

MW100 CAN Bus Module
(MX118-CAN-M30/S1)

User's Manual

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1. Foreword

This manual describes the functions, operating procedures, and handling precautions applicable to the CAN Bus Module (MX118-CAN-M30/S1) when installed in the CAN bus module-compatible MW100 Data Acquisition Unit. Items not included in this manual can be found in the following manuals for the standard MW100 Data Acquisition Unit. Read them along with this manual.

Manual Name	Manual No.	Description
MW100 Data Acquisition Unit User's Manual	IM MW100-01E	Contains useful information about the functions, installation and wiring, operating procedures, and handling precautions of the MW100 Data Acquisition Unit.
MW100 Data Acquisition Unit Operation Guide	IM MW100-02E	Briefly describes handling of the MW100 Data Acquisition Unit and basic operations with the MW100 Viewer software program.
Precautions on the Use of the MX100/MW100	IM MX100-71E	Explains precautions during use of the MW100 Data Acquisition Unit.
MX100/MW100 Data Acquisition Unit Installation and Connection Guide	IM MX100-72E	Briefly describes the installation and connection methods for the MW100 Data Acquisition Unit.
MW100 Viewer Software User's Manual	IM MW180-01E	Explains the functions and operating procedures of the MW100 Viewer Software program that comes standard with the MW100 Data Acquisition Unit.
MW100 Communication Command Manual	IM MW100-17E	Lists and explains the communication commands for the MW100 Data Acquisition Unit.

2. System Reconfiguration

When connecting the MW100 for the first time, or when changing the position of an installed input/output module on the connected MW100, reconfiguration is performed to match up the system with the actual modules. Before reconfiguration, connect to the MW100 to be reconfigured.

Setting Module Information

- (1). From the top screen, click **System Settings > Module information** under the Top item.
- (2). If the Setting Module and Installed Module boxes are different, click the **Reconstruct** button to reconfigure the system.

Top > System Setting > Module Information

Module Information

No.	Configured Module	Attached Module	Status
0	MX118-CAN-M30	MX118-CAN-M30	
1	MX118-CAN---	MX118-CAN---	
2	MX118-CAN---	MX118-CAN---	
3	MX110-UNV-M10	MX110-UNV-M10	
4	MX110-UNV-M10	MX110-UNV-M10	
5	-----	-----	

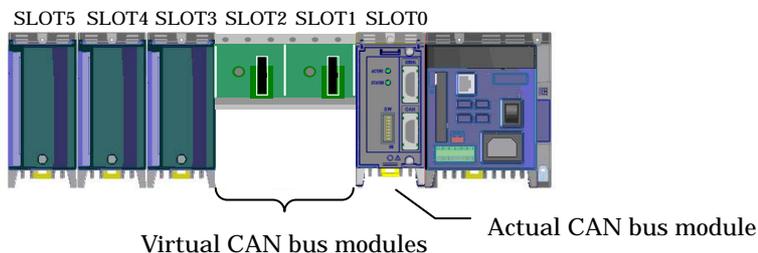
Reconstruct

Note

Always turn the power to the MW100 OFF before attaching or removing input/output modules.

For either of the CAN bus module slot width settings of 1(10ch), 2(20ch), or 3(30ch) in the module information display, actual CAN bus modules are shown as “MX118-CAN-M30” and virtual CAN bus modules (empty slots) are shown as “MX118-CAN- - - -.”

The slot width occupied by a CAN bus module must be set according to the number of channels used (1-30 ch). However, since the actual module’s width is always 1 slot, this “virtual” slot width must be taken into account when installing modules on the base plate.



If the slot width of a CAN bus module is set to 3 (30 ch used) and the module is installed in slot 0, slots 1 and 2 must be left empty. If another module is mistakenly installed into slot 1 or 2, all modules in slots 0 through 2 will be disabled.

3. Setup

3.1. Setting Up the Measurement Operation

From the top screen, click **System Settings** > **Measurement Setting** under the Top item.

Entering Measurement Group Settings

Select a measurement interval from the Measurement Interval list. Set a measurement interval for each group number.

Assigning Measurement Modules

- (1). Select the group you wish to assign in the Measurement groups list.
- (2). Select an integral time of AUTO, 50 Hz, or 60 Hz in the Integral Time box. (The integral time setting is ignored for CAN bus modules.)

Click the **Apply** button. This enables the settings changes.

Top > System Setting > Measurement Setting

Interval Group

No.	Interval
1	100 ms
2	500 ms
3	Off

Measurement Module

Module No.	Interval Group	A/D Integration Time
0	1	Auto
1	1	Auto
2	1	Auto
3	2	Auto
4	2	Auto

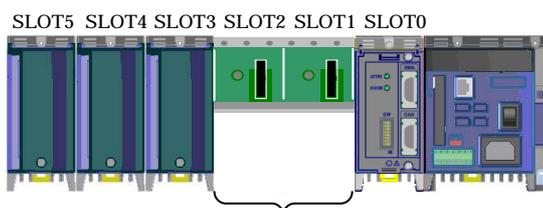
Apply

Note

Assign measurement intervals to measurement groups in such a manner that:

(small interval) < meas. Group 1 ≤ meas. Group 2 < meas. group 3 (long interval)

If multiple measurement intervals are specified for a single CAN bus module, the measurement interval of the first slot is used for the second and/or third slots. For example, if a slot width of 3 is used and the measurement interval number of slots 1 and 2 are set to something different than slot 0, the measurement interval number of slot 0 overrides that of slots 1 and 2. Also, if the measurement interval of slot 0 is OFF, the measurement interval of slots 1 and 2 will also be OFF.



Same measurement interval as the first slot assigned

The relationship between the measurement interval and the maximum number of channels that can be set is the same as that in the MW100 standard specifications (in the table below).

Measurement Interval	Max. Number of Channels Set	Notes
10 ms	10	The <i>max. number of channels that can be set</i> refers to the total number of valid input channels excluding channels set to SKIP, and is applied across multiple modules.
10/50 ms mixed	10	
50 ms	30	
100 ms–	60	No restrictions

Precautions When Setting the Measurement Interval to 10ms(50ms)

All slots can be set to the 10ms(50) measurement interval. However, if the maximum number of channels that can be set is exceeded, an error message will appear upon measurement start. (E223 “Too many measurement channels.”)

3.2. Setting Up Measurement Channels

You can set the input type, range, span, computations, difference input, and scale.

Setting the Input Range

- (1). From the top screen, click **Channel Settings > AI/DI Channel settings** under the Top item.
- (2). Select the channel group you wish to set from the Channel list box.

Setting the Input Mode

Select an input mode of COM or SKIP from the Mode list.

Setting the Measurement Range

Only the measurement range of CAN can be selected from the Range list.

Setting the Measurement Span

Determines the actual measuring range from the measurable range.

Enter the lower or upper limit of Span in the Lower limit value or Upper limit value box under Span. The available setting range is -30000–30000.

Setting the Scaling

Set these items when linearly scaling the measured values.

- (1). Select **SCALE** in the Computation box.
- (2). Enter the lower or upper limit of scale in the Lower limit value or Upper limit value box under Scale. The available setting range is -30000–30000.
- (3). Select the decimal point position from the Point list box under Scale.
- (4). Enter the scale conversion value in the Units box.

Setting Difference Input

- (1). Select **DELTA** in the Computation box.
- (2). Enter the reference channel number in the Reference box.

Click the **Apply** button. This enables the settings changes.

Channel List 001 - 010

No.	Mode	Range	Span		Calc	Ref. Ch.	Scale			Unit
			Lower	Upper			DP	Lower	Upper	
001	COM	CAN	-30000	30000	Off					
002	COM	CAN	-30000	30000	Off					
003	COM	CAN	-30000	30000	Off					
004	COM	CAN	-30000	30000	Off					
005	COM	CAN	-30000	30000	Off					
006	COM	CAN	-30000	30000	Off					
007	COM	CAN	-30000	30000	Off					
008	COM	CAN	-30000	30000	Off					
009	COM	CAN	-30000	30000	Off					
010	COM	CAN	-30000	30000	Off					

Apply

Global Setting

No.	Mode	Range	Span		Calc	Ref. Ch.	Scale			Unit
			Lower	Upper			DP	Lower	Upper	
001	COM	CAN	-30000	30000	Off					
010										

Apply

Note

Linear scaling (SCALE) and difference input (DELTA) cannot be selected at the same time.

If the input type setting does not match that of the MW100, measurements may not be performed correctly. The output data will be "Invalid" (if the setting on the MW100 is COM and the channels set on the module are OFF).

To maintain the highest accuracy possible during measurement of CAN data, you can minimize computation errors by setting all settings on the module (upper and lower limits of both Value and Span) and MW100 main unit (upper and lower limits of both Scale and Span) to the same span.

Value lower limit = span lower limit = MW100 span lower limit (= MW100 scale lower limit)

Value upper limit = span upper limit = MW100 span upper limit (= MW100 scale upper limit)

3.3. Setting Up Filters

You can set filters for CAN measurement channels. The burnout and reference junction compensation settings are ignored for CAN bus modules.

From the top screen, click **Channel Settings > Filter, Burnout, RJC setting** under the Top item.

Setting the Filter Coefficient

Select a coefficient from the Filter Coefficient list.

For noise sources other than power supply noise, the MW100 Data Acquisition Unit is equipped with a first-order lag filter having output characteristics relative to step input. For the filter setting, the time constant is determined by selecting filter coefficient N for the measurement interval.

Click the **Apply** button. This enables the settings changes.

No.	Filter	Burnout	RJC Type	Voltage [uV]
001	0	Off	Internal	
002	0	Off	Internal	
003	0	Off	Internal	
004	0	Off	Internal	
005	0	Off	Internal	
006	0	Off	Internal	
007	0	Off	Internal	
008	0	Off	Internal	
009	0	Off	Internal	
010	0	Off	Internal	

Note

For filter coefficients, see section 2.10, "Measures against Noise on the MW100 Data Acquisition Unit" in the MW100 Data Acquisition Unit User's Manual (IM MW100-01E).

4. Communication Commands

4.1. Setting the Input Range

When setting p2=SKIP

SR p1,p2<terminator>

When p2=COM

When p6=OFF

SR p1,p2,p3,p4,p5,p6<terminator>

When p6=DELTA

SR p1,p2,p3,p4,p5,p6,p7<terminator>

When p6=SCALE

SR p1,p2,p3,p4,p5,p6,p7,p8,p9,p10<terminator>

When Setting Channels to SKIP

Syntax SR p1,p2<terminator>

p1 Channel range (001–060)

p2 Input mode (SKIP)

Query SR[p1]?

Example) Set channel 1 to SKIP.

SR 001,SKIP

Explanation) Channels set to SKIP are not measured.

Specify measurement channels on p1.

When Setting Channels to COM

When no computation performed

Syntax SR p1,p2,p3,p4,p5,p6<terminator>

p1 Channel range (001–060)

p2 Input mode (COM)

p3 Measurement range (CAN)

p4 Lower limit of span (-30000–30000)

p5 Upper limit of span (-30000–30000)

p6 Computation mode (OFF)

Query SR[p1]?

Example) Set the input type for channels 1–10 to COM(CAN), the lower limit span to 0, and the upper limit of span to 10000.

SR 01-10,COM,CAN,0,10000,OFF

Explanation) Specify measurement channels on p1.

When Setting Difference between Channels Computation

Syntax SR p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Channel range (001–060)
p2 Input mode (COM)
p3 Measurement range (CAN)
p4 Lower limit of span (-30000–30000)
p5 Upper limit of span (-30000–30000)
p6 Computation mode (DELTA)
p7 Reference channel number (001–060)

Query SR[p1]?

Example) Set the MATH type for channel 10 to difference computation between channels with channel 1 (the reference channel), set the input type to COM(CAN), the lower limit of span to -5000, and the upper limit of span to 5000.

SR 010,COM,CAN,-5000,5000,DELTA,001

Explanation) Specify measurement channels on p1.

When Setting Scaling

Syntax SR p1,p2,p3,p4,p5,p6,p7,p8,p9,p10<terminator>
p1 Channel range (001–060)
p2 Input mode (COM)
p3 Measurement range (CAN)
p4 Lower limit of span (-30000–30000)
p5 Upper limit of span (-30000–30000)
p6 Computation mode (SCALE)
p7 Scaling lower limit (-30000–30000)
p8 Scaling upper limit (-30000–30000)
p9 decimal place (0–4)
p10 Unit (max 6 characters)

Query SR[p1]?

Example) Convert the CAN signal measured on channel 2 to DC current. Set the lower limit of span to 1000, upper limit of span to 5000, lower limit of scaling to 0.00 A, and upper limit of scaling to 5.00 A.

SR 002,COM,CAN,1000,5000,SCALE,0, 500,2,A

Explanation) Specify measurement channels on p1.

For the characters that can be used for p10, see the user specified characters in section 1.3 of the MW100 Communication Command Manual (IM MW100-17E).

5. PC Software

Use PC software of the following release numbers or later.

Software	Software Name	Release No.
MW100 IP Setting Software	MW100 Viewer Address Setting	R2.06
MW100 Viewer	MW100 Viewer Data Viewer	R2.06
MW100 Calibrator	MW100 Viewer Calibrator	R2.06

6. CAN Bus Module (MX118-CAN-M30) Specifications

6.1. Model Name

Model Name	Description	Max. Number of Channels	Min. Sampling Interval	Slot Width
MX118-CAN-M30	CAN Bus Data Acquisition Module	30 ch	10 ms	1–3

6.2. Module Specifications

Number of Channels: 30 ch/module

No. of messages (ID): 30

Sampling interval: 10 ms–60 s

Max. no. of installed modules: Differs by slot width setting (no. of ch used per module)

Slot Width Setting	Max. No. of Ch Used	Max. no. of Modules (per System)
1	10 ch	6
2	20 ch	5
3	30 ch	4

Multi-interval: Allowed. However, if the slot width is 2 or 3, a separate measurement interval cannot be set for the real and virtual instances of the same module.

Mode switching: Switch between Setting and Measurement modes with hardware dip switch.

Setting mode: CAN bus settings can be entered externally from a PC using a SERIAL (connector).

Measurement mode: CAN bus data can be captured and transferred to the MW100 using a CAN (connector).

Data range: -30000–30000(range of data that can be transferred to the MW100)

Set using the upper/lower limit of span.

Scaling computation: The following scaling computation is carried out inside the module.

$$\frac{InputValue - ValueMin}{ValueMax - ValueMin} (SpanMax - SpanMin) + SpanMin$$

Input Value: Input CAN bus data (max. 64 bit data)

Value Max: Upper limit of CAN bus data set by user

Value Min: Lower limit of CAN bus data set by user

Span Max: Upper limit of span set by user

Span Min: Lower limit of span set by user

For scaling computation When $(\text{Value width}/\text{Span width}) > 1$, Value width is changed to within the span width. For such settings, the resolution of values computed with scaling computation is lower than Value Max/Value Min.

$$\begin{aligned} \text{Value width} &= (\text{Value Max}-\text{Value Min}) \\ \text{Span width} &= (\text{SpanMax}-\text{SpanMin}) \\ \text{Span width (max)} &= 60000 \end{aligned}$$

Scaling computation accuracy: $\pm(\text{zoom factor} + 2)$ digits (zoom factor is $\text{Span width}/\text{Value width}$)

Ex) When $\text{Value Min} = 0$, $\text{Value Max} = 1\ 000$, $\text{Span Min} = 0$, $\text{Span Max} = 10000$
Accuracy = $\pm(10+2)$ digits = ± 12 digits (no digits after the decimal point)

CAN protocol version: Ver. 2.0B (Standard & extended message format)

Supported standards: ISO11898 (High Speed Communication)

Communication speed: 10 kbps–1 Mbps, Time quanta, and sampling points can be selected

Communication Speed Related Settings		
Communication speed (bps)	10 k, 20 k, 33.3 k, 50 k, 62.5 k, 83.3 k, 125 k, 250 k, 500 k, 800 k, 1 M, Other	
Detailed settings	Baud Rate Prescaler (BRP)	1–256
	Synchronization Segment(SS)	1Tq (fixed)
	Time Segment 1 (TSEG1)	4–16Tq
	Time Segment 2 (TSEG2)	2–8Tq
	ReSynchronization Jump Width (SJW)	1–4Tq
	Bit Sample Point (BSP)	1 or 3

Byte order: Big Endian/Little Endian

Data types: Unsigned, Signed, Float (32-bit), Double (64-bit)

No. of CAN ports: 1

Termination (connector type): CAN (for measurement): D-Sub-9 PIN (male)

SERIAL (for settings): D-Sub-9 PIN (male)

Reference operating conditions: Ambient temperature: -20–50°C

Ambient humidity: 20–80% when -20–40°C

10–50% when 40–50°C

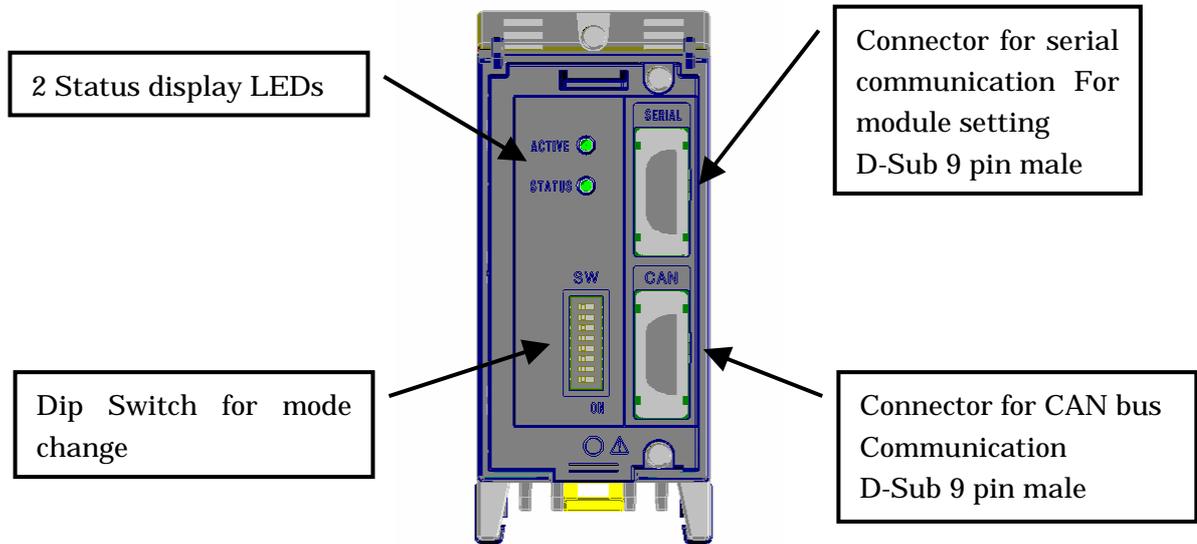
Storage Environment: Storage temperature range: -25–60°C

Storage humidity range: 5–95%

Power consumed: Approximately. 2 W

Weight: Approximately 0.5 kg
 External dimensions: Approximately 57×131×150 mm

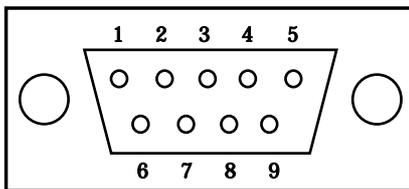
Outer Dimensions



Status LED: ACTIVE and STATUS (2)

ACTIVE: Lights when data received during CAN or SERIAL communications
 STATUS: When CAN bus module is in Setting mode : Blinks for approximately 1 second
 When CAN bus module is in Measurement mode : Lights

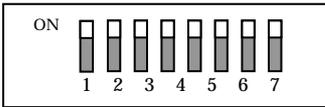
Communication Connector Pin Assignments



Pin No.	For SERIAL Communication	For CAN Bus Communications
1	-	-
2	RXD	CAN_L
3	TXD	GND
4	-	-
5	GND	F.G.
6	-	-
7	-	CAN_H
8	-	-
9	-	-

-:Non Connection

Dip Switch Settings



Dip Switch No.		1	2	3	4	5	6	7	8
Setting mode	Baud rate 57600bps	ON	OFF	OFF	OFF	OFF	OFF	OFF	-
	Baud rate 9600bps	ON	ON	OFF	OFF	OFF	OFF	OFF	-
Measurement mode		OFF	OFF	OFF	OFF	OFF	OFF	OFF	-
CAN bus comm. terminator	ON	-	-	-	-	-	-	-	ON
	OFF	-	-	-	-	-	-	-	OFF

-:Don't care

Note

Number of channels is limited to 10 per unit when the sampling interval is 10 ms. (MW100 standard specifications)

The CAN bus module's physical slot width is always 1, but set an occupied slot width of 1-3 depending on the number of channels used.

7. Switching between Setting and Measurement Mode

When measuring (acquiring) CAN bus data on a CAN bus module, you can insert other I/O modules in the MW100 and perform measurements on them at the same time. However, when the CAN module is installed in the MW100, the CAN settings are entered using dedicated setting software (CAN Bus Module Configuration Tool) via external serial communications.

7.1. Measurement Mode (STATUS LED Lights)

Set the dip switch on the CAN bus module to Measurement mode, and acquire CAN bus data through the CAN connector. CAN bus data is measured on the MW100 in the same manner as that of the other I/O modules.



7.2. Setting Mode (STATUS LED Blinks at Approximately One-Second Intervals)

Set the dip switch on the CAN bus module to Setting mode, and enter the various settings on the module using dedicated setting software (CAN Bus Module Configuration Tool) through the SERIAL connector. CAN bus data cannot be measured while in Setting mode.



7.2.1. Setting Mode Communication Specifications

Interface: RS232

Connections: Point-to-point

Communication method: Half-duplex

Baud rate: 9600 bps/57600 bps (change using CAN bus module Dip SW)

Start bit: Fixed to 1 bit

Data length: Fixed to 8 bit

Parity: Fixed to even number

Stop bits: Fixed to 1 bit

Hardware handshaking: None

Software handshaking: None

Protocol: Dedicated protocol

Communication services: Sending and receiving settings

Format: Command/response