A YS beyond....

**YS1000 Series**

The YS1000 series of single-loop controllers is the successor to the Yokogawa YS100 and YS80 single-loop controllers. The YS1000 series offers improved connectivity to supervisory systems and incorporates new, enhanced features that help operators work more efficiently. The YS1000 will work efficiently in petrochemical, chemical, power, pulp and paper, boiler and combustion control applications.

Compatibly Compatibility

- Easy upgrade for YS100
- Replacement housings for YS100 and YS80 controllers
- Excellent replacement for obsolete competitive controllers

*Some functions are available as optional features or available to a specific model. Please see model and suffix codes for ordering information.*

**Easy to use**

- Color LCD display with a wide variety of screens
- Designed with a lightweight, compact case.
- Programs using text language or graphical

**High reliability**

- Dual CPU’s
- Built-in “hard manual”
- CE and FM Class I Div II approvals

**Powerful and Flexible**

- Ethernet ready (MODBUS TCP)
- Supports MODBUS RTU serial
- Available peer to peer and DCS communication options
- Extended I/O option available

**Envision a plant...**

*YS1000 Series is a core building block of Yokogawa’s VigilantPlant solutions that promise to bring operational excellence.*
Color LCD that’s easy to see and easier to use.

**Meter display**
Digital values displayed side-by-side with an intuitive analog meter makes the YS1000 the perfect replacement for YS80 or obsolete “moving coil” controllers.

**Event Display**
Displays when events are occurring. Messages can be displayed in English, Chinese, Japanese and other languages.

**TREND Display**
Your selection of up to 4 analog inputs or outputs can be displayed as trends.

**ALARM Display**
Color LCD alarm display makes it easy to identify and review alarm activity.

**LOOP Display**
Loops color-coded for easy identification.

**DUAL Display**
Ideal for 2-element control such as cascade or selector control.

**Features a half-reflecting LCD**
Maintains good visibility, even on panels subject to direct morning and evening sunlight.

Under indoor fluorescent lighting
Exposure to Sunlight

Note: Avoid constant exposure to sunlight as this can shorten the lifespan of the LCD display.

**Designed with a lightweight, compact case**

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>YS1000</td>
<td>250mm, 1.6kg</td>
<td></td>
</tr>
<tr>
<td>YS100</td>
<td>320mm, 3.4kg</td>
<td></td>
</tr>
<tr>
<td>YS80</td>
<td>480mm, 6kg</td>
<td></td>
</tr>
</tbody>
</table>

Provides for greater freedom of instrumentation design

Compact, lightweight design allows the use of smaller and less expensive panel. Moreover, it allows attachment to doors which was previously difficult.
YS1000 Configuration and Programming Software

Your Choice of Programming Style: Graphical or Text Based

New Graphic Programming Tool

Programming is easier with our intuitive function block programming. The online module monitoring function allows you to confirm the performance while programming.

YS170

Backwards compatible with existing YS170 users programs. Increased programming capacity allows you to create more sophisticated control schemes.

SLPC

Backwards compatible with existing programs. Conversion software for importing programs from YS80 SLPC ROM is available(*).

Original Text Based Programming

Supports parameter setting for all YS1000 models
Support for YS1700 custom programming.
- Calculations done using Engineering units and Floating point math.
- Includes over one-hundred computation modules for exponents, logarithms, temperature/pressure correction, and other operations.
- Function blocks (sub-programs) can be saved and reused.*

Password protection function

Passwords can be assigned to user programs to prevent unauthorized access to proprietary programs. A password on the main unit prevents unexpected changes in the engineering parameters.

Three connection modes

Connection modes: USB, Ethernet or RS485
When connecting via RS485 or Ethernet, a communication option is required on the main unit.

Full set of computation functions

Supports parameter setting for all YS1000 models
Support for YS1700 custom programming.
- Calculations done using Engineering units and Floating point math.
- Includes over one-hundred computation modules for exponents, logarithms, temperature/pressure correction, and other operations.
- Function blocks (sub-programs) can be saved and reused.*

Calibration tool*

Following the YSS1000’s online calibration instructions makes calibration easy. Calibration records and data can be saved on the YS1000, allowing you to load or print past calibration data as needed.

*: under development. Inquire for release/shipping dates.
Control output backup function

The control output backup function comes standard with YS1000 series controllers (YS1700 and YS1500) and the Manual Station for MV Setting (YS1360).

Dual CPU

With dual-CPU construction (main CPU and display CPU), manual control capability and display continues even if an abnormality occurs on one of the CPUs. If controller self-diagnostics detects a control circuit failure, the controller can suspend analog/digital output, switch to manual mode and allow manual control by operator.

Battery free memory backup

Nonvolatile memory is used for memory backup. Service life is improved because no batteries, backup capacitors, or other components are used.

Improved basic control performance

The YS1000 series achieves higher performance than previous models (YS100 series).

- I/O accuracy
  - Voltage input accuracy: ±0.2% ➞ ±0.1%
  - Voltage output accuracy: ±0.3% ➞ ±0.1%
  - Current output accuracy: ±1.0% ➞ ±0.2%
  - Internal data resolution of the I/O signal: 1/1000 ➞ 1/10000
  - Internal computation resolution of PID and other computations: 1/4096 ➞ 1/65536

Improved process up time

Compatible

Controller online replacement function (portable manual station)

Use the YS110 portable manual station when exchanging or performing maintenance on a controller. You can switch to the spare controller without interrupting the control output.

AC/DC power supply resists powerline fluctuations.

Compatible

Battery free memory backup

Nonvolatile memory is used for memory backup. Service life is improved because no batteries, backup capacitors, or other components are used.

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  - Internal computation resolution of PID and other computations: 1/4096 ➞ 1/65536

Improved process up time

Compatible

Controller online replacement function (portable manual station)

Use the YS110 portable manual station when exchanging or performing maintenance on a controller. You can switch to the spare controller without interrupting the control output.

Independent manual override is built into the control circuits, ensuring that control output can continue even when a control circuit including the CPU experiences a problem.
The instrument can be easily connected to DAQWORX, DAQSTATION, general-purpose SCADA, and OPC servers via Ethernet (Modbus/TCP).

Additional I/O can be added by selecting the YS1700 basic model (with Expandable I/O). The total number of input/outputs points with the main unit and Expandable I/O are 8 analog inputs, 4 analog outputs, and 14 DI/DO.

Ethernet support

The instrument can be easily connected to DAQWORX, DAQSTATION, general-purpose SCADA, and OPC servers via Ethernet (Modbus/TCP).

Expandable I/O

Additional I/O can be added by selecting the YS1700 basic model (with Expandable I/O). The total number of input/outputs points with the main unit and Expandable I/O are 8 analog inputs, 4 analog outputs, and 14 DI/DO.

Communication with PLC

Connections are enabled using the FA-M3's UT link module and the RS485 communication function. No programming is necessary to exchange data between the instrument and the FA-M3.

Communication with CENTUM

As with previous models, communication with Yokogawa’s DCS (CENTUM) is supported. This is ideal for DCS backup in chemical plants and other applications requiring extremely high reliability.

Applicable Models: YS1700, YS1500, YS1350, and YS1360

Peer-to-peer communication function

With peer-to-peer communication, up to 32 YS1700 can be connected interchangeably. Each of the connected instruments can each output 4 points of analog data and 16 points of status data. This makes data exchange and I/O sharing possible since all instruments under peer-to-peer communications can read all data (16 analog and 64 status data).

A sample of System Construction

This is optimal for multi-loop control as such with boiler instrumentation.

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Note: Does not support the YS100 series peer-to-peer communication network (YS-net).

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Maximum no. of connections : 32
No. of receiving units : 32
No. of transmitting units : 4
Transmitted data : 4 analog and 16 status data per transmitting YS1700
Communication interval : 200 ms average (not synchronized to the control computation interval)
Indispensable for lasting, stable operations at the plant when replacing instrumentation. Case and housing are available for replacement of older-model SLCs by Yokogawa Electric Corp. (the EBS, I, EK, and HOMAC series) allowing you to exchange instruments without modifying existing instrumentation panels. Moreover, front panel design with analog-like meters lets you update to new instruments without losing the familiarity of the old interface.

**Self-tuning (STC)**

Simplifies tuning when starting up or changing the process unit under control.

**Setpoint filter (SVF)**

Can optimize tracking with changes in set-points. Also can maintain optimum responsiveness to disturbances.

**Flexible DI/DO**

The YS1700/YS1500’s six DI/DO terminals can be used for both input and output.

**Programmable function key**

With a user program, the program function key (PF key) on the instrument’s front panel can be used as an ON/OFF switch for self-tuning, or as a Start button for sequence operation.

**Direct input function**

An optional signal conversion function can be added for 1 channel. Current, voltage pulse, thermocouples, RTDs, mV and potentiometers signals from differential pressure gauges, manometers, and flow meters can be connected directly to the controller. The direct input employs highly noise resistant, isolated inputs.

---

**Cases and housing for replacing old models**

Compatible

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Compatible

* Options available for suffix code “2”, “4”, “5” of “Type”.

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Applications

Automatic Boiler Control
An appropriate distribution of control functionality enables safe and stable automatic boiler control.

- Feedforward (FF) control: The main steam pressure and feed water level are controlled quickly in response to changes in the main steam flow.
- Cascade Primary Direct (PRD) control: Enables stable level control when the boiler is started.
- Cross-limiting control calculation: Air and fuel flow are calculated so that air flow always exceeds fuel flow to prevent incomplete combustion and explosion.

- Feedforward (FF) control: Enables stable level control when the boiler is started.

Chemical Injection Control
- The controller can be connected with various sensors by eight analog inputs.
- Feedwater flow and chemical injection volume can be controlled by the dual-loop control function.

Models and Suffix Codes
(See General Specification Sheets for the ordering information in the detail.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YS1700</td>
<td></td>
<td></td>
<td>Programmable indicating controller</td>
</tr>
<tr>
<td>YS1500</td>
<td></td>
<td></td>
<td>Indicating controller</td>
</tr>
<tr>
<td>YS1310</td>
<td></td>
<td></td>
<td>Manual setter for 5V setting</td>
</tr>
<tr>
<td>YS1350</td>
<td></td>
<td></td>
<td>Manual setter for 4V setting</td>
</tr>
<tr>
<td>YS1360</td>
<td></td>
<td></td>
<td>Manual setter for 4V setting</td>
</tr>
</tbody>
</table>

- Power supply
  - 0V: 100VAC, 24VDC
  - 1V: 100VAC, 24VDC

- Direct input
  - /A02: Input (isolated)
  - /A03: Thermocouple input
  - /A04: 4-wire transmitter input (isolated)
  - /A05: 4-wire transmitter input (non-isolated)
  - /A06: Transformer input
  - /A07: Thermistor input
  - /A08: Frequency input
  - /A9: Direct input with Fahrenheit temperature range function

- Communication
  - /A31: RS-485 communication (PC-link, Modbus, YS protocol, Peer-to-peer)
  - /A32: Direct input with Fahrenheit temperature range function
  - /A33: Ethernet communication (Modbus/TCP)
  - /A34: Network communication

- Expansion I/O
  - /A03: Expandable I/O

Accessories (sold separately)

<table>
<thead>
<tr>
<th>Product name</th>
<th>Option code</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHUP standard housing</td>
<td>SHUP-100</td>
<td>Available for YS1xx0-000 (Replace for FAS 1 Series)</td>
</tr>
<tr>
<td>SHUP long housing</td>
<td>SHUP-110</td>
<td>Available for YS1xx0-010 (Replace for 100 line pneumatic instrument)</td>
</tr>
<tr>
<td>SHUP DOKIAMAC housing</td>
<td>SHUP-200</td>
<td>Available for YS1xx0-020 (Replace for 100 line pneumatic instrument)</td>
</tr>
<tr>
<td>100 line pneumatic instrument housing</td>
<td>SHUP-300</td>
<td>Available for YS1xx0-030 (Replace for YS80 Series)</td>
</tr>
<tr>
<td>100 line pneumatic instrument replacement housing</td>
<td>SHUP-400</td>
<td>Available for YS1xx0-040 (Replace for YS80 Series)</td>
</tr>
<tr>
<td>isolation diode</td>
<td>YS80</td>
<td>For isolation diode</td>
</tr>
<tr>
<td>YS1000</td>
<td></td>
<td>Manual setter for 5V setting</td>
</tr>
<tr>
<td>YS1001</td>
<td></td>
<td>Manual setter for 4V setting</td>
</tr>
<tr>
<td>YS1002</td>
<td></td>
<td>Manual setter for 4V setting</td>
</tr>
</tbody>
</table>

Option

- Expandable I/O
  - /A03: Expandable I/O

- Direct input
  - /A03: Direct input with Fahrenheit temperature range function

- Communication
  - /A31: RS-485 communication (Peer-to-peer)
  - /A32: Direct input with Fahrenheit temperature range function

- Expansion I/O
  - /A33: Ethernet communication (Modbus/TCP)
### YS1000 Series Line-up

#### YS1700 Programmable Indicating Controller

A programmable controller in which control and computational functions are combined by the user with the YSS1000 programming tool. Each YS1700 can run two PID control calculations simultaneously and output the respective 4-20 mA output signals. The YS1700 can also be used as a multi-function controller without programming, in the same way as the Model 1500.

<table>
<thead>
<tr>
<th>Controller mode</th>
<th>Control type</th>
<th>Control period</th>
<th>Additional control function</th>
<th>Auxiliary control function</th>
<th>Analog input</th>
<th>Analog output</th>
<th>Alarm function</th>
<th>Retransmission output</th>
<th>Input computation</th>
<th>Output computation</th>
<th>Computation modules</th>
<th>Program method</th>
<th>Program capacity</th>
<th>Communication</th>
<th>Hardmanual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable, Multi-function mode (single-loop, cascade and auto-selector)</td>
<td>Basic PID control (built-in nonlinear control function), proportional control (built-in nonlinear control function), sampling PID control, (built-in sampling PID control function), and batch PID control</td>
<td>0.05, 0.1 and 0.2 sec (program mode), 0.1 sec (multi-function mode)</td>
<td>Adjustable setpoint filter (SVF), Self-tuning (STC), Non-linear PID control, PID control with reset bias function, output limiter, external cascade-control setpoint signal</td>
<td>Feed-forward control, output tracking, preset MV output, PV/SV tracking, operation mode change, input filter, Square-root, 10-line-segment characterizer, ratio</td>
<td>1 to 5 V DC (5 channels) or 9 channels with with expandable I/O</td>
<td>4 to 20 mA (2 channels) or 9 channels with with expandable I/O</td>
<td>High/low/high-low/low-high/lower limit, deviation limit, and velocity alarm</td>
<td>PV1, PV2, SV1, SV2, and other analog inputs</td>
<td>Square-root with low signal cut off, 10-line-segment characterizer, first-order lag calculation, scaling of external cascade-control setpoint signal, feed-forward signal calculation</td>
<td>Four arithmetic operators, square-root, absolute, selector, limiter</td>
<td>Function block or text (use YS1000 configuration and programming software)</td>
<td>400 modules (function block), 1000 steps (text)</td>
<td>Modbus/TC, RS-485 (modbus), and DCS-LCS</td>
<td>Yes (standard)</td>
<td></td>
</tr>
</tbody>
</table>

#### YS1500 Indicating Controller

Incorporates fundamental control functions required for PID control. Necessary functions can be selected in accordance with the user’s purpose. The available functions include those necessary for input signal processing, such as square root extraction and linear segment conversion, and feed-forward calculation.

<table>
<thead>
<tr>
<th>Controller mode</th>
<th>Control type</th>
<th>Control period</th>
<th>Additional control function</th>
<th>Auxiliary control function</th>
<th>Analog input</th>
<th>Analog output</th>
<th>Alarm function</th>
<th>Retransmission output</th>
<th>Input computation</th>
<th>Output computation</th>
<th>Computation modules</th>
<th>Program method</th>
<th>Program capacity</th>
<th>Communication</th>
<th>Hardmanual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-loop, cascade and auto-selector</td>
<td>Basic PID control (built-in nonlinear control function), proportional control (built-in nonlinear control function), sampling PID control (built-in sampling PID control function)</td>
<td>0.1 sec</td>
<td>Adjustable setpoint filter (SVF), Self-tuning (STC), Non-linear PID control, PID control with reset bias function, output limiter, external cascade-control setpoint signal</td>
<td>Feed-forward control, output tracking, preset MV output, PV/SV tracking, operation mode change, input filter, Square-root, 10-line-segment characterizer ratio</td>
<td>1 to 5 V DC (5 channels)</td>
<td>4 to 20 mA (1 channel) and 1 to 5 V DC (2 channels)</td>
<td>High/low/high-low/low-high/lower limit, deviation limit, and velocity alarm</td>
<td>PV1, PV2, SV1, SV2, and other analog inputs</td>
<td>Square-root with low signal cut off, 10-line-segment characterizer, first-order lag calculation, scaling of external cascade-control setpoint signal, feed-forward signal calculation</td>
<td>Four arithmetic operators, square-root, absolute, selector, limiter</td>
<td>Function block or text (use YS1000 configuration and programming software)</td>
<td>400 modules (function block), 1000 steps (text)</td>
<td>Modbus/TC, RS-485 (modbus), and DCS-LCS</td>
<td>Yes (standard)</td>
<td></td>
</tr>
</tbody>
</table>

#### YS1310 Indicating Controller with Alarm

Indicating alarm monitor with two inputs for simultaneous monitoring of two loops. High, high, low, and low-low alarms can be detected for each of the two inputs, and logical ANDs or ORs of arbitrary alarms can be set. From among these, a total of six alarms can be assigned to alarm output contacts.

<table>
<thead>
<tr>
<th>Analog input</th>
<th>Digital signal</th>
<th>Alarm functions</th>
<th>Input computation</th>
<th>Security</th>
<th>Trend display</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 V DC (2 channels)</td>
<td>1 to 5 V DC (2 channels)</td>
<td>High/low/high-low/low limits</td>
<td>Square-root with low signal cut off, first-order lag calculation</td>
<td>Protection by password</td>
<td>Modbus/TC, RS-485 (modbus), and DCS-LCS</td>
<td></td>
</tr>
</tbody>
</table>

#### YS1100 Portable Manual Station

When a YS1700, YS1500 or YS1360 requires maintenance, the YS1100 Portable Manual Station can be used to output a 4 - 20 ma signal to the final control element. Simply swing up the front panel of the controller, connect this unit to the controller, and replace the internal assembly while keeping the existing manipulated output active.

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Manipulation signal</th>
<th>Input/manipulation signal meters</th>
<th>Output manipulation</th>
<th>I/O connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 V DC (1 channel)</td>
<td>4 to 20 mA DC (1 channel)</td>
<td>Moving-coil meter</td>
<td>Manual using the front-panel dials</td>
<td>I/Os are coupled with the controller on the case using a dedicated cable</td>
</tr>
</tbody>
</table>

#### YS1350 Manual Setter for SV Setting

This manual loader allows an operator to send a setpoint to a remote controller. Its operation mode is switched by the mode keys (C and M) or a status input. A status identification output is provided as standard.

<table>
<thead>
<tr>
<th>Analog input</th>
<th>Analog output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 V DC (1 channel) and</td>
<td>4 to 20 mA (1 channel) and</td>
</tr>
</tbody>
</table>

#### YS1360 Manual Setter for MV Setting

This manual loader allows an operator to interrupt a control signal to a final control device and manually control its operation temporarily. Its operation mode is switched by the mode keys (C and M) or a status input. A status identification output is provided as standard.

<table>
<thead>
<tr>
<th>Analog input</th>
<th>Analog output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 V DC (2 channels) and</td>
<td>4 to 20 mA (1 channel) and</td>
</tr>
</tbody>
</table>

#### YS110 Portable Manual Station

When a YS1700, YS1500 or YS1360 requires maintenance, the YS110 Portable Manual Station can be used to output a 4 - 20 mA signal to the final control element. Simply swing up the front panel of the controller, connect this unit to the controller, and replace the internal assembly while keeping the existing manipulated output active.

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Manipulation signal</th>
<th>Input/manipulation signal meters</th>
<th>Output manipulation</th>
<th>I/O connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 V DC (1 channel)</td>
<td>4 to 20 mA DC (1 channel)</td>
<td>Moving-coil meter</td>
<td>Manual using the front-panel dials</td>
<td>I/Os are coupled with the controller on the case using a dedicated cable</td>
</tr>
</tbody>
</table>

#### YS1700, YS1500, YS1360

YS1310, YS1350, YS1360, and YS110 are designed for use in industrial processes to control and monitor various parameters. The YS1700, YS1500, and YS1360 are equipped with advanced features such as programmable control, multi-function capabilities, and enhanced monitoring options. These controllers are user-friendly and easy to operate, making them ideal for a wide range of applications in the industrial sector.
### Terminal Block

#### YS1700/YS1500 Terminal Arrangements

<table>
<thead>
<tr>
<th>No.</th>
<th>Programmable mode</th>
<th>Single-loop mode</th>
<th>Cascade mode</th>
<th>Selector mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
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<tr>
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#### YS1310/YS1350/YS1360 Terminal Arrangements

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<tr>
<th>No.</th>
<th>Programmable mode</th>
<th>Single-loop mode</th>
<th>Cascade mode</th>
<th>Selector mode</th>
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</table>

*1: Only applicable for YS100 compatible terminal type (**2** "4" "5")

### YS1000 Series (Basic Type) Terminal Block

### YS010 Expandable I/O Terminal Arrangements

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## Dimensions

### Main Unit Dimensions

**YS1000 Basic Type**  
**YS1000 Basic Type with Expandable I/O**

![Main Unit Dimensions Diagram]

- **Panel Cutout Width**
  - **For single mounting**
  - **For side-by-side mounting**

- **Expandable I/O Terminal Dimensions**
- **Expandable I/O Cable Dimensions**
- **Weight Main unit 1.6 kg + Expandable I/O Cable 300 g**

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**Note 1:** If a nameplate, etc. is installed within 60 mm above the instrument, ensure that its thickness is less than 30 mm.

**Note 2:** When mounting the expandable I/O cable, ensure the wiring space of at least 60 mm for a minimum curvature radius of the cable in addition to the mounting bracket space of 72 mm from the terminal cover face of the main unit.

**Note 3:** Instrument panel thickness: 2.3 to 25 mm

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**Vig-RM-1E**

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