AIM & THURLBY THANDAR INSTRUMENTS

QPX600D & QPX600DP



1200 watt dual dc power supply with PowerFlex+

Dual independent or tracking outputs of up to 600 watts each

Variable voltage/current combinations over a very wide range

Up to 80 volts and up to 50 amps within each power envelope

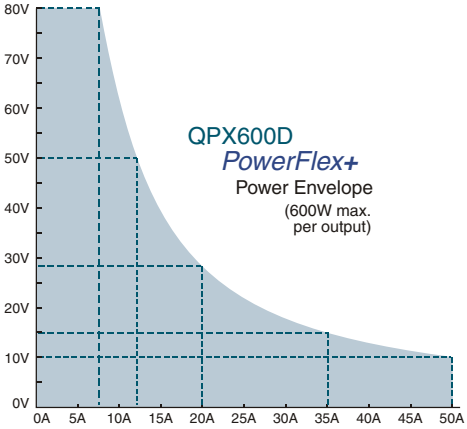
Smart tracking and metering for easy series/parallel operation

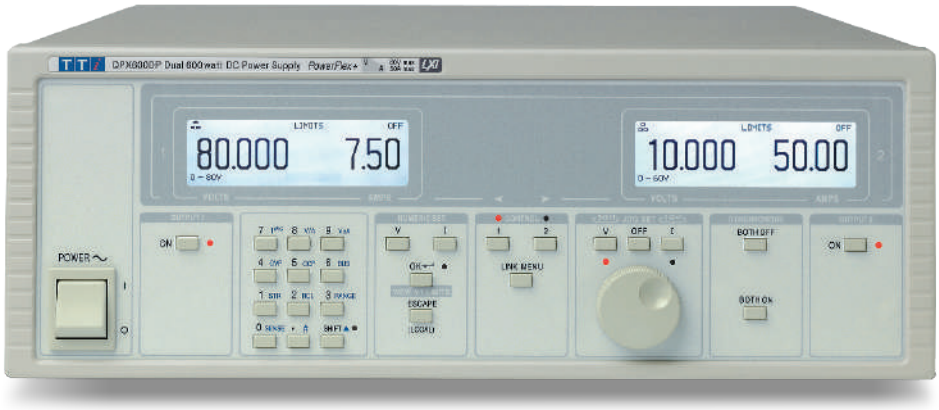
Analog, RS-232, USB, GPIB and LAN interfaces (QPX600DP)

tti-test.com

aimtti.com | tti.eu | ttid.co | aimtti.us

QPX600D - dual 600 watt dc power supply with *PowerFlex+* 80V, 50A max.





The QPX600D is a dual output dc power supply with a maximum total output power of 1200 watts and is suited to both bench-top and system applications.

The QPX600DP incorporates full digital remote control using USB, RS-232, LAN and GPIB interfaces. Both models include analog remote control.

PowerFlex+

The QPX600D is a different type of laboratory power supply designed to meet the need for flexibility in the choice of voltage and current.

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 QPX600D enables higher currents to be generated at lower voltages within an overall power limit envelope. Each output can provide more than six times the current of a conventional PSU of the same maximum voltage and power (see power curve).

PowerFlex+ uses a balanced multi-phase converter system to minimise ripple and improve dynamic performance.

Example voltage/current combinations include 80V/7.5A, 60V/10A, 40V/15A, 28V/20A, 18V/30A and 10V/50A.

Dual independent or tracking outputs

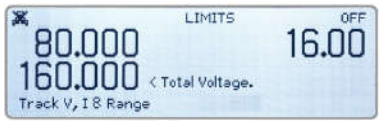
The QPX600D can be operated as two entirely independent power supplies, each with its own comprehensive graphic LCD display.

Alternatively multiple isolated tracking modes are available including ones intended for series and parallel operation which provide metering of total voltage or total current respectively.

Tracking Modes:

1. V2 set = V1 set
2. V2 set = N% x V1 set, where N can be between 5% and 2000%.
3. V2 set = V1 set, I2 set = I1 set. Additional display metering shows the total current flowing (I1+I2 actual). This mode is intended for parallel wiring of the outputs.
4. V2 set = V1 set, I2 set = I1 set. Additional display metering shows total voltage generated (V1+V2). This mode is intended for series wiring of the outputs.

Up to 160V or 100A



The combination of PowerFlex+ regulation with series or parallel wiring of the outputs and the use of smart tracking and metering, enables a higher voltage or higher current single output power supply to be simulated.

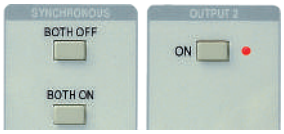
Bench or rack mounting

The QPX600D is housed in a 350mm (13¾") wide case suitable for use on the bench-top. Output and remote sense terminals are mounted on the rear panel along with the analog and logic interface connectors and, on the QPX600DP, the bus interface connectors.

The power supply is 3U high and a rack mounting kit (RM310A) is available as an option.

- Dual independent or tracking 600 watt outputs
- Ultra-wide range of voltage/current combinations
- Up to 80V and up to 50A within each power envelope
- Isolated tracking of voltage only, or voltage and current
- Smart metering and tracking functions facilitate series or parallel wiring for up to 160V or 100A
- Low output noise and ripple
- High setting resolution of 1mV
- Variable OVP and OCP trips
- Analog control interfaces for voltage and current
- GPIB, RS-232, USB and LAN (LXI) interfaces (QPX600DP)

Independent or simultaneous output control



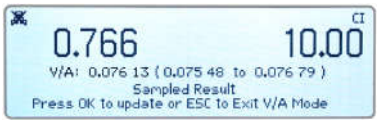
The Both On and Both Off buttons are in addition to the individual switches for each output, and allow both outputs to be turned on or off synchronously by a single button press.

Synchronous switching of the outputs is of increasing importance for circuitry which can lock-up or even be damaged if one voltage rail is present without the other.

Power calculation

The meter for each output can be set to show the total power currently being provided to the load (V x A) to a resolution of 0.1 watts.

Low resistance calculation



The meter for each output can be set to show the equivalent resistance of the load by displaying voltage divided by current.

Low resistance measurements using a DMM utilise a low excitation current and suffer from thermal emf errors and other low voltage effects.

This function enables low resistance measurements to be made at high currents by using the remote sense terminals to create a four terminal connection. This can give much more reliable results for certain component types, such as magnetics, which operate at ampere levels.

Graphic display for clarity and ease of use



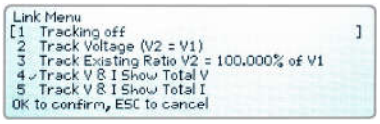
The QPX600D incorporates two high resolution graphic LCDs capable of showing numbers and text in a variety of sizes.

The standard display mode shows voltage and current in large characters along with text annunciators such as CV mode and Output On.



When settings are being changed, a dual display of parameters is used enabling existing and new settings, or actual and limit values to be viewed simultaneously.

A similar arrangement is used with smart metering for series or parallel operation. More complex functions are provided with text prompts or complete selection menus.



Current meter averaging

When measuring rapidly varying loads it can become difficult to get useful readings from the current meter.

By selecting meter averaging, the reading is stabilised by averaging the last four readings to reduce the speed and extent of the variation.

Numeric or rotary entry

Voltage and current levels can be set directly via the numeric keypad.

Alternatively settings can be changed via the jog wheel at user selectable increments.

Multiple settings stores

Non-volatile stores are incorporated for rapid recall of voltage and current settings and are useful for repetitive testing applications.

Separate stores are provided for each output.

OVP and OCP trips

Variable trips for over-voltage and over-current are provided on each output. Unlike a limit setting, the trip setting turns the output off and provides a different level of protection.

For example, when repetitively testing a unit which normally takes a peak current of 10A, the current limit could be set to 11A and the OCP to 10.1A to ensure that a faulty unit will trip the supply off and not be damaged by over dissipation.

The output trip can also be activated by other fault conditions including over temperature and remote sense mis-wiring. The cause of the trip is shown on the display.

Analog and Logic interfaces

QUASI ANALOG REMOTE CONTROL

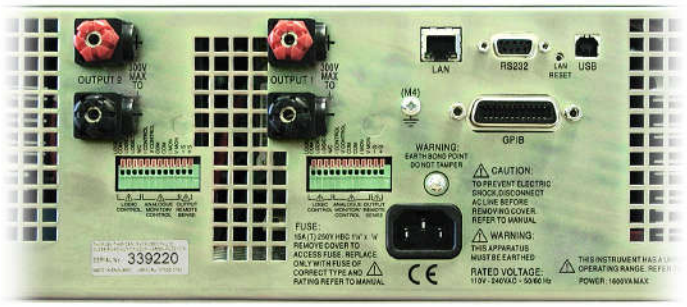
Both models incorporate analog interfaces for voltage control of both output voltage and output current (non-isolated, one for each output).

The control voltages are digitised to control the PSU and the scaling can be selected as 0 to 5V or 0 to 10V for zero to full scale.

Monitor outputs for voltage and current are also provided, and can similarly be selected as 0 to 5V or 0 to 10V.

An opto isolated logic control signal is provided for control of output on/off. This can be menu selected as true = output on, or true = output off.

An opto isolated open-collector logic output signal is also available. This can be menu selected as true or false for output enabled or disabled, current limit, power limit, or any fault trip.



LAN ETHERNET LXI · GPIB IEEE-488 · USB UNIVERSAL SERIAL BUS · RS-232 RS-423

QPX600DP - comprehensive bus remote control

To meet a wide variety of needs, the QPX600DP adds a comprehensive array of digital bus interfaces. RS-232, USB, GPIB and LAN (Ethernet) with LXI support are all provided as standard.

Each of the digital bus interfaces provides full control of voltage, current, output on/off and set-up, plus read-back of voltage, current and status. The interfaces are at ground potential and are opto-isolated from the output terminals.

GPIB IEEE-488

The GPIB interface is compliant with IEEE-488.1 and IEEE-488.2. Currently GPIB remains the most widely used interface for system applications.

RS-232 RS-423

An RS-232/RS-423 interface is provided for use with legacy systems. This type of serial interface remains in common useage and is perfectly satisfactory for the control of power supplies because data speed is not an issue.

USB UNIVERSAL SERIAL BUS

USB provides a simple and convenient means of connection to a PC and is particularly appropriate for small system use. A USB driver is provided which supports Windows 2000, XP , Vista and Windows 7.

LAN ETHERNET

The LAN interface uses a standard 10/100 base-T Ethernet hardware connection with ICMP and TCP/IP Protocol for connection to a Local Area Network or direct connection to a single PC. This interface supports LXI and is highly appropriate for system use because of its scalable nature and low cost interconnection.

LXI LAN eXtensions for Instrumentation

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

For more information on LXI and how it replaces GPIB, or operates along side it, go to: www.tti-test.com/go/lxi

IVI Driver

An IVI driver for Windows is included. This provides support for common high-level applications such as LabView*, LabWindows*, and HP/ Agilent VEE*.

** LabView and LabWindows are trademarks of National Instruments.*
HPVEE (now Agilent VEE) is a trademark of Agilent Technologies.
** Windows is a trademark of Microsoft.*

Other models in the QPX series

For those requiring only a single output power supply, the QPX1200 offers 1200 watts of PowerFlex performance from one output.

Go here for details: **www.tti-test.com/go/qpx**

QPX600D & QPX600DP - Technical Specifications

OUTPUT SPECIFICATIONS (each Output)

Voltage/Current Levels

Voltage Range:	Range 1 - 0V to 60V; Range 2 - 0V to 80V
Current Range:	0A to 50A.
Power Range:	Up to 600W - see PowerFlex+ power envelope graph.
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.

Output Setting

Voltage Setting:	By floating point numeric entry or rotary jog wheel; resolution 1mV for 60V range or 2mV for 80V range.
Current Setting:	By floating point numeric entry or rotary jog wheel; resolution 10mA.
Setting Accuracy:	Voltage - 0.1% ± 2mV; 0.1% ± 4mV on 80V range Current - 0.3% ± 20mA
Setting Stores:	Up to 10 set-ups can be saved and recalled via the keyboard (or the digital interfaces on QPX600DP).

Keyboard & Rotary Control

All functions, including the selection and set-up of the remote control interfaces, can be set from the keyboard. The rotary Jog control can be used to adjust output voltage and current settings in a quasi-analogue mode. The output to be controlled is first selected with the appropriate Control key.

Output Performance

Load regulation:	<0.01% +5mV (CV mode) for any load change within the PowerFlex envelope, using remote sense.
Line regulation:	<0.01% +5mV for a 10% line voltage change.
Ripple & Noise:	Typically <3mV rms, <20mV pk-pk, (20MHz bandwidth).
Transient Response:	<2ms to within 100mV of set level for 5% to 95% load change.
Temp. Coefficient:	Typically <100ppm/oC.
Sensing:	Selectable local or remote sensing.

Output Protection

External Voltage:	Output will withstand forward voltages of up to 90V. Reverse protection by diode clamp.
Power Limit:	Automatic protection within PowerFlex+ control system.
Fault Trip:	The output will be shut down if any of the four trip conditions listed below occur.
Over Voltage (OVP):	Settable 2V to 85V in 0.1V steps
Over Current (OCP):	Settable 2A to 55A in 0.1A steps
Over Temperature:	Monitors internal temperature rise to protect against excess ambient temperature or blocked ventilation slots.
Sense Error:	Monitors the voltage between the remote sense terminals and output terminals to protect against mis-wiring.

Output Switching

Push switch operating electronic power control. LED indication of On state

Connection

Output Terminals:	Rear mounted safety terminals accepting 6mm wire diameter, 6mm plugs or 8mm spades at 50 Amps max, or 4mm plugs at 30 Amps max.
Sensing Terminals:	Screw-less terminals on rear panel.

LINK MODES

In addition to independent output operation, the instrument is capable of operating in a number of different voltage and current tracking modes which can be activated from the Link Menu. These modes include Output 2 voltage (V2) tracking Output 1 voltage (V1) by any ratio in the range 5% to 2000%, V2 and I2 set to track V1and I1 (1:1) with total V1 + V2 displayed (useful when Output 1 and Output 2 are series connected), V2 and I2 set to track V1and I1 (1:1) with total I1 + I2 displayed (useful when Output 1 and Output 2 are parallel connected).

METERING (each Output)

Display Type:	Large dot-matrix black-on-white backlit LCD.
Meter Function:	5 digit voltage meter and 4 digit current meter. Display of limits values, memory contents etc. Wide range of alpha-numeric messages/menus.
Limits Display:	Limits settings can be displayed simultaneously with measurements.
Meter Resolution:	Voltage: 1mV (2mV on 80V range). Current: 10mA
Meter Accuracy:	Voltage: 0.1% of reading ± 2 digits (CI mode and Unreg) Current: 0.3% of reading ± 2 digits (CV mode and Unreg)

Additional Metering Functions

V x A	Display shows calculated power in watts. Resolution 0.1W. Accuracy 0·5% ± 0·1W
V/A	Display shows calculated resistance. Resolution up to 5 digits. Measurement uncertainty is shown on display.

ANALOG & LOGIC INTERFACES (each Output)

Analog Remote Control and Monitoring

Non-isolated inputs and outputs to set voltage and current limit and to monitor actual output voltage and current. These signals are referenced to the negative output and have a range of 0 to 10V or 0 to 5V (selectable via the keyboard). Note that the analog control voltage is digitised within the power supply.

Control Accuracy:	Voltage: 0.3% ± 4mV; Current: 0.5% ± 40mA
Monitor Accuracy:	Voltage: 0.3% ± 4mV; Current: 0.5% ± 40mA

Logic Control Input and Output

LOGIC IN is a rear-panel opto-isolated input that is activated at an input current greater than approximately 1mA. User can set LOGIC IN (via the keyboard) to enable the output, disable the output, or be ignored when it is activated.
LOGIC OUT is an isolated rear-panel open-collector output that will sink up to 2mA when activated ('switch closure'); the maximum voltage that can be applied to LOGIC OUT is 30VDC. User can set LOGIC OUT to be 'closed' or 'open' for output enabled or disabled, current limit (CI mode), power limit (UNREG mode), or for any fault trip.

DIGITAL BUS INTERFACES (QPX600DP only)

The QPX600DP offers full remote control and read-back using RS-232, USB, GPIB or LAN (compliant with LXI class C). All interfaces are at ground potential and opto-isolated from the output terminals.

RS-232

Standard 9-pin D connector. Baud rate 9,600.

USB

USB 2.0 connection (backwards compatible with USB 1.x). Operates as a virtual COM port.

GPIB (IEEE-488)

The interface conforms with IEEE-488.1 and IEEE-488.2.

Ethernet (LAN)

Standard 10/100 base-T hardware connection. ICMP and TCP/IP Protocol for connection to Local Area Network or direct connection to a single PC.

LXI Compliance

LAN interface is compliant with LXI class C. (LXI is the abbreviation for Lan eXtensions for Instrumentation). For more information visit: www.tti-test.com/go/lxi

DIGITAL PROGRAMMING PERFORMANCE (QPX600DP only)

Setting Accuracy and Resolution

As per Manual Control (see Output Setting under Output Specifications)

Programming Speed

Command Delay:	Typically <100ms between receiving the command terminator for a step voltage change at the instrument and the output voltage beginning to change.

DRIVER SOFTWARE SUPPLIED (QPX600DP only)

IVI Driver

An IVI driver for Windows is supplied. This provides support for common applications such as LabView*, LabWindows*, HPVEE* etc.

USB Driver

An installation file is supplied which calls a standard Windows* USB driver.

** LabView and LabWindows are trademarks of National Instruments.*
HPVEE (now Agilent VEE) is a trademark of Agilent Technologies.
** USB interface is supported for Windows 2000, XP, and Vista. Windows is a trademark of Microsoft.*

GENERAL SPECIFICATIONS

Input

AC Input:	110V to 240V AC ±10%, 50/60Hz. Installation Category II.
Input Power:	1600VA max.

Temperature & Environmental

Operating Range:	+5ºC to +40ºC, 20% to 80% RH
Storage Range:	-40ºC to + 70ºC
Environmental:	Indoor use at altitudes up to 2000m, Pollution Degree 2.
Cooling:	Intelligent variable-speed fans.

Safety & EMC

Safety:	Complies with EN61010-1
EMC:	Complies with EN61326

Physical

Size:	350 x 130 x 413mm (WxHxD) (3U height) .
Weight:	9.2kg (20lb).

OPTIONS

Rack Mount (RM420)

19 inch 4U rack mount (provides ventilation space above and below PSU).

Thurlby Thandar Instruments Ltd. operates a policy of continuous development and reserves the right to alter specifications without prior notice.
Accuracy specifications apply for the temperature range 18°C to 28°C after 1 hour warm-up.

Designed and built in Europe by:

Thurlby Thandar Instruments Ltd.
Glebe Road, Huntingdon, Cambridgeshire. PE29 7DR United Kingdom
Tel: +44 1480 412451 Fax: +44 1480 450409
Email: info@tti-test.com **Web: www.tti-test.com**

Brochure Part No. 82100-1410