VAMP 321

ARC SELF-SUPERVISION FUNCTION

1 INTRODUCTION

V321 includes arc self-supervision function (further on referred as: ASF) for the all arc protection functionalities. Purpose of ASF is to indicate user, when equipment may not be fully functional and user attention is demanded.

ASF monitors the installed system including I/O units, light sensors, binary channels, FPGA (field-programmable gate array) configurations and auxiliary supply. ASF detecting deviation in any of the supervised items causes self supervision alarm in V321 master unit. In active state ASF activates the service status output (STO) and turns on the service status LED on HMI.

ASF function consists from following items:

- Disconnected sensor
- Sensor not installed
- Sensor daylight alarm
- Arc I/O communication time out
- CAN-bus timeout
- FPGA alarm
- Binary channel alarm
- Auxiliary supply supervision

2 ARC FUNCTIONS SELF SUPERVISION (ASF)

2.1 GENERAL

ASF is always enabled and can't be disabled. Function constantly monitors the installed system, according and within the technical aspects explained in this chapter.

Self supervision data from I/O unit is transferred periodically to V321 master unit trough the communication line (VX001 cable). Communication line is constructed around the RS-485 standard but the communication protocol and data structure is custom made and unique protocol developed by Vamp.

Master unit sends out periodically a report request for installed I/O units one at a time. After receiving I/O unit response, master unit moves on to a next I/O unit and continues this process nonstop. Order of reporting is based on I/O unit addressing, from lowest to a highest I/O units address.

2.2 DETAILED DESCRIPTION

Sensor supervision

Sensor supervision is based on test current. The host unit (V321 or I/O unit) of the sensor injects a test current which flows constantly trough the cable and electronics components of the sensor.

Non-active state test current consumption:	4mA
Active state test current consumption:	20mA

Binary channel supervision

Binary channels are supervised with the test pulses which are sent by binary-out channel (BO) and received by binary-in channel (BI). Binary-out sends a test pulse in every 137ms. When binary-in channel doesn't receive a test pulse inside the 500ms delay, ASF is activated.

ARC I/O Communication timeout

Communication time out is declared in a condition when V321 master unit haven't received answer from the I/O unit within the 2500ms.
Period of report request from master unit is 60ms for each I/O unit. I/O units typical response time is 20-80ms.

CAN-bus timeout

CAN-bus communication is used for exchanging light- and over current detection signals between V321 master and I/O units. Arc protection issues a trip signal based on data transmitted through the CAN-bus communication and according to system configurations.
Data exchange procedure is same as described in "*ARC I/O Communication timeout*" above.

FPGA Alarm

FPGA is an integrated circuit (chip) which is responsible of all fast acting arc protection operations. In V321 especially such as light, over current and trip signals are processed by FPGA circuit. FPGA configurations are stored to FPGA internal memory and backed up to external memory buffer in V321. FPGA configurations are constantly compared against the back up data and any deviation within these causes ASF - FPGA alarm.

Auxiliary supply supervision

Service status output (STO) relay type in V321 is change over contact containing one normal open (NO) and one normal close (NC) output contact. Disconnection of auxiliary supply will cause STO changing its status.

Total operating time of ASF

Total operating time of ASF may vary. Operating time is dependant of the fault type and amount of I/O units. Detection of Arc I/O communication timeout includes a filtering and delaying built inside ASF.

ASF – typical operating time:	< 1-30s
ASF - Arc I/O communication timeout:	< 400s (typical: 30-180s)

3 Typical causes for self supervision alarms

Disconnected Sensor

- Sensor cable disconnected from host unit (V321 or I/O unit)
- Poor connection
(Item is functional only for the sensors stored in master unit configuration.)

Sensor not installed

- Sensor is connected properly to host unit (V321 or I/O unit) but "*install of I/O units and sensors*" haven't been executed properly after adding the sensor.

Sensor daylight alarm

- Sensor is detecting constant light (> 3 second) above the sensitivity limit. When daylight mode is activated, sensor is disabled in order to avoid unwanted light detection.

Binary channel alarm

- Physical connection disconnected or broken (communication interrupted).
(Item is functional only when "install I/O units & sensors" have been executed properly.)

Auxiliary supply supervision

- Lost / disconnection of an external auxiliary supply will cause STO relay to change its status.

ARC I/O & CAN-bus communication timeout

- Disconnected I/O unit.
- Disconnected or broken VX001 communication cable.

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