> ⚠ **CAUTION**
> After all I/O signals are set, the setting information should be saved in external storage in case the information needs to be re-loaded. Otherwise, the current setting information would be lost when it is changed.

11　To perform forced output of a signal, place the cursor on ON or OFF and press the corresponding function key.

```
I/O Robot Out

     RO[   1]  U    ON    [                        ]

   [ TYPE ]           IN/OUT    ON     OFF    >
```

For the forced output of a signal, see Chapter 6, Section 6.4.

> ⚠ **WARNING**
> The controller uses signals to control the peripheral equipment. The forced output may adversely affect the security of the system. Check the use of signals in the system before attempting the forced output.

3.3　PERIPHERAL I/O

Peripheral I/O signals (UI/UO) are a group of specialized signals whose usage is decided by the system. These signals are connected with a remote controller and the peripheral devices via the following interfaces and I/O links and they are used to control the robot from the outside.

Refer to "3.8 SETTING AUTOMATIC OPERATION" for the setting to control the robot from outside.

Configuring I/O

When all I/O assignment is deleted and cycling power of the robot controller, the connected I/O devices are recognized and proper I/O assignment is automatically performed. In case that the configuration of I/O is set automatically, the configuration of peripheral I/O is set depending on the setting of the item "UOP auto assignment" in the system configuration screen.

There are seven types of UOP auto assignment as shown below and each type has different assignment of peripheral I/O signals (UOP).

Table 3.3 UOP auto assignment

Type	UOP assignment type	I/O device to which UOP is assigned
None	No assignment	None
Full	Full assignment	I/O link master interface, etc
Full (Slave)	Full assignment	I/O link slave interface
Full (CRMA16)	Full assignment	R-30iB Mate main board (CRMA16)
Simple	Simple assignment	I/O link master interface, etc
Simple (Slave)	Simple assignment	I/O link slave interface
Simple (CRMA16)	Simple assignment	R-30iB Mate main board (CRMA16)

In default setting, the UOP auto assignment is set as follows.
-　R-30iB :　　　　　　　　　　Full
-　R-30iB Mate LR Tool :　　　　Simple(Slave)
-　R-30iB Mate LR Handling Tool :　Simple(CRMA16)

Refer to "3.1 I/O" for the standard I/O assignment according to the setting of UOP auto assignment.

UOP assignment types

There are the following two types of peripheral I/O (UOP) assignment.

Full assignment

All peripheral I/O signals can be used.
Eighteen input physical signals and twenty output physical signals are assigned to peripheral I/O signals.

Simple assignment

The peripheral I/O signals that the number of signals is small can be used.
Eight input physical signals and four output physical signals are assigned to peripheral I/O signals.

In simple assignment, the number of signals that can be used for general digital I/O is increased because the number of peripheral I/O signals is decreased, but the functions of peripheral I/O signals are restricted as shown in the table below.

UI[1]	IMSTP	Always ON *4
UI[2]	HOLD	Operable
UI[3]	SFSPD	Always ON *4
UI[4]	CSTOPI	Allocated to the same signal as in RESET *1
UI[5]	RESET	Operable
UI[6]	START	Operable
UI[7]	HOME	No allocation
UI[8]	ENBL	Operable
UI[9]	RSR1/PNS1/STYLE1	Operable as PNS1 *3
UI[10]	RSR2/PNS2/STYLE2	Operable as PNS2 *3
UI[11]	RSR3/PNS3/STYLE3	Operable as PNS3 *3
UI[12]	RSR4/PNS4/STYLE4	Operable as PNS4 *3
UI[13]	RSR5/PNS5/STYLE5	No allocation
UI[14]	RSR6/PNS6/STYLE6	No allocation
UI[15]	RSR7/PNS7/STYLE7	No allocation
UI[16]	RSR8/PNS8/STYLE8	No allocation
UI[17]	PNSTROBE	Allocated to the same signal as in START *2
UI[18]	PROD_START	No allocation

UO[1]	CMDENBL	Operable
UO[2]	SYSRDY	No allocation
UO[3]	PROGRUN	No allocation
UO[4]	PAUSED	No allocation
UO[5]	HELD	No allocation
UO[6]	FAULT	Operable
UO[7]	ATPERCH	No allocation
UO[8]	TPENBL	No allocation
UO[9]	BATALM	Operable
UO[10]	BUSY	Operable
UO[11]	ACK1/SNO1	No allocation
UO[12]	ACK2/SNO2	No allocation
UO[13]	ACK3/SNO3	No allocation
UO[14]	ACK4/SNO4	No allocation
UO[15]	ACK5/SNO5	No allocation
UO[16]	ACK6/SNO6	No allocation
UO[17]	ACK7/SNO7	No allocation
UO[18]	ACK8/SNO8	No allocation
UO[19]	SNACK	No allocation
UO[20]	RESERVE	No allocation

*1 Since CSTOPI and RESET are allocated to the same signal, reset input can forcibly terminate the program if "CSTOPI for ABORT" is enabled.
*2 Since PNSTROBE and START are allocated to the same signal, the program is selected at the rising edge (OFF→ON) of the START signal and the program is started at the falling edge (ON→OFF) of the START signal.
*3 Only PNS can be used as the program selection method in simple allocation (that START and PNSTROBE are allocated to the same signal). Even if the "program selection method" other than PNS is selected on the Prog Select screen, PNS is automatically selected during power-on.
*4 These signals are assigned to the internal I/O device (rack 35, slot 1) in which the signal is always on.
*5 Since PROD_START is not allocated in simple allocation, when "START for CONTINUE only" item in System Config menu is TRUE, the program cannot be started by peripheral I/O. Set the "START for CONTINUE only" item FALSE in simple allocation.

*IMSTP input UI [1] (Always enabled.)

The immediate stop signal turns servo power off by the software.
The *IMSTP input is on in the normal status. When this signal is turned off, the following processing is performed:

- An alarm is generated and the servo power is turned off.

● The robot operation is stopped immediately. Execution of the program is also stopped.

> ⚠ **WARNING**
> The *IMSTP signal is controlled by software. Please use external emergency stop for safety-critical processing. For connection of external emergency stop signal, refer to the "FANUC Robot series R-30*i*B/R-30*i*B Plus CONTROLLER MAINTENANCE MANUAL" (B-83195EN) or the "FANUC Robot series R-30*i*B Mate/R-30*i*B Mate Plus CONTROLLER MAINTENANCE MANUAL" (B-83525EN).

*HOLD input UI [2] (Always enabled.)

The temporary stop signal specifies a temporary stop from an external device.
The *HOLD input is on in the normal status. When this signal is turned off, the following processing is performed:
● The robot is decelerated until its stops, then the program execution is halted.
● If ENABLED is specified at "Break on hold" on the general item setting screen, the robot is stopped, an alarm is generated, and the servo power is turned off.

*SFSPD input UI [3] (Always enabled.)

The safety speed signal temporarily stops the robot when the safety fence door is opened. This signal is normally connected to the safety plug of the safety fence door.
The *SFSPD input is on in the normal status. When this signal is turned off, the following processing is performed:
● The operation being executed is decelerated and stopped, and execution of the program is also stopped. At this time, the feed rate override is reduced to the value specified for $SCR.$FENCEOVRD.
● When the *SFSPD input is off and a program is started from the teach pendant, the feed rate override is reduced to the value specified for $SCR.$SFRUNOVLIM. When jog feed is executed, the feed rate override is reduced to the value specified for $SCR.$SFJOGOVLIM. When *SFSPD is off, the feed rate override cannot exceed these values.

> ⚠ **WARNING**
> The *SFSPD signal controls deceleration and stop by software. To stop the robot immediately for safety purposes, use safety fence signal. For connection of safety fence signal, refer to the FANUC Robot series R-30*i*B/R-30*i*B Plus CONTROLLER MAINTENANCE MANUAL (B-83195EN) or the FANUC Robot series R-30*i*B Mate/R-30*i*B Mate Plus CONTROLLER MAINTENANCE MANUAL (B-83525EN).

> **NOTE**
> When the *IMSTP, *HOLD, and *SFSPD signals are not used, jumper these signal lines.

CSTOPI input UI [4] (Always enabled.)

The cycle stop signal terminates the program currently being executed. It also releases programs from the wait state by RSR.
● When FALSE is selected for "CSTOPI for ABORT" on the Config system setting screen, this signal terminates the program currently being executed as soon as execution of the program completes. It also releases (Clear) programs from the wait state by RSR. (Default)
● When TRUE is selected for "CSTOPI for ABORT" on the Config system setting screen, this signal immediately terminates the program currently being executed. It also releases (Clear) programs from the wait state by RSR.

> ⚠ **WARNING**
> When FALSE is selected for "CSTOPI for ABORT" on the Config system setting screen, CSTOPI does not stop the program being executed until the execution is complete.

FAULT_RESET input signal, RESET, UI [5]

The RESET signal cancels an alarm. If the servo power is off, the RESET signal turns on the servo power. The alarm output is not canceled until the servo power is turned on. The alarm is canceled at the instant this signal falls in default setting.

ENBL input signal, ENBL, UI [8]

The ENBL signal allows the robot to be moved and places the robot in the ready state. When the ENBL signal is off, the system inhibits a jog feed of the robot and activation of a program including a motion (group). A program which is being executed is halted when the ENBL signal is set off.

> **NOTE**
> When the ENBL signal is not monitored, strap the signal with the ground.

RSR1 to RSR8 inputs UI [9-16] (Enabled in the remote state.)

These are robot service request signals. When one of these signals is received, the RSR program corresponding to the signal is selected and started to perform automatic operation. When another program is being executed or is stopped temporarily, the selected program is added to the queue and is started once the program being executed terminates. (→ Subsection 3.8.1, Robot Service Request (RSR))

PNS1 to PNS8 UI [9-16] PNSTROBE UI [17] (Enabled in the remote state.)

These are program number select signals and a PN strobe signal. When the PNSTROBE input is received, the PNS1 to PNS8 inputs are read to select a program to be executed. When another program is being executed or temporarily stopped, these signals are ignored. (→ Subsection 3.8.2, Program Number Selection (PNS))

When the remote conditions are satisfied, program selection using the teach pendant is disabled while PNSTROBE is on.

STYLE1 to STYLE8 UI [9-16] (Enabled in the remote state.)

These are STYLE number select signals. When the start signal is received, the STYLE1 to STYLE8 inputs are read to select a program, then the selected program is executed. When another program is being executed or temporarily stopped, these signals are ignored. (→ Subsection 3.8.3, STYLE)

PROD_START input UI [18] (Enabled in the remote state.)

The automatic operation start (production start) signal starts the currently selected program from line 1. This signal functions at its falling edge when turned off after being turned on.

When this signal is used together with a PNS signal, it executes the program selected by the PNS signal starting from line 1. When this signal is used together with no PNS signal, it executes the program selected using the teach pendant starting from line 1.

When another program is being executed or temporarily stopped, this signal is ignored. (→ Subsection 3.8.2, Program Number Selection (PNS))

START input UI [6] (Enabled in the remote state.)

This is an external start signal. This signal functions at its falling edge when turned off after being turned on. When this signal is received, the following processing is performed:
- When FALSE is selected for "START for CONTINUE" only on the Config system setting screen, the program selected using the teach pendant is executed from the line to which the cursor is positioned. A temporarily stopped program is also continued. (Default)

● When TRUE is selected for "START for CONTINUE" only on the Config system setting screen, a temporarily stopped program is continued. When the program is not temporarily stopped, it cannot be started.

NOTE

To start a program from a peripheral device, the RSR or PROD_START input is used. To start a temporarily stopped program, the START input is used.

CMDENBL input UO [1]

The input accept enable (command enable) signal is output when the following conditions are satisfied. This signal indicates that a program including an operation (group) can be started from the remote controllers.

■ The remote conditions are satisfied.
■ The operation enable conditions are satisfied.
■ The mode is continuous operation (single step disable).

SYSRDY output UO [2]

SYSRDY is output while the servo power is on. This signal places the robot in the operation enable state. In the operation enable state, jog feed can be executed and a program involving an operation (group) can be started. The robot enters the operation enable state when the following operation enable conditions are satisfied:

■ The ENBL input of the peripheral device I/O is on.
■ The servo power is on (not in the alarm state).

PROGRUN output UO [3]

PROGRUN is output while a program is being executed. It is not output while a program is temporarily stopped.

PAUSED output UO [4]

PAUSED is output when a program is temporarily stopped and waits for restart.

HELD output UO [5]

HELD is output when the hold button is pressed. It is not output when the hold button is released. Otherwise, when the HOLD signal UI[2] is OFF from some peripheral devices, then HELD is output.

FAULT output UO [6]

FAULT is output when an alarm occurs in the system. The alarm state is released by the FAULT_RESET input. FAULT is not output when a warning (WARN alarm) occurs.

ATPERCH output UO [7]

ATPERCH is output when the robot is in a previously defined reference position.
Up to ten reference positions can be defined. This signal is output only when the robot is in the first reference position. For any other reference positions, general-purpose signals are assigned.

TPENBL output UO [8]

TPENBL is output when the enable switch of the teach pendant is set to on.

BATALM output UO [9]

BATALM indicates a low-voltage alarm for the backup battery of the controller or robot Pulsecoder. Turn the power to the controller on and replace the battery.

> **⚠ CAUTION**
> In case that the BATALM signal is specified to include BZAL/BLAL of Pulsecoder,
> BATALM is output when at least one Pulsecoder of all axis of all motion group
> detects BZAL/BLAL. However BATALM signal excludes Process axis (Servo torch
> axis) which has no motion group and Slave axis of Dual drive function.

BUSY output UO [10]

BUSY is output while a program is being executed or while processing using the teach pendant is being performed. It is not output while a program is temporarily stopped.

ACK1 to ACK8 outputs UO [11-18]

When the RSR function is enabled, ACK1 to ACK8 are used together with the function. When an RSR input is accepted, a pulse of the corresponding signal is output as an acknowledgment. The pulse width can be specified. (→ Subsection 3.8.1, Robot Service Request (RSR))

SNO1 to SNO8 outputs UO [11-18]

When the PNS function is enabled, SNO1 to SNO8 are used together with the function. The currently selected program number (signal corresponding to the PNS1 to PNS8 inputs) is always output, in binary code, as confirmation. The selection of another program changes SNO1 to SNO8. (→ Subsection 3.8.2, Program Number selection (PNS))

SNACK output UO [19]

When the PNS function is enabled, SNACK is used together with the function. When the PNS inputs are accepted, a pulse of this signal is output as an acknowledgment. The pulse width can be specified. (→ Subsection 3.8.2, Program Number selection (PNS))

Procedure 3-5   Assigning Peripheral I/O

Step
1   Press the [MENU] key. The screen menu will be displayed.
2   Select "5 I/O".
3   Press the F1 key, [TYPE]. The screen change menu will be displayed.
4   Select "UOP".

Peripheral I/O list screen

```
I/O UOP In
          #           Status              1/18
     UI[   1]      OFF   [*IMSTP              ]
     UI[   2]      OFF   [*HOLD               ]
     UI[   3]      OFF   [*SFSPD              ]
     UI[   4]      OFF   [Cycle stop          ]
     UI[   5]      OFF   [Fault reset         ]
     UI[   6]      OFF   [Start               ]
     UI[   7]      OFF   [Home                ]
     UI[   8]      OFF   [Enable              ]
     UI[   9]      OFF   [RSR1/PNS1/STYLE1    ]
     UI[  10]      OFF   [RSR2/PNS2/STYLE2    ]
     UI[  11]      OFF   [RSR3/PNS3/STYLE3    ]
   Sorted by port number.


   [ TYPE  ]   CONFIG   IN/OUT               >
```

5   To switch the input screen to the output screen, or vice versa, press the F3, "IN/OUT".
6   To allocate I/O, press the F2, "CONFIG".

Peripheral I/O configuration screen

```
I/O UOP In
                                                    1/3
          #       RANGE    RACK SLOT START STAT.
          1  UI[  1-   8]    0    1      1 ACTIV
          2  UI[  9-  16]    0    1      9 ACTIV
          3  UI[ 17-  18]    0    1     17 ACTIV




          Device Name : PrcI/O JB


  [ TYPE ]  MONITOR   IN/OUT   DELETE   HELP    >
```

To return to the list screen, press F2, "MONITOR".

7 Manipulating the I/O assignment screen
  a) Place the cursor on Range, and specify the range of signals to be assigned.
  b) Line division is performed automatically according to the specified range.
  c) Enter appropriate values for Rack, Slot, and Start point.
  d) When the entered values are valid, abbreviation PEND is displayed in STAT.
      If any entered value is invalid, abbreviation INVAL is displayed in STAT.
  Unnecessary lines can be deleted by pressing F4, "Delete".
  The abbreviations that will appear in "STAT" mean the following:
      ACTIV   : This assignment is now in use.
      PEND   : Assignment is normal. Turning the power off and on again causes the ACTIV
                   status to be entered.
      INVAL   : A specified value is invalid.
      UNASG   : No assignment has been made.
8 To set the attribute of I/O, press the [NEXT] key of the selection screen and press F4, "DETAIL" of the
   next page.

Peripheral I/O detail screen

```
I/O UOP In
     Port Detail                               1/1

        User Opr. Panel Input             [    1]

     1    Comment:  [*IMSTP                  ]









  [ TYPE ]  PRV-PT   NXT-PT
```

To return to the configuration screen, press the [PREV] key.

9 To add a comment:
  a   Move the cursor to the comment line and press the [ENTER] key.
  b   Select the method of naming the comment.
  c   Press the appropriate function keys to add the comment.
  d   When you are finished, press the [ENTER] key.

NOTE
   The comment of peripheral equipment I/O is written by the tool software and can
   be changed. Even if the comment is rewritten, the function is not changed.

---

10   To set the item, move the cursor to the setting column, and select the function key menu.
11   When you are finished, press [PREV] key to return to the selection screen.
12   Cycle power of the controller so it can use the new information.

⚠ **WARNING**
  Cycling power is required to make a new setting valid. Otherwise, injury or property damage would occur.

⚠ **CAUTION**
1   In the first power-up after I/O re-allocation, power failure recovery would not be executed even if it is enabled.
2   After all I/O signals are set, the setting information should be saved in external storage in case the information needs to be re-loaded. Otherwise, the current setting information would be lost when it is changed.

NOTE
  To control the peripheral I/O (UOP) by integrated PMC (option), UOP is assigned to PMC address (F, G) by PMC internal I/O assignment. When UOP is assigned to PMC address, the mark "*" is displayed on the left of "UI" and "UO" in the peripheral I/O configuration menu. In this case, the setting of the peripheral I/O configuration menu is ignored, and the setting is not used for the assignment of UI and UO. The UI and UO are assigned to PMC address according to the setting of the PMC internal I/O assignment menu.

3.4   OPERATOR'S PANEL I/O

The operator's panel I/O means dedicated digital signals for passing data indicating the status of the buttons and LEDs on the operator's panel/box. The status of each input signal depends on whether the corresponding button on the operator's panel is on or off. Each output signal is used to turn the corresponding LED lamp on the operator's panel on or off.

For the operator's panel I/O, the signal numbers cannot be mapped (redefined). Sixteen input and sixteen output signals are defined as standard. For the definition of the signals of the operator's panel I/O, see Fig. 3.4.

When the operator's panel is enabled, the operator's panel I/O can be used to start a program. However, any signals which have a significant effect on safety are always enabled.

The operator's panel is enabled when the following operator's panel enable conditions are satisfied:
■   The enable switch on the teach pendant is set to off.
■   The remote signal (SI[2]) is off. (For how to turn the remote signal on and off, see the description of "Remote/Local setup" in Section 3.15, "SYSTEM CONFIG MENU".)
■   The *SFSPD input of the peripheral device I/O is on.

To start a program involving operation (group), the following conditions must be satisfied:
■   The ENBL input of the peripheral device I/O is on.
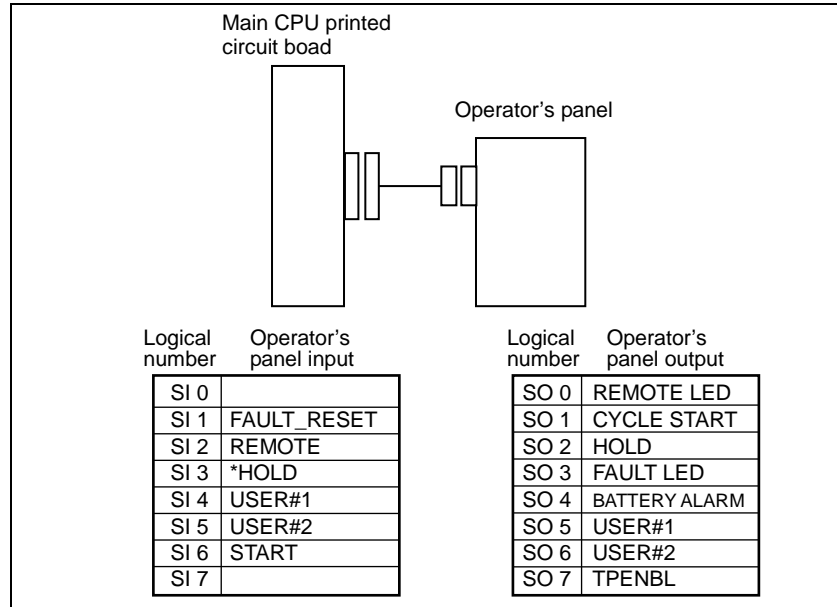■   The servo power is on (not in the alarm state).

Fig. 3.4 Operator's panel I/O

Table 3.4 (a) Operator's panel input signals

Input signal	Description
*HOLD SI [3] Always enabled. Not provided for the operator's panel.	The temporary stop (hold) signal specifies temporary stop of the program. The *HOLD signal is on in the normal status. When this signal is turned off: ● The robot operation being executed is decelerated, then stopped. ● The program being executed is temporarily stopped.
FAULT_RESET SI [1] Always enabled.	The alarm release (fault reset) signal releases the alarm state. When the servo power is off, this signal turns on the servo power. In this case, the alarm state is not released until the servo power is turned on.
REMOTE SI [2] Always enabled. Not provided for the operator's panel.	The remote signal (remote) switches between remote mode and local mode of the system. In remote mode (SI[2] = on), when the remote conditions are satisfied, a program can be started using the peripheral device I/O. In local mode (SI[2] = off), when the operator's panel enable conditions are satisfied, a program can be started from the operator's panel. To turn the remote signal (SI[2]) on and off, set "Remote/Local setup" on the system config menu. For details, see Section "3.15, SYSTEM CONFIG MENU".
START SI [6] Enabled in the operator's panel enable state.	The start signal starts the currently selected program using the teach pendant from the line to which the cursor is positioned or restarts a temporarily stopped program. This signal functions at its falling edge when turned off after being turned on.

Table 3.4 (b) Operator's panel output signals

Output signal	Description
REMOTE SO [0] Not provided for the operator's panel.	The remote signal is output when the remote conditions are satisfied (remote conditions →Section 3.3, PERIPHERAL I/O).
BUSY SO [1] Not provided for the operator's panel.	The busy signal is output while processing such as program execution or file transfer is being performed. It is not output when a program is temporarily stopped.
HELD SO [2] Not provided for the operator's panel.	The hold signal is output when the hold button is pressed or the HOLD signal is input.
FAULT SO [3]	The alarm (fault) signal is output when an alarm occurs in the system. The alarm state is released by the FAULT_RESET input. This signal is not output when a warning (WARN alarm) occurs.
BATAL output SO [4] Not provided for the operator's panel.	The abnormal battery (battery alarm) signal indicates a low-voltage alarm for the battery in the controller or the battery of the Pulsecoder of the robot. While keeping the power to the controller on, replace the battery.
TPENBL output SO [7] Not provided for the operator's panel.	The teach pendant enable (TP enable) signal is output when the enable switch on the teach pendant is on.

Procedure 3-6   Displaying the operator's panel I/O

> **NOTE**
> For the operator's panel I/O, the signal numbers cannot be redefined.

Step
1   Press [MENU] key to display the screen menu.
2   Select "5 I/O".
3   Press F1, [TYPE] to display the screen switching menu.
4   Select "SOP".

Operator's panel I/O list screen

```
I/O SOP Out
              #        STATUS              1/15
      SO[   0]          ON    [Remote LED      ]
      SO[   1]         OFF    [Cycle start     ]
      SO[   2]         OFF    [Hold            ]
      SO[   3]          ON    [Fault LED       ]
      SO[   4]          ON    [Batt alarm      ]
      SO[   5]         OFF    [                ]
      SO[   6]         OFF    [                ]
      SO[   7]          ON    [TP enabled      ]
      SO[   8]         OFF    [                ]
      SO[   9]         OFF    [                ]
      SO[  10]         OFF    [                ]
   Sorted by port number.


   [ TYPE ]           IN/OUT     ON      OFF    >
```

5   Press F3, "IN/OUT" to switch the display between the input and output screens.

> **NOTE**
> The input signal status can only be checked. Values cannot be changed forcibly.