

Digital Motor Protection Relay

<5 Series>

<VIP-5EL/5EM,5CL/5CM,5TL/5TM,5SM>



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Digital Motor Protection Relay

<5 Series : VIP-5EL/5EM,5CL/5CM,5TL/5TM,5SM>

1.Abstraction

Installation	Model	Protection	Description
Panel Mounting Type	VIP-5EL	Over/Under Current,Phase Loss,Reverse Phase,Locked Rotor,Ground Fault,current unbalance, Shock/Stall	Password,self-diagonostics, Main contactor auto close,Alarm RS232 communication
	VIP-5CL		Password,self-diagonostics, Main contactor auto close,Alarm ,RS485 communication
	VIP-5TL		Password,self-diagonostics, Main contactor auto close,Alarm ,RS232 communication 4 ~ 20mA
Panel Flush Mounting Type	VIP-5EM		Password,self-diagonostics, Main contactor auto close,Alarm ,RS232 communication
	VIP-5CM		Password,self-diagonostics, Main contactor auto close,Alarm ,RS485 communication
	VIP-5TM		Password,self-diagonostics, Main contactor auto close,Alarm ,RS232 communication,4 ~ 20mA
	VIP-5SM	Over/Under Current,Phase Loss,Reverse Phase,Locked Rotor,Ground Fault,current unbalance, Shock/Stall, Short Circuit	Password,self-diagonostics, Main contactor auto close, Alarm ,RS232 communication

Panel Mounting Type	Panel Flush Mounting Type
	

2. Main Feature

- To give a guarantee to authorized operator: Password
- To response for various motor starting system and to use trip for the protection : the application for trip output according to Logic input as follows :

Applied Mode	The pattern of trip output
out/LooFF /a/b	* Trip output : C1-M, 97-98/Main trip, 07-08/Aux * As the control power is powered : ▶ for selecting LooFF("Auto" is displayed in the initial state) :disable for logic input :C1-M:open→close in motor start/(open in trip) :sequence for contactor ON-OFF → C1-M(b), 97-98(a)/ actually just like 1b-1a ▶ for selecting one of a / b("LOP", rcs. EFI are displayed in the initial state according to logic input state) :C1-M:open → close in motor start :sequence wiring for contator ON-OFF→C1-M(1b): as trip is happend > C1-M : Open > 97-98 : ▶ select "a" :control power-ON : open→close :trip : close→open ▶ select "b" :control power-ON : still open :trip : open→close

- MCU based digital control : precised motor protection
- Compact size, Multi-function
 - *Protection : Over current/Under current/Phase loss/Reverse phase /Locked rotor/Shock(Stall)/Ground fault,[Short circuit:5SM Type]
 - *Indication :Current(each phase line or average),earth current, load factor,accumulated working time[AWT]
 - *Digital communication :485/5CM Type, 4~20mA,RS232/5TM Type
- To cover a wide and precised current range for the protection
 - *03 Type :0.2 ~ 6A
 - only available for 5SM Type
 - *70 Type : 0.2A~70A
 - changed naturally into 0.2~6A with external CT if 5A is preset in cto mode or for 5SM type
 - *Extended current range with external CT : 1A~3000A
- To keep a steady characteristics in the noisy installed environment : embedded RMS chip/correct RMS current value
- The classification for Logic Input
 - *LOP>> rcs >> EFI(External Fault Input)

Logic Input	#1	#2	#4	#6
Usage	LOP		rcs	E F I

- To show a trip cause and operation information in character and/or number :
5 Digit Window
- To realize instant trip time for the ground fault protection
*0.1 ~ 30sec/Definite
- To realize instant trip time for the short circuit protection
* 0.08 sec/instant T-I for 5SM Type
- "Shock" protection :available for instant mechanical shock due to over load
while crasher,roller,conveyer,etc are working
- To indicate a necessary information in every 3 sec
- Convenient installation of ZCT to sense a zero phase current for GF protection
*Standard type : to use external ZCT(200mA/1.5mA)
*Optional type : embedded ZCT(not available for external CT application)
- High sensitive level and wide range for ground fault protection :30mA ~ 8A
- Possible to monitor a operating state through RS232 communication
(except 5CL/5CM): monitoring by "Samdsp" or customer device
- To response for digital network communication through RS485, Modbus /RTU :
5CL/5CM Type
- DC 4~20mA Output for current loop communication :5TL/5TM Type
- Main contactor auto close : in case a line power is "ON" again within a
preset time(SDDT) after a line power is "OFF" during normal operation, main
contactor is closed orderly according to another preset time(DOMT)
- Various way for reset: Manual or Automatic /to response flexibly for applied
sequence system
- To keep a stable operation under frequency variation from Inverter:
20Hz~400Hz
- Self-diagnostic test by one touch for "SET" key
- Alarm before Tripping by over current
- To memorize latest number of 8 among trip event : possible to recognise more
detail through RS232,RS485,"Samdsp"
- To have stable state under the noise environment :line noise filter attached
connection cable between indication meter and converter in panel flush
mounting type
- Convenient installation into existed meter hole:65Φ hole or rectangular
hole/display meter of panel flush mounting type

3. Function

Protection	Operating time	Description
Over current	- d-time :1 ~ 300sec/def. - o-time :0.08 sec/instant (only for 5SM Type) :Definite/0.1 ~ 60sec :Inverse/0.2~30 Class	to protect over current of each phase /L1,L2,L3
Under current	U-time :0.1 ~ 30 sec/def.	to protect under current of each phase/L1,L2,L3
Current unbalance	8 sec	- adjustable:30% ~ 90%: - rate=[(max-min)/max]*100[%]
Phase loss	1~5sec/def	to protect phase loss of each phase,L1,L2,L3, based on load current
Reverse phase	0.5 sec	to ptotect reverse phase based on load current
Locked rotor	dt + 0.1 sec	to protect locked rotor in starting state
Shock/ Stall	0.1 ~ 3sec/def.	- to make a trip if preset value is sensed during working - preset range to "OC" :180% ~ 300%
Short Circuit	0.08sec/instant	only available for 5SM type - This function is useful under 6A, so external CT must be adopted over 6A - preset range to "OC" : 800% ~ [70/"OC" preset value}*100[%],but maximum is 2000% - trip output for this function comes out through "07-08" so that this output may make a exclusive trip for a circuit interrupter with interrupting capacity
Ground fault	Edt:0.1 ~ 25sec, Eot:0.1 ~ 30sec/def	Trip by zero phase sequence current sensed through ZCT
Indication	Description	
Rotated indication during the operation	*Indication in every 3 sec :3 phaе current >> Earth current >>AWT>> Load factor *Load factor:Bar Graph[actual running current/preset value of "oc"] *AWT:accumulated working time/"rotA" mode : ON *Possible to fix one of rotated factor or to release :repeated one touch for "CLR" key	
Check preset value of each mode during the	* Possible to check a value and a mode as pressing "SET" key once during the operation * preset vale and mode are appeared alternatively * possible to check next mode as pressing "CLR" Key	

operation	* Return to operating mode as pressing both "SET" & "CLR" key in samw time or waiting for 15sec
Alarm	* Able to make alarm before tripping if actual current is kept over preset alarm rate to "OC" preset value over 3 sec *Alarm signal comes through AUX output
Aux	Description
Main contactor auto close	*In case a line power is "on" again within a preset time(SDDT) after a line power is "OFF" during a normal operation, main contactor is closed automatically after another preset time(DOMT)
RS 232	*Each type except 5CL/5CM keeps basically this output *Possible to monitor the operation data by "Samdsp"
RS485	*Available only for 5CL/5CM Type *Possible to monitor the operation data by "Samdsp"
4~20mA	*Available only for 5TL/5TM Type *Max current in 3 phase is transformed into 20mA *Zero value is transformed into 4mA *The receiver for 4-20 signal does not loop voltage

4. Technical Specification

DIV		Description
Current range	70 Type	0.2A~70A or 0.2~6A with external CT if cto mode is able
	03 Type	0.2~6A,only available for 5SM Type
	With External CT	1A~3000A
Ground fault Current	Zero phase current	*30mA~8A *sensed through external ZCT or embedded ZCT
Time preset	Starting delay time(dt)	0.1~300 sec/def.
	over current trip delay time(ot)	*0.08 sec/instant(5SM Type) , *0.1~60 sec/def. *5~30Class/inverse
	under current trip delay time(ut)	0.1~30sec/def.
	Ground fault starting delay time(Edt)	OFF,0.1~25 sec/def.
	Ground fault trip delay time(Eot)	0.1~30 sec/def.
	Shock/stall trip delay time(st)	0.1~3sec/def
	Phase loss trip delay time(PLc)	1~5sec/def
Allowable tollerance	Current	C<=2A:0.1A,C>2A:±5%
	Time	t<=2sec:± 0.2sec, t>2sec:±5%

Control power			*AC 85V ~ AC260V,50/60Hz (DC90V ~ DC370V)	
			*DC24V(Optional)	
Trip output relay	Main:97-98		1a(1-SPST),3A/Resistive	
	C1-M		1a (1-SPST),3A/Resistive	
	Aux(07-08)		1a(1-SPST),3A/Resistive(possible to output one of,AlEc/AL/uc/Shoc/Ec-ta/ Ec-tb or SS(5SM type)	
Application environment	temper ature	Operation	-25 ⁰ C ~ +70 ⁰ C	
		Storage	-40 ⁰ C ~ +80 ⁰ C	
	Humidity		30 ~ 85%,non-condensing	
Logic Input			*220VAC:150 ~ 260VAC,50/60Hz(220 ~ 370VDC)/ Standard *110VAC:75 ~ 150VAC,50/60Hz(110 ~ 220VDC)/ Optional	
Current tollerance against changeable frequency from inverter			Average +,- 5%,1Hz ~ 400Hz	
Max Main Conductor Size			25SQ	
Screw Torque			Max0.6N.m	
Insulation Resistance/IEC-60255-5			10Mohm or more/500VDC,circuit-case	
High Voltage Withstand Test/ IEC-60255-5			*circuit-case:AC 2000V,60Hz, 1 min *contact-contact:AC1500V,60Hz,1min	
1 MHz Burst Immunity Test : IEC-60255-22-1			2.5KV,Positive/Negative under 2sec	
Electrostatic Discharge:IEC-60255-22-2			Air:Level 3, 8KV,Contact:Level 3,6KV	
Radiated Electromagnetic Field Disturbance:IEC-60255-22-3			Level 3, 10V/m	
Electric Fast Transient Burst: IEC-60255-22-4			Power,Realy output:Level 4,4KV	
Surge Immunity test:IEC- 60255-22-5			Relay output:1.2X50uS, 2KV (0 ⁰ ,90 ⁰ ,180 ⁰ ,270 ⁰)	
Conducted Disturbance Test: IEC-60255-22-6			10V,Level 3	
Digital commun ication	5EL/5EM,5TL/5TM,5SM		RS232(RXD,TXD,GND)	
	5CL/ 5CM	RS 485	Physical	2 wire RS 485,Modbus/RTU
			Address	1 ~ 250
			Speed	9.6/19.2/38.4/57.6/76.8/115.2kbps
			Connection	Terminal:TRX(+),TRX(-)
			Termination resistance	120 Ω,if neccessary
			Cable	Sheathed 2 Pair
Current Loop Communication/only for 5TL/5TM Type			Max current value in 3 phase is transformed into 20mA	
Power consumption			6W/Max	

5.Preset Description

► Main Mode

Press "SET" key to enter into setting mode ,then enter password.
The more detail is described in "Operation of Control key "

Mode	Function/ range	Description	Factory Setting value
P****	Password	*need to input a number of digit,"0000" to enter setting mode *need to move a cursor from first digit (1000unit) to last unit(1unit) to pass over next mode as pushing CLR key (Enter function) 4 times. *possible to change password in "PEdIt" mode in CAB mode group	0000
OC/ setting value	to preset a range to protect over current	Current range *0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode *0.2~6A for 5SM type	70A
CtO/1t/ 5A	to sense a current/ DSP in itself or combined with external CT	*1t :current is sensed through its own CT, next "ct" mode is not appeared automatically *5A:a secondary current rating of external CT is 5A/extended current range is calculated based on 0.2A ~ 6A	1t
Ct /setting value	to preset a ratio [primary A /5] of external CT	*if 1t is selected in "cto" mode , this mode is displayed like "ct--", it means that any preset is not available any more.so need to enter to next mode. *to preset the value of CT ratio[primary value/5] *setting value :1~600 *1 for its own CT or 5:5 external CT	ct--
dt/OFF/s etting value	to preset starting delay time	*Trip delay time to prevent unwanted trip caused by starting current *0.1 ~ 300sec *available for sensing current over 0.2A , otherwise preset dt is not adopted internally	5sec
OtC/deF/ Inv	to select time - current chracteristics for over current protection	*to decide t-i characteristics to protect over current : deF/Inv *deF(definite):trip based on preset value for "OC" and "ot" *inverse ► dt=0 : trip based on cold curve ► dt>0 :trip based on hot curve after dt is elapsed (actually dt+calculated time in inverse curve) ► Available range:100~(210/"oc" value) *100[%]	deF
Ot/ setting value	to preset trip delay time	*to preset time to make a trip when a current exceeds preset value *definite:0.1sec ~ 60sec *inverse:0.2 ~ 30 Class	5sec

LC/oFF/ on	to protect Locked Rotor	*OFF:disable for this mode in starting state *ON -Lc is shown in trip after dt+0.1sec if starting current exceeds 300% to oc/def,Inv	OFF
SS/oFF/ on	to define available term for short protection	*Only available for 5SM Type *oFF:disable only for starting time (dt),but this function is able after dt is elapsed *on:able from starting initially	oFF
SSC/ OFF/ Setting Value	to define short protection % to "OC"	*Only available for 5SM Type *adjustable preset to "OC":800% ~ {(70/"OC" preset value)*100[%]} *maximum preset:2000%. *operating trip time:within:0.08sec *OFF:disable for this function *Available through AUX(07-08) output	1500%
ShOC/ oFF/ setting value	Shock protection during working	*to protect mechanical shock while the motor is working *OFF:disable for this function *adjustable preset to "OC":180% ~ 300%	oFF
St /setting value	to preset a time for shock protection	*0.1 ~ 3sec/def. *this mode is shown as "st--" if shock mode is disable	"st--"
PLC /oFF/ setting value	to protect phase loss by load current	*OFF:disable *1~5sec/adjustable,definite	ON
RPC /oFF/ on	to protect reverse phase by load current	*OFF:disable *ON:to make a trip to protect reverse phase based on load current within 0.5sec	OFF
EC/oFF/s etting value	to preset zero phase current	*for ground fault protection *OFF:disable *sensitive range:30mA ~ 8A	OFF
Edt/ oFF/ setting value	to preset starting trip delay time	*definite T-I *preset range :0.1 ~ 25sec *this mode is shown as "Ec--" if Ec mode is disable"	2 sec
EOt /setting value	to preset operating trip delay time for GF protection	*0.1 ~ 30sec/def. *this mode is shown as "Ec--" if Ec mode is disable"	0.1sec
OUt/ LOOFF/ a/b	to define the pattern of main trip output in initial state	*Trip output : C1-M,97-98/Main trip, 07-08/Aux *In case "dISP" is selected in "run" mode, this "out" mode is disable naturally *As the control power is powered: ▶ select LooFF("Auto" is displayed in the initial state)	b

		:disable for logic input :C1-M:open-->close in starting/(open in trip) :sequence for contator ON-OFF --->C1-M, 97-98 (actually just like 1b-1a) ▶ select a/b ("LOP",rcs.EFI are displayed in the initial state according to logic input state) :C1-M:open-->close in starting :sequence for contator ON-OFF--->C1-M(1a) :as trip is happend > C1-M : Open > 97-98 : ▶ select "a" :open -->close/control power-ON, Close--> open/trip ▶ select "b" :open/control power-ON, open-->close/trip	
UC/oFF/ setting value	to preset a range to protect under current	*preset range :"oc" preset value<0.3A:not available :0.3A~under "oc" preset value	OFF
Ut/ setting value	to preset trip delay time for under current	*0.1 ~ 30sec	2sec
Ub / oFF / value	to define current unbalance rate	*to protect current unbalance among each phase *calculation : $[(\text{max}-\text{min})/\text{max}]*100[\%]$ *preset range : 30% ~ 90%	oFF
AUO/ oFF/Ec/ AL/uc/ Shoc/SS/ Ec-ta/ Ec-tb	to preset a kind of AUX(07-08) trip output	*oFF:to make same output as main trip *Ec:only for ground fault protection *Uc:only for under current protection *shoc:only for shock protection *SS :short protection,only for 5SM Type *AL:only for alarm to oc before trip *Ec-ta:the state of 07-08 before trip is "b"(close) state, then takes trip action caused by GR with main trip together *Ec-tb:the state of 07-08 before trip is not changed as "a"(open) state, then takes trip action caused by GR with main trip together *independent output from main trip except "OFF", Ec-ta & Ec-tb *Selected protection factor in this mode is excluded in main trip output naturally *This trip except "Ec-ta" and "Ec-tb" is automatically reset if a trip condition is clear during working	OFF
AL/ setting value	to preset alarm level rate(%) to "OC"	*if other factor except "AL" in "AUo" mode is preset, this mode is shown "AL--" *preset range to"OC" :65% ~ 100% *alarm is come out as the condition of preset alarm % is keeping for 3 sec or more	90

ALt/ setting value & Clear	to preset a limit of accumulated working time necessary to give alarm & clear	*possible to preset a value between 0.1 hr ~ 6553.5 hr by 0.1 hr unit *able to accumulate time in case 0.2A or more is sensed *indicated value is flickering as preset value is elapsed *To clear : press "UP" or "DN" after entering "ALT" mode in motor stop state, but "t 0.0" will be flickered until 6 min has passed after starting a motor	6500
dC/ setting value	to decide max current to change into 20mA	*Available only for 5TL/5TM Type *to transfer maximum current of 3 phase current into 20mA and 4mA means zero ampere output *Primary current is transformed in case external CT is used. *The receiver for 4-20 signal does not need loop voltage	5
rOtA/ oFF/on	to decide a number of indicated factor in the order	*OFF:3 phase current(L1,L2,L3),GF current, Load factor *ON:[3 phase current,GF current, Load factor]+[AWT] *interval time between each displayed factor : 3sec	oN
rESEt/Hr /Er/ AuL-#	to decide how to reset trip state	*Hr:password input *Er :"Reset" button of converter :"CLR" Key :Control power : OFF :Logic #2 input :OFF(High→Low) *AuL-#(n times):Auto reset by followed condition :n=1:possible to do only by entering password :n>1 ▶ 1(once)~(n-1) times: reset automatically according to preset reset time without entering password ▶ n(last times) :possible to do only by entering password :trip state is kept on untill making password reset even though the control power is off (password lock) *Password reset:reset is done by coming out from operating mode after input password	Er
AUt-t/ setting value	to preset auto reset time	*time range :0(instant), 1~300sec *If Hr is preset in "rESEt" mode, this mode becomes disable	"--"
t-AUt/set ting value	to preset total possible time available for executing defined times of auto reset	*possible total allowable time to have the preset number of auto reset *time range:30min~60min *only possible for over current trip *the preset time is counted from the instant of first trip and return to the preset condition for auto reset after the allowable time is elapsed *Password lock in Auto Reset :able in case the preset number of auto	"--"

		trip is done within preset total reset time :otherwise, the counted number of trip time is initialized to previous preset value *If Hr is preset in "rESet" mode, this mode becomes disable	
trIP/8 ~ 1 /trip cause / trip value	to show latest number of 8 trip cause	*to show the number of 8 trip cause in the order *trip cause and caused value is appeared alternatively as pressing UP" ."DN" key *next trip in the order can be appeared as pressing Set or CLR key *nothing after 1st trip is shown "nonE"	--
TovEr/ OFF/ Setting value(SDDT-DODT)	Main contactor auto close	*In case a line power is "on" again within a preset time(SDDT) after a line power is "OFF" during a normal operation, main contactor is closed automatically after another preset time(DOMT) *Shut Down Delay Time :1 ~ 5sec /Adjustable *Delay On Make Time :0(instant) ~ 25sec/Adjustable by 5sec unit	OFF
rUn/ StOP/ dISP	To decide if the normal operation is forward or stop in case of a trip	*STOP:the normal operation is not forward any more when a main trip is occurred *dISP : the normal operation is forward even if a main trip is occurred → naturally reset if motor is stopped or sensed current is under "oc" preset value :In case this mode is used, "out" mode is disable naturally :Also "dISP" is displayed in motor stop state instead of "AUTO"	Stop
Addr /Setting value	to put self-address to communicate with PC	*to preset an address for 485 communication *range of number: #1 ~ #250 *Available only for 5CL/5CM Type	1
bPS /setting value	to decide communication speed	*to select communication speed :9.6/19.2/38.4/57.6/76.8/115.2kbps *Available only for 5CL/5CM Type	115.2
Test	*This is done by test sw on the converter or by pressing "CLR" key *to check if this relay is ready to work normally or not. *main trip(97-98) output will be trip after counting down preset o-time (o-time/definite T-I ; 550 % time of its class/inverse T-I) *Test result is stored in "TRIP" mode		

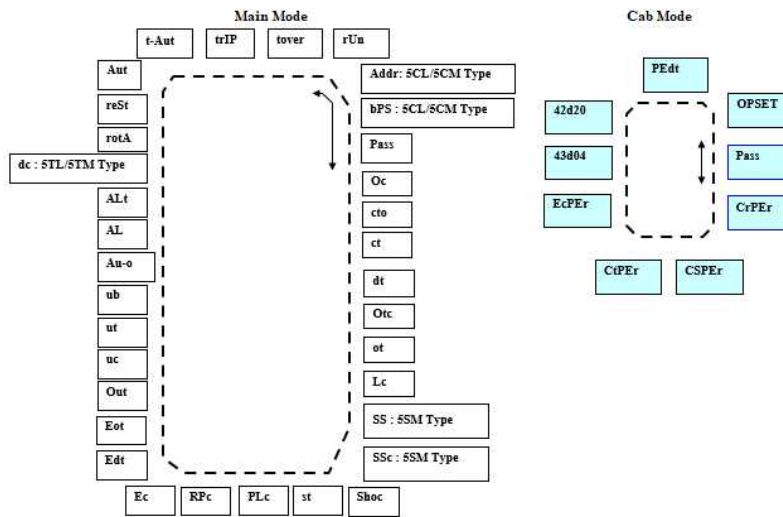
► Cab(calibration) Mode

This mode is appeared as pressing "SET" key for 10 sec or more, and is disappeared as "SET" key once more

Mode	Function/ range	Description	Factory Setting value
P****	Password Input	*need to input password to adjust this mode group so that authorized person may be able to adjust.	0000

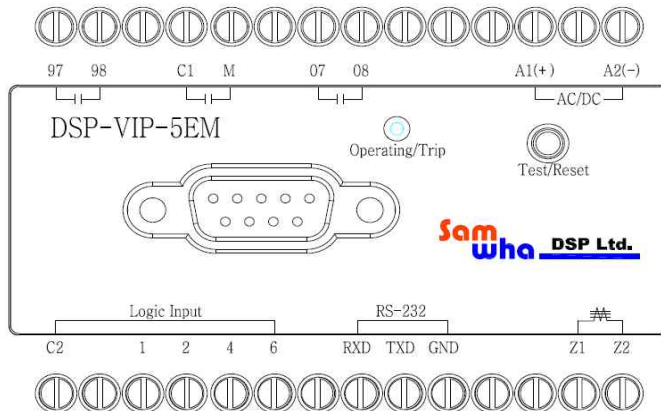
		*How to input is aame as it of main mode	
CrPEr	to have a calibration for phase "R"current	*Possible to adjust within +,- 50% by using "UP"."DN" key.	100
CSPEr	to have a calibration for phase "S" current		100
CtPEr	to have a calibration for phase "T" current		100
EcPEr	to have a calibration for GF current		100
42d04	to adjust 4mA level of 4-20 output	*adjust range: +,- 0~19	0
42d20	to adjust 20mA level of 4-20 output	*adjust range: +,- 0~19	0
PedIt	to change Password	*Possible to enter new digit by using "UP" or "DN" key after positioning a cursor on the required digit *need to press "SET" key in order to complete this change after editing.	
OPSET/ ON/ OFF	to decide if a preset value can be changed or not during normal operation	*ON:possible to change a preset value during normal operation *OFF: not possible to change a preset value during normal operation *This mode can not interfere “out” mode in any case *5SM type is not use this mode	OFF

6. The order of Rotated Mode

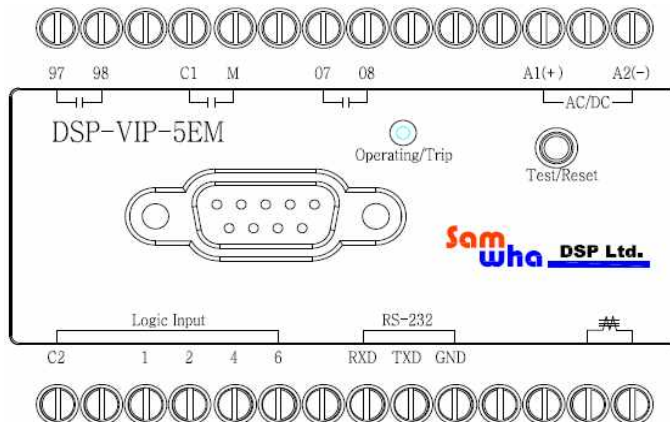


7. Input-Output terminal

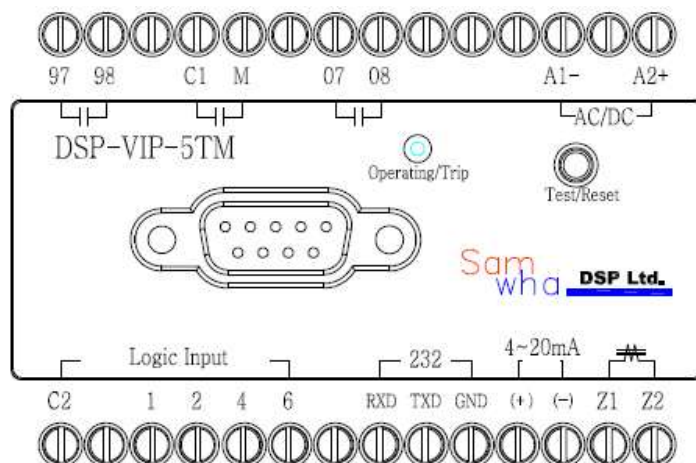
► 5EM : External ZCT Type



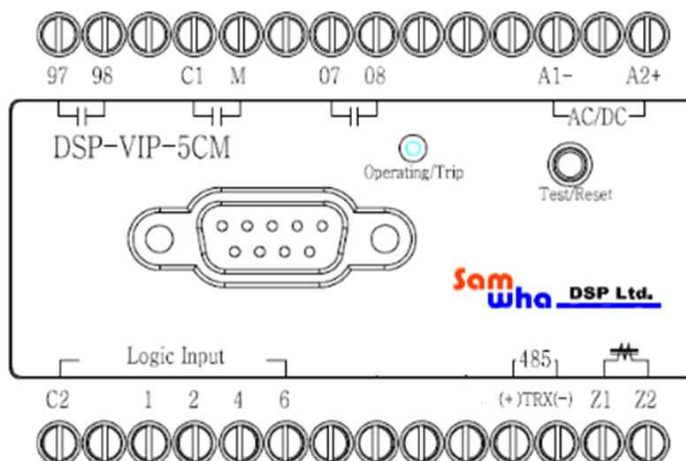
► 5EM : Embedded ZCT Type



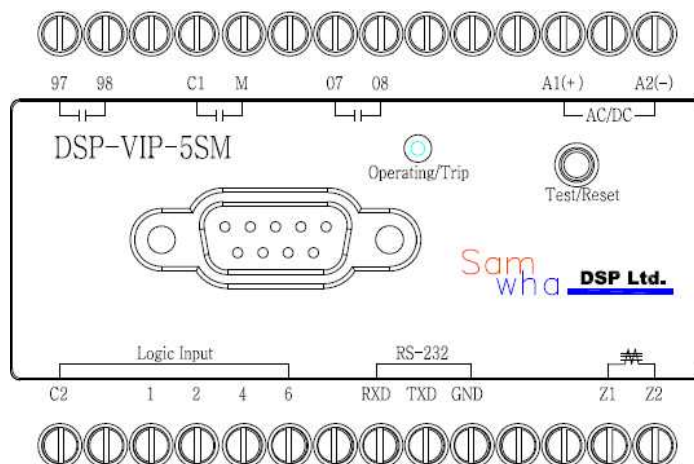
► **5TM : External ZCT Type**



► **5CM : Embedded ZCT Type**



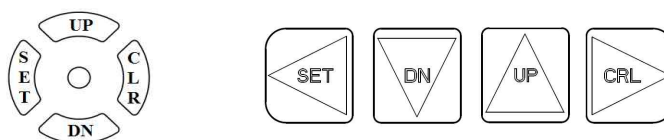
► **5SM : External ZCT Type**



***Note : all of each type is composed of external ZCT type and embeded ZCT type, but external CT type is not available for embeded ZCT**

DIV	Feature	Terminal	Description	
Input	Control power	A1(+),A2(-)	*85 ~ 260VAC,50/60Hz *120 ~ 370VDC	
	Logic input	C2	Common	
		1	ON	LOP
		2	OFF	
		4	Remote control sensor	
		6	External fault input	
	Z1,Z2	ZCT	*200mA/1.5mA in case using external ZCT : Basic Type *with Embeded ZCT :Optional Type	
Stae Indication	RED	Operating	3 Tone Colour LED	
	Green	Power/Stop		
	Yellow	Trip		
Output	Main Trip	*1a:C1-M *1a:97-08	*Over Current *Under Current *Locked Rotor *Phase Loss *Reverse Phase *Ground Fault *Current Unbalance *Shock/Stall	
	Aux trip	1a(07-08)	*Au-o/oFF/Ec/AL/uc/Shoc/Ec-ta/ Ec-tb/SS *Selected factor is excluded from main trip *short circuit(SS):only for 5SM	
	232	RXD,TXD, GND	*RS232 digital communication *Available for each type except 5CL/5CM	
	485	TRX(+) TRX(-)	*RS485 digital communication *Available for 5CL/5CM Type	
	420	+, -	*4 ~ 20mA/DC *Available for 5TL/5TM Type	

8. Operation of Control key



1."SET" key	*Initial state to indicate one of controlled position (ON-OFF control :LOP,rcs,EFI) is appeared. *Press "SET" Key to enter into setting mode, then "P0000"(factory default password) is shown *Move cursor from first digit to right end digit by pressing "CLR"key ,finally press once more, if password is not changed from factory default value, but if password is changed, then make required digit by using "UP","DN" key untill operator meets changed password. *If there is no input for 15sec or pressing "CLR" key,VIP is entered into operating condition.
2.Changed feature of Setting Key	*After entering into possible state for setting , each key acts its job as follows :SET--->backward direction,CLR--->forward direction,UP.DN--->able to select number or character in preset mode. *If operator wants to preset in next mode during pressing, it is possible to search next mode as pressing "CLR"key *If there is nothing for 15sec or more,then all selected data before stopping preset is stored automatically.
3."SET" Key & "CLR" Key /to select MODE	*Possible to select Mode by using "SET" or "CLR" key
4."UP" key & "DN" Key/Adjust	*Possible to preset required value as selection a character or number by using UP/DOWN
5."SET" & "CLR" Key/Store	*The storage for preset data is completed by pressing both SET and CLR key in the same time *it needs 3 sec at least to store, because all stored data is initialized into factory default value if the power is off during processing to store
to check and/or to change preset value of each mode during the operation	*Possible to check a value and a mode as pressing "SET" key once during the operation ▶ preset value and mode are appeared alternatively ▶ next mode as pressing "CLR" Key or previous mode as pressing "SET" key *Possible to change a preset value after entering into checking state if the preset value of "OPSET" mode belonged to "CAB" mode group is "ON"/factory default value is "OFF" *Return to operating mode as pressing both "SET" and "CLR" key in the same time or waiting for 10sec as storing adjusted value
Test/Reset : "CLR" Key	*This is done by test sw on the converter or by pressing "CLR" key *to check if this relay is ready to work normally or not. *main trip output will be trip after counting down preset o-time(definite T-I

	: o-time, inverse T-I : 550 % time of its class) *need to make a reset to enter into operational condition as pressing "CLR" key again
The centered LED of Control key	This is turned on in case 485(for 5CL type) is executed normally

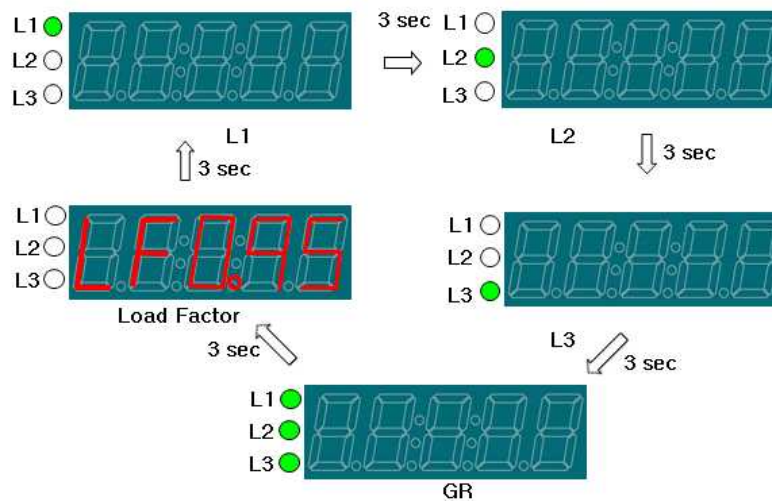
9. Trip Indication

Trip cause and caused value is appeared alternatively

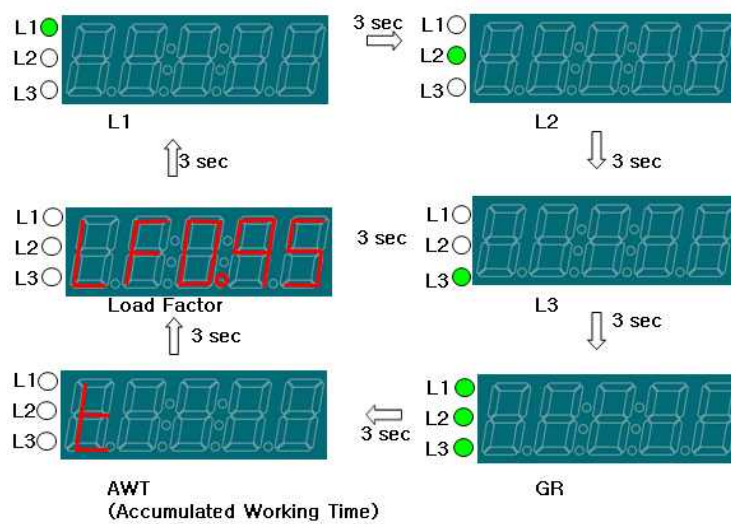
Trip	Display	Cause
Over current(oc)	OC-	*trip caused by over current in phase L1
Under current(Uc)	UC-	*trip caused by under current in phase L1
Current unbalance	Ub-	*trip caused by unbalanced current in phase L1
GF	Ec-	*trip caused by ground fault current
Phase loss	PL-	*trip caused by phase loss of phase L2 in load part
Reverse phase	rP-	*trip caused by reverse phase in load part
Shock/stall	Shoc	*trip caused by instant shocking current in load part
Locked Rotor	Lc-	*trip caused by locked rotor current in phase L2 during motor starts
Short circuit	-SS-	*trip caused by short circuit in phase L2 *only for 5SM type

10. Rotated indication

- 3 phase current(L1,L2,L3)>GF current>Load factor:"rota" mode/OFF

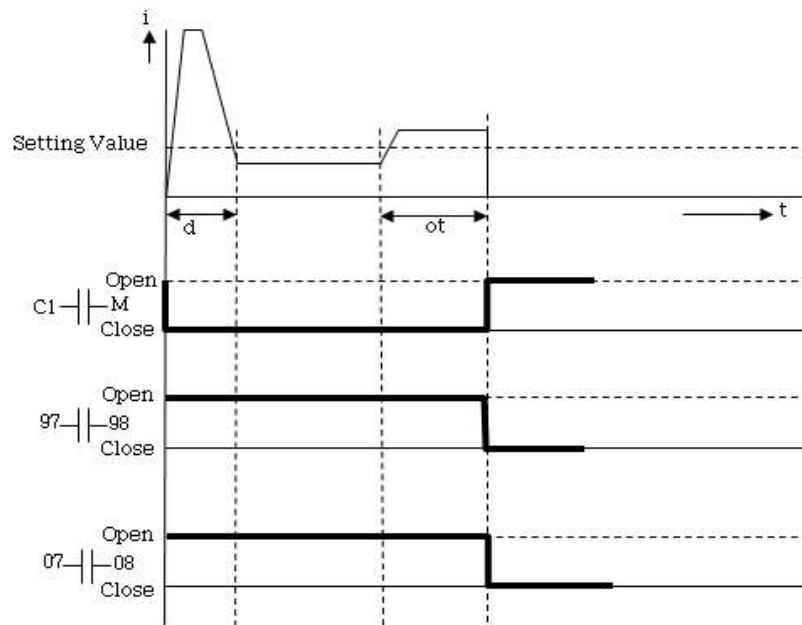


- phase current(L1,L2,L3)> GF current>AWT>Load factor:"rota" mode/ON

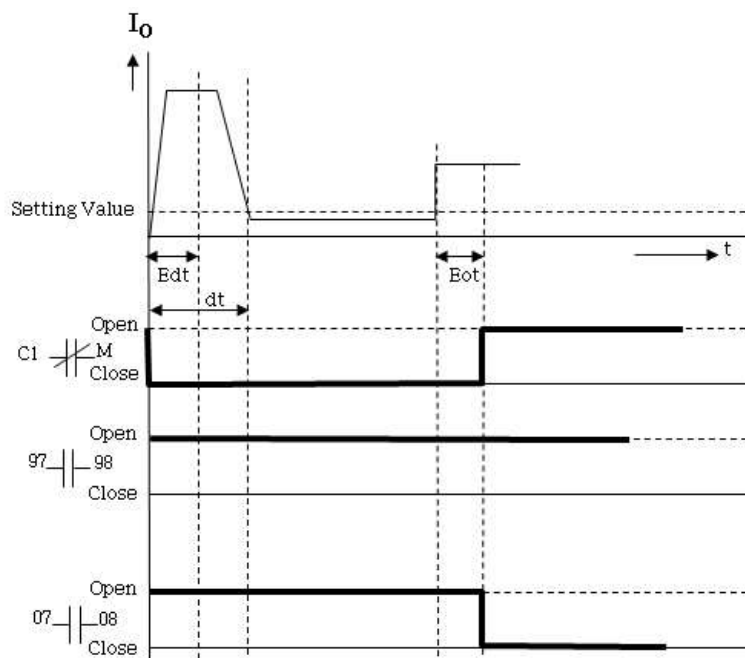


11. Time Based Trip relay Output

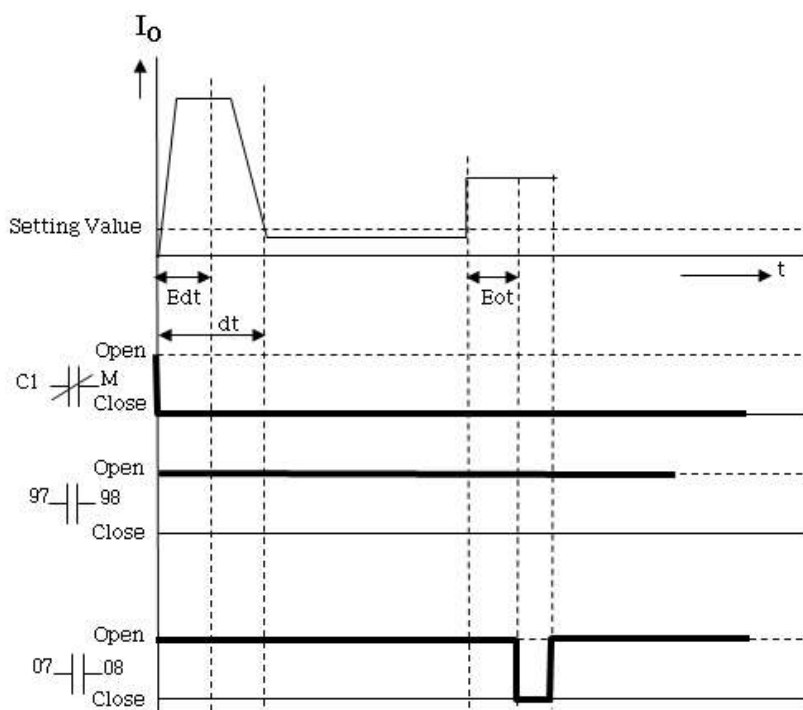
- Over current protection/"Out" mode:LooFF,"Au-o" mode:OFF(07-08)



- GF protection/"Out" mode:LooFF,"Au-o" mode:Ec-ta(07-08)

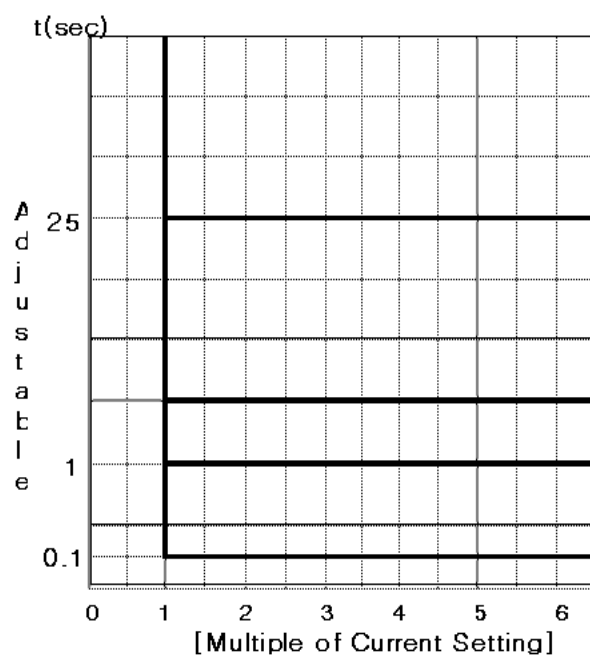


- GF protection/"Out" mode:LooFF,"Au-o" mode:Ec(07-08)

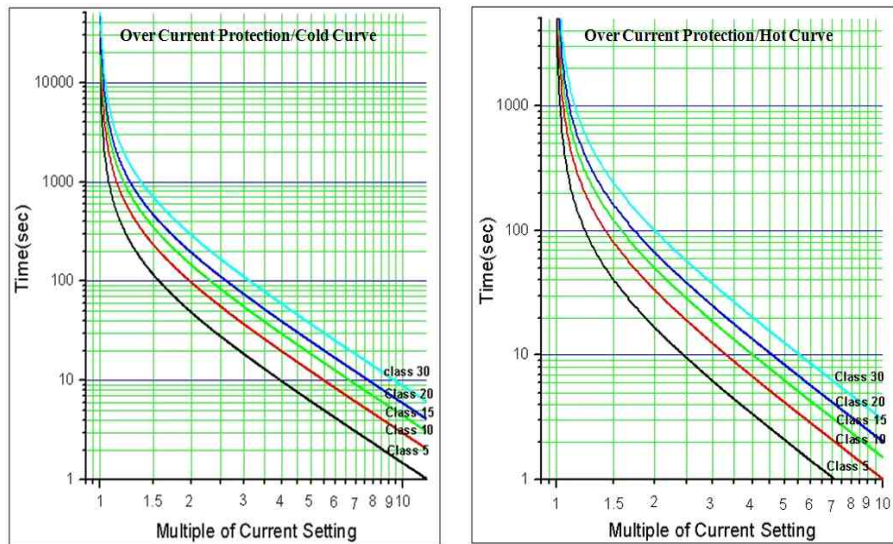


12.T-I Characteristic

- Definite[over/under current protection]



► Inverse[over current protection]



13. Application Sequence Diagram

► Logic input operation

LOP Duty

Logic Input	High	Low	State	OutputrelaytripbyLogicinput
1	Low→High		Motor Start	C1-M→Close
2	O	–		
1	–	O	Motor Stop	C1-M→Open
2	High→Low			

rcs(Remote Control Sensor) Duty

Logic Input	High	Low	State	OutputrelaytripbyLogicinput
1	O		Motor Start	C1-M→Close
4	O	O		
1		O	Motor Stop	C1-M→Open
4	O			

EFI(External Fault Input) Duty

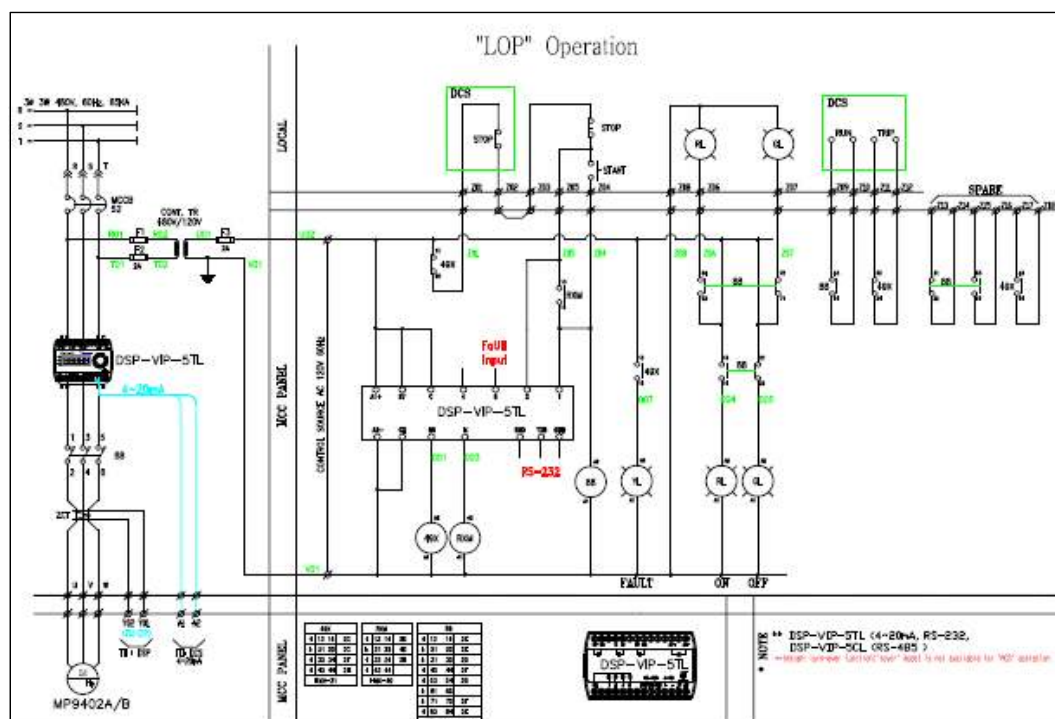
Logic Input	High	Low	State	OutputrelaytripbyLogicinput
6	O	–	*Motorstop *Displayed :OUT-F(Fault)	*Starting:Open→Close *EFIinput:Close→Open

※Incase selected operation mode is changed by Selector SW, the motor will be continued to work according to new selected mode after the motor is stopped shortly

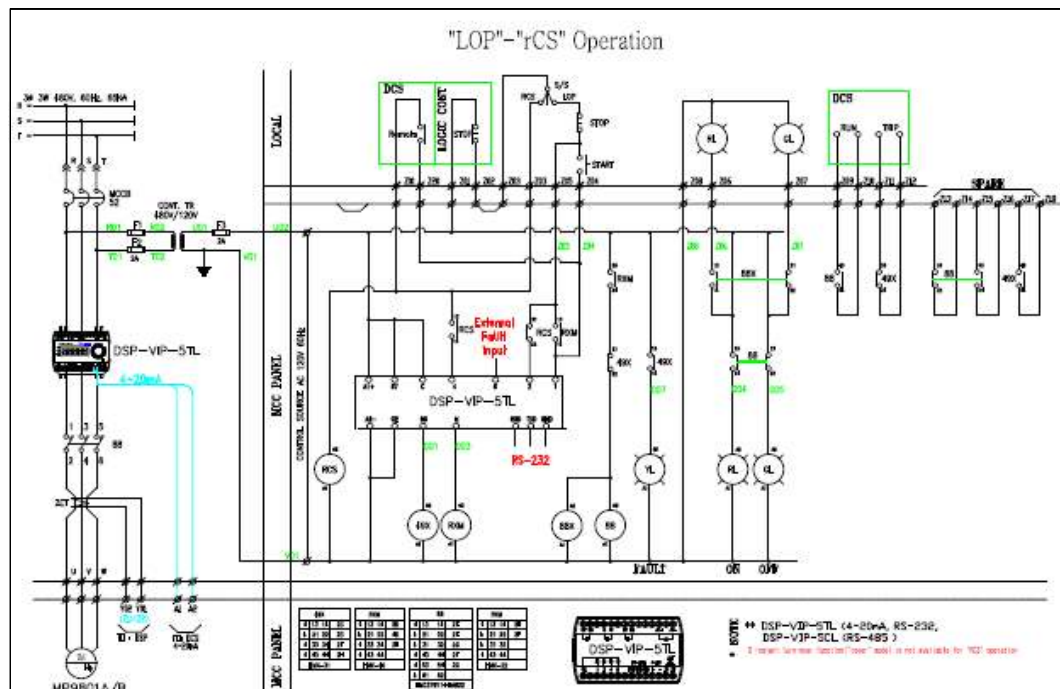
※It would be easy to understand as referring the application sequence diagram

- ※In case motor is stopped by the command of ON-OFF (Rmote sensor or external fault tinput), LOP,rcS(remote control sensor), out-F(External fault Input) is appeared in the front window to indicate originated command source
- ※It is required that logic input from ong distance sensor mustbe connected through the output of external aux relay because input line could keep unwanted voltage by induced current

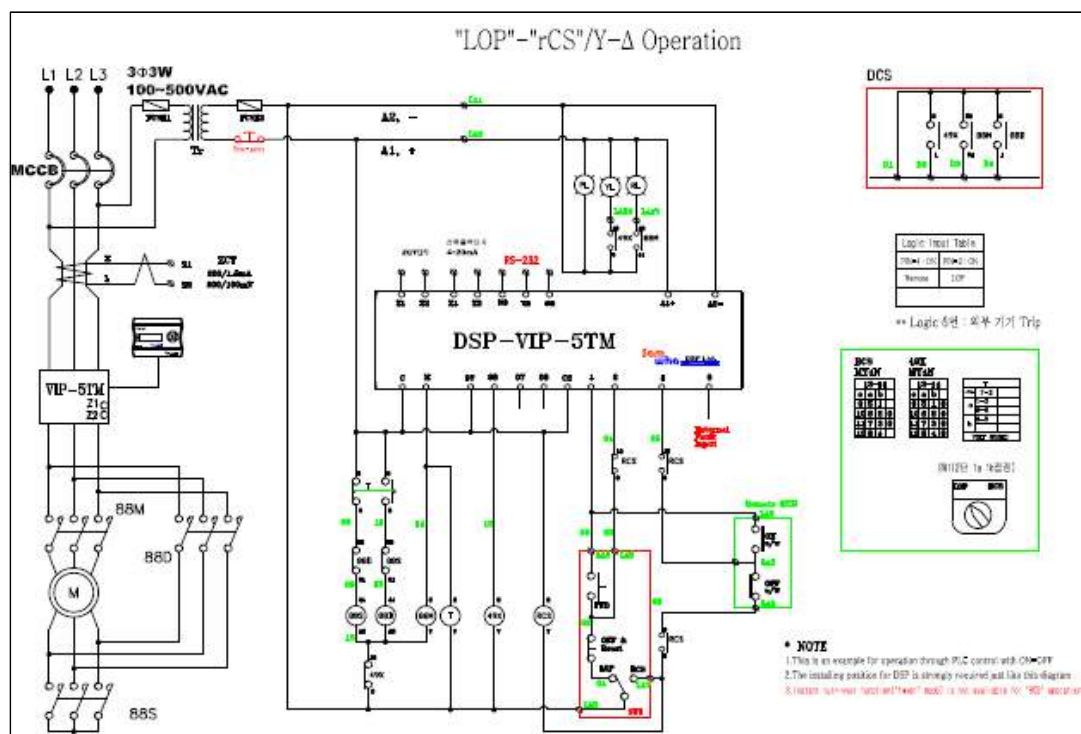
► LOP Operation



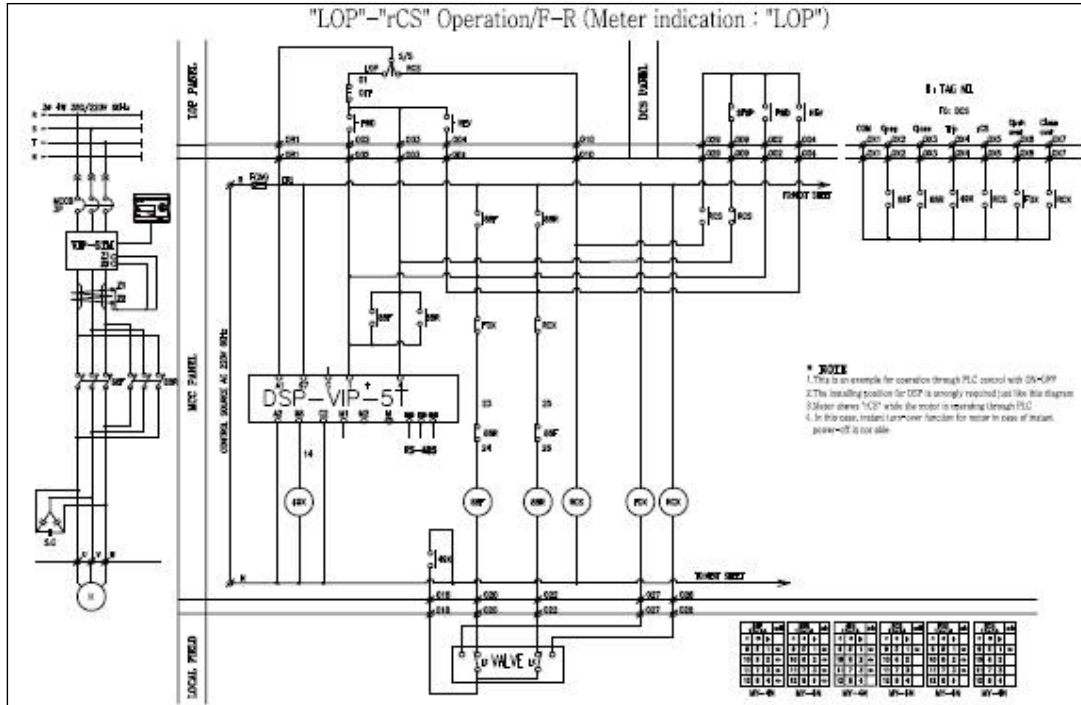
► LOP-RCS Operation/to use for logic input #4 in RCS



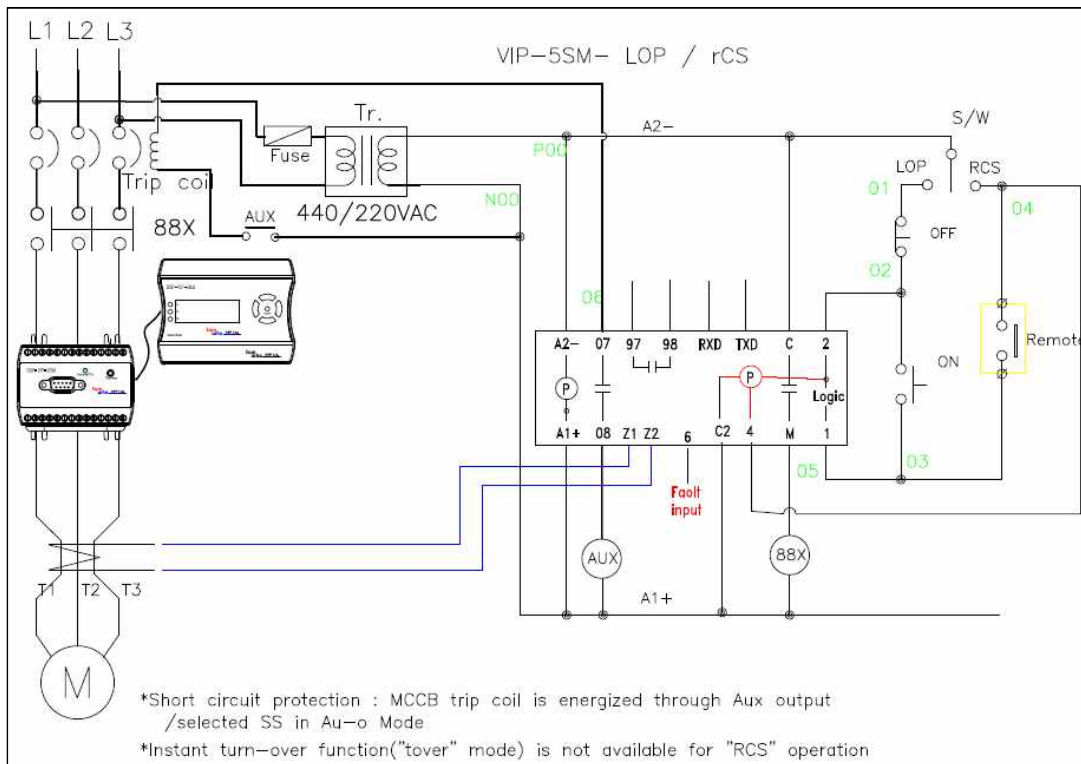
► LOP-RCS-Y/D operation



► LOP-RCS-FWD/REV Operation



- 5SM/short circuit protection: External ZCT, MCCB trip through AUX

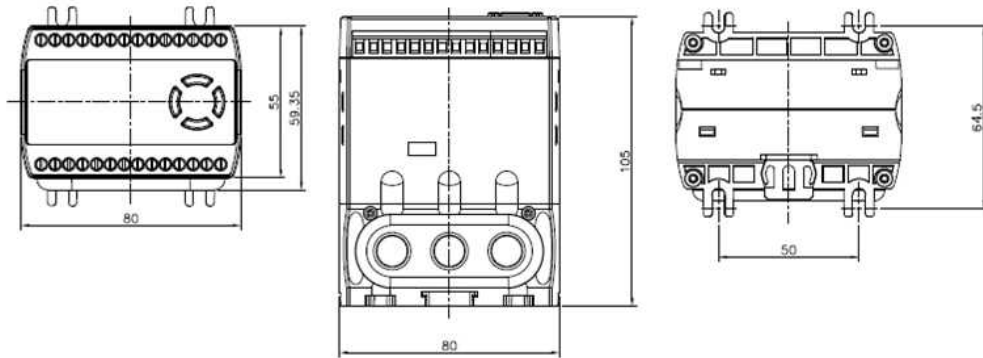


※ Embedded ZCT type is optional and can not be used for external CT application

※ In case of short circuit protection in 5SM Type, Aux output “07-08” must be used to make MCCB trip as selecting “SS” in “Auto” mode

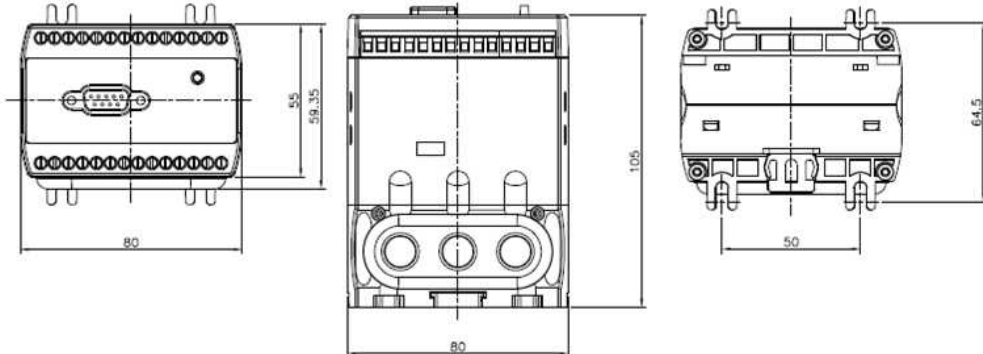
14. Dimension

► 5EL Type

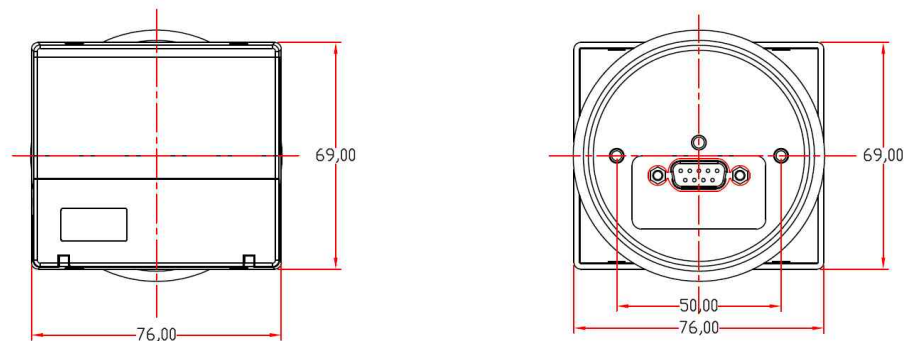


► 5EM/5TM/5CM/5SM Type

• Converter



• Display Meter



15. Order form

DSP-1(Type)-2(Rating current)-3(Control Power)-4(ZCT Embedded)-XX(optional)

Item	Reference Code	Description
VIP-5EL	DSP-VIP5EL-70Z7	Panel Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode ,85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), external ZCT
	DSP-VIP5EL-70Z7ZCT	Panel Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), ZCT embedded(not available for external CT application)
VIP-5EM	DSP-VIP5EM-70Z7	Panel Flush Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode ,85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), external ZCT
	DSP-VIP5EM-70Z7ZCT	Panel Flush Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), ZCT embedded
VIP-5CL	DSP-VIP5CL-70Z7	Panel Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode , 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), external ZCT
	DSP-VIP5CL-70Z7ZCT	Panel Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), ZCT embedded(not available for external CT application)
VIP-5CM	DSP-VIP5CM-70Z7	Panel Flush Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), external ZCT, 485 communication
	DSP-VIP5CM-70Z7ZCT	Panel Flush Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), ZCT embedded(not available for external CT application), 485 communication
VIP-5TL	DSP-VIP5TL-70Z7	Panel Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), external ZCT, 4 ~ 20mA
	DSP-VIP5TL-70Z7ZCT	Panel Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC, 50/60Hz(90 ~ 370VDC), ZCT embedded(not available for external CT application), 4 ~ 20mA
VIP-5TM	DSP-VIP5TM-70Z7	Panel Flush Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode, 85 ~ 260VAC , 50/60Hz(90 ~ 370VDC), external ZCT , 4 ~ 20mA
	DSP-VIP5TM-70Z7ZCT	Panel Flush Mounting Type, 0.2A ~ 70A or 0.2~6A with external CT if 5A is preset in cto mode , 85 ~ 260VAC , 50/60Hz(90 ~ 370VDC), ZCT embedded(not available for external CT application), 4 ~ 20mA
5SM	DSP-VIP5SM-03Z7	Panel Flush Mounting Type, 0.2A ~ 6A, 85 ~ 260VAC,

		50/60Hz(90~370VDC),exclusively external CT & external ZCT over 6A
Terminal Type	Basic reference code +T	Three terminal through CT hole of each phase is composed with one body

※Note

1. Logic input voltage is 220VAC(150~260 VAC)/220~370VDC unless “B” is suffixed in completed reference code in case control voltage is 220VAC
2. Logic input voltage is 24VDC unless “C” or “D” is suffixed in completed reference code in case control voltage is 24VDC
 - ▶ ”C” : 220VAC:150~260VAC,50/60Hz(220~370VDC)
 - ▶ ”D” : 110VAC:75~150VAC,50/60Hz(110~220VDC)

*Accessory

Item	Refeence	Description	Remarks
Cable	DSP -CABLE-12	1.2m	
	DSP -CABLE-18	1.8m	
	DSP -CABLE-30	3m	
	DSP -CABLE-50	5m	
ZCT	DSP -ZCT--XX	100mA/1.5mA	XX:Inner diameter of ZCT
Display Meter	DSP -ID-5EM	Input device/Display Meter	