



THURLBY THANDAR INSTRUMENTS

EL Series



Compact bench DC power supplies

*low cost, linear regulated PSU range*

*single, dual and triple output models*

*RS-232 programmable model available*

# EL series DC bench Power Supplies

## compact linear PSUs offering performance and value

### High performance at low cost

The EL series of DC bench power supplies has been designed to meet the need for a compact power supply of good performance at a reasonable price.

They provides medium levels of power (up to 130 watts) with fan-free cooling for silent operation.

### Linear regulation

The EL series uses all linear regulation for the best possible performance. Excellent line and load regulation is matched by very low output noise and good transient response.

### Simultaneous digital metering

The EL series incorporates separate digital voltage and current meters on each main output. The meters use bright 14mm (0.56") LED displays and have an update rate of 4 per second providing near instantaneous response.

Simultaneous metering of voltage and current provides accurate information "at a glance" and avoids any possibility of misinterpretation. When an output switch is set to "off", the current limit setting is displayed enabling conditions to be set before the load is connected.

### Constant voltage or constant current

The main outputs can operate in constant voltage or constant current mode with automatic crossover and mode indication. Coarse and fine voltage controls are provided. The current control is logarithmic enabling low current levels to be set accurately.

### Single, dual or triple outputs

The EL series includes six single output models plus one dual output and one triple output model.

The EL302D has two independent and isolated outputs each with a 0 to 30V, 0 to 2A capability and its own on-off switch. The outputs can be wired in either series or parallel to provide voltages up to 60 volts or currents up to 4 amps.

All outputs are intrinsically short circuit proof, and are protected against external voltages and reverse currents.

Model	Outputs	Voltage & Current	Power
EL301	One	0 to 30V/0 to 1A	30W
EL183	One	0 to 18V/0 to 3.3A	60W
EL302	One	0 to 30V/0 to 2A	60W
EL561	One	0 to 56V/0 to 1.1A	60W
EL155	One	0 to 15V/0 to 5A	75W
EL303	One	0 to 30V/0 to 3A	90W
EL302D	Two	2 x (0 to 30V/0 to 2A)	120W
EL302Tv	Three	2 x (0 to 30V/0 to 2A) + 1.5V to 5V @ 2A	130W

### Low voltage auxiliary output

The new EL302Tv incorporates a third output fully variable between 1.5V and 5.0V with a fixed current limit of 2A.

The set voltage can be measured using the digital meters.

### New 3A and 5A models

Responding to the requirement for higher currents and power, two new single output models have been added.

The EL303 provides 0 to 30 volts at 0 to 3 amps, while the EL155 provides 0 to 15V at 0 to 5A.

### EL-P models - operation via RS-232

The EL302P is a digitally controlled version of the EL302 with an isolated RS-232 interface.

It offers a low-cost solution for a basic programmable PSU, and will be sufficient for many applications where the sophistication and complexity of GPIB is not needed.

A simple command set allows remote control of voltage, current and output enable along with read-back of metering values and operational status.

Local control is via three rotary encoders providing rapid and accurate setting



## EL SERIES

### MAIN OUTPUTS

Voltage Range:	0V to 15V minimum (EL155) 0V to 18V minimum (EL183) 0V to 30V minimum (EL301, EL302, EL303, EL302D, EL302T) 0 to 56V minimum (EL561) 0A to 1A minimum (EL301) 0A to 1.1A minimum (EL561) 0A to 2A minimum (EL302, EL302D, EL302T) 0A to 3A minimum (EL303) 0A to 3.3A minimum (EL183) 0A to 5A minimum (EL155)
Current Range:	0A to 1A minimum (EL301) 0A to 1.1A minimum (EL561) 0A to 2A minimum (EL302, EL302D, EL302T) 0A to 3A minimum (EL303) 0A to 3.3A minimum (EL183) 0A to 5A minimum (EL155)
Operating Mode:	Constant voltage or constant current with automatic cross-over and indication.
Voltage Setting:	By coarse and fine controls.
Current Setting:	By single logarithmic control.
Load regulation:	<0.01% of max. O/P for a 90% load change.
Line regulation:	<0.01% of max. O/P for a 10% line voltage change.
Output impedance:	Typically <5mΩ in constant voltage mode. Typically >50kΩ in constant current mode.
Ripple & Noise (20MHz bandwidth):	Typically <1mV rms, (CV mode).
Transient Response:	<20μs to within 50mV of set level for 90% load change.
Temp. Coefficient:	Typically <100ppm/°C.
Output Protection:	Outputs will withstand forward voltages of up to 20V above the rated output voltage. Reverse protection by diode clamp for currents up to 3A.
Status Indication:	Output ON lamps. Constant current mode lamps.
Output Switch:	Electronic. Preset voltage and current displayed when output is off.
Output Terminals:	4mm terminals on 19mm (0.75") pitch.

### METERS (main outputs)

Meter Types:	Separate 3 digit meters for voltage and current with 14mm (0.56") LED displays. Reading rate 4/sec.
Meter Resolutions:	100mV, 10mA.
Meter Accuracies:	Voltage 0.3% ±1 digit. Current 0.6% ±1 digit.

### AUXILIARY OUTPUT (EL302Tv only)

Voltage:	Variable <1.5V to >5V by front panel control.
Meter accuracy:	0.3% ± 1 digit.
Current limit:	2A minimum.
Load regulation:	<3% for 90% load change.
Line regulation:	<0.2% for 10% line voltage change.
Ripple & Noise (20MHz bandwidth):	Typically <5mVrms, <15mVpk-pk (CV mode).
Output Protection:	Output will withstand up to 7V forward voltage. Diode clamp reverse protection for currents up to 3A.
Output Terminals:	4mm terminals on 19mm (0.75") pitch.
Status Indication:	UNREG lamp.

## EL302P

(where different from EL302)

### OUTPUT

Voltage Setting:	By coarse and fine rotary encoders or RS-232 interface. Resolution 10mV
Current Setting:	By single rotary encoder or RS-232 interface. Resolution 10mA

### METERING

Meter Types:	Separate 4 digit meter for voltage and 3 digit meter for current with 14mm (0.56") LED displays. Reading rate 4/sec.
Meter Resolutions:	100mV, 10mA.
Meter Accuracies:	Voltage 0.3% ±1 digit. Current 0.6% ±1 digit.

Note that in constant voltage mode the meter will show the set voltage to a resolution of 10mV. However the metering resolution is limited to 100mV and when in constant current mode the last digit will be set to zero.

### RS-232 CONTROL

Interface:	RS-232 interface, fully opto-isolated from power supply output. 9-pin D connector.
Baud Rate:	Variable from 600 baud to 9,600 baud.
Remote Functions:	Set Voltage, Set Current, Set Output On/Off, Read Voltage, Read Current, Read On/Off, Read Mode (CV or CC).
Setting Accuracy:	Voltage 0.3% ±20mV. Current 0.6% ±20mA.
Setting Resolution:	Voltage 10mV. Current 10mA.
Readback Accuracy:	Voltage 0.3% ±100mV. Current 0.6% ±20 mA.
Readback Resolution:	Voltage 100mV. Current 10mA.

## GENERAL

### OUTPUT TERMINALS

Standard Type:	4mm "binding post" terminals suitable for plugs or wires.
Optional (all models):	4mm safety sockets, suitable for shrouded plugs. N.B. Output impedance and load regulation will be slightly poorer with safety sockets because of the internal resistance of the socket.

### INPUT POWER

AC Input:	230V or 115V ±10%, 50/60Hz. Adjustable internally. Installation Category II.
VA Rating:	EL301 - 85 VA, EL302, EL302P, EL183, EL561 - 160VA, EL155, EL303 - 250VA, EL302D, EL302T - 320VA.

### TEMPERATURE & ENVIRONMENTAL

Operating Range:	+5°C to +40°C, 20% to 80% RH.
Storage Range:	-40°C to + 70°C.
Environmental:	Indoor use at altitudes to 2000m, Pollution Degree 2.
Cooling:	Silent fan-less convection cooling.
Safety:	Complies with EN61010-1.
EMC:	Complies with EN61326.

### MECHANICAL

Size:	EL301, EL302, EL302P, EL183, EL561, EL155, EL303 - 140x160x295 mm (WxHxD) EL302D, EL302T - 260x160x295 mm (WxHxD).
Weight:	EL301 - 3.4kg, EL302, EL302P, EL183, EL561 - 4.4kg EL155, EL303 - 5.0kg, EL302D, EL302T - 7.5kg.

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

## Part of a large power supply family

TTi is one of the world's foremost producers of laboratory power supplies. If the EL series does not offer a model to meet your needs, then one of our other series probably will.

### EX series

The EX series is similar in style, size and model range to the EL series but uses mixed-mode regulation with powers from 175W to 420W. An RS-232 controlled version is also available.

### QL series

The QL series is a high precision digitally controlled PSU range using all-linear regulation and offering single and triple outputs. Standard and bus-programmable versions are available, the latter having RS-232, GPIB and USB interfaces.

### TSX series

The TSX series is a half-rack sized high power single output PSU range offering very high performance. Analogue and digitally controlled versions are available, the latter having RS-232 and GPIB interfaces.

### CPX series

The CPX series is a dual output half-rack sized bench PSU range offering PowerFlex capability. This allows higher currents to be generated at lower voltages giving increased flexibility.

### PL and TS series

The PL and TS series are long established power supplies which have become the standard for many companies across the world. Both use linear regulation and offer a wide choice of models. The PL series is also available with RS-232 and GPIB interfaces.

### Further models

TTi also produce some specialised PSUs not mentioned above. New models are added each year. Please visit our web site for up to date information.

# Power Supply Range and Model Selector

BENCH MODELS												
Model No	Type	Regulation	O/Ps	Main Output(s)	Logic Output	Power	Fan	OVP	Controls	Meters	Size mm	Weight
EB2025T	Basic	Linear	Triple	0.3 - 20V @ 0.25A	5V @ 1A	15W	No	No	Analogue	Analogue	220x82x230	1.8kg
TS1410	PowerPack	Linear	Single	12V - 14V @ 10A		140W	No	No	Analogue	Analogue	190x160x273	7.8kg
EL301	Compact	Linear	Single	0V - 30V @ 1A		30W	No	No	Analogue	LED	140x160x195	3.4kg
EL183	Compact	Linear	Single	0V - 18V @ 3.3A		60W	No	No	Analogue	LED	140x160x195	4.4kg
EL302	Compact	Linear	Single	0V - 30V @ 2A		60W	No	No	Analogue	LED	140x160x195	4.4kg
EL561	Compact	Linear	Single	0V - 56V @ 1.1A		60W	No	No	Analogue	LED	140x160x195	4.4kg
EL155	Compact	Linear	Single	0V - 15V @ 5A		75W	No	No	Analogue	LED	140x160x195	5.0kg
EL303	Compact	Linear	Single	0V - 30V @ 3A		90W	No	No	Analogue	LED	140x160x195	5.0kg
EL302D	Compact	Linear	Dual	0V - 30V @ 2A		120W	No	No	Analogue	LED	260x160x195	7.5kg
EL302Tv	Compact	Linear	Triple	0V - 30V @ 2A	1.5 - 5V @ 2A	130W	No	No	Analogue	LED	260x160x195	7.5kg
EX1810R	Precision	Mixed Mode	Single	0V - 18V @ 10A		180W	No	No	Analogue	LED	140x160x195	3.0kg
EX355	Compact	Mixed Mode	Single	0V - 35V @ 5A		175W	No	No	Analogue	LED	140x160x195	3.0kg
EX2020R	Precision	Mixed Mode	Single	0V - 20V @ 20A		400W	Yes	No	Analogue	LED	140x160x195	3.5kg
EX4210R	Precision	Mixed Mode	Single	0V - 42V @ 10A		420W	Yes	No	Analogue	LED	140x160x195	3.5kg
EX354D	Compact	Mixed Mode	Dual	0V - 35V @ 4A		280W	No	No	Analogue	LED	260x160x195	4.3kg
EX354Tv	Compact	Mixed Mode	Triple	0V - 35V @ 4A	1.5 - 5V @ 5A	305W	No	No	Analogue	LED	260x160x195	4.3kg
EX752M	Compact	Mixed Mode	Dual **	0V - 75V @ 2A		300W	No	No	Analogue	LED	260x160x195	4.4kg
PL154	Precision	Linear	Single	0V - 15V @ 4A		60W	No	No	Analogue	LED	155x170x265	5.0kg
PL320	Precision	Linear	Single	0V - 32V @ 2.1A		65W	No	No	Analogue	LED	155x170x265	5.0kg
PL330	Precision	Linear	Single	0V - 32V @ 3.1A		95W	No	No	Analogue	LED	155x170x300	6.0kg
PL320QMD	Precision	Linear	Dual *	0V - 32V @ 2.1A		130W	No	No	Analogue	LED	350x170x265	9.5kg
PL330QMD	Precision	Linear	Dual *	0V - 32V @ 3.1A		190W	No	No	Analogue	LED	350x170x300	12.0kg
PL320QMT	Precision	Linear	Triple *	0V - 32V @ 2.1A	4V - 6V @ 4A	155W	No	No	Analogue	LED	425x170x265	13.5kg
PL330QMT	Precision	Linear	Triple *	0V - 32V @ 3.1A	4V - 6V @ 7A	230W	No	No	Analogue	LED	425x170x300	15.5kg
TS3021S	Precision	Linear	Single	0V - 30V @ 2A		60W	No	No	Analogue	LCD	160x160x238	4.9kg
TS3022S	Precision	Linear	Dual	0V - 30V @ 2A		120W	No	No	Analogue	LCD	308x160x238	9.6kg
QL355	High Precision	Linear	Single	0V - 35V @ 5A #		105W	Yes	Yes	Digital	LED	141x171x300	5.0kg
QL564	High Precision	Linear	Single	0V - 56V @ 4A #		112W	Yes	Yes	Digital	LED	141x171x300	5.0kg
QL355T	High Precision	Linear	Triple	0V - 35V @ 5A #	3.3V/5V @ 1A	215W	Yes	Yes	Digital	LED	282x171x300	10.0kg
TSX1820	Precision	Mixed Mode	Single	0V - 18V @ 20A		360W	No	Yes	Analogue	LED	210x130x350	5.0kg
TSX3510	Precision	Mixed Mode	Single	0V - 35V @ 10A		350W	No	Yes	Analogue	LED	210x130x350	5.0kg
CPX200	Precision	PowerFlex	Dual	0V - 35V @ 10A #		350W	No	Yes	Analogue	LED	210x130x350	6.0kg
CPX400A	Precision	PowerFlex	Dual	0V - 60V @ 20A #		840W	Yes	Yes	Analogue	LED	210x130x350	7.5kg
BUS PROGRAMMABLE MODELS												
Model No	Interfaces	Regulation	O/Ps	Main Output(s)	Logic Output	Power	Fan	OVP	Controls	Meters	Size mm	Weight
EL302-P	RS-232	Linear	Single	0V - 30V @ 2A		60W	No	No	Digital	LED	140x160x195	4.4kg
EX355-P	RS-232	Mixed Mode	Single	0V - 35V @ 5A		175W	No	No	Digital	LED	140x160x195	3.0kg
PL330-P	RS-232 & GPIB	Linear	Single	0V - 32V @ 3.1A		95W	No	No	Analogue	LED	207x170x300	6.5kg
PL330D-P	RS-232 & GPIB	Linear	Dual	0V - 32V @ 3.1A		190W	No	No	Analogue	LED	350x170x300	12.5kg
PL330T-P	RS-232 & GPIB	Linear	Triple	0V - 32V @ 3.1A	4V - 6V @ 7A	230W	No	No	Analogue	LED	425x170x300	16.0kg
QL355-P	USB/RS232/GPIB	Linear	Single	0V - 35V @ 5A #		105W	Yes	Yes	Digital	LED	141x171x300	5.0kg
QL564-P	USB/RS232/GPIB	Linear	Single	0V - 56V @ 4A #		105W	Yes	Yes	Digital	LED	141x171x300	5.0kg
QL355T-P	USB/RS232/GPIB	Linear	Triple	0V - 35V @ 5A #	3.3V/5V @ 1A	215W	Yes	Yes	Digital	LED	282x171x300	10.0kg
TSP3222	GPIB	Linear	Dual	0V - 30V @ 2A		120W	Yes	Yes	Digital	LCD	210x130x380	11.0kg
TSX1820-P	RS-232 & GPIB	Mixed Mode	Single	0V - 18V @ 20A		360W	No	Yes	Digital	LED	210x130x350	5.5kg
TSX3510-P	RS-232 & GPIB	Mixed Mode	Single	0V - 35V @ 10A		350W	No	Yes	Digital	LED	210x130x350	5.5kg

\* = Quad-mode selection of output combination - isolated, parallel, series or series tracking.

\*\* = Multi-mode switching of output capability, 2 x 75V/2A, 1 x 75V/4A or 1 x 150V/2A.

# = Multi-range output - maximum voltage and maximum current not available simultaneously.

**Note:** Further models may have been added since this brochure was printed. For the latest product information please see our web site or contact our sales desk.

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