TORYTRANS

www.torytrans.com

GENERAL CATALOGUE v.4.2


TRANSFORMERS


AUTOTRANSFORMERS


REACTORS


FILTERS


VOLTAGE REGULATORS


CUSTOMIZED PRODUCTS

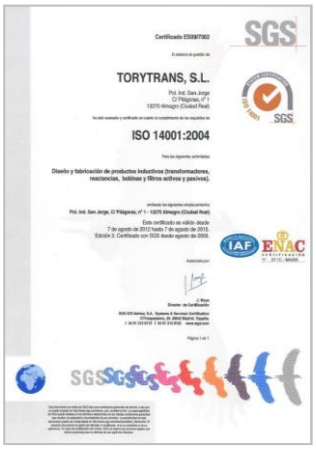
Presentation

TORYTRANS S.L. is a Spanish company specialized in design and manufacture of single and three phase transformers, autotransformers, reactors, sinusoidal filters, harmonic filters, voltage stabilizers, etc...

Torytrans S.L. was founded in 1989 as a manufacturer of small transformers. From the beginning it has carried out a policy based on customer satisfaction offering the best service with the highest quality and warranty of our products, being one of the first companies in the electrical industry certified according to the standard UNE EN **ISO 9001** from 1999.

Torytrans has always been aware of the respect and environment care. This fact has always been present in Torytrans policy and our management system which is certified according to the standard UNE EN **ISO 14001**.

At this moment Torytrans has more than 7500 m2 of modern production facilities and a complete laboratory for testing our products, becoming a leading manufacturer in Europe with a reference brand. Currently we are present in more than 50 countries at the world with an own Export department.



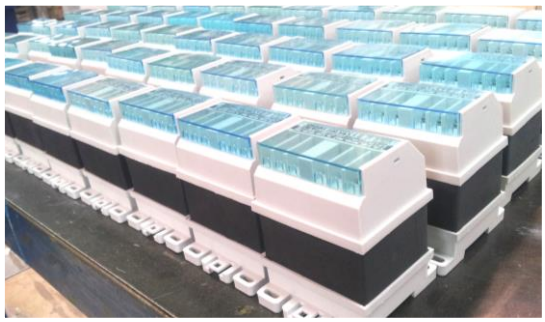
We are characterized by providing customized products and solutions with the highest level of quality, featuring technical and human resources that allow us to have great flexibility and ability to design and manufacture, thus being able to offer really short delivery deadlines, that would completely satisfy our customers.

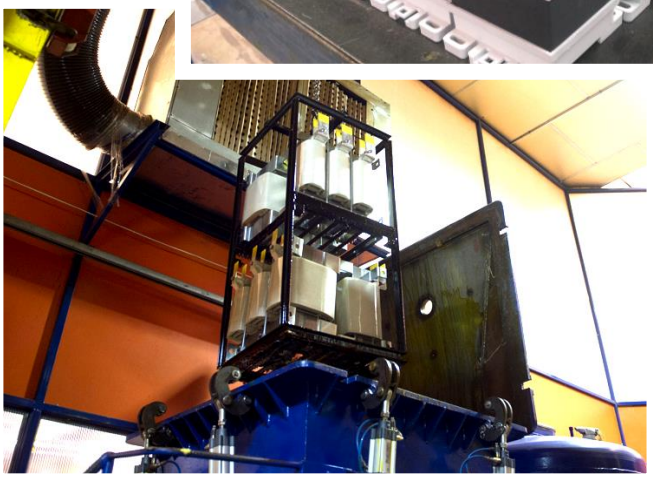
As an added value we offer our services: needs analysis, proposals and improvements, simulations, 3D design, measurements, etc. Not supply only a product, but a solution to your particular needs, we also have at your disposal a team of professionals to provide the support and a complete assistance, satisfying the most demanding requirements and standards.

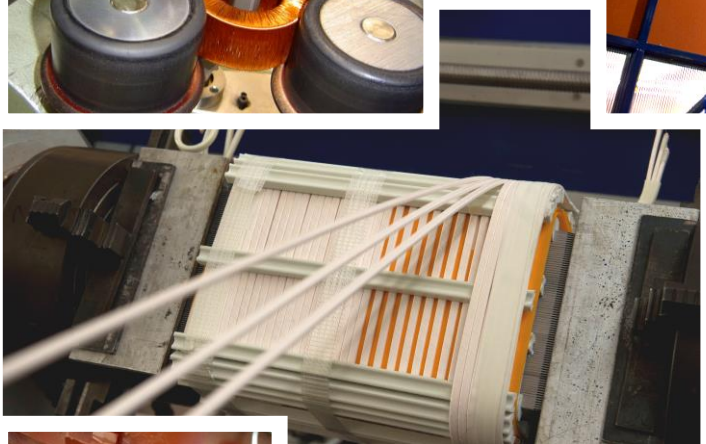
INDEX

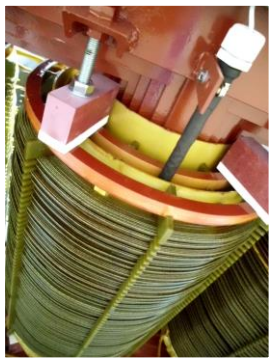
TORYTRANS

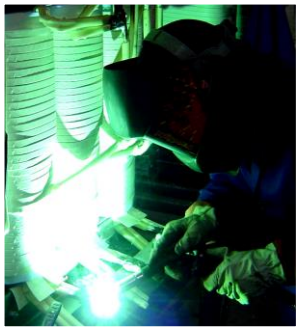
PRODUCTION

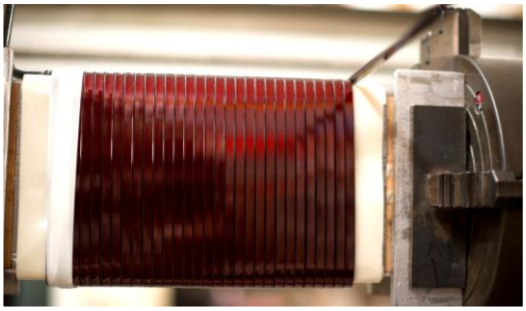




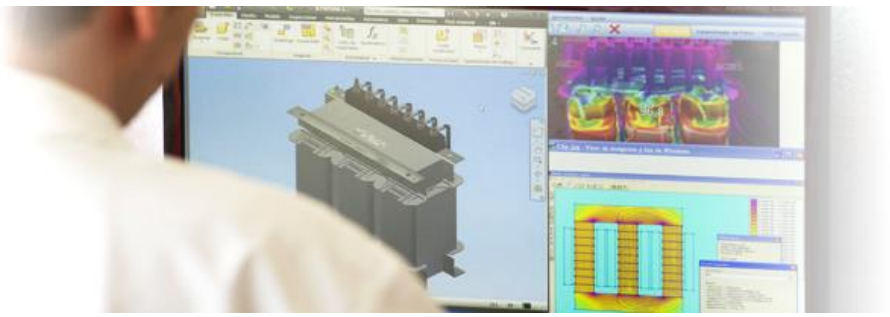






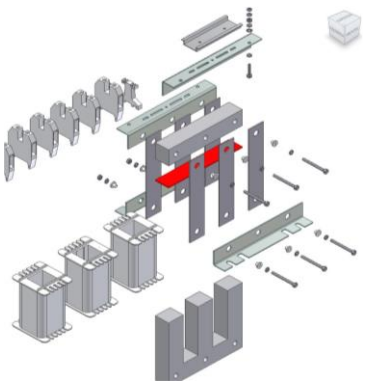


R & D



Our R & D department is composed of highly skilled engineers who currently applying the last processes and new technologies such as electromagnetic computer simulation using finite element or 3D modeling.

This software makes easier to analyze and optimize designs, giving designers faster results for complex designs that help to reduce material costs, the need of physical prototypes and develop innovating products to provide solutions to the new demands of the market.

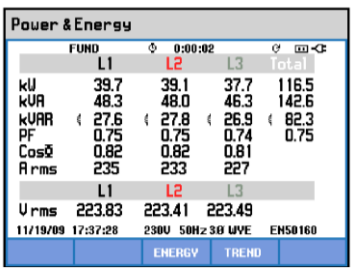


Electromagnetic simulation by finite elements:

The competitive demands of the market are imposing increasingly using of electromagnetic simulation packages based on finite elements. Thanks to the results obtained we could retouch dimensional aspects, materials, parts or technical specifications that allow to adapt the product to the customer needs.

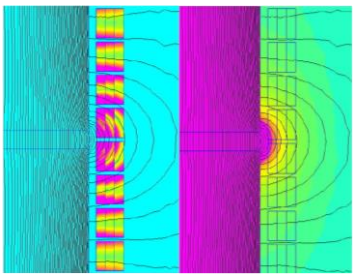
3D modeling and mechanical design:

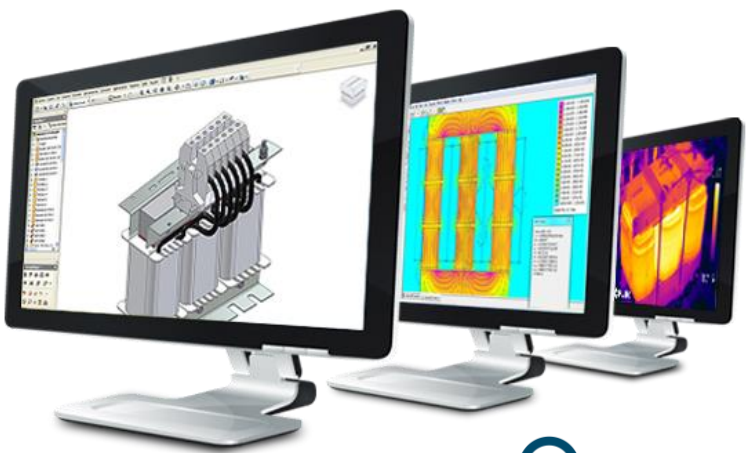
It is an essential tool for the engineers at TORYTRANS. In the last years we have moved to computer design and the digitalization of drawings and component parts of our products. The final result is a highly accurate model with a minimum error margin.



Simulations and electrical designs:

It allows us to know in detail the operation and structure of the final equipment. Is also possible to estimate important parameters such as performance, waveforms, voltage variations, quality of the network, warm-ups, etc.., And get result charts, flow charts and other statistics for study.





TORYTRANS

SECTORS

Main sectors we focus on are: Renewable Energy, Lighting, Industry, Medicine, Motors and Drives, Computers, Railway, Elevation and Quality and Energy Efficiency.

Torytrans offers catalog and customized solutions for each customer needs or application, providing the required optimum product, by analyzing customer or installation requirements or needs, from the specification guidelines and initial design to the final approval tests and / or validation, to ensure compliance with all requirements and regulations.

RENEWABLE ENERGY

MOTORS AND DRIVES

MEDICINE

RAILWAY

LIGHTING

COMPUTERS

INDUSTRY

QUALITY EFFICIENCY

ELEVATION

COMMERCIAL NETWORK

Torytrans has a commercial team that ensures fast and personalized response at all times for any query, with the best technical support so that we can always offer the best product according to customer needs.

Our head office and factory are located in Almagro (Ciudad Real), and our nationally representatives are:

ENER-Q (NORTH)
- Barcelona
- Tarragona
- Lleida
- Girona
- Álava
- Guipúzcoa
- Vizcaya
- Pamplona
- Zaragoza
- Huesca
- Teruel

ROMBO (CENTER)
- Segovia
- Ávila
- Guadalajara
- Madrid
- Toledo

victoriano@romboelectronic.com

enerq@enerq.es

TORYTRANS
Almagro

torytrans@torytrans.com

CINTORA (EAST)
- Alicante
- Castellón
- Valencia

fperez@cintora.es

CORPALUZ (SOUTH)
- Huelva
- Sevilla
- Cádiz

representaciones.corpaluz@gmail.com

AGS (SOUTH)
- Islas Canarias

info@ags-pmc.es

EXPORT

Our entrepreneurial spirit and our internationalization strategy have achieved that today Torytrans is present in over 50 countries. Among them may be mentioned some like:

- Germany
- Saudi Arabia
- Belgium
- Bolivia
- Brazil
- Bulgaria
- Chile
- Denmark
- Egypt
- Estonia
- Finland
- France
- Netherlands
- England
- Italy
- Jordan
- Kuwait
- Uruguay
- Libya
- Lithuania
- Mauritania
- Norway
- Portugal
- Russia
- Czech Rep.
- Sweden
- Switzerland
- Taiwan
- Tunisia
- Venezuela

Torytrans provides an international presence, with our engineering, production, sales and distribution, based on a long reach and guaranteed logistics that allows us to support all international customers. Our products leave our factory and are transported to the location of each client with careful packaging and full traceability to the final destination. Finally, we contact with customers to verify the reception.

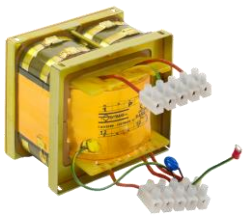
Contact with our Export department: **export@torytrans.com**

CUSTOMIZED PRODUCTS

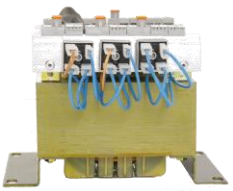
Most of the production of Torytrans is based on-demand solutions and adjusted to our customers requirements. Our experience allows us to provide special products and we could develop or improve on request the design of transformers, inductors, filters, voltage stabilizers, toroidal, autotransformers, etc..

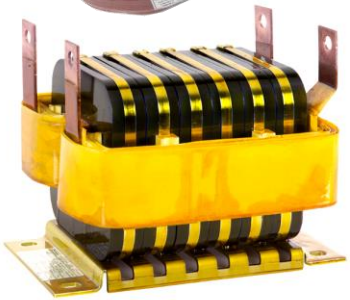
Our Technical Department, in close cooperation with the customer, studies each particular project, providing an immediately support and a customized attention to achieve:

- Special ratings: power, voltages, currents, insulation class…
- Customized dimensions, sizes and weights.
- Mounting, special brackets, wheels, mechanical supports ...
- Connection types: Terminal blocks, strips, bus bars, screws…
- Components: rectifiers, varistors, thyristors, relays, capacitors…
- Thermal protections: thermal sensors, fuses, circuit breakers, MCB …
- Forced ventilation: cooling fans, extractors, turbines …
- Protection degree: IP-00, IP-20, IP-23, IP-54…
- Finishing and coating: varnished, paintings, encapsulated …
- Vector groups: delta, star, zig-zag…
- Manufacturing under customer samples or drawings.



Contact with us to study and analyze your requirements and application needs.





UL

In US and Canada all electrical control systems must have the required official authorization. Compliance with national safety standards is evidenced by a symbol approval of a testing laboratory qualified and officially recognized.

The test laboratory most recognized is UL (Underwriters Laboratories). It is a globally recognized brand that ensures the reliability of the products, its design and manufacture, validating computers by demanding laboratory tests in addition to regular inspections of the manufacturing process control and traceability of all components.

Torytrans has implemented the UL certification to expand its market to the US and Canada. We guarantee high quality products with carefully selected materials and suppliers recognized by UL.

It covers the specific manufacturing **reactors and transformers Torytrans Series U**-Insulation System UL-CSA adopted:

- **E466028 (OBJY2/8)**
- **E354573 (XORU2/8)**

Design according to standards UL 5085-1 y UL 5085-2:

- Single phase transformers 25 VA ÷ 100 kVA
- Three phase transformers 100 VA ÷ 3000 kVA
- Single phase reactors 25 var ÷ 100 kvar
- Three phase reactors 100 var ÷ 3000 kvar

CERTIFICATE OF COMPLIANCE

Certificate Number 20150414-E466028
Report Reference E466028-20150414
Issue Date 2015-APRIL-14

Issued to: TORYTRANS SL
Pol Ind San Jorge
Parcela 16/19
13270 Almagro SPAIN

This is to certify that representative samples of: COMPONENT- SYSTEMS, ELECTRICAL INSULATION
Class 180 (H) coil transformer insulation system designated TORYTRANS 180-1.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: Standard for System of Insulating Materials – General, UL1446;
Standard for General Requirements Canadian Electrical Code, Part II, CAN/CSA-C22.2 No. 0-10, Annex B

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

CERTIFICATE OF COMPLIANCE

Certificate Number 20150416-E354573
Report Reference E354573-20150416
Issue Date 2015-APRIL-16

Issued to: TORYTRANS SL
Pol Ind San Jorge
C/Pitagoras 1
13270 Almagro SPAIN

This is to certify that representative samples of: COMPONENT- TRANSFORMERS, CONSTRUCTION ONLY
Reactors – Open Type.
Catalog Numbers: IT, f/b one letter, f/b four numbers, f/b U121 or U201 or U202.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 5085-1 and CAN/CSA C22.2 No. 66.1-06, Low Voltage Transformers – Part 1: General Requirements; UL 5085–2 and CAN/CSA C22.2 No. 66.2-06, Low Voltage Transformers – Part 2: General Purpose Transformers

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

UL recognized brand: transformers or reactors with this mark are generally components of a product or equipment that later will be tested as a whole to obtain the UL listing mark.

Single phase compact control transformers

Single phase control transformer with separated windings by galvanic isolation between primary and secondary.

Compact and modular design, therefore reduced dimensions than a conventional one, providing a space-saving installation into electrical cabinets mounting.

DIN Rail mounting or screw fixing.

Overtemperature and overload protection via bimetal thermal resetting relay.

Power "ON" indicated by LED.

Enclosure is a self-extinguishable V-0 technical polyamide; free of halogens and phosphorus.

Its safe cover protects users from the risk of electrical shocks and connections contact are not accessible by the user.

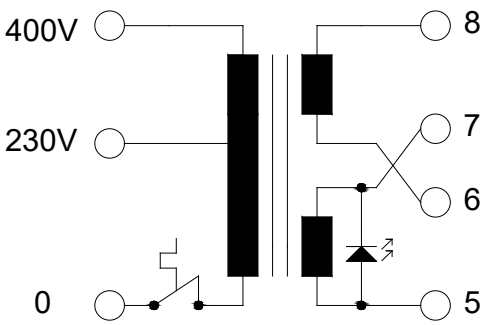
Connections by screws with self-lifting supporting washers.

Output voltage selection by supplied voltage links.

Technical characteristics

Power rating	25, 40, 63 and 100 VA
Input voltage	230 - 400 V
Output voltage	12 - 24 V 115 - 230 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	B (130 ºC)
Protection degree	IP-20
Safety class	Class II
Test voltage	4 kV
Standard	IEC/UNE-EN 61558-1
	IEC/UNE-EN 61558-2-2
	Output voltage < 50 V: IEC/UNE-EN 61558-2-6
	Output voltage > 50 V: IEC/UNE-EN 61558-2-4

Electrical diagram



• For general applications, select output power rating according to the load and power factor:

VA = W / cos φ

• To be used as control transformer for relays, contactors, timers, electro-valves, etc:

1º Sum all maintenance powers of elements.

2º Multiply value by 4.
Nominal power rating **VA** is obtained.

Check that instantaneous power of the selected transformer (see table below) is higher than the simultaneous powers of the control elements.

It is recommended a protection against short circuits via fuse, installed in series at the primary circuit.

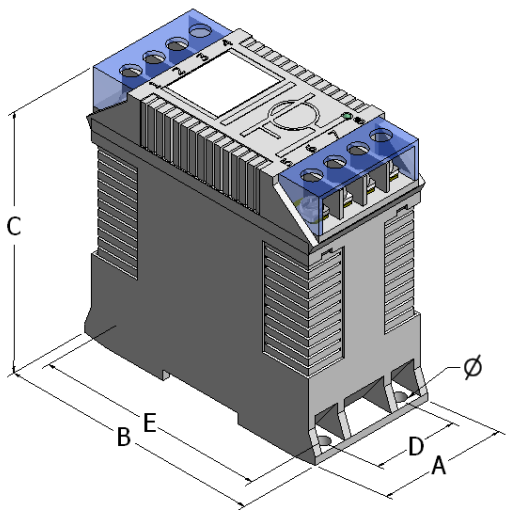
Following we indicate the recommended fuses to put at the primary side of the transformer according to the input voltage and rating.

Rating VA	Input voltage	
	230V	400V
25	T 125mA	T 80mA
40	T 200mA	T 125mA
63	T 315mA	T 200mA
100	T 500mA	T 315mA

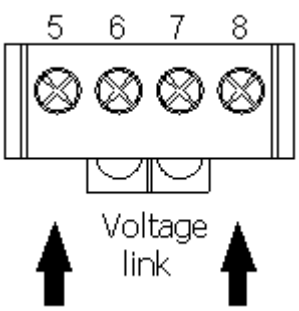
Inrush current of a transformer can reach about 20-30 times I nominal during 5-10 ms. For this reason, fuses selected must be slow-blow or time-delay types.

Rating **VA**		Reference		Dimensions **mm**						Weight **kg**
Nominal	(Inst.)	Sec. 12-24 V	Sec. 115-230 V	A	B	C	D	E	Ø	
25	(45)	TC025-1	TC025-3	54	112	112	37	100	6	0,6
40	(70)	TC040-1	TC040-3	54	112	112	37	100	6	0,8
63	(100)	TC063-1	TC063-3	54	112	112	37	100	6	1,0
100	(150)	TC100-1	TC100-3	54	112	112	37	100	6	1,5

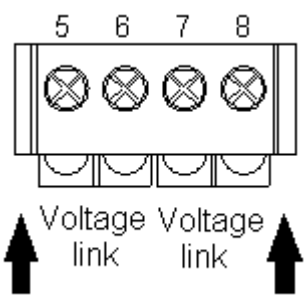
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Output Series Connection.
Higher value: 24 V or 230 V accord. to model



Output Parallel Connection.
Lower value: 12 V or 115 V accord. to model



Single phase control transformers IP-20

Single phase control, safety and isolation transformer intended for control, switching and signaling elements supply, in electrical cabinets at machines and processes.

Separated windings by galvanic isolation between primary and secondary. Wounds totally protected against mechanical chocks and adverse environments.

DIN Rail mounting (for ratings up to 100 VA) and screw fixing (for all ratings).

Up to 630 VA, magnetic core covered of an elastomeric with rubber neoprene that protects against external agents, at the same time as it provides a comfortable and safe manipulation of the transformer. From 1000 VA, epoxy varnish painted core.

Up to 1600 VA, enclosure is a self- V-0 technical polyamide; halogens and phosphorus free. From 2000 VA, cast resin encapsulated transformers.

Connections by screws with self-lifting supporting washers.

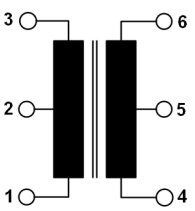
Transparent protective cover for the terminals that avoids the risk of accident by direct contact.

Technical characteristics

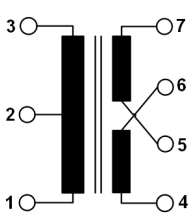
Power rating	25 ÷ 5000 VA
Input voltage (Ratings 25 ÷ 1600 VA)	230 – 400 V
Input voltage (Ratings 2000 ÷ 5000 VA)	230 – 400 – 460 V
Output voltage	12 – 24 V 24 – 48 V 115 – 230 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-20
Safety class (Ratings 25 - 630 VA)	Class II
Safety class (Ratings 1000 - 5000 VA)	Class I
Test voltage	4 kV
Standard	IEC/UNE-EN 61558-1
	IEC/UNE-EN 61558-2-2
	Output voltage < 50 V: IEC/UNE-EN 61558-2-6
	Output voltage > 50 V: IEC/UNE-EN 61558-2-4

Electrical diagram

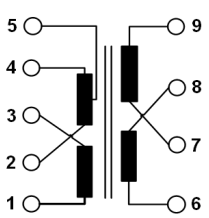
25 ÷ 630 VA



160 ÷ 1600 VA



2000 ÷ 5000 VA



• For general applications, select output rating according to the load and power factor:

VA = W / Cos φ

• To be used as control transformer for relays, contactors, timers, electro-valves, etc:

1º Sum all maintenance powers of elements.

2º Multiply value by 4.
Nominal power rating **VA** is obtained.

Check that instantaneous power of the selected transformer (see table below) is higher than the simultaneous powers of the control elements.

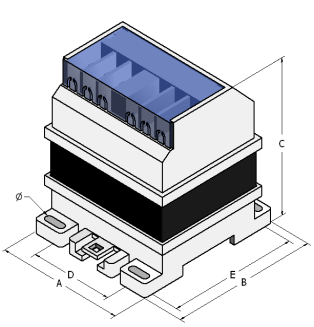
It is recommended a protection against short circuits via fuse, installed in series at the primary circuit.

Inrush current of a transformer can reach about 20-30 times I nominal during 5-10 ms. For this reason, fuses selected must be slow-blow or time-delay types.

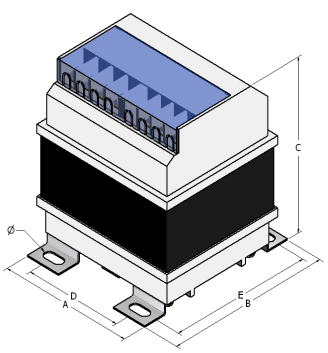
It is recommended a fuse at the secondary side of the transformer according to the load to protect it against overload. Its size must be next lower than I nominal of the transformer label.

Power Rating **VA**		Reference			Dimensions **mm**						Weight **kg**	Type	Primary Protection T , aM , D		
Nominal	(Inst.)	Sec. 12-24 V	Sec. 24-48 V	Sec. 115-230 V	A	B	C	D	E	Ø			230 V	400 V	460 V
25	(65)	CSE0025-1	CSE0025-2	CSE0025-3	82	90	92	58	79	5,5x12	1,0	I	125 mA	80 mA	
40	(80)	CSE0040-1	CSE0040-2	CSE0040-3	82	90	92	58	79	5,5x12	1,3	I	200 mA	125 mA	
63	(135)	CSE0063-1	CSE0063-2	CSE0063-3	82	90	96	58	79	5,5x12	1,4	I	315 mA	200 mA	
100	(210)	CSE0100-1	CSE0100-2	CSE0100-3	82	90	106	58	79	5,5x12	1,6	I	500 mA	315 mA	
160	(370)	CSE0160-1	CSE0160-2	CSE0160-3	94	106	117	58	90	7x14	2,5	II	800 mA	500 mA	
200	(460)	CSE0200-1	CSE0200-2	CSE0200-3	105	115	116	70	99	7x14	2,9	II	1 A	600 mA	
250	(650)	CSE0250-1	CSE0250-2	CSE0250-3	105	115	127	70	99	7x14	3,6	II	1,25 A	800 mA	
315	(875)	CSE0315-1	CSE0315-2	CSE0315-3	115	123	134	80	108	7x14	4,5	II	1,6 A	1 A	
400	(1250)	CSE0400-1	CSE0400-2	CSE0400-3	115	123	148	80	108	7x14	5,5	II	2 A	1,25 A	
500	(1400)	CSE0500-1	CSE0500-2	CSE0500-3	135	145	148	101	130	7X15	6,5	II	2,5 A	1,6 A	
630	(1800)	CSE0630-1	CSE0630-2	CSE0630-3	135	145	170	101	130	7X15	8,4	II	3,15 A	2 A	
1000	(3200)	CSE1000-1	CSE1000-2	CSE1000-3	155	158	190	124	143	7X15	12,7	III	5 A	3,15 A	
1600	(5350)		CSE1600-2	CSE1600-3	155	158	228	124	143	7X15	17,8	III	8 A	5 A	
2000	(5600)		CSE2000-2	CSE2000-3	192	212	210	165	195	7X16	24,6	IV	10 A	6,3 A	5 A
2500	(7800)		CSE2500-2	CSE2500-3	192	212	210	165	195	7X16	30,0	IV	12 A	8 A	6 A
3150	(10100)			CSE3150-3	192	212	250	165	195	7X16	39,5	IV	15 A	8 A	8 A
4000	(12500)			CSE4000-3	240	255	235	205	235	9X18	47,5	IV	20 A	12 A	10 A
5000	(15000)			CSE5000-3	240	255	255	205	235	9x18	52,5	IV	25 A	15 A	12 A

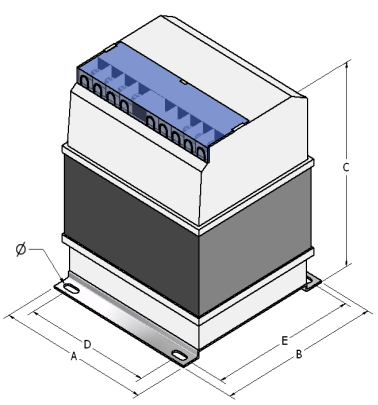
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



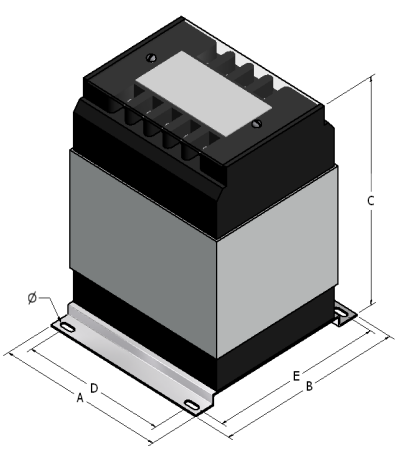
Type I



Type II



Type III



Type IV

Single phase control transformers IP-00

Single phase control transformer with separated windings by galvanic isolation between primary and secondary.

Economic design intended for installation in control circuits such as switches, interlocking, signaling systems… Screw fixing (for all ratings).

Reduced size and weight for easy installation in switchgear cabinets or control panels.

Open mounting IP-00 with a completely vacuum varnishing for a robust finish that protects it from moisture, dust and corrosion. It also prevents any vibration and noises.

Connection protected by connection terminals from direct contact.

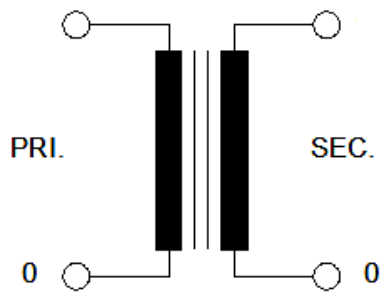
For higher protection it is recommended to install fuses (not included) that could be added on request.

Wide range of primary and secondary voltages (multi-taps) available according to installation requirements.

Technical characteristics

Power rating	25 ÷ 5000 VA
Input voltage	≤ 750 V
Output voltage	≤ 750 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-00
Safety class	Class I
Test voltage	4 kV
Standard	IEC/UNE-EN 61558-1
	IEC/UNE-EN 61558-2-2
	Output voltage < 50 V: IEC/UNE-EN 61558-2-6
	Output voltage > 50 V: IEC/UNE-EN 61558-2-4

Electrical diagram



• For general applications, select output rating according to the load and power factor:

VA = W / Cos φ

• To be used as control transformer for relays, contactors, timers, electro-valves, etc:

1º Sum all maintenance powers of elements.

2º Multiply value by 4.
Nominal power rating **VA** is obtained.

Verify that instantaneous power of the selected transformer (see table below) is higher than the simultaneous powers of the control elements.

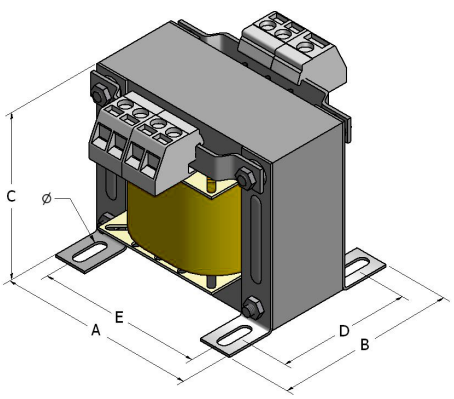
It is recommended a protection against short circuits via fuse, installed in series at the primary circuit.

Inrush current of a transformer can reach about 20-30 times I nominal during 5-10 ms. For this reason, fuses selected must be slow-blow or time-delay types.

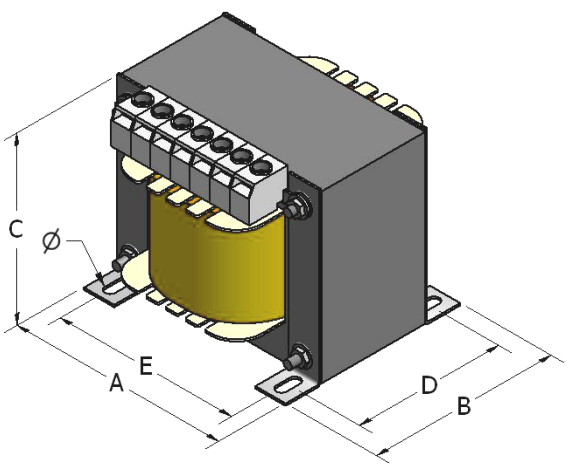
It is recommended a fuse at the secondary side of the transformer according to the load to protect it against overload. Its size must be next lower than I nominal of the transformer label.

Power Rating **VA**		Reference	Dimensions **mm**						Weight **kg**	Type	Primary Protection T , aM , D	
Nominal	(Inst.)		A	B	C	D	E	Ø			230V	400V
25	(65)	CSSx0025	75	58	75	44	62	4x10	0,7	I	125mA	80 mA
40	(80)	CSSx0040	75	58	75	44	62	4x10	1	I	200mA	125mA
63	(135)	CSSx0063	75	58	75	44	62	4x10	1,1	I	315mA	200mA
100	(210)	CSSx0100	75	72	75	59	62	4x10	1,6	I	500mA	315mA
160	(370)	CSSx0160	84	88	82	72	70	5x11	2,5	I	800mA	500mA
200	(460)	CSSx0200	96	88	91	70	80	5x14	3	I	1A	600mA
250	(650)	CSSx0250	96	98	91	80	80	5x16	3,6	I	1,25A	800mA
315	(875)	CSSx0315	108	105	102	84	90	6x16	4,5	I	1,6A	1A
400	(1250)	CSSx0400	108	122	102	98	90	6x16	5,4	II	2A	1,25A
500	(1400)	CSSx0500	126	114	116	88	105	6X16	6,5	II	2,5A	1,6A
630	(1800)	CSSx0630	126	134	116	108	105	6X16	8	II	3,15A	2A
1000	(3200)	CSSx1000	150	145	120	116	125	8X20	12	II	5A	3,15A
1600	(5350)	CSSx1600	150	195	120	166	125	8X20	18	II	8A	5A
2000	(5600)	CSSx2000	195	150	175	120	164	10X23	21	II	10A	6,3A
2500	(7800)	CSSx2500	195	180	175	150	164	10X23	30	II	12A	8A
3150	(10100)	CSSx3150	195	200	175	170	164	10X23	33,5	II	15A	8A
4000	(12500)	CSSx4000	240	218	215	178	200	12X28	42	II	20A	12A
5000	(15000)	CSSx5000	240	248	215	208	235	12x28	49	II	25A	15A

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type I



Type II

Single phase isolation transformers

Galvanic isolation between primary and secondary and effective attenuation of electromagnetic disturbances.

Series CN: open transformer IP-00, vacuum impregnation with dielectric varnish high binding power with special properties that protect windings and magnetic core against dust and humidity.

Series CNB: in metal enclosure IP-23 protection degree, resin polyester-epoxy powder coated with excellent physical-mechanical and anti-corrosive properties. Type II enclosure includes wheels.

Connection with terminal blocks (rating from 6 to 31 kVA).

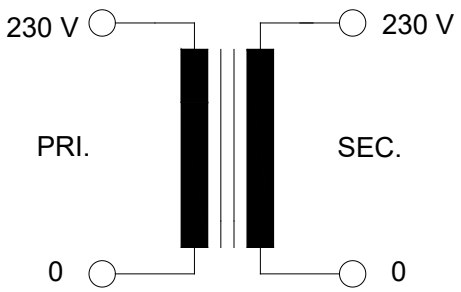
Connection with flat busbars (rating from 40 to 60 kVA).

Low losses magnetic cores.

Technical characteristics

Power rating	3,15 ÷ 60 kVA
Input voltage	230 V
Output voltage	230 V
Frequency	50/60 Hz
Ambient temperature	40 ºC (Series CN) 30 ºC (Series CNB)
Insulation class	F (155 ºC)
Protection degree	IP-00 (Series CN) IP-23 (Series CNB)
Safety class	Class I
Test voltage	3 kV
Standard	<u>Power rating ≤ 25 kVA:</u> IEC/UNE-EN 61558-1 IEC/UNE-EN 61558-2-4 <u>Power rating > 25 kVA:</u> IEC/UNE-EN 60076-11

Electrical diagram



- For general use, select the power according to the load and power factor:

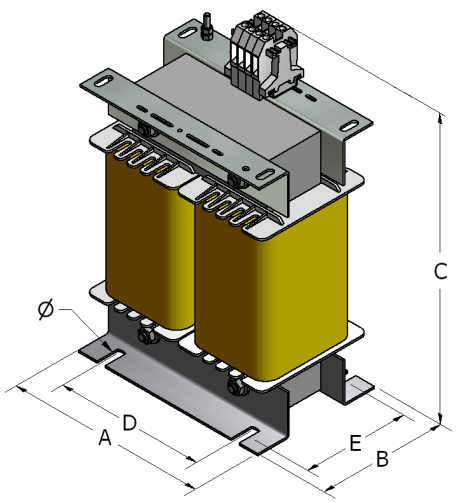
kW = V x I / 1000

kVA = kW / Cos φ

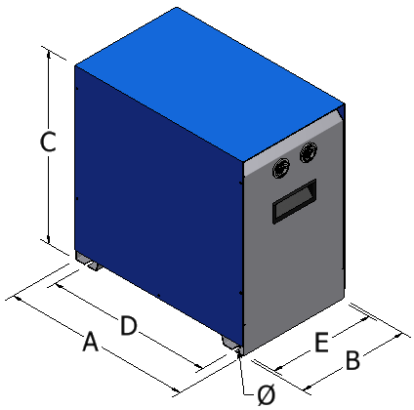
- For loads with high inrush current or harmonics, consult "Rating selection guide" at the end of catalogue.

Series CN IP-00

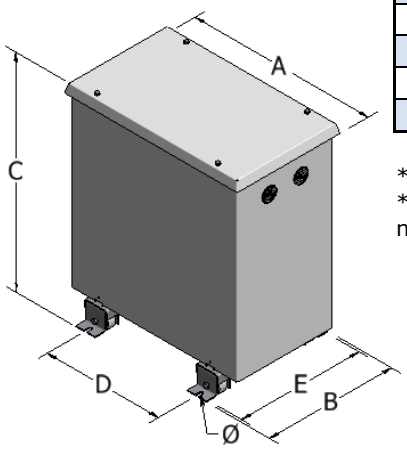
Rating **kVA**	Reference	Dimensions **mm**						Weight **kg**
		A	B	C	D	E	Ø	
3,15	CN03	200	215	340	150	130	9	24
4	CN04	240	210	380	205	120	11	31
5	CN05	240	220	380	205	130	11	35
6	CN06	240	230	380	205	140	11	40
8	CN08	280	230	440	225	140	11	50
10	CN10	320	265	490	265	175	11	78
12	CN12	320	265	490	265	175	11	81
16	CN16	320	255	575	265	165	11	91
20	CN20	320	275	575	265	185	11	105
25	CN25	420	370	605	300	230	11	126
31	CN31	420	390	605	300	250	11	149
40	CN40	420	380	705	300	240	11	173
50	CN50	420	400	705	300	260	11	201
60	CN60	420	400	805	300	260	11	252



* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type I



Type II

Series CNB IP-23

Rating **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
3,15	CNB03	370	225	375	325	205	7	32	I
4	CNB04	475	345	520	320	320	10	44	II
5	CNB05	475	345	520	320	320	10	48	II
6	CNB06	475	345	520	320	320	10	53	II
8	CNB08	545	385	615	350	360	10	66	II
10	CNB10	615	425	690	400	400	10	98	II
12	CNB12	615	425	690	400	400	10	101	II
16	CNB16	615	425	690	400	400	10	111	II
20	CNB20	615	425	690	400	400	10	125	II
25	CNB25	775	575	940	400	550	10	161	II
31	CNB31	775	575	940	400	550	10	184	II
40	CNB40	775	575	940	400	550	10	208	II
50	CNB50	775	575	940	400	550	10	236	II
60	CNB60	775	575	940	400	550	10	287	II

* Other features, power, voltage, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.

Single phase ultra-isolation transformers IP-20

Single phase transformer with ultra galvanic isolation between primary and secondary winding through one or three electrostatic shields.

Wounds totally protected against mechanical chocks and adverse environments. Screw fixing.

Connections by screws with self-lifting supporting washers. Its safe cover protects users from the risk of electrical shocks and connections contact are not accessible by the user.

High degree of attenuation and filtering of electromagnetic disturbances.

Elevated harmonic distortion causes electric noises, malfunctioning and failure in electronic and control equipments. CUP series transformer is the most convenient choice to protect them against these undesired disturbances.

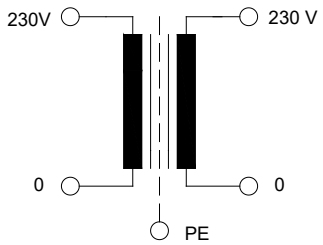
Electromagnetic disturbances can be caused by:

- Interruptions of inductive loads
- Deficient or no Earth connection system
- Atmospheric discharges
- Operation with significant loads
- Proximity of electrical motors

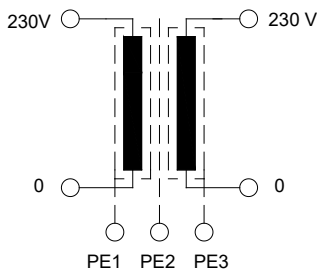
Technical characteristics

Power rating	2**0**0 ÷ 5000 VA
Input voltage	230 V
Output voltage	230 V
Frequency	50/60 Hz
Ambient temp.	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-20
Safety class	Class I
Test voltage	4 kV
Standard	IEC/UNE-EN 61558-1
	IEC/UNE-EN 61558-2-4

Electrical diagram CU1P – One shield

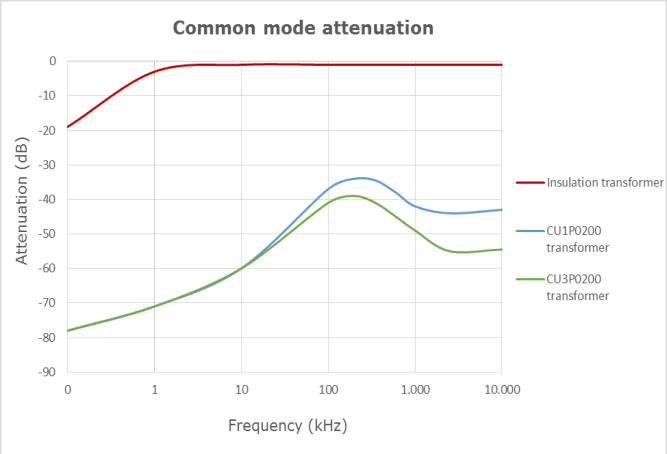


Electrical diagram CU3P – Three shields

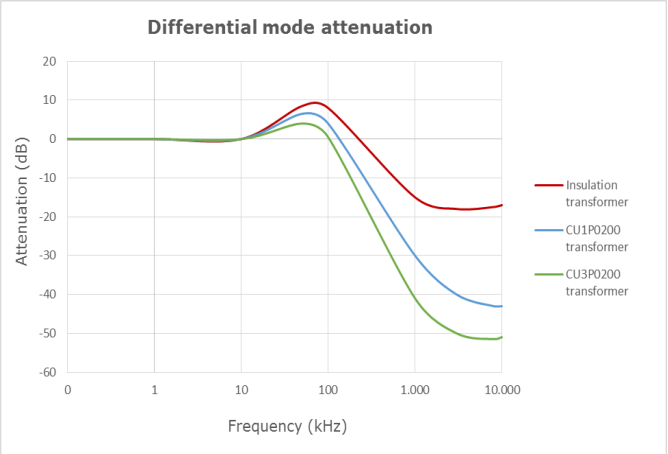


Disturbances or transients in the voltage cause interferences (electrical noises) in the utility. These noises can be:

Common mode noise, refers to noise that occurs between an active phase or neutral and the ground conductors.

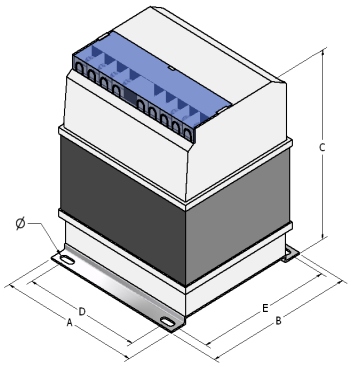


Differential mode noise, refers to noise that occurs between the hot and neutral conductors.

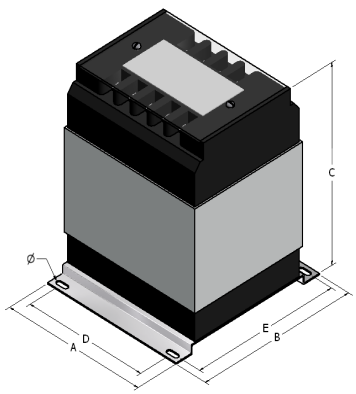


Rating **VA**	Reference		Dimensions **mm**						Weight **kg**	Type
	1 Shield	**3 Shields**	A	B	C	D	E	Ø		
200	CU1P0200	CU3P0200	105	115	116	70	99	7x14	2,9	I
315	CU1P0315	CU3P0315	115	123	134	80	108	7x14	4,5	I
500	CU1P0500	CU3P0500	135	145	148	101	130	7X15	6,5	I
630	CU1P0630	CU3P0630	135	145	170	101	130	7X15	8,4	I
1000	CU1P1000	CU3P1000	150	158	190	124	143	7X15	12,7	I
1600	CU1P1600	CU3P1600	155	158	228	124	143	7X15	17,8	I
2000	CU1P2000	CU3P2000	192	212	215	165	195	7X16	24,6	II
2500	CU1P2500	CU3P2500	192	212	230	165	195	7X16	33	II
3150	CU1P3150	CU3P3150	192	212	250	165	195	7X16	42	II
4000	CU1P4000	CU3P4000	240	255	235	205	235	9X18	53	II
5000	CU1P5000	CU3P5000	240	255	255	205	235	9x18	59	II

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type I



Type II

Single phase swimming-pool LED transformers IP-20

Single phase safety and isolating transformer with galvanic isolation between primary and secondary for swimming pool led lights, garden spotlights, saunas and illuminated fountains.

Ensure the necessary led focus voltage, with margins that ensure the internal operation of all components, preserving the life of the lamp and optimal lighting.

Maximum security against electrical shocks, all live parts are protected and not accessible.

Compact and modular design, therefore reduced dimensions than a conventional one, providing a space-saving installation into electrical cabinets mounting.

DIN Rail mounting or screw fixing.

Enclosure is a V-0 technical polyamide; free of halogens and phosphorus.

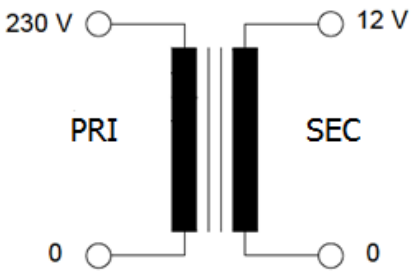
Connections by screws with self-lifting supporting washers.

Transparent cover to protect the terminal connections intended to avoid the risk of electrical contact accident.

Technical characteristics

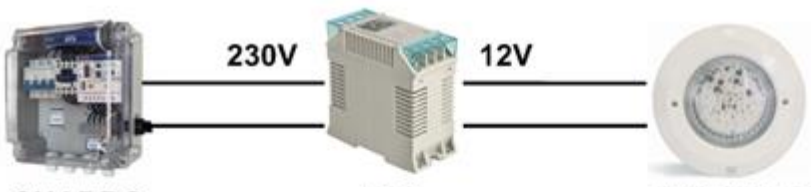
Power rating	30 ÷ 120 VA
Input voltage	230 V
Output voltage	12 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-20
Safety class	Class II
Test voltage	4 kV
Standard	IEC/UNE-EN 61558-1
	IEC/UNE-EN 61558-2-6

Electrical diagram

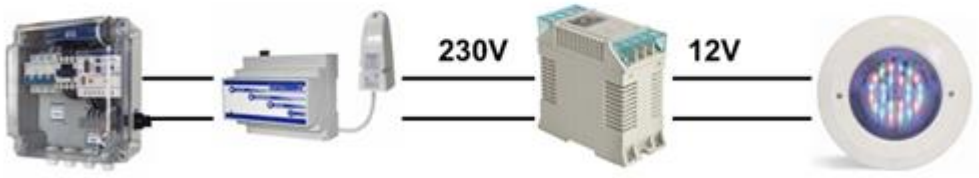


LED Spotlights Monochrome & Multicolor

Connection diagram: Monochrome LED Light.



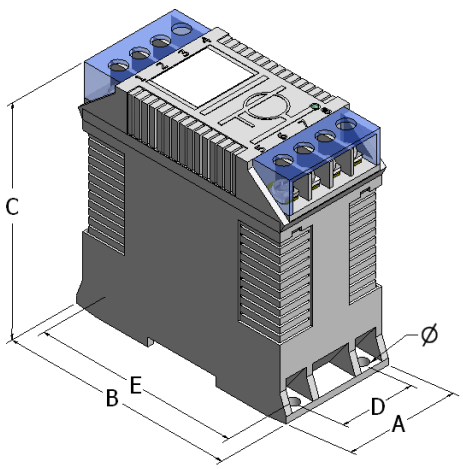
Connection diagram: Multicolor LED Light.



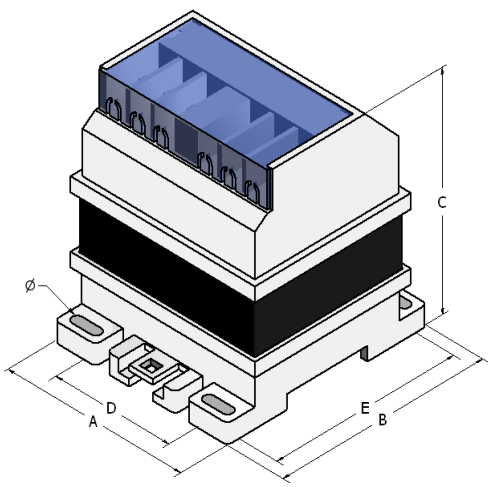
Series TCL

Rating **VA**	Reference	LED Spotlight		Dimensions **mm**						Weight **kg**	Type
		Max. Power	Power Factor	A	B	C	D	E	Ø		
30	TCL30	18 W	0,6	54	112	112	37	100	6	0,8	I
50	TCL50	30 W	0,6	54	112	112	37	100	6	1,1	I
75	TCL75	45 W	0,6	82	90	92	58	79	5,5	1,6	II
120	TCL120	70 W	0,6	94	106	107	58	90	7	2,2	II

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type I



Type II

Single phase swimming-pool transformers IP-20

Single phase safety and isolating transformer with galvanic isolation between primary and secondary for swimming pool, garden spotlights, saunas and illuminated fountains.

Wounds totally protected against mechanical chocks and adverse environments.

Maximum security against electrical shocks, all live parts are protected and not accessible.

It provides several taps in the primary winding in order to compensate for the voltage drop in the transformer-spotlight line according to distance.

Screw fixing and possible horizontal mounting designed for placing in cabinets with reduced height (series CPEH).

Core with antioxidant protection.

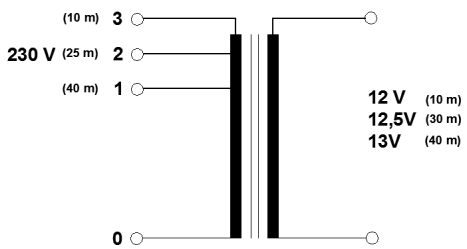
Connections by screws with self-lifting supporting washers.

Protect the terminal connections intended to avoid the risk of electrical contact accident.

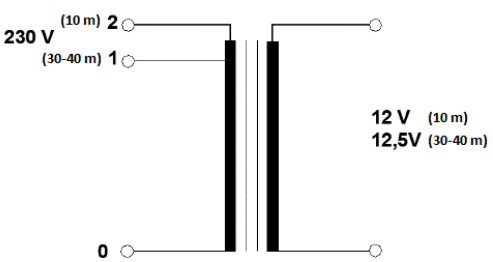
Technical characteristics

Power rating	100, 300 and 600 VA
Input voltage	230 V
Output voltage	12 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-20
Safety class	Class II
Test voltage	4 kV
Standards	IEC/UNE-EN 61558-1
	IEC /UNE-EN 61558-2-6

Electrical diagram (100 VA y 600 VA)



Electrical diagram (300 VA)



Selection table

Rated transformer	Rated spotlight	Distance between spotlight and transformer					
100 VA	100 W	Wire section 2.5 mm^2			Wire section 4 mm^2		
		1 a 6 m	6 a 15 m	15 a 24 m	1 a 10 m	10 a 25 m	30 a 25 m
300 VA	300W	Wire section 6 mm^2			Wire section 10 mm^2		Wire section 16 mm^2
		1 a 6 m	6 a 15 m	-	1 a 10 m	10 a 30 m	30 a 40 m
600 VA	2 x 300 W	(x2) Wire section 6 mm^2			(x2) Wire section 10 mm^2		
		1 a 6 m	6 a 15 m	15 a 24 m	1 a 10 m	10 a 25 m	25 a 40 m

Terminal connection 230V (100VA, 600VA)	0 - 3	0 - 2	0 - 1	0 - 3	0 - 2	0 - 1
Terminal connection 230V (300 VA)	0-2	0-1	-	0-2	0-1	-

It is recommended a protection against short circuits via fuse, installed in series at the primary circuit.

Fuses selected must be slow-blow or time-delay types because the high inrush current when the transformer is connected

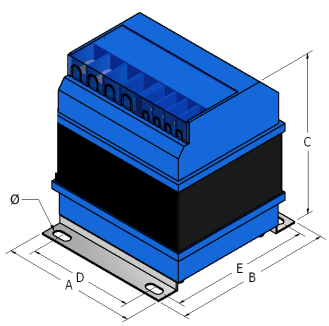
Power Rating	Fuse 230V
100 VA	T 0,63A
300 VA	T 1,6A
600 VA	T 3,15A

Series CPE Vertical mounting

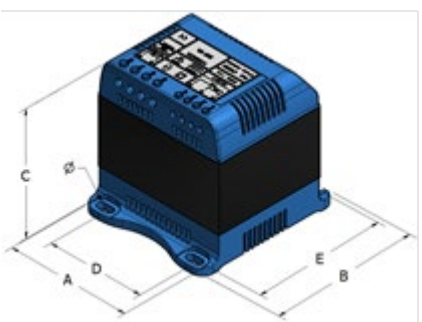
Rating **VA**	Reference	Dimensions **mm**						Weight **Kg**	Type
		A	B	C	D	E	Ø		
100	CPE100	94	106	105	58	90	7x14	1,9	I
300	CPEN300	108	120	112	80	106	7x14	4,0	II
600	CPE600	135	148	172	91	132	7x15	7,6	I

Series CPEH Horizontal mounting

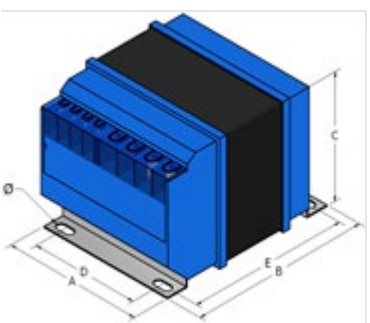
Rating **VA**	Reference	Dimensions **mm**						Weight **Kg**	Type
		A	B	C	D	E	Ø		
100	CPEH100	94	116	83	58	100	7X14	1,9	III
600	CPEH600	135	182	117	91	166	7x15	7,6	III



Type I



Type II



Type III

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Single phase swimming pool transformers IP-65

Single phase safety and isolating transformer with galvanic isolation between primary and secondary for swimming pool, garden spotlights, saunas and illuminated fountains.

Wounds totally protected against mechanical chocks and adverse environments. Internally encapsulated by resin.

Automatic protection against overloads and overheat by a built-in self-resetting system that prevents the transformer to reach dangerous temperatures for its normal operation.

Short-circuit protection by an internal fuse.

It has several taps in the primary winding in order to compensate for the voltage drop in the transformer-spotlight line according to distance.

Ground terminal provided. Primary and secondary tap compartments separated and fully enclosed.

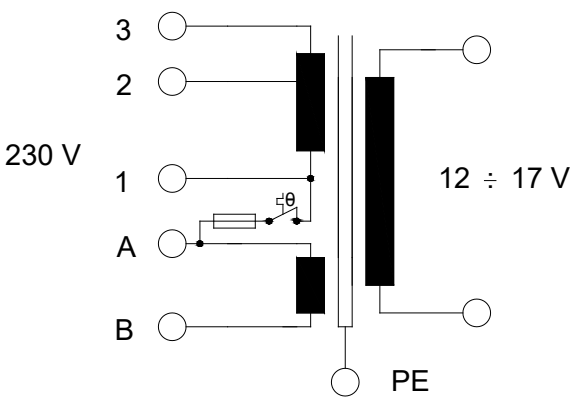
Internal terminal block with cable gland included.

Enclosure protection by a polycarbonate box IP-65.

Technical characteristics

Power rating	100, 300 and 600 VA
Input voltage	230 V
Output voltage	12 – 17 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-65
Safety class	Class II
Test voltage	4 kV
Standard	IEC /UNE-EN 61558-1
	IEC /UNE-EN 61558-2-6

Electrical diagram



Selection table

Cable section	Rated spotlight	Transformer EPC100					
		Distance between spotlight and transformer					
2,5 mm²	100 W	1 to 10 m.	10 to 15 m.	15 to 20 m.	20 to 30 m.	30 to 40 m.	40 to 50 m.
4 mm²	100 W	1 to 16 m.	16 to 25 m.	25 to 35 m.	35 to 45 m.	45 to 60 m.	60 to 75 m.
Input voltage 230 V		B - 3	B - 2	B - 1	A - 3	A - 2	A - 1

Cable section	Rated spotlight	Transformer EPC300					
		Distance between spotlight and transformer					
6 mm²	300 W	1 to 10 m.	10 to 15 m.	15 to 20 m.	20 to 25 m.	25 to 35 m.	35 to 40 m.
10 mm²	300 W	1 to 16 m.	16 to 25 m.	25 to 35 m.	35 to 45 m.	45 to 55 m.	55 to 65 m.
Input voltage 230 V		B - 3	B - 2	B - 1	A - 3	A - 2	A - 1

Cable section	Rated spotlight	Transformer EPC600					
		Distance between spotlight and transformer					
6 mm²	2x300 W	1 to 10 m.	10 to 15 m.	15 to 20 m.	20 to 25 m.	25 to 30 m.	30 to 35 m.
10 mm²	2x300 W	1 to 16 m.	16 to 25 m.	25 to 30 m.	30 to 35 m.	35 to 40 m.	40 to 45 m.
Input voltage 230 V		B - 3	B - 2	B - 1	A - 3	A - 2	A - 1

NOTE: for these figures, EPC600 reference to be connected 2 lines and 1 spotlight of 300W each one.

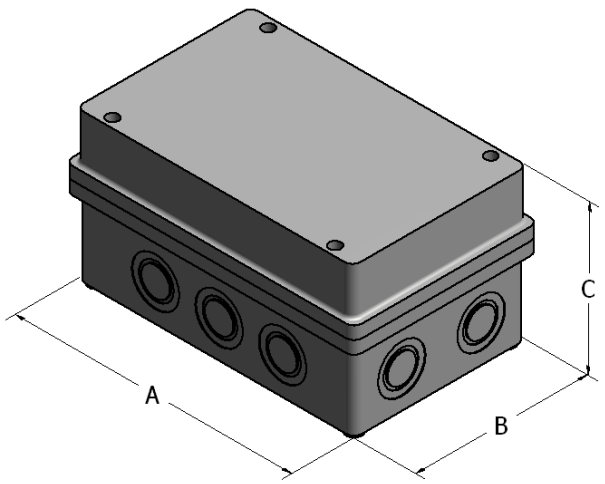
Following we indicate the recommended fuses to put at the primary side of the transformer according to the rating.

Power Rating	Fuse 230 V
100 VA	T 0,63A
300 VA	T 1,6A
600 VA	T 4A

Degree of protection against external objects or water is indicated by an 'IP' degree number. A higher number means more protection.

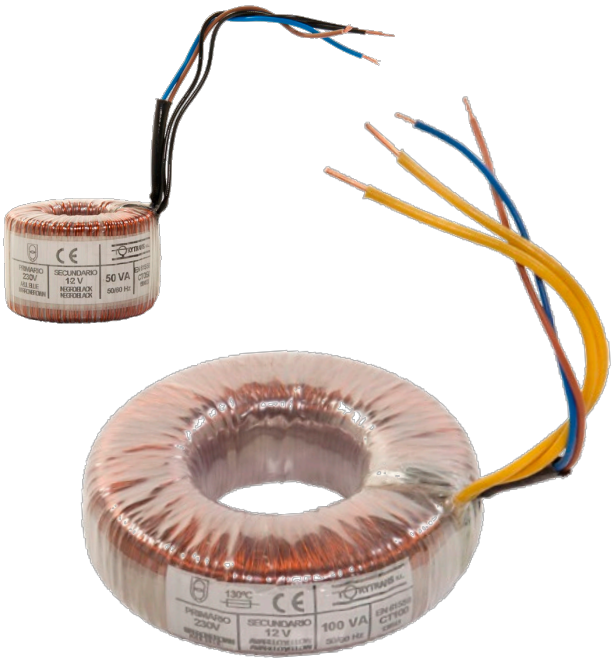
IP-6_	IP-_5
	
Completely closed enclosure	Water proof hermetically closed

Rating **VA**	Reference	Dimensions **mm**			Weight **Kg**
		A	B	C	
100	EPC100	190	125	95	2,9
300	EPC300	220	170	120	5,5
600	EPC600	220	170	120	11,0



* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Toroidal Transformers



Single phase safety transformer with galvanic isolation between primary and secondary for light and low voltage devices (12 V).

Optimized design that provides it with electrical and mechanical advantages by comparison with conventional transformers, such as:

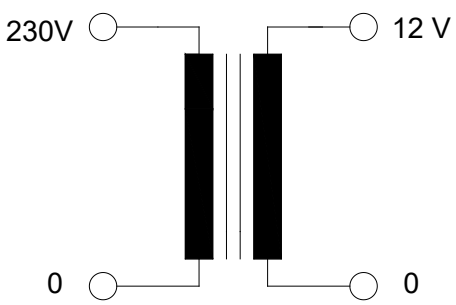
- Higher efficiency
- Minimal no-load losses
- Lower magnetic stray field
- Very low noise field
- Vibrations free
- Lower heat losses
- Reduced dimensions and weight
- Easier mounting
- Flexible design
- Direct output with winding wire.

On request it could be supplied with potted centre hole or potted in polyamide housings. Moreover, it can be mounting in a polyamide enclosure protection.

Technical characteristics

Power rating	50 ÷ 600 VA
Input voltage	230 V
Output voltage	12 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	B (130 ºC)
Protection degree	IP-00
Safety class	Class II
Connection type	Connecting leads
Accessories	Mounting kit (optional)
Test voltage	4 kV
Standards	IEC/UNE-EN 61558-1
	IEC/UNE-EN 61558-2-6

Electrical diagram



Torytrans S.L., as specialized and flexible manufacturer of toroidal transformers, designs and produces custom-made products under the customer´s requirements.

Its installations count with its own toroidal magnetic cores production, essential component to assure the most reliable use of the transformer.

Manufactured by high quality grain-oriented electrical steel core (Fe-Si alloy) and processed in updated thermal process. In particular, our toroidal cores are designed with very low losses and optimized working induction.

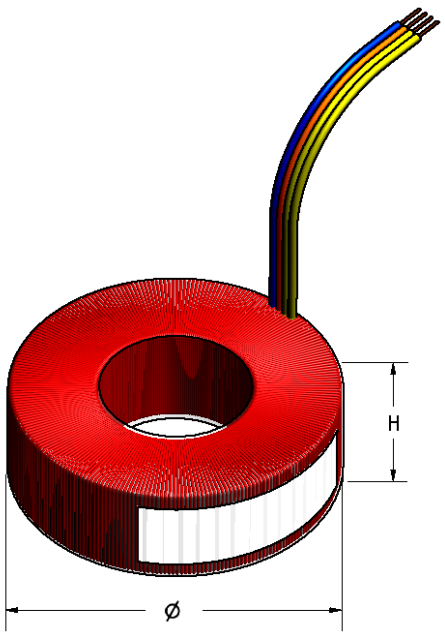
It is recommended a protection against short circuits via fuse, installed in series at the primary circuit.

Inrush current of a toroidal transformer is higher than a conventional transformer due its air gaps absence in the core.

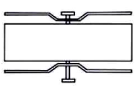
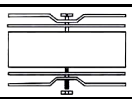
It is recommended a fuse at the secondary side of the transformer according to the load to protect it against overload. Its type selection must be according to the load and size must be next lower than nominal current of the transformer label.

Rating **VA**	Reference	Diameter **mm**	Height **mm**	Weight **Kg**
50	TOR050	60	42	0,6
100	TOR100	115	35	1,2
150	TOR150	115	42	1,6
200	TOR200	120	44	1,8
250	TOR250	120	50	2,4
300	TOR300	130	50	2,9
400	TOR400	140	51	3,6
500	TOR500	150	52	4,2
600	TOR600	166	56	4,9

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



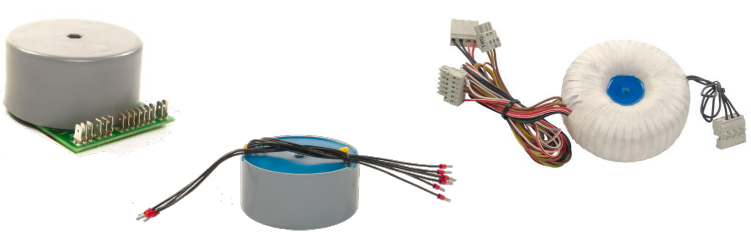
Mounting kit (optional)

	Reference	Accessories
	TORxxx-1	2 Nylon discs (screw included)
	TORxxx-2	2 isolation washers 2 metal discs (screw included)

* Other mounting accessories on request

Customized designs (on request)

- Full resin encapsulation
- Potted center hole
- Polyamide plastic housing
- Metal sheet cabinet IP-23
- Connections by terrminal blocks
- Thermal protection and fuses
- Electrostatic shield for earth connection
- Longer length cables and custom colours
- Strip and clamp fast connectors



Isolation transformers for medical rooms
IEC/UNE-EN 61558-2-15 2012

Single or three phase isolating transformer with galvanic isolation between primary and secondary intended to be installed at medical facilities, according to the new European standard IEC/UNE-EN 61558-2-15 valid from 2012 which cancels and replaces the previous from 2008 and Spanish standard UNE 20615.

Intended for generate a neutral IT point connection at industries with processes sensitive to interruptions.

Thermal protection against overload and overtemperature. Low losses magnetic cores.

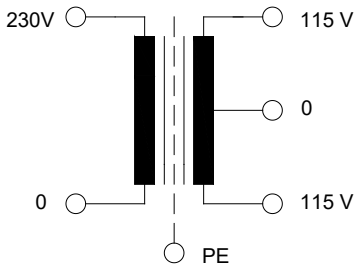
Open transformer IP-00, vacuum impregnation with dielectric varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

Electrostatic shield between primary and secondary winding connected to PE terminal (individual connector).

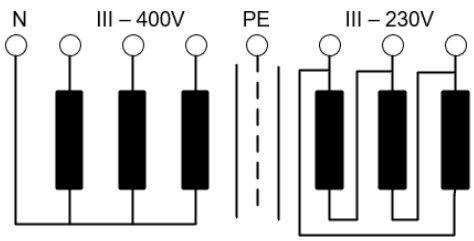
Technical characteristics

Power rating	1 ÷ 10 kVA
Input voltage Output voltage	230 V (Series CM) 230 V (Series CM)
Input voltage Output voltage	3 x 400 V+N (Series CTM) 3 x 230 V (Series CTM)
Frequency	50/60 Hz
Ambient temp.	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-00
Safety class	Class I
Test voltage	4 kV - 2 kV
Connection current	< 12 I_N
No load current	< 3%
Leakage current	< 0,5 mA
Insulation resistance	> 7 MΩ
Standard	IEC/UNE EN 61558-1
	IEC/UNE EN 61558-2-15

Electrical diagram CM single phase



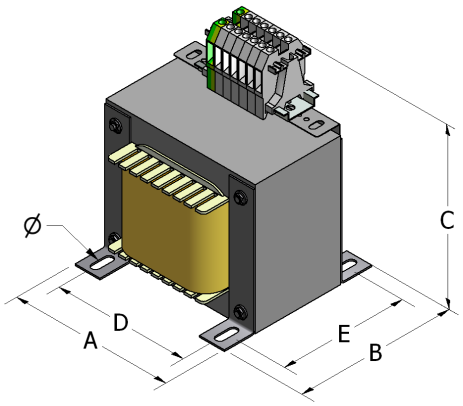
Electrical diagram CTM three phase – Ynd5



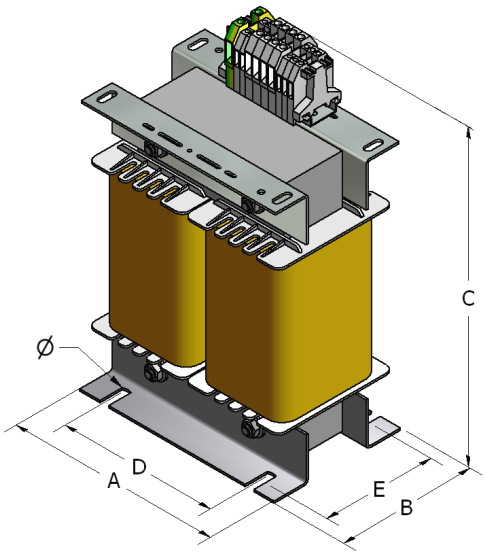
Series CM - Single phase

Rating **VA**	Reference	Dimensions **mm**						Weight **kg**	Type	Losses **W**	
		A	B	C	D	E	Ø			No-load	Total
1000	CM1000	150	162	185	125	133	8	14,1	I	12	60
1600	CM1600	180	154	220	150	122	9	18,6	I	16	86
2000	CM2000	195	188	228	163	154	10	25,2	I	20	110
2500	CM2500	240	166	270	200	123	12	28,4	I	25	120
3150	CM3150	240	176	270	200	133	12	32,3	I	28	128
3500	CM3500	240	186	270	200	143	12	34,0	I	32	138
4000	CM4000	240	136	375	150	110	11	33,0	II	25	190
5000	CM5000	240	156	380	150	131	11	34,5	II	34	250
6300	CM6300	240	176	390	150	151	11	40,0	II	40	285
8000	CM8000	280	176	430	225	149	11	48,3	II	45	300
10000	CM10000	280	216	430	225	189	11	66,0	II	70	400

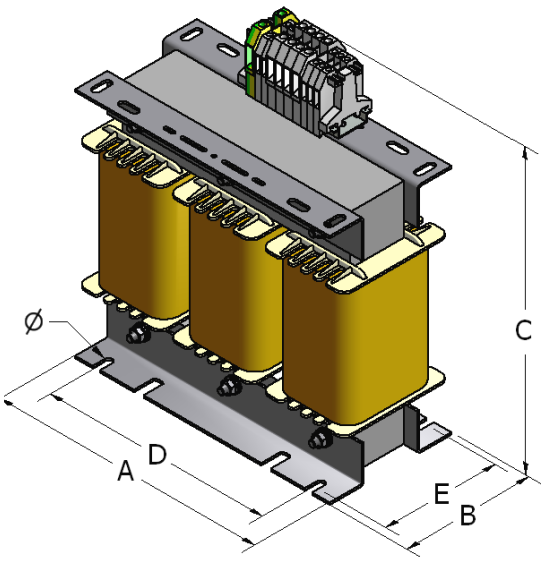
* Also available into IP23 enclosure on request.



Single phase Type I



Single phase Type II



Three phase

Serie CTM – Three phase

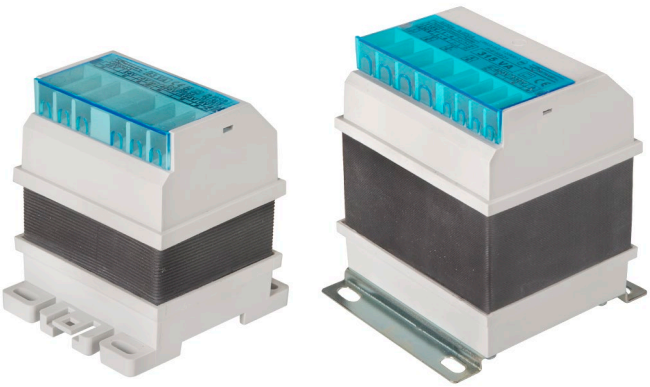
Rating **VA**	Reference	Dimensions **mm**						Weight **kg**	Losses **W**	
		A	B	C	D	E	Ø		No load	Total
2000	CTM2000	240	140	280	200	118	7	25	20	145
2500	CTM2500	300	120	310	200	96	11	27	22	165
3500	CTM3500	300	140	330	200	115	11	32	30	175
4000	CTM4000	300	150	330	200	125	11	36	33	200
5000	CTM5000	300	170	340	200	145	11	45	43	255
6300	CTM6300	360	135	380	320	110	11	42	43	335
7500	CTM7500	360	165	390	320	140	11	55	58	345
8000	CTM8000	360	165	390	320	140	11	59	62	348
10000	CTM10000	360	185	390	320	160	11	72	72	385

* Also available into IP23 enclosure on request.

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Measurement transformers

Potential transformer



Technical characteristics

Power rating	3 ÷ 150 VA (Class 0,5) 5 ÷ 250 VA (Class 1)
Input voltage	max. 690V/$\sqrt{3}$
Output voltage	100V/$\sqrt{3}$
Accuracy	Class 0,5 Class 1
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	B (130 ºC)
Protection degree	IP-20
Safety class	Class II
Test voltage	4 kV
Continuous overvoltage	+20%
Thermal current	6 x I_N
Standard	IEC/UNE-EN 61869-3

CE

Current transformer

Technical characteristics

Power rating	5 ÷ 10 VA
Primary current	50 ÷ 1000 A
Secondary current	5 A
Accuracy	Class 1
Voltage service	690 V
Ambient temperature	40 ºC
Insulation class	B (130 ºC)
Protection degree	IP-20
Safety class	Class II
Connection type	Screw
Screw fixing	
Busbar or cable-through	
Standard	IEC/UNE-EN 61869-2

CE

The application of measurement transformers is normally reduction of a higher to a lower voltage or current values that can be measured by protection relays and measurement instruments.

The relation between the primary and secondary is very accurate, independent of primary and load (as long as within the limits of transformer specifications) and 0º shift phase angle. The accuracy class is indicating the maximum error in voltage or current relation, for example class 1 means 1% error.

These transformers provide insulation and separation of circuits and measurement devices from the voltage lines.

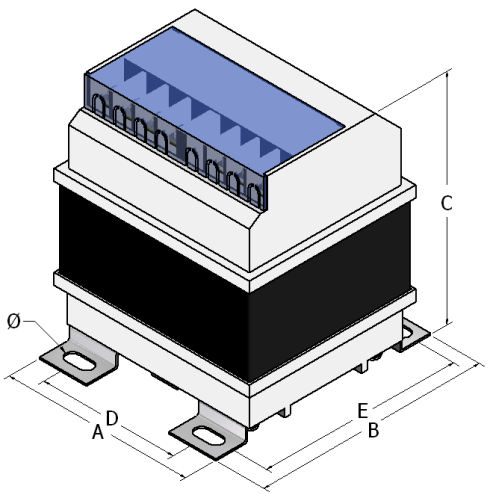
To define the transformer power VA, sum all the power consumed by the external loads connected to the transformer and the power consumed by the interconnecting leads. It is recommended to select the closer higher rating because accuracy and safety factor could be changed.

Accuracy:
Class 0,5: Precision and tariff equipments.
Class 1: Industrial measurement equipments.

Turns:
The number of turns of the primary cable converts the primary current value proportionally to secondary current (not modify accuracy).

Series MT Potential Transformers

Rating **VA**		Ref.	Dimensions **mm**						Weight **kg**
Class 0,5	Class 1		A	B	C	D	E	Ø	
3	5	MT003	82	90	96	58	79	5,5x12	1,4
5	7,5	MT005	82	90	106	58	79	5,5x12	1,6
10	15	MT010	94	106	117	58	90	7x14	2,5
15	25	MT015	105	115	116	70	99	7x14	2,9
30	50	MT030	115	123	134	80	106	7x14	4,5
50	75	MT050	135	148	148	91	132	7X15	6,5
100	150	MT100	150	158	190	124	143	7X15	12,7
150	250	MT150	150	158	228	124	143	7X15	17,8

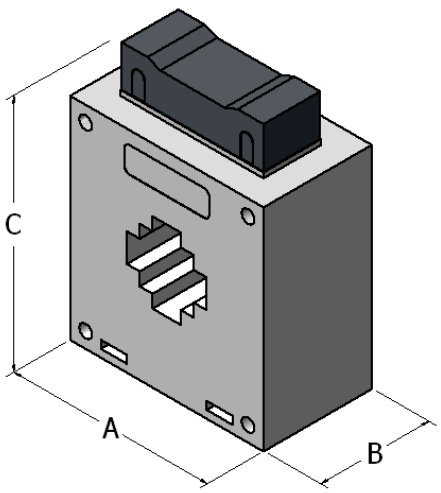


* Other features, power, voltage, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.

Series MI Current Transformers

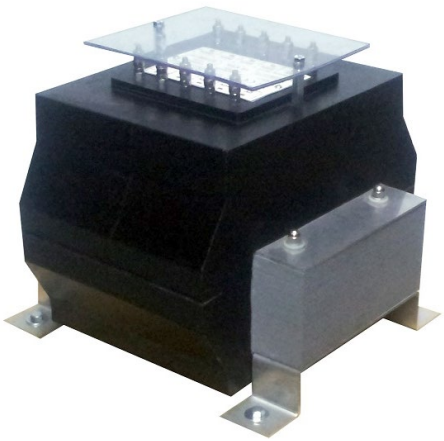
Current Ratio **A**	Power **VA**	Ref.	Dimensions **mm**			Weight **kg**	Central section **mm**
	Class 1		A	B	C		
50/5	5	MI050(3)	75	42	100	0,4	Φ20 30x10
100/5	5	MI100(2)	75	42	100	0,4	
150/5	5	MI150	75	42	100	0,4	
200/5	5	MI200	75	42	100	0,4	Φ32 40x10
250/5	5	MI250	75	42	100	0,4	
300/5	5	MI300	75	42	100	0,4	
400/5	5	MI400	102	40	128	0,6	Φ46 60x20
500/5	5	MI500	102	40	128	0,6	
600/5	5	MI600	102	40	128	0,6	
800/5	10	MI800	102	40	128	0,6	
1000/5	10	MI1000	102	40	128	0,6	

(3) Perform 3 turns of the primary cable through the transformer
(2) Perform 2 turns of the primary cable through the transformer



* Other central section or current range on request.

Isolation transformers encapsulated in resin



Single phase (CNE series) and three phase (TTE series) transformers with galvanic isolation between primary and secondary and excellent attenuation against electrical perturbations.

Separated windings by galvanic isolation between primary and secondary. Wounds totally protected against mechanical shocks and adverse environments.

It increases the mechanical resistance against the electrodynamics stresses of the winding extending the working life of the isolations.

Improves the reliability working on vibratory environments.

Encapsulated in resin of high robustness and high thermal power dissipation. Optionally you can be done self-extinguishing V0 and fireproof.

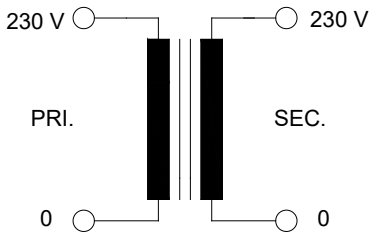
Magnetic core with low losses impregnated with epoxy antioxidant varnish.

Transparent protective cover for the terminals that avoids the risk of accidents by electrical contact.

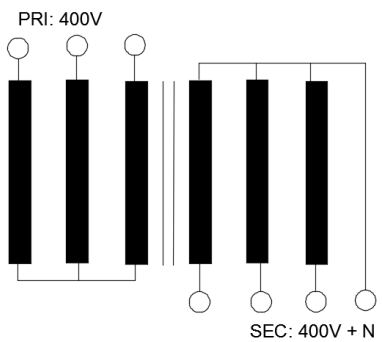
Technical characteristics

Power rating	5 ÷ 50 kVA
Input voltage Output voltage	230 V (Series CNE) 230 V
Input voltage Output voltage	3 x 400 V (Series TTE) 3 x 400 V + N
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-20
Safety class	Class I
Test voltage	3 kV
Standard	**(CNE Series)** Power rating ≤ 25 kVA: IEC/UNE-EN 61558-1 Power rating > 25 kVA: IEC/UNE-EN 60076-11 **(TTE Series)** Power rating ≤ 40 kVA: IEC/UNE-EN 61558-1 Power rating > 40 kVA: IEC/UNE-EN 60076-11

Electrical diagram series CNE single phase

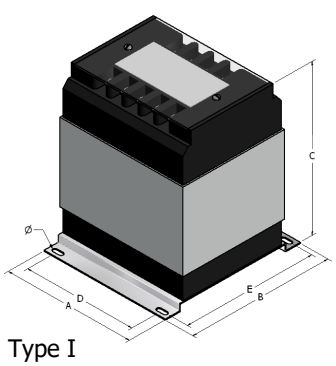


Electrical diagram series TTE three phase - Yyn0

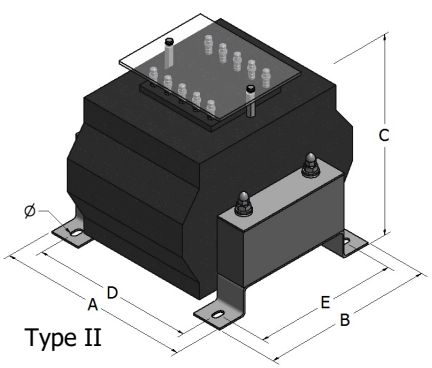


Series CNE - Single phase

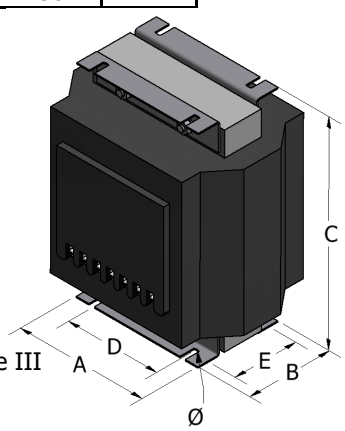
Rating **kVA**	Reference	Dimensions **mm**						weight **kg**	Type
		A	B	C	D	E	Ø		
5	CNE005	240	255	255	205	235	9	59	I
6,3	CNE006	300	285	210	250	235	9	62	II
8	CNE008	350	310	270	295	262	12	70	II
10	CNE010	350	310	280	295	262	12	70	II
12	CNE012	320	265	490	265	175	11	98	III
16	CNE016	320	255	575	265	165	11	115	III
20	CNE020	320	275	575	265	185	11	128	III
25	CNE025	420	370	605	300	230	11	150	III
31,5	CNE031	420	390	605	300	250	11	172	III
40	CNE040	420	380	705	300	240	11	195	III
50	CNE050	420	400	705	300	260	11	230	III



Type I



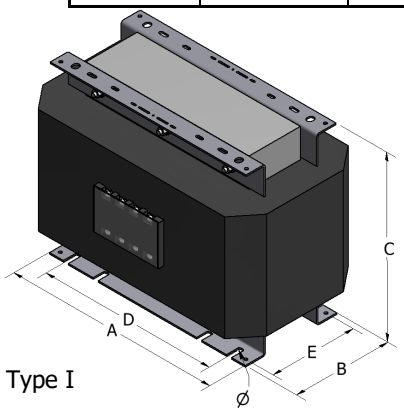
Type II



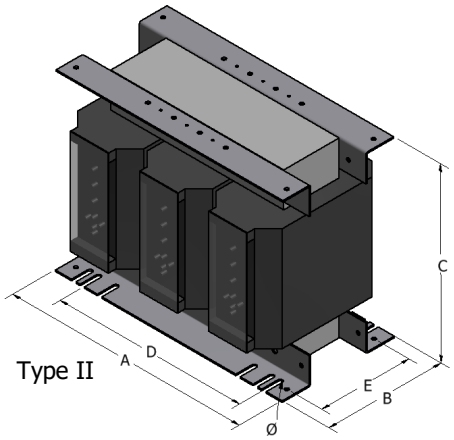
Type III

Series TTE - Three phase

Rating **kVA**	Reference	Dimensions **mm**						weight **kg**	Type
		A	B	C	D	E	Ø		
5	TTE005	300	200	320	200	120	11	65	I
6,3	TTE006	300	220	320	200	140	11	76	I
8	TTE008	360	205	375	320	125	11	82	I
10	TTE010	360	225	380	320	145	11	95	I
12	TTE012	420	230	430	350	140	11	115	I
16	TTE016	420	250	435	350	160	11	125	II
20	TTE020	480	240	490	400	155	11	147	II
25	TTE025	480	260	490	400	175	11	170	II
31,5	TTE031	655	325	595	400	220	13	220	II
40	TTE040	655	345	595	400	240	13	265	II
50	TTE050	655	375	595	400	270	13	305	II



Type I



Type II

* All values show maximum dimension.
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Three phase isolating transformers IP-00

Three phase isolating transformer with galvanic isolation between primary and secondary.

For general use as isolating transformer and isolation of circuits, it eliminates the risk of electrical shock in case of unipolar human contact. For voltage adaptation use in three phase systems, the maximum unbalanced single phase loads between phases should not exceed 25%.

Vacuum impregnation with dielectric varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

Type of connection:

- From 1 to 25 kVA: connection with terminal blocks.
- From 31 to 80 kVA: connection with screws for flat terminals.
- From 100 to 1000 kVA: connection with flat busbars.

Technical Characteristics

Power rating	1 ÷ 1000 kVA
Input voltage	400 V
Output voltage	230 V + N (Series TDS) 400 V + N (Series TTS)
Vector group	Yyn0
Frequency	50/60 Hz
Ambient temp	40 ºC
Insulation class	F (155 ºC) up to TTS0125 H (180 ºC) from TTS0160
Protection degree	IP-00
Safety class	Class I
Test voltage	3 kV

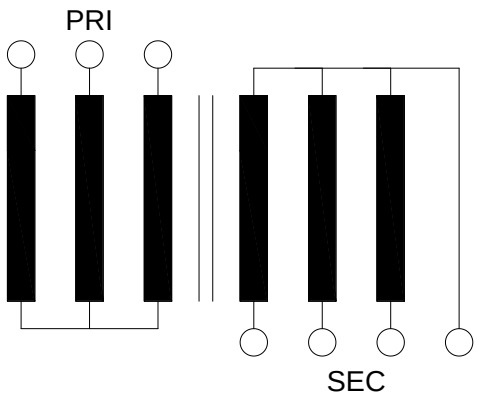
Standard

CE

<u>Power rating ≤ 40 kVA:</u>
IEC/UNE-EN 61558-1

<u>Power rating > 40 kVA:</u>
IEC/UNE-EN 60076-11

Electrical diagram



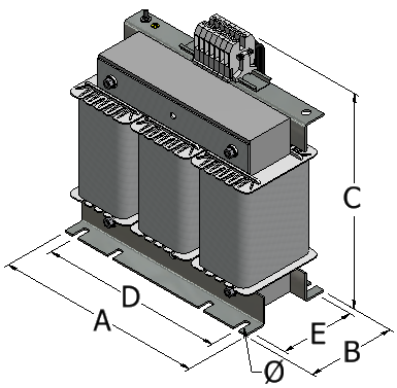
- For general use, select the power according to the load and power factor:

kW = √3 x V x I / 1000
kVA = kW / Cos φ

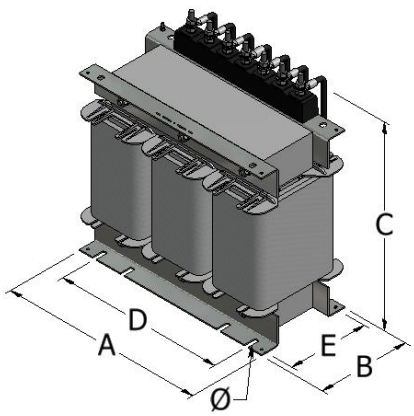
- For loads with high inrush current or harmonics, consult "Rating selection guide" at the end of catalogue.

Rating **kVA**	Reference 400/230V	Reference 400/400V	Dimensions **mm** A	B*1	C	D	E	Ø	Weight **kg**	Type
1	TDS001	TTS001	240	165	260	200	95	7	13	I
2	TDS002	TTS002	240	190	265	200	120	7	20	I
3	TDS003	TTS003	300	180	310	200	100	11	25	I
4	TDS004	TTS004	300	190	320	200	110	11	29	I
5	TDS005	TTS005	300	200	320	200	120	11	34	I
6	TDS006	TTS006	300	220	320	200	140	11	42	I
8	TDS008	TTS008	360	205	375	320	125	11	49	I
10	TDS010	TTS010	360	225	380	320	145	11	60	I
12	TDS012	TTS012	420	230	430	350	140	11	76	I
16	TDS016	TTS016	420	250	435	350	160	11	90	I
20	TDS020	TTS020	420	290	420	350	190	11	107	I
25	TDS025	TTS025	480	260	490	400	175	11	128	I
31	TDS031	TTS031	655	325	595	400	220	13	178	II
40	TDS040	TTS040	655	345	595	400	240	13	213	II
50	TDS050	TTS050	655	375	595	400	270	13	262	II
63	TDS063	TTS063	655	325	795	400	220	13	246	II
80	TDS080	TTS080	655	355	795	400	250	13	311	II
100	TDS100	TTS100	660	310	875	480	265	13	400	III
125	TDS125	TTS125	660	380	875	480	335	13	568	III
160	TDS160	TTS160	720	390	940	480	340	13	667	III
200	TDS200	TTS200	720	420	940	480	370	13	764	III
250	TDS250	TTS250	780	450	1035	660	395	16	923	III
315	TDS315	TTS315	840	575	1000	660	420	16	1142	IV
400	TDS400	TTS400	840	615	1000	660	460	16	1307	IV
500	TDS500	TTS500	900	605	1100	660	465	16	1494	IV
630	TDS630	TTS630	900	650	1110	660	505	16	1705	IV
800	TDS800	TTS800	960	690	1170	660	550	16	2106	IV
1000	TDS1000	TTS1000	960	760	1170	660	610	16	2454	IV

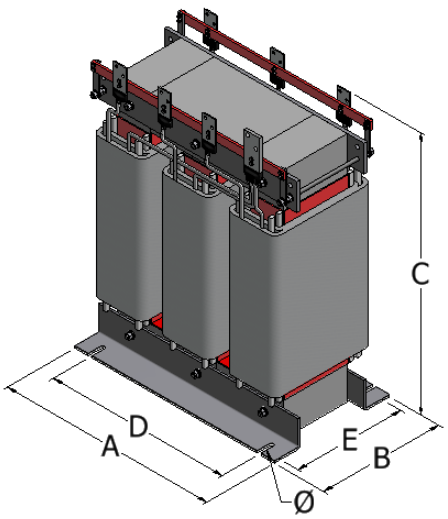
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



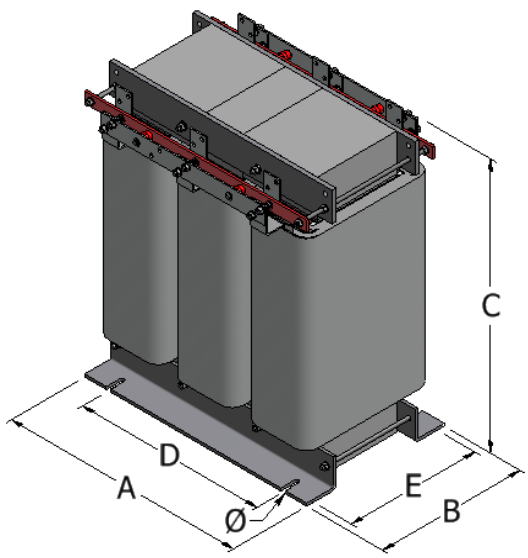
Type I



Type II



Type III



Type IV

Three phase isolating transformers IP-23

Three phase isolating transformer with galvanic isolation between primary and secondary.

For general use as isolating transformer and isolation of circuits, eliminating the risk of electrical shock in case of unipolar human contact. Intended for voltage adaptation in three phase systems and single phase loads with a maximum unbalance of 25% between phases.

Mounting into metal enclosure, protection degree of IP23, coated with a resin polyester-epoxy powder with excellent physical-mechanical and anti-corrosive properties. Type II enclosure includes wheels.

Connection with terminal blocks (rating from 1 to 25 kVA).

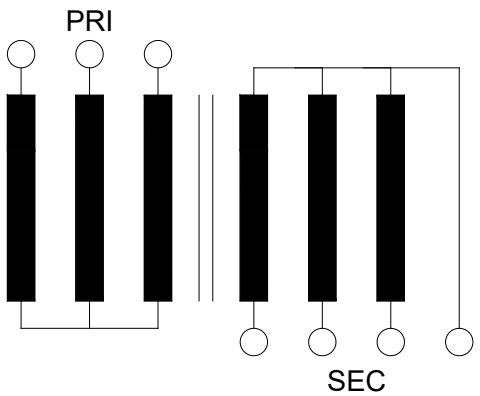
Connection with screws for flat terminals (rating from 31 to 80 kVA).

Connection with flat busbars (rating from 100 to 1000 kVA).

Technical Characteristics

Power rating	1 ÷ 1000 kVA
Input voltage	3 x 400 V
Output voltage	3 x 230 V + N (Series TDC) 3 x 400 V + N (Series TTC)
Vector group	Yyn0 Dyn11 (add suffix D to reference)
Frequency	50/60 Hz
Ambient temp	30 ºC
Insulation class	F (155 ºC) up to TTC0125 H (180 ºC) from TTC0160
Protection degree	IP-23
Safety class	Class I
Test voltage	3 kV
Standard	<u>Power rating ≤ 40 kVA:</u> IEC/UNE-EN 61558-1 <u>Power rating > 40 kVA:</u> IEC/UNE-EN 60076-11

Electrical diagram



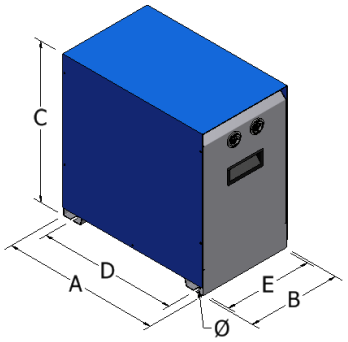
- For general use, select the power according to the load and power factor:

kW = √3 x V x I / 1000
kVA = kW / Cos φ

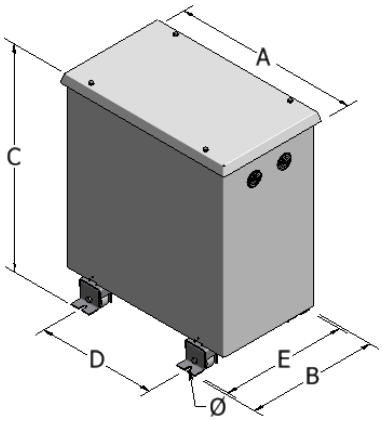
- For loads with high inrush current or harmonics, consult "Rating selection guide" at the end of catalogue.

Rating **kVA**	Reference		Dimensions **mm**						Weight **kg**	Type
	400/230V	400/400V	A	B	C	D	E	Ø		
1	TDC001	TTC001	300	185	305	265	165	7	18	I
2	TDC002	TTC002	300	185	305	265	165	7	25	I
3	TDC003	TTC003	370	225	375	325	205	7	33	I
4	TDC004	TTC004	370	225	375	325	205	7	37	I
5	TDC005	TTC005	370	225	375	325	205	7	42	I
6	TDC006	TTC006	370	225	375	325	205	7	50	I
8	TDC008	TTC008	475	345	520	320	320	10	62	II
10	TDC010	TTC010	475	345	520	320	320	10	73	II
12	TDC012	TTC012	545	385	615	350	360	10	92	II
16	TDC016	TTC016	545	385	615	350	360	10	106	II
20	TDC020	TTC020	615	425	690	400	400	10	127	II
25	TDC025	TTC025	615	425	690	400	400	10	148	II
31	TDC031	TTC031	775	575	940	400	550	10	213	II
40	TDC040	TTC040	775	575	940	400	550	10	248	II
50	TDC050	TTC050	775	575	940	400	550	10	297	II
63	TDC063	TTC063	775	575	940	400	550	10	281	II
80	TDC080	TTC080	775	575	940	400	550	10	346	II
100	TDC100	TTC100	930	710	1275	480	670	16	468	III
125	TDC125	TTC125	930	710	1275	480	670	16	636	III
160	TDC160	TTC160	930	710	1275	480	670	16	735	III
200	TDC200	TTC200	930	710	1275	480	670	16	832	III
250	TDC250	TTC250	1070	880	1460	660	840	16	1041	IV
315	TDC315	TTC315	1070	880	1460	660	840	16	1260	IV
400	TDC400	TTC400	1070	880	1460	660	840	16	1425	IV
500	TDC500	TTC500	1210	1070	1650	660	840	16	1645	IV
630	TDC630	TTC630	1210	1070	1650	660	840	16	1856	IV
800	TDC800	TTC800	1210	1070	1650	660	840	16	2257	IV
1000	TDC1000	TTC1000	1210	1070	1650	660	840	16	2605	IV

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type I



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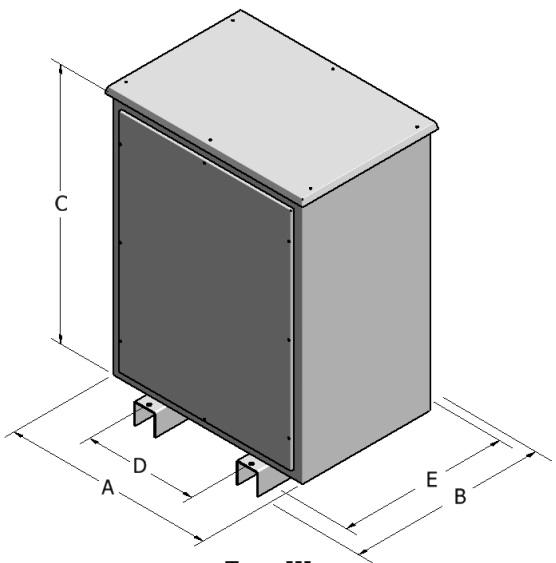
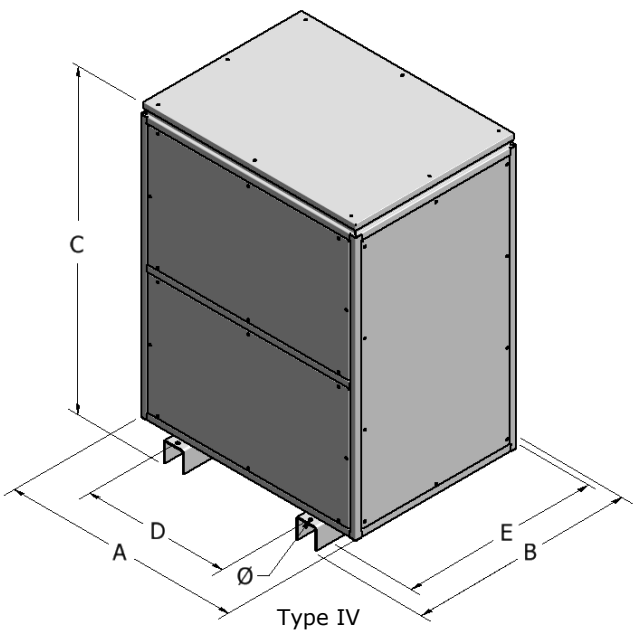


Type III



Type IV

Low-losses isolation transformers IP-23

Galvanic isolation transformers with reduced losses and high efficiency.

Series REDLOSS is the most economical solution in the long term and helps to save electrical energy in a significant way.

Higher electrical efficiency means heat losses reduction and therefore, increases reliability and service life of the transformer.

REDLOSS transformer operating service resulting in much lower losses than a conventional transformer, this implies an important reduction of exploitation costs and quick payback of the difference price.

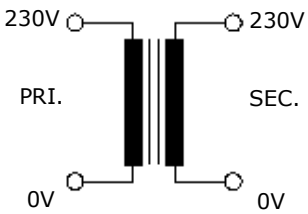
Suitable for renewable energy facilities in compliance with electric supply company requirements.

In metal enclosure IP23 protection degree, resin polyester-epoxy powder coated with excellent physical - mechanical and anti - corrosive properties. Type II enclosure includes wheels.

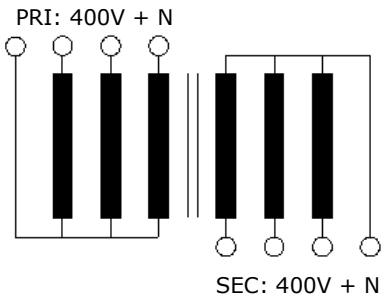
Technical characteristics

Power rating	1 ÷ 100 kVA
Input voltage Output voltage	230 V (Serie RLM) 230 V
Input voltage Output voltage	3 x 400 V + N (Serie RLT) 3 x 400 V + N
Frequency	50/60 Hz
Ambient temp.	30 ºC
Insulation class	F (155 ºC)
Protection degree	IP-23
Safety class	Class I
Test voltage	3 kV
Standard	**(RLM Series)** Power rating ≤ 25 kVA: IEC/UNE-EN 61558-1 Power rating > 25 kVA: IEC/UNE-EN 60076-11 **(RLT Series)** Power rating ≤ 40 kVA: IEC/UNE-EN 61558-1 Power rating > 40 kVA: IEC/UNE-EN 60076-11

Electrical diagram RLM single phase



Electrical diagram RLT three phase – YNyn0



Example of energy saving between REDLOSS and standard three phase transformer, over 8760 working hours per year and full load.

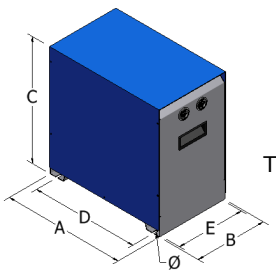
Rating **kVA**	Standard transformer Losses **W**	REDLOSS transformer Losses **W**	Losses (difference) **W**	Energy saving/year **kWh**	Yearly savings *(0,12 €/kWh)*
10	460	309	151	1.323	159 €
50	1.546	916	630	5.519	662 €
100	2.354	1.522	832	7.288	875 €

INCREASES:
- Efficiency
- Environmental protection
- Service life

REDUCES:
- Losses
- Energy consumption
- Heating

- For general use, select the power according to the load and power factor:

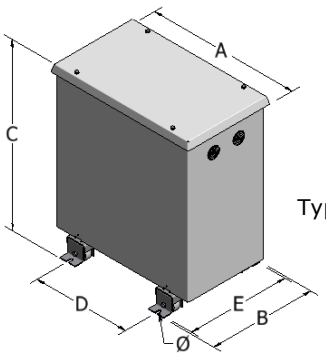
Series RLM: **kW = V x I / 1000**
Series RLT: **kW = √3 x V x I / 1000**
kVA = kW / Cos φ



Type I

Series RLM Single phase

Rating **kVA**	Reference	Effic.	Dimensions **mm**						Weight **kg**	Type
			A	B	C	D	E	Ø		
1	RLM01	95%	300	185	305	265	165	7	15,2	I
2	RLM02	95,5%	370	225	375	325	205	7	21,9	I
3	RLM03	96%	370	225	375	325	205	7	30,6	I
4	RLM04	96,5%	370	225	375	325	205	7	37,3	I
5	RLM05	97%	475	345	520	320	320	10	46	II
6	RLM06	97,3%	475	345	520	320	320	10	54,6	II
8	RLM08	97,6%	545	385	615	350	360	10	68	II
10	RLM10	97,8%	545	385	615	350	360	10	81,3	II

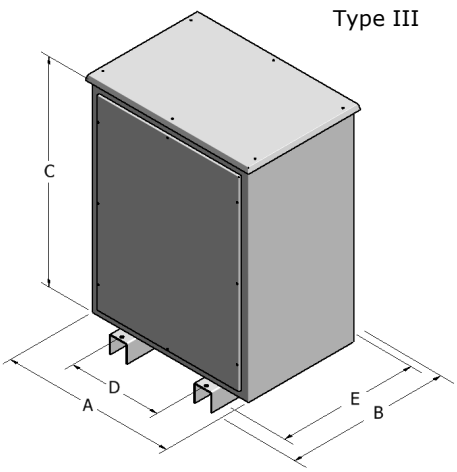


Type

Series RLT Three phase

Rating **kVA**	Reference	Effic.	Dimensions **mm**						Weight **kg**	Type
			A	B	C	D	E	Ø		
10	RLT010	97%	475	345	520	320	320	10	82	II
15	RLT015	97,3%	545	385	615	350	360	10	122	II
20	RLT020	97,6%	615	425	690	400	400	10	148	II
25	RLT025	97,9%	615	425	690	400	400	10	174	II
30	RLT030	98%	615	425	690	400	400	10	210	II
40	RLT040	98,1%	775	575	940	400	550	10	239	II
50	RLT050	98,2%	775	575	940	400	550	10	288	II
63	RLT063	98,3%	775	575	940	400	550	10	338	II
80	RLT080	98,4%	775	575	940	400	550	10	395	II
100	RLT100	98,5%	930	710	1275	480	670	16	487	III

Type III



* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.
* Also available on IP-00 (open construction without enclosure) on request.

Three phase isolating transformers
Factor "K" intended for installations with harmonics

Three phase transformer with galvanic isolation between primary and secondary, includes an electrostatic shield for installations with a high level of harmonic distortion.

Transformers factor "k" of Torytrans provide a special design features that protect the transformer from harmonics current that cause losses and overheating at the windings of transformers.

The "K" factor is a constant that indicates the capacity of the transformer to supply non-linear loads (e.g. induction furnaces, variable speed motors, rectifiers, data centers ...) and support harmonic currents without exceeding their operating temperature (do not filter harmonics).

Construction into enclosure, protection degree of IP-23, metal cabinet with epoxy powder coating polyester resin with excellent mechanical and physical properties corrosion. Type II enclosure includes wheels.

Technical Characteristics

Power rating	10 ÷ 500 kVA
Input voltage	3 x 400 V
Output voltage	3 x 400 V + N
Vector group	Dyn11
Frequency	50/60 Hz
Factor K harmonics overload	k = 13 k = 20
Harmonic distortion max. admissible	THD-I ≈ 50% (k=13) THD-I ≈ 80% (k=20)
Neutral overload max. admissible	2 x I_N
Ambient temp	30 ºC
Insulation class	F (155 ºC) Up to 100 kVA H (180 ºC) From 125 kVA
Protection degree	IP-23
Safety class	Class I
Voltage test	3 kV

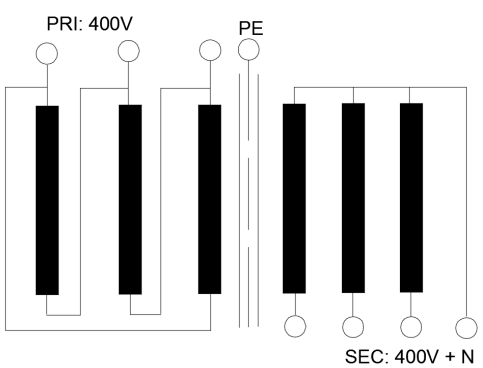
Standard

CE

<u>Power rating ≤ 40 kVA:</u>
IEC/UNE-EN 61558-1

<u>Power rating > 40 kVA:</u>
IEC/UNE-EN 60076-11

Electrical diagram



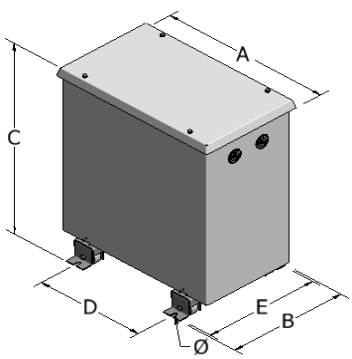
• Select the K factor depending on the application and harmonics in the network:

Factor	Applications
K =13	Informatics and Telecommunications equipment UPS without input filtering Lighting with electronic ballast General facilities of offices General facilities of production lines
K = 20	Data Centers Variable Frequency drives (VFD) Induction furnaces Welding equipment Machine tools with numerical control General facilities in critical areas as operating/recovery rooms of hospitals

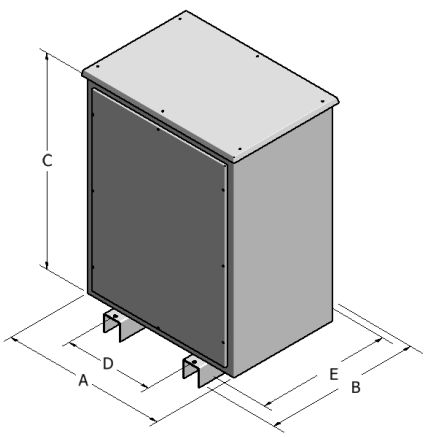
Series TTFK

Rating **kVA K = 13**	Rating **kVA K = 20**	Reference	Dimensions **mm**						Weight **kg**	Type
			A	B	C	D	E	Ø		
10	8	TTFK010	545	385	615	350	360	10	87	II
12	10	TTFK012	545	385	615	350	360	10	100	II
16	12	TTFK016	615	425	690	400	400	10	120	II
20	16	TTFK020	615	425	690	400	400	10	140	II
25	20	TTFK025	775	575	940	400	550	10	202	II
31	25	TTFK031	775	575	940	400	550	10	235	II
40	31	TTFK040	775	575	940	400	550	10	282	II
50	40	TTFK050	775	575	940	400	550	10	267	II
63	50	TTFK063	775	575	940	400	550	10	329	II
80	63	TTFK080	930	710	1275	480	670	16	445	III
100	80	TTFK100	930	710	1275	480	670	16	605	III
125	100	TTFK125	930	710	1275	480	670	16	735	III
160	125	TTFK160	1070	880	1460	660	840	16	800	IV
200	160	TTFK200	1070	880	1460	660	840	16	990	IV
250	200	TTFK250	1070	880	1460	660	840	16	1200	IV
315	250	TTFK315	1070	880	1460	660	840	16	1355	IV
400	315	TTFK400	1210	1070	1650	660	840	16	1564	IV
500	400	TTFK500	1210	1070	1650	660	840	16	1763	IV

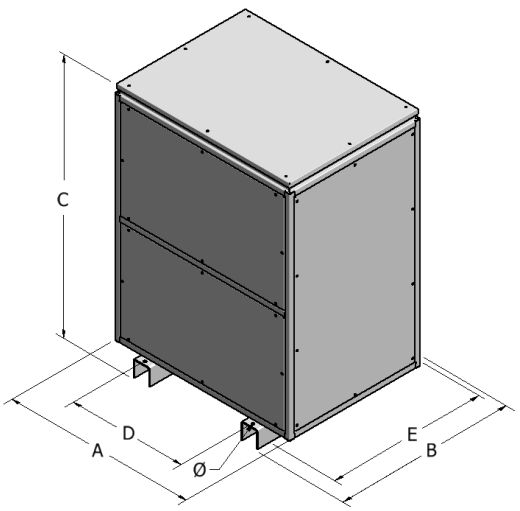
* Other features, power, voltage, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type II



Type III



Type IV

Harmonic filtering compensator transformers IP-23

- Electromagnetic filters for the elimination of harmonics based on the cancellation and compensation of magnetic fluxes. Three phase isolating transformers with electrostatic shield between primary and secondary and galvanic isolation of the load.
- Improves energy efficiency, power factor and current and voltage distortion.
- Reduces phase currents, neutral current and neutral-earth voltage.

- **TAC3** compensator is especially designed to cancel homopolar current harmonics (3º-9º-15º) generated by computers, fluorescents and discharge lamps, power supplies, motor starters and other types of single phase non-linear loads. Indicated for data centers, bank offices, telecommunication buildings, etc.
- **TAC5** compensator provides two outputs (12 pulses), each supplying 50% of the load. It is especially designed to cancel current harmonics (5º-7º-17º) generated by frequency converters, variable speed drives for motors, UPS systems, rectifiers, soft-starters and other types of non-linear loads. Indicated for large HVAC installations, three phase coupled power converters and simultaneously working.
- Installed into metal enclosure IP-23 protection degree, resin polyester-epoxy powder coated with excellent physical-mechanical and anti-corrosive properties.

Technical characteristics

Power rating	5 ÷ 200 kVA
Input voltage	3 x 400 V
Output voltage	3 x 400 V + N
Frequency	50/60 Hz
Harmonics overload factor	K ≥ 20
Crest factor of current wave	4,5
Ambient temp.	30 ºC
Insulation class	F (155 ºC) Up to 100 kVA H (180 ºC) From 125 kVA
Protection degree	IP-23
Safety class	Class I
Test voltage	3 kV
Standard	IEC/UNE-EN 61558-1 IEC/UNE-EN 60076-11

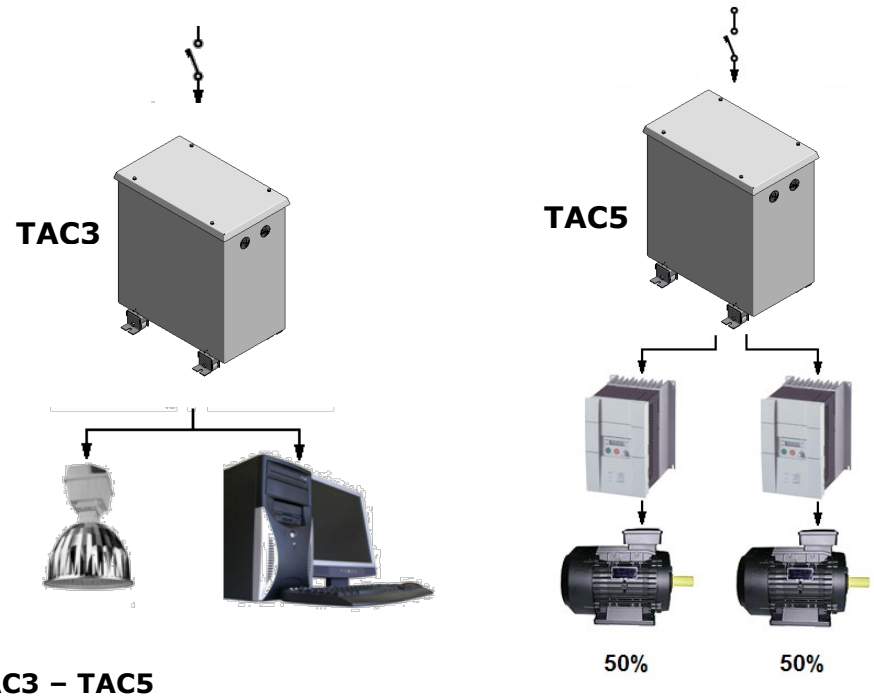
CE

- Select model TAC3 or TAC5 according to harmonic type present in the network:

		TAC3	TAC5
Current harmonics at network		3º-9º-15º	5º-7º-17º
% Filtering	Neutral current	≈ 90 %	-
	Phase current	≈ 25 %	≈ 40%
	THD I	≈ 50%	≈ 80%
	THD V	≈ 50%	≈ 80%

• Select compensator rating according to the load:

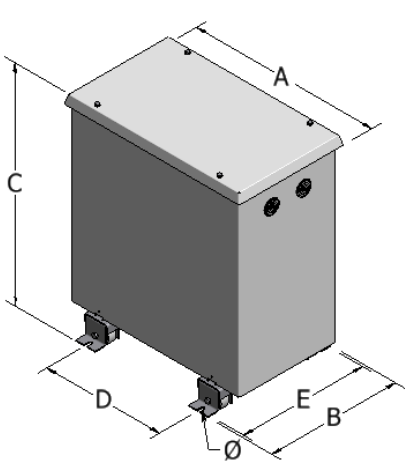
$$kVA = \sqrt{3} \times V_{TRMS} \times I_{TI} \quad / 1000$$



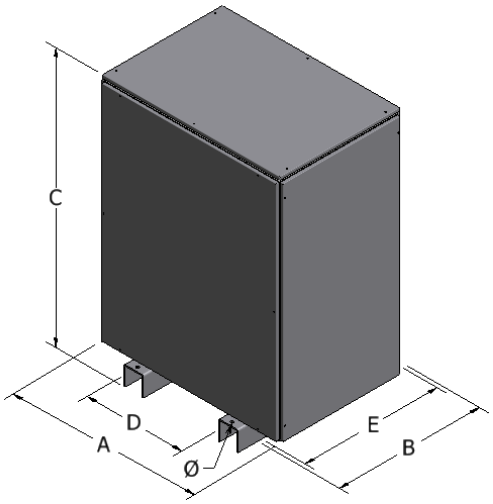
Series TAC3 – TAC5

Rating **kVA**	Reference		Dimensions **mm**						Weight **kg**	Type
	TAC3	TAC5	A	B	C	D	E	Ø		
5	TAC3005	TAC5005	475	345	520	320	320	10	55	II
10	TAC3010	TAC5010	545	385	615	350	360	10	95	II
15	TAC3015	TAC5015	615	425	690	400	400	10	125	II
20	TAC3020	TAC5020	615	425	690	400	400	10	150	II
25	TAC3025	TAC5025	615	425	690	400	400	10	178	II
30	TAC3030	TAC5030	775	575	940	400	550	10	212	II
40	TAC3040	TAC5040	775	575	940	400	550	10	254	II
50	TAC3050	TAC5050	775	575	940	400	550	10	295	III
60	TAC3060	TAC5060	775	575	940	400	550	10	320	III
80	TAC3080	TAC5080	775	575	940	400	550	10	390	III
100	TAC3100	TAC5100	930	710	1275	480	670	16	495	III
125	TAC3125	TAC5125	930	710	1275	480	670	16	600	III
160	TAC3160	TAC5160	1070	880	1460	660	840	16	780	III
200	TAC3200	TAC5200	1070	880	1460	660	840	16	900	III

* Other features, power, voltage, IP00, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.

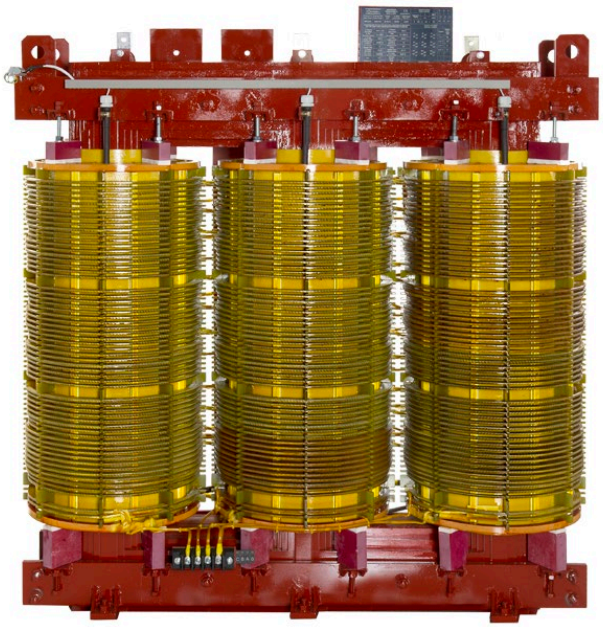


Type II



Type III

Multi-pulse harmonic filtering compensator transformers



Multi-pulse harmonic filtering compensator transformer designed for power converters such as frequency converters with high motor rating at medium voltage from 3,3 kV to 15 kV.

The multi-pulse transformer of 12 to 60 pulses cancels current harmonics, generated by the converter with multilevel technology, providing a low value of current harmonic distortion THD-I <5% and a power factor PF ≈ 0.99 without external filters, complying with the strictest standards.

As a result the electric distribution grid and the transformer do not require declassification avoiding unwanted resonances and reducing electrical losses by increasing the efficiency of the installation.

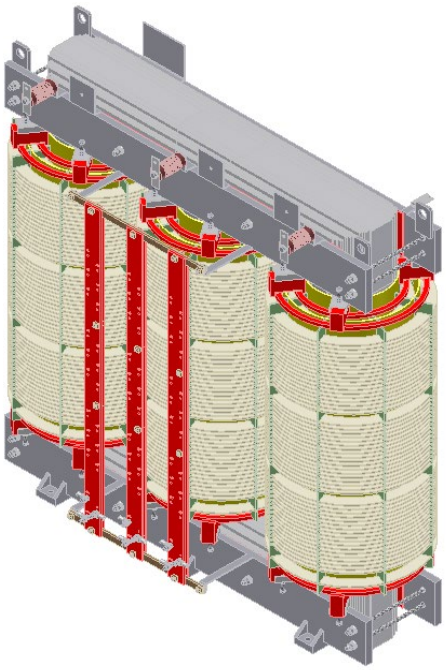
With the advanced design and manufacturing TORYTRANS technology in dry type medium voltage transformers it is provided partial discharge isolation levels lower than 10 pC, according to the standard, that ensure reliability and service life of the transformer for periods greater than 20 years.

Most common applications are for startup and speed variation of high power motors for pumping and Water purification, Mining, Power Generation, Petroleum and Gas Plants, Metallurgy and Paper sectors.

Technical characteristics

Power rating	200 ÷ 4000 kVA
PRIMARY voltage	3,3 / 4,16 / 6,6 / 11/ 15 kV
SECONDARY voltage	600 ÷ 1100 V Pulses: 12 / 18 / 24 / 36 / 48 / 60
THIRD voltage	400 V
Regulation taps	± 5% at primary
Frequency	50/60 Hz
Harmonics overload factor	K ≥ 20
Ambient temp.	50 ºC
Altitude	1000 m
Insulation class	H (180 ºC)
Protection degree	IP-00
Safety class.	Class I
Cooling	AF ≥ 3 m/s
Insulation level	3,6 / 7,2 / 12 / 17,5 kV Um
Test voltage	10 / 20 / 28 / 38 kV at 50 Hz 1 min
Lightning impulse	40 / 60 / 75 / 95 kV 1,2/50 µs
Partial discharges	< 10 pC
Temperature sensor	PT100
Standard	IEC/UNE-EN 60076-1 IEC/UNE-EN 60076-11 IEC/UNE-EN 60146-1-3 IEC/UNE-EN 61378-1

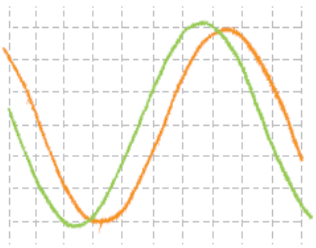
CE



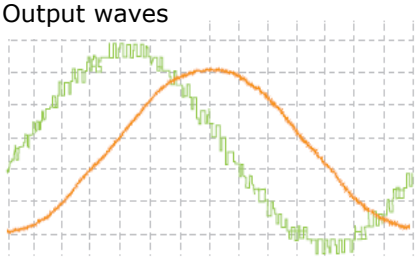
Series:

TAM12 – 12 pulses
TAM18 – 18 pulses
TAM24 – 24 pulses
TAM36 – 36 pulses
TAM48 – 48 pulses
TAM60 – 60 pulses

Input waves

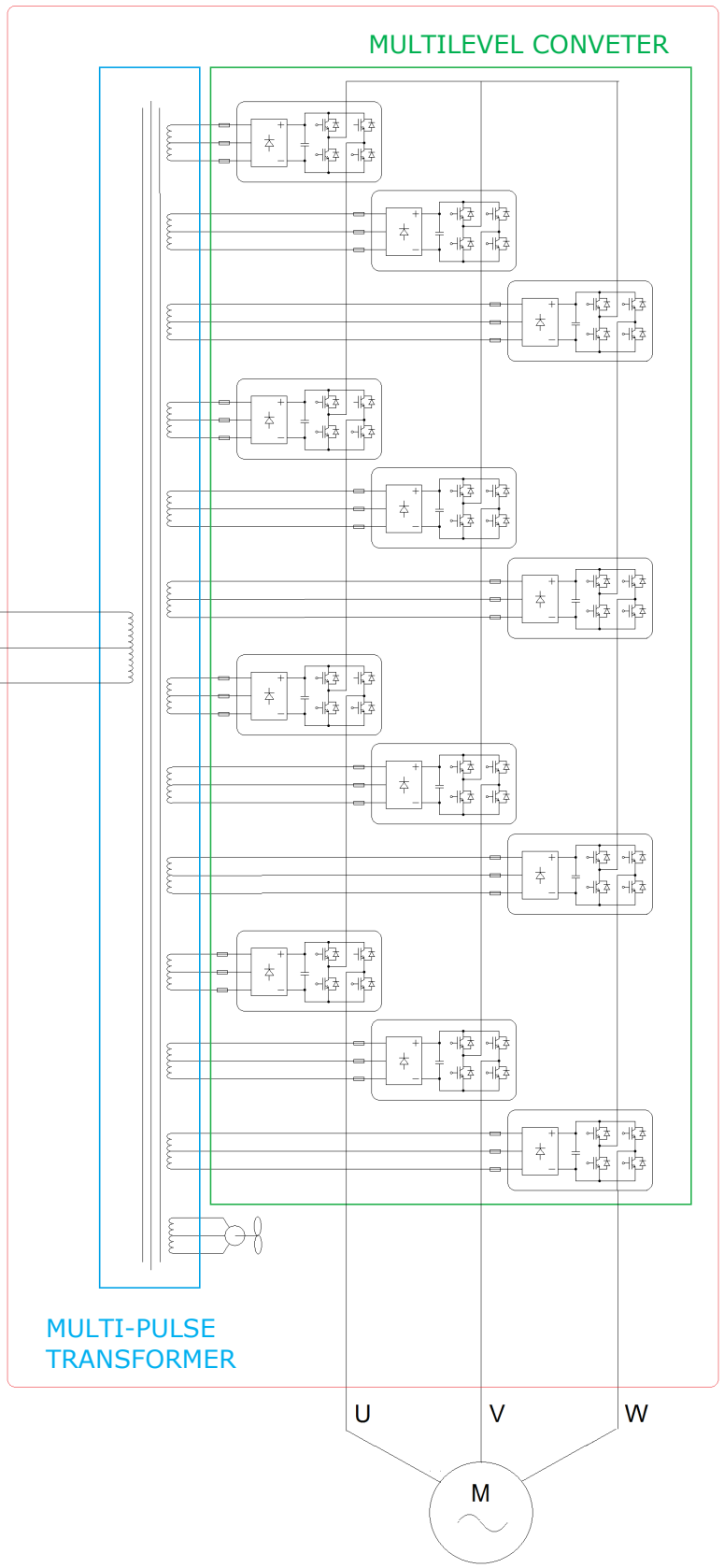


Output waves



Voltage Current

VARIABLE FREQUENCY DRIVER: MEDIUM VOLTAGE



* Other features, power, voltage, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.

TORYTRANS

Three phase to single phase transformers

Three phase to single phase isolation transformer to convert three phase power to single phase. It allows to supply single phase equipments (230 V) in three phase installations without neutral (3 x 400 V).

Minimizes the unbalance in electrical three phase power supply caused by high-power single phase loads.

Series TTMS: open transformer IP-00, vacuum impregnation with dielectric varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

Series TTMC: in metal enclosure IP-23 protection degree, resin polyester-epoxy powder coated with excellent physical-mechanical and anti-corrosive properties. Type II enclosures includes wheels.

Connection with terminal blocks (rating from 1 to 20 kVA).

Connection with screws for flat terminals (rating from 25 to 100 kVA).

Technical characteristics

Power rating	1 ÷ 100 kVA
Input voltage	3 x 400 V (Three phase)
Output voltage	230 V (Single phase)
Vector group	V - Λ inverted
Frequency	50/60 Hz
Ambient temp.	40 ºC (Series TTMS) 30 ºC (Series TTMC)
Insulation class	F (155 ºC)
Protection degree	IP-00 (Series TTMS) IP-23 (Series TTMC)
Safety class	Class I
Test voltage	4 kV

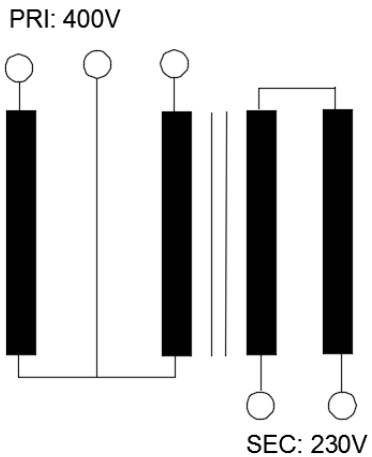
Standard

CE

<u>Power rating ≤ 25 kVA:</u>
IEC/UNE-EN 61558-1

<u>Power rating > 25 kVA:</u>
IEC/UNE-EN 60076-11

Electrical diagram

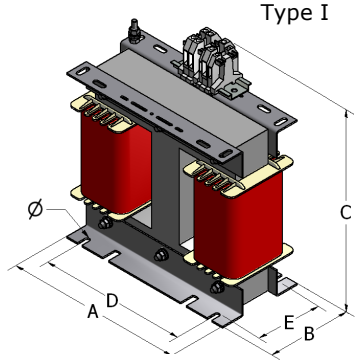


- For general use, select the power according to the load and power factor:

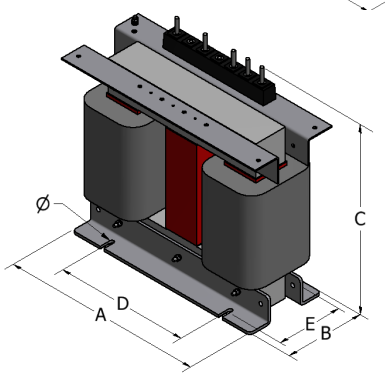
kVA = kW / Cos φ
kVA = V x I / 1000

- For loads with high inrush current or harmonics, consult "Rating selection guide" at the end of catalogue.

Type I



Type



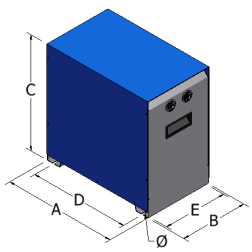
Series TTMS IP-00

Rating **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
1	TTMS001	240	140	270	200	118	7	20	I
2	TTMS002	300	130	325	200	105	7	27	I
3	TTMS003	300	170	325	200	145	7	42	I
4	TTMS004	360	155	380	320	130	11	49	I
5	TTMS005	360	165	380	320	140	11	56	I
6	TTMS006	360	185	380	320	160	11	68	I
8	TTMS008	420	195	435	350	170	11	90	I
10	TTMS010	420	215	435	350	190	11	107	I
12	TTMS012	480	190	500	400	165	11	113	I
16	TTMS016	480	240	500	400	215	11	160	I
20	TTMS020	655	260	595	400	195	13	198	I
25	TTMS025	655	270	595	400	205	13	222	II
31	TTMS031	655	290	595	400	225	13	256	II
40	TTMS040	655	320	795	400	255	13	309	II
50	TTMS050	655	280	795	400	215	13	340	II
63	TTMS063	655	320	795	400	255	13	418	II
80	TTMS080	660	350	860	480	275	13	540	II
100	TTMS100	720	350	875	480	270	13	610	II

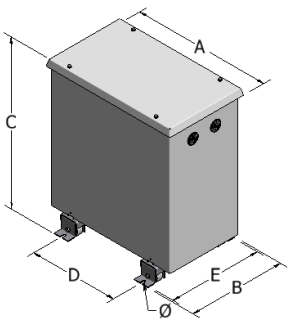
Series TTMC IP-23

Rating **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
1	TTMC001	300	185	305	265	165	7	25	I
2	TTMC002	370	225	375	325	205	7	33	I
3	TTMC003	370	225	375	325	205	7	50	I
4	TTMC004	475	345	520	320	320	10	62	II
5	TTMC005	475	345	520	320	320	10	70	II
6	TTMC006	475	345	520	320	320	10	82	II
8	TTMC008	545	385	615	350	360	10	106	II
10	TTMC010	545	385	615	350	360	10	125	II
12	TTMC012	615	425	690	400	400	10	135	II
16	TTMC016	775	575	940	400	550	10	195	II
20	TTMC020	775	575	940	400	550	10	255	II
25	TTMC025	775	575	940	400	550	10	280	II
31	TTMC031	775	575	940	400	550	10	315	II
40	TTMC040	775	575	940	400	550	10	368	II
50	TTMC050	775	575	940	400	550	10	340	II
63	TTMC063	775	575	940	400	550	10	400	II
80	TTMC080	930	710	1275	480	670	16	625	III
100	TTMC100	930	710	1275	480	670	16	695	III

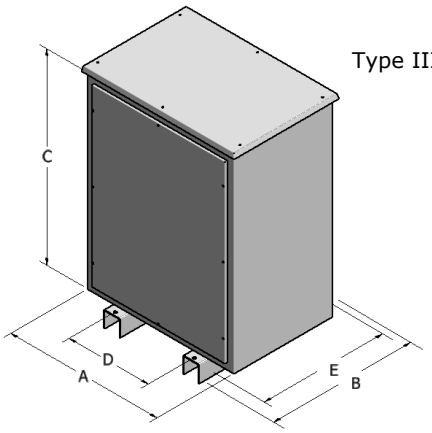
Type I



Type



Type III



* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Single phase to three phase transformers IP-23

Single phase to three phase transformer intended to convert single phase voltage 230 V to three phase 400 V. For general use with three phase low power machine-tools (saws, sanders, planers, shears, pressure washers, polishers, pumps, etc).

In general, TMT transformer is an useful solution for small industries such as wood and metal carpentries, building construction, cleaning services, etc.

TMT transformer solves the inconvenient where three phase facility does not exist, it allows the use of three phase equipment in single phase installations.

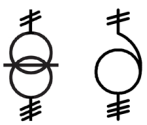
Series TMTA includes a galvanic isolation transformer that attenuates and filters possible electrical disturbances on the supply.

- Connection by Schuko II male (F, N, T) and Cetac III female plug (U, V, W, N, T) for power rating up to 6000 VA.
- Connection by screw terminals for power rating higher tan 6000 VA.

Technical characteristics

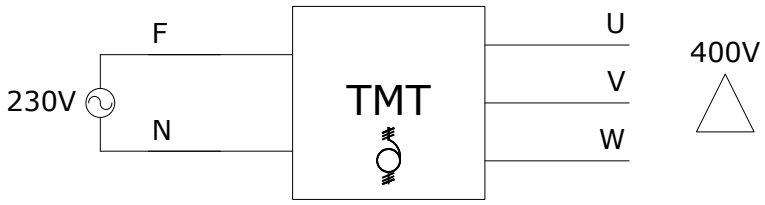
Motor rating	1 CV (0,75 kW) 2 CV (1,5 kW) 3 CV (2,2 kW) 4 CV (3 kW) 5,5 CV (4 kW) 7,5 CV (10 kW)
Input voltage	230 V (Single phase)
Output voltage	3 x 400 V (Three phase)
Frequency	50 Hz
Ambient temperature	30 ºC
Protection degree	IP-23
Cooling	AF
Input protection	Magnetothermic switch
Light status	Green (ON)
Standard	IEC/UNE-EN 61558-1 IEC/UNE-EN 61558-2-20 IEC/UNE-EN 61439-1 IEC/UNE-EN 61558-2-13

CE



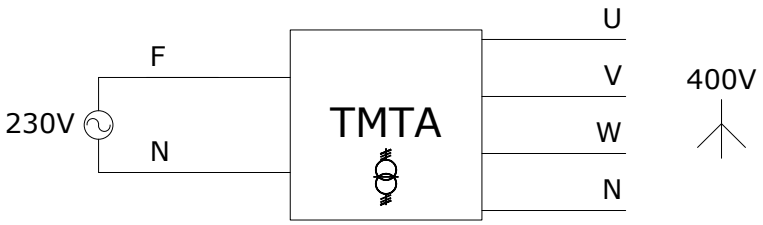
II NETWORK **TMT TRANSFORMER** **III VOLTAGE** **III LOAD MACHINE**

Series TMT – Single to Three phase transformer with three output phases.



Motor rating		Nominal rating	Reference	Dimensions **mm**						Weight	Type
kW	**CV**	**VA**		A	B	C	D	E	Ø	**kg**	
0,75	1	1500	TMT15	520	300	585	350	235	9	30	I
1,5	2	3000	TMT30	520	300	585	350	235	9	42	I
2,2	3	4500	TMT45	590	375	665	400	345	13	48	I
3	4	6000	TMT60	590	375	665	400	345	13	60	I
4	5,5	8000	TMT80	590	375	665	400	345	13	85	II
7,5	10	12000	TMT120	750	440	910	400	400	13	110	II

Series TMTA – Single to Three phase transformer with three phases + N output neutral Isolating transformer incorporated



Motor rating		Nominal rating	Reference	Dimensions **mm**						Weight	Type
kW	**CV**	**VA**		A	B	C	D	E	Ø	**kg**	
0,75	1	1500	TMTA15	520	300	585	350	235	9	60	I
1,5	2	3000	TMTA30	590	375	665	400	345	13	75	I
2,2	3	4500	TMTA45	590	375	665	400	345	13	90	I
3	4	6000	TMTA60	750	440	910	400	400	13	95	I
4	5,5	8000	TMTA80	750	440	910	400	400	13	120	II
7,5	10	12000	TMTA120	750	440	910	400	400	13	150	II

* Other features, power, voltage, etc., on request.
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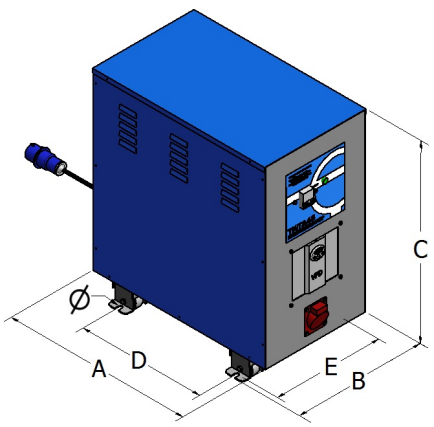
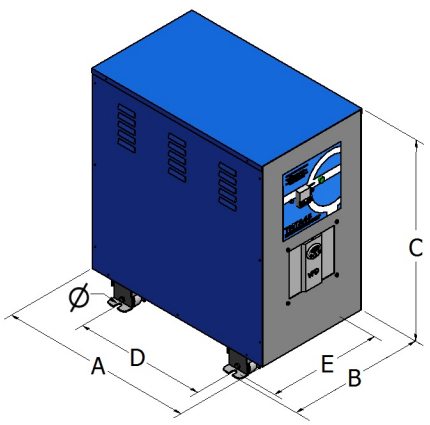




Rectifier AC / DC for voltage and current control

Controlled rectifier for voltage and current designed to be used as a power source in electrochemical processes for surface treatment, chrome, galvanic baths, electrolysis and water purification processes by electrocoagulation.

Fast response and high stability against load variations.

It allows constant control of the output voltage (voltage source mode) or constant control of the output current (current source mode).

Control board to trigger the thyristors (SCR) with adjustable input for 0-10 Volt, 4-20 mA, all / nothing.

General magnetothermic cutting load switch incorporated. Thermal protection against overload.

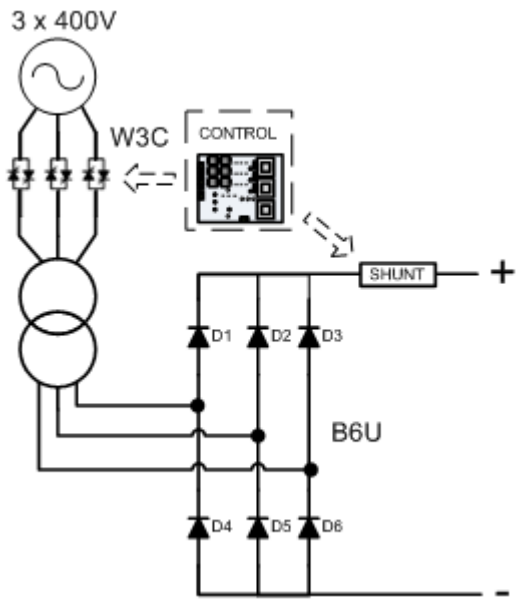
The galvanic isolation transformer provides a high degree of system reliability against electromagnetic disturbances and avoid the risk of accidental electrocution by direct contact.

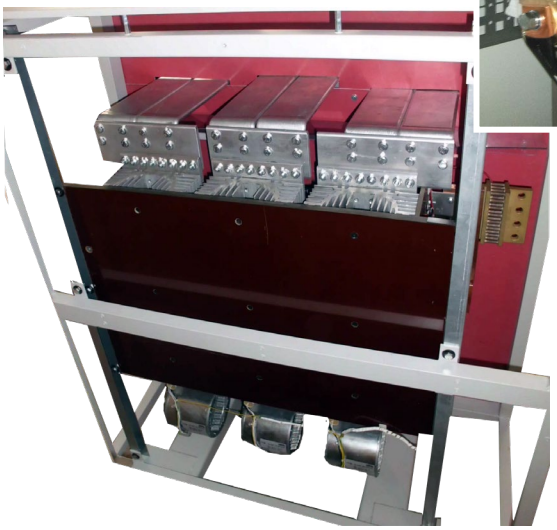
Technical characteristics

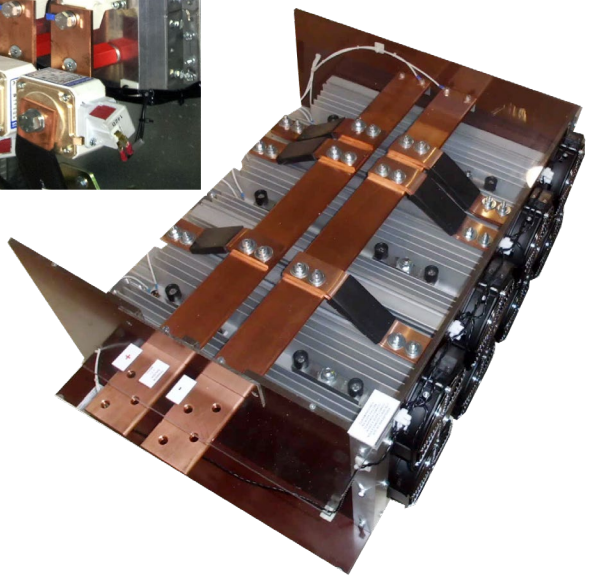
Output voltage	0 ÷ 50 Vdc
Output current	100 ÷ 5000 Adc
Input voltage	3 x 400V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Protection degree	IP-23
Cooling	Air Forced
Connection	Busbars
Rectifier	Diode bridge B6U
Regulation	Thyristors W3C
Galvanic insulation	6-pulse Transformer
Control	SCR firing board
Standard	IEC/UNE-EN 61439-1 IEC/UNE-EN 61558-1 IEC/UNE-EN 60076-11

CE

Electrical diagram



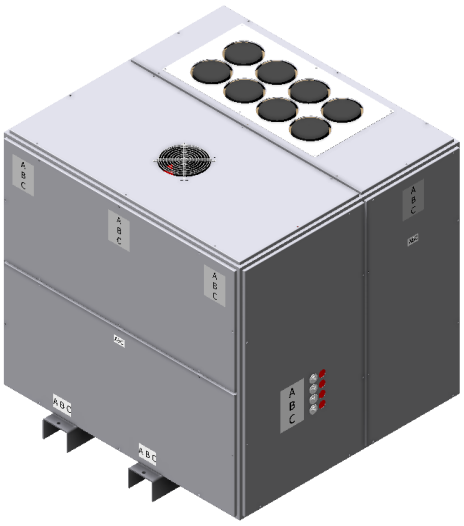


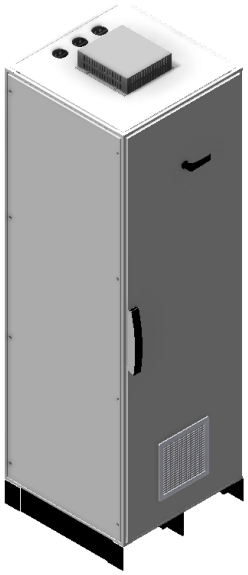


The power of the equipment is selected according to the voltage and current required by the electrochemical process

** Optional: automatic polarity reversal. Other ratings and voltages on request.*

Power cabinet





Control cabinet

TORYTRANS

Single phase reversible autotransformers IP-20

Single phase reversible Autotransformer for adjustment of the voltage 400 V / 230 V, with no requirement for electrical isolation.

Optional DIN Rail mounting (for ratings up to 200 VA) and screw fixing (for all ratings).

Advanced testing technologies have been adopted in order to satisfy the most exigent demands in terms of reliability and efficiency.

Enclosure is a V-0 technical polyamide; halogens and phosphorus free. Its safe cover protects users from the risk of electrical shocks and connections contact are not accessible by the user.

Protection IP-20 against dust, humidity and corrosion. Simple and easy mounting in cabinets, switchboards, panels or installation directly on engine/equipment.

Epoxy varnish painted core.

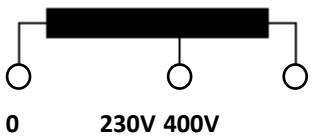
Connections by screws with self-lifting supporting washers.

Transparent cover to protect the terminal connections intended to avoid the risk of electrical contact accident.

Technical characteristics

Power rating	100 VA ÷ 10 kVA
Input voltage	400 V
Output voltage	230 V
Frequency	50/60 Hz
Ambient temperature	40 ºC
Insulation class	F (155 ºC)
Protection degree	IP-20
Safety class:	Class I
Test voltage:	3 kV
Standard	<u>Power rating ≤ 4 kVA:</u> IEC/UNE-EN 61558-1 IEC/UNE-EN 61558-2-13 <u>Power rating > 4 kVA:</u> IEC/UNE-EN 60076-11

Electrical diagram



Intended for use as a voltage adapter when an economical solution is required in applications where the galvanic isolation or attenuation of disturbances are not required

For general applications, select output rating according to the load and power factor:

VA = W / Cos φ

Low weight and small size (compared to isolating transformers)

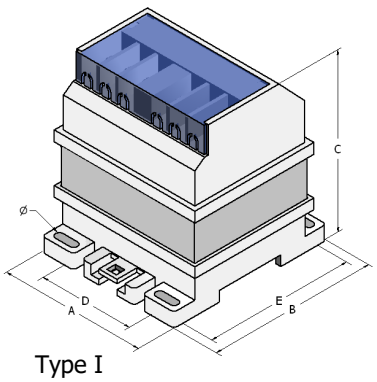
Its main advantage consists in to transform voltage up or down (reversible).

On request we can manufacture it with other voltages, with taps, with thermal switch, etc.

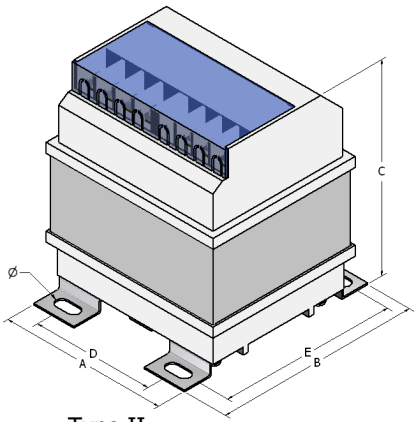
Series AME

Rating **VA**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
100	AME100	82	90	87	58	79	5,5x12	1,3	I
200	AME200	82	90	102	58	79	5,5x12	1,6	I
315	AME315	94	106	107	58	90	7x14	2,3	II
400	AME400	94	106	107	58	90	7x14	2,5	II
500	AME500	105	115	111	70	99	7x14	3,1	II
630	AME630	105	115	116	70	99	7x14	3,2	II
800	AME800	115	123	127	80	106	7x14	3,5	II
1000	AME1000	115	123	132	80	106	7x14	5,0	II
2000	AME2000	135	148	174	91	132	7X15	10,1	II
2500	AME2500	150	158	196	124	143	7X15	13,2	III
3150	AME3150	150	158	206	124	143	7X15	14,4	III
4000	AME4000	150	158	238	124	143	7X15	17,7	III
5000	AME5000	192	212	215	165	195	7X16	24,1	IV
6300	AME6300	192	212	215	165	195	7X16	27,5	IV
8000	AME8000	192	212	230	165	195	7X16	30,5	IV
10000	AME10000	240	255	235	200	235	9X18	43,1	IV

* Other features, power, voltage, etc., on request.
* Also available on IP-00 (open construction) on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type I



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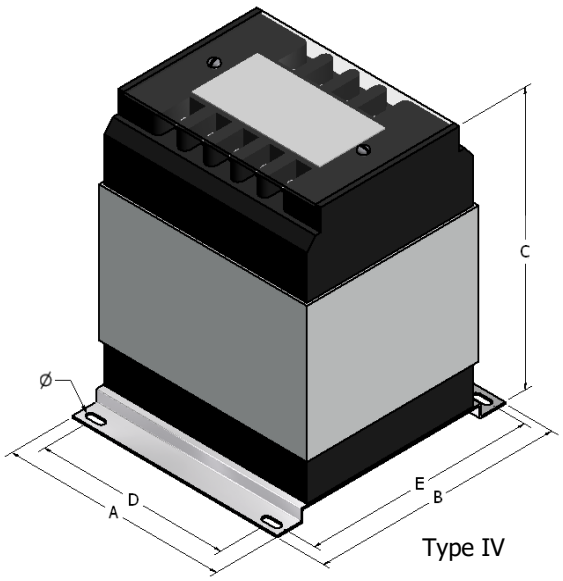
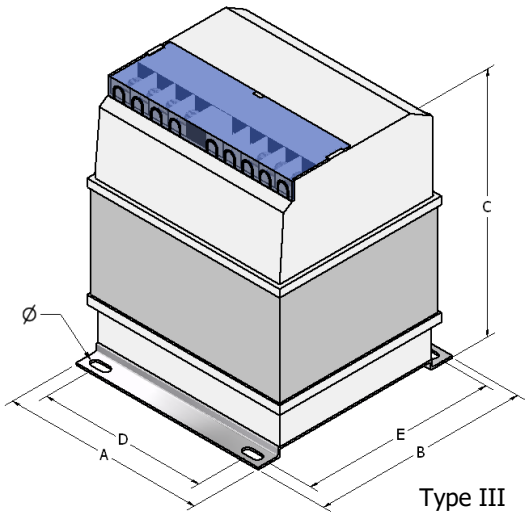


Type IV



Type III

Three phase reversible autotransformers IP-00

Three phase reversible autotransformer.

Intended for voltage adaptation in three phase systems and single phase loads with a maximum unbalance of 10% between phases.

Without galvanic isolation between primary and secondary; so they do not avoid earth faults

Vacuum impregnation with dielectric varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

Connection with terminal blocks (rating from 3 to 40 kVA).

Connection with screws for flat terminals (rating from 50 to 125 kVA).

Connection with flat busbars (rating from 160 to 1000 kVA).

Technical Characteristics

Power rating	3 ÷ 1000 kVA
Input voltage	3 x 400 V
Output voltage	3 x 230 V
Vector group	YN0
Frequency	50/60 Hz
Ambient temp	40 ºC
Insulation class	F (155 ºC) up to ATS315 H (180 ºC) from ATS400
Protection degree	IP-00
Safety class	Class I
Test voltage	3 kV

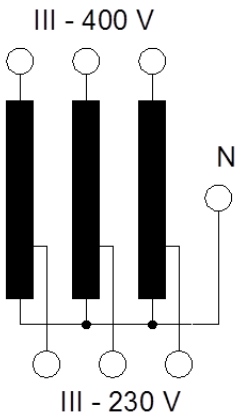
Standard

CE

Power rating ≤ 20 kVA:
IEC/UNE-EN 61558-1
IEC/UNE-EN 61558-2-13

Power rating > 20 kVA:
IEC/UNE-EN 60076-11

Electrical diagram

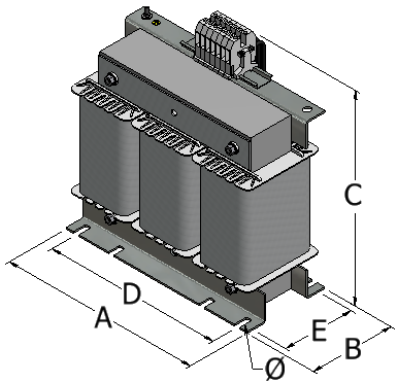


• For general use, select the power according to the load and power factor:

kW = √3 x V x I / 1000
kVA = kW / Cos φ

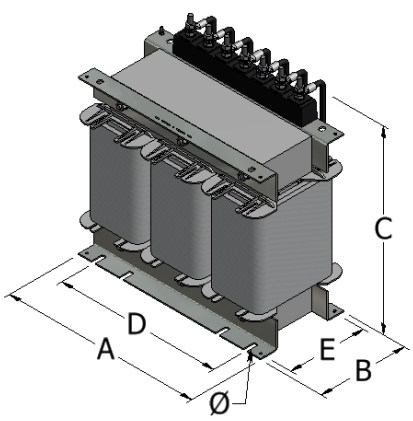
• For loads with high inrush current or harmonics, consult "Rating selection guide" at the end of catalogue.

Rating **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
3	ATS003	240	155	265	200	85	7	11	I
4	ATS004	240	165	265	200	95	7	13	I
6	ATS006	240	190	270	200	120	7	20	I
8	ATS008	300	180	320	200	95	11	24	I
10	ATS010	300	190	325	200	105	11	28	I
12	ATS012	300	220	325	200	135	11	39	I
16	ATS016	360	205	375	320	125	11	46	I
20	ATS020	360	225	380	320	145	11	57	I
25	ATS025	420	225	435	350	140	11	70	I
31	ATS031	420	235	435	350	150	11	79	I
40	ATS040	420	255	435	350	170	11	96	I
50	ATS050	480	240	500	400	155	11	107	II
63	ATS063	480	270	500	400	185	11	136	II
80	ATS080	655	325	595	400	220	13	178	II
100	ATS100	655	345	595	400	240	13	211	II
125	ATS125	655	375	595	400	270	13	258	II
160	ATS160	655	275	810	400	220	13	242	III
200	ATS200	655	305	810	400	250	13	306	III
250	ATS250	660	310	875	480	265	13	402	III
315	ATS315	660	380	905	480	335	13	569	III
400	ATS400	720	440	875	480	340	13	664	IV
500	ATS500	720	470	875	480	370	13	755	IV
630	ATS630	780	490	955	660	395	16	931	IV
800	ATS800	840	515	1025	660	420	16	1126	IV
1000	ATS1000	840	555	1035	660	460	16	1292	IV

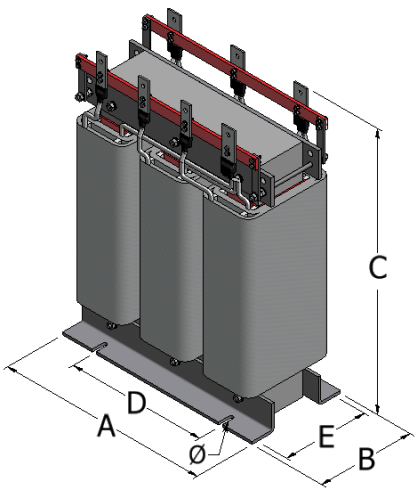


Type I

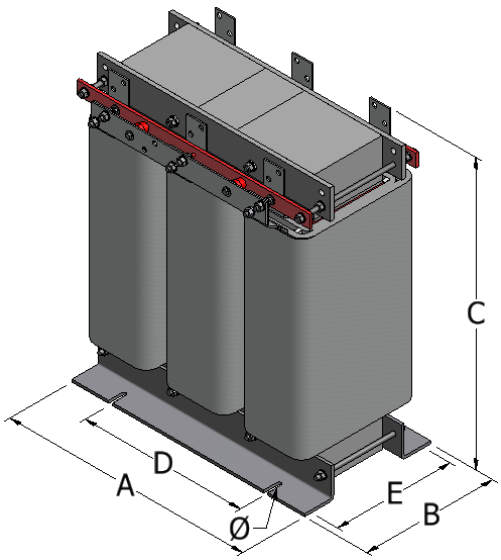
* All values show maximum dimensions.
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type II



Type III



Type IV

Three phase reversible autotransformers IP-23

Three phase reversible autotransformer.

Intended for voltage adaptation in three phase systems and single phase loads with a maximum unbalance of 10% between phases.

Without galvanic isolation between primary and secondary; so they do not avoid earth faults.

Mounting into metal enclosure, protection degree of IP-23, coated with a resin polyester-epoxy powder with excellent physical-mechanical and anti-corrosive properties. Type II enclosure includes wheels.

Connection with terminal blocks (rating from 3 to 40 kVA).

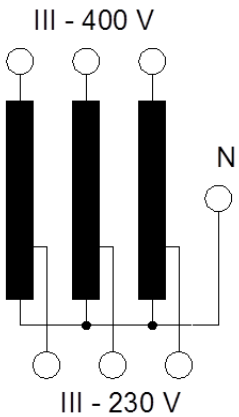
Connection with screws for flat terminals (rating from 50 to 125 kVA).

Connection with flat busbars (rating from 160 to 1000 kVA).

Technical Characteristics

Power rating	3 ÷ 1000 kVA
Input voltage	3 x 400 V
Output voltage	3 x 230 V
Vector group	YN0
Frequency	50/60 Hz
Ambient temp	30 ºC
Insulation class	F (155 ºC) up to ATC315 H (180 ºC) from ATC400
Protection degree	IP-23
Safety class	Class I
Test voltage	3 kV
Standard	<u>Power rating ≤ 20 kVA:</u> IEC/UNE-EN 61558-1 IEC/UNE-EN 61558-2-13 <u>Power rating > 20 kVA:</u> IEC/UNE-EN 60076-11

Electrical diagram



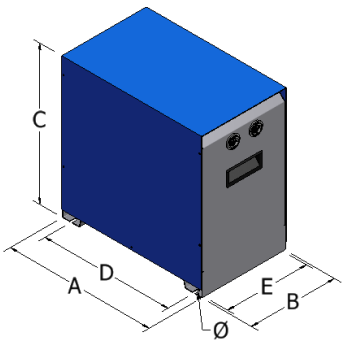
- For general use, select the power according to the load and power factor:

kW = √3 x V x I / 1000
kVA = kW / Cos φ

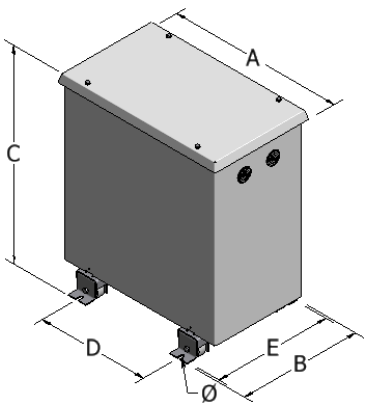
- For loads with high inrush current or harmonics, consult "Rating selection guide" at the end of catalogue.

Rating **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
3	ATC003	300	185	305	265	165	7	16	I
4	ATC004	300	185	305	265	165	7	18	I
6	ATC006	300	185	305	265	165	7	25	I
8	ATC008	370	225	375	325	205	7	32	I
10	ATC010	370	225	375	325	205	7	36	I
12	ATC012	370	225	375	325	205	7	47	I
16	ATC016	475	345	520	320	320	10	59	II
20	ATC020	475	345	520	320	320	10	70	II
25	ATC025	545	385	615	350	360	10	86	II
31	ATC031	545	385	615	350	360	10	95	II
40	ATC040	545	385	615	350	360	10	112	II
50	ATC050	615	425	690	400	400	10	127	II
63	ATC063	615	425	690	400	400	10	156	II
80	ATC080	775	575	940	400	550	10	213	II
100	ATC100	775	575	940	400	550	10	246	II
125	ATC125	775	575	940	400	550	10	293	II
160	ATC160	775	575	940	400	550	10	277	II
200	ATC200	775	575	940	400	550	10	341	II
250	ATC250	930	710	1275	480	670	16	470	III
315	ATC315	930	710	1275	480	670	16	637	III
400	ATC400	930	710	1275	480	670	16	732	III
500	ATC500	930	710	1275	480	670	16	823	III
630	ATC630	1070	880	1460	660	840	16	1049	IV
800	ATC800	1070	880	1460	660	840	16	1244	IV
1000	ATC1000	1070	880	1460	660	840	16	1443	IV

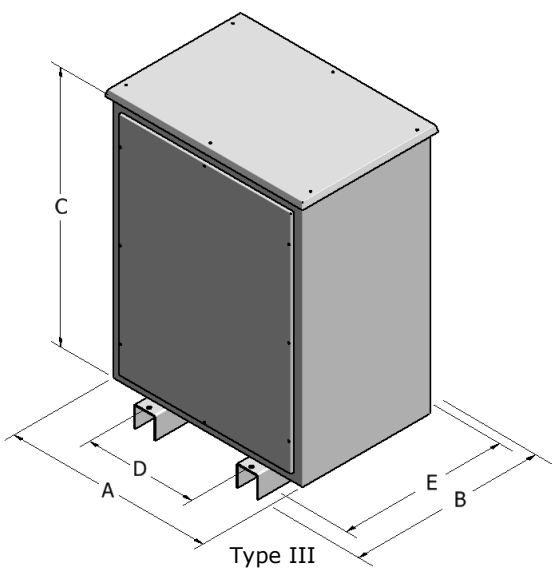
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



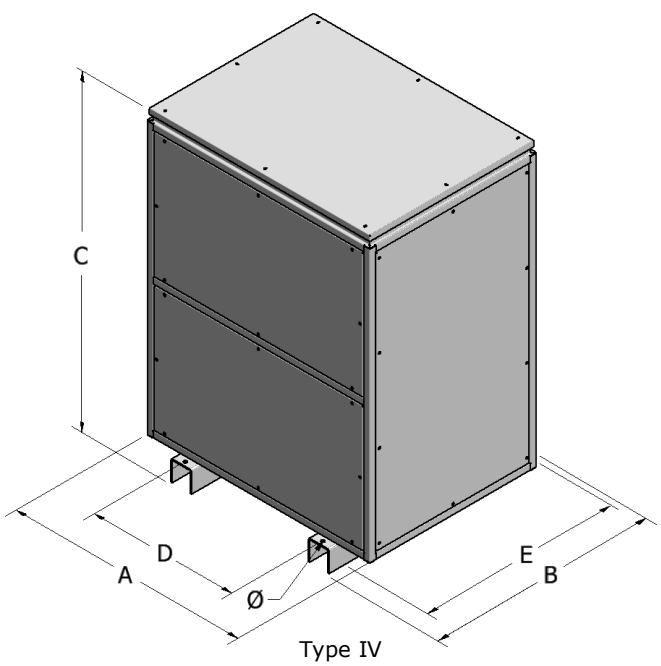
Type I



Tipo II



Type III



Type IV

Three phase Autotransformer Neutral generator

The Torytrans three-phase autotransformers Neutral generators are used to generate an artificial neutral in all those installations that do not have a neutral and need to connect single phase loads between phase-neutral.

The neutral generated for single-phase loads must not exceed a maximum imbalance between phases of 33%.

Series ATNC: in metal enclosure IP-23 protection degree, resin polyester-epoxy powder coated with excellent physical-mechanical and anti-corrosive properties. Type II enclosure includes wheels.

Series ATNS: open autotransformer IP-00, vacuum impregnation with dielectric varnish high binding power with special properties that protect windings and magnetic core against dust and humidity.

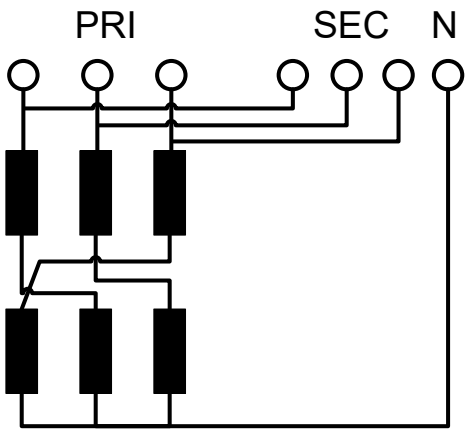
Connection by screw terminals blocks or flat busbars.

Technical Characteristics

Power rating	3 ÷ 100 kVA
Input voltage	3 x 400 V
Output voltage	3 x 400 V + N
Connection group	ZN0
Frequency	50/60 Hz
Ambient temperature	40 ºC (series ATNS) 30 ºC (series ATNC)
Insulation class	F (155 ºC)
Protection degree	IP-00 (series ATNS) IP-23 (series ATNC)
Safety class	Class I
Voltage test	3 kV
Standard	IEC/UNE-EN 61558-1 IEC/UNE-EN 61558-2-13

CE

Electrical diagram

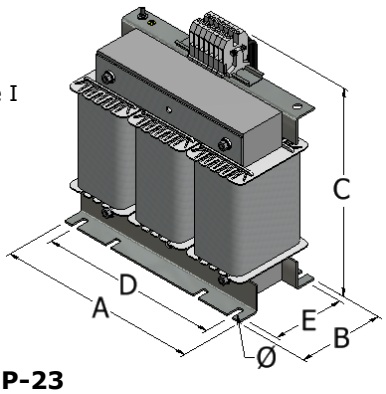


Series ATNS IP-00

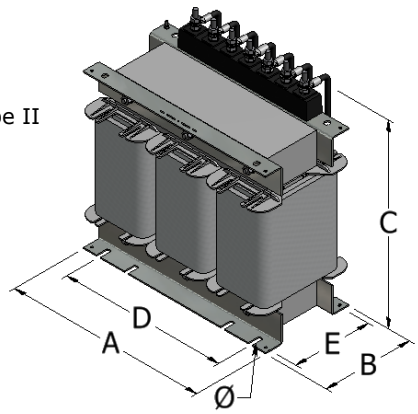
Total Rating III **kVA**	Load Rating II **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
			A	B	C	D	E	Ø		
3	1	ATNS003	180	170	240	140	100	7	10	I
5	1,6	ATNS005	240	155	270	200	85	7	15	I
8	2,6	ATNS008	300	165	310	200	95	11	22	I
10	3,3	ATNS010	300	180	310	200	100	11	25	I
12	4	ATNS012	300	190	320	200	110	11	30	I
16	5,3	ATNS016	300	210	320	200	130	11	38	I
20	6,6	ATNS020	360	190	375	320	110	11	45	I
25	8,3	ATNS025	360	210	375	320	130	11	58	I
31	10,3	ATNS031	360	230	380	320	150	11	70	I
40	13,3	ATNS040	420	210	430	350	130	11	77	I
50	16,6	ATNS050	420	240	435	350	160	11	105	I
63	21	ATNS063	480	240	490	400	160	11	135	II
80	26,6	ATNS080	480	220	490	400	140	11	150	II
100	33,3	ATNS100	655	240	595	400	160	13	180	II

* All values show maximum dimensions.

Type I



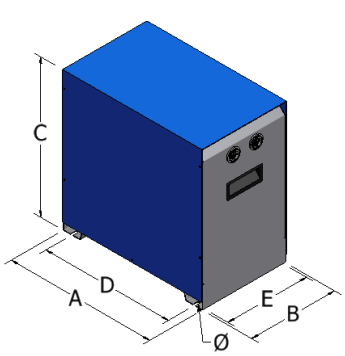
Type II



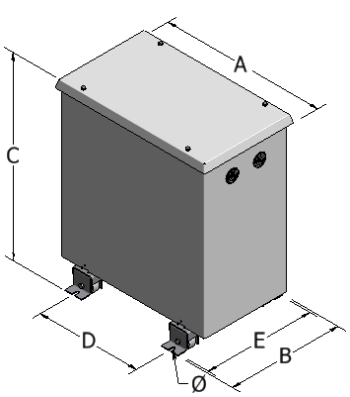
Series ATNC IP-23

Total Rating III **kVA**	Load Rating II **kVA**	Reference	Dimensions **mm**						Weight **kg**	Type
			A	B	C	D	E	Ø		
3	1	ATNC003	300	185	305	265	165	7	15	I
5	1,6	ATNC005	300	185	305	265	165	7	20	I
8	2,6	ATNC008	370	225	375	325	205	7	30	I
10	3,3	ATNC010	370	225	375	325	205	7	33	I
12	4	ATNC012	370	225	375	325	205	7	38	I
16	5,3	ATNC016	370	225	375	325	205	7	46	I
20	6,6	ATNC020	475	345	520	320	320	10	53	II
25	8,3	ATNC025	475	345	520	320	320	10	71	II
31	10,3	ATNC031	475	345	520	320	320	10	83	II
40	13,3	ATNC040	545	385	615	350	360	10	93	II
50	16,6	ATNC050	545	385	615	350	360	10	121	II
63	21	ATNC063	615	425	690	400	400	10	155	II
80	26,6	ATNC080	615	425	690	400	400	10	170	II
100	33,3	ATNC100	775	575	940	400	550	10	215	II

Type I



Type II



* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

TORYTRANS

Three phase filtering reactors for capacitor banks

Three phase reactors for harmonic rejection filters and protections of capacitors to compensate the reactive energy in installations with high content of harmonics.

The rejection filter avoids:

- Capacitor resonances that may have destructive results for the capacitor banks, main transformer and main switchboard.

- Any current amplification in the capacitor banks caused by harmonics to avoid its overtemperature and destruction.

Overtemperature and overload protection via bimetal thermal resetting relay.

Vacuum impregnation with epoxy varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

Connection with screw terminal blocks: rating up to 20 A.

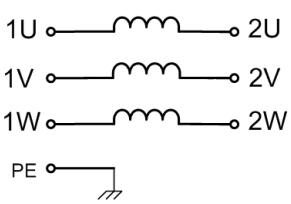
Connection with screws for flat terminals: rating from 20 to 60 A.

Connection with flat busbars: rating over 60 A.

Technical characteristics

Line voltage	3 x 400 V
Network overvoltage	106 % x U1
Harmonic distortion THD U	3º = 0,5 % 5º = 6 % 7º = 5 % 11º = 3,5 % 13º = 3 %
Frequency	50 Hz
Attenuation coefficient	p = 7%
Resonance frequency	189 Hz
Capacitor voltage	3 x 440 V
Inductance tolerance:	L ± 3 %
Admissible overload	1,1 I_N
Linearity	1,6 I_N
Insulation class	F (155 ºC)
Ambient temperature	40 ºC
Protection degree	IP-00
Test voltage	3 kV
Safety class	Class I
Protection	Bimetal thermal contact
Standard	IEC/UNE-EN 60076-6

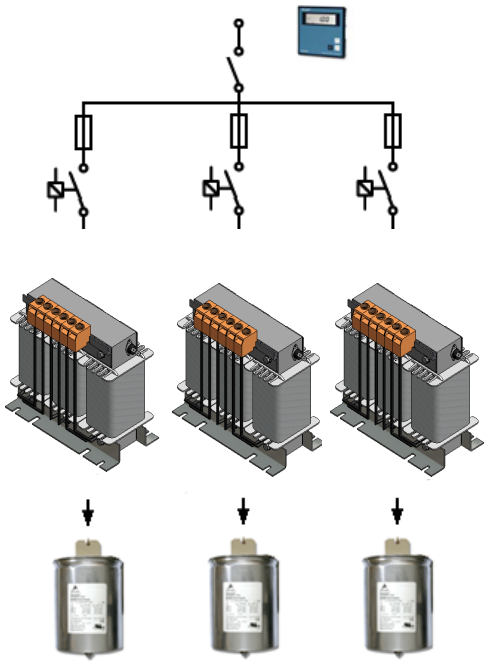
Electrical diagram



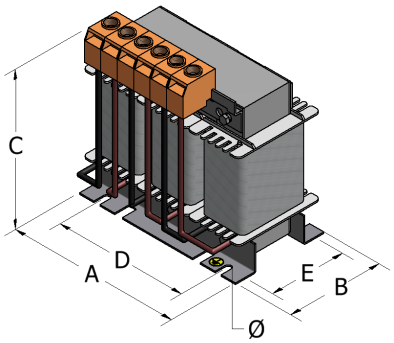
CE

Selection of the reactor according to each capacitor bank step, rating and voltage capacitor.

Effective Rating **kVAr**	Reference	Capacitor	Current **Arms**	Inductance **mH**
2,5	IRT002	440V 2,8 kVAr	4,1	15,331
5	IRT005	440V 5,6 kVAr	8,2	7,665
6,25	IRT006	440V 7,0 kVAr	10,2	6,132
10	IRT010	440V 11,3 kVAr	16,4	3,833
12,5	IRT012	440V 14,1 kVAr	20,5	3,066
15	IRT015	440V 16,9 kVAr	24,5	2,555
20	IRT020	440V 22,6 kVAr	32,7	1,916
25	IRT025	440V 28,1 kVAr	40,9	1,533
30	IRT030	440V 33,8 kVAr	49,1	1,278
40	IRT040	440V 45,0 kVAr	65,4	0,958
50	IRT050	440V 56,3 kVAr	81,8	0,767
60	IRT060	440V 67,5 kVAr	98,2	0,639
75	IRT075	440V 84,4 kVAr	122,7	0,511
100	IRT100	440V 112,5 kVAr	163,6	0,383

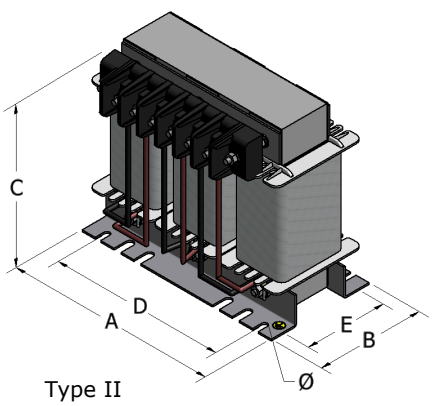


Effective Rating **kVAr**	Reference	Dimensions **mm**						Weight **kg**	Type
		A	B	C	D	E	Ø		
2,5	IRT002	150	90	150	100	62	7	3	I
5	IRT005	180	100	190	140	61	7	5	I
6,25	IRT006	180	125	190	140	86	7	8	I
10	IRT010	180	145	190	140	106	7	10	I
12,5	IRT012	240	135	215	200	88	7	10	II
15	IRT015	240	135	210	200	88	7	11	II
20	IRT020	240	155	210	200	108	7	16	II
25	IRT025	240	155	210	200	108	7	16	II
30	IRT030	265	170	250	200	113	7	22	II
40	IRT040	265	170	250	200	113	7	23	II
50	IRT050	265	155	245	200	123	7	26	III
60	IRT060	265	190	245	200	157	7	38	III
75	IRT075	300	185	305	200	137	11	43	III
100	IRT100	300	195	305	200	146	11	47	III

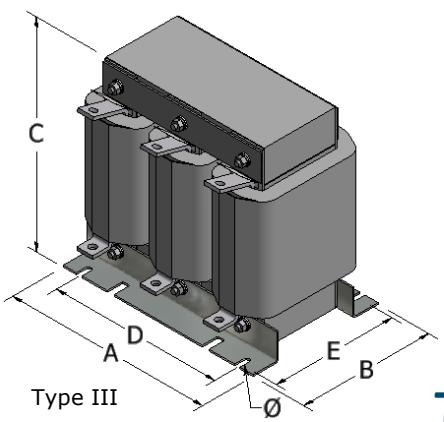


Type I

* Other features, power, voltage, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.



Type II



Type III

TORYTRANS

Three phase input line reactors for VFD

Three phase line reactors especially designed for power converters such as frequency converters, variable speed drives for DC motors, UPS systems, rectifiers, soft-starters and other types of non-linear loads.

It reduces current harmonics generated by the loads and the crest factor of the current wave. Attenuates micro cuts in the supply voltage generated by power converters.

Reduces energy consumption and improves power factor. Extends the service life of the equipment, avoids breakdowns and improves reliability.

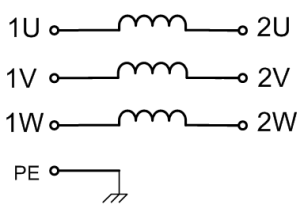
Vacuum impregnation with epoxy varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

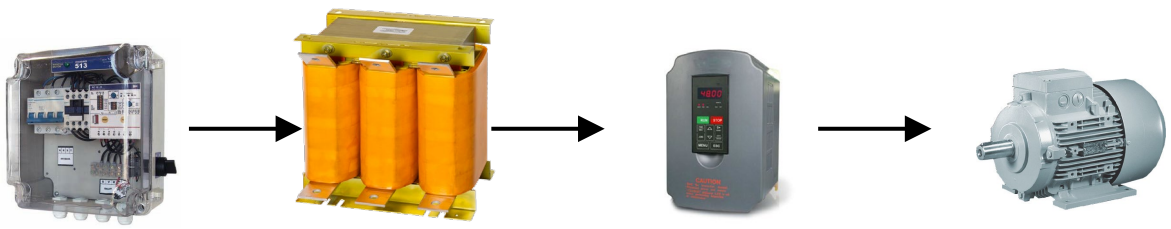
Connection with screw terminal blocks (rating up to 20 A). Connection with screws for flat terminals (rating from 25 to 100 A). Connection with flat busbars (rating over 125 A).

Technical characteristics

Motor rating	0,75 ÷ 630 kW (1 ÷ 855 CV)
Nominal current	2 ÷ 1200 A
Nominal voltage	380 ÷ 500 V
Inductive impedance	3,5 % @ 400 V, 50 Hz
Frequency	50/60 Hz
Distortion 75÷100% load Distortion 50÷75% load Distortion < 50% load	≈ 35% THD-I ≈ 45% THD-I ≈ 60% THD-I
Admissible overload	Permanent 1,07 I_N Transitory 1,5 I_N
Insulation class	F (155 ºC)
Ambient temperature	50 ºC
Protection degree	IP-00
Test voltage	4 kV
Safety class	Class I
Standard	IEC/UNE-EN 60076-6

Electrical diagram



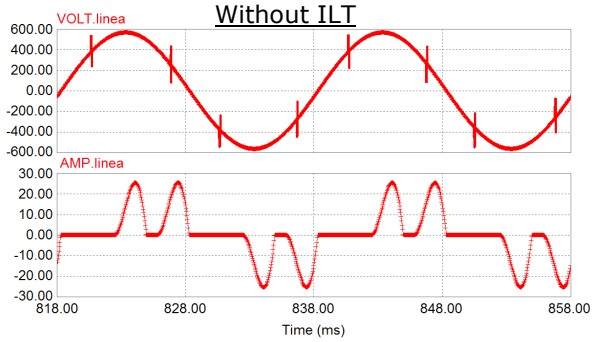


NET | **ILT** | **CONVERTER (VFD)** | **MOTOR**

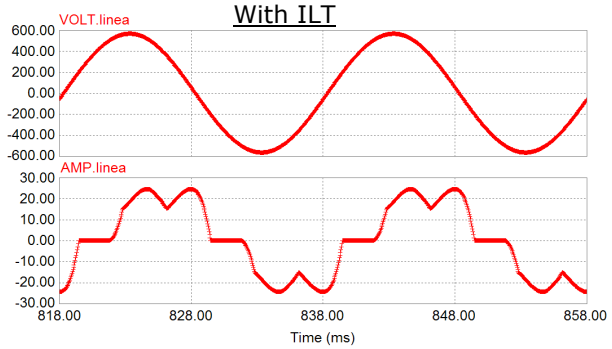
TORYTRANS

Comparative waveform of voltage-current at input of frequency converter

Without ILT

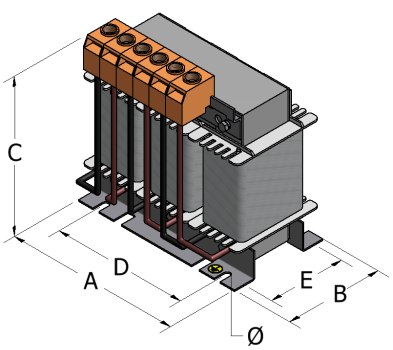


With ILT

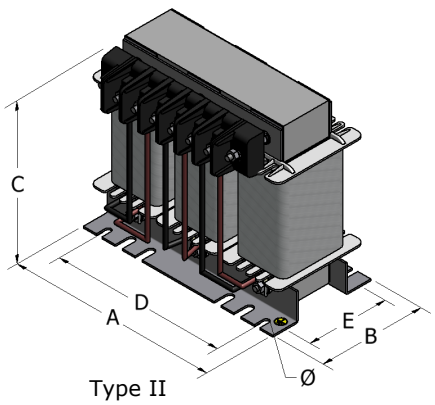


Select reactor according to motor rating

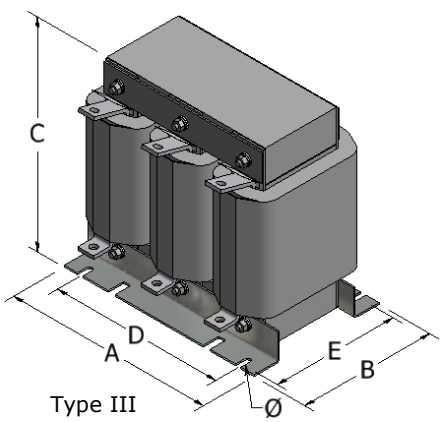
Motor rating		Rated current	Inductance	Losses	Reference	Dimensions mm						Weight	Type
kW	**CV**	**A**	**mH**	**W**		A	B	C	D	E	Ø	**kg**	
0,75	1	2	12,812	20	ILT002	120	75	125	94	47	6,5	1,1	I
1,5	2	4	6,406	30	ILT004	120	75	125	94	47	6,5	1,2	I
2,2	3	6	4,271	40	ILT006	120	84	125	94	57	6,5	1,7	I
3	4	8	3,203	45	ILT008	120	84	125	94	57	6,5	1,8	I
4	5,5	10	2,562	50	ILT010	150	72	149	100	47	7	2,3	I
5,5	7,5	15	1,708	70	ILT015	150	98	149	100	62	7	3,7	I
7,5	10	20	1,281	75	ILT020	150	98	149	100	62	7	3,9	I
11	15	25	1,025	85	ILT025	180	108	205	140	72	7	5,4	II
15	20	30	0,854	95	ILT030	180	113	205	140	77	7	6,2	II
18,5	25	40	0,641	120	ILT040	180	123	205	140	87	7	7,6	II
22	30	50	0,512	140	ILT050	240	131	210	200	90	7	9,6	II
30	40	60	0,427	150	ILT060	240	131	210	200	90	7	10,1	II
37	50	80	0,320	180	ILT080	240	151	210	200	110	7	14,7	II
45	60	100	0,256	200	ILT100	240	166	210	200	125	7	18,4	II
55	75	125	0,205	230	ILT125	300	160	252	200	100	11	21,1	III
75	100	150	0,171	310	ILT150	300	175	252	200	100	11	28	III
90	125	200	0,128	390	ILT200	300	166	302	200	110	11	28,8	III
110	150	250	0,102	480	ILT250	300	183	302	200	120	11	34,4	III
150	200	300	0,085	530	ILT300	300	193	302	200	130	11	39,3	III
185	250	400	0,064	730	ILT400	360	210	363	320	130	11	52,4	III
220	300	500	0,051	800	ILT500	360	210	363	320	130	11	55,7	III
300	410	600	0,043	850	ILT600	360	240	363	320	160	11	73,7	III
400	545	800	0,032	1060	ILT800	420	265	470	280	165	11	87,0	III
500	680	1000	0,026	1280	ILT1000	420	275	542	280	165	11	110,0	III
630	855	1200	0,022	1360	ILT1200	420	300	542	280	190	11	125,7	III



Type I



Type II



Type III

* All values show maximum dimensions.
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

TORYTRANS

Three phase output line reactors for VFD

Three phase reactors especially designed for the filtering of the power converter output voltages.

Reduces output ripple current; this reduces the risk of motor heating.

Attenuates voltage spikes dv/dt at the output of the converter. These spikes cause premature deterioration of the motor isolation.

Reduces capacitive leakages of significant long cables avoiding the consequent overload of the converter.

Vacuum impregnation with epoxy varnish high binding power with special properties that protect windings and magnetic core from dust and humidity.

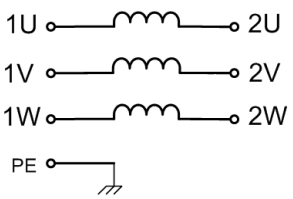
Connection with screw terminal blocks (rating up to 25 A). Connection with screws for flat terminals (rating from 30 to 80 A). Connection with flat busbars (rating over 80 A).

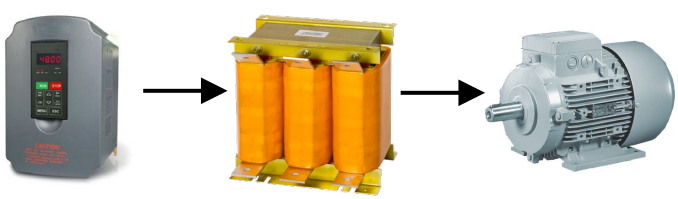
Converters' commutation frequency	Maximum cable lengths between VFD and motor
2 ÷ 4 kHz	200 m
5 ÷ 8 kHz	125 m
9 ÷ 10 kHz	50 m

Technical characteristics

Motor rating	0,75 ÷ 630 kW (1 ÷ 855 CV)
Nominal current	2 ÷ 1200 A
Nominal voltage	380 ÷ 500 V
Inductive impedance	3 % @ 400 V 50 Hz
Maximum converters´ output frequency	0 ÷ 70 Hz
Max. commutation freq.	10 kHz
Admissible overload	Permanent 1,07 I_N Transitory 1,5 I_N
Insulation class	F (155 ºC)
Ambient temperature	50 ºC
Protection degree	IP-00
Test voltage	4 kV
Safety class	Class I
Standard	IEC/UNE-EN 60076-6

Electrical diagram

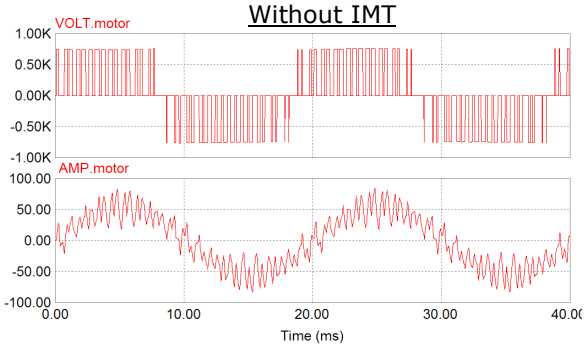




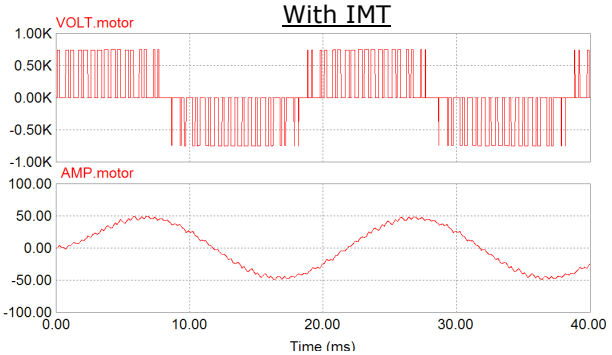
CONVERTER (VFD) **IMT** **MOTOR**

Comparative waveform of voltage-current at output of frequency converter:

Without IMT

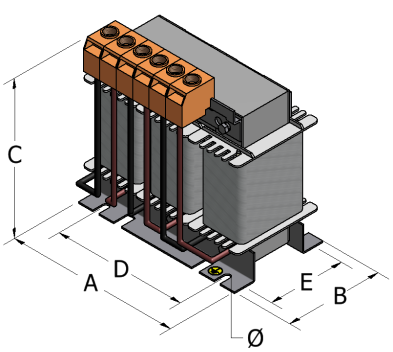


With IMT

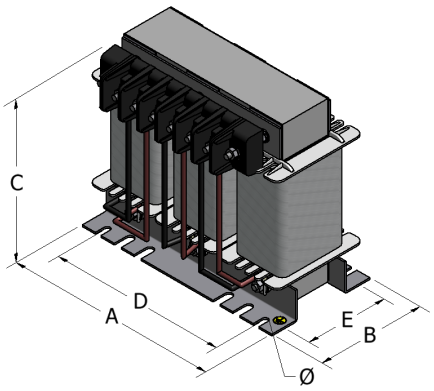


Select the reactor according to the motor rating.

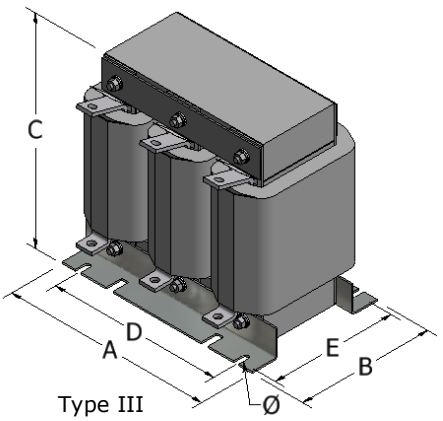
Motor rating		Rated current	Inductance	Losses	Reference	Dimensions mm						Weight	Type
kW	**CV**	**A**	**mH**	**W**		A	B	C	D	E	Ø	**kg**	
0,75	1	2	10,982	25	IMT002	120	75	125	94	47	6,5	1,2	I
1,5	2	4	5,491	35	IMT004	120	75	125	94	47	6,5	1,4	I
2,2	3	6	3,661	45	IMT006	120	84	125	94	57	6,5	1,9	I
3	4	8	2,745	60	IMT008	150	75	150	100	45	7	2,4	I
4	5,5	10	2,196	55	IMT010	150	75	150	100	45	7	2,7	I
5,5	7,5	15	1,464	65	IMT015	150	97	150	100	64	7	3,9	I
7,5	10	20	1,098	90	IMT020	180	97	200	140	64	7	5,4	I
11	15	25	0,879	95	IMT025	180	112	200	140	79	7	7,3	I
15	20	30	0,732	120	IMT030	240	131	210	200	90	7	9,2	II
18,5	25	40	0,549	130	IMT040	240	131	210	200	90	7	9,6	II
22	30	50	0,439	140	IMT050	240	131	210	200	90	7	10,3	II
30	40	60	0,366	150	IMT060	240	151	210	200	110	7	14,6	II
37	50	80	0,275	190	IMT080	240	166	210	200	125	7	18	II
45	60	100	0,22	200	IMT100	300	160	252	200	100	11	22	III
55	75	125	0,176	260	IMT125	300	190	252	200	120	11	28	III
75	100	150	0,146	340	IMT150	300	170	252	200	100	11	29	III
90	125	200	0,11	400	IMT200	300	190	252	200	120	11	35	III
110	150	250	0,088	460	IMT250	300	220	252	200	144	11	40	III
150	200	300	0,074	670	IMT300	360	215	363	320	139	11	51,5	III
185	250	400	0,055	750	IMT400	360	220	363	320	144	11	57	III
220	300	500	0,044	880	IMT500	420	220	424	350	144	11	76	III
300	410	600	0,037	890	IMT630	420	235	424	350	159	11	88,5	III
400	545	800	0,028	1030	IMT800	420	281	542	280	170	11	106	III
530	720	1000	0,022	1240	IMT1000	480	290	610	320	173	11	133	III
630	855	1200	0,0185	1530	IMT1200	480	315	610	320	198	11	161	III



Type I



Type II



Type III

* All values show maximum dimensions.
* Other features, power, voltage, etc., on request.
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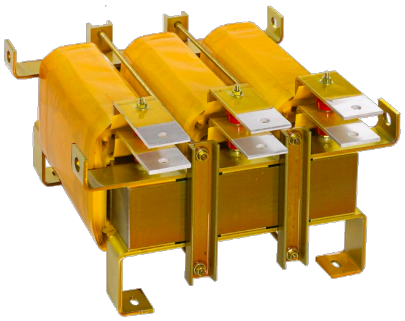
TORYTRANS

Reactors for Wind Converters



Single and three phase inductors specifically designed for wind converters:

- DFM with doubly-fed generator.
- Full Converter for low voltage LV.
- Full Converter for medium voltage MV.

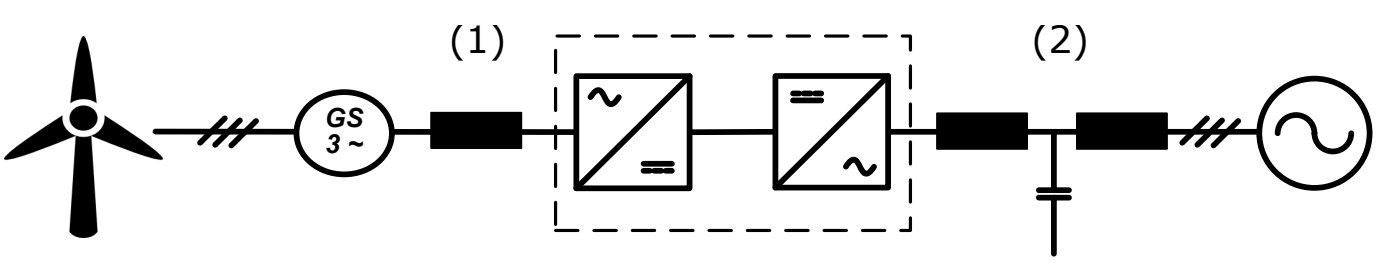
Applications and reactor types:

Reactors dV/dt & LC filter at generator side (1):
Protect the generator windings to limit voltage spikes caused by the switching converter. Reduce fault currents in rolling bearings of the turbine extending its useful life.

Reactors for LC & LCL filter at network side (2):
Filter voltage harmonics caused by the PWM modulation of the converter, adjusting the output voltage to a sine wave to make the connection to network.

Technical characteristics

Power generators	0,65 ÷ 10 MW
Nominal voltage LV	400 ÷ 750 V
Nominal voltage MV	3 ÷ 10 kV
Nominal current (A)	100 ÷ 4000 Arms
Nominal inductance (L)	1 uH ÷ 1000 mH
Nominal frequency	1 ÷ 60 Hz
Switching frequency	1 ÷ 10 kHz
Insulation class	H (180 ºC)
Ambient temperature	-25ºC ÷ 70ºC
Installation altitude	0 ÷ 4000 m
Relative humidity	up to 95%
Protection degree	IP-00
Cooling	Natural / Forced
Impregnation	VPI & drying oven
C4M treatment	Anticorrosion and long durability
Useful life	30 years
International standard	IEC/UNE-EN 60076-6
UL standard	File E354573 UL 5085-1 UL 5086-2
UL EIS	File E466028



Reactors for Photovoltaic Inverters

Single and three phase inductors specifically designed for photovoltaic inverters:

- Compact inverters
- Modular inverters
- Inverters with or without galvanic insulation

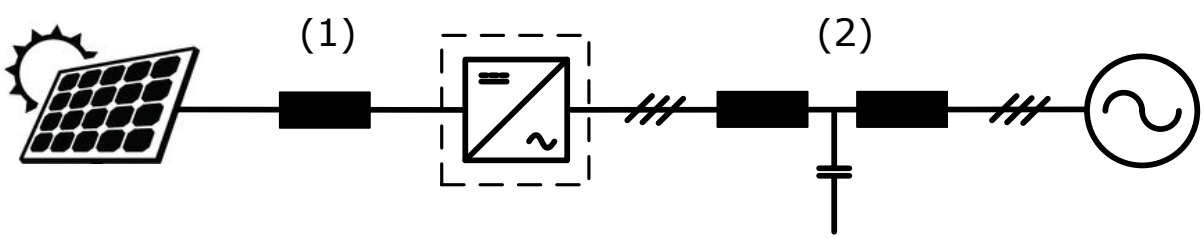
Applications and reactor types:

<u>DC common mode Reactors at panel side (1):</u>
Attenuate the harmonic components of common mode between photovoltaic panels and the inverter input.

<u>Reactors for LCL filter at network side (2):</u>
Filter voltage harmonics caused by the PWM modulation of the converter, adjusting the output voltage to a sine wave to make the connection to network.

Technical characteristics

Power inverters	10 kW ÷ 2,5 MW
Nominal voltage	230 ÷ 750 V
Nominal current (A)	10 ÷ 4000 Arms
Nominal inductance (L)	1 uH ÷ 1000 mH
Nominal frequency	50/60 Hz
Switching frequency	1 ÷ 10 kHz
Insulation class	H (180 ºC)
Ambient temperature	-25ºC ÷ 70ºC
Installation altitude	0 ÷ 2000 m
Relative humidity	up to 95%
Protection degree	IP-00
Cooling	Natural / Forced
Impregnation	VPI & drying oven
C4M treatment	Anticorrosion and long durability
Useful life	30 years
International standard	IEC/UNE-EN 60076-6
UL standard	File E354573 UL 5085-1 UL 5086-2
UL EIS	File E466028



Sinusoidal output filters for VFD

Three phase sine wave voltage output filters especially designed for frequency converters.

LC filters of TORYTRANS remove pulses generated by the output voltage of the frequency converters PWM (pulse width modulation) at high frequencies and restore sinusoidal waveform at power converter´s output.

Avoid the premature motor deterioration caused by high dV / dt, overvoltage and reflection wiring.

Increase significantly the motor's lifetime, reducing its overheating and eddy current losses.

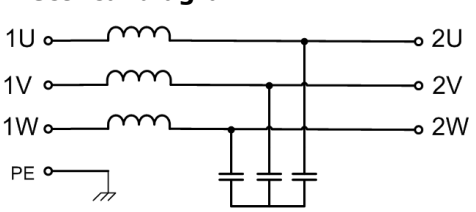
Recommended for installations with cables over 50 up to 1000 meters between the frequency converter and motor.

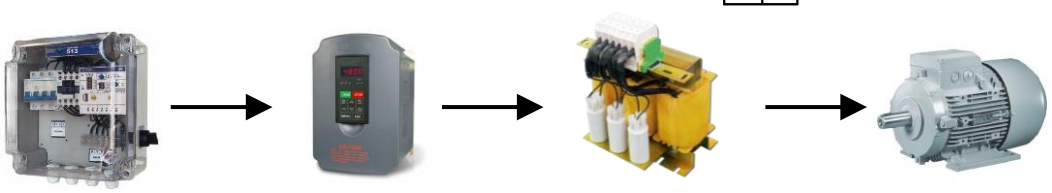
Technical characteristics

Motor rating	0,37 ÷ 630 kW (0,5 ÷ 855 CV)
Nominal current	1 ÷ 1200 A
Converter output voltage	3 x 400 V ± 20 V
Converter output frequency	0 ÷ 70 Hz
Commutation frequency	5÷8 kHz up to LC050 3÷5 kHz LC060 to LC200 2÷3 kHz from LC250
Voltage distortion	≈ 8% THD-U
Drop voltage	<5% @ I_N 50 Hz
Insulation class	H (180ºC)
Transitory overload	1,5 I_N 1 min x hour
Ambient temperature	50 ºC
Protection degree	IP-20 (up to LC040) IP-00 (from LC050)
Safety class	Class I
Standards	IEC/UNE-EN 60076-6 IEC/UNE-EN 61439-1

CE

Electrical diagram

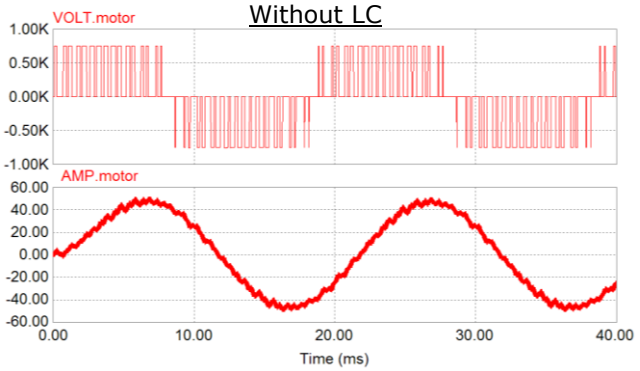




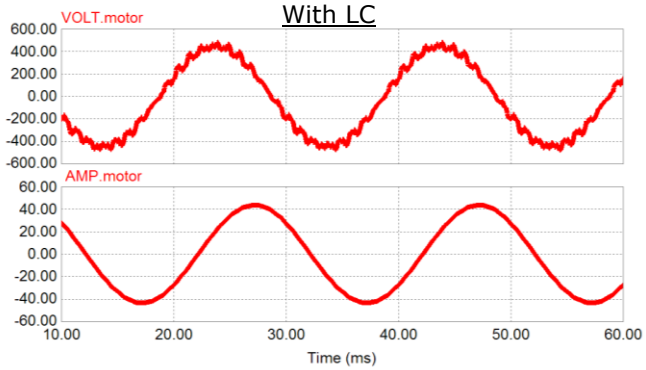
NET **CONVERTER** **LC FILTER** **MOTOR**

Output voltage-current comparative waveform of frequency converter

Without LC

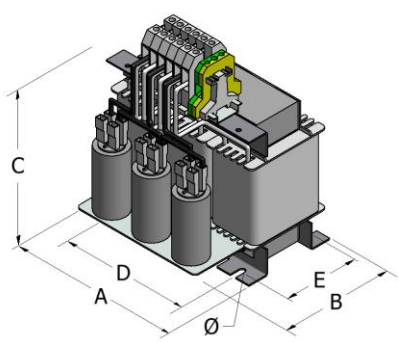


With LC

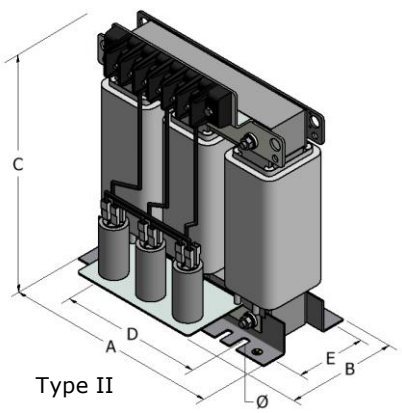


Select filter current according to motor rating.

Motor rating		Rated current	Reference	Dimensions **mm**						Weight	Losses	Type
kW	**CV**	**A**		A	B	C	D	E	Ø	**kg**	**W**	
0,37	0,5	1	LC001	150	120	190	100	46	7	2,9	38	I
0,75	1	2	LC002	150	120	190	100	46	7	3,3	48	I
1,5	2	4	LC004	150	135	190	100	61	7	4,2	55	I
2,2	3	6	LC006	150	135	195	100	61	7	4,7	60	I
3	4	8	LC008	150	135	195	100	61	7	5	73	I
4	5,5	10	LC010	180	150	215	140	82	7	8,5	85	I
5,5	7,5	15	LC015	180	155	220	140	87	7	9,5	105	I
7,5	10	20	LC020	240	170	285	200	99	7	15	123	I
11	15	25	LC025	240	170	285	200	99	7	16	140	I
15	20	30	LC030	240	195	285	200	124	7	21	152	I
18,5	25	40	LC040	240	195	285	200	124	7	22	161	I
22	30	50	LC050	300	192	355	200	105	11	29	270	II
30	40	60	LC060	300	212	355	200	125	11	36	310	II
37	50	80	LC080	300	212	405	200	125	11	43	400	II
45	60	100	LC100	300	242	375	200	130	11	50	430	III
55	75	125	LC125	300	272	379	200	160	11	68	500	III
75	100	150	LC150	300	292	379	200	175	11	77	565	III
90	125	200	LC200	360	318	473	240	174	11	90	730	III
110	150	250	LC250	420	318	543	280	169	11	110	960	III
150	200	300	LC300	420	355	550	280	194	11	135	1050	III
185	250	400	LC400	420	380	550	280	219	11	160	1220	III
220	300	500	LC500	480	360	610	320	210	11	195	1480	III
300	410	600	LC600	480	365	610	320	215	11	210	1500	III
400	545	800	LC800	480	385	610	320	235	11	250	1600	III
530	720	1000	LC1000	540	390	680	360	242	13	285	2000	III
630	855	1200	LC1200	540	430	680	360	282	13	360	2225	III



Type I



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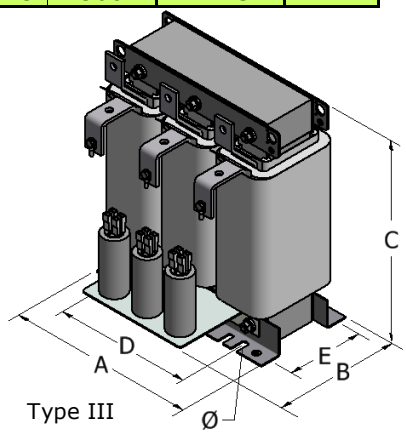


Type III

* All values show maximum dimensions.
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Sinusoidal output filters for VFD

Three phase sine wave voltage output filters especially designed for frequency converters.

LC filters of TORYTRANS remove pulses generated by the output voltage of the frequency converters PWM (pulse width modulation) at high frequencies and restore sinusoidal waveform at power converter´s output.

Avoid the premature motor deterioration caused by high dV/dt, overvoltage and reflection wiring.

Increase significantly the motor's lifetime, reducing its overheating and eddy current losses.

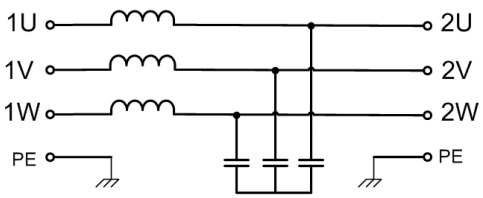
Mounting into metal enclosure, protection degree of IP-23, coated with a resin polyester-epoxy powder with excellent physical-mechanical and anticorrosive properties. Type II enclosure includes wheels.

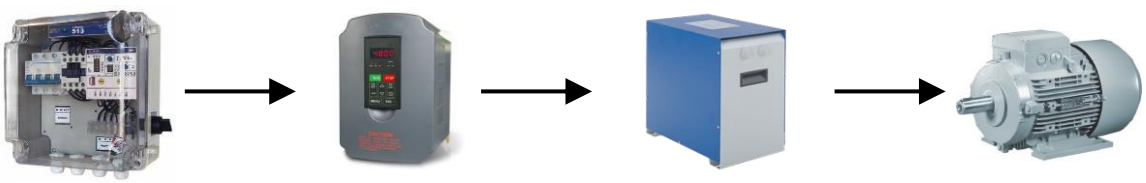
Recommended for installations with cables over 50 meters in length between the frequency converter and motor.

Technical characteristics

Motor rating	0,37 ÷ 630 kW (0,5 ÷ 855 CV)
Nominal current	1 ÷ 1200 A
Converter output voltage	3 x 400 V ± 20 V
Converter output frequency	0 ÷ 70 Hz
Commutation frequency	5÷8 kHz up to LCB050 3÷5 kHz LCB060 to LCB200 2÷3 kHz from LCB250
Voltage distortion	≈ 8% THD-V
Insulation class	H (180ºC)
Transitory overload	1,5 I_N 1 min x hour
Ambient temperature	40 ºC
Protection degree	IP-23
Safety class	Class I
Standards	IEC/UNE-EN 60076-6 IEC/UNE-EN 61439-1

Electrical diagram

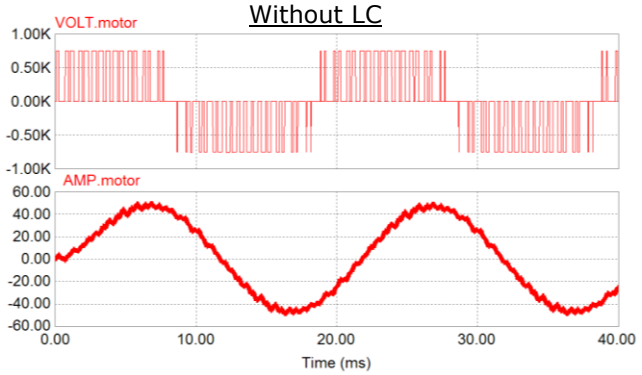




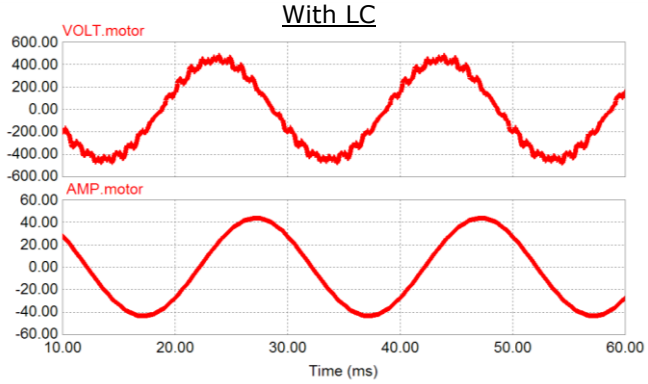
NET **CONVERTER** **LCB FILTER** **MOTOR**

Output voltage-current comparative waveform of frequency converter

Without LC

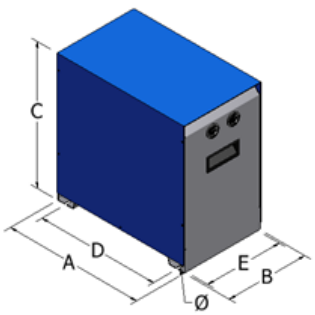


With LC

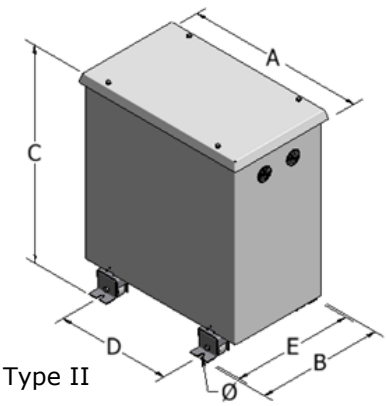


Select filter current according to motor rating

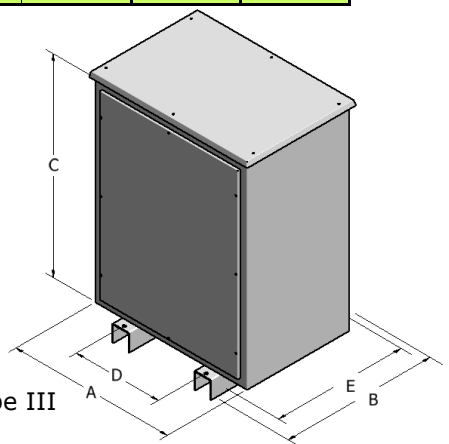
Motor rating		Rated current	Reference	Dimensions **mm**						Weight	Losses	Type
kW	**CV**	**A**		A	B	C	D	E	Ø	**kg**	**W**	
0,37	0,5	1	LCB001	230	145	245	205	125	7	6,9	37	I
0,75	1	2	LCB002	230	145	245	205	125	7	6,3	39	I
1,5	2	4	LCB004	300	185	305	265	165	7	7,2	46	I
2,2	3	6	LCB006	300	185	305	265	165	7	8,7	61	I
3	4	8	LCB008	300	185	305	265	165	7	8	73	I
4	5,5	10	LCB010	300	185	305	265	165	7	16	78	I
5,5	7,5	15	LCB015	300	185	305	265	165	7	17	96	I
7,5	10	20	LCB020	370	225	375	325	205	7	23	79	I
11	15	25	LCB025	370	225	375	325	205	7	24	127	I
15	20	30	LCB030	370	225	375	325	205	7	29	135	I
18,5	25	40	LCB040	370	225	375	325	205	7	30	141	I
22	30	50	LCB050	475	345	520	320	320	10	42	279	II
30	40	60	LCB060	475	345	520	320	320	10	49	320	II
37	50	80	LCB080	475	345	520	320	320	10	56	420	II
45	60	100	LCB100	545	385	615	350	360	10	65	308	II
55	75	125	LCB125	615	425	690	400	400	10	90	541	II
75	100	150	LCB150	615	425	690	400	400	10	100	579	II
90	125	200	LCB200	775	575	940	400	550	10	125	762	II
110	150	250	LCB250	775	575	940	400	550	10	150	1086	II
150	200	300	LCB300	775	575	940	400	550	10	158	1124	II
185	250	400	LCB400	775	575	940	400	550	10	185	1223	II
220	300	500	LCB500	775	575	940	400	550	10	230	1491	II
300	410	600	LCB600	930	710	1275	480	670	16	270	1513	III
400	545	800	LCB800	930	710	1275	480	670	16	300	1614	III
530	720	1000	LCB1000	930	710	1275	480	670	16	342	2016	III
630	855	1200	LCB1200	930	710	1275	480	670	16	415	2241	III



Type I



Type II



Type III

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Passive harmonic filters for VFD IP-20

Passive harmonic filter especially designed for 6 pulses power converters such as frequency converters, variable speed drives for motors, three phase rectifiers, battery chargers, HVAC systems …

SPF filter provides a very good cost-filtering relation and a very effective attenuation of harmonic currents in three phase facilities. Reduces wave form current distortion to the energy network and to the rest of the installation.

Reduces energy consumption due to higher efficient power energy use, reducing the power energy demand. Improves the reliability and extends the service life of equipments and electrical facilities.

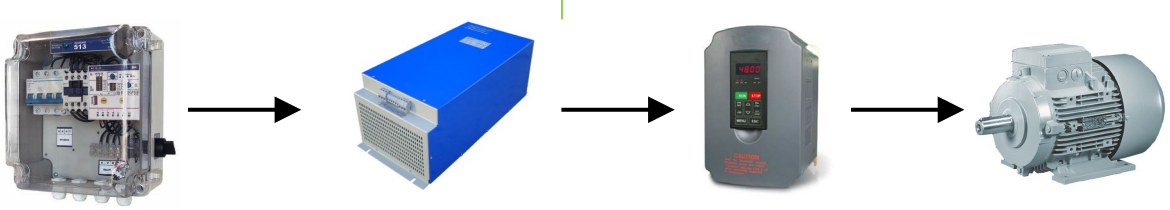
Additionally it eliminates the notches and transients generated by the power converters avoiding mal-functioning and failure in electronic devices.

Optionally, a contactor can be incorporated, that according to the converter load level, the reactive part of the filter can be switched off when no-load.

Technical characteristics

Motor rating	4 ÷ 630 kW (5,5 ÷ 860 CV)
Nominal current	9 ÷ 1171 A
Nominal voltage	3 x 400 V ± 20 V
Frequency	50 Hz
Distortion 75÷100% load	≈ 5% THD-I
Distortion 50÷75% load	≈ 6% THD-I
Distortion < 50% load	≈ 8% THD-I
Power Factor with full load	≈ 0,99
with load > 40%	≥ 0,9
Ambient temperature	30 ºC
Protection degree	IP-20
Protection	Bimetal thermal contact
Safety class	Class I
Cooling	Type I: Natural Type II: Forced
Standard	IEC/UNE-EN 60076-6 IEC/UNE-EN 61000-6

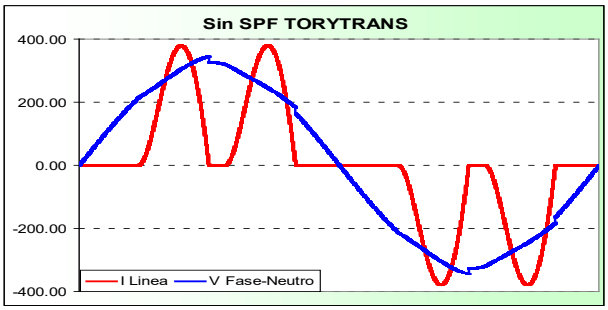
CE



NET | SPF FILTER | CONVERTER (VFD) | MOTOR

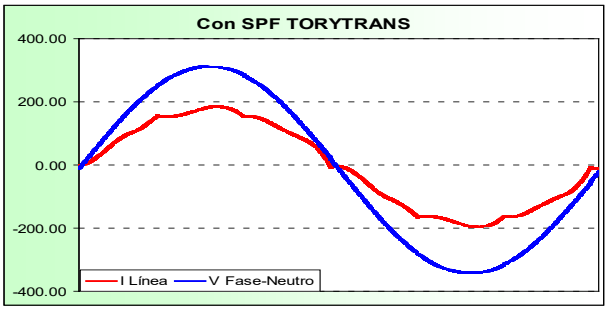
TORYTRANS

Filtering example for a 75kW motor rating



I_{rms} = 186 Arms
THD-I = 81,4 %
Individual harmonics: 5º = 69,0 %
7º = 45,8 %
11º = 9,0 %
13º = 5,3 %

V_{line} = 400 V_{rms}
THD-V = 2,7 %



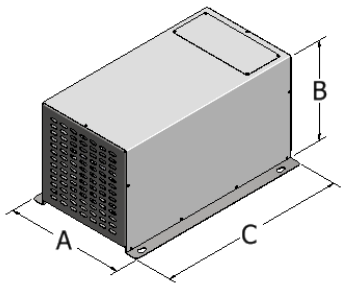
I_{rms} = 128 A_{rms}
THD-I = 4,9 %
Individual harmonics: 5º = 0,3 %
7º = 3,1 %
11º = 2,9 %
13º = 1,9 %

V_{line} = 400 V_{rms}
THD-V = 0.3 %

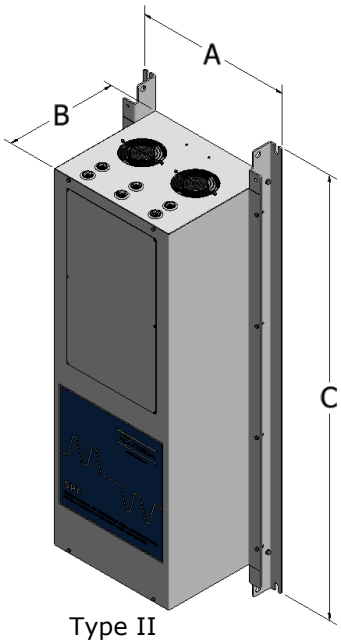
Minimization in harmonics, SPF also improves the power factor, and helps to reduce energy consumption more than 30% that allows shrinking cables section, protections size, etc, decreasing significantly installation costs.

Select filter current according to motor rating

Motor rating		Current	Reference	Dimensions mm			Weight	Losses	Type
kW	**CV**	**A**		A	B	C	**kg**	**W**	
4	5,5	9	SPF004	290	250	510	21,0	165	I
5,5	7,5	12	SPF005	290	250	510	24,6	190	I
7,5	10	16	SPF007	290	250	510	27,2	225	I
11	15	23	SPF011	330	315	610	34,3	310	I
15	20	30	SPF015	330	315	610	40,7	350	I
18,5	25	37	SPF018	330	315	610	50,4	405	I
22	30	43	SPF022	330	315	610	56,0	450	I
30	40	58	SPF030	410	390	670	66,2	565	I
37	50	72	SPF037	410	390	670	84,5	610	I
45	60	86	SPF045	410	390	670	94,4	670	I
55	75	104	SPF055	410	390	670	105	720	I
75	100	140	SPF075	490	410	1275	129	975	II
90	125	168	SPF090	490	410	1275	147	1145	II
110	150	204	SPF110	570	470	1520	193	1345	II
132	180	245	SPF132	570	470	1520	222	1435	II
150	205	278	SPF150	570	470	1520	235	1505	II
160	220	296	SPF160	570	470	1520	269	1610	II
185	270	341	SPF185	570	470	1520	298	1660	II
200	270	369	SPF200	570	470	1520	320	1835	II
220	300	406	SPF220	570	470	1520	356	1835	II
250	340	485	SPF250	570	470	1520	427	2190	II
280	380	543	SPF280	570	470	1520	439	2260	II
315	430	611	SPF315	570	470	1520	502	2555	II
355	485	667	SPF355	570	470	1520	520	2485	II
400	545	746	SPF400	630	560	1630	593	2770	II
450	610	836	SPF450	630	560	1630	690	3135	II
500	680	929	SPF500	630	560	1630	720	3115	II
560	760	1041	SPF560	630	560	1630	740	3220	II
630	860	1171	SPF630	630	560	1630	890	3200	II



Type I



Type II

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Passive harmonic filters for power converters IP-00

Passive harmonic filter especially designed for 6 pulses power converters such as frequency converters, variable speed drives for motors, three phase rectifiers, battery chargers, HVAC systems …

SPFS filter provides a very good cost-filtering relation and a very effective attenuation of harmonic currents in three phase facilities. Reduces wave form current distortion to the energy network and to the rest of the installation.

Reduces energy consumption due to higher efficient power energy use, reducing the power energy demand. Improves the reliability and extends the service life of equipment and electrical facilities.

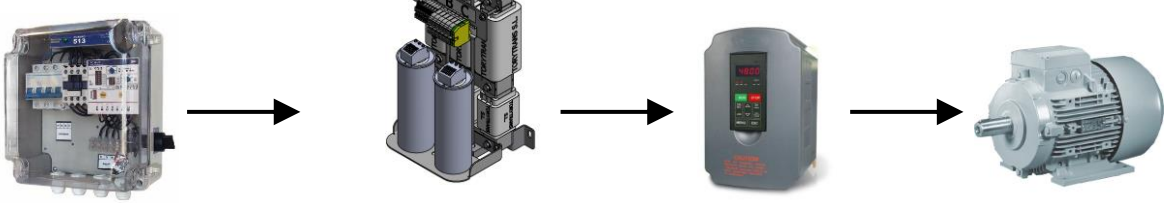
Additionally, it eliminates the notches and transients generated by the power converters avoiding mal-functioning and failure in electronic devices.

Optionally, a contactor can be incorporated, that according to the converter load level, the reactive part of the filter can be switched off when no-load.

Technical characteristics

Motor rating	4 ÷ 630 kW (5,5 ÷ 860 CV/HP)
Nominal current	9 ÷ 1171 A
Nominal voltage	380 / 400 / 415 V
Frequency	50 Hz (60 Hz add suffix Z at ref.)
Distortion 75÷100% load	≈ 5% THD-I
Distortion 50÷75% load	≈ 6% THD-I
Distortion < 50% load	≈ 8% THD-I
Power Factor with full load	≈ 0,99
with load > 40%	≥ 0,9
Admissible overload	Permanent 1,07 IN Transitory 1,5 IN
Ambient temperature	50 ºC
Insulation class	H (180ºC)
Protection degree	IP-20 up to SPFS055 IP-00 from SPFS075
Protection	Bimetal thermal contact
Safety class	Class I
Standard	IEC/UNE-EN 60076-6 IEC/UNE-EN 61000-6

CE

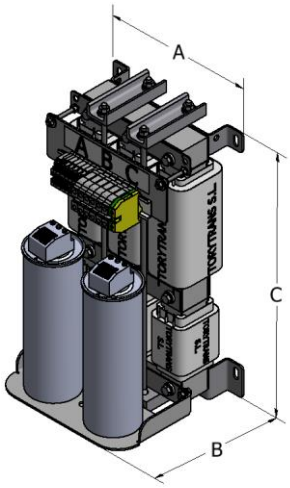


NET — SPFS FILTER — CONVERTER — MOTOR

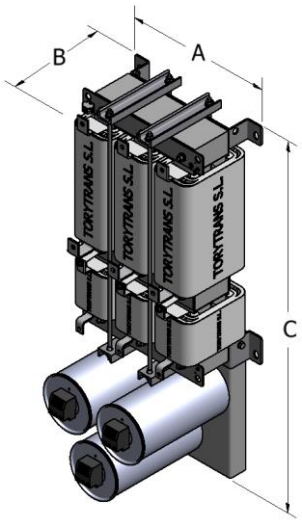
Select current rating of the filter according to the nominal power of the motor:

Motor rating		Current	Ref.	Ref.	Dimensions mm			Weight	Losses	Capacitors plate	Type*
kW	CV	A	50 Hz	60 Hz	A	B	C	kg	W		
4	5,5	9	SPFS004	SPFS004Z	210	205	410	14	165	-	I
5,5	7,5	12	SPFS005	SPFS005Z	210	210	410	16	180	-	I
7,5	10	16	SPFS007	SPFS007Z	210	230	410	20	215	-	I
11	15	23	SPFS011	SPFS011Z	260	245	495	25	335	-	I
15	20	30	SPFS015	SPFS015Z	260	250	495	30	330	-	I
18,5	25	37	SPFS018	SPFS018Z	260	265	495	38	375	-	I
22	30	43	SPFS022	SPFS022Z	260	280	495	44	460	-	I
30	40	58	SPFS030	SPFS030Z	320	325	555	59	540	-	I
37	50	72	SPFS037	SPFS037Z	320	330	555	65	610	-	I
45	60	86	SPFS045	SPFS045Z	320	345	555	77	650	-	I
55	75	104	SPFS055	SPFS055Z	320	355	555	87	690	-	I
75	100	140	SPFS075	SPFS075Z	380	345	940	105	925	-	II
90	125	168	SPFS090	SPFS090Z	380	360	940	120	1115	-	II
110	150	204	SPFS110	SPFS110Z	420	245	760	145	1395	(1x)PC2	III
132	180	245	SPFS132	SPFS132Z	420	260	760	168	1505	(1x)PC2	III
150	205	278	SPFS150	SPFS150Z	420	260	760	180	1575	(1x)PC2	III
160	220	296	SPFS160	SPFS160Z	420	280	760	192	1685	(1x)PC2	III
185	255	341	SPFS185	SPFS185Z	420	280	760	200	1715	(1x)PC2	III
200	270	369	SPFS200	SPFS200Z	480	280	860	211	1875	(1x)PC2	III
220	300	406	SPFS220	SPFS220Z	480	300	860	242	1995	(2x)PC1	III
250	340	485	SPFS250	SPFS250Z	480	320	860	285	2190	(2x)PC1	III
280	380	543	SPFS280	SPFS280Z	480	320	860	293	2260	(2x)PC1	III
315	430	611	SPFS315	SPFS315Z	480	345	860	335	2555	(2x)PC2	III
355	485	667	SPFS355	SPFS355Z	480	345	860	347	2485	(2x)PC2	III
400	545	746	SPFS400	SPFS400Z	540	330	970	395	2770	(2x)PC2	III
450	610	836	SPFS450	SPFS450Z	540	360	970	460	3135	(2x)PC2	III
500	680	929	SPFS500	SPFS500Z	540	360	970	477	3115	(3x)PC2	III
560	760	1041	SPFS560	SPFS560Z	540	360	970	493	3220	(3x)PC2	III
630	860	1171	SPFS630	SPFS630Z	540	395	970	594	3200	(3x)PC2	III

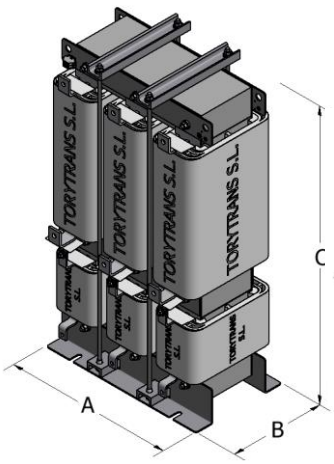
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.
* Capacitors is not included in the type III reactors body, they are supplied in an independent capacitors plate PC1 and/or PC2.



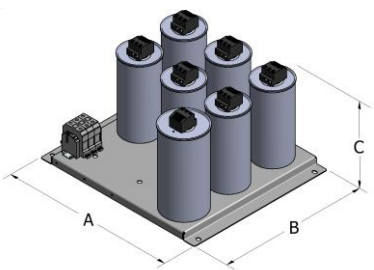
Type I



Type II



Type III



Capacitors plate

	Dimensions (mm)		
	A	B	C
PC1	560	320	325
PC2	560	480	325

Line Filters for Regenerative VFD

Series LCR Torytrans filters are designed to connect between the network and the input frequency inverters (VFD) regenerative in applications where mechanical inertia of the load can be used to regenerate energy and return it to the network at the moment of braking, such as in lift motors (elevators, escalators, forklifts, cranes, etc ...).

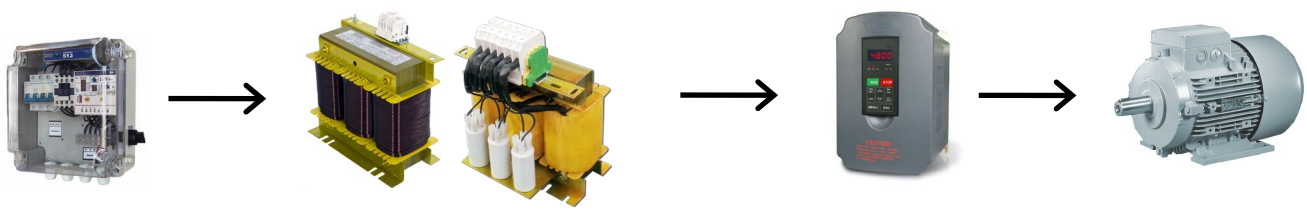
Filter the PWM voltage waveform generated by the front inverter of the converter (AFE) adapting to sine wave voltage of the network. They considerably reduce the current ripple and the THD (I) factor of the wave reinjected into the network.

The LCR filters are composed of a line reactor LCR_A connected to the network and the sinusoidal filter LCR_B connected to the input of the regenerative drive VFD.

Technical characteristics

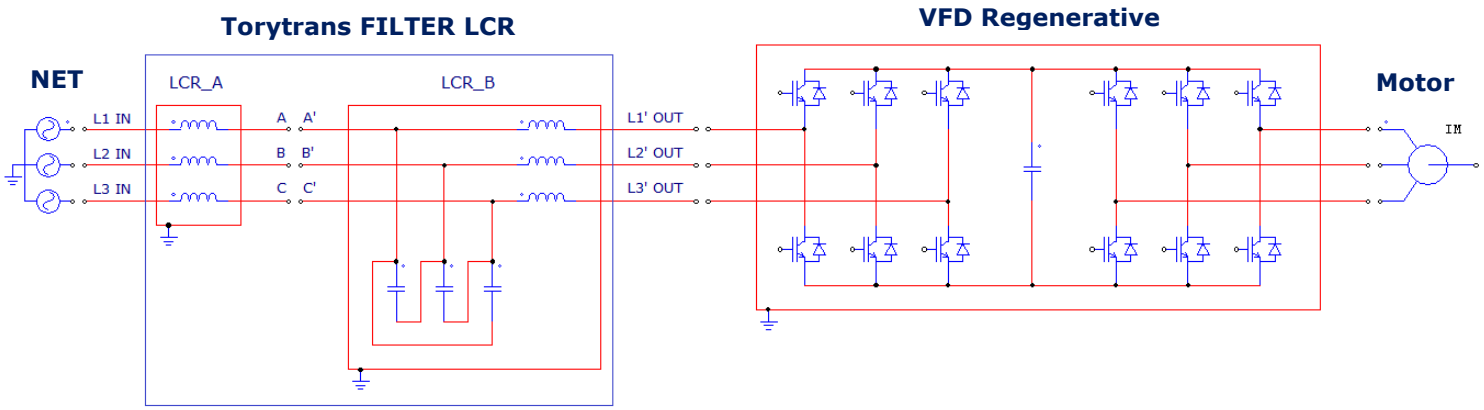
Motor rating	4 ÷ 30 kW (5,5 ÷ 40 CV)
Nominal current Filter	10 ÷ 75 A
Network voltage	3 x 400 V ± 20 V
Network frequency	50 ÷ 60 Hz
Switching frequency	2 ÷ 8 kHz
Insulation class	H (180ºC)
Admissible overload	Permanent 1,07 I_N Transitory 1,5 I_N
Ambient temperature	40 ºC
Protection degree	IP-20
Safety class	Class I
High efficiency	Bobinado en cobre Núcleo de bajas perdidas Condensadores MKP
Line Reactor	equipment LCR_A
Sinusoidal filter	equipment LCR_B
Standard	IEC / UNE-EN 60831-1 IEC / UNE-EN 60831-2 IEC/UNE-EN 61558-2-20

CE



NET | **LCR FILTER** | **VFD REGENERATIVE** | **MOTOR**

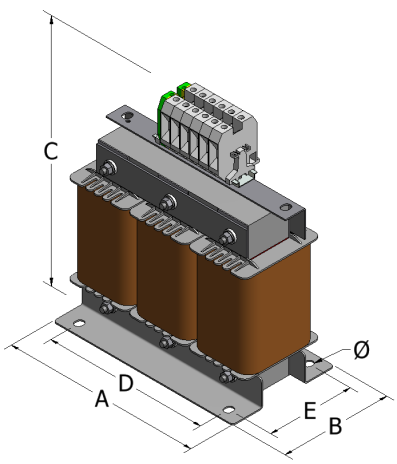
Application diagram for the TORYTRANS filter **Series LCR**



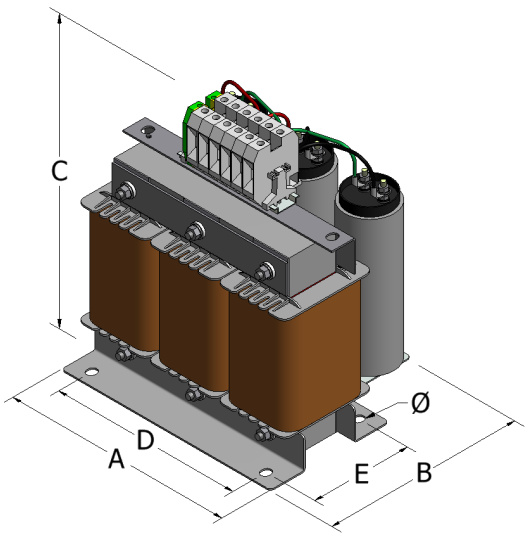
Select the filter current according to the motor rating.

Motor rating		Current	Reference	Dimensions **mm**							Weight
kW	**CV**	**A**		Equipment	A	B	C	D	E	Ø	**kg**
4	5,5	10	LCR010	LCR010A	125	80	155	100	60	5	4
				LCR010B	190	140	205	170	57	8	9
5,5	7,5	18	LCR018	LCR018A	155	85	185	130	57	8	6
				LCR018B	240	155	245	180	71	8	15
15	20	32	LCR032	LCR032A	190	90	205	170	62	8	9
				LCR032B	240	200	270	190	95	12	20
22	30	48	LCR048	LCR048A	190	110	220	170	90	8	10
				LCR048B	240	225	270	190	120	12	28
30	40	75	LCR075	LCR075A	240	120	270	180	81	8	19
				LCR075B	300	235	320	250	133	12	45

* All values show maximum dimensions.
* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.



LCR_A



LCR_B

Single phase automatic voltage stabilizers

Single phase automatic voltage stabilizers consist of a buck-boost transformer and motor driven variable autotransformer with individual phase regulation.

Torytrans voltage stabilizers provide a fast speed response time against voltage fluctuations and variation of power consumed by load. In this way, our stabilizers avoid malfunctioning and failures of equipment and installations caused by these voltage fluctuations.

Output voltage display and switch circuit breaker ON/OFF at the front panel.

No harmonic distortion and protected against short circuits and overloads.

Series SNA includes line conditioner transformer with galvanic insulation and electrostatic shield, providing a stable output voltage and attenuation and filtering of electromagnetic disturbances.

Applications:

- Data centers, processing and computer rooms.
- Transmissions, telecommunications and radio.
- Hospitals and medical centers.
- Lifts, escalators, offices, hotels and shops.
- Motors, industrial machines, lasers and robots.
- Any electronic or electric equipment sensitive to voltage variations.

Technical characteristics

Power rating	1 ÷ 60 kVA
Input voltage	230 V
Input margin	±15%
Output voltage	230 V
Output accuracy	±1%
Response time	≈ 20 V/s
Frequency	50/60 Hz
Ambient temperature	30 ºC
Protection degree	IP-23
Service	Continuous
Harmonic distortion	Nil
Load-break switch	ON/OFF
Standard	IEC/UNE-EN 61439-1
CE	<u>Power rating ≤ 25 kVA:</u> IEC /UNE-EN 61558-1 <u>Power rating > 25 kVA:</u> IEC /UNE-EN 60076-11

<u>OPTIONAL:</u>

- Enclosure for high protection degree (IP54).
- External Bypass switch.
- Additional power meter and monitoring.
- Protection against transitory surges.
- Wall mounting design.

*Customized stabilizer and features on request.

Series SN

Single phase

Rating **kVA**	Ref.	Dimensions **mm**			Weight **kg**	Type
		A	B	C		
1	SN01	370	225	375	15	I
2	SN02	370	225	375	20	I
3	SN03	450	270	492	25	II
5	SN05	450	270	492	33	II
7,5	SN07	520	310	588	42	II
10	SN10	520	310	588	55	II
15	SN15	520	310	588	76	II
20	SN20	750	450	915	80	II
25	SN25	750	450	915	122	II
30	SN30	750	450	915	127	II
40	SN40	930	640	1255	148	II
50	SN50	930	640	1255	175	II
60	SN60	1070	880	1460	212	III

Series SNA

Single phase
Line conditioner

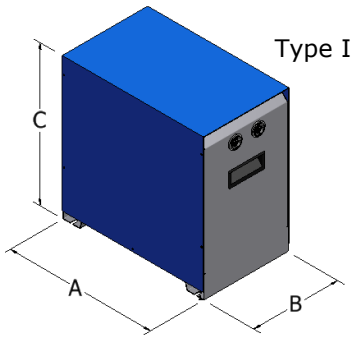
Rating **kVA**	Ref.	Dimensions **mm**			Weight **kg**	Type
		A	B	C		
1	SNA01	450	260	430	22	I
2	SNA02	450	260	430	35	I
3	SNA03	520	300	525	59	II
5	SNA05	520	300	525	82	II
7,5	SNA07	590	340	600	92	II
10	SNA10	750	440	850	130	II
15	SNA15	930	710	1275	175	III
20	SNA20	930	710	1275	209	III
25	SNA25	1070	880	1460	262	III
30	SNA30	1070	880	1460	302	III
40	SNA40	1070	880	1460	348	III
50	SNA50	1070	880	1460	425	III
60	SNA60	1280	1080	1520	502	III

* Other features, power, voltage, etc., on request
* Torytrans reserves the right to modify the information in any time and without prior notice.

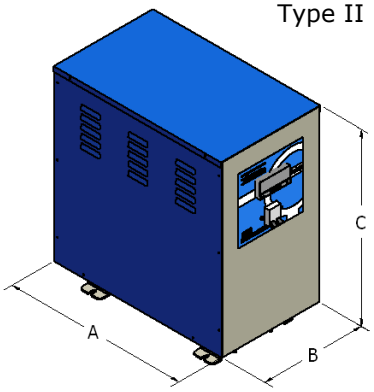
For general use, select power rating according to the load and power factor:

kVA = kW / Cos φ

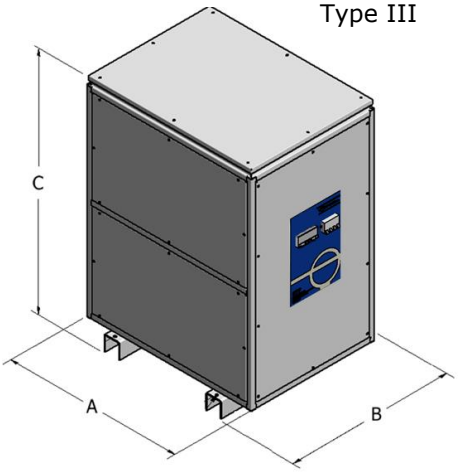
Type I

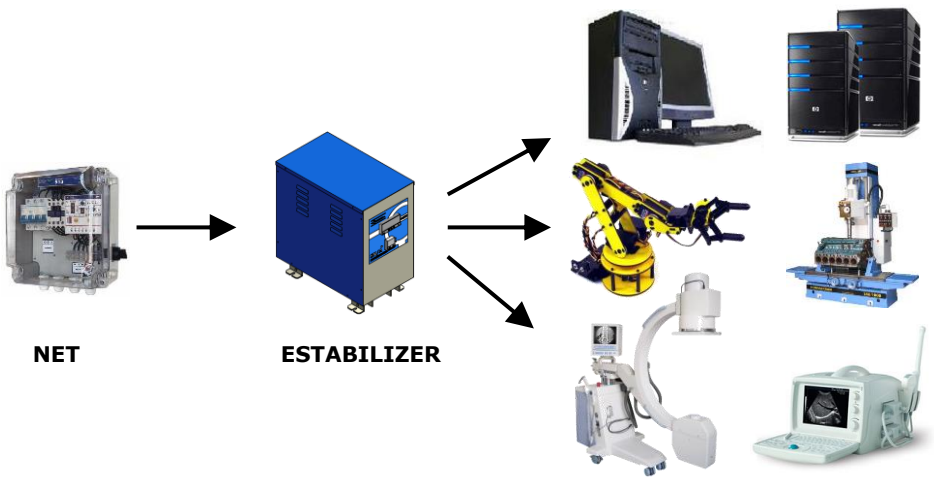


Type II



Type III





NET **ESTABILIZER** **OUTPUT LOAD**

Three phase automatic voltage Stabilizers

Three phase automatic voltage stabilizers consist of a buck-boost transformer and motor driven variable autotransformer with common phase or individual phase regulation.

Torytrans voltage stabilizers provide a fast speed response time against voltage fluctuations and variation of power consumed by load. In this way, our stabilizers avoid malfunctioning and failures of equipment and installations caused by these voltage fluctuations.

Output voltage display and switch circuit breaker ON/OFF at the front panel.

No harmonic distortion and protected against short circuits and overloads.

Series STA and STFA includes line conditioner transformer with galvanic insulation and electrostatic shield, providing a stable output voltage and attenuation and filtering of electromagnetic disturbances.

Applications:

- Data centers, processing and computer rooms.
- Transmissions, telecommunications and radio.
- Hospitals and medical centers.
- Lifts, escalators, offices, hotels and shops.
- Motors, industrial machines, lasers and robots.
- Any electronic or electric equipment sensitive to voltage variations.

Technical characteristics

Power rating	1 ÷ 100 kVA
Input voltage	3 x 400 V + N
Input margin	± 15 %
Output voltage	3 x 400 V + N
Output accuracy	± 1 %
Response time	≈ 20 V/s
Frequency	50/60 Hz
Ambient temperature	30 ºC
Protection degree	IP-23
Service	Continuous
Harmonic distortion	Nil
Load-break switch	ON/OFF
Efficiency	> 95%
Standard	IEC/UNE-EN 61439-1
CE	<u>Power rating ≤ 40 kVAr:</u> IEC /UNE-EN 61558-1 <u>Power rating > 40 kVAr:</u> IEC /UNE-EN 60076-11

<u>OPTIONAL:</u>

- Enclosure for high protection degree (IP54).
- External Bypass switch.
- Additional power meter and monitoring.
- Protection against transitory surges.
- Wall mounting design.

*Customized stabilizer and features on request.

Series ST

Three phase - Common control

Rating kVA	Ref.	Dimensions mm			Weight kg
		A	B	C	
1	ST01	370	225	375	16
2	ST02	450	260	430	20
3	ST03	450	260	430	26
5	ST05	450	260	430	30
7,5	ST07	450	260	430	33
10	ST10	520	310	588	36
15	ST15	520	310	588	36
20	ST20	590	350	665	71
30	ST30	590	350	665	114
40	ST40	750	450	915	126
50	ST50	930	640	1255	195
60	ST60	930	640	1255	165
80	ST80	930	640	1255	190
100	ST100	930	640	1255	205

Series STF

Three phase – Phase control

Rating kVA	Ref.	Dimensions mm			Weight kg
		A	B	C	
1	STF01	370	225	375	16
2	STF02	450	260	430	35
3	STF03	590	340	600	40
5	STF05	590	340	600	46
7,5	STF07	750	440	850	74
10	STF10	750	440	850	77
15	STF15	750	440	850	98
20	STF20	750	440	850	107
30	STF30	930	710	1275	168
40	STF40	930	710	1275	225
50	STF50	1070	880	1460	283
60	STF60	1070	880	1460	304
80	STF80	1280	1080	1520	351
100	STF100	1280	1080	1520	450

Series STA

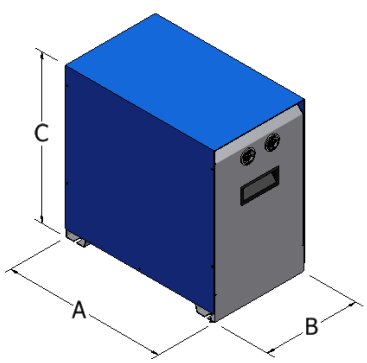
Three phase – Common control
Line conditioner

Rating kVA	Ref.	Dimensions mm			Weight kg
		A	B	C	
1	STA01	450	260	430	28
2	STA02	450	260	430	40
3	STA03	450	260	430	52
5	STA05	520	300	525	70
7,5	STA07	520	300	525	87
10	STA10	590	340	600	110
15	STA15	750	440	850	163
20	STA20	750	440	850	200
30	STA30	930	710	1275	284
40	STA40	1070	880	1460	343
50	STA50	1070	880	1460	429
60	STA60	1070	880	1460	440
80	STA80	1070	880	1460	517
100	STA100	1070	880	1460	585

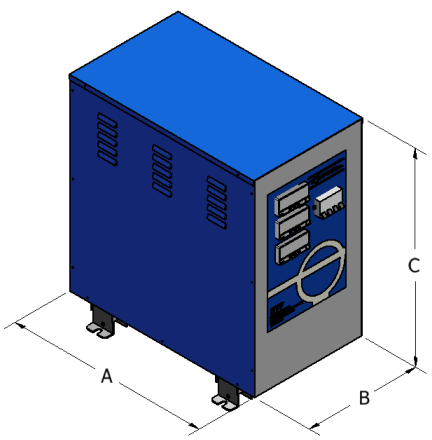
Series STFA

Three phase – Phase control
Line conditioner

Rating kVA	Ref.	Dimensions mm			Weight kg
		A	B	C	
1	STFA01	450	260	430	95
2	STFA02	590	340	600	105
3	STFA03	750	440	850	129
5	STFA05	750	440	850	180
7,5	STFA07	750	440	850	209
10	STFA10	930	710	1275	255
15	STFA15	930	710	1275	363
20	STFA20	930	710	1275	447
30	STFA30	1070	880	1460	673
40	STFA40	1070	880	1460	850
50	STFA50	1280	1080	1520	1008
60	STFA60	1280	1080	1520	1089
80	STFA80	1280	1080	1520	1251
100	STFA100	1280	1080	1520	1470



Type I



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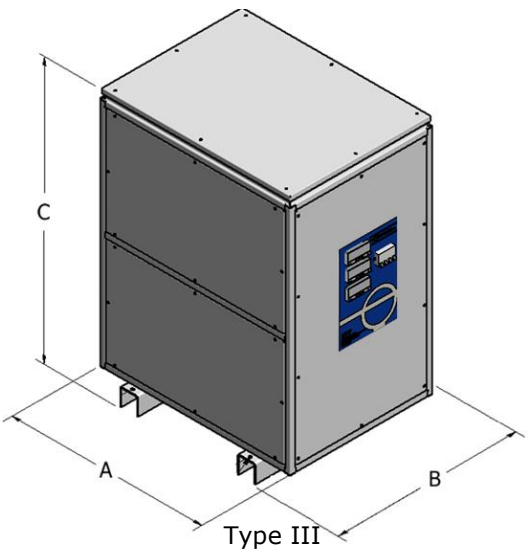


Type III

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.
* Type II enclosure includes wheels.

TORYTRANS

Energy consumption reducer for lighting systems

Consumption reduction up to 40% at any type of lighting system, mainly for discharge sodium vapor lamps or high pressure mercury vapor lamps.

Absorbs input voltage fluctuations as for example night overvoltages, being an additional energy saving.

Increases in the useful life and performance of the lamps, reducing maintenance costs.

Output voltage display. Astronomic switch in order to control Power On-Saving-Power OFF of the equipment.

Robust, high reliability, easy to install and operate.

Mounting into metal enclosure IP-23 protection degree, resin polyester-epoxy powder coated with excellent physical-mechanical and anti-corrosive properties.

Technical characteristics

Power rating		5 ÷ 60 kVA
Input voltage	II	230 V (Series RCM)
Output voltage	III	3 x 400 V + N (Series RCT)
Output voltage (phase-neutral)		184 V (Sodium) 207 V (Mercury) 230 V (ON)
Frequency		50/60 Hz
Ambient temperature		30 ºC
Protection degree		IP-23
Safety class		Class I
Phase protection		Magnetothermic switch
Input voltage margin		± 10% (Saving)
LED indicator		Blue (ON) Green (Saving)
Standard		IEC/UNE-EN 61439-1
CE		**(RCM Series)** Power rating ≤ 25 kVA: IEC/UNE-EN 61558-1 Power rating > 25 kVA: IEC/UNE-EN 60076-11 **(RCT Series)** Power rating ≤ 40 kVA: IEC/UNE-EN 61558-1 Power rating > 40 kVA: IEC/UNE-EN 60076-11

• For general use, select the power according to the load and power factor:

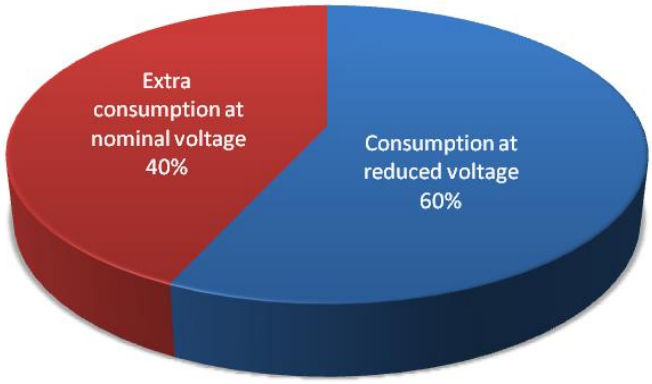
II series RCM : kW = V x I / 1000
III series RCT : kW = √3 x V x I / 1000
kVA = kW / Cos φ

SERIES REDCON

REDCON are especially designed to reduce the energy consumption at all lighting facilities:

- Roads, motorways, highways
- Public lighting
- Industrial areas
- Shopping centers
- Companies
- Railway, ports, airports, tunnels...

REDCON improves the energy efficiency of the facilities contributing to the sustainability of the environment reducing the CO2 emissions for the reduction in the demand of energy.



Only 60% power energy is required when the equipment is working at reduced voltage.

Example of REDCON equipment, 60 kVA, working on 2500 hours/year at reduced voltage, see table below the energy saving for each lamp type:

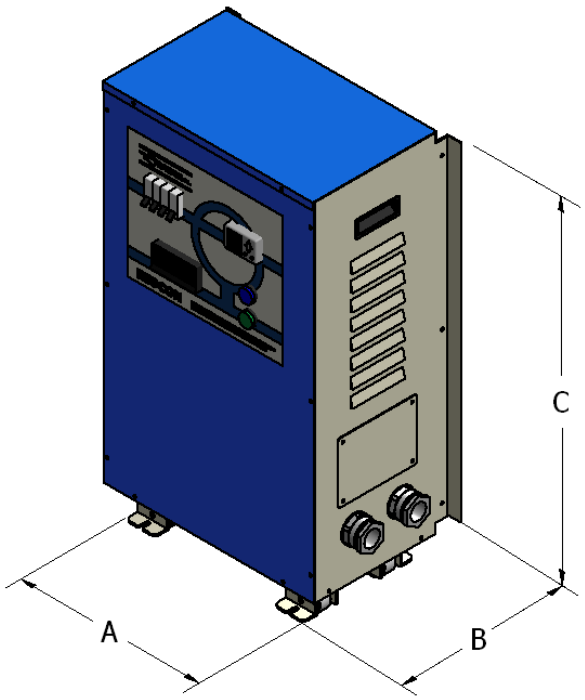
Lamp type	Consumption Without REDCON **kW**	Consumption With REDCON **kW**	Consumption reduction **kW**	Annual reduction **kWh**	Annual saving *(0,12 €/kWh)*
Sodium	56	33	23 (40%)	57.500	6.900 €
Mercury	56	40	16 (30%)	40.000	4.800 €

Series RCM Single phase

Rating **kVA**	Reference	Dimensions **mm**			Weight **kg**
		A	B	C	
5	RCM05	435	300	690	26
10	RCM10	515	340	830	52
15	RCM15	515	340	830	61
20	RCM20	515	340	830	65

Series RCT Three phase

Rating **kVA**	Reference	Dimensions **mm**			Weight **kg**
		A	B	C	
15	RCT15	435	300	690	50
30	RCT30	515	340	830	88
45	RCT45	585	380	1000	121
60	RCT60	585	380	1000	155



According to the lamp type, add at the end of the reference:
-S for sodium vapor lamps.
-H for high pressure mercury vapor lamps.
* Other lamps type or protection degree IP00 or IP54, on request.

* Other features, power, voltage, etc., on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Protective steel enclosures: Cabinets IP-23

Technical Characteristics

Protection degree	IP-23
Color	RAL7035 RAL5005 (cabinets type I)
Mounting Type	Floor
Coated	Epoxy resin painted steel
Cables	Cable glands / Open bottom
Accessories	Handles (cabinets type I) Wheels (cabinets type II) Lifting eyebolts (not included)

** Optionally available with special paint color (on request)*

Description

Protective metal enclosures with protection degree IP-23 coated with a resin polyester-epoxy powder with excellent physical-mechanical and anti-corrosive properties.

Intended for the installation of transformers, reactors, filters, stabilizers and other customized products.

Floor and vertical mounting. Its structure allows disassembling easily and quickly, and take the outer covers off.

Perforated steel base for the equipment fixing. Fully ventilated by a separated roof and an opened base for an optimum convection providing a good heat dissipation.

Cable glands at the back side for the access and internal connections at cabinets type I and II.

Wheels for handling and displacement of heavy units at cabinets type II. Handles included for cabinets type I.

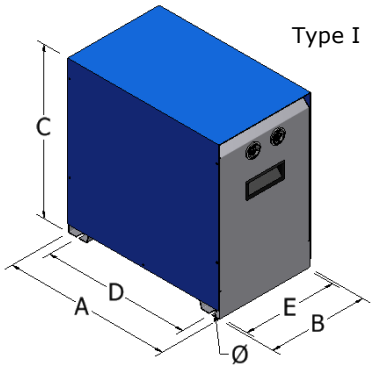
RAL 7035 color for all cabinets references. RAL 5005 only for covers of cabinets type I.

All materials according to the RoHS Directive.

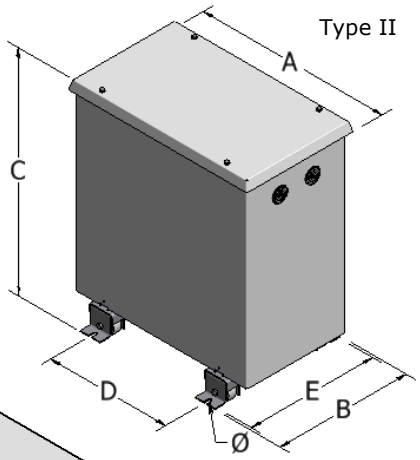
Reference	Dimensions **mm**						Weight **kg**	Type
	A	B	C	D	E	Ø		
MXTC100	230	145	245	205	125	7	3	I
MXTC101	300	185	305	265	165	7	5	I
MXTC102	370	225	375	325	205	7	8	I
MXTC103	475	345	520	320	320	10	13	II
MXTC104	545	385	615	350	360	10	16	II
MXTC105	615	425	690	400	400	10	20	II
MXTC106	775	575	940	400	550	10	35	II
MXTC107	930	710	1275	480	670	16	68	III
MXTC108	1070	880	1460	660	840	16	118	IV
MXTC109	1210	1070	1650	660	1030	16	151	IV

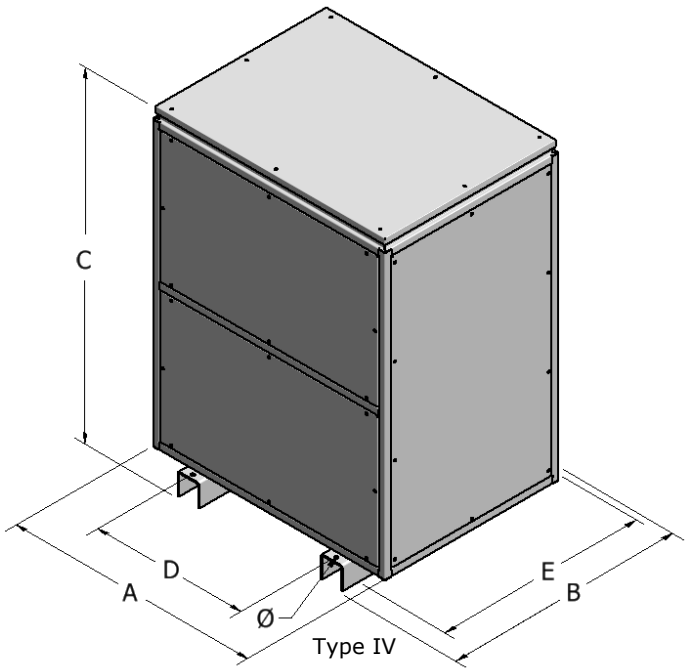
* Other RAL color or higher protection degree on request.
* Torytrans reserves the right to modify the information in any time and without prior notice.

Type I

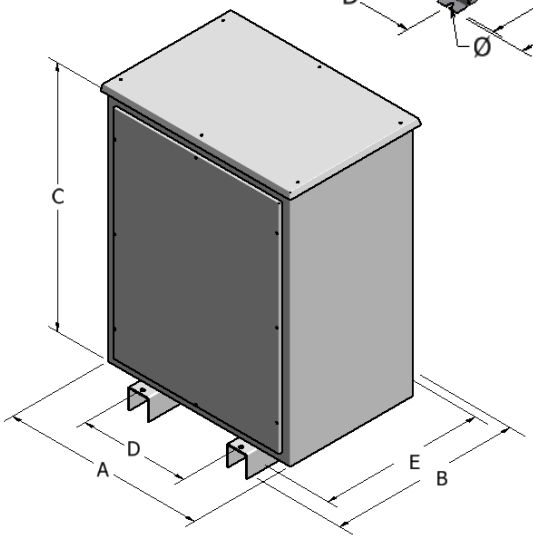


Type II





Type IV



Type III

The IP code indicates the protection degree provided by the enclosure against the access to hazardous parts, the penetration of solid foreign objects and liquids into the housing.

IP-2_	IP-_3
 2	 3
Protection against medium-size foreign objects. (greater than 12mm)	No harmful effect from rain at angle less than 60 degrees from vertical

RATING SELECTION GUIDE

To select transformers and autotransformers with high inrush current loads like motors, cooling devices, etc., magnitude, duration and repeatability of inrush currents must be taken into account.

Furthermore, in case of motors powered by variable frequency drivers (VFD) it should be considered the harmonics that cause overheating on transformers or autotransformers.

Select kVA needed according to the load rating: CV or kW (see table below):

LOAD RATING		TRANSFORMER OR AUTOTRANSFORMER RATING REQUIRED				
		3 to 5 starters/hour		**12 to 15 starters/hour**		Motor with frequency converter (VFD)
		Air conditioning	Turbines	Air conditioning	Turbines	
		Freeze chamber	Belt conveyors	Freeze chamber	Belt conveyors	
		Compressors	Pumps	Compressors	Pumps	
		Tool-machines	Press machines	Tool-machines	Press machines	
CV	**KW**	**kVA**	**kVA**	**kVA**	**kVA**	**kVA**
0,25	0,18	1	1	1	1	1
0,5	0,37	1	1	1	2	1
0,75	0,55	2	2	2	2	2
1	0,74	2	2	2	3	2
1,5	1,10	3	3	3	4	3
2	1,47	3	4	4	5	4
2,5	1,84	4	4	4	5	4
3	2,2	4	5	5	6	5
4	2,9	5	6	8	8	8
5	3,7	6	8	8	10	8
5,5	4,0	8	8	8	10	8
7,5	5,5	10	12	12	16	12
10	7,4	12	16	16	20	16
15	11,0	20	25	25	31	25
20	14,7	25	31	31	40	31
25	18,4	31	40	40	50	40
30	22,1	40	40	40	50	40
40	29,4	50	63	63	80	63
50	36,8	63	80	80	80	80
60	44,2	63	80	80	100	80
75	55	80	100	100	125	100
100	74	100	125	125	160	125
125	92	125	160	160	200	160
150	110	160	200	200	250	200
180	132	200	250	250	315	250
200	147	200	250	250	315	250
220	162	250	315	315	400	315
250	184	250	315	315	400	315
270	199	315	400	400	400	400

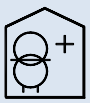
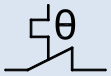
SALES TERMS - LEGEND

Sales terms

- The **prices** are quoted in EUROS, on "ex works" (EXW Almagro (Ciudad Real) SPAIN — INCOTERMS 2010), and do not include freight, assembly, commissioning and other incidental costs (e.g. customs duties), which shall be charged separately.
- The **delivery time** is to be understood in our premises for completely fulfilled orders, ready for delivery to forwarders. It never includes the time required for the transportation of the goods from our factory to the client warehouse. It doesn't exist any responsibility of Torytrans S.L. for the loss or delay due to the transport or another circumstance.
- The orders for **special or custom-made** products must be covered by a written order and it is not until the time of receiving such formal order that they will be considered as firm.
- All **right**, title and interest in and to all items covered by Buyer's order are reserved to Torytrans, S.L. until the full purchase price for all such times has been paid.
- **Returns** of material will not be admitted without acceptance in writing by Torytrans S.L. In any case, we will not admit returns in excess 15 days from receipt of goods. In case of return of standard products, due to any cause which is not imputable to Torytrans S.L., then goods will be applied a 25% depreciation on invoice value. In all cases, returns shall be made freight prepaid.
- Torytrans, S.L. **warrants** all items against defects in material under normal use and service for a period of one (1) year from the date of shipment. This **guarantee** shall not apply to items or parts thereof that have been (a) subjected to misuse, neglect, accident, damage in transit, abuse or unusual hazard; (b) repaired, altered or modified by anyone other than Torytrans, S.L.; or (c) used in violation of instructions furnished by Torytrans, S.L. It does not cover the two-way carriage of goods. The buyer agrees to waive the right for claiming indemnities of any kind. All requests for return of items must receive the written authorization of Torytrans, S.L.
- Technical and design information in our catalogs can be modified without notice and always have a certain tolerance. The pictures of the products are not contractual, may be modified between publication of the catalog and put into circulation in the market. We also could be required to stop making some references. Therefore, under the circumstances mentioned above, we are not required to provide the removed or the old specifications items.
- The **civil liability** of our products expires one year after delivery date.
- Place of **jurisdiction** for both parties is Ciudad Real.

Legend

	**Isolating Transformer:** Galvanic isolation between primary and secondary windings.
	**Safety Transformer:** Transformer with reinforced isolation between primary (isolation transformer) and secondary and secondary voltage below 50Vac. Safe in case of bipolar human contact with secondary voltage.
	**Control Transformer:** Isolating transformer for control and power circuits.
	**Autotransformer:** Without galvanic isolation between primary and secondary. Input and output share the same winding.
	**Reactor:** One or more windings with a frequency dependent impedance, working by the principle of self-inductance, whereby a magnetising current produces a magnetic field.

	**Transformer for medical use:** Isolating transformer for hospital applications with reinforced isolation.
	**Safety Class II transformer:** Indicates in which way the safety protection is obtained. All external metal parts are not accessible or galvanically isolated from the active parts. Reinforced isolation. Without earth terminal.
	**Safety Class I Transformer:** Indicates in which way the safety protection is obtained. All accessible external metal parts connected to earth.
	**Resetting thermal protection:** Overtemperature and overload protection device. Generally, it is a bimetal thermal relay placed inside of the wound.
	**Protection fuse non-resetting:** Overtemperature and overload protection device. Interrupts excessive current (blows) according to maximum fuse current rating

Notes

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SYSTEM CERTIFICATION ISO 9001 SGS

SYSTEM CERTIFICATION ISO 14001 SGS