THURLBY THANDAR INSTRUMENTS

EX Series



Compact high power bench DC power supplies

single, dual and triple output models

powers from 175 watts to 420 watts

voltage up to 150V, current up to 20A

RS-232 programmable model available

EX series DC bench Power Supplies

(including EX-R and EX-P models)



Models illustrated within this brochure:

Front cover:	*EX354T ***	*Above:*	*EX1810R*	*Next Page:*	*EX2020R*
	EX4210R		*EX355P*		
	EX355		*EX752M (Mode C)*		

*(** Note - the EX354T has now been replaced by the EX354Tv)*

EX series - high power at low cost

The EX series provides high levels of power at surprisingly low cost.

The attractive case style is highly compact using the minimum of bench space. The fan-less design provides silent operation *. The low weight makes them easy to move about.

Mixed-mode regulation

The EX series combines switch-mode pre-regulation with linear post-regulation to provide performance comparable with an all linear design.

Excellent line and load regulation is matched by low noise and good transient response. High power efficiency makes fan cooling unnecessary *.

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.

Low voltage auxiliary output

The new EX354Tv incorporates a third output fully variable between 1.5V and 5.0V with a fixed current limit of 5A.

The set voltage can be measured using the digital meters.

** The EX2020R and EX4210R use fan assisted cooling. All other EX series power supplies use fan-less convection cooling.*

Simultaneous digital metering

The EX series incorporate 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.

Single, dual or triple outputs

EX series units are available in single, dual or triple output versions.

The EX354D, for example, has two independent and isolated outputs each with a 0 to 35V, 0 to 4A capability. The outputs can be wired in either series or parallel to provide voltages up to 70 volts or currents up to 8 amps.

The EX354Tv has an additional low voltage auxiliary output with a 5A current capability. This output is fully variable between 1.5V and 5V and can be measured using the digital meters.

Safety and reliability

The EX series has been designed to meet the stringent requirements of relevant IEC standards for safety and EMC.

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

compact high power PSUs

offering an unrivalled combination of performance and value

Output voltages up to 150V

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.

Because of the higher voltages it can produce, the EX752M uses special safety binding posts which can accept spade terminals, 4mm plugs, or bare-end wires without exposing any metal parts.

EX-R models
Higher currents and remote sense

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, EX-R models include switchable remote sensing and extended voltmeter resolution.

The EX1810R provides current up to 10A yet still retains silent fan-free cooling.

The EX4210R provides 420 watts of power within this highly compact and lightweight format.

It can provide current of up to 10 amps at voltages up to 42V in both constant voltage and constant current modes.

The EX2020R provides a similar power output but with double the current capability for voltages up to 20V.



Switchable remote sense is provided to remove the effects of connection lead resistance at high current.

EX-P models
Remote operation via RS-232

The EX355P is a digitally controlled version of the EX355 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 of voltage and current for bench use.

EX series - model range			
Single Output			
EX355	35V/5A	175 watts	
EX355P	35V/5A	175 watts	RS-232
EX1810R	18V10A	180 watts	Remote Sense
EX2020R	20V/20A	400 watts	Remote Sense
EX4210R	42V/10A	420 watts	Remote Sense
Dual Output			
EX354D	2 x 35V/4A	280 watts	
EX752M	2 x 75V/2A or 1 x 75V/4A or 1 x 150V/2A	300 watts	
Triple Output			
EX354Tv	2 x 35V/4A + 1.5 - 5V@5A	305 watts	

Further models may have been added since this brochure was printed. Please check our web site or contact our sales desk.

Part of a large power supply family

TTi is one of the world's foremost producers of laboratory power supplies.

If the EX series does not offer a model to meet your needs, then one of our other series probably will.

EL series

The EL series is similar in style, size and model range to the EX series but uses all linear regulation with powers from 30 watts to 125 watts. 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.

Technical Specifications

EX series

MAIN OUTPUTS

Voltage Range:	0V to 35V minimum (EX355, EX354D, EX354T) 0V to 75V or 0V to 150V minimum (EX752M)
Current Range:	0A to 2A or 0A to 4A minimum (EX752M) 0A to 4A minimum (EX354D, EX354T) 0A to 5A minimum (EX355)
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 >20kΩ in constant current mode.
Ripple & Noise (20MHz bandwidth):	Typically <2mV rms, <10mV pk-pk, (CV mode).
Transient Response:	<200µs to within 50mV of set level for 90% load change.
Temp. Coefficient:	Typically <100ppm/°C.
Output Protection:	Outputs will withstand forward voltages up to 40V (EX355, EX354D, EX354T) or 85V/170V (EX752M). Over-voltage trip operates above these levels. Reverse protection by diode clamp for currents up to 3A.
Status Indication:	Output ON lamps. Constant current mode lamps.
Output Switch:	Electronic. Preset voltage/current displayed with output off.
Output Terminals:	4mm terminals on 19mm (0.75") pitch. Special safety terminals on EX752M.

METERS (main outputs)

Meter Types:	Separate 3 digit meters for voltage and current with 14mm (0.56") LED displays. Reading rate 4/sec. (4 digit voltmeter on EX752M).
Meter Resolutions:	100mV, 10mA.
Meter Accuracies:	Voltage 0.3% ±1 digit. Current 0.6% ±1 digit.

AUXILIARY OUTPUT (EX354Tv only)

Voltage:	<1.5V to >5V by front panel control.
Meter accuracy:	0.3% ± 1 digit
Current limit:	5A minimum
Load regulation:	<0.5% for a 90% load change.
Line regulation:	<0.1% for a 10% line voltage change.
Ripple & Noise:	Typically <2mV rms, <10mV pk-pk (20MHz bandwidth).
Output Protection:	Output will withstand up to 7V forward voltage. Diode clamp reverse protection for currents to 3A.
Output Terminals:	4mm terminals on 19mm (0.75") pitch.
Status Indication:	Unreg. lamp.

MULTI-MODE OPERATION (EX752M only)

Three modes of operation can be selected via a rotary switch:

Mode A:	Two independent and isolated outputs (75V/2A each).
Mode B:	One output of double the current capability (75V/4A). Unused output is disabled and its displays are blanked.
Mode C:	One output of double the voltage capability (150V/2A). Unused output is disabled and its displays are blanked.

EX-R models

(where different from standard EX series)

OUTPUT

Voltage Range:	0V to 18V minimum (EX1810R) 0V to 20V minimum (EX2020R) 0V to 42V minimum (EX4210R)
Current Range:	0A to 10A minimum (EX1810R, EX4210R) 0A to 20A minimum (EX2020R)
Output Protection:	As EX series but with limits of 22V (EX1810R), 25V (EX2020R), 48V (EX4210R). Over-temperature trip.
Ripple & Noise (20MHz bandwidth):	Typically <2mV rms, <10mV pk-pk, (CV mode) except EX2020R - <2mV rms, <20mV pk-pk

REMOTE SENSE

Selection:	Switch selectable as Local or Remote.
Connection:	Remote sense connections via spring loaded connectors.

METERS

Meter Types:	Separate 4 digit meters for voltage and current with 14mm (0.56") LED displays. Reading rate 4/sec.
Meter Resolutions:	10mV, 10mA.
Meter Accuracies:	Voltage 0.3% ±2 digit. Current 0.6% ±2 digit.

EX355P

(where different from standard EX series)

OUTPUT

Voltage Range:	0V to 35V
Current Range:	0A to 5A
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. 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.
Meter Accuracies:	Voltage 0.3% ±1 digit. Current 0.6% ±1 digit.

MEMORY

The power supply saves the voltage, current and output-enable status at power down and restores the settings at power up.

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

COOLING

EX4210R/2020R only:	Fan assisted using low-noise brushless dc fan.
All Other Models:	Silent fan-less convection cooling.

OUTPUT TERMINALS

Standard Type:	4mm "binding post" terminals suitable for plugs or wires.
EX752M only:	As above but with fully "touch proof" construction.
Optional (all models):	4mm safety sockets, suitable for shrouded plugs.

POWER

AC Input:	EX354D, EX354Tv, EX752M: 110V to 240V ±10%, 50/60Hz. EX355, EX355P,EX1810R, EX2020R, EX4210R, : 220 to 240V ±10% (115V to order). Installation Category II.
Consumption:	See table for maximum VA figures for each model.

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

SIZE, WEIGHT, VA

MODEL	SIZE (W X H X D) mm	WEIGHT (kg)	Input VA max.
EX355	140 x 160 x 320	3.0	400
EX355P	140 x 160 x 320	3.0	400
EX1810R	140 x 160 x 320	3.0	400
EX2020R	140 x 160 x 320	3.6	800
EX4210R	140 x 160 x 320	3.6	800
EX354D	260 x 160 x 320	4.3	500
EX354Tv	260 x 160 x 320	4.3	500
EX752M	260 x 160 x 320	4.4	500

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

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