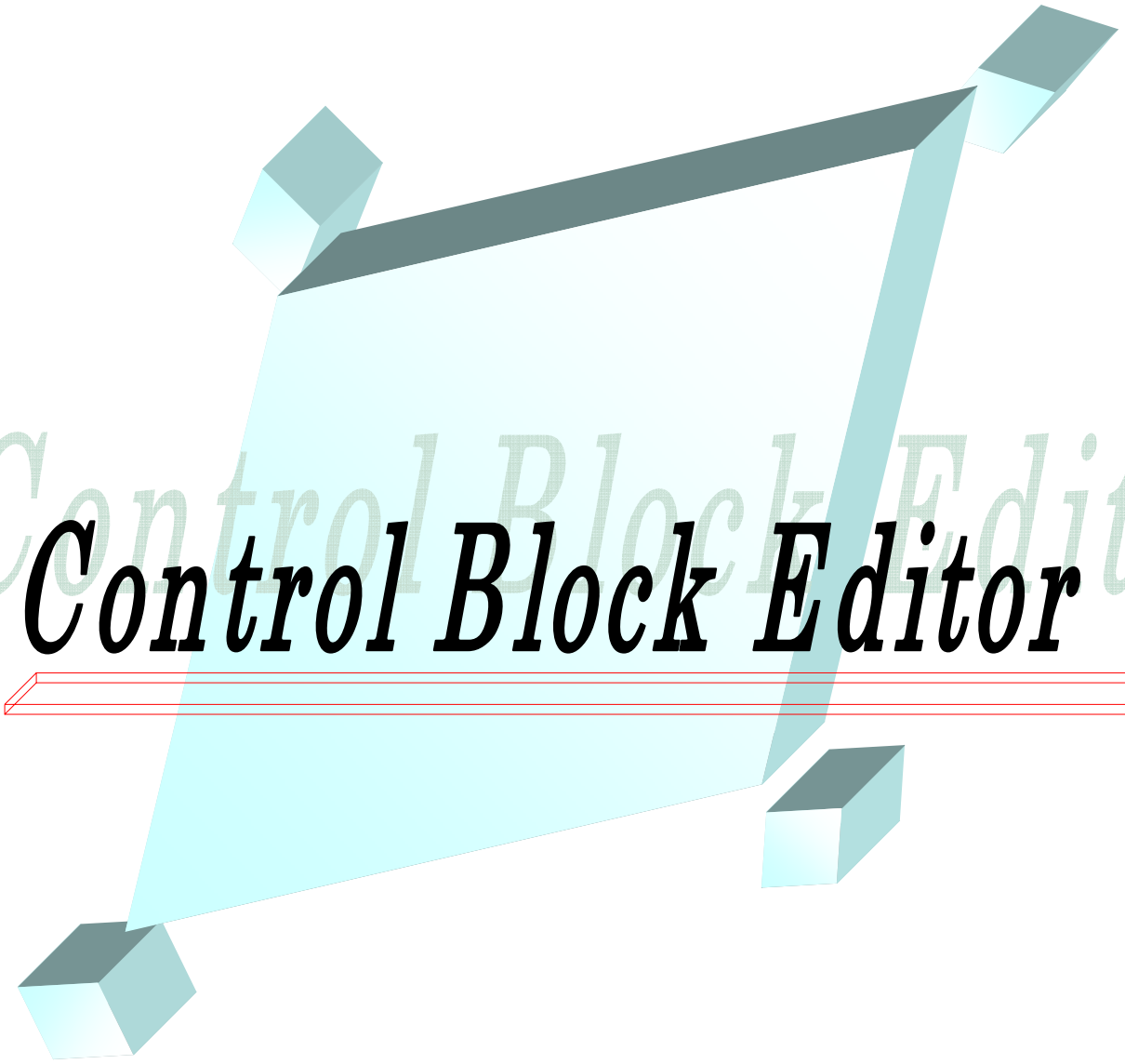
TOYO INTELLIGENT INVERTER
VF66 Series

VF66PCTool



Control Block Editor

Function Manual

TOYODENKI

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Chapter 1
Built-in PLC function

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

Built-in 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.

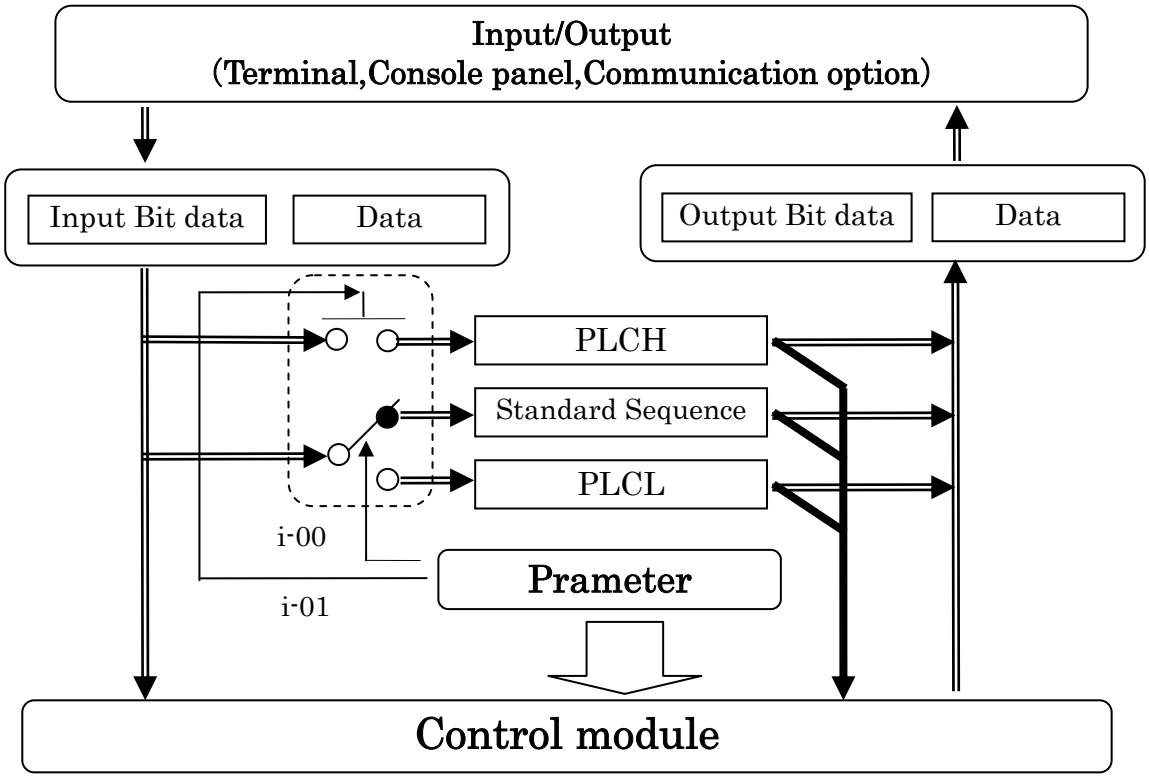
Processing has PLCH table (1ms cycle) and PLCL table (5ms cycle). It is possible to control each table only or combination of tables.

Built-in function's characteristics, I/O structure and details of function are described below.

【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 parameeter and etc.
- I/O terminal data and Communication data can be used.

【I/O Dataflow】



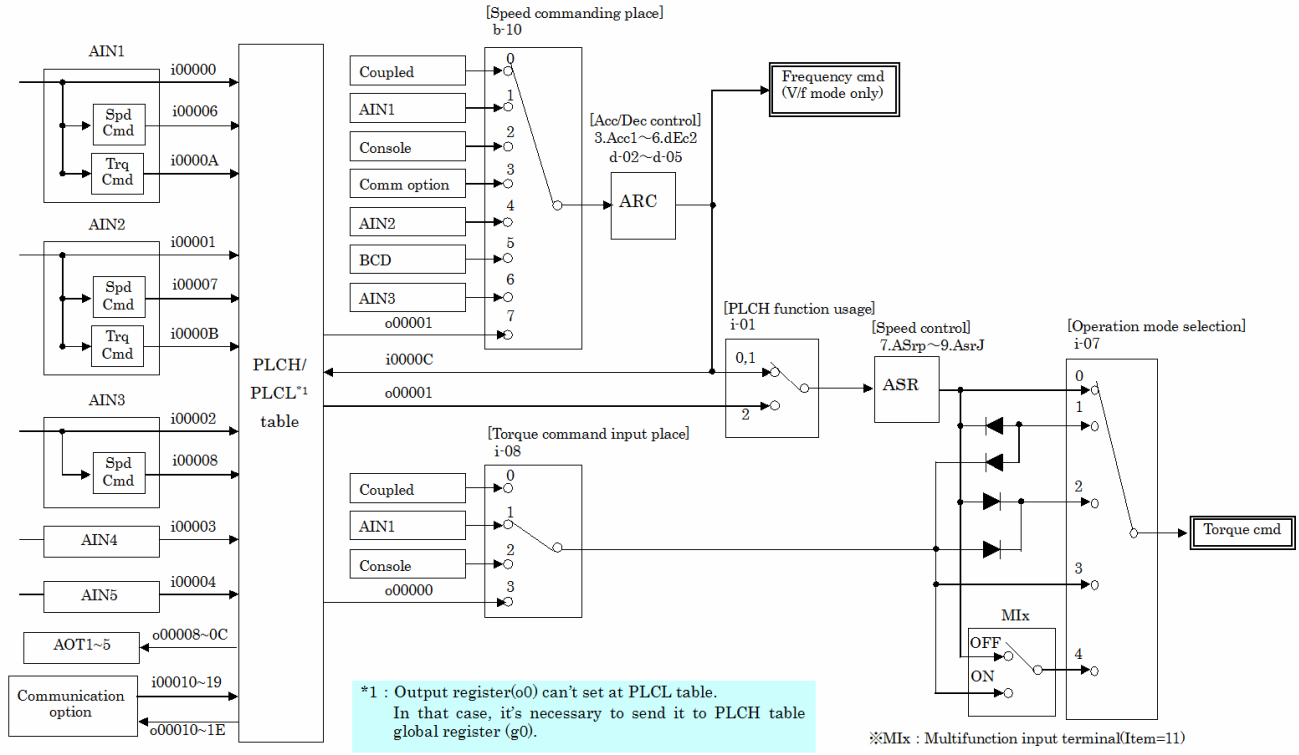
◆ PLCH and PLCL

	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)	5ms or 10ms (Changing by amount of total program)
	Control cycle is displayed at window, after compile.	
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.

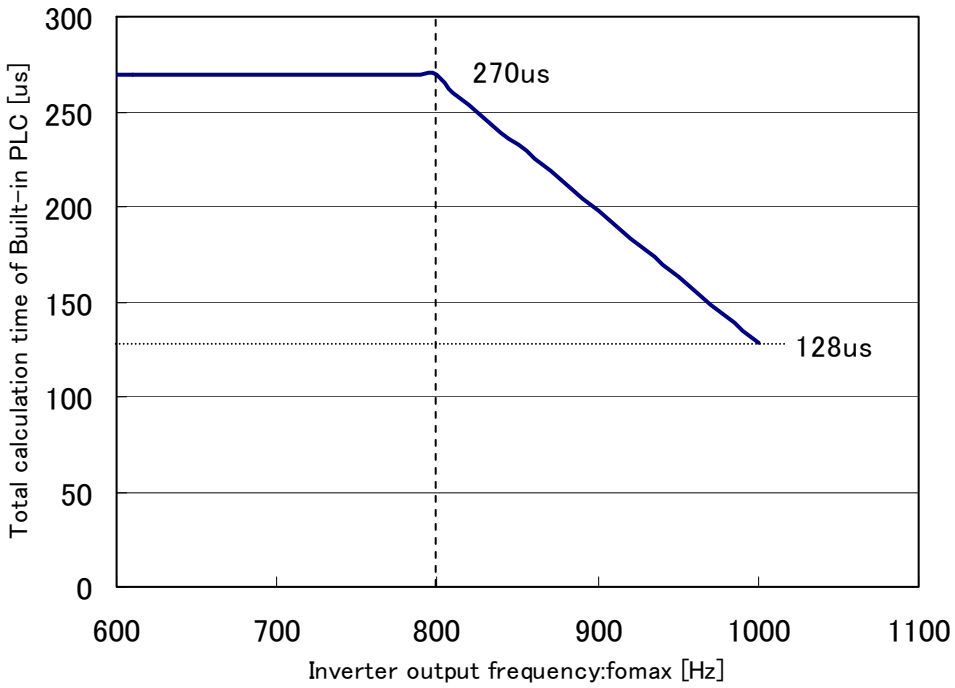
【Built in PLC function. input and output flowchart】



◆ Inverter output frequency and Built-in PLC function control cycle

When inverter output frequency over 800[Hz], built-in PLC function control cycle changing by inverter output frequency. So, it's necessary to limit amount of the total of built-in PLC function program. (It's a possibility that inverter stops according to the condition.)

Therefore, when an inverter drives over 800[Hz], referring to following the expression and graph that should adjust the amount of the total of built-in PLC function program.



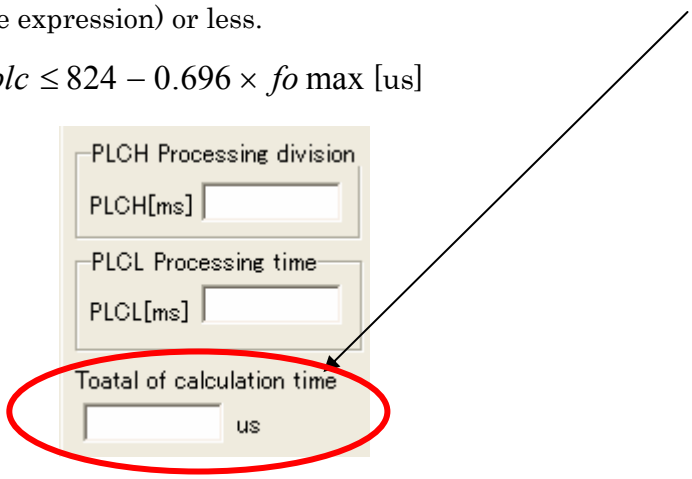
fomax is inverter output frequency when a motor top speed.

$$fo\max = \frac{N\max \times p}{120}\ [\mathrm{Hz}]$$

Nmax : Motor top speed(A-00)
p : Pole of motor(A-06)

From above, when ***fomax*** over 800[Hz], it's necessary to make the total of built-in PLC function calculation time ***Tplc*** (following the expression) or less.

$$Tplc \le 824 - 0.696 \times fo\max\ [\mathrm{us}]$$

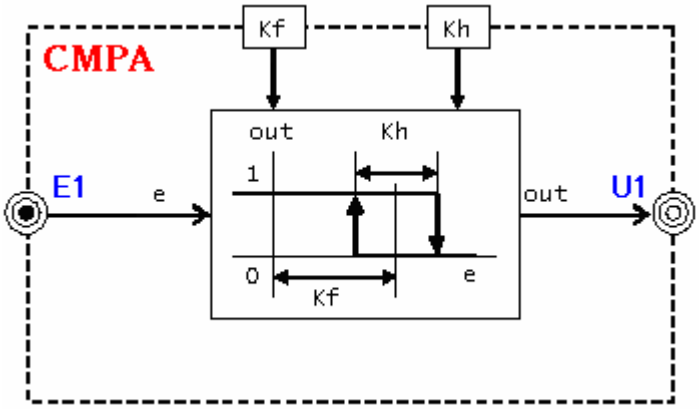


Chapter 2
Control-Block

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

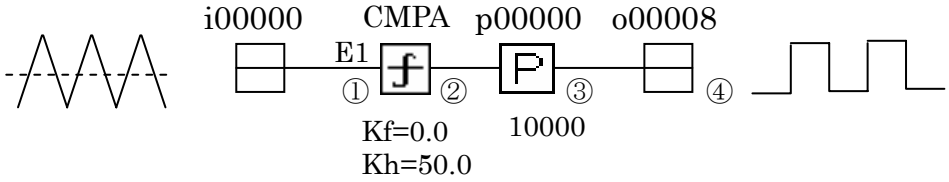
ブロック名	機能
CMPA	It is comparater. When the value of *Kf* or more is input to *E1*, output *zero*. But, *Kf* or less output to *1*. To set deflection in *Kf*, *Kh* is set based on *Kf*.
LAG1	First-order lag element. Delay time is set by *Tf*.
FFWD	The difference with actual motor rotational speed is corrected 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.

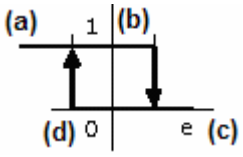
【 CMPA 】		
Input data : 32bit Cal.Time : 0.5μs	Function	It is comparater.When the value of Kf or more is input to E1, output zero. But, Kf or less output to 1.To set deflection in Kf, Kh is set based on Kf.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
Kf	Offset	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Kh	Hysteresis width	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed

[Usage example]





CMPA output

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

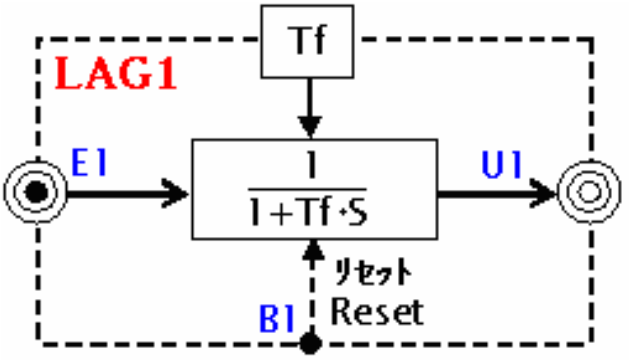
① *i00000* is register that specifies *AIN1*. A triangular wave (Vp-p=10V) is input from the outside to *AIN1*. However, the voltage is converted into 10V/20000 internally.

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 characterristics of ±25% base on 0.0. Therefor, 1 when the state of the input becomes *E1<Kf-25%(-5000)* from *E1≫Kf* is output.
But, 0 when the state of the input becomes *E1>Kf+25%(5000)* from *E1≪Kf* is output.

③ *p00000* is p-register that shown P-area parameter: P-00.
The Coefficient-P has function: [Output=Input*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*. Therefor, square-wave (Amplitude: +2.5V) output from *AOT1*.

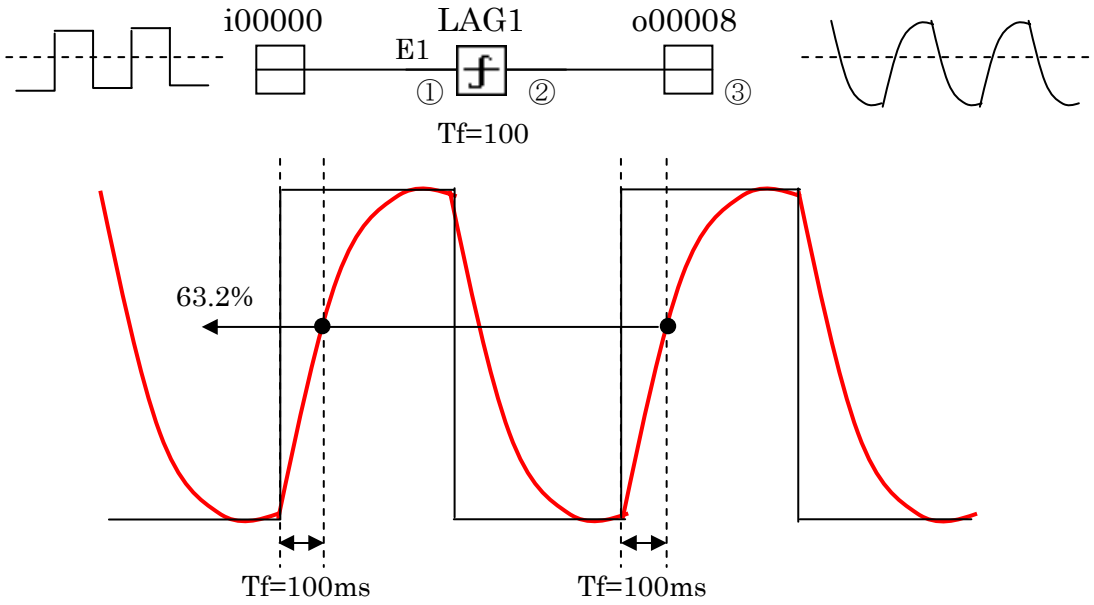
【 LAG1 】		
Input data : Limit to 16bit Cal.Time : 0.8μs	Function	First-order lag element. Delay time is set by Tf.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
Tf	Filter constant time[ms]	1~32767	ms	65536/Tf	Unsigned Max. to 65535
B1	Reset	—	—	B1=1	U1=0

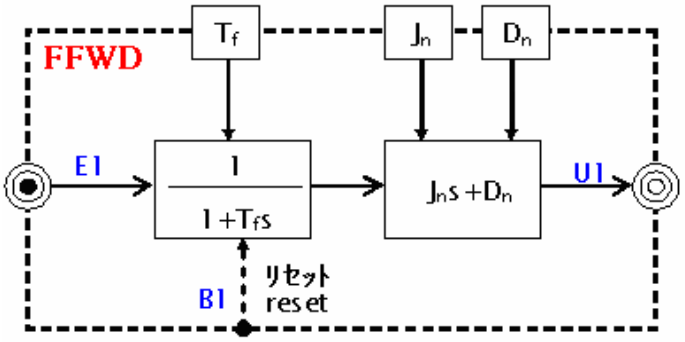
(*1) *E1* is limited to -32767~32767.
(*2) Double the value when *Tf* that is shorter than double of proceesing cycle is set.

[Usage example]



① *i00000* is register that specifies *AIN1*. A square-wave wave (Vp-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*.

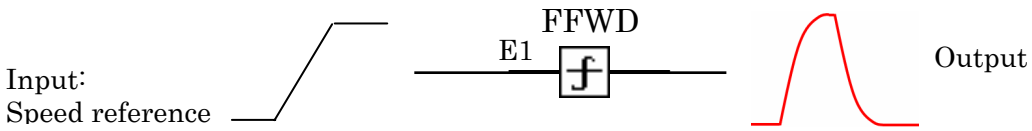
【 FFWD 】		
Input data : Limit to 16bit Cal.Time : 1.9μs	Function	The difference with actual motor rotational speed is corrected to the motor rotational speed reference by value of mortor characterlistic.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
Tf	Filter constant time[ms]	1~32767	ms	65536/Tf	Unsigned Max. to 65535
Jn	Motor reduced inertial	0.001~32.767	注 1 の Jn	Jn*1024	Unsigned
Dn	Motor reduced dumping	0.001~1.999	注 2 の Dn	Dn*32768	Unsigned
B1	Reset	—	—	B1=1	Filter output=E1 U1=0

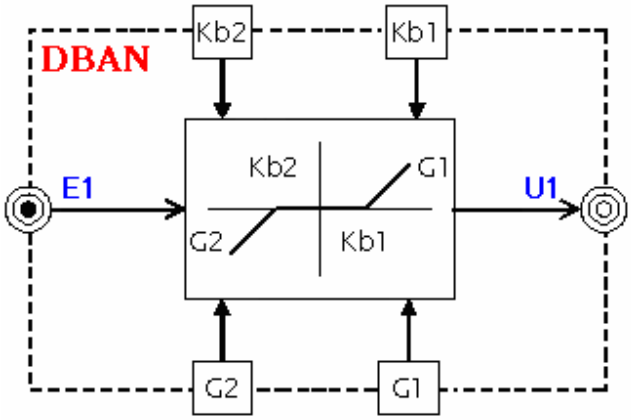
(*1) Jn= Motor reduced inertial [kgm^2]×Speed that corresponds to A-00 [rad/s]／Rated torque[Nm]
(*2) Dn= Motor reduced dumping [Nm・s/rad]×Speed that corresponds to A-00 [rad/s]／Rated torque [Nm]
(*3) *E1* is limited to -32767~32767.
(*4) Double the value when *Tf* that is shorter than double of proceesing cycle is set.

[Usage example]



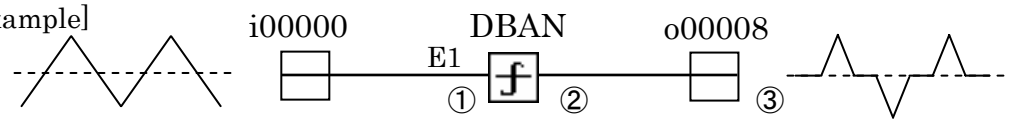
[Characteristics]
① Generally, rotationsl speed reference is input to *E1*.
② Following to rotational speed reference improves by setting value of mortor characterlistic.

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

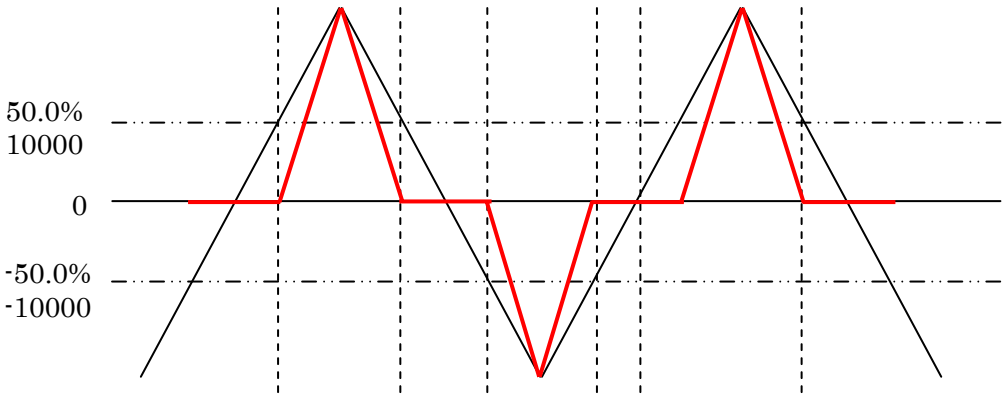


Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
Kb1	Positive dead band	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Kb2	Negative dead band	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
G1	Positive Gain	0.000~32.767	Double	4096*G1	Unsigned
G2	Negative Gain	0.000~32.767	Double	4096*G2	Unsigned

[Usage example]



Kb1=50.0% Kb2=-50.0%
G1=2.000 G2=2.000



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

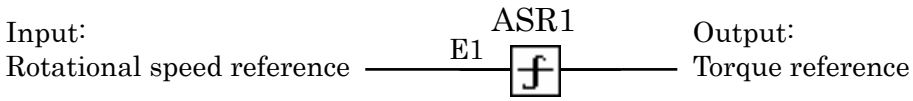
② *Kb1* is set by 50.0 % (10000).So, output is 0, if the input 50.0% or less. It is an idea similar as for a negative side. When the dead band is exceeded, the value in which the gain is multiplied by the input is output.

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

<table>
<tr><td colspan="5">【 ASR1 】</td></tr>
<tr><td colspan="2">Input data : Limit to 16bit
Cal.Time : 3.5μs</td><td>Function</td><td colspan="2">It is a block for a built-in speed control. Sets it by 7.ASrP*, 8.ASri*, and 9.ASrJ*. *Vector mode only</td></tr>
<tr><td colspan="5"> 
</td></tr>
<tr><td rowspan="2">Item</td><td rowspan="2">Contents</td><td colspan="2">Set p-register</td><td rowspan="2">Set the other</td><td rowspan="2">Recital</td></tr>
<tr><td>Setting band</td><td>Unit/CF</td></tr>
<tr><td colspan="5">Item nothing</td></tr>
</table>

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

[Usage example]

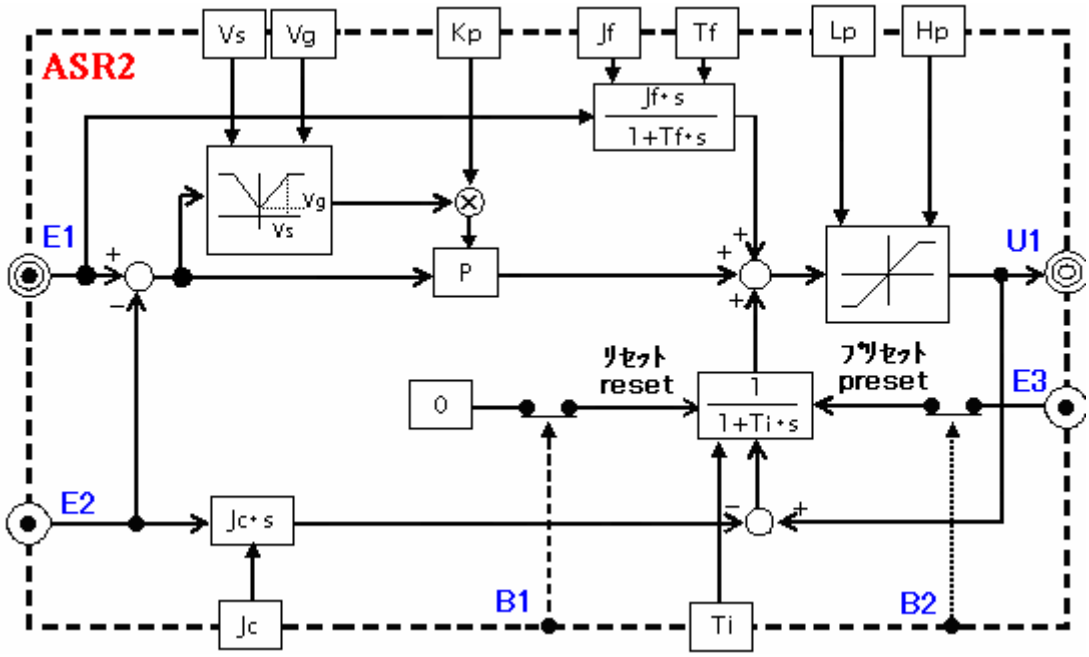


[Characteristics]

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 】

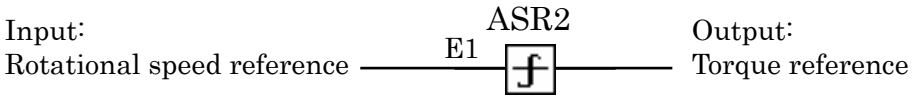
Input data : Limit to 16bit Cal.Time : 4.8μs	Function	It is a block for a speed control. However, it has the function that the gain changes by the velocity deviation.

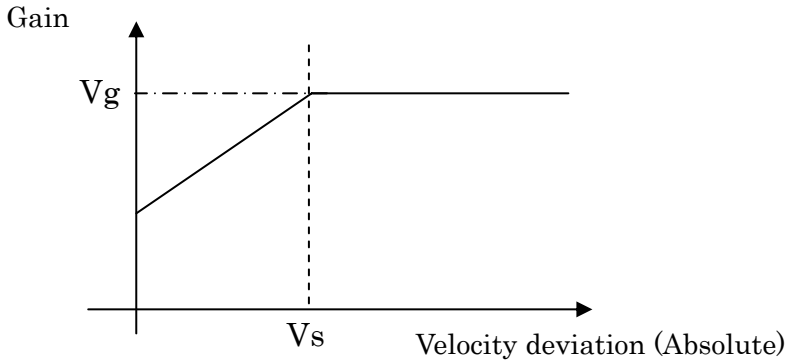


Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E3	Input 3	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Vs	Variable struct gain Variable start speed	0.01~327.67[%]	100.0%/20000	65536/Vs	Unsigned
Vg	Variable struct gain Minimum gain	0.000~32.767	Double	4096*Vg	Unsigned
Kp	Speed gain	0.00~327.67	Double	256*Kp	Unsigned
Jf	Motor reduced inertial	0.001~32.767	*1	Jf*1024	Unsigned
Tf	Filter constant time[ms]	1~32767	ms	65536/Tf	Unsigned Max. to 65535
Lp	Torque lower limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Hp	Torque upper limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Jc	Motor reduced inertial	0.001~32.767	*1	Jc*1024	Unsigned
Ti	Filter constant time[ms]	1~32767	ms	65536/Ti	Unsigned Max. to 65535
B1	Reset	—	—	B1=0	Filter output=0
B2	Pre-Reset	—	—	B2=0	Filter output =E3

(*1) Jf,Jc= Motor reduced inertial [kgm^2]×Speed that corresponds to A-00 [rad/s]／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 proceesing cycle is set.

[Usage example]



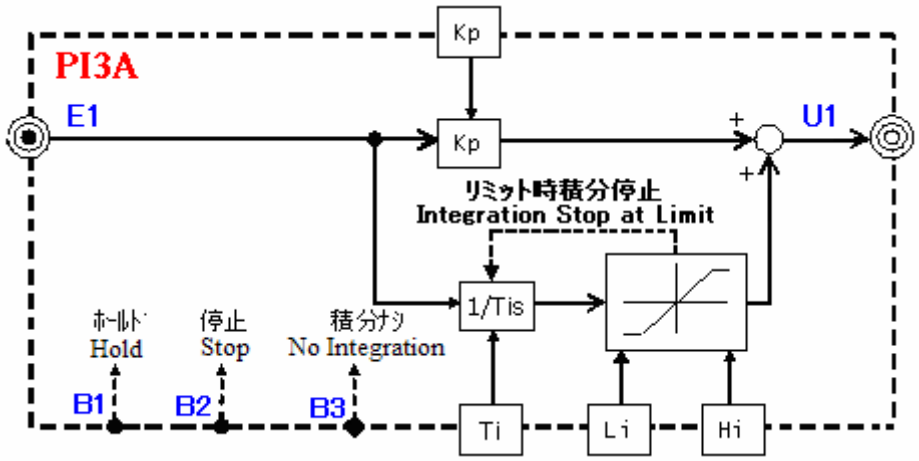


[Characteristics]

① *Kp* can be changed by input Velocity deviation.
② The feedfoward 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 】

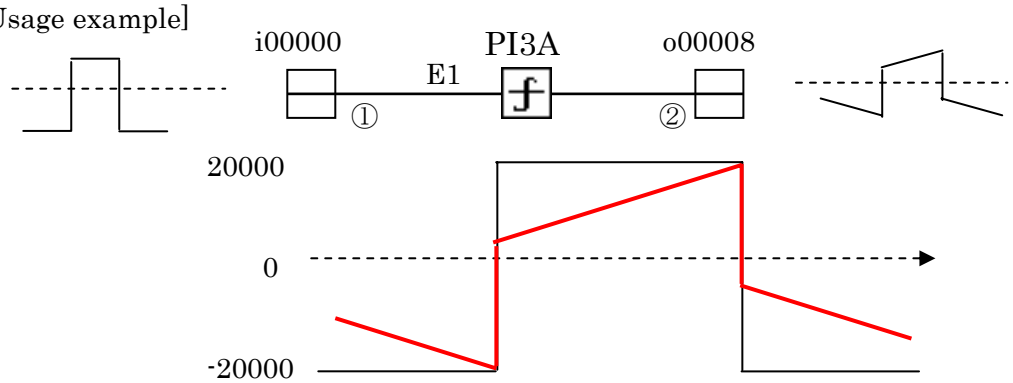
Input data : Limit to 16bit Cal.Time : 2.1μs	Function	It is PI controller with the integration output limitation. It is possible to change only to proportional control by B3.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
Kp	Proportional gain	0.00~327.67	Double	256*Kp	Unsigned
Ti	Integration constant time[ms]	1~32767	ms	262144/Ti	Unsigned Max. to 65535
Li	Integration output lower limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Hi	Integration output upper limit	-163.8~163.8[%]	100.0%/20000	Unchanged	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]

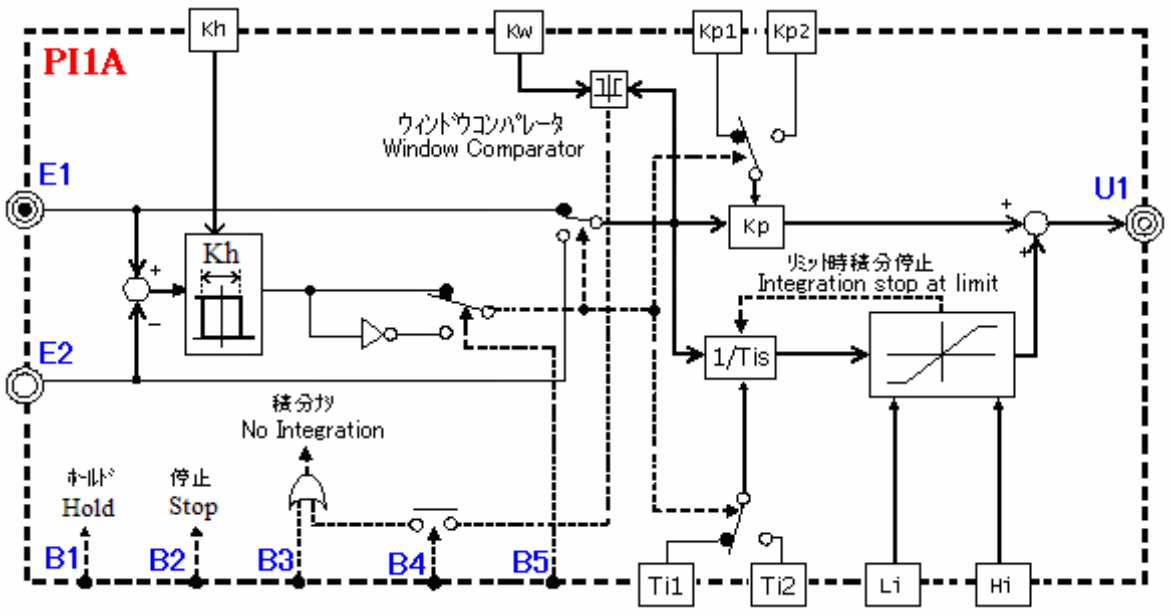


① *i00000* is register that specifies *AIN1*. A square-wave wave (Vp-p=10V) is input from the outside to *AIN1*. However, the voltage is converted into 10V/20000 internally.

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 】

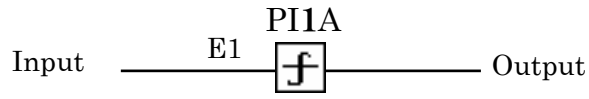
Input data : Limit to 16bit Cal.Time : 2.7μs	Function	The proportional gain and integration time constant can be changed according to the difference of two inputs.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Kh	Hysteresis width	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Kw	Window comparater width	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Kp1	Proportional gain 1	0.00~327.67	Double	256*kp1	Unsigned
Kp2	Proportional gain 2	0.00~327.67	Double	256*kp2	Unsigned
Ti1	Integration constant time 1[ms]	1~32767	ms	262144/Ti1	Unsigned Max. to 65535
Ti2	Integration constant time 2[ms]	1~32767	ms	262144/Ti2	Unsigned Max. to 65535
Li	Integration output lower limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Hi	Integration output upper limit	-163.8~163.8[%]	100.0%/20000	Unchanged	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 Swicth:ON
B5	Priority polarity reversion	—	—	B5=1	Polarity reversion

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

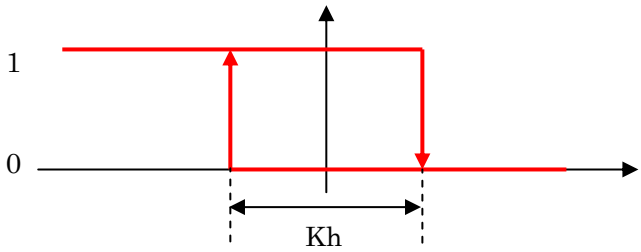
[Usage example]



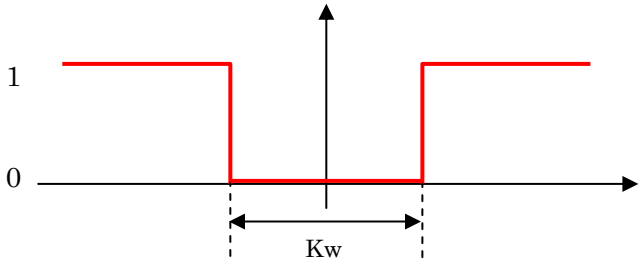
[Characteristics]

① Common part is same as *PI3A*.

② It can be changed according to the difference of *E1* and *E2:Kp1,Kp2,Ti1,Ti2*
However, *Kh* has the hysteresis characteristics.



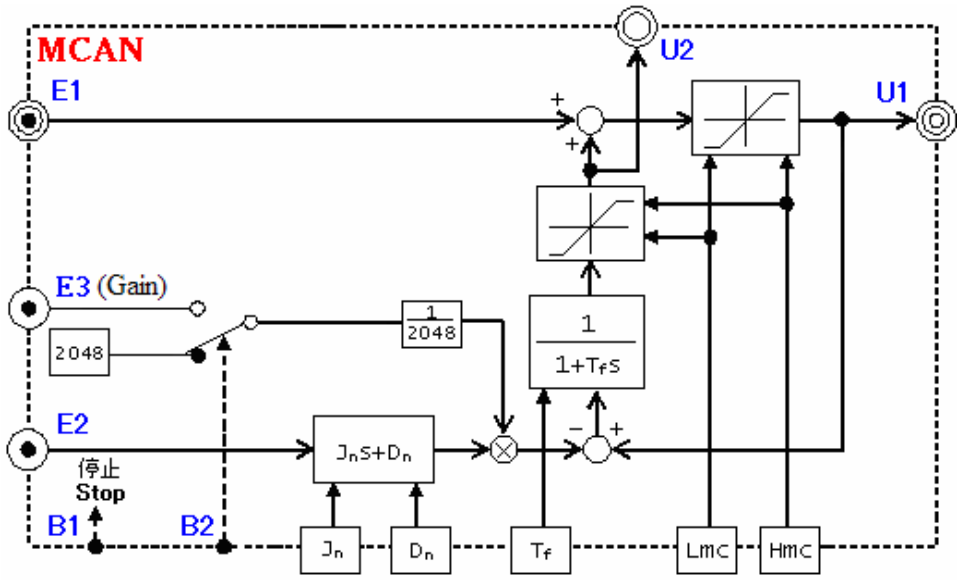
③ It has Window comparater function. Absolute of *E1* is *Kw/2* or more and the output of integration output is 0.



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

【 MCAN 】

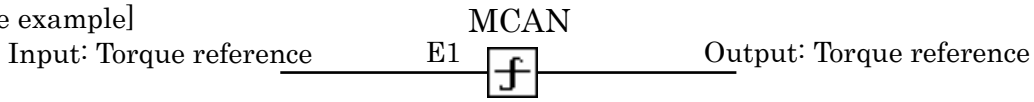
Input data : 32bit Cal.Time : 2.7μs	Function	The control that brings the value requested by actual rotational speed, inertial, and dumping close to the torque reference or more is done.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E3	Input 3(Gain)	-1599.9~1599.9[%]	100.0%/20000	Gain*2048	Signed
U2	Output 2	—	—	—	
Jn	Motor reduced inertial	0.001~32.767	*1	Jn*1024	Unsigned
Dn	Motor reduced dumping	0.001~1.999	*2	Dn*32768	Unsigned
Tf	Filter constant time[ms]	1~32767	ms	65536/Tf	Unsigned Max. to 65535
LMC	Output lower limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
HMC	Output upper limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
B1	Stop	—	—	B1=1	U1=U2=0
B2	Change Input 3	—	—	B2=1	Select E3

(*1) Jn= Motor reduced inertial [kgm^2]×Speed that corresponds to A-00 [rad/s]／Rated torque[Nm]
(*2) Dn= Motor reduced dumping [Nm・s/rad]×Speed that corresponds to A-00 [rad/s]／Rated torque [Nm]
(*3) Double the value when *Tf* that is shorter than double of proceesing cycle is set.

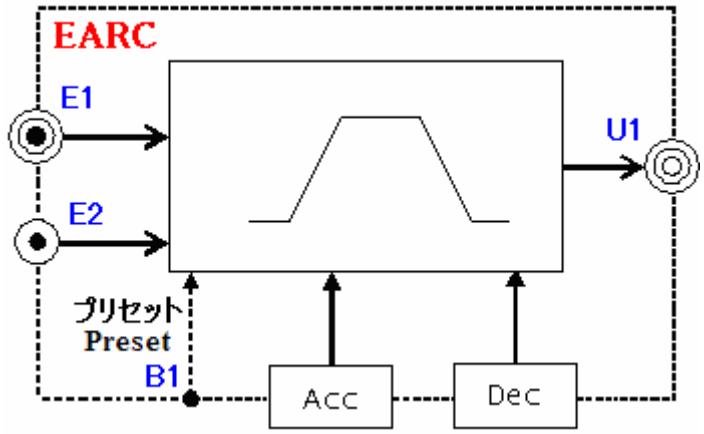
[Usage example]



[Characteristics]
① Torque reference is set to *E1*.
② Motor rotational speed is set to *E2*.
③ Estimated the torque from motor rotational speed and adding it to the torque reference.
④ The precipitous fluctuations of load to torque fluctuations is controlled.

【 EARC 】

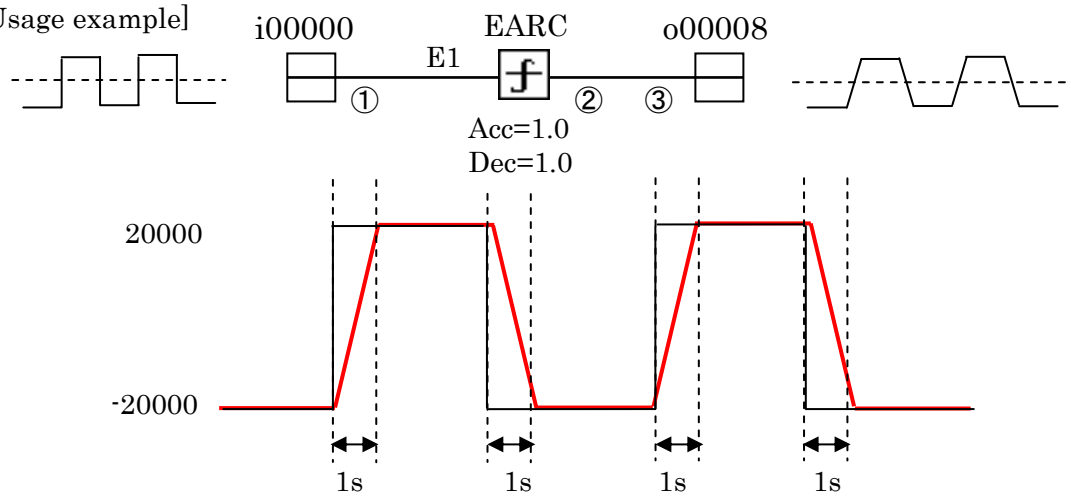
Input data : Limit to 16bit Cal.Time : 0.7μs	Function	Easy amplitude and rise time compensation.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Acc	Change rate of acceleration	0.1~200.0	sec	5120/Acc	Unsigned
Dec	Change rate of deceleration	0.1~200.0	sec	5120/Dec	Unsigned
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*.

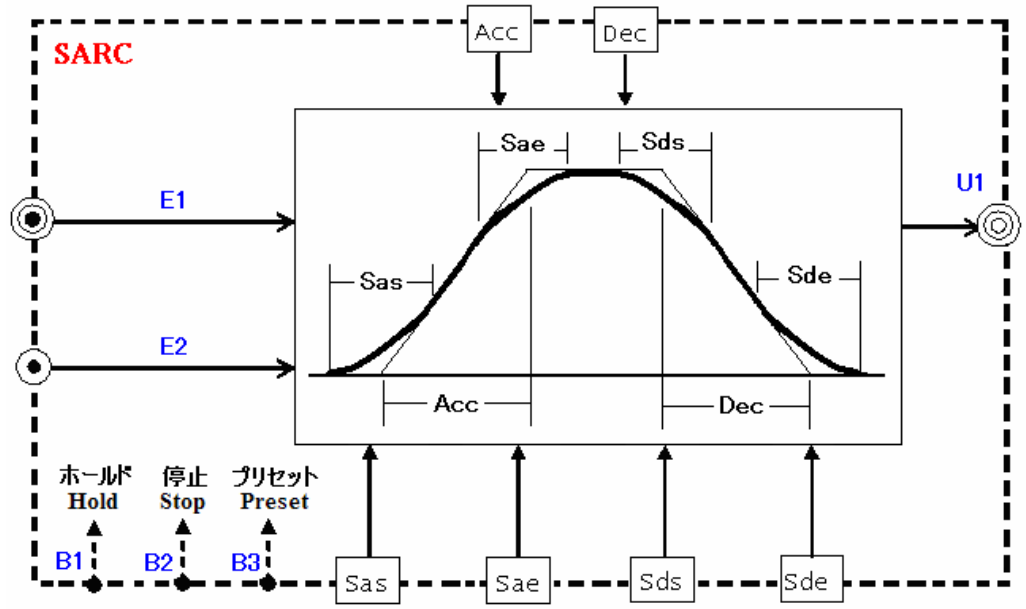
[Usage example]



① *i00000* is register that specifies *AIN1*. A square-wave wave (Vp-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 】

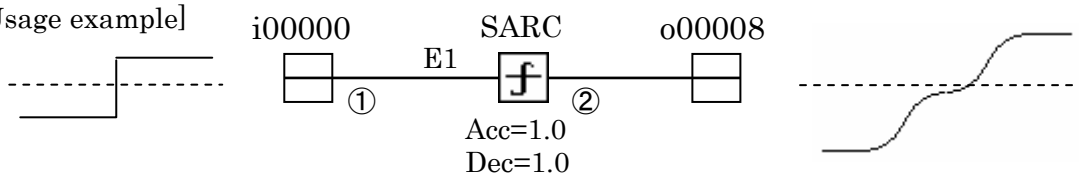
Input data : Limit to 16bit Cal.Time : 9.2μs	Function	S-pattern amplitude and rise time compensation. The frank part is made smooth movement.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Acc	Acceleration time	0.1~200.0	sec	5120/Acc	Unsigned
Dec	Deceleration time	0.1~200.0	sec	5120/Dec	Unsigned
Sas	Acc. rise time	0.1~20.0	sec	4194.304/Sas	Unsigned
Sae	Acc. reach time	0.1~20.0	sec	4194.304/Sae	Unsigned
Sds	Dec. fall time	0.1~20.0	sec	4194.304/Sds	Unsigned
Sde	Dec. reach time	0.1~20.0	sec	4194.304/Sde	Unsigned
B1	Hold	—	—	B1=1	Holding operation
B2	Stop	—	—	B2=1	E1=0
B3	Pre-Reset	—	—	B3=1	U1=E2

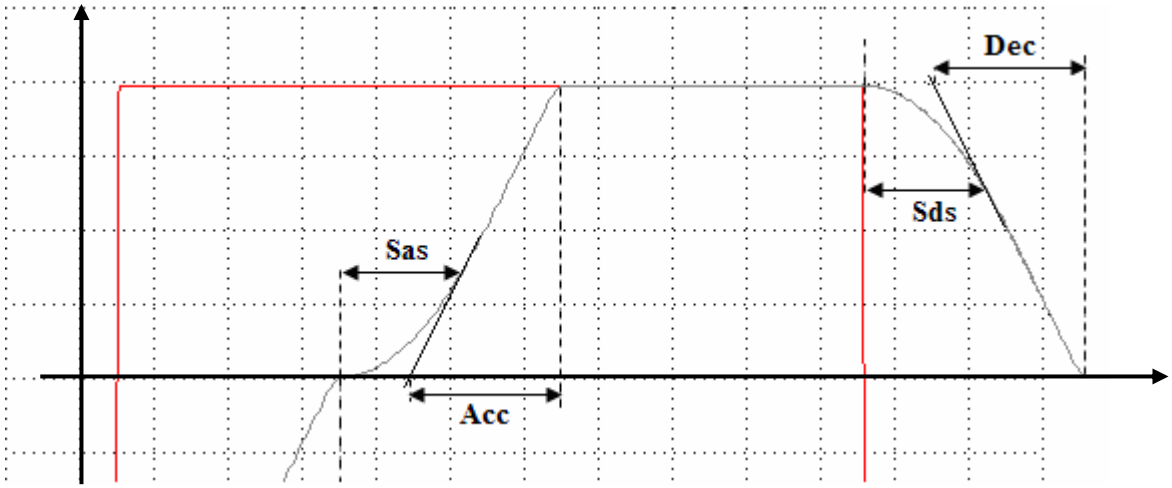
(*1) *E1* is limited to -32767~32767.
(*2) *Acc* is time that 0 to ±20000 *U1*. Dec is time that ±20000 to 0 *U1*.
(*3) *Sas* is time that 0 to *Acc*. *Sae* is time that *Acc* to reference value.
(*4) *Sds* is time that reference value to *Dec*. *Sde* is time that *Dec* to 0.
(*5) When the sign of *E1* 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]

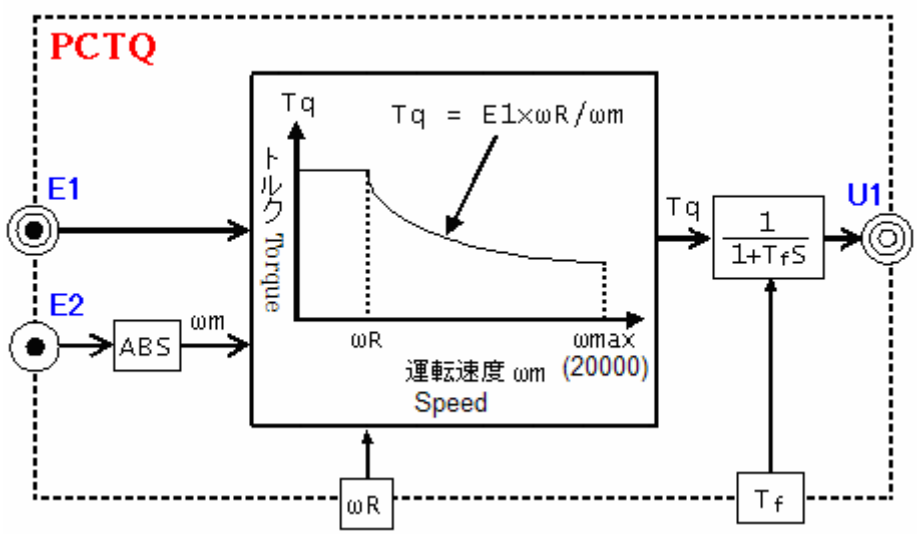


① *i00000* is register that specifies *AIN1*. A square-wave wave (Vp-p=10V) is input from the outside to *AIN1*. However, the voltage is converted into 10V/20000 internally.

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*.



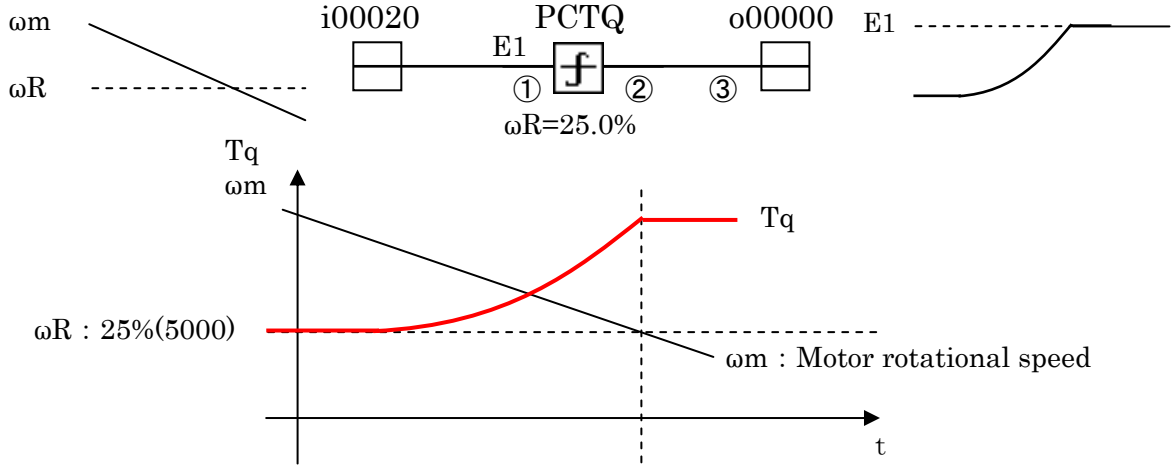
【 PCTQ 】		
Input data : Limit to 16bit Cal.Time : 2.1μs	Function	E1 is torque reference, E2 is speed referencr. The torque reference converted to become a constant electric power by the rotational speed of ωR or more is output.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
ωR	Torque developmental speed	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Tf	Filter constant time[ms]	1~32767	ms	65536/Tf	Unsigned Max. to 65535

(*1) *E1* is limited to -32767~32767.
(*2) Tq is Tq=E1 when |E2|<ωR. Also,Tq=E1・ωR/|E2| in the other.
(*3) Double the value when Tf that is shorter than double of proceesing cycle is set.

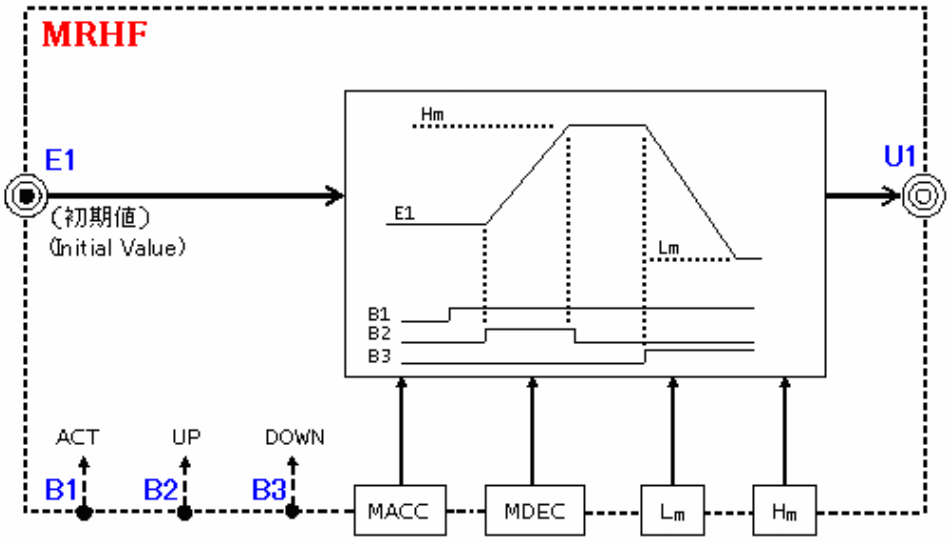
[Usage example]



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 】

Input data : Limit to 16bit	Function	Accelerates or decelerates by the control signal.
Cal.Time : 1.2μs		



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
MACC	Acceleration time	0.1~200.0	sec	5120/MACC	Unsigned
MDEC	Deceleration time	0.1~200.0	sec	5120/MDEC	Unsigned
Lm	Lower limit	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Hm	Upper limit	-163.8~163.8[%]	100.0%/20000	Unchanged	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.

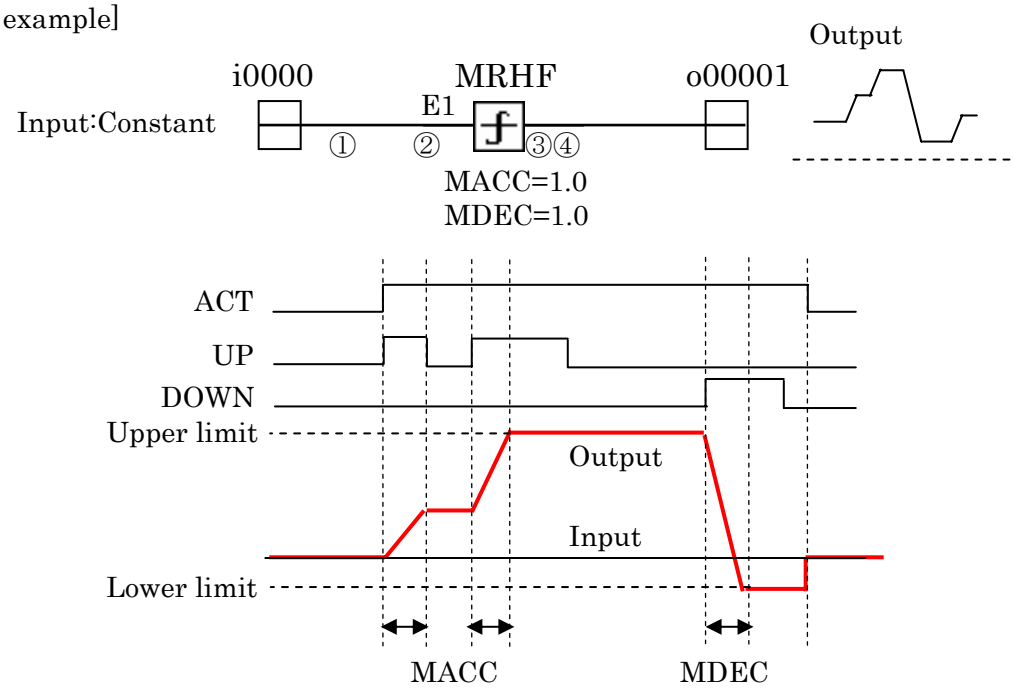
(*2) Refer to the following table for the signal operation.

Connection between Input and Control signal

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

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

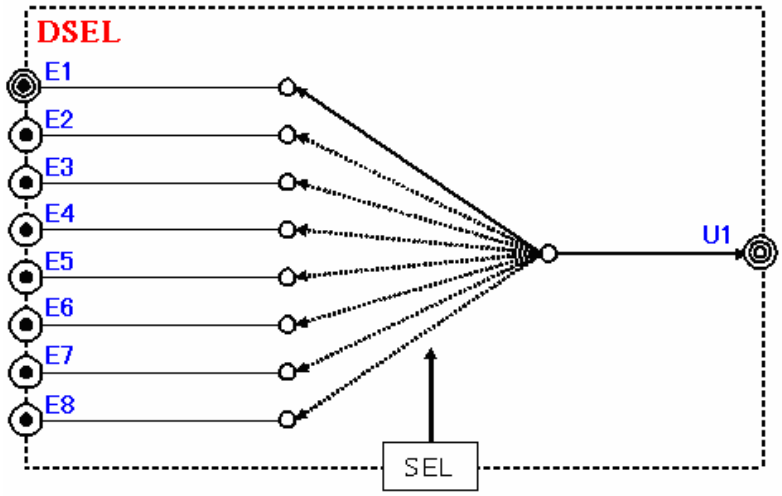
[Usage example]



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 】

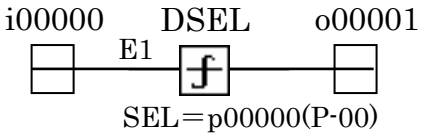
Input data : 32bit Cal.Time : 0.4μs	Function	The input data is selected by SEL.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E3	Input 3	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E4	Input 4	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E5	Input 5	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E6	Input 6	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E7	Input 7	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
E8	Input 8	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
SEL	Select Input	—	—	Unchanged	*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

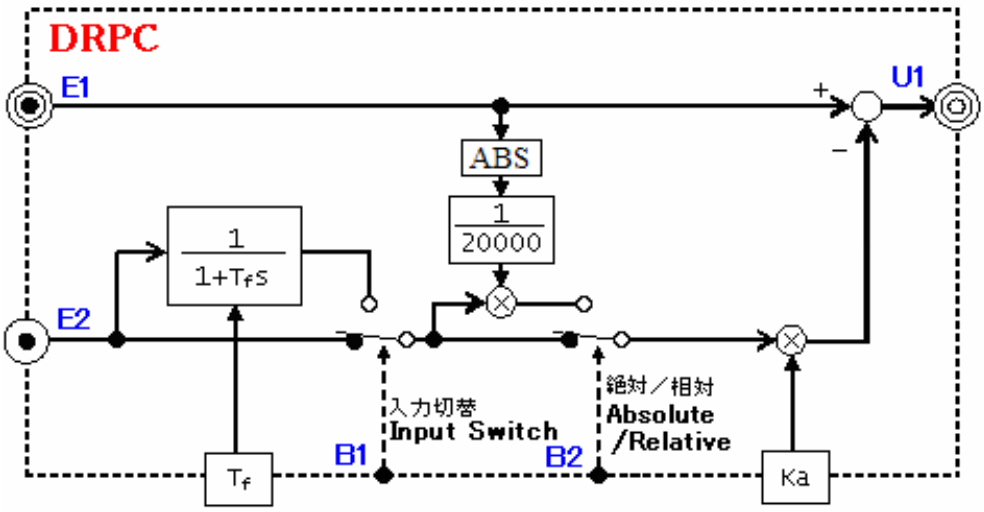
[Characteristics]

① Change the output according to *SEL*.

② If P-area is set parameter to SEL, it can be easily changed.

【 DRPC 】

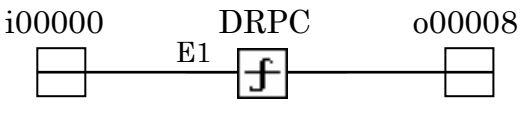
Input data : 32bit Cal.Time : 1.7μs	Function	The drooping control. The change relativity and absolutely is possible according to B2.

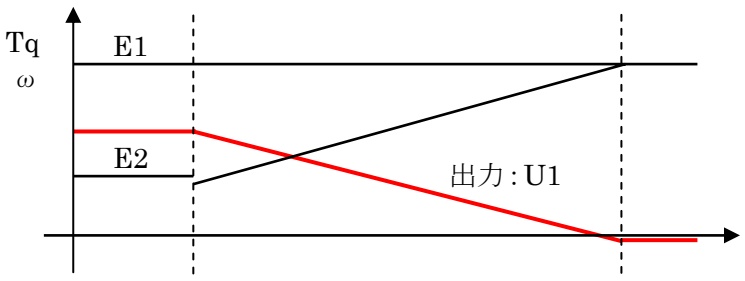


Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Tf	Filter constant time[ms]	1~32767	ms	65536/Tf	Unsigned Max. to 65535
Ka	Amount of droop	0.000~32.767	Double	4096*Ka	Unsigned
B1	Select Input	—	—	B1=1	Use Filter
B2	Absolute/Relative	—	—	B2=1	Relative drooping

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

[Usage example]



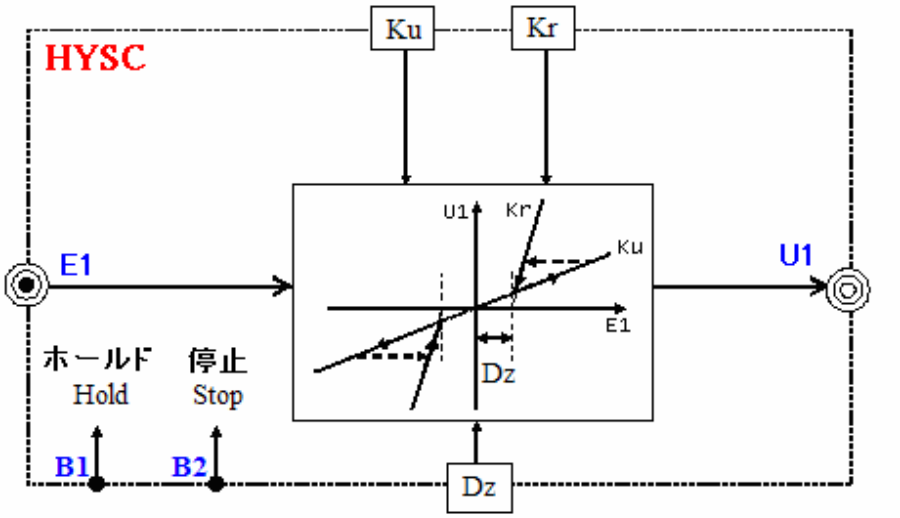


[Characteristics]

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

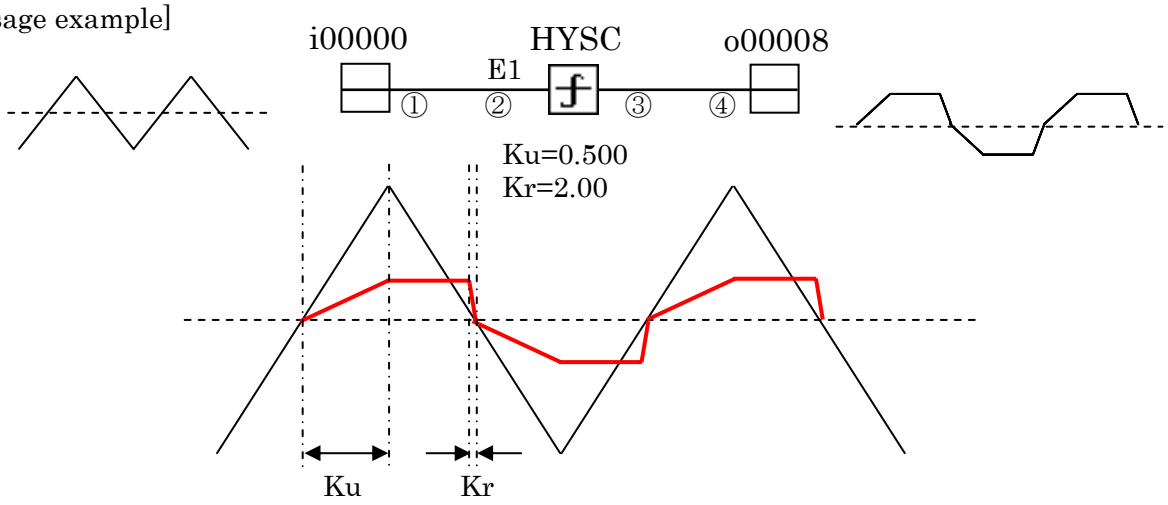
【 HYSC 】

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



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
Ku	Hysteresis rise gain	0.000~32.767	Double	4096*Ku	Unsigned
Kr	Hysteresis fall gain	0.00~327.67	Double	256*kr	Unsigned
Dz	Dead-band zone	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
B1	Hold	—	—	B1=1	Hold output
B2	Stop	—	—	B2=1	U1=0

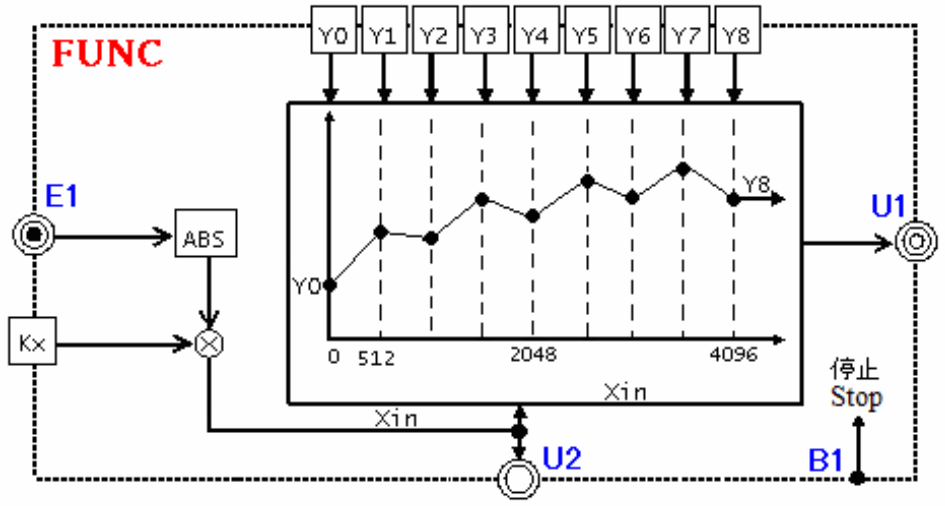
[Usage example]



① *i00000* is register that specifies *AIN1*. A triangular wave (Vp-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 multipled 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*.

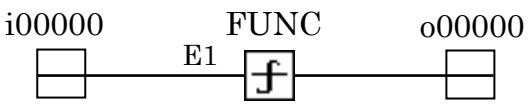
【 FUNC 】

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



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
U2	Output 2	—	—	—	
Kx	Setting value 1	0.000~32.767	Double	4096*Kx	Unsigned
Y0	Setting value 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y1	Setting value 3	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y2	Setting value 4	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y3	Setting value 5	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y4	Setting value 6	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y5	Setting value 7	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y6	Setting value 8	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y7	Setting value 9	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y8	Setting value 10	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
B1	Stop	—	—	B1=1	U1=0

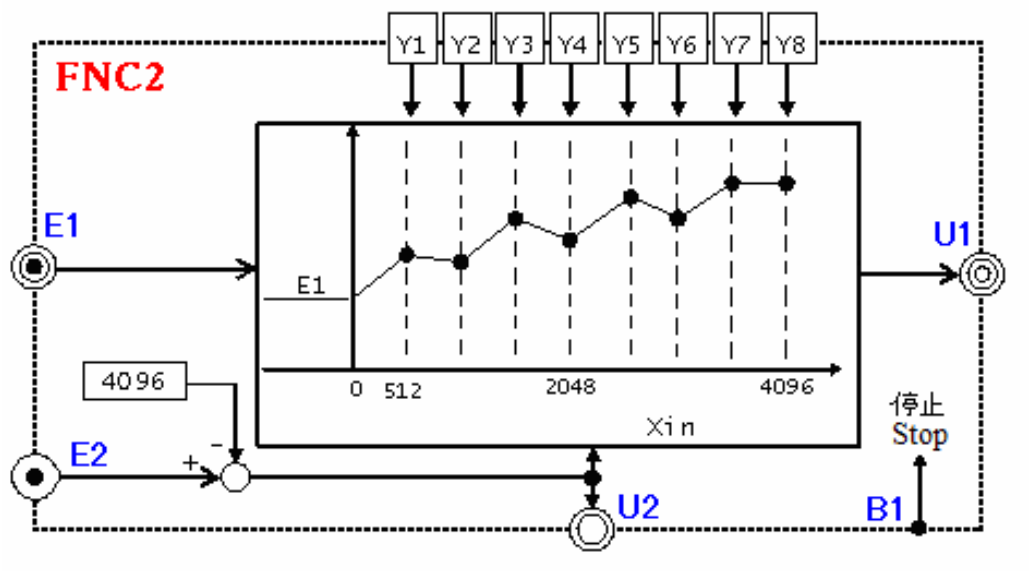
[Usage example]



* Refer to FNC2 [FUNC usage].

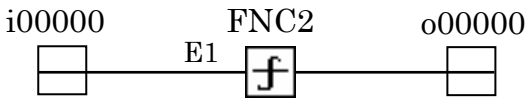
【 FNC2 】

Input data : 32bit Cal.Time : 1.0μs	Function	FNC2 ties to FUNC to use two or more FUNC continuously.



Item	Contents	Set p-register		Set the other	Recital
		Setting band	Unit/CF		
E2	Input 2	—	—	Unchanged	
U2	Output 2	—	—	—	
Y1	Setting value 1	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y2	Setting value 2	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y3	Setting value 3	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y4	Setting value 4	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y5	Setting value 5	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y6	Setting value 6	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y7	Setting value 7	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
Y8	Setting value 8	-163.8~163.8[%]	100.0%/20000	Unchanged	Signed
B1	Stop	—	—	B1=1	U1=0

[Usage example]



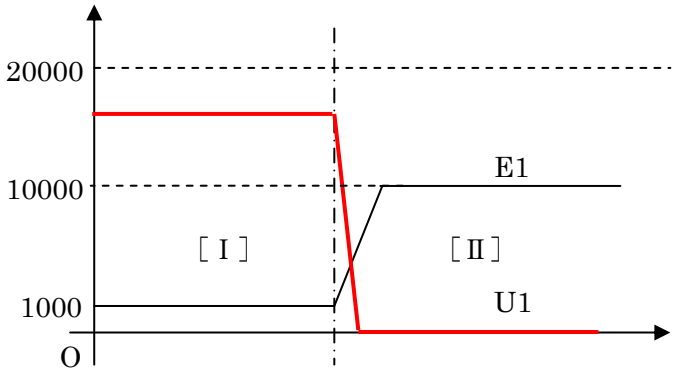
[FUNC usage]

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≦E1) because input is 10000 is output.



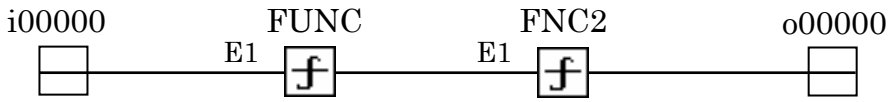
FUNC setting

	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 necessaly 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	Recital
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	Recital
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	Recital
RI0000~RI000F	Holding relay for PLCL	16 points
RI1000~RI100F	Holding relay for PLCH	16 points

3-4. Input relay

	Relay	Contents ⋮ Item	Recital
Input data (Input terminal)	I00000	ST-F terminal block input	VFC66-Z terminal
	I00001	Multi-function input MI1 (VFC66)	
	I00002	Multi-function input MI2 (VFC66)	
	I00003	Multi-function input MI3 (VFC66)	
	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 (IO66EX)	IOEXT66-Z terminal
	I0000B	Multi-function input MI13 (IO66EX)	
	I0000C	Multi-function input MI14 (IO66EX)	
	I0000D	Multi-function input MI15 (IO66EX)	
	I0000E	Multi-function input MI16 (IO66EX)	
	I0000F	Multi-function input MI17 (IO66EX)	
	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	Recital
Input from communication option	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		
	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 (Speed=detection speed)	H-06~ H-08	Detection rotation speed
	I00045	Multi-function output rotation speed(frequency)detection (Speed>=detection speed)		
	I00046	Multi-function output rotation speed(frequency)detection (Speed<=detection speed)		
	I00047	Multi-function output rotation speed(frequency)detection (Speed=detection speed)		
	I00048	Multi-function output rotation speed(frequency)detection (Speed>=detection speed)		
	I00049	=Multi-function output rotation speed(frequency)detection (Speed<=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		
	I00051	Multi-function output under voltage		Ttouble and Check

	Relay	Contents	Item	Recital
Inverter internal state	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		Ttouble and Check (*Nothing 7.5kW or less)
	I00063~72	Not Used		——

3-5. Output relay

(*Output relay can arrange only PLCL.)

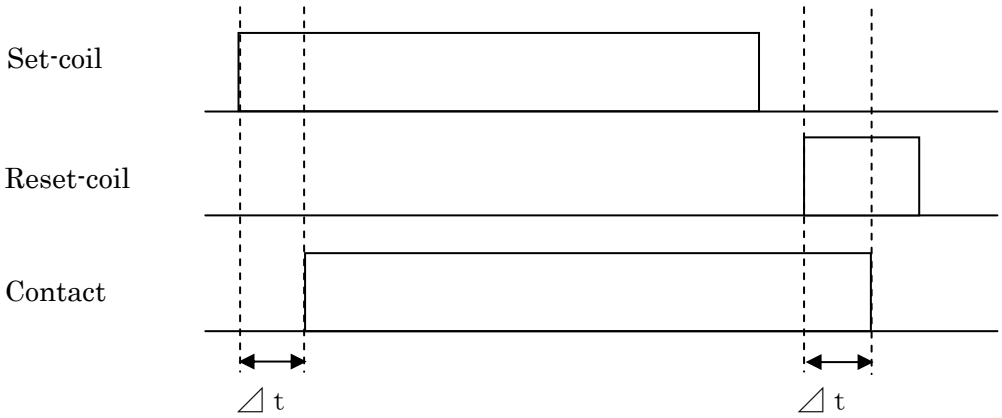
	Relay	Contents	Item	Recital
Command to inverter	O00000	RUN command		Command to inverter
	O00001	RUN command		
	O00002	Emergency stop command		
	O00003	Protect reset		
	O00004	JOG command		
	O00005	Initial excitation start command		
	O00006	DC brake command	b-01~03	
	O00007	0 speed hold command		
	O00008	Preset rotational speed(frequency) 1 select command	d-15	Select Pre-set speed command
	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		———
	O00012	Max.rotational speed reduction command	H-12	Speed/Frequency
	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	Uesd 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	Recital
	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	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)		
	O00033	Multi-function output MO2 (VFC66)		
	O00034	Multi-function output MO3 (Option)		Option board terminal
	O00035	Multi-function output MO4 (Option)		
	O00036	Multi-function output MO5 (IO66EX)		IOEXT66-Z terminal
	O00037	Multi-function output MO6 (IO66EX)		
	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		

3-6. Latch relay

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

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



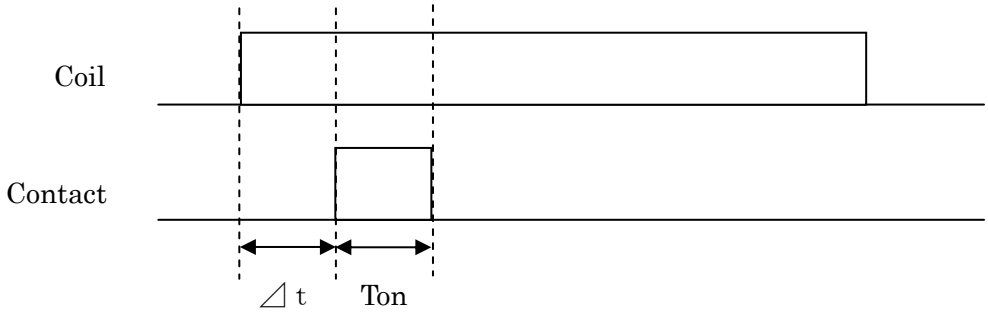
Relay	Contents	Recital
LS0000~LS000F	Set-coil for PLCL	16 points(For PLCL)
LS1000~LS1007	Set-coil for PLCH	8 points(For PLCH)
LR0000~LR000F	Reset-coil for PLCL	16 points(For PLCL)
LR1000~LR1007	Reset-coil for PLCH	8 points(For PLCH)
LC0000~LC000F	Latch contact for PLCL	16 points(For PLCL) (*PLCH is also 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 ⊿t are displayed in PLCH[ms] or PLCL[ms] at the left of the window.

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



Relay	Contents	Recital
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 PLC) (*PLCH is also possible)

3-8. OFF-Differential relay

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

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

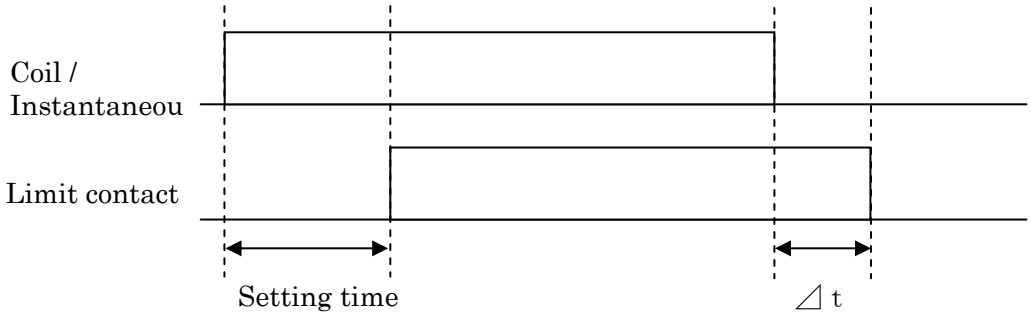
However, ⊿t is big when operated by terminal. For example, when PLCL processing time:5ms, it becomes ⊿t that adds 3~8ms. Also when PLCL processing time:10ms, it becomes ⊿t that adds 3~13ms.

Relay	Contents	Recital
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 aftr the elapse ⊿t after the coil is turned off. The ⊿t 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)



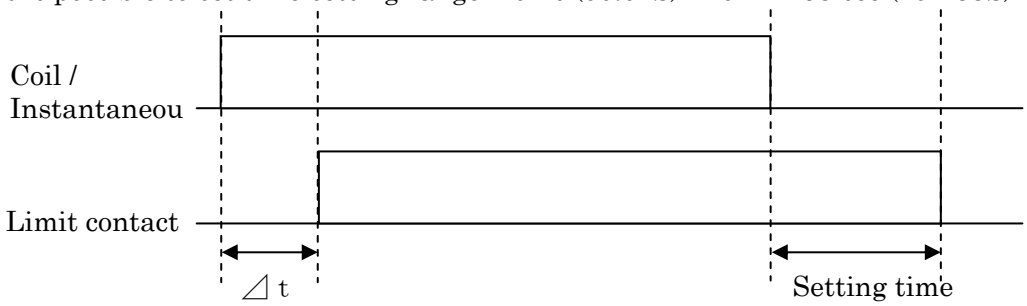
Relay	Contents	Recital
TS0000~TS000F	Coil and instantaneous contact for PLCL	16 points(For PLCL)
TD0000~TD000F	Time limit contact for PLCL	16 points(For PLCL) (*PLCH is also possible)

*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 aftr the elapse ⊿t after the coil is turned on. The ⊿t are displayed in PLCL[ms] at the left of the window.

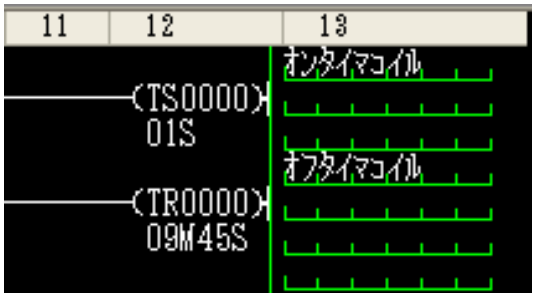
It is possible to set time setting range: 10ms (00.01S) ~10 min 55 sec (10M55S) (Resolution: 10ms)



Relay	Contents	Recital
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】

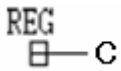
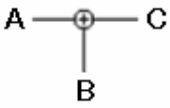
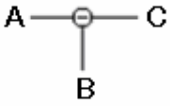
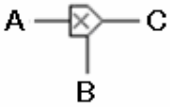
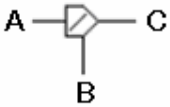
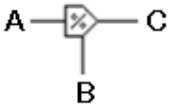
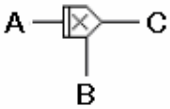
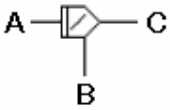
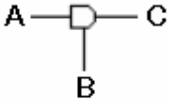
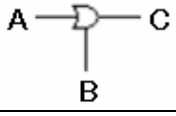
Refer to the figure below.

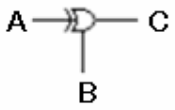
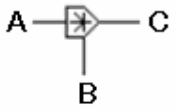
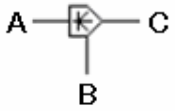
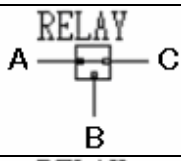
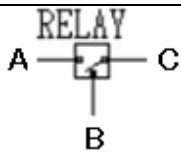
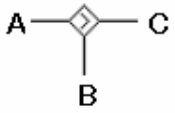
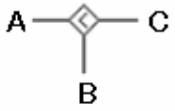
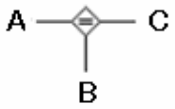
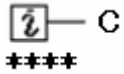


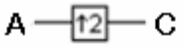
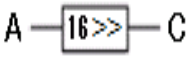
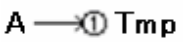
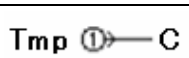
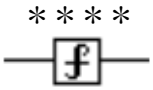
Chapter 4
Dataflow-Block

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

4-1. Dataflow command

Command	Symbol	Contents	Cal.Time	Recital
Load		C=REG	0.113μs	(*Load is possible arenging regardless of PLCH or PLCL.)
Store		REG=A C=A	0.225μs	Limit to -32768~32767
Load and Store			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 AND A	0.088μs	
OR		C=B OR A	0.088μs	

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

Command	Symbol	Contents	Cal.Time	Recital
Spuare		C=A*A/20000	1.200μs	With round-off
P-area parameter Coefficient		C=A*P	0.175μs	The coefficient is specified *p-register*.
Right shift		C=A/65536	0.100μs	
Left shift		C=A*65536	0.088μs	
Connector load		Tmp=A	0.088μs	For conectting 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 discribe graph by *VF Monitor*.

Register	Contents	Recital
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 *Built-in 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	Recital
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 tha 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. Therefor, 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

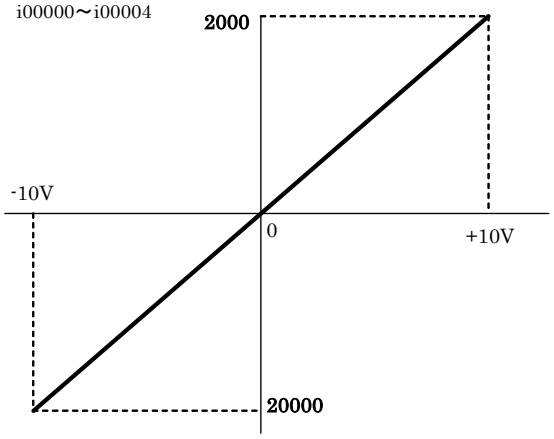
* The conversion processing of a set value is done by the automatic operation internally when the p-register is set to item of Control-block.
For details refer to *Chapter 2 Control-block.*

4-4. Input register

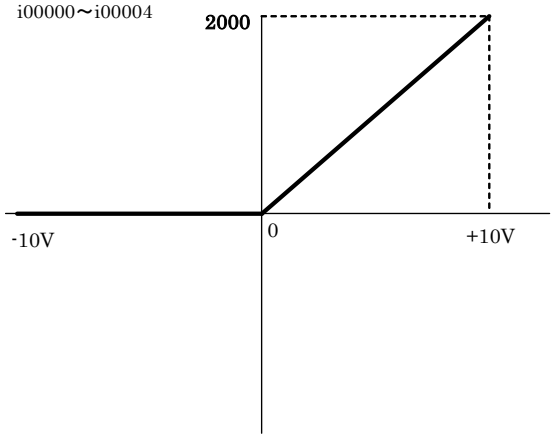
	Register	Contents	Item	Recital
Command data (Analog input terminal)	i00000	Analog input AIN 1 (VFC66-Z)	b-17 b-20	20000/10V*1
	i00001	Analog input AIN 2 (Option board)	G-03	20000/10V*1
	i00002	Analog input AIN 3 (IO66-Z)	G-06	20000/10V*1
	i00003	Analog input AIN 4 (IOEXT66-Z)	G-11	20000/10V*1
	i00004	Analog input AIN 5 (IOEXT66-Z)	G-12	20000/10V*1
	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	7500/150%(-10V)*3
	i0000B	Analog input AIN2 Torque command (Option board)	G-03 i-09	7500/150%(-10V)*3
	i0000C	Internal ARC output Rotational speed command		20000/(A-00)
	i0000D~0000F	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)		
	i00013	Digital communication option input 4 (Clock Data U:hour L:min)		
	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~0001F	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)
	i00026	Torque command(only Vector-control)		5000/100%

	i00027	Overload counter	10000/100%
	i00028	Motor temperature	10/℃
	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	

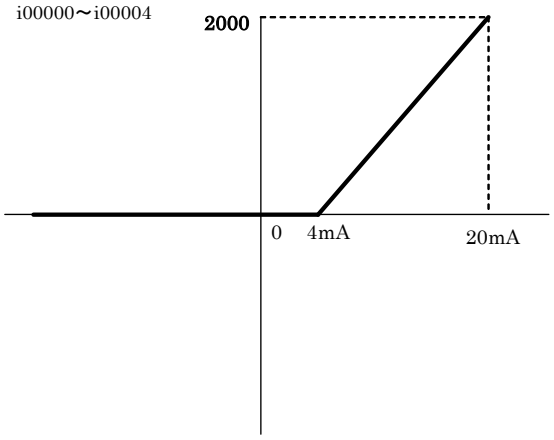
*1 : The relations with *i00000~i00004* and the analog input is shown in the figure below.



Input characteristic(0~±10V)



Input characteristic(0~10V)

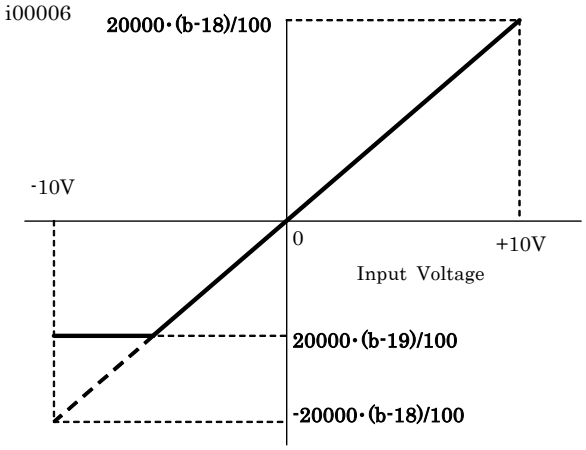


Input characteristic(4~20mA)

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.).

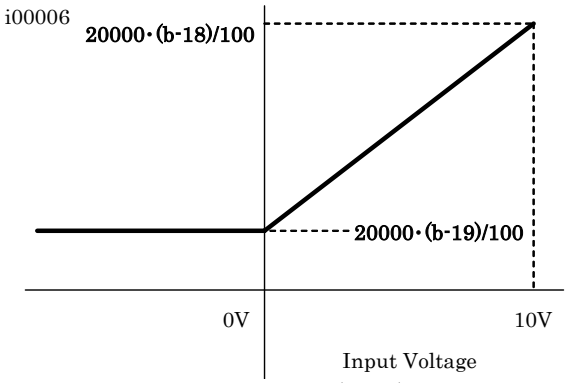
*2 : The relations with i00006~i00008 and the analog input is shown in the figure below.
And the figure below is shown as i00006. i00007 is set by: G-03~05. i00008 is set by: G-06~08.

・Voltage input:0~±10V

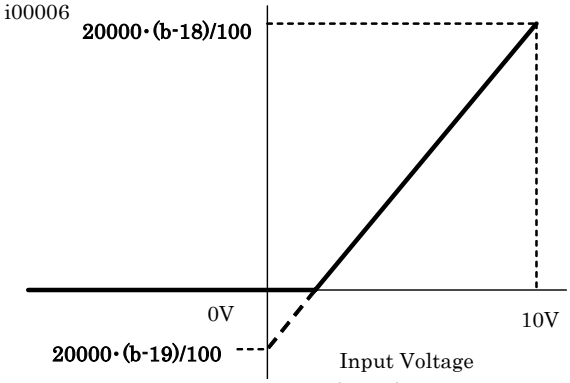


Input characteristic(0~±10V)

・Voltage input:0~10V

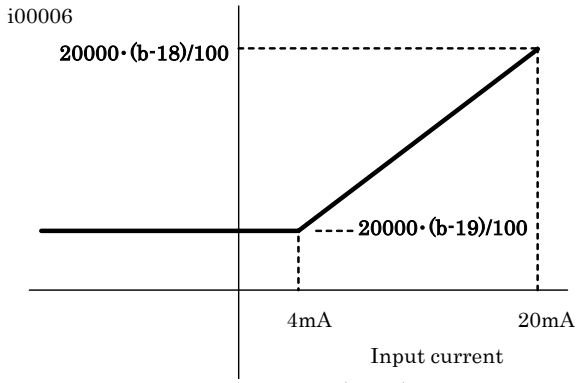


Lower limit speed(b-19)-positive
Input characteristic(0~10V)

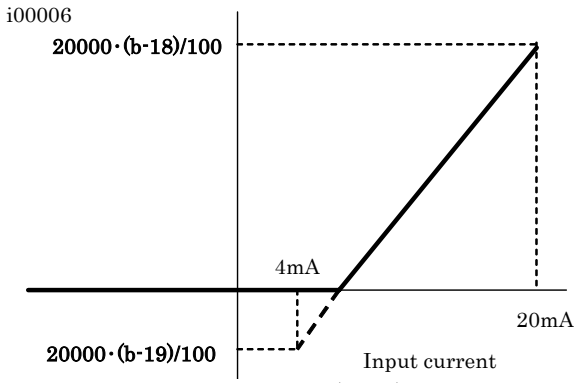


Lower limit speed(b-19)-negative
Input characteristic(0~10V)

・Current input:4~20mA



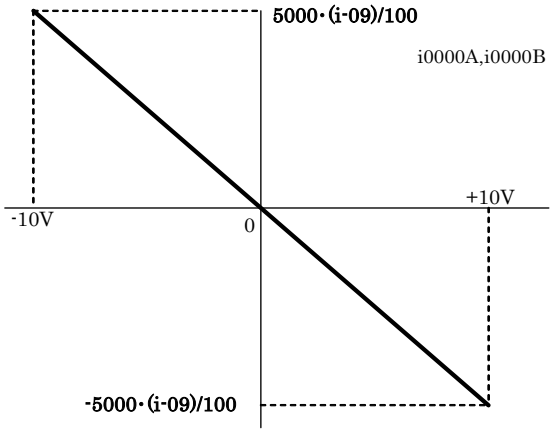
Lower limit speed(b-19)-positive
Input characteristic(4~20mA)



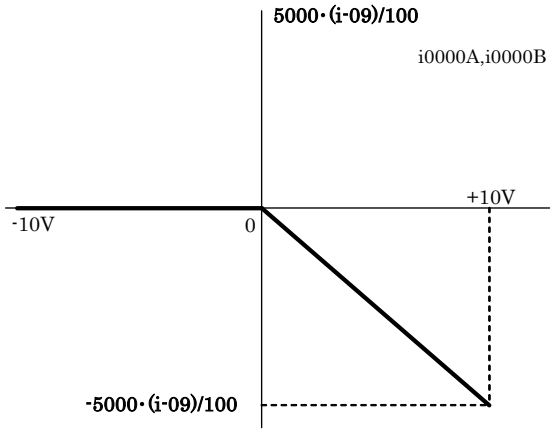
Lower limit speed(b-19)-negative
Input characteristic(4~20mA)

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.).

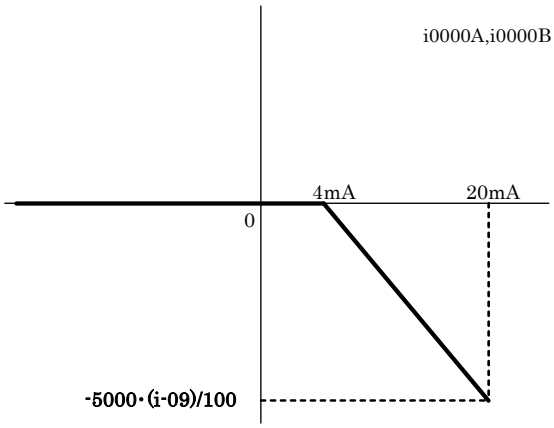
*3 : The relations with *i0000A,i0000B* and the analog input is shown in the figure below.



Input characteristic(0~±10V)



Input characteristic(0~10V)



Input characteristic(4~20mA)

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

*4 : For *i00010~i00019*, refer to manual of each option.

4-5. Output register

	Register	Contents	Item	Recital
Input (To control)	o00000	Torque command from Built-in PLC	**i-08=3**	5000/100%
	o00001	Rotational speed(frequency) command from Built-in PLC function	**b-10=7 i-01**	20000/(A-00)
	o00002~o00007	Not Used		
Output	o00008	Analog output 1 (VFC66-Z)		20000/5V
	o00009	Analog output 2 (Option board)		20000/5V
	o0000A	Analog output 3 (Option board)		20000/5V
	o0000B	Analog output 4 (IOEXT66-Z)		20000/5V
	o0000C	Analog output 5 (IOEXT66-Z)		20000/5V
	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.

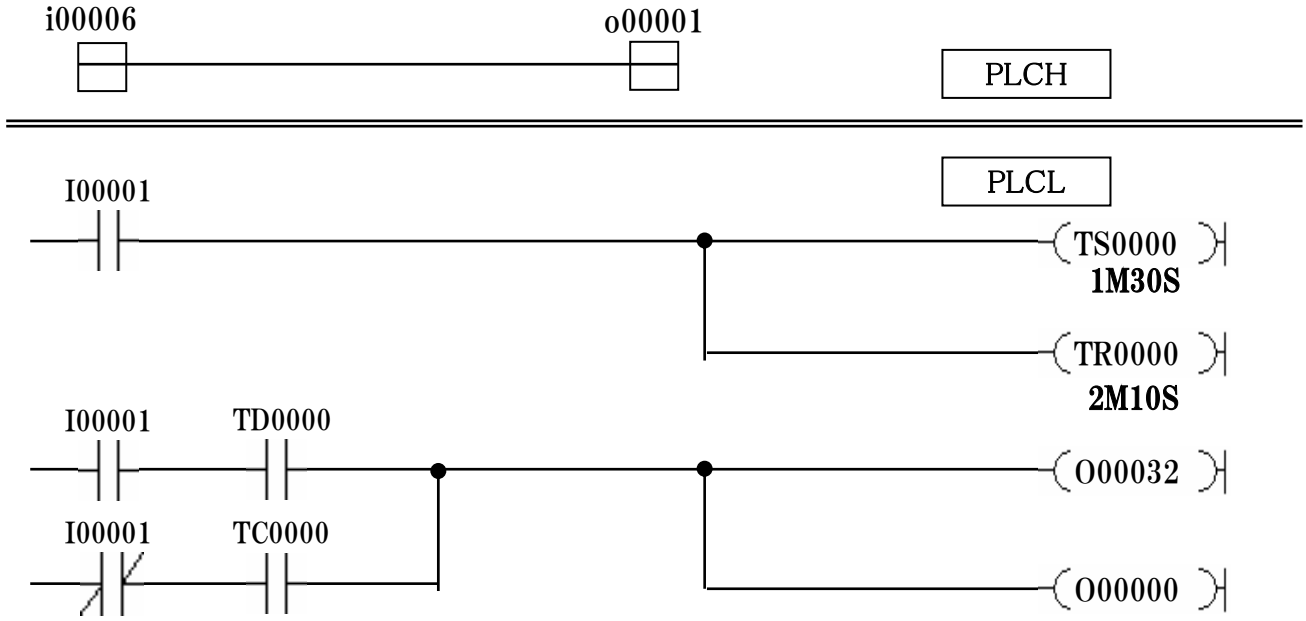
Chapter 5
Application Circuit

The application circuit 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*).



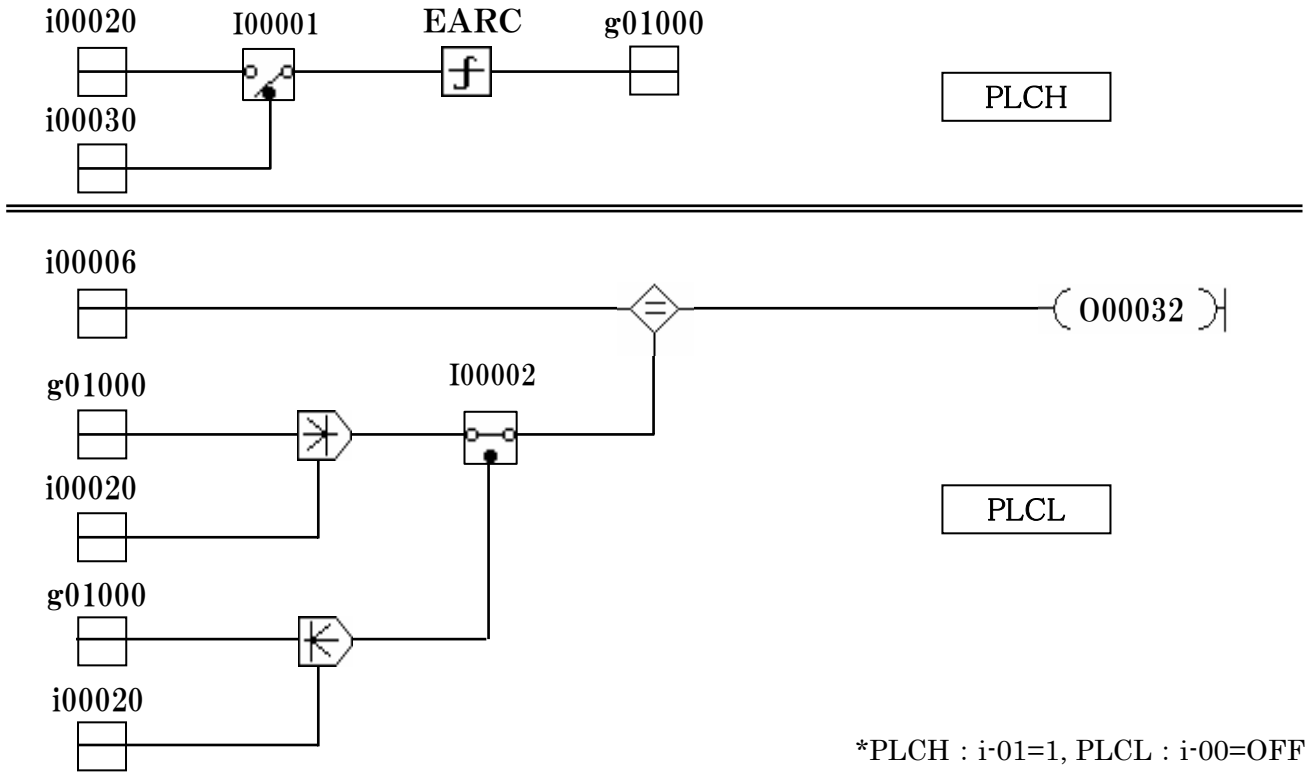
*PLCH : i-01=1, PLCL : i-00=OFF

Symbol	Kinds	Contents
i00006	Dataflow-block	Analog input AIN 1 (VFC66-Z)
o00001	Dataflow-block	Rotational speed(frequency) command from Built-in PLC function
I00001	Ladder-block	Multi-function input MI1 (VFC66)
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)
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.



*PLCH : i-01=1, PLCL : i-00=OFF

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)

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◆Unannounced, the content of manual description is change.

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