Applicable Modules:

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Model Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>TACXD08-3AE</td>
<td>e-CON-type DC input unit with 8 input points</td>
</tr>
<tr>
<td>TACXD16-3AM</td>
<td>MIL-type DC input unit with 16 input points</td>
</tr>
<tr>
<td>TACYD08-1AE</td>
<td>e-CON-type TR output unit with 8 output points</td>
</tr>
<tr>
<td>TACYD16-1AM</td>
<td>MIL-type TR output unit with 16 output points</td>
</tr>
<tr>
<td>TACYC04-0NB</td>
<td>European-type relay output unit with 4 output points</td>
</tr>
<tr>
<td>TACWD08-3NE</td>
<td>e-CON-type DC input/TR output unit with 4 input and 4 output points</td>
</tr>
<tr>
<td>TACWD16-3NM</td>
<td>MIL-type DC input/TR output unit with 8 input and 8 output points</td>
</tr>
</tbody>
</table>
Applicable Product:

- **Range-free Multi-controller FA-M3**
  
  Model code: TACXD08-3AE, TACXD16-3AM, TACYD08-1AE, TACYD16-1AM, TACYC04-0NB, TACWD08-3NE, and TACWD16-3NM
  
  Name: YHLS Slave Units

The document number and document model code for this manual are given below.

Refer to the document number in all communications; also refer to the document number or the document model code when purchasing additional copies of this manual.

- Document No.: IM 34M6H46-02E
- Document Model Code: DOCIM
Important

■ About This Manual
- This Manual should be passed on to the end user.
- Before using the controller, read this manual thoroughly to have a clear understanding of the controller.
- This manual explains the functions of this product, but there is no guarantee that they will suit the particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made to ensure accuracy in the preparation of this manual. However, should any errors or omissions come to the attention of the user, please contact the nearest Yokogawa Electric representative or sales office.

■ Safety Precautions when Using/Maintaining the Product
- The following safety symbols are used on the product as well as in this manual.

⚠️

Danger. This symbol on the product indicates that the operator must follow the instructions laid out in this instruction manual to avoid the risk of personnel injuries, fatalities, or damage to the instrument. Where indicated by this symbol, the manual describes what special care the operator must exercise to prevent electrical shock or other dangers that may result in injury or the loss of life.

웜

Protective Ground Terminal. Before using the instrument, be sure to ground this terminal.

toHave

Function Ground Terminal. Before using the instrument, be sure to ground this terminal.

㌓

Alternating current. Indicates alternating current.

---

Direct current. Indicates direct current.
The following symbols are used only in the instruction manual.

⚠️ **WARNING**

Indicates a “Warning”.
Draws attention to information essential to prevent hardware damage, software damage or system failure.

⚠️ **CAUTION**

Indicates a “Caution”
Draws attention to information essential to the understanding of operation and functions.

**TIP**

Indicates a “TIP”
Gives information that complements the present topic.

**SEE ALSO**

Indicates a “SEE ALSO” reference.
Identifies a source to which to refer.

- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety stated in this manual whenever handling the product. Take special note that if you handle the product in a manner other than prescribed in these instructions, the protection feature of the product may be damaged or impaired. In such cases, Yokogawa cannot guarantee the quality, performance, function and safety of the product.

- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system as well as designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of processes and lines using the product and the system controlled by it, the user should implement it using devices and equipment, additional to this product.

- If component parts or consumable are to be replaced, be sure to use parts specified by the company.

- This product is not designed or manufactured to be used in critical applications which directly affect or threaten human lives and safety — such as nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities or medical equipment. If so used, it is the user’s responsibility to include in the system additional equipment and devices that ensure personnel safety.

- Do not attempt to modify the product.

**Exemption from Responsibility**

- Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa Electric) makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.

- Yokogawa Electric assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.
Software Supplied by the Company

- Yokogawa Electric makes no other warranties expressed or implied except as provided in its warranty clause for software supplied by the company.
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- Copying the software for any purposes other than backup is strictly prohibited.
- Store the original media, such as floppy disks, that contain the software in a safe place.
- Reverse engineering, such as decompiling of the software, is strictly prohibited.
- No portion of the software supplied by Yokogawa Electric may be transferred, exchanged, or sublet or leased for use by any third party without prior permission by Yokogawa Electric.
General Requirements for Using the FA-M3 Controller

- Avoid installing the FA-M3 controller in the following locations:
  - Where the instrument will be exposed to direct sunlight, or where the operating temperature exceeds the range 0°C to 55°C (32°F to 131°F).
  - Where the relative humidity is outside the range 10 to 90%, or where sudden temperature changes may occur and cause condensation.
  - Where corrosive or flammable gases are present.
  - Where the instrument will be exposed to direct mechanical vibration or shock.
  - Where the instrument may be exposed to extreme levels of radioactivity.

- Use the correct types of wire for external wiring:
  - Use copper wire with temperature ratings greater than 75°C.

- Securely tighten screws:
  - Securely tighten module mounting screws and terminal screws to avoid problems such as faulty operation.
  - Tighten terminal block screws with the correct tightening torque as given in this manual.

- Securely lock connecting cables:
  - Securely lock the connectors of cables, and check them thoroughly before turning on the power.

- Interlock with emergency-stop circuitry using external relays:
  - Equipment incorporating the FA-M3 controller must be furnished with emergency-stop circuitry that uses external relays. This circuitry should be set up to interlock correctly with controller status (stop/run).

- Ground for low impedance:
  - For safety reasons, connect the [FG] grounding terminal to a Japanese Industrial Standards (JIS) Class D (earlier called Class 3) Ground. For compliance to CE Marking, use braided or other wires that can ensure low impedance even at high frequencies for grounding.

  *1 Japanese Industrial Standard (JIS) Class D Ground means grounding resistance of 100 Ω max.

- Configure and route cables with noise control considerations:
  - Perform installation and wiring that segregates system parts that may likely become noise sources and system parts that are susceptible to noise. Segregation can be achieved by measures such as segregating by distance, installing a filter or segregating the grounding system.

- Configure for CE Marking Conformance:
  - For compliance to CE Marking, perform installation and cable routing according to the description on compliance to CE Marking in the “Hardware Manual” (IM34M6C11-01E).
Keep spare parts on hand:
- Stock up on maintenance parts including spare modules, in advance.

Discharge static electricity before operating the system:
- Because static charge can accumulate in dry conditions, first touch grounded metal to discharge any static electricity before touching the system.

Never use solvents such as paint thinner for cleaning:
- Gently clean the surfaces of the FA-M3 controller with a cloth that has been soaked in water or a neutral detergent and wringed.
- Do not use volatile solvents such as benzine or paint thinner or chemicals for cleaning, as they may cause deformity, discoloration, or malfunctioning.

Avoid storing the FA-M3 controller in places with high temperature or humidity:
- Since the CPU module has a built-in battery, avoid storage in places with high temperature or humidity.
- Since the service life of the battery is drastically reduced by exposure to high temperatures, take special care (storage temperature should be from -20°C to 75°C).
- There is a built-in lithium battery in a CPU module and temperature control module which serves as backup power supply for programs, device information and configuration information. The service life of this battery is more than 10 years in standby mode at room temperature. Take note that the service life of the battery may be shortened when installed or stored at locations of extreme low or high temperatures. Therefore, we recommend that modules with built-in batteries be stored at room temperature.

Always turn off the power before installing or removing modules:
- Failing to turn off the power supply when installing or removing modules, may result in damage.

Do not touch components in the module:
- In some modules you can remove the right-side cover and install ROM packs or change switch settings. While doing this, do not touch any components on the printed-circuit board, otherwise components may be damaged and modules may fail to work.

Do not use unused terminals:
- Do not connect wires to unused terminals on a terminal block or in a connector. Doing so may adversely affect the functions of the module.
Introduction

■ Overview of the Manual

This manual describes FA-M3 YHLS slave units.

■ Related Instruction Manuals

● Always read the instruction manual for the YHLS master module
  - YHLS Master Module (IM34M6H-01E)

Other manuals to be read depend on the CPU module to be used. You should read the latest versions of the following instruction manuals, as required.

● F3SP28, F3SP38, F3SP53, F3SP58, or F3SP59
  For information on sequence CPU functions, refer to:
  - Sequence CPU Instruction Manual - Functions (for F3SP28-3N3S, F3SP38-6N/6S, F3SP53-4H/4S, F3SP58-6H/6S, F3SP59-7S)(IM34M6P13-01E)
  For information on creating ladder programs, refer to:
  - FA-M3 Programming Tool WideField2 (IM34M6Q15-01E)

● F3SP21, F3SP25, F3SP35, F3SP05, or F3SP08
  For information on sequence CPU functions, refer to:
  - Sequence CPU Instruction Manual - Functions (for F3SP21, F3SP25, and F3SP35) (IM34M6P12-02E)
  For information on creating ladder programs, refer to:
  - FA-M3 Programming Tool WideField2 (IM34M6Q15-01E)

● All sequence CPU modules
  For the FA-M3 specifications and configurations*1, installation and wiring, test run, maintenance, and module installation restrictions, refer to:

*1: Refer to the relevant product manuals for specifications except for power supply modules, base modules, input/output modules, cables and terminal units.
  - Hardware Manual (IM34M6C11-01E)
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1 Overview

1.1 What is YHLS?

Yokogawa High-speed Link System (YHLS) is designed for implementing high-speed remote I/O in an FA-M3 system. A YHLS system consists of an FA-M3 master module connected to multiple distributed slave units through a communication cable to allow high-speed control of remote I/O units from a sequence CPU. It has the following merits:

- Reduced wiring through use of distributed I/O units within a system
- Simple mechanism for high-speed exchange of ON/OFF signals and numerical data with remote devices.
- Flexibility in building customized application systems using devices from different partner manufacturers.
- Support for user-built devices.

1.2 What are YHLS Slave Units?

A maximum of 32 YHLS slave units can be connected to each port of the YHLS master module to construct a high-speed remote I/O system controlling up to 512 I/O points per port.

YHLS slave unit comes in different types having different number of I/O points: 8 inputs, 16 inputs, 8 outputs, 16 outputs, 4 outputs, 4 inputs/4 outputs, and 8 inputs/8 outputs.

Each unit must be supplied with external power supply so that it can provide non-isolated power supply to its external loads (see "List of YHLS Slave Units" below).

The digital I/O interface employs connectors (e-CON, MIL, and European types) for easier attachment and detachment.

● List of YHLS Slave Units

<table>
<thead>
<tr>
<th>Model</th>
<th>Communications Mode</th>
<th>Transmission Speed</th>
<th>Number of I/Os</th>
<th>I/O Connector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>TACXD08-3AE</td>
<td>Half-duplex</td>
<td>12 Mbps or 6 Mbps*2</td>
<td>8 8</td>
<td>e-CON</td>
</tr>
<tr>
<td>TACXD16-3AM</td>
<td></td>
<td>12 Mbps or 6 Mbps*2</td>
<td>16 16</td>
<td>MIL</td>
</tr>
<tr>
<td>TACYD08-1AE</td>
<td></td>
<td></td>
<td>8 16</td>
<td>e-CON</td>
</tr>
<tr>
<td>TACYD16-1AM</td>
<td></td>
<td></td>
<td>16 8</td>
<td>MIL</td>
</tr>
<tr>
<td>TACYC04-0NB</td>
<td></td>
<td></td>
<td>4 4</td>
<td>European</td>
</tr>
<tr>
<td>TACWD08-3NE</td>
<td></td>
<td></td>
<td>8 8</td>
<td>e-CON</td>
</tr>
<tr>
<td>TACWD16-3NM</td>
<td></td>
<td></td>
<td>8 8</td>
<td>MIL</td>
</tr>
</tbody>
</table>

*1: Only half-duplex is available (full-duplex is not available).
*2: Selection between 12 Mbps and 6 Mbps is done with a DIP switch on the slave unit. 3 Mbps is not available.
1.3 Features of YHLS

1.3.1 Communication between Sequence CPU Module and Slave Units

The YHLS master module relays actuator on/off signals from the sequence CPU module to the YHLS slave units, and relays switch on/off signals from the slave units to the sequence CPU module using its input/output data areas as buffer.

1.3.2 Withdrawal of Slave Unit

YHLS adopts a bus connection so when a slave unit is switched off or otherwise fails to communicate, the master module can continue communicating with other normal slave units.

1.3.3 Automatic Slave Unit Participation

When a withdrawn slave unit is switched on and returns to normal condition, it automatically resumes communications with the master module.

1.3.4 Constant Communication Cycle Time

YHLS features a constant communication cycle time, not affected by automatic participation or withdrawal of slave units, thus delivering reliable communications with constant cycle time under all circumstances.

1.3.5 Control of YHLS Output States when CPU Stops

If the sequence CPU module switches to STOP mode, the YHLS master module also stops communications with the slave units. The YHLS master module can be used to configure the output control function of each slave unit to either reset or hold its outputs when the CPU stops.
1.4 System Configuration

YHLS slave units

- Sensor
- Operation switch
- LED indicator

YHLS slave unit (MIL type)

YHLS slave unit (European type)

YHLS slave unit (e-CON type)

YHLS master module (F3LH02-0N)
### 2. General Specifications

#### Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Style Code</th>
<th>Option Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TACXD08</td>
<td>-3AE</td>
<td>...</td>
<td>...</td>
<td>8 DC inputs (sink type), 24 V DC, e-CON</td>
</tr>
<tr>
<td>TACXD16</td>
<td>-3AM</td>
<td>...</td>
<td>...</td>
<td>16 DC inputs (sink type), 24 V DC, MIL</td>
</tr>
<tr>
<td>TACYD08</td>
<td>-1AE</td>
<td>...</td>
<td>...</td>
<td>8 TR outputs (sink type), 24 V DC, 0.1 mA, e-CON</td>
</tr>
<tr>
<td>TACYD16</td>
<td>-1AM</td>
<td>...</td>
<td>...</td>
<td>16 TR outputs (sink type), 24 V DC, 0.1 mA, MIL</td>
</tr>
<tr>
<td>TACYC04</td>
<td>-0NB</td>
<td>...</td>
<td>...</td>
<td>4 relay outputs, 24 V DC/250 V AC 1 A, European</td>
</tr>
<tr>
<td>TACWD08</td>
<td>-3NE</td>
<td>...</td>
<td>...</td>
<td>4 inputs and 4 outputs, 24 VDC, e-CON</td>
</tr>
<tr>
<td>TACWD16</td>
<td>-3NM</td>
<td>...</td>
<td>...</td>
<td>8 inputs and 8 outputs, 24 V DC, MIL</td>
</tr>
</tbody>
</table>

#### Performance Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>TACXD08-3AE</th>
<th>TACXD16-3AM</th>
<th>TACYD08-1AE</th>
<th>TACYD16-1AM</th>
<th>TACYC04-0NB</th>
<th>TACWD08-3NE</th>
<th>TACWD16-3NM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
<td>DC voltage (sink type)</td>
<td>DC voltage (sink type)</td>
<td>DC voltage (sink type)</td>
<td>DC voltage (sink type)</td>
<td>DC voltage (sink type)</td>
<td>DC voltage (sink type)</td>
<td>DC voltage (sink type)</td>
</tr>
<tr>
<td>Number of points</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Points/common</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Isolation method</td>
<td>Not isolated</td>
<td>Not isolated</td>
<td>Physical isolation</td>
<td>Not isolated</td>
<td>Physical isolation</td>
<td>Not isolated</td>
<td>Not isolated</td>
</tr>
<tr>
<td>Rated input voltage</td>
<td>24 V DC</td>
<td>24 V DC</td>
<td>24 V DC</td>
<td>24 V DC</td>
<td>24 V DC</td>
<td>24 V DC</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>20.4 to 26.4 V DC</td>
<td>20.4 to 26.4 V DC</td>
<td>20.4 to 26.4 V DC</td>
<td>20.4 to 26.4 V DC</td>
<td>20.4 to 26.4 V DC</td>
<td>20.4 to 26.4 V DC</td>
<td>20.4 to 26.4 V DC</td>
</tr>
<tr>
<td>Rated input current</td>
<td>4 mA/point</td>
<td>4 mA/point</td>
<td>4 mA/point</td>
<td>4 mA/point</td>
<td>4 mA/point</td>
<td>4 mA/point</td>
<td>4 mA/point</td>
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</tbody>
</table>

#### Input Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>TACXD08-3AE</th>
<th>TACXD16-3AM</th>
<th>TACYD08-1AE</th>
<th>TACYD16-1AM</th>
<th>TACYC04-0NB</th>
<th>TACWD08-3NE</th>
<th>TACWD16-3NM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input display</td>
<td>LED (lit when input is turned on)</td>
<td>LED (lit when input is turned on)</td>
<td>LED (lit when input is turned on)</td>
<td>LED (lit when input is turned on)</td>
<td>LED (lit when input is turned on)</td>
<td>LED (lit when input is turned on)</td>
<td>LED (lit when input is turned on)</td>
</tr>
<tr>
<td>Number of points</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Points/common</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

#### Output Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>TACXD08-3AE</th>
<th>TACXD16-3AM</th>
<th>TACYD08-1AE</th>
<th>TACYD16-1AM</th>
<th>TACYC04-0NB</th>
<th>TACWD08-3NE</th>
<th>TACWD16-3NM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>Transistor contact</td>
<td>Relay contact</td>
<td>Transistor contact</td>
<td>Transistor contact</td>
<td>Transistor contact</td>
<td>Transistor contact</td>
<td>Transistor contact</td>
</tr>
<tr>
<td>Number of points</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Points/common</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Isolation method</td>
<td>Not isolated</td>
<td>Physical isolation</td>
<td>Not isolated</td>
<td>Physical isolation</td>
<td>Not isolated</td>
<td>Physical isolation</td>
<td>Not isolated</td>
</tr>
</tbody>
</table>

### Power Supply

- External power supply: 20.4 to 26.4 V DC
- Dissipating current: 130 mA, 190 mA, 80 mA, 90 mA, 130 mA, 110 mA, 140 mA
- Weight: 75 g
- Insulation resistance: 5 MΩ min. between the group of DC terminals for external connection and the communication shield terminal when measured with a 500 V DC meggerrometer
- Withstanding voltage: 500 V AC for one minute between the group of DC terminals for external connection and the communication shield terminal
- Operating ambient temperature: 0 to 55°C
- Operating ambient humidity: 30 to 90% RH (with no dew)
### Common specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>TACXD08-3AE</th>
<th>TACXD16-3AM</th>
<th>TACYD08-1AE</th>
<th>TACYD16-1AM</th>
<th>TACYC04-0NB</th>
<th>TACWD08-3NE</th>
<th>TACWD16-3NM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating ambient atmosphere</td>
<td>No corrosive or flammable gas, no significant dust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage ambient temperature</td>
<td>-25 to 70°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage ambient humidity</td>
<td>30 to 90% RH (with no dew)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting method</td>
<td>DIN rail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External dimensions</td>
<td>See the External Dimensions drawing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications mode</td>
<td>2-wire, half-duplex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission speed</td>
<td>6M bps or 12M bps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum total transmission distance</td>
<td>200 m (at 6M bps) or 100 m (at 12M bps)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of connected units</td>
<td>32 units max./port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Networking topology</td>
<td>Multidrop connection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impedance</td>
<td>100 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminating resistor</td>
<td>Built-in resistor can be enabled or disabled using a switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications connector</td>
<td>RJ-45 modular connector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: For resistance load of 1 A at 250 V AC or 1 A at 30 V DC.
*2: For details on the output connectors, see the connector tables below.
*3: The power supply must be provided with a noise filter.
*4: Operating and storage temperature and humidity for these units differ from other FA-M3 modules. For these units, this performance specification takes precedence over the general specification for the FA-M3 modules.

#### Table 2.1 Sumitomo 3M Connector Table

<table>
<thead>
<tr>
<th>Cover Color</th>
<th>Wire-mount Plug (4 pins)</th>
<th>Compatible Conductors</th>
<th>AWG No.</th>
<th>Cross-sectional area (mm²)</th>
<th>External wire diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>37104-3101-000FL</td>
<td>AWG 24-26</td>
<td>0.14-0.3 (exclusive)</td>
<td>0.8-1.0</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>37104-3122-000FL</td>
<td>AWG 24-26</td>
<td>0.14-0.3 (exclusive)</td>
<td>1.0-1.2</td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>37104-3163-000FL</td>
<td>AWG 24-26</td>
<td>0.14-0.3 (exclusive)</td>
<td>1.2-1.6</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>37104-2124-000FL</td>
<td>AWG 20-22</td>
<td>0.3–0.5 (inclusive)</td>
<td>1.0-1.2</td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td>37104-2165-000FL</td>
<td>AWG 20-22</td>
<td>0.3–0.5 (inclusive)</td>
<td>1.2-1.6</td>
<td></td>
</tr>
<tr>
<td>Gray</td>
<td>37104-2206-000FL</td>
<td>AWG 20-22</td>
<td>0.3–0.5 (inclusive)</td>
<td>1.6-2.0</td>
<td></td>
</tr>
</tbody>
</table>

#### Table 2.2 MIL Connector Table

<table>
<thead>
<tr>
<th>Pressure contact type</th>
<th>Socket</th>
<th>PS-20SM-D4P1-1C (from JAE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimp type</td>
<td>Strain relief</td>
<td>PS-SR20M2 (from JAE)</td>
</tr>
<tr>
<td>Socket housing</td>
<td>Socket housing</td>
<td>PS-D4C20 (from JAE)</td>
</tr>
</tbody>
</table>

#### Table 2.3 European Connector Table

| Vertical plug          | AKZ950/7-5.08-GREEN (from Phoenix Mechano) |

### Components and Functions

- **DIP switch:** Sets transmission speed, etc.
- **Power supply status LED:** Indicates power supply status.
- **Communication status LED:** Indicates communication status.
- **I/O status LED:** Indicates input and output on/off status.
- **e-CON type I/O connector:**
- **ML type I/O connector:**
- **24 V DC power supply connector:** Receives external power supply.
- **RJ-45 YHLS communication connector:**
- **DIN rail lock:**
- **Terminating resistor switch:** Enables (ON) or disables (OFF) the terminating resistor.
External Dimensions

- **e-CON type:**
  TACXD08-3AE/TACYD08-1AE/TACWD08-3NE

- **MIL type:**
  TACXD16-3AM/TACYD16-1AM/TACWD16-3NM

- **European type:**
  TACYC04-0NB
2.1 Installation Sites

Take the following precautions when installing the YHLS slave units in unfriendly environments.

<table>
<thead>
<tr>
<th>Installation Site</th>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside a control panel</td>
<td>The control panel must be sufficiently large or provided with cooling so that the ambient temperature of a YHLS slave unit does not exceed 55°C.</td>
</tr>
<tr>
<td>Near a heat source</td>
<td>A YHLS slave unit must be installed in a control panel so that its ambient temperature does not exceed 55°C due to heat radiation or convection from a heat source.</td>
</tr>
<tr>
<td>Near a vibration source</td>
<td>A YHLS slave unit must be mounted with an anti-vibration device in a control panel to protect it against vibration.</td>
</tr>
<tr>
<td>In corrosive atmosphere</td>
<td>A YHLS slave unit must be installed in a control panel that prevents the ingress of corrosive gases. Exposure to corrosive gases may cause its electrical contacts to fail over time.</td>
</tr>
<tr>
<td>At other places</td>
<td>A YHLS slave unit must be installed in a control panel free of high temperature, high humidity, dust, or air-borne iron particles.</td>
</tr>
</tbody>
</table>

2.2 Attaching to and Detaching from DIN Rail

The YHLS slave units are designed for installation on a 35-mm DIN rail as follows:

- How to attach (see figure below)
  1. Apply a slave unit to a DIN rail such that its bottom claw on the DIP switch side engages with one edge of the rail.
  2. Push the slave unit until its bottom claw on the DIN rail lock side clicks into engagement with the other edge of the rail.
• How to Detach (1) (see figure below)

1. Unlock the slave unit by pulling out the DIN rail lock using a flat-blade screwdriver.
2. With the slave unit unlocked, lift its DIN rail lock side and remove the slave unit.

• How to remove 2 (see the figure below)

Unlock the slave unit by pushing outward the DIN rail lock from the DIP switch side, lift up the DIN rail lock side and take out the slave unit.
3. YHLS Communications

3.1 Assigning Addresses to Slave Units

All YHLS slave units connected to a port of the YHLS master module must each be assigned a unique address. No two YHLS slave units connected to the same port of the YHLS master module can have the same address. A YHLS slave unit may be assigned any address from 1 to 63, regardless of its physical position relative to other slave units on the communication line.

**CAUTION**

In YHLS communications, the master module scans its slaves sequentially, starting from slave address 1 to the last slave address. The scan time is independent of the number of slave units actually connected but depends only on the last slave address. To minimize scan time, we recommend that you assign slave unit addresses sequentially, starting from 1.

3.2 Maximum Transmission Distance

Maximum transmission distance here refers to the total length of all segments of a transmission line from the YHLS master module to the farthest YHLS slave unit. The maximum allowable transmission distance depends on transmission speed.

<table>
<thead>
<tr>
<th>Transmission Speed</th>
<th>Maximum Transmission Distance (total length)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Mbps</td>
<td>100 m</td>
</tr>
<tr>
<td>6 Mbps</td>
<td>200 m</td>
</tr>
</tbody>
</table>

**CAUTION**

Normal YHLS communications is not guaranteed if the maximum transmission distance is exceeded.
3.3 Maximum Number of YHLS Slave Units

The YHLS master module supports up to 32 YHLS slave units per port.

CAUTION

Normal YHLS communication is not guaranteed if more than 32 YHLS slave units are connected to the same port of the YHLS master module.
4. Details of Components

- **YHLS communications connector**
  
<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>YHLS communication connector</td>
<td>TACXD08-3AE TACXD16-3AM TACYD08-1AE TACYD16-1AM TACYC04-0NB TACWD08-3NE TACWD16-3NM</td>
<td>2-wire, half-duplex</td>
<td>940-SP-360808-A108 (from Stewart)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin No.</td>
<td>Symbol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TRD+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>TRD-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SHIELD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **24 V DC power supply connector**
  
<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>24 V DC power supply connector</td>
<td>TACXD08-3AE TACXD16-3AM TACYD08-1AE TACYD16-1AM TACYC04-0NB TACWD08-3NE TACWD16-3NM</td>
<td></td>
<td>AKZ1550/4-3.81-GREEN (from Phoenix Mechano)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin No.</td>
<td>Symbol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>24V+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>24V+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>24V-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24V-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### I/O connector

#### e-CON type

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
</table>
| 3   | I/O interface connector | TACXD08-3AE  
TACYD08-1AE  
TACWD08-3NE | Pin 1  
Pin 4 | 37104-□□□□-000FL  
(from Sumitomo 3M) | For  □□□□□□, see Table 2.1, “Sumitomo 3M Connector Table.” |

#### MIL type

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
</table>
| 3   | I/O interface connector on a 16-input slave unit | TACXD16-3AM | Pin 1  
Pin 19 | See Table 2.2, “MIL Connector Table.” |

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
</table>
| 3   | I/O interface connector on a 16-output slave unit | TACYD16-1AM | Pin 1  
Pin 19 | See Table 2.2, “MIL Connector Table.” |

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
</table>
| 3   | I/O interface connector on an 8-input, 8-output slave unit | TACWD16-3NM | Pin 1  
Pin 19 | See Table 2.2, “MIL Connector Table.” |

#### European type

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Compatible Slave Units</th>
<th>Pin Assignment</th>
<th>Recommended Connector</th>
</tr>
</thead>
</table>
| 3   | I/O interface connector on a 4-relay output slave unit | TACYC04-0NB | Pin 1  
Pin 7 | AKZ950/7-5.08-GREEN  
(from Phoenix Mechano) |
### LED

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I/O status LED</td>
<td>IN1 to IN16: Lit when an input is on (closed). Not lit when an input is off (open).&lt;br&gt;OUT1 to OUT16: Lit when an output is on. Not lit when an output is off.</td>
</tr>
<tr>
<td>5</td>
<td>Power supply status LED</td>
<td>Lit when power supply is on. Not lit when power supply is off.</td>
</tr>
<tr>
<td>6</td>
<td>Communication status LED</td>
<td>Lit when communication is in progress. Not lit when communication is in error or not in progress.</td>
</tr>
</tbody>
</table>

### DIP switch

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>DIP switch</td>
<td>(Factory setting)&lt;br&gt;ON&lt;br&gt;OFF&lt;br&gt;Not used&lt;br&gt;Slave unit address setting (1-63)&lt;br&gt;Transmission speed: 12 for 12 Mbps; 6 for 6 Mbps&lt;br&gt;Hold/reset output on communications failure&lt;br&gt;H: Hold&lt;br&gt;R: Reset (off)&lt;br&gt;This setting applies only to output slave units, and is ignored for input slave units.</td>
</tr>
</tbody>
</table>

### DIN rail lock

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>DIN rail lock</td>
<td>Used to attach a YHLS slave unit to a 35-mm DIN rail.</td>
</tr>
</tbody>
</table>

### Terminating resistor switch

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Terminating resistor switch</td>
<td>OFF&lt;br&gt;ON&lt;br&gt;TERM&lt;br&gt;ON: Enables the terminating resistor.&lt;br&gt;OFF: Disables the terminating resistor.&lt;br&gt;Only the YHLS slave unit at the end of a transmission line should have its terminating resistor enabled (the figure above shows the factory setting (= OFF)).</td>
</tr>
</tbody>
</table>
- e-CON type: 8-DC input slave unit (TACXD08-3AE)

- e-CON type: 8-TR output slave unit (TACYD08-1AE)

- e-CON type: 4-DC input, 4-TR output slave unit (TACWD08-3NE)
- MIL type: 16-DC input slave unit (TACXD16-3AM)

- MIL type: 16-TR output slave unit (TACYD16-1AM)

- MIL type: 8-DC input, 8-TR output slave unit (TACWD16-3NM)
- European type: 4-relay output slave unit (TACYC04-0NB)
5. Slave Unit Setup

5.1 Slave Unit Address Setup

All YHLS slave units connected to a port of the YHLS master module must each be assigned with a unique address. No two YHLS slave units connected to the same port of the YHLS master module can have the same address. A YHLS slave unit may be assigned with any address from 1 to 63. Up to 32 YHLS slave units may be connected to each port of the YHLS master module.

CAUTION

When designing a YHLS system or setting up a slave unit, ensure that all slave unit addresses are unique. If two or more slave units connected to the same port of the YHLS master module have the same address, the units will not be damaged, but all slave units, including those with unique addresses, will fail to communicate normally.

5.1.1 How to Assign Slave Unit Addresses

Use bits 5-10 (marked as 32, 16, 8, 4, 2, and 1 respectively) of the DIP switch on a YHLS slave unit to assign it with an address. A 6-bit binary number can represent any decimal number between 0 and 63.

Because address 0 is assigned to the YHLS master module, slave units should be assigned with addresses between 1 and 63.

Table 5.1, "Slave Unit Address Setup Table" shows the mapping between addresses and bit combinations of the DIP switches.
### Table 5.1 Slave Unit Address Setup Table

<table>
<thead>
<tr>
<th>Slave Unit Address</th>
<th>DIP Switch Setup</th>
<th>Slave Unit Address</th>
<th>DIP Switch Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>00</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>01</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>02</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>03</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>04</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>05</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>06</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>07</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>08</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>09</td>
<td>OFF</td>
<td>ON</td>
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</tr>
<tr>
<td>10</td>
<td>OFF</td>
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<td>11</td>
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<td>12</td>
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<td>13</td>
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</tr>
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<td>14</td>
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</tr>
<tr>
<td>15</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>16</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>17</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>18</td>
<td>OFF</td>
<td>ON</td>
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</tr>
<tr>
<td>19</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>20</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>21</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>22</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>23</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>24</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>25</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>26</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>27</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>28</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>29</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>30</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>31</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

#### 5.2 Transmission Speed Setup

Use bit 4 (marked as 6↔12) of the DIP switch on a YHLS slave unit to specify its transmission speed as 6 Mbps (= 6) or 12 Mbps (= 12).

**CAUTION**

- Total transmission distance depends on transmission speed: 100 m at 12 Mbps or 200 m at 6 Mbps.
- 3 Mbps may not be specified.
- Full-duplex may not be specified.
5.3 Reset/Hold Output Setup

The output unit of a YHLS output slave unit has a reset/hold output function, which allows it to reset or hold its current output state when it detects that communications from the YHLS master module has been terminated for whatever reason.

Use bit 3 (marked as R↔H) of the DIP switch on a YHLS slave unit to specify whether to reset (= R) or hold (= H) the current output state upon termination of communications.

⚠️ CAUTION

If the sequence CPU module encounters a moderate or fatal failure, the YHLS master module stops communications with its slave units.

The output state of a slave unit when the master module terminates communications depends on the setting of the reset/hold output function of the slave unit. YHLS slave modules for input only do not have the reset/hold output function.

5.4 Terminating Resistor Switch Setup

Only the last YHLS slave unit (farthest from the YHLS master module) on a transmission line should have its terminating resistor switch set to ON.

OFF  ON
TERM

⚠️ CAUTION

Do not enable the terminating resistor switch of a slave unit other than the one farthest from the YHLS master module. Otherwise communications becomes unreliable.
6. YHLS Communications Data

6.1 Input and Output Data Areas

In YHLS communications, input data to a YHLS slave unit is sent to the YHLS master module and stored in its input data area, while output data from the sequence CPU module is buffered in the output data area of the YHLS master module and sent to YHLS slave units.

6.2 DC-input Slave Units

(1) TACXD16-3AM
How input data (IN1-16) from a 16-input slave unit is stored in the input data area:

```
  bit15 bit8 bit7 bit0
  IN 16  IN 15  IN 14  IN 13  IN 12  IN 11  IN 10  IN  9  IN  8  IN  7  IN  6  IN  5  IN  4  IN  3  IN  2  IN  1
```

- Input data (16 bits)
  1: Input on
  0: Input off or no input yet

(2) TACXD08-3AE
How input data (IN1-8) from an 8-input slave unit is stored in the input data area:

```
  bit15 bit8 bit7 bit0
  0    0    0    0  IN  8  IN  7  IN  6  IN  5  IN  4  IN  3  IN  2  IN  1
```

- Input data (8 bits)
  1: Input on
  0: Input off or no input yet

6.3 TR-output Slave units

(1) TACYD16-1AM
How output data (OUT1-16) stored in the output data area is sent to a 16-output slave unit:

```
  bit15 bit8 bit7 bit0
  OUT 16 OUT 15 OUT 14 OUT 13 OUT 12 OUT 11 OUT 10 OUT  9 OUT  8 OUT  7 OUT  6 OUT  5 OUT  4 OUT  3 OUT  2 OUT  1
```

- Output data (16 bits)
  1: Output on
  0: Output off

(2) TACYD08-1AE
How output data (OUT1-8) stored in the output data area is sent to an 8-output slave unit:

```
  bit15 bit8 bit7 bit0
  OUT  8 OUT  7 OUT  6 OUT  5 OUT  4 OUT  3 OUT  2 OUT  1
```

- Output data (8 bits)
  1: Output on
  0: Output off
6.4 DC-input, TR-output Slave Units

(1) TACWD16-3NM
How input data (IN1-8) from an 8-input, 8-output slave unit is stored in the input data area:

<table>
<thead>
<tr>
<th>bit15</th>
<th>bit8</th>
<th>bit7</th>
<th>bit0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IN8</td>
<td>IN7</td>
<td>IN6</td>
<td>IN5</td>
</tr>
<tr>
<td>IN4</td>
<td>IN3</td>
<td>IN2</td>
<td>IN1</td>
</tr>
</tbody>
</table>

How output data (OUT1-8) stored in the output data area is sent to an 8-input, 8-output slave unit:

<table>
<thead>
<tr>
<th>OUT8</th>
<th>OUT7</th>
<th>OUT6</th>
<th>OUT5</th>
<th>OUT4</th>
<th>OUT3</th>
<th>OUT2</th>
<th>OUT1</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT8</td>
<td>OUT7</td>
<td>OUT6</td>
<td>OUT5</td>
<td>OUT4</td>
<td>OUT3</td>
<td>OUT2</td>
<td>OUT1</td>
</tr>
</tbody>
</table>

(2) TACWD08-3NE
How input data (IN1-4) from a 4-input, 4-output slave unit is stored in the input data area:

<table>
<thead>
<tr>
<th>bit15</th>
<th>bit8</th>
<th>bit7</th>
<th>bit0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

How output data (OUT1-4) stored in the output data area is sent to a 4-input, 4-output slave unit:

<table>
<thead>
<tr>
<th>OUT4</th>
<th>OUT3</th>
<th>OUT2</th>
<th>OUT1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
7. External Connection

7.1 YHLS Communications Line

The YHLS slave units support 2-wire, half-duplex communications only.

![Diagram of YHLS Communications Line]

The following cable is recommended for the connection between a YHLS master module and a YHLS slave unit:

- Manufacturer: Shinko Seisen Industry
- Model: ZHT262PS
- Impedance: 100 Ω

7.2 Power Supply Line

![Diagram of Power Supply Line]
7.3 I/O Circuits

- **e-CON type: 8-DC input slave unit (TACXD08-3AE)**

- **e-CON type: 8-TR output slave unit (TACYD08-1AE)**

- **e-CON type: 4-DC input, 4-TR output slave unit (TACWD08-3NE)**
- MIL type: 16-DC input slave unit (TACXD16-3AM)

- MIL type: 16-TR output slave unit (TACYD16-1AM)

- MIL type: 8-DC input, 8-TR output slave unit (TACWD16-3NM)
- European type: 4-relay output slave unit (TACYC04-0NB)
8. Troubleshooting
This chapter describes how to troubleshoot problems involving YHLS slave units.

8.1 Hardware or Setup Error?
Check for the following setup errors before proceeding with troubleshooting:

- Is the setup of the YHLS slave unit consistent with that of the YHLS master module?
- Is the YHLS slave unit installed correctly?
- Is the communication cable correct?
- Is the YHLS system configured correctly?
- Is the power supply proper?
8.2 Troubleshooting Common Problems

This section shows troubleshooting flowcharts for various error scenarios that may occur when using the YHLS slave unit.

```
Error

Is sequence CPU module in error?  Yes
  Remove the cause of the error of the sequence CPU module.
  No

Is YHLS master module in error?  Yes
  Remove the cause of the error of the YHLS master module.
  No

Is POWER LED lit?  No
  See Subsection 8.2.1, "POWER LED is not Lit."
  Yes

Is LNK LED lit?  No
  See Subsection 8.2.2, "LNK LED is not Lit."
  Yes

Is output to slave units normal?  No
  See Subsection 8.2.3, "No Output to Slave Unit."
  Yes

See Subsection 8.2.4, "No Input from Slave Unit."
```
8.2.1 POWER LED is not Lit

- POWER LED is not lit.
  - Is 24 V DC power supply cable connected correctly?
    - No: Connect the cable correctly.
    - Yes: Is 24 V DC power supply voltage normal?
      - No: Check 24 V DC power supply and its cable.
      - Yes: Replace the YHLS slave unit.
8.2.2 LNK LED is not Lit

1. LNK LED is not lit.
   - Is communication cable connected correctly?
     - Yes
     - No
       - Connect the cable correctly (see Section 7.1, "YHLS Communication Line").
       - Note: Commercially available Ethernet cable sets must not be used because their pin assignments are different.

   - Is total transmission distance observed?
     - Yes
     - No
       - The total transmission distance must not exceed 100 m at 12 Mbps or 200 m at 6 Mbps.

   - Is transmission speed setting the same as YHLS master module?
     - Yes
     - No
       - Rectify setting.

   - Is YHLS master module set to half-duplex?
     - Yes
     - No
       - Set the communications mode of the YHLS master module to half-duplex.

   - Is the number of slave units per port 32 or less?
     - Yes
     - No
       - Not more than 32 slave units must be connected to the same port.

   - Are slave unit addresses set correctly?
     - Yes
     - No
       - Rectify setup (see Section 5.1, "Slave Unit Address Setup").

   - Is slave unit terminating resistor switch set correctly?
     - Yes
     - No
       - Only the last slave unit should have its terminating resistor enabled.
       - Note: YHLS master module has a built-in terminating resistor.

   - Replace the slave unit.
### 8.2.3 No Output to Slave Unit

- **No output to a slave unit**
  - **Is data position in the output data area correct?**
    - **Yes**
    - **Replace the slave unit.**
    - **No**
      - **Write output data in the correct data position of the output data area (see Chapter 6, "YHLS Communication Data").**
  - **Is output connection to the load correct?**
    - **Yes**
    - **Replace the slave unit.**
    - **No**
      - **Correct the output connection to the load (see Chapter 7, "External Connection").**

### 8.2.4 No Input from Slave Unit

- **No input from a slave unit**
  - **Is data position in the input data area correct?**
    - **Yes**
    - **Replace the slave unit.**
    - **No**
      - **Read input data from the correct data position of the input data area (see Chapter 6, "YHLS Communication Data").**
  - **Is input connection from a sensor correct?**
    - **Yes**
    - **Replace the slave unit.**
    - **No**
      - **Correct the input connection from a sensor or switch (see Chapter 7, "External Connection").**
9. Sample Program

9.1 Accessing through YHLS Master Module

The sample program below assumes that the YHLS master module (F3LH02-0N) is installed in slot 3 of the FA-M3 main unit and YHLS slave units are connected to it as shown in the figure below.

The sample program reads input data from the input slave units into the D register, and turns on OUT1 of each output slave unit.

See Chapter 6, "YHLS Communication Data," for information on how IN data from a slave unit is stored in the input data area of the YHLS master module or how OUT data stored in the output data area is sent to a slave unit.

---

(Continued on the next page)
***Communication Start***

**SCANSTAR**

**I/O Data**

******16-input slave unit (TACXD16-3AM)******

**X00001**

**READ 2 1 000001 1**

******8-input slave unit (TACXD08-3AE)******

**X00001**

**READ 3 2 000002 1**

******16-output slave unit (TACYD16-1AM)******

**K00003**

**WRITE 31 3 262 1**

******8-output slave unit (TACY08-1AE)******

**K00002**

**WRITE 31 8 261 1**

******4-output slave unit (TACYC04-0NB)******

**K00002**

**WRITE 31 8 261 1**

******8-input, 8-output slave unit (TACWD16-3NM)******

**X00001**

**READ 3 5 000009 1**

******4-input, 4-output slave unit (TACWD08-3NE)******

**X00001**

**READ 3 7 000007 1**

**WRITE $108 8 262 1**

**WRITE $10 8 263 1**
Appendix: Connectors and Cables

1. Connectors

- **YHLS communication connector (modular type)**
  
  Manufacturer : Stewart  
  Model : 940-SP-360808-A108

- **Power supply connector**  
  
  Manufacturer : Phoenix Mechano  
  Model : AKZ1550/4-3.81-GREEN

- **I/O connector**
  
  - **e-CON type**
    
    Manufacturer : Sumitomo 3M  
    Model : 37104-□□□□-000FL
    
    (For what □□□□ represents, see Appendix Table 1-1, "Sumitomo 3M Connector-Wire Table,"

  **Appendix Table 1.1 Sumitomo 3M Connector-Wire Mapping Table**

<table>
<thead>
<tr>
<th>Cover Color</th>
<th>Wire-mount Plug (4 pins)</th>
<th>Compatible Conductors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AWG No.</td>
</tr>
<tr>
<td>Red</td>
<td>37104-3101-000FL</td>
<td>24-26</td>
</tr>
<tr>
<td>Yellow</td>
<td>37104-3122-000FL</td>
<td>24-26</td>
</tr>
<tr>
<td>Orange</td>
<td>37104-3163-000FL</td>
<td>24-26</td>
</tr>
<tr>
<td>Green</td>
<td>37104-2124-000FL</td>
<td>20-22</td>
</tr>
<tr>
<td>Blue</td>
<td>37104-2165-000FL</td>
<td>20-22</td>
</tr>
<tr>
<td>Gray</td>
<td>37104-2208-000FL</td>
<td>20-22</td>
</tr>
</tbody>
</table>

- **MIL type**
  
  Manufacturer : JAE  
  Model : see Appendix Table 1.2

  **Appendix Table 1.2 MIL Connector Table**

<table>
<thead>
<tr>
<th>Pressure contact type</th>
<th>Socket PS-20SM-D4P1-1C (from JAE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain relief</td>
<td>PS-SR20M2 (from JAE)</td>
</tr>
<tr>
<td>Socket housing</td>
<td>PS-D4C20 (from JAE)</td>
</tr>
</tbody>
</table>

- **European type**
  
  Manufacturer : Phoenix Machano  
  Model : AKZ950/7-5.08-GREEN
2. YHLS Communications Cable

The following cable is recommended for YHLS communications:

- **Cable (to be fitted with a modular plug)**
  Manufacturer: Shinko Seisen Industry
  Model: ZHT262PS
  Impedance: 100 Ω

Plug-cable Set (modular type)
INDEX

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