TECHNICAL DATA SHEET

ProVU 4 Advanced Temperature Controller

- ¼ DIN Format
- Graphical / text LCD Display (red/green)
- PID single loop, dual loop or cascade controller
- All control types including VMD control
- Single process variable or ratio control
- Profiling option
- Datalogging option (data, alarms & events)
- 5 languages (English, French, German, Italian, Spanish)
- Configurable user-menu structure via BlueControl®
- Modbus RS485 and Modbus TCP Ethernet supported
- USB option
- Standards CE, UL and cUL

Features

HMI Display
- Graphic display - Easy to read backlit LCD display. *(160 x 80 pixels)*
- Dual colour screen (green / red). Colour can be set to change on alarm.
- Multi-language option *(English, French, German, Italian, Spanish)*
- Custom splash-screen on startup *(bitmap file)*
- Alarm status view
- On screen trend view
- LEDs to indicate heat, cool, autotuning and alarm

User operation and control
- Easy setup wizard for quick configuration. *(inputs, alarms, outputs, comms & real-time clock)*
- 2 Universal inputs for thermocouple, RTDs and linear DC process signals *(mA, mV or V),* safety galvanic isolation (240VAC) and user defined two-point calibration
- Flexible output options, relay, ssr driver, triac & Linear DC (9 max). Select to precisely match the process.
- Digital inputs (10 max + 1 combinational logic input) for setpoint selection, auto/manual control, remote setpoint, enable SP ramp, control output enable/ disable, start pre/self tuning, program control (start/ stop, abort), program selection via digital inputs (binary / BCD), datalogging start/stop, remote front key operation, key lock, alarm clear
- Configurable menus (via BlueControl® software)
- USB port for local upload/download of configuration files & download logged data
- Password protected supervisor and configuration mode
- Pre-tune and self-tune function
- Master-slave configuration for multi-zone applications

PID controller
- Single loop controller
- Option: Dual loop & cascade controller
- Single process variable or ratio control
- Control type: On/Off, 2-point, 3-point, continuous, VMD
- Position feedback indication (with VMD control)
- Valve position clamping (with VMD & position feedback)
- Automatic/Manual control
- Local (2 max) / Remote setpoint
- Gain scheduling with 5 PID sets depending on setpoint
- Pre-tune, Self tune, Auto tune
- Loop alarm

Profiling function (option)
- 2 profiles (e.g. temperature, humidity) with Dual loop controller (common time base)
- 255 segments to allocate freely in up to 64 programs
- Ramp, dwell, hold, loop or jump to other profile
- User defined text profile names
- Delayed or real-time day/time profile start
- Up to 5 events

Datalogging Function (option)
- Historic process data for analysis or reporting
- Export data files via front USB or comms
- Log process values, setpoints or alarms (including min, max & average)
- Run-then-stop or FIFO (first in – first out) buffer recording
- Logging intervals from 1s to 30m

Description

ProVU with graphic/text LCD display is an affordable temperature and process controller with advanced functionality including profiling and datalogging options. Designed to improve user efficiency many features are integrated to reduce commissioning time, simplify operation and minimise maintenance downtime.

TECHNICAL DATA SHEET

The LCD screen on ProVU displays real-text messages, removing ambiguity that can be caused by mnemonic codes on LED displays used in many products. Information is displayed in a logical format to be easily understood, hence reducing the risk of errors. User screens are only displayed as each function is enabled, creating an optimised menu structure that is simpler to navigate. Access to specific settings and parameters can also be restricted by assigning them to password protected supervisor and configuration parameter access levels.

The process of configuring ProVU is simplified as a setup wizard runs on first power-up. The user is guided step-by-step through the common parameter settings to quickly program the unit. These settings can be saved on a memory stick via the USB port and can be used for reconfiguration or to program other ProVU units. BlueControl software can be used for on and off-line configuration.

Flexible input and output option boards mean that the controller can be selected to precisely match an application. Universal process inputs (Thermocouple, PT100 & linear DC), digital inputs, remote setpoint inputs, RS485 and Ethernet (Modbus TCP) comms and up to nine outputs (relay, SSR driver, triac, linear DC and 24V transmitter PSU) are all available.

The optional profiling function supports 255 segments for use in up to 64 profiles, segments supported are ramp, dwell, hold, loop, jump to profile. Profile control is possible from the controller, remote input or timed via the integral real time clock.

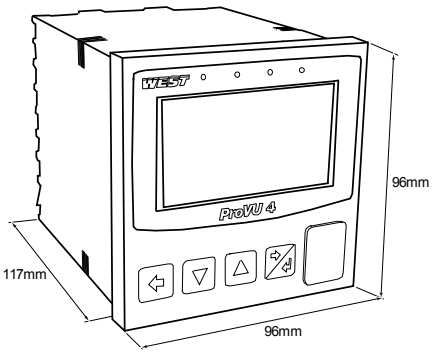
There is an increasing requirement to log process data for quality control purposes. The optional datalogging feature is a low cost method of recording historical data for exporting to a .CSV file.

Specification

PROCESS INPUTS

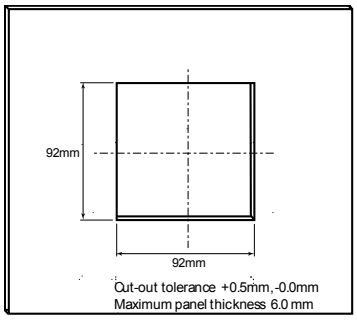
Sensor type:	Universal, type selectable
Number:	2, universal input 2 optional
Function:	Input 1: Process value PV (loop 1) Input 2: Process value PV (loop 2), or redundant PV (loop1), or remote setpoint SP, or valve position
Unit:	Selectable °C, °F, K, bar, pH, %, %rH, psi or user defined (3 digit units)
Decimal point:	0, 1, 2, 3 (selectable)
Sampling Rate:	10 per second.
Resolution:	16 bits, always four times better than display resolution.
Impedance:	>10MΩ resistive, except DC mA (5Ω) and V (47kΩ).
Temperature stability:	Error <0.01% of span per °C change in ambient temperature.
Supply Variation:	Supply voltage influence negligible within supply limits.
Humidity Influence:	Negligible if non-condensing.
Process Display:	Displays up to 5% over and 5% under span limits.
Calibration:	User defined two-point calibration

Dimensions and Installation

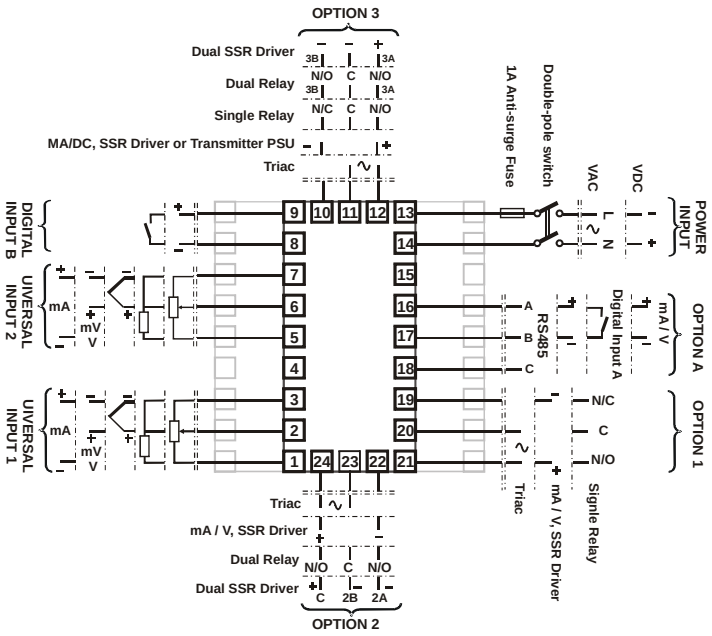


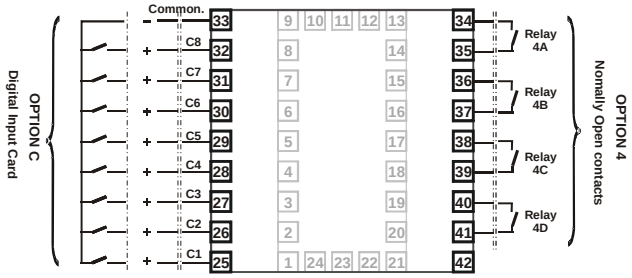
Weight 0.45kg

Panel Cut-out



Connections





TECHNICAL DATA SHEET

Sensor Break Detection:	Thermocouple & RTD - *Control goes to pre-set power value. High & Sensor Break alarms activate.* Linear *(*4 to 20mA, 2 to 10V and 1 to 5V only) - *Control goes to pre-set power value.* *Low & Sensor Break alarms activate.*
Galvanic Isolation:	240VAC reinforced safety isolation from process inputs and outputs (except SSR driver).

Supported Thermocouple Types & Ranges:

Type	Range °C	Range °F	
B	+100 to 1824°C	+211 to 3315°F	
C	0 to 2320°C	32 to 4208°F	
D	0 to 2315°C	0 to 4199°F	
E	-240 to 1000°C	-400 to 1832°F	
J	-200 to 1200°C	-328 to 2192°F	*
K	-240 to 1373°C	-400 to 2503°F	*
L	0 to 762°C	32 to 1402°F	*
N	0 to 1399°C	32 to 2551°F	*
PtRh 20%:40%	0 to 1850°C	32 to 3362°F	
R	0 to 1759°C	32 to 3198°F	
S	0 to 1762°C	32 to 3204°F	
T	-240 to 400°C	-400 to 752°F	*

Optional decimal place can be displayed up to 999.9°C/F

Thermocouple	±0.1% of full range, ±1LSD (±1°C for internal CJC if enabled).
TC accuracy:	Linearization better than better ±0.2°C (± 0.05 typical) on ranges marked ***** in the table above. Linearization for other ranges is better than better than ±0.5°C. BS4937, NBS125 & IEC584

Supported RTD Types & Ranges:

Type	Range °C	Range °F
3-Wire Pt100	-199 to 800°C	-328 to 1472°F
Ni120	-80 to 240°C	-112 to 464°F
Potentiometer	> 2000 Ω	

Optional decimal place can be displayed up to 999.9°C/F

RTD accuracy:	0.1% of full range, ±1 LSD. Linearization better than ±0.2°C (±0.05 typical). Pt100 input to BS1904 & DIN43760 *(0.00385Ω/Ω/°C).*
RTD Excitation:	Sensor current 150µA ±10%.
Lead Resistance:	<0.5% of span error for max 50Ω per lead, balanced.

Supported Linear Types & Ranges:

Type	Range	Offset Range
mA DC	0 to 20mA	4 to 20mA
mV DC	0 to 50mV	10 to 50mV
V DC	0 to 5V	1 to 5V
V DC	0 to 10V	2 to 10V

Scalable from -9999 to 10000. Decimal point selectable from 0 to 3 places, but limited to 5 display digits (e.g 9999.9)

DC accuracy:	Linearization better than ±0.1% of full range, ±1LSD.
Multi-Point Linearization:	DC inputs only: Up to 15 scaling values can be defined anywhere between 0.1 and 100% of input.

AUXILIARY INPUT A

Supported Input Types & Ranges:

Type	Slot A Ranges
mA DC	0 to 20, 4 to 20
V DC	0 to 5, 1 to 5, 0 to 10, 2 to 10

Function:	Remote setpoint loop 1 (or 2)
Accuracy:	±0.25% of input range ±1 LSD.
Sampling Rate:	4 per second.
Resolution:	16 bits.
Impedance:	>10MΩ resistive, except DC mA (10Ω) and DC V (47kΩ).
Sensor Break Detection:	4 to 20mA, 2 to 10V and 1 to 5V ranges only. *Control goes to pre-set power value if Aux Input is the active setpoint source.*
Galvanic Isolation:	240VAC reinforced safety isolation from all inputs and outputs (except to Digital Input B).
Auxiliary Input Scaling:	Scalable as Remote Setpoint (RSP) input between –1999 and 9999, but constrained within setpoint limits.

DIGITAL INPUTS A, B and Option C

Volt-free contacts (or TTL):	Open contacts (>5000Ω) or 2 to 24VDC signal = Logic High Closed contacts (<50Ω) or -0.6 to +0.8VDC signal = Logic Low.
Number:	Max 10; digital input A, digital input B, 8 additional inputs with Option C
Function:	Selectable function per input - *Controllers*: Automatic/Manual, Control outputs OFF, Remote/Local SP, selection local SP, enable SP ramping, PV selection, Tuning start - *Programmer*: Profile Hold, Release, Stop, Abort - Data recorder: Stop - *Operation and others*: Key lock, remote front key operation (Up, Down, Back, Forward), reset alarm latch, reset output latch, clear alarm, use for combinatorial soft input Digital input card (Option C): Program selection binary coded or BCD
Soft digital input:	Any of the digital inputs can be combined (AND / OR) to form an internal digital signal.
Characteristic: Sensitivity:	Direct / reverse, selectable per input Edge Sensitive. Requires High-Low or Low-High transition to change function. Response within <0.25 second.
Galvanic Isolation:	240VAC reinforced safety isolation from all inputs and outputs.

OUTPUTS

Number:	Max 9, depending on options fitted
Function:	Selectable function per output - *Primary loop 1 or 2 (Heat)* - Secondary *loop 1 or 2 (Cool)* - Selection of alarms to OR - Selection of events to OR (profiler) - Selection of digital inputs to OR
Characteristic:	Direct / reverse, selectable per output
Galvanic Isolation:	240 VAC reinforced safety isolation from all inputs and outputs.

Single Relay

Type & Rating:	Single pole double throw (SPDT); 2A resistive at 120/240VAC.
Lifetime:	>500,000 operations at rated voltage/current.

TECHNICAL DATA SHEET

Dual Relay

Type & Rating:	Single pole single throw (SPST),2A resistive at 120/240VAC. Dual relay modules have shared common.
Lifetime:	>200,000 operations at rated voltage/current.

Quad Relay Option slot 4 only !

Type & Rating:	Single pole single throw (SPST),2A resistive at 120/240VAC. Dual relay modules have shared common.
Lifetime:	>500,000 operations at rated voltage/current.

SSR Driver

Drive Capability:	SSR driver voltage >10V into 500Ω minimum; npn-logic (connects to GND)
Galvanic Isolation:	Not isolated from the universal input, Ethernet communications or other SSR driver outputs.

Triac

Operating Voltage:	20 to 280Vrms (47 to 63Hz)
Current Rating:	0.01 to 1A (full cycle rms on-state @ 25°C); de-rates linearly above 40°C to 0.5A @ 80°C.

Linear DC

Ranges	0 to 5, 0 to 10, 1-5, 2 to 10V & 0 to 20, 4 to 20mA (selectable) with 2% over/under-drive when used for control outputs.
Resolution:	8 bits in 250mS (10 bits in 1s typical, >10 bits in >1s typical).
Accuracy:	±0.25% of range, (mA @ 250Ω, V @ 2kΩ). Degrades linearly to ±0.5% for increasing burden (to specification limits).

Transmitter Power Supply PSU Option slot 4

Power Rating:	24V nominal (19 to 28V DC) into 910Ω minimum resistance. (*Option to use DC Linear output as 0-10V stabilised PSU*).

COMMUNICATIONS

PC Configuration

Connection:	RS232 via PC Configurator Cable to RJ11 socket under case.
Isolation:	Not isolated from input or SSR Driver outputs. For bench configuration only !

RS485

Connection:	Locates in Option Slot A. Connection via rear terminals (*refer to wiring diagram*).
Protocol:	Modbus RTU.
Slave/Master Mode	Slave address range 1-255 or Setpoint master mode.
Supported Speeds:	4800, 9600, 19200, 38400, 57600 or 115200 bps.
Data Type:	8 data bits and 1 stop bit. Odd, even or no parity.
Galvanic Isolation:	240VAC reinforced safety isolation from all inputs and outputs.

Ethernet

Connection:	Locates in Option Slot A. Connection via RJ45 connector on top of case.
Protocol:	Modbus TCP. Slave only.
Supported Speed:	10BaseT or 100BaseT
Galvanic Isolation:	240 V reinforced safety isolation from the supply, inputs and outputs (except SSR Drivers).

LOOP CONTROL

Tuning Types:	Pre-Tune, Auto Pre-Tune, Self-Tune or Manual Tuning.
Proportional Bands:	Primary & Secondary (e.g. Heat & Cool) 0.5 to 999.9, 0.1 increments, or On/Off control.
Automatic Reset:	Integral Time Constant, 1s to 99min 59s and OFF
Rate:	Derivative Time Constant, 1s to 99 min 59s and OFF
Manual Reset:	Bias 0 to 100% (-100% to +100% Primary & Secondary).
Deadband/ Overlap:	–20% to +20% of Primary + Secondary Proportional Band.
ON/OFF Differential:	0.1% to 10.0% of input span
Auto/Manual Control:	Selectable with “bumpless” transfer when switching between Automatic and Manual control.
Cycle Times:	Selectable from 0.5s to 512s.
Setpoint Ramp:	Ramp rate selectable 1 to 9999 LSDs per hour and infinite.
Gain Scheduling:	5 PID parameter sets, automatically effective depending on active setpoint triggers.

ALARMS

Number:	Up to 7
Alarm Types:	Selectable as High, Low, Band, Deviation, Rate of Signal Change (per minute). Band and Deviation (high or low) alarm values are relative to the current setpoint value.
Alarm Source:	Analog inputs, control outputs (loop 1 and 2), Sensor/input Break, Loop Alarm
Alarm Hysteresis:	A deadband from 1 LSD to full span (in display units) for Process, Band or Deviation Alarms. Rate Of Change Alarm hysteresis is the shortest time (1 to 9999 secs) the rate of change must be above the threshold for the alarm activate, or fall below the threshold to deactivate. **Note:** If the duration is less than this time, the alarm will not activate no matter how fast the rate of rise.
Latch function:	Any alarm output can be latched; reset via digital input, front operation and interface
Clear:	Any alarm can be cleared by digital input, even if it is still active.
Combination Alarm Outputs:	Logical OR of alarms 1 & 2, 1 to 3, 1 to 4 or 1 to 5. Logical AND of alarms 1 to 5 with Profiler Events 1 to 5.

PROFILER

Limits	Max. 64 programs with 2 profiles each (e.g. temperature / humidity; common time base). Total number of segments (*all programs*) = 255 maximum. Max. 5 segment events.
Program Selection:	By operation, serial interface or digital inputs (binary or BCD-coded; Digital Input Card Option C required !)
Binary selection:	Digital inputs C1 (LSB) to C6 (MSB)
BCD selection:	Ones column: C1 (LSB) to C4 (MSB) Tens column: C5 (LSB) to C7 (MSB)
Loop Back	1 to 9999 loops back to specified segment.
Profile Cycling	1 to 9999 or Infinite repeats per profile.

Sequence Repeats	1 to 9999 or Infinite repeats of joined profile sequences.
Segment Types	Ramp Up/Down over time, Ramp Rate Up/Down, Step, Dwell, Hold, Join A Profile, End or Repeat Sequence Then End.
Timebase	hh:mm:ss (Hours, Minutes & Seconds), common for both profiles (identical segmentation)
Segment Time	Maximum segment time 99:59:59 hh:mm:ss. Use loop-back for longer segments (e.g. 24:00:00 x 100 loops = 100 days).
Ramp Rate	0.001 to 9999.9 display units per hour.
Hold Segment Release	Release With Key Press, At Time Of Day or Digital Input.
Start From	1st segment starts from current setpoint or current input value.
Delayed Start	After 0 to 99:59 (hh:mm) delay, or at specified day(s) & time.
End On	Keep Last Profile Setpoint, Use Controller Setpoint or Control Outputs Off.
Abort Action	Keep Last Profile Setpoint, Use Controller Setpoint or Control Outputs Off.
Power/signal Loss Recovery	Continue Profile, Restart Profile, Keep Last Profile Setpoint, Use Controller Setpoint or Control Outputs Off.
Auto-Hold	Hold if input >Band above and/or below SP for each segment.
Profile Control	Run, Manual Hold/Release, Abort or Jump to next segment.
Segment Events	Events turn on for the duration of the segment. For End Segments, the event state persists until another profile starts, the user exits from profiler mode, or the unit is powered down.

DATA RECORDER

Recording Memory:	1MB non-volatile flash memory. Data retained when power is turned off.
Variables:	Process variable PV 1 / 2, Max or Min of PV1 / 2, Setpoint SP, Alarm status, Primary / Secondary Power, Profiler event
Recording Interval:	1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes.
Recording Trigger:	By Operator, recorder menu, any alarm, any digital input incl. soft digital input
Recording Capacity:	Dependant on sample rate and number of values recorded. Two values can be recorded for up to 7 days at 10s intervals. More values or faster sample rates reduce the maximum duration.
RTC Battery Type:	CR 1616 3V Lithium. Clock runs for >1 year without power.
RTC accuracy	Real Time Clock error <1second per day.

OPERATING CONDITIONS (FOR INDOOR USE)

Temperature:	0°C to 55°C (Operating), –20°C to 80°C (Storage).
Relative Humidity:	20% to 95% non-condensing.

POWER SUPPLY

Power:	100 to 240VAC ±10%, 50/60Hz, 20VA
Low voltage versions.	20 to 48VC 50/60Hz, 15VA or 22 to 65VDC, 12W.
External fuse:	1A anti-surge fuse

ENVIRONMENTAL

Standards:	CE, UL, cUL.
EMI:	Complies with EN61326.
Safety Considerations:	Complies with EN61010-1 & UL61010C-1. Pollution Degree 2, Installation Category II.
Front Panel Sealing:	To IP66 (IP65 front USB connector). IP20 behind the panel.

DISPLAY

Display Type:	160 x 80 pixel, monochrome graphic LCD with a dual colour (red/green) backlight.
Display Area:	66.54mm (W) x 37.42mm (H).
Display Characters:	0 to 9, a to z, A to Z, plus ( ) - and _
Trend View:	120 of 240 data points shown in a scrollable window. Data is not retained when power turned off or if time base is changed.
Trend Data:	Any active alarm plus PV (solid) & SP (dotted) at sample time or Max/Min PV between samples (candle-stick graph).
Trend Sample Rate:	1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes.

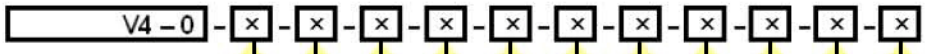
LEDs

Number:	4, colour red
Function:	Default (from left to right): OUT1 (Heat, loop1), OUT2 (Cool, loop1), Manual, TUNE, ALARM. Selectable function per LED: Controller output, Tune active, any alarm, any event, collective alarm/event, Profile Running, Profile Ended.
LED labels:	Max. 6 user-defined characters per LED
Characteristic:	Direct / reverse, selectable per LED

ADDITIONAL COMMUNICATIONS OPTIONS - USB

Connection:	Locates in Option Slot C. Connection via front mounted connector.
Protocol:	USB 1.1 or 2.0 compatible. Mass Storage Class.
Supply Current:	Up to 250mA.
Targeted Peripheral:	USB Memory Stick.
Galvanic isolation:	240 VAC reinforced safety isolation from all inputs and outputs.

Ordering Information



Unit Type
- Controller — C
- Controller with USB Port — U
- Controller / Recorder with USB Port — R

Profiler
- — — 0
- Profiler — P

Supply Voltage
- 100-240 VAC — 0
- 24-48 V AC or DC — 2

Option Slot 1
- — — 0
- Relay Output — 1
- DC Drive Output for SSR — 2
- Linear DC Output — L
- Triac Output — 8

Option Slot 2
- — — 0
- Relay Output — 1
- DC Drive Output for SSR — 2
- Linear DC Output — L
- Triac Output — 8
- Dual Relay Output — 9
- Dual SSR Driver Output — S
- 24 VDC Transmitter Power Supply — T

Option Slot 3
- — — 0
- Relay Output — 1
- DC Drive Output for SSR — 2
- Linear DC Output — L
- Triac Output — 8
- Dual Relay Output — 9
- Dual SSR Driver Output — S
- 24 VDC Transmitter Power Supply — T

Display Language & Manual
- 1 — English
- 2 — French
- 3 — German
- 4 — Italian
- 5 — Spanish
- R — Russian

Option Slot C
- 0 — —
- 1 — Digital Input Card

Second Universal Input
- 0 — —
- 1 — Auxilary Input
- D — 2nd Loop Control Input

Option Slot A
- 0 — —
- 1 — RS 485 Serial Comms
- 3 — Digital Input 1
- 4 — Auxilary Input A
- 5 — Ethernet Port

Option Slot 4
- 0 — —
- 1 — 4 Relay Output