

# VV/HH

High voltage fuse-links 974

Technical data 983

**KEMA** Labs

## HIGH VOLTAGE FUSES



# High voltage fuse-links

## High voltage high-breaking capacity VV fuse-links

**General information**

ETI HV (High-voltage Current-limiting fuse-links) named VVT TD3 are designed to protect devices in switch-gears and other equipment (distribution transformers, power capacitors, MV motors) from thermal and dynamic effects of short-circuits and over-currents. Time-current characteristics correspond to standard IEC 60282-1, item 3.3.3. Back-up fuse. They are suitable for installation in:

- indoor and outdoor RMU (Ring-Main Units) switchgear
- SF6 - insulated enclosures
- special service conditions (different from normal conditions, described in item 4.1. of standard IEC 60282-1)

The most significant features of ETI VVT TD3 high-voltage fuses:

- Low temperature rise because of low power dissipation
- Low minimum breaking currents
- High breaking capacity 63 kA (up to 24kV)
- Two types of striker pins: 50N and 80 N (with integrated temperature dependent limiter)
- Reliable sealing system against humidity irruption
- Low switching voltages
- Upon a request, fuse links can be supplied into non-standard dimensions

Overview of standard and non-standard dimensions

ETI VV TD3	1A	2A	4A	6A	6,3A	10A	16A	20A	25A	31,5A	32A	40A	50A	63A	80A	100A	125A	160A	200A	250A	315A	
6/7,2 kV	192 x Ø 53												192 x Ø 68			192 x Ø 83,5						
	292 x Ø 53												292 x Ø 68			292 x Ø 83,5						
	442 x Ø 53												442 x Ø 68			442 x Ø 83,5						
													442 x Ø 68			442 x Ø 83,5						
10/12 kV	192 x Ø 53						192 x Ø 68						292 x Ø 68			292 x Ø 83,5						
	292 x Ø 53						442 x Ø 53						442 x Ø 68			442 x Ø 83,5						
													442 x Ø 68			537 x Ø 83,5						
													442 x Ø 68			537 x Ø 83,5						
15/17.5 kV	292 x Ø 53						292 x Ø 68						292 x Ø 83,5			367 x Ø 83,5						
	367 x Ø 53						442 x Ø 53						442 x Ø 68			442 x Ø 83,5						
													442 x Ø 68			442 x Ø 83,5						
													442 x Ø 68			442 x Ø 83,5						
20/24 kV	292 x Ø 53						292 x Ø 68						292 x Ø 83,5			442 x Ø 83,5						
	442 x Ø 53						537 x Ø 53						537 x Ø 68			537 x Ø 83,5						
													537 x Ø 68			537 x Ø 83,5						
													537 x Ø 68			537 x Ø 83,5						
30/36 kV	442 x Ø 53						537 x Ø 53						537 x Ø 68			537 x Ø 83,5						
													537 x Ø 68			537 x Ø 83,5						

\* purple: standard dimensions  
 \*\* green: non-standard dimensions

## KEMA Labs

→ KEMA type test reports

→ Reliable sealing system against humidity irruption

→ High endurance ceramic tube

→ Low temperature rise because of low power dissipation

→ Low minimum breaking currents

→ Low switching voltages

→ High breaking capacity 63 kA

→ Galvanically protected contact caps made of electrolytic copper can be nickel (Ni), tin (Sn) or silver (Ag) plated

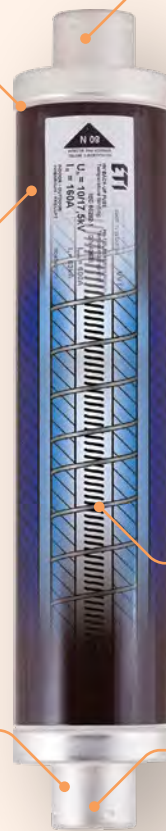
→ Striker system: a temperature sensitive element, which does not react to short time overloads, only to inadmissible values of temperatures. Convenient for the protection of the fuse-links, installed in enclosures or SF6 switchgears

→ Rigid striker pin

→ Various striker variants (50N, 80N, without striker, thermo, non-thermo...)

→ Silver melting element

→ Easier mounting because of improved contact cap



### Standards

ETI MV/VV High voltage fuse-links comply with the following standards and specifications:

- IEC 60282-1 "Current-limiting fuses", Edition 8.0 from 2020-04
- DIN 43625 "Hochspannungs-Sicherungen; Nennspannung 3,6 bis 36kV; maÙe für Sicherungseinsätze"
- VDE 0670 T402, Wechselstromschaltgeräte für Spannungen über 1kV, "Auswahl von strombegrenzenden Sicherungseinsätzen für Transformatorstromkreise"
- IEC TR 62655 "Tutorial and application guide for high-voltage fuses"
- IEC 60644 "Specification for high-voltage fuse-links for motor circuit applications"
- IEC 60549 "High-voltage fuses for external protection of shunt capacitors"

### Certificates, Test reports

- KEMA Type Test Certificates of breaking performance
- Test reports for 25kV, 38.5kV, 40.5kV and 42kV versions

### Construction:

ETI High voltage fuse-links are designed to assure stable and reliable technical characteristics. The glazed porcelain tube (made in ETI own ceramic factory) is extremely high mechanical and thermal resistant.

Galvanically protected contact caps made of electrolytic copper are nickel (Ni) or tin (Sn) or upon customer request silver (Ag) plated. Caps are rolled by pressing into the groove of the tube. The tightness of this connection is assured by a special seal resistant to ageing and high temperatures.

The design and method of production of the melting elements ensures precisely tolerances and stable time/current characteristics. Fuse elements are wound on a ceramic carrier and electrically welded on a special copper strips.

The inside of the tube is filled with quartz sand with an exactly determined granulation and chemical structure. The sand guarantees good and reliable extinguishing of the electric arc.

An important element in the fuse-link construction is also the striker system. Part of that system is temperature sensitive element, which reacts in cases of temperature increasing of the fuse-link due to various reasons. The system reacts in such a way that short time overloads do not cause the fuse to interrupt the circuit unnecessarily. Only when inadmissible values of temperatures are exceeded, the fuse-link open the switch via the striker pin.

Because of these characteristics, ETI "thermal" striker pin is convenient for the protection of the fuse-links, installed in enclosures or SF6 switchgears, which requires additional protection features against inadmissible temperatures.

### Striker pin Type description:

- VVA3; without striker
- VVC3; 50N striker force.
- VVT-D3; 80N striker force, with temperature limiter (VVT)

Ordering Code Numbers

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVA (without striker pin)	VVC3 Striker type 50N	VVT-D3 Striker type 80N THERMO		Tube diameter "d" (mm)	weight [kg]
					Ni plated contacts	Ag plated contacts*		
3/7.2	192	1 A	004221102				53	1.1
		2 A	004221103	004220003	004222003			
		4 A	004221104	004220004	004222004			
		6 A	004221105	004220005	004222005			
		6,3 A	004221106	004220006	004222006			
		10 A	004221107	004220007	004222007			
		16 A	004221108	004220008	004222008			
		20 A	004221109	004220009	004222009			
		25 A	004221110	004220010	004222010			
		31,5 A	004221111	004220011	004222011			
		32 A	004221112	004220012	004222012			
		40 A	004221113	004220013	004222013			
		50A	004221114	004220014	004222014			
		63 A	004221115	004220015	004222015			
		80 A	004221116	004220016	004222016			
		100 A	004221117	004220017	004222017			
		125 A	004221118	004220018	004222018			
		160 A	004221119	004220019	004222019			
3/7.2	292	2 A		004220503	004222503	004222033	53	1.6
		4 A		004220504	004222504	004222034		
		6 A		004220505	004222505	004222035		
		6,3 A		004220506	004222506	004222036		
		10 A		004220507	004222507	004222037		
		16 A		004220508	004222508	004222038		
		20 A		004220509	004222509	004222039		
		25 A		004220510	004222510	004222040		
		31,5 A		004220511	004222511	004222041		
		32 A		004220512	004222512	004222042		
		40 A		004220513	004222513	004222043		
		50 A		004220514	004222514	004222044		
		63 A		004220515	004222515	004222045		
		80 A		004220516	004222516	004222046		
		100 A		004220517	004222517	004222047		
		125 A		004220518	004222518	004222048		
		160 A		004220519	004222519	004222049		
		200 A		004220520	004222520			
250 A		004220521	004222521					
3/7.2	442	2 A		004220603	004222603		68	3.9
		4 A		004220604	004222604			
		6 A		004220605	004222605			
		6,3 A		004220606	004222606			
		10 A		004220607	004222607			
		16 A		004220608	004222608			
		20 A		004220609	004222609			
		25 A		004220610	004222610			
		31,5 A		004220611	004222611			
		32 A		004220612	004222612			
		40 A		004220613	004222613			
		50 A		004220614	004222614			
		63 A		004220615	004222615			
		80 A		004220616	004222616			
		100 A		004220617	004222617			
		125 A		004220618	004222618			
		160 A		004220619	004222619			
		200 A		004220620	004222620			
250 A		004220621	004222621					
315 A		004220622	004222622					
							83,5	5.8



Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.  
 Note 2: Orange colored types according to IEC 60282-1 dimensions.  
 \* Other dimensions available upon request

## High voltage fuse-links

### Ordering Code Numbers

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVA (without striker pin)	VVC3 Striker type 50N	VVT-D3 Striker type 80N THERMO		Tube diameter "d" (mm)	weight [kg]				
					Ni plated contacts	Ag plated contacts*						
6/12	192	2 A		004230103	004232103		53	1.1				
		4 A		004230104	004232104							
		6 A		004230105	004232105							
		6,3 A		004230106	004232106							
		10 A		004230107	004232107							
		16 A		004230108	004232108							
		20 A		004230109	004232109							
		25 A		004230110	004232110							
		31,5 A		004230111	004232111							
		32 A		004230112	004232112							
	40 A		004230113	004232113								
	50 A		004230114	004232114								
	292	1 A	004231102					53	1.6			
		2 A	004231103	004230003	004232003	004232033						
		4 A	004231104	004230004	004232004	004232034						
		6 A	004231105	004230005	004232005	004232035						
		6,3 A	004231106	004230006	004232006	004232036						
		10 A	004231107	004230007	004232007	004232037						
		16 A	004231108	004230008	004232008	004232038						
		20 A	004231109	004230009	004232009	004232039						
		25 A	004231110	004230010	004232010	004232040						
		31,5 A	004231111	004230011	004232011	004232041						
		32 A	004231112	004230012	004232012	004232042						
		40 A	004231113	004230013	004232013	004232043						
		50 A	004231114	004230014	004232014	004232044						
		63 A	004231115	004230015	004232015	004232045						
		80 A	004231116	004230016	004232016	004232046						
		100 A	004231117	004230017	004232017	004232047						
	125 A	004231118	004230018	004232018	004232048							
	160 A	004231119	004230019	004232019	004232049							
	442	2 A			004230503	004232503		53	2.3			
		4 A			004230504	004232504						
		6 A			004230505	004232505						
		6,3 A			004230506	004232506						
		10 A			004230507	004232507						
		16 A			004230508	004232508						
		20 A			004230509	004232509						
		25 A			004230510	004232510						
		31,5 A			004230511	004232511						
		32 A			004230512	004232512						
		40 A			004230513	004232513						
		50 A			004230514	004232514						
		63 A			004230515	004232515						
		80 A			004230516	004232516						
		100 A			004230517	004232517						
		125 A			004230518	004232518						
		160 A			004230519	004232519						
		200 A			004230520	004232520						
		537	160 A			004230619	004232619				83,5	7.0
			200 A			004230620	004232620					
250 A				004230621	004232621							

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.

\* Other dimensions available upon request



Ordering Code Numbers										
rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVA (without striker pin)	VVC3 Striker type 50N	VVT-D3 Striker type 80N THERMO		Tube diameter "d" (mm)	weight [kg]		
					Ni plated contacts	Ag plated contacts*				
10/17,5	292	2 A		004240103	004242103		53	1.6		
		4 A		004240104	004242104					
		6 A		004240105	004242105					
		6,3 A		004240106	004242106					
		10 A		004240107	004242107					
		16 A		004240108	004242108					
		20 A		004240109	004242109					
		25 A		004240110	004242110		68	2.8		
		31,5 A		004240111	004242111					
		32 A		004240112	004242112					
		40 A		004240113	004242113					
		50A		004240114	004242114		83,5	4.0		
		63 A		004240115	004242115					
		80 A		004240116	004242116					
	80 A		004240116	004242116						
	100 A		004240117	004242117						
		367	1 A	004241102				53	1.9	
	2 A		004241103	004240003	004242003	004242033				
	4 A		004241104	004240004	004242004	004242034				
	6 A		004241105	004240005	004242005	004242035				
	6,3 A		004241106	004240006	004242006	004242036				
	10 A		004241107	004240007	004242007	004242037				
	16 A		004241108	004240008	004242008	004242038				
	20 A		004241109	004240009	004242009	004242039				
	25 A		004241110	004240010	004242010	004242040				
	31,5 A		004241111	004240011	004242011	004242041				
	32 A		004241112	004240012	004242012	004242042				
	40 A		004241113	004240013	004242013	004242043				
	50 A		004241114	004240014	004242014	004242044				
	63 A		004241115	004240015	004242015	004242045	68	3.1		
	80A		004241116	004240016	004242016	004242046				
				100 A	004241117	004240017	004242017	004242047	83,5	4.6
			125A	004241118	004240018	004242018	004242048			
			160 A	004241119	004240019	004242019	004242049			
		442	2 A		004240503	004242503		53	2.3	
				4 A		004240504	004242504			
				6 A		004240505	004242505			
				6,3 A		004240506	004242506			
			10 A		004240507	004242507				
			16 A		004240508	004242508				
			20 A		004240509	004242509				
			25 A		004240510	004242510				
			31,5 A		004240511	004242511				
			32 A		004240512	004242512				
			40 A		004240513	004242513				
			50 A		004240514	004242514				
			63 A		004240515	004242515	68	3.9		
			80A		004240516	004242516				
			100 A		004240517	004242517				
		125 A		004240518	004242518	83,5	5.8			

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.

\* Other dimensions available upon request



## High voltage fuse-links

### Ordering Code Numbers

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVA (without striker pin)	VVC3 Striker type 50N	VVT-D3 Striker type 80N THERMO		Tube diameter "d" (mm)	weight [kg]			
					Ni plated contacts	Ag plated contacts*					
10/24	292	2 A		004250103	004252103		53	1.6			
		4 A		004250104	004252104						
		6 A		004250105	004252105						
		6,3 A		004250106	004252106						
		10 A		004250107	004252107						
		16 A		004250108	004252108						
		20 A		004250109	004252109		68	2.8			
		25 A		004250110	004252110						
		31,5 A		004250111	004252111						
		32 A		004250112	004252112						
		40 A		004250113	004252113						
		50A		004250114	004252114				83,5	4.0	
		63 A		004250115	004252115						
		442	1 A	004251102				53	2.3		
	2 A		004251103	004250003	004252003	004252033					
	4 A		004251104	004250004	004252004	004252034					
	6 A		004251105	004250005	004252005	004252035					
	6,3 A		004251106	004250006	004252006	004252036					
	10 A		004251107	004250007	004252007	004252037					
	16 A		004251108	004250008	004252008	004252038					
	20 A		004251109	004250009	004252009	004252039					
	25 A		004251110	004250010	004252010	004252040					
	31,5 A		004251111	004250011	004252011	004252041					
	32 A		004251112	004250012	004252012	004252042					
	40 A		004251113	004250013	004252013	004252043					
	50 A		004251114	004250014	004252014	004252044				68	3.9
	63 A		004251115	004250015	004252015	004252045					
	80A	004251116	004250016	004252016	004252046						
			100 A	004251117	004250017	004252017	004252047	83,5	5.8		
			125A	004251118	004250018	004252018	004252048				
		537	2 A		004250503	004252503		53	2.8		
	4 A			004250504	004252504						
6 A			004250505	004252505							
6,3 A			004250506	004252506							
10 A			004250507	004252507							
16 A			004250508	004252508							
20 A			004250509	004252509							
25 A			004250510	004252510							
31,5 A			004250511	004252511							
32 A			004250512	004252512							
40 A			004250513	004252513							
50 A			004250514	004252514		68	4.7				
63 A			004250515	004252515							
80A			004250516	004252516							
100 A		004250517	004252517								
		125 A		004250518	004252518		83,5	7.0			
		160 A		004250519	004252519						

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.

\* Other dimensions available upon request





Ordering Code Numbers									
rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVA (without striker pin)	VVC3 Striker type 50N	VVT-D3 Striker type 80N THERMO		Tube diameter "d" (mm)	weight [kg]	
					Ni plated contacts	Ag plated contacts*			
20/36	442	2 A		004260103	004262103		53	2.3	
		4 A		004260104	004262104				
		6 A		004260105	004262105				
		6,3 A		004260106	004262106				
		10 A		004260107	004262107				
		16 A		004260108	004262108				
		20 A		004260109	004262109				
	25 A		004260110	004262110					
	537	1 A	004261102					53	2.8
		2 A	004261103	004260003	004262003	004262033			
		4 A	004261104	004260004	004262004	004262034			
		6 A	004261105	004260005	004262005	004262035			
		6,3 A	004261106	004260006	004262006	004262036			
		10 A	004261107	004260007	004262007	004262037			
		16 A	004261108	004260008	004262008	004262038			
		20 A	004261109	004260009	004262009	004262039			
		25 A	004261110	004260010	004262010	004262040			
		31,5 A	004261111	004260011	004262011	004262041			
		32 A	004261112	004260012	004262012	004262042			
		40 A	004261113	004260013	004262013	004262043			
		50 A	004261114	004260014	004262014	004262044			
63 A		004261115	004260015	004262015	004262045				
80 A	004261116	004260016	004262016	004262046					

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.

\* Other dimensions available upon request

## High voltage fuse-links for liquid-immersed transformers



Ordering Code Numbers						
rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVT-D Striker type 80N	Tube diameter "d" (mm)	weight [kg]	
6/12	292	2A	004236903	53	1,6	
		4A	004236904			
		6A	004236905			
		10A	004236906			
		16A	004236907			
		20A	004236908			
		25A	004236909			
		32A	004236910			
		40A	004236911			
10/24	292	2A	004256943	53	1,6	
		4A	004256944			
		6A	004256945			
		10A	004256946			
		16A	004256947			
	442	442	2A	004256903	53	2,3
			4A	004256904		
			6A	004256905		
			10A	004256906		
			16A	004256907		
			20A	004256908		
			25A	004256909		
			32A	004256910		
			40A	004256911		



## High voltage fuse-links

### High voltage fuse-links for protection of voltage transformers

#### Ordering Code Numbers

rated voltage	Dimension "e" according to DIN and IEC (mm)	rated current	VVT-D	Tube diameter "d" (mm)	weight
$U_n$ [kV]		[A]			[kg]
10/24	235	2A	004251033	54	1,45
		4A	004251034		



### Fuse bases for VV fuse-links

#### 1-pole Indoor mounting

type	Rated voltage [kV]	code No.	Dimension "e" according to DIN and IEC [mm]	packaging [pcs]
VVP 7,2 1p-N	7,2	004229010	192	1
VVP 12 1p-N	12	004239010	292	1
VVP 17,5 1p-N	17,5	004249010	367	1
VVP 24 1p-N	24	004259010	442	1
VVP 36 1p-N	36	004269010	537	1

\* when choosing right fuse base consider size and rated voltage of fuse-link

\*\* due to safety reasons fuse bases cannot be later adjusted on different length by a user

\*\*\* indoor edition of fuse base may not be used for outside applications

\*\*\*\* Max thermal current: 100A, used with ETI VVT TD3 fuse-links.



#### 1-pole Indoor mounting with microswitch fuse monitoring

type	Rated voltage [kV]	code No.	Dimension "e" according to DIN and IEC [mm]	packaging [pcs]
VVP 7,2 1p-N + NK 7,2 BSW	7,2	004349019	192	1
VVP 12 1p-N + NK 12 BSW	12	004349020	292	1
VVP 17,5 1p-N + NK 17,5 BSW	17,5	004349021	367	1
VVP 24 1p-N + NK 24 BSW	24	004349022	442	1
VVP 36 1p-N + NK 7,2 BSW	36	004349023	537	1

\* when choosing right fuse base consider size and rated voltage of fuse-link

\*\* due to safety reasons fuse bases cannot be later adjusted on different length by a user

\*\*\* Rotation in installation is allowed only with the pin striker pointing upward (as in the photo on the right)

\*\*\*\* Max thermal current: 100A, used with ETI VVT TD3 fuse-links.





**1-pole Outdoor mounting**

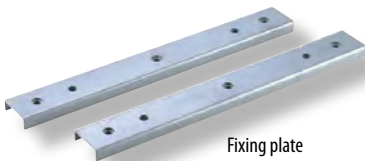
type	Rated voltage [kV]	code No.	Dimension "e" according to DIN and IEC [mm]	packaging [pcs]
VVP 7,2 1p-Z	7,2	004229030	192	1
VVP 12 1p-Z	12	004239030	292	1
VVP 17,5 1p-Z	17,5	004249030	367	1
VVP 24 1p-Z	24	004259030	442	1
VVP 36 1p-Z	36	004269030	537	1

\* when choosing right fuse base consider size and rated voltage of fuse-link

\*\* due to safety reasons fuse bases cannot be later adjusted on different length by a user

\*\*\*\* Max thermal current: 100A, used with ETI VVT D3 fuse-links.

**Accessories**

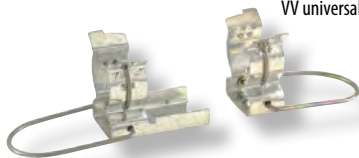


Fixing plate to obtain 3p fuse base (2 fixing plates are needed)



Microswitch

VV universal clip



VV universal clip with tail

**Accessories for VVP fuse bases**

type	Rated voltage [kV]	code No.	packaging [pcs]
Fixing plate for VVP 7,2 3p-N, INDOOR	7,2	004229020	1
Fixing plate for VVP 12 3p-N, INDOOR	12	004239020	1
Fixing plate for VVP 17,5 3p-N, INDOOR	17,5	004249020	1
Fixing plate for VVP 24 3p-N, INDOOR	24	004259020	1
Fixing plate for VVP 36 3p-N, INDOOR	36	004269020	1
Fixing plate for VVP 12 3p-Z, OUTDOOR	12	004239040	1
Fixing plate for VVP 24 3p-Z, OUTDOOR	24	004259040	1
Microswitch NK 7,2 BSW, INDOOR	7,2	004349007	1
Microswitch NK 12 BSW, INDOOR	12	004349008	1
Microswitch NK 17,5 BSW, INDOOR	17,5	004349009	1
Microswitch NK 24 BSW, INDOOR	24	004349010	1
Microswitch NK 36 BSW, INDOOR	36	004349011	1
VV universal clip with tail, prepared for M10 screw connection	7,2 - 36	004349015	1
VV universal clip	7,2 - 36	004349016	1

Fixing plate is used for combining 1-pole fuse bases into 3-pole fuse bases.