Selection Table for VAMP Protection Relays

VTEN020C / 05.2016

Protection and measurement

Type of fault	ANSI	IEC Symbol	Protection function/measurement	Protection function/measurement	Feeder protection											Machine protection											Arc protection			
					VAMP 40	VAMP 50	VAMP 52	VAMP 55	VAMP 57	VAMP 59	VAMP 230	VAMP 255	VAMP 257	VAMP 259	VAMP 300F	VAMP 40	VAMP 52	VAMP 57	VAMP 210	VAMP 230	VAMP 255	VAMP 257	VAMP 265 (1	VAMP 265 M	VAMP 300M	VAMP 300G	VAMP 120	VAMP 121	VAMP 221	VAMP 321
Short circuit	50/51	3I>	Three-phase non-directional overcurrent, low-set stage, definite or inverse time	Three-phase non-directional overcurrent, low-set stage, definite or inverse time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	50/51	3I>>	Three-phase non-directional overcurrent, high-set stage, definite time	Three-phase non-directional overcurrent, high-set stage, definite time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	50/51	3I'>	Three-phase non-directional overcurrent, high-set stage, definite or inverse time (secondary side)	Three-phase non-directional overcurrent, high-set stage, definite or inverse time (secondary side)																		■	■		■					
	50/51	3I'>>	Three-phase non-directional overcurrent, high-set stage, definite time (secondary side)	Three-phase non-directional overcurrent, high-set stage, definite time (secondary side)																		■	■		■					
	50/51	3I>>>	Three-phase non-directional overcurrent, high-set stage, definite time	Three-phase non-directional overcurrent, high-set stage, definite time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
	67 or 50/51	3Iφ>	Three-phase directional or non dir. o/c, low-set stage, definite or inverse time	Three-phase directional or non dir. o/c, low-set stage, definite or inverse time					■		■	■	■	■	■			■	■	■	■	■			■	■				
	67 or 50/51	3Iφ>>	Three-phase directional or non dir. o/c, high-set stage, definite or inverse time	Three-phase directional or non dir. o/c, high-set stage, definite or inverse time					■		■	■	■	■	■			■	■	■	■	■			■	■				
	67 or 50/51	3Iφ>>>	Three-phase directional or non dir. o/c, high-set stage, definite time	Three-phase directional or non dir. o/c, high-set stage, definite time					■		■	■	■	■	■			■	■	■	■	■			■	■				
	67 or 50/51	3Iφ>>>>	Three-phase directional or non dir. o/c, high-set stage, definite time	Three-phase directional or non dir. o/c, high-set stage, definite time					■		■	■	■	■	■			■	■	■	■	■			■	■				
	21/21N	Z<	Distance protection, 5 zones polygonal characteristic	Distance protection, 5 zones polygonal characteristic										■	■															
	87L	Ldl>	Line differential	Phase segregated current differential, definite time						■				■	■															

(1 also for transformer differential protection

Earth-fault	50N/51N	I_0>	Non-directional earth-fault, low-set stage, sensitive, definite or inverse time	Non-directional earth-fault, low-set stage, sensitive, definite or inverse time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	50N/51N	I_0>>	Non-directional earth-fault, high-set stage, definite time	Non-directional earth-fault, high-set stage, definite time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	50N/51N	I_0>>>	Non-directional earth-fault, high-set stage, definite time	Non-directional earth-fault, high-set stage, definite time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	50N/51N	I_0>>>>	Non-directional earth-fault, high-set stage, definite time	Non-directional earth-fault, high-set stage, definite time	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	67N-IEF	I_{0T}	Intermittent transient earth-fault protection	Intermittent transient earth-fault protection	■	■	■		■	■	■	■	■		■															
	67N or 50N/51N	$I_{0\varphi}$>	Directional or non dir. earth-fault, low-set stage, sensitive, definite or inverse time	Directional or non dir. earth-fault, low-set stage, sensitive, definite or inverse time	■		■		■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
	67N or 50N/51N	$I_{0\varphi}$>>	Directional or non dir. earth-fault, high-set stage, definite or inverse time	Directional or non dir. earth-fault, high-set stage, definite or inverse time	■		■		■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
	59N	U_0>	Residual overvoltage, low-set stage	Residual overvoltage, low-set stage	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
	59N	U_0>>	Residual overvoltage, high-set stage	Residual overvoltage, high-set stage	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
	59N	U_0>>>	Residual overvoltage, high-set stage					■																						
	50N/51N	REF	Restricted earth fault (application)	Restricted earth fault (application)	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				

Overload	49M	T>	Three-phase thermal overload (motors & generators)	Three-phase thermal overload (motors & generators)												■	■	■	■	■	■	■	■	■	■	■				
	49F	T>	Three-phase thermal overload (feeders & cables)	Three-phase thermal overload (feeders & cables)	■	■	■		■	■	■	■	■	■	■															
	49T	T>	Three-phase thermal overload (transformers)	Three-phase thermal overload (transformers)																		■			■					

Voltage	59	1U>/3U>	One-/Three-phase overvoltage, low-set stage	One-/Three-phase overvoltage, low-set stage	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	59	1U>>/3U>>	One-/Three-phase overvoltage, high-set stage	One-/Three-phase overvoltage, high-set stage	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	59	1U>>>/3U>>>	One-/Three-phase overvoltage, high-set stage	One-/Three-phase overvoltage, high-set stage	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	59	3U>>>>	Three-phase overvoltage, high-set stage					3																						
	59	3U>>>>>	Three-phase overvoltage, high-set stage					3																						
	27	1U</3U<	One-/Three-phase undervoltage, low-set stage	One-/Three-phase undervoltage, low-set stage	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	27	1U<</3U<<	One-/Three-phase undervoltage, high-set stage	One-/Three-phase undervoltage, high-set stage	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	27	1U<<</3U<<<	One-/Three-phase undervoltage, instantaneous stage	One-/Three-phase undervoltage, instantaneous stage	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	27	3U<<<<	Three-phase undervoltage, instantaneous stage					3																						
	27	3U<<<<<	Three-phase undervoltage, instantaneous stage					3																						
	27P	U1<	1st positive sequence undervoltage stage for generator applications	1st positive sequence undervoltage stage for generator applications				■											■						■					
	27P	U1<<	2nd positive sequence undervoltage stage for generator applications	2nd positive sequence undervoltage stage for generator applications				■											■						■					
	27P	U1<<<	3rd positive sequence undervoltage stage for generator applications					■																						
	47	U2>, U2>>, U2>>>	Negative sequence overvoltage					■																						
	59C	U_0>	Capacitor overvoltage protection	2nd positive sequence undervoltage stage for generator applications	■																									

Protection and measurement

Type of fault	ANSI	IEC Symbol	Protection function/measurement	Protection function/measurement	Feeder protection											Machine protection											Arc protection			
					VAMP 40	VAMP 50	VAMP 52	VAMP 55	VAMP 57	VAMP 59	VAMP 230	VAMP 255	VAMP 257	VAMP 259	VAMP 300F	VAMP 40	VAMP 52	VAMP 57	VAMP 210	VAMP 230	VAMP 255	VAMP 257	VAMP 265 (1	VAMP 265 M	VAMP 300M	VAMP 300G	VAMP 120	VAMP 121	VAMP 221	VAMP 321
Arc protection	50ARC/ 50NARC	3 I> / I_0>, L>	Electrical arc protection stage; point sensors optional, (in VAMP 321 also fiber)	Electrical arc protection stage; point sensors optional (in VAMP 321 also fiber)	■	■	■			■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■				■
	50ARC/ 50NARC	3 I> / I_0>, L>	Electrical arc protection with point sensor; I/O units	Electrical arc protection with point sensor; I/O units																							■	■	■	■
	50ARC/ 50NARC	3 I> / I_0>, L>	Electrical arc protection with fiber or current sensor I/O units	Electrical arc protection with fiber or current sensor I/O units																									■	■
Other functions	79	O ⟶ I	Auto-reclosure	Auto-reclosure	■	■	■		■	■	■	■	■	■	■															
	68		Inrush and cold load detection	Inrush and cold load detection	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				
	68F2	I_{f2}>	Magnetising inrush	Magnetising inrush	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	46	I_2 / I_1>	Current unbalance protection (in feeder mode)	Current unbalance protection (in feeder mode)	■	■	■		■	■	■	■	■	■	■															
	46	I_2>	Current unbalance protection (in motor mode)	Current unbalance protection (in motor mode)												■	■	■	■	■	■	■	■	■	■	■				
	46	I'$_2$>	Phase unbalance protection (secondary side)	Phase unbalance protection (secondary side)																		■	■		■				
	47	I_2>>	Phase sequence / incorrect phase sequence protection	Phase sequence / incorrect phase sequence protection												■	■	■		■	■	■		■	■					
	48		Excessive starting time	Excessive starting time												■	■	■		■	■	■		■	■					
	37	3I<	Loss of load / under current protection	Loss of load / under current protection	■		■		■		■	■	■	■		■	■	■	■	■	■	■		■	■	■				
	86		Latched trip	Latched trip	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	87	3 ΔI>	Three phase biased differential stage, low-set stage, 2nd harmonic blocking, 5th harmonic blocking	Three phase biased differential stage, low-set stage, 2nd harmonic blocking						■				■								■	■		■				
	87	3 ΔI>>	Three phase differential stage, high-set stage	Three phase differential stage, high-set stage						■				■								■	■		■				
	66		Restart inhibit	Successive start												■	■	■		■	■	■		■	■					
	64F3	U_{0f3}>	100% stator earth fault protection	100% stator earth fault protection															■							■				
	40	Q<	Underexcitation protection	Underexcitation protection															■							■				
	40	X<, X<<	Loss of excitation protection	Loss of excitation protection															■							■				
	32	P<,P<<	One-/Three-phase reverse power and underpower protection	One-/Three-phase reverse power and underpower protection	1		1		3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	24	U_f>, U_f>>	Volts / hertz overexcitation protection	Volts / hertz overexcitation protection				■											■							■				
	50BF	CBFP	Circuit breaker failure protection	Circuit breaker failure protection	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■
	81H/ 81L	f ><, f >><<	Overfrequency and underfrequency protection	Overfrequency and underfrequency protection				■	■		■	■	■	■	■			■	■	■	■	■			■	■				
	81H/ 81L	f >>><<<	Overfrequency and underfrequency protection					■																						
	81L	f<, f<<	Underfrequency protection	Underfrequency protection				■	■		■	■	■	■				■	■	■	■	■			■	■				
	81L	f<<<	Underfrequency protection					■																						
	81R	df/dt	Rate of change of frequency (ROCOF) protection	Rate of change of frequency (ROCOF) protection			■	■	■		■	■	■	■	■			■	■	■	■	■			■	■				
	21	Z<, Z<<	Under-impedance protection, circle characteristic	Under-impedance protection, circle characteristic															■							■				
	51V	I_v>	Voltage restrained or controlled overcurrent protection	Voltage restrained or controlled overcurrent protection															■							■				
	25	Δf, ΔU, Δφ	Synchrocheck	Synchrocheck				■	■		■	■	■	■	■			■		■	■	■			■	■				
	21FL		Incomer short circuit fault locator, Feeder fault locator	Short circuit fault location					■		■	■	■	■	■															
	99		8 Programmable stages	8 Programmable stages	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
		DR	Disturbance recorder	Disturbance recorder	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
	68F5	I_{f5}>	Transformer overexcitation	Transformer overexitation	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	50NC/51NC	Iocap>	Capacitor bank protection	Capacitor bank protection	■				■			■	■	■				■												
Type of measurement																														
Primary current	3I		Three-phase current	Three-phase current	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■
	3dI>		Three-phase differential current	Three-phase differential current						■				■								■	■		■				
	3I_0		Zero sequence current	Zero sequence current	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
	I_2		Current balance	Current balance	■	■	■		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■				
	IL		Average and maximum demand current	Average and maximum demand current	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Primary voltage	U/3U		one-/Three-phase and line voltages	one-/Three-phase and line voltages	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
	U_0		Zero sequence voltage	Zero sequence voltage	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■				■
	U_2/U_1		Relative voltage unbalance	Relative voltage unbalance				■	■		■	■	■	■	■			■	■	■	■	■			■	■				
Frequency	f		System frequency	System frequency	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Power	P		Active power	Active power	(*)		(*)		■		■	■	■	■	■	(*)		■	■	■	■	■			■	■				
	Q		Reactive power	Reactive power	(*)		(*)		■		■	■	■	■	■	(*)		■	■	■	■	■			■	■				
	S		Apparent power	Apparent power	(*)		(*)		■		■	■	■	■	■	(*)		■	■	■	■	■			■	■				
Energy	E+, E-		Active energy	Active energy	(*)		(*)		■		■	■	■	■	■	(*)		■	■	■	■	■			■	■				
	Eq+, Eq-		Reactive energy, exported/imported	Reactive energy, exported/imported	(*)		(*)		■		■	■	■	■	■	(*)		■	■	■	■	■			■	■				
Power factor	PF		Power factor	Power factor	(*)		(*)		■		■	■	■	■	■	(*)		■	■	■	■	■			■	■				
Harmonics	I		2nd to 15th and THD of phase currents	2nd to 15th and THD of phase currents	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	U		2nd to 15th and THD of measured voltages	2nd to 15th and THD of measured voltages	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
Voltage sags / swells	U		Voltage sags / swells	Voltage sags / swells	1		1	3	3		3	3	3	3	3	1	1	3	3	3	3	3			3	3				
Analog mA output, 1 channel	AO		Any measured or calculated value, freely scalable, Optional	Any measured or calculated value, freely scalable, Optional		■	■	■		■							■													
Analog mA output, 4 channels	AO		Any measured or calculated value, freely scalable, Optional	Any measured or calculated value, freely scalable, Optional					■		■	■						■		■	■									

(*) : Based on one-phase voltage measurement

Protection and measurement

Type of fault	ANSI	IEC Symbol	Protection function/measurement	Protection function/measurement	Feeder protection											Machine protection											Arc protection			
					VAMP 40	VAMP 50	VAMP 52	VAMP 55	VAMP 57	VAMP 59	VAMP 230	VAMP 255	VAMP 257	VAMP 259	VAMP 300F	VAMP 40	VAMP 52	VAMP 57	VAMP 210	VAMP 230	VAMP 255	VAMP 257	VAMP 265 (1	VAMP 265 M	VAMP 300M	VAMP 300G	VAMP 120	VAMP 121	VAMP 221	VAMP 321
Control																														
Digital inputs			Number of digital inputs, max	Number of digital inputs	2	7	7	7	16	7	8	20	28	28	40	2	7	16	6	8	20	28	6	8	40	20				6
			Number of binary inputs (arc protection)	Number of binary inputs (arc protection)											3										3	3	1	1	3	3
Outputs relays			Number of trip relays, max	Number of trip relays	4	5	5	5	7	5	2	4	8	8	20	4	5	7	2	2	4	8	2	2	20	13				4
			Number of alarm relays	Number of alarm relays	1	1	1	1	1	1	5	5	5	5	2	1	1	1	5	5	5	5	5	5	2	2	3		2	1
			Number of arc protection trip relays, < 7 ms	Number of arc protection trip relays, < 7 ms											4										4	4	2	1	4	4
			Number of semicontactor outputs, <1 ms	Number of semicontactor outputs, <1 ms																										2
			Number of binary outputs (arc flash protection)	Number of binary outputs (arc flash protection)											3										3			1	3	3
Object status indication			Single line diagram, 8 objects	Single line diagram, 8 objects	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8				8
Local and remote control			Number of controllable objects	Number of controllable objects	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6				6
Interlocking and logic			Configurable	Configurable	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Condition monitoring																														
Trip circuit		TCS	Trip Circuit Supervision	Trip Circuit Supervision	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
		TCS	Trip Circuit Supervision with DI for T5...T8	Trip Circuit Supervision with DI for T5...T8		■ (2	■ (2	■		■ (2			■	■			■ (2					■								
CT Supervision			CT Supervision	CT Supervision	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
VT Supervision	60		VT Supervision/ Fuse failure supervision	VT Supervision/ Fuse failure supervision				■	■		■	■	■	■	■			■	■	■	■	■			■	■				
CB Wear			Breaker wear	Breaker wear	■	■	■		■	■	■ (2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Communication																														
IEC 60870-5-101 TCP					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
IEC 60870-5-101					■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
IEC 60870-5-103					■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Modbus TCP					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Modbus RTU					■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Profibus DP					■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
DNP 3.0					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
DNP TCP					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Ethernet IP					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
SPA-bus communication					■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
IEC 61850						■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■				■
DeviceNet					■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
TCP / IP					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Human-Machine-Communication, display					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■
Human-Machine-Communication, PC					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
General functions																														
Selfsupervision					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■
Annunciating, event generating and value recording					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■
Measurement and parameter display					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■
Real time clock			Year, month, day, hour, minutes, seconds, milliseconds	Year, month, day, hour, minutes, seconds, milliseconds	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				■

(2: option (T5)

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NRJED313449EN