



BXC-CBRML

Command reference manual

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1. INTRODUCTION

CBRML is the firmware of the control box BXC-CBRML. This document describes the external specifications of CBRML.

1.1. Rule of Notation

This document complies with the following notations.

Table 1 Rule of Notations

Notation	Example	Description
All text	<u>Commands cannot be received.</u>	<u>Underline</u> or Block , or both of <u>Underline and Block</u> are used to emphasize or to call attention to the meaning of the text.
All text	<i>number</i>	If representing the element in the special group, those terms are shown in <i>Italics</i> . <i>Number</i> represents the element in the numeral group. When the numeral group consists of 1, 2, 3, 4, 5, and 6, <i>number</i> describes one of those.
	<i>command</i>	<i>command</i> represents the element in Command group.
Area of variables	(0 - 1000)	The area between 0 to 1000. $0 \leq x \leq 1000$
	(ON, OFF, STANDBY)	Any one of ON, OFF and STANDBY.
Radix of value	0x01, 0x55, 0xAA	prefix 0x shows hexadecimal.
	0b01, 0b0101, 0b10101010	prefix 0b shows binary.
Units	[0.1%]	Multiplying the set value by 0.1 indicates the actual percentage. Example on the left shows that the set value 2 equals to 0.2%.
	[um]	The unit of the set value is um (micro meter).
	[s]	The unit of the set value is s (second).
Command format	EBNF(<u>E</u> xtended <u>B</u> ackus- <u>N</u> aur <u>F</u> orm)	
	$\alpha := \beta$	α is defined as β .
	$\alpha \beta$	Select α or β
	[α]	α or nothing
	{ α }	Repeat α for 0 times or more.
	<< α >>	Repeat α once or more
	(α)	α
	$\alpha - \beta$	A value which is no less than α and no more than β . Both α and β must be integers. $\alpha \leq x \leq \beta$
	<i>Identifier</i> := <i>Alphabet</i> { <i>Alphabet</i> <i>Numeral</i> }	An identifier is defined as a string beginning with an alphabet, after which 0 or more alphabets and/or numeric characters follow.
	Repeated abbreviated notation ... <i>Foo p1,...</i>	Repeats the last sorted data more than once. <i>Foo p1,p1</i> <i>Foo p1,p1,p1</i> <i>Foo p1,p1,p1,p1</i> are shown.

2. System overview

2.1. Configuration of the System

CBRML system

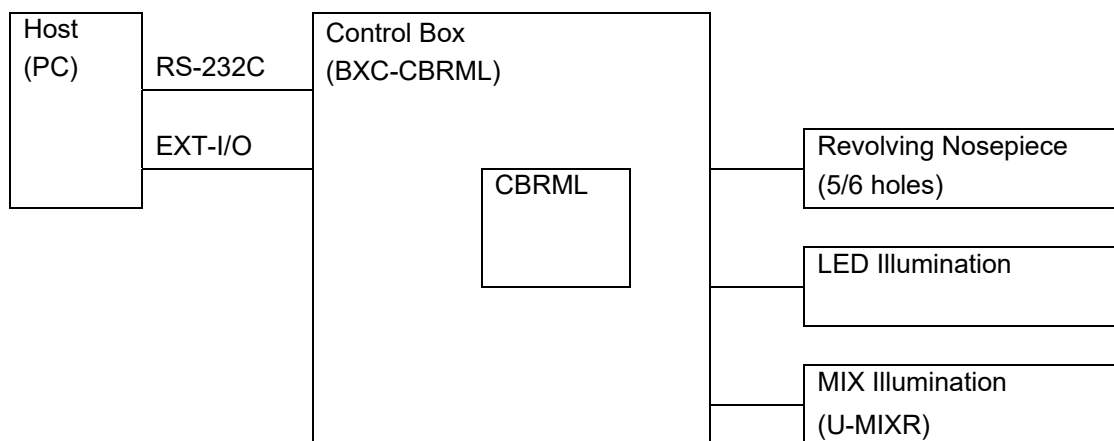


Fig 1 CBRML system

3. I/F

BXC-CBRML has the following I/F.

- DIP-SW
- Indicator LED
- Buzzer
- Host I/F
 - RS-232C
 - EXT-I/O

3.1. Dip Switch

3.1.1. BXC-CBRML

Refer to the instructions.

3.1.2. EXT-I/O Command support

The table below shows the commands that are valid for EXT-I/O control.

*) In the case of RS-232C control, all commands are supported.

Table 2 List of EXT-I/O control commands

Command	
LOG?	X
UNIT?	X
U?	X
V?	X
IL	-
IL?	X
ILSW	-
ILSW?	X
MIL	-
MIL?	X
MILS	-
MILS?	X
NMS1	-
MS1?	X
NMS2	-
MS2?	X
OB	-
OB?	X
OBREF	-
LMIL	-
LMIL?	X
LMMIL	-
LMMIL?	X
ER	X
ER?	X
DSW?	X

X: Enable, -: Disable

3.2. Host I/F

CBRML is controlled by commands from Host. I/F uses the serial UART communication via RS-232C. In the further descriptions, **responses/replies of CBRML for commands from Host and notifications from CBRML are expressed as Commands.**

3.2.1. Basic Actions of the Commands

3.2.1.1. Port Setting

Refer to the instructions.

3.2.2. Command Format

The following table shows the command format. The command character set uses ASCII codes and commands are expressed in EBNF (*E*xtended *B*ackus-*N*aur *F*orm) notation. The maximum length of a command is 64[B] (including a terminator).

command := index tag [tag-delimiter data { data-delimiter data }] terminator

Table 3 Command components

Command component	Name	Description	code
<i>index</i>	Index	Selects the target system or unit. A numeric character.	CBRML is 1.(Fixed)
<i>tag</i>	Tag	Classifies the application. string: uppercase alphabets and graphic characters.	Combination in variable length of 'A'~'Z' and '?' e.g. 'L', 'OB', 'U?', etc.
<i>tag-delimiter</i>	Tag delimiter	Delimiter between <i>tag</i> and <i>data</i> . A graphic character.	' ' Space(0x20)
<i>data</i>	Data	Data A graphic character, a string of numeric characters or a string of uppercase alphabet characters.	Combination in variable length of '+', '!', '-', '.', ':', '_', '0'~'9', 'A'~'Z'.~
<i>data-delimiter</i>	Data delimiter	Delimiter between <i>data</i> and <i>data</i> . A graphic character.	',' Comma (0x2C)
<i>terminator</i>	Terminator	Terminates <i>command</i> . 2 control character	CR+LF (0x0D 0x0A)

The command is a string terminated by control characters (CR+LF). ***“index”*** and ***“terminator”*** are omitted in the further descriptions of commands.

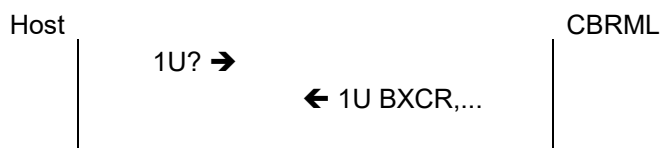
3.2.2.1. Index and Target System

Host must specify the target system(F/W) which is the transmission destination of commands by the index. The index of CBRML is 1. **CBRML ignores commands containing the index other than 1.**

Table 4 Index and Target System

Index	Target System	Description
1	CBRML	

e.g.



3.2.2.2. Command Response

This section described the case that CBRML ignores (discards) the received command. All commands of *FOO* which is sent from the host are ignored. The cases of below are limited to CBRML. However, this is limited to the case that *FOO* index specifies CBRML.

■ Sequence

Host	CBRML
s1. On initialization	Turn of the power Starts initialization
<i>nFOO</i> →	On initialization (The command will be discarded.)
	Terminated initialization (The command can be accepted.)
s2. Numerous commands	
<i>nFOO1</i> →	When sending a command unilaterally before receiving a handshake command, the unit accepts up to 32 commands and ignores subsequent commands. The commands of <i>FOO1</i> to <i>FOO32</i> will be processed. The command of <i>FOO33</i> and later will be ignored.
:	
:	
<i>nFOO32</i> →	
<i>nFOO33</i> →	

The index of *FOO* specifies CBRML, but it sends the invalid response if not interpretable.

■ Sequence

Host	CBRML
s1. Undefined command	<i>FOO</i> is not described in the command dictionary of the unit.
<i>nFOO</i> →	
← <i>nx</i>	Invalid (command) response will be sent.
s2. Overlong command	
<i>nFOO</i> →	<i>FOO</i> exceeds the maximum command length.
← <i>nx</i>	Invalid (command) response will be sent.

*) *n* represents the index.

3.2.2.3. Command Sequence

The commands sent by the host can be classified according to their purposes. The classified type determines whether handshake is used or not (whether the commands between the Host and CBRML are synchronized or not).

Table 5 Handshake and Nest

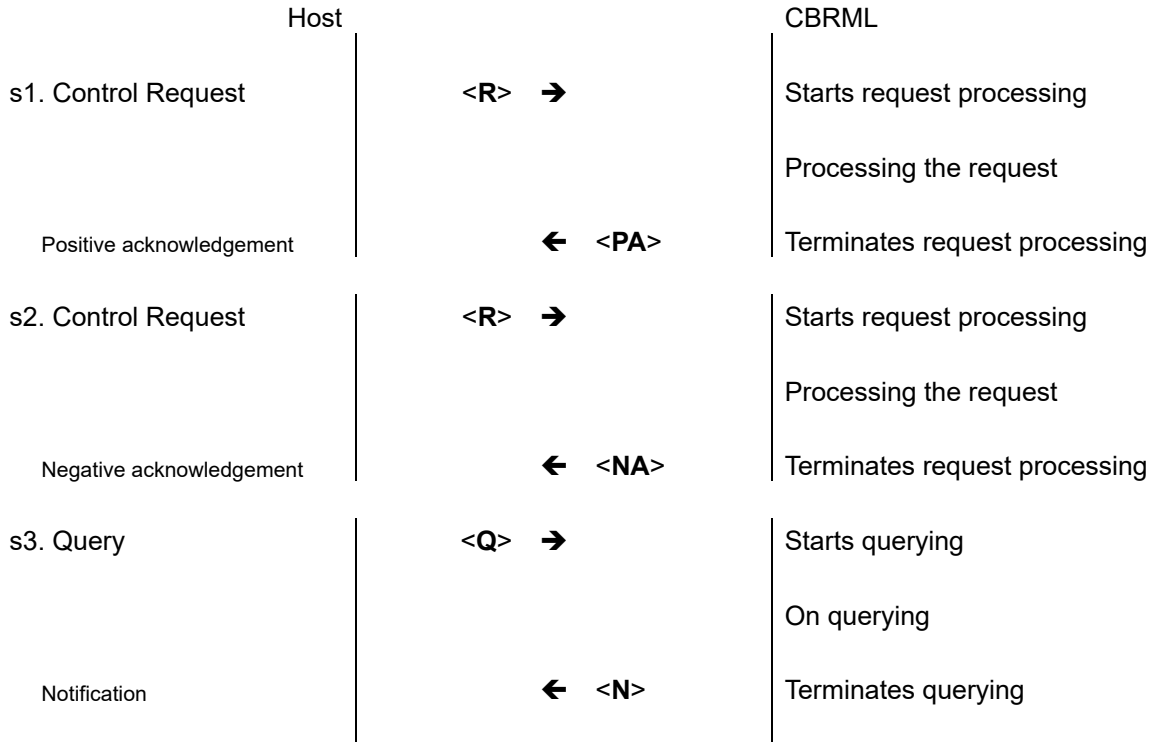
Format*1	Type	Direction		Description	Handshake
		Host	CBRML		
<i>X parameters</i> ----- <i>X</i>	Control request <R>		➔	Request of control(action/setup)	Used
<i>X +</i> ----- <i>X parameters</i>	Positive acknowledgement <PA>		←	Normal completion of the control request	Used
<i>X !,error-code</i> ----- <i>X !,error-code,...</i>	Negative acknowledgement <NA>		←	Abnormal completion of the control request	Used
<i>X?</i>	Query <Q>		➔	Parameter/data query	Used
<i>X parameters</i>	Notification <N>		←	Parameter/data notification	Used
<i>X parameters</i>	Active notification <AN>		←	Parameter/data active notification	Not used
<i>X error-code</i>	Error notification <EN>		←	Error notification	Not used

*1 X represents a tag, parameters represents parameters and *error-code* represents the error code.

3.2.2.3.1. Command with Handshake

A control request <R> handshakes with a positive acknowledgement <PA>/negative acknowledgement <NA> while a query <Q> handshakes with a notification <N>. Receiving a handshake command from CBRML, the host computer is notified that a processing (an action) is completed.

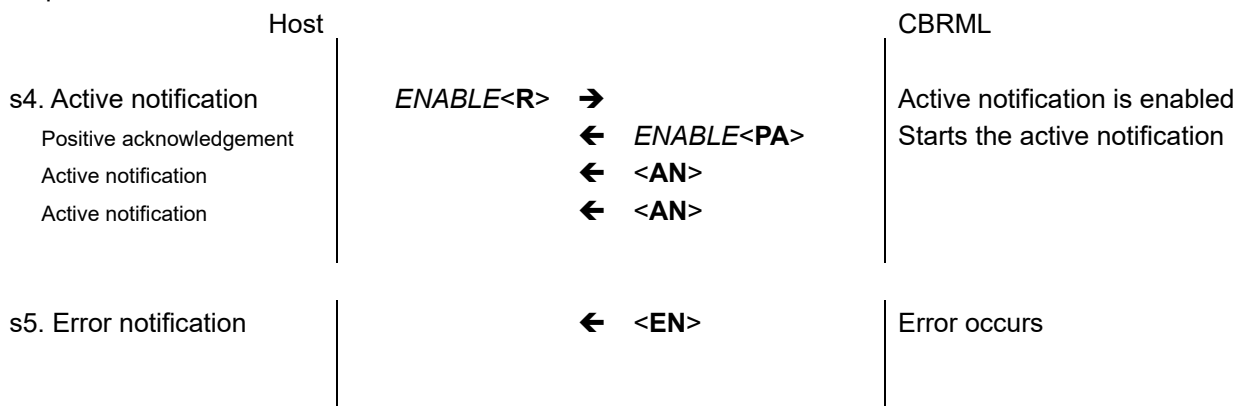
■ Sequence



3.2.2.3.2. Commands without Handshake

Handshake is not required with the active notification <AN> and error notification <EN>.

■ Sequence



*) *ENABLE* represents a command that enables active notification.

3.2.2.3.3. The Nest of Handshaking

The commands can be nested to a handshake command. The commands sent by the host computer are not received in the order they sent. An acknowledgement is sent to the host computer when a corresponding process is completed. However, some <R> commands cannot be nested.

■ Sequence

Host		CBRML
s6. Control request	FOO<R> → BAR<R> → ← FOO<PA> ← BAR<PA>	Starts the processing requested by FOO. Starts the processing requested by BAR. Completes the processing requested by FOO. Completes the processing requested by BAR.
s7. Control request/Query	FOO<R> → BAR<R> → FOO2<R> → BAR2<R> → FOO<Q> → ← FOO<PA> ← FOO<N> ← BAR2<PA> ← FOO2<PA> ← BAR<PA>	Starts the processing requested by FOO. Starts the processing requested by BAR. Starts the processing requested by FOO2. Starts the processing requested by BAR2. Starts the query. Starts the processing requested by FOO. Completes the query. Completes the processing requested by BAR2. Completes the processing requested by FOO2. Completes the processing requested by BAR.
s8. Control request (cannot be nest)	FOO<R> → BAR<R> → ← BAR<NA> ← FOO<PA>	

* FOO_n and BAR_n represent tags and error-code represents an error code.

3.2.3. Command Reference

3.2.3.1. Normal Commands

3.2.3.1.1. Remote state LOG?

■ Summary

1. Gets the current mode.

■ Comments

1. Switch between remote and local with DIP-SW No.3.

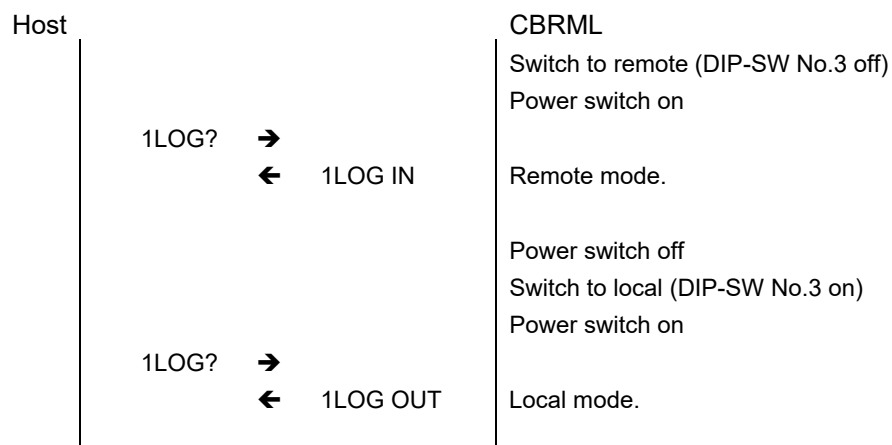
■ Format

Command	Type	Direction	Description
LOG?	Q	Host → CBRML	Queries the current mode.
LOG <i>p1</i>	N	Host ← CBRML	Notifying the current mode.

■ Parameters

<i>p1</i>	'OUT'	Local (EXT-I/O Control)
	'IN'	Remote (RS-232C Control)

■ Sequence



3.2.3.1.2. Unit U? UNIT?

■ Summary

1. Returns the unit name.

■ Comments

1. The number of the parameters in <N> is the variable number of the strings that have been specified to represent the respective unit.

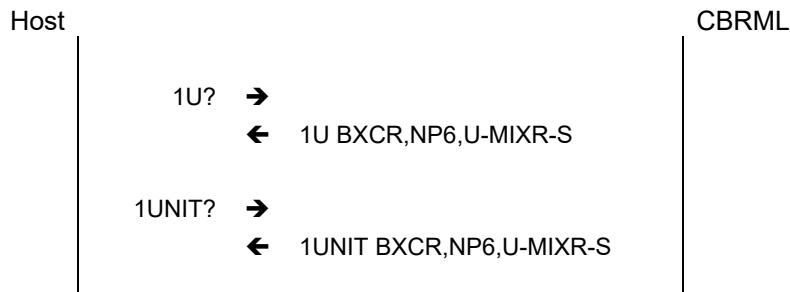
■ Format

Command	Type	Direction	Description
U?	Q	Host → CBRML	Queries the unit name.
U p1...	N	Host ← CBRML	Notifies the unit name.
UNIT?	Q	Host → CBRML	Queries the unit name.
UNIT p1...	N	Host ← CBRML	Notifies the unit name.

■ Parameters

	ID	Description
<i>p1</i>	BXCR	System ID
	NP5	Motorized Revolving nosepiece 5 holes
	NP6	Motorized Revolving nosepiece 6 holes
	U-MIXR-S	MIX slider

■ Sequence



3.2.3.1.3. Version V?

■ Summary

1. Gets the firmware version.

■ Comments

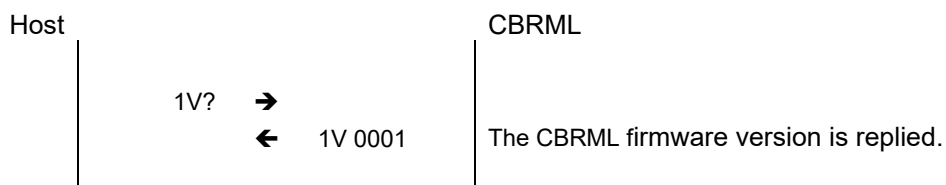
■ Format

Command	Type	Direction	Description
V?	Q	Host → CBRML	Queries the firmware version.
V p1	N	Host ← CBRML	Notifies the firmware version.

■ Parameters

p1	(0001 - 9999)	Firmware version. 4[B] fixed length
----	---------------	-------------------------------------

■ Sequence



3.2.3.1.4. LED Illumination IL IL?

■ Summary

1. Controls the LED illumination intensity.
2. Gets the LED illumination intensity.

■ Comments

1. Dimming with a linear curve.
2. It lights up when the intensity value is 200 or more. There is no guarantee that the light will light up when the intensity value is less than 200.
3. The last set value will be the initial value at the next startup.

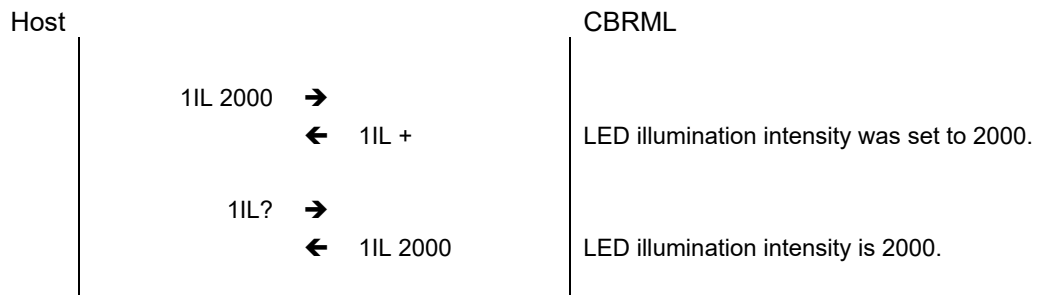
■ Format

Command	Type	Direction	Description
IL <i>p1</i>	R	Host → CBRML	Controls the LED illumination intensity.
IL +	PA	Host ← CBRML	Succeeded.
IL !, <i>error-code</i>	NA	Host ← CBRML	Failed.
IL?	Q	Host → CBRML	Queries the LED illumination intensity value.
IL <i>p1</i>	N	Host ← CBRML	Notifies the LED illumination intensity value.

■ Parameters

<i>p1</i>	(0 - 65535)	Illumination intensity value
-----------	-------------	------------------------------

■ Sequence



3.2.3.1.5. LED Illumination on / off Switch ILSW ILSW?

■ Summary

1. Turn on / off the LED illumination.
2. Gets the LED illumination status.

■ Comments

1. The last set value will be the initial value at the next startup.

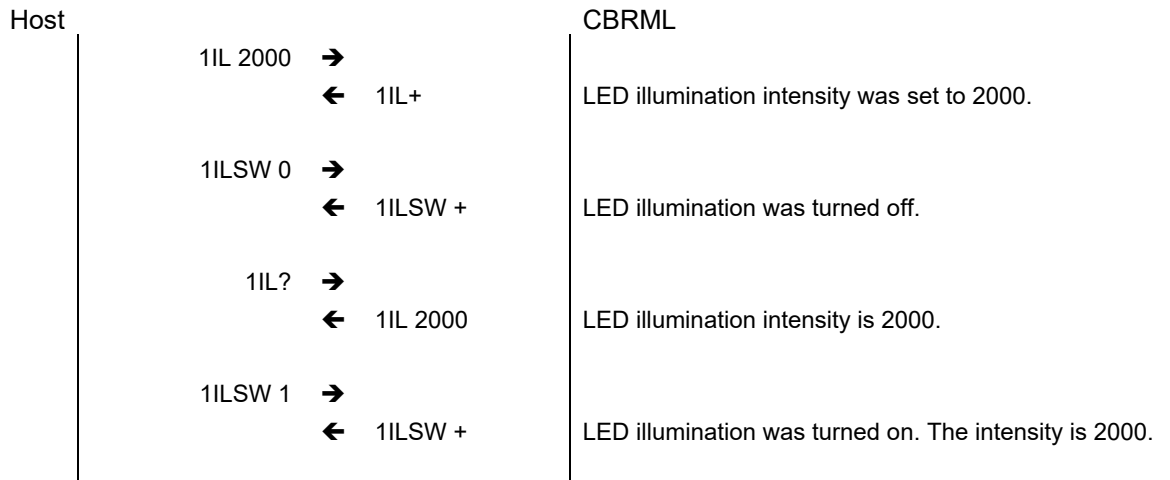
■ Format

Command	Type	Direction	Description
ILSW <i>p1</i>	R	Host → CBRML	Turn on / off the LED illumination.
ILSW +	PA	Host ← CBRML	Succeeded.
ILSW !, <i>error-code</i>	NA	Host ← CBRML	Failed.
ILSW?	Q	Host → CBRML	Queries the LED illumination status.
ILSW <i>p1</i>	N	Host ← CBRML	Notifies the LED illumination status.

■ Parameters

<i>p1</i>	0	off
	1	on

■ Sequence



3.2.3.1.6. MIX Illumination MIL MIL?

■ Summary

1. Controls the MIX illumination intensity.
2. Gets the MIX illumination intensity.

■ Comments

1. Illumination intensity of MIX lighting is the same for all segments.
2. <R> returns a combination error when the MIX optical path switch is off or when the MIX connector is disconnected.
3. The last set value will be the initial value at the next startup.

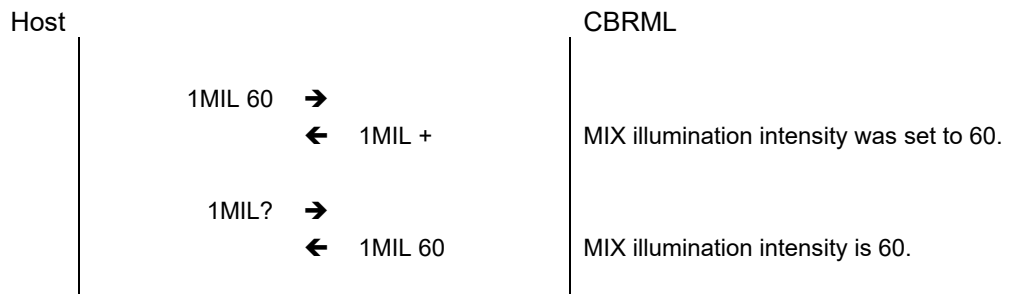
■ Format

Command	Type	Direction	Description
MIL <i>p1</i>	R	Host → CBRML	Controls the MIX illumination intensity.
MIL +	PA	Host ← CBRML	Succeeded.
MIL !, <i>error-code</i>	NA	Host ← CBRML	Failed.
MIL?	Q	Host → CBRML	Queries the MIX illumination intensity value.
MIL <i>p2</i>	N	Host ← CBRML	Notifies the MIX illumination intensity value.

■ Parameters

<i>p1</i>	(0 - 100)	Illumination intensity value
<i>p2</i>	(0 - 100)	Illumination intensity value
	X	MIX no connection

■ Sequence



3.2.3.1.7. MIX Illumination Segment MILS MILS?

■ Summary

1. Turn on / off the MIX illumination for each segment.
2. Gets the MIX illumination status.

■ Comments

1. The value is constructed with 16 bit image.
0: off, 1: on
2. <R> returns a combination error when the MIX optical path switch is off or when the MIX connector is disconnected.
3. The last set value will be the initial value at the next startup.

■ Format

Command	Type	Direction	Description
MILS <i>p1</i>	R	Host → CBRML	Turn on / off the MIX illumination.
MILS +	PA	Host ← CBRML	Succeeded.
MILS !, <i>error-code</i>	NA	Host ← CBRML	Failed.
MILS?	Q	Host → CBRML	Queries the MIX illumination status.
MILS <i>p2</i>	N	Host ← CBRML	Notifies the MIX illumination status.

■ Parameters

<i>p1</i>	(0 - FFFF)	MIX illumination status. (hexadecimal) Variable length, A to F are uppercase.
<i>p2</i>	(0 - FFFF)	MIX illumination status. (hexadecimal) Variable length, A to F are uppercase.
	X	MIX no connection

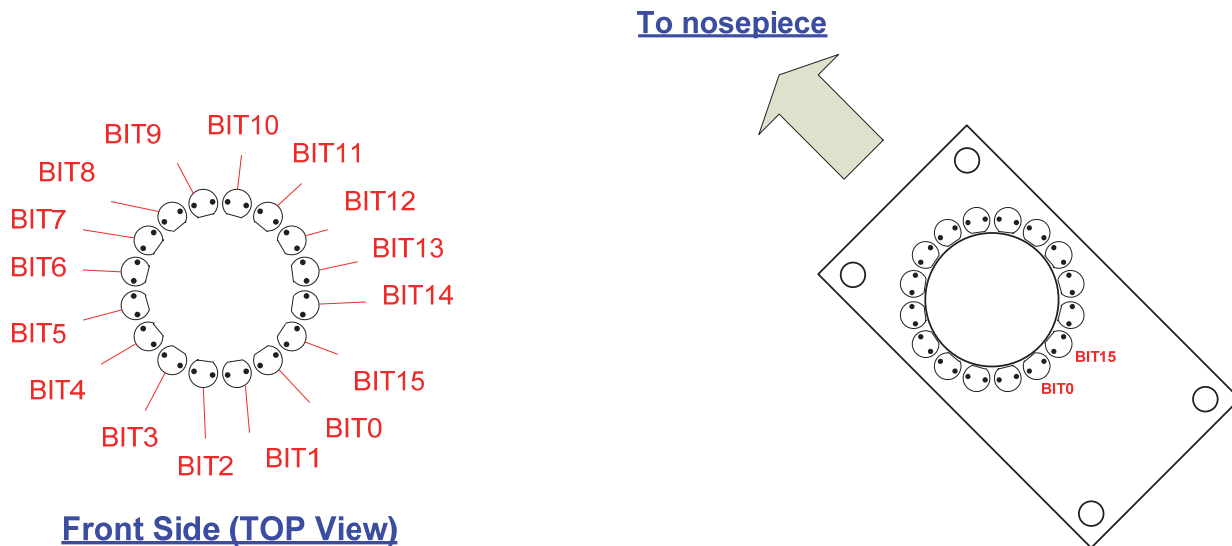


Fig 2 MIX illumination segment

■ Sequence



3.2.3.1.8. Active Notification of MIX optical path NMS1 MS1?

■ Summary

1. Enable / Disable Active Notification <AN> of MIX optical path.
2. Gets the MIX optical path status.

*) MIX: U-MIXR-S

■ Comments

1. When active notification is enabled, the current MIX optical path status is notified. After that, <AN> will be sent when the MIX optical path is changed.
2. When it becomes MIX optical path OUT, all turn off. When it becomes MIX optical path IN, it becomes the illumination status before becoming MIX optical path OUT.

■ Format

Command	Type	Direction	Description
NMS1 <i>p1</i>	R	Host → CBRML	Enable/Disable <AN> of MIX optical path.
NMS1 +	PA	Host ← CBRML	Succeeded.
NMS1 !, <i>error-code</i>	NA	Host ← CBRML	Failed.
NMS1 <i>p2</i>	AN	Host ← CBRML	Notifies MIX optical path status.
MS1?	Q	Host → CBRML	Queries MIX optical path status.
MS1 <i>p3</i>	N	Host ← CBRML	Notifies MIX optical path status.

■ Parameters

<i>p1</i>	0	Disable default
	1	Enable
<i>p2</i>	0	MIX optical path OUT
	1	MIX optical path IN
<i>p3</i>	0	MIX optical path OUT
	1	MIX optical path IN
	X	MIX no connection

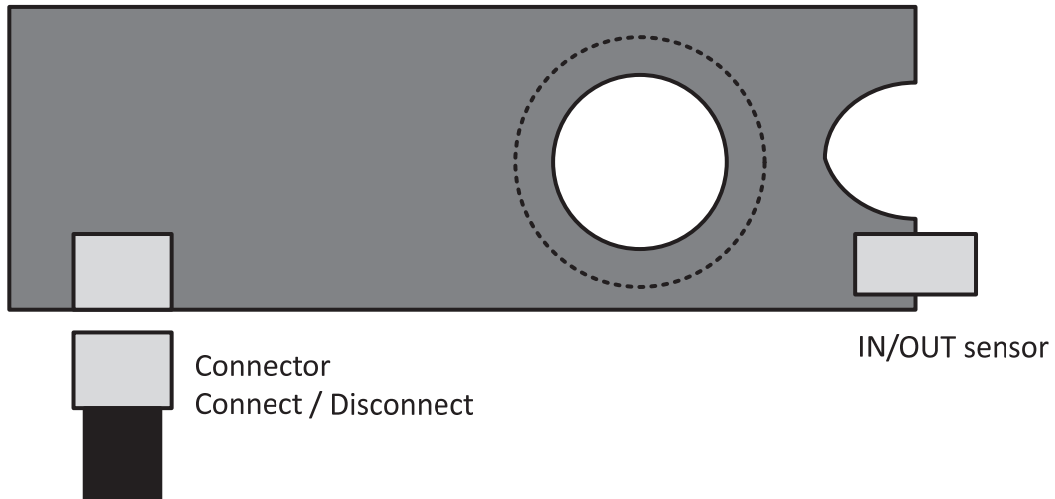
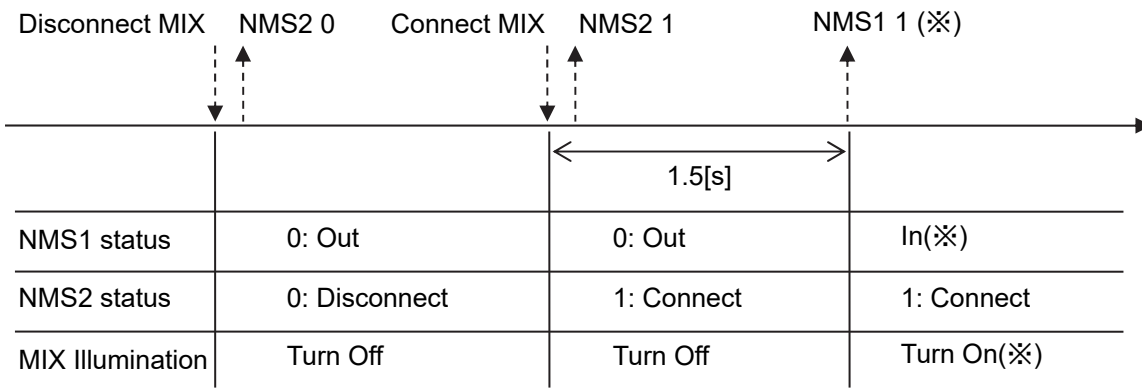
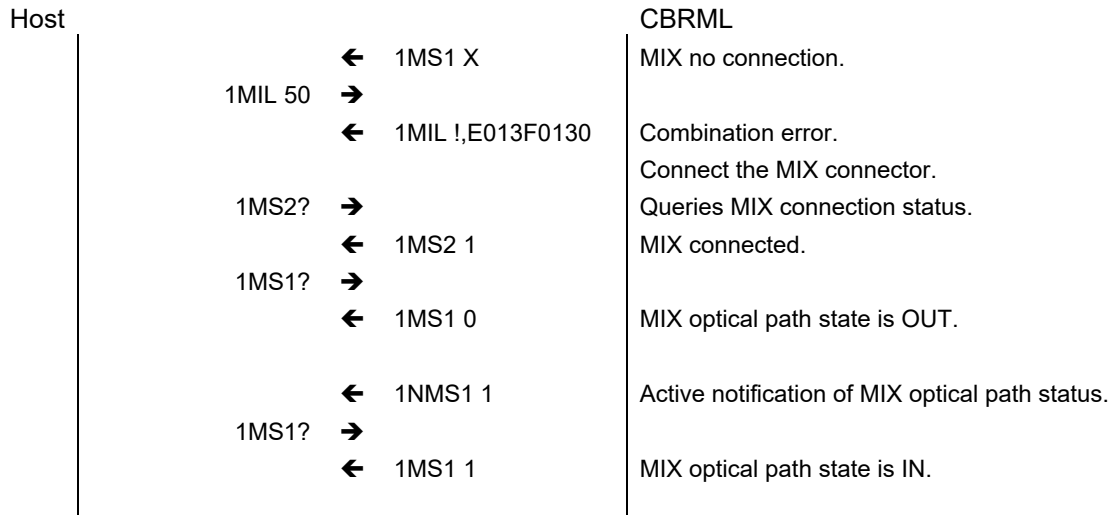


Fig 3 MIX illumination (U-MIXR-S) TOP View

■ Sequence

Host		CBRML
1MIL 100	→	MIX illumination intensity was set to 100.
	←	1MIL +
1NMS1 0	→	Disable MIX optical path active notification.
	←	1NMS1 +
		MIX optical path OUT.
1MIL?	→	MIX illumination intensity is 0.
	←	1MIL 0
		MIX optical path IN.
1MIL?	→	MIX illumination intensity is 100.
	←	1MIL 100
1NMS1 1	→	Enable MIX optical path active notification.
	←	1NMS1 +
	←	1NMS1 1
	←	1NMS1 0
1MS1?	→	Active notification of MIX optical path status.
	←	1MS1 0
		MIX optical path state is OUT.
1MIL 50	→	Combination error.
	←	1MIL !,E013F0130
1MIL?	→	MIX illumination intensity is 0.
	←	1MIL 0
1MILS?	→	All MIX is off.
	←	1MILS 0
	←	1NMS1 1
1MS1?	→	MIX optical path IN.
	←	1MS1 1
	←	Active notification of MIX optical path status.
1MIL?	→	MIX optical path state is IN.
	←	1MIL 100
	←	MIX illumination intensity is 100.
	←	Unplug the MIX connector.
	←	Active notification of MIX optical path status.
1MS1?	→	Queries MIX optical path status.



※ This chart is premised that MIX Illumination light axis is IN.

Fig 4 MIX connection timing chart

3.2.3.1.9. MIX Connection NMS2 MS2?

■ Summary

1. Enable / Disable Active Notification <AN> of MIX connection status.
2. Gets the MIX connection status.

■ Comments

1. When active notification is enabled, the current MIX connection state is notified. After that, <AN> will be sent when the MIX connection is changed.
2. When MIX is disconnected, all turn off. When the MIX is connected, it becomes in the illumination status before it was disconnected.

■ Format

Command	Type	Direction	Description
NMS2 <i>p1</i>	R	Host → CBRML	Enable/Disable <AN> of MIX connection status.
NMS2 +	PA	Host ← CBRML	Succeeded.
NMS2 !, <i>error-code</i>	NA	Host ← CBRML	Failed.
NMS2 <i>p2</i>	AN	Host ← CBRML	Notifies MIX connection status.
MS2?	Q	Host → CBRML	Queries MIX connection status.
MS2 <i>p2</i>	N	Host ← CBRML	Notifies MIX connection status.

■ Parameters

<i>p1</i>	0	Disable default
	1	Enable
<i>p2</i>	0	MIX no connection
	1	MIX connection

■ Sequence

Host

```

1MIL 100 →
          ← 1MIL +
1NMS2 0 →
          ← 1NMS2 +

1MIL? →
        ← 1MIL X

1MIL? →
        ← 1MIL 100
1NMS2 1 →
          ← 1NMS2 +
          ← 1NMS2 1
          ← 1NMS2 0
1MS2? →
        ← 1MS2 0
1MIL 50 →
          ← 1MIL !,E013F0130
1MIL? →
        ← 1MIL X
1MILS? →
         ← 1MILS X

         ← 1NMS2 1
1MS2? →
        ← 1MS2 1
1MIL? →
        ← 1MIL 100
    
```

CBRML

```

MIX illumination intensity was set to 100.

Disable MIX connection status active notification.
Unplug the MIX connector.

MIX no connection.
Connect the MIX connector.

MIX illumination intensity is 100.

Enable MIX connection status active notification.
Active notification of MIX connection status.
Unplug the MIX connector.
Active notification of MIX connection status.

MIX no connection.

Combination error.

MIX no connection.

MIX no connection.
Connect the MIX connector.

Active notification of MIX connection status.

MIX connection.

MIX illumination intensity is 100.
    
```

3.2.3.1.10. Objective Switching OB OB?

■ Summary

1. Inserts the specified position of the revolving nosepiece into the light axis.
2. Gets the revolving nosepiece position.

■ Comments

1. When the OB position is switched while the OB position is off the optical axis, the OB position is switched to the optical axis on the side where the OB position is smaller (CW direction), and then the OB position moves to the specified position.

■ Format

Command	Type	Direction	Description
OB <i>p1</i>	R	Host → CBRML	Inserts the specified position of the revolving nosepiece into the light axis.
OB +	PA	Host ← CBRML	Succeeded.
OB !, <i>error-code</i>	NA	Host ← CBRML	Failed.
OB?	Q	Host → CBRML	Queries the revolving nosepiece position.
OB <i>p2</i>	N	Host ← CBRML	Notifies the revolving nosepiece position.

■ Parameters

<i>p1</i>	(1 - n)	The revolving nosepiece position; 1 - n n := (5, 6) <u>It depends on the flexibility of the revolving nosepiece equipped.</u>
<i>p2</i>	(1 - n)	The revolving nosepiece position; 1 - n n := (5, 6) <u>It depends on the flexibility of the revolving nosepiece equipped.</u>
	X	Unknown

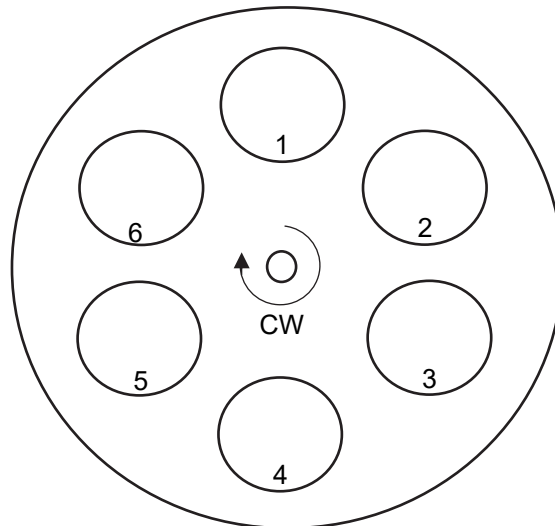


Fig 5 Revolving Nosepiece position (top view)

■ Sequence

Host	1OB 2 →	CBRML
	← 1OB +	Changed the revolving nosepiece position to 2.
	1OB? →	
	← 1OB 2	The revolving nosepiece position is 2.

3.2.3.1.11. OB Refresh OBREF

■ Summary

1. Make one rotation from the current revolving nosepiece position in the specified direction (CW or CCW).

■ Comments

■ Format

コマンド	種類	方向	意味
OBREF <i>p1</i>	R	Host → CBRML	Make one rotation from the current position in the specified direction.
OBREF +	PA	Host ← CBRML	Succeeded.
OBREF !, <i>error-code</i>	NA	Host ← CBRML	Failed.

■ Parameters

<i>p1</i>	1	CW
	2	CCW

■ Sequence

Host		CBRML
	1OB? → ← 1OB 1	The revolving nosepiece position is 1.
	1OBREF 1 → ← 1OBREF +	One rotation from OB position 1 in the CW direction.

3.2.3.1.12. Light Intensity Manager of LED LMIL LMIL?

■ Summary

1. Write the LED light Intensity manager (LIM) value to the non-volatile memory.
2. Gets the LED LIM value from the non-volatile memory.

■ Comments

1. <R> stores the LED illumination intensity value for each NP position in non-volatile memory. Dimming is not performed.
 2. <Q> gets the LED illumination intensity value stored in the LIM.
 3. Ignore p6 when the 5Position-NP is used.
 4. The LIM works when the EXT I/O Control. The LED illumination intensity does not change even if the NP position is switched during the RS-232C Control.
- *) NP: revolving nosepiece

■ Format

Command	Type	Direction	Description
LMIL <i>p1,p2,p3,p4,p5,p6</i>	R	Host → CBRML	Sets the LIM value.
LMIL +	PA	Host ← CBRML	Succeeded.
LMIL <i>!,error-code</i>	NA	Host ← CBRML	Failed.
LMIL?	Q	Host → CBRML	Queries the LIM value.
LMIL <i>p1,p2,p3,p4,p5,p6</i>	N	Host ← CBRML	Notifies the LIM value.

■ Parameters

<i>p1</i>	(0 - 65535)	LED illumination intensity value at NP position 1. default: 0
<i>p2</i>	(0 - 65535)	LED illumination intensity value at NP position 2. default: 0
<i>p3</i>	(0 - 65535)	LED illumination intensity value at NP position 3. default: 0
<i>p4</i>	(0 - 65535)	LED illumination intensity value at NP position 4. default: 0
<i>p5</i>	(0 - 65535)	LED illumination intensity value at NP position 5. default: 0
<i>p6</i>	(0 - 65535)	LED illumination intensity value at NP position 6. default: 0

■ Sequence

• In case of LIM setting mode with RS-232C Control

Host		CBRML
	1OB? →	
	← 1OB 1	The NP position is 1.
	1IL 2000 →	
	← 1IL +	LED illumination intensity was set to 2000.
	1LMIL 10,20,30,40,50,60 →	
	← 1LMIL +	LIM value was set.
	1LMIL? →	
	← 1LMIL 10,20,30,40,50,60	
	1IL? →	
	← 1IL 2000	LED illumination intensity is 2000.
	1OB 2 →	
	← 1OB +	Changed the NP position to 2.

1IL? →
 ← 1IL 2000

LED illumination intensity is 2000.

• In case of LIM setting mode with EXT-I/O Control

Host

1OB? →
 ← 1OB 1

CBRML

The NP position is 1.

nVD0 - nVD7 signal: →
 11111110b

LED_VSET signal: →
 Lo → Hi

LED illumination intensity was set to 257.

LIMSET signal: →
 Lo → Hi

LIM value was set.

1LMIL? →
 ← 1LMIL 257,20,30,40,50,60

1IL? →
 ← 1IL 257

LED illumination intensity is 257.

nNP_PD0 - nNP_PD2 signal: →
 101b

NP_PSET signal: →
 Lo → Hi

Changed the NP position to 2.

1IL? →
 ← 1IL 257

LED illumination intensity is 257.

• In case of LED LIM mode with EXT-I/O Control

Host

1OB? →
 ← 1OB 1

CBRML

Power switch on

The NP position is 1.

1IL? →
 ← 1IL 257

LED illumination intensity is 257.

1LMIL? →
 ← 1LMIL 257,20,30,40,50,60

nNP_PD0 - nNP_PD2 signal: →
 101

NP_PSET signal: →
 Lo → Hi

Changed the NP position to 2.

1IL? →
 ← 1IL 20

LED illumination intensity is 20.

3.2.3.1.13. Light Intensity Manager of MIX LMMIL LMMIL?

■ Summary

1. Write the MIX light Intensity manager (LIM) value to the non-volatile memory.
2. Gets the MIX LIM value from the non-volatile memory.

■ Comments

1. <R> stores the MIX illumination intensity value for each NP position in non-volatile memory. Dimming is not performed.
 2. <Q> gets the MIX illumination intensity value stored in the LIM.
 3. Ignore p6 when the 5Position-NP is used.
 4. The LIM works when the EXT-I/O Control. The LED illumination intensity does not change even if the NP position is switched during the RS-232C Control.
- *) NP: revolving nosepiece

■ Format

Command	Type	Direction	Description
LMMIL <i>p1,p2,p3,p4,p5,p6</i>	R	Host → CBRML	Sets the LIM value.
LMMIL +	PA	Host ← CBRML	Succeeded.
LMMIL !, <i>error-code</i>	NA	Host ← CBRML	Failed.
LMMIL?	Q	Host → CBRML	Queries the LIM value.
LMMIL <i>p1,p2,p3,p4,p5,p6</i>	N	Host ← CBRML	Notifies the LIM value.

■ Parameters

<i>p1</i>	(0 - 100)	MIX illumination intensity value at NP position 1. default: 0
<i>p2</i>	(0 - 100)	MIX illumination intensity value at NP position 2. default: 0
<i>p3</i>	(0 - 100)	MIX illumination intensity value at NP position 3. default: 0
<i>p4</i>	(0 - 100)	MIX illumination intensity value at NP position 4. default: 0
<i>p5</i>	(0 - 100)	MIX illumination intensity value at NP position 5. default: 0
<i>p6</i>	(0 - 100)	MIX illumination intensity value at NP position 6. default: 0

■ Sequence

• In case of LIM setting mode with RS-232C Control

Host		CBRML
	1OB? →	
	← 1OB 1	The NP position is 1.
	1MIL 60 →	
	← 1MIL +	MIX illumination intensity was set to 60.
1LMMIL 10,20,30,40,50,60	→	
	← 1LMMIL +	LIM value was set.
1LMMIL?	→	
	← 1LMMIL 10,20,30,40,50,60	
	1MIL? →	
	← 1MIL 60	MIX illumination intensity is 60.
	1OB 2 →	
	← 1OB +	Changed the NP position to 2.

1MIL? →
 ← 1MIL 60

MIX illumination intensity is 60.

• In case of LIM setting mode with EXT-I/O Control

Host

1OB? →
 ← 1OB 1

CBRML

The NP position is 1.

VD0 - VD7 signal: →
 00000001b(1)

MIX_VSET signal: →
 Lo → Hi

MIX illumination intensity was set to 1.

LIMSET signal: →
 Lo → Hi

LIM value was set.

1LMMIL? →
 ← 1LMMIL 1,20,30,40,50,60

1MIL? →
 ← 1MIL 1

MIX illumination intensity is 1.

NP_PD0 - NP_PD2 signal: →
 0010b(2)

NP_PSET signal: →
 Lo → Hi

Changed the NP position to 2.

1MIL? →
 ← 1MIL 1

MIX illumination intensity is 1.

• In case of MIX LIM mode with EXT-I/O Control

Host

1OB? →
 ← 1OB 1

CBRML

Power switch on

The NP position is 1.

1MIL? →
 ← 1MIL 1

MIX illumination intensity is 1.

1LMMIL? →
 ← 1LMMIL 1,20,30,40,50,60

NP_PD0 - NP_PD2 signal: →
 0010b(2)

NP_PSET signal: →
 Lo → Hi

Changed the NP position to 2.

1MIL? →
 ← 1MIL 20

MIX illumination intensity is 20.

3.2.3.1.14. Error ER ER?

■ Summary

1. Notifies of an error.
2. Gets the last errors.

■ Comments

1. When an error occurs, the error notification <EN> is sent. This <EN> can neither be disabled nor controlled.
2. The parameter of the notification <N> is up to 4. And after gets the last errors, the errors are all cleared.

■ Format

Command	Type	Direction	Description
ER <i>error-code</i>	EN	Host ← CBRML	Notifies of an error.
ER?	Q	Host → CBRML	Gets the error.
ER <i>error-code</i> ,...	N	Host ← CBRML	Notifies of an error.

■ Parameters

<i>error-code</i>	(E0000000 - EZZZZZZZ)	9[B] fixed length (cf. Error code list)
-------------------	-----------------------	---

■ Sequence

Host

```

1ER? →
      ← 1ER E0000000

1OB 1 →
      ← 1OB !,error-code(OB timeout)

1ER? →
      ← 1ER error-code(OB timeout)

1ER? →
      ← 1ER E0000000

1OB 1 →
      ← 1OB !,error-code(OB timeout)
      ← 1ER error-code(OB disconnected)

1ER? →
      ← 1ER error-code(OB timeout),error-code(OB disconnected)

1ER? →
      ← 1ER E0000000
    
```

CBRML

```

No error

OB timeout

Notifying the last error-code.
The errors are all cleared.

No error

OB timeout

OB disconnected

Notifying the last error-code.
The errors are all cleared.

No error
    
```

3.2.3.1.15. DIP-SW Read DSW?

■ Summary

1. Gets the CBRML DIP-SW settings.

■ Comments

1. Returns the DIP-SW settings read when the power is turned on.
2. The value is constructed with 6 bit image.

0: Switch off, 1: Switch on

BIT0: SW1

BIT1: SW2

BIT2: SW3

BIT3: SW4

BIT4: SW5

BIT5: SW6

■ Format

Command	Type	Direction	Description
DSW?	Q	Host → CBRML	Queries the DIP-SW settings.
DSW <i>p1</i>	N	Host ← CBRML	Notifies the DIP-SW settings.

■ Parameters

<i>p1</i>	(0 - 3F)	DIP-SW settings (hexadecimal) Variable length, A to F are uppercase.
-----------	----------	---

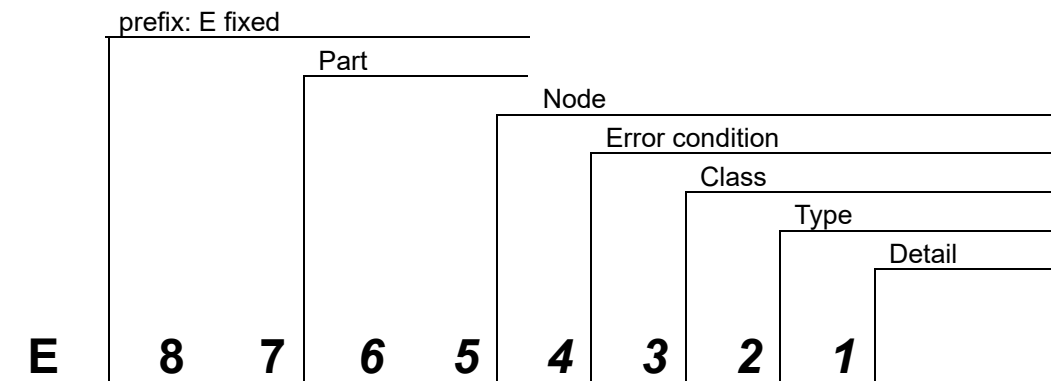
■ Sequence



4. Error Code List

Error codes are described as follows. The error codes are created based on the hierarchical structure, and the meaning of the lower digits differs depending on the upper digits.

<i>error-code</i>	E00000000 - EFFFFFFF	9[B] fixed length with hexadecimal 8 digits following after prefix: E
-------------------	----------------------	---



8th and 7th digit	code	Description	Notes
Guest	01 - 15	Guest ID	Indicates the guest ID of CBRML. The guest number of CBRML is fixed with "01".

6th and 5th digit	code	Description	Notes
Node	01 - 3F	Node ID	Indicates the node ID of unit.

4th digit	code	Description	Notes
Error condition	0	Warning or nonfatal error	When causes are removed, most of the cases can be restored.
	1	Fatal error	Unable to restore, and the relevant part/unit will be locked.

■ The Class differs depending on the function performed by parts or nodes. All parts or nodes do not necessarily have all classes.

3th digit	code	Description
Class	1	Command
	2	Motorized (including the light source)
	3	AF control
	4	Limit
	5	System
	6	MMI (Man Machine I/F e.g. HS, JOG, JS, etc.)
	7	Nonvolatile memory
	8 - 0	Reserved

■ Further Type (2nd digit) and Detail (1st digit) indicate the different meaning by each Class.

4.1. CBRML

Error codes of CBRML are described as follows. However, prefix:E is omitted.

Table 7 Error code list

ノード	種別	型	error-code	詳細	
0x3F (CBRML)	Command	Nesting error	013F0110	The command which cannot execute nesting, nested.	
		Parameter error	013F0120	The parameter exceeds the area. Too many parameters or too few parameters.	
		Combination error	013F0130	Unacceptable due to the combination with other status. No target part exists.	
	Motorized	Revolving nosepiece	013F0210	013F0210	timeout (Moving to next click in position)
			013F0211	013F0211	Over run
			013F0212	013F0212	sensor error (Position sensor unsettle)
			013F0213	013F0213	timeout (Escape of Click sensor is not detected)
			013F0214	013F0214	timeout (Entering of Click sensor is not detected)
			013F1216	013F1216	Disconnected
	Limit	Revolving nosepiece	013F0412	013F0412	1 side software limit
			013F0413	013F0413	Max side software limit
	System	System error	013F1511	013F1511	Sequence error
	Nonvolatile memory	FRAM	013F1701	013F1701	FRAM read error

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