

PD500 SuperNova

PID Process & Temperature Controllers

QUICK START GUIDE

This Quick Start Guide is intended to provide basic information about the SuperNova controllers. A complete instruction manual is available for download at www.predig.com.

Disclaimer: The information contained in this document is subject to change without notice. Precision Digital Corporation makes no representations or warranties with respect to the contents hereof, and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.
©2021 Precision Digital Corporation. All rights reserved.



PRECISION DIGITAL CORPORATION
233 South Street
Hopkinton, MA 01748 USA
Tel (800) 343-1001
Fax (508) 655-8990
www.predig.com

LIM510QS_C 11/21

Safety Information

Installation and service should be performed only by trained service personnel. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the controller and ensure personnel safety. Read complete instructions prior to installation and operation of the meter.

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or property damage

DANGER

- The input/output terminals are subject to electric shock risk and should never come in contact with personnel or conductive substances.
- Use 18 AWG to 24 AWG copper wire with 60°C or 60/75°C insulation for all line voltage and relay connections.

WARNING

- This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.
- Additional protective devices or circuits should be installed with this controller to prevent serious consequences should it malfunction.
- Install a power switch or fuse rated at 250 VAC, 0.5 A.
- Complete all wiring before applying power to prevent electric shocks.
- This product should not be used in locations with flammable or explosive gases.
- This product should not be disassembled, modified, improved or repaired.

CAUTION

- The contents of this quick start guide may be changed without prior notification.
- Inspect the product prior to use for damage or other abnormalities.
- This product is intended for use in the following environments:
 - Indoors.
 - Within the ambient temperature and humidity ranges indicated in the instruction manual.
 - Areas where corrosive gases (especially harmful gases, ammonia, etc.) and flammable gases are not present.

CAUTION

- Areas where vibration and impact are not directly applied to the product.
- Areas where liquids, oils, chemicals, steam, dust, salt, iron, etc. (pollution degree 1 or 2) are not present.
- Areas where large inductive interference, static electricity, magnetic noise are not generated.
- Areas not subject to heat accumulation caused by direct sunlight, radiant heat, etc.
- Areas below elevation of 2000 meters.
- Screw terminal connections should be tightened to torque of 5 lb-in (0.56 Nm).
- Do not wipe the product with organic solvents such as alcohol, benzene, etc. (use neutral detergents).
- Use non-grounded thermocouples (using a grounded sensor may cause malfunctions to the device due to short circuits).
- Remove power before replacing the sensor.
- The proportional cycle should be set to at least 20 seconds when using an electromagnetic switch.
- Unused terminals should remain free of any wiring.
- This product should receive regular maintenance to ensure its continuous safe use.
- Check the temperature deviation between the PV value of the temperature controller and the actual temperature before use and make any needed adjustments.
- The relay outputs of the device may change states during power up or take time to follow normal programming. If outputs are being used for safety interlock purposes, or other safety measures, an intermediary relay with state delay is recommended.
- The USB loader is intended for programming the device only and not for control or monitoring.

WARNING

Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Ordering Guide

Model	Model Number Digits	Description
PD5	□ - □ - □ - □ - □ - □	PID Process & Temperature Controller
Size	10	(1/16 DIN) 1.9" x 1.9" x 2.5" (48 x 48 x 63 mm) (W x H x D)
	20	(1/8 DIN) 3.8" x 1.9" x 2.5" (48 x 96 x 63 mm) (W x H x D)
	30	(1/4 DIN) 3.8" x 3.8" x 2.5" (96 x 96 x 63 mm) (W x H x D)
Control & Alarm Outputs	A	Control OUT 1 = Current output (4-20 mA current output for PID control) Control OUT 2 = Relay output 2 SUB alarm relay outputs
	R	Control OUT 1 = Relay output for On/Off or time-proportional PID Control Control OUT 2 = Relay output 2 SUB alarm relay outputs
	S	Control OUT 1 = Voltage pulse output for On/Off or time-proportional SSR PID Control Control OUT 2 = Relay output 2 SUB alarm relay outputs
Communication (RS485)	C	None RS-485 communication
	T	None Retransmission output (4-20 mA)
Retransmission Output (RET)	D	None 2 digital inputs (DI 1-2)
	R	None 1 input, 4-20 mA (1-5 VDC)

Accessories

Models	Description
PDX-RES2	250 ohm 0.1% Precision Resistor for SuperNova 4-20 mA Input
PDA7485-I	RS-232 to RS-485 Isolated Converter
PDA8485-I	USB to RS-422/485 Isolated Converter
PDA8485-N	USB to RS-422/485 Non-Isolated Converter
PD9501	Multi-Function Calibrator
PDA-LH	Light / Horn Accessory
PDA-MINIUSB	USB Cable for SuperNova Series, Type A Male to Type Mini-B Male
PDX6901	Suppressor (snubber): 0.01 µF/470 Ω, 250 VAC
PDA1024-01	24 VDC Power Supply for DIN Rail

Visit www.predig.com for available enclosures for the PD500 SuperNova Series

Front Key Description & Functions

Key	Operation mode		Menu mode	
	Control/Monitoring	SV change	Programming Menu	Change parameters
Mode MD	Hold to enter programming menu	-	Hold to return to run mode display	-
Set SET	Enter a new SV	Save SV value	Change a parameter or enter a group	Move to next parameter after saving value
Shift IK	-	Shift digit position	-	Shift digit position
Down ↓	-	Decrease value	Move among parameters or groups	Decrease numeric value of change parameter
Up ↑	-	Increase value	-	Increase / change value

Front Key Operation

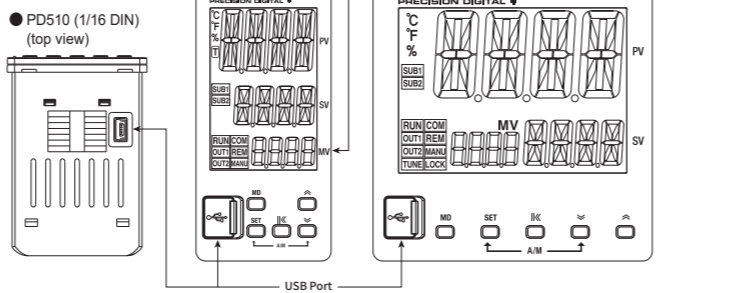
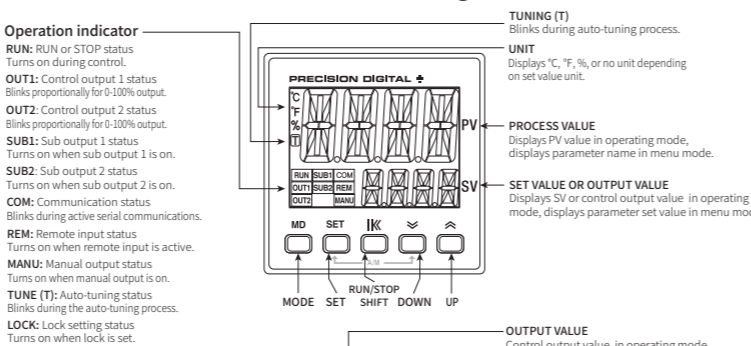
Function	Front Key Operation
Enter programming menu	Press and hold MD for 1 second
Lock / unlock front panel buttons	Press and hold SET + IK for 3 seconds
Change between automatic and manual output mode	Press and hold SET + ↓ for 3 seconds
Begin auto tuning (AT) / Stop auto tuning	Press and hold SET + ↑ for 3 seconds
Change between run and stop output modes	Press and hold IK for 1 second
Acknowledge latching alarms	Press ↑ or ↓

Specifications

Input	Thermocouple	K, J, E, T, R, B, S, L, N, U, W, PLII
	RTD	JPT100, PT100
	DC voltage / current	1-5 V (4-20 mA with resistor), 0.5 V, 0-10 V, 0-50 mV, 0-100 mV
	Sampling cycle	50 ms
Control output	Relay output	<ul style="list-style-type: none"> Rated resistive load switching capacity: 5 A, 250 VAC; 5 A, 30 VDC Max switching power: 750 VA, 90 W Max switching voltage: 250 VAC, 110 VDC Max switching current: 5 A Mechanical life: 20 million cycles (at 180 CPM) Recommended minimum cycle time: 20 sec
	Current SCR output	4-20 mA linear current output, Load resistance: 600 Ω maximum ± 0.2% of FS ± 1 digit
Control	Control type	ON/OFF, PID control
	Output operation	Programmable for reverse or direct action
USB Loader	Communication method	USB 2.0 Standard, Compliant
	Protocol	Protocol: PC-LINK
Communication distance	Sub output	Relay 1 & 2 outputs, rated switching capacity: 5 A 250 VAC, 5 A 30 VDC
	Digital input	2 digital inputs; Logic levels: On: 1.5 V, Off: 0.1 V Input current: Approximately 2 mA each contact Input impedance: On: 1 kΩ max, Off: 100 kΩ min Open contact voltage: Open contact voltage approximately 5 VDC
Option	Retransmission output	4-20 mA ±0.2% of FS ±1 digit, load resistance: max. 600 Ω
	Remote input	4-20 mA (1-5 VDC)
Power	RS-485 Connection	RS-485, 2-wire and common, half-duplex
	Voltage	100 - 240 VAC ±10%, 50 / 60 Hz, 8.5 VA max
	Insulation resistance	20 MΩ minimum, 500 VDC
	Dielectric strength	3,000 VAC 50/60 Hz for 1 minute across power terminals
	Power consumption	Max. 9.0 VA
Environment	Operating temperature	-10 to 50°C (14 to 122°F)
	Storage temperature	-25 to 65°C (-40 to 185°F)
	Relative humidity	35 to 85% non-condensing
Approval		
	<ul style="list-style-type: none"> Electrostatic discharge (ESD): KN61000-4-2 Conductive RF (CS): KN61000-4-6 EFT(RS): KN61000-4-3 SURGE: KN61000-4-5 	
Basic components		
Main body, bracket, 250 Ω resistor (1%), rubber gasket, quick start guide		
Front panel		
IP65		
Warranty		
1 year parts & labor. See www.predig.com for complete details.		

For a complete list of Specifications, refer to the instruction manual available at www.predig.com.

Front Panel Indicators and Messages



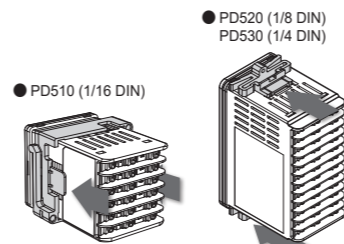
ERROR Message Display

Display	Error	Cause and Action
	Burn out	The sensor appears to be disconnected. Check sensor wiring and the condition of the sensor. Confirm the correct input type is selected for the attached sensor. Measure the input signal, and verify it is within the sensor input maximum and minimum signal.
	+Over	This error occurs when the input signal exceeds +5% (full scale) of the sensor input maximum range. Confirm the correct input type is selected for the attached sensor.
	-Over	This error occurs when the input signal is less than -5% (full scale) of the sensor input minimum range. Confirm the correct input type is selected for the attached sensor. Check the sensor setting state.

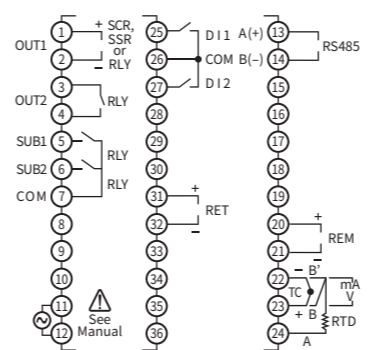
Error messages are displayed on PV display window. For a complete list of error messages, refer to the instruction manual available at www.predig.com.

Installation & Connections

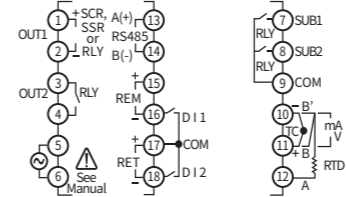
Install Panel Mount Brackets



PD520 (1/8 DIN)



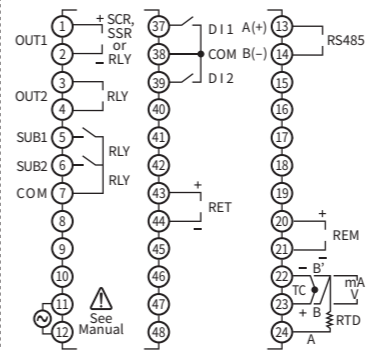
PD510 (1/16 DIN)



4-20 mA Input Connections

To achieve the highest accuracy with a 4-20 mA input to the controller, connect a 250 Ω (0.1% or higher precision) resistor across the input terminals. The 250 Ω (1%) resistor included with the product is not a precision resistor. For precision resistor, order PDX-RES2.

PD530 (1/4 DIN)



Input Sensor Types and Ranges

Input Device	Type	Parameter set value Screen display	Temperature range		Tolerance		
			°C	°F			
Thermocouple	K	K0	-200 to 1370	-328 to 2498	±0.2% of FS ±1 digit		
		K1	-100.0 to 500.0	-148 to 932			
	J	J0	-200 to 1200	-328 to 2192			
		J1	-199.9 to 900.0	-328 to 1652			
	E	E1	-199.9 to 900.0	-328 to 1652			
		T	T1	-199.9 to 400.0		-328 to 752	
	R	R0	0 to 1700	32 to 3092			
		B	B0	100 to 1800		212 to 3272	
	RTD	S	S0	0 to 1700		32 to 3092	±0.2% of FS ±1 digit
			L	-199.9 to 900.0		-328 to 1652	
N		N0	-200 to 1300	-328 to 2372			
		U	-199.9 to 400.0	-328 to 752			
W		W0	0 to 2300	32 to 4172			
		PLII	PL0	0 to 1300	32 to 2372		
RTD	JP100	JP10	-200 to 500	-328 to 932	±0.2% of FS ±1 digit		
		JP11	-199.9 to 500.0	-328 to 932			
	Pt100	P10	-200 to 640	-328 to 1184			
		P11	-199.9 to 640.0	-328 to 1184			

Direct current and voltage

Classification	Type	Parameter set value Screen display	Range	Tolerance
Direct voltage (VDC / mV DC)	1-5 V	1-5 V		
	0-5 V	5 V		
	0-10 V	10 V		
	0-50 mV	0.05 V		
	0-100 mV	0.1 V		

(1) To achieve the highest accuracy with a 4-20 mA input to the controller, connect a 250 Ω (0.1% or higher precision) resistor across the input terminals. The 250 Ω (1%) resistor included with the product is not a precision resistor. For precision resistor, order PDX-RES2.

Alarm Type (An.TY) and Alarm Operation Description

The light grey area represents the alarm deadband, An.DB. ▲: AL-n Alarm value. This is the specific PV value, or for deviation alarms the deviation amount from the SV, when the alarm activates. Δ: Set value. For deviation alarms only. Alarm types in parenthesis () include standby sequence.

An.TY No.	Alarm type	Alarm operation	Absolute alarm	Deviation alarm
0	Alarm off	-	-	-
1	High absolute		○	
(7)	High absolute with standby sequence		○	
2	Low absolute		○	
(8)	Low absolute with standby sequence		○	
3	High deviation			○
(9)	High deviation with standby sequence			○
4	Low deviation			○
(10)	Low deviation with standby sequence			○
5	High-Low deviation			○
(11)	High-Low deviation with standby sequence			○
6	High-Low range			○
(12)	High-Low range with standby sequence			○
13	Sensor error	Burn-out	○	

Quick Start Programming Instructions

1. Select Input Type

A. Press & hold the MD button for 1 second to enter the programming menu. *Programming note: In programming mode, the PV display shows the setup parameter group, and the SV display shows the group # (GP##), for reference during navigation.*

- Press the DOWN arrow button to navigate to the Input group (G.IN, GP09)
 - Press the SET button to enter the Input group.
- Displayed parameter INP is used to select the input type.
 - Press SET to change the input type.
 - Use the UP and DOWN arrow buttons to select the desired input type. See the table on page 1 under Input Type Parameters (INP), Input Sensor Types and Ranges, and select the desired input type by choosing the appropriate Screen display for the desired input type.
 - Programming note: Changing the INP parameter may change other settings in the controller!

Example 1: To select a high temperature range J type thermocouple input, press the UP arrow several times until J0 is displayed and blinking in the SV window. Then press the SET button.

Example 2: To select a 4-20 mA input, press the UP arrow several times until 1-5V is displayed and blinking in the SV window. Then press the SET button.

Programming note: Current inputs require a 250-ohm resistor across the input terminals.

D. Displayed parameter UNIT is used to select the temperature units.

- Press SET to change the temperate units to °F or °C.
- Use the UP and DOWN arrows to select the desired unit.

iii. Press the SET button to confirm the desired unit. *Programming note: Temperature units may be selected even when using a voltage or current input for a PV that is not temperature. In this case, the temperature units will have no impact on programming or operation.*

E. If voltage or current inputs were selected, set the decimal point and scale them appropriately.

- After selecting the unit type above, the displayed parameter is DP-P.
- Press SET to change the number of displayed decimal places.
- Use the UP and DOWN arrow to select how many decimal places (0-3) will be used for the scaled PV.

c. Press SET to confirm the number of decimal places. *Displayed parameter SL-H is used to scale the high input limit display value.*

d. Press SET to change the high input display value.

e. Use the UP, DOWN, and LEFT arrows to select a digit, and change the value to set the desired display value at the high input limit.

f. Press Set to confirm this new value.

- Displayed parameter SL-L is used to scale the low input limit display value.

a. Press SET to change the low input display value.

b. Use the UP, DOWN, and LEFT arrows to select a digit, and change the value to set the desired display value at the low input limit.

c. Press Set to confirm this new value. *Example: When using a 4-20 mA input, with parameter INP set to 1-5V and an external resistor installed, the following settings would be used to display 0.0 at 4 mA and 250.0 at 20 mA.*

Parameter	Setting Value	Description
INP (Input)	1-5V	1-5V for use with 4-20 mA inputs
DP-P (Decimal Place)	1	1 decimal place in PV and SV scaling.
SL-H (Scale - High)	250.0	Display 250.0 at 20 mA
SL-L (Scale - Low)	0.0	Display 0.0 mA at 0 mA

2. Configure the Control Output - Output 1

A. Setup 4-20 mA PID Output (PD5X0-A Models) *Most settings are configured by default to use Output 1 (CNT1) as a 4-20 mA output for PID control. By default, Output 1, the 4-20 mA output for PID control, is set for Reverse acting. This means the output will increase to drive up the PV (E.g. Heating).*

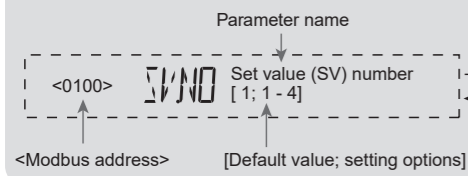
To set the output for direct acting, so the output will increase to drive down the PV (E.g. Cooling), follow the steps below.

- Press & hold the MD button for 1 second to enter the programming menu.
- Press the DOWN arrow two times to navigate to the Output group (G.OUT, GP08).
- Press the SET button to enter the Output group. Press the DOWN arrow once to display the CNT2 parameter.
- Press the SET button to change the CNT2 parameter.
- Press the DOWN arrow several times until the setting is NONE.

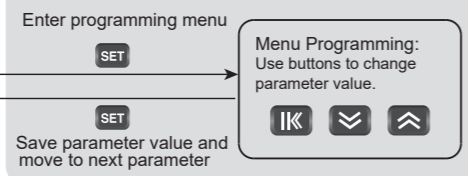
(Continued on Back)

Parameter Configuration

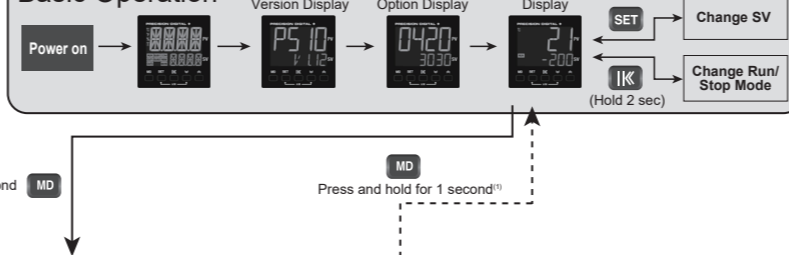
How to Read Parameters Listed Below



How to Change Parameter Values



Basic Operation



Programming Menu: press and hold MD for 1 second

SV group <0100> SVND > Set value (SV) number > [1, 1-4] <0101> SV-H > Set value (SV) high limit > [1370, refer to input range] <0102> SV-L > Set value (SV) low limit > [-200, refer to input range] <0103> SV-1 > Set value 1 (SV 1) > [-200, refer to input range] <0104> SV-2 > Set value 2 (SV 2) > [-200, refer to input range] <0105> SV-3 > Set value 3 (SV 3) > [-200, refer to input range] <0106> SV-4 > Set value 4 (SV 4) > [-200, refer to input range] <a+0> nP > n. proportional band (heating) > [EUS 5.0%] <a+1> nI > n. integral time (heating) > [240, OFF or 1-6000] <a+2> nD > n. derivative time (heating) > [60, OFF or 1-6000] <a+3> nMP > n. manual reset > [50.0, -5.0 to 105.0] <a+4> nPC > n. proportional band (cooling) > [EUS 5.0%] <a+5> nIC > n. integral time (cooling) > [240, OFF or 1-6000] <a+6> nDC > n. derivative time (cooling) > [60, OFF or 1-6000] <a+8> nDB > n. heating/cooling deadband > [3.0, -100.0 to 50.0]	CONTROL group <0200> ATND > Auto-tuning mode > [STND, STND or LOW] <0207> AT > Auto-tuning (AT) > [OFF, OFF or ON] <0208> ARW > Anti-reset wind-up (ARW) > [Auto, Auto or 50.0-200.0] <0209> ALPA > Alpha > [50, 0-100] <a=0210> PID1 > 1.PID group <a=0219> PID2 > 2.PID group <a=0228> PID3 > 3.PID group <a=0237> PID4 > 4.PID group <0246> RMPU > Ramp-up > [OFF, refer to input range] <0247> RMPU > Ramp-up time > [01.00, 00.01-99.59] <0248> RMPD > Ramp-down > [OFF, refer to input range] <0249> RMPD > Ramp-down time > [01.00, 00.01-99.59] <0250> MVBL > MV Bumpless > [ON, OFF or ON]	ALARM group <0300+(n-1)x4> ALTY > Alarm n type > [0-13] <0301+(n-1)x4> ALN > Alarm n value <0302+(n-1)x4> ALDB > Alarm n deadband > [1] <0303+(n-1)x4> ALNS > Alarm n output hold status > [RST, RST or SET] <0316> LBTM > Loop break alarm time > [480, 0-7200] <0317> LBSV > Loop break alarm set value > [2, EUS 0.0-5.0%] <0318> LBDL > Loop break alarm deadband > [2, EUS 0.0-5.0%] <0319> LBSH > Loop break alarm output hold status > [RST, RST or SET] <0320> HBA1 > Heater break alarm 1 set value > [OFF, 1.0-50.0] <0321> HBD1 > Heater break alarm 1 deadband > [0.5, 0.1-50.0] <0015> CTM1 > Current detection 1 monitoring > [0.0, 0.0-55.0] <0322> HBA2 > Heater break alarm 2 set value > [OFF, 1.0-50.0] <0323> HBD2 > Heater break alarm 2 deadband > [0.5, 0.1-50.0] <0016> CTM2 > Current detection 2 monitoring > [0.0, 0.0-55.0] <0324> HBS > Heater break alarm output hold status > [RST, RST or SET]	TRANS group <0400> RETT > Retransmission output type > [PV, PV/SV/MV] <0401> TSH > Retransmission output high limit > [1370] <0402> TSL > Retransmission output low limit > [-200] <0403> T-AH > Retransm. output high adjust. value > [0] <0404> T-AL > Retransm. output low adjust. value > [0] <0405> REME > Enable remote input > [OFF, OFF or ON] <0406> REMH > Remote input high limit > [5.000, 1.000-5.000] <0407> REML > Remote input low limit > [1.000, 1.000-5.000] <0408> RSH > Remote input high scale value > [1370] <0409> RSL > Remote input low scale value > [-200] <0410> RAH > Remote input high adjust. value > [0] <0411> RAL > Remote input low adjust. value > [0]	SUB group <0500> SUB1 > Sub 1 output type > [ALM1] <0501> SUB2 > Sub 2 output type > [ALM2] <0502> SUB3 > Sub 3 output type > [ALM3] <0503> SUB4 > Sub 4 output type > [ALM4] <0504+(n-1)x4> ANND > Alarm n ON delay time > [0, 0-999] <0505+(n-1)x4> ANFD > Alarm n OFF delay time > [0, 0-999] <0506+(n-1)x4> ANCC > Alarm n contact type > [N.O, N.O or N.C] <0507+(n-1)x4> ANLT > Alarm n output hold > [OFF, OFF or ON] <0520> LBN1 > Loop break alarm ON delay time > [0, 0-999] <0521> LBF1 > Loop break alarm OFF delay time > [0, 0-999] <0522> LBC1 > Loop break alarm contact type > [N.O, N.O or N.C] <0523> LBL1 > Loop break alarm output hold > [OFF, OFF or ON] <0524> HBE2 > Enable heater break alarm 2 > [OFF, OFF or ON] <0525> HBN2 > Heater break alarm ON delay time > [0, 0-999] <0526> HBF2 > Heater break alarm OFF delay time > [0, 0-999] <0527> HBC2 > Heater break alarm contact type > [N.O, N.O or N.C] <0528> HBL2 > Heater break alarm output hold > [OFF, OFF or ON]
INPUT group <0900> INP > Input type > [K0] <0901> UNIT > Unit > [°C] <0904> DP-P > Decimal point position > [1] <0905> SL-H > Scale high limit > [100.0, -1999 to 9999] <0906> SL-L > Scale low limit > [0.0, -1999 to 9999] <0907> RJC > Reference junction compensation > [ON, OFF or ON] <0908> FILT > Input filter > [OFF, OFF or 1-120] <0909> BIAS > Input bias > [0]	OUTPUT group <0800> CNT1 > OUT1 control mode > [PID, ONOFF or PID] <0801> CNT2 > OUT2 control mode > [PID, NONE/ONOFF/PID] <0802> OACT > Control direction > [REV, REV or DIR] <0803> CP > Control cycle (OUT1) <0804> CPC > Control cycle (OUT2) <0805> HYS > ON/OFF control hysteresis (OUT1) > [1] <0806> HYS > ON/OFF control hysteresis (OUT2) > [1] <0807> EO > Emergency output (OUT1) > [0.0] <0808> EOC > Emergency output (OUT2) > [0.0] <0809> OL-H > Control output high limit > [100] <0810> OL-L > Control output low limit > [0.0]	SET group <0700> DIMD > Digital input mode > [OFF, OFF or ON] <0701> PDOM > Operation mode after power on > [RUN, STOP or RUN] <0702> PINT > Parameter initialization > [OFF, OFF or ON] <0703> LOCK > Parameter set value lock > [0, 0-2] <0704> EEP > EEPROM lock during operation > [OFF, OFF or ON] <0041> SYS > System data > [0000-FFFF] <0042> OPT > Option data > [0000-FFFF] <0045> FVER > Firmware version > [V0.00-Vx.xx]	COMM group <0600> PPS > Communication protocol > [PCK] <0601> BPS > Baud rate > [9.6K] <0602> PPI > Parity bit > [NONE] <0603> STOP > Stop bit > [1, 1 or 2] <0604> LEN > Data length > [8, 7 or 8] <0605> ADDR > Address > [1, 1-99] <0606> RPTM > Response delay time > [0, 0-10]	

For More Information or to Download Programming Software visit www.predig.com

Notes:
The parameter display differs depending on suffix code options and parameter settings. Refer to the complete instruction manual available at www.predig.com.

- (1) To exit the programming menu, hold MD for 1 second.
- (2) To return to the Group menu when displaying programming parameters, press MD.

(Continued from Front)

- vi. Press the SET button to change the CNT2 parameter to none.
- vii. Press the DOWN arrow several times to navigate to the O.ACT parameter.
- viii. Press the SET button to change the O.ACT setting.
- ix. Press the UP arrow to select DIR.
- x. Press the SET button to select direct acting.

B. Setup Relay or SSR On/Off Output (PD5X0-R or PD5X0-S Models)
Output 1 is configured by default for time-proportional PID control. This process will program Output 1 (Solid State Relay (SSR) or Relay) to be used for On/Off control, and disable PID control.

- i. Press & hold the MD button for 1 second to enter the programming menu.
- ii. Press the DOWN arrow several times to navigate to the Output group (G.OUT, GP08)
- iii. Press the SET button to enter the Output group.
- iv. Press the SET arrow to change the CNT1 parameter.
- v. Press the DOWN arrow to change the parameter to ONOF.
- vi. Press the SET button to confirm on/off control.
- vii. Press the DOWN arrow one or two times to navigate to the HYS parameter.
- viii. Press the SET button to change the HYS setting.
- ix. Use the UP, DOWN, and LEFT arrows to enter the hysteresis value (or deadband) for On/Off control around the Set Value.
- x. Press the SET button to confirm the hysteresis value.

By default, Output 1, the On/Off control relay, is set for Reverse acting. Use Reverse acting mode if the output turning on will drive up the PV (E.g. Heating). To change the operating direction of the output, see above.

C. Setup SSR Time-Proportional PID Output (PD5X0-S Models)
Most settings are configured by default to use Output 1 (CNT1) as a time-proportional output for PID control.

- i. Press & hold the MD button for 1 second to enter the programming menu.
- ii. Press the DOWN arrow several times to navigate to the Output group (G.OUT, GP08)
- iii. Press the SET button to enter the Output group.
- iv. Press the DOWN arrow several times to navigate to the CP parameter.
- v. Press the SET button to change the CP setting.
- vi. Use the UP, DOWN, and LEFT arrows to enter the Control Period – the total time for one On/Off cycle, in seconds.
- vii. Press the SET button to confirm the Control Period value.

By default, Output 1, the SSR output for PID control, is set for Reverse acting. This means the output will increase to drive up the PV (E.g. Heating). To change the operating direction of the output, see above.

3. Configure Alarms & SUB Relays

Configuring relay alarms is a two-step process. First, configure the alarms themselves. Then, assign those alarms to relays SUB1, SUB2, etc. By default, alarm 1 (ALM1) is assigned to relay SUB1, etc. The following instructions explain how to configure alarm 1 (ALM1) in the Alarm group (G.ALM) and SUB Output group (G.SUB).

- A. Press & hold the MD button for 1 second to enter the programming menu.
- B. Press the UP arrow two times to navigate to the Alarm group (G.ALM, GP03)
- C. Press the SET button to enter the Alarm group.
- D. Press the SET arrow to change the Alarm 1 Type A1.TY parameter.
- E. Press the UP and DOWN arrows to select the alarm type number that corresponds to the desired alarm type. See Alarm Type and Alarm Operation Description in this Quick Start Guide for details.
- i. Setup a High Alarm for SUB1 Relay

The following setup instructions will program alarm 1 as a high alarm which is assigned by default to SUB1 relay.

- a. Select alarm type number 1 at the A1.TY parameter to select the High absolute value alarm type.
- b. Press the SET button to confirm alarm type 1.
- c. Press the SET button to change parameter alarm value parameter AL-1.
- d. Use the UP, DOWN, and LEFT arrows to program the value for the high alarm in the engineering units of the PV.
- e. Press the SET button to confirm the new absolute alarm set point.
- f. Press the SET button to change parameter alarm deadband A1.DB.
- g. Use the UP, DOWN, and LEFT arrows to program the value for the high alarm deadband in the engineering units of the PV. This is not the reset value, but the difference between the alarm set point and the reset point.
- h. Press the SET button to confirm the new value for the deadband.

4. Auto-Tune (PID Control Models Only, Not Applicable for On/Off Control)

Programming Note: Beginning an auto-tune should be the last step in programming. Program all other parameters that impact the input, PV, SV, and output configuration before engaging auto-tune.

- A. From the run mode screen, use the UP, DOWN, and LEFT arrows to program a set value (SV) in the range of what is expected during normal operation.
 - B. Press and hold the SET and UP keys together for 3 seconds to initiate auto-tuning.
- Programming Note: The auto-tuning cycle consists of several cycles; each causing the PV to overshoot and undershoot the SV. The PID output will switch between 0 and 100% during auto-tuning. It will only begin controlling with other output levels after the auto-tuning process is complete.