

F-Series Controllers

FUNCTION SELECTION

Omron's F-Series temperature controllers have an internal, in-line DIP switch that enables or disables programming functions. The following descriptions of key functions clarify the selections available and help in resolving apparent conflicts between operating status and the settings.

Control Mode

This function selects whether the control algorithm applied by the controller will be ON/OFF or advanced PID.

Control Output

Selects whether the action of the control output will be Normal or Reverse. If Normal is selected, the control output percentage will increase as the temperature increases. This selection would be utilized for a Cooling application. For a Heating application,

Reverse would be selected, as the control output percentage will increase as the temperature decreases.

Input Shift

Used to enable/disable the Input Shift function from the Programming menu. When enabled, the Input Shift value will be accessible in Programming Level 0. When disabled, this value will not be accessible through the front panel. However, setting Switch 3 to disable will not eliminate a previously-set input shift value. That value will still be utilized by the controller, although it cannot be viewed or changed until Switch 3 is reset to Enable.

Temperature Sensor Standard

When utilizing a Type J thermocouple, the controller can be set to utilize the JIS scale

(equivalent to NBS 561) or the DIN 43710 scale.

Scale Indication

Selects whether the temperature will be displayed in Fahrenheit (°F) or Celsius (°C).

PID Constants

Used to enable/disable the PID constants from the Programming Menu. When enabled, the settings for Proportional Band, Integral Time and Derivative Time, can be accessed in Programming Level 0. When disabled, these parameters are not accessible through the front panel. However, this does not prevent the PID constants from being changed through auto-tuning.

PROGRAMMING MENUS

Omron's F-Series controllers have three programming levels that allow users to set parameter values and monitor the settings. The following items are typical settings or displays at each level. These vary by model and by internal switch settings made prior to powering up the controller. The front panel level key is the only unmarked key. Pressing this key advances the levels starting at Level 0.

Level 0

This is the default mode of the controller and allows the user to monitor process temperature, set the set point, set the alarm value, set the input shift value, make manual changes to the PID parameters, and set the level of Fuzzy Intensity.

Fuzzy Intensity determines the strength of the fuzzy logic reaction to a process disturbance. As this value increases, the corrective actions taken by the controller will become stronger. The fuzzy logic properties of

this controller can be nullified by changing this setting to zero. When this setting is zero, the controller performs the same advanced PID control functions of X-Series controllers.

Level 1

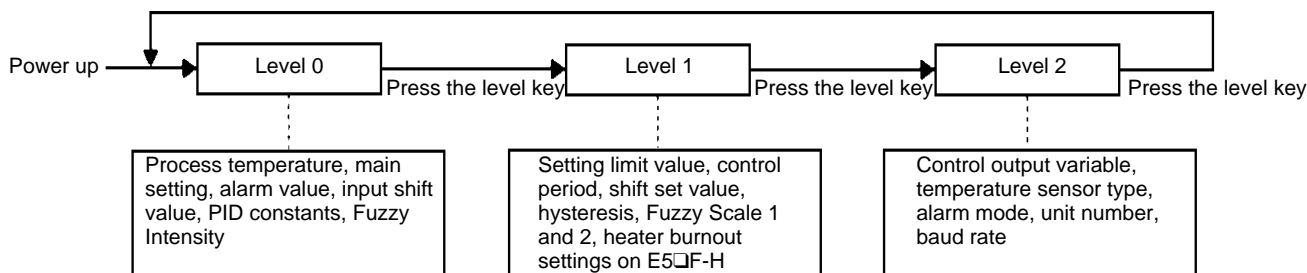
This level allows the operator to set temperature limit values, adjust the control period, shift set value, hysteresis, Fuzzy Scale 1 and Fuzzy Scale 2. For models with heater burnout alarm, Level 1 also has the setting for heater current monitor and heater burnout alarm value.

Fuzzy Scale 1 controls the magnitude of error "membership function". This setting corresponds to what the controller should consider to be a large magnitude of error. Decreasing this value makes the controller more sensitive to error and will decrease the response time for returning the process back to set value.

Fuzzy Scale 2 controls the rate of change "membership function". This setting corresponds to what the controller should consider a fast rate of change. Decreasing this value will make the controller more sensitive to change. Because minor changes to this parameter can have dramatic results to the process (increased oscillations, hunting, etc.), best results can usually be achieved by manually setting Fuzzy Intensity and Fuzzy Scale 1 and leaving Fuzzy Scale 2 at the auto-tuned value.

Level 2

This level displays the control output variable, temperature sensor input type, alarm mode(s) selected. For models with communications capability, Level 2 has settings for baud rate (transmission speed) and unit number (used to identify the controller on the network).



J-Series Controllers

Omron's J-Series controllers have two programming levels that allow users to set parameter values and monitor the settings.

The front panel level key is the only unmarked key. Pressing this key advances the levels starting at Level 0.

Level 0

This default level allows the operator to monitor process temperature, set the set point, and set the alarm values for both alarm outputs.

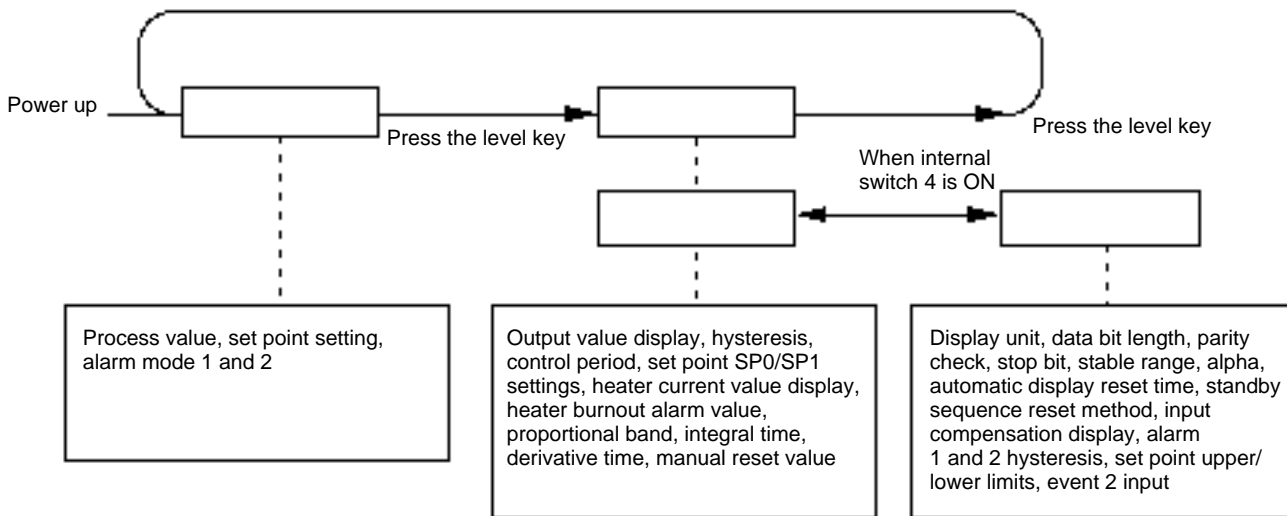
Level 1

Two different Level 1 parameter menus can be selected by internal switch. The *Standard Programming Menu* allows the opera-

tor to monitor output value; set hysteresis or control period; and set the two set points. For heater burnout alarm models, this is where the current monitor and heater burnout alarm are set. The J-Series controllers have continuous fuzzy adaptive tuning to adjust PID parameters for optimum performance, as well as manual tuning of PID values to achieve specific results. The *Standard Programming Menu* is where the unit number and baud rate are set for models with communications capability.

The *Engineering Programming Menu* of Level 1 lets the operator select display units of Celsius or Fahrenheit; designate data bit length, parity check and stop bit for serial communications; adjust the stable range for

fuzzy adaptive tuning; manually skew the "alpha" parameter balance of PID from derivative priority to proportional priority; adjust the display reset time after a period of no key operations; select power cycling reset or automatic reset for alarm standby sequence; compensate for a known sensor input error; adjust alarm output hysteresis to prevent contact chattering; adjust maximum and minimum set points the controller will accept; and enable additional event alarm input options.



K-Series Controllers

Omron's K-Series process controller has six programming levels that allow users to set parameter values, monitor current settings, and field calibrate the controller. The K-series is rated NEMA 4X and is programmable from the front panel.

PARAMETERS AND MENUS - FOR SETTING THE CONTROLLER

Limits use of the menu and A/M Keys.

The protect function prevents unwanted modification of parameters and can also be used to prevent switching between the auto and manual operation.

Sets the controller to manual operation mode.

You can only manually adjust the manipulated variable (MV) in this mode.

For normal operation.

Change: the set point during operation, and start or stop Controller operation; and, (only in this mode) monitor the process value, ramp SP, and manipulated variable.

For adjusting primary control parameters.

Execute: AT (auto-tuning); set alarm values; set the control period; and, set PID parameters.

For adjusting secondary control parameters.

Set parameters for: limiting the manipulated variable and set point; switch between the remote and local modes; set the loop break alarm (LBA), alarm hysteresis, and the digital filter value of inputs.

For setting the basic specifications.

Set parameters for: input type, scaling, output assignments and direct/reverse operation.

For setting expanded functions.

Set: ST (self-tuning), SP setting limiter. Select: advanced PID or ON/OFF control. Specify the standby sequence resetting method. Initialize parameters; and, set the time for automatic return to the monitoring display.

For setting option functions.

Set: the communications conditions; transfer: output and event input parameters to match the type of Option Board installed in the Controller. *This mode will be accessible only when an option board is installed in the controller.*

For calibrating inputs and transfer output.

Calibrate the selected input type. *Transfer output can be calibrated only when the Communications Unit (E53-CKF) has been installed in the Controller.*

