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You can download the latest manuals from the following website:
User’s Manual

UT150

Temperature Controller

Check the Following Package Contents
Before using the product, check that its model & suffix codes are as you ordered.

Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT150</td>
<td>-V</td>
<td>Temperature controller</td>
</tr>
<tr>
<td></td>
<td>-R</td>
<td>Relay output (time-proportional PID or on-off control)</td>
</tr>
<tr>
<td></td>
<td>-N</td>
<td>No cooling output (standard type)</td>
</tr>
</tbody>
</table>

UT150 Option Codes

<table>
<thead>
<tr>
<th>AL</th>
<th>AL OPTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alarm output (2 points)</td>
</tr>
<tr>
<td></td>
<td>Heater disconnection alarm (includes optional AL function)</td>
</tr>
<tr>
<td>EEX</td>
<td>4-20mA, SP1/SP2 switching, starting of timer, RUN/STOP</td>
</tr>
<tr>
<td>RET</td>
<td>PV retransmission in 4 to 20mA</td>
</tr>
<tr>
<td>V24</td>
<td>Power Supply 24V DC/ 24V AC</td>
</tr>
</tbody>
</table>

Note: When selecting the AL option, you must choose the required number of copies of Communication Functions User's Manual separately.

1. Notice

The following safety symbol is used both on the product and in this user's manual.

WARNING

This symbol stands for "Handle with Care." When displayed on the product, the operator should refer to the corresponding explanation given in the user’s manual in order to avoid injury or death of personnel and/or damage to the product. In the manual the symbol is accompanied by an explanation of the special care that is required to avoid shock or other dangers that may result in injury or loss of life.

The following symbols are used in this manual only.

CAUTION

Indicates that operating the hardware or software in a particular manner may lead to damage or result in system failure.

IMPORTANT

Draws attention to information that is essential for understanding the operation and/or features of the product.

Exemption from Responsibility

Make sure that all of the precautions are strictly adhered to. Yokogawa Electric Corporation assumes no liability for any damage resulting from use of the instrument in contradiction to the precautions given. Yokogawa Electric Corporation assumes no liability to any party for any loss or damage, including, but not limited to, direct, indirect, incidental, or consequential loss or damage or result in system failure.

What is on the Front Panel

UT150

1. Menu Button / SET/ENT Key

2. Push the bracket to the panel, and then remove the bracket into position.

3. Installing the Controller

WARNING

To prevent electric shock, the source of power to the controller must be turned off when mounting the controller on a panel.

1. Notice

The following safety symbol is used both on the product and in this user’s manual.

WARNING

This symbol stands for "Handle with Care." When displayed on the product, the operator should refer to the corresponding explanation given in the user’s manual in order to avoid injury or death of personnel and/or damage to the product. In the manual the symbol is accompanied by an explanation of the special care that is required to avoid shock or other dangers that may result in injury or loss of life.

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What is on the Front Panel

UT150

1. Menu Button

2. SET/ENT key (data registering key)

3. Cutoff Dimensions and External Dimensions

4. Wiring

WARNING

1) Before you start wiring, turn off the power source and use a tester to check that the controller and cables are not receiving any power in order to prevent electric shock.

2) For safety, be sure to install a circuit breaker switch (of 5A and 100W or AC and 220V AC, and that conforms to IEC60947) near the instrument so as to be operated easily, and clearly indicate that the device is used to de-energize the instrument.

3) The control output relay cannot be replaced even though it has a limited service life (100,000 relay contacts for the resistance load). Thus, an auxiliary relay should be used so that the load can be turned on and off.

4) When using an inductive load (L) such as an auxiliary relay and solenoid valve, be sure to insert a CR filter (for AC) or diode (for DC) in parallel as a spark-rejecting surge suppressor to prevent malfunctions or damage to the relay.

5) When there is the possibility of being struck by external lightning surge, use the arrester and the protector to prevent the instrument.

5. Wiring

WARNING

1) Use a single-phase power source. If the source has a lot of noise, use an isolation transformer for the primary side and a filter (we recommend TDK's ZAC2205-000) product for the secondary side. When this noise-prevention measure is taken, keep the primary and secondary power cables well apart. Since the controller has no fuse, be sure to install a circuit breaker switch (of 5A and 100W or AC and 220V AC, and that conforms to IEC standards) and clearly indicate that the device is used to de-energize the controller.

2) For thermostatic input, use shielded compensating lead wires. For RTD input, use shielded wires which have low resistance and no resistance difference between the 3 wires. See the table given later for the specifications of the cables and terminals and the recommended products.

3) The control output relay cannot be replaced even though it has a limited service life (100,000 relay contacts for the resistance load). Thus, an auxiliary relay should be used so that the load can be turned on and off.

4) When using an inductive load (L) such as an auxiliary relay and solenoid valve, be sure to insert a CR filter (for AC) or diode (for DC) in parallel as a spark-rejecting surge suppressor to prevent malfunctions or damage to the relay.

5) When there is the possibility of being struck by external lightning surge, use the arrester to protect the instrument.

Revision Record

IM 05C01E12-01E 1st Edition: Oct. '00
2nd Edition: Feb. '01
3rd Edition: June '04
4th Edition: Mar. '16

Note when specifying for the RoHS option, you must choose the required number of copies of Communication Functions User's Manual separately.

Check the package contents against the list below.

- Temperature controller
- Operating instruction
- Setting instruction
- Test certificate
- Warranty card
- Set of connecting wire (3m)
- Quick Start Guide
- RS-485 connector (2 sets)
- Sensor (1 piece)
- Terminal board
- Cable ties
- 3m cable (1 piece)

Specifications

- Temperature Controller (IM 05C01E12-01E) - Model UT150
- UT100 Series Communication Functions (IM 05C01E12-10E)
- General Specifications

- Model UT130, UT110 Temperature Controller (GS 05C01E2-01E)

- Authorized Representative in the EEA

Yokogawa Europe BV (Address: Eeuweg 2, 3825 HD Amersfoort, The Netherlands) is the Authorized Representative of Yokogawa Electric Corporation for this Product in the EEA.

- Printed Manuals

Model UT150 Temperature Controller (IM 05C01E12-01E)
Model UT100 Series Communication Functions (IM 05C01E12-10E)
### 6. Hardware Specifications

#### Measured Value (PV) Input

<table>
<thead>
<tr>
<th>Measurement Type</th>
<th>DC Voltage Range</th>
<th>DC Current Range</th>
<th>Resistance Range</th>
<th>Accuracy Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple</td>
<td>±2°C</td>
<td>±1 digit</td>
<td>±2°C</td>
<td>±1 digit</td>
</tr>
<tr>
<td>RTD</td>
<td>±2°C</td>
<td>±1 digit</td>
<td>±2°C</td>
<td>±1 digit</td>
</tr>
</tbody>
</table>

#### Alarm Functions

- **Heater Disconnection Alarm (Option Code HRA)**: Triggers when the heater has been turned off
- **Sensor Out of Range Alarm (Option Code HRA)**: Triggers when the sensor is not within the specified range

#### Communication Function

- **RS-485**
  - **Baud Rate**: 9600, 19200, 38400
  - **Configuration**: 8N1
  - **Data Rate**: 2,500 baud

#### Power Supply and Isolation

- **Input Voltage**: 100-240VAC (±10%)
- **Output Voltage**: 24VDC
- **Maximum power consumption**: 3W

#### Environmental Conditions

- **Ambient Temperature**: 0°C to 50°C (0°C to 40°C when mounted side-by-side)
- **Humidity**: 5 to 95% RH (no condensation allowed)
- **Vibration**: Up to 3 Grms
- **Shock**: 100G for 2 milliseconds

#### Safety and EMC Standards

- **Safety Standards**: CE, UL, CSA
- **EMC Standards**: EN 61010-2-030, EN 61010-2-031, EN 61010-2-032

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### Important Notice

Always fix a terminal cover bracket to the UT150 controller before wiring if an optional anti-electric-shock terminal cover (part number: L400FB) is used.

---

### UT150 Terminal Arrangement

#### Measured Value (PV) Input

- **Input**:
  - Thermocouple: ±2°C
  - RTD: ±2°C

#### Alarm Functions

- **Heater Disconnection Alarm (Option Code HRA)**
- **Sensor Out of Range Alarm (Option Code HRA)**

#### Communication Function

- **RS-485**
  - Baud Rate: 9600, 19200, 38400
  - Configuration: 8N1
  - Data Rate: 2,500 baud

#### Power Supply and Isolation

- **Input Voltage**: 100-240VAC (±10%)
- **Output Voltage**: 24VDC
- **Maximum power consumption**: 3W

---

### CAUTION

- **To prevent damage to the controller,** never provide 100-240V AC power supply for power supply AC power model (when "V24" is specified).
- **Safety Notes:**
  - **Always fix a terminal cover bracket to the UT150 controller before wiring if an optional anti-electric-shock terminal cover (part number: L400FB) is used.**

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### Construction, Mounting, and Wiring

- **Precautions**:
  - Leave a 2 cm (0.25") gap at the base and sides.
  - Avoid touching the terminal block connections when power is applied.

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### Thermal Compensation

- **Rated Measurement Input Voltage**: Max. 10 V DC
- **Rated Measurement Input Current**: Max. 10 mA

---

### Table

<table>
<thead>
<tr>
<th>Pin Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>PV high input</td>
</tr>
<tr>
<td>6</td>
<td>PV low input</td>
</tr>
<tr>
<td>1</td>
<td>DI input 1</td>
</tr>
<tr>
<td>2</td>
<td>DI input 2</td>
</tr>
<tr>
<td>3</td>
<td>DI input 3</td>
</tr>
<tr>
<td>4</td>
<td>DI input 4</td>
</tr>
<tr>
<td>5</td>
<td>DI input 5</td>
</tr>
<tr>
<td>8</td>
<td>DI input 8</td>
</tr>
</tbody>
</table>

---

### Diagram

- **Screw-compatible crimp-on terminals** with an insulating sleeve, as shown below.

---

### Diagram

- **UT150 Terminal Arrangement**

---

### Diagram

- **UT150 Terminal Arrangement**

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### Diagram

- **Alarm Functions**

---

### Diagram

- **Communication Function**

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### Diagram

- **Power Supply and Isolation**

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- **Communication Function**

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- **Power Supply and Isolation**

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- **UT150 Terminal Arrangement**

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### Diagram

- **Alarm Functions**

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- **Communication Function**

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- **Power Supply and Isolation**

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- **UT150 Terminal Arrangement**

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- **Alarm Functions**

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- **Communication Function**

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- **Power Supply and Isolation**

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- **Alarm Functions**

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- **Communication Function**

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### Diagram

- **Alarm Functions**

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### Diagram

- **Communication Function**

---

### Diagram

- **Power Supply and Isolation**

---

### Diagram

- **Screw-compatible crimp-on terminals** with an insulating sleeve, as shown below.
7. Key Operations

**WARNING**

To prevent electric shock, the controller should be mounted on the panel so that you do not accidentally touch the terminals when power is being applied.

**IMPORTANT**

The temperature controller is shipped with the parameters set at the factory-set defaults. Check the default values against the “Parameter Lists” in the following page, and change the parameter settings that need to be changed.

This section explains how to set and register parameter values.

The setting of some parameters (such as the control mode parameter CTL) determines whether the other parameters are displayed or not.

There are no setup displays for parameters specific to functions, such as the optional alarm output functions or heating/cooling control, if they were not selected at ordering.

The following instructions assume that the controller is already receiving power.

### Changing Target Setpoint (SP)

The following instructions assume that the controller is already receiving power.

1. Confirm that the controller shows the operating display (during normal operation) and SP and PV are displayed on the indicators.
2. Press the \( \text{SP} \) key to change the displayed SP value to the required value.
3. Press the \( \text{A1} \) key once to register the setting.

---

### 8. Troubleshooting

In the event of an abnormality, perform the following checks as outlined by the flowchart.

#### Error Display during Operation

(1) If the controller displays one of the following, carry out the appropriate remedy for the particular error.

- **Display**: Error content
- **Display**: Error content

#### When Power Failure Occurred during Operation

- Momentary power failures of less than 20ms (or less than 1ms when “V24” is specified) have no effect on the controller operation (i.e., normal operation continues).
- For power failures longer than 20ms (or longer than 1ms when “V24” is specified), however the status will be as follows.
  - Alarm action: Continues (but alarms with a warning alarm enter the wait state once).
  - Setting parameters: Maintained
  - Auto-tuning: Canceled

---

### UT150 Measured Input Ranges

<table>
<thead>
<tr>
<th>Input type</th>
<th>Range (°C)</th>
<th>Range code (°C)</th>
<th>Range (°F)</th>
<th>Range code (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>–199.9 to 999.9°C</td>
<td>7</td>
<td>–300 to 1800°F</td>
<td>37</td>
</tr>
<tr>
<td>B</td>
<td>0 to 1800°C</td>
<td>10</td>
<td>32 to 3200°F</td>
<td>40</td>
</tr>
<tr>
<td>S</td>
<td>0 to 1700°C</td>
<td>9</td>
<td>32 to 3100°F</td>
<td>39</td>
</tr>
<tr>
<td>E</td>
<td>–199.9 to 400.0°C</td>
<td>6</td>
<td>–300 to 750°F</td>
<td>36</td>
</tr>
<tr>
<td>T</td>
<td>–199.9 to 400.0°C</td>
<td>6</td>
<td>–300 to 750°F</td>
<td>36</td>
</tr>
<tr>
<td>K</td>
<td>0 to 1370°C</td>
<td>1</td>
<td>392 to 2500°F</td>
<td>32</td>
</tr>
<tr>
<td>J</td>
<td>0 to 965°C</td>
<td>2</td>
<td>195 to 1700°F</td>
<td>31</td>
</tr>
<tr>
<td>R</td>
<td>0 to 1700°C</td>
<td>5</td>
<td>32 to 3100°F</td>
<td>39</td>
</tr>
<tr>
<td>B</td>
<td>0 to 1800°C</td>
<td>10</td>
<td>32 to 3200°F</td>
<td>40</td>
</tr>
<tr>
<td>S</td>
<td>0 to 1700°C</td>
<td>9</td>
<td>32 to 3100°F</td>
<td>39</td>
</tr>
<tr>
<td>E</td>
<td>–199.9 to 999.9°C</td>
<td>7</td>
<td>–300 to 1800°F</td>
<td>37</td>
</tr>
<tr>
<td>TP</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
</tbody>
</table>
### Alarm Function List

<table>
<thead>
<tr>
<th>PV high level</th>
<th>PV low level</th>
<th>Deviation high level</th>
<th>Deviation low level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm on</td>
<td>Alarm off</td>
<td>Alarm on</td>
<td>Alarm off</td>
</tr>
<tr>
<td>Time-out (CN)</td>
<td>Time-out (CN)</td>
<td>Time-out (CN)</td>
<td>Time-out (CN)</td>
</tr>
<tr>
<td>Time-out (CN)</td>
<td>Time-out (CN)</td>
<td>Time-out (CN)</td>
<td>Time-out (CN)</td>
</tr>
</tbody>
</table>

### Dynamic Auto Tune Control

Dynamic Auto Tune control is designed to obtain the PID constants for a system where there is interference or continual disturbances.

- **Alarm 1 and Alarm 2**: Alarms that are called for the PV low level and PV high level, respectively.
- **Alarm on** and **Alarm off**: Indicate that the alarm is on or off, respectively. The alarm will not be indicated on the display if the alarm is off.

### Alarm Type Setting

- **PV high level**: High level alarm for PV input scale
- **PV low level**: Low level alarm for PV input scale
- **Deviation high level**: High level deviation alarm
- **Deviation low level**: Low level deviation alarm

### Description of Parameters

This section describes the function parameters specific to the UT150 temperature controller. (The function is described in other sections of this manual and general functions are not discussed.)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Function</th>
<th>Setting range and unit</th>
<th>Default setting</th>
<th>User setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control mode</td>
<td>PV input bias</td>
<td>–10.00 to 10.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>MR</td>
<td>Minimum value of measured input</td>
<td>0.00 to 100.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>DP</td>
<td>Maximum minimum value of measured input scale</td>
<td>0.00 to 100.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>SLP</td>
<td>Hysteresis (SP)</td>
<td>0.01 to 10.00</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>BSL</td>
<td>Maximum off-limit value of measured input</td>
<td>0.00 to 100.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>CTC</td>
<td>Coolant output control output</td>
<td>–10.00 to 10.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>FL</td>
<td>Filter type</td>
<td>0: Digital filter 1 to 240 seconds</td>
<td>30 seconds</td>
<td></td>
</tr>
</tbody>
</table>

### Target Setpoint (SP) and Setting Time and 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting range and unit</th>
<th>Default setting</th>
<th>User setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>Start auto-tuning</td>
<td>0.00 to 100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>SP2</td>
<td>Start auto-tuning</td>
<td>0.00 to 100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>d</td>
<td>Cycle time</td>
<td>0.00 to 240.00</td>
<td>30 seconds</td>
</tr>
<tr>
<td>t</td>
<td>Time-out</td>
<td>0.00 to 240.00</td>
<td>30 seconds</td>
</tr>
</tbody>
</table>

### Setup Parameters: Parameters rarely changed in normal use after once having been set.

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Setting range and unit</th>
<th>Default setting</th>
<th>User setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>b5</td>
<td>PID</td>
<td>–100 to 100</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>db</td>
<td>SP1</td>
<td>–100 to 100</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>dB</td>
<td>SP2</td>
<td>–100 to 100</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>dH</td>
<td>HP</td>
<td>–100 to 100</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>dB</td>
<td>SP1</td>
<td>–100 to 100</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>dH</td>
<td>HP</td>
<td>–100 to 100</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

### IMPORTANT

To use dynamic auto tune control,

1. Be sure to turn on the final control element, such as a heater, before starting the control, and
2. Make sure the controlled loop is a closed loop.

If you do not follow these precautions, improper PID constants may be written into the controller. If this occurs, carry out the following:

- **Set the Control mode at PID**.
- **Set the PID constants at the factory-set defaults** (P = upper range-limit - lower range-limit) × 5%; I = 240 s; and D = 60 s)
- **Use the parameter CTL at SLF**.
- **Use 0.00 or 25.00 (0.00 or 25.00) for the alarm 1 setpoint, and 0.00 (0.00) for the alarm 1 max and min limits.**
- **Use the parameter CTL at SLF**.

If the control still doesn’t work properly, stop using the dynamic auto tune function. Change the parameter CTL setting to PID and execute auto-tuning to obtain the PID constants.