General Specifications

GS 05P08D31-01EN

UT32A-D
Digital Indicating Controller
(Dual-loop, Panel Mounting Type)

UTAdvanced™
Functional Enhancement

■ Overview

The UT32A-D dual-loop digital indicating controllers employ an easy-to-read, 14-segment large color LCD display, along with navigation keys, thus greatly increasing the monitoring and operating capabilities. A ladder sequence function is included as standard. The short depth of the controller helps save instrument panel space.

The UT32A-D has a DIN rail mounting type (with option code /MDL). For more details, please see General Specification GS 05P08D81-01EN.

■ Features

- Dual-loop control is available.
- 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.
- 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.
- Quick setting function
  Setting only the minimum necessary parameters for operation is possible.
- 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 digital indicating controller can be built from a PC using this software. It makes data management even easier.
- Dust-proof and drip-proof
  IP66 (for front panel) (Not applicable to side-by-side close mounting.)
  NEMA4 (Hose-down test only)

■ 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	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

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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

• 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
	LCD backlight ON/OFF switching
	Message interrupt displays 1 through 4
	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

- PV display
  5-digit, 14-segment active color LCD (white/red)
  Character height: 13.0 mm
- Data display
  5-digit, 11-segment color LCD (orange)
- Bar graph display
  12-segment color LCD (orange)

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 thermocouple 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 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	
		-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
- 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

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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.

Heater Break Alarm Specifications (for /HA Option)

- Function: Measures the heater current using an external current transformer (CT) and generates a heater break alarm when the measured value is less than the disconnection detection value.
- Number of input points: 2 points
- Number of output points: 2 points (transistor contract output)
- CT input resistance: about 9.4 Ω
- CT input range: 0.0 to 0.1 Arms (0.12 Arms or more cannot be applied)
- Heater current alarm setting range: OFF, 0.1 to 300.0 Arms
  Heater current measured value display range: 0.0 to 360.0 Arms
  *: The CT ratio can be set. CT ratio setting range: 1 to 3300
- Recommended CT: CT from URD Co. Ltd.
  CTL-6-S-H: CT ratio 800, measurable current range: 0.1 to 80.0 Arms
  CTL-12L-30: CT ratio 3000, measurable current range: 0.1 to 180.0 Arms
- Heater current measurement period: 200 ms
- Heater current measurement accuracy: ±5% of CT input range span ±1 digit (CT error is not included)
- Heater current detection resolution: Within 1/250 of CT input range span
- Disconnection detection ON time: Minimum 200 ms. (for time proportional output)

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, 24 V DC: 7 VA, 24 V 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

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• Isolation specifications

PV1 (universal) input terminal	Internal circuits	Power supply
PV2 (universal) input terminal		
Control (analog) output terminal (OUT, OUT2) (not isolated between the analog output terminals)		
Control relay (2 a-contact) output terminal (OUT, OUT2)		
Alarm-1 relay (a-contact) output terminal		
Alarm-2 relay (a-contact) output terminal		
Alarm-3 relay (a-contact) output terminal		
Contact input terminal (3 points) RS485 communication terminal		
Current transformer input terminal		

The circuits divided by lines are insulated mutually.

Environmental Conditions

Normal operating conditions

- Ambient temperature: -10 to 50°C (side-by-side mounting: -10 to 40 °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

- Dust-proof and drip-proof: IP66 (Front panel) (Except for side-by-side close mounting)/NEMA4 *
  *: Hose-down test only
- Material: Polycarbonate resin (Flame retardancy: UL94 V-0)
- Case color: White (Light gray) or Black (Light Charcoal gray)
- Weight: 0.5 kg or less
- External dimensions (mm):
  48 (width) x 96 (height) x 65 (depth from the panel surface)
- Mounting: DIN rail mounting type
- Panel cutout dimensions (mm):
  $45^{+0.6}_{0}$ (width) x $92^{+0.8}_{0}$ (height)
- Mounting position: Up to 30 degrees above the horizontal. No downward titling allowed.
- Wiring: M3 screw terminal with square washer (signal wiring and power)

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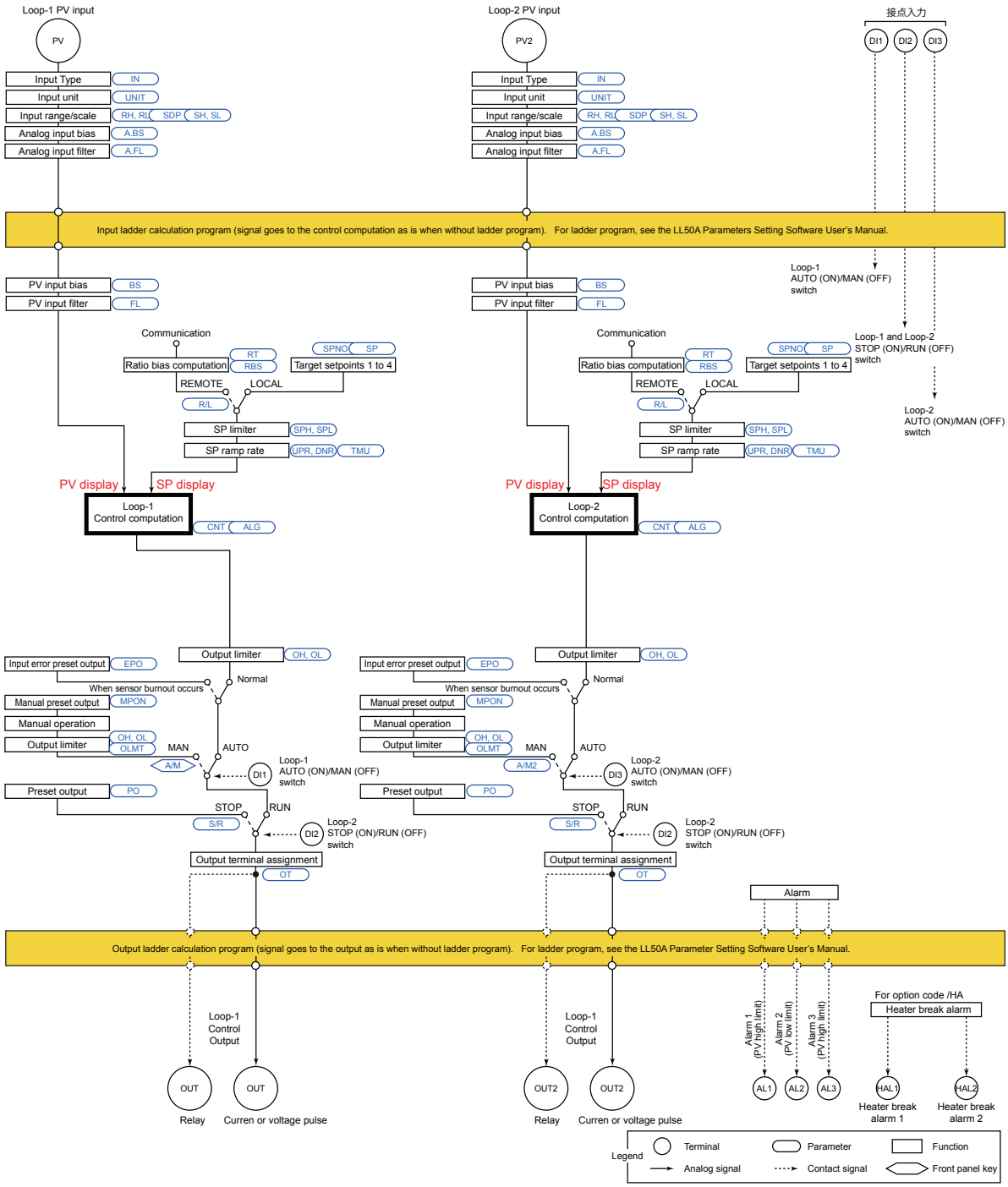
■ Block Diagram



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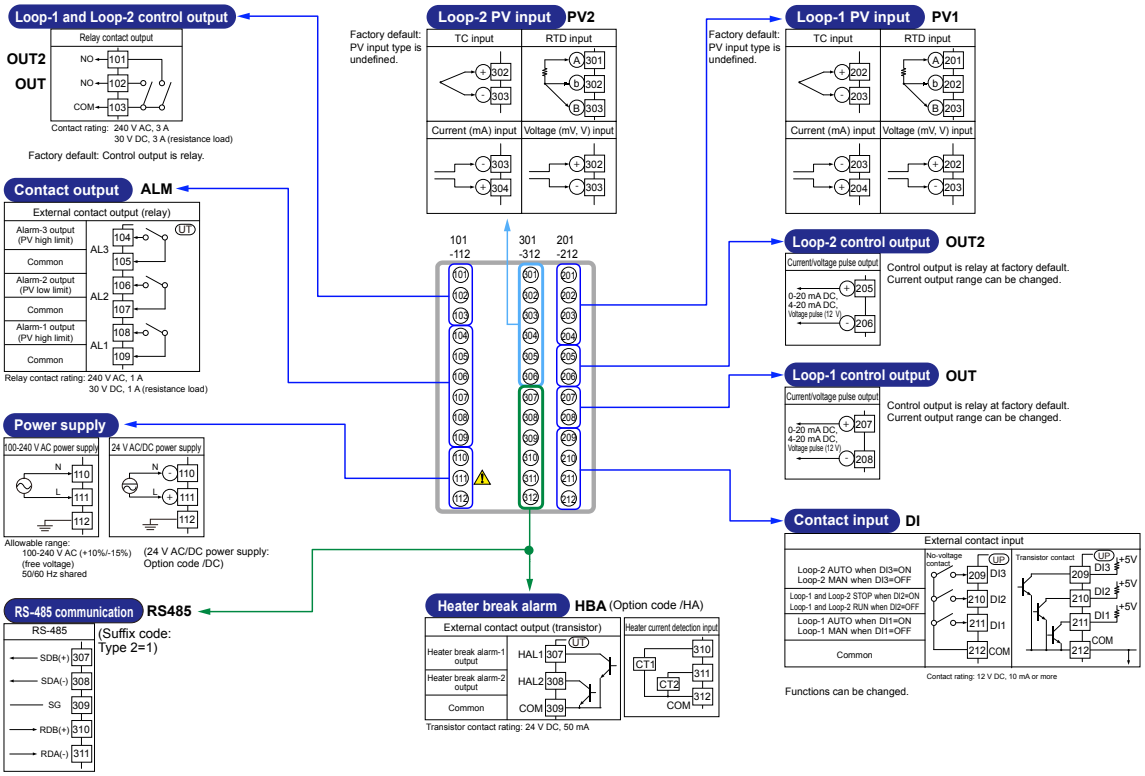
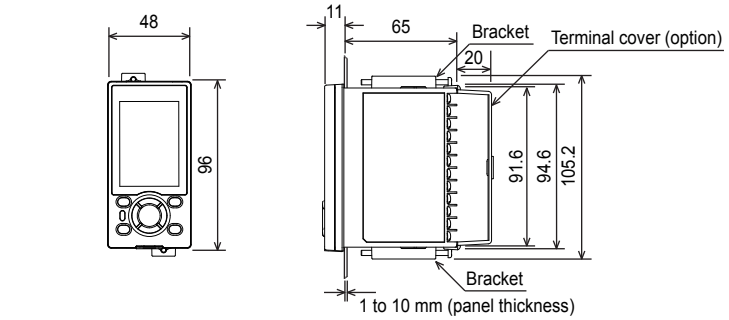
■ Terminal Arrangement

Terminal Arrangement for UT32A-D Dual Loop Controls

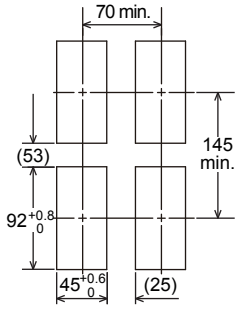


■ External Dimensions and Panel Cutout Dimensions

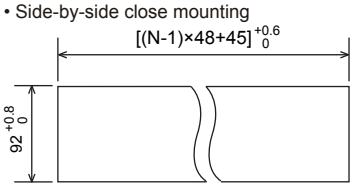
Unit: mm



• General mounting



• Side-by-side close mounting



"N" stands for the number of controllers to be installed.
However, the measured value applies if N≥5.

Normal tolerance:
±(value of JIS B 0401-1998 tolerance class IT18)/2

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■ Model and Suffix Code

Model	Suffix code						Option code	Description
UT32A								Digital Indicating Controller (Power supply: 100-240 V AC) (provided with 3 DIs and 3 DOs)
Type 1: Basic control	-D							Dual-loop type
Type 2:Functions	0							None
	1							RS-485 communication (Max. 38.4 kbps, 2-wire/4-wire)
Type 3:Fixed code		0						None
Display language (*1)			-1					English (Default. Can be switched to other language by the setting.)
			-2					German (Default. Can be switched to other language by the setting.)
			-3					French (Default. Can be switched to other language by the setting.)
			-4					Spanish (Default. Can be switched to other language by the setting.)
Case color				0				White (Light gray)
				1				Black (Light charcoal gray)
Fixed code					-00			Always "-00" (for Standard Code Model)
Option codes							/HA	Heater break alarm (*2)
							/DC	Power supply 24 V AC/DC
							/CT	Coating (*3)
							/CV	Terminal cover

*1: English, German, French, and Spanish are available for the guide display.
*2: The /HA option can be specified when the Type 2 code is "0."
*3: 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

Brackets (mounting hardware), Unit label, 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

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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