

Double channel pulse converter K12

Neutral input pulses: press the button three-times short and one-time long to choose neutral input pulses setting. Then adjust the position in which you want to have a neutral length of the input pulses. Then press and hold the button long, the current pulses are saved and setting is returned at the beginning.

Minimal input pulse: press the button four-times short and one-time long to choose minimal input pulses setting. Then adjust the position in which you want to have a minimal length of input pulses. Then press and hold the button long, the current pulses are saved and setting is returned at the beginning.

Maximal input pulses press the button five-times short and one-time long to choose maximal input pulses setting. Then adjust the position in which you want to have a maximal length of input pulses. Then press and hold the button, the current pulses are saved and setting is returned at the beginning.

Neutral output pulses (servo position): press the button six-times short and one-time long to choose neutral output pulses setting. Then connect servo to output of the converter and set it to required neutral position. Then press and hold the button, the current pulses are saved and setting is returned at the beginning.

Minimal output pulses (servo position): press the button seven-times short and one-time long to choose minimal output pulses setting. Then set servo to required minimal position. Then press and hold button, the current pulses are saved and setting is returned at the beginning.

Maximal output pulses (servo position): press the button eight-times short and one-time long to choose maximal output pulses setting. Then set servo to required maximal position. Then press and hold the button, the current pulses are saved and setting is returned at the beginning.

Output pulses (servo position) replacement: press the button nine-times short and one-time long to choose output pulses replacement setting. Then set the servo to a position in which you want to have it when signal from the receiver is lost. Then press and hold button, the current pulses are saved and setting is returned at the beginning.

Setting of channel 1 modulation by channel 2: press the button ten-times short and one-time long to choose channel 1 modulation by channel 2 setting. Then press the button short 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 choice is saved and setting is returned at the beginning.

Factory setting: press the button 14-times short and one-time long to reset all settings to: input and output pulses 1.15 ms, 1.5 ms, 1.85 ms, V mixer 100 %, gain mode 50 %. Then press and hold the button and setting is returned at the beginning.

Notice: saved length of pulses must be $t_{\text{minimal}} < t_{\text{neutral}} < t_{\text{maximal}}$, otherwise converter will not work correctly.

General description:

Pulse converter K12 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 transform 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:

Convertor 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.

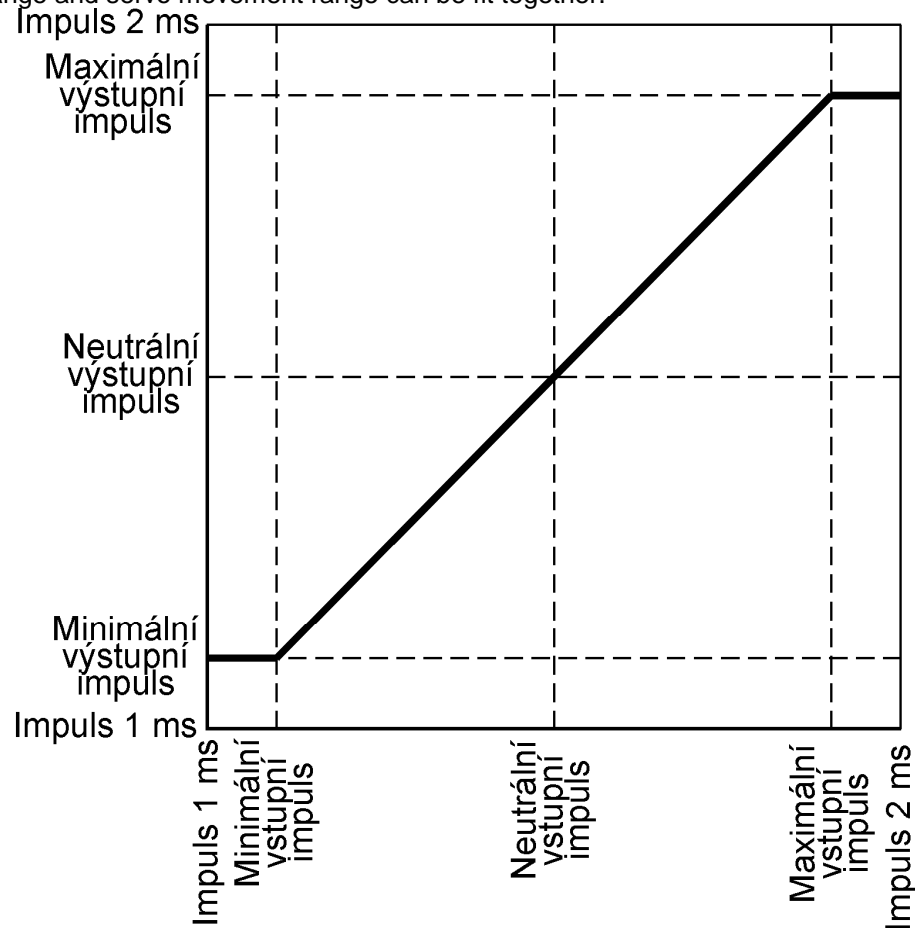
3) Fail Safe - pulse replacement generator:

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:

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.



Specification:

Number of inputs:	two.
Number of outputs:	two normal + two reversed.
Supply voltage:	4 to 6 V.
Length of input and output pulses:	1 to 2 ms
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

Setting of the converter:

The converter can save in memory 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 chosen if setup button is pressed when converter is just connected to the power supply. Setup button must be connected to the input pins 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, data storing converter makes after long (over 2 seconds) pressing the button. Data storing is indicated by short servo shaking. Every parameter can be set individually, first choose type of parameter and then set it. 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:

Setting the operation mode: press the button one-time long to choose operating mode setting. Then press short the button 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 button long, the choice is saved and setting is returned at the beginning. 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.

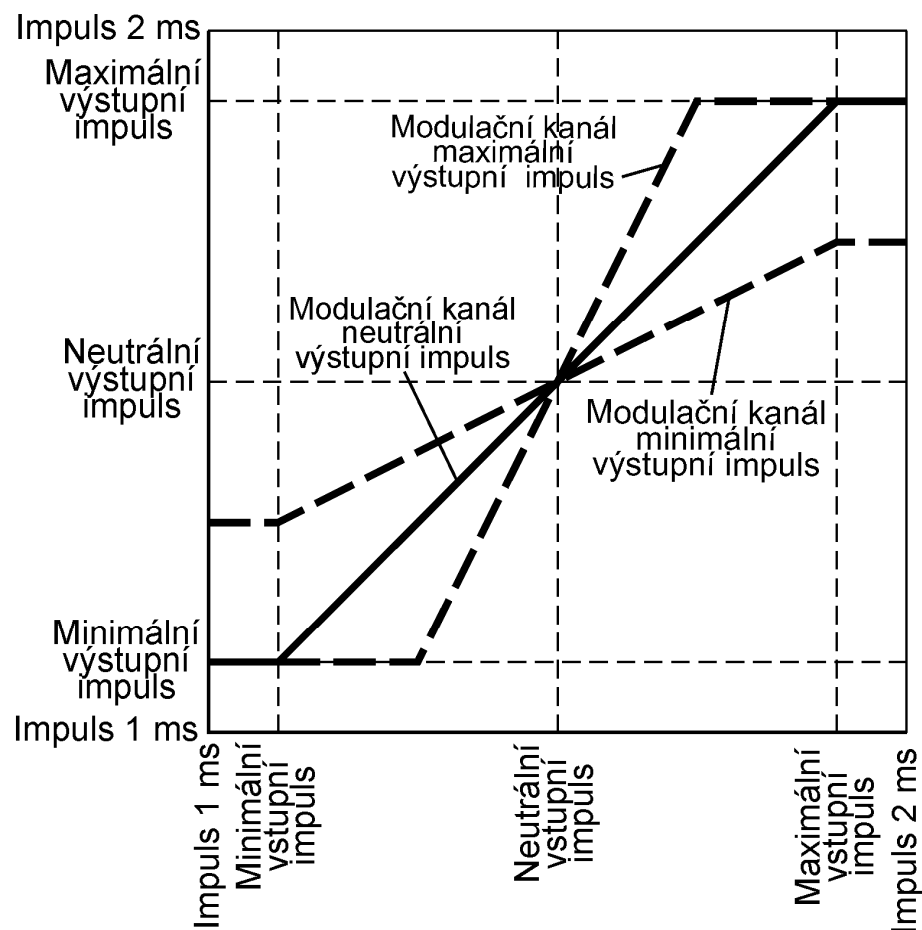
Setting of degree of deceleration, when pulses length is lengthened: press the button one-time short and one-time long to choose degree of deceleration, when pulses length is lengthened, setting. Then press the button short zero-time (no deceleration), one-time (0.3 s slow down range), twice (0.6 s), free-times (1.2 s), four-times (2.5 s) or five-times (5 seconds). Then press the button long, the choice is saved and setting is returned at the beginning.

Setting of degree of deceleration, when pulses length is shortened: press the button twice short and one-time long to choose degree of deceleration, when pulses length is shortened setting. Then press the button short zero-time (no deceleration), one-time (0.3 s slow down range), twice (0.6 s), free-times (1.2 s), four-times (2.5 s) or five-times (5 seconds). Then press and hold the button long, the choice is saved and setting is returned at the beginning.

8) Gain mode:

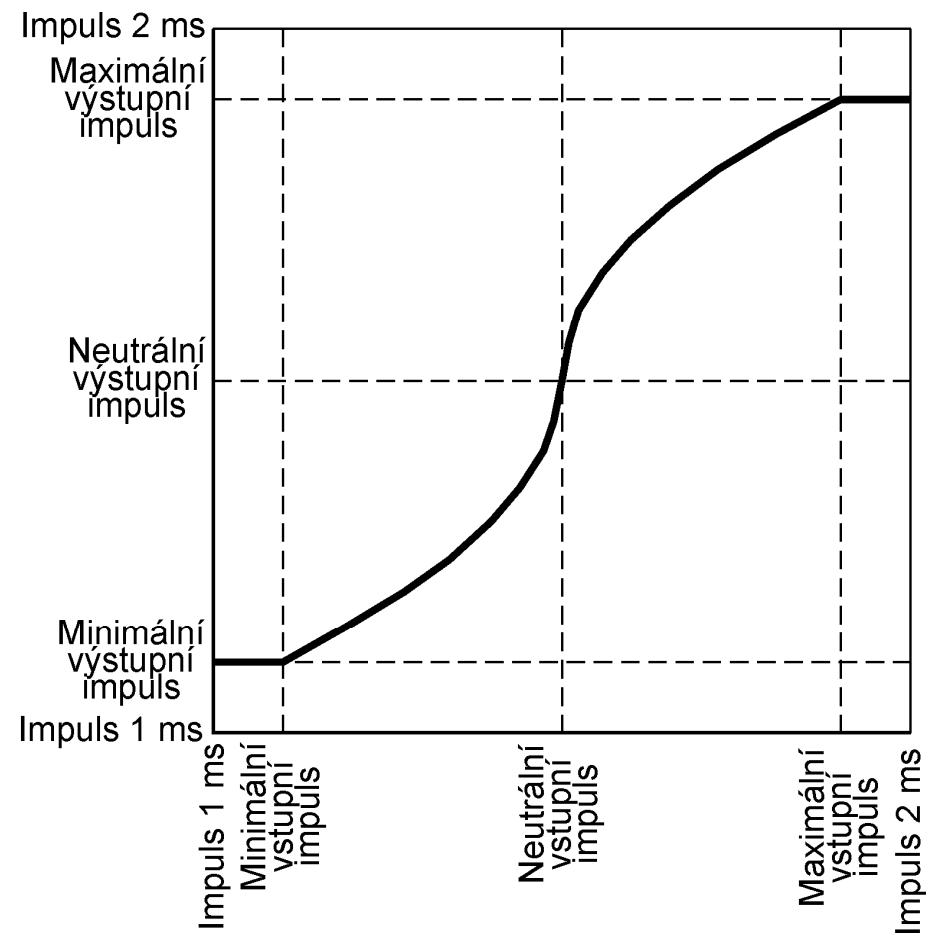
Slope between input and output pulses of the first channel is increased or decreased by signal of the second channel. The degree of modulation of the first channel by the second channel can be set in five levels ranging from 10 to 50 %. Slope of impulse conversion from the first channel to both outputs 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).



5) Square root pulse conversion:

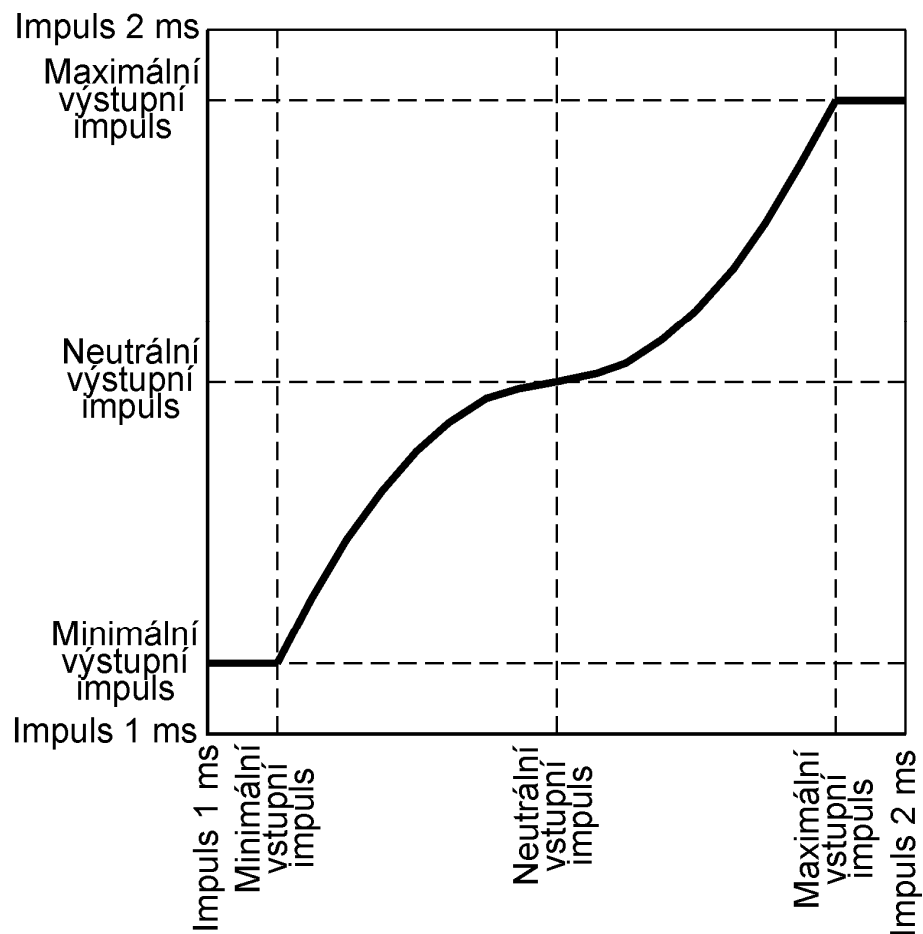
Square root conversion is used for adapting the range of input pulses and range of required servo movement. Square root conversion causes that small change of input pulses around the neutral position generates bigger change of output pulses and in the area of the minimum or maximum pulses bigger change 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 quadratic depending on the speed) depending on the deviation from the neutral.



6) Square pulse conversion:

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:

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.

