

# small size, Adjustable output voltage type high voltage power supply 0.2W Mid-high voltage DC-DC converter Bellnix® **0V to 100V, 0V to 200V BYH Series**

The BYH series is an ultra small type mid-high voltage DC-DC converter which has stored 0 to 100V and 0 to 200V in a 24pin-IC. Using the latest SMT (surface mount technology), the high voltage technology is now 1/3 to 1/4 of the original product.

## ■ Features

- Achieved 24pin-IC size
- Output voltage 0 to 100V and 0 to 200V
- Output capacity 0.2W
- Over current protection
- Worlds ultra small size, device achieved
- Low cost
- 5 sided metallic shield
- Low ripple noise of 10mVp-p
- Bar in tests 100% conducted
- Adjustable voltage with external voltage
- Isolation withhold between P-S, DC250V
- High reliability and long life



## ■ Model/rating

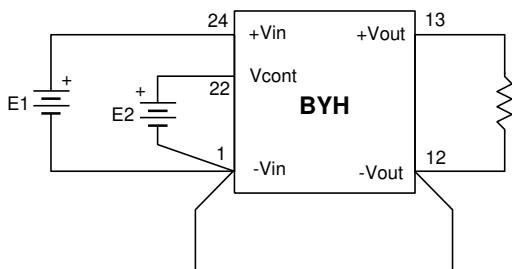
BYH series	Input voltage (Vdc)	Output voltage (Vdc)	Adjustable output voltage (Vdc) (note 1)	Output current (mA)	Output capacity (W)	Input current (mA) typ	Ripple noise (mVp-p) typ	Case
<b>BYH05-100S02</b>	4.75~5.25	100 ± 4%	0 ~ 100	0 ~ 2	0.2	90	10	Y
<b>BYH12-100S02</b>	11.0~16.0	100 ± 4%	0 ~ 100	0 ~ 2	0.2	34	10	Y
<b>BYH05-200S01</b>	4.75~5.25	200 ± 4%	0 ~ 200	0 ~ 1	0.2	98	10	Y
<b>BYH12-200S01</b>	11.0~16.0	200 ± 4%	0 ~ 200	0 ~ 1	0.2	41	10	Y

## ■ Specifications

Input fluctuation	0.3% typ.(Input voltage:+4.75V~+5.25V or to fluctuation +11.0V~+16.0V)
Load fluctuation	8% typ.(Load current fluctuation from 0%~100%)
Temp fluctuation	±0.5% typ.(Temp. fluctuation from -10°C~+50°C.)
Over current protection	Droop type characteristic, auto restart circuit activates at 105% or more
Output voltage accuracy	Below ±4%(Rated output, rated load, and the Vcont 3.0V or 10.0V)
Output voltage control (1)	BYH05 series : External voltage controlled with 0V~+3V
Output voltage control (2)	BYH12 series : External voltage controlled with 0V~+10V
Usage temp range	-10°C~+60°C(Temp derating required for 50°C and higher)
Storage temp range	-25°C~+85°C
Usage humidity range	20%~95%RH( no dewing)
Isolation withhold	Between primary and secondary DC250V 1 min. (continuous withhold : DC250V)
Isolation resistance	Between primary and secondary also between case DC500V 100MΩ min.
Floating output	Floating output until voltage DC250V. Therefore either the minus or plus can be in contact.
MTBF anticipated value	1,400,000H min.(Calculated using the Bellnix MTBF calculation graph)

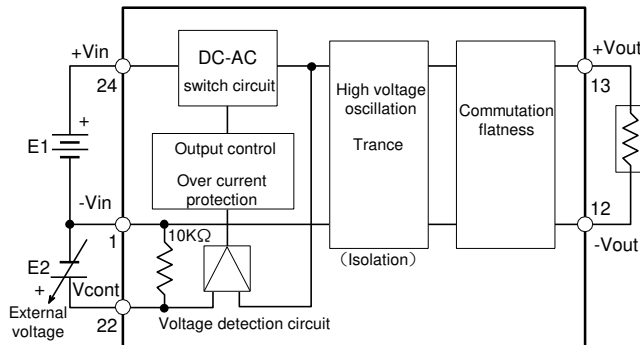
Note 1: The output voltage is controlled by the Vcont voltage being impressed. Connect an external voltage to impress to the the Vcont pin to control the output voltage. When Vcont voltage =0V, the output voltage (output residual voltage) must be within 0.5% of the max output voltage (when input/output is rated)

## ■ Test circuit

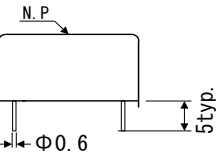
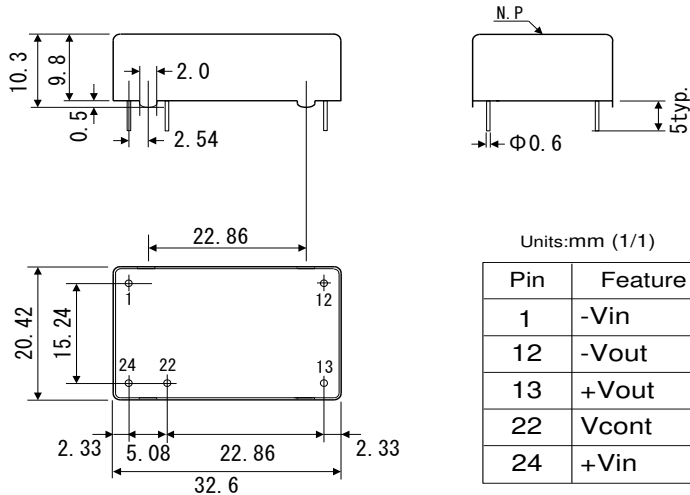


BYH05 series : E1=4.75V~5.25V, E2=0V~3V  
BYH12 series : E1=11.0V~16.0V, E2=0V~10V

## ■ Block diagram



■ Model/Dimensions/Pin Configuration (Y case)



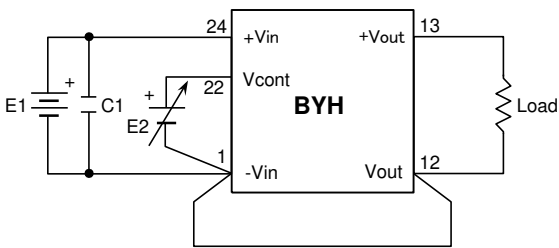
Units:mm (1/1)

Pin	Feature
1	-Vin
12	-Vout
13	+Vout
22	Vcont
24	+Vin

Weight : 14g typ.

Units : mm

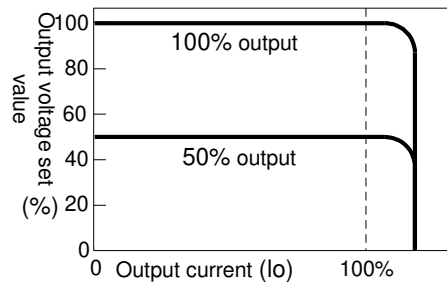
■ Standard usage



The BYH series does not need any external parts, however the longer the power supply and converter distance is, and thinner the input line is to the input filter, the higher the impedance will be, and connected a capacitor to C1 is recommended. As long as the capacitor is connected, the design should be the converter's side lead inductance is lowered.

■ Over current protection

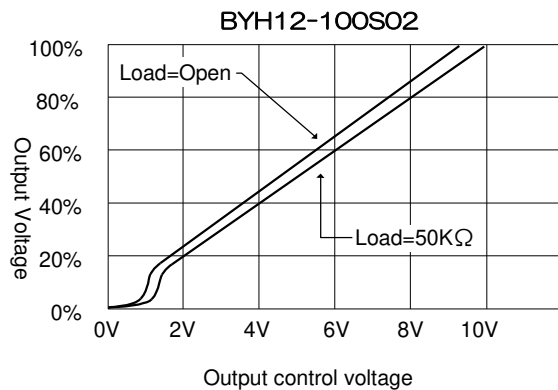
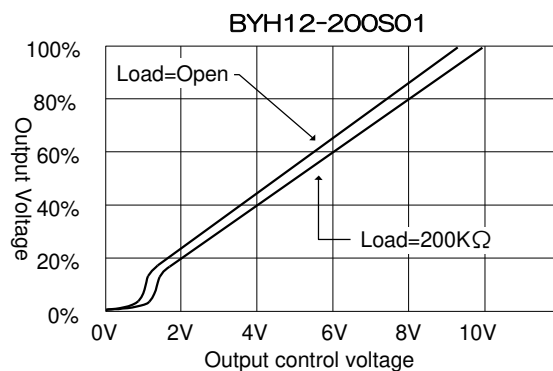
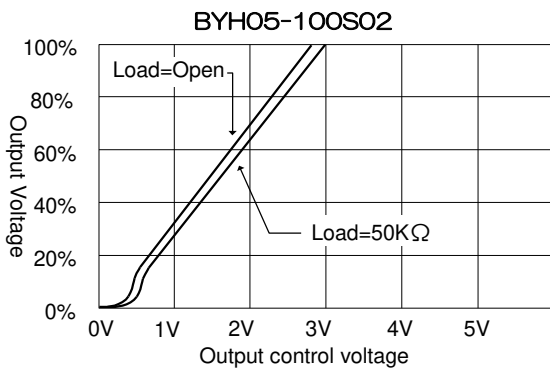
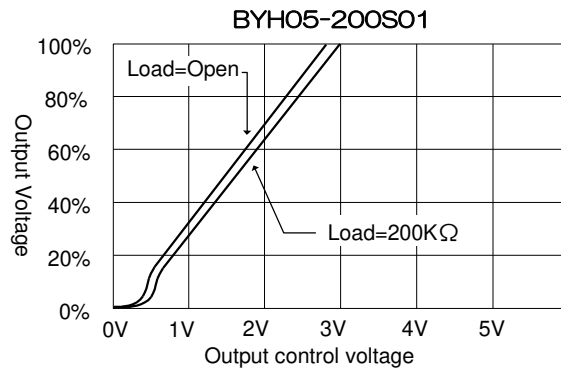
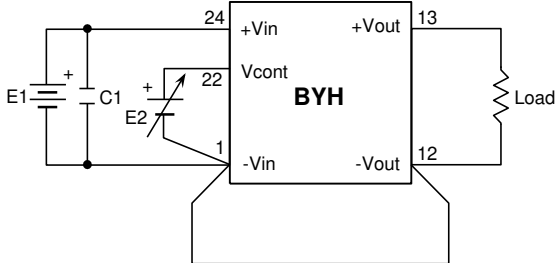
The BYH series has an over current protection to protect against over load and load shortage. When over load or load shortage occurs, if the output voltage is lowered an activated, and the reason has been removed, the output will auto recover.



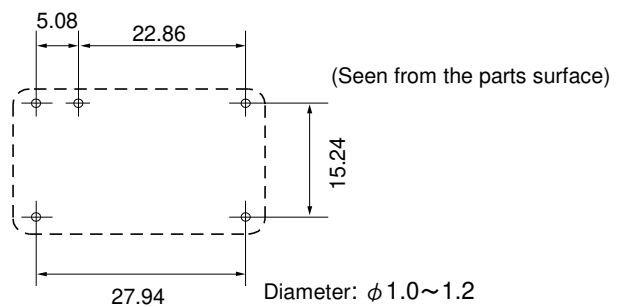
Over current protection characteristic

## ■ Setting output voltage/adjusting information

The BYH series output voltage can be adjusted using an external voltage.



## ■ Recommended pattern

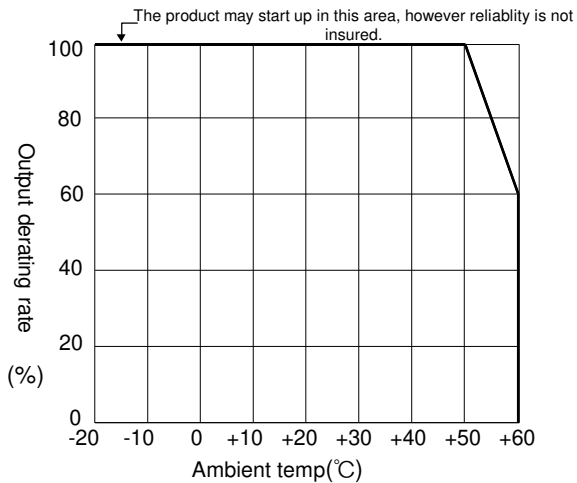


- The voltage impressed on Vcont should not exceed (Vcont+11%)
- Connect the external control voltage common to the -Vin (1pin).
- The fluctuation rate and ripple noise of Vcont pin will be determined by the output.

- 1) The BYH series uses a metallic case. When using a double mounting PCB, the wiring to the converter should be done on the soldering surface. Also, this converter will have a high voltage so make sure to create enough creepage distance.
- 2) When using a double mounting PCB, make the high voltage output pin's surface as small as possible.
- 3) The metallic case does not need to be in contact with anything else. However, if you would like to bring the metallic case into contact, it should be used to lower the anti ground impedance.

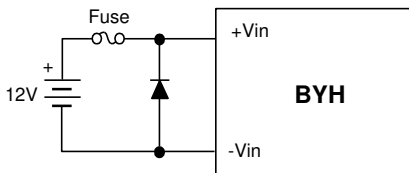
## Temp derating

When using the product where the ambient temp is higher than 50°C, follow the derating graph below. Increase the load resistor as the temp increases.



## Preventing inverse connections

The converter may break if the polarities are reversed. If there is a possibility in which the connections maybe reversed, connect a diode and fuse like below.



## Recommended solder conditions

Soldering conditions for each part is as follows:

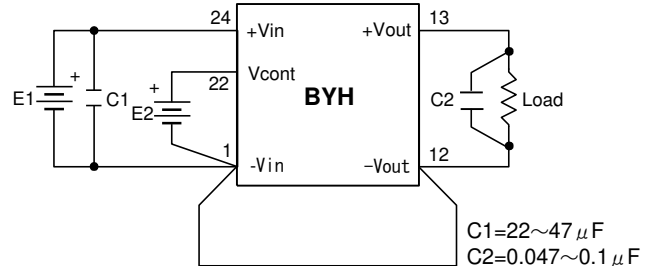
- |                           |           |         |
|---------------------------|-----------|---------|
| 1) Using a soldering iron | 340~360°C | 5 sec.  |
| 2) Using a soldering tub  | 230~260°C | 10 sec. |

## About washing the product

This product can not be washed as a whole. However, when there is a need to wash the product, use an IPA to wash only the soldered surface with a hand brush.

## When lowering the output noise even more

The BYH series does need any external parts, however to lower the output noise even farther, connect a capacitor C2 like the figure below.



When lowering the output noise even more, keep in mind the input/output wiring, creepage and area distance, while keeping the wiring as thin as possible and the C2 near the Load in the layout.

## Points!

- 1) When choosing a capacitor, choose one which is a high frequency characteristic capacitor.
- 2) Earth (COMMON) line should be bundled and kept small while the wiring pattern is thick and short.
- 3) The capacitor which is connected to the output side should be able to withstand the pressure, and connected to the load side. At this time, the capacitor lead should be shortened. Also, when the load response time is a problem, please be aware of the time constant.