AIM & THURLBY THANDAR INSTRUMENTS

MX Series

Multi output dc power supplies - 315 or 375 watts

Three high performance outputs each with multiple ranges

70V max. and 6A max. (MX100T), 120V max. and 20A max. (MX180T)

Ultra-compact size for bench or rack mounting

Graphic LCD with simultaneous display of outputs

Advanced features including sequenced on/off control

RS-232, USB, GPIB and LAN (LXI) interfaces (-P versions)

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Aim-TTi

MX Series multi-output power supplies

in a word "versatility"

MX Series Key Features

- Three high performance outputs each with full functionality
- Range switching gives variable voltage/current combinations
- Shared power mode provides double power from a single output
- Low output noise and ripple via linear final regulation
- High setting resolution of up to 1mV and 0.1mA
- Variable OVP and OCP trips on all outputs
- 50 setting memories per output plus 50 linked memories
- Selectable voltage tracking (isolated tracking)
- Selectable current meter averaging
- Switchable remote sense capability
- Graphic LCD provides simultaneous output metering
- Numeric or spin-wheel control of all parameters
- Individual or combined output on/off control with programmable delay sequencing.
- 3U half-rack case for bench or rack mounting
- GPIB, RS-232, USB and LAN (LXI) interfaces (-P models)
- Duplicate power & sense terminals at rear (-P models)

The MX Series - a new power supply generation

The MX Series represents a new generation of multiple output laboratory power supplies from Aim-TTi.

Offering high power within a compact format they use ranged switched mixed-mode regulation with display and control via a large backlit graphic LCD with soft keys.

The first models in the MX Series to be launched are the 315 watt triple output MX100T and 375 watt triple output MX180T.

Three full-performance outputs

All outputs of an MX Series power supply have fully variable voltage and current setting and are able to operate in both constant voltage and constant current modes.

High resolution metering is incorporated and variable OVP and OCP trips are provided. Each output has its own DC On/Off switch.

Mixed-mode regulation

To provide its impressive power density the MX series combines high frequency switch-mode pre-regulation with linear post-regulation to offer performance that comes close to that of an all-linear design.

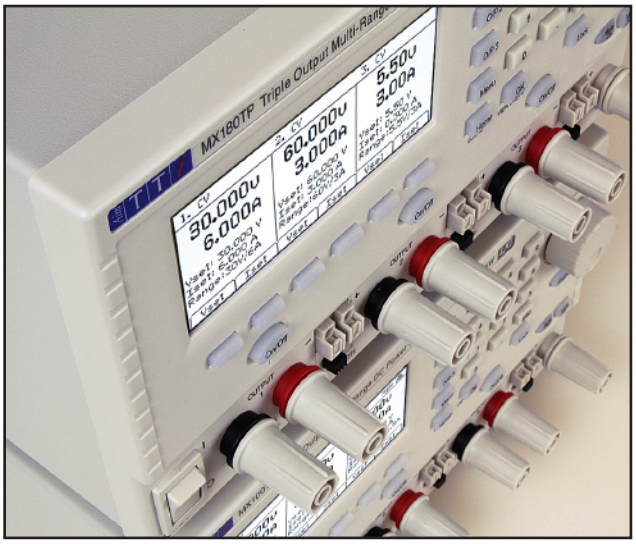
Excellent line and load regulation is matched by low noise and good transient response.

Range switching and power control

To increase its ability to match a variety of applications, each output has more than one range.

This enables higher currents to be provided when the voltage requirement is lower, or higher voltages when the current requirement is lower.

When higher power is required, a shared power mode is available in which twice the power is available from a single output..



Typical Application Areas

- Medium power bench-top applications requiring multiple outputs
- Situations where voltage and current requirements may vary widely between projects
- Repetitive testing applications requiring multi-output settings memories
- High density system applications requiring multiple outputs from limited rack space
- Remote control applications where bus interface requirements may change

MX100T & MX100TP

- 315 watts total power
- Three outputs of equal power, each capable of 35V at 3A
- Range switching provides up to 70 volts and up to 6 amps
- MX100TP includes full bus remote control

MX180T & MX180TP

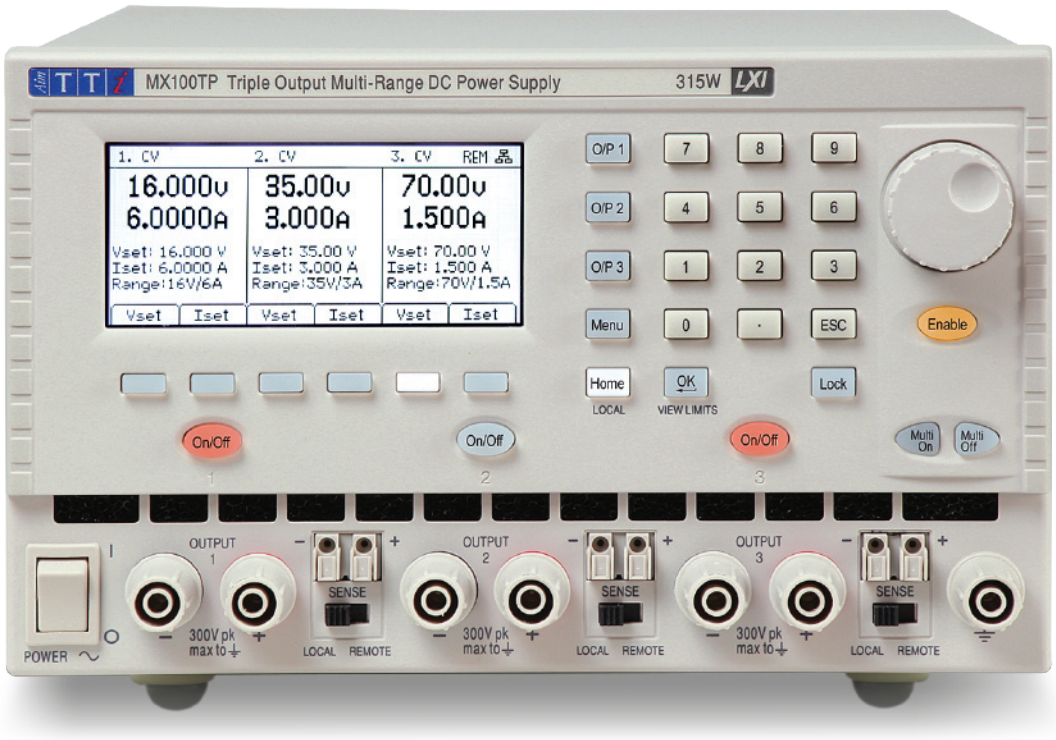
- 375 watts plus of total power
- Two high power outputs plus one low power output
- High power outputs each capable of 30 volts at 6 amps
- Range switching provides up to 120 volts or up to 20 amps
- Low power output provides up to 12 volts or up to 3 amps
- MX180TP includes full bus remote control

MX series output comparison table

	MX100T	MX180T
Max. Power Total	315 watts	378 watts
Max. Power per Output	105W + 105W + 105W or 105W + 210W	180W + 180W + 18W or 360W + 18W
Output 1 Ranges	16V/6A, 35V/3A	15V/10A, 30V/6A, 60V/3A, 15V/20A*, 30V/12A*, 60V/6A*, 120V/3A*
Output 2 Ranges	16V/6A, 35V/3A, 35V/6A*	15V/10A, 30V/6A, 60V/3A
Output 3 Ranges	35V/3A, 70V/1.5A, 70V/3A*	5.5V/3A, 12V/1.5A

* range available subject to another output being disabled (shared power mode).

MX100T - triple output 315 watt dc power supply - 3 x 35V/3A (70V or 6A max.)



- Three high performance outputs of 105 watts each 3 x (0 to 35V at 0 to 3A)
- Total power of 315 watts in a highly compact package
- Range switching gives up to 70 volts and up to 6 amps
- Twelve range combinations for maximum flexibility
- Up to 210 watts from a single output
- Low output noise and ripple via linear final regulation
- High setting resolution of 1mV and 0.1mA (output 1)
- Variable OVP and OCP trips on all outputs
- 50 setting memories per output plus 50 linked memories
- Selectable voltage tracking (isolated tracking)
- Selectable current meter averaging
- Switchable remote sense on all outputs
- Graphic LCD provides simultaneous output metering
- Numeric or spin-wheel control of all parameters
- Individual or combined output on/off control with programmable delay sequencing.
- 3U half-rack case for bench or rack mounting
- GPIB, RS-232, USB and LAN (LXI) interfaces (MX100TP)
- Duplicate power & sense terminals at rear (MX100TP)

Multiple ranges and power sharing

Each output of the MX100T has more than one range enabling it to cover a wider variety of applications.

Outputs two and three can also be combined internally to provide up to 210 watts of power as either 35V/6A or 70V/3A from a single output.

MX100T Range Choices			
	Output 1	Output 2	Output 3
Range 1	35V/3A	35V/3A	35V/3A
Range 2	16V/6A	16V/6A	70V/1.5A
Range 3	--	35V/6A*	70V/3A**
* = output 3 disabled; ** = output 2 disabled			

Three full-performance outputs

The MX100T differs from most other triple output power supplies in having three outputs of equal power, each with the ability to provide 35V at 3A.

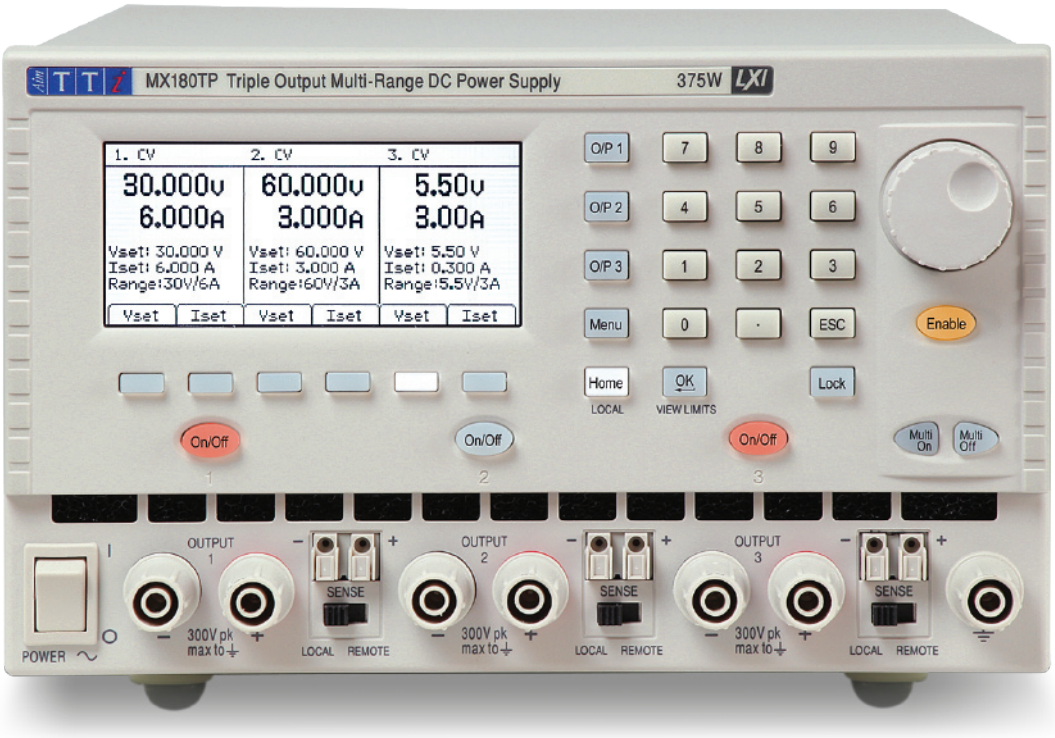
Each output features CV or CI operation, simultaneous high resolution metering, switchable remote sense, and an individual output switch.

Mixed-mode regulation

To provide its impressive power density the MX series combines high frequency switch-mode pre-regulation with linear post-regulation to offer performance that comes close to that of an all-linear design.

Excellent line and load regulation is matched by low noise and good transient response.

MX180T - triple output 375 watt dc power supply - 2 x 30V/6A (120V or 20A max.)



- Two high power outputs plus one low power output 2 x 180 watts plus 1 x 18 watts
- Total power of over 375 watts in a highly compact package
- Range switching gives up to 120 volts and up to 20 amps
- Twenty six range combinations for maximum flexibility
- Up to 360 watts from a single output
- Low output noise and ripple via linear final regulation
- High setting resolution of 1mV and 0.1mA
- Variable OVP and OCP trips on all outputs
- 50 setting memories per output plus 50 linked memories
- Selectable voltage tracking (isolated tracking)
- Selectable current meter averaging
- Switchable remote sense on all outputs
- Graphic LCD provides simultaneous output metering
- Numeric or spin-wheel control of all parameters
- Individual or combined output on/off control with programmable delay sequencing.
- 3U half-rack case for bench or rack mounting
- GPIB, RS-232, USB and LAN (LXI) interfaces (MX180TP)
- Duplicate power & sense terminals at rear (MX180TP)

Multiple ranges and power sharing

Each output of the MX180T has more than one range enabling it to cover a wider variety of applications.

Outputs one and two can also be combined internally to provide up to 360 watts of power as either 15V/20A, 30V/12A, 60V/6A or 120V/3A from a single output.

MX180T Range Choices			
	Output 1	Output 2	Output 3
Range 1	30V/6A	30V/6A	5.5V/3A
Range 2	15V/10A	15V/10A	12V/1.5A
Range 3	60V/3A	60V/3A	--
Range 4	30V/12A*	--	--
Range 5	15V/20A*	--	--
Range 6	60V/6A*	--	--
Range 7	120V/3A*	--	--
* = output 2 disabled			

Three full-performance outputs

The MX180T differs from most other triple output power supplies in having three full function outputs with fully variable voltage and current along with OVP and OCP trips.

Each output features CV or CI operation, simultaneous high resolution metering, switchable remote sensing, and an individual output switch.

Mixed-mode regulation

To provide its impressive power density the MX series combines high frequency switch-mode pre-regulation with linear post-regulation to offer performance that comes close to that of an all-linear design.

Excellent line and load regulation is matched by low noise and good transient response.

Advanced user interface

Clarity and ease-of-use

Unlike some other multi-output power supplies, the MX Series displays voltage, current and other essential information for all outputs simultaneously using its backlit graphic LCD.

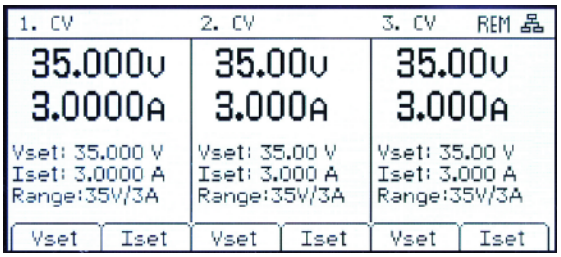


Illustration shows MX100T display MX180T display is similar

The illuminated keypad includes six soft keys via which voltage or current can be instantly set for any output, or which can be used to set up other functions using a menu system.

Values can be set numerically direct from the keypad or can be adjusted in a quasi-analog manner using the spin wheel.

Individual output display

Each output also has an individual display mode which provides larger digits and enables OVP, OCP, current meter averaging and range to be viewed and changed.

Access to 50 memory stores for the output is also available from this screen.

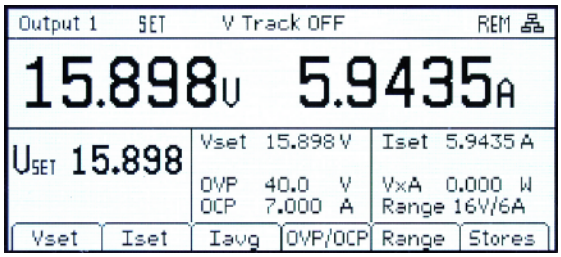


Illustration shows MX100T display MX180T display is similar

Up to 1mV and 0.1mA resolution

For applications requiring the highest accuracy and resolution, output one (MX100T) and outputs one and two (MX180T) provide 5 digit setting and metering with 1mV and 0.1mA resolution.

Other outputs use four digits giving a resolution of 10mV and 1mA.

Double power from a single output

When a higher power level is needed, two outputs can be combined internally to provide 210 watts (MX100T) or 360 watts (MX180T) from a single output.

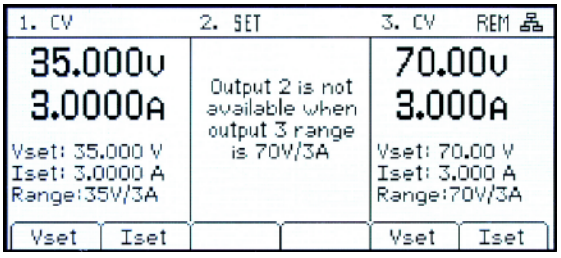


Illustration shows MX100T display MX180T display is similar

Current meter averaging

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

By selecting meter averaging, the reading is stabilised by displaying the average of several readings to reduce the speed and extent of the variation.

Voltage Tracking

The three outputs of the are completely independent and isolated. However it is possible to set the power supply up so that the voltage on an output automatically tracks the voltage on another output.

Because the outputs are isolated, tracking can be used to set equal voltage of the same polarity or opposite polarities. It can be useful when outputs have been wired in parallel or series where control can be made by adjusting a single output voltage.

For the MX180T the tracking arrangement is simply V2 tracks V1.

For the MX100T, three voltage tracking arrangements can be set: V2 tracks V1, V3 tracks V2 or V2 and V3 both track V1.

Low noise cooling

The MX series uses an intelligent fan controller which monitors both ambient temperature and power loading.

Under normal operating conditions the fan is almost silent.

200 settings stores

Non-volatile stores are incorporated for rapid recall of voltage and current settings (along with Range, OVP and OCP).

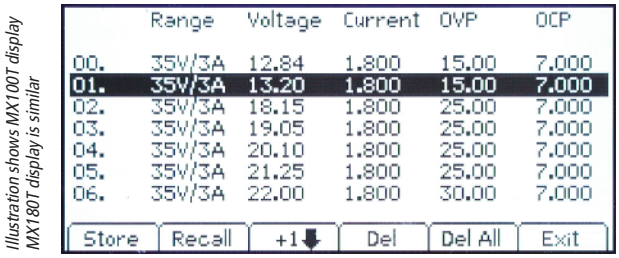


Illustration shows MX100T display MX180T display is similar

Each output has its own set of 50 stores, but an additional set of 50 linked stores is provided that contain values for all three outputs to be recalled simultaneously.

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.

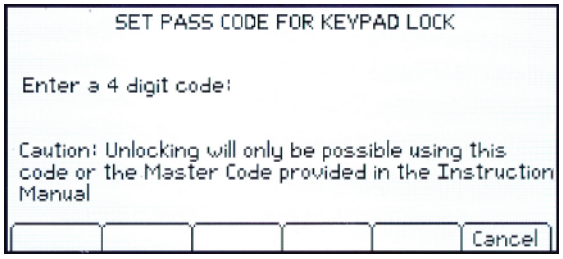
For example, when repetitively testing a unit which normally takes a peak current of 4A, the current limit could be set to 5A and the OCP to 4.1A to ensure that a faulty unit will trip the supply off and not be damaged by over dissipation.

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.

Front panel locking

An illuminated front panel key locks out the keypad to guard against accidental mis-setting.

For even greater security, as might be required when the PSU is incorporated into a fixed system, the keypad can be locked using a pass code chosen by the user.

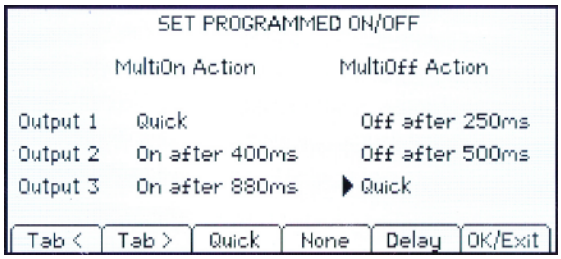


On/Off Synchronism and Sequencing

A unique capability of the product is synchronous on/off switching and programmable on/off sequencing.

Many circuits can be damaged if one voltage rail is present without the other, or if voltage rails are not applied in the correct order.

In addition to the individual output on/off buttons of the MX100T, there are further buttons for Multi-On and Multi-Off.

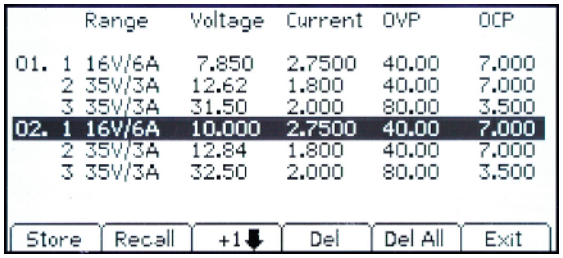


By default these turn all three outputs on or off simultaneously, but they can also be set to operate any combination of outputs in a user defined sequence with delays between 10 milliseconds and 20 seconds.

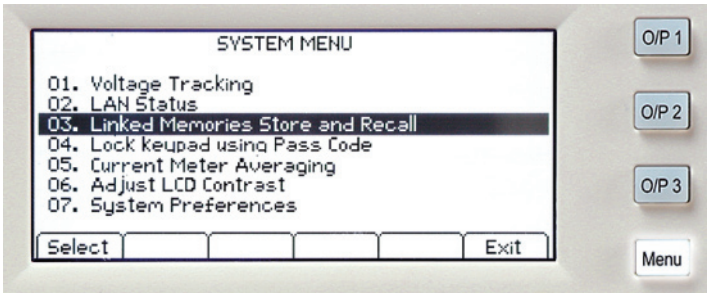
The Multi-On button is slightly recessed to avoid the possibility of it being pressed accidentally.

Multi-output Linked Memories

In addition to the individual memories for each output, 50 further memories are provided that store settings for all three outputs together.



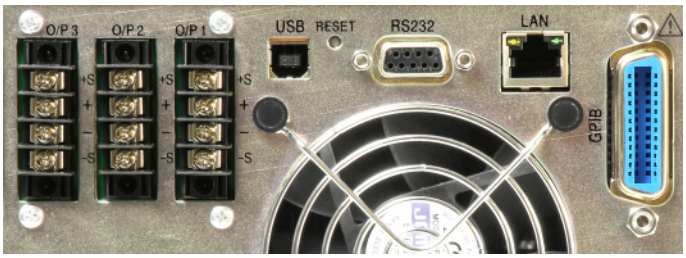
Advanced Functions are accessed using the Menu key.



Bench or rack mounting

The MX100T is housed in a compact case that uses minimum bench space. It is half-rack width by 3U high and a rack kit capable of mounting one or two units is available as an option. Front input ventilation ensures that no additional space is needed top or bottom.

On the -P version, output and remote sense terminals are mounted both on the front and rear panels.



MX100TP - comprehensive bus remote control

To meet a wide variety of needs, the MX100TP 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 and above including Win 8.

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 LXI compliant.
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.aimtti.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.*

Rear output terminals

Power and sense terminals are duplicated on the rear panel for rack mount applications or other situations where rear connection is more appropriate.

MX100T & MX100TP - Technical Specifications

OUTPUT SPECIFICATIONS

Output 1

Ranges:	Range 1 - 0V to 35V at 1mA to 3A; Range 2 - 0V to 16V at 1mA to 6A
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.
Voltage Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mV.
Current Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mA.
Setting Accuracy:	Voltage - 0.05% of reading ± 3mV; Current - 0.3% of reading ± 3mA to 3A, 0.5% of reading ± 3mA to 6A
Setting Stores:	Up to 50 set-ups can be saved and recalled via the keyboard (or the digital interfaces on MX100TP).
Load regulation:	<0.01% +5mV (CV mode) for any load change using remote sense.
Line regulation:	<0.01% +5mV (CV mode) for a 10% line voltage change.
Ripple & Noise:	Typically <0.5mV rms, <5mV pk-pk, 1mV rms max. (20MHz bandwidth).
Transient Response:	<100us to within 50mV of set level for 5% to 95% load change.
Over Voltage Trip:	Settable 1V to 40V in 0.1V steps
Over Current Trip:	Settable 0.1A to 7A in 0.01A steps
Sensing:	Selectable local or remote sensing.

Output 2

Ranges:	Range 1 - 0V to 35V at 1mA to 3A; Range 2 - 0V to 16V at 1mA to 6A Range 3 - 0V to 35V at 1mA to 6A* (available when output 3 is disabled).
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.
Voltage Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 10mV.
Current Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 10mA.
Setting Accuracy:	Voltage - 0.1% of reading ± 10mV; Current - 0.3% of reading ± 3mA to 3A, 0.5% of reading ± 3mA to 6A
Setting Stores:	Up to 50 set-ups can be saved and recalled via the keyboard (or the digital interfaces on MX100TP).
Load regulation:	<0.01% +5mV (CV mode) for any load change using remote sense.
Line regulation:	<0.01% +5mV (CV mode) for a 10% line voltage change.
Ripple & Noise:	Typically <0.5mV rms, <5mV pk-pk, 1mV rms max. (20MHz bandwidth).
Transient Response:	<100us to within 50mV of set level for 5% to 95% load change.
Over Voltage Trip:	Settable 1V to 40V in 0.1V steps
Over Current Trip:	Settable 0.1A to 7A in 0.01A steps
Sensing:	Selectable local or remote sensing.

Output 3

Ranges:	Range 1 - 0V to 35V at 1mA to 3A; Range 2 - 0V to 70V at 1mA to 1.5A Range 3 - 0V to 70V at 1mA to 3A* (available when output 2 is disabled).
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.
Voltage Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 10mV.
Current Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mA.
Setting Accuracy:	Voltage - 0.1% of reading ± 10mV; Current - 0.3% of reading ± 3mA
Setting Stores:	Up to 50 set-ups can be saved and recalled via the keyboard (or the digital interfaces on MX100TP).
Load regulation:	<0.01% +5mV (CV mode) for any load change using remote sense.
Line regulation:	<0.01% +5mV (CV mode) for a 10% line voltage change.
Ripple & Noise:	Typically <0.5mV rms, <5mV pk-pk, 1mV rms max. (20MHz bandwidth). 70V range - typically <1mV rms, <10mV pk-pk, 1.5mV rms max.
Transient Response:	<100us to within 50mV of set level for 5% to 95% load change.
Over Voltage Trip:	Settable 1V to 80V in 0.1V steps
Over Current Trip:	Settable 0.1A to 3.5A in 0.01A steps
Sensing:	Selectable local or remote sensing.

Output Protection

External Voltage:	Output will withstand forward voltages of up to 50V (O/Ps 1 and 2) or 80V (O/P 3). Reverse protection by diode clamp, 3A max..
Fault Trip:	The output will be shut down if a trip conditions listed below occurs.
OVP or OCP	Exceeding over-voltage or over-current settings for the output.
Over Temperature:	Monitors internal temperature rise to protect against excess ambient temperature or blocked ventilation slots.

Connection

Output Terminals:	Universal 4mm safety binding posts on 19mm (0·75") spacing at front. Screw terminals at rear (MX100TP only).

Terminals can accept fixed shroud 4mm plugs, standard 4mm plugs, fork terminals and bare wires.

Sense Terminals:	Sprung loaded screw-less terminals at front. Screw terminals at rear (MX100TP only).

OUTPUT ON/OFF SWITCHING

Individual On/Off:	Individual keys for each output. On state indicated by key illumination.
Multi-On/Multi-Off:	Separate keys enable any combination of outputs to be turned on or off either simultaneously (default) or with timed delays from 10ms and 20s. Delayed operation indicated by flashing key illumination.

VOLTAGE TRACKING

The power supply can be set so that the voltage of an output is automatically set equal to that of another output and tracks any changes.

Tracking Modes: None, V2 tracks V1, V3 track V2, V2 and V3 both track V1.

SETTING MEMORIES

Individual Output Memories

No. of Stores:	50 per output
Parameters Stored:	Range, Set Volts, Set Current, OVP, OCP

Linked Output Memories

No. of Stores:	50
Parameters Stored:	Range, Set Volts, Set Current, OVP, OCP (for all three outputs)

METERING (each Output)

Meter Function:	5 digit voltage and current meters (O/P 1), 4 digit voltage and current meters (O/Ps 2 & 3). Simultaneous display of actual and set values.
Meter Resolution:	1mV/0.1mA (O/P 1), 10mV/1mA (O/Ps 2 & 3).
Meter Accuracy:	As per setting accuracy (CV mode).

Additional Metering Functions

V x A	Calculated power in watts. Resolution 0.01W. Accuracy 0·5% ± 3 digits

DIGITAL BUS INTERFACES (MX100TP only)

The MX100TP offers full remote control and read-back using USB, RS-232, GPIB or LAN (compliant with LXI). All interfaces are at ground potential and opto-isolated from the output terminals.

RS-232

Standard 9-pin D connector.

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 Core 2011. (LXI is the abbreviation for Lan eXtensions for Instrumentation). For more information visit: www.aimtti.com/go/lxi

DIGITAL PROGRAMMING PERFORMANCE (MX100TP only)

Programming Speed

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

Output Response

Range	Direction	90% load	No load	Direction	90% load	No load
16V/6A	Up	10ms	10ms	Down	10ms	350ms
35V/3A	Up	10ms	10ms	Down	35ms	550ms
35V/6A	Up	10ms	10ms	Down	20ms	550ms
70V/3A	Up	25ms	12ms	Down	60ms	600ms

The above figures are indicative only and will be affected by load capacitance.

DRIVER SOFTWARE SUPPLIED (MX100TP 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, Vista, 7 and 8 (including 64 bit versions).*
Windows is a trademark of Microsoft.

GENERAL SPECIFICATIONS

Input

AC Input:	110V to 240V AC ±10%, 50/60Hz. Installation Category II.
Input Power:	500VA 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:	212 x 130 x 375mm (WxHxD) (half rack x 3U height) .
Weight:	4.8kg (MX100T); 4.9kg (MX100TP).

OPTIONS

Rack Mount

19 inch rack mount for one or two power supplies.

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.

MX180T & MX180TP - Technical Specifications

OUTPUT SPECIFICATIONS

Output 1

Ranges:	Range 1 - 0V to 15V at 1mA to 10A; Range 2 - 0V to 30V at 1mA to 6A Range 3 - 0V to 60V at 1mA to 3A; Range 4* - 0V to 15V at 1mA to 20A; Range 5* - 0V to 30V at 1mA to 12A Range 6* - 0V to 60V at 1mA to 6A; Range 7* - 0V to 120V at 1mA to 3A (ranges marked * are only available with output 2 disabled)
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.
Voltage Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mV.
Current Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mA.
Setting Accuracy:	Voltage - 0.05% of reading ± 3mV; (± 30mV on 120V range) Current - 0.3% of reading ± 3mA to 3A, 0.5% of reading ± 3mA to 10A: 0.5% of reading ± 4mA to 20A
Setting Stores:	Up to 50 set-ups can be saved and recalled via the keyboard (or the digital interfaces on MX180TP).
Load regulation:	<0.01% +5mV (CV mode) for any load change using remote sense.
Line regulation:	<0.01% +5mV (CV mode) for a 10% line voltage change.
Ripple & Noise:	Typically <2mV rms, <15mV pk-pk, 3mV rms max. (20MHz bandwidth).
Transient Response:	<100us to within 50mV of set level for 5% to 95% load change.
Over Voltage Trip:	Settable 1V to 130V in 0.1V steps
Over Current Trip:	Settable 0.1A to 21A in 0.01A steps
Sensing:	Selectable local or remote sensing.

Output 2

Ranges:	Range 1 - 0V to 15V at 1mA to 10A; Range 2 - 0V to 30V at 1mA to 6A Range 3 - 0V to 60V at 1mA to 3A
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.
Voltage Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mV.
Current Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 1mA.
Setting Accuracy:	Voltage - 0.05% of reading ± 3mV; (± 30mV on 120V range) Current - 0.3% of reading ± 3mA to 3A, 0.5% of reading ± 3mA to 10A: 0.5% of reading ± 4mA to 20A
Setting Stores:	Up to 50 set-ups can be saved and recalled via the keyboard (or the digital interfaces on MX180TP).
Load regulation:	<0.01% +5mV (CV mode) for any load change using remote sense.
Line regulation:	<0.01% +5mV (CV mode) for a 10% line voltage change.
Ripple & Noise:	Typically <2mV rms, <15mV pk-pk, 3mV rms max. (20MHz bandwidth).
Transient Response:	<100us to within 50mV of set level for 5% to 95% load change.
Over Voltage Trip:	Settable 1V to 65V in 0.1V steps
Over Current Trip:	Settable 0.1A to 11A in 0.01A steps
Sensing:	Selectable local or remote sensing.

Output 3

Ranges:	Range 1 - 0V to 5.5V at 10mA to 3A; Range 2 - 0V to 12V at 10mA to 1.5A.
Operating Mode:	Constant voltage or constant current with automatic cross-over and mode indication.
Voltage Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 10mV.
Current Setting:	By direct numeric entry or quasi-analog rotary wheel; resolution 10mA.
Setting Accuracy:	Voltage - 0.5% of reading ± 20mV; Current - 0.5% of reading ± 20mA
Setting Stores:	Up to 50 set-ups can be saved and recalled via the keyboard (or the digital interfaces on MX180TP).
Load regulation:	<0.1% +5mV (CV mode) .
Line regulation:	<0.1% +5mV (CV mode) for a 10% line voltage change.
Ripple & Noise:	Typically <2mV rms, <15mV pk-pk, 3mV rms max. (20MHz bandwidth).
Transient Response:	<100us to within 50mV of set level for 5% to 95% load change.
Over Voltage Trip:	Settable 1V to 14V in 0.1V steps
Over Current Trip:	Settable 0.1A to 3.5A in 0.01A steps
Sensing:	Selectable local or remote sensing.

Output Protection

External Voltage:	Output will withstand forward voltages of up to 140V (O/P 1), 70V (O/P 2) or 20V (O/P 3). Reverse protection by diode clamp, 3A max..
Fault Trip:	The output will be shut down if a trip conditions listed below occurs.
OVP or OCP	Exceeding over-voltage or over-current settings for the output.
Over Temperature:	Monitors internal temperature rise to protect against excess ambient temperature or blocked ventilation slots.

Connection

Output Terminals:	Universal 4mm safety binding posts on 19mm (0·75") spacing at front. Screw terminals at rear (MX180TP only).

Terminals can accept fixed shroud 4mm plugs, standard 4mm plugs, fork terminals and bare wires.

Sense Terminals:	Sprung loaded screw-less terminals at front. Screw terminals at rear (MX180TP only).

OUTPUT ON/OFF SWITCHING

Individual On/Off:	Individual keys for each output. On state indicated by key illumination.
Multi-On/Multi-Off:	Separate keys enable any combination of outputs to be turned on or off either simultaneously (default) or with timed delays from 10ms and 20s. Delayed operation indicated by flashing key illumination.

VOLTAGE TRACKING

The power supply can be set so that the voltage of output two is automatically set equal to that of output one and tracks any changes.

SETTING MEMORIES

Individual Output Memories

No. of Stores:	50 per output
Parameters Stored:	Range, Set Volts, Set Current, OVP, OCP

Linked Output Memories

No. of Stores:	50
Parameters Stored:	Range, Set Volts, Set Current, OVP, OCP (for all three outputs)

METERING (each Output)

Meter Function:	5 digit voltage and current meters (O/P 1 and O/P 2), 3.5 digit voltage and current meters (O/P 3). Simultaneous display of actual and set values.
Meter Resolution:	1mV/1mA (O/P 1 and O/P 2), 10mV/10mA (O/P 3).
Meter Accuracy:	As per setting accuracy (CV mode).

Additional Metering Functions

V x A	Calculated power in watts. Resolution 0.01W. Accuracy 0·5% ± 3 digits

DIGITAL BUS INTERFACES (MX180TP only)

The MX180TP offers full remote control and read-back using USB, RS-232, GPIB or LAN (compliant with LXI). All interfaces are at ground potential and opto-isolated from the output terminals.

RS-232

Standard 9-pin D connector.

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 Core 2011. (LXI is the abbreviation for Lan eXtensions for Instrumentation). For more information visit: www.aimtti.com/go/lxi

DIGITAL PROGRAMMING PERFORMANCE (MX180TP only)

Programming Speed

Command Delay:	Typically <200ms between receiving the command terminator for a step voltage change at the instrument and the output beginning to change.

DRIVER SOFTWARE SUPPLIED (MX180TP 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, Vista, 7 and 8 (including 64 bit versions).*
Windows is a trademark of Microsoft.

GENERAL SPECIFICATIONS

Input

AC Input:	110V to 240V AC ±10%, 50/60Hz. Installation Category II.
Input Power:	600VA 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:	212 x 130 x 375mm (WxHxD) (half rack x 3U height) .
Weight:	5.0kg (MX180T); 5.1kg (MX180TP).

OPTIONS

Rack Mount

19 inch rack mount for one or two power supplies.

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Designed and built in Europe by:

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Brochure Part No. 82100-1XXX