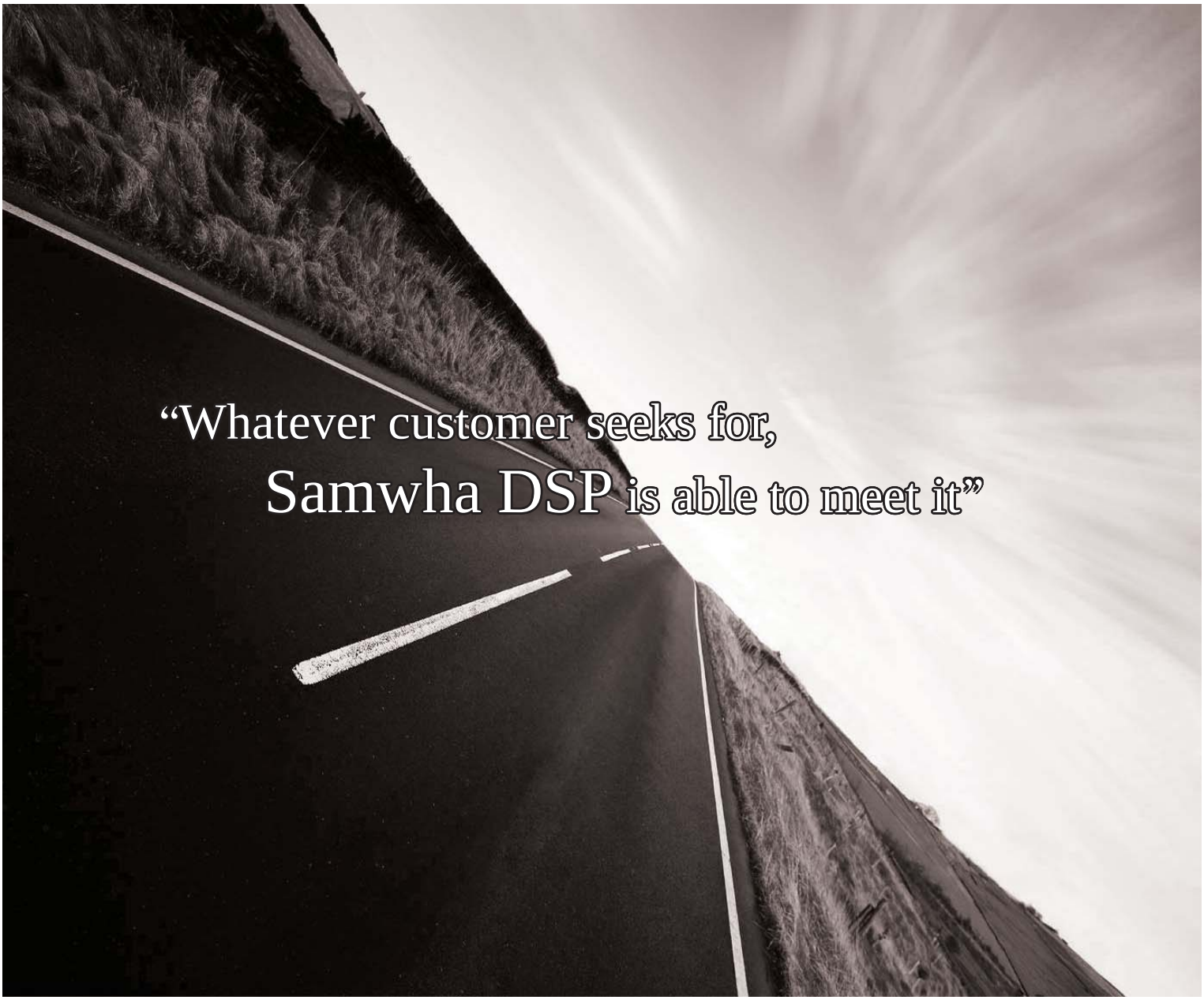


MOTOR PROTECTION RELAY

Main Feature

[Power Type(Voltage-Current based)]
VIP-PM/PL(High-end Class), DSP-P Series(Economic Class)

Excellent Protection

- Possible to calculate KWH : responsible for CO_2 reduction pdicy (PM, P Series Type)
- Pre-protection for over heated motor through a temperature detection (PM Type)
- Possible to communicate in RS232 with Note PC to analyze an opertaion data (PM Type)
- Main contactor auto close for instant power-off (PM Type)
  - Response for Voltage Zero
  - Response for voltage sag
  - Required duration time for voltage/30 mS or more
- Short circuit protection within 0.05 Sec (PM Type)
- Possible for remote contrd operation in RS485 with additional communication module (PM Type)

Precised measurement

- Precised RMS current value : application for RMS chip (PM Type)
  - C<=2A:0.1A, C>2A:+,- 5%(PM Type)
  - C<=2A:0.2A,C>2A:+,- 5%(P Series Type)

Various protection

- Actual complexed meter : voltage, current, KW, KWH, power factor, ground fault, accumulated working time (AWT), load factor (PM, P Series Type)
- Acceptable for both rating of ZCT
  - 200mA / 1.5mA (PM, P Series Type)
  - 200mA / 100mV (PM Type)
- Embeded ZCT type as optional order (PM, P Series Type)
- Stored trip number of the main contactor (PM Type)
- Responsible for various type of the control sequence in terms of logic input (PM Type)
- Possible to check service term for bearing oil substitution through AWT (PM, P Series Type)

Convenient maintenance

- Possible to replace errored PCB module according to self-diagnostic
- Possible to replace only communication module for communication error

Approval certification
CE

Main Feature

[Current Type]
VIP-RTM/RTL(Insulation Resistance-Current), High-end Class
VIP-5 Series(High-end Class), DSP-C Series(Economic Class)

Excellent Protection

- Pre-protection for over heated motor through a temperature detection (RTM/RTL Type)
- Possible to realize pre-maintenance as measuring insulation resistance in motor stop state (RTM/RTL Type)
- Possible to communicate in RS232 with Note PC to analyze an operation data
- Main contactor auto close for instant power-off (RTM/RTL, 5 Series Type)
  - Response for Voltage Zero
  - Response for voltage sag
  - Required duration time for voltage/30 mS or more (RTM/RTL, 5 Series Type)
- Short circuit protection within 0.05 Sec (5SM, CSM/CSL Type)
- Possible for remote contrd operation in RS485
  - ＊RTM/RTL Type : additional communication module
  - ＊5CM/5CL, CCM/CCL, CSM/CSL : embeded communication module

Precised measurement

- Precised RMS current value : application for RMS chip (RTM/RTL, 5 Series)
  - C<=1A:0.1A, C>2A:+,- 5%

Various protection

- Motor protection in motor running state, insulation resistance measurement in motor stop state (RTM/RTL TYPE)
- Acceptable for both rating of ZCT
  - 200mA / 1.5mA (RTM/RTL, 5 Series, C Series Type)
  - 200mA / 100mV (RM Type)
- Embeded ZCT type as optional order
- Execution for basic motor protection, indication for AWT, load factor

Convenient maintenance

- Possible to replace errored PCB module according to self-diagnostic
- Possible to replace only communication module for communication error (RTM/RTL TYPE)

Approval certification
CE

Product Table Ⅰ

Series		Power type/High-End Class	Current type					
Division		PM Type	RM Type		5EM Type			
Model		VIP-PM/PL	VIP-RTM/RTL	VIP-RM/RL	VIP-5EM VIP-5EL	VIP-5TM VIP-5TL	VIP-5CM VIP-5CL	VIP-5SM
Control voltage		AC85~260V[50/60HZ] (DC90~370VDC) Free Voltage						
		24VAC[50/60HZ] (24VDC)						
Available frequency/Inverter		1-400Hz						
Single phase(1P)		●	●	●	●	●	●	●
Three phase(3P)		●	●	●	●	●	●	●
Protection	Over load	●						
	Over current	●	●	●	●	●	●	●
	Under load	●						
	Under current	●	●	●	●	●	●	●
	Over voltage	●						
	Under voltage	●						
	Phase loss/Incomming voltage	●						
	Phase loss/load current	●	●	●	●	●	●	●
	Reverse phase/incomming voltage	●						
	Reverse phase/load current	●	●	●	●	●	●	●
	Current unbalance	●	●	●	●	●	●	●
	Voltage unbalance	●						
	Pre-alarm	●	●	●	●	●	●	●
	Locked rotor	●	●	●	●	●	●	●
	Shock/Stall	●	●	●	●	●		
	Short Circuit	●						●
	Insulation resistance measurement		●	●				
	Ground fault	●	●	●	●	●	●	●
	Over temperature	●	●	●				
Indication	Temperature	●	●	●				
	Line voltage	●						
	Insulation resistance		●	●				
	Ground fault current	●	●	●	●	●	●	●
	Load current	●	●	●	●	●	●	●
	KWH	●						
	Accumulated working time	●	●	●	●	●	●	●
	Preset value check in operation	●	●	●	●	●	●	●
	Load factor	●	●	●	●	●	●	●
Auxiliary	F-R(Y-D) transfer timer	●	●	●				
	2 Level Pre-Alarm	●*●	●	●	●	●	●	●
	FWD-REV operation	●	●	●				
	On-Off s/w button	●	●	●				
	Password	●	●	●	●	●	●	●
	Main contactor auto close	●	●	●	●	●	●	●
Commun-ication	4~20mA	●	●			●		
	RS-232	●	●	●	●	●		
	RS 485-422-Modbus	●	●	●			●	
	Interface with Note PC	●	●	●	●	●	●	●
Protection Level(operation manual)*		7E	6E	6E	4E	4E	4E	4E
Remarks		Standard : external ZCT/Optional : ZCT embeded						

Protection Level
1E : Over current
2E : Over current, Phase loss
3E : Over current, Phase loss, reverse phase
4E : Over current, Phase loss, Reverse phase, Ground fault
5E : Over current, Phase loss, Reverse phase, Ground fault, Shock(Stall), Short circuit
6E : Over current, Phase loss, Reverse phase, Ground fault, Shock(Stall), Short circuit, Over temperature
7E : Over current, Phase loss, Reverse phase, Ground fault, Shock(Stall), Short circuit, Over temperature, Over/Under voltage

Product Table Ⅱ

Series		Power Type/Economic Class		Current type			
Division		DSP-P Series		DSP-C Series			
Model		DSP-POM DSP-POL	DSP-PTM DSP-PTL	DSP-COM DSP-COL	DSP-CTM DSP-CTL	DSP-CCM DSP-CCL	DSP-CSM DSP-CSL
Control voltage		85~260VAC[50/60HZ] (90 ~ 370VDC)					
		24VAC[50/60HZ] (24VDC)					
Available frequency/Inverter		20 ~ 300HZ					
Single phase(1P)		●	●	●	●	●	●
Three phase(3P)		●	●	●	●	●	●
Protection	Over load	●	●				
	Over current	●	●	●	●	●	●
	Under load	●	●				
	Under current	●	●	●	●	●	●
	Over voltage	●	●				
	Under voltage	●	●				
	Phase loss/incomming voltage	●	●				
	Phase loss/load current	●	●	●	●	●	●
	Reverse phase/incomming voltage	●	●				
	Reverse phase/load current	●	●	●	●	●	●
	Current unbalance	●	●	●	●	●	●
	Voltage unbalance	●	●				
	Pre-alarm	●	●	●	●	●	●
	Locked rotor	●	●	●	●	●	●
	Shock/Stall	●	●	●	●	●	●
	Short Circuit						●
	Insulation resistance measurement						
	Ground fault	●	●	●	●	●	●
Indication	Line voltage	●	●				
	Ground fault current	●	●	●	●	●	●
	Load current	●	●	●	●	●	●
	KWH	●	●				
	Accumulated working time	●	●	●	●	●	●
	Preset value check in operation	●	●	●	●	●	●
	Load factor	●	●		●	●	●
Auxiliary	Password	●	●	●	●	●	●
	Main contactor auto close						
Commun-ication	4~20mA		●		●		
	RS-232						
	RS 485-422-Modbus					●	●
	Interface with Note PC						
Protection Level(operation manual)*		5E	5E	4E	4E	4E	4E
Remarks		Standard : external ZCT/Optional : ZCT embeded					

• DSP-VIP-PL/PM

Power Type(Voltage-Current based) Digital Multi-function Motor Protection Relay/High-end Class
VIP-PL : Panel Mounting Type(Converter + Loader)
VIP-PM : Panel Flush Mounting Type(Converter + Display meter)

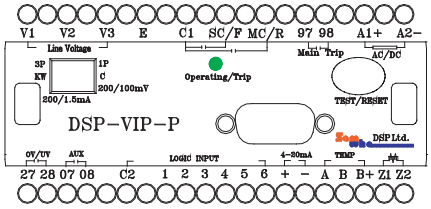
Technical Specification

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
	SC/F-MC/R starting transfer time(ydt)	1 sec~5 min/def(Transit interval time/SC-end~MC-start : 0.2 sec)
	Main contactor Auto Close	*Shut down delay Time : 1 sec~5 sec *Delay On Make Time : 0(instant)~25 sec
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 output Relay	C1-SC/F-MC/R	1a *3(3-SPST), 3A/Resistive
	Main	1a(1-spst), 3A/Resistive
	Aux	1a(1-spst), 3A/Resistive
	OV/UV	1a(1-spst), 3A/Resistive/possible to use for 2nd alarm(lower level alarm to "OC") under "Line" mode is OFF or short circuit trip under both OP & UP is OFF
	GR	1a, 3A/Resistive(Aux output must be set "GR" in "Au-o" mode)
Application environment	Temperature	Operation -25℃ ~ +70℃ Storage -40℃ ~ +80℃
	Relative humidity	30 ~ 85%, non-condensing
Current tollerance against changeable frequency in inverter		Avg ± 3% in 10Hz ~ 400Hz
Max Conductor Size		25sq
Insulation Resistence		10Mohm or more/500VDC, circuit-case
High Voltage Insulation Test		*circuit-case : AC 2000V, 60Hz, 1 min *contact-contact : AC 1500V, 60Hz, 1 min
Logic Input		90~220 VAC/DC
Screw Torque		Max 0.6 N.m
Frame : IEC/EN 60695-2-12		650℃
Shock : IEC/EN 60068-2-27		1/2 sine wave, 15g/11ms
Trip Output : IEC/EN60947-1		690V(Vrms : 2KV/1 min)
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV
Radiated Electromagnetic Field Disturbance : IEC/EN 61000-4-3		Level 3, 10V/m
Electric Fast Transient Burst : IEC/EN 61000-4-4		Power, relay output : Level 4, 4KV, others : Level 3, 2KV
Surge : IEC/EN 61000-4-5		relay output : 1.2 X 50uS, 2KV (0°, 90°, 180°, 270°)
Immunity to conducted disturbence : IEC/EN61000-4-6		10V, Level 3
Voltage variation : IEC-61000-4-11		3ms/0, 300ms/70%
Digital Communication with communication module/recorder	Physical feature	2 wire RS 485
	Address	1 ~ 250
	Speed	9.6/19.2/38.4/57.6/76.8/115.2kbps
	wiring connection	*Input/Output : RJ 45 ot Screw Terminal
		*RJ45 and Screw Terminal(5P) is commoned phisically
		*RJ45 is recommended for the test by "Samdsp"
	Termination resistence	*DIP S/W selection / 200 Ohm
	Cable	Sheathed cable, 2 Pair
Current Loop Communication : 4 ~ 20mA		20mA for maximum value in 3 phase current
Consuming power		10W / Max

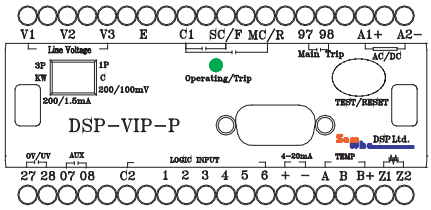
•DSP-VIP-PL/PM

Input/Output

▶ Embeded ZCT type/not possible with external CT



▶ External ZCT applied type/possible with external CT



Protection Range

70 Type	0.2~70A	* Possible matched with external CT/0.2~6A based * 5A must be selected in "Cto" mode for external CT

Trip Output Operation Pattern with Logic Input

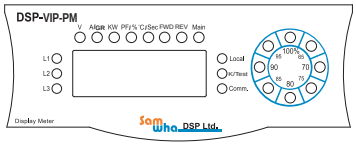
Trip output : main/97-98(a), C1-SC/F(a)-MC/R(a)/co-worked with logic input, aux/07-08(a)

b is selected in "out" mode : factory default
ON(start) : C1-SC/F → Closed(b), 97-98 → Open(a), 07-08 → Open(a)
Trip : C1-SC/F → Open(a), 97-98 → Close(b), 07-08 → Close(b)

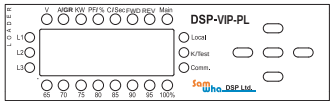
a is selected in "out" mode
ON(start) : C1-SC/F → Closed(b), 97-98 → Close(b), 07-08 → Open(a)
Trip : C1-SC/F → Open(a), 97-98 → Open(a), 07-08 → Close(b)

Display window

▶ Panel Flush Mounting Type : Display meter



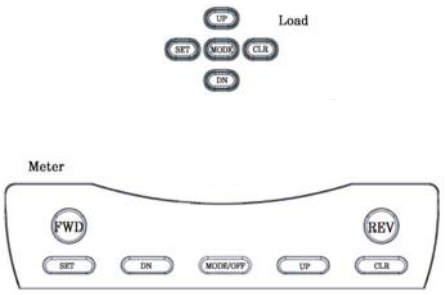
▶ Panel Mounting Type : Loader



Protection

DIV	Description	Operation time	Remark
Over voltage(OP)	in case the line voltage greater than preset value is sensed	Definite time:0.1~30 sec/adjustable	
Under voltage(UP)	in case the line voltage lower than preset value is sensed	Definite time:0.1~30 sec/adjustable	
Over current(OC)	in case the load current greater than preset value is sensed	Definite time:0.1~60 sec/adjustable	
Under current(UC)	in case the load current lower than preset value is sensed	Definite time:0.1~30 sec/adjustable	Possible alarm output through AUX
Phase loss(PL)	In case one of three phase is a state of phase loss/confirmed by line voltage	0.5sec	
Phase loss(PLc)	In case one of three phase is a state of phase loss/confirmed by load current	2sec	
reverse phase(rP)	In case the order of incomming phase is changed like "RTS" from "RST"/confirmed by line voltage	0.5 sec	
reverse phase(rPc)	In case the order of incomming phase is changed like "RTS" from "RST"/confirmed by load current	0.5 sec	
Locked rotor(LC)	In case the starting current greater than 300% of "OC" preset value is kept after dt is elapsed	0.1sec	
Shock/Stall	In case the 180~700% running current of preset "OC" value is sensed	0.05sec	
Current unbalance(ub)	[(max current-min current)/max current] *100%	8sec	
Voltage unbalance(vub)	[(max voltage-min voltage)/max voltage] *100%	0.5~10sec/adjustable	
Ground fault(EC)	in case the ground fault current greater than preset value is sensed	Definite time : 0.05Sec, 0.1 ~30sec	
Short circuit(SS)	In case shot circuit current greater than preset value to 800~2000% of "OC" is sensed	0.05Sec	MCCB Trip

Preset Key Operation



Preset Key	Description
SET	Start to preset : password "P0000" is shown by one touch → press 4 times → enter into mode : flickered character → preset by "UP" or "DN" * Press SET button to return to operation state, or press CLR button to move to next mode
CLR	* move to next mode as pressing CLR * Self diagnostic test as pressing CLR for 3sec : trip output is energized after preset O-Time * Make reset after a trip
MODE	* LED "Main" is turned on in Main mode & is turned off in Sub mode * return to operation state during preset as pressing MODE button
UP / DN	* change a character and/or a digit number for the preset
SET & CLR	* return to operation state as pressing both SET & CLR after preset, or * wait for 15sec or more
To check preset value of each mode during operation	* possible to check value and mode as pressing "SET" key once during operation, * preset vale and mode are appeared alternatively * possible to check next mode as pressing "CLR" Key * return to operating mode as pressing "Mode" key once again or waiting for 15 sec * make reset after trip is happened as pressing CLR key or test button of the converter

Logic Input Application

Logic	(1)	(2)	(3)	(4)	(5)	(6)
Application	ON(FWD)	OFF	ON(REV)	rCS	MCC	EFI(External fault Input)
	LOP			PC		

LOP Duty

Logic Input	High	Low	State	Output relay trip by Logic input
1	Low → High		Motor Start	C1-SC/F → Close
2	O	–		
1	–	O	Motor Stop	C1-SC/F → Open
2	High → Low			

rcs(Remote Control Sensor)Duty

Logic Input	High	Low	State	Output relay trip by Logic input
1	O	–	Motor Start	C1-SC/F → Close
4	O	O		
1	–	–	Motor Stop	C1-SC/F → Open
4	O	O		

Display Meter Duty(MCC)

Logic Input	High	Low	State	Output relay trip by Logic input
5	O	–	Start/Stop in Display Meter	C1-SC/F → Close(Start) C1-SC/F → Open(Stop)

rcs-FWD/REV

Logic Input	High	Low	State	Output relay trip by Logic input
1	O		Forward Start	C1-SC/F
4	O			
1		O	Forward Stop	C1-SC/F
4	O			
3	O		Reverse Start	C1-SC/R
4	O			
3		O	Reverse Stop	C1-SC/R
4	O			

PC Duty

Logic Input	High	Low	State	Output relay trip by Logic input
4	O	–	Motor Start/Stop in PC	C1-SC/F → Close(Start) C1-SC/F → Open(Stop)
5	O	–		

LOP-FWD/REV

Logic Input	High	Low	State	Output relay trip by Logic input
1	Low → High		Forward Start	C1-SC/F
2	O	–		
2	–	O	Forward Stop	
3	Low → High		Reverse Start	C1-SC/R
2	O	–		
2	–	O	Reverse Start	

EFI(External Fault Input(Available for VIP)

Logic Input	High	Low	State	Output relay trip by Logic input
6	O	–	*Motor *Stop Displayed : OUT-R(auLt)	97-98(Close, selected "b" on "out" mode), C1-SC/F → Open 97-98(Open, selected "b" on "out" mode), C1-SC/F → Open

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

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

※ In order to use Logic input #3 for FWD-REV operation, "ydt" mode in sub menu group must be preset "OFF"

※ In case motor is stopped by the command of ON-OFF(Rmote sensor or external fault input, not by the trip output signal), LOP, MCC, rcs(remote control sensor), out-F(External fault Input) or PC is appeared in the front window to indicate originated command source

※ It is 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

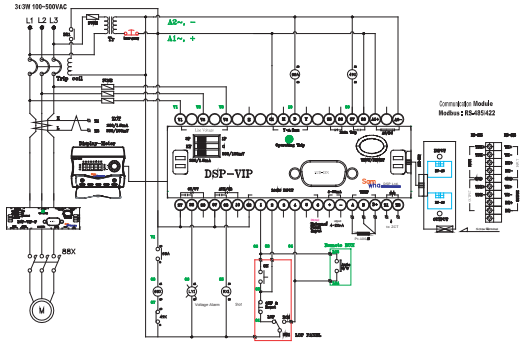
Trip cause indication

- Check for preset value in running state/Such mode and preset value are shown alternatively as pressing SET button, and next mode is shown as pressing CLR button
- If trip is happened, trip cause and current value of each phase are stored and indicated on the display meter
- The information of 8 trip is stored and this is able to be checked in "trip" mode orderly

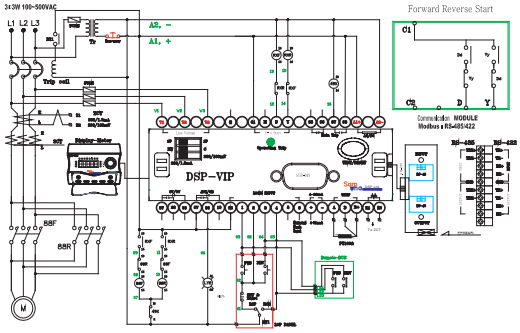
•DSP-VIP-PL/PM

Application sequence diagram

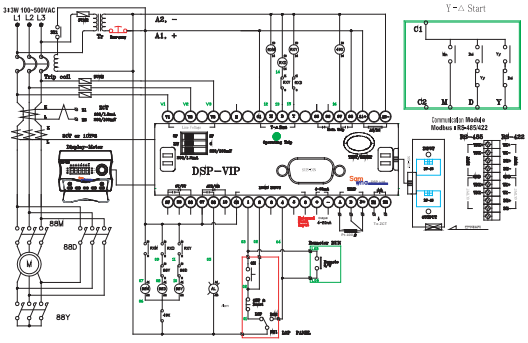
▶ DOL



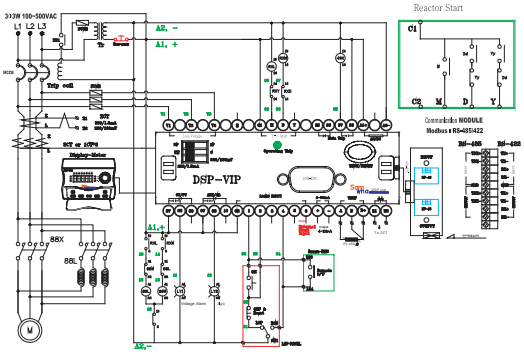
▶ FWD-REV



▶ Y-D



▶ Reactor



Preset Description

Main Mode

Mode	Function	Description	Factory
Pass	Password	P0000 is shown as pressing SET and need CLR 4 times to enter into mode to be preset	P0000
LinE	to select a value of line voltage	selection for line voltage(first mode after pressing CLR 4 times in password state)	440
OC[OL]	to preset a range to proted over current	0.2~70A/adjustable(0.2~6A with external CT)	10
CtO	to sense a current through DSP in itself or combined with external CT	5A for external CT, 1t for current sensed through its own CT	1t
Ct	to preset a ratio for external CT	preset for CT ratio based on 5A in secondary current of CT : eg, if CT is 100:5, preset value is 20	--
dt	to preset starting trip delay time	0.1~300Sec/adjustable	5
OtC	to select time-current chracteristics for over current protection	dEF : definite, Inv : inverse	dEF
Ot	to preset operating trip delay time	0.1~60Sec/adjustable	5
LC	to protect Locked Rotor	it is available for selecting ON [operation time : 01sec after dt is elapsed]	OFF
SS	to protect short circuit	it is available for selecting ON [operation time : 0.05Sec)	OFF
SSC	to preset short protection % to OC	protection range to OC : 800~2000%/adjustable	OFF
ShOC	to protect mechanical shock during motor is working	protection range to OC : 180~700%/adjustable	OFF
St	to preset a time for shock protection	0.05Sec, 0.1~3.0Sec/adjustable	--
PLC	to protect phase loss by load current	ON : available, OFF : not available	ON
rPC	to protect reverse phase by load current	ON : available, OFF : not available	OFF
OP	to protect over voltage	protection range : within + 70V from selected line voltage, eg : 440~510V if 440V is selected	OFF
UP	to protect under voltage	protection range : within -70V from selected line voltage, eg : 370~440 if 440V is selected	OFF
OUPt	to preset trip delay time to protect over /under voltage	0.1~30sec/adjustable	1t
PL	to protect phase loss by line voltage	ON : available, OFF : not available	OFF
rp	to protect reverse phase by line voltage	ON : available, OFF : not available	OFF
EC	to preset a range of zero phase current to protect ground fault	protection range : 0.03A~10A/adjustable	10
Edt	to preset starting trip delay time	0.1~25Sec/adjustable	2
EtC	to select time-current chracteristics to protect ground fault	dEF:definite, Inv : inverse	dEF
EOt	to preset operating trip delay time to protect ground fault	0.05Sec, 0.1~30Sec/adjustable	0.5

• DSP-VIP-PL/PM

Sub Mode

Out	to decide initial state of main trip relay	*to make initial state(a or b) of main trip output(97-98) when control power is powered *a : normal energized type(open→close) *b : normal deenergized type(not changed)	b
Fr-ty/a/b	to decide transferred pattern for SC/F-MC/Ry	*a : C1-MC/R is closed after C1-SC/F is opened as preset time of Frdt mode is elapsed *b : C1-MC/R is closed after C1-SC/F is kept close as preset time of Frdt mode is elapsed	
Frdt	to preset transferred time for SC/F-MC/R	1~300Sec/adjustable, OFF : not availble, but useful for reverse start by logic input #3 protection	OFF
UC(UL)	to preset a range to protect under current/load	range : 0.3A ~ under preset value for "Oc"	OFF
Ut	to preset trip delay time to protect under load/current	0.1~30Sec/adjustable	--
Ub	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	50
AU-O	to preset a kind of AUX trip output	*oFF/Ec/uc/Shoc/AL/tEP/Ec-tE/SS-tr/Ec-ta/Ec-tb *oFF : samw as main output	OFF
AL.HC	to preset higher alarm level rate(%) to OC(OL)	65~100%/adjustable	95
AL.LC	to preset lower alarm level rate(%) to OC	The preset in this mode is possible only in case "UnE" mode is in "OFF", 65%~under "ALHC" %/adjustable	--
Alt	to preset a limit of accumulated working time necessary to give alarm	0.1 hr ~ 6553.5 hr in 0.1 hr step	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	5
tEP	to preset temperature value to protect temperature rising	1~150℃/adjustable	OFF
Cn	to count tripped number of main contactor	*Fixed Value : to show accumulated number of actual trip *max value is 65535 *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
rOtA	to indicate additional factor besides basic factor to indicate running operation value in a order	OFF : basic factor, ON : basic factor + additional factor	OFF
hP-C	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	to decide how to reset trip state	*Hr:manual reset *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 inputs password	hr
Aut-t	to preset auto reset time	*time range : 0(instant), 0.1sec, 1~300sec	0
t-Aut	to preset total possible time available for executing defined times of auto reset	30min~60min	--
trIP	to show latest number of 8 trip cause	trip information in order : faulty phase and faulty value is appeared alternatively	--
Addr	to put self-address to communicate with pc	range of number : #1 ~ #250	1
bPS	to decide communication speed	9.6/19.2/38.4/57.6/76.8/115.2kbps	115.2
tOvEr	Main contactor Auto Close	*Shut Down Delay Time : 1~5sec/Adjustable * Delay On Make Time : 0(instant)~25sec	OFF

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 recommened that user makes a calibration without checking by accurate source

Mode	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"	0
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		0
tEPEr	to have a caribration for temperature		0
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
PEdit/setting Value(P****)	to change password	* possible to enter new digit by using "UP" or "DN" key after positioning a curser on the required digit * possible to enter into main mode or sub mode as pressing "mode" key	0000
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)-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
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

•DSP-VIP-PL/PM

Order Form

DSP-VIP-1-2-3-4-5-XX

DIV		Description	Remark
1	PL	Loader	Data Input Device/Panel Mounting Type
	PM	Display Meter	Data Input Device/Panel Flush Mounting Type
2	7	0A ~ 70A(0.2A~6A with external CT)	Current rating
3	B	24VAC/DC(Optional : order made)	Control Power
	Z	85VAC~260VAC(90VDC~370VDC)	
4	7	50/60Hz	Frequency/Control Power
5	ZCT	ZCT Embeded	
XX	Option	Exclusive Customer Order	* Available for Package type 1)None : Standard Software 2)P : Optional software 3)PC : Optional Software with Comm. Module 4)Others except above : Customer Order Made

Reference Code

Item	Reference Code	Data Input Device	Current Rating	Description
DSP-VIP	DSP-VIP-PL7Z7	Loader	0.2~70A/0.2~6A with external CT	85VAC~260VAC,50/60Hz(90VDC~370VDC), with external ZCT
	DSP-VIP-PM7Z7	Display Meter		85VAC~260VAC,50/60Hz(90VDC~370VDC), with external ZCT
	DSP-VIP-PL7Z7ZCT	Loader		85VAC~260VAC,50/60Hz(90VDC~370VDC), ZCT Embeded
	DSP-VIP-PM7Z7ZCT	Display Meter		85VAC~260VAC,50/60Hz(90VDC~370VDC), ZCT Embeded
Converter Only	DSP-VIP-7Z7			85VAC~260VAC,50/60Hz(90VDC~370VDC), with external ZCT
	DSP-VIP-7Z7ZCT			85VAC~260VAC,50/60Hz(90VDC~370VDC), ZCT Embeded
Package Type	DSP-VIP-PM7Z7-P			Converter+DisplayMeter/OptionalFunction program/85VAC~260VAC,50/60Hz, (90VDC~370VDC), with external ZCT
	DSP-VIP-PM7Z7-PC			Converter+Display Meter+Comm.Module/Optional Function program/85VAC~260VAC, 50/60Hz (90VDC~370VDC), with external ZCT
	DSP-VIP-PM7Z7-TC			Converter + Display Meter + Comm. Module + Terminal/85VAC~260VAC,50/60Hz, (90VDC~370VDC), with external ZCT
	DSP-VIP-PM7Z7ZCT-P			Converter + DisplayMeter/OptionalFunction program/85VAC~260VAC,50/60Hz,(90VDC~370VDC), ZCT embeded
	DSP-VIP-PM7Z7ZCT-PC			Converter + Display Meter + Comm.Module /Optional Function program/85VAC~260VAC, 50/60Hz, (90VDC~370VDC),ZCT embeded
	DSP-VIP-PM7Z7ZCT-TC			Converter + Display Meter + Comm. Module + Terminal/85VAC~260VAC, 50/60Hz, (90VDC~370VDC), ZCT Embeded

Accessory

Item	Refeence code	Description	Remark
Cable	DSP-CABLE-1H	1.5m	
	DSP-CABLE-03	3m	
	DSP-CABLE-XX	longer than 3m	
ZCT	DSP-ZCT-XX	100mA/1.5mA	XX : 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	
CT Terminal	DSP-TB-3T	Terminal through CT Hole	
Communication Module	DSP-CM-44	* Modul RS 485/422( )RS 485/422	RS485/422 Serial Comm.
Matching Converter	DSP-MC-42	* Module RS 485/422()RS 232 : USB	Other manufacturer product
Protocol converter	DSP-CMB	* Multi-1U/USB Combo @ Cross cable * 485(CM-44)( )232 USB(Note PC)	

• DSP-VIP-RL/RM/RTL/RTM

Multi-function Motor Protection Relay with Insulation Resistance Measurement/High-end Class
VIP-RL/RTL : Panel Mounting Type(Converter + Loader)
VIP-RM/RTM : Panel Flush Mounting Type(Converter + Display meter)

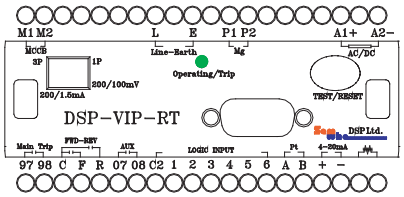
Technical Specification

Division		Description
Current setting range	70 Type	0.2 ~ 70A / 0.2 ~ 6A 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 current trip delay time(ot)	0.1~60 sec/def, 5~30class/inv:refer curve
	under 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
	SC/F-MC/R starting transfer time(ydt)	1 sec~5 min/def(Transit interval time/SC-end~MC-start : 0.2 sec)
	Main contactor Auto Close	*Shut down delay Time : 1 sec~5 sec *Delay On Make Time : 0(instant)~25 secAC 85V~AC260V, 50/60Hz (DC90V~DC370V)
Allowable tollerance	Current	C<=2A:0.1A,C>2A : +,- 5%
	Time	t<=2 sec : +,-,0.1sec, t>2 sec : +,-,5%
Control power		*85VAC~260VAC, 50/60Hz(90VDC~370VDC)
		*24VAC/DC(optional)
Trip output Relay	C1-SC/F-MC/R	1a *2(2-SPST), 3A/Resistive
	Main	1a(1-spst), 3A/Resistive
	Aux	1a(1-spst), 3A/Resistive
	GR	1a, 3A/Resistive(Aux output must be set "GR" in "Au-o" mode)
Application environment	Temperature	Operation : -25℃ ~ +70℃
		Storage : -40℃ ~ +80℃
	Relative humidity	30 ~ 85%, non-condensing
Current tollerance against changeable frequency in inverter		Avg ± 3% in 1Hz ~ 400Hz
Max Conductor Size		25sq
Insulation Resistence		10Mohm or more/500VDC, circuit-case
High Voltage Insulation Test		*circuit-case:AC 2000V, 60Hz, 1 min *contact-contact:AC 1500V, 60Hz, 1 min
Logic Input		90~220 VAC/DC
Screw Torque		Max 0.6 N.m
Frame : IEC/EN 60695-2-12		650℃
Shock : IEC/EN 60068-2-27		1/2 sine wave, 15g/11ms
Trip Output : IEC/EN60947-1		690V(Vrms : 2KV/1 min)
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV
Radiated Electromagnetic Field Disturbance : IEC /EN 61000-4-3		Level 3, 10V/m
Electric Fast Transient Burst : IEC/EN 61000-4-4		Power, relay output : Level 4, 4KV, others : Level 3, 2KV
Surge : IEC/EN 61000-4-5		relay output : 1.2 X 50uS, 2KV (0°, 90°, 180°, 270°)
Immunity to conducted disturbence : IEC/EN61000-4-6		10V, Level 3
Voltage variation : IEC-61000-4-11		3ms/0, 300ms/70%
Digital Communication with communication module/recorder	Physical feature	2 wire RS 485
	Address	1~250
	Speed	9.6/19.2/38.4/57.6/76.8/115.2kbps
	wiring connection	*Input/Output : RJ 45 ot Screw Terminal *RJ45 and Screw Terminal(5P) is commoned phisically
	Termination resistence	*DIP S/W selection / 200 Ohm
	Cable	Sheathed cable, 2 Pair
Current Loop Communication : 4 ~ 20mA		20mA for maximum value in 3 phase current
Consuming power		10W / Max

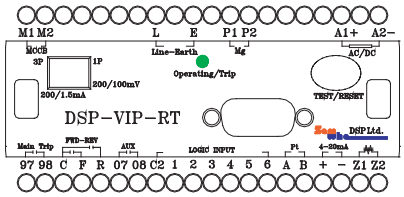
•DSP-VIP-RL/RM/RTL/RTM

Input/Output

▶ Embeded ZCT type/not possible with external CT



▶ External ZCT applied type/possible with external CT



Protection Range

70 Type	0.2~70A	∗Possible matched with external CT/0.2~6A based ∗5A must be selected in "Cto" mode for external CT

Trip Output Operation Pattern with Logic Input

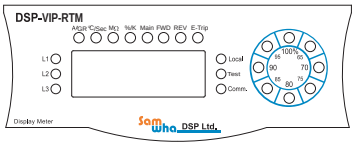
Trip output : main/97-98(a), C-F(a)-R(a)/co-worked with logic input, aux/07-08(a)

b is selected in "out" mode : factory default
ON(start) : C-F → Closed(b), 97-98 → Open(a), 07-08 → Open(a)
Trip : C-F→ Open(a), 97-98 → Close(b), 07-08 → Close(b)

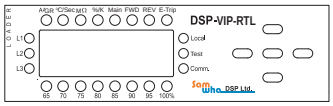
a is selected in "out" mode
ON(start) : C-F → Closed(b), 97-98 → Close(b), 07-08 → Open(a)
Trip : C-F→ Open(a), 97-98 → Open(a), 07-08 → Close(b)

Display window

▶ Panel Flush Mounting Type : Display meter



▶ Panel Mounting Type : Loader



Protection

DIV	Description	Operation time	Remark
Over current (OC)	in case the load current greater than preset value is sensed	Definite time:0.1~60 sec/adjustable	
Under current (UC)	in case the load current lower than preset value is sensed	Definite time:0.1~30 sec/adjustable	Possible alarm output through AUX
Phase loss (PLc)	In case one of three phase is a state of phase loss	1sec	
reverse phase (rPc)	In case the order of incomming phase is changed like "RTS" from "RST"	0.5sec	
Locked rotor (LC)	"In case the starting current greater than 300% of "OC" preset value is kept after dt is elapsed"	0.1sec	
Shock/Stall	"In case the 180~700% running current of preset "OC" valueis sensed"	0.05sec	
Current unbalance(ub)	[(max current-min current)/max current] ∗100%	8sec	
Ground fault (EC)	"in case the ground fault current greater than preset value is sensed"	Definite time : 0.05Sec, 0.1 ~30sec	
Insulation resistance(Ir)	the measurement for insulation resistance in motor stop state (0.1~500㏁)/ IrPS is shown if measured value is 500㏁)	possible to make Alarm if Ir is selected in "Auo"	

Trip cause indication

- Check for preset value in running state / Such mode and preset value are shown alternatively as pressing SET button, and next mode is shown as pressing CLR button
- If trip is happened, trip cause and current value of each phase are stored and indicated on the display meter
- The information of 8 trip is stored and this is able to be checked in "trip" mode orderly

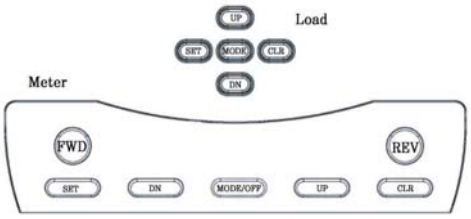
Logic Input Application

Logic Input	(1)	(2)	(3)	(4)	(5)	(6)
Application	ON(FWD)	OFF	ON(REV)	rCS	MCC	ER
	LOP			PC		

∗ The more detail for case study is described in VIP-PM

•DSP-VIP-RL/RM/RTL/RTM

Preset Key Operation



Preset Key	Description
SET	*Start to preset : password "P0000" is shown by one touch → press 4 times → enter into mode : flickered character → preset by "UP" or "DN" *Press SET button to return to operation state, or press CLR button to move to next mode
CLR	*move to next mode as pressing CLR *Self diagnostic test as pressing CLR for 3sec : trip output is energized after preset O-Time *Make reset after a trip
MODE	*LED "Main" is turned on in Main mode & is turned off in Sub mode *return to operation state during preset as pressing MODE button"
UP / DN	*change a character and/or a digit number for the preset
To check preset value of each mode during operation	*possible to check value and mode as pressing "SET" key once during operation *preset vale and mode are appeared alternatively *possible to check next mode as pressing "CLR" Key *return to operating mode as pressing "Mode" key once again or waiting for 15 sec *make reset after trip is happened as pressing CLR key or test button of the converter *Not possible to change existed preset value"

Preset Description

Main Mode

Mode	Function	Description	Factory
Pass	Password	P0000 is shown as pressing SET and need CLR 4 times to enter into mode to be preset	P0000
OC	to preset a range to protect over current	0.2~70A/adjustable(0.2~6A with external CT)	10
CtO	to sense a current through DSP in itself or combined with external CT	5A for external CT, 1t for current sensed through its own CT	1t
Ct	to preset a ratio for external CT	preset for CT ratio based on 5A in secondary current of CT:eg,if CT is 100:5, preset value is 20	--
dt	to preset starting trip delay time	0.1~300Sec/adjustable	5
OtC	to select time-current chracteristics for over current protection	dEF : definite, Inv : inverse	dEF
Ot	to preset operating trip delay time	0.1~60Sec/adjustable	5
LC	to protect Locked Rotor	it is available for selecting ON [operation time : 01sec after dt is elapsed]	OFF
ShOC	to protect mechanical shock during motor is working	protection range to OC : 180~700%/adjustable	OFF
St	to preset a time for shock protection	0.05Sec, 0.1~3.0Sec/adjustable	--
PLC	to protect phase loss by load current	ON : available, OFF : not available	ON
rPC	to protect reverse phase by load current	ON : available, OFF : not available	OFF
EC	to preset a range of zero phase current to protect ground fault	protection range : 0.03A~10A/adjustable	10
Edt	to preset starting trip delay time	0.1~25Sec/adjustable	2
EtC	to select time-current chracteristics to protect ground fault	dEF : definite, Inv : inverse	dEF
EOt	to preset operating trip delay time to protect ground fault	0.05Sec, 0.1~30Sec/adjustable	0.5

•DSP-VIP-RL/RM/RTL/RTM

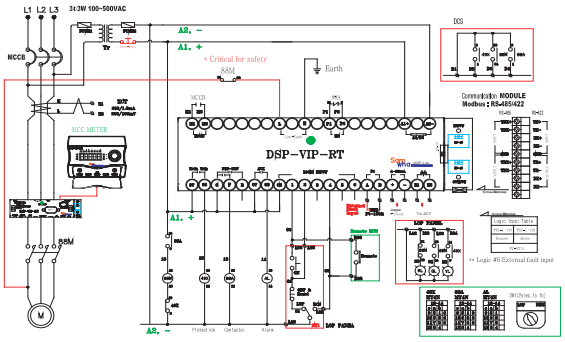
Sub Mode

Out	to decide initial state of main trip relay	*to make initial state(a or b) of main trip output(97-98) when control power is powered *a : normal energized type(open→close) *b : normal deenergized type(open→open)	b
Fr-ty/a/b	to decide a pattern for forward reverse transfer	*a : C1-F is closed, then C1-R is closed as keeping C1-F is opend after Frdt is elapsed *b : C1-F is closed, then C1-R is closed as keeping C1-F is opend after Frdt is elapsed	
Frdt/oFF/ Setting value	to preset a transfer time for F-R	*transfer time range for reactor starting, forward-reverse operation : 1sec~5 min *transfer interval time for F-end~R-start : 0.2sec *dt is normally available for each contactor while the transfer operation is done *OFF : possible to have rever operation in case Logic input #3 is used	
UC	to preset a range to protect under current	*OFF : possible to have reverse operation in case Logic input #3 is used *protection range : 0.3A ~ under preset value for "Oc" to preset a range to protect under current/load	OFF
Ut	to preset trip delay time to protect under load/current	0.1~30Sec/adjustable	—
Ub	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 urrent:0.3A	50
AU-O	to preset a kind of AUX trip output	*OFF/Ec/Uc/Shoc/AL/tEP/Ir/Ec-tE-AL/Ec-ta/Ec-tb *oFF : samw as main output	OFF
AL	to preset alarm level rate(%) to OC	% range : 65% ~ 100%/adjustable	95
Alt	to preset a limit of accumulated working time necessary to give alarm.	0.1 hr ~ 6553.5 hr in 0.1 hr step	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	5
Pt	to preset temperature value to protect temperature rising	*adjustable range : 10C ~150 OC/1 OC in a step	OFF
Cn	to count tripped number of main contactor	*Fixed Value : to show accumulated number of actual trip *max value is 65535 *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
rOtA	to indicate additional factor besides basic factor to indicate running operation value in a order	OFF : basic factor, ON : basic factor + additional factor	OFF
rESEt	to decide how to reset trip state	*Hr : manual reset *Aut-# : to preset auto reset and allowable number for auto reset, posible number is 1 to 9. *if Auto reset is preset, manual reset by self Reset S/W of converter is not available *if trip is acted by phase loss, auto reset is not able, only for manual reset	hr
AUt-t	to preset auto reset time	*to preset time from trip to reset in auto reset mode *time range : 1sec~1800sec(30min) · 1~59 sec : actual digit, · 1min~30 min:actual digit + □(time unit) in display	0
trIP	to show latest number of 8 trip cause	trip information in order : faulty phase and faulty value is appeared alternatively	--
Addr	to put self-address to communicate with pc	range of number : #1 ~ #250	1
bPS	to decide communication speed	9.6/19.2/38.4/57.6/76.8/115.2kbps	115.2
tOvEr	Main contactor Auto Close	*Shut Down Delay Time : 1~5sec/Adjustable *Delay On Make Time : 0(instant)~25sec	OFF
IrAL	to preset alarm level for insulation resistance	*OFF : Disable *preset range : 0.1Mohm~500Mohm	1
rECOd	to preset measurement interval time for insulation resistance	*adjustable interval time : 0.1 min~3000 min *First measument is done after preset time from motor stop *If such interval time is placed on the mid of motor operation, a measurement is neglected	60
rE-nb	to preset possible number to continue a measument by interval time	*OFF : a measurement is done in every interval time during motor stopping state *Setting value : measurement is done only preset times. *Adjustable range : 1~10 times	OFF

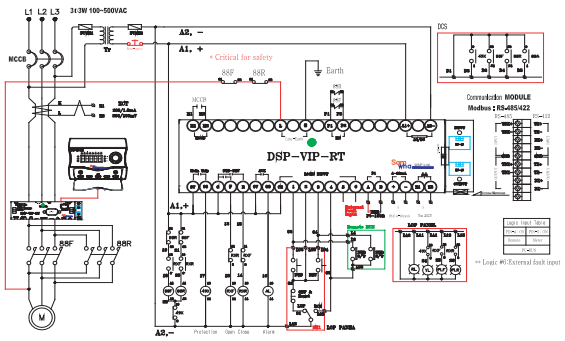
•DSP-VIP-RL/RM/RTL/RTM

Application sequence diagram

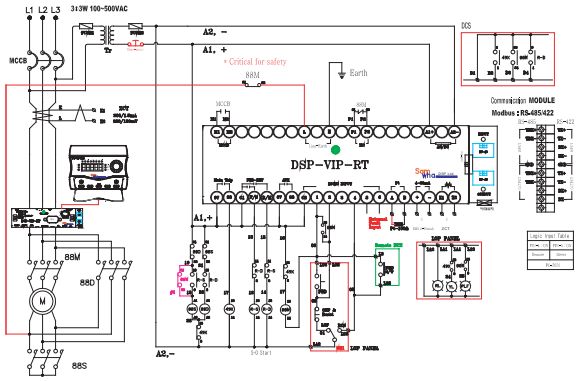
▶ DOL



▶ FWD-REV



▶ Y-D



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 recommened that user makes a calibration without checking by accurate source

Mode	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% * possible to come next mode by pressing right direction key "CLR"	0
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
EcPEr	to have a caribration for ground fault current		0
PtpEr	to have a caribration for a temperatute from Ptl		0
Log2/LOP/ ALL	to determine method and scope to reset through Logic input #2	* LOP : reset is possible as the state of logic input #2 is transferred from high to low in case trip is happened in the condition of LOP * ALL : reset is possible as the state of logic input #2 is transferred from high to low in case trip is happened in the whole condition, so logic input #2 should be high firstly * In any case, reset is possible by pressing "CLR" key	LOP
cLaSS/oFF/ Man	to determine a method to measure a resistance	* oFF : not available for resistane measurement function * Auto : resistance is measured automatically according to first measuring time and next measuring interval time which is preset in each * the starting point to measure a resistance is the time control power is on * the measured resistance is lower than preset value in MAN and AUTO, the mortor is not possible to start	AUTO
1st/oFF/Setting Value(min)	to preset a first measuring time	* OFF : not available for this function after the control power is on * available only in case "Class" mode is preset by "Auto" * adjustable value : 0.1 min(6 sec)~ 3000min * the measurement starts in the point of motor stop and next measurement is done by the preset time of "Recod" mode * the preset time is positioned in the mid of running state, the actual measuring action is not executed * if the motor is restarted according to the "Tover" mode, this function is not executed * this is reset by power OFF or the pressing "SET" button	0.1
Comm/auto /slave	To decide a qualification of VIP in communication	* auto : VIP always dispatches a data * Slave : VIP dispatches a data only in case the master requires	
PEdIt /setting Value(P***)	to change password	* possible to enter new digit by using "UP" or "DN" key after positioning a curser on the required digit * possible to enter into main mode or sub mode as pressing "mode" key	0000

•DSP-VIP-RL/RM/RTL/RTM

Order Form

DSP-VIP-1-2-3-4-5-XX

DIV		Description	Remark
1	RL	Loader	Data Input Device/Panel Mounting Type
	RL		
	RM	Display Meter	Data Input Device/Panel Flush Mounting Type
	RTM		
2	7	0A ~ 70A(0.2A~6A with external CT)	Current rating
3	B	24VAC/DC(Optional:order made)	Control Power
	Z	85VAC~260VAC(90VDC~370VDC)	
4	7	50/60Hz	Frequency/Control Power
5	ZCT	ZCT Embeded	
X	Option	Exclusive Customer Order	*Available for Package type

Reference Code

Item	Reference Code	Data Input Device	Current Rating	Description
DSP-VIP	DSP-VIP-RL7Z7	Loader	0.2~70A/0.2~6A with external CT	85VAC~260VAC, 50/60Hz(120VDC~370VDC)
	DSP-VIP-RTL7Z7			85VAC~260VAC, 50/60Hz(120VDC~370VDC), 4~20mA
	DSP-VIP-RL7Z7ZCT			85VAC~260VAC, 50/60Hz(120VDC~370VDC), ZCT Embeded
	DSP-VIP-RTL7Z7ZCT			85VAC~260VAC, 50/60Hz(120VDC~70VDC), 4~20mA,ZCT Embeded
	DSP-VIP-RM7Z7	Display Meter		85VAC~260VAC, 50/60Hz(120VDC~370VDC)
	DSP-VIP-RTM7Z7			85VAC~260VAC, 50/60Hz(120VDC~370VDC), 4~20mA
	DSP-VIP-RM7Z7ZCT			85VAC~260VAC, 50/60Hz)120VDC~370VDC), ZCT Embeded
	DSP-VIP-RTM7Z7ZCT			85VAC~260VAC, 50/60Hz(120VDC~370VDC), 4~20mA, ZCT Embeded
Converter Only	DSP-VIP-R7Z7			85VAC~260VAC, 50/60Hz(120VDC~370VDC)
	DSP-VIP-R7Z7ZCT			85VAC~260VAC, 50/60Hz(120VDC~370VDC), ZCT Embeded
Converter Only/4~20mA	DSP-VIP-RT7Z7			85VAC~260VAC, 50/60Hz(120VDC~370VDC)
	DSP-VIP-RT7Z7ZCT			85VAC~260VAC, 50/60Hz(120VDC~370VDC), ZCT Embeded
Package Type	DSP-VIP-RL7Z7-C			Converter+Loader+Comm module/85VAC~260VAC,50/60Hz(120VDC~370VDC)
	DSP-VIP-RL7Z7ZCT-C			Converter+Loader+Comm module/85VAC~260VAC,50/60Hz(120VDC~370VDC),ZCT Embeded
	DSP-VIP-RM7Z7-C			Converter+Display Meter+Comm module/85VAC~260VAC,50/60Hz
	DSP-VIP-RM7Z7ZCT-C			Converter+Display Meter+Comm module/85VAC~260VAC, 50/60Hz(120VDC~370VDC), ZCT Embeded
	DSP-VIP-RTL7Z7-C			Converter+Loader+Comm module, 4~20mA/85VAC~260VAC, 50/60Hz(120VDC~370VDC)
	DSP-VIP-RTL7Z7ZCT-C			Converter+Loader+Comm module, 4~20mA/85VAC~260VAC, 50/60Hz(120VDC~370VDC), ZCT Embeded
	DSP-VIP-RTM7Z7-C			Converter+Display Meter+Comm module, 4~20mA/85VAC~260VAC, 50/60Hz
	DSP-VIP-RTM7Z7ZCT-C			Converter+Display Meter+Comm module, 4~20mA/85VAC~260VAC, 50/60Hz(120VDC~370VDC), ZCT Embeded

Accessory

Item	Refeence code	Description	Remark
Cable	DSP-CABLE-1H	1.5m	
	DSP-CABLE-03	3m	
	DSP-CABLE-XX	Over 3m	
ZCT	DSP-ZCT-I-XX	100mA/1.5mA	XX : inside diameter of ZCT
	DSP-ZCT-V-XX	100mA/100mV	
Loader	DSP-ID-RL	Input Device/Loader	
Display Meter	DSP-ID-RM	Input Device/Display Meter	
CT Terminal	DSP-TB-3T	Terminal through CT Hole	
Communication Module	DSP-CM-44	* Module : RS 485/422( )RS 485/422	
Communication & recorder Module	DSP-MWR-	* Module : RS 485/422( )RS 485/422 *Recorder for 20 days in every second	
Matching(Protocol) Converter	DSP-CMB	* Module:RS 485/422 ( ) RS 232.USB	*Existed product by other manufacturer *only for test, input, retrieval for VIP-CM44 combined with VIP by using "Samdsp"

• DSP-VIP-5EL/M, 5TL/M, 5CL/M, 5SM

Digital Motor Protection Relay/High-end Class
VIP-5EL, 5TL, 5CL : Panel Mounting Type
VIP-5EM. 5TM. 5CM, 5SM : Panel Flush Mounting Type

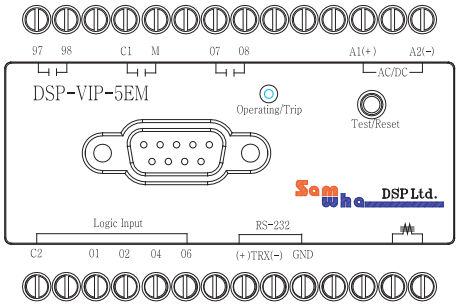
Technical Specification

Division		Description	
Current setting range	70 Type	0.2 ~ 70A /0.2 ~ 6A with external CT	
	External CT	Refer Table	
Ground protection	Zero Sequence Current	30mA~4A	
Time setting	Starting delay time(dt)	OFF, 0.1 ~300 sec/def, "OFF" selection means inverse curve	
	over current trip delay time(ot)	0.1~60 sec/def, 5~30class/inv:refer curve	
	under current trip delay time(ut)	0.1~30 sec/def	
	Shock/stall trip delay time(st)	0.1 ~ 3 sec/def	
	Ground fault starting delay time(Edt)	OFF, 1 ~ 25 sec/def	
	Ground fault trip delay time(Eot)	* 0.1~ 30 sec/def * 1~10 Class/Inverse, refer curve	
	SC/F-MC/R starting transfer time(ydt)	1 sec~5 min/def(Transit interval time/SC-end~MC-start : 0.2 sec)	
	Main contactor Auto Close	* Shut down delay Time : 1 sec~5 sec * Delay On Make Time : 0(instant)~25 sec	
Allowable tollerance	Current	C<=2A : 0.1A,C>2A : +,- 5%	
	Time	t<=2 sec : +,-,0.1sec, t>2 sec : +,-,5%	
Control power		* 85VAC~260VAC, 50/60Hz(90VDC~370VDC)	
		* 24VAC/DC(optional)	
Trip output Relay	C1-M(coworked by logic input/trip)	1a 1(1-SPST), 3A/Resistive	
	Main	1a(1-spst), 3A/Resistive	
	Aux	1a(1-spst), 3A/Resistive	
	GR	1a, 3A/Resistive(Aux output must be set "GR" in "Au-o" mode)	
Application environment	Temperature	Operation	-25°C ~ +70°C
		Storage	-40°C ~ +80°C
	Relative humidity	30 ~ 85%,non-condensing	
Current tollerance against changeable frequency in inverter		Avg ± 3% in 1Hz ~ 400Hz	
Max Conductor Size		25sq	
Insulation Resistence		10Mohm or more/500VDC, circuit-case	
High Voltage Insulation Test		* circuit-case : AC 2000V, 60Hz, 1 min * contact-contact : AC 1500V, 60Hz, 1 min	
Logic Input		90~220 VAC/DC	
Screw Torque		Max 0.6 N.m	
Frame : IEC/EN 60695-2-12		650°C	
Shock : IEC/EN 60068-2-27		1/2 sine wave, 15g/11ms	
Trip Output : IEC/EN60947-1		690V(Vrms : 2KV/1 min)	
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV	
Radiated Electromagnetic Field Disturbance : IEC /EN 61000-4-3		Level 3, 10V/m	
Electric Fast Transient Burst : IEC/EN 61000-4-4		Power, relay output : Level 4, 4KV, others : Level 3, 2KV	
Surge : IEC/EN 61000-4-5		relay output : 1.2 X 50uS, 2KV (0°, 90°, 180°, 270°)	
Immunity to conducted disturbence : IEC/EN61000-4-6		10V, Level 3	
Voltage variation : IEC-61000-4-11		3ms/0, 300ms/70%	
Digital Communication/5CM/5CL Type	Physical feature	2 wire RS 485	
	Address	1 ~ 250	
	Speed	9.6/19.2/38.4/57.6/76.8/115.2kbps	
	wiring connection	Screw Terminal	
	Termination resistence	External resistance/200 Ohm	
	Cable	Sheathed cable, 2 Pair	
Current Loop Communication : 4 ~ 20mA/5TM/5TL Type		20mA for maximum value in 3 phase current	
Consuming power		6W / max	

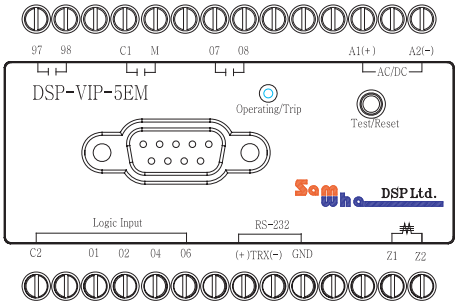
•DSP-VIP-5EL/M, 5TL/M, 5CL/M, 5SM

Input/Output : 5EM/5EL Type

▶ External ZCT applied type/possible with external CT



▶ Embeded ZCT type/not possible with external CT



Protection Range

70 Type	0.2~70A	*Possible matched with external CT/0.2~6A based *5A must be selected in "Cto" mode for external CT *55M Type : 0.2~6A

Trip Output Operation Pattern with Logic Input

Trip output : main/97-98(a), C1-M(a)/co-worked with logic input, aux/07-08(a)

b is selected in "out" mode : factory default
ON(start) : C-M → Closed(b), 97-98 → Open(a), 07-08 → Open(a)
Trip : C-M → Open(a), 97-98 → Close(b), 07-08 → Close(b)

a is selected in "out" mode
ON(start) : C1-M → Closed(b), 97-98 → Close(b), 07-08 → Open(a)
Trip : C1-M → Open(a), 97-98 → Open(a), 07-08 → Close(b)

Trip Output Operation Pattern without Logic Input

LOOFF" is selected in "OUT" mode : "AUTO" is shown initially

In case the control power is on : C1-M Close(b), 97-98 Open(a), 07-08 Open(a)
AUX output(07-08) : The kind of output factor can be selected in "Auo" mode
/Possible output : AL, UC, SHOCK, EC, FF/independent from main trip

Input/Output

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
4-20	+, -	*4~20mA/DC *Available for 5TL/5TM Type

Protection

DIV	Description	Operation time	Remark
Over current(OC)	in case the load current greater than preset value is sensed	Definite time:0.1~60 sec/adjustable	5EL/5EM 5TL/5TM 5CL/5CM 5SM
Under current(UC)	in case the load current lower than preset value is sensed	Definite time:0.1~30 sec/adjustable	
Phase loss(PLc)	In case one of three phase is a state of phase loss	1sec	
reverse phase(rPc)	In case the order of incomming phase is changed like "RTS" from "RST"	0.5sec	
Locked rotor(LC)	In case the starting current greater than 300% of "OC" preset value is kept after dt is elapsed	0.1sec	
Shock/Stall	In case the 180~700% running current of preset "OC" valueis sensed	0.1sec	
Current unbalance(ub)	[(max current-min current)/max current] * 100%	8sec	
Ground fault(EC)	in case the ground fault current greater than preset value is sensed	Definite time : 0.1 ~30sec	
Short circuit(SS)	In case shot circuit current greater than preset value to 800~2000% of "OC" is sensed	0.05sec	5SM

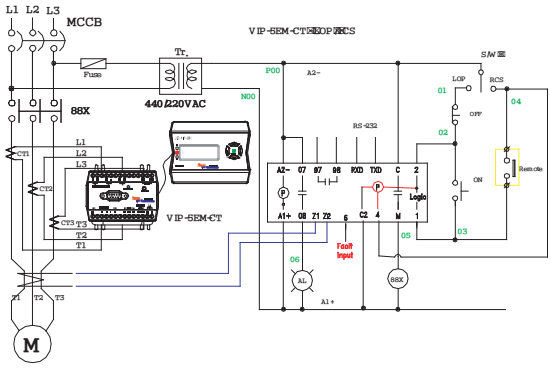
Trip cause indication

- Check for preset value in running state/Such mode and preset value are shown alternatively as pressing SET button, and next mode is shown as pressing CLR button
- If trip is happened, trip cause and current value of each phase are stored and indicated on the display meter
- The information of 8 trip is stored and this is able to be checked in "trip" mode orderly

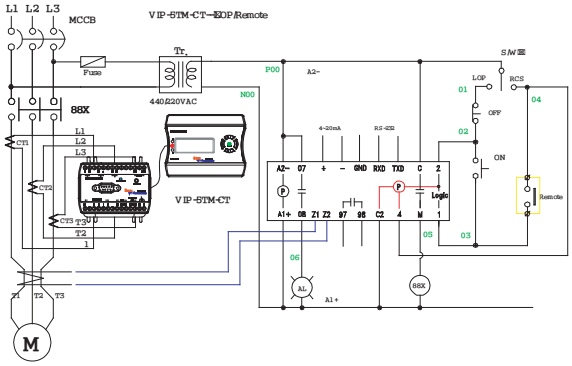
•DSP-VIP-5EL/M, 5TL/M, 5CL/M, 5SM

Application sequence diagram : 5EL/M Type

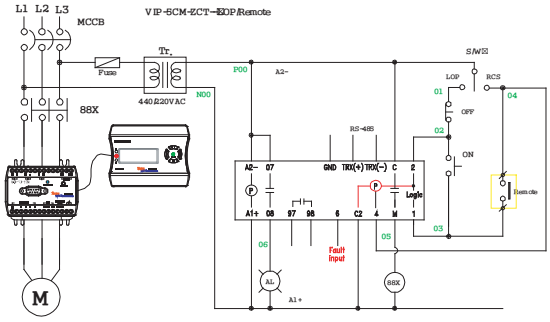
▶ External ZCT type



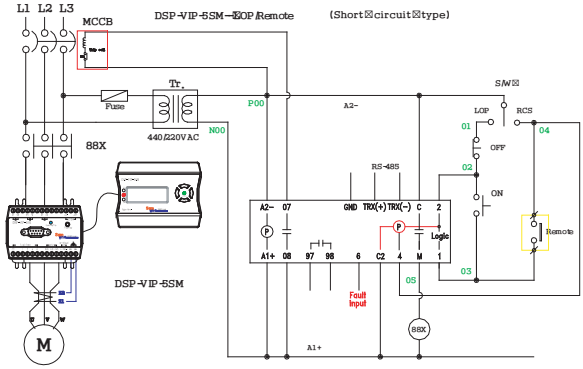
▶ External ZCT type



▶ Embeded ZCT type/not possible with external CT



5SM : External ZCT type



Logic Input Application

Logic	(1)	(2)	(4)	(6)
Application	LOP		rCS	EFI

LOP Duty

Logic Input	High	Low	State	Output relay trip by Logic input [C1-M]
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	Output relay trip by Logic input [C1-M]
1	O	–	Motor Start	C1-M → Close
4	O	–		
1	–	O	Motor Stop	C1-M → Open
4	O	O		

EFI(External Fault Input) Duty(Available for VIP-PM,RM,RTM)

Logic Input	High	Low	State	Output relay trip by Logic input [C1-M]
6	O	–	* Motor Stop * Displayed : OUT-F(aULt)	*Starting : Open → Close *EFI input : Close → Open

※ In case selected operation mode is changed by Selector SW, the motor will be continued to work according to new selected mode afre 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 input), 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 long distance sensor must be connected through the output of external aux relay because input line could keep unwanted voltage by induced current

•DSP-VIP-5EL/M, 5TL/M, 5CL/M, 5SM

Preset Key Operation

Preset Key	Description
SET	*Start to preset : password "P0000" is shown by one touch → press 4 times → enter into mode : flickered character → preset by "UP" or "DN" *Press SET button to return to operation state, or press CLR button to move to next mode
CLR	*move to next mode as pressing CLR *Self diagnostic test as pressing CLR for 3sec : trip output is energized after preset O-Time *Make reset after a trip
UP / DN	*change a character and/or a digit number for the preset
SET & CLR	*return to operation state as pressing both SET & CLR after preset, or *wait for 15sec or more
To check preset value of each mode during operation	*possible to check value and mode as pressing "SET" key once during operation, *preset vale and mode are appeared alternatively *possible to check next mode as pressing "CLR" Key *return to operating mode as pressing "Mode" key once again or waiting for 15 sec *make reset after trip is happened as pressing CLR key or test button of the converter *Not possible to change existed preset value

Order Form

DSP-1(Type)-2(Rating current)-3(Control Power)-4(ZCT Embeded)

Item	Reference Code	Current Rating	Description
VIP-5EL	DSP-VIP5EL-70Z7	0.2~70A/0.2~6A with external CT	Panel Monting Type, 85~260VAC, 50/60Hz(90~370VDC), external ZCT
	DSP-VIP5EL-70Z7ZCT		Panel Monting Type85~260VAC, 50/60Hz(90~370VDC), ZCT embeded(not available for external CT application)
VIP-5EM	DSP-VIP5EM-70Z7		Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), external ZCT
	DSP-VIP5EM-70Z7ZCT		Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded
VIP-5CL	DSP-VIP5CL-70Z7		Panel Monting Type, 85~260VAC, 50/60Hz(90~370VDC), external ZCT
	DSP-VIP5CL-70Z7ZCT		Panel Monting Type, 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded(not available for external CT application)
VIP-5CM	DSP-VIP5CM-70Z7		Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), external ZCT, 485 communication
	DSP-VIP5CM-70Z7ZCT		Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded(not available for external CT application), 485 communication
VIP-5TL	DSP-VIP5TL-70Z7		Panel Monting Type, 85~260VAC, 50/60Hz(90~370VDC), external ZCT, 4~20mA
	DSP-VIP5TL-70Z7ZCT		Panel Monting Type, 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded(not available for external CT application), 4~20mA
VIP-5TM	DSP-VIP5TM-70Z7		Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), external ZCT, 4~20mA
	DSP-VIP5TM-70Z7ZCT		Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded(not available for external CT application), 4~20mA
VIP-5SM	DSP-VIP5SM-03Z7	0.2~6A	Panel Flush Monting Type, 85~260VAC, 50/60Hz(90~370VDC), exclusively external CT, external ZCT

• DSP-VIP-5EL/M, 5TL/M, 5CL/M, 5SM

Preset Description

Mode	Function	Description	Factory
P0000	Password	P0000 is shown as pressing SET and need CLR 4 times to enter into mode to be preset	0
OC	to preset a range to protect over current	0.2~70A/adjustable(0.2~6A with external CT)	5
CtO	to sense a current through DSP in itself or combined with external CT	5A for external CT, 1t for current sensed through its own CT	1t
Ct	to preset a ratio for external CT	preset for CT ratio based on 5A in secondary current of CT:eg,if CT is 100:5, preset value is 20	(—)
dt	to preset starting trip delay time	0.1~300Sec/adjustable	5
OtC	to select time-current chracteristics for over current protection	dEF : definite, Inv : inverse	dEF
Ot	to preset operating trip delay time	0.1~60Sec/adjustable	5
LC	to protect Locked Rotor	it is available for selecting ON [operation time:01sec after dt is elapsed]	OFF
SS	to protect short circuit	it is available for selecting ON [operation time: 0.05Sec)/5SM Type	OFF
SSC	to preset short protection % to OC	protection range to OC : 800~2000%/adjustable/5SM Type	1500%
ShOC	to protect mechanical shock during motor is working	protection range to OC : 180~700%/adjustable	OFF
St	to preset a time for shock protection	0.05Sec(only for 5SM/L), 0.1~3.0Sec/adjustable	0.1
PLC	to protect phase loss by load current	ON : available, OFF : not available	ON
rPC	to protect reverse phase by load current	ON: available, OFF : not available	OFF
EC	to preset a range of zero phase current to protect ground fault	protection range : 0.03A~4A/adjustable, OFF : disable	4A
Edt	to preset starting trip delay time	0.1~25Sec/adjustable	2sec
EOt	to preset operating trip delay time to protect ground fault	0.1~30Sec/adjustable	0.5sec
OUt	to decide if logic input is used or not	* LooFF : not available for logic input/ AUtO is shown in initial state * Starting : selecting a or b : C1–M is closed, 97–98(a)/b selected, 97–98(b)/a selected * Trip : selecting a or b : C1–M is opened, 97–98(b)/b selected, 97–98(a)/a selected	AUtO
UC	to preset a range to protect under current	protection range : 0.3A~under preset value for "Oc" to preset a range to protect under current/load	OFF
Ut	to preset trip delay time to protect under current	0.1~30Sec/adjustable	2sec
Ub	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	50%
AUO	to preset a kind of AUX trip output	* OFF/Ec/Uc/Shoc/AL/Ec * oFF:samw as main output	AL
AL	to preset alarm level rate(%) to OC	* % range : 65% ~ 100%/adjustable ("AL" is preset in "Auo" mode)	90
ALt	to preset a limit of accumulated working time necessary to give alarm.	0.1 hr ~6553.5 hr in 0.1 hr step	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/5TM–Type	5
rOtA	to indicate additional factor besides basic factor to indicate running operation value in a order	OFF : basic factor, ON : basic factor + additional factor	OFF
rESEt	to decide how to reset trip state	* Hr:manual reset * Aut–# : to preset auto reset and allowable number for auto reset, posible number is 1 to 9. * if Auto reset is preset, manual reset by self Reset S/W of converter is not available * if trip is acted by phase loss,auto reset is not able,only for manual reset	hr
AUt	to preset auto reset time	* to preset time from trip to reset in auto reset mode * time range : 1sec~1800sec(30min) • 1~59 sec : actual digit • 1min~30min : actual digit + □(time unit) in display	(--)
t–AUt	to preset total possible time available for executing defined times of auto reset	30min~60min	60
trIP	to show latest number of 8 trip cause	trip information in order : faulty phase and faulty value is appeared alternatively as controlling "UP" or "DN" key	
tOVEr	Main contactor Auto Close	* Shut Down Delay Time : 1~5sec/Adjustable * Delay On Make Time:0(instant)~25sec	OFF
rUn	to define protection job in case of trip	STOP : protection job is stopped / dlsp : operation factor is still indicated in display meter	StOP
Addr	to put self-address to communicate with pc	range of number : #1 ~ #250	1
bps	to decide communication speed	9.6/19.2/38.4/57.6/76.8/115.2kbps	9600

• DSP-POL/M, PTL/M

Power Type(Voltage-Current based) Digital Over Load Motor Protection Relay/Economic Class
DSP-POL, PTL : Panel Mounting Type
DSP-POM, PTM : Panel Flush Mounting Type

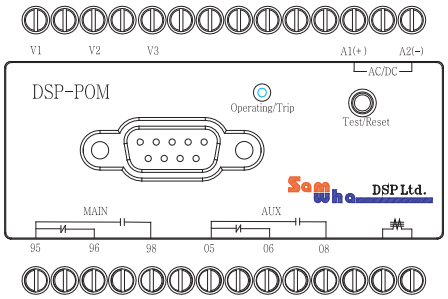
Technical Specification

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	10 Type	0.5 ~ 10A/0.4KW ~ 7.5KW(AC 480V) / 0.5 ~ 6A with external CT	
	70 Type	5 ~ 70A/3.7KW ~ 52KW(AC 480V)	
	External CT	Refer Table	
Ground protection	Zero Sequence Current	30mA~2A *Sensed through external ZCT or embeded ZCT *External CT type must be combined with external ZCT	
Time setting	Starting delay time(dt)	OFF,1 ~300 sec/def, "OFF" selection means inverse curve	
	over load/current trip delay time(ot)	1~60 sec/def, 5~30class/inv : refer curve	
	under load/current trip delay time(ut)	1~30 sec/def	
	Shock/stall trip delay time(st)	0.5~3 sec/def	
	Ground fault starting delay time(Edt)	OFF,1~25 sec/def	
	Ground fault trip delay time(Eot)	0.5~30 sec/def	
	over/under voltage trip delay time (ouPt)	0.5~30 sec/def	
Allowable tollerance	Current	C<=2A : 0.2A, C>2A : +,- 5%	
	Voltage	+,- 3%	
	Time	t<=2 sec : +,-,0.1sec, t>2 sec : +,-,5%	
	Power factor	<± 5%	
	KW/KWH	Cos Phi>0.6 : <3%	
Control power		*85VAC~260VAC, 50/60Hz(90VDC~370VDC) *24VAC/DC(optional)	
Trip output Relay	Main	1c(1-spdt), 3A/Resistive	
	Aux	1c(1-spdt), 3A/Resistive	
	GR	1c(1-spdt), 3A/Resistive(Aux output must be set "GR" in "Au-o" mode)	
Application environment	Temperature	Operation	-25 OC ~ +70 OC
		Storage	-40 OC ~ +80 OC
	Relative humidity	30 ~ 85%,non-condensing	
Current tollerance against changeable frequency in inverter		Avg ± 3% in 20Hz ~ 400Hz	
Max Conductor Size		25sq	
Insulation Resistence		10Mohm or more/500VDC, circuit-case	
High Voltage Insulation Test		*circuit-case : AC 2000V, 60Hz, 1 min *contact-contact : AC 1500V, 60Hz, 1 minLevel 3 : 10V	
Screw Torque		Max 0.6 N.m	
Frame : IEC/EN 60695-2-12		650℃	
Trip Output : IEC/EN60947-1		690V(Vrms : 2KV/1 min)	
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV	
Radiated Electromagnetic Field Disturbance : IEC /EN 61000-4-3		Level 3, 10V/m	
Electric Fast Transient Burst : IEC/EN 61000-4-4		Power, relay output : Level 4, 4KV, others : Level 3, 2KV	
Surge : IEC/EN 61000-4-5		relay output : 1.2 X 50uS, 2KV (0°, 90°, 180°, 270°)	
Immunity to conducted disturbence : IEC/EN61000-4-6		10V, Level 3	
Voltage variation : IEC-61000-4-11		3ms/0, 300ms/70%	
Current Loop Communication : 4 ~ 20mA		Maximum value in 3 phase current : PTM/PTL type	
Consuming power		6W / max	

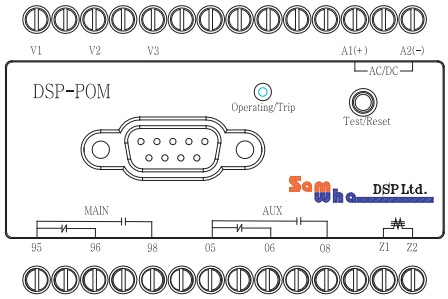
•DSP-POL/M, PTL/M

Input/Output : POL/M Type

▶ External ZCT applied type/possible with external CT



▶ Embeded ZCT type/not possible with external CT



Protection Range

10 Type	0.5~10A	*Possible matched with external CT/0.2~6A based
70 Type	5~70A	

Trip Output Operation Pattern

Trip output : Main 95-96(b)-98(a), Aux 05-06(b)-08(a)

b is selected in "out" mode : factory default
*control power is "ON" → 95-96(b)-98(a)/output state is not changed.05-06(b)- 08(a)
*TRIP : 95-96(a)-98(b), 05-06(a)-08(b)

a is selected in "out" mode
*control power is "ON" → 95-96(a)-98(b),05-06(b)- 08(a)
*TRIP : 95-96(b)-98(a), 05-06(a)-08(b)

Aux output → : AL/pre-alarm to OC preset value before trip
: Trip factor is selected in "AU-O" Mode
: Independent output contact from main trip output
: "Auo" mode : OFF, AL, UC, SHOCK, EC, rP

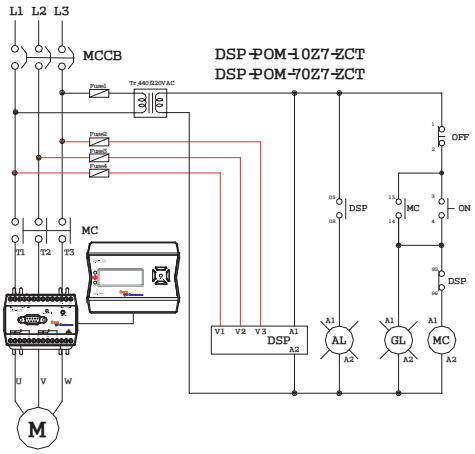
Protection

DIV	Description	Operation time	Remark
Over voltage(OP)	in case the line voltage greater than preset value is sensed	Definite time:0.5~30 sec/adjustable	
Under voltage(UP)	in case the line voltage lower than preset value is sensed	Definite time:0.5~30 sec/adjustable	not available incase of "PL" (Phase Loss)
Over current(OC)	in case the load current greater than preset value is sensed	Definite time:0.5~60 sec/adjustable	
Under current(UC)	in case the load current lower than preset value is sensed	Definite time:0.5~30 sec/adjustable	
Phase loss(PL)	In case one of three phase is a state of phase loss/confirmed by line voltage	1sec	
Phase loss(PLc)	In case one of three phase is a state of phase loss/confirmed by load current	3sec	
reverse phase(rP)	In case the order of incomming phase is changed like "RTS" from "RST"/confirmed by line voltage	0.5sec	
reverse phase(rPc)	In case the order of incomming phase is changed like "RTS" from "RST"/confirmed by load current	0.5sec	
Locked rotor(LC)	In case the starting current greater than 300% of "OC"	0.1sec	
Shock/Stall	In case the 180~700% running current of preset "OC"	0.5~3sec	
Current unbalance(ub)	[(max current-min current)/max current] * 100%	8sec/adjustable	
Ground fault(EC)	in case the ground fault current greater than preset value is sensed	Definite time:0.5~30 sec/adjustable	

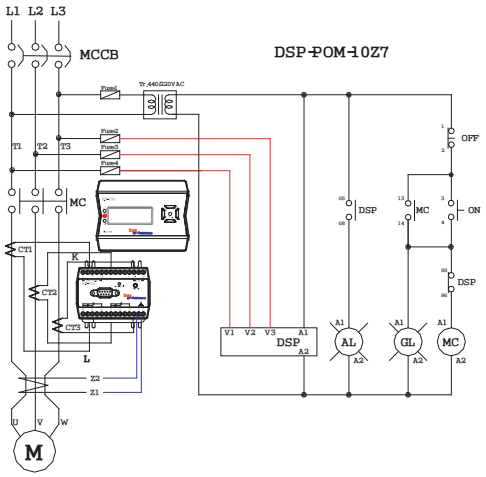
•DSP-POL/M, PTL/M

Application sequence diagram

▶ Embeded ZCT type/not possible with external CT



▶ External ZCT type



Trip cause indication

- Preset value check in running state/Such mode and preset value are shown alternatively as pressing SET button, and next mode is shown as pressing CLR button
- If trip is happened, trip cause and current value of each phase are stored and able to indicate
- The information of 8 trip is stored and this is able to be checked in "trip" mode orderly

Preset Key Operation

Preset Key	Description
1."SET" key	*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 to input password, in the same time make required digit by using "UP","DN" key, finally press once more, then operator meets possible state for preset a number or character of mode. *If there is no input for 15sec or pressing both "SET" and "CLR"key, it can be entered into operating condition.
2.Changed feature of Setting Key	*After entering into posible state for preset, each key acts its job as follows : SET⟶backward direction, CLR⟶foward direction,UP.DN⟶able to select number or character in preset mode. *The previous mode based on setting mode is come out as pressing ""SET"" key during doing a prest job
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
6."CLR" key	*While each factor is rotated, one of rotated factor is fixed by pressing "CLR" key *After fixing a operating factor, the operator is able to rotate manual one by one as pressing "UP"(forwardly), "DN"(reversely)
To check preset value of eachmode during operation	*possible to check value and mode as pressing "SET" key once during operation, *preset value and mode are appeared alternatively *possible to check next mode as pressing "CLR" Key *return to operating mode as pressing both "SET" and "CLR" key or waiting for 15sec without any touch *Not possible to change existed preset value
Test/Reset:"CLR" Key	*to check if this relay is ready to work normally or not. *"tESt" is appeared in case the operator presses test sw on the converter or "CLR" key for 3 sec or more, then release pressed test sw or "CLR" key *main(95-96-98) & aux trip(05-06-08) output will be trip after counting down preset o-time (definite T-I) *In case of display meter type, LED on the converter is flickering after a trip *After making trip, press "CLR" key for the reset action

•DSP-POL/M, PTL/M

Preset Description

Mode	Function	Description	Factory
P0000	Password	P0000 is shown as pressing SET and need CLR 4 times to enter into mode to be preset	0
Out	to decide initial state of main trip relay	*to make initial state(a or b) of main trip output(95-96-98) when control power is powered *a : normal energized type(95-96(a)-98(b) *b : normal deenergized type(95-96(b)-98(a))/not changed state	b
USAgE	to decide what kind of operation mode(V,A,VA)	Power type : "VA", Current type : "A", Voltage type : "V"	VA
LInE	to select a value of line voltage	110/220/380/440/480V	440
PhASE	to select the phase of provided power into the motor	3 phase : "3P", Single phase : "1P"	3P
trAnS	to select indication pattern of incomming voltage	*"L" : line voltage:v1,v2,v3 *"A" : average voltage	A
LOAd	To preset a condition for KW calculation for motor protection	*"Pr" : acive power measured from V*I*Power factor *"VA" : apparent power/useful for the operation under the inverter	VA
Ct	to select for direct through CT or external CT	5-2t(2 times through CT hole), 5-4t((4 times through CT hole), 5-1 ~ 5-240(the value of CT ratio,eg:"5-20"→CT 100/5A)	1
OL	to preset a range to protect over load	*10 Type ::3P 440V/0.34[KW]~6.85[KW], *70 Type ::3P 440V/3.42[KW]~48[KW] *Basically calculated by root 3*V*I*cos phi*0.9	OFF
OC	to preset a range to protect over current	*10 Type : 0.5A~10A . *70 Type : 5A ~70A	10
OtC	to select time-current chracteristics for over current protection	dEF : definite, Inv : inverse	dEF
Ot	to preset operating trip delay time	0.2~60Sec/adjustable	5
dt	to preset starting trip delay time	1.0~300Sec/adjustable	5
LC	to protect Locked Rotor	it is available for selecting ON [operation time : 01sec after dt is elapsed], conditoion for "ON" : start running current is kept on 300% after dt is elapsed	OFF
ShOC	to protect mechanical shock during motor is working	*protection range to OC : followed as below calculation, max700% •10 Type : 180~[30/"OC" value]% •70 Type : 180~[200/"OC" value]%	OFF
St	to preset a time for shock protection	0.1 ~ 3sec / definite	--
PL	to protect phase loss by line voltage	ON : available, OFF : not available	OFF
PLC	to protect phase loss by load current	ON : available, OFF : not available	OFF
rp	to protect reverse phase by line voltage	ON : available, OFF : not available	OFF
rPC	to protect reverse phase by load current	ON : available, OFF : not available	OFF
OP	to protect over voltage	*to preset a value to protect over voltage concerned with LInE mode *110V:110~150, 220V:220~290V, 380:380~450V, 440:440~510V, 480V:480~550V	OFF
UP	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	OFF
OUPt	to preset trip delay time to protect over/under voltage	0.5~30sec/adjustable	2
EC	to preset a range of zero phase current to protect ground fault	protection range : 30mA~2A/adjustable, OFF : disable	OFF
Edt	to preset starting trip delay time	1 ~ 25/adjustable	2
EOt	to preset operating trip delay time to protect ground fault	0.1 ~30/adjustable	0.5
UL[UC]	to preset a range to protect under current	possible preset range:minimum possible preset current ~ under "OC" preset value	OFF
Ut	to preset trip delay time to protect under current	0.2 ~ 30/adjustable	2
Ub	to preset current unbalance rate(%) among 3 phase	*formular : [(max-min) /max]*100 [%]*range:30% ~ 50% *minimum available current : 0.3A	50
AU-O	to preset a kind of AUX trip output	OFF/Ec/Uc/Shoc/AL/Ec *oFF:samw as main output	OFF
AL	to preset alarm level rate(%) to OC	% range:65%~100%/adjustable ("AL" is preset in "Auo" mode)	90
Alt	to preset a limit of accumulated working time necessary to give alarm.	0.1 hr ~6553.5 hr in 0.1 hr step	6500
hP-C	to start to accumulate KWH or to clear accumulated KWH	*KWH is accumulated in every 0.1hr(6 min) and max value is 9999 KWH *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
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/PTM-Type	5
rOtA	to decide additional factor besides basic factor to indicate value orderly	OFF : basic factor, ON : All of the operating factor	OFF
rESEt	to decide how to reset trip state	hr : manual reset, AUt : auto reset/available for "OC" trip	hr
Aut	to preset auto reset time	0.1 ~ 300sec/adjustable	0
t-Aut	to preset total possible time available for executing defined times of auto reset	30 ~ 60min/adjustable	30
trIP	to show latest number of 8 trip cause	trip information in order : faulty phase and faulty value is appeared alternatively as controlling "UP" or "DN" key	

•DSP-POL/M, PTL/M

Order Form

DSP-1(Type)-2(Rating current)-3(Control Power)-4(ZCT Embeded)

Item	Reference Code	Description
DSP-POL	DSP-POL-10Z7	Panel Monting Type, : 0.5~10A[0.37 KW~7.5KW/3P 480V, 0.1KW~2KW /1P], 85~260VAC, 50/60Hz(90~370VDC), 0.5~6A with external CT
	DSP-POL-10Z7ZCT	Panel MontingType, : 0.5~10A[0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded/not possible to use external CT
	DSP-POL-70Z	Panel Monting Type, 5A~70A[5.9KW~41.4KW/3P, 380V], 85~260VAC, 50/60Hz(90~370VDC)
	DSP-POL-70Z7ZCT DSP-VIP5CL-70Z7	Panel Monting Type, 5A~70A[5.9KW~41.4KW/3P, 380V], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded /not possible to use external CT
DSP-POM	DSP-POM-10Z7	Panel Flush MontingType : 0.5~10A [0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), 0.5~6A with external CT
	DSP-POM-10Z7ZCT	Panel Flush MontingType : 0.5~10A [0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded /not possible to use external CT
	DSP-POM-70Z	Panel Flush Monting Type, 5A~70A [5.9KW ~41.4KW/3P, 380V], 85~260VAC, 50/60Hz(90~370VDC)
	DSP-POM-70Z7ZCT	Panel Flush Monting Type : 0.5~10A [0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded/not possible to use external CT
DSP-PTL	DSP-PTL-10Z7	Panel MontingType, : 0.5~10A[0.37 KW~7.5KW/3P 480V, 0.1KW~ 2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), 0.5~6A with external CT, 4~20mA
	DSP-PTL-10Z7ZCT	Panel MontingType, : 0.5~10A[0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded/not possible to use external CT, 4~20mA
	DSP-PTL-70Z	Panel Monting Type, 5A~70A[5.9KW~41.4KW/3P, 380V], 85~260VAC, 50/60Hz(90~370VDC), 4~20mA
	DSP-PTL-70Z7ZCT	Panel Monting Type, 5A~70A[5.9KW ~41.4KW/3P, 380V], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded /not possible to use external CT, 4~20mA
DSP-PTM	DSP-PTM-10Z7	Panel Flush MontingType : 0.5~10A [0.37 KW~7.5KW/3P 480V, 0.1KW ~ 2.2KW/1P], 85~260VAC, 50/60Hz (90~370VDC), 0.5~6A with external CT, 4~20mA
	DSP-PTM-10Z7ZCT	Panel Flush MontingType : 0.5~10A [0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz (90~370VDC), ZCT embeded /not possible to use external CT, 4~20mA
	DSP-PTM-70Z	Panel Flush Monting Type, 5A~70A [5.9KW~41.4KW/3P, 380V], 85~260VAC, 50/60Hz(90~370VDC), 4~20mA
	DSP-PTM-70Z7ZCT	Panel Flush Monting Type : 0.5~10A[0.37 KW~7.5KW/3P 480V, 0.1KW~2.2KW/1P], 85~260VAC, 50/60Hz(90~370VDC), ZCT embeded /not possible to use external CT, 4~20mA
DSP-XXX	DSP-VIP-XXX-XXXXXXP	Custome made product

• DSP-COL/M, CTL/M, CCL/M, CSL/M

Digital Motor Protection Relay/Economic Class
VIP-COL, CTL, CCL, CSL : Panel Mounting Type
VIP-COM, CTM, CCM, CSM : Panel Flush Mounting Type

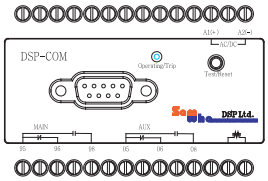
Technical Specification

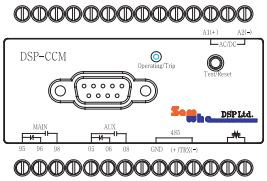
Division		Description	
Current setting range	10 Type	0.5A ~ 10A /0.5 ~ 6A with external CT	
	70 Type	5A ~ 70A	
	External CT	Refer Table	
Ground protection	Zero Sequence Current	30mA~2A * Sensed through external ZCT or embeded ZCT * External CT type must be combined with external ZCT	
Time setting	Starting delay time(dt)	OFF,1 ~300 sec/def, "OFF" selection means inverse curve	
	over current trip delay time(ot)	0.5~60 sec/def, 5~30class/inv : refer curve	
	under current trip delay time(ut)	0.5~30 sec/def	
	Shock/stall trip delay time(st)	0.5~3 sec/def	
	Ground fault starting delay time(Edt)	OFF,0.5~25 sec/def	
	Ground fault trip delay time(Eot)	0.5~30 sec/def	
Allowable tollerance	Current	C<=2A:0.2A,C>2A:+,- 5%	
	Time	t<=2 sec:+,-,0.1sec, t>2 sec:+,-,5%	
Control power		* 85VAC~260VAC, 50/60Hz(90VDC~370VDC) * 24VAC/DC(optional)	
Trip output Relay	Main	1c(1-spdt), 3A/Resistive	
	Aux	1c(1-spdt), 3A/Resistive	
	GR	1c(1-spdt), 3A/Resistive(Aux output must be set "GR" in "Au-o" mode)	
Application environment	Temperature	Operation	-25°C ~ +70°C
		Storage	-40°C ~ +80°C
	Relative humidity	30 ~ 85%, non-condensing	
Current tollerance against changeable frequency in inverter		Avg ± 3% in 20Hz ~ 400Hz	
Max Conductor Size		25sq	
Insulation Resistence		10Mohm or more/500VDC, circuit-case	
High Voltage Insulation Test		* circuit-case : AC 2000V, 60Hz, 1 min * contact-contact : AC 1500V, 60Hz, 1 min	
Logic Input		90~220 VAC/DC	
Screw Torque		Max 0.6 N.m	
Frame : IEC/EN 60695-2-12		650°C	
Shock : IEC/EN 60068-2-27		1/2 sine wave, 15g/11ms	
Trip Output : IEC/EN60947-1		690V(Vrms : 2KV/1 min)	
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV	
Radiated Electromagnetic Field Disturbance : IEC /EN 61000-4-3		Level 3, 10V/m	
Electric Fast Transient Burst : IEC/EN 61000-4-4		Power, relay output : Level 4, 4KV,others : Level 3, 2KV	
Surge : IEC/EN 61000-4-5		relay output : 1.2 X 50uS, 2KV (0°, 90°, 180°, 270°)	
Immunity to conducted disturbence : IEC/EN61000-4-6		10V, Level 3	
Voltage variation : IEC-61000-4-11		3ms/0, 300ms/70%	
Digital Communication /COM/COL Type	Physical feature	2 wire RS 485	
	Address	1 ~ 250	
	Speed	9.6/19.2/38.4/57.6/76.8/115.2kbps	
	wiring connection	Screw Terminal	
	Termination resistence	External resistance/200 Ohm	
	Cable	Sheathed cable, 2 Pair	
Current Loop Communication : 4 ~ 20mA		20mA for maximum value in 3 phase current : CTM/CTL type	
Consuming power		6W / max	

•DSP-COL/M, CTL/M, CCL/M, CSL/M

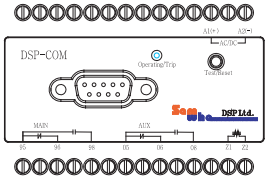
Input/Output : COL/M Type

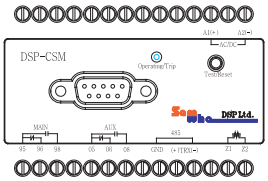
▶ External ZCT type/possible with external CT

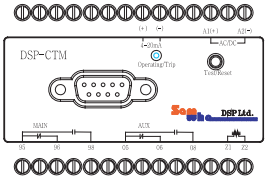




▶ Embeded ZCT type/not possible with external CT







Trip Output Operation Pattern

Trip output : main/95-96(b)-98(a), aux/05-06(b)-08(a)

b is selected in "out" mode : factory default

Control power is on/unchanged output state : 95-96(b)-98(a), aux/05-06(b)- 08(a)
TRIP operation state : 95-96(a)-98(b), 05-06(a)-08(b)

a is selected in "out" mode

Control power is on/changed output state : 95-96(a)-98(b), 05-06(b)-08(a)
TRIP operation state : 95-96(b)-98(a), 05-06(a)-08(b)

Aux output → : AL/pre-alarm to OC preset value before trip
: Trip factor is selected in "AU-O" Mode
: Independent output contact from main trip output
: "Auo" mode : OFF, AL, UC, SHOCK, EC, rP

Model

- DSP-COL,COM : Typical basic type
- DSP-CTL,CTM : Typical Basic Type + 4~20mA
- DSP-CCL,CCM : Typical basic type + RS485
- DSP-CSL,CSM : Typical basic type + Short circuit protection

Trip cause indication

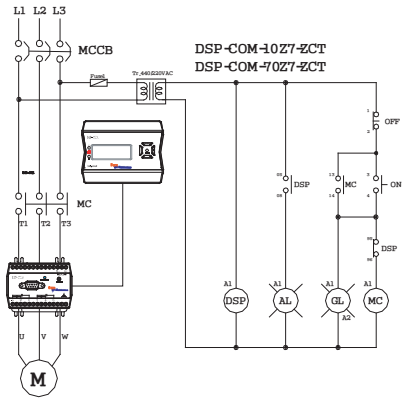
- Preset value check in running state/Such mode and preset value are shown alternatively as pressing SET button and next mode is shown as pressing CLR button
- If trip is happened, trip cause and current value of each phase are stored and able to indicate
- The information of 8 trip is stored and this is able to be checked in "trip" mode orderly

Protection

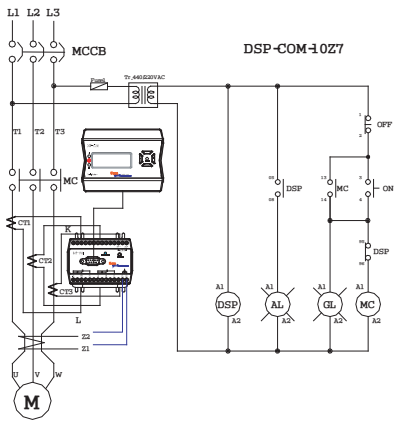
DIV	Description	Operation time	Remark
Over current(OC)	in case the load current greater than preset value is sensed	Definite time:0.1~60 sec/adjustable	C Type
Under current(UC)	in case the load current lower than preset value is sensed	Definite time:0.1~30 sec/adjustable	
Phase loss(PLc)	In case one of three phase is a state of phase loss	1sec	
reverse phase(rPc)	In case the order of incomming phase is changed like "RTS" from "RST"	0.5sec	
Locked rotor(LC)	In case the starting current greater than 300% of "OC" preset value is kept after dt is elapsed	0.1sec	
Shock/Stall	In case the 180~700% running current of preset "OC" valueis sensed	0.05sec	
Current unbalance(ub)	[(max current-min current)/max current] *100%	1sec ~8sec/adjustable	
Ground fault(EC)	in case the ground fault current greater than preset value is sensed	Definite time:0.1~30 sec/adjustable	
short circuit(SSc)	in case short circuit is happend	in stant/0.05 sec	CSL/CSM Type

Application sequence diagram

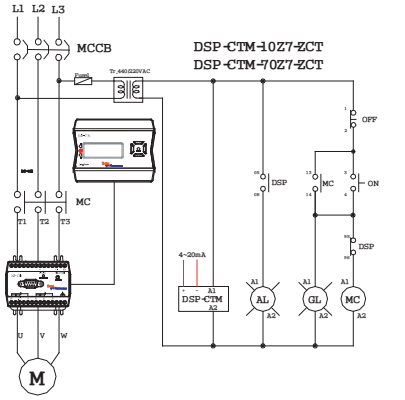
▶ Embeded ZCT type/not possible with external CT



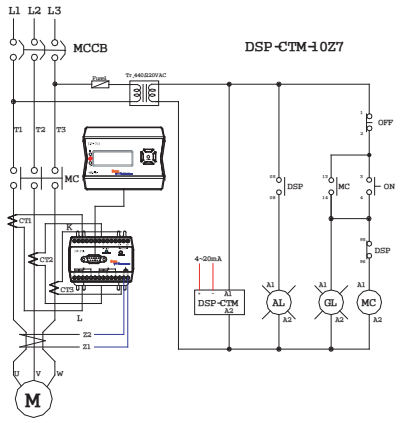
▶ External ZCT type



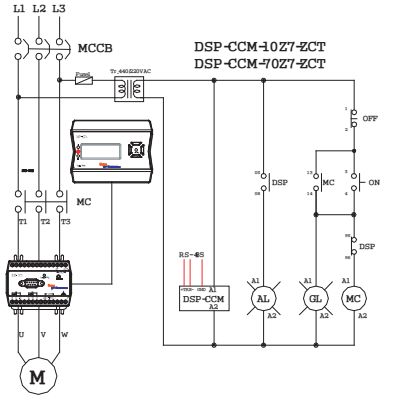
▶ Embeded ZCT type/not possible with external CT



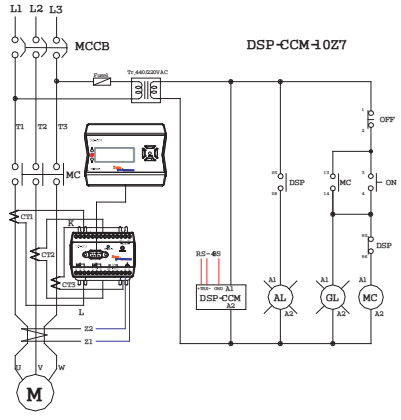
▶ External ZCT type



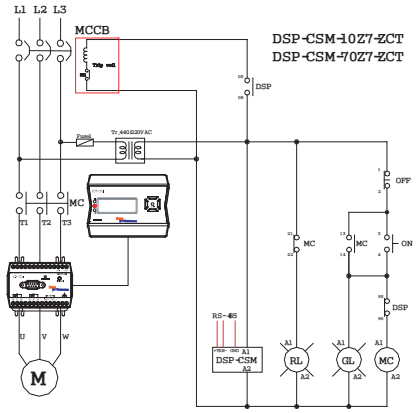
▶ Embeded ZCT type/not possible with external CT



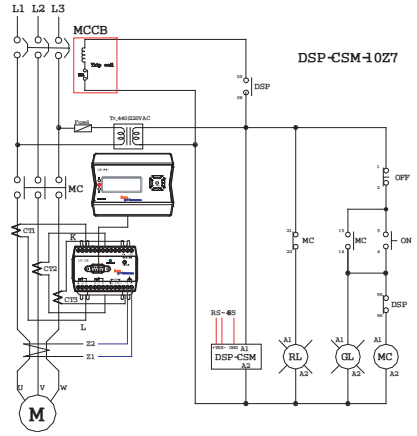
▶ External ZCT type



▶ Embeded ZCT type/not possible with external CT



▶ External ZCT type



•DSP-COL/M, CTL/M, CCL/M, CSL/M

Preset Key Operation

DIV	Description
1."SET" key	* 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 to input password, in the same time make required digit by using "UP","DN" key, finally press once more, then operator meets possible state for preset a number or character of mode. * If there is no input for 15sec or pressing both "SET" and "CLR"key, it can be entered into operating condition.
2.Changed feature of Setting Key	* After entering into posible state for preset, each key acts its job as follows : SET——〉backward direction, CLR——〉foward direction, UP.DN——〉able to select number or character in preset mode. * The previous mode based on setting mode is come out as pressing "SET" key during doing a prest job
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
6."CLR" key	* While each factor is rotated, one of rotated factor is fixed by pressing "CLR" key * After fixing a operating factor, the operator is able to rotate manual one by one as pressing "UP"(forwardly), "DN"(reversely)
To check preset value of each mode during operation	* possible to check value and mode as pressing "SET" key once during operation, * preset value and mode are appeared alternatively * possible to check next mode as pressing "CLR" Key * return to operating mode as pressing both "SET" and "CLR" key or waiting for 15sec without any touch * Not possible to change existed preset value
Test/Reset: "CLR" Key	* to check if this relay is ready to work normally or not. * "tEST" is appeared in case the operator presses test sw on the converter or "CLR" key for 3 sec or more, thenrelease pressed test sw or "CLR" key * main(95-96-98) & aux trip(05-06-08) output will be trip after counting down preset o-time (definite T-I) * In case of display meter type, LED on the converter is flickering after a trip * After making trip, press "CLR" key for the reset action

•DSP-COL/M, CTL/M, CCL/M, CSL/M

Preset Description

Mode	Function	Description	Factory
P0000	Password	P0000 is shown as pressing SET and need CLR 4 times to enter into mode to be preset	0000
OUt	to decide initial state of main trip relay	*to make initial state(a or b) of main trip output(95-96-98) when control power is powered *a : normal energized type(95-96(a)-98(b) *b : normal deenergized type(95-96(b)-98(a)/not changed state	b
Ct	to select for direct through CT or external CT	5-2t(2 times through CT hole), 5-4t((4 times through CT hole), 5-1 ~ 5-240(the value of CT ratio, eg:"5-20"→CT 100/5A)	5-1
OC	to preset a range to protect over current	10 type:0.5~10A/adjustable, 70 type:5~70A/adjustable	10
dt	to preset starting trip delay time	1.0 ~ 300Sec/adjustable	5sec
OtC	to select time-current chracteristics for over current protection	dEF : definite, Inv : inverse	dEF
Ot	to preset operating trip delay time	0.2~60Sec/adjustable	5sec
LC	to protect Locked Rotor	it is available for selecting ON [operation time : 01sec after dt is elapsed], conditoion for "ON" : start running current is kept on 300% after dt is elapsed	OFF
SS/OFF /ON	to define available term for short protection	*off : disable only for starting time (dt) *on : able from starting initially *only for CSL/M Type	ON
SSc/off/ setting value	to define short protection % to "OC"	*current range for short circuit protection *10 Type : 0.5~5A *70 Type : 2~10A *only for CSL/M Type	10 : 1300 70 : 2000
ShoC	to protect mechanical shock during motor is working	*preset to "OC" : followed calculation max 700% -10Type : 180% ~ [50/"OC"preset value]% -70Type : 180% ~ [210/"OC"preset value]%	OFF
St	to preset a time for shock protection	0.5 ~ 3sec / definite	St--
PLC	to protect phase loss by load current	ON : available, OFF : not available	ON
rPC	to protect reverse phase by load current	ON : available, OFF : not available	OFF
EC	to preset a range of zero phase current to protect ground fault	protection range : 30mA~2A/adjustable, OFF : disable	2A
Edt	to preset starting trip delay time	1 ~ 25/adjustable	2sec
EOt	to preset operating trip delay time to protect ground fault	0.1 ~ 30/adjustable	0.1sec
UC	to preset a range to protect under current	possible preset range : minimum possible preset current ~ under "OC" preset value	OFF
Ut	to preset trip delay time to protect under current	0.2 ~ 30/adjustable	2sec
Ub	to preset current unbalance rate(%) among 3 phase	*formular : [(max-min) /max] * 100 [%] *range : 30% ~ 90% *minimum available current : 0.3A	50%
AU-O	to preset a kind of AUX trip output	*OFF/Ec/Ect(COL/M,CTL/M Type)/Uc/Shock/AL/[Ec-ta/Ec-tb(CCL/M, CSL/M Type)]	AL
AL	to preset alarm level rate(%) to OC	*% range : 65% ~ 100%/adjustable ("AL" is preset in "Auo" mode)	90
ALt	to preset a limit of accumulated working time necessary to give alarm.	0.1 hr~6553.5 hr in 0.1 hr step	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/CTM, CTL Type	5
rOtA	to indicate additional factor besides basic factor to indicate running operation value in a order	OFF : basic factor(L1,L2,L3,Ec), ON : basic factor + additional fdtor (AWT/ accumulated working time, load factor)	OFF
rESEt	to decide how to reset trip state	hr : manual reset, AUt : auto reset/available for "OC" trip	hr
At	to preset auto reset time	0.1 ~ 300sec/adjustable	0.1
t-AUt	to preset total possible time available for executing defined times of auto reset	30 ~ 60min/adjustable	60
trIP	to show latest number of 8 trip cause	trip information in order : faulty phase and faulty value is appeared alternatively as controlling "UP" or "DN" key	
Addr	to put self-address to communicate with pc	range of number : #1 ~ #250/CCM/L, CSM/L Type	1
bPS	to decide communication speed	2400, 9600, 19200, 38400bps/CCM/L, CSM/L Type	9600

•DSP-COL/M, CTL/M, CCL/M, CSL/M

Order Form

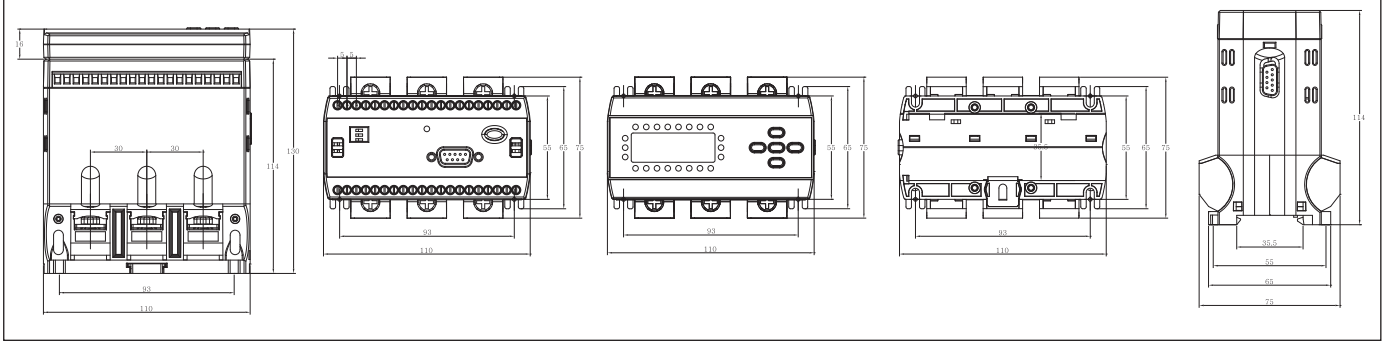
DSP-1(Type)-2(Rating current)-3(Control Power)-4(ZCT Embeded)-P(Optional)

Item	Reference Code	Description
DSP-COL	DSP-COL-10Z7	Panel Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT & external ZCT
	DSP-COL-70Z7	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), able to use external ZCT
	DSP-COL-10Z7-ZCT	Panel Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT
	DSP-COL-70Z7-ZCT	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT
DSP-CCL	DSP-CCL-10Z7	Panel Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, RS485
	DSP-CCL-70Z7	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, RS485
	DSP-CCL-10Z7-ZCT	Panel Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, RS485
	DSP-CCL-70Z7-ZCT	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, RS485
DSP-CTL	DSP-CTL-10Z7	Panel Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, 4~20mA
	DSP-CTL-70Z7	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, 4~20mA
	DSP-CTL-10Z7-ZCT	Panel MountingType, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, 4~20mA
	DSP-CTL-70Z7-ZCT	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, 4~20mA
DSP-COM	DSP-COM-10Z7	Panel Flush Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT
	DSP-COM-70Z7	Panel Flush MountingType, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), ble to use external ZCT
	DSP-COM-10Z7-ZCT	Panel Flush MountingType, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT
	DSP-COM-70Z7-ZCT	Panel Flush Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT
DSP-CCM	DSP-CCM-10Z7	Panel Flush Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, RS485
	DSP-CCM-70Z7	Panel MountingType, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, RS485
	DSP-CCM-10Z7-ZCT	Panel MountingType, 0.5A~10A,85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, RS485
	DSP-CCM-70Z7-ZCT	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, RS485
DSP-CTM	DSP-CTM-10Z7	Panel Mounting Type, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), able to use external CT, able to use external ZCT, 4~20mA
	DSP-CTM-70Z7	Panel MountingType, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), able to use external ZCT, 4~20mA
	DSP-CTM-10Z7-ZCT	Panel MountingType, 0.5A~10A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, 4~20mA
	DSP-CTM-70Z7-ZCT	Panel Mounting Type, 5A~70A, 85~260VAC, 50/60Hz(90~370VDC), Embeded ZCT/inable to use external CT, 4~20mA
DSP-CSL	DSP-CSL-10Z7	Panel Mounting Type, unified meter type with converter, 0.5A~10A(0.5~5A for short circuit protection), 5~260VAC, 50/60Hz(90~370VDC), external CT, external ZCT
	DSP-CSL-10Z7-ZCT	Panel Mounting Type, unified meter type with converter, 0.2A~10A(0.5~5A for short circuit protection), 85~260VAC, 50/60Hz(90~370VDC), not available for external CT, embeded ZCT
	DSP-CSL-70Z7	Panel Mounting Type, unified meter type with converter, 5A~70A(2~15A for short circuit protection), 85~260VAC, 50/60Hz(90~370VDC), external ZCT
	DSP-CSL-70Z7-ZCT	Panel Mounting Type, unified meter type with converter, 5A~70A(2~15A for short circuit protection) 85~260VAC, 50/60Hz(90~370VDC), embeded ZCT
DSP-CSM	DSP-CSM-10Z7	Panel Flush Mounting Type, seperated meter type, 0.5A~10A(0.5~5A for short circuit protection), 85~260VAC , 50/60Hz(90~370VDC), not available for external CT, embeded ZCT
	DSP-CSM-10Z7-ZCT	Panel Flush Mounting Type, seperated meter type, 0.5A~10A(0.5~5A for short circuit protection), 85~260VAC, 50/60 Hz(90~370VDC), not available for external CT, embeded ZCT
	DSP-CSM-70Z7	Panel Flush Mounting Type, seperated meter type, 5A~70A(2~15A for short circuit protection), 85~260VAC, 50/60Hz(90~370VDC), embeded ZCT
	DSP-CSM-70Z7-ZCT	Panel Flush Mounting Type, seperated meter type, 5A~70A(2~15A for short circuit protection), 85~260VAC, 50/60 Hz (90~370VDC), embeded ZCT
Optional Order	DSP-VIPXXX-XXXXXXX-P	* Customised Software

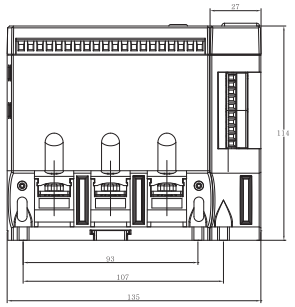
• Dimension

Applied Type : DSP - VIP - PL / PM
DSP - VIP - RL / RM, RTL / RTM

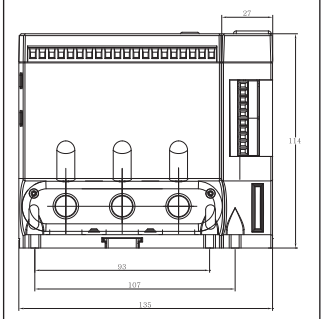
Converter+Terminal



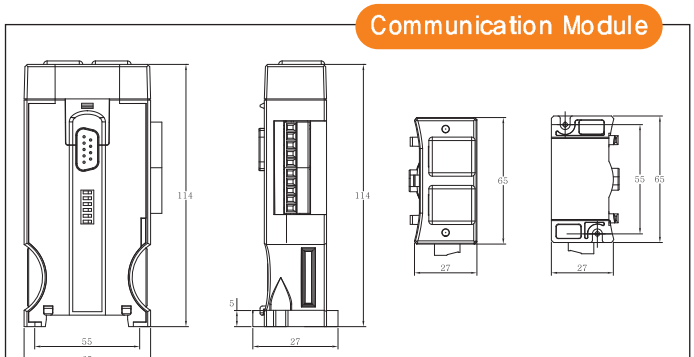
Converter+Terminal+Communication



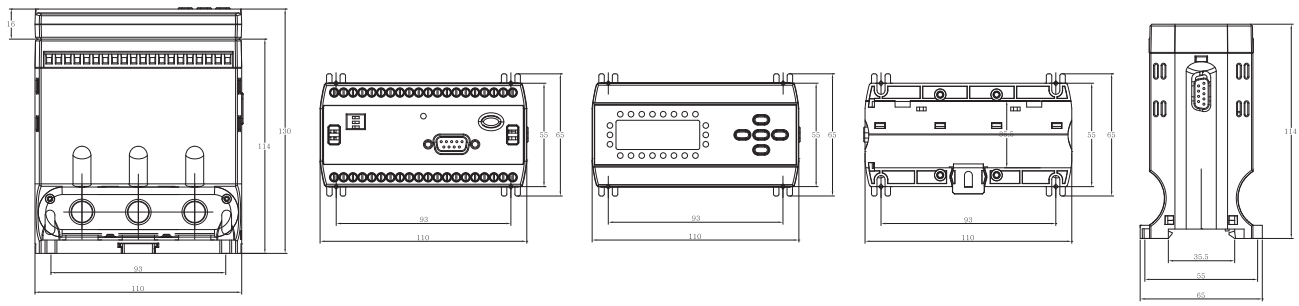
Wire Through+Communication



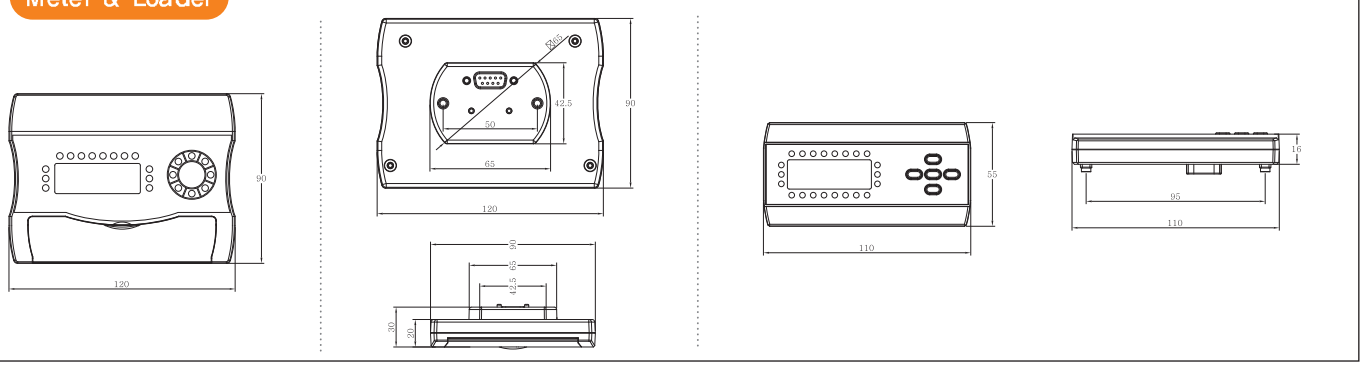
Communication Module



Wire Through Type



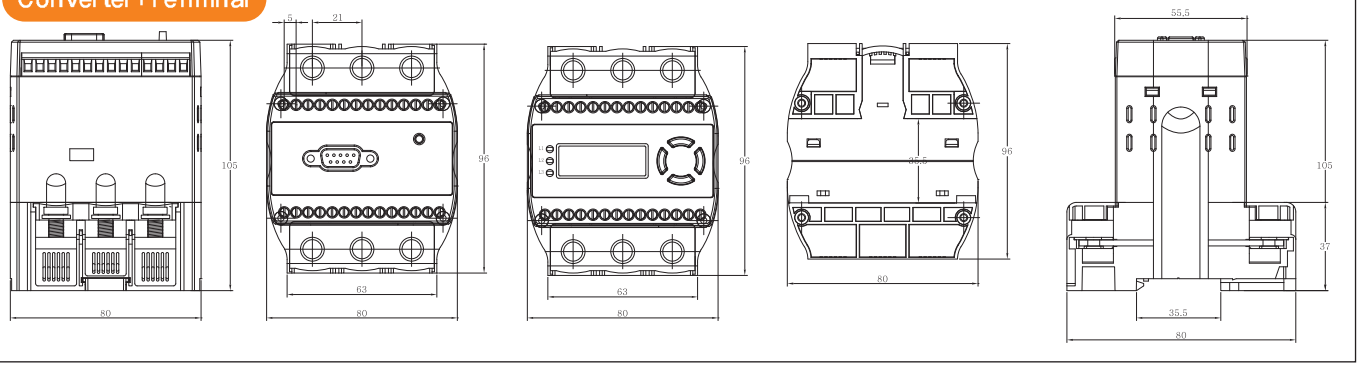
Meter & Loader



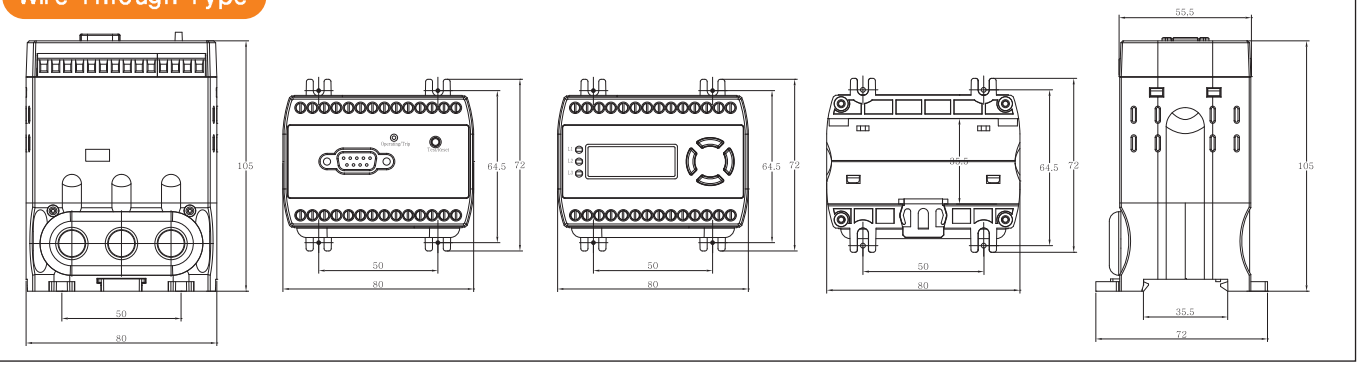
•Dimension

Applied Type : DSP - VIP - 5EL / 5EM, 5TL / 5TM, 5CL / 5CM, 5SM
DSP - POL / POM, PTL / PTM
DSP - COL / COM, CTL / CTM, CCL / CCM, CSL/M

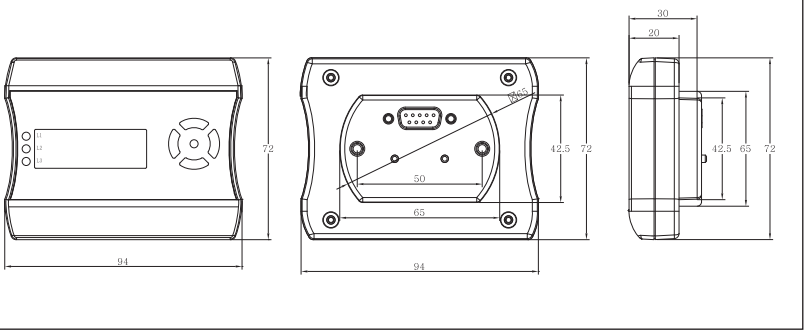
Converter+Terminal



Wire Through Type



Meter



• Motor Working Recorder : MWR-S

1.Feature

MWR-S

▶ Motor is working

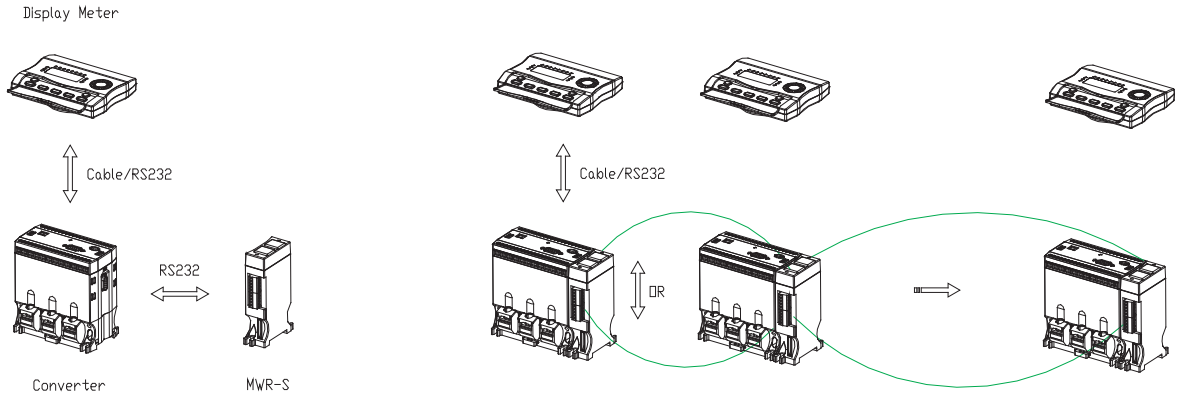
- Internal communication with a converter of VIP : RS232
- External communication with a Master(PC, PLC) through 485 as a RTU,Modbus
- Operating data is stored according to data storage interval time which is preset by the DIP SW Data, storage interval time is valued as 0.05sec-0.1-sec-0.2sec-1sec selected by DIP SW
- Address change for the converter must be done in the motor stop state
- The operator should wait for 15sec or more after changing an address so that the converter may recognize changed address in itself.
- Able to communicate with PC directly through a protocol converter with 485 〈〉 USB/232(PC)
- Convenient engagement for a termination resistance of extreme end unit by DIP SW
- Convenient wiring connection through RJ45 or 10P screw terminal
- The operator is able to make setup for this module through "samdsp" monitoring program
- The user can confirm that the address number like Ca*** which is shown in the circulated factor or derly after supplying the control voltage. If Ca*** is shown, it means that MWR-S is able to work normally

▶ Motor is stopping

- Possible to monitor and to retrieve a data from DSP-VIP combined with MWR-S in the field or this seperated recorder in the office or by the PC under the operation executed in "samdsp"
- Possible to retrieve a raw data by Excel format
- Possible to analyze a data by the typical graphic format

2.Structure

a. Coupling with converter
b. Serial communication wiring through RJ45 or screw terminal



3.Technical Specification

- Memory capacity : 1 Gbyte Flash Memory
- Embeded calendar / real time clock
  - * life time : 10 years under power-off state
  - * time count : Year, Month, Hour, Minute, Second
  - * actual time adjustment : possible by "samdsp"
- DIP SW function
  - * possible to adopt termianation resistance
  - * setup for communication speed : 9.6Kbps ~ 230.4Kbps
  - * setup for data storage interval time
  - * qualify for master or slave
  - * change for read only mode
- Wiring connection terminal
  - * 10P screw terminal : actual connection for serial communication
  - * RJ45 : test connection through "samdsp" monitoring program
- possible to evacuate a storage space

•Motor Working Recorder : MWR-S

Internal DIP SW function

DIP SW No.		Function	Description
OFF 1 2 3 4 5 6 7 8	1	Termination Resistance	1 / 2 / Terminal Resistance ON / ON / Loaded OFF / OFF / Not Loaded
	2		
	3	M/S	ON : Worked as Master OFF : Worked as Slave
	4	Data Storage Interval Time	5 / 4 / Interval(sec) / 1초당 저장 OFF / OFF / 1 / 1 OFF / ON / 0.2 / 5 ON / OFF / 0.1 / 10 ON / ON / 0.05 / 20
	5		
	6	bps set	8 / 7 / 6 / Bbps(KBbps) OFF / OFF / OFF / 9.6 OFF / OFF / ON / 19.2 OFF / ON / OFF / 38.4 OFF / ON / ON / 57.6 ON / OFF / OFF / 76.8 ON / OFF / ON / 115.2 ON / ON / OFF / 230.4 ON / ON / ON / Auto baud
	7		
	8		
	3 ~ 8	Read Only Mode	* DIP SW #3 ~ #8 : ON * Address & bps is preset naturally for 1 & 115.2Kbps * Possible to read only by PC

Order Form

Item	Reference Code	Description
Motor working recorder	DSP-MWR-S	* 422/485/Modbus RTU * Data Recorder
Protocol converter	DSP-CMB	* 485( ) 232 USB : to connect to PC * RJ45, 485( )232, 9Pin D-Sub/ PC * Only for test, input, retrieval to DSP-MWR-S through RJ45 connection jack
Power adapter	DSP-ADT22	* AC220V/DC12V * Input/AC 220V Plug, Output/ DC12V : 9Pin D-sub

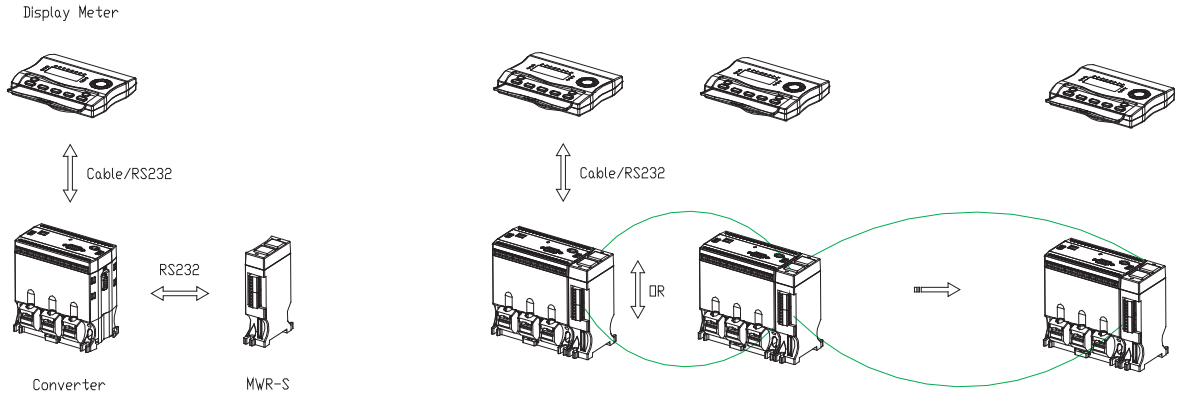
• Communication Module : CM-44

1.Feature

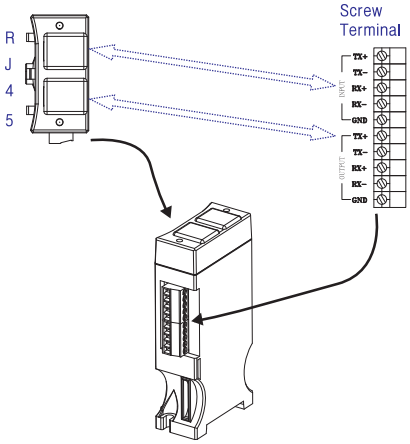
- Internal communication with a converter of VIP
- External communication with a Master(PC, PLC) through 485/422 as a RTU, Modbus
- Able to communicate with PC directly through a protocol converter of 485 〈 〉 USB/232
- Convenient engagement for a termination resistance of extreme end unit by DIP SW
- Possible to meet 485 or 422 by the DIP SW selection
- Convenient wiring connection through RJ45 or 10P screw terminal

2.Structure

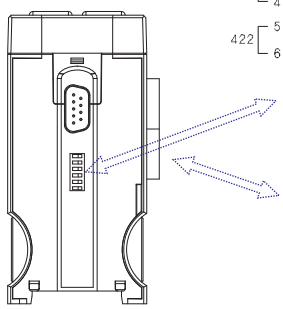
a. Coupling with converter

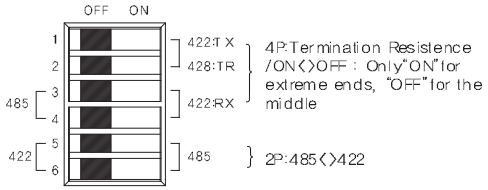


b. Detailed communication module



▲ Serial communication wiring through RJ45 or screw terminal





DIP SW:6P

▲ DIP SW selection for 485/422 & termination resistance

Terminal No.	Function		Terminal No.	Function	
	422	485		422	485
1	TX+	TRX+	6	TX+	TRX+
2	TX−	TRX−	7	TX−	TRX−
3	RX+		8	RX+	
4	RX−		9	RX−	
5	Signal GND		10		

Movable Terminal : 10P

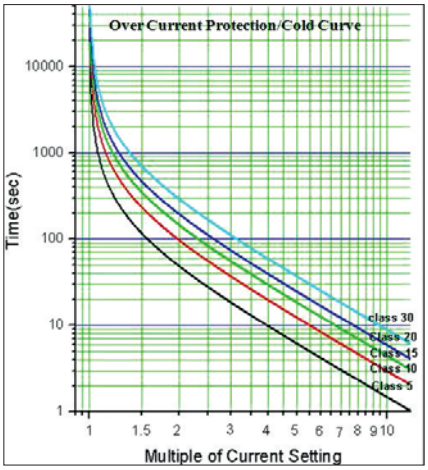
Order Form

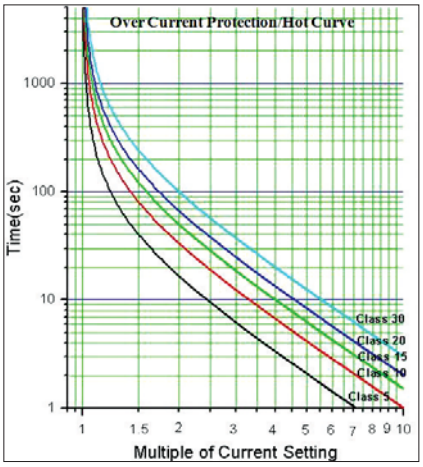
Item	Reference Code	Description
CM44/communication module	DSP-CM44	* Available for VIP-PM/PL, VIP-RM/RL, VIP-RTM/RTL * RS232 with VIP * RS485 with Master

• T(Time)-I(Current) Characteristics

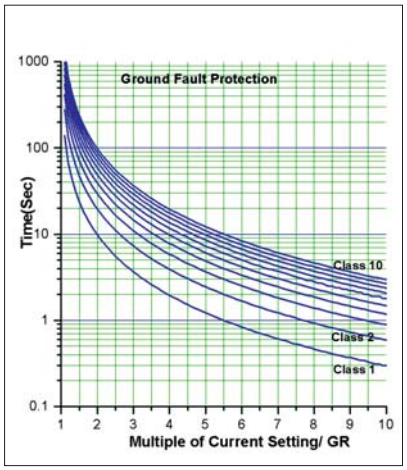
Inverse

- Over Current Protection



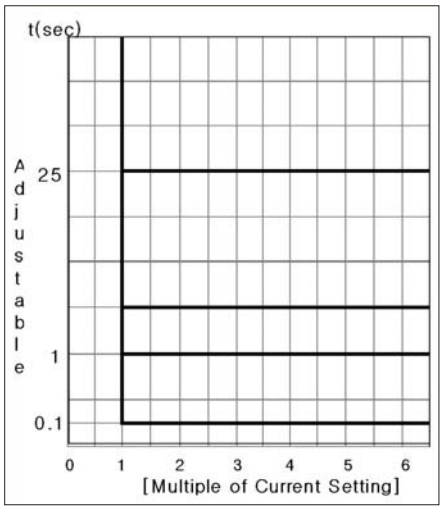


- Ground Fault Protection



Definite

- Over Current Protection



• DSP-SDTR (Digital Shut Down Turn-over Relay)

Abstraction

- Compact size, Complete Digital Type based on MCU
- Just restart execution under instant power-off and voltage drop
- 3 Wire Easy Connection : not concerend with ON-OFF Switch Position
- Possible to prest numerical operation time : 3 Digit Window
- Shut down delay time(SDDT)/S-t
  - ▶ OFF : Disable
  - ▶ Adjustable time : 0.1sec ~ 10sec
- Delay on make time(DOMT)/d-t : 0.1~60sec

Critical Note

→ "ON" switch contact must be self-holding by auxiliary output of the contactor

→ This relay needs to wait for 3 minitue at least under no-voltage state to change sequence control voltage

→ At first, "v**"(version) is shown and "StP" is appeared consequently when the sequence control power is on. This means this relay has completed to remember a system voltage, so this relay works after 1min from an pearance of "Stp".

→ Once this relay remember a sequence control voltage, "StP" is shown without showing "v**" even if the control power is ON newly.

Applied benefit

- To compensate a production loss and/or productive process delay caused by voltage drop(;voltage sag) or unexpected power-off during normal moter operation
- Neccessary minimum voltage duration time : 17ms or more
- In case the voltage drop or the zero voltage(power-off) is recovered on the normal rated voltage within preset value (0.1sec ~ 10 sec) in "S-t" mode, SDTR is able to command for a contactor to reclose after elapsed preset value(0.1sec ~ 60 sec) in "d-t" mode so that it may reduce a heavy starting shock to power supplied transformer

Technical Specification

Division			Description
Time Adjust	SDDT		Disable, 0.1sec ~10 sec
	DOMT		0.1 sec ~ 60 sec
Applicable Environment	Temp	Operation	-20°C ~ 60°C
		Storage	-30°C ~ 80°C
	Humidity		30 ~ 85%, Relative/Non-condensing
Allowable tolerance			t<=2sec : +, -, 0.1sec t>2sec : +, -, 5%
Insulation	Circuit-Case		10MOhm/500VDC
High Voltage Insulation test	Circuit-Case		2KV/60Hz, 1 min
	Contact-Contact		1KV/60Hz, 1 min
Control Power			85 ~ 260VAC, 50/60Hz(120~370VDC)
Power consumption			2VA/max
Installation			35mm DIN Rail/Panel Mounting

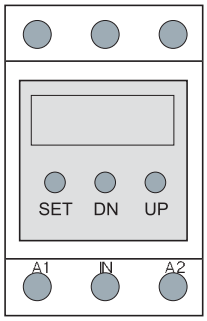
※ This relay is useful for both 110/220VAC and works based on initial voltage

Preset Mode

Mode	Function	Description
S-t/OFF/Setting Value	Shut down delay time	* OFF : Disable * Adjustable : 0.1 ~ 10sec
d-t/Setting value	Make on delay time	* 1 ~ 60sec

Operation Key

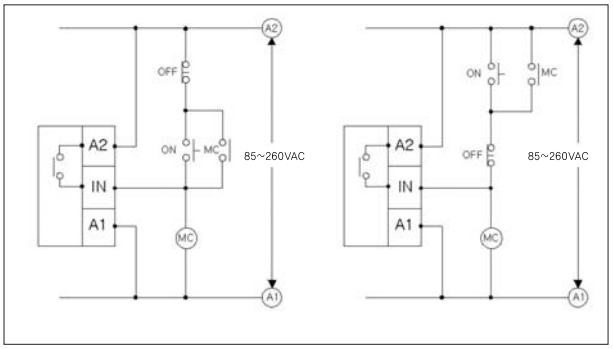
Key	Function	Description
1. SET	To enter preset state	* When the control power is loaded, "StP" is displayed to show that SDTR is not doing its unique job * "SET" is displayed as pressing "SET" key for 3 sec or more * Consequently the first preset mode is appeared after releasing "SET" key, then preset required value(time)
2. UP/DN	To preset a time	* Under preset mode state → UP : to increament a value → DN : to decreament a value
3. SET	To finish preset	* Press "SET" key for 3 sec or more after completing preset, then "End" is displayed * Consequently, preset job is finished and enter into operating state



Operating Indication

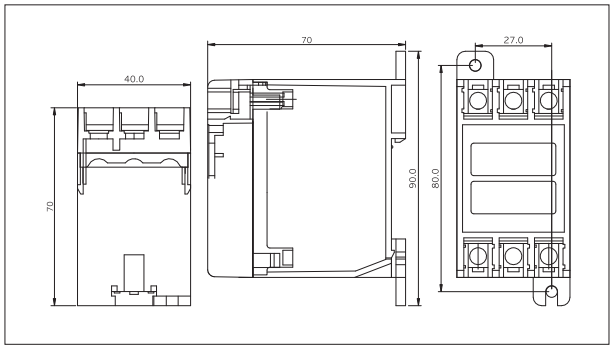
Indication	Description
StP	Motor is stopped
run	* Motor is working * SDTR is ready to response for voltage drop/zero voltage

Application Diagram



※ Possible 3 Wire connection without concerning ON-OFF SW position

Dimension



Order Form

Item	Reference	Remarks
DSP-SDTR	DSP-SDTR-Z7	control power 85~260VAC, 50/60Hz

• DSP-DGFR (Digital Ground Fault Protection Relay)

Abstraction

- Minimized compact size, panel mounting type
- MCU(Microprocessor Control Unit) based
- High sensitive, wide operation range : 20mA ~ 4A
- Precised preset for zero phase current & operation time : 3 Digit Window
- Easy and flexible response : Adjustble time / Eot
- Various type based on ZCT type

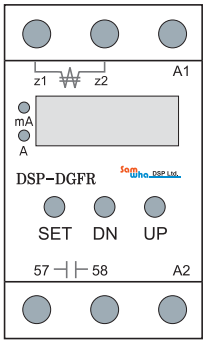
Type	ZCT	Current range
DGFR-A	200mA/1.5mA	20mA ~ 4A
DGFR-V	200mA/100mV	20mA ~ 4A
DGFR-N	100/5A	200mA ~ 10A

- Self diagnostic function

Technical specification

Division			Description
Trip delay time	Edt		0.05sec, 0.1 ~ 60sec
Trip output relay			1a/3A, 250VAC,Resistive
ZCT Type	DGFR-A Type		ZCT : 200mA/1.5mA
	DGFR-V Type		ZCT : 200mA/100mV
	DGFR-N Type		NCT : 100A/5A
Environment	Temp	Operation	-20°C ~ 60°C
		Storage	-30°C ~ 80 °C
	Humidity		30~85%, Relative/Non-condensing
Allowable tollerance	Earth current		IO<=100mA : ±10mA, 100mA<IO : ±5%
	Operation time		t<=2sec:± 0.1sec, t>2sec:±5%
Insulation for Case-Circuit			10MOhm or more/500VDC
Withstanding voltage	Case-Circuit		2KV/60Hz, 1min
	Contact-Contact		1KV/60hz, 1 min
Control power			85 ~ 260VAC, 50/60Hz (120 ~ 370VDC)
Consuming power			4W/max
Installation			35mm DIN Rail, Panel Mounting

Input-Output termianl



Preset mode

Mode	Description
Out/a/b	When the control power is charged initially * a : trip output relay is energized * b : trip output relay is deenergized
Ec/oFF/setting value	* OFF : Disable * adjustable : 20mA~4A
Eot/setting value	* trip delay time * adjustable : 0.05sec, 0.1~60sec
rst/Hr/aut	* Hr : manual reset * aut : auto reset
a-t	Adjustable auto reset time : 0.1 ~ 60sec

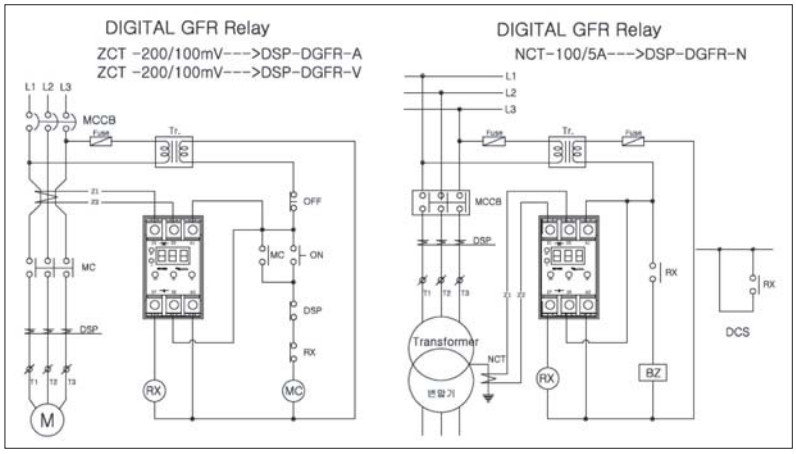
Key Operation

Key	Description
SET	* "SET" is appeared as pressing "SET" Key for 1sec or more * First mode and preset value is showned alternatively as releasing "SET" key
UP, DN	to change preset value in each mode
SET	* preset is completed as pressing "SET" key for 3sec or more * Earth current value is appeared if earth current is detected
Test	* Trip output relay is energized after counting preset "Eot" as pressing both "UP","DN" key for 3sec or more * Make reset as pressing "SET" key

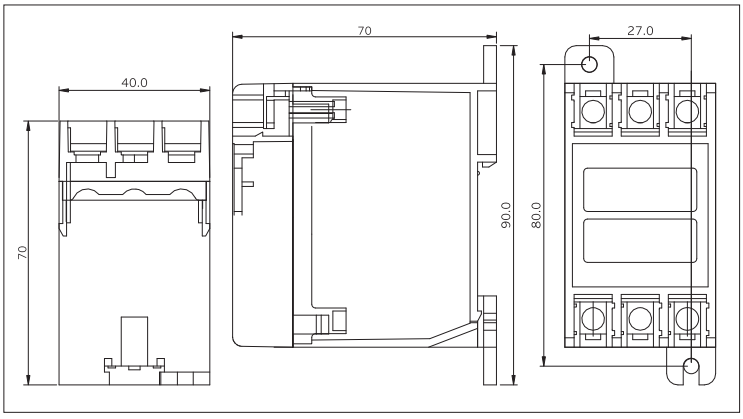
Trip State Indication

- Trip value is showned alternatively
- Possible to reset as pressing "SET" Key

Application Diagram



Dimension

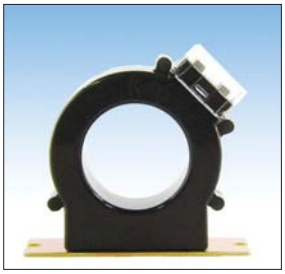


Order Form

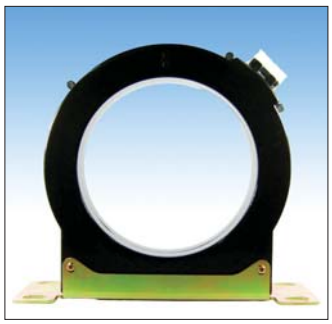
Model	reference	Remarks
DSP-DGFR-A DSP-DGFR-V DSP-DGFR-N	DGFR-A-Z7 DGFR-V-Z7 DGFR-N-Z7	Control voltage 85~260 VAC,50/60Hz((120~370VDC)

• DSP-ZCT

Zero Phase Current Transformer



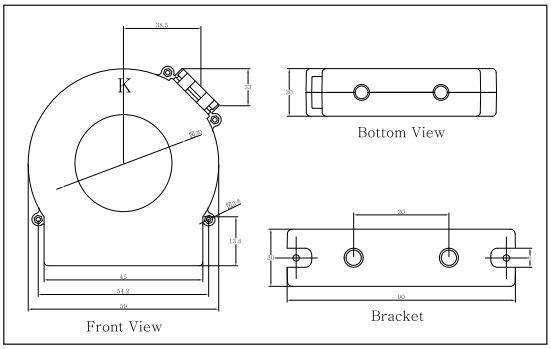
(30 ϕ ~80 ϕ)



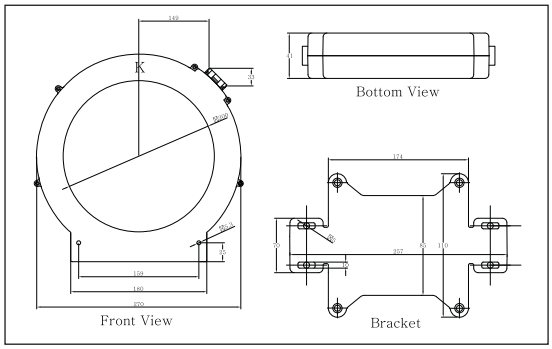
(100 ϕ ~200 ϕ)

Technical Specification

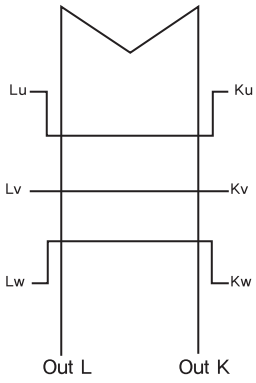
Inner diameter(mm)	30	50	65	80	100	120	150	200
Z.P. Primary Current	200mA							
Z.P. Secondary Current	1.5mA							
Operating temperature	-25˚C ~ +70˚C							
Storage temperature	-35˚C ~ +80˚C							
High potential test	AC2KV, 1min							
Insulation resistance	DC500V, 10MOhm							
Operating Frequency	50/60Hz							
Error tolerance	+,- 10%							
Installation	Panel Type							
Weight(g)	170	215	275	345	590	785	1140	1500



30 ϕ



30 ϕ



Order Form

Item	Inner diameter(mm)	Reference Code
DSP-ZCT	30	DSP-ZCT-30
	50	DSP-ZCT-50
	65	DSP-ZCT-65
	80	DSP-ZCT-80
	100	DSP-ZCT-100
	120	DSP-ZCT-120
	150	DSP-ZCT-150
	200	DSP-ZCT-200

• DSP-3CT

External 3CT of One Body

3 CT

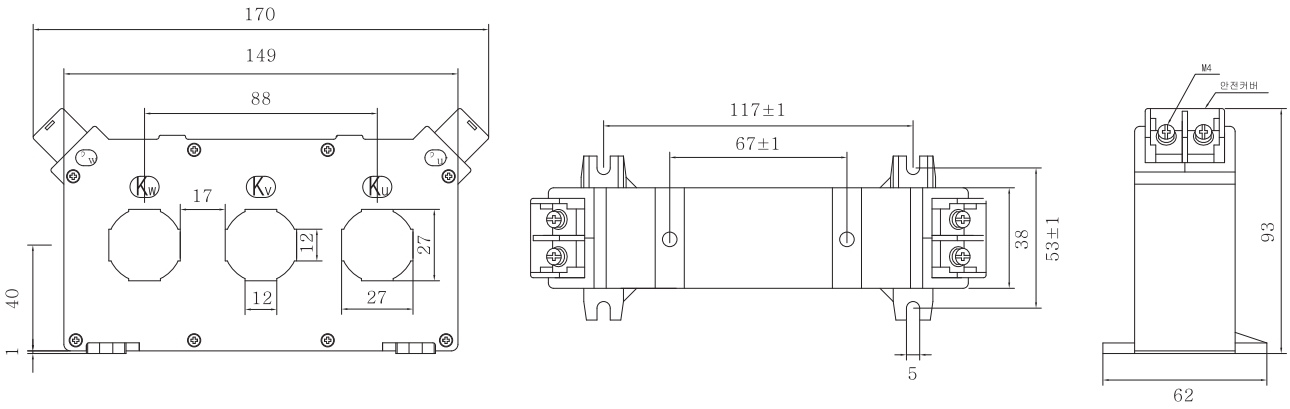
Example assembled with DSP-5,C series

Technical Specification

Division		Description	Remark
DSP-3CT	CT ratio	100 : 5	internal shape : octagonal
		150 : 5	
		200 : 5	
		300 : 5	
		400 : 5	
Class		1.0, 3.0	
Burden		1VA, 3VA	
Maximum system Voltage		1150V	
Dielectric Voltage		4kV / 1min	
Usage Frequency		50 / 60Hz	
Thermal withstand current		16KA / 1sec	
Maximum allowable cable length		2.5SQ / 10M	
Installation		Panel Mounting	

※ Burden is based on metering class and the accuracy is lower than 1.5% under 1VA
※ Do not use this CT except DSP

Dimension



Order Form

Item	CT Ratio	Reference code
DSP-3CT	100 : 5	DSP-3CT-100
	150 : 5	DSP-3CT-150
	200 : 5	DSP-3CT-200
	300 : 5	DSP-3CT-300
	400 : 5	DSP-3CT-400

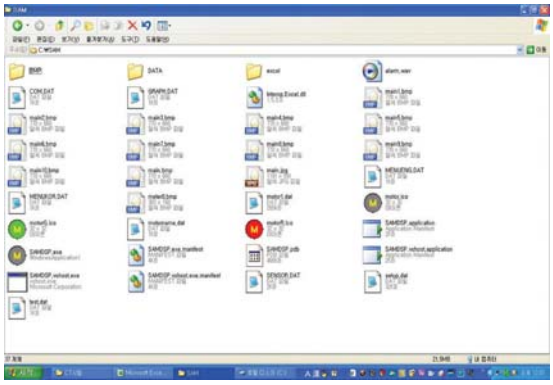
SamDSP / Monitoring Program

▶ General

- This program, “Samdsp” is to monitor an operation state of VIP-PL/M, RTL/M, 5CL/M, DSP-CL/M, CSL/M and to control Start-Stop for a motor cooperated with VIP-PL/M, RTL/M, also this “Samdsp” is useful to check a communication state in 485 serial connection communication
- The user needs additional USB/232〈 〉485/422 protocol converter like DSP-CMB for PC to make a dialog with a protection relay of Samwha DSP
- The user's PC basically based on Window XP and Window 7 should be embeded by *.net framework v**(version number) for MS Window. The user is able to down load this *.net framework v** which is opened to everyone with a free of charge

▶ How to install "samdsp" program

1. Down load latest "samdsp-v**(version nmber)" file provided by SamWha DSP.Co.(web page or CD) in C:// of your PC and run into the execution for this file, then compressed file is released
2. Check if c:\"samdsp" folder is created or not
3. If you find "Samdsp" folder, execute c:\"samdsp" by making double click for it, then user will meet the circled "M" symbol, hereafter this samdsp** is execution file to open main window
4. Eexcute "samdsp" with image of motor symbol "M" in circle, then main window is shown. 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 a 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 and come out.

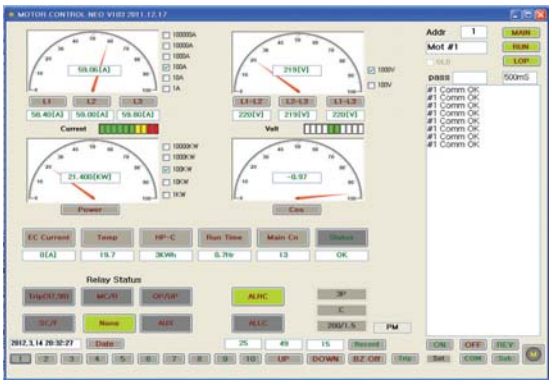


▶ How to monitor & analize a data by "Samdsp" program

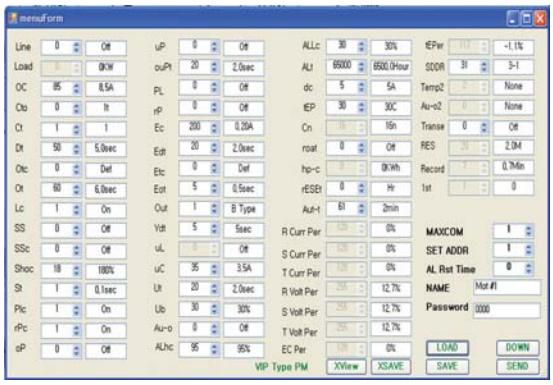
1. General

- This is aimed to monitor an operation state, preset value, trip state by the one way and to change preset value by the bi-directional way in motor protection relay with RS485 output. Also this is able to analyze a data stored in flash memory of MWR-S(motor working recorder).
- Particulary in terms of MWR-S, it is possible to search a stored data which is matched with appointed terms, also possible to have a raw data by Excel format for a searched data. Furthermore it is possible to design a searched data in the typical graphic format

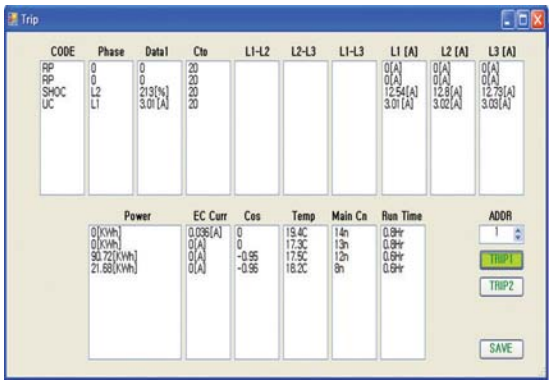
2.Main window



3. Setup Window



4.Trip Window

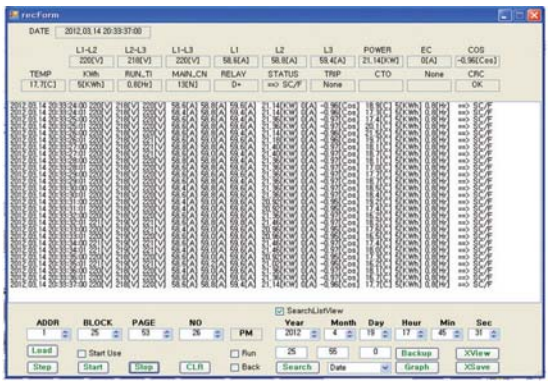


▶ How to manage a searched data of MWR-S

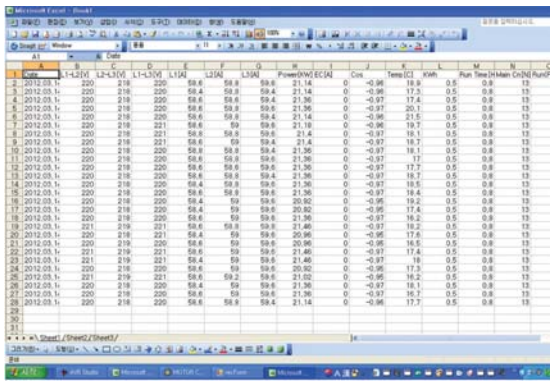
- General

* The searched raw data can be transformed by excel format as pressing "XVIEW"
* The user is able to save automatically in the folder like c://"samdasp" as pressing "XSAVE"
* In case the user clicks "Rec Reset" which is appeared as by pressing F10 key of user's pc, all of existed stored data is clear
* The user is able to take all of stored data in Excel Format by pressing "backup", but this function should be used carefully because a lot of time is needed to retrieve a data. It is required that this function should be used particulary to retrieve all of data

• Searched data



• Raw data in Excel format of searched data



• How to make typical graphic diagram

The user is able to make a complexed typical graphic diagram as pressing "Graph"

* The kind of displayed graph is classified by the colour of the character in the bottom
* The number of the division in X-Y axis is 12-10 and the value inside a box upper part indicates a scale for the such graph to show a value of a point moved by the mouse of PC.
  This scale value is changed according to click the value box by the mouse and the shown value indicates the value of upper end point in Y-axis, but the value of lower end point in X-axis is fixed to zero.
  However, the scale value for the voltage is always fixed to 500V.
* The yellow vertical line can be movable by the mouse and the value for the changed position on the X-axis is indicated inside each factor box in the bottom part.
* The +1 and -1 with green colour on the Y-axis is only available for the power factor
* The value of Time box in the bottom means time division, so the more this value is higher(20/max), the more the graph is detailed.
* The extreme bottom end box value [Time] on the X-axis takes sec unit and this is changed according to click the value box or arrow symbol in the right and left bottom corner by the mouse.
  Whenever the user press this arrow one by one, the start time position of the shown graph begins in minus time or plus time from the box value on the Year-Date-Time
* Choose a factor what you want to check, then press SET
* Time : to adjut a width of graphic window
* Colour match : the value of each factor is matched with a value with a same colour in the graph
* Value check : move a cursor followed by a mouse to the point of the graph and make click, then each informatiom is shown in the each factor box.