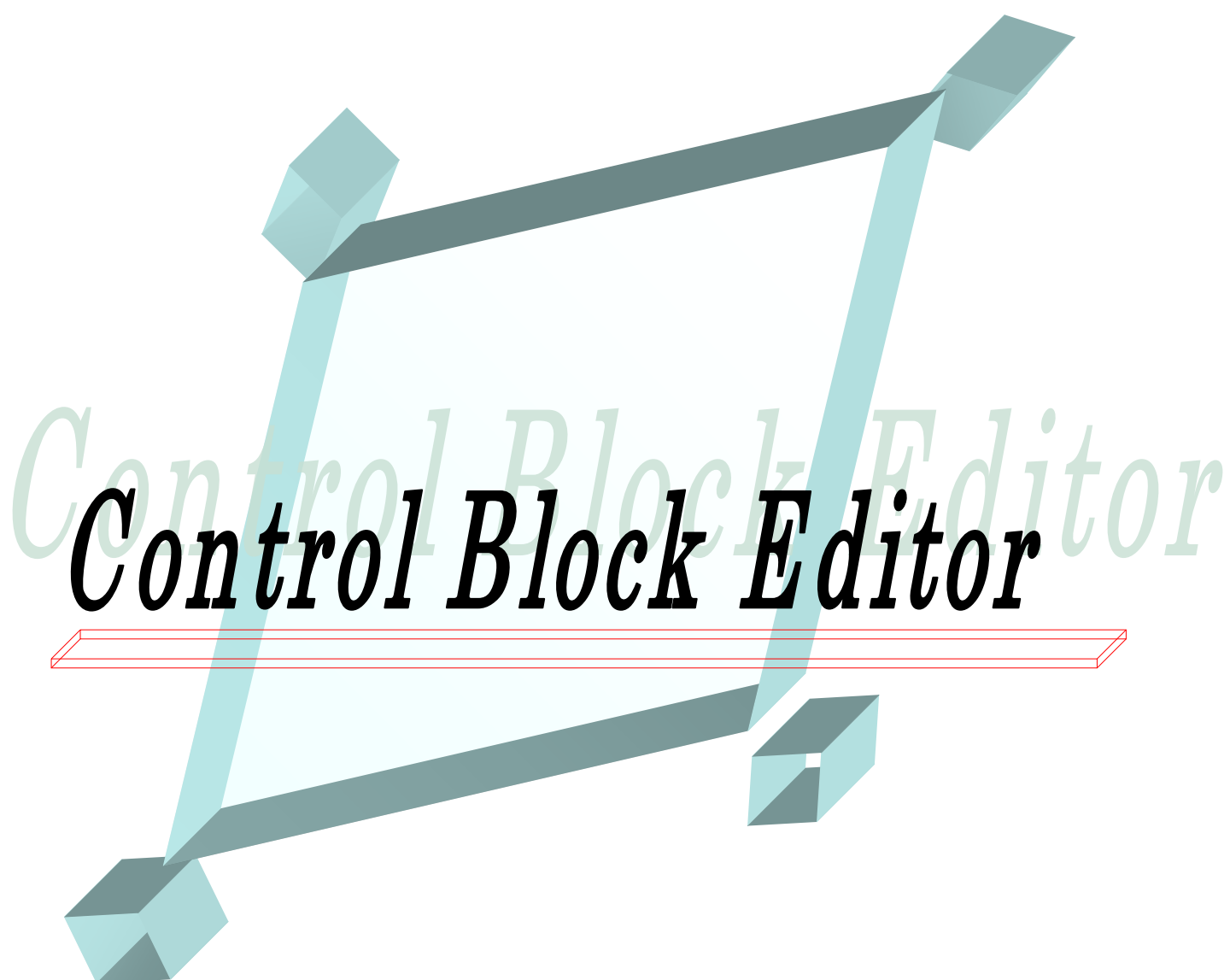


TOYO INTELLIGENT INVERTER
VF66 Series
VF66PCTool



Function Manual



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Chapter 1

Internal PLC function

Control Block Editor of VF66PCTool is software that customize Internal PLC function. It can edit control or sequence freely.

Internal PLC function can construct original user's control techniques by building in special motor control and driving sequence base of control.

Built-in an inverter control and sequence function are displayed as a symbol. Construct the control system of inverter by connecting with those symbols.

Processing has PLCH table (1ms cycle) and PLCL table (5ms cycle). It is possible to control each table only or combination of tables.

Internal PLC function's characteristics, I/O structure and details of function are described below.

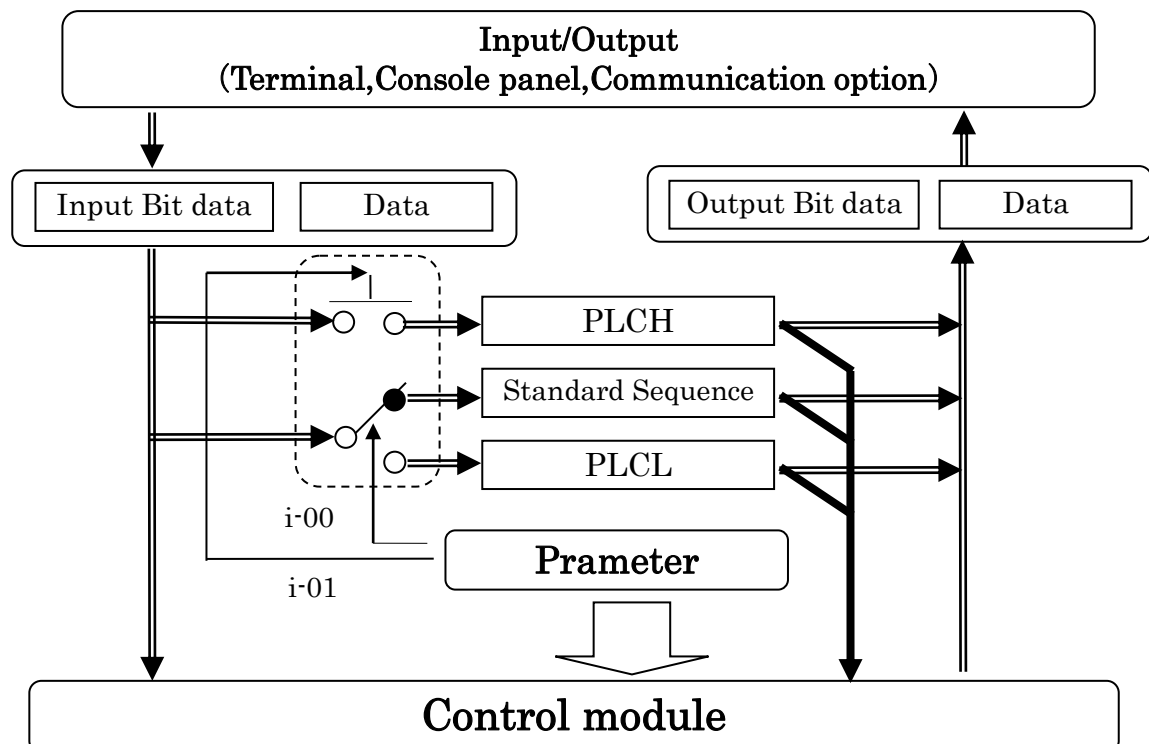
【Compatible models】

VF66B · VF66CH · VF66G · VF66R

【Characteristics】

- Control cycle of two kinds(PLCH/PLCL)
- Not PLC controller if the Easy sequence
- It can the hybrid control;Combination of motor control and sequence
- Flexibly configurable
- It is possible to set internal data; Feedback data, P-area parameter and etc.
- I/O terminal data and Communication data can be used.

【I/O Dataflow】



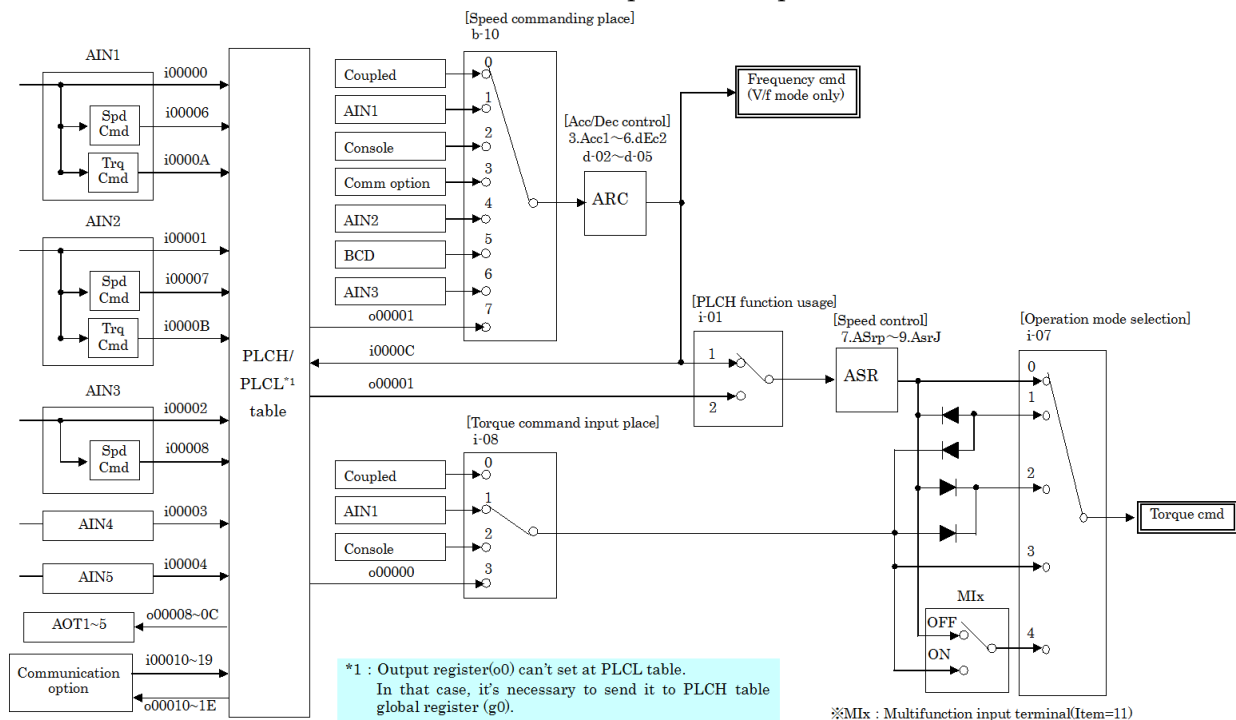
◆ PLCH and PLCL

	PLCH	PLCL
Set data	i-01=1 or i-01=2	i-00=ON
Control cycle	1ms to 4ms (Changing by amount of total program) Control cycle is displayed at window, after compile.	5ms or 10ms (Changing by amount of total program)
Inhibition	Output relay (O0) coil set.	Output register (o0) set.
Regulation	When i-01=2, speed reference (ASR input) becomes o00001*. When i-00=OFF, MI4 becomes emergency stop (Contact A) and master control*¹ of PLCH regardless of c-04 setting.	The items below become invalid. • b-11, b-12, c area, and H-00~H-05. MI4 becomes master control*¹ of both PLCH and PLCL. MI5 becomes protect reset. Necessary to operate of 52MA and 86A on PLCL circuit.
	MI4:Multifunction input terminal(4)	MI5:Multifunction input terminal(5)

*1: If master control is turned on, operation program is stopped. And output register is cleared to zero. Also all of relay-coil (include operation command etc.) are off.

*2: Either first setting block or second setting block if it's *i-00=ON*, only [24: Selection second set block] can be set. At both *i-00=ON*, The operation of *O00026* (2nd set-up block selection) coil become effective.

【Internal PLC function. input and output flowchart】



◆ Inverter output frequency and division of Internal PLC function program

The control cycle shortens as the frequency rises. It is necessary to shorten the Internal PLC function program more than the control cycle according to the condition.

Set the approach to the manner of division according to the following procedure and do the program compilation.

See the figure (Compile procedure) to check which condition the machine applies to.

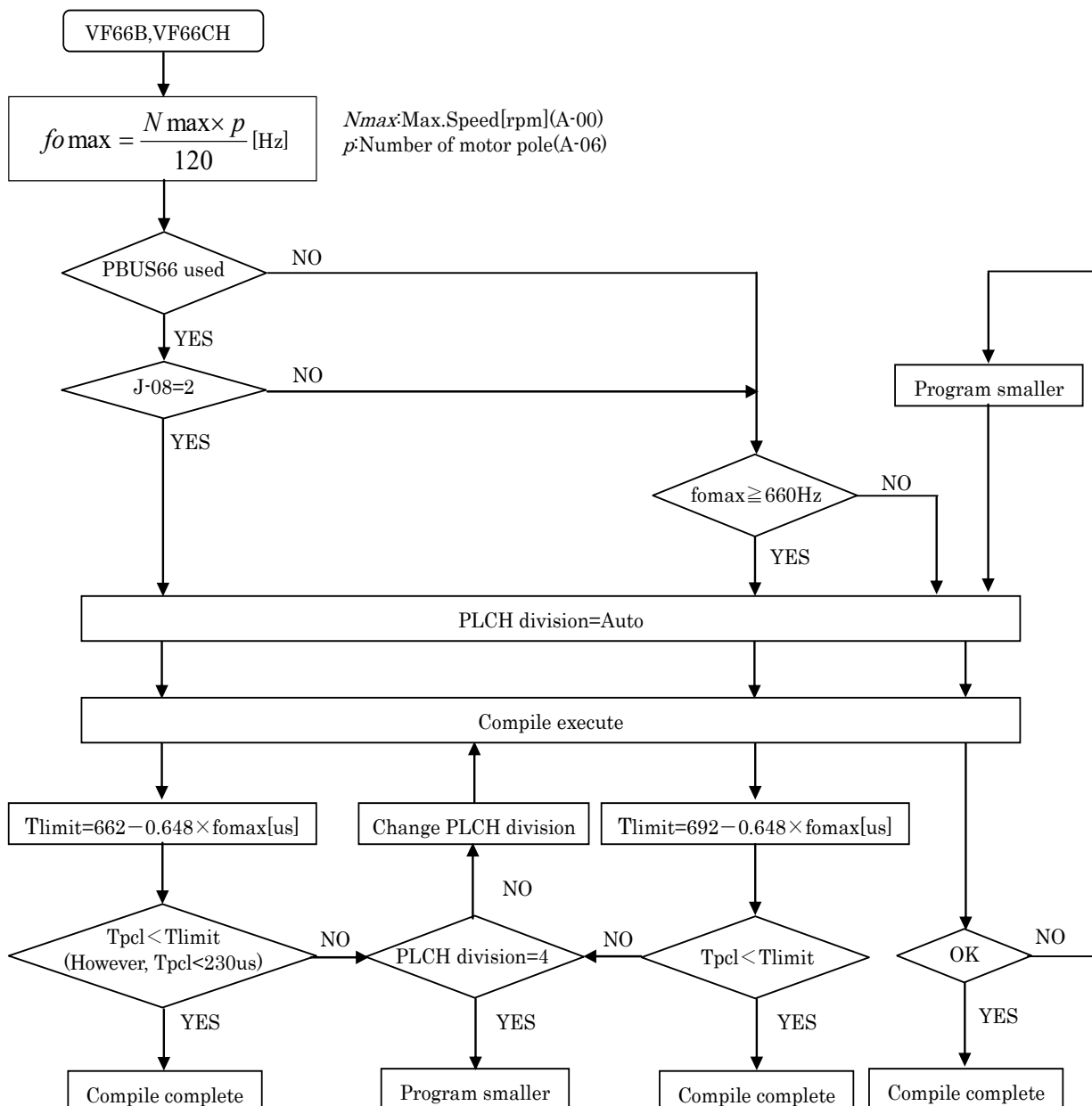
T_{pcl} is smaller than the limited value of following table then it's complete.

If T_{pcl} is bigger than limited value by PLCH division "4", make the program smaller.

* The limited value is depending on the machine condition.

The machine control may be affected, when the following procedure disregarded and into the program.

【 Compile procedure 】



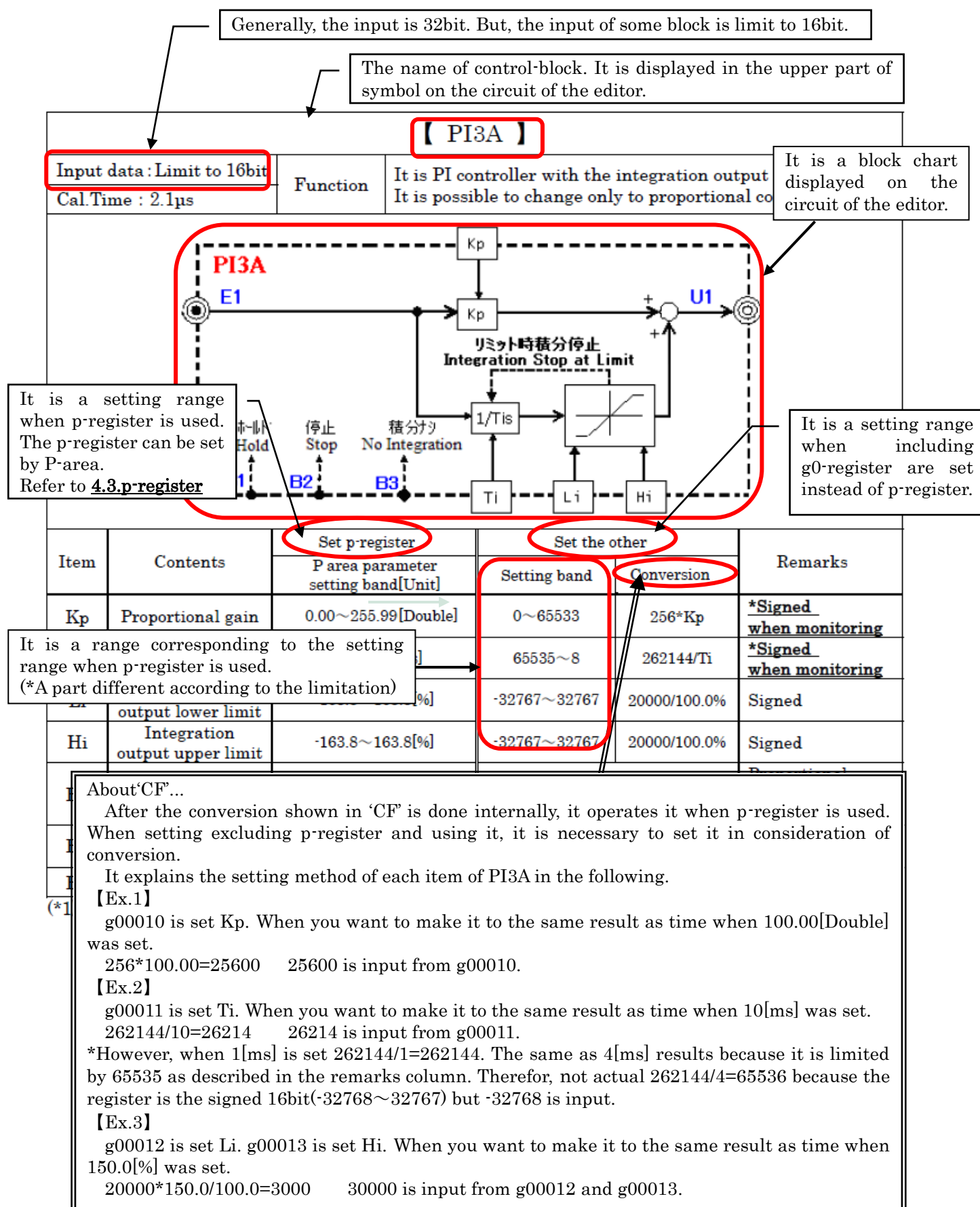
Chapter 2

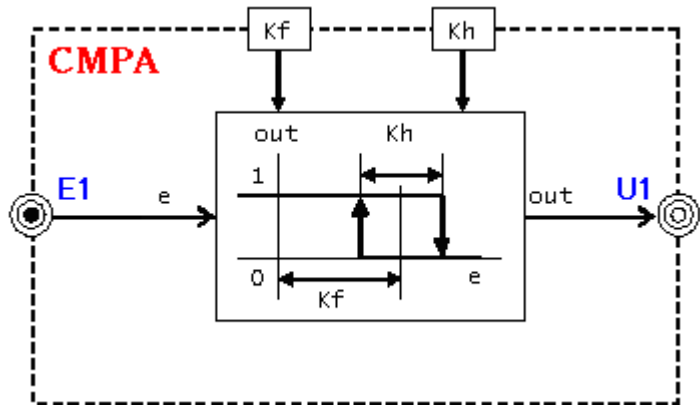
Control-Block

When the motor control is customized, these following blocks are used.

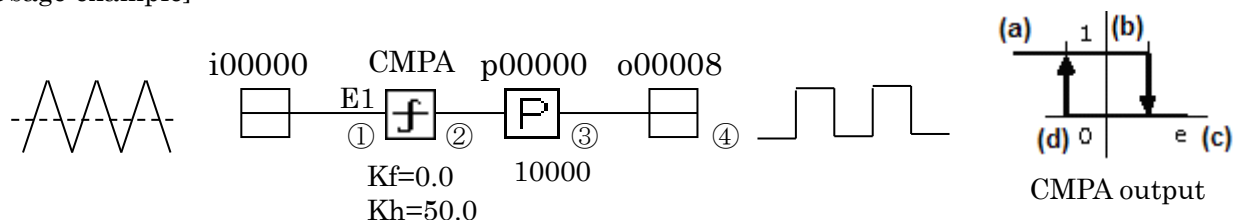
Block Name	Function
CMPA	It is comparater. When the value of Kf or more is input to $E1$, output <i>zero</i> . But, Kf or less output to 1 . To set deflection in Kf , Kh is set based on Kf .
LAG1	First-order lag element. Delay time is set by Tf .
FFWD	The difference with actual motor rotational speed is corrected to the motor rotational speed reference by value of mortor characterlistic.
DBAN	The dead-band characteristic control. Zero is output in the range where the input was set with $Kb1$ and $Kb2$.
ASR1	It is a block for a built-in speed control. Sets it by $7.ASrP$, $8.ASrI$, and $9.ASrJ$.
ASR2	It is a block for a speed control. However, it has the function that the gain changes by the velocity deviation.
PI3A	It is PI controller with the integration output limitation. It is possible to change only to proportional control by $B3$
PI1A	The proportional gain and integration time constant can be changed according to the difference of two inputs.
MCAN	The control that brings the value requested by actual rotational speed, inertial, and dumping close to the torque reference or more is done.
EARC	Easy amplitude and rise time compensation.
SARC	S-pattern amplitude and rise time compensation. The frank part is made smooth movement.
PCTQ	$E1$ is torque reference, $E2$ is speed referencr. The torque reference converted to become a constant electric power by the rotational speed of ωR or more is output.
MRHF	Accelerates or decelerates by the control signal.
DSEL	The input data is selected by SEL .
DRPC	The drooping control. The change relativity and absolutely is possible according to $B2$.
HYSC	The hysteresis characteristic control. The dead zone band is set by Dz .
FUNC	Each section is made an approximate expression, and the input value is output by the approximate expression.
FNC2	FNC2 ties to FUNC to use two or more FUNC continuously.

The table of control-block is shown in the following as an example of PI3A.



【 CMPA 】					
Input data : 32bit	Function	It is comparater.When the value of Kf or more is input to E1, output zero. But, Kf or less output to 1.To set deflection in Kf, Kh is set based on Kf.			
Cal.Time : 0.5μs					
					
Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Kf	Offset	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Kh	Hysteresis width	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed

[Usage example]



	①	②	③	④
(a)	$E1 < -5000$	1	10000	10000
(b)	$E1 \leq 5000$	1	10000	10000
(c)	$5000 < E1$	0	0	0
(d)	$E1 \leq -5000$	0	0	0

- ① *i00000* is register that specifies *AIN1*. A triangular wave ($V_{p-p}=10V$) is input from the outside to *AIN1*. However, the voltage is converted into $10V/20000$ internally.
- ② Result of comparing $E1$ ($=i00000$) with Kf . If $E1 < Kf$ output 1, also $E1 > Kf$ output 0. However, set $Kf=0.0/Kh=50.0$ % ($100\%/20000$), It has the hysteresis characteristics of $\pm 25\%$ base on 0.0. Therefore, 1 when the state of the input becomes $E1 < Kf + 25\%(-5000)$ from $E1 \gg Kf$ is output. But, 0 when the state of the input becomes $E1 > Kf - 25\%(5000)$ from $E1 \ll Kf$ is output.
- ③ *p00000* is p-register that shown P-area parameter: P-00. The Coefficient-P has function: $[Output=Input \times P-00]$.
- ④ *o00008* is register that specifies *AOT1*. The result to ③ is converted ($5V/20000$) into the voltage and it outputs it to *AOT1*. Therefore, square-wave (Amplitude: $+2.5V$) output from *AOT1*.

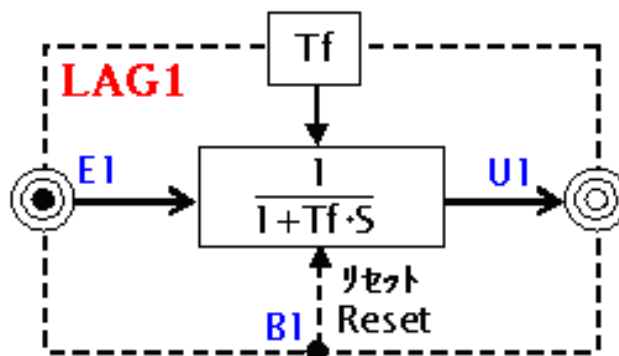
【 LAG1 】

Input data : Limit to 16bit

Cal.Time : 0.8μs

Function

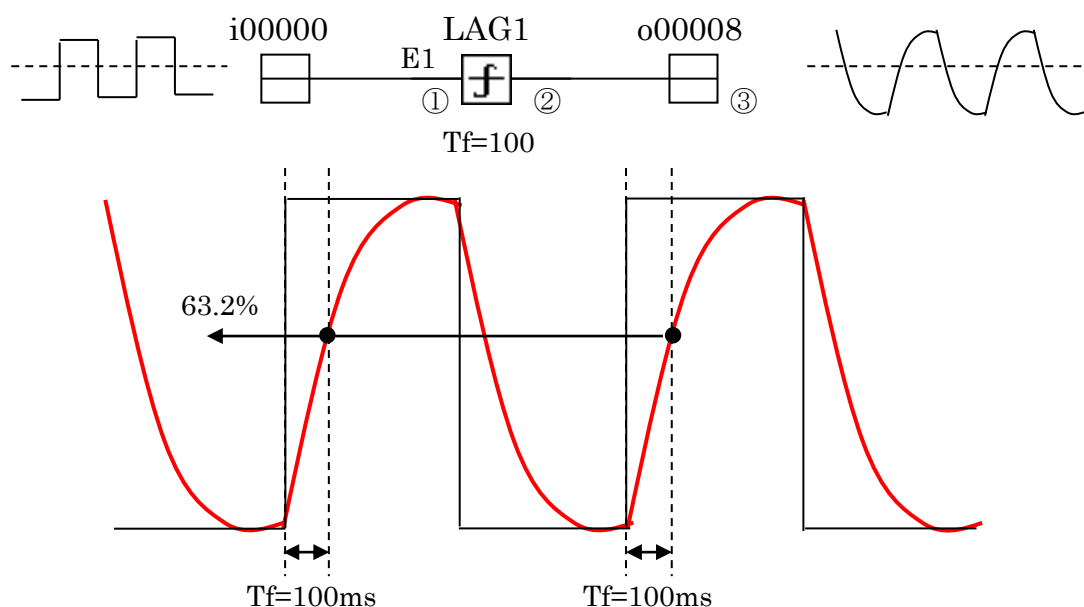
First-order lag element. Delay time is set by Tf.



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Tf	Filter constant time[ms]	1~32767[ms]	65535~2	65536/Tf	*Signed when monitoring
B1	Reset	—	B1=1		U1=0

(*1) *E1* is limited to -32767~32767.(*2) Double the value when *Tf* that is shorter than double of processing cycle is set.

[Usage example]

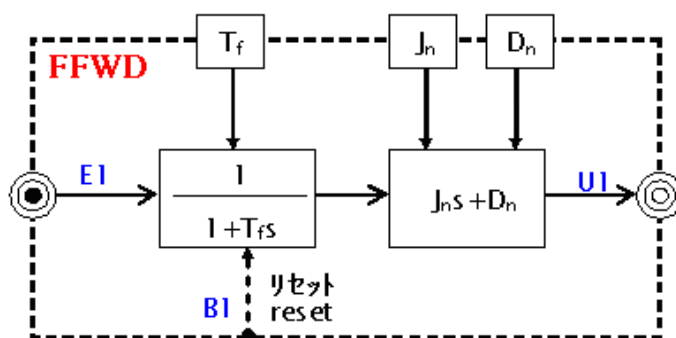
① *i00000* is register that specifies *AIN1*. A square-wave wave ($V_{p-p}=10V$) is input from the outside to *AIN1*. However, the voltage is converted into $10V/20000$ internally.

② The value of the first delay is output to the input.

③ *o00008* is register that specifies *AOT1*. The result to ② is converted ($5V/20000$) into the voltage and it outputs it to *AOT1*.

【 FFWD 】

Input data : Limit to 16bit	Function	The difference with actual motor rotational speed is corrected to the motor rotational speed reference by value of motor characteristic.
Cal.Time : 1.9μs		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Tf	Filter constant time[ms]	1~32767[ms]	65535~2	65536/Tf	*Signed when monitoring
Jn	Motor reduced inertial	0.001~32.767(*1)	1~33553	Jn*1024	*Signed when monitoring
Dn	Motor reduced dumping	0.001~1.999(*2)	32~65503	Dn*32768	*Signed when monitoring
B1	Reset	—	B1=1		Filter output=E1 U1=0

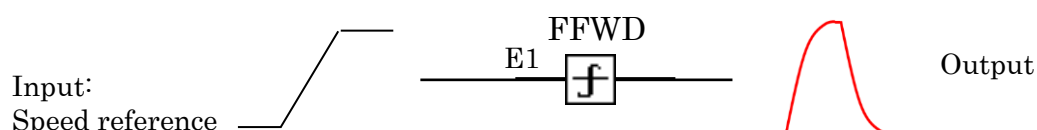
(*1) $J_n = \text{Motor reduced inertial [kgm}^2\text{]} \times \text{Speed that corresponds to A-00 [rad/s]} / \text{Rated torque [Nm]}$

(*2) $D_n = \text{Motor reduced dumping [Nm} \cdot \text{s/rad]} \times \text{Speed that corresponds to A-00 [rad/s]} / \text{Rated torque [Nm]}$

(*3) $E1$ is limited to -32767~32767.

(*4) Double the value when Tf that is shorter than double of processing cycle is set.

[Usage example]

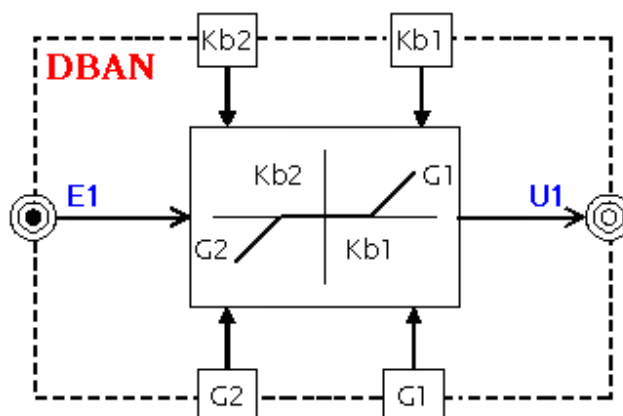


[Characteristics]

- ① Generally, rotational speed reference is input to $E1$.
- ② Following to rotational speed reference improves by setting value of motor characteristic.

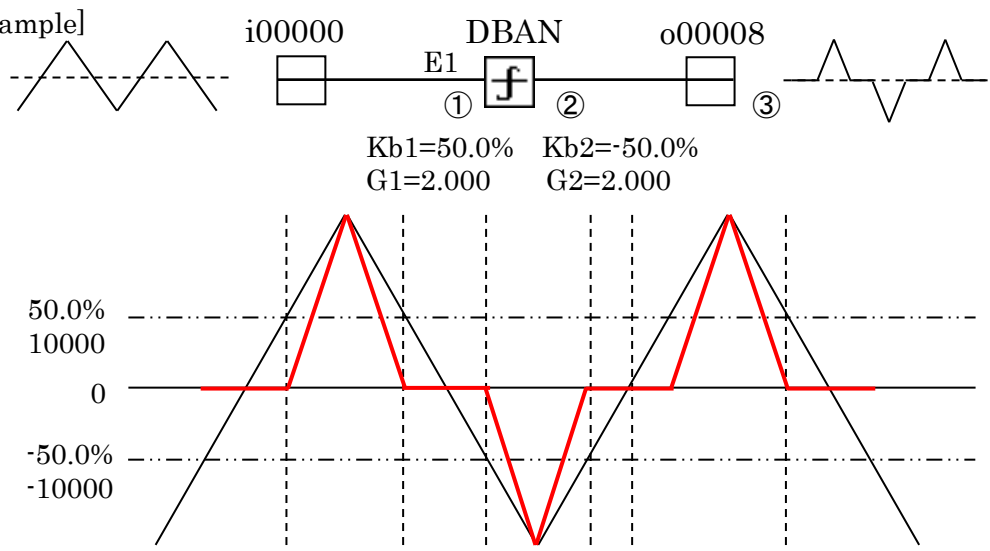
【 DBAN 】

Input data : 32bit	Function	The dead band characteristic control. Zero is output in the range where the input was set with Kb1 and Kb2.
Cal.Time : 0.9μs		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Kb1	Positive dead band	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Kb2	Negative dead band	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
G1	Positive Gain	0.000~15.999[Double]	0~65531	4096*G1	<u>*Signed when monitoring</u>
G2	Negative Gain	0.000~15.999[Double]	0~65531	4096*G2	<u>*Signed when monitoring</u>

[Usage example]

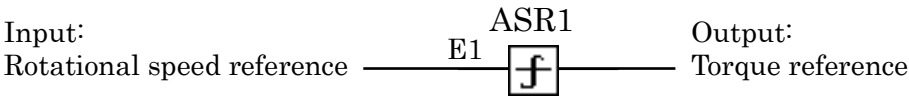


- ① *i00000* is register that specifies *AIN1*. A square-wave wave ($V_{p-p}=10V$) is input from the outside to *AIN1*. However, the voltage is converted into $10V/20000$ internally.
- ② *Kb1* is set by 50.0 % (10000). So, output is 0, if the input 50.0% or less. It is an idea similar as for a negative side. When the dead band is exceeded, the value in which the gain is multiplied by the input is output.
- ③ *o00008* is register that specifies *AOT1*. The result to ② is converted ($5V/20000$) into the voltage and it outputs it to *AOT1*.

【 ASR1 】					
Input data :Limit to 16bit		Function	It is a block for a built-in speed control. Sets it by 7.ASrP*, 8.ASrI*, and 9.ASrJ*. <u>*Vector mode only</u>		
Cal.Time : 3.5μs					
ASR1 E1 Speed Cmd. Standard ASR AMP. (※ラベルは内蔵 ASR と同じ) Torq. Cmd U1					
Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Item nothing					

(*1) E1 is limited to -32767~32767.

[Usage example]



[Characteristics]

- ① This block is built into by the standard. Speed control with combinations of combination feedfoward control and cancelation
- ② Set 7.ASrP, 8.ASrI, 9.ASrJ. But, vector mode only.
- ③ The use selection of the cancelation is done by i-14.
- ④ The use selection of the feedfoward is done by i-15.
- ⑤ It is the same as a general PI control when the feedfoward control and cancelation are OFF.
- ⑥ U1 is torque reference.(20000/ Torque that corresponds to motor rated torque)

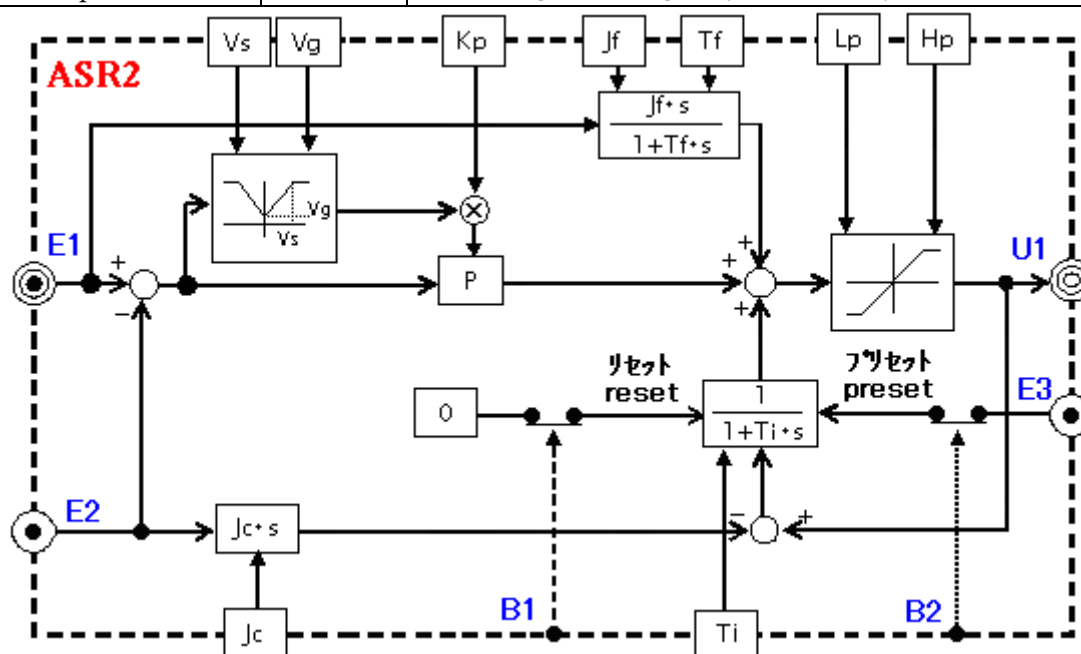
【 ASR2 】

Input data : Limit to 16bit

Cal.Time : 4.8μs

Function

It is a block for a speed control. However, it has the function that the gain changes by the velocity deviation.



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E3	Input 3	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Vs	Variable struct gain Variable start speed	0.01~327.67[%]	32767~1	32768/Vs	Unsigned
Vg	Variable struct gain Minimum gain	0.000~15.999[Double]	0~65531	4096*Vg	*Signed when monitoring
Kp	Speed gain	0.00~255.99[Double]	0~65533	256*Kp	*Signed when monitoring
Jf	Motor reduced inertial	0.001~32.767(*1)	1~33553	Jf*1024	Unsigned
Tf	Filter constant time[ms]	1~32767[ms]	65535~2	65536/Tf	*Signed when monitoring
Lp	Torque lower limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Hp	Torque upper limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Jc	Motor reduced inertial	0.001~32.767(*1)	1~33553	Jc*1024	Unsigned
Ti	Filter constant time[ms]	1~32767[ms]	65535~2	65536/Ti	*Signed when monitoring
B1	Reset	—	B1=0		Filter output=0
B2	Pre-Reset	—	B2=0		Filter output =E3

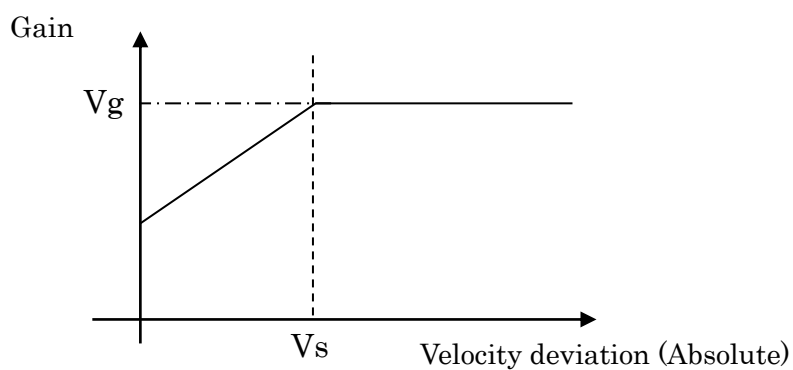
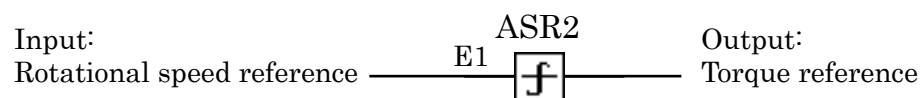
(*1) $Jf, Jc = \text{Motor reduced inertial [kgm}^2\text{]} \times \text{Speed that corresponds to A-00 [rad/s]} / \text{Rated torque[Nm]}$

(*2) B1 is given to priority when B1 and B2 are turned on at the same time.

(*3) E1 is limited to -32767~32767.

(*4) Double the value when Tf and Ti that is shorter than double of processing cycle is set.

[Usage example]

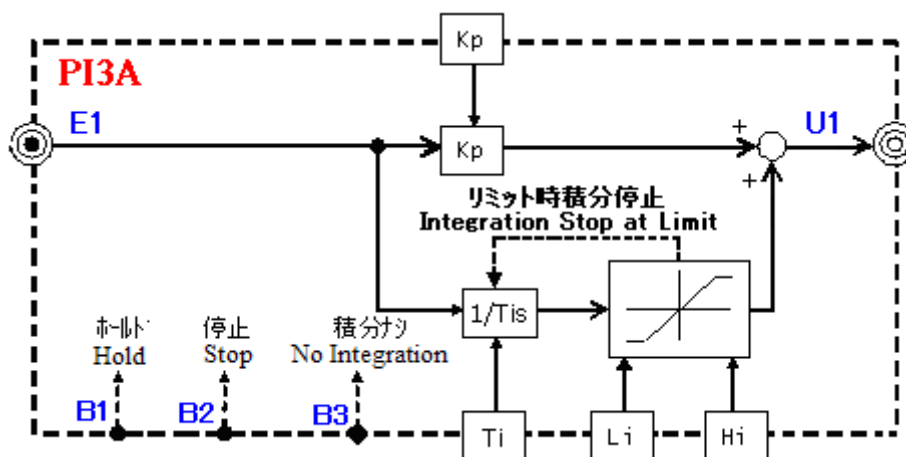


[Characteristics]

- ① Kp can be changed by input Velocity deviation.
- ② The feedforward control and cancelation are same as *ASR1*.
- ③ It is possible to change output of filter by *B1* or *B2*.
- ④ It can set upper and lower limit to output.

【 PI3A 】

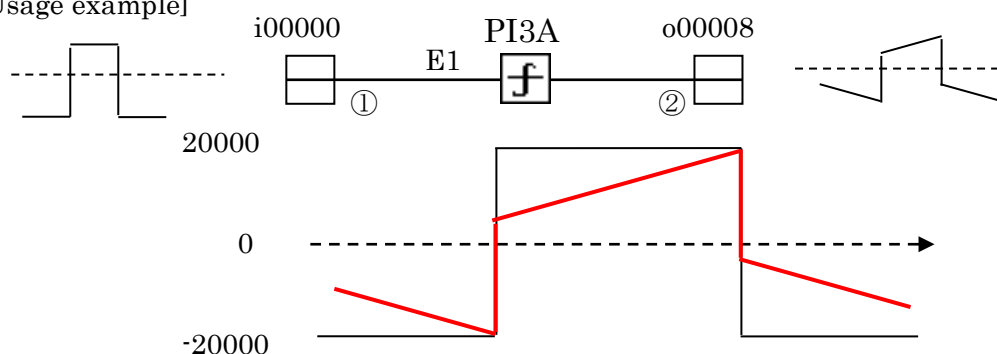
Input data : Limit to 16bit	Function	It is PI controller with the integration output limitation. It is possible to change only to proportional control by B3.
Cal.Time : 2.1 μ s		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Kp	Proportional gain	0.00~255.99[Double]	0~65533	256*Kp	<u>*Signed when monitoring</u>
Ti	Integration constant time[ms]	1~32767[ms]	65535~8	262144/Ti	<u>*Signed when monitoring</u>
Li	Integration output lower limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Hi	Integration output upper limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
B1	Hold	—	B1=1		Proportional value=0, Hold integration
B2	Stop	—	B2=1		U1=0, Integration out=0
B3	Not integration	—	B3=1		Integration out=0

(*1) $E1$ is limited to -32767~32767.

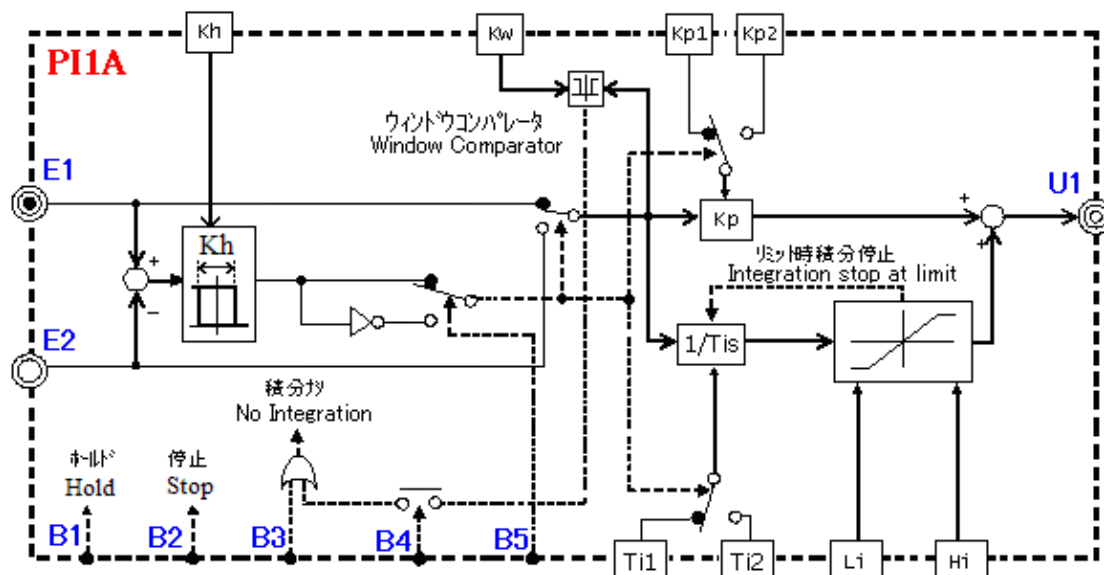
[Usage example]



- ① $i00000$ is register that specifies $AIN1$. A square-wave wave ($V_p-p=10V$) is input from the outside to $AIN1$. However, the voltage is converted into $10V/20000$ internally.
- ② $o00008$ is register that specifies $AOT1$. The result to ② is converted ($5V/20000$) into the voltage and it outputs it to $AOT1$.

【 PI1A 】

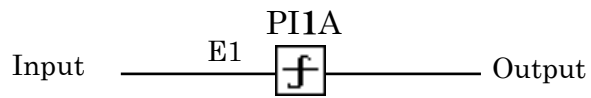
Input data : Limit to 16bit	Function	The proportional gain and integration time constant can be changed according to the difference of two inputs.
Cal.Time : 2.7μs		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Kh	Hysteresis width	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Kw	Window comparater width	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Kp1	Proportional gain 1	0.00~255.99[Double]	0~65533	256*Kp1	*Signed when monitoring
Kp2	Proportional gain 2	0.00~255.99[Double]	0~65533	256*Kp2	*Signed when monitoring
Ti1	Integration constant time 1[ms]	1~32767[ms]	65535~8	262144/Ti1	*Signed when monitoring
Ti2	Integration constant time 2[ms]	1~32767[ms]	65535~8	262144/Ti2	*Signed when monitoring
Li	Integration output lower limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Hi	Integration output upper limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
B1	Hold	—	B1=1		Proportional value=0, Hold integration
B2	Stop	—	B2=1		U1=0, Integration out=0
B3	Not integration	—	B3=1		Integration out=0
B4	Window comparater switch	—	B4=1		Window Comparator Switth:ON
B5	Priority polarity reversion	—	B5=1		Polarity reversion

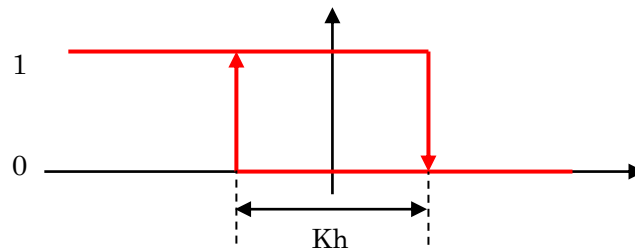
(*1) E1 is limited to -32767~32767.

[Usage example]

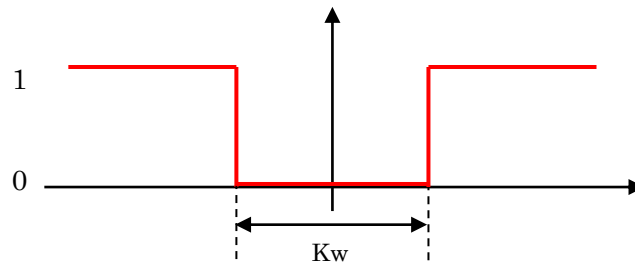


[Characteristics]

- ① Common part is same as *PI3A*.
- ② It can be changed according to the difference of *E1* and $E2 \cdot Kp1, Kp2, Ti1, Ti2$. However, *Kh* has the hysteresis characteristics.



- ③ It has Window comparater function. Absolute of *E1* is $Kw/2$ or more and the output of integration output is 0.



- ④ It can set upper and lower limit to integration output.

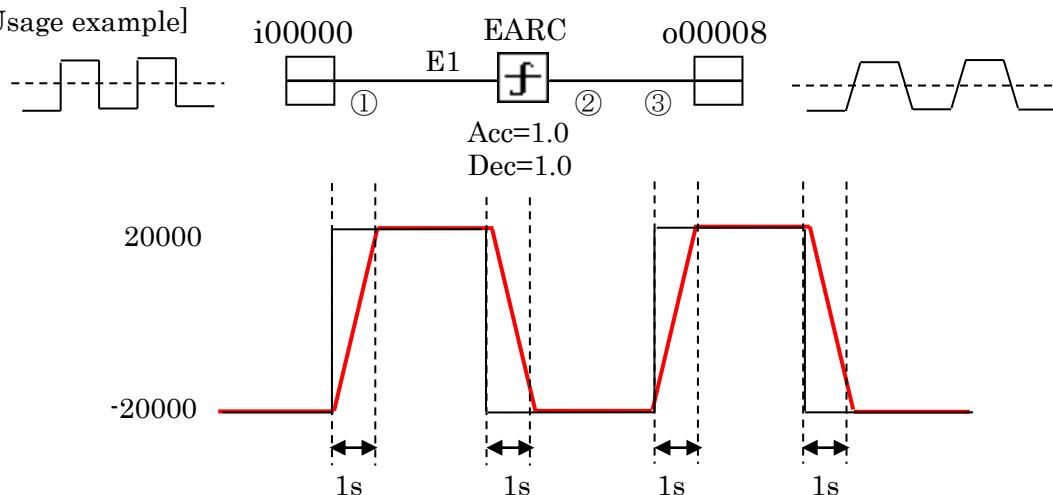
【 EARC 】

Input data : Limit to 16bit		Function	Easy amplitude and rise time compensation.		
Cal.Time : 0.7μs					
Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8～163.8[%]	-32767～32767	20000/100.0%	Signed
Acc	Change rate of acceleration	0.1～200.0[sec]	51200～25	5120/Acc	<u>*Signed when monitoring</u>
Dec	Change rate of deceleration	0.1～200.0[sec]	51200～25	5120/Dec	<u>*Signed when monitoring</u>
B1	Pre-Reset	—	B1=1		U1=E2

(*1) *E1* is limited to -32767~32767.

(*2) *Acc* is time that 0 to ±20000 *U1*. *Dec* is time that ±20000 to 0 *U1*.

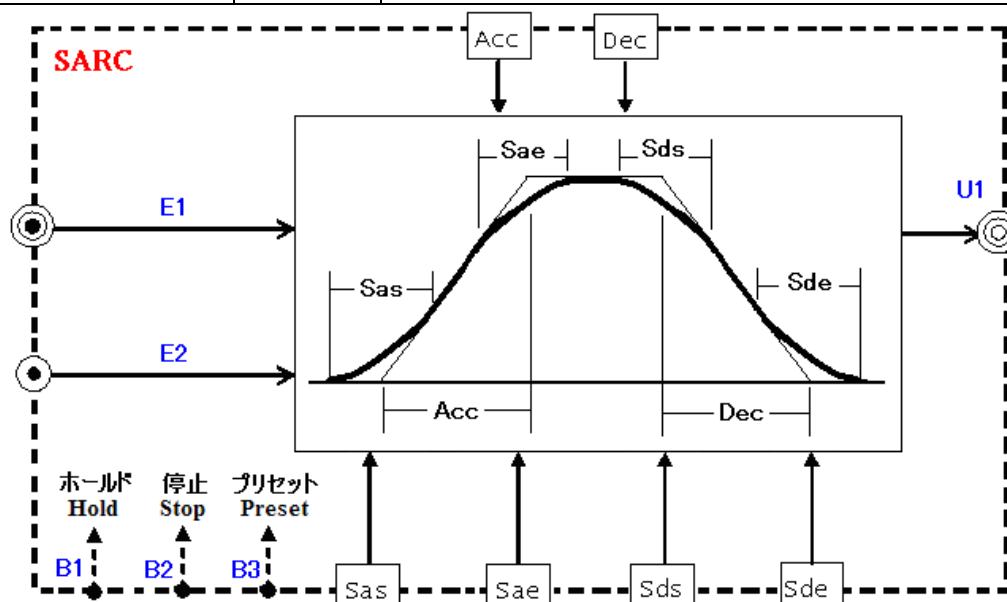
[Usage example]



- ① *i00000* is register that specifies *AIN1*. A square-wave wave ($V_{p-p}=10V$) is input from the outside to *AIN1*. However, the voltage is converted into $10V/20000$ internally.
- ② The acceleration or deceleration to reference value according to *Acc* or *Dec*.
- ③ *o00008* is register that specifies *AOT1*. The result to ② is converted ($5V/20000$) into the voltage and it outputs it to *AOT1*.

【 SARC 】

Input data : Limit to 16bit	Function	S-pattern amplitude and rise time compensation. The frank part is made smooth movement.
Cal.Time : 9.2 μ s		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Acc	Acceleration time	0.1~200.0[sec]	51200~25	5120/Acc	<u>*Signed when monitoring</u>
Dec	Deceleration time	0.1~200.0[sec]	51200~25	5120/Dec	<u>*Signed when monitoring</u>
Sas	Acc. rise time	0.1~20.0[sec]	41943~209	4194.304/Sas	<u>*Signed when monitoring</u>
Sae	Acc. reach time	0.1~20.0[sec]	41943~209	4194.304/Sae	<u>*Signed when monitoring</u>
Sds	Dec. fall time	0.1~20.0[sec]	41943~209	4194.304/Sds	<u>*Signed when monitoring</u>
Sde	Dec. reach time	0.1~20.0[sec]	41943~209	4194.304/Sde	<u>*Signed when monitoring</u>
B1	Hold	—	B1=1		Holding operation
B2	Stop	—	B2=1		E1=0
B3	Pre-Reset	—	B3=1		U1=E2

(*1) E1 is limited to -32767~32767.

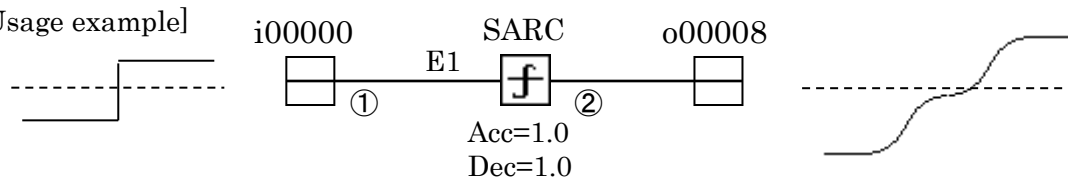
(*2) Acc is time that 0 to ± 20000 U1. Dec is time that ± 20000 to 0 U1.

(*3) Sas is time that 0 to Acc. Sae is time that Acc to reference value.

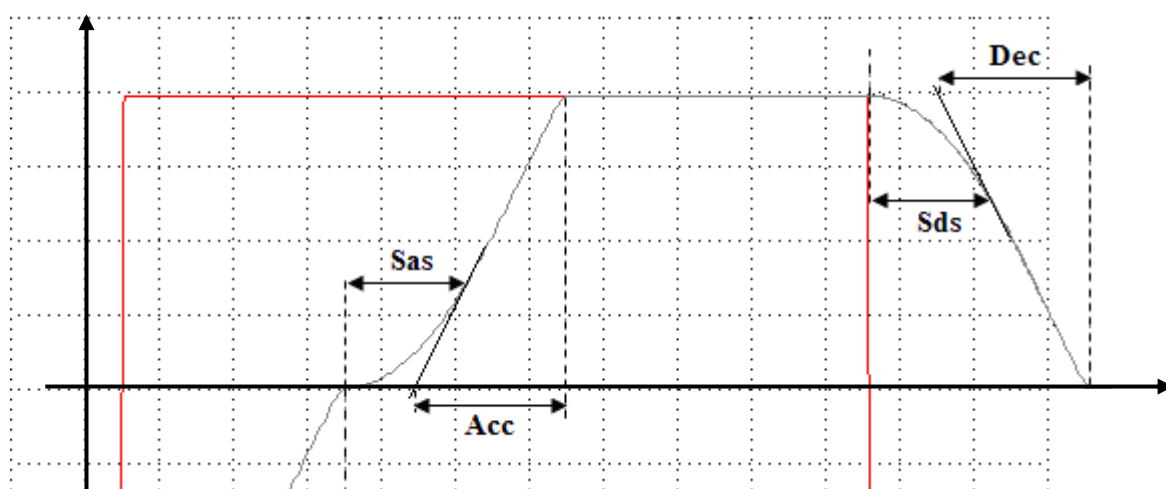
(*4) Sds is time that reference value to Dec. Sde is time that Dec to 0.

(*5) When the sign of E1 and U1 invert, U1 is operated as E1=0. For example, in the case of U1>0 and E1<0, it accelerates to E1 after once U1=0 and the acceleration=0.

[Usage example]

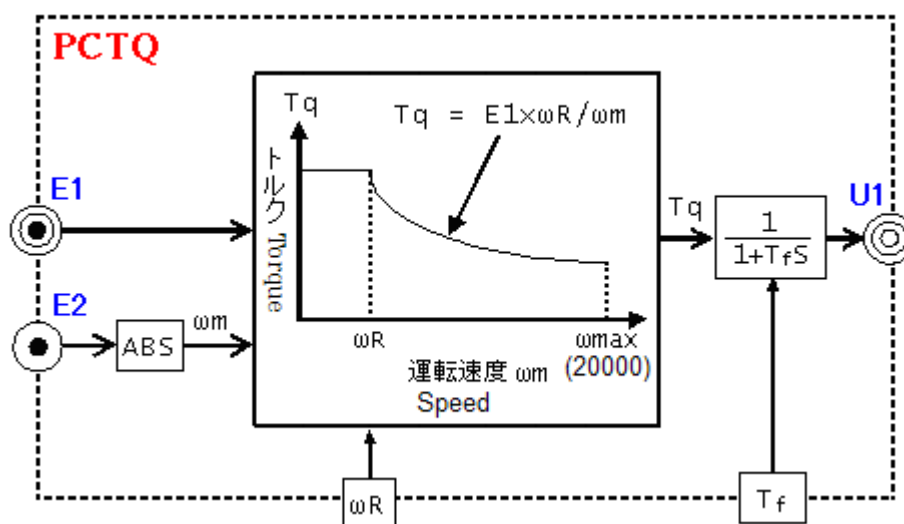


- ① `i00000` is register that specifies `AIN1`. A square-wave wave ($V_{p-p}=10V$) is input from the outside to `AIN1`. However, the voltage is converted into $10V/20000$ internally.
- ② For the example of the figure below that is input waveform rise, accelerates according to `Sas` and `Acc`. In the case of input waveform fall, decelerates according to `Sds` and `Des`.



【 PCTQ 】

Input data : Limit to 16bit	Function	E1 is torque reference, E2 is speed reference.
Cal.Time : 2.1μs		The torque reference converted to become a constant electric power by the rotational speed of ωR or more is output.



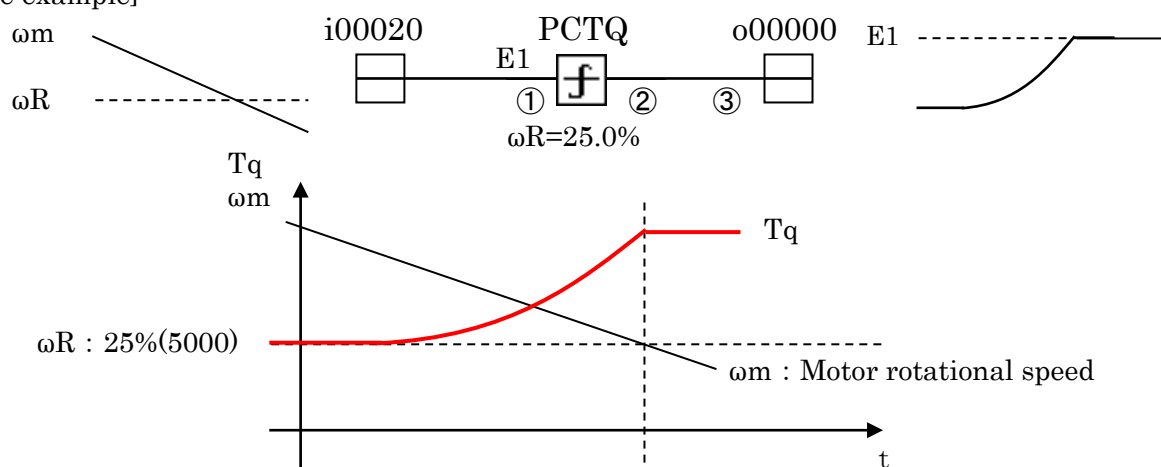
Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
ωR	Torque developmental speed	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Tf	Filter constant time[ms]	1~32767[ms]	65535~2	65536/Tf	*Signed when monitoring

(*1) E1 is limited to -32767~32767.

(*2) Tq is $Tq=E1$ when $|E2| < \omega R$. Also, $Tq=E1 \cdot \omega R / |E2|$ in the other.

(*3) Double the value when Tf that is shorter than double of processing cycle is set.

[Usage example]

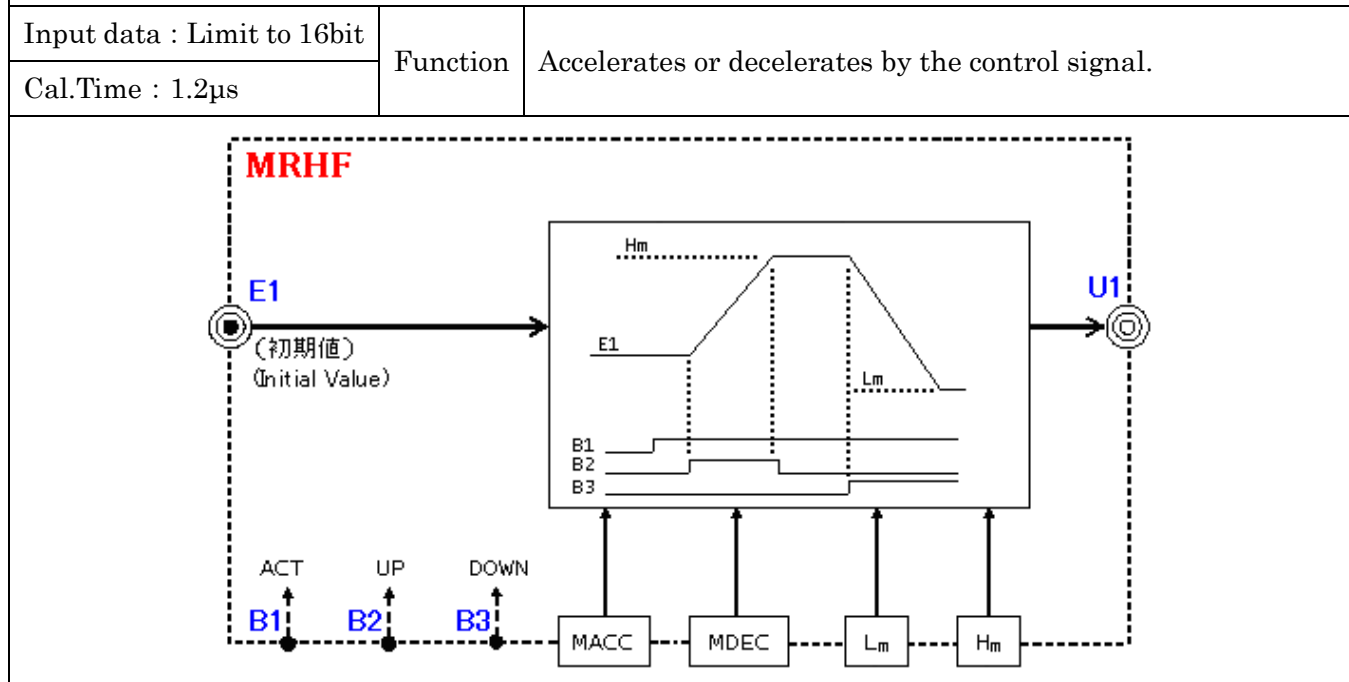


① Motor rotational speed is input, Torque is output.

② The torque changes until ωm becomes ωR.

③ When ωm is ωR or less, the torque is constant.

【 MRHF 】



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
MACC	Acceleration time	0.1~200.0[sec]	51200~25	5120/MACC	*Signed when monitoring
MDEC	Deceleration time	0.1~200.0[sec]	51200~25	5120/MDEC	*Signed when monitoring
Lm	Lower limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Hm	Upper limit	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
B1	ACT	—	B1=0		U1=E1
B2	UP	—	B2=1		U1 to positive
B3	DOWN	—	B3=1		U1 to negative

(*1) $E1$ is limited to -32767~32767.

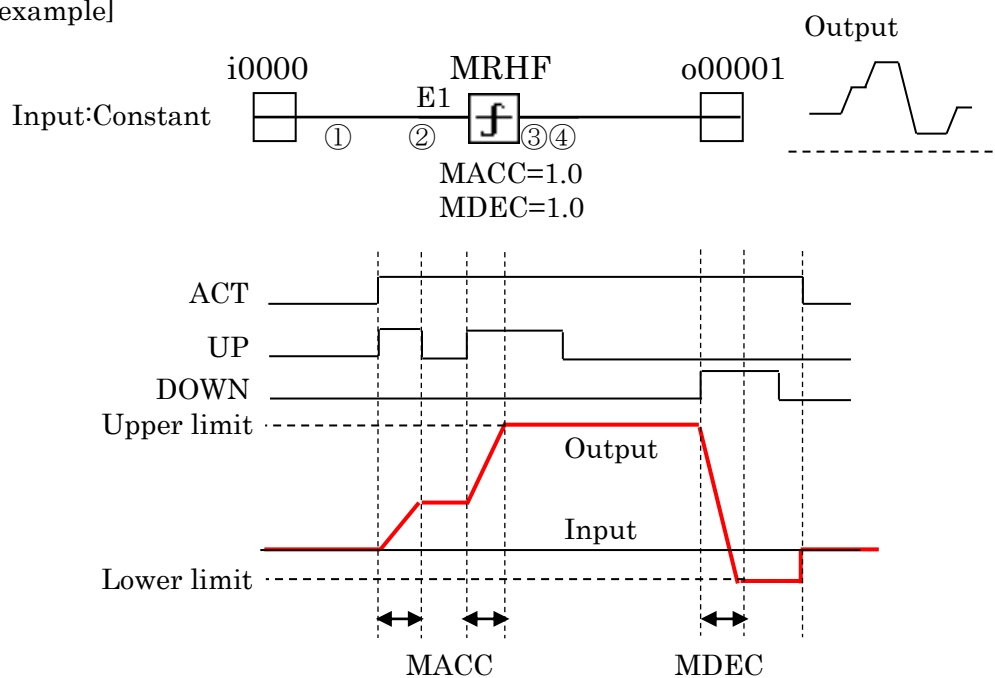
(*2) Refer to the following table for the signal operation.

Connection between Input and Control signal

Situation	B1	B2	B3	ACC/DEC
$E1 > H_m$	ON	OFF	ON	MDEC(to H_m)
$E1 < H_m$	ON	ON	OFF	MACC(to H_m)
Holding $U1$	ON	OFF	OFF	0
$E1 > L_m$	ON	OFF	ON	MDEC(to L_m)
$E1 < L_m$	ON	ON	OFF	MACC(to L_m)

(*3) $MACC$ is time that 0 to 20000 $U1$. $MDEC$ is time that 20000 to 0 $U1$.

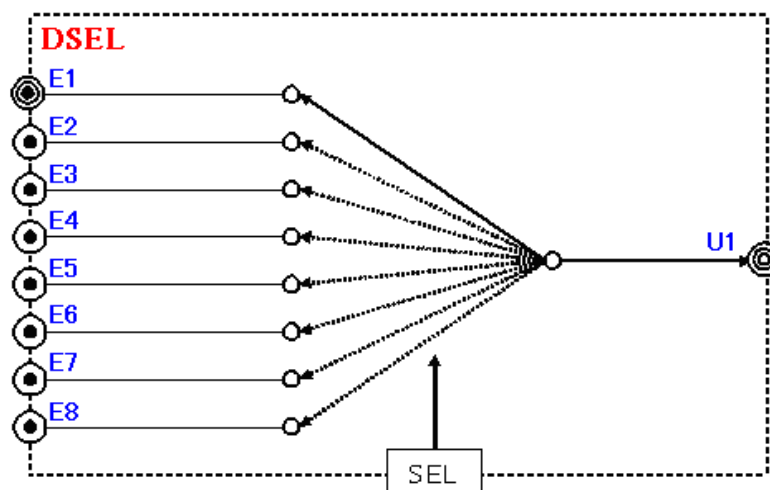
[Usage example]



- ① *i00006* is register that inputs the rotational speed reference *AIN1*.
- ② While *ACT* is ON, the output is same as input.
- ③ When *UP* is turn ON, accelerate to *Hm* according to *MACC*.
- ④ When *DOWN* is turn ON, decelerate to *Lm* according to *MACC*.

【 DSEL 】

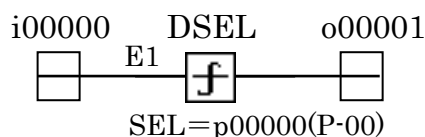
Input data : 32bit	Function	The input data is selected by SEL.
Cal.Time : 0.4μs		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E3	Input 3	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E4	Input 4	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E5	Input 5	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E6	Input 6	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E7	Input 7	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
E8	Input 8	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
SEL	Select Input	-19999~32767	-32767~32767	—	*The figure below

(*1) Refer to the output table by *SEL* below.

[Usage example]



SEL(P-00)	U1
~1	E1
2	E2
3	E3
4	E4
5	E5
6	E6
7	E7
8~	E8

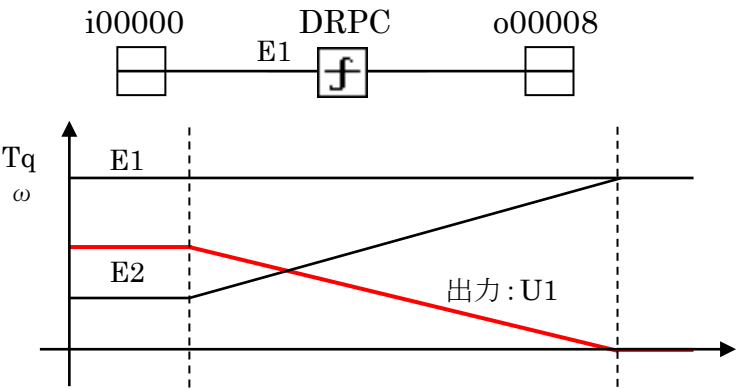
[Characteristics]

- ① Change the output according to *SEL*.
- ② If P-area is set parameter to *SEL*, it can be easily changed.

【 DRPC 】					
Input data : 32bit		Function	The drooping control. The change relativity and absolutely is possible according to B2.		
Cal.Time : 1.7μs					
The diagram illustrates the DRPC control system. It features two main inputs, E1 and E2, and a feedback signal U1. E1 is summed with U1 (negative feedback) and then passes through an ABS block and a gain of 1/20000. E2 passes through a filter block 1/(1+Tf*s). The outputs of these two paths are summed and then multiplied by a gain Ka. The result is summed with U1 to produce the final output U1. Control inputs B1 (Input Switch) and B2 (Absolute/Relative) are used to switch between different input sources and control modes.					
Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Tf	Filter constant time[ms]	1~32767[ms]	65535~2	65536/Tf	<u>*Signed when monitoring</u>
Ka	Amount of droop	0.000~15.999[Double]	0~65531	4096*Ka	<u>*Signed when monitoring</u>
B1	Select Input	—	B1=1		Use Filter
B2	Absolute/Relative	—	B2=1		Relative drooping

(*1) Double the value when Tf that is shorter than double of proceesing cycle is set.

[Usage example]

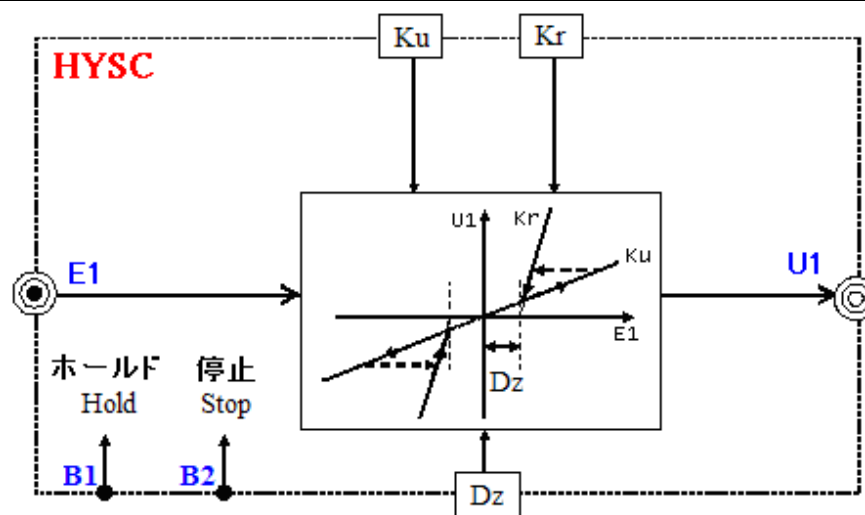


[Characteristics]

Amount of drooping is possible to change absolute or relative (20000).

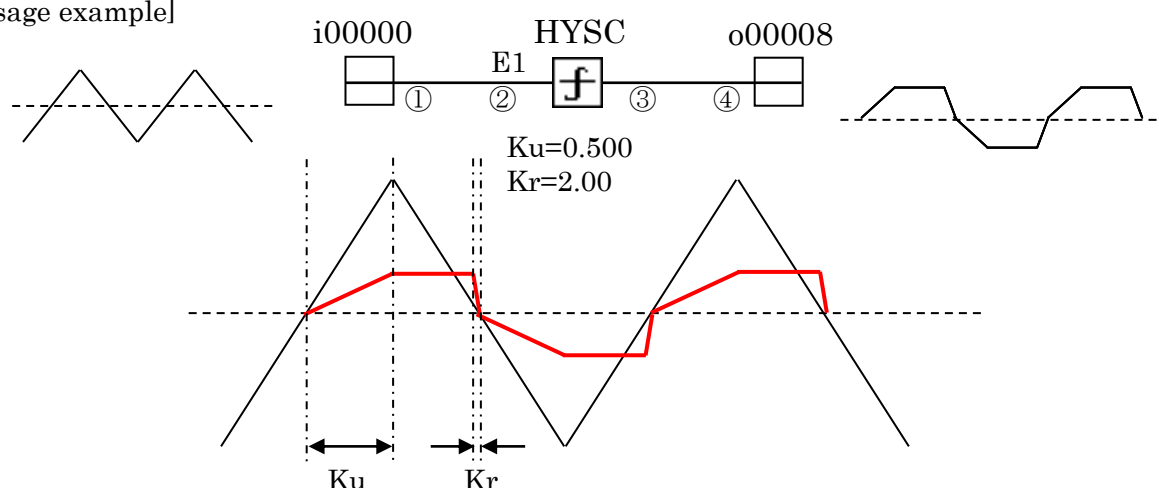
【 HYSC 】

Input data : 32bit	Function	The hysteresis characteristic control. The band of dead zone is set by Dz.
Cal.Time : 1.2μs		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
Ku	Hysteresis rise gain	0.000~15.999[Double]	0~65531	4096*Ku	*Signed when monitoring
Kr	Hysteresis fall gain	0.00~255.99[Double]	0~65533	256*Kr	*Signed when monitoring
Dz	Dead-band zone	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
B1	Hold	—	B1=1		Hold output
B2	Stop	—	B2=1		U1=0

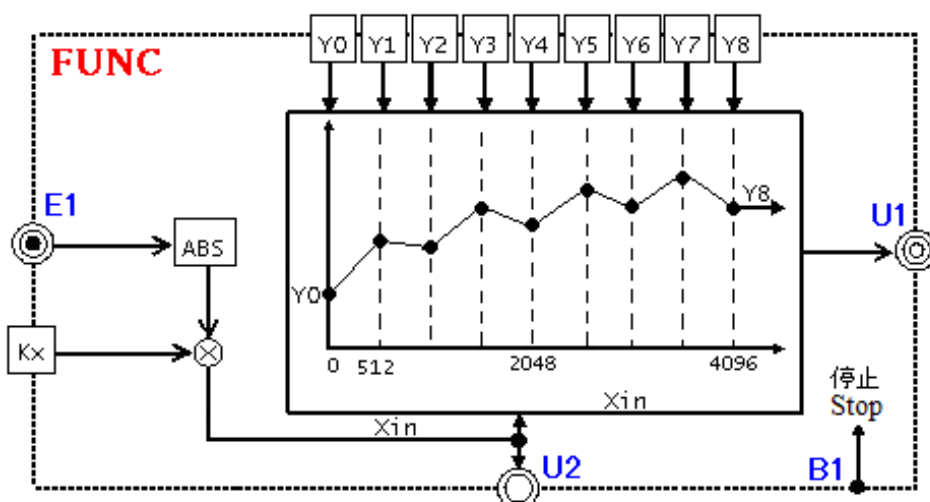
[Usage example]



- ① *i00000* is register that specifies *AIN1*. A triangular wave ($V_p-p=10V$) is input from the outside to *AIN1*. However, the voltage is converted into $10V/20000$ internally.
- ② When the input is outside of the dead zone, gain is multiplied by input.
- ③ It has the hysteresis characteristics. It is possible to set gain according to move direction of input.
- ④ *o00008* is register that specifies *AOT1*. The result to ③ is converted ($5V/20000$) into the voltage and it outputs it to *AOT1*.

【 FUNC 】

Input data : 32bit	Function	Each section is made an approximate expression, and the input value is output by the approximate expression.
Cal.Time : 1.1μs		



Item	Contents	Set p-register	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
U2	Output 2	—	—	—	
Kx	Input conversion coefficient	0.000~15.999[Double]	0~65531	4096*Kx	*Signed when monitoring
Y0	Setting value 0	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y1	Setting value 1	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y2	Setting value 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y3	Setting value 3	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y4	Setting value 4	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y5	Setting value 5	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y6	Setting value 6	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y7	Setting value 7	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y8	Setting value 8	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
B1	Stop	—	B1=1		U1=0

[Usage example]



* Refer to FNC2 [FUNC usage].

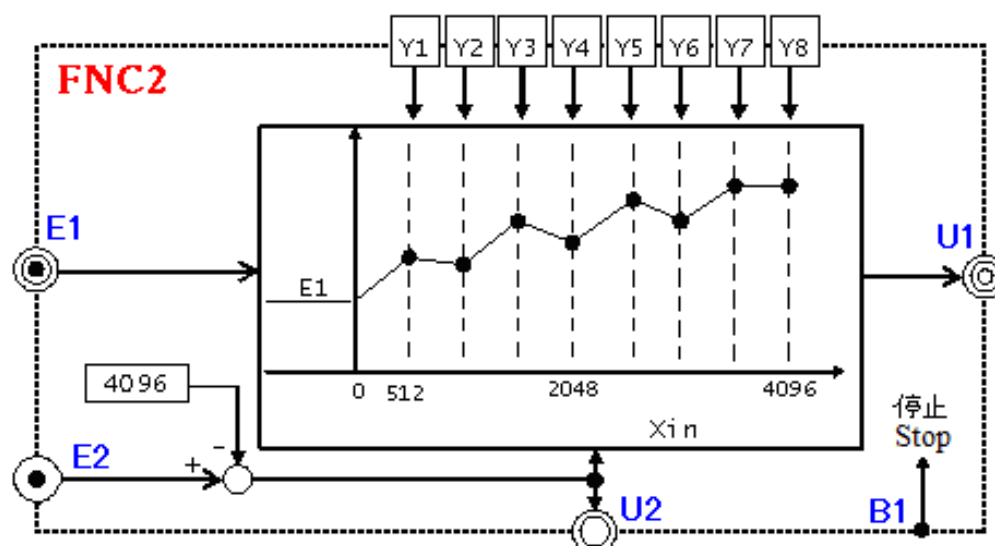
【 FNC2 】

Input data : 32bit

Cal.Time : 1.0μs

Function

FNC2 ties to FUNC to use two or more FUNC continuously.



Item	Contents	Set pregister	Set the other		Remarks
		P area parameter setting band[Unit]	Setting band	Conversion	
E2	Input 2	—	-32768~32767	—	
U2	Output 2	—	—	—	
Y1	Setting value 1	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y2	Setting value 2	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y3	Setting value 3	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y4	Setting value 4	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y5	Setting value 5	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y6	Setting value 6	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y7	Setting value 7	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
Y8	Setting value 8	-163.8~163.8[%]	-32767~32767	20000/100.0%	Signed
B1	Stop	—	B1=1		U1=0

[Usage example]



[FUNC usage]

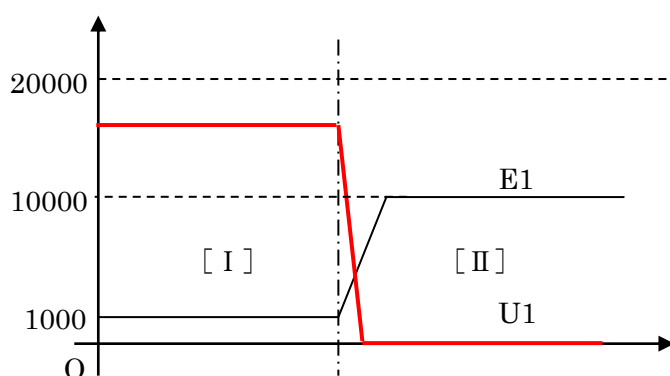
Input (1000) is between Y1 and Y2 in the range in figure below [I]. Therefor, $f(1000)$ is calculated from the function($f(x)$) that passes Y1 and Y2.

$$f(1000) = \frac{(50 - 80)}{1024 - 512} \times (1000 - 512) + 80$$

$$= 51.4[\%]$$

51.4[%] (10281) is output.

Similarly, 0.0[%] (0) set to Y8 ($4096 \leq E1$) because input is 10000 is output.



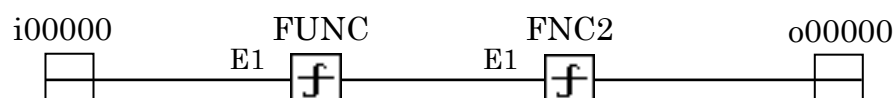
FUNC setting

	E1	U1
Y0	0	100.0%
Y1	512	80.0%
Y2	1024	50.0%
Y3	1536	25.0%
Y4	2048	0.0%
Y5	2560	-100.0%
Y6	3072	-50.0%
Y7	3584	10.0%
Y8	4096	0.0%

[FNC2 usage]

Genellay, *FNC2* ties to *FUNC* to use two or more *FUNC* continuously. At the time, it is necessary to connect U2 of *FUNC* and E2 of *FNC2*. *FUNC* is possible set to 4096. But, E2 of *FNC2* is possible set to E2 minus 4096. Therefor, *FNC2* output the value when E2 of *FNC2* is set by 4096~8192.

[Usage example]



Chapter 3

Ladder-Block

When the sequence is chiefly composed, Ladder-block is used.

3-1. Ladder command

Command	Symbol	Contents	Cal.Time	Remarks
A contact		ON: C=A OFF: C=0	0.150μs	Connects it with the series: AND operation Connects it in parallel: OR operation (*Contact is possible arenging regardless of PLCH or PLCL.)
B contact		ON: C=0 OFF: C=A	0.163μs	Connects it with the series: AND operation Connects it in parallel: OR operation (*Contact is possible arenging regardless of PLCH or PLCL.)
Coil		Exciting coil	0.225μs	If the coil is excited, the contact of the same label of coil is turned on.
PLCBRK	—	Program divided	0.313μs	
Logic inversion		A=0 : C=1 A=1 : C=0	0.088μs	

3-2. Global relay

Relay	Contents	Remarks
G00000~G0003F	Global relay for PLCL	64 points
G01000~G0103F	Global relay for PLCH	64 points

3-3. Holding relay

When the dc stage voltage (Vdc) is less than under the voltage (200V class: 180V, 400V class: 360V), preserves in the memory. Therefor, data holding if power supply turn off.

Relay	Contents	Remarks
RI0000~RI000F	Holding relay for PLCL	16 points
RI1000~RI100F	Holding relay for PLCH	16 points

3-4. Input relay

【Inverter type】

	Relay	Contents	Item	Remarks
Input data (Input terminal)	I00000	ST-F terminal block input		VFC66-Z terminal
	I00001	Multi-function input MI1 (VFC66-Z)		
	I00002	Multi-function input MI2 (VFC66-Z)		
	I00003	Multi-function input MI3 (VFC66-Z)		
	I00004	Multi-function input MI6 (Option)		Option board terminal
	I00005	Multi-function input MI7 (Option)		
	I00006	Multi-function input MI8 (Option)		
	I00007	Multi-function input MI9 (Option)		
	I00008	Multi-function input MI10 (Option)		
	I00009	Multi-function input MI11 (Option)		IOEXT66-Z terminal
	I0000A	Multi-function input MI12 (IOEXT66-Z)		
	I0000B	Multi-function input MI13 (IOEXT66-Z)		
	I0000C	Multi-function input MI14 (IOEXT66-Z)		
	I0000D	Multi-function input MI15 (IOEXT66-Z)		
	I0000E	Multi-function input MI16 (IOEXT66-Z)		
	I0000F	Multi-function input MI17 (IOEXT66-Z)		
	I00010	START key state		Console panel key state
	I00011	JOG key state		
	I00012	REV key state		
	I00013	STOP key state		
	I00014	Fixed value 0		Constant
	I00015	Fixed value 1		
	I00016~17	Not Used		
	I00018~1F	Not Used		
Input from communication option	I00020	Digital communication option input relay 1(RUN command)		Input Relay from Communication
	I00021	Digital communication option input relay 2(JOG command)		
	I00022	Digital communication option input relay 3(REV command)		
	I00023	Digital communication option input relay 4		
	I00024	Digital communication option input relay 5		
	I00025	Digital communication option input relay 6		
	I00026	Digital communication option input relay 7		
	I00027	Digital communication option input relay 8		
	I00028	Digital communication option input relay 9		
	I00029	Digital communication option input relay 10		
	I0002A	Digital communication option input relay 11		
	I0002B	Digital communication option input relay 12		
	I0002C	Digital communication option input relay 13		
	I0002D	Digital communication option input relay 14		
	I0002E	Digital communication option input relay 15		
	I0002F	Digital communication option input relay 16		

	Relay	Contents	Item	Remarks
Input from communication option	I00030	Digital communication option input relay 17		Input Relay from Communication
	I00031	Digital communication option input relay 18		
	I00032	Digital communication option input relay 19		
	I00033	Digital communication option input relay 20		
	I00034	Digital communication option input relay 21		
	I00035	Digital communication option input relay 22		
	I00036	Digital communication option input relay 23		
	I00037	Digital communication option input relay 24		
	I00038	Digital communication option input relay 25		
	I00039	Digital communication option input relay 26		
	I0003A	Digital communication option input relay 27		
	I0003B	Digital communication option input relay 28		
	I0003C	Digital communication option input relay 29		
	I0003D	Digital communication option input relay 30		
	I0003E	Digital communication option input relay 31		
	I0003F	Digital communication option input relay 32		
Inverter internal state	I00040	Inveter state RUN		Inverter state
	I00041	Inveter state REV		
	I00042	Inveter state Asr_Stop (Stop/0 Torque control)		
	I00043	Inveter state Protecting		
	I00044	Multi-function output rotation speed(frequency)detection 1 (H-06=detection speed)	H-06 ~H-08	Detection rotation speed
	I00045	Multi-function output rotation speed(frequency)detection 1 (H-06>=detection speed)		
	I00046	Multi-function output rotation speed(frequency)detection 1 (H-06<=detection speed)		
	I00047	Multi-function output rotation speed(frequency)detection 2 (H-07=detection speed)		
	I00048	Multi-function output rotation speed(frequency)detection 2 (H-07>=detection speed)		
	I00049	=Multi-function output rotation speed(frequency)detection 2 (H-07<=detection speed)		
	I0004A	Multi-function output set rotation speed(frequency) attainment		
	I0004B	Multi-function output Torque detection	H-09	Detection torque (Vector mode:i-07,08)
	I0004C	Multi-function output Absolute value torque detection	H-10	
	I0004D~50	Not Used		

	Relay	Contents	Item	Remarks
Inverter internal state	I00051	Multi-function output under voltage		Trouble and Check
	I00052	Multi-function output overload pre-alarm	H-11	
	I00053	Multi-function output retrying		
	I00054	Multi-function output protective operation code 1		
	I00055	Multi-function output protective operation code 2		
	I00056	Multi-function output protective operation code 3		
	I00057	Multi-function output protective operation code 4		
	I00058	Multi-function output internal memory abnormal detection		
	I00059	Multi-function output over-speed (frequency)protecting	F-01,02	
	I0005A	Multi-function output IGBT,OC,FCL protecting		
	I0005B	Multi-function output over-voltage protecting		
	I0005C	Multi-function output PG error protecting		
	I0005D	Multi-function output sensor abnormal protecting		
	I0005E	Multi-function output passage of operating time 1	F-04	Detection integrating operating time
	I0005F	Multi-function output passage of operating time 2	F-05	
	I00060	Not Used		
	I00061	2nd parameter block selecting		Uesd Set-block
	I00062	Cooling fan motor trouble		Trouble and Check (*Nothing 7.5kW or less)
	I00063~72	Not Used		

【Chopper type】

	Relay	Contents	Item	Remarks
Input data (Input terminal)	I00000	ST-F terminal block input		VFC66-Z terminal
	I00001	Multi-function input MI1 (VFC66-Z)		
	I00002	Multi-function input MI2 (VFC66-Z)		
	I00003	Multi-function input MI3 (VFC66-Z)		
	I00004	Multi-function input MI6 (Option)		Option board terminal
	I00005	Multi-function input MI7 (Option)		
	I00006	Multi-function input MI8 (Option)		
	I00007	Multi-function input MI9 (Option)		
	I00008	Multi-function input MI10 (Option)		
	I00009	Multi-function input MI11 (Option)		IOEXT66-Z terminal
	I0000A	Multi-function input MI12 (IOEXT66-Z)		
	I0000B	Multi-function input MI13 (IOEXT66-Z)		
	I0000C	Multi-function input MI14 (IOEXT66-Z)		
	I0000D	Multi-function input MI15 (IOEXT66-Z)		
	I0000E	Multi-function input MI16 (IOEXT66-Z)		
	I0000F	Multi-function input MI17 (IOEXT66-Z)		
	I00010	START key state		Console panel key state
	I00011	→ key state		
	I00012	← key state		
	I00013	STOP key state		
	I00014	Fixed value 0		Constant
	I00015	Fixed value 1		
	I00016~17	Not Used		
	I00018~1F	Not Used		
Input from communication option	I00020	Digital communication option input relay 1(RUN command)		Input Relay from Communication
	I00021	Digital communication option input relay 2		
	I00022	Digital communication option input relay 3		
	I00023	Digital communication option input relay 4		
	I00024	Digital communication option input relay 5		
	I00025	Digital communication option input relay 6		
	I00026	Digital communication option input relay 7		
	I00027	Digital communication option input relay 8		
	I00028	Digital communication option input relay 9		
	I00029	Digital communication option input relay 10		
	I0002A	Digital communication option input relay 11		
	I0002B	Digital communication option input relay 12		
	I0002C	Digital communication option input relay 13		
	I0002D	Digital communication option input relay 14		
	I0002E	Digital communication option input relay 15		
	I0002F	Digital communication option input relay 16		
	I00030	Digital communication option input relay 17		
	I00031	Digital communication option input relay 18		
	I00032	Digital communication option input relay 19		
	I00033	Digital communication option input relay 20		
	I00034	Digital communication option input relay 21		
	I00035	Digital communication option input relay 22		
	I00036	Digital communication option input relay 23		

	Relay	Contents	Item	Remarks
Input from communication option	I00037	Digital communication option input relay 24		Input Relay from Communication
	I00038	Digital communication option input relay 25		
	I00039	Digital communication option input relay 26		
	I0003A	Digital communication option input relay 27		
	I0003B	Digital communication option input relay 28		
	I0003C	Digital communication option input relay 29		
	I0003D	Digital communication option input relay 30		
	I0003E	Digital communication option input relay 31		
	I0003F	Digital communication option input relay 32		
Chopper internal state	I00040	Chopper state RUN		Chopper state
	I00041	Not Used		
	I00042	Chopper state Avr_Stop (Stop/Zero-Current control)		
	I00043	Chopper state Protecting		
	I00044	Multi-function output voltage detection 1 (H-06=detection speed)	H-06 ~H-08	Detection voltage
	I00045	Multi-function output voltage detection 1 (H-06>=detection speed)		
	I00046	Multi-function output voltage detection 1 (H-06<=detection speed)		
	I00047	Multi-function output voltage detection 2 (H-07=detection speed)		
	I00048	Multi-function output voltage detection 2 (H-07>=detection speed)		
	I00049	Multi-function output voltage detection 2 (H-07<=detection speed)		
	I0004A	Multi-function output set voltage attainment		
	I0004B	Multi-function output current detection	H-09	Detection current
	I0004C	Multi-function output Absolute value current detection	H-10	
	I0004D~50	Not Used		
	I00051	Multi-function output under voltage		Trouble and Check
	I00052	Multi-function output overload pre-alarm	H-11	
	I00053	Multi-function output retrying		
	I00054	Multi-function output protective operation code 1		
	I00055	Multi-function output protective operation code 2		

	Relay	Contents	Item	Remarks
Chopper internal state	I00056	Multi-function output protective operation code 3		Trouble and Check
	I00057	Multi-function output protective operation code 4		
	I00058	Multi-function output internal memory abnormal detection		
	I00059	Not Used		
	I0005A	Multi-function output IGBT,OC,FCL protecting		
	I0005B	Multi-function output over-voltage protecting		
	I0005C	Not Used		
	I0005D	Multi-function output sensor abnormal protecting		Detection integrating operating time
	I0005E	Multi-function output passage of operating time 1	F-04	
	I0005F	Multi-function output passage of operating time 2	F-05	
	I00060	Not Used		
	I00061	Not Used		
	I00062	Cooling fan motor trouble		Trouble and Check (*Nothing 7.5kW or less)
	I00063~72	Not Used		

【VF66G type】

	Relay	Contents	Item	Remarks
Input data (Input terminal)	I00000	START terminal block input		VFC66R-Z terminal
	I00001	Multi-function input MI1 (VFC66R-Z)		
	I00002	Multi-function input MI2 (VFC66R-Z)		
	I00003	Multi-function input MI3 (VFC66R-Z)		
	I00004	Multi-function input MI6 (Option)		Option board terminal
	I00005	Multi-function input MI7 (Option)		
	I00006	Multi-function input MI8 (Option)		
	I00007	Multi-function input MI9 (Option)		
	I00008	Multi-function input MI10 (Option)		
	I00009	Multi-function input MI11 (Option)		
	I0000A	Multi-function input MI12 (IOEXT66-Z)		IOEXT66-Z terminal
	I0000B	Multi-function input MI13 (IOEXT66-Z)		
	I0000C	Multi-function input MI14 (IOEXT66-Z)		
	I0000D	Multi-function input MI15 (IOEXT66-Z)		
	I0000E	Multi-function input MI16 (IOEXT66-Z)		
	I0000F	Multi-function input MI17 (IOEXT66-Z)		
	I00010	START key state		Console panel key state
	I00011	→ key state		
	I00012	← key state		
	I00013	STOP key state		
	I00014	Fixed value 0		Constant
	I00015	Fixed value 1		
	I00016~17	Not Used		
	I00018~1F	Not Used		
Input from communication option	I00020	Digital communication input signal 1(RUN command)		Input Relay from Communication option
	I00021	Digital communication input signal 2		
	I00022	Digital communication input signal 3		
	I00023	Digital communication input signal 4		
	I00024	Digital communication input signal 5		
	I00025	Digital communication input signal 6 (RESET)		
	I00026	Digital communication input signal 7		
	I00027	Digital communication input signal 8		
	I00028	Digital communication input signal 9		
	I00029	Digital communication input signal 10		
	I0002A	Digital communication input signal 11		
	I0002B	Digital communication input signal 12		
	I0002C	Digital communication input signal 13		
	I0002D	Digital communication input signal 14		
	I0002E	Digital communication input signal 15		
	I0002F	Digital communication input signal 16		
	I00030	Digital communication input signal 17 (External failure 1)		
	I00031	Digital communication input signal 18 (External failure 2)		
	I00032	Digital communication input signal 19 (External failure 3)		

	Relay	Contents	Item	Remarks
Input from communication option	I00033	Digital communication input signal 20 (External failure 4)	20	Input Relay from Communication option
	I00034	Digital communication input signal 21 (External failure1 86A not operated)	21	
	I00035	Digital communication input signal 22 (External failure2 86A not operated)	22	
	I00036	Digital communication input signal 23 (External failure3 86A not operated)	23	
	I00037	Digital communication input signal 24 (External failure4 86A not operated)	24	
	I00038	Digital communication input signal 25 (Traceback external trigger)	25	
	I00039	Digital communication input signal 26 (Emergency stop)	26	
	I0003A	Digital communication input signal 27		
	I0003B	Digital communication input signal 28		
	I0003C	Digital communication input signal 29		
	I0003D	Digital communication input signal 30		
	I0003E	Digital communication input signal 31		
	I0003F	Digital communication input signal 32		
VF66G internal state	I00040	VF66G state RUN		VF66G state
	I00041	VF66G bootable state		
	I00042	Not Used		
	I00043	VF66G state Protecting		
	I00044	Not Used		
	I00045	System protection status Trg (Non-passive)		System protection detection
	I00046	OVR		
	I00047	UVR		
	I00048	OFR		
	I00049	UFR		
	I0004A	Active power outage		
	I0004B	Integrated power pulse		Detection current
	I0004C	OVR-Trg		System protection detection
	I0004D	UVR-Trg		
	I0004E	OFR-Trg		
	I0004F	UFR-Trg		
	I00050	Passive power outage		Trouble and Check
	I00051	Power outage		
	I00052	Multi-function output overload pre-alarm		
	I00053	Multi-function output retrying		
	I00054~57	Not Used		
	I00058	Multi-function output internal memory abnormal detection		
	I00059	OVGR		
	I0005A	Special Adjustment		
	I0005B	Interconnect relay On permission		
	I0005C	Power outage (System anomalies or Power outage)		Trouble and Check
	I0005D	Non-passive system protection		

	Relay	Contents	Item	Remarks
VF66G internal state	I0005E	Multi-function output passage of operating time 1		Detection integrating operating time
	I0005F	Multi-function output passage of operating time 2		
	I00060	Independent relay ON permission		
	I00061	Special Adjustment		
	I00062	Cooling fan motor trouble		Trouble and Check (*Nothing 7.5kW or less)
	I00063~72	Not Used		

【Converter type】

	Relay	Contents	Item	Remarks
Input data (Input terminal)	I00000	START terminal block input		VFC66R-Z terminal
	I00001	Multi-function input MI1 (VFC66R-Z)		
	I00002	Multi-function input MI2 (VFC66R-Z)		
	I00003	Multi-function input MI3 (VFC66R-Z)		
	I00004	Multi-function input MI6 (Option)		Option board terminal
	I00005	Multi-function input MI7 (Option)		
	I00006	Multi-function input MI8 (Option)		
	I00007	Multi-function input MI9 (Option)		
	I00008	Multi-function input MI10 (Option)		
	I00009	Multi-function input MI11 (Option)		IOEXT66-Z terminal
	I0000A	Multi-function input MI12 (IOEXT66-Z)		
	I0000B	Multi-function input MI13 (IOEXT66-Z)		
	I0000C	Multi-function input MI14 (IOEXT66-Z)		
	I0000D	Multi-function input MI15 (IOEXT66-Z)		
	I0000E	Multi-function input MI16 (IOEXT66-Z)		
	I0000F	Multi-function input MI17 (IOEXT66-Z)		Console panel key state
	I00010	START key state		
	I00011	→ key state		
	I00012	← key state		
	I00013	STOP key state		Constant
	I00014	Fixed value 0		
	I00015	Fixed value 1		
	I00016~1F	Not Used		
Input from communication option	I00020	Digital communication input signal 1(RUN command)		Input Relay from Communication option
	I00021	Digital communication input signal 2		
	I00022	Digital communication input signal 3		
	I00023	Digital communication input signal 4		
	I00024	Digital communication input signal 5		
	I00025	Digital communication input signal 6 (RESET)		
	I00026	Digital communication input signal 7		
	I00027	Digital communication input signal 8		
	I00028	Digital communication input signal 9		
	I00029	Digital communication input signal 10		
	I0002A	Digital communication input signal 11		
	I0002B	Digital communication input signal 12		
	I0002C	Digital communication input signal 13		
	I0002D	Digital communication input signal 14		
	I0002E	Digital communication input signal 15		
	I0002F	Digital communication input signal 16		
	I00030	Digital communication input signal 17 (External failure 1)		
	I00031	Digital communication input signal 18 (External failure 2)		
	I00032	Digital communication input signal 19 (External failure 3)		
	I00033	Digital communication input signal 20 (External failure 4)		

	Relay	Contents	Item	Remarks
Input from communication option	I00034	Digital communication input signal 21 (External failure1 86A not operated)	21	Input Relay from Communication option
	I00035	Digital communication input signal 22 (External failure2 86A not operated)	22	
	I00036	Digital communication input signal 23 (External failure3 86A not operated)	23	
	I00037	Digital communication input signal 24 (External failure4 86A not operated)	24	
	I00038	Digital communication input signal 25 (Traceback external trigger)	25	
	I00039	Digital communication input signal 26 (Emergency stop)	26	
	I0003A	Digital communication input signal 27		
	I0003B	Digital communication input signal 28		
	I0003C	Digital communication input signal 29		
	I0003D	Digital communication input signal 30		
	I0003E	Digital communication input signal 31		
	I0003F	Digital communication input signal 32		
Converter internal state	I00040	Converter state RUN		Converter state
	I00041~42	Not Used		
	I00043	Converter state Protecting		
	I00044	Inverter operational		
	I00045~4A	Not Used		
	I0004B	Integrated power pulse		Detection current
	I0004C~50	Not Used		
	I00051	Power outage		Trouble and Check
	I00052	Multi-function output overload pre-alarm		
	I00053	Multi-function output retrying		
	I00054~57	Not Used		
	I00058	Multi-function output internal memory abnormal detection		
	I00059	Not Used		
	I0005A	Multi-function output IGBT,OC,FCL protecting		
	I0005B	Not Used		
	I0005C	Power outage (System anomalies or Power outage)		
	I0005D	System Protection other than passive		
	I0005E	Multi-function output passage of operating time 1		Detection integrating operating time
	I0005F	Multi-function output passage of operating time 2		
	I00060	MC state		
	I00061	Special Adjustment		
	I00062	Cooling fan motor trouble		Trouble and Check (*Nothing 7.5kW or less)
	I00063~72	Not Used		

3-5. Output relay

(*Output relay can arrange only PLCL.)

【Inverter type】

	Relay	Contents	Item	Remarks
Command to inverter	O00000	RUN command		Command to inverter
	O00001	REV command		
	O00002	Emergency stop command		
	O00003	Protect reset		
	O00004	JOG command		
	O00005	Initial excitation start command		
	O00006	DC brake command	b-01~03	
	O00007	0 speed hold command		Select Pre-set speed command
	O00008	Preset rotational speed(frequency) 1 select command	d-15	
	O00009	Preset rotational speed(frequency) 2 select command	d-16	
	O0000A	Preset rotational speed(frequency) 3 select command	d-17	
	O0000B	Preset rotational speed(frequency) 4 select command	d-18	
	O0000C	Preset rotational speed(frequency) 5 select command	d-19	
	O0000D	Preset rotational speed(frequency) 6 select command	d-20	
	O0000E	Preset rotational speed(frequency) 7 select command	d-21	
	O0000F~11	Not Used		Speed/Frequency
	O00012	Max.rotational speed reduction command	H-12	
	O00013	Selecting rotational speed(frequency) command terminal block		
	O00014	Holding rotational speed(frequency) command		
	O00015	Selecting torque control command (ON:Speed/OFF:Torque)	i-07=4	Change to torque mode
	O00016	Selecting Accel/Decel time 2	5.Acc2 6.dEc2	Change time of acc/dec
	O00017	Selecting Accel/Decel time 3	d-02 d-03	
	O00018	Selecting Accel/Decel time 4	d-04 d-05	
	O00019	Rotational speed(frequency) up command	d-28	MRH mode
	O0001A	Rotational speed(frequency) down command	d-29	
	O0001B	Prohibit S-curve Accel/Decel	d-06	Used internal SARC
	O0001C	Inactivation of drooping control	i-02	Used drooping control
	O0001D	External failure signal 1		Input the external failure
	O0001E	External failure signal 2		
	O0001F	External failure signal 3		
	O00020	External failure signal 4		

	Relay	Contents	Item	Remarks
Command to inverter	O00021	External failure signal 1(Protective relay 86A inactive)		Input the external failure
	O00022	External failure signal 2(Protective relay 86A inactive)		
	O00023	External failure signal 3(Protective relay 86A inactive)		
	O00024	External failure signal 4(Protective relay 86A inactive)		
	O00025	Traceback external trigger signal	F-15~26	Traceback
	O00026	Change 2nd parameter block command		Chang the Set-block
	O00027	Magnetic flux up command		Vector control only
	O00028	Selecting 2nd ASR-P gain command	i-10	For speed control
	O00029	d-axis The second auto tuning Start		Auto tuning
	O0002A~2F	Not Used		
Output	O00030	52MA relay output		VFC66-Z terminal
	O00031	86A relay output		
	O00032	Multi-function output MO1 (VFC66-Z)		
	O00033	Multi-function output MO2 (VFC66-Z)		
	O00034	Multi-function output MO3 (Option)		Option board terminal
	O00035	Multi-function output MO4 (Option)		
	O00036	Multi-function output MO5 (IOEXT66-Z)		IOEXT66-Z terminal
	O00037	Multi-function output MO6 (IOEXT66-Z)		
	O00038~3F	Not Used		
Output (Communication option)	O00040	Digital communication option output relay 1		Output
	O00041	Digital communication option output relay 2		
	O00042	Digital communication option output relay 3		
	O00043	Digital communication option output relay 4		
	O00044	Digital communication option output relay 5		
	O00045	Digital communication option output relay 6		
	O00046	Digital communication option output relay 7		
	O00047	Digital communication option output relay 8		
	O00048	Digital communication option output relay 9		
	O00049	Digital communication option output relay 10		
	O0004A	Digital communication option output relay 11		
	O0004B	Digital communication option output relay 12		
	O0004C	Digital communication option output relay 13		
	O0004D	Digital communication option output relay 14		
	O0004E	Digital communication option output relay 15		
	O0004F	Digital communication option output relay 16		

【Chopper type】

	Relay	Contents	Item	Remarks
Command to chopper	O00000	RUN command		Command to chopper
	O00001	Not Used		
	O00002	Emergency stop command		
	O00003	Protect reset		
	O00004	Not Used		
	O00005	Not Used		
	O00006	Not Used		
	O00007	Not Used		
	O00008	Preset rotational voltage 1 select command	d-15	Select Pre-set voltage command
	O00009	Preset rotational voltage 2 select command	d-16	
	O0000A	Preset rotational voltage 3 select command	d-17	
	O0000B	Preset rotational voltage 4 select command	d-18	
	O0000C	Preset rotational voltage 5 select command	d-19	
	O0000D	Preset rotational voltage 6 select command	d-20	
	O0000E	Preset rotational voltage 7 select command	d-21	
	O0000F	ACR connect change to input current	i-11	
	O00010	Not Used		
	O00011			
	O00012	Not Used		
	O00013	Selecting voltage command terminal block		Voltage command
	O00014	Holding voltage command		
	O00015	Selecting current control command (ON:Speed/OFF:Torque)	i-07=4	Change to current mode
	O00016	Selecting Accel/Decel time 2	5.Acc2 6.dEc2	Change time of acc/dec
	O00017	Selecting Accel/Decel time 3	d-02 d-03	
	O00018	Selecting Accel/Decel time 4	d-04 d-05	
	O00019	Not Used		
	O0001A	Not Used		
	O0001B	Prohibit S-curve Accel/Decel	d-06	Uesd internal SARC
	O0001C	Selecting second AVR Gain		
	O0001D	External failure signal 1		Input the external failure
	O0001E	External failure signal 2		
	O0001F	External failure signal 3		
	O00020	External failure signal 4		
	O00021	External failure signal 1(Protective relay 86A inactive)		
	O00022	External failure signal 2(Protective relay 86A inactive)		

	Relay	Contents	Item	Remarks
Command to chopper	O00023	External failure signal 3(Protective relay 86A inactive)		Input the external failure
	O00024	External failure signal 4(Protective relay 86A inactive)		
	O00025	Traceback external trigger signal	F-15~26	Traceback
	O00026	AVR connect change to input current	i-10	
	O00027~2F	Not Used		
Output	O00030	52MA relay output		VFC66-Z terminal
	O00031	86A relay output		
	O00032	Multi-function output MO1 (VFC66-Z)		
	O00033	Multi-function output MO2 (VFC66-Z)		
	O00034	Multi-function output MO3 (Option)		Option board terminal
	O00035	Multi-function output MO4 (Option)		
	O00036	Multi-function output MO5 (IOEXT66-Z)		IOEXT66-Z terminal
	O00037	Multi-function output MO6 (IOEXT66-Z)		
	O00038~3F	Not Used		
Output (Communication option)	O00040	Digital communication option output relay 1		Output
	O00041	Digital communication option output relay 2		
	O00042	Digital communication option output relay 3		
	O00043	Digital communication option output relay 4		
	O00044	Digital communication option output relay 5		
	O00045	Digital communication option output relay 6		
	O00046	Digital communication option output relay 7		
	O00047	Digital communication option output relay 8		
	O00048	Digital communication option output relay 9		
	O00049	Digital communication option output relay 10		
	O0004A	Digital communication option output relay 11		
	O0004B	Digital communication option output relay 12		
	O0004C	Digital communication option output relay 13		
	O0004D	Digital communication option output relay 14		
	O0004E	Digital communication option output relay 15		
	O0004F	Digital communication option output relay 16		

【VF66G type】

	Relay	Contents	Remarks
Command to VF66G	O00000	RUN command	Command to VF66G
	O00001	Not Used	
	O00002	Emergency stop command	
	O00003	Protect reset	
	O00004	Self-sustained operation	
	O00005	OVGR	Command to VF66G
	O00006	Not Used	
	O00007	Not Used	
	O00008	For expansion (governor voltage drooping command)	
	O00009	For expansion (governor UP)	
	O0000A	For expansion (governor DWN)	
	O0000B~1C	Not Used	
	O0001D	External failure signal 1	Input the external failure
	O0001E	External failure signal 2	
	O0001F	External failure signal 3	
	O00020	External failure signal 4	
	O00021	External failure signal 1(Protective relay 86A inactive)	
	O00022	External failure signal 2(Protective relay 86A inactive)	
	O00023	External failure signal 3(Protective relay 86A inactive)	
	O00024	External failure signal 4(Protective relay 86A inactive)	
	O00025	Traceback external trigger signal	Traceback
	O00026	Special Adjustment	
	O00027~28	Not Used	
	O00029	Special Adjustment	
	O0002A~2F	Not Used	
Output	O00030	52MA relay output	VFC66R-Z terminal
	O00031	86A relay output	
	O00032	4INC relay output	
	O00033	4I relay output	
	O00034	Multi-function output MO3 (Option)	Option board terminal
	O00035	Multi-function output MO4 (Option)	
	O00036	Multi-function output MO5 (IOEXT66-Z)	IOEXT66-Z terminal
	O00037	Multi-function output MO6 (IOEXT66-Z)	
	O00038	4STA relay output	VFC66R-Z terminal
	O00039~3F	Not Used	

	Relay	Contents	Remarks
Output (Communication option)	O00040	Digital communication option output relay 1	Output
	O00041	Digital communication option output relay 2	
	O00042	Digital communication option output relay 3	
	O00043	Digital communication option output relay 4	
	O00044	Digital communication option output relay 5	
	O00045	Digital communication option output relay 6	
	O00046	Digital communication option output relay 7	
	O00047	Digital communication option output relay 8	
	O00048	Digital communication option output relay 9	
	O00049	Digital communication option output relay 10	
	O0004A	Digital communication option output relay 11	
	O0004B	Digital communication option output relay 12	
	O0004C	Digital communication option output relay 13	
	O0004D	Digital communication option output relay 14	
	O0004E	Digital communication option output relay 15	
	O0004F	Digital communication option output relay 16	

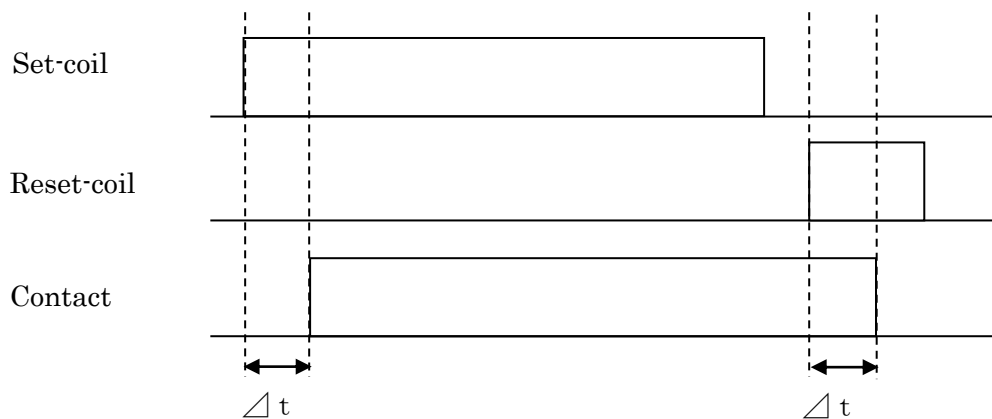
【Converter type】

	Relay	Contents	Remarks
Command to Converter	O00000	RUN command	Command to Converter
	O00001	Not Used	
	O00002	Emergency stop command	
	O00003	Protect reset	
	O00004~1C	Not Used	
	O0001D	External failure signal 1	Input the external failure
	O0001E	External failure signal 2	
	O0001F	External failure signal 3	
	O00020	External failure signal 4	
	O00021	External failure signal 1(Protective relay 86A inactive)	
	O00022	External failure signal 2(Protective relay 86A inactive)	
	O00023	External failure signal 3(Protective relay 86A inactive)	
	O00024	External failure signal 4(Protective relay 86A inactive)	
	O00025	Traceback external trigger signal	Traceback
	O00026~2F	Not Used	
Output	O00030	52MA relay output	VFC66R-Z terminal
	O00031	86A relay output	
	O00032	4INC relay output	
	O00033	4I relay output	
	O00034	Multi-function output MO3 (Option)	Option board terminal
	O00035	Multi-function output MO4 (Option)	
	O00036	Multi-function output MO5 (IOEXT66-Z)	IOEXT66-Z terminal
	O00037	Multi-function output MO6 (IOEXT66-Z)	
	O00038	4STA relay output	VFC66R-Z terminal
	O00039~3F	Not Used	
Output (Communication option)	O00040	Digital communication option output relay 1	Output
	O00041	Digital communication option output relay 2	
	O00042	Digital communication option output relay 3	
	O00043	Digital communication option output relay 4	
	O00044	Digital communication option output relay 5	
	O00045	Digital communication option output relay 6	
	O00046	Digital communication option output relay 7	
	O00047	Digital communication option output relay 8	
	O00048	Digital communication option output relay 9	
	O00049	Digital communication option output relay 10	
	O0004A	Digital communication option output relay 11	
	O0004B	Digital communication option output relay 12	
	O0004C	Digital communication option output relay 13	
	O0004D	Digital communication option output relay 14	
	O0004E	Digital communication option output relay 15	
	O0004F	Digital communication option output relay 16	

3-6. Latch relay

The contact is turned on $\triangle t$ second after set-coil turned on. And the contact is turned off $\triangle t$ second after reset-coil turned on.

The $\triangle t$ is displayed in PLCH[ms] or PLCL[ms] at the left of the window.



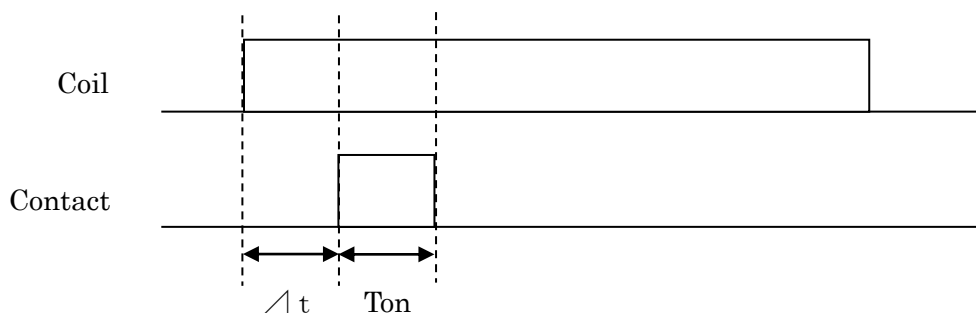
Relay	Contents	Remarks
LS0000~LS000F	Set-coil for PLCL	16 points(For PLCL)
LS1000~LS1007	Set-coil for PLCH	8 points(For PLCH)
LR0000~LR000F	Reset-coil for PLCL	16 points(For PLCL)
LR1000~LR1007	Reset-coil for PLCH	8 points(For PLCH)
LC0000~LC000F	Latch contact for PLCL	16 points(For PLCL) (*PLCH is also possible)
LC1000~LC1017	Latch contact for PLCH	8 points(For PLCH) (*PLCH is also possible)

3-7. ON-Differential relay

The contact is turned on one scan after coil turned on.

The Ton or $\triangle t$ are displayed in PLCH[ms] or PLCL[ms] at the left of the window.

However, $\triangle t$ is big when operated by terminal. For example, when PLCL processing time:5ms, it becomes $\triangle t$ that adds 3~8ms. Also when PLCL processing time:10ms, it becomes $\triangle t$ that adds 3~13ms.



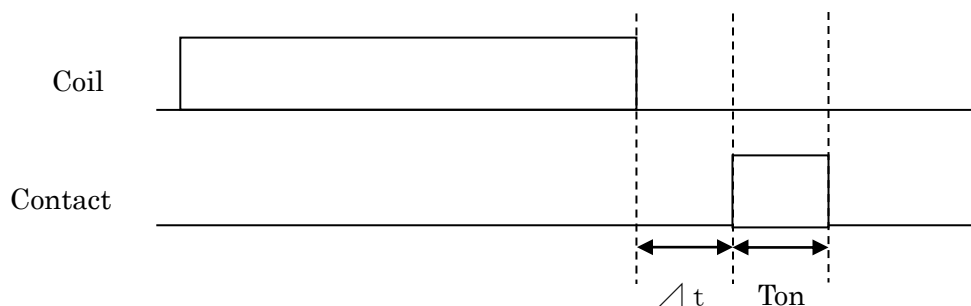
Relay	Contents	Remarks
US0000~US000F	Coil for PLCL	16 points(For PLCL)
US1000~US1007	Coil for PLCH	8 points(For PLCH)
UC0000~UC000F	Differential contact for PLCL	16 points(For PLCL) (*PLCH is also possible)
UC1000~UC1007	Differential contact for PLCH	8 points(For PLCH) (*PLCH is also possible)

3-8. OFF-Differential relay

The contact is turned on one scan after coil turned off.

The Ton or $\triangle t$ are displayed in PLCH[ms] or PLCL[ms] at the left of the window.

However, $\triangle t$ is big when operated by terminal. For example, when PLCL processing time:5ms, it becomes $\triangle t$ that adds 3~8ms. Also when PLCL processing time:10ms, it becomes $\triangle t$ that adds 3~13ms.

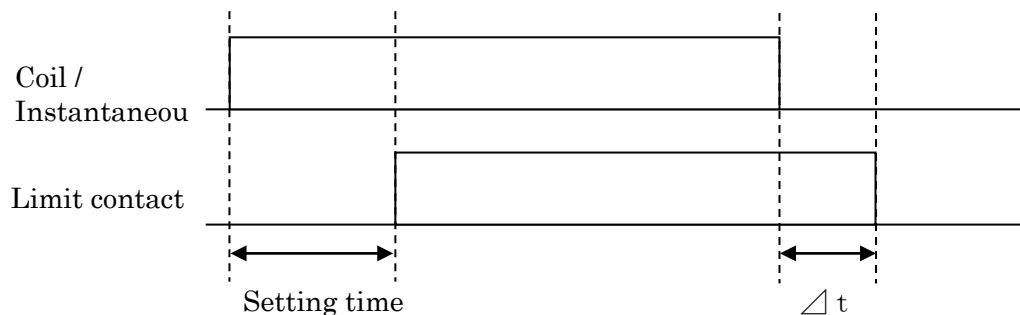


Relay	Contents	Remarks
DS0000~DS000F	Coil for PLCL	16 points(For PLCL)
DS1000~DS1007	Coil for PLCH	8 points(For PLCH)
DC0000~DC000F	Differential contact for PLCL	16 points(For PLCL) (*PLCH is also possible)
DC1000~DC1007	Differential contact for PLCH	8 points(For PLCH) (*PLCH is also possible)

3-9. ON-Timer relay

The relay that is the time limit contact is turned on after the elapse setting time after the coil turned on. The limit contact is turned off after the elapse Δt after the coil is turned off. The Δt are displayed in PLCL[ms] at the left of the window.

It is possible to set time setting range: 10ms (00.01S) ~10 min 55 sec (10M55S) (Resolution: 10ms)



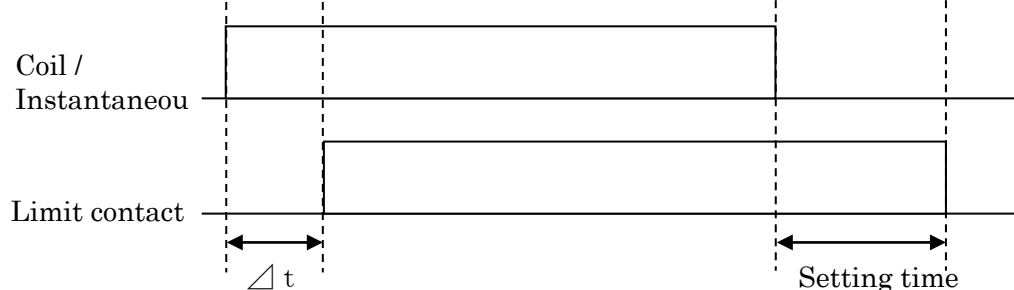
Relay	Contents	Remarks
TS0000~TS000F	Coil and instantaneous contact for PLCL	16 points(For PLCL)
TD0000~TD000F	Time limit contact for PLCL	16 points(For PLCL) (*PLCH is also possible)

*Refer to 【The timer value of timer relay setting method】 below.

3-10. OFF-Timer relay

The relay that is the time limit contact is turned off after the elapse setting time after the coil turned off. The limit contact is turned on after the elapse Δt after the coil is turned on. The Δt are displayed in PLCL[ms] at the left of the window.

It is possible to set time setting range: 10ms (00.01S) ~10 min 55 sec (10M55S) (Resolution: 10ms)



Relay	Contents	Remarks
TR0000~TR000F	Coil and instantaneous contact for PLCL	16 points(For PLCL)
TC0000~TC000F	Time limit contact for PLCL	16 points(For PLCL) (*PLCH is also possible)

【The timer value of timer relay setting method】

Refer to the figure below.

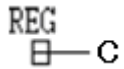
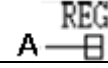
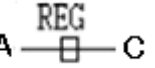
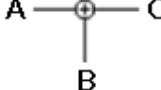
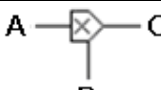
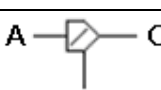
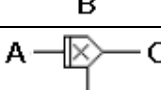
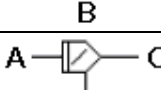
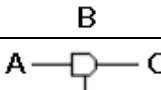
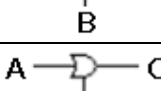
11	12	13
(TS0000)	01S	オンタイマコイル
(TR0000)	09M45S	オフタイマコイル

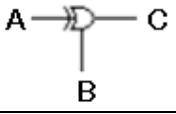
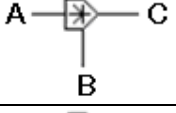
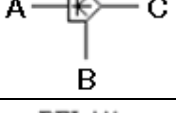
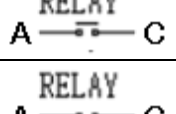
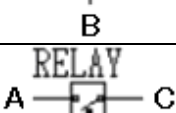
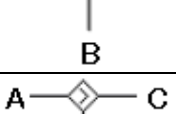
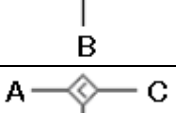
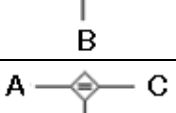
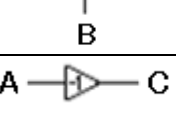
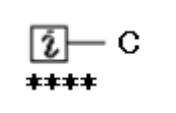
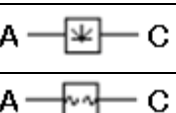
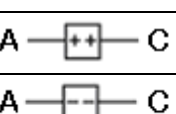
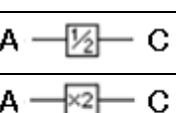
Chapter 4

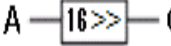
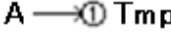
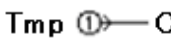
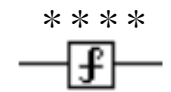
Dataflow-Block

Dataflow-block is used to operate input/output of Control-block or each parameter.

4-1. Dataflow command

Command	Symbol	Contents	Cal.Time	Remarks
Load		$C = \text{REG}$	0.113μs	(*Load is possible arenging regardless of PLCH or PLCL.)
Store		$\text{REG} = A$	0.225μs	Limit to -32768~32767
Load and Store		$C = A$	0.225μs	
Addition		$C = A + B$	0.088μs	
Subtraction		$C = A - B$	0.100μs	
Multiplication		$C = A * B$	0.150μs	
Division		$C = A / B$	1.300μs	With round-off
Remainder		$C = A - (A/B) * B$	1.150μs	
Multiplication (Base 20000)		$C = B * A / 20000$	1.325μs	With round-off
Division (Base 20000)		$C = A * 20000 / B$	1.425μs	With round-off, signed and limit to Max.32bit
AND		$C = B \text{ AND } A$	0.088μs	
OR		$C = B \text{ OR } A$	0.088μs	

Command	Symbol	Contents	Cal.Time	Remarks
EXOR		$C = B \text{ EXOR } A$	0.088 μ s	
High-level priority		$A > B : C = A$ $A < B : C = B$	1.400 μ s	Gives priority to the value large.
Low-level priority		$A > B : C = B$ $A < B : C = A$	0.138 μ s	Gives priority to the value small.
Contact a		ON: $C = A$ OFF: $C = 0$	0.175 μ s	Turn on when excited.
Contact b		ON: $C = 0$ OFF: $C = A$	0.175 μ s	Turn off when excited.
Contact c (1)		ON: $C = B$ OFF: $C = A$	0.175 μ s	Input-B output when excited.
Contact c (2)		ON: $C = A$ OFF: $C = B$	0.175 μ s	Input-A output when excited.
Compare high		if($B > A$) $C = 0$ else $C = 1$	0.100 μ s	
Compare low		if($B < A$) $C = 0$ else $C = 1$	0.100 μ s	
Compare equal		if($B == A$) $C = 0$ else $C = 1$	0.113 μ s	
Sign Conversion		$C = -A$	0.088 μ s	
Local constant integer		$C = ****$	0.113 μ s	Limit to -32768~32767 *p-register is used by loading to change the value freely.
Absolute value Conversion		$C = \text{ABS}(A)$	0.125 μ s	
Complement of 1		$C = \text{NOT}(A)$	0.088 μ s	
Increment		$C = A + 1$	0.088 μ s	
Decrement		$C = A - 1$	0.088 μ s	
One half		$C = A / 2$	0.088 μ s	
Double		$C = A * 2$	0.088 μ s	

Command	Symbol	Contents	Cal.Time	Remarks
Square		$C=A*A/20000$	1.200μs	With round-off
P-area parameter Coefficient		$C=A*P$	0.175μs	The coefficient is specified <i>p-register</i> .
Right shift		$C=A/65536$	0.100μs	
Left shift		$C=A*65536$	0.088μs	
Connector load		$Tmp=A$	0.088μs	For connecting only, 32bit temporary register
Connector store		$C=Tmp$	0.100μs	
Control-block		Control-block	0.275μs	Select from list. *It is necessary add time of selected block.

4-2. Traceback register

Traceback register is data storage when occur traceback function. Setting at *F-15~F-26*.

Also, it is possible to describe graph by *VF Monitor*.

Register	Contents	Remarks
t00000~t0000B	Traceback register	12 points

The list below shows Traceback register corresponding to set value of *F-15~F-26*.

When you set a set value to one or more, traceback register set by *Internal PLC* function is allocated in traceback-data.

Value	Contents	Value	Contents
0	Default	7	t00006
1	t00000	8	t00007
2	t00001	9	t00008
3	t00002	10	t00009
4	t00003	11	t0000A
5	t00004	12	t0000B

Normal traceback-data (Set value of *F-15~F-26* is zero) is correct data (Current, voltage and speed, etc.) when protect occur.

When you set a set value to one or more, useable Traceback register (Refer to above).

The data in PLCH or PLCL circuits is corrected by Traceback register.

4-3. Global register / p-register / Holding register

Register	Contents	Remarks
g00000~g0007F	Global register for PLCL	Max.128 points
g01000~g0107F	Global register for PLCH	Max.128 points
p00000~p00063	p-register	Max.100 points(P-00~P-99)* ¹
ri0000~ri000F	Holding register for PLCL* ²	Max.16 points
ri1000~ri100F	Holding register for PLCH* ²	Max.16 points

*1: Refer to the table [p-register P-area parameter number] below.

*2: When the dc stage voltage (Vdc) is less than under the voltage (200V class: 180V, 400V class: 360V), preserves in the memory. Therefore, data holding if power supply turn off.

p-register / P-area parameter number

p-register	P area	p-register	P area	p-register	P area	p-register	P area
p00000	P-00	p00019	P-25	p00032	P-50	p0004B	P-75
p00001	P-01	p0001A	P-26	p00033	P-51	p0004C	P-76
p00002	P-02	p0001B	P-27	p00034	P-52	p0004D	P-77
p00003	P-03	p0001C	P-28	p00035	P-53	p0004E	P-78
p00004	P-04	p0001D	P-29	p00036	P-54	p0004F	P-79
p00005	P-05	p0001E	P-30	p00037	P-55	p00050	P-80
p00006	P-06	p0001F	P-31	p00038	P-56	p00051	P-81
p00007	P-07	p00020	P-32	p00039	P-57	p00052	P-82
p00008	P-08	p00021	P-33	p0003A	P-58	p00053	P-83
p00009	P-09	p00022	P-34	p0003B	P-59	p00054	P-84
p0000A	P-10	p00023	P-35	p0003C	P-60	p00055	P-85
p0000B	P-11	p00024	P-36	p0003D	P-61	p00056	P-86
p0000C	P-12	p00025	P-37	p0003E	P-62	p00057	P-87
p0000D	P-13	p00026	P-38	p0003F	P-63	p00058	P-88
p0000E	P-14	p00027	P-39	p00040	P-64	p00059	P-89
p0000F	P-15	p00028	P-40	p00041	P-65	p0005A	P-90
p00010	P-16	p00029	P-41	p00042	P-66	p0005B	P-91
p00011	P-17	p0002A	P-42	p00043	P-67	p0005C	P-92
p00012	P-18	p0002B	P-43	p00044	P-68	p0005D	P-93
p00013	P-19	p0002C	P-44	p00045	P-69	p0005E	P-94
p00014	P-20	p0002D	P-45	p00046	P-70	p0005F	P-95
p00015	P-21	p0002E	P-46	p00047	P-71	p00060	P-96
p00016	P-22	p0002F	P-47	p00048	P-72	p00061	P-97
p00017	P-23	p00030	P-48	p00049	P-73	p00062	P-98
p00018	P-24	p00031	P-49	p0004A	P-74	p00063	P-99

* The conversion processing of a set value is done by the automatic operation internally when the p-register is set to item of Control-block.

For details refer to *Chapter 2 Control-block*.

4-4. Input register**【Inverter type】**

	Register	Contents	Item	Remarks
Command data (Analog input terminal)	i00000	Analog input AIN 1 (VFC66-Z)	b-17 b-20	20000/10V ^{*1} 20000/20mA ^{*1}
	i00001	Analog input AIN 2 (Option board)	G-03	
	i00002	Analog input AIN 3 (IO66-Z)	G-06	20000/10V ^{*1}
	i00003	Analog input AIN 4 (IOEXT66-Z)	G-11	20000/10V ^{*1} 20000/20mA ^{*1}
	i00004	Analog input AIN 5 (IOEXT66-Z)	G-12	20000/10V ^{*1}
	i00005	BCD input(HEX)		——
	i00006	Analog input AIN1 Rotational speed command (VFC66-Z)	b-17~ b-20	20000/(A-00) ^{*2}
	i00007	Analog input AIN2 Rotational speed command (Option board)	G-03~ G-05	20000/(A-00) ^{*2}
	i00008	Analog input AIN3 Rotational speed command (IO66-Z)	G-06~ G-08	20000/(A-00) ^{*2}
	i00009	BCD option Rotational speed command		20000/(A-00) ^{*2}
	i0000A	Analog input AIN1 Torque command (VFC66-Z)	b-17 i-09	-5000/100%(10V) ^{*3} -5000/100%(20mA) [*]
	i0000B	Analog input AIN2 Torque command (Option board)	G-03 i-09	³
	i0000C	Internal ARC Output Rotational speed command		20000/(A-00)
	i0000D~0F	Not Used		
Input from communication option	i00010	Digital communication option input 1 (Rotational speed command*4)		20000/(A-00)
	i00011	Digital communication option input 2 (Torque command)		5000/100%
	i00012	Digital communication option input 3 (Clock Data U:Month L:Day)	J-14	Binary data
	i00013	Digital communication option input 4 (Clock Data U:hour L:min)	J-14	Binary data
	i00014	Digital communication option input 5		
	i00015	Digital communication option input 6		
	i00016	Digital communication option input 7		
	i00017	Digital communication option input 8		
	i00018	Digital communication option input 9		
	i00019	Digital communication option input 10		
	i0001A~1F	Not Used		
Inverter internal data	i00020	Rotational speed feed-back		20000/(A-00)
	i00021	Absolute of rotational speed feed-back		20000/(A-00)
	i00022	Output frequency		20000/(A-00)
	i00023	Effective current		10000/100%
	i00024	Output voltage		20/V (400V class:10/V)
	i00025	DC voltage		10/V (400V class:5/V)

	Register	Contents	Item	Remarks
Inverter internal data	i00026	Torque command(only Vector-control)		5000/100%
	i00027	Overload counter		10000/100%
	i00028	Motor temperature		10/°C
	i00029	Motor magnetic flux ratio		1024/100%
	i0002A	Caluculation torque		5000/100%
	i0002B	PG count(TCNT_2)		PG-4 multiply signal
	i0002C	Not Used		
	i0002D	Internal monitor 1 (Set at o-00,o-01)		
	i0002E	Internal monitor 2(Set at o-02,o-03)		
	i0002F	Rotational speed by PG (V/f:0)		20000/(A-00)
	i00030	Fixed value 0		Constant
	i00031	Fixed value 20000		

【Chopper type】

	Register	Contents	Item	Remarks
Command data (Analog input terminal)	i00000	Analog input AIN 1 (VFC66-Z)	b-17 b-20	20000/10V ^{*1} 20000/20mA ^{*1}
	i00001	Analog input AIN 2 (Option board)	G-03	
	i00002	Analog input AIN 3 (IO66-Z)	G-06	20000/10V ^{*1}
	i00003	Analog input AIN 4 (IOEXT66-Z)	G-11	20000/10V ^{*1}
	i00004	Analog input AIN 5 (IOEXT66-Z)	G-12	20000/10V ^{*1} 20000/20mA ^{*1}
	i00005	BCD input(HEX)		Decimal conversion
	i00006	Analog input AIN1 Voltage command (VFC66-Z)	b-12=1	20000/(A-00) ^{*2}
	i00007	Analog input AIN2 Voltage command (Option board)	b-12=0	20000/(A-00) ^{*2}
	i00008	Analog input AIN3 Voltage command (IO66-Z)	G-06~ G-08	20000/(A-00) ^{*2}
	i00009	BCD option Voltage command		20000/(A-00) ^{*2}
	i0000A	Analog input AIN1 Current command (VFC66-Z)	b-12=1 i-08=0	-5000/100%(10V) ^{*3} -5000/100%(20mA) ^{*3}
	i0000B	Analog input AIN2 Current command (Option board)	b-12=0 i-08=1	
	i0000C	Internal ARC Output Voltage command		20000/(A-00)
	i0000D~0F	Not Used		
Input from communication option	i00010	Digital communication option input 1 (Voltage command*4)		20000/(A-00)
	i00011	Digital communication option input 2 (Current command)		5000/100%
	i00012	Digital communication option input 3 (Clock Data U:Month L:Day) *BTS mode: Internal resistance voltage drop (CHG) when constant current.		
	i00013	Digital communication option input 4 (Clock Data U:hour L:min) *BTS mode: Internal resistance voltage drop (DisCHG) when constant current.		
	i00014	Digital communication option input 5		
	i00015	Digital communication option input 6		
	i00016	Digital communication option input 7		
	i00017	Digital communication option input 8		
	i00018	Digital communication option input 9		
	i00019	Digital communication option input 10		
	i0001A~1F	Not Used		

	Register	Contents	Item	Remarks
Chopper internal data	i00020	Output voltage feedback		20000/(A-00)
	i00021	Not Used		
	i00022	Controlled object current		10000/(A-04)
	i00023	Output current		10000/Reference current
	i00024	BTS drooping voltage		20000/(A-00)
	i00025	DC voltage		10/V (400V class:5/V)
	i00026	Current command		5000/100%
	i00027	OL counter		10000/100%
	i00028	Reactor temperature		10/°C
	i00029	Output power		10000/(A-00*A-04)
	i0002A	Output current(100msLPF)		5000/A-04
	i0002B	Not Used		
	i0002C	Not Used		
	i0002D	Internal monitor 1(Set at o-00,o-01)		
	i0002E	Internal monitor 2(Set at o-02,o-03)		
	i0002F	Not Used		
	i00030	Fixed value 0		Constant
	i00031	Fixed value 20000		

Reference current of chopper machine

200V class		400V class	
Capacity	Current	Capacity	Current
2R222	10.0	2R244	5.50
3R722	17.0	3R744	9.20
5R522	24.0	5R544	13.0
7R522	32.5	7R544	17.0
1122	46.0	1144	24.0
1522	62.5	1544	32.5
2222	87.0	2244	46.0
3022	121.0	3044	62.5
3722	146.0	3744	75.5
4522	185.0	4544	92.5
5522	222.0	5544	111.0
7522	280.0	7544	146.0
9022	340	11044	210.0
15022	560	16044	300.0
18022	680	20044	370
		25044	460
		31544	600
		40044	740
		50044	920
		60044	1110
		75044	1380
		100044	1840

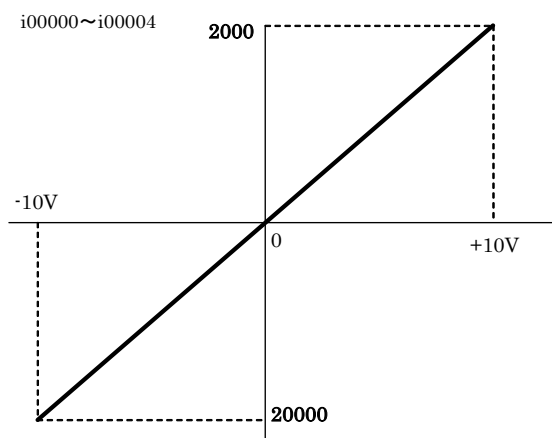
【VF66G type】

	Register	Contents	Remarks
Command data (Analog input terminal)	i00000	Not Used	
	i00001	Analog input AIN 2 (Option board)	20000/10V ^{*1} 20000/20mA ^{*1}
	i00002	Analog input AIN 3 (Option board)	20000/10V ^{*1}
	i00003	Analog input AIN 4 (IOEXT66-Z)	
	i00004	Analog input AIN 5 (IOEXT66-Z)	
	i00005~0F	Not Used	
Input from communication option	i00010	Digital communication input 1 (DC Voltage command*4)	10000/300V (200V class) 10000/600V (400V class)
	i00011	Digital communication input 2 (Active Current command*4)	20000/100%
	i00012	Digital communication option input 3 (Clock Data U:Month L:Day*4)	
	i00013	Digital communication option input 4 (Clock Data U:hour L:min*4)	
	i00014	Digital communication option input 5 (Reactive current command*4)	20000/100%
	i00015	Digital communication option input 6	
	i00016	Digital communication option input 7	
	i00017	Digital communication option input 8	
	i00018	Digital communication option input 9	
	i00019	Digital communication option input 10	
	i0001A~1F	Not Used	
VF66G internal data	i00020	Not Used	
	i00021	Active current	
	i00022	Reactive current	
	i00023	RMS value current	10000/Reference current
	i00024	Output voltage	20/V (200V class) 10/V (400V class)
	i00025	DC voltage	10/V(200V class) 5/V(400V class)
	i00026	System voltage	20/V(200V class) 10/V(400V class)
	i00027	OL counter	10000/100%
	i00028	Special Adjustment	
	i00029	Special Adjustment	
	i0002A	Special Adjustment	
	i0002B	Frequency	10/Hz
	i0002C~F	Not Used	
	i00030	Fixed value 0	Constant
	i00031	Fixed value 20000	

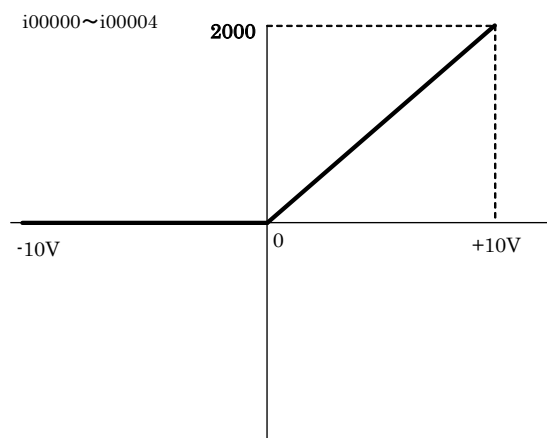
【Converter type】

	Register	Contents	Remarks
Command data (Analog input terminal)	i00000	Not Used	
	i00001	Analog input AIN 2 (Option board)	20000/10V ^{*1} 20000/20mA ^{*1}
	i00002	Analog input AIN 3 (Option board)	20000/10V ^{*1}
	i00003	Analog input AIN 4 (IOEXT66-Z)	
	i00004	Analog input AIN 5 (IOEXT66-Z)	
	i00005~0F	Not Used	
Input from communication option	i00010	Digital communication input 1 (DC Voltage command*4)	
	i00011	Digital communication input 2 (Active Current command*4)	
	i00012	Digital communication option input 3 (Clock Data U:Month L:Day*4)	
	i00013	Digital communication option input 4 (Clock Data U:hour L:min*4)	
	i00014	Digital communication option input 5	
	i00015	Digital communication option input 6	
	i00016	Digital communication option input 7	
	i00017	Digital communication option input 8	
	i00018	Digital communication option input 9	
	i00019	Digital communication option input 10	
	i0001A~1F	Not Used	
Converter internal data	i00020	Not Used	
	i00021	Active current	20000/100%
	i00022	Reactive current	20000/100%
	i00023	Line current effective value	10000/Reference current
	i00024	Interline voltage execution value	20000/200V
	i00025	DC voltage	10/V (400V class:5/V)
	i00026	System voltage	20/V (400V class:10/V)
	i00027	OL counter	10000/100%
	i00028	Output power	
	i00029	d-axis voltage	
	i0002A	q-axis voltage	
	i0002B	Frequency	
	i0002C~F	Not Used	
	i00030	Fixed value 0	Constant
	i00031	Fixed value 20000	

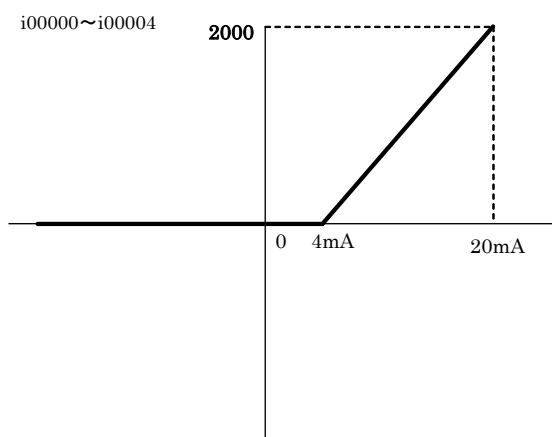
*1 : The relations with $i00000 \sim i00004$ and the analog input is shown in the figure below.



Input characteristic(0~±10V)



Input characteristic(0~10V)



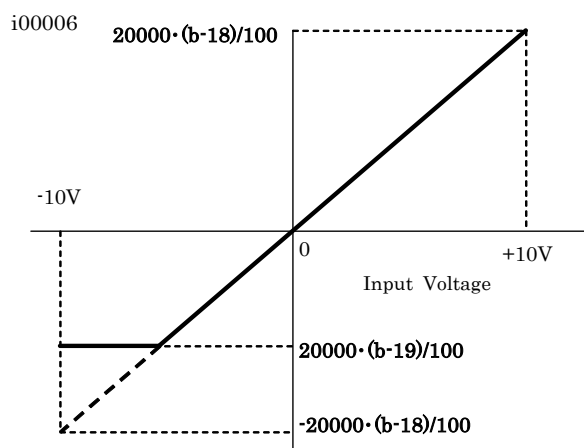
Input characteristic(4~20mA)

Only as for i00000, 0 when AIN1 becomes setting or less of b-20 is output (4-20mA: The current value that equivalent to b-20 or less.).

*2 : The relations with i00006~i00008 and the analog input is shown in the figure below.

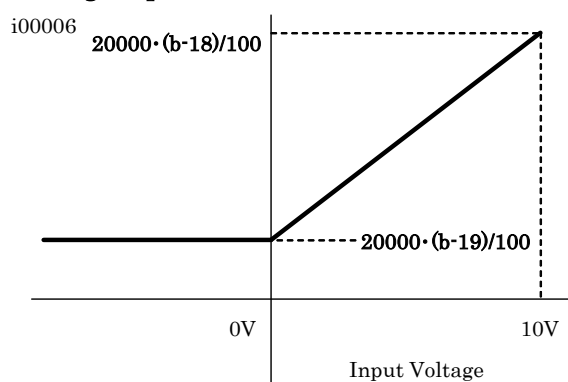
And the figure below is shown as i00006. i00007 is set by: G-03~05. i00008 is set by: G-06~08.

• Voltage input:0~±10V

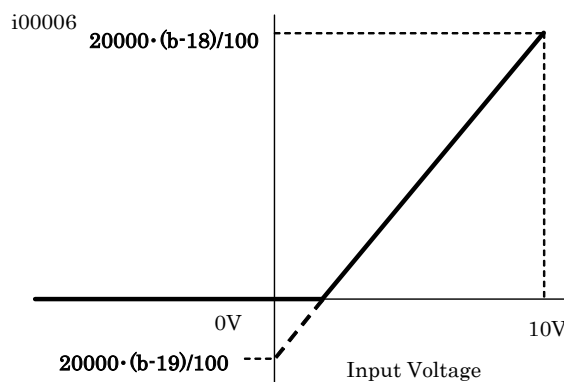


Input characteristic(0~±10V)

• Voltage input:0~10V

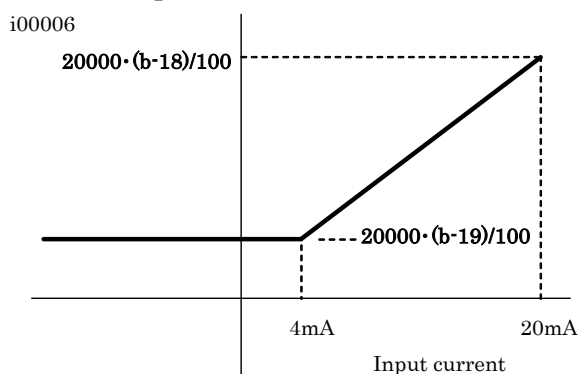


Lower limit speed(b-19)-positive
Input characteristic(0~10V)

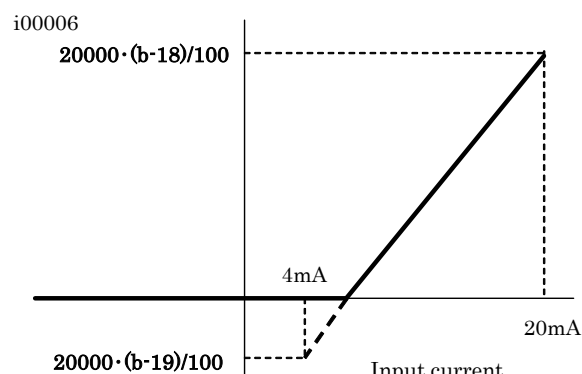


Lower limit speed(b-19)-negative
Input characteristic(0~10V)

• Current input:4~20mA



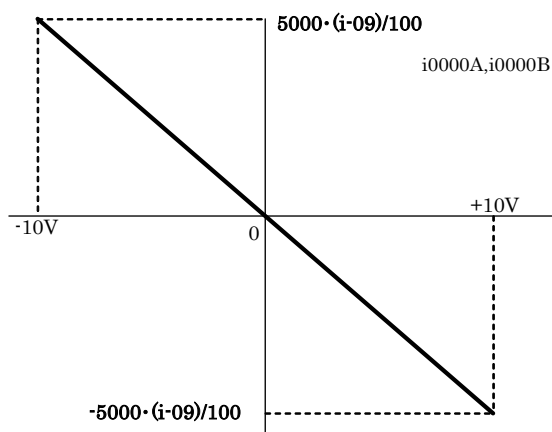
Lower limit speed(b-19)-positive
Input characteristic(4~20mA)



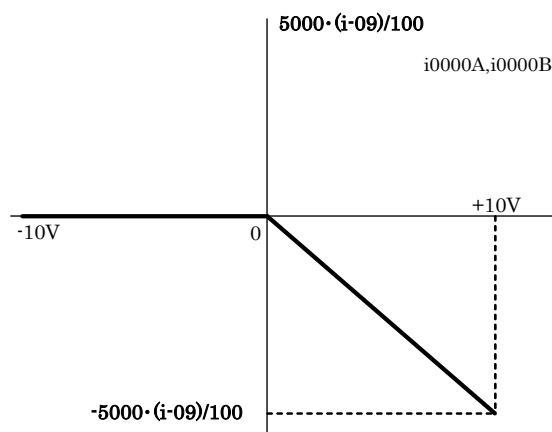
Lower limit speed(b-19)-negative
Input characteristic(4~20mA)

Only as for i00006, the same characteristic as input voltage equal 0(4~20mA:4mA) above when AIN1 becomes setting or less of b-20 is output (4~20mA: The current value that equivalent to b-20 or less.).

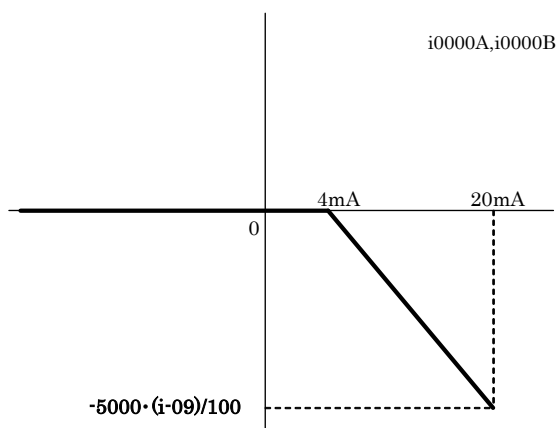
*3 : The relations with $i0000A$, $i0000B$ and the analog input is shown in the figure below.



Input characteristic(0~±10V)



Input characteristic(0~10V)



Input characteristic(4~20mA)

Only as for $i0000A$, 0 when AIN1 become s setting or less of b-20 is output (4-20mA: The current value that equivalent to b-20 or less.).

*4 : For $i00010 \sim i00019$, refer to manual of each option.

4-5. Output register**【Inverter type】**

	Register	Contents	Item	Remarks
Input (To control)	o00000	Torque command from Internal PLC	i-08=3	20000/100%
	o00001	Rotational speed(frequency) command from Internal PLC function	b-10=7 i-01	20000/(A-00)
	o00002	Not Used		
	o00003			
	o00004			
	o00005			
	o00006			
	o00007			
Output	o00008	Analog output 1 (VFC66-Z)	b-21=5	20000/5V
	o00009	Analog output 2 (Option board)	G-09=5	20000/5V
	o0000A	Analog output 3 (Option board)	G-10=5	20000/5V
			G-10=13	20000/12mA
	o0000B	Analog output 4 (IOEXT66-Z)	G-13=5	20000/5V
	o0000C	Analog output 5 (IOEXT66-Z)	G-14=5	20000/5V
			G-14=13	20000/12mA
	o0000D	Not Used		
Output (From inverter by communication option)	o00010	Digital communication option output 1		
	o00011	Digital communication option output 2		
	o00012	Digital communication option output 3		
	o00013	Digital communication option output 4		
	o00014	Digital communication option output 5		
	o00015	Digital communication option output 6		
	o00016	Digital communication option output 7		
	o00017	Digital communication option output 8		
	o00018	Digital communication option output 9		
	o00019	Digital communication option output 10		
	o0001A	Digital communication option output 11		
	o0001B	Digital communication option output 12		
	o0001C	Digital communication option output 13		
	o0001D	Digital communication option output 14		
	o0001E	Digital communication option output 15		

* It should not be set not to be described to this manual.

【Chopper type】

	Register	Contents	Item	Remarks
Input (To control)	o00000	Current command from Internal PLC	i-08=3	20000/100%
		*BTS mode: Internal resistance regulation	i-02~ i-04	$G=(1+o00000/20000)$
		i-02=0 : $G*(i-03)$ or $G*(i-04)$ is voltage drop when constant current. i-02=1 : ($G* i00011$) is voltage drop when constant current.		
	o00001	Voltage command from Internal PLC	b-10=7 i-01	20000/(A-00)
	o00002	Not Used		
	o00003			
	o00004			
	o00005			
	o00006			
	o00007			
Output	o00008	Analog output 1 (VFC66-Z)	b-21=5	20000/5V
	o00009	Analog output 2 (Option board)	G-09=5	20000/5V
	o0000A	Analog output 3 (Option board)	G-10=5	20000/5V
			G-10=13	20000/12mA
	o0000B	Analog output 4 (IOEXT66-Z)	G-13=5	20000/5V
	o0000C	Analog output 5 (IOEXT66-Z)	G-14=5	20000/5V
			G-14=13	20000/12mA
	o0000D	Not Used		
	o0000E			
	o0000F			
Output (From chopper by communication option)	o00010	Digital communication option output 1		
	o00011	Digital communication option output 2		
	o00012	Digital communication option output 3		
	o00013	Digital communication option output 4		
	o00014	Digital communication option output 5		
	o00015	Digital communication option output 6		
	o00016	Digital communication option output 7		
	o00017	Digital communication option output 8		
	o00018	Digital communication option output 9		
	o00019	Digital communication option output 10		
	o0001A	Digital communication option output 11		
	o0001B	Digital communication option output 12		
	o0001C	Digital communication option output 13		
	o0001D	Digital communication option output 14		
	o0001E	Digital communication option output 15		

* It should not be set not to be described to this manual.

【VF66G type】

	Register	Contents		Item	Remarks
Input (To control)	o00000	Active current command from built-in PLC		b-05=2	
	o00001	Reactive current command from built-in PLC		b-06=2	
	o00002	Not Used			
	o00003				
	o00004				
	o00005				
	o00006				
	o00007				
Output	o00008	Not Used			
	o00009	Analog output AOT2 (Option board)	L-01=5	20000/5V	
	o0000A	Analog output AOT3 (Option board)	L-02=5		
	o0000B	Analog output 4 (IOEXT66-Z)			
	o0000C	Analog output 5 (IOEXT66-Z)			
	o0000D	Not Used			
	o0000E				
	o0000F				
Output (From inverter by communication option)	o00010	Digital communication option output 1			
	o00011	Digital communication option output 2			
	o00012	Digital communication option output 3			
	o00013	Digital communication option output 4			
	o00014	Digital communication option output 5			
	o00015	Digital communication option output 6			
	o00016	Digital communication option output 7			
	o00017	Digital communication option output 8			
	o00018	Digital communication option output 9			
	o00019	Digital communication option output 10			
	o0001A	Digital communication option output 11			
	o0001B	Digital communication option output 12			
	o0001C	Digital communication option output 13			
	o0001D	Digital communication option output 14			
	o0001E	Digital communication option output 15			

* It should not be set not to be described to this manual.

【Converter type】

	Register	Contents		Item	Remarks
Input (To control)	o00000	Active current command from built-in PLC		b-05=2	20000/100%
	o00001	Reactive current command from built-in PLC		b-06=2	
	o00002	Not Used			
	o00003				
	o00004				
	o00005				
	o00006				
	o00007				
Output	o00008	Not Used			
	o00009	Analog output AOT2 (Option board)		L-01=5	20000/5V
	o0000A	Analog output AOT3 (Option board)		L-02=5	
	o0000B	Analog output 4 (IOEXT66-Z)			
	o0000C	Analog output 5 (IOEXT66-Z)			
	o0000D	Not Used			
	o0000E				
	o0000F				
Output (From inverter by communication option)	o00010	Digital communication option output 1			
	o00011	Digital communication option output 2			
	o00012	Digital communication option output 3			
	o00013	Digital communication option output 4			
	o00014	Digital communication option output 5			
	o00015	Digital communication option output 6			
	o00016	Digital communication option output 7			
	o00017	Digital communication option output 8			
	o00018	Digital communication option output 9			
	o00019	Digital communication option output 10			
	o0001A	Digital communication option output 11			
	o0001B	Digital communication option output 12			
	o0001C	Digital communication option output 13			
	o0001D	Digital communication option output 14			
	o0001E	Digital communication option output 15			

* It should not be set not to be described to this manual.

Chapter 5

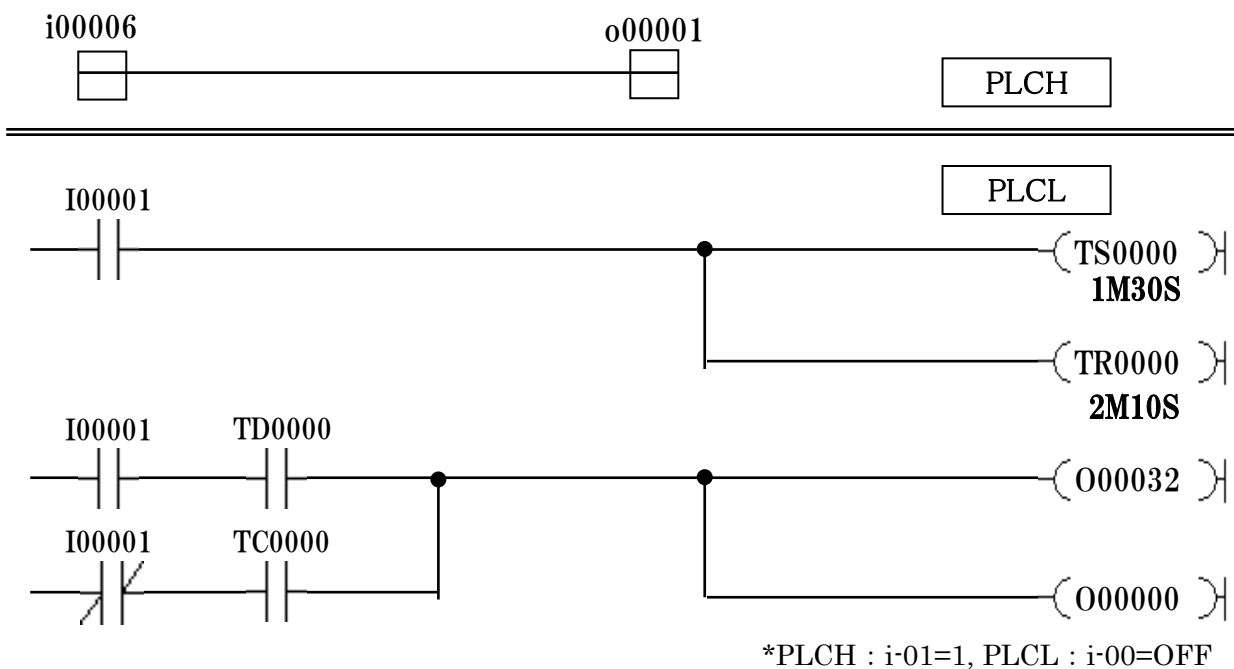
Application Circuit

The application circuit using the VF66B as an example is shown figure below.

【Application program 1】

This program can the inverter's sequence (Run/Stop) control by the Multi-function input (*MI1*). But insert timer relay, the inverter is started after a lapse of 1 min 30 sec after MI1 is turned on. And also the inverter is stoped after a lapse of 2 min 10 sec after MI1 is turned off.

Motor rotational speed reference is set by analog input (*AIN1*).

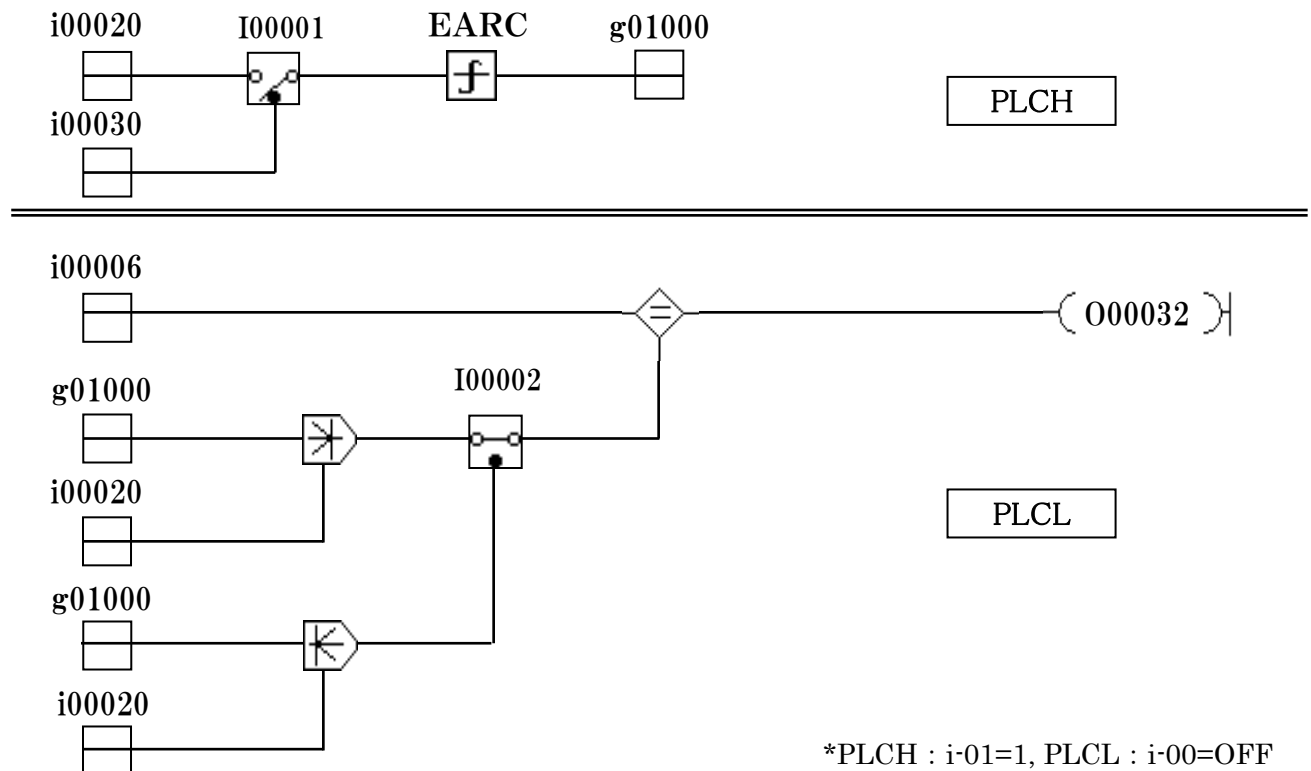


Symbol	Kinds	Contents
i00006	Dataflow-block	Analog input AIN 1 (VFC66-Z)
o00001	Dataflow-block	Rotational speed(frequency) command from Internal PLC function
I00001	Ladder-block	Multi-function input MI1 (VFC66-Z)
TS0000	Ladder-block	ON-timer relay coil
TR0000	Ladder-block	OFF-timer relay coil
TD0000	Ladder-block	ON-timer relay limit contact
TC0000	Ladder-block	OFF-timer realy limit contact
O00032	Ladder-block	Multi-function output MO1 (VFC66-Z)
O00000	Ladder-block	RUN command

【Application program 2】

This program that when motor rotational speed is equal to speed feed-back is turned on the Multi-function output (MO1).

I00002 is used for change priority direction.



Symbol	Kinds	Contents
i00020	Dataflow-block	Rotational speed feed-back
I00001	Dataflow-block	ON:i00020/OFF:i00030
i00030	Dataflow-block	Fixed value 0
EARC	Control-block	Limit to Accel/Decel
g01000	Dataflow-block	Result of calculation made by EARC is stored.
i00006	Dataflow-block	Analog input AIN 1 (VFC66-Z)
Compare equal	Dataflow-block	Bit ON:Two inputs are equal
High-level priority	Dataflow-block	The whichever are greater is output.
I00002	Dataflow-block	ON: Low-level priority/OFF: High-level priority
Low-level priority	Dataflow-block	The whichever are smaller is output.
O00032	Ladder-block	Multi-function output MO1 (VFC66-Z)

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TIM080 [C]_20250430