Technical Specifications

MODEL SELECTOR GUIDE

MODEL	MAIN OUTPUT(S)	LOGIC OUTPUT	INTERFACES	
			GPIB	ARC
PL310	0 - 32V at 0 - 1A			
PL320	0 - 32V at 0 - 2A			
PL154	0 - 15.5V at 0 - 4A			
PL330	0 - 32V at 0 - 3A			
PL310QMD	2 x 0 - 32V at 0 - 1A			
	or 0 - 32V at 0 - 2A			
	or 0 - 64V at 0 - 1A			
	or 0 - ±32V at 0 - 1A			
PL320QMD	2 x 0 - 32V at 0 - 2A			
	or 0 - 32V at 0 - 4A			
	or 0 - 64V at 0 - 2A			
	or 0 - ±32V at 0 - 2A			
PL330QMD	2 x 0 - 32V at 0 - 3A			
	or 0 - 32V at 0 - 6A			
	or 0 - 64V at 0 - 3A			
	or 0 - ±32V at 0 - 3A			
PL310QMT	2 x 0 - 32V at 0 - 1A	5V at 1.5A		
	or 0 - 32V at 0 - 2A			
	or 0 - 64V at 0 - 1A			
	or 0 - ±32V at 0 - 1A			
PL320QMT	2 x 0 - 32V at 0 - 2A	4 - 6V at 0.1 - 4A		
	or 0 - 32V at 0 - 4A			
	or 0 - 64V at 0 - 2A			
	or 0 - ±32V at 0 - 2A			
PL330QMT	2 x 0 - 32V at 0 - 3A	4 - 6V at 0.1 - 7A		
	or 0 - 32V at 0 - 6A			
	or 0 - 64V at 0 - 3A			
	or 0 - ±32V at 0 - 3A			
PL330P	0 - 32V at 0 - 3A		Yes	Yes
PL330DP	2 x 0 - 32V at 0 - 3A		Yes	Yes
PL330TP	2 x 0 - 32V at 0 - 3A	4 - 6V at 1 - 7A	Yes	Yes

Models illustrated within this brochure:-
Front cover - PL330, PL320QMD, PL310QMT
In side pages - PL330QMT, PL330DP

MAIN OUTPUT(S)

Output Range: 0 - 32 Volts nominal; 0 - 15.5V (PL154).
0 - 1.1A nominal (PL310);
0 - 2.1A nominal (PL320);
0 - 3.1A nominal (PL330);
0 - 4A nominal (PL154).

Output Voltage Setting: By coarse and fine controls; resolution better than 5mV across the range.

Output Current Setting: By single logarithmic control.

Output Mode: The power supply operates in constant current or constant voltage modes with automatic cross-over. Decimal points flash to indicate constant current mode.

Configuration Selection: (QMD and QMT only) Isolated, Tracking or Series Tracking via front panel switches.

Output Switch: Isolates the output and permits output voltage to be set before connecting the load.

Output Terminals: 4mm terminals on 19mm (0.75") spacing.

Output Impedance: Constant Voltage: Typically <5m Ω at 1kHz
Constant Current: Typically 50kΩ with voltage limit at maximum

Output Protection: Up to maximum output voltage +20 Volts forward; diode clamped for reverse voltages and up to 3A reverse current.

Load Regulation: <0.01% of maximum output for 90% load change

Line Regulation: <0.01% of maximum output for 10% line voltage change

Remote Sense: Eliminates up to 0.5V drop per lead.

Ripple and Noise: Typically <1mV rms

Transient Response: <20usec to within 50mV of setting for 90% load change

Temperature Coefficient: Typically <100ppm/oC

Meter Type: Dual 3.75 digit (4095 count) with 12.5mm (0.5") LEDS, (scale length in creased to 8190 on PL330QMD/QMT). Reading rate 4 per second.

Meter Resolution: Voltage: 10mV over the entire range
Current: 1mA over the entire range

Meter Accuracy: Voltage: ±(0.1% of reading + 1 digit)
Current: ±(0.3% of reading + 1 digit)

Current Meter Damping: Nominally 20ms switchable to 2 sec for averaging of rapidly varying loads

LOGIC OUTPUT - PL310QMT

Output Voltage: Fixed 5 V±0.1 V.

Max. Output Current: >1.5 Amps.

Output Terminal: 4mm terminals on 19mm (0.75") spacing.

Output Protection: Output will withstand up to 16 V forward voltage. Diode clamped for reverse voltages and up to 3 Amps reverse current.

Load Regulation: < 0.3% for 50% load change.

Line Regulation: < 0.1% for 10% line change.

LOGIC OUTPUT - PL320QMT

Output Voltage Range: 4 to 6 Volts

Output Current: 0.1 to 4 Amps.

Output Switch: Isolates the output and permits output voltage to be set before connecting the load.

Output Terminals: 4mm terminals on 19mm (0.75") spacing.

Over-Voltage Protection: Above 7 Volts

Output Protection: Clamped by the over-voltage protection circuit for forward voltages over 7 Volts and up to 1 Amp for ward current. Diode clamped for reverse voltages and up to 3 Amps reverse current.

Load Regulation: <0.01% of maximum output for 90% load change

Line Regulation: <0.01% of maximum output for 10% line voltage change

Remote Sense: Eliminates up to 0.5V drop per lead.

Ripple and Noise: Typically <1mV rms

Transient Response: <20usec to within 50mV of setting for 90% load change

Temperature Coefficient: Typically <100ppm/oC

Voltage Setting Accuracy: ±0.1V

Technical Specifications continued

LOGIC OUTPUT - PL330QMT & PL330TP

Output Voltage Range: 4 to 6 Volts

Output Current: 0.1 to 7 Amps.

Output Switch: Isolates the output and permits output voltage to be set before connecting the load.

Output Terminals: 4mm terminals on 19mm (0.75") spacing.

Over-Voltage Protection: Above 7 Volts

Output Protection: Clamped by the over-voltage protection circuit for forward voltages over 7 Volts and up to 1 Amp for ward current. Diode clamped for reverse voltages and up to 3 Amps reverse current.

Load Regulation: <0.01% of maximum output for 90% load change

Line Regulation: <0.01% of maximum output for 10% line voltage change

Remote Sense: Eliminates up to 0.5V drop per lead.

Ripple and Noise: Typically <1mV rms

Transient Response: <20usec to within 50mV of setting for 90% load change

Temperature Coefficient: Typically <100ppm/oC

Meter Type: 3.75 digit (4095 count) with 12.5mm (0.5") LEDs. Reading rate 4 per second.

Meter Resolution: Voltage: 10mV
Current: 10mA

Meter Accuracy: Voltage: ±(0.2% of reading + 1 digit)
Current: ±(0.5% of reading + 1 digit)

PL-P MODELS, ADDITIONAL SPECIFICATIONS

Remote programmable versions in the range feature full control, read back and status reporting via the GPIB and RS232 interfaces. The GPIB interface conforms to the IEEE 488.1 and 488.2 standards and the RS232 interface is fully compatible with the Thurlby-Thandar Addressable RS232 Chain (ARC) standard. 8 rear panel DIP switches are used to specify baud rate, bus address and active interface (GPIB or RS232). Remote/Local operation is selected by a front panel switch.

LOCAL OPERATION

For a programmable instrument operated in local state, all capabilities and specifications remain unchanged from those of a standard instrument.

REMOTE OPERATION

With the instrument switched to the remote state, all voltage and current adjustment controls become inoperative and commands received over the active interface will be parsed and executed.

MAIN OUTPUT(S) - REMOTE OPERATION

Output Voltage Setting: 12 bit resolution (10mV steps)

Output Current Setting: 12 bit resolution (1mA steps)

Setting Accuracy: Voltage: ±(0.1% + 10mV)
Current: ±(0.2% + 2mA)

Output Switch: Electronic by interface command (front panel output switches must be set to ON)

Readback Resolution Voltage: 10mV over the entire range
Current: 1mA over the entire range

Readback Accuracy: Voltage: ±(0.1% of reading + 1 digit)
Current: ±(0.3% of reading + 1 digit)

Current Meter Damping: Nominally 20ms switchable to 2 sec and back by remote commands

LOGIC OUTPUT (PL330TP) - REMOTE OPERATION

Output Voltage Range: 4 to 6 Volts in 10mV steps

Output Current: 1 to 7 Amps in approximate 1A steps

Setting Accuracy: Voltage: ±(0.2% + 10mV)

Output Switch: Electronic by interface command (front panel output switch must be set to ON)

Readback Resolution: Current: 10mA

Readback Accuracy: Current: ±(0.5% of reading + 1 digit)

REMOTE CONTROL INTERFACES - PL-P MODELS

Both interfaces feature full control, read back and status reporting.

RS232: Variable Baud rate (9600 maximum), 9 pin D- connector (female). Fully compatible with ARC (Addressable RS232 Chain) system.

GPIB: Conforming with IEEE- 488.1 and IEEE- 488.2

Address Selection: By rear panel DIP switch.

Remote/Local Operation: Selected by front panel switch.

Remote Command Response Time:

Interface: <15 ms (single command, input buffer empty).

Output Voltage - Up: Time constant typically 2ms, e.g. 10ms to settle within 1% of a step change, 15ms to settle within 0.1%.

Output Voltage - Down: Time constant determined by the discharge of the power supply output capacitor (47uF). Typically <10ms to settle within 1% for a 10V step change at 50mA load current; typically <200ms to settle within 1% at zero load.

Output Current: Typically 50ms to settle within 10mA for a 1A change.

GENERAL

Power Requirements:

Input Voltage: Internally set for 110, 120, 220 or 240VAC 50/60Hz

Input Voltage Range: ±10% of voltage setting

Power Consumption:

	Single	Dual	Triple
30V/1A	75VA	150VA	300VA
15V/4A & 30V/2A	150VA	300VA	450VA
30V/3A	225VA	450VA	600VA

Environmental: Operating Range: 5oC to 40oC, 20% to 80% RH
Storage Range: -20 oC to +60oC

Weight:

	Single	Dual	Triple
30V/1A PL	4.0kg	8.0kg	11.5kg
15V/4A PL	5.0kg		
30V/2A PL	5.0kg	9.5kg	13.5kg
30V/3A PL	6.0kg	12.0kg	15.5kg
30V/3A PL-P	6.5kg	12.5kg	16.0kg

Size:

PL310, PL154, & PL320: 155mm(W) x 170mm(H) x 265mm(D)

PL330: 155mm(W) x 170mm(H) x 300mm(D)

PL330P: 207mm(W) x 170mm(H) x 300mm(D)

PL310QMD, PL310QMT, & PL320QMD: 350mm(W) x 170mm(H) x 265mm(D)

PL330QMD, & PL330DP: 350mm(W) x 170mm(H) x 300mm(D)

PL320QMT: 425mm(W) x 170mm(H) x 265mm(D)

PL330QMT, & PL330TP: 425mm(W) x 170mm(H) x 300mm(D)

Rack Mount Option: 19 inch 4U mount for two PL330P or one PL330DP/TP. Anti-tamper cover for security.

Electrical Safety: Designed and manufactured to comply with IEC 348 and IEC1010-1. Full safety sockets available to special order.

EMC: Designed and manufactured to comply with EN50081–1 and EN50082–1.

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

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THURLBY THANDAR INSTRUMENTS

PL & PL-P Series

Laboratory Power Supplies

Standard and Programmable models, 35 watts to 240 watt

Thurlby Thandar PL series

the Premier range of laboratory power supplies

Precision with convenience

The Thurlby Thandar PL series of laboratory bench power supplies has established itself in many countries as the "premier" range.

High resolution controls enable precise setting of voltage and current levels whilst high accuracy digital meters provide clear, unambiguous readings.

All of the many features of these PSUs have been carefully designed to give the user not just greater precision, but greater clarity, more control and unrivalled ease of use.

The range has now been improved and extended to offer even better performance and choice.

Digital accuracy and convenience

PL series units incorporate digital meters with a 3.75 digit scale length (4095 counts) to provide greater accuracy and resolution than other PSUs.

Large and bright LEDs give a clear and unambiguous reading. An update rate of 4 per second provides near instantaneous response.

Separate meters are used for voltage and current, eliminating the need for meter function switches with their attendant problems of misinterpretation.

A damping switch for the current meter simplifies measurements on rapidly varying loads.

Remote sense for precision at high currents

PL series units incorporate integrated band-gap reference diodes as the basis for stabilisation of both voltage and current.

Remote sense terminals enable precision to be maintained at high currents by eliminating the effects of connection lead resistance.

Without remote sense lead resistance of just a few tens of milliohms can seriously degrade regulation and produce misleading results. (Two cables of 0.05Ω each will drop a total of 0.3V at 3 Amps.)

Greater resolution and control

The PL series sets the standard for simple and comprehensive control. Voltages are set with coarse and fine controls for speed with precision. Currents are set with a semi-logarithmic control for increased resolution at low current levels.

The DC output switch enables voltage and current levels to be set before the load is connected.

With the output switch "off" the the current limit set point is displayed. With the output switch "on" the actual output current flowing is displayed.

This invaluable feature allows delicate circuits to be protected by accurately setting the current limit level (down to a few milliamps if necessary) before connecting the circuit under test.

- *Simultaneous digital metering of voltage and current.*
- *True constant voltage or constant current operation.*
- *Twin 3.75 digit meters with large LED displays.*
- *0.1% accuracy; 0.01 Volts and 0.001 Amps resolution.*
- *Excellent stability, resolution and setting accuracy.*
- *DC output switches, automatic mode indication.*
- *Precise control and monitoring of current limit settings.*
- *Remote sense facility for high-current precision.*
- *Current meter damping switch for fluctuating currents.*
- *Parallel and tracking modes on QMD & QMT models.*
- *High current "logic supply" output on QMT models.*

Safety and protection

PL series PSUs are designed and built to meet the stringent requirements of IEC348 and IEC1010.

All outputs are fully protected against short circuit, reverse voltage and reverse currents.

A wide range of models

The PL series includes single, dual and triple output models from 35 Watts up to 240 Watts.

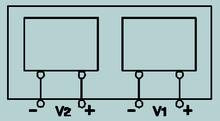
See the model selector guide for a summary of voltage and current combinations.

The PL series is part of a wider range of bench PSUs from Thurlby Thandar which includes models with current capabilities up to 20 Amps.

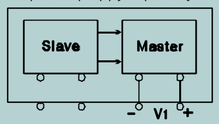
Quad-Mode Dual versions

The 32V- 1A, 32V- 2A and 32V- 3A supplies are each available as a dual unit incorporating push button selection of four different modes of operation.

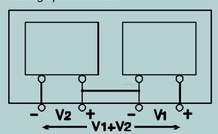
Isolated
Completely independent operation of each supply.



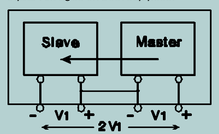
True Parallel
Converts the Master unit into a 2 Amp, 4 Amp or 6 Amp supply respectively.



Series
Internal linking of the two supplies providing up to 64 Volts.



Series Tracking
The Master unit voltage control sets up equal voltages on both supplies.



Quad Mode Triple versions

Each of the quad- mode dual models is alternatively available as a triple supply incorporating one further independent output.

This is a higher current 5 Volt output intended for powering logic circuits.

The current rating and sophistication of the logic output varies according to the model as follows:

PL310QMT

Fixed 5V supply at 1.5A maximum.

Full short- circuit protection.

PL320QMT

Variable output voltage (4V to 6V) and variable current limit (0.1A to 4A).

Calibrated voltage control.

Remote sense terminals, DC output switch, over- voltage trip.

PL330QMT

Variable output voltage (4V to 6V) and variable current limit (0.1A to 7A).

Digital meter for current measurement and voltage setting.

Remote sense terminals, DC output switch, over- voltage trip.

Thurlby Thandar PL-P series

programmable power at surprisingly low cost

PL-P series

The Thurlby Thandar PL-P series offers a high performance fully programmable power supply system at low cost.

Based around the 32V- 3A versions of the standard PL series, the PL-P models include single, dual and triple output units suit able for bench or rack mounting.

When not connected to the bus, these PSUs can be operated exactly as a standard PL series PSU.

GPIB and RS-232 (ARC) interfaces

Each PL-P series supply is fitted with both a GPIB (IEEE- 488) interface and an ARC (addressable RS232) interface as standard.

Both interfaces provide full bus control of voltage and current settings along with full read back of actual current and voltage levels.

The GPIB interface conforms fully with IEEE- 488.2 as well as IEEE- 488.1. The ARC interface can be used as a conventional RS- 232 interface or as part of a multi- instrument ARC system.

On dual and triple output models a single bus address controls all outputs.

Fully isolated outputs for maximum flexibility

Each output is fully floating and is opto- isolated from the bus interfaces.

Outputs can be linked in series or parallel to produce higher voltages or higher currents as required.

High resolution control and readback

Voltage and current levels can be set via the bus to a resolution of 10mV and 1mA for each main output.

The 7 Amp logic output of the PL330TP can also be set to a resolution of 10mV but the current control resolution is limited to 1 Amp steps.

Each main output can be read back via the bus to a resolution of 10mV and 1mA.

Simple and consistent control

PL-P series supplies use simple and consistent command structures which make programming particularly easy regard less of which interface is used.

A National Instruments LabWindows* device driver is available as an option.

ARC, an exclusive Thurlby Thandar innovation

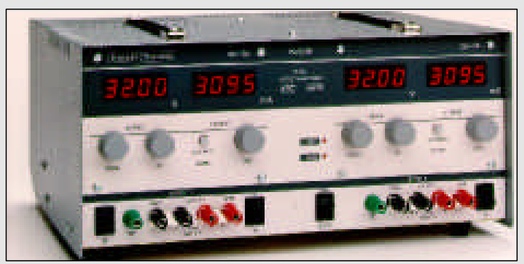
ARC stands for "Address able RS- 232 Chain" and is a low- cost system for linking instruments together so that they can be controlled and monitored by a personal computer.

The ARC interface is an extension of the industry standard RS- 232 interface and is exclusive to Thurlby- Thandar instruments.

It differs from conventional RS- 232 in that it allows multiple instruments (up to 32) to be controlled using the normal RS- 232 or RS- 422/423 port of a PC.

ARC provides a low- cost alternative to GPIB which utilises lower cost instruments, in expensive cables, and can be controlled by any personal computer with out the need for a special interface card or special software.

* LabWindows is a trade mark of National Instruments Corporation.



- *Full bus control and readback of voltage and current.*
- *GPIB interface conforms to IEEE-488.2.*
- *ARC (Addressable RS-232) interface for low-cost PC based control.*
- *Can be operated as a conventional bench PSU.*
- *Single, dual and triple output models available.*
- *Triple output model incorporates fully controllable high current logic output.*
- *Rack mounting kit (4U) available for all models.*