THURLBY THANDAR INSTRUMENTS

TSX Series

High Power Laboratory DC Power Supplies

350/360 watts, standard and bus programmable

the TSX series of high output DC power supplies power with precision & simplicity

The standard & P versions

The TSX series represents the state of the art in high output PSU design.

A wide range of voltage-current output combinations will become available with power levels of 360 Watts and more.

Each output combination is available in two versions: with conventional analogue controls (TSX) and with programmable controls (TSX-P).

Linear post regulation for unrivalled performance

The heart of all TSX series PSUs is an innovative regulator design which combines switch mode pre-regulation with linear post-regulation.

The pre-regulator uses specially developed techniques to dramatically reduce the capacitance between input and output thus eliminating the high levels of common-mode noise normally associated with switch mode PSUs.

The linear post-regulator combines very low levels of output noise with excellent load regulation and transient response. The result is performance comparable with a pure linear design.

Compact and lightweight

The hybrid regulator design provides a PSU which is both smaller and lighter than competitive products.

The high thermal efficiency also means that the PSUs are silent in operation since fan cooling is unnecessary *.

Bench or rack mounting

The attractively styled casing takes up very little bench space and incorporates a tilt bail to angle the front panel when required.

The case is half rack width (3U height), an optional rack-mount kit is available.

Output terminals are fitted at both front and rear.

* Note that in rack environments with limited ventilation fan cooling may become necessary.

Constant voltage or constant current operation

All TSX series PSUs can operate in both constant voltage and constant current modes with automatic crossover and automatic mode indication.

High accuracy metering

All versions incorporate high resolution digital meters for both voltage and current.

V and I levels can be set to high accuracy prior to connection to the load and the limit settings can be checked at any time.

A damping switch for the current meter enables the average value of rapidly changing currents to be read.

Full overvoltage protection

All versions incorporate a fully variable OVP trip to protect against regulator failure.

The output is fully protected and other protection functions include regulator over temperature, and sense miswiring.

- *35V-10A & 18V-20A variants*
- *High power levels in a compact & lightweight casing*
- *Bench or rack mounting, front & rear terminals*
- *Very low noise, excellent transient response*
- *CV & CI operation with automatic crossover*
- *Comprehensive protection including variable OVP trip*
- *High setting resolution, remote sense terminals*
- *High accuracy digital meters, current meter damping*
- *Silent fan-free operation*

The standard versions

The standard TSX versions of the series incorporate conventional analogue controls for precision with simplicity.

Coarse and fine voltage controls offer fast setting with high setting resolution at all levels while a semi-logarithmic current control provides resolution commensurate with the current level.

Fan-free operation means that these PSUs add no noise to the bench-top environment.

These PSUs are ideally suited to general purpose applications in many technology areas.

power with programmable versatility

The P versions

The TSX-P versions represent a major step forward in PSU design.

They combine a wealth of “ease of use” orientated keyboard functions with full remote programmability.

The result is the most comprehensive and versatile PSU control system available anywhere.

A third display for clarity & safety

To provide additional data and to avoid any possibility of ambiguity or error an auxiliary display is incorporated.

All keyboard entries appear on this display for inspection before they are actioned by pressing the “confirm” key.

This failsafe system avoids such possibilities as setting 25 Volts instead of 2.5 Volts as could occur on other less carefully designed systems.

The auxiliary display is also used to set and display a variety of useful information.

Keyboard or quasi-analogue control

Voltage and current levels can be entered directly from the keypad to a resolution of 10mV or 10mA giving unparalleled speed and precision.

Alternatively a rotary control can be used to set voltage or current in a manner simulating a conventional analogue control.

Watts display for added convenience

When not being used for other purposes the auxiliary display shows the output power in Watts (Volts x Amps).

Delta-mode control

Voltages and currents can be stepped up and down by a fixed increment set from the keyboard. This facility is invaluable for repetitive testing where, for example, the effect of 1% changes in voltage need to be observed.

The delta increment is clearly shown on the auxiliary display.

Non-volatile storage of multiple settings

25 non-volatile memories are provided for storing frequently used settings. Each store holds a voltage, current and OVP setting.

This facility is particularly useful in repetitive testing situations within production, development or inspection areas.

Part of an extensive PSU range

TTi is one of the world’s foremost producers of laboratory power supplies.

If the TSX series does not meet your needs, then one of our other PSU series probably will.

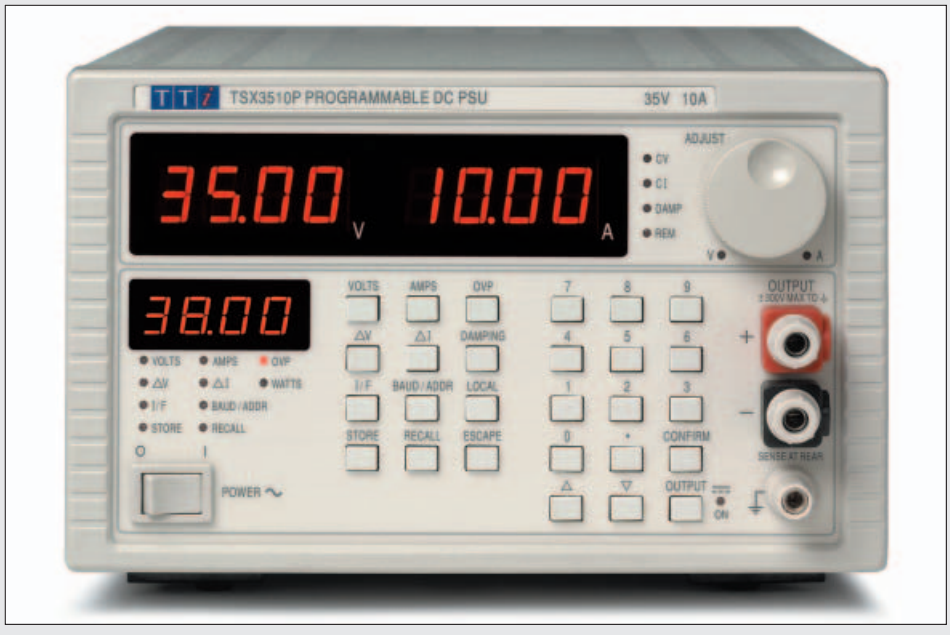
The range includes single, dual and triple output models with power levels from 15 watts up to around 1kW.

Full bus control, GPIB & RS-232

The P versions incorporate both GPIB (conforming to IEEE-488.1 & .2) and addressable RS-232 (ARC) interfaces as standard.

The ARC system allows up to 32 instruments to be “daisy-chained” together and to be individually addressed and controlled using a single RS-232 port on a computer.

Bus controlled functions include set voltage, set current, set OVP, set output on/off, read voltage, read current.



- *Keyboard setting of all parameters*
- *Rotary and delta (step) control of V and I*
- *Watts display, non-volatile storage of 25 settings*
- *Fully programmable with bus readback of V and I*
- *GPIB (.2) & addressable RS232 (ARC) interfaces*

Technical Specifications

OUTPUT SPECIFICATIONS

Operating modes:	Constant voltage or constant current with automatic crossover.
Voltage range:	0V to 35V (TSX3510/TSX3510P). 0V to 18V (TSX1820/TSX1820P).
Current range:	0A to 10A (TSX3510/TSX3510P). 0A to 20A (TSX1820/TSX1820P).
Overvoltage protection:	10% to 110% of max. output voltage.
Setting resolution:	10mV, 10mA.
Load regulation:	<0.01% of max. O/P for 90% change.
Line regulation:	<0.01% of max. O/P for 10% change.
Output impedance:	<1mΩ in constant voltage mode. >5kΩ in constant current mode.
Ripple & noise:	<1mV RMS typical in constant voltage. <3mA RMS typical in constant current.
HF common mode noise:	Typically <3mV RMS, <10mV pk.
Transient load response:	<20us to within 50mV of set level for 90% load change.
Temperature coefficient:	typically <100ppm/^{o}C.
Overvoltage protection delay:	<200us.
Protection functions:	Overvoltage trip Regulator overtemperature Sense miswiring.
Status indication:	Output On lamp Constant voltage mode lamp Constant current mode lamp Trip message on display.
Output terminals:	4mm output terminals at front, screw terminals for output and sense at rear.
Output protection:	Full forward and reverse protection via OVP and diode clamp.

METER SPECIFICATIONS

Meter types:	Separate 4 digit meters for voltage and current with 12.5mm (0.5") LED displays.
Meter resolutions:	10mV, 10mA.
Meter accuracies:	Voltage ±(0.2% + 1 digit) Current ±(0.5% + 1 digit).

GENERAL

Input voltage range:	220V to 240 volts ± 10% or 110 to 120 volts ± 10%, 47 to 63Hz. Installation Category II.
Power requirement:	600VA max.
Electrical safety:	Complies with EN61010-1.
EMC:	Complies with EN61326.
Temperature:	+5^{o}C to +40^{o}C operating, 20% to 80% RH, -40^{o}C to +70^{o}C storage.
Cooling:	Silent fan-less convection cooling.
Size:	210 x 130 x 350mm (WxHxD) (half rack width x 3U height).
Weight:	5.0kg (TSX versions). 5.5kg (TSX-P versions).
Options:	Rack Mounting kit.

*Thurlby Thandar Instruments Ltd. operates a policy of continuous development and reserves the right to alter specifications without prior notice. * Labwindows is a trademark of National Instruments Corporation.*

FRONT PANEL CONTROLS (standard versions)

Voltage setting:	Via single rotary controls for coarse and fine control.
Current setting:	Via single turn semi-logarithmic rotary control.
Overvoltage setting:	Via screwdriver adjustable preset potentiometer.
Output On/Off:	Latchinh push-push switch operating electronic power control.

FRONT PANEL CONTROLS (P versions)

Voltage setting:	Direct keyboard entry or quasi-analogue rotary control.
Current setting:	Direct keyboard entry or quasi-analogue rotary control.
Overvoltage setting:	Direct keyboard entry.
Output On/Off:	Push button control with indicator lamp operating electronic power control.

Note: all voltage and current levels set via the keyboard are displayed on a separate 0.3" 4 digit display. This entry preview system ensures that the user can observe the value entered before it is effected thus avoiding possible error. The display is also used for setting additional functions and for displaying watts.

Additional keyboard functions:

Increase or decrease voltage or current in user-selectable steps (delta mode). Store/recall voltage, current & OVP levels from non-volatile memory (25 memories). Set digital interface type (RS232 or GPIB), set baud rate, set address.

DIGITAL INTERFACES (P versions)

RS232:

Variable baud rate, 9600 baud maximum, 9 pin D connector (male). Fully compatible with standard RS232 or TTi addressable RS232 system (ARC).

IEEE-488 (GPIB):	Conforming with IEEE488.1 & IEEE488.2.
Bus Functions:	Set voltage; set current; set OVP; set output On/Off; read output voltage/current.
Setting resolution:	Voltage - 10mV; Current - 10mA.
Setting accuracy:	Voltage - ±(0.1% + 10mV); Current - ±(0.2% + 20mA).

Response times:

Interface - <15ms (single command);
PSU - Depends on Load conditions, typically 150ms to within 0.1% of final value (except for voltage reduction with low load current which will be longer).

Readback resolution:	Voltage - 10mV; Current - 10mA.
Readback accuracy:	Voltage - ±(0.1% + 1 digit); Current - ±(0.5% +1 digit).

Operating software:

Software for operating the PSUs under GPIB or RS232 control is available including a Labwindows* driver and ARC-TALK software for a PC.

Models		Voltage/Current	Power
TSX1820	TSX1820P	18 volts, 20 amps	360 watts
TSX3510	TSX3510P	35 volts, 10 amps	350 watts

Designed and built in Europe by:

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