FANUC Robot series

R-30*i*B Plus/R-30*i*B Mate Plus/R-30*i*B Compact Plus/
R-30*i*B Mini Plus CONTROLLER

MTConnect Adapter

OPERATOR'S MANUAL

B-84254EN/01

- **Original Instructions**

Thank you very much for purchasing FANUC Robot.
Before using the Robot, be sure to read the "FANUC Robot series SAFETY HANDBOOK (B-80687EN)" and understand the content.

The products in this manual are controlled based on Japan's “Foreign Exchange and Foreign Trade Law". The export from Japan may be subject to an export license by the government of Japan. Further, re-export to another country may be subject to the license of the government of the country from where the product is re-exported. Furthermore, the product may also be controlled by re-export regulations of the United States government. Should you wish to export or re-export these products, please contact FANUC for advice.

In this manual, we endeavor to include all pertinent matters. There are, however, a very large number of operations that must not or cannot be performed, and if the manual contained them all, it would be enormous in volume. It is, therefore, requested to assume that any operations that are not explicitly described as being possible are "not possible".

SAFETY PRECAUTIONS

This chapter describes the precautions which must be followed to enable the safe use of the robot. Before using the robot, be sure to read this chapter thoroughly.

For detailed functions of the robot operation, read the relevant operator's manual to understand fully its specification.

For the safety of the operator and the system, follow all safety precautions when operating a robot and its peripheral equipment installed in a work cell. For safe use of FANUC robots, you must read and follow the instructions in the *FANUC Robot series SAFETY HANDBOOK (B-80687EN)*.

PERSONNEL

Personnel can be classified as follows:

Operator:

- Turns the robot controller power on/off
- Starts the robot program from the operator panel

Programmer or Teaching operator:

- Operates the robot
- Teaches the robot inside the safeguarded space

Maintenance technician:

- Operates the robot
- Teaches the robot inside the safeguarded space
- Performs maintenance (repair, adjustment, replacement)

The operator is not allowed to work in the safeguarded space.

The programmer or teaching operator and maintenance technician are allowed to work in the safeguarded space. Work carried out in the safeguarded space include transportation, installation, teaching, adjustment, and maintenance.

To work inside the safeguarded space, the person must be trained on proper robot operation.

Table s-1 lists the work outside the safeguarded space. In this table, the symbol "o" means the work is allowed to be carried out by the specified personnel.

Table s-1 Work Performed Outside the Safeguarded Space

	Operator	Programmer or Teaching Operator	Maintenance Technician
Turn power ON/OFF to Robot controller	o	o	o
Select operating mode (AUTO, T1, T2)		o	o
Select remote/local mode		o	o
Select robot program with teach pendant		o	o
Select robot program with external device		o	o

Start robot program with operator's panel	o	o	o
Start robot program with teach pendant		o	o
Reset alarm with operator's panel		o	o
Reset alarm with teach pendant		o	o
Set data on teach pendant		o	o
Teaching with teach pendant		o	o
Emergency stop with operator's panel	o	o	o
Emergency stop with teach pendant	o	o	o
Operator Panel maintenance			o
Teach Pendant maintenance			o

During robot operation, programming and maintenance, the operator, programmer, teaching operator and maintenance engineer take care of their own safety using at least the following safety protectors:

- Use clothes, uniform, overall adequate for the work
- Safety shoes
- Helmet

DEFINITION OF SAFETY NOTATIONS

To ensure the safety of workers and prevent damage to the machine, this manual indicates each precaution on safety according to its severity. Read the contents of each **Warning** and **Caution** before attempting to use the robot.

⚠WARNING

Indicates a hazard resulting in the death or serious injury of the user could occur if he or she fails to follow the approved procedure.

⚠CAUTION

Indicates a hazard resulting in the injury of the user or damage to equipment could occur if the user fails to follow the approved procedure.

Note

Indicates a supplementary explanation not related to any WARNING or CAUTION.

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1 MTConnect ADAPTER OVERVIEW

The FANUC Robot MTConnect® Adapter option provides a native MTConnect adapter on the robot controller. This enables the robot controller to send MTConnect standardized data items directly to the widely deployed, open source C++ agent hosted by the MTConnect Institute. To use this function, MTConnect Adapter (R914) is required.

The MTConnect Adapter communicates with the MTConnect C++ Agent over an Ethernet network.

Currently, the following MTConnect data items are available from the Robot MTConnect Adapter:

- AVAILABILITY
- EMERGENCY_STOP
- FUNCTIONAL_MODE
- CONTROLLER_MODE
- EXECUTION
- PROGRAM
- LINE_NUMBER
- PATH_FEEDRATE_OVERRIDE
- SYSTEM (Alarm condition)

Please see Chapter 2, SYSTEM OVERVIEW for additional details about requirements, supported data items, and limitations.

2 SYSTEM OVERVIEW

2.1 OVERVIEW OF MTConnect

MTConnect is a data exchange standard that defines a vocabulary and model for data produced by manufacturing equipment. This ensures that data from varying device vendors is uniform and allows asset owners to focus on analyzing the data instead of spending time and resources translating data from proprietary interfaces.

The MTConnect Adapter option enables the robot controller to participate in this uniform information exchange by writing standardized data directly to the MTConnect C++ Agent.

2.2 OVERVIEW OF MTConnect ADAPTER OPTION

The Robot MTConnect Adapter interface consists of the following components:

- Robot Controller with MTConnect Adapter option
- Ethernet network
- PC or server hosting the MTConnect C++ Agent
- Robot Device XML configuration file

The Robot MTConnect Adapter requires no configuration in the robot controller. The adapter starts listening for an incoming agent connection whenever the robot controller enters COLD start.

The Robot MTConnect Adapter must be properly configured in the agent's configuration settings. Please see Section 3.3, MTConnect C++ AGENT CONFIGURATION for details about configuring the MTConnect C++ agent and the FANUC Robot device configuration XML file.

The robot MTConnect Adapter writes data to the agent at two second update intervals. The adapter is always processing internal data items for changes but does not buffer data that is changed between agent updates. Only the latest values are sent at the time of writing to the agent.

2.3 MTConnect ADAPTER SPECIFICATION

Table 2.3 Adapter Specification

Item	Description
Robot MTConnect Adapter Software Version	V1.0.0
Number of Agent Connections	1
Update frequency	2 seconds
Supported Ethernet Ports	CD38A (Port 1), CD38B (Port 2)
TCP Listening Port	7878

Item	Description
Robot Configuration	No configuration of the robot adapter is required. Supported data items will always be written when a connection is established.
Agent Configuration	Robot MTConnect Device Configuration XML file: `fanuc_mtca_v010000.xml` This xml file is available in the following versions, and later: ● V9.10P/33 (7DF1) ● V9.30P/12 (7DF3) ● V9.40P/05 (7DF5) The Robot MTConnect Device Configuration XML file can be copied to a selected device by using **MENU** > **File** > **F4 [BACKUP]** > **Com. Conf.**
Supported MTConnect Agent	MTConnect Agent C++ Agent Version 1.4.0.12 Earlier or later versions may be functional.

2.4 MTConnect ADAPTER ORDERING INFORMATION

Table 2.4 Adapter Ordering Information

Item	Description
Option Name	MTConnect Adapter
Ordering Specification	R914
Description	MTConnect Adapter software for use with the MTConnect C++ Agent.

2.5 MTConnect ADAPTER REQUIREMENTS

Supported Software Versions:

R-30*i*B Plus V9.10P/29 (7DF1) or later
R-30*i*B Plus V9.30P/08 (7DF3) or later

Supported MTconnect Agent running on a PC or server:

MTConnect Agent C++ Agent Version 1.4.0.12
Earlier or later versions may be functional.

2.6 MTConnect ADAPTER LIMITATIONS

The following limitations exist when using the FANUC Robot MTConnect Adapter:

- The MTConnect C++ Agent expects UTF-8 characters. The robot controller does not currently support UTF-8 character encoding. Special characters may be illegible when alarm text is written.
- The MTConnect Data Item configuration is predetermined and cannot be modified. Every item in the FANUC Robot device configuration XML file will be written to the agent.
- Timestamp is not supplied by the robot adapter. Timestamp is applied by the agent when data from the robot adapter is received.

2.7 MTConnect ADAPTER FEATURES

2.7.1 Listing of Supported MTConnect Data Items

Description of MTConnect Data Item categories:

SAMPLE

Data whose value changes with predictable frequency, therefore is streamed at a defined frequency.

Currently there are no SAMPLE data items supported by the robot MTConnect Adapter.

EVENT

Data whose value can change with unpredictable frequency.

CONDITION

Provides information reported by a piece of equipment describing its health and ability to function.

The following table provides a listing of MTConnect Data Items supported by the robot MTConnect Adapter and details about their meaning in the robot controller.

Table 2.7.1 (a) EVENT Category Data Items

Data Item	Description	Possible Values
AVAILABILITY	Reported by the MTConnect Agent to represent its ability to communicate with the robot MTConnect Adapter.	AVAILABLE UNAVAILABLE

Data Item	Description	Possible Values
EMERGENCY_STOP	Reports a summary of the robot controller e-stop signal status.	**ARMED** The emergency stop circuit is complete and the robot is allowed to operate. **TRIGGERED** The emergency stop circuit is open and the robot must cease operation.
FUNCTIONAL_MODE	Reports the state of the mode select switch.	T1 T2 AUTO **Note** These values are not compliant with MTConnect Specified values for FUNCTIONAL_MODE. The MTConnect C++ agent accepts these deviated values without error. Warning or error may occur in a Client application.
CONTROLLER_MODE	Reports `AUTOMATIC` or `MANUAL` based on the status of the mode select switch and the teach pendant enable switch.	**AUTOMATIC** Teach pendant enable switch is OFF, and mode select switch is in AUTO. **MANUAL** Teach pendant enable switch is ON, or mode select switch is not in AUTO.
EXECUTION	Reports the execution status of the currently selected (or most recently executed) program.	**ACTIVE** Program running, or robot run request accepted **STOPPED** Program stopped, or abort request received **INTERRUPTED** Program paused

Data Item	Description	Possible Values
PROGRAM	Displays the currently selected (or most recently executed) program name. This will update as the program calls into sub-programs.	
LINE_NUMBER	Reports the current line of program execution.	
PATH_FEEDRATE_OVERRIDE	The value of percent override in the robot controller.	0.0 - 100.0

Table 2.7.1 (b) CONDITION Category Data Items

Data Item	Description	Value
SYSTEM	Provides the error code (facility-code), error text, level, and severity of the currently active alarm. If no alarm exists, this data item reports blank.	**Level:** normal warning fault **Severity:** NONE WARN PAUSE.G PAUSE.L STOP.G STOP.L SERVO SERVO2 APBORT.G ABORT.L **Code and error text:** As displayed in the teach pendant status bar

If any of the data item values report as "UNAVAILABLE", this means an error has occurred in the robot MTConnect Adapter. Please see Chapter 4, DIAGNOSTICS AND TROUBLESHOOTING for details about diagnosing and reporting errors.

For additional details about the MTConnect Data Items, please refer to the associated version of the *MTConnect Standard*. At the time of this writing, MTConnect standards documents are free and publicly available through the MTConnect foundation.

3 CONFIGURATION

3.1 INTRODUCTION

The following sections describe the requirements for configuring the Robot MTConnect Adapter and the MTConnect C++ Agent.

3.2 ROBOT MTConnect ADAPTER CONFIGURATION

The robot controller must have a valid TCP/IP setting and be on an Ethernet network accessible by the MTConnect C++ Agent. Details on the robot Ethernet interfaces and TCP/IP configuration and diagnostics can be found in the *Internet Options Setup and Operations Manual (MAROUIN9010171E)* or the *Ethernet Function OPERATOR'S MANUAL (B-82974EN)*.

The Robot MTConnect Adapter will only listen for agent connections in COLD start.

The Robot configuration is static. Therefore, the only requirement is that the MTConnect C++ Agent is properly configured.

For details about troubleshooting MTConnect interface problems, please see Chapter 4, DIAGNOSTICS AND TROUBLESHOOTING.

3.3 MTConnect C++ AGENT CONFIGURATION

The MTConnect C++ Agent must be properly configured to communicate with the FANUC Robot MTConnect Adapter.

This consists of the following steps:

1. Obtain a supported version of the MTConnect C++ Agent.
2. Configure the agent to point to a target robot.
3. Update the agent's device XML file to include the robot device xml content.
4. Launch the agent and verify data is received from the robot adapter.

The following sections will describe the basic information required to get the agent running and communicating with the robot adapter. For additional details and examples about using the MTConnect C ++ Agent, please refer to the agent's readme files and other documentation made available by MTConnect.

3.3.1 Install MTConnect C++ Agent

The MTConnect C++ Agent can be obtained from the MTConnect Institute, github.com/mtconnect/cppagent/releases.

Binaries are available for Windows® and Linux®.

Optionally, the source code is available for you to clone or download in order to build binaries on your own.

In order for the MTConnect C++ Agent to connect to and receive data from adapters, the following configurations must be made:

1. The network configuration settings of the adapters must be defined in the `agent.cfg` file of the MTConnect C++ Agent.
2. The definition of the adapter's supported data items must be described in the Device configuration XML file of the MTConnect C++ Agent.

Please see the following sections for details about the above configurations.

3.3.2 Agent Configuration File `agent.cfg`

Procedure

1. Define where the MTConnect agent should look for the device configuration XML file.

   This is the schema definition file for all devices that the agent will connect to.

   MTConnect allows many adapters to supply data for one device. In the case of the Robot MTConnect Adapter, there is one adapter for one robot device. This simplifies the configuration.

   The following example shows the case of using the Robot MTConnect Adapter's supplied device configuration XML file directly. Details about the device configuration XML file will be presented in Section 3.3.3, Device Configuration XML File.

   ```
   Devices = fanuc_mtca_v010000.xml
   ```

   If the device configuration xml file is stored in a different directory than the `agent.cfg` file, please supply the relative path from `agent.cfg` to the device configuration xml file.

2. Define top level agent parameters.

   Please refer to the MTConnect C++ Agent readme for details about these parameters.

   ```
   AllowPut = false
   ReconnectInterval = 10000
   BufferSize = 17
   SchemaVersion = 1.4
   MonitorConfigFiles = true
   ```

3. Define the adapter settings for one adapter.

   ```
   Adapters {
      my_fanuc_robot_001 {
         Host = 172.22.194.102
         Port = 7878
      }
   }
   ```

Table 3.3.2 Adapter Settings

Item	Description
my_fanuc_robot_001	Define a name for the robot adapter. This must match the name supplied to the associated device in the device configuration xml file. Details about the device configuration xml file will be presented in Section 3.3.3, Device Configuration XML File.
Host	Define the ip-address of the robot whose MTConnect Adapter the agent should connect to.
Port	Define the TCP port of the robot MTConnect Adapter. This value is always 7878.

4. Define the adapter settings for multiple adapters (if required).

If you plan to connect the agent to multiple robots, use the following example as a configuration guideline.

```
Adapters {
   my_fanuc_robot_001 {
      Host = 172.22.194.102
      Port = 7878
   }

   my_fanuc_robot_002 {
      Host = 172.22.194.103
      Port = 7878
   }
}
```

The above example implies there will be two entries in the device configuration xml file. Details about the device configuration xml file, including hosting multiple devices, will be presented in Section 3.3.3, Device Configuration XML File.

5. Describe the static content and XML document style.

The following settings are from the default MTConnect C++ Agent configuration file.

It is recommended to use these settings, and only modifying them for advanced use cases.

For additional details and examples about using the MTConnect C++ Agent, please refer to the agent's readme files and other documentation made available by MTConnect.

```
Files {
    schemas {
        Path = ../schemas
        Location = /schemas/
    }
    styles {
        Path = ../styles
        Location = /styles/
    }
}

StreamsStyle {
```

```
  Location = /styles/Streams.xsl
}
```

An example of final `agent.cfg`:

```
Devices = fanuc_mtca_v010000.xml

AllowPut = false
ReconnectInterval = 10000
BufferSize = 17
SchemaVersion = 1.4
MonitorConfigFiles = true

Adapters {
   my_fanuc_robot_001 {
      Host = 172.22.194.102
      Port = 7878
   }
}

Files {
    schemas {
        Path = ../schemas
        Location = /schemas/
    }
    styles {
        Path = ../styles
        Location = /styles/
    }
}

StreamsStyle {
  Location = /styles/Streams.xsl
}
```

3.3.3 Device Configuration XML File

Overview

The device configuration XML file is used by the MTConnect C++ Agent in order to supply MTConnect Clients with a detailed description about each of the devices for which data is available.

The general format of the device configuration XML file is as follows:

```
<MTConnectDevices>
  <Header/>
  <Devices>
    <Device>
      <... Device specifications .../>
    </Device>
    .
    .
    .
    <Device>
      <... Device specifications .../>
    </Device>
```

```
  </Devices>
</MTConnectDevices>
```

Each device that the agent collects data from should have a <Device> entry under the <Devices> element. This provides a structured listing of all devices and their data items to the agent and clients of the agent.

The Robot MTConnect Device Configuration XML file can be copied to a selected device by using **MENU** > **File** > **F4 [BACKUP]** > **Com. Conf.**

Robot MTConnect Device Configuration XML file:

`fanuc_mtca_v010000.xml`

This xml file is available in the following versions, and later:

- V9.10P/33 (7DF1)
- V9.30P/12 (7DF3)
- V9.40P/05 (7DF5)

The sample device configuration xml file supplied by the robot will work as is with the correct version of MTConnect C++ Agent.

Care should be taken to provide a unique `uuid` property for each device.

On many Linux distributions, a command line utility exists to provide UUID numbers.

Example:

```
$ uuidgen
```

Copying robot specification from sample xml file to existing xml file

When importing the robot to an already existing agent application, the contents within the <Devices> element of the sample device configuration xml file should be copied into your existing device configuration xml file. (In this case, `agent.cfg` should not be modified to point to `fanuc_mtca_v010000.xml` since the contents are copied into your existing xml file).

Example of the copy operation:
From fanuc_mtca_v010000.xml:

```
    <Device>
      <... Device specifications .../>
    </Device>
```

To your existing device xml file:

```
<MTConnectDevices>
  <Header/>
  <Devices>
    <... Insert anywhere in this listing ...>
  </Devices>
</MTConnectDevices>
```

Hosting multiple robot devices in one agent.

Follow the same procedure as the above case of copying the robot specification into the devices xml file.

In this case, be sure to supply a unique `id` to every element for every additional device. In the following example, replace all `###` with a unique identification for the robot.

```
<Device id="robot_###" name="(name matching adapter defined in agent.cfg)" sampleInterval="2000" uuid="(generate unique uuid)" >
  <Description manufacturer="FANUC Robotics">FANUC-Robot-MTCA-v1.0.0</Description>
```

```
    <DataItems>
      <DataItem category="EVENT" type="AVAILABILITY" name="avail" id="avail_###"/>
    </DataItems>
    <Components>
      <Controller name="FANUC-Robot-MTCA-v1.0.0" id="controller_###">
        <DataItems>
          <DataItem category="EVENT" type="EMERGENCY_STOP" name="estop" id="estop_###"/>
          <DataItem category="EVENT" type="CONTROLLER_MODE" name="mode" id="mode_###"/>
          <DataItem category="EVENT" type="FUNCTIONAL_MODE" name="modeSwitch" id="modeSwitch_###"/>
          <DataItem category="EVENT" type="PROGRAM" name="program" id="program_###"/>
          <DataItem category="EVENT" type="EXECUTION" name="execution" id="execution_###"/>
          <DataItem category="EVENT" type="LINE_NUMBER" subType="ABSOLUTE" name="lineNumber" id="lineNumber_###"/>
          <DataItem category="EVENT" type="PATH_FEEDRATE_OVERRIDE" subType="PROGRAMMED" name="genoverride" id="genoverride_###"/>
          <DataItem category="CONDITION" type="SYSTEM" name="system" id="system_###"/>
        </DataItems>
      </Controller>
    </Components>
  </Device>
```

Example for hosting two robots:

```
<Devices>
  <Device id="robot_001" name="my_fanuc_robot_001" sampleInterval="2000" uuid="(generate unique uuid)" >
    <Description manufacturer="FANUC Robotics">FANUC-Robot-MTCA-v1.0.0</Description>
    <DataItems>
      <DataItem category="EVENT" type="AVAILABILITY" name="avail" id="avail_001"/>
    </DataItems>
    <Components>
      <Controller name="FANUC-Robot-MTCA-v1.0.0" id="controller_001">
        <DataItems>
          <DataItem category="EVENT" type="EMERGENCY_STOP" name="estop" id="estop_001"/>
          <DataItem category="EVENT" type="CONTROLLER_MODE" name="mode" id="mode_001"/>
          <DataItem category="EVENT" type="FUNCTIONAL_MODE" name="modeSwitch" id="modeSwitch_001"/>
          <DataItem category="EVENT" type="PROGRAM" name="program" id="program_001"/>
          <DataItem category="EVENT" type="EXECUTION" name="execution" id="execution_001"/>
          <DataItem category="EVENT" type="LINE_NUMBER" subType="ABSOLUTE" name="lineNumber" id="lineNumber_001"/>
          <DataItem category="EVENT" type="PATH_FEEDRATE_OVERRIDE" subType="PROGRAMMED" name="genoverride" id="genoverride_001"/>
          <DataItem category="CONDITION" type="SYSTEM" name="system" id="system_001"/>
        </DataItems>
      </Controller>
    </Components>
  </Device>

  <Device id="robot_002" name="my_fanuc_robot_002" sampleInterval="2000" uuid="(generate unique uuid)" >
    <Description manufacturer="FANUC Robotics">FANUC-Robot-MTCA-v1.0.0</Description>
    <DataItems>
      <DataItem category="EVENT" type="AVAILABILITY" name="avail" id="avail_002"/>
    </DataItems>
    <Components>
      <Controller name="FANUC-Robot-MTCA-v1.0.0" id="controller_002">
        <DataItems>
          <DataItem category="EVENT" type="EMERGENCY_STOP" name="estop" id="estop_002"/>
          <DataItem category="EVENT" type="CONTROLLER_MODE" name="mode" id="mode_002"/>
          <DataItem category="EVENT" type="FUNCTIONAL_MODE" name="modeSwitch" id="modeSwitch_002"/>
          <DataItem category="EVENT" type="PROGRAM" name="program" id="program_002"/>
          <DataItem category="EVENT" type="EXECUTION" name="execution" id="execution_002"/>
          <DataItem category="EVENT" type="LINE_NUMBER" subType="ABSOLUTE" name="lineNumber" id="lineNumber_002"/>
          <DataItem category="EVENT" type="PATH_FEEDRATE_OVERRIDE" subType="PROGRAMMED" name="genoverride" id="genoverride_002"/>
          <DataItem category="CONDITION" type="SYSTEM" name="system" id="system_002"/>
        </DataItems>
      </Controller>
    </Components>
  </Device>
</Devices>
```

3.3.4 Running the Agent

With the previous configuration steps complete, you may launch the agent to ensure no errors are found and that communication begins.

If there is difficulty obtaining data from the robot MTConnect Adapter, please see Chapter 4, DIAGNOSTICS AND TROUBLESHOOTING for guidelines.

4 DIAGNOSTICS AND TROUBLESHOOTING

4.1 GENERAL TROUBLESHOOTING

If the MTConnect C++ Agent cannot connect to, or is not receiving data from the Robot MTConnect Adapter, the following guidelines will help with troubleshooting most cases.

Cause

Generally, this occurs because of an Ethernet network configuration problem.

Procedure

1. Double check robot and MTConnect C++ Agent network configuration settings.
2. Make sure the robot can ping the MTConnect C++ Agent.
3. Make sure the MTConnect C++ Agent can ping the robot.
4. Make sure no errors occur during execution of the MTConnect C++ agent.
5. Ensure the Ethernet status LEDs at the RJ45 connectors on both devices are active and valid.
6. If there is a firewall between the Ethernet interfaces of the robot and MTConnect C++ agent, this may be interfering with communication. Please ensure traffic between the devices is allowed.

   The port for the Robot MTConnect Adapter is 7878.

   The default port for the MTConnect C++ Agent is 5000. Please check the `agent.cfg` file in case the port has been changed.

   In case MTConnect Clients are unable to communicate with the MTConncect C++ Agent, please ensure HTTP traffic is allowed. Please see the *MTConnect Client* documentation for further details.

4.2 TROUBLESHOOTING ROBOT MTConnect ADAPTER

Troubleshooting the robot MTConnect Adapter involves the following steps:

- General Ethernet troubleshooting. Please refer to Section 4.1, GENERAL TROUBLESHOOTING for details.
- Sniffing the Ethernet network. Please refer to Section 4.6, DIAGNOSTIC TOOLS for details.
- Capturing robot and agent log files and sending to a FANUC representative for investigation. Please refer to Section 4.3, ROBOT MTConnect ADAPTER DIAGNOSTIC FILES for details.

4.3 ROBOT MTConnect ADAPTER DIAGNOSTIC FILES

If all other troubleshooting steps have failed, the following log files will be asked for by a FANUC technical support representative:

Please copy the following files immediately after the problem occurs, before cycling power on the robot controller.

- `CONSLOG.DG`
- `ERRALL.LS`
- `ETHERNET.DG`
- `HIST.LS`
- `MTCALOG.DG`

The above files are available from an AOA, or MD: backup.

Additionally, a full AOA backup or robot full system image will be beneficial

Please see Section 4.4, TROUBLESHOOTING MTConnect C++ AGENT for additional diagnostic files.

4.4 TROUBLESHOOTING MTConnect C++ AGENT

Troubleshooting the MTConnect C++ Agent involves the following steps:

- General Ethernet troubleshooting. Please refer to Section 4.1, GENERAL TROUBLESHOOTING for details.
- Sniffing the Ethernet network. Please refer to Section 4.6, DIAGNOSTIC TOOLS for details.
- Capturing robot and agent log files and sending to a FANUC representative for investigation. Please refer to Section 4.5, CONFIGURATION OF AGENT LOG FILE for details.

4.5 CONFIGURATION OF AGENT LOG FILE

The MTConnect C++ Agent supports configurable log file data.

For full details, please refer to the MTConnect C++ Agent repository for details about enabling logging features.

The following log file setting steps will assist with troubleshooting most connection problems with the robot adapter.

1. Stop the agent
2. Configure logging settings in the `agent.cfg` file

   Add the following configuration items to the bottom of the `agent.cfg` file

```
logger_config
{
    logging_level = trace
    output = file log.file
    max_size = 10M
}
```

3. Restart the agent
4. Copy the log file out for review after as soon as possible after the problem occurs.

When contacting a FANUC technical support representative, please supply the following agent files:

- Your device configuration XML file
- agent.cfg
- agent's log file

Please see Section 4.3, ROBOT MTConnect ADAPTER DIAGNOSTIC FILES for additional diagnostic files.

4.6 DIAGNOSTIC TOOLS

For advanced troubleshooting, please refer to the following utilities which will assist with troubleshooting communication failures.

- Wireshark

  We recommend using the free, open source Wireshark network protocol analyzer for sniffing network traffic.
- Free robot option: Ethernet Packet Sniffer

  Details about the robot Ethernet Packet Sniffer configuration and execution can be found in the *Internet Options Setup and Operations Manual (MAROUIN9010171E)* or the *Ethernet Function OPERATOR'S MANUAL (B-82974EN)*.

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