General Specifications

Model UP150
Program Temperature Controller

GS 05C01F12-01E

■ General
The UP150 program temperature controller has one program pattern consisting of 16 segments, and it can easily be set and operated.

The two event outputs are provided as standard, and the external contact input, communication and retransmission output as options.

The universal input selectable an input type among TC, RTD and Voltage, and the three types of outputs are also provided.

The front panel has a splash-proof and dust-proof design (IP65), which enables the use in the dusty environment.

■ Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP150</td>
<td>–A</td>
<td>General</td>
</tr>
<tr>
<td></td>
<td>–B</td>
<td>Control output</td>
</tr>
<tr>
<td></td>
<td>–V</td>
<td>Voltage output</td>
</tr>
<tr>
<td></td>
<td>–R</td>
<td>Relay output</td>
</tr>
<tr>
<td></td>
<td>–N</td>
<td>Fixed code</td>
</tr>
<tr>
<td>Option</td>
<td>/EX</td>
<td>RUN/RESET switching, and HOLD program</td>
</tr>
<tr>
<td></td>
<td>/RS</td>
<td>Optional relay output</td>
</tr>
<tr>
<td></td>
<td>/RET</td>
<td>Communication function</td>
</tr>
<tr>
<td></td>
<td>/V24</td>
<td>Power Supply 24V DC / 24V AC</td>
</tr>
</tbody>
</table>

■ Specifications

<table>
<thead>
<tr>
<th>PV/SP data display</th>
<th>4-digits PV/SP separately</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV input</td>
<td>Universal input</td>
</tr>
<tr>
<td>Termocouple</td>
<td>K, J, T, E, R, B, S, N, L, U, Platinel 2</td>
</tr>
<tr>
<td>RTD</td>
<td>Pt100, Pt1000</td>
</tr>
<tr>
<td>Voltage</td>
<td>0.0 to 100mV, 0 to 5V, 1 to 5V, 0 to 10V</td>
</tr>
<tr>
<td>Input accuracy</td>
<td>±0.1°C ±1-digit</td>
</tr>
<tr>
<td>RTD</td>
<td>±0.5°C ±2-digit</td>
</tr>
<tr>
<td>Sampling period</td>
<td>50ms</td>
</tr>
<tr>
<td>Number of program pattern</td>
<td>1 program pattern</td>
</tr>
<tr>
<td>Number of program segment</td>
<td>16 segment</td>
</tr>
<tr>
<td>Program time span</td>
<td>0 second to 1,599 hour</td>
</tr>
<tr>
<td>Accuracy of program time span</td>
<td>±2% of program time span</td>
</tr>
<tr>
<td>Control output</td>
<td>Method</td>
</tr>
<tr>
<td>Relay output</td>
<td>Time-proportional PID or ON/OFF</td>
</tr>
<tr>
<td>Voltage pulse output</td>
<td>Time-proportional PID</td>
</tr>
<tr>
<td>4 to 20 mA output</td>
<td>Continuous PID</td>
</tr>
<tr>
<td>Power supply</td>
<td>100 to 240 VAC or 24V/24VDC (option)</td>
</tr>
<tr>
<td>Safety and EMC standard</td>
<td>CSA, CE and UL</td>
</tr>
<tr>
<td>Construction front protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Dimensions and weight</td>
<td>48xWxHx80mm, approx. 200g</td>
</tr>
<tr>
<td>External contact input (when /EX is specified)</td>
<td>Run/Reset, Hold/Cancel Hold</td>
</tr>
<tr>
<td>PV retransmission output (when /RET is specified)</td>
<td>4 to 20 mA/DC</td>
</tr>
<tr>
<td>RS485 communication (when /RS is specified)</td>
<td>Modbus/Ladder/PC link protocol</td>
</tr>
<tr>
<td>24V Power supply (when /V24 is specified)</td>
<td>24V DC / 24V AC</td>
</tr>
</tbody>
</table>

■ Measured Value Input
The UP150 allows you to freely change the input type by software.

<table>
<thead>
<tr>
<th>UP150 Measured Input Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
</tr>
<tr>
<td>K</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>R</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>U</td>
</tr>
<tr>
<td>Platinel 2</td>
</tr>
<tr>
<td>Pt100</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pt1000</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

For example, to select thermocouple type J (°F), set the range code to 36.
Hardware Specifications

**Measured Value (PV) Input**
- Input: 1 point
- Input type: Universal, can be selected by software
- Input accuracy: at 23 ± 2°C (ambient temperature)
- Thermocouple: ±2°C 0.14 digit

  - +4°C for thermocouple input: -200 to -100°C
  - +4°C for thermocouple input: -100 to 0°C
  - +4°C for type R and S (+5°C for 0 to 100°C)
  - +5°C for type B (accuracy is not guaranteed for -5 to 40°C)
- RTD: ±1°C 0.14 digit
- Voltage (V, V): ±0.3 0.14 digit

Sampling period for measured value input: 500ms
- PWM or pulse input: functions for thermocouple or RTD input (burn-out unsuitable only, cannot be switched off)
- Input resistance: 1MΩ or greater for thermocouple or DC input
- Maximum allowable signal source resistance: 250Ω for thermocouple or DC input
- Maximum allowable wiring resistance for RTD input: 3Ω between thermal resistance and wires must be the same.

Applicable standards:
- +4°C for DC V input
- ±2Ω DC for DC input
- Noise rejection ratio: Normal mode noise: Min. 40dB
- Maximum allowable wiring resistance for RTD input: ±2Ω
- Sampling rate for measured value input: 500ms
- Voltage (mV, V):
  - RTD:
  - Input type: Universal; can be selected by software
  - Input: 1 point
  - On/off judgment: On state for 1kΩ
  - Contact inputs are provided only when the COM terminal is common

**Communication**

- **Communication Port**
  - Universal; can be set by software
  - Input: 2 points (with the shared common terminal)
  - Functions:
    - (1) HOLD/Cancel switching
    - (2) RUN/RESET switching
  - Input: 2 points (with the shared common terminal)
  - Input type: Non-voltage contact or transistor contact input
  - Communication method: Two-wire half-duplex, start-stop synchronization, non-procedural
  - Baud rate: 2400, 4800, or 9600 bps

**Accuracy of Program Time**

| ±0.2% of program time |

**Retransmission Output**

The retransmission output is provided only when the BRT option is specified.
- Output signal: Measured value in 4-20mA is DC.
- Maximum load resistance: 600Ω
- Output accuracy: ±0.3% of span at 2±4°C ambient temperature

**Applicable Standards**

- Safety, Compliance with IEC/EN61010-1 (CE), IEC/EN61010-2-403 (CE), approved by CAN/CSA C22.2 No.61010-1 (CSA), approved by UL61010-1

Communication Interface
- Applicable standards: With IEC/EN61010-1
- Number of controllers that can be connected: Up to 31
- Maximum communication distance: 1,200m
- Communication method: Two-wire half-duplex, start-stop synchronization, non-procedural
- Baud rate: 2400, 4800, or 9600 bps

**Power Supply and Isolation**

- **Power Supply**
  - Rated transient overvoltage: 1500 V (*)
  - Rated measurement input voltage: Max. 10 V DC

<table>
<thead>
<tr>
<th>Power supply voltage</th>
<th>Voltage rating</th>
<th>4mA (1500V 0.03%)</th>
<th>4mA (1500V 0.03%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5mA/60Hz</td>
<td>3W max.</td>
<td>50mA/60Hz</td>
<td>3W max.</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>±0.5% of span at 23±2°C ambient temperature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Safety and EMC Standards**

- Safety: Compliance with IEC/EN61010-1 (CE), IEC/EN61010-2-403 (CE), approved by CAN/CSA C22.2 No.61010-1 (CSA), approved by UL61010-1

Safety and EMC: Standards: Complies with EN61326
- Communication standard, electromagnetic wave protection, performance.
- EMC standards: Complies with EN61010-1.
- This value is not necessary for a guarantee of instrument performance.
- EN61010-1: This value is not necessary for a guarantee of instrument performance.
- EMI standards: Complies with EN61010-1

**Construction, Mounting, and Wiring**

- Construction: Dust-proof and splash-proof front panel (compliant with IP65). Splash-proof construction is not available for side-by-side close mounting.
- Casing: ABS resin and polycarbonate
- Case color: Black
- Weight: approx. 200g
- Mounting: Flush panel mounting
- Wiring: Screw terminals

**Environmental Conditions**

**Normal Operating Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude</td>
<td>2000m or less above sea level</td>
</tr>
<tr>
<td>Humidity</td>
<td>20-90% RH (no condensation allowed)</td>
</tr>
<tr>
<td>Temperature</td>
<td>0-50°C (0-49°C when mounted side-by-side)</td>
</tr>
<tr>
<td>Shock</td>
<td>90ms/10g (1G) for 11 milliseconds or less</td>
</tr>
<tr>
<td>Mounting angle</td>
<td>Upward incline of up to 30 degrees, downward incline is not allowed</td>
</tr>
<tr>
<td>Vibration</td>
<td>5W max. when noise is applied</td>
</tr>
<tr>
<td>Isolation</td>
<td>0.05% of F.S. / V</td>
</tr>
</tbody>
</table>

**Maximum Effects from Operating Conditions**

- (1) Temperature effects
  - Thermocouple, DC V and DC V input: ±2°C/V°C or ±0.02% of F.S. / °C, whichever is larger
  - Resistance temperature detector: ±0.05°C/C

- (2) Effect from fluctuation of power supply voltage (within rated voltage range)
  - Analog input: ±10%V/V at ±0.02% of F.S./V, whichever is larger
  - Analog output: ±0.05% of F.S. / V

**Transportation and Storage Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>-25 to 70°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH (no condensation allowed)</td>
</tr>
<tr>
<td>Shock</td>
<td>90ms/10g (1G) for 11 milliseconds or less</td>
</tr>
</tbody>
</table>

Note: Neither the measured value input terminals, nor 2 input terminals for the I/EX interface are isolated from the internal circuit.
**Display and Operation Functions**

**SEG lamp (green)**
- Lit when the value of segment no. or remaining segment time is displayed on SP display.

**PV display (red)**
- Indicates PV (measured value) and character information such as parameter codes and error codes.
- Indicates PV and “AT” alternatively during Auto-tuning.

**SP display (green)**
- Indicates SP (target setpoint), segment no., remaining segment time and parameter setpoints.

**EV1, EV2 lamps (red)**
- EV1: Lit when event 1 (PV event 1 or Time event 1) is activated.
- EV2: Lit when event 2 (PV event 2 or Time event 2) is activated.

**RUN lamp (orange)**
- Lit while the operation mode is “RUN”.
- Flashing while the operation mode is “WAIT”.

**HLD (hold) lamp (green)**
- Lit while the operation mode is “HOLD”.

**Data change key (or Reset key)**
- Pressing this key for more than 1 second (in operating display) stops (resets) the program operation.
- Changes the program setpoints(SP) and the parameter setpoints.
- Holding down the key will gradually increase the speed of changes.

**Data change key (or Run key)**
- Pressing this key for more than 1 second (in operating display) starts (runs) the program operation.
- Changes the program setpoints(SP) and the parameter setpoints.
- Holding down the key will gradually decrease the speed of changes.

**SET/ENT key**
- (data registering key)
- Switches the operating displays.
- Registers the data value changed using the data change keys.
- Switches between parameter setting displays sequentially.
- Pressing the key for 3 seconds or longer in the operating display retrieves the operating parameter setting display.
- Pressing the key for 3 seconds or longer in operating, setup or program parameter setting display transfers back to operating display.

**Communication Functions**

**Sample Structures of Communication Systems Configuration Diagram**

1. **Computer link communication/MODBUS communication**
   - Personal computer
   - UT130, UT150/UT152/UT155 Temperature Controller
   - UP150 Program Temperature Controller

2. **Ladder communication**
   - MELSEC-A PLC
   - UT130, UT150/UT152/UT155 Temperature Controller
   - UP150 Program Temperature Controller

**Function Block Diagram**

When ordering, please specify the suffix and option codes according to the functions required.

- **Measured Value Input**
- **Input Processing**
- **Bias Calculation**
- **First Order Lag**
- **PV Indication**
- **SUPER Calculation**
- **SP Indication**
- **PID Control**
- **Scaling**
- **Retransmission Output (RET)**
- **Relay Output**
- **Voltage Pulse Output**
- **4-20 mA Output**
- **Run/Reset Switching**
- **Hold/Cancel hold Switching**
- **DI1**
- **DI2**
- **Program Setpoint (SP)**
- **Event Outputs**
- **EV1**
- **EV2**

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External Dimensions and Panel Cutout Dimensions

1. General Mounting

2. Side-by-side Close Mounting
(Splash-proof construction is unavailable)

Terminal Arrangements

NOTE
Do not use unassigned terminals as relay terminals.

PV or Time Event Outputs

TC Input

RTD Input

DC mV or V Input

Receiving 4-20 mA DC Current Signals with the Controller
* When receiving 4-20 mA DC current signals, set the PV input type to 1-5 V DC (setpoint "22").

CAUTION
To prevent damage to the controller, never provide 100-240V AC power supply for power supply AC/DC 24V model (when "V24" is specified).

NOTE
The + and - stand for the polarity for DC 24V power supply.

EV
RUN
HOLD
HOLD program when DI=ON.
Cancel HOLD program when DI=OFF.
Starts program (RUN) when DI=ON.
Resets program (RESET) when DI=OFF.

Universal input-selectable input type

DC mV or V Input

Measured Value (PV) Input

When "/RET" is specified.

PV Retransmission Output

Universal Input-selectable input type

RS-485

Power Supply

AC/DC 24V

when /V24 option is specified.

Control Output

Relay Contact Output

4 to 20 mA Output

Voltage Pulse Output

Specify one for the output signal type.

Specified by model (UP150-RN) (model UP150-AN) (model UP150-VN)

Measured Value (PV) Input

When "/RET" is specified.

PV Retransmission Output

Universal Input-selectable input type

DC mV or V Input

Measured Value (PV) Input

When "/RET" is specified.

PV Retransmission Output

Universal Input-selectable input type

DC mV or V Input

Measured Value (PV) Input

When "/RET" is specified.