

VAMP 321

Modular solutions for flexible arc flash protection



Main characteristics

- **Modular structure**

The design of VAMP 321 allows insertion of new hardware which adds performance and functionality to the system. The basic unit has two dedicated arc sensor inputs and is scalable from standard to high-end arc flash protection systems.

- **PC configurable**

The system can be configured by the end-user with the VAMPSET software tool. Events and disturbance recordings are easily evaluated using a PC with USB connection.

- **Event logs and disturbance recording**

A world first, Vamp introduces event and disturbance functionality in an arc protection system to enhance the pre and post fault analysis of the arc phenomena.

- **Compatible with existing systems**

The VAMP 321 relies on the same VAM I/O units, cabling and sensors as the company's other renowned arc flash protection systems.

- **Engineered for the most demanding environments**

The new mechanical structure comprises a robust cast aluminium casing. Adjustable fixtures provide flexible installation to every power system environment. IP54 protection is achieved when flush mounted.

- **Proven technology**

Developed in close cooperation with customers, the VAMP 321 combines the reliable technology of Vamp's 50 and 200 series and that of the VAMP 221 arc flash protection system.

- **Communication**

The VAMP 321 has five communication ports, four of which are intended for a SCADA interface. Supported protocols are IEC 61850, Profibus DP, Modbus TCP, DNP TCP, Modbus RTU, SPA, IEC 60870-5-101 and IEC 60870-5-103.

Modern society heavily depends on an uninterrupted supply of electric power. Prolonged power outages cause loss of business to the power supplier and loss of production to the power consumer. Regardless of how safe a power system is, faults do occur.

An arc flash protection relay is a protective device used to maximise the safety of personnel and minimise the damage to the installation in the most hazardous power system fault situations.

Fast arc flash protection increases operator safety in case of an arc fault occurring in switchgear.

The faster the operating time of the protection system, the lesser the damage caused by the arc fault will be.

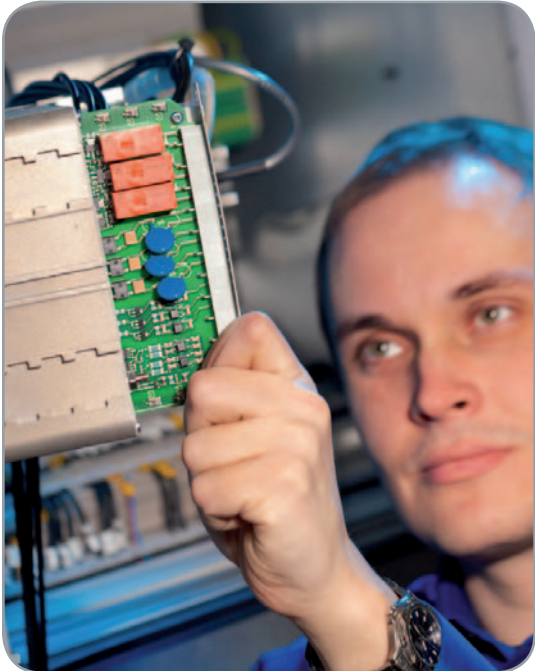
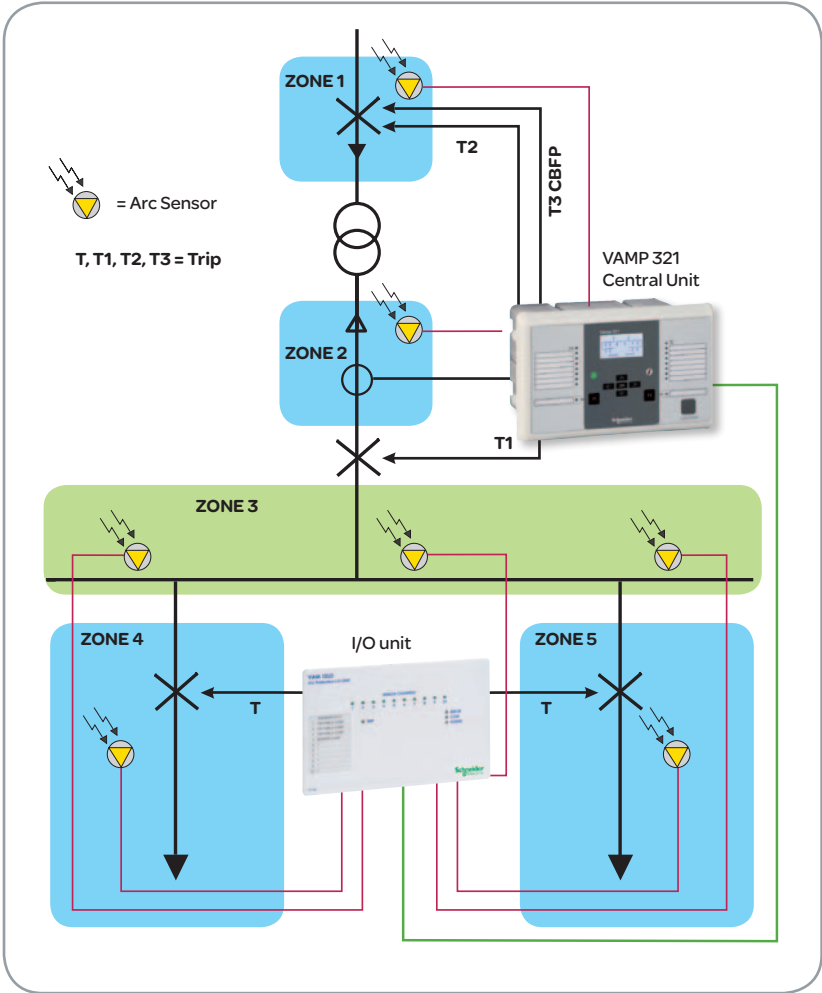
Schneider Electric's Vamp range is the pioneer in the field of arc flash protection with close to 10,000 systems in service world-wide.

The new VAMP 321 system is designed with user-friendliness in mind

Why arc flash protection?

When traditional time-grading or blocking based protection coordination principle is used, it may not provide fast enough protection of substation faults. Further, high-impedance type earth-faults may cause prolonged operation times of earth-fault relays leading to the significant release of arcing energy.

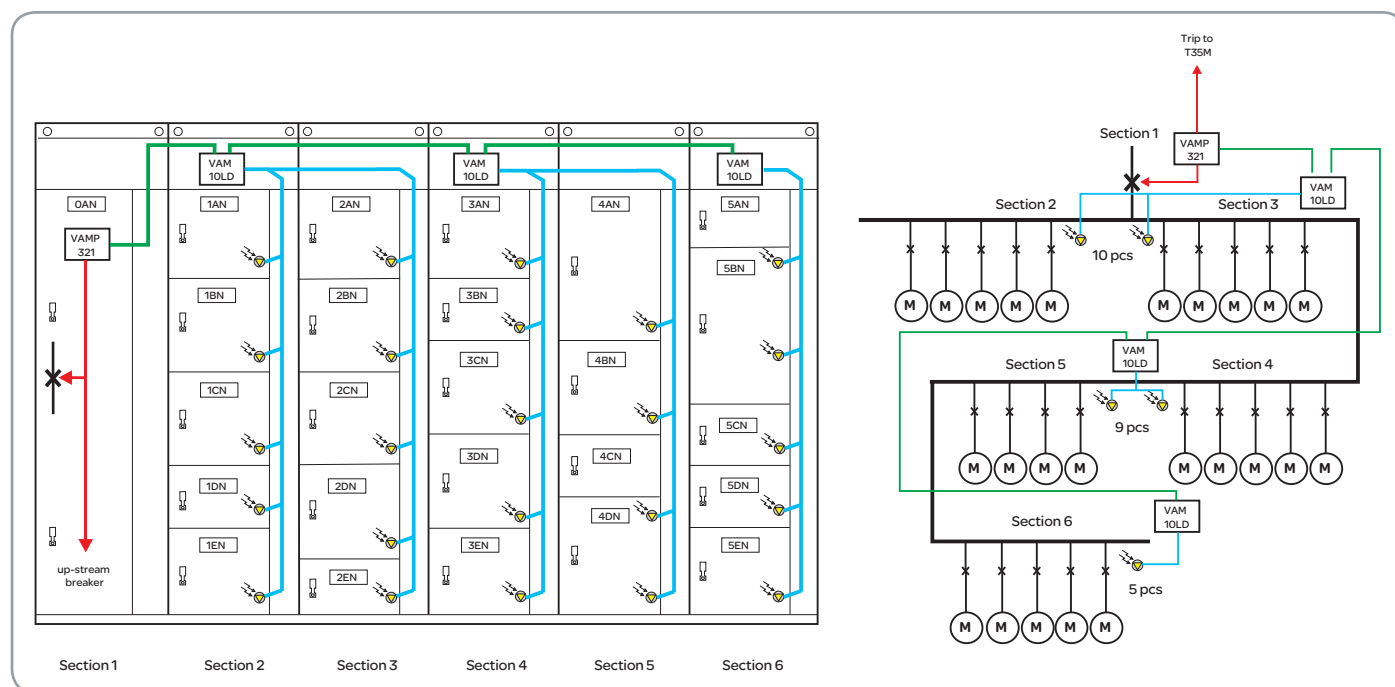
These facts pose a considerable risk to operation personnel and economical assets.



Selective and Flexible Arc Flash Protection Solutions for Low and Medium Voltage Systems

Modern motor control centers (MCC) equipped with arc flash protection provide ultra-fast arc protection for the switchgear, limiting the possible arc flash fault to a minimum.

The point sensors give an accurate location of the fault thus the required repair for the MCC's is fast and the power can be restored without fault location time delay. The central unit trips both the incoming LV circuit breaker and the circuit breaker up-stream. The nature for an arc flash fault can be fuse, cable termination, contactor or circuit breaker feeding the motor in the MCC, therefore fast fault location is extremely useful.

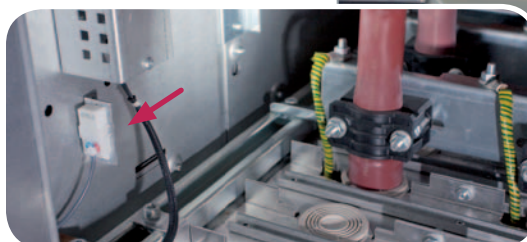


Various solutions for any medium or low voltage arc protection application

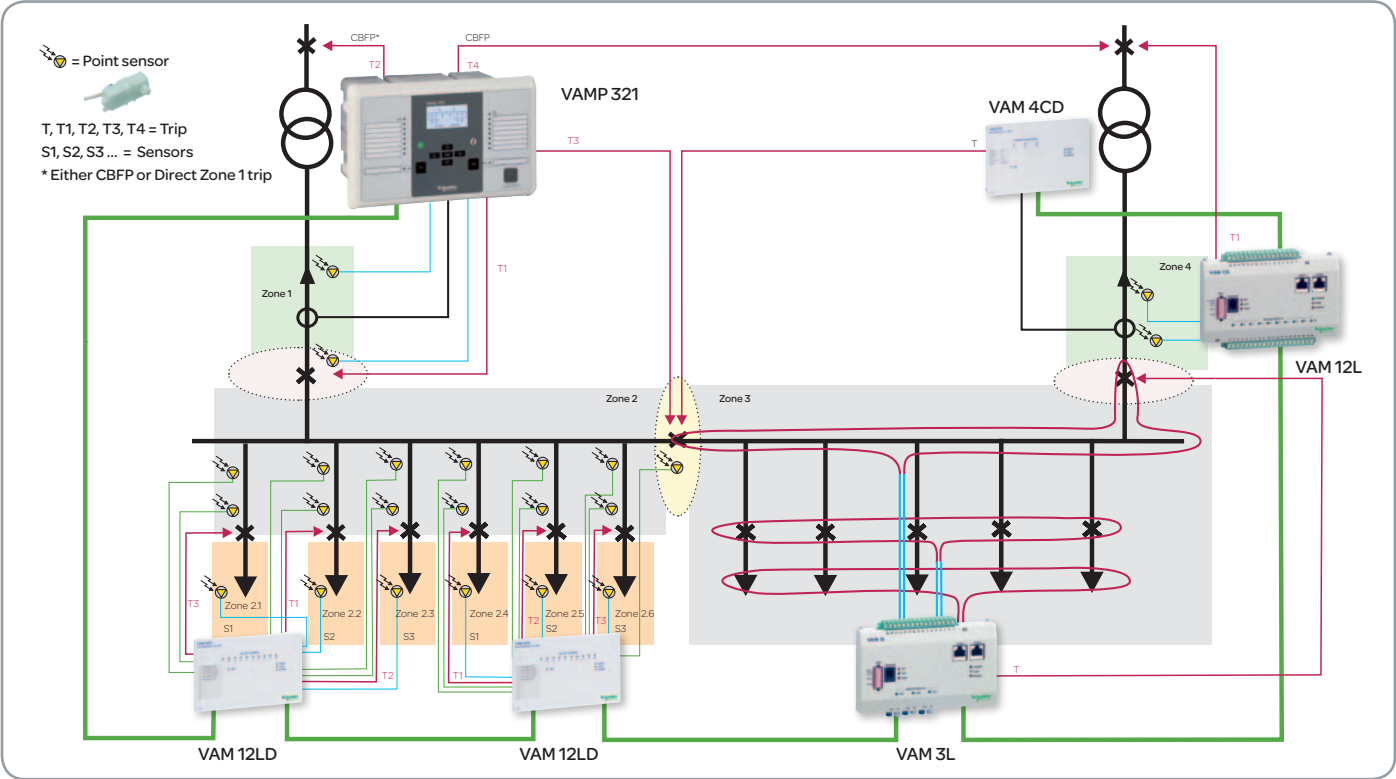
- The VAMP arc protection system can be built using various components of the VAMP relay family.
- The system has been designed to cover basic level and demanding applications of the low and medium voltage power distribution system.
- VAMP arc protection system and relay products can be combined to obtain an arc protection scheme for any application.



The arc sensor I/O units incorporate a snap-in connector for the portable sensor. The activated arc sensor channel is indicated with a led.



The majority of arc faults occur in the cable compartment hence it is a natural location for the point sensor.



The selectivity requirement of the arc flash protection is dependent on the switchgear construction and the importance of the power distribution. The more important the supplied power, the more selective arc flash protection scheme is implemented.

The left side of the medium voltage switchgear, as seen in the picture, has various protection zones. Cable termination has its own zone and is tripped should the fault occur in the cable compartment.

One VAM 12LD unit is able to trip up to three sub-

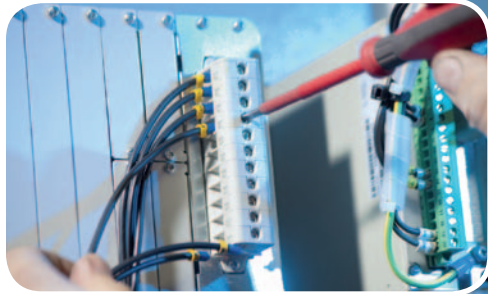
zones selectively.

The circuit breaker and busbar compartments belongs to another zone supervised by the VAM 12LD units.

As the distribution system does not have current measurement on the high voltage side of the power transformer, the arc flash protection system uses the current status from low voltage side. In this case the zone 1 selectivity is set up by light only criteria and the zone is fully isolated should the fault occur.

The right side of the switchgear has a universal one zone scheme for the cable, circuit breaker and bus bar compartments using three fibre sensor loops. The incoming cable termination compartment is based on the light only protection principle.

Point sensors are mounted in the switchgear's arc pressure relief compartment in this installation.



Arc protection systems require three phase currents for selective high-speed arc protection. Using the zero-sequence voltage and current in tripping criteria, the arc fault trip can be activated before the fault is completely exposed.

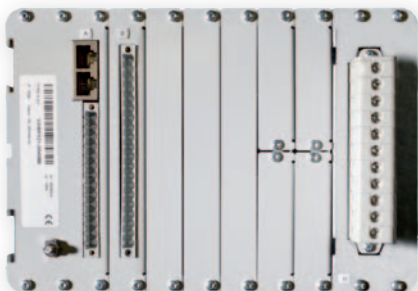


Characteristics and Highlights of the VAMP 321 Arc Protection System

VAMP 321 ARC PROTECTION SYSTEM CENTRAL UNIT



- 3-phase current, zero-sequence current and voltage
- Event logs, disturbance recording and real-time clock
- High speed output, HSO: 1 ms (typically)
- Trip contact, T: 7 ms
- Operation on simultaneous current and light or on light only
- Informative display
- Communication with SCADA
- Four normally open trip contacts (option)
- One normally open and one change over alarm contact
- Programmable operation zones
- Continuous system self-supervision
- Circuit breaker failure protection (user configurable)



The auxiliary supply, CT wiring, trip and alarm outputs as well as modular cables are connected to the rear side of the central unit.

VAMP 321 ARC PROTECTION SYSTEM

- Auxiliary supply and communication via modular cable
- Continuous supervision of sensors
- Connection of portable arc sensor, except VAM 4C and VAM 4CD
- Indication of arc sensor / current channel and trip relay activation

VAM 4C, VAM 4CD CURRENT I/O UNIT



- Auxiliary supply and communication via modular cable
- 3-phase current measurement or 2-phase and zero-sequence current measurement
- Adjustable pick-up setting
- Indication of the current channel pick-up, current imbalance and trip relay activation
- One trip relay
- Two communication ports for central unit and I/O unit interconnection

VAM 4CD - Additional features to VAM 4C

- Labelling for customised arc sensor channel text
- Flush mounting
- HMI indication available on door closed position

VAM 3L, VAM 3LX FIBRE SENSOR I/O UNIT



- Auxiliary supply and communication via modular cable
- Three supervised fibre loop arc sensor connections
- Connection of portable arc sensor
- Indication of the sensor channel and trip relay activation
- One trip relay
- Two communication ports for central unit and I/O unit interconnection

VAM 3LX - Additional features to VAM 3L

- Fibre arc sensor sensitivity adjustment

VAM 10L, VAM 10 LD
POINT SENSOR I/O UNIT



- Auxiliary supply and communication via modular cable
- Ten (10) point arc sensor connections
- Continuous supervision of sensors
- Connection of portable arc sensor
- Indication of the sensor channel and trip relay activation
- One trip relay
- Two communication ports for central unit and I/O unit interconnection

VAM 10LD - Additional features to VAM 10L

- Labelling for customised arc sensor channel text
- Flush mounting
- HMI indication available on door closed position

VAM 12L, VAM 12LD
POINT SENSOR I/O UNIT



- Three selective trip output contacts for dedicated sensors
- Auxiliary supply and communication via modular cable
- 10 point arc sensor connections
- Continuous supervision of sensors
- Connection of portable arc sensor
- Indication of the sensor channel and trip relay activation
- Two communication ports for central unit and I/O unit interconnection

VAM 12LD - Additional features to VAM 12L

- Flush mounted unit
- HMI indication available on door closed position
- Labelling for customised arc sensor channel text

SELECTION TABLE FOR VAM I/O UNITS

	VAM 3L	VAM 10L	VAM 10LD	VAM 12 L	VAM 12LD	VAM 4C	VAM 4CD
Mounting	DIN rail	DIN rail	Door	DIN rail	Door	DIN rail	Door
No. of point sensors		10	10	10	10		
No. of loop sensors	3						
No. of protection zones supported	1	1	1	4	4		
No. of trip contacts	1	1	1	3	3	1	1
No. of alarm contacts				1	1		
No. of current inputs						3	3
No. of BI (24-48Vdc)*	1	1	1				
No. of BI (24-48Vdc) L>						1	1
No. of BO (24Vdc) trip	1	1	1			1	1
No. of sensor channel indication (LED)	3	10	10	10	10	3	3
Connection for portable sensor	1	1	1	1	1		
Other			(*)		(*)		(*)

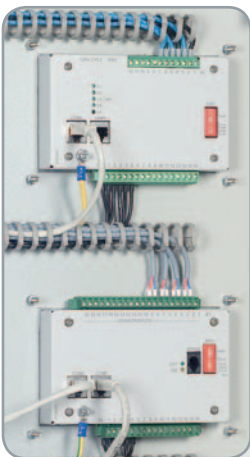
* Used for zone shift 1 < -- > 2 and 3 < --- > 4

(*) Text pocket for setting values

DI CONTROL FOR ZONE SHIFT

	Active zone			
BI channel state	1	2	3	4
Not active	x		x	
Active		x		x

Used for VAM 10L, VAM 3L and VAM 3LX



Door mounted I/O units show arc protection system information without opening the secondary compartment door

In case the central unit is located close to the I/O units, the I/O units can be placed in the secondary equipment compartment.



Sensors and Accessories

POINT SENSORS

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



FIBRE ARC-SLm SENSORS

- Standard fibre
- Length from 1 to 70 meters
- Self-supervision
- Cost effective when many compartments



- ARC-SLm**
- Activation 8,000 lx
 - Multicore cable
 - 10 mm bending radius minimum

SENSOR MOUNTING PLATES

- Z- or L-shaped
- Wall mounting to VA1DA-x sensors (no extra holes in the switchgear)



PORTABLE SENSOR VA1DP

- Provides additional detection of arc flash
- Quick connection with snap-in socket



Portable sensor VA1DP-5



Portable sensor VA1DP-5D



VX031-5 Extension cable



Modular cable VX001-x 1)



Fibre joint SLS-1

Portable sensor VA1DP-5

- Snap-in socket connection to sensor I/O unit

Portable sensor VA1DP-5D

- Snap-in socket connection to sensor I/O unit via VX031-5 cable

VX031-5 Extension cable

- Extension cable and door socket for VA1DP-5D
- Diplexer for two portable sensors

Modular cable VX001-x

- Transfers all information and aux. supply between VAMP 321 and I/O unit or between I/O units, simple wiring with RJ 45 connector

Fibre joint SLS-1

- Conveniently connects two fibres together
- Used for switchgear shipping splits, maximum one joint per fibre

VAMP 4R TRIP MULTIPLIER RELAY

- 4 + 4 trip outputs (4 x NO and 4 x NC)
- Two separate tripping groups
- Enables a 7 ms total operation time to a large number of CBs controlled by binary output (BO) of VAMP 121 unit
- Requires external auxiliary power supply



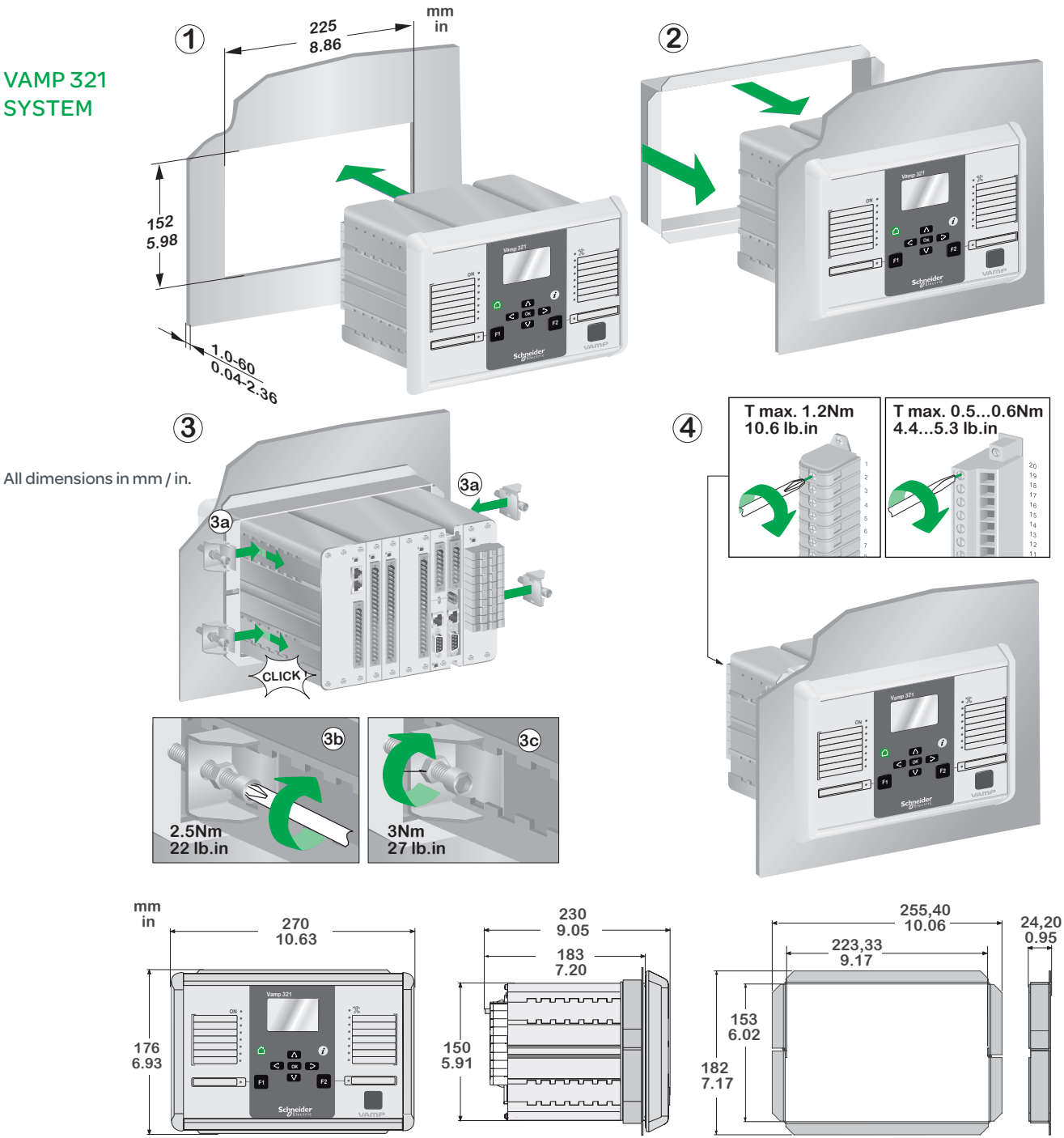
Note 1: X = cable length (m)

Note 2: X = fibre length (m)

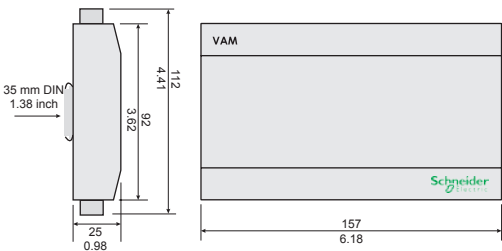
For more details, see accessories page 12.

Dimensional drawings

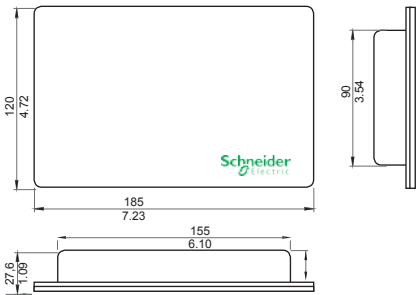
VAMP 321 SYSTEM



VAM 10L, 3L, 4C AND VAMP 4R



VAM 4CD, 10 LD, 12LD FLUSH MOUNTING



Technical data

VAMP 321 System

Power supply	
Vs	90...265 V ac/dc 110/120/220/240 V ac 110/125/220 V dc
Measuring circuits	
Rated current I _N Burden	5 A (configurable for CT secondaries 1 – 10 A) < 0.2 VA
Rated current I _O Burden	5 A / 1 A (optionally 1 A / 0.2 A) < 0.2 VA
Rated voltage U _N Burden	100 V (configurable for VT secondaries 50 – 120 V) < 0.5 VA
Rated frequency f _N	45 - 65 Hz
Operating settings	
Phase current stage IL>	0.5 ... 8.0 x I _N
Earth-fault current Io>	0.1 ... 5.0 x I _N
Tripping outputs	
Number of contacts	As per order code
Rated voltage	250 V ac/dc
Continuous carry	5 A
Make and carry for 0.5 s	30 A
Make and carry for 3 s	15 A
Contact material	AgNi 90/10
Operating time (trip contact)	7 ms
Operating time (HSO)	2 ms
Signal outputs	
SF output contact	1 pc change over
Signal contact	1 pc NO
Rated Voltage	250 V ac/dc
Continuous carry	5 A
Contact material	AgNi
Binary inputs / outputs	
Rated output voltage	+30 V dc
Rated input voltage	+18...265 Vdc
Rated current (BO)	20 mA
Rated current (BI)	5 mA
BI line (IN)	3 pcs
BO lines (OUT)	3 pcs
Arc I/O bus (RJ-45)	
Multi drop	Max 16 slaves and 3 masters
Supply to slaves	Isolated 24 V dc
Communication (master-slave)	RS485 information / self supervision
ARC / OC signal master-slave	4 zone ARC and 1 zone OC line
Arc sensor inputs	
Direct inputs	As per order code
Supply to sensor	Isolated 12 V DC

Tests and environment

EMC emission tests:	
EN 55011, IEC 60255-25	
EMC immunity tests:	
IEC 60255-11, EN 61000-4-11	
IEC 60255-22-1	
EN 61000-4-2, IEC 60255-22-2	
EN 61000-4-3, IEC 60255-22-3	
EN 61000-4-4, IEC 60255-22-4	
EN 61000-4-5, IEC 60255-22-5	
EN 61000-4-6, IEC 60255-22-6	
EN 61000-4-8	
EN 61000-4-9	
IEC 61000-4-17	
Environmental tests:	
IEC 60068-2-1 Ad	
IEC 60068-2-2 Bd	
IEC 60068-2-1 Ab	
IEC 60068-2-2 Bb	
IEC 60068-2-30 Db	
IEC 61068-2-78 Cab	
Mechanical tests:	
IEC 60255-21-1	
IEC 60255-21-2	
Operating temperature	-10...+60° C
Relative humidity	< 95 %, no conden- sation allowed
Degree of protection (IEC 60529)	IP54
Weight	4,0 kg
Dimension (w x h x d)	270 x 176 x 230 mm 10.63 x 6.93 x 9.05 in.

Technical data

VAM I/O units

TRIP contacts		
Rated voltage	250 V ac/dc	
Continuous carry	5 A	
Make and carry for 0.5 s	30 A	
Make and carry for 3 s	15 A	
t>	7 ms	
Digital inputs		
Rated voltage	24 V dc	
Rated current	5 mA	
Digital outputs		
Rated voltage	24 V dc	
Rated current	20 mA (max)	
VAM 10L / 10LD / 12L / 12LD		
	VAM 10L / LD	VAM 12L / LD
No. of trip contacts	1	3
No. of digital inputs	1	
No. of digital outputs	1	
No. of arc sensor channels	10 pcs	
Power supply	+24 V dc via modular cable or terminals	
Power consumption, In (stand-by)	45 mA	
Power consumption per activated channel I sensAct	20 mA	
Total power consumption	45 mA + (n* x I sens Act)	
VAM 3L, VAM 3LX		
No. of trip contacts	1	
No. of digital inputs	1	
No. of digital outputs	1	
No. of fibre loops	3 pcs	
Power supply	+24 V dc via modular cable or terminals	
Power consumption, In (stand-by)	45 mA	
Power consumption per activated channel I sensAct	20 mA	
Total power consumption	45 mA + (n* x I sens Act)	
VAM 4C / VAM 4CD		
No. of trip contacts	1	
No. of digital inputs	1	
No. of digital outputs	1	
Measuring circuits		
Rated current In	1 A / 5 A	
Rated frequency fn	45...65 Hz	
Power consumption	≤ 0.3 VA	
Thermal withstand	60 x In for 1 s	
Operating settings		
Phase current stage IL>	0.5...6.0 x In	
Earth-fault current Io>	0.05...5.0 x In	
Accuracy	± 5%	
Reset ratio	0.95	

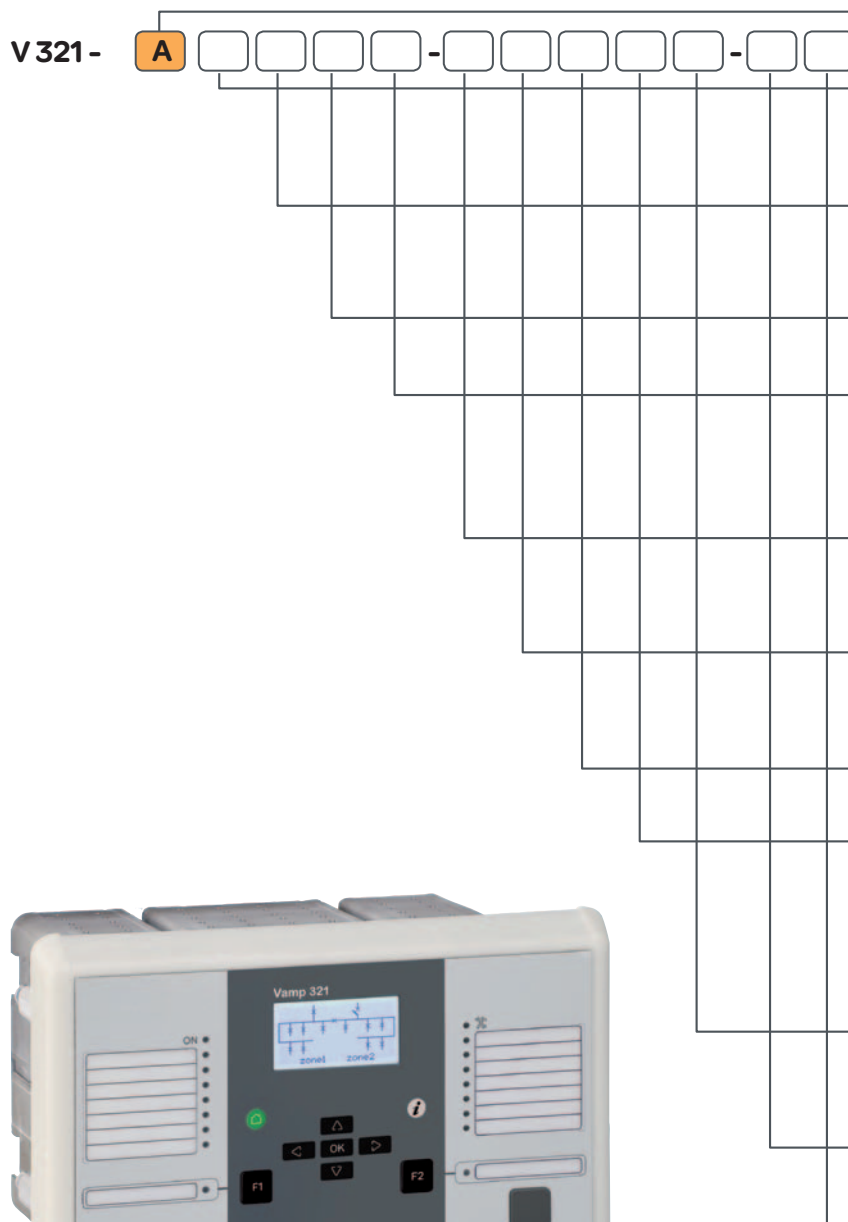
VAMP 4R trip multiplier relay

Power supply	24Vdc
Control signal	18..265 V ac/dc
Tripping contacts	4 pcs NO, 4 pcs NC
Rated voltage	250V ac/dc
Continuous carry	5A
Make and carry for 0.5s	30A
Make and carry for 3s	15A
Contact material	AgNi
Number of tripping groups	2



n* = number of active sensors

VAMP 321 Order Codes



Supply voltage [V]	
A	= 80 .. 265Vac/dc, T1, A1, SF
I/O Card I	
A	= None
B	= 3 x BI/BO, 2 x arc sensor, T2, T3, T4
I/O Card II	
A	= None
B	= Digital I/O; 6 x DI, 4 x DO
I/O Card III	
A	= None
I/O Card IV	
A	= None
D	= 2 x IGBT High speed outputs (Excludes I/O Card III, slot 4)
I/O Option card I	
A	= None
D	= 4 x Arc sensor
I/O Option card II	
A	= None
D	= 4 x Arc sensor
Analog measurement card [A, V]	
A	= 3L + Io (5A / 1A) + U
Communication interface I	
A	= None
B	= RS232
C	= RS232 + Ethernet RJ-45
D	= RS232 + Ethernet LC
Communication interface II	
A	= None
B	= RS232
Display type	
A	= 128 x 64 LCD matrix
DI nominal activation voltage	
1	= 24 VDC
2	= 110 VDC
3	= 220 VDC

ACCESSORIES

Order Code	Explanation	Note
VAM 3LSE	Fibre sensor I/O unit	3 fibre loops, 1 trip relay
VAM 3LXSE	Fibre sensor I/O unit adjustable sensitivity	3 fibre loops, 1 trip relay,
VAM 4CSE	Current I/O unit	3 current inputs, 1 trip relay
VAM 4CDSE	Current I/O unit	3 current inputs, 1 trip relay, flush mounting
VAM 10LSE	Point sensor I/O unit	10 sensor inputs, 1 trip relay
VAM 10LDSE	Point sensor I/O unit	10 sensor inputs, 1 trip relay, flush mounting
VAM 12LSE	Point sensor I/O unit	10 sensor inputs, 3 trip relays
VAM 12LDSE	Point sensor I/O unit	10 sensor inputs, 3 trip relays, flush mounting
VAMP 4RSE	Interface Unit (use vx002 cable)	4 x NO, 4 x NC, 2 groups
VA 1DA-6	Arc Sensor	Cable length 6 m
VA 1DA-20	Arc Sensor	Cable length 20 m
VA 1DA-6s	Arc Sensor, shielded	Cable length 6 m
VA 1DA-20s	Arc Sensor, shielded	Cable length 20 m
VA1DA-6-HF	Arc Sensor, halogen free	Cable length 6 m
VA1DA-20-HF	Arc Sensor, halogen free	Cable length 20 m
VA 1DT-6	Temperature Sensor	Cable length 6 m
VA 1DP-5	Portable Arc Sensor	Cable length 5 m
VA 1EH-6	Arc Sensor (Pipe type)	Cable length 6 m
VA 1EH-20	Arc Sensor (Pipe type)	Cable length 20 m
ARC-SLm-x	Fibre sensor, 8 000 lx	x = fibre length [m], see note 1
VX001-xx	Modular cable between VAMP 321 - VAM and VAM - VAM	xx = Preferred Cable Lengths [m], see note 2
VX031-5	Extension cable for VA1DP-5D	
VX052-3	USB programming cable (VAMPSET)	Cable length 3m
VX054-3	Interface cable to VPA3CG	Cable length 3m
VYX001	Surface Mounting Plate for Sensors	Z-shaped
VYX002	Surface Mounting Plate for Sensors	L-shaped
VSE001	Fibre optic Interface Module	RS-232 mode only
VSE002	RS485 Interface Module	RS-232 mode only
VPA 3CG	Profibus interface module	

Note 1:

Fibre lengths 1, 5, 10, 15, 20, 25, 30, 35, 40, 50 or 70 m

Note 2:

Cable lengths 1, 3, 5, 7, 10, 15, 20, 25 & 30 m



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 systems. Their unique integrated arc flash fault protection functionality enhances the safety of both people and property and has made VAMP a leading brand in arc flash protection worldwide. VAMP products meet international standards and regulations.

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