**Operation Guide**

UT35A/MDL, UT32A/MDL
Digital Indicating Controller (on Hall Mounting Type)

**YOKOGAWA**

Yokogawa Electric Corporation

This operation guide describes installation, wiring, and other tasks required to make the controller ready for operation. For details of each function, refer to the electronic manual. Manuals can be downloaded from the following site.

http://www.yokogawa.com/ns/utim/

**Contents**

1. Safety Precautions
2. Model and Suffix Codes
3. How to Install
4. Hardware Specifications
5. How to Connect Wires
6. Terminal Wiring Diagram
7. Setup Procedure
8. Operaters
9. Troubleshooting

**Introduction**

Thank you for purchasing the UT35A/MDL, UT32A/MDL Controller. (The UT35A and option MDL have no display.)

This operation guide describes the installing, wiring, setup, and troubleshoot of the UT35A/MDL and UT32A/MDL. The guide should be provided to the end user of this product.

It is important to achieve correct operation before using the product in order to ensure safe operation. For details of each function, refer to the electronic manual. Before using the product, refer to the table of Model and Suffix Codes to make sure that the delivered product is consistent with the model and suffix codes you ordered.

Also make sure that the following items are included in the package:

- Controller (the model you ordered).............................................
- Unit Label (450x450)...............................................................x1
- Tag Label (450x450).................................................................x1
- Operation Guide (User's manual)..............................................x2 (A3 size)
- (Installation and Wiring, Initial Settings, Operations, and Parameters)

**Target Readers**

This guide is intended for the following personnel:

- Engineers responsible for installing, wiring, and maintaining the equipment.
- Personnel responsible for daily operation of the equipment.

**1. Safety Precautions**

The following symbol is used on the instrument. It indicates the possibility of injury to the user or damage to the instrument or in a location subject to the operation guide or user’s manual for special instructions. The same symbol is used in the operation guide and user’s manual so that the user needs to refer to it, together with the term “WARNING” or “CAUTION.”

- Calls attention to actions or conditions that could cause serious or fatal injury to the user, and indicates precautions that should be taken to prevent such occurrences.

- AC

- AC/DC

The equipment wholly protected by double insulation or reinforced insulation.

- Functional grounding terminals

(Do not use this terminal as a protective grounding terminal.)

**Note**

Identifies important information required to operate the instrument.

**Warning and Disclaimer**

(1) YOKOGAWA makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.

(2) The product is provided on an “as-is” basis. YOKOGAWA assumes no liability to any person or entity for any loss or damage, direct or indirect, arising from the use of the product or for any unpreventable defect of the product.

**Safety, Protection, and Modification of the Product**

In order to protect the system controlled by this product and the product itself, and to ensure safe operation, observe the safety precautions described in this Operation Guide. Use of the instrument in a manner not prescribed herein may compromise the product’s functions and the protection features inherent in the device. We assume no liability for safety, or responsibility for the product’s quality performance or functionality should users fail to observe these instructions when operating the product.

Installation of protection and safety circuits with respect to a lightning protector, protective equipment for the system controlled by the product itself, footprint or fail-safe design of a process or line using the system controlled by the product, or the installation of other protective and safety circuits are to be appropriately implemented as the user deems necessary.

Be sure to use the spare parts approved by YOKOGAWA when replacing parts or consumables.

This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, or navigation facilities, aviation facilities, and medical equipment.

Modifying the product is strictly prohibited.

This product must be handled by skilled and experienced personnel for electric devices.

(3) This product is UL Recognized Component. In order to comply with UL standards, end-products are necessary to be designed by those who have knowledge of the requirements.

**Power Supply**

Ensure that the instrument’s supply voltage matches the voltage of the power.

Do Not Use in an Explosive Atmosphere

Do not use the instrument in operations with combustible or explosive gases or steam. Operation in such environments constitutes an extreme safety hazard. Use of the instrument in environments with high concentrations of corrosive gas (Pb, Se, etc.) over long periods of time may cause a failure.

Do Not Remove Internal Unit

The internal unit should not be removed by anyone other than YOKOGAWA’s service personnel. There are dangerous high voltage parts inside. Additionally, do not recharge battery by yourself.

Damage to the Protective Construction

If the instrument is not handled in a manner not specified in the operation guide may damage its protective construction.

This instrument is an EMC class A product. In a domestic environment, this product may cause radio interference in which case the user needs to take adequate measures.

**2. Model and Suffix Codes**

**UT35A/MDL «Standard Code Model»**

**UT32A/MDL «Standard Code Model»**

**3. How to Install**

**Installation Location**

The instrument should be installed in indoor locations meeting the following conditions:

- Instrument enclosure

This instrument is designed to be mounted in an instrument enclosure. Mount the instrument in a location where its terminals will not be inadvertently touched. Be sure to mount the instrument in an enclosure with a door.

- Well ventilated locations

Mount the instrument in well ventilated locations to prevent the instrument’s internal temperature from rising.

However, make sure that the terminal ports are not exposed to wind. Exposure to wind may cause the temperature sensor accuracy to deteriorate. To mount multiple instrument controllers, see the external dimensions which follow. If mounting other instruments adjacent to the instrument, comply with these external dimensions to provide sufficient clearance between the instruments.

- Locations with little mechanical vibration

Install the instrument horizontally and ensure that it is level, with no inclination to the right or left.

**Horizontal Location**

Mount the instrument horizontally and ensure that it is level, with no inclination to the right or left.

**Note**

If the instrument is moved from a location with low temperature and low humidity to a place with high temperature and high humidity, or if the temperature changes rapidly, condensation will result. Moreover, in the case of thermocouple inputs, measured values may drop to zero. To avoid such a situation, leave the instrument in the new environment under ambient conditions for more than 1 hour prior to using it.

Do not mount the instrument in the following locations:

- Outdoors

Location subject to direct sunlight or close to a heater

Install the instrument in a location with stable temperatures that remain close to an ambient temperature of 23°C. Do not mount it in locations subject to direct sunlight or close to a heater. Doing so adversely affects the instrument.

- Locations subject to substantial amounts of oily fumes, steam, moisture, dust, or corrosive gases

The presence of oily fumes, steam, moisture, dust, or corrosive gases adversely affects the instrument. Do not mount the instrument in locations subject to any of these substances.

- Areas near electromagnetic field generating sources

Do not place magnets or tools that generate magnetism near the instrument. If the instrument is used in locations close to a strong electromagnetic field generating source, the magnetic field may cause measurement errors.

- Areas where explosion articles

Absolutely do not place the instrument directly on flammable surfaces. If such a circumstance is unavoidable and the instrument must be placed close to a flammable article, provide a shield for it made of 1.43 mm thick plated steel or 1.6 mm thick unspotted steel with a space of at least 150 mm between it and the instrument on the top, bottom, and sides.

- Areas subject to being splashed with water

**Customized Product**

For customized product, the product is identified by the option code (or suffix) where ‘X’ is a modified letter or digit.

Contact your supplier in case your instrument has option suffix X, and you are not in the possession of Fusion Technologies (Model code)/S or MDL (Model code)/S (where [Model code] means, for example, UT355A).

**Accessories (sold separately)**

The following is an accessory sold separately. (See the operation guide or the electronic manual for details.)

- External Precision Resistor

**4. Operation**

This is an explanation to display of the product based on Waste Electrical and Electronic Equipment (WEEE) Directive.

This directive is only valid in the EU.

- Marking

This product complies with the WEEE Directive marking requirement. This marking indicates that you must not discard the electronic product as municipal waste in domestic household waste.

- Product Category

With reference to the equipment types in the WEEE directive, this product is classified as a “Small equipment” product.

Do not dispose in domestic household waste. When disposing products in the EU, contact your local Yokogawa Europe B.V. office

**5. Specifications**

**- Component.** Recognized (CE) for EU countries (EEA-market). See the operation guide IM 05/01/D1-11EN  page 5/5

**- WEEE, Directive**

The Waste Electrical and Electronic Equipment (WEEE) Directive is an explanation to display of the product based on Waste Electrical and Electronic Equipment (WEEE) Directive. This directive is only valid in the EU.

- Marking

This product complies with the WEEE Directive marking requirement. This marking indicates that you must not discard the electronic product as municipal waste in domestic household waste.

- Product Category

With reference to the equipment types in the WEEE directive, this product is classified as a “Small equipment” product.

Do not dispose in domestic household waste. When disposing products in the EU, contact your local Yokogawa Europe B.V. office.
4. Hardware Specifications

This instrument is for Measurement Category No.1. Do not use it for measurements in locations falling under Measurement Categories No.2, No.3, and No.4.

- **Universal Input (Equipped as standard)**
  - Number of inputs: 1
  - Input type, instrument range, and measurement accuracy: See the table below.
  - Input resistance: ±1000 Ω (max. 5 A)

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Measurement Range</th>
<th>Accuracy</th>
</tr>
</thead>
</table>
| V | 0 V to 1000 V | ±0.2% | ±0.5%
| K | 0°C to 1000°C | ±0.5% | ±1%
| J | 0°C to 1000°C | ±0.5% | ±1%
| B | 0°C to 1200°C | ±0.5% | ±1%
| E | 0°C to 750°C | ±0.5% | ±1%
| N | 0°C to 125°C | ±0.5% | ±1%
| P | 0°C to 200°C | ±0.5% | ±1%

- **Input Specifications**
  - **Universal Input (Equipped as standard)**
  - Input resistance: ±1000 Ω (max. 5 A)

- **Input Voltage, Measurement Range, and Measurement Accuracy**

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Measurement Range</th>
<th>Accuracy</th>
</tr>
</thead>
</table>
| V | 0 V to 1000 V | ±0.2% | ±0.5%
| K | 0°C to 1000°C | ±0.5% | ±1%
| J | 0°C to 1000°C | ±0.5% | ±1%
| B | 0°C to 1200°C | ±0.5% | ±1%
| E | 0°C to 750°C | ±0.5% | ±1%
| N | 0°C to 125°C | ±0.5% | ±1%
| P | 0°C to 200°C | ±0.5% | ±1%

- **Analog Output Specifications**
  - **Number of outputs:** Control output: 1
  - Cooling-side control output of Heating-cooling type (Refrigeration output): 1
  - Output type: Current output or voltage pulse output
  - Current output: 4 to 20 mA DC or 0 to 25 mA DC (less than 0.5% of span)
  - Current output accuracy: ±0.1% of span (±0.5 mA or less)

- **Retransmission Output Specifications**
  - **Number of outputs:** Retransmission output: 1, shared with 15 V DC loop power supply or Cooling-side control output
  - Current output: 4 to 20 mA DC or 0 to 25 mA DC (less than 0.5% of span)
  - Current output accuracy: ±0.1% of span (±0.5 mA or less)

- **Step Response Time Specifications**
  - Within 1 x (33% of analog output response time when a step change of 10 to 90% of input span is applied)
**Safety and EMC Standards**

- **Safety:**
  - Compliant with IEC 61010-1 (IEC), IEC 61010-2-020 (IEC), IEC 61010-2-030 (IEC), and UL 61010-1.
  - Installation category: II
  - Pollution degree: 2
  - Protection category (I) (CAT) (UL, CSA), O (Other)
  - Rated measurement voltage: 500 V AC, 1500 V DC, 1 A (resistance load)

- **EMC standards:**
  - Compliant with CE marking
  - EN 61326-2-3
  - UL 61010-2-030
  - IEC/EN 61010-2-030

**Construction, Installation, and Wiring**

- **Construction:**
  - DIN rail mounting type
  - Material:
    - Polycarbonate (Flame retardant, UL94-V-0)
  - DIN mounting bracket material: Panel steel sheet
  - Case color:
    - Black (Light black color gray)
  - Weight:
    - 0.1 kg or less
  - External dimensions (mm):
    - TH35-7.5A: (L) x (W) x (H) = 114 x 114 x 114 (height) x 114 (depth)
    - UT32A/MDL: 48.2 (width) x 114 (height) x 114 (depth)
  - Compatibility:
  - Mounting position:
    - Horizontal
  - Wiring:
    - 110/220V series terminal with square washer (for signal wire and wiring power)

**Power Supply Specifications and Isolation**

- **Power supply:**
  - Rated voltage: 100-240 VAC (+10%/-15%), 50/60 Hz
  - Power consumption:
    - UT32A: 16 W (DC 9 A), AC 14 W (DC circuit option is specified)
    - UT35A: 16 W (DC 9 A), AC 14 W (DC circuit option is specified)
  - Data backup:
    - Nonvolatile memory
  - Maximum supply current:
    - 200 A (DC 9 A drive)
  - Withstanding voltage:
    - Between primary terminals and secondary terminals: 2300 V AC for 1 minute (UL, CSA)
    - Between primary terminals and secondary terminals: 3000 V AC for 1 minute (IEC)
    - Between secondary terminals: 350 V AC for 1 minute (Power supply)
    - Relay input terminals: Secondary terminals
    - Analog (DC) signal terminals, control input terminals, communication terminals, and functional grounding terminals
  - Power terminals for 24 V AC control:
    - UL32A/MDL4

**Insulation specification:**

- Between power supply terminals and a grounding terminal: 20 MΩ or more at 500 V DC
- Terminal specifications:
  - Magnetic field: 400 A/m or less
  - Continuous vibration at 5 Hz, 10% of 1.5 mm or less, 1 cyc/min for 90 minutes in the three axes directions
  - Continuous vibration at 9 Hz, 2 mm/s2 (±0.01) or less, 1 cyc/min for 90 minutes in the three axes directions
  - Short-period vibration: 14.7 m/s2, 15 seconds or less
  - Shock: 98 m/s2 or less, 11 ms
  - Altitude: 2000 m or less above sea level
  - Warm-up time: 30 minutes or more after the power is turned on
  - Startup time: Within 15 seconds

The LCD is a liquid crystal display and is used for a display portion of this product. This LCD has a dead pixel, which is a significant difference in resistance between the three wires. However, the control function is not affected.

**Transportation and Storage Conditions:**

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

**Effects of Operating Conditions**

- **Effect of ambient temperature:**
  - Voltage of UT: ±1% or ±0.01% of F.S./F.S.C., whichever is larger
  - Current input: ±0.01% of F.S./F.P.C.
  - RTD input: ±0.001% (amplitude or temperature) or less
  - Analog output: ±0.02% of F.S./F.S.C. or less
  - Effect of Electrostatic Discharge:
    - Analog input: ±0.01% of F.S./F.S.C. or less
    - Analog output: ±0.01% or F.S./F.S.C. or less (Each terminal)

**5. How to Connect Wires**

- **Wiring work must be carried out by a person with basic electrical knowledge and practical experience.**
- **Be sure to turn OFF the power supply to the controller before wiring and wiring should be done by a professional.**
- Use a tester or similar device to ensure that no power is being supplied to a cable to be connected.
- Enhance safety, use a device for turning off the power to the instrument.
- **For the wiring cable, the temperature rating is 75°C or more.**
- **As a safety measure, always install a circuit breaker (IEC 60847-compliant product, 3 A, 150 V, and 220 VA AC) in an easily accessible location near the instrument.**
- **Since the control input is used for control relay, it is necessary to provide electromagnetic interference prevention standard complete.**
- **Provide electricity from a single-phase power supply.**
  - If the power is noisy, install an isolation transformer on the primary side, and use a line filter on the secondary side. When measured against noise are taken, do not install the primary and secondary power cables close to each other.
  - **If there is a risk of external lighting surges, use a lightning arrester etc.**

**Recommended Crimp-on Terminal Lugs**

- **Recommended crimp-on terminal lug:**
  - Rated voltage: 60 V or less
  - Applicable wire size: Power supply wiring 1.25 mm² or more

**Cable Specifications and Recommended Cables**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer sheath</td>
<td>PVC</td>
</tr>
<tr>
<td>Insulation</td>
<td>PVC</td>
</tr>
<tr>
<td>Current rating (AC)</td>
<td>5.0A</td>
</tr>
<tr>
<td>Voltage rating</td>
<td>600V</td>
</tr>
<tr>
<td>Condenser output</td>
<td>Surge shielded wire (2A)</td>
</tr>
<tr>
<td>Internal wiring</td>
<td>Shielded two-wire (2A)</td>
</tr>
<tr>
<td>External wiring</td>
<td>Shielded two-wire (2A)</td>
</tr>
</tbody>
</table>

**DC Relay Wiring**

- **Connection:**
  - Use the UT's contact to relay coil terminal wiring of the minimum rating less than the UT's contact rating.

**AC Relay Wiring**

- **Connection:**
  - Use one with a relay coil rating less than the UT's contact rating.

**Transistor Output Wiring**

- **Connection:**
  - Use one with a relay coil rating less than the UT's contact rating.
6. Terminal Wiring Diagrams

- Do not use an unassigned terminal as the relay terminal.
- Do not use a 100-240 V AC power supply for the 24 V AC/DC model; otherwise, the instrument will malfunction.

### UT35A/MDL

#### Control output

- OUT (Suffix code: Type1=0)
  - Factory default: Control output is relay

- OUT1
  - 30 V DC, 1 A (resistance load)
  - Relay contact rating: 240 V AC, 1 A

- OUT2
  - 50/60 Hz shared (free voltage)

- Allowable range: 30 V DC, 3 A (resistance load)

#### Control output

- OUT1 (Suffix code: Type1=1)
  - Factory default: Control output is relay

- OUT2
  - 24 V AC/DC power supply
  - Factory default: PV input (24 V AC/DC power supply: Option code /DC)

- NO
  - AL2

- NO
  - 24 V DC loop power supply
  - Factory default: No function

#### Power supply

- 24 V AC/DC power supply
  - 101
  - 102
  - 103

- AC power supply for the 24 V AC/DC type is undefined.

#### Alarm-2 output

- (PV high limit) (PV low limit)

#### Heating/cooling control output

- Heating
- Cooling

#### Heating/cooling relay contact output

- Heating
- Cooling

#### Current (mA) input

- Current (mA) input: 4-20 mA DC

#### Current output range can be changed.

- 4-20 mA DC:
  - 0-20 mA DC

#### Current/voltage pulse output

- Current/voltage pulse output
  - Load resistance 600 or less

- 4-20 mA DC, 0-20 mA DC, 0-20 mA DC, 14.5-18.0 V DC

#### Factory default: PV input

#### Contact input DI

- (Suffix code: Type 1=0 or 2)

- Contact input
  - D1
  - (Equipped as standard)

- Contact rating: 12 V DC, 10 mA or more

#### Contact input DI

- (Suffix code: Type 3=2)

- Contact input
  - D1
  - (Equipped as standard)

- Contact rating: 12 V DC, 10 mA or more

#### Contact input DI

- (Suffix code: Type 3=5)

- Contact input
  - D1
  - (Equipped as standard)

- Contact rating: 12 V DC, 10 mA or more

#### Contact input DI

- (Suffix code: Type 2=2)

- Contact input
  - D1
  - (Equipped as standard)

- Contact rating: 12 V DC, 10 mA or more

### 6-ES7 communication

- RS485
  - D045
  - ETHR

### Ethernet communication (with gateway function)

- Ethernet communication
  - D045
  - Type 3=1

### PROFIBUS communication (with Modbus master)

- PROFIBUS
  - Suffix code: Type 3=4

### CC-Link communication (with Modbus master)

- CC-L
  - Suffix code: Type 3=4

### DeviceNet communication (with Modbus master)

- DeviceNet
  - Suffix code: Type 3=4

---

**Important Note:**

- The terminal wiring diagrams are to be prepared by the installer as necessary.
- These are to be separately needed.
7. Setup Procedure

The following flowchart shows the setup procedure for UT35A/MDL and UT32A/MCL. Perform setup through communication or the LL50A Parameter Setting Software (sold separately).

- Install and set a controller.
- Power ON (UT35A/MDL, UT32A/MCL).
- NO: Set parameters through communication.
- YES: Parameter Setting Software (LL50A Parameter Setting Software sold separately).

To communicate through communication, you need to create a program on the host device side. For controller parameter information (parameters, parameter formats, etc.), refer to the following manuals:
- For setup through RS485 serial communication or Ethernet communication, see the UT/UTAAdvanced Series Communication Interface (Universal Interface Manual)(M05P032A-01EN).
- For setup through protocol networks, see the UT/UTAAdvanced Series Communication Interface (Universal Interface Manual)(M05P034A-01EN).

8. Operations

The controller status can be verified with the LED.

Check the operating status (run/stop, auto/manual, remote/local, etc.) of the controller through communication or the LL50A Parameter Setting Software (sold separately).

For details, see the (1) UT35A/UT32A Digital Indicating Controller User’s Manual (M05P032A-01EN), (2) UTAdvanced Series Communication Interface (RS-485, Ethernet) User’s Manual (M05P034A-01EN), and (3) LL50A Parameter Setting Software User’s Manual (M05P030A-02EN).

9. Troubleshooting

If a problem appears to be complicated, contact our sales representatives.

- Wiring error (LL50A: PV input terminal, UT35A/MDL: UT35A/MDL Front, UT32A/MCL: UT32A/MCL Front (with terminal cover)).
  - Check the input wiring and settings.

Errors at Power On

The errors shown below may occur during power up. (For details of Setpoint display and input/output action when each error occurs, see the User’s Manual.)

For details on each register, see the UTAdvanced Series Communication Interface (RS485, Ethernet) User’s Manual (M05P030A-01EN).

- Check the errors according to the LED indications.
  - System errors, Parameter errors, Operation errors. (Register for each bit: Bit 9 (Register #00), Bit 8 (Register #01))

- Communication error (View parameter: Bit 0-7 (Register #02))
  - Setting error, Parameter error, Communication error.

- Errors during Operation

The errors shown below may occur during operation. (For input/output action when each error occurs, see the User’s Manual.)

For details on each register, see the UTAdvanced Series Communication Interface (RS485, Ethernet) User’s Manual (M05P030A-01EN).

- Communications parameters, Interface parameters, Relay error, Communication error, Communication error ( coordinated operation).
  - Check the communication parameters, Interface parameters, Relay error, Communication error, Communication error ( coordinated operation).

- Problems with the controller,
  - User profile error, User profile is corrupted.
  - Check the user profile again.

- Software error
  - User profile error, User profile is corrupted.
  - Check the user profile again.