



Description

DC power supply modules with high accuracy, resolution, stability and low noise. They are utilised in CalBench systems for various applications, including providing power to process loops, routine checking of instruments, devices and circuits at certain voltages and currents.

A user-friendly interface enables simple, fast, and safe operation of the power supply. Smart analogue controls makes setting the required output quick and easy, with the benefit of incremental rotary control.

Low Noise: Linear regulation provides ultra low output noise and superior transient response. Each module has an RMS noise figure of 0.4 mV and tightly specified pk-pk noise and common-mode current figures.

Precision Metering: High accuracy, four digit, fixed-resolution meters display both voltage and current. The fixed resolution ensures that there are no sudden and confusing changes in the reading.

Low current range: Each power supply incorporates a low current range. This provides metering with 0.1 mA resolution and enables lower currents to be set with more precision.

Meter averaging: A meter averaging function reduces the display cycling when working with rapidly varying load currents.

Locking function: The Lock button transfers control of voltage and current from the analogue controls to internal digital circuitry. This enables complete security and stability, meaning settings cannot be changed accidentally. This is useful when the module is frequently used at a specific output, for example 24 V DC, 200 mA. A safety interlock feature prevents an unexpected voltage appearing on the output when the settings are unlocked. The Lock function can only be released when the output is set to off.

V-Span function: The V-Span function allows users to define the end-stop values of the voltage control to create a specific voltage range. This helps to prevent over-voltage damage. Vmin and Vmax can be set anywhere between zero and maximum output voltage subject only to $V_{max} > (V_{min} + 0.1 V)$. The fine control gives additional adjustment of 1%. Once set, the voltage span function can be turned on or off at the press of a button.

Safety Terminals / Binding Posts: Output connections are via safety terminals that are compatible with 4 mm shrouded plugs, standard plugs, bare wires, and spade terminals. These terminals are specifically designed with safety features including limited opening distance and a raised flange around the metal connection surface. This ensures that the clearances are sufficient to make the exposed metal parts touch-proof.

Features

- **7052:** 0 to 30V/1mA to 3 A; 0 to 30V/0.1mA to 500mA; (90W)
- **7056:** Two identical outputs as per the 7052, with tracking and parallel modes
- **7057:** 0 to 60V/1mA to 1.5A; 0 to 60V/0.1mA to 500mA; (90W)
- Linear regulation for enhanced performance
- Analogue control for easy and fast setting
- Locking function - instantly lock settings
- V-Span function - customise the voltage range
- Low current range and current meter averaging
- DC output switches and "view limits" button
- Selectable remote sense terminals
- Safety terminals / binding posts
- Independent, isolated tracking, ratio tracking and true parallel modes on 7056

7052P, 7056P, 7057P Programmable Versions

- Full digital remote control and readback
- RS-232 or USB (from rear of bench console)
- Interfaces are opto-isolated from outputs
- Analogue remote control of V and I (7052P and 7057P)



Technical Specifications

Output

Voltage/Current ranges

7052 0 V to 30 V / 1 mA to 3 A; 0 V to 30 V / 0.1 mA to 500 mA; (90 W max.).

7056 Two identical outputs as per 7052, with Tracking and Parallel modes (see Modes section).

7057 0 V to 60 V / 1 mA to 1.5 A; 0 V to 60 V / 0.1 mA to 500 mA; (90 W max.).

Note: Actual maxima for voltage and current are typically 1 % greater than the figures given above.

Output setting and control

Voltage Setting By coarse and fine controls.

Current Setting By single logarithmic control.

Output Mode Constant voltage or constant current with automatic cross-over. CC indicator in constant current mode.

Output Switch Electronic, non isolating. Preset voltage and current limit displayed when Output off. Output rise time no load < 15 ms.

V-Span (voltage span control)

The voltage adjustment range can be controlled by digital setting of the end-stop values of the coarse voltage control to any desired values.

The range for V_{max} is 0.1 V to 30 V (60 V on 7057). The range for V_{min} is 0 to ($V_{max} - 0.1$ V).

S-Lock (settings Lock)

Voltage and current settings can be locked by a single button press. Lock accuracy is equal to the meter accuracy (see Meter Specification).

Output performance

Ripple and Noise Normal mode voltage: < 0.4 mV rms and 2 mV p-p; Normal mode current: < 0.2 mA rms; (< 40 μ A on 500 mA range);
Common mode current: < 5 mA rms.

Load regulation Voltage: < 0.01 % + 2 mV. Current: typically 0.01 % + 500 μ A.

Voltage specification applies for any load change, measured at the output terminals. When using remote sense add 0.5 mV per 0.1 V drop in the positive output lead (max. sense lead resistance 0.5 Ω).

Line regulation Voltage < 0.01 % + 2 mV for 10 % line change. Current < 0.01 % + 250 μ A. for 10 % line change.

Transient response < 50 ms to within 50 mV of setting for a 90 % load change.

Temp. coefficient Voltage: typically <(50 ppm + 0.5 mV)/ $^{\circ}$ C; Current: typically <(100 ppm + 1 mA)/ $^{\circ}$ C; (100 ppm + 0.1 mA)/ $^{\circ}$ C on 500 mA range.

Output protection

Output protection Output withstands forward voltages of up to 20 V above rated output voltage. Reverse protection by diode clamp for currents up to 3 A.

Over-temperature Output trips off for over-temperature.

Safety interlocks Operations that could cause an unpredictable change in V or I settings are interlocked with the output switch.

Output connections

Output terminals Universal 4 mm safety binding posts on 19 mm (0.75 ") spacing.

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

Remote sense

Sense selection Voltage sensing can be selected as Local or Remote by front panel switch.

Sense terminals Sprung loaded screw-less terminals.

Modes of operation (7056 only)

The 7056 has four modes of operation - Independent, Isolated Tracking, Isolated Ratio Tracking, and True Parallel.

Independent The two outputs are completely independent and electrically isolated from each other.

Tracking The two outputs remain electrically isolated, but voltage control of the Master output sets an identical voltage on the Slave output.

Ratio tracking As Tracking, but Slave voltage can be set to any percentage of Master output & will retain that % ratio as the Master voltage is varied.

Parallel All of the power (up to 180 watts) is channelled to the Master output which can consequently supply up to 6 amps.
The Slave output is turned off and its meters are blanked.

Both on/Both off 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.

Meter Specifications

Display type Dual 4-digit meters, 10 mm (0.39 ") LED.

Voltage meter

Resolution 10 mV;

Accuracy \pm (0.1 % of reading + 10 mV).

Current meter

Resolution 1 mA (0.1 mA on 500 mA range);

Accuracy \pm (0.3 % + 0.005 A) to 3 A; \pm (0.5 % + 0.005 A) to 5 A; \pm (0.3% + 0.5 mA) on 500 mA range.

Meter damping Normally 20 ms, switchable to 2 sec for averaging of rapidly varying loads.



Technical Specifications - Remote Control (7052P/7056P/7057P)

Versions

7052P	0 to 30 V at 0 to 3 A, programmable.
7056P	2 x (0 to 30 V at 0 to 3 A), programmable.
7057P	0 to 60 V at 0 to 1.5 A, programmable.

Digital bus interfaces - RS-232 or USB

Full remote control and read-back using RS-232 or USB. All interfaces are at ground potential and opto-isolated from the outputs.

Note: Remote/Local Sense, and Operational Mode (7056P) are manually selectable only.

RS-232	Standard 9-pin D connector. Baud rate 19,200 max.
USB	Standard USB hardware connection. Operates as a virtual COM port.

Digital programming performance

Voltage setting

Setting resolution	1 mV
Setting accuracy	$\pm (0.05 \% + 10 \text{ mV})$

Current setting

Setting resolution	0.1 mA (0.01 mA on 500 mA range)
Setting accuracy	$\pm (0.3 \% + 0.005 \text{ A})$ to 3 A, $\pm (0.5 \% + 0.005 \text{ A})$ to 6 A, $\pm (0.3 \% + 0.5 \text{ mA})$ on 500 mA range.

Programming speed

Command delay	Typically < 80 ms (this must be added to any of the figures below)
Voltage up time	Typically < 45 ms to 1 %
Voltage down time	Typically < 20 ms to 1 % (full load); typically < 150 ms to 1 % (no load)

Variable OVP and OCP Protection

Measure and compare over-voltage and over-current protection are implemented in firmware and can be set via the remote interfaces only. Output trips Off for OVP and OCP conditions.

Setting resolution	10 mV and 1 mA.
Response time	Typically 500 ms.

Analog remote control (7052P/7057P only)

Non-isolated analog voltage control of voltage and current. Analog control outputs are also provided to enable easy parallel connection of multiple units in a master-slave configuration. Note that the 7056P does not have analog remote control.

Scaling

Reference point	All control voltage are referenced to the positive output terminal
Set voltage input	0 V to 10 V sets 0 to 100 % of rated output (e.g. 0 to 30 V for 7052P). Alternative scaling of 0 V to 5 V (selectable using internal link).
Set current input	0 V to 10 V sets 0 to 100 % of rated output (e.g. 0 to 3A for 7052P). Alternative scaling of 0 V to 5 V (selectable using internal link).
Voltage output	0 to 100 % of rated output voltage generates 0 V to 5 V.
Current output	0 to 100 % of rated output current generates 0 V to 5 V.

Accuracy

Set voltage input	$\pm (0.3 \% + 10 \text{ mV})$; Input Impedance = 100 k Ω
Set current input	$\pm (0.5 \% + 0.005 \text{ A})$; Input impedance = 64 k Ω
Voltage output	$\pm (0.3 \% + 10 \text{ mV})$; Output Impedance = 125 Ω
Current output	$\pm (0.5 \% + 0.005 \text{ A})$; Output Impedance = 125 Ω

Note that Analog control of current cannot be used with the 500 mA range selected.

Remote analog on/off control (7052P/7057P only)

Non-isolated terminal which sets the output to Off when pulled low by gate signal or relay closure. Signal is reference to the positive output terminal. Note that the 7056P does not have this facility.

General Specifications

Power Requirements	230 V or 115 V. Installation category II. Power is dependant on the line power to the CalBench.
Operating Range	5 °C to 40 °C, 20 % to 80 % RH. Storage Range: -20 °C to +60 °C.
Electrical Safety	Designed and manufactured to comply with IEC1010-1. EMC: Designed and manufactured to comply with EN61326.
Module widths	7052, 7052P, 7057, 7057P: 150 mm. 7056 and 7056P: 295 mm.

Ordering information

7052	30 V DC 3 A Adjustable Power Supply
7052P	30 V DC 3 A Programmable Adjustable Power Supply - RS-232 or USB
7056	2 x 30 V DC 3 A Dual Adjustable Power Supply
7056P	2 x 30 V DC 3 A Programmable Dual Adjustable Power Supply - RS-232 or USB
7057	60 V DC 1.5 A Adjustable Power Supply
7057P	60 V DC 1.5 A Programmable Adjustable Power Supply - RS-232 or USB

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.