General Specifications

GS 05P08D81-01EN

UT32A-D/MDL
Digital Indicating Controller
(Dual-loop, DIN Rail Mounting Type)

UTAdvanced
Functional Enhancement

■ Overview

The UT32A-D/MDL controller is a dual-loop controller that can be mounted in an enclosure. A ladder sequence function is included as standard. Configuration is performed using LL50A (sold separately) via the maintenance port or communication interface.

The UT32A-D has a Panel mounting type (without option code /MDL). For more details, please see General Specification GS 05P08D31-01EN.

■ Features

- Simple panel surface
  Mounting the controller in an enclosure simplifies the panel surface. This controller saves space because dual-loop control is possible from its compact body.
- Ladder sequence function is included as standard.
  This function allows for creating a simple sequence control. Dedicated LL50A Parameter Setting Software (sold separatly) allows for performing programming using a ladder language.
- Equipped with a multitude of functions
  Universal I/O is included as standard. PID control, ON/OFF control, etc. are available.
- LL50A Parameter Setting Software (sold separately)
  The parameters and ladder programs of UTAdvanced controller can be built from a PC using this software. It makes data management even easier.

■ Functional Specifications

Control Specifications

(1) Control Mode : Dual-loop control
(2) Control period: 200 ms

Table of Number of Inputs and Outputs

Model and suffix code	Number of analog input points	Number of analog output points	Number of contact input points	Number of contact output points
UT32A				
-Dx0/MDL	2	2	3	3

■ Control Computation Function

(1) Types of control
- PID control
- ON/OFF control

(2) Control Computation Function
(a) Target setting point and the number of PID parameter groups
Respectively, four sets of target setpoints, alarm setpoints, and PID parameters can be set.
(b) Selecting the PID parameter group
The following PID parameter groups can be selected.
- Target setpoint number (SPNO) (The PID number can be set arbitrarily.)
- Measured input zone PID
- Target setpoint zone PID
- Reached target setpoint zone PID

(c) Auto-tuning
- Tuning results can be selected from two options, Normal or Stable.
- Tuning output limit can be set.

(d) “Super” function: Overshoot-suppressing function
(e) “Super 2” function: Hunting-suppressing function
(f) STOP preset output function
(g) Input ERROR preset output function
(h) MANUAL preset output function

(3) Operation Mode Switching

Operation mode switching	AUTO/MANUAL and RUN/STOP switching REMOTE/LOCAL switching (only model with communication option)

(4) Control Parameter Setting Range

Proportional band	0.1 to 999.9%
Integral time	1 to 6000 sec. or OFF (using manual reset)
Derivative time	1 to 6000 sec. or OFF
ON/OFF control hysteresis (one or two hysteresis points)	0.0 to 100.0% of measured input range width
Preset output value	-5.0 to 105.0% (however, 0 mA or less cannot be output)
High/low output limiter	-5.0 to 105.0% Low limit setpoint < high limit setpoint
Tight shut function	When manual control is carried out with 4 to 20 mA output, control output can be reduced to about 0 mA.
Rate-of-change limiter of output	0.1 to 100.0%/sec., OFF

Alarm Functions

- Types of Alarm (loop-1 and loop-2)

Measured value alarm Deviation alarm Rate-of-change alarm	PV (measured value) high/low limit alarm Deviation high/low limit alarm Deviation high and low limits alarm Deviation within high and low limits alarm Analog input PV high/low limit alarm PV rate-of-change alarm
Setpoint alarm	SP (setpoint) high/low limit alarm Target SP high/low limit alarm Target SP deviation high/low limit alarm Target SP deviation high and low limits alarm Target SP deviation within high and low limits alarm
Output alarm	Control output high/low limit alarm Cooling control output high/low limit alarm
Other alarms	Heater disconnection alarm (for /HA option) Self-diagnosis alarm FAIL

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• Alarm Functions

Alarm output action	Alarm stand-by action Alarm latch (forced reset) function Alarm hysteresis Alarm ON/OFF delay timer
Number of alarm settings	4
Number of alarm output points	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. AUTO/MAN, REMOTE/LOCAL, and STOP/START can be switched individually or simultaneously both in loop-1 and loop-2.

Contact input	AUTO/MANUAL switching
	REMOTE/LOCAL switching (only model with communication option)
	STOP/START switching
	Switching to AUTO
	Switching to MANUAL
	Switching to REMOTE (only model with communication option)
	Switching to LOCAL (only model with communication option)
	AUTO-TUNING START/STOP switching
	SP number specification
	PID number specification
	Manual preset output number specification
Contact output	Alarms 1 through 4
	Status output

Ladder Sequence Function

(1) Number of I/O Points

	Number of I/O
Digital input points	3
Digital output points	3

(2) Types of Command

	Number of commands	Remark
Number of basic command types	13	Load, AND, OR, Timer, Counter, etc.
Number of application command types	73	Comparison, reverse, addition/subtraction/multiplication/division, logic operation, high/low limiter, etc.

(3) Sequence Device

	Types of device	Number of points
Digital I/O	Input relay	3
	Output relay	3
Internal device	M relay (bit data)	256
	DAT register (data)	28
	P register (parameter)	10
	K register (constant)	30
Special device	Special relay (bit data)	12

Process data and process relay can be used besides the above-mentioned.

(4) Program capacity

Max Program capacity: 300 steps *

*: Available number of steps differs according to the parameters and using command.

(5) Ladder computation period

Ladder computation period is the same as control period.

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Communication Function

	Function	Method	Interface	Targets	Max connection	Communication Data
Modbus (RTU/ASCII)	A standard industry protocol allowing communications between the controller and devices such as PCs, PLCs, and DCSs.	Slave	RS-485	PLC and others, UT75A, UT55A, UT52A, UT35A, UT32A, UP55A, UP35A, UP32A, UM33A (*1)	31 units	PV, SP, OUT, ALM etc
Peer to peer	A protocol allowing multiple controllers to send and receive data between one another. The Ladder Program is used.	Multi-drop	RS-485 (2 wire only)	UT75A, UT55A, UT52A, UT35A, UT32A, UP55A, UP35A, UP32A	Read/Write: 4 units Read only : 28 units	
Coordinated Communication	A protocol to coordinate the operation of two or more instruments controlling the same process.	Master/Slave	RS-485	UT75A, UT55A, UT52A, UT35A, UT32A, UP55A, UP35A, UP32A(*1)	Master : 1 unit Slave : 31 units	
PC link	The proprietary Yokogawa protocol allowing communications to PCs, PLCs and touch panels.	Slave	RS-485	PC and others, UT75A, UT55A, UT52A, UT35A, UT32A, UP55A, UP35A, UP32A, UM33A(*1)	31units	
Ladder	A protocol to communicate to PLCs.					

*1: UT digital indication controllers can be connected.

Physical Interface

RS-485 Standard : EIA RS-485
Communication method : Two-wire harf-duplex or four-wire harf-duplex, start-stop synchoronization, and non-procedural
Baud rate : 600,1200,2400,4800,9600,19200 or 38400bps, Peer to peer communication is fixed at 19200bps
Maximum communication distance : 1200m
Terminating resistor : 220Ω (External)

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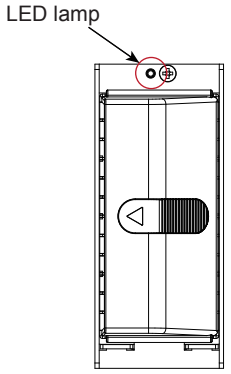
■ Hardware Specifications

Display Specifications

The controller status can be verified with the LED.

Status	LED	Lit/Blinks	Description
Normal	Green	Lit	
Communication error	Green	Blinks	
Instrument failure	Red	Lit	Parameter error/ Hardware failure/Ladder program corruption.
Input error	Red	Blinks	sensor burnout, input over



UT32A-D/MDL Front
(with terminal cover)

Universal Input Specifications (PV1, PV2)

- Number of input points: 2
- Types of input, instrument range, and measurement accuracy (see the table below)

Types of input		Instrument range °C	Instrument range °F	Accuracy
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 ±0.2% of instrument range ±1 digit for less than 0°C However, ±2% of instrument range ±1 digit for less than -200°C of thermocouple K ±1% of instrument range ±1 digit for less than -200°C of thermo-couple T
		-270.0 to 1000.0°C	-450.0 to 2300.0°F	
		-200.0 to 500.0°C	-200.0 to 1000.0°F	
	J	-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	
		0.0 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 ±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
	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	
		0.0 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 guaran-teed 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	
		-150.00 to 150.00°C	-200.0 to 300.0°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	-	
		4.00 to 20.00 mA	-	
DC voltage		0.000 to 2.000 V	-	
		0.00 to 10.00 V	-	
		-10.00 to 20.00 mV	-	
DC current		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

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- 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)

Contact Input Specifications (DI)

- Number of points: 3 points (standard)
- 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
  For 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 μ A or less in OFF state
- Status detection minimum hold time: control period + 50 ms
- Application: SP switching, operation mode switching, event input

Control Output Specifications (OUT, OUT2)

- Number of points: 2
- Output functions:
  Current output or voltage pulse output
- Current output:
  4 to 20 mA DC or 0 to 20 mA DC/load resistance 600 Ω or less
- Current output accuracy:
  ±0.1% of span (however, ±5% of span for 1 mA or less)
  The accuracy is that in the standard operating conditions: 23 ±2°C, 55 ±10%RH, and power frequency at 50/60 Hz
- Voltage pulse output
  Application: time proportional output
  ON voltage: 12 V or more/load resistance of 600 Ω or more
  OFF voltage: 0.1 V DC or less
  Time resolution: 10 ms or 0.1% of output value, whichever is larger

Control Relay Contact Output Specifications (OUT, OUT2)

- Types of contact and number of points: 2 points, 1a-contact point (common is separated)
- Contact rating
  1a-contact: 3 A at 240 V AC or 3 A at 30 V DC (resistance load)
  *: The control output should always be used with a load of 10 mA or more.
- Application: time proportional output, ON/OFF output
- Time resolution for control output: 10 ms or 0.1% of output value, whichever is larger

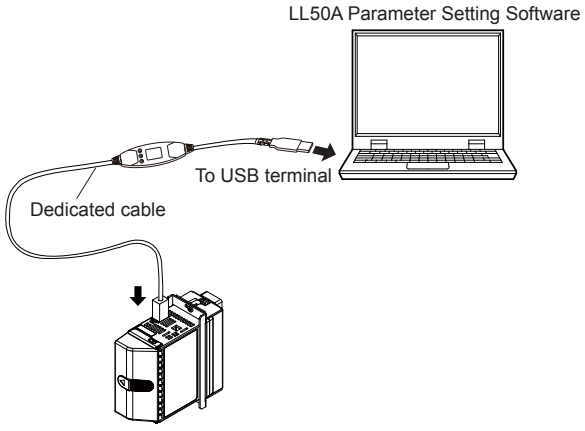
Alarm Relay Contact Output Specifications (ALM)

- Types of contact and number of points: 3 points, 1a-contact points (common is separated)
- Contact rating
  1a-contact: 1 A at 240 V AC or 1 A at 30 V DC (resistance load)
  *: The alarm output should always be used with a load of 1 mA or more.
- Application: alarm output, FAIL output, etc.

Maintenace Port Specifications

The maintenance port is used to connect a dedicated cable when using the LL50A Parameter Setting Software (sold separately). Through this port, you can set controller parameters, download ladder programs, and so on.

For details, see the LL50A General Specifications (GS05P05A01-01EN).



Use LL50A with the controller turned on. (The dedicated cable must be connected. LL50A Light-loader adapter cannot be used.)

The maintenance port is not isolated from the PV input terminal. Use the port only for maintenance purposes, such as for setting the controller parameters.

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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.
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

• KC marking: Electromagnetic wave interference prevention standard, electromagnetic wave protection standard compliance

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: 15 VA (For the /DC option.
DC: 7 VA, AC: 11 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

<table>
<tr><td colspan="2">PV1 (universal) input terminal, Maintenance port</td><td rowspan="9">Power supply</td></tr>
<tr><td>PV2 (universal) input terminal</td><td rowspan="8">Internal circuits</td></tr>
<tr><td>Control (analog) output terminal (OUT, OUT2)
(not isolated between the analog output terminals)</td></tr>
<tr><td>Control relay (2 a-contact) output terminal (OUT, OUT2)</td></tr>
<tr><td>Alarm-1 relay (a-contact) output terminal</td></tr>
<tr><td>Alarm-2 relay (a-contact) output terminal</td></tr>
<tr><td>Alarm-3 relay (a-contact) output terminal</td></tr>
<tr><td>Contact input terminal (3 points)
RS485 communication terminal</td></tr>
<tr><td colspan="2">Current transformer input terminal</td></tr>
</table>

The circuits divided by lines are insulated mutually.

Environmental Conditions

Normal operating conditions

• Ambient temperature: -10 to 50°C
• 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^2 or less, 1 oct/min for 90 minutes each in the three axis directions
• Rapid vibration: 14.7 m/s^2, 15 s or less
• Impact: 98 m/s^2 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 μ V/°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)

Construction, Mounting, and Wiring

• Construction: DIN rail mounting type
• Material: Polycarbonate resin (Flame retardancy: UL94 V-0)
DIN rail mounting bracket material: Panel steel sheet
• Case color: Black (Light Charcoal gray)
• Weight: 1 kg or less
• External dimensions (mm):
UT52A/MDL: 48.2 (width) x 114 (height) x 100 (depth)
• Compatible DIN rails: TH35-7.5Fe, TH35-7.5Aℓ, JIS C 2812
• Mounting position: Horizontal.
• Wiring: M3 screw terminal with square washer (signal wiring and power)

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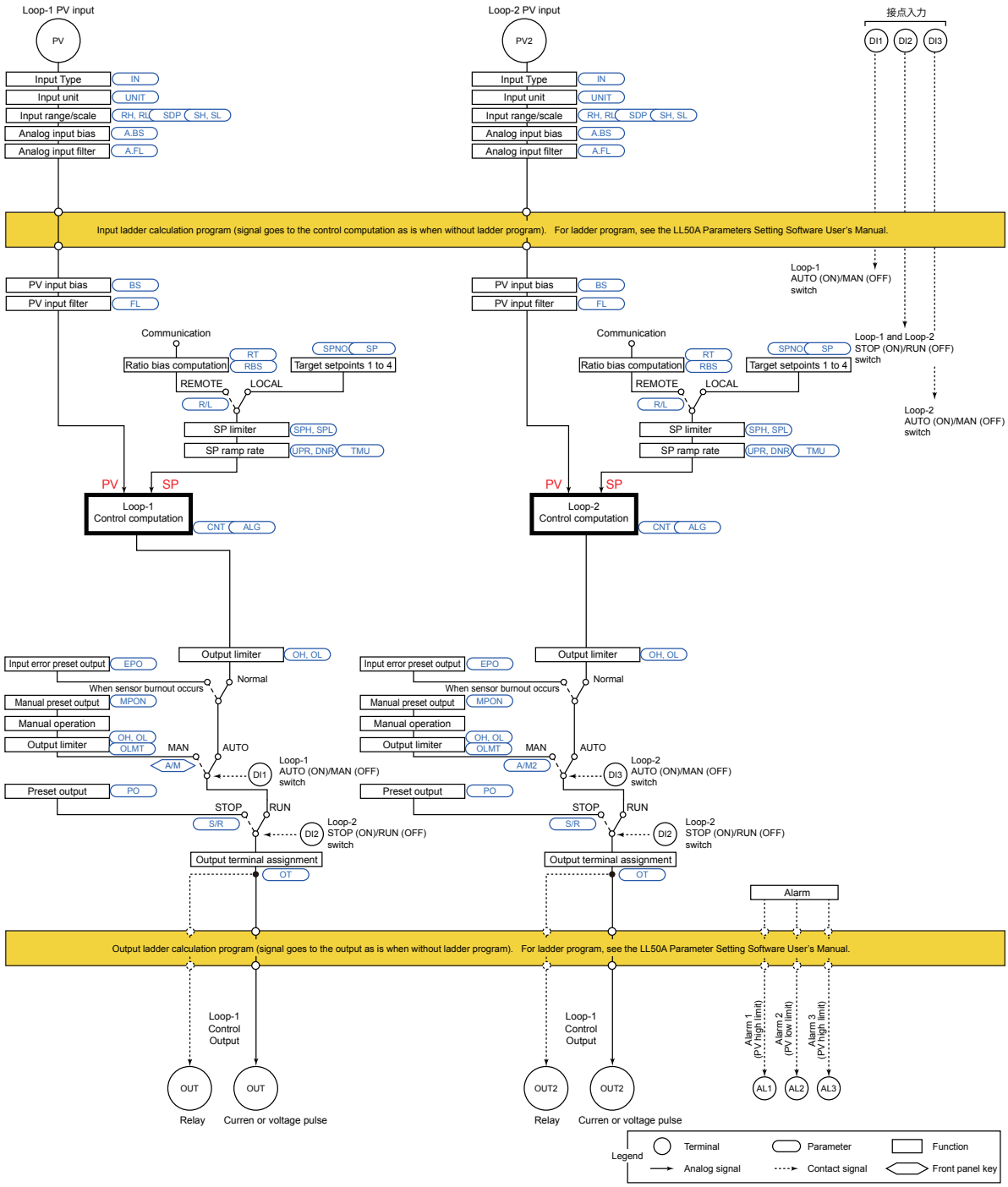
■ Block Diagram



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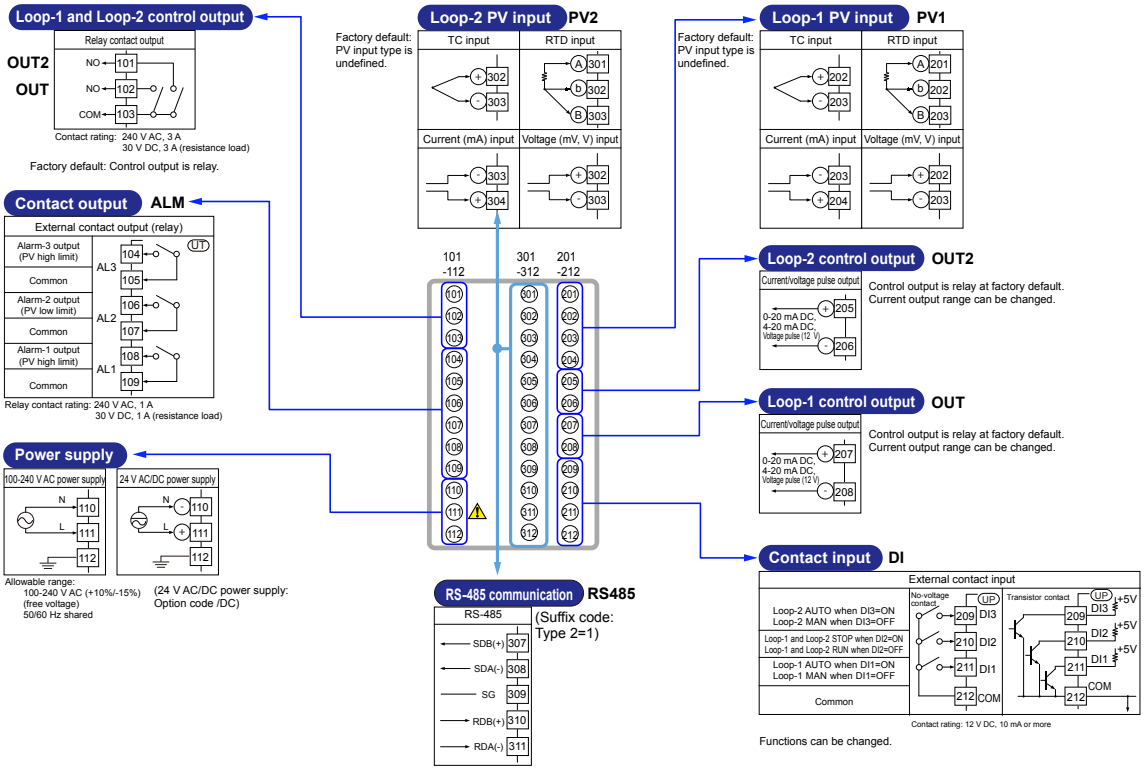
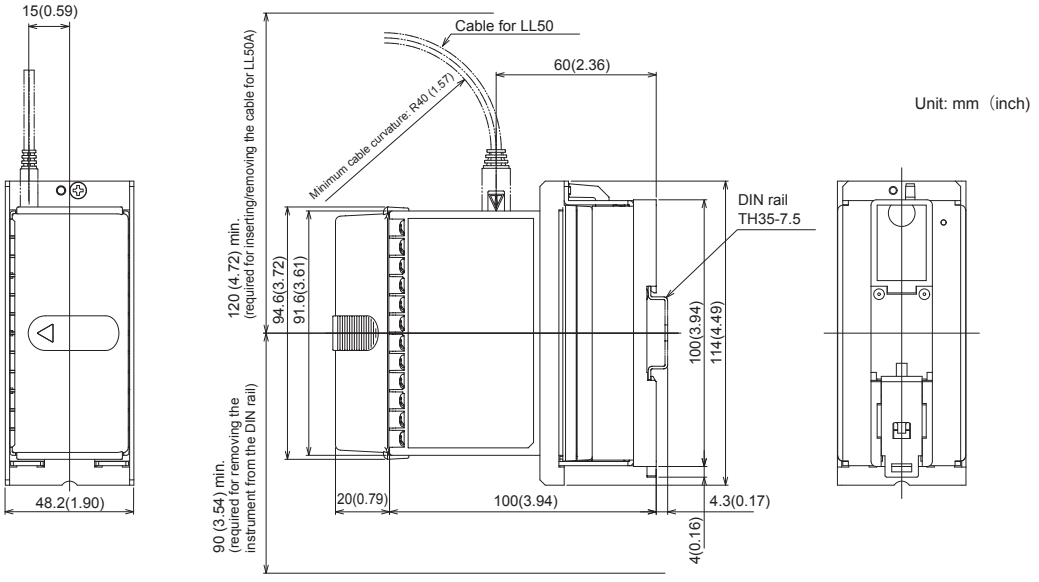
■ Terminal Arrangement



■ External Dimensions



Note:
Trigonometry
General tolerance = ±(JIS B 0401-1998 tolerance class IT18)/2

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■ Model and Suffix Code

Model	Suffix code						Option code	Description
UT32A							**/MDL** (Required)	Digital Indicating Controller (Power supply: 100-240 V AC) (provided with 3 DIs, and 3 DOs) (without the display parts and keys)
Type 1: Basic control	**-D**							Dual-loop type
Type 2:Functions		**1**						RS-485 communication (Max. 38.4 kbps, 2-wire/4-wire)
Type 3:Fixed code			**0**					None
Fixed code				**-1**				Temperature unit: deg C & deg F
Case color					**1**			Black (Light charcoal gray)
Fixed code						**-00**		Always "-00" (for Standard Code Model)
Option codes							**/MDL** (Required)	Mount on DIN rail (without the display parts and keys)
							/DC	Power supply 24 V AC/DC
							/CT	Coating (*1)
							/CV	Terminal cover

*1: When the /CT option is specified, the UT32A does not conform to the safety standards (UL and CSA) and CE marking (Products with /CT option are not intended for EEA-market).

■ Items to be specified when ordering

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

■ Standard accessories

Operation Guide

■ Special Order Items

Model code	Suffix code	Description
LL50A	-00	Parameter Setting Software
X010	See the General Specifications (*)	Resistance Module

*: Necessary to input current signal to voltage input terminal.

Name	Model
Terminal cover	**UTAP002**
User's Manual (CD)	**UTAP003**
Wall mount bracket (for UT32A-D/MDL)	**UTAP005**

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/

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