The IT M@chine Controller

I/O Open
Creating dedicated modules freely and efficiently
As a customer, would you like to create your own dedicated module?

“I would like to make a direct bus connection to an external image processing controller.” “I would like to incorporate an external controller inside our machine to save space.” “I would like an economically efficient communication interface with excellent performance.” “My cost has ballooned with ever faster obsolescence of board components. What can I do?” The answers to these and many other customer problems can be found in Yokogawa’s new FA-M3R module development environment, named I/O Open. With I/O Open, customers can now build their own FA-M3R compatible user I/O modules to improve performance and functionality of their devices at dramatically reduced total cost of ownership (TCO).

FA-M3R Design Rules Made Open

The I/O Open program empowers customers to develop their own I/O modules. By implementing proprietary know-how in the form of an FA-M3R-compatible user I/O module, users can achieve increased package density and performance. Moreover, complex data transfer between the CPU module and I/O modules is handled by an ASIC interface, which simply requires data to be written into a Dual Port RAM. Special parts required for module development such as ASIC, module casing and connectors can all be purchased from Yokogawa so customers only need to focus on the design of a printed circuit board.

FA-M3R I/O Open

Seamless System Integration

An FA-M3R compatible user module, which is seamlessly integrated with the FA-M3R system, can demonstrate its unique functionality and also easily exchange data with high-level equipment and other FA-M3R systems through Ethernet.

Flexibility

As an example, consider developing an FA-M3R compatible user I/O module incorporating a program for communicating with an external controller. This approach improves total communication performance. No communication programs for the CPU module need to be written so modification of individual devices is easier.

Low Cost

If the functions of an external controller are built into an FA-M3R user I/O module, it will not only avoid unnecessary investments and space, but also minimize software development effort and yield maximum cost savings.

Simple System Configuration

An FA-M3R user I/O module can achieve both control and data processing with no need to purchase extra devices or reconfigure a new system, resulting in a simpler system configuration.

Application Examples

Achieving reduced wiring

- By minimizing superfluous units, a simpler system configuration, higher speed and lower cost can be achieved.
- By eliminating connecting parts, higher reliability is ensured.

Competitors’ PLC

I/O module

External master unit

I/O relays

Terminal blocks

FA-M3R

Master module directly connected to a bus (I/O Open)

I/O module

External master unit

I/O relays

Terminal blocks

Master module directly connected to a bus
**Implementing I/O signal processing not achievable with standard I/O modules**

- **Control signal-synchronized data input**
  A dedicated module is created to acquire input data from 50 to 100 microseconds after each rising edge of a synchronization signal.

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**High-speed handshake**
A dedicated communication module is created to return an ACK signal within 1 millisecond after receiving an ENQ signal without going through the sequence CPU module.

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**Incorporating special sensor controller functions in a special module**

- A dedicated module can be created for use with a high-resolution sensor to enable accurate and fast reading of data and high-accuracy positioning control for a diverse range of industrial machinery.

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**I/O Open implementation examples**

- Wire saving system
- Position sensor input system
- Semi-conductor equipment (chiller control, cleaner, handler)
- Electronic weigher
- Electron accelerator
- Ice thermal storage system
- Automatic vending machine
- Components mounter/inserter
- Molding machine controller
- Car washing machine
- Audio communication system
- Small-power generation system
- Building airconditioning system
- Generator control system
- F/V convertor module
- Governor control
- AGV

Note: Only some examples are listed above.
### I/O Open components

![Diagram of Module casing](image)

- **Module casing (available in 10-unit packs)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YZ16-1A</td>
<td>Standard ASIC, FG bar x 1, connector, LED holder for 4 indicators x 1, label x 1</td>
</tr>
<tr>
<td>YZ16-2A</td>
<td>Standard ASIC, FG bar x 2, connector, LED holder for 4 indicators x 2, label x 2</td>
</tr>
</tbody>
</table>

### PCB surface-mounted components (available in 10-unit packs)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YZ19-0S</td>
<td>Front cover (no hole)</td>
</tr>
<tr>
<td>YZ19-1S</td>
<td>Single casing with door, front cover (no hole), filter</td>
</tr>
<tr>
<td>YZ19-2S</td>
<td>Single casing with door, front cover (for 64 I/Os), filter</td>
</tr>
<tr>
<td>YZ19-3S</td>
<td>Single casing without door, front cover (no hole), filter</td>
</tr>
<tr>
<td>YZ19-1D</td>
<td>Double casing without door, front cover (no hole) x 2, double-filter</td>
</tr>
<tr>
<td>YZ19-2D</td>
<td>Single casing with door, front cover (no hole) x 2, double-filter</td>
</tr>
</tbody>
</table>

### I/O Open implementation workflow

**Workflow**

BEGIN

**Required Items**

- Literature: I/O Open catalog (Bulletin 34M6Z31-01E).
- Literature: I/O Open Overview (TI 34M6Z31-01E)
- Written quotation

**Product introduction**

- Customer designs module.
- Yokogawa issues a module ID.
- Yokogawa-supplied products: module casing, ASIC
- Yokogawa provides consultation on interface specification.

**Overview**

- Customer performs debugging.
- Yokogawa supports debugging.

**Quotation**

- Customer performs evaluation.

**Detailed description**

- Customer incorporates module into system for operation.

**Design**

- Customer maintains module.

**Debugging**

**Evaluation**

**Operation**

**Warranty & Maintenance**

END

**Agreement**

- YES
- NO Non-disclosure agreement

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