

# VAL-US Open Terminal Power SPD



# VAL-US Open Terminal SPD Introduction

## Key Features

- Large selection of UL Type 1 Listed DIN rail SPDs
  - UL Type 1 : Allowed on supply side of overcurrent protection
  - Assemblies are Listed, modules are Recognized.
- Marked according to US voltage systems
- Listed Open Type SPDs can be used in any suitable NEMA/UL type enclosure.
  - Easily integrated into 508A control projects.



# What does UL “Listed” mean

- UL has evaluated the product and it fully complies with the UL1449 standard.
- Recognized SPDs have not been fully tested and must be evaluated as installed. Some testing may be required.
- The 'c' and 'us' means tested for Canadian and US standards.

# VAL-US plugs and VAL-US-48/40 assemblies



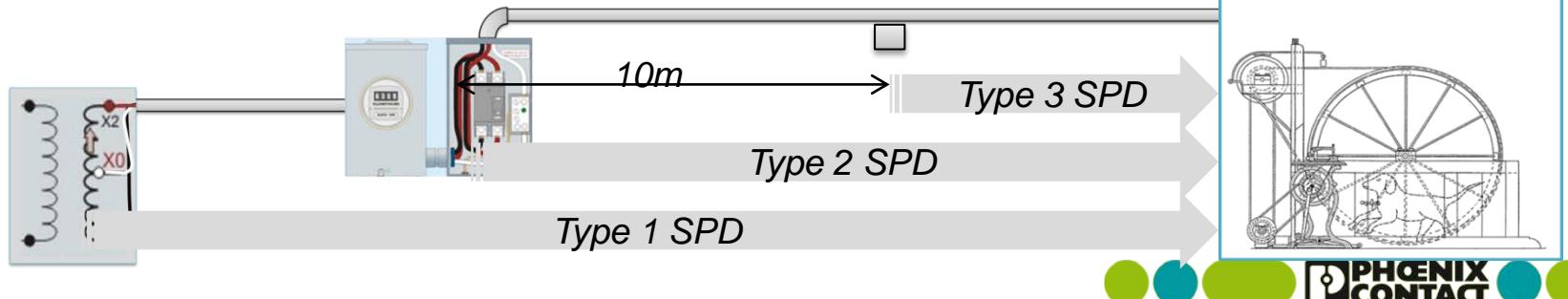
All other VAL-US  
assemblies



## What is a UL “type”

UL 1449 defines an SPD “type” by its allowable connection with respect to overcurrent protection.

- Type 1: may be installed before main overcurrent protection
- Type 2: must be after main overcurrent protection
- Type 3: must be  $>10m$  away from main overcurrent protection



# What is “Open Terminal” SPD Classification

UL 1449 ed4, issue 17 MAR 2016, added a category and requirement set for Open-Type SPD:

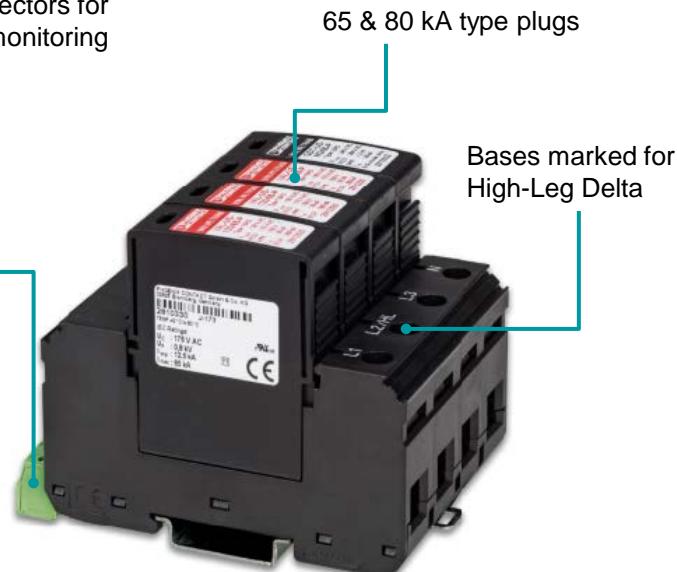
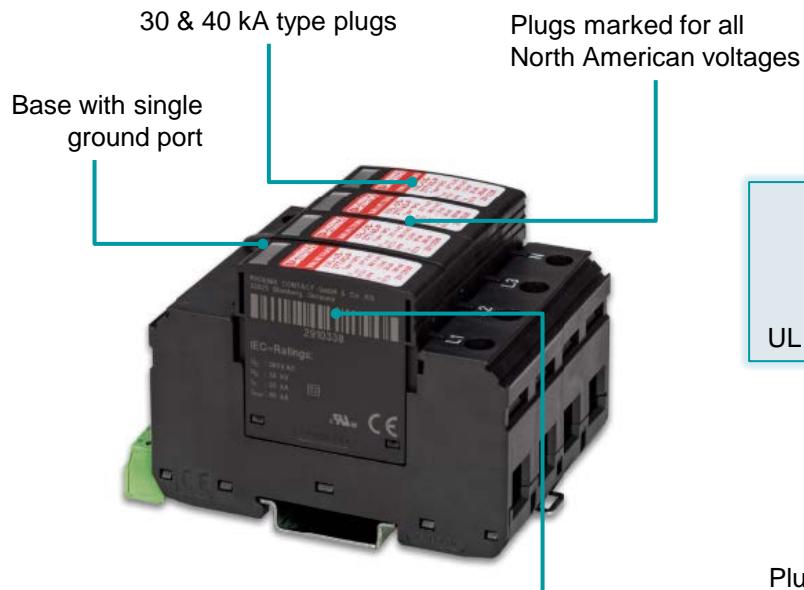
- “OPEN-TYPE SPD – A Type 1, 2 or 3 SPD, with an incomplete or partial enclosure and with field wiring terminals and/or leads, suitable for field installation, in accordance with the National Electrical Code, ANSI/NFPA 70, within a suitable enclosure.”

Now SPDs with field wiring terminals, such as DIN rail VAL-series, may be Listed, and used according their conditions of acceptability.

- Prior to this, a Listed SPD had to include it's connection wires and a threaded conduit fitting for integration.

# VAL-US Open Terminal SPD Introduction

## Key Features



## VPR vs MLV



- Listed products have a Voltage Protection Rating (VPR)
  - Value determined at 3kA
- Recognized Components have a Measured Limiting Voltage (MLV)
  - Value determined at  $I_L$  (20kA for our VAL-US recognized products)
- Why does this matter?
  - MLVs will be significantly higher than VPRs for the same voltage levels

# VAL-US Open Terminal SPD Introduction

## VPR vs MLV (example)

VAL-US 120/40 ST

vs.

VAL-MS 120 ST

UL specifications

SPD Type	1CA
Maximum continuous operating voltage MCOV	175 V AC
Nom. voltage	120/240 V AC
Mode of protection	L-N
	L-G
	N-G
Power distribution system	1
Nominal frequency	50/60 Hz
Voltage protection rating VPR	700 V
Nominal discharge current $I_n$	20 kA
Maximum Surge Current per Phase	40 kA
Short-circuit current rating (SCCR)	200 kA

UL specifications

SPD Type	4CA
Maximum continuous operating voltage MCOV (L-N)	150 V AC
Nom. voltage	120 V AC
Mode of protection	L-N
Power distribution system	1
Nominal frequency	50/60 Hz
Measured limiting voltage MLV (L-N)	1490 V
Nominal discharge current $I_n$ (L-N)	20 kA

# VAL-US Open Terminal SPD Introduction

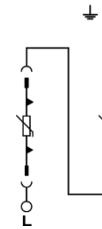
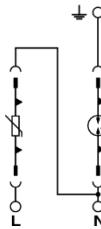
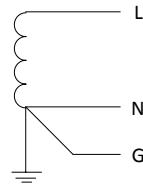
## Configuration by Service

	<b>VAL-US Plugs</b>	VAL-US	-120/40		-P
	<b>VAL-US SPDs</b>	VAL-US	-120/40	/3+1V	-FM
Component	VAL : MOV based components GDT : GDT based components				
Family	-US				
Voltage	-120 : 120V single, 120/240 split -120 : 120/208 Y, 120/240 HLD -240 : 240V single, 240/480 split -240D : 240/415 Y, 240 D, 240 HLD -277 : 277V single, 277/480 Y -347 : 347 single, 347/600 Y -400 : 400/690 Y -480D : 480 single, 480 D, 480 HLD -600D : 600 single, 600 D				
Surge Capacity (8/20)	/30, /40, /65, or /80				
Configuration	/1, 2, 3, 4 : First character is number of parallel modes +0 : for protection to ground (TN-C) +1 : with GDT to N for Sub-Panel locations (TN-S) +1V : with MOV to N for Sub-Panel locations (TN-S) HLD : High-Leg Delta				
FM Option	-FM : Assembly with Function Monitor -P : Denotes Plug <i>Non-FM only under special request.</i>				

# VAL-US Open Terminal SPD Introduction

## Configuration by Service

## *Single Phase*



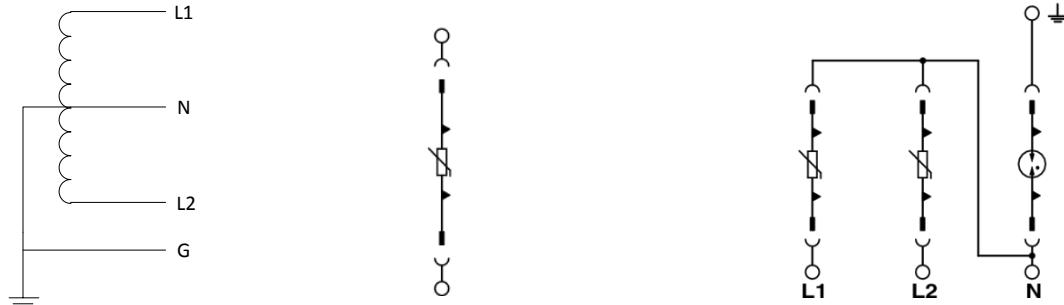
Single Phase	“1+0” for L-N at the grounded service entrance or anywhere for isolation to ground.	“1+1” for use away from the N-G bonding point, with a GDT protecting N-G.	“1+1V” for use away from the N-G bonding point, with an MOV protecting N-G for DC and higher-voltage AC.
120V (40kA)	2910348 - VAL-US-120/40/1+0-FM	2910349 - VAL-US-120/40/1+1-FM	
120V (65kA)	2910355 - VAL-US-120/65/1+0-FM	2910356 - VAL-US-120/65/1+1-FM	
240V (40kA)	2910361 - VAL-US-240/40/1+0-FM	2910362 - VAL-US-240/40/1+1-FM	
277V (40kA)	2910372 - VAL-US-277/40/1+0-FM	2910373 - VAL-US-277/40/1+1-FM	
277V (80kA)	2910377 - VAL-US-277/80/1+0-FM		2910378 - VAL-US-277/80/1+1V-FM
347V (30kA)	2910381 - VAL-US-347/30/1+0-FM		2910382 - VAL-US-347/30/1+1V-FM

## Configuration by Service

The single-split phase is very common in North America, present in more than 99% of residential and most office spaces.

This is delivered from a single transformer that is center tapped and grounded at the center.

## *Single Split Phase*



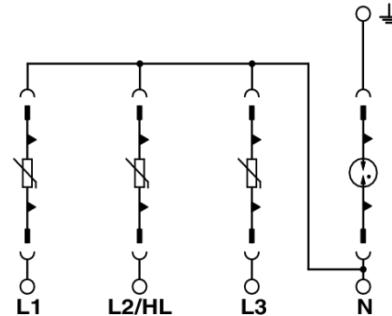
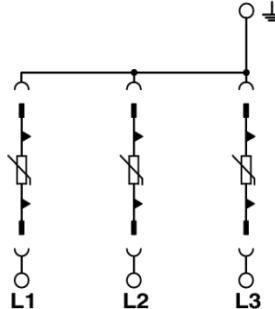
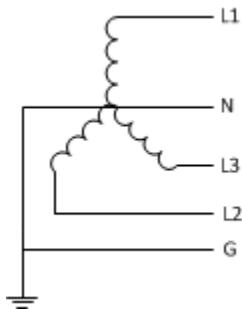
Split Phase	“1+0” for L-N at the grounded service entrance or anywhere for isolation to ground.	“2+1” for use away from the N-G bonding point, with a GDT protecting N-G.
120/240V (40kA)	2910348 - VAL-US-120/40/1+0-FM	2910365 - VAL-US-120/40/2+1-FM
120/240V (65kA)	2910355 - VAL-US-120/65/1+0-FM	2910358 - VAL-US-120/65/2+1-FM
240/480V (40kA)	2910361 - VAL-US-240/40/1+0-FM	2910365 - VAL-US-240/40/2+1-FM

## Configuration by Service

## Three-Phase Wye “Y”

The 3-phase “Y” is very common in North American industrial installations.

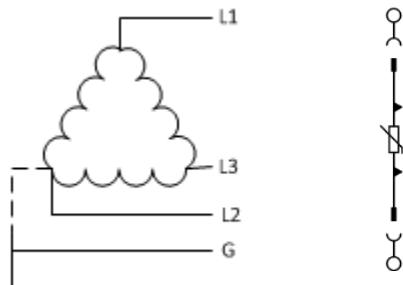
Common notation is 120/208Y, meaning the L-N is 120V and L-L is 208V. It may also be called “208V 3-phase 208Y”, “208 star or “208Y 120V”.



Three-Phase Y	“3+0” for locations within 3m of the N-G bond, in the service panel.	“3+1” for use away from the N-G bonding point, with a GDT or MOV protecting N-G.
120/208V (40kA)	2910353 - VAL-US-120/40/3+0-FM	2910354 - VAL-US-120/40/3+1-FM
120/208V (65kA)	2910359 - VAL-US-120/65/3+0-FM	2910360 - VAL-US-120/65/3+1-FM
240/400V (40kA)	2910366 - VAL-US-240/40/3+0-FM	2910367 - VAL-US-240/40/3+1-FM
277/480V (40kA)		2910374 - VAL-US-277/40/3+1-FM
277/480V (80kA)	1075896 - VAL-US-277/80/3+0-FM	2910379 - VAL-US-277/80/3+1V-FM
347/600V and 400/690V (30 kA)	2910383 - VAL-US-347/30/3+0-FM	1079099 - VAL-US-347/30/3+1V-FM

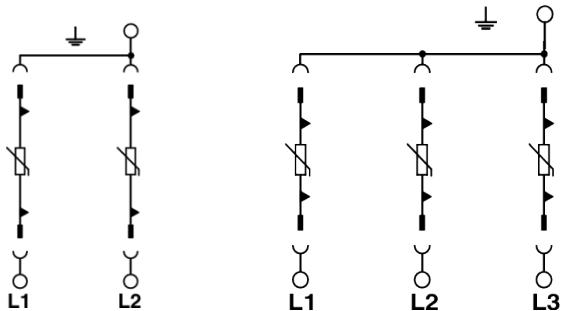
# Configuration by Service

Delta is only common in heavy industrial locations. These are preferred for driving motors with large loads and high voltage.



Delta phases are mutually referenced and often are not grounded. When they are it is on one 'corner', "Corner-Grounded Delta". Either L2 or L3 may be grounded.

## Three-Phase Delta "D"



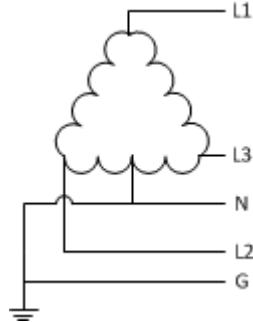
Delta Phase	"1+0" for each L-L and/or L-G mode.	"2+0" for L-L/G on corner-grounded Delta.	"3+0" all Delta L-G modes.
240V (40kA)	2910368 - VAL-US-240D/40/1+0-FM	2910369 - VAL-US-240D/40/2+0-FM	2910370 - VAL-US-240D/40/3+0-FM
480V (30kA)	2910384 - VAL-US-480D/30/1+0-FM	2910385 - VAL-US-480D/30/2+0-FM	2910386 - VAL-US-480D/30/3+0-FM
600V (30kA)	2910388 - VAL-US-600D/30/1+0-FM	2910390 - VAL-US-600D/30/2+0-FM	2910391 - VAL-US-600D/30/3+0-FM

## Configuration by Service

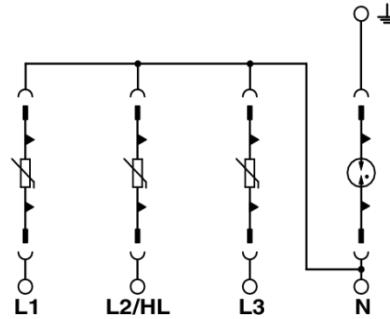
High-Leg Delta is used in light industry and offices where large motors, like refrigeration, are located, but office 120V power is also required.

HLD is often created with two transformers as an open delta, one transformer L1-L2 and one L2-N-L3.

Also called 120/240 delta, 'wild-leg' delta and 'crazy-leg' delta.



## *High-Leg Delta “HLD”*



High-Leg Delta	“3+1” with the ‘HL’ a different voltage than L1 and L2. N-G is a GDT in the 240HLD and an MOV in the 480HLD.
120/240V Delta or 240 High-Leg Delta (40kA)	2910371 - VAL-US-240HLD/40/3+1-FM
480V High-Leg Delta (40kA)	2910387 - VAL-US-480HLD/30/3+1V-FM

# VAL-US Open Terminal SPD Introduction

## Competition



	Phoenix Contact	Citel	Dehn	Mersen	ProSurge
UL Open-Type <b>Listed</b> SPD	✓	✓	✓		
UL Type-1 SPD	116 AC, 8 DC, all cULus	104 AC models	36 models all cULus	18 models all UL (not Canada)	30 AC models cURus
UL Type-2 SPD		48 cUL and 6 cULus			
UL $I_{SCCR}$	DC : 5 kA AC : 200 kA	100 kA & 200 kA	200 kA	200 kA	AC: 200 kA DC: 30,50,100kA
Voltage Range	48 V DC – 600V Delta & 400/690V Wye	All AC, 120V – 600V Delta	120V AC – 480V Delta	120V AC – 480V Delta	120V AC – 600V Delta 48-1500VDC

# VAL-US Open Terminal SPD Introduction

## FAQ

- 1. What is the difference between the VAL-MS and VAL-US products?** The VAL-MS products are tested and labeled according to European requirements and voltage levels. The VAL-US series has all markings required for North American standards.
- 2. Is there a physical difference between VAL-MS and VAL-US?** Yes. According to the UL way of testing short circuit current, without overcurrent protection, the SPD can only have one connection per port. The grounds may not be connected in series. For that reason, all VAL-US bases have only one ground connection point.
- 3. What UL classification is VAL-US?** VAL-US is a UL Listed "Type 1 Open Terminal SPD".
- 4. What does UL "Type 1" mean?** UL SPDs are categorized by how they can be used. A Type-1 SPD does not require overcurrent protection to be used safely if applied according to its ratings. For this reason, it may be connected before or after the line-side main disconnect. Overcurrent protection for the wires connecting it must still be considered.
- 5. What does "Open Type" mean?** Open Type (or "Open Terminal"), is a new category of UL SPDs. These are assemblies that meet the Listed requirements according to UL1449, but do not have a touch-safe enclosure. They may be considered a UL Listed SPD, but must be installed in a suitable UL/NEMA rated enclosure.
- 6. Will the VAL-US products take the place of the VAL-MS products?** Not for all applications, but ideally for any equipment to be installed in North America.
- 7. Wasn't there already a VAL-US product line? What happened to those?** The old VAL-US products will be obsoleted to prevent confusion. The same product and technology will be available, but with new part numbers.

# VAL-US Open Terminal SPD Introduction

## Tools

- [www.phoenixcontact.com/VAL-US](http://www.phoenixcontact.com/VAL-US)
  - Product video
  - Flyer
- NPL literature
  - FAQ sheet
  - Xref list (VAL-MS to VAL-US)
  - Competitor comparison
- Expanded brochure coming soon!



# VAL-US Open Terminal SPD Introduction Positioning



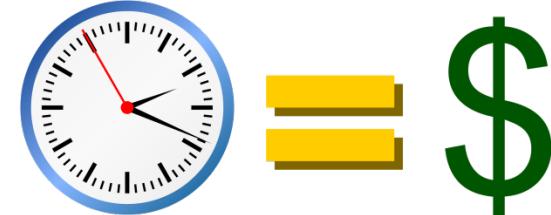
- If not a PLT-SEC application, always start with the VAL-US series
- The series includes high and standard capacity plugs (65 & 80kA)
  - Lead with high capacity
  - If price becomes a concern, offer standard capacity
- If a thinner footprint is required for an application, offer the VAL-SEC

# Who are the primary targets and why?

- UL 508 shops/Integrators and OEMs
- UL Listing makes these products very user friendly
  - No additional evaluations required on end products
  - “Plug and Play”
  - Easier to displace competitors who only have Recognized Component rated products



# **IMPORTANT: UL 508A Panel Shops**



- The new 3<sup>rd</sup> Edition of UL 508A was released in April of 2018
- Table C.1.2 details approvals required for SPDs
  - Type 4 and 5 Recognized components may require additional testing and evaluation
    - These must also be added to the Procedure document
    - Bottom line... additional cost and time!
  - Type 1, 2, and 3 devices do not require any further evaluation when installed per requirements

## Summary

- These are UL Open Listed Type 1 SPDs for easy integration into customer applications
- These are available in US voltage system configurations for easy selection
- Don't compare MLV and VPR – NOT THE SAME!!!
- Position high capacity plugs first
- Primary targets are UL 508 shops/Integrators and OEMs



*Thank You*

