

General Specifications

YS1700 Programmable Indicating Controller



GS 01B08B01-01E

■ GENERAL

The YS1700 Programmable Indicating Controller can be tailored for various applications by running a user program, and offers high reliability thanks to Yokogawa's proprietary technology, user friendliness, and expandability. Standard models are smaller and lighter than earlier series, requiring less space for installation, and are compliant with international safety standards including the CE Mark and FM nonincendive (optional) approvals. For easy replacement of earlier controllers, models requiring the same panel cutout dimensions and depth as those of earlier models are also offered.

■ FEATURES

- Excellent legibility thanks to a full-dot, semi-reflective color LCD: High visibility of the display screen is ensured even in direct sunlight in the early morning and late afternoon. The user can freely access a desired operation display from meter, trend display, bar graph, alarm, and event displays. All parameters can be set via the front panel display.
- Function block programming: Besides the text programming compatible with earlier models, the YS1700 offers the new GUI-based programming method, function block programming. The optional YSS1000 Setting Software for YS1000 Series is used to develop user programs.
- Large programming capacity: Program capacity is 1000 steps for a text program, and 400 modules for a function block program.
- More powerful control and calculation functions: IEEE754-format four-byte floating-point calculations enable actual values to be used in calculations. More than a hundred types of calculation modules are featured, including exponential and logarithmic functions, temperature compensation, and pressure compensation.
- Function selection mode (needs no programming): The multi-function controller mode allows control to be selected from frequently used functions (single-loop, cascade, or selector control) without programming. Function assignments to digital and analog inputs/outputs (DIs, DOs, AIs, and AOs) can be determined by parameter settings.
- Expandable I/O: The basic type with expandable I/O has eight analog inputs, four analog outputs, ten digital inputs or ten digital outputs (total fourteen digital inputs and outputs).



- Fail-safe: Thanks to dual CPU (one for control and one for display), display and manual operations are enabled even during a failure of either CPU. The hard manual circuit incorporated independently from the digital circuits enables the controller output to be adjusted manually during a failure of a digital circuit including both CPUs. (The hard manual circuit is not incorporated when the /NHM option is specified.)
- Nonvolatile memory for memory backup: No battery or capacitor is used for memory backup, facilitating maintenance.
- AC/DC dual power supply with wide operating voltage range to ensure stability against supply voltage fluctuations: Can be driven by either an AC (100 V) or DC (24 V) power supply. Furthermore, the DC power supply enables receiving power without polarity. (Must be specified upon ordering if using a 220 V AC power supply.)
- 250 mm depth (for basic types only)
- Dust- and splash-proof IP54 faceplate (for basic type only)
- CE Mark (for basic type and YS100 compliant type only)
- FM Nonincendive explosion protection (optional for basic type only)
- Communication (optional)
 - Ethernet (Modbus/TCP; for basic type only)
 - RS485 (PC Link, Modbus, Peer-to-Peer communication, and YS protocol; unavailable for YS80 internal unit-compatible type)
 - DCS-LCS communication
- Compatibility with YS100 Series: Setting and control operations can be done with the same feel. For basic-type cases, terminal-to-terminal pitches differ but the signal-to-terminal arrangement is almost the same.

| Type | Model and Suffix Codes (x: Depending on specifications) | Analog Inputs | | Analog Outputs | | Digital Inputs and Outputs (*2) |
|---|---|---------------|--------------------|----------------|---------|---------------------------------|
| | | 1-5 V | Direct inputs (*3) | 1-5 V (*1) | 4-20 mA | |
| Basic type | YS1700-00x | 5 | - | 2 (1) | 1 (2) | 6 |
| Basic type with expandable I/O | YS1700-01x | 8 | - | 3 (2) | 1 (2) | 14 |
| Compatible type for YS100 | YS1700-02x (/Ax) | 5 (4) | (1) | 2 (1) | 1 (2) | 6 |
| Compatible type for YS80 internal unit | YS1700-03x | 5 | - | 2 (1) | 1 (2) | 6 |
| Compatible type for EBS and I | YS1700-03x | 5 | - | 2 (1) | 1 (2) | 6 |
| Compatible type for EK and HOMAC | YS1700-03x | 5 | - | 2 (1) | 1 (2) | 6 |
| Compatible type for YS80(Compatible size for YS80 with YS100 terminal) | YS1700-04x (/Ax) | 5 (4) | (1) | 2 (1) | 1 (2) | 6 |
| Compatible type for 100 line(with YS100 terminal) | YS1700-05x (/Ax) | 5 (4) | (1) | 2 (1) | 1 (2) | 6 |

*1: One point can be changed to 4-20 mA DC by a parameter setting.
 *2: For only six points, each can be used as either a DI or DO by a parameter setting.
 *3: One from among five analog inputs can be used for a direct input (Option/Ax where x = 01 to 08).
 *4: An interface for the additional Expandable I/O cannot be added after delivery. If there is a possibility that extra input/outputs will be needed, we recommend that you start with the basic model (with expandable I/O)

■ DISPLAY AND SETTING FUNCTIONS

Display Functions

(1) Display Specifications

YS1700 displays are composed of the following three groups and the individual functions can be set up via displays for the respective settings:

| | |
|--------------------|---|
| Operation displays | LOOP displays TREND displays ALARM displays DUAL display METER display FAIL display |
| Tuning displays | PID settings STC settings Parameter settings P and T register settings Input/output data display |
| Engineering | Function settings Input specification settings Password setting Line-segment characterizer function settings Operation display settings LCD settings Communication settings DI/DO settings Flexible line-segment characterizer function settings Programmed setpoint settings Preset PID settings K register value display K |

(2) Operation Displays

● Bar Graph Displays (in LOOP and DUAL displays)

| | |
|------------------------------------|---|
| Scale divisions | Up to 20 |
| Digits of scale markings | Up to 7 digits (including decimal point and sign) |
| Display position of scale markings | At 0% and 100% positions |
| Units | Up to 7 alphanumeric characters |
| PV bar graph resolution | 0.5% |
| SV pointer resolution | 0.5% |
| Alarm setting pointer resolution | 0.5% |
| MV bar graph resolution | 1.25% |
| PV overflow display | Above 100% |
| PV underflow display | Below 0% |

● Meter Displays (in METER displays)

| | |
|------------------------------------|---|
| Scale divisions | Automatic setting based on upper and lower scale limits (reading factor can be modified). |
| Scale graduation | |
| Scale markings | |
| Reading factor | |
| Digits of scale markings | Up to 4 digits (including decimal point and sign) |
| Display position of scale markings | At 0% and 100% positions |
| Units | Up to 7 alphanumeric characters |
| PV pointer resolution | 0.5% |
| SV pointer resolution | 0.5% |

| | |
|----------------------------------|-------|
| Alarm setting pointer resolution | 0.5% |
| MV pointer resolution | 1.25% |

● Tag Number and Digital Value Displays

| | |
|---|--|
| Display characters for tag numbers | Alphanumeric characters |
| Display digits of tag numbers | Up to 12 |
| Display digits of PV and SV digital indications | Up to 7 (including decimal point and sign) |
| Display digits of MV digital indications | Up to 6 (including decimal point and sign) |

● Trend Display Specifications Kinds of TRENDdisplays

| | |
|--------|---|
| TREND1 | Can display the trend curves for three variables: PV1, SV1, and MV1. These PV1, SV1, and MV1 curves can be hidden and shown individually. Scaling can be performed for PV1 and SV1 for display. |
| TREND2 | Can display the trend curves for three variables: PV2, SV2, and MV2. These PV2, SV2, and MV2 curves can be hidden and shown individually. Scaling can be performed for PV2 and SV2 for display. |
| TREND3 | Can display on the same graph the trend curves of four variables arbitrarily chosen by the user from PV1, SV1, MV1, PV2, SV2, MV2, X1–X8, and Y1–Y4. Scaling can be performed for chosen PVs and SVs for display. |

● Trend Display Time Span

1.5, 7.5, 15, or 45 minutes; or 1.5, 7.5, 15, or 45 hours

● Event Display Specifications

The event display means that a user-defined message will appear on the current operation display when a predefined event occurs.

The event display can be closed by pressing the SHIFT key for three seconds and the messages can be redisplayed in the ALARM display. Up to five event messages can be set.

To use this event display function, specify the messages and corresponding events (flag statuses) inside the event display settings in YSS1000 setting software.

● Manual SV and MV Changes

Via operation displays, SV and MV can be changed using keys on the front panel.

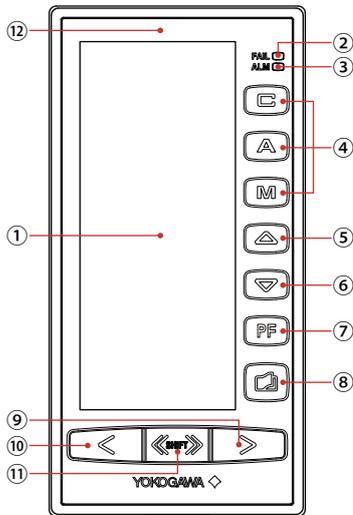
| | |
|---|--|
| Rate of manual SV increments/decrements | 40 seconds/full scale |
| Rate of manual MV increments/decrements | Normal: 40 seconds/full scale FAST mode: 4 seconds/full scale |

● Display during Failure

The display is automatically switched to the FAIL display upon a failure. For details, see the "Self-diagnostics" section.

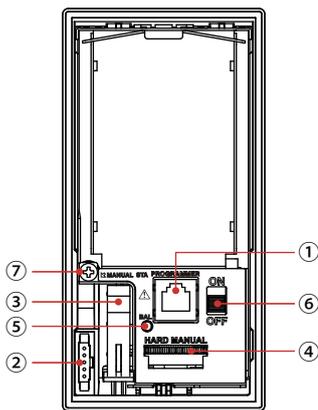
Names of Elements

(1) Front Panel



| No. | Name |
|-----|---|
| 1 | Color LCD, 120×320 pixels |
| 2 | FAIL lamp (red LED) |
| 3 | ALM lamp (yellow LED) |
| 4 | C (cascade), A (automatic), and M (manual) mode keys with respective mode indicators (green LED for C, green for A, yellow for M) |
| 5 | SV increase key |
| 6 | SV decrease key |
| 7 | PF key and LED indicator |
| 8 | Page key |
| 9 | MV increase key |
| 10 | MV decrease key |
| 11 | Fast change/SHIFT key |
| 12 | Tag label (advisable position to paste) |

(2) Inner Panel behind Swing-up Front Panel



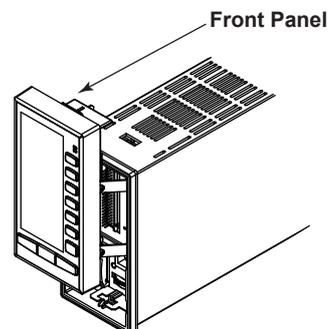
| No. | Name | Remarks |
|-----|---|--|
| 1 | Computer link connector (PROGRAMMER): | Communication cable connector used when downloading, uploading, and viewing the parameters and user program set using the YSS1000 Setting Software for YS1000 Series |
| 2 | Connector for YS110 standby manual station (MANUAL STA) | For connecting the YS110 standby manual station |
| 3 | Internal-unit release lever | Used when drawing out the internal unit |
| 4 | Hard manual operation wheel (HARD MANUAL) | Used to set the output level |
| 5 | MV balance lamp (BAL [green]) | Lights up when the control output agrees with the hard manual output level. |
| 6 | Hard manual selector switch (ON/OFF) | Used to switch over the output (MV) to the level set by the hard manual operation wheel |
| 7 | Internal-unit fixing screw | Used to prevent the internal unit from being drawn out |

Control Output Backup (Except /NHM)

The hard manual wheel behind the front panel enables manual operations in an emergency.

Output balancing before a switchover from/to hard manual is possible.

Note: Connecting the YS110 standby manual station enables the internal unit to be replaced without interrupting the 4–20 mA DC control output (Y1). (Replacement of the internal unit, however, should be performed by a Yokogawa authorized serviceperson.)



■ FUNCTION SPECIFICATIONS

(1) Controller Modes

The controller mode is selected from programmable mode and function selection mode, and when the function selection mode is selected, one of the following modes should be selected: single-loop mode, cascade mode, or selector mode.

| Controller Mode | | Description |
|--|------------------|--|
| Programmable mode (needs YSS1000 setting software) | | Using YSS1000, the user can assemble control and various calculation modules to configure control calculations. The following three types of control modules are available: <ul style="list-style-type: none"> • Basic control modules (BSC1 and BSC2) • Cascade control module (CSC) • Selector control module (SSC) |
| Function selection mode | Single-loop mode | Basic control module preassembled with auxiliary control functions |
| | Cascade mode | Cascade control module preassembled with auxiliary control functions |
| | Selector mode | Selector control module preassembled with auxiliary control functions |

(2) Control Types

The control type can be selected by a parameter from PID, PD, sample-and-hold PI, and batch PID.

(3) Control Parameters

Common Parameters for PID, PD, Sample-and-hold PI, Batch PID

| Parameter | Setting Range |
|--------------------------|---------------------|
| Proportional band, PB | 0.1 to 999.9 (%) |
| Integral time, TI (*1) | 1 to 9999 (seconds) |
| Derivative time, TD (*2) | 0 to 9999 (seconds) |

Parameters Specific to PD

| Parameter | Setting Range |
|------------------------------------|---------------------|
| First-order lag time constant (*3) | 1 to 9999 (seconds) |
| Manual reset, MR | -6.3 to 106.3 (%) |

Parameters Specific to Sample-and-hold PI

| Parameter | Setting Range |
|------------------------|---------------------|
| Sample period, STM | 0 to 9999 (seconds) |
| Control time span, SWD | 0 to 9999 (seconds) |

Parameters Specific to Batch PID

| Parameter | Setting Range |
|-------------------|------------------|
| Deviation, BD | 0.0 to 100.0 (%) |
| Bias, BB | 0.0 to 100.0 (%) |
| Lock-up width, BL | 0.0 to 100.0 (%) |

*1: Needs no setting for PD control.

*2: A setting from 1 to 9999 is effective and 0 means OFF.

*3: To avoid abrupt changes in output when the operation mode is changed, follow-up actions take place with first-order lag delay. Set the parameter to an integral time.

(4) Operation Modes

- Operation mode switching by digital inputs: In programmable mode, specify in the user program. In function selection mode, switching functions can be assigned to digital inputs.

For details, see the "Function Assignments to Digital Inputs" section.

- Digital outputs of operation mode statuses: In programmable mode, specify in the user program. In function selection mode, status indicating functions can be assigned to digital inputs. For details, see the "Function Assignments to Digital Outputs" section.

(5) Control and Input/Output Calculation Period

| | Programmable Mode | Function Selection Mode |
|----------------|---------------------------|-------------------------|
| Control period | 50 ms 100 ms 200 ms | 100 ms |

Control Add-on Functions (in Both Programmable Mode and Function Selection Mode)

The following functions can be added to control actions by simple parameter settings:

| |
|-------------------------------|
| Adjustable setpoint filters |
| Self tuning (STC) |
| Non-linear PID control |
| PID control with reset bias |
| Output limiters |
| Alarm detection |
| Remote cascade setpoint input |

Control Add-on Functions (Only in Programmable Mode)

The following add-on functions can be used in the user program:

| |
|--------------------------|
| Input compensation |
| Output compensation |
| Adaptive (variable) gain |
| Preset PID |

Control Add-on Functions (Only in Function Selection Mode)

The following functions can be added to control actions by simple parameter settings; however, the available add-on functions differ depending on the controller mode:

| | Single-loop Mode | Cascade Mode | Selector Mode |
|--|------------------|--------------|---------------|
| Feed-forward control | X | X | |
| Output tracking | X | X | X |
| Preset MV | X | X | X |
| PV tracking | X | | |
| SV tracking | X | | |
| Operation mode switching by digital inputs | X | X | X |
| Input filter | X | X | X |
| Square-root extraction | X | X | X |
| Ten-segment linearizer function | X | X | X |
| Ratio operation | X | X | X |

Communication Functions

(1) Communication with Host Systems

Communication with various host systems including Yokogawa's DCSs such as the CENTUM CS 3000 and programmable logic controllers such as the FA-M3, is supported.

| Host System | Link Device in Host System | YS1700 Communication Functions | |
|------------------------------|----------------------------|--------------------------------|-------------|
| | | Option | Protocol |
| CENTUM-XL | LCS card | DCS-LCS Communication (/A32) | Proprietary |
| CENTUM CS 1000/3000 | ACM12 ALR121 (via SCIU) | | |
| CENTUM CS 3000 | ALR121 (direct connection) | RS-485 (/A31) | YS protocol |
| FA-M3 | UT link module | Ethernet (/A34) | PC link |
| PLC or PC from other vendors | RS-485 connection | | Modbus |
| | Ethernet connection | | Modbus/TCP |

- Communication capabilities: Read access to various measured values, and read and write access to various parameters is possible. Write access can be disabled.
- Computer mode: In addition to the previously mentioned normal operation modes, there are two operation modes for control by an host system. In DDC mode, the control output MV is directly manipulated by the host system. In SPC mode, the control setpoint SV is manipulated by the host system.
- Backup mode after communication fault: The mode into which the controller should fall when communication with the host system has continuously been lost for a preset time period, can be selected between MAN or AUT.

(2) Peer-to-Peer communication (Available only in Programmable Mode)

YS1700s connected to an RS-485 link can exchange data with each other.

- Maximum number of YS1700s: 32
- Maximum number of YS1700s that can transmit data: 4
- Receivers: 32 YS1700s including senders (those that transmit data)
- Transmitted data: 4 analog and 16 status data per sender
- Communication period: 200 ms on average (asynchronous to control calculation periods)

Function Selection Mode – Input/Output Settings

(1) Digital Inputs/Outputs (DI/DO) Settings

Each DI/DO terminal on the main unit can be used freely as either a DI or DO, whereas those terminals on the expandable I/O are fixed to either DIs or DOs.

(2) Function Assignments to Digital Inputs

One of the following functions can be assigned to each DI. Available functions differ depending on the controller mode as shown in the table.

| Function | Controller mode | Single-loop | Cascade | Selector |
|--|-----------------|-------------|---------|----------|
| CAS↔AUTO remote switching | | X | | |
| CAS/AUTO↔MAN remote switching | | X | | |
| Internal cascade connection open↔close | | | X | |
| Second loop setpoint remote↔local | | | | X |
| Loop select (OFF = first loop; ON = second loop) | | | | X |
| Preset MV output ON↔OFF | | X | X | X |
| Output tracking ON↔OFF | | X | X | X |
| Preset MV output ON and mode = MAN | | X | X | X |
| Self-tuning remote ON↔OFF switching | | X | X | X |

| Function | Controller mode | Single-loop | Cascade | Selector |
|--|-----------------|-------------|---------|----------|
| Momentary trigger to change mode to M mode | | X | X | X |
| Momentary trigger to change mode to A mode | | X | X | X |
| Momentary trigger to change mode to C mode | | X | X | X |
| LCD backlight OFF | | X | X | X |

(3) Function Assignments to Digital Outputs

One of the following status output functions can be assigned to each DO. Available functions differ depending on the controller mode as shown in the table.

| Function | Controller mode | Single-loop | Cascade | Selector |
|--|-----------------|-------------|---------|----------|
| High limit alarm for PV1 | | X | X | X |
| Low limit alarm for PV1 | | X | X | X |
| High-high limit alarm for PV1 | | X | X | X |
| Low-low limit alarm for PV1 | | X | X | X |
| Deviation alarm for variable 1 | | X | X | X |
| Velocity alarm for PV1 | | X | X | X |
| High limit alarm for PV2 | | | X | X |
| Low limit alarm for PV2 | | | X | X |
| High-high limit alarm for PV2 | | | X | X |
| Low-low limit alarm for PV2 | | | X | X |
| Deviation alarm for variable 2 | | | X | X |
| Velocity alarm for PV2 | | | X | X |
| Deviation alarm for variable 1 or Velocity alarm for PV1 | X | | X | X |
| Deviation alarm for variable 2 or Velocity alarm for PV2 | | | X | X |
| Loop 1 alarm | | X | X | X |
| Loop 2 alarm | | | X | X |
| C mode (not A/M) identification status output | X | | X | X |
| M mode (not C/A) identification status output | X | | X | X |
| Internal cascade open/close status output | | | X | |
| Loop 2 setpoint remote/local status | | | | X |

(4) Analog Output (Transmission) Settings

The following variables can be assigned to analog outputs for transmission:

| |
|-------------|
| PV1 and PV2 |
| SV1 and SV2 |
| MV |
| AI1 to AI5 |
| *AI6 to AI8 |

*Available only for the basic type with expandable I/O.

Input/Output Signal Computations

In function selection mode, input/output computations can be enabled by simple parameter settings. In program mode, these computations can be included in the user program.

- Input signal computations:

| |
|---|
| Square root extraction with variable low cutoff |
| 10-segment linearizer function |
| First-order lag |
| External cascade setpoint computation |
| Setpoint ratio |
| Feed-forward input computation |
| Other signal processing |

• Output signal computations:

| |
|---------------------|
| Output high-limiter |
| Output low-limiter |

• Input/output signals and internal data:

| | Signal | Measurable Signal Limits (Typical) |
|---------|------------------|------------------------------------|
| | Internal Data | Internal Data |
| Inputs | 1 to 5 V | 0 to 5.5 V |
| | 0.0000 to 1.0000 | -0.2500 to 1.1250 |
| Outputs | 1 to 5 V | 0.75 to 5.25 |
| | 0.0000 to 1.0000 | -0.0625 to 1.0625 |
| | 4 to 20 mA | 0.8 to 21.0 mA |
| | 0.0000 to 1.0000 | -0.0625 to 1.0625 |

Note: Current outputs have a tight-shutoff feature.

User Programming Functions

(1) Computation Modules

| | Module Name | Max. number of times of use (*1) |
|--------------------|--|----------------------------------|
| Basic Computations | Addition | Unlimited |
| | Subtraction | |
| | Multiplication | |
| | Division | |
| | Square root extraction (no hysteresis) | |
| | Absolute value | |
| | High selector | |
| | Low selector | |
| | High limiter | |
| | Low limiter | |
| | Natural logarithm | |
| | Common logarithm | |
| | Exponential | |
| | Power | |
| | Temperature compensation | |
| | Pressure compensation | |
| | Scaling | |
| | Normalization | |
| | Ratio | |
| | Conversion from DI to BCD | |
| | Conversion from BCD to DO | |
| | Conversion from DI to binary | |
| | Conversion from binary to DO | |
| | Maximum | |
| | Minimum | |
| | Average | |
| | Increment | |
| | Decrement | |

| | Module Name | Max. number of times of use (*1) |
|--|--|----------------------------------|
| Computation Modules with Serial Number | 10-segment linearizer function | 2 |
| | Inverse conversion of 10-segment linearizer function | 2 |
| | Arbitrary segment linearizer function | 2 |
| | Inverse conversion of arbitrary segment linearizer function | 2 |
| | High limit alarm | 8 |
| | Low limit alarm | 8 |
| | First-order lag (2 kinds: second, minute) | 8 each |
| | Derivative (2 kinds: second, minute) | 2 each |
| | Dead time (2 kinds: second, minute) | 3 each |
| | Velocity computation (2 kinds: second, minute) | 3 each |
| | Moving average computation (2 kinds: second, minute) | 3 each |
| | Velocity limiter | 6 each |
| | Timer (2 kinds: second, minute) | 8 each |
| | Time out (2 kinds: second, minute) | 8 each |
| | Program setter (2 kinds: second, minute) | 1 each |
| | Change detection | 8 |
| | Pulse input counter | 8 |
| | Totalizer pulse output | 2 |
| | Square root extraction (Low cutoff point or less: Linear) (*2) | 8 |
| | Square root extraction (Low cutoff point or less: Zero) (*2) | 8 |
| | RS flip-flop | 8 |
| | Hold timer (2 kinds: second, minute) | 8 each |
| | Previous input variable | 8 |
| | Hold | 8 |
| | Logical Operations | AND |
| OR | | |
| Exclusive OR | | |
| NOT | | |
| Conditional Judgment | Comparison | |
| | Signal switching | |
| | Jump (*3) | |
| | Conditional jump (*3) | |
| Control Functions | Basic control | 2 |
| | Cascade control | 1 |
| | Selector control | 1 |
| Others | S register change (*3) | Unlimited |
| | S register rotation (*3) | |

*1: Limitation when used within the limit of programming capacity.

*2: Hysteresis exists at low cutoff point.

*3: Unavailable in function block programming.

- Constants for computations
Variables: 30 (P parameters)
Constants: 100 (K parameters)
- Temporary memory registers
For numeric data: 60

(2) Online Debugging Functions

The YSS1000 setting software enables online checking of programs, with its ability to carry out test runs and online function block monitoring.

(3) Functions of, and System Requirements for, YSS1000 Setting Software

| | |
|---|---|
| Program development | Using YSS1000, a program can be developed on a computer and downloaded to a YS1700 via communication. |
| Programming method | Can be selected from text programming or function block programming. |
| Test runs (of text programs or function block programs) | Test runs of developed user programs can be carried out. A simple I/O check program can be written in the simulation program area for verifying the user program's actions. Number of simulation program steps: Up to 50 steps or 10 modules |
| Online function block monitoring (for function block programs only) | Connecting to a YS1700 via communication enables operation checks of a user program written in function block programming. |
| User program capacity | Text programming: Up to 1000 steps (total of main program and sub-programs; sub-programs can be repeatedly used). Function block programming: Up to 400 modules |
| System requirements for YSS1000 | IBM PC/AT-compatible computer running Microsoft Windows 2000 or XP For details, see GS01B08K01-01E. |
| Internal data format | IEEE754-format single-precision floating-point calculations |
| Load calculation function | Provided (while running [in RUN state] or during a test run) |

Self-tuning

- Loops subject to self-tuning:
The table below shows the loop to be self-tuned in each mode.

| Controller Mode | | Subject to Self-tuning |
|-------------------------|--------------------------|---|
| Function selection mode | Single-loop mode | Loop 1 |
| | Cascade mode | <ul style="list-style-type: none"> • Internal cascade open: Loop 2 • Internal cascade close: Loop 1 |
| | Selector mode | Selected loop |
| Programmable mode | When using BSC1 and BSC2 | The loop specified in the user program for independent two-loop control |
| | When using CSC | <ul style="list-style-type: none"> • Internal cascade open: Loop 2 • Internal cascade close: Loop 1 |
| | When using SSC | Selected loop |

Alarm Functions (for Function Selection Mode)

The following process alarms can be detected. For other alarms, see the "Self-diagnostics" section.

| Item | Setting Range | Remarks |
|---|----------------|---|
| PV high-limit and high-high-limit alarm setpoint (*1) | -6.3 to 106.3% | Settings are values in engineering units. |
| PV low-limit and low-low-limit alarm setpoint (*1) | | |
| Absolute deviation alarm (*1) | 0.0 to 106.3% | |
| Velocity alarm (*2) | 0.0 to 106.3% | |

*1: Alarm hysteresis = 0.1 to 20.0%

*2: Velocity alarm time setting: 1 to 9,999 seconds

- Contact status during alarm: Close or open as selected by the user.
- Contact status during power failure: Open.

Alarm Functions (for Programmable Mode)

In programmable mode, alarm detection functions need to be built into the user program.

| Item | Service | Indication When Alarm Setpoint is Set or When Alarm Has Occurred | Remarks |
|-------------------------|---|--|---|
| Alarm Setpoint Pointers | PV high-limit and low-limit alarm setpoint | Yellow pointer | In LOOP, DUAL, and METER displays |
| | PV high-high-limit and low-low-limit alarm setpoint | Orange pointer | |
| Alarm Indications | ALM lamp | Lights up in yellow | — |
| | Alarm occurrence indication | Alarm indication on LOOP display | — |
| | Alarm name display | Display on ALARM | — |
| | Tag number inversion display | Inversion and alternating display of tag numbers in all displays | Enabled and disabled by a parameter. |
| | Active display | Change of PV bar and its background colors | Alarm type to cause the active display is to be set by a parameter. |

Response to Power Recovery after Failure

The response to a power recovery depends on the duration of the failure and start mode setting.

| Start Mode | Duration of Failure | |
|---|-----------------------|-----------------------|
| | Less than approx. 2 s | Approx. 2 s or longer |
| AUT | HOT start | |
| M-COLD (equivalent to TM1 and TM2 in YS100) | HOT start | M-COLD start |
| A-COLD | HOT start | A-COLD start |
| C-COLD | HOT start | C-COLD start |
| COLD | HOT start | COLD restart |

Response to Power Recovery

| | Response to Power Recovery | |
|---|---|--|
| | HOT start | M-COLD start A-COLD start C-COLD start COLD restart |
| C, A, or M mode | Remains the same as before power failure. | See note. |
| MV | Remains the same as before power failure. | -6.3% |
| SV | Remains the same as before power failure. | |
| Parameters including P, I, and D | Remains the same as before power failure. | |
| T registers | Remains unchanged. | 0 |
| Dynamic computations such as first-order lag delays | Continuously performed. | Initialized |
| STC result parameter | Initialization | |

Note: M mode at an M-COLD start, A mode at an A-COLD start, C mode at a C-COLD start, and the same as before the power failure, at a COLD restart.

Self-diagnostics

(1) System Failure

- Causes of system failure:
Various hardware failures such as main CPU failure, display CPU failure, A/D conversion error, D/A conversion error, and memory error
- Response to system failure:
The FAIL lamp lights up; the FAIL contact opens (as is the case with power failure); analog outputs are held (Y1 can be changed manually); and digital outputs are held.

(2) Alarms

- Alarm types:
System alarms, process alarms (see the "Alarm Functions [for Function Selection Mode]" section for details), self-tuning alarms
- Response to alarms:
See the table showing the alarm indications in the "Alarm Functions (for Function Selection Mode)" section.

Display upon System Failure

Upon system failure, the display changes to the FAIL display. In the case of a main CPU failure, the display CPU shows the FAIL display and allows manual operations in M mode. Also in the case of a display CPU failure, the main CPU shows the FAIL display and allows manual operations in M mode.

* Except cases of clock stopping or simultaneous failure of the main and display CPUs

Security

The parameters and user program can be password-protected.

■ Hardware Specifications

Input/Output Specifications

Analog Inputs

| Input Type | Programmable Mode | Function Selection Mode |
|------------------------------|----------------------------------|-------------------------|
| 1 to 5 V DC (main unit) | 5 points | 4 points |
| 1 to 5 V DC (expandable I/O) | 3 points | |
| Direct input (optional, *1) | Available for 1 point from above | |
| Input resistance | 1 MΩ or larger | |

*1: To be specified from mV, thermocouple, RTD, potentiometer, two-wire transmitter, isolator, or frequency input.

Analog Outputs

| Output Type | Programmable Mode | Function Selection Mode |
|------------------------------|--|-------------------------|
| 4 to 20 mA | 1 point | 1 point |
| 1 to 5 V DC (main unit) | 2 points (one can be changed to 4 to 20 mA output) | 2 points |
| 1 to 5 V DC (expandable I/O) | 1 point | 1 point |

| Load Resistance | Programmable Mode | Function Selection Mode |
|-----------------|-------------------|-------------------------|
| 4 to 20 mA | 0 to 750 Ω | |

| Load Resistance | Programmable Mode | Function Selection Mode |
|------------------------------|--------------------------|-------------------------|
| 1 to 5 V DC (main unit) | At least 2 kΩ (see note) | |
| 1 to 5 V DC (expandable I/O) | At least 10 kΩ | |

Note: Use a voltage output for the YS1700 main unit to connect to an SIHN panel meter (2 kΩ).

Digital Inputs

| Item | Programmable Mode | Function Selection Mode |
|---------------------------------|--|-------------------------|
| Digital inputs (main unit) | 6 points (shared use with digital outputs) | |
| Digital inputs (expandable I/O) | 4 points (minus line common) | |

| Input Type | ON | OFF |
|------------------------------|--|--|
| No-voltage contacts (*1, *2) | Close (resistance at 200 Ω or less) | Open (resistance at 100 kΩ or larger) |
| Voltage contacts (*2) | Low (input voltage between -0.5 to 1 V DC) | High (input voltage between +4.5 to 30 V DC) |

*1: Input contact rating: 5 V DC, 20 mA or more.

Minimum pulse width:

- In programmable mode
220 ms (control period at 200 ms)
120 ms (control period at 100 ms)
70 ms (control period at 50 ms)
- In function selection mode: 120 ms

*2: The same terminals can be connected to both no-voltage and voltage contacts.

Digital Outputs

| Item | Programmable Mode | Function Selection Mode |
|----------------------------------|---|-------------------------|
| Digital outputs (main unit) | 6 points (shared use with digital inputs) | |
| Digital outputs (expandable I/O) | 4 points (minus line common) | |
| Transistor contacts | Rating: 30 V DC, 200 mA (resistance load) | |
| FAIL output (*1) | 1 point | |
| Transistor contacts | Rating: 30 V DC, 200 mA (resistance load) | |

*1: Normally closed (NC) and open during power failure or system failure.

Transmitter Power Supply

| Item | Specification |
|--------------------------|--|
| Supply voltage | 25 to 25.5 V DC |
| Load | 60 mA or less (30 mA or less if the direct input option is included) |
| Short-circuit protection | 80 mA ±10 mA |
| Others | No effect of a short-circuit on the control circuit. Not isolated from the control circuit. 250 W resistor for conversion into 1-to-5 V signal must be prepared externally if necessary. |

Standard Specifications

Standard Working Conditions

Ambient temperature 23°C ±2°C

Relative humidity: 50% ±10%

Power supply:

- AC (100 V) DC (24 V) dual power drive models: 24 V DC ±10% or 100 V AC ±10%, 50/60 Hz
- 220 V AC power drive models: 135 V DC ±10% or 220 V AC ±10%, 50/60 Hz

| Item | Specification |
|--|--|
| I/O conversion accuracy | |
| 1 to 5 V inputs | ±0.1% of span (*1) |
| Direct inputs | ±0.5% or ±(2 × direct input card's accuracy + 0.1%) (*1) |
| Analog voltage outputs (YS1700 main unit) | ±0.1% of span |
| Analog voltage outputs (expandable I/O) | ±0.2% of span |
| Analog current outputs | ±0.2% of span |
| Allowable input voltage | |
| 1 to 5 V mV or TC direct input Two-wire transmitter | ±30 V DC -0.5 to 4 V DC +40 mA DC |
| Warm-up time | 1 minute (time needed after power-on until the readings fall within the rated accuracy) or 3 minutes for direct input |
| Current dissipation and power consumption | AC (100 V) DC (24 V) dual power driven: 750 mA (20 to 132 V DC) 30 VA (80 to 138 V AC) ----- 220 V AC power driven: 110 mA (120 to 340 V DC) 30 VA (138 to 264 V AC) |
| Insulation resistance | 100 MΩ at 500 V DC between input terminals and ground terminal, and between power supply terminals and ground terminal |
| Withstand voltage | Between input/output terminal and ground terminal 1000 VAC for one minute(In the case of basic specification codes -□0, -□1, or -□2) |
| | Between power supply terminal and ground terminal 500 VAC for one minute(In the case of basic specification codes -□3, -□4, or -□5) |
| | 1500 VAC for one minute |
| LCD replacement period | 7 years |

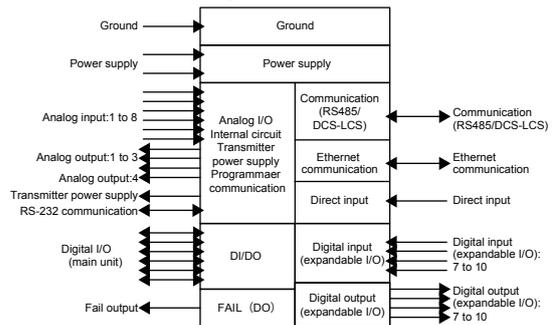
*1: IEC/EN61010-1, CAT I

Signal-to-signal Isolation

| Item | Basic type |
|---------------------|--|
| Analog I/O signals | - Not isolated from the control circuit - Channel-to-channel not isolated, minus lines connected to common - Isolated from other types of I/O signals |
| Direct input | - Isolated from control circuit except for non-isolated two-wire transmitter input - Isolated from power supply circuit - Isolated from other types of I/O signals |
| Digital I/O signals | - Isolated from control circuit - Isolated from other types of I/O signals - Channel-to-channel isolated (see note) |
| FAIL signal | - Isolated from control circuit |
| Communication | - Isolated from other types of I/O signals |
| Power supply | |
| Ground | |

Note: Within the terminals on the expandable I/O, the minus wires of the individual digital inputs are connected to the same common line, and so are the digital outputs. Thus, the expanded DIs and DOs are channel-to-channel non-isolated but those DIs are isolated from those DOs.

Insulation Block Diagram



Power Supply Ratings

When used within the supply voltage ranges below, the YS1700 is compliant with the FM nonincendive and CE Mark standards and can be used with Yokogawa BARD safety barrier.

For AC (100 V) and DC (24 V DC) dual power drive models:

- 24 to 120 V DC (±10%), no polarity, or
- 100 to 120 V AC (±10%), 50/60 Hz (±3 Hz)

For 220 V AC power drive models:

- 135 to 190 V DC (±10%), no polarity, or
- 220 to 240 V AC (±10%), 50/60 Hz (±3 Hz)

Normal Working, Transportation, and Storage Conditions

| Item | Normal Working | Transportation and Storage |
|--------------------------------|--|------------------------------------|
| Ambient temperature | 0 to 50°C | -20 to 60°C |
| Ambient relative humidity | 5 to 90% (no condensation allowed) | 5 to 95% (no condensation allowed) |
| Power supply voltage (AC) (*1) | 80 to 138 V AC (for AC [100 V] or DC [24 V] dual drive models) 138 to 264 V AC (for 220 V AC drive models) | - |
| Power supply frequency (AC) | ±3 Hz | - |
| Power supply voltage (DC) (*1) | 20 to 132 V DC (for AC [100 V] or DC [24 V] dual drive models) 120 to 340 V DC (for 220 V AC drive models) | - |
| Continuous vibration | 5 to 14 Hz with amplitude of 0.625 mm or less; 14 to 150 Hz with acceleration of 4.9 m/s ² or less along orthogonal 3 directions for 2 hours each | |
| Transient vibration | 14.7 m/s ² for 15 seconds or less | |
| Mechanical impact | 49 m/s ² (5 G) or less for 11 ms or less | |
| Package fall | 1 m or less | |
| Magnetic field | 400 A/m or less | |
| Toxic gases | No corrosive gases must be present. | |
| Installation height | At elevation of 2000 m or less | |
| Atmospheric pressure | 86 to 106 kPa | |

*1: Differs from the conditions meeting the CE safety and FM nonincendive standards.

Effect of Variations in Working Conditions

| Item | Specification |
|--|--|
| Effect of fluctuations in power supply | Accuracy |
| Effect of input lead-wire resistance | 0.13% (per 1 kΩ) |
| Effect of load resistance | Accuracy /5 2 kΩ to ∞, 1 to 5 V output 0 to 750 Ω, 4 to 20 mA |
| Common mode noise rejection ratio | 83 dB for (1 to 5 V inputs), 50/60 Hz |
| Series mode noise rejection ratio | 46 dB (1 to 5 V inputs), 50/60 Hz |
| Effect of magnetic field | Accuracy /5 (400 A/m, 50/60 Hz or DC) |
| Effect of ambient temperature changes | Accuracy (per 10°C change within 0 to 50°C) |
| Effect of ambient humidity changes | Accuracy (50% to 93% RH at 40°C) |

Communication Specifications

| Item | Programmer Communication (with YSS1000) | RS-485 | DCS-LCS | Ethernet |
|--|---|--|---|---|
| Electrical specifications | RS-232C compliant | EIA RS-485 compliant | Yokogawa proprietary | IEEE802.3 compliant 10BASE-T/100BASE-TX |
| Connection | Dedicated connector behind the front panel | Screw terminals at the rear (5 signal and 1 ground terminals) | Screw terminals at the rear (2 terminals) | RJ45 connector at the rear |
| Number of controllers that can be linked | 1 | Max. 31 controllers per port (*3) | 8 controllers per LCS card, 4 controllers per SCIU card | Max. 4 cascaded tiers (10BASE-T), max. 2 cascaded tiers (100BASE-TX) (*1) |
| Applicable cable | Model A1053UR (dedicated USB – RS-232C adapter cable) | Shielded twist-pair cable with core size of 0.5 to 1.25 mm ² (AWG 20 to 16) | Model SCCD (dedicated shielded twist-pair cable) | 10BASE-T/100BASE-TX cable |
| Cable length | Approx. 2.7 m | Max. 1200 m (1.25 mm ²) | Max. 100 m | 100 m (*2) |
| Protocol | Proprietary protocol | PC link, Modbus, YS protocol, Peer-to-Peer communication | Proprietary protocol | Modbus/TCP |

*1: Number of cascaded hub connections

*2: Maximum segment length (hub-to-YS1700 cable length)

*3: For Peer-to-Peer communication, up to 32 YS1700s can be linked to each other.

Direct Input Specification

| Item | mV Input | Thermocouple Input |
|---|---|---|
| Option code | /A01 | /A02 |
| Input signal | -50 to +150 mV DC | ANSI/JIS thermocouple type K, T, J, E, B, R, or S, or IEC/ANSI type N |
| Measurable span | 10 to 100 mV DC | 10 to 63 mV (equivalent emf) |
| Zero elevation of measurement range | Within 3 times the span or ±50 mV, whichever is smaller | Within 3 times the span or ±25 mV, whichever is smaller |
| Measurement range | Can be modified via an engineering display. | |
| Input resistance | 1 MΩ (3 kΩ during power failure) | |
| External input resistance | 500 Ω or less | |
| Allowable input voltage and current | -0.5 to 4 V DC | |
| Input linearizer | Not provided | Provided |
| Rated accuracy of conversion to 1 to 5 V output | ±0.2% of span | ±0.2% of span or ±20 μV in input equivalent, whichever is larger |
| Reference junction compensation (RJC) | — | ±1°C or less (*1) |

*1: RJC is not performed for a Type B element. Except for Type B, if the measured temperature is below 0°C, then the error is the product of the value above multiplied by the following constant K: $K = (\text{emf per } 1^\circ\text{C at around } 0^\circ\text{C}) / (\text{emf per } 1^\circ\text{C at the measured temperature})$

| Item | RTD | Potentiometer |
|---|---|--|
| Option code | /A03 | /A04 |
| Input signal | Pt100(IPTS-68:JIS '89), JPt100(JIS '89), Pt100(ITS-90: JIS '97), Pt50(JIS '81) 3-wire measurement current: 1mA | Three-wire potentiometer |
| Measurable span | 10 to 650°C (Pt100) 10 to 500°C (JPt100) | Total resistance: 100 to 2000 Ω Span: 80 to 2000 Ω |
| Zero elevation of measurement range | Within 5 times the span | Within 50% of the total resistance |
| Measurement range | Can be modified via an engineering display. | |
| External input resistance | 10 Ω or less per wire (*2) | 10 Ω or less per wire |
| Input linearizer | Provided | Not provided |
| Rated accuracy of conversion to 1 to 5 V output | ±0.2% of span or ±0.2°C, whichever is larger | ±0.2% of span |

*2: 10 Ω per wire, or (temperature measurement span) x 0.4 Ω, whichever is smaller.

| Item | Input Isolator | Two-wire Transmitter or Non-isolated 2-wire transmitter Input |
|---|------------------------------------|--|
| Option code | /A05 | /A06 or /A07 |
| Input signal | 1 to 5 V DC | 4 to 20 mA DC from transmitter (with its power supplied from the YS1700) |
| Input resistance | 1 MΩ (100 kΩ during power failure) | 250 Ω |
| External input resistance | — | $RL = (20 - [\text{minimum working voltage of transmitter}]) / 0.02 \text{ A } (\Omega)$ or less |
| Allowable input voltage or current | ±30 V DC | 40 mA DC |
| Input linearizer | Not provided | |
| Rated accuracy of conversion to 1 to 5 V output | ±0.2% of span or less | |

| Item | Frequency Input |
|---|---|
| Option Code | /A08 |
| Input signal | Two-wire contact, voltage pulse, or current pulse (can supply transmitter power) Three-wire voltage pulse with transmitter power supply |
| Input frequency | 0 to 10 kHz |
| 100% frequency | 0.1 to 10 kHz |
| Zero elevation | 0 to 50% of 100% input frequency |
| Measurement range | Can be modified via an engineering display. |
| Low-input cutoff level | Can be set to a level from 0.01 Hz (or 1% of maximum frequency) to 100% |
| Minimum input pulse width | On: 60 μs Off: 60 μs (input frequency from 0 to 6 kHz) On: 30 μs Off: 30 μs (input frequency from 6 to 10 kHz) |
| Input signal level | Contact input: Relay or transistor input Open-close detection levels: Open if 100 kΩ or larger, closed if 200 Ω or less Contact capacity: 15 V DC, 15 mA or larger Voltage/current pulse input: Low if -1 to +8 V; High if +3 to +24V Pulse height: 3 V or higher (input frequency from 0 to 6 kHz), 5 V or higher (input frequency from 6 to 10 kHz) |
| Internal load resistance (for current pulse) | Can be selected from 200 Ω, 500 Ω, and 1 kΩ (to be specified upon ordering). |
| Input filter | Whether to enable 10 ms filter for a no voltage contact can be selected (to be specified upon ordering). |
| Transmitter power supply | Can be selected between 12 V DC, 30 mA and 24 V DC, 30 mA (to be specified upon ordering). |
| Rated accuracy of conversion to 1 to 5 V output | ±0.2% of span or less |

■ SAFETY COMPLIANCE

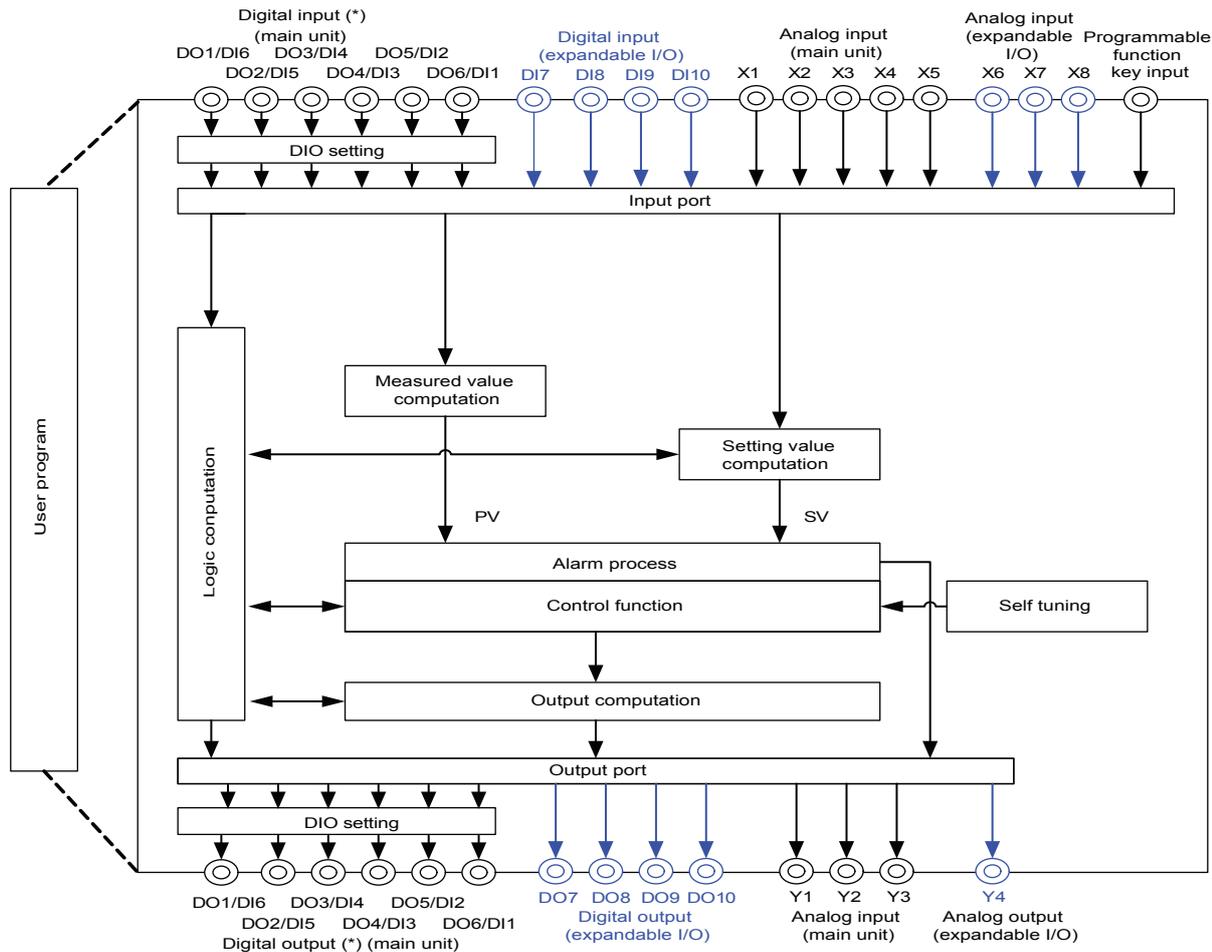
| Item | Compliance | Remarks |
|---|---|---|
| General safety standards | Compliant with IEC/EN61010-1 Installation category: CAT II, Pollution Degree: 2 Measurement category: I (CAT I) | Only for the models with suffix code -00x, -01x, or -02x |
| EMC standards | EN61326 Class A EN55011 Class A, Group 1 EN6100-3-2 EN6100-3-3 Note: The unit under testing can continuously work with accuracy within ±20% of the range throughout the test. | |
| Approval for use in hazardous areas (Under application) | FM nonincendive No. 3611 Locations: Class I, Division 2, Groups A, B, C, and D; Class I, Zone 2, Group IIC Temperature Code T4 | Nonincendive electric device usable in hazardous area (only for the models with option code FM) |

Precautions for Safety Compliance 

1. An internal unit, if used alone, cannot comply with the safety standards. Only a complete set of an internal unit housed in a safety-compliant case or a safety-compliant housing, is compliant with the safety standards listed above.
2. The following actions that involve removal and re-installation of the internal unit from/in the case, required safety checks mandated by the IEC/EN61010-1 safety standard. These actions must be performed by a Yokogawa engineer or Yokogawa-authorized technician, and tests for safety checks (such as a withstanding voltage test) must be performed. When the user carries out any one of these actions at own responsibility, the safety-compliance is lost.
 - (1) Removing the internal unit from the case or re-installing the internal unit in the case or housing.
 - (2) Replacing or installing the power supply unit, display unit, or option board.
 - (3) Changing the setup switch positions on the main board or option board.
 - (4) Any other maintenance or repair work to detach the internal unit from the case.

■ FUNCTION BLOCK DIAGRAM

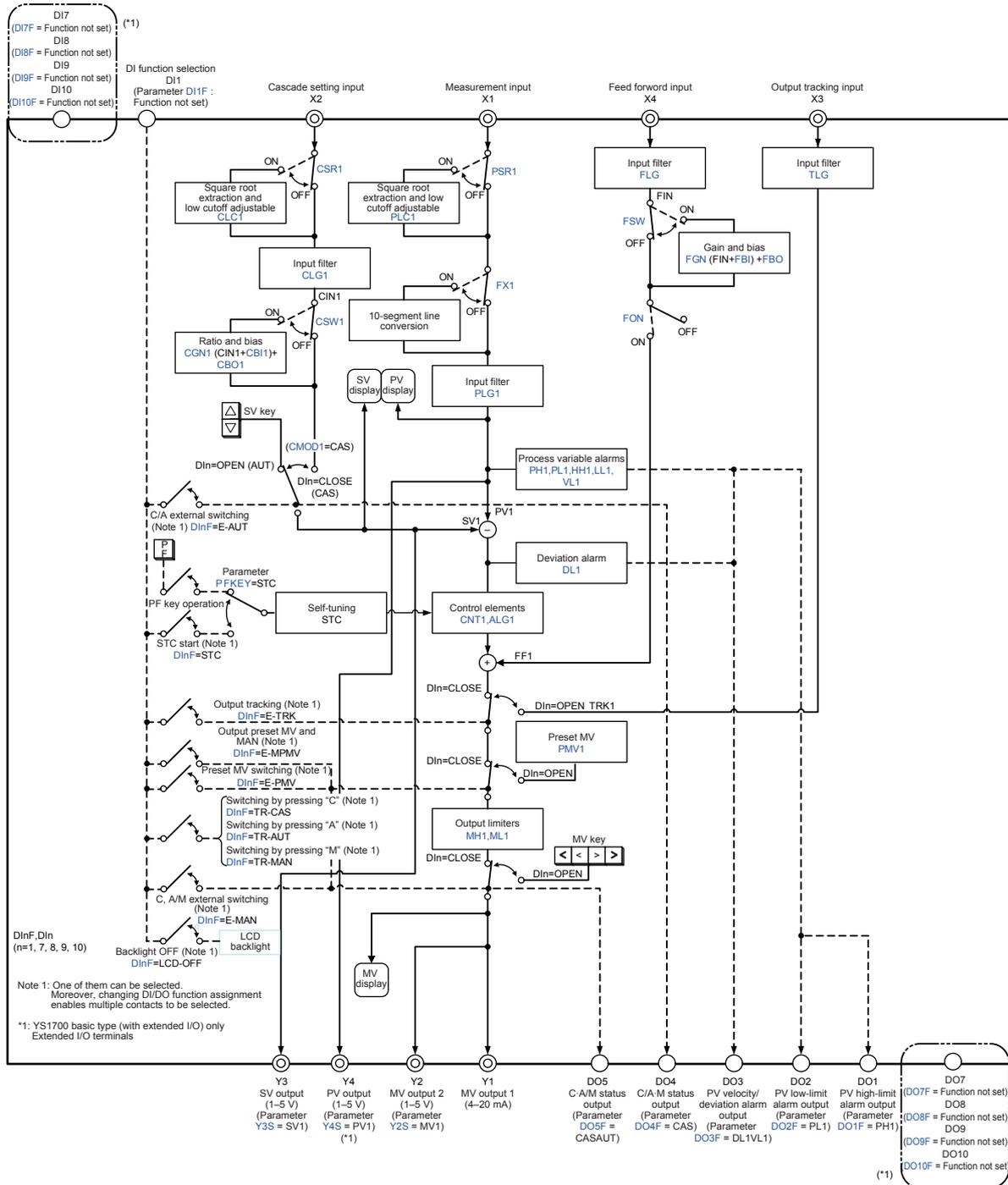
(1) Programmable Mode



*: Digital inputs and outputs are selectable

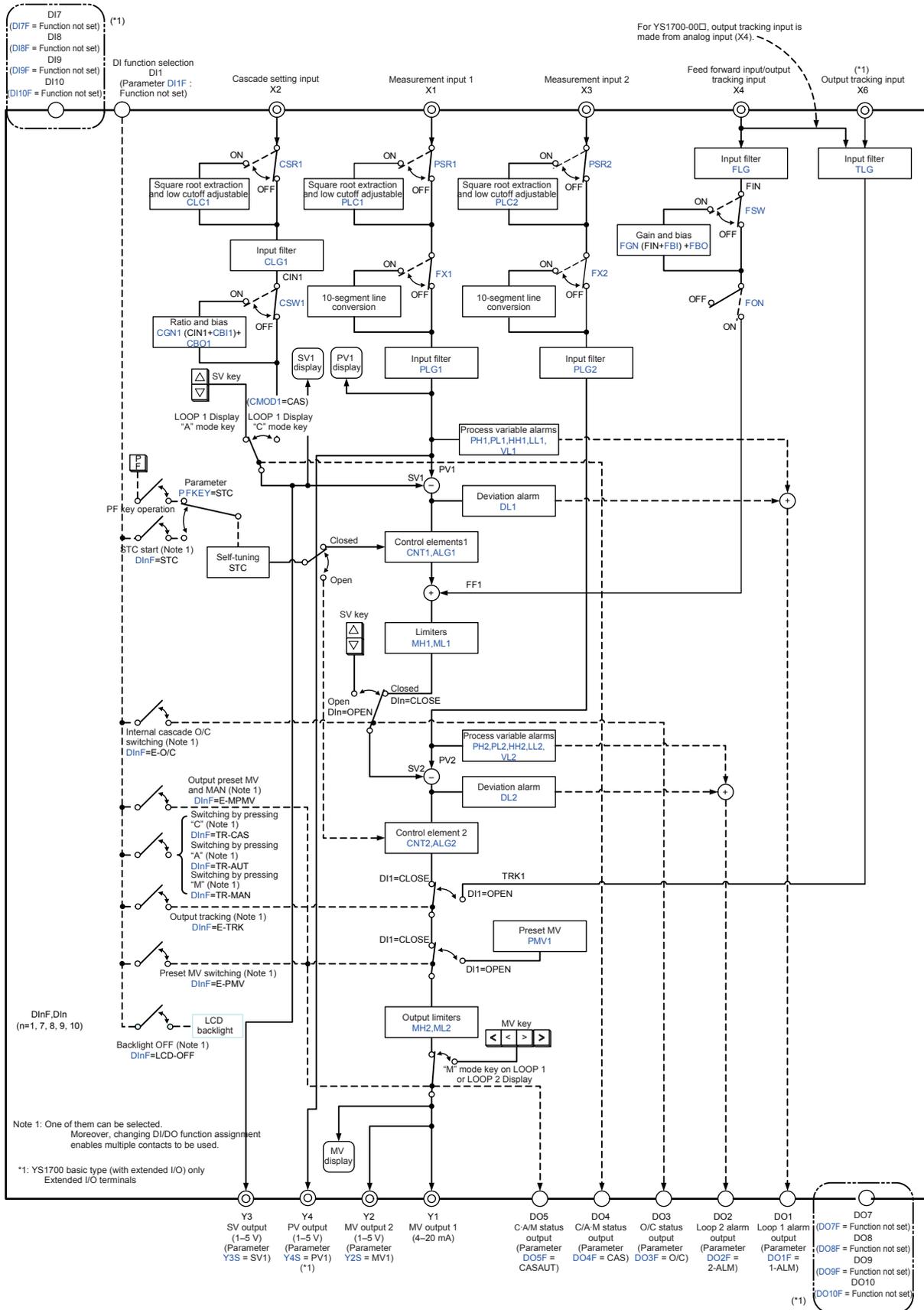
(2) Function Selection Mode: Single-loop Mode

The diagram below shows the default DI/O1 to 6 selection, function, and analog output (Y2 to 4) settings (can be modified by changing the parameters).



(3) Function Selection Mode: Cascade Mode

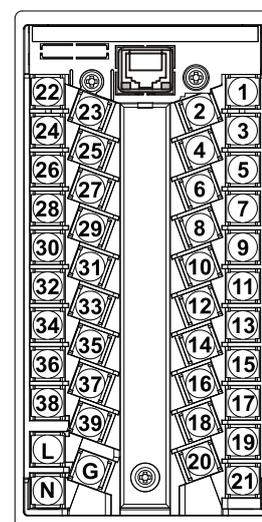
The diagram below shows the default DI/O1 to 6 selection, function, and analog output (Y2 to 4) settings (can be modified by changing the parameters).



■ Terminal Layout (Basic type)

| Terminal No. | Programmable mode | Single-loop mode | Cascade mode | Selector mode |
|----------------|---|---|--|--|
| 1 2 | + Analog input 1 - (1-5V DC) | + PV - (1-5V DC) | + PV1 - (1-5V DC) | + PV1 - (1-5V DC) |
| 3 4 | + Analog input 2 - (1-5V DC) | + Cascade setting input - (1-5V DC) | + Cascade setting input - (1-5V DC) | + Cascade setting input 1 - (1-5V DC) |
| 5 6 | + Analog input 3 - (1-5V DC) | + Tracking input - (1-5V DC) | + PV2 - (1-5V DC) | + PV2 - (1-5V DC) |
| 7 8 | + Analog input 4 - (1-5V DC) | + Feedforward input - (1-5V DC)(*6) | + Feedforward input - (1-5V DC)(*6) | + Cascade setting input 2 - (1-5V DC)(*7) |
| 9 10 | + Analog input 5 - (1-5V DC)(*1) | + Direct input signal - output (*1) | + Direct input signal - output (*1) | + Direct input signal - output (*1) |
| 11 12 | + Fail output - | + Fail output - | + Fail output - | + Fail output - |
| 13 | Transmitter Power supply (24V DC)(*2) | Transmitter Power supply (24V DC)(*2) | Transmitter Power supply (24V DC)(*2) | Transmitter Power supply (24V DC)(*2) |
| 14 | Communication SG | Communication SG | Communication SG | Communication SG |
| 15 | Communication SDA (-) | Communication SDA (-) | Communication SDA (-) | Communication SDA (-) |
| 16 | Communication SDB (+) | Communication SDB (+) | Communication SDB (+) | Communication SDB (+) |
| 17 | Communication RDA (-)or LCS (+) | Communication RDA (-)or LCS (+) | Communication RDA (-)or LCS (+) | Communication RDA (-)or LCS (+) |
| 18 | Communication RDB (+)or LCS (-) | Communication RDB (+)or LCS (-) | Communication RDB (+)or LCS (-) | Communication RDB (+)or LCS (-) |
| 19 20 21 | + } - } Direct input (*3) | + } - } Direct input (*3) | + } - } Direct input (*3) | + } - } Direct input (*3) |
| 22 23 | + Analog output 1 - (4p20mA DC) | + MV1 - (4p20mA DC) | + MV1 - (4p20mA DC) | + MV1 - (4p20mA DC) |
| 24 25 | + Analog output 2 - (1-5V DC) | + MV2 (*5) - (1-5V DC) | + MV2 (*5) - (1-5V DC) | + MV2 (*5) - (1-5V DC) |
| 26 27 | + Analog output 3 (*4) - (4p20mA DC/1-5V DC) | + SV (*5) - (1-5V DC) | + SV (*5) - (1-5V DC) | + SV (*5) - (1-5V DC) |
| 28 29 | + Digital output 1 or - Digital input 6 | + PV1 high limit alarm - output (*5) | + First loop alarm output - | + First loop alarm output - |
| 30 31 | + Digital output 2 or - Digital input 5 | + PV1 low limit alarm - output (*5) | + Second loop alarm output - | + Second loop alarm output - |
| 32 33 | + Digital output 3 or - Digital input 4 | + Deviation alarm output - (*5) | + O/C status output - | + L/R status output - |
| 34 35 | + Digital output 4 or - Digital input 3 | + C/A-M status output - (*5) | + C/A-M status output - | + C/A-M status output - |
| 36 37 | + Digital output 5 or - Digital input 2 | + C/A-M status output - (*5) | + C/A-M status output - | + C/A-M status output - |
| 38 39 | + Digital output 6 or - Digital input 1 | + Action mode switching - input (*5) | + Action mode switching - input | + Action mode switching - input |
| L N G | + Power supply - Ground (GND) | + Power supply - Ground (GND) | + Power supply - Ground (GND) | + Power supply - Ground (GND) |

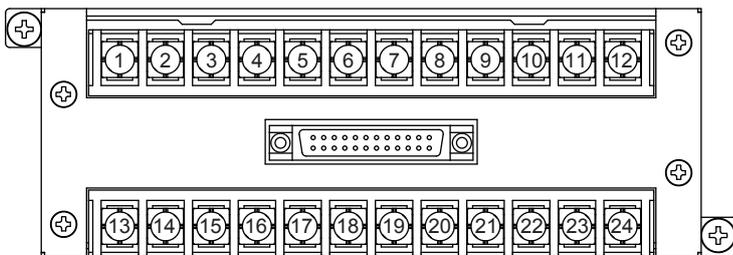
- (*1)If direct input (optional specifications) is provided, analog input 5 becomes direct input signal output.
- (*2)For connecting two wire transmitters: see "Connection of Transmitter Power Supply" described later.
- (*3)For direct input connection: see "Direct Input Wiring" described later.
- (*4)Analog output 3 can be changed by engineering parameter. Initial value: 1 to 5 V DC
- (*5)These settings are default. They can be changed by parameters.
- (*6)If feedforward input is not used, the terminals can be used for output tracking input.
- (*7)If cascade setting input 2 is not used, the terminals can be used for output tracking input.



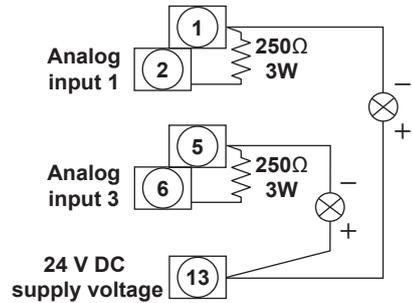
Direct Input Terminals

| | | Terminal number | | |
|--|--|---|--------------|----|
| | | 19 | 21 | 20 |
| mV input (optional code /A01) Isolator (optional code /A05) | | + | | - |
| Thermocouple input (optional code /A02) | | | | |
| RTD input (optional code /A03) | | <p>Match the wiring resistances of terminals 19 and 21 with each other.</p> | | |
| Potentiometer input (optional code /A04) | | <p>Match the wiring resistances of terminals 19 and 20 with each other.</p> | | |
| Frequency input (optional code /A08) | Two-wire type (voltage, contact) | + | | - |
| | Power feed type, two-wired | Signal | Power Supply | |
| | Power feed type, three-wired | + | Power Supply | - |
| Two-wire transmitter input (optional code /A06, /A07) | Supply voltage required | | | |
| | Case of 4 to 20 mA signal not requiring supply power | | | |

Expandable I/O Terminal Diagram



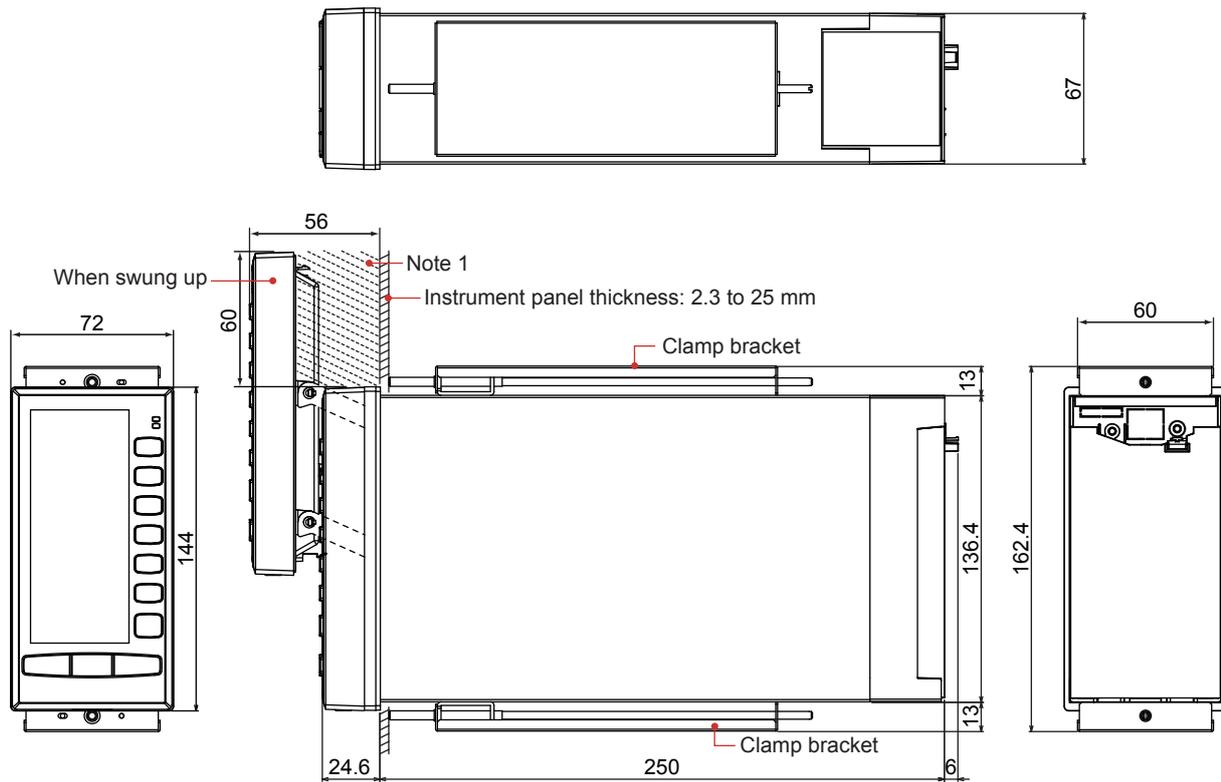
Connection of Transmitter Power Supply



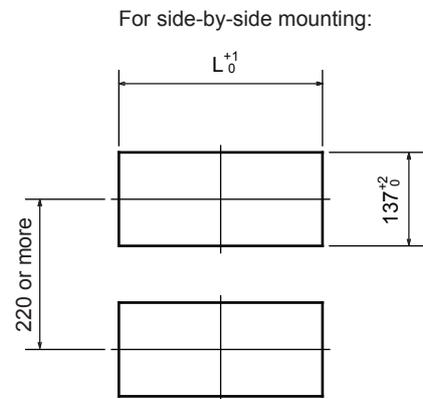
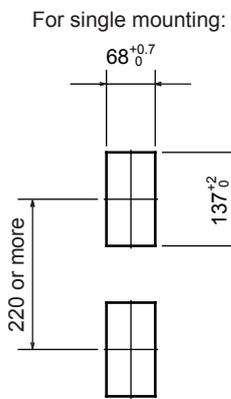
| Terminal number | Expandable I/O Terminal |
|------------------|-------------------------|
| 1 : + 2 : - | Analog input 6 |
| 3 : + 4 : - | Analog input 7 |
| 5 : + 6 : - | Digital input 7 |
| 7 : + 8 : - | Digital input 8 |
| 9 : + 10 : - | Digital input 9 |
| 11 : + 12 : - | Digital input 10 |

| Terminal number | Expandable I/O Terminal |
|------------------|--------------------------------|
| 13 : + 14 : - | Analog input 8 |
| 15 : + 16 : - | Analog output 4 (1 to 5VDC) |
| 17 : + 18 : - | Digital output 7 |
| 19 : + 20 : - | Digital output 8 |
| 21 : + 22 : - | Digital output 9 |
| 23 : + 24 : - | Digital output 10 |

■ DIMENSIONS (YS1000 Basic Type)



Pane Cutout Dimensions



Panel Cutout Width for Side-by-side Mounting

| Number of instruments to be mounted | L(mm) |
|-------------------------------------|-------|
| 2 | 140 |
| 3 | 212 |
| 4 | 284 |
| 5 | 356 |
| 6 | 428 |
| 7 | 500 |
| 8 | 572 |
| 9 | 644 |
| 10 | 716 |
| 11 | 788 |
| 12 | 860 |
| 13 | 932 |
| 14 | 1004 |

Trigonometry

Unit: mm

General tolerance = ±(value of tolerance class IT18 based on JIS B 0401-1998) / 2

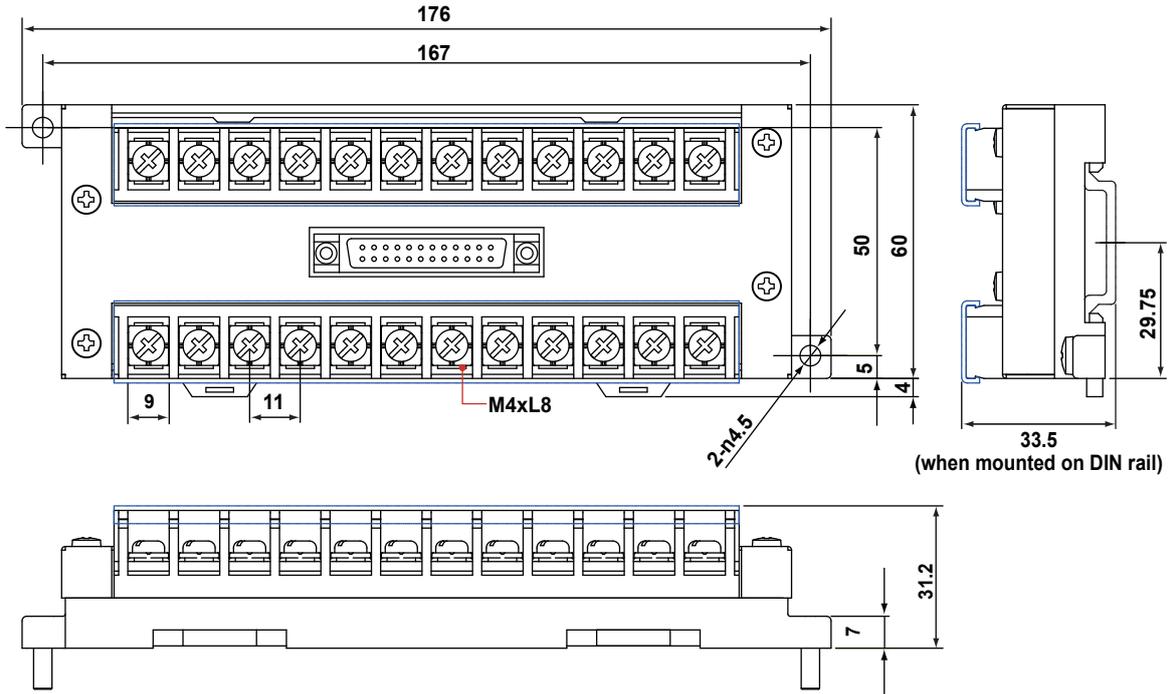
Note 1: If a nameplate, etc. is installed within 60 mm above the instrument, the height of the nameplate, etc. must be 30 mm or less from the panel surface.

Note 2: To ensure good air ventilation, allow space of 100 mm or more at the top and bottom of the panel.

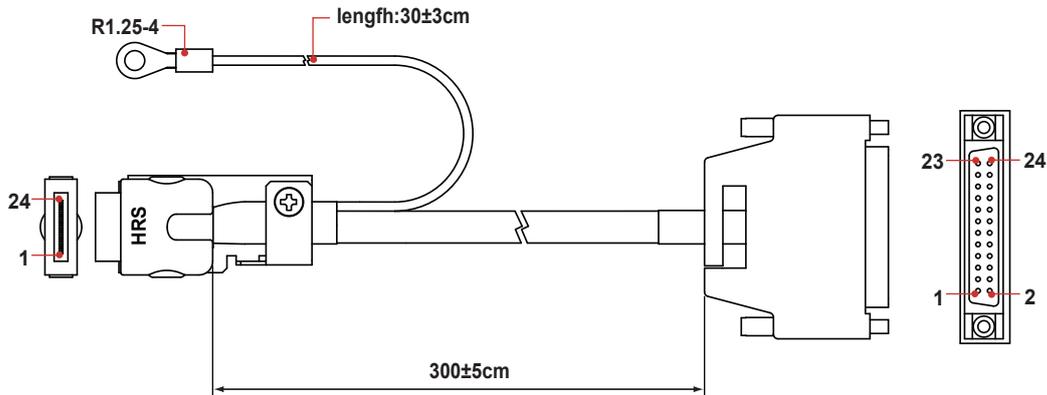
Note 3: For the YS100 compatible type, YS80 internal unit compatible type, EBS, I, EK, and HOMAC compatible types, YS80 compatible type, and 100 Line compatible type, refer to the relevant separate outline view.

0908E.ai

Expandable I/O Terminal Block



Expandable I/O Cable



■ STRUCTURE, MOUNTING (Basic type)

| Item | | Specification |
|-----------------------|-----------------------------------|--|
| Case protection class | | Dust- and splash-proof (IP54-compliant) faceplate Note: Not applicable in side-by-side multi-unit installation or compatible types. |
| Mounting | | Indoor panel mounting |
| Panel mounting device | | Mounting brackets to be used (at the top and bottom). |
| Panel cutout | | 137+2 × 68+0.7 mm |
| Wiring terminals | Signal wirings | M4 screw terminals |
| | Power supply and ground terminals | M4 screw terminals |
| Dimensions | | 144 × 72 × 250 mm (H x W x D from panel plate) |
| Weight | | 1.6 kg |

■ Model and Suffix Codes

| Model | Suffix Code | Optional Code | Remarks |
|--------------------------------------|-------------|----------------------------|--|
| YS1700 | | | Programmable indicating controller |
| | -0 | | Always "0" |
| Type | 0 | | Basic type |
| | 1 | | Basic type with expandable I/O (*1) |
| | 2 | | Compatible type for YS100 (with YS100 case) |
| | 3 | | Compatible type for YS80 internal unit/compatible type for EBS, I, EK, and HOMAC (*2) |
| | 4 | | Compatible type for YS80 (compatible size for YS80 with YS100 terminal) |
| | 5 | | Compatible type for 100 line (with YS100 terminal) (*3) |
| Power supply | 0 | | 100 V AC, 24 V DC common power |
| | 1 | | 220 V AC power |
| Direct input (*4) | | /A01 | mV input |
| | | /A02 | Thermocouple input |
| | | /A03 | RTD input |
| | | /A04 | Potentiometer input |
| | | /A05 | Isolator |
| | | /A06 | Two-wire transmitter input (isolated) |
| | | /A07 | Two-wire transmitter input (non-isolated) |
| | | /A08 | Frequency input |
| Communication | | /A31 | RS-485 communication (PC-link, Modbus, YS protocol, and Peer-to-Peer communication) (*5) |
| | | /A32 | DCS-LCS communication (*6) |
| | | /A34 | Ethernet communication (Modbus/TCP) (*7) |
| Certification (Under an application) | | /FM (Can not be specified) | FM nonincendive approved (FM Class 1, DIV 2) (*8) |
| Hard manual unit | | /NHM | Hard manual unit not included (If optional code /NHM is not specified, the product includes a hard manual unit.) |

- *1 The expandable I/O terminal (model YS010) and expandable I/O cable (model YS011) (cable length: 3 m) are provided.
- *2 This type can be connected to the YS80 housing (model SHUP). (The EK/HOMAC compatible housing (SHUP-420) and EBS/I series-compatible housing (SHUP-100) are sold separately.)
- *3 The 100 line-compatible housing (model YS006) is sold separately.
- *4 Direct input options can be combined only with the suffix codes "-02," "-04," or "-05." Selection of multiple options is not possible.
- *5 A combination with suffix code "-03" is not possible. Optional codes /A31 and /A32 cannot be simultaneously specified.
- *6 Optional codes /A31 and /A32 cannot be simultaneously specified.
- *7 Optional codes /A34 can be specified only for suffix codes "-00" or "-01."
- *8 This option can be combined only with suffix codes "-00" or "-01."

■ Items to Be Specified at the Time of Ordering

Type name, basic spec code, and additional spec code, when necessary, are required to be specified.

Each customer can specify one tag number for the 12 alphanumerical symbols to be used on the main rating plate.

Direct input spec can be specified (only for the additional spec listed in the table below).

| Optional Code | Item to Be Specified |
|----------------------------------|--|
| /A01 (including built-in EM1) | Measurement range Burnout |
| /A02 (including built-in EST) | Thermocouple's compliance standard and type Measurement range Burnout |
| /A03 (including built-in ERS) | Resistance temperature detector's compliance standard, type, and resistance value at 0°C. Measurement range Burnout |
| /A04 (including built-in ES1) | Total resistance 0% resistance 100% resistance Burnout |
| /A08 (including built-in EP3) | Measurement range Transmitter power supply (12 VDC/24 VDC) Input filter (ON/OFF) Current pulse load resistance (200 Ω, 500 Ω, 1 kΩ) |

■ Accessories

| Item Name | Part Number/Model | Q'ty | Remarks |
|-------------------------------|-------------------|------|---|
| Metal clamps | L4041RA | 2 | With screws |
| Tag plate seals | E9760XA | 4 | 50 × 3.5 mm |
| Range entry seals | E9760XL | 4 | 34 × 3.5 mm |
| Expandable I/O terminals | YS010 | 1 | Available only for YS1700-01x |
| Expandable I/O cables | YS011-03 | 1 | Cable length: 3 m Available only for YS1700-01x |
| RJC sensor | L3501RA | 1 | Available only for products with optional code /A02 |
| YS1500/YS1700 Operation Guide | L4041YB | 1 | This user's manual, A4 size |
| User's Manuals for the YS1000 | L4041XA | 1 | CD-ROM containing PDF files of the User's Manual |

■ Accessories (sold separately)

| No. | Item Name | Model | Sales Unit | Remarks |
|-----|---------------------------------|-------|------------|--|
| 1 | 120 Ω terminating resistor (*1) | YS020 | 1 | For RS-485 communication |
| 2 | 250 Ω shunt resistor | YS021 | 1 | For a built-in 24 V transmitter power supply |

- *1 The instrument has a built-in terminating resistor, which can be selected for use by setting the relevant parameter. If a terminating resistor is used in another device at the termination of the same communication system, an external terminating resistor needs to be provided to match the terminating resistance of the YS1000's built-in terminating resistor.