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SINGLE-PHASE

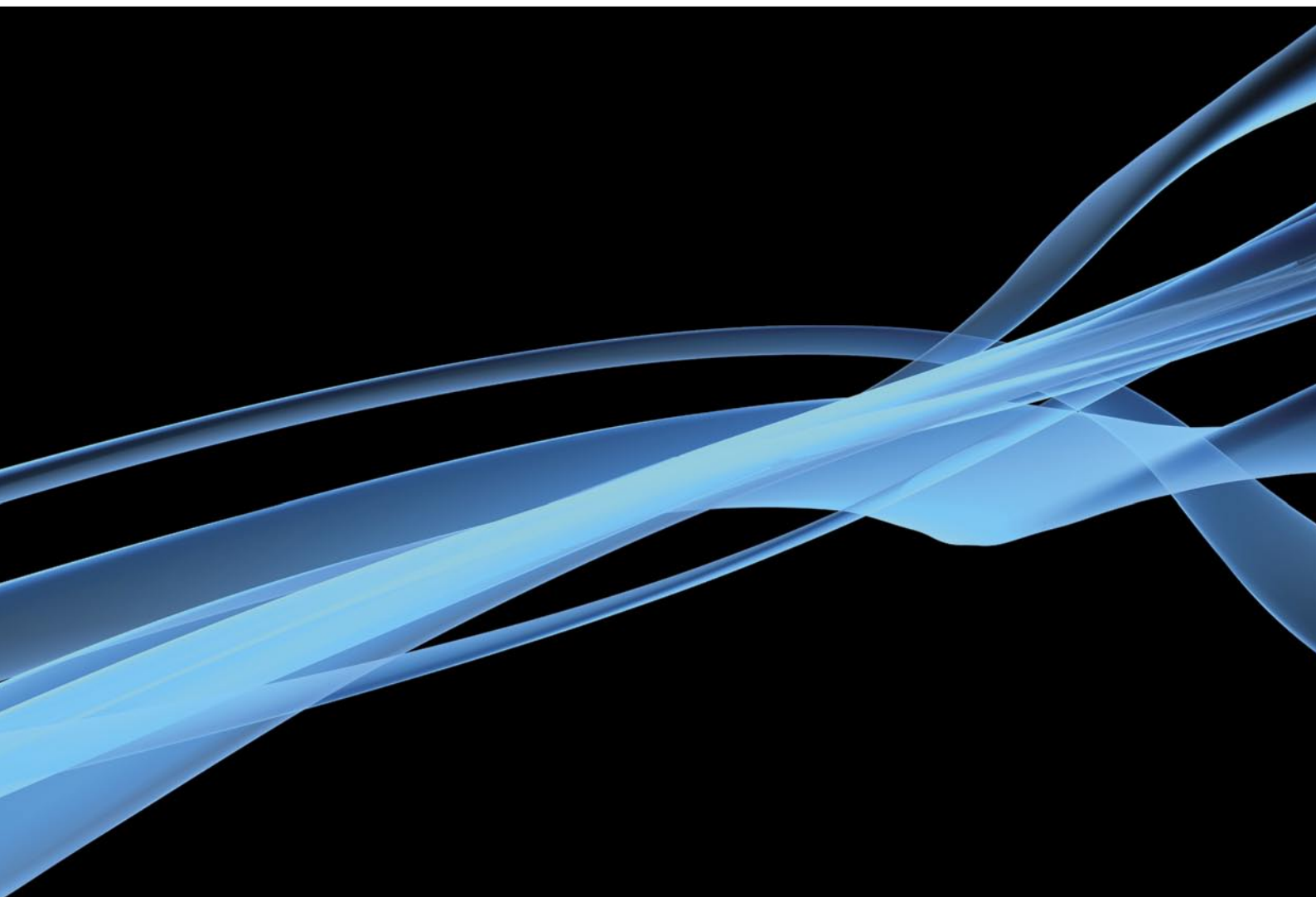
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TRANSFORMERS

SINGLE-PHASE

SAFETY OR ISOLATING



TR 20

Safety and isolating single-phase transformers. They have only one input voltage and one output voltage, and this allow compact dimensions, weight reduction and easier installation. Wide range of rated voltages. TIG welding in the core and the base-plates that prevent vibrations and noise. Fast and easy connection due to the clamp type terminal blocks that are delivered open.

PRI voltage: 230 or 400 V
SEC voltage: 12, 24, 48, 115 or 230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00
Dielectric strength PRI-SEC : > 4 kV



600160001

TR 20 SINGLE-PHASE TRANSFORMER

POWER (VA)	230 // 12 V	230 // 24 V	230 // 48 V	230 // 115 V	230 // 230 V
25	600025000	600025001	600025002	600025003	600025004
40	600040000	600040001	600040002	600040003	600040004
50	600050000	600050001	600050002	600050003	600050004
63	600063000	600063001	600063002	600063003	600063004
100	600100000	600100001	600100002	600100003	600100004
160	600160000	600160001	600160002	600160003	600160004
200	600200000	600200001	600200002	600200003	600200004
250	600250000	600250001	600250002	600250003	600250004
320	600320000	600320001	600320002	600320003	600320004
400	600400000	600400001	600400002	600400003	600400004
500	600500000	600500001	600500002	600500003	600500004
630	600630000	600630001	600630002	600630003	600630004
800	600800000	600800001	600800002	600800003	600800004
1000	601000000	601000001	601000002	601000003	601000004

(VA)	400 // 12 V	400 // 24 V	400 // 48 V	400 // 115 V	400 // 230 V
25	600025005	600025006	600025007	600025008	600025009
40	600040005	600040006	600040007	600040008	600040009
50	600050005	600050006	600050007	600050008	600050009
63	600063005	600063006	600063007	600063008	600063009
100	600100005	600100006	600100007	600100008	600100009
160	600160005	600160006	600160007	600160008	600160009
200	600200005	600200006	600200007	600200008	600200009
250	600250005	600250006	600250007	600250008	600250009
320	600320005	600320006	600320007	600320008	600320009
400	600400005	600400006	600400007	600400008	600400009
500	600500005	600500006	600500007	600500008	600500009
630	600630005	600630006	600630007	600630008	600630009
800	600800005	600800006	600800007	600800008	600800009
1000	601000005	601000006	601000007	601000008	601000009

STANDARDS

IEC 61558-1 EN 61558-2-4
 IEC 61558-2-4 EN 61558-2-6
 IEC 61558-2-6
 EN 61558-1

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TRANSFORMERS

SINGLE-PHASE

SAFETY OR ISOLATING



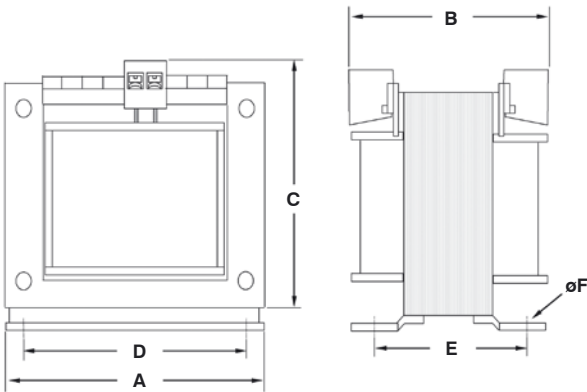
TR 20

DIMENSIONS - TR 20 SINGLE-PHASE TRANSFORMER

POWER	SIZE			FIXING			WEIGHT
(VA)	(mm)			(mm)			(kg)
	A	B	C	D	E	F	
25	60	66	73	44	39	3,5	0,51
40	60	76	73	44	49	3,5	0,74
50	75	71	84	56	47	4,8	1,00
63	75	76	84	56	54	4,8	1,10
100	84	70	90	64	52	4,8	1,35
160	96	82	100	84	67	5,7	2,23
200	96	92	100	84	77	5,7	2,68
250	96	107	100	84	91	5,7	3,35
320	108	104	111	80,5	87	5,7	4,40
400	120	106 ⁽¹⁾	118 ⁽²⁾	90	87	5,7	4,90
500	120	126 ⁽¹⁾	118 ⁽²⁾	90	107	5,7	6,70
630	150	114 ⁽³⁾	142 ⁽³⁾	122	92	6,8	7,50
800	150	130 ⁽³⁾	142 ⁽³⁾	122	108	6,8	9,80
1000	150	157 ⁽³⁾	142 ⁽³⁾	122	135	6,8	13,2

- (1) SEC 12 V → +15 mm
- (2) SEC 12 V → +10 mm
- (3) SEC 12 V - SEC 24 V → +10 mm

DIMENSIONS



STANDARDS
IEC 61558-1 EN 61558-2-4
IEC 61558-2-4 EN 61558-2-6
IEC 61558-2-6
EN 61558-1

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TRANSFORMERS

SINGLE-PHASE

CONTROL



TR 21

Control and safety or isolating single-phase transformers. They can supply high instantaneous power necessary for the correct operation of contactors and other switch and control gear. Great flexibility due to the double primary voltage and the serial-parallel connection. TIG welding in the core and the base-plates that prevent vibrations and noise. Fast and easy connection due to the clamp type terminal blocks.

PRI voltage: 0-230-400 V
SEC voltage: 12-24, 24-48 or 115-230 V
SEC serial or parallel connection
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00
Dielectric strength PRI-SEC: > 4 kV



610250001

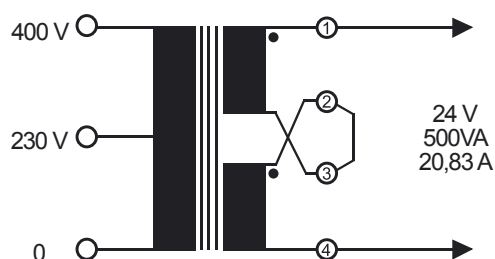
TR 21 SINGLE-PHASE TRANSFORMER

POWER (VA)	INSTANT. POWER (VA)	REFERENCE	REFERENCE	REFERENCE
		 (12-24 V)	 (24-48 V)	 (115-230 V)
40	75	610040000	610040001	610040002
63	140	610063000	610063001	610063002
100	220	610100000	610100001	610100002
160	380	610160000	610160001	610160002
200	450	610200000	610200001	610200002
250	650	610250000	610250001	610250002
320	850	610320000	610320001	610320002
400	1000	610400000	610400001	610400002
500	1400	610500000	610500001	610500002
630	1600	610630000	610630001	610630002
800	2400	610800000	610800001	610800002
1000	3300	611000000	611000001	611000002

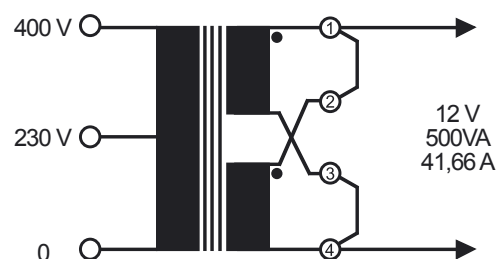
SECONDARY CONNECTION POSSIBILITIES

EXAMPLE: TRANSFORMER 230-400//12-24 V 500 VA (610500000)

SERIAL CONNECTION



PARALLEL CONNECTION



TRANSFORMERS

SINGLE-PHASE

CONTROL



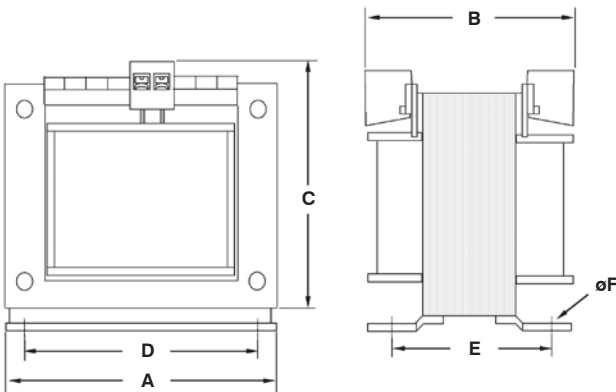
TR 21

DIMENSIONS - TR 21 SINGLE-PHASE TRANSFORMER

POWER (VA)	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
	A	B	C	D	E	F	
40	75	79	84	56	47	4,8	1,00
63	84	80	90	64	52	4,8	1,40
100	84	95	90	64	67	4,8	1,96
160	96	101	100	84	77	5,7	2,80
200	96	115	100	84	91	5,7	3,40
250	108	100	111	80,5	73	5,7	3,64
320	108	114	111	80,5	87	5,7	4,54
400	120	112 ⁽¹⁾	118 ⁽²⁾	90	87	5,7	5,20
500	120	130 ⁽¹⁾	118 ⁽²⁾	90	107	5,7	6,85
630	150	114 ⁽¹⁾	142 ⁽²⁾	122	92	6,8	7,50
800	150	130 ⁽³⁾	142 ⁽⁴⁾	122	108	6,8	10,2
1000	150	157 ⁽³⁾	142 ⁽⁴⁾	122	135	6,8	13,6

- (1) SEC 12-24 V → +15 mm
- (2) SEC 12-24 V → +10 mm
- (3) SEC 12-24 V - SEC 24-48 V → +15 mm
- (4) SEC 12-24 V - SEC 24-48 V → +10 mm

DIMENSIONS



STANDARDS
IEC 61558-1 EN 61558-1
IEC 61558-2-2 EN 61558-2-2
IEC 61558-2-4 EN 61558-2-4
IEC 61558-2-6 EN 61558-2-6

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Single-phase power isolating transformers dry type. Intended for change of voltages with galvanic isolation and/or attenuation of line disturbances. Manufactured with electrical steel with low losses and copper windings. On request we can manufacture transformers with other voltages, with taps, electrostatic screen, with thermal switch, etc.

PRI voltage: 230 V
SEC voltage: 230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00 | IP23
Dielectric strength PRI-SEC: > 4 kV
Natural air cooling
Others characteristics on request



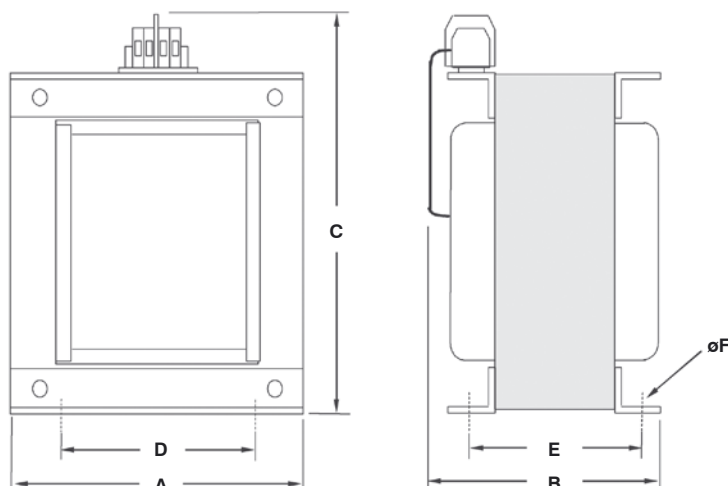
62N0250000

TR 22 IP00 SINGLE-PHASE TRANSFORMER

POWER (kVA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
1,3	62N0013000	163	160	260	98	115	8	17,0
1,6	62N0016000	163	165	260	98	120	8	19,0
2,0	62N0020000	163	175	260	98	130	8	21,5
2,5	62N0025000	163	195	260	98	150	8	25,5
3,0	62N0030000	200	200	310	120	140	10	34,0
3,5	62N0035000	200	210	310	120	150	10	38,0
4,0	62N0040000	200	220	310	120	160	10	42,0
5,0	62N0050000	200	240	310	120	180	10	48,0
6,3	62N0063000	250	250	390	150	180	12	67,0
8,0	62N0080000	250	270	390	150	200	12	79,0
10	62N0100000	250	300	390	150	230	12	95,0
12,5	62N0125000	300	300	460	180	220	12	108
16	62N0160000	300	320	460	180	240	12	126
20	62N0200000	300	340	460	180	260	12	150
25	62N0250000	350	360	520	210	270	12	180
31,5	62N0315000	350	370	520	210	280	12	210

Dimensions may slightly vary according the voltages

DIMENSIONS



TRANSFORMERS

SINGLE-PHASE

POWER



TR 22 IP23

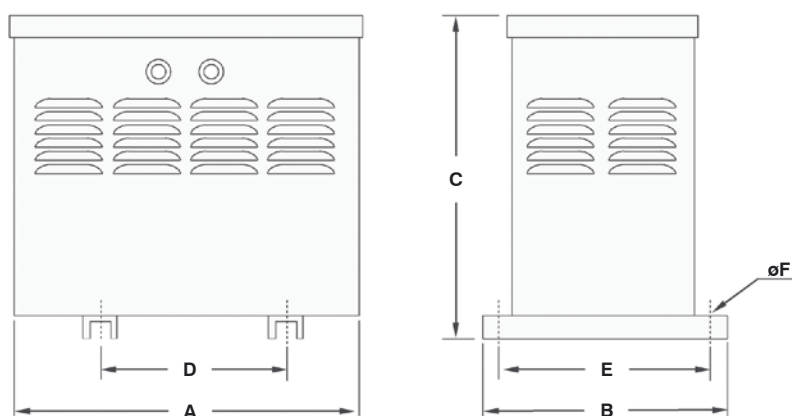
TR 22 IP23 SINGLE-PHASE TRANSFORMER

POWER	REFERENCE	SIZE				FIXING		WEIGHT
(kVA)		(mm)				(mm)		(kg)
		A	B	C	D	E	F	
1,3	62C0013000	285	290	335	200	265	12	21,0
1,6	62C0016000	285	290	335	200	265	12	23,0
2,0	62C0020000	285	290	335	200	265	12	25,5
2,5	62C0025000	285	290	335	200	265	12	29,5
3,0	62C0030000	375	300	435	200	270	12	41,5
3,5	62C0035000	375	300	435	200	270	12	45,5
4,0	62C0040000	375	300	435	200	270	12	49,5
5,0	62C0050000	375	300	435	200	270	12	55,5
6,3	62C0063000	450	400	480	300	370	12	75,0
8,0	62C0080000	450	400	480	300	370	12	87,0
10	62C0100000	450	400	480	300	370	12	103
12,5	62C0125000	540	500	610	400	470	12	116
16	62C0160000	540	500	610	400	470	12	134
20	62C0200000	540	500	610	400	470	12	158
25	62C0250000	540	500	610	400	470	12	190
31,5	62C0315000	540	500	610	400	470	12	220



62C0250000

DIMENSIONS



TR 22 IP23 SINGLE-PHASE TRANSFORMER ACCESSORIES

REFERENCE	DESCRIPTION
690000005	WHEELS KIT (max 200 kg/wheel)

STANDARDS
IEC 60726

PROTECTION

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Single-phase special transformers manufactured on request (customer design). These transformers can be manufactured with fuse holders, thermal protectors, electrostatic screen. TIG welding in the core and the base-plates that prevent vibrations and noise. Fast and easy connection due to the clamp type terminal blocks that are delivered open.

PRI voltage: on request
SEC voltage: on request
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00
Dielectric strength PRI-SEC : > 4 kV



630050017

TR 23 SINGLE-PHASE TRANSFORMER

POWER (VA)	MAX. SIZE (mm)						WEIGHT (kg)
	A	B ^①	C ^②	D	E	F	
10 12 16 20	60	66	73	44	39	3,5	0,51
25 30	60	76	73	44	49	3,5	0,74
40	75	71	84	56	47	4,8	1,00
50	75	76	84	56	52	4,8	1,10
63	84	70	90	64	52	4,8	1,35
100	84	95	90	64	67	4,8	1,96
160	96	97	100	84	81	5,7	2,78
200	96	107	100	84	91	5,7	3,35
250	108	100	111	80,5	73	5,7	3,64
320	108	104	111	80,5	87	5,7	4,40
400	120	106	118	90	87	5,7	4,90
500	120	126	118	90	107	5,7	6,70
630	150	114	142	122	92	6,8	7,50
800	150	130	142	122	108	6,8	9,80
1000	150	157	142	122	135	6,8	13,2

► Dimensions may slightly vary according the voltages

► In transformers with the following characteristics:

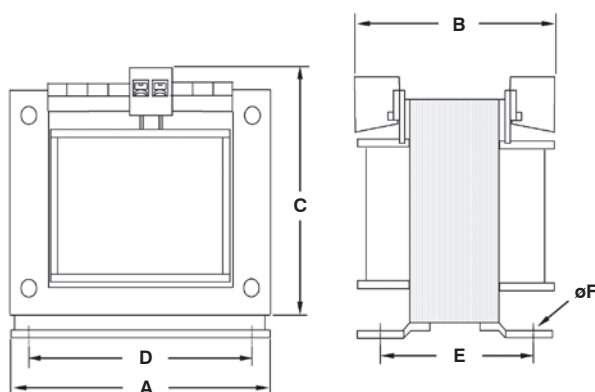
- Rated power up to 250VA
- Without electrostatic screen
- One primary voltage up to 400V
- One SEC voltage between 12V and 230V

the dimensions and weight are those corresponding to the immediate smaller rated power.

① Terminal block: +8,5 mm. Terminal block with current > 32 A: +15 mm. Currents > 80 A (flat terminals or busbar): +50 mm

② Terminal block with fuse: +5 mm. Terminal block with current > 32 A: +10 mm.

DIMENSIONS



TRANSFORMERS

SINGLE-PHASE

SAFETY FOR SWIMMING-POOL SPOTLIGHTS



TR 26 IP20

Single-phase safety transformers intended to supply spotlights in swimming-pools, garden ponds, ornamental fountains and moist locations, where for safety reasons it is necessary to supply with safety extra low voltage (SELV). It has several taps in the primary winding in order to compensate for the voltage drop in the transformer-spotlight line conductors and thus gets an adequate brightness in every spotlight. On request we can manufacture transformers with other rated power or voltages, or with other line lengths between transformers and spotlights.

Rated power range: 130, 350 and 700 VA
Class I protection against electric shock
Rated primary voltage: 230 V
Rated secondary voltage: 12 V
Thermal class: B(130 °C) and F(155 °C)
Maximum ambient temperature (40 °C)
Frequency: 50/60 Hz
Protection index: IP20
Dielectric strenght between primary & secondary: $\geq 4,5$ kV
Dielectric strenght between windings & metallic parts: $\geq 2,5$ kV

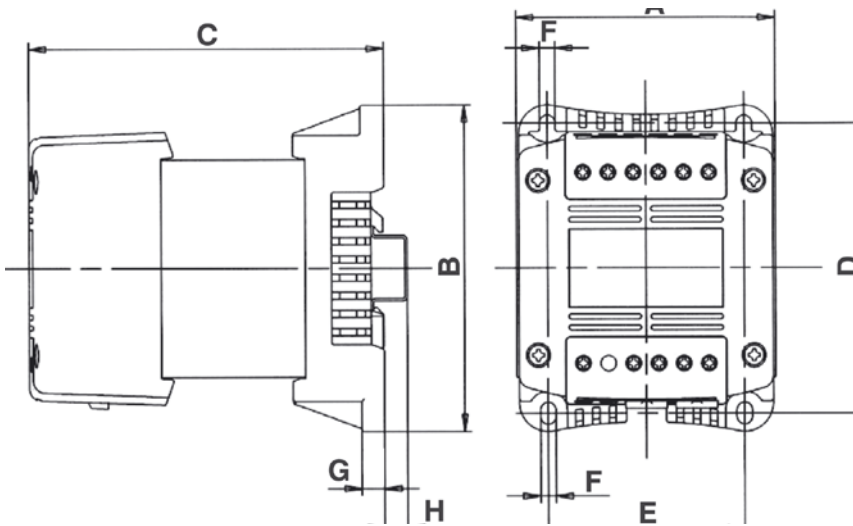
TR 26 SAFETY TRANSFORMER

POWER	REFERENCE	SIZE								FOR SPOTLIGHT	DISTANCES	WEIGHT
(VA)		(mm)									(transformer - spotlight)	(kg)
		A	B	C	D	E	F	G	H			
130	660130000	84	113	116	101	66	5	7,5	2	1x12V 100W	10-18-25 m	2,00
350	660350000	108	135	138	120	82	6,5	9,5	9,5	1x12V 300W	10-25-40 m	4,45
700	660700000	120	152	166	135	94	7	9,5	-	2x12V 300W	10-25-40 m	7,89



660350000

DIMENSIONS



STANDARDS
IEC 61558-1
IEC 61558-2-6
EN 61558-1
EN 61558-2-6

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TRANSFORMERS

TRANSFORMERS SINGLE-PHASE

SAFETY FOR SWIMMING-POOL SPOTLIGHTS



TR 26 IP00

Single-phase safety transformers intended to supply spotlights in swimming-pools, garden ponds, ornamental fountains and moist locations, where for safety reasons it is necessary to supply with safety extra low voltage (SELV). It has several taps in the primary winding in order to compensate for the voltage drop in the transformer-spotlight line conductors and thus gets an adequate brightness in every spotlight. On request we can manufacture transformers with other rated power or voltages, or with other line lengths between transformers and spotlights.

Rated power range: 130, 350 and 700 VA
Class I protection against electric shock
Rated primary voltage: 230 V
Rated secondary voltage: 12 V
Thermal class: B(130 °C) and F(155 °C)
Maximum ambient temperature (40 °C)
Frequency: 50/60 Hz
Protection index: IP00
Dielectric strenght between primary & secondary: $\geq 4,5$ kV
Dielectric strenght between windings & metallic parts: $\geq 2,5$ kV

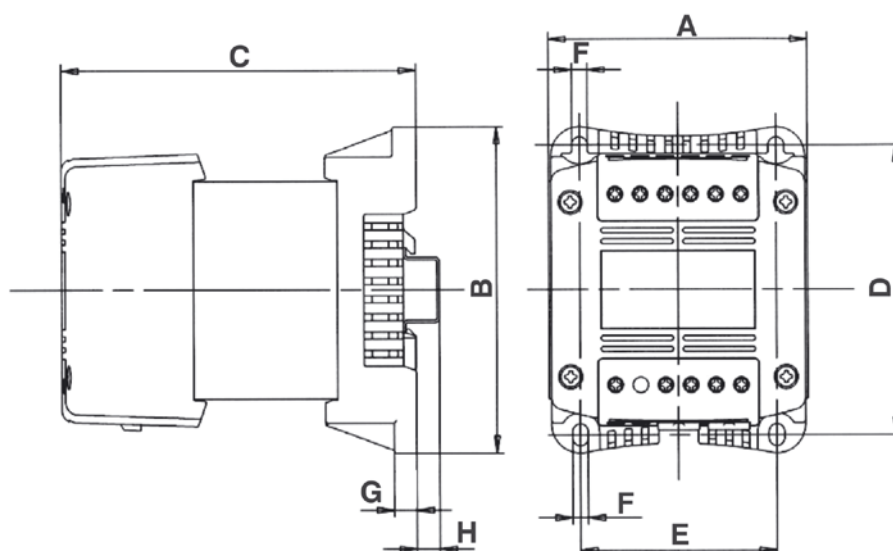


660350001

TR 26 SAFETY TRANSFORMER

POWER (VA)	REFERENCE	SIZE (mm)						FOR SPOTLIGHT	DISTANCES (transformer - spotlight)	WEIGHT (kg)
		A	B	C	D	E	F			
130	660130001	84	90	90	64	67	4,8	1x12V 100W	10-18-25 m	1,96
350	660350001	108	110	93	90	80	5,0	1x12V 300W	10-25-40 m	3,90
700	660700001	120	135	108	90	117	5,7	2x12V 300W	10-25-40 m	7,80

DIMENSIONS



TRANSFORMERS

TRANSFORMERS SINGLE-PHASE

SAFETY FOR SWIMMING-POOL SPOTLIGHTS

NEW



TR 26 H

Single-phase safety transformers intended to supply spotlights in swimming-pools, garden ponds, ornamental fountains and moist locations, where for safety reasons it is necessary to supply with safety extra low voltage (SELV). It has several taps in the primary winding in order to compensate for the voltage drop in the transformer-spotlight line conductors and thus gets an adequate brightness in every spotlight. On request we can manufacture transformers with other rated power or voltages, or with other line lengths between transformers and spotlights.

Rated power: 350 VA
Class I protection against electric shock
Rated primary voltage: 230 V
Rated secondary voltage: 12 V
Thermal class F (155 °C)
Maximum ambient temperature (40 °C)
Frequency: 50/60 Hz
Protection index: IP20
Dielectric strenght PRI-SEC: $\geq 4,5$ kV
Dielectric strenght windings-body: $\geq 2,5$ kV
Electrostatic screen between windings

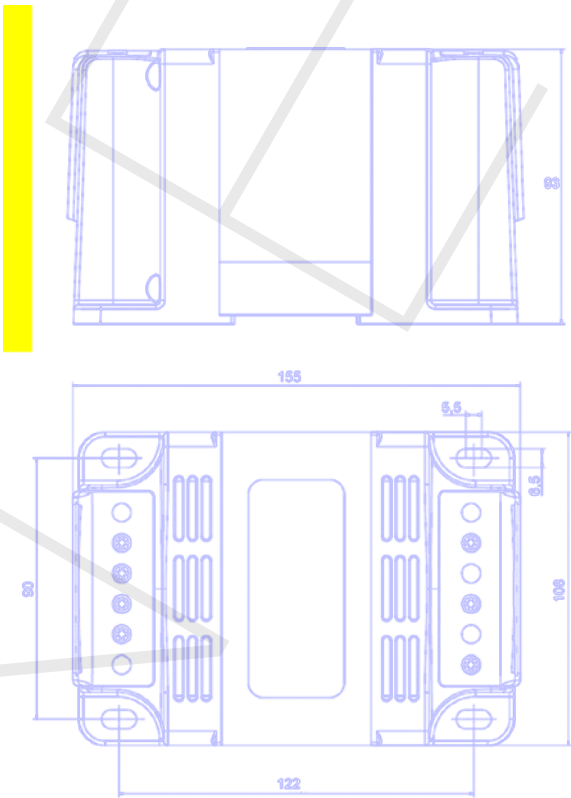
TR 26 H SAFETY TRANSFORMER

POWER	REFERENCE	FOR SPOTLIGHTS	DISTANCES	WEIGHT
(VA)			(transformer - spotlight)	(kg)
350	660350010	1x12V 300W	8-18-25 m (wire size 6 mm ²) 10-18-25 m (wire size 10 mm ²)	4,2



660350010

DIMENSIONS



STANDARDS

IEC 61558-1
IEC 61558-2-6
EN 61558-1
EN 61558-2-6

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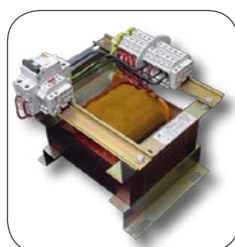
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Single-phase control transformers for machines and industrial installations according to CNOMO standards (automotive industry). They can supply high instantaneous power necessary for the correct operation of contactors and other switch and control gear. Equipped with a circuit breaker on secondary side. On request we can manufacture these transformers with other characteristics.

PRI voltage: 15-0-15-230-400 V
SEC voltage: 24 V or 115-230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Dielectric strength PRI-SEC: > 4 kV
Electrostatic screen
Protection with circuit breaker

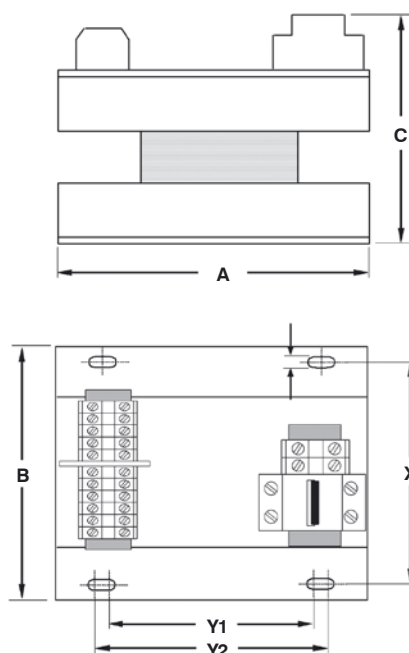


670630000

TR 27 SINGLE-PHASE TRANSFORMER

POWER	REFERENCE		SIZE			FIXING				WEIGHT
(VA)			(mm)			(mm)				(kg)
	24 V	115-230 V								
			A	B	C	X	Y1	Y2	F	
100	670100000	670100001	150	144	180	126	100	120	6	3,20
160	670160000	670160001	150	144	190	126	100	120	6	3,40
250	670250000	670250001	170	162	200	144	100	120	6	5,00
400	670400000	670400001	170	184	190	168	100	120	6	6,05
630	670630000	670630001	170	184	220	168	100	120	6	8,50
1000	671000000	671000001	190	218	240	200	120	150	8	13,2
1600	–	671600001	190	249	250	230	120	150	8	19,0

DIMENSIONS



TRANSFORMERS

SINGLE-PHASE

SAFETY AND ISOLATING

NEW



TR 28 1.1

Safety or isolating single-phase transformers. IP20 protection index (finger safe). For mounting on DIN/EN rail up to 320 VA. Fast and easy connection due to the high capacity clamp type terminal blocks.

PRI voltage: 230 or 400 V
SEC voltage: 12-24-48-115 or 230 V
Rated power range: 40 VA to 1000 VA
Class I against electric shock
Thermal class: B (130 °C)
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP20
Dielectric strength PRI-SEC: $\geq 4,5$ kV
Dielectric strength between windings and metallic parts: $\geq 2,5$ kV

TR 28 1.1 SAFETY OR ISOLATING TRANSFORMER - PRIMARY VOLTAGE 230V

POWER (VA)	REFERENCE				
t_a 40°C	230 // 12 V	230 // 24 V	230 // 48 V	230 // 115 V	230 // 230 V
40	680040025	680040026*	680040027	680040028	680040029
63	680063025	680063026*	680063027	680063028	680063029
100	680100025	680100026*	680100027	680100028	680100029
160	680160025	680160026*	680160027	680160028	680160029
200	680200025	680200026*	680200027	680200028	680200029
250	680250025	680250026*	680250027	680250028	680250029
320	680320025	680320026*	680320027	680320028	680320029
400	680400025	680400026*	680400027	680400028	680400029
500	680500025	680500026*	680500027	680500028	680500029
630	—	680630026*	680630027	680630028	680630029
800	—	680800026*	680800027	680800028	680800029
1000	—	681000026*	681000027	681000028	681000029



680320028

TR 28 1.1 SAFETY OR ISOLATING TRANSFORMER - PRIMARY VOLTAGE 400V

POWER (VA)	REFERENCE				
t_a 40°C	400 // 12 V	400 // 24 V	400 // 48 V	400 // 115 V	400 // 230 V
40	680040030	680040031*	680040032	680040033	680040034
63	680063030	680063031*	680063032	680063033	680063034
100	680100030	680100031*	680100032	680100033	680100034
160	680160030	680160031*	680160032	680160033	680160034
200	680200030	680200031*	680200032	680200033	680200034
250	680250030	680250031*	680250032	680250033	680250034
320	680320030	680320031*	680320032	680320033	680320034
400	680400030	680400031*	680400032	680400033	680400034
500	680500030	680500031*	680500032	680500033	680500034
630	—	680630031*	680630032	680630033	680630034
800	—	680800031*	680800032	680800033	680800034
1000	—	681000031*	681000032	681000033	681000034

t_a maximum ambient temperature

* stock references, the rest on request

TRANSFORMERS

STANDARDS

IEC 61558-1 EN 61558-1
IEC 61558-2-2 EN 61558-2-2
IEC 61558-2-4 EN 61558-2-4
IEC 61558-2-6 EN 61558-2-6

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TRANSFORMERS

SINGLE-PHASE

CONTROL AND SAFETY OR ISOLATING



TR 28 2.2 | 5.2

Control and safety or isolating single-phase transformers. They can supply high instantaneous power necessary for the correct operation of contactors and other switch and control gear. IP20 protection index (finger safe). For mounting on DIN/EN rail up to 320 VA. Great flexibility due to the several primary rated voltages with regulation taps $\pm 15V$ (TR28 5.2) and the serial-parallel secondary connection. Fast and easy connection due to the high capacity clamp type terminal blocks.

TR 28 2.2

PRI voltage: 0-230-400 V
SEC voltage: 12-24, 24-48 or 115-230 V
Rated power range: 25 VA to 1000 VA
Class I against electric shock
Thermal class: B (130 °C)
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP20
Dielectric strength PRI-SEC: $\geq 4,5$ kV
Dielectric strength between windings and metallic parts: $\geq 2,5$ kV

TR 28 5.2

PRI voltage: 0-230-400-460 ± 15 V
SEC voltage: 12-24, 24-48 or 115-230 V
Rated power range: 25 VA to 1000 VA
Class I against electric shock
Thermal class: B (130 °C)
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP20
Dielectric strength PRI-SEC: $\geq 4,5$ kV
Dielectric strength between windings and metallic parts: $\geq 2,5$ kV



680320044

TR 28 2.2 CONTROL AND SAFETY OR ISOLATING TRANSFORMER

POWER		INSTANT. POWER	REFERENCE		
(VA)		(VA)			
t_a 40°C	t_a 25°C		(12-24 V)	(24-48 V)	(115-230 V)
25	40	75	680025043	680025044	680025045
40	63	120	680040043	680040044	680040045
63	100	150	680063043	680063044	680063045
100	130	230	680100043	680100044	680100045
160	200	350	680160043	680160044	680160045
200	250	450	680200043	680200044	680200045
250	320	600	680250043	680250044	680250045
320	400	800	680320043	680320044	680320045
400	500	950	680400043	680400044	680400045
500	630	1275	680500043	680500044	680500045
630	800	1700	680630043	680630044	680630045
800	1000	2100	680800043	680800044	680800045
1000	1250	3300	681000043	681000044	681000045



680320011

TR 28 5.2 CONTROL AND SAFETY OR ISOLATING TRANSFORMER

POWER		INSTANT. POWER	REFERENCE		
(VA)		(VA)			
t_a 40°C	t_a 25°C		(12-24 V)	(24-48 V)	(115-230 V)
25	40	75	680025010	680025011	680025012
40	63	120	680040010	680040011	680040012
63	100	150	680063010	680063011	680063012
100	130	230	680100010	680100011	680100012
160	200	350	680160010	680160011	680160012
200	250	450	680200010	680200011	680200012
250	320	600	680250010	680250011	680250012
320	400	800	680320010	680320011	680320012
400	500	950	680400010	680400011	680400012
500	630	1275	680500010	680500011	680500012
630	800	1700	680630010	680630011	680630012
800	1000	2100	680800010	680800011	680800012
1000	1250	3300	681000010	681000011	681000012

t_a maximum ambient temperature

STANDARDS

IEC 61558-1 EN 61558-1
IEC 61558-2-2 EN 61558-2-2
IEC 61558-2-4 EN 61558-2-4
IEC 61558-2-6 EN 61558-2-6

DIMENSIONS

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TRANSFORMERS

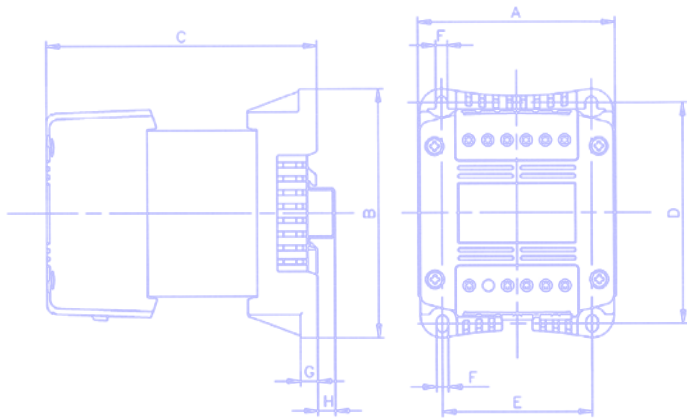
SINGLE-PHASE

DIMENSIONS



TR 28 1.1

DIMENSIONS - TR28 1.1 SINGLE-PHASE TRANSFORMER



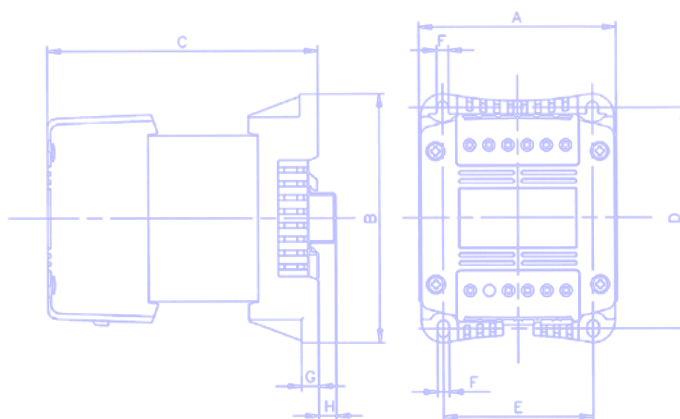
POWER	A	B	C	D	E	F	G	H	WEIGHT
(VA)	(mm)								(kg)
40	84	113	96	101	66	5	7,5	2	1,17
63	84	113	105	101	66	5	7,5	2	1,48
100	84	113	112	101	66	5	7,5	2	1,83
160	84	113	126	101	66	5	7,5	2	2,40
200	108	135	124	120	82	6,5	9,5	9,5	3,95
250	108	135	133	120	82	6,5	9,5	9,5	4,20
320	108	135	138	120	82	6,5	9,5	9,5	4,40
400	120	152	136	135	94	7	9,5	–	5,50
500	120	152	146	135	94	7	9,5	–	6,75
630	150	177	130	160	115	7	2	–	7,60
800	150	177	150	160	115	7	2	–	10,0
1000	150	177	170	160	115	7	2	–	13,0

TRANSFORMERS

STANDARDS
IEC 61558-1 EN 61558-1
IEC 61558-2-2 EN 61558-2-2
IEC 61558-2-4 EN 61558-2-4
IEC 61558-2-6 EN 61558-2-6



DIMENSIONS - TR28 2.2 SINGLE-PHASE TRANSFORMER

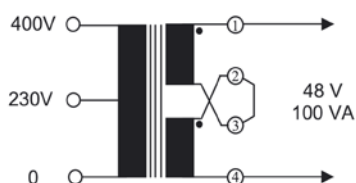


POWER	A	B	C	D	E	F	G	H	WEIGHT
(VA)	(mm)								(kg)
25	84	113	96	101	66	5	7,5	2	1,15
40	84	113	105	101	66	5	7,5	2	1,45
63	84	113	112	101	66	5	7,5	2	1,80
100	84	113	116	101	66	5	7,5	2	1,95
160	84	113	131	101	66	5	7,5	2	2,55
200	108	135	133	120	82	6,5	9,5	9,5	4,15
250	108	135	138	120	82	6,5	9,5	9,5	4,40
320	108	135	148	120	82	6,5	9,5	9,5	4,95
400	120	152	141	135	94	7	9,5	–	5,80
500	120	152	156	135	94	7	9,5	–	7,00
630	150	177	140	160	115	7	2	–	8,60
800	150	177	160	160	115	7	2	–	11,4
1000	150	177	182,60	160	115	7	2	–	14,3

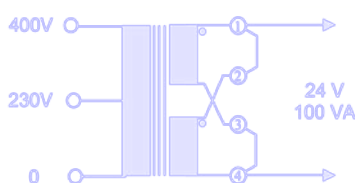
CONNECTION POSSIBILITIES

EXAMPLE: TRANSFORMER 0-230-400//24-48 V 100 VA (610100044)

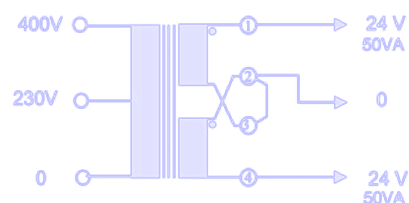
SERIAL CONNECTION



PARALLEL CONNECTION



WITH MIDDLE TAP



STANDARDS

IEC 61558-1 EN 61558-1
IEC 61558-2-2 EN 61558-2-2
IEC 61558-2-4 EN 61558-2-4
IEC 61558-2-6 EN 61558-2-6

TRANSFORMERS

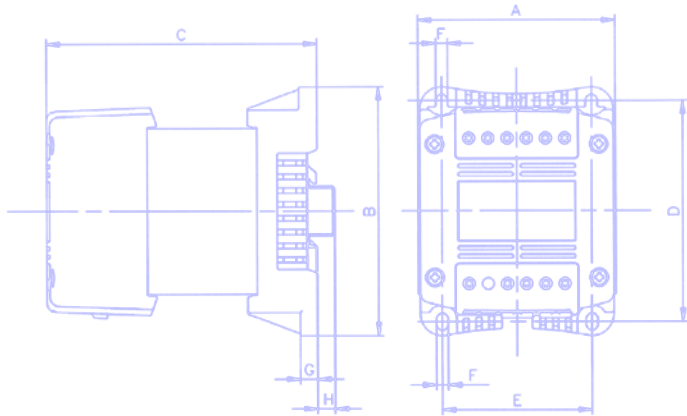
TRANSFORMERS SINGLE-PHASE

DIMENSIONS
CONNECTION POSSIBILITIES



TR 28 5.2

DIMENSIONS - TR28 5.2 SINGLE-PHASE TRANSFORMER

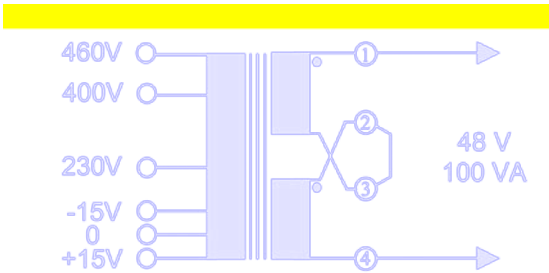


POWER	A	B	C	D	E	F	G	H	WEIGHT
(VA)	(mm)								(kg)
25	84	113	96	101	66	5	7,5	2	1,17
40	84	113	105	101	66	5	7,5	2	1,48
63	84	113	112	101	66	5	7,5	2	1,83
100	84	113	116	101	66	5	7,5	2	2,00
160	84	113	131	101	66	5	7,5	2	2,65
200	108	135	133	120	82	6,5	9,5	9,5	4,20
250	108	135	138	120	82	6,5	9,5	9,5	4,45
320	108	135	148	120	82	6,5	9,5	9,5	5,00
400	120	152	136	135	94	7	9,5	–	5,30
500	120	152	156	135	94	7	9,5	–	7,08
630	150	177	140	160	115	7	2	–	8,68
800	150	177	160	160	115	7	2	–	11,5
1000	150	177	182,60	160	115	7	2	–	14,4

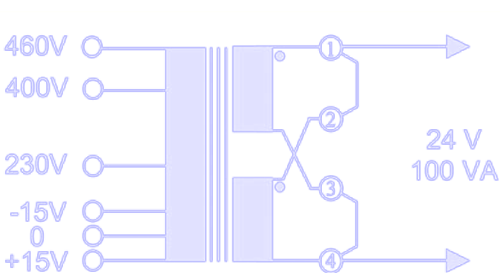
CONNECTION POSSIBILITIES

EXAMPLE: TRANSFORMER 0-230-400//24-48 V 100 VA (610100001)

SERIAL CONNECTION



PARALLEL CONNECTION



STANDARDS
IEC 61558-1 EN 61558-1
IEC 61558-2-2 EN 61558-2-2
IEC 61558-2-4 EN 61558-2-4
IEC 61558-2-6 EN 61558-2-6

TRANSFORMERS

SINGLE-PHASE

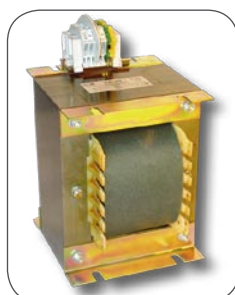
FOR MEDICAL LOCATIONS



TR 29 UNE

Single-phase isolating transformers according to Spanish standard and the requirements of Spanish electrical regulations (REBT2002, ITC-BT-38). These transformers are especially designed for power supply in operating theatres and other medical locations, where due to intensive contact between machines and patients, a high electric shock hazards exists for both patients and medical staff. It is also necessary to maintain the electricity supply even in the case of an insulation fault or overload condition. Very low leakage currents.

PRI voltage: 230 V
SEC voltage: 230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP00
Dielectric strength PRI-SEC: > 5kV
Leakage currents < 0,5 mA
Inrush current < 8-In
Electrostatic screen

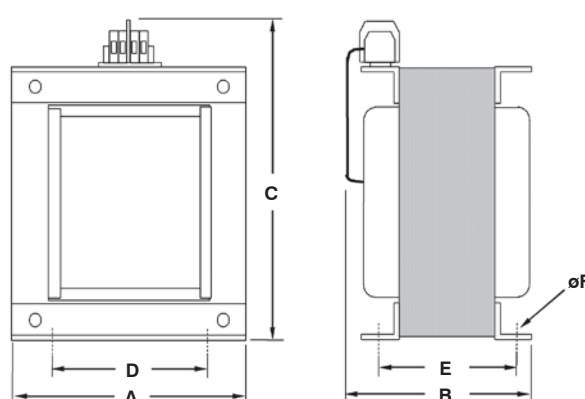


69N0063000

TR 29 STANDARD UNE SINGLE-PHASE TRANSFORMER

POWER (kVA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
1	69N0010000	163	160	260	98	115	8	17,0
1,6	69N0016000	163	175	260	98	130	8	21,5
2	69N0020000	163	195	260	98	150	8	25,5
2,5	69N0025000	200	200	310	120	140	10	34,0
3	69N0030000	200	210	310	120	160	10	38,0
4	69N0040000	200	240	310	120	180	10	48,0
5	69N0050000	250	250	390	150	180	12	65,0
6,3	69N0063000	250	270	390	150	200	12	75,0
7,5	69N0075000	250	300	390	150	230	12	90,0

DIMENSIONS



TRANSFORMERS

SINGLE-PHASE

FOR MEDICAL LOCATIONS



TR 29 IEC/EN

Single-phase isolating transformers especially designed for power supply in medical locations that belong to group 2 (operating theatres, operating recovery rooms, anaesthesia rooms, intensive care units, premature baby units) where due to intensive contact between machines and patients, a high electric shock hazards exists for both patients and medical staff. It is also necessary to maintain the electricity supply even in the case of an insulation fault or overload condition. Very low leakage currents. Built-in PTC thermistors for monitoring the transformer temperature.

PRI voltage: 230 V
SEC voltage: 230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP00
Dielectric strength: > 4 kV
Leakage currents < 0,35 mA
Short circuit voltage < 3%
No load current > 3%
Inrush current < 8-In
Electrostatic screen
2 PTC thermistors
Horizontal or vertical mounting

TR 29 STANDARDS IEC/EN SINGLE-PHASE TRANSFORMER

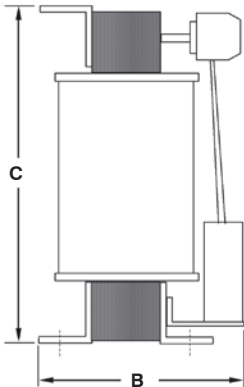
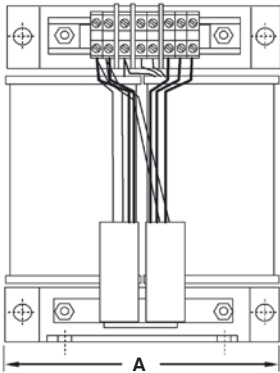
POWER	REFERENCE	SIZE					FIXING					WEIGHT
(kVA)		(mm)					(mm)					(kg)
		A	B	C	D	E	F	G	H	I	J	
1,6	69N0016001	200	180	270	200	175	10	150	110	100	8	20,0
2,5	69N0025001	200	200	270	200	175	10	150	130	100	8	26,0
3,3	69N0033001	240	200	315	240	210	10	205	135	120	10	35,0
5	69N0050001	240	220	315	240	210	10	205	150	120	10	42,5
6,3	69N0063001	280	245	370	280	245	10	235	170	140	10	63,0
8	69N0080001	280	270	370	280	245	10	235	190	140	10	71,0
10	69N0100001	320	265	420	320	280	10	265	195	160	10	93,0



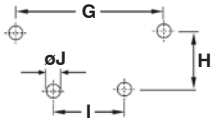
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TRANSFORMERS

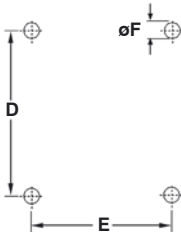
DIMENSIONS



VERTICAL MOUNTING



HORIZONTAL MOUNTING





TRT 33 IP00

Three-phase power isolating transformers dry type. Intended for change of voltages with galvanic isolation, attenuation of line disturbances and/or when it is necessary to change the neutral system. Connection with terminal blocks or with screws for flats terminals. Manufactured with electrical steel with low losses and copper windings. On request we can manufacture transformers with other voltages, with taps, electrostatic screen, with thermal switch, etc.

PRI voltage: 400 V
SEC voltage: 230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00 | IP23
Dielectric strength PRI-SEC: > 4 kV
Natural air cooling
Vector group: Dyn5
Others characteristics on request



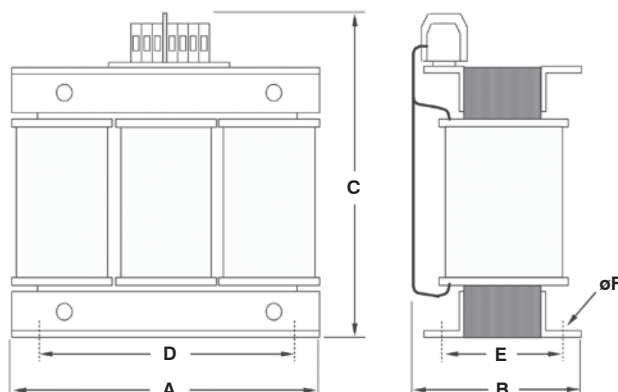
73N0035000

TRT 33 IP00 THREE-PHASE TRANSFORMER

POWER (kVA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
0,5	73N0005000	180	85	225	140	55	6	6,5
1	73N0010000	240	110	260	200	75	6	16,0
1,6	73N0016000	240	120	260	200	85	6	18,5
2	73N0020000	240	130	260	200	95	6	23,0
3,5	73N0035000	300	135	340	200	105	6	33,5
4	73N0040000	300	145	340	200	115	6	40,0
5	73N0050000	300	175	340	200	135	6	50,0
6,3	73N0063000	360	170	390	300	115	8	56,0
8	73N0080000	360	180	390	300	125	8	58,0
10	73N0100000	360	190	390	300	135	8	66,7
12,5	73N0125000	420	195	450	300	135	8	78,0
16	73N0160000	420	215	450	300	155	8	102
20	73N0200000	480	220	500	400	155	10	118
25	73N0250000	480	240	500	400	175	10	154
31,5	73N0315000	480	265	500	400	195	10	165
40	73N0400000	480	300	500	400	215	10	195
50	73N0500000	660	310	600	500	225	12	255
63	73N0630000	660	330	600	500	245	12	320
80	73N0800000	660	350	600	500	270	12	420
100	73N1000000	720	380	720	500	250	12	450

Dimensions may slightly vary according the voltages

DIMENSIONS



STANDARDS
IEC 61558
EN 61558
IEC 60076-11

PROTECTION

VECTOR GROUPS

IP PROTECTION INDEX

TRANSFORMERS

THREE-PHASE



TRT 33 IP23

TRT 33 IP23 THREE-PHASE TRANSFORMER

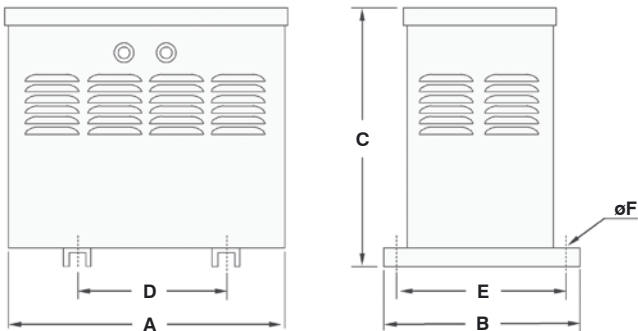
POWER (kVA)	REFERENCE	SIZE (mm)				FIXING (mm)		WEIGHT (kg)
		A	B	C	D	E	F	
0,5	73C0005000	235	240	285	140	215	12	9,5
1	73C0010000	285	290	335	200	265	12	20,0
1,6	73C0016000	285	290	335	200	265	12	22,5
2	73C0020000	285	290	335	200	265	12	27,0
3,5	73C0035000	375	300	435	200	270	12	40,5
6,3	73C0063000	450	400	480	300	370	12	66,0
8	73C0080000	450	400	480	300	370	12	68,0
10	73C0100000	450	400	480	300	370	12	76,5
12,5	73C0125000	510	400	540	300	370	12	89,0
16	73C0160000	510	400	540	300	370	12	113
20	73C0200000	540	500	610	400	470	12	137
25	73C0250000	540	500	610	400	470	12	172
31,5	73C0315000	540	500	610	400	470	12	184
40	73C0400000	540	500	610	400	470	12	215
50	73C0500000	880	530	830	500	500	12	285
63	73C0630000	880	530	830	500	500	12	350
80	73C0800000	880	730	830	500	700	12	460
100	73C1000000	880	730	830	500	700	12	490



73C0035000

TRANSFORMERS

DIMENSIONS



TR 33 IP23 THREE-PHASE TRANSFORMER ACCESSORIES

REFERENCE	DESCRIPTION
690000005	WHEELS KIT (max 200 kg/wheel)

TRANSFORMERS

THREE-PHASE

FOR MEDICAL LOCATIONS



TRT 34 IEC/EN

Three-phase isolating transformers especially designed for power supply in medical locations that belong to group 2 (operating theatres, operating recovery rooms, anaesthesia rooms, intensive care units, premature baby units) where due to intensive contact between machines and patients, a high electric shock hazards exists for both patients and medical staff. It is also necessary to maintain the electricity supply even in the case of an insulation fault or overload condition. Very low leakage currents. Built-in PTC thermistors for monitoring the transformer temperature.

Reinforced insulation
Electrostatic screen between primary and secondary windings
Rated primary voltage: 400 V
Rated secondary voltage: 230 V
Thermal class: B
Maximum ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP00
Dielectric strength windings-metallic parts: > 4kV
Leakage currents: < 0,5 mA (0,35 mA)
Short circuit voltage: < 3%
No load current: < 3%
Inrush current: < 12-In
Electrostatic screen

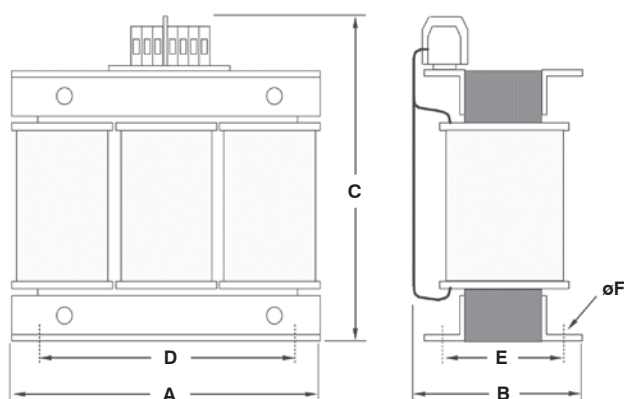


74N0063001

TRT 34 STANDARD IEC/EN THREE-PHASE TRANSFORMER

POWER (kVA)	REFERENCE	SIZE (mm)						WEIGHT (kg)
		A	B	C	D	E	F	
3,15	74N0032001	360	200	400	300	130	9	70,0
5	74N0050001	420	210	450	300	120	9	91,5
6,3	74N0063001	420	220	450	300	130	9	102,0
8	74N0080001	420	240	450	300	150	9	123,0
10	74N0100001	420	250	450	300	160	9	133,5

DIMENSIONS



TRANSFORMERS

THREE-PHASE

FOR MEDICAL LOCATIONS



TRT 34 UNE

Three-phase isolating transformers according to Spanish standard and the requirements of Spanish electrical regulations (REBT2002, ITC-BT-38). These transformers are especially designed for power supply in operating theatres and other medical locations, where due to intensive contact between machines and patients, a high electric shock hazards exists for both patients and medical staff. It is also necessary to maintain the electricity supply even in the case of an insulation fault or overload condition. Very low leakage currents.

PRI voltage: 400 V
SEC voltage: 230 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP00
Vector Group: YNd5
Dielectric strength PRI-SEC: > 5kV
Leakage currents < 0,5 mA
Inrush current < 8·In
Electrostatic screen

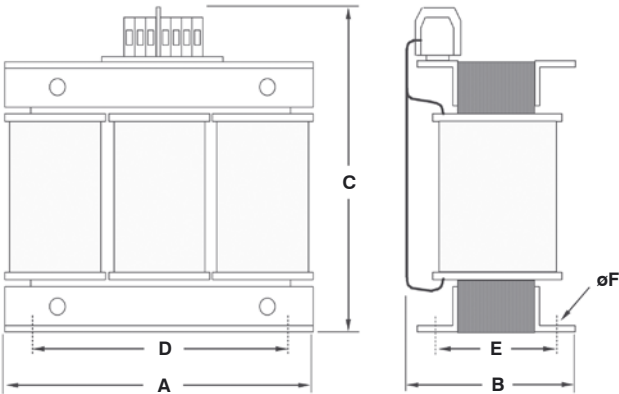
TRT 34 STANDARD UNE THREE-PHASE TRANSFORMER

POWER (kVA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
2	74N0020000	300	135	320	200	95	6	30
3	74N0030000	300	155	320	200	105	6	37
5	74N0050000	360	170	385	300	115	8	59
7,5	74N0075000	420	195	435	300	135	8	73



74N0030000

DIMENSIONS



TRANSFORMERS

STANDARDS

UNE 20615-78
UNE 20615-80 1° C
UNE 20615-85 2° C

SINGLE-PHASE MODEL

152

PROTECTION

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VECTOR GROUPS

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IP PROTECTION INDEX

180-181

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AUTOTRANSFORMERS

SINGLE-PHASE



TR 24

Single-phase reversible autotransformers, especially 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. On request we can manufacture autotransformers with other voltages, with taps, with thermal switch, etc.

Reversible
Voltages: 0-230-400 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00
Dielectric strength: > 3 kV
Others characteristics on request



640100000

TR 24 SINGLE-PHASE AUTOTRANSFORMER

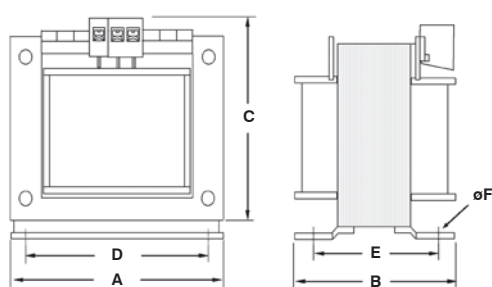
POWER (VA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
100	640100000	75	71	84	56	47	4,8	1,00
200	640200000	84	84	90	64	67	4,8	1,90
320	640320000	96	82	100	84	67	5,7	2,23
400	640400000	96	92	100	84	77	5,7	2,68
500	640500000	96	107	100	84	91	5,7	3,35
630	640630000	108	91	111	80,5	73	5,7	3,60
800	640800000	108	104	111	80,5	87	5,7	4,40
1000	641000000	120	106	118	90	87	5,7	4,90
1600	641600000	150	114	142	122	92	6,8	7,50
2000	642000000	150	130	142	122	108	6,8	9,80
2500	642500000	150	157	142	122	135	6,8	12,9
3000	643000000	150	157	142	122	135	6,8	13,2
4000	644000000	163	165	245	98	120	8	19,0
5000	645000000	163	175	245	98	130	8	21,5
6300	646300000	163	195	245	98	150	8	23,5

Dimensions vary significantly according the voltages

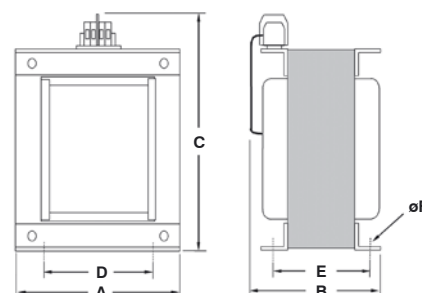


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DIMENSIONS



100 - 3000 VA



4000 - 6300 VA

STANDARDS
 IEC 61558
 EN 61558
 IEC 60076-11

PROTECTION

IP PROTECTION INDEX

AUTOTRANSFORMERS

SINGLE-PHASE



TR 25

Single-phase reversible autotransformers 125-220V, especially 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. Manufactured with metallic covers and handle. Up to 1000VA they are delivered with mains cable.

Reversible
Voltages: 125-220 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Protection index: IP21
Metallic covers
Up to 1000 VA are supplied with cable plug

TR 25 SINGLE-PHASE AUTOTRANSFORMER

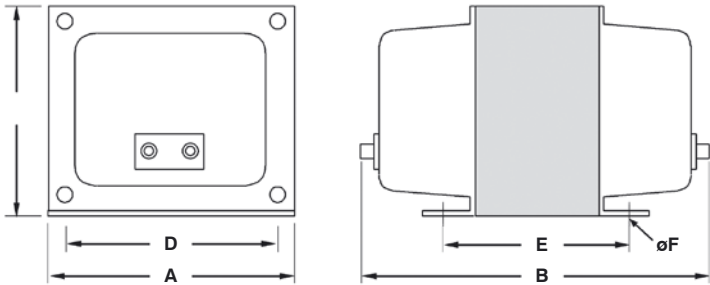
POWER (VA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
100	650100000	75	85	63	57	47	9	1,0
200	650200000	96	105	80	79	49	9	1,5
300	650300000	96	115	80	79	58	9	2,0
400	650400000	96	120	80	79	60	9	2,2
500	650500000	96	130	80	79	67	9	2,8
750	650750000	108	140	90	91	70	10	3,6
1000	651000000	108	150	90	91	75	10	4,1
1500	651500000	126	160	105	116	90	10	6,4
2000	652000000	126	170	105	116	100	10	7,5
2500	652500000	150	165	125	132	80	12	8,2
3000	653000000	150	185	125	132	100	12	10,6



650500000

TRANSFORMERS

DIMENSIONS



STANDARDS
IEC 60076-11

PROTECTION

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AUTOTRANSFORMERS

THREE-PHASE



TRT 30 IP00

Three-phase reversible autotransformers, dry type, intended for use as voltage adapter when an economical solution is required in applications where the galvanic isolation or attenuation of disturbances are not required. The main applications include the voltage adaptation in motors, pumps, machines, air conditioning equipment. Connection with terminal blocks or with screws for flats terminals. Manufactured with electrical steel with low losses and copper windings. On request we can manufacture autotransformers with other voltages, with taps, with thermal switch, etc.

Reversible
Copper windings
Voltages: 230-400 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP00
Dielectric strength: > 3 kV
Natural air cooling
Vector group: Yn0 (with neutral)
Others characteristics on request



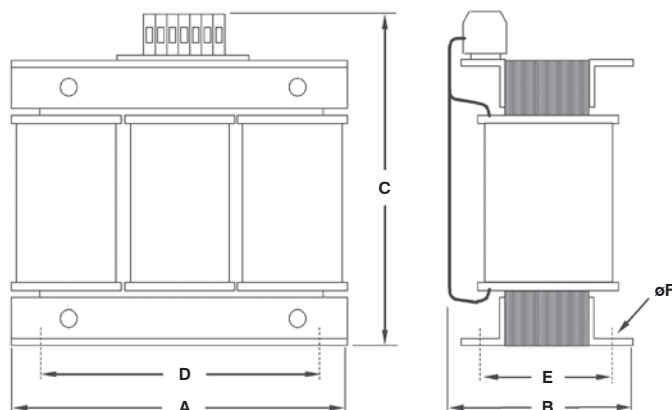
70N0630000

TRT 30 IP00 THREE-PHASE AUTOTRANSFORMER

POWER (kVA)	REFERENCE	SIZE (mm)			FIXING (mm)			WEIGHT (kg)
		A	B	C	D	E	F	
0,5	70N0005000	180	85	160	140	55	6	5,5
1	70N0010000	180	85	225	140	55	6	6,5
2	70N0020000	180	95	225	140	65	6	9,1
3	70N0030000	240	110	250	200	75	6	16,0
5	70N0050000	240	120	250	200	85	6	18,5
8	70N0080000	240	145	250	200	110	6	27,0
10	70N0100000	300	135	320	200	95	6	31,0
12,5	70N0125000	300	155	320	200	115	6	40,0
16	70N0160000	300	165	320	200	125	6	44,0
20	70N0200000	360	170	370	300	115	8	56,0
25	70N0250000	360	180	370	300	125	8	58,0
31,5	70N0315000	420	195	435	300	135	8	78,0
40	70N0400000	420	205	435	300	145	8	90,0
50	70N0500000	420	215	435	300	155	8	102
63	70N0630000	480	240	500	400	175	10	154
80	70N0800000	480	265	500	400	195	10	165
100	70N1000000	480	300	500	400	215	10	195
125	70N1250000	660	310	600	500	225	12	245
160	70N1600000	660	330	600	500	245	12	305
200	70N2000000	660	350	600	500	270	12	400

Dimensions vary significantly according the voltages

DIMENSIONS



AUTOTRANSFORMERS

THREE-PHASE



TRT 30 IP23

Three-phase reversible autotransformers, dry type, intended for use as voltage adapter when an economical solution is required in applications where the galvanic isolation or attenuation of disturbances are not required. The main applications include the voltage adaptation in motors, pumps, machines, air conditioning equipment. Connection with terminal blocks or with screws for flats terminals. Manufactured with electrical steel with low losses and copper windings. On request we can manufacture autotransformers with other voltages, with taps, with thermal switch, etc.

Reversible
Copper windings
Voltages: 230-400 V
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50/60 Hz
Class I
Protection index: IP23
Dielectric strength: > 3 kV
Natural air cooling
Vector group: Yn0 (with neutral)
Others characteristics on request

TRT 30 IP23 THREE-PHASE AUTOTRANSFORMER

POWER	REFERENCE	SIZE			FIXING			WEIGHT
(kVA)		(mm)			(mm)			(kg)
		A	B	C	D	E	F	
0,5	70C0005000	235	240	285	140	215	12	9,0
1	70C0010000	235	240	285	140	215	12	9,5
2	70C0020000	235	240	285	140	215	12	12,0
3	70C0030000	285	290	335	200	265	12	20,0
5	70C0050000	285	290	335	200	265	12	22,5
8	70C0080000	285	290	335	200	265	12	31,0
10	70C0100000	375	300	435	200	270	12	38,0
12,5	70C0125000	375	300	435	200	270	12	47,0
16	70C0160000	375	300	435	200	270	12	51,0
20	70C0200000	450	400	480	300	370	12	66,0
25	70C0250000	450	400	480	300	370	12	68,0
31,5	70C0315000	510	400	540	300	370	12	89,0
40	70C0400000	510	400	540	300	370	12	101
50	70C0500000	510	400	540	300	370	12	113
63	70C0630000	540	500	610	400	470	12	172
80	70C0800000	540	500	610	400	470	12	184
100	70C1000000	540	500	610	400	470	12	215
125	70C1250000	880	530	830	500	500	12	275
160	70C1600000	880	530	830	500	500	12	335
200	70C2000000	880	730	830	500	700	12	440

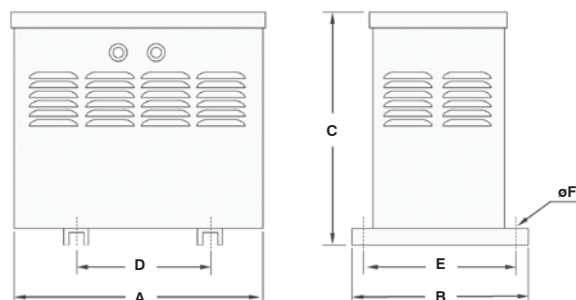
Dimensions vary significantly according the voltages



70C0630000

TRANSFORMERS

DIMENSIONS



TRT 30 IP23 THREE-PHASE AUTOTRANSFORMER ACCESSORIES

REFERENCE	DESCRIPTION
690000005	WHEELS KIT (max 200 kg/wheel)

STANDARDS

IEC 61558
EN 61558
IEC 60076-11

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PROTECTION

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CHOKES

SINGLE-PHASE

RE 8

Single-phase reactors intended for the attenuation of notches and spikes, reduction of harmonics and limitation of inrush currents. Drop voltage of 4% of the rated voltage (230V). On request we can manufacture reactors with other characteristics, for other applications or with thermal switch.

Voltage drop: 4% at I_N (230V)
 Thermal class: B
 Max. ambient temperature: 40°C
 Frequency: 50 Hz
 Class I
 Protection index: IP00
 Dielectric strength: > 3 kV
 Other characteristics on request

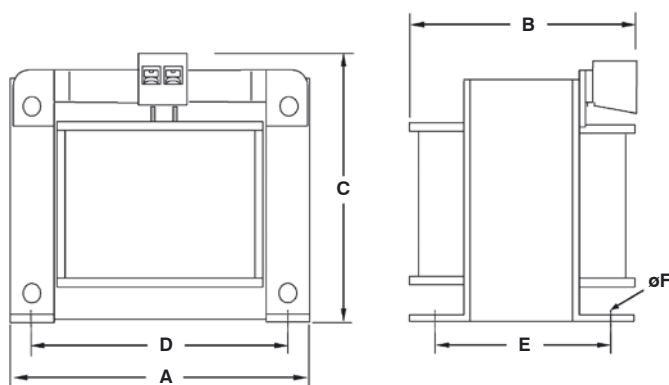


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RE 8 SINGLE-PHASE CHOKE

CURRENT		REFERENCE	SIZE			FIXING			WEIGHT
(A)	(mH)		(mm)			(mm)			(kg)
			A	B	C	D	E	F	
6	4,881	8006100480	60	70	68	50	48	4	0,73
10	2,928	8010100290	75	66	81	62,5	45	4	0,98
16	1,830	8016100180	84	85	86	70	66	4	1,98
25	1,171	8025100110	96	90	96	80	70	5	2,65
32	0,915	8032291500	108	112	106	90	75	5	3,56
40	0,732	8040273200	108	126	116	90	89	5	4,37
50	0,586	8050258600	120	123	128	100	84	6	5,00
63	0,465	8063246500	120	143	128	100	104	6	6,75

DIMENSIONS



CHOKES

THREE-PHASE

LINE

RET 9

Three-phase reactors intended for the attenuation of notches and spikes, reduction of harmonics and limitation of inrush currents in converters and variable speed drives. Drop voltage of 4% of the rated voltage (400V). Manufactured with electrical steel with low losses and copper windings. On request we can manufacture reactors with other characteristics or with thermal switch.

Voltage drop: 4% at I_N (400V)
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50 Hz
Class I
Protection index: IP00
Dielectric strength: > 4 kV
Natural air cooling
Other characteristics on request

RET 9 THREE-PHASE LINE CHOKE

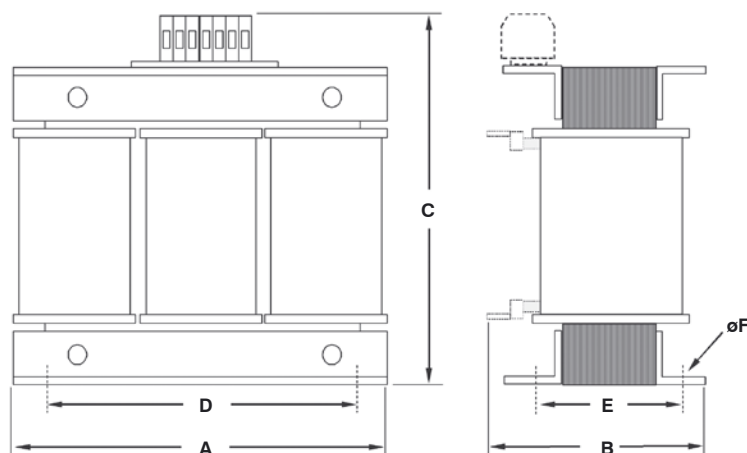
CURRENT		REFERENCE	SIZE			FIXING			WEIGHT
(A)	(mH)		(mm)			(mm)			(kg)
			A	B	C	D	E	F	
10	2,928	9010100290	180	90	205	140	55	6	4,5
16	1,830	9016100180	180	90	205	140	55	6	4,8
20	1,464	9020100140	180	90	205	140	55	6	5,2
25	1,171	9025100110	180	90	205	140	55	6	5,5
32	0,915	9032291500	180	90	220	140	55	6	6,5
40	0,732	9040273200	180	100	235	140	65	6	8,5
50	0,586	9050258600	180	100	235	140	65	6	9,0
63	0,465	9063246500	180	140	185	140	75	6	10,0
80	0,366	9080236600	240	140	235	200	75	6	14,0
100	0,293	9100229300	240	140	235	200	75	6	15,0
125	0,234	9125223400	240	140	235	200	75	6	16,0
160	0,183	9160218300	240	150	235	200	85	6	18,5
200	0,146	9200214600	300	190	290	200	95	6	30,0



9063246500

TRANSFORMERS

DIMENSIONS



STANDARDS

IEC 61558
IEC 60289
EN 61558
EN 60289

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CHOKES

THREE-PHASE

HARMONIC CIRCUIT FILTER REACTORS

RET 9

Three-phase reactors for the protection of capacitor banks in power factor correction equipment with presence of harmonics. Avoids resonance effects, minimizes harmonic currents through the capacitors and reduces the losses, increasing capacitor life. Manufactured with electrical steel with low losses and copper windings. Built-in thermal switch. On request we can manufacture reactors with other characteristics.

Rated voltage: 400V
Filtering factor $p = 0,07$ (7%) $f_r = 189$ Hz
Tolerance L: 3%
Linearity (95% L_N): $1,8 \cdot I_N$
Max. permanent overload: $1,17 \cdot I_N$
Thermal class: B
Max. ambient temperature: 40°C
Frequency: 50 Hz
Class I
Protection index: IP00
Dielectric strength: > 4 kV
Thermal micro switch
Other characteristics on request



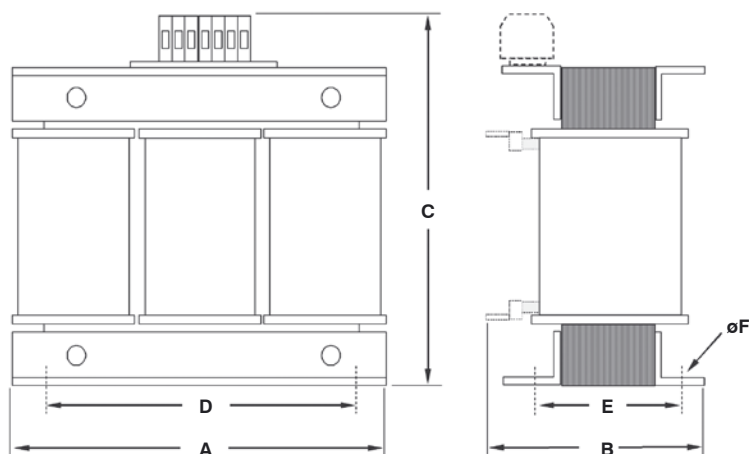
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RET 9 THREE-PHASE HARMONIC CIRCUIT FILTER REACTORS

POWER	CURRENT			REFERENCE	SIZE			FIXING			WEIGHT
(kvar)*	L (mH)	I _N 50 Hz (A)	I _N rms (A)		(mm)			(mm)			(kg)
					A	B	C	D	E	F	
5	7,67	7,65	8,44	9008100760	180	85	220	140	55	6	6,5
10	3,83	15,3	16,9	9015100380	180	95	220	140	65	6	9,0
12,5	3,07	19,1	21,1	9019100310	180	105	170	140	75	6	11,5
15	2,56	22,9	25,3	9023100260	240	135	230	200	75	6	15,0
20	1,92	30,6	33,7	9031100190	240	135	230	200	75	6	15,4
25	1,53	38,2	42,2	9038100150	240	135	230	200	75	6	15,9
30	1,28	45,9	50,6	9046100120	240	145	230	200	85	6	18,0
40	0,958	61,2	67,5	9061295800	240	145	230	200	85	6	20,0
50	0,767	76,5	84,4	9076276700	300	170	285	200	95	6	30,0
60	0,639	91,8	101,3	9092263900	300	180	285	200	105	6	36,0
70	0,548	107,1	118,2	9107254800	300	190	285	200	115	6	40,0
80	0,479	122,4	135,1	9122247900	300	200	285	200	125	6	42,0

(*) Effective filtered compensating reactive power

DIMENSIONS



STANDARDS

IEC 61558
IEC 60289
EN 61558
EN 60289

IP PROTECTION INDEX

180-181

TR21 and TR28 SELECTION GUIDE

DETERMINATION OF RATED POWER OF THE TRANSFORMER IN CONTROL APPLICATIONS

For the correct sizing of a control transformer we must consider the continuous power as well as the inrush power due to the high momentary inrush current caused when electromechanical devices such as contactors or relays are energized. During the normal operation of control circuit the transformer must supply a high instantaneous power for a short time. From the thermal point of view this is not a problem due to the very short time, however, this situation could be problematic due to the reduction of output voltage in the transformer. If the secondary voltage decreases in excess, some devices might not operate and the control circuit won't work properly.

Thus, in every control circuit we will take into account several facts:

- The maximum power in a given moment (inrush power).
- Continuous power requirement.
- Power factor.
- Minimum admissible voltage.

An exhaustive study in each situation could be very complex due to the particularities on every application, however there are simple rules to determine the correct size of a transformer.

We can suppose that the power factor is $\cos \varphi = 0,5$ during the operation of contactors.

The instantaneous power will be:

$$P_{inst} = \sum P_m + \sum P_s + P_a$$

$\sum P_m$: sum of the sealed power of the contactors.

$\sum P_s$: sum of the power of the signalling lamps.

P_a : Inrush power of the biggest contactor.



SELECTION GUIDE

DETERMINATION OF AUTO-TRANSFORMERS FOR MOTORS

When it is necessary to select an autotransformer for supply a electric motor or an equipment where the main charge is a motor, it is important to take into account the type of mechanic charge of the motor as well as the type of start, in order to consider the time and the peak currents that the autotransformer must withstand.

For another hand we must bear in mind the frequency of the starts of the motor (number of starts per hour).

Basically we can consider three load types on the motor:

- Normal load.
- Heavy load.
- Soft starter or variable speed drive.

1. NORMAL LOAD

Direct start on line, star-delta or start with resistors/reactances with fast start and low inertia load on the motor.

Examples:

- Air conditioned.
- Colds chambers or freezers.
- Compressors.
- Machine tools.

2. HEAVY LOAD

Applications where the motor has a load with high inertia what causes a very slow start.

Examples:

- Belt conveyor.
- Fans.
- Shaping machine.
- Grinding machine.
- Pump.
- Rolling-mill train.

3. SOFT STARTER OR VARIABLE SPEED DRIVE.

The use of soft starters or variable speed drives can avoid the high starting current, however, the harmonics increase the losses in the autotransformers which cause elevation of temperature. This point must be take into account for the correct choosing of the rated power because an excessive temperature rise can reduce drastically the duration of the autotransformer.

AUTOTRANSFORMERS

THREE-PHASE

REVERSIBLES - SELECTION GUIDE



TRT 30

SELECTION GUIDE

The following table defines the rated power recommended for the supply motors (or equipment and machines where the motor is the main charge).

MOTOR*					RATED POWER OF AUTOTRANSFORMER					
					NON FREQUENT START (UP TO 4 STARTS / HOUR)			FREQUENT START (UP TO 15 STARTS / HOUR)		
					NORMAL LOAD	HEAVY LOAD	VARIABLE SPEED DRIVE	NORMAL LOAD	HEAVY LOAD	VARIABLE SPEED DRIVE
(CV)	(kW)	FP	η (%)	(kVA)	(kVA)					
0,25	0,18	0,72	72	0,35	0,5	0,5	0,5	0,5	1	0,5
0,5	0,37	0,72	72	0,71	1	1	1	1	2	1
0,75	0,55	0,75	73	1,01	1	2	2	2	2	2
1	0,74	0,76	75	1,29	2	2	2	2	3	2
1,5	1,10	0,78	76	1,86	2	2	3	3	5	3
2	1,47	0,80	77	2,39	3	3	3	3	5	3
2,5	1,84	0,82	79	2,84	3	5	5	5	8	5
3	2,21	0,83	80	3,33	5	5	5	5	8	5
4	2,94	0,84	80	4,38	5	8	8	8	8	8
5	3,68	0,84	83	5,28	8	8	8	8	10	8
5,5	4,05	0,84	83	5,81	8	8	10	8	12,5	10
7,5	5,52	0,84	85	7,73	10	12,5	12,5	10	16	12,5
10	7,36	0,84	86	10,2	12,5	16	16	16	20	16
15	11,0	0,85	87	14,9	16	20	20	20	31,5	20
20	14,7	0,85	88	19,7	25	31,5	31,5	31,5	40	31,5
25	18,4	0,85	89	24,3	31,5	40	40	31,5	50	40
30	22,1	0,86	90	28,5	31,5	40	40	40	63	40
40	29,4	0,86	94	36,4	40	50	50	50	80	50
50	36,8	0,87	96	44,1	50	63	63	63	100	63
60	44,2	0,87	97	52,3	63	80	80	80	100	80
75	55,2	0,88	98	64,0	80	100	100	100	125	100
100	73,6	0,88	98	85,3	100	125	125	125	160	125
125	92,0	0,88	98	106,7	125	160	160	160	200	160
150	110,4	0,88	98	128,0	160	200	200	200	–	200
180	132,5	0,88	98	153,6	200	200	200	200	–	200
200	147,2	0,88	98	170,7	200	–	–	–	–	–

(*) Approximate values for three-phase squirrel cage motors, 4 poles, 50/60 Hz. (Could be different according the manufacturer)

PROTECTION OF TRANSFORMERS AND AUTOTRANSFORMERS

The transformers and autotransformers (and their lines) must be protected against overloads and/or short-circuits that they can be submitted in use, and could causes dangerous situations for persons, animals or installations.
This protection are also a requirement of the standards and the national regulations about electrical installations.

Due to the high inrush current (about $25 \cdot I_n$) it is very difficult to get an optimal protection in the primary side. If we select the rated current of fuses according to the primary rated current, the inrush current will melt the fuses. On the other hand, if the fuses are overrating for withstand the inrush, the transformer won't have a good protection against overloads.

For this reason we recommend to protect transformers and autotransformers on the secondary side (output).
The most adequate way to protect this devices (and their lines) is to include on the output side a device protection capable to interrupt overloads as well as short circuits. For the other hand the input line must be protected against short circuit.

As a general rule the criteria to select the ratings of protection devices are the following:

PROTECTION ON THE OUTPUT SIDE (LOAD)

In this part can appear overloads (if the user try to obtain a power higher than the rated power) as well as short circuits.

In order to achieve a good protection, the device (fuse link, circuit breaker or similar) must be capable to interrupt all range of currents (overloads and short circuits) and must have a rated current equal or lower than the output rated current of the autotransformer.

PROTECTION ON THE INPUT SIDE (SUPPLY LINE)

In this part there is no risk of overload because if the output protection has been correctly selected, it will operate if appear an overload at the output side and the load will be disconnected of the autotransformer.

For this reason we only must protect the input line of autotransformer against short circuits in the line, in the autotransformer connections or inside the windings in a hypothetical failure of the insulations.

When the transformer is energized, it can demand a high momentary current (can be about 25 times the rated current) with a duration of a few milliseconds, that decrease very quickly until reach the rated value.

This factors should be take into account to choose the protection in order to avoid the fusing of the fuses or the not desired operation of the circuit breakers:

- Miniature fuses 5x20 ó 6x32 time-lag (slow) according to IEC/EN60127:
In fuse link $\geq 3 \cdot I_n$ transformer
- Fuse links aM type according to IEC/EN60269:
In fuse link $\geq 1,8 \cdot I_n$ transformer
- Fuse links gG type according to IEC/EN60269:
In fuse link $\geq 3 \cdot I_n$ transformer

TRANSFORMERS

THREE-PHASE

VECTOR GROUPS



VECTOR GROUPS FOR THREE-PHASE TRANSFORMERS

VECTOR GROUP	PHASE ANGLE	GREATER VOLTAGE	SMALLER VOLTAGE	VECTOR GROUP	PHASE ANGLE	GREATER VOLTAGE	SMALLER VOLTAGE
Dd0	0 (0°)			Dd6	6 (180°)		
Yy0	0 (0°)			Yy6	6 (180°)		
Dy5	5 (150°)			Dy11	11 (330°)		
Yd5	5 (150°)			Yd11	11 (330°)		

D → DELTA CONNECTION
Y → STAR (WYE) CONNECTION

- Capital letters (**D**, **Y**, **N**) are associated to the winding with the greater voltage and small letters (**d**, **and**, **n**) with the smaller voltage.
- If the neutral point of star connection winding is accessible (can be connected) is indicated by the letter **N**: **YN** or **yn**.

TRANSFORMERS