



## 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 low output noise and superior transient response. Despite the high output voltages, the 7054 and 7055 maintain output noise figures of below 2 mV, and transient recovery times of better than 250  $\mu$ s.

**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 0.01 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.  $V_{min}$  and  $V_{max}$  can be set anywhere between zero and maximum output voltage subject only to  $V_{max} > (V_{min} + 1 V)$ . 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

- **7054:** 0 to 120 V / 0.01 mA to 750 mA (90 W max.)
- **7055:** 0 to 250 V / 0.01 mA to 375 mA (94 W max.)
- 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

## 7054P and 7055P 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

**7054** ..... 0 to 120 V / 0.01 mA to 750 mA (90W max.)

**7055** ..... 0 to 250 V / 0.01 mA to 375 mA (94W max.)

*Note: Actual maxima for voltage and current are typically 1% greater than the figures given above except for the voltage control on the 7055 which is limited to 250.0V.*

#### Output setting and control

**Voltage Setting** ..... By coarse and fine controls.

**Current Setting** ..... By single logarithmic control.

**Low Current Range** ..... Reduces max. current to 75 mA and increases resolution to 0.01 mA.

**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 < 20 ms.

**View Settings** ..... With the output On, the meters show actual voltage and current. The preset levels can be viewed and adjusted at any time by pressing the View Settings button.

#### 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 Vmax is 1V to 120V or 250V depending on model. The range for Vmin is 0 to (Vmax – 1V).

#### 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: <2 mV rms and 10 mV p-p.  
Normal mode current: < 10  $\mu$ A rms ; < 1  $\mu$ A rms on 75 mA range.  
Common mode current: < 20  $\mu$ A rms

**Load Regulation** ..... Voltage < 0.01 % + 10 mV. Current - typically 0.01 % + 50  $\mu$ A.

**Line Regulation** ..... Voltage < 0.01 % + 10 mV for 10 % line change.  
Current < 0.01 % + 50  $\mu$ A for 10 % line change.

**Transient Response** ..... < 250  $\mu$ s to within 50mV of setting for a 90% load change.

**Temp. Coefficient** ..... Voltage: typically < (50 ppm + 2 mV)/°C.  
Current: typically < (100 ppm + 0.1 mA)/°C; < (100 ppm + 0.01 mA)/°C on 75mA range.

#### Output protection

**Output protection** ..... Output will withstand forward voltages of up to rated output voltage. Reverse protection by diode clamp for currents to 3 A.

**OVP and OCP Trips** ..... Voltage or current measured to be in excess of 105% of the rated maximum will cause the output to trip off.

**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.

## Meter Specifications

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

#### Voltage meter

**Resolution** ..... 100 mV.

**Accuracy** .....  $\pm$  (0.1 % of reading + 100 mV).

#### Current meter

**Resolution** ..... 0.1 mA (0.01 mA on 75 mA range).

**Accuracy** .....  $\pm$  (0.3 % + 0.3mA).  
 $\pm$  (0.3 % + 0.03 mA) on 75 mA range.

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



## Technical Specifications - Remote Control (7054P/7055P)

### Versions

**7054P** ..... 0 to 120 V at 0 to 750 mA, programmable.  
**7055P** ..... 0 to 250 V at 0 to 360 mA, 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.

**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** ..... 10 mV.  
**Setting accuracy** .....  $\pm (0.05 \% + 50 \text{ mV})$ .

#### Current setting

**Setting resolution** ..... 0.1 mA (0.01 mA on 75 mA range).  
**Setting accuracy** .....  $\pm (0.3 \% + 0.1 \text{ mA})$ ;  $\pm (0.3 \% + 0.01 \text{ mA})$  on 75mA range.

#### Programming speed

**Command delay** ..... Typically < 25 ms (this must be added to any of the figures below).  
**Voltage up time** ..... Typically < 45 ms to 1 %.  
**Voltage down time** ..... Typically < 200 ms to 1 % (full load); typically < 500 ms to 1 % (no load).

#### Voltage Readback

**Accuracy** .....  $\pm (0.1 \% + 50 \text{ mV})$ .

#### Current Readback

**Resolution** ..... 0.1mA (0.01mA on 75mA range).  
**Accuracy** .....  $\pm (0.3 \% + 0.1 \text{ mA})$ ;  $\pm (0.3 \% + 0.01 \text{ mA})$  on 75mA range.

### 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** ..... 100 mV and 0.1 mA.  
**Response time** ..... Typically 500 ms.

### Analog remote control

Isolated analog voltage control of voltage and current. Non-isolated analog control outputs are also provided to enable easy parallel connection of multiple units in a master-slave configuration.

#### Control Inputs (Isolated)

**Reference point** ..... Control input voltages are referenced to their own return points.  
**Set voltage input** ..... 0 V to 10 V sets 0 to 100 % of rated output (e.g. 0 to 120 V for 7054P). 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 750 mA for 7054P). Alternative scaling of 0 V to 5 V (selectable using internal link).  
**Set voltage accuracy** .....  $\pm (0.3 \% + 100 \text{ mV})$ ; Input Impedance = 10 k $\Omega$ .  
**Set current accuracy** .....  $\pm (0.5 \% + 0.005 \text{ A})$ ; Input impedance = 10 k $\Omega$ .

#### Control Outputs (Non-isolated)

**Reference point** ..... Control output voltages are referenced to the positive output terminal.  
**Voltage output** ..... 0 to 100 % of rated output voltage generates 0V to 5V.  
**Current output** ..... 0 to 100 % of rated output current generates 0V to 5V.  
**Voltage out accuracy** .....  $\pm (0.3 \% + 100 \text{ mV})$ ; Output Impedance = 125  $\Omega$ .  
**Current out accuracy** .....  $\pm (0.5 \% + 0.5 \text{ mA})$ ; Output Impedance = 125  $\Omega$ .

*Note that Analog control of current can not be used with the low current range selected.*

## 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 width** ..... 150 mm.

## Ordering information

**7054** ..... 120 V DC 750 mA Adjustable Power Supply  
**7054P** ..... 120 V DC 750 mA Programmable Power Supply - RS-232 or USB  
**7055** ..... 250 V DC 37 5mA Adjustable Power Supply  
**7055P** ..... 250 V DC 375 mA Programmable Power Supply - RS-232 or USB

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