

# Thermoregulator TR 6000

## Instruction Manual and User's Guide

Please read this manual before operating this product



© PSI (Photon Systems Instruments), spol. s r. o. (hereinafter PSI), October 2019

*This document and its parts can be copied or provided to a third party only with the express permission of PSI.*

*The contents of this manual have been verified to correspond to the specifications of the device. However, deviations cannot be ruled out. Therefore, a complete correspondence between the manual and the real device cannot be guaranteed. The information in this manual is regularly checked, and corrections may be made in subsequent versions.*

*The visualizations shown in this manual are only illustrative.*

*This manual is an integral part of the purchase and delivery of equipment and its accessories and both Parties must abide by it.*

# TABLE OF CONTENTS

1	General information .....	4
1.1	Thermoregulator components .....	4
2	Installation .....	5
2.1	Firmware update .....	5
2.2	Hardware installation .....	5
3	Control .....	6
3.1	Manual control .....	6
3.2	FluorWin software control .....	7
4	Warranty Terms and Conditions .....	9
5	Troubleshooting and Customer Support .....	10

## 1 GENERAL INFORMATION

The Thermoregulator TR 6000 is an additional device for Fluorometer FL 6000. The thermoregulating unit is fully operated and powered from the control unit of Fluorometer FL 6000. This device controls and regulates temperature of the liquid samples. The TR 6000 has to be installed on the top of measuring unit of FL 6000 and submersed into the measured sample. Therefore, the optimal volume of the sample in the cuvette is 2 ml.



Magnetic stirrer ensures proper operation of the thermoregulator module. Don't forget to stirr the sample during the regulation.

Controlled temperature range is from +5°C to +60°C. The temperature can be set either manually via the FL control unit or by the protocol using FluorWin software. The actual temperature of the sample is displayed on the touchscreen of FL control unit.

### 1.1 THERMOREGULATOR COMPONENTS

A part of the Thermoregulator module are the following items (Fig. 1):

- Thermoregulating unit
- Holder
- USB stick with firmware update for TR 6000 and guide (optional)

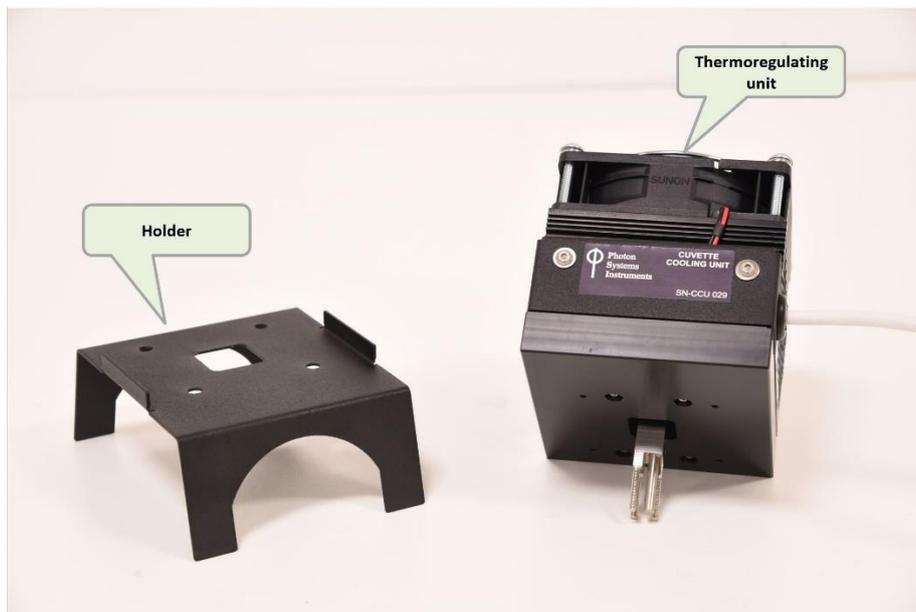


Fig. 1 Thermoregulator components.



If any item is missing, please, contact the manufacturer. Also check the carton for any visible external damage. If you find any damage, notify the carrier and the manufacturer immediately. The carton and all packing materials should be retained for inspection by the carrier or insurer.

For customer support, please write to: [support@psi.cz](mailto:support@psi.cz)

## 2 INSTALLATION

### 2.1 FIRMWARE UPDATE

This procedure is not needed in case that Thermoregulator is delivered with Fluorometer at the same time. The manufacturer ensures that compatible firmware is loaded in FL control unit. Based on this firmware the Thermoregulator can be operated.

Information about supported extensions are available on touchscreen display > Setup > About (Fig. 2).

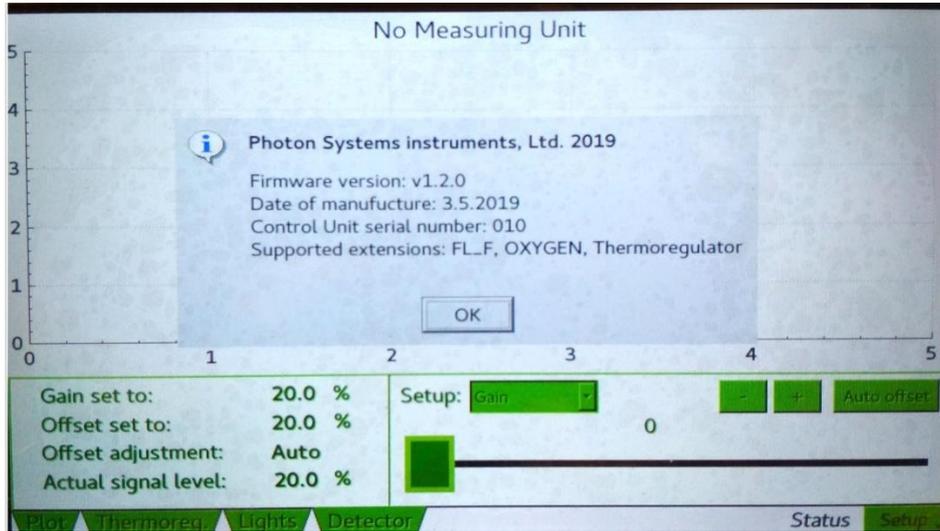


Fig. 2 Table with information about supported extensions.



In case the TR 6000 was ordered additionally, your FL 6000 control unit probably does not support Thermoregulator. Please follow FW Updating guide on USB stick for activation of TR function.

### 2.2 HARDWARE INSTALLATION

Connect the thermoregulating unit cable into thermoregulator connector on the rear side of FL 6000 control unit (Fig. 3).

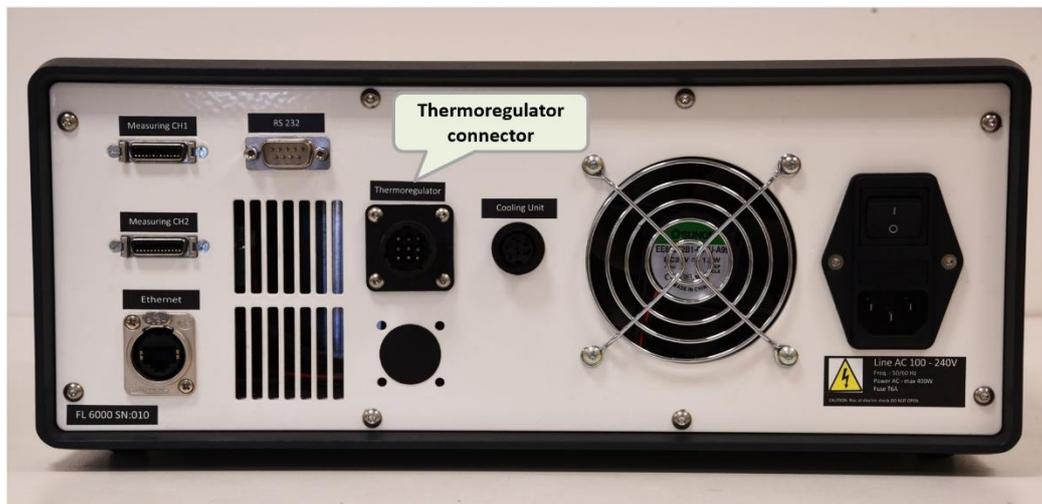


Fig. 3 Rear side of FL 6000 control unit.

### 3 CONTROL

#### 3.1 MANUAL CONTROL

The Thermoregulator can be controlled manually via the touchscreen display of FL control unit (Fig. 4). Left side of the panel informs about actual and set temperature as well as gives information about TR status (cooling, heating or steady) and stirrer. Right side of the panel serves for TR and stirrer control.

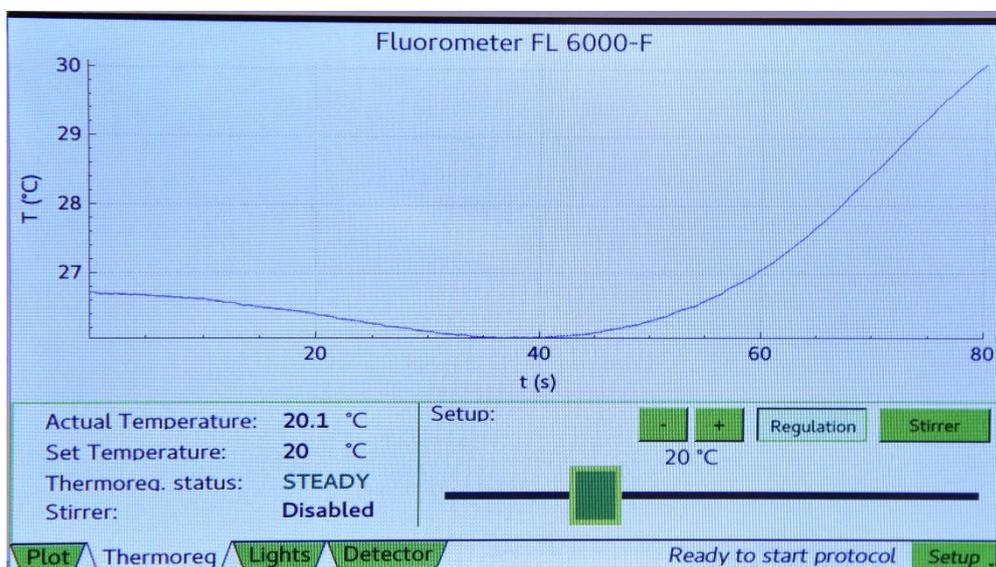


Fig. 4 Thermoregulator display.

- Regulation      activation of temperature regulation, temperature is set using slider
- +              for precise setting of temperature
- Stirrer          enabling or disabling of stirrer

### 3.2 FLUORWIN SOFTWARE CONTROL

For measuring and regulating temperature during the predefined fluorescence protocol select **Measure temperature on channel 2** in Wizard.

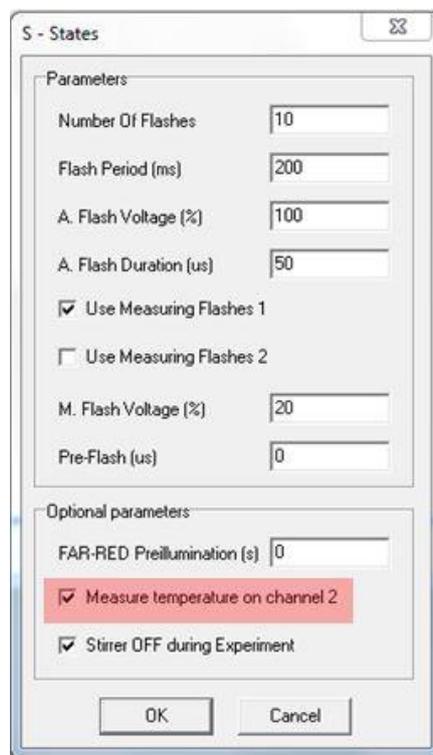


Fig. 5 FluorWin wizard.

The fluorometer protocol has to include the **thermoregulator.inc** in the header (Fig. 6). The .inc file makes the thermoregulator macros accessible from the protocol. This command is added in protocol header automatically if the temperature measurement was enabled in protocol Wizard.

```

Current
; S-states - generated by wizard
; Version MS 2.4.0.0
MeasuringFlash=4us
MeasurDelay=3.5us
AuxDuration=0us
ActinicFlash=50us
PreFlash=0us
include default.inc ; include standard options, don't remove it!
include detector.inc
include thermoregulator.inc
M_Voltage=20Num ; Measuring Flash 1 (Red) Intensity[0.0-100.0]
F_Voltage=100Num ; Actinic Flash Intensity[0.0-100.0]
A1_Voltage=0Num ; Actinic light 1 (Red) Intensity[0.0-100.0]
A2_Voltage=0Num ; Actinic light 2 (Blue) Intensity[0.0-100.0]
FAR_RED_Voltage = 100Num ; FAR RED preillumination intensity[0.0-100.0]
;
;

```

Fig. 6 Include thermoregulator.inc.

FluorWin SW enables:

### Temperature monitoring

Use **m2temp** command for measuring temperature (Fig. 7).

	This command is automatically included in the protocol, if the temperature measurement was enabled in protocol Wizard.
---	--

```
..... Actions .....  
If (PreFlash GR 0) Then  
  <0,Start.Stop>=>mfm1  
Else  
  <0,Start.Stop>=>fm1  
End  
100ms+<0,100ms..Stop-100ms>=>m2temp  
:
```

Fig. 7 Temperature monitoring command.

### Temperature regulation

#### a) Set temperature

The desired temperature is set by *SetTemp* command.

Syntax: <time>=>SetTemp(Temperature in degC)

Example:

<0s>=>SetTemp(20.5)

Means set the sample temperature at 20.5°C in time 0s.

#### b) Start regulation

The device starts temperature regulation. This command can be substitute by enabling regulation on touch screen display.

Syntax: <time>=>StartReg

#### c) Stop regulation

The device stops temperature regulation. This command can be substitute by disabling regulation on touch screen display.

Syntax: <time>=>StopReg

## 4 WARRANTY TERMS AND CONDITIONS

- This Limited Warranty applies only to the SpectraPen device. It is valid for one year from the date of shipment.
- If at any time within this warranty period the instrument does not function as warranted, return it and the manufacturer will repair or replace it at no charge. The customer is responsible for shipping and insurance charges (for the full product value) to PSI. The manufacturer is responsible for shipping and insurance on return of the instrument to the customer.
- No warranty will apply to any instrument that has been (i) modified, altered, or repaired by persons unauthorized by the manufacturer; (ii) subjected to misuse, negligence, or accident; (iii) connected, installed, adjusted, or used otherwise than in accordance with the instructions supplied by the manufacturer.
- The warranty is return-to-base only, and does not include on-site repair charges such as labor, travel, or other expenses associated with the repair or installation of replacement parts at the customer's site.
- The manufacturer repairs or replaces faulty instruments as quickly as possible; the maximum time is one month.
- The manufacturer will keep spare parts or their adequate substitutes for a period of at least five years.
- Returned instruments must be packaged sufficiently so as not to assume any transit damage. If damage is caused due to insufficient packaging, the instrument will be treated as an out-of-warranty repair and charged as such.
- PSI also offers out-of-warranty repairs. These are usually returned to the customer on a cash-on-delivery basis.
- *Wear & Tear Items* (such as sealing, tubing, padding, etc.) are excluded from this warranty. The term *Wear & Tear* denotes the damage that naturally and inevitably occurs as a result of normal use or aging even when an item is used competently and with care and proper maintenance.

## 5 TROUBLESHOOTING AND CUSTOMER SUPPORT

In case of troubles and for customer support, please, visit [FAQ](#) on our websites, write to [support@psi.cz](mailto:support@psi.cz) or contact your local distributor.