

Draft - Isolated 0-10V to 12V-24V DC Power Converter

Industrial-grade isolated analog-to-power converter that translates a standard 0–10V DC control signal into a proportional, high-current 12V to 24V DC power output (up to 3A). It provides 1kV RMS galvanic isolation to eliminate ground loops between control PLCs and high-draw industrial actuators, proportional valves, blowers, and DC motors.



Key Features

- 0–10V analog input to 12V–24V DC power output scaling
- Up to 3.0A continuous load current (72W peak output at 24V DC)
- 1.0 kV RMS galvanic isolation between control input and power output
- Wide 28V to 60V DC field power supply input
- High efficiency 150 kHz buck switching regulator with closed-loop control
- Cycle-by-cycle over-current limiting, thermal shutdown, and TVS protection
- Isolates PLC analog cards from high-current actuator noise
- Compact 35 mm DIN rail mountable enclosure
- Dimensions: 110 mm × 74 mm × 22 mm

Ordering Information

Product Code	Description
APC-10V-1224	Isolated 0-10V to 12V-24V DC Power Converter (Max 3A @ 48V DC Input)
AC-420-420	Signal Isolator 4-20mA to 4-20mA Current Loop Isolator
USS10V24V-D	Voltage Source Simulator 0-10V (Digital Display)
USS20M24V-D	Current Source Simulator 0/4 to 20mA (Digital Display)
SPD-24V-DC	24V DC Power Line Surge Protection Device (DIN Rail)

Applications

- **Proportional Valves & Actuators:** Drives 24V DC proportional hydraulic and pneumatic valves requiring a non-zero minimum bias (12V) and full-scale control (24V).
- **Industrial DC Fan & Blower Speed Control:** Provides smooth speed modulation for 24V DC industrial fans with 12V low-speed continuous ventilation.
- **Brushed DC Motor Speed Regulation:** Translates 0–10V PLC analog velocity commands to a regulated 12V–24V armature power supply.
- **Heating Element & Thermal Modulation:** Delivers controlled DC power to resistive heaters based on 0–10V PID control loops.
- **High-Current Coil & Positioner Driving:** Safely bridges low-power PLC analog output modules with high-current field coils without external power amplifier stages.

Specifications

Parameter	Value
Mounting Type	35 mm DIN Rail Mounting
Dimensions	110 mm x 74 mm x 22 mm (L x W x H)
Enclosure Material	Industrial ABS plastic (Flame-retardant)
Operating Temperature	–10 °C to +60 °C (Derate load current above 50 °C)
Storage Temperature	–40 °C to +85 °C
Relative Humidity	5% to 95% RH (non-condensing)

Electrical Specifications

Parameter	Specification
Main Power Supply (V_{SUPPLY})	48V DC Nominal (Accepts 28V to 60V DC)
Quiescent Current Consumption	< 35 mA @ 48V DC (No output load)
Power Conversion Topology	Step-Down Switching Regulator + Op-Amp Control
Switching Frequency	150 kHz (Fixed)
Galvanic Isolation Voltage	1,000 V RMS (1 minute duration, Input to Power/ Output domain)
Reverse Polarity Protection	Integrated series diode protection on 48V supply terminals

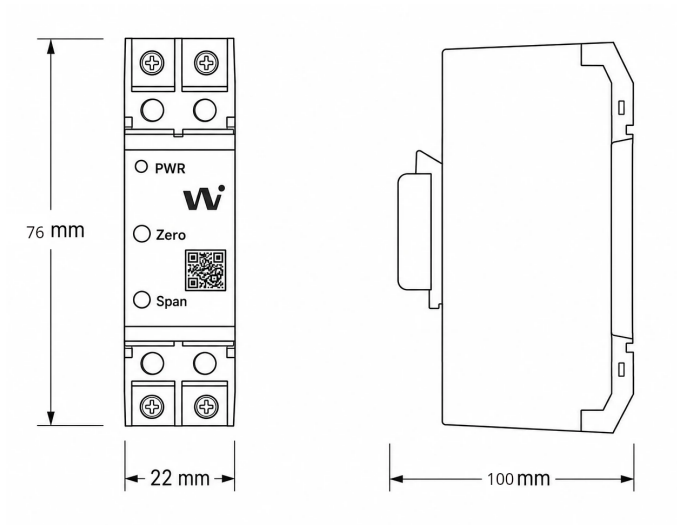
Input/Output Specifications

Parameter	Specification
Control Input Voltage (V_{IN})	0.0 V to 10.0 V DC (Standard industrial analog range)
Input Impedance	> 100 k Ω (Input current < 0.1 mA from controller)
Maximum Input Voltage Rating	± 30 V DC continuous without damage
Regulated Output Voltage (V_{OUT})	12.0 V to 24.0 V DC
Transfer Function	$V_{OUT} = 12.0\text{ V} + (1.20 \times V_{IN})$
Maximum Peak Output Current	3.0 Amps
Maximum Continuous Output Current	1.5 ~ 2.0 Amps
Maximum Continuous Output Power	48 Watts (24V @ 3A)
Voltage Scaling Accuracy	< $\pm 0.5\%$ of Full Scale @ 25 $^{\circ}\text{C}$ ambient
Linearity Error	< $\pm 0.3\%$ of Full Scale across entire 12V–24V span
Temperature Coefficient	< 100 ppm / $^{\circ}\text{C}$
Output Voltage Ripple & Noise	< 100 mVp-p (at 150 kHz switching frequency, full load)
Step Response Time	< 25 ms (10% to 90% output step)

Isolation & Protection Specifications

Parameter	Value	Standard / Notes
Galvanic Isolation	1,000 V RMS	Optical barrier between 0–10V control input and 48V/24V power domain
Thermal Protection	Integrated	Automatic thermal shutdown ($T_J > 150\text{ }^{\circ}\text{C}$) with auto-recovery
Supply Reverse Polarity	Integrated	Series protection diode on 48V power supply terminals
Transient Voltage Clamping	600W TVS	High-surge TVS diodes across power supply and analog input lines
ESD Immunity	± 15 kV Air / ± 8 kV Contact	IEC 61000-4-2 Level 4 industrial immunity

Mechanical Dimensions



Terminal Details & Port Pinouts

Terminal Connections

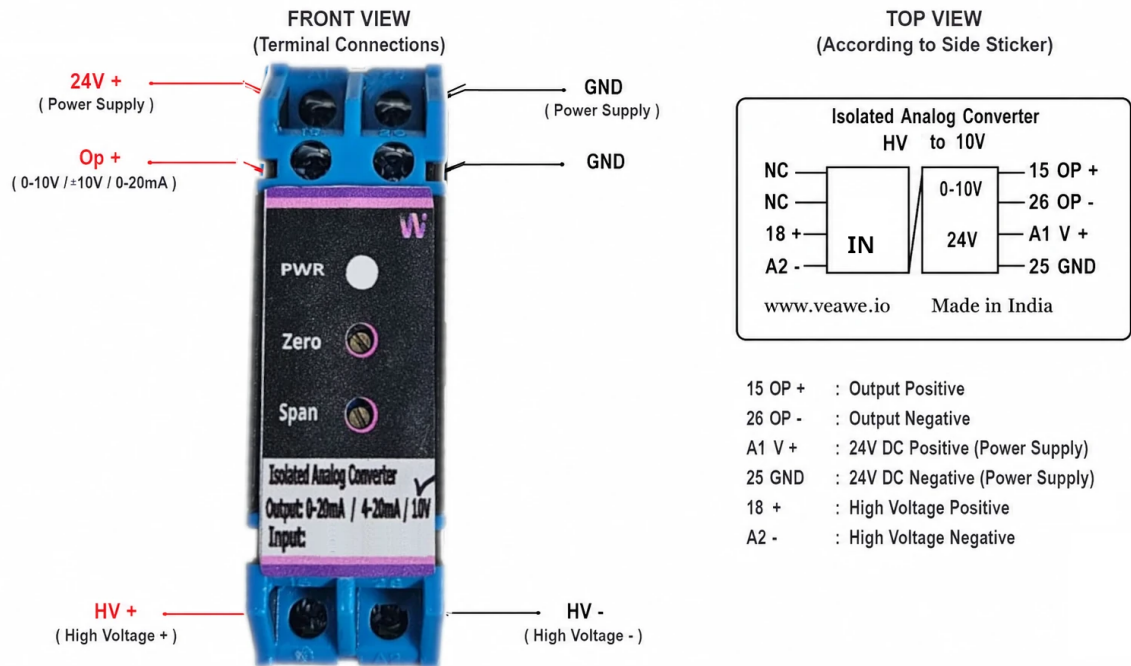
Terminal Block	Pin	Label	Signal	Description
Control Input	1	IN+	0–10V (+)	Analog Voltage Control Input (+)
	2	IN-	GND	Control Input Ground Return (-)
Power Input	3	VIN+	+48V DC	Auxiliary DC Field Supply Input (28V to 60V DC)
	4	VIN-	0V	Power Supply Ground Return
Power Output	5	VOUT+	+12~24V	Regulated DC Power Output (+)
	6	VOUT-	0V	Regulated Output Ground Return (-)

LED Indications and Diagnostics

LED	Color	Status	Description
PWR	Green	ON	Field power input connected and regulated output active

Wiring Diagrams

Note: All images and connection diagrams shown are for illustrative purposes only and may differ from the actual product.



Revision History

Revision	Date	Description of Change
Rev 1.0	2026-09-09	Initial datasheet release

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Support

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