



BOOST + H BRIDGE CONVERTER MODULE WITH CONTROLLER COMMUNICATION

3-phase 0–415 V input · 3-leg IGBT stage · Arduino RS485 control · 20×4 LCD monitoring



Front view of the BHB-900 module

What is this product?

Industrial-grade converter for high-voltage DC conversion and inverter control. A 3-leg IGBT boost stage feeds an H-Bridge output, with real-time 20×4 LCD monitoring and Arduino-based communication control. Built for R&D, testing and industrial power applications.

In simple words: the module takes 3-phase AC power, changes it into DC, raises (boosts) the DC voltage up to 900 V, and then switches it through an H-Bridge to the output. You control it with a knob and two switches, and you see the readings on the LCD screen.

Features

- 3-phase 0–415 V AC input for high-voltage conversion
- Adjustable boost stage up to 900 VDC
- 20×4 LCD for live voltage, PWM and status
- 0–5 V PWM potentiometer for precise boost control
- Independent ON/OFF switches for Boost and H-Bridge
- Arduino UNO card for control and data, with RST button

What's inside — main parts

Part	Job in simple words
3-phase diode bridge (rectifier)	Changes the 3-phase AC input into DC.
Capacitor bank (DC bus)	Stores and smooths the DC voltage, 0–750 VDC.
3-leg IGBT stage (SEMIKRON SKM100GB12T4)	Fast power switches for the boost stage and the H-Bridge output.
Arduino UNO card	The brain: controls the PWM and communicates via RS485.
20×4 LCD (JHD204A)	Shows live voltage, PWM and status.
Integrated fan	Keeps the power parts cool.
Protection	OVP / OCP / OTP / short-circuit.

0–415 V

AC input, 50/60 Hz

0–750 V

Adjustable DC bus

900 V

Max boost output

1 year

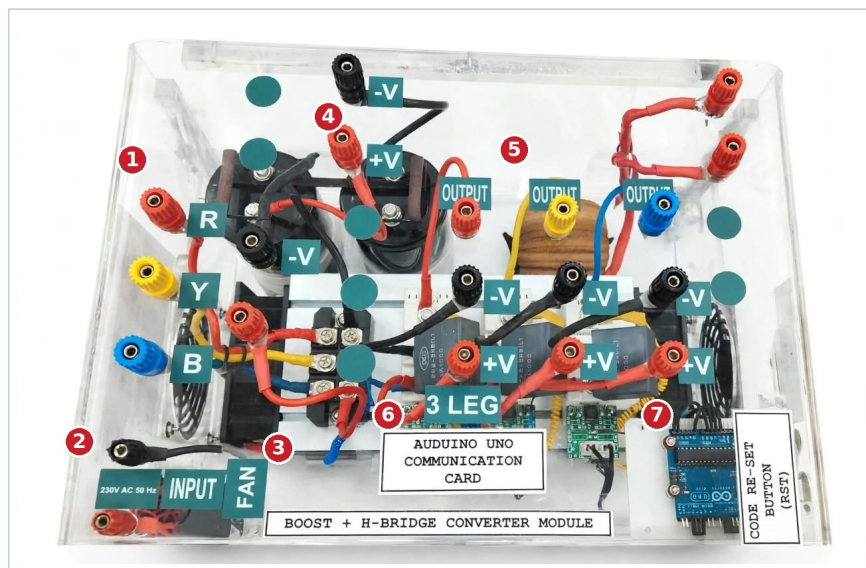
Warranty

Key specifications

Parameter	Value
Input	3-phase AC, 0–415 V, 50/60 Hz
DC bus output	0–750 VDC, adjustable
Max boost output	900 VDC
Topology	3-leg IGBT converter + H-Bridge
Display	20×4 LCD, green backlight
Control	0–5 V PWM pot, Boost and H-Bridge PWM ON/OFF
Communication	Arduino UNO card via RS485
Interface	Window-changing push button, RST button
Protection	OVP / OCP / OTP / short-circuit
Cooling	Integrated input fan
Enclosure	Transparent polycarbonate case
Warranty	1 year



Step 1 — Know the terminals (top view)



Each red number matches a row in the table below

Terminal colour guide

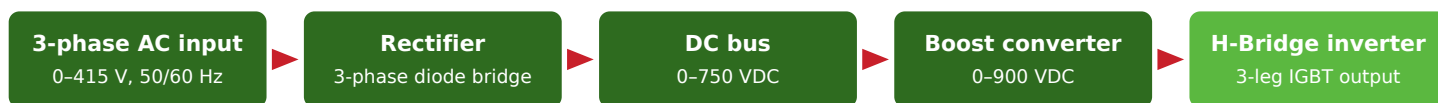
Colour	Used for
Red	R phase input, +V of DC bus and IGBT legs, output
Yellow	Y phase input, output
Blue	B phase input, output
Black	–V of DC bus and IGBT legs, 230 V input

Connection checklist

- 1 Power OFF** — connect only with all supplies off.
- 2 Match colours** — R, Y, B to matching terminals.
- 3 Polarity** — +V to +V, –V to –V.
- 4 Tight** — push every plug fully in.

No.	Terminal	What it is	What you do with it
1	R / Y / B terminals	3-phase AC input, 0–415 V, 50/60 Hz	Connect the 3-phase supply here (R, Y, B).
2	230 V AC input	Single-phase input terminals, 50 Hz	Connect the 230 V single-phase supply here.
3	Fan terminal	Integrated cooling fan supply	Supplies the cooling fan.
4	DC bus +V / –V	Capacitor bank, 0–750 VDC adjustable	Measure the DC bus voltage here. High voltage — do not touch.
5	Output terminals	Converter output connections	Connect your load or test circuit here.
6	3-leg IGBT section	+V / –V terminals of each leg	Test points of each IGBT leg for study and measurement.
7	Arduino UNO card	RS485 communication and code re-set button (RST)	Control card; press RST to restart the program.

Step 2 — How it works (power flow)



- 1 AC input** — 3-phase AC power (0–415 V, 50/60 Hz) enters through the R, Y and B terminals.
- 2 Rectifier** — a 3-phase diode bridge changes the AC into DC.
- 3 DC bus** — a capacitor bank stores the DC and keeps it smooth (0–750 VDC, adjustable).
- 4 Boost converter** — the IGBT switches on and off very fast (PWM) to raise the DC voltage, up to 900 VDC. The PWM pot sets how much it is raised.
- 5 H-Bridge inverter** — IGBTs switch the boosted DC and send it to the output terminals.

Step 3 — Front panel controls

Control	What it does	Control	What it does
Window push button (P/B)	Cycles the LCD windows (pages)	Variable PWM pot	0–5 V boost PWM command — turn to raise or lower the boost
Boost PWM switch (SW)S	Boost PWM ON/OFF	H-Bridge PWM switch (SW)	H-Bridge PWM ON/OFF
20×4 LCD	Shows live voltage, PWM and status	RST button	Arduino code re-set (restart)



Step 4 — How to operate (general guide)

- 1 Prepare** — keep both PWM switches OFF and the PWM pot at minimum.
- 2 Connect** — connect the load to the output terminals and the 230 V AC supply.
- 3 Apply input** — connect the 3-phase supply to R / Y / B and raise it slowly from 0 V.
- 4 Check display** — read the LCD; press the window button to see other pages.
- 5 Boost ON** — switch ON Boost PWM and turn the pot slowly while watching the LCD.
- 6 H-Bridge ON** — switch ON H-Bridge PWM to send power to the output.
- 7 Switch OFF** — H-Bridge OFF, pot to minimum, Boost OFF, then remove the input supply.
- 8 Restart** — if the display or control stops responding, press RST.

SAFETY

Up to 900 VDC can be present on the DC bus, IGBT and output terminals. The capacitors stay charged after power-off — wait, and check with a meter that the DC bus is near 0 V before touching any terminal. For use by trained persons only.

Simple words to know

Word	Meaning
IGBT	Power switch that turns high voltage and current on and off very fast.
PWM	Fast on-off switching; longer ON time gives more output.
DC bus	DC voltage stored in the capacitor bank.
Boost	Circuit that raises a DC voltage to a higher DC voltage.
H-Bridge	Four switches arranged like the letter H.
RS485	Wired communication link of the Arduino card.

Applications

- Motor drive development
- Renewable energy testing
- Battery and EV charging
- Power electronics research
- Industrial automation

Quick answers

Question	Answer
See other readings?	Press the window button (P/B).
Run Boost and H-Bridge separately?	Yes, each has its own ON/OFF switch.
Display stopped?	Press RST to restart.

Core components



Arduino UNO R3

ATmega328P communication card

Voltage	5 V operating, 7-12 V recommended input
I/O	14 digital, 6 PWM, 6 analog
Clock / memory	16 MHz · 32 KB flash · 2 KB SRAM · 1 KB EEPROM
Interfaces	UART, SPI, I ² C, USB Type B (RS485 for BHB-900)



SEMIKRON SKM100GB12T4

Dual IGBT half-bridge module, Trench4, SEMITRANS2

Vces	1200 V
Ic	100 A at Tc 25 °C · 75 A at Tc 80 °C
Vcesat	1.7 V typ (Ic 100 A, Tj 25 °C)
Switching energy	Eon 7.5 mJ · Eoff 8.0 mJ typ (600 V, 100 A)
Isolation	4000 V AC, 1 min, 50 Hz
Tj / mounting	−40 to +175 °C · M5 screws, 3.0 Nm



JHD204A LCD module

20×4 character display, HD44780 compatible

Type	STN, yellow-green backlight
Interface	4/8-bit parallel, 5 V DC
Temp. range	−20 to +70 °C
Size / weight	98 × 60 × 14 mm · 50 g
Compliance	RoHS, lead-free