KONČAR
ELECTRONICS AND
INFORMATICS

KONTRAC GP170DC
Propulsion converter for tramways

KONTRAC GP170DC converts 600 VDC or 750 VDC line voltage into propulsion power to control and drive asynchronous traction motors on tramway vehicles. The converter supplies two asynchronous traction motors connected in parallel. The electrical motor drive operates in two modes: traction mode and braking mode.

FEATURES:
- Input line voltage 600 VDC or 750 VDC
- Latest IGBT technology
- Vector control of asynchronous traction motors
- Easy maintenance
- Light and compact design
- Modular design of power unit and control electronic
- Roof mounting
- Extended ambient temperature range from -40 °C to +40 °C

KONTRAC GP170DC CONSISTS OF:
- Input contactor and precharging circuit
- Input filter
- One propulsion inverter
- DC link overvoltage protection
- Air-cooled cooling system
- Traction control unit
- Traction control unit

BASIC TECHNICAL DATA

Input voltage	600 / 750 VDC
Propulsion output	170 kW
Braking chopper	470 kW
Cooling	Forced air-cooling
Size (W x D x H)	1580 x 1000 x 520 mm
Weight	328 kg
Mounting position	Roof
Connecting interface	CAN / MVB / Ethernet

KONČAR tramway vehicle in Zagreb

TRACTION CONTROL UNIT

Traction control unit (TCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). TCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks. Special care is put on obsolescence issues and modularity.

DIAGNOSTIC AND VISUALIZATION

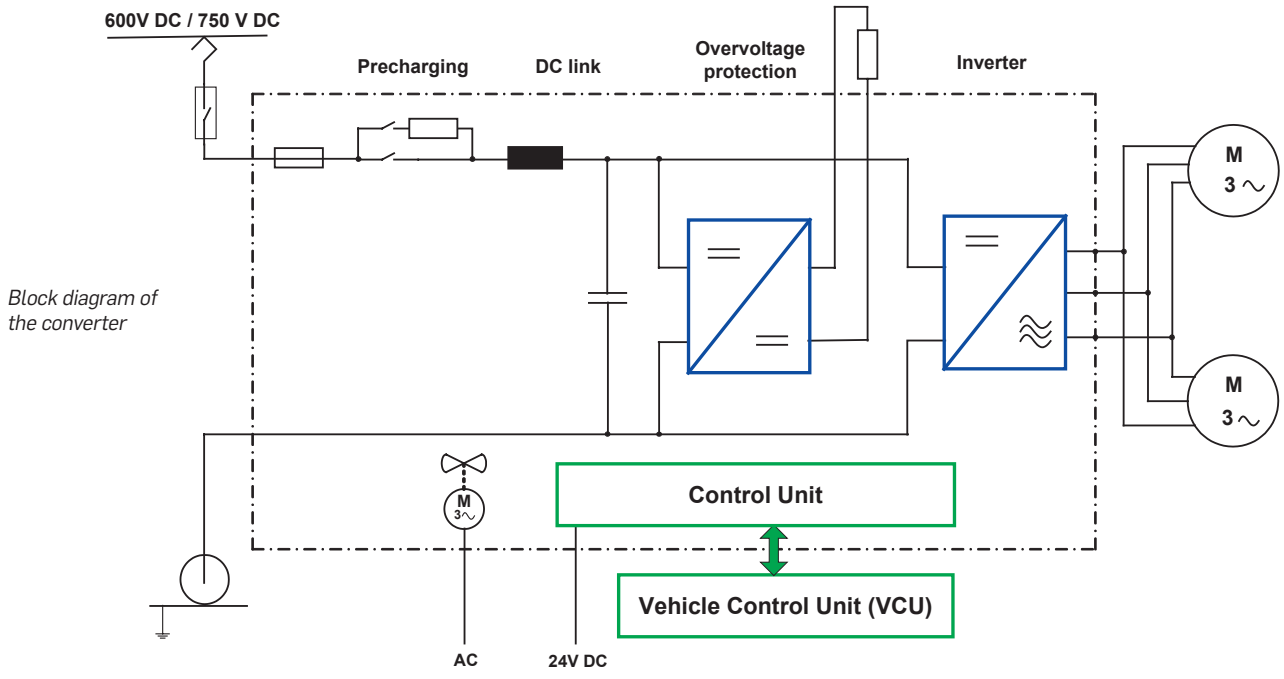
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics. Remote diagnostic functions allow monitoring of all intelligent units from one connection point.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for roof mounting with IP54 protection. Modular design of power unit and control electronic allows an easy maintenance access enabling easy replacement of power unit module. The increased power density of the power unit module enables compact and light-weighted converter design. Converter box is made from stainless steel and it is intended for use in extended ambient temperature range from -40°C to +40°C. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

KONTRAC GP170DC is mounted on the roof of 100 % lowfloor KONČAR tramway TMK 2200 that operates in City of Zagreb, the capital of Croatia. The tramway car series TMK 2200 is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride. These modern vehicles significantly contribute to efficient and comfort public transport in City of Zagreb.



Block diagram of the converter

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KONČAR
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KONTRAC PN25DC
Auxiliary converter for tramways

KONTRAC PN25DC is used as the auxiliary power supply converter in tramway vehicles. It converts 600 VDC or 750 VDC line voltage into three-phase AC voltage intended for supplying of tramway's air-conditioning unit.

FEATURES:
- Input line voltage 600 VDC or 750 VDC
- Latest IGBT technology
- Galvanic insulation input / output
- High-frequency resonant converter
- Easy maintenance
- Light and compact design
- Roof mounting
- Extended ambient temperature range from -40 °C to +40 °C

KONTRAC PN25DC CONSISTS OF:
- Input filter
- Pre-charging circuit
- Buck converter
- Resonant converter
- Three-phase inverter
- Sinus filter
- Cooling system
- Control unit

BASIC TECHNICAL DATA

Input voltage	600 / 750 VDC
AC output	3 x 400 V, 50 Hz, 30 kVA
Cooling	Forced air-cooling
Size (W x D x H)	1515 x 555 x 520 mm
Weight	246 kg
Mounting position	Roof
Connecting interface	CAN / MVB / Ethernet

KONČAR tramway vehicle in Zagreb

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks.

DIAGNOSTIC AND VISUALIZATION

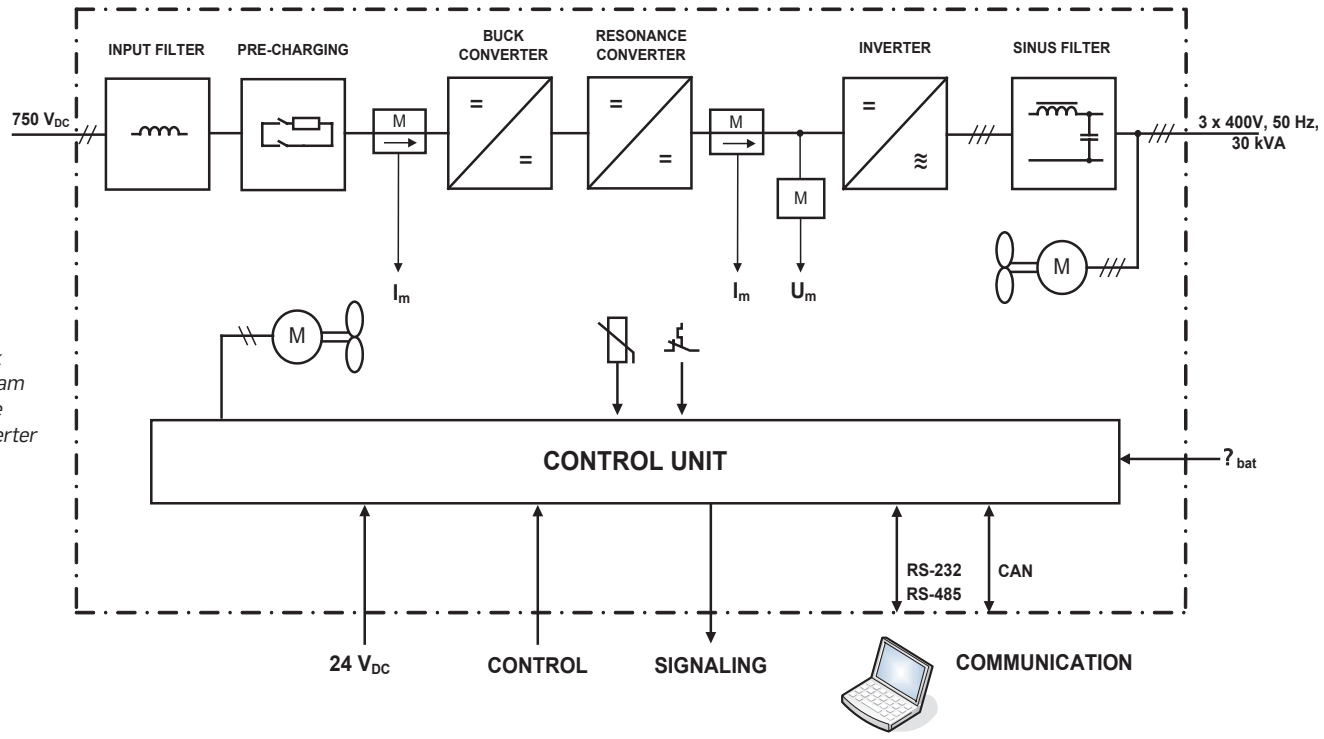
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Remote diagnostic functions allow monitoring of all intelligent units from one connection point.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for roof mounting with IP54 protection. High-frequency resonant converter enables use of transformers and chokes with smaller dimensions and mass which significantly decreases mass and size of the converter, resulting in minimized vehicle weight. Converter box is made from stainless steel and is intended for use in extended ambient temperature range from -40 °C to +40 °C. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

KONTRAC PN25DC is mounted on the roof of 100% lowfloor KONČAR tramway TMK 2200 that operates in City of Zagreb, the capital of Croatia. The tramway car series TMK 2200 is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride. These modern vehicles significantly contribute to efficient and comfort public transport in City of Zagreb.



Block diagram of the converter

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KONČAR
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KONTRAC PN35DC
Auxiliary converter for tramways

KONTRAC PN35DC is used as the auxiliary power supply converter in tramway vehicles. It converts 600 VDC or 750 VDC line voltage into three-phase AC voltage intended for supplying of tramway's air-conditioning unit, single-phase AC voltage for service purposes and DC voltage intended for charging batteries and supplying of all DC consumers on board the tramways.

FEATURES:
- Input line voltage 600 VDC or 750 VDC
- Latest IGBT technology
- Galvanic insulation input / outputs and among outputs
- High-frequency resonant converter
- Easy maintenance
- Light and compact design
- Roof mounting
- Extended ambient temperature range from -40 °C to +40 °C

KONTRAC PN35DC CONSISTS OF:
- Input filter
- Pre-charging circuit
- Buck converter
- Resonant converter
- Three-phase inverter
- Sinus filter
- Battery charger
- Cooling system
- Control unit

BASIC TECHNICAL DATA

Input voltage	600 / 750 VDC
AC output	3 x 400 V, 50 Hz, 25 kVA 230 V, 50 Hz, 2,2 kVA
DC output	24 VDC, 12 kW
Cooling	Forced air-cooling
Size (W x D x H)	1715 x 555 x 520 mm
Weight	300 kg
Mounting position	Roof
Connecting interface	CAN / MVB / Ethernet

KONČAR tramway vehicle in Zagreb

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks.

DIAGNOSTIC AND VISUALIZATION

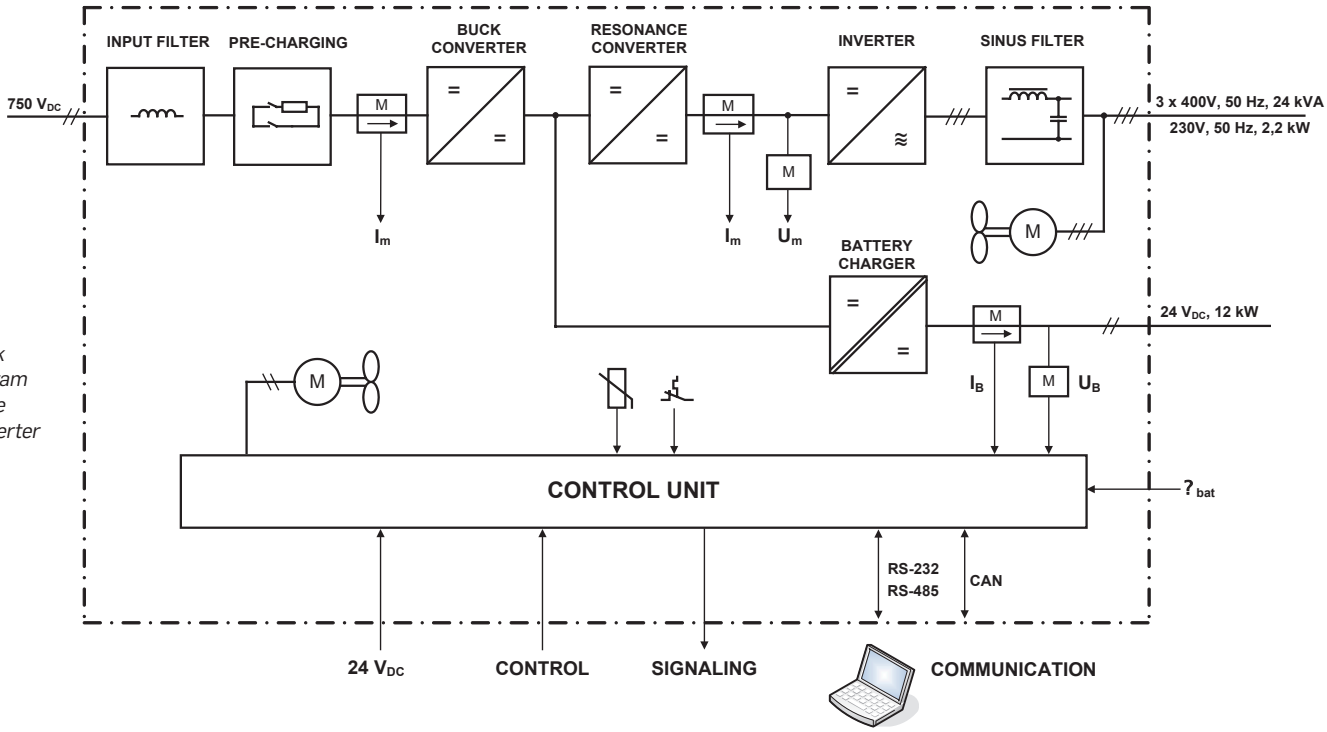
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Remote diagnostic functions allow monitoring of all intelligent units from one connection point.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for roof mounting with IP54 protection. High-frequency resonant converter enables use of transformers and chokes with smaller dimensions and mass which significantly decreases mass and size of the converter, resulting in minimized vehicle weight. Converter box is made from stainless steel and is intended for use in extended ambient temperature range from -40 °C to +40 °C. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

KONTRAC PN35DC is mounted on the roof of 100% lowfloor KONČAR tramway TMK 2200 that operates in City of Zagreb, the capital of Croatia. The tramway car series TMK 2200 is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride. These modern vehicles significantly contribute to efficient and comfort public transport in City of Zagreb.



Block diagram of the converter

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KONTRAC PN12DC
Auxiliary converter for emergency driving of tramway

KONTRAC PN12DC is a DC/DC converter that is used to ensure emergency driving of the tramway powered from built-in 24 V battery, i.e., driving without connecting to the contact line. This operation mode is usually used for emergency driving (in case of a contact line power failure while tramway stays in crossing) or for service driving around the depot and for parking.

This output voltage of KONTRAC PN12DC presents input voltage for a main propulsion converter KONTRAC GP170DC that then speeds up tramway vehicle to the maximum speed of 5 km/h. Besides the maximum vehicle speed, the duration of autonomous driving is also limited. KONTRAC PN12DC is designed to sustain an operation at full load for a maximum of 3 minutes. If the output current is lower, the converter may operate longer. This is controlled by control electronics of the propulsion converter.

FEATURES:
- Latest MOSFET technology
- Galvanic insulation input / output
- High-frequency resonant converter
- Easy maintenance
- Robust design
- Natural cooling
- Roof mounting
- Ambient temperature range from -25 °C to +40 °C

KONTRAC PN12DC consists of
- Input filter
- Pre-charging circuit
- Boost converter
- Output filter
- Control electronics unit

KONTRAC PN12DC for tramways

BASIC TECHNICAL DATA

Input voltage	24 VDC
Output voltage	360 V approx. input voltage x 15 non-stabilized
Cooling	Natural, by air
Size (W x D x H)	890 x 540 x 501 mm
Weight	93 kg
Mounting position	Roof
Connecting interface	CAN

KONČAR tramway vehicle in Liepāja

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, trams, EMUs and DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks.

DIAGNOSTIC AND VISUALIZATION

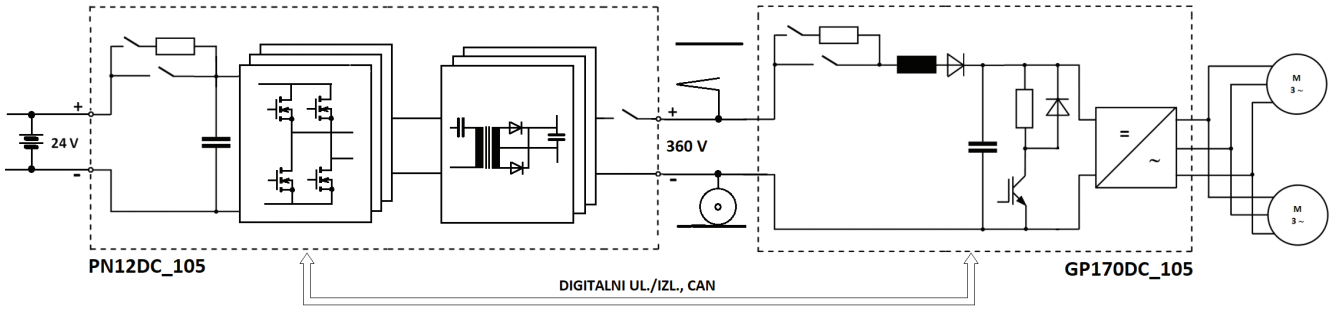
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Remote diagnostic functions allow monitoring of all intelligent units from one connection point.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for roof mounting with IP54 protection. High-frequency resonant converter enables use of transformers and chokes with smaller dimensions and mass which significantly decreases mass and size of the converter, resulting in minimized vehicle weight. Converter box is made from steel and is intended for use in ambient temperature range from -25 °C to +40 °C. The converter is efficiently cooled naturally by air.

APPLICATION EXAMPLE

KONTRAC PN12DC is mounted on the roof of 100% low-floor KONČAR tramway TMK2300LT that operates in City of Liepāja, a city in western Latvia. The tramway series TMK2300LT is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride. These modern vehicles significantly contribute to efficient and comfort public transport in City of Liepāja.



Connection diagram of KONTRAC PN12DC converter to KONTRAC GP170DC propulsion converter during the emergency driving

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KONTRAC GP550AC

Propulsion converter for electric multiple units

KONTRAC GP550AC converts the power from transformer outputs of AC network into propulsion power for the traction motors.

KONTRAC GP550AC has sinusoidal input current in phase with voltage and with low harmonic content. During braking, the converter feeds back energy to the network. All control, protective, communication and monitoring functions are implemented in one control electronics inside the converter.

Converter power unit

FEATURES:

- Regenerative braking capability
- Modular design of power units
- High energy efficiency
- Machine room mounting
- Easy maintenance
- Line friendly
- Motor friendly
- Latest IGBT technology
- Liquid cooling system

KONTRAC GN550AC CONSISTS OF:

- Input contactors and precharging circuit
- Two 4 quadrant converters
- One propulsion inverter
- DC link overvoltage protection
- Liquid cooling system
- Traction control unit

BASIC TECHNICAL DATA

Input voltage	2 x 800 V, 50 Hz
Propulsion output	550 kW
Cooling	Liquid cooled
Size (W x D x H)	1350 x 840 x1900 mm
Weight	849 kg
Mounting position	Roof
Connecting interface	CAN / MVB / Ethernet

KONČAR electric multiple unit for Croatian Railways

TRACTION CONTROL UNIT

Traction control unit (TCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). TCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks. Special care is put on obsolescence issues and modularity.

DIAGNOSTIC AND VISUALIZATION

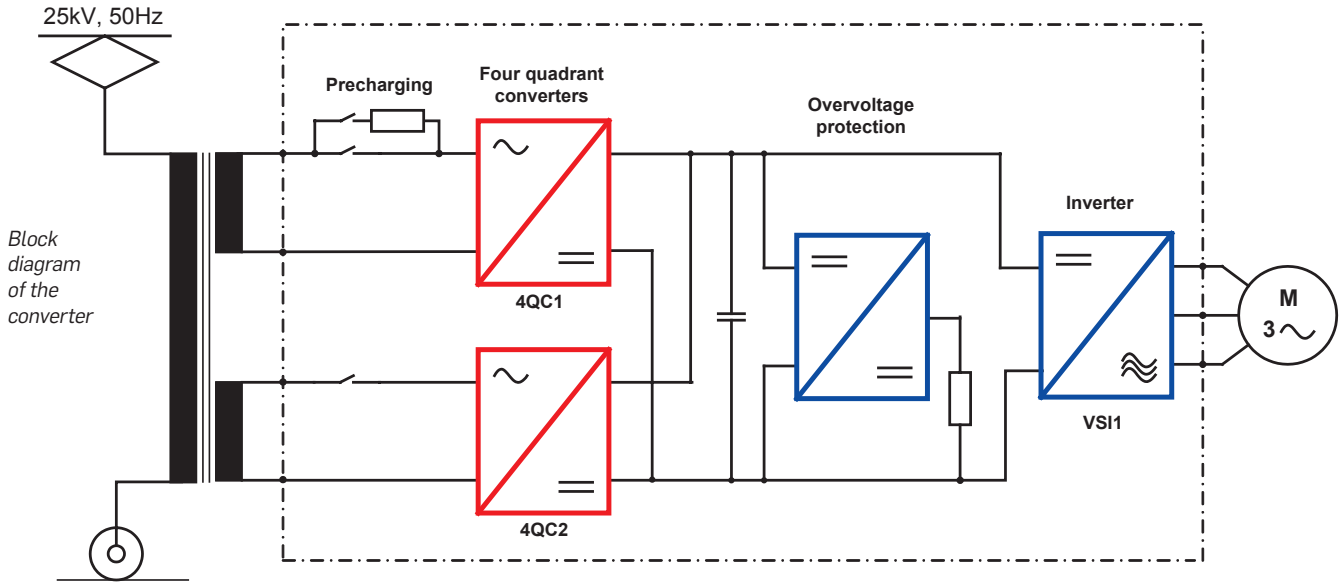
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics. Remote diagnostic functions allow monitoring of all intelligent units from one connection point.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for mounting in machine room with IP54 protection. Modular design of the converter allows an easy maintenance access enabling easy replacement of each module. The increased power density of the power modules enables compact and light-weighted converter design. The equipment is efficiently liquid cooled. Cooling system uses water to cool the converter power modules - a feature contributing to the converter's very compact design. The water itself is cooled by an external water-to-air heat exchanger.

APPLICATION EXAMPLES

KONTRAC GP550AC is used as a propulsion converter in a low-floor KONČAR electric multiple unit built and delivered for Croatian Railways. The electric multiple unit, which is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride, is intended for regional passenger transport in Croatia. The converter KONTRAC GP550AC is also used as a propulsion converter in electric multiple unit built also for Croatian Railways but for urban passenger transport. These modern vehicles significantly contribute to efficient and comfortable passenger commute in urban and regional transport.



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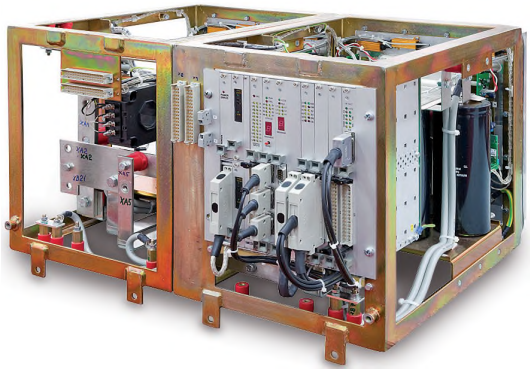
KONTRAC PN110AC

Auxiliary converter for electric multiple units

KONTRAC PN110AC is used as the auxiliary power supply converter in multiple unit trains. It is fed from a dedicated winding of the main transformer and supplies stabilized voltages to electrical loads. The converter has two three-phase outputs and one DC output. Its input current is nearly sinusoidal and its fundamental harmonic is in phase with the input voltage.



Power units of input rectifier and chopper

FEATURES:

- Modular design of power units
- High energy efficiency
- Machine room mounting
- Easy maintenance
- Latest IGBT technology

KONTRAC PN110AC CONSISTS OF:

- Input contactor and precharging circuit
- Input rectifier and chopper power modules
- Two output inverter modules
- Two output sine filters
- Battery charger
- Cooling system
- Control unit

BASIC TECHNICAL DATA

Input voltage	340 V, 50 Hz
AC output	3 x 400 V, 50 Hz, 2 x 60 kVA
DC output	24 VDC, 12 kW
Cooling	Forced air-cooling
Size (W x D x H)	1250 x 820 x 2085 mm
Weight	990 kg
Mounting position	Machine room
Connecting interface	CAN / MVB / Ethernet

KONČAR electric multiple unit for Croatian Railways

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks. Special care is put on obsolescence issues and modularity.

DIAGNOSTIC AND VISUALIZATION

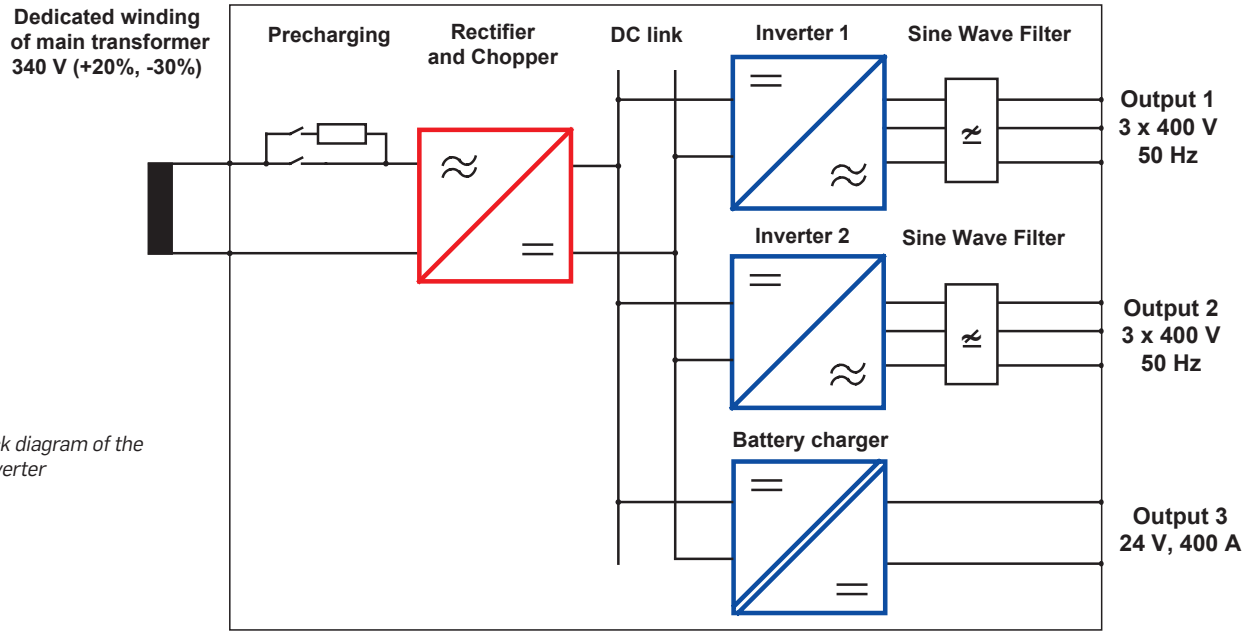
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics. Remote diagnostic functions allow monitoring of all intelligent units from one connection points.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for mounting in machine room with IP54 protection. Modular design of the converter allows an easy maintenance access enabling easy replacement of each power module. The increased power density of the power modules enables compact and lightweighted converter design. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

KONTRAC PN110AC is used as an auxiliary converter in a low-floor KONČAR electric multiple unit built and delivered for Croatian Railways. The electric multiple unit which is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride, is intended for regional passenger transport in Croatia. These modern vehicles significantly contribute to efficient and comfortable passenger commute in urban and regional transport.



Block diagram of the converter

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KONČAR
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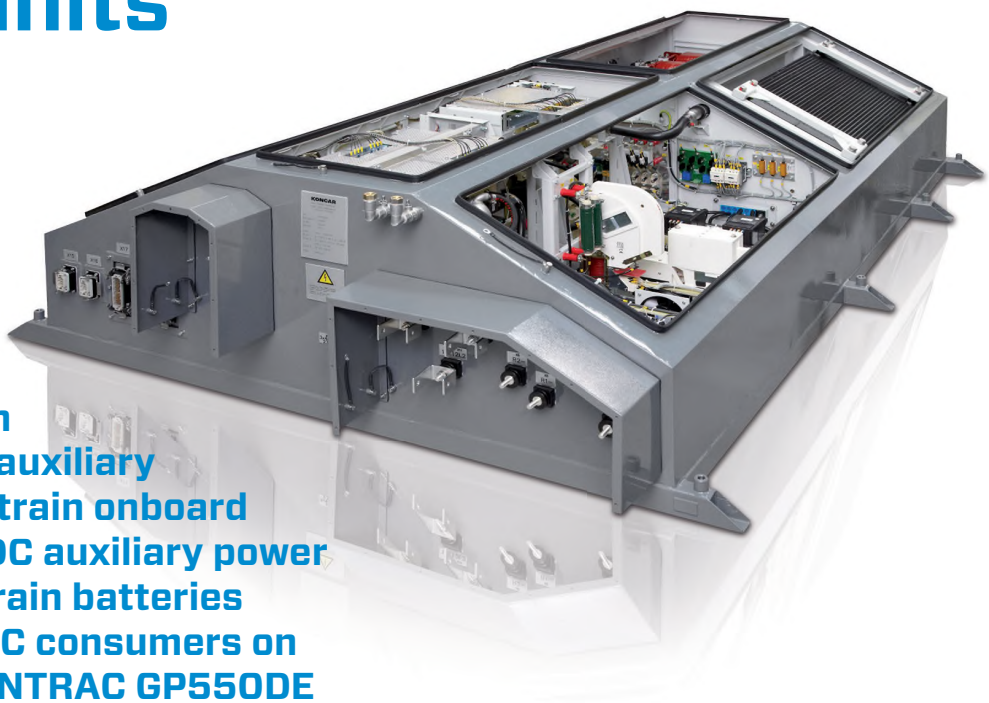
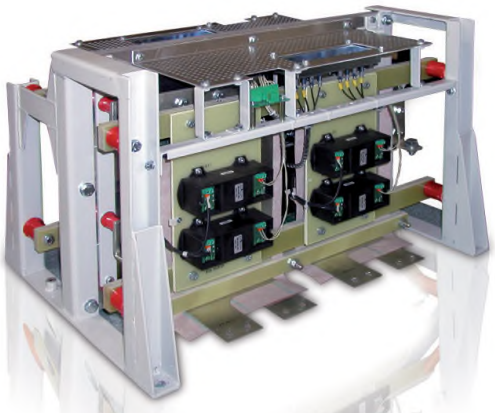
KONTRAC GP550DE

Propulsion and auxiliary converter for diesel-electric multiple units



KONTRAC GP550DE converts the variable voltage from diesel generator into drive power for the traction motors, three-phase auxiliary power supply for the train onboard consumers and into DC auxiliary power supply for charging train batteries and supplying of all DC consumers on board the vehicle. KONTRAC GP550DE is a robust and solid unit incorporating modern IGBT technology.



Power unit of propulsion converter

FEATURES:

- Modular design of power units
- High energy efficiency
- Roof mounting
- Easy maintenance
- Motor friendly
- Integrated auxiliary converter
- Integrated battery charger
- Latest IGBT technology
- Liquid cooling system
- Galvanic isolated output

KONTRAC GP550DE CONSISTS OF:

- Input contactor and precharging circuit
- Propulsion inverter
- Auxiliary converter with three-phase output and battery charger
- Liquid cooled cooling system
- Output transformer
- Traction control unit

BASIC TECHNICAL DATA

Input voltage	1000 VDC - 2000 VDC
Propulsion output	475 kW
Braking chopper	730 kW
AC output	3 x 400 V, 50 Hz, 55 kVA 230 V, 50 Hz, 2,3 kVA
DC output	24 VDC, 10 kW
Cooling	Liquid cooled
Size (W x D x H)	3000 x 1800 x 735 mm
Weight	1485 kg
Mounting position	Roof
Connecting interface	CAN / MVB / Ethernet

Diesel-electric multiple unit for Croatian Railways

TRACTION CONTROL UNIT

Traction control unit (TCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). TCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks. Special care is put on obsolescence issues and modularity.

DIAGNOSTIC AND VISUALIZATION

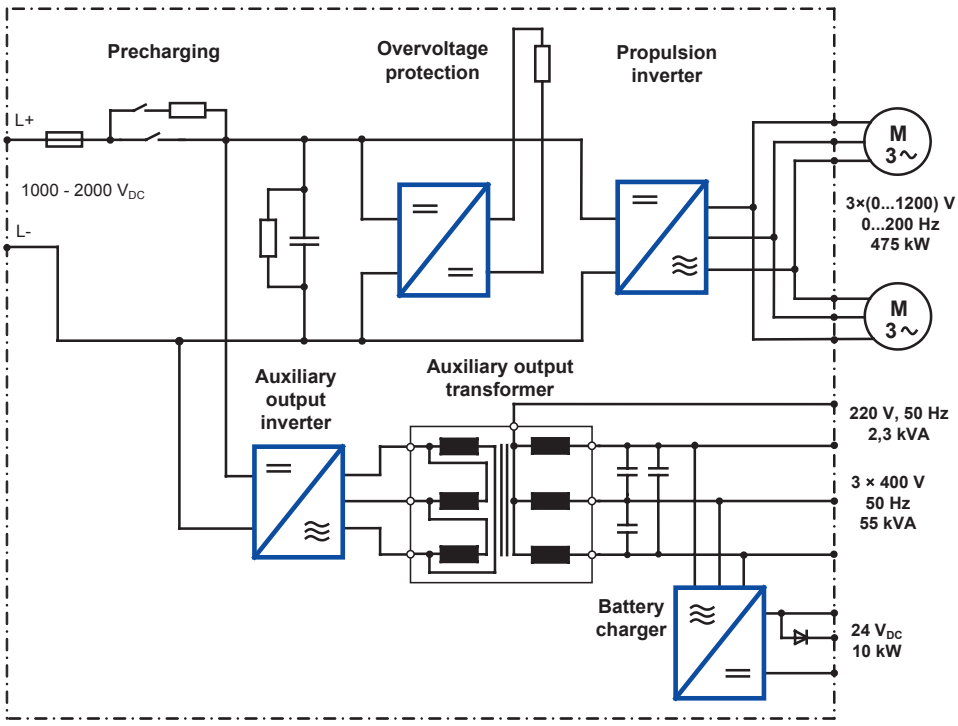
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics. Remote diagnostic functions allow monitoring of all intelligent units from one connection point.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for roof mounting with IP54 protection. Modular design of the converter allows an easy maintenance access enabling that each module could be very easily replaced. The increased power density of the power modules enables compact and light-weighted converter design. The efficient cooling system is completely integrated in converter box achieving a high degree of functional integration. It uses water to cool the converter power modules - a feature contributing to the converter's very compact design. The water itself is cooled by an internal air-to-water heat exchanger.

APPLICATION EXAMPLES

KONTRAC GP550DE is mounted on roof of the low-floor diesel-electric multiple unit built and delivered for Croatian Railways. The diesel-electric multiple unit, which is distinguished by its modern and attractive design, superior technical characteristics and comfortable ride, is intended for regional passenger transport in Croatia.and comfortable passenger commute in urban and regional transport.



Block diagram of the converter

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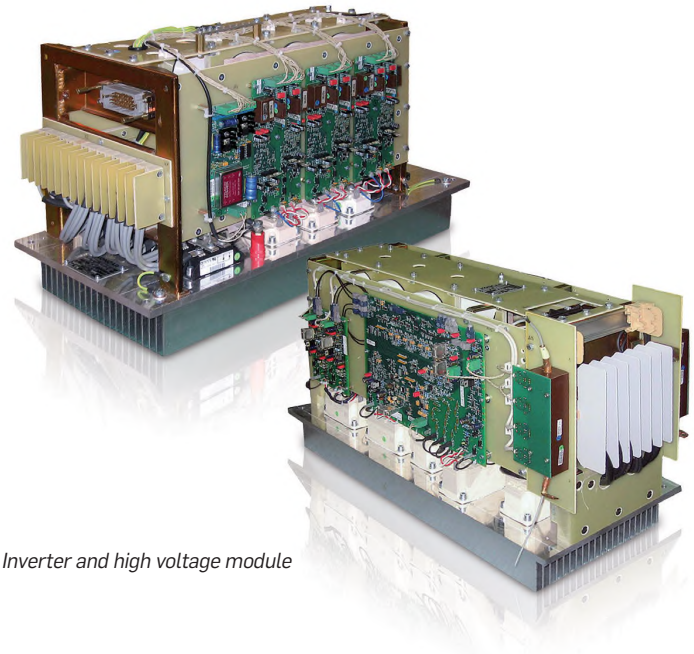
KONTRAC PN30MS

Two-system converter for passenger coaches

KONTRAC PN30MS serves as a power supply for air conditioned passenger coaches. It can be supplied from two conventional UIC voltages (1500 V, 50 Hz or 1500 VDC) used by European railways, contributing significantly to passengers comfort.



Inverter and high voltage module

FEATURES:

- Two input voltages
- Microprocessor control and diagnostics
- Input / output galvanic insulation
- Active control of input impedance
- Easy maintenance
- Modular design
- Integrated disconnecting and earthing device
- Flat-battery power supply
- Automatic switching to another input voltage i.e. supply system

KONTRAC PN30MS CONSISTS OF:

- Disconnecting and earthing device
- Input contactor and precharging circuit
- Input filter
- High-voltage modules
- Output inverter module and a battery charger
- Flat battery power supply
- Air system ventilation
- Control unit

BASIC TECHNICAL DATA

Input voltage	1500 V, 50 Hz 1500 VDC
AC output	3 x 400 V, 50 Hz, 25,5 kVA 230 V, 50 Hz, 2,5 kVA
DC output	30 VDC, 5 kW
Cooling	Forced air-cooling
Size (W x D x H)	1660 x 1900 x 600 mm
Weight	1020 kg
Mounting position	Under-floor
Connecting interface	CAN / MVB / Ethernet

Croatian Railways passenger coach for local traffic equipped with the converter KONTRAC PN30MS

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks.

DIAGNOSTIC AND VISUALIZATION

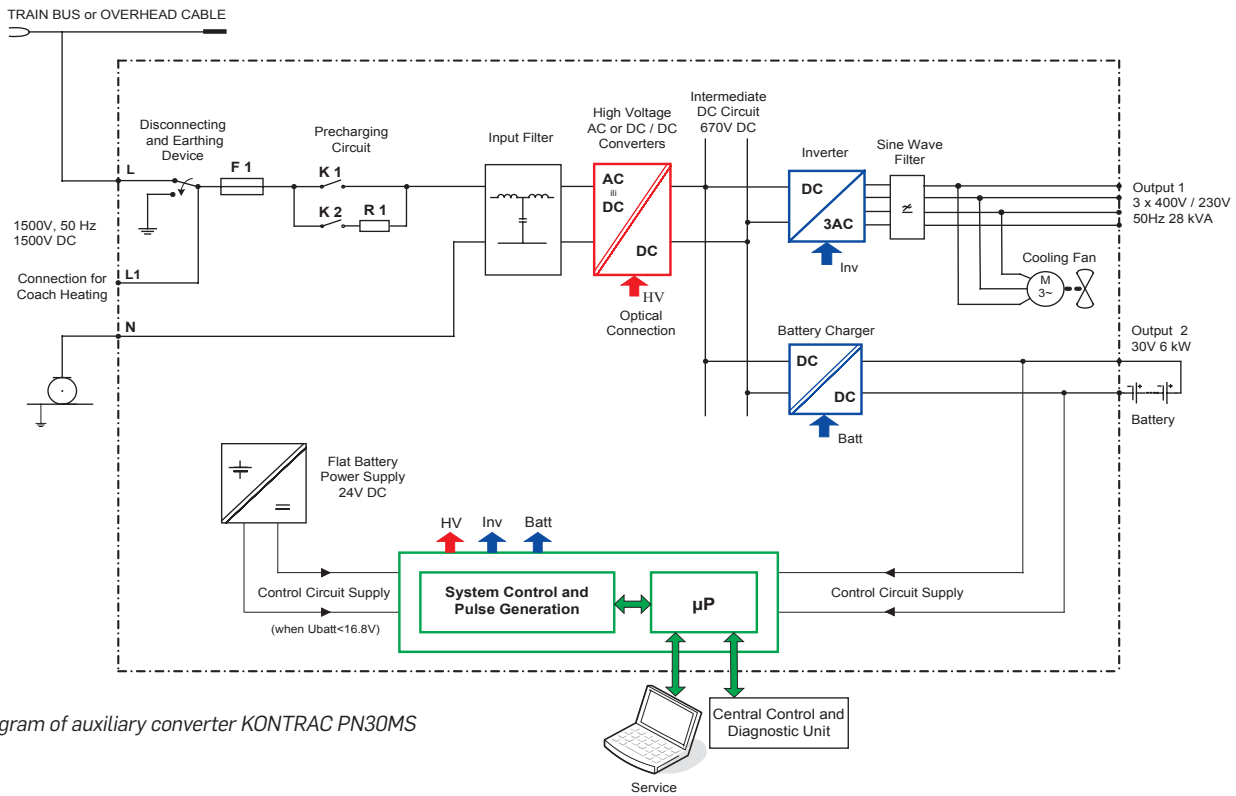
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for under-floor mounting with IP54 protection. Modular design of the converter allows an easy maintenance access enabling easy replacement of each power module. The increased power density of the power modules enables compact and light-weighted converter design. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

As a part of a large modernization project of passenger coaches owned by Croatian Railways, passenger coaches for local traffic have been equipped with dual system static converter KONTRAC PN30MS. The converter is used as a power supply for air conditioning unit, all single-phase and three-phase consumers, all DC consumers and for charging the coach battery. In this way it significantly contributes to pleasant and comfortable ride to different suburban destinations.



Block diagram of auxiliary converter KONTRAC PN30MS

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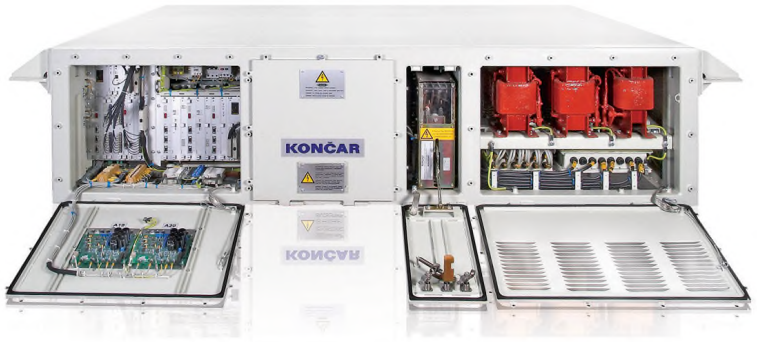
KONTRAC PN50MS / PN60MS

Multi-system converter for passenger coaches



KONTRAC PN50MS / PN60MS is used as the power supply for all consumers in modern air-conditioned coaches on European railways.

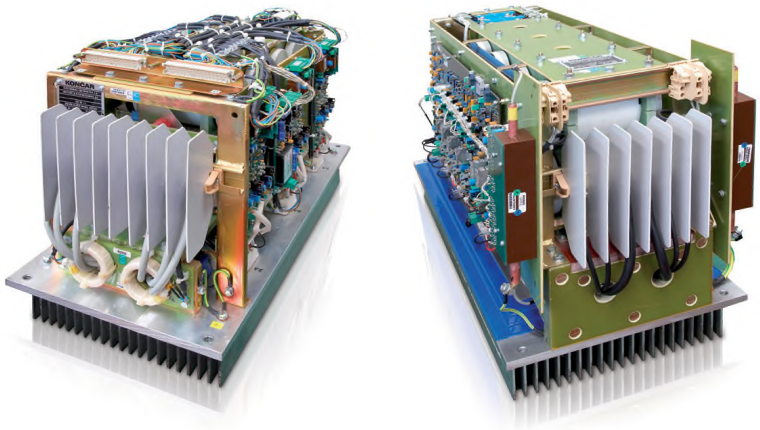
It is powered by any of four UIC voltages and serves as the source of electric energy for the coach air-conditioning system, all single-phase and threephase consumers, as well as for charging batteries and power supply of all DC consumers onboard a passenger coach. Switching to another UIC system is performed automatically and without external supervision.

FEATURES:

- Four input voltages i.e. supply systems
- Microprocessor control and diagnostics
- Input / output galvanic insulation
- Active control of input impedance
- Easy maintenance
- Modular design
- Integrated disconnecting and earthing device
- Flat-battery power supply
- Automatic switching to another input voltage i.e. supply system

KONTRAC PN50MS / PN60MS consists of

- Disconnecting and earthing device
- Input contactor and precharging circuit
- Input filter
- High-voltage modules
- Output inverter modules and a battery charger
- Flat battery power supply
- Air system ventilation
- Control unit



Inverter and high voltage module

BASIC TECHNICAL DATA

	PN50MS	PN60MS
Input voltages	1000 V, 16 2/3 (22, 50) Hz, 1500 V, 50 Hz 1500 / 3000 VDC	
AC outputs	3 x 400 V, 50 Hz, 30 kVA + 22 kVA 3 x 400 / 230 V, 50 Hz, 8 kVA	
DC output	30 VDC, 6 kW	30 VDC, 12 kW
Cooling	Forced air-cooling	
Size (L x W x H)	2360 x 1900 x 600 mm	2590 x 1900 x 600 mm
Weight	1630 kg	1802 kg
Mounting place	Under-floor	
Connecting interface	CAN / MVB / Ethernet	

Croatian Railways couchette coach equipped with the converter KONTRAC PN60MS

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks. Special care is put on obsolescence issues, and modularity.

DIAGNOSTIC AND VISUALIZATION

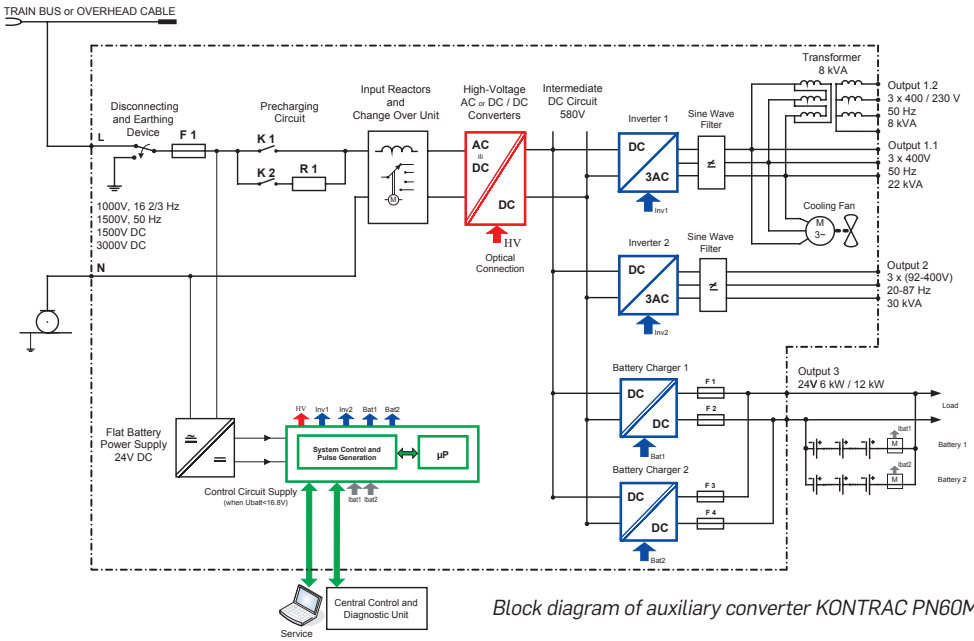
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for under-floor mounting with IP54 protection. Modular design of the converter allows an easy maintenance access enabling easy replacement of each power module. The increased power density of the power modules enables compact and light-weighted converter design. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLE

As a part of a large modernization project of passenger coaches owned by Croatian Railways, couchette coaches of 2nd class have been equipped with multi-system static converter KONTRAC PN60MS. The converter is used as a power supply for air conditioning unit, all single-phase and three-phase consumers, all DC consumers and for charging the coach battery. In this way it significantly contributes to pleasant and comfortable ride to different European destinations.



Block diagram of auxiliary converter KONTRAC PN60MS

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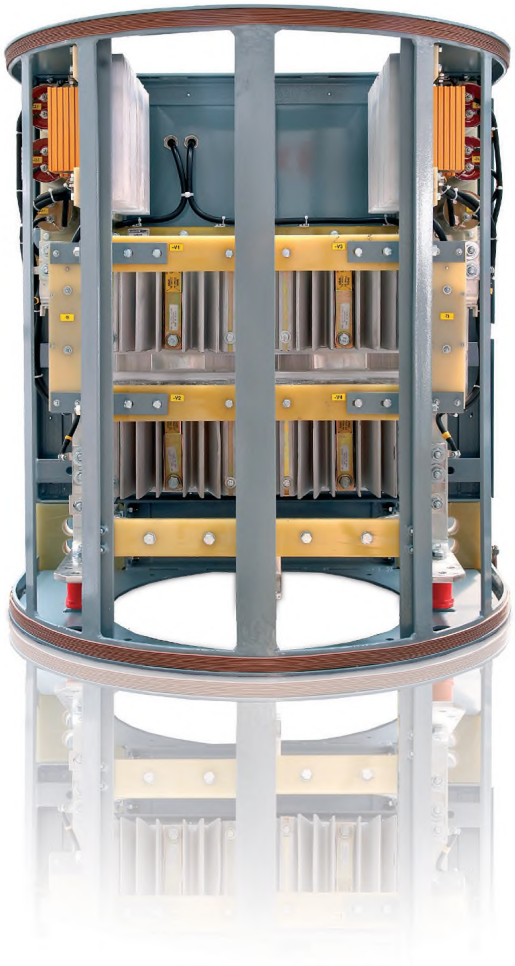
KONTRAC GP1000AC
Propulsion converter for locomotives



KONTRAC GP1000AC is a thyristor propulsion converter which converts AC network electric power fed from a transformer output into propulsion power for DC traction motors. The converter is used in the process of modernization of old diode locomotives into thyristorized locomotives as well as for building new locomotives.

Replacement of diode converters with thyristor converters and implementation of vehicle control unit for traction application (VCU) ensures conversion of old diode locomotives to modern thyristor locomotives with superior traction and exploitation characteristics:

- Continuous speed and torque control of traction motors (both at traction and braking mode) which optimizes adhesion, saves energy, decreases wear of vital parts and provides electronic overload, sliding and torsion vibrations protection.
- Sequential control of thyristor bridges limits consumption of reactive power.

FEATURES:
- Easy maintenance
- Machine room mounting
- Robust and powerful semiconductors
- Air cooled cooling system
- Electrically and mechanically compatible with the existing diode locomotive power supply equipment

BASIC TECHNICAL DATA

Input voltages	1144 V, 50 Hz
Propulsion output	1000 kW
Cooling	Forced air-cooling
Size (W x D x H)	770 x 575 x 840 mm
Weight	150 kg
Mounting position	Machine room

Thyristorized Bo' Bo' locomotive for Croatian Railways

OVERVOLTAGE PROTECTION

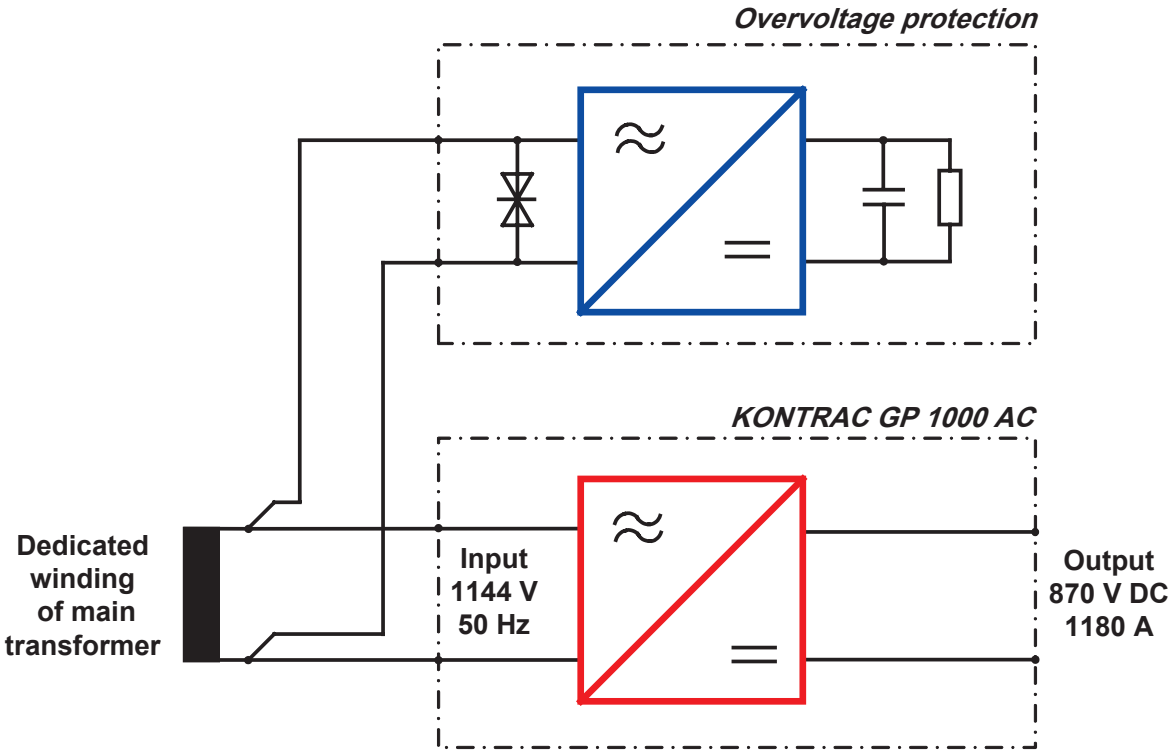
A good protection of semi-conductor valves against transient voltages is very important for reliable and safe operation of a thyristor converter supplied by contact line. The overvoltages are the result of atmospheric discharges and switching of the inductive circuits in the contact line. The overvoltage protection, in two equal cubicles, contains units for the overvoltage protection of the whole thyristor converter of the locomotive.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter KONTRAC GP1000AC is designed for mounting in ventilation tunnel in a locomotive's machine room. The converter is efficiently cooled by forced air. The cubicles with overvoltage protection are put next to the main transformer and protection circuits are connected directly to secondary terminal blocks of the main transformer.

APPLICATION EXAMPLES

KONTRAC GP1000AC is used as a propulsion converter in numerous locomotives which have been modernized and delivered for Croatian Railways, Railways of the Federation of Bosnia and Herzegovina, Macedonian Railways, Serbian Railways, Bulgarian State Railways, etc. The photo shows modernized 4-axle locomotive type Bo' Bo' series 1.141.300 for Croatian Railways, equipped with KONTRAC GP1000AC.



Block diagram of the converter and overvoltage protection

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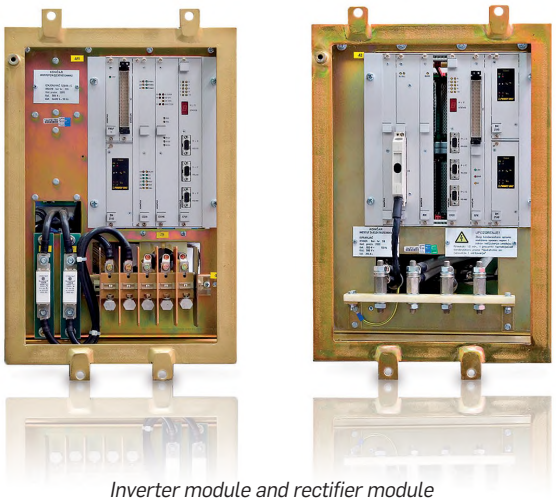
KONTRAC PN170AC
Auxiliary converter for electric locomotives

KONTRAC PN170AC is used as the auxiliary power supply converter in electric locomotives. It is fed from a dedicated winding of the main transformer, converts single-phase voltage into three-phase stabilized voltage and supplies electrical loads such as traction motor blowers, brake resistor blowers, transformer oil cooler blowers, pump, compressors, HVAC etc. The battery charger which is integral part of converter is used for charging locomotive batteries and for supplying of all DC consumers on board the vehicle.



Inverter module and rectifier module

FEATURES:
- Modular design of power units
- High energy efficiency
- Machine room mounting
- Easy maintenance
- Latest IGBT technology

KONTRAC PN170AC consists of:
- Input contactor and precharging circuit
- Input rectifier module
- DC link choke
- Four or five output inverter modules
- Battery charger
- Cooling system
- Control unit

BASIC TECHNICAL DATA

Input voltages	900 V, 50 Hz
AC outputs	3 x 400 V, 50 Hz, 4 (5) x 52 kVA
DC output	72 / 135 VDC, 6 kW
Cooling	Forced air-cooling
Size (W x D x H)	900 x 1360 x 1675 mm
Weight	1450 kg
Mounting position	Machine room
Connecting interface	CAN / MVB / Ethernet

Thyristorized Co'Co' locomotive for Bulgarian Railways

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks. Special care is put on obsolescence issues and modularity.

DIAGNOSTIC AND VISUALIZATION

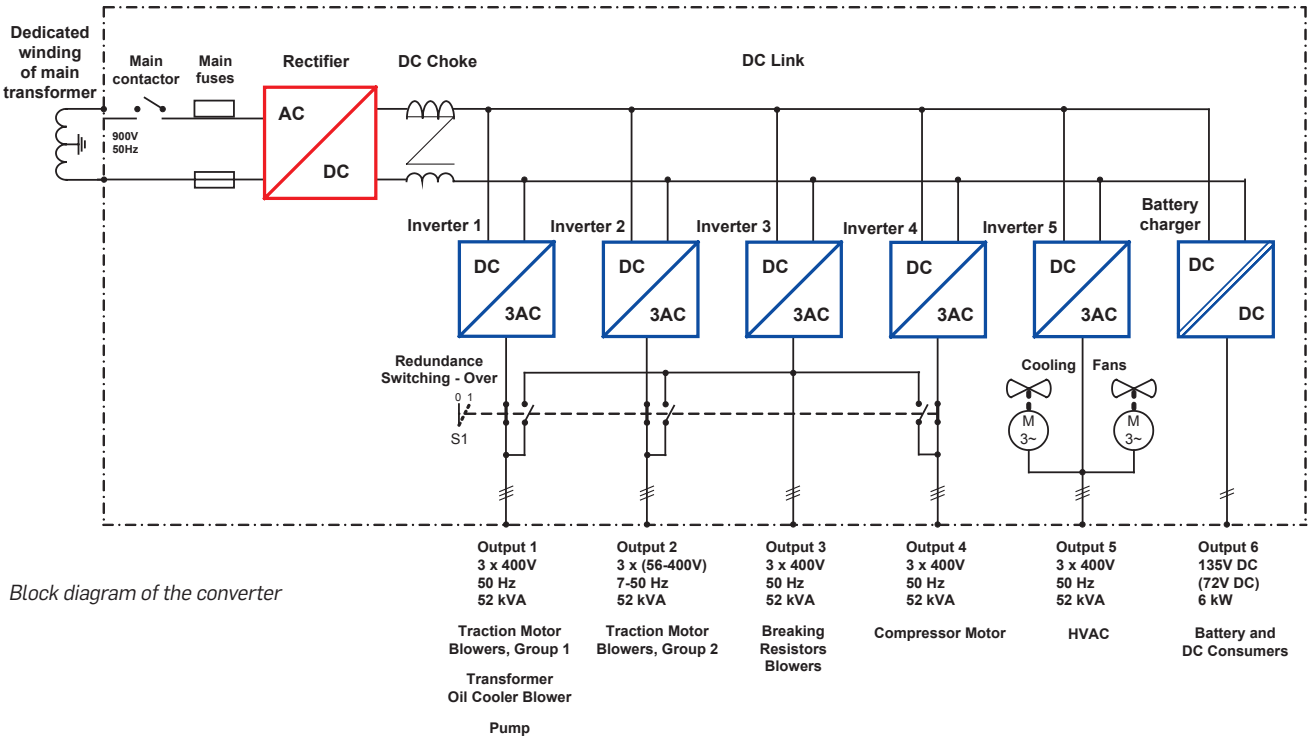
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable eventdriven data logging and event recording is integrated in the control electronics.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter is designed for mounting in machine room with IP54 protection. The modular design of the converter allows an easy maintenance access enabling easy replacement of each power module. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

KONTRAC PN170AC in its several variants, is used as an auxiliary converter in numerous locomotives which have been modernized and delivered for Croatian Railways, Railways of the Federation of Bosnia and Herzegovina, Macedonian Railways, Serbian Railways, Bulgarian State Railways, etc. The photo shows modernized 6-axle locomotive type Co' Co' series 46200 for Bulgarian Railways, equipped with KONTRAC PN170AC.



Block diagram of the converter

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KONTRAC PN30AC / PN50AC

Auxiliary converter for substations

KONTRAC PN30AC / PN50AC is a trackside auxiliary power supply converter fed by 25 kV, 50 Hz overhead line. It is used in order to supply various loads inside the substation facilities (power supply for integrated lighting and information systems, railway signaling and protection systems, etc.). Overhead line might generate spikes, sags and surges caused by the current drawn from locomotives. Those are likely to damage the input stages of conventional converters.

In order to provide a trackside noise filtered power source, we use the same technology as for our rolling stock converters.

The converter is primarily intended to be used as a backup energy source (in case of power outage from the distribution network). However, in projects where poor or no distribution network is available at site, this converter can be implemented as a primary power source as well.

FEATURES:

- Rolling stock converter technology
- Robust input rectifiers
- Nearly sinusoidal input current, in phase with the input voltage
- Output transformer ensures galvanic isolation
- Sine wave output filter
- EMC output filter
- Easy maintenance
- Modular design of power unit
- Air cooling

KONTRAC PN30AC CONSISTS OF:

- Input contactor and precharging circuit
- Input rectifier, chopper and inverter power module
- Output sine wave filter
- Output EMC filter
- Output transformer
- Air ventilation system
- Control unit

BASIC TECHNICAL DATA

Input voltages	230 V, 50 Hz over transformer 25 kV / 230 V
Minimum input voltage	160 V (equivalent to 17,5 kV of overhead line voltage)
Maximum input voltage	270 V (equivalent to 29 kV of overhead line voltage)
AC output	3 x 400 / 230 V, 50 Hz, 30 / 50 kVA
Cooling	Forced air-cooling
Size (W x D x H)	600 x 600 x 2000 mm / 800 x 800 x 2250 mm
Weight	504 kg / 760 kg
Mounting position	Substation
Connecting interface	CAN / MVB / Ethernet

Two converters KONTRAC PN30AC installed in Drivenik Railway Station, Croatia

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, tramways, EMUs, DMUs). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks.

DIAGNOSTIC AND VISUALIZATION

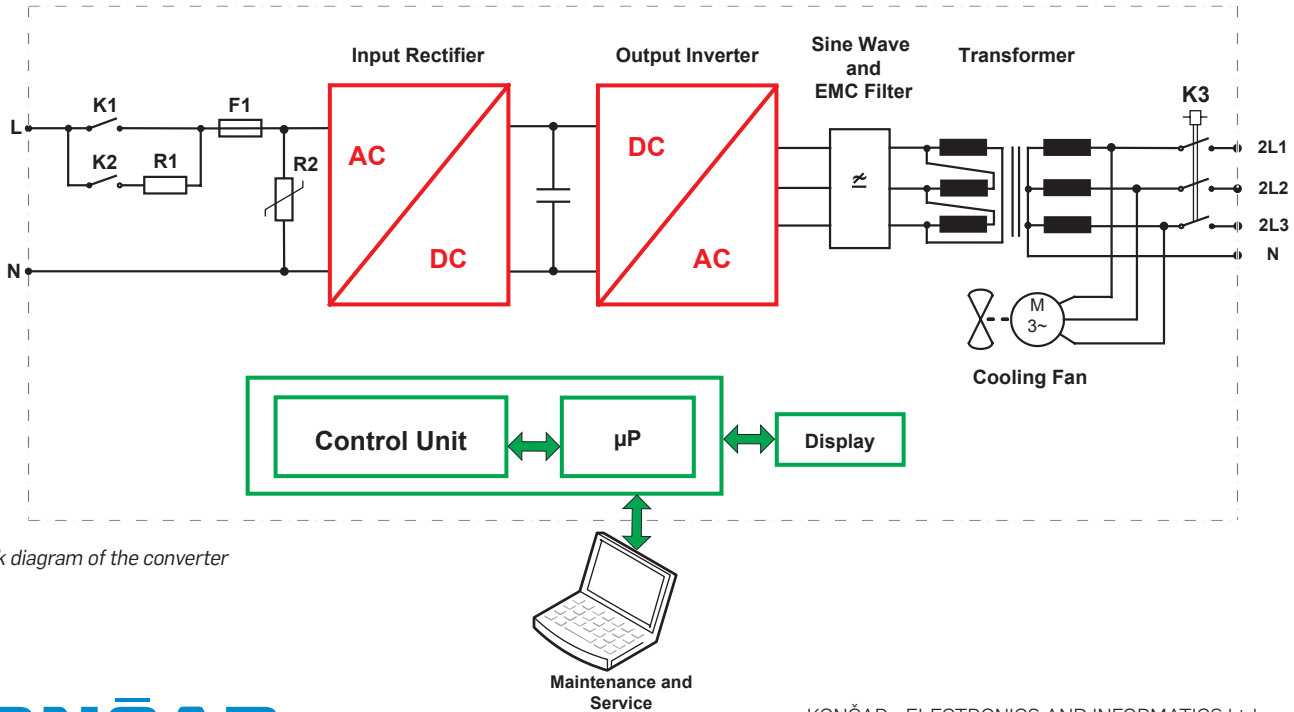
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter has IP54 mechanical protection and it is designed for mounting inside the traction substations. The modular design of the power module allows an easy maintenance. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

The converters KONTRAC PN30AC and KONTRAC PN50AC are installed on several Railway Station in Croatia. The converters are used as a primary auxiliary power supply of all single-phase and three phase AC consumers. The input circuits of the converters are resistant to spikes, sags and surges in overhead line caused by the current drawn from locomotives. The converters KONTRAC PN30AC and KONTRAC PN50AC are also installed in several Railway Station in Croatia and Center for remote control of electric system for rail transportation in Croatia where it is used as a backup auxiliary power supply in case of power outage from the distribution network.



Block diagram of the converter

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KONTRAC PN225AC

Converter for dynamic reactive power compensation

KONTRAC PN225AC is a trackside converter which is used for dynamic reactive power compensation. It is used in substation facilities 110 kV/25 kV in which devices for fixed reactive power compensation have already been installed.

The converter compensates variable amount of reactive power which can fluctuate considerably during a given time period. The range of compensated reactive power of each converter is from 225 kVAr capacitive to 225 kVAr inductive. If a higher range of compensated reactive power is needed, it can be accomplished by parallel connection of several converters. The input stage of the converter is made of robust components dimensioned for rolling stock converter applications which makes this converter KONTRAC PN225AC resistant to spikes, sags and surges that are likely to appear in overhead lines.

This proven and reliable technical solution enables significant energy savings, thus making it a perfect solution for sustainable development.

FEATURES:

- Rolling stock converter technology
- Robust input stage of converter
- Nearly sinusoidal current, in phase with the voltage
- Line friendly
- Latest IGBT technology
- Easy maintenance
- Modular design of power units
- Air cooling

KONTRAC PN225AC CONSISTS OF:

- Input contactors and precharging circuit
- Input filter
- Two input chokes
- Two four quadrant converters
- Two DC links with overvoltage protections
- Air ventilation system
- Control unit

BASIC TECHNICAL DATA

Input voltages	400 V, 50 Hz over transformer 25 kV / 400 V
Minimum input voltage	280 V (equivalent to 17,5 kV of overhead line voltage)
Maximum input voltage	480 V (equivalent to 29 kV of overhead line voltage)
Nominal power	± 225 kVAr
Cooling	Forced air-cooling
Size (W x D x H)	1200 x 800 x 2100 mm
Weight	700 kg
Mounting position	Substation
Connecting interface	CAN / Ethernet

The converters KONTRAC PN225AC are installed in two railway substations in Croatia

DIGITAL CONTROL UNIT

Digital control unit (DCU) is based on proprietary embedded control platform which has been used for years in our rail solutions (locomotives, coaches, trams, EMU, DMU). DCU is responsible for all sequence control, regulation, protection, communication, supervision and diagnostics tasks.

DIAGNOSTIC AND VISUALIZATION

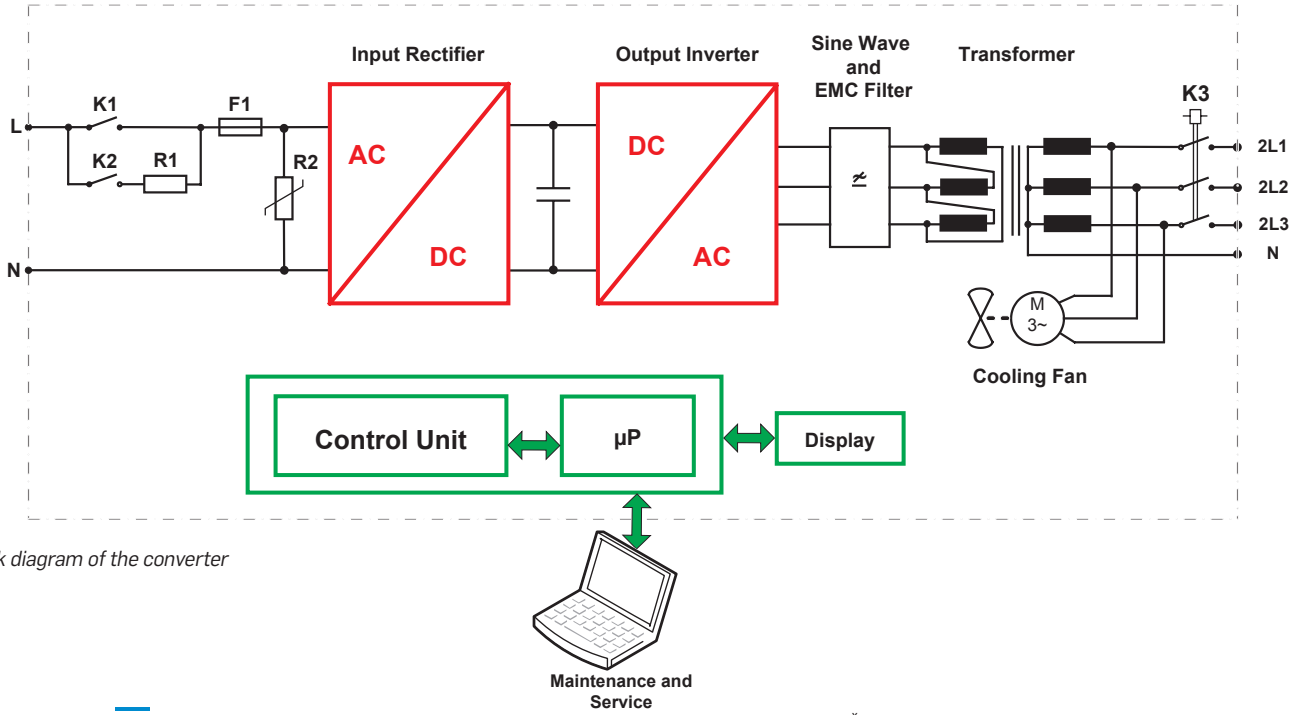
Proprietary powerful diagnostic and visualization tool (ZZT) is compatible with all our platforms through many generations of control electronic solutions. Configurable event-driven data logging and event recording is integrated in the control electronics.

MECHANICAL DESIGN AND COOLING SYSTEM

The converter has IP54 mechanical protection and it is designed for mounting inside the traction substations. The modular design of the power modules allows an easy maintenance. The converter is efficiently cooled by forced air.

APPLICATION EXAMPLES

The converters KONTRAC PN225AC are installed in two railway substations in Croatia where they are demonstrating the successful operation in dynamic reactive compensation in overhead lines. This proven and reliable technical solution enables significant energy savings which also has a positive effect on nature as well as on material costs.



Block diagram of the converter

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