



890GT-B Outdoor rated PCS

Power Conversion Systems for Energy Storage



ENGINEERING YOUR SUCCESS.

Parker's Energy Grid Tie Division

With 10 years of experience in the Energy Storage Market, Parker's Energy Grid Tie Division (EGT) is committed to being a leading diversified solution provider, designing, manufacturing and servicing Power Conversion Systems across the globe. Headquartered in Charlotte, NC, EGT is a global center of excellence for power conversion systems, with local technology centers in Europe and Asia, providing project execution and support of Energy Storage and Power Generation projects on a global basis. To date, EGT has deployed more than 350MW of Power Conversion Systems around the world.

Drawing from over 40 years of experience in electric power conversion and integrating technologies from other Parker divisions, such as advanced cooling technologies, chillers, advanced controls and HMI's, EGT can provide a truly optimized solution.

Complementing our design and manufacturing capabilities is a team of field service engineers who are available to see projects through successful commissioning and maintenance to maximize system uptime.

350+ MW
ON-GRID

40 YRS
DESIGN EVOLUTION

2008
FIRST GRID-TIE INSTALLATION

Parker's Power Conversion Products

Parker EGT provides a wide range of Power Conversion products for Battery Energy Storage and PV Solar applications, from low kW ratings up to 2MW. Inverters and balance of PCS are manufactured at our ISO9001:2008 certified facilities in Charlotte, NC, and Littlehampton UK.

Parker battery energy storage systems enable advanced functionalities including:

- frequency regulation
- ramp rate control
- peak shaving
- renewables capacity firming
- black start
- microgrid
- power factor control
- deferred T&D upgrade investment



For more information about Parker's Power Conversion Products visit : www.parker.com/egt

Outdoor Energy Storage PCS

890GT-B Series

Description

A critical component of any successful energy storage system is the Power Conditioning System, or “PCS”. The PCS is used in a variety of storage systems, and is the intermediary device between the storage element, typically large banks of (DC) batteries of various chemistries, and the (AC) power grid.

The Parker 890GT-B series PCS is a bidirectional power conversion device, enabling grid power to be converted to DC, charging the batteries in a controlled manner, or enabling battery power to be “inverted” to AC to feed the grid. Given the nature of the semiconductor devices that rapidly switch on and off to create alternating current, a big part of the design includes measures to reduce harmonics, producing as close to a pure sine wave output as possible. The PCS must be able to synchronize with the grid frequency and provide a stable output – appearing to the grid to be a synchronous generator. It responds to changing conditions, providing energy at a controlled ramp rate, but also injects power quickly to correct short term frequency fluctuations. In addition, the 890GT-B has the capability of dynamically control power factor by supplying the grid with the requested amount of real or reactive power on demand, over a wide range.

The heart of the 890GT-B is a proven bidirectional grid tie inverter, containing an array of power semiconductors called IGBTs (Insulated Gate Bipolar Transistors), capable of switching high power

at high speeds. Inside the inverter, the power semiconductors are told when to switch on and off by sequenced gate drivers which are coordinated by an internal algorithm, driven by inputs from a supervisory system. Other items that comprise a PCS are responsible for physically connecting to the grid and storage element, as well as for protection, detection, power quality, and safety. Given that the PCS is usually operational 24/7, and in a range of potentially extreme environmental conditions, a good thermal management system is included – both for the inverters and for the ancillary components.

The 890GT-B is available in ratings to 2200 kVA, and for storage arrays up to 1200 volts DC. It is designed for direct outdoor installation. No air conditioner is required, as the power semiconductors, inductor, and internal ambient air are cooled by Parker’s two-phase advanced cooling system. The cooling system is self-contained and requires no chilled water or external condenser. Multiple lockable access panels make installation and scheduled inspections and maintenance a breeze, with no need for personnel to enter the enclosure. The small footprint and integrated transformer connection results in a space saving installation.



Outdoor Energy Storage PCS

890GT-B Series

Technical specifications

Specifications	Units	890GTB-1200	890GTB-1450	890GTB-1800	890GTB-2200
DC Input					
Input Voltage Range	VDC	400 - 1200			
Input DC Bus Voltage (Max)	VDC	820	1200	820	1200
Overvoltage Protection		Included - Type 2 surge arrester			
DC Disconnection Method		Contactor or Circuit Breaker Options			
Surge Protection		Type 2 surge arrester			
AC Output					
Rated Output at up to 40°C	kVA	1200 ⁽¹⁾	1450 ⁽²⁾	1800 ⁽¹⁾	2200 ⁽²⁾
Rated Output at 50°C	kVA	1080 ⁽¹⁾	1305 ⁽²⁾	1620 ⁽¹⁾	1980 ⁽²⁾
Output Voltage Range	VAC	270 - 480			
Nominal Output Frequency	Hz	50/60			
Power Factor Range		+/- 1.0			
Current Distortion	%	< 3			
Overvoltage Protection		Included - Type 2 surge arrester			
AC Circuit Breaker		65kA Interrupt Rating			

⁽¹⁾ Based on AC Voltage of 400V at 800 VDC

⁽²⁾ Based on AC Voltage of 480V at 1000 VDC

Performance Data	
Efficiency (Max, estimated)	98.7%
Auxiliary and Cooling System Losses	< 6 kVA typical, 9kVA maximum
Sensors and User Interface	
User Interface	10.4" TFT LCD Touch-screen
Communications Options	Modbus TCP (Optional: Ethernet IP, CANopen, DNP3, EtherCAT, PROFIBUS)
Control and Monitoring System	Included
Stored Data History	31 days
Monitored Internal Temperatures	Up to 112 - Including busbars, ambient, choke, IGBTs
External Auxiliary Supply	120/230V single phase or 380-480V three phase
Control Power Breaker	65kA Interrupt Rating
Auxiliary Power Breaker	65kA Interrupt Rating
Mechanical User Interface	EPO Button, On/Off Switch, Local/Remote Switch, Light Switch
Humidity Sensor	Included
Anti-Condensation Heaters	Included
Ground Fault Monitoring/Protection	Optional
Specifications are subject to change	
Compliance and Certification to Standards	
European Certifications	CE: LVD, EMC, G5/4 & G59/1
North American Certifications	UL1741 Second Edition, 2010, NFPA70
Grid Interconnection and Power Quality	IEEE1547 (2003), IEEE1547.1 (2005) and IEEE1547a -2014 Amendment to IEEE1547 (2003), IEEE 519
EMC	EN61000-6-2, EN 61000-6-4

Outdoor Energy Storage PCS

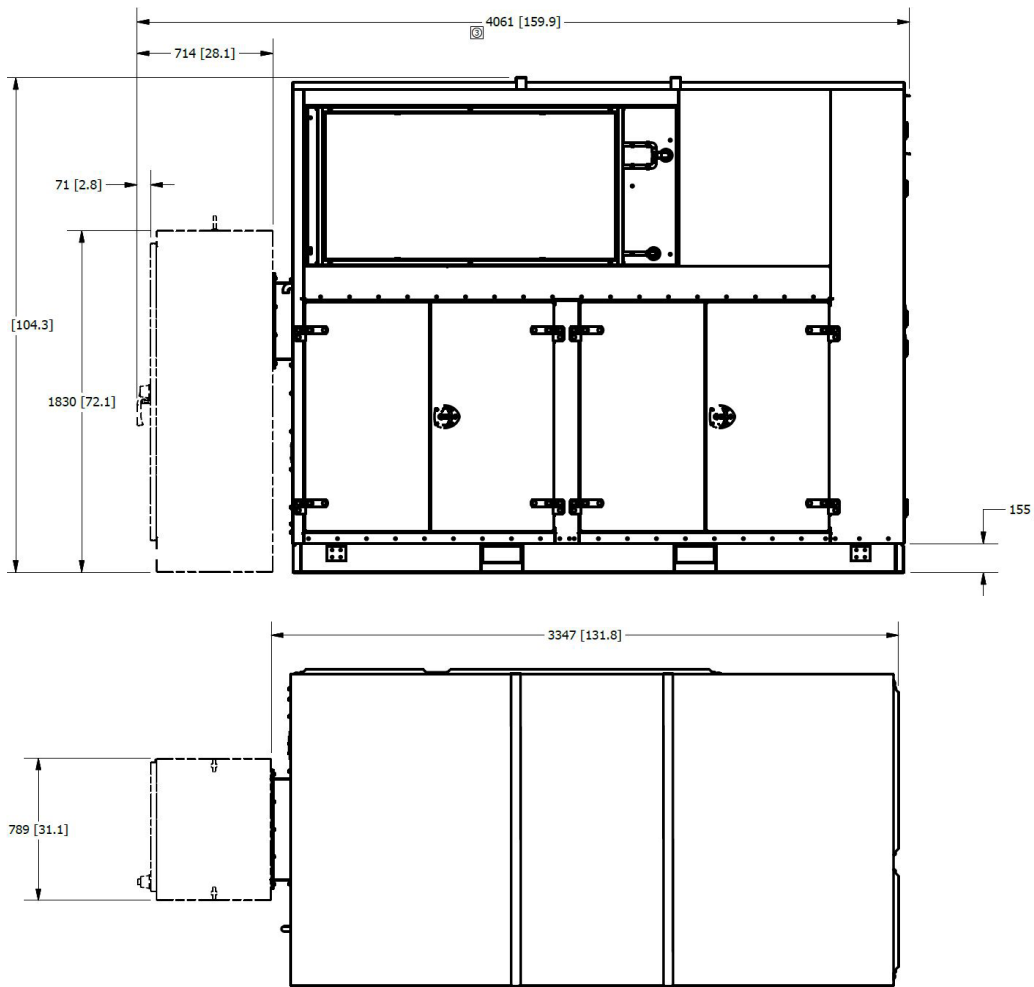
890GT-B Series

Technical specifications

Environmental Ratings	
Ambient Temperature Range	-20° to +55°C, -40°C option available (See AC output specifications)
Relative Humidity	0-100% condensing
Max. Altitude Without Derating	1000 meters/3281 feet
Seismic	IBC Zone 4
Corrosion Resistance Option	>600 hrs salt fog per ASTM B117-11
Mechanical Data	
Environmental Protection Rating	IP55, EN60529
Size (W x D x H) mm (in)	3395 (133.7) x 1710 (67.3) x 2648 (104.3) See detail below
Weight (approximate)	4000 kg/8820 lb

For more information including an animated look inside the 890GT-B, please visit <http://solutions.parker.com/890GT-B>, or **scan the QR code**

Dimensions - mm [in]



Dimensions for estimating purposes only.

Outdoor Energy Storage PCS

890GT-B Series

Features

Control and Diagnostics

A touchscreen HMI is accessible from outside the enclosure, covered by a protective door. The HMI provides useful operating data on a real-time basis. Data includes basic electrical overview, operating mode, inverter output kW or VARs, critical voltages and currents, thermal overview with operating temperatures at over 100 internal monitoring points, operating time, and faults. Also provided are switches for inverter on/off, local/remote, lighting, and control power, an Emergency Power Off button, and a local communication port. Display screens can be customized, allowing visualization of virtually any operating parameter. Typical screen templates will include the following:

Field Diagnostics

- Battery SOC
- Ground current

Basic Parameters

- Grid voltage
- DC bus voltage and current
- Power factor

Performance

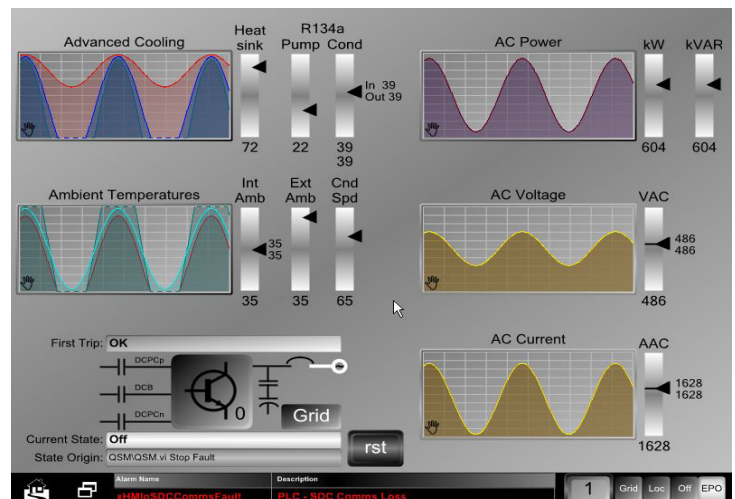
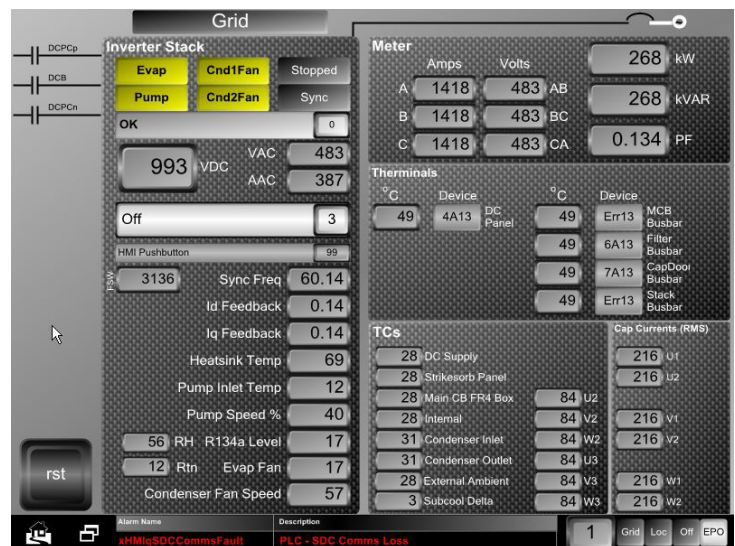
- Actual kilowatt output
- Actual kVAR output
- Target and actual power factor
- Power output ramp rates
- Efficiency
- Cumulative energy output

Climate Control Diagnostics

- Coolant levels
- Fan speeds
- Pump and fan status
- Over 100 internal temperature points
- Coolant temperature
- IGBT temperature
- Contactors temperatures
- Choke temperatures
- Busbar temperatures
- Air temperature and humidity

Digital chart recorder

- Customizable SCADA interface
- SQL database with solid state drive
- Displays and records any parameter
- Displays real time or log



Outdoor Energy Storage PCS

890GT-B Series

Features

VAR Control

In addition to its primary purpose of feeding active power (P , measured in watts) from the battery modules to the grid, the Parker outdoor energy storage PCS is capable of providing reactive power (Q , measured in VARs) when called upon. Within the obvious limitations of rated current and power factor, a reactive power component can be produced on demand. This serves to regulate system voltage, enhancing the stability of a weak grid. Solid state VAR control provides a response time measured in milliseconds, ensuring that momentary fluctuations on the grid are minimized. Real or reactive power can be regulated.

Power Quality

The core of the 890GT-B PCS, Parker's AC890PX Inverter technology, provides quality power by incorporating an advanced Pulse-Width-Modulated (PWM) switching technology, automatically synchronizing to the AC power grid. Integral harmonic filters deliver sine wave power well within IEEE519 guidelines for Total Harmonic Distortion. The Parker system provides automated sequenced shutdown and disconnection under power loss events, in compliance with IEEE 1547 guidelines.

Protection

The Parker Outdoor Energy Storage PCS is equipped with a comprehensive list of protective devices for safe and reliable operation.

DC Inputs: Contactor or circuit breaker disconnect, ground fault sensor, and surge suppression

AC Output: Circuit breaker, phase current sensors (2), and surge suppression



Transformer Coupling Provision

The 890GT-B is designed to be easily pad mounted/skid mounted with a transformer, and includes a connection chute to protect the three phase output lugs. This configuration reduces installation cost by requiring less cabling and can result in a smaller installed footprint.

Outdoor Energy Storage PCS

890GT-B Series

Features

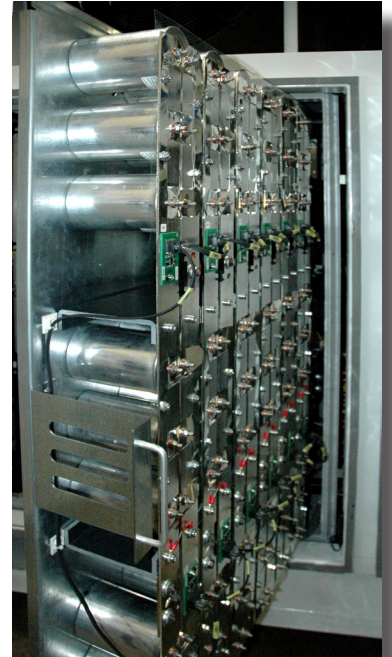


Easily Transportable

Integral forklift tubes allow the 890GT-B to be moved into position or relocated with minimal equipment. Heavy gauge steel housing is rugged and rigid, providing protection before, during, and for years after installation.

Accessible Capacitors

Servicing and maintaining the 890GT-B is easy, with accessible filter capacitor assemblies mounted in a swing-out panel. The design makes it possible to access critical components from the outside of the 890GT-B enclosure, eliminating confined space protocols, and enhancing technician safety.



Replaceable Inductor Modules

With the capacitor door opened, the inductors are externally accessible and easily serviced in the field. Refrigerant cooled inductor modules have a slide-out design to expedite replacement.

Internal Temperature Sensing

Parker's unique heat seeking technology allows monitoring of over 100 crucial internal points like bus bars. Networked temperature sensors are located throughout the inner workings of the 890GT-B. There is no need to open the access panels or use IR ports to perform temperature readings since all data is collected and available to the user through SCADA or HMI device. By continuously monitoring temperature at these points, anomalies can be detected early on.



Outdoor Energy Storage PCS

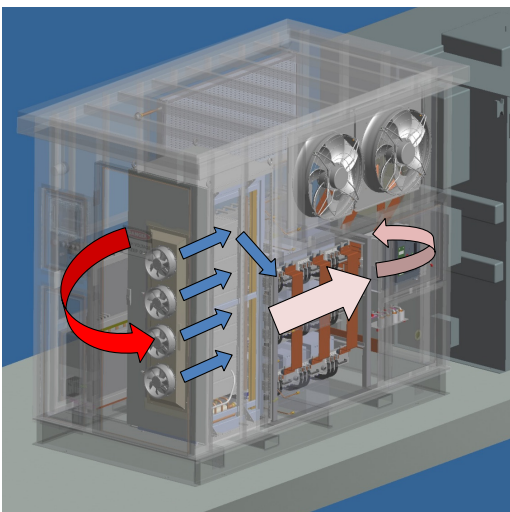
890GT-B Series

Inverter Technology

At the heart of every grid tied system is a reliable and efficient inverter. With over three decades of experience in power conversion, Parker meets these requirements. While the concept of the inverter may seem simple, the design and functionality is critical. Renewable energy sources are valuable, so high efficiency and maximum uptime are desirable attributes. The core of the system, Parker's AC890PX Inverter technology, provides quality power by incorporating an advanced Pulse-Width-Modulated (PWM) switching technology, automatically synchronizing to the AC power grid. Integral harmonic filters deliver pure sine wave power well within IEEE519 guidelines for Total Harmonic Distortion. Maximum uptime is achieved first by a robust and reliable design, but also by a design that makes maintenance and service quick and easy. By virtue of modular design, power components are provided in modular, lightweight, easily replaceable assemblies that can be swapped out by one person, with no ramps, rigging, or major disassembly required. Inverters are manufactured at our ISO9001:2008 quality system certified facility in Charlotte, NC, and satisfy ARRA "Buy American" provision.

Modular Design

The Parker 890GT-B Energy Storage PCS employs a unique modular inverter design for ease of maintenance and service. Output power is handled by replaceable phase modules, which are cooled by Parker's advanced 2-phase cooling system. Each module contains IGBT power semiconductors, DC bus capacitors, and gate drive circuitry. The easily removable modules weigh only 16 kg (about 35 pounds), and average time to swap is under 15 minutes. Cooling and AC power connections are quick disconnect type, with connections made as module is installed. AC output filters also utilize a modular tray design for easy maintenance. This unique modular construction offers an extremely low MTTR for high system availability.



Advanced Cooled

The small footprint and high reliability of the Parker 890GT-B series outdoor energy storage PCS is made possible by an advanced cooling system. Parker's exclusive coolant-based system uses a non-conductive, non-corrosive liquid to cool critical components. The refrigerant used in this two phase system requires only 13% of the flow rate of an equivalent water/glycol based system. By capitalizing on the tremendous amount of heat that is transferred as the refrigerant vaporizes, then releasing the heat through a condenser, the cooling system runs efficiently and effectively, without the need for a compressor. Redundant system components will allow inverter operation even after loss of a pump or a fan. (Output may be reduced under certain operating conditions) Compared to air cooling, IGBT temperatures are kept more constant, with less excursions over time.

Outdoor Energy Storage PCS

890GT-B Series

Product Code

Example Product Code:		890GT	B	-	220	6	-	0C	S	G	2	-	S	4	0	0	S	1	0
Application		Energy Storage		B															
Power Rating:		B2200kVA (480AC)			220														
		B1800kVA (400AC)			180														
		B1450kVA (480AC)			145														
		B1200kVA (400AC)			120														
Frequency:		50 Hz			5														
		60 Hz			6														
DC Connection:		Contactor						0C											
		DC Breaker						0B											
AC Connection		Close Coupled						S											
		Bottom Entry - requires purchase of bolt-on cabinet and bus bars						B											
Ground		Negative Bus Grounded								N									
		Positive Bus Grounded								P									
		Ungrounded w/ GF Detector								G									
		Ungrounded w/o GF Detector								U									
		Grounded (Mid-Point)								M									
Enclosure		White (IP55) - Harsh Environment								2									
		Gray (IP55) - Harsh Environment								3									
		IP21								4									
		Almond (IP55) - Harsh Environment								5									
		Custom								9									
Power Meter		Standard								S									
		Standard with CT's on Phase 2								3									
Communications		Modbus TCP Optical								4									
		Separate Operational & Maintenance Networks								D									
External Control Power		UPS: Derived / AUX 3ph : None								0									
		UPS: 120/230V 1ph / AUX : 400V								4									
		UPS: Derived / AUX : 480V 3ph								5									
		UPS: 120/230V 1ph / AUX : 480V								6									
		UPS: 120/230V 1ph / AUX 3ph : Derived								7									
		UPS: 120/230V 1ph black start / AUX 3ph : Derived								8									
		UPS: Derived / AUX : 400V 3ph								9									
Build Standard		UL								0									
		IEC								1									
Temperature		Standard (-20C to 55C)								S									
		Extended Range (-40 to 55C)								E									
Advanced Controls & I/O		Standard								0									
		Standard w/analog P/Q								1									
		Dynamic controls								2									
Other		Standard								0									
		Attenuator Option with PT's								2									
		AC Pre-Charge Option								3									
		Attenuator and AC Pre-Charge Option								4									

Parker EGT Customer Care Offerings

With a global reach, Parker EGT's Aftermarket and Service team support our Grid Tie Projects across the world for all your Aftermarket and Service related needs.

Commissioning Assistance

Parker EGT's experienced Field Service Engineers assist with the on site commissioning of your Grid Tie equipment to ensure a smooth and timely start up.

Training

Parker EGT can provide you with on-site or class room style training for any aspect of our equipment. Whether it is training on how to operate the equipment and perform troubleshooting or training on how to maintain the equipment, we can provide you with our standard training package, or a training that is customized to your specific needs.

Preventative Maintenance

Regular maintenance of your Grid Tie equipment will ensure maximized uptime. Parker EGT offers different levels of Preventative Maintenance service packages as well as training on Preventative Maintenance of our equipment should you want your local staff service the equipment.

Spare Parts and Warranty Support

Parker EGT Inverters use advanced technologies with high quality components that are critical for optimal performance in each and every PV and Energy Storage installation. Should anything need urgent support, Parker EGT offers readily available Spare Part packages as well as on-site engineering support.

Remote Diagnostics and Troubleshooting

Parker's equipment has built in remote access capabilities which allows Parker to collect and analyze data remotely to perform troubleshooting or predictive failure analysis. Advanced IoT capabilities allows fault monitoring, data logging as well as customized report generation.

For more information about any of our Parker EGT products, solutions or services, please contact us at:

Email: info.us.egt@parker.com

Web: www.parker.com/egt



Energy
Storage
Association



Parker Worldwide

AE – UAE, Dubai

Tel: +971 4 8127100

parker.me@parker.com

AR – Argentina, Buenos Aires

Tel: +54 3327 44 4129

AT – Austria, Wiener Neustadt

Tel: +43 (0)2622 23501-0

parker.austria@parker.com

AT – Eastern Europe,
Wiener Neustadt

Tel: +43 (0)2622 23501 900

parker.easteurope@parker.com

AU – Australia, Castle Hill

Tel: +61 (0)2-9634 7777

AZ – Azerbaijan, Baku

Tel: +994 50 2233 458

parker.azerbaijan@parker.com

BE/LU – Belgium, Nivelles

Tel: +32 (0)67 280 900

parker.belgium@parker.com

BR – Brazil, Cachoeirinha RS

Tel: +55 51 3470 9144

BY – Belarus, Minsk

Tel: +375 17 209 9399

parker.belarus@parker.com

CA – Canada, Milton, Ontario

Tel: +1 905 693 3000

CH – Switzerland, Etoy

Tel: +41 (0)21 821 87 00

parker.switzerland@parker.com

CL – Chile, Santiago

Tel: +56 2 623 1216

CN – China, Shanghai

Tel: +86 21 2899 5000

CZ – Czech Republic, Klecany

Tel: +420 284 083 111

parker.czechrepublic@parker.com

DE – Germany, Kaarst

Tel: +49 (0)2131 4016 0

parker.germany@parker.com

DK – Denmark, Ballerup

Tel: +45 43 56 04 00

parker.denmark@parker.com

ES – Spain, Madrid

Tel: +34 902 330 001

parker.spain@parker.com

FI – Finland, Vantaa

Tel: +358 (0)20 753 2500

parker.finland@parker.com

FR – France, Contamine s/Arve

Tel: +33 (0)4 50 25 80 25

parker.france@parker.com

GR – Greece, Athens

Tel: +30 210 933 6450

parker.greece@parker.com

HK – Hong Kong

Tel: +852 2428 8008

HU – Hungary, Budapest

Tel: +36 1 220 4155

parker.hungary@parker.com

IE – Ireland, Dublin

Tel: +353 (0)1 466 6370

parker.ireland@parker.com

IN – India, Mumbai

Tel: +91 22 6513 7081-85

IT – Italy, Corsico (MI)

Tel: +39 02 45 19 21

parker.italy@parker.com

JP – Japan, Tokyo

Tel: +81 (0)3 6408 3901

KR – South Korea, Seoul

Tel: +82 2 559 0400

KZ – Kazakhstan, Almaty

Tel: +7 7272 505 800

parker.easteurope@parker.com

LV – Latvia, Riga

Tel: +371 6 745 2601

parker.latvia@parker.com

MX – Mexico, Apodaca

Tel: +52 81 8156 6000

MY – Malaysia, Shah Alam

Tel: +60 3 7849 0800

NL – The Netherlands,

Oldenzaal

Tel: +31 (0)541 585 000

parker.nl@parker.com

NO – Norway, Ski

Tel: +47 64 91 10 00

parker.norway@parker.com

NZ – New Zealand, Mt Wellington

Tel: +64 9 574 1744

PL – Poland, Warsaw

Tel: +48 (0)22 573 24 00

parker.poland@parker.com

PT – Portugal, Leca da Palmeira

Tel: +351 22 999 7360

parker.portugal@parker.com

RO – Romania, Bucharest

Tel: +40 21 252 1382

parker.romania@parker.com

RU – Russia, Moscow

Tel: +7 495 645-2156

parker.russia@parker.com

SE – Sweden, Spånga

Tel: +46 (0)8 59 79 50 00

parker.sweden@parker.com

SG – Singapore

Tel: +65 6887 6300

SK – Slovakia, Banská Bystrica

Tel: +421 484 162 252

parker.slovakia@parker.com

SL – Slovenia, Novo Mesto

Tel: +386 7 337 6650

parker.slovenia@parker.com

TH – Thailand, Bangkok

Tel: +662 717 8140

TR – Turkey, Istanbul

Tel: +90 216 4997081

parker.turkey@parker.com

TW – Taiwan, Taipei

Tel: +886 2 2298 8987

UA – Ukraine, Kiev

Tel: +380 44 494 2731

parker.ukraine@parker.com

UK – United Kingdom,
Warwick

Tel: +44 (0)1926 317 878

parker.uk@parker.com

US – USA, Cleveland

Tel: +1 216 896 3000

VE – Venezuela, Caracas

Tel: +58 212 238 5422

ZA – South Africa,
Kempton Park

Tel: +27 (0)11 961 0700

parker.southafrica@parker.com



Parker Hannifin Corporation

Energy Grid Tie Division

9201 Forsyth Park Dr.

Charlotte, NC 28273 USA

Tel: (704) 587-4051 Fax: (704) 588-3249

info.us.egt@parker.com

www.parker.com/egt

