LED-Panel RGBW-L084

Manual

1st edition

File: LEDPanelRGBW_3c

Heinz Walz GmbH • Eichenring 6 • 91090 Effeltrich • Germany
Phone +49-(0)9133/7765-0 • Telefax +49-(0)9133/5395
E-mail info@walz.com • Internet www.walz.com

Contents

1 Safety Instructions

1. Read the safety instructions and the operating instructions first.
2. Pay attention to all the safety warnings.
3. **The LED-Panel RGBW emits strong light, which may harm your eyes!**
4. Keep the device away from water or high moisture areas.
5. Keep the device away from dust, sand and dirt.
6. Always ensure there is sufficient ventilation.
7. Do not place the device anywhere near sources of heat.
8. Connect the device only to the power source indicated in the operating instructions or on the device.
9. Ensure that no liquids or other foreign bodies can find their way inside the device.
10. The device should only be repaired by qualified personnel.

2 Introduction

The LED-Panel RGBW-L084 is an illumination attachment for the Gas-Exchange Chamber 3010-GWK1. It includes the LED colors red, green, blue and white, which can be set individually. The total output is 2000 µmol m^{-2} s^{-1} or better.

After closing the gas exchange chamber with at least two of the eight knurled screws positioned in the edges the LED-panel can be attached with its black distance elements.

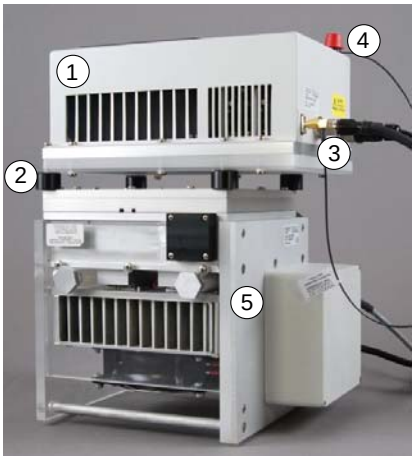


Fig. 1: Mounting LED-Panel RGBW-L084 with an attached Micro Quantum Sensor (MQS/B - optional) on top of Gas-Exchange Chamber 3010-GWK1

1. LED-Panel RGBW
2. black distance elements
3. connectors
4. Micro Quantum Sensor MQS/B (optional)
5. Gas-Exchange Chamber 3010-GWK1

3 Operation

3.1 Setting up the System

To connect the LED-Panel RGBW-L084 to the Gas-Exchange Chamber 3010-GWK1 use the cable connecting the connectors "LIGHT" (gas exchange chamber) with "DATA" (LED-panel). Gas exchange chambers with serial numbers lower than MEBB114 need to be connected via a cable connecting the COMP connector of both devices, because the connector "LIGHT" of the gas exchange chamber is not connected internally.

3.2 Starting the Software

For setting up the GFS-Win software, see manual of the GFS-3000. The LED-Panel RGBW can be used alone or connected to 3010-GWK1 with or without a GFS-3000 gas exchange system.

3.2.1 GFS-3000, Gas-Exchange Chamber GWK1 and LED-Panel RGBW

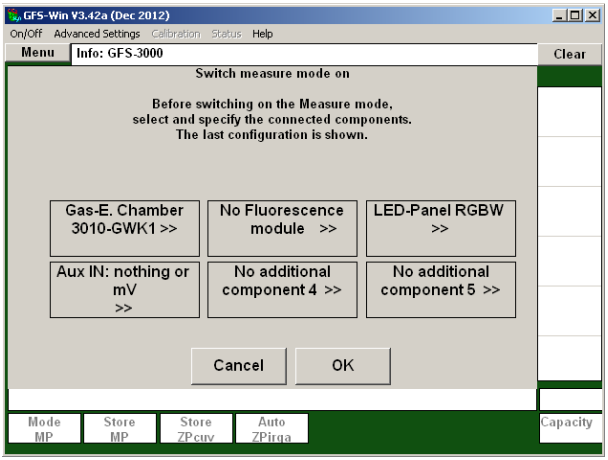
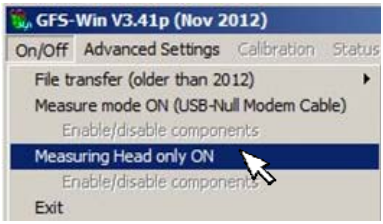


Fig. 2:Choosing Gas-E. Chamber 3010-GWK1 and LED-Panel RGBW in GFS-Win and on the Panel PC

To work with the GFS-3000 switch the Measure Mode on (*System→ Measure Mode on* as described in the GFS-3000 Manual) choosing the components Gas-E. Chamber 3010-GWK1 and LED-Panel RGBW.

3.2.2 Gas-Exchange Chamber GWK1 and LED-Panel RGBW



If the LED-Panel RGBW and Gas-Exchange Chamber 3010-GWK1 are directly connected to a computer with the optional interface 3010-I/GWK (no GFS-3000 used), start the measurement in GFS-Win with *System→Measuring Head only ON*. Enable Gas-Exchange Chamber 3010-GWK1 and LED-Panel RGBW in the appearing window (Fig. 3) and confirm by clicking OK.

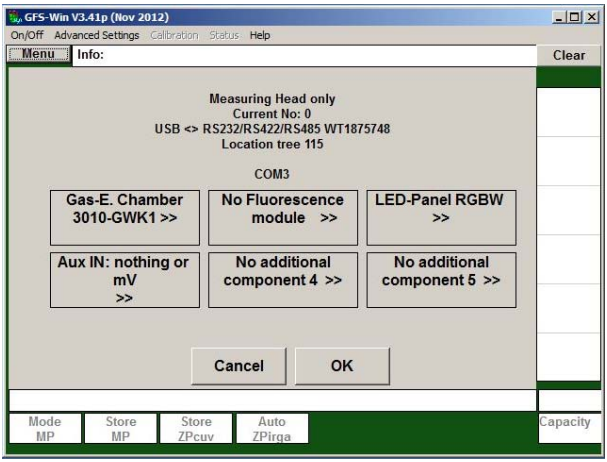


Fig. 3: Choosing 3010-GWK1 and LED-Panel RGBW with Measuring Head only On

3.2.3 LED-Panel RGBW separately

If the LED-Panel RGBW is used separately (connected to a computer with the optional interface 3010-I/GWK) enable it with *System→Measuring Head only ON*, choose LED-Panel RGBW only.

3.3 Adjusting LED-Panel RGBW Light Regime

The radiation emitted from the LED-Panel RGBW is determined by the defined color mixture and the percentage of brightness set as described in the following sections.

The LED-Panel RGBW offers four LED colors red, green, blue and white. Each color can be adjusted individually by its control element displayed under LP (**L**ED-**P**anel) in the *Settings* window of the GFS-Win software. Clicking a control element opens up a dialog window (see Fig. 4), where the intensity-step value for the chosen color can be entered.

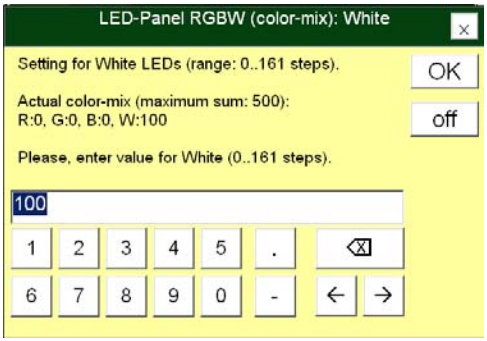


Fig. 4: Dialog window LED-Panel RGBW (color-mix): Red

Identical set-values of different colors result in the same PAR-value (± 5% or ±3 µmol $m^{-2}s^{-1}$, whatever is bigger). There is a restriction of

the total current, therefore the sum of the intensity-steps of all colors may not be higher than 500 steps.

Since green LEDs are weaker than the others, the intensity-step range of the green LEDs is smaller than the step range of the other LEDs. A typical range of LEDs is shown in Tab. 1. It may vary with different instrument as indicated in the software.

Tab. 1: Typical LED step range

Color	**intensity-step**
Red	0...165
Green	0...100
Blue	0...183
White	0...161

The total brightness of the LED-Panel RGBW is set by the control field "total". The entry ranges from 0 to 100% and multiplies the color-mix (see Fig. 5).

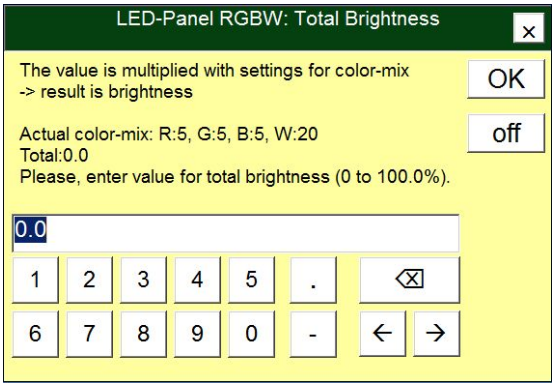


Fig. 5: Dialog window LED-Panel RGBW: Total Brightness

Note: The minimum setting resulting in some light is (Color x Total =3; e.g. Color = 10 and Total = 0.3% or Color = 1 and Total = 3%).

The values indicated in the values window (see red mark in Fig. 6) or report are not the set-values but the set-values multiplied with the total value and divided by 100 resembling the light intensity of each color and the color mix in RGBW x T. This data is displayed in row 7 in the values window of the GFS-Win software, please scroll down or hide rows (as described in chapter 5.1).

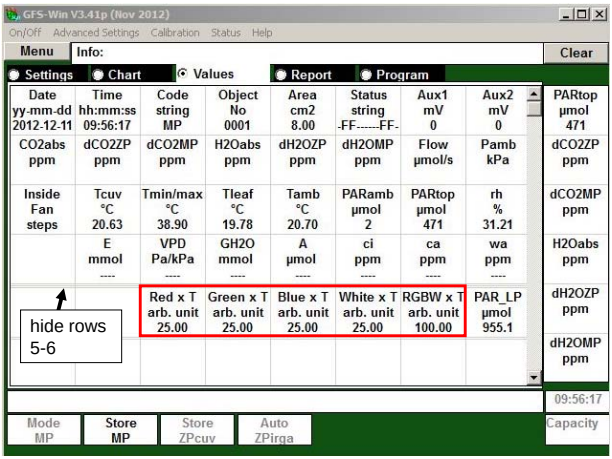


Fig. 6: LED-Panel RGBW values are displayed in row 7 of the values window

3.4 PAR sensor

An external PAR sensor (PAR_LP) can be connected to the LED-panel via the connector for the Miniature Quantum Sensor MQS-B/GFS (see 6.1). The PAR measurement at the Gas Exchange Chamber 3010-GWK1 ranges up to about 2300 µmol m^{-2} s^{-1}. If the same PAR sensor is connected to the LED-Panel RGBW-L084 instead, the measurement range reaches up to 6400 µmol m^{-2} s^{-1}, but the resolution is lower.

If the PAR sensor is connected to the LED-panel, the correct multiplier of the PAR-sensor given in the calibration certificate needs to

be entered with *Calibration→LED-Panel RGBW→Multiplier PAR Sensor* (The value will be stored in the LED-panel).

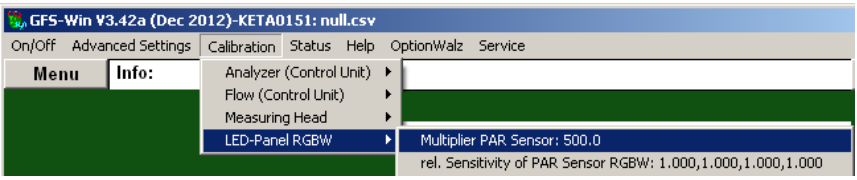


Fig. 7: Multiplier for external PAR-sensor of LED-panel.

An ideal PAR-sensor has the same spectral sensitivity for each color which is within the spectral range of 400 to 700 nm. If this is not the case, correction values for red, green, blue and white can be stored. These correction values are used for the calculation of the indicated PAR value (PAR_LP) as given in the following equation:

$$PAR_{(indicated\ LED-Panel)} = PAR_{(measurred\ @\ LED-Panel)} \cdot \frac{R+G+B+W}{S_R * R + S_G * G + S_B * B + S_W * W}$$

R: Red (steps),
G: Green (steps),
B: Blue (steps),
W: White (steps),
S_R, S_G, S_B, S_W: Sensitivity of PAR sensor for respective color

To adjust the correction values of a given PAR-Sensor a sensitivity value for each color can be entered manually by clicking *Calibration→LED-Panel RGBW→rel. Sensitivity of PAR Sensor RGBW.*

If the PAR sensor is connected to the Gas Exchange Chamber 3010-GWK1, there is no correction for the spectral sensitivity of PARamb.

4 LED-Spectra and System Values

4.1 Spectral Distribution

Fig. 8 shows the spectral distribution of the LED colors red, green, blue and white. Each color was measured with a TriOS Ramses spectrometer at intensity step 50 and total brightness of 50%.

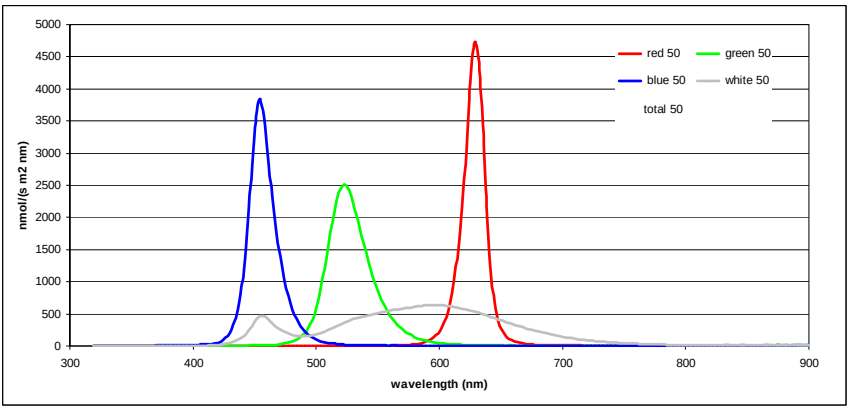


Fig. 8: Spectral distribution of the LED colors: red, green, blue and white each measured at intensity step 50, total 50%

The spectrum, which results from all colors set to the same intensity step, is displayed in Fig. 9.

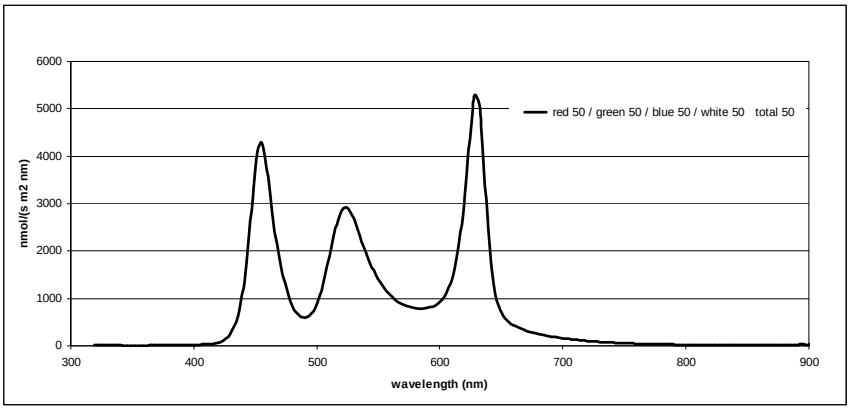


Fig. 9: Spectral distribution of the LED colors: red, green, blue and white measured together at intensity step 50, total 50%

The most continuous spectrum is reached with the color-mix: red 3, green 14, blue 6 and white 145 (see Fig. 10)

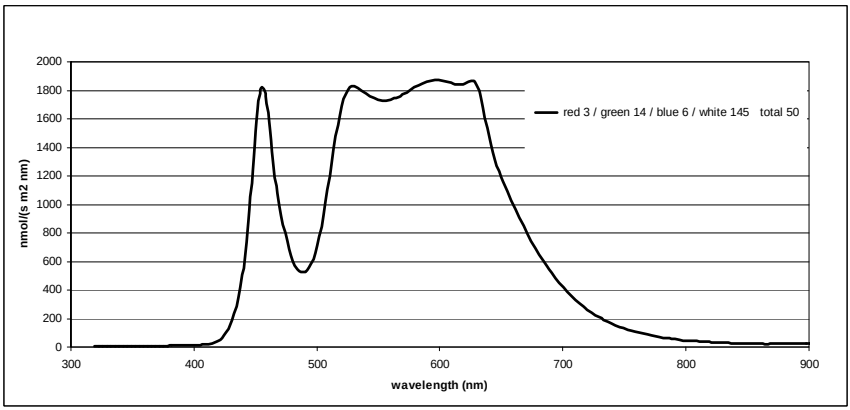


Fig. 10: Spectral distribution of the LED colors mix: red 03, green 14, blue 6 and white 145 at total brightness of 50%

4.2 System Values

Some additional values and constants stored in the LED-Panel RGBW are displayed under *Status* in the Menu Bar.

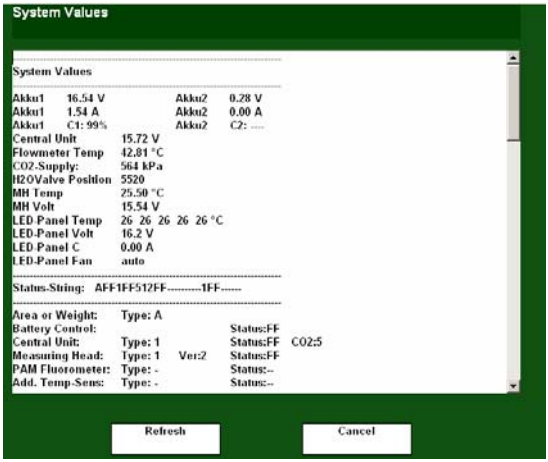


Fig. 11: System Values

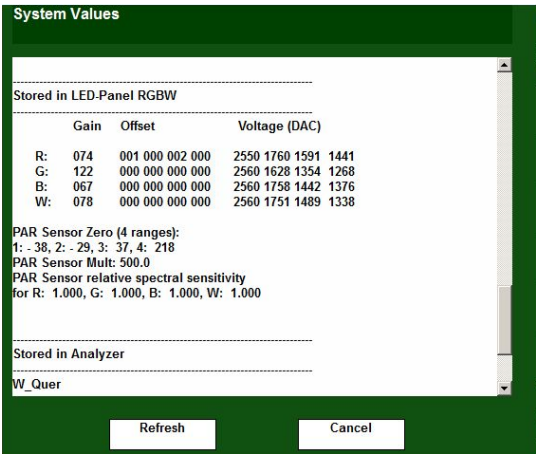
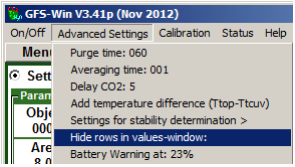


Fig. 12: Component Constants

5 New Features in GFS-Win

5.1 Hiding rows in the value window



Rows which are not of interest can be hidden in the value window. *Advanced Settings→Hide rows in values window:* opens up a dialog window to enter the rows favored for hiding (see Fig. 13).

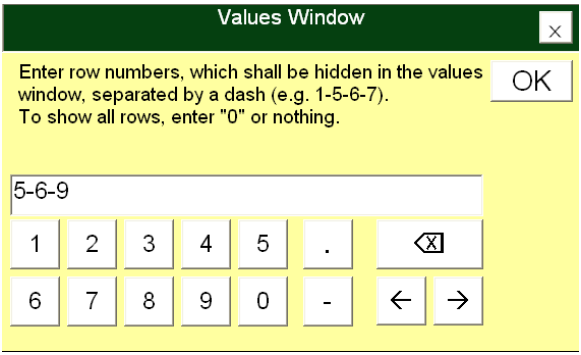


Fig. 13: Dialog window to alter the number of rows displayed in the values window

5.2 Additional programming commands

For general programming information see GFS3000 Manual chapter 9.

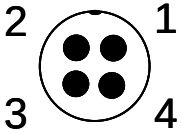
	LED-Panel RGBW
Red =	to set the intensity step value for red colored LEDs
Green =	to set the intensity step value for green colored LEDs

Blue =	to set the intensity step value for blue colored LEDs
White =	to set the intensity step value for white colored LEDs
Red/Green/Blue/White =	to set intensity step values for each color at the same time.
LED-Panel RGBW total =	to enter the total brightness 0-100% or switch the LEDs off.
Red/Green/Blue/White/Tot =	to enter the intensity step values for each color and the total brightness 0-100%

6 Appendix

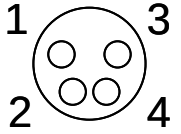
6.1 Pin Assignments of Connectors LED-Panel RGBW-L084

"DC-IN"



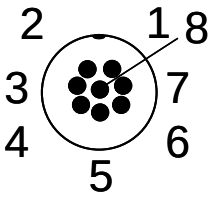
1: input (+15 ... 17 V)
2: GND
3: GND
4: input (+15 ... 17 V)

"COMP"



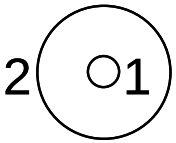
1: RS485/A
2: output (+14 ...16 V)
3: RS485/B
4: GND

"DATA"



1: nothing
2: GND
3: GND
4: GND
5: RS485/B
6: nothing
7: nothing
8: RS485/A

"PAR"



1: cathode
2: anode

Signal-LEDs

LED-Code (main board or power board):

LED Code	**Denotation**
green flashing	no error, communication ok, voltage present
flashing	communication is ok (during last 5s)
continuous	voltage ok, but no communication or boot loader in process
green	no error (temperature and current are not to high)
red	error (e.g. high temperature or current induced switch-off)
red continuous	error and no communication
red flashing	Error, but communication ok
green/red alternating fast	bootloader ready to receive software update

7 Technical Data

7.1 LED-Panel RGBW

Design: LED-Panel fitting to the gas exchange chamber 3010-GWK1: illuminated area 14 cm x 12 cm. LED Colors: red, green, blue and white Maximum Output (all colors together): 2000 µmol m-2 s-1 or better. Air cooled; with separate power supply. Colors can be mixed with Red, Green, Blue, and White in steps of intensity (0 to 100 or more). Total intensity can be chosen in steps of 0.1%.

Color	Wavelength of Maximum	Half band width
Red	625 ±5 nm	620 nm - 640 ±5nm
Green	525 ±10 nm	500 nm - 545 ±10nm
Blue	455 nm ±10 nm	440 ±10 nm - 460 ±10 nm
White	450 nm ±10 nm second peak: 590 ±25 nm	435 nm - 460 ±10 nm 510 nm - 650 ±25 nm with tail up to 900 nm

Homogeneity of light distribution: ± 10% within the 14x12 cm area or ± 3µmol m^{-2} s^{-1} (whatever is bigger).

PAR measurement: PAR sensors with multiplier between -50 and -800 µmol m^{-2} s^{-1} per µA result in a range of 0 to 6400 µmol m^{-2} s^{-1}, resolution: 1 µmol m^{-2} s^{-1}

Fuse: 10 A slow-blow fuse, 5x20 mm

Input voltage: 16 V, 8 A

Voltage inside: up to 36 V

Power supply: : AC Power Supply 3020-N for laboratory operation

Operating temperature: -5 to 45 °C

Dimension: 27 cm x 19 cm x 13 cm L x W x H

Weight: 2.8 kg

7.2 AC Power Supply 3020-N

Design: DC power supply unit for laboratory use

Output voltage: 16 V DC

Output power: 135 W

Mains power supply: 100 to 240 V AC, 50/60 Hz

Operating temperature: 0 to 60 °C

Dimensions: 20 cm x 8 cm x 5 cm (L x W x H)

Weight: 1 kg

7.3 Interface 3010-I/GWK (optional)

Design: USB-RS485 Converter with over voltage protection and connecting cables. For operation of the Gas Exchange Chamber 3010-GWK1 and the LED-Panel RGBW with a PC.

Technical data may change without prior notice.
Please note that especially LEDs are subject to fast technical development and their characteristics may change.

8 Warranty

All products supplied by the Heinz Walz GmbH, Germany, are warranted by Heinz Walz GmbH, Germany to be free from defects in material and workmanship for two (2) years from the shipping date (date on invoice).

8.1 Conditions

This warranty applies if the defects are called to the attention of Heinz Walz GmbH, Germany, in writing within two (2) years of the shipping date of the product.

This warranty shall not apply to

- any defects or damage directly or indirectly caused by or resulting from the use of unauthorized replacement parts and/or service performed by unauthorized personnel.
- any product supplied by the Heinz Walz GmbH, Germany which has been subjected to misuse, abuse, abnormal use, negligence, alteration or accident.
- to damage caused from improper packaging during shipment or any natural acts of God.
- to batteries, cables, calibrations, fiberoptics, fuses, gas filters, lamps, thermocouples, and underwater cables.

Submersible parts of the DIVING-PAM or the underwater version of the MONITORING-PAM have been tested to be watertight down to the maximum operating depth indicated in the respective manual. Warranty shall not apply for diving depths exceeding the maximum operating depth. Further, warranty shall not apply for damage resulting from improper operation of devices, in particular, the failure to properly seal ports or sockets.

8.2 Instructions

To obtain warranty service, please follow the instructions below:

- The Warranty Registration form must be completed and returned to Heinz Walz GmbH, Germany.
- The product must be returned to Heinz Walz GmbH, Germany, within 30 days after Heinz Walz GmbH, Germany has received written notice of the defect. Postage, insurance, and/or shipping costs incurred in returning equipment for warranty service are at customer expense. Duty and taxes are covered by Walz. Accompany shipment by the Walz Service and Repair form available at:
  http://www.walz.com/support/repair_service.html
- All products being returned for warranty service must be carefully packed and sent freight prepaid.
- Heinz Walz GmbH, Germany is not responsible or liable, for missing components or damage to the unit caused by handling during shipping. All claims or damage should be directed to the shipping carrier.