



Supported CNC Devices/Machines of FBR-100AN / FBR-100 and Collectable Data with MTConnect

Application Notes : AN2011FBR_04
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1. Overview

This document describes what CNC devices/machines are supported and what data can be collected by "FBR-100AN (wireless model) / FBR-100 (wired model)" (referred to as "FBR converter" below), silex's MTConnect protocol converters for CNC machine tools.

2. Supported CNC Devices/Machines

FBR converter has been confirmed compatible with the following CNC devices/machines.

Maker	How to connect	Model	Data to be monitored with FBR converter
Fanuc	LAN	30i-MODEL A, 30i-MODEL B 31i-MODEL A, 31i-MODEL B 31i-MODEL A5, 31i-MODEL B5 32i-MODEL A, 32i-MODEL B 35i-MODEL B 0i-M/T MODEL F, 0i-M/T MODEL D Others: LAN models of 16i/18i/21i	Emergency stop status, CNC operation mode, quantity of processed parts, CNC operation status, running program sequence number, main program name, tool number, various override information, absolute position, spindle load, speed, spindle/axis insulation resistance, power consumption, cycle time, operator message, alarm message, etc. Custom macro variables, PMC address status, PMC alarm, PMC operator messages, etc.
	Serial DPRNT	FANUC Series 15 FANUC Series 16/18/20/21 FANUC Power Mate -D/F/H FANUC Series 16i/18i/21i FANUC Power Mate i FANUC Series 15i, 0i FANUC Series 30i/31i/32i	DPRNT commands can collect various CNC data during processing. - Digital input signal from outside - Numerical data (up to 10) - Character data (up to 10) - Product name, total number of processed parts, etc.
Brother	LAN	CNC-B00 & CNC-C00 series	Operation data, alarm status, emergency stop status, spindle data, production counter information, axis torque monitor, tool number, program sequence number, cycle time, operation hours, etc.
Mitsubishi Electric	Serial DPRNT	M600, M700 & M800 series	Equivalent to that of Fanuc's CNC serial/DPRNT models
Patlite	LAN	AirGRID® WD series	Following data of signal tower : - Up to 5 colors of pilot lamp and buzzer data - Lamp: Off / On / Blinking / Not in use - Buzzer: Not sounding/ Sounding
CNC/Machine Tool Builders (General)	Digital In/Out	Signal towers	
Muratec	LAN		FANU's CNC device data plus the following data of Muratec original system: Opr panel light data, counter, cycle time, program number, alarm

3. Monitored Data

3.1. Fanuc CNC Devices (LAN Connected)

FBR converter connects to Fanuc 30i/31i/32i/35i, 0i-M/T, and 16i/18i/21i series in the wired LAN and gets their data listed in this document.

[Procedures]

FBR converter provides two different setting methods.

1. Default Point Setting
Get NC program data of CNC devices. This factory default setting is "On (Collect data)".
2. Custom Point Setting
Get custom macro variables and PMC data of CNC devices. Unlike the default point setting, users can change the settings individually to get data.

[Conditions]

- When FBR converter collects data of up to three CNC devices, the number of collectable data values for the custom point setting will be limited to 5.
- This chapter shows data collectable from LAN-connected CNC devices. For serial communication, see Chapter "3.3 Collecting Data from Legacy CNC Devices with Serial Interface/DPRNT".
- The data collecting cycle varies with various factors such as network delay, connection speed, and the specified number of data values to collect.

[Special Operation Settings]

It will be difficult to collect a lot of information in a short cycle (several hundred milliseconds or less) under FBR converter's normal settings due to the limits on communication performance of CNC devices. If it is your requirement, please contact silex's sales or customer support team.

[How to Read Data Table]

- Under MTConnect Data, the number "-1" next to DataItem name means a channel number of the CNC devices. When a CNC device has multiple channels, channels will be shown as "-1", "-2", and so on.
- CONDITION under Category can collect the status and character strings of alarm/operator messages. Depending on the message status, the XML tag name will be changed and notified to MTConnect client.

Example)

1. Operator message: Change to Unavailable, Normal, or Warning
2. Alarm message: Change to Unavailable, Normal, or Fault

3.1.1. List of Collectable Fanuc CNC Device Data

See the Appendix in this document.

3.2. Brother CNC Devices

FBR converter connects to CNC-C00 and CNC-B00 in Wired LAN and gets the data listed in this document. For the communication, Activation Key (licensed option) has to be registered to the FBR converter.

[Procedures]

FBR converter carries two methods to collect data.

1. Command Data Collection

Issue a command per data to CNC device to get the data.

2. PLC Bulk Data Collection

Store data, which needs to be collected in a short cycle, in PLC's data register beforehand, and then send all the data at once.

[Conditions]

- One unit of FBR converter can save up to three CNC devices in the collection mode of command data (mixed environment of CNC-C00/B00 series), whereas one CNC device in the collection mode of PLC bulk data.
- The collection mode of PLC bulk data supports CNC-C00 series only. CNC devices' firmware has to support the mode as well. Contact your machine tool builder to check the firmware beforehand.
- The data collecting cycle varies with various factors such as network delay, connection speed, and the specified number of data values to collect.
- Depending on the number of data values to collect, data collection cannot be finished within the set time cycle due to communication overhead between FBR converter and CNC device. In that case, reduce the number of collecting data values under FBR converter settings.
- Since some versions of CNC device firmware do not support specific data retrieval commands, CNC device will show an error. In that case, disable (OFF) the data retrieval command, which is corresponding to the error code shown in FBR converter status screen.

[How to Read Data Table]

- Under MTConnect Data, the number "-1" next to Dataltem name means a group number of CNC devices. It is fixed to -1 for Brother CNC devices.
- The category "CONDITION" provides CNC alarm information.

- C00 series:

FBR converter gets the alarm information as a 10-digit number from the CNC device, converts the first two digits into a character string, and assigns it to nativeCode.

Example)

```
nativeCode="EX7015">017015</Message>
```

```
nativeCode="CM75220008">0975220008</Message>
```

- B00 series:

FBR converter gets the alarm information as a 4-digit number from the CNC device.

3.2.1. List of Collectable Brother CNC Device Data

See the Appendix in this document.

3.3. Collecting Data from Legacy CNC Devices with Serial Interface/DPRNT

FBR converter connects to a legacy CNC device (no LAN/Ethernet connectivity) with RS-232C to get the CNC data. For the collectable data, see Chapter "2. Supported CNC Devices/Machines".

[Procedures]

- Set DPRNT commands in the CNC device beforehand.
- Issue the DPRNT command from the CNC device. FBR converter will receive character strings or macro variable values from the serial port.
- FBR converter has to be set to the mode "DPRNT Collection".

[Conditions]

- Though the same CNC device is installed onto machines, RS-232C pin assignment and DPRNT command specifications may be different from each other because each machine tool builder has their own installation specifications. Contact your machine tool builder to check those specifications in advance. For FBR converter's pin assignment information, see the product catalogue or manual.
- One CNC device requires one unit of FBR converter.
- FBR converter cannot be set with the data collection time cycle since DPRNT data is sent from CNC device.

3.3.1. List of Collectable Data with FBR Converter's Serial Interface

See the Appendix in this document.

3.4. Data Collection from Typical Signal Towers with Digital Input Interface

FBR converter collects data of typical signal towers with its digital input interface (DI).

[Procedures]

- FBR converter can collect up to three pieces of lamp data. One signal tower requires one unit of FBR converter.
- FBR converter has to be set to the mode "DPRNT Collection".

[Condition]

- One CNC device requires one unit of FBR converter.

3.4.1. List of Collectable Data with FBR Converter's Digital Input Interface

See the Appendix in this document.

3.5. Patlite AirGRID®

FBR converter gets lamp data (max. 5 colors) and buzzer data via LAN by linking to Patlite's AirGRID® signal towers.

[Condition]

- AirGRID® transmitter (WDT) has to be set to the immediate transmission mode to associate with FBR converter.

[How to Read Data Table]

- Values of buzzer and lamps are defined as follows:
 - Buzzer: Off (Not sounding) / On (Sounding) / UNAVAILABLE (No data)
 - Lamp: Off / On / Blinking / Unused (Not registered, Not in use) / UNAVAILABLE (No data)

3.5.1. List of Collectable Patlite AirGRID® Device Data

See the Appendix in this document.

3.6. Muratec Specific System

FBR converter collects data of CNC devices as well as Muratec's specific data including loader system data by connecting to Muratec's machine tools in the wired LAN. To get the maker-specific data, Activation Key (licensed option) needs to be registered to the FBR converter.

[Conditions]

- One CNC device requires one FBR converter.
- The data collecting cycle varies with various factors such as network delay, connection speed, and the specified number of data values to collect.

[How to Read Data Table]

- Under MTConnect Data, the number "-1" next to Dataltem name means a channel number of CNC devices. When a CNC device has multiple channels, channels will be shown as "-1", "-2", and so on.
- CONDITION under Category can collect the status and character strings of alarm/operator messages. Depending on the message status, the XML tag name will be changed and notified to MTConnect client.

Example)

1. Operator message: Change to Unavailable, Normal, Warning, or Fault
2. Alarm message: Change to Unavailable, Normal, or Fault

- The cycle time data, "n.CycleTime-Loader2" and "n.ProgramNumber-G2", in Muratec specific system will be shown only for twin-loader machines.
- The left/right axis cycle time is not the prepared machine data for Fanuc CNC 18i series. Users need to create NC program, store the data to macro variable values, and specify the variables from FBR converter.
- Names in the data list, such as X/Y/Z/S1/P1/X2/Y2/Z2/S2/P2, vary by quantity and name of spindles.
- The alarm data "n.Msystem-" in Muratec's specific system will show max. 36 ongoing alarms in ascending order (arranged from the smallest to the largest number).

3.6.1. List of Collectable Muratec Machine Tool and Specific System Data

See the Appendix in this document.

3.7. Operation Note

- How to check CNC device's communication settings

In order to update FBR converter with the CNC device's network information (IP addresses and communication ports), go through the following steps to find the necessary information.

- Fanuc CNC devices:

- Press [SYSTEM] on the control panel of the CNC device. -> Press the soft key [EMBED PORT]. -> Press the soft key [COMMON] -> Find its IP address and subnet mask.
- Press the soft key [FOCAS] -> Find the TCP port number. It is typically 8193, but is not always assigned.

Note 1) To connect FBR converter with Fanuc fast Ethernet board, press [Ethernet Board] instead of [Embedded Port].

Note 2) When no IP address, subnet mask or port number is assigned, set up the CNC device according to the manual. CNC devices usually require a restart (power OFF/ON) to apply changes.

- Brother CNC devices:

- Press [Data Bank] on the control panel of the CNC device. -> Press [F6] (Communication Parameter). -> Press [F2] (Ethernet/FTP). -> Find its IP address, mask bit (subnet mask), and port number.

Note 3) When no IP address, mask bit, or port number is assigned, set up the CNC device according to the manual. You must enter an IP address without periods into the input field. (Example. 192168000001)

Note: The product and company names mentioned or referenced in this document are trademarks or registered trademarks of their respective owners.

Revision History

Ver.	Revision History	Date
AN2008FBR_01	First Edition	Jul 26, 2020
AN2011FBR_02	<p>Added the following items to "3.1.1 List of Collectable Fanuc CNC Device Data".</p> <ul style="list-style-type: none"> • Moving axis load current value (%) • Moving axis load current value (A) <p>Modified the following item in "3.2.1 List of Collectable Brother CNC Device Data".</p> <ul style="list-style-type: none"> • Dataltem name (n.system-1) of Alarm message <p>Added the following items to "3.6.1 List of Collectable Muratec Machine Tool and Specific System Data".</p> <ul style="list-style-type: none"> • Two items added in 3.1.1. • Operation panel ramp information (Tool counter up/notice and Check counter up/notice) 	Nov 19, 2021
AN2011FBR_03	<p>Included FBR-100 wired LAN model.</p> <p>Deleted the following descriptions since the firmware version 1.4.3 introduced the updated setting pages of FBR converter:</p> <ul style="list-style-type: none"> • Settings to collect individual and bulk data, and the setting tool information <p>Added the procedure to 3.7 Operation Note: How to check IP address and communication port number assigned to Fanuc/Brother CNC devices</p> <p>Added more information that can be collected with ver. 1.4.3 and more remarks in the tables.</p> <ul style="list-style-type: none"> • Appendix : List of Collectable Fanuc CNC Device Data • Appendix : List of Collectable Muratec Machine Tool and Specific System Data 	Feb 09, 2022
AN2008FBR_04	Added some restrictions to" Appendix : List of Collectable Fanuc CNC Device Data"	March 22, 2022

Appendix: List of Collectable Fanuc CNC Device Data

Default Point Data								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	Dataltem	TYPE	Value	Default	Default	Range (ms)
1	Emergency stop status	EVENT	n.estop-1	EMERGENCY_STOP	ARMED / TRIGGERED	ON	< 1 sec	100~10000
2	CNC operation mode	EVENT	n.mode-1	CONTROLLER_MODE	MANUAL_DATA_INPUT AUTOMATIC / EDIT / MANUAL	ON	< 1 sec	100~10000
3	Number of processed parts	EVENT	n.partcnt-1	PART_COUNT	numerical value	ON	1 sec	100~10000
4	CNC operating status	EVENT	n.execution-1	EXECUTION	READY / STOPPED INTERRUPTED / ACTIVE	ON	< 1 sec	100~10000
5	Sequence number of the program in operation	EVENT	n.line-1	LINE	numerical value	ON	< 1 sec	100~10000
6	Main program name	EVENT	n.program-1	PROGRAM	character string	ON	2 sec	100~10000
7	Main program comment	EVENT	n.progcom-1	PROGRAM_COMMENT	character string	ON	2 sec	100~10000
8	Tool number	EVENT	n.toolnumber-1	TOOL_NUMBER	numerical value	ON	< 1 sec	100~10000
9	Feed rate override	EVENT	n.feedoverride-1	PATH_FEEDRATE_OVERRIDE	numerical value	ON	1 sec	100~10000
10	Block of the program in operation	EVENT	n.block-1	BLOCK	character string	ON	< 1 sec	100~10000
11	Spindle operation mode	EVENT	n.spdlmode-S1_P1	ROTARY_MODE	SPINDLE / INDEX / CONTOUR	ON	< 1 sec	100~10000
12	Fast forward override	EVENT	n.rapidoverride-1	PATH_FEEDRATE_OVERRIDE	numerical value	ON	1 sec	100~10000
13	Spindle override	EVENT	n.spdlovrider-1	ROTARY_VELOCITY_OVERRIDE	numerical value	ON	1 sec	100~10000
14	Data reception status	EVENT	n.avail-	AVAILABILITY	AVAILABLE / UNAVAILABLE	ON	< 1 sec	100~10000
15	Active axis name	EVENT	n.actaxes-1	ACTIVE_AXES	Axis name character string	ON	5 sec	100~10000
16	Axis total travel amount note: Legacy CNC devices including 16i series require an optional function to show the total travel amount.	EVENT	n.axisTotalTravelAmt-X_P1 n.axisTotalTravelAmt-Y_P1 n.axisTotalTravelAmt-Z_P1	MESSAGE	character string	ON	< 1 sec	100~10000
17	Dry run note: compatible with 30i/0i series only.	EVENT	n.dryrun-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
18	Cutting feed note: compatible with 30i/0i series only.	EVENT	n.feedrate-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
19	M00 note: compatible with 30i/0i series only.	EVENT	n.M00-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
20	M01 note: compatible with 30i/0i series only.	EVENT	n.M01-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
21	Absolute position (mm)	SAMPLE	n.act-X_P1 n.act-Y_P1 n.act-Z_P1	ANGLE (for spindle) POSITION (for moving axis)	numerical value	ON	< 1 sec	100~10000
22	Spindle load (%)	SAMPLE	n.load-S1_P1	LOAD	numerical value	ON	< 1 sec	100~10000
23	Moving axis load (%)	SAMPLE	n.load-X_P1 n.load-Y_P1 n.load-Z_P1	LOAD	numerical value	ON	< 1 sec	100~10000

Appendix: List of Collectable Fanuc CNC Device Data

Default Point Data								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range (ms)
24	Spindle speed (rotation/min) note: For machines not equipped with a position coder, NC parameters may need to be changed (change bit No. 3118 to 1).	SAMPLE	n.speed-S1_P1	ROTARY_VELOCITY	numerical value	ON	< 1 sec	100~10000
25	Feed rate (mm/sec)	SAMPLE	n.pathfdrt-1	PATH_FEEDRATE	numerical value	ON	< 1 sec	100~10000
26	Moving axis load current value (%) note: compatible with 30i/0i series only.	SAMPLE	n.loadCurrentPercent-X_P1 n.loadCurrentPercent-Y_P1 n.loadCurrentPercent-Z_P1	LOAD	numerical value	ON	< 1 sec	100~10000
27	Moving axis load current value (A) note: compatible with 30i/0i series only.	SAMPLE	n.loadCurrentAmpere-X_P1 n.loadCurrentAmpere-Y_P1 n.loadCurrentAmpere-Z_P1	AMPERAGE	numerical value	ON	< 1 sec	100~10000
28	Spindle insulation resistance value (MΩ) note: compatible with 30i/0i series only.	SAMPLE	n.spindleInslnRes-S1_P1	RESISTANCE	numerical value	ON	5 sec	100~10000
29	Moving axis insulation resistance value (MΩ) note: compatible with 30i/0i series only.	SAMPLE	n.movingAxisInslnRes-X_P1 n.movingAxisInslnRes-Y_P1 n.movingAxisInslnRes-Z_P1	RESISTANCE	numerical value	ON	5 sec	100~10000
30	All servo and spindle power consumption (0.001kWh) note: compatible with 30i/0i series only.	SAMPLE	n.allServoSpindlePwrCons-1	ELECTRICAL_ENERGY	numerical value	ON	5 sec	100~10000
31	Cycle time (sec)	SAMPLE	n.cycletime-1	ACCUMULATED_TIME	numerical value	ON	< 1 sec	100~10000
32	Real speed for servo adjustment (rotation/min)	SAMPLE	n.servoAdjRealSpeed-X_P1 n.servoAdjRealSpeed-Y_P1 n.servoAdjRealSpeed-Z_P1	ROTARY_VELOCITY	numerical value	ON	< 1 sec	100~10000
33	Operator message display	CONDITION	n.opmessage-	SYSTEM	Store alert number in nativeCode Store error message in HTTP encoding	ON	1 sec	100~10000
34	Alarm message display PW alarm, DS alarm, IE alarm SN alarm, EX alarm OT alarm (non-axis type), OH alarm (non-axis type)	CONDITION	n.system-1	SYSTEM	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
35	Alarm message display SV alarm	CONDITION	n.servo-X_P1 n.servo-Y_P1 n.servo-Z_P1 n.servo-S1_P1	ACTUATOR	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
36	Alarm message display OH alarm	CONDITION	n.overheat-X_P1 n.overheat-Y_P1 n.overheat_Z_P1	TEMPERATURE	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000

Appendix: List of Collectable Fanuc CNC Device Data

Default Point Data								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	Dataltem	TYPE	Value	Default	Default	Range (ms)
37	Alarm message display OT alarm	CONDITION	n.travel-X_P1 n.travel-Y_P1 n.travel-Z_P1	POSITION	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
38	Alarm message display SW alarm, PC alarm	CONDITION	n.logic-1	LOGIC_PROGRAM	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
39	Alarm message display IO alarm, SR alarm	CONDITION	n.comms-1	COMMUNICATIONS	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
40	Alarm message display PS alarm, MC alarm, BG alarm	CONDITION	n.motion-1	MOTION_PROGRAM	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
41	Alarm message display SV alarm (non-axis type)	CONDITION	n.servonoaxis-1	ACTUATOR	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
Custom Point Data (PMC)								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	Dataltem	TYPE	Value	Default	Default	Range (ms)
1	Custom macro local variable (#1 to #33)	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	numerical value	OFF	Not Available	100~10000
2	Custom macro common variable (#100 to #199)	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	numerical value	OFF	Not Available	100~10000
3	Custom macro common variable (#500-#999)	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	numerical value	OFF	Not Available	100~10000
4	PMC address Bit status	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	EVENT: TRUE/FALSE SAMPLE: numerical value	OFF	Not Available	100~10000
5	PMC address Byte size	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	numerical value	OFF	Not Available	100~10000
6	PMC address 2Byte size	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	numerical value	OFF	Not Available	100~10000
7	PMC address 4Byte size	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	numerical value	OFF	Not Available	100~10000
8	PMC alarm	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	character string	OFF	Not Available	100~10000
9	PMC operator message	EVENT/ SAMPLE	Random	Automatically created from Dataltem (self-defined)	character string	OFF	Not Available	100~10000

Appendix: List of Collectable Brother CNC Device Data

Command individual data collection								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range (ms)
1	Emergency stop status	EVENT	n.estop-1	EMERGENCY_STOP	ARMED / TRIGGERD	ON	1 sec	100~999900
2	CNC operation mode	EVENT	n.mode-1	CONTROLLER_MODE	MANUAL_DATA_INPUT AUTOMATIC / EDIT / MANUAL	ON	1 sec	100~999900
3	Number of processed parts	EVENT	n.partcnt-1	PART_COUNT	numerical value	ON	1 sec	100~999900
4	Production counter (current) Production counter (completion) Production counter (remaining)	EVENT	MONTR_ProductionCounter01_Current MONTR_ProductionCounter01_Completion MONTR_ProductionCounter01_Remaining MONTR_ProductionCounter02_Current MONTR_ProductionCounter02_Completion MONTR_ProductionCounter02_Remaining MONTR_ProductionCounter03_Current MONTR_ProductionCounter03_Completion MONTR_ProductionCounter03_Remaining MONTR_ProductionCounter04_Current MONTR_ProductionCounter04_Completion MONTR_ProductionCounter04_Remaining	PART_COUNT	numerical value	ON	1 sec	100~999900
5	CNC operating status	EVENT	n.execution-1	EXECUTION	READY/STOPPED/ INTERRUPTED/ACTIVE	ON	1 sec	100~999900
6	Operating program number	EVENT	MONTR_ExecuteProgramNumber	LINE	4 digit number	ON	1 sec	100~999900
7	Sequence number of the program in operation	EVENT	n.line-1	LINE	numerical value	ON	1 sec	100~999900
8	Main program name	EVENT	n.program-1	PROGRAM	character string	ON	1 sec	100~999900
9	Tool number	EVENT	n.toolnumber-1	TOOL_NUMBER	numerical value	ON	1 sec	100~999900
10	Fast forward override	EVENT	PDSP_RapidOverride	MESSAGE	0:Speed 1 / 1:Speed 2 / 2:Speed 3 3:Speed 4 / 4:100% / 5:0%	ON	1 sec	100~999900
11	Macro variable	EVENT	MCRNDD_500~MCRNDD_999	MESSAGE	numerical value	ON	1 sec	100~999900
12	Data reception status	EVENT	n.avail-	AVAILABILITY	AVAILABLE/UNAVAILABLE	ON	1 sec	100~999900
13	Absolute position (mm)	SAMPLE	PDSP_AbsoluteCoordPos_AxisX PDSP_AbsoluteCoordPos_AxisY PDSP_AbsoluteCoordPos_AxisZ PDSP_AbsoluteCoordPos_AxisP1 PDSP_AbsoluteCoordPos_AxisP2 PDSP_AbsoluteCoordPos_AxisP3 PDSP_AbsoluteCoordPos_AxisP4	POSITION	numerical value	ON	1 sec	100~999900
14	Absolute position (angle)	SAMPLE	PDSP_AbsoluteCoordPos_Axis4 PDSP_AbsoluteCoordPos_Axis5 PDSP_AbsoluteCoordPos_Axis6 PDSP_AbsoluteCoordPos_Axis7 PDSP_AbsoluteCoordPos_Axis8	ANGLE	numerical value	ON	1 sec	100~999900
15	Spindle load (%)	SAMPLE	n.load-S1_P1	LOAD	numerical value	ON	1 sec	100~999900

Appendix: List of Collectable Brother CNC Device Data

Command individual data collection								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range (ms)
16	Moving axis load (%)	SAMPLE	PLC_TorqueMonitor_AxisX PLC_TorqueMonitor_AxisY PLC_TorqueMonitor_AxisZ PLC_TorqueMonitor_Axis4 PLC_TorqueMonitor_Axis5 PLC_TorqueMonitor_Axis6 PLC_TorqueMonitor_Axis7 PLC_TorqueMonitor_Axis8	LOAD	numerical value	ON	1 sec	100~999900
17	Spindle Speed (Rotation/min)	SAMPLE	n.speed-S1_P1	ROTARY_VELOCITY	numerical value	ON	1 sec	100~999900
18	Feed Speed (mm/sec)	SAMPLE	n.pathfdrt-1	PATH_FEEDRATE	numerical value	ON	1 sec	100~999900
19	Cycle time	SAMPLE	PRDC2_CycleTime1 PRDC2_CycleTime2	ACCUMULATED_TIME	hhhhmmsss (Hr/Min/0.1 sec)	ON	1 sec	100~999900
20	Execution time	SAMPLE	MONTR_ExecuteTime	ACCUMULATED_TIME	hhhhmmsss (Hr/Min/Sec)	ON	1 sec	100~999900
21	Operating time	SAMPLE	MONTR_OperationTime	ACCUMULATED_TIME	hhhhmmsss (Hr/Min/Sec)	ON	1 sec	100~999900
22	Alarm message (Up to 36)	CONDITON	n.system-1	SYSTEM	Store alert number in nativeCode	ON	1 sec	100~999900
PLC bulk data collection								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range (ms)
1	PLC data	EVENT	PLC_0000~PLC2046	MESSAGE	Value	OFF	Not Available	100~999900

Appendix: List of Collectable Data with FBR Converter's Serial Interface

DPRNT Configuration								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range (ms)
1	Numerical type information (up to 10)	SAMPLE	value01~value10	CNC_DOUBLE	DPRNT output data	–	Not Available	Not Available
2	Character type information (up to 10)	EVENT	string01~string10	CNC_STRING	DPRNT output data	–	Not Available	Not Available
3	DPRNT output string (Product name, total number of processed parts, etc.)	EVENT	PrintOut / ProductName ProductResultNumber	CNC_STRING CNC_INT32	DPRNT output data	–	Not Available	Not Available

Appendix: List of Collectable Data with FBR Converter's Digital Input Interface

DPRNT Configuration								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Values	Default	Default	Range (ms)
1	FBR-100AN digital input terminal "0" status	SAMPLE	DIO00	LEVEL	0: Off/Low 1: On/High UNAVAILABLE	–	1 sec	Not Available
2	FBR-100AN digital input terminal "1" status	EVENT	DIO01	LEVEL	0: Off/Low 1: On/High UNAVAILABLE	–	1 sec	Not Available
3	FBR-100AN digital input terminal "2" status	EVENT	DIO02	LEVEL	0: Off/Low 1: On/High UNAVAILABLE	–	1 sec	Not Available

Appendix: List of Collectable Patlite AirGRID® Device Data

Patlite AirGRID® data collection								
#	Data to collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range (ms)
1	WDT MAC address	EVENT	n.WDTMacAddress-	MESSAGE	MAC address	OFF	Not Available	Not Available
2	Buzzer	EVENT	n.Buzzer-	MESSAGE	Off / On / ANAVAILABLE	OFF	Not Available	Not Available
3	Green lamp	EVENT	n.GreenLamp-	MESSAGE	Off / On / Blinking Unused / UNAVAILABLE	OFF	Not Available	Not Available
4	Red lamp	EVENT	n.RedLamp-	MESSAGE	Off / On / Blinking Unused / UNAVAILABLE	OFF	Not Available	Not Available
5	Blue lamp	EVENT	n.BlueLamp-	MESSAGE	Off / On / Blinking Unused / UNAVAILABLE	OFF	Not Available	Not Available
6	Yellow lamp	EVENT	n.YellowLamp-	MESSAGE	Off / On / Blinking Unused / UNAVAILABLE	OFF	Not Available	Not Available
7	White lamp	EVENT	n.WhiteLamp-	MESSAGE	Off / On / Blinking Unused / UNAVAILABLE	OFF	Not Available	Not Available

Appendix: List of Collectable Muratec Machine Tool and Specific System Data

NC Program								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Valued	Default	Default	Range (ms)
1	Emergency stop status	EVENT	n.estop-1	EMERGENCY_STOP	ARMED/TRIGGERED	ON	< 1 sec	100~10000
2	CNC operation mode	EVENT	n.mode-1	CONTROLLER_MODE	MANUAL_DATA_INPUT AUTOMATIC/EDIT/MANUAL	ON	< 1 sec	100~10000
3	Number of processed parts	EVENT	n.partcnt-1	PART_COUNT	numerical value	ON	1 sec	100~10000
4	CNC operating status	EVENT	n.execution-1	EXECUTION	READY/STOPPED INTERRUPTED/ACTIVE	ON	< 1 sec	100~10000
5	Sequence number of the program in operation	EVENT	n.line-1	LINE	numerical value	ON	< 1 sec	100~10000
6	Main program name	EVENT	n.program-1	PROGRAM	character string	ON	2 sec	100~10000
7	Main program comment	EVENT	n.progcom-1	PROGRAM_COMMENT	character string	ON	2 sec	100~10000
8	Tool number	EVENT	n.toolnumber-1	TOOL_NUMBER	numerical value	ON	< 1 sec	100~10000
9	Feed rate override	EVENT	n.feedoverride-1	PATH_FEEDRATE_OVERRIDE	numerical value	ON	1 sec	100~10000
10	Block of the program in operation	EVENT	n.block-1	BLOCK	character string	ON	< 1 sec	100~10000
11	Spindle operation mode	EVENT	n.spdlmode-S1_P1	ROTARY_MODE	SPINDLE/INDEX/CONTOUR	ON	< 1 sec	100~10000
12	Fast forward override	EVENT	n.rapidoverride-1	PATH_FEEDRATE_OVERRIDE	numerical value	ON	1 sec	100~10000
13	Spindle override	EVENT	n.spdlovrider-1	ROTARY_VELOCITY_OVERRIDE	numerical value	ON	1 sec	100~10000
14	Data reception status	EVENT	n.avail-	AVAILABILITY	AVAILABLE/UNAVAILABLE	ON	< 1 sec	100~10000
15	Active axis name	EVENT	n.actaxes-1	ACTIVE_AXES	Axis name character string	ON	5 sec	100~10000
16	Axis total travel amount note: Legacy CNC devices including 16i series require an optional function to show the total travel amount.	EVENT	n.axisTotalTravelAmt-X_P1 n.axisTotalTravelAmt-Y_P1 n.axisTotalTravelAmt-Z_P1	MESSAGE	character string	ON	< 1 sec	100~10000
17	Dry run note: compatible with 30i/0i series only.	EVENT	n.dryrun-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
18	Cutting feed note: compatible with 30i/0i series only.	EVENT	n.feedrate-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
19	M00 note: compatible with 30i/0i series only.	EVENT	n.M00-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
20	M01 note: compatible with 30i/0i series only.	EVENT	n.M01-1	INTERFACE_STATE	ENABLED / DISABLED	ON	< 1 sec	100~10000
21	Absolute position (mm)	SAMPLE	n.act-X_P1 n.act-Y_P1 n.act-Z_P1	ANGLE (for spindle) POSITION (for moving axis)	numerical value	ON	< 1 sec	100~10000
22	Spindle load (%)	SAMPLE	n.load-S1_P1	LOAD	numerical value	ON	< 1 sec	100~10000
23	Moving axis load (%)	SAMPLE	n.load-X_P1 n.load-Y_P1 n.load-Z_P1	LOAD	numerical value	ON	< 1 sec	100~10000
24	Spindle speed (rotation/min) note: For machines not equipped with a position coder, NC parameters may need to be changed (change bit No. 3118 to 1).	SAMPLE	n.speed-S1_P1	ROTARY_VELOCITY	numerical value	ON	< 1 sec	100~10000
25	Feed rate (mm/sec)	SAMPLE	n.pathfdrt-1	PATH_FEEDRATE	numerical value	ON	< 1 sec	100~10000

Appendix: List of Collectable Muratec Machine Tool and Specific System Data

NC Program								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Valued	Default	Default	Range (ms)
26	Moving axis load current value (%) note: compatible with 30i/Oi series only.	SAMPLE	n.loadCurrentPercent-X_P1 n.loadCurrentPercent-Y_P1 n.loadCurrentPercent-Z_P1	LOAD	numerical value	ON	< 1 sec	100~10000
27	Moving axis load current value (A) note: compatible with 30i/Oi series only.	SAMPLE	n.loadCurrentAmpere-X_P1 n.loadCurrentAmpere-Y_P1 n.loadCurrentAmpere-Z_P1	AMPERAGE	numerical value	ON	< 1 sec	100~10000
28	Spindle insulation resistance value (MΩ) note: compatible with 30i/Oi series only.	SAMPLE	n.spindleInslnRes-S1_P1	RESISTANCE	numerical value	ON	5 sec	100~10000
29	Moving axis insulation resistance value (MΩ) note: compatible with 30i/Oi series only.	SAMPLE	n.movingAxisInslnRes-X_P1 n.movingAxisInslnRes-Y_P1 n.movingAxisInslnRes-Z_P1	RESISTANCE	numerical value	ON	5 sec	100~10000
30	All servo and spindle power consumption (0.001kWh) note: compatible with 30i/Oi series only.	SAMPLE	n.allServoSpindlePwrCons-1	ELECTRICAL_ENERGY	numerical value	ON	5 sec	100~10000
31	Cycle time (sec)	SAMPLE	n.cycletime-1	ACCUMULATED_TIME	numerical value	ON	< 1 sec	100~10000
32	Real speed for servo adjustment (rotation/min)	SAMPLE	n.servoAdjRealSpeed-X_P1 n.servoAdjRealSpeed-Y_P1 n.servoAdjRealSpeed-Z_P1	ROTARY_VELOCITY	numerical value	ON	< 1 sec	100~10000
33	Operator message display	CONDITION	n.opmessage-	SYSTEM	Store alert number in nativeCode Store error message in HTTP encoding	ON	1 sec	100~10000
34	Alarm message display PW alarm, DS alarm, IE alarm SN alarm, EX alarm OT alarm (non-axis type), OH alarm (non-axis type)	CONDITION	n.system-1	SYSTEM	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
35	Alarm message display SV alarm	CONDITION	n.servo-X_P1 n.servo-Y_P1 n.servo-Z_P1 n.servo-S1_P1	ACTUATOR	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
36	Alarm message display OH alarm	CONDITION	n.overheat-X_P1 n.overheat-Y_P1 n.overheat_Z_P1	TEMPERATURE	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
37	Alarm message display OT alarm	CONDITION	n.travel-X_P1 n.travel-Y_P1 n.travel-Z_P1	POSITION	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
38	Alarm message display SW alarm, PC alarm	CONDITION	n.logic-1	LOGIC_PROGRAM	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
39	Alarm message display IO alarm, SR alarm	CONDITION	n.comms-1	COMMUNICATIONS	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000

Appendix: List of Collectable Muratec Machine Tool and Specific System Data

NC Program								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Valued	Default	Default	Range (ms)
40	Alarm message display PS alarm, MC alarm, BG alarm	CONDITION	n.motion-1	MOTION_PROGRAM	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
41	Alarm message display SV alarm (non-axis type)	CONDITION	n.servonoaxis-1	ACTUATOR	Store alert number in nativeCode Store error message in HTTP encoding	ON	< 1 sec	100~10000
Muratec specific systems data								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range
1	Operation panel ramp information: In operation	EVENT	n.RunLamp-	INTERFACE_STATE	DISABLED (off) / ENABLED (on)	ON	1 sec	100~10000
2	Operation panel ramp information: In alarm	EVENT	n.AlarmLamp-	INTERFACE_STATE	DISABLED (off) / ENABLED (on)	ON	1 sec	100~10000
3	Operation panel ramp information: Warning	EVENT	n.WarningLamp-	INTERFACE_STATE	DISABLED (off) / ENABLED (on)	ON	1 sec	100~10000
4	Operation panel ramp information: Tool counter up	EVENT	n.ToolCounterUp-	INTERFACE_STATE	DISABLED(Normal) /ENABLED(at Event)	ON	1 sec	100~10000
5	Operation panel ramp information: Tool counter up notice	EVENT	n.ToolCounterNotice-	INTERFACE_STATE	DISABLED(Normal) /ENABLED(at Event)	ON	1 sec	100~10000
6	Operation panel ramp information: Check counter up	EVENT	n.CheckCounterUp-	INTERFACE_STATE	DISABLED(Normal) /ENABLED(at Event)	ON	1 sec	100~10000
7	Operation panel ramp information: Check counter notice	EVENT	n.CheckCounterNotice-	INTERFACE_STATE	DISABLED(Normal) /ENABLED(at Event)	ON	1 sec	100~10000
8	Total counter 1	EVENT	n.TotalCount-1	PART_COUNT	numerical value	ON	1 sec	100~10000
9	Work counter 1 set value	EVENT	n.WorkCountSet-1	PART_COUNT	numerical value	ON	1 sec	100~10000
10	Work counter 1 count value	EVENT	n.WorkCount-1	PART_COUNT	numerical value	ON	1 sec	100~10000
11	Check counter 1 set value	EVENT	n.CheckCountSet-1	PART_COUNT	numerical value	ON	1 sec	100~10000
12	Check counter 1 count value	EVENT	n.CheckCount-1	PART_COUNT	numerical value	ON	1 sec	100~10000
13	Total counter 2	EVENT	n.TotalCount-2	PART_COUNT	numerical value	ON	1 sec	100~10000
14	Work counter 2 set value	EVENT	n.WorkCountSet-2	PART_COUNT	numerical value	ON	1 sec	100~10000
15	Work counter 2 count value	EVENT	n.WorkCount-2	PART_COUNT	numerical value	ON	1 sec	100~10000
16	Check counter 2 set value	EVENT	n.CheckCountSet-2	PART_COUNT	numerical value	ON	1 sec	100~10000
17	Check counter 2 count value	EVENT	n.CheckCount-2	PART_COUNT	numerical value	ON	1 sec	100~10000
18	Left axis program number	EVENT	n.ProgramNumber-1	LINE	character string (O (English alphabet O, Capital letter,) + Program number)	ON	1 sec	100~10000
19	Right axis program number	EVENT	n.ProgramNumber-2	LINE	character string (O (English alphabet O, Capital letter,) + Program number)	ON	1 sec	100~10000
20	Loader 1 program number	EVENT	n.ProgramNumber-G1	LINE	character string (O (English alphabet O, Capital letter,) + Program number)	ON	1 sec	100~10000

Appendix: List of Collectable Muratec Machine Tool and Specific System Data

Muratec specific systems data								
#	Data to Collect	MTConnect Data				On or Off	Frequency	
		Category	DataItem	TYPE	Value	Default	Default	Range
21	Loader 2 program number	EVENT	n.ProgramNumber-G2	LINE	character string (O (English alphabet O, Capital letter,) + Program number)	ON	1 sec	100~10000
22	Left axis cycle time	SAMPLE	n.CycleTime-1	ACCUMULATED_TIME	character string (per sec)	ON	1 sec	100~10000
23	Right axis cycle time	SAMPLE	n.CycleTime-2	ACCUMULATED_TIME	character string (per sec)	ON	1 sec	100~10000
24	Loader 1 cycle time	SAMPLE	n.CycleTime-Loader1	ACCUMULATED_TIME	character string (per sec)	ON	1 sec	100~10000
25	Loader 2 cycle time	SAMPLE	n.CycleTime-Loader2	ACCUMULATED_TIME	character string (per sec)	ON	1 sec	100~10000
26	Muratec-specific alarm	CONDITION	n.Msystem-	SYSTEM	The 18i series has an MMA at the beginning, and the 30i series has an MMB. E.g. 18i series: nativeCode=MMA2000 30i series: nativeCode=MMB2000	ON	2 sec	100~10000