MODEL 1630
Microprocessor-Based Oxygen Controller

OXYGEN SENSOR

CONTROLLER

*** ESD recommends reading this section thoroughly before proceeding.

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MODEL 1630
OXYGEN CONTROLLER
Microprocessor Based for Atmospheric Oxygen

The model 1630 oxygen controller utilizes a unique galvanic sensor to measure up to 100% oxygen concentration in an atmospheric environment. The standard sensor with a five-foot cable, is a rugged cell, totally sealed from the environment. Custom cable lengths, up to 100 feet, are available.

The sensor can withstand a maximum pressure limit of 25 psi. There is no membrane replacement or maintenance of the sensor during its expected life of 4-5 years making the sensor virtually maintenance free. The sensor is temperature compensated and is totally sealed from the environment. No flow is needed for atmospheric oxygen.

The latest in microprocessor and surface-mount technology is provided with an unprecedented number of standard features in an economical 1/4-DIN package. All control functions are programable from the front panel.

Self diagnosis with indication of faults is standard. Nonvolatile memory retains all process parameters when power is off without alarm actions. An alarm start-up inhibit feature is available to suspend the alarm function on power-up if the alarm condition no longer exists.

WARNING!! WARNING!! WARNING!!

The most delicate and vulnerable part of the sensor is the cell membrane. DO NOT scratch, puncture or permit sharp objects to touch the cell face. permit sharp objects to touch the cell face. Sensor failure due to mishandling will void the sensor warranty.

SENSOR INSTRUCTIONS

Preparation: The sensor is always operating and does not require a warm-up or break-in period. Insert the sensor cable plug firmly into the phone jack at the rear of the controller.

Calibration: Expose the sensor to fresh air or a known calibration gas and adjust the calibration potentiometer to make the controller read 20.9%. The controller is now calibrated. Measuring Percent Concentration: The controller will indicate the percentage concentration of oxygen in an atmospheric environment. You can increase the accuracy of your reading by calibrating the meter to a known standard close to the area in which you expect your readings to be. For example, if you want to measure an atmosphere around 70% oxygen, calibrate the meter to a known gas concentration in the range of 60% to 80%.

SENSOR MAINTENANCE

To prolong the life of the sensor, DO NOT store in a warm or hot area. Even though the sensor may not be connected to the meter during storage, the sensor is working all the time because of its internal circuitry. Storing the sensor in a refrigerator during down periods will slow the kinetic energy of the cell, prolonging its life.

SENSOR REPLACEMENT

At some point in time, the sensing cell will fail and must be replaced. Failure is indicated by in stability and/or the inability to calibrate. Replacement cells are available from Engineered Systems & Designs, Inc.

CALIBRATION OF MODEL 1630

Set controller to zero by the following method:

Nitrogen Zero - to set the controller to zero, place the sensor in a 100% nitrogen atmosphere and allow the sensor to stabilize for five minutes. If the controller is not reading zero, adjust the zero potentiometer on the front panel so the controller reads zero. Remove the sensor from the nitrogen atmosphere. You are now ready to perform your next calibration procedure.

Calibrate to a known oxygen level:

The air around us contains 20.9% oxygen. You can use air or a known gas mixture to calibrate the controller. If using air, calibrate the controller to 20.9% oxygen using the calibrate percent potentiometer located on the front panel.

WARNING - SAFETY NOTICE - WARNING

In Some Modes of Operation, This Controller Is

NOT FAIL-SAFE!

"Fail-Safe" is defined as follows: In the event the sensor fails or loses calibration, an alarm will sound in a fail-safe instrument.

MODE 1 OF OPERATION FAIL-SAFE - The object of the process control in this mode is to cause an alarm when the percent oxygen drops below a given value; for example, 10%. When the sensor fails, its output goes to zero (0). Also, as the sensor ages, its signal level decreases. Thus, if the operator fails to re-calibrate on a periodic basis, the sensor will produce a signal lower than that for which the instrument is calibrated.

In both of these situations, failed sensor or non-recalibrated sensor, the signal produced by the sensor is falsely low. As an example, let's say we have a chamber in which we do not want the oxygen level to drop below 10%. The oxygen level in the chamber is known to be12%. Should either one of the two possible malfunctions occur with the sensor, the controller will see a signal from the sensor which is below 10% and an alarm occurs even though the actual percent oxygen is 12%. This is a fail-safe situation. The alarm is tripped even though the percent oxygen level is above the set-point but the sensor has failed.

MODE 2 OF OPERATION NON-FAIL SAFE-The object of the process control in this mode is to cause an alarm when the percent oxygen goes above a given value; for example, 30%. As with Mode 1, when the sensor fails or needs recalibration, it produces a false low signal. Thus, should the actual percent oxygen go above30%, the controller will not trip an alarm because the sensor is sending a false low signal. This is a failed non-safe situation.

If you find yourself needing a fail-safe process controller where you do not want the percent oxygen to exceed a certain value, you have a choice of two possible remedies. The first possible solution is to install a redundant oxygen controller and sensor as a back-up. Please be aware that this is not a 100% guarantee of a fail-safe operation.

There is always the chance that the back-up unit can fail simultaneously with the primary unit. The second possible solution is to verify the calibration of the controller on a frequent basis, say every 10, 30 or 60 minutes. The feasibility of calibration verification will depend on the dynamics of your process and must be determined by your engineering staff. Also, the frequency of verification will have to be determined for your process.

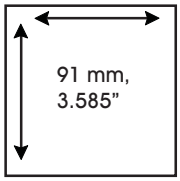
The verification process can be performed manually or it can be automated. Either method is still not 100% fail-safe. The manual method entails periodically placing the sensor in fresh air (20.9% oxygen) or a gas of known percent oxygen and visually verifying that the controller is reading correctly. If it is not, recalibrate the controller. There are two possible sources of error in this method. The first is the operator may not be diligent and forget to verify the calibration at the scheduled time. The second source of error is that there is always the possibility the sensor will have a catastrophic failure between scheduled verification times. An example of catastrophic failures is someone unknowingly unplugging the sensor or cutting the sensor cable in half. An automated verification procedure eliminates the possibility of human error but it still has two sources of possible malfunction. The first source of error is the failure of the automation hardware and the second source of error is, again, catastrophic sensor failure. Thus, there is no 100% sure method of a fail-safe operation when you do not want percent oxygen to exceed a given value.

Specifications

Set Point Range: Selectable
Displays: Two 4-digit, 7-segment, 0.3" high LEDs.
PV, process variable is red;
SV, set-point variable is green
Control Action: Reverse (low), Direct (high) selectable for single or dual set-point models.
On-Off Differential: Adjustable 0.2 counts to full scale in 0.1 steps.
Alarm ON-OFF Differential: 2 counts
Accuracy: +/-1% O2
Resolution: .1% O2
Common Mode Rejection: 140 db minimum at 60 Hz
Normal Mode Rejection: 65 db typical, 60 db at 60 Hz
Isolation: Relay and SSR outputs are isolated
Supply Voltage: 85 to 240 VAC, 50 through 400 Hz.
Power Consumption: 5 VA maximum
Operating Temperature: -10 to +55° C (+14 to 131° F)
Storage Temperature: -40 to +80° C (-40 to 176° F)
Humidity Conditions: 0 to 90% up to 40°C
non-condensing 10 to 50% at 55° C non-condensing
Memory Backup: Nonvolatile memory. No batteries required.
Control Output Ratings: SSR, 3.5 A @ 250 VAC at 25° C. Derates to 1.25 A @ 55° C.
Panel Cutout: 3.585" x 3.585"
Depth Behind Mounting Surface: 6.50"
Warranty: 1 year

Instalation

Mount the instrument in a location that will not be subject to excess temperature, shock or vi-bration. This model is designed for mounting in an enclosed panel.



Prepare the panel by cutting and deburring the required opening. From the front of the panel, slide the housing through the cut out. From the rear of the panel, slide the mounting bracket in the housing. With one hand, hold the housing and using the other hand, push the bracket evenly against the panel. Insert retaining screws behind bracket.

INPUT WIRING

Do not run the input (signal) wiring in the same conduit as the power wires.

Oxygen Controller - Model 1630
1. Line VAC
2. Line Common
3. Output A*
4. Output A
5. Output B*
6. Output B
7. Alarm **
8. Alarm

* Solid State Relay, 3.5A @ 250 VAC
** Relay Form A (SPST), 3A @ 250 VAC

Front Panel Key Functions

1. **INDEX**: Pressing the **INDEX** key advances the display to the next menu item. May also be used in conjunction with other keys as noted below.
2. **UP ARROW**: Increments a value, changes a menu item or selects the item to ON in the upper display.
3. **DOWN ARROW**: Decrements a value, changes a menu item or selects the item to OFF in the upper display.
4. **ENTER**: Pressing **ENTER** stores the value of the item changed. If not pressed, the previously stored value or item will be retained.
5. **UP ARROW & ENTER**: Pressing these keys simultaneously brings up the secondary menu starting at the auto/manual selection. Pressing these keys for 5 seconds will bring up the secure menu.
6. **INDEX & DOWN ARROW**: Pressing these keys simultaneously will allow backing up one menu item, or if at the first menu item they will cause the display to return to the primary menu. If an alarm condition has occurred, these keys may be used to reset the alarm.
7. **INDEX & ENTER**: Pressing these keys simultaneously and holding them for 5 seconds allows recovery from the various error messages. The following menu items will be reset:

LPbr: Loop Break
ALiH: Alarm inhibitb
Ad InP: Bad input error message
CHECK CAL: Check calibration error message
SEnC: Sensor rate of change
OPEnInP: Open input error message
ArEA: Area error message

Correct the problems associated with the above conditions first before using these reset keys. More than one error could be present. Caution is advised since several items are reset at one time.

While in the **Primary or Secondary menu**, if no key is pressed for a period of 30 seconds, the display will return to the HOME position displaying the PV and SV values. The time is increased to 1 minute when in the **Secure menu**.

NOTE: To move to the primary menu quickly from any other menu, press the **UP ARROW & ENTER** keys followed by pressing the **INDEX & DOWN ARROW** keys.

SECURITY LEVEL SELECTION

Four levels of security are provided. The display shows the current security level. To change security levels change the password value using the **UP & DOWN ARROW** keys and pressing the **ENTER** key. Refer to the password table on the following page for the correct value to enter for the security level desired. The **SECr** menu item security level may be viewed or changed at any time regardless of the present security level. The password values shown in the table cannot be altered, so retain a copy of that page for future reference.

This will be the only reference made of password values in this instruction booklet.

SECURITY LEVEL MENU	SECURITY	DISPLAYED VALUE WHEN VIEWED	PASSWORD VALUE TO
Primary	Locked	1	1110
Secondary	Locked		
Secure	Locked		
Primary	Unlocked	2	1101
Secondary	Locked		
Secure	Locked		
Primary	Unlocked	3	1011
Secondary	Unlocked		
Secure	Locked		
Primary	Unlocked	4	111
Secondary	Unlocked		
Secure	Unlocked		

PASSWORD TABLE

MENU SELECTION

PRIMARY MENU - Press **INDEX** to scan the Lower Display. Press **UP ARROW** or **DOWN ARROW** to change the value in the upper display.

SP1 - Set Point 1, Main Control Point

SP2 - Set Point 2, if equipped

SECONDARY MENU - Press **INDEX** to scan the Lower Display. Press **UP ARROW** or **DOWN ARROW** to change the value in the upper display.

AUTO Auto/Manual Control: Select ON or OFF

ON - Automatic Control

OFF - Manual Control is enabled. The lower display in the HOME position will display the output in percent for SP1 or SP2, and is adjustable for each from 0.0 to 100 percent. SP1 appears first with a flashing "o" on the right-hand corner of the lower display to represent percent. Press **INDEX** to display SP2 output. A flashing "o" will appear on the right-hand corner of the lower display to represent percent. When Manual is enabled, the present control outputs are held (bumpless transfer) and displayed. The output for SP1 or SP2 can then be manualy adjusted while displayed by pressing the **UP** or **DOWN ARROW** key to change the value, and then the **ENTER** key. The Upper display will normally indicate the Process Value. Since Manual will over ride fault message. Refer to the Diagnostic Error Message Section for further explanation.

ALLo Alarm Low: The Low Alarm point is usually set below the Main Set Point.

ALHi Alarm High: The High Alarm Point is usually set above the Main Set Point.

tunE Tuning Choice: Select **SELF**, **Pid**, **SLO**, **nor**, or **FASt**

SELF - The controller will evaluate the process and select the PID values to maintain good control. Active for SP1 only.

Strt - Select **YES** or **NO**

YES - Start Learning the Process. After the process has been learned the menu item will revert to **NO**.

LErn - Select **Cont** or **End**

Cont - Continuously adjust the PID values to maintain the best control. The process is being monitored at all times by collecting and analyzing the data to adjust the PID values (adaptive control).

End - The process data is collected once and then the PID values are saved, tuning is stopped.

dFAC - Damping factor, Select OFF, 1 to 7.Sets the ratio of Rate to Reset for the SELF tunE mode. 7 = most Rate. Factory set to 3. For a fast response process the value should be lowered (less Rate). For as slower process the value should be increased (more Rate).

Pid - Manually adjust the PID values. PID control consists of three basic parameters, Proportional Band (Gain), Reset Time (Integral), and Rate Time (Derivative).

Pb1 - Proportional Band (Bandwidth). Select .6 to 999.9 counts

Pb2 - Proportional Band (Bandwidth). Select .6 to999.9 counts

rES - Automatic Reset Time. Select **OFF**, **0.1** to **99.9** minutes. Select **OFF** to switch to **OFS**.

OFS - Manual Offset Correction. Select **OFF**, **0.1 to 99.9%**. Select **OFF** to switch to **rES**.

rtE - Rate Time. Select **OFF**, **0.01** to minutes, Derivative.

SLO PID Values are preset for a slow response process

nor PID values are preset for a normal response process

FASt PID values are preset for a fast response process

Pid2 Linkage of PID parameters between SP1 and SP2.

ON - Links SP2 to SP1 rEs and rtE terms for low/high applications.

OFF - SP2 functions without rEs and rtE.

ArUP Anti-Resest Wind-Up Feature: Select **ON** or **OFF**

ON - When ArUp is **ON** the accumulated Reset Offset value will be cleared to 0% when the process input is not within the Proportional Band.

OFF - When ArUP is **OFF**, the accumulated Reset Offset Value is retained in memory when the process is not within the Proportional Band.

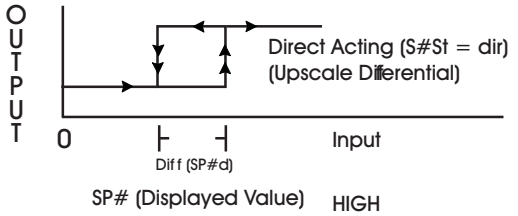
ArtE Approach Rate Time: **OFF**, **0.01** to **99.99** minutes. The function defines the amount of Rate applied when the input is outside of the Proportional Band. The ArtE time and the rtE time are independent and have no effect on each other. To increase damping effect and reduce overshoot, set the approach rate time for a value greater than the natural rise time of the process (natural rise time = process value time to set point).

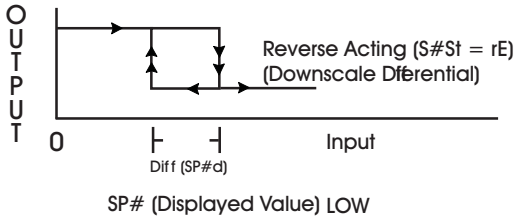
PEA Peak and Valley feature will remember the highest(PEA) and lowest (VAL) input the instrument has had since the last reset or Power On. At Power On, they are reset to the present input, and VAL therefore may have to be manually reset. To manually reset the value, PEA or VAL must be in the lower display and then press the ENTER key. This will cause the Item to be reset to the present input value.

In the following, the symbol "#" will be used to refer to either a number "1" or number "2". The "1" will relate to SP1 functions, the "2" for SP2. If your control is not equipped with a second set point, no SP2 functions will appear. The appearance of CY#, SP#d or PUL# is dependent upon the output type selected in the Secure Menu item S#Ot. If time proportioning (cycle time) was selected, then CY# is adjustable. If ON-OFF was selected, then SP#d is adjustable. If pulsed time proportioning was selected then PUL# is adjustable. If none of the above are selected the menu indexes directly to S#Ot.

CY# Cycle Rate: Select 2 to 80 sec. Time Proportioning Control is adjustable in 2 sec. steps. For best contact life, a time should be selected as long as possible without causing the process to wander.

SP#d Set Point ON-OFF Differential. Select .2 to 1.999 counts. When adjusting SP#d, keep in mind that SPL and SPH have to be considered to avoid a CHEC error message.





PUL# Pulsed Time Proportioning Output: Select 1 to 7. 1 = Linear and 7 = most non-linear.

S#Ot Set Point Output Type, FT
FT refers to Fast Time Proportioning, for Solid State Relay or 5V Logic Outputs. Timing is fixed at 1 sec.

PctO Percent Output Feature: Select ON or OFF.
ON - When selected ON, the HOME lowered display will indicate the output of the controller in percent. An "o" will appear in the right hand side of the lower display to indicate percent output for SP1. An "o" will appear on the right hand corner of the lower display to represent percent output for SP2. The display will alternate between these values.
OFF - Percent Output display is disabled.

Prog Ramp/Soak Feature: Select ON or OFF

StAt Status Display in the HOME position; Select ON or OFF. When selected OFF, the HOME display will alternately indicate the normal HOME and the Ramp/Soak partial status in the Lower Display. The partial status display sequences with the set value showing the ramp (S1rA) or soak (S1So) segment being processed at that moment. It will also show the Program output status if at Hold or OoFF. When selected ON, the HOME display will alternately indicate the normal HOME and Ramp/Soak full status in both the upper and lower displays. The full status display sequences with the set value; Program run, Hold or OoFF; and with the time remaining for the ramp S1rA or the soak S1So segments.

1rt Ramp Time in Hours and Minutes: Select 0.00 to 99.59(HH.MM).

1St Soak Time in Hours and Minutes: Select 0.00 to 99.59(HH.MM).

PEnd End of Soak action: Select HOLD or OoFF.
HOLD - Stay at the Present Set Point
OoFF - Turn OFF SP1 and SP2 Outputs at the End of the Soak.

InPC Set to 0.0

FiLt Digital Filter: Select OFF, 1 to 99. In some cases the time constant of the sensor, or noise could cause the display to jump enough to be unreadable. A setting of 2 is usually sufficient to provide enough filtering for most cases, (2 represents approximately a 1 second time constant). When the 0.1 degree resolution is selected, this should be increased to 4. If this value is set too high, controllability will suffer.

LPbr Loop Break Protection: Select OFF, 1 to 9999 seconds. If during operation, the output is minimum (0%) or maximum (100%), and the input moves less than 5 counts over the time set for LPbr, the **LOOP bAd** message will appear. This condition can also be routed to an Alarm Condition if alarms are present and turned On (see ALbr in the secure menu).The loop break error can be reset by pressing the ENTER key when at the LPbr menu item. The INDEX & ENTER keys may also be used.

Secure Menu

Hold UP ARROW & ENTER for 5 seconds. Press INDEX to change the lower display. Press UP ARROW or DOWN ARROW to change the value in the upper display.

SECr Security Code: See the Security Level Selection and the Password Table in this manual in order to enter the correct pass word.

InP Input Type: Select VoLt
VoLt DC Voltage Input 0.0 to 5.0 or 1.0 to 5.0 volts
_____ For Access to Calibration and FACt dFLt.

OSUP Zero Suppression: Select ON or OFF. Only with Voltage input types.
OFF - The input range will start at 0 (zero) Input
ON - The input range will start at 4.00 mA or 1.00 V

Unit None
nonE °F and°C descriptors will be OFF. This is only available with Current and Voltage Inputs.

dPt Decimal Point Positioning: Select 0, 0.0, 0.00 or 0.000. On temperature type inputs this will only effect the Process Value SP1, SP2, ALLo, ALHi, and InPC. For Current and Voltage Inputs, all Menu Items related to the Input will be affected.
0 - No decimal point is selected. This is available for all Input Types.
0.0 - One decimal place is available for Type J, K, E, T, L, RTD's, Current and Voltage Inputs.
0.00 - Two decimal places are only available for Current and Voltage Inputs
0.000 - Three decimal places are only available for Current and Voltage Inputs.

InPt Input Fault Timer: Select OFF, 0.1 to 540.0 minutes. Whenever an Input is out of range, shorted, or open the timer will start. When the time has elapsed, the controller will revert to a safe condition (Outputs Off, Flashing Displays). If OFF is selected, Input Fault Timer will not be recognized (time=infinite).

SEnC Sensor Rate of Change: Select OFF or counts per 1 second period. This value is usually set to be slightly greater than the fastest process response expected during a 1 second period, but measured for at least 2 seconds. If the process if faster than this setting, the SEnC bAd error message will appear. The outputs will then be turned off. Use the INDEX & ENTER keys to reset.

SCAL Set To: -1.0

SCAH Set to: +999.9

SPL Set Point Low: Select from SCAL value to SPH value. This will set the minimum SP1, SP2, ALLo, ALHi, SP1d, and SP2d values that can be entered. Ifany of the values are less than the SPH value, a check message will appear and the value will not be accepted.

SPH Set point High: Select from SCAH value to SPL value. This will set the maximum SP1, SP2, ALLo, ALHi, SP1d and SP2d values that can be entered. If any of the values are greater than the SPH value, a check message will appear and the value will not be accepted.

SP1o Set Point 1 Output Terminal Assignment: Select OutA or Outb. NOTE: Reassigning the output terminals does not change the Hardware type assigned to those terminals. For single set point models, SP1o is locked to OutA. OutA - Set Pt. 1 output will be directed to terminals 3 & 4 and Set Pt. 2 output to terminals 5 & 6.Outb Set Pt. 1 output will be directed to terminals 5 &6 and Set Pt.2 output to terminals 3 & 4.

S#Ot Set Point Output Type: Select CY, OnOF, PUL, or Ft. Fixed for Curr and Volt, the Hardware Configuration has selected this.
CY Cycle Rate, Adjustable Time Proportioning. CY# Cycle Rate Time: Select 2 to 80 sec.
OnOF On/Off Output
SP#d Set Point Differential in 1 count steps from 2 counts to full scale, but limited by SPL and SPH.
PUL Pulse Time Proportioning
PUL# Pulse Width Value: Select 1 to 7
Ft Fast Time Proportioning: Fixed at 1 sec. Time Base
Volt Proportional Voltage, 0 to 10V
Curr Proportional Current, 0 to 20 mA

S#St Set Point State: Select dir or rE.
dir - Direct Action: As the input increases the output will increase. Most commonly used in cooling processes.
rE - Reverse Action: As the input increases, the output will decrease. Most commonly used in heating processes.

S#OL Set Point Output Low Limit: Select 0 to 90% but less than S#OH. This item limits the lowest output value. This is useful for adding a bias to the process when needed. When a current or voltage output is used, the standard output value is 0 to 20 mA or 0 to 10V. If 4to 20 mA or 2 to 10V is required, the S#OL value should be set for 20% to raise the lowest output.

S#OH Set Point Output High Limit: Select 10 to 102% but greater than S#OL. This item allows setting the maximum output limit. This is useful with processes that are over powered.

S#LP Set Point Lamp: Select "O on" or "OoFF"
"O on" - Lamp ON when Output is ON
"OoFF" - Lamp OFF when Output is ON

S2t Set Point 2 type: Select Abs or dE
Abs - Absolute SP2. SP2 is independent of SP1, and maybe set anywhere between the limits of SPL and SPH.
dE - Deviation SP2. SP2 is set as a deviation from SP1 and allows SP2 to retain its relationship with SP1 when SP1 is changed (tracking SP2).

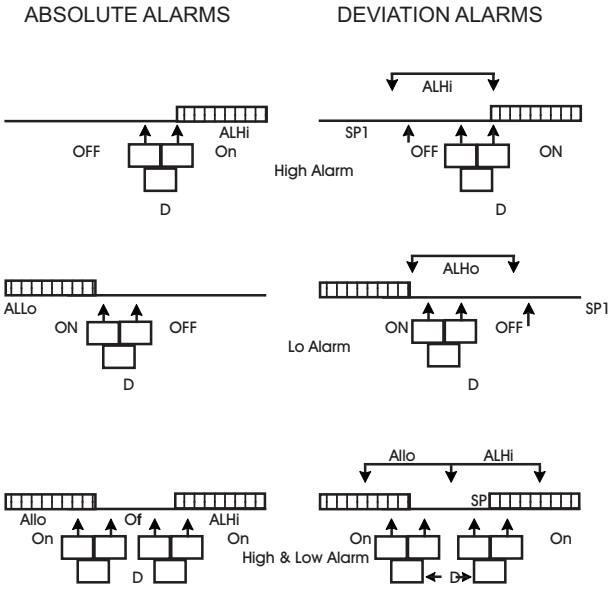
Alarm Type and Action (if present)
CAUTION: In any critical application where failure could cause expensive product loss or endanger personal safety, a redundant limit controller is recommended (See page 2, Safety Notice).

When setting an alarm value for an absolute alarm (ALt=AbS), simply set the value at which the alarm is to occur.

When setting the alarm value for a deviation alarm (ALt=dE), set the difference in value from the Set Value (SV) desired. For example, if a low alarm is required to be 5 counts below the SV, then set ALLo to -5. If a high alarm is required 20 counts above the SV, then set the ALHi to +20. If SP1 is changed, the alarm will continue to hold the same relationship as originally set.

When “Alarm Power Interrupt” ALPi is programmed ON and “Alarm Reset” is programmed for Hold, the alarm will automatically reset upon a power failure and subsequent restoration if no alarm condition is present.

If “Alarm Inhibit” ALHi is selected ON, an alarm condition is suspended upon power up until the process value passes through the alarm set point once. Alarm inhibit can be restored as if a power up took place by pressing together the INDEX and ENTER keys for 5 seconds. WARNING: Resetting a high alarm inhibit will not cause an alarm to occur if the Process Value does not first drop below the high alarm setting.



The following menu items apply only to the alarm:

AL Alarms: Select OFF, Lo, Hi or HiLo
OFF - Alarms are turned OFF. No alarm menu items appear in the Secondary and Secure Menus.
Lo - Low Alarm Only. ALLo appears in the Secondary Menu.
Hi - High Alarm Only. ALHi appears in the Secondary Menu.
HiLo - High and Low Alarms. Both share the same Alarm Relay output.

ALt Alarm Type: Select AbS or dE
AbS Absolute Alarm that may be set anywhere within the values of SPL and SPH and is independent of SP1.
dE - Deviation Alarm that may be set as an offset fromSP1. As SP1 is changed the Alarm Point will track with SP1.

ALrE Alarm Reset: Select OnOF or Hold
OnOf - Automatic Reset
Hold - Manual Reset. Acknowledge by simultaneously pressing the INDEX & DOWN ARROW keys for 5 seconds.

ALPi Alarm Power Interrupt: Select ON or OFF
ON - Alarm Power Interrupt is ON
OFF - Alarm Power Interrupt is OFF

ALiH Alarm Inhibit: Select ON or OFF
ON - Alarm Inhibit is ON. Alarm action is suspended
OFF - Alarm Inhibit is OFF

ALSt Alarm Output State: Select CLOS or OPEn
CLOS - Closes contacts at Alarm Set Point
OPEn - Opens contacts at Alarm Set Point

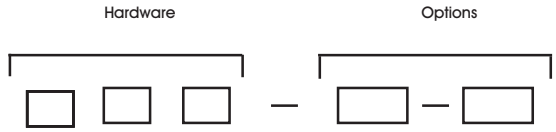
ALLP Alarm Lamp: Select O on or OoFF
O on - Alarm Lamp is ON when alarm contact is closed
OoFF - Alarm Lamp is OFF when alarm contact is closed

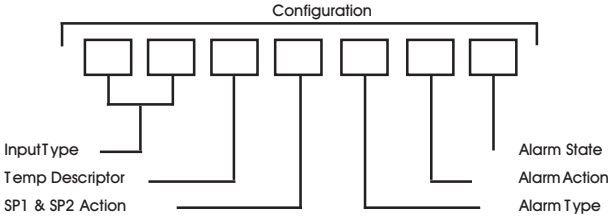
Albr Alarm Loop Break: Select ON or OFF
ON - Loop Break Condition will cause an Alarm Condition
OFF -Loop Break will not affect the Alarm Condition

CONFIGURATION MENU

If re-configuration is required, follow the instructions on this page. The Configuration Menu is used to quickly configure the instrument. The configuration for your particular model is shown on the Model/Serial label located on the top of the instrument housing. A label found inside on the right printed circuit board only shows the hardware configuration and options.

The numbers shown are defined as follows:





The Hardware Configuration Code MUST NOT be changed as it defines the hardware for the specific instrument. All other configurations may be altered if necessary. It is important that the codes be correctly entered in order for the instrument to function properly. If an invalid code number is entered for a particular configuration item, it will not be accepted and the old configuration code will retained.

TO RE-CONFIGURE:
1. At power up, simultaneously press and hold the INDEX & ENTER keys while the lamp test or self test is displayed. Hold the keys down until Hrd1 appears. A dash appears in the upper display.
2. Press the INDEX key to advance through the menu items. Pressing the INDEX & DOWN keys simultaneously will back up to a menu item. Stop at the menu item you wish to change.

To RE-CONFIGURE CONTINUED:

3. Press the UP or DOWN key to select the desired Configuration Code from the following chart.
4. Press ENTER to retain
5. Press INDEX to advance.
6. If you do not want to retain the re-configuration, this is your last chance to return to the old configuration. Press ENTER at **ACPt no** to exit and retain the old configuration.
7. Press ENTER at **AcPt YES** to retain the reconfiguration.

CONFIGURATION CHART

DO NOT change Hrd1, Hrd2 or Hrd3 to codes different from those on the controller labels. Codes in bodlface type indicate factory defaults.See FACt dFLt.

DISPLAY	MEMU ITEM	CONFIGURATION CODE
Hrd1	Alarm Hardware	1 = YES
Hrd2	Output A Hardware	1 = SSR/LOGIC
Hrd3	Output B Hardware	1 = SSR/LOGIC
CnF1	Input Type	25 = 0 to 5 VDC
CnF2	Temperature Descripto	0 = No Descriptor
CnF3	SP1 and SP2 Action	0 = SP1 = Output A, rev. act. (Single set point Models) 1 = SP1 = Output A, dir. act. (Single set point Models) 2 = SP1 = Output A, rev. act.; SP2 = Output B, dir. act. 3 = SP1 = Output B, rev. act.; SP2 = Output A, dir. act. 4 = SP1 = Output A, dir. act.; SP2 = Output B. rev. act. 5 = SP1 = Output B, dir. act.; SP2 = Output A, rev. act. 6 = SP1 = Output A, rev. act.; SP2 = Output B, rev. act. 7 = SP1 = Output B, rev. act.; SP2 = Output A, rev. act. 8 = SP1 = Output A, dir. act.; SP2 = Output B, dir. act. 9 = SP1 = Output B, dir. act.; SP2 = Output A. dir. act.
CnF4	Alarm Type	1 = Absolute High Alarm
CnF5	Alarm Type	1 = ON - OFF
CnF6	Alarm State	1 = Close at SP, LED flashing
AcPt	Accept Configuration	No = Retain old configuration. Press ENTER to exit. Yes = Accept configuration. Press ENTER to exit.
id##		Factory Identification. Not for customer use.
FACt dFL		Factory Default. Defaults configuration to factory codes shown in boldface type in the chart above.

WARNING: The Hardware configuration will be cleared and must be re-entered using the Hardware Configuration Code found on the Model/Serial label located on the top of the instrument housing. The configuration menu cannot be exited until valid Hardware codes are entered.

If factory default is desired, simultaneously press the ENTER & DOWN ARROW keys.

QUICK REFERENCE MENU CHART

The following MENU ITEMS are briefly described in the order that they will appear on the displays.
PRIMARY Menu - Press INDEX to scan the Lower Display. Press UP ARROW or DOWN ARROW to change the value in the upper display.

LOWER DISPLAY	UPPER DISPLAY	FUNCTION
####	####	"HOME" display. Upper display shows Process Variable, lower display shows Set Variable (SP1)
SP1	####	Set Point 1, Adjustable within the values of SPL and SPH
SP2	####	Set Point 2, Adjustable within the values of SPL and SPH

SECONDARY Menu. Hold UP ARROW & ENTER. Then press INDEX to change the lower display. Press UP ARROW or DOWN ARROW to change the value in the upper display.

Auto	On/OFF	Auto/Manual Control, On = Auto and OFF = Manual
ALLo	####	Low Alarm, Adjustable within the values of SPL and SPH
ALHi	###	High Alarm, Adjustable within the values of SPL and SPH
tunE	SELF	Self Tuning (see Strt, LErn, & dFAC)
	Pid	PID is set Manually, (see Pb, rES or OFS, & rtE)
	SLO	PID is preset for Slow Response Process
	nor	PID is preset for Normal Response Process
	FASt	PID is preset for a Fast Response Process

THESE MENUS ARE AVAILABLE ONLY IF tunE = SELF

Strt	YES	Restart the Learning of the Process
	no	Stay with the present Learned Parameters.
LErn	Cont	Continuously Learn the Process (Adaptive Tuning)
	End	Learn the Process once, then Hold Values
dFAC	#	OFF = Rate Term is Disabled, 1 = Min Rate to 7 = Max Rate

THESE MENUS ARE AVAILABLE ONLY IF tunE = PID

Pb1	####	Proportional Band 1, Select 6 to 5000°F, 3 to 2778°C, or 6 to 9999 counts for Current/Voltage
Pb2	####	Proportional Band 2, Select 6 to 5000°F, 3 to 2778°C, or 6 to 9999 counts for Current/Voltage
rES or OFS	##.#	Automatic Reset, Select OFF, 0.1 to 99.9 min Manul Reset, Select OFF, 0.1 to 99.9%
rtE	##.##	Rate Time, Select OFF, 0.01 to 99.99 min

LOWER DISPLAY	UPPER DISPLAY	FUNCTION
Pid2	On/OFF	Reset and rate applied to PB2 when ON
ArUP	On/OFF	Anti-Reset Wind-Up Feature is ON or OFF
ArtE	##.##	Approach Rate OFF, 0.01 to 99.99 min.
PEA	####	Peak (Highest) Input Value. Press "ENTER" to reset to present PV
VAL	####	Valley (Lowest) Input Value. Press "ENTER" to reset to present PV

LOWER DISPLAY	UPPER DISPLAY	FUNCTION
CY1	##	SP1 Cycle Rate, Time Proportioning. Select 2 to 80 sec.
or		
SP1d	####	SP1 On/OFF Differential, 2 to full scale degrees or count
or		
PUL1	#	SP1 Pulse Curve, 1 = Linear, 7 = Most non-linear
or		
S1Ot	Ft	SP1 Fast Time Proportioning. Fixed at 1 sec. Viewable Only.
	Curr	SP1 Proportional Current Output, Viewable Only
	Volt	SP1 Proportional Voltage Output, Viewable Only
CY2	##	SP2 Cycle Rate, TIme Proportioning. Select 2 to 80 sec.
or		
SP2d	####	SP2 On/OFF Differential, 2 to full scale degrees or counts
or		
PUL2	#	SP2 Pulse Curve, 1 = Linear, 7 = Most non-linear
or		
S2Ot	Ft	SP2 Fast Time Proportioning. Fixed at 1 sec. Viewable Only
	Curr	SP2 Proportional Current Output, Viewable Only.
	Volt	SP2 Proportional Voltage Output, Viewable Only.
PctO	On/OFF	Percent Output Feature is ON or OFF in “HOME” Display.
Prog	On/OFF	The Ramp/Soak Feature is ON or OFF.
StAt	On/OFF	Ramp/Soak Status is alternately displayed with the “HOME” position when Prog is On. ON = Full Status, OFF = Partial Status
1rt	##.##	Ramp Time in Hours: Minutes, Select 0.00 to 99.59 (HH.MM)
1St	##.##	Soak Time in Hours: Minutes, Select 0.00 to 99.59 (HH.MM)
PEnd	Hold	Hold the Set Point at the End of the Soak
	OoFF	Turn Off all the Outputs at the End of the Soak
InPC	####	Input Correction, Select +/- 500$_{o}$F, +/- 260$_{o}$C, or +/-1000 counts
FiLt	##	Digital Filter, Select OFF, 1 to 99.2 = 1 sec. Time Constant
LPbr	##	Loop Break Alarm Time, Select OFF, 1 to 9999 sec
SECr	1	No Menu Items May be Altered, (Full Security)
	2	Only Primary Menu Items may be Altered
	3	Only Primary and Secondary Menu Items may be Altered
	4	All Menus may be Altered, (No Security)
InP	VoLt	Voltage Input, 0 to 5 Volts
OSUP	On/OFF	0% or 20% Suppression for Current or Voltage inputs. OFF = 0 to 20mA or 0 to 5 V, ON = 4 to 20 mA or 1 to 5 V
Unit	nonE	No light is On, only Available with Voltage and Current Inputs
dPt	0.0	Available Only for Voltage
InPt	###.#	Input Fault Timer, Select OFF, 0.1 to 540.0 min
SEnC	####	Sensor Rate of Change, OFF, 1 to 4000 counts
SCAL	####	Minimum Scale Low. Viewable only for Thermocouple and RTD Inputs .Adjustable for Current and Voltage Inputs.
SCAH	####	Maximum Scale High. Viewable Only for Thermocouple and RTD inputs. Adjustable for Current and Voltage inputs.

LOWER DISPLAY	UPPER DISPLAY	FUNCTION
SPL	####	Minimum Adjustment for SP1, SP2, ALLo, ALHi, SP1d & SP2d
SPH	####	Maximum Adjustment for SP1, SP2, ALLo, ALHi, SP1d & SP2d
SP1o	OutA	Change SP1 and SP2 hardware outputs. OutA = SP1 to 3 & 4, SP2to 5 & 6
	Outb	Outb = SP1 to 5 & 6, SP2 = 3 & 4
S1Ot	OnOF	On/Off Differential hysteresis. Press ENTER to Adjust SP1d Value for 2 to full scale degrees or counts
S1St	dir	Direct Action, Usually for High Set Point
	rE	Reverse Action, Usually for Low Set Point
S1OL	##	SP1 Output Low Limit, 0 to 90%, but less than S1OH
S1OH	###	SP1 Output High Limit, 10 to 102%, but greater than S1OL
S1LP	O on	SP1 Lamp On with Output On.
	OoFF	SP1 Lamp Off with Output On.
S2T	AbS	Absolute Set Point 2 within SP1 and SPH
	dE	Deviation Set Point 2 from SP1, must be within SPL and SPH
S2Ot	OnOf	On/OFF Differential Hysteresis. Press ENTER to Adjust SP2d Value for 2 to full scale degrees or counts.
S2St	dir	Direct Action. Usually for High Set PointrEReverse Action, Usually for Low Set Point
S2OL	##	SP2 Output Low Limit, 0 to 90%, but less than S2OH
S2OH	###	SP2 Output High Limit, 10 to 102%, but greater than S2OL
S2LP	O on	SP2 Lamp On with Output On
	OoFF	SP2 Lamp Off with Output On
AL	Hi	High Alarm Only; the ALHi point will be adjustable
ALt	dE	Deviation Alarm Point from SP1, must be within SPL and SPH
ALre	OnOf	Automatic Alarm Reset, On/Off Type Alarm
ALPi	On/Off	Alarm Power Interrupt, Select ON or OFF
ALiH	On/Off	Alarm Inhibit, Select ON or OFF
ALSt	CLOS	Alarm Contact Closes at Alarm Point
ALLP	O on	Alarm Lamp On when Contact is Closed
Albr	On/OFF	Loop Break will cause an Alarm Condition, Select ON or OFF

Diagnostic Error Messages

Display	Meaning	SP1, SP2 and Alarm Outputs	Action Required
UPF or OFL	Underflow or Overflow Process value has exceeded input range ends set by SCAL or SCAH.	Set point outputs active Alarms Active	Inputs signals may normally go above or below range ends. If not, check input and correct.
bAd InP OPEn InP	UFL or OFL will sequence to display one of these messages if InPt is set for a time value. For CURRENT or VOLTAGE inputs; input error has occurred.	Set point outputs inactive Alarms active	To reset, use the INDEX & ENTER keys. When InPut (input fault timer) has been set for a time, the outputs will be turned off after the set time. Setting the time to OFF causes the outputs to remain active; however, UFL or OFL will still be displayed. Correct or replace sensor. To reset use the INDEX & ENTER keys.
LOOP bAd	The sensor may be defective, heater fuse open, heater open or the final power output device is bad.	Set point outputs inactive Alarms Active	Correct or replace sensor, or any element in the control loop that may have failed. To reset use the INDEX & ENTER keys, or press the ENTER key while in the LPBr menu item.
SEnC bAd	Sensor rate of change exceeded. Programmed limits set for SEnC.	Set point outputs inactive Alarm active	Check the cause. The value setting may be too slow for the process, or the sensor is intermittent. To reset, use the INDEX & ENTER keys.
#### ArEA	Area appears if the controller's ambient temperature nears specification ends, -5°C (+23°F) or +50°C (+122°F).	Set point outputs active Alarm active	Correct the ambient temperature conditions. Ventilate the area of the cabinet or check fo rclogged air filters
(blank) ArEA	Area appears if the controller's ambient temperature exceeds specification ends, -10°C (+14°F) or +55°C (+131°F).	Set point outputs inactive Alarm active	Correct the ambient temperature conditions. Ventilate the area of the cabinet or check for clogged air filters. To reset use the INDEX & ENTER keys.
CHEC CAL	Check calibration. Appears as an alternating message if the instrument calibration nears tolerance edges.	Set point outputs inactive Alarm active	Remove the instrument for service and/or recalibration. To reset, use the INDEX & ENTER keys.
	Check calibration. Appears as a flashing message if the instrument calibration exceeds specification.	Set point outputs inactive Alarm active	