¼ DIN COMPACT PROCESS CONTROLLER CONCISE PRODUCT MANUAL (59427-1)

The following symbol is use on the product labels:	⚠	*Caution, refer to installation manual when connecting*

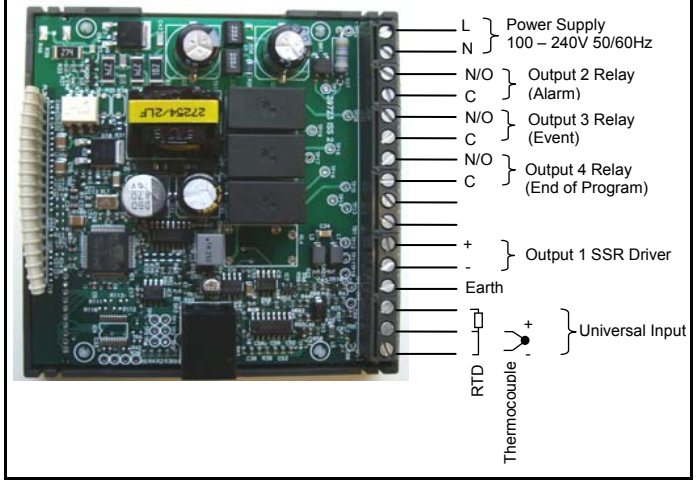
1. INSTALLATION

⚠ **CAUTION: Installation should be only performed by technically competent personnel. It is the responsibility of the installing engineer to ensure that the configuration is safe. Local regulations regarding electrical installation & safety must be observed.**

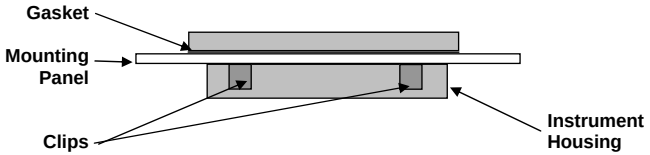
Main Board Connectors

Main Terminals

⚠ **CAUTION: A UL listed 1A anti-surge fuse, rated 250V should be fitted to the power input. An IEC60947-1 & IEC60947-3 compliant isolation switch should be fitted close to the unit, in easy reach of the operator, and appropriately marked.**



Panel Mounting



⚠ **CAUTION: Do not remove the panel gasket; it is a seal against dust and moisture.**

Rear Terminal Wiring

⚠ **CAUTION: Failure to comply with the installation instructions may impact the protection provided by the unit.**

Note: Use single strand (1.2mm / AWG18 max size) copper wire, except for the thermocouple input, where the correct thermocouple or compensating cable and connectors should be used.

2. SPECIFICATIONS

PROCESS INPUT

Sampling Rate:	4 per second.
Resolution:	16 bits. Always four times better than display resolution.
Impedance:	>10MΩ resistive, except DC mA (5Ω) and V (47kΩ).
Temp 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.
Process Variable Input Offset:	Reading adjustable ± Controller Span. +ve values added to Process Variable, -ve values subtracted from Process Variable
Sensor Break Detection:	Thermocouple & RTD - *Control goes to off. High & Sensor Break alarms activate.* Linear (4 to 20mA, 2 to 10V and 1 to 5V only) - *Control goes to off. Low & Sensor Break alarms activate.*
Isolation:	Isolated from all 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	32 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 Calibration:	±0.1% of full range, ±1LSD (±1°C for internal). Linearization better than ±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
Optional decimal place can be displayed up to 999.9°C/F		

RTD Calibration:	0.1% of full range, ±1LSD. 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 DC	4 to 20mA DC
mV DC	0 to 50mV DC	10 to 50mV DC
V DC	0 to 5V DC	1 to 5V DC
V DC	0 to 10V DC	2 to 10V DC
Scalable from -9999 to 10000. Decimal point selectable from 0 to 3 places, but limited to 5 display digits (e.g. 9999.9)		

Maximum Overload:	1A on mA input terminals, 30V on voltage input terminals.
DC Calibration:	±0.1% of full range, ±1LSD.

OUTPUTS

Relay

Type & Rating:	Single pole double throw (SPDT); 2A resistive at 120/240VAC.
Lifetime:	>500,000 operations at rated voltage/current.
Isolation:	Reinforced safety isolation from inputs and other outputs.

SSR Driver

Drive Capability:	SSR driver voltage >10V into 500Ω minimum.
Isolation:	Not isolated from the universal input or communications.

PC CONFIGURATION

Connection:	RS232 via PC Configurator Cable.
Isolation:	Not isolated from input or SSR Driver outputs. For bench configuration only. **CAUTION:** Do not use in live applications.

LOOP CONTROL

Tuning Types:	Pre-Tune or Manual Tuning.
Proportional Bands:	Heat 0.5% to 999.9% of input span in 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).
Differential:	ON/OFF switching differential 0.1% to 10.0% of input span
Cycle Times:	Selectable from 0.5s to 512s.
Setpoint Ramp:	Ramp rate selectable 1 to 9999 LSDs per hour and infinite.

ALARM

Alarm Types:	Process High, Process Low, Band, Deviation. Band and Deviation (high or low) alarm values are relative to the current setpoint value.
Alarm Hysteresis:	A deadband from 1 LSD to full span (in display units) for Process, Band or Deviation Alarms.

OPERATING CONDITIONS (FOR INDOOR USE)

Temperature:	0°C to 60°C (Operating), –20°C to 80°C (Storage).
Relative Humidity:	20% to 95% non-condensing.
Supply Voltage and Power:	100 to 240VAC ±10%, 50/60Hz, 7.5VA.

CONFORMANCE NORMS

EMI:	CE: Complies with EN61326.
Safety Considerations:	CE: Complies with EN61010-1. Pollution Degree 2, Installation Category II.
Front Panel Sealing:	To IP62. *IP20 behind the panel.*
Front Panel Cleaning	Wash with warm soapy water and dry immediately.

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).
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). Auto scales from 2 to 100% of Input Span.
Trend Sample Rate:	1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes.

DIMENSIONS

Weight:	0.2kg maximum.
Size:	96 x 96mm (Front Bezel). 30mm (Depth Behind Panel).
Mounting Panel:	Panel must be rigid. Maximum thickness 2.0mm.
Panel Cut-out Size:	92mm x 92mm. Tolerance +0.5, -0.0mm.
Ventilation	20mm gap required above, below and behind.

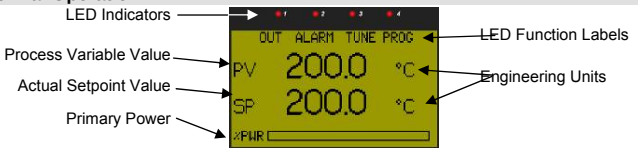
3. POWER UP SEQUENCE

Following the power-up self-test and logo screen, the instrument enters Operation Mode, from which the user can select the instrument's Main Menu (*refer to the Screen Sequence list*).

4. OPERATION MODE

This mode is entered at power on, or accessed from the Main Menu. If required, all Operation Mode parameters can be made read only *(see Display Configuration)*.
Note: Configuration must be completed before starting normal operations.

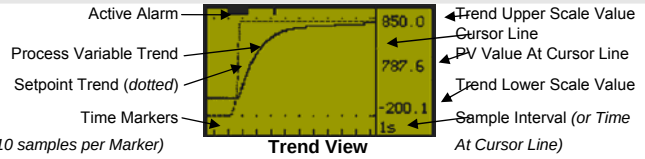
Normal Operation



Typical Operation Screen

Subsequent screens allow the display and selection/adjustment of Setpoint, enable/disable control, alarm status and trends.
Press δ or A to move forward or back though the screens. press B or X to alter the values.

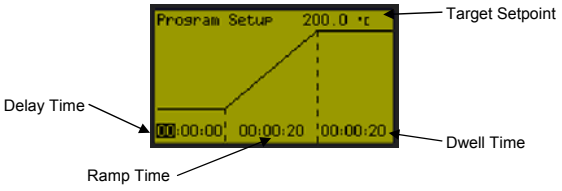
Trend View



Trend View

Trend View graphs PV; PV & SP; or Max/Min PV between samples, plus active alarms. Trend Scale Values adjust automatically to visible data (between 2 to 100% of the input span). Sample intervals are set in Display Configuration.
Pressing B or X moves the Cursor Line back through the last 240 data points.
Note: Data is not retained at power down or the Sample Interval is changed.

Program Setup



Entering a delay time of 00:00:00 (hh:mm:ss) means no delay, A ramp time of 00:00:00 (hh:mm:ss) means the setpoint will step to the target setpoint. The Dwell time can be set to INFINATE which means only the operator can stop the program.

Over/Under Range & Input Fail Indications

If the process or auxiliary inputs are >5% above or below the scale max/min, their displayed value is replaced with the word "**HIGH**" or "**LOW**".
If a signal break is detected, their value is replaced with "**OPEN**" and an un-calibrated input is replaced by "**ERROR**". In OPEN or ERROR conditions, the *Control Outputs off.*
Caution: Correct the problem before continuing normal operation.

5. SCREEN SEQUENCES

The parameters displayed depend on how the instrument has been configured. After 2 minutes without key activity, most screens revert to the next higher menu level, until reaching the base Operation Mode display. Screens marked ⏲ persist unless changed by the user.
Menus marked 🔒 = Require a un-lock code for access.

Screen Navigation

A= Accept Value & Move Back B = Next Item/Increment X = Prior Item/Decrement
Δ = Accept Value & Move Forward χ+ δ = Move Up One Menu Level
The symbols ⬍ are showed to the right of the lists when more menu options are available above ⬆ or below ⬇.

MAIN MENU OPTIONS
Select Main Menus Option from list. Press Δ to continue. Press χ+ δ to move from Operation Mode to Main Menu

Operation Mode:	
Base operating screen. *PV value; SP value* & Primary Power *Bar Graph*	Bar Graph = Primary Power
Program Control	Start and stop a program
Control Enable/Disable	From: Enabled; Disabled - Allows the control output to be turned off.
Setpoint Value Display & Adjustment	View and alter setpoint.
Program status	Includes bar graph of the program progress
Program setup	Graphical representation of the program enabling editing of the delay, ramp and dwell times
Alarm Status	Active / inactive status of all configured Alarm and event.
Trend View	A trend graph of PV & SP, or the Max/Min value of the PV between samples. Any active alarm(s) are indicated at the top of the graph.
Configuration Menu:	
Configuration Mode Unlocking	Enter correct code number to access Configuration Mode. *Default Value = 10*
Configuration Options	Select required Configuration Menu Option from list. Press Δ to continue.
Refer to the Configuration Menu screens sequences opposite for information about the Configuration Sub-Menus	
Automatic Tuning Menu:	
Automatic Tuning Mode Unlocking	Enter correct code number to access Automatic Tuning Menu.
Pre-Tune	Turn Pre-Tune on/off. Pre-Tune is disabled in On-Off Mode; if PV <5% of span from SP; during Profiles or if a Ramping Setpoint is set.
Pre-Tune Status	Shows current Pre-Tune status. Active or Inactive.
Product Information Mode:	
Input Calibration Status	Calibration status of mVDC, VDC, mADC, RTD and Thermocouple CJC inputs. *All should be "Calibrated".*
Firmware Information	Type and version of firmware.
Serial Number Information	Instrument serial number.
Date of Manufacture	Date of Manufacture
Service Information Mode:	
For Service Contact	Contact information for Service, Sales or Technical Support.

CONFIGURATION MENU OPTIONS
Select required Main Menu Option from list. Press Δ to continue. - Press χ+ δ to move back to Main Menu

Input Configuration:	
Process Variable Input Type	From Thermocouple, RTD and Linear inputs. - *see specifications section for details.*
Engineering Units	Select display units from: °C; °F; °K; bar; %; %RH; pH; psi or none.
Decimal Point Position	Display resolution with 0; 1; 2 or 3 decimal places. Temperature inputs are limited to 1 decimal place.
Scale Range Lower Limit	Sets the usable span (min = 100 units, max = range limits - *see specs)* for temperature inputs. For Linear inputs, Upper & Lower Limits define the breakpoints* can scale input vs. displayed value, between the linear input scale limits. *A breakpoint set at 100% input ends the sequence.
Scale Range Upper Limit	
Input Filter Time	Filter unwanted noise from input signal. Adjustable from 0.1 to 100.0 seconds or OFF (default = 2s). **Caution:** Use with care!
Control Configuration:	
Proportional Band	From: On-Off control or 0.1% to 999.9% proportional band. *Read Only during automatic tuning.*
Integral Time Constant	Integral Time value (Automatic Reset) from 1s to 99min 59s or OFF. *Read Only during automatic tuning*
Derivative Time Constant	Derivative Time value (Rate) from 1s to 99 min 59s or OFF. *Read Only during automatic tuning*
Manual Reset (Bias)	Manual Reset value (Bias) from 0-100%
Primary On-Off Differential	Primary On-Off control hysteresis (deadband) from 0.1 to 10.0% of Span (*centred about setpoint*).
Primary Cycle Time	Primary Power Cycle Time from 0.5s to 512s. *Relay, SSR Driver or Triac Control Outputs only.*

CONFIGURATION MENU OPTIONS
Select required Main Menu Option from list. Press Δ to continue. - Press χ+ δ to move back to Main Menu

Power Lower Limit	Minimum Primary Output Power limit, from 0 to 90%. *Must be 10 or more % less than the upper limit*. **Caution:** Use with care
Power Upper Limit	Maximum Primary Output Power limit, from 10 to 100%. *Must be 10 or more % higher than the lower limit*. **Caution:** Use with care
Approach Control	Speed to setpoint control larger the number the faster to setpoint a more overshoot. Smaller the number slower to setpoint and less overshoot.
Setpoint Upper Limit	Maximum allowable setpoint values. Adjustable within Input Span limits. *Applies to local and remote setpoints*. **Caution:** Use with care!
Setpoint Lower Limit	Minimum allowable setpoint values. Adjustable within Input Span limits. *Applies to local and remote setpoints*. **Caution:** Use with care!
Setpoint Ramp Rate	Setpoint Ramp Rate value (1 to 9999 LSDs per hour or OFF). *Applied at start-up and SP changes.*
Setpoint Value	Local Setpoint 1 value, between the Setpoint Upper and Lower Limits.
Fan/Vent Control	Switch on or off the fan / vent
Alarm Configuration:	
Alarm Type	From: Unused; High; Low; Deviation or Band.
Alarm Value	Alarm activation point. – *High; Low; Deviation (+ve above, -ve below SP) or Band (above or below SP).*
Alarm Hysteresis	Deadband on "safe" side of alarm, through which the signal must pass before alarm deactivates.
Alarm Inhibit	Prevents alarm activation if the alarm condition is true at power up. *Activation occurs only after the condition has passed and then reoccurred.*
Program setup:	
Starting setpoint	Starting point for the program to begin Current Setpoint or Current PV
Setpoint Ramp Type	Select between Ramp Time or Ramp Rate
Ramp Auto-hold type	Hold the program while ramping when the PV is below, above or a band around the setpoint
Ramp Auto-hold Value	The value of the auto-hold
Dwell Auto-Hold Type	Hold the program while in a dwell when the PV is below, above or a band around the setpoint
Dwell Auto Hold Value	The value of the auto-hold
Program End Action	The action to take at the end of the program Go to the current controller setpoint or turn control off
Display Configuration:	
Trend Sample Interval	Interval between display of next value on the trend graph From: Every 1; 2; 5; 10; 15; 30 Seconds, or Every 1; 2; 5; 10; 15; 30 Minutes.
Select Trend Mode	From: PV only, PV (solid) & SP (dotted) at sample time or Max/Min PV between samples (candle-stick graph). Alarm activity is always shown.
Display Colour	From: Red only; Green only; Red to Green on Alarm or Green to Red on Alarm.
Invert Display	Standard or Negative display image.
Display Contrast	Screen contrast (0 and 100) to improve clarity. 100 = maximum contrast.
Language	Select English or Russian.
Lock Code Configuration:	
Lock Code View	View and edit the Configuration Mode and Tuning Menu Lock Codes (1-9999 or OFF). *Default Values = 10*
Reset To Defaults:	
Reset To Defaults	Set all parameters to default values. **Caution:** User must reconfigure all required settings before using the instrument following a reset.