SwemaMultipoint
Manual
3.5.1 Rev 4 JU20190612

Introduction

SwemaMultipoint is a software to calculate and store measured values from up to 8 probes at the time via USB. Stored data can be analysed in a separate program SwemaAnalyse or in any standard spread sheet program.

SwemaMultipoint has three separate windows for:

- Control Board (Setup and store data)
- Graphs (Online measuring and graphs)
- PMV- PPD, WBGT - OT (Graphs of the calculated values PMV, PPD, Wet Bulb Globe temperature and Operative temperature)

Note!

The calculations in Swema Multipoint are done according to ISO7730 standards.

If continuous measuring for a long period, i.e. for several days, disable the save energy function in the PC.

For an ISO7730 setup the SwemaMultipoint program collects data from the probes.

Throughout the manual the settings and the measurements of the three different probes are described:

- **Swema 03 / Swema 03+:** Air velocity and air temperature (Swema 03+ also measures barometric pressure)
- **Swema 05:** Black globe temperature
- **HygroClip2:** Relative humidity (and air temperature but not used)

Installation

Run the setup program file to install SwemaMultipoint software.
During installation you can see the default file location where the program is installed under folder "SWEMA MULTIPOINT".
In this folder the USB driver for the HygroClip2 probe is found. To install the driver, run the CDMxxxxx_Setup program.
Note! This driver is so-called unsigned and in Windows 10 you may need to disable driver control. The USB-drivers for Swema 03/03 + and Swema 05 are automatically installed the first time you connect them to your computer. ***Note!*** *Connect each sensor one by one to remember the COM port number for each sensor.*
Step 1: *Start connecting HygroClip2 sensors, go to "Device Manager" then "USB-controllers", double click "USB-Serial Converter", click "Advanced" click in the box "Load VCP". (This is only done the first time your PC gets in contact with the HygroClip2 sensor).*
Step 2: *Unplug HygroClip2 connector from PC, reconnect. After that, the transducer should come up at the "Ports" (Device Manager) having the sensor's COM ports number! To connect correctly in SwemaMultipoint.*
Step 3: The other two sensors (Swema 03 and Swema 05) should get in touch immediately. "Gates" then get in contact again, connect one by one to remember the number for each donor. The USB drivers for Swema 03, Swema 05 and HygroClip2 sensors must be installed before using the program.

Settings

Select in **Control Panel** (A in Fig.1)

- Decimal separator, Point or Comma (1)
- Select channels for the probes (2), click on the box to the right of the channel number. Channel 1 to 6 for Swema 03/03+ and Swema 05, Channel 7 and 8 for humidity relative probe HC2A-S
- Connect one probe at the time and select the COM-port or USB number (3) corresponding to the probe. When clicking on the arrow, a window is showed with the active comports (COM) and the word Refresh. Click on Refresh to be sure the program identifies the COM-ports, then select any of them. Repeat the procedure with the other probes. Each COM-port should be unique for each probe. For this manual the following channels are selected:

  Swema 03:   Channel 1
  Swema 05:   Channel 2
  HC2A-S: Channel 7
- Select the corresponding parameter for the probes (4) by ticking the right box, "DR" for Swema 03/03 and "Dew, Wet, MR" for HC2A-S. Not needed for Swema 05.
- Select the Measuring period, time between reading (sampling frequency) and the time when to stop the program automatically (5). The recommended values by the standard ISO7730 are the default values for SwemaMultipoint:

  Measuring period: 180 seconds
  Sampling frequency: 0,1 second (10Hz)
  Automatic stop: from 0,05h to any other selected time

Note!

In order to get enough calculated values for the graphs of PMV-PPD, WBGT-OT the measurement should be done under at least 0,5h (30 min). During this time 10 averages calculated values are displayed in a graph in the window "PMV PPD" and "WBGT OT" (C). Do not forget to tick the box after the time has been selected.

- Store the measured values (6). Click on the Folder icon and follow the guide in paragraph 4

Online measurement modes

The following measured and calculated values can be displayed in the different modes:

1all: Parameter 1, Air velocity, Black globe temperature and Relative humidity.

2all: Parameter 2, Air temperature from Swema 03/03+ and HC2-S.

3all: Parameter 3, Barometer pressure measured by Swema 03+.

1av: Calculated average of parameter 1 with respect to set measured period.

2av: Calculated average of parameter 2 with respect to set measured period.

1std: Calculated standard deviation of parameter 1 with respect to set measured period.

2std: Calculated standard deviation of parameter 2 with respect to set measured period.

1max: Maximum value of parameter 1 during set measuring period.

2max: Maximum value of parameter 2 during set measuring period.

**1min:** Minimum value of parameter 1 during set measuring period.

2min: Minimum value of parameter 2 during set measuring period

Draught: Draught Rate (**DR**) calculated during set measuring period.

Mixing Ratio: Mixing Ratio (**MR**) calculated during set measuring period.

Dew Point: Dew Point calculated during set measuring period.
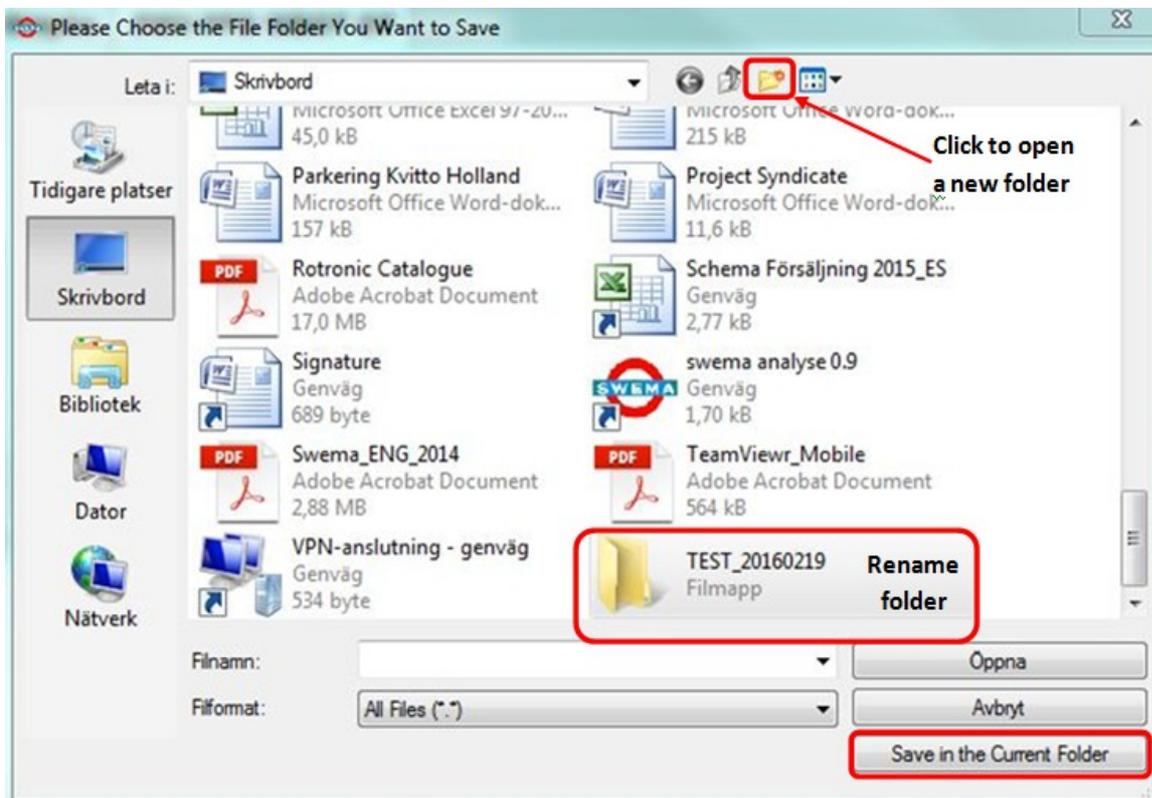
Wet bulb: Web bulb (WB) calculated during set measuring period.
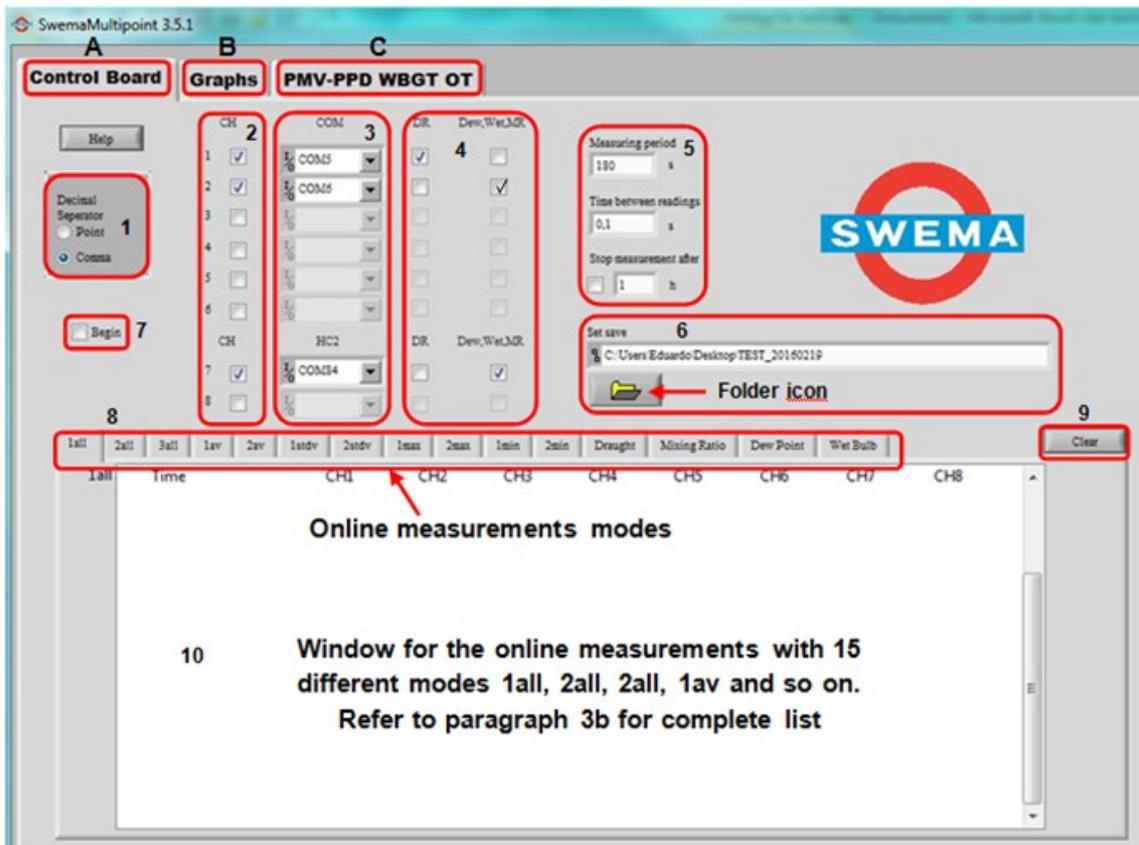
Fig. 1 Settings

Store measurements

To store the measured and calculated values, Click on folder icon (6). Open a new folder in the displayed window and rename it with e.g. the name of the project and the date like TEST_20160119 in *Fig.2* below

**Fig 2. Saving a measurement folder**

Note!

Do not attempt to store in another way, i.e. writing a filename. The measurements listed in 3b are automatically stored with their respective names

Initiate measuring

When the settings are done, initiate the measuring. Click in the box Begin (7). If the command Stop measurement after (5) is not selected, the program stops when the button Stop is clicked on. The button Begin is replaced by Stop when the program is running.

Read the note about automatically stop in paragraph 3
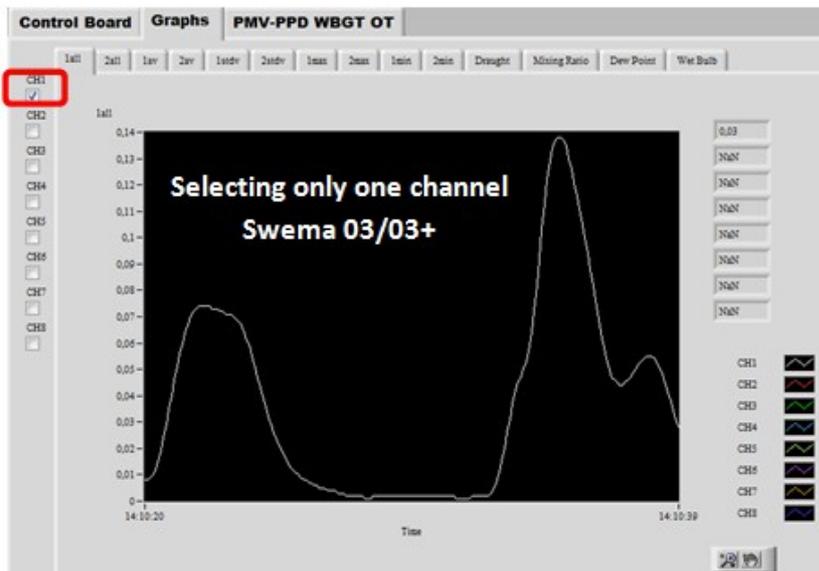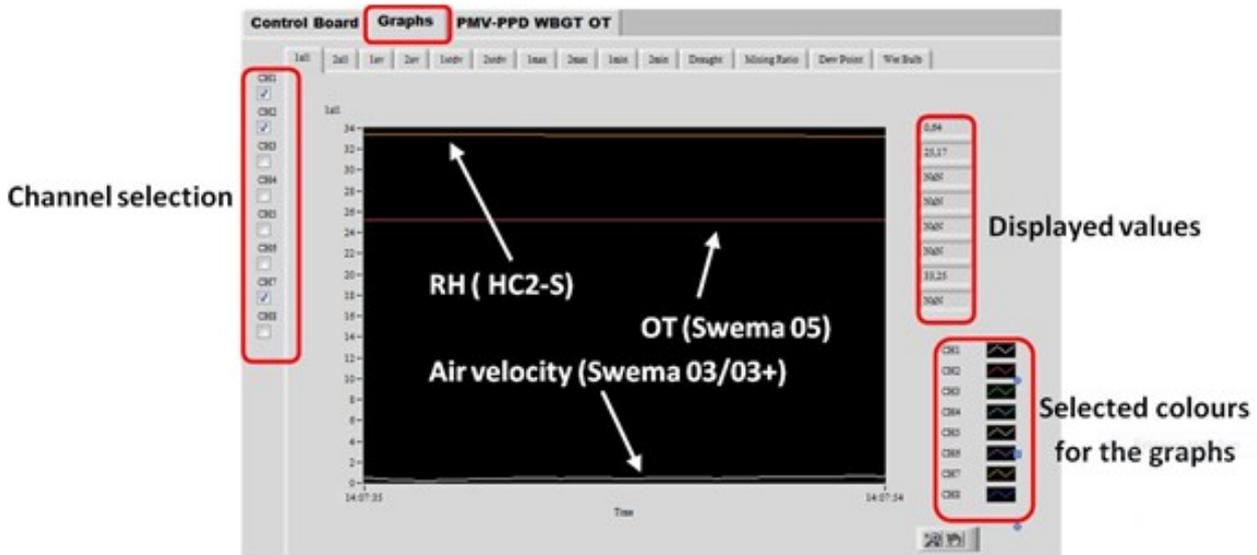
Fig 3. Online Graphs

Online graphs

The online graphs are displayed in **Graphs** (window B)
Fig. on top displays the graphs for the 3 probes. To get a better graph for the fluctuations of the air velocity it is recommended the selection of the channel(s) where the probe(s) Swema 03/03+ are connected. See fig. on the bottom.

Calculations PMV, PPD, WBGT, and OT

To calculate and display the graphs of ISO 7730 parameters, **PMV**, **PPD**, **WBGT**, and **OT**, select the window PMV-PPD WBGT OT (window C).

In this window there are 6 different calculations Cal 1, Calc 2 and so on, to select different scenarios, choosing 6 different workloads (Metabolic rates-MET), 6 different types of clothing the subject(s) are wearing (CLO) or select the alarm boxes between ±1 ±2 and ±3 (PMV Alarm Limit).

Fig. 4 Setting for Calculations
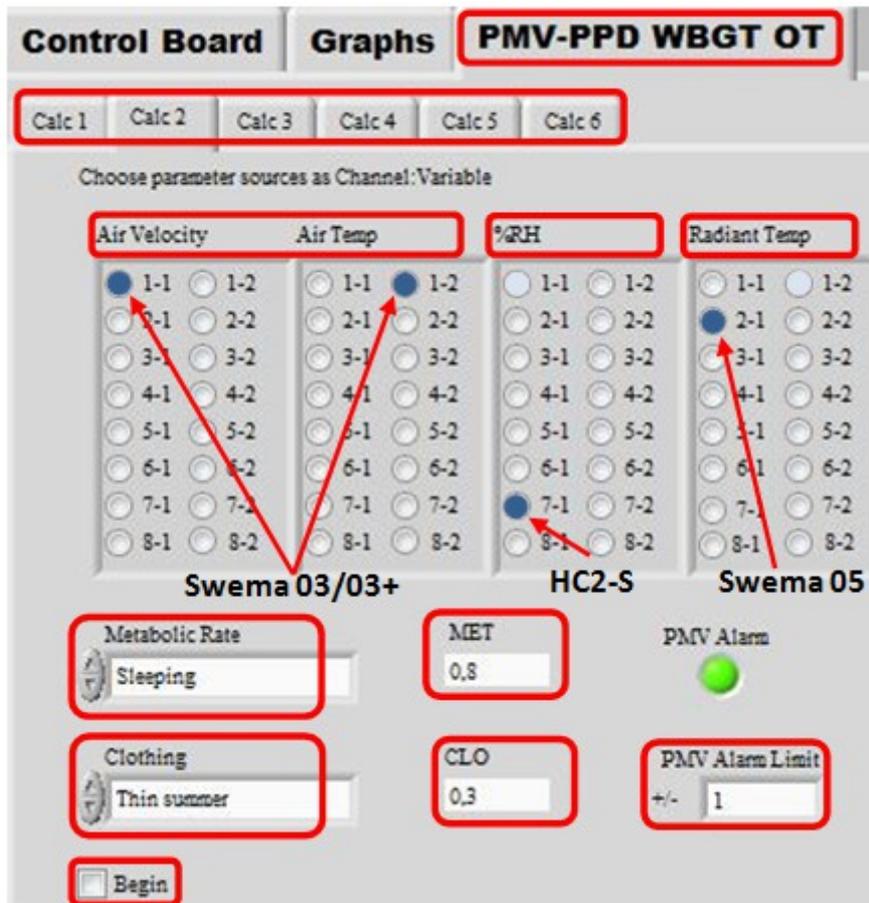
Swema 03/03+ measures the air velocity (channel 1, parameter 1) and the air temperature (channel 1, parameter 2).

Swema 05 measures the radiant temperature (channel 2, parameter 1).

HC2-S measures the relative humidity (channel 7, parameter 1).

With the Up/down arrows the work load (Metabolic Rate) and Clothing types are changed. The alarm button shining green turns red when the written limit is exceeded.

To initiate the calculations, click on Begin. While the calculations are performed the button Begin changes to Stop.

PMV and PPD Calculations and Graphs
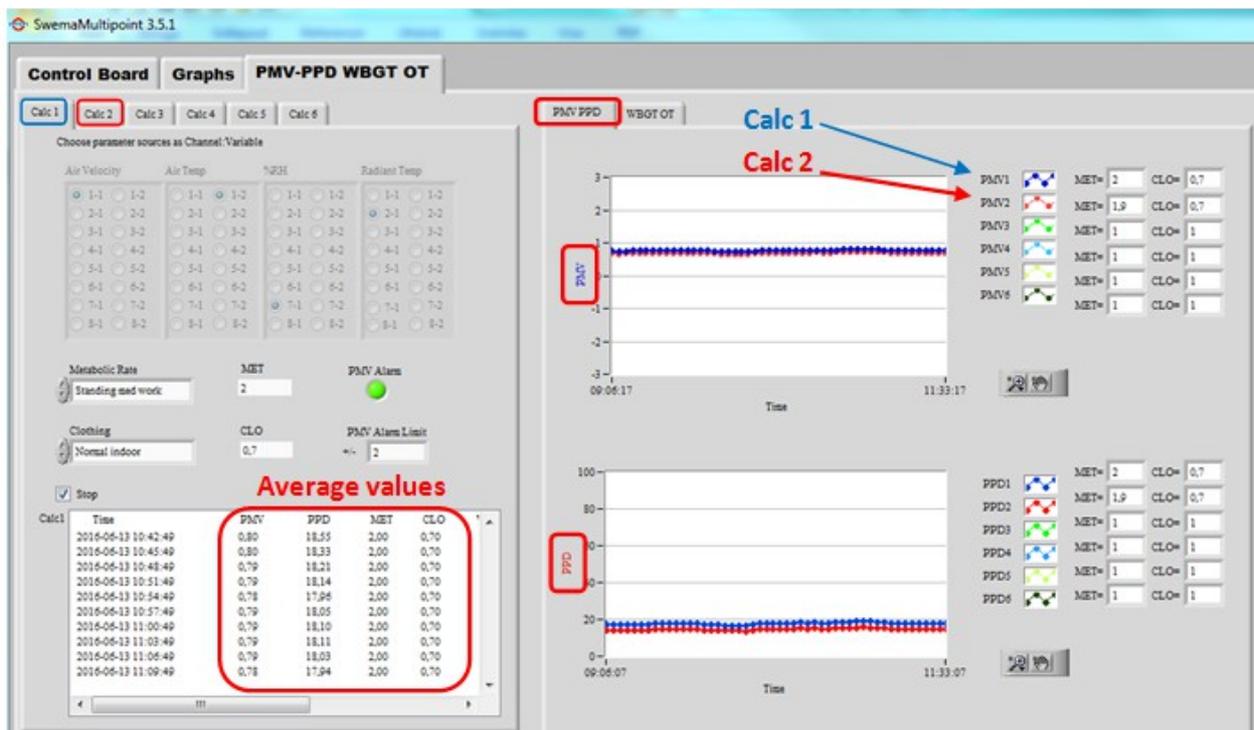
Fig. 5 PMV and PPD Calculations and Graphs

WBGT and OT Calculations and Graphs
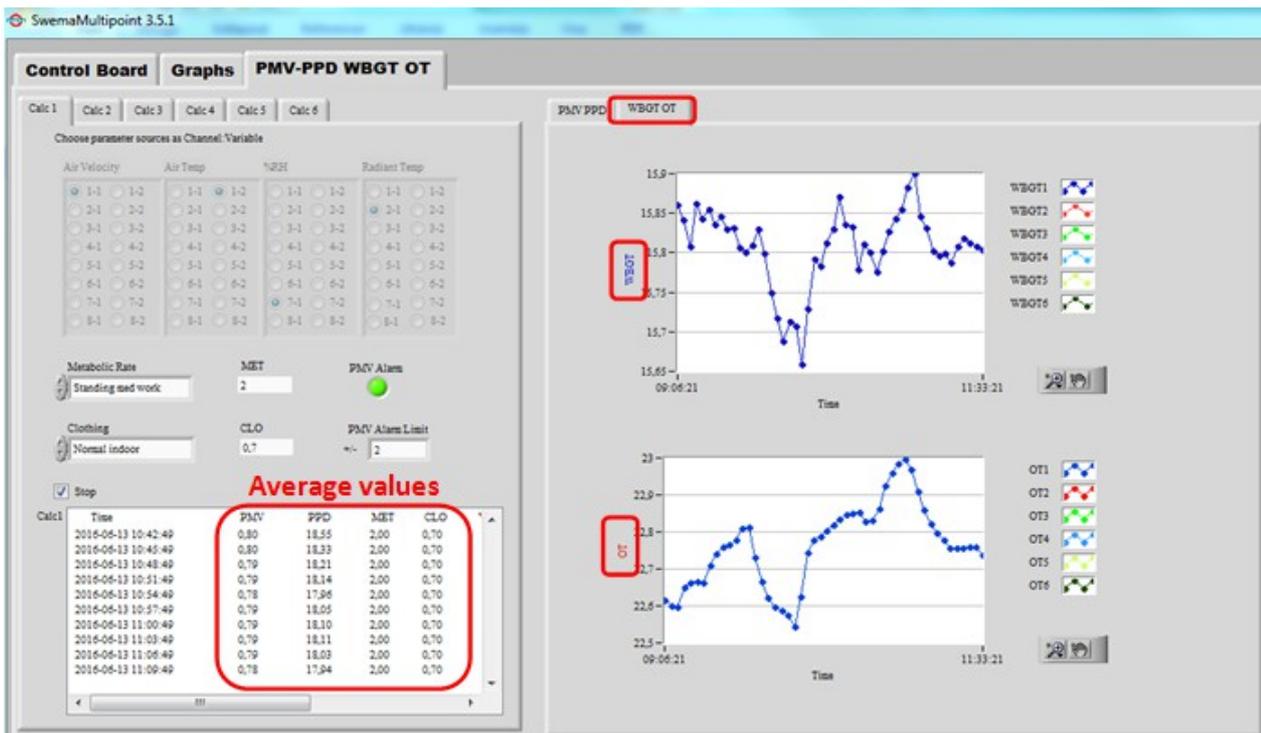
Fig. 6 WBGT and OT Calculations and Graphs

The average values for **PMV**, **PPD**, **WBGT**, and **OT** are calculated from 1800 measured values as a result of measuring periods of 3 min (180 seconds) and sampling frequency of 10 Hz (180x10). Every point in the graphs is an average of those 1800 measured values. Those values are stored in the online measurement (Paragraph 5).