

Setting of the converter:

The memory can store the converter mode of operation, the degree of slowing, minimum, neutral and maximum lengths of input pulses and minimum, neutral and maximum lengths of output pulses or degree of impact of the second channel to the first in modes V mixer and Gain. The setting mode of the converter is set if setup button is pressed and converter is connected to the power supply. Setup button must be connected to the inputs GND-R/SET1 OUT2-R/SET1 (to set channel 1) or GND-R/SET2 and OUT1- R/SET2 (to set channel 2).

Adjustment is done with short (up to 2 seconds) button pressing, storing converter makes after long (over 2 seconds) pressing a button. Data storing is indicated by short servo shaking. The parameters are adjusted step by step. Adjustment is necessary (and possible at any step) finished by power supply removing in the end. If the switch is in setting mode, proceed as follows:

- 1) Setting the operation mode: press zero-time (linear transmission), one-time (square root transfer), twice (a power transmission), three-times (V mixer) or four -times (Gain). Then press and hold, the choice is saved and setting is moved to the next parameter. Note: If the selected channel is in mode 3 or 4, you must set the same mode, where the pulse length, and in the second channel too.
- 2) Setting of degree of deceleration, when pulses length is lengthened: press zero-time (no deceleration), one-time (0.3 s slow down range), twice (0.6 s), free-times (1.2 seconds), four-times (2, 5s) or five-times (5 seconds). Then press and hold button, the choice is saved and setting is moved to the next parameter.
- 3) Setting of the degree of slowdown, while pulses length is shortened: press zero-time (no deceleration), one-time (0.3 s slow down range), twice (0.6 s), free-times (1.2 seconds), four-times (2, 5s) or five-times (5 seconds). Then press and hold button, the choice is saved and setting is moved to the next parameter.
- 4) Neutral input pulses: adjust the position in which you want to have a neutral length of the input pulses. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter.
- 5) Minimum input pulse: adjust the position in which you want to have a minimum length of input pulses. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter.
- 6) Maximum input pulses: adjust the position in which you want to have a maximum length of input pulses. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter.
- 7) Neutral output pulses: connect servo to output of the converter and set it to required neutral position. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter.
- 8) Minimum output pulses: set servo to required minimum position. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter.
- 9) Maximum output pulses: set servo to required maximum position. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter.
- 10) Output pulses replacement: set the servo to a position in which you want to have it when of signal from the receiver is lost. Then press and hold button, the current pulses are stored and setting is moved on to setting the next parameter (only if the selected mode 3 or 4).
- 11) Setting of channel 1 modulation by channel 2: press zero-time (modulation 20/10%), one-time (40/20%), twice (60/30%), free-times (80/40%) or four-times (100/50%). Note: This parameter is set only when modes V mixer or Gain are chosen. The first number in brackets is valid for V mixer, the second for Gain. Then press and hold button, the current pulses are stored and setting is finished.
- 12) Finally, disconnect the converter from the power supply and after its reconnections you can start its using.

Warranty:

- 1) The manufacturer warrants that converter will work in warranty period (24 months) without defect.
- 2) If there is a defect within the warranty period, which was not caused by customer, the product will be repaired free of charge.
- 3) Warranty service applies the user directly from the manufacturer:
BEL s.r.o., Eliasova 38, 160 00 Prague 6, Czech Republic,
phone: 00 420 222 950 345, e-mail: info@bel-shop.eu, WWW: http://www.bel-shop.eu
- 4) The warranty period is extended by the time the product was in warranty repair.
- 5) The complaint must be accompanied by a warranty card with stamp and signature of reseller and date of purchase and must include details of how the defect manifests itself, under what conditions occurred (power, load type, etc..).
- 6) Post-warranty repairs are performed by the manufacturer.

.....
purchase date

.....
stamp, signature

Double channel pulse converter K11

General description:

Pulse converter is a two-channel and it is connected between the receiver and servos in RC model. It brings eight features. It can convert input pulses to output ones so that the full range of transmitter controller movement can be fit to the range of required servo movement. Gear ratio between input and output pulses can be linear, square or square root. Converter can even merge two input signals by summing (V-Mixer) or multiplication (Gain mode). Both channels can have to set deceleration of pulses change independently in both directions up to 5 second per full range. Output signal in both channels is automatically reversed and generated on the next two outputs. In case of failure at inputs converter will begin to generate after 1 second replacement pulses.

Connection:

INPUTS: input cables of converter labeled IN1, +5V, GND and IN2, +5V, GND are plugged to the receiver outputs.

OUTPUTS: servos are connected to two three-pins labeled OUT1, +5V, GND and OUT2, +5V, GND. Reversed pulses are available on the next two free-pins labeled OUT1-R/SET2, +5V, GND/SET2 and OUT2-R/SET1, +5V, GND/SET1.

SETUP BUTTON: the button for setting the first channel is connected to pins OUT2-R/SET1 and GND/SET1, the button for setting the second channel is connected to pins OUT1-R/SET2 and GND/SET2.

Description of the functions of the converter:

1) Servorevers:

Converter reverses automatically output pulses according to the formula: reversed output pulses = 2 x neutral pulses - converted output pulses. In practice, servo connected to the reverse output rotates in the opposite direction.

Usage: This function is used to control moving the aileron servos in the model.

2) Decelerator:

Converter can reduce speed of change of output pulses to 0.3, 0.6, 1.2, 2.5 and 5 seconds per the whole range of pulses (i.e., 1 - 2 ms) or deceleration can be turned off. In practice if length of input pulse is changed fast, change of output signal can be decelerated for up to 5 seconds. The degree of deceleration of output pulses can be set up for each mode, for each channel and for each servo movement direction. Notice: Fast chase protection - big step change of input pulse length automatically caused a temporary slowdown of servo.

Usage: This function can be used gear ejection slowing.

3) Fail Safe - pulse replacement generator:

In the event that there are no input pulses longer than 1 second, converter will generate replacement pulses (reversed and non reversed), whose length can be pre-set when setting up for each mode and each channel.

Usage: generating replacement pulses can saved uncontrolled model.

4) Linear pulse conversion (Fig. 1):

Linear conversion adjusts the range of input pulses and range of required servo movement. You can also set different limits of the maximum speed of electric motor in both directions. This mode can be used as the neutral shift of output pulses due to the neutral input pulses too. Since the conversion area is divided into two sub-areas (from minimum to neutral pulses and from neutral to maximum pulses) you can choose a different rate of conversion in both sub-regions. Minimum, neutral and maximum length of input and output pulses can be chosen when setting up the converter. Usage: Linear conversion is used where controller operating range and servo movement range can be fit together.

5) Square root pulse conversion (Fig. 2):

Square root conversion is used for adapting the range of input pulses and range of required servo movement. Square root conversion causes that small change of input pulses around the neutral position generates bigger change of output pulses and in the area of the minimum or maximum pulses bigger change of input pulses generates smaller change of output pulses. Minimum, neutral and maximum length of input and output pulses can be chosen when setting up the converter. Usage: square root conversion is used for linearization of the motor thrust (it is approximately quadratically depending on the speed) depending on the deviation from the neutral.

6) Square pulse conversion (Fig. 3):

Square conversion is used for adapting the range of input pulses and range of required servo movement. Square conversion causes that big change of input pulses around the neutral position generates small change of output pulses and in the area of the minimum or maximum pulses small change of input pulses generates bigger change of output pulses. Minimum, neutral and maximum length of input and output pulses can be chosen when setting up the converter.

Usage: square conversion is used where fine control is needed in the area around the servo neutral and significant deviations in the outer positions.

7) V mixer (Fig. 4):

Pulses of the second input (usually a rudder) are added or subtracted from the pulses at the first input (usually the elevator control). The degree of modulation can be set in five levels ranging from 20 to 100 %. Pulses at the first input are passed unchanged to the two outputs when the pulses at the second input are in neutral. If the second input pulses are longer than neutral, the pulses at the first output are extended and at the second output are shortened.

Usage: The mixer is used for models with ailerons or with V shaped tail to merge control signal for elevator and rudder.

8) Gain mode (Fig. 5):

Slope between input and output pulses of the first channel is increased or decreased by signal of the second channel. The degree of modulation of the first channel by the second channel can be set in five levels ranging from 10 to 50 %. Slope of impulse conversion from the first channel to both outputs is unchanged if the pulses at the second channel are in neutral. If the second output pulses are longer than neutral, the slope of the first channel pulses is increased (servo deviation is increasing) and the slope of the second channel is decreased (servo deviation is decreasing). If the second output pulses are shorter than neutral, the slope of the first channel pulses is decreased (servo deviation is decreasing) and the slope of the second channel is increased (servo deviation is increasing). Note: Slope is the ratio between input and output pulses.

Usage: gain mode can be used for cars or boats, where the maximum servo deviation can be depended on the speed of a model (the higher speed cause smaller servo deviation).

Specification:

Number of inputs:	two.
Number of outputs:	two normal + two reversed.
Supply voltage:	3.5 to 5.5 V.
Length of input and output pulses:	1 to 2 ms (input and output pulse limits can be changed by setting).
Period input pulses:	10 to 50 ms.
Period of output pulses:	20 ms.
Amplitude of input pulses:	at least 3.5 V.
Amplitude of output pulses:	same as supply voltage.
Delay between the loss and generation of pulses:	1 sec.
Dimensions:	25 x 15 x 5 mm.
Weight:	7 g
Servo cables length:	25 cm.

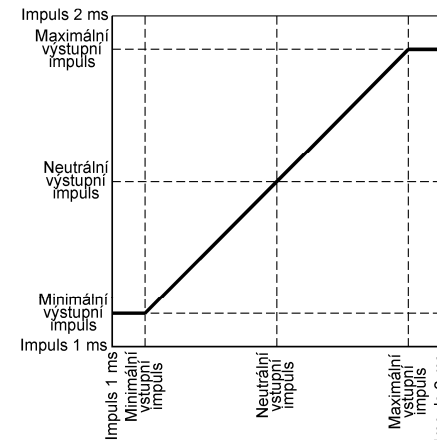


Fig. 1: Linear conversion

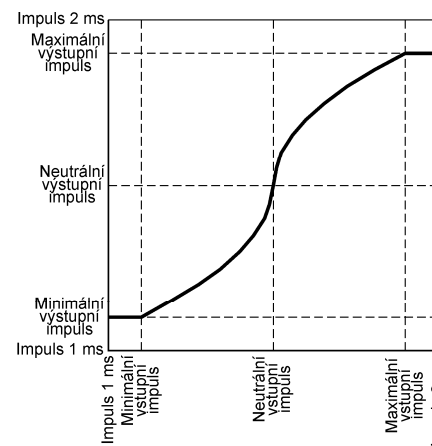


Fig. 2: Square root conversion

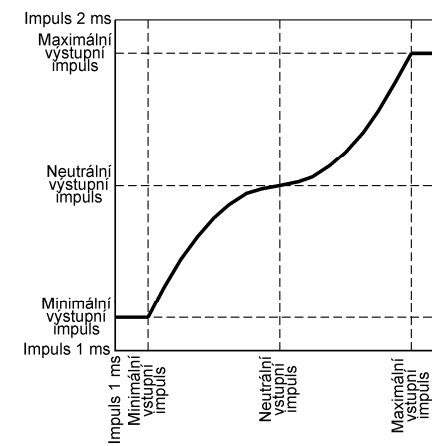


Fig. 3: Square conversion

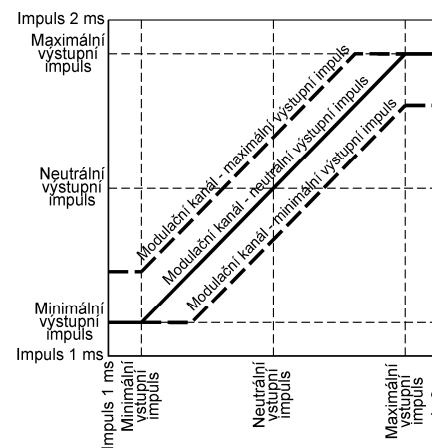


Fig. 4: V mixer

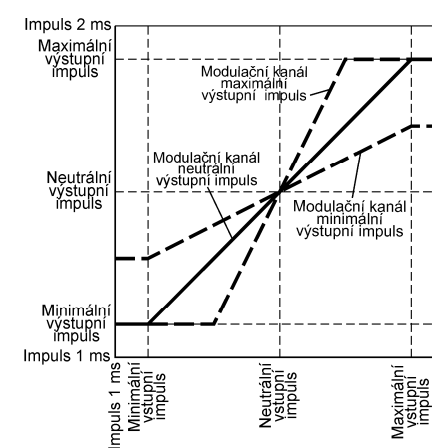


Fig. 5: Gain mode