

# General Specifications

Model UT150L  
Limit Controller



GS 05C01E22-01E

## General

The UT150L is an FM approved limit controller that can be configured either as a high limit or as a low limit controller by a user.

The UT150L features universal input, two alarm outputs, retransmission output, a timer to count the total time the setpoint is exceeded, and a register to retain the maximum temperature reached.

The RS485 communication interface is available optionally.

## Model and Suffix Codes

| Model          | Suffix Codes | Descriptions                           |
|----------------|--------------|--|
| UT150L         |              | Limit Controller (1/16 DIN size)       |
| Control output | -R           | Relay output                           |
| Fixed code     | N            | Always N                               |
| Option         | /AL          | Alarm outputs (2 points)               |
|                | /EX          | Digital input (1 point)                |
|                | /RET         | PV retransmission output in 4 to 20 mA |
|                | /RS          | Communication function                 |

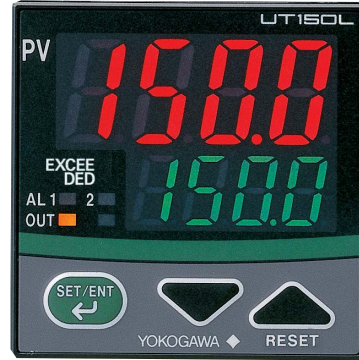
## Measured Value Input

The UT100 series allows you to freely change the input type by software.

Table 1. Measured Input Ranges

| Input Type   | Range(°C)  | Range Code(°C)    | Range(°F)      | Range Code(°F)     |    |
|--------------|------------|-------------------|----------------|--------------------|----|
| Thermocouple | K          | -270 to 1370°C    | 1              | -300 to 2500°F     | 31 |
|              |            | 0.0 to 600.0°C    | 2              | 32.0 to 999.9°F    | 32 |
|              |            | 0.0 to 400.0°C    | 3              | 32.0 to 750.0°F    | 33 |
|              |            | -199.9 to 200.0°C | 4              | -300.0 to 400.0°F  | 34 |
|              | J          | -199.9 to 999.9°C | 5              | -300.0 to 2100°F   | 35 |
|              | T          | -199.9 to 400.0°C | 6              | -300.0 to 750.0°F  | 36 |
|              | E          | -199.9 to 999.9°C | 7              | -300.0 to 1800.0°F | 37 |
|              | R          | 0 to 1700°C       | 8              | 32 to 3100°F       | 38 |
|              | S          | 0 to 1700°C       | 9              | 32 to 3100°F       | 39 |
|              | B          | 0 to 1800°C       | 10             | 32 to 3200°F       | 40 |
| RTD          | Pt100      | -199.9 to 850.0°C | 15             | -199.9 to 999.9°F  | 45 |
|              |            | 0.0 to 400.0°C    | 16             | 32.0 to 750.0°F    | 46 |
|              | Pt100      | -199.9 to 200.0°C | 17             | -300 to 400°F      | 47 |
|              |            | -19.9 to 99.9°C   | 18             | -199.9 to 999.9°F  | 48 |
|              | JPt100     | -199.9 to 500.0°C | 19             |                    |    |
|              | DC voltage | 0 to 100mV        | 0.0 to 100.0   | 20                 |    |
|              |            | 0 to 5 V          | 0.000 to 5.000 | 21                 |    |
|              |            | 1 to 5 V          | 1.000 to 5.000 | 22                 |    |
|              |            | 0 to 10 V         | 0.00 to 10.00  | 23                 |    |

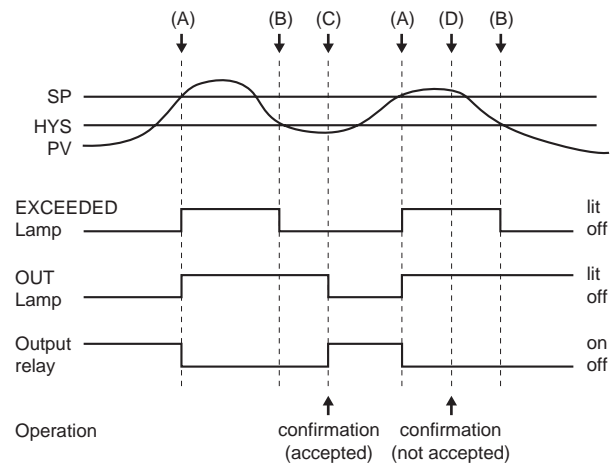
Note: Scalling is enable in the following 4 range.  
-199.9 to 999.9, -199.9 to 999.9, -199.99 to 99.99, -1.999 to 9.999



## Limit Control Function

When a measured value (PV) exceeds a setpoint (SP), “EXCEEDED” lamp lights, and “OUT” lamp turns ON (A). The limit output relay is de-energized then. “EXCEEDED” lamp turns off when PV goes into normal condition, while the output (OUT) display lamp stays on as it is (B). The output (OUT) display lamp turns off when a confirming operation is done by an operator (C). The way to confirm is pressing the “” key (or by an external contact, according to the setting of setup parameter DIS). The confirming operation is not accepted during PV exceeds SP (D) (during EXCEEDED lamp lights\*). State of output relay is de-energized whenever “OUT” lamp is on.

\* Check the “HYS” value if the EXCEEDED lamp is not turn off when PV is lower than SP.



## 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±1digit
 However,
  - ±4°C for thermocouple input -200 to -100°C
  - ±3°C for thermocouple input -100 to 0°C
  - ±5°C for type R and S (±9°C for 0 to 500°C)
  - ±9°C for type B (accuracy is not guaranteed for 0 to 400°C)
- RTD: ±1°C±1digit
- Voltage (mV, V): ±0.3%±1digit
- Sampling period for measured value input: 500ms
- Burnout detection: Functions for thermocouple or RTD input (burnout upscale only; cannot be switched off)
- Input resistance: 1MΩ or greater for thermocouple or DC mV input. Approx. 1MΩ for DC V input
- Maximum allowable signal source resistance :
  - 250Ω for thermocouple or DC mV input
  - 2kΩ for DC V input
- Maximum allowable wiring resistance for RTD input: 10Ω/wire (The resistance values of three wires must be the same.)
- Allowable input voltage:
  - ±10V DC for thermocouple or DC mV input
  - ±20V DC for DC V input
- Noise rejection ratio:
  - Normal mode noise: Min. 40dB (50/60Hz)
  - Common mode noise: Min. 120dB (Min. 90dB for DC V input)
- Error of reference junction compensation:
  - ±1.5°C (at 15-35°C)
  - ±2.0°C (at 0-50°C)
 The reference junction compensation cannot be switched off.
- Applicable standards:
  - Thermocouple and resistance temperature detector JIS/IEC/DIN (ITS90)
- Response time:
  - 2 second or less, 63% (10 - 90%)
  - (The time required for transmission output to reach 63% of the maximum excursion when PV abruptly changes from 10% to 90%)

### Control Output

- Output: 1 point
- Output type:
  - Relay contact output
  - Contact capacity: 3A at 240V AC or 3A at 30V DC (with resistance load)
  - Note: The control output relay cannot be replaced by users.

### Alarm Functions

- **Alarm Functions (Option Code /AL)**
- Alarm types: 22 types (waiting action can be set by software):
  - PV high limit, PV low limit, Deviation high limit, Deviation low limit, De-energized on deviation high limit, De-energized on deviation low limit, Deviation high and low limits, High and low limits within deviation, De-energized on PV high limit, De-energized on PV low limit, Fault diagnosis output, FAIL output
- Alarm output: 2 relay contacts
  - Relay contact capacity: 1A at 240V AC or 1A at 30V DC (with resistance load)
  - Note: The alarm output relays cannot be replaced by users.

### Retransmission Output

- The retransmission output is provided only when the /RET option is specified.
- Output signal: Measured value in 4-20mA DC
  - Maximum load resistance: 600Ω
  - Output accuracy: ±0.3% of span (at 23±2°C ambient temperature)

### Contact Input

- The contact inputs are provided only when the /EX option is specified.
- Function: Resetting "exceeded status"
  - Input: 1 point
  - Input type: Non-voltage contact or transistor contact input
  - Contact capacity: At least 12V/10mA
  - On/off judgment: On state for 1kΩ or less; off state for 20kΩ or greater

### Communication Function

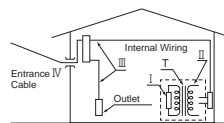
The communication function is provided only when the /RS option is specified. (For details, read the user's manual of the communication functions IM 05C01E22-10E.)

#### Communication Protocol

- Personal computer link: Used for communication with a personal computer, or UT link module of the FA-M3 controller (from Yokogawa Electric Corporation).
  - Ladder communication: Used for communication with a ladder communication module of the FA-M3, or a programmable controller of other manufacturers.
  - MODBUS communication: Used for communication with equipment featuring the MODBUS protocol.
- #### Communication Interface
- Applicable standards: Complies with EIA RS-485
  - 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

### Safety and EMC Standards

- Safety: Complies with IEC/EN61010-1 (CE), approved by C22.2 No.61010-1, approved by UL508. Certified by FM-3810 and FM-3545. Installation category : CAT. II Pollution degree : 2 (IEC/EN61010-1, C22.2 No.61010-1) Measurement category : I (CAT. I : IEC/EN61010-1) Rated measurement input voltage : 10V DC max.(across terminals), 300V AC max.(across ground) Rated transient overvoltage : 1500V (Note) Note : It is a value on the safety standard which is assumed by IEC/EN61010-1 in Measurement category I, and is not the value which guarantees an apparatus performance. Caution: This equipment has Measurement category I, therefore do not use the equipment for measurements within Measurement categories II, III and IV.



| Measurement category | Description  | Remarks                                   |
|----------------------|--|---|
| I CAT. I             | For measurements performed on circuits not directly connected to MAINS.                    |   |
| II CAT. II           | For measurements performed on circuits directly connected to the low voltage installation. | Appliances, portable equipments, etc.     |
| III CAT. III         | For measurements performed in the building installation.                                   | Distribution board, circuit breaker, etc. |
| IV CAT. IV           | For measurements performed at the source of the low-voltage installation.                  | Overhead wire, cable systems, etc.        |

- EMC standards: Complies with EN61326, EN61000-3-2, EN61000-3-3 and EN55011 (CE). The instrument continues to operate at a measuring accuracy of within ±20% of the range during tests.

### Power Supply and Isolation

#### Power Supply

| Power supply              | Voltage   | Rated at 100-240VAC (±10%) |
|---------------------------|---|----------------------------|
|                           | Frequency   | 50 or 60Hz                 |
| Maximum power consumption | 8VA max. (4W max.)  |                            |
| Memory                    | Non-volatile memory   |                            |
| Withstanding voltage      | Between primary terminals and secondary terminals (See note 1.) | 1500V AC for 1 minute      |
| Insulation resistance     | Between primary terminals and secondary terminals (See note 1.) | 20MΩ or more at 500V DC    |

Note 1: The primary terminals are the power supply terminals and relay output terminals. The secondary terminals are the analog input and output terminals, the voltage pulse output terminals, and the contact input terminals.

#### Isolation

The bold lines below indicate reinforced isolation, and the broken line indicates functional isolation.

|   |   |
|---|---|
| • Power supply terminals (100-240V AC)      | <ul style="list-style-type: none"> <li>• Measured value input terminals</li> <li>• I input terminals for /EX</li> <li>• Internal circuit</li> </ul> |
| • Control output terminals (relay contacts) | -----   |
| • Alarm output terminals (2 relay contacts) | <ul style="list-style-type: none"> <li>• PV transmission output terminals for /RET</li> <li>• RS-485 terminals for /RS</li> </ul>                   |

Note: Neither the measured value input terminals nor input terminals for the /EX option are isolated from the internal circuit.

### Construction, Mounting, and Wiring

- Construction: Dust-proof and drip-proof front panel conforming to IP65. For side-by-side close installation the controller loses its dust-proof and drip-proof protection.
  - Casing: ABS resin and polycarbonate
  - Case color: Black
  - Mounting: Flush panel mounting
  - Terminals: Screw terminals
- #### Environmental Conditions
- ##### Normal Operating Conditions
- Warm-up time: At least 30 minutes
  - Ambient temperature: 0-50°C (0-40°C when mounted side-by-side)
  - Rate of change of temperature: 10°C/h or less
  - Ambient humidity: 20-90% RH (no condensation allowed)
  - Magnetic field: 400A/m or less
  - Continuous vibrations of 5 to 14Hz: Amplitude of 1.2mm or less
  - Continuous vibrations of 14 to 150Hz: 4.9m/s<sup>2</sup> (0.5G) or less
  - Short-period vibrations: 14.7m/s<sup>2</sup> (1.5G) for 15 seconds or less
  - Shock: 98m/s<sup>2</sup> (10G) for 11 milliseconds or less
  - Mounting angle: Upward incline of up to 30 degrees; downward incline is not allowed.
  - Altitude: 2000m or less above sea level

#### Maximum Effects from Operating Conditions

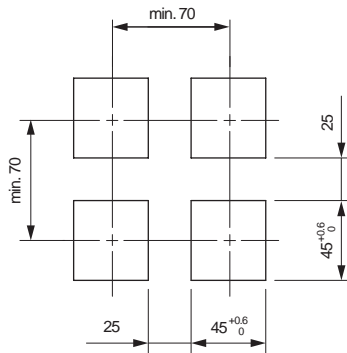
- (1) Temperature effects
- Thermocouple, DC mV and DC V input: ±2μV/°C or ±0.02% of F.S./°C, whichever is the larger
  - Resistance temperature detector: ±0.05°C/°C
  - Analog output: ±0.05% of F.S./°C
- (2) Effect from fluctuation of power supply voltage (within rated voltage range)
- Analog input: ±0.2μV/V or ±0.002% of F.S./V, whichever is the larger
  - Analog output: ±0.05% of F.S./V

#### Transportation and Storage Conditions

- Temperature: -25 to 70°C
- Humidity: 5 to 95% RH (no condensation allowed)
- Shock: Package drop height 90cm (when packed in the dedicated package)

## Panel Cutout Dimensions

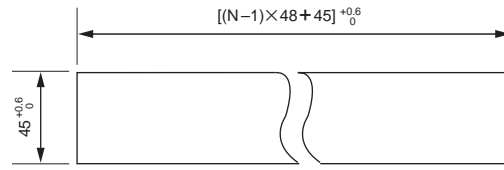
### 1. General Mounting



### 2. Side-by-side Close Mounting

(Splash-proof construction is unavailable)

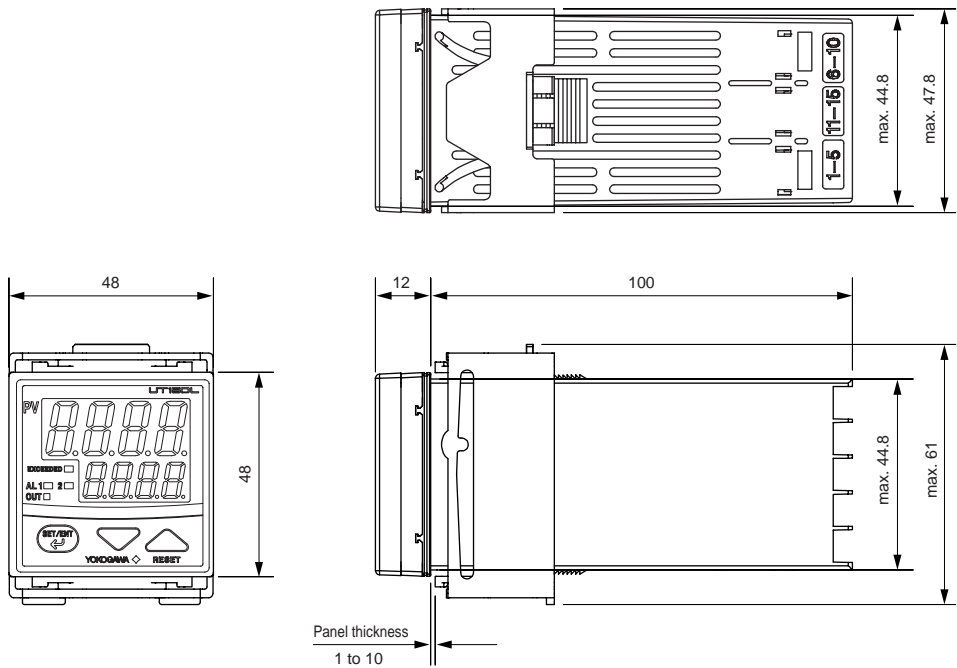
Unit: mm



N is the number of controllers.  
If  $N \geq 5$ , then measure the actual length.

## External Dimensions

Unit: mm



Normal Allowable Deviation=± (Value of JIS B 0401-1999 tolerance grade IT18) / 2

## Terminal Arrangement

