DESCRIPTION

Compute Box

Edition E9

Compute Box Version 3.2.0

July 2018

Content

Information provided within this document is accurate to the best of our knowledge at the time of its publication. There may be differences between this document and the product if the product has been modified after the edition date.

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The original language for this publication is English. Any other languages that are supplied have been translated from English.

1 Preface

1.1 Target Audience

This document is intended for integrators who design and install complete robot applications. Personnel working with the Compute Box are expected to have the following expertise:

- Basic knowledge of electronic and electrical systems

1.2 Intended Use

The Compute Box is designed to work with an OnRobot 6-axis sensor for measuring forces and torques. The Compute Box is used to read and configure the sensor via Ethernet interface.

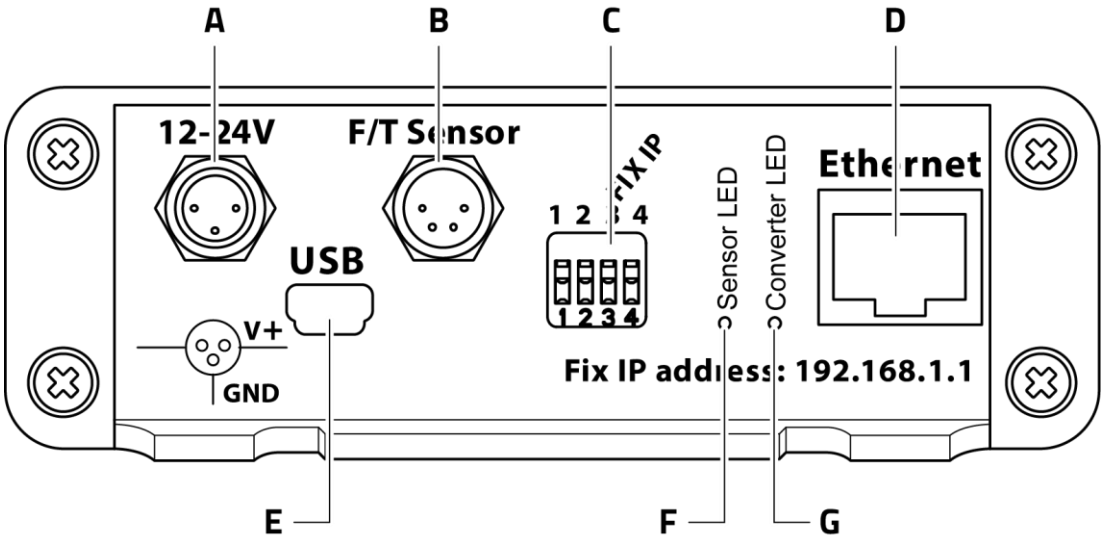
1.3 Typographic Conventions

The following typographic conventions are used in this document.

`Courier Text`	Used for file paths and file names, code, user input and computer output.
Italicized text	Used for citations and marking image callouts in text.
Bold text	Used to indicate UI elements, including text appearing on buttons and menu options.
<angle brackets>	Indicates variable names that must be substituted by real values or strings.
Numbered lists	Numbered list elements indicate steps of a procedure.
A. Alphabetical lists	Alphabetical list elements indicate image callout descriptions.

2 Interfaces and Indicators

The following figure shows the interfaces and indicators of the front panel of the Compute Box.



A. Power Connector

B. F/T Sensor Connector

C. DIP Switch

D. Ethernet Interface

E. USB Connector

F. Sensor Status Indicator

G. Converter Status Indicator

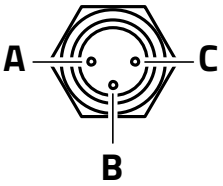
2.1 Power Connector

The Compute Box must be powered via the Power Connector. Power-over-Ethernet (PoE) is not supported. Use the provided power supply or a similar unit, if the cable length of the provided power supply is not sufficient.

The power supply must fulfill the characteristics below:

Power Requirements	
Voltage	12V-24V
Power Consumption	6W

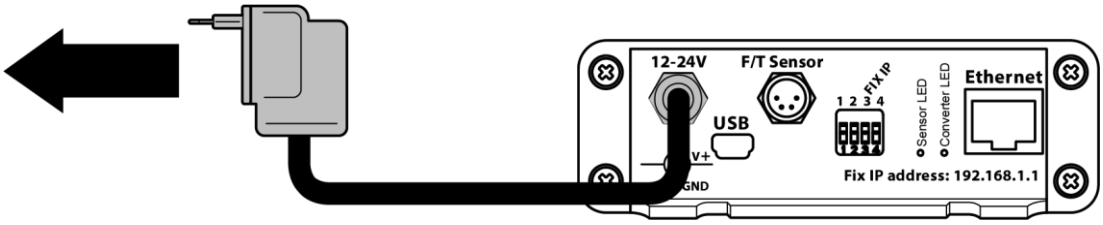
The Power Connector is a standard M8 3 pin male connector with the following pinout:



A. Not in use

B. Ground

C. Power



Once the device is powered on, it takes about 60 seconds for the system to boot.

2.2 F/T Sensor Connector

The Compute Box receives force and torque values through the Force/Torque (F/T) Sensor connector from an OnRobot 6-axis sensor. A dedicated cable is provided for the connection.

2.3 DIP Switch

The DIP switch is used to reconfigure network settings of the device.

 (shown in factory default settings)	**1**	Reserved
	2	Reserved
	3	ON – Device IP address =192.168.1.1 OFF – Static IP/DHCP Client enabled
	4	ON – DHCP Server disabled OFF – DHCP Server enabled

Any change to the settings only takes effect after a power reset.

2.4 Ethernet Interface

The Compute Box provides the data received from the sensor to any device through the Ethernet interface. A cable is provided to connect the Compute Box to a PC or laptop.

The Ethernet interface supports three modes of operation:

- **Web Access**:
  For easy. real-time sensor data reading, configuration of the data transfer, and network configuration of the Compute Box.

- **UDP Connection**:
  For high-speed sensor data reading (up to 500 Hz).

- **TCP Connection**:
  For single or iterated sensor data reading.

> It is not recommended to use two modes at the same time as it can affect the performance.

2.4.1 Configuring the Ethernet Interface

Correct IP addressing must be set to use the Ethernet interface. The following methods can be used to configure the IP address:

- Use the factory default settings. In this case, the Compute Box has both Dynamic Host Configuration Protocol (DHCP) client, and DHCP server enabled.
  - If connected to a device (robot control box, or computer) directly, the DHCP server in the Compute Box assigns IP address to the connected device (in the range of 192.168.1.100-105 with subnet mask 255.255.255.0). After this, connection can be established between the device and the Compute Box.

> Make sure that the computer that is connected to the Control Box is set to obtain an IP address automatically.

  - If connected to a network that has a DHCP server, the Compute Box acts as a DHCP client and receives an IP address from the server. After this, connection can be established between any device on the network and the Compute Box.

> If the Compute Box is used in a company network where a DHCP server is already in use, it is recommended to disable the DHCP server of the Compute Box by setting DIP switch 4 to the ON position.

- Set the IP address of the device to 192.168.1.1 and subnet mask to 255.255.255.0 by setting DIP switch 3 to ON position. After this, connection can be established between any device and the Compute Box.

- If a specific static IP address or subnet mask is needed, Set DIP switch 3 to the OFF position, and using the web access **Network Configuration** page, disable the Compute Box DHCP client and set the IP address to a custom static IP value.

> If the device is used within a company network, contact the IT department for the correct IP and subnet mask to be assigned. If a static IP address is

> used on the Compute Box, make sure that the computer connected to it has matching settings, that is, its IP address is within the same subnet, and the subnet mask is the same.

2.4.2 Web Access

To connect to the Compute Box Web access from a PC, follow this procedure:

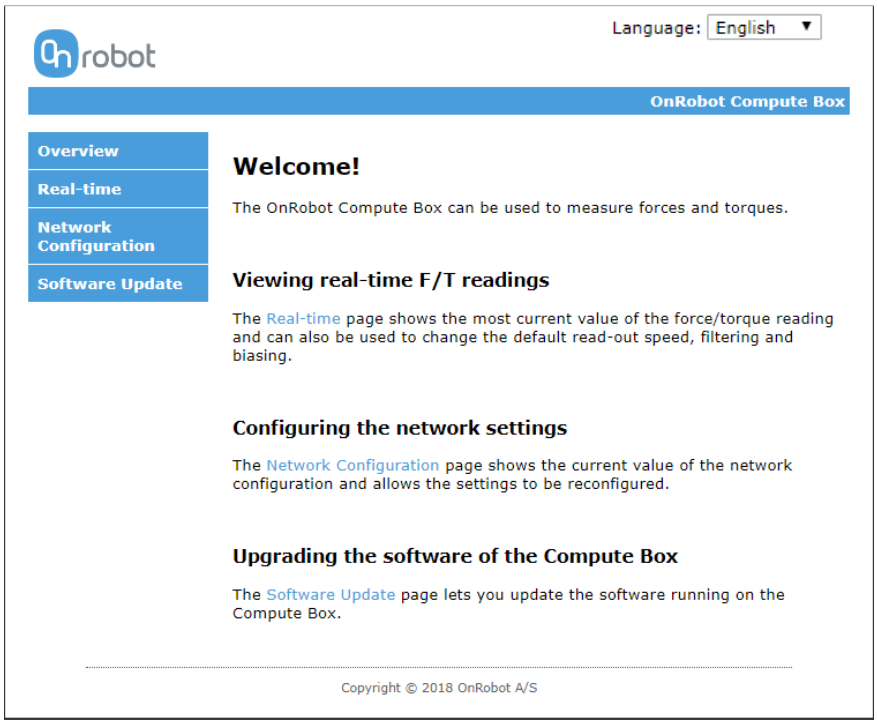
1. Connect the Compute Box to the Sensor by the 4 pin M8 cable.

   Turn on the Compute Box, by connecting it to its power supply.

   Connect the Compute Box to your computer by an ethernet cable, directly.

   Wait one minute, open a browser, and type 192.168.1.1 to the address bar. If you changed the network settings, according to the guidelines in section **Configuring the Ethernet Interface**, use the appropriate IP address.

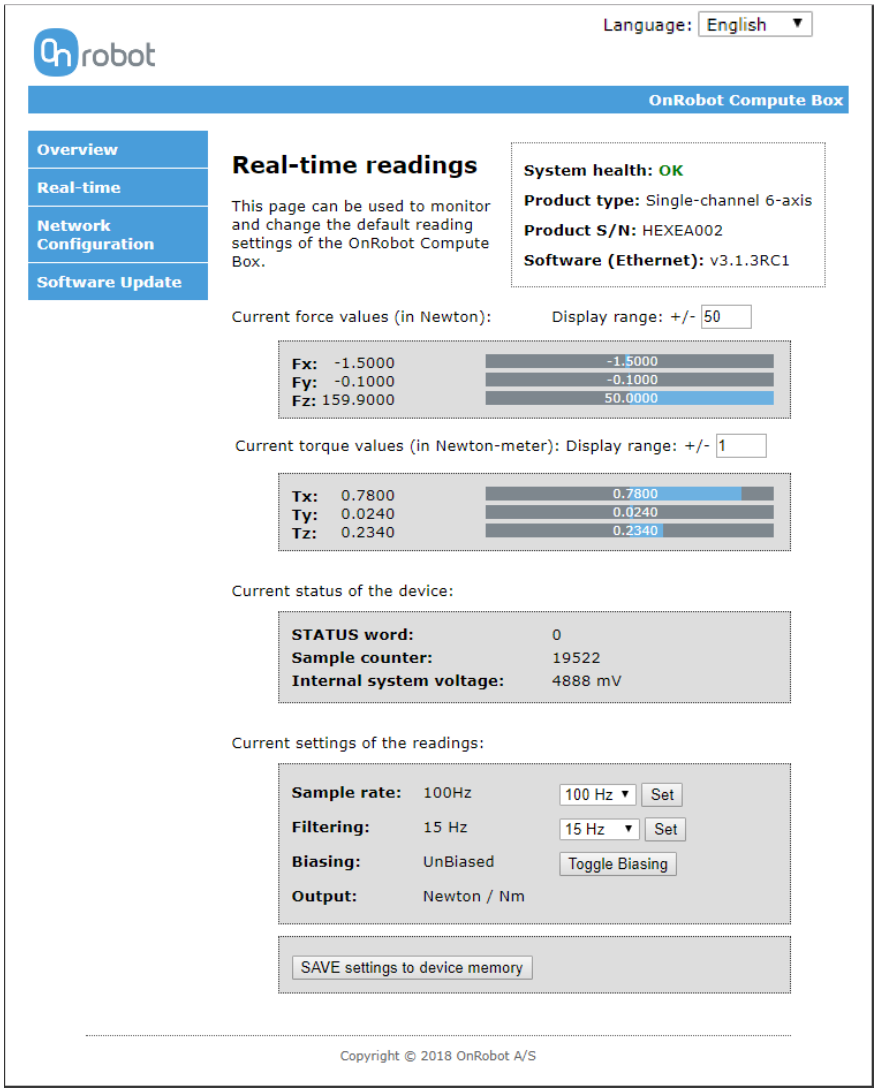
   The following overview page opens:



2.4.2.1 REAL-TIME PAGE

The **Real-time** page, from the top left menu, is used to monitor and change the default reading settings of the OnRobot Compute Box.

> The webpage uses JavaScript to update the page with the most current values. If JavaScript is not enabled in your browser, only question marks will appear.



Elements of the Real-time page are as follows:

- **System health** gives a quick overview of the device. It can have the following values:

OK	The sensor is operating normally
Check status	The sensor is not operating normally. Check the STATUS word. For more information, refer to **STATUS Word Does Not Equal "0"**.

- The force and torque values (**Fx**,**Fy**,**Fz** and **Tx**,**Ty**,**Tz**) are shown in Newton/Nm. The **Display range** can be used to alter the range of the vertical bars (has no effect on the readings via other interfaces).

- The **STATUS word** stores the status of the Sensor and Compute Box. The value "0" means no error. If it is not "0", refer to **STATUS Word Does Not Equal "0"**.

- **Sample counter** is an UINT16 value that is incremented after each internal sample of the sensor itself (2ms).

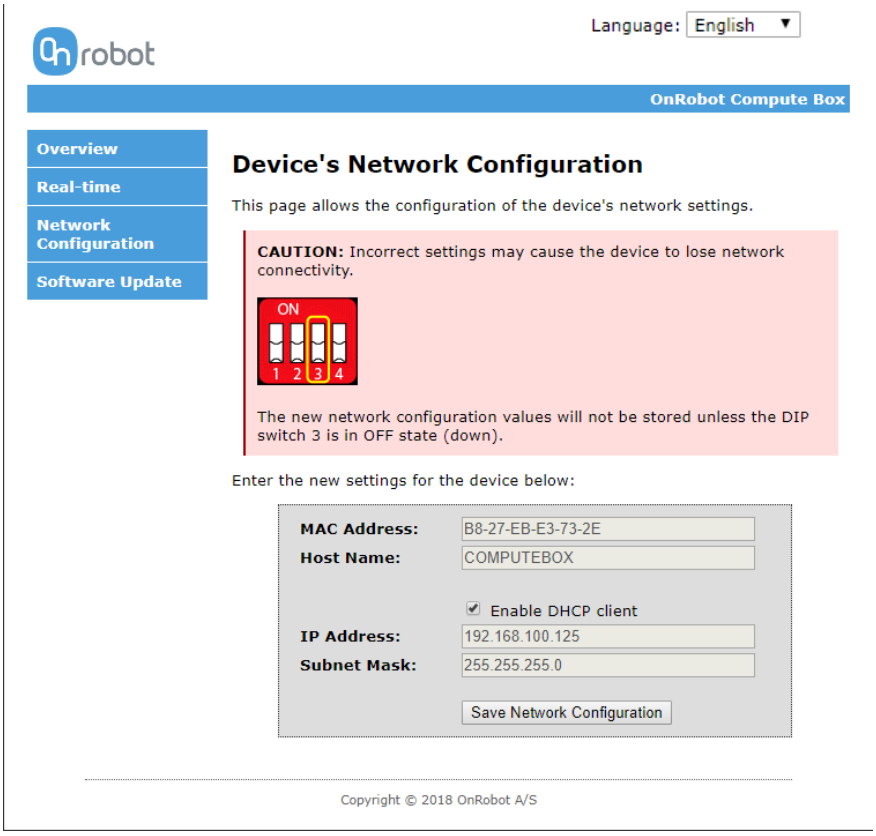
- **Internal system voltage** displays the system voltage of the Compute Box in mV. Healthy value range is 4500-5500 mV, if it is not within this range, Contact OnRobot.

- **Sample rate** is the rate at which samples are sent from the sensor. The default value is 100 Hz, other possible values are: 25 Hz, 50 Hz, 100 Hz, 125 Hz, 250 Hz, 500 Hz.
- **Filtering** displays the internal advanced signal filtering's cut-off frequency and the value can also be set here. The default value is 15 Hz, other possible values are: 1.5 Hz, 5 Hz, 15 Hz, 50 Hz, 150 Hz, 500 Hz, No filter.
- **Biasing** is used to zero the force and torque reading. When the system is UnBiased (default) the force and torque reading should be close to zero (in the range of [-300;+300] Counts). If the **Toggle Biasing** button is clicked, the current values are stored as an offset to make the force and torque values 0.
- **Output** displays the units of the readings in the **Real-time** page. Currently only Newtons and Newton meters are supported.
- By clicking on the **SAVE settings to device memory** button, the current **Sample rate** and **Filtering** can be permanently stored.

> **Biasing** set on this page is not stored permanently and are restored to the default values on power reset.

2.4.2.2 NETWORK CONFIGURATION PAGE

The **Network Configuration** page, from the top left menu can be used to check or change the network configuration of the device.



Elements of the **Network Configuration** page are as follows:

- The **MAC Address** is the world-wide unique identifier that is fixed for the device.
- The **Hostname** is the alternative name by which the device can be accessed on the network, besides the IP address.
- The **Enable DHCP** client checkbox can be used to decide if the Compute Box acts as a DHCP client in the network.

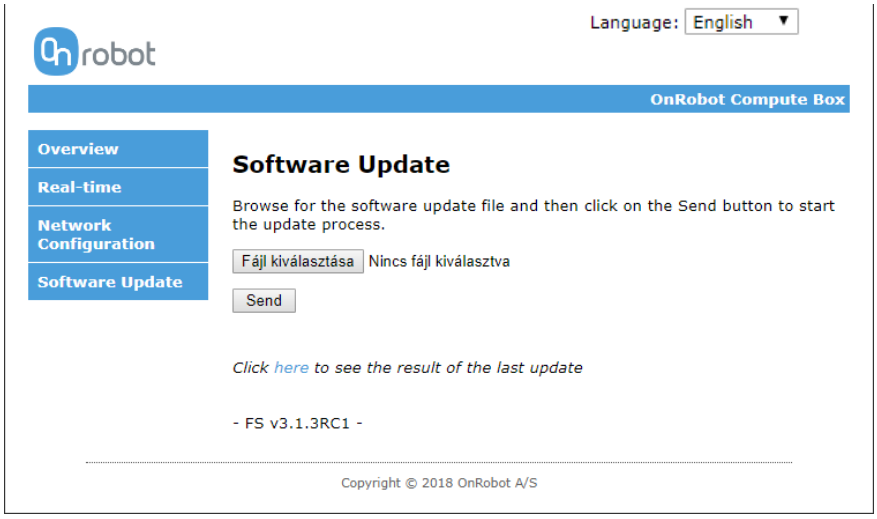
    a. If the DHCP client is enabled, the Compute Box expects an IP address to be given by a DHCP server. If the network that the device is connected to has no DHCP server, then the fixed 192.168.1.1 IP is used for the device.

    b. If the DHCP client is disabled, then the static IP address and subnet mask must be set.

After all parameters are set, click on the **Save Network Configuration** button to store the new values permanently. The next page indicates that the Configuration is in progress, wait 1 minute and reconnect to the device using the new settings.

2.4.2.3 SOFTWARE UPDATE

The **Software Update** page, from the top left menu can be used to update the software on the Compute Box. For more information, see **Update the Compute Box Software**.



2.4.3 UDP Connection

The User Datagram Protocol (UDP) connection can be used to read the sensor's output at a maximal rate of 500 Hz. The UDP can also be used to set the read out, cut-off frequency and to bias the sensor's output.

The UDP protocol has five commands. To start the device outputting the UDP messages, send a request to the device's IP address. The device listens for UDP requests on port 49152. This port is also used for the output messages.

2.4.3.1 COMMANDS

The following five commands are implemented:

Command	Name	Data	Response
0x0000	Stop sending the output	Any value	none
0x0002	Start sending the output	Sample count	UDP record(s)
0x0042	Set software bias	0 or 255 decimal	none
0x0081	Set internal filtering	0-6 decimal	none
0x0082	Set read-out speed	Period in ms	none

The only command with a response is 0x0002, that starts sending of the output. The other commands are not acknowledged, therefore have no response.

2.4.3.2 REQUEST

The commands must be sent to the device as a request with the following structure:

```
UINT16    Header;        // Must be 0x1234
UINT16    Command;       // Value according to the command table
UINT32    Data;          // data according to the actual command
```

The byte count of the request must be 8 bytes and multi-bytes values must be sent as high byte first.

2.4.3.3 RESPONSE

The device sends the output as a UDP record that has the following structure:

```
UINT32    HS_sequence;    // The sequence number of the current UDP record
UINT32    FT_sequence;    // The internal sample counter of the Compute Box
UINT32    Status;         // Status word of the sensor and Compute Box
UINT32    Fx;             // X-axis force in 32 bit Counts*
UINT32    Fy;             // Y-axis force in 32 bit Counts*
UINT32    Fz;             // Z-axis force in 32 bit Counts*
UINT32    Tx;             // X-axis torque in 32 bit Counts* (0 if not available)
UINT32    Ty;             // Y-axis torque in 32 bit Counts* (0 if not available)
UINT32    Tz;             // Z-axis torque in 32 bit Counts* (0 if not available)
```

The byte count of the output is always 36 bytes. If less than 36 bytes are received, they are ignored. For multi-byte values the byte order is high byte first.

The `HS_sequence` shows the current number of the output. If the start request was sent with data (sample count) = 1000 then the `HS_sequence` will be starting from 1 and end with 1000. If the data (sample count) was 0, then the output is produced until a stop request is sent.

> The Fx, Fy, Fz, Tx, Ty, Tz values can be converted to Newton/Newton-meter by dividing the force values by 10000 and the torque values by 100000.

2.4.3.4 BIASING

Biasing can be used to zero the force and torque reading. When the system is unbiased the force and torque reading should be close to zero (in the range of -300 to +300 Counts). If the data (bias) is set to 255 (decimal) the current values are stored as an offset to make the force and torque values 0.

If the data (bias) is set to 0 the stored offset resets and the device restores to the unbiased state.

The biasing is not permanently stored and it is restored on power reset to the default unbiased state.

2.4.3.5 FILTERING

Internal filtering can be programmed to have a custom cut-off frequency. There are 7 options:

Data/Filter (decimal)	Cut-off frequency
0	No filter
1	500 Hz
2	150 Hz
3	50 Hz
4	15 Hz
5	5 Hz
6	1.5 Hz

The new value is not permanently stored and is restored on power reset to the default 15Hz.

2.4.3.6 READ-OUT SPEED

The read-out speed is the rate at which new samples are available. This value can be set in the range of 254ms to 2ms, which are 4Hz to 500Hz respectively.

The value can be any number from 0-255. Odd numbers are rounded to the lower even number. 0 stops the read-out. Values other than 0 can be converted to read-out frequency with the following formula:

`1000 Hz / new_value = new_frequency.`

Examples:

Value 2 means: `1000 Hz / 2 = 500 Hz`

Value 51 means: `1000 Hz / 50 = 20 Hz`

The new value is not permanently stored and it is restored to the default 100 Hz on power reset.

> This command overrides the **Sample rate** settings on the **Real-time Page**, and can set values that cannot be selected on that page.

2.4.4 TCP Connection

Transmission Control Protocol (TCP) mode is used to read the sensor's output and status information.

TCP connections are generally slower compared to the UDP connections, and several software and hardware factors can affect the speed of the response (software firewall, router, and so on). For faster read-out speed, it is recommended to use the UDP mode.

In TCP protocol the device is the server and clients can connect to it. The connection is established as follows:

- The device listens for connection on the 49151 TCP port.
- Once a client has successfully established the connection to the device, the client can request data from the device.
- After receiving the request the device replies with the appropriate response.
- After the response has been received by the user, a new request can be sent without reestablishing the TCP connection. If the device does not receive a request for more than 1 second, the connection is closed (timeout) by the device. In this case, the user needs to reestablish the TCP connection to be able to request more data.

Only one TCP connection can be active at any time.

2.4.4.1 GET THE LATEST F/T READING

2.4.4.1.1 REQUEST

A simple command has to be sent to the device as a request that has the following structure:

```
UINT8      Command;           // Must be decimal 0 (0x00)
UINT8      Reserved[19];      // All the 19 value should be 0s.
```

The byte count of the request must be 20 bytes.

2.4.4.1.2 RESPONSE

The device sends the output as a record that has the following structure:

```
UINT16     Header;       // Fixed 0x1234
UINT16     Status;       // Status word of the sensor and Compute Box
 INT16     Fx;           // X-axis force in 16bit Counts*
 INT16     Fy;           // Y-axis force in 16bit Counts*
 INT16     Fz;           // Z-axis force in 16bit Counts*
 INT16     Tx;           // X-axis torque in 16bit Counts* (0 if not available)
 INT16     Ty;           // Y-axis torque in 16bit Counts*(0 if not available)
 INT16     Tz;           // Z-axis torque in 16bit Counts* (0 if not available)
```

The byte count of the response is always 16 bytes with multi-bytes values sent as high byte first.

> The Fx, Fy, Fz, Tx, Ty, Tz values can be converted to Newton/Newton-meter with the help of the conversion parameters. See, **Get the Newton/Newton-meter Conversion Parameters**.

Fx (in Newton) = Fx * ScaleFactor[0] / CPF

Fy (in Newton) = Fy * ScaleFactor[1] / CPF

Fz (in Newton) = Fz * ScaleFactor[2] / CPF

Tx (in Newton-meter) = Tx * ScaleFactor[3] / CPT

Ty (in Newton-meter) = Ty * ScaleFactor[4] / CPT

Tz (in Newton-meter) = Tz * ScaleFactor[5] / CPT

2.4.4.2 GET THE NEWTON/NEWTON-METER CONVERSION PARAMETERS

2.4.4.2.1 REQUEST

A simple command has to be sent to the device as a request that has the following structure:

```
UINT8    Command;          // Must be decimal 1 (0x01)
UINT8    Reserved[19];     // All the 19 value should be 0s.
```

The byte count of the request must be 20 bytes.

2.4.4.2.2 RESPONSE

The device sends the output as a record that has the following structure:

```
UINT16   Header;           // Fixed 0x1234
UINT8    Unit_Force;       // The unit of the calculated Force values
UINT8    Unit_Torque;      // The unit of the calculated Torque values
UINT32   CPF;              // Counts per Force value
UINT32   CPT;              // Counts per Torque value
UINT16   ScaleFactor[6];   // Additional scaling factor (for the Fx,Fy,Fz,Tx,Ty,Tz)
```

The byte count of the response is always 24 bytes with multi-byte values sent as high byte first.

The `Unit_Force` could be (decimal):

0 – No Newton conversion is available

2 – Newton will be the calculated value (this is the default when powered on)

The `Unit_Torque` could be (decimal):

0 – No Newton-meter conversion is available

3 – Newton-meter will be the calculated value (this is the default when powered on)

2.5 USB Connector

The USB Mini B Connector is used to connect the Compute Box with a PC, for using the sensor with the OnRobot Data Visualization (ODV) software.

2.6 Sensor Status Indicator

The Sensor status indicator provides information about the status of the sensor.

Sensor Status Indicator Behavior	Status
Off	No Sensor connected, or Compute Box is booting.
Blinking green light	The sensor is operating normally.
Constant red light	The sensor is not operating normally. Check the STATUS word. For more information, refer to **STATUS Word Does Not Equal "0"**.

2.7 Converter Status Indicator

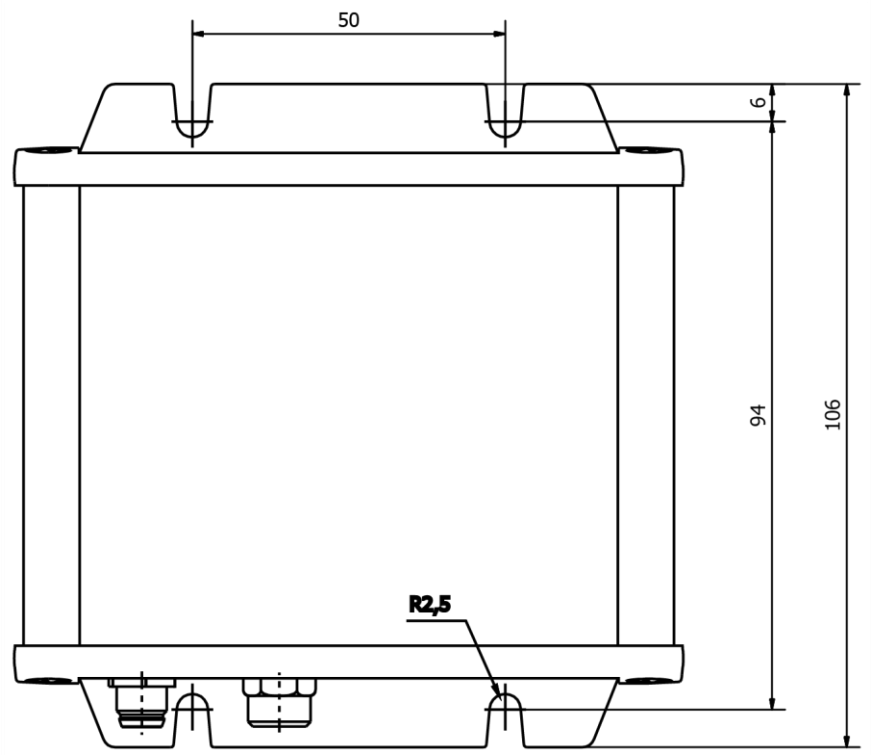
The Converter status indicator provides information about the status of the Ethernet Converter.

Converter Status Indicator Behavior	Status
Blinking blue light	Compute Box is booting.
Constant blue light	Ethernet connection is being established.
Constant green light	The sensor is operating normally.
Constant red light	The Compute Box is not operating normally. Contact OnRobot.

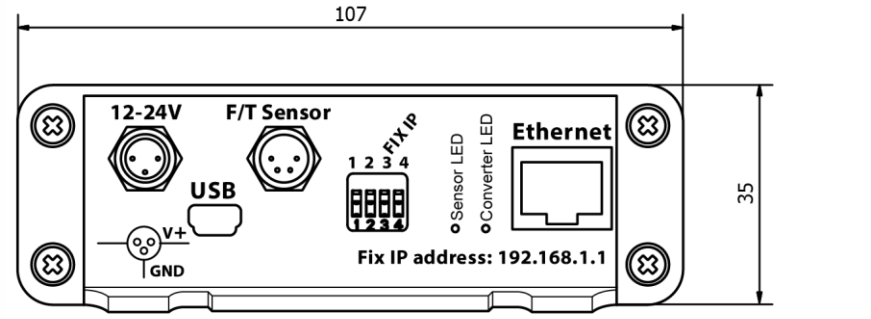
3 Dimensions of the Compute Box

All dimensions are in mm.

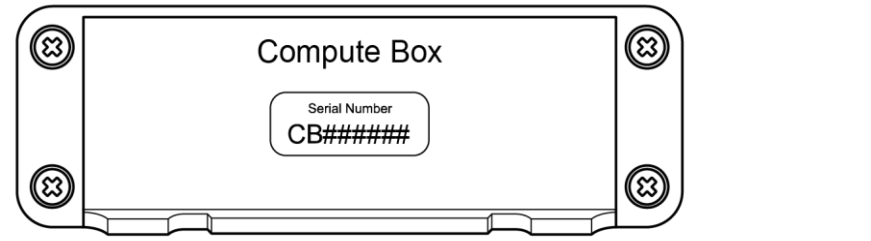
Top view



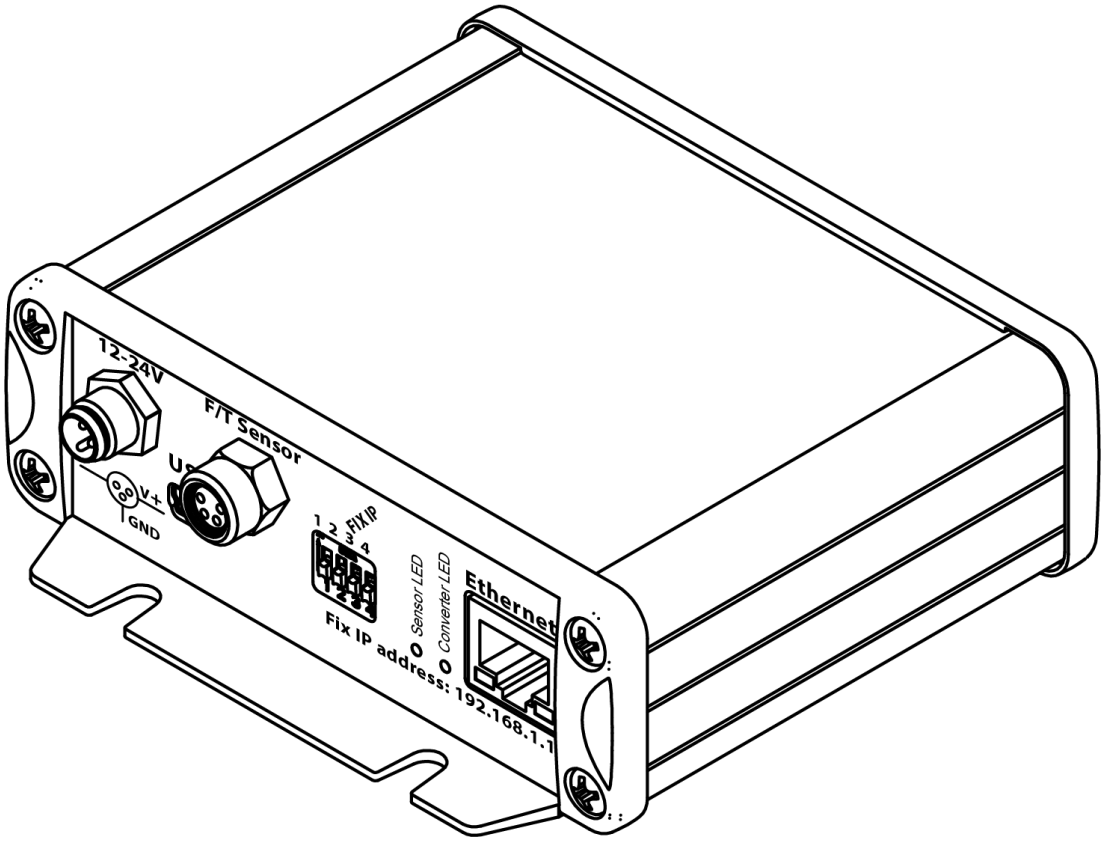
Front view



Back view



Isometric view


12-24V
F/T Sensor
V+
GND
1 2 3 4
FIX IP
Sensor LED
Converter LED
Ethernet
Fix IP address: 192.168.1.1

4 Update the Compute Box Software

4.1 Software Update from 2.6.0 to 3.2.0

To update the Compute Box software from 2.6.0 to 3.2.0, follow this process:

1. Ensure that you have the following files on your computer:

   - Driver_Setup.exe
   - Compute_Box_FW_Updater_v2.6.0_to_v3.2.0.zip
   - Compute_Box_SW_Updater_v3.2.0.osu

   Extract Compute_Box_FW_Updater_v2.6.0_to_v3.2.0.zip to your computer.

   If the Compute Box is not in use, continue with the next step. If the Compute Box is in use, make a note of the network settings, then stop and turn off the robot, and disconnect the Compute Box from its power supply, the sensor, and the robot controller.

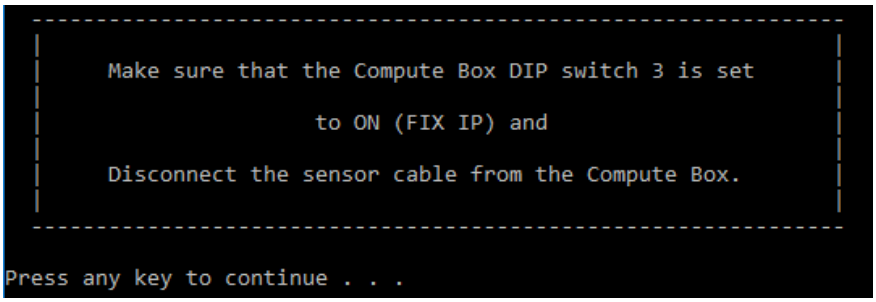
   Put the Compute Box close to your computer or laptop.

   Make sure that DIP switch 3 is set to ON position, and DIP switch 4 is set to OFF position.

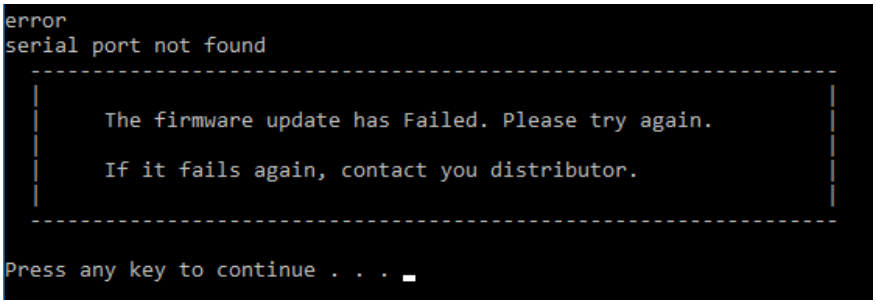
   Connect the Compute Box to its power supply, wait for one minute, and disconnect it from its power supply.

   Connect the Compute Box to your computer by a USB cable.

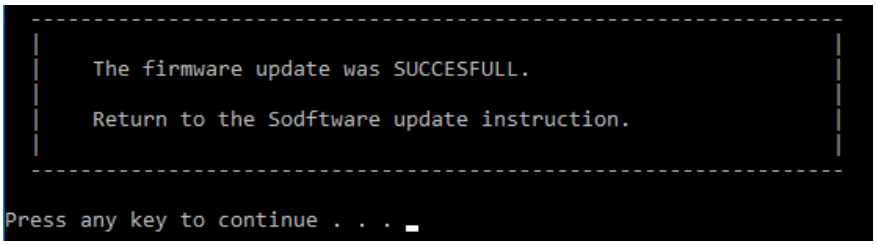
   - On your computer, run the *RUN THIS CB update firmware.cmd* file, extracted from Compute_Box_FW_Updater_v2.6.0_to_v3.2.0.zip.



   If the “serial port not found” message is displayed, install the USB driver to your computer, and run the *RUN THIS CB update firmware.cmd* file again.



Wait until the FW update is finished.



If the FW update is not successful, contact your distributor, otherwise continue with the next step.

Disconnect the USB cable from the Compute Box.

Turn on the Compute Box, by connecting it to its power supply.

Connect the Compute Box to your computer by an ethernet cable, directly.

Wait one minute, open a browser, and type 192.168.1.1 to the address bar.

Click on **Software Update** on the left-side menu.

Click Browse and select the Compute_Box_SW_Updater_v3.2.0.osu file.

Click Send.

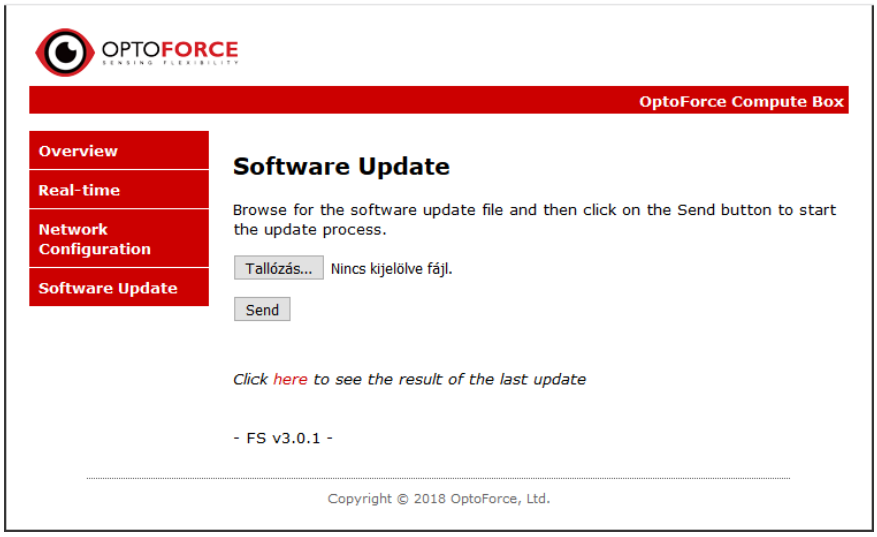
The file upload has been completed and the device is now rebooting to finish the update.

The update will take 5 minutes and DO NOT UNPLUG the power during this time!!!

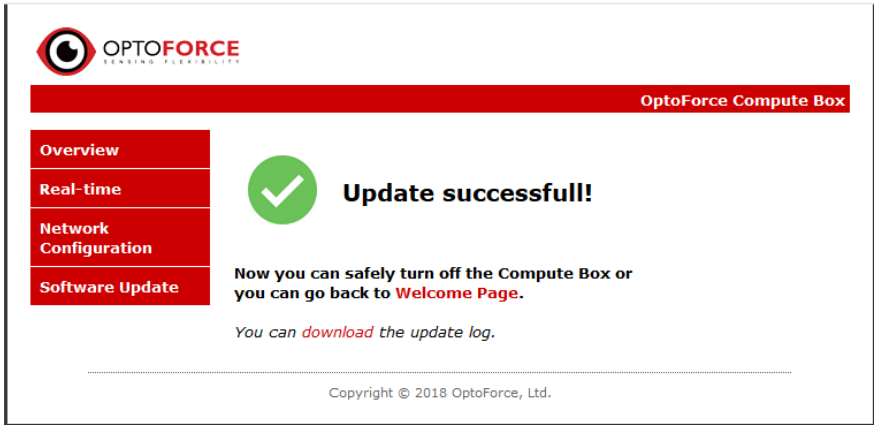
After 5 minutes reconnect to the device and you can use it as normal.

Wait for 5 minutes for the SW update to finish, open a browser and type 192.168.1.1 to the address bar.

Click on **Software Update** on the left-side menu.



Click the word ‘here’ to see the results of the last update.



Disconnect the Compute Box from your computer and from the power supply.

Set DIP switch 3 and 4 back to their original positions and set the original Network Settings from before the update.

4.2 Software Update from 3.0.0 or higher to 3.2.0

To update the Compute Box software from 3.0.0 or higher, follow this process:

1. Ensure that you have the following files on your computer:

- Compute_Box_SW_Updater_v3.2.0.osu

If the Compute Box is not in use, continue with the next step. If the Compute Box is in use, make a note of the network settings, then stop and turn off the robot, and disconnect the Compute Box from its power supply, the sensor, and the robot controller.

Put the Compute Box close to your computer or laptop.

Make sure that DIP switch 3 is set to ON position, and DIP switch 4 is set to OFF position.

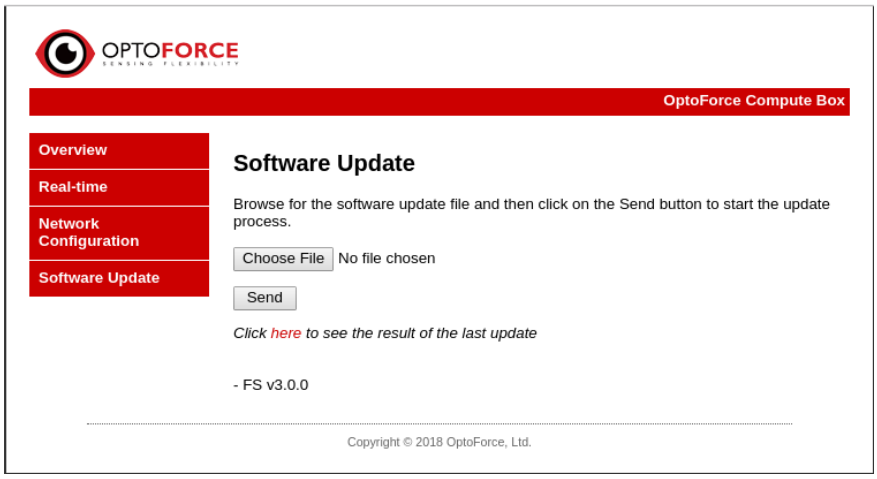
Connect the Compute Box to its power supply, wait for one minute, and disconnect it from its power supply.

Turn on the Compute Box, by connecting it to its power supply.

Connect the Compute Box to your computer by an ethernet cable, directly.

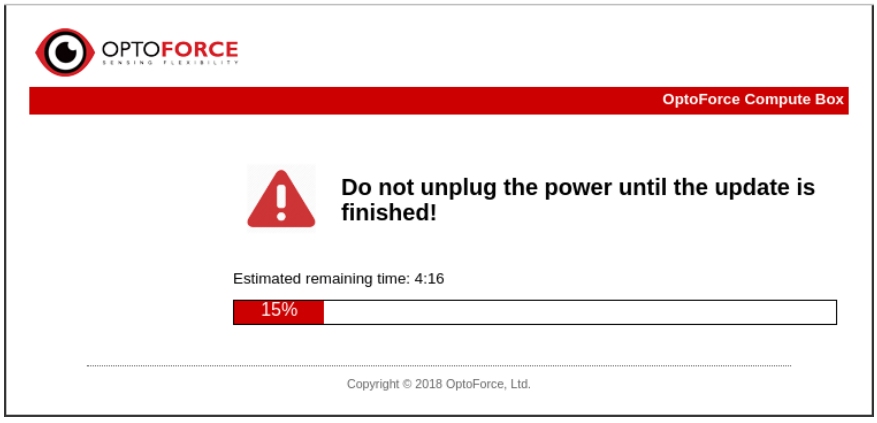
Wait one minute, open a browser, and type 192.168.1.1 to the address bar.

Click on **Software Update** on the left-side menu.

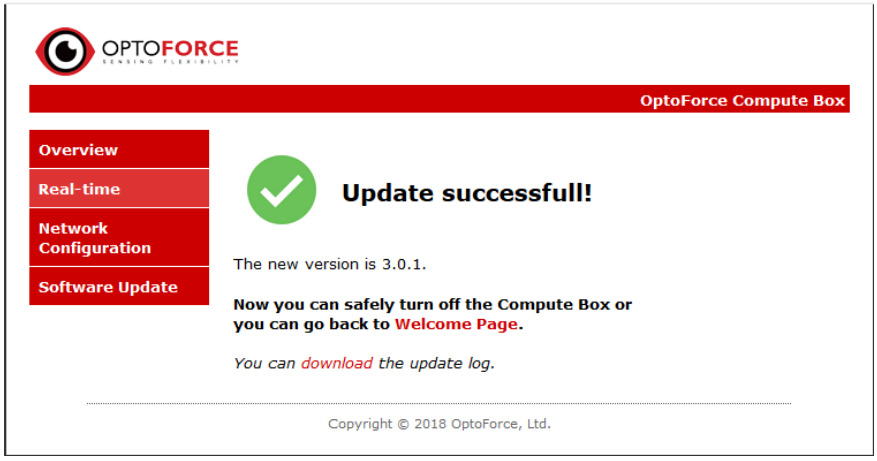


Click Browse and select the Compute_Box_SW_Updater_v3.2.0.osu file.

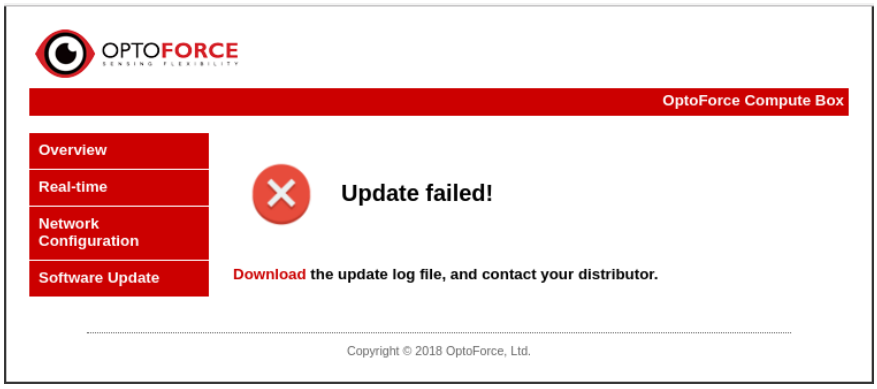
Click Send.



Wait until the SW update finishes.



If the software update is not successful, contact your distributor, otherwise continue with the next step.



Disconnect the Compute Box from your computer and from the power supply.

Set DIP switch 3 and 4 back to their original positions and set the original Network Settings from before the update.

5 Glossary of Terms

Term	Description
Compute Box	A unit provided by OnRobot along with the sensor. It performs the calculations needed to use the commands and applications implemented by OnRobot. It needs to be connected to the sensor and the robot controller.
OnRobot Data Visualization	Data visualization software created by OnRobot, to visualize the data provided by the sensor. Can be installed on Windows operating system.

6 List of Acronyms

Acronym	Expansion
CPF	counts per force
CPT	counts per torque
DHCP	Dynamic Host Configuration Protocol
DIP	dual in-line package
F/T	Force/Torque
IP	Internet Protocol
IT	Information technology
LED	Light Emitting Diode
MAC	media access control
PC	Personal Computer
PoE	Power over Ethernet
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
USB	Universal Serial Bus

7 Appendix

7.1 Troubleshooting

7.1.1 Welcome Page Not Accessible by Hostname

To resolve the problem, follow this procedure:

1. Clear the address caches in the web browser and the OS. Enter `nbtstat -R` to the command prompt in Windows to clear the hostname cache.

   Close your current web browser, open a new web browser and then try to access the hostname again.

7.1.2 Welcome Page Not Accessible by IP Address

To resolve the problem, follow this procedure:

2. Close the browser and reopen it (it might have cached a previous webpage).

   Make sure that no hardware/software firewall (or router) blocks the connection between the computer and the Compute Box.

   Restore the network settings to the default values by switching DIP switch 3 ON on the Compute Box. The default values are IP: 192.168.1.1 and subnet mask to 255.255.255.0 with DHCP client off.

7.1.3 STATUS Word Does Not Equal "0"

To resolve the problem, follow this procedure:

Convert the STATUS word to a binary number, find the source of the error in the table below, and follow the instructions in the Solution column. In the table below, 0 is the least significant bit, and 15 is the most significant bit.

For more information on the Status word, refer to section **Real-time Page**.

Bit	Function	Solution
All bits (Status word is 65535)	No sensor is attached	Disconnect the Compute box from power, make sure that the sensor is connected to the compute box with an undamaged cable, and power on the Compute box. Wait for 30 seconds, and if the error persists, gather information about the situation in which this error occurred, and contact your distributor.
0-3	Reserved	
4	OVERLOAD – in Fx	Eliminate the circumstances that cause the sensor to be overloaded, that is, offload the sensor.
5	OVERLOAD – in Fy	
6	OVERLOAD – in Fz	

7	OVERLOAD – in Tx	
8	OVERLOAD – in Ty	
9	OVERLOAD – in Tz	
10-11	Sensor Failure	Gather information about the situation in which this error occurred, and contact your distributor.
12	Reserved	
13	Sensor power or EEPROM error	Gather information about the situation in which this error occurred, and contact your distributor.
14	Communication error between the sensor and the Compute Box	Disconnect the Compute box from power, make sure that the sensor is connected to the compute box with an undamaged cable, and power on the Compute box. Wait for 30 seconds, and if the error persists, gather information about the situation in which this error occurred, and contact your distributor.
15	Reserved	

7.2 Editions

Edition	Comment
Edition 1	This is the first edition of this document.
Edition 2	Section 'Update the Compute Box Software' added. Compute Box dimensions corrected. Indicator behavior corrected.
Edition 3	Instructions in section 'Software Update from 2.6.0 to 3.0.0' corrected.
Edition 4	Software update instructions added for 2.6.0 to 3.0.1 and 3.0.0 to 3.0.1 update paths.
Edition 5	Section Software Update added. Software update instructions added for 3.0.1 to 3.1.0. All screenshots updated in Section Web Access. Section Dimensions of the Compute Box updated with back view with serial number placement. Device boot time corrected to 60 seconds from 30.
Edition 6	Software update instructions added for 3.1.0 to 3.1.1.
Edition 7	Software update instructions updated for 3.1.2. Editorial changes.
Edition 8	New look & feel. Software update instructions updated for 3.1.3.
Edition 9	Software update instructions updated for 3.2.0.