

CATALOGUE 38
EN

ELECTRIC TRANSFORMERS

since 1980

POWER FOR YOUR SISTEM

meth



ELECTRIC TRANSFORMERS SINCE 1980

METH srl designs and manufactures electric transformers since 1980 focusing on the quality of its product performance, thanks to 30 years of experience in this business. Since 1998 multiple national and international certifications are the result of a continuous effort in updating our products to meet worldwide standards and requirements.

Meth is specialized in manufacturing **LV three-phase transformers from 100VA to 2000kVA and MV-LV three-phase transformers up to 3150kVA**, for applications in different fields from industrial to automation to photovoltaic to marine, **three-phase auto-transformers and three-phase reactors**.

Depending on the configuration, METH transformers bear the European or North American Approvals such as UL, KEMA and ENEC and Middle East Approvals (CoC - ex SASO). Meth experience and technology allow to develop and manufacture in a short time new products to meet any customers' requests and to improve new production programs.



QUALITY Meth Quality System, ISO 9001:2015 certified since 1998, rules all the processes: customers and suppliers orders management, preliminary controls, manufacturing cycles, final tests, handling of non conformity. As further confirmation of the constant quality-research over the years, Meth has obtained the following certifications:

- UL-CSA for single phase transformers up to 10KVA and for three-phase transformers up to 80KVA. Meth is one of the few manufactures in Europe with UL-CSA LISTED certification.
- UL-CSA Insulation System class B-F-H.
- UL-CSA Insolution System for Three-Phase auto-transformers up to 250 KVA.
- ENEC-KEMA for single phase transformers up to 2KVA.

Certification companies inspections are regularly scheduled, ensuring a constant quality level of the products.

PLANNING Meth obtains the transformers parameters that will be tested at the end of production, such as over-temperature, losses, performance, rigidity, insulation, induced voltage, ecc., using “RALE” calculation programs. During the calculation spacers and cooling channels are properly sized to assure a long and reliable service life.

PRODUCTION The entire manufacturing process is carried out internally: preliminary controls, automatic winding for small transformers and winding on machine for flat cable, copper or aluminium strip for bigger transformers, core-assembly and soaking or resin. At the end of production all transformers are tested internally with instruments according to ISO specifications and regularly calibrated in SIT centres.

TEST Meth transformers are 100% tested and test results are stored in Meth database and available on customers request. Meth test equipment allows to carry out all tests required by the standards. At the moment the equipment is available for the following tests: no-load losses, load losses, harmonic analysis, resistance, rigidity and insulation measurement, induced voltage, inrush current.



www.meth.it

Meth Kft is specialized in manufacturing **single-phase electric transformers and three-phase transformers from 30VA to 50kVA** for industrial and automation applications and **three-phase filter reactors**.

The Company is focused on the quality of product performance and deliveries in short time, empowered by the 30-year-experience gained in this business by Meth srl Italy.

Meth Kft performance is based on three statements which represent its core value: Technology and Customization, Dynamic Know-how and Cost Effectiveness. The production cycle refers to Meth srl Italy method and is based on three steps: planning, production, test.



DYNAMIC KNOW-HOW AND COST EFFECTIVENESS

Meth Kft is a dynamic and proactive company, focused on the quality of product performance and the optimization of delivery time. Thanks to technology efficiency and reduced cost line production Meth kft offers to own customers good products and competitive prices.

PLANNING All Meth Kft products are designed by technical dpt. using high-technology calculations programs like RALE for a proper evaluation of transformers electrical and technical features such as over-temperature, losses, performance, rigidity, insulation, induced voltage, dimensions and weight.

PRODUCTION The entire manufacturing process is carried out internally through a computerized production cycle. All the transformers are completely impregnated with resin. Preliminary check of raw materials and regular inspection of every single step during the production process are carried out to assure the best quality performance of the products.

TEST All Meth Kft transformers are tested internally at the end of the production process with routine tests. Test equipment allows to implement type tests required by the standards such as no-load losses, load losses, resistance, rigidity and insulation measurement, inrush current. Test results are stored in the Company database and available upon customer request.

FOCUS ON METH CERTIFICATIONS



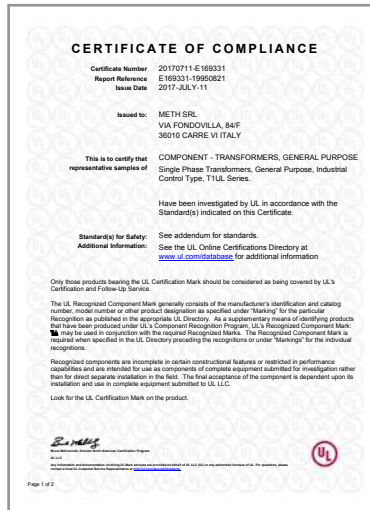
Meth operates with a quality system in compliance with ISO 9001:2015 standards. This means that all production processes follow different quality standards to improve efficiency and effectiveness in products development and manufacturing in order to have the highest customer satisfaction.



UL is one of several companies approved to perform safety testing by the US federal agency Occupational Safety and Health Administration (OSHA)

File: E169331
File: E215141

www.ul.com



CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EC directives. The CE marking is a symbol of free marketability in the European Economic Area (Internal Market)



Coc Certification (ex SASO) allows the company to export in Saudi Arabia market, as the products passed strict technical test in a certified laboratory





ENEC-KEMA is an abbreviation for "European Norms Electrical Certification". It gives customers the assurance that a product has been certified by one of the national certification institutes in Europe and it complies with the relevant European safety standards



Which certifies the products compliance with marine standards

38.01 /// THREE-PHASE TRANSFORMERS & AUTO-TRANSFORMERS

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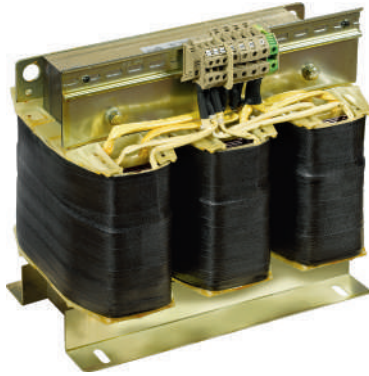
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38.01 ///
**THREE-PHASE
TRANSFORMERS**





up to 25 KVA



up to 80 KVA



General data

Rated input voltage	100-600 V
Rated output voltage	10-600 V
Rated power	from 100 to 80kVA
Insulation class	class H
Temperature class	class F

Ambient temperature	Ta=40°C
Protection degree	IP 00
Test voltage	4,2 KV/1'
Terminals	terminal blocks or bars

Application:

Three-phase transformers UL-CSA marked suitable for any industrial application.

In particular:

- up to 5kVA: UL-CSA Listed marked
 - from 5kVA to 25kVA: UL-CSA – Recognized component marked
- Construction in accordance with the following standards

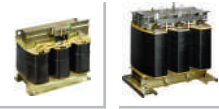
Standard

UL 5085 1 and 2 – Low voltage transformers

CSA 22.2 No 66

Certifications

	(Listed) FILE E169331 vol. 2-sec. 1-2 industrial control transformers
	(Recognized) File E169331 vol.1 sec. 2
	Insulation System : File 215141 vol.1



Technical data T3TULF - T3TAH-UL

CODE	RATED POWER KVA	APPROVALS	INSULATION CLASS	DIMENSIONS (mm)					WEIGHT Kg	FIG.
				A	B	C	D	E		
T3TULF-0,1...	0,1		F	120	75	110	100	50	2,1	1
T3TULF-0,16...	0,16		F	120	85	110	100	60	2,8	1
T3TULF-0,25...	0,25		F	151	95	150	125	60	3,8	1
T3TULF-0,4...	0,4		F	151	110	150	125	75	5,5	1
T3TULF-0,5...	0,5		F	180	120	190	150	72	6,7	1
T3TULF-0,75...	0,75		F	180	140	190	150	92	10,9	1
T3TULF-1...	1		F	240	145	260	200	80	15	1
T3TULF-1,5...	1,5		F	240	155	260	200	90	17,6	1
T3TULF-2...	2		F	240	170	260	200	100	24,8	1
T3TULF-2,5...	2,5		F	240	185	260	200	115	28,1	1
T3TULF-3...	3		F	300	160	315	250	91	33	1
T3TULF-4...	4		F	300	170	315	250	101	39	1
T3TULF-5...	5		F	300	190	315	250	121	49	1
T3TAHUL-7,5...	7,5		H	360	200	356	325	150	62	1
T3TAHUL-10...	10		H	360	230	356	325	180	80	1
T3TAHUL-15...	15		H	420	250	415	375	170	91	1
T3TAHUL-20...	20		H	420	270	415	375	200	135	1
T3TAHUL-25...	25		H	480	300	445	425	190	145	1
T3TAHUL-30...	30		H	480	320	445	425	210	155	1
T3TAHUL-35...	35		H	480	340	445	425	230	180	1
T3TAHUL-40...	40		H	480	350	445	425	240	190	1-2
T3TAHUL-45...	45		H	600	350	600	540	220	200	1-2
T3TAHUL-50...	50		H	600	360	600	540	230	220	1-2
T3TAHUL-60...	60		H	600	380	600	540	250	250	1-2
T3TAHUL-70...	70		H	600	390	600	540	260	270	1-2
T3TAHUL-80...	80		H	600	410	600	540	280	305	1-2

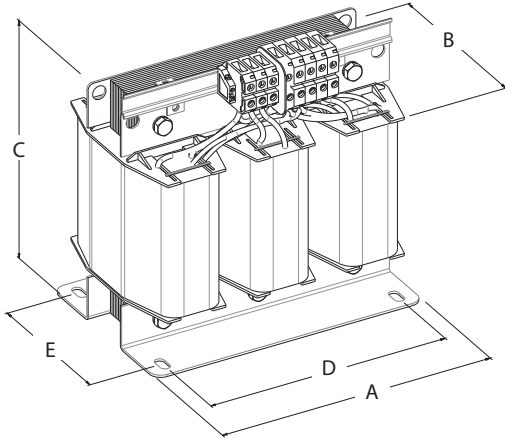


Fig.1 T3TULF - fino a 5 KVA

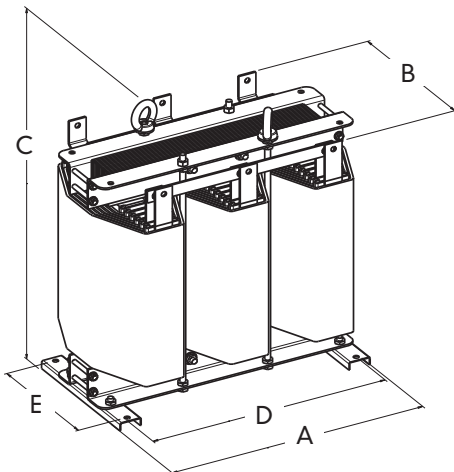


Fig. 2 T3TAH-UL - 5-80 KVA

Electrical data

	RATED POWER KVA	LOSSES (W)			EFFICIENCY %	UCC %	INRUSH CURRENT x In
		a vuoto	a carico (75°C)	totale			
T3TULF	0,1	5	15	20	83	13,5	24
	0,16	6,5	19,5	26	85,8	10,9	25
	0,25	7,5	24	31,5	88,4	9	26
	0,4	11,5	38	49,5	88,6	8,8	28
	0,5	15	26,5	41,5	92,2	5,1	28
	0,75	22,5	30	52,5	93,3	3,9	29
	1	25,8	42	67,8	93,6	4	20
	1,5	30	64,5	94,5	93,9	4,2	18
	2	37,5	102	139,5	93,4	4,8	18
	2,5	46	114	160	93,9	4,4	16
T3TAH-UL	3	47	129	176	94,3	4,2	16
	4	58	186	244	94,2	4,5	16
	5	76	169	245	95,3	3,4	18
	7,5	115	330	445	94,4	4,6	17
	10	125	350	475	95,4	4,2	17
	15	125	540	665	95,7	4,2	18
	20	205	500	705	96,6	3,7	18
	25	190	710	900	96,5	3,5	18
	30	210	760	970	96,8	3,4	17
	35	235	860	1095	96,9	3,2	17
	40	250	970	1220	97	3,2	17
	45	250	1430	1680	96,5	4,8	10
	50	270	1480	1750	96,6	5,5	9
	60	320	1565	1885	97	4,7	9
70	340	1830	2170	97	4,9	9	
80	390	1950	2340	97,2	4,6	9	

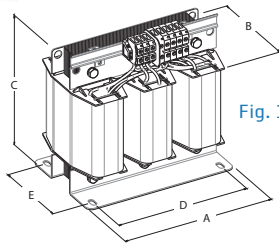
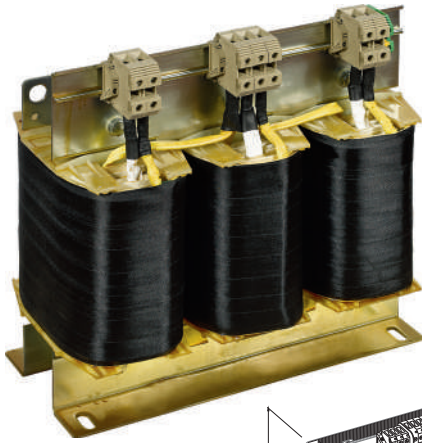


Fig. 1

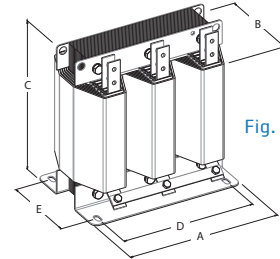
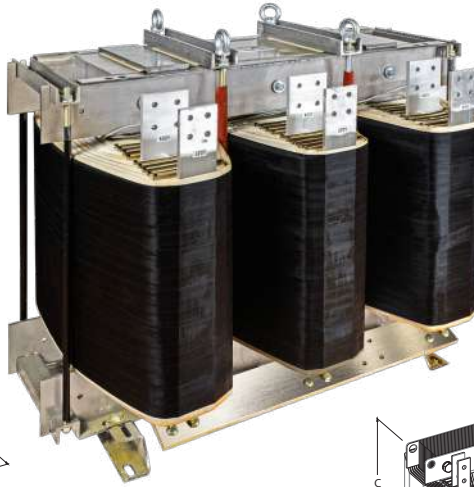


Fig. 2



General data

Three-phase auto-transformers are electrical machine with one single common wiring where primary and secondary are not galvanically separated. They have smaller construction compared to the same isolating transformers. Typical applications are speed control for Fans, Starting of big three-phase Electric Motors, etc... Auto-transformers do not protect from earth failure. Their special feature is that the nearer are the values of the input and output voltage, the more cost-effective are auto-transformers. It is clear that auto-transformers should be calculated and designed every time, based on customer requests, since the input and output voltages are critical to determine the correct electrical sizing.

Construction in accordance with the following standards:

Standard

CEI-EN 61558; p. 2-13

UL5085 1-2 up to 345Amps (generally equivalent to 250kVA of nominal power and core power up to 80kVA)

Certifications



File E169331 vol.1 sec. 2

The design rating power could be calculated by the following formula:

$$\text{Design rating} = P_{nom} \left(1 - \frac{V_1}{V_2} \right)$$

where:

P_{nom} = rated power (VA)

V_1 = lower voltage (V)

V_2 = higher voltage(V)

Example:

P_{nom} = 100 kVA

V_1 = 380 V

V_2 = 480 V

$$\text{Design rating} = 100 \times \left(1 - \frac{380}{480} \right) = 21 \text{ kVA}$$

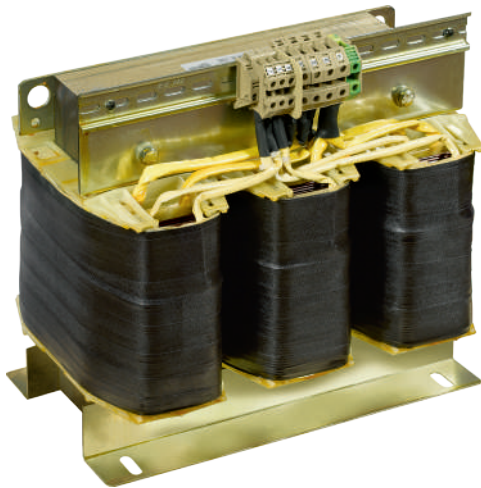
In this case technical data are referred to AT3TH-UL-20kVA

Technical data AT3TH-UL

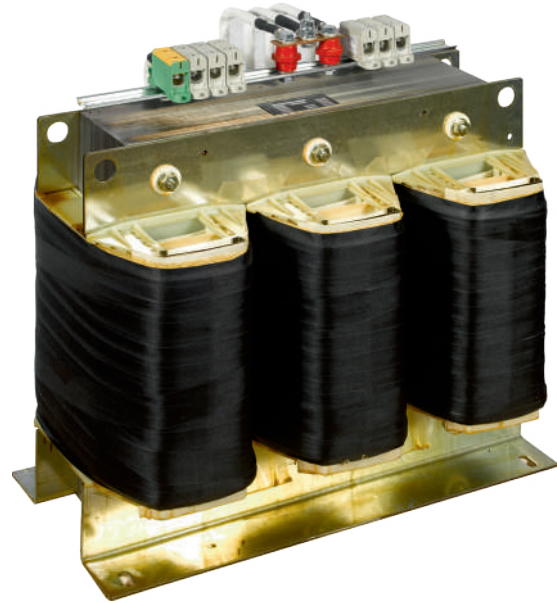
CODE	DESIGN RATING KVA	INSULATION CLASS	DIMENSIONS (mm)					WEIGHT Kg	FIG.	LOSSES (W)			EFFICIENCY %	UCC %	INRUSH CURRENT x In
			A	B	C	D	E			no-load	load	TOTAL			
AT3TH-UL-...	3	H	300	170	315	250	110	30	1	60	210	270	91,7	5,8	20
	5	H	300	190	315	250	140	40	1	85	280	365	93,2	5,2	18
	7,5	H	360	200	356	325	150	62	1	115	330	445	94,4	4,6	17
	10	H	360	230	356	325	180	80	1	125	350	475	95,4	4,2	17
	15	H	420	250	415	375	170	91	1	125	540	665	95,7	4,2	18
	20	H	420	270	415	375	200	135	1	205	500	705	96,6	3,7	18
	25	H	480	300	445	425	190	145	1	190	710	900	96,5	3,5	18
	30	H	480	320	445	425	210	155	1	210	760	970	96,8	3,4	17
	35	H	480	340	445	425	230	180	1	235	860	1095	96,9	3,2	17
	40	H	480	350	445	425	240	190	2	250	970	1220	97	3,2	17
	45	H	600	350	600	540	220	200	2	250	1430	1680	96,5	4,8	10
	50	H	600	360	600	540	230	220	2	270	1480	1750	96,6	5,5	9
	60	H	600	380	600	540	250	250	2	320	1565	1885	97	4,7	9
	70	H	600	390	600	540	260	270	2	340	1830	2170	97	4,9	9
80	H	600	410	600	540	280	305	2	390	1950	2340	97,2	4,6	9	

Electrical data





T3T up to 10 KVA



T3T 11-40 KVA



General data

Rated input voltage	100-600 V
Rated output voltage	24-600 V
Rated power	up to 25 k VA (safety transformers) up to 40 kVA (isolating transformers)
Insulation class	class F / H
Temperature class	class F / H

Ambient temperature	Ta=40°C
Protection degree	IP 00
Standard vector group	Dyn11 (others upon request)
Test voltage	4,2 KV/1'
Terminals	terminal blocks or bars

Application:

Three-phase transformers suitable for any industrial application where it is required the separation between the load and the net. Construction in accordance with the following standards:

Standard

CEI-EN 61558; p. 2-4 – Isolating transformers
CEI-EN 61558; p. 2-6 – Safety transformers
IEC 61558; 2-4; 2-6

Upon request:

The transformers could be customized with:

- different voltages
- regulations
- taps on primary or secondary
- different enclosures
- wheels for movement
- vibration absorbers
- electrostatic screen between primary and secondary
- temperature control unit with 3PT100 probes inserted



STEEL ENCLOSURE for three-phase transformers pag. 40



Technical data T3T

CODE	RATED POWER	INSULATION CLASS	DIMENSIONS (mm)					WEIGHT Kg	FIG.	BOX
	KVA		A	B	C	D	E			
T3T-0,1...	0,1	F	120	75	110	100	50	2,1	1	-
T3T-0,16...	0,16	F	120	85	110	100	60	2,8	1	-
T3T-0,25...	0,25	F	151	95	150	125	60	3,8	1	-
T3T-0,4...	0,4	F	151	110	150	125	75	5,5	1	-
T3T-0,5...	0,5	F	180	120	190	150	72	6,7	1	-
T3T-0,75...	0,75	F	180	140	190	150	92	10,9	1	-
T3T-1...	1	F	240	145	260	200	80	15	1	-
T3T-1,5...	1,5	F	240	155	260	200	90	17,6	1	-
T3T-2...	2	F	240	170	260	200	100	24,8	1	-
T3T-2,5...	2,5	F	240	185	260	200	115	28,1	1	-
T3T-3...	3	F	300	160	315	250	91	33	1	...-1
T3T-4...	4	F	300	170	315	250	101	39	1	...-1
T3T-5...	5	F	300	190	315	250	121	49	1	...-1
T3T-6...	6	F	360	170	365	300	106	58	1	...-2
T3T-7...	7	F	360	180	365	300	116	62	1	...-2
T3T-8...	8	F	360	190	365	300	126	66	1	...-2
T3T-9...	9	F	360	200	365	300	136	69	1	...-2
T3T-10...	10	F	360	210	365	300	146	75	1	...-2
T3T-15...	15	F	420	250	420	375	150	89	2	...-3
T3T-20...	20	F	420	270	420	375	172	110	2	...-3
T3T-25...	25	F	480	270	450	440	180	125	2	...-4
T3T-30...	30	F	480	280	450	440	190	145	2	...-4
T3T-40...	40	F	480	315	450	440	220	178	2	...-4

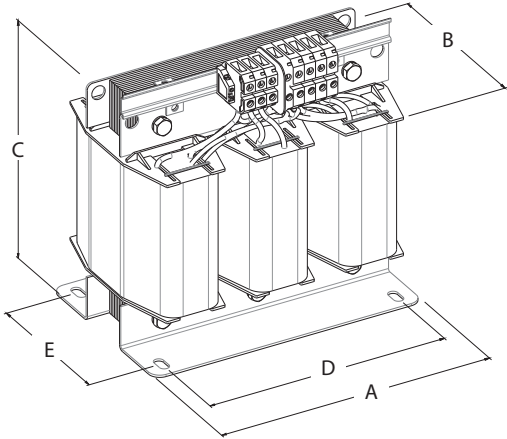


Fig. 1

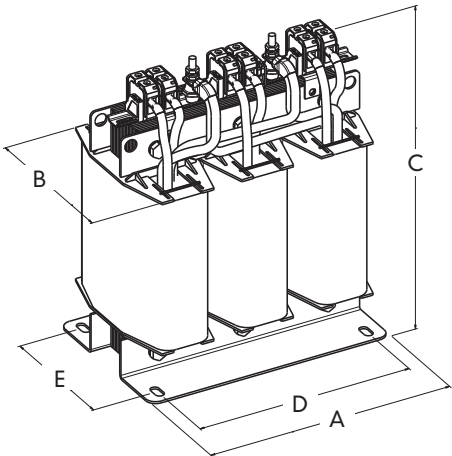
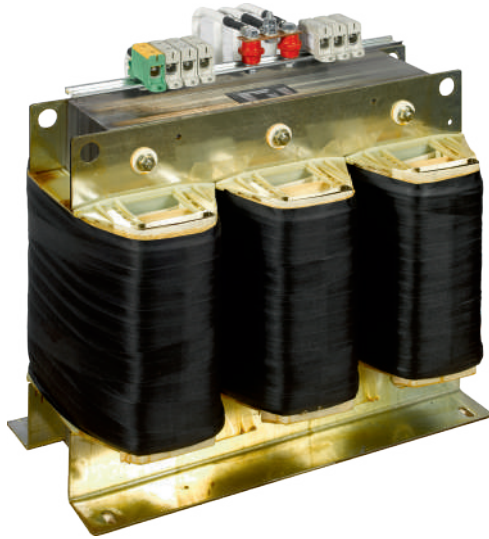


Fig. 2

Electrical data

RATED POWER KVA	LOSSES (W)			EFFICIENCY		Ucc %			INRUSH CURRENT
	a vuoto	a carico (75°C)	totale	%	Ucc X	Ucc R	Ucc tot	x In	
0,1	5	15	20	83	-	-	13,5	24	
0,16	6,5	19,5	26	85,8	-	-	10,9	25	
0,25	7,5	24	31,5	88,4	-	-	9	26	
0,4	11,5	38	49,5	88,6	-	-	8,8	24	
0,5	15	26,5	41,5	92,2	-	-	5,1	22	
0,75	22,5	30	52,5	93,3	-	-	3,9	25	
1	25,8	42	67,8	93,6	-	-	4	20	
1,5	30	64,5	94,5	93,9	-	-	4,2	18	
2	37,5	102	139,5	93,4	-	-	4,8	17	
2,5	46	114	160	93,9	-	-	4,4	15	
3	47	129	176	94,3	-	-	4,2	15	
4	58	186	244	94,2	-	-	4,5	15	
5	76	169	245	95,3	-	-	3,4	16	
6	84	300	384	94	-	-	5,2	14	
7	100	285	385	94,7	-	-	4,4	15	
8	110	355	465	94,5	-	-	4,5	15	
9	122	384	506	94,7	-	-	4,3	15	
10	135	387	522	95,06	1,46	4,3	4,55	16	
15	192	440	632	96,22	1,7	3,17	3,6	16	
20	140	570	710	96,78	1,68	2,6	3,1	16	
25	160	720	880	96,6	2,77	2,88	4	18	
30	190	800	990	96,81	2,18	2,67	3,45	17	
40	235	950	1185	97,12	1,98	2,38	3,1	15	



T3T up to 80 KVA



T3T 81-2000 KVA



General data

Rated input voltage	up to 1000 V
Rated output voltage	up to 1000 V
Rated power	41 to 2000 kVA
Insulation class	class F / H
Temperature class	class F / H

Ambient temperature	Ta=40°C
Protection degree	IP 00
Standard vector group	Dyn11 (others upon request)
Test voltage	3 KV/1'
Terminals	terminal blocks or bars

Application:

Three-phase transformers suitable for any industrial application where it is required the isolation or voltage variation between the load and the net. Construction in accordance with the following standards:

Standard

CEI-EN 60076

IEC 60076

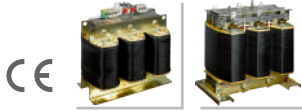
Upon request:

The transformers could be customized with:

- different voltages
- regulations
- taps on primary or secondary
- different enclosures
- wheels for movement
- vibration absorbers
- electrostatic screen between primary and secondary
- temperature control unit with 3PT100 probes inserted



STEEL ENCLOSURE for three-phase transformers pag. 40



Technical data T3T

CODE	RATED POWER	INSULATION CLASS	DIMENSIONS (mm)					WEIGHT Kg	FIG	BOX
	KVA		A	B	C	D	E			
T3T-50...	50	F	600	350	600	540	250	220	1	...-5
T3T-60...	60	F	600	360	600	540	260	230	1	...-5
T3T-80...	80	F	600	390	600	540	290	280	1	...-5
T3T-100...	100	F	600	420	600	540	320	330	2	...-5
T3T-125...	125	F	720	420	740	660	300	390	2	...-6
T3T-160...	160	F	720	460	740	660	340	510	2	...-6
T3T-200...	200	F	720	480	740	660	360	570	2	...-6
T3T-250	250	F	720	510	740	660	380	660	2	...-6
T3T-315	315	F	720	550	740	660	430	780	2	...-6
T3T-400	400	F	960	630	920	-	-	1090	2	...-7
T3T-500	500	F	960	680	920	-	-	1335	2	...-7
T3T-630	630	F	960	730	920	-	-	1575	2	...-7
T3T-800...	800	F	1080	650	1190	-	-	1670	2	...-8
T3T-1000...	1000	F	1080	700	1190	-	-	2020	2	...-8

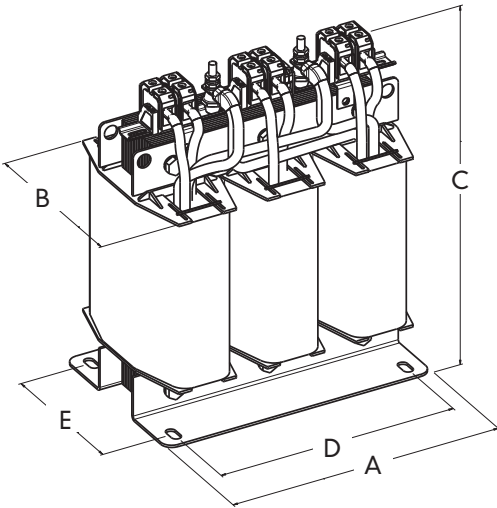


Fig. 1

Electrical data

RATED POWER KVA	LOSSES (W)			EFFICIENCY %	Ucc %			INRUSH CURRENT x In
	no-load	load (75°C)	total		Ucc X	Ucc R	Ucc tot	
50	245	1300	1545	97	4,32	2,6	5,05	18
60	265	1600	1865	96,99	4,4	2,67	5,15	15
80	340	1900	2240	97,28	4,39	2,38	5	15
100	430	2200	2630	97,44	3,75	2,2	4,35	16
125	400	2400	2800	97,81	4,23	1,92	4,65	14
160	520	2800	3320	97,97	3,03	1,75	3,5	14
200	560	3100	3660	98,2	3,46	1,55	3,8	14
250	670	3500	4170	98,36	3,47	1,4	3,75	13
315	840	4000	4840	98,49	3,52	1,27	3,75	14
400	1120	5060	6180	98,5	6,37	1,27	6,5	15
500	1340	5565	6905	98,6	5,34	1,12	5,5	15
630	1650	6780	8430	98,7	4,86	1,08	5	16
800	1760	9150	10910	98,8	5,56	1,15	5,7	8
1000	2100	9250	11350	98,9	4,79	0,93	4,9	8

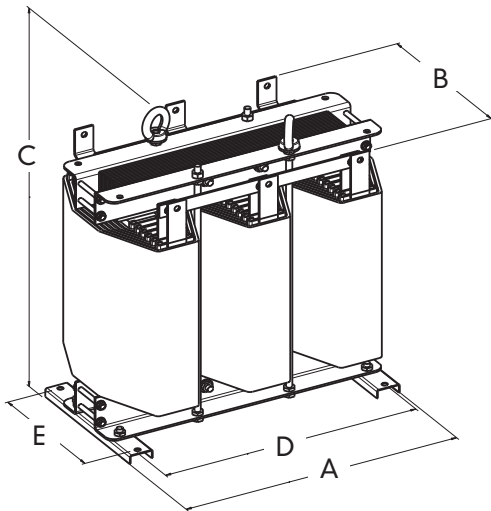
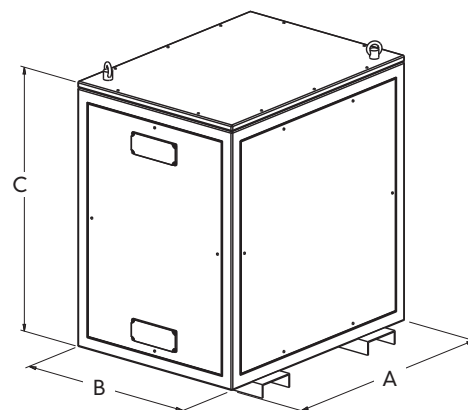
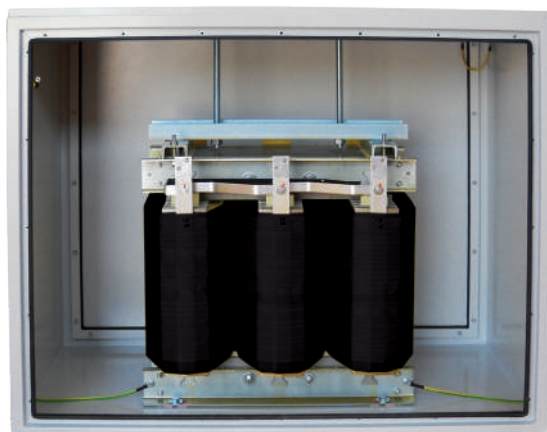


Fig. 2

For higher powers technical and electrical data, please contact METH



General data

Rated input voltage	up to 1000 V	Ambient temperature	Ta=40°C
Rated output voltage	up to 1000 V	Protection degree	with enclosure IP55
Rated power	10 to 300 kVA	Standard vector group	Dyn11 (others upon request)
Insulation class	class F-H	Test voltage	3 KV/1'
Temperature class	class F	Terminals	terminal blocks or bars

Application:

Three-phase transformers suitable for any industrial application where the protection degree IP55 is required. The enclosure is pre-galvanized steel painted with polyester resin for external without fan ventilation. Construction in accordance with the following standards:

Standard

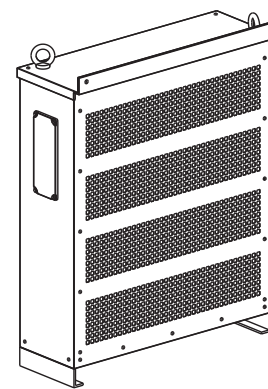
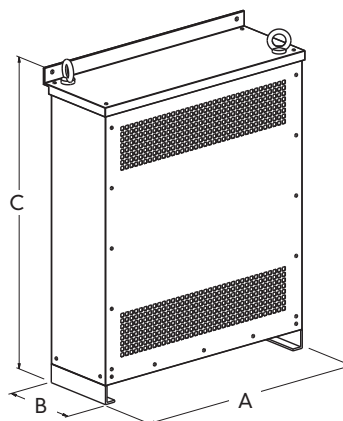
CEI-EN 60076
IEC 60076

For higher power please contact METH

Technical data T3X

Electrical data

CODE	RATED POWER KVA	INSULATION CLASS	DIMENSIONS (mm)			WEIGHT Kg	LOSSES (W)			EFFICIENCY %	Ucc X %	Ucc R %	Ucc tot %	INRUSH CURRENT x In
			A	B	C		no-load	load (75°C)	total					
T3X-10...	10	F	750	650	850	200	150	200	350	96,6	1,67	2	2,6	21
T3X-15...	15	F	850	700	850	220	170	280	450	97	1,16	1,87	2,2	19
T3X-20...	20	F	850	700	950	240	190	350	540	97,3	1,65	1,75	2,4	20
T3X-25...	25	F	850	700	950	270	250	410	660	97,4	1,32	1,64	2,1	17
T3X-30...	30	F	850	700	950	290	280	460	740	97,5	1,28	1,54	2	18
T3X-40...	40	F	1000	850	1100	320	300	650	950	97,6	2,99	1,63	3,4	15
T3X-50...	50	F	1000	850	1100	345	350	850	1200	97,6	2,72	1,7	3,2	14
T3X-60...	60	F	1000	850	1100	380	420	1000	1420	97,6	2,25	1,67	2,8	14
T3X-80...	80	F	1000	850	1100	460	500	1250	1750	97,8	2,2	1,57	2,7	13
T3X-100...	100	F	1200	1000	1300	610	550	1300	1850	98,1	2,14	1,3	2,5	11
T3X-125...	125	F	1200	1000	1300	680	600	1500	2100	98,3	2,08	1,2	2,4	10
T3X-160...	160	F	1200	1000	1300	770	700	1800	2500	98,4	2,24	1,13	2,5	10
T3X-200...	200	F	1200	1000	1360	990	900	2000	2900	98,5	2,19	1	2,4	9
T3X-300...	300	F	1600	1200	1550	1250	1000	2530	3530	98,8	4,14	0,85	4,2	9



ECO-DESIGN

General data

Standard input voltage	230 V
Standard output voltage	400 V
Rated power	from 6,3 to 30 KVA
Insulation class	class F-H
Temperature class	class B
Standard ambient temperature	Ta=40°C

Protection degree	IP20
Standard vector group	YNd11 (others upon request)
Inrush current	≤10 x I _n
Test voltage	4,2 KV/1'
Terminals	terminal blocks

Application:

Three-phase transformers designed for maximum utilization of the transformer design. They have very low losses and inrush current, high efficiency and very compact construction in order to save space and reduce energy consumption. Construction in accordance with the following standards:

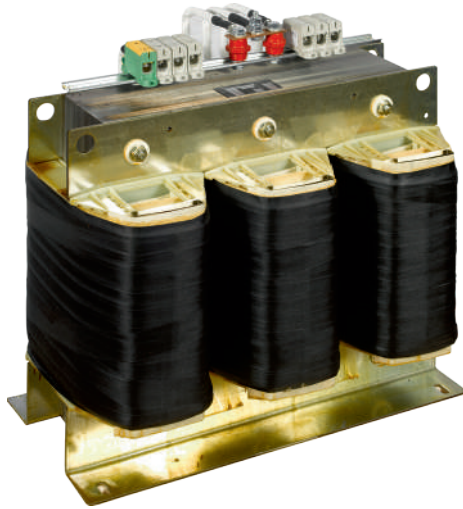
Standard

EN 61558, p.2-4 and directive 2009/125/EC

Technical data T3SL

Electrical data

CODE	RATED POWER KVA	DIMENSIONS (mm)			WEIGHT Kg	LOSSES (W)		I sec A	EFFICIENCY %	Ucc X %	Ucc R %	Ucc tot %	INRUSH CURRENT x I _n
		A	B	C		no-load	load (75°C)						
T3SL-6,3...	6,3	640	220	800	117	38	132	9,1	97,3	0,82	2,1	2,26	13
T3SL-10...	10	640	220	800	134	45	212	14,4	97,5	1,12	2,12	2,4	11
T3SL-12,5...	12,5	640	220	800	145	50	273	18,05	97,4	1,11	2,19	2,46	10
T3SL-16...	16	640	220	800	162	58	386	23,1	97,3	1,72	2,42	2,97	9
T3SL-20...	20	790	240	1050	177	64	477	28,9	97,3	1,71	2,39	2,94	8



T3TFTV UP TO 60 Kva



T3TFTV 61-250 Kva



General data

Standard input voltage	400 V
Standard output voltage	400 V
Rated power	from 10 to 250 kVA
Insulation class	class F-H
Temperature class	class B
Standard ambient temperature	Ta=40°C

Protection degree	IP 00
Standard vector group	YNyn0 (others upon request)
Test voltage	3 KV/1'
Terminals	terminal blocks or bars
Terminals	terminal blocks or bars

Application:

Three-phase transformers with low losses and high performance suitable for galvanic separation in photovoltaic plants or other renewable energies. Construction is accordance with the following standards:

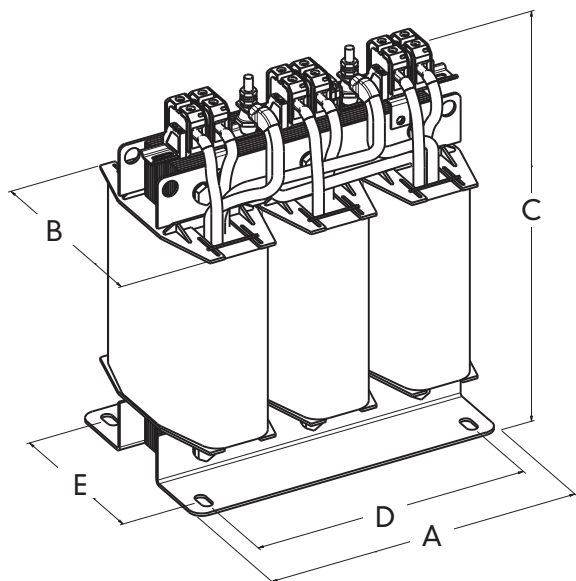
Standard

CEI-EN 60076

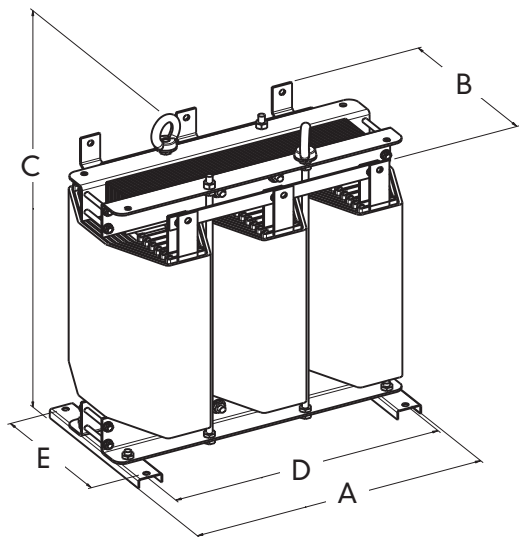
IEC 60076



STEEL ENCLOSURE for three-phase transformers pag. 40



T3TFTV UP TO 60 Kva



T3TFTV 61-250 Kva

Technical data T3TFTV UP TO 60 Kva

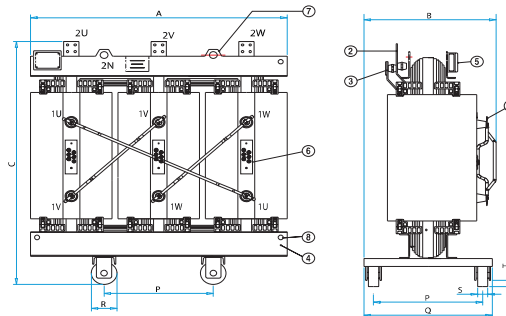
CODE	RATED POWER	INSULATION CLASS	DIMENSIONS (mm)					WEIGHT Kg	BOX
	KVA		A	B	C	D	E		
T3TFTV-10	10	B	420	210	390	375	160	90	...-3
T3TFTV-15	15	B	420	240	390	375	190	120	...-3
T3TFTV-20	20	B	480	260	450	440	200	140	...-4
T3TFTV-25	25	B	480	280	450	440	220	160	...-4
T3TFTV-30	30	B	480	300	450	440	240	190	...-4
T3TFTV-40	40	B	600	350	600	540	250	220	...-5
T3TFTV-50	50	B	600	360	600	540	260	230	...-5
T3TFTV-60	60	B	600	380	600	540	280	260	...-5

Technical data T3TFTV 61-250 Kva

CODE	RATED POWER	INSULATION CLASS	DIMENSIONS (mm)					WEIGHT Kg	BOX
	KVA		A	B	C	D	E		
T3TFTV-70	70	B	600	390	600	540	290	280	...-5
T3TFTV-80	80	B	600	420	600	540	320	330	...-5
T3TFTV-90	90	B	600	450	600	540	350	390	...-5
T3TFTV-100	100	B	720	420	740	660	300	390	...-6
T3TFTV-125	125	B	720	430	740	660	310	425	...-6
T3TFTV-135	135	B	720	440	740	660	320	465	...-6
T3TFTV-150	150	B	720	460	740	660	340	510	...-6
T3TFTV-170	170	B	720	480	740	660	360	565	...-6
T3TFTV-200	200	B	720	500	740	660	380	640	...-6
T3TFTV-250	250	B	720	550	740	660	430	775	...-6

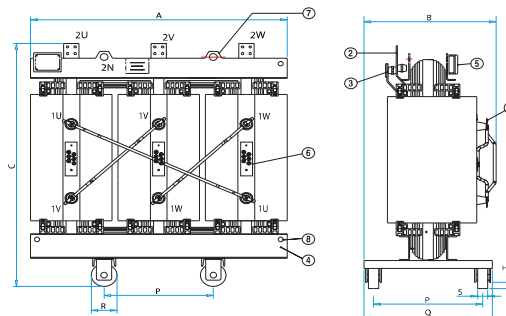
Electrical data - Data referred to 400/400 V

RATED POWER	LOSSES (W)			EFFICIENCY	U _{cc}	INRUSH CURRENT
	KVA	no-load	load (75°C)			
10	80	345	425	95,94	3,66	17
15	105	415	520	96,66	3,13	16
20	130	530	660	96,84	3,37	15
25	150	655	805	96,89	3,29	15
30	180	680	860	97,23	2,88	15
40	175	1060	1235	97,01	5,78	14
50	190	1285	1475	97,15	4,09	12
60	225	115	340	97,76	3,29	13
70	240	1335	1575	97,8	3,4	12
80	290	15005	15295	97,81	3,22	14
90	360	1360	1720	98,13	2,63	15
100	380	1780	2160	97,89	4,04	12
125	430	2080	2510	98,04	4,14	10
135	455	2220	2675	98,06	4,18	10
150	510	2140	2650	98,27	3,54	10
170	565	2390	2955	98,29	3,31	9
200	655	2470	3125	98,46	3,23	9
250	815	2970	3785	98,51	2,79	10



Cast Resin Transformers Data 24 kV

Fig. 1



Cast Resin Transformers Data 36 kV

Fig. 2

Standard Solution

Distribution Transformers:

Rated power	100 – 3150 kVA
Primary rated voltage	up to 36kV
Secondary rated voltage	3 KV/1'
Terminals	up to 433V

Material of windings

Aluminium (Al)

Equipment

Distribution Transformers:

HV terminals (n°3 pieces)
LV bar terminals (n°4 pieces)
Off load tapping links (n°3 pieces)
Rating plate (n°1 pieces)
Lifting lugs (n°4 pieces)
Earth terminals (n°2 pieces)
Orientable rollers (n°4 pieces)

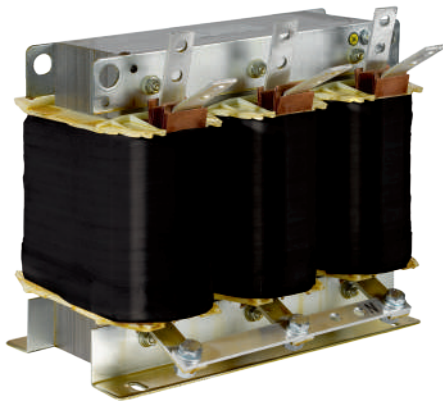
Accessories (on request)

- Pt100 thermosensors with connection box
- PTC thermistors (as an alternative to the Pt100 thermosensors)
- Electronic unit for thermal control, with inputs for Pt100 and temperature display
- Electronic unit for thermal control, with inputs for PTC, without temperature display
- Forced ventilation systems (for temporary power increase)
- Electronic unit for ventilation system
- Transformer protective enclosure (degree protection IP23 & IP31)
- Surge arresters kit
- Antivibration pads
- HV terminals for plugin connections (Elastimold)
- Antiseismic frame (in base of level of earthquake)
- OLTC (OnLoad TapChangers)
- CT and VT instrument transformer

IEC 600761 GENERAL STANDARD OF POWER TRANSFORMERS

Specific Standards related to transformers

- IEC 60076-1 : Power transformers - Part 1: General;
- IEC 60076-3 : Power transformers - Part 3: Insulation levels, dielectric tests and external clearances in air;
- IEC 60076-5 : Power transformers - Part 5: Ability to withstand short circuit;
- IEC 60076-6 : Power transformers - Part 6: Reactors;
- IEC 60076-8 : Power transformers - Part 8: Application guide;
- IEC 60076-10-1 : Power transformers - Part 10-1: Determination of sound levels - Application guide;
- IEC 60076-11 : Power transformers - Part 11: Dry-type transformers;
- IEC 60076-12 : Power transformers - Part 12: Loading guide for dry-type power transformers ;
- IEC TS 60076-19 : Power transformers - Part 19: Rules for the determination of uncertainties in the measurement of the losses on power transformers and reactors ;
- IEC TR 60616 : Terminal and tapping markings for power transformers;
- IEC 61378-1 : Converter transformers - Part 1: Transformers for industrial applications;
- IEC 61378-3 : Converter transformers - Part 3: Application guide;
- IEC 62032 : Guide for the Application, Specification and Testing of Phase-Shifting Transformers;
- IEC 60529 : Degrees of protection provided by enclosures (IP Code);
- IEC 60068-3-3 : Environmental testing - Part 3-3: Guidance - Seismic test methods for equipments;
- EN 50588-1:2015 : Medium power transformers 50 Hz, with highest voltage for equipment not exceeding 36 kV - Part 1: General requirements;



MOTOR STARTING WITH THREE-PHASE AUTO-TRANSFORMERS

Taps: 65% - 70% - 75%

$V_n = 400V$

5 startings/hour – 2 consecutive

Motor $\cos\phi_i = 0,85$ Power factor = 0,9

Technical data

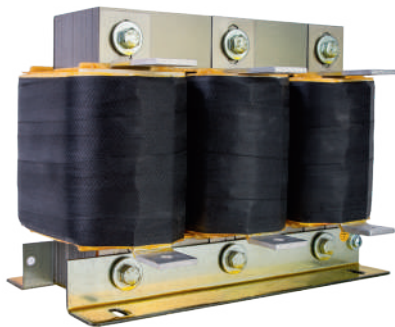
KW	DIMENSIONS (mm)	WEIGHT
		Kg
20	300x120x275 (H)	28
50	360x130x330 (H)	43
75	360x150x330 (H)	56
100	360x180x330 (H)	68
200	420x210x385 (H)	112
300	480x240x440 (H)	150
400	480x270x440 (H)	185
500	600x250x550 (H)	206

MOTOR STARTING WITH THREE-PHASE REACTORS

70% V_n

$V_n = 400V$

Motor $\cos\phi_i = 0,85$ Power factor = 0,9



Technical data

HP	KW	DIMENSIONS (mm)	WEIGHT
			Kg
20	15	180x80x165 (H)	10
30	22	180x90x165 (H)	13
50	37	240x90x220 (H)	20
75	55	240x110x220 (H)	27
100	74	300x100x275 (H)	36
150	110	300x120x275 (H)	47
200	147	360x120x330 (H)	64
300	220	360x140x330 (H)	78
400	295	420x250x385 (H)	136
500	368	480x270x440 (H)	180

These devices help three-phase induction motors starting decreasing the supply voltage and the current. Once the starting is effective, the devices are switched off and the three-phase motor will work with net current.

Meth manufactures a wide range of single- and three-phase reactors.

MAIN APPLICATIONS OF REACTORS

R3F THREE-PHASE PFC FILTER REACTORS

The insertion of capacitors banks in presence of harmonics causes a current absorption harmful for life time of capacitors.

Reactors connected in series with the capacitors guarantee:

- Reduction of harmonics
- Reduction of current and consequent reduction of capacitor overheating
- Increase of capacitors life time

R3L/M THREE-PHASE SMOOTHING REACTORS FOR VARIABLE SPEED DRIVES (MOTOR SIDE)

Inverter Drives produce big quantity of harmful harmonics, which can damage of motor insulation and shorten its life time. Installing a choke between the drive and the motor allows to:

- Reduce the harmonics, improving waveform linearity
- Increase the life time of semiconductors
- Reduce the motor operating temperature
- Reduce the audible equipment noise
- Limit the short circuit current

R3L/R THREE-PHASE SMOOTHING REACTORS FOR VARIABLE SPEED DRIVES (GRID SIDE)

Inverter Drives not only can damage the motor.

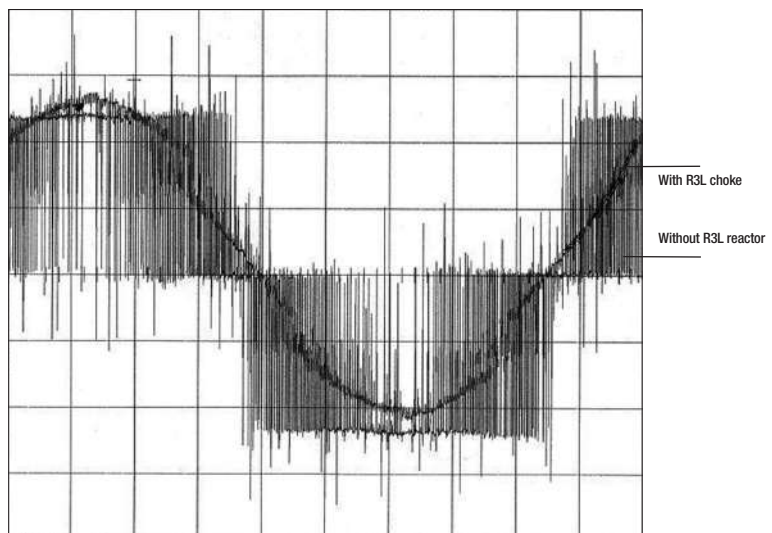
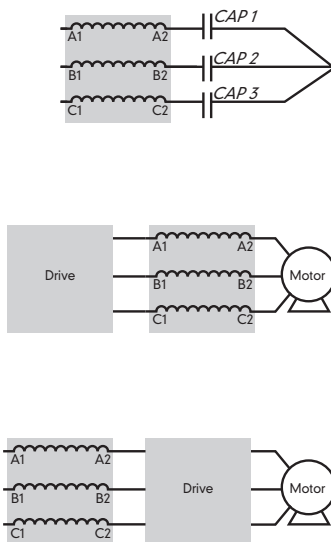
Harmonics can penetrate into the electrical net and cause some problems to other electronic or electrical equipment.

Installing a choke between the drive and the electrical net allows to:

- Reduce the harmonics, improving waveform linearity
- Reduce interferences in the electrical net
- Increase the life time of semiconductors

REACTORS CONSTRUCTION AND MATERIALS

- Windings in copper wire class 200°C or Aluminium
- Magnetic cores from steel with reduced losses and necessary cuts.
- Double impregnation with Polyester resin for safety fixing and with oven dried varnish for protection against external agents.
- Terminals:
 - up to 20A with terminal board IP20
 - up to 90A, with lug terminals
 - over 90A with copper
- Insulation system approved by UL-CSA class F – File E215141
- EN 61558 , p.2-20
- IEC 61558
- UL 5085, p.1-2



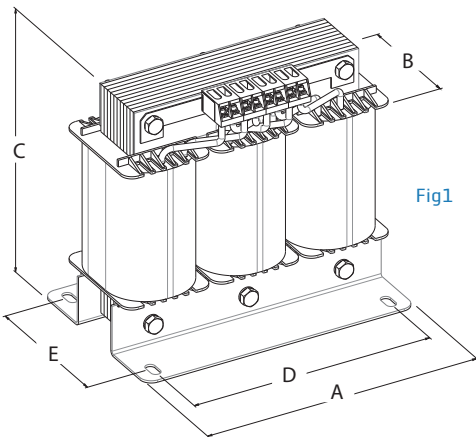
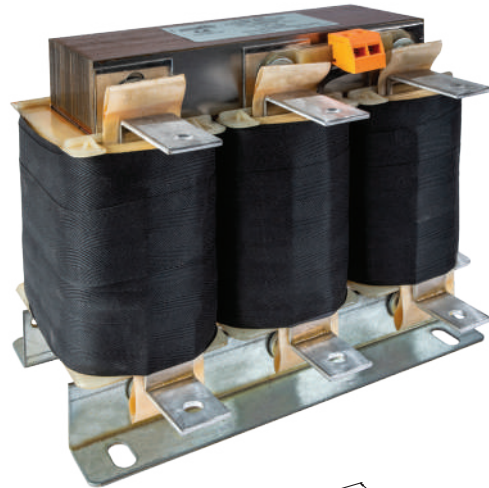


Fig1

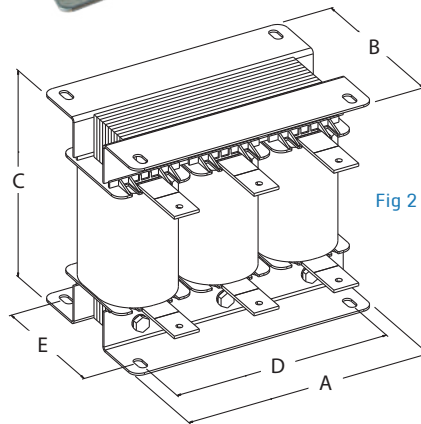


Fig 2



HARMONIC FILTER REACTOR: 400V - P=7% - 189Hz - 50Hz - LINEARITY > 1,73xI rms

Electrical data R3F-7

Technical data

CODE	RATED POWER	INDUCTANCE	I_L	I rms	LOSSES	DIMENSIONS (mm)					WEIGHT	TERMINAL	CLAMP SIZE	FIG
	KVAR					mH	A	A	W	A				
R3F-7-400-6,25	6,25	6,13	9,56	10,2	35	150	85	140	125	65	6	SCREW	2,5 sqmm	1
R3F-7-400-10	10	3,84	15,3	16,32	50	180	102	173	150	80	8	SCREW	6 sqmm	1
R3F-7-400-12,5	12,5	3,07	19,13	20,4	56	180	113	173	150	90	9	SCREW	6 sqmm	1
R3F-7-400-20	20	1,92	30,5	33,6	67	280	150	187	225	85	13	BUSBAR	M6 FLAT	2
R3F-7-400-25	25	1,53	38,3	40,8	78	280	160	187	225	95	17	BUSBAR	M6 FLAT	2
R3F-7-400-40	40	0,96	61,3	65,4	100	280	170	205	225	105	21	BUSBAR	M8 FLAT	2
R3F-7-400-50	50	0,77	76,6	81,7	120	280	195	205	225	120	26	BUSBAR	M8 FLAT	2

HARMONIC FILTER REACTOR: 400V - P=14% - 134Hz - 50Hz - LINEARITY > 1,37xI rms

Electrical data R3F-14

Technical data

CODE	RATED POWER	INDUCTANCE	I_L	I rms	LOSSES	DIMENSIONS (mm)					WEIGHT	TERMINAL	CLAMP SIZE	FIG
	KVAR					mH	A	A	W	A				
R3F-14-400-6,25	6,25	13,27	9,56	10,2	55	180	117	173	150	95	10	SCREW	6 sqmm	1
R3F-14-400-10	10	8,29	15,3	16,32	65	280	155	187	225	95	15	BUSBAR	M6 FLAT	2
R3F-14-400-12,5	12,5	6,63	19,13	20,4	78	280	155	187	225	95	17	BUSBAR	M6 FLAT	2
R3F-14-400-20	20	4,15	30,5	33,6	113	280	195	205	225	120	24	BUSBAR	M6 FLAT	2
R3F-14-400-25	25	3,32	38,3	40,8	117	280	200	205	225	125	27	BUSBAR	M6 FLAT	2
R3F-14-400-40	40	2,07	61,3	65,4	168	360	190	255	275	120	40	BUSBAR	M8 FLAT	2
R3F-14-400-50	50	1,66	76,6	81,7	182	360	200	255	275	130	46	BUSBAR	M8 FLAT	2

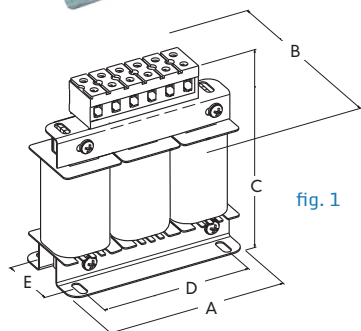


fig. 1

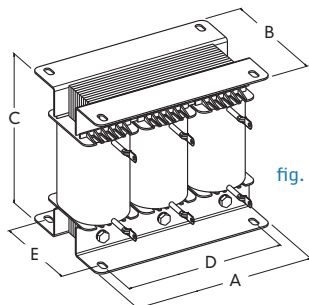


fig. 2

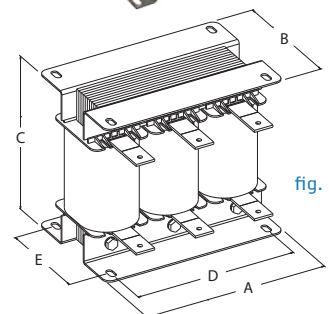


fig. 3



MOTOR SIDE ΔV 2% $I_{sat} = 1,5 I_n$ 400V 50Hz

Electrical data R3L/M

Technical data

CODE	RATED VOLTAGE	cdt	INDUCTANCE	RATED CURRENT	I_{sat}/I_n	DIMENSIONS (mm)			WEIGHT	WINDING	FIG.
	V					%	mH	A			
R3L/15-M	400	2	0,981	15	1,5	150	60	138	4	Cu	fig. 1
R3L/20-M	400	2	0,735	20	1,5	150	65	138	5	Cu	fig. 1
R3L/30-M	400	2	0,49	30	1,5	180	60	165	6	Cu	fig. 1
R3L/50-M	400	2	0,294	50	1,5	180	70	165	8	Al	fig. 1
R3L/75-M	400	2	0,196	75	1,5	180	80	165	10	Al	fig. 2
R3L/100-M	400	2	0,147	100	1,5	240	80	165	12	Al	fig. 2
R3L/125-M	400	2	0,118	125	1,5	240	90	220	14	Al	fig. 2
R3L/150-M	400	2	0,098	150	1,5	240	100	220	16	Al	fig. 3
R3L/200-M	400	2	0,074	200	1,5	240	110	220	19	Al	fig. 3
R3L/250-M	400	2	0,059	250	1,5	300	100	280	24	Al	fig. 3
R3L/300-M	400	2	0,049	300	1,5	300	110	280	28	Al	fig. 3
R3L/350-M	400	2	0,042	350	1,5	300	120	280	29	Al	fig. 3
R3L/400-M	400	2	0,037	400	1,5	300	130	280	34	Al	fig. 3
R3L/500-M	400	2	0,029	500	1,5	360	130	330	42	Al	fig. 3

GRID SIDE ΔV 4% $I_{sat} = 1,5 I_n$ 400V 50Hz

Electrical data R3L/R

Technical data

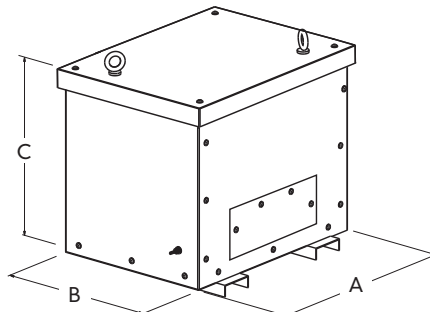
CODE	RATED VOLTAGE	cdt	INDUCTANCE	RATED CURRENT	I_{sat}/I_n	DIMENSIONS (mm)			WEIGHT	WINDING	FIG.
	V					%	mH	A			
R3L/15-R	400	4	1,961	15	1,5	180	90	155	6	Cu	fig. 1
R3L/20-R	400	4	1,471	20	1,5	180	100	155	8	Cu	fig. 1
R3L/30-R	400	4	0,981	30	1,5	180	110	155	10	Cu	fig. 1
R3L/50-R	400	4	0,588	50	1,5	240	120	210	12	Al	fig. 1
R3L/75-R	400	4	0,392	75	1,5	240	130	210	15	Al	fig. 2
R3L/100-R	400	4	0,294	100	1,5	240	140	210	18	Al	fig. 2
R3L/125-R	400	4	0,235	125	1,5	300	150	260	24	Al	fig. 2
R3L/150-R	400	4	0,196	150	1,5	300	160	260	29	Al	fig. 2
R3L/200-R	400	4	0,147	200	1,5	300	170	260	34	Al	fig. 3
R3L/250-R	400	4	0,118	250	1,5	300	180	260	40	Al	fig. 3
R3L/300-R	400	4	0,098	300	1,5	360	190	310	49	Al	fig. 3
R3L/350-R	400	4	0,084	350	1,5	360	200	310	57	Al	fig. 3
R3L/400-R	400	4	0,074	400	1,5	360	230	350	62	Al	fig. 3
R3L/500-R	400	4	0,059	500	1,5	360	240	350	68	Al	fig. 3

Reactors with $I_{sat}=2 I_n$ or $I_{sat}=3 I_n$ are also available. Please contact Meth.



IP23

Standard enclosure



Technical data IP23

CODE	DIMENSIONS (mm)			WEIGHT Kg
	A	B	C	
BOX23-1/-2	570	500	580	23
BOX23-3	640	550	600	26
BOX23-4	740	650	740	36
BOX23-5	860	850	860	58
BOX23-6	1100	1050	1070	96
BOX23-7	1570	1100	1500	150
BOX23-7B	1570	1300	1500	212
BOX23-8	1710	1200	1500	170

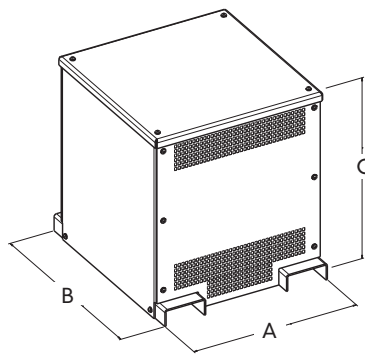
Technical details:

- 15/10 (box 23-1/2-3-4-5) or 20/10 (box 23-6-7-8) pre-galvanized steel painted with polyester resin
- eye bolts for lifting. From size 23-3 also bottom housing for fork lift or trans pallet lifting
- 2 output metallic plates for cable glands on the same side
- enclosure color: RAL7035



IP21

Upon request enclosure



Technical data IP21 (upon request)

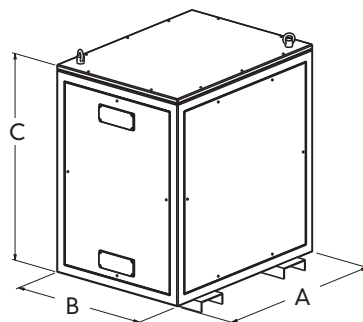
CODE	DIMENSIONS (mm)			WEIGHT Kg
	A	B	C	
BOX21-1	350	340	430	20
BOX21-2	450	340	480	25
BOX21-3	500	440	530	30
BOX21-4	600	490	630	40
BOX21-5	700	500	700	50

Technical details:

- epoxy resin painted steel
- internal eye bolts or bottom housing for fork lift or trans pallet lifting
- 2 output metallic plates for cable glands on the same side
- enclosure color: RAL7032



IP55



Technical data IP55

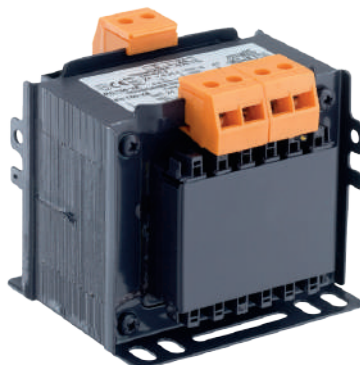
CODE	DIMENSIONS (mm)			WEIGHT Kg
	A	B	C	
BOX55-1	750	650	850	65
BOX55-2	850	700	950	75
BOX55-3	1000	850	1100	90
BOX55-4	1200	1000	1300	110

Technical details:

- pre-galvanized steel painted with polyester resin for external
- eye bolts for lifting
- 2 output plastic cable glands on the same side
- enclosure color: RAL7035

38.04 ///
SINGLE-PHASE
TRANSFORMERS





CoC certified products: T1ULF and T1
 For technical and electrical data see page 10 (T1ULF) and 11 (T1)

General data

Input voltage	T1Q : 200-440 V
	T1ULF-T1AL : 100-600 V
Output voltage	T1Q : 12-440 V
	T1ULF-T1AL : 12-600 V
Rated power	T1Q : 30-2000 VA
	T1ULF : 30-5000 VA
	T1AL : >5 KVA - 10 KVA

Insulation class	class F
Temperature class	T1Q : class B
	T1ULF-T1AL : class F
Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Test voltage	4,2 KV/1'
Terminals	terminal blocks

Application:

Isolating transformer with secondary voltage > 50 V
 Safety transformer with secondary voltage ≤ 50 V
 They are suitable for any industrial/civil use for the electrical isolation of the input and output sides. Construction in accordance with the following standards:

Standard

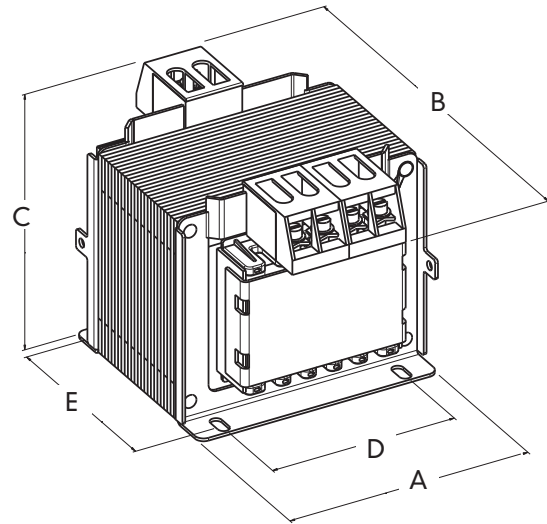
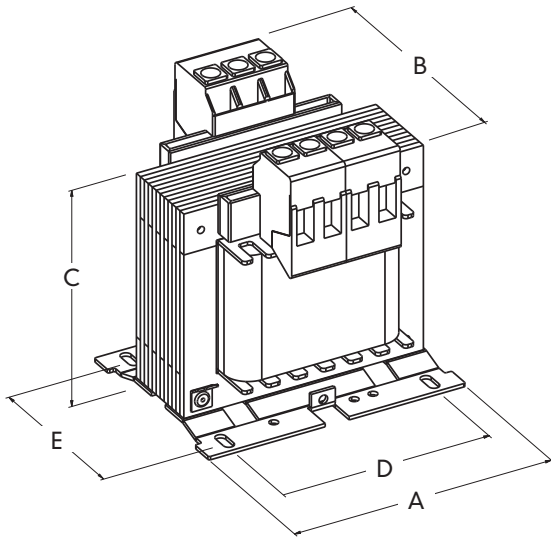
CEI-EN 61558,2-4 – isolating transformers
IEC 61558,2-4 – isolating transformers
UL 5085 1-2 – low-voltage transformers
CEI-EN 61558,2-6 – safety transformers
IEC 61558,2-6 – safety transformers
CSA 22.2, No66

T1Q: ENEC marked

T1ULF-T1UL: UL-CSA marked

Certifications

	KEMA FILE 3502609.01-02-03-04-05
	FILE E169331-vol. 2-sec. 1-2
	FILE E169331-vol. 1-sec. 1-2
	FILE E215141-vol. 1-sec. 1



Technical data T1Q

CODE	RATED POWER	APPROVALS	DIMENSIONS (mm)					DIMENSIONS ACCORDING TO DIN STANDARD (mm)					WEIGHT
			A	B	C	D	E	A	B	C	D	E	
T1Q-30...	30		77	81	77	60	43	76	72	89	56	45	1,1
T1Q-50...	50		77	85	77	60	48	76	78	89	56	50	1,2
T1Q-75...	75		86	85	82	70	55	85	85	98	64	54	1,45
T1Q-100...	100		86	95	82	70	65	85	94	98	64	64	2
T1Q-150...	150		98	98	95	80	69	96	92	109	84	70	2,6
T1Q-200...	200		98	113	95	80	84	96	107	109	84	85	3,1
T1Q-250...	250		122	103	110	100	75	121	95	123	90	70	3,6
T1Q-300...	300		122	108	110	100	80	121	105	123	90	80	4,4
T1Q-400...	400		122	118	110	100	90	121	115	123	90	90	5,7
T1Q-500...	500		122	138	110	100	110	121	135	123	90	110	7
T1Q-600...	600		153	116	136	125	93	151	117	140	122	90	7,4
T1Q-800...	800		153	136	136	125	113	151	137	140	122	110	9,8
T1Q-1000...	1000		153	156	136	125	133	151	157	140	122	130	12,1
T1Q-1250...	1250		193	125	176	160	96	193	125	176	160	96	14
T1Q-1500...	1500		193	131	176	160	102	193	131	176	160	102	16
T1Q-2000...	2000		193	151	176	160	122	193	151	176	160	122	20

Technical data T1ULF/T1AUL (industrial control transformers)

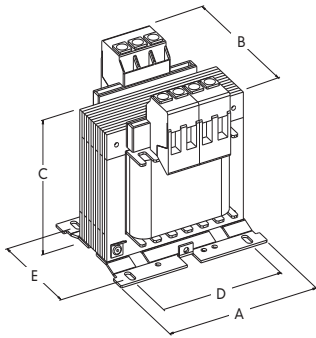


Fig. 1

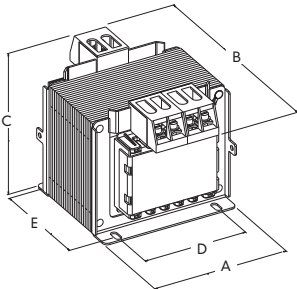


Fig. 2

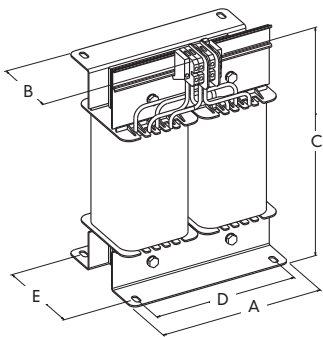


Fig. 3

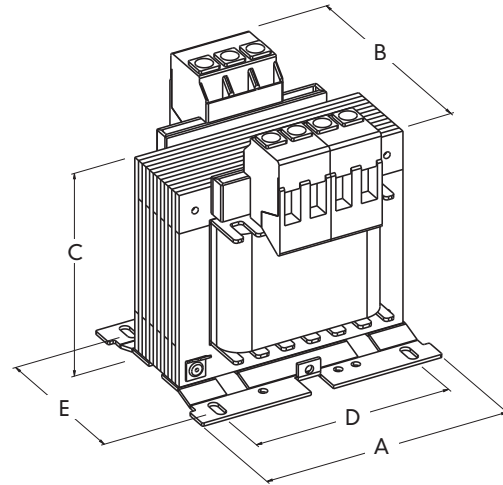
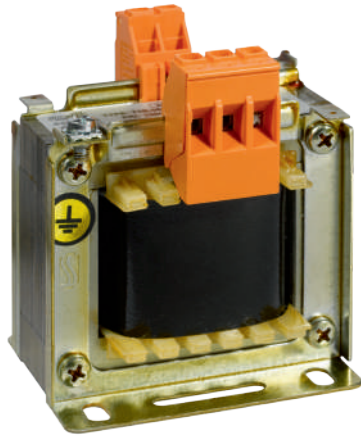
CODE	RATED POWER VA	APPROVALS	DIMENSIONS (mm)					DIMENSIONS ACCORDING TO DIN STANDARD (mm)					WEIGHT Kg	FIG.
			A	B	C	D	E	A	B	C	D	E		
T1ULF-30...	30		77	81	77	60	43	76	72	89	56	45	1,1	1-2
T1ULF-50...	50		77	85	77	60	48	76	78	89	56	50	1,2	1-2
T1ULF-75...	75		86	85	82	70	55	85	85	98	64	54	1,45	1-2
T1ULF-100...	100		86	95	82	70	65	85	94	98	64	64	2	1-2
T1ULF-150...	150		98	98	95	80	69	96	92	109	84	70	2,6	1-2
T1ULF-200...	200		98	113	95	80	84	96	107	109	84	85	3,1	1-2
T1ULF-250...	250		122	103	110	100	75	121	95	123	90	70	3,6	1-2
T1ULF-300...	300		122	108	110	100	80	121	105	123	90	80	4,4	1-2
T1ULF-400...	400		122	118	110	100	90	121	115	123	90	90	5,7	1-2
T1ULF-500...	500		122	138	110	100	110	121	135	123	90	110	7	1-2
T1ULF-600...	600		153	116	136	125	93	151	117	140	122	90	7,4	1-2
T1ULF-800...	800		153	136	136	125	113	151	137	140	122	110	9,8	1-2
T1ULF-1000...	1000		153	156	136	125	133	151	157	140	122	130	12,1	1-2
T1ULF-1250...	1250		193	125	182	122	96	-	-	-	-	-	14	1-2
T1ULF-1500...	1500		193	131	182	160	102	-	-	-	-	-	16	1-2
T1ULF-2000...	2000		193	151	182	160	122	-	-	-	-	-	20	1-2
T1ULF-2500...	2500		193	171	182	160	142	-	-	-	-	-	22	2-3
T1ULF-3000...	3000		200	155	300	150	126	-	-	-	-	-	31	3
T1ULF-4000...	4000		240	175	357	205	104	-	-	-	-	-	37	3
T1ULF-5000...	5000		240	185	357	205	114	-	-	-	-	-	40	3
T1AUL-6000...	6000		240	205	357	205	134	-	-	-	-	-	47	3
T1AUL-7500...	7500		280	228	410	233	152	-	-	-	-	-	57	3
T1AUL-10000...	10000		280	252	410	233	175	-	-	-	-	-	75	3



All the above items are also available with transparent varnish

Electrical data Suitable for T1Q - T1ULF - T1AUL

RATED POWER VA	LOSSES (W)		EFFICIENCY %	U _{cc} %	ΔV %	INRUSH CURRENT x I _n
	a vuoto	a carico				
30	3	3,2	82,8	9,5	9,6	20
50	3,5	6,7	83,1	11,8	11,8	18
75	4	8	86,2	10,6	10	17
100	5,2	6,8	86,9	8,4	8,2	24
150	6,5	12,5	88,9	9,4	8,1	20
200	8,2	16	89,5	9	7,7	19
250	9,1	17,5	90,5	10,2	7,2	19
300	10,5	18,7	91,2	9,2	6,4	19
400	12,5	28,5	91	10	7,1	18
500	15,6	29	91,9	8,6	5,9	20
600	17	36	92,3	5,6	5,6	23
800	20	46	92,4	5	5,4	22
1000	25	47	93,4	4,5	4,5	23
1250	32	48	93,9	3,9	3,8	22
1500	34	63	93,9	4,3	4,1	22
2000	41	79	94,3	4	3,8	21
2500	50	80	95	3,5	3,2	21
3000	60	97	95	3,4	3,2	20
4000	60	150	95,2	4,1	3,8	20
5000	65	170	95,6	3,7	3,4	18
6000	65	185	96	3,4	3,1	18
7500	75	220	96,2	3,2	2,4	17
10000	100	250	96,7	2,9	2,4	17



General data

2 input voltage/1 output voltage output in two sides

Input voltage	230-400 V or others upon request
Output voltage	24 V/115 V or others upon request
Rated power	30-5000 VA
Insulation class	class F

Temperature class	class B
Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Test voltage	4,2 KV/1'
Terminals	terminal blocks

Application:

Single-phase control, isolating and safety transformers designed combining reliable performance and cost-effectiveness.

They are completely impregnated with resin and have faston or screw earth connection, 4 sqmm terminal blocks, input and output in two sides.

Construction in accordance with the following standards:

Standard

CEI-EN 61558,2-4 – isolating transformers

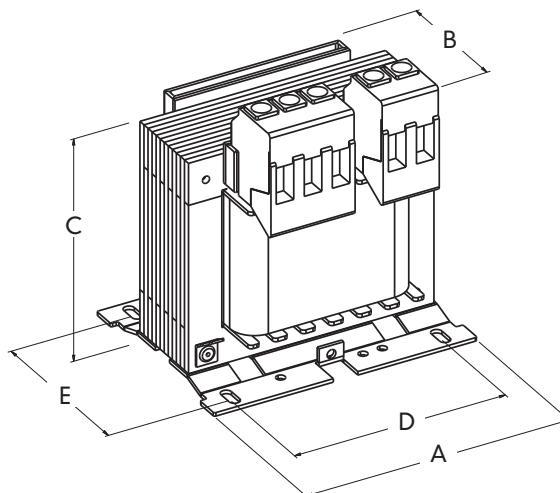
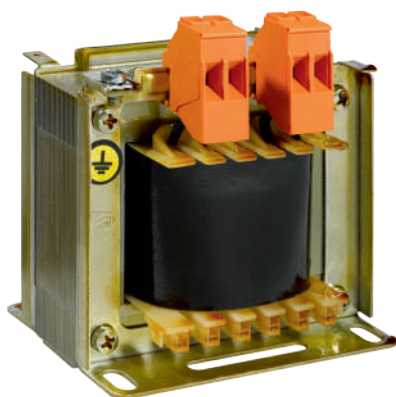
CEI-EN 61558,2-6 – safety transformers

IEC 61558,2-4 and 2-6

Technical data T1B

CODE	RATED POWER VA	DIMENSIONS (mm)					WEIGHT Kg	LOSSES (W)		EFFICIENCY %	U _{cc} %	ΔV %
		A	B	C	D	E		no-load	load			
T1B-30...	30	76	68	89	55	40	1	2,1	5,8	76,5	13,2	13
T1B-50...	50	76	73	89	55	45	1,1	2,7	9,5	81	12,5	12,4
T1B-75...	75	76	87	89	55	59	1,3	3,9	11	83,8	12,4	12,7
T1B-100...	100	85	87	95	64	59	1,8	4,7	13,7	84,6	11,8	12,1
T1B-160...	160	98	87	106	84	66	2,2	5,8	17,9	86,5	10,5	10,7
T1B-200...	200	98	97	106	84	76	3	7	22,8	87,1	10,2	10,3
T1B-250...	250	98	107	106	84	86	3,5	8,4	28,3	87,3	10	10,2
T1B-300...	300	108	107	115	90	86	4,1	9,8	31	88,4	9,2	9,3
T1B-400...	400	122	102	121	90	84	4,9	9,4	34	90,3	7,9	7,9
T1B-500...	500	122	117	121	90	99	6	11	34,1	92	6,4	6,5
T1B-600...	600	151	94	142	123	79	7,8	12,3	39	92,2	6,4	6,2
T1B-800...	800	151	114	142	123	99	10,4	17,2	40,4	93,4	4,9	4,8
T1B-1000...	1000	151	124	142	123	109	11,4	19	47,3	93,5	4,6	4,5
T1B-1500...	1500	192	125	176	160	96	14	30	76	93,5	4,9	4,8
T1B-2000...	2000	192	151	176	160	122	20,1	40	88	94	4,4	4,3
T1B-2500...	2500	192	171	176	160	142	23	52	96	94,5	3,8	3,7
T1B-3000...	3000	192	191	176	160	162	26	61	103	94,9	3,5	3,4
T1B-4000...	4000	240	230	230	180	165	45	85	100	95,6	3	3,5
T1B-5000...	5000	240	240	230	180	180	50	90	105	96	3	3,6

Electrical data



General data

1 input voltage/1 output voltage output in one side

Rated input voltage	230 V or others upon request
Rated output voltage	24 V/115 V or others upon request
Rated power	30-5000 VA
Insulation class	class F
Temperature class	class B

Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Test voltage	4,2 KV/1'
Terminals	terminal blocks

Application:

Single-phase control, isolating and safety transformers designed combining reliable performance and cost-effectiveness.

They are completely impregnated with resin and have faston or screw earth connection, 4 sqmm terminal blocks, input and output in the same side.

Construction in accordance with the following standards:

Standard

CEI-EN 61558,2-4 – isolating transformers

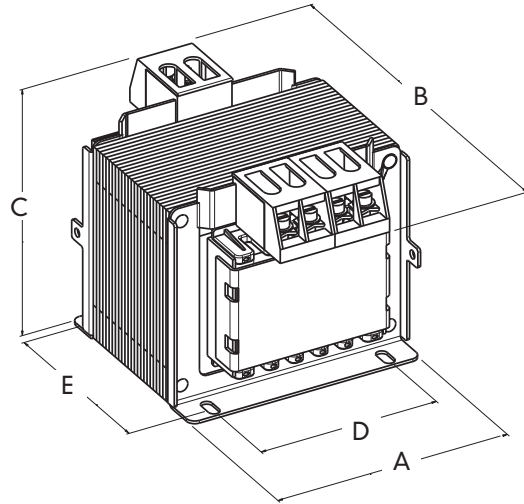
CEI-EN 61558,2-6 – safety transformers

IEC 61558,2-4 and 2-6

Technical data T1C

Electrical data

CODE	RATED POWER VA	DIMENSIONS (mm)					WEIGHT Kg	LOSSES (W)		EFFICIENCY %	U _{cc} %	ΔV %
		A	B	C	D	E		no-load	load			
T1C-30...	30	76	68	89	55	40	1	2,1	5,8	76,5	13,2	13
T1C-50...	50	76	73	89	55	45	1,1	2,7	9,5	81	12,5	12,4
T1C-75...	75	76	87	89	55	59	1,3	3,9	11	83,8	12,4	12,7
T1C-100...	100	85	87	95	64	59	1,8	4,7	13,7	84,6	11,8	12,1
T1C-160...	160	98	87	106	84	66	2,2	5,8	17,9	86,5	10,5	10,7
T1C-200...	200	98	97	106	84	76	3	7	22,8	87,1	10,2	10,3
T1C-250...	250	98	107	106	84	86	3,5	8,4	28,3	87,3	10	10,2
T1C-300...	300	108	107	115	90	86	4,1	9,8	31	88,4	9,2	9,3
T1C-400...	400	122	102	121	90	84	4,9	9,4	34	90,3	7,9	7,9
T1C-500...	500	122	117	121	90	99	6	11	34,1	92	6,4	6,5
T1C-600...	600	151	94	142	123	79	7,8	12,3	39	92,2	6,4	6,2
T1C-800...	800	151	114	142	123	99	10,4	17,2	40,4	93,4	4,9	4,8
T1C-1000...	1000	151	124	142	123	109	11,4	19	47,3	93,5	4,6	4,5
T1C-1500...	1500	192	125	176	160	96	14	30	76	93,5	4,9	4,8
T1C-2000...	2000	192	151	176	160	122	20,1	40	88	94	4,4	4,3
T1C-2500...	2500	192	171	176	160	142	23	52	96	94,5	3,8	3,7
T1C-3000...	3000	192	191	176	160	162	26	61	103	94,9	3,5	3,4
T1C-4000...	4000	240	230	230	180	165	45	85	100	95,6	3	3,5
T1C-5000...	5000	240	240	230	180	180	50	90	105	96	3	3,6



General data

input-output in two sides

Rated input voltage	230-400 V (others upon request)
Rated output voltage	24V or 115V (others upon request)
Frequency	50/60 Hz
Rated power	30-5000 VA
Insulation class	class F
Temperature class	class B

Ambient temperature	Ta=40°C
Operating time	continuous
Protection degree	IP 00 - class I
Terminal protection degree	IP 20
Test voltage	4,2 KV/1'
Terminals	terminal blocks

Application:

Single phase control, isolating and safety transformers designed combining reliable performance and cost-effectiveness. They are completely impregnated with resind. Input and output in two sides. Costruction in accordance with the following standards:

Standard

CEI - EN 61558,2-4 – isolating transformers

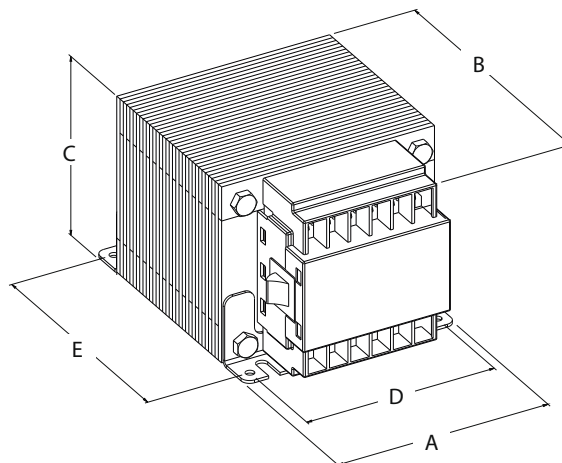
CEI - EN 61558,2-6 – safety transformers

IEC 61558,2-4 and 2-6

Technical data T1-IT

CODE	RATED POWER VA	DIMENSIONS (mm)					WEIGHT Kg	LOSSES (W)		EFFICIENCY %	U _{cc} %	ΔV %
		A	B	C	D	E		no-load	load			
T1-IT-30...	30	76	70	76	55	39	1	2,1	5,8	76,5	13,2	13
T1-IT-50...	50	76	75	76	55	44	1,1	2,7	9,5	81	12,5	12,4
T1-IT-75...	75	76	90	76	55	59	1,3	3,9	11	83,8	12,4	12,7
T1-IT-100...	100	85	88	84	70	61	1,8	4,7	13,7	84,6	11,8	12,1
T1-IT-160...	160	98	94	94	80	64	2,2	5,8	17,9	86,5	10,5	10,7
T1-IT-200...	200	98	104	94	80	74	3	7	22,8	87,1	10,2	10,3
T1-IT-250...	250	98	114	94	80	84	3,5	8,4	28,3	87,3	10	10,2
T1-IT-300...	300	108	112	94	84	83	4,1	9,8	31	88,4	9,2	9,3
T1-IT-400...	400	122	107	110	100	85	4,9	9,4	34	90,3	7,9	7,9
T1-IT-500...	500	122	122	110	100	100	6	11	34,1	92	6,4	6,5
T1-IT-600...	600	151	100	133	125	90	7,8	12,3	39	92,2	6,4	6,2
T1-IT-800...	800	151	120	133	125	110	10,4	17,2	40,4	93,4	4,9	4,8
T1-IT-1000...	1000	151	130	133	125	120	11,4	19	47,3	93,5	4,6	4,5
T1-IT-1500...	1500	192	125	176	160	96	14	30	76	93,5	4,9	4,8
T1-IT-2000...	2000	192	151	176	160	122	20,1	40	88	94	4,4	4,3
T1-IT-2500...	2500	192	171	176	160	142	23	52	96	94,5	3,8	3,7
T1-IT-3000...	3000	192	191	176	160	162	26	61	103	94,9	3,5	3,4

Electrical data



General data

Rated input voltage	230-400 V
Rated output voltage	12/24/48 V (others upon request)
Rated power	30-125 VA
Insulation class	class F
Temperature class	class B

Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Test voltage	4,2 KV/1'
Terminals	Faston 6,3 sqmm

Application:

Single-phase isolating and safety transformers suitable for any industrial or civil use for the electrical isolation of the input and output sides with resettable switch on the output.

Construction in accordance with the following standards:

Standard

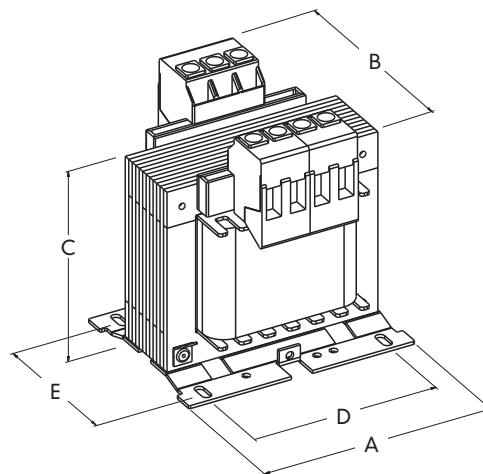
CEI-EN 61558,2-4 and 2-6 – isolating and safety transformers

IEC 61558,2-4 and 2-6

Technical data T1P

CODE	RATED POWER	DIMENSIONS (mm)					WEIGHT	LOSSES (W)		EFFICIENCY	U _{cc}	DV
		VA	A	B	C	D		E	Kg			
T1P-30	30	75	73	63	55	45	1	2,5	3,8	83,2	11,2	10,9
T1P-50	50	75	73	63	55	45	1,1	2,9	7,1	83,4	12,5	12,4
T1P-63	63	75	83	63	55	55	1,3	3,2	8	84,9	12,2	11,8
T1P-75	75	75	88	63	55	60	1,5	3,8	9,7	85,1	12,1	11,7
T1P-100	100	85	95	72	64	61	1,9	4,5	11,8	86,1	11,8	11,3
T1P-125	125	85	105	72	64	71	2,3	5,5	13,4	87	10,9	10,2

Electrical data



General data

Rated input voltage (standard)	208-230-380-400-420-440-460-480-500-525-550 V
Rated output voltage	2x115 V or 2x12 V or 2x24 V
Rated power	from 150 to 1000 VA
Insulation class	class F

Temperature class	class F
Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Test voltage	4,2 KV/1'
Terminals	terminal blocks

Application:

Suitable for any industrial application, where different input voltages are required.

Construction in accordance with the following standards:

Certifications



FILE E169331-vol. 2-sec. 1-2



FILE E215141-vol. 1-sec. 1

Standard

CEI-EN 61558,2-4 and 2-6 – isolating and safety transformers

IEC 61558,2-4 and 2-6

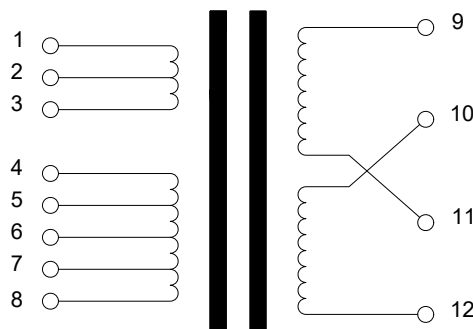
UL 5085 1 and 2 – low voltage transformers

CSA 22.2 No.66

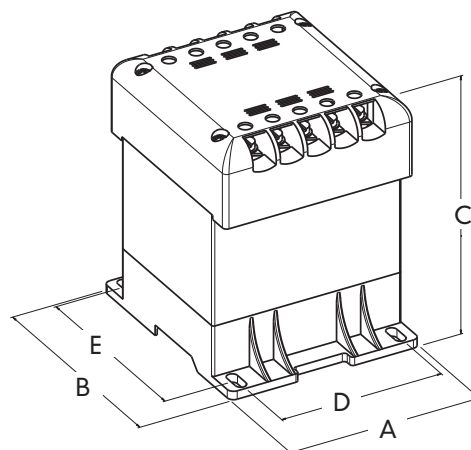
Technical data T1U

CODE	RATED POWER VA	DIMENSIONS (mm)					WEIGHT Kg
		A	B	C	D	E	
T1U-150...	150	96	92	105	84	75	2,6
T1U-250...	250	121	95	125	90	70	3,6
T1U-400...	400	121	115	125	90	90	5,7
T1U-500...	500	121	135	125	90	110	7
T1U-630...	630	151	117	140	120	90	7,4
T1U-800...	800	151	137	140	120	110	9,8
T1U-1000...	1000	151	157	140	120	130	12,1

STANDARD WIRING DIAGRAM



Other configurations available upon request



General data

Rated input voltage	230-400±15 V
Rated output voltage	2X12 V or 2x115 V
Rated power	50-400 VA
Insulation class	class F
Temperature class	class B

Protection class	class II
Ambient temperature	Ta=40°C
Protection degree	IP 20
Test voltage	4,2 KV/1'
Terminals	self-lifting screws

Application:

Single-phase isolating and safety transformers suitable for DIN rail or floor screws installation.

Multi-voltage input and output with protection degree IP20.

Protection class II

Construction in accordance with the following standards:

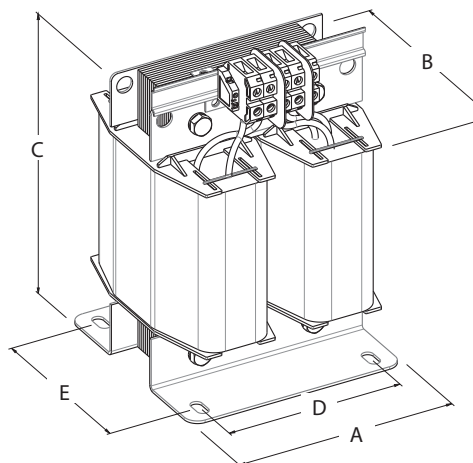
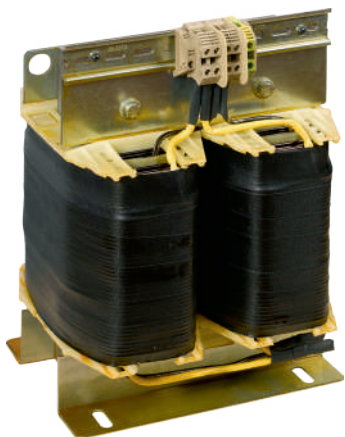
Standard

CEI-EN 61558,2-4 and 2-6 – isolating and safety transformers

IEC 61558,2-4 and 2-6

Technical data T1L

CODE	RATED POWER	APPROVALS	DIMENSIONS					WEIGHT	LOSSES (W)		EFFICIENCY	Ucc	DV
			A	B	C	D	E		Kg	NO-LOAD			
T1L-50	50	CE	89	106	100	68,5	90	1,4	3,5	6,2	84	11,5	11,8
T1L-63	63	CE	89	106	100	68,5	90	1,5	3,4	8,1	84,7	11,1	11,4
T1L-75	75	CE	89	106	110	68,5	90	1,8	4,5	8,2	85,7	9,5	9,7
T1L-100	100	CE	89	106	120	68,5	90	2,1	5,5	10,3	86,3	9,2	9,4
T1L-160	160	CE	113	115	112	80	99	2,3	5,9	15	87,6	9	9,2
T1L-200	200	CE	113	115	122	80	99	3	7,1	21,1	87,8	8,9	9,1
T1L-250	250	CE	113	115	132	80	99	3,5	8,4	26,6	87,9	8,4	8,7
T1L-300	300	CE	126	136	117	96	121	3,8	8,6	27	89,3	8,3	8,3
T1L-400	400	CE	126	136	127	96	121	4,5	10,5	34,9	89,9	8,1	8,2



General data

Rated input voltage	up to 600 V
Rated output voltage	up to 600 V
Rated power	from 5 to 80 KVA
Insulation class	class H
Temperature class	class F

Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Test voltage	3 KV/1'
Terminals	terminal blocks / bars

Application:

Suitable for any industrial applications for electrical isolation of the input and output side.
 Construction in accordance with the following standards:

Standard

CEI-EN 60076 – dry type transformers
IEC -60076 – dry type transformers
UL 5085 1 and 2 – low voltage transformers

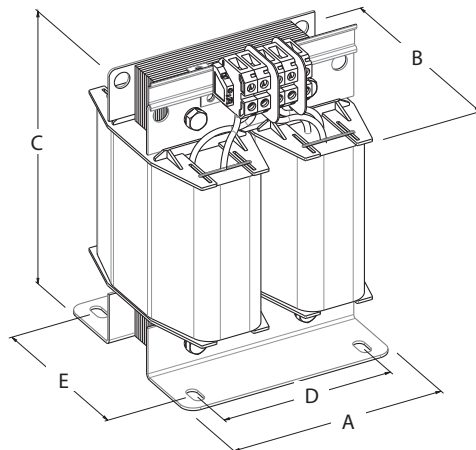
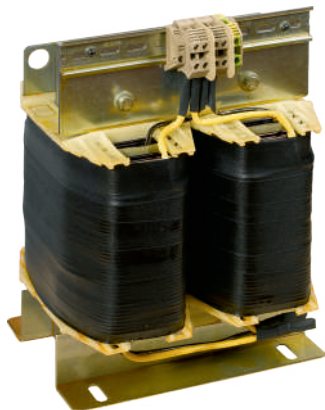
Certifications

 Insulation System class F - H (upon request)

Technical data T2

CODE	RATED POWER kVA	DIMENSIONS (mm)					WEIGHT Kg	LOSSES (W)		EFFICIENCY %	U _{cc} %	ΔV %	INRUSH CURRENT x I _n
		A	B	C	D	E		no-load	load				
T2-5	5	240	210	330	180	120	32	300	93,5	6,4	5	5	20
T2-8	8	240	230	330	180	140	42	340	95,3	4,8	4,8	4,8	20
T2-10	10	280	230	408	240	130	53	390	95,6	4,8	4	4	18
T2-15	15	280	270	408	235	170	72	95	445	96,5	3,7	3,5	15
T2-20	20	320	280	440	265	320	88	115	530	96	3,6	3,5	15
T2-25	25	320	310	440	265	198	110	140	600	97,1	3,1	3,2	14
T2-30	30	400	330	550	300	200	125	150	890	96,6	4,7	4,6	13
T2-40	40	400	360	550	300	220	155	180	1010	97,1	4,6	4,5	12
T2-50	50	400	410	550	300	240	190	230	1060	97,4	3,9	3,8	10
T2-60	60	400	440	550	300	280	225	280	1080	97,8	3,4	3,4	9
T2-80	80	400	480	550	300	320	275	335	1350	97,9	3,3	3,4	9

Electrical data



General data

Rated input voltage	230 V
Rated output voltage	115-0-115 V
Rated power	from 2200 VA to 10kVA
Insulation class	class F-H
Temperature class	class B
Ambient temperature	Ta=40°C
Protection degree	IP 00 - class I
Inrush current	12 x In
Short-circuit voltage	3%

Insulation voltage	5KV/1'
No-load current	3%
Leakage current of the output winding to earth	≤0,5 mA
Leakage current of the enclosure to earth	≤ 3,5 mA
Terminals	terminal blocks
Double screen between primary and secondary	
Equipped with a pocket for PT100 upon request	

Application:

Suitable for galvanic separation between the net from the users in medical locations.

Construction in accordance with the following standards:

Standard

CEI-EN 61558, 2-15

IEC 61558, 2-15

Class F/F version is available upon request



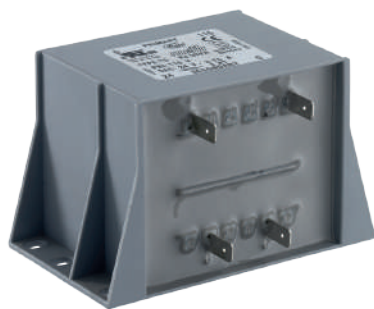
Isolating transformer for powering medical locations.

Technical data T2H

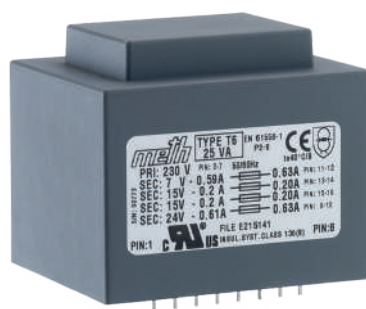
CODE	RATED POWER VA	DIMENSIONS (mm)					WEIGHT Kg	LOSSES (W)		EFFICIENCY %	U _{cc} %	INRUSH CURRENT x In
		A	B	C	D	E		no-load	load			
T2H-2.2	2200	200	155	300	150	126	36	12	65	96,7	3	12
T2H-3.3	3300	240	175	355	180	104	46	15	90	96,9	3	12
T2H-4	4000	240	185	355	180	114	50	20	110	96,9	3	12
T2H-5.5	5500	280	195	355	180	124	56	25	130	97	3	12
T2H-7.5	7500	280	230	410	235	152	66,5	30	190	97,1	3	12
T2H-10	10000	280	240	410	235	162	75	35	230	97,4	3	12

Electrical data

Data referred to 230/115-0-115 V



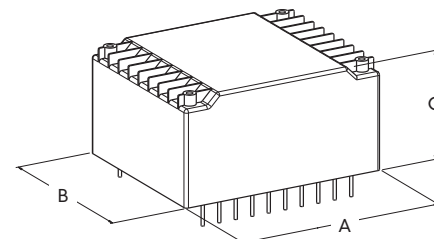
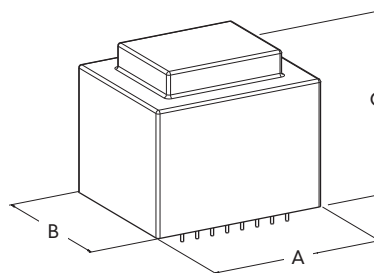
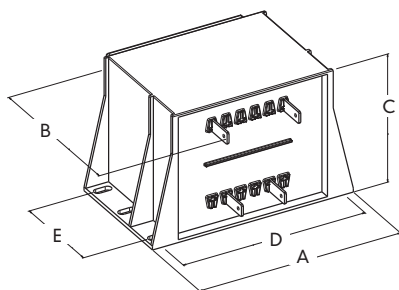
T5



T6



T7



General data

Rated input voltage	from 100 to 250 V
Rated output voltage	from 12 to 42 V
Rated power	T5: from 12 to 70 VA
	T6: from 3,2 to 100 VA
	T7: from 4 to 60 VA

Insulation class	class B
Temperature class	class B
Ambient temperature	Ta=70°C
Protection degree	IP 00
Test voltage	4,2 KV/1'

Application:

Safety transformers encapsulated with epoxy resin suitable for PCB use (T6-T7) or use in critical ambients (T5).



- T5: input and output with 6,3 mm faston
- T6: for PCB insertion with pins with \varnothing 0,8 mm
- T7: for PCB low profile with pins with \varnothing 0,8 mm

Construction in accordance with the following standards:

Standard

CEI-EN 61558, 2-6 – safety transformers
IEC 61558, 2-6 – safety transformers
UL-CSA 5085 1-2 – low voltage transformers

Certifications

	ENEC-KEMA File: 3502609 03-04-05
	UL Insulation System class B File E215141

Technical data T5

Electrical data



CODE	RATED POWER	APPROVALS	DIMENSIONS (mm)						WEIGHT	LOSSES (W)	EFFICIENCY	ΔV
	VA		A	B	C	D	E	no-load		%	%	
T5-12	12		82	48	50	68	11	0,42	1	76	15	
T5-20	20		82	54	54	74	13	0,56	1,2	87	14	
T5-30	30		94	59	60	82	13	0,76	1,5	82	14	
T5-35	35		94	59	71	82	36	1,04	2,2	85	9	
T5-55	55		105	66	73	93	38	1,32	2,7	86	9,9	
T5-70	70		105	66	83	93	48	1,54	3,5	87	8,8	

Technical data T6

Electrical data



CODE	RATED POWER	APPROVALS	DIMENSIONS (mm)								WEIGHT	LOSSES (W)	EFFICIENCY	ΔV	FIG.
	VA		A	B	C	D	E	F	G	Kg		no-load	%	%	
T6-3,2	3,2		42	35,5	27,5	-	-	5	25	0,16	0,5	69	25	2	
T6-4	4		43	37	33	-	-	5	25	0,18	0,9	69	25	2	
T6-5	5		44,2	37,2	32	-	-	5	25	0,19	1	66	27	2	
T6-10	10		50,2	42,2	34,5	-	-	5	27,5	0,28	1,2	71	24	2	
T6-12	12		50,2	42,2	38,1	-	-	5	27,5	0,32	1,4	73	22	2	
T6-16	16		74	47,5	40	65	-	5	32,5	0,42	1,6	72	24	1	
T6-20	20		81,5	53,7	48	72,5	43,5	5	32,5	0,54	1,9	80	14	1	
T6-25	25		81,5	53,7	53	72,5	43,5	5	32,5	0,62	2,2	81	13	1	
T6-30	30		81,5	53,7	58	72,5	43,5	5	32,5	0,72	2,4	83	12	1	
T6-35	35		87,5	58,6	58	78	48	5	35	0,78	2,6	84	12	1	
T6-50	50		87,5	58,6	68	78	48	5	35	1,05	3,2	85	11	1	
T6-60	60		102	69	65	90	57	7,5	39	1,35	3,4	86	11	1	
T6-100	100		102	69	75	90	57	7,5	39	1,6	4,5	86	13	1	

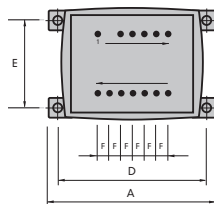


fig. 1

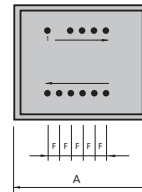
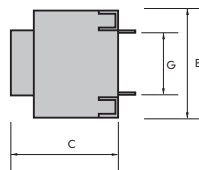
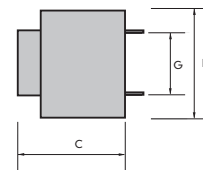


fig. 2



Technical data T7

Electrical data



CODE	RATED POWER	APPROVALS	DIMENSIONS (mm)				WEIGHT	LOSSES (W)	EFFICIENCY	ΔV	FIG.
	VA		A	B	C (H)	Kg		no-load	%	%	
T7-4	4		53	44	17,6	0,16	1,2	55	40	1	
T7-6	6		53	44	22,6	0,18	1,1	63	33	1	
T7-10	10		53	44	28,6	0,19	1,1	70	26	1	
T7-14	14		68	57,5	24,2	0,28	1,6	70	26	2	
T7-18	18		68	57,5	27,2	0,32	1,4	74	23	2	
T7-24	24		68	57,5	31	0,42	1,7	76	21	2	
T7-30	30		68	57,5	35,5	0,54	1,8	78	19	2	
T7-40	40		83,5	69	37	0,62	2,2	78	19	3	
T7-60	60		83,5	69	46	0,72	3,1	78	17	3	

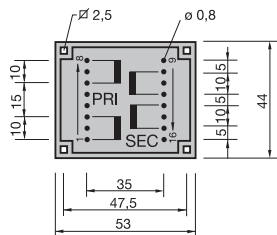


fig. 1

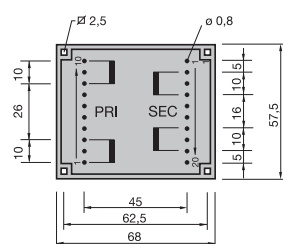


fig. 2

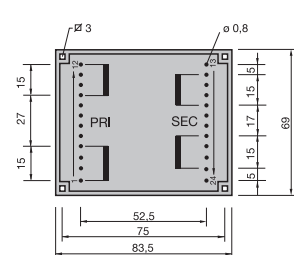


fig. 3

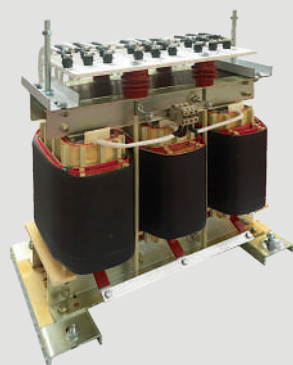
OTHER TRANSFORMERS



Auto-transformers with box IP23



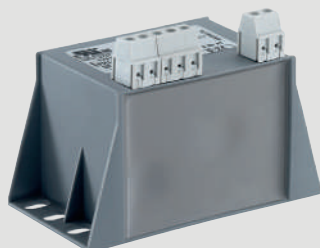
12-pulse transformers



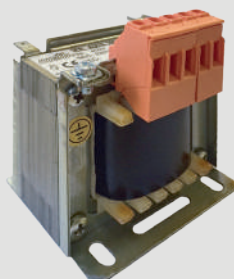
LV/MV three-phase transformers



Single-phase transformers with fast-on terminals



Single-phase transformers with vertical connectors



Single-phase auto-transformers



MV three-phase reactors for short-circuit current

Indications:

the following technical information are a guideline for the correct use of transformers in various voltage fields. The differences in the construction of the transformers are determined by the installation and equipment requirements. We summarize here the main definitions set down in EN 61558.1 and part 2 standard. Other standards which we refer to are: CEI 14-5, 14-8, EN 60076-1 (power transformers), UL 5085-1-2-3.

Transformers

Isolating transformer: suitable for limiting risks caused by contact between the earth and the live parts that can give an electric shock if the isolation is broken or damaged.

Primary voltage: 1000V max - Secondary voltage: max 500V no-load - Frequency: 500Hz max - Rated power: 25kVA if single-phase, max. 40kVA if three-phase. Type of isolating: double or reinforced.

Safety transformer: isolating transformer suitable for feed circuits of low safety voltage. Primary voltage: 1000V max - Secondary voltage: 50V max. no-load - frequency 500Hz - Rated power: 10kVA if single-phase, max. 16kVA if three-phase. Type of isolating: double or reinforced.

Rated Ambient Temperature:

this is the temperature surrounding the transformer. If not otherwise specified, the rated ambient temperature is 40°C. Particular care should be taken when the temperature is higher. It should not exceed the values laid down in the table below. The core power must be adapted to approximately the values given below:

Rated Ambient Temperature	Rated power x factor
40 ° C	1
50 ° C	0.92
60 ° C	0.84
70 ° C	0.75

Over-temperature: this is the temperature which is verified in the transformer when it is working normally. In particular, in the windings, depending on the type of isolating materials and the rated ambient temperature, the following values must not be exceeded:

Maximum excessive temperatures for winding with $t_a=40^\circ\text{C}$
 A=60 °C - E=75 °C - B=80 °C - F=100 °C - H=125 °C

Rated Input Voltage: network voltage feed of the transformer.

Unless otherwise agreed, the maximum limit displayed is a value of 1.1 times the rated input voltage, as long as it does not cause damage to the continuous running of the transformer.

No-load Current: this is the input current of the no-load transformer with rated input voltage and frequency. The value of the no-load current is mainly effected by the properties of the used magnetic core laminations and can oscillate, even between transformers from the same production due to practical effects. An oscillation of - 10%/+20% with respect to the rated value is acceptable.

Protection Class:

the equipment has built-in safety to protect against dangerous electrical currents. **Class I:** all the metallic parts accessible from the transformer are insulated from the voltage parts by basic insulation and added safety measures consisting of a safety conductor within the electrical system of the installation.

Class II: all the metallic parts accessible from the transformers are separated from the voltage parts with double or reinforced isolating. The transformer must not be connected to the earth.

Insulation Class:

Max insulation system temperature	Max temperature on winding with $T_a=40^\circ\text{C}$
A (105 ° C)	60°C
E (120 °C)	75°C
B (130 °C)	80°C
F (155 °C)	100°C
H (180 °C)	125°C

Input Winding (Primary): particular attention should be paid if, rather than only one input voltage, additional voltage inputs are required. In this case an increase of the core power is necessary. For example:

Input voltage	Rated power x factor= scaling of the core power	
	1 section	2 sections
230	1	1
230+400	1.23	1.52
230+500	1.26	1.49
400+440	1.06	1.12
400+440+500	1.12	1.25

Rated Output Voltage: this is the output voltage of the transformer at rated frequency, rated input voltage, with a rated output current at a rated power factor (=1). This is obtained when the transformer is running in continuous service conditions with a rated ambient temperature. If not otherwise agreed, a tolerance of $\pm 5\%$ is acceptable. For short-circuit proof transformers it is $\pm 10\%$ for construction.

No-load Voltage: this is the secondary voltage of the transformer in no-load conditions, at primary voltage and rated frequency. This formula can be found starting from:

$$\text{voltage drop \%} = \left| \frac{\text{No-load voltage} - \text{rated secondary voltage}}{\text{No-load voltage}} \right| \times 100$$

EN 61558.1 standard gives the following values for isolation and safety of transformers:

Nominal % differences between secondary no-load and loaded voltage:		
up to 10 VA	100	Note: for insulating transformers up to 63VA:20%
from 10VA to 25 VA	50	
over 25 VA to 63 VA	20	For control transformers in accordance with EN 61558.1 part CEI 96-3 standard the max. difference is 10%
over 63 VA to 250 VA	15	
over 250 VA to 630 VA	10	
over 630 VA	5	

Output Winding: it means that in case of derivation output, the current is calculated in reference to the highest voltage, if not differently specified. In case of more windings, due to the quantity of isolation, it could be necessary to increase the core power.

Rated Power: this is the product of the rated secondary voltage for the rated secondary current. For three-phase transformers it is $\sqrt{3}$ times the product of the rated secondary voltage for the rated secondary current. For more secondary windings it is the sum of the product of rated secondary voltage for the rated secondary current of the circuits charged simultaneously.

Autotransformer: this is a transformer with common input and output windings, without galvanic isolation between the windings. The relative power is given by the formula:

$$P_{\text{app}} = P_{\text{nom}} \left(1 - \frac{V_1}{V_2}\right)$$

where P_{app} = power (VA)
 P_{nom} = rated power (VA)
 V_1 = lower voltage (V)
 V_2 = higher voltage (V)

Short Circuit Resistance: here is the classification that the standard EN 61558.1 applies to short circuit proof transformers:

a) **Transformer not inherently short-circuit proof:** this is a transformer in which has been designed to resist extreme temperatures using an external protective device not supplied with the transformer (e.g. external fuses).

b) **Short-circuit proof Transformer:** this is a transformer in which the over-temperature can not exceed the limits specified when the transformer is short circuited, and can function normally after the removal of the short circuit.

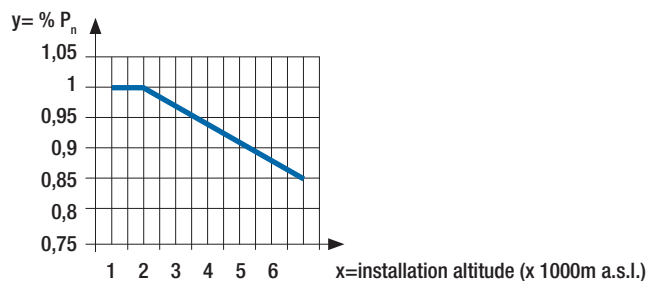
- **Transformer short-circuit proof with specific construction:** this is a transformer which comes with a protective device inside which opens the primary or secondary circuit or reduces the current in case of short circuit (e.g. PTC, bi-metal).
- **Transformer short-circuit proof not with specific construction:** this is a transformer which, in the absence of protective devices, in case of short circuit, does not exceed the temperature limits (e.g. small transformer with high internal resistance).
- **Fail-safe transformer:** this is a transformer which after abnormal use, stops working without placing the user at risk (e.g. transformer with thermo-fuse included).

De-rating Tables: the working conditions of rated power (P_n) are referred to the following parameters:

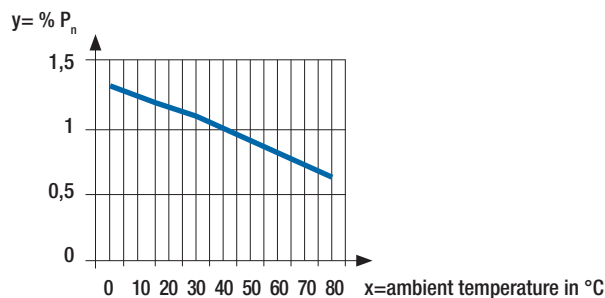
- Continuous service
- Frequency: 50Hz...60Hz
- Protection degree: IP00
- Installation up to 1000m a.s.l.
- Ambient temperature: $t_a=40^\circ\text{C}$

Other conditions are allowed according to the following tables:

ALTITUDE:



AMBIENT TEMPERATURE:



Note: tables are in general. Upon request can be provided tables for the various types of transformers.

Intermittent Service: the required power could be calculated for different intermittent services starting from the following parameters:

- rated power (P_n)
- working time (T_{on})
- resting time (T_{off})

Intermittent rated power P_{int}

$$P_{int} = P_n \times \sqrt{\frac{T_{on}}{T_{on} + T_{off}}} \times 1,1$$

For example: rated load = 500VA

T_{on} = 10'

T_{off} = 20'

$$P_{int} = 500 \times \sqrt{\frac{10}{10+20}} \times 1,1$$

350VA transformer is enough.

Protection Devices: as general rule the transformer should be protected against short-circuits on the primary, against over-loads on the secondary. In both cases with delaying fuses (T) or with magneto-thermal switches with delayed tripping curve. Secondary protection calculation (against over-load) has not problems: EN 61558-1 standards provide a tolerance of ±10% on the rated secondary current and in any case on the external label it is indicated the fuse dimension. The primary protection calculation (against the short-circuit) is more difficult. It should be noted that a current peak (I_e) is generated at insertion moment which is 20-30 times I_n for about 10ms without protection that will occur in case of short-circuit.

It is necessary to know the short-circuit current, considering also the farthest point of the line transformer-user.

Known data:

V₂= transformer output voltage

V_{cc}= short-circuit voltage in % (see catalogue)

P_n= transformer rated power

L= line length in meters

S= section of the conductor in m²

$$I_{2cc} = \frac{V_2}{\frac{V_2^2}{P_n} \times \frac{V_{cc}(\%)}{100} + \frac{0,036 \times l (m)}{S (mm^2)}}$$

In general it is enough to consider a protection calculated as 1,5-2,5xI_n prim.

The table below is for single-phase transformers from 50VA to 1000VA with voltages 230-400/24V or 115V

Single-phase transformers - Protections with delaying fuses "T" serie

Protection against short-circuit

P _n VA	Input voltage		Output voltage	
	230V	400V	24V	115V
50	0,50	0,315	2	0,40
75	0,80	0,40	3,15	0,63
100	1	0,63	4	1
150	1,50	0,80/1	6,3	1,25
200	2	1,25	8	1,6
250	2,50	1,6	10	2
300	3	1,6	12	2,5
400	3,15	2,5	15	3,15/4
500	4	3	25	4/5
630	5	4	-	5/6,3
800	6	5	-	8
1000	8	6,30	-	8/10

Our strength lies in the people.

Our tradition of excellence, globally certified, is based on the constant commitment to updating our products to meet requirements and standards. All thanks to the experience and dedication of our highly specialized team.

A photograph of a worker from behind, wearing a blue cap and a blue long-sleeved uniform with the 'meth' logo on the back. The worker is standing in a large industrial factory with rows of machinery and equipment. A decorative graphic of many thin, curved lines is overlaid on the bottom left of the image.

meth



NOTES

SUPPORTING SUSTAINABILITY



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