TPEG
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RAIL
ELECTROTECHNICS

www.tpe.group

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BY TECH POWER ELECTRONICS GROUP

DRIVING INNOVATION IN POWER ELECTRONICS

At Tech Power Electronics Group (TPEG), we do not simply produce components – we pioneer solutions that drive electrification across industries such as E-Mobility, Renewable Energy, Industrial Solutions, Transportation, Rail, Aeronautics and beyond.

With over 1,000 passionate team members across sites in France, Tunisia, Romania, Estonia, India and our headquarters in Germany, we collaborate closely with you to develop products tailored to your requirements.
Our dedicated Innovation Centers, with a team of 25 expert designers, ensure these solutions are also designed for the future.

From custom designs (transformers, converters, sensors, power supply units, …) and PCB assembly to complete industrial solutions, our innovation pipeline keeps you equipped to stay ahead in a fast-evolving industry.

OUR MARKETS

SIGNALLING

EMPOWERING SAFE & RELIABLE RAILWAY SIGNALLING

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TRACK CIRCUIT AND EQUIPMENT

IMPEDANCE BONDS

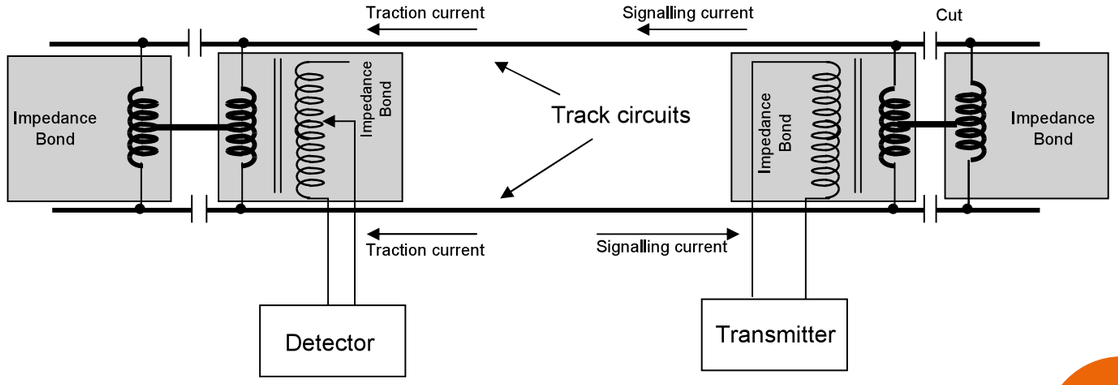
Impedance bonds connected to the track, on both sides of the insulating joint are designed to:

- allow traction current return,
- isolate galvanically the devices connected to them,
- perform the necessary electrical adaptations for High Voltage Impulse (HVI) transmission and reception.

TPE References	Description	Line Type	Nominal Intensity	Dimensions
C35050002A	**Impedance bond CIT 180 AT**	25 kV AC	180 A	400 x 470 x 190
C35050007A	**Impedance bond CIT 430 AT**	25 kV AC	430 A	400 x 470 x 190
C35050008A	**Impedance Bond CIT 1000**	1.5 Kv DV	1000A	610 x 410 x 320
C35050009A	**Impedance bond CIT 1400 CT3**	1.5 kV DC	1400 A	610 x 410 x 320

Note: all impendance bonds are compliant with railway standards.

EXAMPLE OF SCHEMATICS OF A TRACK CIRCUIT WITH TRANSFORMER-BASED IMPEDANCE BONDS



TRACK INDUCTOR

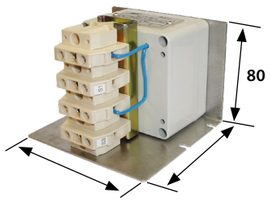
Inductor for High Voltage Impulse (HVI) track circuit are used to:

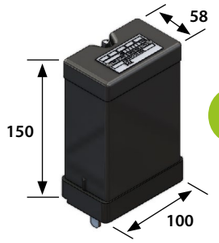
- provide a low-frequency filtering function (8 to 30 kHz) in differential mode,
- increase the primary impedance of the H.V.I. apparatus reported to the secondary side of the transformer (track).

They come in 2 models: Description	TPE Ref.	SNCF Symbol	SNCF Description	Nominal Intensity	Dimensions
H.V.I. Inductor in industrial box	P35500001	7.952.0457	SC-CV-SJC-I	180 A	400 x 470 x 190
H.V.I. Inductor in NS1 box	P35500002	7.954.3699	NS1-SC-CV-SJC-I	430 A	400 x 470 x 190

Contact us for more details

7.952.0457





7.954.3699

SV PMM & SV PC INDUCTOR

Functions

Exposed metals or dead conductors might accidentally reached the power of electric traction overhead lines (25 kV). Exposed metals or dead conductors have to be directly grounded to the rails continuously or during maintenance/ construction operations. These inductors aimed to protect the public, do neither affect the resistance or service life of signalling material connected to the rails nor how equipment work.

Description	TPE Ref.	SNCF Symbol	Dimensions
SV PMM inductor	C3550001A	7.960.0375	204.50 x 144.20 x 150 mm
SV PC inductor	C3550002A	0.392.8550	204.50 x 144.20 x 213.50 mm

Two versions of the SV inductor are available:

SV PC:
(shown in the picture here) comes with a handle for easy transport and is used during Overhead Catenary System (OCS) maintenance or installation. It features a cable fastening system that secures the wires connecting the inductor to the rails.

SV PMM:
without a handle, is equipped with a connection piece that allows it to be fixed onto the SV 90 140 rail support.

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8,500 & 9,500 HZ RESONANT SHUNTS

Used on an 25 kV AC or 1.5 kV DC electrified railway or on a non-electrified railway, resonant shunts will enable:

- 8,500 Hz and 9,500 Hz are Mid-Frequency AC (MFAC) track circuits (MFAC 8500 and MFAC 9500) to operate while overlaying the UM 71 track circuit.
- The UM 71 track circuit operate the train speed signalling control to be transmitted in differential mode without significant attenuation.

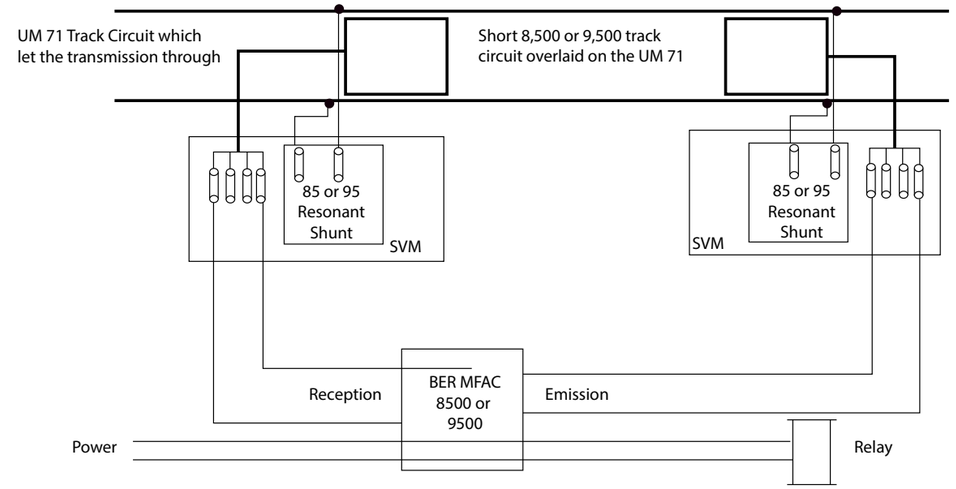
How does it work?

The resonant shunt connected to both rails is passive. This shunt will enable the UM 71 track circuit to work (at frequencies of 1,700 Hz and 2,300 Hz on one track, 2,000 Hz and 2,600 Hz on the other).

It will short cut at the overlaid track circuit frequency:

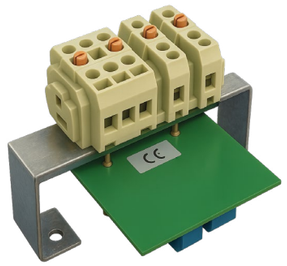
- at 8,500 Hz on a 1,700 Hz & 2,300 Hz UM71 track circuit
- or at 9,500 Hz on a 2,000 Hz & 2,600 Hz UM71 track circuit.

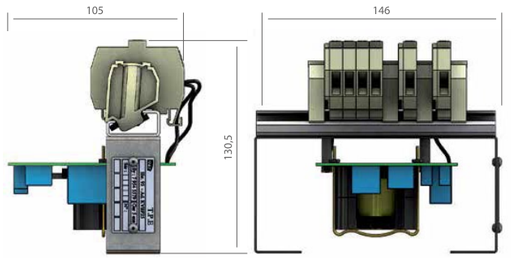
The impedance of the resonant shunt will be sufficiently high to let 20 or 25 kHz transmission frequency pass.



Description	SNCF Symbol
8,500 Hz Resonant Shunt (KVBP20)	7.954.5578
9,500 Hz Resonant Shunt (KVBP25)	7.954.5579

Contact us for more details





TRANSFORMERS FOR TRAFFIC LIGHTS

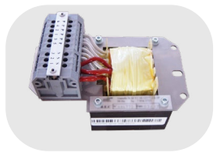
Transformers used for 400 or 50 hz light signals are mounted in a ns.1 box or on a support.
These voltage step-down transformers are inserted between the lights and the power line.
A 1/1 isolating transformer can be used at the head-end.

Description	TPE Ref.	SNCF Symbol
Transformer NS1-2T1.1/1 (58 x 100 x 150 mm)	P35500003	7.954.3656
Single phase transformer 400 Hz 127 Volts ratio 1/10 or 1/20 with a tapping point NS1-T1-1/10/20P (126 x 57 x 80 mm)	P35500004	7.954.4077
Single phase transformer 50 Hz 127 Volts / 7.2 and 6.5 Volts NS1-T1-50-127/7.2-6.5-P (58 x 100 x 150 mm)	P35500005	7.954.5723

P35500003

P35500005

P35500004



Contact us for more details

DIODE LIGHTS TEMPER

Optimized Diode light Temporization

For efficient and seamless operation of LED track lighting systems, incorporating a timer is essential to prevent premature light switching. Our timer unit features a robust block-molded design crafted from self-extinguishing resin, ensuring both safety and durability. Key design elements include:

- Dual mounting holes for easy installation
- Two screw terminal blocks conveniently positioned on the same side for streamlined wiring
- A durable nameplate, securely fastened with two resin-embedded screws
- A compact housing containing a high-performance printed circuit board that integrates all electrical and electronic components

This timer is the ideal solution for controlled, reliable LED lighting performance.

Description	TPE Ref.	SNCF Symbol
Diode light temporization	I00602A	7.954.3656

For drawing & electrical schematics, please contact us at sales@tpe.group

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TIME-DELAY DEVICE

This electronic system limits the inrush current in the lamp when it is powered up.
When it is powered up, the tungsten filament has a low resistance as it is cold, so the powering-up current is very high, and this deteriorates the lamp internal connections. The device limits the inrush current for 3 to 4 seconds, so the filament has time to heat up, then lets all the current through so that the lamp fully lights up.

It is equipped with a safety device fitted in parallel that lights up the lamp after 4 to 5 seconds.
The time-delay device consists of a box fixed to a bracket. There are 2 hatches on each side for connecting the 220-Volt power supply and 200/24V step-down transformer powering the lamp.

Description	TPE Ref.	SNCF Ref.
230 V time-delay device for 24 V / 250 W lamp on the TIV-D-ML 7.940.3109 speedometer board (overall dimensions 51.1 x 120 x 150 mm)	P30500001	7.940.3109

Contact us for more details

BCV1 AND BCV2 TRACK DIPOLE

Track dipoles are used on compensated track circuits.
Compensation is achieved by 22 µF capacitors.
Capacitors are evenly spaced at 100 m intervals and at 35 to 85 m from the adjacent track unit.

Dipoles are used to:

- allow Train Protection and Warning System (TPWS).
- maintain an impedance value equivalent to a 22 µF capacitor at frequencies of 1,700 Hz, 2,000 Hz, 2,300 Hz and 2,600 Hz.

Dipoles are connected between the two rows of rails. There are of the passive type.

There are two types of dipoles:

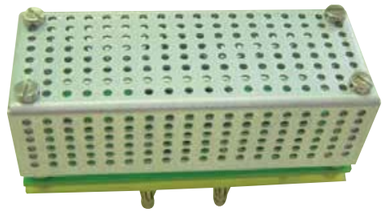
- Dipole for 1,700 Hz & 2,300 Hz compensated UM71 track circuit which supports TPWS at 20 kHz +/- ΔF.
- Dipole for 2,000 Hz & 2,600 Hz compensated UM71 track circuit which supports TPWS at 25 kHz +/- ΔF.

Description	TPE Ref.	SNCF Symbol	SNCF Description
Dipole for 1,700 Hz & 2,300 Hz Track Circuit	135 20 005	7.954.5580	BC V1
Dipole for 2,000 Hz & 2,600 Hz Track Circuit	135 20 006	7.954.5581	BC V2

ACCESSORIES FOR TRAFFIC LIGHTS EQUIPMENT

These resistors are designed to load Indicators such as „CLS-8-70-100C“ and are securely mounted directly onto the units type ES16-3.

Dimensions: max 80 x 32 x 25 mm



Description	TPE Ref.	SNCF Symbol
Load resistor ind. N.S1	P35500007	7.952.0921
Load resistor ind. N.S2	P35500008	7.952.0922

Equipment for ns.1 module

Description	TPE Ref.	SNCF Ref.	SNCF Description
Base for NS.1 module	EMBK06061	7.952.0921	BC V1
Metal case for NS.1 module	EMBK06012	7.952.0922	BC V2

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AUDIO FREQUENCY AND TELECOMMUNICATIONS

LOW-FREQUENCY LINE TRANSFORMERS

A line transformer is specifically designed for hardwired telecommunications. The key characteristics focus on asymmetry related to earth from the transmission perspective.

They are:

- Transversal conversion loss.
- Longitudinal conversion transfer attenuation.
- Transversal conversion transfer attenuation.
- Longitudinal disturbance reduction at inputs.
- Common mode rejection ratio.
- Output signal balancing.

Galvanic separation eliminates the common mode disturbances generated by:

- Connections with power lines.
- Industrial interferences.
- Possible atmospheric discharge currents.

The line transformer bandwidth and magnetic saturation eliminate the differential mode disturbances generated Interfering signals outside the bandwidth (radio transmitter). Since it is one point can be included as a frase above.

THERE ARE 4 MAIN GROUPS:

- **Derivation line Transformers:** They are designed to connect in parallel equipment to the cable. They have a high impedance to not disturb the cable impedance.
- **Interrupted-line Transformers:** They connect different sections of the cable. The impedance is identical at both sides. The conversion factor is 1/1. The closer the transformers are to each other, the weaker the common mode voltage interferences on each section will be.
- **Terminating or end-point line Transformers:** These adjust the impedance to the terminating equipment and protect it and the de-coupling of the phantom circuit.
- **50 hz single Frequency line Transformers:**
  These are used on alarm circuits at derivation points and in amplification units.

Dimensions:

Line Transformers Model R:

- 56 x 42 x 64
- 8/10 Tap, Star connection, L = 1100 mm

Line Transformers Model 51:

- 55 x 40 x 64
- 6/10Tap, Star connection L = 1100mm

LINE TRANDUCERS MODEL R

TPE Ref.	SNCF Type	Use	Circuit	Shield	Impedance fitting side	Impedance line side
C60100002A	131 R	Translation or disconnection	Real	No	1,120 or 800 ohms	1,120 or 800 ohms
C60100003A	521 R	Termination	Real	Yes	600 ohms	1,120 ohms
C60100004A	531 R	Termination	Real	Yes	600 ohms	400 ohms
C60100006A	622 R	Differential	Phantom	Yes	2 x 600 ohms	560 ohms
C60100007A	335 R	Shunt	Real	No	600 ohms	600 ohms
C60100008A	522 R	Termination	Phantom	No	600 ohms	560 ohms
C60100009A	532 R	Termination	Phantom	No	600 ohms	200 ohms
C60100010A	132 R	Translation or disconnection	Phantom	No	800 or 560 ohms	800 or 560 ohms
C60100011A	550 R	Single frequency 50 Hz	-	No	-	-
TR 015Q25	336 R	Shunt	Real	No	600 ohms	600 ohms
C60100012A	541 R	Termination	Real	Yes	600 ohms	560 ohms
TR 022Q25	336 R	Shunt	Real	Yes	600 ohms	560 ohms
C60100013A	60/2000	Termination	Real	No	600 ohms	2,000 ohms
12002109	335 R	Shunt R.A.U	Real	Yes	600 ohms	600 ohms

LINE TRANDUCERS MODEL 51

TPE Ref.	Use	Circuit	Shield	Impedance fitting side	Impedance line side
TR 002Q25	Termination	Real	No	600 ohms	300 ohms
TR 010Q25	Termination	Real	No	600 ohms	530 ohms
TR 013Q25	Disconnection	Real	No	800 or 560 ohms	800 or 560 ohms
TR 014Q25	Termination	Real	Yes	600 ohms	1,120 ohms
TR 016Q25	Termination	Real	No	600 ohms	1,120 ohms
TR 017Q25	Termination	Phantom	No	600 ohms	560 ohms
TR 027Q25	Termination	Real	Yes	600 ohms	400 ohms
TR 029Q25	Termination	Real	No	600 ohms	1,120 ohms
TR 041Q25	Shunt R.A.U	Real	No	600 ohms	600 ohms
TR 042R12	Termination	Real (H22)	No	600 ohms	560 ohms
TR 043R12	Termination	Phantom (H9)	No	600 ohms	280 ohms
TR 052Q25	Disconnection	Real	No	400 ohms	400 ohms
TR 053Q25	Disconnection	Real	No	620 ohms	620 ohms

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BLOCK OF LINE TRANDUCERS

The blocks of line tranducers consist of 2 or 4 tranducers with identical functions.
There are the four same groups: derivation, interrupted, terminating and 50 Hz single frequency.

LINE TRANDUCERS BLOCKS FOR TSE 80 BOX

Description	TPE Ref.	SNCF Symbol
Block of 2 tranducers with inductor (for alarm telephone)	U017SN	0.974.1046
Block of 4 interrupting tranducers 131R	U094SN	0.974.2002
Block of 4 derivation tranducers 335R without center tap	121 10 115	0.974.2003
Block of 2 tranducers for TSE 80 with telephone power supply	U070SN	0.974.2004
Block of 4 tranducers of 335R with center tap	U095SN	0.979.0224
Block of 4 tranducers for TSE 80 without center tap	U004SN	0.979.7006

DIGITAL LINE TRANDUCERS

LINE TRANDUCERS BLOCKS FOR TSE 80 BOX

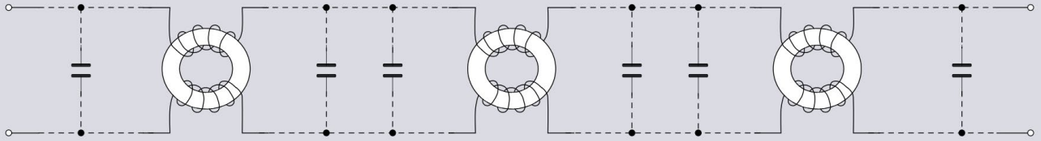
HDSL line tranducers:
The HDSL line tranducers are used to transmit data in a frequency range from 50 kHz to 2 MHz.

SHDSL line tranducers:
SHDSL line tranducers are used to transmit data in a frequency range from 7 kHz to 200 kHz.

Description	TPE Ref.	SNCF Symbol
Block of 2 tranducers with inductor (for alarm telephone)	U017SN	0.974.1046
Block of 4 interrupting tranducers 131R	U094SN	0.974.2002
Block of 4 derivation tranducers 335R without center tap	121 10 115	0.974.2003
Block of 2 tranducers for TSE 80 with telephone power supply	U070SN	0.974.2004
Block of 4 tranducers of 335R with center tap	U095SN	0.979.0224
Block of 4 tranducers for TSE 80 without center tap	U004SN	0.979.7006

«PUPIN» LOAD UNIT

Charging coils or originally called „Puppin Loads“ are inserted into the telephone line to increase its induction and prevent audio signal distortion (voice) in long-distance transmission in regards to the capacitance. The load coil are wound so that the magnetic flux induced in the core is in the same direction for the both winding.
Load Units are in a box with coloured cable quad.

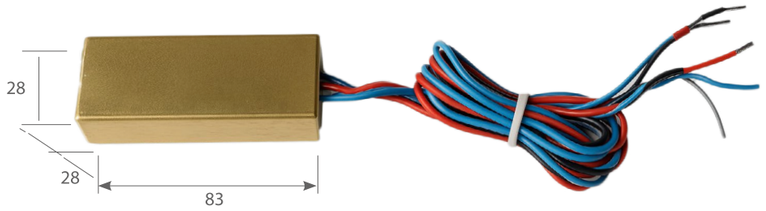


THERE ARE 3 MAIN FAMILIES:

- **Regional and long-distance units with 2 and 3 coils**
- **Urban units with 4 coils**
- **Urban units with 2 coils**

«PUPIN» LOAD UNIT

TPE Ref.	Pupin Description	SNCF Type	Unit Type	mH C harge	Quad Type	Box Dimensions	Ohms Rcc	Ohms Closing Impedance (Real) (Phantom)	
C25230002A	4 x H88	0.964.6300	Urban	88	Star 8/10	28 x 28 x 83	5.40	1,120	
PU003F22	4 x H44		Urban	44	Star 6/10	28 x 28 x 83	2.96	800	
C25200002A	4 x H22	0.964.6310	Urban	22	Star 8/10	28 x 28 x 83	2.28	560	
C25230004A	3 x H88/36	0.964.6302	Regional	88/36	DM 6/10	28 x 28 x 83	6.50	1,120	560
C25200003A	3 x H22/9		Regional	22/9	DM 6/10	28 x 28 x 83	1.60	560	280
PU008F22	2 x H44		Urban	44	Star 6/10	28 x 28 x 83	2.96	800	
C25230003A	2 x H88		Urban	88	Star 6/10	28 x 28 x 83	5.40	1,120	
PU012F26	2 x H80		Long distance 80	Star 6/10	28 x 28 x 83	3.70	1,200		
PU015F26	2 x H96		Long distance 96	Star 6/10	28 x 28 x 83	3.80	1,120		
C25300001B	2 x H160		Urban	2 x 160	Star 8/10	28 x 28 x 83	4.70		



BUILDING-OUT LINE SECTION

A building-out line section used with a pupinized cable is a set comprising capacitors and resistors grouped so as to represent the capacity and resistance of a cable section shorter than one coil spacing.

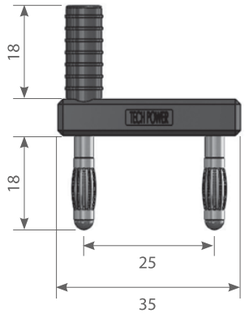
Dimensions: 55 x 40 x 64 mm

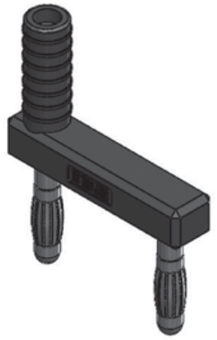
BUILDING-OUT LINE SECTION

Description	TPE Ref.
Building-out section for star-quad cable without compensation of the phantom circuit	CS001AU
Building-out section for star-quad cable with compensation of the phantom circuit	CS002DM

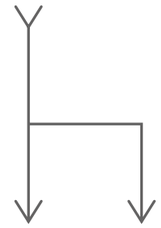
MISCELLANEOUS

Description	TPE Ref.	SNCF Ref.
Short-cut jumper	P80100001A	0.979.3091





Circuit diagram



AUDIO FREQUENCY ELECTRONIC BOARDS

2-Wire/ 4-Wire Repeater

The telephone repeater regenerates the frequency levels used in telephony.
It consists of adjustable elements that compensate line defects. It is a 4U-format printed circuit board with an HE9A board-mounted connector on the rear side.

Changeover switch

In order to secure a link, it could be needed to double up the transmission circuit. The same data can be carried over 2 geographically distinct circuits. The changeover switch is installed at both ends of these 2 circuits and it chooses the best data path.

AF coupling unit

From a 4-wire circuit in the audio frequency band, the 3-way coupling unit:

- Transmits towards 3 circuits in the transmitting direction.
- Concentrates 3 circuits in the receiving direction.

It consists of adjustable elements that compensate line defects.

2-Wire/ 4-Wire adapter

Installed in a transmission chain **the adapter transfers a 4-wire termination to a 2-wire termination or vice versa.**
It is more particularly used to adapt the 2-wire access of 2/4 wire station circuit repeaters to 4 wires.

19-inch rack for 4 repeaters

These frames are placed in 19-inch cabinets.

Isolation monitor

The isolation monitor permanently monitors that the cable conductors or sheaths are connected properly to the ground. The monitor comes in a standard 2 rack units. It can be fixed to a 70 type or 80 type frame. Overall dimensions: Length: 235 mm - Height: 89 mm - Width: 490 mm.

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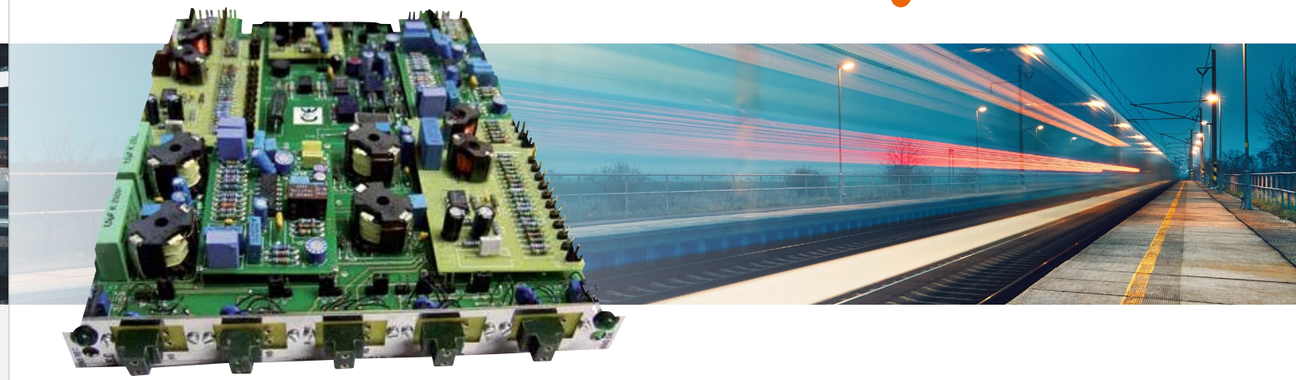


Description	TPE Ref.	SNCF Ref.
2U frame for 20 balancing networks	130 11 002	0.979.3086
48 DC isolation monitor for 80 frame ref. H1370 020, including documentation	988102	0.979.3089
4-wire repeater without signalling relay	130 11 110	0.979.3092
2W/4W terminal repeater for M88/36 load	908059	0.979.3093
2W/4W intermediate repeater for M88/36 load	130 11 111	0.979.3094
2/4 wire re-injecting repeater without signalling relay	130 11 103	0.979.3095
Repeater for station circuit without signalling relay	130 11 104	0.979.3096
Changeover switch for multipoint circuit	130 11 147	0.979.3098
Signalling relay for voice call	130 11 155	0.979.3101
H38/36 cable balancing network (Z 3000)	130 11 113	0.979.3103
Overhead balancing network (Z 3000)	130 11 106	0.979.3104
Alarm + clock card for changeover switch	130 11 137	0.979.3105
4U extension card (2X25 pts) for AF 80 frame	130 11 158	0.979.3107
Filter for 300 Hz and harmonics	130 11 143	0.979.3110
Measuring cord for AF 80 test	150 11 100	0.979.3125
3 ways AF coupling unit for 4 wires line FO receiving board	130 11 102	0.979.3129
2F/4F adapter	130 11 105	0.979.3635
19 inch frame for 4 analogue repeaters	131 11 003	0.979.3653
Audio-frequency noise suppressor card for 2 devices	131 11 004	0.979.3654
Documentation on the type AF 80 transmission system	C90000005	0.979.3744
Technical manual (Changeover switch + clock board)	C90000001	0.979.3745
Isolation monitor for 19 inch frame	135 11 029	0.979.4329

Contact us for specific drawings or details for each reference

ROLLING STOCK

RELIABLE ON-BOARD POWER SOLUTIONS

RESIDUAL CURRENT BREAKER WITH OVERCURRENT PROTECTION

FEATURES

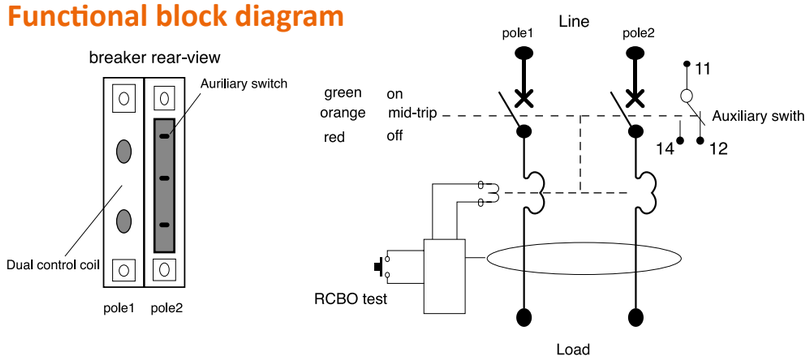
- Rolling stock-oriented design.
- From 2 poles.
- Hydro-magnetic breaker technology, multi brands possibly up to 80Amps.
- Three LEDs indicates the RCBO status, green for ON. position, yellow-orange for mid-trip position and red in OFF position.
- 120Vac / 240ac 50/60Hz - 5mA/30mA/100mA/300mA.
- Push button for tripping the RCBO device instantaneously (test).
- Panel front mounting.
- Imperial/metric versions possible.
- Handle protected against hazard object fall and use of any coat rack.
- Temperature range -25°C to +55°C.
- Compliance with EN 50155 and its sub-norms.

Standard codifications

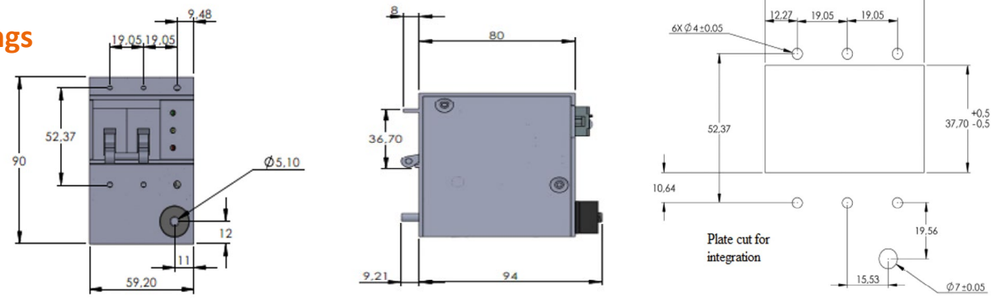
Description	TPE standard codes	Detail
I01161A + 000 000*	RCBO-AR-5-120-UNF-2P	RCBO 2 poles with breaker imperial screwing 5mA-120Vac
I01163A + 000 000*	RCBO-AR-5-230-UNF-2P	RCBO 2 poles with breaker imperial screwing 5mA-230Vac
I01165A + 000 000*	RCBO-AR-30-230-M-2P	RCBO 2 poles with breaker Metric screwing 30mA-230Vac
I01165A + 000 000*	RCBO-AR-100-230-M-2P	RCBO 2 poles with breaker Metric screwing 100mA-230Vac
I01169A+ 000 000*	RCBO-AR-300-230-M-2P	RCBO 2 poles with breaker Metric screwing 300mA-230Vac
I01246A + 000 000*	RCBO - AR-5-230-M-2P	RCBO 2 Poles with breaker Metric screwing 5mA-230Vac
I01297A + 000 000*	RCBO - AR-30-120-M-2P	RCBO 2 Poles with breaker Metric screwing 30mA - 120Vac

***Other combinations and references upon request**

Functional block diagram



Drawings



TPEG Tech Power Electronics Group

Features

Electrical	Nominal AC voltage	240VAC (Metric) / 120Vac (Imperial) +/-10%				
	Nominal current	Breaker range from 0.02 to 80A				
	Residual current	5mA/6mA/30mA/100mA/300mA tolerance +/-1.5%				
	Frequency	50/60Hz +/-2%				
	Interruption capacity	120/240Vac. UL1077 -> 2kA (0.02A..100A)				
	Auxiliary Contact	Low level (0,1A) gold contacts or High level (10,1A) silver contacts AgWC				
	Power consumption	120Vac 50/60Hz : 80mA. 230Vac 50/60Hz : 120mA				
	Delay Curves and inrush level of breaker	Short 8 x In, 15 x In, 22 x IN | Medium 8 x In, 15 x In, 22 x IN | Long 8 x In, 15 x In, 22 x IN				
	Electrical connections	Line directly connected on the breaker terminal input M5 or US # 10-32UNF Load connected down on the RCBO terminal block M5 or US # 10-32UNF Auxiliary contact 2.8 mm Wide × 0.5 mm thickness (Usually clip defined for wires 0.34 to 1.5 mm^2)				
General	Weight	350 g				
	Overall dimensions	Depth: 80mm without load terminal. High: 90mm. Wide: 59.20mm				
	Triggering time	7ms at nominal voltage				
	IP protection code	IEC 60529 | Front IP 42 | Terminals IP 00				
	Color	Breaker handle black with white on/off prints				
	Handle positions of breaker	"ON" "MID-TRIP" "OFF"				
	Illumination (status of breaker handle)	Co	Handle position	LEDS of RCBO		
				green	orange	red
		Normal	High	ON	OFF	OFF
		Ground fault	Horizontal (Mid-trip)	OFF	ON	ON
		Over current	Low	OFF	OFF	ON
		Manual	Low	OFF	OFF	ON
	Mounting	Front panel mounting (around 1 to 3 mm thickness) 6 inserts for screw M3 (metric) or US # 6-32UNC (imperial)				
Safety & EMC	Safety standards	EN 50155 (2021) Railway-On-board electronic equipment EN60068-2-1/ 2-2 (2007) / (2021) /2-30 (2005) Environmental testing (cold/dry heat/ cyclic-humidity)				
	Electromagnetic compatibility	EN 50121-3-2 (2021); Electrical fast transient/burst Surge immunity test Shockwave Immunity test Immunity to conducted disturbances Immunity to radiated electromagnetic field Conducted emission Radiated emission EN61000-4-2 (2009) Immunity to Electrostatic Discharge 6KV contact 8KV air				
	Withstand Voltage	Dielectric strength Breaker 3750VAC-50-60Hz acc to EN50124-1 (2017) RCBO 1950Vac 50/60hz (pollution PD2) Altitude ≤ 2000m over voltage category: OV2 – material group 1 according to EN50155				
	Isolation Resistance	>100MΩ under 500VDC acc to EN50124-1 (2017)				
	Fire and smoke	EN45545 (2020) HL1 HL2 HL3 R22/R23. NFPA130 (2020) BSS 7239 (1988)				
Environment	Operating temperature range	-40°C / +55°C according to EN50155 (OT2/ST1 category). Breaker -40°C / +85°C				
	Class of increased operating temperature at switch-on switch-on:	ST1 (cycle B)				
	Storage temperature range:	-40°C-+70°C				
	Humidity	95% relative Humidity max non-condensing				
	Altitude class	Class A1 < 1400m				
Mechanical	Shocks sand vibrations	EN 61373: 2011 category 1 class B: 2010				
RAMS	Useful life class	L2 (15 years under normal conditions of use)				
	Repairable, not repairable	Possible on request only and under limited number of products				
	LRU identification	None				
	Preventive maintenance	None				

USB CHARGER POWER SOCKET

FEATURES

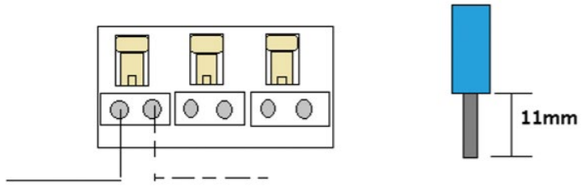
- Rolling stock-oriented design.
- 16A sockets-230Vac 50/60Hz double USB total 15W.
- Socket design Schuko (type F) and French (type E).
- Double USB type A or C - outputs 4.75 to 5.25Vdc.
- 16A socket shutter (against direct contacts).
- Green USB charging light Note.
- Blue illuminated socket outline (Option).
- Front face with 2 standard colours (whitish and black).
  (Others on special request with respect to EN45545 standard).
- 16 A socket connection via push-in cage clamps.
- 2 wires (2.5mm²) per clamp (junction to a second socket).
- Temperature range -25°C to +55°C.
- Compliance with EN 50155 and its sub-norms; EN45545-2; EN62262; IEC60884-1; NFC61-314 Standards.

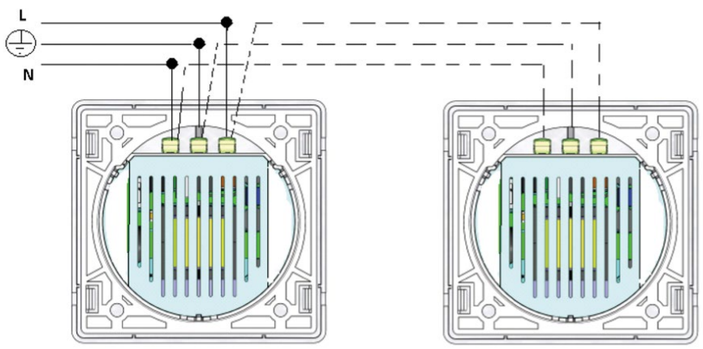
Standard codifications

16A Socket type	USB-A				USB-C				Mixed USB-A/C			
Illuminated ring	Yes	Yes	No	No	yes	yes	No	No	yes	yes	No	No
Socket color	Whitish	Black	Whitish	Black	Whitish	Black	Whitish	Black	Whitish	Black	Whitish	Black
Schuko/Europe	I01185A	I01186A	I01187A	I01188A	I01189A	I01190A	I01191A	I01192A	I01193A	I01194A	I01195A	I01196A
France	I01197A	I01198A	I01199A	I01200A	I01201A	I01202A	I01203A	I01204A	I01205A	I01206A	I01207A	I01208A

Note: different illumination for charging light and socket outline are possible on request.
Charging light switches off in around 10 second when port is removed.

Drawings





TPEG Tech Power Electronics Group

Features

Electrical (for USB output)	Nominal dc voltage per output	5V range 4.75 to 5.25V
	Nominal total power ability	15W (1.2A per USB output) Max 2.8A
	Ripple & Noise	< 80mVpp
	Minimum load	No
	Short circuit protection	Yes (integrated fuse)
	Efficiency	~ 88% typical
	Stand-by power	< 50mW
	Output ports	Located below the 16A socket: 2 × USB Type A or C - 5000 Mate cycles
	Overload current	Each USB port are protected independently against overload current
	Mating cycle	5000
Electrical (for socket output)	Ac voltage range	220Vac to 250vac 50/60Hz
	Nominal current	16A
	Standards	French NFC61-314 (CEE7/5) - Europe Schuko IEC60884-1 (CEE7/3)
	Input connections	At the top rear: push-in cage clamps (Phase/Earth/Neutral) 1.5 to 2.5mm2 (accept EN50306 wires and pre-isolated clip 51222-2 Mécatraction
	Mate cycles	5000
	Design	Compact product with 16A socket - integrated electronics and front trim plate included (front trim plate to be clipped after fitting the socket unit)
General	Mounting unit	4 holes Ø 4.3 mm. holes depth to fixing partition/wall 4mm Note: The front trim plate of socket covers the mounting aspect once clipped
	Weight	120g
	Dimension	Front plate 81mm (height) × 81mm (wide) Back cover 45mm (depth) × 60mm (wide) × 57 mm (high)
	Material	Polycarbonate flame retardant
	IP protection code	IP20 according to IEC60529 (Back part unit gets some ventilation tabs)
	Color	Standard White (RAL9003) and black (RAL9005)
	Front trim plate	The front trim plate clips onto the socket unit (no screw). From fixing partition/wall: 15 mm minimum to be considered in a case of electrical cabinet integration with a door
	Illumination	Blue illuminated outline of 16A socket is an option (blue color in standard with possible change on request) Charging light for both USB ports but operates independently (Green standard with possible change on request)
Safety & EMC	Safety standards	EN 50155 : 2021 ; CEI60321 : 2004 ; EN 50124-1 : 2017 ; EN 50153 : 2014 ; EN 45545-2 :2020 R22/R23-HL1/HL2/HL3
	Electromagnetic compatibility	EN 50121-3-2: 2019
	Withstand Voltage	Input -16A socket output / socket Earth: 3750V 50Hz 1 minute. Input -16A socket output - socket Earth / 2 × USBA: 2210V 50Hz 1minute
	Electrical hazard	Shutter prevents leakage accidents caused by accidental insertion of external metals
Environment	Operating temperature range	-20 °C to +55 °C
	Class of increased operating temperature at switch-on:	ST1 (cycle B)
	Storage temperature range:	-40°C-+70°C
	Humidity	95% relative Humidity max non-condensing
	Altitude class	Class A1 < 1400m
Mechanical	IK (Shocks protection) ratings	IK 08 according to EN62262: 2004
	Shocks sand vibrations	EN 61373: 2010 category 1 class B: 2010
RAMS	Useful life class	L2
	Repairable, not repairable	Possible on request only and under limited number of products
	LRU identification	None
	Preventive maintenance	None
	Altitude class	Class A1 < 1400m

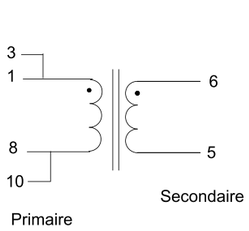
RAIL-GRADE AUDIO TRANSFORMER

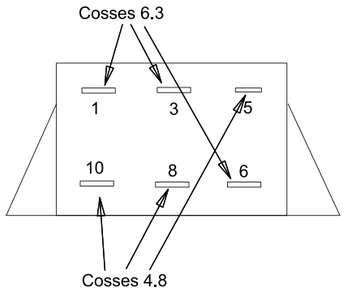
REF. P151000015A

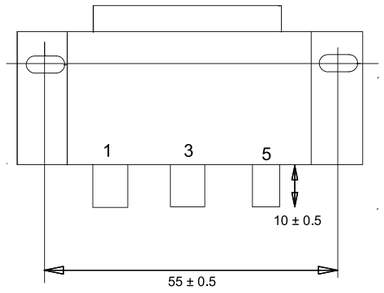
Specifically designed for Loudspeaker Impedance Matching, this transformer ensures optimal & reliable audio performance in onboard train electronic systems.

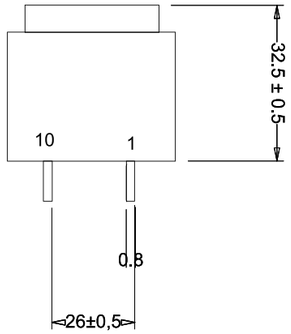
- Ensures efficient impedance matching for consistent audio output.
- Superior Acoustic Fidelity – Delivers clean, distortion-free audio.
- Easy integration into onboard electronic modules.
- Fully meets railway-grade EMC and safety requirements.

Description	Value
Weight	160 g
Data audio transformer range	Audible frequencies 20Hz to 20Khz Bandwidth specification 100Hz to 8Khz at 20°C
Standards	EN50155 EN45545
Nominal power	5W
Primary voltage	20°C 90v+/-10%
Primary resistance	20°C 27.1Ω+/-15%
Secondary resistance	20°C 0.148Ω+/-15%
Ratio	17+/-1%
Primary impedance	1000Hz 2312Ω
Secondary impedance	1000Hz 8 Ω
Primary inductance	1v 100Hz >= 20mH









ELECTROMAGNET

TPEG Tech Power Electronics Group

REF. A00725A

- Fast operation less than 10ms.
- Polarities reverse protection (all terminals).
- Embedded electronic for pulse monitoring.
- Self-pulse adjustment regarding voltage level.
- Inhibits pulse orders for a chosen voltage.
- Filtering against transients and surges (120ms with possible extension).
- 2 versions connector design.
- Large voltage operation.
- 200hr salt mist protection.
- Comply with EN50155, IEC 61373 and EN 45545 standards.

The electromagnet can be continuously energized at the positive Power terminal versus the 0v. From an unlimited order received on the V+ Control terminal, the electronic module filters and generates a calibrated pulse for the magnet coil, which then drives the piston to move up. It is recommended that the signal duration sent on +V Control remains at least 1 second.

To prevent the electromagnet to untimely act, the electronic delays the signal received on +V Control terminal for 120ms. This time can be extended on demand. +V control signals with a voltage value less that a reference set in the design are not transmitted to the coil. The reference value is to be determined in advance and discussed with TPE.

For shorter durations, contact us.

Features

General	Mounting panel thickness	1 to 3mm
	Weight	350 g
	Packaging	Single or 10 products
	Mounting aspects	M5. Length of screw according to panel thickness (Max 9 mm)
Electrical	DC nominal Voltage	24/72/110Vdc -30 +/-30%
	Control current consumption under 110VDC	1 mA
	Power current consumption under 110 VDC	2.7 A
	Pulse duration	77VDC 1.2s / 110 VDC 0.8s / 140VDC 0.4s
Safety & EMC	Design and safety Standards	EN50155, VED0580
	Withstand Voltage	1.5 Kvac-50hZ Inputs to Ground 1 minute (EN50155 standard)
	Insulation Resistance	10 G ohms - 500VDC
	EMI Conduction & Radiation & Immunity	EN 55016-2.1 and 2.3 / EN 6100 0-4.2 to 4.6 / EN 55155-5.1 and 7.2.6 t 7.2.8 and 13.4.3
	Vibration and shocks	IEC/EN 61373 A1- class A
Environment	Working Temperature	From -25 °C to +70 °C (tested at -40°C)
	Salt spray behavior	200h to 300h according to EN 50155
	Working Humidity	95% relative Humidity
	Storage Temperature and Humidity	From -25°C to +85°C, 95% relative Humidity max
	Operating Altitude	EN50125-1: 1400m A1
	IP Level	IP41 according to IEC60529
	Fire and smoke	Comply with EN45545 HL3/R22 - HL3/R23
	ROHS	European directive ROHS (2002/95/CE)

YOUR IDEA –
OUR CUSTOMIZED SOLUTION

E-MOBILITY

- **Industrial Vehicles**
  - OBC
  - Inverter
  - Converter
  - Battery Management
- **Charging Solutions**
  - DC Charging
  - AC Bidirectional Charging
  - Inverter
  - Battery Management
  - Wireless Charging
  - Coils

ENERGY

- **Energy Infrastructure**
- **Energy Distribution**
- **Energy Production**
  - Wind
  - Hydrogen
  - Nuclear
  - Solar
  - Gas turbines
  - Heating pumps
  - Fans

SMART INDUSTRIAL SOLUTIONS

- **Measurement & Control**
  - Measurement Instruments
  - Meters & Controllers
- **Industrial Machinery**
  - Welding Equipment
  - Laser Technology
  - Special Machinery
- **Drives & Automation**
  - Actuators & Gearboxes
  - Drive & Automation Technology

TRANSPORTATION

- **Infrastructure**
- **Signaling**
- **Energy Transfer**
- **On-Board Energy**
- **Smart Railway Technology**
- **Aviation**

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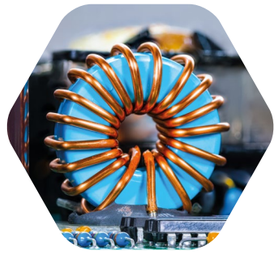
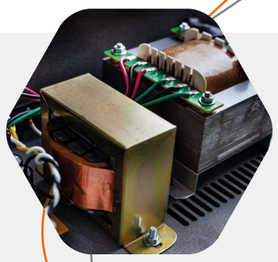


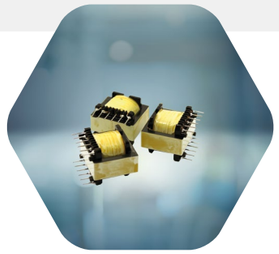
CHOKES

- **Network Chokes**
- **Output Chokes**
- **Common Mode Chokes (THT & SMD) with Nano-crystalline or ferrite core**
- **PFC Chokes**
- **Smoothing Chokes**
- **Power Chokes with Edge-Wound Coils**
- **Cup Core Chokes**
- **Standard Products**



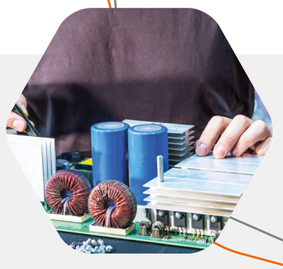
LINE FREQUENCY TRANSFORMERS
(UP TO 500 KVA)

- **Single-Phase and Three-Phase Transformers**
- **Isolation Transformers**
- **Control Transformers**
- **Safety Transformers**
- **Ignition Technology Transformers (up to 14,000 V)**
- **Ignition Devices for Lamps / High-Performance Coils**
- **Cast Resin Encapsulated Transformers**



HIGH FREQUENCY TRANSFORMERS

- **Switching Power Supply Transformers**
- **Flyback Transformers**
- **Single-Ended Forward Transformers**
- **Half-Bridge Forward Transformers**

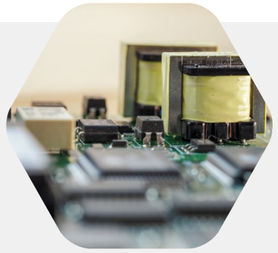


CONVERTERS & POWER SUPPLIES

- **AC/DC Converters**
- **DC/DC Converters**
- **Custom Power Supplies (0 to 50 kW)**
- **Charge Controllers**
- **Battery Chargers (Standard Range)**
  - Up to 40 kW / 1 kV / 2 kA
  - Standard AC/DC Converters (0.5 W to 25 W)
  - Contactless Power Transmission

FILTERS

- **Network Filters**
- **EMI/RFI Filters**
  - Up to 50 kW (70 kW in development)
  - Single and Three-Phase
  - Air- & Water-Cooled



ELECTRONIC PRODUCTS / PRODUCTS FOR SPECIFIC CUSTOMER REQUIREMENTS / CABLING / PCB ASSEMBLY

- **THT & SMD**
- **Single, Double-Sided & Multilayer**
- **PCBs, IMS**
- **Automatic Optical & Visual Inspection**
- **Lead & RoHS Process**
- **Varnishing**
- **Potting, Assembly & Integration**
- **Electric, Functional & Burn-In Tests**

TPEG
Tech Power Electronics Group

OUR STRENGTHS

GLOBAL GROUP

- From highly-specific production in Estonia to competitive prices & high volumes in Tunisia or India.
- Internal tenders with minimum 2 production sites for the best and most cost-optimized solutions.
- For specific projects, an internal second source option is available.

BUSINESS UNITS

Your business is our focus. Within our strategy, a dedicated Business Unit is providing solutions for your needs.

PRODUCTS

From standard to customized winding goods,
over industrialization and the final PCB assembling.
WE HAVE THE RIGHT SOLUTION.

CENTRALIZED PURCHASING

Strategic centralized purchasing combined with the local specialists for the best and most competitive prices.

DEDICATED TEAM

- Your personal contact with Inside Sales and Key Account Manager **FOR BEST SUPPORT.**
- Direct access to our Engineering Experts to tackle your most challenging projects or program.
- Visit by our top management any time.

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