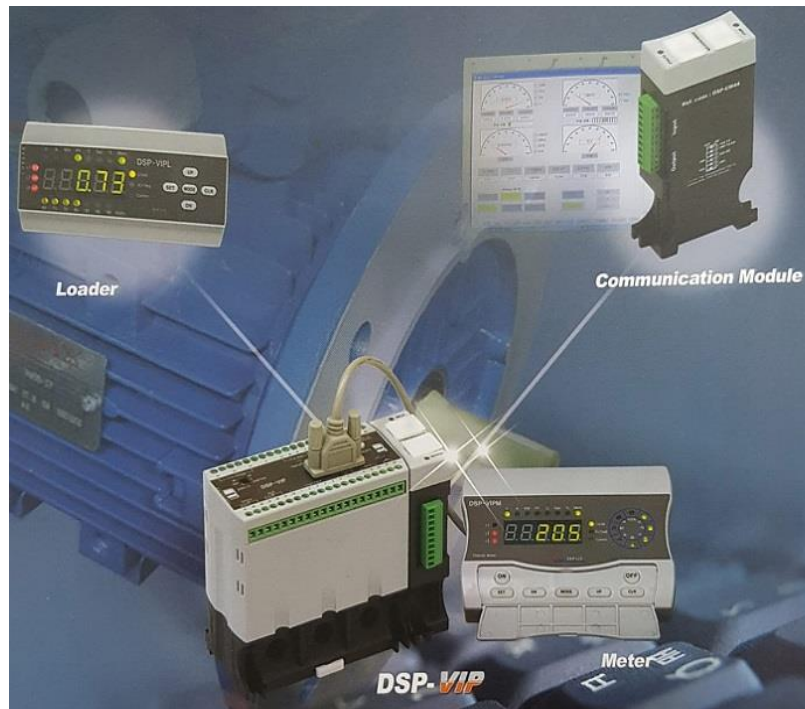


Voltage-Current based Digital Multi-function Motor Protection Relay DSP-VIP-PL/PM

<"oPSEt" mode: to preset while operation> <Main:1a-1b, SS,GR trip output>
<"FdbuS" mode : 485/422 serial or Ethernet communication>
<SamSung , Year 2018>



Sam
Wha **DSP Ltd.**
Control Protection Maintenance



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- 1. System Construction**
- 2. Detailed Structure**
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DSP-VIP-PL/PM

Voltage-Current based Digital Multi-function Motor Protection Relay

<"oPSEt" mode: to preset while operation> < Main: 1a-1b, SS, GR trip output >

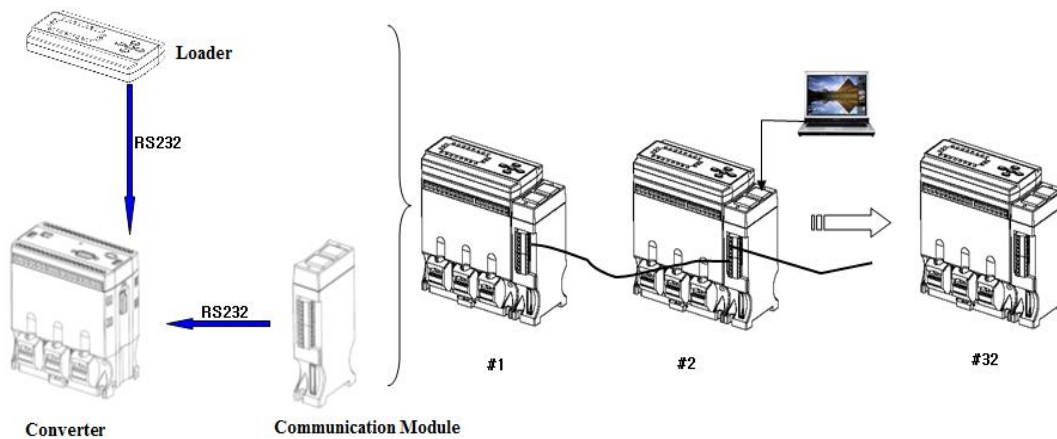
<"FdbuS" mode: 485/422 serial or Ethernet communication>

<SamSung, Year 2018>

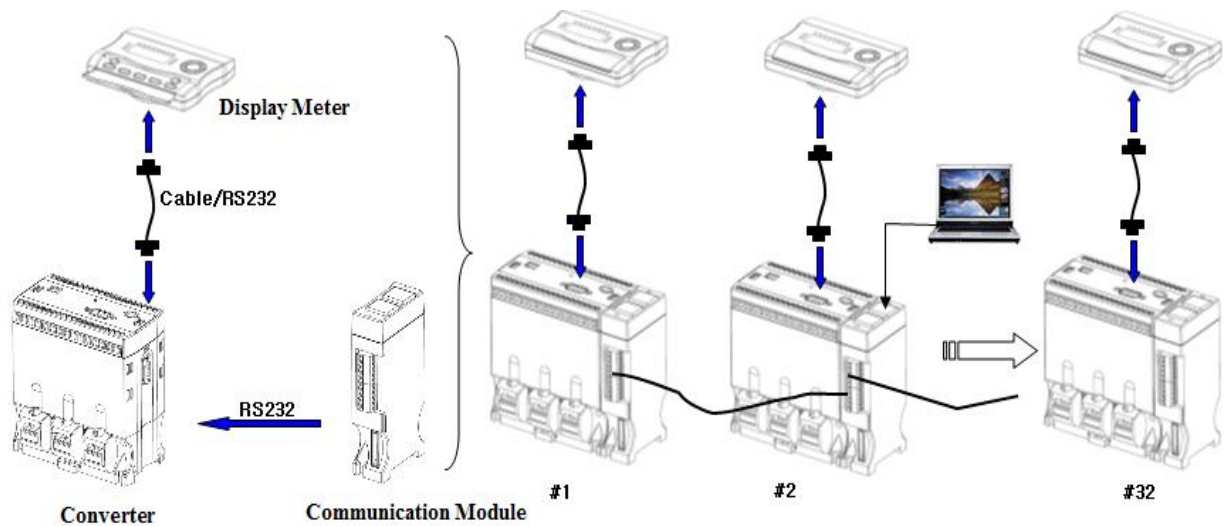
1. System Construction

1-1. 485/422 Serial Network

► DSP-VIP-PL/Panel Mounting Type

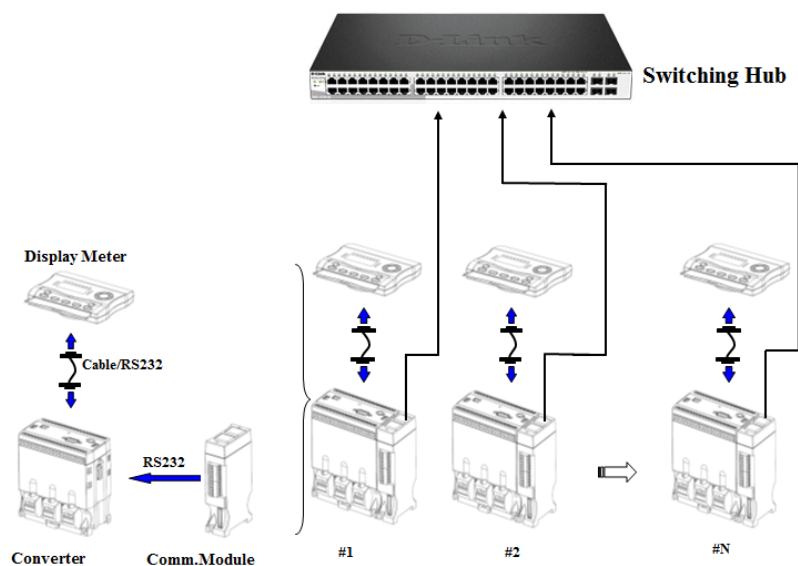


► DSP-VIP-PM/ Panel Flush Mounting Type



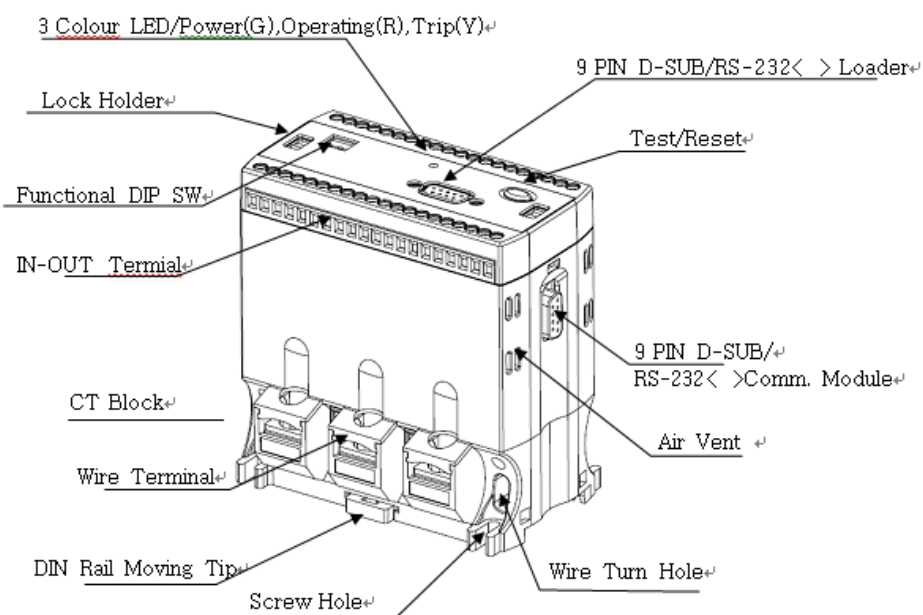
1-2. Ethernet Network

► DSP-VIP-PM/ Panel Flush Mounting Type

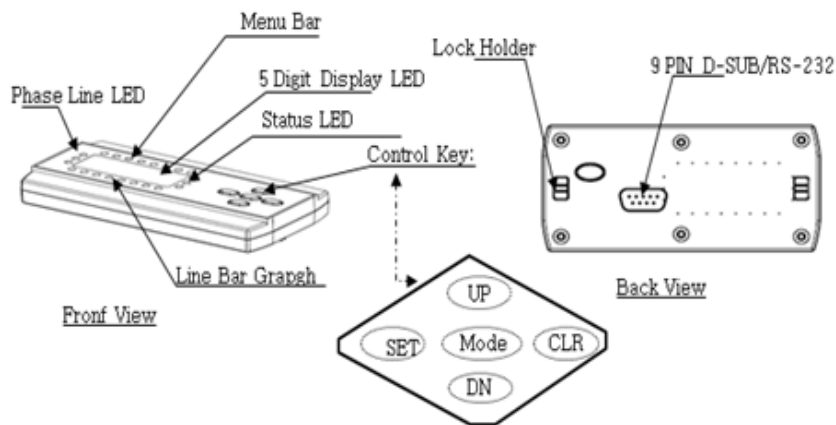


2.Detailed Structure

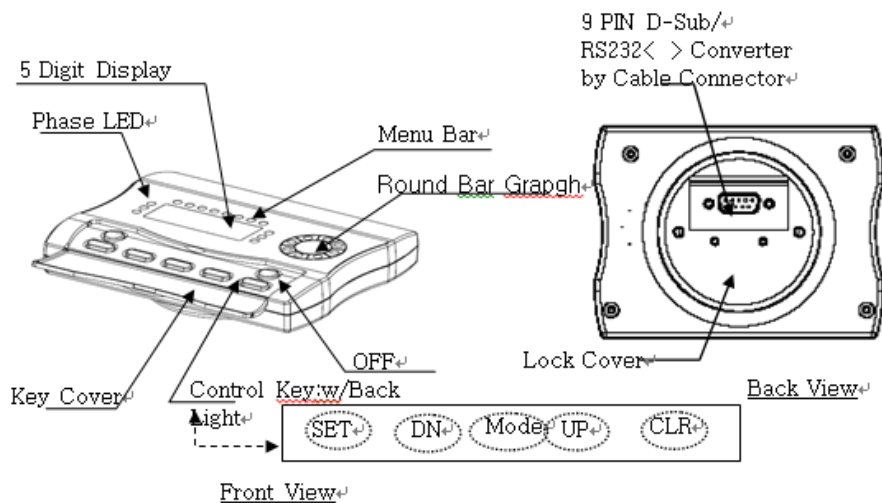
► Converter



► Loader

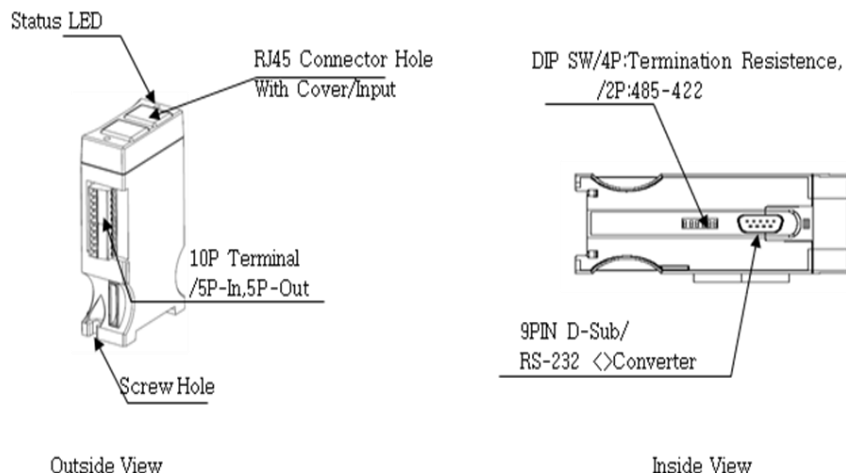


► Display Meter



► Communication Module (CM-44,CM-44E , MWR-S)

- CM-44 : RS485/422 Serial Network , Modbus/RTU
- CM-44E : Ethernet Network, Modbus/TCP
- MWR-S : 485/422 Serial Network,Modbus/RTU & Recorder



3.Main Feature

◆ Easy Handling

- ☐ Incoming voltage is indicated orderly while a motor is stopped
- ☐ To give a guarantee to exclusive operator : Password Input
- ☐ To realize convenient and various data input
 - Loader: DSP-VIP-PL
 - Display Meter: DSP-VIP-PM
 - Note Book PC: DSP-VIP-PL,VIP-PM
- ☐ Main/Sub/Cab Menu:Three devided menu group according to usage and the frequency of data input
 - Main menu : Data input frequency is rather higher
 - Sub menu : Ratherly common application for all kind of motor
 - Cab (calibration) menu :adjustable for indicating value within narrow range($\pm 12.7\%$)
/This menu is appeared when "SET" key is pressed for 5 sec or more and disappeared right after pressing again.
- ☐ Beautiful inside lighting by every touch button:Easy handling in dark space of the panel.
- ☐ To Indicate a necessasary information in every 3 sec
 - Basic Factor circulating indication:V,I,KW,GR)/ "OFF" must be set in "rota" mode
 - Basic Factor + PF,Temp,KWH,AWT(Accumulated Working Time)/"ON" must be set in "rota" mode/
Possible to fix one of circulated factor or to release : repeated one touch for CLR Key
 - To show load factor(actual/setting)/65% ~ 100%:Line Type/DSP-VIP-PL, Round Type/DSP-VIP-PM
 - Possible to check and/or to change preset value of each mode during the operation
 - ▶to check preset value : possible as pressing "SET" key
 - *Press "SET" key during a motor run,then search a mode neccessary to check as using "SET","CLR" key , consequently name of mode & preset value is shown alternatively
 - *not possible to change preset value,only to show presetting state.
 - ▶to change preset value
 - *Firstly, preset "ON" in "oPSet" mode of "CAB" mode group before motor starts
 - *Press "SET" key during a motor run,then search a mode neccessary to change , consequently name of mode & preset value is shown alternatively and make a change for preset value by "UP",DN" key
 - *Press "mode" key to enter operating state after changing for preset value
- ☐ Alarm: in case running current is higher than preset value in "OC"(over current) mode
- ☐ Convenient installation:65Phi circle or rectagular hole(48*96)/DSP-VIP-PM:Display Meter.
- ☐ To keep a stable operation under frequency variation of Inverter:1Hz ~ 400Hz
- ☐ To call initialized factory setting value: possible as presetting in "InIt" mode of "sub" mode group

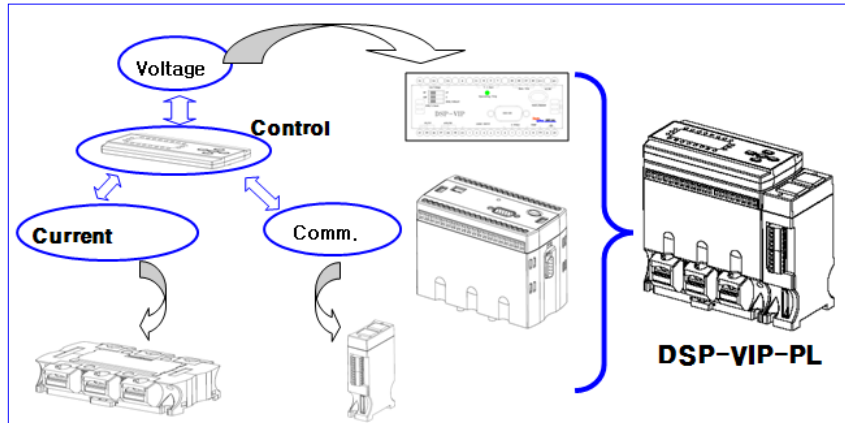
◆ Multi-complexed Function

- ☐ Power type protection relay based on Voltage and Current
- ☐ To indicate RMS value/voltage,current :RMS chip adopted in current input, isolated voltage chip/
to contribute to check an exact condition of motor
- ☐ To act as actual complexed meter:V,I,KW,PF,KWH,Temp
 - *Voltage Select:110V/220V/380V/440V/480V(110V is secondary voltage of PT)
 - *Current Meter with CT:0.5A~3600A(Auto Range for decimal point)
 - *KW Meter:0.1~60000KW(Auto Range)
 - *Power Factor Meter: $\pm 0\% \sim 100\%$
 - *KWH Meter:1KWH~99999999KWH(used "K" unit LED)
 - *Temperature Meter:0°C ~ 150°C
 - *Auto Range: to indicate decimal point in conjunction with "K/Test" LED in Loader and DM

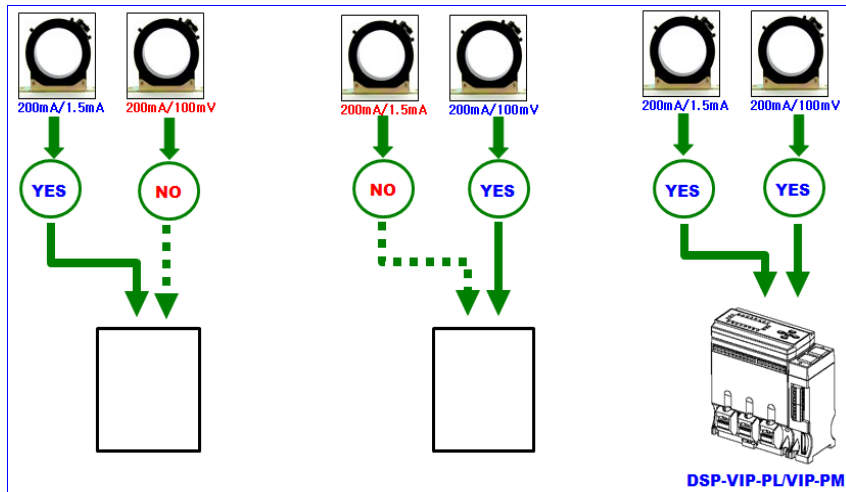
- ❑ To cover a wide current range
 - *70 Type:0.2A ~70A/0.2A ~ 6A(0.2KW~4.4KW/AC480V) with external CT
 - *With external CT :0.5~3600A
- ❑ High sensitive Level and Wide range for ground fault protection:30mA~ 10A
 - *Standard type/with external ZCT : need to use shield wire for connection between ZCT and Z1,Z2 terminal of converter
 - *Optional type : ZCT embedded
 - *Alarm to disconnection with ZCT:In case ZCT is disconnected with Z1,Z2 of the converter after the control power is on, "Ec-ct" is shown as a disconnection alarm in initial state and preseting job is followed ahead normally
- ❑ To realize Short,Ground fault protection by instant trip time:0.05sec
- ❑ To be acceptable for various rating of ZCT: 200/1.5mA or 200/100mV,selectable in DIP SW
- ❑ Various and multiple trip output of Main and Aux relay
 - *Main/1a-1b(95-96,97-98)
 - *AUX/1a(07-08):same job as main trip or one of Shoc/Uc/AL/Temp/ov-uv/v-ub,v-oFF selected in "Au-o" mode according to a selection in "Au-o" mode
 - *03-04/1a : trip for short circuit
 - *57-58/1a : trip for ground fault
- ❑ To memorize 8 events of the latest trip : to contribute analyzing trouble cause and motor working condition in conjunction with a number of lighted LED in bar graph to show a order of tripped event.
- ❑ Self-diagnostics:in case of pressing "CLR" key for 3 sec or more,Main ,AUXtrip output is trip after counting down o-time of definite T-I characteristic or a time of 550% to "OC" preset value in Inverse T-I Curve , hence % of bar graph LED shows how much time is counted down
- ❑ Basically 4~20mA output : 20mA for maximum current value among 3 phase
- ❑ To realize effective system for digital communication : possible to combine a module simply if necessary
 - *CM-44 : RS485/422,Modbus RTU
 - *CM-44E:Ethernet TCP
 - *MWR-S:Data Recorder,RS485,Modbus RTU
- ❑ To select one of RS 485 and 422 : Simply selectable in DIP SW inside communication module:CM-44
- ❑ To put easily termination resistance in extreme end unit : Simply selectable in DIP SW inside communication Module
- ❑ To monitor and to input a data by using "samdsp" software in the field
 - *PC<RS232>VIP converter:not need a communication module
 - *PC<Comm. Module>VIP converter:need protocol converter/485(Comm. Module)< >USB(PC)/ DSP-CMB
- ❑ To construct data base to realize a preventive maintenance by using software "samdspdb"

4.Specialized Point

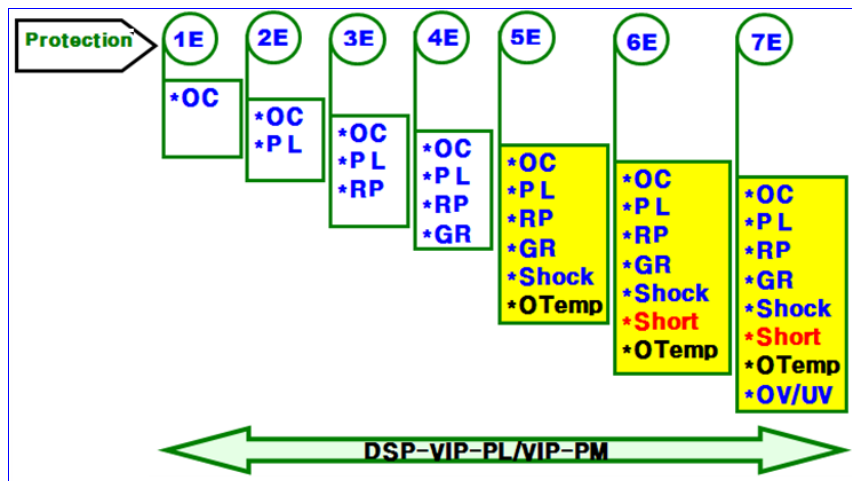
- ◆ Power Type = Incoming Line Voltage $\Leftrightarrow$ Load Current



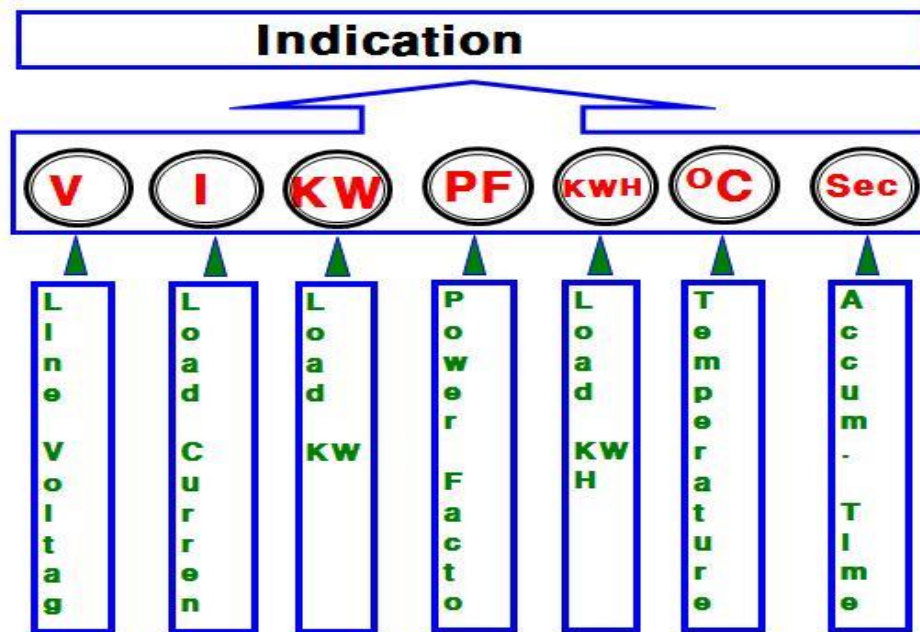
- ◆ Acceptable with both rating of ZCT



- ◆ High Level Protection Class



◆ Various and Multiple Indication

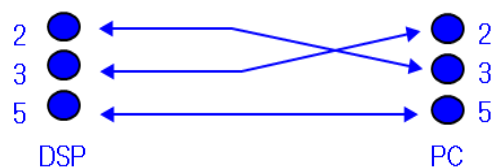


◆ Convenient Communication Module : CM-44, CM-44E, MWR-S

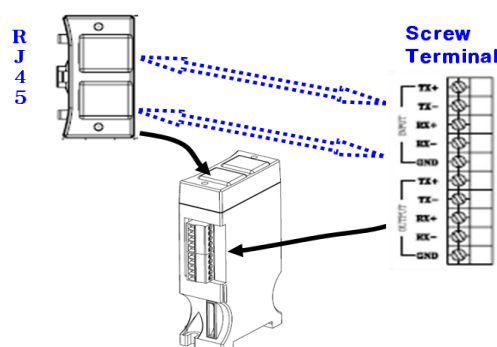
a. the interface between Note PC and DSP directly by RS232



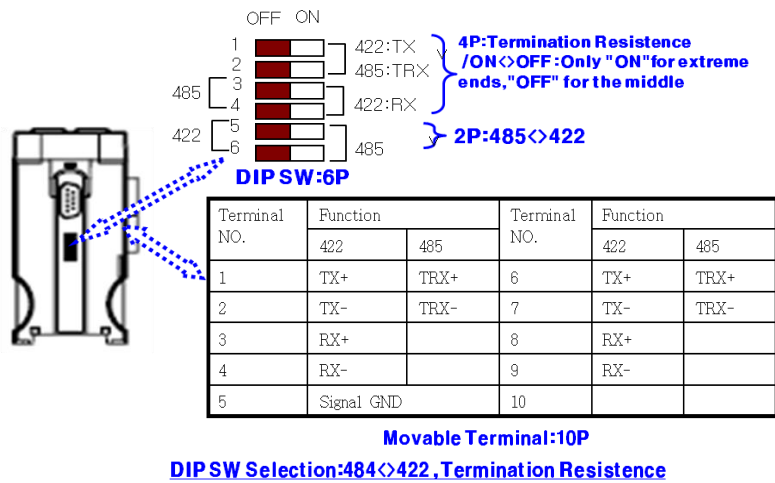
※ Note: If DSP is connected through a 9 pin port in PC, the wiring must be changed as follows:



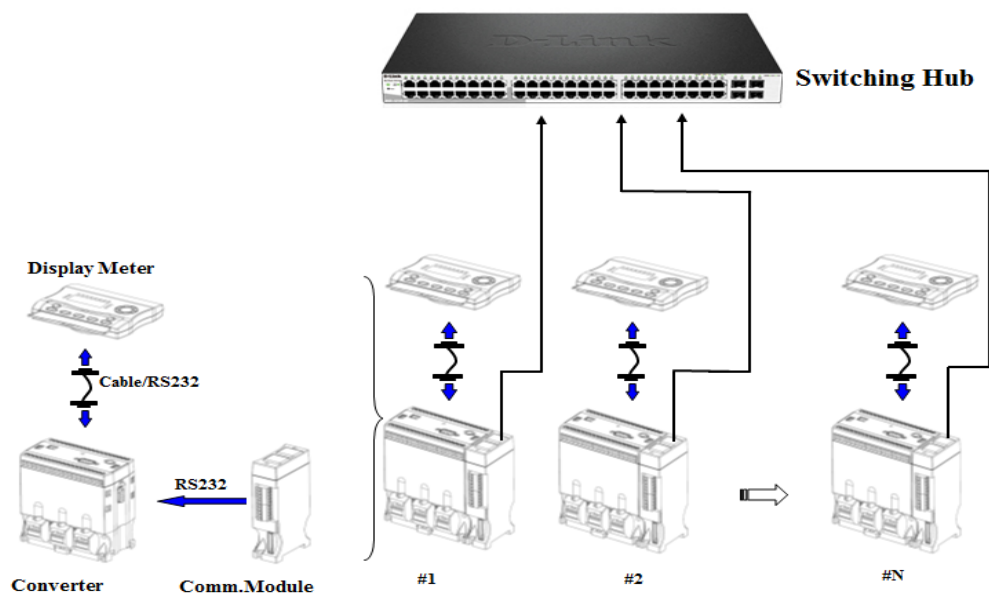
b. VIP/ CM-44 < 485/422: Serial Network > PC/Master



Serial connection through Terminal



c.VIP/CM-44E < Ethernet Network > PC/Master



5.Function List

Function		DSP-VIP-PL		DSP-VIP-PM	
		Converter + Loader	Comm. Module	Converter +D. Meter	Comm. Module
Protection	Over Load/Over Current	O		O	
	Under Load/Under current	O		O	
	Over Voltage	O		O	
	Under Voltage	O		O	
	Phase Loss by Line Voltage	O		O	
	Phase Loss by Load Current	O		O	
	Phase Reverse by Line Voltage	O		O	
	Phase Reverse by Load Current	O		O	
	current Unbalance	O		O	
	Voltage Unbalance	O		O	
	Locked Rotor	O		O	
	Shock/Stall	O		O	
	Short/Availab e for Type 10	O		O	
	Ground Fault	O		O	
	Over temperature	O		O	
Indication	Line Voltage	O		O	
	Load current			O	
	Phase power	O		O	
	Power factor	O		O	
	KWH	O		O	
	Accumulated working time	O		O	
	Load factor/Bar graph	O		O	
Communication	4~20mA	O		O	
	RS 485,Modbus/CM-44	X	O	X	O
	Ethernet/CM-44E		O		O
	RS 232	O		O	
	Interface with Note PC	O		O	

6.Technical Specification

Division		Description
Line Voltage		3 phase ,AC 100V ~ 600V,50/60Hz
Voltage setting range	AC 110V	over:110V~150V , under:70~110V
	AC 220V	over:220V~290V , under:150~220V
	AC 380V	over:380~450V , under:310~380V
	AC 440V	over:440V~510V , under:370~440V
	AC 480V	over:480V~550V , under:410~480V
Current setting range	70 Type	0.2 ~ 70A/0.2KW ~52.4KW(AC 480V) /0.2 ~ 6A(0.2KW~4.4KW/AC480V) with external CT
	External CT	Refer Table
Ground protection	Zero Sequence Current	30mA~10A
Time setting	Starting delay time(dt)	OFF,0.1 ~300 sec/def, "OFF" selection means inverse curve
	over/under voltage trip delay time (ouPt)	0.1~30 sec/def
	over load/current trip delay time(ot)	0.1~60 sec/def,5~30class/inv:refer curve
	under load /current trip delay time(ut)	0.1~30 sec/def
	Shock/stall trip delay time(st)	0.05 sec/instant, 0.1 ~ 3 sec/def
	Ground fault starting delay time(Edt)	OFF,1 ~ 25 sec/def
	Ground fault trip delay time(Eot)	*0.05(instant),0.1~ 30 sec/def *1~10 Class/Inverse,refer curve
	Voltage Unbalance	0.5~10sec/Adjustable
	Phase loss trip delay time(PLc)	*based on load current *1~5sec/definite
Allowable tollerance	Voltage	+,- 3%
	Current	C<=2A:0.1A,C>2A:+,- 5%
	Time	t<=2 sec:+,-,0.1sec, t>2 sec:+,-,5%
	Power factor	+,- 5%
	KW,KWH	+,-5% , Cos Phi>0.6
Control power		*85VAC~260VAC,50/60Hz(90VDC~370VDC)
		*24VAC/DC(optional)
Trip Relay	Main	1a-1b(1-SPDT), 3A/Resistive
	Aux	1a(1-SPST), 3A/Resistive
	SS	1a(1-SPST), 3A/Resistiv
	GR	1a(1-SPST), 3A/Resistive

Application environment	Temperature	Operation	-25 °C ~ +70 °C
		Storage	-40 °C ~ +80 °C
	Relative humidity	30 ~ 85%,non-condensing	
Current tolerance against changeable frequency in inverter		Avg ± 3% in 1Hz ~ 400Hz	
Logic Input		*220VAC:150 ~ 260VAC,50/60Hz(220~370VDC) /Standard *110VAC:75 ~ 150VAC,50/60Hz(110~220VDC)/Optional	
Max Conductor Size		25sq	
Screw Torque		Max 0.6 N.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:AC 1500V,60Hz,1 min	
Lightning Impulse Voltage Withstand Test)/ IEC-60255-5		*Circuit-Ground,Circuit-Circuit:1.2/50uS,5KV *Control Circuits:1.2/50uS, 3KV	
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°,90°,180°,270°)	
Conducted Disturbance Test:IEC-60255-22-6		10V,Level 3	
Digital Communication/ Serial Network/CM-44, MWR-S	Physical feature	*RS 48*RS 485/ RS 422 : CM-44 *RS48*RS485 : MWR-S	
	Address	1 ~ 250	
	Speed	*9.6/19.2/38.4/57.6/76.8/115.2kbps *matched with CM-44,MWR-S	
	wiring connection	*Input/Output:RJ 45 ot Screw Terminal *RJ45 and Screw Terminal(5P) is commoned Physically *RJ45 is recommended for the test by "Samdsp"	
	Termination resistance	*DIP S/W selection / 200 Ohm	
	Cable	Sheathed cable,2 Pair	
Digital Communication/Ethernet Network/CM-44E	Physical feature	Modbus TCP	
	IP Address	*RJ45 * http://www.sollae.co.kr/kr/download/utility .php : ezManager ,v3.2E/Software to preset an operation factor for Windows	
Current Loop Communication:4 ~ 20mA		Maximum value in 3 phase current	

Consuming power	10W max
-----------------	---------

7. Protection List

Item	Description	Remarks
Over Voltage	*110V:110~150 *220V:220~290 *380V:380~450 *440V:440~510 *480V:480~550	*The 3 phase voltage over upper level of each range makes trip by over voltage. *The trip caused by a voltage is reset automatically after reaching over preset value *Only 110V is based on a secondary voltage of PT *The output caused by a voltage comes through AUX output in case a voltage is selected in “Auo” mode
Under Voltage	*110V:70~110 *220V:150~220 *380V:310~380 *440V:370~440 *480V:410~480	*The 3 phase voltage under lower level of each range is not sensed, but assumed zero. *The trip caused by a voltage is reset automatically after recovering to level of preset value *The output caused by a voltage comes through AUX output in case a voltage is selected in “Auo” mode
Over Load(KW)	Trip is done if the load(KW) greater than preset value is kept over preset o-time	
Over Current	Trip is done if the load current greater than preset value is kept over preset o-time	
Under Load(KW)	Trip is done if the load(KW) smaller than preset value is kept over preset u-time	
Under Current	Trip is done if the load current greater than preset value is kept over preset o-time	
Current Unbalance	*Trip is done if the preset current unbalance rate is kept over 8 sec. *rate=[(max curr.-min curr.)/max curr.]*100[%]	
Voltage Unbalance	*Trip is done if the preset voltage unbalance rate is kept over preset time. *rate=[(max voltage-min voltage)/max voltage] * 100 [%]	*Preset time:0.5~10sec/adjustable *The output comes through AUX output in case a voltage is selected in “Auo” mode
Locked Rotor	Trip is done if 300% current greater than preset “oc” is kept for d-time plus 0.1 sec.	

Shock/Stall (instant over current/shock)	*Trip is done if a current greater than preset value during working is happened for preset time. *Preset range:180%~700% to "OC"	*upper limit for 70 type is based on $[(240/OC \text{ setting value}) * 100(\%)]$
Short Circuit	*If load current is greater than preset value,output relay is trip with 0.05 sec *Preset range:800%~2000% to "OC" *Trip time : 0.05sec±10mS	*Available "OC" preset range ▶0.2A~40A without external CT •Available short protection range based on "OC" preset value is followed calculation : $800\% \sim [(400/"OC" \text{ preset value})] * 100[\%]$ ▶0.2A~6A with external CT *SS(03-04) output through intermediate auxiliary relay will operate MCCB with enough short current capacity
Ground Fault	Trip is done if a current greater than preset zero phase current is kept for Eot(earth operating time)	*according to selection of DIP SW:ZCT rating is used for 200mA/1.5mA or 200mA/100mV
Over temperature	*Trip is done if the temperature sensed by PT100 greater than preset temperature is kept over 8 sec	* If sensed temperature is greater than preset value, "tEP" and "latest measured value" is shown alternatively on the order of temperature indication as warning procedure
Phase Loss by line voltage	*This protection is identified by line voltage *Trip time is within 1 sec. *"OFF" is possible in this mode	*If each of 3 phase is a state of phase loss in the same time,which means normal "power off", this mode does not response to such state *If phase loss is happened, auto reset is not possible,but manual reset.
Phase Loss by load current	*This protection is identified by load current *Trip time:1~5 sec/definite. *"OFF" is possible in this mode	*If phase loss is happened,auto reset is not possible,but manual reset.
Reverse Phase by line voltage	*This protection is identified by line voltage *Trip time is within 0.5 sec. *"OFF" is possible in this mode	*If reverse phase is happened ,auto reset is not possible ,but manual reset.
Reverse Phase by load current	*This protection is identified by load current *Trip time is within 0.5 sec. *"OFF" is possible in this mode	*If reverse phase is happened, auto reset is not possible,but manual reset.

8. Indication List

Item	Description	Remarks
Line Voltage	Incoming Line/V1,V2,V3 or Average voltage(selected in "trans" mode of "cab" mode group)	*110V is based on a secondary voltage of PT *In case incoming voltage is zero in the same time:OFF is shown
Load Current	L1,L2,L3	
Temperature/ case,winding	1°C ~ 150°C/scale 1°C	
Power factor	COS Phi	In case of 110V, it is based on secondary voltage of PT for correct calculation
Accumulated KWH	*if a current greater than 0.2A is loaded,KWH is accumulated every 6 min. *possible to record 99999999 KWH *to clear existing accumulated KWH: in "hp-c" mode ,press "DN" under pressing "UP" at first ,then finally make both pressing state ,and reversely release "UP" after releasing "DN" at first	
Accumulated working time	*if a current greater than 0.2A is loaded, working time is accumulated in every 6 min *range:0~6553.5 hr,next to zero *to clear an existed value , use the way to call initial factory default value	
preset time to make alarm for working time	*range:1~6553.5, next to zero *to clear existing accumulated time in "Alt" mode :refer a case of KWH	
Load factor by bar graph	*calculating % as followed. [actual load curr./preset curr.]*100[%] or [actual load kw/preset load kw]*100[%] *Line type/DSP-VIP-PL ,round type/DSP-VIP-PM *indicating only ALhc(higher level alarm)	
Alarm before trip	*preset "AL" in "Au-o" mode ,then make level % in "Alhc" mode *1a is closed(energized) if actual level % exceeds preset level %/Available even when a condition is keeping for 3 sec	

9.Auxiliary Function

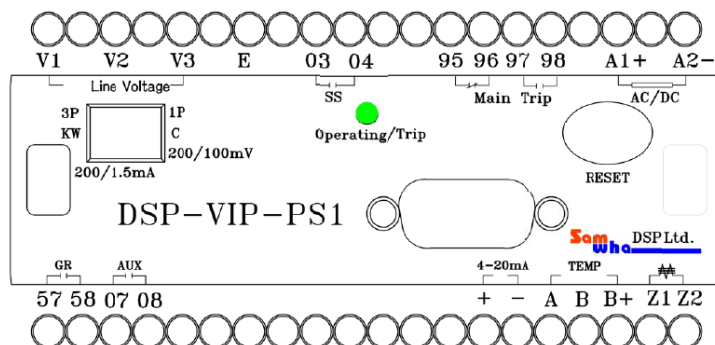
Item	Description	Remarks
DC 4~20mA	*To change max current among 3 phase into 20mA *The receiver for 4-20 signal does not need loop voltage	
Password	*The preset procedure in a mode is possible as inputting password for a exclusive operator to have gurantee for operation	
Self-diagnostics	*Main,Aux(if "Auo" mode preset "oFF") trip relay will be trip(energized) after count down a preset o-time(dt or time of 550% in inverse) in pressing "CLR" SW for 3 sec to check if a self-function is normal or not.	

10. Self-diagnostics table

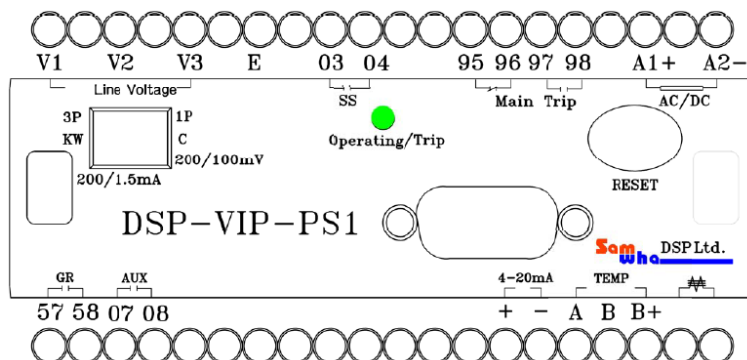
Discription	Message display
485 communication error	LED on the communication module is not turned on or not flickered
Fault for internal current board	cu-no
Fault for internal voltage board	vo-no
Fault for GR protection function in internal main board	Ec-no
ZCT disconnection	Ec-ct is only shown initial state
PT100 disconnection	*Latest sensed temperature and "tEmP" is shown alternatively after 3 phase voltage is loaded if sensed temperature is greater than preset value
Latest measured temperature greater than preset temperature	* If sensed temperature is greater than preset value, "tEP" and "latest measured value" is shown alternatively on the order of temperature indication as warning procedure
Self-test by "CLR" SW	Main ,Aux trip is trip after counting down preset o-time in definite T-I(550% time in inverse T-I)/the number of lighted LED is matched with counted time

11.Input-Output Terminal

► External ZCT type/possible to match with external CT



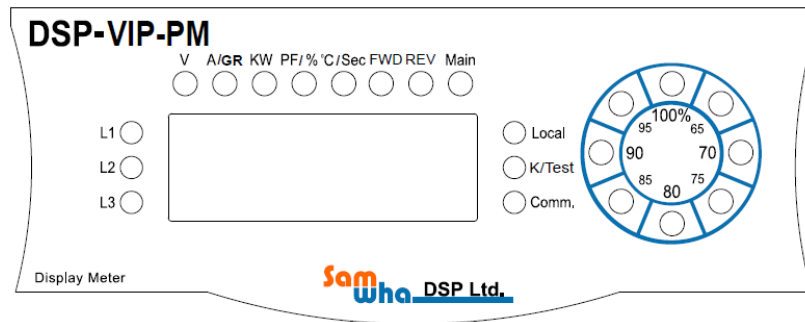
► Embedded ZCT type/not possible to match with external CT



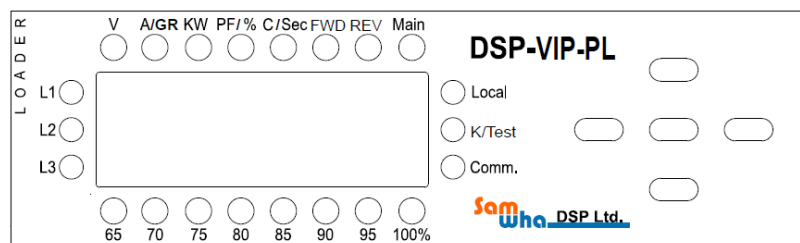
Division			Description	
Feature		Terminal		
Input	3P/1P	3P-1P	DIP SW	3 phase/Single phase
	Load-current	KW-C		Power-Current
	External ZCT	200/1.5mA-200/100mV		Rating of External ZCT
	Control Power	A1+, A2-	85~260VAC,50/60Hz/90~370VDC	
	Line Voltage	V1,V2,V3		
	Motor Earth	E	*Frame Earth for EMC *Depending on noise environment	
	Temperature	A,B,B+	PT100	
State	RED	Operating	3 Tone Colour LED	
	Green	Power ON/stop state		
	Yellow	Trip		
Output	Main TRIP	95-96,97-98	OL/OC,UL/UC,Lc,PL/PLc,rP/rPc,Shock (Stall),Temp	
	GR	57-58	Ground fault	
	SS	03-04	Short Circuit/to trip a device like MCCB with sufficient VA capacity	
	AUX	07-08	AL,volt(ov-uv-v-ub,v-oFF),uc,Temp	
	4~20mA	+, -	Current loop communication/not allowed to be loaded a voltage from a receiving device	

► Display window image

→ Panel Flush Mounting Type : Display meter



→ Panel Mounting Type : Loader



12.Trip Relay Output

Trip	Relay	Output
Main	95-96,97-98	*Over Load/OverCurrent
		*Under Load/Under Current
		*Locked Rotor
		*Phase Loss
		*Reverse Phase
		*Over Temperature
		*Current Unbalance
		*Shock
GR	57-58	*Ground Fault
SS	03-04	*Short Circuit
Aux	07-08	*Selected in Au-o mode(one of OFF, uc ,Shoc, Al, tEmP,volt) *OFF:same as Main Trip *Al: alarm to OC,65~100%/Contact is closed after 3 sec from reaching setting alarm level *tEmP : alarm to temperature *Shoc : alarm to shock(instant over current) *volt

		▶ ov: alarm to over voltage ▶ uv: alarm to under voltage ▶ v-ub: alarm to voltage unbalance ▶ v-oFF : voltage value is not sensed *selected factor is excluded from main trip *all trip in this mode is naturally reset in case trip cause is clear
--	--	--

13.Preset Description

13-1.Main Mode

Mode	Function/range	Description	Factory Setting value
P0000	Password	*Press "SET" button to have a preset. *Input a factory setting number,"0000" to enter setting mode *Move a cursor from first digit(1000 unit) to last digit(1 unit) to pass over next mode as pushing CLR key(Enter function) 4 times. *possible to change password made by "PEdIt" mode in CAB mode group *If the operator forget a password, manufacturer can support it or use a procedure to call factory initialized setting value *To call factory seting value,make pressed state for Test button of converter at first under power-off condition, then power-on under pressed state of test button for 3 sec or more	0000
LInE/oFF/ 110/220/380/440/480	to select a value of line voltage	*to select voltage range of incoming line *OFF:to make disable a protection at a one time for phase loss ,reverse phase based on line voltage ,over(Ov) and under(Uv) voltage *this disable execution takes a priority from ON/OFF of each mode(Ov,Uv) about voltage *110V is the output of PT by D-Y connection between primary and secondary for the correct calculation of power factor ,but others are line voltage to operate a motor	480V
Load(DIP S/W→KW)/setting value	to preset a range to protect over load	*In case of selecting KW in DIP SW,this mode is available to preset value(Load)and it is default condition that previous "C" mode is not appeared *Imaginary preset value of "OC" to execute a protection for "Lock","Short" and "Shock" is calculated inside algorithm as followed formular:[KW=[root3 * V * I * K]. here K=0.9. *Normal operation is done as sensing a current greater than 0.12KW/0.2A(380V)	“ _ _ “

oc(DIP S/W→C) / setting value	to preset a range to protect over current	*In case of selecting C in DIP SW, this mode is available to preset value(current) and it is default condition that previous "KW" mode is not appeared *even though "C" is selected, the indication and the protection in conjunction with line voltage can be executed if line voltage is powered. *Current range --70 Type: 0.2A ~ 70A/0.2A~6A with external CT *Over Load range with Voltage --70 Type: 0.2KW~52.4KW(AC480V)/0.2KW~4.5KW(AC480V) with external CT	25
Cto/1t/5A	*to sense a current through DSP in itself or combined with external CT	*1t :current is sensed through its own CT :the preset in next "ct" mode is not able. *5A: a secondary current rating of external CT is 5A	1t
ct/setting value	to preset a ratio for external CT	*if 1t is selected in "cto" mode, this mode is displayed like "ct--", it means that any preset is not available anymore. 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	“_ _”
dt/off/ setting value	to preset starting trip delay time	*Trip delay time to prevent unwanted trip caused by starting current *0.1~300 sec	10 sec
Otc/deF/ Inv	to select time - current characteristics 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~(240/“oc” value)*100[%]	deF
Ot/oFF/setting value	to preset operating trip delay time	to preset time to make a trip when Load(KW) or C exceeds preset value *definite: 0.1sec ~ 60sec *inverse: 5 ~ 30 Class	7 sec
Lc/oFF / on	to protect locked Rotor	*OFF: disable for this mode *ON -Otc=Def/Inv: dt+0.1sec if starting current exceeds 300% to oc during dt, Lc is shown in trip *In case Load is selected, this protection is done by imaginary oc value calculated internally by the relationship of V, I, PF, Efficiency.	oFF
SS/oFF/on	To protect short circuit	*oFF: This function is disable only for starting time(dt), so after dt is elapsed, this function is able *on: This function is able from starting point	ON
SSc/OFF/ Setting Value	To preset short protection % to OC	*Available “OC” preset range ▶without external CT: 0.2A~40A •Available short protection range based on OC” preset value is followed Calculation : 800%~[(400/“OC” preset value)]*100[%] ▶with external CT: 0.2A~6A/800%~2000% *SS(03-04) output through intermediate auxiliary relay will operate MCCB with enough current capacity	1000

		*trip time:0.05sec ±10mS	
Shoc/oFF /Setting Value	To protect mechanical shock during motor is working	*to preset a value in each current range *Preset range is 180% ~700% to OC setting value *In case of 70 type , this upper level % must be limited by this formular as {(240/OC preset value) *100[%]} *OFF:This mode is disable *If KW is selected, OC value above formular is still applied for this protection.	oFF
st/setting value	To preset a time for shock protection	*0.05/instant,0.1~3 sec/definite *If "Shoc" mode is oFF, this mode is displayed like a image of "st --",it means that user is not able to input a value anymore	“_ _”
PLc /oFF / setting value	to protect phase loss by load current	*ON:to make a trip to protect phase loss based on load current:1~5sec/adjustable *OFF:to make this mode disable *Auto reset is not possible,but manual reset.	oFF
rPc /oFF / on	to protect reverse phase by load current	*OFF:not to protect reverse phase *ON:to make a trip to protect reverse phase based on load current within 0.5 sec *Auto reset is not possible,but manual reset.	oFF
Ov/OFF/ setting value	to protect over voltage	*to preset a value to protect over voltage concerned with LInE mode *OFF:disable for this mode *preset range ▶ 110V:110~150 ▶ 220V:220 ~ 290V ▶ 380 V: 380~450V ▶ 440: 440~510V, ▶ 480V:480~550V *a trip by over voltage is reset automatically in case actual voltage is reached under preset value *this function is activated during initial waiting state if voltage is loaded *motor can not run in initial start state if line voltage is over preset value	oFF
Uv/OFF/ setting value	to protect under voltage	*to preset a value to protect under voltage concerned with LInE mode *110V:70~110,220V:150~220, 380V: 310~380 , 440V:370~440 , 480V:410~480V *a trip by over voltage is reset automatically in case actual voltage is reached over preset value *this function is activated during initial waiting state if voltage is loaded *motor can not run in initial start state if line voltage is under preset value	oFF
OUvt/oFF/ setting value	to preset trip delay time to protect over/under voltage	*oFF:to make this mode disable,but this disable job is not available if any one of over and under voltage standard is preset *this mode can be "OFF" only in case all of Uv,Ov is oFF *trip delay time range:0.1 ~ 30sec/definite	“_ _”
PL/oFF/ on	to protect phase loss by line voltage	*OFF:to make this mode disable *Even if C is selected,this mode is available to protect phase loss of line *ON:to make a trip to protect phase loss based on line voltage within 0.5 sec *In case 3 phase is normal power-off state,this mode is not worked. *Auto reset is not possible,but manual reset.	oFF

rP/oFF/ on	to protect reverse phase by line voltage	*OFF:to make this mode disable *Even if C is selected,this mode is available to protect reverse phase of line *ON:to make a trip to protect reverse phase based on line voltage within 0.5 sec *Auto reset is not possible,but manual reset.	oFF
Ec/oFF/ setting value	to preset a range of zero phase current to protect ground fault	*based on zero phase current through ZCT *range:20mA~10A	400mA
Edt/oFF/ setting value	to preset starting trip delay time	*OFF:to make this mode disable *starting trip delay time:1 ~ 25 sec/def *Sensitive range:20mA~10A *If "Ec" mode is off,this mode is displayed like an image of "Ec --",it means that user is not able to input a value anymore	oFF
Etc/deF/ Inv	to select time-current chracteristics to protect ground fault	*deF or inv *If "Ec" mode is off,this mode is displayed like an image of "Etc --",it means that user is not able to input a value anymore	deF
Eot /setting value	to preset operating trip delay time to protect ground fault	*deF:0.05 sec(instant),0.1 ~ 30 sec/1sec step *Inv:1 ~ 10 Class/refer curve *If "Ec" mode is off,this mode is displayed like an image of "Eot --",it means that user is not able to input a value anymore	1sec
Test	*This is done by pressing "CLR" key for 3 sec or more *to check if this relay is ready to work normally or not. *Main,Aux(if "oFF" is preset in "Auo" mode) 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 "Reset SW in Converter or "CLR" key for 0.5sec more, then "End" is shown		

13-2. Sub Mode

Mode	Function/range	Description	Factory setting value
P0000	Password	*same as a job of password mode in "main Mode"	0000
uL/oFF/ setting value/ [uc/oFF]	to preset a range to protect under current/load	*this mode shows "uL" or "uC" according to a selection(Load/KW) in DIP SW *under load setting range with voltage -110V:70W~ OL preset value -220V:135W~ OL preset value -380V:235W~ OL preset value -440V:270W~ OL preset value -480V:300W~ OL preset value *under current setting range:0.1A~ preset value for "Oc"	OFF
ut/oFF/setting value	to preset trip delay time to protect under load/current	*to preset trip delay time to protect under load/current *def:0.1~30sec *in case "uL" mode is OFF ,this mode is displayed an image like "uL--", it means this mode is disable	"--"

ub / oFF / setting value	to preset current unbalance rate(%) among 3 phase	* even if Load is selected,this function is available by actual current *formular:[(max-min)/max]*100 [%] *range:30% ~ 90% *minimum available current:0.3A	oFF
Au-o/ oFF/ uc/Shoc/AL/ tEMP/volt	to preset a factor of AUX trip output	*oFF:to make same output as main trip *uc:only for under load/under current *Shock:only for Shock/Stall *AL:only for higher level alarm to oc *tEMP:only for over temperature *volt : ov or uv or v-ub or v-OFF ▶ ov : over voltage ▶ uv:under voltage ▶ v-ub : voltage unbalance ▶ v-OFF : voltage value is not sensed *This selected protection factor is excluded in main trip naturally *This trip is automatically reset if a trip condition is clear	oFF
ALhc/oFF/ setting value	to preset higher alarm level rate(%) to OC(OL)	*oFF;if other factor except AL in this "Au-o" mode is preset,this mod is displayed an image like "- _" *% range:65% ~100% of preset value to Load (KW)/OC	" _ "
ALt/setting value	to preset a limit of accumulated working time necessary to give alarm.	*if 0.2A is loaded, working time is accumulated in every 6 min *setting range:0.1 hr ~6553.5 hr in 0.1 hr step *"Sec" LED of front window will be flickered to give alarm after passing a preset value for hour *To clear:press "UP" or "DN" after entering "ALT" mode in motor stop state, but "—" will be flickerd until 6 min has passed after starting a motor	6500
dc	to decide max current to change into 20mA	*to transfer maximum current of 3 phase current into 20mA ,and 4mA means zero ampere output *Primary current is transferred in case external CT is used. *The receiver for 4-20 signal does not need loop voltage	50
tEMP/oFF/ Setting Value	to preset temperature value to protect temperature rising	*based on PT100 sensor *range: 1°C ~150°C/1°C a step *trip time : 8sec *If sensed temperature is greater than preset value, then main trip is happened in 8 sec after dt is elapsed as motor starts	OFF
rota /oFF / on	to indicate additional factor besides basic factor to indicate running operation value in a order	*OFF:to indicate basic factor orderly in every 3sec: V,I,KW(V*I*t*cos phi) ,GR *ON:to indicate additional factor such as Temp, PF,KWH,AWT(Accumulated Working Time) including basic factor together * Possible to fix one of circulated factor or to release:one touch button(CLR Key:enter function)	OFF

hP-c /clear	to start to accumulate KWH or to clear accumulated KWH	*to accumulate KWH from timed position in every 6 min *max accumulated KWH is 99999999 *To clear:press "UP" firstly-->keeping pressed "UP" -->nextly,press "DN" key ,then keep 1 sec under pressed state of both key ,finally release "DN" key earlier than "UP" key	0
rESet/Hr/ 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 comming out from operating mode after input password	Er
Aut-t/ setting value	to preset auto reset time	*time range :0(instant), 0.1sec,1~300sec *If Hr is preset in "rESet" mode, this mode becomes disable	"_ _"
t-Aut/ setting 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 tripped cause	*To show latest number of 8 trip cause in order *8th tripped cause and caused value are appeared firstly, next 7th and finally 1st trip ped cause as every pressing "up" button *to support an operator how many order of 8 trip event is appeared, a number of lighted LED in bar graph is in conjunction with it. *need to press "Mode" key to return to main mode *trip information in order:faulty phase and faulty value is appeared alternatively *more detailed information can be retrieved by note PC directly or remote center	trip
Addr /Setting	to put self-address to	*to preset an address for 485/422 communication	1

value	communicate with pc	*range of number:#1 ~ #250 *This mode is naturally disable if “tcP” is slected in “FdbuS”	
bPS / setting value	to decide communication speed	*to select communication speed : 9.6/19.2/38.4/57.6/76.8/115.2kbps *This mode is naturally disable if “tcP” is slected in “FdbuS” mode	9.6

13-3.Cab Mode

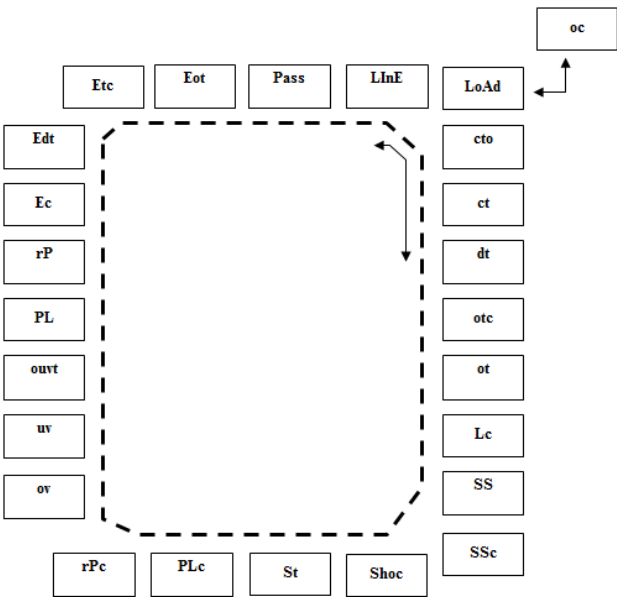
This mode is appeared as pressing "SET" key for 5 sec or more and is disappeared as pressing "SET" key shortly once more, also it is not recommended that user makes a calibration without checking by accurate source

Division	Function/range	Description	Factory setting value
P0000	Password Input	*need to input factory value "0000" to enter into this mode group *to calibrate slight difference between indication and actual value within +,-12.7% *next mode by pressing right direction key "CLR"	0000
CrPEr	to have a caribration for phase "R" current	*possible to adjust within +, - 12.7% from indicated value by using "UP" or "DN" key	0
CsPEr	to have a caribration for phase "S" current		0
CtPEr	to have a caribration for phase "T" current		0
vrPEr	to have a caribration for phase "R" voltage		0
vsPEr	to have a caribration for phase "S" voltage		0
vtPEr	to have a caribration for phase "T" voltage		0
EcPEr	to have a caribration for ground fault current		
tEPEr	to have a caribration for temperature		
tranS/OFF/ d-Ear	to select indication pattern of incomming voltage	*OFF: to indicate line voltage:v1,v2,v3 *d-Ear:to indicate average voltage	OFF
vUb/OFF/ setting value	to preset voltage unbalance protection rate(%)	*trip in case preset rate condition is kept on preset time or more *rate:[(Max V-Min V)/Max V]*100 [%] *adjustable range:2%~40%	OFF
v-ut/ setting value	to preset operating trip delay time for voltage unbalance	*to preset a operating trip time for voltage unbalance *Adjustable range: 0.5~10 sec	3

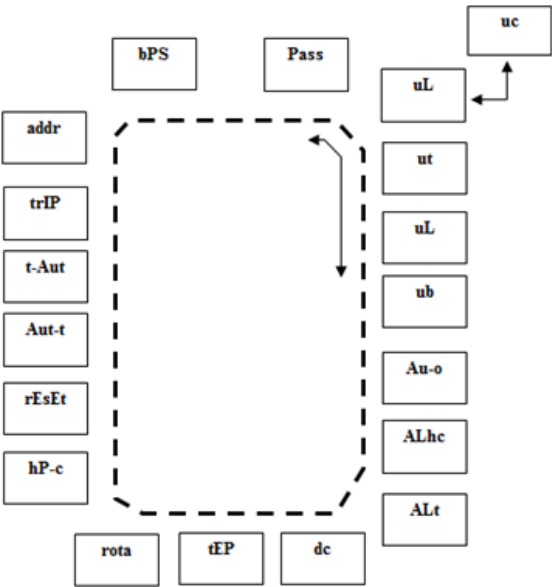
PF/Pa/va	To preset a condition for KW calculation	* Pa :to adopt actual power factor measured from running state *va : to fix to 1(100%) as power factor//useful for the operation under the inverter	Pa
v-mul	To decide a To preset PT ratio for primary voltage indication	*auto:VIP always dispatches a data *Slave:VIP *Ratio is based on that PT secondary voltage is 110V *setting range:1~99	auto --
Comm/auto/slave	To decide a qualification of VIP in case of the communication	*auto:VIP always dispatches a data *Slave:VIP dispatches a data only in case the master requires	auto
FdbuS/RTU/TCP	To decide network protocol	*RTU : Modbus/RTU,422/485 *TCP : Modbus TCP, Ethernet	RTU
oPSEt/ON/OFF	to decide if it is possible to preset during the operation	*ON : it is possible for operator to change a preset value during motor normal operation except "out" mode * OFF : it is not possible for operator to change a preset value during motor normal operation	OFF
LogIc/oN/oFF	To decide if logic input state can be activated or not	*ON : to make logic input state be able ▸ C1-F : 1a/Forward ▸ C1-R : 1a/Reverse *OFF : to make logic input state be disable ▸ "Auto" is shown initially after the control power is loaded	OFF
InIt	To make factory default condition	*It becomes the factory default value after "EEPIn" is shown as pressing "UP" and "DN" key together for 2sec or more	
PEdIt/setting Value(P****)	to change password	*possible to enter new digit by using "UP" or "DN" key after positioning a cursor on the required digit *possible to enter into main mode or sub mode as pressing "mode" key	

13-4. Order of MODE

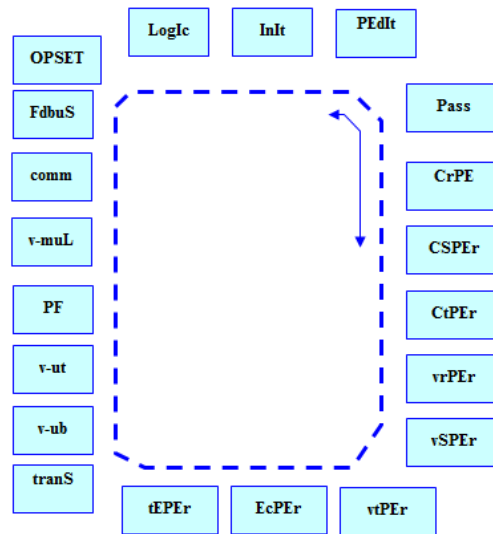
► Main Mode



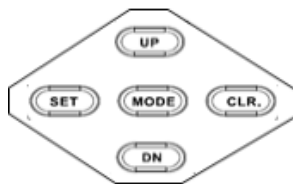
► Sub Mode



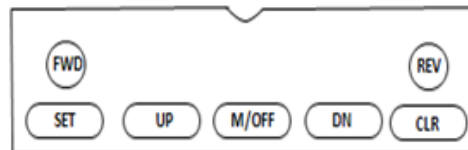
► CAB Mode



14.Control Key Operation

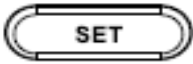
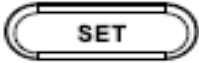
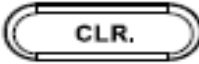
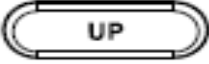
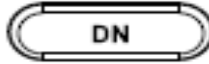
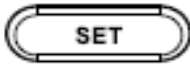
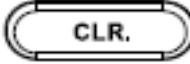


DSP-VIP-PL



DSP-VIP-PM

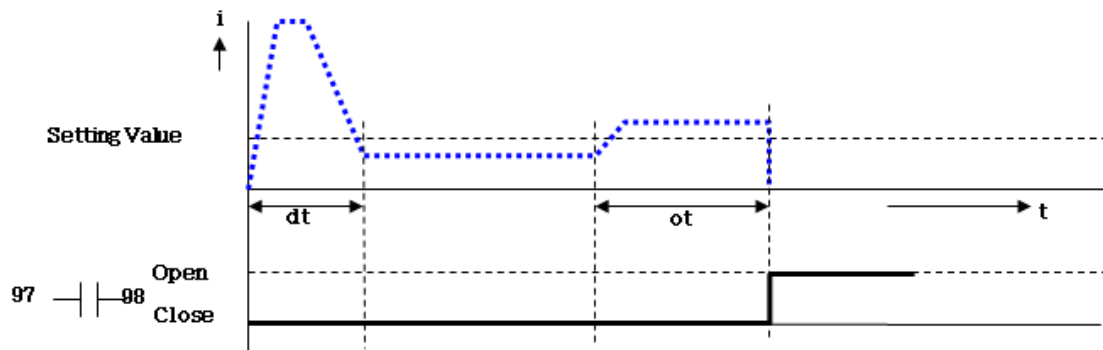
Function	Key	Description
1.Mode Group Selection		*Main Mode or Sub Mode in conjunction with "Main" LED/"Main " mode:LED is turned on. *Firstly LOP",nextly version number is shown in the order as control power is loaded in a converter → "Ec-ct","tE-no" is shown if ZCT ,PT-100 is not connected *Press "SET" Key to enter into setting mode,then "P0000" (factory default password) is shown *In case of using this default number, move cursor from first digit to right end digit by pressing "CLR" key ,finally press once more,then operator meets possible state for setting a number or character of mode . *If there is no input for 15 sec or pressing "Mode" key, VIP is entered into operating condition.

2.Set Key Function			*After entering into posible state for setting , each key acts its job as follows : SET→backward direction, CLR→foward direction,UP.DN→able to select number or character in preset mode. *if operator wants to stop setting,it is possible to return to next mode as pressing "Mode" key or setting nothing for 15 sec or more ,then all selected data untill previous action to cease a setting is stored automatically.
3. MODE selection	 		a Mode selection to preset data is done by pressing "SET" or "CLR" under the job of directional key.
4.Adjust	 		*To select number or character in the each mode *Return to next mode as pressing "CLR" key
5.Mode (Store)			*As pressing "Mode" Key once again ,preset procedure is completed and is ready to operate in its duty. *it needs 3 sec to store a preset data,so if operator makes "power-off" without waiting a storing precess for this time,ratherly VIP could returns to initial factory state
DSP-VIP-PM	Motor Start	 	*To start a motor in conjunition with logic input *Stop job is kept each other while the motor is operated by the command for the other *FWD :Forward operation *REV:Reverse operation *Not used
	Motor Stop		*To stop a motor in any case *Not used *Available for select main/sub mode
To check and/or change preset value of each mode during operation	  		*possible to check preset value during an operation ▸ press "SET" key once during operation ▸ preset vaue and mode are appeared alternatively ▸ "SET" and "CLR" key works same direction job above to check next mode or previous mode * possible to change preset value during an operation ▸ "oPSet" mode will be "ON" before activating this condition ▸ "UP" and "DN" key for changing a preset value , then SET" or "CLR" key for next mode or previous mode *press "Mode" key in order to return to normal operation state or wait 15 sec after completing its job *there is no interval between "Main" and "sub" for direction of "SET" or "CLR" key

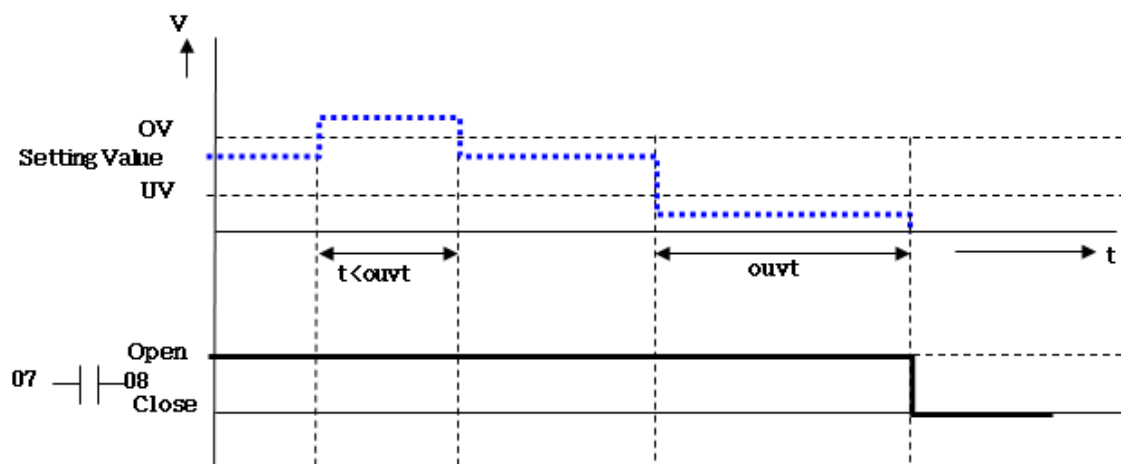
15. Time based Trip Relay Output

15-1. Over Load / Over Current Protection

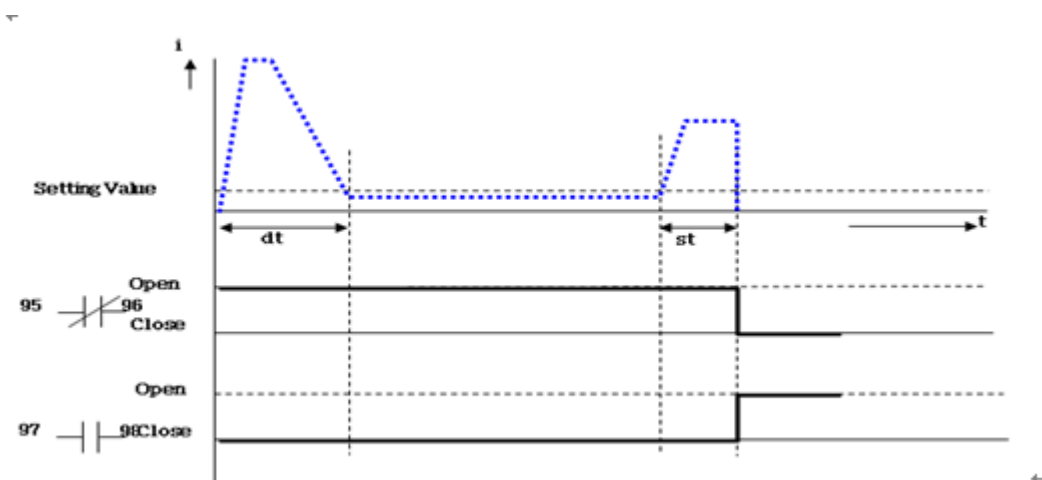
(Normal energized condition: 97-98/close after control power is oN as “out” mode is preset “a”)



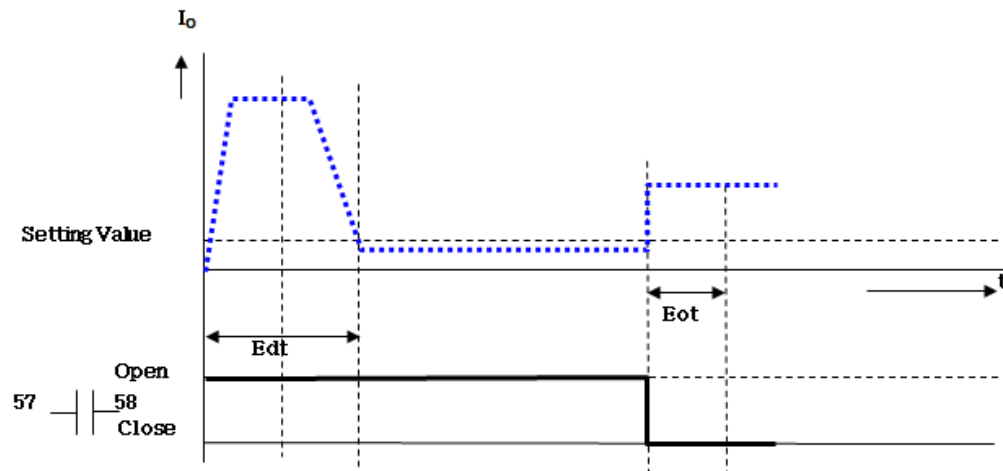
15-2. Over Voltage/Under Voltage Protection as “Au-o” mode is preset “ov-uv”



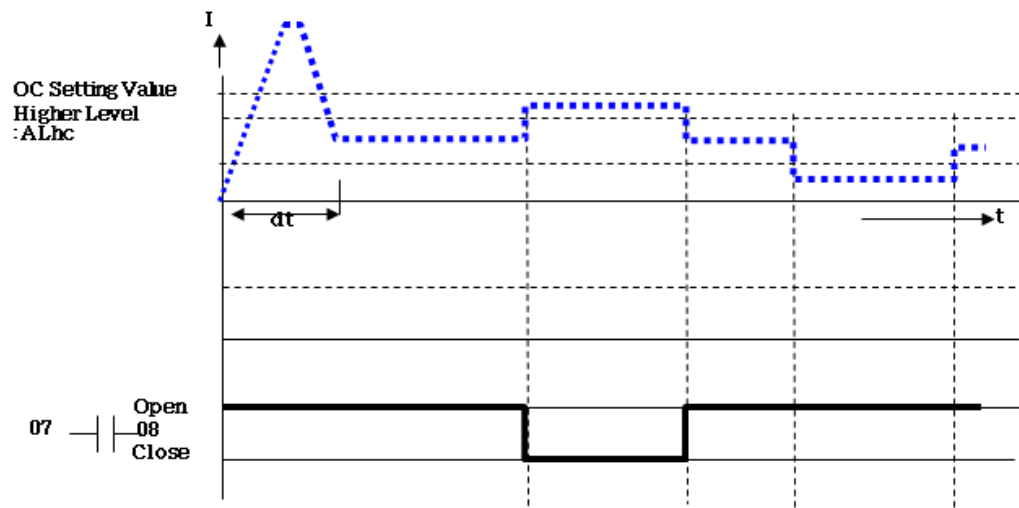
15-3. Shock/Stall Protection/Normal energized condition



15-4. Ground fault Protection



15-5. Higher Level Alarm to Over Current



16.Trip Indication

Trip	Display	Cause
Over Load(KW)	L1 ☒ L2 ☒ L3 ☒ -LoAd- ☐ Local ☐ Test ☐ Comm.	trip caused by over load(KW)
Over current(oc)	L1 ☒ L2 ☐ L3 ☐ -OC- ☐ Local ☐ Test ☐ Comm.	trip caused by over current in phase L1
Under Load	L1 ☒ L2 ☒ L3 ☒ -UL ☐ Local ☐ Test ☐ Comm.	trip caused by under load(KW)
Under Current	L1 ☒ L2 ☐ L3 ☐ -UC- ☐ Local ☐ Test ☐ Comm.	trip caused by under current in phase L1
Current unbalance	L1 ☐ L2 ☐ L3 ☒ -Ub- ☐ Local ☐ Test ☐ Comm.	trip caused by unbalanced current in phase L3
Ground Fault	L1 ☒ L2 ☒ L3 ☒ -Ec- ☐ Local ☐ Test ☐ Comm.	trip caused by ground fault current
Phase loss	L1 ☐ L2 ☒ L3 ☐ -PL- ☐ Local ☐ Test ☐ Comm.	trip caused by phase loss of phase L2 in incoming voltage
	L1 ☐ L2 ☒ L3 ☐ -PLc- ☐ Local ☐ Test ☐ Comm.	trip caused by phase loss of phase L2 in load part
Reverse phase	L1 ☒ L2 ☒ L3 ☒ -rP- ☐ Local ☐ Test ☐ Comm.	trip caused by reverse phase of phase L2 in incoming voltage
	L1 ☒ L2 ☒ L3 ☒ -rPc- ☐ Local ☐ Test ☐ Comm.	trip caused by reverse phase in load part

Locked Rotor	L1 ☐ L2 ☒ L3 ☐ -Lc- ☐ Local ☐ Test ☐ Comm.	trip caused by locked rotor current in phase L2 during motor start
Shock/Stall	L1 ☐ L2 ☒ L3 ☐ Shoc ☐ Local ☐ Test ☐ Comm.	trip caused by shocking current in phase L2 during working
Short	L1 ☐ L2 ☒ L3 ☐ -SS- ☐ Local ☐ Test ☐ Comm.	trip caused by short circuit current in phase L2
Over Temp	L1 ☒ L2 ☒ L3 ☒ -tEmP- ☐ Local ☐ Test ☐ Comm.	trip caused by over temperature/3 LED of L1,L2,L3 is flickering together

► Trip indication caused by Voltage only:

*Target : Ov,Uv,vUb,v-oFF

*Output : AUX(07-08) in case “volt” is selected in “Au-o” mode

*Indication: Basically a trip caused by voltage is reset automatically if trip cause is clear, so when trip is happened, LED indication for both voltage and trip cause is shown together in the rotated order for voltage as below while normal circulation for each factor is turned on, then move forward to next indication factor.

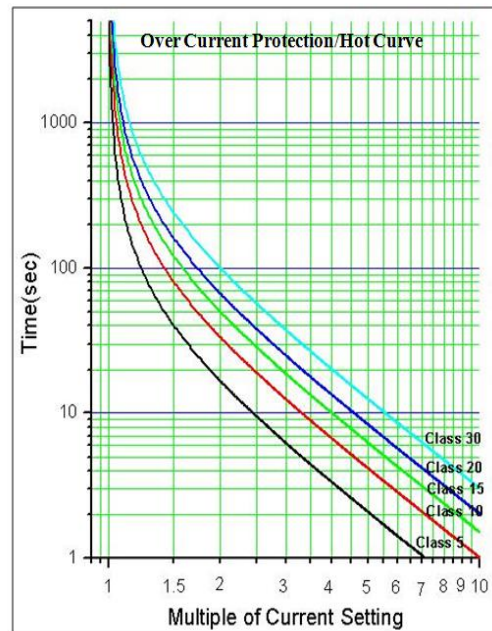
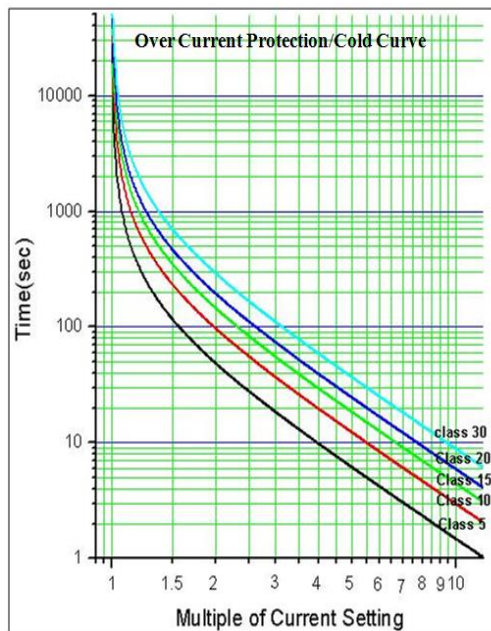
Trip	Display	Cause
Over voltage (Ov)	L1 ☒ L2 ☒ L3 ☐ -ov- ☐ Local ☐ Test ☐ Comm.	*trip caused by over voltage *ov and voltage value is shown alternatively
Under voltage (Uv)	L1 ☒ L2 ☒ L3 ☐ -uv- ☐ Local ☐ Test ☐ Comm.	*trip caused by under voltage *uv and voltage value is shown alternatively
Voltage unbalance (vUb)	L1 ☒ L2 ☒ L3 ☐ -v-ub- ☐ Local ☐ Test ☐ Comm.	*trip caused by voltage unbalance *v-Ub and voltage value is shown alternatively
Zero Voltage during running	L1 ☒ L2 ☒ L3 ☐ v-oFF ☐ Local ☐ Test ☐ Comm.	trip caused by line voltage zero during running

17.Current Range Table for external CT

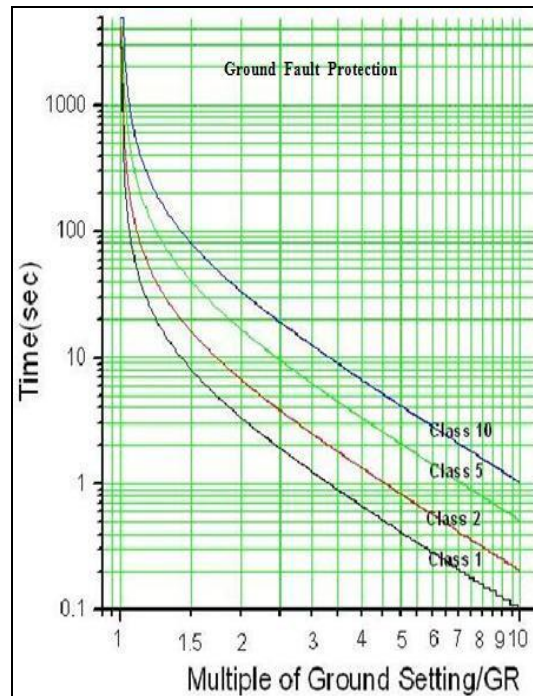
Range	Number of CT turn in itself	Preset in "ct" mode	Preset in "cto" mode	Remarks
		(ct ratio)		
0.2A~70A	1	*Without external CT	1t	70 Type,Wide Range
	1	*With external CT:0.2~6A	5t	
0.4A~10A	1	2(10:5)	5A	*With external CT, Secondary rating of CT is 5A *CT ratio to preset is 1~600
0.6A~15A	1	3(15:5)		
0.8A~20A	1	4 (20:5)		
1.2A~30A	1	6 (30:5)		
1.6A~40A	1	8 (40:5)		
2A~50A	1	10(50:5)		
2.4A~60A	1	12 (60:5)		
3A~75A	1	15 (75:5)		
4A~100A	1	20(100:5)		
4.8A~120A	1	24(120:5)		
3.6A~150A	1	30(150:5)		
8A~200A	1	40(200:5)		
10A~250A	1	50(250:5)		
12A~300A	1	600(300:5)		
16A~400A	1	80(400:5)		
20A~500A	1	100(500:5)		
24A~600A	1	120(600:5)		
30A~750A	1	150 (750:5)		
32A~800A	1	160(800:5)		
40A~1000A	1	200(1000:5)		
48A~1200A	1	240(1200:5)		
60A~1500A	1	300(1500:5)		
80A~2000A	1	400(2000:5)		
100A~2500A	1	500(2500:5)		
120A~3000A	1	600(3000:5)		

18. Time-Current Characteristics

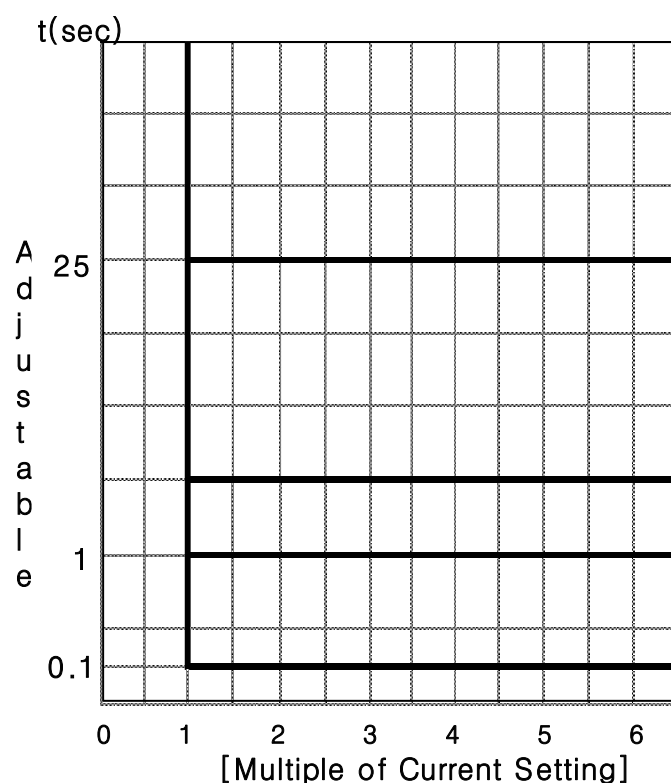
18-1. Over Current/Over Load protection : Inverse Curve



18-2. Ground Fault Protection : Inverse Curve

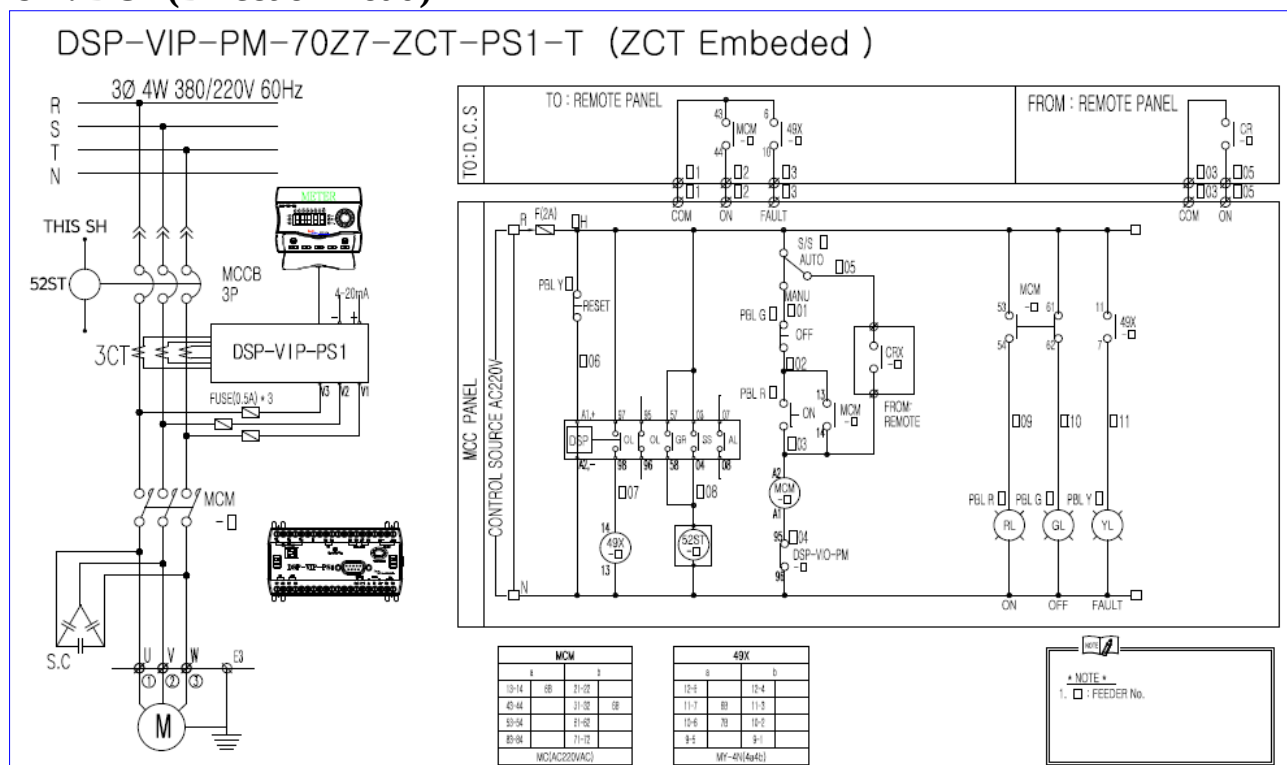


18-3.Over Current/Over Load ,GF protection : Definite Curve

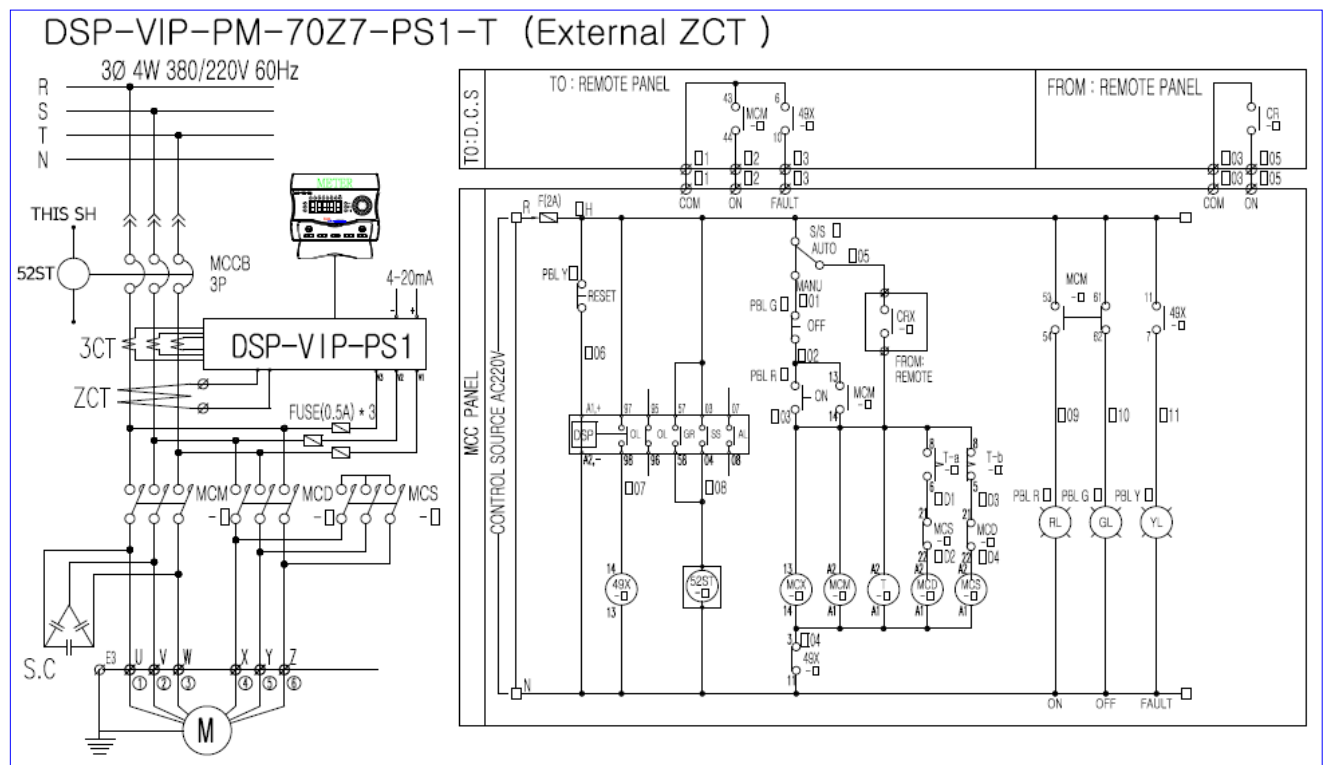


19.Application Sequence Diagram

19-1. DOL(Direct on Load)

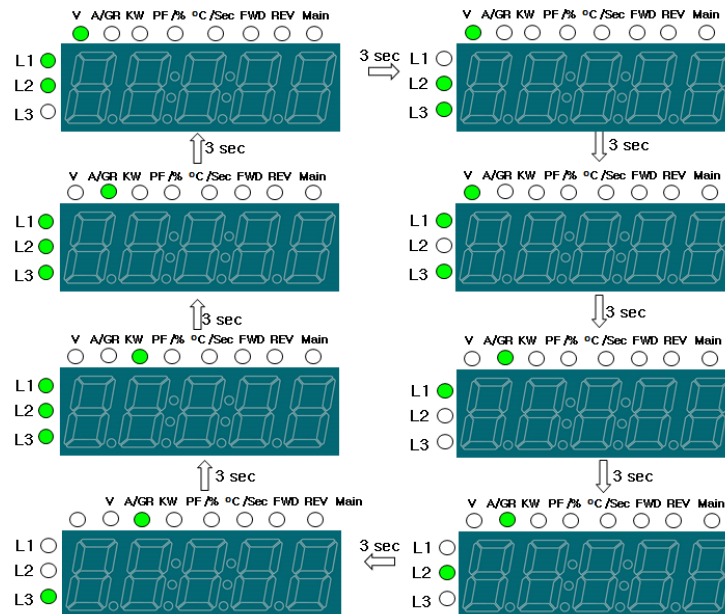


19-1. Y-Δ

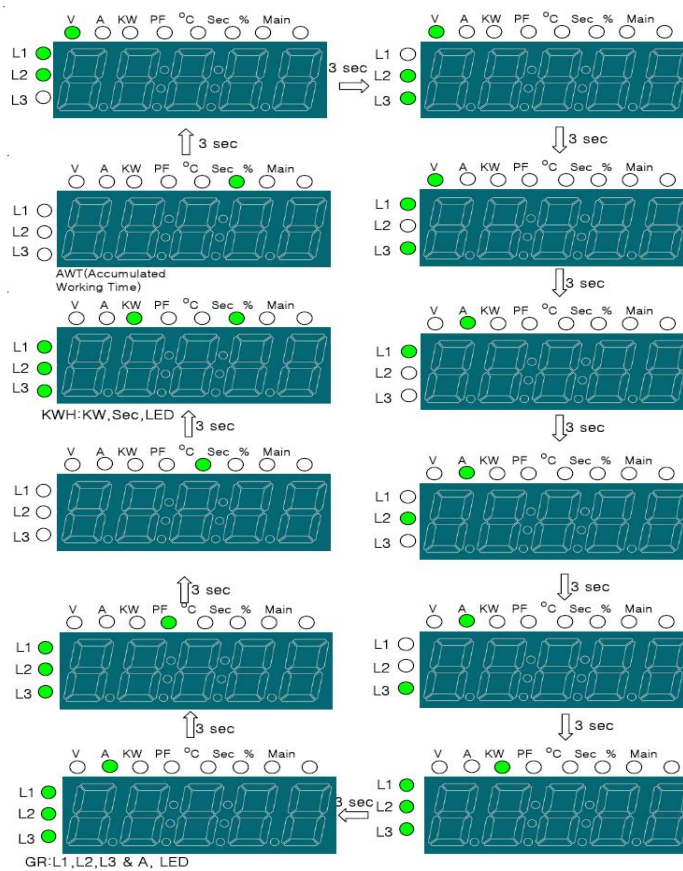


- ✱ It will be required that logic input from long distance sensor must be connected through the output of external aux relay because input line could keep unwanted voltage by induced current

20-1. Basic factor(V,I,KW,GR)

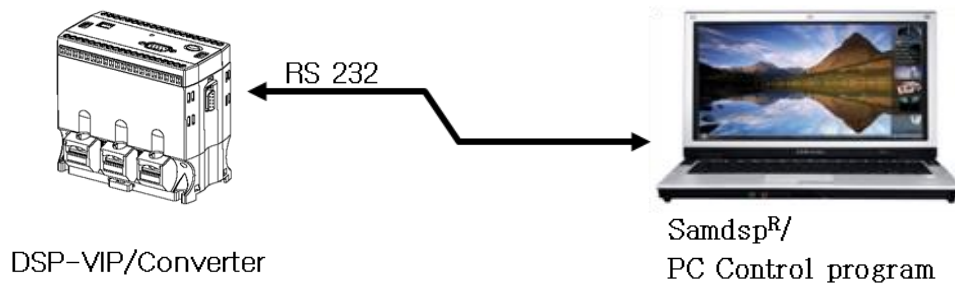


20-2. Basic factor + PF, Temp, AWT

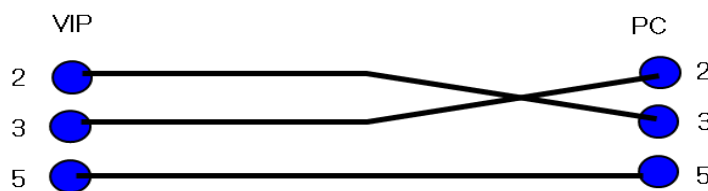


21.Example for Applied Communication

21-1.PC <Directly > DSP by RS-232/Data Input & Monitoring

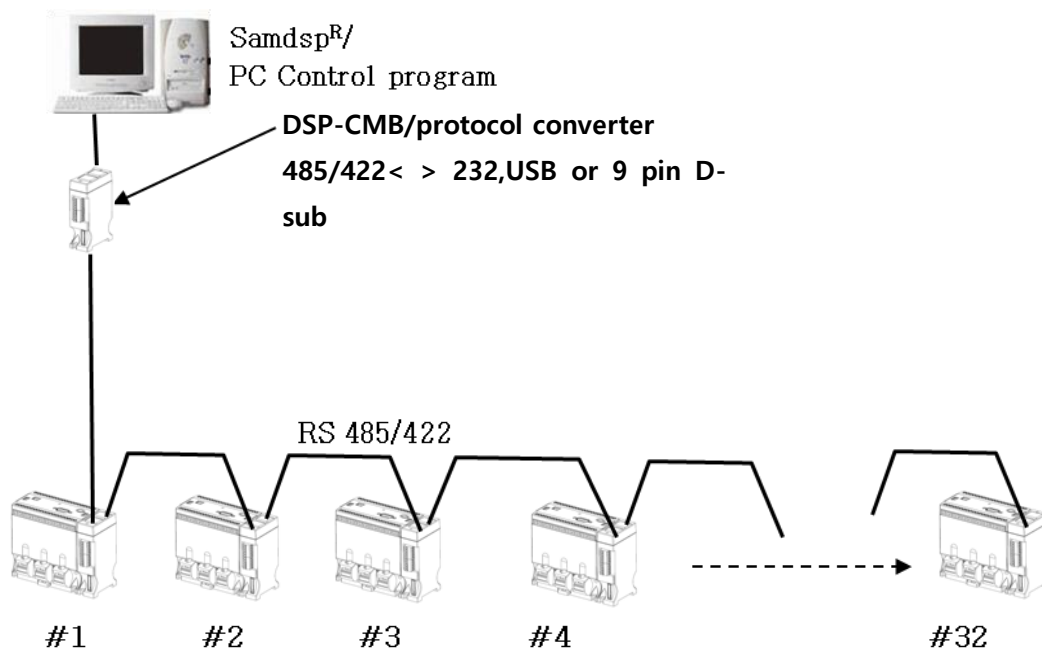


*In case VIP is connected with PC through 9 pin connector in PC,a connection is changed as follows: ,but if USB port of PC is used,it is not changed



21-2.Center(PC),PLC < > DSP by RS-485/422

a.Serial Line Connection

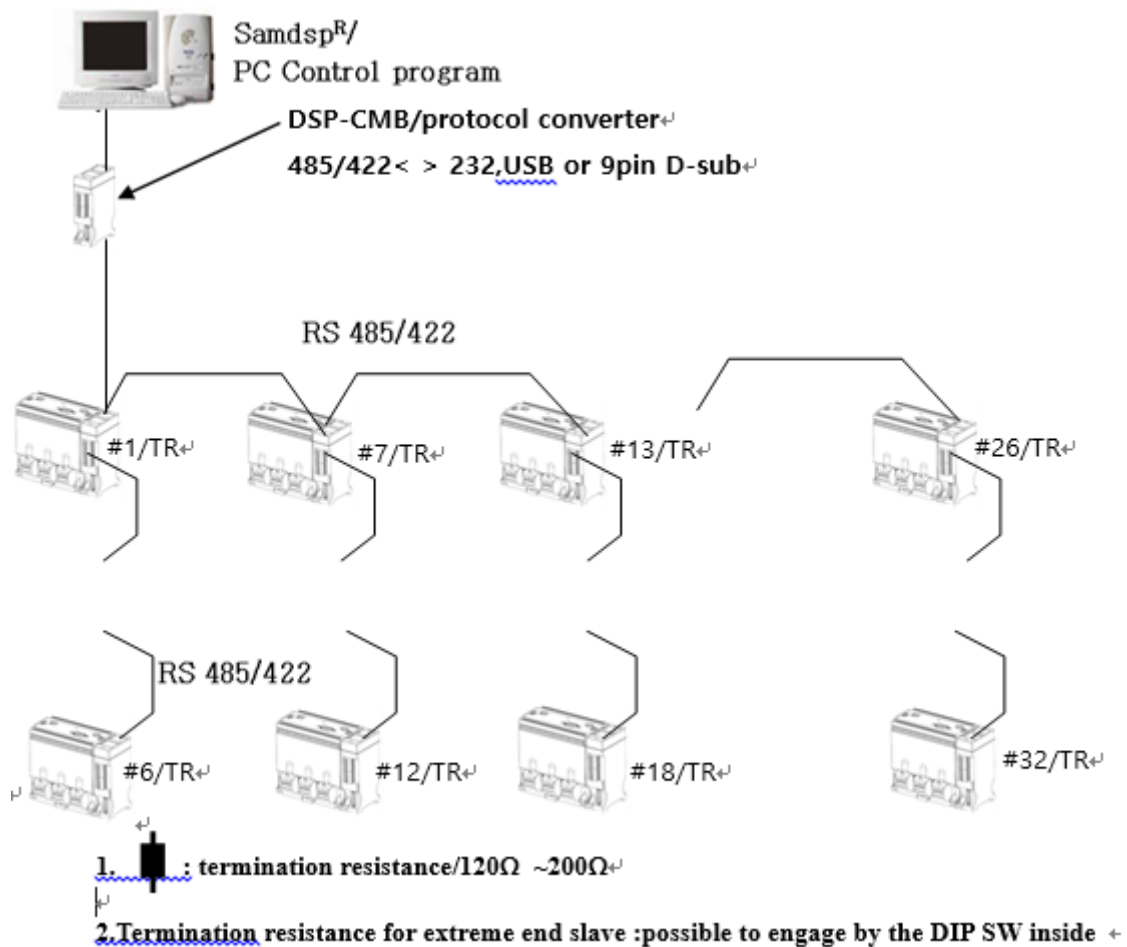


T R

TR

※TR : termination resistance

b. Serial Line-Parallel Connection



※ Note

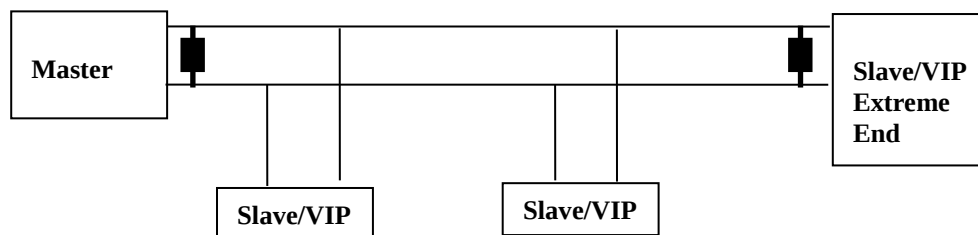
- The end connection device to connect with communication module is available for both RJ45 and/or screw terminal.
But it is mainly recommended to use RJ45 for the test of communication state one by one or a serial group, on the other hand Screw terminal is for actual field connection wiring to secure from the vibration, noise, humidity, contact resistance, etc.
The example picture for RJ45 is as follows:



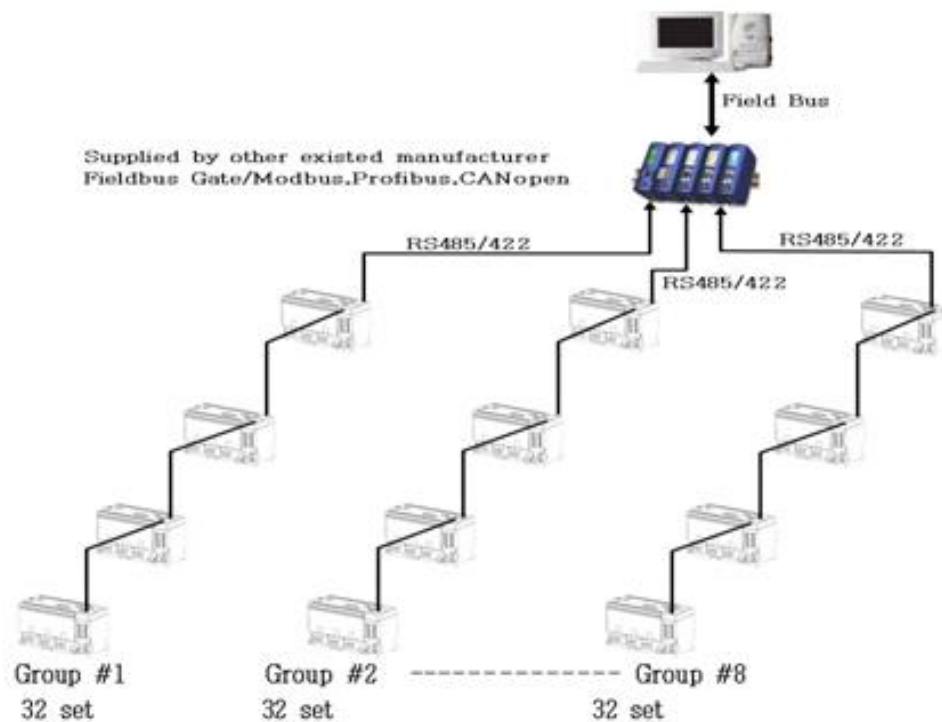
Also the actual connection through screw terminal between Master and Slave(DSP-VIP) in field bus system is as follows:



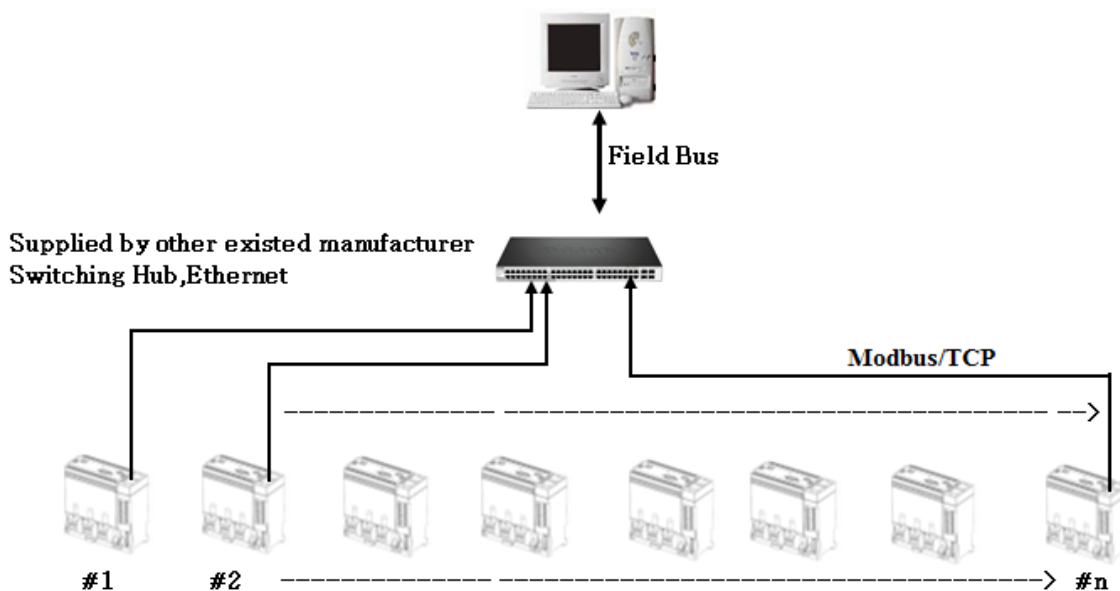
- In the connection on the concept with Master and Slave, a matching converter (protocol converter) to match 485 of VIP with Master ,which is manufactured by other manufacturer, is required to have isolated power from a PC(Master)
- The position of termination resistance in serial communication between Master and Slave(VIP) is basically referred as follows,but it could be changed according to a field condition:



21-3.Center(PC),PLC < > DSP by RS-485/422 through Gateway



21-4.Center(PC),PLC < Switching Hub > DSP , Ethernet/Modbus,TCP



21-5. How to handle

- 1) It is not possible that an operator presets an address in VIP while a motor is working, so if user wants to do so, motor must be stopped.
- 2) The operator needs to check carefully additional selection by DIP SW for 485/422 or termination resistance before combining. not to make a separation again to preset DIP SW or termination resistance
- 3) As possible as you can, do not separate this module once after combining in order not to give a damage caused by an unwanted force while the separation job is doing
- 4) The operator needs to give a very attention to combine this module with VIP converter through 9 pin D-sub which is located in inside of this module, because a connection pin could be damaged by unwanted enforcement during a combining job.
To prevent a pin damage during a combination, follow a next procedure
 - 1) check a pin condition if there is any defect, corroded state or not.
 - 2) put a hook into the hole in the bottom of VIP converter
 - 3) align correctly both D-sub connector each other
 - 4) press a top side of module slightly toward a converter until a cricking sound is sensed
- 5) As like a same manner, a separation for this module from the converter must be done carefully.
If a separation is needed inevitably, give a force slightly to expand a clearance between a converter and a module on the center part of top side as using something like a thin driver.
- 6) Operator needs to use RS 422/485 < > RS232(USB) protocol converter to make a communication between a converter of VIP and Note PC through a this module to operate VIP by using "Samdsp" operation program.
"Samdsp" is provided by a manufacturer in free of charge, also "Samdsp" is loaded in our web site([www://samwhadsp.com](http://www.samwhadsp.com))
- 7) The model name of protocol converter mentioned in above is DSP-CMB(Multi-1U/USB Combo @ Cross Cable) and is not included in standard product of DSP-VIP
So if this is necessary, a purchaser of DSP-VIP needs to order this protocol converter separately because this item is very common in the commercial market.
It is mainly recommended that DSP-CMB is useful to test VIP by using "Samdsp"
- 8) In actual serial communication, the proper protocol converter is desirably required to have with two of 485 port at least
Also one end of cross cable is terminated with RJ45, hence if operator wants to connect this one end with 10P screw terminal of a communication module, please do to cut a RJ45, then connect a wire into screw terminal as follows:

22. PC Operation Program/"Samdsp"

► General

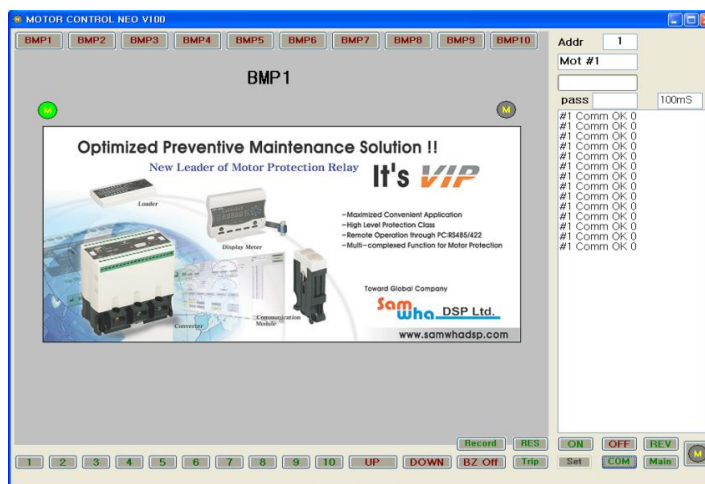
- (1) This program is written by C# language and a basic bps is ranged in 9.6K to 38.4K, but MWR-S is 9.6K~115.2Kbps)
- (2) The user needs additional USB/232<>485/422 protocol converter like DSP-CMB to make PC to communicate with VIP
- (3) The user's PC basically based on Window XP and Window 7 should be embedded by following file
*.net framework 4.0(dotnetfx40_full_setup.exe) for MS Window :able to down load from MS or
"[www://samwhadsp.com](http://www.samwhadsp.com)"
* This is opened software with a free of charge
- (4) This program is to operate a serial communication by CM-44 and MWR-S

► How to install "samdsp" program

- (1) Down load latest "samdsp-v**(version number)" file provided by SamWha DSP.Co.(web page or CD) in C:// of your PC and run into the execution for this file
- (2) Check if c:\ "samdsp" folder is created naturally or not
- (3) If you find "Samdsp" folder ,enter into c:\ "samdsp",then user will meet **"samdsp" file with circled "M" symbol** , hereafter this "samdsp" is execution file to open main window.

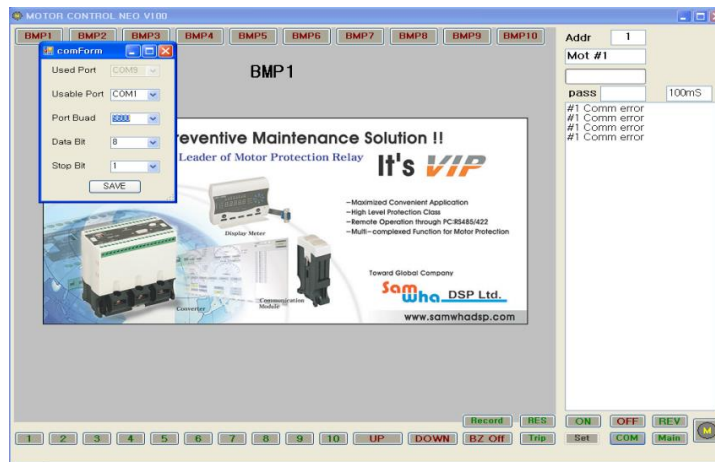


4)Execute "samdsp" with image of motor symbol "M" in circle,then main window is shown.



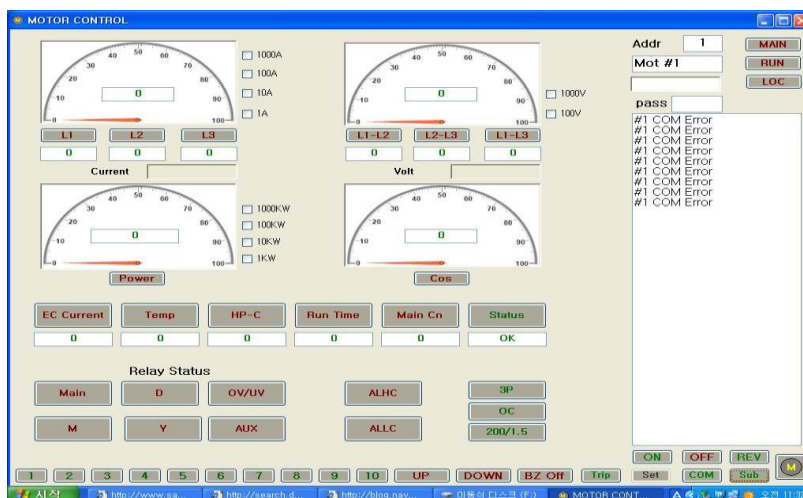
- 5) In this stage,if communication port to be run in "samdsp" is not matched with it in your PC, errorred message in right column is shown, then user can preset right port number and bps in pop-up window that is shown by pressing "COM" button
After preset port number and bps, make a press "SAVE" button in pop-up window.



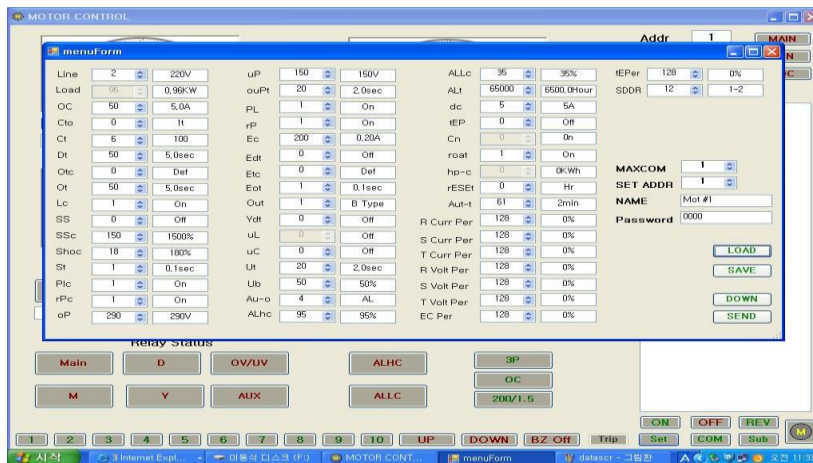


► How to monitor a data in your PC

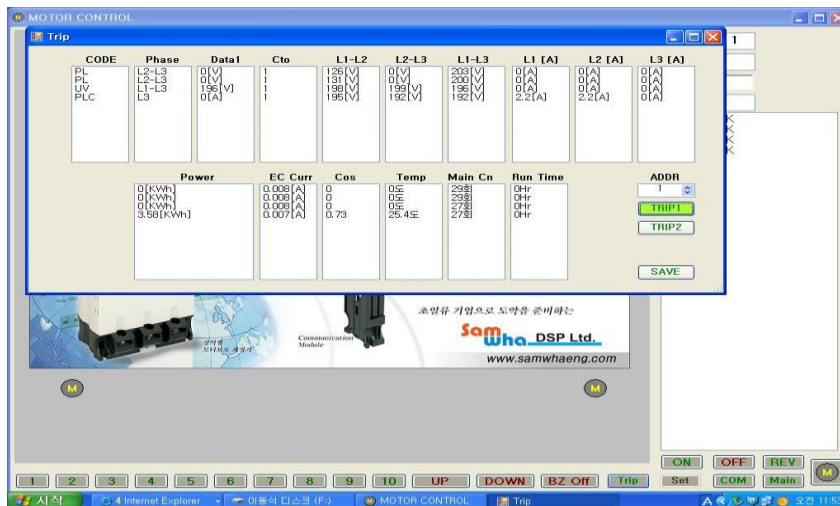
- 1) Unless you make other picture to be expressed by "main.bmp" file, you meet a window with Samwha DSP company image below . It means everything is OK.
- 2)if you want to change this main window with image of samwha dsp company into your own layout,then you need to save a file named by "main.bmp" for new layout in "samsdp" folder
- 3) If you create a motor symbol matched with address of VIP in the position what you want to put,click a number matched in a bottom ,then you can put a motor symbol in proper position by operating a mouse. Like this manner,same process should be done for remained motor.
- 4)After this action,an operator is able to control a data by clicking a button in screen on the right bottom side.
- 5)In case you click "Main" button,a following screen has come



6) In case you click "Set" button under the condition with password input, a following screen is come



7) In case you click "Trip" button, a following screen is come



8) Then, you could operate this protection relay as controlling and/or monitoring in every screen

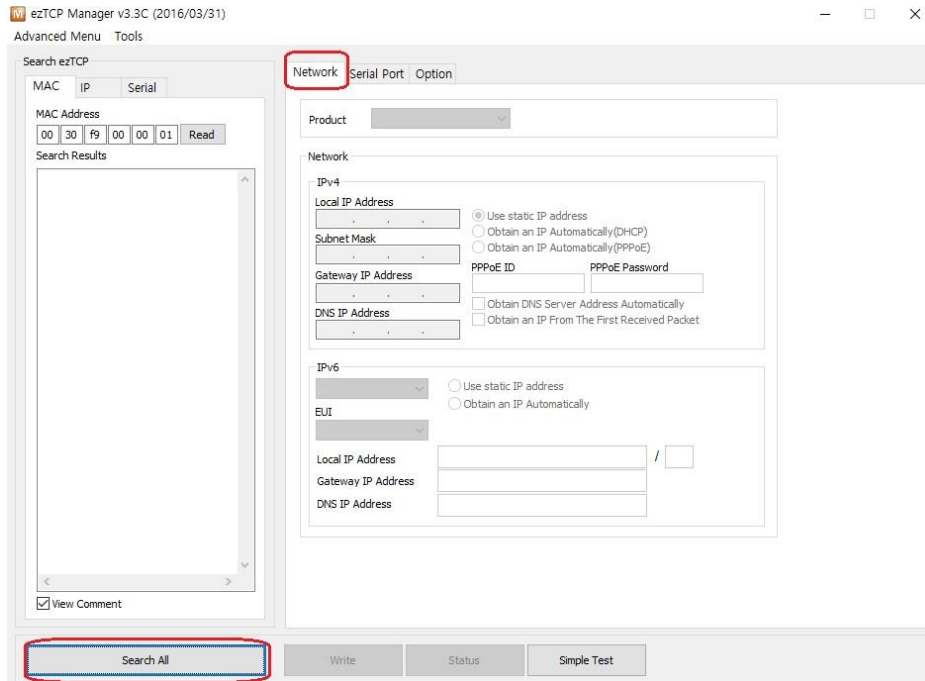
► How to analyze recorded data in your PC

In case MWR/MWR-S is used with VIP-PM/PL, this is described in user manual for MWR-S (Motor Working Recorder)

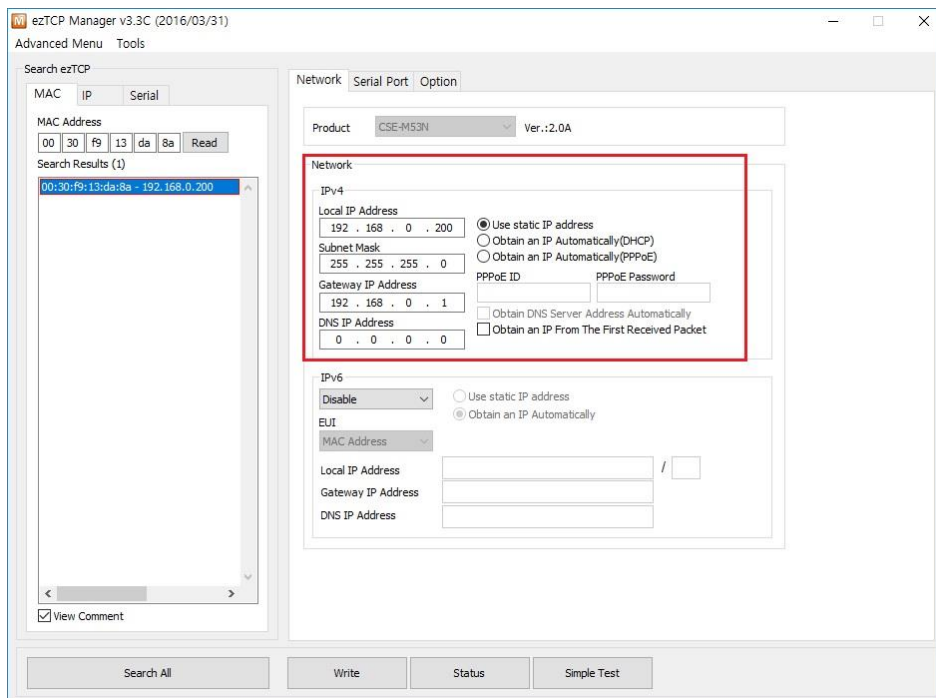
23.Ethernet Network Operation

- ▶ Ethernet network is based on Modbus TCP and the applied module for this job is CM-44E
- ▶ CM-44E is embedded system chip , CSE-M53E,which is made by “Sollae Systems(www.sollae.co.kr)
- ▶ The user will follow to preset a necessary value in order to fix IP address according to manual of “ezManager”

1.The followed window is shown firstly after completing “down load” for “ezManager”

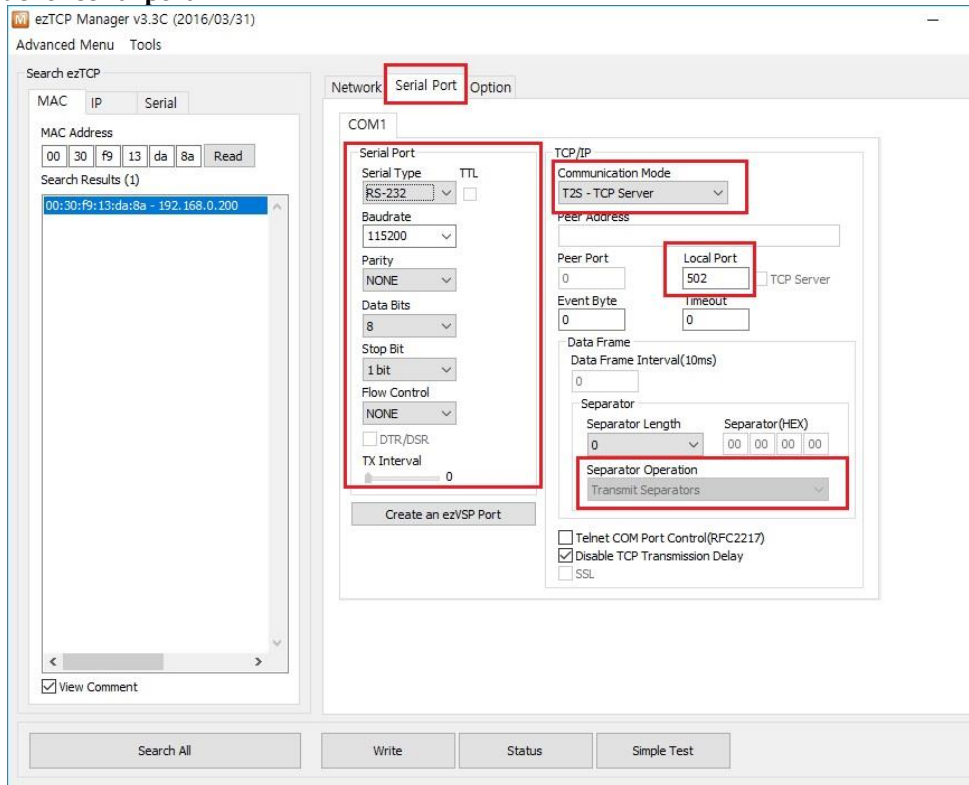


2.Select “Network” and click “Search All” ,then product CSE-53N / embedded chip will be risen with an information about IP as followed window

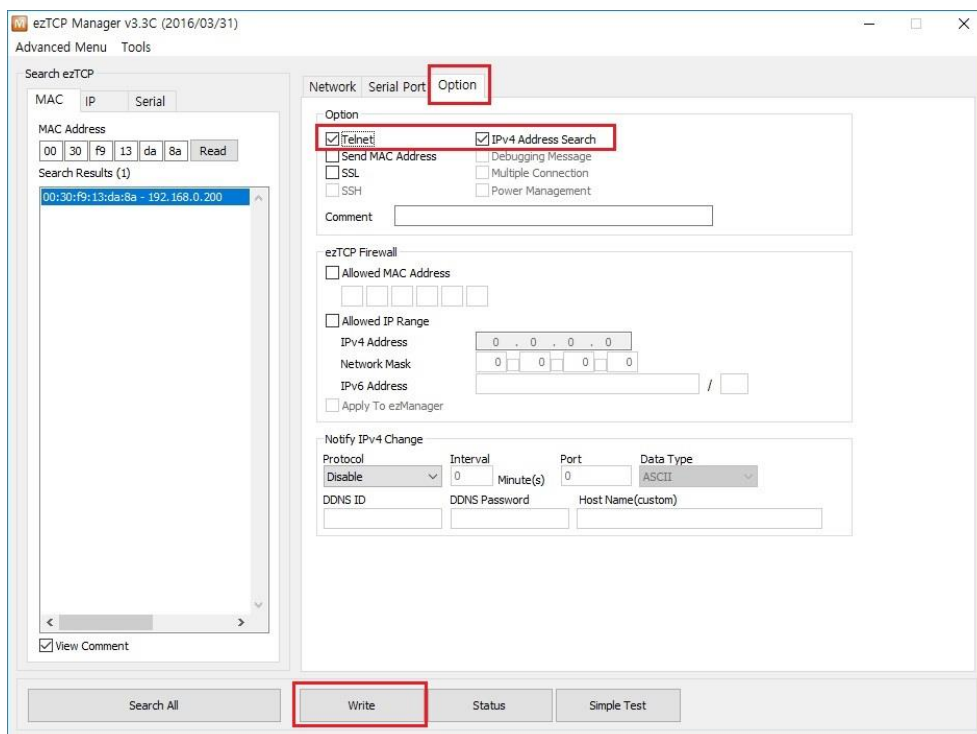


- The user need to input an necessary information into above needs and make “write”

3.input a value for serial port



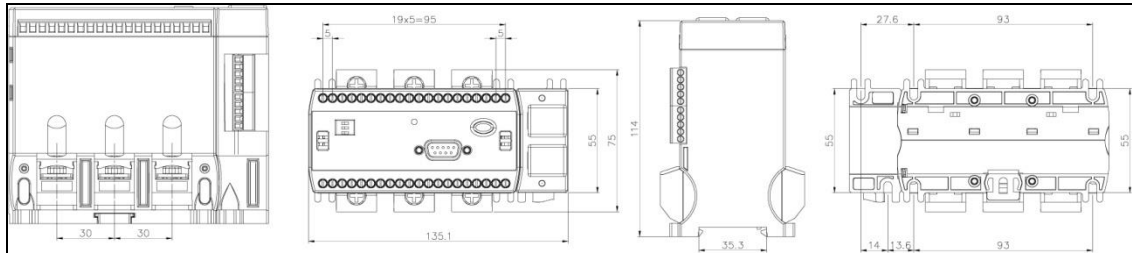
- 4.make a store after input necessary information inside “option” menu, also “telnet” and “IPv4 address search” must be selected. Finally make a store as clicking “write”



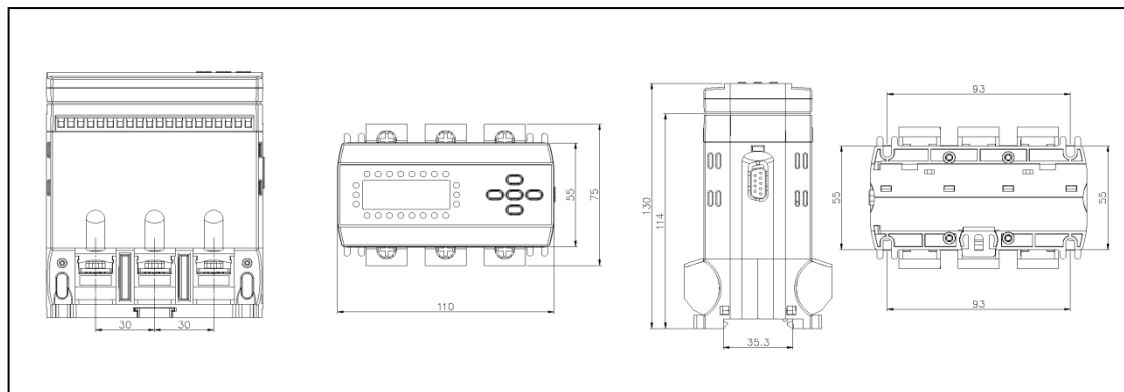
- For the more detail. the user can make down load for “ezManager”/user’s manual in “Sollae system Website”

24.Dimension

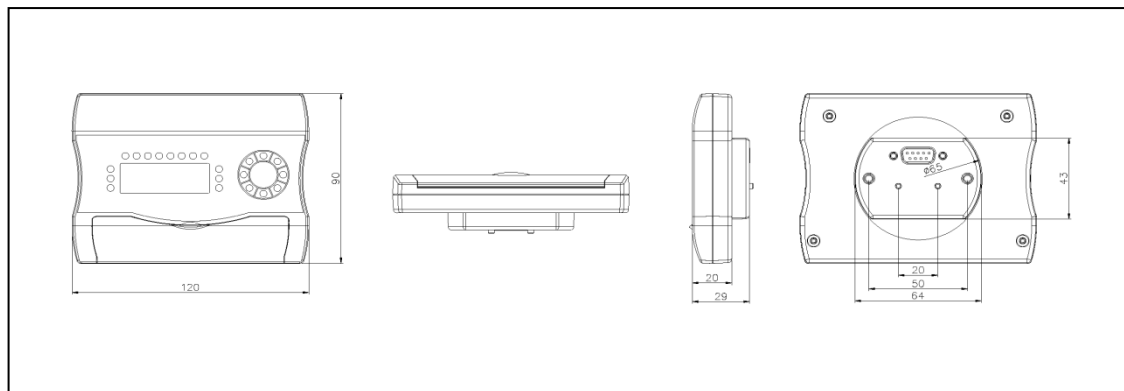
► Converter/Communication Module



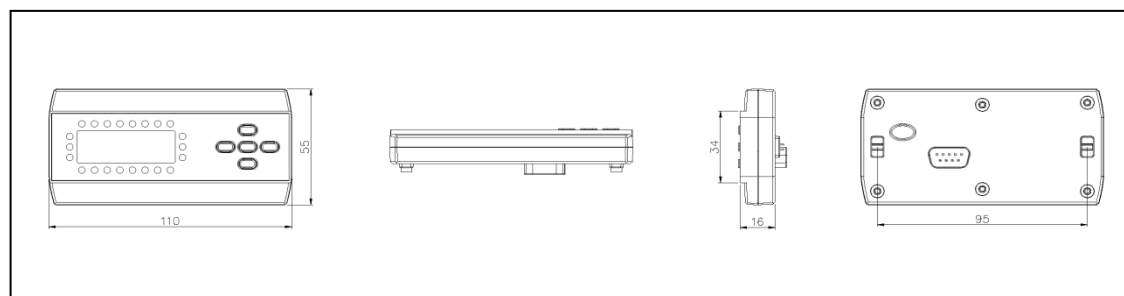
► Converter/Loader



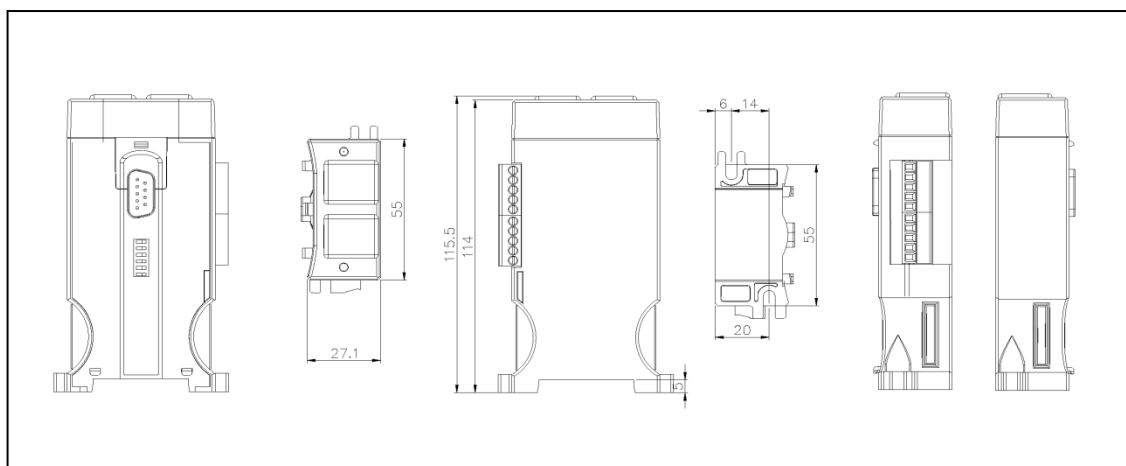
► Display Meter



► Loader



► Communication Module



25.Order Form

***Reference Type : DSP-VIP-PM-70-Z-7-ZCT-P**

DIV		Description	Remark
1	PL	Loader	Data Input Device/anel Mounting Type
	PM	Display Meter	Data Input Device/Panel Flush Mouting Type
2	70	0.2A ~ 70A(0.2A ~ 6A with external CT)	Current rating
	C1	4A~100A	External CT,100/5
	Cc	6A~150A	External CT,150/5
	C2	8A~200A	External CT,200/5
	C3	12A~300A	External CT,300/5
	C4	16A~400A	External CT,400/5
3	B	24VAC/DC	Control Power
	Z	85VAC ~ 260VAC(90VDC ~ 370VDC)	
4	7	50/60Hz	Frequency/Control Power
5	ZCT	Embeded ZCT	Embeded ZCT:Not possible to use with xternal CT *External ZCT if there is not specified
6	Optional	Exclusive Customer Order	*Available for Packagetype 1)None:Standard Software 2)P:Optional Software 3)C:Comm.Module,RS485 Modbus/RTU 4)E:Comm.Module,Ethernet,ModbusTCP 5)CR:Comm.Module(RS485)+Data Recorder 6)Others except above:customer order Made 7)Logic Input Voltage
	A	Logic Input Voltage	220VAC(150~260VAC)/220~370VDC

	B	110VAC(75~150VAC)/110~220VVDC
Terminal Type : XXXXXX -T		

*Reference Code

Item	Reference Code	Description	
DSP-VIP	-PL70Z7-PS1	Loader	0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), with external ZCT,Wire Through type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PL70Z7-PS1-ZCT		0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), Embedded ZCT,Wire Through type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PL70Z7-PS1-T		0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), with external ZCT,Wire Terminal type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PL70Z7-PS1-ZCT-T		0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), Embedded ZCT,Wire Terminal type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PM70Z7-PS1	Display Meter	0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), with external ZCT,Wire Through type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PM70Z7-PS1-ZCT		0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), Embedded ZCT,Wire Through type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PM70Z7-PS1-T		0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), with external ZCT,Wire Terminal type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,
	-PM70Z7-PS1-ZCT-T		0.2~70A/0.2~6A with external CT , 85VAC~260VAC, 50/60Hz(90VDC~370VDC), Embedded ZCT,Wire Terminal type, Main/1a-1b.Aux/1a,SS/1a,GR/1a,

*Accessory

Item	Reference	Description	Remarks
Cable	DSP-CABLE-12	1.2m	
	DSP-CABLE-18	1.8m	
	DSP -CABLE-30	3m	
	DSP -CABLE-XX	Over 3m	
ZCT	DSP -ZCT- -XX	00mA 1.5mA	X :Inner diameter of ZCT
	DSP -ZCT-V-XX	100mA/100mV	
Loader	DSP -ID-PL	Input Device/ Loader	
Display Meter	DSP -ID-PM	Input device/ Display Meter	
Converter	DSP-VIP-PS1		not included external CT block
CT Terminal	DSP -TB-3T	Terminal through CT Hole	
Communication Module	DSP -CM-44	*Module RS 485/422 >RS 485/422	RS485/422 Serial Comm.
	DSP-CM-44E	*Module,Ethernet < > Switching Hub	Ethernet

Communication & Recorder Module	DSP-MWR-S	*Module:RS 485< > RS 485 *Recorder for 20 days in every second	RS485 Serial communication
Protocol converter	DSP-CMB	*Multi-1U/USB Combo @ Cross cable *485(CM-44)< >232 USB(Note PC)	
External CT	DSP-C1	3CT/Rectangular, 100/5	
	DSP-CC	3CT/Rectangular, 150/5	
	DSP-C2	3CT/Rectangular, 200/5	
	DSP-C3	3CT/Rectangular, 300/5	
	DSP-C4	3CT/Rectangular, 400/5	

25. Guide for user

- ❑ This product should be maintained by qualified engineer according to manufacturer's guide, so a damage or something wrong of this product which comes from violating this guide may cost to user
- ❑ Applied environment is as follows:
 - 1)Temperature:-25 OC ~+70 OC
 - 2)Storage :-40 OC ~ +80 OC
 - 3)Humidity:30 ~ 80%/RH,Non-condensing
 - 4)Voltage

The control voltage is AC 85V~260V , 50/60Hz(DC 90V~370V) or AC/DC 24V and allowable deviation for this voltage is +.-10% .

 - (1)a supplied voltage greater than rating value may be given a damage to incoming part of DSP,so customer must keep allowable deviation of input voltage.
Also this control voltage must be supplied through a transformer insulated between primary and secondary,also proper fuse/do not use Line-Neutral Voltage in 3P4W
 - (2)in case of the interface between Note PC and DSP directly by RS232 to monitor and to preset data ,power source for Note PC also must be provided through an insulated transformer and a proper fuse above mentioned,otherwise RS 232 communication could be interfered
 - (3)fastening screw:a connection between a terminal of DSP and a wire must be done clearly and surely, but user should be care of distortion caused by extra fastening torque
 - (4)It is not possible that an operator presets a data directly DSP and a motor are working , so if user wants to do so,please stop to operate a motor.
- ❑ An operator should not combine a converter with a loader and a display meter while the motor is working,so if necessary to do so, a motor should be stopped.
- ❑ An operator should not control DIP SW while a motor is working. If necessary to do so, a motor should be stopped and be done in waiting mode state
- ❑ Operator need to use RS 422/485<>RS232(USB) protocol converter,so USB must have isolated power to connect communication module of DSP-VIP to PC in serial connection . This converter is one of common accessory provided by other manufacturer.
- ❑The more detailed information about a communicatio between PC and VIP is also described in the manual for a communication module