

# • 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

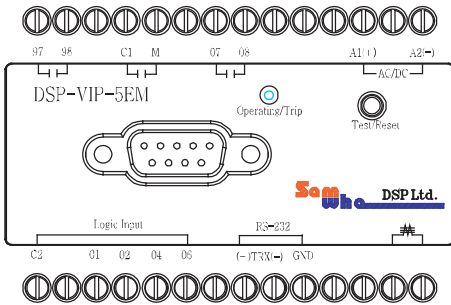
## Technical Specification

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(dI)	CFF, 0.1 ~ 300 sec/def, "CFF" section means inverse curve
	Over current trip delay time(dI)	0.1~60 sec/def, 5~30class/inverse/refer curve
	Under current trip delay time(dI)	0.1~30 sec/def
	Shock/stop trip delay time(dI)	0.1 ~ 3 sec/def
	Ground fault starting delay time(EdI)	CFF, 1 ~ 25 sec/def
	Ground fault trip delay time(Ect)	* 0.1~ 30 sec/def * 1~10 Class/Inverse, refer curve
	SC/F-MC/R starting transfer time(ydI)	1 sec~5 mr/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 tolerance	Current	C(<=2A : C.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(ccwoked by logic input/trip)	1a 1(-SFST), 3A/Resistive
	Main	1a(1-spsl), 3A/Resistive
	Aux	1a(1-spsl), 3A/Resistive
	GR	1a, 3A/Resistive(Aux output must be set "GR" in "Au-c" mode)
Application environment	Temperature	Operation -25° C ~ +70° C Storage -40° C ~ +80° C
	Relative humidity	30 ~ 85%, non-condensing
Current tolerance against changeable frequency in inverter		Avg ± 3% in 1Hz ~ 400Hz
Max Conductor Size		25sq
Insulation Resistance		10M ohm 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 : EC/EN 60695-2-12		650° C
Shock : EC/EN 60068-2-27		1/2 sine wave, 15g/11ms
Trip Output : IEC/EN 60947-1		690V(Vrms) : 2KV, 1 min)
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV
Rated Electromagnetic Field Disturbance : EC/EN 61000-4-3		Level 3, 10V/m
Electric Fast Transient Burst : EC/EN 61000-4-4		Power, relay output : Level 4, 4KV, others : Level 3, 2KV
Surge : EC/EN 61000-4-5		relay output : 1.2 X 50µs, 2KV (0°, 90°, 180°, 270°)
Immunity to conducted disturbance : EC/EN 61000-4-6		10V, Level 3
Voltage variation : EC-61000-4-11		3ms/0, 300ms/10%
Equal Communication/5CM/5CL Type	Physical feature	2 wire RS 485
	Address	1 ~ 250
	Speed	9.6/9.2/38.4/57.6/76.8/115.2kbps
	wiring connection	Screw Terminal
	Termination resistance	External resistance/200 Ohm
	Cable	Sheathed cable, 2 Pair
Current Loop Communication : 4 ~ 20mA/5TM/5TL Type		20mA or maximum value in 3 phase current
Consuming power		6W / max

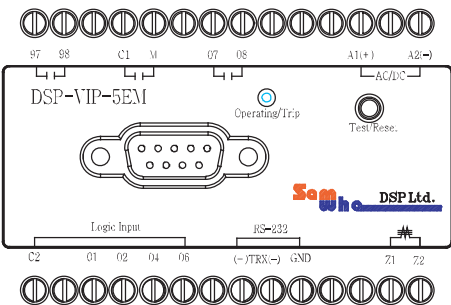
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## Input/Output : 5EM/5EL Type

### External ZCT applied type/possible with external CT



### Embedded ZCT type/not possible with external CT



## Protection Range

70 Type	C2~7CA	*Fussible matched with external CT/C, 2~6A based *5A must be selected in "Ctc" mode for external CT *5SM Type : C, 2~6A
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### Trip Output Operation Pattern with Logic Input

Trip output : main/97-98(a), C1-M(e)/co-worked with logic input, aux/C7-C8(a)

**b** is selected in "ct" mode : factory default  
CN(start) : C-M → Cclosed(b), 97-98 → Open(a), C7-C8 → Copen(a)  
Trip : C-M → Open(a), 97-98 → Cclosed(b), C7-C8 → Cclosed(b)

**a** is selected in "ou" mode  
CN(start) : C1-M → Cclosed(b), 97-98 → Cclosed(b), C7-C8 → Open(a)  
Trip : C1-M → Copen(a), 97-98 → Open(a), C7-C8 → Cclosed(b)

### Trip Output Operation Pattern without Logic Input

LOCFP" is selected in "OUT" mode : "AU10" is shown initially

In case the control power is on : C1-M Cclosed(b), 97-98 Copen(a), C7-C8 Copen(a)  
AUX output(07-08) : The kind of output factor can be selected in "Auc" mode  
/Possible output : AL, LC, SHCCK, EC, FF/ independent from main trip

### Input/Output

232	FXD, 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(LC)	in case the load current lower than preset value is sensed	Definite time:0.1~30 sec/adjustable	
Phase loss(FLC)	In case one of three phases a state of phase loss	1sec	
reverse phase(rFc)	In case the order of incoming phase is changed like "RTS" from "RST"	0.5sec	
Locked rotor(LC)	In case the starting current greater than 300% of "CC" preset value is kept after dt is elapsed	0.1sec	
Shock/Stall	In case the 180~700% running current of preset "CC" value is sensed	0.1sec	
Current unbalance(ub)	$[(\text{max current} - \text{min current}) / \text{max current}] * 100\%$	8sec	
Ground fault(EC)	in case the ground fault current greater than preset value is sensed	Definite time : 0.1 ~30sec	5SM
Short circuit(SS)	In case short circuit current greater than preset value to 800~2000% of "CC" is sensed	0.05sec	

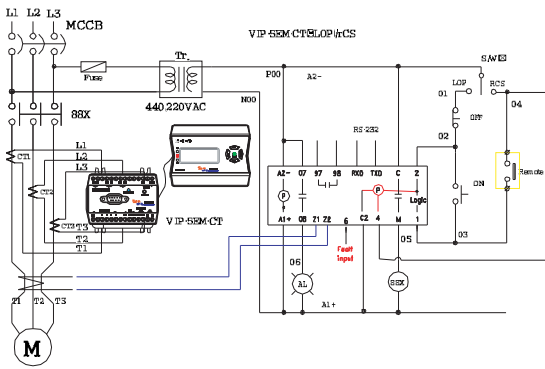
## Trip cause indication

- Check for preset value in running state/Such mode and preset value are shown alternately 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

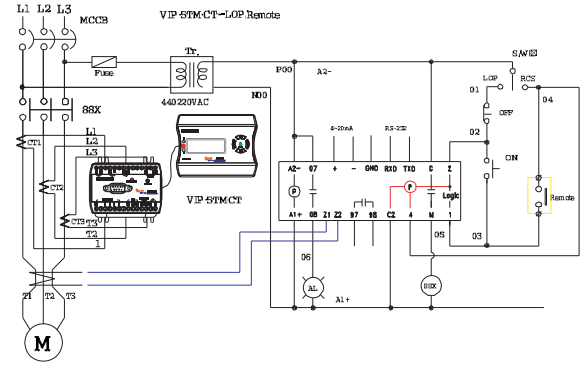
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Application sequence diagram : 5EL/M Type

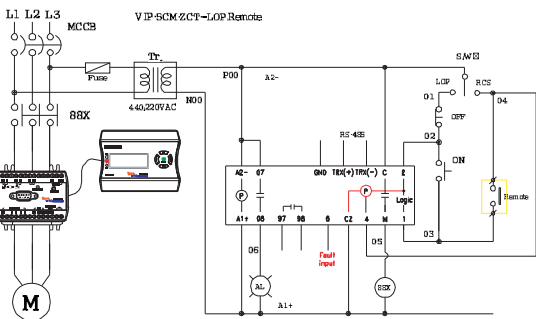
External ZCT type



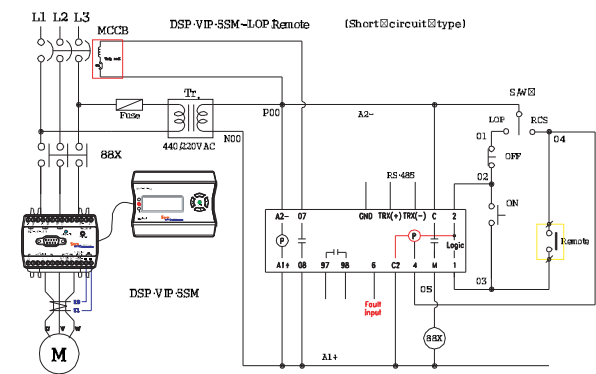
External ZCT type



Embeded ZCT type/not possible with external CT



5SM : External ZCT type



Logic Input Application

Logic	(1)	(2)	(4)	(6)
Application	LCP		rCS	EH

LOP Duty

Logic input	High	Lcw	State	Output relay trip by Logic input [C-M]
1	Lcw → High		Motor Start	C1-M → Cose
2	O	-		
1	-	O	Motor Stop	C1-M → Cpen
2	High → Lcw			

rCS (Remote Control Sensor) Duty

Logic input	High	Lcw	State	Output relay trip by Logic input [C1-M]
1	O	-	Motor Start	C1-M → Cose
4	O	-		
1	-	O	Motor Stop	C1-M → Cpen
4	O	O		

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

Logic input	High	Lcw	State	Output relay trip by Logic input [C1-M]
6	O	-	* No or Stop * Displayed : OLT=F(auLi)	* Starting : Open → Clcse * EFI input : Clcse → Open

- ※ In case selected operation mode is changed by Selector SW, the motor will be continued to work according to new selected mode after the motor is stopped shortly
- ※ It would be easy to understand as referring the application sequence diagram
- ※ In case motor is stopped by the command of CN-OFF (Remote sensor or external fault input), LOP, rCS (remote control sensor), OLT-F (External fault input) is appeared in the front window to indicate originated command source
- ※ It is required that logic input from crg distance sensor must be connected through the output of external aux relay because input line could keep unwanted voltage by induced current

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### ▣ Preset Key Operation



Preset Key	Description
SET	<ul style="list-style-type: none"> <li>*Start to preset : passwcrd 'FOCCO' is shown by one touch → press 4 times → enter into mode : flickered character → preset by "UP" or "DN"</li> <li>*Press SET button to return to operation state, or press CLR button to move to next mode</li> </ul>
CLR	<ul style="list-style-type: none"> <li>*move to next mode as pressing CLR</li> <li>*Self diagnostic test as pressing CLR for 3sec : trip output is energized after preset C-Time</li> <li>*Make reset after a trip</li> </ul>
UP / DN	<ul style="list-style-type: none"> <li>*change a character and/or a digit number for the preset</li> </ul>
SET & CLR	<ul style="list-style-type: none"> <li>*return to operation state as pressing both SET &amp; CLR after preset, or</li> <li>*wait for 1fsec or more</li> </ul>
To check preset value of each mode during operation	<ul style="list-style-type: none"> <li>*possible to check value and mode as pressing "SET" key once during operation,</li> <li>*preset value and mode are appeared alternately</li> <li>*possible to check next mode as pressing "CLR" Key</li> <li>*return to operating mode as pressing "Mode" key once again or waiting for 15 sec</li> <li>*make reset after trip is happened as pressing CLR key or test button of the converter</li> <li>*Not possible to change existed preset value</li> </ul>

### ▣ Order Form

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

Item	Reference Code	Current Rating	Description	
VIP-5EL	DSF-VIF5EL-7CZ7	0.2~70A/0.2 ~6A with external CT	Farel Monring Type, 85~260VAC, 50,60Hz(90~370VDC), external ZCT	
	DSF-VIF5EL-7CZ7ZCT		Farel Monring Type, 85~260VAC, 50,60Hz(90~370VDC), ZCT embedded (not available for external CT application)	
VIP-5EM	DSF-VIF5EM-7CZ7		Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), external ZCT	
	DSF-VIF5EM-7CZ7ZCT		Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), ZCT embedded	
VIP-5CL	DSF-VIF5CL-7CZ7		Farel Monring Type, 85~260VAC, 50,60Hz(90~370VDC), external ZCT	
	DSF-VIF5CL-7CZ7ZCT		Farel Monring Type, 85~260VAC, 50,60Hz(90~370VDC), ZCT embedded (not available for external CT application)	
VIP-5CM	DSF-VIF5CM-7CZ7		Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), external ZCT, 485 communication	
	DSF-VIF5CM-7CZ7ZCT		Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), ZCT embedded (not available for external CT application), 485 communication	
VIP-5TL	DSF-VIF5TL-7CZ7		Farel Monring Type, 85~260VAC, 50,60Hz(90~370VDC), external ZCT, 4~20mA	
	DSF-VIF5TL-7CZ7ZCT		Farel Monring Type, 85~260VAC, 50,60Hz(90~370VDC), ZCT embedded (not available for external CT application), 4~20mA	
VIP-5TM	DSF-VIF5TM-7CZ7		Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), external ZCT, 4~20mA	
	DSF-VIF5TM-7CZ7ZCT		Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), ZCT embedded (not available for external CT application), 4~20mA	
VIP-5SM	DSF-VIF5SM-C3Z7		0.2~6A	Farel Flush Monring Type, 85~260VAC, 50,60Hz(90~370VDC), exclusively external CT, external ZCT

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### 📌 Preset Description

Mode	Function	Description	Factory
FC0C0	Passwrd	FC0C0 is shown as pressing SET and need CLR 4 times to enter into mode to be preset	0
CC	to preset a range to protect over current	C.2~7CA/adjustable(C.2~6A with external CT)	5
CIO	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
Cl	to preset a ratio or 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	C.1~30C5Sec/adjustable	5
CIC	to select time-current characteristics for over current protection	cEF : define, Inv : inverse	cEF
Cl	to preset operating trip delay time	C.1~6C5Sec/adjustable	5
LC	to protect Locked Floor	it is available for selecting ON (operation time 0.1sec after dt is elapsed)	OFF
ES	to protect short circuit	it is available for selecting ON (operation time: C.05Sec )/5SM Type	OFF
SSC	to preset short protection % to CC	protection range to CC : 80C~200C%/adjustable/5SM Type	15C0%
SFOC	to protect mechanical shock during motor's working	protection range to CC : 1EC~70C%/adjustable	OFF
Sl	to preset a time for shock protection	C.05Sec(only for 5SM/L), C.1~2.C5Sec/adjustable	C.1
FLC	to protect phase loss by load current	CN : available, OFF : not available	CN
rPC	to protect reverse phase by load current	CN : available, OFF : not available	OFF
EC	to preset a range of zero phase current to protect ground fault	protection range : C.03A~4A/adjustable, CFF : disable	4A
Ect	to preset starting trip delay time	C.1~25Sec/adjustable	2sec
ECl	to preset operating trip delay time to protect ground fault	C.1~30C5Sec/adjustable	C.5sec
CLt	to decide if logic inputs used or not	* LcoFF : not available for logic input / ALIO 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 or "Co" to preset a range to protect under current/Icud	OFF
Ut	to preset trip delay time to protect under current	C.1~30C5Sec/adjustable	2sec
Lb	to preset current unbalance rate(%) among 3 phase	* even if Load is selected, this function is available by actual current * formula: [(max-min) / max] * 100 [%] * range: 3C% ~ 5C% * minimum available current 0.3A	50%
AUO	to preset a kind of AUX trip output	* OFF/EC/Lc/SFOC/AL/EC * OFF:samwas main output	AL
AL	to preset alarm level rate(%) to CC	* % range : 65% ~ 100C%/adjustable ("AL" is preset in "Auo" mode)	90
ALt	to preset a limit of accumulated working time necessary to give alarm.	C.1 hr ~ 6553.5 hr in C.1 hr step	6E00
cC	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
rCIA	to indicate additional factor besides basic factor to indicate running operation value in a order	OFF : basic factor, CN : 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, possible number is 1 to 9. * if Auto reset is preset, manual reset by self Reset SW of converter is not available * if trip is acted by phase loss, auto reset is not able, only for manual reset	tr
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 "LF" or "DN" key	
ICVer	Main contactor Auto Close	* Shut Down Delay Time : 1~5sec/Adjustable * Delay On Make Time: 0(rstert)~25sec	OFF
rUn	to define protection job in case of trip	STCP : protection job is stopped / clsp : operation factor is still indicated in display refer	STCP
Addr	to put set-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	96C0