PowerBox Systems®

World Leaders in RC
Power Supply Systems

INSTRUCTION MANUAL

P²-SERVOBRIDGE

Dear Customer,

we are delighted that you have chosen the **P² ServoBridge** from **PowerBox-Systems.**

The P²-ServoBridge is a multi-function adapter for connecting conventional PWM servos to various bus systems, featuring an adjustable electronic fuse. The **P²-ServoBridge** can also be used as an over-current power-off device at normal receiver outputs with a PWM signal.

When used in conjunction with PowerBox, Jeti or Futaba radio control systems the **P²-ServoBridge** transfers telemetry data such as voltage, current and temperature to the transmitter. Additional data, including peak current or average current, are helpful in optimising the adjustable fuse.
When used with the PowerBox Core and Atom, and also with Jeti radio control systems, all the device's parameters can be adjusted from the transmitter; with all other systems adjustments are carried out using the Royal SR2 and Competition SR2. A further adjustment facility is available using the PC-Terminal program and a USB adapter.
Our website includes a range of factory-made cables and distributors for the wiring in your model; they are available in various sizes and conductor cross-sections.

For wiring in the model you will find pre-assembled cables and distributors in various sizes and cross-sections on our website.

We wish you much pleasure and success with the PowerBox **P²-ServoBridge**!

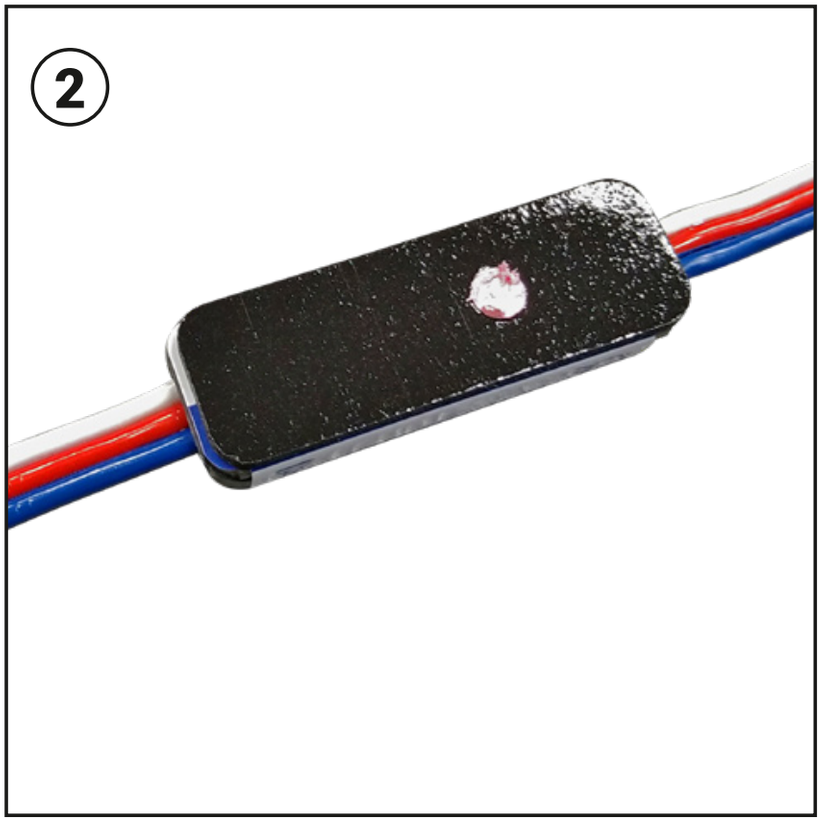
Features:

- Automatic detection of the bus system in use
- Can be used with P²-BUS, S.BUS2, SRXL/UDI or PWM
- Telemetry data for PowerBox, Jeti and Futaba radio control systems
- Current, voltage and temperature acquired at the servo itself
- Adjustable at the transmitter with PowerBox and Jeti radio control systems
- Unrestricted choice of bus channel
- Variable PWM frame rate: 12ms, 14ms, 16ms and 18ms
- Accurately adjustable electronic fuse
- Automatic fuse reset function
- Facility to set two separate cut-off currents and times
- Fuse immune to wear or ageing effects
- Fuse not temperature-dependent
- LED display of power-off processes
- Can be updated via USB interface
- Compact design: 35mm x 12mm x 4mm
- Low weight: 4g

1. INSTALLATION

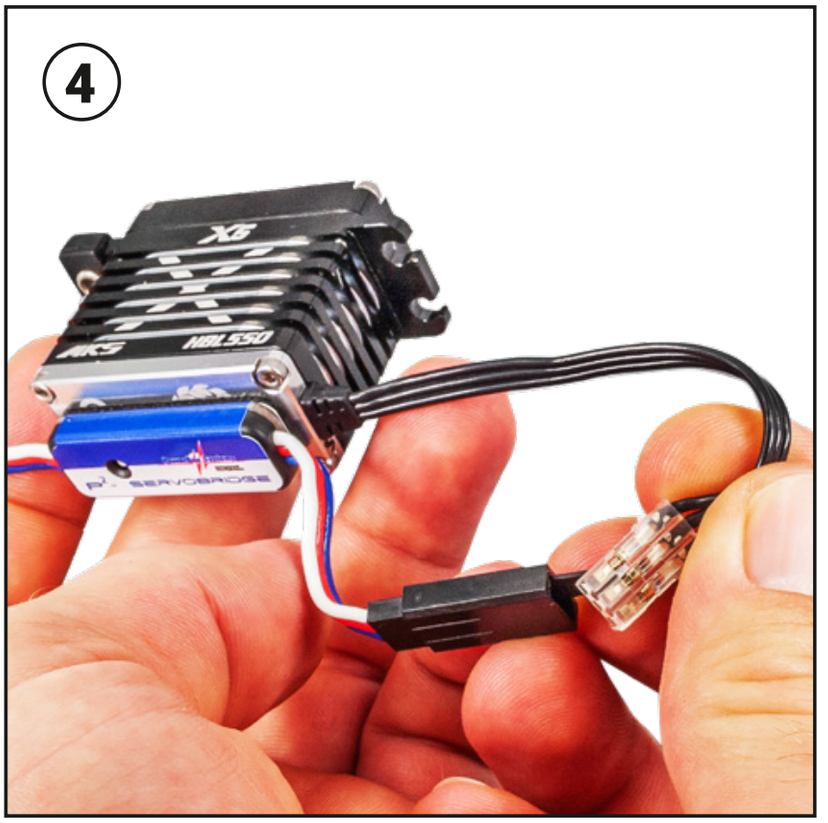
The most efficient way of mounting the P²-ServoBridge is to attach it to a metal surface on the servo. As this ensures optimum temperature measurement.

To transfer the temperature of the servo case to the sensor of the P²-ServoBridge, apply a small amount of heat-conducting paste to the hole in the sensor as shown in the illustration **(1)**, then wipe it off flush.



Remove the backing film from the adhesive tape once you have done this **(2)**.

Stick the P²-ServoBridge to the underside or one side of the servo, to suit the installation in your model **(3)**.



Now connect the output of the ServoBridge to the servo input socket **(4)**.
To minimise losses between the P²-ServoBridge and the servo we recommend that you shorten the servo cable and crimp a new connector (Order No. 1060) to the end.

2. SET-UP

The P²-ServoBridge operates with a range of bus systems as well as standard PWM servo signals. All signals are detected automatically, which means that the device is ready to use immediately. The default settings are: Channel 1, fuse set for servos rated at 15kg/cm to 25kg/cm output torque. The following adjustment facilities are available at your transmitter or in PC-Terminal:

2.1 OUTPUT CHANNEL

At this point you can select the channel to be derived from the bus signal: this will be generated as a PWM servo signal.

2.2 FRAME RATE

The frame rate refers to the speed at which the PWM signal is repeated at the ServoBridge's output. Modern digital servos generally operate without problem at the 12ms setting, but the frame rate should be set to the slower 18ms value for use with earlier analogue servos. If in doubt, your servo manufacturer will be able to provide accurate information.

2.3 SERVO TYPE

Four different pre-set servo templates can be selected at the P²-ServoBridge: Micro, Midi, Standard and Hi-Torque. Of course, you can also adjust the set values for the two fuse thresholds individually if you wish.

The table below is designed to help you assign your servo to the appropriate category:

Servo type	Servo size in mm	Output torque in kg/cm
Micro	8 – 12	2 – 7
Midi	12 - 15	8 – 15
Standard	20	15 - 25
Hi-Torque	20	25 - 60

2.4 TRIP CURRENT AND TRIP TIME

The P²-ServoBridge has two current thresholds which can be set to different values, as well as the associated trip time.
This feature enables you to set one threshold which causes the fuse to trip if the current value is exceeded for a significant period. The second threshold then switches the power off if a higher current peak of shorter duration occurs.

An example:

Trip current 1: 5.0A
Trip time 1: 2000ms

Trip current 2: 8.0A
Trip time 2: 500ms

The fuse switches the power off if a current of 5.0A is exceeded for at least two seconds, and also if 8.0A is exceeded for half a second.
If you don’t wish to set two different threshold values, simply set both trip currents and times to the same value.

3. FUSE FUNCTION, RESET FUNCTION

The electronic fuse is very precise in operation, and can be set accurately to suit any application. In contrast to the commonly used polyfuses, the power-off current does not vary with external temperature. The cut-off characteristics of electronic fuses do not vary even if used frequently, i.e. the device continues to work reliably even over a period of years.

A further advantage of electronic fuses is that it is possible to set two different cut-off thresholds, as mentioned above. Excessive continuous current can damage a servo just as easily as a brief period of higher (peak) current - for example, as a result of overheating. Electronic fuses are able to cope with both scenarios.

The automatic Reset function attempts to restart the consumer unit (servo) after it has been switched off. This is accomplished by switching the fuse on again, and measuring the current. If the current is above half the set thresholds, the fuse immediately switches off again. This procedure is repeated ten times at intervals of one second before the fuse switches off permanently. The frequency of the power-off actions is indicated by the flashing LED.

4. LED FUNCTIONS

The two-colour LED can display various operational states:

- LED constant blue: bus system detected, fuse on. No power-off events.
- LED flashing blue: bus system detected, fuse on, number of flashes indicates number of power-off events.
- LED flashing red: bus system detected, fuse off, number of flashes indicates number of power-off events. The automatic reset function was unable to restart the consumer unit within the set parameters.
- LED flashing violet: no bus system detected: the P²-ServoBridge is in Terminal USB mode.

5. BUS-OPERATION, P²-SERVOBRIDGE SET-UP FACILITIES

Various methods can be employed to set up and adjust the P²-ServoBridge. A greater or lesser quantity of data can be transferred depending on the bus system in use. Several systems allow the P²-ServoBridge to be set up from the transmitter.

The table below provides an overview of the integral functions:

Radio control system Application	Telemetry	Servo bus	Set-up
PowerBox P²-BUS	Current, voltage, capacity, temperature, peak and average current, status	Radial and parallel addressed telemetry 26 channels	At the transmitter itself
Royal SR2 Competition SR 2	Full servo telemetry only in conjunction with Core and Atom	P²-BUS Radial and parallel addressed telemetry 26 channels	At the PowerBox Data socket via the P²-BUS menu
Jeti EX-Bus	Current, voltage, capacity, temperature, peak and average current	One Bridge per EX-BUS output 24 channels	At the transmitter itself
Futaba S.BUS 2	Current, voltage, capacity, temperature	Radial and parallel addressed telemetry Max. 7 Bridges, 16+2 channels	USB interface and PC-Terminal
SRXL/UDI	None	Radial 16 channels	USB interface and PC-Terminal
PWM Servo signal	None	None	USB interface and PC-Terminal

5.1 IN CONJUNCTION WITH POWERBOX CORE AND ATOM TRANSMITTERS WITH P²-BUS

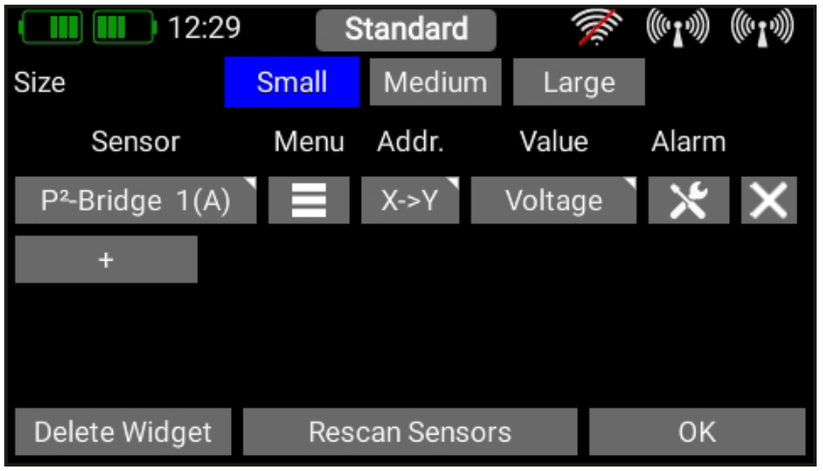
If you wish to adjust the P²-ServoBridge using a PowerBox transmitter, connect the unit to the P²-BUS socket at the receiver or the PowerBox Royal SR2, and carry out a Rescan.

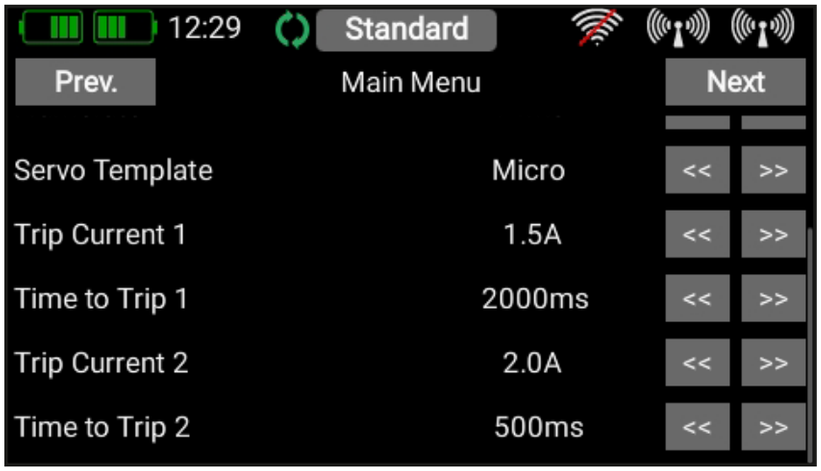
If multiple P²-ServoBridges are installed in the model, the address should immediately be established. The transmitter automatically sets the address to a vacant location when you press the X->Y button.

NOTE

The sensor address is not the channel address! The transmitter automatically sets the sensor address for telemetry. You must use settings to define the channel on which the P²-ServoBridge output is to be generated. In theory it is possible to connect a maximum of 250 ServoBridges to the P²-BUS, but output is limited to channels 1- 26!

The P²-ServoBridge now appears in the list as a sensor, and from here you can access the menu in order to enter your preferred settings.





Any additional ServoBridges should be connected in the same manner.

5.2 IN CONJUNCTION WITH THE POWERBOX ROYAL SR2 OR POWERBOX COMPETITION SR2

Both these PowerBoxes feature a P²-BUS menu point. If you select this point, you are asked to connect the P²-ServoBridge to the **DATA** output. The PowerBox now reads out the menu, and you can carry out all the required adjustments using the screen.

We included this feature in order to offer a quick, simple method of setting up the ServoBridge - regardless of the radio control system you are using.

You can now connect the ServoBridge to one of the P²-BUS outputs on the PowerBox Royal SR2.

5.3 IN CONJUNCTION WITH A JETI TRANSMITTER WITH EX-BUS

You can use the JetiBox menu to set up the P²-ServoBridge for use with a PowerBox Royal SR2, or for operation at one of your receiver's EX-BUS outputs. This is accomplished by connecting the P²-ServoBridge to an EX-BUS output on your receiver, where you can access MX to set the output channel and the fuse. However, the Jeti system only allows the connection of one P²-ServoBridge to each EX-BUS output at the receiver! Since the EX-BUS does not feature sensor addressing, it is not possible to implement arrangements such as Y-lead distribution - as is possible with the P²-BUS.
Please note that changing the output channel alters the ID of every ServoBridge. For example, it is possible to connect two P²-ServoBridges to two of the receiver's EX-BUS outputs, and receive telemetry data from both of them.

5.4 IN CONJUNCTION WITH A FUTABA TRANSMITTER WITH S.BUS2

The S.BUS2 can accommodate up to 31 sensor values (slots). With this system each P²-ServoBridge transfers four sensor values: current, voltage, capacity and temperature. Up to seven ServoBridges can be connected directly to the receiver's S.BUS2 output using Y-leads.

The USB interface and the Terminal PC program are used to select the slots to be used, the output channel and the fuse settings.

The P²-ServoBridge is not registered at the transmitter: simply access the sensor list at the transmitter, and tap on the slot which you have already set for the ServoBridge in Terminal. Select the sensor CURR-1678 for this slot; this sensor occupies three slots. Immediately after these three slots you should select the temperature sensor TEMP-1713, which takes up one further slot.

You can use 1, 5, 9, 13, 17, 21 and 25 as starting slots.

5.5 SRXL/UDI

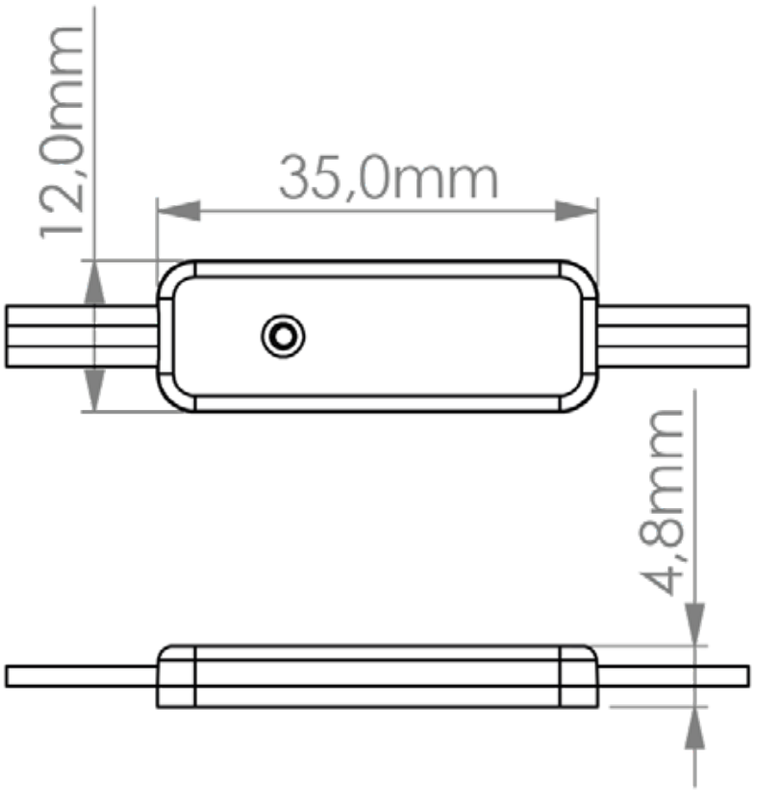
The P²-ServoBridge is also compatible with uni-directional bus systems. For example, a Multiplex M-Link receiver with SRXL output can be used as the basis for a bus wiring arrangement; the SRXL bus offers up to sixteen channels. The USB interface and PC-Terminal are used to define which channel is to be generated at the output, and to adjust the fuse.

5.6 PWM SERVO SIGNAL

The P²-ServoBridge can also be connected to a normal receiver output to provide over-current protection for your servo. A typical and popular application is to prevent excessive currents drawn by retract servos in model gliders.

The fuse is set up using the USB interface and PC-Terminal.

6. DIMENSIONS



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- HEAT-CONDUCTING PASTE
- INSTRUCTIONS

8 SERVICE NOTE

In order to be able to offer our customers good service, a support forum has been set up for all questions concerning our products. Please use the support forum before contacting us by phone.

You can find the forum at the following address:

www.forum.powerbox-systems.com

9 GUARANTEE CONDITIONS

We place particular emphasis on a high level of quality.

Due to this quality management, for development and production, we are able to grant a **warranty of 24 months** from the date of sale on our products. The warranty consists of the fact that during the warranty period, proven material defects will be repaired by us free of charge.

10 LIABILITY EXCLUSION

We cannot monitor compliance with the installation instructions, the conditions of the **P²-ServoBridge** or the maintenance of the entire remote control system.

Liability for damage and consequential damage caused by the device or the use of the same is excluded!

We wish you every success in using your new **P²-ServoBridge!**

Donauwörth, November 2021

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