



POWER ELECTRONICS

for electric vehicles





**IZHEVSKIY RADIOZAVOD
(IRZ)**

**RUSSIAN GROUP OF COMPANIES
PRODUCING ELECTRONICS**



FUEL & POWER

Oilfield electronic equipment, control and data acquisition systems, power converters for electric vehicles



AEROSPACE & DEFENSE

Space-related electronics for on-board and ground segments, telemetry systems, visual control systems, communication systems, navigation equipment, mobile robotic systems



RAILWAYS

Railway automatics and safety systems, railway traffic control systems, train control and monitoring systems



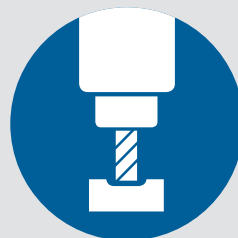
TELECOM

Radio communication and data transmission systems



PRODUCTION

Printed circuits boards, surface mounting, high-precision mechanical parts production, assembly and integration of end products



MACHINING

High precision mechanical parts production, assembly and integration of end products



TESTING CENTER

Certification tests of electronic components, electronic equipment tests, check-out equipment

Power components of **ELECTRIC VEHICLES**

**ELECTRIC VEHICLE IS A MODERN AND ENVIRONMENTAL-FRIENDLY TYPE OF TRANSPORT
THE DEMAND FOR WHICH IS CONSTANTLY GROWING**

For more than 20 years IRZ has been producing equipment for electronic and power industry.
Among the latest developments is a family of products for electric buses and vehicles which includes:

- traction inverter;
- on-board power converters;
- charging station converter.

● **Traction inverter**

up to 160 kW, IP67, CAN, fluid cooling

● **DC/AC**

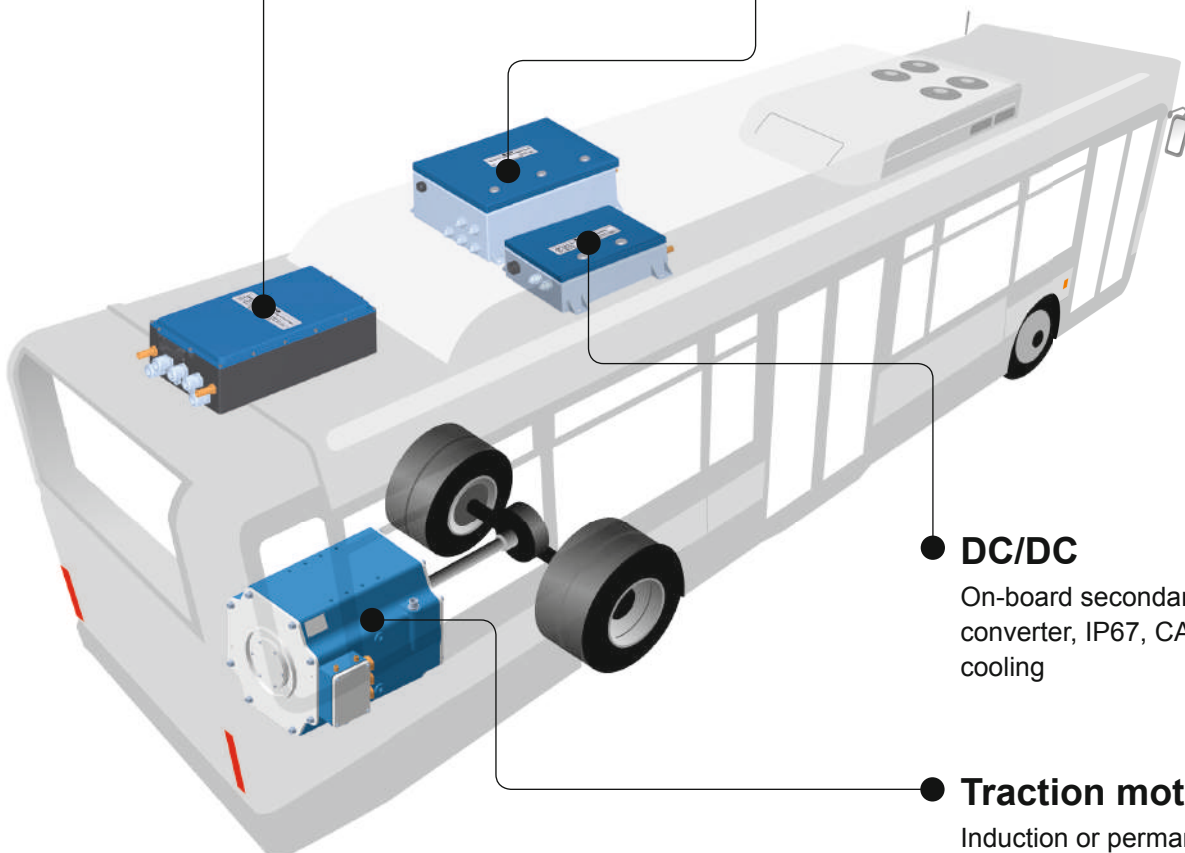
Air conditioner motor control, IP67, CAN, fluid cooling

● **DC/DC**

On-board secondary power converter, IP67, CAN, fluid cooling

● **Traction motor**

Induction or permanent magnet electric motor

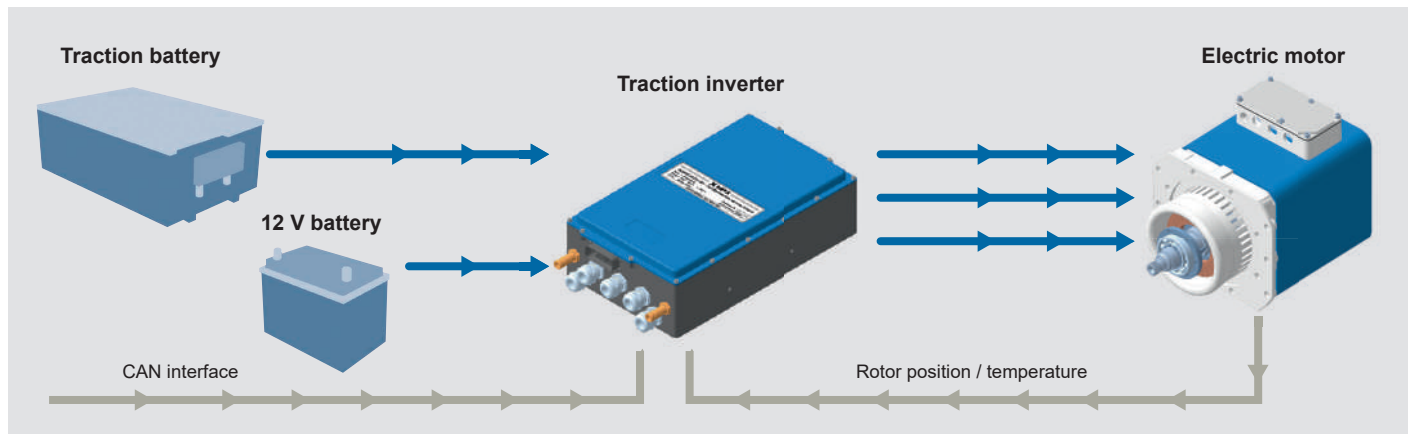


Traction inverter

RELIABLE AND EFFICIENT CONTROL OF TRACTION ELECTRIC MOTOR

KEY BENEFITS

- Control of induction and permanent magnet electric motors
- Fluid cooling
- Housing protection rating IP67
- Sensor vector control
- CAN interface
- In-house design and production by IRZ
- Customizable design



| Parameter | TI60 | TI125 | TI160 |
|---|--------------|--------------|-------------|
| Rated power, kW | 60 | 125 | 160 |
| Rated output current, A (3 phases) ($T_{\text{fluid}} +65\text{ }^{\circ}\text{C}$) | 120 | 250 | 300 |
| Maximum output current, A (3 phases) | 200 | 350 | 400 |
| Power supply range, V | 350 - 850 | 350 - 850 | 350 - 850 |
| Cooling | fluid | fluid | fluid |
| Coolant temperature, $^{\circ}\text{C}$ | -40... +65 | -40... +65 | -40... +65 |
| Operating temperature, $^{\circ}\text{C}$ | -40... +85 | -40... +85 | -40... +85 |
| Radiator tube diameter, mm | 14 | 14 | 14 |
| Weight, kg | 8 | 12 | 14 |
| Efficiency, % | 97 | 97 | 97 |
| Housing protection rating | IP67 | IP67 | IP67 |
| Dimensions, mm | 400x240x120* | 400x240x120* | 400x240x120 |

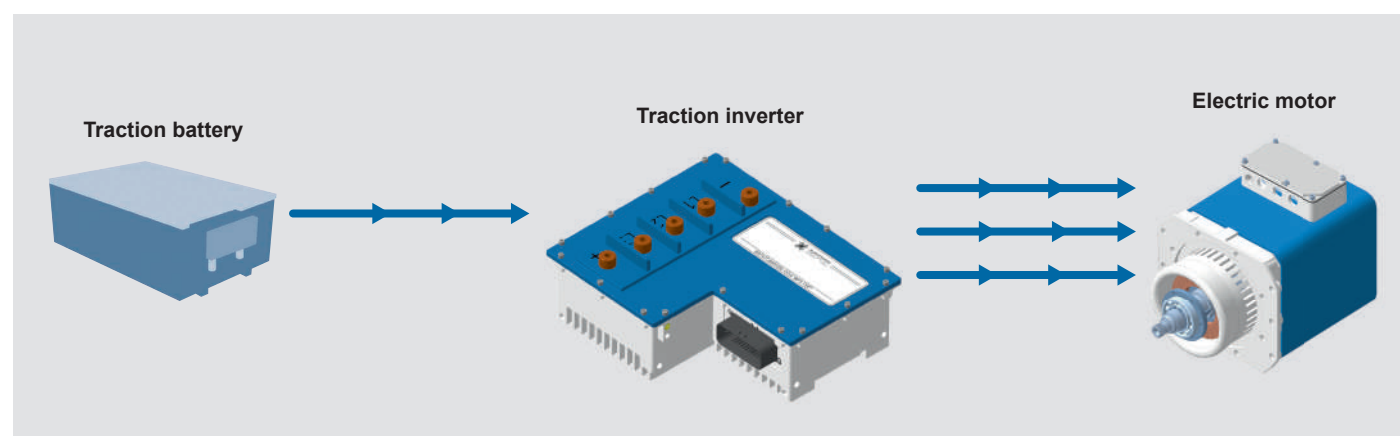
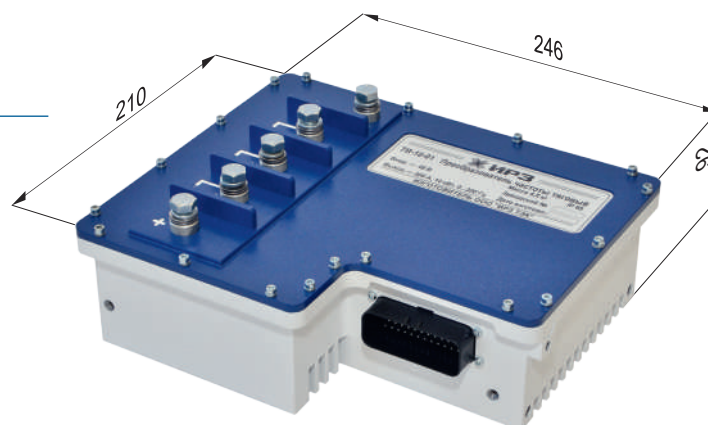
* Actual dimensions may be different from the specified dimensions

Traction inverter for light vehicles

CONTROL OF ASYNCHRONOUS AND PERMANENT MAGNET ELECTRIC MOTORS

KEY BENEFITS

- vector sensor and sensorless control
- CAN and RS-485 interfaces
- Air cooling



| Parameter | Value |
|------------------------|------------|
| Rated voltage, V | 48 |
| Rated current, A | 200 |
| Maximum current, A | 250 |
| Power, kW | 10 |
| Weight, kg | 4,5 |
| Enclosure class | IP65 |
| Dimensions (W*H*L), mm | 210*92*246 |

Traction inverter TI450

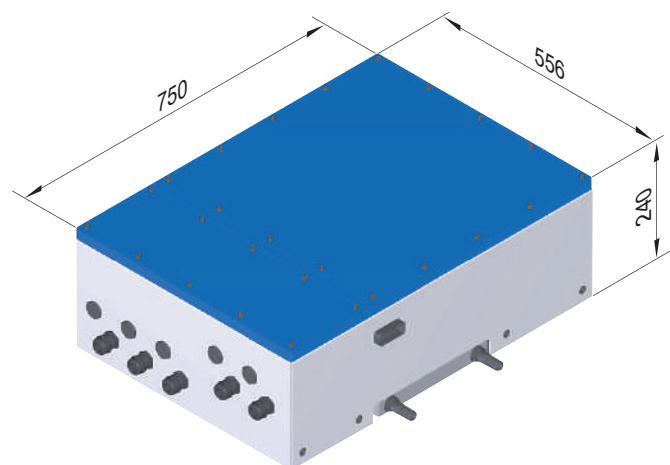
TRACTION INVERTER FOR HIGH-POWER ELECTRIC VEHICLES

OVERVIEW

TI450 is a traction inverter with liquid cooling, designed for effective control of the three-phase electric motors with power up to 450 kW (500 A). The device is powered by a battery. TI450 is available in two versions: with embedded DSP and without DSP (DSP is the interface for connection of an external controller).

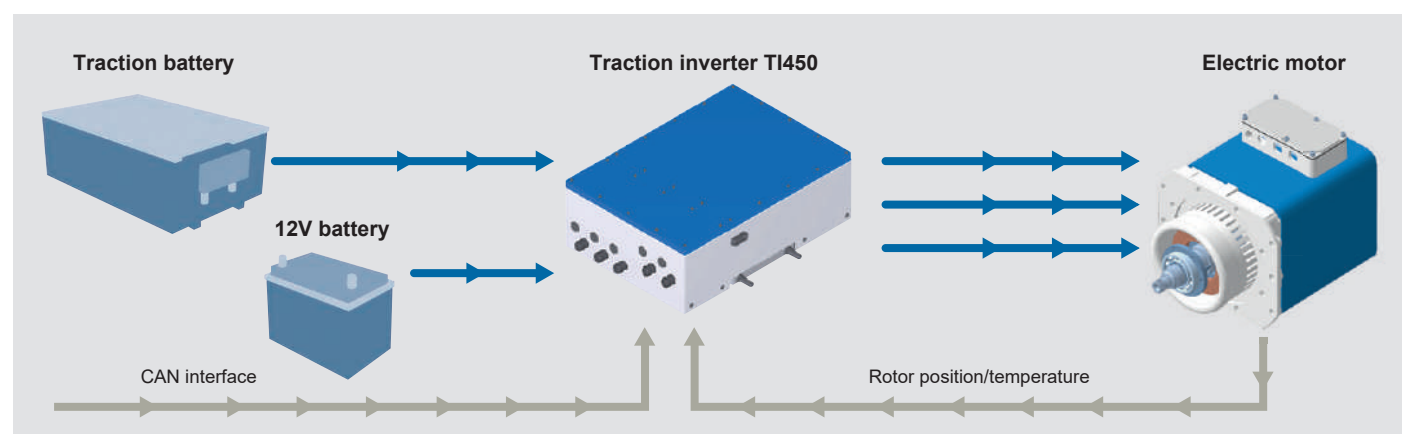
KEY BENEFITS

- Liquid cooling
- Special power modules developed for application in vehicles
- Housing protection rating ip67



WORKING STAGE

Design documentation is fully developed. TI450 will be available in Q2 2020.



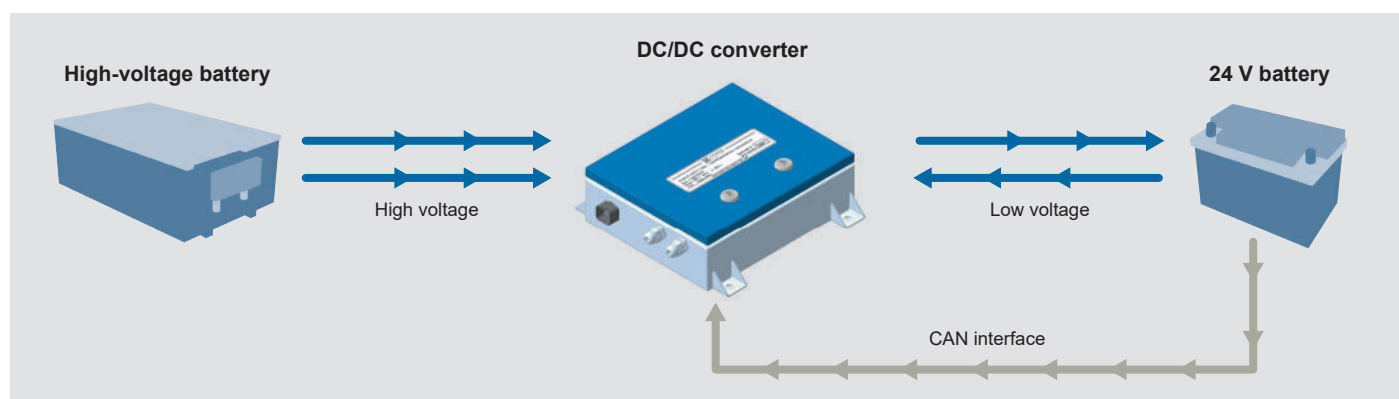
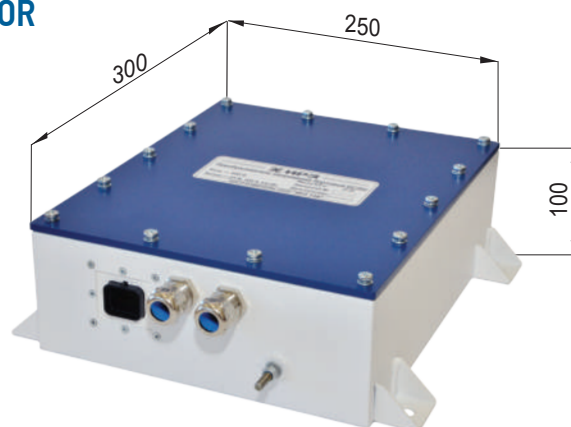
| Parameter | Value |
|--------------------------------|-----------------------|
| Number of phases at the output | 3 |
| Operating temperature, °C | minus 40...+65 |
| Housing protection rating | IP67 |
| Dimensions, mm | 556x750x240 |
| Cooling | forced liquid cooling |
| Rated total output power, kVA | 560 |
| Rated active output power, kW | 450 |
| Rated DC link voltage, V | 800 |
| Rated input DC current, A | 500 |

On-board DC/DC converter

CHARGING LOW-VOLTAGE BATTERY AND POWER SUPPLY FOR LOW-VOLTAGE ON-BOARD EQUIPMENT

KEY BENEFITS

- Galvanic insulation between input and output
- Fluid cooling
- Housing protection rating IP67
- CAN interface
- In-house design and production by IRZ
- Customizable design



| Parameter | PNB2.8 | PNB3.7 | PNB5.6 |
|----------------------------|-------------|-------------|-------------|
| Rated power, kW | 2.8 | 3.7 | 5.6 |
| Rated output current, A | 90 | 120 | 180 |
| Power supply range, V | 350 - 850 | 350 - 850 | 350 - 850 |
| Rated input voltage, V | 600 | 600 | 600 |
| Rated output voltage, V | 24 | 24 | 24 |
| Supply voltage, V | 23.5 - 28.5 | 23.5 - 28.5 | 23.5 - 28.5 |
| Cooling | fluid | fluid | fluid |
| Coolant temperature, °C | -40... +65 | -40... +65 | -40... +65 |
| Ambient temperature, °C | -40... +85 | -40... +85 | -40... +85 |
| Radiator tube diameter, mm | 14 | 14 | 14 |
| Weight, kg | 5 | 7 | 9 |
| Efficiency, % | 91 | 91 | 91 |
| Insulation voltage, V | 1200 | 1200 | 1200 |
| Housing protection rating | IP67 | IP67 | IP67 |

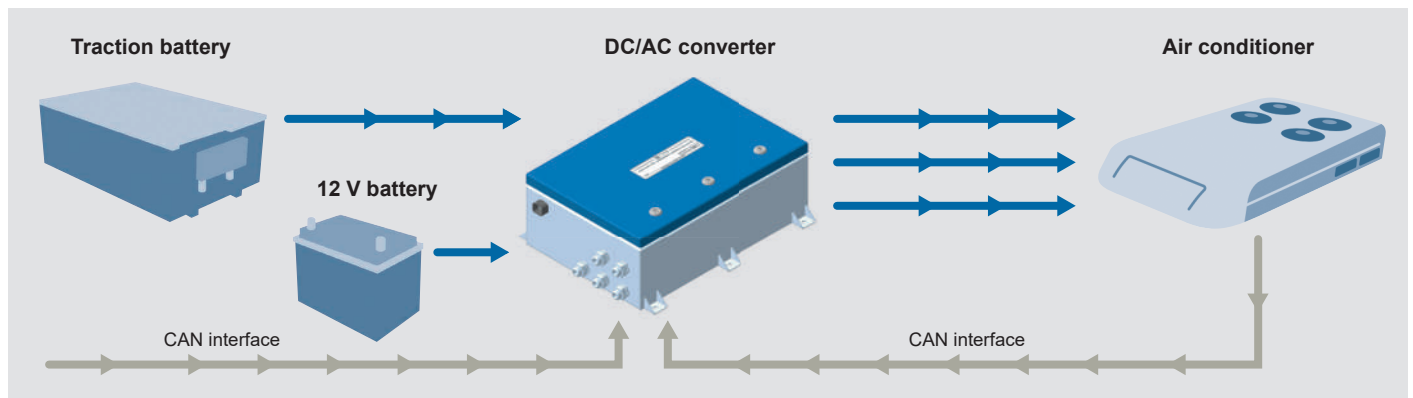
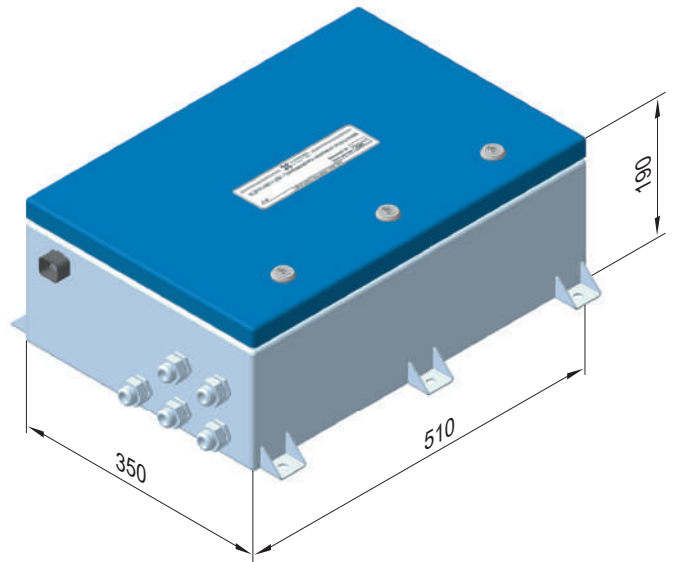


DC/AC converter for air conditioner

AIR CONDITIONER MOTOR CONTROL

KEY BENEFITS

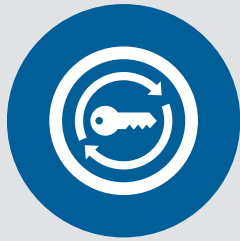
- Fluid cooling
- Housing protection rating IP67
- CAN interface
- In-house design and production by IRZ
- Customizable design



| Parameter | PNK |
|--|------------|
| Rated power, kW | 12 |
| Rated output current, A (three phases) | 17 |
| Supply voltage, V | 350 - 850 |
| Rated output voltage, V, 50 Hz | 380 |
| Cooling | fluid |
| Coolant temperature, °C | -40... +65 |
| Environmental temperature, °C | -40... +85 |
| Radiator tube diameter, mm | 14 |
| Weight, kg | 13 |
| Efficiency, % | 94 |
| Housing protection rating | IP67 |

Advantages of **IRZ SOLUTIONS**

- 1** IMPLEMENTATION OF TURNKEY PROJECTS IN ACCORDANCE WITH CUSTOMER REQUIREMENTS
- 2** IN-HOUSE PRODUCTION OF POWER CONVERTERS
- 3** COST-EFFECTIVE SOLUTIONS
- 4** DELIVERY TIME – UP TO 12 WEEKS
- 5** EQUIPMENT INSTALLATION AND COMMISSIONING ARE DONE BY QUALIFIED EXPERTS OF IRZ
- 6** HIGH QUALITY OF PRODUCTS COMPLIANT WITH RUSSIAN AND INTERNATIONAL STANDARDS
- 7** QUALITY MANAGEMENT SYSTEM IS CERTIFIED FOR COMPLIANCE TO ISO 9001:2015, ISO 14001:2015 AND BS OHSAS 18001
- 8** OPTIMAL ENVIRONMENTAL CATEGORY OF PRODUCTS
- 9** HOUSING PROTECTION RATING IS IP67
- 10** 24/7 CUSTOMER SERVICE SUPPORT



TURNKEY SOLUTIONS –
FROM ENGINEERING TO SERIAL
PRODUCTION AND AFTER-SALE
SERVICES



NUMBER OF EMPLOYEES

400 PEOPLE



ENGINEERING TEAM

100 PEOPLE



20+
YEARS OF EXPERIENCE



15
REGISTERED PATENTS FOR
FUEL AND ENERGY INDUSTRY



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