

• 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)

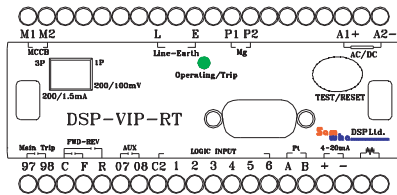
Technical Specification

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(ct)	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 sec AC 85V~AC260V, 50/60Hz (DC90V~DC370V)
Allowable tolerance	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-SFST), 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 tolerance against chargeable frequency in inverter		Avg ± 3% in 1Hz ~ 400Hz
Max Conductor Size		25sq
Insulation Resistance		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 : EC/EN 60695-2-12		65°C
Shock : EC/EN 60068-2-27		1/2 sine wave, 15g/11ms
Trip Output : IEC/EN60947-1		690V(rms) : 2KV, 1 min)
Electrostatic Discharge : IEC/EN 61000-4-2		Air : Level 3, 8KV, Contact : Level 3, 6KV
Radiated 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 : IEC/EN 61000-4-5		relay output : 1.2 X 50uS, 2KV (0°, 90°, 180°, 270°)
Immunity to conducted disturbance : EC,EN61000-4-6		10V, Level 3
Voltage variation : IEC-61000-4-11		3ms/0, 300ms/10%
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 or Screw Terminal *RJ45 and Screw Terminal(5P) is connected physically
	Termination resistance	*DIP S/W selection / 200 Ohm
	Cable	Shielded cable, 2 Pair
Current Loop Communication : 4 ~ 20mA		20mA or maximum value in 3 phase current
Consuming power		10W / Max

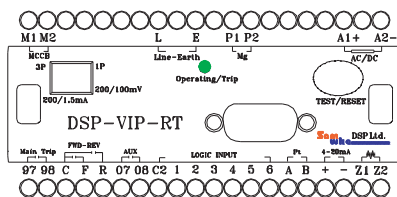
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Input/Output

- Embedded ZCT type/not possible with external CT



- External ZCT applied type/possible with external CT



Protection Range

70 Type	C.2~7CA	* Fcssble matched with external CT/C.2~6A tased * 5A must be selected in "Ctc" mode for external CT
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Trip Output Operation Pattern with Logic Input

Trip output : main/97-98(a, C-F)(b, C-F)(c, C-F) co-worked with logic input, aux/C7-C8(e)

b is selected in "cut" mode : factory default

CN(start) : C-F → Cclosed(b, 97-98 → Open(a), C7-C8 → Cpen(a)

Trip : C-F → Open(a), 97-98 → Ccse(b, C7-C8 → Ccse(b)

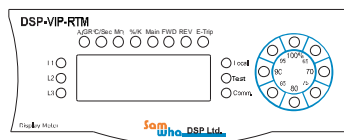
a is selected in "ou" mode

CN(start) : C-F → Cclosed(b, 97-98 → Ccse(b, C7-C8 → Cpen(a)

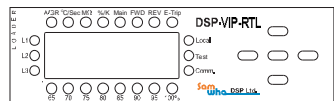
Trip : C-F → Open(a), 97-98 → Open(a), C7-C8 → Ccse(b)

Display window

- Panel Flush Mounting Type : Display meter



- Panel Mounting Type : Loader



Protection

DIV	Description	Operat on time	Remark
Over current (CC)	in case the load current greater than preset value is sensed	Definite time:0.1~60 sec/adjustable	Foss ble alarm cupt thrugh ALX
Under current (LC)	in case the load current over then preset value is sensed	Definite time:0.1~30 sec/adjustable	
Phase loss (FLC)	In case one of three phase is a slae of phase loss	1sec	
reverse phase (rPc)	In case the order of rcomming phase s changed like "FTS" from "RST"	0.5sec	
Lcked rotor (ILC)	"In case the starting current greater than 300% of "CC" preset value s kept after dt is eapsed"	0.1sec	
Shock/Stall	"In case the 180~700% running current of preset "CC" value is sensed"	0.05sec	
Current unbalance(ub)	[(max current-min current)/max current] * 100%	8sec	
Ground fault (EC)	"in case the ground fault current greater han preset value is sensed"	Definite time : 0.05Sec, 0.1 ~30Sec	
Insulation resistance(Ir)	the measurement for insulation resistance n motor stop state (0.1~500M Ω)/ IrFS is shown if measured value s 500M Ω)	poss ble to make Alarm if Ir s selected in "ALC"	

Trip cause indication

- Check cr preset value n 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 scord and indicated on the display meter
- The information of 8 trip is scord and this is able to be checked n "trip" mode order y

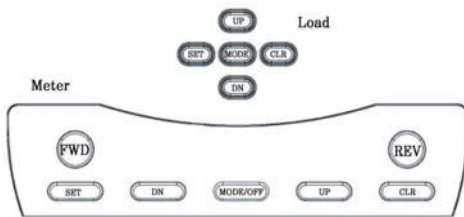
Logic Input Application

Logic Input	(1)	(2)	(3)	(4)	(5)	(6)
Application	ON(RWC)	CFF	CN(REV)	rCS	MCC	EFI
	LOP			FC		

* The more detail for case study is described in VP-PM

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➔ Preset Key Operation



Preset Key	Description
SET	<ul style="list-style-type: none"> *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	<ul style="list-style-type: none"> *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	<ul style="list-style-type: none"> *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	<ul style="list-style-type: none"> *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 "Mode" key once again or waiting for 15 sec *make reset after trips 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
CIO	to sense a current through DSP in itself or combined with external CT	5A or 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
OIC	to select time-current characteristics for over current protection	dEF: definite, Inv: inverse	dEF
Ct	to preset operating trip delay time	0.1~60Sec/adjustable	5
LC	to protect Locked Rotor	it is available for selecting ON [operation time: 0.1sec after dt is elapsed]	CFF
ShOC	to protect mechanical shock during motor is working	protection range to OC: 180~700%/adjustable	CFF
St	to preset a time for shock protection	0.05Sec, 0.1~3.0Sec/adjustable	--
FLC	to protect phase loss by load current	CN: available, CFF: not available	CN
rFC	to protect reverse phase by load current	CN: available, CFF: not available	CFF
EC	to preset a range of zero phase current to protect ground fault	protection range: 0.03A~0A/adjustable	10
Edt	to preset starting trip delay time	0.1~25Sec/adjustable	2
EIC	to select time-current characteristics to protect ground fault	dEF: definite, Inv: inverse	dEF
Ect	to preset operating trip delay time to protect ground fault	0.05Sec, 0.1~30Sec/adjustable	0.5

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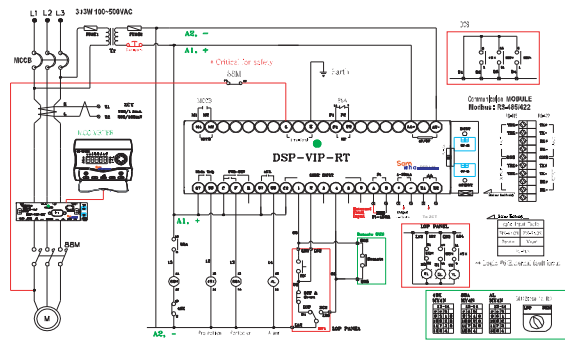
Sub Mode

Out	to decide initial state of main trip relay	<ul style="list-style-type: none"> *to make initial state(a or b) of main trip output(97~98) when control power is powered *a : normal energized type(cpen→close) *b : normal deenergized type(cpen→cper) 	b
Fr-Iy/a/b	to decide a pattern for forward reverse transfer	<ul style="list-style-type: none"> *a : C1-F is closed, then C1-R is closed as keeping C1-F is opened after Ftdt is elapsed *b : C1-F is closed, then C1-R is closed as keeping C1-F is closed after Ftdt is elapsed 	
Frdt/cFF/ Setting value	to preset a transfer time for F-R	<ul style="list-style-type: none"> *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 reverse operation in case Logic input #3 is used 	
UC	to preset a range of protect under current	<ul style="list-style-type: none"> *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 of 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	<ul style="list-style-type: none"> *even if Load is selected, this function is available by actual current *formular: $[(\max - \min) / \max] \times 100 [\%]$ *range: 30% ~ 90% *minimum available current: 0.3A 	50
AU-O	to preset a kind of AUX trip output	*OFF/Ec/Uc/Shcc/AL/IEP/Ir/Ec-IE-AL/Ec-te/Ec-lb *cFF : same 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 ~150OC/1 CC in a step	OFF
Cn	to count tripped number of main contactor	<ul style="list-style-type: none"> *Fixed Value : to show accumulated number of actual trip *max value is 6555 *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
rCIA	to indicate additional factor besides basic factor to indicate running operation value in a order	OFF : basic factor, ON : basic factor + additional factor	OFF
rRESET	to decide how to reset trip state	<ul style="list-style-type: none"> *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 S/W of converter is not available *if trip is acted by phase loss, auto reset is not able, only for manual reset 	hr
AU-t	to preset auto reset time	<ul style="list-style-type: none"> *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 	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	9.6/9.2/38.4/57.6/76.8/115.2kbps	115.2
tCvEr	Main contactor Auto Close	*Shut Down Delay Time : 1~5sec/Adjustable *Delay On Make Time : 0(1start)~25sec	OFF
IAL	to preset alarm level for insulation resistance	<ul style="list-style-type: none"> *OFF : Disable *preset range : 0.1Mchm~500Mchm 	1
rECCd	to preset measurement interval time for insulation resistance	<ul style="list-style-type: none"> *adjustable interval time : 0.1min~3000 min *First measurement is done after preset time from motor stop *If such interval time is passed in the mid of motor operation, a measurement is neglected 	60
rE-rb	to preset possible number to continue a measurement by interval time	<ul style="list-style-type: none"> *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

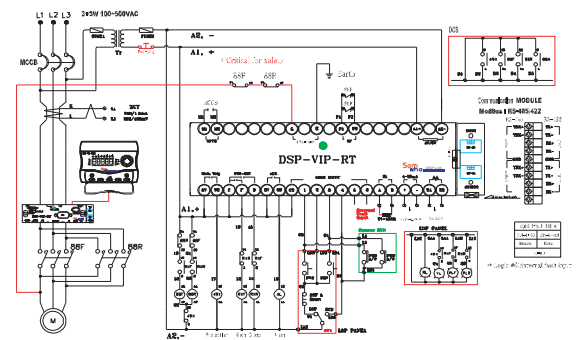
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Application sequence diagram

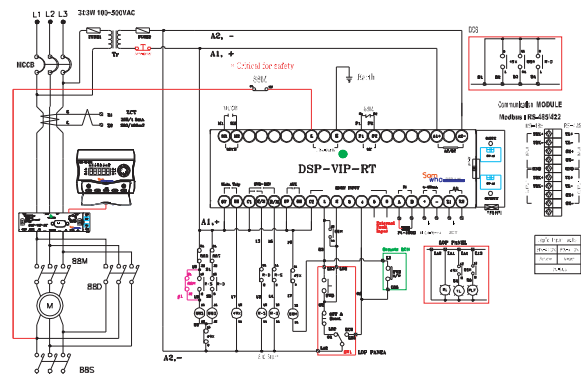
► DCL



► FWD-REV



► Y-D



Cab Mode

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

Mode	Function/range	Description	Factory setting value
PCC00	Passwcrd input	<ul style="list-style-type: none"> * need to input factory value "0000" to enter into this mode group * to calibrate slight difference between indication and actual value within $\pm 12.7\%$ * possible to come next mode by pressing right direction key "CLF" 	0
CrFer	to have a calibration for phase "R" current	<ul style="list-style-type: none"> * possible to adjust within $\pm 12.7\%$ from indicated value by using "UF" or "DN" key 	0
CsFer	to have a calibration for phase "S" current		0
CIFer	to have a calibration for phase "T" current		0
EcFer	to have a calibration for ground fault current		0
FtpEr	to have a calibration for a temperature from Pt1		0
Lcg2/LCF/ALL	to determine method and scope to reset through Lcg input #2	<ul style="list-style-type: none"> * LCP: 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 LCP * 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 "CLF" key 	LCP
clAss/off/Man	to determine a method to measure a resistance	<ul style="list-style-type: none"> * OFF: not available for resistance 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 motor is not possible to start 	AUTO
1st/cFF/Sett ing Value(min)	to preset a first measuring time	<ul style="list-style-type: none"> * CFF: 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 port 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 FEclt /setting Value(P***)	To decide a qualification of VIP in communication to change password	<ul style="list-style-type: none"> * auto: VIP always dispatches a data * Slave: VIP dispatches a data only in case the master requires * possible to enter new digit by using "UF" or "DN" key after positioning a cursor on the required digit * possible to enter into man mode or submode 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
	RL	
	RM	Display Meter
	RTM	
2	7	CA ~ 7CA(C,2A~6A with external CT)
3	B	24VAC/DC(Cpical:order made)
	Z	85VAC~260VAC(90VDC~370VDC)
4	7	50/60Hz
5	ZCT	ZCT Embedded
X	Cpion	Exclusive Customer Order
		* Available for Package type

Reference Code

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

Accessory

Item	Reference code	Description	Remark
Cable	DSF-CABLE-1H	1.5m	
	DSF-CABLE-C3	3m	
	DSF-CABLE-XX	Over 3m	
ZCT	DSF-ZCT-I-XX	100mA/1.5mA	XX : inside diameter of ZCT
	DSF-ZCT-V-XX	100mA/100mV	
Loader	DSF-ID-RL	Input Device/Loader	
Display Meter	DSF-ID-RM	Input Device/Display Meter	
CT Terminal	DSF-TE-3T	Terminal through CT Hole	
Communication Module	DSF-CM-44	* Module : RS 485,422 < RS 485/422	
Communication & recorder Module	DSF-MWR-	* Module : RS 485,422 < RS 485/422 * Recorder for 20 days in every second	
Matching(Frctcdl) Converter	DSF-CMB	* Module RS 485/422 < RS 232:USB	* Existed product by other manufacturer * only for test, input, retrieval for VIF-CM44 combined with VP by using "Samdsp"