I/O SOLUTION PRODUCTS

1. Signal Conditioners
2. Limit Alarms
3. Indicators
4. Tower Lights
5. Power Transducers
6. Remote I/O
7. Paperless Recording System
8. Web Data Loggers
9. PID Control Components
10. Temperature Controllers
11. Final Control Components
12. Lightning Surge Protectors

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A signal conditioner is used to condition and convert a field sensor signal suitable for processing with the PLC/DCS in a wide variety of process plants and factories. Typical applications are:

- Signal conversion
- Signal isolation to stop ground loops
- Signal boosting to increase load drive capability

M-System signal conditioners are available with wide combinations of process signal I/O, power input and mounting configuration. Additionally, M-System offers the broadest line of signal splitters available.

**ISOLATOR APPLICATIONS**

Isolator is installed between a transmitter (i.e. sensor) and a receiver to galvanically isolate DC signals. Breaking the path between a field instrument and a control room device minimizes various influences coming from the field site to the control room. In addition, each instrument separated by galvanic isolation can choose its own ground point independently from other ones, avoiding the ‘ground loop’ problem. Lastly, the isolator can provide impedance conversion to beat loop impedance constraints, and signal level conversion (e.g. from 10-50 mA to 4-20 mA) function.

### Choose by Housing and Terminal Access Styles
- Plug-in base socket mounted
- Terminal block style
- Euro terminal block style
- Ultra-slim housing
- Installation base mounted
- Rack mounted
- Field enclosure mounted
- Sensor head mounted
- PCB mounted
- Connector output

### Choose by I/O Signal Types
- Universal input
- DC mV, V, mA
- Two-wire transmitter
- Temperature
- Potentiometer
- Strain gauge
- CT & VT
- Frequency and pulse
- Pneumatic
- AC power
- And others

### Choose by Functions
- Isolation / Amplification
- Conversion / Transmission
- Signal splitting
- Limit alarm
- Filtering
- Math / Process function
- Linearization

### Choose by Power Supply
- AC line powered (4-wire)
- DC line powered (4-wire)
- Output loop powered (2-wire)
- Input loop powered (self powered)

---

**4-wire isolator : 4-20 mA (passive) input / 4-20 mA output / Line powered**

![Diagram](image)

- Designed primarily for front-ending PLC/DCS systems which are mounted within the same panel or adjacent to it.
- The isolator module is powered from terminals separate from signal lines.
- Test and measurement applications
- Manufacturing cells
- Monitoring systems located in-line with the manufacturing process

**4-wire isolator / current loop supply : 4-20 mA (active) input / 4-20 mA output / Line powered**

![Diagram](image)

- Basic isolator designed to interface a PLC and DCS system with a field instrument.
- The isolator module supplies 24 Vdc power to the field device and provides a linearized output signal if necessary.
- Remote field signal monitored by control system
- Water/wastewater treatment
- Petrochemical, tank farms, large manufacturing sites

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**M-System**

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### Compact Plug-in Signal Conditioners

- **M2 Series**
  - M2/W2 Series (Mini-M and Mini-MW) features wide selection of input/output ranges and functions
  - M5/W5 Series: Line powered type (4-wire)
  - B5 Series: Loop powered type (2-wire)
  - W5 Series provides a second isolated output of independent range
  - DIN rail or surface mounting
  - 2000 Vac isolation
  - Base socket included with the modules

- **M2E Series**
  - With bright, high-contrast OEL (Organic Electroluminescence) display for setting and process monitor

- **W2 Series**
  - Mini-MW provides a second isolated output of independent range
  - DIN rail or surface mounting
  - 2000 Vac isolation

### Low-profile Signal Conditioners

- **M5 Series**
  - Only 41 mm (1.61 in) deep, terminal block style modules can be installed anywhere, even behind the panel cover.
  - M5/W5 Series: Line powered type (4-wire)

- **B5 Series**
  - Loop powered type (2-wire)

- **W5 Series**
  - Provides a second isolated output of independent range
  - DIN rail mounting
  - 2000 Vac isolation

### Thin-profile Signal Conditioners

- **M3S Series**
  - Space-saving modules with separable terminal blocks
  - Universal AC/DC power input available

- **M6 Series**
  - Ultra-slim design
  - Selectable connection styles: Tension-clamp, screw terminal or euro terminal
  - Low power consumption, high load drive capability
  - 2000 Vac isolation

### Why Isolate the Second Output?

Channel-to-channel isolation enhances the overall system reliability.

Whenever you want to add another device such as a recorder to a sensor signal loop connected to PLC’s analog input module, a signal splitter that can output two isolated signals is recommended.

The loop’s load capacity may allow to connect one more load in series to (4-20 mA current signal) or in parallel to (1-5 V voltage signal) an existing receiving instrument. However, in such a configuration, short-circuit, open-circuit or ground loop at one part of the loop could affect the entire system.

Galvanically separating each part of the loop is beneficial to contain any damage to the limited section in case of an accident, thus making troubleshooting easier, minimizing the system downtime.
**Programmable Signal Conditioners**

**M3L Series**
“One-Step Cal” Configuration without PC
- Enhanced PC configurator software is also available
- Universal I/O specifications ideal for spare parts stock reduction programs
- DIN rail mounting
- 1500 Vac isolation

**B3 Series**
DIP Switch Configurable
- Input type and range selectable with the internal DIP switches and fine calibration using the front potentiometers
- Wide supply voltage range 12-45 Vdc
- 1500 Vac isolation between input and output

**Field-mount Signal Conditioners**

**B6U / B6U-B**
Universal HART Temperature Transmitters
- Plug-in two-line LCD display
- HART programmable
- User’s own temperature calibration tables can be used
- IP66 / IP67 field enclosure; Stainless steel optional

**27 / 26 Series**
Programmable Head-mount Transmitters
- 27 Series: HART or PC programmable type available
- 26 Series: Fixed range
- Function monitor LED optional for 27 Series RTD and potentiometer input

**FIELD-MOUNT ACCESSORIES**

**ISOLATOR APPLICATIONS**

4-wire isolator / current loop supply : 4-20 mA (active) input / 4-20 mA output (source) / Line powered

When the receiver powers the isolator’s output loop (sink)
- Remote field signal monitored by control system
- Water/wastewater treatment
- Petrochemical, tank farms, large manufacturing sites
Other Signal Conditioners

These products which were released in the market decades ago are still maintained today as M-System products lineup to serve our customers maintaining the performance of existing process control systems.

Please visit M-System web site to confirm specs of specific models.

M-UNIT Series
Plug-in Signal Conditioners

W-UNIT Series
Plug-in Signal Splitters

MX-UNIT Series
Front-Configurable Signal Conditioners

K-UNIT Series
Plug-in Signal Conditioners

F-UNIT Series
Space-saving Signal Conditioners

H-UNIT Series
Space-saving Signal Conditioners

M8 (Pico-M) Series
Dual Output Super-mini Signal Conditioners

10-RACK Series
High-density Signal Conditioners

18-RACK Series
DCS Signal Conditioners

38-RACK Series
Interposing Relays

ISOLATOR APPLICATIONS

2-wire isolator: 4-20 mA input / 4-20 mA output (loop powered)

Basic isolator designed to interface a PLC and DCS system that provides a 24 Vdc power supply with a 4-20 mA input.

- Remote field signal monitored by control system
- Water/wastewater treatment
- Petrochemical, tank farms, large manufacturing sites

With the excitation supply to the field device

2-wire isolator: 4-20 mA input (loop powered) / 4-20 mA output

Mainly used to retrofit existing 4-20 mA process loops that need to add another instrument to the loop while maintaining isolation.

- Chart recorder or another PLC
- Backup monitoring system
## Signal Conditioners Selection Guide

Only typical signal conditioner models and specs are mentioned in this table. Please visit M-System web site to confirm availability and specs of specific models.

<table>
<thead>
<tr>
<th>SERIES</th>
<th>M2 / M2E</th>
<th>W2</th>
<th>M5 / B5</th>
<th>W5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure / Mounting Type</td>
<td>Plug-in base socket, DIN rail or surface mount</td>
<td>41 mm deep housing, DIN rail mount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range Availability</td>
<td>Specified when ordering or PC/One-step Cal programming (M2E: PC / Front display setting)</td>
<td>Specified when ordering or DIP switch programming (W5FV)</td>
<td></td>
<td></td>
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<tr>
<td>Dual Output</td>
<td>–</td>
<td>Yes</td>
<td>–</td>
<td>Yes</td>
</tr>
<tr>
<td>Power Input</td>
<td>AC/DC</td>
<td>AC/DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>2000V AC</td>
<td>(except M5/AC powered type: 1500V AC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-5 to +55°C (23 to 131°F)</td>
<td>M5/W5: -5 to +55°C (23 to 131°F)</td>
<td>B5: -40 to +80°C (-40 to +176°F)</td>
<td></td>
</tr>
<tr>
<td>Standards &amp; Approval</td>
<td>CE / UL / C-UL</td>
<td>CE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4-wire Signal Conditioners

- **Universal input**: DC output (M2XU, M2XUM)
- **DC mV, Voltage & Current**: Fixed range (M2VS, M2VS2, M2VF, M2VF2, M2VF3), Configurable (M2XV, M2XV2, M2LV, M2LVF, M2XEV)
- **Thermocouple**: Fixed range (M2TS, M2TT), Configurable (M2XT, M2XT2, M2EXT)
- **RTD**: Fixed range (M2RS, M2RS1, M2RT, M2RR), Configurable (M2XR, M2XR2, M2XMR)
- **Potentiometer**: Fixed range (M2MS), Configurable (M2XM, M2LPM, M2EXM)
- **Strain gauge**: Fixed range (M2LCS), Configurable (M2EXDY)
- **AC voltage & current**: Voltage transformer (M2PE, M2PA), Current transformer (M2CE, M2CA, M2CEC, M2CA, M5CT, M5CTC)
- **Current loop supply (2-wire transmitter excitation supply)**: Fixed range (M2D, M2DYS, M2DY, M2DLY, M2DYH, M2DNY, M2DU), Configurable (M2XDY, M2DYH2, M2DYHR, W2DYH2)
- **Pulse to analog**: Fixed range (M2PA, M2PA3), Configurable (M2XP2)
- **Analog to pulse**: Fixed range (M2AP), Configurable (M2XP2)
- **Pulse scaling**: Configurable (M2P, M2P6U)
- **Pulse isolation**: Fixed range (M2PP), Configurable (M2PP)
- **Pneumatic input**: 19.6-98.1 kPa (M2P, M2PV), 4-20 mA output (M2PV)

### 2-wire Signal Conditioners

- **Input loop powered isolator**: 1 channel (M2SN-1), 2 channels (M2SN-2)
- **Output loop powered isolator**: 1 channel (B5SN), 2 channels (B5VS)
- **DC mV, Voltage & Current**: Fixed range, Configurable
- **Thermocouple**: Fixed range, Configurable, IS
- **RTD**: Fixed range, Configurable, IS
- **Potentiometer**: Fixed range, Configurable, IS
- **Pulse to analog**: Fixed range, Configurable
- **Universal input**: 4-20 mA output (M2PV, M2PP), PROFIBUS

### Limit alarms

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<table>
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<th>M3 / B3 / A3</th>
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<th>M6</th>
<th>B6 / 27</th>
<th>27</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 mm wide housing, DIN rail mount</td>
<td>12 mm wide housing, DIN rail mount</td>
<td>Ultra-slim housing, DIN rail mount</td>
<td>Field mount enclosure</td>
<td>DIN type B head mount</td>
<td>Enclosure / Mounting Type</td>
</tr>
<tr>
<td>Specified when ordering or PC programming</td>
<td>Specified when ordering or PC programming</td>
<td>Specified when ordering or PC programming</td>
<td>HART (PC) programming</td>
<td>PC or HART programming</td>
<td>Specified when ordering</td>
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<tr>
<td>AC/DC</td>
<td>AC/DC</td>
<td>DC</td>
<td>Output loop powered</td>
<td>Output loop powered</td>
<td>Power Input</td>
</tr>
<tr>
<td>2000V AC (DC powered)</td>
<td>2000V AC</td>
<td>2000V AC</td>
<td>1500V AC</td>
<td>1500V AC</td>
<td>Isolation</td>
</tr>
<tr>
<td>M3: -25 to +65°C (14 to 131°F)</td>
<td>-40 to +85°C (-40 to +185°F)</td>
<td>-10 to +55°C (-4 to +131°F)</td>
<td>-20 to +55°C (-40 to +131°F)</td>
<td>-40 to +55°C (-40 to +131°F)</td>
<td>Operating Temperature</td>
</tr>
<tr>
<td>CE / UL / C-UL / ATEX / FM</td>
<td>CE / UL / C-UL</td>
<td>CE / ATEX / FM</td>
<td>CE / ATEX / FM</td>
<td>CE / ATEX</td>
<td>Standards &amp; Approval</td>
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<tr>
<td>M3LU2</td>
<td>M6xXU</td>
<td>M3SYV, M3SVS</td>
<td>M6xTV, M6xVS</td>
<td>DC mV, Voltage &amp; Current</td>
<td></td>
</tr>
<tr>
<td>M3LV</td>
<td>M3SXV</td>
<td>M6xXV</td>
<td>M3SWVS</td>
<td>M6xWVS</td>
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<td>M3LT</td>
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<td>M3LR</td>
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<td>M3LM</td>
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<tr>
<td>M3DY</td>
<td>M3SYD</td>
<td>M6xDY</td>
<td>M6xPA</td>
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</tr>
<tr>
<td>M3DY</td>
<td>A3DYH (IS)</td>
<td>M6xPA</td>
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<tr>
<td>M3LP2</td>
<td></td>
<td></td>
<td>M6xXAP</td>
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<td></td>
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<td>M6xPP</td>
<td></td>
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<td></td>
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<td></td>
<td>Pulse isolation</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Pneumatic input</td>
<td></td>
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<td>Function modules</td>
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</tr>
<tr>
<td>B3/VS1</td>
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<td>26R1, 26RS</td>
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<td>26REX</td>
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<td>Potentiometer</td>
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<tr>
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<td>Pulse to analog</td>
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</tr>
<tr>
<td>B3PU</td>
<td></td>
<td>27HU</td>
<td>Universal input</td>
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Signal Conditioners

Signal Conditioners Selection Guide

Function Modules & Retrofit Products

Limit Alarms

Indicators

Tower Lights

Power Transducers

Remote I/O

Paperless Recording System

Web Data Loggers

PID Control Components

Temperature Controllers

Final Control Components

Lightning Surge Protectors
**Function Modules & Retrofit Products**

**Function Modules**
- Math functions
- Process functions
- Filters
- Unique functions to ensure stable process operations and to solve problems in system upgrading

**Self-Synch Transmitter**
**M2EXS / MXS**
- Converting position signals from a self-synchronizing motor into a DC signal proportional to the rotating shaft position
- Position indication using self-synch, tank gauge, sounding level meter

**I/P Transducer**
**HVP / HVPN**
- Semiconductor pressure sensor in the feedback circuit
- Max. air capacity 60 Nl/minute

**I/O CHARACTERISTICS EXAMPLES**
- Delay buffer
- Lead time
- Inverted output
- Track/hold
- Ramp buffer
- Dead time
- High/low limiting
- Peak hold
- H x N
- H  x  N
- H  x  N
- H  x  N

**High Current Output Transmitters**
**VA / SVA / 99SVA**
- 200 mA, 1 A output to drive actuators used in turbines, speed governors, hydraulic machinery
- Retrofitting 10-50 mA loop

**Potentiometer Output**
**CVR1**
- Remote setting for dampers, inverters, motors and other devices with potentiometer settings
- DC voltage/current input
- 135 Ω, 1k Ω and other outputs

**Damper Operation for Air Conditioning**
- CVR1
- Temperature Setting Signal (resistance)
- Temperature Transmitter (room temp.)

**Motor Speed Setting**
- CVR1
- Level Transmitter
- INVERTER
A limit alarm is used to provide one or more relay/contact outputs when a monitored process signal goes out of preselected high or low limits. Typical applications are:

- **Trouble warning (annunciators)**
- **Emergency shutdown**
- **ON/OFF control**

M-System limit alarms are available with wide combinations of process signal I/O and power input, featuring also various setpoint access means.

Programmable alarms feature enhanced programmable functions such as failsafe operation, deadband, delay time, latching relay and others, while analog alarms feature basic but easy setting.

### Programmable Alarms

#### AS4 Series
**Dual/Quad Alarms with LED Display**
- Simple configuration via the front Up/Down buttons with a help of two displays, by calling parameters’ ID numbers (ITEM) and choosing values (DATA)
- Direct sensor input: DC, temperature, potentiometer, strain gauge and CT
- Field selectable sensor type and range
- Dual SPDT or quad NO or NC output
- Process monitor

#### M2EA / M7E Series
**Compact Alarms with OEL/LCD Display**
- Multi-line display showing parameters and selection in text; intuitive, easy programming just like operating a cell phone
- Dual SPDT or quad NO or NC output
- PC configuration is also available

#### KS2V2 / KS2TR2
**Panel Surface Mount**
- 1/16 DIN size (48 mm square) panel cutout
- 1-5 Vdc input (KS2V2) or temperature (T/C or RTD) input (KS2TR2)
- Dual SPDT output

### Analog Alarms
- Various setting methods are available:
  - Dial setting
  - Thumwheel switch setting
  - Rotary switch setting
  - Potentiometer setting
- Direct sensor input type
- Extra DC transmitter output
A panel installed meter, digital or bargraph, provides not only process signal indication but also a combination of signal conditioning, limit alarm and control functions. Basic and extended applications are:

- Signal indication by LED or LCD display
- Signal conversion by transmitter output
- Alarm and emergency shutdown by relay outputs
- ON/OFF control by relay outputs

A field indicator is used for local indication for operators’ convenience while signals from sensors and transmitters installed throughout a large installation of tanks and pipelines are typically transmitted to a control/monitoring station via 4-20 mA current line. The loop powered indicator is simple to install and wire, and reliable and durable in an explosive/corrosive environment.

**Digital Panel Meters**

**Bright, Colorful LED**

**47L Series**
- 1/8 DIN size (96 x 48 mm)
- Red, Orange, Green, Bluegreen, Blue and White LED selectable
- 4 or 4 1/2 digit display
- Alarm and/or transmitter output optional
- IP66 front panel
- Separable terminal block

**High Performance LCD Display**

**47D Series**
- 1/8 DIN size (96 x 48 mm)
- 5 1/2 digit display plus small 20 segment bargraph
- Main display color can be changed from green to red in alarm
- Alarm and/or transmitter output optional
- 12 V or 24 Vdc sensor excitation
- RS-485 Modbus-RTU interface optional
- IP66 front panel
- Separable terminal block

**Large 0.8” High LED Display**

**40 Series**
- 1/8 DIN size (96 x 48 mm)
- 3 1/2 or 4 digit display
- Display hold function

**1/32 DIN Size Meters**

**43 Series**
- 1/32 DIN size (48 x 24 mm)
- Easy-to-wire tension clamp connecting
- 24 Vdc powered or loop powered (no external power supply required)

**Loop Powered Type: No external power supply required**
Ultra-slim Digital Panel Meters
Flat Rear Surface Stuck to the Panel with a Magnet

47NL Series
- 1/8 DIN size (96 x 48 mm)
- 4 or 4 1/2 digit display
- Large 16 mm-high LED display: Bright and colorful
- Mountable on standard 30 mm round panel cutout
- IP 66 (except for magnet mounting)
- Moving average function to suppress display flickering
- High/low alarm trips
- Short-depth flat type

![Image of Ultra-slim Digital Panel Meters](image)

### TENSION-CLAMP TERMINAL BLOCK TYPE

- Magnet sheet
- Binder
- Watertight packing
- Wiring direction

### SCREW TERMINAL BLOCK TYPE

- Screw terminal block
- Watertight packing

### SCREW MOUNTING

- Screw(s)

### FUNCTION

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>47L</th>
<th>47D</th>
<th>40</th>
<th>43</th>
<th>47NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC input, input loop powered</td>
<td></td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>DC input</td>
<td>Y</td>
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<td>Thermocouple input</td>
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<td>RTD input</td>
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<td>Potentiometer input</td>
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<td>Y</td>
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<tr>
<td>2-wire transmitter input (with excitation)</td>
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<tr>
<td>Strain gauge input</td>
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<tr>
<td>AC current / voltage input</td>
<td>Y</td>
<td>Y</td>
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<td>PT input</td>
<td>Y</td>
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<td>CT input</td>
<td>Y</td>
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<td>Frequency input (AC line voltage)</td>
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<td>Frequency input</td>
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<tr>
<td>Pulse input totalizer (6 digits)</td>
<td>Y</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

http://www.m-system.com
Barigraph Indicators

48N Series Barigraph Indicators
- 9/64 DIN size (36 x 144 mm)
- 101-segment, 3 mm wide LED
- Red, amber, green and blue colors
- Alarm and/or transmitter output optional
- Vertical or horizontal mounting
- Custom scale with no extra cost
- IP65 front panel
- Separable terminal block

48SV2 Series Barigraph Indicators
- 18 x 72 mm size
- 51-segment LED
- Red, amber, green and blue colors
- Vertical or horizontal mounting
- Custom scale with no extra cost
- Zero & span adjustments at the front panel
- Separable terminal block optional

48NV
- Single or dual bars
48NA Series
- Single bar
- Dual/quad alarm
48ND Series
- Single bar
- Dual/quad alarm
- 4-digit digital display

FUNCTION

<table>
<thead>
<tr>
<th></th>
<th>48NV</th>
<th>48NA</th>
<th>48ND</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC input,</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>single channel</td>
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<tr>
<td>DC input,</td>
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<td></td>
</tr>
<tr>
<td>dual channel</td>
<td>Y</td>
<td></td>
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</tr>
<tr>
<td>DC input,</td>
<td></td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>transmitter output</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4-20 mA</td>
<td></td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>input,</td>
<td></td>
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<td></td>
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<tr>
<td>excitation supply</td>
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<td></td>
</tr>
<tr>
<td>Thermocouple</td>
<td></td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTD input</td>
<td></td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Potentiometer input</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Field Indicators

6DV / 6DV-B Loop Powered Field Indicator
- 4-20 mA input loop powered
- No external power source required
- Scaling & linearization selectable via the front control buttons
- IP66 / IP67 field enclosure, aluminium or stainless steel
- ATEX Zone 0, FM Class I, II, III, Division 1 approvals

2-WIRE LOOP APPLICATION EXAMPLE

The indicator is powered from a two-wire current loop (4-20 mA), requiring no external power source.
The maximum voltage drop caused by inserting the 6DV into the loop is only 4.0 V at 20 mA.
It is ideal for use as a remote indicator added to a current loop between a field sensor / transmitter and a monitoring / control room, without worrying about needing a power source or about loaded impedance on the loop.
IT Series Open Network Capable Tower Lights

- Energy saving, maintenance free LED lights
- Direct Modbus/TCP and CC-Link control saves wiring and cost
- Wireless LAN access point and infrastructure mode (IEEE 802.11b/g/n, 2.4 GHz)
- Bright and even illumination thanks to M-System’s original reflection system
- Number and color of LED modules can be freely combined
- Rugged IP65 construction is ideal for harsh industrial applications

**Modbus/TCP**

**CC-Link**

**TOWER LIGHT APPLICATIONS**

Remote monitoring and control of an equipment using mobile interface

No hardwiring between multiple sets of equipment to monitor and control by a single master PLC

The network capable tower lights can save a great part of parallel wiring between sensors, PLC and lights.

http://www.m-system.com
Transducers for electrical measurement are an essential part of any monitoring, measuring, or controlling system where electrical quantities are involved. For example, a power transducer monitors both AC current and voltage to measure/calculate true electrical power delivered to a load and converts it to a DC voltage or current signal proportional to the measured power.

Multi power monitors are capable of open network interface such as Modbus-RTU, Modbus TCP/IP, CC-Link and LonWorks, which are commonly used for modern energy measurement and management systems to achieve energy saving.

**53U / 54U Series**

**Multi Power Monitor and Transducer**

- Single-phase 2-wire and 3-wire, three-phase 3-wire and 4-wire systems
- IP50 front panel (53U, 54U)
- Various network communication and Ao/Do combinations selectable
- Up to 31st harmonic distortion measurement
- Software lock

**LT-UNIT Series Power Transducer**

- True RMS sensing
- M4 screw terminal
- Max. 550 Vac input
- Conforming to IEC 60688
- DIN rail or surface mounting

**LSMT4 Multi Power Transducer**

- Measuring AC current, voltage, active/reactive/apparent power and power factor
- 10 x DC voltage/mA outputs plus 2 x Do
- Parameters are freely programmable with the front control buttons or by PC
- DIN rail mounted

**L-UNIT Series**

- Average or RMS sensing
- Economical dual channel type available
- DIN rail or surface mounting

**K-UNIT Series**

- Average or RMS sensing
- Plug-in socket mounted
- DIN rail or surface mounting
Start Your Energy Saving Program with a Minimum Time & Cost

Remote I/O for Energy Consumption Monitoring

- Data from power distribution panels scattered throughout a building/industrial installation can be monitored using local area Ethernet data network.
- Minimum down time by using clamp-on current sensors
- Three energy sensing ways selectable for easy application: energy computation via VT/CT, pulse output from energy meters, and pulse pickup at energy meters
- Integration of utility and process monitoring (e.g. flow, temperature, discrete signal) by mixing other sensor input modules on the R3 base

Three Energy Sensing Ways: System Configuration Example with a Commercial Building

**Distribution Panel**
- VT/CT
- Clamp-on current sensor
- Energy output via a pulse pickup
- Energy measuring/computing via transformers
- Pulse pickup
- Pulse output from an energy meter
- Energy output
- High voltage

**Monitoring via VPN**
- SCADA
- Internet
- VPN Connection
- SCADA
- Client PC
- Client PC
- Server PC

**R7MWTU / R7EWTU / R7CWTU / R7LWTU**
- Clamp-on current sensor use: easy installation
- 2 systems input

**R9MWTU / R9EWTU / R9CWTU / R9LWTU**
- Clamp-on current sensor use: easy installation
- Up to 8 systems input
- Time stamped data logging in SD card

R3 Series Remote I/O
- 4-point totalized pulse input module for pulse pickups
- Other heavy current system input modules: AC voltage/current, zero-phase current, wattage
- Temperature, DC and other sensor signal inputs are also available
Remote I/O supports DCS/PLC systems by expanding I/O flexibility in addition to providing all full channel-to-channel isolation. It communicates directly to the PLC and DCS via industry standard open-protocol networks.

Remote I/O can be also used as stand-alone distributed I/O communicating with popular HMI software. It can be located remotely in the field, or within an instrumentation cabinet such as test stands.

The flexibility and scalability of M-System's Remote I/O supports future system upgrades with full isolation between power-communication-I/O and between analog channels. Economical non-isolated analog modules are also selectable.

Applications include: signal concentrator, data collection in flow and level monitoring, injection molding monitoring and control, test stands and prototyping, glass furnace temperature control, paint booth environment reporting, pharmaceutical processes, and assembly line discrete ON/OFF.

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Remote I/O Applications

1. Replacing I/O modules of PLC and DCS
   - Flexible combinations of I/O modules
   - Eliminating point-to-point wires for each input

2. I/O for PC based SCADA systems
   - No PLC ladder programming required
   - Easy system expansion

3. I/O solution for IoT terminals
   - Free combinations of I/O modules
   - Concentrating remote signals to a single network connection point
Mixed Signal Remote I/O

**R3 Series**

*Multi-channel, Mixed Signal Remote I/O*

- Wide selection of I/O modules including DC, AC, temperature, strain gauge, pulse trains, AC power, etc.
- 4 isolated to 16 non-isolated analog inputs per module
- Max. 64 discrete I/O per module
- Selections of AC power, CT and VT modules suitable for energy monitoring applications
- Dual redundant communication networks and power supplies
- 1500 Vac isolation

**D3 Series**

*Multiplex Transmission System*

- Max. 10 km (6.21 mi) transmission via twisted-pair cable
- No software programming required
- Interfacing field signals to the host PLC via Modbus-RTU or Modbus TCP/IP
- Free combination of I/O signals

**PEER-TO-PEER COMMUNICATION WITHOUT NEEDING A MASTER**
R30 Series
Compact, Mixed Signal Remote I/O
- Ethernet based network protocols
- High-speed internal bus
- 2 or 4 fully-isolated analog I/O per module
- 16 discrete I/O per module
- R3 Series I/O modules can be added by using a special connecting base
- Dual redundant communication networks and power supplies
- 1500 Vac isolation

R8 Series
Slice Type, Mixed Signal Remote I/O
- 'Slice type' modules can be freely added by necessary number of I/O points, saving installation space to the minimum
- Only 55 mm deep modules (except connector)
- Easy I/O terminal access via e-CON (mini-clamp) connector, MIL connector, or Tension-clamp terminal block

R6 Series Ultra-Slim, Mixed Signal Remote I/O
- Only 78 mm (3.07 in) wide with the minimum system of 8 modules
- Extension by 8 module units — Max. 31 I/O modules
- 2 fully-isolated analog I/O per module
- 4-point discrete I/O per module
- Low power consumption
- 1500 Vac isolation

R5 Series Compact, Mixed Signal Remote I/O
- 2 fully-isolated analog I/O per module
- Re-transmitted output modules suitable for extra field monitoring
- Dual redundant communication networks and power supplies
- 1500 Vac isolation
## I/O Selection Guide

### Analog Input Module (Isolated)

<table>
<thead>
<tr>
<th>Function</th>
<th>R3 Series</th>
<th>R30 Series</th>
<th>R5 Series</th>
<th>R6 Series</th>
<th>R8 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal input</td>
<td>4 ch</td>
<td>2 / 4 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>DC voltage input</td>
<td>4 / 8 ch</td>
<td>2 / 4 ch</td>
<td>1 / 2 ch</td>
<td>2 ch</td>
<td>2 ch</td>
</tr>
<tr>
<td>DC voltage input (non-isolated)</td>
<td>16 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4 / 16 ch</td>
</tr>
<tr>
<td>DC current input</td>
<td>4 / 8 ch</td>
<td>2 / 4 ch</td>
<td>1 / 2 ch</td>
<td>2 ch</td>
<td>2 / 8 ch</td>
</tr>
<tr>
<td>DC current input (non-isolated)</td>
<td>16 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4 / 16 ch</td>
</tr>
<tr>
<td>Thermocouple input</td>
<td>4 / 8 ch</td>
<td>4 ch</td>
<td>1 / 2 ch</td>
<td>2 ch</td>
<td>2 ch</td>
</tr>
<tr>
<td>RTD input</td>
<td>4 / 8 ch</td>
<td>4 ch</td>
<td>1 / 2 ch</td>
<td>2 ch</td>
<td>---</td>
</tr>
<tr>
<td>RTD input (non-isolated)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4 ch</td>
</tr>
<tr>
<td>Potentiometer input</td>
<td>4 / 8 ch</td>
<td>4 ch</td>
<td>1 / 2 ch</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>4-20mA input with excitation</td>
<td>4 ch</td>
<td>---</td>
<td>1 / 2 ch</td>
<td>1 ch</td>
<td>---</td>
</tr>
<tr>
<td>4-20mA input with excitation (non-isolated)</td>
<td>6 ch</td>
<td>---</td>
<td>---</td>
<td>4 ch</td>
<td></td>
</tr>
<tr>
<td>Strain gauge input</td>
<td>2 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>CT input</td>
<td>4 ch</td>
<td>---</td>
<td>1 / 2 ch</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Zero-phase current input</td>
<td>4 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>AC current input (clamp-on current sensor)</td>
<td>4 / 8 ch</td>
<td>4 ch</td>
<td>1 / 2 ch</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>AC current input (clamp-on current sensor) (non-isolated)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4 ch</td>
<td></td>
</tr>
<tr>
<td>AC voltage input</td>
<td>4 ch</td>
<td>---</td>
<td>1 / 2 ch</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>AC power input</td>
<td>4 circuits</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>AC power input (clamp-on current sensor)</td>
<td>4 circuits</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Multi power input</td>
<td>1 system</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Multi power input (clamp-on current sensor)</td>
<td>1 / 2 systems</td>
<td>---</td>
<td>---</td>
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</tbody>
</table>

### Temperature Control Module

<table>
<thead>
<tr>
<th>Function</th>
<th>2 loops</th>
<th>---</th>
<th>---</th>
<th>---</th>
<th>2 loops</th>
</tr>
</thead>
</table>

### Analog Output Module (isolated)

<table>
<thead>
<tr>
<th>Function</th>
<th>4 / 8 ch</th>
<th>4 ch</th>
<th>1 / 2 ch</th>
<th>2 ch</th>
<th>---</th>
</tr>
</thead>
</table>

### Pulse I/O Module

<table>
<thead>
<tr>
<th>Function</th>
<th>Pi 4 / 8 / 16</th>
<th>---</th>
<th>Pi 2</th>
<th>---</th>
<th>Pi 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totalized pulse input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High speed pulse input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encoder input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse output</td>
<td>Po 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Analog Input Module with Transmitter Output (isolated)

<table>
<thead>
<tr>
<th>Function</th>
<th>---</th>
<th>1 ch</th>
<th>---</th>
<th>---</th>
<th>---</th>
</tr>
</thead>
</table>

### Alarm Module (isolated)

<table>
<thead>
<tr>
<th>Function</th>
<th>4 / 8 ch</th>
<th>---</th>
<th>---</th>
<th>---</th>
<th>---</th>
</tr>
</thead>
</table>

### Discrete I/O Module

<table>
<thead>
<tr>
<th>Function</th>
<th>Di 16</th>
<th>---</th>
<th>Di 4 / 16</th>
<th>Di 4</th>
<th>Di 4 / 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete input</td>
<td>Di 16</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Discrete input with excitation supply</td>
<td>Di 8 / 16 / 32 / 64</td>
<td>Di 16</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>AC contact input</td>
<td>Di 16</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Discrete input / output</td>
<td>Di 8, Do 8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Relay contact output</td>
<td>Do 8 / 16</td>
<td>---</td>
<td>Do 4</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Open collector output (NPN)</td>
<td>Do 16 / 32 / 64</td>
<td>Do 16</td>
<td>Do 16</td>
<td>Do 4</td>
<td>Do 4 / 16</td>
</tr>
<tr>
<td>Open collector output (PNP)</td>
<td>Do 16 / 32 / 64</td>
<td>Do 16</td>
<td>---</td>
<td>Do 4</td>
<td>Do 32</td>
</tr>
</tbody>
</table>

### BCD Code I/O Module

<table>
<thead>
<tr>
<th>BCD code input / output</th>
<th>7-digit BCD</th>
<th>---</th>
<th>---</th>
<th>---</th>
<th>---</th>
</tr>
</thead>
</table>
All-in-One Style Remote I/O

R7 Series

Expandable, Compact Remote I/O

- Palm-top size compact module can handle 4 analog input, 2 analog output or 16 discrete signals.
- 8 or 16 discrete input/output module can be attached to the base module.
- 1500 Vac isolation

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>R7M</th>
<th>R7E</th>
<th>R7D</th>
<th>R7C</th>
<th>R7L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Module</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discrete input</td>
<td>Di 16</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Transistor output</td>
<td>Do 16</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Relay contact output</td>
<td>Do 8</td>
<td>Y</td>
<td>---</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Discrete I/O</td>
<td>Di 8 + Do 8</td>
<td>Y</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>DC voltage / current input</td>
<td>4 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Thermocouple input</td>
<td>4 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>RTD input</td>
<td>4 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Thermostat input</td>
<td>4 ch</td>
<td>Y</td>
<td>---</td>
<td>Y</td>
<td>---</td>
</tr>
<tr>
<td>Potentiometer input</td>
<td>4 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>AC current input</td>
<td>4 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>DC voltage output</td>
<td>2 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>DC voltage output</td>
<td>4 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>DC current output</td>
<td>2 ch</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>DC current output</td>
<td>4 ch</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Totalized pulse input</td>
<td>8 ch</td>
<td>Y</td>
<td>---</td>
<td>Y</td>
<td>---</td>
</tr>
<tr>
<td>Remote control relay control output</td>
<td>4 / 8 ch</td>
<td>Y</td>
<td>---</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Extension Module</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discrete input</td>
<td>Di 8 / 16</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Transistor output</td>
<td>Do 8 / 16</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Relay contact output</td>
<td>Do 8</td>
<td>Y</td>
<td>---</td>
<td>Y</td>
<td>---</td>
</tr>
</tbody>
</table>

R1 Series Compact, Multi-point Remote I/O

- Economical all-in-one module for Modbus, CC-Link and DeviceNet
- Trigger contact input and alarm contact output

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>Modbus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal input</td>
<td>12 ch</td>
</tr>
<tr>
<td>Thermocouple &amp; DC input</td>
<td>8 / 16 ch</td>
</tr>
<tr>
<td>RTD &amp; potentiometer input</td>
<td>8 ch</td>
</tr>
<tr>
<td>Totalized counter input &amp; contact I/O</td>
<td>Pi 4 + Di 8 + Do 8</td>
</tr>
<tr>
<td>Contact input</td>
<td>32 ch</td>
</tr>
<tr>
<td>Contact output</td>
<td>32 ch</td>
</tr>
</tbody>
</table>
Compact Remote I/O for FA Control Equipment

R7 Series Compact Remote I/O for MECHATROLINK-I, -II, -III

- Motion and I/O networks can be on single MECHATROLINK line to save wires and cost
- High speed AD conversion and isolation of sensor signals
- Compact, terminal block style, all-in-one modules

I/O network signals introduced into MECHATROLINK network

High speed AD conversion of tension/pressure/weight measurement

R7 Series Compact Remote I/O for HLS

- Remote I/O modules for HLS (Hi-speed Link System) proposed by StepTechnica Co., Ltd.
- Compact, terminal block style, all-in-one modules
- Four connection styles are selectable to fit with various sensors and devices: e-CON (mini-clamp) connector, MIL connector, spring cage (tension-clamp) terminal and screw terminal

APPLICATION EXAMPLE WITH YOKOGAWA FA-M3 YHLS MASTER MODULE

- Chip shooter machines
- Semiconductor manufacturing equipment
- Injection molding machines
- Large printers
- LCD panel manufacturing equipment/carrier devices
- Automatic carrier robots
- Welding machines
- Electrical discharge machines
- Warehouse management systems

YHLS (Yokogawa Hi-speed Link System) adopts a HLS-compliant span protocol, enhanced to allow easy monitoring of transmission line quality during development and operation of IT machine systems.
# I/O Selection Guide

## MECHATROLINK-III

<table>
<thead>
<tr>
<th>SERIES</th>
<th>TERMINAL STYLE</th>
<th>DI</th>
<th>DO</th>
<th>DIO</th>
<th>AI</th>
<th>AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>R7K4JML3</td>
<td>Tension clamp terminal</td>
<td></td>
<td></td>
<td></td>
<td>32 each</td>
<td></td>
</tr>
<tr>
<td>R7K4FML3</td>
<td>M3 screw terminal</td>
<td>32</td>
<td>32</td>
<td>16 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7F4HML3</td>
<td>I/O : MIL connector Power : Tension clamp terminal</td>
<td></td>
<td></td>
<td>16 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7G4FML3</td>
<td>M3 screw terminal</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7G4HML3</td>
<td>M3 screw terminal</td>
<td></td>
<td></td>
<td></td>
<td>4 x DC voltage/current 4 x T/C 2 x Strain gauge 2 x NIRECO tension sensor 1 x Encoder 1 x Self synch + 1 x DC output</td>
<td>4 x DC voltage 4 x DC current</td>
</tr>
</tbody>
</table>

## MECHATROLINK-I, -II

<table>
<thead>
<tr>
<th>SERIES</th>
<th>TERMINAL STYLE</th>
<th>DI</th>
<th>DO</th>
<th>DIO</th>
<th>AI</th>
<th>AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>R7K4FML</td>
<td>M3 screw terminal</td>
<td>32</td>
<td>32</td>
<td>16 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7K4DML</td>
<td>I/O : Mini-clamp (e-CON) connector Power : Tension clamp terminal</td>
<td></td>
<td></td>
<td>16 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7G4HML</td>
<td>M3 screw terminal</td>
<td></td>
<td></td>
<td></td>
<td>4 x DC voltage/current 4 x T/C</td>
<td>4 x DC voltage 4 x DC current</td>
</tr>
<tr>
<td>R7ML*</td>
<td>M3 screw terminal</td>
<td>16</td>
<td>16</td>
<td></td>
<td>4 x DC voltage/current 4 x T/C 2 x Strain gauge</td>
<td>2 x DC voltage 2 x DC current</td>
</tr>
</tbody>
</table>

* 8-pt or 16-pt discrete I/O extension module can be added.

## HLS

<table>
<thead>
<tr>
<th>SERIES</th>
<th>TERMINAL STYLE</th>
<th>DI</th>
<th>DO</th>
<th>DIO</th>
<th>AI</th>
<th>AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>R7F4DH-1</td>
<td>I/O : Mini-clamp (e-CON) connector Power : Tension clamp terminal</td>
<td>16</td>
<td>16</td>
<td>8 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7F4DH-2</td>
<td>I/O : MIL connector Power : Tension clamp terminal</td>
<td>16</td>
<td>16</td>
<td>8 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7F4DH-3</td>
<td>I/O : MIL connector Power : Tension clamp terminal</td>
<td></td>
<td></td>
<td>16 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7F4DH-4</td>
<td>Tension clamp terminal</td>
<td>16</td>
<td>16</td>
<td>8 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7K4DH</td>
<td>I/O : Mini-clamp (e-CON) connector Power : Tension clamp terminal</td>
<td></td>
<td></td>
<td>16 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R7G4HH</td>
<td>M3 screw terminal</td>
<td></td>
<td></td>
<td></td>
<td>4 x DC voltage/current 4 x DC voltage</td>
<td>4 x DC voltage</td>
</tr>
<tr>
<td>R7HL</td>
<td>M3 screw terminal</td>
<td>16</td>
<td>16 or 8</td>
<td>8 each</td>
<td>8 x DC voltage 4 x DC voltage/current 4 x T/C 4 x RTD 4 x Totalized pulse 2 x Strain gauge 2 x Encoder</td>
<td>4 x DC voltage 2 x DC voltage 2 x DC current</td>
</tr>
</tbody>
</table>
M-System’s model TR30-G is a web-based data acquisition system enabling users to view and access stored data via an internet browser. Freed from a dedicated display screen, accessibility and portability of the data is greatly enhanced.

In addition, users can receive free benefit of ever-evolving state-of-the-art user interface and apps provided by tablet terminals: i.g. ultra-high resolution screen, intuitive touch panel operations, entering comments by dictation or hand-writing, capturing a screen shot and e-mailing, etc.

At the maximum of 64 analog inputs (16-bit data), 64 discrete inputs, 64 discrete outputs, 32 pulse inputs (32-bit data) plus 32 function inputs (mathematical, logic, filter, etc.) are usable. At the maximum of 120 channels can be plotted on the charts and stored at the storing cycle of 1 minute. The fastest storing cycle is 5 milliseconds for 16 channels, 100 milliseconds for 32 channels.

**PLANT FIELD MAINTENANCE**

Operators can bring in tablets and smart phones to access trend data while freely walking around the site. Data can be transferred to PC via FTP or via SD card.

**TEST AND RESEARCH**

Researchers can access data logged at a test lab in a remote building while working in their own office.
**Browser Views**

**Trend (vertical)**

**Trend (horizontal)**

**Event Summary**

**Overview**

**Comment Summary**

**System Configuration**

**Desktop PC**
- Monitoring
- Report preparation*1
- Receiving mails

**Tablet**
- Monitoring
- Receiving mails

**Laptop PC**
- Monitoring
- Report preparation*1
- Receiving mails

**Internet**
- ISP: Internet Service Provider
- FTP (File Transfer Protocol): a file transmission function standardly equipped on the browser

**Local**
- Mobile Line
- Mobile router*2
- TR30-G: Input signal
  - Alarm contact output

**Modbus/TCP (Ethernet)**

- Router*2
- Wi-Fi access point

**Modbus/RTU**

- Power monitor

---

*1. Create through user programs based on the trend data file retrieved from the SD card or via FTP
*2. A static IP or dynamic DNS is required.
TR30-G Tablet Recorder Application Examples

Machinery & Equipment Test Run Monitoring
“Mobile” solution needs only a minimum space

Microbrewery & Small Scale Fermentation Plants
Economical solution using existing in-house LAN and e-mail server

Remote Monitoring of Fish Farms
Also applicable to greenhouses, hydroponic farms

Wireless Monitoring of Tank Level
Also applicable to utilities / infrastructure monitoring

IoT Solution for Predictive and Preventive Maintenance

Plants and assembly processing factories
- Heat exchangers
- Curing tanks
- Lime kilns
- Electric furnaces
- Packaging machines
- Conveying equipment
- Robots
- Injection molding machines

Machine tools
- Press equipment
- Forges
- Machining centers
- Turning centers
- Grinders/polishers
- Electron beam welders
- Vacuum coating
- Electro-discharge machining
- Laser machining

Utility
- Compressors
- Freezers
- Transformers
- Cogeneration
- Water purification
- Seawater desalination
- Wastewater processing
- Heat pumps
- PSA equipment
- Desulfurization and denitration

Others
- Small-scale water supply
- Weather observation
- Wind-power generators
- Greenhouses
- Poultry farms
- Aquaculture farms
- Park facilities

Beverage-filling machine

NC equipment

Power receiving equipment

Brewing equipment
73VR Series Paperless Recorder

- Touch panel operated 5.5 inch TFT color LCD display
- 144 mm square DIN standard panel size
- Data can be transferred in real time to the host PC via Ethernet, viewed and stored on the MSR128 PC Recorder program.
- IP65 front panel

<table>
<thead>
<tr>
<th>Model</th>
<th>CE</th>
<th>Max. Inputs</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>73VR1100: Remote I/O acquisition</td>
<td></td>
<td>128 points</td>
<td>Installation flexibility, fitting in the tight space of a control panel or machinery chassis</td>
</tr>
<tr>
<td>73VR2100: Built-in universal input</td>
<td></td>
<td>12 points</td>
<td>Universal input; independent input type and range selectable per channel</td>
</tr>
<tr>
<td>73VR3100: Selectable I/O modules</td>
<td></td>
<td>64 points</td>
<td>Compatible with various open networks to communicate with major PLC</td>
</tr>
</tbody>
</table>

MSRpro Client/Server System
High Performance PC Recorder

- Max. 2048 points
- High speed 100 msec. mode up to 256 points
- Active trend view to compare in real time past and present data overlapped on each other
- Arithmetic and logic functions, including the ones performed between channels
- Alarm history and data search functions

SYSTEM CONFIGURATION EXAMPLES

2048 Channels
Max. 8 Stations (in normal sampling speed)

http://www.m-system.com
**DL8 Series**

*Web Enabled Remote Terminal Unit*

**Use Internet and Your Own Smart Phone To Build Up Remote Monitoring System**

- Simple remote monitoring via internet without needing to build up a complex PC based system
- Pre-installed user-friendly browser view for remote data access through smart phones or tablets
- Reporting by e-mails
- Local data stored in an SD card memory
- Various network protocols are usable: TCP/IP, SMTP client, HTTP server, FTP client and server, Modbus/TCP master and slave
- R8 Series remote I/O modules available to accept a wide variety of field signals

**Enhanced Functions with Flexible Configurations**
Web Browsed Views Designed for Mobiles

Customized Web Browser Views

DATA VIEW BY HTML
Example using the DL8 original tags

GRAPHIC VIEW
Example using JavaScript

I/O Mapping by Modbus/TCP Master Function

TYPICAL APPLICATIONS

• Event alert
• Remote monitoring and operation
• Labor-saving maintenance
• Material refilling schedule management
• Predictive and preventive maintenance
SC100/SC200 Series
Multi-Function PID Controller

Highly Visible Color Graphic LCD
Intuitive Touch Panel Operation

- Two loops of PID control
- 2 x universal inputs, 4 x analog inputs, 5 x contact or pulse inputs, 1 x high speed pulse input
- DCS in instrument format
- Auto tuning function
- Ideal for replacing existing instruments
- High reliability for demanding process use – Built-in manual loader with enhanced security features
- Host communication via Modbus Ethernet TCP/IP or RS-485 RTU
- Peer-to-peer communication via NestBus to expand number of I/Os
- IP55 front panel

Operation and Engineering Views

Powerful Engineering Tools

- **PC Configuration Software SCCFG**
  Used to configure display setting.

- **Loop Configuration Builder Software SFEW3E**
  Used to program advanced computation and sequential control function block setting.
DCS IN INSTRUMENT FORMAT – Advanced Computation and Sequential Control Functions

The control and computation functions are achieved by combining a wide variety of basic to advanced function blocks, which are normally found only in DCS systems, 2 PID blocks, 48 computation blocks and 12 sequential control blocks (1068 commands) are available for all versions of the SC Series, applicable to a wide range of application fields.

**Function Block Structure**

**Control Blocks**
- Basic PID
- Advanced PID
- Manual loader
- Ratio setting
- Indicator

**Operation Blocks**
- Addition / Subtraction
- Division
- Square root extractor
- Absolute value
- Non-linear gain
- Deadband
- Low-end output
- Temperature / pressure compensation
- First order lag
- Ramp program
- Dead time compensation
- Dead time accumulation
- Rate of Change Limit
- High/low limit
- Deviation limit
- Input selector
- Max value selector
- Min value selector
- Parameter selector

**Filters**
- First order lag
- First order lag with two time constants
- Ramp buffer
- Mean average
- Moving average
- Dead time compensation
- Dead time accumulation
- Rate of Change Limit
- Signal Limiters
- High/low limit
- Deviation limit

**Signal Selectors**
- Input selector
- Max value selector
- Min value selector
- Parameter selector

**Math Functions**
- Addition / Subtraction
- Multiplication
- Division
- Square root extractor
- Absolute value
- Non-linear gain
- Deadband

**Process Functions**
- Linearizer
- Ramp program
- Non-linear gain
- Deadband
- Low-end cutout
- Temperature / pressure compensation

**Alarm**
- High/low alarm
- Deviation alarm
- Rate of change alarm
- Parameter setter
- Numerical converter
- Analog/digital converter
- Analog/digital converter
- Signal hold
- (max, min, momentary)

**Others**
- Parameter setter
- Manual loader
- Ratio setting
- Indicator
- Numeric converter
- Weight totalizer
- Analog / pulse duration converter
- Signal hold

**Sequential Control**
- Timer
- Counter
- Batch Program

**Field Terminal Blocks**

**Excellence Expandability – Peer-to-peer and Host Communication**

The SC200/SC210 has Modbus (Ethernet TCP/IP or RS-485 RTU) which enables easy connection to logging or SCADA systems on a host PC for supervising and controlling the local I/O data.

In addition, the RS-485 ‘NestBus’ enables peer-to-peer communication with other controllers and I/O devices for flexibility of I/O points.

**Expanded System Configuration Example**

**Temperature Controllers**

**TC10 Series**
- Universal input configurable to T/C, RTD, DC current or voltage independently
- Discrete input for remote trigger
- Clamp-on current sensor input to detect wire breakdown or overload
- Modbus-RTU slave

**TC10NM**
- 1/8 DIN size
- One PID loop

**TC10EM**
- 1/4 DIN size
- Two PID loops
**MSP / MRP Series**

Open Network Capable Linear / Rotary Motion Actuator

- High resolution positioning for superior control
- Built-in feedback positioner and electric limiter
- Brushless stepping motor assures long-life operation
- 1/1000 resolution
- Optional network interface with CC-Link, DeviceNet

**Linear and Rotary Actuators for Valve and Machinery Control**

<table>
<thead>
<tr>
<th>MSP4</th>
<th>MSP5</th>
<th>MSP6</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="MSP4 Diagram" /></td>
<td><img src="image2" alt="MSP5 Diagram" /></td>
<td><img src="image3" alt="MSP6 Diagram" /></td>
</tr>
<tr>
<td>Thrust</td>
<td>Thrust</td>
<td>Thrust</td>
</tr>
<tr>
<td>150 N</td>
<td>300 N</td>
<td>500 N</td>
</tr>
<tr>
<td>300 N</td>
<td>500 N</td>
<td>700 N</td>
</tr>
<tr>
<td>600 N</td>
<td>1200 N</td>
<td>1500 N</td>
</tr>
<tr>
<td>33.7 lbf</td>
<td>67 lbf</td>
<td>112 lbf</td>
</tr>
<tr>
<td>117 lbf</td>
<td>157 lbf</td>
<td>1800 lbf</td>
</tr>
<tr>
<td>135 lbf</td>
<td>270 lbf</td>
<td>337 lbf</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Torque</th>
<th>Torque</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 N·m</td>
<td>10 N·m</td>
<td>15 N·m</td>
</tr>
<tr>
<td>10 N·m</td>
<td>16 N·m</td>
<td>24 N·m</td>
</tr>
<tr>
<td>24 N·m</td>
<td>33 N·m</td>
<td>33 N·m</td>
</tr>
<tr>
<td>3.69 lbf·ft</td>
<td>7.38 lbf·ft</td>
<td>11.8 lbf·ft</td>
</tr>
<tr>
<td>11.8 lbf·ft</td>
<td>17.7 lbf·ft</td>
<td>24.3 lbf·ft</td>
</tr>
<tr>
<td>7.38 lbf·ft</td>
<td>11.8 lbf·ft</td>
<td>24.3 lbf·ft</td>
</tr>
<tr>
<td>24 N·m</td>
<td>33 N·m</td>
<td>33 N·m</td>
</tr>
<tr>
<td>3.69 lbf·ft</td>
<td>7.38 lbf·ft</td>
<td>11.8 lbf·ft</td>
</tr>
<tr>
<td>11.8 lbf·ft</td>
<td>17.7 lbf·ft</td>
<td>24.3 lbf·ft</td>
</tr>
<tr>
<td>7.38 lbf·ft</td>
<td>11.8 lbf·ft</td>
<td>24.3 lbf·ft</td>
</tr>
</tbody>
</table>
PSN /PRP Series
Linear / Rotary Motion Actuator

- Brushless angle sensor eliminates problems with mechanical potentiometer feedback sensing
- Opening/closing speed, split range and failsafe position programmable by hand-held programmer
- Internal temperature sensor to control heater in cold climate and to prevent motor from overheating
- Forced-open/closed contacts for remote or manual override
- Lloyd's Register type approved (PRP)

PSN / PRP Specifications

- PSN1
  - 2500 N
  - 562 lbf
  - 40 N·m
  - 29.5 lbf·ft
  - IP66

- PSN3
  - 3000 N
  - 674 lbf
  - 100 N·m
  - 73.8 lbf·ft
  - IP66

- CSP
  - 5000 N
  - 1124 lbf
  - 200 N·m
  - 148 lbf·ft
  - IP66

- PRP-0
  - 100 N·m
  - 73.8 lbf·ft
  - IP66

- PRP-1
  - 200 N·m
  - 148 lbf·ft
  - IP66

- PRP-2*
  - 600 N·m
  - 443 lbf·ft
  - IP66

* The PRP-2 is available in Autumn 2018. Specifications are subject to change without notice.

For OEM

Environmentally Resistant CPU
RJ-45 Connector
M3 Screw Terminal
Brushless Angle Sensor
Wiring Conduit
Screw
Sealing Spring
Stem Button
Indicator
Stem for manual operation
Transparent image of PSN1

EA Series
Rotary Motion Actuator

- Reversible AC motor
- Inchng and proportional control
- High vibration resistance

For OEM

Focused New Products for Japan
M-System Company
Electric Actuator Application Examples

**BUILDING HVAC**
Cold/Hot Water Control for Fan Coil Unit

**WATER TREATMENT**
Chemical Injection Ratio Control

**ENVIRONMENTAL TEST CHAMBER**
Brine Temperature Control in an Environmental Test Chamber

**SHIP**
Diesel Engine Cooling System

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**PAPER**
Paper Profile Control

**FOOD**
Gas Flow Control in Combustion System for Roasting Machine
VOS2T / VOS2T-R 2-wire Position Transmitters

- Detecting mechanical position of pneumatic and electric actuators to send a proportional 4-20 mA signal
- Linear motion type (±22.5°) or rotary motion type (±45°)
- Brushless design for long lasting reliability
- Lightweight & compact
- IP66

MEX Series I/I Positioners

- Positioning of valve and damper can be controlled with a direct/reverse turn motor
- Remote 4-20 mA positioning input, SSR or 24 V AC dry contact switch output
- Adjustable deadband, timer, electronic limits and other additional functions depending upon models
- Modbus and LonWorks for position setting available

Manual Loading Stations

- Holding control signals in case of computer or DCS failure
- ON/OFF signal input or analog signal input
- Manual control with an external Up/Down contact signal or with the front manual loader
- Ramp rate adjustable
**M-Rester Series**

**M-System Surge Protectors Absorb Only the Lightning Surges With No Interruption of the Instrumentation Signal**

- Protecting sensors, signal and power lines, communication networks
- Excellent protection by multi-stage SPD: extra protection by a series resistance with diodes to limit current flow in addition to the discharge element at the first stage
- Each model identified by specific sensors or devices to be protected; with carefully chosen specifications to provide maximum protection
- One-port surge protectors are also available for power line protection

### Superior Selection Across a Broad Range of Sensor / Signal Types and Applications

- 4-20 mA & pulse signals
- Thermocouple
- RTD
- Potentiometer
- Strain gauge
- Frequency pickup

- RS-485 / RS-422
- Ethernet
- DeviceNet
- PROFIBUS
- LonWorks

- Multi-stage SPD for AC/DC power supply lines up to 30 amps
- One-port SPD
- Class I and III
- Life monitor function for health testing
- Plug-in base wiring for easy maintenance
- Ultra-slim design for high density mounting
- Hazardous location approvals

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**Life Monitor & Surge Counter**

**MAA-100 / MAA-200 / MAAC-100 / MAAC-200**

- Protects 120 Vac / 240 Vac power supply lines for up to 5 amps load current
- Life monitor function helps you to decide when you should replace the surge protector, reducing maintenance and preventing downtime.
- Alarm contact output to alert externally the surge protector’s health

**One-Port SPD for Power Supply**

**MAKF / MAT2 / MAT3**

- Connected in parallel between the power and ground lines regardless of load current
- Thermal breaker ensures degraded head element to be automatically separated from the power lines to prevent overheating.
- MAT2 / MAT3 applicable to three-phase power line in single module
Plug-in Base Mounted

MDP Series
- Lightweight, easy-to-handle, plug-in construction
- Head element can be removed and tested without disconnecting wires.
- Base socket connects input/output signals when the head element is removed.

Ultra-Slim Housing

MD7 Series
- High density mounting with 7 mm wide modules
- Max. discharge current 20 kA (8/20 μsec.)
- Floating mode for the field to avoid ground loops
- DIN rail mounting / grounding

Battery Powered Health Testing

MDPA-24
- Protects 4-20 mA & pulse signals
- Battery powered life monitoring function includes a 'Test' button with indicators alerting panel inspectors of the surge protector’s health.

Field Transmitter Cable Conduit Mount

MD6N-24 / MD6T-24 / MD6P-24
- Protects 4-20 mA & pulse signals
- Directly mountable to the cable conduit of 2-wire transmitters and other field devices in an outdoor enclosure

8-port Pulse Signal Use

MDR2
- Protection for semiconductor switches of discrete outputs
- PNP or NPN connection
- Applicable to multi analog signals (non-isolated between channels)
- Space saving with multi-channel protectors
- LED monitor indicating degradation of voltage limiter, driven by discrete I/O signal without auxiliary power supply

PoE Plus / 1000BASE-T Ethernet Use

MDCAT
- Power-over-Ethernet compatible
- 1000BASE-T / 100BASE-TX / 10BASE-T
- Ideal to protect network devices powered from Ethernet such as webcams
- Conforms to IEC 61643-21, Categories C1, C2

APPLICATION

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<th>MDP SERIES</th>
<th>MD7 SERIES</th>
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<td>RTD transmitter</td>
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http://www.m-system.com
FOCUSED NEW PRODUCTS FOR JAPAN

Products introduced in this section are only available in Japanese market or for limited release outside Japan.

HVAC Controllers for Energy-Efficient Building Managing System

- Open protocol network based
- Intelligent controller, network gateway (master) modules and economical I/O modules can be freely selected.
- DDC equipped with convenient control functions
- IEC-61131 Function Blocks

LED Tubes for Replacing Fluorescent Lamps without Modification

- Direct replacement of existing lamps using the existing lamp holder
- Universally adaptable to glow tube starter, rapid start and inverter ballast types, single and dual-lamp lighting fixtures
- Energy-saving, long-life LED lamp
- Glass-free and mercury-free design for safe working condition and non-hazardous waste disposal
Wireless I/O System for IoT

- Convenient wireless converter/gateways to collect field sensor data
- Remote monitoring using your mobile terminals via the internet
- Abnormality can be alerted via e-mails

Multi-port Gateway IB10W2
- 920 MHz ISM band gateway and Wi-Fi access point in one unit

Wireless Gateway Module R3-NW1 / R3-NMW1
- R3 Series Remote I/O interfacing to 920 MHz ISM band
- Gateway to Modbus-RTU (R3-NMW1)

Wireless Gateway Module R3-NW1 / R3-NMW1
- R3 Series Remote I/O interfacing to 920 MHz ISM band
- Gateway to Modbus-RTU (R3-NMW1)

Wireless I/O Module WL40W1/ WL40MW1
- Universal input type
- Discrete I/O type
- Power monitor type
- Gateway to Modbus-RTU (WL40MW1)
We have not discontinued our products without compatible replacements.

We do not easily stop manufacturing products once released in the market, without trying to supply compatible products of equal or better performance to replace with, because we believe it is an important responsibility as the world’s leading manufacturer to continue serving people who maintain the performance of process control systems. Visit M-System web site and find specifications and instruction manuals no matter how old the product, downloadable online.

We supply ready-to-install products in fast and precise delivery time.

The standard manufacturing lead time for most M-System products with customer’s specified range is 5 days. But more than quarter of the total shipments are delivered in shorter lead time, and Quick Service Center expedites more than 600 orders every month on the same day or the next day after ordered.

So do not worry too much about the standard delivery. Just let us know ‘When’ you need one of our products. They are calibrated for your exact needs with no extra charge.

Once a delivery time is promised, you can of course count on us to deliver them precisely on time.

We strive toward complete offerings with special specification products.

We offer an enormous selection of signal conditioners and remote I/Os, power monitors, paperless recorders, panel meters, surge suppressors and valve actuators, and even that may not be enough for your particular needs.

But do not give up easily. Just ask us. We continue to work toward full product offerings with special specifications without additional charge, starting with major product series. In addition, we put our effort to make them into standard selections so that they are more easily accessible to you and everyone else in the future.

We offer continued reassurance. Always Customers First.

Based on our “Customer Creed” policy, we go beyond normal manufacturers’ obligations with our special repair service. If you suspect damage to a product by mistakes in handling, contact our Customer Center. We would be happy to check and repair it without charge.

Consult M-System web site for detailed terms and conditions applicable to this service.
Locations

JAPAN

Osaka Headquarters, International Department & Factory

Kansai Branch Office (Osaka)

Sendai Sales Office

Kanto Branch Office (Tokyo)

Chubu Branch Office (Nagoya)

Mie Factory

Kyushu Sales Office

Kyoto Techno Center

Type testing and evaluation facilities
- VCCI (Japan) registered anechoic chamber
- 6 m² shielded room capable of conducting multiple tests at once

Kyoto Research Center & Factory

- Second manufacturing location inspired by BCP revised after East Japan Earthquake in 2011
- Showcase plant utilizing M-System’s BA controllers

GLOBAL SALES NETWORK

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South Africa

Turkey

M-System India Pvt. Ltd.

MG Korea Co., Ltd.

M-System Co., Ltd.

M-System China Co., Ltd. (Shanghai, Guangzhou)

MGTEC Asia Pte. Ltd.

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Brazil

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