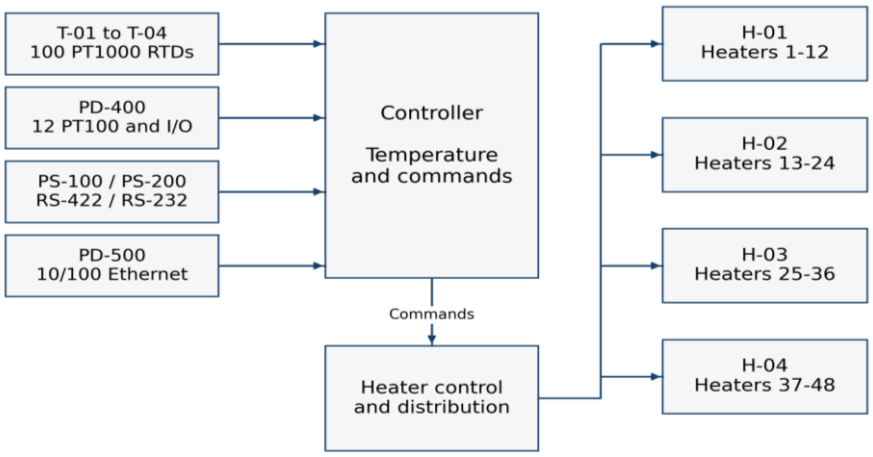
High-Power Thermal Control Unit

DESCRIPTION

The High-Power TCU provides programmable thermal control with 48 heater outputs and 112 RTD inputs. Channels 1-100 use PT1000 and channels 101-112 use PT100. Ethernet 10/100, primary and redundant RS422, and RS232 provide command and telemetry.

Function	Configuration
Thermal control	48 outputs; four banks of 12
Output current	7 A maximum on-state; 50 A per bank
Rated power	5 kW at 50 V with approved 100 A intake
Temperature inputs	100 PT1000 and 12 PT100; -100 to +150 deg C
Input range	12-50 V DC
Mass and envelope	Approximately 1.8 kg; 240 x 160 x 47 mm



High Power TCU functional interfaces.

Heater power is remote load power, not electronics consumption. All channel, bank, feed and whole-unit limits apply simultaneously.

ELECTRICAL POWER AND HEATER CONNECTIONS

The product is rated 5 kW only at 50 V with the high-current mating option. Total intake shall never exceed 100 A, or 50 A with the default mating cables. Reducing input voltage does not increase the permitted current: 25 V and 200 A is prohibited. At 25 V the input power ceiling is 2.5 kW with high-current mates, or 1.25 kW with default mates. Electronics and distribution losses are included within these ceilings.

Each heater output is limited to 7 A on-state. Each 12-channel bank is limited to 50 A, and the complete unit remains subject to the selected 100 A or 50 A intake limit. Low duty cycle does not permit an on-state current above these limits.

Interface	Unit connector	Mate / contact
H-01 to H-04	280-029S3S25MEPA	280-018P3S25MEGL
P-HP-A / P-HP-B	280-056P1-2P2MEGPA	280-047S1-2W2MEL
Default removable power contact	Not a unit-side item	850-057-0812

For 50 A per power pin, contact Glenair directly and specify factory non-removable contacts and the approved cable termination. There is no separate ordering code specified here. The default mating cable is rated 25 A per power pin.

Connection	Allocation
Heater connectors	Pins 1-12 outputs in order; 13 NC; 14-25 GND return
Power inputs	A2 positive; A1 return
Input harness	AWG #8 positive and return, approved termination
Heater harness	AWG #20 feed and return
Signal harness	Supplied mate leads, AWG #24 to #28

Wire gauge alone does not establish installed ampacity. Verify contact option, current sharing, temperature, bundling and mission derating.

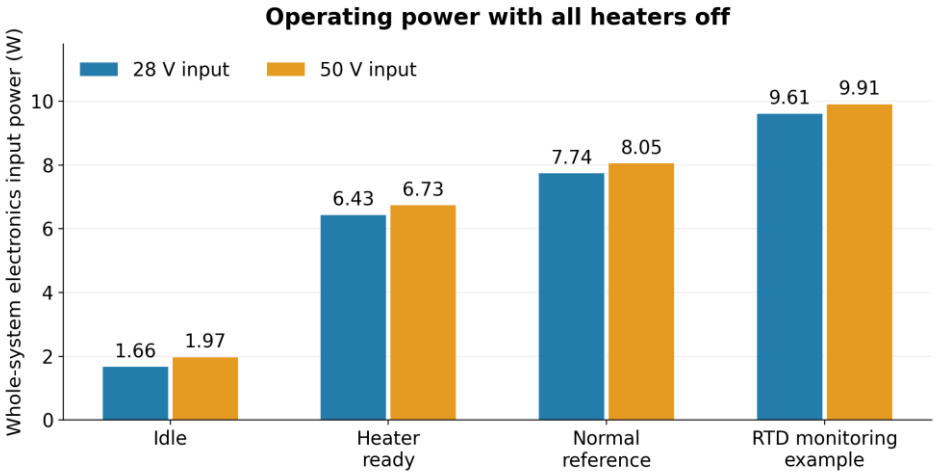
SENSORS INTERFACES & INSTALLATION

Parameter	Definition
Channels 1-100	PT1000; 602.5584-1573.2513 ohms over -100 to +150 deg C
Channels 101-112	PT100; 60.25584-157.32513 ohms over -100 to +150 deg C
RTD wiring	Passive two-wire inputs; calibrated lead compensation
Acquisition	16 bit; +/-10 V input span
Digital I/O	3.3 V logic level
Active communications	10/100 Ethernet; primary/redundant RS422; RS232
Serial start-up reference	RS422 921600 bit/s; RS232 115200 bit/s; 8-N-1
Envelope	240 x 160 x 47 mm; excludes mating cables
Mounting	Four diameter 5 mm holes; 225 x 145 mm centres
Mass	Approximately 1.8 kg
Unit temperature target	-40 to +85 deg C; load and thermal derating apply



Mating plugs, backshells and cable bends require additional clearance.

OPERATING POWER



Whole-system electronics projections at 28 V and 50 V. Heater loads are excluded.

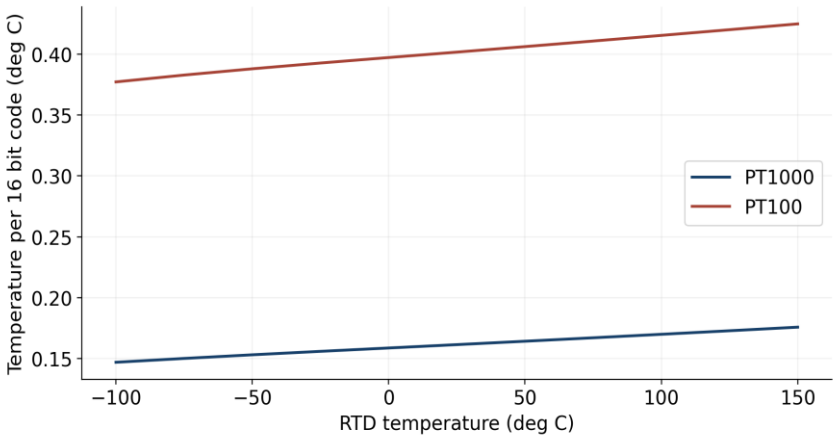
State	28 V input	50 V input
Idle	1.66 W / 59.4 mA	1.97 W / 39.3 mA
Heater ready	6.43 W / 229.7 mA	6.73 W / 134.7 mA
Normal reference	7.74 W / 276.4 mA	8.05 W / 160.9 mA
RTD monitoring example	9.61 W / 343.1 mA	9.91 W / 198.1 mA

The chart shows projected whole-system electronics consumption with all heater elements disconnected. Values come from the reconciled circuit and measured-system model; they are engineering planning values, not measured high-power-unit acceptance limits.

State	Conditions
Idle	Heaters, acquisition, traffic and memory idle
Heater ready	All heaters off; all four banks ready for heating
Normal reference	Heaters off; reference workload
RTD monitoring	100 PT1000 and 12 PT100 at 25 deg C; full acquisition; 25% processing; 100BASE-TX; one RS422 at 10% traffic; memory idle

At 50 V, the defined RTD monitoring example projects 9.91 W before external heater loads. Detailed breakdown and operating procedures are in the High Power ICD and User Guide.

RTD CALIBRATION & OPERATING ASSURANCE



Nominal raw temperature code step; not absolute accuracy.

Parameter	Definition
Calibration band	-100 to +150 deg C
Raw ADC code step	305.1758 uV on +/-10 V span
Maximum nominal temperature step	PT1000: 0.176 deg C/code; PT100: 0.425 deg C/code
Calibration instrument	WireFlow WF 2144 programmable resistor
Absolute accuracy	Defined by unit calibration and installed sensor record

Averaging may reduce noise; it does not change the 16-bit raw code spacing. Record residuals using verified resistance and the actual harness. EMC and environmental acceptance evidence are configuration-specific.

Gitlab: TCU software documentation