

Low-voltage voltage transformers

For high transient voltage peaks and harmonic measurements up to 20 kHz



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Burden range I and II – Differences explained quickly!

In July 2011, the IEC 61869-3 (Additional requirements for inductive voltage transformers) replaced the previously valid IEC 60044-2. One of the most important changes is, that loads with a power factor of 1 are permissible in addition to the known loads with power factor 0.8.

The standard divides these burdens into two burden ranges:

The **burden range I** with a **power factor of 1** includes the following burdens::

1.0 – 2.5 – 5.0 – 10 VA

The **burden range II** with a **power factor of 0.8** includes the following burdens:

10 – 25 – 50 – 100 VA

Both burden ranges are tested for accuracy between 80 % and 120 % of the rated voltage. The burden range to be checked differs as follows:

Burden range I:

Each burden from **0 VA up to 100 %** of the rated burden with a **power factor of 1** must be within the accuracy class defined for the voltage transformer.

Burden range II:

Each burde from **25 % up to 100 %** of the rated burden with a **power factor of 0.8 inductive** must be within the accuracy class defined for the voltage transformer.

This regulation refers to the usage of modern measuring devices, which ordinarily have a voltage input with a high pure omic resistance. The power factor of 1 required in this case is covered by burden range I. An often encountered underloading is therefore also excluded. Details can be found in the illustrations on the following page.

Error limits for voltage transformers for classes 0.2 ... 3 according to DIN EN 61869, part 3

Accuracy class	Voltage error ϵ_u	Phase displacement error $\Delta \varphi$
	\pm %	\pm min
0.2	0,2	10
0.5	0,5	20
1	1,0	40
3	3,0	-

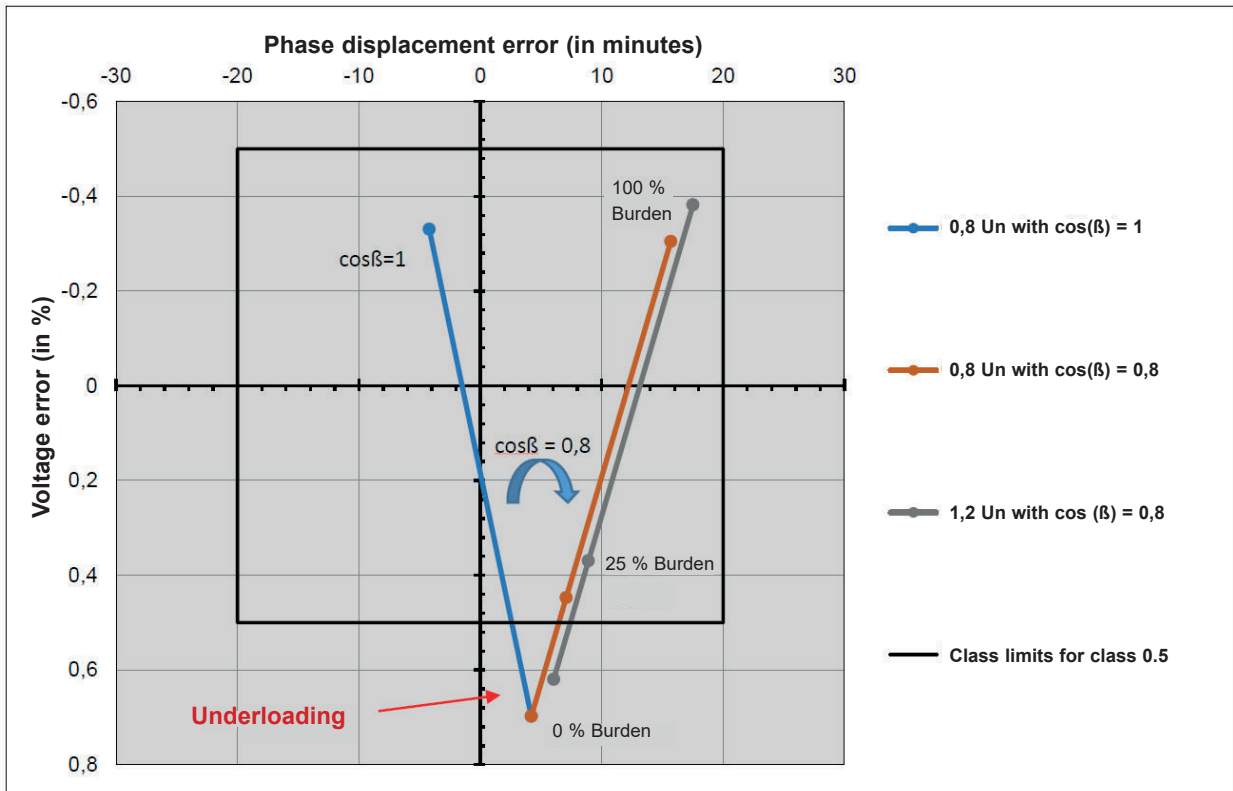


Fig. 1: Exemplary error chart of voltage transformer BR II in class 0.5

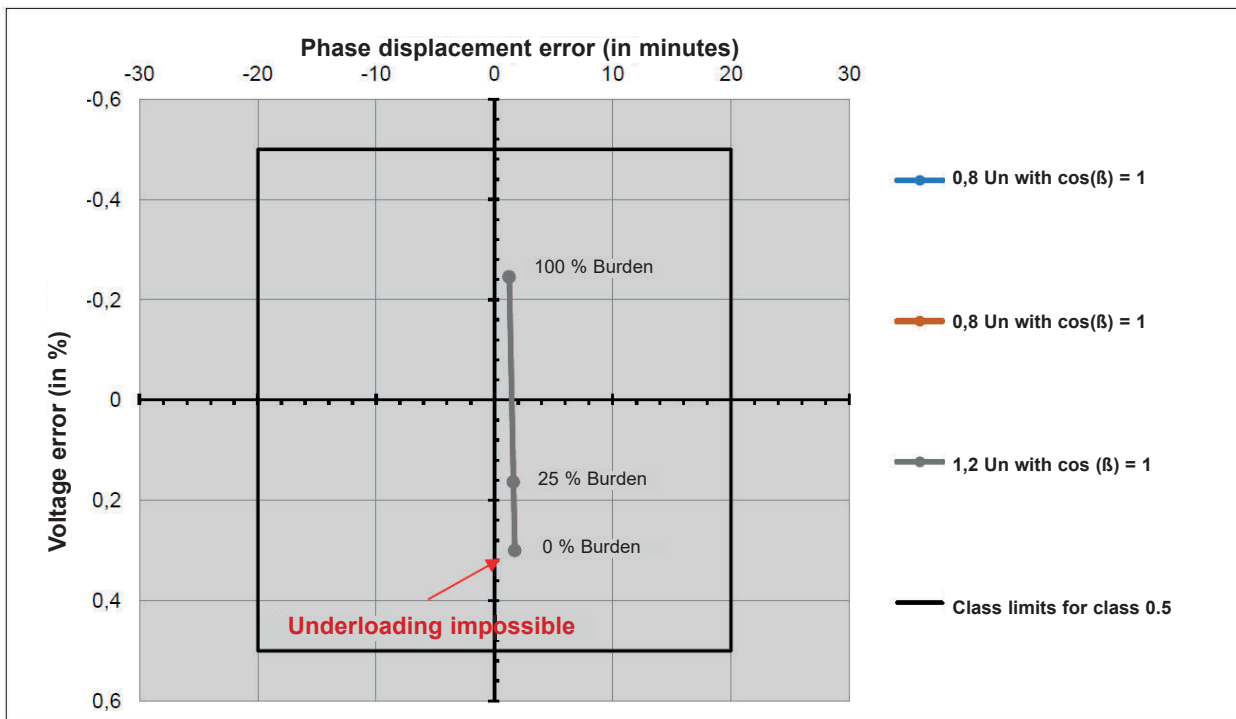


Fig. 2: Exemplary error chart of voltage transformer BR I in class 0.5

VTLS(-L)/VTLD(-L) - One- and two-pole isolated voltage transformers

Due to their physical design, MBS AG's low-voltage voltage transformers have a higher dielectric strength and generate only very low heat losses, due to the use of low-loss toroidal cores. Additionally there are no typical resonance points below 20 kHz. So they are predestined for measuring harmonics.

Our range of voltage transformers consists of one-pole isolated voltage transformers for connection between phase and earth and two-pole isolated voltage transformers for connection between phases.



Features / benefits

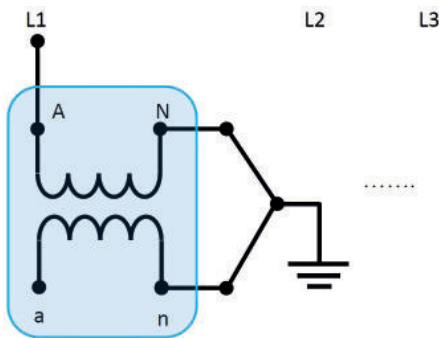
- ▶ Primary rated voltage range from $100/\sqrt{3}$ V up to $1000/\sqrt{3}$ V
resp. 100 V up to 1000 V
- ▶ Secondary rated voltage $100/\sqrt{3}$ V or 100 V
- ▶ Accuracy: Measuring: cl.0.2 / 0.5 / 1
Protection: cl. 3P / 6P
- ▶ Very low own-consumption of voltage transformers due to powerful toroidal cores
- ▶ Perfect for usage with modern measuring devices, since underloading is not possible in burden range 1 (acc. to IEC 61869-3), please see the following order list
- ▶ Very easy connection (primary + secondary) via screw connection M5 x 8

General technical characteristics

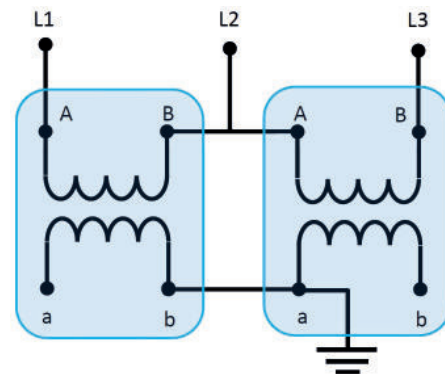
- ▶ Nominal frequency: 50 or 60 Hz
- ▶ Maximum operating voltage U_m
for $U_{pr} \leq 600/\sqrt{3}$ V or 600 V: 0.72 kV r.m.s.
for $U_{pr} > 600/\sqrt{3}$ V or 600 V: 1.2 kV r.m.s.
- ▶ Continuous operating voltage: $1.2 \times U_{pr}$
- ▶ Rated voltage factor F_V : $1.9 \times U_{pr} / 8h$ (VTLS)
- ▶ Isolation class: E
- ▶ Operating temperature range: $-5^\circ\text{C} \dots +50^\circ\text{C}$
- ▶ Storage temperature range: $-40^\circ\text{C} \dots +85^\circ\text{C}$
- ▶ Protection class acc. IEC 60529: IP 20
- ▶ Weight: approx. 2.13 kg

Subject to technical modifications without notice
Please note, that the above mentioned data are standard values. Other values upon request.

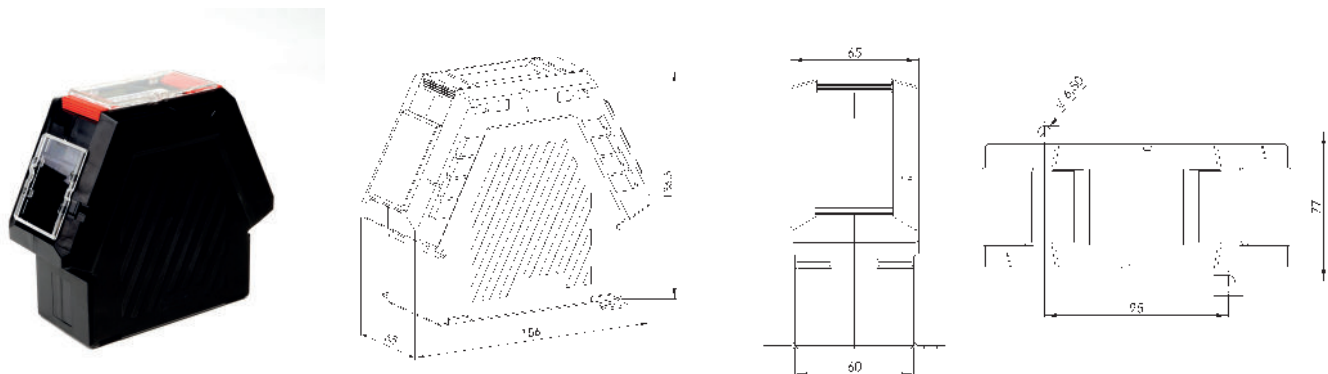
Connection drawings



Connection of voltage transformer VTLS(-L)
phase-earth



Connection of two voltage transformers VTLD(-L)
phase-phase (2-watt-meter circuit / Aron circuit)



Order list - VTLS (one-pole isolated, not galvanically isolated)

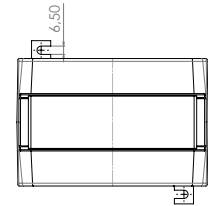
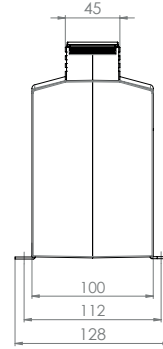
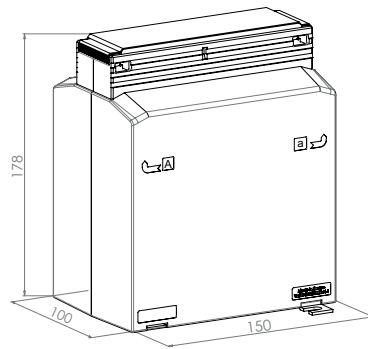
Max. operation voltage U_m	Primary rated voltage U_{pr}	Secondary rated voltage 100/√3 V - Nominal frequency: 50 Hz				VA_{th}
		cl. 0.2 / 3P (BR 1)	cl.0.5 / 3P (BR 1)	cl.1 / 3P (BR 1)	cl.3 / 3P (BR 2)	
		0-1 VA	0-2.5 VA	0-5 VA	15 VA	
		Order no.	Order no.	Order no.	Order no.	
0.72 kV	100/√3 V	601-0001	601-0020	601-0040	601-0060	25
	110/√3 V	601-0002	601-0021	601-0041	601-0061	25
	200/√3 V	601-0003	601-0022	601-0042	601-0062	25
	220/√3 V	601-0004	601-0023	601-0043	601-0063	25
	230/√3 V	601-0005	601-0024	601-0044	601-0064	25
	380/√3 V	601-0006	601-0025	601-0045	601-0065	25
	400/√3 V	601-0007	601-0026	601-0046	601-0066	25
	500/√3 V	601-0008	601-0027	601-0047	601-0067	25
	600/√3 V	601-0009	601-0028	601-0048	601-0068	25
1.2 kV	660/√3 V	601-0010	601-0029	601-0049	601-0069	25
	690/√3 V	601-0011	601-0030	601-0050	601-0070	25
	750/√3 V	601-0012	601-0031	601-0051	601-0071	25
	800/√3 V	601-0014	601-0033			
	1000/√3 V	601-0013	601-0032	601-0052	601-0072	25

BR 1: Burden range 1: cos phi = 1
 BR 2: Burden range 2: cos phi = 0.8

Order list - VTLD (two-pole isolated , galvanically isolated)

Max. operation voltage U_m	Primary rated voltage U_{pr}	Secondary rated voltage 100 V - Nominal frequency: 50 Hz				VA_{th}	
		cl. 0.2 (BR 1)	cl.0.5 (BR 1)	cl.1 (BR 1)	cl.1 (BR 2)		
		0-2.5 VA	0-5 VA	0-10 VA	10VA		
		Order no.	Order no.	Order no.	Order no.		
0.72 kV	100 V	602-0001	602-0020	602-0040	602-0060	602-0080	25
	110 V	602-0002	602-0021	602-0041	602-0061	602-0081	25
	200 V	602-0003	602-0022	602-0042	602-0062	602-0082	25
	220 V	602-0004	602-0023	602-0043	602-0063	602-0083	25
	230 V	602-0005	602-0024	602-0044	602-0064	602-0084	25
	380 V	602-0006	602-0025	602-0045	602-0065	602-0085	25
	400 V	602-0007	602-0026	602-0046	602-0066	602-0086	25
	500 V	602-0008	602-0027	602-0047	602-0067	602-0087	25
	600 V	602-0009	602-0028	602-0048	602-0068	602-0088	25
1.2 kV	660 V	602-0010	602-0029	602-0049	602-0069	602-0089	25
	690 V	602-0011	602-0030	602-0050	602-0070	602-0090	25
	750 V	602-0012	602-0031	602-0051	602-0071	602-0091	25
	800 V	602-0014	602-0033		602-0073	602-0093	
	1000 V	602-0013	602-0032	602-0052	602-0072	602-0092	25

BR 1: Burden range 1: cos phi = 1
 BR 2: Burden range 2: cos phi = 0.8



Order list - VTLS-L (one-pole isolated, not galvanically isolated)

Max. operation voltage U_m	Primary rated voltage U_{pr}	Secondary rated voltage 100/ $\sqrt{3}$ V - Nominal frequency: 50 Hz			VA_{th}
		cl. 0.5 (BB 1)	cl.0.5 (BB 2)	cl.1 (BB 2)	
		0-25 VA	25 VA	50 VA	
		Order no.	Order no.	Order no.	
0.72 kV	100/ $\sqrt{3}$ V	603-0001	603-0021	603-0041	100
	110/ $\sqrt{3}$ V	603-0002	603-0022	603-0042	100
	200/ $\sqrt{3}$ V	603-0003	603-0023	603-0043	100
	220/ $\sqrt{3}$ V	603-0004	603-0024	603-0044	100
	230/ $\sqrt{3}$ V	603-0005	603-0025	603-0045	100
	380/ $\sqrt{3}$ V	603-0006	603-0026	603-0046	100
	400/ $\sqrt{3}$ V	603-0007	603-0027	603-0047	100
	500/ $\sqrt{3}$ V	603-0008	603-0028	603-0048	100
	600/ $\sqrt{3}$ V	603-0009	603-0029	603-0049	100
1.2 kV	660/ $\sqrt{3}$ V	603-0010	603-0030	603-0050	100
	690/ $\sqrt{3}$ V	603-0011	603-0031	603-0051	100
	750/ $\sqrt{3}$ V	603-0012	603-0032	603-0052	100
	1000/ $\sqrt{3}$ V	603-0013	603-0033	603-0053	100

BR 1: Burden range 1: cos phi = 1
BR 2: Burden range 2: cos phi = 0.8

Order list - VTLD-L (two-pole isolated , galvanically isolated)

Max. operation voltage U_m	Primary rated voltage U_{pr}	Secondary rated voltage 100 V - Nominal frequency: 50 Hz			VA_{th}
		cl. 0.5 (BB 1)	cl.0.5 (BB 2)	cl.1 (BB 2)	
		0-50 VA	50 VA	100 VA	
		Order no.	Order no.	Order no.	
0.72 kV	100 V	604-0001	604-0021	604-0041	100
	110 V	604-0002	604-0022	604-0042	100
	200 V	604-0003	604-0023	604-0043	100
	220 V	604-0004	604-0024	604-0044	100
	230 V	604-0005	604-0025	604-0045	100
	380 V	604-0006	604-0026	604-0046	100
	400 V	604-0007	604-0027	604-0047	100
	500 V	604-0008	604-0028	604-0048	100
	600 V	604-0009	604-0029	604-0049	100
1.2 kV	660 V	604-0010	604-0030	604-0050	100
	690 V	604-0011	604-0031	604-0051	100
	750 V	604-0012	604-0032	604-0052	100
	1000 V	604-0013	604-0033	604-0053	100

BR 1: Burden range 1: cos phi = 1
BR 2: Burden range 2: cos phi = 0.8

- Current transformers for industry
- Current transformers for tariffs
- Accessories for current transformers
- Medium-voltage transformers
- Bus bar insulators / -supports
- Shunts

- Voltage transformers
- All current sensors
- Measuring transducers
- Energy meters with or without MID approval
- Accessories for energy meters
- Panel board heaters, filter fans, roof fans and control units



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