

Operational Management Software for Factory IoT

# FANUC MT-LINK*i*





# What You Want on the Factory Floor

## CASE.1

### Make **routine operations** quicker and easier

- | Create daily and monthly reports with ease
- | Make equipment\*\* checks less labor-intensive
- | Go paperless for all kinds of data

## CASE.2

### Monitor **operations** remotely

- | Be notified of alarms even when away from the factory
- | Reduce total duration of brief stoppages
- | Spend less time standing over equipment\*\*

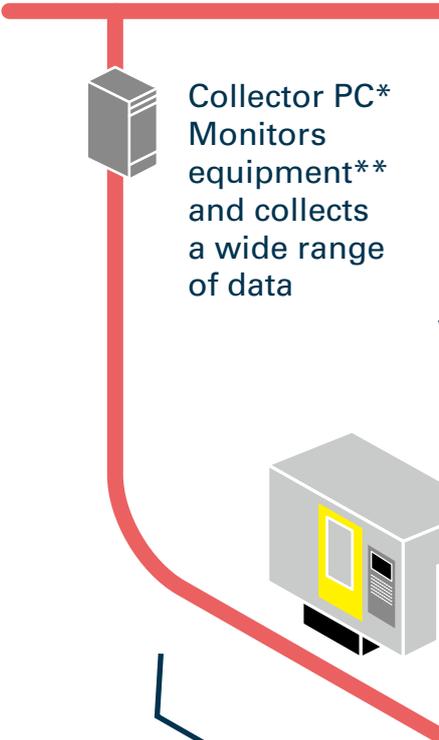
## CASE.3

### Analyze **operational results**

- | Do more with regularly collected data
- | Identify reasons for different operating rates across lines
- | Aggregate operational/production results more easily



Server PC\*  
Stores data collected by Collector PCs to a database, and uses web server functionality to display equipment\*\* status in a browser



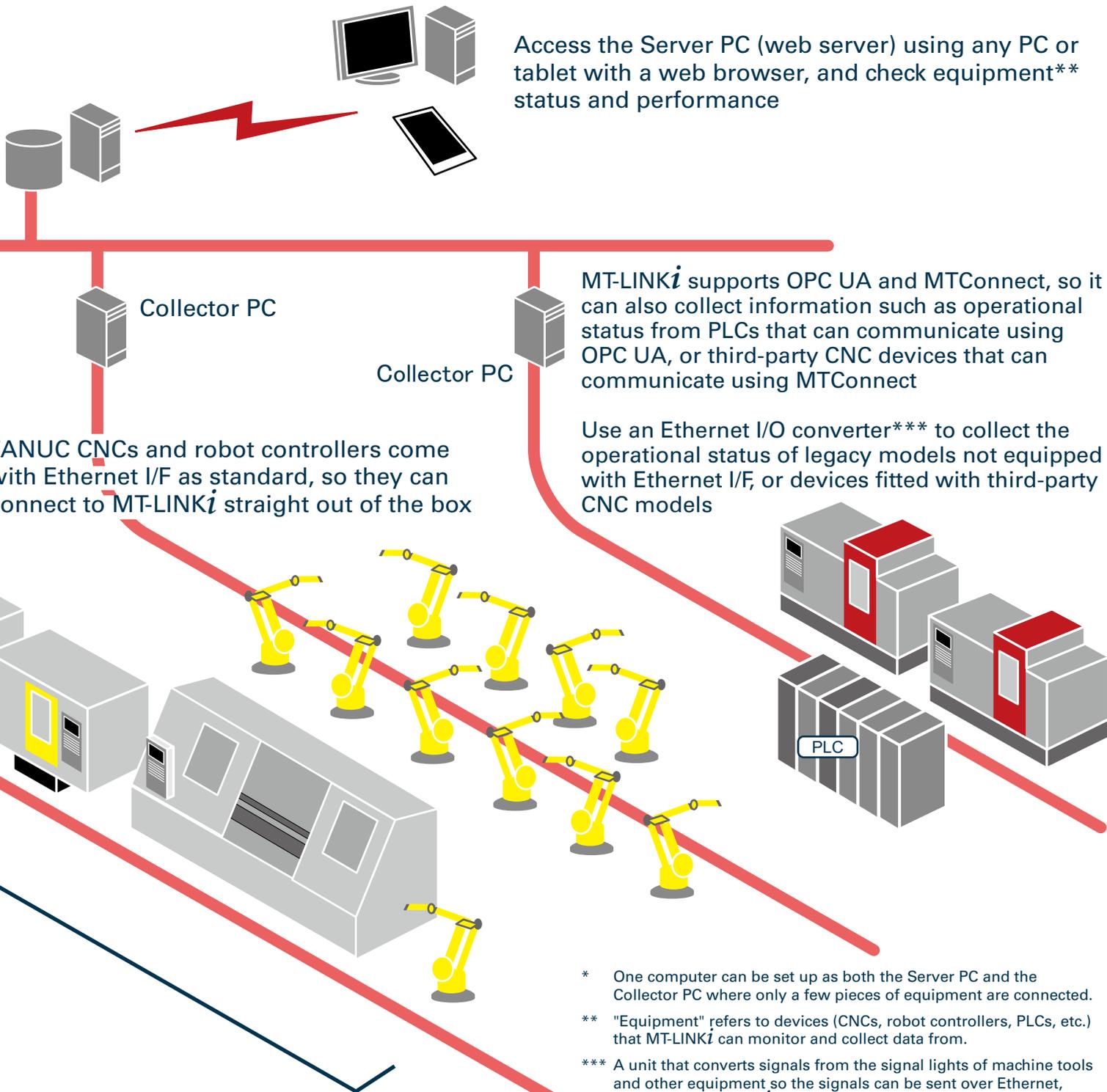
Collector PC\*  
Monitors equipment\*\* and collects a wide range of data

MT-LINK<sup>i</sup> can "group" multiple pieces of equipment\*\* such as CNC machines and robot controllers into units, like process steps or lines, and represent a wide range of data visually

# MT-LINK*i* Makes It Possible

MT-LINK*i* is software that runs on computers (Server PCs and Collector PCs)  
It supports Connection, Collection, and Visualization throughout the factory

- Reduced downtime (monitor operations)
- Optimized operations (understand operating rates)
- Improved production capacity (analyze operating times)
- Increased production planning accuracy (leverage operational/production results)
- Traceability (analyze causes of alarms and defective parts)
- Go paperless for data collection
- Preventive maintenance (analyze device data)



\* One computer can be set up as both the Server PC and the Collector PC where only a few pieces of equipment are connected.  
\*\* "Equipment" refers to devices (CNCs, robot controllers, PLCs, etc.) that MT-LINK*i* can monitor and collect data from.  
\*\*\* A unit that converts signals from the signal lights of machine tools and other equipment so the signals can be sent over Ethernet, and notifies MT-LINK*i* of the operational status of the equipment. Contact our sales department for details.

# What You Can Do With MT-LINK*i*

## Overview monitoring

Prepare a diagram of the factory floor and place icons to visualize the operational status of the whole factory

**Monitoring - Overlook**

There are alarms ( 4 Items)

Auto layout feed: OFF 10 sec 20 sec 30 sec

Layout01

Full Screen

Hide

|            |    |        |
|------------|----|--------|
| OPERATE    | 11 | 68.8%  |
| DISCONNECT | 0  | 0.0%   |
| ALARM      | 4  | 25.0%  |
| EMERGENCY  | 0  | 0.0%   |
| SUSPEND    | 0  | 0.0%   |
| STOP       | 1  | 6.2%   |
| MANUAL     | 0  | 0.0%   |
| WARMUP     | 0  | 0.0%   |
| TOTAL      | 16 | 100.0% |

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## Equipment monitoring

Click an icon to display operational status or alarms for groups or individual pieces of equipment

**Monitoring - Equipment monitoring [Equipment0002]**

Start Time range: 2016/08/19 13:42:21 End Time range: 2016/08/20 13:42:21

Operational Results

Production Results

1 / 1

Alarm

11:57:04

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**Monitoring - Equipment monitoring**

There are alarms ( 4 Items)

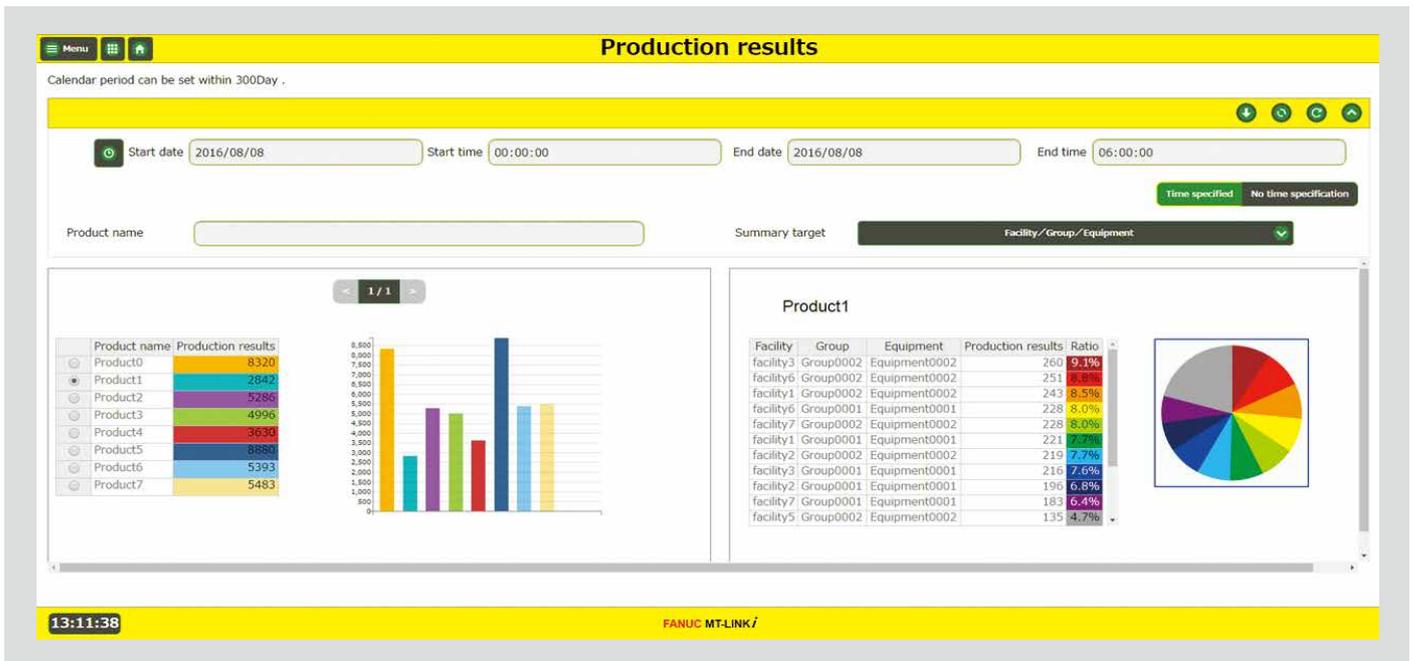
Auto page feed: OFF 10 sec 20 sec 30 sec

| Equipment0001     | Equipment0002   | Equipment0003  | Equipment0004     | Equipment0005     |
|-------------------|-----------------|----------------|-------------------|-------------------|
| OPERATE           | ALARM           | STOP           | OPERATE           | OPERATE           |
| OPERATE on        | OPERATE off     | OPERATE off    | OPERATE on        | OPERATE on        |
| DISCONNECT off    | DISCONNECT off  | DISCONNECT off | DISCONNECT off    | DISCONNECT off    |
| ALARM off         | ALARM on        | ALARM off      | ALARM off         | ALARM off         |
| EMERGENCY off     | EMERGENCY off   | EMERGENCY off  | EMERGENCY off     | EMERGENCY off     |
| STOP off          | STOP off        | STOP on        | STOP off          | STOP off          |
| condition OPERATE | condition ALARM | condition STOP | condition OPERATE | condition OPERATE |

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## Operational results

- Operational results by group as a graph
- Detailed analysis of operational status of every device
- Output, number of production schedules, and completion rates as a graph

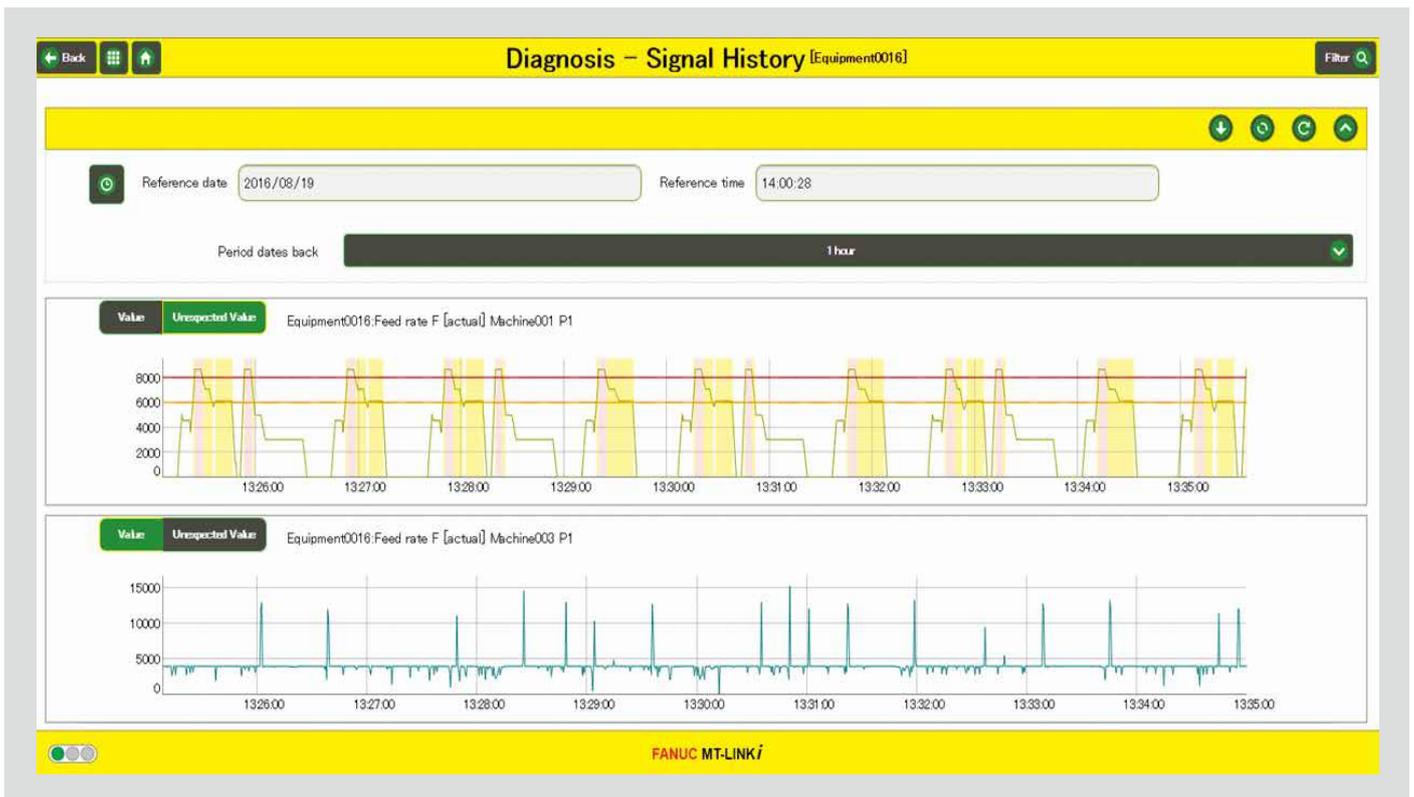


## Signal monitoring

- Display signal status in real time
- Display can be based on preset threshold values

## Signal history

- Display signal changes in collected data as a graph
- Data can be output in CSV format



# Data MT-LINK<sup>i</sup> Can Collect

## CNC signals

A range of data from CNCs, PMCs, servos, etc.

- CNC status signals (OP, STL, SPL, AL, EMG, CUT, SBK, etc.)
- CNC mode
- Running programs (name, comments)
- Spindle speed
- Feedrate
- Number of parts produced
- Weld time, operation time, cutting time
- User data (PMC data, macro variables)



## Data for preventive maintenance

- Servo/spindle motor insulation resistance
- Servo/spindle motor temperature
- Total number of spindle rotations
- Fan replacement information (CNC control unit, amplifier, power supply)
- Number of fan rotations (CNC control unit, amplifier, power supply)
- Battery status (CNC control unit, amplifier, detector)

## Robot controller signals

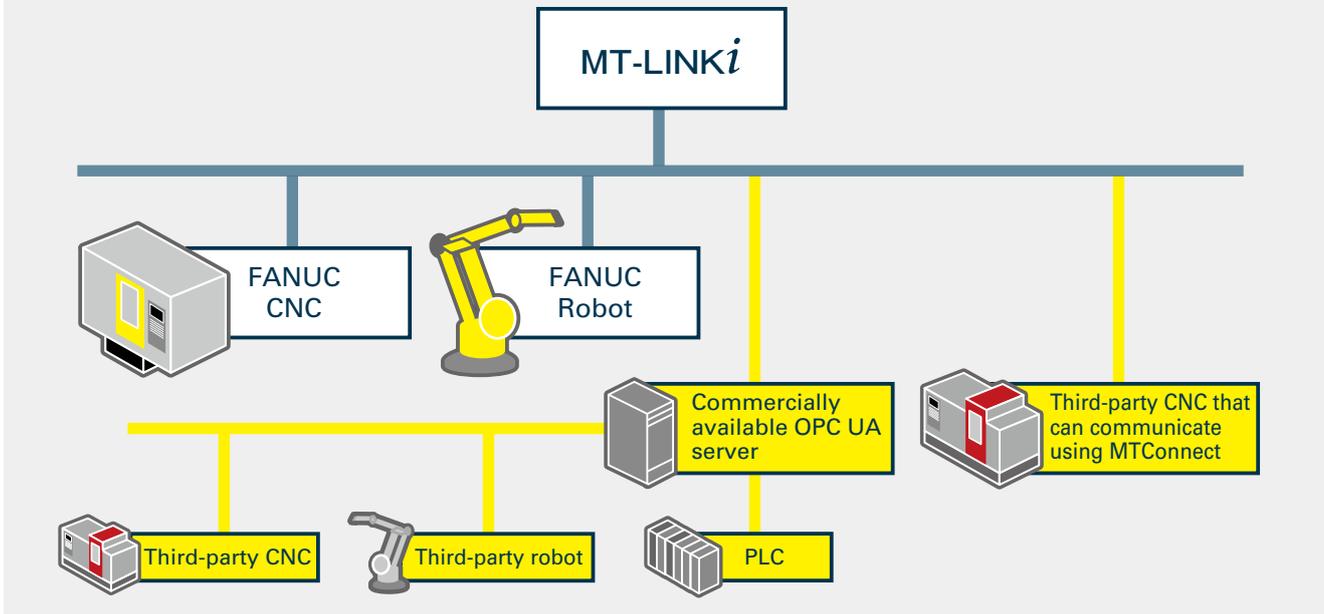
- Remote signals
- Operating signals
- Hold signal
- Alarm signal
- Battery abnormality signal
- Teach pendant enabled signal
- Mode
- Robot status
- Alarm status



Available data depends on model of CNC/robot, system configuration, selected options, etc. Collection of large volumes of data may affect performance. If this happens, it may be necessary to decrease the volume of data collected or the number of devices monitored.

# Supports OPC UA/MTConnect

MT-LINK*i* can collect operational status data using OPC UA/MTConnect, allowing it to collect data from PLCs that can communicate using OPC UA, and from third-party CNC machine tools that can communicate using MTConnect



## FANUC CNCs that can connect to MT-LINK*i*

| Current models   | Ethernet I/O converter |                 | Ethernet | Embedded Ethernet |
|--|------------------------|-----------------|----------|-------------------|
|  | I/O signals            | RS-232-C(DPRNT) |          |                   |
| Series 0 <i>i</i> -D/F                                       | ✓                      | ✓               | ✓        | ✓*1               |
| Series 30 <i>i</i> /31 <i>i</i> /32 <i>i</i> /35 <i>i</i> -B | ✓                      | ✓               | ✓        | ✓                 |
| Power Motion <i>i</i> -A                                     | ✓                      | ✓               | ✓        | ✓                 |

| Legacy models                                   | Ethernet I/O converter |                 | Ethernet | Embedded Ethernet |
|---|------------------------|-----------------|----------|-------------------|
|   | I/O signals            | RS-232-C(DPRNT) |          |                   |
| Series 0  | ✓                      |                 |          |                   |
| Series 15                                       | ✓                      | ✓               |          |                   |
| Series 16/18/20/21                              | ✓                      | ✓               |          |                   |
| Series 16 <i>i</i> /18 <i>i</i> /21 <i>i</i> -A | ✓                      | ✓               | *3       |                   |
| Series 16 <i>i</i> /18 <i>i</i> /21 <i>i</i> -B | ✓                      | ✓               | *3       | ✓*2               |
| Series 15 <i>i</i>                              | ✓                      | ✓               | *3       |                   |
| Power Mate <i>i</i> -D/H                        | ✓                      | ✓               | *3       |                   |
| Series 0 <i>i</i> -A                            | ✓                      | ✓               |          |                   |
| Series 0 <i>i</i> -B/C                          | ✓                      | ✓               | *3       |                   |
| Series 30 <i>i</i> /31 <i>i</i> /32 <i>i</i> -A | ✓                      | ✓               | *3       | ✓*2               |

- Ethernet: Models marked with "✓" can have Ethernet added if they have a free NC slot. \*3: Please contact our sales department.
- Embedded Ethernet: \*1: Embedded Ethernet was a hardware option for the FS0*i*-D immediately after it was released, so some machines of this model do not have embedded Ethernet. It now comes with embedded Ethernet as standard.
- \*2: Embedded Ethernet is a hardware option for FS32*i*-A and FS21*i*-B models, meaning that some machines of these models do not have embedded Ethernet.
- Please check if there are free ports for embedded Ethernet and RS-232-C.
- The custom macro option is required for RS-232-C.
- (Please ask the machine-tool manufacturer to add this option.)

## FANUC robot controllers that can connect to MT-LINK*i*

Robot series R-30*i*B/R-30*i*B Mate

Robot series R-30*i*A/R-30*i*A Mate

Robot series R-J3*i*B (7D80/45, 7D81/09, 7D82/01, and later versions)

Robot series R-J3*i*B Mate (7D91/01 and later versions)

# MT-LINK*i* Operating Environment

**Server PC** (Stores collected data in a database and delivers it to a client via a web server)

|                             |   |
|-----------------------------|---|
| Supported operating systems | Windows 7 Professional SP1 64bit (Japanese/English/Simplified Chinese)<br>Windows Server 2012 R2 Standard 64bit (Japanese/English/Simplified Chinese)<br>Windows 10 Pro 64bit (Japanese/English/Simplified Chinese) |
| CPU                         | Intel® Core™ i7 Processor 3.60GHz 4-core/8-thread or more   |
| Memory                      | 32GB or more  |
| Hard disk capacity          | 1.0 TB or more (assuming collection of 1 year of data from about 100 pieces of equipment)   |

**Collector PC** (Monitors equipment and collects a variety of data)

|                             |   |
|-----------------------------|---|
| Supported operating systems | Windows 7 Professional SP1 64bit (Japanese/English/Simplified Chinese)<br>Windows Server 2012 R2 Standard 64bit (Japanese/English/Simplified Chinese)<br>Windows 10 Pro 64bit (Japanese/English/Simplified Chinese) |
| CPU                         | Intel® Core™ i3 Processor or higher (Intel® Core™ i5 Processor or higher recommended)   |
| Memory                      | 4 GB or more (8 GB or more recommended)   |
| Hard disk capacity          | 200 MB or more  |

**Server PC/Collector PC** (One computer can serve as both Collector PC and Server PC when monitoring up to 25 devices)

|                             |  |
|-----------------------------|--|
| Supported operating systems | Same as the Server PC  |
| CPU                         | Intel® Core™ i5 Processor 3.40GHz 4-core/4-thread or more                    |
| Memory                      | 8 GB or more   |
| Hard disk capacity          | 260 GB or more (assuming collection of 1 year of data from about 25 devices) |

**Client PC/Tablet** (Accesses the Server PC web server to view equipment status and performance)

|             | Supported operating systems                           | Tested Web browsers            |
|-------------|---|--------------------------------|
| PC          | Windows 7 SP1<br>Windows Server 2012 R2<br>Windows 10 | Google Chrome (54.0)           |
| iPad mini 4 | iOS 10.0.1  | Google Chrome (54.0)<br>Safari |
| Nexus9      | Android 6.0.1   | Google Chrome (54.0)           |

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