

Operator Pushbuttons and Indicators

ISO 9001 Certified
 Quality Construction and Reliability
 Manufactured with SMT and verified with long burn-in times and temperature cycling, the 1603 is guaranteed for reliability and long, maintenance-free service.

Indicators Red LEDs
 ALM Alarm condition exists
 OUT Load output is on

Lower Display
 (3 Orange 7-Segment LEDs)
 For set point value. During configuration, shows the code of the selected parameter.

NEMA 4X Splashproof Front Faceplate

Upper Display
 (3 Green 7-Segment LEDs)
 For process temperature. During configuration, shows the programmed value of selected parameter.

Programming Security Levels
 Access to programmed parameters is protected by 4 security levels:
 Level 1 Set point and SMART self-tuning
 Level 2 All control parameters and alarm setpoint
 Level 3 Main configuration level
 Level 4 Special functions configuration

Indicator Red LED
 SMART SMART tuning is active

Large Target Pushbuttons Simplify Operator Adjustments



Enables SMART self-tuning. During configuration, scrolls back parameters without storing them.



Decrease/Increase Parameter Values



Scrolls parameter display forward and stores previous parameter value.

Operator Parameters

Push the FUNC pushbutton. The lower display will show the cue while the upper display will show the value of the selected parameter.

Cue	Description
SP	Setpoint—range set at P1-Sensor Selection. May be limited by setting low and high limits at P2 and P3 (see configuration parameters).
nnn	Security code for parameter protection.
AL	Alarm setpoint—range set at P1-sensor selection. May be limited by setting low and high limits at P2 and P3 (see configuration parameters).
HSA	Alarm hysteresis—deadband range from 0.1 to 10.0 %.
Pb	Proportional band—range from 1.0 to 99.9 % of span; when Pb = 0 the instrument performs as an ON/OFF control and TI, TD, C, C2 rC, OLP, OLh and tOL parameters are skipped.
HS	hysteresis (deadband for ON/OFF control action Pb = 0)—range from 0.1 to 10 % of input span.
ti	Integral time—range from 1 minute and 20 seconds to 20 minutes and 0 seconds (minutes. seconds); above the upper limit the display blanks out and the integral action is excluded.

Cue	Description
td	Derivative time—range from 0.00 to 9.59 (minutes. seconds).
C	Heating cycle time—range from 1 to 200 seconds (30 seconds or greater recommended for relay outputs).
C2	Cooling cycle time—range from 1 to 200 seconds (30 seconds or greater recommended for relay outputs).
rC	Relative cooling gain—range from 0.20 to 1.00.
OLP	Dead zone/Overlap—range from -20% to +50% of the proportional band.
rL	SP min. value—range (low limit) from the initial scale value (P2) to rH value.
rH	SP max value—range (high limit) from the rL value to the full scale value (P3).
OLH	Output power maximum value—range 0 to 100% heating, -100 to 100% heat/cool, limits power continuously (tOL = Inf)
tOL	Time interval for OLH power output limit, range 1 to 100 minutes or "Inf" infinite. The timer starts if the actual temperature is less than P15 (threshold value).

Configuration Codes

P1 - Input Type and Standard Range

0	= TC type	L	range	0 / +800 °C
1	= TC type	J	range	0 / +800 °C
2	= TC type	K	range	0 / +999 °C
3	= TC type	N	range	0 / +999 °C
4	= RTD type	Pt 100	range	-199 / +500 °C
5	= RTD type	Pt 100	range	-19.9 / +99.9 °C
8	= TC type	L	range	0 / +999 °F
9	= TC type	J	range	0 / +999 °F
10	= TC type	K	range	0 / +999 °F
11	= TC type	N	range	0 / +999 °F
12	= RTD type	Pt 100	range	-199 / +999 °F

Note: To set the display for °C engineering units, place the °C sticker label on the instrument faceplate. The label is located in the Operator Mode section of this manual.

P2 = Initial Scale Value

Not present when P1 = 5

Enter the initial and full scale values which are going to be used by the PID algorithm to calculate the input span.

P3 = Full Scale Value

Not present when P1 = 5

Enter the initial and full scale values which are going to be used by the PID algorithm to calculate the input span.

Note: The minimum input span (P3 - P2) is 300°C or 600°F for TC input and 100°C or 200°F for RTD input.

P4 = Main Output Action

The 1603 skips this parameter when P5 = 5 (cooling)

r = reverse action (heating)
d = direct action (cooling)

P5 = Output 2 Functions

0 = None

- 1 = Process alarm (absolute)
- 2 = Band alarm (+ and - deviation)
- 3 = Deviation alarm (+ or - deviation)
- 4 = Instrument failure indicator (under- or over-range, CJC or A-D converter failure)
- 5 = Cooling output

Note: When P5 = 5, the P4 parameter is forced to "r".

P6 = Output 2 Operative Mode

This parameter is present only if P5 is set to 1, 2, 3 or 5.

If P5 = 1, 2 or 3 set

- H = high alarm
- L = low alarm.

If P5 = 5 this parameter selects the cooling medium.

- Air = Air
- OIL = Oil
- H2O = Water

Note: Selection of the cooling medium automatically modifies the relative cooling gain and the cooling cycle time.

P7 = Alarm Action

Present only when P5 is different from 0 or 5.

- r = reverse (relay de-energized in alarm condition)
- d = direct (relay energized in alarm condition)

P8 = Alarm Inhibit

Present only when P5 is different from 0, 4 or 5.

- OFF = Inhibit disabled
- ON = Inhibit enabled

Note: The alarm inhibit function disables the alarm indication at start up and/or after a setpoint change until the process temperature setpoint passes the alarm setpoint.

P9 = OFFSET Applied to the Measured Temperature

This OFFSET is applied along the whole range.

When P1 = 5 P9 is programmable from -19.9 to 19.9 °C.

When P1 ≠ 5 P9 is programmable from -199 to 199 °C or °F.

P10 = Threshold of the "Soft Start" Function

Enter the Threshold value, in °C or °F, for the automatic start of the "Soft Start" function (limiting output power). If the unit powers up below the Threshold value, the "Soft Start" function is enabled and limits the power output to "OLH" for "tOL" minutes. "OLH" and "tOL" are set in the Operator Mode.

P11 = User Defined Security Code

0 = Security lock disabled. All Operator Mode parameters can be modified.

1 = Security lock enabled. No parameters can be modified except the setpoint.

2 to 499 = Select the security code (to be stored).

During the "Operator Mode" the security code setting will display:

- a.

OFF
n n n

 The device is "Unlocked" and all parameters can be modified.
To make the device "Locked," insert a number different from the security code. Now none of the parameters can be modified except the SP.
- b.

ON
n n n

 The device is "locked" and none of the parameters can be modified except the SP.
To "Unlock" the device, insert the security code.

500 to 999 = Selecting a security code between these two numbers, everything will occur as explained above except that when the device is "Locked" the only parameters that can be modified are the setpoint and the alarm setpoint.

P12 = Output Maximum Rate of Rise

Limits the output rate of rise to 1 to 10 % of the output value per second. Setting a value greater than 10% per second the instrument shows "InF" and no ramp limitation is applied.

End of Configuration

Push FUNC when configuration is completed. ". . . ." will be shown in both displays.

To restart Configuration

Push FUNC to begin the Configuration Mode.

SMART Function

The SMART function automatically calculates the optimum PID control parameters. To enable the SMART function, push the SMART pushbutton when the instrument is in normal display mode. The SMART LED will light or flash according to the algorithm automatically selected. When the SMART function is enabled, it is possible to display but not to modify the control parameters (PB, TI, TD and rC). When the traditional control (PID) is desired, push the SMART pushbutton again to turn the "SMART" OFF. The instrument maintains the last set of SMART calculated control parameters and allows parameters to be adjusted.

Note:

1. When ON/OFF control is programmed (PB = 0), the SMART function is disabled.
2. The SMART enable/disable is protected by the security lock.