AMADA MIYACHI CO., LTD.

MM370 provider

Version 1.0.4

User’s guide

August 08, 2022

[Remarks]

[Revision history]

Version	Date	Description
1.0.0	2016-09-05	First edition.
1.0.3	2016-09-26	Added the message (No. 0) of failed analysis of receive packet 2.4 Message
	2017-04-07	Modified misprint
1.0.4	2022-08-08	Correction of internal processing

[Supported models]

Model	Version	Note
AMADA MM370B		
AMADA MM370C	−	

Contents

1. Introduction

This is a user's guide of ORiN provider (AMADA MM370 provider) for Weld checker device MM370 made by AMADA MIYACHI Co., LTD.

You can get measured values from MM370 by using this provider.

This guide describes about functions of AMADA MM370 provider and implemented methods on the controller.

2. Outline of provider

2.1. Outline

AMADA MM370 provider obtains data by using RS232C Communication from Weld checker made by AMADA MIYACHI Co., LTD. The file format of this provider is DLL (Dynamic Link Library). For details, see the following Table 2-1.

Table 2-1 AMADA MM370 provider

File name	CaoProvAMADAMM370.dll
ProgID	CaoProv.AMADA.MM370
Registration	regsvr32 CaoProvAMADAMM370.dll
Deregistration	regsvr32 /u CaoProvAMADAMM370.dll

This provider has 2 major communication modes:

1. One way communication mode

   This mode sends a message from the provider to Application-side automatically at that timing of being sent the data from the device. When this mode is being set, to obtain the dynamic data, such as measured values etc., is unable to asking from the application-side.

2. Two-way communication mode

   This mode enables to obtain data from the device by asking from the application-side. When this mode is being set, to notify a message automatically to the application-side is impossible even if the device has completed measuring.

These modes have a setting on the device side. When using the provider, you need to specify the mode on the device side as an option of AddController, which will be explained later. Figure 2-1 shows corresponding flows of CaoProvController and AMADA's Weld checker.

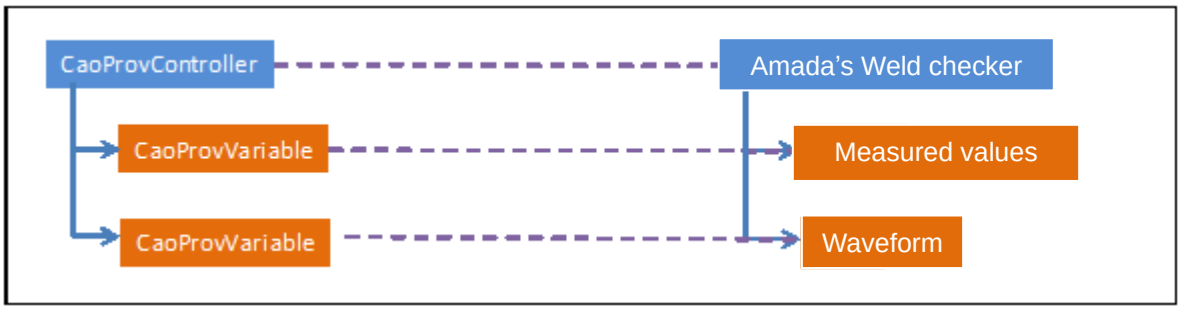

Figure 2-1 Corresponding flows of CaoProvController and MM370

2.2. Method and Properties

2.2.1 CaoWorkspace::AddController method

When generating Controller objects, specify the communication modes described previously and the necessary options for each communication mode.

The specification of AddController is shown below.

Syntax

```
AddController
(
        "<Controller name>",            // Controller name (arbitrary)
        "CaoProv.AMADA.MM370" ,         // Provider name（fixed）
        "<Machine name>",               // Provider execution machine name (unused)
        "<Option>",                     // Option character strings
)
```

The following is Option character strings to be specified. If a value specified at the time of any other Mode options, at which the necessary option should be one way or two-way communication mode, the value will be ignored.

Table 2-2 Option character string of CaoWorkspace::AddController

Option	Required	Description	Range of value	Default value
CONN=<COM Connection Option >	✓	Specify the COM port to use and communication specifications of RS232C as per the device setting. For details, refer to 2.2.1.1.	-----	Baud rate: 38400 Data bits: 8bit Stop bit: 1bit Parity: even number
Mode[=<Communication mode>]	--	Specify the communication mode.	1: One way 2: Two-way	1: One way
ID=<Instrument ID>	--	Specify the Instrument No. of the device to connect. Only at the time of two-way, it is needed.	1 to 99	1
INPUT=<Input item>	--	Specify which data will be sent from the device. Only at the time of one way, it is needed.	1: Measured values 2: Current all cycles 3: Force all cycles 4: Waveform data 5: Measured value history 6: Error history	1
TIMEOUT=<Timeout period>	--	Specify the timeout period (ms). It is needed regardless of specifying MODE.	0 to 65535	500

(Example of use)

1. When the target device to be obtained is one way communication mode and the data to be send is the measured values;

   CONN=COM:4, MODE=1, INPUT=1, TIMEOUT=500

2. When the instrument ID of the target device to be obtained is 2 and two-way communication mode;

   CONN=COM:4, MODE=2, ID=2, TIMEOUT=500

2.2.1.1. Conn option

The following shows the connection parameter strings of Conn option. Parameters surrounded by the square brackets ("[ ]") can be omitted. Underlined part shows the default value when the option is not specified.

RS232C

"Conn=COM:<COM Port>[:BaudRate>[:<Parity>:<DataBits>:<StopBits>[:Flow]]]"

<COM Port>	:	COM port number. '1' -COM1, '2' - COM2, ...
<BaudRate>	:	Baud rate. 4800, 9600, 19200, 38400, 57600, 115200
<Parity>	:	Parity.' N'-NONE, 'E'-EVEN, 'O'-ODD
<DataBits>	:	Data bit count. '7'-7bit, '8'-8bit
<StopBits>	:	Stop bit count. '1'-1bit, '2'-2bit
<Flow>	:	Flow control. '0'-None, '1'-Xon/Xoff, '2'-Hardware control This can be specified without OR.

2.2.2. CaoController::AddVariable method

CaoVariable object is created from CaoController. Those only variable names in Table 2-3 (for one way communication mode) or in Table 2-4 (for two-way communication mode) can be used.

The following shows the specification of AddVariable.

Syntax

AddVariable

(

"< Variable name >", // Variable name

"", // Option character string（unused）

)

Variable names that can be used differ depending on the communication mode.

Variable names used at the time of one way communication mode are written in Table 2-3; used at the time of two-way communication mode are written in Table 2-4 .

2.2.3. CaoController::get_VariableNames method

Obtain the variable name list from Table 2-3 List of control class variables used for one way communication.

2.3. Variable list

2.3.1. Control class variables at time of single-directional communication

List of control class variables used at the time of one way communication mode are described in Table 2-3. Only get operation is available with all the variables.

Table 2-3 List of control class variables used for one way communication mode

Variable name	Data type	Description	Attribute	
			get	put
@MAKER_NAME	VT_BSTR	Return the maker name.	✓	-
@VERSION	VT_BSTR	Return the version of provider.	✓	-

2.3.2. Control class variables at time of bi-directional communication

List of control class variables used at the time of two-way communication mode are described in Table 2-. Only get operation is available with all the variables.

Table 2-4 List of control class variables used for two-way communication mode

Variable name	Data type		Description	Attribute	
				get	put
@MAKERNAME	VT_BSTR		Return the maker name.	✓	−
@VERSION	VT_BSTR		Return the version of provider.	✓	−
@MACHNAME	VT_BSTR		Return the machine name.	✓	−
@MEASUREMENT	VT_ARRAY | VT_VARIANT		Return the measured values. Meanings of the values of measured values item, the information about the corresponding type, etc., see Table 2-5 . For the meanings of the character strings of measurement result, see Table 2-6.	✓	−
	0	VT_UI1	Instrument ID (1 to 99)		
	1	VT_UI1	Schedule No. (1 to 127)		
	2	VT_DATE	Measurement date		
	3	VT_UI1	Measurement item code 1		
	4	VT_BSTR	Measurement result		
	5	VT_VARIANT	Measured values		
	6	VT_BSTR	Measurement unit		
	7	VT_UI1	Measurement item code 2		
	8	VT_BSTR	Measurement result		
	9	VT_VARIANT	Measured values		
	10	VT_BSTR	Measurement unit		
	11	VT_UI1	Measurement item code 3		
	12	VT_BSTR	Measurement result		
	13	VT_VARIANT	Measured values		
	14	VT_BSTR	Measurement unit		

	15	VT_UI1	Measurement item code 4		
	16	VT_BSTR	Measurement result		
	17	VT_VARIANT	Measured values		
	18	VT_BSTR	Measurement unit		
	19	VT_UI1	Measurement item code 5		
	20	VT_BSTR	Measurement result		
	21	VT_VARIANT	Measured values		
	22	VT_BSTR	Measurement unit		
@WAVEFORM	VT_ARRAY | VT_VARIANT		Return the waveform data.	✓	-
		VT_UI1	Instrument ID (1 to 99)		
		VT_UI4	Sampling number (0 to 99999) When this value is 0, the latter data will be VT_EMPTY.		
		VT_UI2	Schedule No. (1 to 127)		
		VT_UI1	Waveform item 1 When OFF displayed, the value is VT_EMPTY.		
		VT_UI1	Waveform item 2 When OFF displayed, the value is VT_EMPTY.		
		VT_UI1	Waveform item 3 When OFF displayed, the value is VT_EMPTY.		
		VT_UI1	Waveform item 4 When OFF displayed, the value is VT_EMPTY.		
		VT_ARRAY | VT_VARIANT	Array that stores the number of samplings of the waveform data		
		0 VT_R4	Sampling time (ms)		
		1 VT_R4	Measured values of Waveform data 1 When OFF displayed or measured values is Nil, the value is VT_EMPTY.		
		2 VT_R4	Measured values of Waveform data 2 When OFF displayed or measured values is Nil, the value is VT_EMPTY.		
		3 VT_R4	Measured values e of Waveform data 3 When OFF displayed or measured values is Nil, the value is VT_EMPTY.		
		4 VT_R4	Measured values of Waveform data 4 When OFF displayed or measured values is Nil, the value is VT_EMPTY.		
@CURRENT_ALL CYCLE	VT_ARRAY | VT_VARIANT		Return All current cycle. For the unit of each measured values, follows @MEASUREMENT.	✓	-
	0	VT_UI1	Instrument ID (1 to 99)		
	1	VT_UI4	Sampling number (0 to 99999) When this value is 0, the latter data will be VT_EMPTY.		
	2	VT_UI2	Schedule No. (1 to 127)		
	3	VT_ARRAY | VT_VARIANT	Array that stores the number of samplings of the waveform data		
		0 VT_R4	Cycle time		
		1 VT_BSTR	Cycle time unit (CYC / ms)		
		2 VT_UI1	Measurement out of range (0: in the range, 1: out of the range)		
		3 VT_R4	Current value When a measured value is Nil, the value is VT_EMPTY.		
		4 VT_BSTR	Current value unit		
		5 VT_R4	Voltage value When a measured value is Nil, the value is VT_EMPTY.		
		6 VT_BSTR	Voltage value unit		
		7 VT_R4	Conduction angle When conduction angle is Nil or measured value is Nil, the value is VT_EMPTY.		

	8	VT_BSTR	Conduction angle l unit When conduction angle is Nil, the value is VT_EMPTY.		
@FORCE_ALLCYCLE	VT_ARRAY | VT_VARIANT		Return All pressure cycle. For the unit of each measured value, follows @MEASUREMENT.	✓	–
	0	VT_UI1	Instrument ID (1 to 99)		
	1	VT_UI4	Sampling number (0 to 99999) When this value is 0, the latter data will be VT_EMPTY.		
	2	VT_UI2	Schedule No. (1 to 127)		
	3	VT_ARRAY | VT_VARIANT			
		0 VT_R4	Cycle time		
		1 VT_BSTR	Cycle time unit (CYC / ms)		
		2 VT_UI1	Measurement out of range (0: in the range, 1: out of the range)		
		3 VT_R4	Pressure value When a measured value is Nil, the value is VT_EMPTY.		
		4 VT_BSTR	Pressure value unit		

Table 2-5 Correspondence table of measurement item

Measurement item		Measured values	
Item name	Code	Type	Unit
Current(RMS)	0	VT_R4	kA
Current (PEAK)	1		
Voltage (RMS)	2	VT_R4	V
Voltage (PEAK)	3		
Current flow time	4	VT_R4	When CYC: CYC When ms: ms
Conduction angle	5	VT_UI2	deg
Power	6	VT_R4	kW
Resistance	7	VT_R4	mOhm
Counter	8	VT_UI4	-----
Mean Force 1	9	VT_R4	N, kgf, lbf
Mean Force 2	10		
Peak Force	11		
Continuous Force [*1]	12		
Force Time	13	VT_UI2	ms
Mean External Voltage	14	VT_R4	----
Peak External Voltage	15		
Continuous External[*1]	16		
External Time	17	VT_UI2	ms
Displacement	18	VT_R4	mm
Continuous Displacement [*1]	19		

[1] As the function cannot output its measured value, the value always outputs 0.

Table 2-6 Meanings of character strings of measured values judgment

Character string	Judgment
" "	No judgment
"N"	Normal
"H"	Upper limit error
"L"	Lower limit error
"C"	Lack-of-current error
"O"	Over range error
"I"	Impulse error
"P"	Parity error

2.4. Message

As mentioned before, once Controller with one way communication mode is added, AMADA MM370 provider sends the measured values, which were sent from the device, to the application side through the added Controller. Table 2-7 Message list of one way communication mode shows a list of messages for the one way communication mode.

Table 2-7 Message list of one way communication mode

No	Meaning	Data type			Description
0	Receive error packet	VT_I4			Send when failed to analyze the receive packet. The data is the value of HRESULT.
1	Receive measured values	VT_ARRAY | VT_VARIANT			Refer to @MEASUREMENT.
2	Receive current all cycle	VT_ARRAY | VT_VARIANT			Refer to @CURRENT_ALLCYCLE.
3	Receive force all cycle	VT_ARRAY | VT_VARIANT			Refer to @FORCE_ALLCYCLE.
4	Receive waveform data	VT_ARRAY | VT_VARIANT			Refer to @FORCE_ALLCYCLE.
5	Receive measure values history	VT_ARRAY | VT_VARIANT			Send the history of all measured values that was received as a message. Meanings of the values of measured values item, the information about the corresponding type, etc., see Table 2-5 . For the meanings of the character strings of measurement result, see Table 2-6.
		0	VT_UI1		Instrument ID (1 to 99)
		1	VT_UI4		History count (0 to 99999) When this value is 0, the latter data will be VT_EMPTY.
		2	VT_ARRAY | VT_VARIANT		
			0	VT_UI1	Schedule No. (1 to 127)
			1	VT_DATE	Measurement
			2	VT_UI1	Measurement item code 1
			3	VT_BSTR	Measurement result
			4	VT_VARIANT	Measured values
			5	VT_BSTR	Measurement unit
			6	VT_UI1	Measurement item code 2
			7	VT_BSTR	Measurement result
			8	VT_VARIANT	Measured values
			9	VT_BSTR	Measurement unit
			10	VT_UI1	Measurement item code 3

		11	VT_BSTR	Measurement result
		12	VT_VARIANT	Measured values
		13	VT_BSTR	Measurement unit
		14	VT_UI1	Measurement item code 4
		15	VT_BSTR	Measurement result
		16	VT_VARIANT	Measured values
		17	VT_BSTR	Measurement unit
		18	VT_UI1	Measurement item code 5
		19	VT_BSTR	Measurement result
		20	VT_VARIANT	Measured values
		21	VT_BSTR	Measurement unit
6	Receive error history	VT_ARRAY | VT_VARIANT		The data is the same as the history of receiving measured values.
7	Notice of interrupted communication	VT_UI1		Interrupted communication types Communication types corresponding to the message No.

2.5. Error code

This provider has an original error code as shown below. (Refer to Table 2-8 Optional error code)

For ORiN2 common errors, refer to the error code section of ORiN2 programming guide.

Table 2-8 Optional error code list

Error name	Error No.	Description
E_NOCONN	0x80110001	CONN option does not exist
E_OUTOFRANGE_MODE	0x80110002	Value specified for MODE option is out of the range
E_OUTOFRANGE_ID	0x80110003	Value specified for ID option is out of the range
E_OUTOFRANGE_INPUT	0x80110004	Value specified for INPUT option is out of the range
E_OUTOFRANGE_TIMEOUT	0x80110005	Value specified for TIMEOUT option is out of the range
E_INVALID_PACKET	0x80110006	Receive the unexpected packet

3. Sample program

The following shows the simple sample program that obtains values of variable name "MEASUREMENT" from the device.

Precondition:

- Device for use shall be AMADA MM370B.
- The number of COM port for use shall be 1.
- Device communication mode shall Bi-directional communication, ID shall be 1.

List 3-1 Sample.frm

```
Dim eng As CaoEngine
Dim ctrl As CaoController
Dim var As CaoVariable
Private Sub Form_Load()
        Set eng = New CaoEngine
        'Create controller object
        Set ctrl = eng.Workspaces(0).AddController(
                "MM370",
                "CaoProv.AMADA.MM370"
                "",
                "CONN=COM:4, MODE=2, ID=1, TIMEOUT=500")
        'Create controller variable object
        Set var = ctrl.AddVariable("@MEASUREMENT", "")
End Sub

Private Sub Command1_Click()
        'Obtain the controller variable values
        Dim meases As Variant
        meases = var.Value
        'Take apart the arrays because the values are stored by array.
        For i = 0 To UBound(meases)
                Text[i].text = meases[i].get_Value
        Next i
End Sub
```