



VAMP 300T

Modular IED for power transformer protection

The VAMP 300 IED is modular and fully supervised unit that can be adapted for a wide range of applications. Within VAMP 300 family the VAMP 300T is dedicated for protection of power transformers.

The VAMP 300T is based on the proven technology of VAMP protection relays. Besides a comprehensive range of standard protection functions the VAMP relays also offers temperature measurement with external RTD input module. Further, the VAMP relays incorporate power quality assessment based on fast Fourier transform. Following a network or transformer fault, the relays support fault analysis by providing event sequence recordings, fault value registration and disturbance recorder capability.

The modularity of the VAMP 300 IED also allows a wide selection of communication protocols, including IEC 61850, Profibus DP, Modbus TCP, Modbus RTU, DNP 3.0, DeviceNet, IEC 60870-5-101, 60870-5-103, DNP TCP, IEC 60870-5-101 TCP and SPA-Bus.

m.vamp.fi

Life Is On

Schneider
Electric

VAMP 300T

We can supply a protection IED tailored to your application



Customer specific configuration is obtained by freely configurable mimic display and logic programming using the easy-to-use VAMPSET software.

VAMP 300T at a glance

- VAMP 300T has all necessary power transformer, incoming feeder and substation voltage protection functionalities in one device
- Interface to external VIO 12A RTD input module for twelve Pt, Ni or Cu temperature sensors. The external module enables the sensor connection point to be close to the transformer, minimising sensor cable lengths. Measurements are transferred to the relay via RS485 or optical interface for the required protection stages, logic or measurements.
- Two alternative display options
 - 128 x 128 LCD matrix
 - 128 x 128 LCD matrix (detachable)
- Power quality measurements and disturbance recorder enable capture of quick network phenomena
- Wide range of communication protocols i.e. IEC61850, Profibus DP to Modbus TCP to name the most important ones.

User benefits

- Pre-selectable amount of digital inputs ranging from 0 to 20 and outputs from 5 to 13 enable large amount of signals being interfaced with the power generation process.
- Bay mimic and control for quick detection of power process status
- Proven Vamp's flexible and simple to use solution
- User friendly multilingual HMI for customised messaging
- Free of cost VAMPSET configuration and setting tool with USB connection
- Text pocket for customised alarm legend indications



Flexible protection solutions

Benefits of modular design

- **A modular IED for different applications:**

VAMP 300 IED features a modular design that allows user-defined protection to both new and existing power distribution systems.

- **VIO 12 RTD input module**

VIO 12 RTD module is used for extending the measuring quantities of VAMP transformer protection relays. The VIO 12 module has channels for RTD sensors, mA inputs and outputs and PTC input.

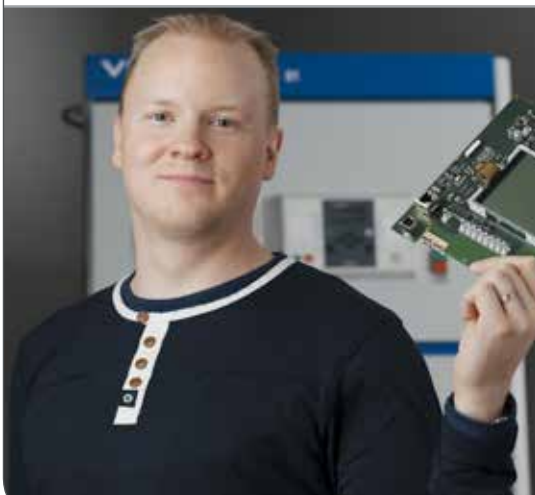
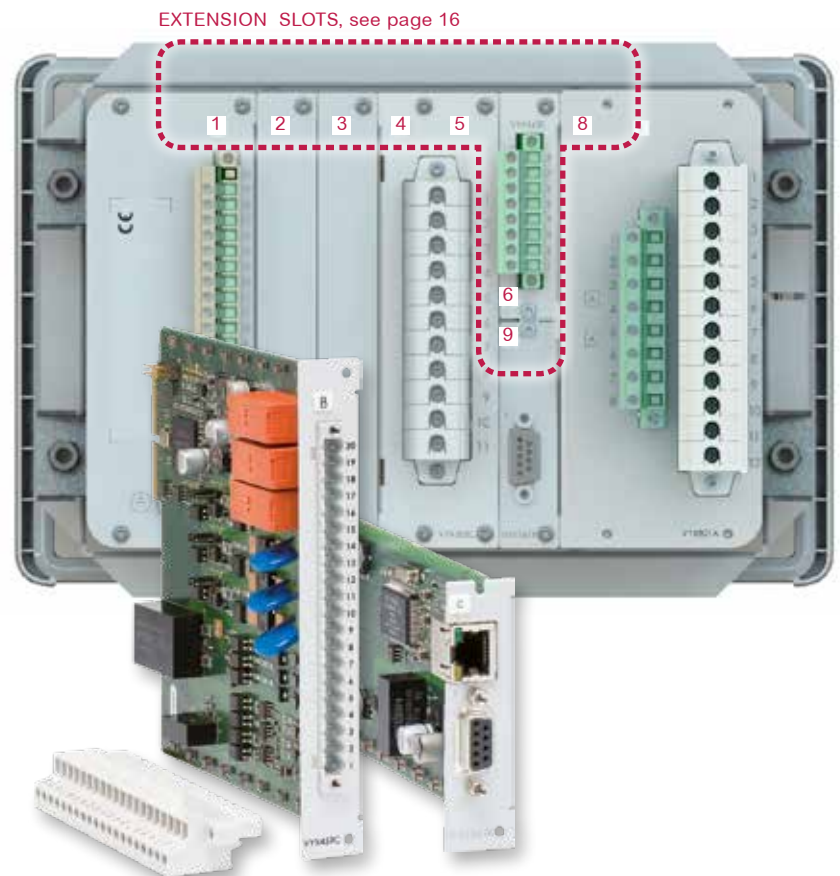
- **Local push buttons for object control:**

New password protected and easy to use control buttons for breaker controlling.

User may decide the hardware of the unit .



Build your own protection IED suitable to your application



Quick selection tables

Input and output alternatives

Modularity ensures a wide range of DI / DO combination as per customer demand. The table shows number of DI / DO for optional module combinations.

Alternative Input and Output combinations

DI (pcs)	0	6	12	16	20
DO (pcs)	5	9	13	9	5

Protection functions

Coming now, transformer protection include necessary protection functions and modern control features for basic and demanding applications.

Protection functions of VAMP 300T

Phase overcurrent (50/51)
Directional phase overcurrent (67)
SOTF Switch on to fault (50 HS)
Current unbalance (46)
Thermal overload (49)
Earth fault (50N/51N)
Directional earth fault (67N)
Differential overcurrent (87)
Undervoltage (27)
Overvoltage (59)
Volts/hertz over-excitation (24)
Zero sequence voltage protection (59N)
Positive sequence under voltage (27P)
Frequency (81)
Underfrequency (81L)
Rate of change of frequency (81R)
Magnetising inrush (68F2)
Transformer over-excitation (68F5)
Circuit breaker failure (50BF)
Cold load pick-up and magnetising inrush
Programmable stages (99)
Synchro check (25)
CB wear



User-friendliness has always been a feature of VAMP products, and the transformer protection is no exception.

Circuit breaker control

ON / OFF buttons

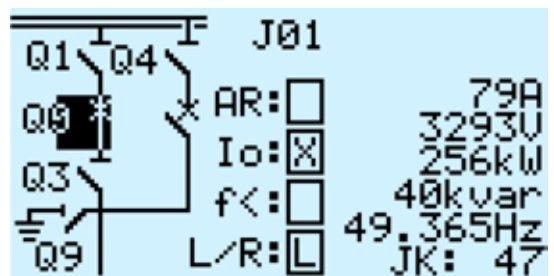
The most advanced circuit breaker controlling is to use dedicated ON / OFF control buttons for the object. Two different operational modes may be chosen:

- **Selective:** Once a control button is pressed a dedicated Control view with pre-determined timeout asks confirmation for the control.
 - **Direct:** Using this mode the control of the circuit breaker is immediate. This mode is practical for instance during the commissioning stage.
- Customized interlocking is checked before output of the controlling will become active.



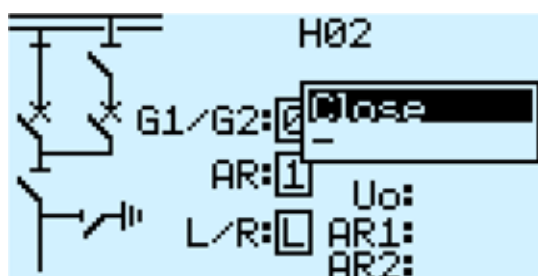
Control through HMI

A third possibility to control circuit breakers and isolators is to use the Mimic view of the IED. User selects wanted object in the single line diagram and executes the control with dedicated Info view instructions.



F1 / F2 buttons

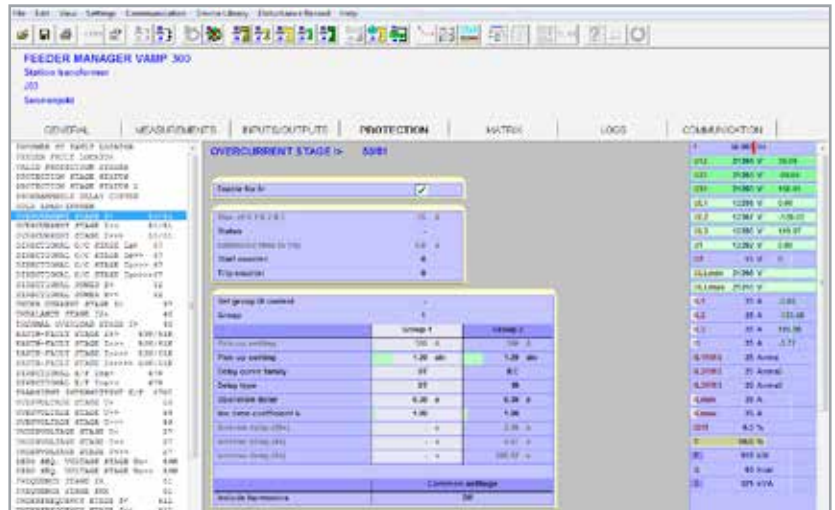
Another way to control circuit breaker or isolators is to program Function button F1 and F2 to execute the control command. Once programmed F1 could be the close and F2 open operand. A dedicated info view appears on the HMI requesting confirmation or de-selection of the action.



VAMPSET

Setting and Configuration Tool

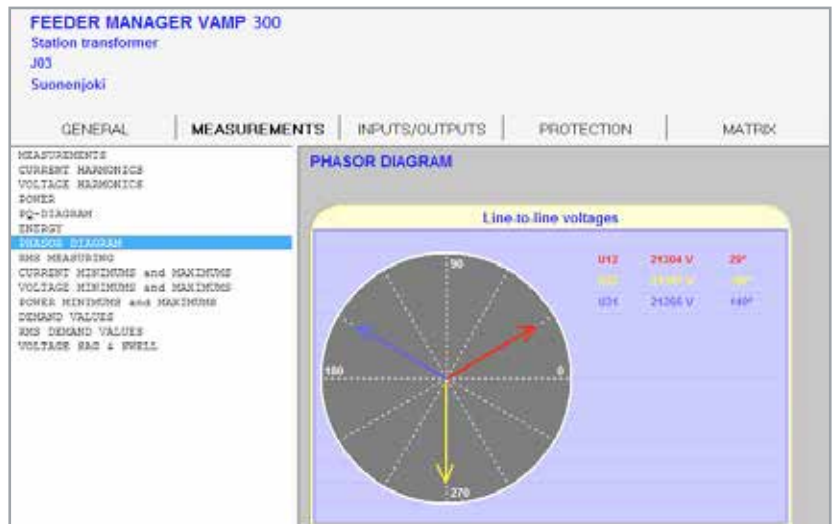
VAMPSET is a user-friendly, free-of-charge relay management software for setting parameters and configuring VAMP relays. Via the VAMPSET software, relay parameters, configurations and recorded data can be exchanged between PC and VAMP relays. Supporting the COMTRADE format, VAMPSET also incorporates tools for analysing relay events, waveforms and trends from data recorded by the relays, e.g. during a network fault situation.



Relay's setting views are organised to several folders in the VAMPSET setting tool views in order to conveniently find right data for parameterisation of the IED. The setting tool displays on-line measurements in each folder view.



The VAMPSET software is future-proof, supporting future updates and new VAMP products.



The phase sequences for currents and voltages can be read on-line from the clear and explicit phasor diagram screen for easy commissioning of the relay .

Arc flash protection

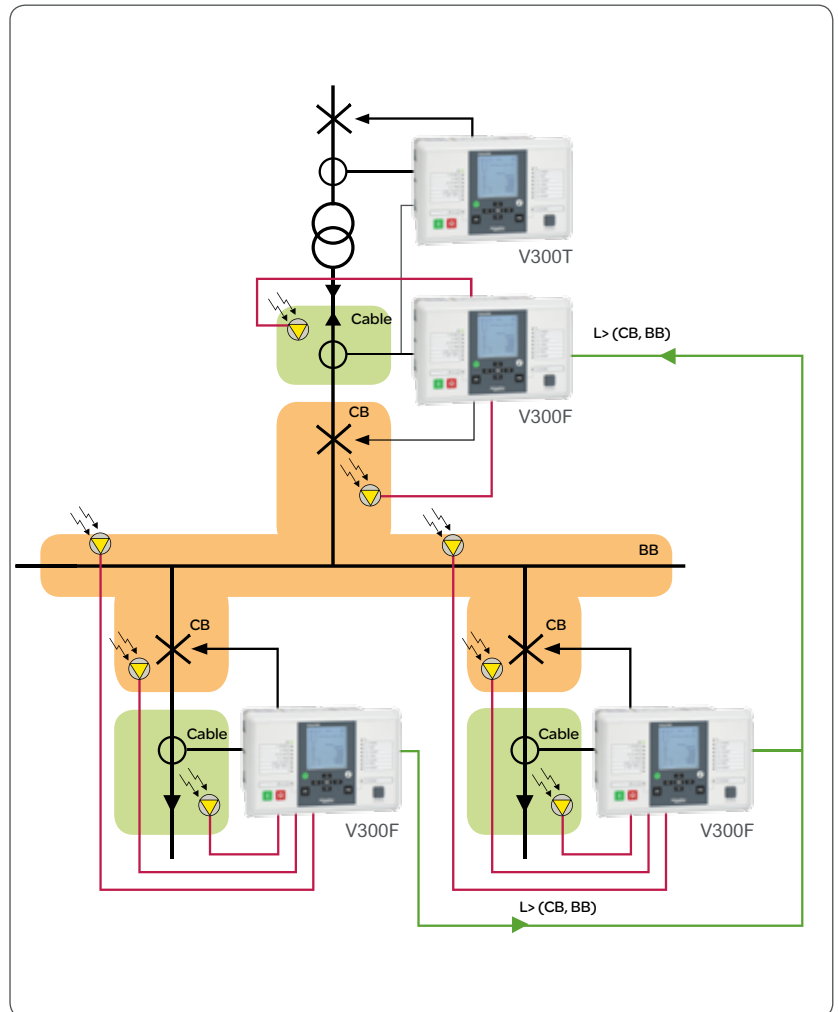
Transformer protection VAMP 300T does not comprise arc flash protection as it is typically used for protection of outdoor power transformer.

Even though VAMP 300 series feeder and motor protection IED can optionally measure fault current and with optional arc protection, also measure light via arc sensor channels, which provide monitoring for the whole switchgear. Should an arc fault occur in the switchgear the arc protection system provides extremely fast tripping of the circuit breaker. The fault will be prevented from spreading and quickly isolated, which may save valuable assets.

Alternatively the arc flash protection for the indoor switchgear can be implemented using dedicated arc flash protection units from VAMP's product family.



VAMP - pioneer in arc flash protection



Arc sensors for V300F and V300M models used for feeder and protection

- Easy installation and replacement
- Enables fault location indication
- Surface mounting
- Tube mounting
- Continuous self-supervision



Communication

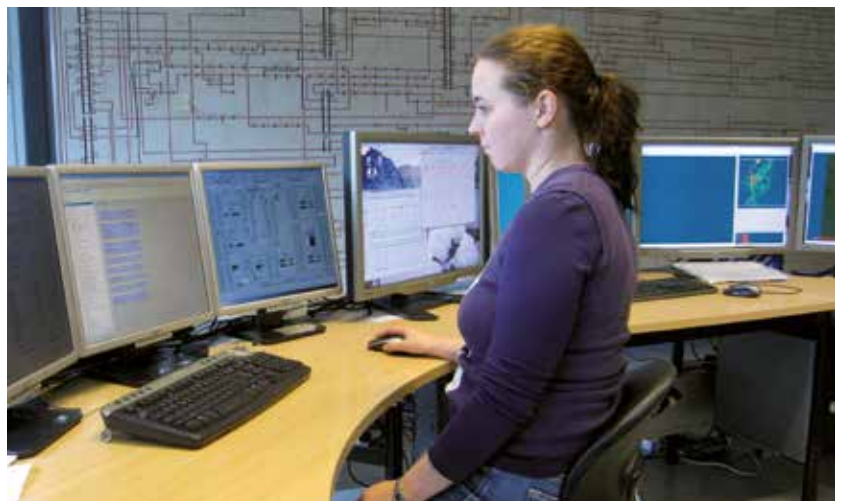
VAMP is a communication expert with a wide experience in interfacing with different system integrators' and SCADA suppliers' RTUs, PLCs, gateways etc. using many different protocols. Flexible adaptation of the communication protocols together with powerful and easy to use software tools are the key of successful integration.

VAMP 300 IED and the VAMPSET tool provide access to practically any power system information you may need.

IEC 61850

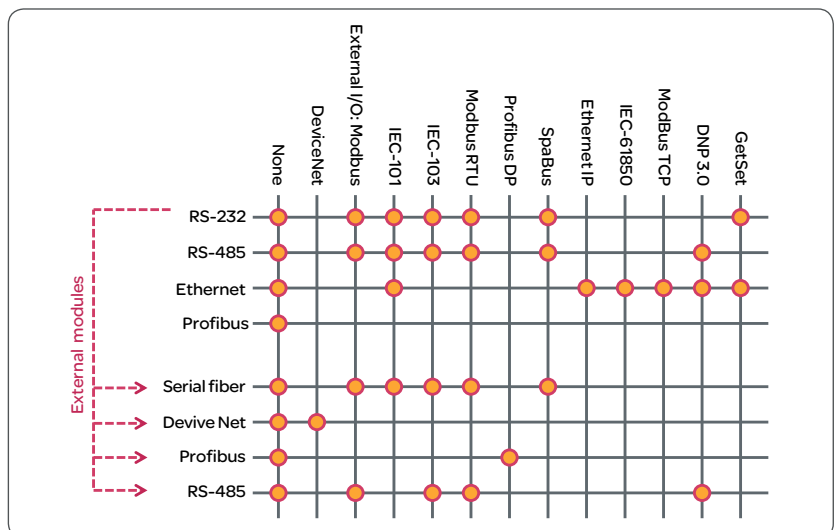
The IEC 61850 protocol can be used to read or write static data or to receive events sent spontaneously from the relay. In addition, the interface allows peer-to-peer communication between the relays, called GOOSE communication. The IEC 61850 interface is configured with familiar, user-friendly VAMPSET software.

The IEC 61850 datamodel, data-sets, report control blocks and the GOOSE communication are configured according to the requirements of the system configuration. VAMPSET is also used to produce ICD files, which may be needed for the substation RTU configuration



Communication matrix

Communication matrix shows which physical interface matches with supported protocols.



Connections

Analog interface modules


The slot 8 can accommodate three different analog measurement cards. Modules C, D and W have 3 phase currents, 2 residual currents and 4 voltage channels. Transformer protection requires use of T option card in slot 4-5 in order to form differential connection for the application.

Slot 8: $C = 3L(5A) + 4U + 2I_0 (5+1A)$

Slot 8: $D = 3L(5A) + 2I_0 (1+0.2A)$

Slot 8: $W = 3L(1A) + 4U + 2I_0 (5+1A)$

Slot 4-5: $T = 3xI (5/1A) + I_0 (5/1A)$

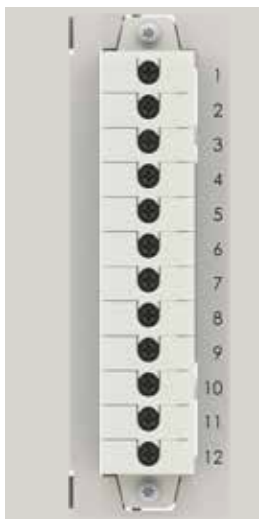


Voltage connection mode

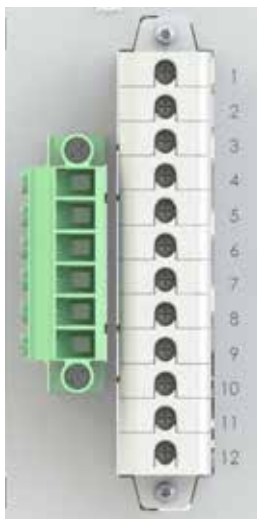
Terminal	8/C/2, 8/D/2 and 8/W/2						8/C/1, 8/D/1 and 8/W/1	
	1	2	3	4	5	6	11	12
Voltage channel	U1		U2		U3		U4	
Mode / Used voltage								
3LN	UL1		UL2		UL3		Not in use	
3LN+U ₀							U ₀	
3LN+LL _y							LL _y	
3LN+LN _y							LN _y	
2LL+U ₀	U12		U23		U ₀		Not in use	
2LL+U ₀ +LL _y							LL _y	
2LL+U ₀ +LN _y							LN _y	
LL+U ₀ +LL _y +LL _z			L12z					
LN+U ₀ +LN _y +LN _z	UL12		U11 _y				UL1z	

Correlation between voltage measuring mode, physical voltage input and available voltages in terminals 8/C/1, 8/D/1, 8/W/1 and 8/C/2, 8/D/2, 8/W/2.

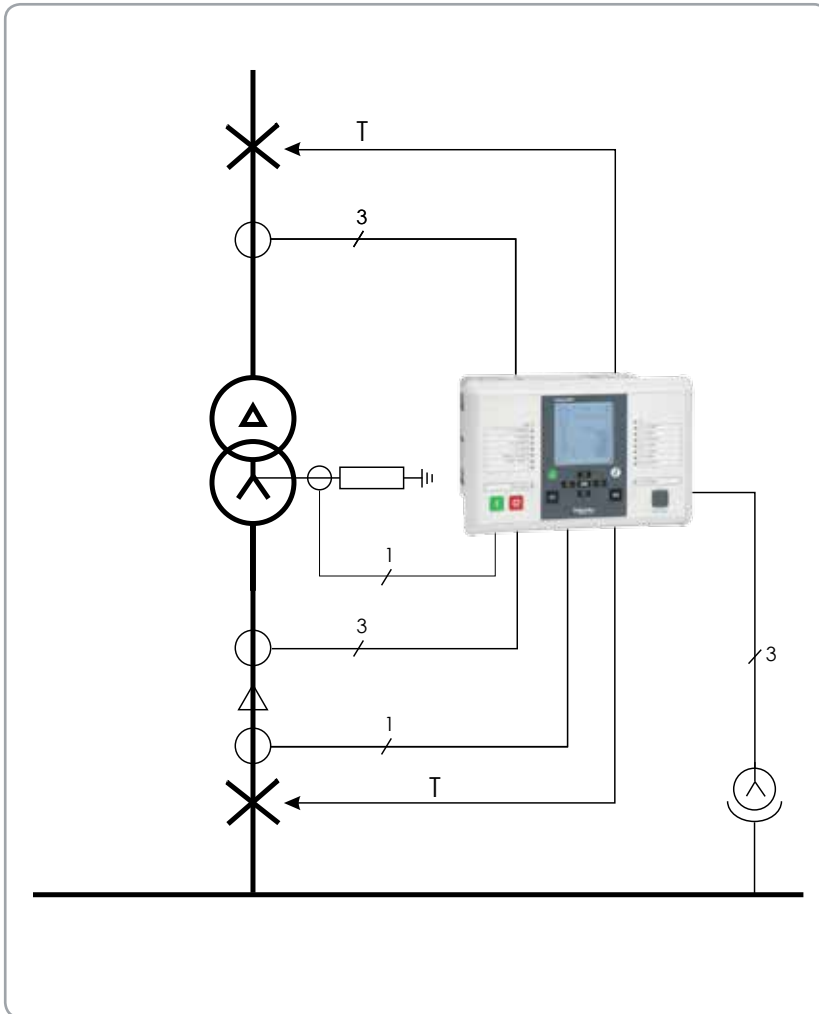
The T analog measurement card for IL and I₀



The C, D and W analog measurement card for IL, I₀ and U.



Connection examples



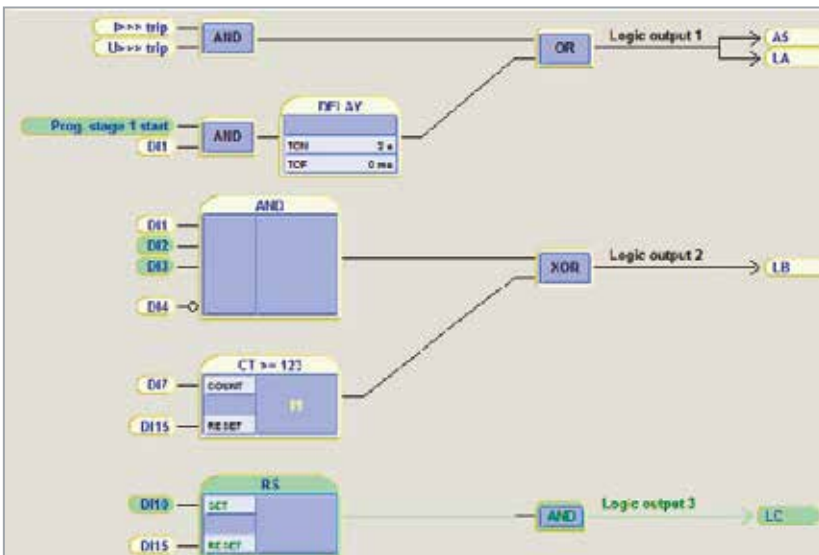
Typical protection scheme for power transformers includes phase current measurements from both sides of the transformer. These measurements can be used for differential protection enabling selective tripping between faults inside transformer and faults in the network. Also power system voltages can be monitored with V300T transformer protection relay.



Programmable stages

There are eight programmable stages available to use with various applications. Each stage can monitor any analogue (measured or calculated) signal and issue start and trip signals. Programmable stages extend the protection functionality of the manager series to a new

level. For example, if four stages of frequency are not enough, with programmable stages, the maximum of 12 can be reached. Other examples are using the stages to issue an alarm when there are a lot of harmonics (THD) or indicating reverse power condition



Programmable logic: The logic editor has colours to enable viewing of active statuses. Furthermore, each input status can be also seen on-line in VAMPSET view .

PROGRAMMABLE STAGE 1

Enable for Prg1

Priority 20 ms

Programmable stage 1 status

Enable forcing

Coupling THDL1

THDL1 10.0 %

Compare condition >

Set group DI control

Group	Group 1	Group 2
Pick-up setting	15.0 %	100.0 %
Pick-up setting	15 %	100 %
Operation delay	0.50 s	0.50 s

Common settings

Hysteresis 3.0 %

No compare limit for mode < 6 %

PROGRAMMABLE STAGE 1 00

Enable for Prg1

Priority 20 ms

Programmable stage 1 status Trip

Enable forcing

Threshold for input value A Invert

Coupling A 0.1

U.I 10 s

Threshold for input value B Invert

Coupling B 0.2

U.I 10 s

Compare condition >

Set group DI control

Group	Group 1	Group 2
Pick-up setting	15.0 %	100.0 %
Pick-up setting	15.0 %	100.0 %
Operation delay	0.50 s	0.50 s

Common settings

Hysteresis 3.0 %

No compare limit for mode < 6.00 s



Programmable stage has a possibility to compare two freely selectable signals between each other. Using this feature the user can create compare function using relay's own measured or calculated signals. One or both of the signals can be connected to comparison function over GOOSE.

Mounting options

Order options provide two alternative mounting principles to VAMP 321 IED. Both options have its own advantages.

Panel mounting

The conventional mounting technique has always been installing the IED on the secondary compartment's door. Limitation in this approach could be that the door construction is not strong enough for the IED's weight and suitability to wire large amount of secondary and communication cabling could be challenging.



Projection mounting

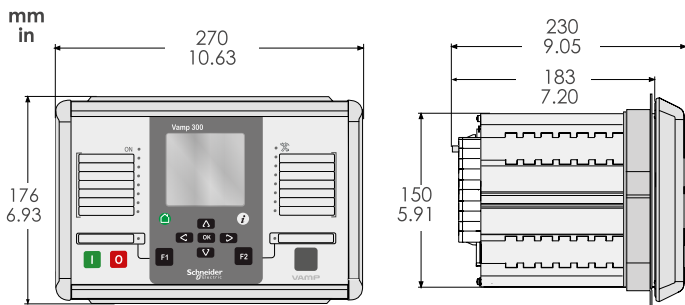
In case the depth dimension behind the compartment door is limited, the IED can be equipped with frame around the collar. This arrangement reduces depth inside compartment by 45 mm.

Wall mounting with detachable HMI brings more flexibility

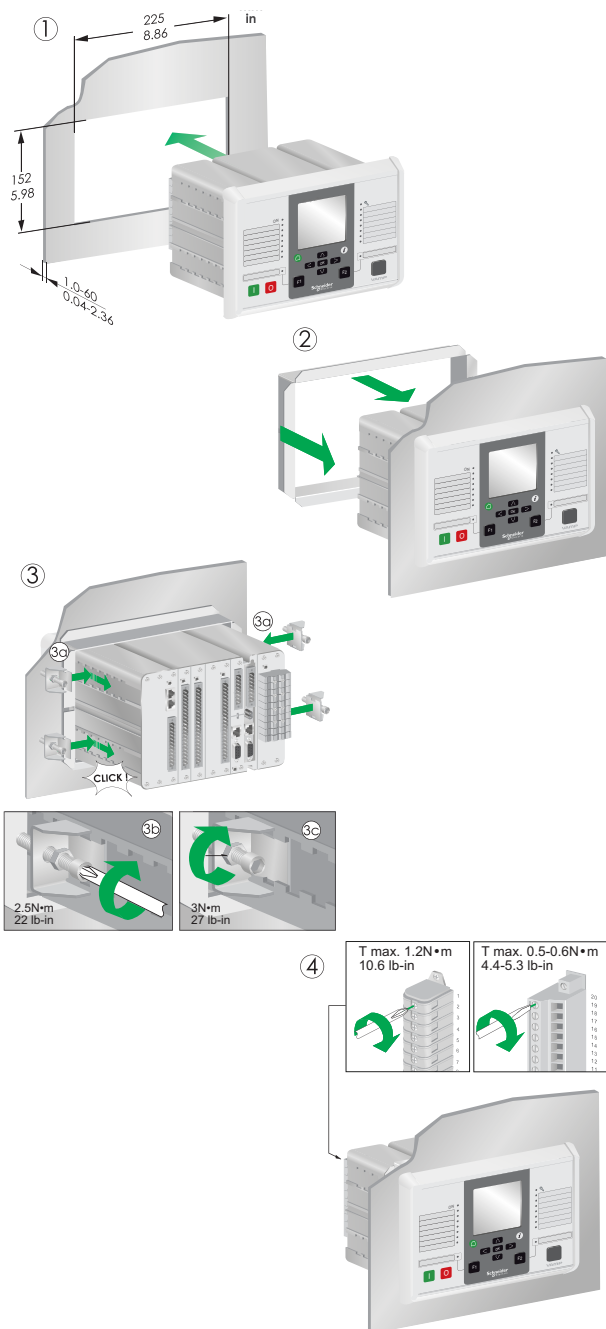
This mounting technique allows door being lighter as the relays frame is installed in the back of the secondary compartment. Communication, DI and DO cabling is easier, too, as the door movement does not need to be considered. In this case, only the communication between IED base and display has to be wired.



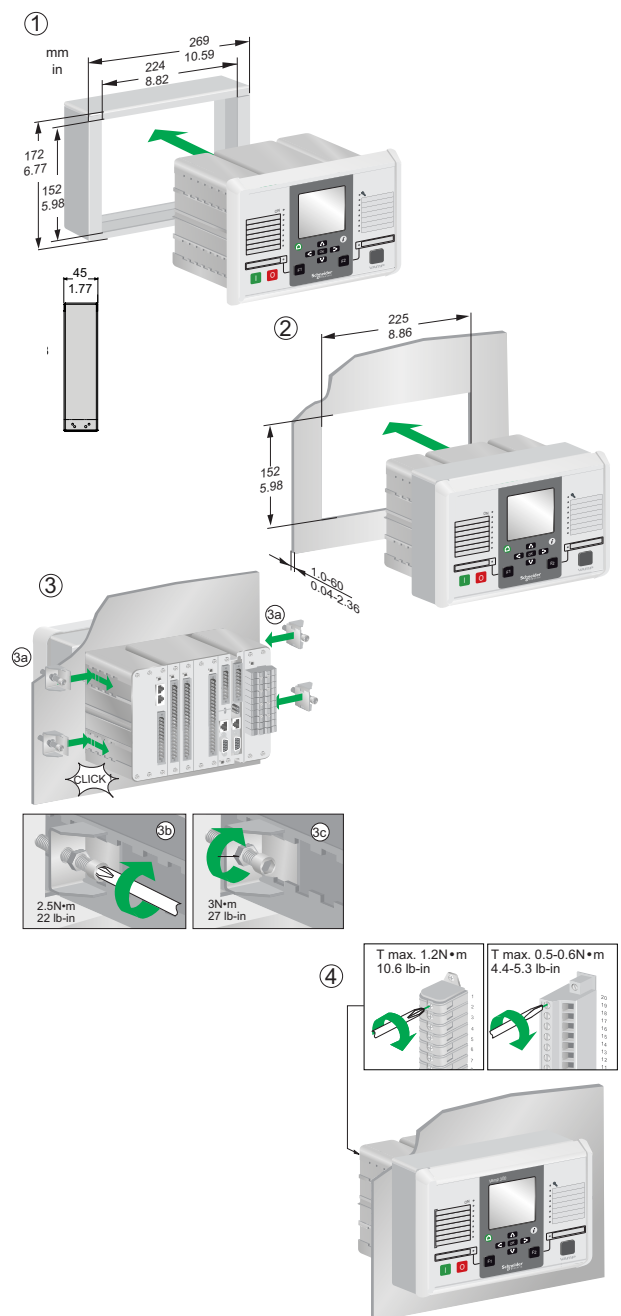
Dimensional drawings



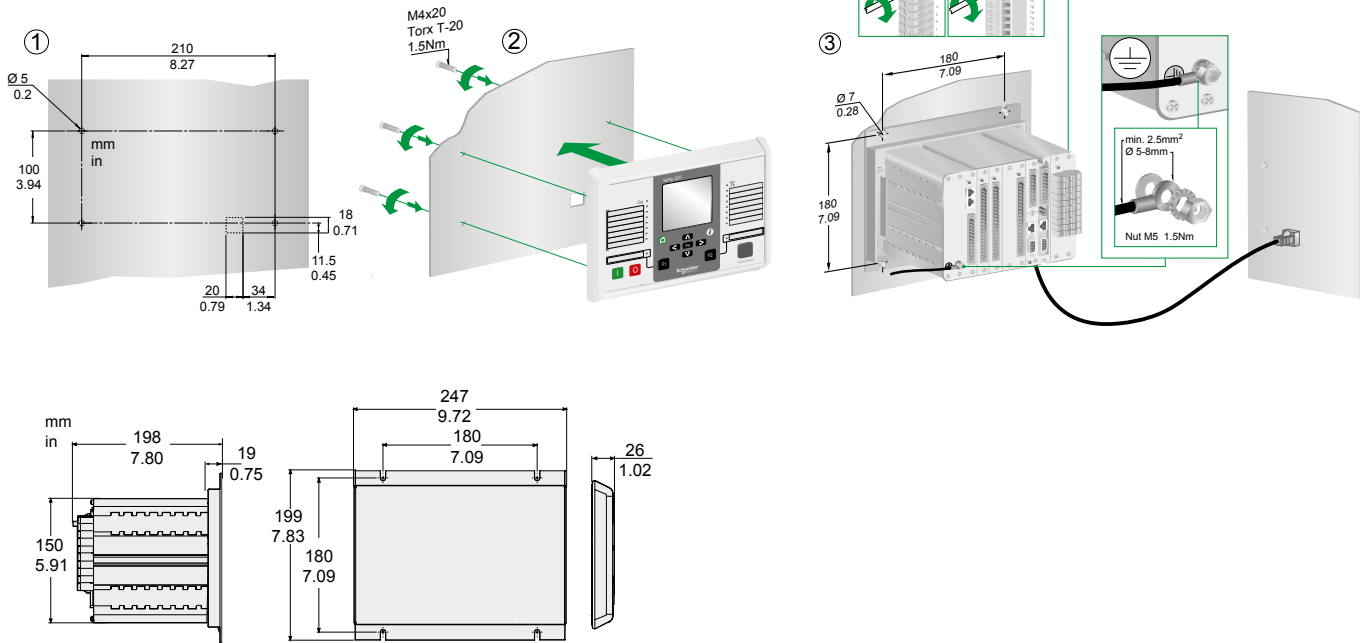
Panel mounting



Projection mounting



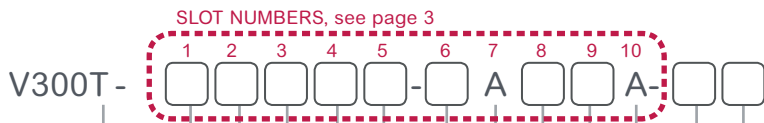
Wall mounting with detachable HMI



The VAMP 300 Series is designed with user-friendliness in mind.



Order codes



G = 6DI+4DO (6 x DI, 4 x DO)



C = RS232+RJ
(RS232 + Ethernet RJ-45 100 Mbs)



D = RS232+LC
(RS232 + Ethernet LC 100 Mbs)

Application	T = Transformer
Supply voltage [V]	C = Power C 110 - 240 (80 - 265 Vac/dc, 5 x DO heavy duty, A1, SF) D = Power D 24 - 48 (18 - 60Vdc, 5 x DO heavy duty, A1, SF)
I/O Card I	A = None G = 6DI+4DO (6 x DI, 4 x DO) H = 6DI+4DO (6 x DI, 4 x DO(NC)) I = 10DI (10 x DI)
I/O Card II	A = None G = 6DI+4DO (6 x DI, 4 x DO) H = 6DI+4DO (6 x DI, 4 x DO(NC)) I = 10DI (10 x DI)
I/O Card III	T = 3xI (5/1A) + Io (5/1A) for transformer, excludes I/O card in slot 5
I/O Card IV	A = None
Option card I	A = None K = RS232 (RS232) P = PP (Plastic / Plastic serial fibre) R = GG (Glass / Glass serial fibre)
Future option	A = None
Analog measurement card	C = 3L (5 A)+4U+2Io (5+1 A) D = 3L (5 A)+4U+2Io (1+0.2 A) W = 3L (1 A)+4U+2Io (5+1 A)
Communication interface I	A = None B = RS232 (RS232, IRIG-B) C = RS232+RJ (RS232, IRIG-B + Ethernet RJ-45 100 Mbs) D = RS232+LC (RS232, IRIG-B + Ethernet LC 100 Mbs) N = 2xRJ (Ethernet RJ 100 Mbs, RSTP) O = 2xLC (Ethernet LC 100 Mbs, RSTP) P = PP (Plastic / Plastic serial fibre) R = GG (Glass / Glass serial fibre)
Future option	A = None
Display type	B = 128 x 128 (128 x 128 LCD matrix) C = 128 x 128Ext (128 x 128 LCD matrix, detachable, 2 m cable) (1)
DI nominal voltage	1 = 24 Vdc/ac 2 = 110 Vdc/ac 3 = 220 Vdc/ac A = 24 Vdc/ac, WITH conformal coating B = 110 Vdc/ac, WITH conformal coating C = 220 Vdc/ac, WITH conformal coating

Note 1: By default cable length is 2 m. In case other length is needed order separately VX001-1, Vx001-3 or VX001-5 for 1 m, 3 m and 5 m respectively

Accessories

Order code	Description	Note
VX052-3	USB programming cable (VAMPSET)	Cable length 3 m
VX067	VAMP 300/321 split cable for COM1-2 and COM 3-4 ports	Cable length 3 m
VSE001PP	Fiber optic interface module (plastic - plastic)	Max. distance 30 m
VSE001GG	Fiber optic interface module (glass - glass)	Max. distance 1 km
VSE001GP	Fiber optic Interface Module (glass - plastic)	Max. distance 1 km
VSE001PG	Fiber optic Interface Module (plastic - glass)	Max. distance 1 km
VSE002	RS485 module	
VSE009	DeviceNet module	
VPA3CG	Profibus DP fieldbus option module	
VX072	VAMP 300/321 profibus cable	Cable length 3m
VIO 12 AB	RTD module, 12 pcs RTD inputs, RS 485 communication (24-230 Vac/dc)	Always conformally coated
VIO 12 AC	RTD/mA Module, 12 pcs RTD inputs, PTC, mA inputs/outputs, RS232, RS485 and optical Tx/Rx communication (24 Vdc)	Always conformally coated
VIO 12 AD	RTD/mA module, 12 pcs RTD inputs, PTC, mA inputs/outputs, RS232, RS485 and optical Tx/Rx communication (48-230 Vac/dc)	Always conformally coated
VYX695	Projection for 300-series	Height 45 mm

Note 1. Fiber lengths 1, 5, 10, 15, 20, 25, 30, 35, 40, 50, 60 or 70 m

Tests and enviromental

Disturbance tests	Standard & Test class / level	Test value
Emission - Conducted - Emitted	EN 61000-6-4 / IEC 60255-26 EN 55011, Class A / IEC 60255-25 EN 55011, Class A / IEC 60255-25 / CISPR 11	0.15 – 30 MHz 30 – 1 000 MHz
Immunity - 1Mhz damped oscillatory wave - Static discharge (ESD) - Emitted HF field - Fast transients (EFT) - Surge - Conducted HF field - Power-frequency magnetic field - Pulse magnetic field - Voltage interruptions - Voltage alternative component - Voltage dips and short interruptions	EN 61000-6-2 / IEC 60255-26 IEC 60255-22-1 EN 61000-4-2 Level 4 / IEC 60255-22-2 Class 4 EN 61000-4-3 Level 3 / IEC 60255-22-3 EN 61000-4-4 Level 4 / IEC 60255-22-4 Class A EN 61000-4-5 Level 4 / IEC 60255-22-5 EN 61000-4-6 Level 3 / IEC 60255-22-6 EN 61000-4-8 EN 61000-4-9 Level 5 EN 61000-4-29 / IEC 60255-11 EN 61000-4-17 / IEC 60255-11 EN 61000-4-11	±2.5 kVp CM, ±2.5 kVp DM ± 8 kV contact, ± 15 kV air 80 - 2700 MHz, 10 V/m ± 4 kV 5/50 ns, 5 kHz ± 4 kV, 1.2/50 µs, CM ± 2 kV, 1.2/50 µs, DM 0.15 - 80 MHz, 10 Vemf 300 A/m (continuous), 1000 A/m 1–3 s 1000 A/m, 1.2/50 µs 30 %/1 s, 60 %/0.1 s, 100 %/0.05 s 12 % of operating voltage (DC) / 10 min 30 % / 10 ms, 100 % / 10 ms, 60 % / 100 ms, < 95 % / 5000 ms
Electrical safety tests		
- Impulse voltage withstand - Dielectric test - Insulation resistance - Protective bonding resistance - Power supply burden	EN 60255-5, Class III EN 60255-5, Class III EN 60255-5 EN 60255-27 IEC 60255-1	5 kV, 1.2 / 50 µs 2 kV, 50 Hz > 100Mohm, 500 V / 100 V < 0.1 ohm > 20 W internal
Mechanical tests		
Device in operation - Vibrations - Shocks	IEC 60255-21-1, Class II / IEC 60068-2-6, Fc IEC 60255-21-2, Class II / IEC 60068-2-27, Ea	1Gn, 10Hz – 150 HZ 10Gn/11 ms
Device de-energized - Vibrations - Shocks - Bump	IEC 60255-21-1, Class II / IEC 60068-2-6, Fc IEC 60255-21-2, Class II / IEC 60068-2-27, Ea IEC 60255-21-2, Class II / IEC 60068-2-27, Ea	2Gn, 10 Hz – 150 HZ 30Gn/11 ms 20 Gn/16 ms
Environmental tests		
Device in operation - Dry heat - Cold - Damp heat, cyclic - Damp heat, static	EN / IEC 60068-2-2, Bd EN / IEC 60068-2-1, Ad EN / IEC 60068-2-30, Db EN / IEC 60068-2-78, Cab	+70°C -40°C From +25°C to +55°C, From 93% RH to 98% RH, 6 days
Device in storage - Dry heat - Cold	EN / IEC 60068-2-2, Bb EN / IEC 60068-2-1, Ab	+40°C, 93% RH, 10 days +70°C -40°C
Environmental conditions		
Ambient temperature, in-service Ambient temperature, storage Relative humidity Maximum operating altitude Degree of protection (IEC 60529) Weight Dimension (W x H x D)	-40 – +60°C -40 – +70 °C < 95%, no condensation allowed 2000 m IP54 (from front when panel mounted) 3.2 kg or higher (depends of options) 270 x 176 x 230 mm	
Package		
Dimensions (W x H x D) Weight (IED, Package and Manual)	315 x 210 x 257 mm 5.2 kg or higher (depends of options)	



Device track record

- Schneider Electric's VAMP range specialises in protection relays, arc flash protection and measuring and monitoring units for power systems.
- VAMP's medium-voltage and sub-transmission protection relays are used in numerous applications, from overhead line feeders and substations to power plants and industrial power system. Their unique integrated arc flash fault protection functionality enhances the safety of both people and property and has made VAMP a leading range in arc flash protection worldwide. VAMP products meet the latest international standards and regulations.