PMT

est. 1878

Manual
TV16000

Tamson Instruments bv

1   Safety and Warnings

Make sure before installing or operating the equipment to read and understand all instructions and safety precautions listed in this manual. If there are any questions concerning the operation of the equipment or about the information given in this manual, please contact your local dealer or our sales department first.

Performance of installation, operation, or maintenance other than those described in this manual may result in a hazardous situation and may void the warranty.

Never operate equipment that is not correctly installed. Unqualified personnel must not operate the equipment. Avoid damage to the equipment, or its accessories, caused by incorrect operation.

Important:
- When performing service, maintenance or moving the apparatus, always disconnect at the mains socket of the apparatus.
- Proper skilled and trained personnel are only allowed to operate this equipment.
- Take notice of warning labels and never remove them.
- Refer service and repairs to a qualified technician.
- If a problem persists, call your supplier or Tamson Instruments b.v.

2   Warranty

Tamson Instruments b.v. warrants that all their manufactured equipment is free from defects in material and workmanship preventing the machine from normal operation. Tamson Instruments bv does not warranty that the equipment is fit for any other use than stated in this manual. The manufacturer can only be held responsible for the security, reliability and performance of the equipment when operated in accordance with the operating instructions, extensions, adjustments, changes and/or if repair is performed by Tamson Instruments b.v. or authorized persons only. This warranty is limited to one year from the date of invoicing. All equipment and materials are subject to standard production tolerances and variations.

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3   PRECAUTIONS AND HAZARDS

> **Before attempting to operate the bath read all parts of this manual carefully to ensure proper operation and avoid damage to the equipment or its accessories.**
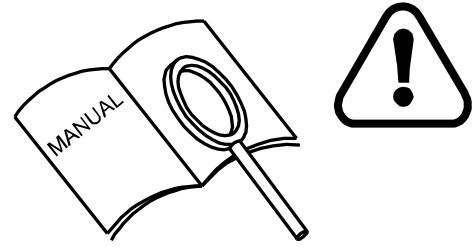
Before attempting to operate the bath read all parts of this manual carefully to ensure smooth operation and avoid damage to the equipment or its accessories. If a malfunction occurs consult the section TROUBLE SHOOTING found on page 23 at the end of this manual. If the problem persists, call your supplier or Tamson Instruments b.v.

Never operate the equipment if not correctly installed. The equipment must be operated only by qualified personnel. Avoid damage to the equipment or its accessories through incorrect operation.

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4 Specifications and precision

4.1 General

Operating temperature low	=	5°C
Operating temperature high	=	60°C
Accuracy	=	0.005°C
Ambient temp fluctuations	=	0.008%

4.1.1 Technical details

2 x 500W DC heater
1500W Boost
Window heating 3 amp

4.1.2 Measurements

4.1.3 Test conditions:
- Ambient control is necessary and kept constant at 19°C +/- 0.8°C
- Used thermometer is calibrated F250. Calibration report reference
- Bath medium: tap water

4.1.4 Heating cooling rates
Heating to SP 20°C
First with boost heater
Second, without boostheater (18.2°C)

Heating:

Heating to SP 20°C Boost - No Boost

Heating PV40°V to 60°C

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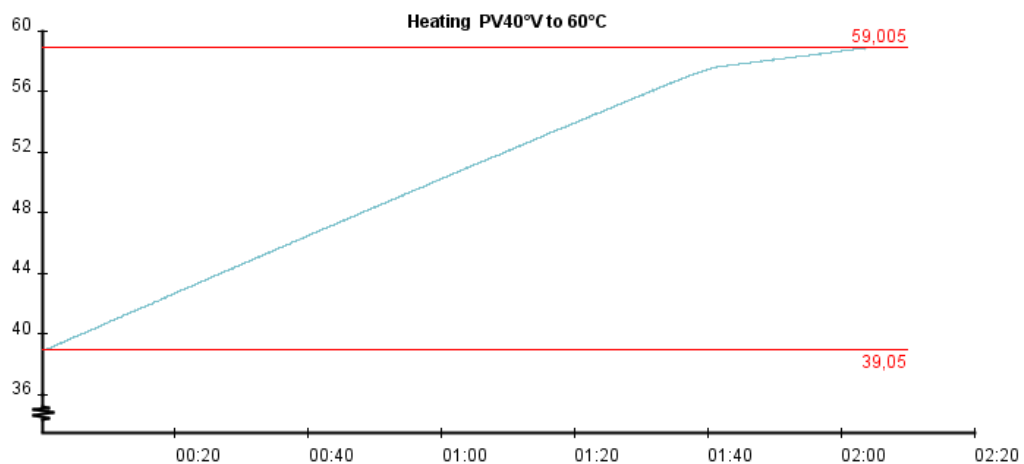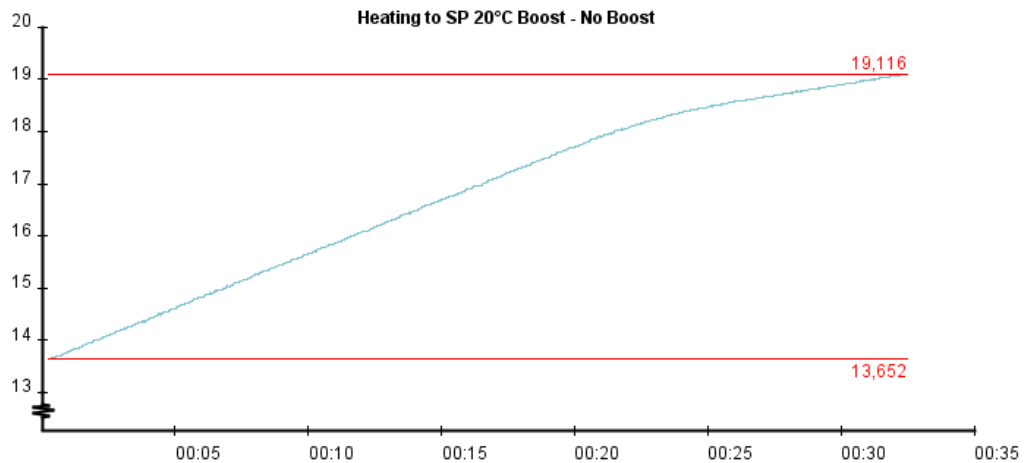
4.1.5 Cooling
R404
LP   = 3.5 Bar
HP   = 25 bar
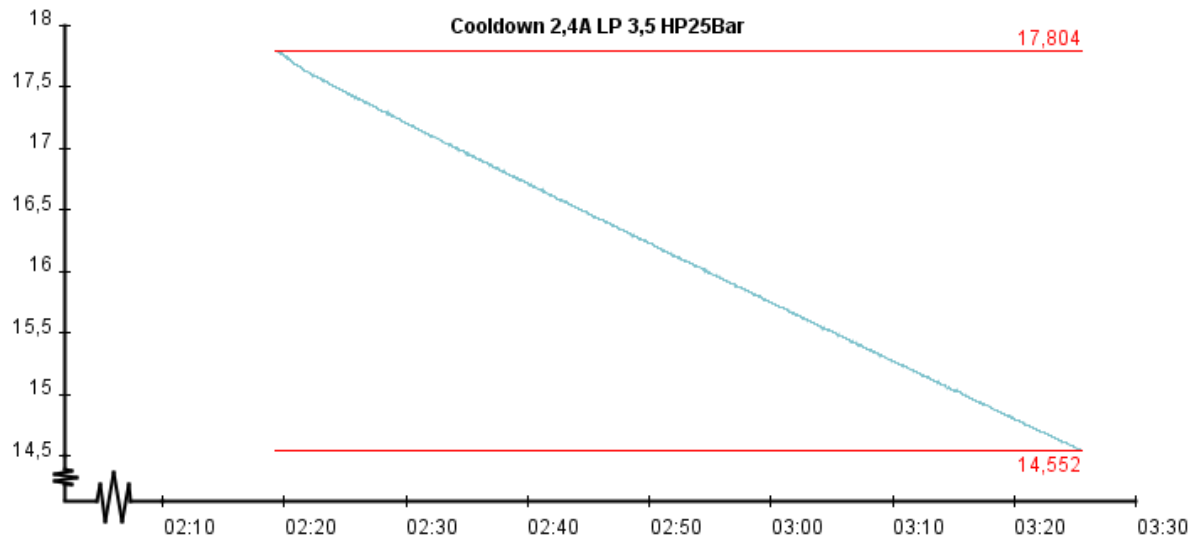
Cooldown 2,4A LP 3,5 HP25Bar

4.1.6 Stability

Tune	:	Precise (240 sec)
Bath fluid	:	Water
PID	:	25,25,0

Period	:	60 min
Set point temp.	:	15°C
Min-max	:	0.009°C
Delta	:	±0.005°C
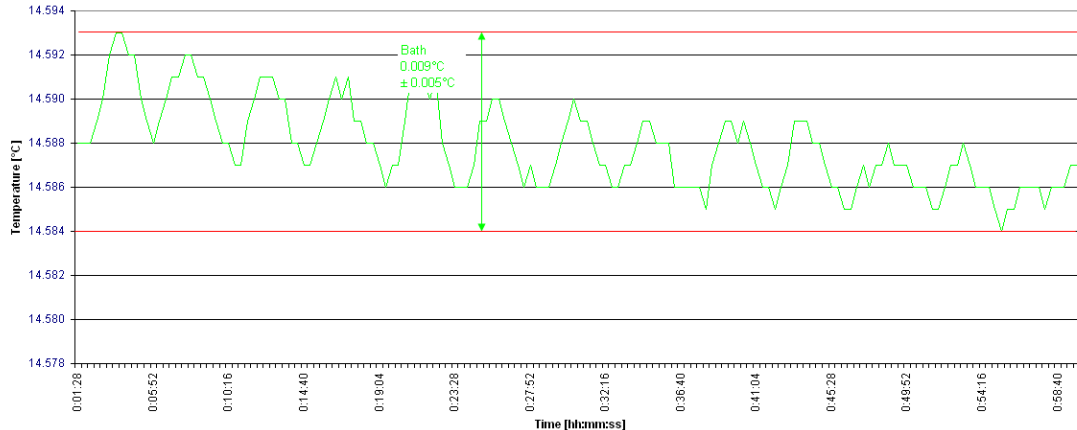
Period	:	60 min
Set point temp.	:	20°C
Min-max	:	0.008°C
Delta	:	±0.004°C
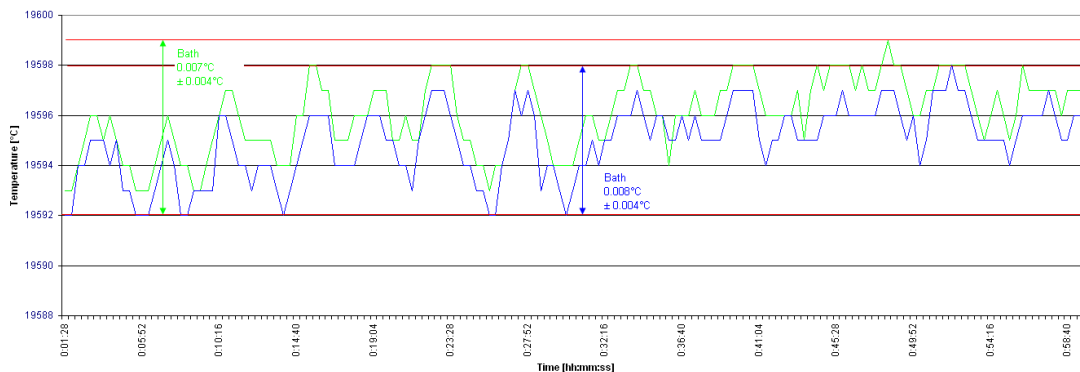
Period	:	60 min
Set point temp.	:	40°C
Min-max	:	0.010°C
Delta	:	±0.005°C
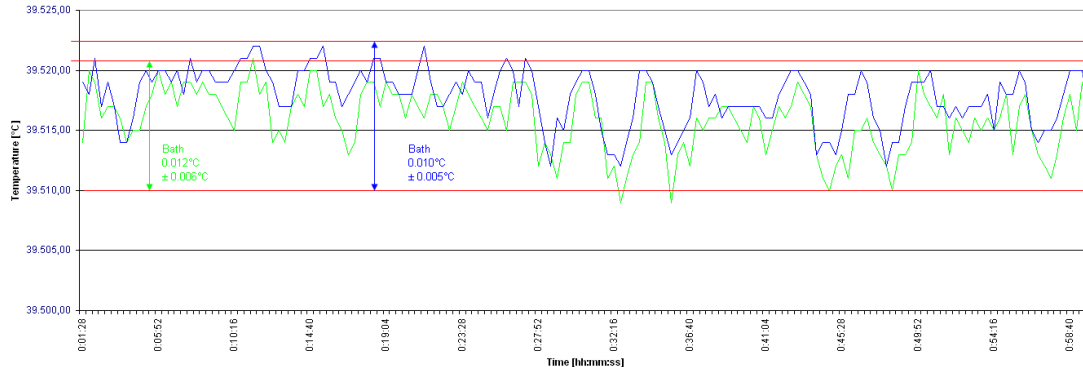
```
Period                    :        60 min
Set point temp.           :        60°C
Min-max                   :        0.007°C
Delta                     :        ±0.004°C
```
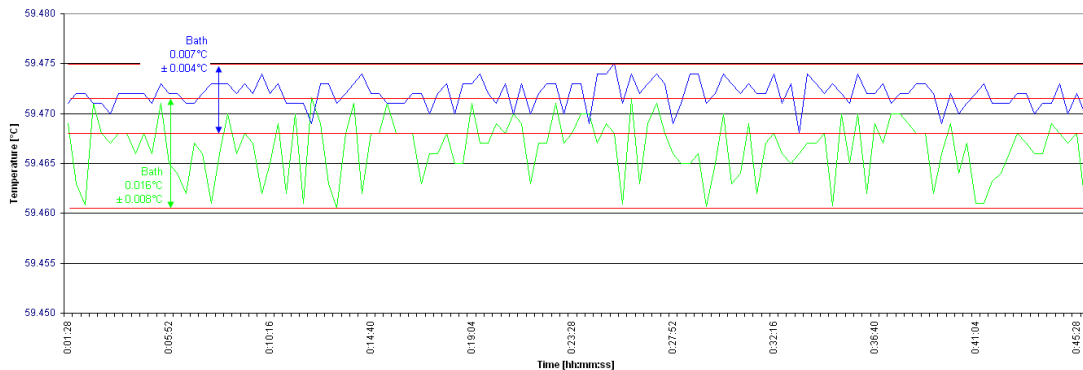

Influence ambient to bath

```
Period                    :        200 min
Set point temp.           :        60°C
Min-max                   :        0.032°C
Delta                     :        ±0.016°C
Change ambient            :        15.0°C to 19.0°C
```
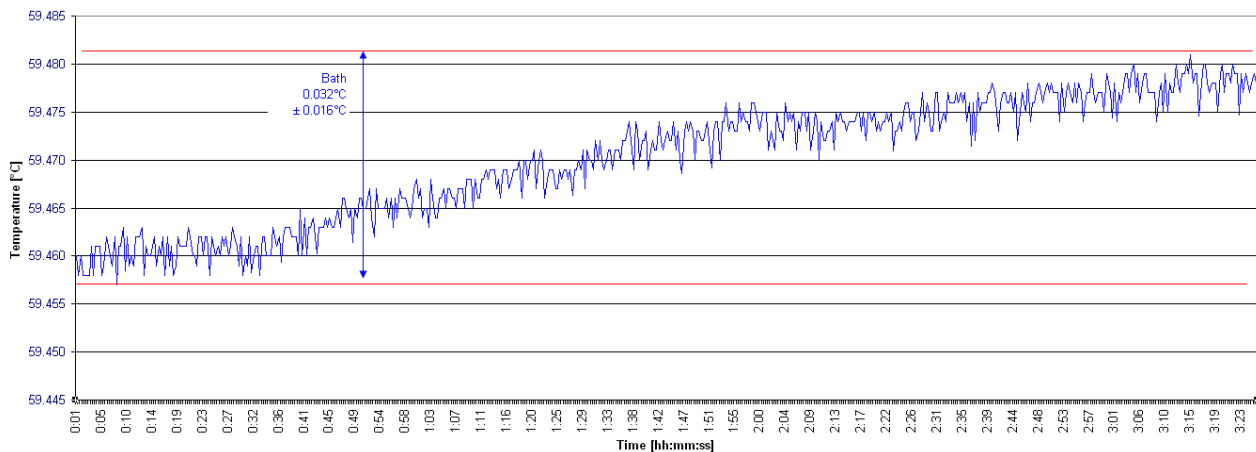
5   INSTALLATION

5.1   Important

Tamson Instruments b.v. is not responsible for any consequential damage or harm caused by using this bath. Repairs on the electrical system of the bath may only be carried out by well trained and authorized persons.

5.2   Unpacking

Before leaving the factory Tamson baths are adequately packed to prevent damage during normal transportation. Check the packing for external damage and make a note on the shipping documents if any damage is found. Always retain the cartons and packing material until the bath has been tested and found in good condition. (Transport companies generally will not honour a claim for damage if the respective packaging material is not available for examination).

The shipment contains at least the bath as mentioned in the delivery checklist. Further the consignment might contain one or more viscometers which should be individually packed in small boxes with the calibration certificate included in the box, as well as ASTM thermometers, thermometer holders, etc. Please see the packing list for details concerning total contents of consignment.

Before filling the bath remove any remaining packing material from its interior. The interior of the bath can be accessed by taking off the lid on the top of the bath.

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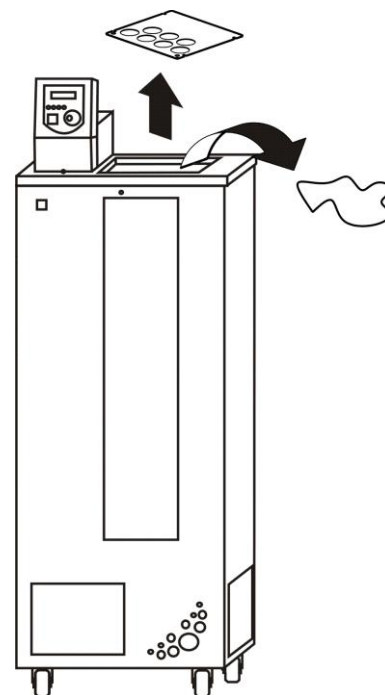
5.3 Bath liquids

Preferred bath liquid is tap or demineralised water, by reversed osmosis. Do not use distilled water. Distilled water causes corrosion and wear of bearings

The liquid level should be maintained between 1 and 3 cm below the lid during normal operation.
A lower level than 5 cm below the lid may damage the heaters. A high bath level can cause overflow and will might also damage the bath insulation.

Connect outlet to waste container

5.3.1 Maximum level

If the fluid level is too high, it will leave the bath via the overflow outlet (14mm or 3/8" outher diameter pipe, no thread). Prevent fluid from the overflow outlet entering the side of the bath. For this reason the overflow outlet must be connected to a waste container.

Tubing and container:
- Chemical resistant
- Withstand high temperature
- Outlet is 10mm outher nipple

DRAIN BATH LIQUID

5.3.2 Drain bath liquid

The bath can be emptied via the drain tap located at the backside of the apparatus. For safety reasons the tap can only be opened by using a screwdriver. The thread inside the tap is 3/8".

Take necessary precautions against fire hazard when removing flamable bath fluid.

When removing bath fluid do not inhale toxic vapor. Always use appropriate ventilation.

Handle old bath fluid as toxic waste.

Cool down bath fluid to ambient before removing.

USE SCREWDRIVER TO OPEN DRAIN
3/8" BSP innerthread

Tubing and container:
- Chemical resistant
- Withstand high temperature
- Outlet valve is inner thread straight 3/8" BSP
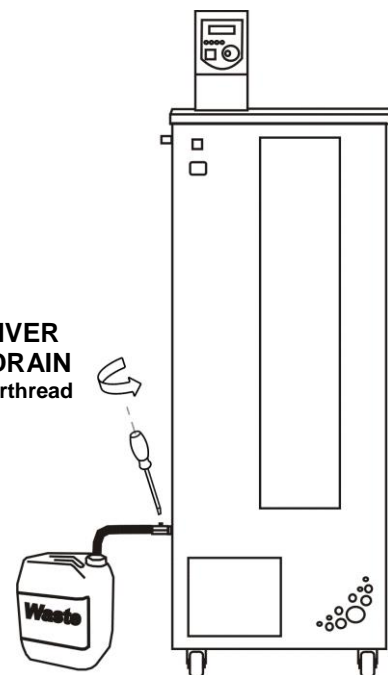
Do not drain hot liquid !!

6 GENERAL

The TV16000 is intended for temperature control of applications requiring a high degree of stability over a certain temperature range. The robust construction including advanced safety features give the bath a range of wide application.

The heat input is controlled by a microprocessor system. A special optimized electronic temperature measurement circuit ensures an extremely high degree of accuracy and reproducibility of operation conditions.

The baths feature a standard RS232C interface for communication with a computer. Please download our free communication software "Tamcom" from the website.

The bath standard features include an integrated cooling system enabling for rapid reduction of its temperature or enabling control around or below ambient temperature.

6.1 Construction

The TAMSON baths are constructed entirely from corrosion-resistant materials such as stainless steel and brass.

A thick layer of rock wool between the inner bath and outer casing ensure effective insulation. It improves temperature stability and lowers the casing temperature when the instrument is used at high bath temperatures.

The central microprocessor within the control module manages and controls, the functions for temperature measuring regulation, program storage, safety control and error coding.

6.2 Temperature control and setting

The bath temperature is regulated using a PT100 temperature probe which is connected to a microprocessor module. The advanced electronic control system continually computes the energy input required for optimal temperature accuracy and stability. The controller will activate the heaters partially or in full, taking into account the difference between actual bath temperature and set point.

The required temperature is set by three membrane switches on the front panel. Read-out is on LCD. An absolute temperature offset is provided with a resolution of 0.01°C and a specific offset of 0.005°C is available from the menu. This fine-tuning can be carried out at any time during operation of the bath.
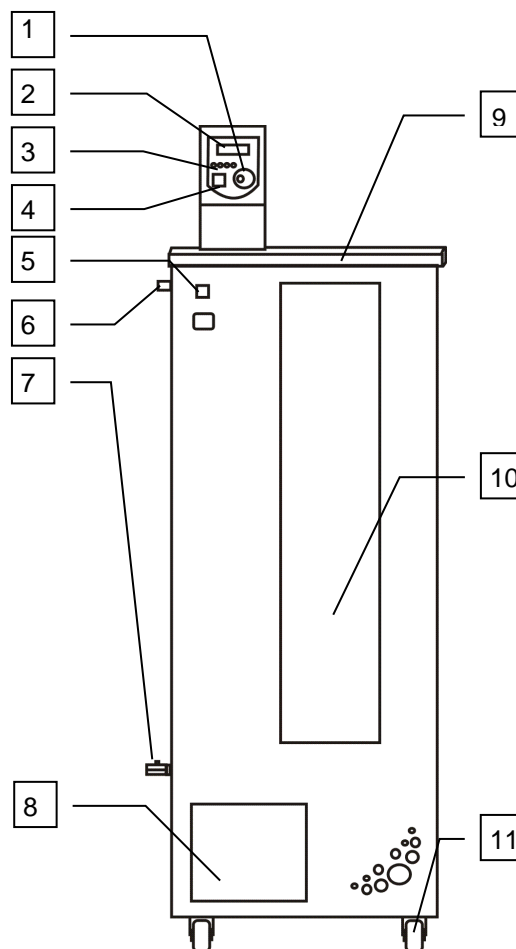
Item	Descrtption
1	Push/turn selection button
2	LC display
3	Indicators
4	Mains on/off switch (window heating is separate!)
5	Window heating on / off (independent from mains switch)
6	Overflow outlet pipe (10mm outher diameter)
7	Drain valve (3/8" BSP inner thread)
8	Condenser
9	Top-plate
10	Heated window
11	Wheels with brake

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6.3 RS232C Control

A RS232C, bi-directional communication interface (300 to 38400 Baud) is integrated as standard, and offers the possibility of computerised control.

6.4 Safety systems

A number of precautions is provided to ensure a safe around the clock working of the bath. These features protect the equipment, the bath fluid temperature and the workplace. A mechanical over-temperature protection thermostat will automatically switch-off the entire bath when its maximum value is exceeded. This maximum temperature can be manually adjusted from 50°C up to 270°C.

A thermal protection of the stirrer mechanism will switch-off the motor in case of malfunction. Both thermostat and motor-fuse can easily be accessed. A large number of integral electronic safety checks will cause the bath to shut-down in case of electronic or electrical error. Any kind of activated safety system will be attended with an acoustic and visible alarm. On the front display operating faults or component failures, are reported as numbered 'errors'. In this way there is a continual check of the proper functioning of the bath.

6.5 Ventilation

The bath has to be placed in a well ventilated area. Air circulation has to be enabled by 30 cm of free space at all sides.

If the bath has no or insufficient ventilation severe mechanical damage will occur.
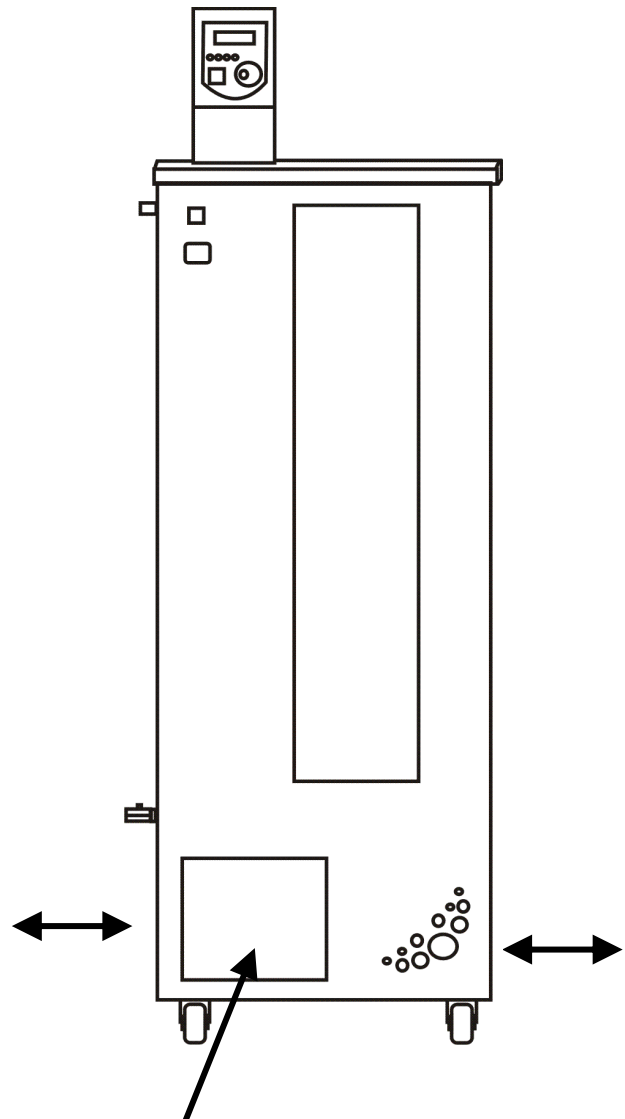
Keep free for
ventilation
30cm
all sides

7   Maintenance

!!!!Keep condenser free from dust!!!!

Remove front panel unscrewing bolts.

Remove dust from condenser using a vacuum cleaner.

Dust builds up depending on environment. Regularly check and clean if dust is spotted.

Do not use compressed air to "clean", use a vacuum cleaner

Compressed air is unhealthy, blown away dust can cause allergic reactions and eye infection. It can further have a negative effect on electronics and moving parts.

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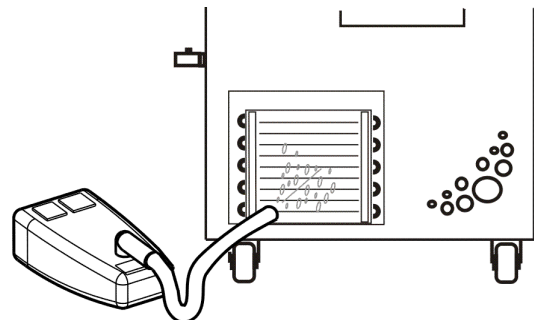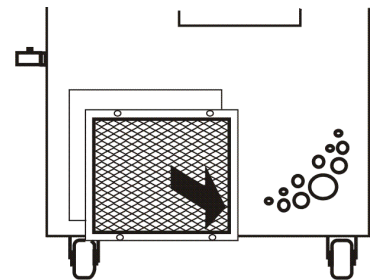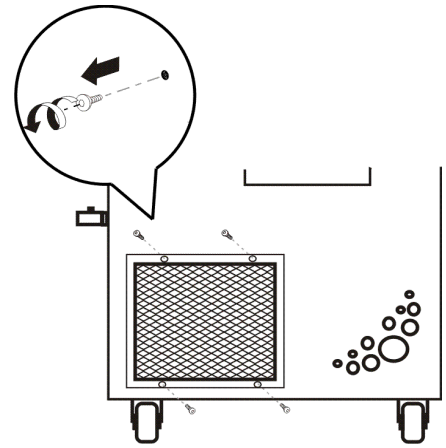
7.1 Front panel layout

Item	Description	Function
1	Display	Shows bath parameters
2	LED	Alarm – over tempeature
3	LED	Level
4	LED	System - Error
5	LED	Heater control
6	LED	Heater Boost
7	Switch	On - Off
8	Select	Over temperature protection
9	Switch	Press – turn to select menu
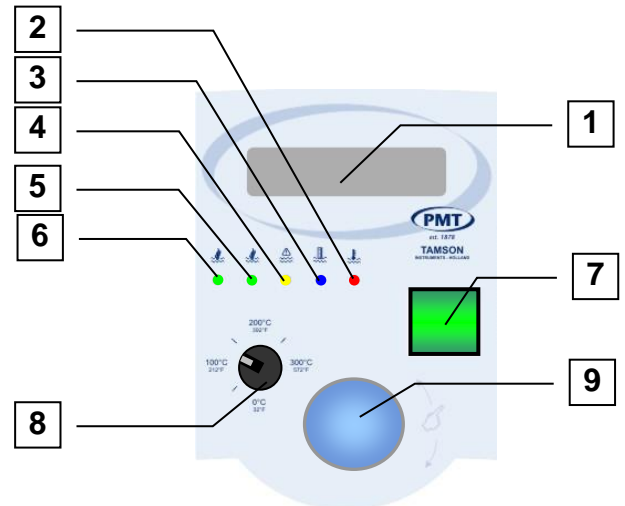
The front panel layout shows the turn-push button:

Next / increase: Turn right

Previous / decrease: Turn left

Select: Press

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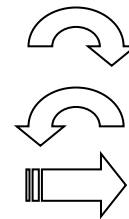
8   OPERATING THE BATH

> **Use well grounded mains. Before plugging the TV16000 into the mains socket, make sure the voltage of the bath corresponds to the local voltage.**

When the bath is ready for use it can be switched on by pressing the mains switch. The bath will initialise and calibrate itself.

8.1   Overview menu items

- Set point
- Offset (press: <-5.00 .. +5.00°C resolution 0.01°C)
- Max Power (press: low, med, hi, max)
- Boost heater (press on / off)
- Time const (press: fast, medium slow, precise)
- PID parameter :
  PID set 1,
  PID set 2,
  PID set 3,
  PID set 4, for use with RS232
  Each PID set offers settings for
  - Proportional band value
  (Pb=1/P where P is proportional value)
  - Integral value
  - Differential value
- Backlight (LCD)
- Temp units
- Baudrate
- SP Offset
- Restart

8.2   Window heating

The TV16000 system has heated windows to prevent build up of condensate. The heating is thermostat driven and kept around 30°C. If heating is off and the inner bath cooled down, the outside window also will drop in temperature forming a cold surface. This surface quickly will be covered with condensate blocking the visibility.

Window heating can be switched on or off separately from the system. If the bath is off, the window heating can be switched on independantly. When the window heating is on, the green lamp of the switch will light.
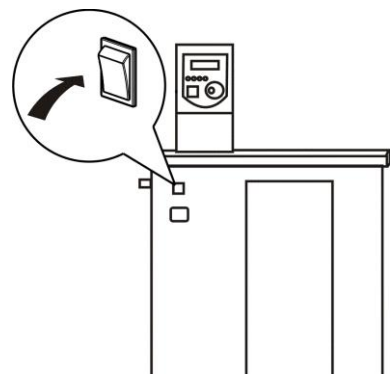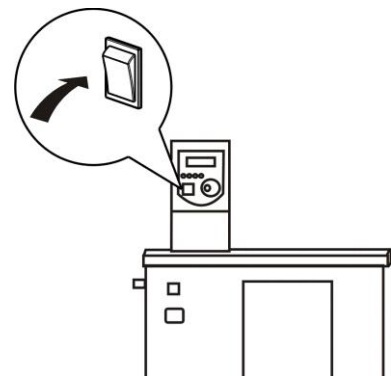
8.3 Safety thermostat

When the bath temperature becomes higher than the set point temperature of the safety thermostat. The heating electronics and controller are switched-off. The red LED on the display will light. When the temperature of the bath has been lowered with approximately 20°K, the thermostat re-sets itself automatically, however to continue normal operation the bath has to be switched off and on again.

When switching off wait 5 seconds before switching on again.

8.4 Display

1   Temperature readout
2   Applied percentage of power
3   Operating mode
4   Indicator, alarm high, alarm low, control stable
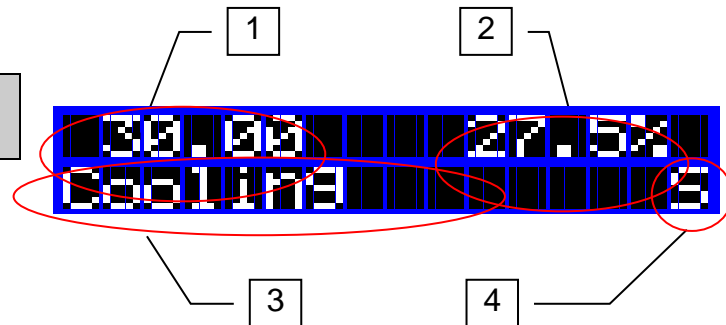
Ad 1:   When the controller starts or is restarted, the displayed value increases to a stable readout appears after a few seconds.

Ad 2:   The controller calculates every second the amount of power which should be applied for stable control. The value is displayed with a resolution of 0.1% and ranges from 0% to 99.9%.

Ad 3:	Boost	Bath is heating to set point using boost heater
	Heating	Bath is heating to set point, boost heater is off
	Cooling	Bath is cooling down to set point
	Tuning Ratio	Bath is tuning for power needed at set point, first step
	Tuning SA	Bath is tuning, second step
	PID SP=25.00	Bath is controlling, set point is 25.00°C (example)

Ad 4:

-          Bath control is stable

-          Alarm high, press button to reset*

-          Alarm low, press button to reset*

* Optional item

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8.5 QUICK START

To start operating the bath in a quick way do the following:

Fill the bath with liquid as indicated, place the power plug, connect to mains socket, switch-on the bath, using the mains switch, select appropriate set point.

PID settings
All measuring results have been acquired using following PID settings:

Pb   :=   25
I   :=   16
D   :=   0

Under different settings its possible to achieve even better values by trimming the PID settings.

Place the bath spirit level.

Spirit level

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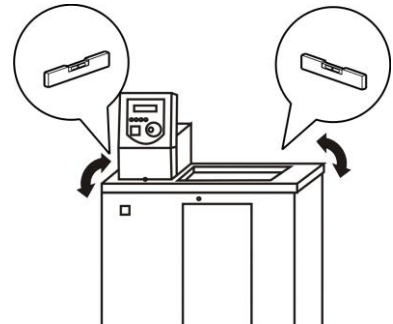
9 Menu items

Use the turn-push button to select a menu item and select the item by pressing the button. After pressing a sign appears next to the value indicating the value can now be changed. Pressing the button again activates the value immediately. When the value is altered but the button is not pressed the value will be accepted and stored after approximately 5 seconds, and the menu will returns back to normal operating mode.

9.1.1 Menu item "Set point"

This item will set the bath temperature. It can be set in steps of 0.001°C.

9.1.2 Menu item "Offset"

The temperature displayed can be increased or decreased with an offset ranging from +5.00 down to -5.00 in steps of 0.01°C.

The offset will synchronise the bath temperature readout with an independent separate thermometer.

In addition a special offset of 0.005°C can be set using the item "SP offset".

9.1.3 Menu item "Max Power"

(press: low, med, hi, max)
Limits the applied power by a maximum value:

Low	Maximum of 25% applied
Medium	Maximum of 50% applied
High	Maximum of 75% applied
Maximum	100% power is applied

9.1.4 Menu item "Boost heater"

A secondary heater is used to quickly heat up the bath. This menu item enables or disables the boost heater.
Standard value: On

9.1.5 Menu item "Time const"

Used to select time to tune. The option precise has to be used to reach maximum temperature accuracy. Options are:

- Fast	60	seconds
- Medium	120	seconds
- Slow	180	seconds
- Precise	240	seconds
Standard value:	Precise	

9.1.6 Menu item "PID parameter"

PID set 1	-	First set of parameters
PID set 2	-	Second set of parameters
PID set 3	-	Third set of parameters
PID set 4	-	Activated when communication via RS232

Each set offers individual PID settings for:
>   Proportional band value
>   Integrating value
>   Differentiating value

Default settings
Pb* := 25
I := 16
D := 0
*Pb= proportional band. Proportional value P is found to be 100/Pb.

9.1.7 Menu item "Backlight"

On
Off
Standard value: On

9.1.8 Menu item "Temp units"

°C
°F
Standard value: °C

9.1.9 Menu item "Baudrate"

300
600
1200
2400
4800
9600
19200
38400
Standard value: 9600

9.1.10 Menu item "Offset 0.005"

This menu item offers an additional offset of 0.005°C. The value of 0.005°C is added to the selected SP value. The SP can be selected with 0.01°C accuracy.

9.1.11 Menu item "Restart"

Restarts system and activates tuning

9.2 PID standard settings

When power on display below 10 % use:
>   P = 2
>   I = 16
>   D = 0
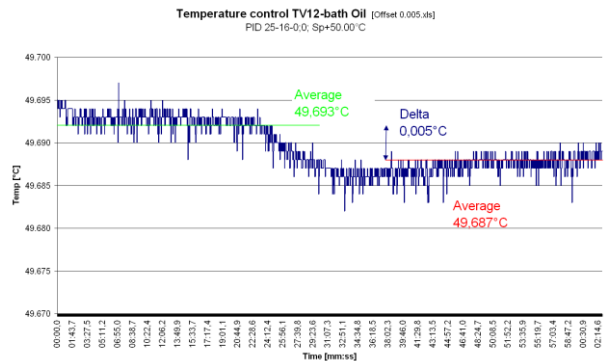
Temperature control TV12-bath Oil [Offset 0.005.xls]
PID 25-16-0;0; Sp+50.00°C

When power on display higher than 10 % use:

P = 25
I = 16
D = 0

9.3   Other PID settings

It is not recommended but other PID settings can be used. Experimenting can provide slightly better stability results. Following shows influence on stability with different PID settings

Temperature	:	75°C
Proportional band (Pb)	:	25
Integrator	:	16
Differentiator	:	0
Min/max	:	± 0.015

SP 75°C
Δ 0.029
± 0.015

Temperature	:	75°C
Proportional band (Pb)	:	50
Integrator	:	25
Differentiator	:	0
Min/max	:	± 0.018°C

SP 75°C
Δ 0.036
± 0.018
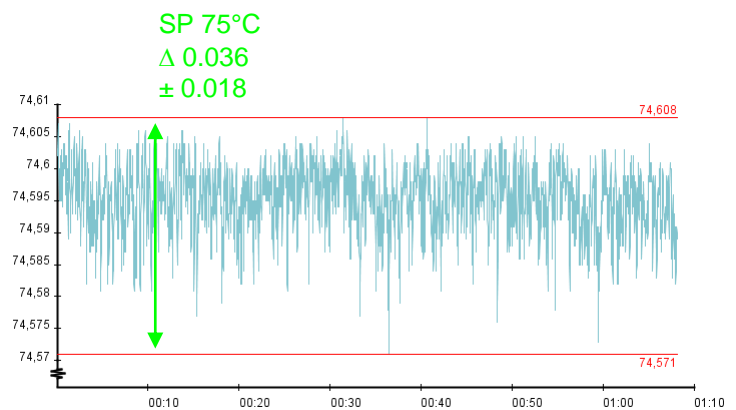
Temperature	:	75°C
Proportional band (Pb)	:	100
Integrator	:	25
Differentiator	:	0
Min/max	:	± 0.045°C

SP 75°C
Δ 0.089
± 0.045

Oscillation

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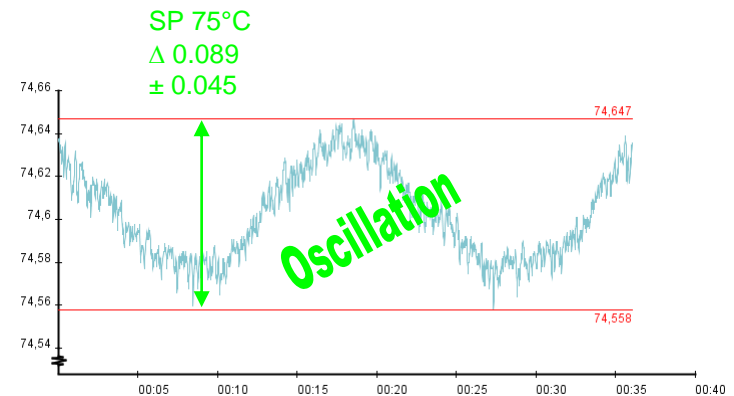
10 TROUBLE SHOOTING

10.1 Safety devices

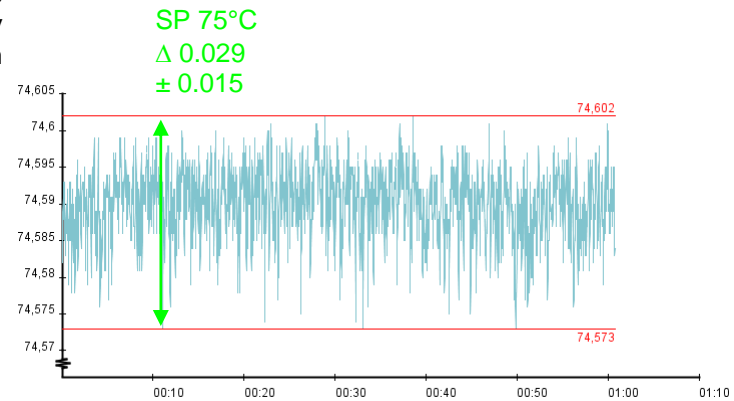The controller is equipped with a number of safety devices which switch-off the bath to prevent excessive temperature rise or malfunction. The safety devices are divided in mechanical and electronic parts. The mechanical over-temperature safety thermostat is located near the mains switch and consists of an adjustable thermostat and a red LED. The desired temperature at which the bath should be switched-off can be set by turning the knob with a screwdriver or a coin.

10.2 Over-temperature safety thermostat

When the thermostat is activated the entire bath is switched-off (with the exception of the controller) the red arrow shaped lamp and ERROR LED will light up. The display shows error E1 after a few minutes. When the temperature of the bath has been lowered with approximately 20°K, the thermostat re-sets itself automatically, however to continue normal operation the bath has to be switched off and on again.

The thermostat can be adjusted as follows:
-Turn the thermostat fully clockwise.
-Heat the bath to its proper temperature. Be aware that the safety thermostat is now only functioning at 270 °C.
-Turn the thermostat gently counter clockwise, until you hear a "click". Turn the knob approximately 20 to 30° higher (clockwise). Switch the bath off and on again. The bath is ready to operate safely.

10.3 Error messages

There are two types of error messages:
- Fatal
- Non fatal

In case of a fatal error the bath will be switched-off. If a non fatal error exists the error will be repeated after approximately 3 minutes.

10.4 Application errors

Besides the electronic errors reported on the display there are also practical errors.

10.5 Bath temperature does not become stable

If the bath temperature does not stabilize after 45 minutes after set point has been reached the following points might cause this problem:
·Viscosity of the bath fluid must lie below 10 mm²/s at the operating temperature. It is preferred however to use a viscosity of 3 mm²/s around the working temperature. If the viscosity of the bath fluid used is too high the circulating system is incapable to mix the bath fluid thoroughly which may result in poor stability.

·Power is limited to a very low level.

·Position of PT100 has been changed. The tip of the PT100 must be positioned just above the baffle plate.

·Position of the stirrer fan must be exactly in the center of the hole in the baffle plate (both in horizontal and vertical position).

·Check possible heat transfer from additional apparatus close to the bath i.e. oven or central heating.

·Check any possible strong magnetic field from other apparatus.

·Check overheating of electronics inside apparatus. All fans must be running.

10.6   Error LED on, system locked

The bath temperature has exceeded the preset temperature of the safety thermostat. This has activated the thermostat and switched-off the bath.

10.7   Motor / stirrer not running

Check motor fuse on front panel. Reset fuse by pressing it.

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10.8 RS 232 C Interface

The bath is equipped with a RS 232 C interface which allows the communication with a computer.

> **Please see our separate manual "communication.PDF" and Tamsom software to use the bath remotely or use the software as datatlogger.**

10.8.1 General settings

Baudrate can be selected using the menu option "Baudrate". Standard setting is
 9600

Data setting parameters are fixed (can not be altered):
 8 data bits
 1 stop bit
 parity none

10.8.2 Commands overview

Notation
commands are place between brackets "[ ]"
values are placed between "< >" signs
 (Do not use these brackets when sending commands.)

[ST]   returns whether bath is stable or not. State 1 = stable, 0 not stable. Limits are set with parameters StableLimitHigh and StableLimitLow defined by ASTM D445. So when PV is in the region of 100°C>PV<0°C StableLimitHigh is defined as 0.05. When the average PV deviation (calculated from a sliding window of 255 seconds) is smaller than StableLimitHigh, the ST command will return stable(1).

When PV is 0°<=PV<=100°C and the average PV (calculated from a sliding window of 255 seconds) is smaller than StableLimitLow, the ST command will return stable(1)

[RS]   Restarts (same as power off-on)
[RA]   Reads raw ADC value, returns 3 bytes binary data, LSB first. This returns the last raw ADC reading. Note that this is updated every 200mS, so reading at a faster rate may return duplicate values. Maximum reading is 0x7FFFFF. This command is used for factory calibration/test.
[CT]   **<enter>**   Returns the offset value.
[CT]   **<value> <enter>**   Sets the offset value.

[TC]   Sets/displays time constant in seconds
[PL]   Power limit in seconds.
[BH]   Returns boost heater on/off state, 0 or 1
[BH<n>] sets boost heater state 0/1
[CS]   Control state – returns state of control algorithm
  bits 4..7 represent the main control stages, bits 0..3 are sub-states within each main state
$00 : control algorithm disabled – allows external PC to take control of heaters
$10 : startup hold-off started
$11 : startup holdoff in progress
$12 : startup delay finished, decide to boost or cool
$20 : boosting
$30 : Waiting for cool-down
$40 : Start of ratio process
$41 : Ratio process in progress
$42 : waiting for PV<SP-tuneoffset after ratio

$50 : Start of successive approximation process
$51 : Sucessive approximation stabilisation delay
$52 : Successive approximation in progress
$53 : end of sucessuve approximation stage
$60 : Proportional mode   (subject to change - other values to be defined)

[CS<n>] Sets state of control algorithm

[HP]   Returns current heater power percentage
HP<nn> : sets heater percentage to <nn> - this command is only useful if control algorithm suspended with CS command.
[AC]   Returns 1 when a new temperature value is available, 0 if no new has been measured since the last PV or PVH command. Cleared by PV or PVH command. Used for external PC control synchronisation.
PV Returns Proces Value with unit, no decimals. 23C or 74F
[PVF]   returns temp as follows :
Use PVF to return a decimal value with 7 decimal digits, e.g.
12.345342C, works for degrees Centigrade, and degrees Fahrenheid. Only first three are significant. When reading is in degree Fahrenheit character F indicates the unit i.e. 73.3961328F

When temperature is negative, minus sign appears i.e. -1.6955468F

[PP]   returns proportinal band value. Proportional band is 100/gain
[PI]   returns integrating value
[PD]   returns derivative value

PID range and set:

```
Pb = setting 1..999
I = 0..999
D = 0..999
```

[PP]   Followed by value, or space and value, will set proportional band. I.E. PP25 wil set Proportional band to 25.
[PI]   Followed by value, or space and value, will set integrating value. I.E. PI16 will set Integratin g value to 16.
[PD]   Followed by value , or space and value, will set integrating value. I.E. PD2 will set Derivative value to 2.
The TMC70 contains 4 independent PID sets. Each set can be enabled using the TMC70.EXE program and can have its own name i.e "water", "silicone oil" or "methanol". However when the command PP, PI, or PD is used to set a value, automatically set 4 is used. **So PID set4 is reserved for RS232 operation and is activated when approached from RS232.**

[SP]   Set point temperature
           SP, Set point temperature is returned i.e. 20.22
           SP22.50 sets set point temperature to 20.50°C
           When controller displays temperature in °F, SP20.50 sets the set point to 20.50°F
           SP22.555 results in error code "10"

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10.9 RS 232 Cable

D-connector
Seen on
BACKSIDE
(female)

D-connector
Seen on "**PIN**"
side (male)

Pin 1   Pin 1
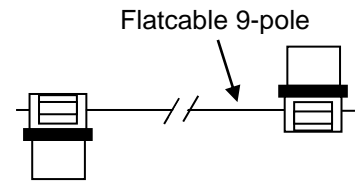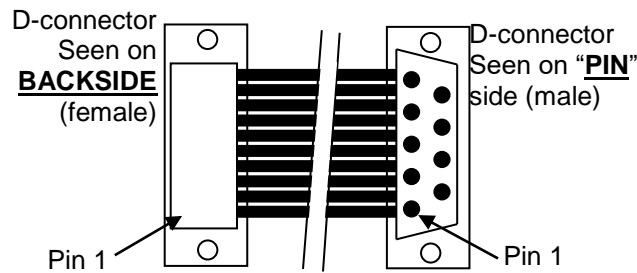
Flatcable 9-pole

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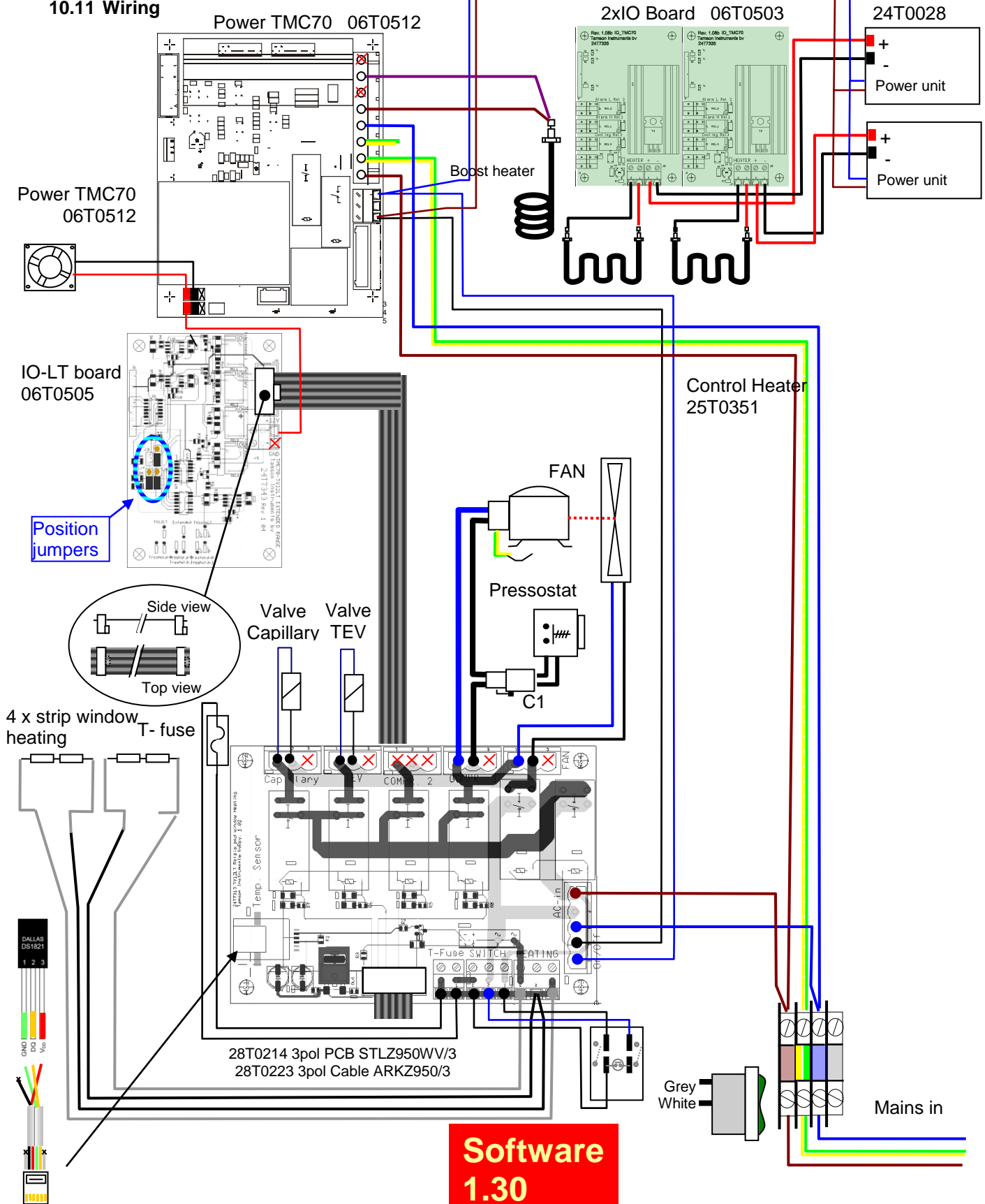IBAN Code: NL95 RABO 0160100046
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10.10 Spare parts list`

```
06T0512  PCB POWERBOARD TMC70 230V                 1
25T1104  COMPRESSOR TLC30 230V/50HZ                1
24T8081  FUSE MOTOR  0.3 AMP                       1
28T4022  HEATER 1500 TV7000                        1
26T1455  COIL MAGN. VALVE PARKER 230V/50~60Hz      2
25T1295  MOTOR EBM 230V 50-60HZ 30W RIGHT          1
25T1244  FAN 120*38 161M3 230V                     1
28T2065  RELAIS 2xDPDT 8A 12V FINDER 300R          4
28T2060  RELAIS FINDER 40.61. 230V SPDT 16A        2
06T0527  PCB TMC70 IO/EXT Range                    1
06T0503  PCB TMC70 IO-PWM HEAT/PUMP/ALARM          2
06T0525  PCB TV12LT RELAIS+WINDOW HEATING          1
24T0028  POWER SUPPLY 500W 48V 10A 85..264V IN     2
24T8581  THERMOSTAT 0-300 C, NT-252 AO             1
25T0352  HEATER 500W TV12 48V DC long              2
26T1204  PRESSOSTAAT Johnson 42 bar AUTO-RESET     1
10T2200  KNOP AFDEKPLAATJE LICHT BLAUW             1
10T2205  KNOP 40MM-6MM AS GRIJS                    1
06T0507  PCB TMC70 Display (TV12)                  1
28T4026  PT100 long                                1
28T4019  FOLIE TTU-A ABS                           1
24T8545  SWITCH NEON 2*10AMP GREEN                 2
24T8546  PROTECTIVE COVER                          2
06T0500  PRINT GEM uP TMC70 MICRO CONTR. BOARD     1
23T0012  KRAAN KOGEL 3/8 - 3/8inch                 1
```

PMT
est. 1878

TECHNICAL REFERENCE
10.11 Wiring

Power TMC70   06T0512

2xIO Board   06T0503

Power Unit
24T0028

+
-
Power unit

+
-
Power unit

Power TMC70
06T0512

Boost heater

IO-LT board
06T0505

Control Heater
25T0351

Position
jumpers

Side view

Top view

FAN

Pressostat

C1

Valve
Capillary

Valve
TEV

4 x strip window
heating

T- fuse

DALLAS
DS1821
1 2 3

GND
DQ
Vcc

28T0214 3pol PCB STLZ950WV/3
28T0223 3pol Cable ARKZ950/3

Grey
White

Mains in

**Software
1.30**

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10.12 EC Declaration

Manufacturer:	**Tamson Instruments BV** van 't Hoffstraat 12 2665 JL Bleiswijk The Netherlands
Product:	Thermostatic bath
Model:	TV16000

We declare that the product mentioned above conforms to the essential's exigency of the directive 2006/42/EC relative to machinery, directives 2004/108/EC relatives to electromagnetic compatibility and directive 2006/95/EC relative to low voltage.

The products are in conformity with the following specifications:
EMC (2004/108/EG)

Conducted emission	- EN55016-2-1 + EN61326+A1
Radiated emission	- EN55016-2-3 + EN61326+A1+A2+A3
Harmonics	- EN61000-3-2
ESD	- EN61326 +A1+A2+A3 and EN61000-4-2 +A1+A2
Radiated immunity	- EN61000-4-3 +A1
Electrical Fast Transients	- EN61000-4-4+A1+A2
Surges	- EN61000-4-5+A1
Conducted immunity	- EN 61000-4-6+A1
Voltage dips and Voltage variations	- EN61000-4-11 +A1

Low voltage (2006/95/EC):

Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1, General requirements,
EN 61010-1-2010

Safety requirements for electrical equipment for measurement, control, and laboratory use Part 2, Particular requirements for laboratory equipment for the heating of material,
EN 61010-2-010-2003

Machinery directive (2006/42/EC)

2006-42-ec-2nd-2010

January 2011, Tamson Instruments bv, The Netherlands

Ing. R.C. van Hall
Director

Tamson Instruments bv

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