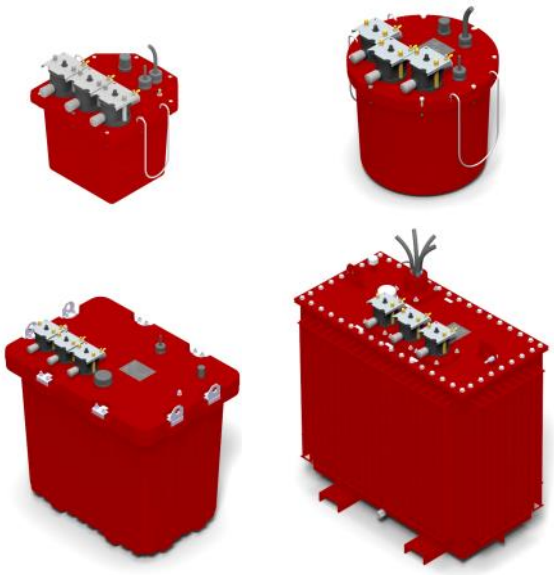
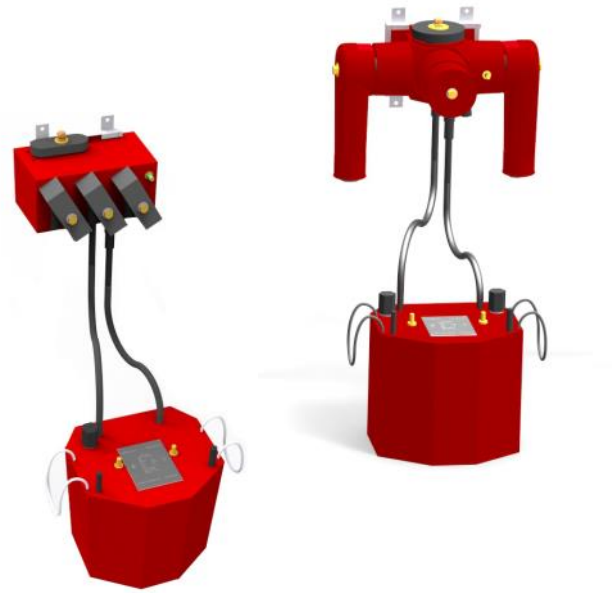
AUGIER energy
a company of ARETÈ COCCHI TECHNOLOGY



TER Transformers

EcoDesign



MODULO Transformers

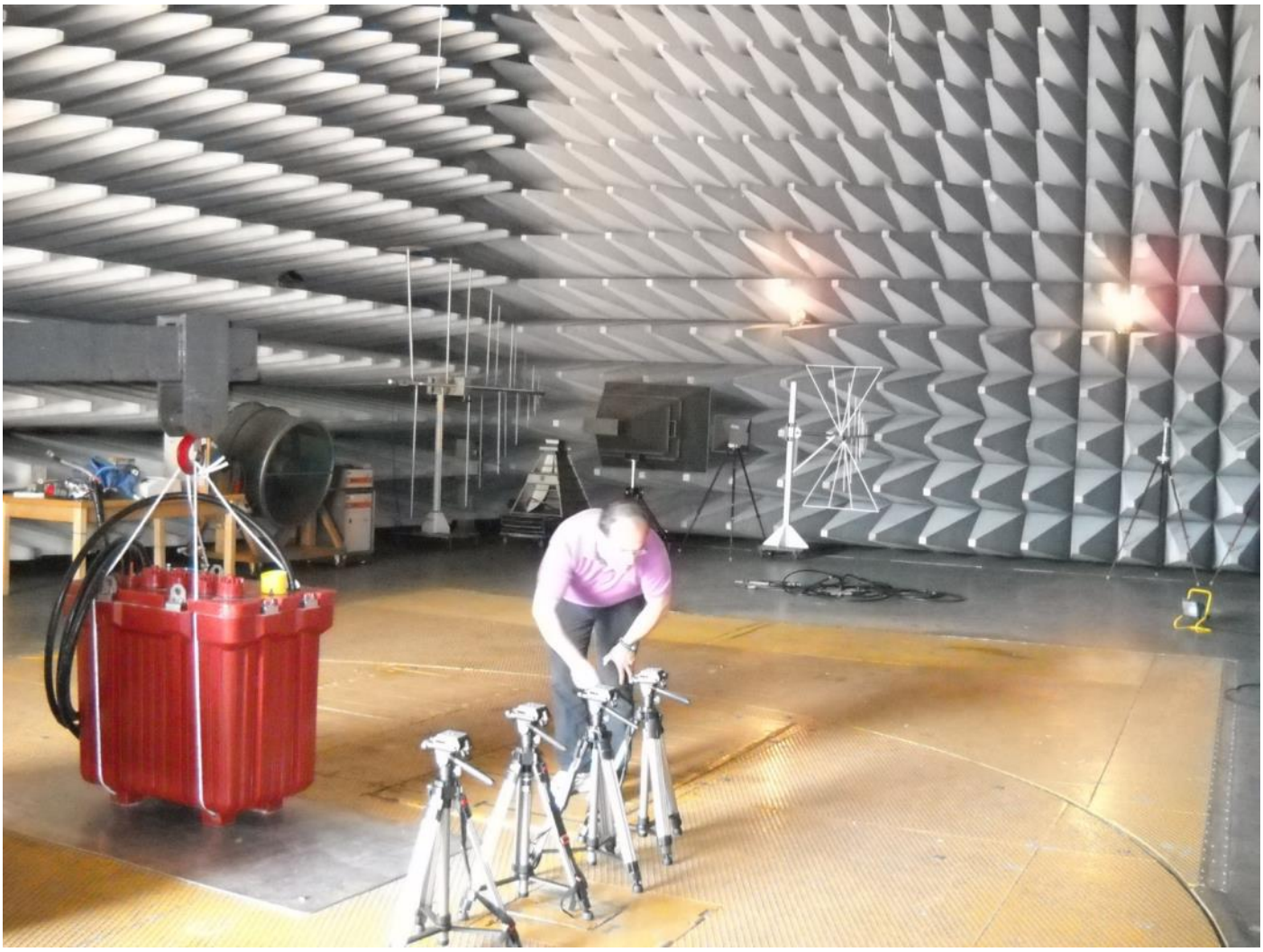
IP68 WATERTIGHT TRANSFORMERS

950 V - 3200 V - 5500 V - 6600 V networks

Product leaflet

- Recommended for underground installations
- Immersible and non-corrodible substations
- Integrated electrical protections
- Robust and long lasting
- Dry or vegetable oil transformers depending on power rating

6012202– 14/11/2024



Watertight transformers, IP68, resistant to severe weather conditions, designed to function in hostile conditions, underground transformers in pit or in outdoor cabinet.
Transformers are tested and conform to the standards NF C52-410.

CONTENTS

WATERTIGHT TRANSFORMERS

Abbreviations

LV	Low voltage
MLV	Maximum low voltage – 950 V
MV	Medium voltage — 3200 to 6600 V
HRC	High breaking power

OVERVIEW

WATERTIGHT TRANSFORMERS

TRANSFORMERS INSTALLED IN A PIT

- Watertight and submergible transformers
- Non-corrodible transformer, unchanging over time
- Connectors adapted for all types of cables
- Easy installation

IP 68

ECO RESPONSIBLE TRANSFORMERS

- Low-loss transformers, complying with EU recommendations 548/2014 2021, aimed at reducing CO2 emissions
- AUGIER oil transformers are removable, repairable with a long lifespan
- Vegetable oil cooled transformers, 98% biodegradable oil in 21 days

NETWORK AND TRANSFORMERS PROTECTION

- MV or MLV protection by accessible fuses
- Transformer protection by thermal probe
- Low voltage protection by circuit breaker or fuse

LARGE RANGE OF TRANSFORMERS

- Power rating from 1 to 160 kVA
- Single or three-phase coupling
- Step-up or step-down transformers
- Voltage: 950 V, 3200 V, 5500 V, 6600 V

APPLICATIONS

WATERTIGHT TRANSFORMERS

Lighting
Lighting supply for roads, bypasses, industrial zones, tunnels, bridges

Roadway equipment
Supply to dynamic equipment (camera, variable messaging boards, radar, vehicle counting)

Airports
Supply to Navaids equipment (Glide, VOR, DME, Localizer) and lighting for airplane parking, access roads, fencing

Military
Supply for surveillance devices, identified targets, gates

Power plants
Supply for security lighting, remote buildings, motorized doors, pumps, measuring equipment

Railways
Supply for GSM-R communications materials, instrumentation, and lighting of emergency outlets in tunnels

Recreational sites
Power for parking and access lighting

Oil & Gas
Supply for instrumentation and cathodic protection

TER - MODULO
CHOICE GUIDE

WATERTIGHT TRANSFORMERS

AUGIER's watertight transformers are made of resin epoxy for power ratings up to 32 kVA. Resin epoxy guarantees non-corrosive transformers that do not change over time. They are watertight and submergible, insulating, and can be buried in a pit.

Main characteristics:

- Protection grade : IP 68 – IK 10
- Operating temperatures : - 15°C to + 40° C (+55°C on demand)
- Industrial frequencies : 5.5 kV : 20 kV – 50 Hz – 1 minute
  : 3.2 kV : 10 kV – 50 Hz – 1 minute
  : 950 V : 3 kV – 50 Hz – 1 minute
- Maximum altitude : 1000 meters

TRANSFORMERS		TER	MODULO
Operating voltage	950 V	x	x
	3200 V	x	x
	5500 V	x	x
	6600 V	x	x
Power rating	Single phase	1 à 32 kVA	1 à 32 kVA
	Three phase	10 à 160 kVA	10 à 160 kVA
Dielectric	Oil	x	8 à 160 kVA
	Dry		1 à 6 kVA
MV connection	On the transformer	x	
	Separate from the transformer		x
LV connection	On flexible cable HO7RNF	Length 4 meters	Length 4 meters
Tap changer	+- 5%	Included	Included from 8 kVA
MV Protection	By HRC fuse	x	x
Thermal protection	By threshold probe	Included	Included
LV protection	By fuse	Optional, in a separate cabinet	Optional, in a separate cabinet
	By circuit breaker and MX coil	Optional, in a separate cabinet	Optional, in a separate cabinet
Interlocking	By special nut	Optional	Optional

Compliance with the following standards:

Our transformers comply with the following standards and regulations:

NC C52-410 : Transformers for outdoor electrical installation
IEC 76 : Power rating transformers
NF C20-010 – IEC 60 529 : Degree of protection for enclosures (IP)
NF C17-200 : Rules for road lighting systems
UE No. 548/2014 : European Directive ECODESIGN 2021

Operating conditions:

Environmental class AD7: can be completely or partially submerged in water, temporarily.

SELECTED PROJECTS

WATERTIGHT TRANSFORMERS

Railway, France, tunnel lighting supply

Tunnel, Spain, lighting and outlet supply

Airport, Middle East, Navaids supply

Large sites, France, car park lighting

Airport, Middle East, lighting supply

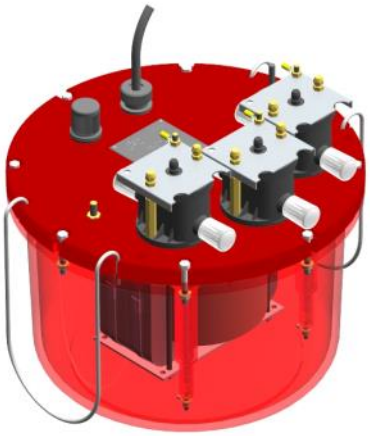
Highway, Middle East, lighting

Military, France, shooting range supply (targets)

Roads, China, lighting supply

TER
From 1 to 160 kVA - 950 V, 3200 V, 5500 V, 6600 V

WATERTIGHT TRANSFORMERS



TER MT

TER network connection

- A system of one-pole disconnectable terminals incorporated in the transformer guarantees complete operational flexibility
- Easy to connect and disconnect
- For recommended cable type, AUGIER supplies the necessary equipment to connect to the one-pole terminals
- The “T” transformers allow section isolation by disconnecting the shunt located on the terminal
- For TER MT, the two external terminals are active and the middle terminal ensures continuity of the network

TER low voltage connection

- The low voltage output is with H 07 RNF cable length 4 meters

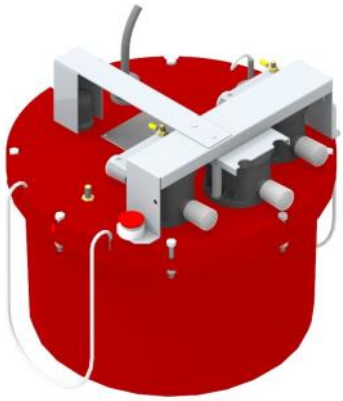
TER transformers and network protections

- The HRC fuses are easily accessible and directly incorporated in the transformer connection terminal

Advantages of TER transformers

- Watertight transformers, IP68, can be buried in an accessible pit
- Finished in epoxy resin up to 32 kVA
- Thermal protection by probe, output on cable H07 RNF 2x1.5 mm², length 4 meters. Thermal probe with closing, 110°C – 2A – 250 V
- Voltage adjusting tap changers of +/- 5% available on full TER line
- Full line of equipment for no-voltage check, conforms to NF C17-200 standards and available on demand

Optional features



- Low voltage protection:
  - IP67 cabinet equipped with a circuit breaker, providing protection against short circuits for low voltage network. Circuit breaker offers the thermal protection of the transformer, guaranteeing absence of defects. Cabinet is separate from transformer (see page 24 for details).
  - IP67 cabinet also equipped with low voltage fuses
- Terminal interlocking by nut (see detail pages 29-30)
- 6 meters or 10 meters low voltage connection cable

Choice table - TER for single or three-phase network

Network / Transformer	TER MM	TER MT	TER TT
Single phase	From 1 to 32 kVA		
Three phase		From 1 to 25 kVA	From 10 to 160 kVA

TER MM : Single-phase transformer for single-phase network
TER MT : Single-phase transformer for three-phase network
TER TT : Three-phase transformer for three-phase network

Technical characteristics:

Transformers made of Araldite resin up to 32 kVA, and metallic cuve from 50 to 160 kVA
Corrosion resistant, water-resistant, disconnectable, can be buried in accessible pits or installed in outdoor cabinet

Protective grade	: IP 68
Primary voltage	: 950 V, 3200 V, 5500 V, 6600 V
Primary insulation voltage	: 1.1 kV, 3.6 kV, 7.2 kV
Secondary no load voltage	: 237 V single phase, 410 V three phase + neutral
Secondary insulation voltage	: 1.1 kV
Coupling	: Single-phase li0 or three-phase Yzn11, Dyn 11, from 63 kVA
Dielectric	: Vegetable oil

Comply with the following standards NF C52-410, IEC 76, Eco design TIER 2

Connection:

- T connection on the transformer
- One-pole disconnectable terminals, for section cables from 6 to 50 mm²
- Low voltage output on a two-pole cable H 07RN F for the TER MM and MT 1 to 25 kVA on two H 07 RN F one-pole cables for TER 32 kVA, on a five-pole for the TER TT. Cable available from 4 meters, choices available in table on page 11.

Protection :

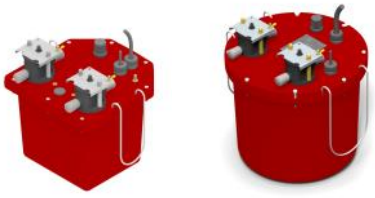
MV : By 1 fuse in for TER MM, 2 fuses for TER MT, or three fuses for TER TT
LV : Delivered without protection, low voltage protection is installed in a separate cabinet

Electric positions :

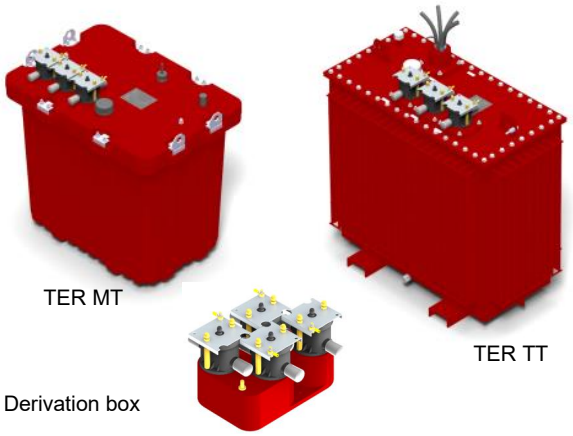
MV : Winding isolated from the earth
Upon request for the TER MM: winding end corresponds to the cable periphery conductor (neutral), grounding
LV : A low voltage winding extremity joined to the earthing terminal (blue conductor).
Upon request: Low voltage isolated or connected to the ground by the middle winding point; in either case low voltage protection must be bipolar

Equipment: delivered with the transformer

- Hight voltage connection accessories to be assembled
- An M10 ground terminal rod, internally connected to the magnetic circuit
- Lifting ropes or lifting rings
- Signal panel
- Instructions for assembling disconnectable plugs



TER MM



TER MT

TER TT

Derivation box

Electrical characteristics

TER MM 1 to 32 kVA and TER MT 1 to 25 kVA										
Nominal power rating (kVA)	**1**	**2**	**3**	**5**	**6**	**8**	**10**	**16**	**25**	**32**
Power rating (kVA) (1)	0.8	1.6	2.4	4	4.8	6.4	8	12.8	20	25.6
Fuse rating 950 V (A)	8	12	12	20	20	25	32	40	63	80
Fuse rating 3 à 3.3 kV (A)	5	8	8	12	12	16	16	20	20	32
Fuse rating 5.5 à 6.6 kV (A)	4	4	4	4	4	12	12	12	16	
Off load losses (W)	20	30	40	50	55	110	110	110	130	155
On load losses (W) 75°C	26	40	45	75	90	115	130	390	580	650
Short-circuit voltage (%)	2.9	2.5	2.5	2.5	3	3	3	3	3	3
Voltage drop (%) cos φ = 0.8	2.85	2.5	2.4	2.4	2.76	2.73	2.66	4.22	4.17	4.03
Short circuit current (kA)	0.15	0.35	0.52	0.87	0.87	1.16	1.45	1.55	2.42	3.09

Electrical characteristics

TER TT 10 to 100 kVA 950 V - TER TT 10 to 160 kVA 3 kV to 6.6 kV										
Nominal power rating (kVA)	**10**	**16**	**25**	**32**	**50**	**63**	**80**	**100**	**125**	**160**
Power rating (kVA) (1)	8	12.8	20	25.6	40	50.4	64	80	100	128
Fuse rating 950 V (A)	20	32	40	50	80	80	100	125		
Fuse rating 3 à 3.3 kV (A)	12	16	16	40	40	50	63	63	80	100
Fuse rating 5.5 à 6.6 kV (A)	12	8	8	20	20	32	32	40	50	63
Coupling	Yzn11	Yzn11	Yzn11	Yzn11	Yzn11	Dyn11	Dyn11	Dyn11	Dyn11	Dyn11
Off load losses (W)	80	110	120	150	150	280	315	320	350	395
Off load losses (W) Eco (2)	63	63	63	68	81	93	110	130	153	189
On losses 75°C (W)	290	350	650	700	950	1100	1400	1800	1900	2450
On losses 75°C (W) Eco (2)	290	350	600	630	750	880	1020	1250	1440	1750
Short-circuit voltage (%)	3.5	3	4	3	4	4	4	4.5	4.5	4
Voltage drop (%) cos φ = 0.8	3.48	2.99	3.84	2.93	3.42	3.37	3.29	3.59	3.53	3.18
Short circuit current (%)	0.41	0.77	0.9	1.54	1.8	2.27	2.89	3.21	4.01	5.77

(1) For road lighting, discharge lamps, complying with NF C 52-410
(2) Compliance with EcoDesign regulation N°548/2014 TIER 2

TER
MECHANICAL CHARACTERISTICS

WATERTIGHT TRANSFORMERS

Mechanical characteristics

TER MM 1 to 32 kVA - TER MT 1 to 25 kVA										
Nominal power rating (kVA)	**1**	**2**	**3**	**5**	**6**	**8**	**10**	**16**	**25**	**32**
Length (mm)	400	400	400	400	Ø500	Ø500	Ø500	660	930	930
Width (mm)	420	420	420	420	Ø500	Ø500	Ø500	540	655	655
Height on terminals (mm)	440	440	440	440	552	552	552	750	950	950
Total weight (kg)	65	65	70	75	100	125	130	250	375	380
Weight of oil filling (kg)	19	19	15	15	20	32	32	72	140	100
LV cable cross section (mm^2)	6	6	6	6	6	10	10	25	35	50

TER MM
1-5 kVA

TER MM
6-10 kVA

TER MM
16 kVA

TER MM
25-32 kVA

TER MT
1-5 kVA

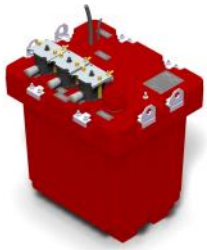
TER MT
6-10 kVA

TER MT
16 kVA

TER MT
25 kVA

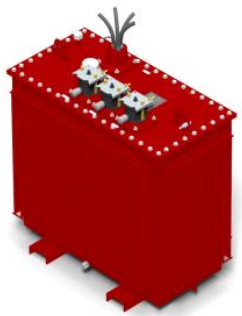
Mechanical characteristics

TER TT 10 to 160 kVA										
Nominal power rating (kVA)	**10**	**16**	**25**	**32**	**50**	**63**	**80**	**100**	**125**	**160**
Length (mm)	660	930	930	930	1042	1090	1090	1090	1122	1122
Width (mm)	540	655	655	655	545	595	595	595	627	627
Height on terminals (mm)	750	950	950	950	1029	1129	1129	1129	1129	1229
Total weight (kg)	260	400	410	420	550	730	750	780	830	900
Weight of oil filling (kg)	66	140	160	160	250	150	180	180	210	280
LV cable cross section (mm^2)	6	16	25	25	35	35	35	50	70	70



TER TT
10 kVA

TER TT
16-25-32 kVA



TER TT
50 to 160 kVA

Connection box

Our line includes different types of connection boxes: one offering one input- three outputs for single or three-phase networks, and the other offering one input - one output. The latter model can be used as an end cap or junction box, or to guarantee network continuity.

Box 1A
Box 1A/ 1D
(for single-phase network)

Connection box

Cast in Araldite resin, corrosion resistant, watertight, disconnectable, and can be buried in accessible pits.

Insulation voltage : 7.2 kV
Operating voltage : 950 V to 6600 V
Maximum current : 80 A
Protection grade : IP68

Connection

The boxes comprise disconnectable terminals receiving a cable of 6 to 50 mm².

They are delivered with the necessary equipment for the cable heads.

Box 1A / 1, 2 or 3D
(for single-phase network)

Operating conditions

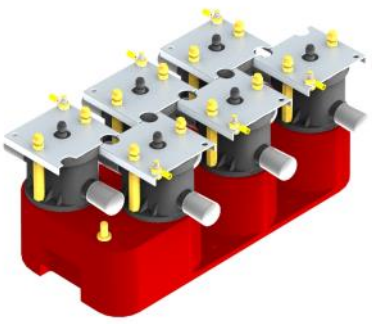
AD7 environmental operating class: the boxes can partially or totally submerged in water for limited periods of time.

Box 1A - 1A / 1D
(for three-phase network)

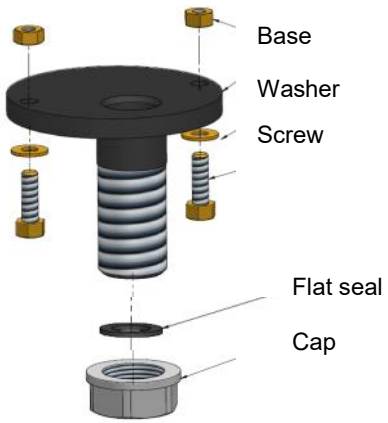
Mechanical characteristics					
Type	**Network**	**Length**	**Width**	**Height**	**Weight**
1A or 1A / 1, 2 or 3D	Single phase	342 mm	228 mm	218 mm	15 kg
1A or 1A / 1D	Three phase	342 mm	228 mm	218 mm	15 kg
1A / 2 or 3D	Three phase	495 mm	230 mm	218 mm	32 kg

TER continuity plug

Waterproof plug - Ref 3012748
The plug isolates a TER terminal one-pole, allowing network continuity when the terminal TER is disconnected.



Box 1A / 2 or 3D
(for three-phase network)



TER
ONE-POLE TERMINAL

WATERTIGHT TRANSFORMERS

Overview
This terminal allows connection of numerous cables:
3200 V, 5500 V, 6600 V network:

- Belted cable
- Radial field cable
- One-pole twisted cable
- Two-pole cable

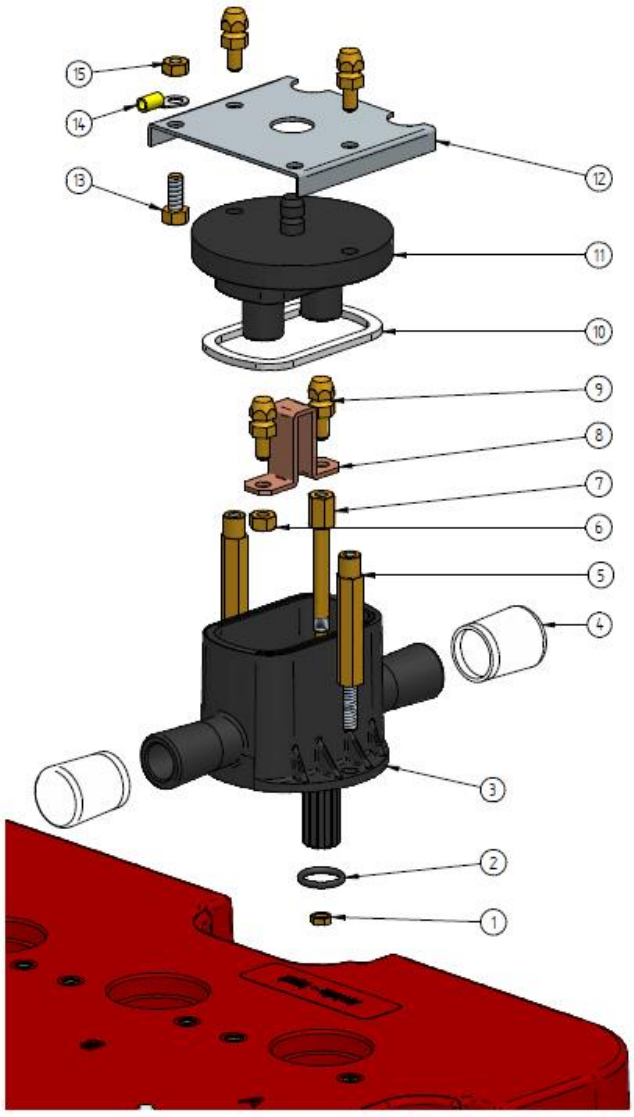
950 V network:
- U 1000 R2V cable or other

The terminal consists of two parts:
The socket, integrated with the TER
Plug to connect to the cable, designed to receive all types of cables from 6 to 50 mm²

Electrical characteristics
The terminal allows maximum transportation of 80 A.
The one-pole terminal was designed to maintain 7.2 kV and support all anticipated UTE tests

Mechanical characteristics
The sealing ring accommodates cables with a maximum sheath diameter of 19.5 mm

Connection
Par By copper crimp terminal
Please specify in the order:
- Cable type and cross section
- For special cable types, please supply a sample



Protection against water leaks
The terminal offers three levels of protection:
- Between the enclosure (3) and the transformer cover by O-ring seal (2)
- Between the enclosure (3) and the cover (11) by soft seal (10)
- Between the cable and the enclosure (3) by thermo-retractable sleeve
- thermo-rétractable

1. B.3P Phase contact nut
2. D:18.64x3.53 O-ring
3. Disconnectable box
4. GPN Kapsto cap, watertight for storage
5. Spacer
6. HH M8 brass nut
7. Contact plug-in
8. Jumper
9. Screw gripper
10. Flat sealing junction box
11. Lid
12. Reinforced sheet lid
13. HU M8 brass screw*
14. Yellow 6 D8 round terminal*
15. HH M8 brass nut*

* Not supplied

Part number

Sealing kit for one transformer		
	TER single phase	**TER three phase**
Two pole cable 3.6/6 kV	3013213	
One pole cable 3.6/6 kV	3013214	3013215
Three pole cable 6/6 kV		3013212
Airfield cable	30 3217	3013218
U1000 R2V cable	3013216	3013219

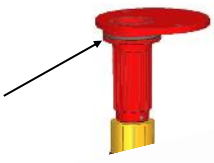
Bag of 6 thimbles						
Cross cable section	**6 mm²**	**10 mm²**	**16 mm²**	**25 mm²**	**35 mm²**	**50 mm²**
Thimbles part numbers	3013430	3013431	3013432	3013433	3013434	3013435

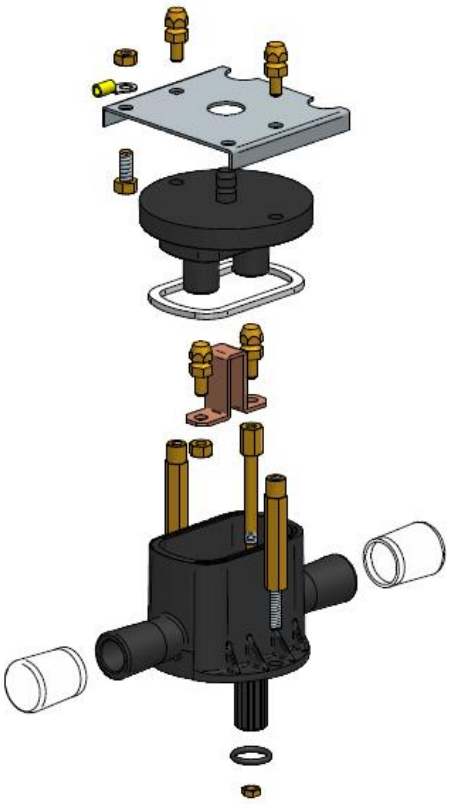
We recommend replacing the seals after disassembling to guarantee water-resistant protection.

Sealing kit
TER for one single phase transformer

Sealing kit
TER for one three phase transformer

Bag of 6 thimbles

Part number	Designation	Product
3012968	Kit cover	
3012712	Kit housing	
3012969	Kit seal	
3011239	Jumper + screw kit	
3013054	Brace + screw kit	
3011235	Sealing cap TER MM	
3011865	Sealing cap TER T	
1024354	Seal for fuse terminal	
1023765	Fuse removal tool for 10x180 fuse	
1024130	Fuse removal tool for 36x190 and 36x250 fuse	
3010902	Fuse removal tool for 20x127 fuse	



MODULO
FROM 1 To 160 kVA - 3200 V, 5500 V, 6600 V

WATERTIGHT TRANSFORMERS

Modulo TRI

MODULO overview and connection network

- MODULO Consists of an IDR connection interface and a watertight transformer
- The IDR connection interface is separate from the transformer and guarantees highly flexible operation and network connection
- The IDR is connected to the transformer by flexible cables equipped with a one-pole plug manufactured in-house
- To connect the network cable to the IDR, AUGIER provides the necessary equipment adapted to high voltage
- The TEE transformers are dry type, while the TEDE are vegetable oil type

MODULO low voltage connection

- The low voltage output is standard with H 07 RNF cable, 4 meters length

MODULO transformers and network protection

- The high voltage fuses are installed in the back of the transformer and easily accessible
- The thermal probe protects the transformer from surcharges

Advantages of MODULO transformers

- Watertight transformers, IP68, can be buried in an accessible pit or installed in outdoor cabinet
- No-voltage verification is carried out in the IDR in a dedicated compartment
- From the 8 kVA single phase and for the full three-phase line, the transformers are equipped with tap changers +/- 5%

Optional functions

- Low voltage protection:
  - IP67 cabinet equipped with a circuit breaker, providing protection against short circuits. Circuit breaker offers the thermal protection of the transformer, guaranteeing elimination of defects. Cabinet is separate from transformer (see page 24 for details).
  - IP67 cabinet also equipped with low voltage fuses
- 6 meters or 10 meters low voltage connection cable
- Terminal interlocking by nut (see detail pages 29-30)
- Transformer fuse terminal interlocking by nut

Choice table - MODULO for single or three-phase network

Network / Transformer	Modulo BI TEE or TEDE MM	Modulo TRI TEE or TEDE MT	Modulo TRI TEDE TT
Single phase	From 1 to 32 kVA		
Three phase		From 1 to 25 kVA	From 10 to 160 kVA

Modulo BI:
Single-phase transformer and interface for IDR connection for single-phase network

Modulo TRI :
Single-phase or three-phase transformer and IDR TRI interface connection for three-phase network

Technical characteristics:

Transformers made of Araldite resin up to 32 kVA, and metallic tank from 50 to 160 kVA
Corrosion resistant, water-resistant, disconnectable, can be buried in specially designed pit or installed in outdoor cabinet

Protective grade	: IP 68
Primary voltage	: 3200 V, 5500 V, 6600 V
Primary insulation voltage	: 3.6 kV, 7.2 kV
Secondary empty voltage	: 237 V single phase, 410 V three phase + neutral
Secondary insulation voltage	: 1.1 kV
Coupling	: Single-phase or three-phase Yzn11, Dyn11 from 63 kVA
Dielectric	: Dry or oil depending on voltage

Comply with the following standards NF C52-410, IEC 76, Eco design TIER 2

Connection:

- Bypassing on the IDR connection interface
- Removable high voltage terminals for section cable from 6 to 35 mm²
- Low voltage output on a two-pole cable H 07RN F for the single-phase transformers 1 to 25 kVA; on two H 07 RNF one-pole cables for the 32 kVA single-phase transformer, on a five-pole for the three-phase transformer. Cable available from 4 meters, choices available in table on page 19

Protection :

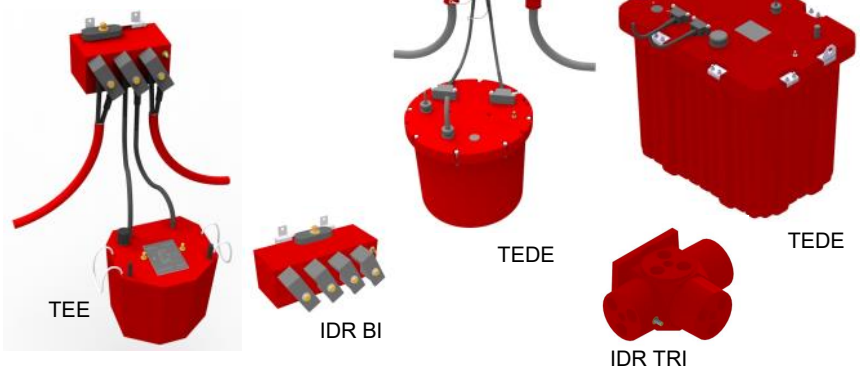
MV: By one fuse for TEE and TEDE, two fuses for TEE and TEDE MT, or three fuses for TEDE TT, fuse for high breaking capacity.
LV: Delivered without protection, low voltage protection is installed in a separate cabinet

Electric positions:

MV: Winding isolated from the earth
Upon request for the Modulo BI: neutral grounding on the IDR connection interface
LV: A low voltage winding extremity joined to the earthing terminal (blue conductor).
Upon request: Low voltage isolated or middle winding point connected to the ground, In either case low voltage protection must be bipolar

Equipment delivered with the transformer:

- Low-voltage connection accessories to be assembled
- Stainless steel support plate for mounting the IDR on the viewing panel
- An M10 ground terminal rod, internally connected to the magnetic circuit and on the IDR
- Lifting ropes or lifting rings
- Signal panel
- Instructions for assembling disconnectable plugs



Electrical characteristics

MODULO BI: TEE or TEDE MM 1 to 32 kVA and MODULO TRI: TEE or TEDE MT 1 to 25 kVA										
Nominal power rating (kVA)	**1**	**2**	**3**	**5**	**6**	**8**	**10**	**16**	**25**	**32**
Type of transformer	TEE	TEE	TEE	TEE	TEE	TEDE	TEDE	TEDE	TEDE	TEDE
Power rating (kVA) (1)	0.8	1.6	2.4	4	4.8	6.4	8	12.8	20	25.6
Fuse rating 950 V (A)					20	25	32	40	63	80
Fuse rating 3 to 3.3 kV (A)	5	8	8	12	12	16	16	20	20	32
Fuse rating 5.5 to 6.6 kV (A)	4	4	4	4	4	12	12	12	16	
Off load losses (W)	25	45	58	65	75	110	110	110	130	155
On load losses 75°C (W)	26	40	45	75	90	115	130	390	580	650
Short-circuit voltage (%)	2.9	2.5	2.5	2.5	3	3	3	3	3	3
Pressure drop (%) cos φ = 0.8	2.85	2.5	2.4	2.4	2.76	2.73	2.66	4.22	4.17	4.03
Short circuit current (kA	0.15	0.35	0.52	0.87	0.87	1.16	1.45	1.55	2.42	3.09

Electrical characteristics

MODULO TRI: TEDE TT 10 to 160 kVA										
Nominal power rating (kVA)	**10**	**16**	**25**	**32**	**50**	**63**	**80**	**100**	**125**	**160**
Type of transformer	TEDE	TEDE	TEDE	TEDE	TEDE	TEDE	TEDE	TEDE	TEDE	TEDE
Power rating (kVA) (1)	8	12.8	20	25.6	40	50.4	64	80	100	128
Fuse rating 950 V (A)	20	32	40	50	80	80	100	125		
Fuse rating 3 to 3.3 kV (A)	12	16	16	40	40	50	63	63	80	100
Fuse rating 5.5 to 6.6 kV (A)	12	8	8	20	20	32	32	40	50	63
Coupling	Yzn11	Yzn11	Yzn11	Yzn11	Yzn11	Dyn11	Dyn11	Dyn11	Dyn11	Dyn11
Off load losses (W)	80	110	120	150	150	280	315	320	350	395
Off load losses (W) Eco (2)	63	63	63	68	81	93	110	130	153	189
On load losses 75°C (W)	290	350	650	700	950	1100	1400	1800	1900	2450
On load losses 75°C (W) Eco (2)	290	350	600	630	750	880	1020	1250	1440	1750
Short-circuit voltage (%)	3.5	3	4	3	4	4	4	4.5	4.5	4
Pressure drop (%) cos φ = 0.8	3.48	2.99	3.84	2.93	3.42	3.37	3.29	3.59	3.53	3.18
Short circuit current (kA)	0.41	0.77	0.9	1.54	1.8	2.27	2.89	3.21	4.01	5.77

(1) For road lighting, discharge lamps, complying with NF C 52-410
(2) Compliance with EcoDesign regulation N°548/2014 TIER 2

MODULO
MECHANICAL CHARACTERISTICS

WATERTIGHT TRANSFORMERS

Mechanical characteristics

TEE or TEDE MM 1 to 32 kVA TEE or TEDE MT 1 to 25 kVA										
Nominal power rating (kVA)	**1**	**2**	**3**	**5**	**6**	**8**	**10**	**16**	**25**	**32**
Length (mm)	260	260	310	310	390	Ø500	Ø500	660	930	930
Width (mm)	260	260	276	276	290	Ø500	Ø500	540	655	655
Height on terminals (mm)	280	280	280	280	330	500	500	690	850	850
Total weight (kg)	40	45	58	66	95	125	130	250	375	380
Weight of oil filling (kg)						32	32	72	140	100
LV cable cross section (mm^2)	6	6	6	6	6	10	10	25	35	50

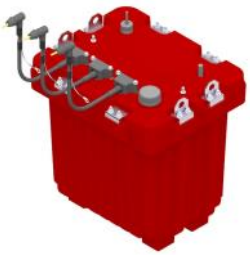
TEE MM or MT
1 - 6 kVA

TEDE MM or MT
8 - 10 kVA

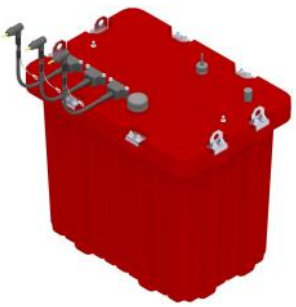
TEDE MM or MT
16 - 32 kVA

Mechanical characteristics

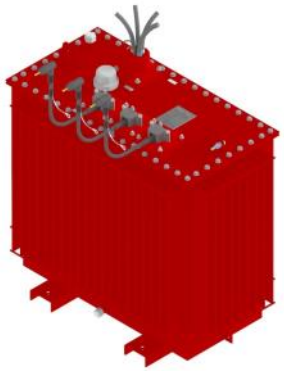
TEDE TT 10 to 160 kVA										
Nominal power rating (kVA)	**10**	**16**	**25**	**32**	**50**	**63**	**80**	**100**	**125**	**160**
Length (mm)	660	930	930	930	1042	1090	1090	1090	1122	1122
Width (mm)	540	655	655	655	545	595	595	595	627	627
Height on terminals (mm)	690	850	850	850	1029	1129	1129	1129	1129	1229
Total weight (kg)	260	400	410	420	550	730	750	780	830	900
Weight of oil filling (kg)	66	140	160	160	250	150	180	180	210	280
LV cable cross section (mm^2)	6	16	25	25	35	35	35	50	70	70



TEDE TT
10 kVA



TEDE TT
16 - 32 kVA



TEDE TT
50 -160 kVA

IDR connection interface

The IDR connection interface include plug-in that can be used to ensure the incoming network functions, network departure or bypass, for the supply of a TEE or TEDE transformer, and verification of voltage absence, earthing and short-circuiting. The same IDR interface will be able to perform network junction or bypass, depending on its equipment.

Connection

The various IDR have removable terminals that receive cable cross-sections of 6 to 35 mm². They are delivered along with the equipment needed to configure the cable heads.

Mechanical characteristics

IDR connection interface (with connectors)			
IDR	**IDR BI 1A / 1D 1A / 2D**	**IDR BI 1A / 3D**	**IDR TRI 1A / 1D 1A / 2D**
Length (mm)	275	365	456
Width (mm)	230	230	307
Height (mm)	190	190	367
Total weight (kg)	11	14	11

Characteristics

Araldite resin, corrosion resistant, Water-resistant, disconnectable, can be buried in specially designed pits

Isolating voltage : 7.2 kV
Operating voltage : 3200 V to 6600 V
Max. intensity : 100 A
Protection grade : IP68

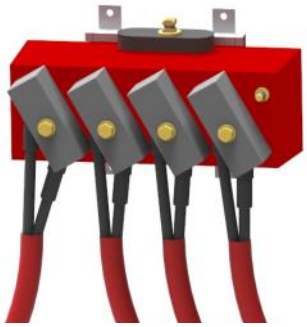
Operating conditions

Environmental class AD7: can be completely or partially submerged in water, temporarily.

IDR BI CONNECTION INTERFACE for single-phase network

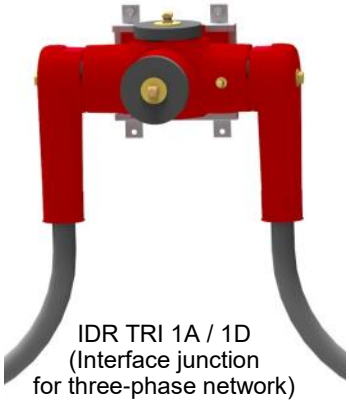
IDR BI 1A / 1D
(Interface junction
for single-phase network)

IDR BI 1A / 2D
(Bypass interface
for single-phase network)



IDR BI 1A / 3D
(Bypass interface
for single-phase network)

IDR TRI CONNECTION INTERFACE for three-phase network

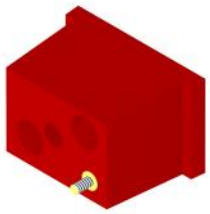
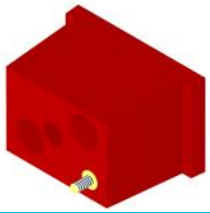
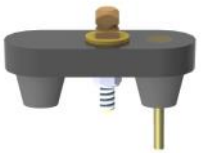


IDR TRI 1A / 1D
(Interface junction
for three-phase network)

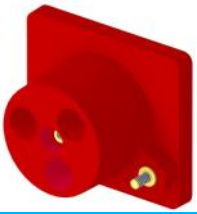
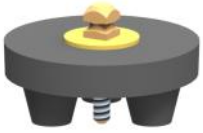
IDR TRI 1A / 2D
(Bypass interface
for three-phase network)

IDD
(Supplemental bypass
Interface making possible an
IDR 1A / 3D)

Complementary accessories for single-phase network

Part number	Designation	Use	Product
3008125	BBF female two-pole plug	Can be used to isolate up to two one-pole plugs, allowing for an isolated network	
3008126	Earthing and short circuiting plug (EMCB)	Allows the earthing of two one-pole plugs	
3008090	BBM male two-pole plug (for TNRS network)	Can insulate any of the four IDR inputs	
3008115	BBM-C male two-pole plug (for TNRC network)		

Complementary accessories three-phase network

Part number	Designation	Use	Product
3007826	BTF female three-pole plug	To insulate either a three-pole plug or up to three one-pole plugs	
3007827	Earthing and short-circuiting plug (EMC)	Allows earthing of either one three-pole plug, or up to three one-pole plugs	
3010158	Three-pole plug (BTM)	Can be used to insulate any of the four three-pole IDR inputs	

MODULO
Plug in TERMINAL kit

WATERTIGHT TRANSFORMERS

Overview
The connection terminals allow connection of numerous cables, with the plug on the cable. It can receive all cables types, 6 to 35 mm².

For 3200 V, 5500 V, 6600 V networks:
- Belted cable
- Radial field cable
- One-pole twisted cable
- Two-pole cable

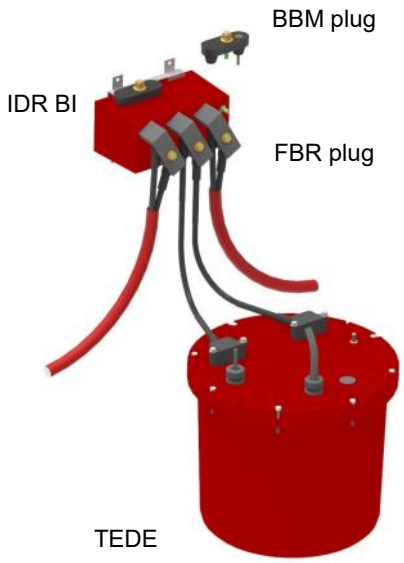
For 950 V network:
- U 1000 R2V cable or other

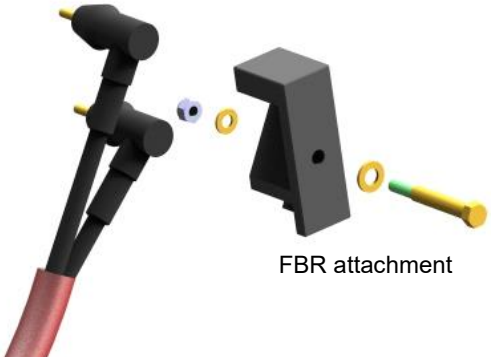
Electrical characteristics
Max. intensity : 100 A
Insulation class : 7.2 kV

Mechanical characteristics
The cable on the sealing sleeve has a maximum outer diameter of 48 mm (MODULO TRI)

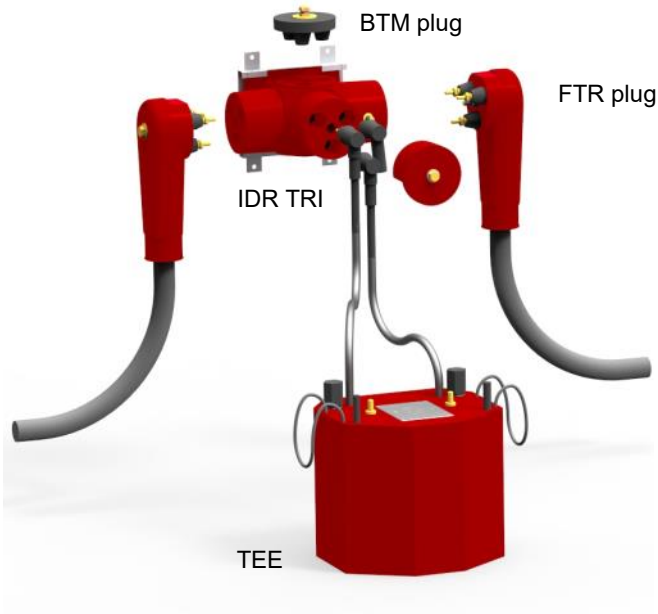
Connection
By screw terminal
Please specify in the order:
- Cable type and cross section
- For special cable type please supply a sample

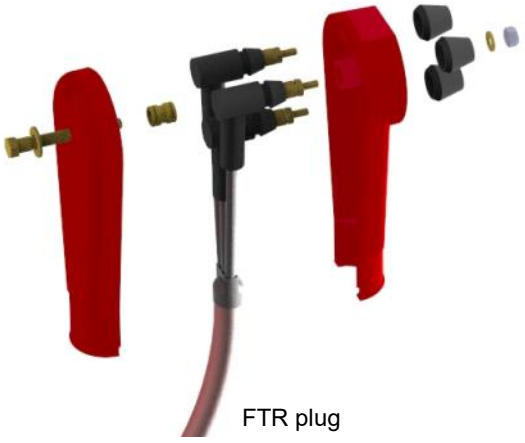
MODULO BI





MODULO TRI



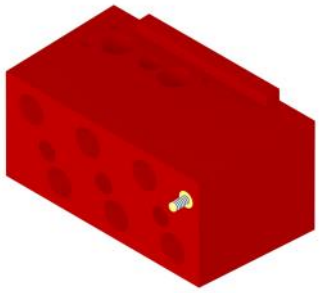


MODULO
SPARE PARTS ACCESSORIES

WATERTIGHT TRANSFORMERS

Part number	Designation	Product
3008122	BI IDR FBR mounting plug	
3008105	Socket for concentric two-pole cable, 6 to 25 mm^2	
3008354	Socket for two one-pole cables 6 to 25 mm^2	

For IDR BI



Part number	Designation	Product
3008244	Mounting plug for one-pole TRI IDR	
3007861	Three-phase watertight cap	
3008788	Socket for three-pole belting cable 6 to 25 mm^2	
3007867	Socket for 3 one-pole cables 6 to 25 mm^2	

For IDR TRI

Part number	Designation	Product
1017491	Tube of silicon grease	
1026033	Sealing cap	
3009136	One-pole plug for TEE or TEDE	
1018116	BBF, EMCB Mounting plate	
1017316	Mounting plate for IDR BI, IDR TRI, BTF, EMC	

For both

CBT low voltage cabinet with circuit breaker

CBT IP67 Low voltage protection cabinet

Watertight ABS low voltage cabinet, corrosion resistant, for installation on the wall near the network transformer.
Made of a base and a cover closed by plastic screw. Grey cover.
Equipment options, depending on needs:

Circuit breaker cabinet:

One or several one-pole and neutral circuit breaker, two-pole or three-pole B curve, appropriate for the power rating transformer and dimension for supplying outdoor lighting lamps.
An MX trigger coil associated with a transformer thermal probe

Fuse cabinet:

A fuse with a neutral strip or multiple fuses

For all cabinet:

Direct connection on the circuit breaker terminal for U1000 R2V cable type or equivalent, maximum cable cross-section 25 mm^2
One cable gland for the cable arriving at the transformer
One cable gland for thermal probe
One cable gland for output cable

IP67 CBT cabinet for single-phase transformers										
For transformer	1 kVA	2 kVA	3 kVA	5 kVA	6 kVA	8 kVA	10 kVA	16 kVA	25 kVA	32 kVA
One-pole circuit breaker + neutral B curve	10 A	16 A	20 A	32 A	40 A	-	-	-	-	-
Two-pole circuit breaker B curve	10 A	16 A	20 A	32 A	40 A	50 A	63 A	100 A	-	-
Fuse rating GL curve	6 A	10 A	16 A	25 A	32 A	40 A	50 A	80 A	-	-
Dimensions for 1 circuit breaker or one fuse	140 x 230 x 95 mm									
Dimensions for 2 circuit breakers	280 x 190 x 130 mm									
Output cable gland	Diameter included between 11 and 17 mm (for a U1000 R2V cable, 2 x 6 or 2 x 10 mm^2) Other cable gland upon request									

IP67 CBT cabinet for three-phase transformers									
For transformer	5 kVA	10 kVA	16kVA	25 kVA	32 kVA	50 kVA	63kVA	80kVA	100 kVA	125 kVA
4-pole circuit breaker B curve	16 A	32 A	50 A	80 A	80 A	By consultation				
Dimensions for 1 circuit breaker	280 x 190 x 130 mm									
Dimensions for 2 circuit breakers	280 x 280 x 130 mm									
Dimensions for 3 circuit breakers	560 x 280 x 130 mm									
Output cable gland	Diameter included between 22 and 32 mm (for a U1000 R2V cable, 5G25 or 5G35) Other cable gland upon request									

TER - MODULO
NETWORK INTERVENTION ACCESSORIES

WATERTIGHT TRANSFORMERS

The network intervention for each transformer must conform to the standards laid out in NF C17-200 and must use proper accessories.
The intervention procedure is laid out in our leaflet “Network intervention tools and methods.”

Common intervention tools

Part number	Designation
1004588	Pole insulating
3010047	Electronic voltage detector with sound signal for MV
1019011	Electronic voltage detector with sound signal for 950 V network

Specific TER intervention tools

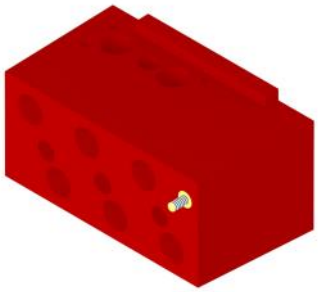
The voltage confirmation, earthing and short circuit operations are carried out on the one-pole connection interfaces.

Part number	Designation	Use	Product
3010354	Operation key	Unscrew the cap to access the VAT compartment	
1023765	Fuse extractor for 10x180 fuse	Remove the fuses	
3010902	Fuse extractor for 20x127 fuse		
1024130	Fuse extractor for 36x190 or 36x250 fuse		
3011866	Earthing tools for single-phase network	Connect to the terminal jumper and earthing network (earthing cable 1x25 mm^2)	
3011208	Earthing tools for three-phase network		

Specific MODULO intervention tools

The voltage confirmation, earthing and short circuit operations are carried out on the IDR connection interfaces.

Part number	Designation	Use	Product
3007813	CMB operation key	Unscrew the cap to access the VAT compartment	
3008056	PMCB earthing and short circuiting plate	For BI IDR	
3007819	PMC earthing and short circuit plate	For TRI IDR	
1004709	Earthing strap	Attach the earthing plate to the earthing clamp	
1004711	Earthing clamp	Connect the earthing network (1x25 mm^2)	



IDR BI

IDR TRI

CLA LIGHTING ARRESTERS
WATERTIGHT ARRESTERS FOR TER AND MODULO

Use

The CLA lighting arresters are specially made for installation in the pits closer to the transformers. They conform to current CEI standards, and are effective against overvoltage due to various causes, including atmospheric influences, static charges and lightning.

Advantages

A high margin of operating safety between the start-up voltage and the insulation level, with no inadvertent operation.

Maintenance optimization; the CLA can easily be added to existing installations, thanks to its standard connection adapted to all transformers.

Construction

The CLA is made of oxide and zinc non-linear resistors (varistors), protected by an epoxy glass laminate. The assembly is moulded in polyurethane. The ground connection is achieved via M12 dowel.

Technical characteristics

CLA connected on IDR BI

PERFORMANCES:

Protection grade : P68
Operating temperature : 40 degrees C to +60 degrees C
Earthing connection : M12

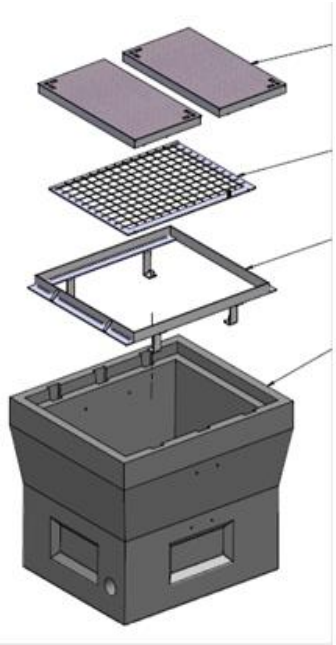
Connection:

TER:
Cable 1.5 m long equipped with a thimble to connect to the TER terminal
MODULO:
Cable 1.5 m long equipped with a one-pole plug, to connect to the IDR

Model	***CLA-10***	***CLA-20***	***CLA-30***
Network voltage	950 V	3200 V	5500 V
Permanent voltage service	2.55 kV	5.10 kV	7.65 kV
Nominal voltage (current 1 mA)	3 kV	6 kV	9 kV
Acceptable overvoltage (1s)	3.4 kV	6.8 kV	10.2 kV
Surcharge nominal current	10 kA	10 kA	10 kA
Residual voltage (10 kA surge 1 us)	9 kV	19 kV	29 kV
Max. overcurrent (4/10 us)	65 kA	65 kA	65 kA
Length (mm)	115		
Width (mm)	85		
Height (mm)	240		
Weight (kg)	5		

TER - MODULO
CONCRETE PITS

WATERTIGHT TRANSFORMERS

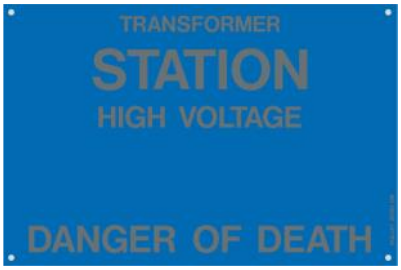


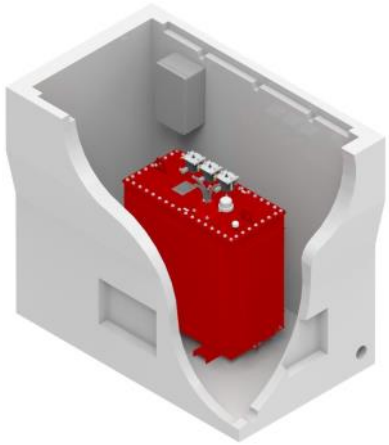
Watertight transformers can be installed in concrete pits.
Pit bottom must include a water drainage system.
The pit is to be buried near the receivers.
The sleeves penetrating the pit must be closed to prevent water from entering.

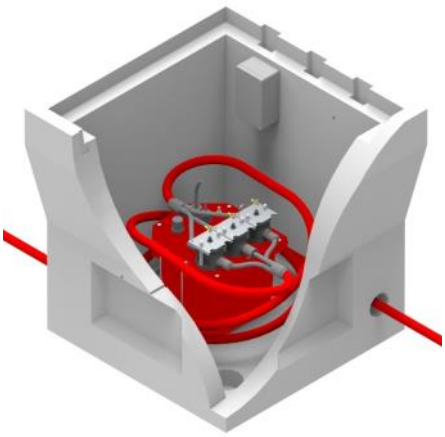
The pit must be in accordance with the standards NF C17-200.
Pit equipped with:

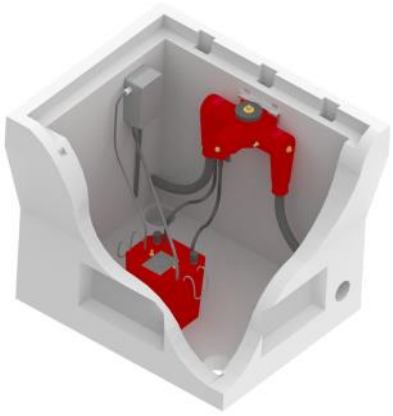
- One or more 250 kN buffers
- An articulated safety grill
- A grill support frame ready to seal
- Interlocking device (by nut) and poster set conforming to the standard NF C17-200. Interlocking can be realised on the grill or directly on the transformer

Recommended Posters









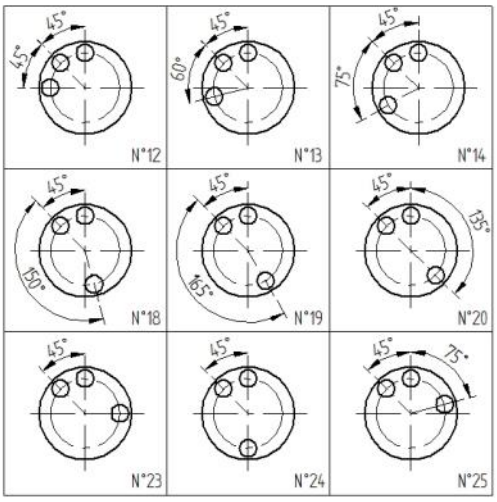
Transformer	Power rating	Pit operating dimension (mm)		
		L	I	H
TER M	1 à 5 kVA	800	800	840
Modulo M	1 à 6 kVA			
TER M	6 to 10 kVA	1000	800	840
Modulo M	8 to 10 kVA			
TER or Modulo M	16 kVA	1300	800	1100
TER or Modulo T	5 & 10 kVA			
TER or Modulo M	25 & 32 kVA	1700	1000	1300
TER or Modulo T	16 to 50 kVA			
TER or Modulo T	63 to100 kVA	1900	1000	1500
TER or Modulo T	125 & 160 kVA	1900	1000	1700

The 5500 V cable will have to loop around the TER transformer to make it possible to redo a plug-in terminal if necessary

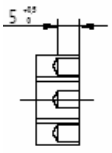
Principle

A special key, which is recoverable at the transformer station after closing the earthing switch, allows access to the network transformers.

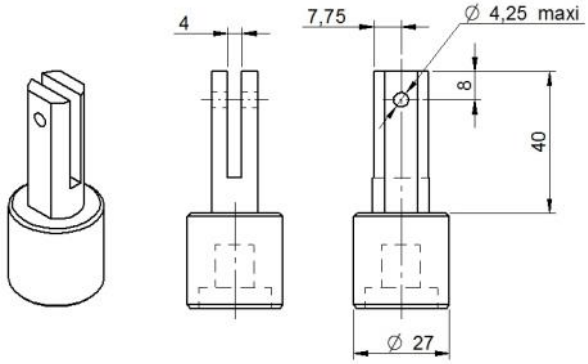
This interlocking system between the earthing section and the transformers allows safe operation. For the installation, a special key for each feeder will be associated with the locks bearing the same numbers, allowing access to all the transformer feeders. Numbers 11 to 52 are provided.



Examples of interlocking nut



Special nut



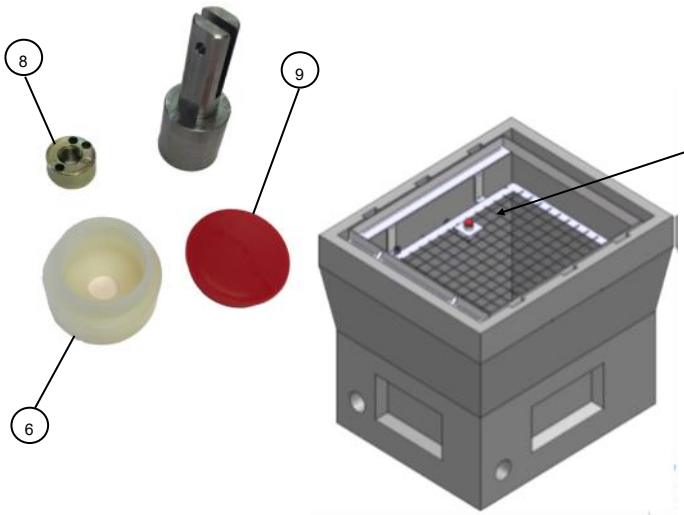
Pit key

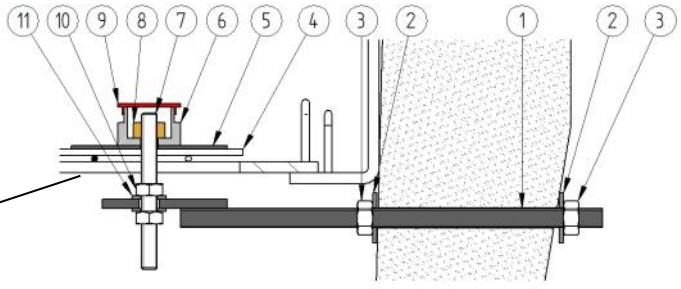
Pit interlocking

The special key activates nut ⑧ which releases the grid located in the interior of the pit (accessible through the access trap and the transformer).

Only the specific parts marked 6, 8 and 9 are listed in AUGIER's price lists.

Pit key



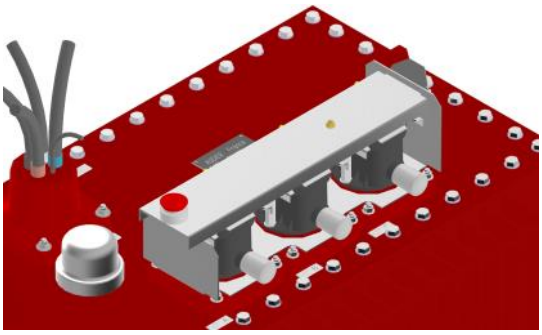


1. Fixation device
2. Stainless steel washer
3. Stainless steel M12 nut
4. Wire mesh
5. Platinum
6. Nylon cap
7. Threaded shaft
8. Special nut
9. Cap
10. Stainless steel M10 nut
11. Stainless steel washer

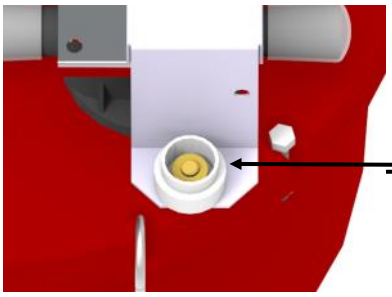
Transformer interlocking

Interlocking transformer terminals in TER transformers

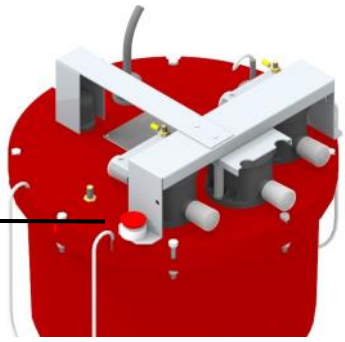
Mechanical interlocking device available for areas directly accessible under voltage (terminals, fuse switches) on the TER transformer. This type of interlocking is used where the pit interlocking is not retained. The principle is the same as for the pit interlocking, with a secure nut.



TER TT 50 kVA interlocking



Detail of interlocking mechanism with special nut

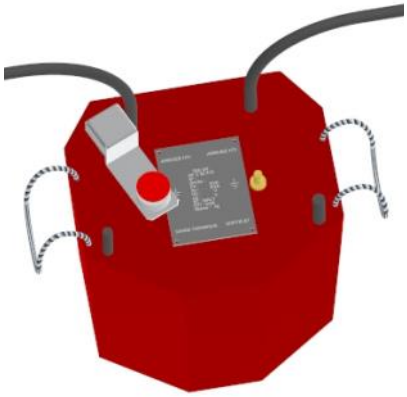


Interlocking TER MT 10 kVA

MODULO interlocking - Transformer and connection interface

Mechanical interlocking device available for fuse terminals directly on the transformer and a terminal interlocking device on the IDR connection terminal. The principle is the same as for the pit interlocking, with a security nut.

IDR TRI interlocking by nut



TEE interlocking by nut

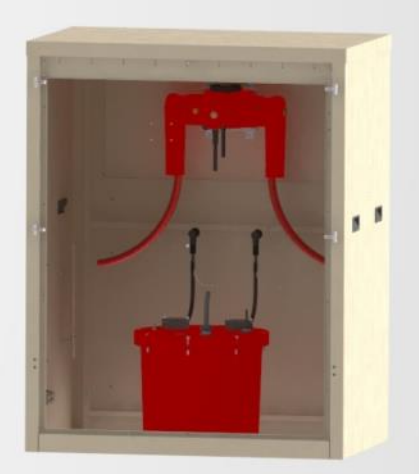
Detail TEE

Transformer installed in cabinet

AUGIER offers outdoor cabinets to accommodate watertight transformers. Cabinets made of aluminium sheet, RAL 1015, IP44, front closed by a door with a three-point lever handle.

Cabinet equipped with low-voltage connection terminals, a door contact. In the case of MODULO transformers, the connection interface is delivered mounted in the cabinet.

These cabinets are to be installed on a concrete slab, access to the transformer being possible after opening and grounding the upstream protection cell, locking by RONIS lock.



TER - MODULO
TOOLS

WATERTIGHT TRANSFORMERS

These tools are recommended for the MV or MLV cable heads for the TER and MODULO transformers.

(1)

(2)


(3)
(4)
(5)

(6)
(7)
(8)
(9)
(10)

Part number	Indication	Product name
1024867	(1)	Clamping tool for cable cross-section 6 to 50 mm^2
1024865	(2)	Stripping tool
1024864	(3)	Cable cutter
1024868	(4)	Cutting pliers
1024869	(5)	Flat nosed pliers
1024871	(6)	Tape measure
1024872	(7)	Indelible marker
1024870	(8)	Scissors
1024866	(9)	Electrician's knife
1024875	(10)	Pipe wrench no. 13
	(10)	Pipe wrench no. 16 (BI and TRI IDR)
1026593	(11)	Tool for peeling the semiconductor
1028713	(12)	Tool for stripping a one-pole cable
1028714	(13)	Hot air gun


(11)


(12)

(13)

* To be used in the case of bonded semiconductor

Photos not contractual

Voltamax
240 VA 950 V / 230 V

WATERTIGHT TRANSFORMERS

The VOLTAMAX is an IP68 water-resistant transformer intended for use on 950 V networks.
VOLTAMAX transformers are used to supply outdoor lighting and all other receivers.

These transformers can be supplied alone for easy integration directly into the lighting source, or in a pit. They can also be supplied cables in an IP55 cabinet.

The VOLTAMAX is designed for single or three-phase networks:
- Voltamax single-phase for single-phase network (M)
- Voltamax single-phase for three-phase network (T)

The VOLTAMAX allows
- Fewer cable cross-sections due to use of a 950 V network
- Absence of LV 230 V sub-networks
- Easy integration on 950 V networks
- Simple installation

The use of epoxy resin guarantees the transformers will be:
- **Non corrosive, with no change over time**
- **Water resistant and immersible**
- **Insulating**

Voltamax in cabinet

- Grey wall cabinet, IP55
- Equipped with a Voltamax, 950 V terminals, LV 230 V circuit breaker
- Dimensions: Height 400 x length 300 x depth 200 mm
- Approximate weight: 8 kg

950 V connection

950 V connection on terminals protected by a transparent lid, for use with a U1000 R2 V cable or equivalent of 6 to 25 mm².
Terminals allow switch-off of the 950 V network artery.

Equipped with 950 V connection terminals, which can be supplied with just a Voltamax in order to facilitate implementation.

Voltamax
TECHNICAL CHARACTERISTICS

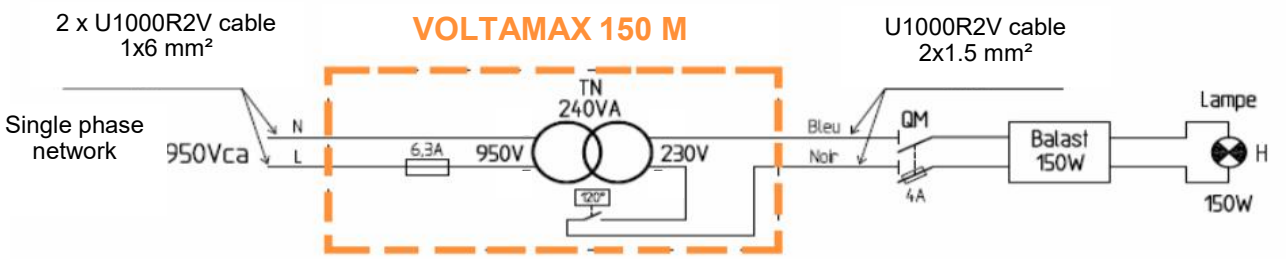
WATERTIGHT TRANSFORMERS

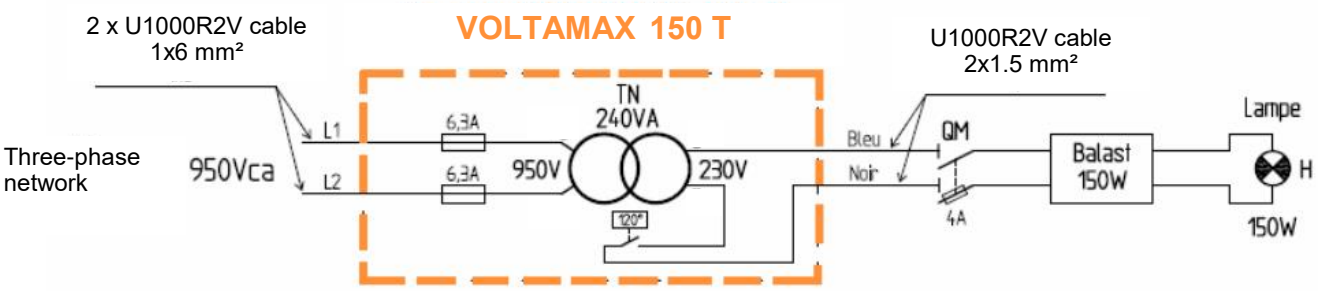
Electrical characteristics

Voltamax 150 M / T	
Nominal power rating (VA)	240
Fuse rating 950 V FU (A)	6,3
Frequency (Hz)	50
Primary voltage	950
Off load secondary voltage	237
On load secondary voltage	230
Isolation voltage	1100
Coupling	Single-phase
Off load losses	2 W
On load losses	14 W
Short circuit voltage	3.96%
Transformer efficiency	94%
Operating temperature (degrees C)	-15 / + 40
Overheating class	H

VOLTAMAX 150 M
For 950 V single-phase networks, used for power supply receivers up to 240 VA.

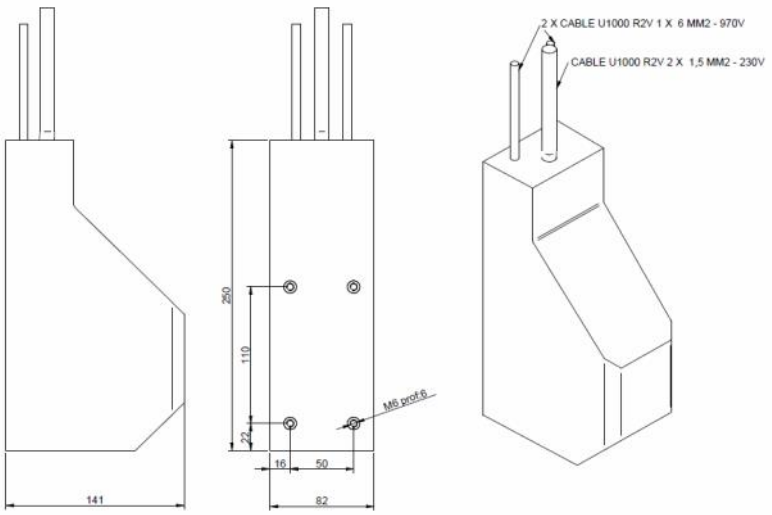
VOLTAMAX 150 T
For 950 V three-phase networks, used for power supply receivers up to 240 VA.





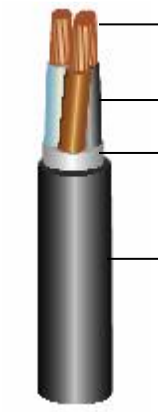
Mechanical characteristics

150 M / T	
Height (mm)	250
Length (mm)	141
Width (mm)	82
Mass (kg)	6
Attachment	4 M6x10 screw
Cable cross-section 950 V (mm^2)	2x1x6 - 1 meter long
Cable cross-section 230 V (mm^2)	2x1,5 - 1 meter long
IP protection grade	68
IK protection grade	10



950 V Network

U 1000 R2V 1000 V cable



Example of three-pole cable

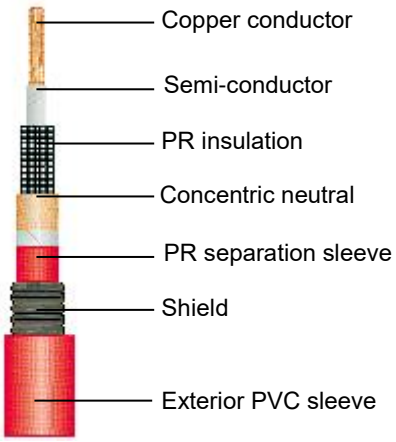
Cable cross-section ($mm^{2)}$	Max. diameter of isolating sleeve (mm)	Approx. diameter at outer sleeve (mm)	Admissible intensity (A)
			Buried
3 x 6	4.3	15	66
3 x 10	5.1	17	87
3 x 16	6.1	19.5	113
3 x 25	7.8	23.5	144
3 x 35	8.8	26	174
3 x 50	10.2	29	206

Curved ribbon: 6 x diameter

These cables should conform to the following standards:
Regulation : NF C32-321
Class : 1 kV
Conductor : class 2

3200 V Single-phase network

Two-pole concentric 3.6 / 6 kV - with or without shield



Cable cross-section (mm^2)	Max. diameter on isolating sleeve	Approx. diameter at outer sleeve (mm)		Admissible intensity (A) **Buried**
		Cable without shield	**Cable with shield**	
6 + 6	16	18.6	19.6	63
10 + 10	16.5	19.2	20.2	90
16 + 16	18.3	21	22	115
25 + 25	20.5	23.2	24.2	150

Curved ribbon: 10 x diameter

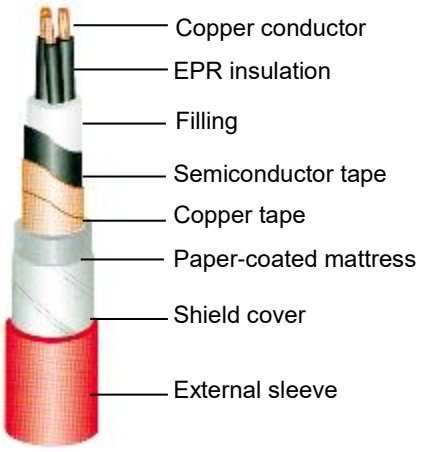
These cables should conform to the following standards:
Regulation : NF C33-321
Class : 7.2 kV
Conductor : class 2

RECOMMENDED CABLES

WATERTIGHT TRANSFORMERS

5500 V / 6600 V Network

Three-pole belting cable, non-radial shielded cable 6/6 kV



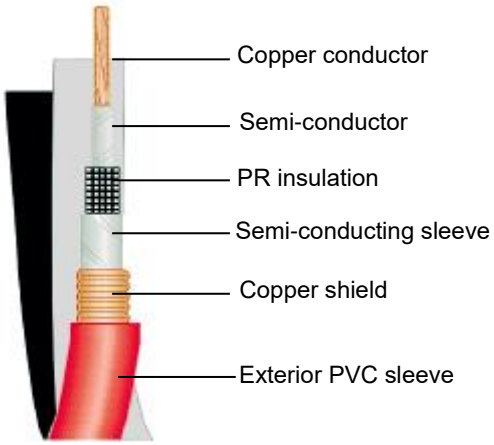
Cable cross-section (mm^2)	Max. outer diameter (mm)	Admissible intensity (A)	
		Buried	**Open air**
3 x 10	33	72	62
3 x 16	35	94	81
3 x 25	39.5	120	105
3 x 35	43	145	130

Curved ribbon: 9 x exterior diameter

These cables should conform to the following standards:
Regulation : NF C33-321
Class : 7.2 kV
Conductor : class 2

5500 V / 6600 V Network

Twisted three-pole cable 3.6/6 kV



Cable cross-section (mm^2)	Max. exterior diameter (mm)		Admissible intensity (A)	
	Sleeve	**Twist**	**Buried**	**Open air**
3 x 1 x 10	18	36	97	92
3 x 1 x 16	19.6	39.5	125	120
3 x 1 x 25	21.2	42.5	160	155
3 x 1 x 35	22.4	45	190	190

Curved ribbon: 9 x exterior diameter

These cables conform to the following standards:
Regulation : NF C33-321
Class : 7.2 kV
Conductor : class 2

AUGIER HAS BEEN ISO 9001 CERTIFIED SINCE 1995

Dealer contact information:

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