

# General Specifications

## UT35A-L Digital Indicating Controller (Limit Control Type)



GS 05P04D41-01EN

### Overview

The UT35A-L is a Limit Control Type Digital Indicating Controller that can be configured either as a high limit or as a low limit controller by a user. The UT35A-L complies with FM approval.

The UT35A-L features universal input, three 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 UT35A-L controller employs an easy-to-read, 14-segment large color LCD display, along with navigation keys, thus greatly increasing the monitoring and operating capabilities. The short depth of the controller helps save instrument panel space. The UT35A-L also support RS-485 and Ethernet communication.



### Features

- A 14-segment, active (PV display color changing function) color LCD display is employed. Two five-digit, high-resolution displays are possible. Alphabet letters can be displayed in an easy-to-read manner. The guide display shows parameter names.
- Easy to operate  
Navigation keys (SET/ENTER and Up/Down/Left/Right arrow keys) are employed to facilitate making settings.
- 65 mm depth  
The small depth enables the mounting in a thin and small instrumented panel.
- Quick setting function  
Setting only the minimum necessary parameters for operation is possible.

### Functional Specifications

#### Limit Control Function

Setpoint : 1

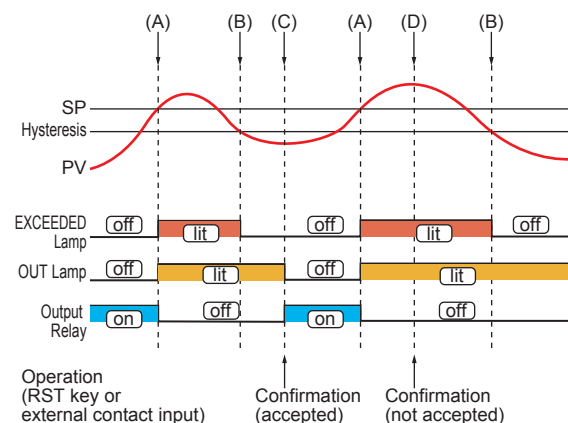
Control type : high limit or low limit

Limit action : latching

### High Limit Control

When PV exceeds a setpoint (SP), "EXCEEDED" lamp lights, and "OUT" lamp turns ON (point A). The limit control output relay is de-energized then.

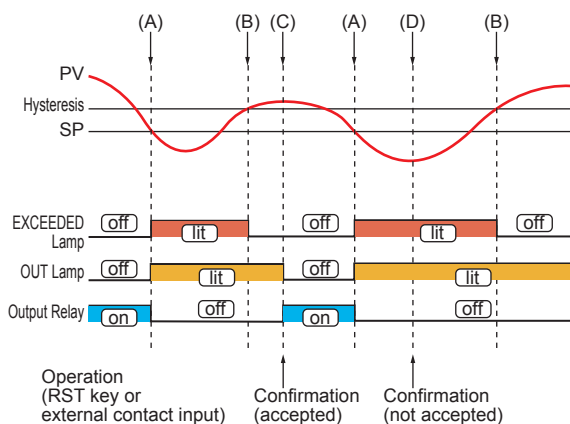
"EXCEEDED" lamp turns off when PV goes into normal condition, while "OUT" lamp stays on as it is (point B). "OUT" lamp turns off when a confirming operation is done by an operator (point C). The way to confirm is pushing the "RST" key (or by an external contact, according to the setting of setup parameter CNF). The confirming operation is not accepted during PV exceeds SP (point D). State of output relay is de-energized whenever "OUT" lamp is on. (NC terminal: CLOSE, NO terminal: OPEN)



### Low Limit Control

When PV exceeds a setpoint (SP), "EXCEEDED" lamp lights, and "OUT" lamp turns ON (point A). The limit control output relay is de-energized then.

"EXCEEDED" lamp turns off when PV goes into normal condition, while "OUT" lamp stays on as it is (point B). "OUT" lamp turns off when a confirming operation is done by an operator (point C). The way to confirm is pushing the "RST" key (or by an external contact, according to the setting of setup parameter CNF). The confirming operation is not accepted during PV exceeds SP (point D). State of output relay is de-energized whenever "OUT" lamp is on. (NC terminal: CLOSE, NO terminal: OPEN)



### Control Computation Function

#### Alarm Functions

• Types of Alarm

<b>Measured value alarm</b>	PV (measured value) high/low limit alarm
<b>Deviation alarm</b>	Deviation high/low limit alarm
<b>Rate-of-change alarm</b>	Deviation high and low limits alarm Deviation within high and low limits alarm PV rate-of-change alarm
<b>Other alarms</b>	Self-diagnosis alarm FAIL

• Alarm Functions

<b>Alarm output action</b>	Alarm stand-by action Alarm latch (forced reset) function Alarm hysteresis Alarm ON/OFF delay timer
<b>Number of alarm settings</b>	3
<b>Number of alarm output points</b>	3

#### Contact I/O Function

This function allows for allocating the input error condition, operation condition, alarm condition or other conditions to the contact input and contact output.

<b>Contact input</b>	Limit output confirmation (RESET) (DI1 fixed)
	Alarm Latch release
	PV red/white switching
	LCD backlight ON/OFF switching Message interrupt displays 1 through 4
<b>Contact output</b>	Alarms 1 through 3

### Communication Function

	Function	Method	Interface	Targets	Max connection	Communication Data
<b>Modbus/TCP</b>	A standard industry protocol allowing communications between the controller and devices such as PCs, PLCs, and DCSs.	Server	Ethernet	PLC and others	2 connections	PV, SP, ALM, etc
		Gateway	Ethernet +RS-485	RS-485: UT55A/UT52A/ UT35A/UT32A/ UP55A/UP35A/ UM33A (*1)	31 units	
Slave		RS-485	PLC and others, UT55A/UT52A/ UT35A/UT32A/ UP55A/UP35A/ UM33A (*2)	31 units		
Slave		RS-485	PC and others, UT55A/UT52A/ UT35A/UT32A/ UP55A/UP35A/ UM33A(*2)	31 units		
<b>Modbus (RTU/ASCII)</b>						
<b>PC link</b>	The proprietary Yokogawa protocol allowing communications to PCs, PLCs and touch panels.					
<b>Ladder</b>	A protocol to communicate to PLCs.					

\*1: UT digital indicating controller, Signal conditioner JUXTA, Power monitor POWERCERT can be connected.  
\*2: UT digital indicating controllers can be connected.

#### Physical interface

**Ethernet** Standard : IEEE802.3 (10BASE-T, 100BASE-TX)  
Max segment length : 100m  
Max. Connecting Configuration : Cascade Max. 4 level (10BASE-T), Max. 2 level (100BASE-TX)

**RS-485** Standard : EIA RS-485  
Communication method : Two-wire half-duplex or four-wire half-duplex, start-stop synchronization, and non-procedural  
Baud rate : 600,1200,2400,4800,9600,19200 or 38400 bps  
Maximum communication distance : 1200 m  
Terminating resistor : 220Ω (External)

## ■ Hardware Specifications

### Display Specifications

- PV display  
5-digit, 14-segment active color LCD (white/red)  
Character height: 21.5 mm
- Data display  
5-digit, 11-segment color LCD (orange)

### Universal Input Specifications

- Number of input points: 1
- Types of input, instrument range, and measurement accuracy (see the table below)

Types of input	Instrument range		Accuracy	
	°C	°F		
Thermocouple	K	-270.0 to 1370.0°C	-450.0 to 2500.0°F	±0.1% of instrument range ±1 digit for 0°C or more
		-270.0 to 1000.0°C	-450.0 to 2300.0°F	
	J	-200.0 to 500.0°C	-200.0 to 1000.0°F	±0.2% of instrument range ±1 digit for less than 0°C
		-200.0 to 1200.0°C	-300.0 to 2300.0°F	
	T	-270.0 to 400.0°C	-450.0 to 750.0°F	±0.15% of instrument range ±1 digit for less than -200°C of thermocouple T
		0.0 to 400.0°C	-200.0 to 750.0°F	
	B	0.0 to 1800.0°C	32 to 3300°F	±0.15% of instrument range ±1 digit for 400°C or more ±5% of instrument range ±1 digit for less than 400°C
	S	0.0 to 1700.0°C	32 to 3100°F	±0.15% of instrument range ±1 digit
	R	0.0 to 1700.0°C	32 to 3100°F	
	N	-200.0 to 1300.0°C	-300.0 to 2400.0°F	±0.1% of instrument range ±1 digit ±0.25% of instrument range ±1 digit for less than 0°C
	E	-270.0 to 1000.0°C	-450.0 to 1800.0°F	±0.1% of instrument range ±1 digit for 0°C or more
	L	-200.0 to 900.0°C	-300.0 to 1600.0°F	
	U	-200.0 to 400.0°C	-300.0 to 750.0°F	±0.2% of instrument range ±1 digit for less than 0°C However, ±1.5% of instrument range ±1 digit for less than -200.0°C of thermocouple E
		0.0 to 400.0°C	-200.0 to 1000.0°F	
	W (*2)	0.0 to 2300.0°C	32 to 4200°F	±0.2% of instrument range ±1 digit
Platinel 2	0.0 to 1390.0°C	32.0 to 2500.0°F	±0.1% of instrument range ±1 digit	
PR20-40	0.0 to 1900.0°C	32 to 3400°F	±0.5% of instrument range ±1 digit for 800°C or more Accuracy not guaranteed for less than 800°C	
W97 Re3-W75 Re25	0.0 to 2000.0°C	32 to 3600°F	±0.2% of instrument range ±1 digit	
Resistance-temperature detector (RTD) 3-wire	JPt100	-200.0 to 500.0°C	-300.0 to 1000.0°F	±0.1% of instrument range ±1 digit (*1)
		-150.00 to 150.00°C	-200.0 to 300.0°F	±0.1% of instrument range ±1 digit
	Pt100	-200.0 to 850.0°C	-300.0 to 1560.0°F	±0.1% of instrument range ±1 digit (*1)
		-200.0 to 500.0°C	-300.0 to 1000.0°F	±0.1% of instrument range ±1 digit
Standard signal	0.400 to 2.0000 V		±0.1% of instrument range ±1 digit	
	1.000 to 5.000 V			
DC voltage	4.00 to 20.00 mA			
	0.000 to 2.000 V			
DC current	0.00 to 10.00 V			
	-10.00 to 20.00 mV			
	0.00 to 20.00 mA			

The accuracy is that in the standard operating conditions: 23 ±2°C, 55 ±10%RH, and power frequency at 50/60 Hz.

- \*1: ±0.3°C and ±1 digit in the range between 0 and 100°C  
±0.5°C ±1 digit in the range between -100 and 200°C
  - \*2: W-5% Re/W-26% Re (Hoskins Mfg.Co.), ASTM E988
  - Applicable standards: JIS, IEC and DIN (ITS-90) for thermocouples and resistance-temperature detectors (RTD)
  - Input sampling period: Synchronized to control period
  - Burnout detection  
Upscale and downscale of function, and OFF can be specified for the standard signal of thermocouple and resistance-temperature detector (RTD).  
For integrated signal input, 0.1 V or 0.4 mA or less is judged as a burnout.
  - Input bias current: 0.05 µA (for thermocouple and resistance-temperature detector (RTD))
  - Resistance-temperature detector (RTD) measured current: About 0.16 mA
  - Input resistance  
1 MΩ or more for thermocouple/mV input  
About 1 MΩ for voltage input  
About 250 Ω for current input (with built-in shunt resistance)
  - Allowable signal source resistance  
250 Ω or less for thermocouple/mV input  
Effect of signal source resistance: 0.1 µV/Ω or less  
2 kΩ or less for DC voltage input  
Effect of signal source resistance: about 0.01%/100 Ω
  - Allowable wiring resistance  
Up to 150 Ω per line for resistance-temperature detector (RTD) input (conductor resistance between the three lines shall be equal)  
Effect of wiring resistance: ±0.1°C/10 Ω
  - Allowable input voltage/current  
±10 V DC for thermocouple/mV/mA or resistance-temperature detector (RTD) input  
±20 V DC for V input  
±40 mA DC for mA input
  - Noise reduction ratio  
40 dB or more (at 50/60 Hz) in normal mode  
120 dB or more (at 50/60 Hz) in common mode
  - Reference junction compensation error  
±1.0°C (15 to 35°C)  
±1.5°C (-10 to 5°C and 35 to 50°C)
- ### Relay Contact Output Specifications
- Types of contact and number of points  
Limit control relay output: one 1 c-contact point  
Alarm output: 3 1a-contact points (Common is separated)
  - Contact rating  
1c-contact: 3 A at 250 V AC or 3 A at 30 V DC (resistance load)  
1a-contact: 1 A at 240 V AC or 1 A at 30 V DC (resistance load)
  - \*: The control output should always be used with a load of 10 mA or more.  
The alarm output should always be used with a load of 1 mA or more.
  - Application: alarm output, FAIL output, etc.
  - Time resolution for limit control output: 10 ms or 0.1% of output value, whichever is larger
- ### Step Response Time Specifications
- 1 s
- (Response time at 63% of transmission output when a change is made stepwise in the range between 10 and 90% of input span)

**Retransmission Output Specifications**

- Number of points: 1 point
- Output function: current output  
4 to 20 mA DC or 0 to 20 mA DC/load resistance 600 Ω or less
- Current output accuracy (conversion accuracy from PV display on the set scale): ±0.1% of span (however, ±5% of span for 1 mA or less)  
The accuracy is that in the basic operating conditions: 23 ±2°C, 55 ±10%RH, and power frequency at 50/60 Hz  
This is not conversion accuracy through input and output but the performance of transmission output itself.

**Contact Input Specifications**

- Number of points: 2 points
- Input type: no-voltage contact input or transistor contact input
- Input contact capacity: 12 V DC, 10 mA or more  
Be sure to use a contact with a minimum ON current of 1 mA or less
- ON/OFF detection  
No-voltage contact input:  
Contact resistance 1 kΩ or less in ON state  
Contact resistance 50 kΩ or more in OFF state  
Transistor contact input:  
2 V or less in ON state  
Leak current 100 μA or less in OFF state
- Status detection minimum hold time: 250 ms
- Application: Confirmation operation, etc.

**Safety and EMC Standards**

- Safety:  
Compliant with IEC/EN 61010-1 (CE), IEC/EN 61010-2-201 (CE), IEC/EN 61010-2-030 (CE), approved by CAN/CSA C22.2 No. 61010-1 (CSA), approved by UL 61010-1. Certified for FM-3810 and FM-3545.  
Installation category: II  
Pollution degree: 2  
Measurement category: I (CAT I) (UL, CSA)  
O (Other) (CE)  
Rated measurement input voltage: Max. 10 V DC  
Rated transient overvoltage: 1500 V (\*)  
\*: This is a reference safety standard value for measurement category I of CSA/UL 61010-1, and for measurement category O of IEC/EN 61010-2-030. This value is not necessarily a guarantee of instrument performance.
- EMC standards:  
Compliant with  
CE marking  
EN 61326-1 Class A, Table 2 (For use in industrial locations),  
EN 61326-2-3  
\*: The instrument continues to operate at a measurement accuracy of within ±20% of the range during testing.  
EN 55011 Class A, Group 1  
EN 61000-3-2 Class A  
EN 61000-3-3  
EMC Regulatory Arrangement in Australia and New Zealand  
EN 55011 Class A, Group 1

**Power Supply Specifications and Isolation**

- Power supply  
Rated voltage: 100 to 240 V AC (+10%/-15%), 50/60 Hz  
24 V AC/DC (+10%/-15%) (When the /DC option is specified)
- Power consumption: 18 VA (For the /DC option.  
DC: 9 VA, AC: 14 VA)
- Storage: Nonvolatile memory

- Allowable power interruption time: 20 ms (at 100 V AC)
- Withstanding voltage  
2300 V AC for 1 minute between primary and secondary terminals (UL, CSA)  
3000 V AC for 1 minute between primary and secondary terminals (CE)  
1500 V AC for 1 minute between primary terminals  
500 V AC for 1 minute between secondary terminals (Primary terminals = Power (\*) and relay output terminals, Secondary terminals = Analog I/O signal terminals, contact input terminals, communication terminals, and functional grounding terminals.)  
\*: Power terminals for 24 V AC/DC models are the secondary terminals.
- Insulation resistance  
Between power supply terminals and a grounding terminal: 20 MΩ or more at 500 V DC
- Isolation specifications

PV (universal) input terminals	Internal circuits	Power supply
Retransmission (analog) output terminals		
Control relay (c-contact) output terminals		
Alarm-1 relay (a-contact) output terminals		
Alarm-2 relay (a-contact) output terminals		
Alarm-3 relay (a-contact) output terminals		
Contact input terminals RS485 communication terminals		
Ethernet communication terminal		

The circuits divided by lines are insulated mutually.

**Environmental Conditions**

**Normal operating conditions**

- Ambient temperature: -10 to 50°C (-10 to 40°C for side-by-side mounting of controllers)
- Ambient humidity: 20 to 90% RH (no condensation)
- Magnetic field: 400 A/m or less
- Continuous vibration (at 5 to 9 Hz) Half amplitude of 1.5 mm or less  
(at 9 to 150 Hz) 4.9 m/s<sup>2</sup> or less, 1 oct/min for 90 minutes each in the three axis directions
- Rapid vibration: 14.7 m/s<sup>2</sup>, 15 s or less
- Impact: 98 m/s<sup>2</sup> or less, 11 msec.
- Installation altitude: 2,000 m or less above sea level
- Warm-up time: 30 minutes or more after the power is turned on
- Start-up time within 10 s

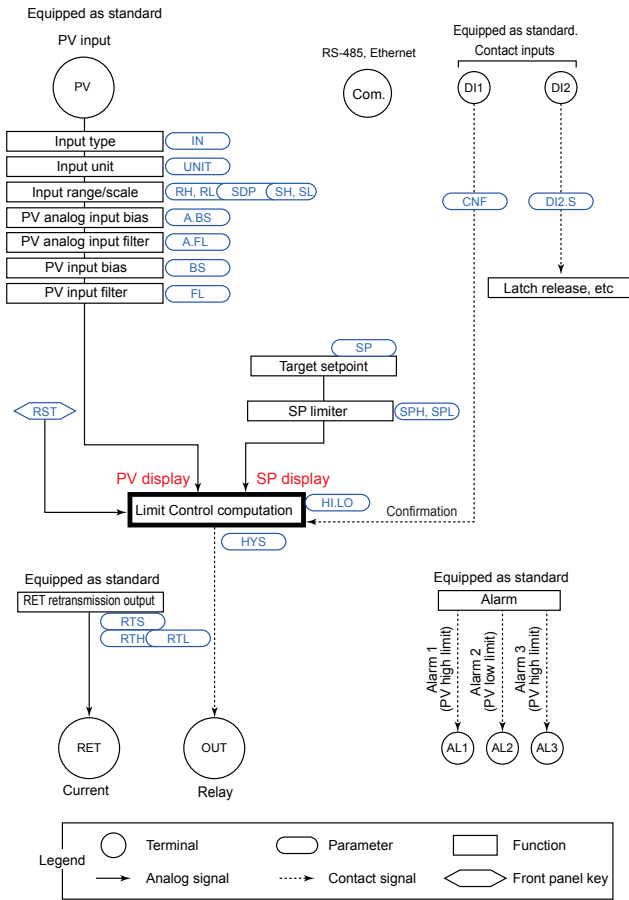
**Transportation and Storage Conditions**

- Temperature: -25 to 70°C
- Temperature change rate: 20°C per hour or less
- Humidity: 5 to 95%RH (no condensation)

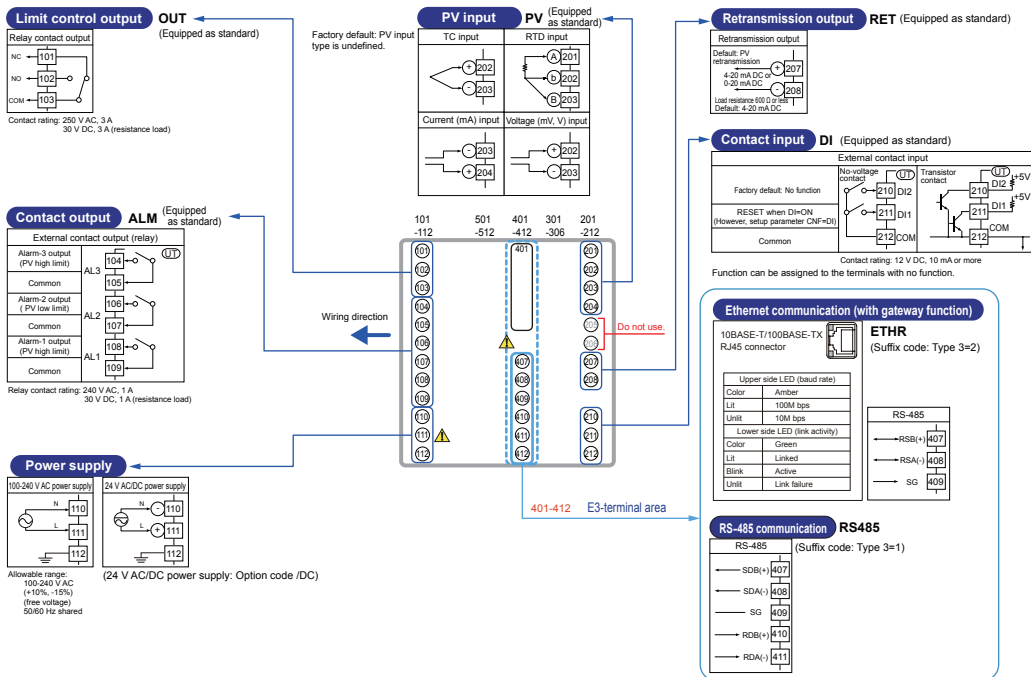
**Effects of Operating Conditions**

- Effect of ambient temperature  
For voltage or TC input:  
±1 μV/°C or ±0.01% of F.S. (instrument range)/°C, whichever is greater  
For RTD input:  
±0.05°C/°C (ambient temperature) or less  
For current input:  
±0.01% of F.S. (instrument range)/°C  
For analog output:  
±0.02% of F.S./°C or less
- Effect of power supply fluctuation:  
For analog input: ±0.05% of F.S. (instrument range) or less  
For analog output: ±0.05% of F.S. or less  
(Each within rated voltage range)

## ■ Block Diagram



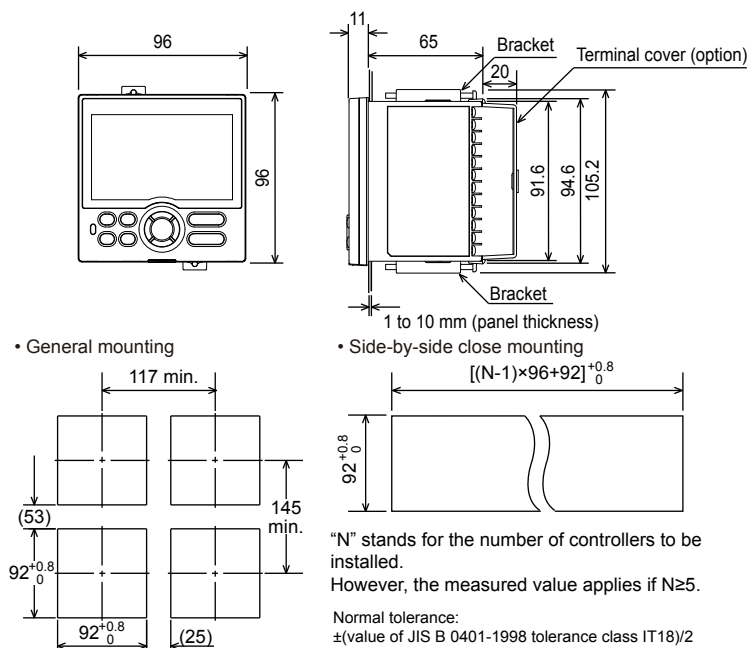
## ■ Terminal Arrangement



## External Dimensions and Panel Cutout Dimensions

UT35A-L

Unit: mm



### Construction, Mounting, and Wiring

- Degree of protection provided by Enclosure: IP66 (for front panel) (Not available for side-by-side close mounting.)
- Material: Polycarbonate resin (Flame retardancy: UL94 V-0)
- Case color: Light gray or Light charcoal gray
- Weight: 0.5 kg or less
- External dimensions (mm): 96 (width) x 96 (height) x 65 (depth from the panel surface)
- Mounting: Direct panel mounting; mounting bracket, one each for upper and lower mounting
- Panel cutout dimensions (mm):  $92^{+0.8/0}$  (width) x  $92^{+0.8/0}$  (height)
- Mounting position: Up to 30 degrees above the horizontal. No downward tilting allowed.
- Wiring: M3 screw terminal with square washer (signal wiring and power)

### Model and Suffix Code

Model	Suffix code	Option code	Description
UT35A			Digital Indicating Controller (provided with retransmission output, 2 DIs, and 3 DOs) (Power supply: 100-240 V AC)
Type 1: Basic control	L		Limit control type
Type 2: Functions	0		Always "0"
Type 3: Open networks	0 1 2		None RS-485 communication (Max.38.4 kbps, 2-wire/4-wire) Ethernet communication (with serial gateway function)
Display language	-1		English
Case color	0 1		White (Light gray) Black (Light charcoal gray)
Fixed code		-00	Always "-00" (for Standard Code Model)
Option codes		/DC	Power supply 24 V AC/DC

### Items to be specified when ordering

Model and suffix codes, whether User's Manual and QIC required.

### Standard accessories

Brackets (mounting hardware), Unit label, Operation Guide

### Accessory

Name	Model
Terminal cover	UTAP001
User's Manual (CD)	UTAP003

### Special Order Items

Model code	Suffix code	Description
LL50A	-00	Parameter Setting Software

### User's Manual

Product user's manuals can be downloaded or viewed at the following URL. To view the user's manual, you need to

use Adobe Reader 7 or later by Adobe Systems.

URL: <http://www.yokogawa.com/ns/ut/im/>