

HV/LV distribution transformers

ground mounted immersed transformers
from 100 to 3150 kVA - insulation \leq 24 kV / 400 V
IEC standards



description

This range consists of transformers complying with the following specification:

- three-phase transformers, for indoor or outdoor use (installation to be specified);
- step-down type (1);
- rated frequency: 50 Hz (6);
- maximum ambient temperature: 40°C (5);
- mineral oil immersed (other dielectric upon request);
- hermetically sealed with integral filling (7);
- cover bolted on tank;
- ONAN type natural cooling;
- standard anti-corrosion surface treatment and coating (1);
- final colour grey RAL 7033 (1).

standards

These transformers comply with the following standards:

- IEC standards;
- French standard NFC 52 100 (1990);
- CENELEC harmonization document HD 398-1 to 398-5.

basic fittings

Each transformer includes:

- 1 off-circuit tapping switch with padlocking located on the cover; this switch operates on the highest rated voltage to bring the transformer to the supply voltage-actual value;
- 3 fixed plug-in connectors parts HN 52 S 61 250 A / 24 kV - HV side;
- 4 LV flat-bars, from 250 kVA only; for 100 and 160 kVA: 4 LV porcelain bushings;
- 2 earthing terminals on the cover;
- 4 bi-directional flat rollers from 160 kVA;
- 2 lifting and untanking lugs;
- 1 rating plate to be fixed on 1 of the 4 sides;
- 1 filling plug;

* non standard ratings available on request.

(1) others upon request, consult us.

(2) load losses and rated impedance voltage, at 75°C.

(3) classification of dielectrics according to NF C 27-300:

■ O1 for mineral oil;

■ K3 for silicone oil.

(4) reminder of insulation levels:

insulation level (kV)	7.2	12	17.5	24
kV r.m.s. 50 Hz - 1 min	20	28	38	50
kV B.I.L. 1.2/50 μ s	60	75	95	125

(5) other ambient temperature (45°C, 50°C, 55°C, etc.) upon request, consult us.

(6) other rated frequency (60 Hz) upon request, consult us.

(7) breathing type transformer with conservator upon request, consult us.

- 1 draining device;
- protection index IP 00.

options

The following fittings may be provided as an option:

- 3 HV mobile plug-in connectors 250 A / 24 kV, straight or elbow (the cable characteristics should always be specified);
- 3 HV porcelain bushings;
- 4 LV porcelain bushings from 250 kVA;
- Locking device (lock not supplied) for plug-in connectors;
- LV air-insulated terminal cover to be sealed (possible only with plug-in connectors on HV side and flat-bars on LV side);
- Protection devices: thermometer, thermostat, DGPT2 relay, etc.

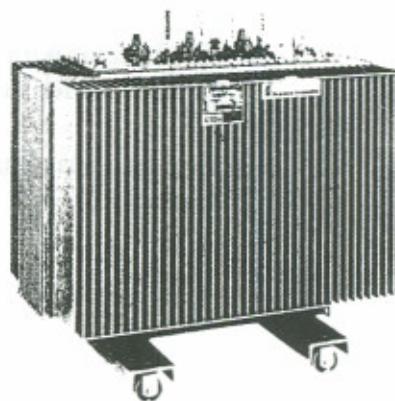
Note: the above options concern usual cases and are not restrictive. For other information, please consult us.

Ce transformateur est garanti réalisé avec des composants neufs et exempts de toute pollution susceptible d'avoir été causée par des PCB.

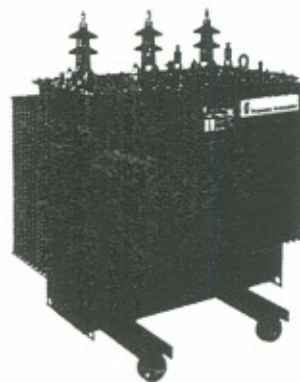
We warrant that this transformer has been manufactured with new material and is totally free from second hand parts polluted with PCB's.

Label stuck on all transformers.

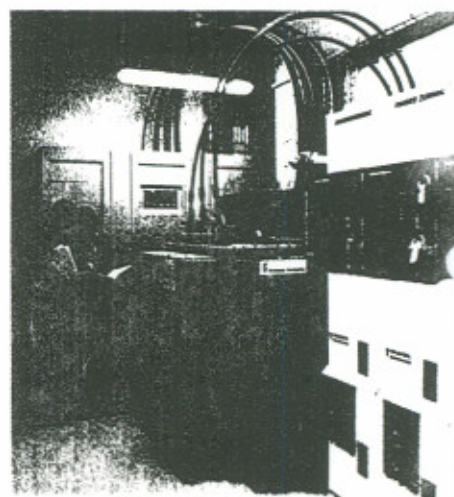
France Transfo guarantees that its transformers are assembled using components that are both new and PCB-free (<2 ppm level), in strict compliance with the current standards.



1000 kVA - 20 kV / 400 V



250 kVA - 20 kV / 400 V

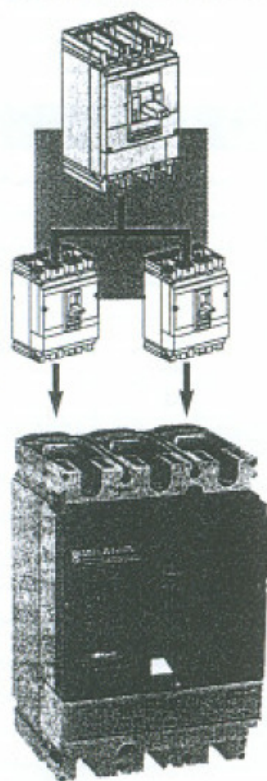


800 kVA - 20 kV / 400 V

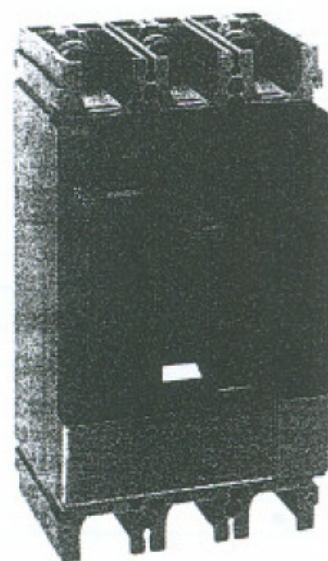
electrical characteristics

rated power (kVA) (1)	100	160	250	315*	400	500*	630	800	1000	1250	1600	2000	2500	3150
rated voltage primary (1)	15 or 20 kV													
secondary at no-load (1)	400 V between phases, 231 V phase to neutral													
rated insulation level (4) primary	17.5 kV for 15 kV 24 kV for 20 kV													
HV tapping range (off-voltage) vector group	$\pm 2.5\%$ or $\pm 5\%$ or $\pm 2.5\%$ $\pm 5\%$ (1) Dyn 11 (1) (delta; star neutral brought-out)													
losses (W) no-load	210	460	650	800	930	1100	1300	1220	1470	1800	2300	2750	3350	4380
load (2)	2150	2350	3250	3900	4600	5500	6500	10700	13000	16000	20000	25500	32000	33000
rated impedance voltage (%) (2)	4	4	4	4	4	4	4	6	6	6	6	6	6	7
no load current (%)	2.5	2.3	2.1	2	1.9	1.9	1.8	2.5	2.4	2.2	2	1.9	1.8	1.7
voltage drop at full load (%) P.F. = 1	2.21	1.54	1.37	1.31	1.22	1.17	1.11	1.51	.47	1.45	1.42	1.45	1.45	1.29
P.F. = 0.8	3.75	3.43	3.33	3.30	3.25	3.22	3.17	4.65	4.63	4.52	4.60	4.61	4.62	5.11
efficiencies (%) load P.F. = 1	97.69	98.27	98.46	98.53	98.64	98.70	98.78	98.53	98.37	98.60	98.63	98.61	98.61	98.83
100 % P.F. = 0.8	97.13	97.85	98.09	98.17	98.30	98.387	98.48	98.17	98.22	98.25	98.29	98.27	98.26	98.54
load P.F. = 1	98.14	98.54	98.70	98.75	98.84	98.89	98.96	98.81	98.84	98.86	98.88	98.87	98.87	99.04
75 % P.F. = 0.8	97.69	98.18	98.37	98.44	98.56	98.62	98.71	98.51	98.56	98.58	98.61	98.60	98.60	98.80
noise level (dBA) power acoustic Lwa	53	59	62	64	65	67	67	68	68	70	71	72	74	74
acoustic pressure Lpa at 0.3 metre	42	48	50	52	53	54	54	55	55	56	58	58	59	59

interruptores automáticos para tableros eléctricos de distribución de potencia



Compact NS250H



Compact NS630L

interruptores automáticos Compact				S100	NS160	NS250	NS400	NS630							
número de polos				2 (*), 3, 4	2 (*), 3, 4	2 (*), 3, 4	3, 4	3, 4							
características eléctricas según CEI 947-2 y EN 60947.2															
intensidad asignada (A)	In	40 °C		100	160	250	400	630							
tensión asignada de aislamiento (V)	Ui			750	750	750	750	750							
tensión asg. soportada al impulso (kV)	Uimp			8	8	8	8	8							
tensión asignada de empleo (V)	Ue	CA 50/60 Hz		690	690	690	690	690							
		CC		500	500	500	500	500							
poder de corte último (kA ef)	Icu	CA 50/60 Hz	220/240 V	N	H	L	N	H	L	N	H	L	N	H	L
			380/415 V	85	100	150	85	100	150	85	100	150	85	100	150
			440 V	25	70	150	36	70	150	36	70	150	45	70	150
			500 V	25	65	130	35	65	130	35	65	130	42	65	130
			525 V	18	50	70	30	50	70	30	50	70	30	50	70
			660/690 V	18	35	50	22	35	50	22	35	50	22	35	50
				8	10	20	8	10	20	8	10	20	10	20	35
				50	85	100	50	85	100	50	85	100		85	
				50	85	100	50	85	100	50	85	100		85	
				50	85	100	50	85	100	50	85	100		85	
poder de corte de servicio	Ics	(% Icu)		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%**	100%**	100%**
categoria de empleo				A	A	A	A	A	A	A	A	A	A	A	A
aptitud al seccionamiento				■	■	■	■	■	■	■	■	■	■	■	■
resistencia (ciclos C-A)		mecánica		50000		40000		20000		15000		15000			
		eléctrica	440 V - In/2	50000		40000		20000		12000		8000			
			440 V - In	30000		20000		10000		6000		4000			
características eléctricas según Nema AB1															
poder de corte (kA)			240 V	85	100	200	85	100	200	85	100	200	85	100	200
			480 V	25	65	130	35	65	130	35	65	130	42	65	130
			600 V	10	35	50	20	35	50	20	35	50	20	35	50
protección (ver páginas siguientes)															
protección contra las sobrecargas (A)	Ir	unidad de disparo intercambiable		■		■		■		■		■		■	
		intensidad de regulación		12,5...100		12,5...160		12,5...250		160...400		250...630			
protección diferencial		dispositivo adicional Vigi		■		■		■		■		■		■	
		relés Vigirex		■		■		■		■		■		■	
instalación y conexionado															
fijo frontal				■		■		■		■		■		■	
fijo posterior				■		■		■		■		■		■	
extraíble con zócalo				■		■		■		■		■		■	
seccionable con chasis				■		■		■		■		■		■	
auxiliares de señalización y medida															
contactos auxiliares				■		■		■		■		■		■	
funciones asociadas a los unidades de disparo electrónicos				■		■		■		■		■		■	
indicador de presencia de tensión				■		■		■		■		■		■	
bloque de transformadores de intensidad				■		■		■		■		■		■	
bloque amperímetro				■		■		■		■		■		■	
bloque de vigilancia de aislamiento				■		■		■		■		■		■	
auxiliares de mando															
bobinas de disparo				■		■		■		■		■		■	
mando eléctrico				■		■		■		■		■		■	
mandos rotativos (directo, prolongado)				■		■		■		■		■		■	
inversor de redes manual/automático				■		■		■		■		■		■	
accesorios de instalación y conexionado															
bornes				■		■		■		■		■		■	
platinas y espaciadores				■		■		■		■		■		■	
cubrebornes y separadores de fases				■		■		■		■		■		■	
marcos embellecedores				■		■		■		■		■		■	
dimensiones y pesos															
dimensiones L x H x P (mm)	2 - 3 polos fijo PAV			105 x 161 x 86	105 x 161 x 86	105 x 161 x 86	140 x 255 x 110	140 x 255 x 110							
	4 polos fijo PAV			140 x 161 x 86	140 x 161 x 86	140 x 161 x 86	185 x 255 x 110	185 x 255 x 110							
peso (kg)	3 polos fijo PAV			1,6	1,6	1,9	6,0	6,0							
	4 polos fijo PAV			2,1	2,1	2,3	7,8	7,8							

(*) 2P en tipo N solamente
 (**) tensión de empleo hasta 500 V

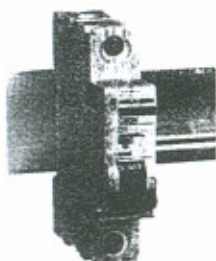
C60N

interruptores automáticos

curvas B, C y D

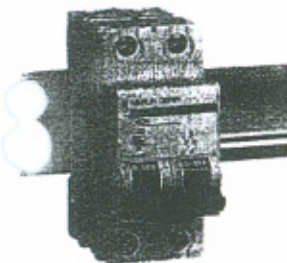
C60N

6000
IEC 898
10 kA
IEC 947.2



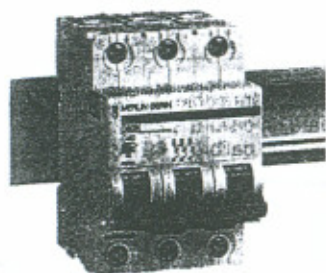
tipo	ancho en paso de 9 mm	In (A)	referencias curva B	referencias curva C	referencias curva D
1P	2	0.5		24067	
		1	24045	24395	24625
		2	24046	24396	24626
		3	24047	24397	24627
		4	24048	24398	24628
		6	24049	24399	24629
		10	24050	24401	24630
		16	24051	24403	24632
		20	24052	24404	24633
		25	24053	24405	24634
		32	24054	24406	24635
		40	24055	24407	24636
		50	24056	24408	24637
		63	24057	24409	24638

1 polo protegido



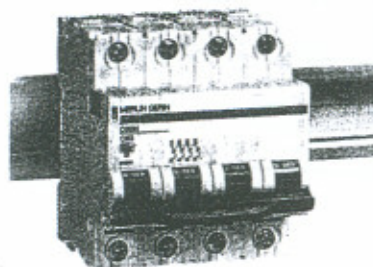
tipo	ancho en paso de 9 mm	In (A)	referencias curva B	referencias curva C	referencias curva D
2P	4	0.5		24068	
		1	24071	24331	24653
		2	24072	24332	24654
		3	24073	24333	24655
		4	24074	24334	24656
		6	24075	24335	24657
		10	24076	24336	24658
		16	24077	24337	24660
		20	24078	24338	24661
		25	24079	24339	24662
		32	24080	24340	24663
		40	24081	24341	24664
		50	24082	24342	24665
		63	24083	24343	24666

2 polos protegidos



tipo	ancho en paso de 9 mm	In (A)	referencias curva B	referencias curva C	referencias curva D
3P	6	0.5		24069	
		1	24084	24344	24667
		2	24085	24345	24668
		3	24086	24346	24669
		4	24087	24347	24670
		6	24088	24348	24671
		10	24089	24349	24672
		16	24090	24350	24674
		20	24091	24351	24675
		25	24092	24352	24676
		32	24093	24353	24677
		40	24094	24354	24678
		50	24095	24355	24679
		63	24096	24356	24680

3 polos protegidos



tipo	ancho en paso de 9 mm	In (A)	referencias curva B	referencias curva C	referencias curva D
4P	8	0.5		24070	
		1	24097	24357	24681
		2	24098	24358	24682
		3	24099	24359	24683
		4	24100	24360	24684
		6	24101	24361	24685
		10	24102	24362	24686
		16	24103	24363	24688
		20	24104	24364	24689
		25	24105	24365	24690
		32	24106	24366	24691
		40	24107	24367	24692
		50	24108	24368	24693
		63	24109	24369	24694

4 polos protegidos

Uso

Mando y protección contra las sobrecargas de circuitos y contra los cortocircuitos:

- en instalación doméstica
- en distribución terminal terciaria e industrial.

Características

- calibre : 0,5 a 63 A a 30°C
- tensión de empleo : 230/400 V CA
- poder de corte :

cal. (A)	tipo	tensión (V)	Poder de corte (A)
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según IEC 898

6 a 63	1P	230/240	6000
	2, 3, 4P	400/415	6000

según IEC 947.2 (Icu)

0,5 a 63	1P	130	20000
		230/240	10000
		400/415	3000
	2, 3, 4P	230/240	20000
		400/415	10000
		440	6000

aplicaciones en DC : ver página 63

- seccionamiento de corte plenamente aparente

- cierre brusco
- número de ciclos (A-C) : 20000

- curvas de disparo :

□ curva B : las unidades de disparo magnéticas actúan entre 3 y 5 In

□ curva C : las unidades de disparo magnéticas actúan entre 5 y 10 In

□ curva D : las unidades de disparo magnéticas actúan entre 10 y 14 In

- tropicalización : ejecución 2

(humedad relativa del 95 % a 55 °C)

- peso (g) :

tipo	1P	2P	3P	4P
	110	220	340	450

- conexión :

cables rígidos de hasta :

□ 25 mm² para un calibre ≤ 25A

□ 35 mm² para un calibre ≤ 63 A

- instalación : compatible con todos los equipamientos multi 9.

informaciones complementarias

auxiliares : página 20
accesorios : página 22
bloque diferencial Vigi : página 27

dimensiones : página 75
curvas : página 60
desclasificación : página 61, 62

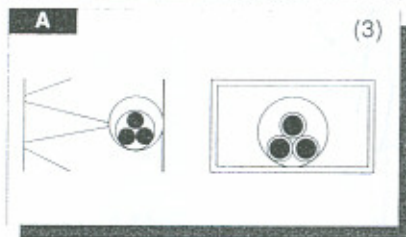
		NS100N/H/L				NS160	NS250		NS400N/H/L		NS630N/H/L			
		unidad de disparo STR22SE				N/H/L	N/H/L		unidad de disparo STR23SE/53UE					
aguas arriba	cal. (A)	40	63	80	100	160	200	250	320	400	320	400	500	630
NS100N	16		1,2	1,2	1,2	2	T	T	T	T	T	T	T	T
unid. de disparo	25		1,2	1,2	1,2	2	T	T	T	T	T	T	T	T
TM-D	40				1,2	2	T	T	T	T	T	T	T	T
	63					2	T	T	T	T	T	T	T	T
	80						T	T	T	T	T	T	T	T
	100							T	T	T	T	T	T	T
NS100H	16		1,2	1,2	1,2	2	T	T	T	T	T	T	T	T
unid. de disparo	25		1,2	1,2	1,2	2	T	T	T	T	T	T	T	T
TM-D	40				1,2	2	36	36	T	T	T	T	T	T
	63					2	36	36	T	T	T	T	T	T
	80						36	36	T	T	T	T	T	T
	100							36	T	T	T	T	T	T
NS100L	16		1,2	1,2	1,2	2	T	T	T	T	T	T	T	T
unid. de disparo	25		1,2	1,2	1,2	2	T	T	T	T	T	T	T	T
TM-D	40				1,2	2	36	36	T	T	T	T	T	T
	63					2	36	36	T	T	T	T	T	T
	80						36	36	T	T	T	T	T	T
	100							36	T	T	T	T	T	T
NS160N	≤ 80						3	3	T	T	T	T	T	T
unid. de disparo	100							3	T	T	T	T	T	T
TM-D	125							3	T	T	T	T	T	T
	160								T	T	T	T	T	T
NS160H	≤ 80						3	3	T	T	T	T	T	T
unid. de disparo	100							3	T	T	T	T	T	T
TM-D	125							3	T	T	T	T	T	T
	160								T	T	T	T	T	T
NS160L	≤ 80						3	3	T	T	T	T	T	T
unid. de disparo	100							3	T	T	T	T	T	T
TM-D	125							3	T	T	T	T	T	T
	160								T	T	T	T	T	T
NS250N	≤ 100							3	5	5	T	T	T	T
unid. de disparo	125								5	5	T	T	T	T
TM-D	160									5	5	T	T	T
	200										5	5	T	T
	250										5	5	5	T
NS250H/L	≤ 100							3	5	5	T	T	T	T
unid. de disparo	125								5	5	T	T	T	T
TM-D	160								5	5	T	T	T	T
	200										5	5	T	T
	250										5	5	5	T
NS100N	40				1,2	2	T	T	T	T	T	T	T	T
STR22SE	100					2	T	T	T	T	T	T	T	T
NS100H/L	40				1,2	2	36	36	T	T	T	T	T	T
STR22SE	100					2	36	36	T	T	T	T	T	T
NS160N	40				1,2	2	3	3	T	T	T	T	T	T
STR22SE	100					2	3	3	T	T	T	T	T	T
	160							3	T	T	T	T	T	T
NS160H/L	40				1,2	2	3	3	T	T	T	T	T	T
STR22SE	100					2	3	3	T	T	T	T	T	T
	160							3	T	T	T	T	T	T
NS250N	≤ 100					2	3	3	5	5	T	T	T	T
STR22SE	160						3	3	5	5	T	T	T	T
	250									5	5	T	T	T
NS250H/L	≤ 100					2	3	3	5	5	T	T	T	T
STR22SE	160						3	3	5	5	T	T	T	T
	250									5	5	T	T	T

Nota : el limite de selectividad está expresado en kA

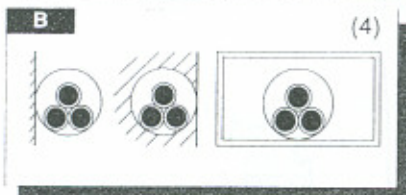
3.1. Determination of the current-carrying capacity value

According to the type of cable installation, tables T3/1 and T3/2 make it possible to determine the current-carrying capacities in continuous operation, defined in the standard as I_z , in the copper or aluminium conductors and cables in free air and in ground installation in compliance with the IEC 364-5-523 Standard.

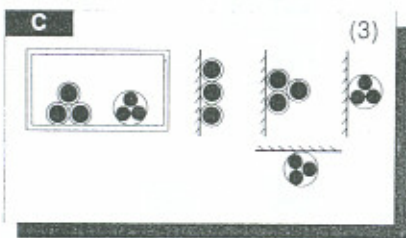
When there are several circuits close together, or ambient temperatures other than the standard values (30 °C for installation in free air and 20 °C for installation in the ground), the capacity values shown in table T3/2 must be multiplied by the correction factors indicated in the tables of paragraphs 3.2. and 3.3.

T3/1 - Description of the most common installation systems of cables in free air or in the ground

- ⇒ single- (1) – multicore in conduit in insulated wall
- ⇒ single-core (1) in conduit in closed trench or molded



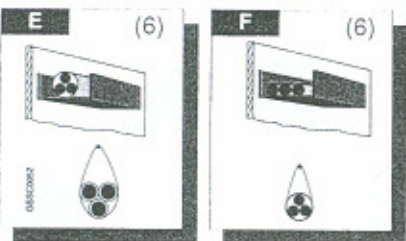
- ⇒ single-core (1) in conduit or in open trunking, in conduit in ventilated trench
- ⇒ single-multicore in conduit under masonry



- ⇒ single-multicore in open or ventilated trench
- ⇒ single-multicore on wall, floor or ceiling



- ⇒ single-multicore in conduit or ground duct or directly in ground



- ⇒ single-core touching or twin-multicore in free air (trays (2), cleats or suspended from catenary wires)

1) Without sheath, practically with just insulating covering. Valid for perforated trays; for non-perforated trays (hole surface < 30% of total), the capacities must be decreased by 5%.

2) Max. no. of cables laid: 20 with max. cross-section of 300 mm².

3) Max. no. of cables laid: 20 with max. cross-section of 120 mm².

4) Max. no. of cables laid: 6 with max. cross-section of 300 mm².

5) Max. no. of cable laid: 27 with max. cross-section of 300 mm².

T3/2 - Current-carrying capacity I_z [A] for copper cables (1)

Type of installation (T3/1)	Number of live conductors (2) and type of insulation (3)													
	3 PVC	2 PVC	— 3 PVC	3 XLPE 2 PVC	2 XLPE 3 PVC	— 3 XLPE	— 2 XLPE	— — —	— — —	— — —	— — —	— — —	— — —	— — —
Conductor cross-section (copper) [mm ²]	Current-carrying capacity I_z [A]													
1	10.5	11	12	13.5	14.5	17	18	19	21	18	14.5	21	17	
1.5	13	14.5	15.5	17	18.5	22	23	24	26	22	18	26	22	
2.5	18	19.5	21	23	25	30	32	33	36	29	24	34	29	
4	24	26	28	31	34	40	42	45	49	38	31	44	37	
6	31	34	36	40	43	52	54	58	63	47	39	56	46	
10	42	46	50	54	60	71	75	80	86	63	52	73	61	
16	56	61	68	73	80	96	100	107	115	81	67	95	79	
25	73	80	89	95	101	119	127	138	149	104	86	121	101	
35				117	126	147	157	171	185	125	103	146	122	
50				141	153	179	192	210	225	148	122	173	144	
70				179	196	229	246	269	289	183	151	213	178	
95				216	238	278	298	328	352	216	179	252	211	
120				249	276	322	346	382	410	246	203	287	240	
150				285	318	371	399	441	473	278	230	324	271	
185				324	362	424	456	506	542	312	257	363	304	
240				380	424	500	538	599	641	360	297	419	351	
300				435	496	576	620	693	741	407	336	474	396	

- (1) For cables in AI, multiply the capacity values by $K_0 = 0.62$.
- (2) In this sense, live conductor means any conductor through which current passes during normal service. For example, in a balanced three-phase circuit the neutral must not be considered as a live conductor.
- (3) PVC: polyvinyl chloride (max. service temperature = 70 °C); XLPE: cross-linked polyethylene (max. service temperature = 90 °C).
For installation at low temperatures, follow the cable manufacturer's instructions.
- (4) For installation at low temperatures, follow the cable manufacturer's instructions.
Non-adjacent installation:
- Temp.: 30 °C (air)
- Temp.: 20 °C (ground).

T3/2 Correction factors for adjacent installation

T3/3 - K1 correction factors for adjacent installation in free air

Type of installation	Number of circuits or multi-core cables								
	1	2	3	4	6	9	12	15	20
Embedded or enclosed	1,00	0,80	0,70	0,70	0,55	0,50	0,45	0,40	0,40
Single layer on wall, floor or unventilated tray	1,00	0,85	0,80	0,75	0,70	0,70	—	—	—
Single layer on ceiling	0,95	0,80	0,70	0,70	0,65	0,60	—	—	—
Single layer on horizontal or vertical ventilated trays	1,00	0,90	0,80	0,75	0,75	0,70	—	—	—
Single layer on cleats	1,00	0,85	0,80	0,80	0,80	0,80	—	—	—

T3/4 - K2 correction factors for adjacent installation in ground

Number of circuits	Distance between cables (a) [m]				
	None	1 cable diameter	0,125	0,25	0,5
2	0,75	0,80	0,85	0,90	0,90
3	0,65	0,70	0,75	0,80	0,85
4	0,60	0,60	0,70	0,75	0,80
5	0,55	0,55	0,65	0,70	0,80
6	0,50	0,55	0,60	0,70	0,80

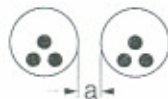
Multicore cables

Single-core cables

T3/5 - K3 correction factors for adjacent installation in ground ducts

A	Multicore cables	Distance between cables (a) [m]			
	Number of cables	None	0,25	0,5	1,0
	2	0,85	0,90	0,95	0,95
	3	0,75	0,85	0,90	0,95
	4	0,70	0,80	0,85	0,90
	5	0,65	0,80	0,85	0,90
	6	0,60	0,80	0,80	0,90

B	Single-core cables	Distance between cables (a) [m]			
	No. of single-core circuits of two or three cables	None	0,25	0,5	1,0
	2	0,80	0,90	0,90	0,95
	3	0,70	0,80	0,85	0,90
	4	0,65	0,75	0,80	0,90
	5	0,60	0,70	0,80	0,90
	6	0,60	0,70	0,80	0,90



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3.3. Correction factors for other ambient temperatures

T3/6 - K4 correction factors of the capacity for installation in free air

Ambient temperature (1) [°C]	PVC	XLPE - EPR
10	1,22	1,15
15	1,17	1,12
20	1,12	1,08
25	1,06	1,04
35	0,94	0,96
40	0,87	0,91
45	0,79	0,87
50	0,71	0,82
55	0,61	0,76
60	0,50	0,71
65	—	0,65

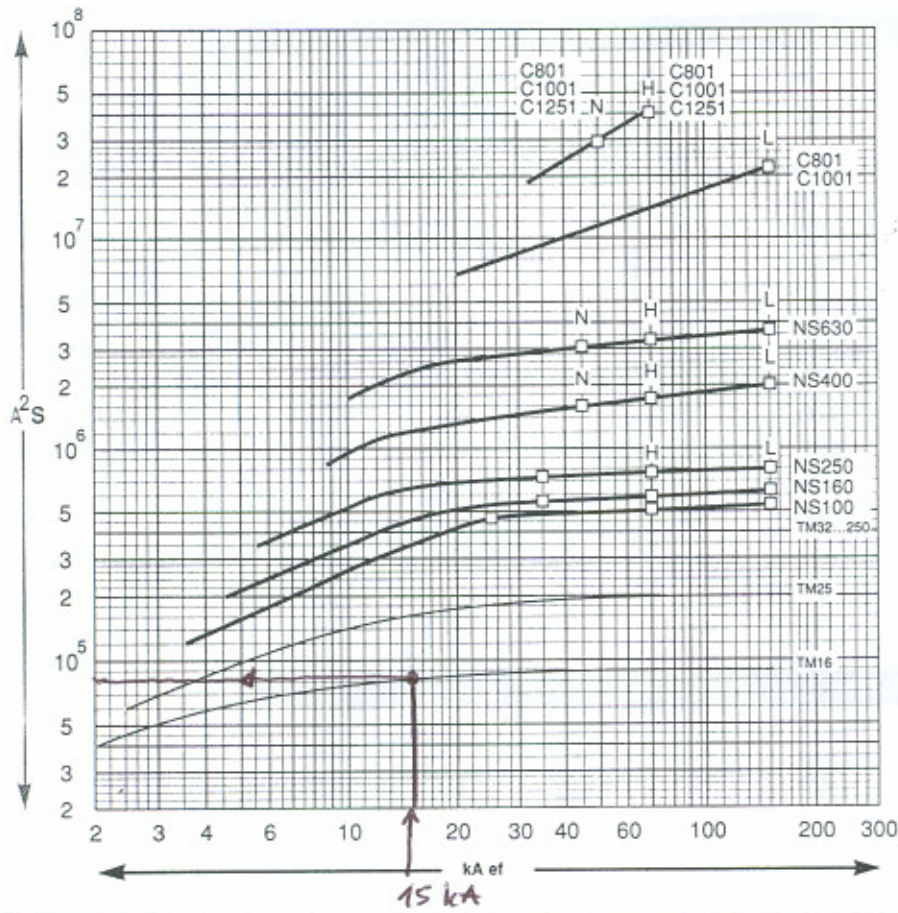
T3/7 - K5 correction factors of the capacity for installation in ground

Ground temperature (2) [°C]	PVC	XLPE - EPR
10	1,10	1,07
15	1,05	1,04
25	0,95	0,96
30	0,89	0,93
35	0,84	0,89
40	0,77	0,85
45	0,71	0,80
50	0,63	0,76
55	0,55	0,71
60	0,45	0,65
65	—	0,60

(1) Ambient temperature of
than 30 °C.

(2) Ground temperature of
than 20 °C.

curvas de limitación en sollicitación térmica : 380 / 415 V



$\Rightarrow (I^2t)_{Int} = 8 \times 10^4 A^2_{scg}$
 ↑
 NS100N
 46A

curvas de limitación en intensidad : 380 / 415 V

