

SMP0098 Prototyping Essentials Expansion Kit

Raspberry Pi Pico Prototyping Framework (400-Hole Breadboard + Interface Bundle)

1. System Overview

The **Keyestudio SMP0098** is a compact commercial-grade engineering framework optimized for the **Raspberry Pi Pico (RP2040)** development environment. This specific revision bundles a space-efficient 400-hole solderless breadboard, a heavy-duty USB interface cable for combined power delivery and serial terminal diagnostics, and a comprehensive 65-piece precision jumper wire matrix. It abstracts physical connection routing bottlenecks, enabling engineers and electronics developers to maintain reliable signal structures during complex hardware debugging.

2. Component Specifications & Material Matrix

A. Compact Solderless Breadboard (400 Tie-Points)

Designed for multi-cycle physical retention and low contact transition impedance in streamlined embedded layouts.

Parameter	Specification Value
Total Tie-Points	400 Holes (1x Main Terminal Grid [300 points] + 2x Distribution Power Lanes [100 points total])
Base Material Structure	High-Impact ABS Thermoplastic (Acrylonitrile Butadiene Styrene)
Internal Spring Clips	Premium Phosphor-Bronze Alloy, heavy nickel-plated to prevent structural tarnishing
Pitch Standard	2.54 mm (0.1 inch), perfectly uniform with global Dual-in-Line (DIP) IC configurations
Wire Retention Envelope	Compatible with solid or stranded conductors spanning 21 AWG to 26 AWG (0.4 mm – 0.7 mm)
Mechanical Life Index	≥ 50,000 insertion/extraction operational cycles

B. High-Speed USB Interface Cable

Configured for low-loss DC current routing and reliable upstream device synchronization.

- **Interface Layout:** USB Type-A Male to Micro-USB (or USB-C depending on production lot) matching the hardware design parameters of the Raspberry Pi Pico controller board.
- **Conductor Resistance:** ≤ 0.2 Ω/m for stable 5V VBUS rail distribution.
- **Shielding Implementation:** Dual-layer aluminum foil along with a tinned copper braided mesh to eliminate electromagnetic interference (EMI) during synchronous serial communication.

C. Premium Multi-Configuration Jumper Wire Array (65-Piece Set)

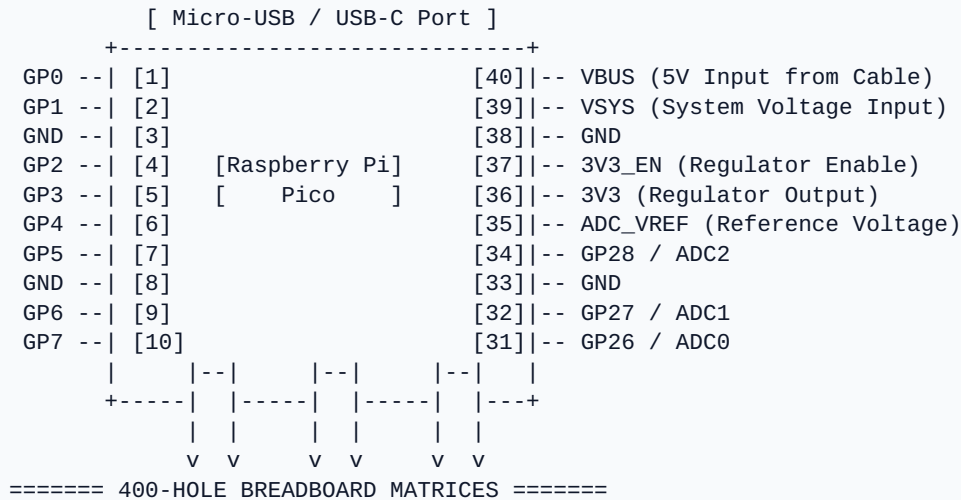
A sorted 65-piece structural jumper wire set optimized to eradicate signal skew and wire clutter in fast-paced breadboard configurations.

Parameter	Jumper Wire Specification
Total Quantity	65 Individual conductors per factory bundle
Conductor Core Gauge	24 AWG to 28 AWG Stranded Pure Copper Core Matrix
Insulation Jacket	Flame-Retardant PVC (UL94 V-0 Rated)
Boot Mold Construction	High-Density Polyethylene (HDPE) molded strain-relief headers
Current Rating Envelope	Up to 1.5 A Continuous current load
Length Variety Matrix	Pre-cut assortment lengths: 100 mm, 150 mm, 200 mm, and 250 mm variants

3. Electrical & Environmental Operations Matrix

Parameter Description	Minimum	Nominal	Maximum
Working Supply Voltage (VBUS / VSYS)	3.0 V	5.0 V	5.5 V
Contact Terminal Current Limit	—	1.2 A	2.0 A
Terminal Insulator Breakdown	500 V AC	—	—
Contact Resistance (R_contact)	—	≤ 15 mΩ	25 mΩ
Insulation Resistance (R_insulation)	1000 MΩ	—	—
Operating Ambient Temperature (ΔT)	-10 °C	—	+70 °C

4. Hardware Integration Layout



Deployment Engineering Protocol:

1. **Structural Alignment:** Align the Raspberry Pi Pico module centered cleanly across the central dividing channel of the terminal strip. This maintains structural isolation between column matrices A-E and F-J, preventing fatal short-circuit configurations.
2. **Power Bus Isolation:** Dedicate outer lateral power lanes uniquely to Ground (GND) and System High (3V3 or 5V VBUS) to mitigate the potential for accidental over-voltage induction into sensitive logic pins or analog-to-digital converter inputs.

5. System Compliance & Regulatory Standards

- **RoHS Directive:** 2011/65/EU Compliant (completely lead-free/cadmium-free assembly architecture).
- **CE Mark Requirements:** Satisfies mandatory European structural and safe operational provisions.
- **UL Certification Standard:** All synthetic polymers utilized in breadboard frameworks and conductor insulation comply fully with standardized international flammability safety ratings.