

DX100 OPTIONS INSTRUCTIONS

FOR I/O TRACE FUNCTION

Upon receipt of the product and prior to initial operation, read these instructions thoroughly and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
DX100 INSTRUCTIONS
DX100 OPERATOR'S MANUAL
DX100 MAINTENANCE MANUAL

The DX100 operator's manuals above correspond to specific usage.
Be sure to use the appropriate manual.

Part Number: 159118-1CD
Revision: 0



MANDATORY

- This manual explains the details on I/O trace function of the DX100. Read this manual carefully and be sure to understand its contents before handling the DX100.
- General items related to safety are listed in Chapter 1: Safety of the DX100 INSTRUCTIONS. To ensure correct and safe operation, carefully read the DX100 Instructions before reading this manual.



CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the DX100.

In this manual, the Notes for Safe Operation are classified as “WARNING,” “CAUTION,” “MANDATORY,” or “PROHIBITED.”



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.



MANDATORY

Always be sure to follow explicitly the items listed under this heading.



PROHIBITED

Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items



To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING.”



WARNING

- Before operating the manipulator, check that servo power is turned OFF pressing the emergency stop buttons on the front door of the DX100 and the programming pendant. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Fig. : Emergency Stop Button



- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Fig. : Release of Emergency Stop



- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
 - View the manipulator from the front whenever possible.
 - Always follow the predetermined operating procedure.
 - Keep in mind the emergency response measures against the manipulator's unexpected motion toward you.
 - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
 - Turning ON the power for the DX100.
 - Moving the manipulator with the programming pendant.
 - Running the system in the check mode.
 - Performing automatic operations.

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there is a problem.

The emergency stop buttons are located on the right of front door of the DX100 and the programming pendant.



CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
 - Check for problems in manipulator movement.
 - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the DX100 cabinet after use.

The programming pendant can be damaged if it is left in the P-point maximum envelope of the manipulator, on the floor, or near fixtures.

- Read and understand the Explanation of Warning Labels in the DX100 Instructions before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN manipulator is the YASKAWA industrial robot product.


The manipulator usually consists of the controller, the programming pendant, and supply cables.

In this manual, the equipment is designated as follows.

Equipment	Manual Designation
DX100 Controller	DX100
DX100 Programming Pendant	Programming Pendant
Cable between the manipulator and DX100	Manipulator Cable

DX100

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with []. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. page key  The cursor key is an exception, and a picture is not shown.
	Axis Keys Numeric Keys	"Axis Keys" and "Numeric Keys" are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a "+" sign between them, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select •••" means that the cursor is moved to the object item and the SELECT key is pressed, or that the item is directly selected by touching the screen.

1	I/O Trace Function	1-1
2	Basic Specification.....	2-1
3	Setting of I/O Trace Function	3-1
3.1	Window	3-1
3.2	Operation Procedure	3-2
3.3	Specified I/O Signal	3-3
3.3.1	Specified Input Signal.....	3-3
3.3.2	Specified Output Signal.....	3-3
4	I/O Trace Log Data	4-1
4.1	Window	4-1
4.2	Operation Procedure	4-2
5	External Memory	5-1
5.1	Operation Procedure	5-1
5.2	Data Format.....	5-2
6	I/O TraceViewer (Optional)	6-1

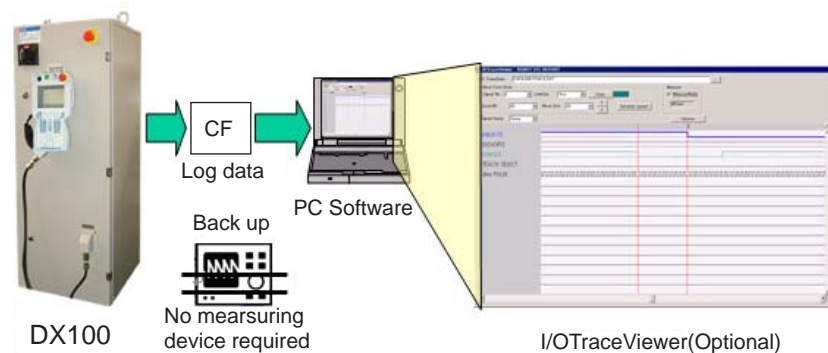
1 I/O Trace Function

I/O trace function is a function that can trace the signal status used by the robot controller after synchronizing it to the concurrent I/O scanning without using any measuring devices.

The trace log data can be saved in CSV format and utilize it in variety of situations depending on the purpose of use. For example, when setting up the system or a failure occurred, problems can be easily analyzed to find their solutions by using the log data traced by this function and thus the time to solve the problem is reduced.

Also, by using the PC software IO TraceViewer, the waveform of the saved log data can be displayed and analyze it without any difficulty.

Fig. 1-1: System Configuration



2 Basic Specification

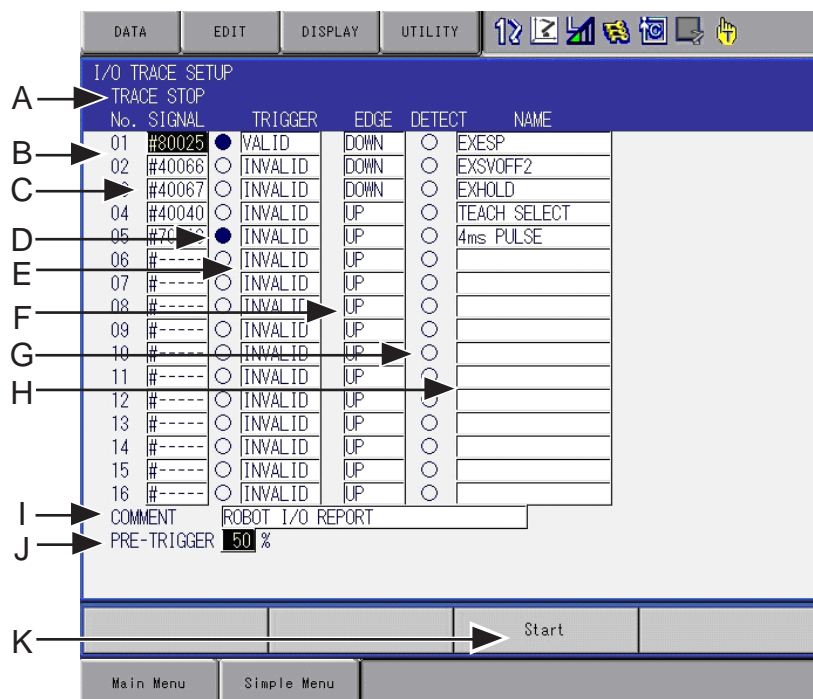
Item	Specification
Trace cycle	4 m sec (Synchronized to concurrent I/O cycle)
Trace target	Concurrent I/O number ·General input (#00010 to #02567) ·General output (#10010 to #12567) ·External input (#20010 to #22567) ·External output (#30010 to #32567) ·Specific input (#40010 to #41607) ·Specific output (#50010 to #52007) ·Interface panel input (#60010 to #60647) ·Auxiliary relay (#70010 to #79997) ·Control status (#80010 to #80647) ·Pseudo Input (#82010 to #82207) ·Network Input (#25010 to #27567) ·Network output (#35010 to #37567)
Number of trace signal	16 signals at maximum
Trigger	Edge (up and down)
Pre-trigger	Specify the triggering point of the trace log data (0 % to 100 %) 0 %: Save the log data for 10 sec from the trigger point. 50 %: Save the log data for 10 sec from 5sec previous to the trigger point. 100 %: Save the log data for 10 sec from 10 sec previous to the trigger point.
Amount of log data	Save the log data for 10sec including the trigger point.
Trace start/end operation	Can be operated by the programming pendant or a specific input signal (#40600)
Tracing status	Can be verified with the programming pendant or a specific input signal (#50900)



The trace log data is cleared with ON/OFF button. Please backup the necessary trace log data to the external memory device before turning OFF the control power supply.

3 Setup of I/O Trace

3.1 Window



- A. TRACE STOP/ START
Displays the tracing status
- B. No. 1 to 16
Up to 16 tracing conditions can be set
- C. SIGNAL
Set the concurrent I/O signal (#0xxxxx to #9xxxxx)
The tracing condition is cleared when "0" is input
- D. SIGNAL STATUS
Show the signal status. ●: Signal is ON ○: Signal is OFF
- E. TRIGGER
Set "VALID" or "INVALID" of the trigger condition
- F. EDGE
Set "UP" or "DOWN" of the trigger condition edge
- G. DETECT
Show the trigger detecting status
●: Trigger is detected ○: Trigger is undetected
- H. NAME
Can set the signal name with up to 16 letters
- I. COMMENT
Can set the I/O trace comment with up to 32 letters

J. PRE-TRIGGER

Specify the triggering point of the traced log data (initial value is 50%)

0 % :Save the log data for 10 sec from the trigger point.

50 % :Save the log data for 10 sec from 5sec previous to the trigger point

100 % :Save the log data for 10 sec from 10 sec previous to the trigger point.

K. {START}/{STOP} button

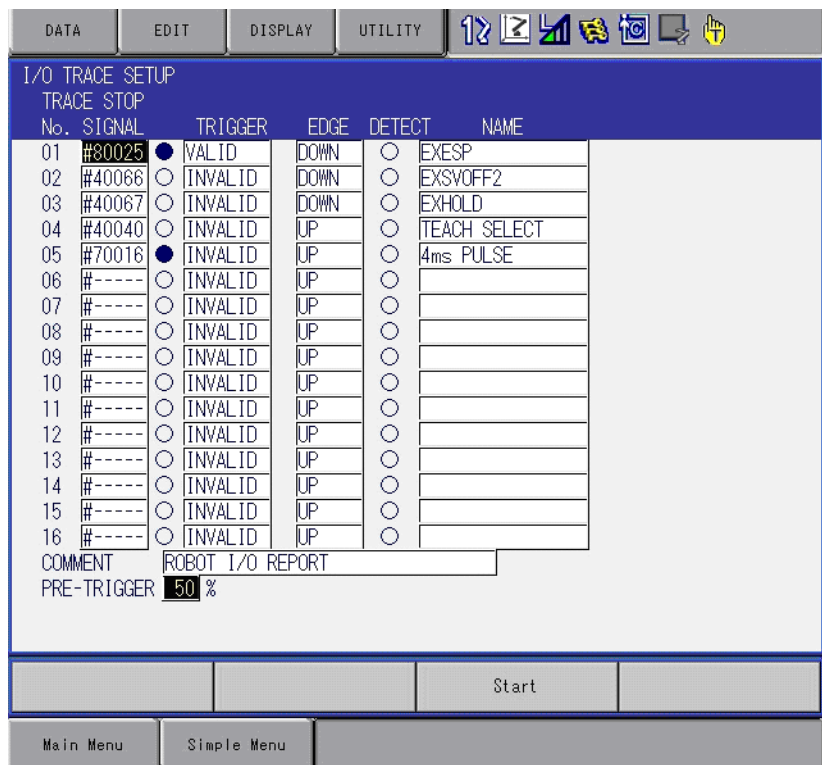
Press {START} button to start I/O tracing, display {STOP} button.

Also, press {START} button to save the data when trigger is detected and display {STOP} button .

Press {STOP} button to end I/O tracing and display {START} button.

3.2 Operation Procedure

1. Change the security mode to management mode. ({I/O TRACE} menu is not displayed under the operation/edit mode.)
2. Select {IN/OUT} under the main menu.
3. Select {I/O TRACE}.
 - I/O TRACE SETUP window appears.



4. Set the trace signal.
 - Move the cursor to {SIGNAL} part and press [SELECT] key to input the concurrent I/O signal logical number.
 - Input "0" to clear the tracing condition.

DX100

3 Setup of I/O Trace

3.3 Specified I/O Signal

5. Set the trigger condition.
 - Move the cursor to {TRIGGER} part and press [SELECT] key to alternate {VALID} and {INVALID}.
 - While the trigger is valid, move the cursor to {EDGE} and press [SELECT] key to alternate {UP} and {DOWN}.
6. Set the signal name.
 - Move the cursor to {SIGNAL} and press [SELECT] key to input its name with up to 16 letters.
7. Set the comment.
 - Move the cursor to {COMMENT} and press [SELECT] key to input a comment with up to 32 letters.
8. Set the pre-trigger.
 - Move the cursor to {PRE-TRIGGER} and press [SELECT] key to set the pre-trigger.
9. Start or end the tracing operation.
 - Press {START} button to start tracing.
The status becomes in a tracing state.
 - Press {STOP} button to end tracing.
The status becomes in a out-of-tracing state.
 - After the trigger is detected and the data is saved, the status becomes in a out-of-tracing state.

3.3 Specified I/O Signal

3.3.1 Specified Input Signal

- **#40600 I/O tracing start**
Tracing operation starts when this signal is turned ON and stops when it is turned OFF.



When the tracing operation is started with the programming pendant, complete it with the programming pendant.

Also, when the tracing operation is started with specified input signal, again complete it with the specified input signal.

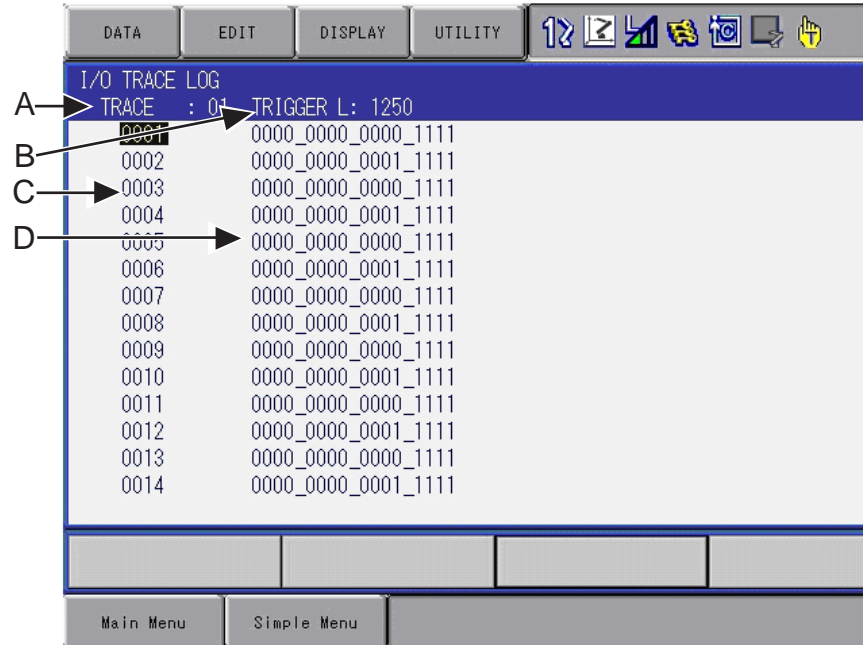
In case the trigger is detected, the tracing operation completes automatically.

3.3.2 Specified Output Signal

- **#50900 While in I/O tracing mode**
This number shows the tracing status. The signal is turned ON when it is in a tracing state, and it is in a out-of-tracing state when the signal is turned OFF.

4 I/O Trace Log Data

4.1 Window



A. TRACE

Display the tracing condition No. from which a trigger is detected.
 "***" is displayed when the trigger is undetected.

B. TRIGGER L

Display the line from which a trigger is detected.
 "*****" is displayed when the trigger is undetected.

C. Log data line No.

Display the line No. of the log data.

D. Log data

Display the data of logged 16 signal
 "0" means the signal is in OFF state and "1" means it is in ON state.
 The signal numbers from No.1 to No.16 are shown from right to left of the line.

Example) The signal No. 1 and 15 are in ON state.

```
0100_0000_0000_0001
```

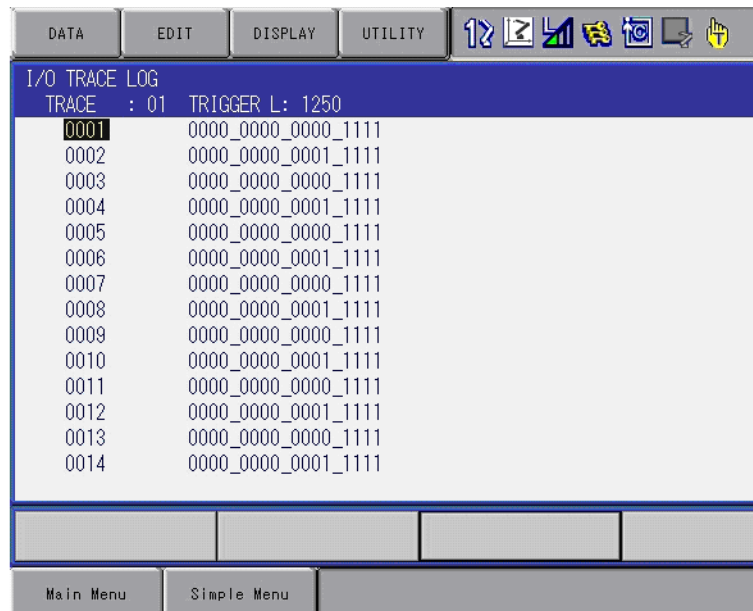
DX100

4 I/O Trace Log Data

4.2 Operation Procedure

4.2 Operation Procedure

1. Change the security to management mode. ({I/O TRACE LOG} menu is not displayed under the operation/edit mode.)
2. Select {IN/OUT} under the main menu.
3. Select {I/O TRACE LOG}.
 - I/O TRACE LOG window appears.



4. Search the line number.
 - Move the cursor to a line number part, input a desired line number and press [SELECT] key to search the line.



4 I/O Trace Log Data
4.2 Operation Procedure

5. Search the trigger number.

- Move the cursor to the log data part and press [SELECT] key to search the desired trigger line.

DATA	EDIT	DISPLAY	UTILITY	
I/O TRACE LOG				
TRACE : 01 TRIGGER L: 1250				
0001		0000_0000_0000_1111		
0002		0000_0000_0001_1111		
0003		0000_0000_0000_1111		
0004		0000_0000_0001_1111		



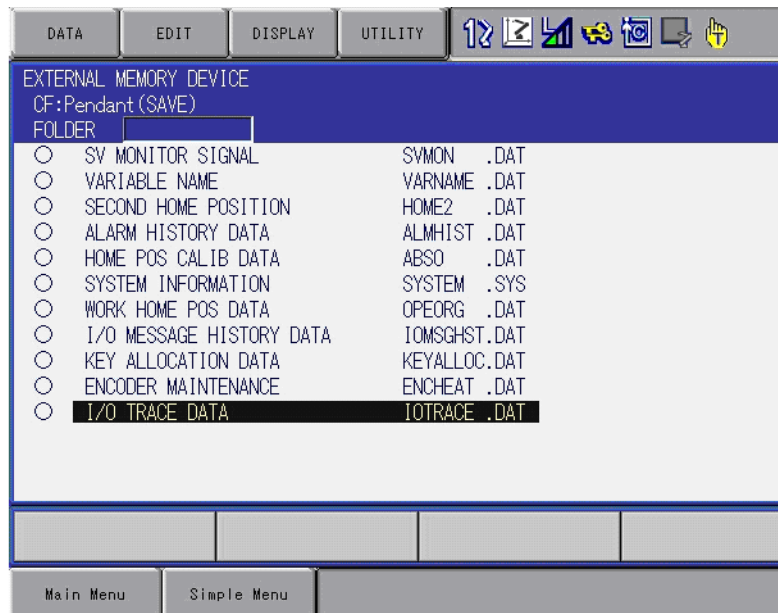
1247		0000_0000_0000_1011		
1248		0000_0000_0001_1011		
1249		0000_0000_0000_1011		
1250		0000_0000_0001_1010		

DX100	5	External Memory
	5.1	Operation Procedure

5 External Memory

5.1 Operation Procedure

1. Select {FD/PC CARD} under the main menu.
2. Select {SAVE}.
3. Select {SISTEM DATA}.
 - System data window apepars.



4. Select "I/O TRACE DATA" on the window.
 - "★" mark is displayed.
 - Press [ENTER] key to display the confirmation dialog box. Select [YES] to save the data.
5. Select [LOAD] or [VERIFY] to load or verify the I/O trace data.
 - Note that the security should be in the management mode when loading the data.
 - No log data other than I/O trace setup data can be loaded.

5.2 Data Format

Following is the examples of output file data when I/O trace data is output to the external memory.

■ File name : IOTRACE.DAT

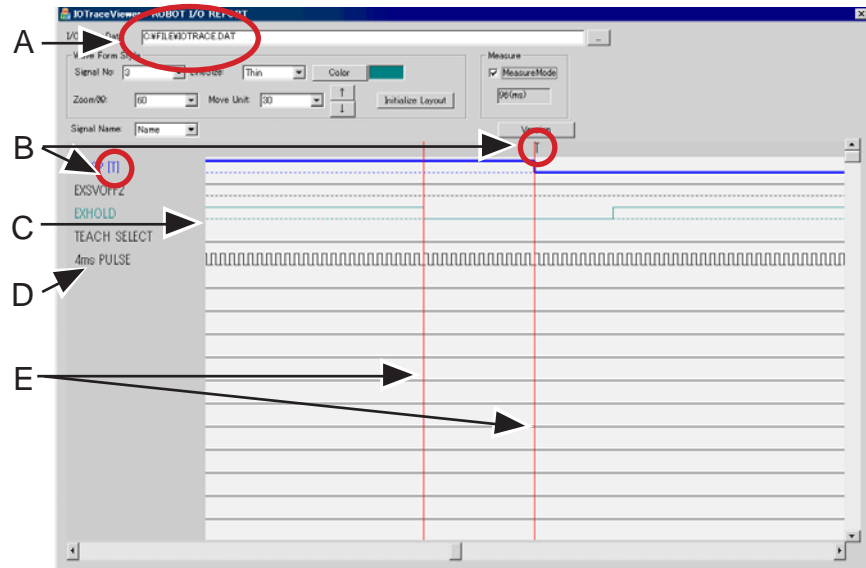
	//IOTRACE	//IOTRACE
1 ¹⁾	<pre>//COMMENT Robot I/O Report 50 80025,1,0,EXESP 40066,0,0,EXSVOFF2 40067,0,0,EXHOLD 40040,0,1,EACH SELECT 70016,0,1,4 ms pulse 0,0,1 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1, 0,0,1,</pre>	<pre>//COMMENT <Comment , up to 32 letters> <Pre-trigger> <Signal 1>, <Trigger 1>, <Edge 1>, <Signal name 1> <Signal 2>, <Trigger 2>, <Edge 2>, <Signal name 2> <Signal 3>, <Trigger 3>, <Edge 3>, <Signal name 3> <Signal 4>, <Trigger 4>, <Edge 4>, <Signal name 4> <Signal 5>, <Trigger 5>, <Edge 5>, <Signal name 5> <Signal 6>, <Trigger 6>, <Edge 6>, <Signal name 6> <Signal 7>, <Trigger 7>, <Edge 7>, <Signal name 7> <Signal 8>, <Trigger 8>, <Edge 8>, <Signal name 8> <Signal 9>, <Trigger 9>, <Edge 9>, <Signal name 9> <Signal 10>, <Trigger 10>, <Edge 10>, <Signal name 10> <Signal 11>, <Trigger 11>, <Edge 11>, <Signal name 11> <Signal 12>, <Trigger 12>, <Edge 12>, <Signal name 12> <Signal 13>, <Trigger 13>, <Edge 13>, <Signal name 13> <Signal 14>, <Trigger 14>, <Edge 14>, <Signal name 14> <Signal 15>, <Trigger 15>, <Edge 15>, <Signal name 15> <Signal 16>, <Trigger 16>, <Edge 16>, <Signal name 16></pre>
2 ²⁾	<pre>4 1,1250 1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 1,1,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 1,1,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 :</pre>	<pre><Trace scan time> <Trigger Signal Number>, <Trigger Line Number> <Signal 1 log 1>, <Signal 2 log 1>, <Signal 3 log 1>, ..., <Signal 16 log 1> <Signal 1 log 2>, <Signal 2 log 2>, <Signal 3 log 2>, ..., <Signal 16 log 2> <Signal 1 log 3>, <Signal 2 log 3>, <Signal 3 log 3>, ..., <Signal 16 log 3> <Signal 1 log 4>, <Signal 2 log 4>, <Signal 3 log 4>, ..., <Signal 16 log 4> <Signal 1 log 5>, <Signal 2 log 5>, <Signal 3 log 5>, ..., <Signal 16 log 5> : <Signal 1 log 2499>, <Signal 2 log 2499>, <Signal 3 log 2499>, ..., <Signal 16 log 2499> <Signal 1 log 2500>, <Signal 2 log 2500>, <Signal 3 log 2500>, ..., <Signal 16 log 2500></pre>

1 Data 1: I/O trace setup data

2 Data 2: I/O trace log data

6 I/O TraceViewer (Optional)

By using the PC software, IO TraceViewer, the wave shape of the saved I/O trace log data (IOTRACE.DAT) can be displayed.



- A. Comment
The comment of the I/O trace setup window/IOTRACE.DAT is displayed.
- B. Trigger information
The information of the I/O trace log data/IOTRACE.DAT is displayed.
- C. Waveform
The log of the I/O trace log data/IOTRACE.DAT is displayed in a waveform .
Also, the setting of the waveform display can be changed with "Wave Form Style" on the window.

6 I/O TraceViewer (Optional)

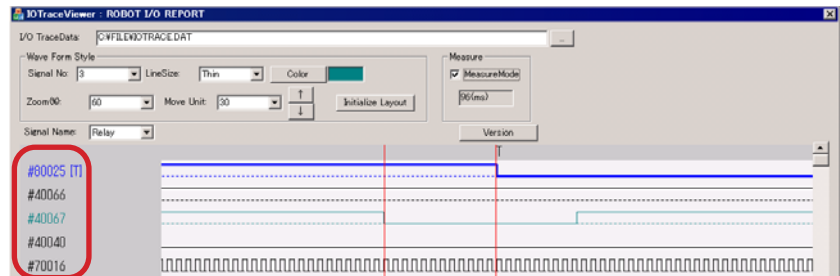
DX100

D. Signal name

The item displayed in this part can be changed to signal number, relay number or signal name.

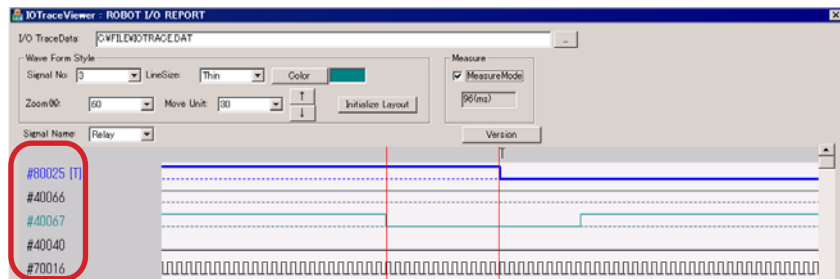
■ Signal number

Display the signal number



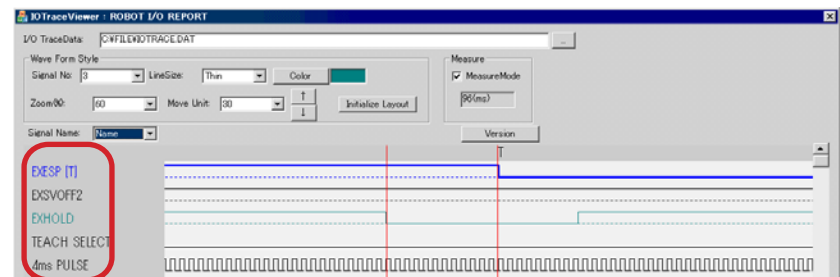
■ Relay number

Display I/O trace setup window / IOTRACE.DAT relay number



■ Signal name

Display I/O setup window / IOTRACE.DAT signal name



E. Measure

The time between the two points can be measured.

DX100 OPTIONS INSTRUCTIONS

FOR I/O TRACE FUNCTION

HEAD OFFICE

2-1 Kurosaki-Shiroishi, Yahatanishi-ku, Kitakyusyu, Fukuoka, 806-0004, Japan
Phone +81-93-645-7745 Fax +81-93-645-7746

YASKAWA America Inc. MOTOMAN Robotics Division
805 Liberty Lane, West Carrollton, OH 45449, U.S.A.
Phone +1-937-847-6200 Fax +1-937-847-6277

YASKAWA Nordic AB
Franska vagen 10, Box 4004, 390 04 Kalmar, Sweden
Phone +46-480-417800 Fax +46-480-417999

YASKAWA Europe GmbH Robotics Division
Kammerfeld strasse 1, 85391 Allershausen, Germany
Phone +49-8166-90-100 Fax +49-8166-90-103

YASKAWA Electric Korea Co., Ltd.
7F, Doore Bldg.; 24, Yeoido-Dong Youngdungpo-ku, Seoul, KOREA
Phone +82-2-784-7844 Fax +82-2-784-8495

YASKAWA Electric (Singapore) PTE Ltd.
151 Lorong Chuan, #04-02A, New Tech Park, Singapore 556741
Phone +65-6282-3003 Fax +65-6289-3003

YASKAWA Electric (Thailand) Co., Ltd.
252/246, 4th Floor. Muang Thai-Phatra Office Tower II Rachadaphisek Road, Huaykwang Bangkok, 10320 Thailand
Phone +66-2-693-2200 Fax +66-2-693-4200

Shougang MOTOMAN Robot Co. Ltd.
No.7, Yongchang-North Road, Beijing E&T Development Area, China 100176
Phone +86-10-6788-2858 Fax +86-10-6788-2878

MOTOMAN Motherson Robotics Ltd.
Plot No.195-196, 1st Floor, Sec.4 IMT Manesar, Gurgaon 122050, Haryana
Phone +91-124-475-8500 Fax +91-124-414-8016

Specifications are subject to change without notice
for ongoing product modifications and improvements.

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