

Power & Distribution Transformers

Oil-immersed · Cast-resin dry-type · Amorphous-core · Pole-mounted · Power transformers with OLTC · Compact substations



ABOUT CASK POWER SYSTEMS

Engineered for reliable, efficient power delivery

With more than 15 years of experience in electrical manufacturing, CASK Power Systems, a division of CASK Electric, designs and supplies transformers and medium-voltage solutions for utilities, industry, infrastructure and renewable-energy projects. Every unit is engineered to the IEC 60076 series and configured to the project's network, site and efficiency requirements.

15+ years

OF MANUFACTURING
EXPERIENCE

25 kVA – 63 MVA

RATED POWER RANGE

Up to 145 kV

HIGHEST VOLTAGE UM

IEC · Tier 2

LOSS LEVELS TO IEC, EU
ECODESIGN OR YOUR
SPEC

OUR COMMITMENT

▶ Designs to IEC 60076, with EU Ecodesign Regulation 548/2014 (Tier 2) designs available

▶ Quality management system to ISO 9001:2015

▶ 100 % routine testing before dispatch, with type tests as required

▶ Engineering support from specification to commissioning

MARKETS SERVED

▶ Electrical utilities: distribution networks

▶ Industry, mining and oil & gas

▶ Commercial buildings, data centres and hospitals

▶ Solar PV and wind power plants

▶ Infrastructure: rail, ports, airports and water

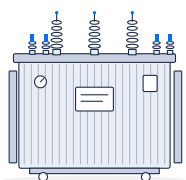
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PRODUCT RANGE OVERVIEW

One partner, the full range

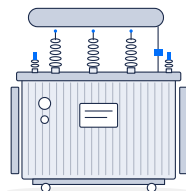
From pole-mounted distribution units to medium power transformers with on-load tap changers, the range covers each step of the network.


CPS-TR001 · 002 SERIES
Hermetic oil-immersed

25 – 3 150 kVA · up to 36 kV

ONAN / KNAN, sealed, maintenance-free

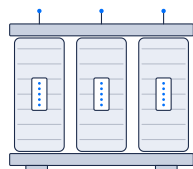
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CPS-TR005 SERIES
Conventional with conservator

up to 10 MVA · up to 36 kV

ONAN / ONAF, Buchholz protection

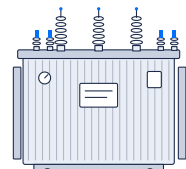
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CPS-TR003 SERIES
Cast-resin dry-type

50 – 3 150 kVA · up to 36 kV

AN / AF, class F, E2 C2 F1

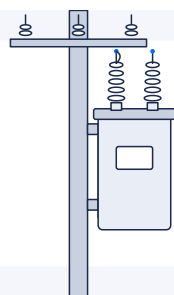
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CPS-TR006 SERIES
Amorphous-core

25 – 2 500 kVA · up to 36 kV

Ultra-low no-load losses

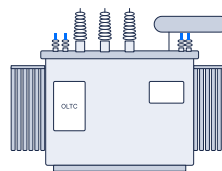
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CPS-TR004 SERIES
Pole-mounted

25 – 315 kVA · up to 36 kV

Single and three-phase

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CPS-TR007 SERIES
Power transformers

5 – 63 MVA · up to 145 kV

On-load tap changer, ONAN / ONAF

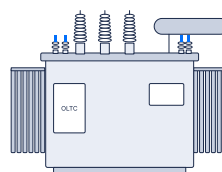
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CPS-MV SERIES
Compact substations

up to 2 500 kVA · up to 36 kV

IEC 62271-202 prefabricated

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CPS-TR008 SERIES
Special-application to specification

Earthing, wind, solar, rectifier

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ENGINEERING & DESIGN

Built around the active part

Performance, losses and lifetime are decided by the core, the windings and how well they are held together. Each design is optimised for total cost of ownership, not just purchase price.

MAGNETIC CORE

Cold-rolled grain-oriented (CRGO) silicon steel, or Fe-based amorphous ribbon for minimum no-load losses. Step-lap mitred joints cut no-load loss, magnetising current and noise. Core clamping is designed for transport and short-circuit forces.

WINDINGS

Copper or aluminium conductors. LV windings are made of foil for axial short-circuit strength; HV windings use enamelled wire or paper-insulated strip in disc or layer construction. Cooling ducts are sized for uniform hot-spot temperatures.

TANK & FINISH

Hermetically sealed corrugated-fin tanks or radiator tanks with conservator. Surfaces are shot-blasted and given a multi-layer paint system (standard RAL 7033 or RAL 7035, about 105 µm; other colours on request) with corrosion protection matched to the site environment.

STANDARD DESIGN DATA

Frequency	50 Hz or 60 Hz
Phases	Three-phase (single-phase on request)
Vector group	Dyn11 standard; Dyn5, Yzn11, YNd11 on request
Tapping (off-circuit)	±2 × 2.5 % on HV side
Tapping (on-load)	OLTC per IEC 60214-1, typically ±8 – 10 steps
Short-circuit impedance	Per IEC 60076-5 or to customer specification
Temperature rise, oil	60 K top oil / 65 K average winding
Temperature rise, dry	100 K (class F) / 125 K (class H)
Ambient	Up to 40 °C standard; higher ambients and altitudes > 1 000 m by derating design
Insulating liquid	Mineral oil (IEC 60296) or natural ester (IEC 62770)
Winding material	Copper or aluminium
Efficiency	EU Ecodesign Tier 2 or the applicable national MEPS

Low losses

Losses to customer specification, from standard IEC levels to EU Tier 2 and AAA0 with amorphous cores

Short-circuit strength

Mechanical and thermal withstand verified per IEC 60076-5

Low noise

Step-lap cores and optimised flux density to meet EN 50588 sound levels

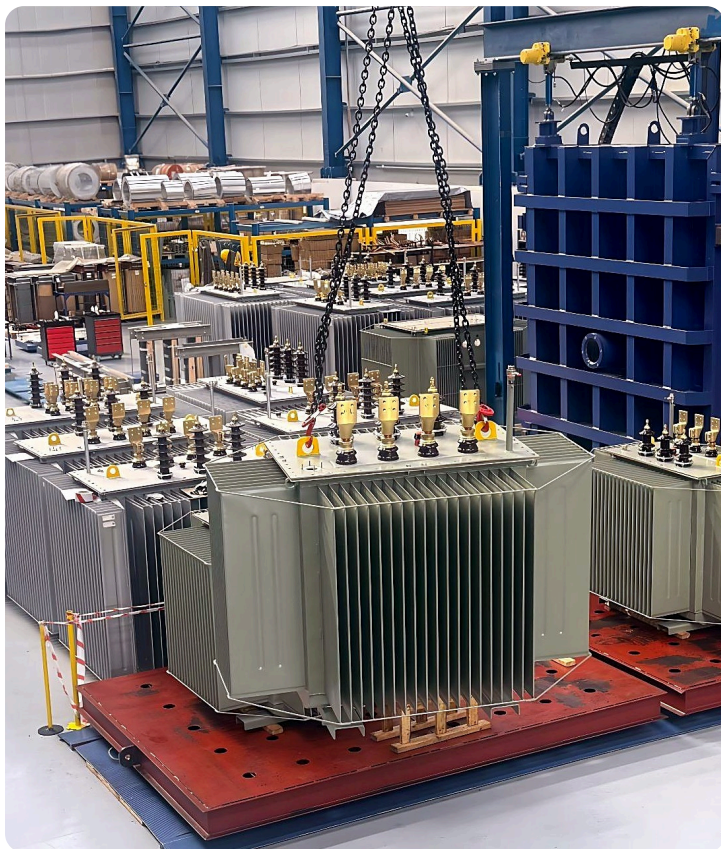
Long life

Hot-spot temperature controlled per IEC 60076-7 loading guide

PRODUCTION & DELIVERY

From the factory floor to your site

Every transformer is manufactured, tested and prepared for shipment in our partner production facility in Türkiye, then delivered to projects across the region.



Final assembly and routine testing



Power transformer tank in fabrication



Cable-connection side with protected terminals



Finished units with cable boxes awaiting dispatch

OIL-IMMERSED DISTRIBUTION

Hermetic transformers

Totally filled, hermetically sealed design with a corrugated-fin tank. The flexible fins take up the oil's thermal expansion, so there is no conservator and no breather, and the oil never touches the air. This means minimal maintenance and a long oil life.



Hermetic distribution transformers ready for dispatch

- IEC 60076
- EU Tier 2 option
- EN 50708
- ONAN / KNAN
- Natural ester option

FEATURES & BENEFITS

- ▶ No contact between oil and atmosphere: no oxidation or moisture ingress
- ▶ Maintenance-free in service; no oil sampling needed for the life of the unit
- ▶ Compact footprint and lower height than conservator designs
- ▶ Suitable for indoor, outdoor and compact-substation installation
- ▶ Copper or aluminium windings, CRGO or amorphous core
- ▶ Integrated protection relay (DGPT2/RIS) available
- ▶ Plug-in (elbow) HV bushings for compact substations and cable connection

GENERAL SPECIFICATION

Main numbers	CPS-TR001 Tier 2 · CPS-TR002 standard losses
Rated power	25 – 3 150 kVA
Primary voltage	up to 36 kV (Um)
Secondary voltage	0.4 – 0.69 kV (up to 3.6 kV)
Cooling	ONAN (mineral oil) / KNAN (ester)
Tapping	±2 × 2.5 % off-circuit
Vector group	Dyn11 (others on request)
Insulation level, 24 kV	LI 125 kV / AC 50 kV
Insulation level, 36 kV	LI 170 kV / AC 70 kV
Installation	Indoor / outdoor, up to 1 000 m

TECHNICAL DATA

Oil-immersed distribution transformers

Low-loss option: EU Ecodesign Tier 2 · $U_m \leq 24 \text{ kV}$ · $LV \leq 3.6 \text{ kV}$ · 50 Hz

Item number	Rated power kVA	Impedance U _k %	No-load loss P ₀ max. W	Load loss P _k at 75 °C max. W	Loss class EN 50588	Sound power LWA max. dB(A)	Efficiency 50 % load min. %, cos φ = 1	Efficiency 100 % load min. %, cos φ = 1
CPS-TR001-001	25	4.0	63	600	Ak / A0-10 %	on request	98.32	97.42
CPS-TR001-002	50	4.0	81	750	Ak / A0-10 %	on request	98.94	98.37
CPS-TR001-003	100	4.0	130	1 250	Ak / A0-10 %	40	99.12	98.64
CPS-TR001-004	160	4.0	189	1 750	Ak / A0-10 %	on request	99.22	98.80
CPS-TR001-005	250	4.0	270	2 350	Ak / A0-10 %	46	99.32	98.96
CPS-TR001-006	315	4.0	324	2 800	Ak / A0-10 %	on request	99.35	99.02
CPS-TR001-007	400	4.0	387	3 250	Ak / A0-10 %	49	99.40	99.10
CPS-TR001-008	500	4.0	459	3 900	Ak / A0-10 %	50	99.43	99.14
CPS-TR001-009	630	4.0	540	4 600	Ak / A0-10 %	51	99.47	99.19
CPS-TR001-010	800	6.0	585	6 000	Ak / A0-10 %	52	99.48	99.18
CPS-TR001-011	1 000	6.0	693	7 600	Ak / A0-10 %	54	99.48	99.18
CPS-TR001-012	1 250	6.0	855	9 500	Ak / A0-10 %	55	99.49	99.18
CPS-TR001-013	1 600	6.0	1 080	12 000	Ak / A0-10 %	57	99.49	99.19
CPS-TR001-014	2 000	6.0	1 305	15 000	Ak / A0-10 %	59	99.50	99.19
CPS-TR001-015	2 500	6.0	1 575	18 500	Ak / A0-10 %	62	99.51	99.20
CPS-TR001-016	3 150	6.0	1 980	23 000	Ak / A0-10 %	on request	99.51	99.21

LOSS LEVELS

This table shows the EU Ecodesign Tier 2 limits. Standard IEC designs for other markets have higher losses but a lower purchase price; choose the level that suits your loss evaluation. For $U_m = 36 \text{ kV}$ with $LV \leq 3.6 \text{ kV}$, the regulation allows up to 15 % higher no-load loss and 10 % higher load loss than the values above. Intermediate ratings are interpolated linearly.

DIMENSIONS & WEIGHTS

Dimensions, total weight and oil volume depend on the voltage, losses, winding material and accessories you choose. Dimensions and weights for each model, and a reference drawing, are on the next pages; certified drawings and guaranteed data are sent with every offer.

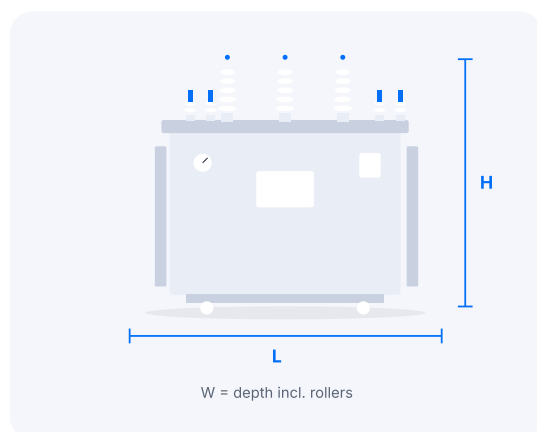
Loss values are the maximum permitted by Commission Regulation (EU) No 548/2014 as amended by (EU) 2019/1783, Tier 2 (from 1 July 2021), Annex I Table I.1. Impedance: 4 % up to 630 kVA and 6 % above, as typically specified (IEC 60076-5 minimum: 5 % for 631 – 1 250 kVA). Sound power per EN 50588-1. Efficiencies are calculated from the maximum losses at rated voltage, so actual efficiencies are equal or higher. Lower-loss designs (for example AAA0 / Ak) are available. For markets outside the EU, losses are designed to the customer specification or the national standard (see the reference design on page 9). Guaranteed values are subject to IEC 60076-1 tolerances.

CPS-TR002 MODEL RANGE

Models, dimensions & weights

Hermetic oil-immersed · up to 24 kV / 0.4 kV · CRGO core · Cu windings · standard losses

Item number	Rated power kVA	Length L mm	Width W mm	Height H mm	Oil approx. kg	Total weight approx. kg
CPS-TR002-001	25	950	670	770	90	380
CPS-TR002-002	50	1 000	730	810	120	500
CPS-TR002-003	100	1 110	780	880	160	670
CPS-TR002-004	160	1 220	840	910	200	870
CPS-TR002-005	250	1 320	890	980	240	1 110
CPS-TR002-006	315	1 370	950	1 020	270	1 300
CPS-TR002-007	400	1 480	1 010	1 050	310	1 490
CPS-TR002-008	500	1 590	1 060	1 090	350	1 730
CPS-TR002-009	630	1 690	1 120	1 120	400	2 020
CPS-TR002-010	800	1 800	1 170	1 190	460	2 400
CPS-TR002-011 ★	1 000	1 850	1 230	1 230	536	2 789
CPS-TR002-012	1 250	1 960	1 290	1 300	620	3 270
CPS-TR002-013	1 600	2 060	1 400	1 370	740	3 940
CPS-TR002-014	2 000	2 220	1 510	1 440	870	4 710
CPS-TR002-015	2 500	2 380	1 570	1 510	1 030	5 580
CPS-TR002-016	3 150	2 540	1 680	1 620	1 240	6 730



HOW TO READ THE ITEM NUMBER

CPS**TR002****011**

CPS

CASK Power Systems

TR

Product group: transformers

002

Main number: type and loss level (001 hermetic Tier 2 · 002 hermetic standard losses · 003 cast-resin · 004 pole-mounted)

011

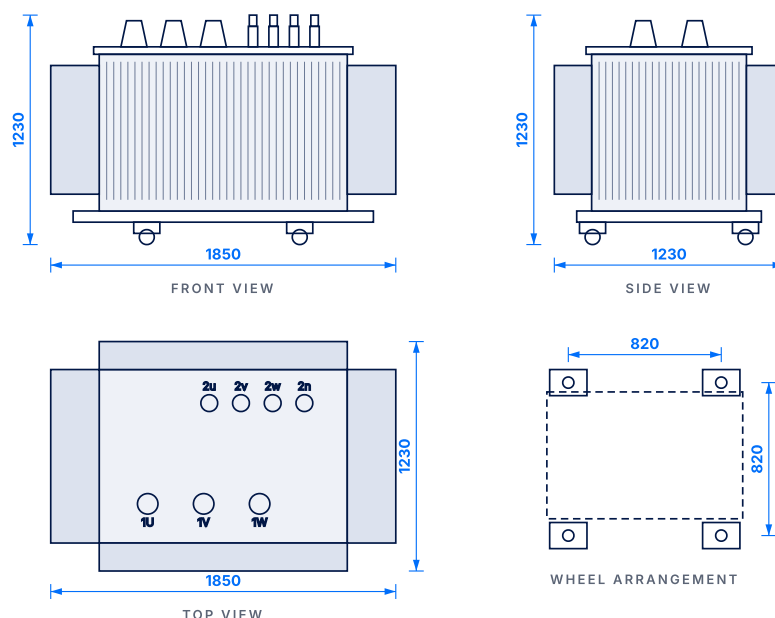
Size number: rated power (011 = 1 000 kVA). The same size number means the same rating in TR001 and TR002.

★ The CPS-TR002-011 (1 000 kVA) figures are from a CASK reference design (11 / 0.416 kV, copper windings, plug-in MV bushings; see next page). The other ratings are indicative, scaled from that design, and may vary by ±15 %. Low-loss designs (EU Tier 2, AAA0) are typically larger and heavier. They change with voltage class, loss level, winding material (Cu / Al), insulating liquid and accessories. Certified dimension drawings and weights are supplied with every offer and approval drawing.

REFERENCE DESIGN · CPS-TR002-011

1 000 kVA hermetic transformer

11 / 0.416 kV · Dyn11 · ONAN · general arrangement & guaranteed data



GUARANTEED TECHNICAL DATA

Item number	CPS-TR002-011
Rated power / cooling	1 000 kVA · ONAN · hermetically sealed
Rated voltages	11 kV (D) / 0.416 kV (Y) · Dyn11 · 50 Hz
Tap changer	Off-load, $\pm 2 \times 2.5$ % (5 steps)
No-load loss / current	1 250 W · 1.30 %
Load loss at 75 °C	9 900 W
Total losses at 75 °C	11 150 W
Impedance at 75 °C	6.00 %
Efficiency at full load	99.30 %
Regulation	0.98 %
Temperature rise oil / winding	45 / 50 K
Insulation level HV	LI 75 kV · AC 28 kV (LV AC 3 kV)
Noise level	68 dB
Windings · core	Copper / copper · grain-oriented electrical steel
MV / LV bushings	24 kV 250 A plug-in · 1 kV 2 000 A
Insulating oil	Nytro Lyra X, 536 kg
Total weight	2 789 kg
Dimensions L × W × H	1 850 × 1 230 × 1 230 mm (approx.)
Wheel gauge	820 × 820 mm
Paint	RAL 7033, 105 µm

FITTINGS

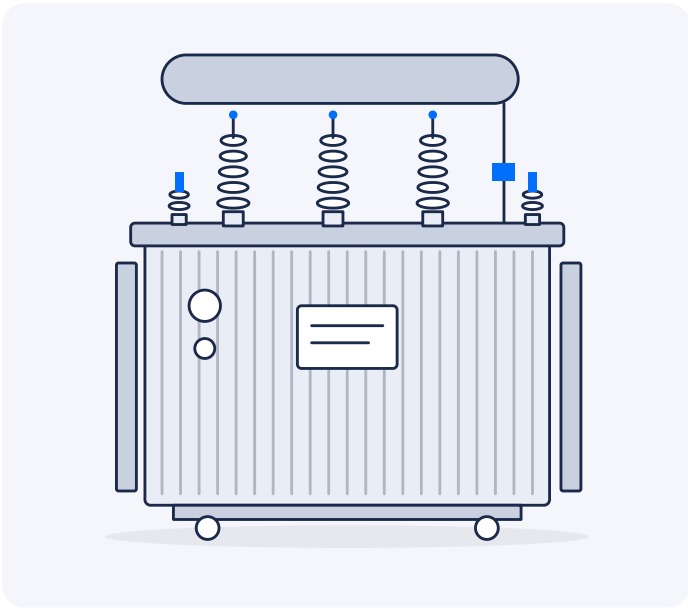
1	Wheels
2	Oil drain and sampling valve
3	Corrugated wall for cooling
4	Rating plate
5	MV bushings
6	LV bushings
7	Hermetic relay: oil temperature (2 contacts, max. indicator), oil/gas level and overpressure contacts
8	Off-load tap changer
9	Earthing terminal
10	Thermometer pocket
11	Lifting lugs
12	Pressure relief valve
13	Oil filling valve

Project design to customer specification (IEC 60076, standard loss level). Weights and dimensions are approximate; tolerances per IEC 60076. The certified drawing and guarantee schedule for each project are supplied with the order.

OIL-IMMERSED DISTRIBUTION & MEDIUM POWER

Transformers with conservator

The proven free-breathing design. A conservator tank takes up the oil's expansion, and Buchholz protection gives early warning of internal faults. This is the preferred choice for higher ratings, demanding utility specifications and sites where oil condition must be monitored.



- IEC 60076
- ONAN / ONAF
- Buchholz relay
- Silica-gel breather
- Detachable radiators

FEATURES & BENEFITS

- ▶ Oil condition can be monitored and the oil treated on site
- ▶ Buchholz relay for gas and oil-surge protection
- ▶ Oil and winding temperature indicators with alarm and trip contacts
- ▶ Corrugated-fin tank or detachable radiators for higher ratings
- ▶ ONAF fan cooling for extra capacity
- ▶ Rubber bag (air cell) in the conservator available to keep the oil sealed from air

GENERAL SPECIFICATION

Main number	CPS-TR005
Rated power	up to 10 000 kVA
Primary voltage	up to 36 kV (Um)
Secondary voltage	0.4 – 11 kV
Cooling	ONAN / ONAF
Tapping	±2 × 2.5 % off-circuit; OLTC on request
Vector group	Dyn11, Dyn5, YNd11
Temperature rise	60 K top oil / 65 K winding
Losses	EU Tier 2 (≤ 3 150 kVA) or to specification

HERMETIC OR CONSERVATOR: WHICH TO CHOOSE

Criterion	Hermetic	Conservator
Maintenance	Minimal	Regular breather and oil checks
Oil-air contact	None	Through the breather (or air cell)
Installed height	Lower	Higher
Typical rating	25 – 3 150 kVA	Up to 10 MVA and beyond
Fault detection	Integrated DGPT2/RIS relay	Buchholz relay, OTI/WTI
On-site oil treatment	Limited	Fully possible

DRY-TYPE DISTRIBUTION

Cast-resin transformers

HV windings are vacuum-cast in epoxy resin. There is no liquid to leak or burn, so these units can be installed right next to the load: in buildings, tunnels, data centres, hospitals and offshore. Fire-behaviour class F1 limits fire spread and smoke emission.



- IEC 60076-11
- E2 · C2 · F1
- Class F / H
- AN / AF
- IP00 – IP31

FEATURES & BENEFITS

- ▶ No insulating liquid: no oil pit, no risk of leakage
- ▶ Self-extinguishing, halogen-free epoxy system
- ▶ High resistance to humidity, pollution and thermal shock
- ▶ PT100 sensors in each LV winding with a digital temperature relay
- ▶ Cross-flow fans (AF) for temporary overload capacity
- ▶ Low partial-discharge levels for long insulation life
- ▶ Optional enclosures IP21 / IP23 / IP31

GENERAL SPECIFICATION

Main number	CPS-TR003
Rated power	50 – 3 150 kVA (higher on request)
Primary voltage	up to 36 kV (Um)
Secondary voltage	0.4 – 0.69 kV
Cooling	AN; AF with fans
Insulation class	F (155 °C), rise 100 K; H on request
Classes (IEC 60076-11)	E2 · C2 · F1
Tapping	±2 × 2.5 % by HV links
Partial discharge	≤ 10 pC at 1.1 × Um/√3 (typical routine acceptance)

TECHNICAL DATA

Cast-resin dry-type transformers

Low-loss option: EU Ecodesign Tier 2 · $U_m \leq 24 \text{ kV}$ · $LV \leq 3.6 \text{ kV}$ · 50 Hz

Item number	Rated power kVA	Impedance Uk %	No-load loss Po max. W	Load loss Pk at 120 °C max. W	Loss class	Efficiency 50 % load min. %, cos φ = 1	Efficiency 100 % load min. %, cos φ = 1
CPS-TR003-001	≤ 50	4.0	180	1 500	Ak / A0-10 %	97.83	96.75
CPS-TR003-002	100	4.0	252	1 800	Ak / A0-10 %	98.62	97.99
CPS-TR003-003	160	4.0	360	2 600	Ak / A0-10 %	98.75	98.18
CPS-TR003-004	250	4.0	468	3 400	Ak / A0-10 %	98.96	98.48
CPS-TR003-005	400	4.0	675	4 500	Ak / A0-10 %	99.11	98.72
CPS-TR003-006	630	4.0	990	7 100	Ak / A0-10 %	99.13	98.73
CPS-TR003-007	800	6.0	1 170	8 000	Ak / A0-10 %	99.21	98.87
CPS-TR003-008	1 000	6.0	1 395	9 000	Ak / A0-10 %	99.28	98.97
CPS-TR003-009	1 250	6.0	1 620	11 000	Ak / A0-10 %	99.31	99.00
CPS-TR003-010	1 600	6.0	1 980	13 000	Ak / A0-10 %	99.35	99.07
CPS-TR003-011	2 000	6.0	2 340	16 000	Ak / A0-10 %	99.37	99.09
CPS-TR003-012	2 500	6.0	2 790	19 000	Ak / A0-10 %	99.40	99.14
CPS-TR003-013	3 150	6.0	3 420	22 000	Ak / A0-10 %	99.44	99.20

Environmental, climatic and fire classes (IEC 60076-11)

ENVIRONMENTAL E

E0 No condensation, negligible pollution.
E1 Occasional condensation, limited pollution.
E2 Frequent condensation and/or heavy pollution. **Standard for CASK designs.**

CLIMATIC C

C1 Operation down to -5 °C; transport and storage down to -25 °C.
C2 Operation, transport and storage down to -25 °C, verified by thermal shock test. **Standard for CASK designs.**

FIRE BEHAVIOUR F

F0 No special fire-risk measures.
F1 Limited flammability, self-extinguishing, minimal toxic and opaque smoke, verified by fire test.
Standard for CASK designs.

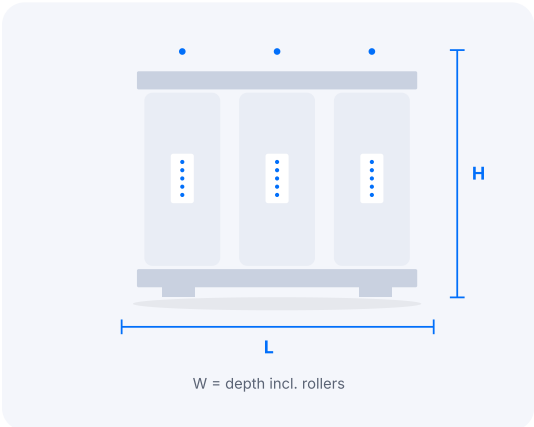
Loss values are the maximum permitted by Regulation (EU) 548/2014 as amended by 2019/1783, Tier 2, Annex I Table I.2. Load losses refer to the reference temperature for the insulation system (120 °C for class F). Efficiencies are calculated from the maximum losses, so actual efficiencies are equal or higher. Dimensions, weights and sound levels depend on the design and enclosure, and are sent with every offer.

CPS-TR003 MODEL RANGE

Models, dimensions & weights

Cast-resin dry-type · 24 kV / 0.4 kV · IP00 · class F · Tier 2

Item number	Rated power kVA	Length L mm	Width W mm	Height H mm	Total weight approx. kg
CPS-TR003-002	100	1 150	650	1 150	700
CPS-TR003-003	160	1 200	650	1 250	900
CPS-TR003-004	250	1 300	750	1 350	1 150
CPS-TR003-005	400	1 400	800	1 450	1 550
CPS-TR003-006	630	1 550	850	1 600	2 100
CPS-TR003-007	800	1 600	900	1 700	2 450
CPS-TR003-008	1 000	1 650	950	1 800	2 800
CPS-TR003-009	1 250	1 750	1 000	1 900	3 300
CPS-TR003-010	1 600	1 850	1 050	2 050	4 000
CPS-TR003-011	2 000	1 950	1 150	2 200	4 700
CPS-TR003-012	2 500	2 050	1 250	2 300	5 600
CPS-TR003-013	3 150	2 200	1 300	2 450	6 800



ENCLOSURES

With an IP21 / IP23 / IP31 enclosure, add about 300 – 500 mm to the length, about 300 – 400 mm to the width and about 200 – 400 mm to the height. Enclosure drawings are sent with each offer.

ITEM NUMBER

CPS-TR003-008 = cast-resin dry-type, 1 000 kVA, 24 kV class.

Dimensions and weights are indicative for a standard Tier 2 design without enclosure (IP00), 24 kV / 0.4 kV, Dyn11, and may vary by ±15 %. They change with voltage class, loss level, winding material and accessories. Certified drawings are supplied with every offer.

HIGH-EFFICIENCY DISTRIBUTION

Amorphous-core transformers

The core is wound from Fe-based amorphous metal ribbon about 0.025 mm thick. With no crystalline grain structure, the core magnetises with very low hysteresis and eddy-current losses. Because a distribution transformer is energised 8 760 hours a year, this saving adds up over its whole life.

55 – 75 %
LOWER NO-LOAD LOSS VS.
CRGO

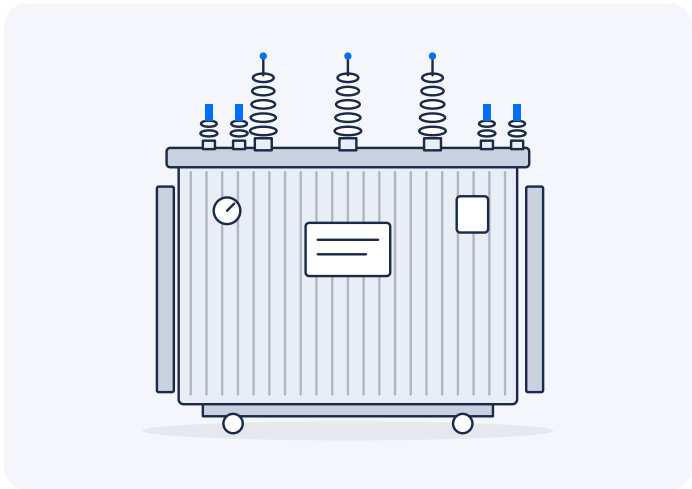
≈ 0.025 mm
RIBBON THICKNESS

1.56 – 1.63 T
SATURATION INDUCTION

AAAA
NO-LOAD LOSS CLASS
ACHIEVABLE

IDEAL FOR

- ▶ Utility networks with low average load factor
- ▶ Solar PV plants, where units are energised overnight with no load
- ▶ Projects assessed on total cost of ownership or loss capitalisation
- ▶ Carbon-reduction and green-building programmes



MODEL SERIES

CPS-TR006 Hermetic amorphous-core distribution transformers, 25 – 2 500 kVA, up to 36 kV, no-load loss class AAA0.

MATERIAL COMPARISON

Property	Amorphous ribbon	CRGO steel
Structure	Non-crystalline	Grain-oriented crystalline
Thickness	≈ 0.025 mm	0.23 – 0.30 mm
Saturation induction	1.56 – 1.63 T	≈ 2.0 T
Resistivity	≈ 1.3 μΩ·m	≈ 0.5 μΩ·m
Core loss	Very low	Low
Material standard	IEC 60404-8-11	IEC 60404-8-7

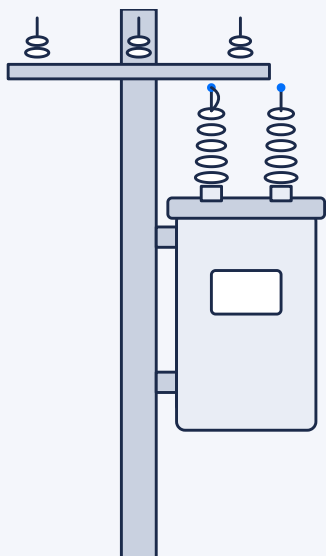
WORKED EXAMPLE: 630 KVA

No-load loss	W	kWh / year
EU Tier 2 limit (A0 – 10 %)	540	4 730
Amorphous, class AAA0	300	2 628
Saving per unit	240	2 102

The example uses the EN 50588-1 class AAA0 value for 630 kVA (300 W) and continuous energisation (8 760 h/yr). Multiply by your energy tariff and emission factor to get cost and CO₂ savings. Amorphous cores have a lower saturation induction, so for the same rating the core and tank are somewhat larger than a CRGO design.

OVERHEAD NETWORKS

Pole-mounted transformers



Single-phase

Three-phase

Hermetic

Surge arresters

Light, compact hermetic transformers for overhead rural and suburban distribution lines. They are designed for direct pole mounting and outdoor exposure, and are easy to transport and install.

FEATURES

- ▶ Hermetically sealed tank, maintenance-free
- ▶ Pole-mounting brackets and lifting lugs
- ▶ HV bushings with arcing horns or surge arresters
- ▶ Weather-resistant outdoor paint system
- ▶ Single-phase (phase-phase or phase-neutral) or three-phase

GENERAL SPECIFICATION

Main number	CPS-TR004
Rated power	25 – 315 kVA (single-phase 10 – 167 kVA)
Primary voltage	up to 36 kV (Um)
Secondary voltage	0.4 / 0.23 kV, 0.24 / 0.12 kV
Vector group	Yzn11, Dyn11; single-phase li0
Cooling	ONAN

EU ECODESIGN TIER 2: POLE-MOUNTED LIMITS

Item number	Rated power kVA	No-load loss Po max. W	Load loss Pk max. W	Efficiency 50 % min. %
CPS-TR004-001	25	70	725	98.03
CPS-TR004-002	50	90	875	98.78
CPS-TR004-003	100	145	1 475	98.98
CPS-TR004-004	160	270	3 102	98.71

Regulation (EU) 548/2014 as amended, Annex I (liquid-immersed pole-mounted transformers). Ratings of 200 – 315 kVA follow the same annex; values on request.

TRANSMISSION & SUB-TRANSMISSION

Power transformers with OLTC

Medium power transformers for primary substations, industrial plants and generation step-up. On-load tap changers keep the voltage under control while the transformer stays in service. Each unit is designed to the project's specification.



Power transformer on its way to site

FEATURES

- ▶ On-load tap changer (IEC 60214-1) with AVR panel
- ▶ Conservator with air cell, Buchholz relay and silica-gel breather
- ▶ Detachable radiators; ONAF fan stages for extra capacity
- ▶ Oil and winding temperature indicators; fibre-optic hot-spot option
- ▶ Online monitoring ready: DGA, bushing monitoring
- ▶ Bushing CTs for protection and metering

GENERAL SPECIFICATION

Main number	CPS-TR007
Rated power	5 – 63 MVA
HV voltage	33 / 66 / 132 kV (Um up to 145 kV)
LV voltage	6.6 – 36 kV
Cooling	ONAN / ONAF (ODAF on request)
Tap changer	OLTC, e.g. $\pm 8 \times 1.25\%$ or to specification
Vector group	YNd11, YNd1, YNyn0(d)
Efficiency	Peak efficiency index per EU 548/2014 Tier 2

MINIMUM SHORT-CIRCUIT IMPEDANCE (IEC 60076-5)

Rated power	Min. Uk %
≤ 630 kVA	4.0
631 – 1 250 kVA	5.0
1 251 – 2 500 kVA	6.0
2 501 – 6 300 kVA	7.0
6 301 – 25 000 kVA	8.0
25 001 – 40 000 kVA	10.0
40 001 – 63 000 kVA	11.0
63 001 – 100 000 kVA	12.5

INSULATION LEVELS

Um kV	Lightning impulse kV peak	AC withstand kV rms
36	170	70
52	250	95
72.5	325	140
123	550	230
145	650	275

PREFABRICATED SOLUTIONS

Compact & package substations

Factory-built and type-tested enclosures that combine MV switchgear, a distribution transformer and the LV distribution board in one unit. They are delivered ready to connect, which cuts site work, footprint and commissioning time.



CASK MV TRANSFORMER KIOSK SERIES

- CPS-MV9000
- CPS-MV9500
- CPS-MV10000
- CPS-MV10500

Contact us for the configuration and dimension drawings of each series.

TYPICAL CONFIGURATION

- ▶ MV ring main unit or modular switchgear up to 36 kV (IEC 62271-200)
- ▶ Hermetic oil-immersed or cast-resin transformer up to 2 500 kVA
- ▶ LV switchboard with incomers, outgoing feeders and metering (IEC 61439)
- ▶ Walk-in or non-walk-in steel or concrete enclosure
- ▶ Oil-retention tray, ventilation louvres, internal lighting and earthing

DESIGN DATA

Model series	CPS-MV (configured to order)
Standard	IEC 62271 - 202 (prefabricated substations)
Rated voltage	up to 36 kV
Transformer	up to 2 500 kVA
Internal arc classification	IAC-AB per IEC 62271 - 202, on request
Enclosure class	Temperature-rise class 10 / 20 / 30 K
Degree of protection	IP23D enclosure (typical)

TYPICAL APPLICATIONS

Residential developments, solar PV plants (inverter stations), wind farms, industrial sites, construction power and temporary supply.

ENGINEERED TO ORDER

Special-application transformers

Where a standard unit does not fit the application, we design transformers to the duty cycle, harmonic content and site conditions.

Earthing transformers

IEC 60076-6

ZNyn / ZN neutral earthing transformers for isolated networks, sized to the fault current and duration.

Solar PV step-up

IEC 60076-1 / -11

Inverter step-up units, including double-LV-winding designs, for harmonic loading and daily cycling.

Wind turbine step-up

IEC/IEEE 60076-16

For nacelle or tower-base installation; designed for high cyclic loading and vibration.

Rectifier & converter

IEC 61378-1

For drives, electrolysis, traction and furnaces, with phase-shifting and multi-pulse winding arrangements.

Auxiliary & station service

IEC 60076-1

Auxiliary supply transformers for power plants and substations.

Pad-mounted (IEEE)

IEEE C57.12.34

Dead-front, tamper-resistant units for North American-style networks.

Have a non-standard requirement?

Send us your specification or single-line diagram. Our engineering team will propose a design with guaranteed losses, impedance and dimensions.

INSULATING LIQUIDS

Mineral oil or natural ester

The insulating liquid both insulates and cools. Choose it for the fire-safety, environmental and lifetime needs of the site.

Property	Mineral oil	Natural ester
Standard	IEC 60296	IEC 62770 / IEEE C57.147
Origin	Refined petroleum	Vegetable oils (e.g. soybean, rapeseed)
Fire point	≈ 170 °C	> 300 °C (≈ 360 °C typical)
Fire class (IEC 61039)	O	K (less flammable)
Biodegradability	Low	Readily biodegradable (OECD 301)
Moisture tolerance	Low	High: helps paper insulation last longer
Cooling designation	ONAN / ONAF	KNAN / KNAF
Recommended design	All types	Hermetically sealed units

FIRE SAFETY

With K-class liquids, transformers can be installed closer to buildings, and fire walls and suppression systems can often be smaller.

ENVIRONMENT

Natural esters are non-toxic and readily biodegradable, so a spill does far less damage to sensitive sites and water catchments.

ASSET LIFE

Ester draws moisture out of the cellulose insulation and slows its ageing, so the transformer can last longer or carry more load.

IEC 62770 recommends natural esters for sealed equipment, because they oxidise when exposed to air. Fire-point figures are typical; the values for the selected product are stated in the offer.

ACCESSORIES & PROTECTION

Accessories

HERMETIC: STANDARD

- ▶ HV and LV porcelain bushings (IEC 60137 / EN 50180 / EN 50386)
- ▶ Off-circuit tap changer operated from the cover
- ▶ Thermometer pocket
- ▶ Drain and sampling valve
- ▶ Filling valve
- ▶ Lifting lugs and pulling eyes
- ▶ Tank earthing terminals
- ▶ Bi-directional rollers
- ▶ Rating plate to IEC 60076-1

HERMETIC: OPTIONAL

- ▶ DGPT2 / RIS integral protection relay (EN 50216-3)
- ▶ Pressure relief valve with contacts
- ▶ Magnetic oil-level indicator
- ▶ Dial thermometer with contacts, or PT100
- ▶ Plug-in (elbow) HV bushings
- ▶ HV / LV cable boxes
- ▶ Surge arresters
- ▶ Anti-vibration pads
- ▶ Natural ester filling

CONSERVATOR TYPE

- ▶ Conservator with oil-level gauge
- ▶ Buchholz relay
- ▶ Silica-gel dehydrating breather
- ▶ Pressure relief device
- ▶ Oil and winding temperature indicators
- ▶ Detachable radiators
- ▶ Filtration and sampling valves
- ▶ Air cell (rubber bag) option
- ▶ Marshalling box

CAST-RESIN DRY-TYPE

- | | |
|--|---|
| <ul style="list-style-type: none"> ▶ 3 × PT100 sensors in the LV windings (4th optional) ▶ Digital temperature relay: alarm, trip, fault and fan outputs ▶ Cross-flow cooling fans (AF) with fan control ▶ Enclosures IP21, IP23 or IP31 | <ul style="list-style-type: none"> ▶ HV tapping links ▶ Anti-vibration pads ▶ Bi-directional wheels ▶ Lifting lugs, pulling eyes and earthing terminals ▶ Surge arresters (optional) |
|--|---|

TECHNICAL REFERENCE

Key design parameters

INSULATION LEVELS: IEC 60076-3 (SERIES I)

Um kV rms	Lightning impulse LI kV peak	Applied / induced AC kV rms
3.6	40	10
7.2	60	20
12	75	28
17.5	95	38
24	125	50
36	170	70
52	250	95
72.5	325	140
123	550	230
145	650	275

COOLING DESIGNATIONS

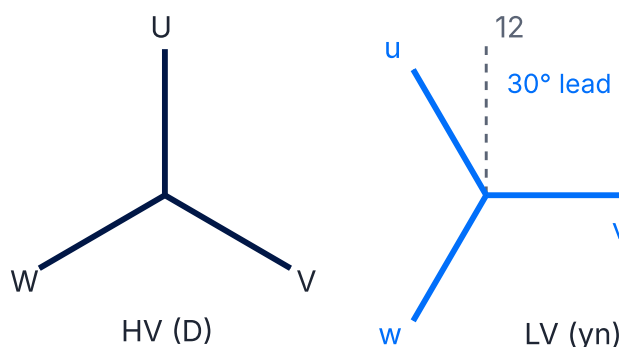
O / K	Mineral oil / liquid with fire point > 300 °C
N / F / D	Natural / forced / directed liquid flow
A	Air as the external cooling medium
ONAN	Oil natural, air natural
ONAF	Oil natural, air forced (fans)
KNAN	Ester natural, air natural
AN / AF	Dry-type, natural or forced air

TEMPERATURE-RISE LIMITS

Item	Limit
Top oil (ON / OF)	60 K
Average winding (ON / OF)	65 K
Average winding (OD)	70 K
Winding hot-spot	78 K
Dry-type, class F (155 °C)	100 K
Dry-type, class H (180 °C)	125 K

IEC 60076-2 (liquid-immersed, at 40 °C maximum ambient) and IEC 60076-11 (dry-type).

VECTOR GROUP DYN11



Delta-connected HV, star-connected LV with the neutral brought out. The LV phasor leads the HV phasor by 30° (the 11 o'clock position). This is the international standard for distribution transformers feeding 4-wire LV networks.

TOLERANCES (IEC 60076-1)

Total losses	+10 %
Each loss component	+15 % (total within +10 %)
Voltage ratio, principal tap	±0.5 % or ±1/10 of Uk
Short-circuit impedance	±7.5 % (Uk ≥ 10 %: ±10 %)
No-load current	+30 %

TESTING & QUALITY ASSURANCE

Tested before it leaves

Every transformer gets the full routine test programme of IEC 60076-1 and comes with a test report. Type and special tests are done on request or as the contract requires, in-house or at accredited independent laboratories.

ROUTINE TESTS: EVERY UNIT

- ▶ Measurement of winding resistance
- ▶ Voltage ratio and check of phase displacement
- ▶ Short-circuit impedance and load loss
- ▶ No-load loss and no-load current
- ▶ Applied-voltage (separate source) AC withstand test
- ▶ Induced-voltage AC withstand test
- ▶ Partial-discharge measurement (dry-type, and where specified)
- ▶ Leak test with pressure (liquid-immersed)
- ▶ On-load tap changer operation tests (where fitted)
- ▶ Insulation resistance measurement

TYPE TESTS

- ▶ Temperature-rise test (IEC 60076-2 / -11)
- ▶ Full-wave lightning impulse test (IEC 60076-3)
- ▶ Sound level determination (IEC 60076-10)
- ▶ Power taken by fans and pumps

SPECIAL TESTS

- ▶ Dynamic short-circuit withstand test (IEC 60076-5)
- ▶ Chopped-wave lightning impulse test
- ▶ Zero-sequence impedance measurement
- ▶ Harmonics of the no-load current
- ▶ Capacitance and dissipation factor ($\tan \delta$)
- ▶ Sweep frequency response analysis (IEC 60076-18)
- ▶ Dissolved gas analysis
- ▶ Tank vacuum and pressure deflection tests
- ▶ Climatic, environmental and fire tests (dry-type)

Design review

Electrical, thermal and mechanical design checks for every order

Incoming inspection

Core steel, conductors, insulation and components

In-process control

Winding, active-part drying, tanking and sealing checks

Documentation

Test reports, drawings, O&M manual and rating plate data

Test classification follows IEC 60076-1. Witness testing by the customer or a third-party inspector can be arranged.

COMPLIANCE

Applicable standards

Transformers are designed and tested to the latest editions of the following standards, or to the national and utility specifications named in the enquiry.

IEC 60076-1	Power transformers: general
IEC 60076-2	Temperature rise for liquid-immersed transformers
IEC 60076-3	Insulation levels, dielectric tests and external clearances
IEC 60076-4	Lightning and switching impulse testing guide
IEC 60076-5	Ability to withstand short circuit
IEC 60076-6	Reactors (incl. earthing transformers)
IEC 60076-7	Loading guide for mineral-oil-immersed transformers
IEC 60076-10	Determination of sound levels
IEC 60076-11	Dry-type transformers
IEC 60076-12	Loading guide for dry-type transformers
IEC 60076-14	Liquid-immersed transformers with high-temperature insulation
IEC/IEEE 60076-16	Transformers for wind turbine applications
IEC 60076-18	Measurement of frequency response
IEC 60214-1	Tap-changers: performance and test methods
IEC 60137	Insulated bushings above 1 000 V
IEC 60296	Unused mineral insulating oils
IEC 62770	Unused natural esters
IEC 61039	Classification of insulating liquids
IEC 61378-1	Converter transformers for industrial applications
IEC 62271-202	HV/LV prefabricated substations
IEC 60404-8-11	Fe-based amorphous strip
EN 50708-1-1 / -2-1	Additional European requirements (supersedes EN 50588-1)
EN 50216 series	Power transformer and reactor fittings
EU 548/2014 + 2019/1783	Ecodesign requirements for transformers
IEEE C57.12.00	General requirements, liquid-immersed (on request)
IEEE C57.12.90	Test code, liquid-immersed (on request)
IEEE C57.147	Natural ester fluids

REQUEST A QUOTATION

Enquiry data sheet

Fill in and send to cps@caskelectric.com. The more complete the data, the faster and more accurate our offer.

Application / project

Quantity	
Transformer type	☐ Hermetic ☐ Conservator ☐ Cast-resin ☐ Amorphous
Rated power	kVA / MVA
Primary voltage / Um	kV
Secondary voltage	kV
Frequency	☐ 50 Hz ☐ 60 Hz
Vector group	e.g. Dyn11
Tapping range	e.g. $\pm 2 \times 2.5\%$ / OLTC
Short-circuit impedance	%
Loss requirement	☐ EU Tier 2 ☐ AAA0 ☐ Capitalisation formula
Winding material	☐ Copper ☐ Aluminium
Insulating liquid	☐ Mineral oil ☐ Natural ester
Cooling	ONAN / ONAF / AN / AF
Installation	☐ Indoor ☐ Outdoor Altitude ____ m
Max. ambient temperature	°C
HV / LV connection	☐ Bushings ☐ Cable box ☐ Plug-in
Accessories / protection	
Dimension limits	L × W × H mm
Applicable specification	IEC / IEEE / utility spec.
Required delivery	
Contact	Name · company · e-mail · phone



Let's power your next project

Talk to our engineering team about specifications, loss evaluation and delivery schedules.

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