

## Selection Guide for ROV Devices

### Step 1. Determine the circuit's operating parameters (complete as much of the following information as possible).

Complete the following information about the circuit, if known:

- 1-a. Source and path of the transient \_\_\_\_\_ Source \_\_\_\_\_ Path
- 1-b. Normal operating voltage of protected equipment or device \_\_\_\_\_ ( $V_{RMS}$  AC) or \_\_\_\_\_ ( $V_{DC}$ )
- 1-c. Tolerance of normal operating voltage (1-b) \_\_\_\_\_ (V) or \_\_\_\_\_ Unknown
- 1-d. Maximum allowable voltage of protected equipment or device \_\_\_\_\_ ( $V_{RMS}$  AC) or \_\_\_\_\_ ( $V_{DC}$ )
- 1-e. Maximum expected surge current\* and number of hits \_\_\_\_\_ (A) \_\_\_\_\_ (# of hits)  
*\*Specify 8x20µs waveform equivalent of surge current*
- 1-f. Maximum energy applied to device in surge event \_\_\_\_\_ (Joules) ( $E=1.4 \times V \times I \times T$ )
- 1-g. Maximum power applied to device in surge event \_\_\_\_\_ (W) ( $P=V \times I$ )
- 1-h. Maximum allowable varistor capacitance\* (@1kHz; 0V<sub>DC</sub> bias) \_\_\_\_\_ (pF)  
*\*This is the maximum capacitance of the varistor device that will not impair the functionality of the circuit*
- 1-i. Required safety standards \_\_\_\_\_ Name of standard(s) required (UL, CSA, VDE)

### Step 2. Calculate the required varistor voltage value.

- 2-a. The required varistor voltage value should be equal to: (the operating voltage of the protected equipment or device\*) + (the tolerance of the operating voltage). If the tolerance is not known, multiply the operating voltage of protected equipment or device by 1.10 to 1.25 (i.e. 10–25% above operating voltage value).  
*\*If the operating voltage is in AC ( $V_{RMS}$ ), convert to  $V_{DC}$ .*

$$\text{_____ Operating voltage AC } (V_{RMS}) \quad \times 1.414 \quad = \text{_____ Operating voltage } (V_{DC})$$

$$\text{_____ Operating voltage of equipment or device } (V_{DC}) + \text{_____ Tolerance (V)} = \text{_____ Required varistor voltage (V)}$$

or

$$\text{_____ Operating voltage of equipment or device } (V_{DC}) \quad \times \text{_____ (1.10 to 1.25)} = \text{_____ Required varistor voltage (V)}$$

**Step 3. Select a varistor that meets the following requirements.**

If the response to one of the requirements below is “False”, refer to the appropriate corrective action notes (A-F) at bottom of list:

- 3-a. Varistor voltage value - Tolerance of varistor  $\geq$  Required varistor voltage value (2-a) \_\_\_\_\_ True \_\_\_\_\_ False (A)
- 3-b. Varistor maximum clamping voltage value  $\leq$  Maximum allowable voltage of protected equipment or device (1-d)\*  
*\*Max. current should be less than or equal to the current at which maximum clamping voltage is measured.* \_\_\_\_\_ True \_\_\_\_\_ False (B)
- 3-c. Varistor maximum peak current value  $\geq$  Maximum expected surge current (1-e)\*  
*\*If surge current waveform is not  $8 \times 20\mu\text{s}$ , use Pulse Lifetime Ratings curves.* \_\_\_\_\_ True \_\_\_\_\_ False (C)
- 3-d. Varistor maximum energy rating  $\geq$  Maximum energy applied to system (1-f) \_\_\_\_\_ True \_\_\_\_\_ False (D)
- 3-e. Varistor maximum rated power  $\geq$  Maximum power applied to system (1-g) \_\_\_\_\_ True \_\_\_\_\_ False (E)
- 3-f. Varistor capacitance  $\leq$  Maximum allowable system capacitance (1-h) \_\_\_\_\_ True \_\_\_\_\_ False (F)

Corrective action notes:

- A. Select next varistor on the list (i.e. next varistor with increasing varistor voltage value) and then re-verify 3-a.
  - B. Select previous varistor on the list (i.e. previous varistor with decreasing varistor voltage value) and then re-verify 3-b.
  - C. Select next varistor diameter level and then re-verify 3-c\*.
  - D. Select next varistor diameter level and then re-verify 3-d\*.
  - E. Select next varistor diameter level and then re-verify 3-e\*.
  - F. Select lower varistor diameter level and then re-verify 3-c, 3-d, 3-e and 3-f\*.
- \* If varistor voltage is below 82V, selecting an 82V ROV may be preferable over a higher diameter part.*

**Step 4. Verify the following system conditions.**

- 4-a. Leakage current of the selected varistor is appropriate for the circuit \_\_\_\_\_ True \_\_\_\_\_ False
- 4-b. Verify the performance of the varistor under fault conditions\* \_\_\_\_\_ Verified

*\*This selection guide is intended to assist the user in selecting a Raychem Circuit Protection ROV device. However, users should independently evaluate the suitability of, and test each ROV device in their application.*