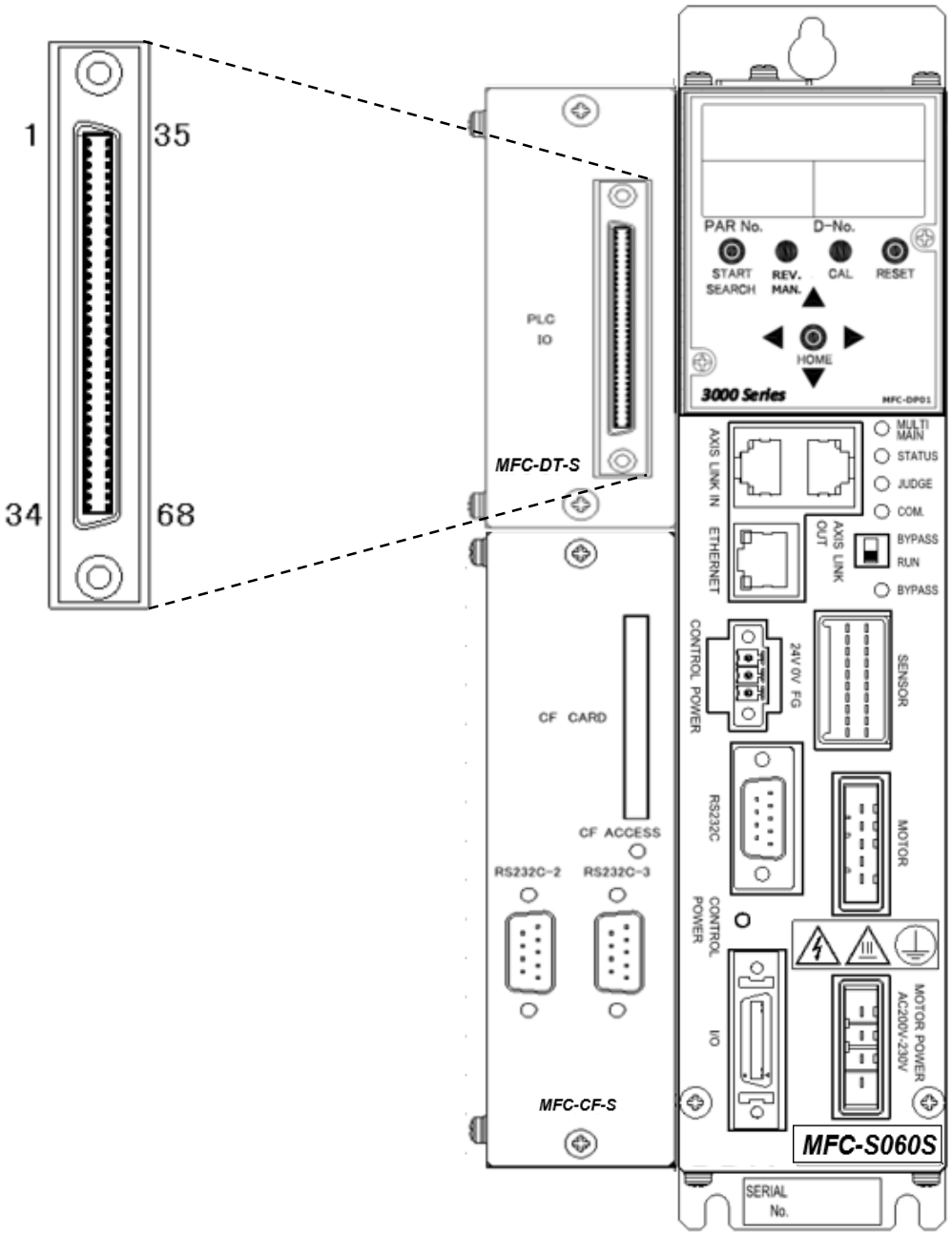
Chapter 1: **Expansion I/O**

1

1-1. **Hardware**



Adaptable Plug

Manufacturer:	Hirose Electric
Type:	Cable connector
Model:	DX31A-68P (50)
Specifications:	Applicable wire size AWG 28 or 0.08mm2
Type:	Cable connector case
Model:	DX-68-CV1

* The cable is not provided with the equipment, Please order in the model No. below.

Manufacturer:	Misumi
Model:	SD31-HY-A-68-2-02S-00F

1-2. **PLC Interface**

1-2-1. Input Signals (PLC → PRESS)

【Input Signal List】 **NC: Normal Close NO: Normal Open**

PIN No.	Signal Name	Conn-ection	Function and application explanation
1	Input Signal Common		Bipolar NPN (Sink Type) : DC+24V PNP (Source Type) : DC0V
2	Input Signal Common		
3	Emergency Stop	NC	Signal MUST be active to perform a pressing operation. When this signal is inactive (off), all controller operation ceases, all connected presses in motion will stop and all communication ports & input/outputs will be disabled.
4	Reset	NO	When active (on), this signal will clear all press data and discrete outputs. A Zero Check of all load transducers will be completed. During the Zero Check, the CHECK lamp will illuminate, the READY signal will turn OFF, and the ACCEPT or REJECT lamp will light to indicate the result of the Zero Check. If the System has been disabled by an Abnormal output, the System will not return to normal operation until the Abnormal condition has been corrected, and this signal has been input for 500ms or more. Do not input this signal between cycles as part of an automatic cycle due to the potential for press data loss.
5	Return	NO	**Jog Signal: ON (Jog Operation)** When used in conjunction with the Jog Input, the selected press will move in the return direction for as long as this signal is activated (on) and maintained.
6	Start	NO	**Jog Signal: OFF (Sequence Operation)** The Start input automatically resets the previous cycle, clears all data to zero, and initiates the next pressing cycle. The start input must be maintained "on" for the entire cycle (until the “Busy” signal turns off). **Jog Signal: ON (Jog Operation)** When used in conjunction with the Jog Input, the selected press will move in the advance direction for as long as this signal is activated (on) and maintained. *Upon Emergency Stop recovery or after clearing a Reset, wait at least 100ms before activating.
7	Home	NO	**Jog Signal: OFF** Switching this signal ON for 200ms or more will initiate a Home Position Search for any connected press where a Home Position has not been set. If a Home Position (Origin) has been established this for a connected press, this input will move that connected press to the returned (Job Start) position. **Jog Signal: ON (Forced Home Search Operation)** Switching this signal ON for 200ms or more will force a Home Position Search.
8	Jog	NO	Switch ON this signal to perform Jog Advance or Jog Return operation.
9	Seq / Press Select 0	NO	**Jog Signal: OFF (Sequence Operation)** **Page 1-3, 4** These 6 inputs form a binary code which is capable of selecting up to 64 different operation sequences. (See Page 1-5). **Jog Signal: ON (Jog Operation)** **Page 1-5** When using manual operation inputs (Jog, Return), these binary inputs are used to select the press to be operated. *Selection during operation is not allowed. It will be allowed when the next operation is started.
10	Seq / Press Select 1	NO	
11	Seq / Press Select 2	NO	
12	Seq / Press Select 3	NO	
13	Seq / Press Select 4	NO	
14	Seq Select 5	NO	
15	Input Wait Port 1	NO	These four (4) signals are external inputs to the pressing sequence. When a [PLC INPUT WAIT] instruction is programmed in the pressing sequence, it will stop until the designated external input is active.
16	Input Wait Port 2	NO	
17	Input Wait Port 3	NO	
18	Input Wait Port 4	NO	

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PIN No.	Signal Name	Conn-ection	Function and application explanation
19	Press 1 Bypass	NO	Switching each signal ON turns each press No. to the BYASS state, turning OFF the servo press operation. Press No. which is in the BYPASS state is not activated. When any Press No. in the BYPASS state is set in the sequence, such Press No. is out of the operation target. Switching ON any of the Press Nos. during operation stops the operation of the corresponding press No.
20	Press 2 Bypass	NO	
21	Press 3 Bypass	NO	
22	Press 4 Bypass	NO	
23	Press 5 Bypass	NO	
24	Press 6 Bypass	NO	
25	Press 7 Bypass	NO	
26	Press 8 Bypass	NO	
27	ID Data Clear	NO	Clears the ID data which is being input.
28	ID Select Enable	NO	Switching ON this signal with [Select by ID Input] in [RS232C Input Format/Data Input Setup] selected on the User Console activates the sequence select by ID.
29	Cycle Count Up	NO	Activated when the [Count Up by the signal input] method has been selected. Switching this signal ON for 200ms or more increments the cycle count of the sequence No. selected by Seq / Press Select 1 to 5, by one. Under the factory setting, [Auto Count Up] has been selected. Selection of the count up method is done through the User Console.
30	Cycle Count Clear	NO	Switching ON this signal for 200ms or more clears the cycle count of the sequence No. selected by Seq. / Press Select 1 to 5 (returns to 1).
31	Jog Speed Select	NO	Selects the speed for Jog Advance or Jog Return. OFF: Jog High Speed, System parameter [SYS-059] ON: Jog Medium Speed, System parameter [SYS-060]
32	BANK Select 0	NO	Page 1-5 Selects the output signal banks 1 to 8
33	BANK Select 1	NO	
34	BANK Select 2	NO	

Seq Select 0~5

Seq Select 5	Seq Select 4	Seq Select 3	Seq Select 2	Seq Select 1	Seq Select 0	Sequence No.
OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	OFF	OFF	OFF	OFF	ON	2
OFF	OFF	OFF	OFF	ON	OFF	3
OFF	OFF	OFF	OFF	ON	ON	4
OFF	OFF	OFF	ON	OFF	OFF	5
OFF	OFF	OFF	ON	OFF	ON	6
OFF	OFF	OFF	ON	ON	OFF	7
OFF	OFF	OFF	ON	ON	ON	8
OFF	OFF	ON	OFF	OFF	OFF	9
OFF	OFF	ON	OFF	OFF	ON	10
OFF	OFF	ON	OFF	ON	OFF	11
OFF	OFF	ON	OFF	ON	ON	12
OFF	OFF	ON	ON	OFF	OFF	13
OFF	OFF	ON	ON	OFF	ON	14
OFF	OFF	ON	ON	ON	OFF	15
OFF	OFF	ON	ON	ON	ON	16
OFF	ON	OFF	OFF	OFF	OFF	17
OFF	ON	OFF	OFF	OFF	ON	18
OFF	ON	OFF	OFF	ON	OFF	19
OFF	ON	OFF	OFF	ON	ON	20
OFF	ON	OFF	ON	OFF	OFF	21
OFF	ON	OFF	ON	OFF	ON	22
OFF	ON	OFF	ON	ON	OFF	23

↓ (Continue)

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Seq Select 5	Seq Select 4	Seq Select 3	Seq Select 2	Seq Select 1	Seq Select 0	Sequence No.
OFF	ON	OFF	ON	ON	ON	24
OFF	ON	ON	OFF	OFF	OFF	25
OFF	ON	ON	OFF	OFF	ON	26
OFF	ON	ON	OFF	ON	OFF	27
OFF	ON	ON	OFF	ON	ON	28
OFF	ON	ON	ON	OFF	OFF	29
OFF	ON	ON	ON	OFF	ON	30
OFF	ON	ON	ON	ON	OFF	31
OFF	ON	ON	ON	ON	ON	32
ON	OFF	OFF	OFF	OFF	OFF	33
ON	OFF	OFF	OFF	OFF	ON	34
ON	OFF	OFF	OFF	ON	OFF	35
ON	OFF	OFF	OFF	ON	ON	36
ON	OFF	OFF	ON	OFF	OFF	37
ON	OFF	OFF	ON	OFF	ON	38
ON	OFF	OFF	ON	ON	OFF	39
ON	OFF	OFF	ON	ON	ON	40
ON	OFF	ON	OFF	OFF	OFF	41
ON	OFF	ON	OFF	OFF	ON	42
ON	OFF	ON	OFF	ON	OFF	43
ON	OFF	ON	OFF	ON	ON	44
ON	OFF	ON	ON	OFF	OFF	45
ON	OFF	ON	ON	OFF	ON	46
ON	OFF	ON	ON	ON	OFF	47
ON	OFF	ON	ON	ON	ON	48
ON	ON	OFF	OFF	OFF	OFF	49
ON	ON	OFF	OFF	OFF	ON	50
ON	ON	OFF	OFF	ON	OFF	51
ON	ON	OFF	OFF	ON	ON	52
ON	ON	OFF	ON	OFF	OFF	53
ON	ON	OFF	ON	OFF	ON	54
ON	ON	OFF	ON	ON	OFF	55
ON	ON	OFF	ON	ON	ON	56
ON	ON	ON	OFF	OFF	OFF	57
ON	ON	ON	OFF	OFF	ON	58
ON	ON	ON	OFF	ON	OFF	59
ON	ON	ON	OFF	ON	ON	60
ON	ON	ON	ON	OFF	OFF	61
ON	ON	ON	ON	OFF	ON	62
ON	ON	ON	ON	ON	OFF	63
ON	ON	ON	ON	ON	ON	64

Press Select 0~4

Press Select 4	Press Select 3	Press Select 2	Press Select 1	Press Select 0	Jog Operation Press No.
OFF	OFF	OFF	OFF	OFF	1
OFF	OFF	OFF	OFF	ON	2
OFF	OFF	OFF	ON	OFF	3
OFF	OFF	OFF	ON	ON	4
OFF	OFF	ON	OFF	OFF	5
OFF	OFF	ON	OFF	ON	6
OFF	OFF	ON	ON	OFF	7
OFF	OFF	ON	ON	ON	8
OFF	ON	OFF	OFF	OFF	9
OFF	ON	OFF	OFF	ON	10
OFF	ON	OFF	ON	OFF	11
OFF	ON	OFF	ON	ON	12
OFF	ON	ON	OFF	OFF	13
OFF	ON	ON	OFF	ON	14
OFF	ON	ON	ON	OFF	15
OFF	ON	ON	ON	ON	16
ON	OFF	OFF	OFF	OFF	17
ON	OFF	OFF	OFF	ON	18
ON	OFF	OFF	ON	OFF	19
ON	OFF	OFF	ON	ON	20
ON	OFF	ON	OFF	OFF	21
ON	OFF	ON	OFF	ON	22
ON	OFF	ON	ON	OFF	23
ON	OFF	ON	ON	ON	24
ON	ON	OFF	OFF	OFF	25
ON	ON	OFF	OFF	ON	26
ON	ON	OFF	ON	OFF	27
ON	ON	OFF	ON	ON	28
ON	ON	ON	OFF	OFF	29
ON	ON	ON	OFF	ON	30
ON	ON	ON	ON	OFF	31
ON	ON	ON	ON	ON	32

BANK Select 0~2

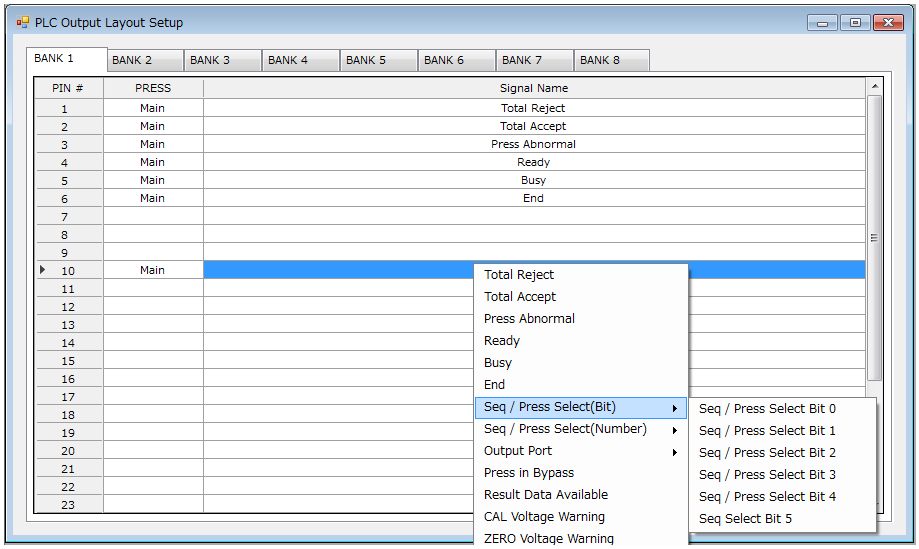
BANK Select 2	BANK Select 1	BANK Select 0	Output Signal BANK No.
OFF	OFF	OFF	1
OFF	OFF	ON	2
OFF	ON	OFF	3
OFF	ON	ON	4
ON	OFF	OFF	5
ON	OFF	ON	6
ON	ON	OFF	7
ON	ON	ON	8

1-2-2. Output Signals (PRESS → PLC)

Signals of the Bank No. assigned to Pin No. 37 to 68 are output.

PIN No.	Signal Name	Conn-ection	Function and application explanation
35	Output Signal Common		Bipolar NPN (Sink Type) : DC0V PNP (Source Type) : DC+24V
36	Output Signal Common		
37	Total Accept	NO	
38	Total Reject	NO	
39	Press Abnormal	NO	
40	Ready	NO	
41	Busy	NO	
42	End	NO	
43		NO	
44		NO	
45		NO	
46	Seq / Press Select 0	NO	
47	Seq / Press Select 1	NO	
48	Seq / Press Select 2	NO	
49	Seq / Press Select 3	NO	
50	Seq / Press Select 4	NO	
51	Seq Select 5	NO	
52		NO	
53		NO	
54		NO	
55		NO	
56		NO	
57		NO	
58		NO	
59		NO	
60		NO	
61		NO	
62		NO	
63		NO	
64		NO	
65		NO	
66		NO	
67		NO	
68		NO	

Output signals of pin No. 37 to 68 are freely assigned to either of Banks 1.
Assign the output signal via [PLC Output Layout Setup: Pin No. 1 to 32] on the User Console.



【Main: Output Signal List】

NO: Normal Open

Signal Name	Conn-ection	Function and application explanation
Total Reject	NO	ON is output when the operation result is Reject. ON is output also at [Emergency Stop], [Bypass], [Start Signal OFF] during the operation. At the operation by multiple Press Controllers, ON is output when any of the Press Controller is Reject.
Total Accept	NO	ON is output when the operation result is Accept. In the case of operation by multi Controller system, ON is output when all the Press Controllers having performed the pressing operation are Accept.
Press Abnormal	NO	ON is output at operation start or when any abnormality occurs during operation.
Ready	NO	ON is output when the system is operable. OFF is output at [Power ON], [Abnormal], [Emergency Stop], [Busy], [Reset], and [CAL Check].
Busy	NO	ON is output during the press operation and the sequence operation.
End	NO	ON is output when the sequence operation ends. *ON is not output when the sequence operation is canceled due to Start Signal OFF or else.
Seq / Press Select 0	NO	**Jog Signal: OFF (Sequence Operation)** **Page 1-3, 4** The selected sequence from No. 1 to 64 is output in bit format. **Jog Signal: ON (Jog Operation)** **Page 1-5** The selected jog operation from press No. 1 to 32 is output in bit format. *Used for interlocking.
Seq / Press Select 1	NO	
Seq / Press Select 2	NO	
Seq / Press Select 3	NO	
Seq / Press Select 4	NO	
Seq Select 5	NO	
Seq 1~64	NO	**Jog Signal: OFF (Sequence Operation)** The selected sequence from No. 1 to 64 is output. **Jog Signal: ON (Jog Operation)** The selected jog operation from Press No. 1 to 32 is output.
Press 1~32	NO	
Output Port 1~8	NO	Signal used in each sequence command [Output Port 1 to 8]. *ON output is retained until the next sequence operation starts.
Press in Bypass	NO	ON is output when any of the press Nos. is in the BYPASS state.
Result Data Available	NO	ON is output when there is the pressing result collected on the User Console. OFF is output at the completion of data collection of the pressing result or when the sequence operation has started.
CAL Voltage Warning	NO	ON is output if CAL Voltage Error Warning occurs to any of the press Nos.
ZERO Voltage Warning	NO	ON is output if ZERO Voltage Error Warning occurs to any of the press Nos.

【Press 1~32: Output Signal List】 **NO: Normal Open**

Signal Name	Conn-ection	Function and application explanation
Reject	NO	When the pressing result is Reject, ON is output after the Busy signal is OFF.
Accept	NO	When the operation result is Accept, ON is output after the [Busy] signal is switched OFF.
Press Abnormal	NO	Output when the servo press error occurs.
Ready	NO	ON is output when operation is ready. OFF is output for [5 sec after power ON], [Abnormal], [Emergency Stop], [Busy], [Reset], [CAL Check], and [Servo OFF].
Busy	NO	ON is output during operation.
Bypass	NO	ON is output when the Press Controller is in the BYPASS state.
Home Set	NO	After the home search operation, ON is output with the press home position determined.
Home Returned	NO	ON is output when the tool stops between the press home position to the system parameter [SYS-064 Home Returned Signal Output Range].
Press Returned	NO	ON is output when the tool stops between the press home position to the selected parameter [214 Job Start Position].
Advanced	NO	When reaching [105 Target Load] or [204 Target Distance], ON is output only during [301 Target Hold Time]. * No output when [301 Target Hold Time] is ”0”.
Advance Position	NO	During the pressing operation by the sequence [Press Operation], ON is output from [250 Advance ON Position] to [251 Advance OFF Position].
Return Position	NO	During the return operation by the sequence [Press Operation], ON is output from [252 Return ON Position] to [253 Return OFF Position].
Advance Direction	NO	ON is output during the advance operation.
Return Direction	NO	OFF is output during the return operation.
Servo On	NO	ON is output when the servo press starts operation. OFF is output at [Press Abnormal], [Emergency Stop], [Reset], and [Bypass].
Parameter Select 0	NO	Selected parameters from No. 1 to 128 are output in a bit format.
Parameter Select 1	NO	
Parameter Select 2	NO	
Parameter Select 3	NO	
Parameter Select 4	NO	
Parameter Select 5	NO	
Parameter Select 6	NO	
Parameter 1~128	NO	Selected parameters from No. 1 to 128 are output.
Load Low Reject	NO	ON is output when the judgement load is Low Reject.
Load High Reject	NO	ON is output when the judgement load is High Reject.
Final Load Low Reject	NO	ON is output when the final load is Low Reject.
Final Load High Reject	NO	ON is output when the final load is High Reject.
Distance Low Reject	NO	ON is output when the judgement distance is Low Reject.
Distance High Reject	NO	ON is output when the judgement distance is High Reject.
Final Distance Low Reject	NO	ON is output when the final distance is Low Reject.
Final Distance High Reject	NO	ON is output when the final distance is High Reject.
Interference Check Reject	NO	ON is output when [106 Interference Check Load] is detected between the operation start point and [207 Interference Check Distance]
Load Inhibit Limit Reject	NO	ON is output when the load exceeds [107 Load Inhibit Limit] between the operation start point and [208 Load Inhibit Distance].
Press Time Low Reject	NO	ON is output when the pressing time after detecting [110 Distance Measurement Start Load] until reaching [204Target Distance] is Low Reject. *Press Method: Distance Control With Load Limit
Press Time High Reject	NO	ON is output when the pressing time after detecting [110 Distance Measurement Start Load] until reaching [204Target Distance] is High Reject. *Press Method: Distance Control With Load Limit

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Signal Name	Conn-ection	Function and application explanation
Part Check 1 Distance Low Reject	NO	ON is output when the distance detecting [114 Part Check 1 Load] becomes Low Reject.
Part Check 1 Distance High Reject	NO	ON is output when the distance detecting [114 Part Check 1 Load] becomes High Reject.
Part Check 2 Load Low Reject	NO	ON is output when the load between [217 Part Check 2 Start Distance] and [218 Part Check 2 End Distance] becomes Low Reject.
Part Check 2 Load High Reject	NO	ON is output when the load between [217 Part Check 2 Start Distance] and [218 Part Check 2 End Distance] becomes High Reject.
Part Check 3 Load Low Reject	NO	ON is output when the load between [219 Part Check 3 Start Distance] and [220 Part Check 3 End Distance] becomes Low Reject.
Part Check 3 Load High Reject	NO	ON is output when the load between [219 Part Check 3 Start Distance] and [220 Part Check 3 End Distance] becomes High Reject.
Band Check Load Low Reject	NO	ON is output when the load between Band Check L1~L10 becomes Low Reject.
Band Check Load High Reject	NO	ON is output when the load between Band Check H1~H10 becomes High Reject.
CAL Voltage Warning	NO	ON is output when CAL Voltage Warning occurs during parameter operation.
ZERO Voltage Warning	NO	ON is output when ZERO Voltage Warning occurs during parameter operation.
Abnormal Number 0	NO	Abnormal No. of error is output in a bit format.
Abnormal Number 1	NO	
Abnormal Number 2	NO	
Abnormal Number 3	NO	
Abnormal Sub Number 0	NO	Abnormal sub No. of error is output in a bit format.
Abnormal Sub Number 1	NO	
Abnormal Sub Number 2	NO	
Abnormal Sub Number 3	NO	
Abnormal Sub Number 4	NO	
Judgment Combination 1~8	NO	ON is output when the NG condition from the information signal setting, Combo 1 to Combo 8, is detected.
Always Off / Always On	NO	Can be used to form a binary bit pattern to echo which Bank is Selected (See Below).

Note: When using Bank selects, it is recommended that the bank number be monitored to confirm actual output status of shared discrete output points. This can be performed by using the “Always On / Always Off” bits set-up in specific discrete output points when programming the output points with the DSP User Console Software. Using different combinations of these bits programmed in an output in each Bank will allow monitoring of which Bank is selected.
The number of discrete outputs used for this monitoring function depends on how many Banks are required as shown below:

Number of Banks Required	Number of Discrete Outputs Required
1	0 or 1
2-4	2
5-8	3

Typically, these “Always On / Always Off” bits are programmed in the last output points (Pins 66 - 68).

[Output Bank Selected]

Pin #68 (Ref.)	Pin #67 (Ref.)	Pin #66 (Ref.)	Output BANK Selected
Always OFF	Always OFF	Always OFF	1
Always OFF	Always OFF	Always ON	2
Always OFF	Always ON	Always OFF	3
Always OFF	Always ON	Always ON	4
Always ON	Always OFF	Always OFF	5
Always ON	Always OFF	Always ON	6
Always ON	Always ON	Always OFF	7
Always ON	Always ON	Always ON	8