

# 2V68-S



## CT Supervision and Shorting Relay

For the continuous supervision of CT circuits in high impedance differential protection schemes.

- > ANSI code 57 / 59
- > Optional harmonic filter and time delay
- > Draw out case
- > Flush panel or rack mount
- > Made in Australia





## Description

The 2V68 type relays have a setting range of 2-14V adjusted on a per phase basis from calibrated potentiometers at the front panel. The relay is continuously rated at 300V RMS & no external resistors are required.

An optional harmonic filter is available to reject 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> harmonics to reduce the effect of switching transients.

The AC input is continuously monitored & when it exceeds the pre-set level. Latching contacts are actuated after a three (3) second time delay. An optional adjustable time delay setting version may be specified.

Three (3) latching contacts are intended to be connected across the buswires of the busbar protection to provide short-circuiting of the busbar protection relay on detection of an open circuit condition. The remaining three (3) latching contacts are available for alarm & signalling functions.

Operation of the relay is indicated by a hand reset flag.

A switchmode power supply provides a very wide auxiliary operating range. A relay fail alarm is provided in the form of a C/O contact which is picked up when the auxiliary supply is healthy.

## Features

- > Low AC burden
- > No external resistors required
- > 3 latching N/O (Hand reset), alarm contacts
- > 3 latching N/O (Hand reset), heavy duty buswire shorting contacts
- > Optional harmonic filter - 50Hz or 60Hz
- > Optional adjustable time delay
- > Hand reset flag
- > 62-250V DC auxiliary supply
- > 44-230V AC auxiliary supply
- > Optional 40-58V DC supply
- > Auxiliary supply fail alarm

## Application

The 2V68 is a three phase monitoring device designed to provide continuous supervision of the CT circuits in high impedance differential protection schemes.

The relay will detect open circuit conditions in the CT summation wiring and open circuited main current transformers.



Figure: 1: 2V68-S-BBB front panel

## Voltage Set Point

The adjustable voltage setting for each phase is set via front panel rotary dials as depicted in figure 1.

## Operate Time Delay

A time delay from detection of a voltage condition above the set point is desirable to avoid nuisance operation due to transients such as system energization.

The 2V68-S is available with either a fixed time delay or adjustable time delay. The adjustable time delay is set via a front panel rotary dial as depicted in figure 1.

## Harmonic Filter

The 2V68-S may be specified with a harmonic filter tuned to 50Hz or 60Hz and designed to reject 2<sup>nd</sup> and higher harmonics to reduce the possibility of mal operation during system energization.

## Output Contact Status Indication

A high visibility hand reset flag is located on the front panel as depicted in figure 1.

## Buswire Shorting and Alarm Contacts

All CT shorting and alarm contacts operate and latch when the voltage set point on any phase is exceeded for the duration of the time delay. The flag, CT shorting and alarm contacts are reset via the front panel reset button as depicted in the figure 1.

## Watchdog Alarm Output

A C/O watchdog alarm contact and system status LED are maintained in the energized state when both of the following conditions are met:

- > The auxiliary supply is applied
- > The internal 5V DC rail is within acceptable limits

## System Status

A green LED is provided to indicate auxiliary supply as depicted in figure 1.

## Auxiliary Supply

Low Range Version	Order Code A
Nominal dc Voltage Supply	48
Standards Compliant Range (Shown on relay front panel)	40-58V dc
Absolute Range	20-70V dc
High Range Version	Order Code B
Nominal dc Voltage Supplies	110 / 125 / 220 / 240 / 250
Standards Compliant Range (Shown on relay front panel)	62-250V dc 44-230V ac
Absolute Range	40-300V dc 40-275V ac
Allowable breaks/dips in supply (Collapse to zero)	As per IEC60255-26 *7.2.11
Burden - Quiescent	2W at 110V dc
Burden - Maximum	5W at 110V dc

## AC Voltage Sensing

Sensing range	2-14 V ac
Dropout / pickup ratio	85% minimum
Accuracy	+/-5% of full scale
Frequency range	47-61 Hz (No harmonic filter)
	49-51Hz (50Hz filter)
	59-61Hz (60Hz filter)
Burdens – VA at 50 Hz	<0.0001 at 2V
	<0.002 at 8V
	<0.007 at 14V
	<4 at 300V
Thermal rating	300V rms / phase continuous
	2.5kV for 3s on all phases
	3kV for 0.5s on all phases

## Time Delay

Fixed time delay version	3s
Adjustable time delay	3-20s (order option)
Accuracy	+/-5% of maximum setting

## Harmonic Filter

Harmonic	Rejection
1st	-
2 <sup>nd</sup>	10x
3 <sup>rd</sup>	20x
4 <sup>th</sup>	30x
5 <sup>th</sup>	40x

## Buswire Shorting and Alarm Outputs

Buswire shorting contacts	3 n/o
Alarm contacts	3 n/o
Operating Voltage	Voltage free
Isolation across open contacts	Shorting contacts: 3 kV rms Alarm contacts: 1 kV rms
Operating Mode	Latching
Reset mechanism	Front panel push button reset
Make and Carrying Capacity :	
Continuous	3,000 VA AC and 3,000 W DC with maxima of 660V and 12A – resistive load
For 3s	7,500 VA AC and 3,000 W DC with maxima of 660V and 30A – resistive load
For 0.5s	150A rms peak withstand
Breaking Capacity :	
AC	3,000 VA with maximums of 660V and 12A – resistive load
24V DC	12 A resistive
48V DC	12 A inductive (L/R=40ms)
125V DC	1.5 A resistive
250V DC	1 A inductive (L/R=40ms)
	0.5 A resistive
	0.25 A inductive (L/R=40ms)
	0.25 A resistive
	0.15 A inductive (L/R=40ms)

## Watchdog Output

Contact Form	1 c/o
Operating Voltage	Voltage free
Operating Mode	Self-reset
Make and Carrying Capacity : (L/R ≤ 40ms and V ≤ 300V)	
Continuous	5A ac or dc
For 0.5s	20A ac or dc
For 0.2s	30A ac or dc
Breaking Capacity : ( ≤ 5A and ≤ 300V)	
AC Resistive	1,250VA
AC Inductive	250VA at p.f. ≤ 0.4
DC Resistive	75W
DC Inductive	30W at L/R ≤ 40ms
	50W at L/R ≤ 10ms
Minimum Load	0.5W limit at 10mA / 12V

## ATMOSPHERIC ENVIRONMENT

### Temperature

Standard	IEC 60068-2-1, IEC 60068-2-2	
Test Identification	Test specification	Auxiliary power Supply voltage
Operating Range	-10 to +55°C	Min and Max
Storage Range	-25 to +70°C	Non-energized
Test duration	16 h at top and bottom temperatures	

### Damp Heat (Humidity)

Standard	IEC 680068-2-78	
Test Identification	Test specification	
Operating Range	40°C and 93% RH non condensing	
Test duration	16 h	

### IP Rating

Standard	IEC 60529	
Test Identification	Test specification	
Installed	IP5x	

## MECHANICAL ENVIRONMENT

### Vibration - Sinusoidal

Standard	IEC 60255-21-1 Class 1	
Test Identification	Test specification	Variation
Vibration Response in each of 3 axes	0.035 mm/0.5 gn peak 1 sweep cycle 10-150 Hz	≤5%
Vibration Endurance in each of 3 axes	1.0 gn peak 20 sweep cycles 10-150 Hz	Non- energized

### Shock and Bump

Standard	IEC 60255-21-2 Class 1	
Test Identification	Test specification	Variation
Shock Response in each of 3 axes	5 gn, 11 ms, 3 pulses in each direction	≤5%
Shock Withstand in each of 3 axes	15 gn, 11 ms, 3 pulses in each direction	Non- energized
Bump Test in each of 3 axes	10 gn, 16 ms, 1,000 bumps in each direction	Non- energized

### Seismic

Standard	IEC 60255-21-3 Class 1	
Test Identification	Test specification	Variation
Seismic Response Horizontal, on each axis	3.5 mm/1.0 gn, 1 sweep cycle 1-35Hz	≤5%
Seismic Response Vertical	1.5 mm/0.5 gn, 1 sweep cycle 1-35Hz	≤5%

## ELECTRICAL ENVIRONMENT

### AC and DC Voltage Dips

Standard	IEC 60255-26, #7.2.11
Test Level	Test specification
Dip to 0% of residual voltage	DC: 20 ms
Acceptance criterion A	AC: 1 cycle 50/60 Hz
Dip to 40% of residual voltage	DC: 200 ms
Acceptance criterion C	AC: 10/12 cycles 50/60 Hz
Dip to 70% of residual voltage	DC: 500 ms
Acceptance criterion C	AC: 25/30 cycles 50/60 Hz

### AC and DC Voltage Interruptions

Standard	IEC 60255-26, #7.2.11
Test Level	Acceptance criterion C
Test Level	Test specification
Drop to 0% of residual voltage	DC: 5 s
	AC: 250/300 cycles 50/60 Hz

### AC Component in DC (Ripple)

Standard	IEC 60255-26, #7.2.12
Test Level	Acceptance criterion A
Test Level	Test specification
15% of rated DC value	100/120 Hz, Sinusoidal

### Gradual Shut-down/Start-up (DC Power Supply)

Standard	IEC 60255-26, #7.2.13
Test Identification	Acceptance criterion C
Test Identification	Test specification
Shut-down ramp	60 s
Power off	5 min
Start-up ramp	60 s

### Clearances and Creepage Distances

Standard	IEC 60255-26, #10.6.3
Test Identification	Test specification
Pollution degree	2
Overvoltage category	III
Rated insulation voltage	300 V rms or d.c.
Clearances and Creepage Compliance	CAD drawings assessment

## Safety-related Electrical Tests

Standard	IEC 60255-27, #10.6.4	
Test Identification	Test specification	
Between Independent Circuits	5 kV 1.2/50 $\mu$ s 0.5 J	
	3 pulses of each polarity	
Any Terminal and Earth	2.0 kV ac rms for 1 minute	
	5 kV 1.2/50 $\mu$ s 0.5 J	
Across Normally Open Contacts	3 pulses of each polarity	
	2.0 kV ac rms for 1 minute	
Protective Bonding Resistance	Alarm	1 kV ac rms for 1 min
	CT shorting	3 kV ac rms for 1 min

## Electrical Environment and Flammability

Standard	IEC 60255-27, #10.6.5	
Test Identification	Test specification	
Thermal Overvoltage VT input test	Continuous withstand: 300 V a.c.	
	Short-time withstand:	
	3.0 kV a.c. for 0.5 s	
Single-fault condition	2.5 kV a.c. for 3 s	
	Assessment	
Maximum temperature of accessible parts at ambient temperature +40°C	Metal parts: < 70°C	
	Non-metallic parts: < 80°C	
Flammability of insulating materials, components and fire enclosures	Assessment	

## Reverse Polarity and Slow Ramp Test

Standard	IEC 60255-27, #10.6.6	
Test Identification	Test specification	
Maximum voltage d.c.	V start-up + 20%	
Minimum voltage d.c.	V shutdown - 20%	
Ramp down/up gradient	1 V/min	



## ELECTROMAGNETIC COMPATIBILITY (EMC)

### IMMUNITY

#### Electrostatic Discharge (ESD)

Standard	IEC 60255-26, #7.2.3, Acceptance criterion B	
Port	Enclosure	
Test Identification	Test specification	Variation
Air Discharge	8 kV	≤5%

#### Radiated Electromagnetic Field

Standard	IEC 60255-26, #7.2.4, Acceptance criterion A	
Port	Enclosure	
Test Identification	Test specification	Variation
Frequency sweep	10 V rms, 80 to 1000 MHz 1400 to 2700 MHz	≤5%
Spot frequencies	10 V rms, 80, 160, 380, 450, 900, 1850 & 2150 MHz	≤5%

#### Fast Transients (EFT)

Standard	IEC 60255-26, #7.2.5, Acceptance criterion B	
Port	Auxiliary power supply, Input and Output, Functional Earth	
Test level	Test specification	Variation
Zone A	4 kV peak, 5/50 ns, 5 kHz	≤5%

#### Slow Damped Oscillatory Wave (HFD)

Standard	IEC 60255-26, #7.2.6, Acceptance criterion B	
Port	Auxiliary power supply, Input and Output	
Test Identification	Test specification	Variation
Common Mode	1 MHz 2.5 kV peak	≤5%
Differential Mode	1 MHz 1.0 kV peak	≤5%

#### Surge

Standard	IEC 60255-26, #7.2.7, Acceptance criterion B	
Port	Auxiliary power supply, Input and Output	
Test Identification	Test specification	Variation
Line-to-earth	4 kV peak	≤10%
Line-to-line	2 kV peak	≤10%

## Conducted Disturbance Induced by RF Fields

Standard	IEC 60255-26, #7.2.8, Acceptance criterion A	
Port	Auxiliary power supply, Input and Output, Functional Earth	
Test Identification	Test specification	Variation
Frequency sweep	10 V rms, 0.15 to 80 MHz	≤5%
Spot frequencies	10 V rms, 27 & 68 MHz	≤5%

## Power Frequency Magnetic Field

Standard	IEC 60255-26, #7.2.10	
Port	Enclosure only	
Test Identification	Test specification	
Continuous ≥ 60 s	30 A/m - Acceptance criterion A	
Short time 1 s to 3 s	300 A/m - Acceptance criterion B	

## EMISSION

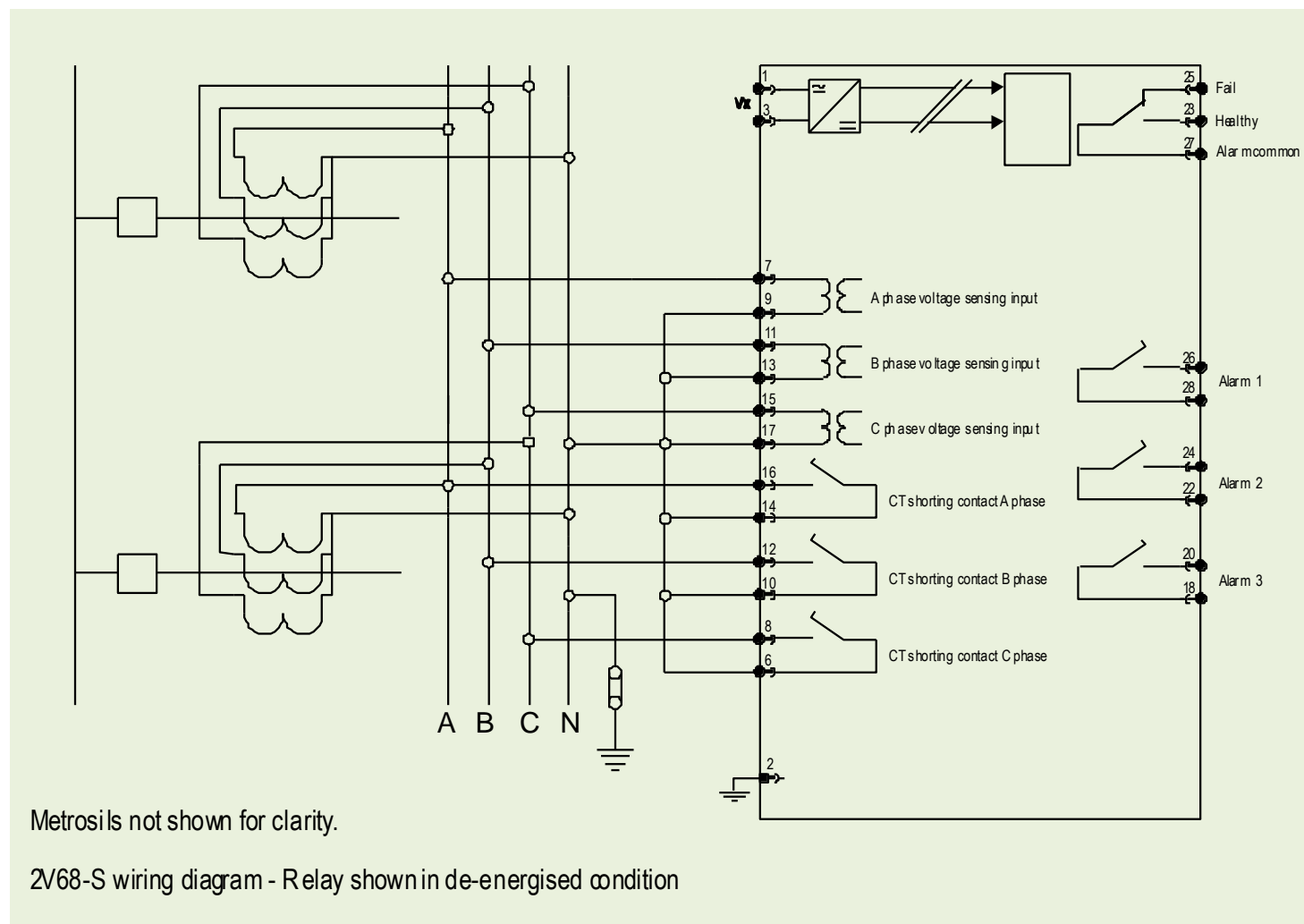
### Emission Enclosure

Standard	IEC 60255-26, #5.1	
Test Identification	Frequency range	Limits, dB (μV/m)
Radiated emission <1 GHz	30 - 230 MHz	40, quasi peak at 10 m 50, quasi peak at 3 m
	230 - 1000 MHz	47, quasi peak at 10 m 57, quasi peak at 3 m
Radiated emission >1 GHz	1 - 3 GHz	56, average 76, peak at 3 m
	3 - 6 GHz	60, average 80, peak at 3 m

### Emission Auxiliary Power Supply Port

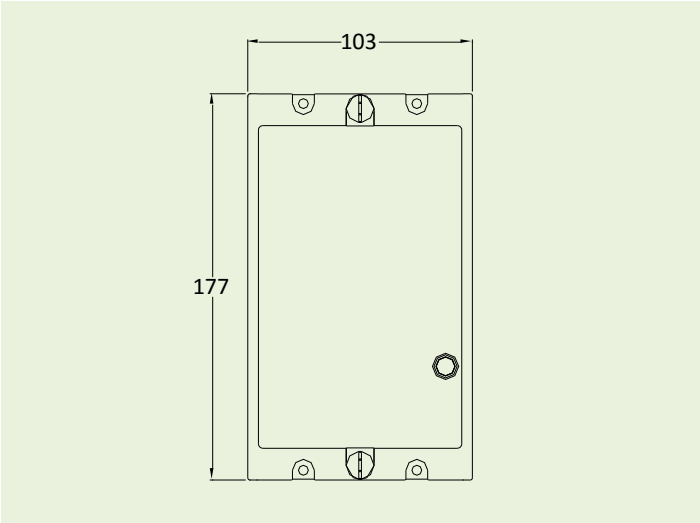
Standard	IEC 60255-26, #5.2	
Test Identification	Frequency range	Limits, dB (μV/m)
Conducted emission	0.15 - 0.50 MHz	79, quasi peak 66, average
	0.5 - 30 MHz	73, quasi peak 60, average

## 2V68- S Relay Wiring Diagram

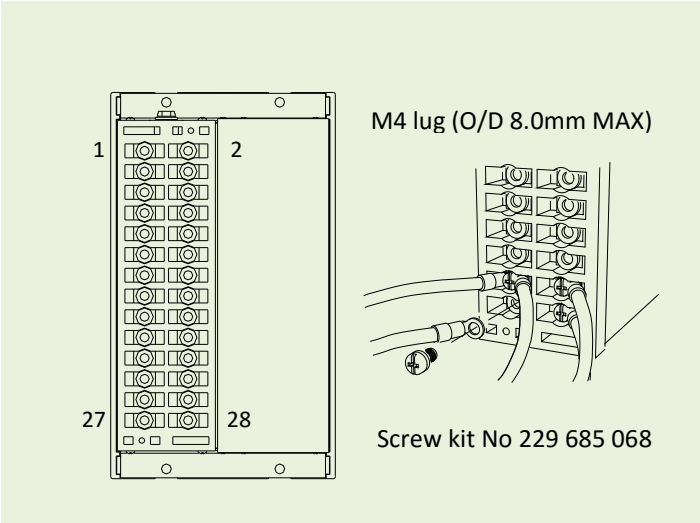




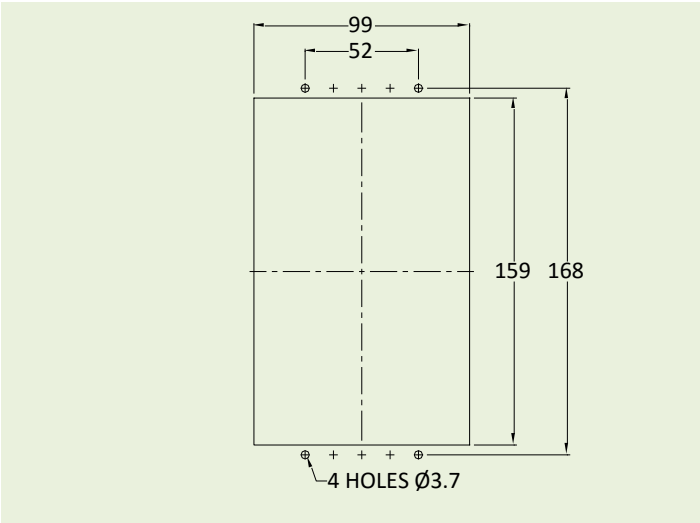
Front View



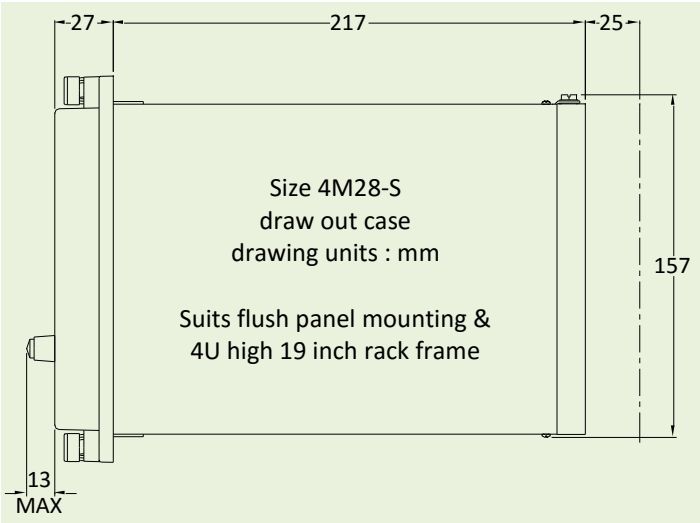
Rear View



Panel Cut-out



Side View



2V68-S Relay Order Code

2V68-S -					
Auxiliary Supply	A				40-58V DC
	B				44-230V AC / 62-250V DC
Harmonic Filter	A				No filter
	B				50 Hz
	C				60 Hz
Time Delay	A				Fixed 3s nominal time delay
	B				Adjustable 3-20s time delay
Options	-				No options required



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