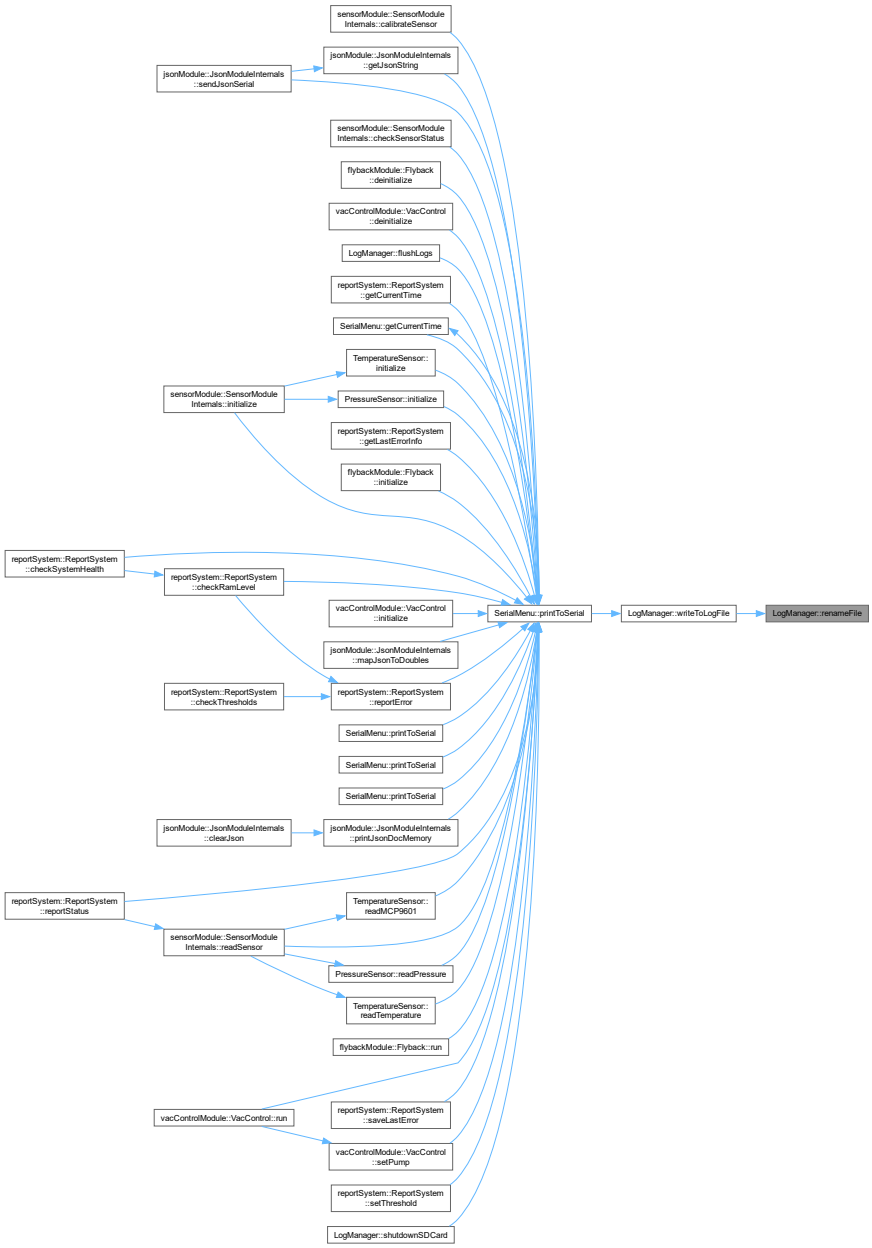
```
void LogManager::renameFile (
            const String & oldName,
            const String & newName )
```

Function to rename the currently written to file.

**Parameters**

| | |
|---|---|
| *oldName* | -> This is the oldName of the file |
| *newName* | -> This is the newName of the file |

Here is the caller graph for this function:



#### 6.12.1.6 setLogFileName()

```
void LogManager::setLogFileName (
            const String & fileName )
```

Set the Log File Name object.

**Parameters**

| | |
|---|---|
| *fileName* | -> The file name to set the log file name to. |

Here is the call graph for this function:


#### 6.12.1.7 writeToLogFile()

```
bool LogManager::writeToLogFile (
            const String & logMessage )
```

Function to write a log message to the log file.

**Parameters**

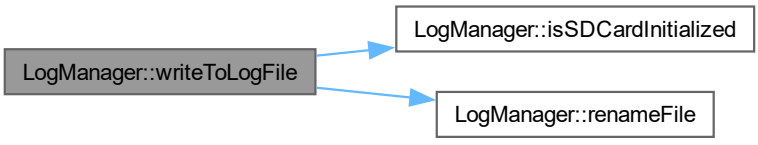
| | |
|---|---|
| *logMessage* | -> The log message to write to the log file. |

**Returns**

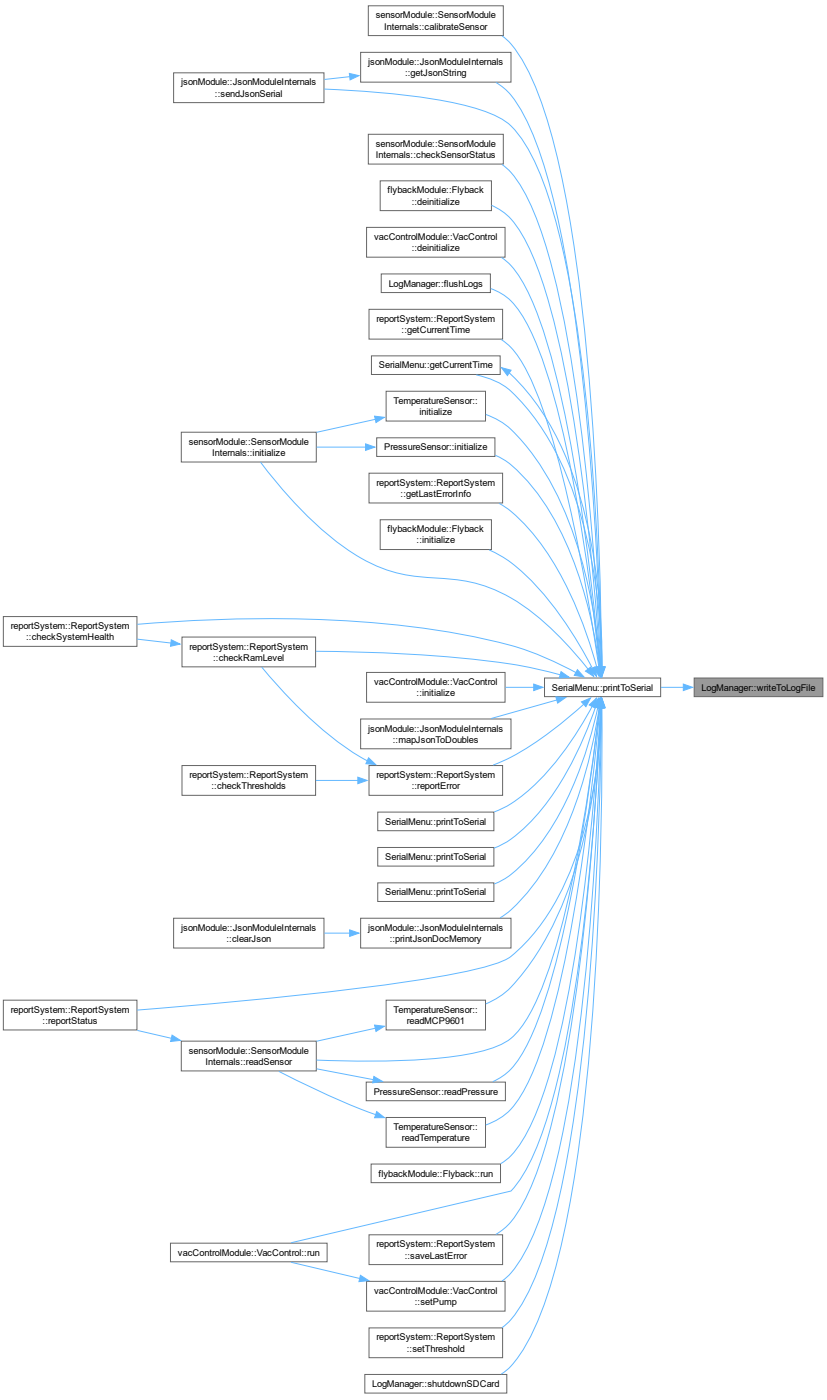
true -> if the log message was written successfully

false -> if the log message was not written successfully

Here is the call graph for this function:



Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/logManager/logManager.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/logManager/logManager.cpp

## 6.13 LogMapper Class Reference

Class which handle the printed log messages, maps aka parses them and saves them to the SD card.

`#include <logManager.h>`

### 6.13.1 Detailed Description

Class which handle the printed log messages, maps aka parses them and saves them to the SD card.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/logManager/logManager.h

## 6.14 flybackModule::Measurement Struct Reference

Structure to store the measured values of the system This structure holds the voltage, current, power, frequency and dutycycle values measured from the system.

`#include <flyback.h>`

#### Public Attributes

- float **voltage**
- float **current**
- float **power**
- int **digitalFreqValue**
- int **digitalDutyValue**
- int **dutyCycle**
- uint32_t **frequency**

### 6.14.1 Detailed Description

Structure to store the measured values of the system This structure holds the voltage, current, power, frequency and dutycycle values measured from the system.

The documentation for this struct was generated from the following file:

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/flyback/flyback.h

## 6.15 Measurement Struct Reference

Structure to store the measured values of the system This structure holds the pressure values measured from the system.

`#include <vacControl.h>`

### 6.15.1 Detailed Description

Structure to store the measured values of the system This structure holds the pressure values measured from the system.

The documentation for this struct was generated from the following file:

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/vacControl/vacControl.h

## 6.16 MenuItem Struct Reference

Serial menu structure.

`#include <serialMenu.h>`

#### Public Attributes

- const char * **label**
- char **key**
- void(* **callback** )()

### 6.16.1 Detailed Description

Serial menu structure.

The documentation for this struct was generated from the following file:

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/serialMenu/serialMenu.h

## 6.17 Outputlevel Class Reference

Enum Class for the differnet Outputlevels.

`#include <serialMenu.h>`

### 6.17.1 Detailed Description

Enum Class for the differnet Outputlevels.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/serialMenu/serialMenu.h

## 6.18 PointerWrapper< T > Class Template Reference

Tempalte class for wrapping a pointer.

`#include <ptrUtils.h>`

### Public Member Functions

- **PointerWrapper** (T *p=nullptr)
- T * get () const

  *Function to get the pointer.*
- T * release ()

  *Function to release the pointer.*
- void reset (T *p=nullptr)

  *Function to reset the pointer.*
- T & operator* ()

  *Operator to dereference the pointer.*
- T * operator-> ()

  *Operator to access the pointer.*

### 6.18.1 Detailed Description

**template<typename T>**
**class PointerWrapper< T >**

Tempalte class for wrapping a pointer.

**Template Parameters**

| | |
|---|---|
| *T* | |

### 6.18.2 Member Function Documentation

#### 6.18.2.1 get()

```
template<typename T >
T * PointerWrapper< T >::get ( ) const  [inline]
```

Function to get the pointer.

**Returns**

T* -> The pointer.

#### 6.18.2.2 operator*()

```
template<typename T >
T & PointerWrapper< T >::operator* ( )  [inline]
```

Operator to dereference the pointer.

**Returns**

T& -> The dereferenced pointer.

#### 6.18.2.3 operator->()

```
template<typename T >
T * PointerWrapper< T >::operator-> ( )  [inline]
```

Operator to access the pointer.

**Returns**

T* -> The pointer.

#### 6.18.2.4 release()

```
template<typename T >
T * PointerWrapper< T >::release ( )  [inline]
```

Function to release the pointer.

**Returns**

T* -> The released pointer.

#### 6.18.2.5 reset()

```
template<typename T >
void PointerWrapper< T >::reset (
            T * p = nullptr )  [inline]
```

Function to reset the pointer.

**Parameters**

| | |
|---|---|
| *p* | -> The pointer to reset to. |

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/ptrUtils/ptrUtils.h

## 6.19 vacControlModule::Pressure Struct Reference

### Public Attributes

- float **pressure**

The documentation for this struct was generated from the following file:

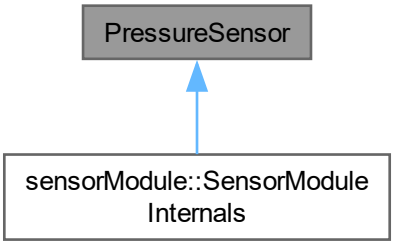
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/vacControl/vacControl.h

## 6.20 PressureSensor Class Reference

Pressure sensor class.

`#include <pressure.h>`

Inheritance diagram for PressureSensor:




### Public Member Functions

- void **initialize** ()

  *Function to initialize the pressure sensor.*
- float readPressure ()

  *Function to read the pressure from the sensor.*
- bool isInitialized () const

  *Function to check if the pressure sensor is initialized.*

### 6.20.1 Detailed Description

Pressure sensor class.

## 6.20.2 Member Function Documentation

### 6.20.2.1 isInitialized()

```
bool PressureSensor::isInitialized ( ) const
```

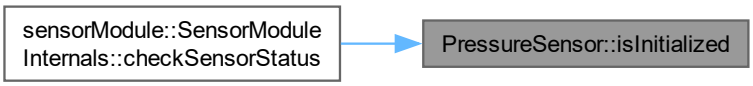
Function to check if the pressure sensor is initialized.

**Returns**

true -> if the pressure sensor is initialized

false -> if the pressure sensor is not initialized

Here is the caller graph for this function:




### 6.20.2.2 readPressure()

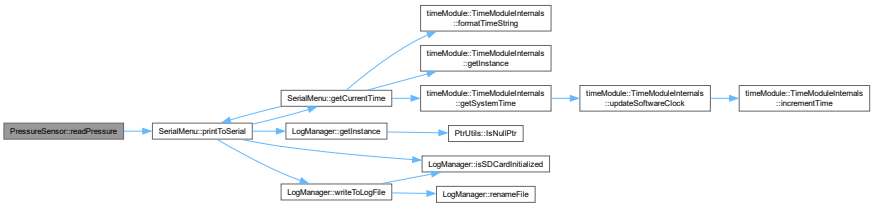
```
float PressureSensor::readPressure ( )
```

Function to read the pressure from the sensor.

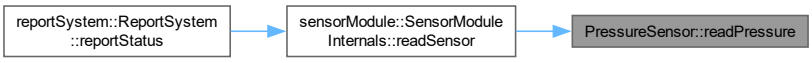
**Returns**

float -> The pressure value.

Here is the call graph for this function:




Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/pressure/pressure.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/pressure/pressure.cpp

## 6.21 PtrUtils Class Reference

Utility class for pointer operations.

`#include <ptrUtils.h>`

### Static Public Member Functions

- template<typename T >
  static bool IsNullPtr (T *ptr)
- template<typename T >
  static bool IsValidPtr (T *ptr)

### 6.21.1 Detailed Description

Utility class for pointer operations.

### 6.21.2 Member Function Documentation

#### 6.21.2.1 IsNullPtr()

```
template<typename T >
static bool PtrUtils::IsNullPtr (
            T * ptr )  [inline], [static]
```

Check if a pointer is nullptr.

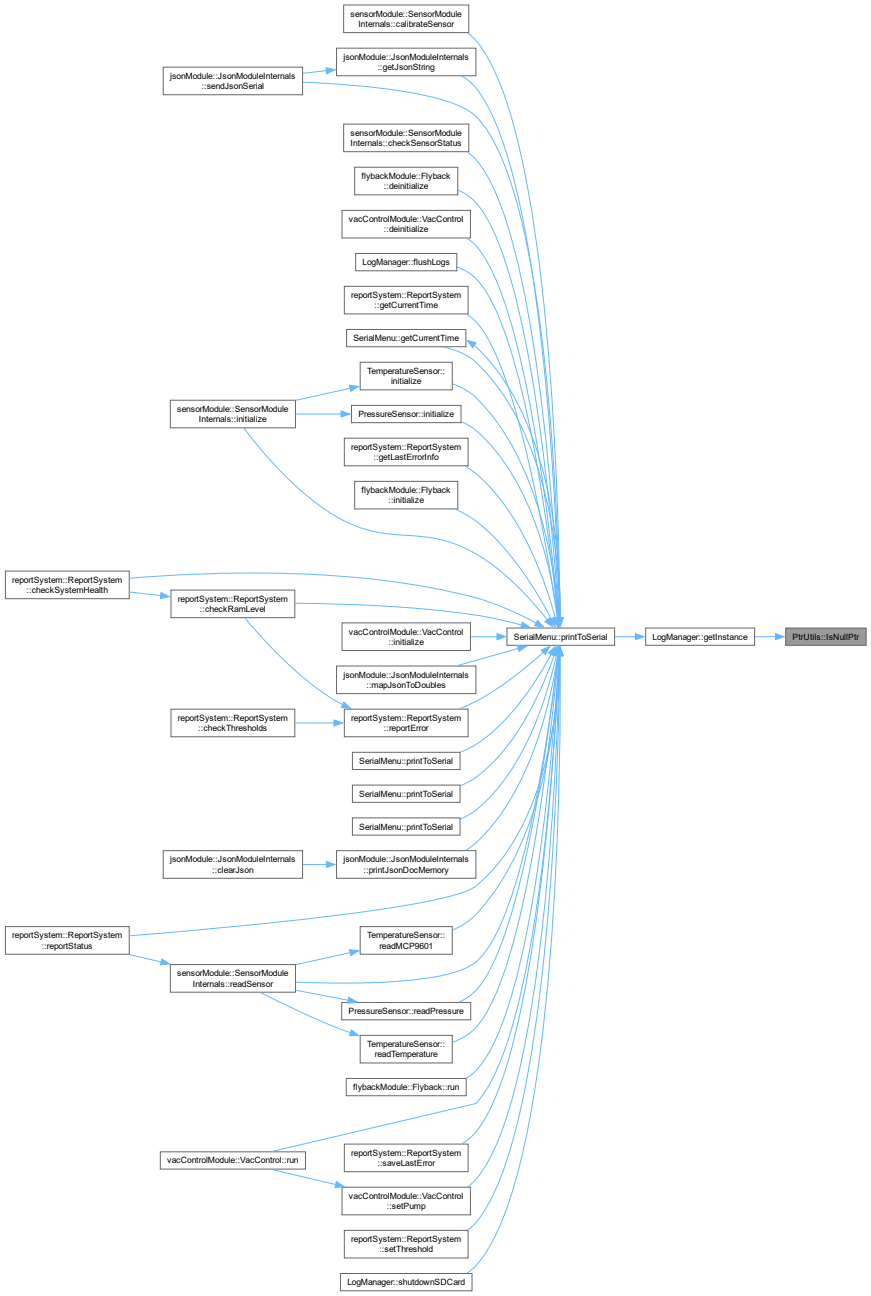
**Parameters**

| | |
|---|---|
| *ptr* | Pointer to check. |

**Returns**

true if the pointer is nullptr, false otherwise.

Here is the caller graph for this function:




### 6.21.2.2 IsValidPtr()

```
template<typename T >
static bool PtrUtils::IsValidPtr (
            T * ptr )  [inline], [static]
```

Check if a pointer is valid (not nullptr).

**Parameters**

| | |
|---|---|
| *ptr* | Pointer to check. |

**Returns**

true if the pointer is not nullptr, false otherwise.

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/ptrUtils/ptrUtils.h

## 6.22 reportSystem::ReportSystem Class Reference

Class for the report system.

`#include <reportSystem.h>`

### Public Member Functions

- void reportError (const char *errorMessage)
  *Function to log an error message.*
- bool checkSystemHealth (size_t memoryThreshold, bool checkEth, bool checkSpi, bool checkI2c, bool checkTemp, bool checkPress)
  *Function to check the system health of the uC.*
- String reportStatus (bool active)
  *Function to report the status of the system.*
- void setThreshold (float tempThreshold, float pressureThreshold)
  *Set Thresholds for the pressure and temperature sensors.*
- bool checkThresholds (float currentTemp, float currentPressure)
  *Check the thresholds for the temperature and pressure sensors.*
- String getCurrentTime ()
  *Get the Current Time of the system.*
- String getMemoryStatus ()
  *Get the Memory Status of the system.*
- String getStackDump ()
  *Get the Stack Dump of the system.*
- void **startBusyTime** ()
  *For Stack Guarding.*
- void **startIdleTime** ()
  *For Stack Guarding.*
- float getCPULoad ()
  *Getter for the CPU Load.*
- void **resetUsage** ()
  *Start the CPU Load Calculation.*
- void saveLastError (const char *error)
  *Saves last error message to EEPROM.*
- String getLastError ()
  *Get the Last Error message from EEPROM.*
- bool getLastErrorInfo ()
  *Get the Last Error message from EEPROM.*
- bool checkRamLevel (unsigned int warningThreshold, unsigned int criticalThreshold)
  *Function to check the SRAM level on the hostsystem.*

### Static Public Member Functions

- static void **initStackGuard** ()

  *Initialize the Stack Guard.*
- static bool detectStackOverflow ()

  *Detect Stack Overflow.*

## 6.22.1 Detailed Description

Class for the report system.

## 6.22.2 Member Function Documentation

### 6.22.2.1 checkRamLevel()

```
bool ReportSystem::checkRamLevel (
            unsigned int warningThreshold,
            unsigned int criticalThreshold )
```

Function to check the SRAM level on the hostsystem.

#### Parameters

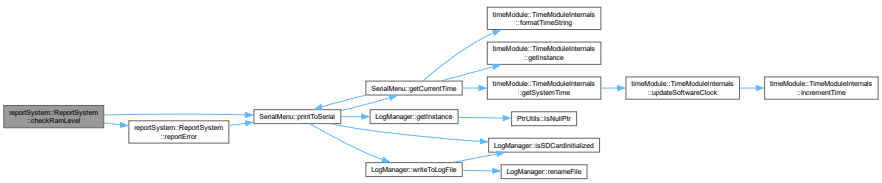
| | |
|---|---|
| *warningThreshold* | -> first warning to get |
| *criticalThreshold* | -> last warning to get |

#### Returns

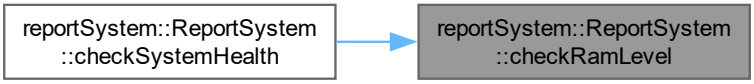
true -> if the level exceeded

false -> if the levels are withing the thresholds

Here is the call graph for this function:



Here is the caller graph for this function:




#### 6.22.2.2 checkSystemHealth()

```
bool ReportSystem::checkSystemHealth (
            size_t memoryThreshold,
            bool checkEth,
            bool checkSpi,
            bool checkI2c,
            bool checkTemp,
            bool checkPress )
```

Function to check the system health of the uC.

**Parameters**

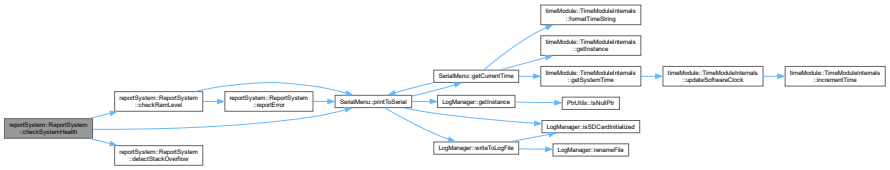
| | |
|---|---|
| *memoryThreshold* | -> The memory threshold to check |
| *checkEth* | -> Check the Ethernet connection |
| *checkSpi* | -> Check the SPI connection |
| *checkI2c* | -> Check the I2C connection |
| *checkTemp* | -> Check the temperature sensor |
| *checkPress* | -> Check the pressure sensor |

**Returns**

true -> if the system is healthy

false -> if the system is not healthy

Here is the call graph for this function:



#### 6.22.2.3 checkThresholds()

```
bool ReportSystem::checkThresholds (
            float currentTemp,
            float currentPressure )
```

Check the thresholds for the temperature and pressure sensors.

**Parameters**

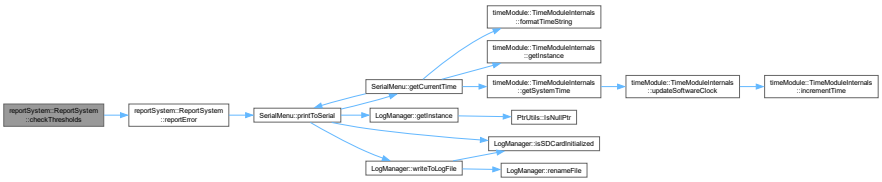
| | |
|---|---|
| *currentTemp* | -> The current temperature |
| *currentPressure* | -> The current pressure |

**Returns**

true -> if the thresholds are met

false -> if the thresholds are not met

Here is the call graph for this function:




#### 6.22.2.4 detectStackOverflow()

```
bool ReportSystem::detectStackOverflow ( )  [static]
```

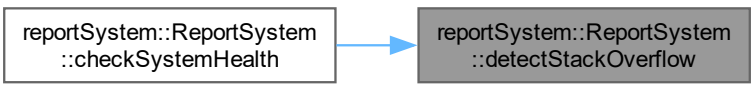
Detect Stack Overflow.

**Returns**

true -> if the stack has overflowed

false -> if the stack has not overflowed

Here is the caller graph for this function:



#### 6.22.2.5 getCPULoad()

```
float ReportSystem::getCPULoad ( )
```

Getter for the CPU Load.

**Returns**

float -> The CPU Load

#### 6.22.2.6 getCurrentTime()

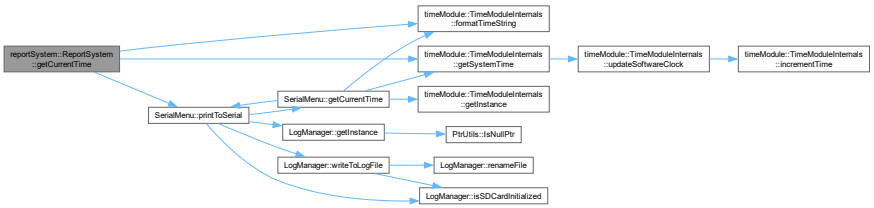
```
String ReportSystem::getCurrentTime ( )
```

Get the Current Time of the system.

**Returns**

String -> The current time

Here is the call graph for this function:




#### 6.22.2.7 getLastError()

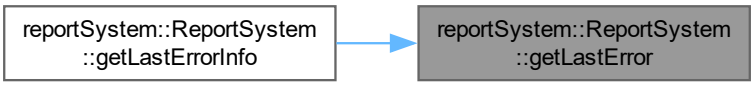
```
String ReportSystem::getLastError ( )
```

Get the Last Error message from EEPROM.

**Returns**

String -> The last error message

Here is the caller graph for this function:



#### 6.22.2.8 getLastErrorInfo()

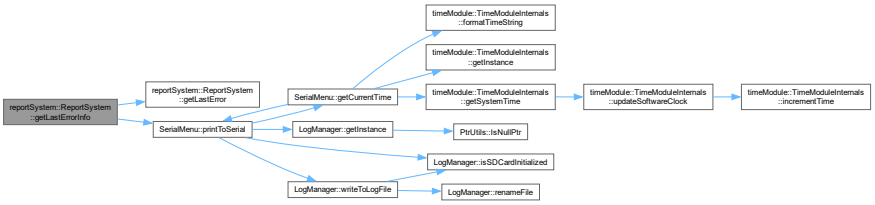
```
bool ReportSystem::getLastErrorInfo ( )
```

Get the Last Error message from EEPROM.

**Returns**

bool -> used by the Endpoint to report to HAS

Here is the call graph for this function:




#### 6.22.2.9 getMemoryStatus()

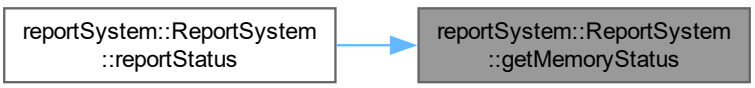
```
String ReportSystem::getMemoryStatus ( )
```

Get the Memory Status of the system.

**Returns**

String -> The memory status

Here is the caller graph for this function:




#### 6.22.2.10 getStackDump()

```
String ReportSystem::getStackDump ( )
```

Get the Stack Dump of the system.

**Returns**

String -> The stack dump

#### 6.22.2.11 reportError()

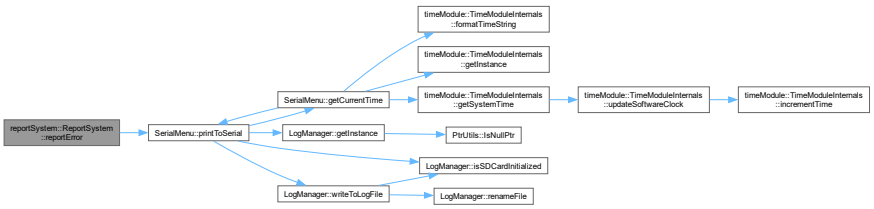
```
void ReportSystem::reportError (
            const char * errorMessage )
```

Function to log an error message.

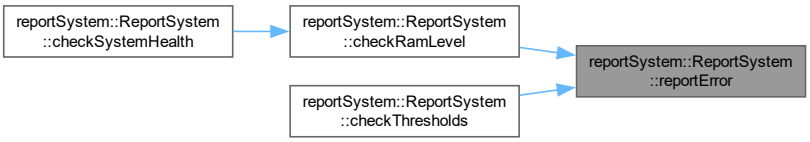
**Parameters**

| | |
|---|---|
| *errorMessage* | -> The error message to log |

Here is the call graph for this function:




Here is the caller graph for this function:




### 6.22.2.12 reportStatus()

```
String ReportSystem::reportStatus (
            bool active )
```

Function to report the status of the system.

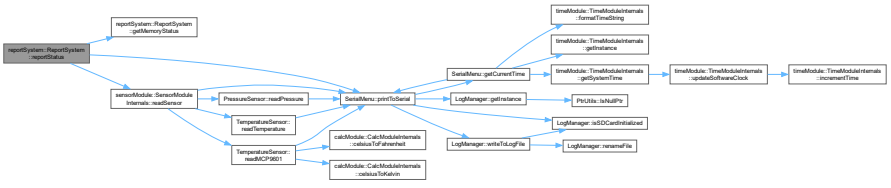
**Parameters**

| | |
|---|---|
| *active* | -> The status of the system |

**Returns**

String -> The status of the system

Here is the call graph for this function:



### 6.22.2.13 saveLastError()

```
void ReportSystem::saveLastError (
            const char * error )
```

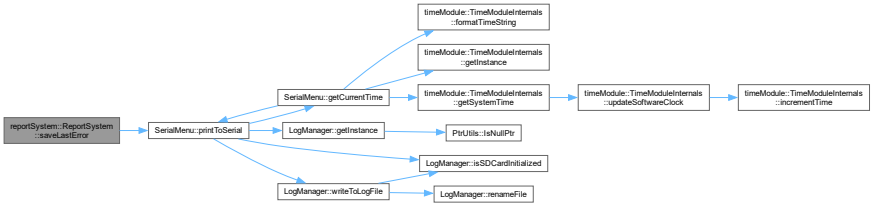
Saves last error message to EEPROM.

HINT: KEEP IN MIND ~100 000 write cycles per cell!

**Parameters**

| | |
|---|---|
| *error* | -> The error message to save |

Here is the call graph for this function:




### 6.22.2.14 setThreshold()

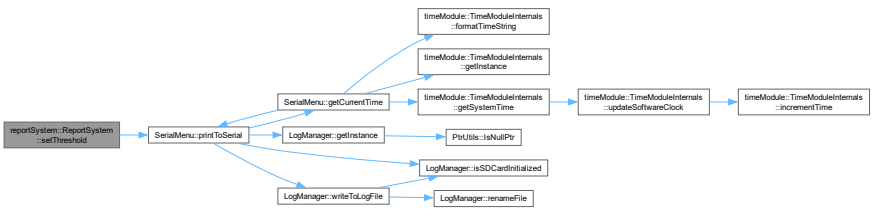
```
void ReportSystem::setThreshold (
            float tempThreshold,
            float pressureThreshold )
```

Set Thresholds for the pressure and temperature sensors.

**Parameters**

| | |
|---|---|
| *tempThreshold* | -> The temperature threshold |
| *pressureThreshold* | -> The pressure threshold |

Here is the call graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/reportSystem/reportSystem.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/reportSystem/reportSystem.cpp

## 6.23 locker::ScopedLock Class Reference

Scoped lock class for mutexes.

`#include <scopedLock.h>`

### Public Member Functions

- ScopedLock (frt::Mutex &mutex)

  *Construct a new Scoped Lock object.*
- **ScopedLock** (const ScopedLock &)=delete
- ScopedLock & **operator=** (const ScopedLock &)=delete
- ScopedLock (ScopedLock &&other) noexcept

  *Construct a new Scoped Lock object.*
- ScopedLock & **operator=** (ScopedLock &&)=delete

### 6.23.1 Detailed Description

Scoped lock class for mutexes.

### 6.23.2 Constructor & Destructor Documentation

#### 6.23.2.1 ScopedLock() [1/2]

```
locker::ScopedLock::ScopedLock (
            frt::Mutex & mutex )  [inline], [explicit]
```

Construct a new Scoped Lock object.

**Parameters**

| | |
|---|---|
| *mutex* | -> The mutex to lock |

#### 6.23.2.2 ScopedLock() [2/2]

```
locker::ScopedLock::ScopedLock (
            ScopedLock && other )  [inline], [noexcept]
```

Construct a new Scoped Lock object.

**Parameters**

| | |
|---|---|
| *other* | -> The other ScopedLock object to move from |

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/lockerBase/scopedLock.h

## 6.24 ScopedPointer< T > Class Template Reference

Template class for a Scoped Pointer.

`#include <ptrUtils.h>`

### Public Member Functions

- **ScopedPointer** (T *p=nullptr)
- T * get () const

  *Function to get the pointer.*
- T * release ()

  *Function to release the pointer.*
- void reset (T *p=nullptr)

  *Function to reset the pointer.*
- T & operator* () const

  *Operator to dereference the pointer.*
- T * operator-> () const

  *Operator to access the pointer.*

### 6.24.1 Detailed Description

**template<typename T>**
**class ScopedPointer< T >**

Template class for a Scoped Pointer.

**Template Parameters**

| | |
|---|---|
| *T* | -> The type of the pointer. |

### 6.24.2 Member Function Documentation

#### 6.24.2.1 get()

```
template<typename T >
T * ScopedPointer< T >::get ( ) const  [inline]
```

Function to get the pointer.

**Returns**

T* -> The pointer.

#### 6.24.2.2 operator*()

```
template<typename T >
T & ScopedPointer< T >::operator* ( ) const  [inline]
```

Operator to dereference the pointer.

**Returns**

T& -> The dereferenced pointer.

#### 6.24.2.3 operator->()

```
template<typename T >
T * ScopedPointer< T >::operator-> ( ) const  [inline]
```

Operator to access the pointer.

**Returns**

T* -> The pointer.

#### 6.24.2.4 release()

```
template<typename T >
T * ScopedPointer< T >::release ( )  [inline]
```

Function to release the pointer.

**Returns**

T* -> The released pointer.

#### 6.24.2.5 reset()

```
template<typename T >
void ScopedPointer< T >::reset (
            T * p = nullptr )  [inline]
```

Function to reset the pointer.

**Parameters**

| | |
|---|---|
| *p* | -> The pointer to reset to. |

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

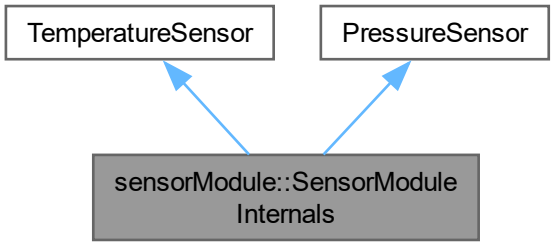
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/ptrUtils/ptrUtils.h

## 6.25 sensorModule::SensorModuleInternals Class Reference

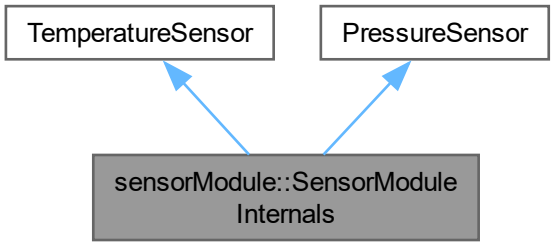
Class for the sensor module internals.

`#include <sensorModule.h>`

Inheritance diagram for sensorModule::SensorModuleInternals:




Collaboration diagram for sensorModule::SensorModuleInternals:



#### Public Member Functions

- void **initialize** ()

  *Initialize the sensors.*
- float readSensor (SensorType type)

  *Function to read the sensor.*
- bool calibrateSensor (SensorType type)

  *Function to calibrate the sensor.*
- bool checkSensorStatus (SensorType type)

  *Function to check the status of the sensor.*

### Public Member Functions inherited from TemperatureSensor

- void **initialize** ()

  *Function to initialize the temperature sensor.*
- float readTemperature ()

  *Function to read the temperature from the sensor.*
- float readMCP9601 (Units unit)

  *Function to read form specific sensor MCP9601.*
- bool isInitialized () const

  *Check if the temperature sensor is initialized.*
- uint8_t calibMCP9601 ()

  *Method to calibrate the MCP9601 sensor.*

### Public Member Functions inherited from PressureSensor

- void **initialize** ()

  *Function to initialize the pressure sensor.*
- float readPressure ()

  *Function to read the pressure from the sensor.*
- bool isInitialized () const

  *Function to check if the pressure sensor is initialized.*

## 6.25.1 Detailed Description

Class for the sensor module internals.

## 6.25.2 Member Function Documentation

### 6.25.2.1 calibrateSensor()

```
bool SensorModuleInternals::calibrateSensor (
            SensorType type )
```

Function to calibrate the sensor.

**Parameters**

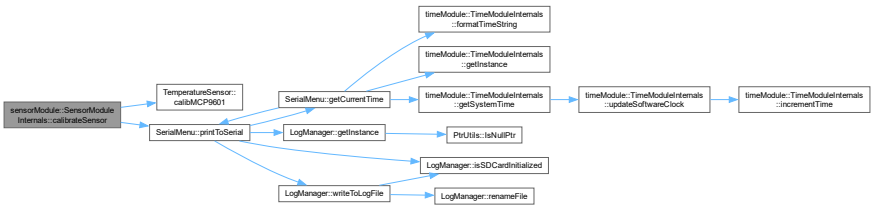
| | |
|---|---|
| *type* | -> The type of the sensor to calibrate. |

**Returns**

true -> if the sensor was calibrated successfully

false -> if the sensor was not calibrated successfully

Here is the call graph for this function:




### 6.25.2.2 checkSensorStatus()

```
bool SensorModuleInternals::checkSensorStatus (
            SensorType type )
```

Function to check the status of the sensor.

**Parameters**

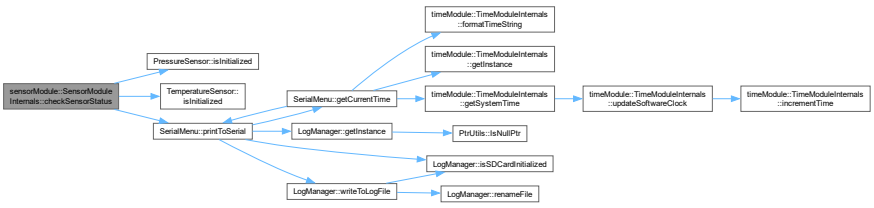
| | |
|---|---|
| *type* | -> The type of the sensor to check. |

**Returns**

true -> if the sensor is healthy

false -> if the sensor is not healthy

Here is the call graph for this function:



#### 6.25.2.3 readSensor()

```
float SensorModuleInternals::readSensor (
            SensorType type )
```

Function to read the sensor.

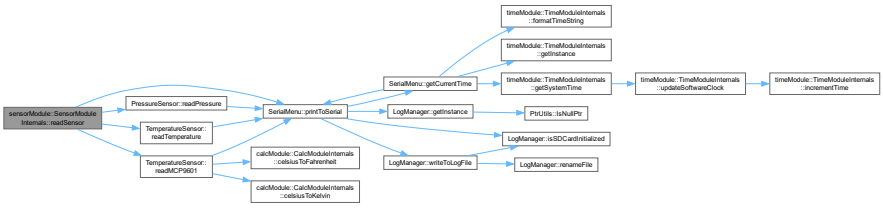
**Parameters**

| | |
|---|---|
| *type* | -> The type of the sensor to read. |

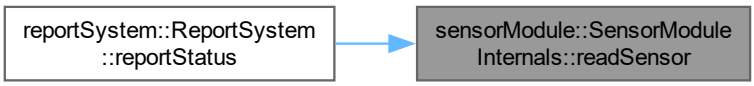
**Returns**

float -> The value of the sensor.

Here is the call graph for this function:




Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/sensorModule/sensorModule.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/sensorModule/sensorModule.cpp

## 6.26 comModule::SerialCommunication Class Reference

Class to handle Serial communication.

```
#include <SER.h>
```

**Public Member Functions**

- void beginSerial (long baudRate)

  *Function to start the serial communication.*
- void **endSerial** ()

  *Function to end the serial communication.*
- void sendSerialData (const char *data)

  *Function to end the serial communication.*
- void receiveSerialData (char *buffer, size_t length)

  *Function to receive data over serial.*
- bool isInitialized () const

  *Function to check if the serial communication is initialized.*

## 6.26.1 Detailed Description

Class to handle Serial communication.

## 6.26.2 Member Function Documentation

### 6.26.2.1 beginSerial()

```
void SerialCommunication::beginSerial (
            long baudRate )
```

Function to start the serial communication.

**Parameters**

| | |
|---|---|
| *baudRate* | -> The baud rate to use for the serial communication |

### 6.26.2.2 isInitialized()

```
bool SerialCommunication::isInitialized ( ) const
```

Function to check if the serial communication is initialized.

**Returns**

true -> if the serial communication is initialized

false -> if the serial communication is not initialized

### 6.26.2.3 receiveSerialData()

```
void SerialCommunication::receiveSerialData (
            char * buffer,
            size_t length )
```

Function to receive data over serial.

**Parameters**

| | |
|---|---|
| *buffer* | -> The buffer to read the data into |
| *length* | -> The length of the data to read |

#### 6.26.2.4 sendSerialData()

```
void SerialCommunication::sendSerialData (
            const char * data )
```

Function to end the serial communication.

**Parameters**

| | |
|---|---|
| *data* | -> The data to send |

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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/SER/SER.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/SER/SER.cpp

## 6.27 SerialMenu Class Reference

Class for the serial menu.

```
#include <serialMenu.h>
```

### Public Types

- enum class **OutputLevel** {
  **DEBUG** , **INFO** , **WARNING** , **ERROR** ,
  **CRITICAL** , **STATUS** , **PLAIN** }

### Public Member Functions

- void load (MenuItem *items, size_t size)
  *Function to load the menu items.*
- void **show** ()
  *Function to show the menu.*
- void **run** ()
  *Function to run the menu.*

### Static Public Member Functions

- static void printToSerial (OutputLevel level, const String &message, bool newLine=true, bool log↩ Message=false)

  *Function to print a message to the serial port, using mutexes, output level and new line options.*
- static void printToSerial (OutputLevel level, const __FlashStringHelper *message, bool newLine=true, bool logMessage=false)

  *Function to print a message to the serial port, using mutexes, output level and new line options.*
- static void printToSerial (const String &message, bool newLine=true, bool logMessage=false)

  *Funtion to print a message to the serial port, using mutexes, output level and new line options.*
- static void printToSerial (const __FlashStringHelper *message, bool newLine=true, bool logMessage=false)

  *Function to print a message to the serial port, using mutexes, output level and new line options.*
- static String getCurrentTime ()

  *Getter for the current time.*

## 6.27.1 Detailed Description

Class for the serial menu.

## 6.27.2 Member Function Documentation

### 6.27.2.1 getCurrentTime()

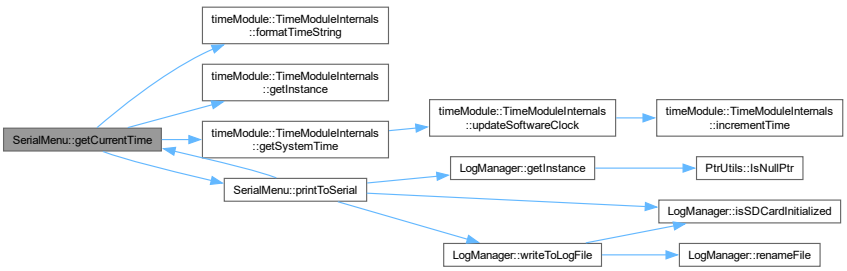
```
String SerialMenu::getCurrentTime ( )  [static]
```

Getter for the current time.

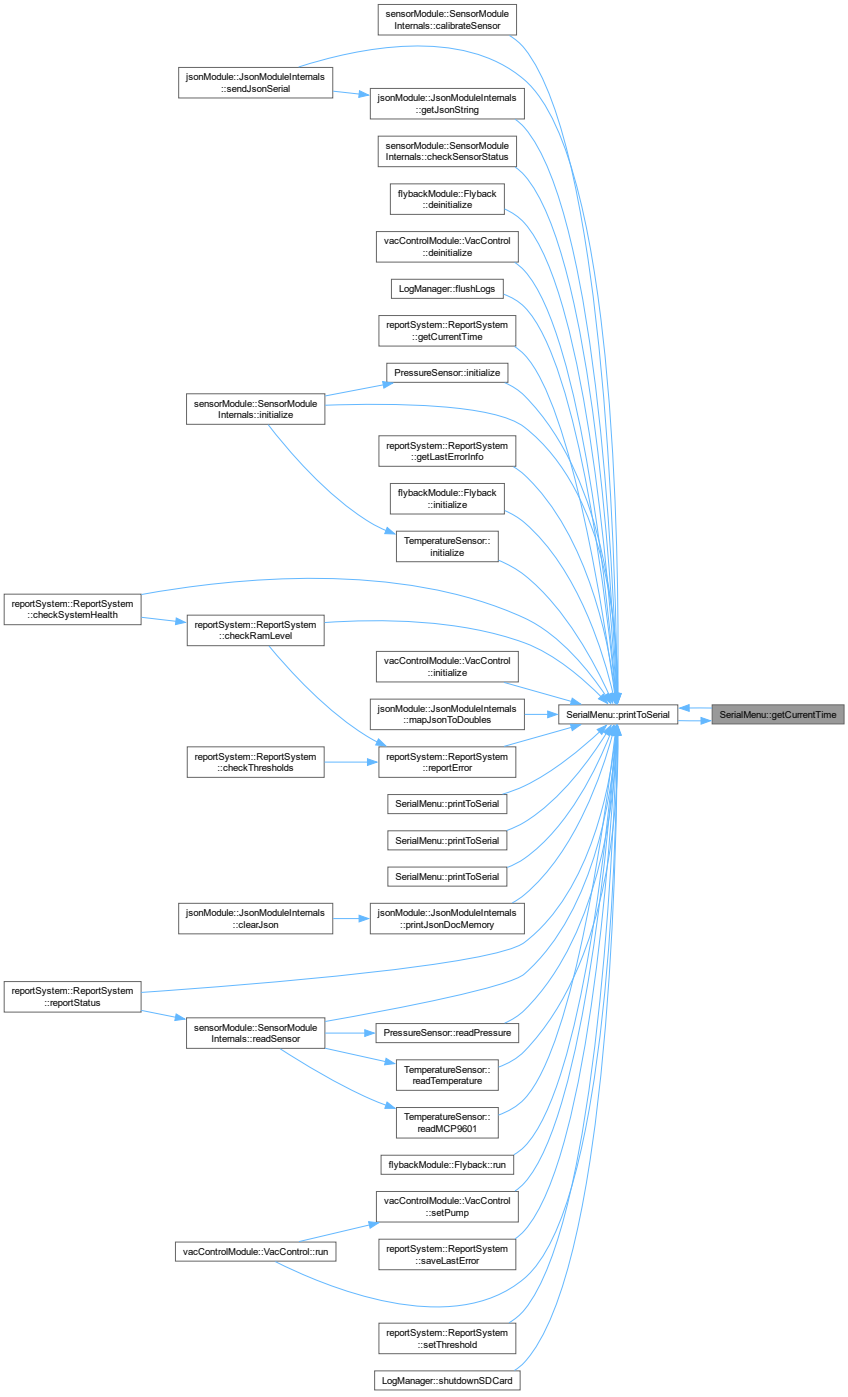
#### Returns

The current time as a String

Here is the call graph for this function:



Here is the caller graph for this function:




### 6.27.2.2 load()

```
void SerialMenu::load (
            MenuItem * items,
            size_t size )
```

Function to load the menu items.

**Parameters**

| | |
|---|---|
| *items* | -> The menu items. |
| *size* | -> The size of the menu items. |

### 6.27.2.3 printToSerial() [1/4]

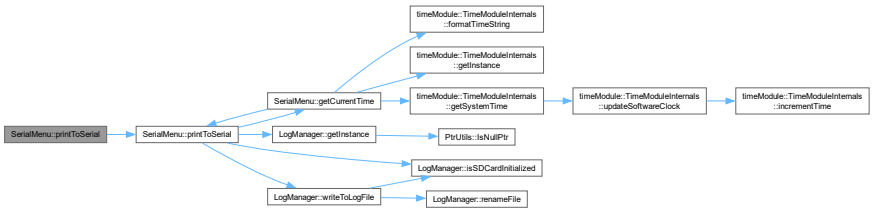
```
void SerialMenu::printToSerial (
            const __FlashStringHelper * message,
            bool newLine = true,
            bool logMessage = false )  [static]
```

Function to print a message to the serial port, using mutexes, output level and new line options.

**Parameters**

| | |
|---|---|
| *message* | -> The message to print, a __FlashStringHelper pointer. |
| *newLine* | -> Whether to add a new line at the end of the message. |

Here is the call graph for this function:




### 6.27.2.4 printToSerial() [2/4]

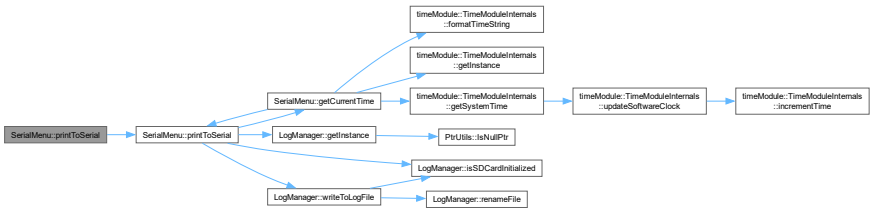
```
void SerialMenu::printToSerial (
            const String & message,
            bool newLine = true,
            bool logMessage = false )  [static]
```

Funtion to print a message to the serial port, using mutexes, output level and new line options.

**Parameters**

| | |
|---|---|
| *message* | -> The message to print, a String object. |
| *newLine* | -> Whether to add a new line at the end of the message. |

Here is the call graph for this function:




### 6.27.2.5 printToSerial() [3/4]

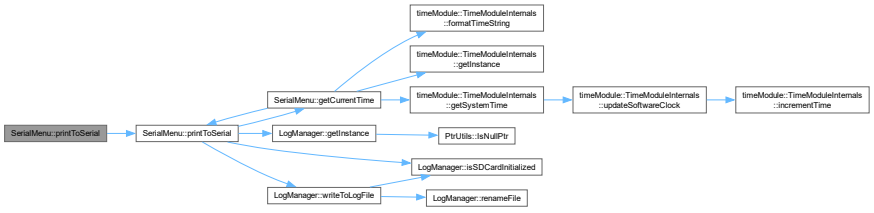
```
void SerialMenu::printToSerial (
            OutputLevel level,
            const __FlashStringHelper * message,
            bool newLine = true,
            bool logMessage = false )  [static]
```

Function to print a message to the serial port, using mutexes, output level and new line options.

**Parameters**

| | |
|---|---|
| *level* | -> The output level of the message. |
| *message* | -> The message to print, a __FlashStringHelper pointer. |
| *newLine* | -> Whether to add a new line at the end of the message. |

Here is the call graph for this function:




### 6.27.2.6 printToSerial() [4/4]

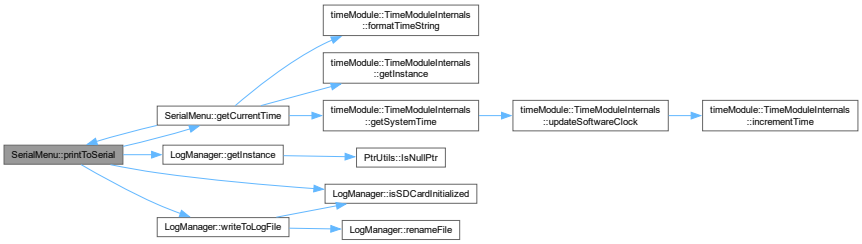
```
void SerialMenu::printToSerial (
            OutputLevel level,
            const String & message,
            bool newLine = true,
            bool logMessage = false )  [static]
```

Function to print a message to the serial port, using mutexes, output level and new line options.

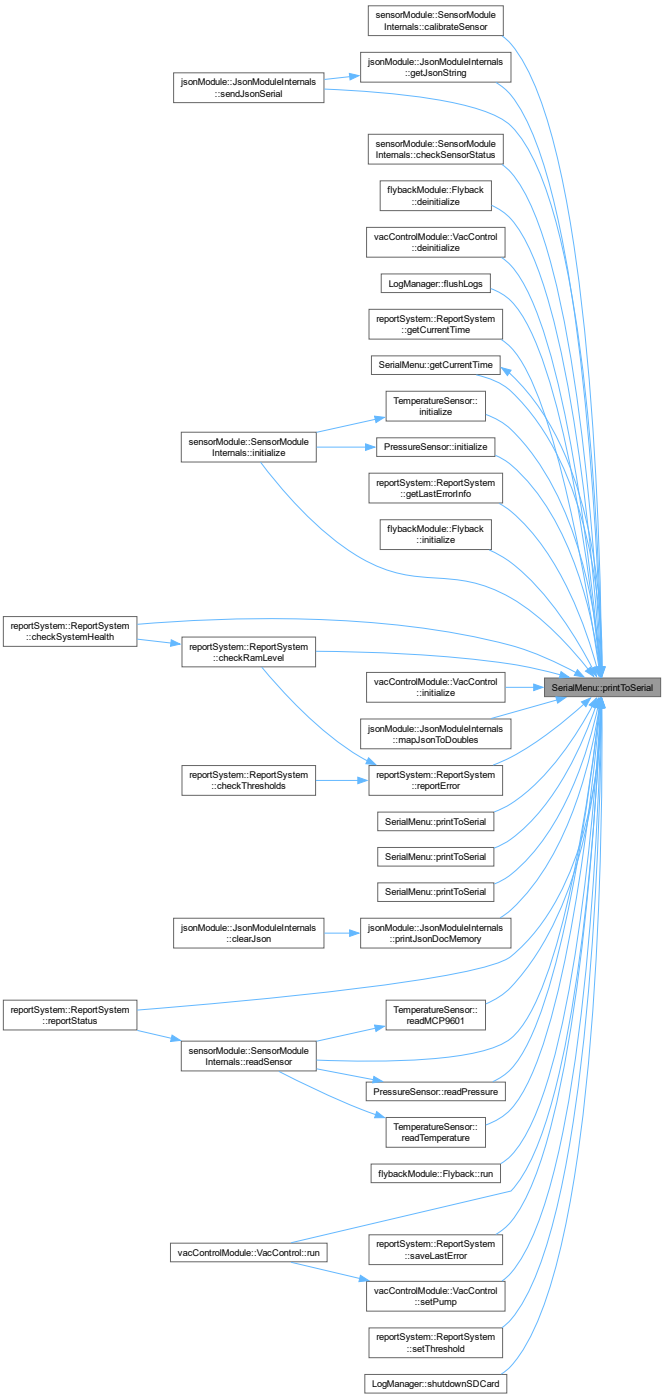
### Parameters

| | |
|---|---|
| *level* | -> The output level of the message. |
| *message* | -> The message to print, a String object. |
| *newLine* | -> Whether to add a new line at the end of the message. |

Here is the call graph for this function:



Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/serialMenu/serialMenu.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/serialMenu/serialMenu.cpp

# 6.28 comModule::SPICommunication Class Reference

Class to handle SPI communication.

`#include <SPII.h>`

### Public Member Functions

- void **beginSPI** ()
  *Function to initialize the SPI communication.*
- void **endSPI** ()
  *Function to end the SPI communication.*
- void spiWrite (uint8_t *data, size_t length)
  *Function to write data over SPI.*
- void spiRead (uint8_t *buffer, size_t length)
  *Function to read data over SPI.*
- bool isInitialized () const
  *Function to check if the SPI communication is initialized.*

## 6.28.1 Detailed Description

Class to handle SPI communication.

## 6.28.2 Member Function Documentation

### 6.28.2.1 isInitialized()

```
bool SPICommunication::isInitialized ( ) const
```

Function to check if the SPI communication is initialized.

**Returns**

true -> if the SPI communication is initialized

false -> if the SPI communication is not initialized

### 6.28.2.2 spiRead()

```
void SPICommunication::spiRead (
            uint8_t * buffer,
            size_t length )
```

Function to read data over SPI.

**Parameters**

| | |
|---|---|
| *buffer* | -> The buffer to read the data into |
| *length* | -> The length of the data to read |

#### 6.28.2.3 spiWrite()

```
void SPICommunication::spiWrite (
            uint8_t * data,
            size_t length )
```

Function to write data over SPI.

**Parameters**

| | |
|---|---|
| *data* | -> The data to write |
| *length* | -> The length of the data |

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

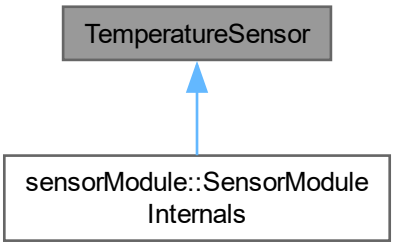
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/SPII/SPII.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/SPII/SPII.cpp

## 6.29 TemperatureSensor Class Reference

Temperature sensor class.

`#include <temperature.h>`

Inheritance diagram for TemperatureSensor:




### Public Member Functions

- void **initialize** ()

  *Function to initialize the temperature sensor.*
- float readTemperature ()

  *Function to read the temperature from the sensor.*
- float readMCP9601 (Units unit)

  *Function to read form specific sensor MCP9601.*
- bool isInitialized () const

  *Check if the temperature sensor is initialized.*
- uint8_t calibMCP9601 ()

  *Method to calibrate the MCP9601 sensor.*

### 6.29.1 Detailed Description

Temperature sensor class.

### 6.29.2 Member Function Documentation

#### 6.29.2.1 calibMCP9601()

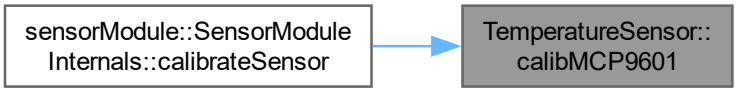
```
uint8_t TemperatureSensor::calibMCP9601 ( )
```

Method to calibrate the MCP9601 sensor.

**Returns**

uint8_t -> the status of the calibration

Here is the caller graph for this function:




#### 6.29.2.2 isInitialized()

```
bool TemperatureSensor::isInitialized ( ) const
```

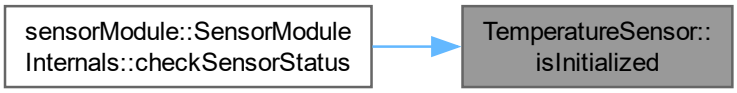
Check if the temperature sensor is initialized.

**Returns**

true -> if the temperature sensor is initialized

false -> if the temperature sensor is not initialized

Here is the caller graph for this function:




#### 6.29.2.3 readMCP9601()

```
float TemperatureSensor::readMCP9601 (
            Units unit )
```

Function to read form specific sensor MCP9601.

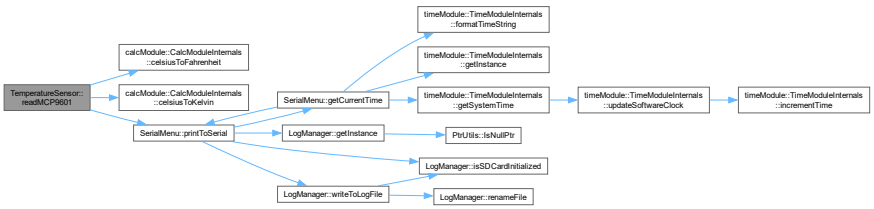
### Parameters

| | |
|---|---|
| *unit* | -> Choose the unit ℃, F, K |

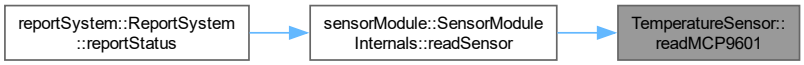
### Returns

-> The temperature value

Here is the call graph for this function:




Here is the caller graph for this function:




#### 6.29.2.4 readTemperature()

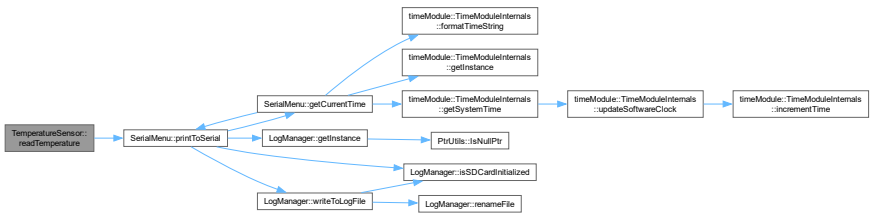
```
float TemperatureSensor::readTemperature ( )
```

Function to read the temperature from the sensor.

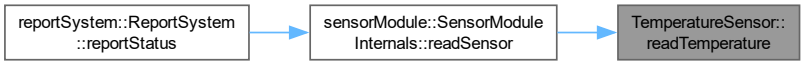
### Returns

float -> The temperature value.

Here is the call graph for this function:



Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/temperature/temperature.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/temperature/temperature.cpp

## 6.30 timeModule::TimeModuleInternals Class Reference

Class to handle Systemtime.

`#include <timeModule.h>`

### Public Member Functions

- bool setTimeFromHas (const String &timeString)
  *Set the Time From Has object to the system time.*
- void setSystemTime (const DateTimeStruct &dt)
  *Set the System Time object of the system.*
- void **updateSoftwareClock** ()
  *Updates the software clock.*
- DateTimeStruct getSystemTime ()
  *Get the System Time object.*

### Static Public Member Functions

- static void incrementTime (DateTimeStruct *dt)
  *Function to increment the time of the system.*
- static String formatTimeString (const DateTimeStruct &dt)
  *Function to format the time to a string.*
- static TimeModuleInternals * getInstance ()
  *Get the Instance object, Singleton pattern.*

### 6.30.1 Detailed Description

Class to handle Systemtime.

### 6.30.2 Member Function Documentation

#### 6.30.2.1 formatTimeString()

```
String TimeModuleInternals::formatTimeString (
            const DateTimeStruct & dt )  [static]
```

Function to format the time to a string.

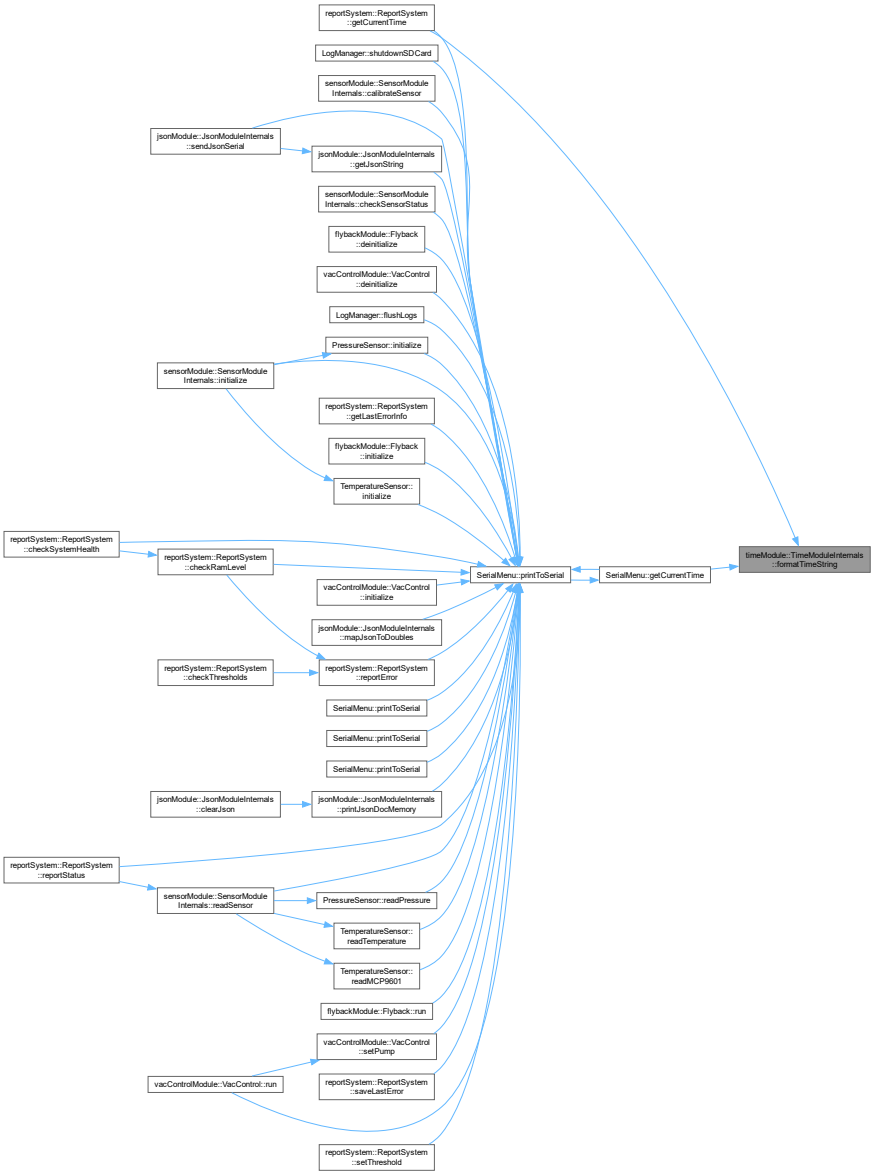
### Parameters

| | |
|---|---|
| *dt* | -> DateTimeStruct to format |

### Returns

String -> The formatted time.

Here is the caller graph for this function:




#### 6.30.2.2 getInstance()

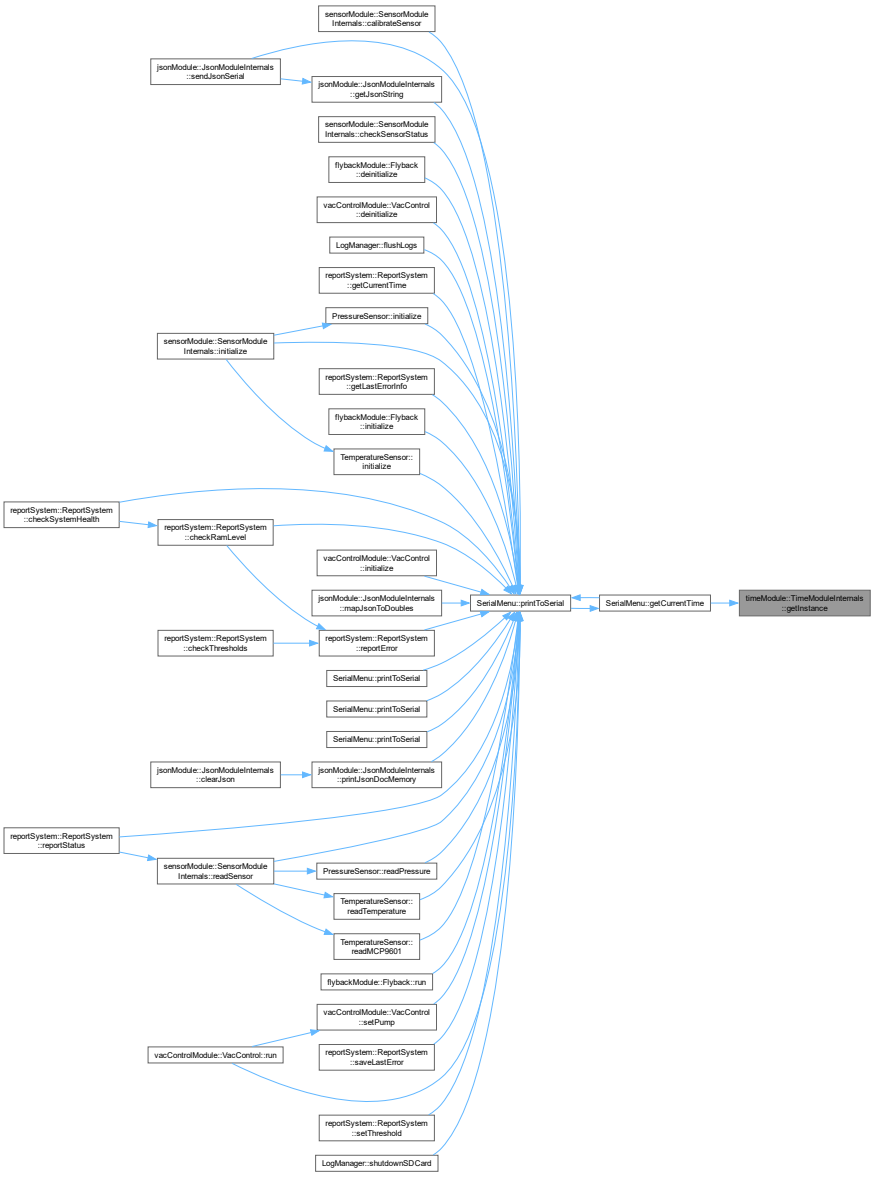
```
TimeModuleInternals * TimeModuleInternals::getInstance ( )  [static]
```

Get the Instance object, Singleton pattern.

### Returns

TimeModuleInternals* -> The instance of the TimeModuleInternals.

Here is the caller graph for this function:




#### 6.30.2.3 getSystemTime()

```
DateTimeStruct TimeModuleInternals::getSystemTime ( )
```

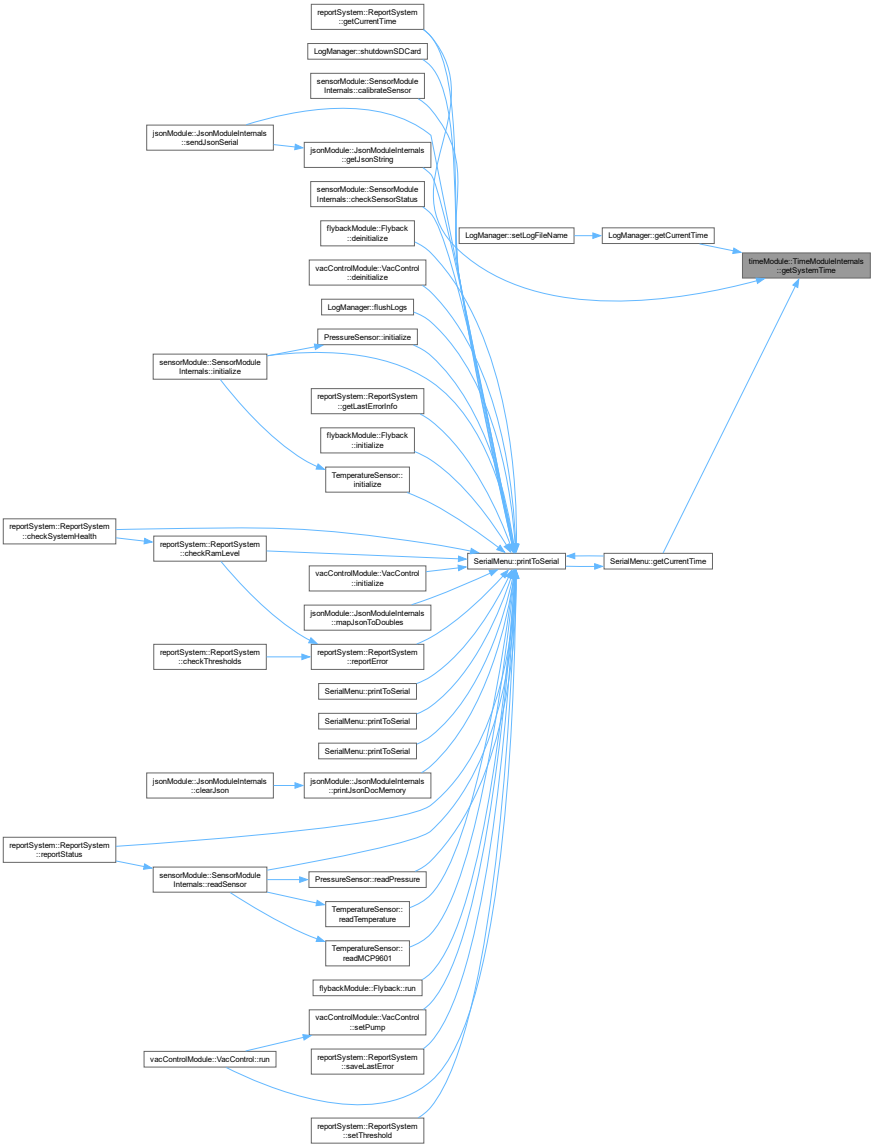
Get the System Time object.

### Returns

DateTimeStruct -> The system time.

Here is the call graph for this function:


Here is the caller graph for this function:



### 6.30.2.4 incrementTime()

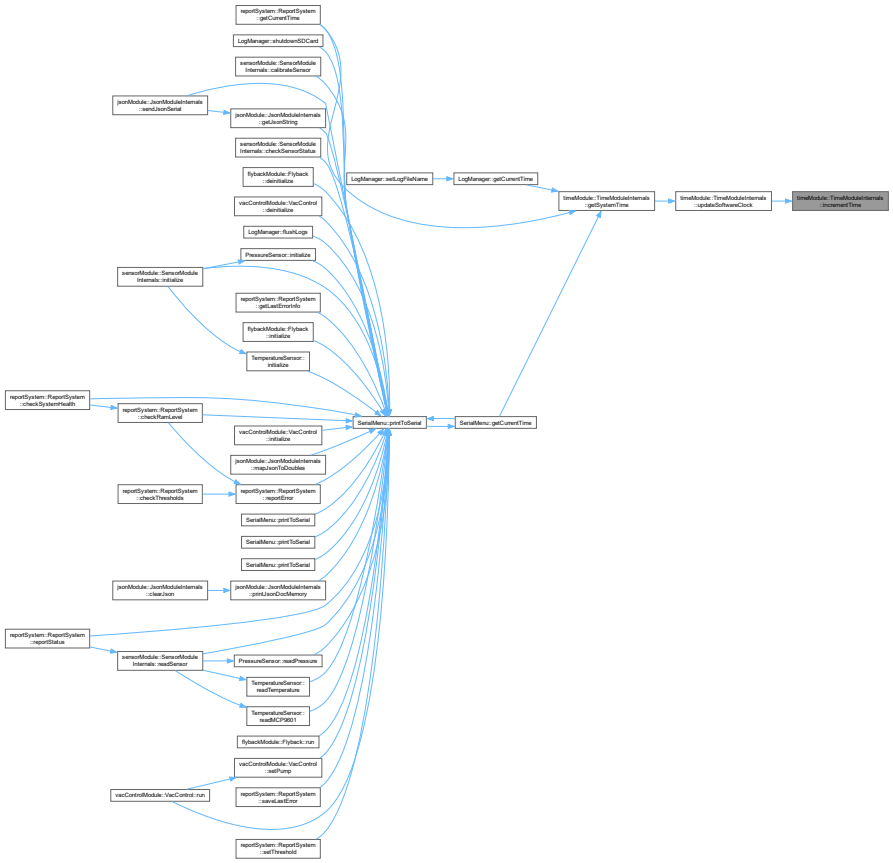
```
void TimeModuleInternals::incrementTime (
            DateTimeStruct * dt )  [static]
```

Function to increment the time of the system.

**Parameters**

| | |
|---|---|
| *dt* | -> DateTimeStruct to increment time |

Here is the caller graph for this function:




### 6.30.2.5 setSystemTime()

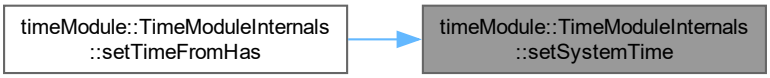
```
void TimeModuleInternals::setSystemTime (
            const DateTimeStruct & dt )
```

Set the System Time object of the system.

**Parameters**

| | |
|---|---|
| *dt* | -> DateTimeStruct to set the system time to. |

Here is the caller graph for this function:




#### 6.30.2.6 setTimeFromHas()

```
bool TimeModuleInternals::setTimeFromHas (
            const String & timeString )
```

Set the Time From Has object to the system time.

**Parameters**

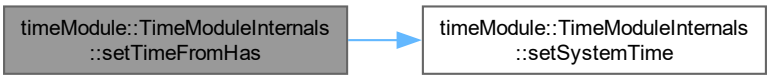
| | |
|---|---|
| *timeString* | -> The time string to set the system time to. |

**Returns**

true -> if the time was set successfully

false -> if the time was not set successfully

Here is the call graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/timeModule/timeModule.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/timeModule/timeModule.cpp

## 6.31 vacControlModule::VacControl Class Reference

VacControl class to manage the vacuum control system This class provides methods for initializing the system, configuring the timer, measuring parameters, and handling different system states such as ON, OFF, HAND, and REMOTE modes.

```
#include <vacControl.h>
```

**Public Member Functions**

- void **initialize** ()

  *Initialize the VacControl System This method sets up the pins and prepares the system for operation.*
- void **deinitialize** ()

  *denitialize the VacControl System This method shuts down the pins and prepares graceful restart.*
- bool isInitialized () const

  *Get the state of the VacControl system.*
- SwitchStates getSwitchState ()

  *Returns the state of the main switch.*
- Scenarios getScenario ()

  *Executes logic depending on which Main-Switch state is active.*
- Pressure measure ()

  *Measures the actual pressure of the system.*
- void setVacuumLed (float pressure, float targetPressure)

  *Controls the vacuum LED based on the current and target pressures.*
- int getScenarioFromPotValue (int potValue)

  *Determines the scenario based on the potentiometer value.*
- void setPump (bool flag)

  *Set the Pump flag.*
- void run ()

  *Runs the main control loop for the VacControl system.*
- void setExternScenario (int pressure)

  *Function to set an external scenario, typically from remote input.*
- int getExternScenario ()

  *Getter function to retrieve the current external scenario state.*
- void externProcess ()

  *Process external data for scenarios (currently unused)*
- void setExternPressure (float pressure)

  *Sets the external pressure value.*
- float getExternPressure ()

  *Gets the external pressure value.*

## 6.31.1 Detailed Description

VacControl class to manage the vacuum control system This class provides methods for initializing the system, configuring the timer, measuring parameters, and handling different system states such as ON, OFF, HAND, and REMOTE modes.

## 6.31.2 Member Function Documentation

### 6.31.2.1 externProcess()

```
void vacControlModule::VacControl::externProcess ( )
```

Process external data for scenarios (currently unused)

This function could be expanded to process external scenario commands if needed.

#### 6.31.2.2 getExternPressure()

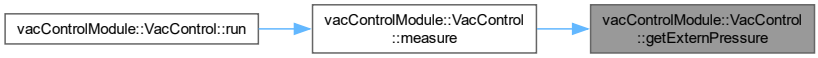
```
float VacControl::getExternPressure ( )
```

Gets the external pressure value.

**Returns**

The current external pressure value

Here is the caller graph for this function:




#### 6.31.2.3 getExternScenario()

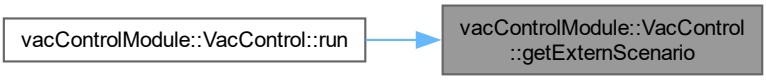
```
int VacControl::getExternScenario ( )
```

Getter function to retrieve the current external scenario state.

**Returns**

The current external scenario state (integer)

Here is the caller graph for this function:




#### 6.31.2.4 getScenario()

```
Scenarios VacControl::getScenario ( )
```

Executes logic depending on which Main-Switch state is active.

This function decides which scenario to run based on the current state of the system.

#### 6.31.2.5 getScenarioFromPotValue()

```
int VacControl::getScenarioFromPotValue (
            int potValue )
```

Determines the scenario based on the potentiometer value.

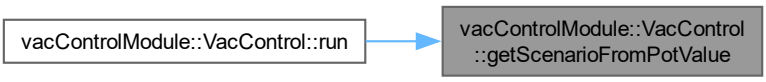
**Parameters**

| | |
|---|---|
| *potValue* | The value read from the potentiometer (used for pressure regulation) |

**Returns**

The corresponding scenario based on the potentiometer value

Here is the caller graph for this function:




#### 6.31.2.6 getSwitchState()

```
SwitchStates VacControl::getSwitchState ( )
```

Returns the state of the main switch.

**Returns**

The current state of the switch (Main_Switch_OFF, Main_Switch_MANUAL, etc.)

#### 6.31.2.7 isInitialized()

```
bool VacControl::isInitialized ( ) const
```

Get the state of the VacControl system.

**Returns**

true -> VacControl is initialized and ready

false -> VacControl is not initialized

#### 6.31.2.8 measure()

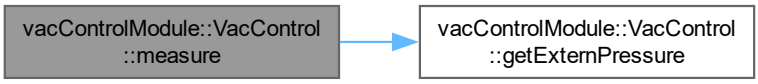
```
Pressure VacControl::measure ( )
```

Measures the actual pressure of the system.

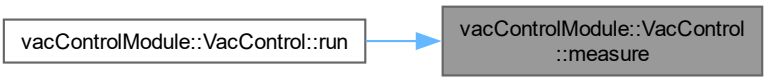
**Returns**

Measurement -> A Measurement object containing the current pressure

Here is the call graph for this function:




Here is the caller graph for this function:

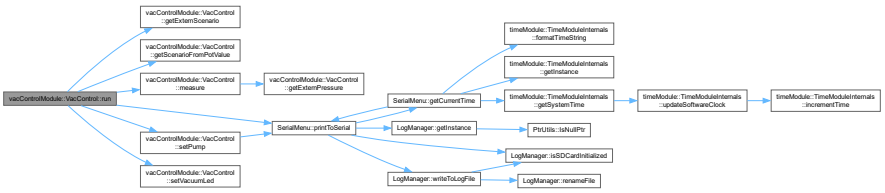



#### 6.31.2.9 run()

```
void VacControl::run ( )
```

Runs the main control loop for the VacControl system.

This function checks the current system state and performs actions accordingly (e.g., switch states, pump control, LED control). Here is the call graph for this function:




#### 6.31.2.10 setExternPressure()

```
void VacControl::setExternPressure (
            float pressure )
```

Sets the external pressure value.

**Parameters**

| | |
|---|---|
| *pressure* | The external pressure value to set |

### 6.31.2.11 setExternScenario()

```
void VacControl::setExternScenario (
            int pressure )
```

Function to set an external scenario, typically from remote input.

**Parameters**

| | |
|---|---|
| *pressure* | The external scenario pressure value |

### 6.31.2.12 setPump()

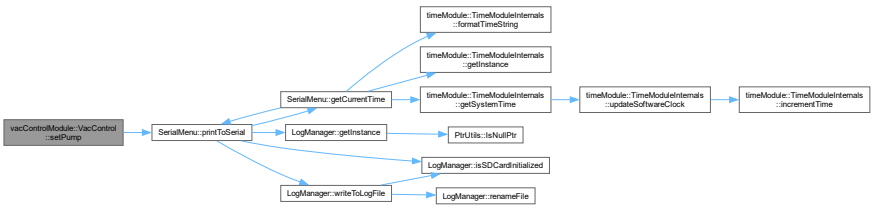
```
void VacControl::setPump (
            bool flag )
```

Set the Pump flag.

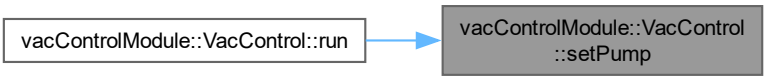
**Parameters**

| | |
|---|---|
| *flag* | This is the boolean flag to set |

Here is the call graph for this function:




Here is the caller graph for this function:



#### 6.31.2.13 setVacuumLed()

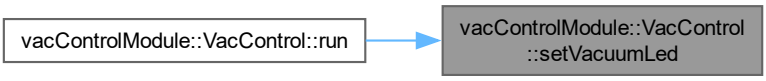
```
void VacControl::setVacuumLed (
            float pressure,
            float targetPressure )
```

Controls the vacuum LED based on the current and target pressures.

**Parameters**

| | |
|---|---|
| *pressure* | The current pressure in the system |
| *targetPressure* | The target pressure to reach |

Here is the caller graph for this function:




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

- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/vacControl/vacControl.h
- C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/vacControl/vacControl.cpp

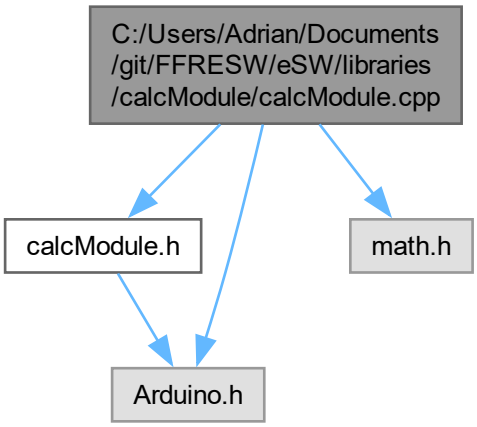
# Chapter 7

# File Documentation

## 7.1 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/calc↩ Module/calcModule.cpp File Reference

```
#include "calcModule.h"
#include <Arduino.h>
#include <math.h>
```

Include dependency graph for calcModule.cpp:




### 7.1.1 Detailed Description

**Author**

your name ( you@domain.com)

**Version**

0.1

**Date**

2024-09-28

**Copyright**

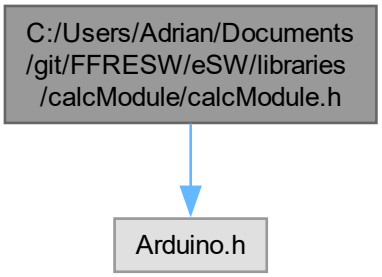


## 7.2 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/calcModule/calcModule.h File Reference

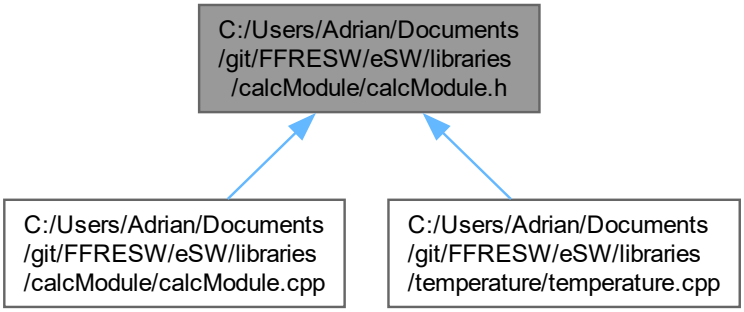
Header file for the calculation module handling sensor data.

```
#include <Arduino.h>
```

Include dependency graph for calcModule.h:




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



### Classes

- class calcModule::CalcModuleInternals

### Namespaces

- namespace calcModule

  *Namespace for the calculation module.*

### Enumerations

- enum calcModule::Type { **General** , **Pressure** , **Position** }

  *Enum for the different Types we want to extract from a response.*

### 7.2.1 Detailed Description

Header file for the calculation module handling sensor data.

**Author**

Adrian Goessl

**Version**

0.1

**Date**

2024-01-26

**Copyright**



## 7.3 calcModule.h

Go to the documentation of this file.

```
00001
00012 #ifndef CALCMODULE_H
00013 #define CALCMODULE_H
00014
00015 #include <Arduino.h>
00016
00018 namespace calcModule
00019 {
00021     enum Type
00022     {
00023         General,
00024         Pressure,
00025         Position
00026     };
00027
00029     class CalcModuleInternals
00030     {
00031     public:
```

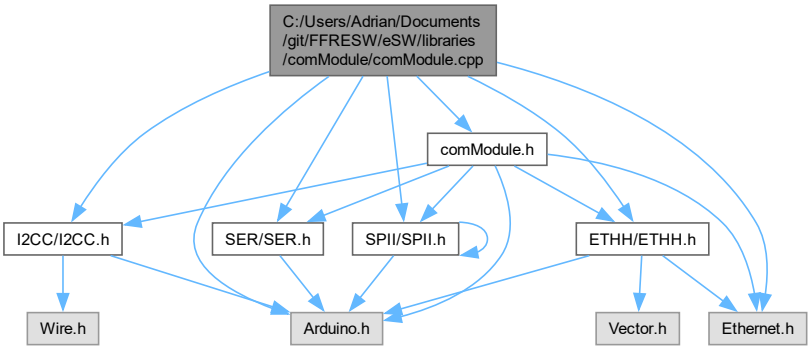
```
00032         CalcModuleInternals();
00033         ~CalcModuleInternals();
00034
00042         static float calculateAverage(const float* data, int length);
00043
00051         static float findMaximum(const float* data, int length);
00052
00060         static float findMinimum(const float* data, int length);
00061
00069         static float calculateStandardDeviation(const float* data, int length);
00070
00078         static float findMedian(float* data, int length);
00079
00086         static float celsiusToFahrenheit(float celsius);
00087
00094         static float fahrenheitToCelsius(float fahrenheit);
00095
00102         static float celsiusToKelvin(float celsius);
00103
00110         static float kelvinToCelsius(float kelvin);
00111
00118         static float pascalToAtm(float pascal);
00119
00126         static float atmToPascal(float atm);
00127
00134         static float pascalToPsi(float pascal);
00135
00142         static float psiToPascal(float psi);
00143
00151         static float calculatePower(float voltage, float current);
00152
00160         static float calculateCurrent(float voltage, float resistance);
00161
00169         static float calculateResistance(float voltage, float current);
00170
00184         static float extractFloat(String response, int id);
00185
00194         static float extractFloatFromResponse(const String& response, Type type);
00195
00196     private:
00197
00204         static void sortArray(float* data, int length);
00205
00212         static float roundToPrecision(float value, int precision);
00213     };
00214 }
00215
00216 #endif // CALCMODULE_H
```

## 7.4 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/comModule/comModule.cpp File Reference

Implementation of the comModule class that utilizes various communication protocols.

```
#include <Arduino.h>
#include <Ethernet.h>
#include "comModule.h"
#include "ETHH/ETHH.h"
#include "I2CC/I2CC.h"
#include "SER/SER.h"
#include "SPII/SPII.h"
```

Include dependency graph for comModule.cpp:




### 7.4.1 Detailed Description

Implementation of the comModule class that utilizes various communication protocols.

## 7.5 comModule.h

```
00001 #ifndef COMMODULE_H
00002 #define COMMODULE_H
00003
00004 #include <Arduino.h>
00005 #include <Ethernet.h>
00006 #include "ETHH/ETHH.h"
00007 #include "I2CC/I2CC.h"
00008 #include "SER/SER.h"
00009 #include "SPII/SPII.h"
00010
00012 namespace comModule
00013 {
00015     class ComModuleInternals
00016     {
00017     public:
00018         ComModuleInternals();
00019         ~ComModuleInternals();
00020
00026         EthernetCommunication& getEthernet();
00027
00033         I2CCommunication& getI2C();
00034
00040         SPICommunication& getSPI();
00041
00047         SerialCommunication& getSerial();
00048
00049     private:
00050         EthernetCommunication eth;
00051         I2CCommunication i2c;
00052         SPICommunication spi;
00053         SerialCommunication ser;
00054     };
00055 }
00056
00057 #endif // COMMODULE_H
```

## 7.6 ETHH.h

```
00001
00008 #ifndef ETHERNET_COMMUNICATION_H
00009 #define ETHERNET_COMMUNICATION_H
```

```
00010
00011 #include <Arduino.h>
00012 #include <Ethernet.h>
00013 #include <Vector.h>
00014
00016 namespace comModule
00017 {
00019     enum class Service : uint8_t
00020     {
00021         SET = 0x01,
00022         GET = 0x0B,
00023         SET_COMPOUND = 0x28,
00024         GET_COMPOUND = 0x29,
00025         SETGET = 0x30
00026     };
00027
00029     enum class Compound1 : uint32_t
00030     {
00031         CONTROL_MODE = 0x0F020000,
00032         TARGET_POSITION = 0x11020000,
00033         TARGET_PRESSURE = 0x07020000,
00034         NOT_USED = 0x00000000
00035     };
00036
00038     enum class Compound2 : uint32_t
00039     {
00040         ACCESS_MODE = 0x0F0B0000,
00041         CONTROL_MODE = 0x0F020000,
00042         TARGET_POSITION = 0x11020000,
00043         TARGET_PRESSURE = 0x07020000,
00044         ACTUAL_POSITION = 0x10010000,
00045         POSITION_STATE = 0x00100000,
00046         ACTUAL_PRESSURE = 0x07010000,
00047         TARGET_PRESSURE_USED = 0x07030000,
00048         WARNING_BITMAP = 0x0F300100,
00049         NOT_USED = 0x00000000
00050     };
00051
00053     enum class Compound3 : uint32_t
00054     {
00055         CONTROL_MODE = 0x0F020000,
00056         TARGET_POSITION = 0x11020000,
00057         TARGET_PRESSURE = 0x07020000,
00058         SEPARATION = 0x00000000,
00059         ACCESS_MODE = 0x0F0B0000,
00060         ACTUAL_POSITION = 0x10010000,
00061         POSITION_STATE = 0x00100000,
00062         ACTUAL_PRESSURE = 0x07010000,
00063         TARGET_PRESSURE_USED = 0x07030000,
00064         WARNING_BITMAP = 0x0F300100,
00065         NOT_USED = 0x00000000
00066     };
00067
00069     enum class Error_Codes : uint8_t
00070     {
00071         NO_ERROR = 0x00,
00072         WRONG_COMMAND_LENGTH = 0x0C,
00073         VALUE_TOO_LOW = 0x1C,
00074         VALUE_TOO_HIGH = 0x1D,
00075         RESULTING_ZERO_ADJUST_OFFSET = 0x20,
00076         NO_SENSOR_ENABLED = 0x21,
00077         WRONG_ACCESS_MODE = 0x50,
00078         TIMEOUT = 0x51,
00079         NV_MEMORY_NOT_READY = 0x6D,
00080         WRONG_PARAMETER_ID = 0x6E,
00081         PARAMETER_NOT_SETTABLE = 0x70,
00082         PARAMETER_NOT_READABLE = 0x71,
00083         WRONG_PARAMETER_INDEX = 0x73,
00084         WRONG_VALUE_WITHIN_RANGE = 0x76,
00085         NOT_ALLOWED_IN_THIS_STATE = 0x78,
00086         SETTING_LOCK = 0x79,
00087         WRONG_SERVICE = 0x7A,
00088         PARAMETER_NOT_ACTIVE = 0x7B,
00089         PARAMETER_SYSTEM_ERROR = 0x7C,
00090         COMMUNICATION_ERROR = 0x7D,
00091         UNKNOWN_SERVICE = 0x7E,
00092         UNEXPECTED_CHARACTER = 0x7F,
00093         NO_ACCESS_RIGHTS = 0x80,
00094         NO_ADEQUATE_HARDWARE = 0x81,
00095         WRONG_OBJECT_STATE = 0x82,
00096         NO_SLAVE_COMMAND = 0x84,
00097         COMMAND_TO_UNKNOWN_SLAVE = 0x85,
00098         COMMAND_TO_MASTER_ONLY = 0x87,
00099         ONLY_G_COMMAND_ALLOWED = 0x88,
00100         NOT_SUPPORTED = 0x89,
00101         FUNCTION_DISABLED = 0xA0,
00102         ALREADY_DONE = 0xA1
```

```
00103     };
00104
00106     class EthernetCommunication
00107     {
00108     public:
00109         EthernetCommunication();
00110         ~EthernetCommunication();
00111
00118         void beginEthernet(uint8_t* macAddress, IPAddress ip);
00119
00126         void sendEthernetData(const char* endpoint, const char* data);
00127
00134         void receiveEthernetData(char* buffer, size_t length);
00135
00140         void handleEthernetClient();
00141
00147         String getRequestedEndpoint();
00148
00155         String getSpecificEndpoint(const String& jsonBody);
00156
00162         void sendJsonResponse(const String& jsonBody);
00163
00169         EthernetClient& getClient();
00170
00177         bool isInitialized() const;
00178
00185         bool getSendDataFlag() const;
00186
00192         void setSendDataFlag(bool flag);
00193
00201         void setCompound(Compound1 id, int index, String value);
00202
00210         void setCompound(Compound2 id, int index, String value);
00211
00219         void setCompound(Compound3 id, int index, String value);
00220
00229         void setCompoundInternal(String compoundType, unsigned long id, int index, String value);
00230
00238         String getCompound(Compound1 id, int index);
00239
00247         String getCompound(Compound2 id, int index);
00248
00256         String getCompound(Compound3 id, int index);
00257
00266         String getCompoundInternal(String compoundType, unsigned long id, int index);
00267
00275         Vector<float> getParsedCompound(Compound1 id, int index);
00276
00284         Vector<float> getParsedCompound(Compound2 id, int index);
00285
00293         Vector<float> getParsedCompound(Compound3 id, int index);
00294
00301         Vector<float> parseCompoundResponse(String response);
00302
00309         void setParameter(Compound2 id, String value);
00310
00317         String getParameter(Compound2 id);
00318
00324         void sendCommand(String command);
00325
00326     private:
00327         EthernetServer server;
00328         EthernetClient client;
00329         bool ethernetInitialized = false;
00330         bool sendDataFlag = false;
00331
00338         String floatToIEEE754(float value);
00339
00346         Vector<float> parseResponse(String response);
00347
00348     };
00349 }
00350
00351 #endif // ETHERNET_COMMUNICATION_H
00352
00353
```

## 7.7 I2CC.h

```
00001
00008 #ifndef I2C_COMMUNICATION_H
00009 #define I2C_COMMUNICATION_H
00010
```

```
00011 #include <Arduino.h>
00012 #include <Wire.h>
00013
00014 namespace comModule
00015 {
00017     class I2CCommunication
00018     {
00019     public:
00020         I2CCommunication();
00021         ~I2CCommunication();
00022
00028         void beginI2C(uint8_t address);
00029
00034         void endI2C();
00035
00043         void i2cWrite(uint8_t deviceAddress, uint8_t* data, size_t length);
00044
00053         size_t i2cRead(uint8_t deviceAddress, uint8_t* buffer, size_t length);
00054
00061         bool isInitialized() const;
00062
00063     private:
00064         bool i2cInitialized = false;
00065     };
00066 }
00067
00068 #endif // I2C_COMMUNICATION_H
```

## 7.8 SER.h

```
00001
00008  #ifndef SERIAL_COMMUNICATION_H
00009  #define SERIAL_COMMUNICATION_H
00010
00011  #include <Arduino.h>
00012
00013  namespace comModule
00014  {
00016      class SerialCommunication
00017      {
00018      public:
00019
00025          void beginSerial(long baudRate);
00026
00031          void endSerial();
00032
00038          void sendSerialData(const char* data);
00039
00046          void receiveSerialData(char* buffer, size_t length);
00047
00054          bool isInitialized() const;
00055
00056      private:
00057          bool serInitialized = false;
00058      };
00059  }
00060
00061  #endif // SERIAL_COMMUNICATION_H
```

## 7.9 SPII.h

```
00001
00008 #ifndef SPI_COMMUNICATION_H
00009 #define SPI_COMMUNICATION_H
00010
00011 #include "SPII.h"
00012
00013 #include <Arduino.h>
00014
00016 namespace comModule
00017 {
00019     class SPICommunication
00020     {
00021     public:
00022         SPICommunication();
00023         ~SPICommunication();
00024
00029         void beginSPI();
00030
```

```
00035         void endSPI();
00036
00043         void spiWrite(uint8_t* data, size_t length);
00044
00051         void spiRead(uint8_t* buffer, size_t length);
00052
00059         bool isInitialized() const;
00060
00061     private:
00062         bool spiInitialized = false;
00063     };
00064 }
00065
00066 #endif // SPI_COMMUNICATION_H
```

## 7.10 config.h

```
00001 // config.h
00002 // FreeROTS Kernel Configuration
00003
00004 #ifndef CONFIG_H
00005 #define CONFIG_H
00006
00007 // Enable Arduino C++ Interface
00008 // This allows the HeliOS kernel to interact with the Arduino API
00009 #define CONFIG_ENABLE_ARDUINO_CPP_INTERFACE
00010
00011 // Enable System Assertions (optional, for debugging purposes)
00012 #define CONFIG_ENABLE_SYSTEM_ASSERT
00013 #define CONFIG_SYSTEM_ASSERT_BEHAVIOR(file, line) __ArduinoAssert__(file, line)
00014
00015 // Message Queue Configuration
00016 #define CONFIG_MESSAGE_VALUE_BYTES 0x8u  // Message queue message value size in bytes
00017
00018 // Task Notification Configuration
00019 #define CONFIG_NOTIFICATION_VALUE_BYTES 0x8u  // Task notification value size in bytes
00020
00021 // Task Name Configuration
00022 #define CONFIG_TASK_NAME_BYTES 0x8u  // Length of task names in bytes
00023
00024 // Memory Region Configuration
00025 #define CONFIG_MEMORY_REGION_SIZE_IN_BLOCKS 0x10u  // Number of memory blocks (16 blocks)
00026 #define CONFIG_MEMORY_REGION_BLOCK_SIZE 0x20u  // Memory block size in bytes (32 bytes)
00027
00028 // Queue Configuration
00029 #define CONFIG_QUEUE_MINIMUM_LIMIT 0x5u  // Minimum queue size limit (5 items)
00030
00031 // Stream Buffer Configuration
00032 #define CONFIG_STREAM_BUFFER_BYTES 0x20u  // Stream buffer length (32 bytes)
00033
00034 // Task Watchdog Timer
00035 #define CONFIG_TASK_WD_TIMER_ENABLE  // Enable watchdog timer for tasks
00036
00037 // Device Name Configuration
00038 #define CONFIG_DEVICE_NAME_BYTES 0x8u  // Device name length (8 bytes)
00039
00040 #endif // CONFIG_H
```

## 7.11 flyback.h

```
00001 /*
00002  * flyback.h
00003  *
00004  *  Created on: 07.12.2024
00005  *      Author: domin
00006  */
00007 #ifndef FLYBACK_H
00008 #define FLYBACK_H
00009
00010 #include <Arduino.h>
00011 #include <Wire.h>
00012
00014 namespace flybackModule
00015 {
00017     enum class SwitchStates : int
00018     {
00019         HV_Module_OFF,
00020         HV_Module_MANUAL,
00021         HV_Module_REMOTE,
```

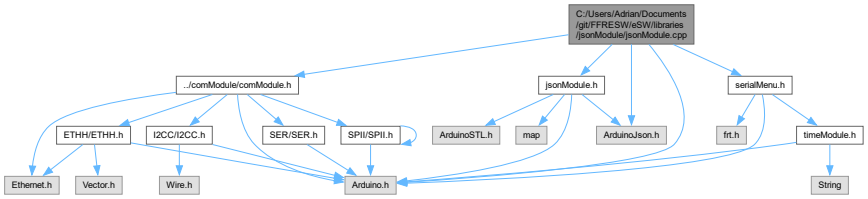
```
00022         HV_Module_INVALID
00023     };
00024
00027     typedef struct Measurement
00028     {
00029         float voltage;
00030         float current;
00031         float power;
00032         int digitalFreqValue;
00033         int digitalDutyValue;
00034         int dutyCycle;
00035         uint32_t frequency;
00036     } meas;
00037
00041     class Flyback
00042     {
00043     public:
00044         Flyback();
00045         ~Flyback();
00046
00051         void initialize();
00052
00057         void deinitialize();
00058
00065         bool isInitialized() const;
00066
00073         bool getTimerState();
00074
00080         void setTimerState(bool state);
00081
00088         SwitchStates getSwitchState();
00089
00095         Measurement measure();
00096
00101         void run();
00102
00108         void setExternFrequency(uint32_t frequency);
00109
00114         uint32_t getExternFrequency();
00115
00121         void setExternDutyCycle(int dutyCycle);
00122
00127         int getExternDutyCycle();
00128
00129
00130     private:
00131         Measurement meas;
00132
00133         //Define Pins -->Signaltable
00134         static const int Main_Switch_OFF = 27;
00135         static const int Main_Switch_MANUAL = 28;
00136         static const int Main_Switch_REMOTE = 29;
00137         static const int Measure_ADC = A0;          //ADC PIN for Voltage Measurement
00138         static const int PWM_OUT = 11;
00139         static const int PWM_INV = 12;
00140
00141         //Variables for calculating HV
00142         const float R1 = 100000000;
00143         const float R2 = 10000;
00144         const float ADC_Max_Value = 1023.0;
00145         const float Vcc = 5.0;
00146
00147         //Define Pins --> Signaltable
00148         static const int HV_Module_ON = 37;
00149         static const int HV_Module_OFF = 36;
00150         static const int HV_Module_Working = 35;
00151         static const int PWM_Frequency = A1;
00152         static const int PWM_DutyCycle = A2;
00153
00154         bool _flybackInitialized;
00155         bool _timerInitialized;
00156
00157         // States
00158         static SwitchStates lastState;
00159         static bool lastTimerState;
00160         static int lastPWMFrequency;
00161         static int lastPWMDutyCycle;
00162
00167         void timerConfig();
00168
00175         void setPWMFrequency(uint32_t frequency, int dutyCycle);
00176     };
00177 }
00178
00179 #endif //FLYBACK_H
```

# 7.12 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/jsonModule/jsonModule.cpp File Reference

Implementation of the jsonModule class.

```
#include <Arduino.h>
#include <ArduinoJson.h>
#include "../comModule/comModule.h"
#include <jsonModule.h>
#include <serialMenu.h>
```

Include dependency graph for jsonModule.cpp:




## 7.12.1 Detailed Description

Implementation of the jsonModule class.

**Version**

0.1

**Date**

2024-01-26

**Copyright**

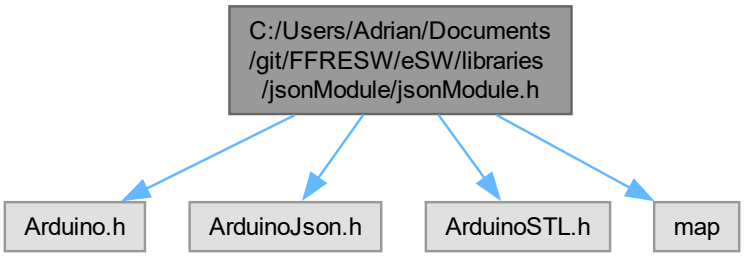
Copyright (c) 2024

# 7.13 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/jsonModule/jsonModule.h File Reference

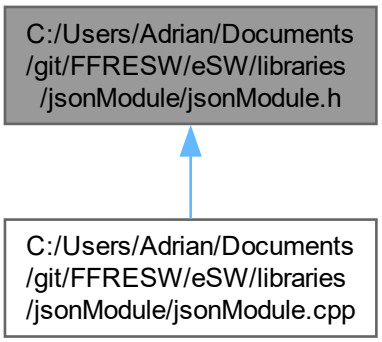
```
#include <Arduino.h>
#include <ArduinoJson.h>
#include <ArduinoSTL.h>
```

```
#include <map>
```

Include dependency graph for jsonModule.h:




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




### Classes

- class jsonModule::JsonModuleInternals

### Namespaces

- namespace jsonModule

  *Namespace for the JSON module.*

### Macros

- #define **ARDUINO_STL_MEMORY** 0

### 7.13.1 Detailed Description

**Author**

Adrian Goessl

**Version**

0.1

**Date**

2024-09-28

**Copyright**



## 7.14 jsonModule.h

Go to the documentation of this file.

```
00001
00012 #ifndef JSONMODULE_H
00013 #define JSONMODULE_H
00014
00015 #ifndef ARDUINO_STL_MEMORY
00016 #define ARDUINO_STL_MEMORY 0  // Disable STL memory management (new, delete, new_handler)
00017 #endif
00018
00019 #include <Arduino.h>
00020 #include <ArduinoJson.h>
00021 #include <ArduinoSTL.h>
00022 #include <map>
00023
00025 namespace jsonModule
00026 {
00028     class JsonModuleInternals
00029     {
00030     public:
00031         JsonModuleInternals();
00032         ~JsonModuleInternals();
00033
00040         void createJson(const char* key, const char* value);
00041
00048         void createJsonFloat(const char* key, float value);
00049
00056         void createJsonInt(const char* key, int value);
00057
00064         void createJsonString(const char* key, String& value);
00065
00072         void createJsonStringConst(const char* key, const String& value);
00073
00078         void sendJsonSerial();
00079
00085         void sendJsonEthernet(const char* endpoint);
00086
00092         String getJsonString() const;
00093
00094
00103         std::map<String, float> mapJsonToDoubles(const String& rawJson);
00104
00109         void clearJson();
00110
00115         void printJsonDocMemory();
00116
00117         size_t jsonBuffer;
00118
00119     private:
00120         StaticJsonDocument<512> jsonDoc;
00121
00122     };
00123 }
00124
00125 #endif // JSONMODULE_H
```

## 7.15 lockerBase.h

```
00001 #ifndef LOCKER_BASE_H
00002 #define LOCKER_BASE_H
00003
00004 #include <frt.h>
00005 #include <Arduino.h>
00006 #include <scopedLock.h>
00007 #include <logManager.h>
00008
00010 class LockerBase
00011 {
00012 public:
00013     LockerBase()
00014     {
00015         if (_logger->isSDCardInitialized())
00016         {
00017             _logger->setLogFileName("log_LockerBase.txt");
00018         }
00019     }
00020
00021     ~LockerBase() {}
00022
00028     locker::ScopedLock lockEthernetScoped()
00029     {
00030         ethernetConnected = true;
00031         logState("Ethernet connected", ethernetConnected);
00032         return locker::ScopedLock(ethernetMutex);
00033     }
00034
00040     locker::ScopedLock lockTemperatureScoped()
00041     {
00042         temperatureReading = true;
00043         logState("Temperature reading", temperatureReading);
00044         return locker::ScopedLock(temperaturQueueMutex);
00045     }
00046
00052     locker::ScopedLock lockSerialScoped()
00053     {
00054         serialReading = true;
00055         logState("Serial reading", serialReading);
00056         return locker::ScopedLock(serialMutex);
00057     }
00058
00059 private:
00060
00061     // Mutexes for the different resources
00062     frt::Mutex temperaturQueueMutex;
00063     frt::Mutex ethernetMutex;
00064     frt::Mutex serialMutex;
00065
00066     // Semaphores for the different resources
00067     frt::Semaphore ethernetSemaphore;
00068     frt::Semaphore temperatureSemaphore;
00069     frt::Semaphore serialSemaphore;
00070
00071     // Flags for the different resources
00072     bool ethernetConnected = false;
00073     bool temperatureReading = false;
00074     bool serialReading = false;
00075
00076     // Logger instance
00077     LogManager* _logger = LogManager::getInstance();
00078
00085     void logState(const char* label, bool state)
00086     {
00087         char buffer[64];
00088         snprintf(buffer, sizeof(buffer), "[LockerBase] %s: %s", label, state ? "true" : "false");
00089         _logger->writeToLogFile(buffer);
00090     }
00091 };
00092
00093 #endif // LOCKER_BASE_H
```

## 7.16 scopedLock.h

```
00001 #ifndef LOCKER_BASE_SCOPEDLOCK_H
00002 #define LOCKER_BASE_SCOPEDLOCK_H
00003
00004 #include <frt.h>
00005
00007 namespace locker
00008 {
```

```
00010     class ScopedLock
00011     {
00012     public:
00013
00019         explicit ScopedLock(frt::Mutex& mutex) : m_mutex(mutex), m_locked(true)
00020         {
00021             m_mutex.lock();
00022         }
00023
00024         ScopedLock(const ScopedLock&) = delete;
00025         ScopedLock& operator=(const ScopedLock&) = delete;
00026
00032         ScopedLock(ScopedLock&& other) noexcept : m_mutex(other.m_mutex), m_locked(other.m_locked)
00033         {
00034             other.m_locked = false;
00035         }
00036
00037         // Deleted: assignment to a reference is illegal in C++
00038         ScopedLock& operator=(ScopedLock&&) = delete;
00039
00040         ~ScopedLock()
00041         {
00042             if (m_locked)
00043                 m_mutex.unlock();
00044         }
00045
00046     private:
00047         frt::Mutex& m_mutex;
00048         bool m_locked;
00049     };
00050 }
00051
00052 #endif // LOCKER_BASE_SCOPEDLOCK_H
```

## 7.17 logManager.h

```
00001 #ifndef LOGMANAGER_H
00002 #define LOGMANAGER_H
00003
00004 #include <Arduino.h>
00005 #include <SD.h>
00006 #include <SPI.h>
00007 #include <String.h>
00008 #include <timeModule.h>
00009
00011 class LogManager
00012 {
00013 public:
00014
00020     static LogManager* getInstance();
00021
00027     void initSDCard(int cs);
00028
00032     void shutdownSDCard();
00033
00037     void flushLogs();
00038
00045     bool isSDCardInitialized() const;
00046
00051     static String getCurrentTime();
00052
00058     void setLogFileName(const String& fileName);
00059
00067     bool writeToLogFile(const String& logMessage);
00068
00075     void renameFile(const String& oldName, const String& newName);
00076
00077 private:
00078     LogManager();
00079     ~LogManager();
00080
00081     static LogManager* _instance;
00082     File logFile;
00083     bool sdCardInitialized = false;
00084     String logFileName;
00085     String baseLogFileName;
00086
00087     static const int chipSelectPinEth = 10; // Default CS pin for SD card
00088     static const int maxLogFileSize = 1024 * 1024 * 100; // 100 MB
00089
00090     LogManager(const LogManager&) = delete;
00091     LogManager& operator=(const LogManager&) = delete;
00092 };
```

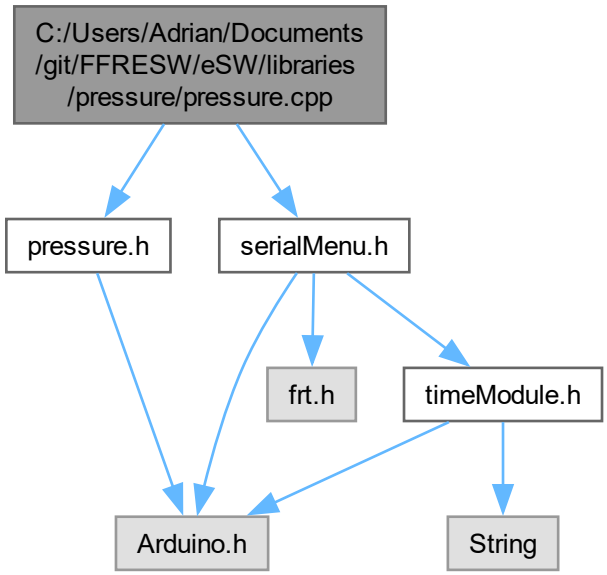
```
00093
00094
00095 #endif // LOGMANAGER_H
```

## 7.18 C:/Users/Adrian/Documents/git/FFRESW/e↩ SW/libraries/pressure/pressure.cpp File Reference

Implementation of the pressure class.

```
#include "pressure.h"
#include <serialMenu.h>
```

Include dependency graph for pressure.cpp:




### 7.18.1 Detailed Description

Implementation of the pressure class.

**Version**

0.1

**Date**

2024-01-26

**Copyright**

## 7.19 pressure.h

```
00001 #ifndef PRESSURESENSOR_H
00002 #define PRESSURESENSOR_H
00003
00004 #include <Arduino.h>
00005
00007 class PressureSensor
00008 {
00009 public:
00010     PressureSensor();
00011     ~PressureSensor();
00012
00017     void initialize();
00018
00024     float readPressure();
00025
00032     bool isInitialized() const;
00033
00034 private:
00035     bool _pressureSensorInitialized;
00036     static const int PRESSURE_SENSOR_PIN = 0;
00037
00044     float readAnalogSensor(int pin);
00045
00046 };
00047
00048 #endif // PRESSURESENSOR_H
```

## 7.20 ptrUtils.h

```
00001 #ifndef PTRUTILS_H
00002 #define PTRUTILS_H
00003
00004 #include <Arduino.h>
00005 #include <serialMenu.h>
00006
00013 template <typename T>
00014 static inline void SafeDelete(T*& ptr)
00015 {
00016     if (ptr != nullptr)
00017     {
00018         delete ptr;
00019         ptr = nullptr;
00020     }
00021 }
00022
00029 template <typename T>
00030 static inline void SafeDeleteArray(T*& ptr)
00031 {
00032     if (ptr != nullptr)
00033     {
00034         delete[] ptr;
00035         ptr = nullptr;
00036     }
00037 }
00038
00047 template <typename T>
00048 static inline void Verify(const T& value, const T& expected, const char* errorMsg = nullptr)
00049 {
00050     if (value != expected)
00051     {
00052         if (errorMsg)
00053         {
00054             SerialMenu::printToSerial(errorMsg);
00055         }
00056         else
00057         {
00058             String errStr;
00059             errStr += "[ERROR] Verification failed: Value (";
00060             errStr += value;
00061             errStr += ") does not match expected (";
00062             errStr += expected;
00063             errStr += ").";
00064             SerialMenu::printToSerial(errStr);
00065         }
00066         while (true); // Halt execution
00067     }
00068 }
00069
00078 template <typename T>
00079 static inline void Verify(T* value, T* expected, const char* errorMsg = nullptr)
00080 {
```

```
00081     if (value != expected)
00082     {
00083         if (errorMsg)
00084         {
00085             SerialMenu::printToSerial(errorMsg);
00086         }
00087         else
00088         {
00089             String errStr;
00090             errStr += "[ERROR] Verification failed: Pointer (";
00091             errStr += (unsigned long)value, HEX;
00092             errStr += ") does not match expected pointer (";
00093             errStr += (unsigned long)expected, HEX;
00094             errStr += ").";
00095             SerialMenu::printToSerial(errStr);
00096         }
00097         while (true); // Halt execution
00098     }
00099 }
00100
00108 template <typename T>
00109 static inline void Verify(T* value, const char* errorMsg = nullptr)
00110 {
00111     if (value != nullptr)  // Directly compare with nullptr (no std::nullptr_t)
00112     {
00113         if (errorMsg)
00114         {
00115             SerialMenu::printToSerial(errorMsg);
00116         }
00117         else
00118         {
00119             String errStr;
00120             errStr += "[ERROR] Verification failed: Pointer (";
00121             errStr += (unsigned long)value, HEX;
00122             errStr += ") is not null.";
00123             SerialMenu::printToSerial(errStr);
00124         }
00125         while (true); // Halt execution
00126     }
00127 }
00128
00129
00134 #define tryDeletePtr(ptr)                                       \
00135     if (PtrUtils::IsValidPtr(ptr))                              \
00136         SafeDelete(ptr);                                        \
00137
00138
00139
00141 class PtrUtils
00142 {
00143 public:
00150     template <typename T>
00151     static inline bool IsNullPtr(T* ptr)
00152     {
00153         return ptr == nullptr;
00154     }
00155
00162     template <typename T>
00163     static inline bool IsValidPtr(T* ptr)
00164     {
00165         return ptr != nullptr;
00166     }
00167 };
00168
00176 template <typename T>
00177 static inline void ClearArray(T* array, size_t size)
00178 {
00179     for (size_t i = 0; i < size; ++i)
00180     {
00181         array[i] = T();
00182     }
00183 }
00184
00192 template <typename T>
00193 static inline void PrintPtrInfo(T* ptr, const char* ptrName = "Pointer")
00194 {
00195     if (ptr == nullptr)
00196     {
00197         SerialMenu::printToSerial("[INFO] " + String(ptrName) + String("is nullptr"));
00198     }
00199     else
00200     {
00201         SerialMenu::printToSerial("[INFO] " + String(ptrName) + String(" points to address: 0x") +
      (uintptr_t)ptr, HEX);
00202     }
00203 }
00204
```

```
00210 template <typename T>
00211 class ScopedPointer
00212 {
00213 private:
00214     T* ptr;
00215
00216 public:
00217     explicit ScopedPointer(T* p = nullptr) : ptr(p) {}
00218     ~ScopedPointer() { SafeDelete(ptr); }
00219
00225     T* get() const { return ptr; }
00226
00232     T* release()
00233     {
00234         T* temp = ptr;
00235         ptr = nullptr;
00236         return temp;
00237     }
00238
00244     void reset(T* p = nullptr)
00245     {
00246         SafeDelete(ptr);
00247         ptr = p;
00248     }
00249
00255     T& operator*() const { return *ptr; }
00256
00262     T* operator->() const { return ptr; }
00263 };
00264
00270 template <typename T>
00271 class PointerWrapper
00272 {
00273 private:
00274     T* ptr;
00275
00276 public:
00277     explicit PointerWrapper(T* p = nullptr) : ptr(p) {}
00278     ~PointerWrapper() { SafeDelete(ptr); }
00279
00285     T* get() const { return ptr; }
00286
00292     T* release()
00293     {
00294         T* temp = ptr;
00295         ptr = nullptr;
00296         return temp;
00297     }
00298
00304     void reset(T* p = nullptr)
00305     {
00306         SafeDelete(ptr);
00307         ptr = p;
00308     }
00309
00315     T& operator*() { return *ptr; }
00316
00322     T* operator->() { return ptr; }
00323 };
00324
00325 #endif // PTRUTILS_H
```

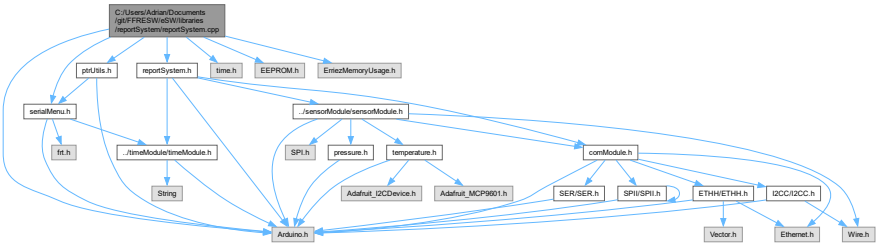
## 7.21 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/reportSystem/reportSystem.cpp File Reference

Unified system health and error reporting module.

```
#include "reportSystem.h"
#include "ptrUtils.h"
#include <Arduino.h>
#include <time.h>
#include <EEPROM.h>
#include <ErriezMemoryUsage.h>
```

```
#include <serialMenu.h>
```

Include dependency graph for reportSystem.cpp:




### Functions

- volatile uint16_t stackCheck __**attribute**__ ((section(".noinit")))

### 7.21.1 Detailed Description

Unified system health and error reporting module.

**Author**

Adrian Goessl

**Version**

0.3

**Date**

2024-09-28

**Copyright**

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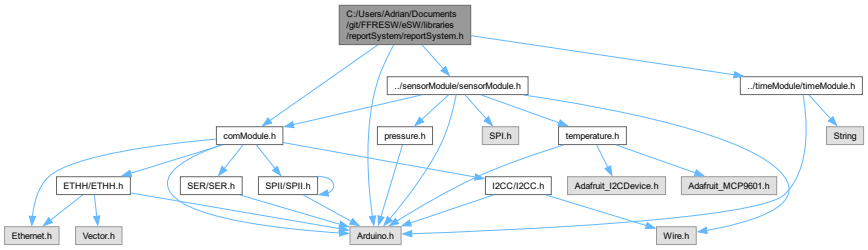
## 7.22 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/reportSystem/reportSystem.h File Reference

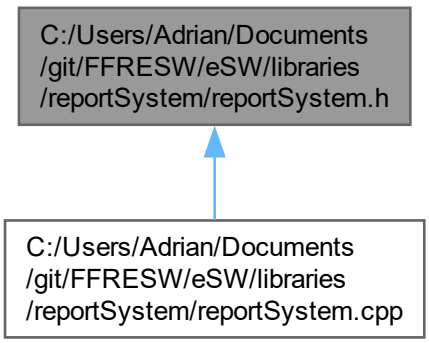
```
#include <Arduino.h>
#include "../sensorModule/sensorModule.h"
#include "../comModule/comModule.h"
```

```
#include "../timeModule/timeModule.h"
```

Include dependency graph for reportSystem.h:




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




## Classes

- class reportSystem::ReportSystem

  *Class for the report system.*

## Namespaces

- namespace reportSystem

  *Namespace for the report system.*

## Macros

- #define **STACK_GUARD** 0xDEAD
- #define **EEPROM_ERROR_ADDR** 0

## Variables

- volatile uint16_t **stackCheck**

### 7.22.1 Detailed Description

**Author**

your name ( you@domain.com)

**Version**

0.1

**Date**

2024-09-28

**Copyright**

Copyright (c) 2024

## 7.23 reportSystem.h

Go to the documentation of this file.

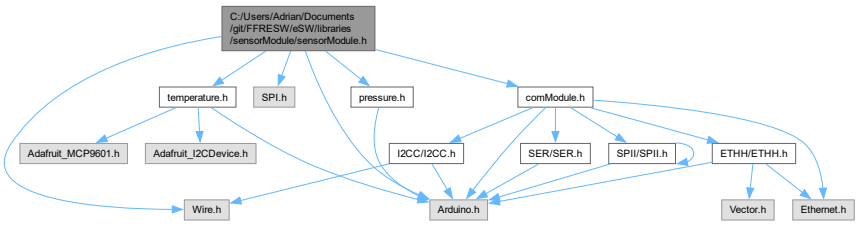
```
00001
00011 #ifndef REPORTSYSTEM_H
00012 #define REPORTSYSTEM_H
00013
00014 #include <Arduino.h>
00015 #include "../sensorModule/sensorModule.h"
00016 #include "../comModule/comModule.h"
00017 #include "../timeModule/timeModule.h"
00018
00019 #define STACK_GUARD 0xDEAD // Stack guard value
00020 extern volatile uint16_t stackCheck; // Stack check variable
00021
00022 #define EEPROM_ERROR_ADDR 0
00023
00025 namespace reportSystem
00026 {
00028     class ReportSystem
00029     {
00030     public:
00031         ReportSystem();
00032         ~ReportSystem();
00033
00039         void reportError(const char* errorMessage);
00040
00053         bool checkSystemHealth(size_t memoryThreshold, bool checkEth,
00054                                bool checkSpi, bool checkI2c,
00055                                bool checkTemp, bool checkPress);
00056
00063         String reportStatus(bool active);
00064
00071         void setThreshold(float tempThreshold, float pressureThreshold);
00072
00081         bool checkThresholds(float currentTemp, float currentPressure);
00082
00088         String getCurrentTime();
00089
00095         String getMemoryStatus();
00096
00102         String getStackDump();
00103
00108         void startBusyTime();
00109
00114         void startIdleTime();
00115
00121         float getCPULoad();
00122
00127         void resetUsage();
00128
00133         static void initStackGuard();
```

```
00134
00141         static bool detectStackOverflow();
00142
00149         void saveLastError(const char* error);
00150
00156         String getLastError();
00157
00163         bool getLastErrorInfo();
00164
00174         bool checkRamLevel(unsigned int warningThreshold, unsigned int criticalThreshold);
00175
00176     private:
00177         float tempThreshold;
00178         float pressureThreshold;
00179         unsigned long lastHealthCheck;
00180         const unsigned long healthCheckInterval = 10000; // 10 seconds
00181         unsigned long busyTime = 0;
00182         unsigned long idleTime = 0;
00183         unsigned long lastTimestamp = 0;
00184
00193         bool checkSensors(bool checkTemp, bool checkPress);
00194
00204         bool checkCommunication(bool checkEth, bool checkSpi, bool checkI2c);
00205
00213         bool checkMemory(unsigned int threshold);
00214
00215         sensorModule::SensorModuleInternals* _sens;
00216         comModule::ComModuleInternals* _com;
00217         timeModule::TimeModuleInternals* _time;
00218     };
00219 }
00220
00221 #endif // REPORTSYSTEM_H
```

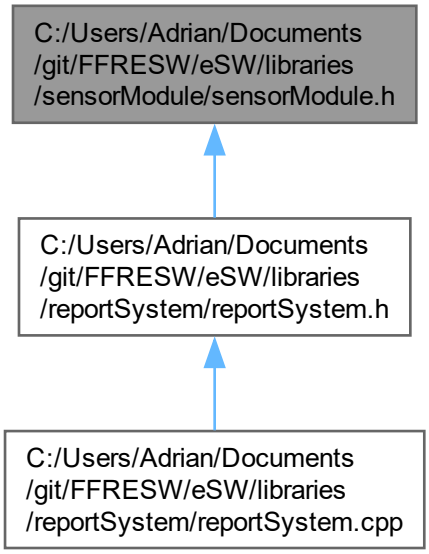
## 7.24 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/sensorModule/sensorModule.h File Reference

```
#include <Arduino.h>
#include <Wire.h>
#include <SPI.h>
#include <pressure.h>
#include <temperature.h>
#include <comModule.h>
```

Include dependency graph for sensorModule.h:



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




### Classes

- class sensorModule::SensorModuleInternals

  *Class for the sensor module internals.*

### Namespaces

- namespace sensorModule

  *Namespace for the sensor module.*

### Enumerations

- enum class sensorModule::SensorType {
  **TEMPERATURE** , **OBJECTTEMPERATURE** , **AMBIENTTEMPERATURE** , **PRESSURE** ,
  **DHT11** , **MCP9601_Celsius** , **MCP9601_Fahrenheit** , **MCP9601_Kelvin** ,
  **UNKNOWN** }

  *Enum class for the sensor types.*

## 7.24.1 Detailed Description

**Author**

Adrian Goessl

**Version**

0.1

**Date**

2024-09-28

**Copyright**



## 7.25 sensorModule.h

Go to the documentation of this file.

```
00001
00012 #ifndef SENSORMODULE_H
00013 #define SENSORMODULE_H
00014
00015 #include <Arduino.h>
00016 #include <Wire.h>
00017 #include <SPI.h>
00018 #include <pressure.h>
00019 #include <temperature.h>
00020 #include <comModule.h>
00021
00022
00024 namespace sensorModule
00025 {
00027     enum class SensorType
00028     {
00029         TEMPERATURE,
00030         OBJECTTEMPERATURE,
00031         AMBIENTTEMPERATURE,
00032         PRESSURE,
00033         DHT11,
00034         MCP9601_Celsius,
00035         MCP9601_Fahrenheit,
00036         MCP9601_Kelvin,
00037         UNKNOWN
00038     };
00039
00041     class SensorModuleInternals : public TemperatureSensor, public PressureSensor
00042     {
00043     public:
00044         SensorModuleInternals();
00045         ~SensorModuleInternals();
00046
00051         void initialize();
00052
00059         float readSensor(SensorType type);
00060
00068         bool calibrateSensor(SensorType type);
00069
00077         bool checkSensorStatus(SensorType type);
00078
00079     private:
00080         TemperatureSensor _temperatureSensor;
00081         PressureSensor _pressureSensor;
00082
00083         bool _i2cSensorInitialized;
00084         bool _spiSensorInitialized;
00085     };
00086 }
00087
00088 #endif // SENSORMODULE_H
```

## 7.26 serialMenu.h

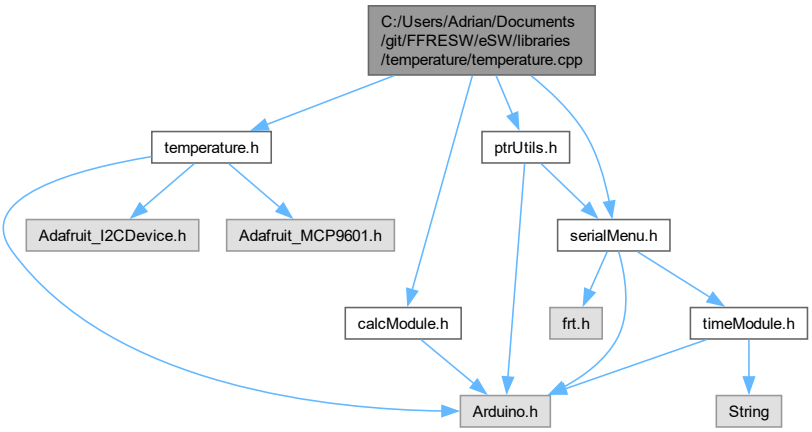
```
00001 #ifndef SERIAL_MENU_H
00002 #define SERIAL_MENU_H
00003
00004 #include <Arduino.h>
00005 #include <frt.h>
00006 #include <timeModule.h>
00007
00008
00010 struct MenuItem
00011 {
00012     const char* label;
00013     char key;
00014     void (*callback)();
00015 };
00016
00018 class SerialMenu
00019 {
00020 public:
00021
00023     enum class OutputLevel
00024     {
00025         DEBUG,
00026         INFO,
00027         WARNING,
00028         ERROR,
00029         CRITICAL,
00030         STATUS,
00031         PLAIN
00032     };
00033
00034     SerialMenu();
00035     ~SerialMenu();
00036
00043     void load(MenuItem* items, size_t size);
00044
00049     void show();
00050
00055     void run();
00056
00064     static void printToSerial(OutputLevel level, const String& message, bool newLine = true, bool
      logMessage = false);
00065
00073     static void printToSerial(OutputLevel level, const __FlashStringHelper* message, bool newLine =
      true, bool logMessage = false);
00074
00081     static void printToSerial(const String& message, bool newLine = true, bool logMessage = false);
00082
00089     static void printToSerial(const __FlashStringHelper* message, bool newLine = true, bool logMessage
      = false);
00090
00095     static String getCurrentTime();
00096
00097 private:
00098     MenuItem* currentMenu;
00099     size_t menuSize;
00100 };
00101
00102 #endif // SERIAL_MENU_H
```

## 7.27 C:/Users/Adrian/Documents/git/FFRESW/e↩ SW/libraries/temperature/temperature.cpp File Reference

Implementation of the temperature class.

```
#include <temperature.h>
#include <serialMenu.h>
#include <ptrUtils.h>
#include <calcModule.h>
```

Include dependency graph for temperature.cpp:




### 7.27.1 Detailed Description

Implementation of the temperature class.

#### Version

0.1

#### Date

2024-01-26

#### Copyright

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## 7.28 temperature.h

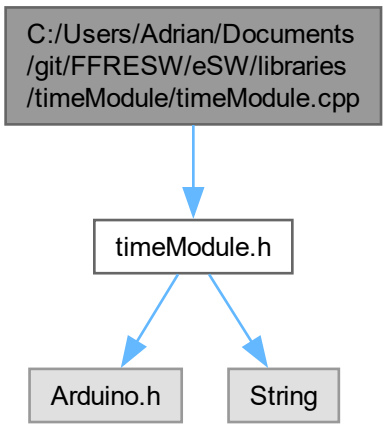
```
00001 #ifndef TEMPERATURESENSOR_H
00002 #define TEMPERATURESENSOR_H
00003
00004 #include <Arduino.h>
00005 #include <Adafruit_I2CDevice.h>
00006 #include "Adafruit_MCP9601.h"
00007
00009 enum Units
00010 {
00011     Celsius,
00012     Kelvin,
00013     Fahrenheit
00014 };
00015
00017 enum MCP9601_Status : uint8_t
00018 {
00019     MCP9601_OPENCIRCUIT = 0x10,
00020     MCP9601_SHORTCIRCUIT = 0x20
00021 };
00022
00024 class TemperatureSensor
```

```
00025 {
00026 public:
00027     TemperatureSensor();
00028     ~TemperatureSensor();
00029
00034     void initialize();
00035
00041     float readTemperature();
00042
00049     float readMCP9601(Units unit);
00050
00057     bool isInitialized() const;
00058
00059
00065     uint8_t calibMCP9601();
00066
00067 private:
00068     bool _temperatureSensorInitialized;
00069     static const int TEMP_SENSOR_PIN = A0;
00070     static const int TEMP_SENSOR_PIN_DIG = 4;
00071     static const int DHT11_PIN = 7;
00072
00073     static const uint8_t MLX90614 = 0x5A;
00074     static const uint8_t AMBIENT_TEMP = 0x06;
00075     static const uint8_t OBJECT_TEMP = 0x07;
00076
00077     // Settings for the MCP9601 Sensor board
00078     Adafruit_MCP9601 _mcp;
00079     Ambient_Resolution _ambientREs = RES_ZERO_POINT_0625;
00080     static const uint8_t MCP9601_I2C = 0x67;
00081
00082
00089     float readAnalogSensor(int pin);
00090
00097     float readDigitalSensor(int pin);
00098 };
00099
00100 #endif // TEMPERATURESENSOR_H
```

## 7.29 C:/Users/Adrian/Documents/git/FFRESW/eSW/libraries/timeModule/timeModule.cpp File Reference

Implementation of the timeModule class.

`#include <timeModule.h>`
Include dependency graph for timeModule.cpp:



### 7.29.1 Detailed Description

Implementation of the timeModule class.

**Version**

0.1

**Date**

2024-01-26

**Copyright**

Copyright (c) 2024

## 7.30 timeModule.h

```
00001 #ifndef TIMEMODULE_H
00002 #define TIMEMODULE_H
00003
00004 #include <Arduino.h>
00005 #include <String>
00006
00008 namespace timeModule
00009 {
00011     typedef struct DateTimeStruct
00012     {
00013         int year;
00014         int month;
00015         int day;
00016         int hour;
00017         int minute;
00018         int second;
00019     } DateTimeStruct;
00020
00022     class TimeModuleInternals
00023     {
00024     public:
00025         TimeModuleInternals();
00026         ~TimeModuleInternals();
00027
00033         static void incrementTime(DateTimeStruct *dt);
00034
00041         static String formatTimeString(const DateTimeStruct &dt);
00042
00050         bool setTimeFromHas(const String& timeString);
00051
00057         void setSystemTime(const DateTimeStruct& dt);
00058
00063         void updateSoftwareClock();
00064
00070         DateTimeStruct getSystemTime();
00071
00077         static TimeModuleInternals* getInstance();
00078
00079     private:
00080         DateTimeStruct dt;
00081         unsigned long startMillis = 0;
00082     };
00083 }
00084
00085 #endif // TIMEMODULE
```

## 7.31 vacControl.h

```
00001 /*
00002 * flyback.h
00003 *
00004 *  Created on: 28.03.2025
00005 *      Author: domin
00006 */
00007 #ifndef VACCONTROL_H
00008 #define VACCONTROL_H
00009
00010 #include <Arduino.h>
00011 #include <Wire.h>
00012
00013
00015 namespace vacControlModule
00016 {
00018     enum class SwitchStates : int
00019     {
00020         Main_Switch_OFF,
00021         Main_Switch_MANUAL,
00022         Main_Switch_REMOTE,
00023         Main_switch_INVALID,
00024         PUMP_ON,
00025         PUMP_OFF
00026     };
00029     typedef struct Pressure
00030     {
00031         float pressure;
00032
00033     } meas;
00034
00036     enum Scenarios
00037     {
00038         Scenario_1 = 0,
00039         Scenario_2 = 1,
00040         Scenario_3 = 2,
00041         Scenario_4 = 3,
00042         Scenario_5 = 4,
00043         Invalid_Scenario = -1
00044     };
00045
00049     class VacControl
00050     {
00051     public:
00052
00053         VacControl();
00054         ~VacControl();
00055
00060         void initialize();
00061
00066         void deinitialize();
00067
00074         bool isInitialized() const;
00075
00081         SwitchStates getSwitchState();
00082
00088         Scenarios getScenario();
00089
00095         Pressure measure();
00096
00103         void setVacuumLed(float pressure, float targetPressure);
00104
00111         int getScenarioFromPotValue(int potValue);
00112
00118         void setPump(bool flag);
00119
00125         void run();
00126
00127
00133         void setExternScenario(int pressure);
00134
00140         int getExternScenario();
00141
00147         void externProcess();
00148
00154         void setExternPressure(float pressure);
00155
00161         float getExternPressure();
00162
00163
00164     private:
00165         Pressure meas;
00166
00167         //Define Pins --> Main_Switch
00168         static const int Main_Switch_OFF = 27;      //Main_Switch OFF Mode 27
00169         static const int Main_Switch_MANUAL = 28;   //Main_Switch Manual Mode 28
```

```
00170         static const int Main_Switch_REMOTE = 29;   //Main_Switch Remote Mode 29
00171
00172         //Define Pins --> Vacuum Logic
00173         static const int Switch_Pump_ON = 23;       //Button to turn Pump ON 37
00174         static const int Pump_Status_LED = 24;      //OUTPUT to see State off Pump
00175         static const int Pump_Relay = 25;           //OUTPUT to turn on/off Relais
00176         static const int targetVacuumLED = 26;      //OUTPUT to see Vacuum reached
00177         static const int targetPressure = A4;   //Potentiometer for Regulation
00178
00179         //Variables to save Values
00180         int currentScenario = -1;
00181
00182         //Variables for TargetPressure
00183         static const float TARGET_PRESSURE_1 = 1;
00184         static const float TARGET_PRESSURE_2 = 0.8f;
00185         static const float TARGET_PRESSURE_3 = 0.5;
00186         static const float TARGET_PRESSURE_4 = 0.01f;
00187
00188         // TODO NEW ADDED-> CHECK FUNCTIONALTY WITH FRANIC
00189         static int lastState;
00190         static int lastPumpState;
00191
00192
00193         bool _vacControlInitialized;
00194     };
00195 }
00196
00197 #endif //VACCONTROL_H
```

# Index