UTAdvanced™

Digital Indicating Controllers

UT55A / UT52A / UT35A / UT32A

Bulletin 05P01A01-01EN

INTRODUCING THE UTAdvanced™

Balancing Simplicity and Power

The UTAdvanced was designed as a result of knowledge obtained in Yokogawa's fifty plus years of experience in the control market. Significant changes in the market are setting the tone for the future and Yokogawa will be leading the way meeting the challenging needs of the control segment. Balancing an easy to use controller with the power to handle your most challenging applications, that's the UTAdvanced.

features

Advanced Control

- PID Control — 8 built-in Control Functions
  — 8 built-in Control Algorithms
- Ladder Sequence Control
- Fuzzy Logic Control

Simplicity

- Bright & Easy to read Active Color LCD Display
- Scrolling Text
- Navigation Guide & Navigation Keys
- Programmable function keys
- User settable default values
- Multiple language support
- Compact design

Networking

- Ethernet (Modbus / TCP)
- RS485 (Modbus / RTU, Peer to Peer, Coordinated Operation, PC-Link)
- PROFIBUS-DP

Reliability

- 3 year warranty *Note 1
- RoHS / WEEE
- NEMA4*Note 2 / IP56 front panel

CSA C22.2 61010-1
172608

UL61010-1

CE

Note 1 : The 3 year warranty extends 36 months after shipment from our factory.
Note 2 : Hose down test only.

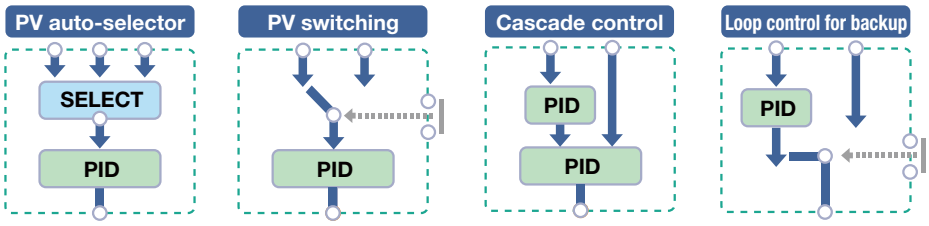
Advanced Control

8 built-in Control Functions

Eight of the most commonly used control functions are built in to the UT52A and UT55A. A simple configuration change within the UTAdvanced allows any one of the eight preset control schemes to be used.

- Single-loop control*
- Cascade primary-loop control
- Cascade secondary-loop control
- Cascade control
- Loop control for backup
- Loop control with PV switching
- Loop control with PV auto-selector
- Control with PV-hold function

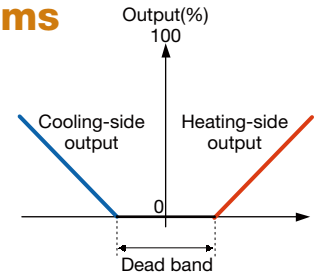
(The UT35A/UT32A support control marked with an asterisk (*) only)



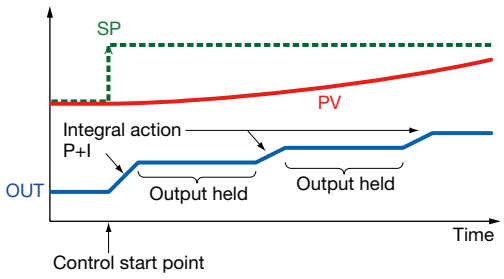
8 built-in Control Algorithms

- PID control*
- ON / OFF control (1 point of hysteresis)*
- ON / OFF control (2 points of hysteresis)*
- Two-position, two-level control*
- Heating / cooling control*
- Sample PI control
- Batch PID control
- Feedforward control

(The UT35A/UT32A support control marked with an asterisk (*) only)



Heating / cooling control



Sample PI control

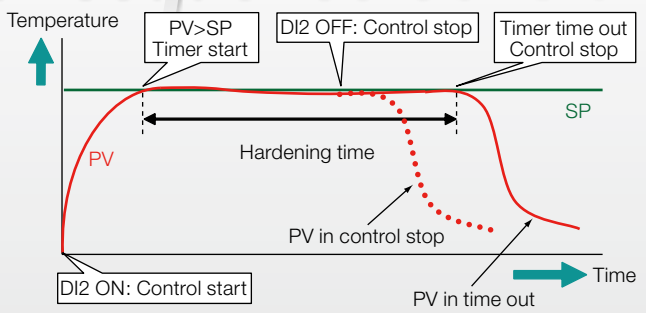
Ladder sequence Control

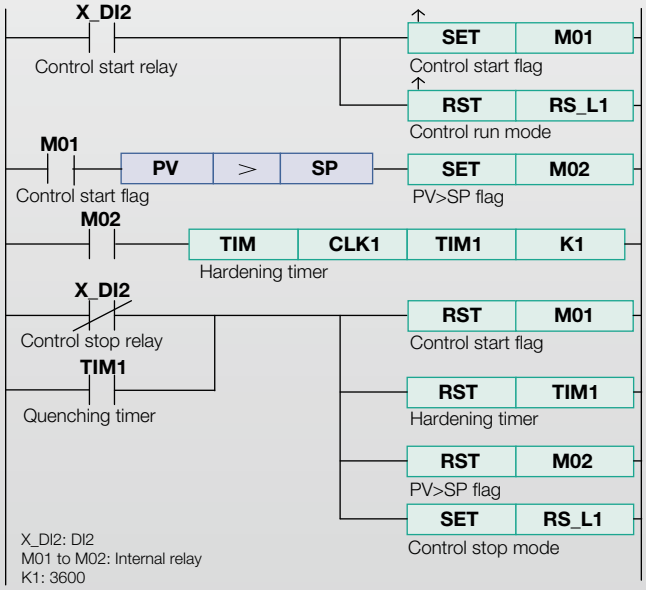
With built in ladder sequence control, the range of applications covered by single loop control are dramatically increased. This feature is standard in all the UT52A/UT55A controllers. The ladder sequence control function can replace a small PLC required by the application. Integrated sequence and PID control.

- Monitoring and control of external machinery
  Eg. Lamps, switches, timers
- Solve digital input / output logic functionality easily.
  Number of basic command types : 13
  Number of application command types : 71

Name	Symbol
Load	
Set	SET
Timer	TIM
Counter	CNT
Compare	>
Logic	& =
Data transfer	MOV
High selector	HSL
Temperature correction	TCMP1

* LL50A Parameter Setting Software (sold separately) is required to build functions.





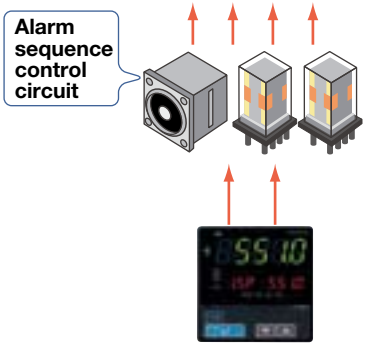
Application Examples of Ladder Sequence Program

■ Alarm Sequence Control Circuits can be Reduced

The ladder sequence program is built in the UTAdvanced as standard. The ladder sequence function enables monitoring and controlling peripheral devices such as relays, thus making it possible to reduce costs.

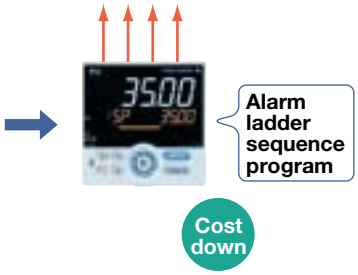
Conventional

Alarm action was built by a sequence control circuit (relay, timer, etc.) outside of the controller.



UTAdvanced

Alarm action is built by the ladder sequence program inside the UTAdvanced, thus making it possible to reduce costs.



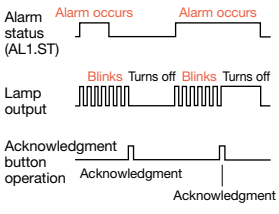
Example: Alarm annunciator

Action explanation

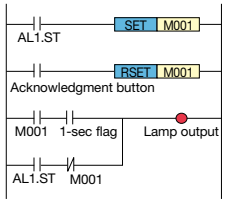
- Lamp blinks when alarm occurs
- Lamp turns on by acknowledgment when alarm is on
- Lamp turns off by acknowledgment when alarm is off

Alarm acknowledgment by function key

Time Chart



Alarm Ladder Sequence Program



■ Host System Load is Reduced

Conventional

Action: Various types of analog data were captured into the host system (PLC, etc.) and calculated, and the results were processed by the field controller for control via a command.

UTAdvanced

Merit The UTAdvanced with up to 4 analog inputs* enables various types of analog data to be captured directly into the controller and calculated by the ladder program, thus reducing the system-building load of the host.

* In the case of the UT55A

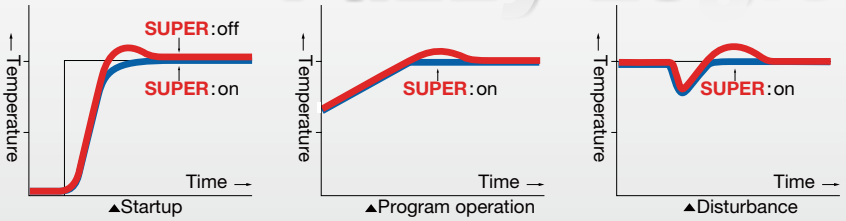
Fuzzy Logic

Fuzzy Logic

■ SUPER Function suppresses overshoot

The field-proven **SUPER** function utilizes a built-in operator experience and fuzzy theory to deliver fine control and suppress overshoot.

- When wishing to suppress overshoot
- When wishing to reduce the startup time
- When load changes are significant
- When setpoint is changed frequently

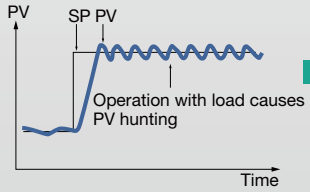


■ SUPER2 Function suppresses hunting

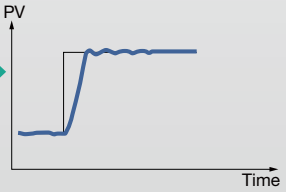
The new **SUPER2** function utilizes a built-in operator experience and modern control theory to deliver fine control and suppress hunting.

Effect 1: Material change or load change with the same PID.

When **SUPER2** function is not used

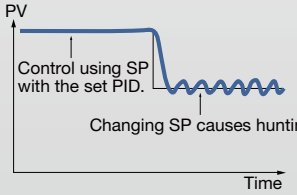


When **SUPER2** function is used

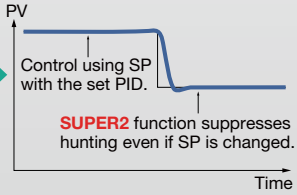


Effect 2: Setpoint (SP) change with the same PID.

When **SUPER2** function is not used



When **SUPER2** function is used

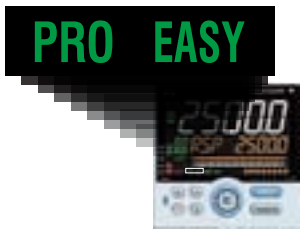


Simplicity

Bright & Easy to read Active Color LCD Display

(Illustration of the UT55A)

Complexity Selection



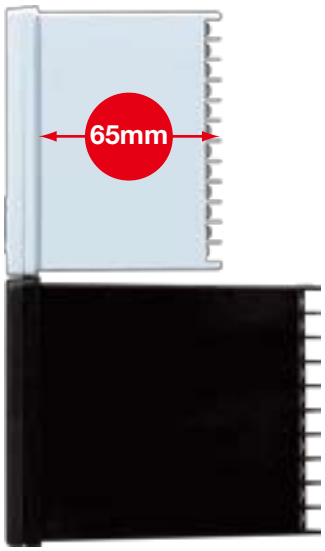
The controller menus and layout are adjusted in accordance with the level (EASY, STD, PRO) of information required by the user. If simple temperature or level control is needed, then select the easy configuration. Very sophisticated applications are no problem for the UTAdvanced. Just select the PRO setting and make use of the additional functionality shown in this mode. Advanced applications can be programmed in the PRO setting and then changed back to the easy setting to lock out functions not required by operators.

Active Color LCD Display

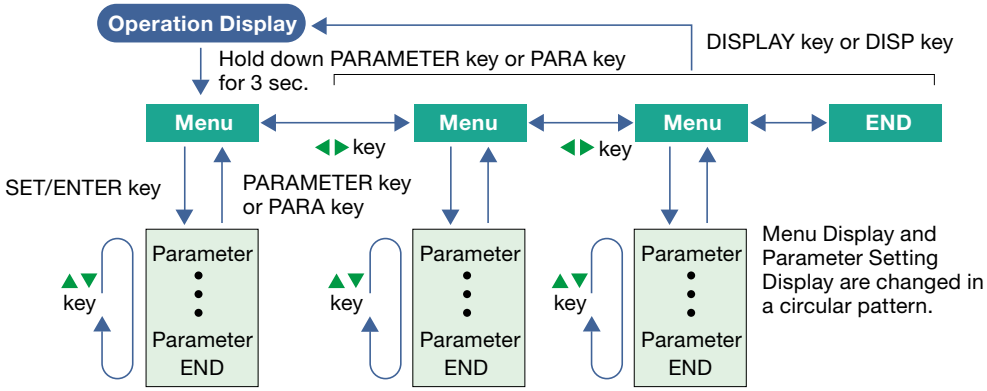
With Yokogawa's ACTIVE COLOR display you can instantly tell, at a glance, the status of your process.
Alarm Status : Active color display changes from white (normal) to red (alarm).
Deviation Status : Color changes based on a PV deviation from SP.
User-Defined Color : Choose between white or red display for constant readings.

Compact design

The 65-mm depth of the controller reduces the constraints on installation location.



Easy Operation Map, Navigation Guide and Navigation Keys



The parameter groups can be switched using ◀, ▶ keys.

The navigation keys is an intuitive method to navigate the controller's configuration menus and setting its various menus. Navigation arrows even tell you what button to push next.

Programmable Function Keys

Functions that are routinely utilised can be assigned to a programmable function key. Functions such as Run / Stop, auto / manual, remote / local and autotune are obvious choices. Display contrast can be adjusted, digital outputs can be activated and the start contact for a ladder logic routine can be simply input.

Scrolling Text

The UTAdvanced is equipped with a scrolling text feature that fully lists the parameter being modified. There is no guessing what parameter you are looking at. It is possible to turn off scrolling text function.

Multiple language support

Example : TARGET SET POINT

German
Sollwert

French
Valeur de consigne

Spanish
Punto de ajuste objetivo

The UTAdvanced is fluent is multiple languages. English, Spanish, French, German. The use of the UTAdvanced by local language operators is not an Obstacle.

User settable default values

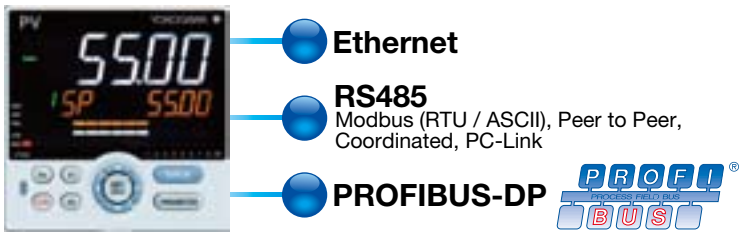
Initialize → **Factory Default**
Initialize → **User Default**

Parameter values (SP, P, I, D, ALM1, etc.) configured by the user can be stored in the controller as the default values. Even if a parameter set value is accidentally changed, it can be restored to the original value with a simple operation.

Networking

Communication Functions

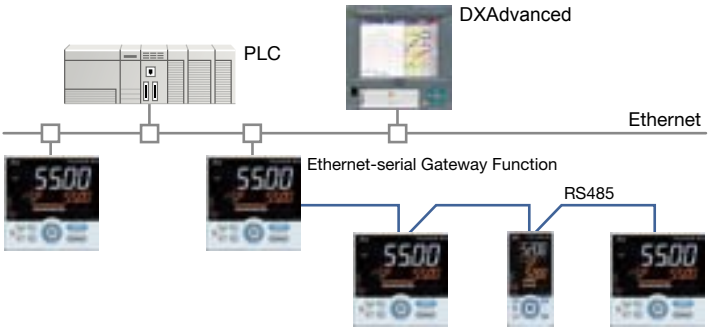
A network function is built into the back panel of the controller to make wiring simple.



Modbus / TCP

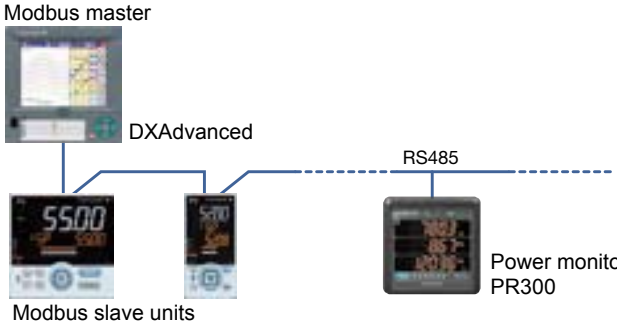
Modbus TCP/IP, a protocol that allows the controller to connect to any Ethernet network and have the ability to exchange data with the computers or devices on that network.

- Allows control devices to be integrated into an application simply.
- Works with any Modbus TCP/IP compliant software.
- Support for Modbus function codes 03, 06, 08 & 16.
- Gateway function allows RS485 Modbus devices to communicate via Ethernet.
- Reduced labor costs in wiring and setup of a communications network.
- Physical Layer : 10 BASE-T / 100 BASE-TX.
- Max. Number of connection : 2.



Modbus / RTU

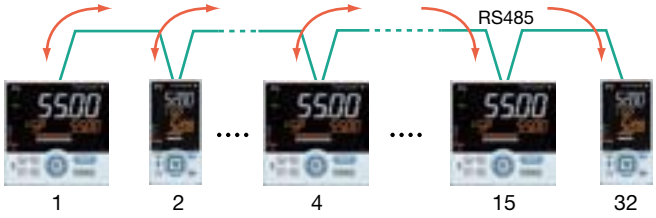
The data of UTAdvanced (slave units) can be displayed and saved on the DXAdvanced using the Modbus RTU function.



Peer to Peer

The use of the ladder sequence program makes it possible to exchange analog data and status data between communication-capable UTs.

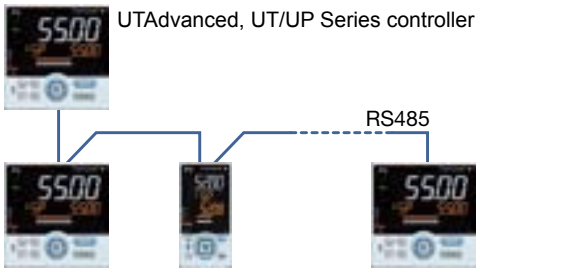
Example: A UT in which an input error occurs sends a signal to another UT to enable that UT switch to MAN operation, thus shifting the whole system into a safe mode. In such a case, the safety mechanism can be built into the UT Advanced and is not required in the host system.



Up to 4 master units, total 32 units

Coordinated Operation

In coordinated operation, a single UTAdvanced controller is used as a master controller and multiple UTAdvanced or other UT digital indicating controllers as slave controllers.
The slave controllers are operated in accordance with the actions of the master controller.

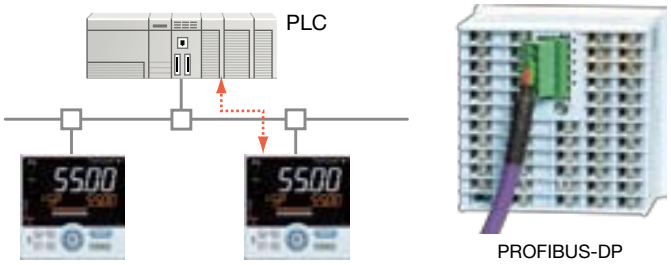


Up to 31 slave units

PROFIBUS-DP

Embedded open networks will provide direct connection to PLC's.

- Reads data from UTAdvanced
- Writes parameter setting value to UTAdvanced



PC-Link

A protocol used for communicating with a general-purpose personal computer, or UT link module and serial communication module of FA-M3R (range-free controller).

Product line-up

Model			UT55A	UT52A	UT35A	UT32A
						
Size	1/4 DIN		✔		✔	
	1/8 DIN			✔		✔
	Depth from the panel surface (mm)		65	65	65	65
Control scan period	(msec)		Choice 50/100/200	Choice 50/100/200	200	200
Display Function	Figure Number of PV Display		5	5	5	5
	Active Color PV Display Function		✔	✔	✔	✔
	Guide Scroll Display Function		✔	✔	✔	✔
	Message Display Function		✔	✔	✔	✔
	Bar graph display (Number)		✔ (2)	✔ (2)	✔ (1)	✔ (1)
PV Input Indication accuracy	(% of F.S.)		0.1	0.1	0.1	0.1
PV Input type	TC		✔	✔	✔	✔
	RTD (3-wire)		✔	✔	✔	✔
	RTD (4-wire) (When /DR option specified)		✔	✔		
	mV, V		✔	✔	✔	✔
	mA		✔	✔	✔	✔
Analog Input Number	Standard (Maximum)		1 (4)	1 (2)	1	1
SP (PID) Number	Maximum		8	8	4	4
Control Functions Number	Maximum		8	8	1	1
Control Algorithms Number	Maximum		8	8	5	5
Control Output	Type	Relay Contact Output, Voltage pulse output, Current output	✔	✔	✔	✔
	Algorithm	ON/OFF	✔	✔	✔	✔
		PID (Continuance, Time Proportion)	✔	✔	✔	✔
		Position proportional	✔	✔	✔	✔
		Heating / cooling	✔	✔	✔	✔
Analog Output Number	Standard (Maximum)		2 (3)	2 (3)	2	2
Digital Inputs Number	Standard (Maximum)		3 (9)	3 (5)	2 (7)	2 (4)
Alarm Number			8	8	4	4
Digital Outputs Number	Standard (Maximum)		3 (18)	3 (5)	3 (8)	3 (5)
Communication	RS-485 communication (Maximum)		✔ (2)	✔ (1)	✔ (1)	✔ (1)
	Ethernet communication		✔		✔	
	PROFIBUS-DP communication		✔		✔	
Various Function	Quick Setting Function		✔	✔	✔	✔
	Split Computation Output Function (When Remote Input option specified)		✔	✔		
	Ratio and Square Root Extraction Function (When Remote Input option specified)		✔	✔		
	Remote SP Function (When Remote Input option specified)		✔	✔		
	24 V DC Loop Power Supply Function (When /LP option specified)		✔	✔	✔	✔
	Heater Break Alarm Function (When /HA option specified)		✔ (Only -0*)	✔ (Only -0*)	✔ (Only -0* or -2*)	✔ (Only -0* or -2*)
Ladder Sequence Function	(Max. Step Numbers)		✔ (500)	✔ (500)	✔ (300)	✔ (300)
Other specifications	Power Supply	AC100V, 200V	✔	✔	✔	✔
		AC/DC 24V (When /DC option specified)	✔	✔	✔	✔
	Dust and waterproof Level of Front Panel		IP56	IP56	IP56	IP56
	Configuration Tool	Via Light-loader Communication	✔	✔	✔	✔
		Via Maintenance Port Communication	✔	✔	✔	✔
		Via Ethernet communication	✔		✔	

Input Range

Input type	
TC	K, J, T, B, S, R, N, E, L, U, W PL-2, PR20-40, W97Re3-W75Re25
RTD	JPt100, Pt100
DC Voltage	0.4 to 2.0 V, 1.0 to 5.0 V, 0.0 to 2.0 V, 0 to 10 V, -10 to 20 mV, 0 to 100 mV
DC Current	4 to 20 mA, 0 to 20 mA

Product line-up

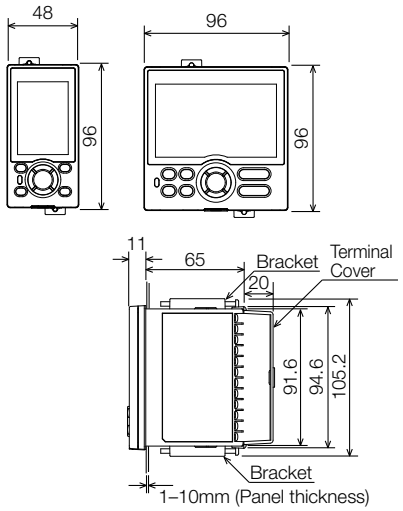
Digital Indicating Controller UT55A / UT52A

Main Features

- Up to 4 analog inputs available
- 3 alarm independent common terminals available as standard
- Ladder sequence programs can be built
- Simple operation
- Up to 18 Do outputs (combinations available)
- Multiple language operation manual (Japanese, English, German, French, Spanish, Chinese, and Korean) available.
  Please specify the desired language when ordering.

External Dimensions

UT52A UT55A Unit : mm



Model and Suffix Codes

UT55A (1/4 DIN Size)

Model	Suffix code	Optional suffix code	Description
UT55A			Digital Indicating Controller (provided with retransmission output or 15 V DC loop power supply, 3 DIs, and 3 DOs) (Power supply: 100-240 V AC)
Basic control	-0		Standard type
	-1		Position proportional type
	-2		Heating / cooling type
Functions (* 1)	0		None
	1		Remote (1 additional aux. analog) input, 6 additional DIs, 5 additional DOs, and RS-485 communication (Max.19.2 kbps, 2-wire / 4-wire) (* 2)
	2		Remote (1 additional aux. analog) input, 1 additional DI, and RS-485 communication (Max.19.2 kpbs, 2-wire / 4-wire) (* 2)
	3		5 additional DIs and 5 additional DOs
	4		Remote (1 additional aux. analog) input and 1 additional DI
	5		Remote (1 additional aux. analog) input, 6 additional DIs, and 5 additional DOs
	6		5 additional DIs and 15 additional DOs
	7		3 additional aux. analog inputs and 3 additional DIs
Open networks	0		None
	1		RS-485 communication (Max.38.4 kbps, 2-wire / 4-wire)
	2		Ethernet communication (with serial gateway function)
	4		PROFIBUS-DP communication
Display language (* 7)	-10		English
	-20		German
	-30		French
	-40		Spanish
	-00		Always "-00"
Options		/DR	Additional direct input (TC and 3-wire / 4-wire RTD) and DC current to Remote (1 additional aux. analog) input, 1 DI to be deleted (* 3)
		/LP	24 V DC loop power supply (* 4)
		/HA	Heater break alarm (* 5)
		/DC	Power supply 24 V AC / DC
		/CT	Coating (* 6)

* 1: When "1" or "6" is specified for the Functions code, only "0" can be specified for the Open networks code.
* 2: When the /LP option is specified, the RS-485 communication is 2-wire system.
* 3: When any of "1," "2," "4," "5," or "7" is specified for the Functions code, the /DR option can be specified.
* 4: /LP option can be specified in the combination of Functions code (any of "0", "2", "3" or "4") and Open networks code (any of "0" or "1"). Additionally, /LP option can be specified in the combination of Functions code "1" and Open networks code "0".
* 5: When "-0" is specified for the Basic control code, the / HA option can be specified.
* 6: When the /CT option is specified, the UT55A does not conform to the safety standards (UL and CSA) and CE marking.
* 7: English, German, French, and Spanish can be displayed as the guide display.

UT52A (1/8 DIN Size)

Model	Suffix code	Optional suffix code	Description
UT52A			Digital Indicating Controller (provided with retransmission output or 15 V DC loop power supply, 3 DIs, and 3 DOs) (Power supply: 100-240 V AC)
Basic control	-0		Standard type
	-1		Position proportional type
	-2		Heating / cooling type
Functions	0		None
	1		Remote (1 additional aux. analog) input, 1 additional DI, and RS-485 communication (Max. 38.4 kbps, 2-wire)
	2		Remote (1 additional aux. analog) input and 1 additional DI
	3		2 additional DIs and 2 additional DOs
Open networks	0		None
Display language (* 5)	-10		English
	-20		German
	-30		French
	-40		Spanish
	-00		Always "-00"
Options		/DR	Additional direct input (TC and 3-wire / 4-wire RTD) and DC current to Remote (1 additional aux. analog) input, 1 DI to be deleted. (* 1)
		/LP	24 V DC loop power supply (* 2)
		/HA	Heater break alarm (* 3)
		/DC	Power supply 24 V AC / DC
		/CT	Coating (* 4)

* 1: When "2" is specified for the Functions code, the /DR option can be specified.
* 2: When "-0" or "-1" is specified for the Basic control code, the /LP option can be specified.
  When "0" is specified for the Functions code, the /LP option can be specified.
* 3: When "-0" is specified for the Basic control code, the /HA option can be specified.
* 4: When the /CT option is specified, the UT52A does not conform to the safety standards (UL and CSA) and CE marking.
* 5: English, German, French, and Spanish can be displayed as the guide display.

Popular Universal I/O and Auto-Tuning Function Available

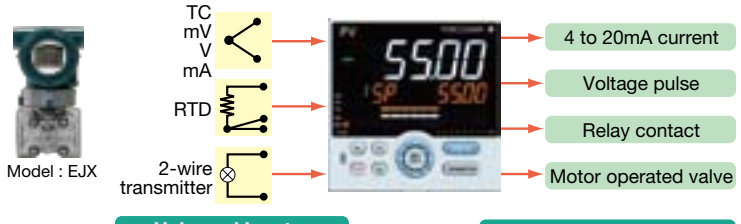
Universal Input

Select from TC, RTD, mV / DC voltage and DC current.
(Direct connection : No shunt resistor required)
The input type and range is user selectable via the front panel or by using the LL50A parameter setting software.

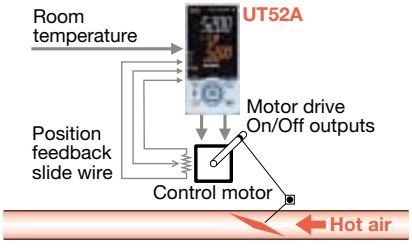
- **0.1% Indication Accuracy.**
- **Connect up to two 2-wire transmitters simultaneously.**

All instruments have a 15V Loop Power Supply (15V LPS) for a transmitter.
In addition, a 24V LPS is also available simultaneously for some instruments as optional function.
Applicable models for 24V LPS: UT55A, UT52A

Thermocouple Type	K, J, T, B, S, R, N, E, L, U, W, PL-2, PR20-40, W97Re3-W75Re25
RTD Type	Pt100, JPt100
DC Voltage Input	0.4 to 2V, 1 to 5V, 0 to 2V, 0 to 10V, -10 to 20mV, 0 to 100mV
DC Current Input	4 to 20mA, 0 to 20mA



Position proportional control for Control motor



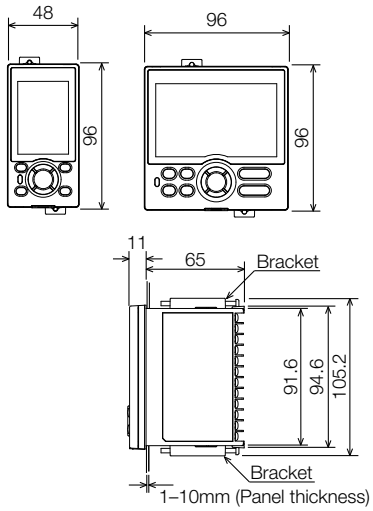
Digital Indicating Controller UT35A / UT32A

Main Features

- 4 target setpoints (PID numbers) available as standard
- 3 alarm independent common terminals available as standard
- Ladder sequence programs can be built
- Simple operation
- Up to 8 Do outputs (combinations available)
- Multiple language operation manual (Japanese, English, German, French, Spanish, Chinese, and Korean) available.
  Please specify the desired language when ordering.

External Dimensions

UT32A UT35A Unit : mm



Model and Suffix Codes

UT35A (1/4 DIN Size)

Model	Suffix code	Optional suffix code	Description
UT35A			Digital Indicating Controller (provided with retransmission output or 15 V DC loop power supply, 2 DIs, and 3 DOs) (Power supply: 100-240 V AC)
Basic control	-0		Standard type
	-1		Position proportional type
	-2		Heating / cooling type
Functions	0		None
	1		2 additional DIs and 2 additional DOs
	2		5 additional DIs and 5 additional DOs
Open networks	0		None
	1		RS-485 communication (Max.38.4 kbps, 2-wire / 4-wire)
	2		Ethernet communication (with serial gateway function)
	4		PROFIBUS-DP communication
Display language (*1)	-10		English
	-20		German
	-30		French
	-40		Spanish
	-00		Always "-00"
Options		/LP	24 V DC loop power supply (* 2)
		/HA	Heater break alarm (* 3)
		/DC	Power supply 24 V AC / DC
		/CT	Coating (* 4)

* 1: English, German, French, and Spanish can be displayed as the guide display.
* 2: The /LP option can be specified in combination with function code "0" or "1" and open network code "0" or "1."
* 3: The /HA option can be specified when basic control code is "-0" or "-2."
* 4: When the /CT option is specified, the UT35A does not conform to the safety standards (UL and CSA) and CE marking.

UT32A (1/8 DIN Size)

Model	Suffix code	Optional suffix code	Description
UT32A			Digital Indicating Controller (provided with retransmission output or 15 V DC loop power supply, 2 DIs, and 3 DOs) (Power supply: 100-240 V AC)
Basic control	-0		Standard type
	-1		Position proportional type
	-2		Heating / cooling type
Functions	0		None
	1		RS-485 communication (Max.38.4 kbps, 2-wire / 4-wire) (* 2)
	2		2 additional DIs and 2 additional DOs
Open networks	0		None
Display language (*1)	-10		English
	-20		German
	-30		French
	-40		Spanish
	-00		Always "-00"
Options		/LP	24 V DC loop power supply (* 2)
		/HA	Heater break alarm (* 3)
		/DC	Power supply 24 V AC / DC
		/CT	Coating (* 4)

* 1: English, German, French, and Spanish can be displayed as the guide display.
* 2: The /LP option can be specified in combination with basic control code "-0" or "-1" and function code "0" or "1." Futhermore, when the function code is "1," the RS-485 communication is 2-wire system.
* 3: The /HA option can be specified when basic control code is "-0" or "-2."
* 4: When the /CT option is specified, the UT32A does not conform to the safety standards (UL and CSA) and CE marking.

Sold separately (Accessory)

Model Name	Model	Note
Terminal Cover	UTAP001	For UT35A
	UTAP002	For UT32A
User's Manual (CD-ROM)	UTAP003	

■ Universal Output

User selectable for Relay, Voltage Pulse and Current outputs.

- Relay output: ON/OFF control, Time-proportional PID control
- Voltage Pulse output: Time-proportional PID control
- Current output: Continuous PID control

Heating/Cooling Control has two sets of universal outputs.

- Any combinations of Relay, Pulse and Current outputs are available.

Drive a Motorized Control Valve by using Position-Proportional PID.

- The position-proportional PID control function has two sets of relay outputs for direct / reverse rotation of motorized control valve.
- The slide wire input to feed back the valve position is also available.

■ Auto-Tuning (AT) Function

The following conditions can be set in order to increase the accuracy of calculating PID constants using AT .

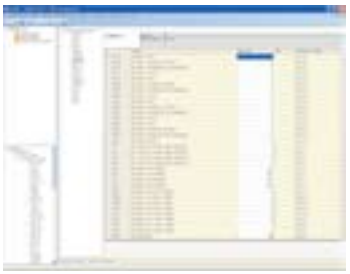
1) Two types of algorithms to calculate PID constants are available for selection.
   Normal: Fast-rising PID constant
   Stable: Slow-rising PID constant
2) High and low output limits can be set individually for control output values during AT runtime.

Configuration Tool

LL50A Parameters Setting Software

Parameter setting functions

Parameters that determine controller functions can easily be set: controller model type, controller mode (single-loop control, cascade control, loop control with PV switching, etc.), universal input/output functions, setup parameters and others.



Parameters Setting Display

Tuning function

Used to tune a controller's PID parameters. Displays measured input value, target setpoint, and control output value as a trend graph on a personal computer screen, allowing PID parameter modification, AUTO/MAN switching, control output modification in manual operation, etc.

Tuning display

Ladder Building functions

Ladder sequence programs can be created and ladder programs can be monitored.

Ladder Programs Building display

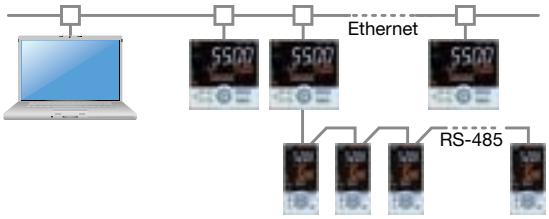
Network Profile Creation Function

Can be used to create an electronic device data sheet for PROFIBUS-DP communication.

Via Bus Powered USB Cable

Can be set parameters while no power supply to controller.

Via Ethernet Communication Connector



Via Dedicated Adapter

Can be used while attached to the control panel.

Via RS-485 Communication Terminals

ML2 recommended for RS-232C/RS-485 communication

- Applicable Controllers : UT55A, UT52A
  UT35A, UT32A
- Applicable OS : Windows XP / Vista
- Communication method : USB 1.1

Model and Suffix Code

Model	Suffix code	Description
LL50A	-00	Parameters Setting Software

A parameter conversion tool that enables GREEN series parameter data to be used with the LL50A is available and downloadable from the website below.
https://y-link.yokogawa.com

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Vig-RS-4E
Printed in Japan, 912 (KP) [Ed : 02/b]

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