



# THURLBY THANDAR INSTRUMENTS

## SHORTFORM CATALOGUE

### Laboratory DC Power Supplies



- Laboratory Power Supplies - manual and remote control •
- Current up to 50A, voltage up to 150V •
- Power from 15 watts up to 1200 watts •
- Single, dual and triple output models •
- RS-232, GPIB, USB & LAN interfaces •

[tti-test.com](http://tti-test.com)

## Laboratory DC Power Supplies

### The technology leader

TTi is one of the world's major producers of laboratory power supplies (PSUs).

TTi has been a major technology innovator in PSUs since 1979 and now offers products ranging from 15 watts up to 1200 watts.

Hundreds of thousands of TTi power supplies are in everyday use around the world.

### Power technologies

TTi laboratory power supplies use both linear and switch-mode technologies in order to optimise performance and value for money.

#### Linear regulation

Pure linear regulation still provides the lowest output noise and best transient response. The disadvantage is greater physical size and weight for a given power, together with higher heat output.

#### Mixed-mode regulation

For higher power levels, TTi have developed a technology that uses switch-mode pre-regulation and linear final regulation. This technique combines exceptional efficiency with noise levels that are close to that of pure linears.

#### PowerFlex regulation

The TTi PowerFlex system uses a modified form of mixed-mode regulation to provide higher levels of current when the voltage is set to lower values.

Although producing slightly higher noise levels than the standard mixed-mode regulation, performance is still excellent.

### Measurement and control

#### Digital Metering

All TTi power supplies incorporate separate digital meters for voltage and current.

On most models these are 4 digit scale length with fixed resolution (e.g. 0.00V to 56.00V). Fixed resolution avoids the misinterpretation of readings that can occur with autoranging 3 or 3½ digit meters where the decimal point position moves as the reading changes.

QL and QPX models provide 5 digit meters for voltages to give still higher precision and resolution.

QL and New PL models also include a low current range which provides 0.1mA resolution.

#### Remote Sense

Most TTi power supplies incorporate remote sense terminals that can be enabled or disabled at the flick of a switch.

Remote sensing is essential to maintaining precise regulation at the load and true metering of the load voltage. Many other power supplies omit remote sense, but quote regulation figures that could never be achieved in a practice.

N.B. A 2 meter length of a 24/0.2 wire pair has a resistance of around 0.1 Ω. For a 5V load drawing 3A the metering error would be 0.3V and the effective full current load regulation would be around 6%, against a quoted figure of perhaps 0.01% for the power supply itself.

#### Output On/Off Switches

All TTi power supplies incorporate output on/off switches for the main outputs. This enables voltage and current settings to be viewed before the load is connected and allows multiple outputs to be controlled individually.

Many other power supplies omit this essential feature.

#### Analog or Digital Controls

TTi power supplies offer a choice of true analog controls or digital controls (numeric keyboard and/or spin-wheel).

The New PL Series combines true analog controls with advanced digital features such as S-Lock and V-Span.

The QL and QPX series offer 16-bit digital control and five digit metering with a resolution of 1mV.



### Bus programmable models

As well as the large range of manually controlled power supplies, TTi also offers many bus programmable units incorporating varying combination of RS-232, GPIB, USB and LAN interfaces.

LabView or LabWindows drivers are available for most power supplies.

### Silent Cooling

Most TTi power supplies use convection cooling thus removing the need for a fan and providing silent operation.

Certain models which offer particularly high power density (e.g. EX4210R) use fan-blown cooling to limit temperature rise in the power section.

Additionally, the QL series of high precision linear power supplies uses fan cooling to minimise power related temperature variation within the precision analog circuitry.

### Rack mounting

Many TTi PSU series, both bus programmable and manual, have a rack-modular casing size.

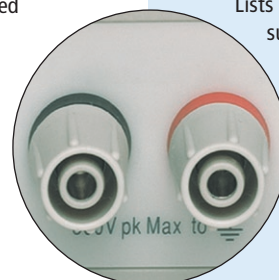
Rack mounts are available for the PL, QL, TSX, CPX, QPX and New PL series.

### Safety binding-post terminals

In response to changing customer requirements, TTi has introduced a new terminal design to most of the power supply range.

The new terminals accept a 4mm safety plug with rigid insulating sleeve, a requirement specified by an increasing number of laboratories for safety reasons.

However, unlike the usual 4mm safety sockets, the new TTi terminals can also accept fork connectors or bare wires, giving maximum flexibility.



## Model ranges

### EL-R series - page 2

Compact linear regulated power supply series with analog controls. Single, dual and triple outputs. 30 to 130 watts  
RS-232 controlled model (EL302P).

### PL & PL-P series - page 2

Long established linear regulated power supply series. Single, dual and triple outputs. 65 to 235 watts.  
RS-232 and GPIB controlled models (PL-P).

### New PL & PL-P series - page 3

Advanced linear regulated power supply series with analog controls combined with digital functions. Ultra compact. Single and dual outputs. 75 to 180 watts.  
Models with RS-232, USB, and LAN (New PL-P). Optional GPIB.

### PLH & PLH-P series - page 3

Higher voltage versions of the New PL and PL-P series offering output voltages up to 250V. Single output, 90 watts.  
Models with RS-232, USB, and LAN (PLH-P). Optional GPIB.

### QL & QL-P series - page 4

High precision digitally controlled linear regulated power supply series with advanced features. Single and triple outputs. 105 to 220 watts.  
RS-232, USB, & GPIB controlled models (QL-P).

### TS series - page 4

Well established linear regulated power supply series. Single and dual outputs. 60 to 120 watts.

### EX-R series - page 5

Compact mixed-mode regulated power supply series with analog controls. Single, dual and triple outputs. 175 to 420 watts  
RS-232 controlled model (EX355P).

### TSX & TSX-P series - page 6

High performance mixed-mode regulated single output power supply series with analog or digital controls. 360 watts.  
RS-232 and GPIB controlled models (TSX-P).

### CPX series - page 7

Compact 'PowerFlex' regulated dual output series with analog controls. 350 to 840 watts.

### QPX series - page 8

High power 'PowerFlex' regulated power supplies with digital controls. 1200 watts. Analogue, RS-232 and USB interfaces standard. Optional LAN interface.

### Model selection chart - page 9

Lists all power supply models giving a summary of voltage, current, power and major features.

## Linear Regulation

Power supplies using all linear regulation offer the lowest output noise, the best transient response and the most benign stability characteristics when driving complex loads.

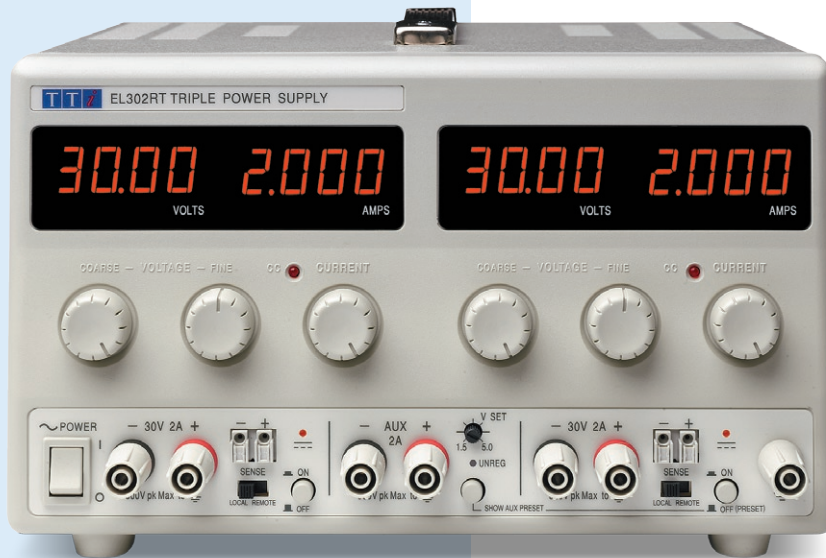
The disadvantage is greater physical size and weight for a given power, together with higher heat output. Linear regulation is used on the EL, EL-R, PL, QL and TS series.

## EL-R series

- ▶ Linear bench power supplies
- ▶ Single, dual or triple outputs
- ▶ 30W to 130W power range
- ▶ Switched remote sense terminals
- ▶ RS-232 interface model available

Dual output and triple output models are available using a similar casing style.

The EL302RT triple (illustrated) has a variable voltage auxiliary output which can be set using the digital displays. ▼



The EL-R series is the ideal solution for users requiring a good quality manual control, linear regulated bench power supply of low to medium power.

The series offers dual displays, high resolution control and metering, remote sensing, dc output switches and silent fan-free operation.

The EL302P includes an RS232 interface for those requiring a basic bus controllable power supply. ▶



Model	Outputs	Voltage / Current	Power	Interfaces
EL301R	One	0 to 30V / 0 to 1A	30W	-
EL183R	One	0 to 18V / 0 to 3.3A	60W	-
EL302R	One	0 to 30V / 0 to 2A	60W	-
EL302P	One	0 to 30V / 0 to 2A	60W	RS232
EL561R	One	0 to 56V / 0 to 1.1A	60W	-
EL155R	One	0 to 15V / 0 to 5A	75W	-
EL303R	One	0 to 30V / 0 to 3A	90W	-
EL302RD	Two	2 x (0 to 30V / 0 to 2A)	120W	-
EL302RT	Three	2 x (0 to 30V / 0 to 2A) plus 1.5 to 5V @ 2A	130W	-

Brief specifications for main outputs:  
 Line & load regulation: <0.01%. Output noise: < 1mV rms.  
 Meter accuracies: voltage - 0.3% ± 3digits, current - 0.5% ± 3digits.  
 Sizes: singles - 140 x 160 x 295mm; dual/triple - 260 x 160 x 295mm (WxHxD)

- ▶ Linear regulation provides low noise
- ▶ 4 digit voltage and current meters on each output \*
- ▶ Constant voltage or constant current operation
- ▶ Variable auxiliary output (1.5-5V@2A) on triple model
- ▶ Silent fan-free cooling
- ▶ DC output switches
- ▶ Low costs



\* Note that a 3 digit current meters is used on the EL302P, and that this model does not have remote sense terminals.

## Original PL & PL-P



The original PL series has been one of the most successful laboratory power supply product ranges of all time.

The products will remain available for a limited period of time, but are being replaced with the New PL series (see next page).

Model	Outputs	Voltage / Current	Power	Interfaces
PL154	One	0 to 15V / 0 to 4A	60W	-
PL320	One	0 to 32V / 0 to 2A	65W	-
PL330	One	0 to 32V / 0 to 3A	95W	-
PL320QMD	Two	2 x (0 to 32V / 0 to 2A)	130W	-
PL330QMD	Two	2 x (0 to 32V / 0 to 3A)	190W	-
PL320QMT	Three	2 x (0 to 32V / 0 to 2A) plus 4 - 6V @ 0 to 4A	155W	-
PL330QMT	Three	2 x (0 to 32V / 0 to 3A) plus 4 - 6V @ 0 to 7A	235W	-
PL330P	One	0 to 32V / 0 to 3A	95W	RS232/GPIB
PL330DP	Two	2 x (0 to 32V / 0 to 3A)	190W	RS232/GPIB
PL330TP	Three	2 x (0 to 32V / 0 to 3A) plus 4 - 6V @ 1 to 7A	235W	RS232/GPIB

Brief specifications for main outputs:  
 Line & load regulation: <0.01%. Output noise: < 1mV rms.  
 Meter accuracies: voltage - 0.1% ± 1digit, current - 0.3% ± 1digit.  
 Sizes: singles - 105 x 130 x 295mm; dual - 210 x 130 x 295mm (WxHxD)

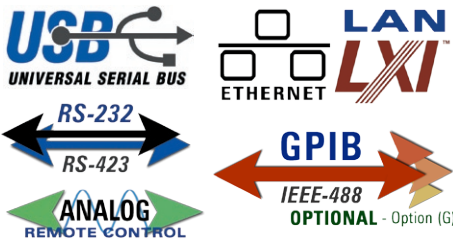
- ▶ Linear regulated precision power supplies
- ▶ Wide model range, single, dual or triple outputs
- ▶ Twin 3 3/4 digit meters on each output
- ▶ Constant voltage or constant current operation



Model	Outputs	Voltage / Current	Power	Interfaces
PL155	One	0 to 15V / 0 to 5A	75W	-
PL303	One	0 to 30V / 0 to 3A	90W	-
PL601	One	0 to 60V / 0 to 1.5A	90W	-
PL303QMD	Two	2 x (0 to 30V / 0 to 3A)	180W	-
PL155P	One	0 to 15V / 0 to 5A	75W	RS232/USB/LAN
PL303P	One	0 to 30V / 0 to 3A	90W	RS232/USB/LAN
PL601P	One	0 to 60V / 0 to 1.5A	90W	RS232/USB/LAN
PL303QMDP	Two	2 x (0 to 30V / 0 to 3A)	180W	RS232/USB/LAN

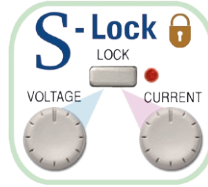
Brief specifications for main outputs:  
 Line & load regulation: <0.01%. Output noise: < 0.4mV rms.  
 Meter accuracies: voltage - 0.1% ± 1digit, current - 0.3% ± 3 digits.  
 Sizes: singles - 105 x 130 x 290/315mm; dual - 210 x 130 x 290mm (WxHxD)

- ▶ Linear regulation provides ultra-low noise
- ▶ Highly compact (1/4 rack 3U) with small bench footprint
- ▶ True analog controls with advanced digital features
- ▶ Settings can be locked at the touch of a button
- ▶ 4 digit voltage and current meters on each output
- ▶ Low current range with 0.1mA resolution
- ▶ Constant voltage or constant current operation
- ▶ Independent, tracking or true parallel modes (PL303QMD)
- ▶ Front and rear power and sense terminals (PL-P models)
- ▶ Analog remote control (PL-P single output models)
- ▶ RS-232, USB and LAN/LXI interfaces (PL-P model)s



The New PL series is the latest power supply series from TTI and represents the successor to best-selling PL series.

This ultra-compact linear regulated design retains the traditional analog controls of the PL but adds important digital features.



When working with any piece of equipment, engineers tend to require a voltage source variable over only a narrow range. That's where the V-Span function comes in. It allows the user to redefine the end-stop values of the voltage control to create a specific voltage range. For example - An engineer is working on a circuit that will operate from four NiMH cells. They use V-Span to set a Vmax of 5.8 volts (to prevent over-voltage damage) and a Vmin of 3.6 volts (to ensure that the circuit doesn't reset). They now have a power supply which provides high-resolution analog control over the exact voltage range they need.

The New PL-P series offers a comprehensive set of digital interfaces including RS232, USB and LAN (Ethernet) as standard, with GPIB optional.

The LAN interface is compliant with LXI-C. LXI (LAN eXtensions for Instrumentation) is the next-generation, modular architecture standard for automated test systems, and is expected to become the successor to GPIB in many systems.

## New PL & PL-P series

- ▶ High performance power supplies
- ▶ Linear regulation, 75W to 180W
- ▶ Manual or bus programmable
- ▶ RS-232, USB, LAN or GPIB



The New PL series is the solution for users requiring an advanced linear regulated precision bench power supply that retains conventional analog controls.

Its ultra-compact design uses minimal space on the bench or in the rack.

The New PL-P series offers the same manual control features but adds full remote control using analog, RS232, USB and LAN interfaces, the latter conforming with LXI.



For more information concerning LXI visit:  
[www.tti-test.com/go/lxi](http://www.tti-test.com/go/lxi)

Model	Outputs	Voltage / Current	Power	Interfaces
PLH120	One	0 to 120V / 0 to 0.75A	90W	-
PLH250	One	0 to 250V / 0 to 0.36A	90W	-
PLH120-P	One	0 to 120V / 0 to 0.75A	90W	RS232/USB/LAN
PLH250-P	One	0 to 250V / 0 to 0.36A	90W	RS232/USB/LAN

Brief specifications for main outputs:  
 Line & load regulation: <0.01%. Output noise: < 0.4mV rms.  
 Meter accuracies: voltage - 0.1% ± 1digit, current - 0.3% ± 3 digits.  
 Size: PLH - 105 x 130 x 290mm; PLH-P - 105 x 130 x 315mm

The PLH series has been developed from the New PL series and retains all of its advanced features at output voltages of 120V or 250V. Linear regulation offers the highest possible performance, and the compact quarter-rack width design provides an impressive 90 watts of power. PLH-P series units have the same comprehensive set of interfaces as the New PL-P.



## PLH & PLH-P series

- ▶ High voltage versions of New PL
- ▶ Manual or bus programmable
- ▶ 90W power at 120V or 250V
- ▶ RS-232, USB, LAN or GPIB

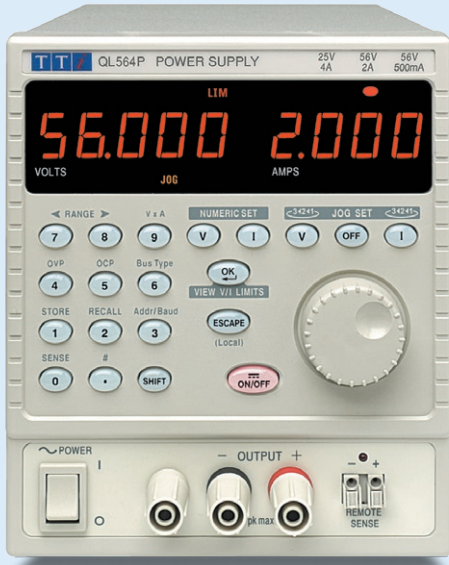


**New Product**

The PLH series is available mid 2009

## QL & QL-P series

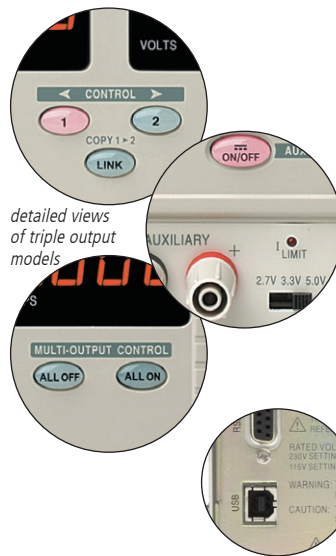
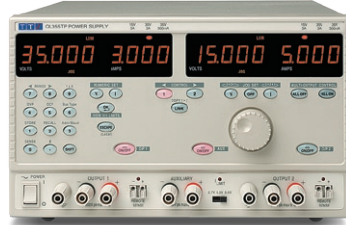
- ▶ High precision power supplies
- ▶ Single or triple outputs
- ▶ Linear regulation, 105W to 215W
- ▶ RS-232/GPIB/USB interfaces



The triple output models incorporate two single output units plus an auxiliary low voltage output.

The two main outputs can be put into a linked mode for simultaneous or tracking control.

A master on/off system enables all three outputs to be switched synchronously. ▼



The QL series represents the state-of-the-art in a linear regulated laboratory PSU.

Very high precision is matched by very low output noise. The digital user interface combines speed with safety.

Despite the compact dimensions, power is in excess of 100 watts per output, and multiple ranges provide higher current at lower voltages.

Model	Outputs	Voltage / Current	Power	Interfaces
QL355	One	0 to 35V / 0 to 3A or 0 to 15V / 0 to 5A	105W	-
QL564	One	0 to 56V / 0 to 2A or 0 to 25V / 0 to 4A	112W	-
QL355T	Three	2 x (0 to 35V / 0 to 3A or 0 to 15V / 0 to 5A) plus 2.7/3.3/5.0 @ 1A	215W	-
QL355P	One	0 to 35V / 0 to 3A or 0 to 15V / 0 to 5A	105W	RS-232/ USB/GPIB
QL564P	One	0 to 56V / 0 to 2A or 0 to 25V / 0 to 4A	112W	RS-232/ USB/GPIB
QL355TP	Three	2 x (0 to 35V / 0 to 3A or 0 to 15V / 0 to 5A) plus 2.7/3.3/5.0 @ 1A	215W	RS-232/ USB/GPIB

Brief specifications for main outputs:  
Line & load regulation: <0.01%. Output noise: < 0.35mV rms.  
Setting accuracies: voltage - 0.03% ± 5mV, current - 0.3% ± 0.5mA.  
Sizes: singles - 141 x 172 x 300mm; triples - 282 x 172 x 300mm (WxHxD)

- ▶ Linear regulation with noise below 0.35mV rms
- ▶ 1mV setting resolution at all output voltages
- ▶ Setting by direct numeric entry or by spin wheel
- ▶ Multiple ranges for higher currents at lower voltages
- ▶ Multiple non-volatile setting memories with preview
- ▶ OVP and OCP trips with isolated alarm output
- ▶ Selectable remote sense for perfect regulation
- ▶ Linked-mode operation of main outputs (T models)
- ▶ Auxiliary output of 2.7/3.3/5.0V at 1A (T models)
- ▶ Compact modular width for bench or rack mounting
- ▶ GPIB (IEEE-488), RS232 & USB interfaces (P versions)
- ▶ Front and rear mounted output terminals (P versions)

QL-P versions are fitted with rear power and sense terminals together with digital bus control interfaces.

In addition to GPIB (IEEE-488) and RS-232, they include a USB interface for easy connection to a PC.

## TS series

- ▶ Manual bench power supplies
- ▶ Single, or dual outputs
- ▶ Linear regulation, 60W or 120W
- ▶ LCD displays

The TS series has been one of TTI's most successful products being in continuous production for more than 20 years.

Users appreciate its low noise design and all-metal construction.

It uses LCD displays and has remote sense terminals



Model	Outputs	Voltage / Current	Power	Interfaces
TS3021S	One	0 to 30V / 0 to 2A	60W	-
TS3022S	Two	2 x (0 to 30V / 0 to 2A)	120W	-

Brief specifications:  
Line & load regulation: <0.01%. Output noise: < 1mV rms.  
Meter accuracies: voltage - 0.1% ± 1digit, current - 0.3% ± 1digit.  
Sizes: single - 160 x 160 x 245mm; dual - 308 x 160 x 245mm (WxHxD)

- ▶ Linear regulation provides low noise
- ▶ 3.5 digit autoranging LCD voltage and current meters
- ▶ Constant voltage or constant current operation
- ▶ Meter resolution 10mV and 1mA
- ▶ Remote sense terminals
- ▶ Silent fan-free cooling
- ▶ DC output switches





All-linear regulation becomes impractical at higher power levels, so TTI have developed a technology that combines HF switch-mode pre-regulation with linear final regulation.

This technique combines exceptional efficiency with noise levels that are close to that of pure linears. Mixed-mode regulation is used in the EX, EX-R and TSX series.

## Mixed-mode Regulation

Model	Outputs	Voltage / Current	Power	Interfaces
EX355R	One	0 to 35V / 0 to 5A	175W	-
EX355P	One	0 to 35V / 0 to 5A	175W	RS232
EX1810R	One	0 to 18V / 0 to 10A	180W	-
EX2020R	One	0 to 20V / 0 to 20A	400W	-
EX4210R	One	0 to 42V / 0 to 10A	420W	-
EX354RD	Two	2 x (0 to 35V / 0 to 4A)	280W	-
EX354RT	Three	2 x (0 to 35V / 0 to 4A) plus 1.5 to 5.0V @ 5A	305W	-
EX752M	Two	2 x (0 to 75V / 0 to 2A) or 0 to 75V / 0 to 4A or 0 to 150V / 0 to 2A	300W	-

Brief specifications for main outputs:  
Line & load regulation: <0.01%. Output noise: <2mV rms.  
Meter accuracies: voltage - 0.3% ± 1digit, current - 0.6% ± 1digit.  
Sizes: singles - 140 x 160 x 295mm; dual/triple - 260 x 160 x 295mm (WxHxD)

- ▶ Mixed-mode regulation with linear output stage
- ▶ 4 digit voltage and current meters on each output \*
- ▶ Constant voltage or constant current operation
- ▶ Variable auxiliary output (1.5-5V@5A) on triple model
- ▶ Switched remote sensing (not EX355P or EX752M)
- ▶ Silent fan-free cooling \*\*
- ▶ DC output switches

\* Note that 3 digit current meters are used on the EX355P and EX752M and that voltmeter resolution on the EX752M is 0.1V.

\*\* Note that the EX2020R and EX4210R use fan assisted cooling.



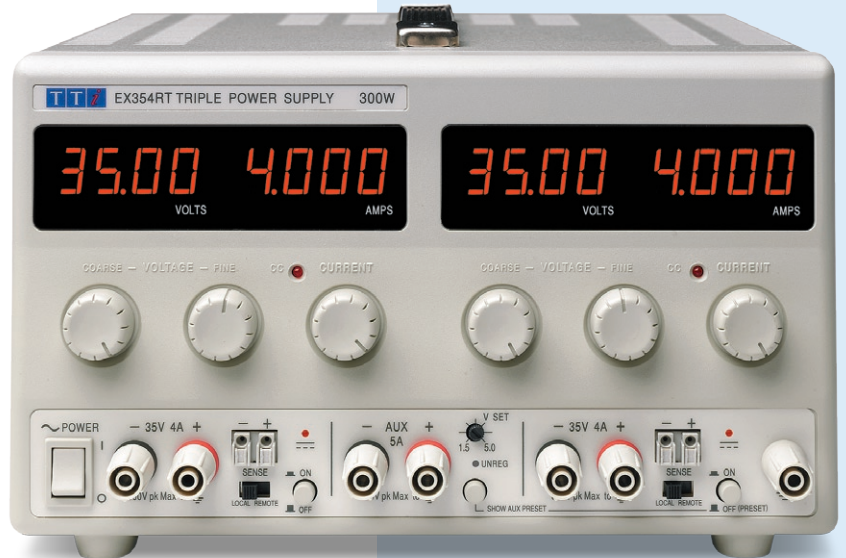
**Higher Voltage**  
up to **150V**



The EX series is the value-for-money PSU for users who require higher power levels. Mixed-mode regulation gives excellent performance combined with compact size and low weight.

Dual output and triple output models are available in a similar casing style.

The EX354RT triple (illustrated) has a variable voltage auxiliary output which can be set using the digital displays. ▼



The EX-R series are single output power supplies similar in size and weight to the standard EX series but offering higher output currents.

To match their higher current capability, they include switchable remote sensing and extended voltmeter resolution. ▶

The EX355P includes an RS232 interface for those requiring a basic bus controllable power supply.

12 bit voltage setting resolution is matched by a 4 digit volts display. ◀

The EX752M is a dual output 300 watt PSU with Multi-Mode capability. This enables it to operate as a dual power supply with two independent and isolated outputs, or as a single power supply of double the power. ◀

As a dual, each output provides 0 to 75V at 0 to 2A (mode A). As a single, the output can be selected as either 0 to 75V at 0 to 4A (mode B) or 0 to 150V at 0 to 2A (mode C). In single modes, the unused half of the unit becomes completely inoperative and its displays are blanked.

## EX-R series

- ▶ Compact bench power supplies
- ▶ Single, dual or triple outputs
- ▶ Mixed-mode regulation
- ▶ Power from 175W to 420W
- ▶ Switched remote sense terminals
- ▶ RS-232 interface model available



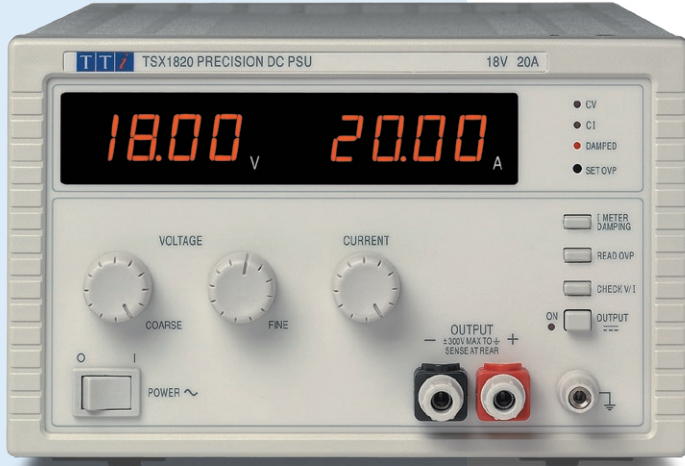
**Higher Current**  
up to **20A**

## TSX series

- ▶ Mixed-mode regulation
- ▶ Very high performance
- ▶ Single output, 350W/360W
- ▶ Front and rear terminals

The TSX series is housed in a 3U half-rack size case suitable for bench use or rack mounting.

It uses silent convection cooling for the quietest possible working environment.



The TSX series offers exceptionally good noise and transient performance.

The switch-mode pre-regulation uses ultra low capacitance components to minimise common mode noise, while the linear final regulator minimises differential output noise.



Model	Outputs	Voltage / Current	Power	Interfaces
TSX1810	One	0 to 18V / 0 to 20A	360W	-
TSX3510	One	0 to 35V / 0 to 10A	350W	-

Brief specifications:  
 Line and load regulation: <0.01%. Output noise: < 1mV rms.  
 Meter accuracies: voltage - 0.2% ± 1digit, current - 0.5% ± 1digit.  
 Size: 210 x 130 x 350mm (WxHxD). Weight: 5.0kg

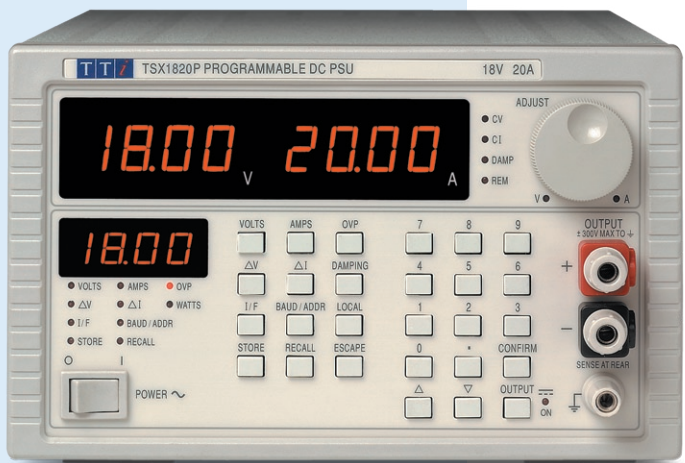
- ▶ Choice of 35V/10A and 18V/20A models
- ▶ Very low noise, excellent transient response
- ▶ Constant voltage or constant current operation
- ▶ Comprehensive protection including OVP trip
- ▶ High setting resolution, remote sense terminals
- ▶ Bench or rack mounting, front and rear terminals
- ▶ Compact half-rack 3U case size

## TSX-P series

- ▶ Mixed-mode regulation
- ▶ Very high performance
- ▶ Fully digital control
- ▶ RS-232 and GPIB interfaces

The TSX-P series is housed in a 3U half-rack size case suitable for bench use or rack mounting.

It uses silent convection cooling for the quietest possible working environment.



The TSX-P is a digitally controlled version of the high performance TSX series.

It offers both keyboard and rotary control of setting along with a number of convenience features. It incorporates both RS-232 and GPIB interfaces.



Model	Outputs	Voltage / Current	Power	Interfaces
TSX1810P	One	0 to 18V / 0 to 20A	360W	RS232/GPIB
TSX3510P	One	0 to 35V / 0 to 10A	350W	RS232/GPIB

Brief specifications:  
 Line and load regulation: <0.01%. Output noise: < 1mV rms.  
 Meter accuracies: voltage - 0.2% ± 1digit, current - 0.5% ± 1digit.  
 Size: 210 x 130 x 350mm (WxHxD). Weight: 5.0kg

- ▶ Power features as per TSX series (see above)
- ▶ Digital control with keyboard setting of all parameters
- ▶ Rotary and delta (step) control of voltage/current
- ▶ Third display for parameter indication including watts
- ▶ Non-volatile storage of up to twenty five settings
- ▶ Fully programmable with bus readback of V and I
- ▶ GPIB (IEEE-488) and addressable RS232 interfaces

Local operation convenience features of the TSX-P series include a auxiliary display for displaying other data such as increment values, OVP level, or watts.

The display is also used to preview entry from the keyboard in order to prevent errors.

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

The TTI PowerFlex system uses a modified form of mixed-mode regulation to provide higher levels of current when the voltage is set to lower values. Although producing slightly higher noise levels than

the standard mixed-mode regulation, performance is still excellent. PowerFlex regulation is used on the CPX and QPX series.

## PowerFlex Regulation

Model	Outputs	Voltage / Current	Power	Interfaces
CPX200	Two	2 x (0 to 35V / 0 to 10A*)	350W	-
CPX400A	Two	2 x (0 to 60V / 0 to 20A*)	840W	-

Brief specifications:  
 Line regulation: <0.01%. Load regulation: <0.02%. Output noise: < 3mV rms.  
 Meter accuracies: voltage - 0.2% ± 1digit, current - 0.5% ± 1digit.  
 Size: 210 x 130 x 350mm (WxHxD)  
 \* Note: maximum current is not available with maximum voltage see PowerFlex power envelope curves.

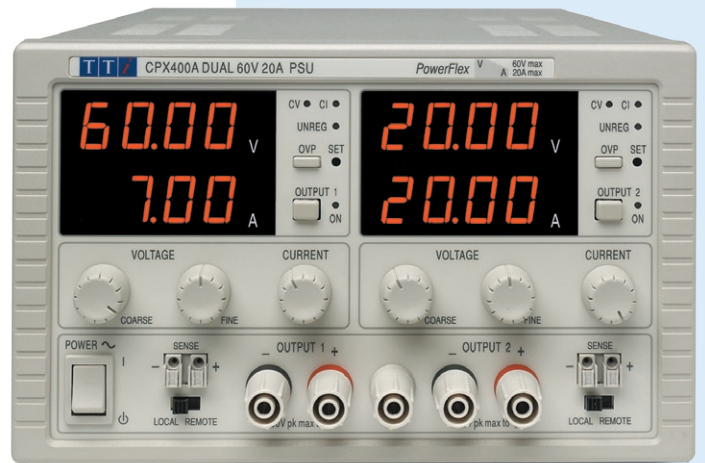
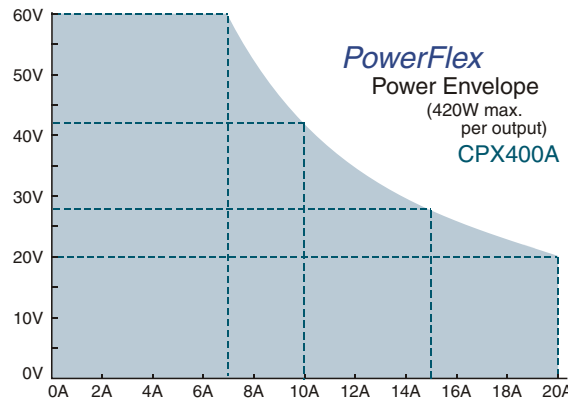
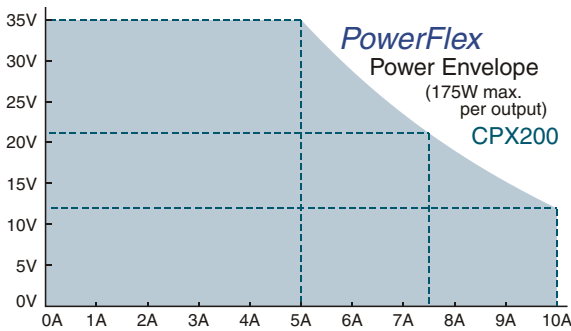
The CPX200 and CPX400A share the same compact case style.

The 350 watt CPX200 uses silent convection cooling while the 840 watt CPX400A uses fan assisted cooling.

## CPX series

- ▶ PowerFlex regulation
- ▶ Higher current at lower voltage
- ▶ Dual independent outputs
- ▶ 350 watts or 840 watts total

- ▶ PowerFlex design gives variable voltage and current combinations within a maximum power range
- ▶ Isolated outputs can be wired in series or parallel
- ▶ Constant voltage or constant current operation
- ▶ Variable OVP trips
- ▶ Selectable remote sense terminals
- ▶ Compact half-rack 3U case size



The CPX series is a different type of laboratory power supply designed to meet the need for flexibility in the choice of voltage and current.

Today's engineers often need a wide voltage range capability and a high current capability. Normally, however, the maximum voltage and maximum current are not required simultaneously.

A conventional PSU has a fixed current limit giving a power capability that reduces directly with the output voltage.

The TTI PowerFlex design of the CPX series enables higher currents to be generated at lower voltages within an overall power limit envelope.

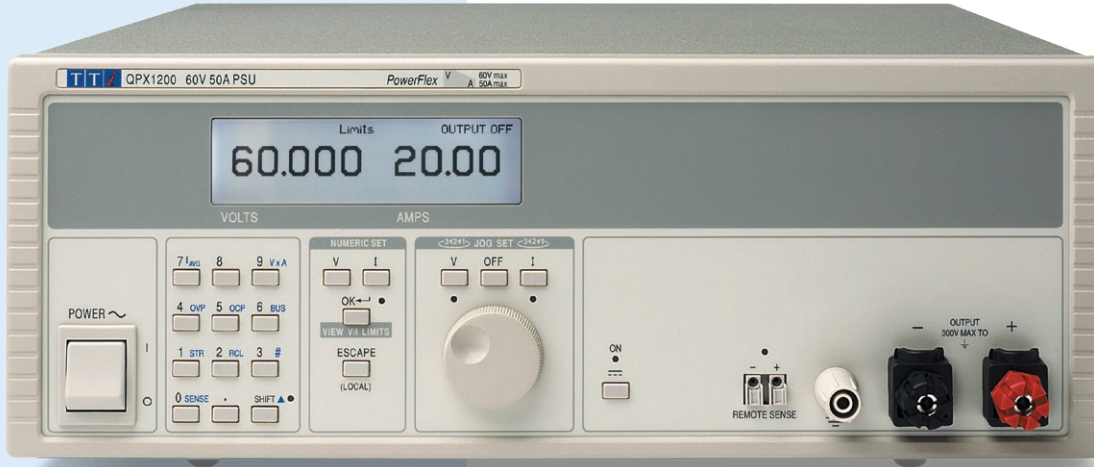




## QPX1200L

- ▶ 1200 watts PowerFlex
- ▶ Higher currents at lower voltages
- ▶ 0 to 60 volts, 0 to 50 amps
- ▶ Analog, RS-232, USB & LAN (LXI)
- ▶ GPIB interface optional

Model	Outputs	Voltage / Current	Power	Interfaces
QPX1200L	One	0 to 60V / 0 to 50A*	1200W	RS232/USB/LAN
Option G				adds GPIB
Brief specifications:				
Line & load regulation: <0.01%. Output noise: < 3mV rms.				
Setting accuracies: voltage - 0.1% ± 2mV, current - 0.3% ± 20mA.				
Size: 350 x 130 x 415mm (WxHxD)				
* Note: max. current is not available with max. voltage, see PowerFlex curve.				



With a current capability of 20 amps at the maximum output of 60 volts, the PowerFlex design offers increasing output current with reducing output voltage.

Example voltage/current combinations include 60V/20A, 48V/25A, 37.5V/30A, 26V/40A, and 20V/50A.

The QPX1200L has analog, RS232 USB and LAN interfaces as standard. The latter conforms with the LXI standard

An optional GPIB interface can be specified.

The QPX1200 offers users a level of flexibility that cannot be achieved with conventional laboratory power supplies.

It can therefore perform the task of many different power supplies.

The QPX1200 is suited to be bench-top and system applications with front and rear terminals and a wide range of interfaces.

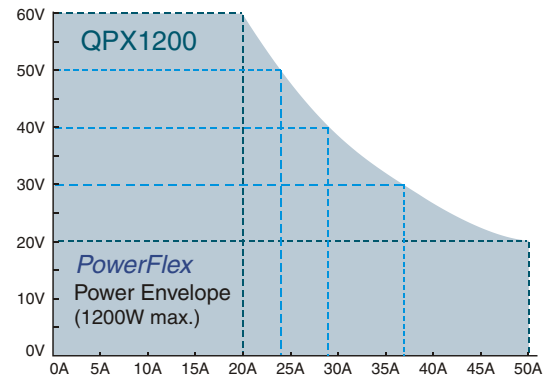
- ▶ PowerFlex design gives variable voltage/current combinations
- ▶ Up to 60 volts and up to 50 amps within a power envelope
- ▶ Setting by direct numeric entry or by spin wheel
- ▶ High setting resolution of 1mV in up to 60 volts
- ▶ Very low noise of < 3mV rms at full power
- ▶ Bench or rack mounting (3U) with front and rear terminals
- ▶ Analog, RS232, USB and LAN interfaces standard, GPIB option



LAN eXtensions for Instrumentation

For more information concerning LXI visit:

[www.tti-test.com/go/lxi](http://www.tti-test.com/go/lxi)



**Power Supply Selector**

MANUAL CONTROL MODELS												
Model No	Type	Regulation	O/Ps	Main Output(s)	Aux. Output	Power	R.Sense	Fan	Controls	Meters	Size mm	Weight
EB2025T	Basic	Linear	Triple	0.3 - 20V / 0 - 0.25A	5V @ 1A	15W	No	No	Analog	Analog	220x82x230	1.8kg
EL301R	Precision	Linear	Single	0 - 30V / 0 - 1A		30W	Yes	No	Analog	4 digit LED	140x160x195	3.4kg
EL183R	Precision	Linear	Single	0 - 18V / 0 - 3.3A		60W	Yes	No	Analog	4 digit LED	140x160x195	4.4kg
EL302R	Precision	Linear	Single	0 - 30V / 0 - 2A		60W	Yes	No	Analog	4 digit LED	140x160x195	4.4kg
EL561R	Precision	Linear	Single	0 - 56V / 0 - 1.1A		60W	Yes	No	Analog	4 digit LED	140x160x195	4.4kg
EL155R	Precision	Linear	Single	0 - 15V / 0 - 5A		75W	Yes	No	Analog	4 digit LED	140x160x195	5.0kg
EL303R	Precision	Linear	Single	0 - 30V / 0 - 3A		90W	Yes	No	Analog	4 digit LED	140x160x195	5.0kg
EL302RD	Precision	Linear	Dual	0 - 30V / 0 - 2A		120W	Yes	No	Analog	4 digit LED	260x160x195	7.5kg
EL302RT	Precision	Linear	Triple	0 - 30V / 0 - 2A	1.5 - 5V @ 2A	130W	Yes	No	Analog	4 digit LED	260x160x195	7.5kg
EX1810R	Precision	Mixed Mode	Single	0 - 18V / 0 - 10A		180W	Yes	No	Analog	4 digit LED	140x160x195	3.0kg
EX355R	Precision	Mixed Mode	Single	0 - 35V / 0 - 5A		175W	Yes	No	Analog	4 digit LED	140x160x195	3.0kg
EX2020R	Precision	Mixed Mode	Single	0 - 20V / 0 - 20A		400W	Yes	Yes	Analog	4 digit LED	140x160x195	3.5kg
EX4210R	Precision	Mixed Mode	Single	0 - 42V / 0 - 10A		420W	Yes	Yes	Analog	4 digit LED	140x160x195	3.5kg
EX354RD	Precision	Mixed Mode	Dual	0 - 35V / 0 - 4A		280W	Yes	No	Analog	4 digit LED	260x160x195	4.3kg
EX354RT	Precision	Mixed Mode	Triple	0 - 35V / 0 - 4A	1.5 - 5V @ 5A	305W	Yes	No	Analog	4 digit LED	260x160x195	4.3kg
EX752M	Multi-Mode HV	Mixed Mode	Dual	0 - 75V / 0 - 2A		300W	No	No	Analog	3 digit LED*	260x160x195	4.4kg
PL155	Advanced	Linear	Single	0 - 15V / 0 - 5A		75W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PL303	Advanced	Linear	Single	0 - 30V / 0 - 3A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PL601	Advanced	Linear	Single	0 - 60V / 0 - 1.5A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PL303QMD	Advanced	Linear	Dual	0 - 30V / 0 - 3A		180W	Yes	LN	Smart Analog	4 digit LED	210x130x295	9.0kg
PLH120	Advanced HV	Linear	Single	0 - 120V / 0 - 0.75A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PLH250	Advanced HV	Linear	Single	0 - 250V / 0 - 0.36A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PL154	Precision	Linear	Single	0 - 15V / 0 - 4A		60W	Yes	No	Analog	4 digit LED	155x170x265	5.0kg
PL320	Precision	Linear	Single	0 - 32V / 0 - 2.1A		65W	Yes	No	Analog	4 digit LED	155x170x265	5.0kg
PL330	Precision	Linear	Single	0 - 32V / 0 - 3.1A		95W	Yes	No	Analog	4 digit LED	155x170x300	6.0kg
PL320QMD	Precision	Linear	Dual	0 - 32V / 0 - 2.1A		130W	Yes	No	Analog	4 digit LED	350x170x265	9.5kg
PL330QMD	Precision	Linear	Dual	0 - 32V / 0 - 3.1A		190W	Yes	No	Analog	4 digit LED	350x170x300	12.0kg
PL320QMT	Precision	Linear	Triple	0 - 32V / 0 - 2.1A	4 - 6V / 0 - 4A	155W	Yes	No	Analog	4 digit LED	425x170x265	13.5kg
PL330QMT	Precision	Linear	Triple	0 - 32V / 0 - 3.1A	4 - 6V / 0 - 7A	230W	Yes	No	Analog	4 digit LED	425x170x300	15.5kg
TS3021S	Precision	Linear	Single	0 - 30V / 0 - 2A		60W	Yes	No	Analog	3½ dig LCD	160x160x238	4.9kg
TS3022S	Precision	Linear	Dual	0 - 30V / 0 - 2A		120W	Yes	No	Analog	3½ dig LCD	308x160x238	9.6kg
QL355	High Precision	Linear	Single	0 - 35V / 0 - 5A #		105W	Yes	Yes	Digital	5 digit LED	141x171x300	5.0kg
QL564	High Precision	Linear	Single	0 - 56V / 0 - 4A #		112W	Yes	Yes	Digital	5 digit LED	141x171x300	5.0kg
QL355T	High Precision	Linear	Triple	0 - 35V / 0 - 5A #	2.7V-5V @ 1A	215W	Yes	Yes	Digital	5 digit LED	282x171x300	10.0kg
TSX1820	Precision	Mixed Mode	Single	0 - 18V / 0 - 20A		360W	Yes	No	Analog	4 digit LED	210x130x350	5.0kg
TSX3510	Precision	Mixed Mode	Single	0 - 35V / 0 - 10A		350W	Yes	No	Analog	4 digit LED	210x130x350	5.0kg
CPX200	Precision	PowerFlex	Dual	0 - 35V / 0 - 10A †		350W	Yes	No	Analog	4 digit LED	210x130x350	6.0kg
CPX400A	Precision	PowerFlex	Dual	0 - 60V / 0 - 20A †		840W	Yes	Yes	Analog	4 digit LED	210x130x350	7.5kg
BUS PROGRAMMABLE MODELS (Manual and Remote Control)												
Model No	Interfaces	Regulation	O/Ps	Main Output(s)	Aux. Output	Power	R.Sense	Fan	Local Cntrl	Meters	Size mm	Weight
EL302-P	RS-232	Linear	Single	0 - 30V / 0 - 2A		60W	No	No	Digital	4 digit LED*	140x160x195	4.4kg
EX355-P	RS-232	Mixed Mode	Single	0 - 35V / 0 - 5A		175W	No	No	Digital	4 digit LED*	140x160x195	3.0kg
PL155-P	RS-232/USB/LAN	Linear	Single	0 - 15V / 0 - 5A		75W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.7kg
PL303-P	RS-232/USB/LAN	Linear	Single	0 - 30V / 0 - 3A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.7kg
PL601-P	RS-232/USB/LAN	Linear	Single	0 - 60V / 0 - 1.5A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.7kg
PL303QMD-P	RS-232/USB/LAN	Linear	Dual	0 - 30V / 0 - 3A		180W	Yes	LN	Smart Analog	4 digit LED	210x130x295	9.2kg
PLH120-P	RS-232/USB/LAN	Linear	Single	0 - 120V / 0 - 0.75A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PLH250-P	RS-232/USB/LAN	Linear	Single	0 - 250V / 0 - 0.36A		90W	Yes	LN	Smart Analog	4 digit LED	105x130x295	4.5kg
PL330-P	RS-232 & GPIB	Linear	Single	0 - 32V / 0 - 3.1A		95W	Yes	No	Analog	4 digit LED	207x170x300	6.5kg
PL330D-P	RS-232 & GPIB	Linear	Dual	0 - 32V / 0 - 3.1A		190W	Yes	No	Analog	4 digit LED	350x170x300	12.5kg
PL330T-P	RS-232 & GPIB	Linear	Triple	0 - 32V / 0 - 3.1A	4 - 6V / 1 - 7A	230W	Yes	No	Analog	4 digit LED	425x170x300	16.0kg
QL355-P	USB/RS232/GPIB	Linear	Single	0 - 35V / 0 - 5A #		105W	Yes	Yes	Digital	5 digit LED	141x171x300	5.0kg
QL564-P	USB/RS232/GPIB	Linear	Single	0 - 56V / 0 - 4A #		112W	Yes	Yes	Digital	5 digit LED	141x171x300	5.0kg
QL355T-P	USB/RS232/GPIB	Linear	Triple	0 - 35V / 0 - 5A #	2.7V-5V @ 1A	215W	Yes	Yes	Digital	5 digit LED	282x171x300	10.0kg
TSX1820-P	RS-232 & GPIB	Mixed Mode	Single	0 - 18V / 0 - 20A		360W	Yes	No	Digital	4 digit LED	210x130x350	5.5kg
TSX3510-P	RS-232 & GPIB	Mixed Mode	Single	0 - 35V / 0 - 10A		350W	Yes	No	Digital	4 digit LED	210x130x350	5.5kg
QPX1200L	RS-232/USB/LAN	PowerFlex	Single	0 - 60V / 0 - 50A †		1200W	Yes	Yes	Digital	5 digit LCD	350x130x 415	9.2kg

for full power supply  
technical information:  
[www.tti-test.com/psu](http://www.tti-test.com/psu)



## LD300 dc load

- ▶ 300 watt dc electronic load
- ▶ Up to 80 volts or 80 amps
- ▶ CI, CR, CV and CP modes
- ▶ Built-in transient generator

*Note: Full technical details are available on the web site.*



The LD300 is an inexpensive electronic load which is suitable for testing and characterising a wide variety of dc power sources.

It can be used to investigate the behaviour of many different types of power source such as batteries, solar cells, fuel cells or wind generators, as well as electronic power supply units.

Its wide voltage/current range, multiple operating modes and built-in transient generator give it the versatility to offer test solutions from the design laboratory through to the component

- ▶ Versatile solution for testing dc power sources
- ▶ Constant current, constant resistance, constant conductance, constant voltage and constant power modes
- ▶ Wide voltage and current range, 0 to 80 volts and 0 to 80 amps.
- ▶ 300 watts continuous dissipation at 40°C
- ▶ Low minimum operating voltage of <1V at 40A
- ▶ Ten turn controls for level setting
- ▶ Built-in transient generator with variable slew
- ▶ Current monitor output for waveform viewing
- ▶ Variable drop-out voltage for battery testing
- ▶ Analog remote control capability

**About this Short Form Catalogue****Products included**

This Laboratory Power Supplies catalogue is an extract from the main TTI short form catalogue which covers all TTI product groups and can be downloaded from the web site.

**New product introductions and changes**

TTi regularly introduces new products and some may have been added since this catalogue was printed. For the latest information please visit our web site.

Products are subject to continuous development and changes to some detailed specifications or to cosmetic appearance may have taken place since the catalogue was printed.

**Detailed product information**

This catalogue contains only limited product information.

Fully detailed information for each product is available from the web site. Alternatively contact TTI or the local distributor in your country to request detailed information.

**Product illustrations**

The illustrations within this catalogue are representative of the products at the time of printing. The main illustration for each product is at approximately 42% (linear) of actual size in order to enable size comparisons.

Further illustrations within the product description area are at a variable scaling to fit the available space.

**About TTI****Excellence through experience**

Thurlby Thandar Instruments is one of Europe's leading manufacturers of test and measurement instruments.

The company has wide experience in the design and manufacture of advanced test instruments and power supplies built up over nearly thirty years

TTi is based in the United Kingdom, and all products are built at the company's facility in Huntingdon, close to the famous university city of Cambridge.

**Traceable quality systems**

TTi is an ISO9001 registered company operating fully traceable quality systems for all processes from design through to final calibration.  
BS EN ISO9001:2000  
Certificate number FM 20695



Measurably better value

**Other TTI product groups**

In addition to laboratory power supplies, TTI also manufactures a wide range of test and measurement instruments including waveform generators, precision measurement instruments, and RF test equipment.

Please visit the web site for full information.

**Where to buy TTI products**

TTi products are widely available from a network of distributors and agents in more than fifty countries across the world.

To find your local distributor, please visit our web site which provides full contact details.

**tti-test.com**

**tti.eu**

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*Designed and built in Europe*