

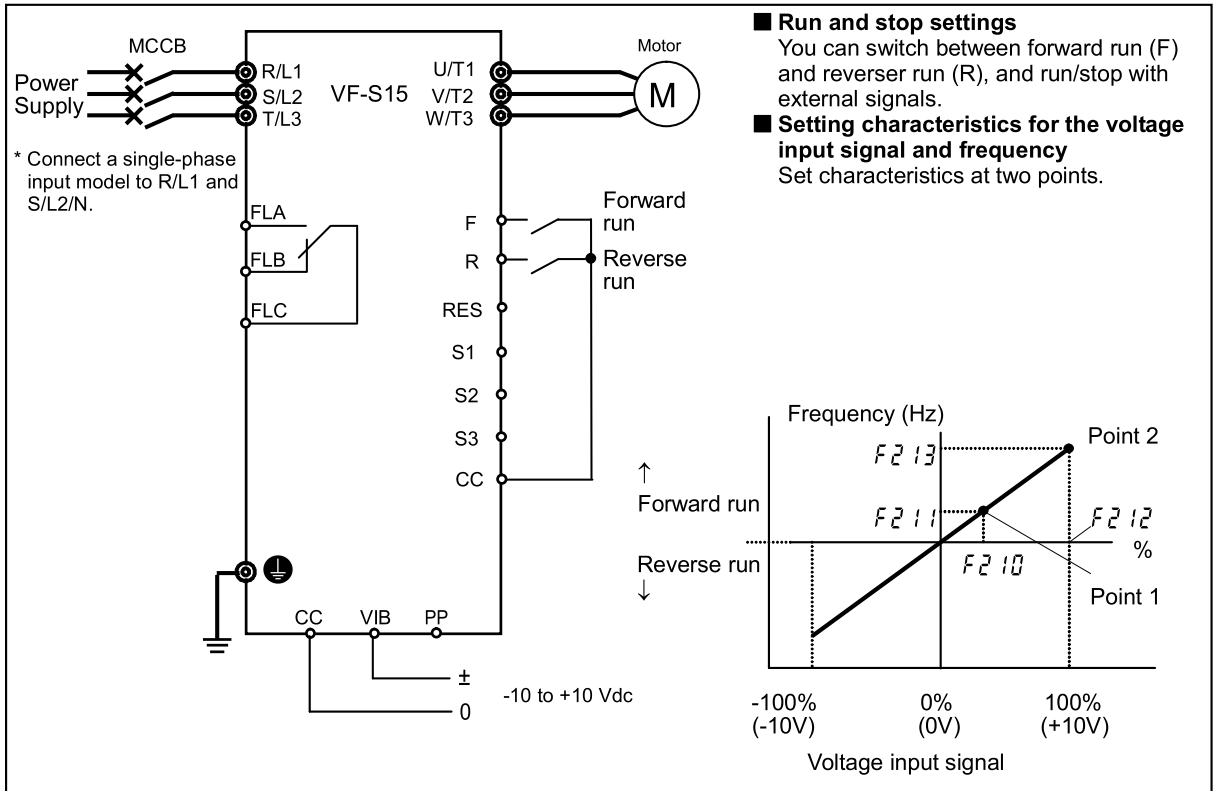
7.3.3 Settings depending on voltage (-10 to +10 V) input

You can set the frequency settings by inputting an analog voltage signal of -10 to +10Vdc between the VIB and CC terminals.

The following shows examples when the run command is input from the terminal.

Title	Function	Adjustment range	Default setting	Setting example
<i>E n 0 d</i>	Command mode selection	0 - 4	1 (panel keypad)	0 (terminal block)
<i>F n 0 d</i>	Frequency setting mode selection	0 - 14	0 (setting dial 1)	2 (terminal VIB)
<i>F 1 0 7</i>	Analog input terminal selection (VIB)	0: 0-+10V 1: -10-+10V	0	1 (-10 - +10V)
<i>F 1 0 9</i>	Analog/logic input selection (VIA/VIB)	0 - 4	0	0 (Analog input)
<i>F 2 1 0</i>	VIB input point 1 setting	-100 - +100%	0	0
<i>F 2 1 1</i>	VIB input point 1 frequency	0.0 - 500.0Hz	0.0	0.0
<i>F 2 1 2</i>	VIB input point 2 setting	-100 - +100%	100	100
<i>F 2 1 3</i>	VIB input point 2 frequency	0.0 - 500.0Hz	*1	50.0/60.0
<i>F 2 0 9</i>	Analog input filter	2 - 1000 ms	64	64

*1: Default setting values vary depending on the setup menu setting. Refer to section 11.5.



7.3.2 Settings depending on current (4 to 20 mA) input

You can set the frequency settings by inputting an analog current signal of 4 (0) to 20mA dc between the VIC and CC terminals.

The following shows examples when the run command is input from the terminal.

Title	Function	Adjustment range	Default setting	Setting example
<i>Cn0d</i>	Command mode selection	0 – 4	1 (panel keypad)	0 (terminal block)
<i>Fn0d</i>	Frequency setting mode selection 1	0 – 14	0 (setting dial 1)	8 (terminal VIC)
<i>F216</i>	VIC input point 1 setting	0 – 100%	20	20 (or 0)
<i>F217</i>	VIC input point 1 frequency	0.0 - 500.0Hz	0.0	0.0
<i>F218</i>	VIC input point 2 setting	0 – 100%	100	100
<i>F219</i>	VIC input point 2 frequency	0.0 - 500.0Hz	*1	50.0/60.0
<i>F209</i>	Analog input filter	2 - 1000 ms	64	64

*1: Default setting values vary depending on the setup menu setting. Refer to section 11.5.

* Connect a single-phase input model to R/L1 and S/L2/N.

■ Run and stop settings
You can switch between forward run (F) and reverse run (R), and run/stop with external signals.

■ Setting characteristics for the current input signal and frequency
Set characteristics at two points.

7.3.1 Settings depending on voltage (0 to 10 V) input <external potentiometer>

You can set the frequency settings by connecting the external potentiometer (1k to 10kΩ) between PP, VIA, and CC terminals.

You can also set by inputting an analog voltage signal of 0 to 10Vdc between the VIA and CC terminals.

The following shows examples when the run command is input from the terminal.

Title	Function	Adjustment range	Default setting	Setting example
<i>Cn0d</i>	Command mode selection	0 - 4	1 (panel keypad)	0 (terminal block)
<i>Fn0d</i>	Frequency setting mode selection 1	0 - 14	0 (setting dial 1)	1 (terminal VIA)
<i>F109</i>	Analog/logic input selection (VIA/VIB)	0 - 4	0	0 or 1 (Analog input)
<i>F201</i>	VIA input point 1 setting	0 - 100%	0	0
<i>F202</i>	VIA input point 1 frequency	0.0 - 500.0Hz	0.0	0.0
<i>F203</i>	VIA input point 2 setting	0 - 100%	100	100
<i>F204</i>	VIA input point 2 frequency	0.0 - 500.0Hz	*1	50.0/60.0
<i>F209</i>	Analog input filter	2 - 1000 ms	64	64

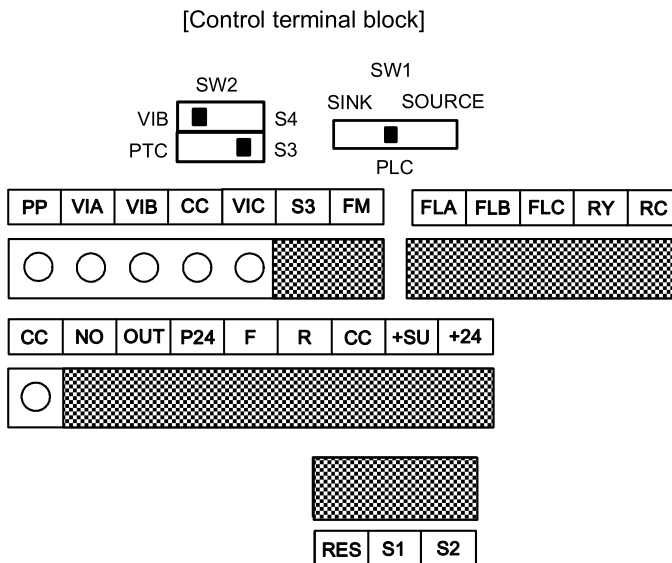
*1: Default setting values vary depending on the setup menu setting. Refer to section 11.5.

■ Run and stop settings
You can switch between forward run (F) and reverse run (R), and run/stop with external signals.

■ Setting characteristics for the voltage input signal and frequency
Set characteristics at two points.

7.3 Speed instruction (analog signal) settings from external devices

Function of analog input terminals can be selected from four functions (external potentiometer, 0 to 10Vdc, 4 (0) to 20mA dc, -10 to +10Vdc).
 The selective function of analog input terminals gives system design flexibility.
 The maximum resolution is 1/1000.
 Default settings of slide switch SW1 and SW2 are as follows;
 SW1: PLC side, SW2: VIB side and S3 side.
 Refer to page B-11 to 13 for details.



■ Analog input terminal function settings

Terminal symbol	Title	Function	Adjustment range	Default setting
VIA	F201	VIA input point 1 setting	0 - 100%	0
	F202	VIA input point 1 frequency	0.0 - 500.0Hz	0.0
	F203	VIA input point 2 setting	0 - 100%	100
	F204	VIA input point 2 frequency	0.0 - 500.0Hz	*1
VIB	F210	VIB input point 1 setting	-100 - +100%	0
	F211	VIB input point 1 frequency	0.0 - 500.0Hz	0.0
	F212	VIB input point 2 setting	-100 - +100%	100
	F213	VIB input point 2 frequency	0.0 - 500.0Hz	*1
VIC	F216	VIC input point 1 setting	0 - 100%	20
	F217	VIC input point 1 frequency	0.0 - 500.0Hz	0.0
	F218	VIC input point 2 setting	0 - 100%	100
	F219	VIC input point 2 frequency	0.0 - 500.0Hz	*1
VIA to VIC	F209	Analog input filter	2 - 1000 ms Note 1)	64

*1: Default setting values vary depending on the setup menu setting. Refer to section 11.5.

Note1) When stable operation cannot be attained because of frequency setting circuit noise, increase the value of F209.

Note 2) Refer to section 5.8 when switching between two types of analog signals.

Note 1) ON with positive logic : Open collector output transistor or relay turned ON.
OFF with positive logic : Open collector output transistor or relay turned OFF.
ON with negative logic : Open collector output transistor or relay turned OFF.
OFF with negative logic: Open collector output transistor or relay turned ON.

☆ Refer to section 11.7 for details about the output terminal functions or levels.

■ List of output terminal function settings

<Explanation of terminology>

- Alarm Alarm output when a setting has been exceeded.
- Pre-alarm Alarm output when the inverter may cause a trip during continued operation.

List of detection levels for output terminal selection

Parameter programmed value		Function	Parameter programmed value		Function
Positive logic	Negative logic		Positive logic	Negative logic	
0	1	Frequency lower limit	108	109	Heavy load output
2	3	Frequency upper limit	120	121	Lower limit frequency stop
4	5	Low-speed detection signal	122	123	Power failure synchronized operation
6	7	Output frequency attainment signal (acceleration/deceleration completed)	124	125	Traverse in progress
8	9	Set frequency attainment signal	126	127	Traverse deceleration in progress
10	11	Fault signal (trip output)	128	129	Parts replacement alarm
14	15	Over-current detection pre-alarm	130	131	Over-torque detection pre-alarm
16	17	Overload detection pre-alarm	132	133	Frequency setting mode selection 1/2
20	21	Overheat detection pre-alarm	136	137	Panel / remote selection
22	23	Overvoltage detection pre-alarm	138	139	Forced continuous operation in progress
24	25	Power circuit undervoltage detection	140	141	Specified frequency operation in progress
26	27	Small current detection	144	145	Signal in accordance of frequency command
28	29	Over-torque detection	146	147	Fault signal (output also at a retry waiting)
30	31	Braking resistor overload pre-alarm	150	151	PTC input alarm signal
40	41	Run/Stop	152	153	Factory specific coefficient *1
42	43	Serious failure	154	155	Analog input break detection alarm
44	45	Light failure	156	157	F terminal status
50	51	Cooling fan ON/OFF	158	159	R terminal status
52	53	In jogging operation	160	161	Cooling fan replacement alarm
54	55	Operation panel / terminal block operation	162	163	Number of starting alarm
56	57	Cumulative operation time alarm	166	167	Acceleration operation in progress
58	59	Communication option communication error	168	169	Deceleration operation in progress
60	61	Forward/reverse run	170	171	Constant speed operation in progress
62	63	Ready for operation 1	172	173	DC braking in progress
64	65	Ready for operation 2	174 to 179		Factory specific coefficient *1
68	69	Brake release	180	181	Integral input power pulse output signal
70	71	Pre-alarm	182	183	Shock monitoring pre-alarm signal
78	79	RS485 communication error	222 to 253		Factory specific coefficient *1
92	93	Designated data output 1	254		Always OFF
94	95	Designated data output 2	255		Always ON
106	107	Light load output			

*1: Factory specific coefficients are manufacturer setting menus. Do not change the value of these parameters.

(3) Holding the output of signals in ON status

- ☆ If the conditions for activating the functions assigned to RY-RC terminal and OUT terminal agree with and as a result the output of signals is put in ON status, the output of signals is held ON, even if the conditions change. (Output terminal holding function)

Assign function 80 to 83 to an input terminal.

Once RY-RC terminal or OUT terminal is turned on when the assigned input terminal is ON, RY-RC terminal or OUT terminal is held ON.

Function No.	Code	Function	Action
80	HDRY	Holding of RY-RC terminal output	ON : Once turned on, RY-RC are held on. OFF: The status of RY-RC changes in real time according to conditions.
82	HDOUT	Holding of OUT-NO terminal output	ON : Once turned on, OUT-NO are held on. OFF: The status of OUT-NO changes in real time according to conditions.

Each one of the following numbers (81, 83) is an inverse signal.

■ Usage example ...operational signal, brake signal

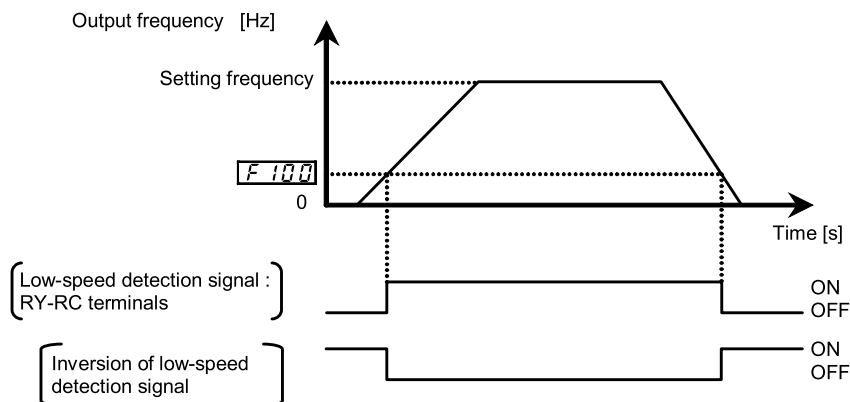
Low-speed detection signal outputs the signal when the output frequency exceeds the setting of *F 100*.

This signal can be used as an operation signal by setting *F 100* to 0.0Hz. (Default setting)

This signal can also be used as an electromagnetic brake excitation/release signal.

Setting example) When outputting the brake signal from RY-RC terminal

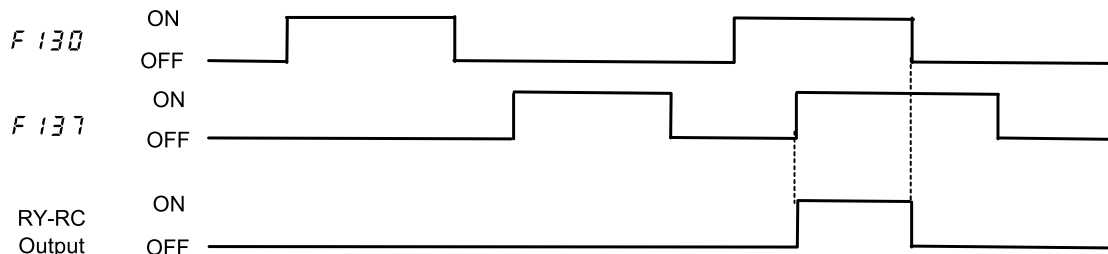
Title	Function	Adjustment range	Example of setting
<i>F 100</i>	Low-speed signal output frequency	0.0 - <i>F H</i> (Hz)	2.5
<i>F 130</i>	Output terminal selection 1A (RY-RC)	0-255	4: LOW (Low-speed detection signal)



(1) Output signals when two types of functions are simultaneously turned ON. <AND>

In case of RY-RC terminal, signals are output when parameter $F 139 = 0$ or 2 , and the functions set at parameters $F 130$ and $F 137$ are simultaneously turned on.

☆ Timing chart

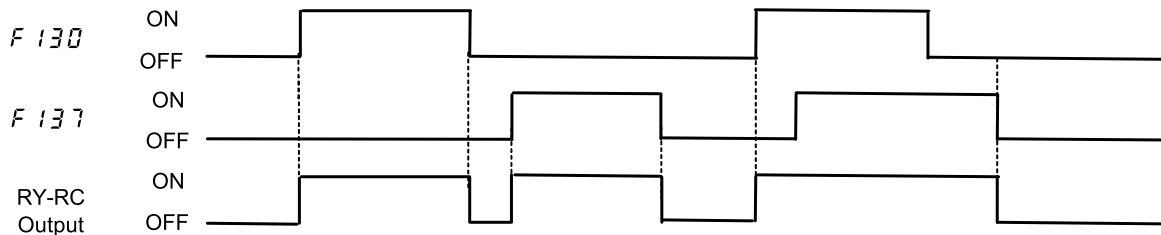


* OUT terminal outputs signals when parameter $F 139 = 0$ or 2 , and the functions set at parameters $F 131$ and $F 138$ are simultaneously turned on.

(2) Output signals when either one of two types of functions is turned ON. <OR>

In case of RY-RC terminal, signals are output when parameter $F 139 = 1$ or 3 , and either of the functions set at parameters $F 130$ and $F 137$ is turned on.

☆ Timing chart



*OUT terminal outputs signals when parameter $F 139 = 2$ or 3 , and either of the functions set at parameters $F 131$ and $F 138$ is turned on.

■ Assign one type of function to an output terminal

Terminal symbol	Title	Function	Adjustment range	Default setting
RY-RC	<i>F 130</i>	Output terminal selection 1A	0 - 255	4 (Low-speed detection signal)
OUT	<i>F 131</i>	Output terminal selection 2A		6 (Output frequency attainment signal)
FL (A, B, C)	<i>F 132</i>	Output terminal selection 3		10 (Fault signal)

Note 2) When assigning 1 type of function to the RY-RC terminal, set only *F 130*.

Leave parameter *F 137* as the default setting (*F 137* = 255).

Note 3) When assigning 1 type of function to the OUT terminal, set only *F 131*.

Leave parameter *F 138* as the default setting (*F 138* = 255).

■ Assign two types of functions to the output terminal (RY-RC, OUT)

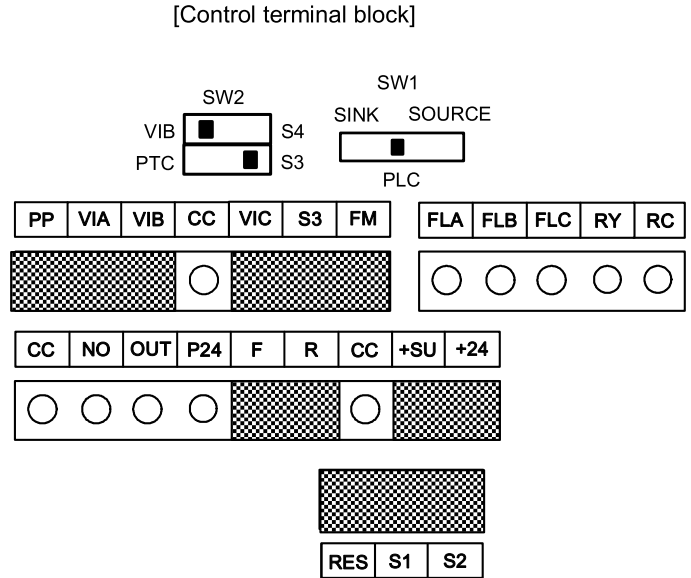
Terminal symbol	Title	Function	Adjustment range	Default setting
RY-RC	<i>F 130</i>	Output terminal selection 1A	0 - 255	4 (Low-speed detection signal)
	<i>F 137</i>	Output terminal selection 1B		255 (Always ON)
OUT	<i>F 131</i>	Output terminal selection 2A		6 (Output frequency attainment signal)
	<i>F 138</i>	Output terminal selection 2B		
RY-RC, OUT	<i>F 139</i>	Output terminal logic selection	0: <i>F 130</i> and <i>F 137</i> <i>F 131</i> and <i>F 138</i> 1: <i>F 130</i> or <i>F 137</i> <i>F 131</i> and <i>F 138</i> 2: <i>F 130</i> and <i>F 137</i> <i>F 131</i> or <i>F 138</i> 3: <i>F 130</i> or <i>F 137</i> <i>F 131</i> or <i>F 138</i>	0

Note 4) *F 131* and *F 138* are active only when *F 669* = 0: Logic output (default).

Function is inactive when *F 669* = 1: Pulse train output is set.

7.2.2 Output terminal function (sink logic)

This function is used to output a variety of signals to external devices from the inverter. With the logic output terminal function, you can select from multiple output terminal functions. Set two types of functions for the RY-RC, OUT terminal and then you can output when either one or both of them is ON. Default settings of slide switch SW1 and SW2 are as follows;
 SW1: PLC side, SW2: VIB side and S3 side.
 Refer to page B-11 to 13 for details.



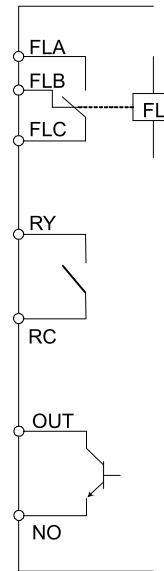
7

■ Usage

Function of FLA, B, C terminals:
 Set at parameter *F 132* Note 1)

Function of RY terminal:
 Set at parameter *F 130* and *137* Note 1)

Function of OUT terminal:
 Set at parameter *F 131* and *138*



Note1) A chattering (momentary ON/OFF of contact) is generated by external factors of the vibration and the impact, etc. In particular, please set the filter of 10ms or more, or timer for measures when connecting it directly with input unit terminal of programmable controller. Please use the OUT terminal as much as possible when the programmable controller is connected.

■ List of logic input terminal function settings

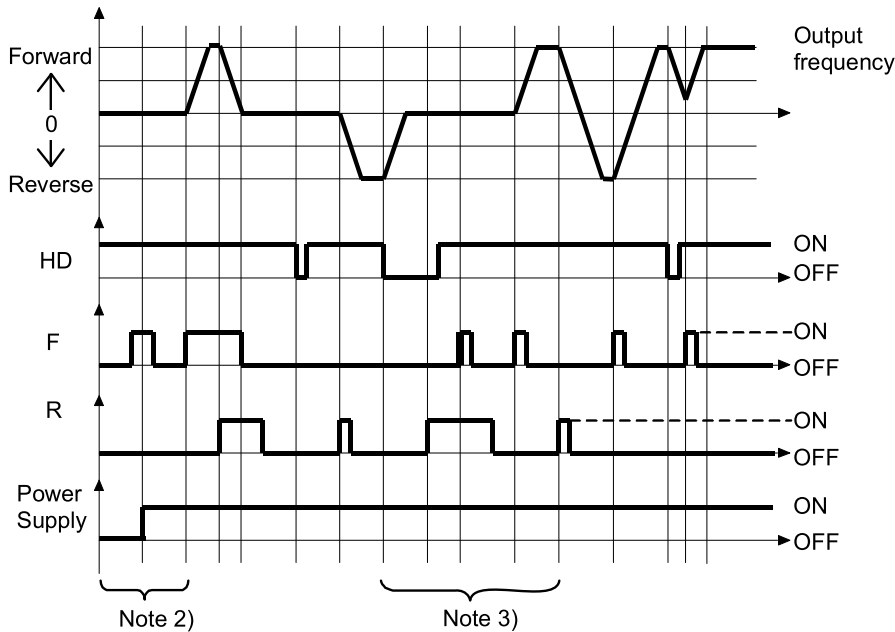
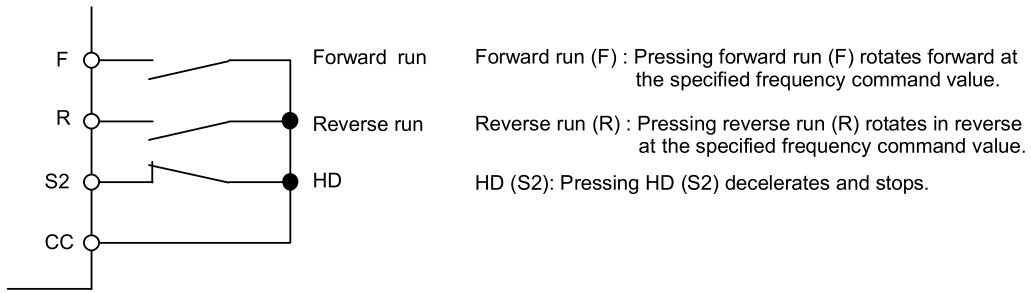
Parameter programmed value		Function	Parameter programmed value		Function
Positive logic	Negative logic		Positive logic	Negative logic	
0	1	No function	74	75	Integrating wattmeter (kWh) display clear
2	3	Forward run command	76	77	Trace back trigger signal
4	5	Reverse run command	78	79	Light-load high-speed operation prohibitive signal
6	7	Standby	80	81	Holding of RY-RC terminal output
8	9	Reset command	82	83	Holding of OUT-NO terminal output
10	11	Preset-speed command 1	88	89	Frequency UP *2
12	13	Preset-speed command 2	90	91	Frequency DOWN *2
14	15	Preset-speed command 3	92	93	Clear frequency UP/DOWN *2
16	17	Preset-speed command 4	96	97	Coast stop command
18	19	Jog run mode	98	99	Forward/reverse selection
20	21	Emergency stop by external signal	100	101	Run/Stop command
22	23	DC braking command	104	105	Frequency reference command forced switching
24	25	2nd acceleration/deceleration	106	107	Frequency setting mode terminal block
26	27	3rd acceleration/deceleration	108	109	Command mode terminal block
28	29	2nd V/F control mode switching	110	111	Parameter editing permission
32	33	2nd stall prevention level	120	121	Fast stop command 1
36	37	PID control prohibition	122	123	Fast stop command 2
46	47	External thermal error input	134	135	Traverse permission signal
48	49	Forced local from communication	136	137	Low voltage operation
50	51	Operation hold (hold of 3-wire operation)	140	141	Forward deceleration
52	53	PID integral/differential clear	142	143	Forward stop
54	55	PID characteristics switching	144	145	Reverse deceleration
56	57	Forced run operation	146	147	Reverse stop
58	59	Fire speed operation	148 to 151		Factory specific coefficient *1
60	61	Acceleration/deceleration suspend signal	152	153	No.2 motor switching
62	63	Power failure synchronized signal	200	201	Parameter editing prohibition
64	65	Factory specific coefficient *1	202	203	Parameter reading prohibition
70	71	Factory specific coefficient *1			

*1: Factory specific coefficients are manufacturer setting menus. Do not change the value of these parameters.

*2: Active when *FND* (frequency setting mode selection) = 5 (UP/DOWN from external logic input) is set.

The frequency setup range is from 0.0 to *FH* (maximum frequency). The acceleration/deceleration time relative to the set frequency is *ACC/DEC* while the acceleration/deceleration speed is not switched.

☆ Refer to section 11.6 for details about the input terminal function.



Note 1) Set $F110 = 6$ (ST: standby) and $ENOD = 0$ (terminal block) for 3 wire operation. Assign HD (operation hold) to any input terminal at input terminal selection. When assigning the S2 terminal as shown above, set $F115 = 50$ (HD: Operation hold).

Note 2) If the terminals are ON before turning on the power, terminal input is ignored when the power is turned ON. (Prevents sudden movements.) After turning the power ON, turn terminal input ON again.

Note 3) When HD is OFF, F and R are ignored even when ON. R does not operate even if it's ON when HD is ON. Likewise in this state, F does not operate even if it's ON. Turn F and R OFF and then turn them ON.

Note 4) During 3 wire operation, sending the jog run mode command stops operation.

Note 5) Be aware that DC braking continues even if a startup signal is input during DC braking.

Note 6) Only F and R maintain HD (operation hold). When using F or R in combination with other functions, be aware that the other functions do not hold. For example, when F and SS1 are assigned, F holds, but SS1 does not.

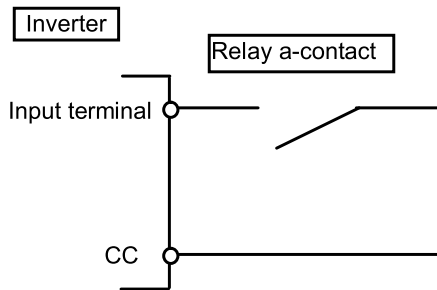
[Parameter settings]

Terminal symbol	Title	Function	Adjustment range	Setting example
S2	F115	Input terminal selection 5 (S2)	0-203	50: HD (Operation hold)

- Note 1) Multiple functions assigned to a single terminal operate simultaneously.
- Note 2) In case of setting always active function, assign the menu number to $F 104$, $F 108$ and $F 110$ (always active function selection).
- Note 3) In case of using terminal S2 as a logic input, set the parameter $F 145=0$ (logic input).
- Note 4) In case of using terminal S3 as a logic input, set the slide switch SW2 (lower) to S3 side and the parameter $F 145=0$ (logic input).
- Note 5) In case of using terminal VIB as a logic input, set the side switch SW2 (upper) to S4 side and set the parameter $F 109=1, 3$, or 4 (logic input). Since/ source logic depends on the slide switch SW1.
- Note 6) In case of using terminal VIA as a logic input, set the parameter $F 109=3$ or 4 (logic input).
- Note 7) When stable operation cannot be attained because of frequency setting circuit noise, increase the value of $F 144$.

■ Connecting

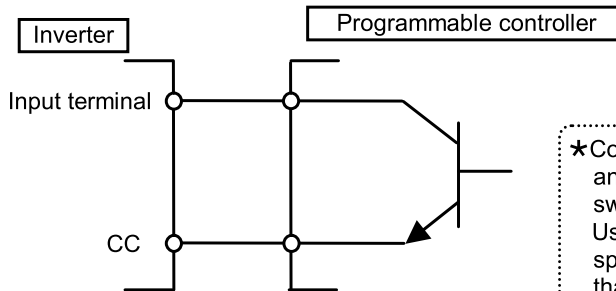
- 1) For logic input



With sink settings

★ Operates by short circuiting between the input terminal and CC (common). Use for forward run, reverse run, preset-speed and so on.

- 2) For connection (sink logic) via transistor output



★ Control by connecting the input terminal and CC (common) to the output (non-logic switch) of the programmable controller. Use for forward run, reverse run, preset-speed and so on. Use a 5 mA transistor that operates at 24 V dc.

■ Usage example ... 3-wire operation (one-push operation)

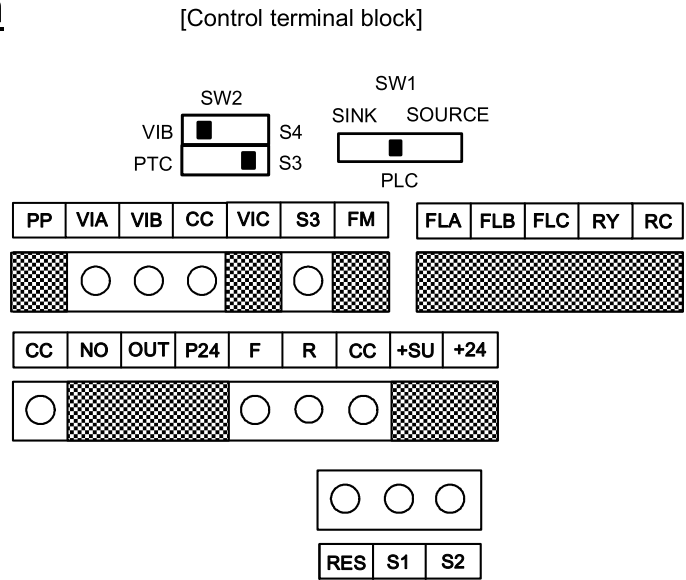
Use the 3-wire operation function to operate the inverter, maintaining operation without using the sequence circuit by inputting an external signal (reset logic signal).

7.2 Applied operations by an I/O signal (operation from the terminal block)

Input terminal sink and source logic are set by using slide switch SW1.

7.2.1 Input terminal function (sink logic)

This function is used to send a signal to the input terminal from an external programmable controller to operate or configure the inverter. The ability to select from a variety of functions allows for flexible system design. Default settings of slide switch SW1 and SW2 are as follows;
 SW1: PLC side, SW2: VIB side and S3 side.
 Refer to page B-11 to 13 for details.



■ Settings for the logic input terminal function

Terminal symbol	Title	Function	Adjustment range	Default setting
F	F 111	Input terminal selection 1A (F)	0-203 Note 1)	2 (F)
	F 151	Input terminal selection 1B (F)		0 (No function)
	F 155	Input terminal selection 1C (F)		0 (No function)
R	F 112	Input terminal selection 2A (R)	0-203 Note 1)	4 (R)
	F 152	Input terminal selection 2B (R)		0 (No function)
	F 156	Input terminal selection 2C (R)		0 (No function)
RES	F 113	Input terminal selection 3A (RES)	0-203 Note 1)	8 (RES)
	F 153	Input terminal selection 3B (RES)		0 (No function)
S1	F 114	Input terminal selection 4A (S1)	0-203 Note 1)	10 (SS1)
	F 154	Input terminal selection 4B (S1)		0 (No function)
S2	F 115	Input terminal selection 5 (S2)	0-203 Note 3)	12 (SS2)
	F 146	Logic input / pulse train input selection (S2)		0: Logic input 1: Pulse train input
S3	F 116	Input terminal selection 6 (S3)	0-203 Note 4)	14 (SS3)
	F 147	Logic input / PTC input selection (S3)		0: Logic input 1: PTC input
VIB	F 117	Input terminal selection 7 (VIB)	8-55 Note 5)	16 (SS4)
VIA	F 118	Input terminal selection 8 (VIA)	8-55 Note 6)	24 (AD2)
VIA VIB	F 109	Analog/logic input selection (VIA/VIB)	0-4	0
F to VIB	F 144	Input terminal response time	1-1000 (ms) Note 7)	1

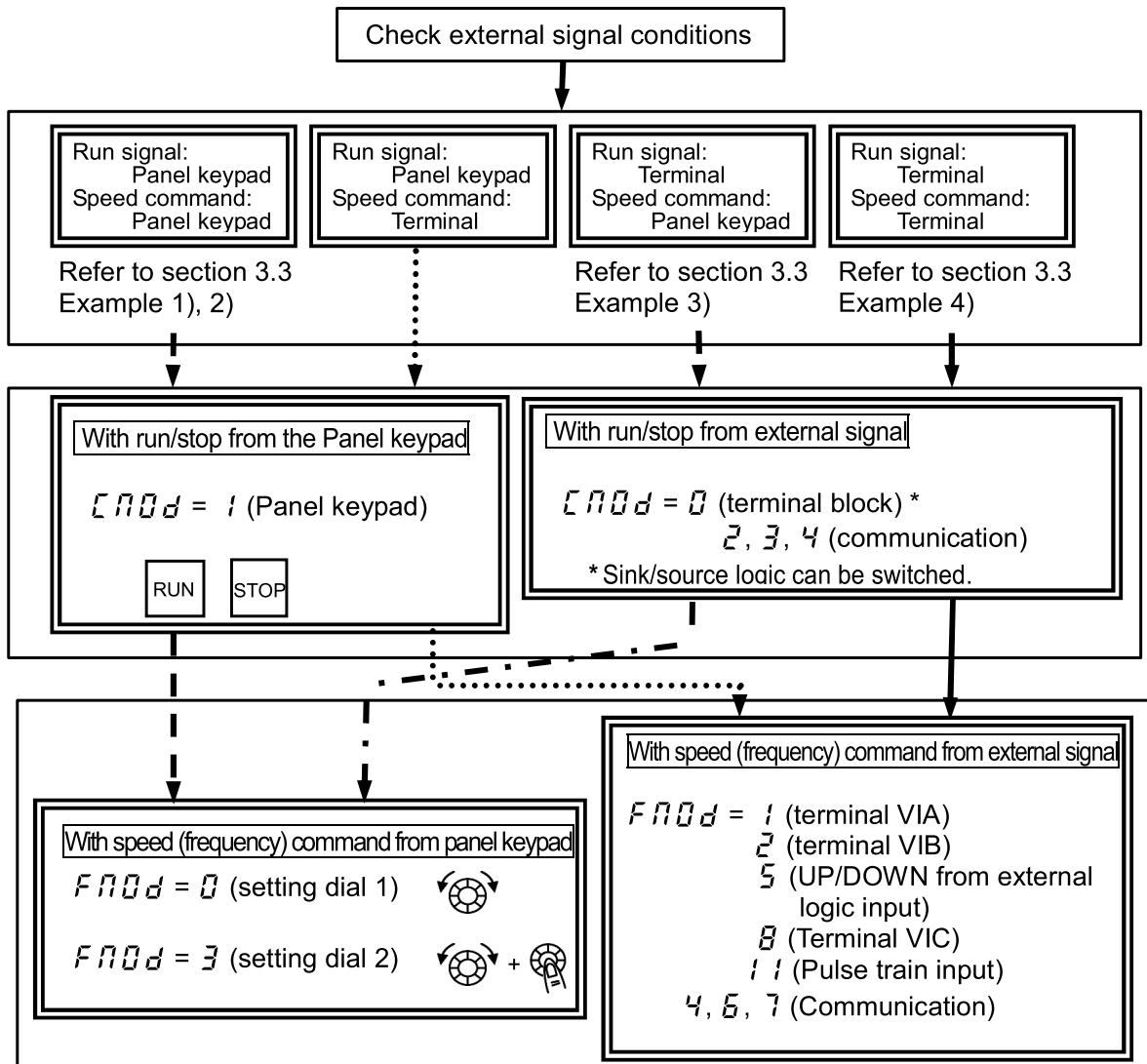
7. Operations with external signal

7.1 Operating external signals

You can control the inverter externally.

The parameter settings differ depending upon your method of operation. Determine your method of operation (the operational signal input method, speed (frequency) command input method) before using the procedure below to set the parameters.

[Procedure for setting parameters]



* For settings based on communication, refer to the Communication Manual (E6581913) or section 6.33.