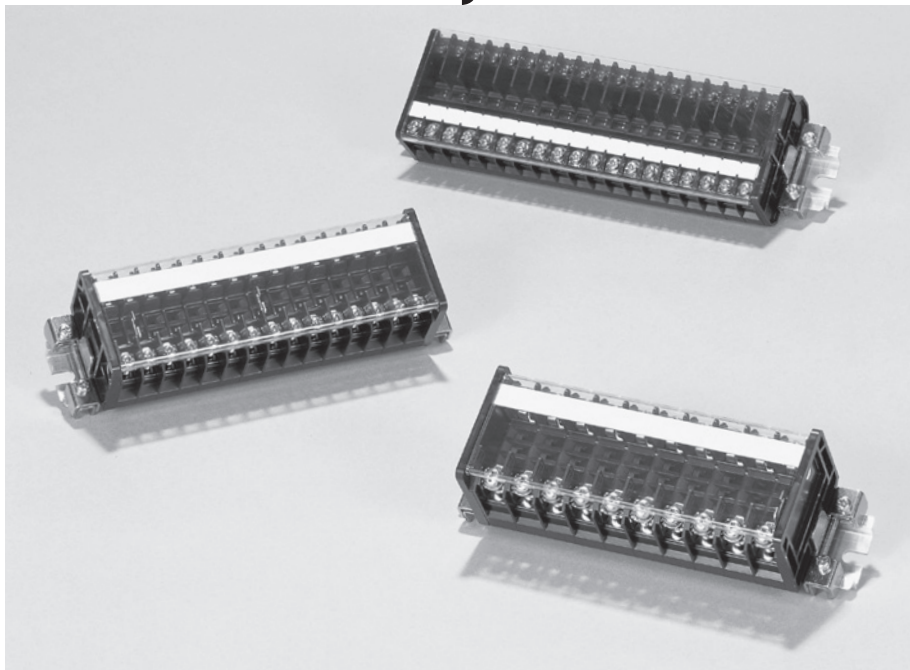




SURGE ABSORBER TERMINAL BLOCK

TV TYPE, TEV TYPE



FEATURES

- Terminal blocks that enable quick mounting and removal of a surge absorber.
- You can select a varistor (voltage-dependent resistor), arrester, etc. according to the purpose of use, enabling a desired circuit configuration.
- Available in a variety of lineup, the terminal blocks are selectable according to the purpose of use and can be used in combination with the rail mounting method.
- The up-screw terminal connection is used, enabling easy wiring. (The TEV type provides up-screw terminals on one side only.)

SPECIFICATIONS (RATINGS, PERFORMANCE)

Type Specification	TVS-3.5 TVS-3.5C	TVF-3.5	TVA-3.5	TVA-8	TEV-2	TEV-5.5
Rated insulation voltage (UI)	250V	600V	250V			
Rated current-carrying capacity (Ith)	20A			30A	20A	30A
Rated cross-section	3.5mm ²			8.0mm ²	2.0mm ²	5.5mm ²
Screw size	M4×10			M5×12	M4×10	M5×12
Number of conductors simultaneously connectable	2					
Power-Frequency withstand voltage	2,000V AC / 1 min.				2,500V AC / 1 min.	
Rated impulse withstand voltage	±4kV / 3 times for each pole (1.2 / 50 μs)				±6kV / 3 times for each pole (1.2 / 50 μs)	
Ambient operating temperature	-25 to 50°C (No freeze)					
Storing temperature	-40 to 85°C					
Altitude	2,000 m or less					

How to order of terminal blocks

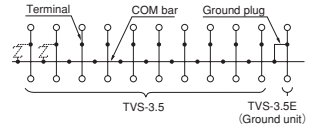
Note: The product can be ordered as an assembly only, except for the TVF type.
For combination, up to 20 poles can be specified.
For the earth unit, an earth plug is inserted in the conventional unit (For grounding)

How to order assembly

1 TVS series (Assembly)

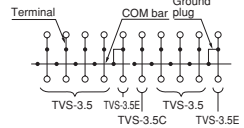
TVS - 3.5 × 10, 3.5E × 1 XF - 155

Basic type Size No. of poles Ground unit No. of poles Rail



TVS - 3.5 × 4, 3.5E × 1, 3.5C × 1, 3.5 × 3, 3.5E × 1 XF - 145

Basic type Size No. of poles Ground unit No. of poles COM bar dividing unit No. of poles Size No. of poles Ground unit No. of poles Rail



* Combinations other than the above can be freely selected. Please contact us when required.

2 TVF series (Assembly)

TVF - 3.5 × 10 XF - 145

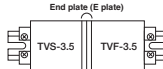
Basic type Size No. of poles Rail



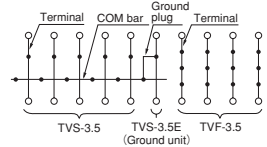
3 TVS, TVF series (Mix assembly)

TVS - 3.5 × 5, 3.5E × 1, TVF - 3.5 × 4 XF - 155

Basic type Size No. of poles Ground unit No. of poles Basic type Size No. of poles Rail



* The TVS and TVF types can be combined by inserting a side plate between individual units. (See the figure on the right.)

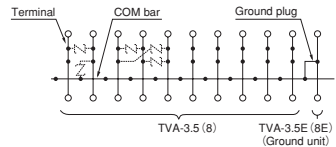


4 TVA series (Assembly)

TVA - 3.5 × 10, 3.5E × 1 XF - 155

Basic type Cable size No. of poles Ground unit size No. of poles Rail

Code	Size	Code	Size
3.5	3.5mm ²	3.5E	3.5mm ²
8	8mm ²	8E	8mm ²



5 TVA series (Mix assembly)

TVA - 8 × 1, 8E × 1, 3.5E × 1, 3.5 × 4 XF - 125

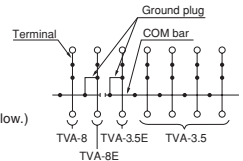
Basic type Size No. of poles Ground unit No. of poles Ground unit No. of poles Size No. of poles Rail



* When you place an order, specify the earth plug position.

* The TVA-type models 3.5 and 8 can be combined directly without insertion of the side plate. (See the figure below.)

Note: The COM bar shall be divided.

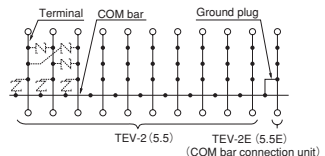


6 TEV series (Assembly)

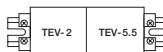
TEV - 2 × 10, 2E × 1 XF - 155

Basic type Wire size for varistor connecting unit No. of poles Wire size for COM bar connecting unit No. of poles Rail

Code	Size	Code	Size
2	2mm ²	2E	2mm ²
5.5	5.5mm ²	5.5E	5.5mm ²



* The TEV-type models 2 and 5.5 can be combined directly without insertion of the side plate. (See the figure on the right.)





SURGE ABSORBER TERMINAL BLOCK

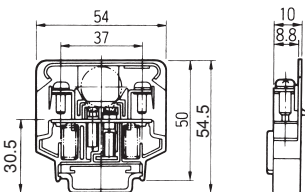
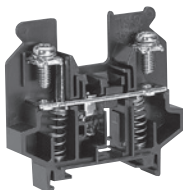
TV TYPE, TEV TYPE

STANDARD PRODUCTS *Rail assembly only, except TVF type

COM connecting method

TVS-3.5 (20A)

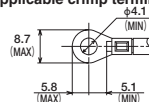
Applicable wire size: 1.25 to 3.5mm² (M4)



● Applicable accessories (References)

End plate	TVE-3.5A
	TVE-3.5B
Standard marker strip	TUM-2
Standard rail	TXB
End clamp	TXL
Cover	TUC-8
Ground plug	TV Ground plug

● Applicable crimp terminal

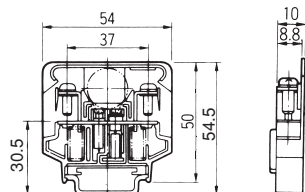
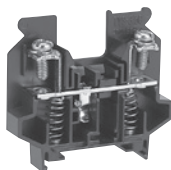


* With insulating cover

COM connecting method

TVS-3.5C (20A)

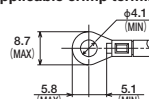
Applicable wire size: 1.25 to 3.5mm² (M4)



● Applicable accessories (References)

End plate	TVE-3.5A
	TVE-3.5B
Standard marker strip	TUM-2
Standard rail	TXB
End clamp	TXL
Cover	TUC-8

● Applicable crimp terminal



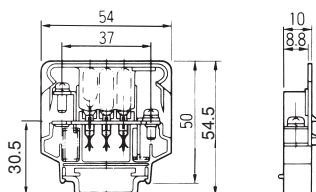
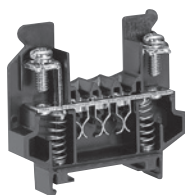
* With insulating cover

* For TVS-3.5, use this unit to divide COM.

Interconnecting method

TVF-3.5 (20A)

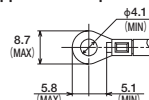
Applicable wire size: 1.25 to 3.5mm² (M4)



● Applicable accessories (References)

End plate	TVE-3.5A
	TVE-3.5C
Standard marker strip	TUM-2
Standard rail	TXB
End clamp	TXL
Cover	TUC-8

● Applicable crimp terminal

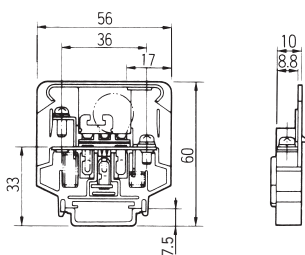
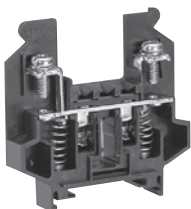


* With insulating cover

COM connecting method and interconnecting method

TVA-3.5 (20A)

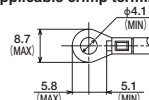
Applicable wire size: 1.25 to 3.5mm² (M4)



● Applicable accessories (References)

End plate	TVAE-A
	TVAE-B
Standard marker strip	TUM-2
Standard rail	TXB
End clamp	TXL
Cover	TUC-8
Ground plug	TV Ground plug

● Applicable crimp terminal

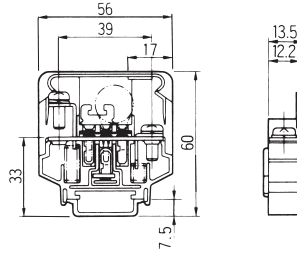
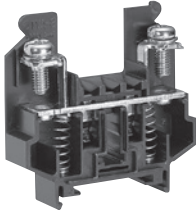


* With insulating cover

COM connecting method and interconnecting method

TVA-8 (30A)

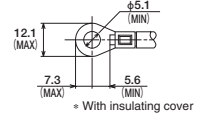
Applicable wire size: 2.0 to 8mm² (M5)



● Applicable accessories (References)

End plate	TVAE-A
	TVAE-B
Standard marker strip	TUM-2
Standard rail	TXB
End clamp	TXL
Cover	TV-8
Ground plug	TV Ground plug

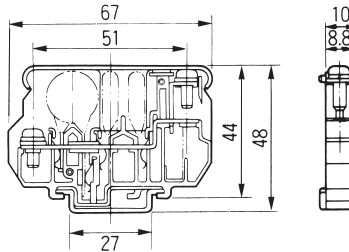
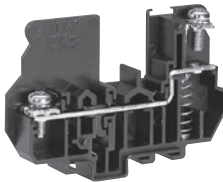
● Applicable crimp terminal



COM connecting method and interconnecting method

TEV-2 (20A)

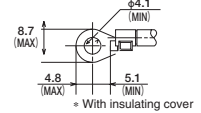
Applicable wire size: 0.75 to 2.0mm² (M4)



● Applicable accessories (References)

End plate	TEVE-A
	TEVE-B
Standard marker strip	TUM-1
Standard rail	TXB
End clamp	TXL
Cover	TUC-15
Ground plug	TE Ground plug

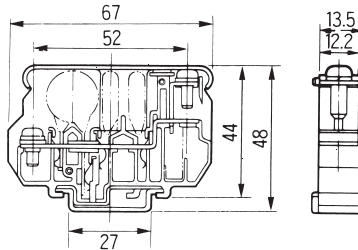
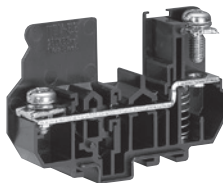
● Applicable crimp terminal



COM connecting method and interconnecting method

TEV-5.5 (30A)

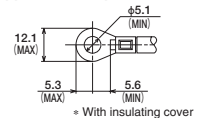
Applicable wire size: 2.0 to 5.5mm² (M5)



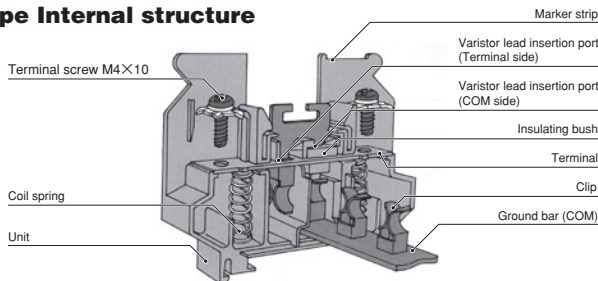
● Applicable accessories (References)

End plate	TEVE-A
	TEVE-B
Standard marker strip	TUM-1
Standard rail	TXB
End clamp	TXL
Cover	TUC-15
Ground plug	TE Ground plug

● Applicable crimp terminal



TV, TEV type Internal structure





SURGE ABSORBER TERMINAL BLOCK

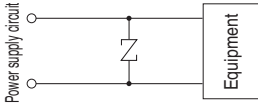
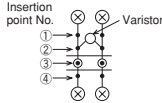
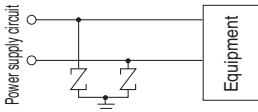
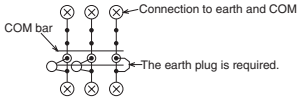
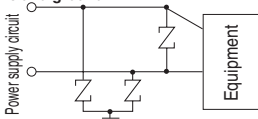
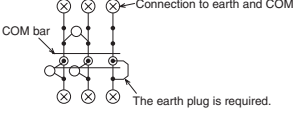
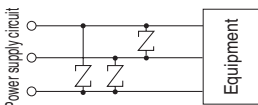
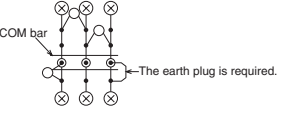
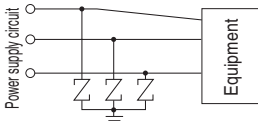
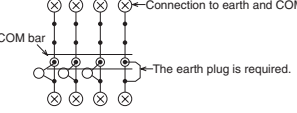
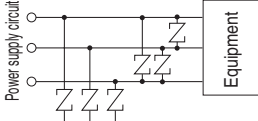
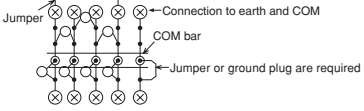
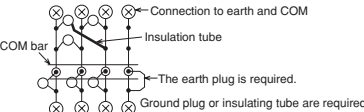
TV TYPE, TEV TYPE

How to use

Structure	Circuit of 1 unit	Circuit diagram	Assembly schematic diagram	Varistor
●TVS-3.5 				<p>Thickness 8mm (MAX)</p>
●TVS-3.5E 				<p>Use the earth plug.</p>
●TVF-3.5 				<p>Thickness 7mm (MAX)</p> <p>* TVF-3.5 can't do both common and ground connection directly.</p>
●TVA-3.5, TVA-8 				<p>Thickness 6mm (MAX)</p>
●TEV-2, TEV-5.5 				<p>Thickness 7mm (MAX)</p> <p>Thickness 8mm (MAX)</p> <p>* In case of TEV-5.5, the thickness (MAX) will be 10mm.</p>

Use case examples (TEV type)

The surge absorber terminal blocks can be used in a wide range of applications, if device types and inserting positions are changed.
An example of the connection is shown below. (TEV type)
For applications of other types and detailed usage, please contact us.

Circuit diagram	TEV-2, TEV-5.5
<p>1. Surge absorption between single-phase lines</p> 	 <p>To be inserted in insertion port ① or ②.</p>
<p>2. Surge absorption between single-phase line and ground</p> 	 <p>COM bar Connection to earth and COM The earth plug is required.</p> <p>To be inserted in insertion port ③ or ④.</p>
<p>3. Surge absorption between single-phase lines, or between single-phase line and ground</p> 	 <p>COM bar Connection to earth and COM The earth plug is required.</p> <p>Insert a line-to-line varistor in insertion port ① or ②, and a line-to-ground varistor in insertion ports ③ and ④.</p>
<p>4. Surge absorption between 3-phase lines</p> 	 <p>COM bar Connection to earth and COM The earth plug is required.</p> <p>A varistor can be connected between 3-phase lines via the COM bar.</p>
<p>5. Surge absorption between 3-phase lines and ground</p> 	 <p>COM bar Connection to earth and COM The earth plug is required.</p>
<p>6. Surge absorption between 3-phase lines, and between individual line and ground</p> 	 <p>Jumper Connection to earth and COM COM bar Jumper or ground plug are required</p>  <p>COM bar Connection to earth and COM Insulation tube The earth plug is required. Ground plug or insulating tube are required</p>



TV TYPE, TEV TYPE

Reference

Precautions for use

Surge absorbers that can be mounted are described below.

For selection, refer to the reference material of each device manufacturer.

Varistor

●Application of varistor and inserting method

1. Since phase-to-phase impulse withstand voltage is lower than phase-to-ground, a varistor should be used for surge absorption.
2. Ideally, varistors should be inserted between individual phases and between each phase and ground.

●Varistor voltage

1. Normally, when a varistor is inserted between phases, select a varistor whose voltage is higher than line-to-line peak voltage by 10 to 20%.
 2. Withstand voltage of devices and equipment other than varistors should be larger than the varistor voltage.
- (Diode, transistor) Withstand voltage > Varistor voltage

(Diode
Transistor) Withstand voltage > Varistor voltage

●Withstand surge current and device diameter

Withstand surge current is proportional to the area of device, if the same material is used.

Nominal device diameter (mm)	φ 5	φ 7	φ 10	φ 14	φ 20
Area ratio (take φ 10 for 100)	25	49	100	196	400
Withstand surge current (A)	200	600	1250	2500	4000
(8 / 20μS 2 times)	50*	125*	250*	500*	1000*

* Varistor voltage: 22 V to 68 V

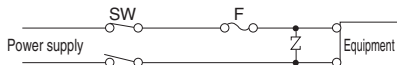
* A device diameter of 20 mm is applicable only when the terminal cover is not used.

●Device temperature rise

1. When surge is continuously applied, device temperature rises. In this case, heat radiation effect varies depending on the device diameter.
2. With progress of varistor deterioration, leak current occurs with the varistor at the peak value under normal voltage, resulting in device temperature rise.

●Countermeasures against overload

1. If it is expected that a surge current much larger than the rating flows through a varistor, connect the varistor to the line after the power supply fuse.

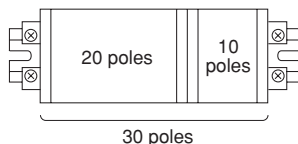


2. If an overcurrent interrupter is not provided for the circuit, connect a fuse to the varistor in series.

Type	5 series	7 series	10 series	14 series	20 series
Rated current of fuse	1 to 2A	2 to 3A	3 to 5A	3 to 10A	5 to 15A

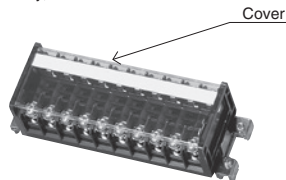
●Varistor mounting method

- ① When inserting a varistor
 - Cut and bend the varistor lead wire into the specified shape.
 - Use a varistor that meets the specifications.
- ② Common bar for grounding
 - The common bar for grounding is applicable to up to 20 poles. For 21 or more poles, the common bar should be divided into two for each pole.



③ Cover (TUC)

- To ensure safety, be sure to use the cover.



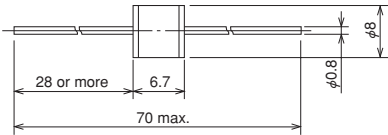
<List of applicable varistor>

Manufacturer	Panasonic	NIPPON CHEMICON
Model		
Common to all models	ERZV-05D□□□ ERZV-07D□□□ ERZV-09D□□□	TND05V□□□K TND07V□□□K TND09V□□□K
TVS-3.5	~ERZV-10D751 ~ERZV-14D751	~TND10V-751K ~TND12V-751K ~TND14V-751K
TVF-3.5	~ERZV-10D751 ~ERZV-14D751	~TND10V-561K ~TND12V-561K ~TND14V-561K
TEV-2	~ERZV-10D751 ~ERZV-14D751	~TND10V-561K ~TND12V-561K ~TND14V-561K
TEV-5.5	~ERZV-10D751 ~ERZV-14D751	~TND10V-561K ~TND12V-561K ~TND14V-561K
TVA-3.5 TVA-8	~ERZV-10D431 ~ERZV-14D431	~TND10V-431K ~TND12V-431K ~TND14V-431K

Ceramic • arrester

Y08U

※Made by SANKOSHA



■Specification (Rating • Efficiency)

Variation		Y08U-90B	Y08U-230B	Y08U-350B	Y08UZ-230B	Y08UZ-350B
Discharge inception voltage	DC-V	90±20%	230±15%	350±15%	230±15%	350±15%
Hold-over voltage	DC-V	60			125	
1.2 / 50μs Impulse discharge inception voltage	V	1,000				
8 / 20μs Impulse current tolerance rate	A	10,000				
50Hz±1sec AC current tolerance rate	A	10				
(Y08U-90B DC50V) Insulation resistance 100V DC	M Ω	10,000 or more				
Electrostatic capacity	pF	Y08U(z) : 1 or less				

■Features

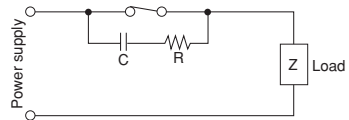
1. Because of large withstand discharge current, the arrester is resistant to repeated discharge.
2. The arrester enables quick response to an abnormal voltage.
3. Once an abnormal voltage is eliminated, the device will be immediately restored.
4. The arrester will not be activated by system power supply voltage.
5. Free from deterioration for a long period.

Capacitor, Resistance

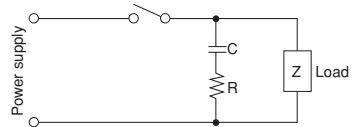
●Usage instructions

1. While a general surge absorbing device is inserted into the signal receiving side, a noise/spark killer (comprising CR or LC) is connected to the noise source side by forming the lead.
2. Generally, the capacitor and resistor are used in the following circuits.

(a) When the circuit is almost closed



(b) When the circuit is almost opened



3. Relative to normal operating current of a load circuit, C and R values should be selected as follows:

Capacitance $C \approx I^2/10$ to $I^2/20$ (μF)

Resistance $R \approx$ DC resistance of load circuit (Ω)



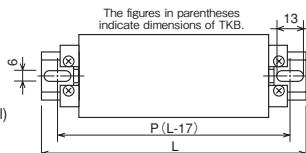
TV TYPE, TEV TYPE

TABLE OF ASSEMBLED DIMENSIONS

TV type, TEV type assembly on punched rail

TXB-D type

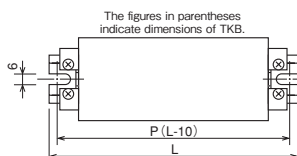
The assembled dimensions for the TKB-D (Reinforced rail) are the same as shown in the following table. However, the rails are marked as KD-□.



Type	TVS-3.5, TVF-3.5, TVA-3.5			TVA-8			TEV-2			TEV-5.5			Type
Pole	P	L	Rail	P	L	Rail	P	L	Rail	P	L	Rail	Pole
1	60	77	XD-4	60	77	XD-4	60	77	XD-4	60	77	XD-4	1
2	60	77	XD-4	60	77	XD-4	60	77	XD-4	60	77	XD-4	2
3	60	77	XD-4	80	97	XD-5	60	77	XD-4	80	97	XD-5	3
4	80	97	XD-5	100	117	XD-6	80	97	XD-5	100	117	XD-6	4
5	80	97	XD-5	100	117	XD-6	80	97	XD-5	100	117	XD-6	5
6	100	117	XD-6	120	137	XD-7	100	117	XD-6	120	137	XD-7	6
7	100	117	XD-6	140	157	XD-8	100	117	XD-6	140	157	XD-8	7
8	120	137	XD-7	140	157	XD-8	120	137	XD-7	140	157	XD-8	8
9	120	137	XD-7	160	177	XD-9	120	137	XD-7	160	177	XD-9	9
10	140	157	XD-8	180	197	XD-10	140	157	XD-8	180	197	XD-10	10
11	140	157	XD-8	180	197	XD-10	140	157	XD-8	180	197	XD-10	11
12	160	177	XD-9	200	217	XD-11	160	177	XD-9	200	217	XD-11	12
13	160	177	XD-9	220	237	XD-12	160	177	XD-9	220	237	XD-12	13
14	180	197	XD-10	220	237	XD-12	180	197	XD-10	220	237	XD-12	14
15	180	197	XD-10	240	257	XD-13	180	197	XD-10	240	257	XD-13	15
16	200	217	XD-11	260	277	XD-14	200	217	XD-11	260	277	XD-14	16
17	200	217	XD-11	260	277	XD-14	200	217	XD-11	260	277	XD-14	17
18	220	237	XD-12	280	297	XD-15	220	237	XD-12	280	297	XD-15	18
19	220	237	XD-12	300	317	XD-16	220	237	XD-12	300	317	XD-16	19
20	240	257	XD-13	300	317	XD-16	240	257	XD-13	300	317	XD-16	20

TV type, TEV type assembly on U-cut rail








TXB-F type



Type	TVS-3.5, TVF-3.5, TVA-3.5			TVA-8			TEV-2			TEV-5.5			Type
Pole	P	L	Rail	P	L	Rail	P	L	Rail	P	L	Rail	Pole
1	45	55	XF-55	50	60	XF-60	45	55	XF-55	50	60	XF-60	1
2	55	65	XF-65	65	75	XF-75	55	65	XF-65	60	70	XF-70	2
3	65	75	XF-75	75	85	XF-85	65	75	XF-75	75	85	XF-85	3
4	75	85	XF-85	90	100	XF-100	75	85	XF-85	85	95	XF-95	4
5	85	95	XF-95	105	115	XF-115	85	95	XF-95	100	110	XF-110	5
6	95	105	XF-105	120	130	XF-130	95	105	XF-105	115	125	XF-125	6
7	105	115	XF-115	130	140	XF-140	105	115	XF-115	130	140	XF-140	7
8	115	125	XF-125	145	155	XF-155	115	125	XF-125	140	150	XF-150	8
9	125	135	XF-135	160	170	XF-170	125	135	XF-135	155	165	XF-165	9
10	135	145	XF-145	170	180	XF-180	135	145	XF-145	170	180	XF-180	10
11	145	155	XF-155	185	195	XF-195	145	155	XF-155	180	190	XF-190	11
12	155	165	XF-165	200	210	XF-210	155	165	XF-165	195	205	XF-205	12
13	165	175	XF-175	215	225	XF-225	165	175	XF-175	210	220	XF-220	13
14	175	185	XF-185	225	235	XF-235	175	185	XF-185	220	230	XF-230	14
15	185	195	XF-195	240	250	XF-250	185	195	XF-195	235	245	XF-245	15
16	195	205	XF-205	255	265	XF-265	195	205	XF-205	250	260	XF-260	16
17	205	215	XF-215	265	275	XF-275	205	215	XF-215	265	275	XF-275	17
18	215	225	XF-225	280	290	XF-290	215	225	XF-225	275	285	XF-285	18
19	225	235	XF-235	295	305	XF-305	225	235	XF-235	290	300	XF-300	19
20	235	245	XF-245	305	315	XF-315	235	245	XF-245	305	315	XF-315	20

ACCESSORIES

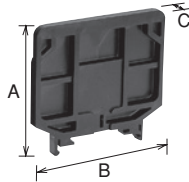
LIST OF APPLICABLE ACCESSORIES

Accessory		End plate	Marker strip		Marker strip case	Marker sheet	Aluminum rail		End clamp		Cover	Ground plug
												
Type			Applicable	Semi-applicable			Applicable	Semi-applicable	Applicable	Semi-applicable		
TV TYPE	TVS-3.5	TVE-3.5A, TVE-3.5B	TUM-2	_____	TUM marker strip case 10	_____	TXB	TUB TKB	TXL	TUL-W TJL	TUC-8	TV Ground plug
	TVS-3.5C			_____		_____						
	TVF-3.5	TVE-3.5A, TVE-3.5C		_____		_____						_____
	TVA-3.5	TVAE-A, TVAЕ-B		_____		_____						_____
	TVA-8			_____		_____						_____
TEV TYPE	TEV-2	TEVE-A, TEVE-B	TUM-1	_____	TUM marker strip case 8	_____	TXB	TUB TKB	TXL	TUL-W TJL	TUC-15	TE Ground plug
	TEV-5.5			_____		_____						

End plate

(Order unit: 100)

- TVE-3.5A
- TVE-3.5B
- TVE-3.5C
- TVAE-A
- TVAE-B
- TEVE-A
- TEVE-B

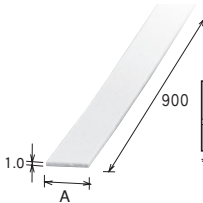


Type name	TVE-3.5A TVE-3.5B TVE-3.5C	TVAE-A TVAE-B	TEVE-A TEVE-B
A	50.5	56	46
B	54	56	67
C	5	5	3

* Plates A and B or A and C should be used as a set.

Marker strip

(Order unit: 100)


Standard thickness: $t = 1.0$ mm

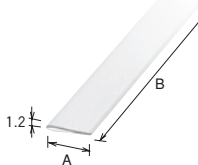
Type name	TUM-1 (TUM marker strip 8A ABS)	TUM-2 (TUM marker strip 10A ABS)
A	8	10

* Plate thickness:
 $t = 0.5$ mm specification is available.
Type: TUM-1 0.5T (TUM marker strip 8ABS 0.5)
Type: TUM-2 0.5T (TUM marker strip 10ABS 0.5)

Marker strip case

(Order unit: 100)

- TUM marker strip case 8
- TUM marker strip case 10

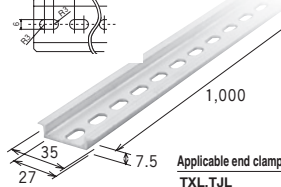
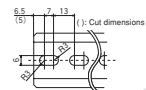

Plate thickness: $t = 0.3$ mm
Transparent case

Type name	TUM marker strip case 8	TUM marker strip case 10
A	8	10.2
B	1,000	1,000

Aluminum rail

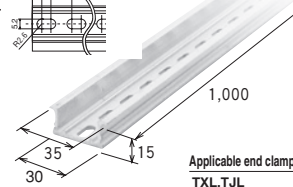
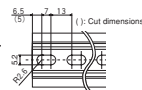
- TXB (DIN rail)

(Order unit: 50)


Applicable end clamp
TXL, TJL

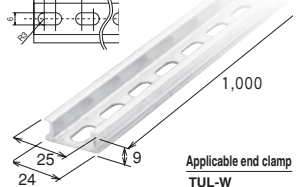
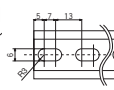
- TKB (Reinforced DIN rail)

(Order unit: 20)


Applicable end clamp
TXL, TJL

- TUB (Fuji exclusive rail)

(Order unit: 50)


Applicable end clamp
TUL-W



SURGE ABSORBER TERMINAL BLOCK

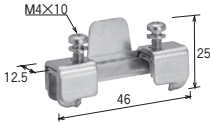
TV TYPE, TEV TYPE

ACCESSORIES

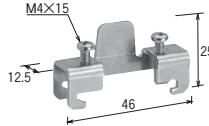
End clamp

(Order unit: 50)

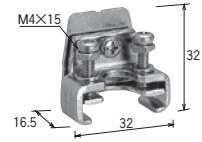
●TXL (for TXB)



●TJL (for TXB)



●TUL-W (for TUB)



Cover

(Order unit: 20)



Type name	TUC-8	TUC-15
A	50	62
B	1,000	1,000
C	7	7.5

Name plate mount

(Order unit: 50)

●TX NP mount S

●TX NP mount lens



(Assembled state)

* The NP mount can be attached to TXL (end clamp).

Ground plug

(Order unit: 10)

●TV type

TV Ground plug



This plug is inserted in the earth unit.
This is connected to the COM bar, through
which the circuit is grounded.

●TEV type

TE Ground plug



Applicable to COM and wiring unit.

Rail cap

Please refer to the page C29 for the rail cap.