



TECHNICAL NOTE #: TN_VFD_VG1_008-G

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ORIGINATOR: B. de Vries
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OPTION CARD PARAMETERS for the SAFTRONICS GP10 and VG10

In the GP10 and VG10 Parameter Group O is reserved for parameters related to option cards. Below you will find a list of parameters for each option card. On Page 7 you will find a description on how to change to response characteristics for the PG and PG2 option.

Option Cards:

- | | | |
|---------------|--------------------------------|---------------------------|
| - PG: | PG Feedback Option: 2 Channel | Saftronics PN SOPCG11SPG |
| - PG2: | PG2 Feedback Option: 4 Channel | Saftronics PN SOPCG11SPG2 |
| - SY: | Synchronized Operation Card | Saftronics PN SOPCG11SSY |
| - DIO: | Digital Interface Card | Saftronics PN SOPCG11DIO |
| - AIO: | Analog Interface Card | Saftronics PN SOPCG11AIO |

PG (Feedback Option : 2 channels)

	Name	Setting Range	Unit	Min. Unit	Factory Setting	Change during operation
O01	Speed command system / automatic speed control system	00 ,01 ,10 ,11 ,20 ,21	-	-	00	N
o02	Time constant of PG vector and speed command filter	0.000 to 5.000	s	0.001	0.02	Y
o03	Number of feedback PG pulses	20 to 3000	p	1	1024	N
o04	Constant P of feedback speed controller	0.01 to 200.00	Times	0.01	10.00	Y
o05	Constant I of feedback speed controller	0.000 to 5.000	s	0.001	0.100	Y
o06	Time constant of feedback speed detection filter	0.000 to 5.000	s	0.001	0.005	Y
o07	Feedback pulse correction coefficient 1	1 to 10000	-	1	1	N
o08	Feedback pulse correction coefficient 2	1 to 10000	-	1	1	N

PG2 (Feedback Option : 4 channels)

Func No.	Name	Setting Range	Unit	Min. Unit	Factory Setting	Change during operation
o01	Speed command system / automatic speed control system	00 ,01 ,10 ,11 ,20 ,21	-	-	00	x
o02	Time constant of PG vector and speed command filter	0.000 to 5.000	s	0.001	0.02	O
o03	Number of feedback PG pulses	20 to 3000	p	1	1024	x
o04	Constant P of feedback speed controller	0.01 to 200.00	Times	0.01	10.00	O
o05	Constant I of feedback speed controller	0.000 to 5.000	s	0.001	0.100	O
o06	Time constant of feedback speed detection filter	0.000 to 5.000	s	0.001	0.005	O
o07	Feedback pulse correction coefficient 1	1 to 10000	-	1	1	x
o08	Feedback pulse correction coefficient 2	1 to 10000	-	1	1	x

SY (Synchronized Option)

Function code	Name	Setting range	Unit	Min. Unit	Factory setting	Change during operation
O01	Speed command method / speed control method	00,01,10,11, 20, 21, 30, 31	-	-	00	<input type="checkbox"/>
o02	Speed command filter time constant	0.000 to 5.000	S	0.001	0.02	<input type="checkbox"/>
o03	PG pulse count on slave side	20 to 3000	P	1	1024	<input type="checkbox"/>
o04	P constant of speed controller on slave side	0.01 to 200.00	Times	0.01	10.00	<input type="checkbox"/>
o05	I constant of speed controller on slave side	0.000 to 5.000	S	0.001	0.100	<input type="checkbox"/>
o06	Speed detection filter time constant on slave side	0.000 to 5.000	S	0.001	0.005	<input type="checkbox"/>
o07	Pulse correction coefficient 1 on slave side	1 to 10000	-	1	1	<input type="checkbox"/>
o08	Pulse correction coefficient 2 on slave side	1 to 10000	-	1	1	<input type="checkbox"/>
o09	PG pulse count on command side	20 to 3000	P	1	1024	<input type="checkbox"/>
o10	Pulse setting filter time constant on command side	0.000 to 5.000	S	0.001	0.005	<input type="checkbox"/>
o11	Pulse correction coefficient 1 on command side	1 to 10000	-	1	1	<input type="checkbox"/>
o12	Pulse correction coefficient 2 on command side	1 to 10000	-	1	1	<input type="checkbox"/>
o13	Main speed controller gain	0.1 to 1.5	Times	0.1	1.0	<input type="checkbox"/>
o14	APR P constant	0.01 to 200.00	Times	0.01	1.00	<input type="checkbox"/>
o17	Synchronization completion detection angle	0 to 100	Deg	1	10	<input type="checkbox"/>
o18	Deviation limit width	0 to 65535	-	1	65535	<input type="checkbox"/>

DIO (Digital Input/Output Option)

Function code	Contents of function code	Data	Contents of data	Remarks
o19	Input function selection	<input type="checkbox"/>	Frequency setting (without polarity)	
		<input type="checkbox"/>	Frequency setting (with polarity)	When 4 or 5 (BCD code) is selected for o20, the function is the same as that with no polarity.
o20	Input mode selection	<input type="checkbox"/>	8-bit binary setting	* <input type="checkbox"/>
		<input type="checkbox"/>	12-bit binary setting	* <input type="checkbox"/>
		<input type="checkbox"/>	15-bit binary setting	* <input type="checkbox"/>
		<input type="checkbox"/>	16-bit binary setting	
		<input type="checkbox"/>	4-digit BCD setting: 0 to 99.99	
		<input type="checkbox"/>	4-digit BCD setting: 0 to 400.0	* <input type="checkbox"/>

(Notes) *1. The frequency setting method selected using function code F01 (C30) takes priority over this setting even when OPG11SDIO is installed. To make the frequency setting at OPG11SDIO effective, set function code F01 (C30) to "11".

*2. I16: Hold signal

When I16 is "OFF", the set frequency is updated according to the input data.

When I16 is "ON", the input data is ignored and the set frequency is held.

AIO (Analog Input/Output Option}

Func No.	Name	Setting Range	Unit	Min. Unit	Factory Setting	Change during operation
o22	Analog input function	000 to 555	-	-	000	N
o23	Analog output function	00 _H to AA _H	-	-	00 _H	Y
o24	Voltage output gain	0.0 to 200.0%	%	0.1	100.0	Y
o25	Current output gain	0.0 to 200.0%	%	0.1	100.0	Y

O22 Analog Input Function

[3*][2*][1*]:

1*: selection of current input C2 function

2*: selection of voltage input 32 function

3*: selection of voltage input 22 function

o22 Analog Input mode selection	0	AI Inactive	Set this value if you don't use the analog input terminals
	1	Driving torque limit value	22,32 Terminal: 0-+10V / 0 to 200% (20% min) C2 Terminal: 4-20mA / 0 to 200% (20% min)
	2	Braking torque limit value	22,32 Terminal: 0-+10V / 0 to 200% (20% min) C2 Terminal: 4-20mA / 0 to 200% (20% min)
	3	Driving and braking torque limit value	22,32 Terminal: 0-+10V / 0 to 200% (20% min) C2 Terminal: 4-20mA / 0 to 200% (20% min)
	4	Frequency aux. setting (V1)	22 Terminal: 0-+10V / 0 to 100% 32 Terminal: 0-+/-10V / 0 to +/-100% C2 Terminal: 4-20mA / 0 to 100% 100% = Max frequency
	5	Ratio setting	22,32 Terminal: 0-+10V / 0 to 100% C2 Terminal: 4-20mA / 0 to 100% Freq.setting = analog freq. setting x ratio setting/100% x F17/100%

O23 Analog Output Function

[2*][1*]:

1*: selection of current output CS function

2*: selection of voltage output AO function

o23	Analog Output mode selection	0	Output frequency 1 (before slip compensation)	Pos Out: FWD OPR Neg Out: REV OPR
		1	Output frequency 2 (after slip compensation)	Pos Out: FWD OPR Neg Out: REV OPR
		2	Output current	Drive Rated Current x 2
		3	Output voltage	200V Type: 250V 400V Type: 500V
		4	Output torque	Motor Rated torque x 2
		5	Load rate	Motor Rated Load Factor x 2
		6	Power consumption	Drive Rated output x 2
		7	PID feedback amount	Max. feedback value
		8	PG feedback amount	Max. speed
		9	DC link circuit voltage	200V Type: 500V 400V Type: 1000V
		A	Universal AO	+/- 20000

PG FEEDBACK SETUP

Option Function Settings

Speed Command System and Automatic Speed Control System Selection

Function code o01: The unit's digit of o01 selects the speed command system. The ten's digit of o01 selects the automatic speed control system.

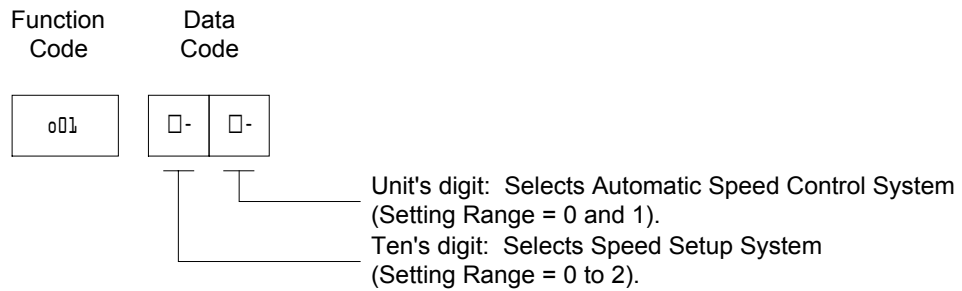


Table 5-5-1 Function Codes.

Function code		Function	
o01	Unit's Digit	0	Without speed feedback control
		1	PG vector control
	Ten's Digit	0	Without pulse train input
		1	Phase A or phase B pulse train input
		2	Phase B pulse train input

- Function code o02: Sets the time constant of primary delay filter for the speed setting. This code is used to suppress overshoot when speed commands are changed.
- Function code o03: Sets the number of feedback PG pulses.
- Function code o04: Sets constant P of the feedback speed controller. (*1)
- Function code o05: Sets constant I of the feedback speed controller. (*1)

The transfer function of the speed controller is expressed as follows:

$$\tau^* = k_p \left(1 + \frac{1}{sT_I} \right) \times \varepsilon$$

K_p : Constant P

T_I : Constant I

τ* : Torque command

ε : Speed deviation

When speed deviation $\varepsilon = 100\%$, Constant P (for torque command $\tau^* = 100\%$) is assumed to be 1.

- Function code o06: Sets the time constant of primary delay filter for the speed detection value. This code is used to suppress the large ripple in the speed detection signal.

Set function code o07 and o08 for a motor equipped with speed reducer.

- Function code o07: Sets pulse compensation coefficient 1. (*2)

- Function code o08: Sets pulse compensation coefficient 2. (*2)

(*1) Function codes o04 and o05 must be readjusted when the value of function code F03 is changed.

(*2) Set a value of $\frac{o08}{o07}$ to 1 or more. Any value less than 1 is treated as 1.

Reference

PG Vector Control Setting Procedure

Set function codes o02: 0.02 (s), o04: 10 (times), o05: 0.1 (s), and o06: 0.005 (s). See the setting procedure for constants P (o04) and I (o05) below to adjust stability and response. Adjusting constants with function codes o02 (time constant of speed command filter) and o06 (time constant of feedback speed filter) can also improve stability and response.

Constant P (o04)

Constant P (o04) is a parameter used to determine response speed for any deviation in proportion operation. Specifying a larger value for constant P enables a quicker response. Specifying a value that is too large results in vibrating response. Specifying a smaller value for constant P slows the response.

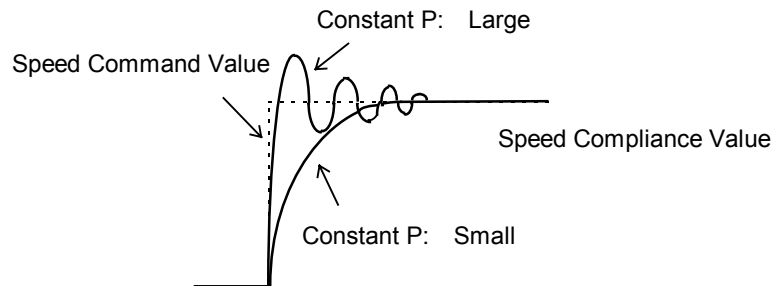


Figure 5-5-1 Response When Constant P Adjusted.

Constant I (o05)

Specifying a larger value for constant I (o05) slows the response and weakens the reaction to external force. Specifying a smaller value for constant I (o05) enables a quicker response. Specifying a value that is too small results in unstable (vibrating) response. Vibration in a larger cycle than constant I (o05) can be suppressed.

