

# Thermoelectric Generators



Power where you need it.®

[www.GenthermGlobalPower.com](http://www.GenthermGlobalPower.com)

## THE WORLD'S LEADING MANUFACTURER

Gentherm Global Power Technologies (GPT) is the world's largest supplier of thermoelectric generators. A vertically integrated manufacturer with an ISO 9001 registered QA program in place, GPT has 40 years of experience in the engineering, manufacturing and installation of remote power systems.

The company established in 1975 to commercialize the unique lead telluride thermoelectric generator technology developed by the 3M Corporation in the 1960s for the Apollo space program. Based on this initial technology, GPT has developed a product line of thermoelectric generators using high quality, field proven components which has resulted in the company's worldwide recognition for economic and reliable remote power solutions.

### Our Mission:

To be the dominant supplier of reliable remote power systems for industrial customers in the world's toughest environments.

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GENTHERM  
GLOBAL POWER TECHNOLOGIES



## CORE VALUES

### Pride and Ethics

- We behave ethically, are passionate, and take pride in all we do

### Customers

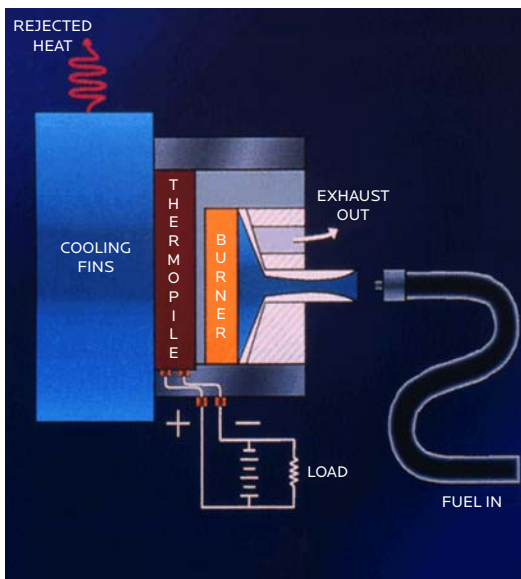
- We genuinely care about the success of our customers
- We get energized by technical challenges presented by customers

### People

- We are dedicated and loyal to the GPT team
- We are respectful of others and want all of us to succeed

### Community

- We are part of a positive environment at work, home and community
- We enjoy our work-life mix and have fun together



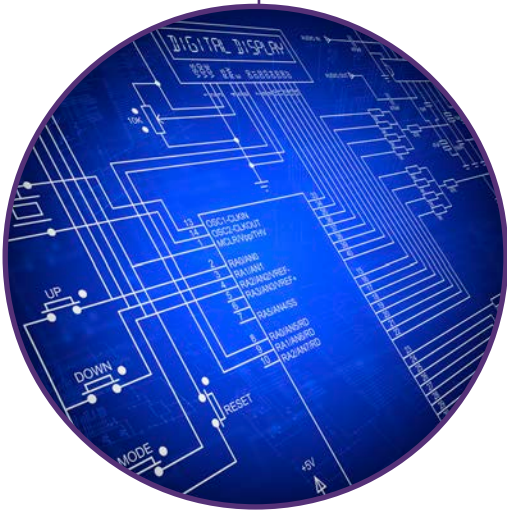
*The three main parts of GPT's solid state generator: a burner, the thermopile and cooling fins*

## TEGs: SIMPLE, INNOVATIVE TECHNOLOGY

Our legacy product line of thermoelectric generators, convert heat directly into electricity. As heat moves from a gas burner through a thermoelectric module, it causes an electrical current to flow.

The heart of a GPT thermoelectric generator is a hermetically sealed thermoelectric module (thermopile) which contains an array of lead-tin-telluride semiconductor elements. This durable module provides a chemically stable environment for the thermoelectric materials which ensures a long service life. On one side of the thermopile, a gas burner is installed, while the opposite side is kept cool by aluminum cooling fins or a heat pipe assembly. An operating generator maintains a temperature of approximately 540°C on the hot side and 140°C on the cold side. The heat flow through the thermopile creates steady DC electricity with no moving parts.

# Gentherm Global Power Technologies (GPT) Leadership



## Systems Engineering

In addition to supplying thermoelectric generators, Gentherm Global Power Technologies (GPT) can provide complete turnkey power systems for both hazardous (Class 1, Division 2) and non-hazardous locations including:

- power conditioning for any DC or AC voltage output
- gas pressure reduction systems
- battery banks (NiCad, VRLAS, etc.)
- alarm monitoring and control
- peripheral equipment.

## Customer Support

GPT takes pride in providing high levels of customer service and support. Knowledgeable sales staff, backed by GPT's Integrated Systems Engineering group, are capable of providing full technical support in the selection and sizing of components for remote power supplies. As well, post-sales support is provided by GPT's Customer Service representatives on a world-wide basis. This service includes telephone hotline support and field support for installation, commissioning and trouble shooting.

## Training

Scheduled training courses are conducted throughout the year at GPT's facility in Calgary. These courses are a combination of hands-on maintenance procedures and classroom technical training. GPT's training staff can also provide onsite customized training programs anywhere in the world.

### When To Specify GPT TEG'S

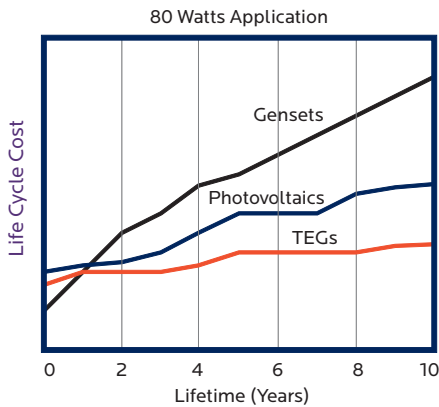
- Load requirements from 5 to 5,000 watts
- Critical application requiring highly reliable power
- Low maintenance is required
- Long life is important
- Extreme climatic conditions (hot, cold, wet, dry) exist
- Remote or unattended location
- Lowest life cycle cost

# How Thermoelectric Generators Stack Up

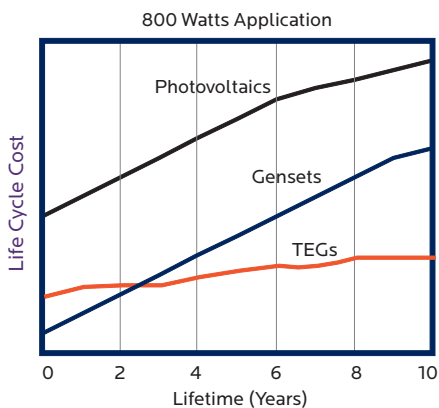


100 watt system  
cathodic protection, Louisiana, USA

## LIFE CYCLE COST COMPARISON



## LIFE CYCLE COST COMPARISON



## COMPARED TO THE POWER GRID...

**RELIABILITY:** Power grid reliability can be a concern in many countries, particularly in developing countries where the reliability is often below the requirements of many applications. The installation of a GPT thermoelectric generator is a common solution for customers requiring highly reliable power for automation, cathodic protection, and telecom applications.

**COST:** Even in developed countries with a reliable grid infrastructure, the capital cost and service charges associated with running grid lines to a remote location can be prohibitive. In such cases, the installation for a thermoelectric generator to meet local power requirements is often a more cost effective solution.

## COMPARED TO GENSETS...

**MAINTENANCE, RELIABILITY:** While the capital cost of diesel or natural gas gensets is typically lower than that of a thermoelectric generator, the requirement to have a skilled technician perform regular maintenance on the gensets results in greatly increased operational costs, increased downtime and overall reduced reliability. When the complete life cycle costs, including all operational costs, are compared, the thermoelectric generator has lower operational costs and is more reliable.

## COMPARED TO PHOTOVOLTAICS...

**LIFE CYCLE COST AND PERFORMANCE:** Although properly sized photovoltaic systems have shown promise in providing low power solutions in areas with high solar insolation, solar users are increasingly turning to thermoelectric generators because of problems with reliability, short battery life and theft.

GPT's thermoelectric generators have a 20-year design life and require minimal maintenance over the life of the system. An equivalent photovoltaic system would require 20-year life batteries - the cost of batteries alone can be as much as the thermoelectric generator. Studies have shown that when the capital cost of a photovoltaic system is based on medium life batteries (i.e. 10 years), the true life cycle cost of the solar system is much higher than that of a thermoelectric generator due to the high cost of battery replacement and higher maintenance costs. Theft and vandalism have not been a concern with GPT systems, which are small and unobtrusive, and can be mounted inside security shelters if required.

## Reliability, Low Maintenance, Long Life



2000 watt system  
well site, Peru



1000 watt system  
Offshore, Gabon

### AT WORK AROUND THE WORLD

In more than 55 countries around the world, GPT's thermoelectric generators are providing reliable, cost-effective power for critical operation located in remote areas.

GPT's generators range in output size from 15 to 550 watts, and are ideal for numerous applications requiring power up to 5,000 watts. Applications include power for remote control and monitoring of oil or gas pipelines and production facilities, power for navigational aids, telecommunications systems and cathodic protection pipelines, and well casings.

Producing power by the direct conversion of heat into electricity, GPT's solid-state generators have no moving parts, which translates to many significant advantages in remote locations or whenever power supply is considered critical.

#### HIGH RELIABILITY:

Solid-state design ensures trouble-free operation and the most reliable power supply system available.

#### LOW MAINTENANCE:

One to two hours a year is a pro-active maintenance schedule.

#### COMPETITIVE PRICE:

Extremely competitive capital and operating costs for systems up to 5,000 watts.

#### LONG LIFE:

Hermetically sealed thermopile has a 20-year design life.

#### EASY INSTALLATION:

Typically requires less than a day to install and commission.

#### CONTINUOUS OPERATION:

Field-proven, GPT's systems operate unsheltered in all climates and weather conditions and are not affected by salt spray, bird droppings, or airborne contaminants.

# The Preferred Remote Power Source



## FEATURES OF GPT'S THERMOELECTRIC GENERATOR

- Operate on natural gas, propane or butane
- Hermetically sealed power unit with a 20-year design life
- Burner system constructed from high-temperature nickel alloys
- Stainless steel cabinets
- Automatic spark ignition
- Automatic safety shutoff

## OIL & GAS INDUSTRY

Gentherm Global Power Technologies's (GPT) thermoelectric generators are used for a variety of remote power applications in the oil and gas industry primarily because they have proven to be the most reliable power source available for the rugged demands of the industry.

## Cathodic Protection

*Use: to provide electrical current to prevent corrosion in pipelines and producing oil and gas wells.*

GPT's thermoelectric generators are the perfect match for the unattended, continuous power requirements of impressed current cathodic protection systems in pipelines and well casings. With high reliability, low maintenance requirements, and minimal gas consumption, GPT generators have negligible operating costs.

## SCADA

*Use: for remote instrumentation, automation, and communication.*

Pipeline operators and oil and gas producers are increasingly using Supervisory Control And Data Acquisition (SCADA) systems for monitoring, measuring, and controlling equipment in the field. GPT's thermoelectric generators are being used to power remote telemetry units, gas analyzers, and metering equipment as well as for routine operating functions and emergency shutdown.

## Offshore Operations

*Use: to provide primary power for unmanned platforms and backup power on manned platforms for critical communications and emergency shutdown systems.*

For offshore oil and gas operators, the ultimate test of equipment operation is in the harsh and highly corrosive offshore environment. GPT's generators pass this rigorous test - in terms of reliability, low maintenance and safety, including operating in hazardous (Class 1, Division 2) environments.



**Telecommunications**  
150 watt system  
*remote radio repeater tower, USA*

## TELECOMMUNICATIONS INDUSTRY

Gentherm Global Power Technologies (GPT) generators are the obvious choice for an increasing variety of tasks in the rapidly growing telecommunications industry, including:

- VSAT terminals
- Point to point microwave links
- Point to multi-point systems
- Cellular and PCS
- Radio/television rebroadcasting systems
- Military communication systems
- Fiber optic links
- Mobile radio repeaters
- Emergency services communication
- Security and surveillance

As the telecom industry's reliability requirements approach 100%, GPT's generators are becoming the reliable and cost-effective power supply solution of choice. Also, as many telecom applications involve remote sites, the proven performance of GPT's generator technology is essential. The low maintenance requirements of GPT's generators are a distinct advantage as site visits can be reduced to coincide with the annual preventive maintenance cycle of the telecom equipment.

## DIVERSE INDUSTRIAL USES

GPT thermoelectric generators are also being used as the power source solution for many other remote applications, such as environmental monitoring, navigation aids, buoys, airstrip landing lights, and lighthouses.



**GlobalSolarHybrid**  
50 watt  
*environmental fish and wildlife monitoring system*

## Operation & Maintenance

The key operational feature of GPT thermoelectric generators is the minimal maintenance requirement associated with the products solid state design. Recommended maintenance of one to two hours per year is all that is required to check the power output and ensure a clean fuel supply by cleaning and/or changing the orifice and fuel filter. Consumables for recommended maintenance are typically less than one percent of the capital cost per year.

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## Product Summary

Model	Power Specification @ 20°C	Fuel Consumption at Full Power *All natural Gas is Std. 1000 BTU/SCF 37.7 MJ/Sm <sup>3</sup> gas	Dimensions LxWxH mmxx(inches)	Weight kg (lb)
5030	21 Watts @ 12 Volts 21 Watts @ 24 Volts	<b>Natural Gas:</b> 2.1 m <sup>3</sup> /day (74 ft <sup>3</sup> /day) <b>Propane:</b> 3.0 l/day (0.8 USgal/day) / 1.5 kg/day <b>Max Supply Pressure:</b> 172 kPa (25 psig) <b>Min. Supply Pressure:</b> 69 kPa (10 psig)	347 x 355 x 449 (14 x 14 x 18)	18 (40)
5060	60 Watts @ 6.7 Volts 54 Watts @ 12 Volts 54 Watts @ 24 Volts 54 Watts @ 48 Volts	<b>Natural Gas:</b> 4.4 m <sup>3</sup> /day (155 ft <sup>3</sup> /day) <b>Propane:</b> 5.7 l/day (1.5 USgal/day) / 2.9 kg/day <b>Max Supply Pressure:</b> 172 kPa (25 psig) <b>Min. Supply Pressure:</b> 69 kPa (10 psig)	629 x 372 x 988 (25 x 15 x 39)	41 (90)
5120	120 Watts @ 6.7 Volts 108 Watts @ 12 Volts 108 Watts @ 24 Volts 108 Watts @ 48 Volts	<b>Natural Gas:</b> 8.8 m <sup>3</sup> /day (311 ft <sup>3</sup> /day) <b>Propane:</b> 11.4 l/day (3.0 USgal/day) / 5.8 kg/day <b>Max Supply Pressure:</b> 172 kPa (25 psig) <b>Min. Supply Pressure:</b> 69 kPa (10 psig)	757 x 372 x 988 (30 x 15 x 39)	60 (132)
5220	195 Watts @ 12 Volts 178 Watts @ 24 Volts	<b>Natural Gas:</b> 19.7 m <sup>3</sup> /day (700 ft <sup>3</sup> /day) <b>Propane:</b> 28.0 l/day (7.4 USgal/day) / 14.2 kg/day <b>Max Supply Pressure:</b> 345 kPa (50 psig) <b>Min. Supply Pressure:</b> 165 kPa (24 psig)	810 x 450 x 1275 (31 x 18 x 50)	97 (214)
8550	480 Watts @ 12 Volts 550 Watts @ 24 Volts 480 Watts @ 48 Volts	<b>Natural Gas:</b> 48 m <sup>3</sup> /day (1695 ft <sup>3</sup> /day) <b>Propane:</b> 76 l/day (20.1 USgal/day) / 38 kg/day <b>Max Supply Pressure:</b> 172 kPa (25 psig) <b>Min. Supply Pressure:</b> 103 kPa (15 psig)	1549 x 1549 x 1016 (61 X 61 X 40)	102 (225)
1120 <small>Hazardous Approved  (Class 1, Div. 1 or 2) (Optional Class 1, Div. 1)</small>	110 Watts @ 6.7 Volts 100 Watts @ 12 Volts 100 Watts @ 24 Volts 100 Watts @ 48 Volts	<b>Natural Gas:</b> 8.8 m <sup>3</sup> /day (311 ft <sup>3</sup> /day) <b>Propane:</b> 11.4 l/day (3.0 USgal/day) / 5.8 kg/day <b>Max Supply Pressure:</b> 172 kPa (25 psig) <b>Min. Supply Pressure:</b> 69 kPa (10 psig)	797 X 602 X 1150 (32 x 24 x 45)	130 (285)
1500 <small>Hazardous Approved  (Class 1, Div. 2)</small>	500 Watts @ 24 Volts	<b>Natural Gas:</b> 48.0 m <sup>3</sup> /day (1695 ft <sup>3</sup> /day) <b>Propane:</b> N/A <b>Max Supply Pressure:</b> 172 kPa (25 psig) <b>Min. Supply Pressure:</b> 103 kPa (15 psig)	1416 x 1416 x 2899 (56 x 56 x 114)	700 (1530)





# Model 5030 Thermoelectric Generators



Gentherm Global Power Technologies' \* (GPT) Model 5030 Thermoelectric Generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

## Power Specification

Power Rating at 20°C  
21 Watts at 12 Volts  
21 Watts at 24 Volts

## Electrical

Adjustment:	12 V	12 -18 Volts
	24 V	24 - 30 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 10 AWG wire. Opening for 3/4" conduit in the base of the cabinet.

## Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)

## Optional Features

- Pole Mount or bench stand
- Corrosive Environmental Fuel System

**Note:** Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric

## Fuel

<b>Natural Gas:</b>	2.1 m <sup>3</sup> /day (74 Sft <sup>3</sup> /day) 1000 BTU/Sft <sup>3</sup> (37.7 MJ/SM <sup>3</sup> ) gas max 115 mg/Sm <sup>3</sup> (~170 ppm) H <sub>2</sub> S max 120 mg/Sm <sup>3</sup> H <sub>2</sub> O max 1% free O <sub>2</sub>
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<b>Propane:</b>	3.0 l/day (0.8 US gal/day)
Max. Supply Pressure:	172 kPa (25 psi)
Min. Supply Pressure:	69 kPa (10 psi)
Fuel Connection:	1/4" MNPT

## Environmental

Ambient Operation Temperature: Max. 45°C (115°F) Min. -40°C (-40°F).  
Operating Conditions: Unsheltered operation  
Please contact GPT for operating conditions below -40°C or above +45°C.

## Materials of Construction

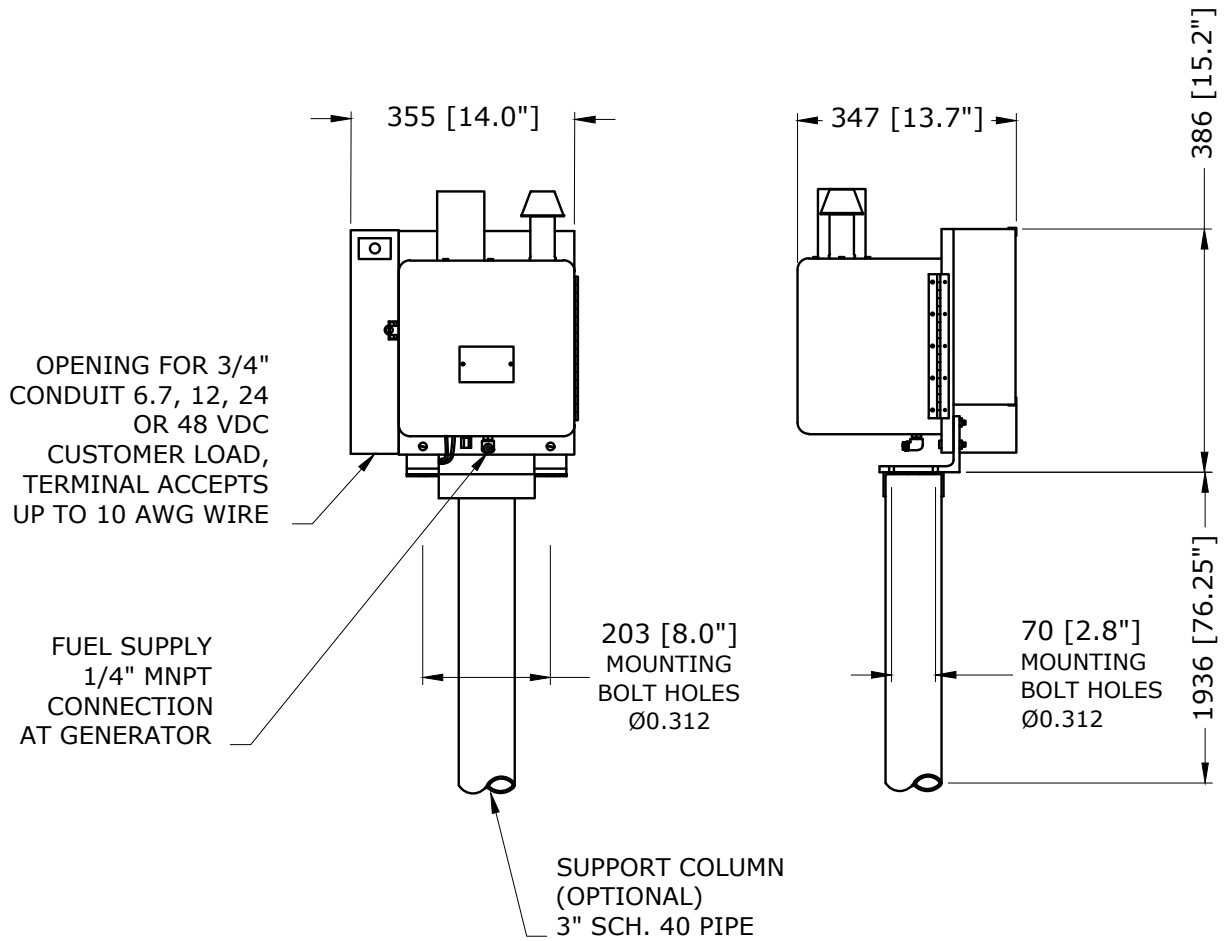
Cabinet:	Aluminum
Cooling Type:	Natural Convection
Fuel System:	Brass, Aluminum & SS

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## Typical Installation



### NOTES:

1. GENERATOR WEIGHT: 18 kg [40 lb]
2. DIMENSIONS IN mm [INCHES].

MODEL: 5030  
DRW: 42354 rev2

# Model 5060 Thermoelectric Generators



## Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- Volt & Amp Meter

## Optional Features

- Cathodic Protection Interface
- Pole Mount or bench stand
- Corrosive Environmental Fuel System
- Flame Arrestor

**Note:** Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric

Gentherm Global Power Technologies' \* (GPT) Model 5060 Thermoelectric Generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

## Power Specifications

Power Rating at 20°C  
60 Watts at 6.7 Volts  
54 Watts at 12 Volts  
54 Watts at 24 Volts  
54 Watts at 48 Volts

## Electrical

Adjustment:	6.7 V	up to 11 Volts
	12 V	12 -18 Volts
	24 V	24 - 30 Volts
	48 V	48 - 60 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 8 AWG wire. Opening for 3/4" conduit in the base of the cabinet.

## Fuel

**Natural Gas:** 4.4 m<sup>3</sup>/day (155 Sft<sup>3</sup>/day)  
1000 BTU/Sft<sup>3</sup> (37.7 MJ/SM<sup>3</sup>) gas  
max 115 mg/Sm<sup>3</sup> (~170 ppm) H<sub>2</sub>S  
max 120 mg/Sm<sup>3</sup> H<sub>2</sub>O  
max 1% free O<sub>2</sub>

**Propane:** 5.7 l/day (1.5 US gal/day)  
Max. Supply Pressure: 172 kPa (25 psi)  
Min. Supply Pressure: 69 kPa (10 psi)  
Fuel Connection: 1/4" MNPT

## Environmental

Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).  
Operating Conditions: Unsheltered operation  
Please contact GPT for operating conditions below -40°C or above +45°C.

## Materials of Construction

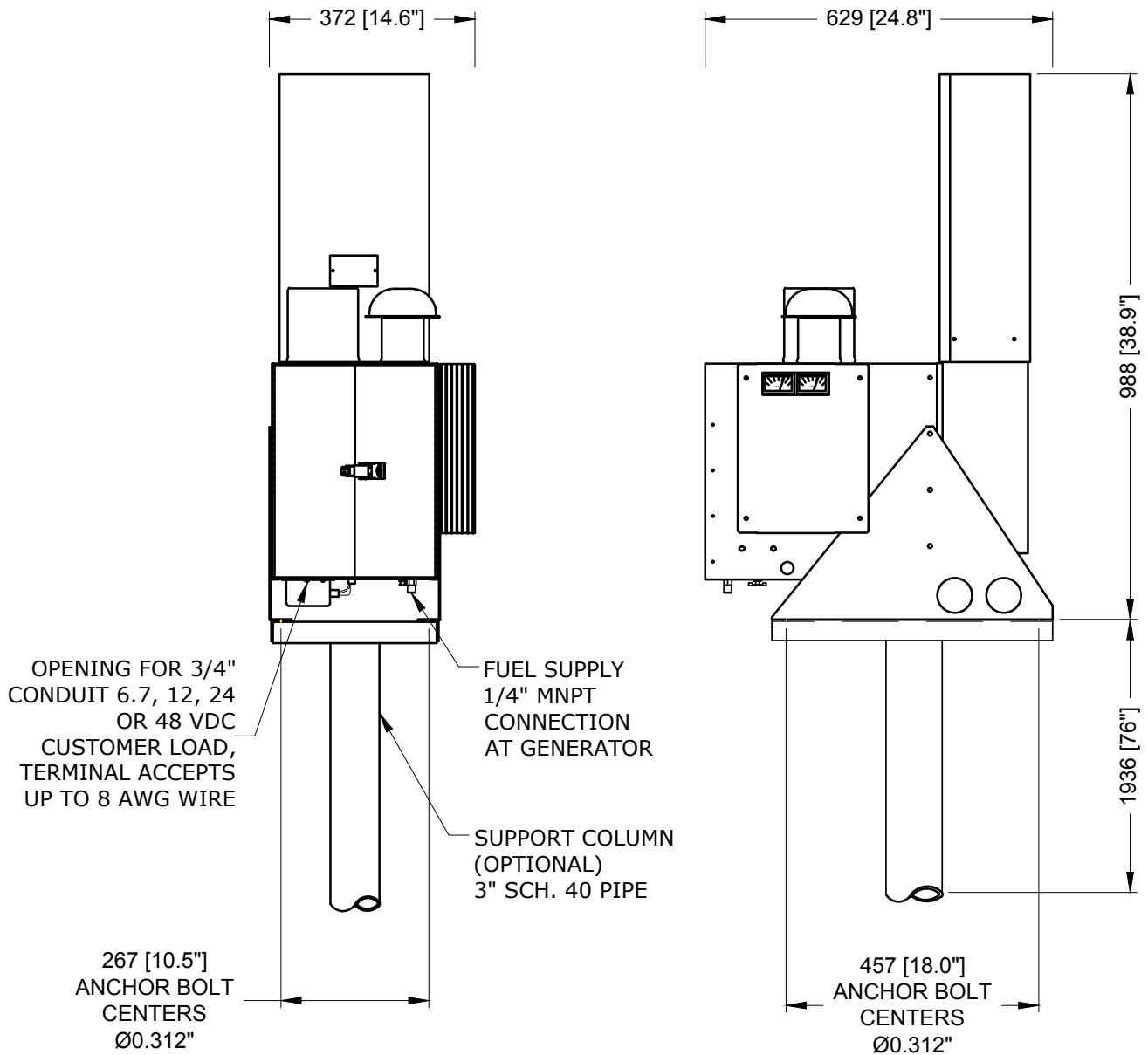
Cabinet: 304 SS  
Cooling Type: Natural Convection  
Fuel System: Brass, Aluminum & SS

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## Typical Installation



### NOTES:

1. GENERATOR WEIGHT: 41 kg [90 lb]
2. DIMENSIONS IN mm [INCHES].

MODEL: 5060  
DRW: 42355 rev2

# Model 5120 Thermoelectric Generators



## Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- Volt & Amp Meter

## Optional Features

- Cathodic Protection Interface
- Pole Mount or bench stand
- Corrosive Environmental Fuel System
- Flame Arrestor
- Marine Service

**Note:** Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric

Gentherm Global Power Technologies' \* (GPT) Model 5120 Thermoelectric Generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

## Power Specifications

Power Rating at 20°C  
120 Watts at 6.7 Volts  
108 Watts at 12 Volts  
108 Watts at 24 Volts  
108 Watts at 48 Volts

## Electrical

Adjustment:	6.7V	up to 11 Volts
	12 V	12 -18 Volts
	24 V	24 - 30 Volts
	48 V	48 - 60 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 8 AWG wire. Opening for 3/4" conduit in the base of the cabinet.

## Fuel

**Natural Gas:** 8.8 m<sup>3</sup>/day (311 Sft<sup>3</sup>/day) of Std.  
1000 BTU/Sft<sup>3</sup> (37.7 MJ/SM<sup>3</sup>) gas  
max 115 mg/Sm<sup>3</sup> (~170 ppm) H<sub>2</sub>S  
max 120 mg/Sm<sup>3</sup> H<sub>2</sub>O  
max 1% free O<sub>2</sub>

**Propane:** 11.4 l/day (3.0 US gal/day)  
Max. Supply Pressure: 172 kPa (25 psi)  
Min. Supply Pressure: 69 kPa (10 psi)  
Fuel Connection: 1/4" MNPT

## Environmental

Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).  
Operating Conditions: Unsheltered operation  
Please contact GPT for operating conditions below -40°C or above +45°C.

## Materials of Construction

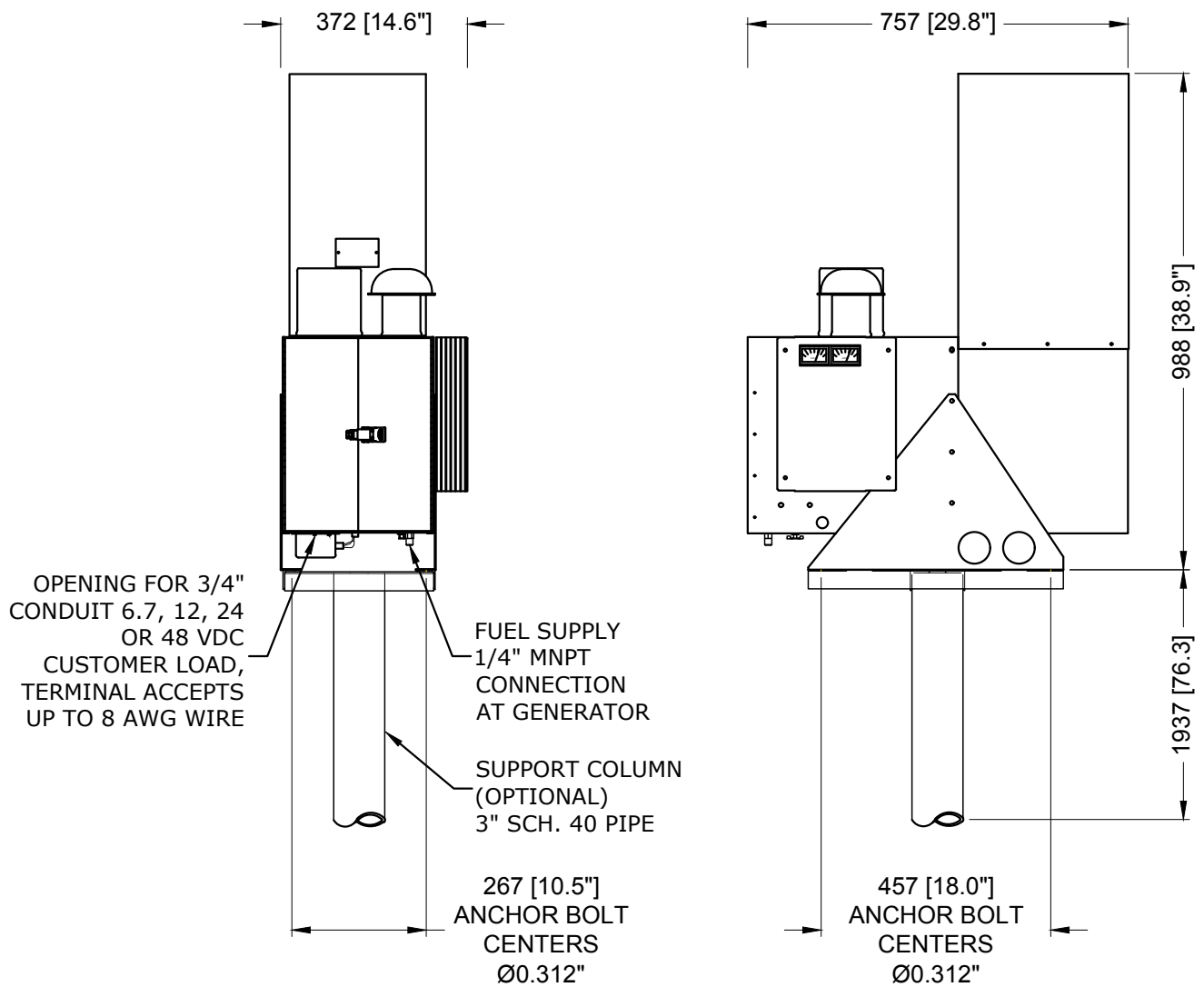
Cabinet: 304 SS  
Cooling Type: Natural Convection  
Fuel System: Brass, Aluminum & SS

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## Typical Installation



**NOTES:**

1. GENERATOR WEIGHT: 60 kg [132 lb]
2. DIMENSIONS IN mm [INCHES].

MODEL: P-5120  
 DRW: 42356 rev2

# Model 5220 Thermoelectric Generators



## Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- Volt & Amp Meter

## Optional Features

- Cathodic Protection Interface
- Pole Mount or bench stand
- Corrosive Environmental Fuel System
- Marine Service
- Certification to CSA Std. T.I.L. R-10

**Note:** Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric



ISO 9001 Registered

Gentherm Global Power Technologies' \* (GPT) 5220 Thermoelectric Generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

## Power Specifications

Power Rating at 20°C  
195 Watts at 12 Volts  
178 Watts at 24 Volts

## Electrical

Adjustment:	12 V	12 -18 Volts
	24 V	24 - 30 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 8 AWG wire. Opening for 3/4" conduit in the base of the cabinet.

## Fuel

Natural Gas:	19.7 m <sup>3</sup> /day (700 Sft <sup>3</sup> /day) 1000 BTU/Sft <sup>3</sup> (37.7 MJ/SM <sup>3</sup> ) gas max 115 mg/Sm <sup>3</sup> (~170 ppm) H <sub>2</sub> S max 120 mg/Sm <sup>3</sup> H <sub>2</sub> O max 1% free O <sub>2</sub>
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Propane:	28.0 l/day (7.4 US gal/day)
Max. Supply Pressure:	345 kPa (50 psi)
Min. Supply Pressure:	165 kPa (24 psi)
Fuel Connection:	1/4" MNPT

## Environmental

Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).  
Operating Conditions: Unsheltered operation  
Please contact GPT for operating conditions below -40°C or above +45°C.

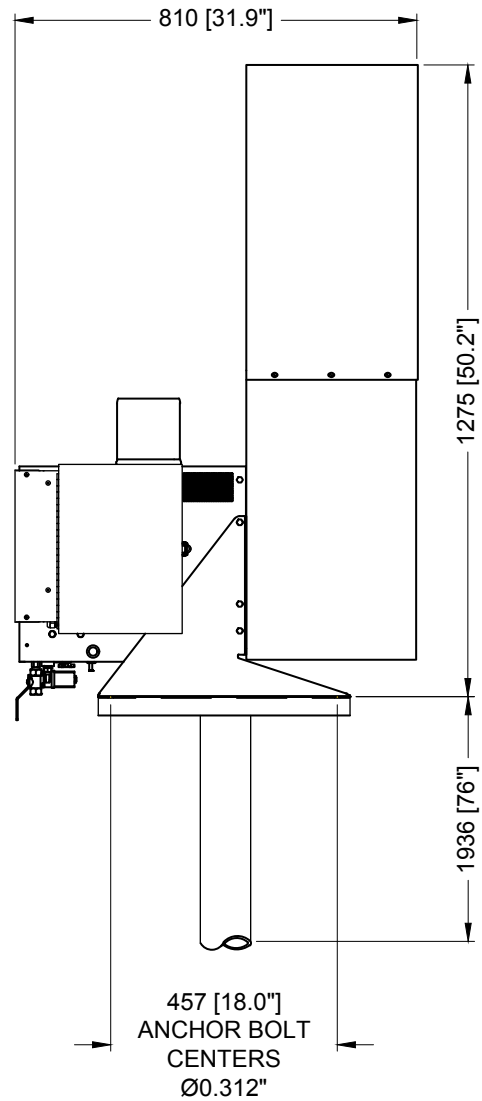
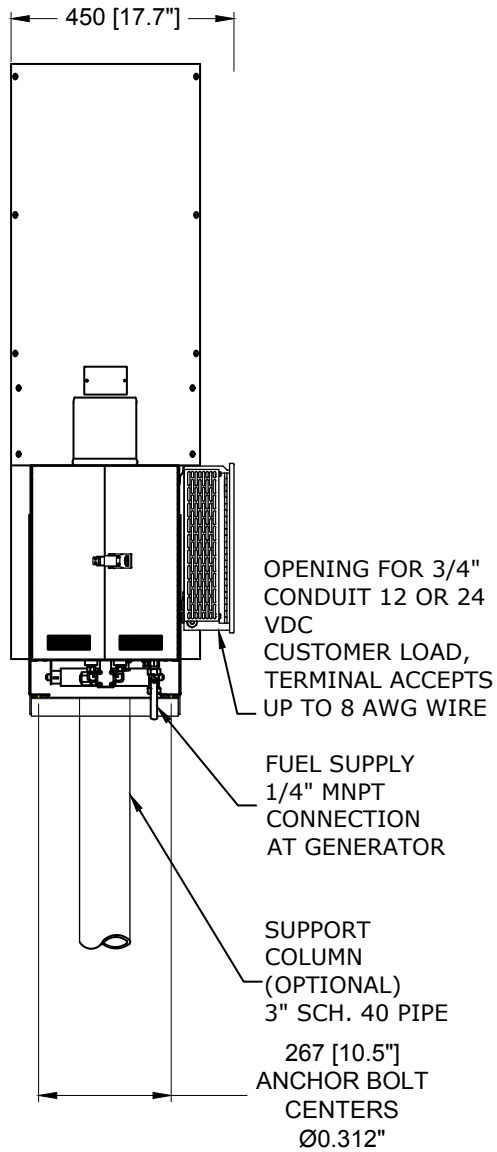
## Materials of Construction

Cabinet:	304 SS
Cooling Type:	Natural Convection
Fuel System:	Brass, Aluminum & SS

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## Typical Installation



NOTES:

1. GENERATOR WEIGHT: 97 kg [214 lb]
2. DIMENSIONS IN mm [INCHES].

MODEL: 5220  
DRW: 42360 rev2





## Model 8550 Thermoelectric Generators

Gentherm Global Power Technologies' \* (GPT) Model 8550 thermoelectric generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

### Power Specifications

Power Rating at 20°C  
480 Watts at 12 Volts  
550 Watts at 24 Volts  
480 Watts at 48 Volts

### Electrical

Adjustment:	12 V	11.4 - 12.6 Volts
	24 V	24 - 30 Volts
	48 V	47 - 57 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 8 AWG wire. Opening for 3/4" conduit in the base of the cabinet.

### Fuel

**Natural Gas:** 48.0 m<sup>3</sup>/day (1695 Sft<sup>3</sup>/day)  
1000 BTU/Sft<sup>3</sup> (37.7 MJ/SM<sup>3</sup>) gas  
max 115 mg/Sm<sup>3</sup> (~170 ppm) H<sub>2</sub>S  
max 120 mg/Sm<sup>3</sup> H<sub>2</sub>O  
max 1% free O<sub>2</sub>

**Propane:** 76.0l/day (20.1 US gal/day)  
Max. Supply Pressure: 172 kPa (25 psi)  
Min. Supply Pressure (NG): 103 kPa (15 psi)  
Min. Supply Pressure (LPG): 140 kPa (20 psi)  
Fuel Connection: 1/4" MNPT

### Environmental

Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).  
Operating Conditions: Unsheltered operation  
Please contact GPT for operating conditions below -40°C or above +45°C.

### Materials of Construction

Cabinet: 304 SS  
Cooling Type: Natural Convection  
Fuel System: Brass, Aluminum & SS

### Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)

### Optional Features

- Cathodic Protection Interface
- Bench Stand
- Ethylene fuelled
- Operation over 4000m elevation

**Note:** Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric

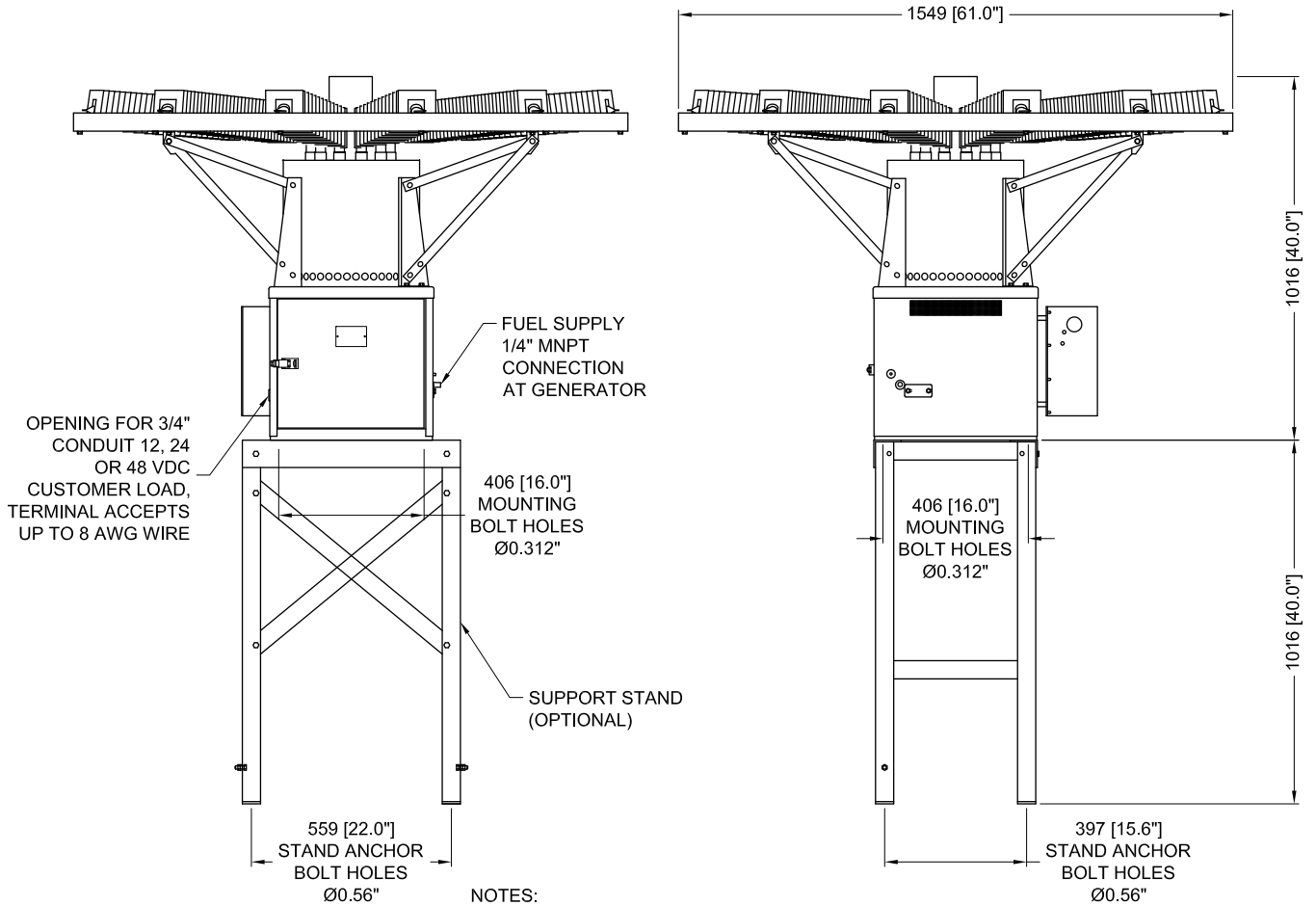


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# Typical Installation



42361 rev1

- NOTES:
1. GENERATOR WEIGHT: 102 kg [225 lb]
  2. DIMENSIONS IN mm [INCHES].

# Model 1120 Thermoelectric Generators



## Hazardous Area Generator

Gentherm Global Power Technologies' \* (GPT) Model 1120 Thermoelectric Generator is Class 1, Div. 2 or Class 1, Div. 1 Hazardous area rated. With no moving parts it is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

## Power Specifications

Power Rating at 20°C  
110 Watts at 6.7 Volts  
100 Watts at 12 Volts  
100 Watts at 24 Volts  
100 Watts at 48 Volts

## Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- Volt & Amp Meters
- Flame Arrestor
- CSA Certification  
(Class 1, Div. 2 Group D, Temp T3)

## Optional Features

- FM certification (Class 1, Div. 1, Temp T3)
- 316 SS regulator & fuel valve
- Cathodic Protection Interface Panel
- Pole Mount or Bench Stand
- Intake Air Filter

**Note:** Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric

## Electrical

Adjustment:	6.7 V	up to 11 Volts
	12 V	12 -18 Volts
	24 V	24 - 30 Volts
	48 V	48 - 60 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 00 AWG wire. Opening for two 3/4" NPT ports in the base of the electronics enclosure.

## Fuel

<b>Natural Gas:</b>	8.8 m <sup>3</sup> /day (311 Sft <sup>3</sup> /day) 1000 BTU/Sft <sup>3</sup> (37.7 MJ/SM <sup>3</sup> ) gas max 115 mg/Sm <sup>3</sup> (~170 ppm) H <sub>2</sub> S max 120 mg/Sm <sup>3</sup> H <sub>2</sub> O max 1% free O <sub>2</sub>
<b>Propane:</b>	11.4 l/day (3.0 US gal/day)
Max. Supply Pressure:	172 kPa (25 psi)
Min. Supply Pressure:	69 kPa (10 psi)
Fuel Connection:	1/4" MNPT

## Environmental

Ambient Operation Temperature: Max. +45°C (115°F) Min. -20°C (-4°F).  
Operating Conditions: Unsheltered operation certified for use in hazardous areas.  
Please contact GPT for operating conditions below -20°C or above +45°C.

## Materials of Construction

Cabinet:	316 SS
Cooling Type:	Natural Convection
Fuel System:	Aluminum & Stainless Steel

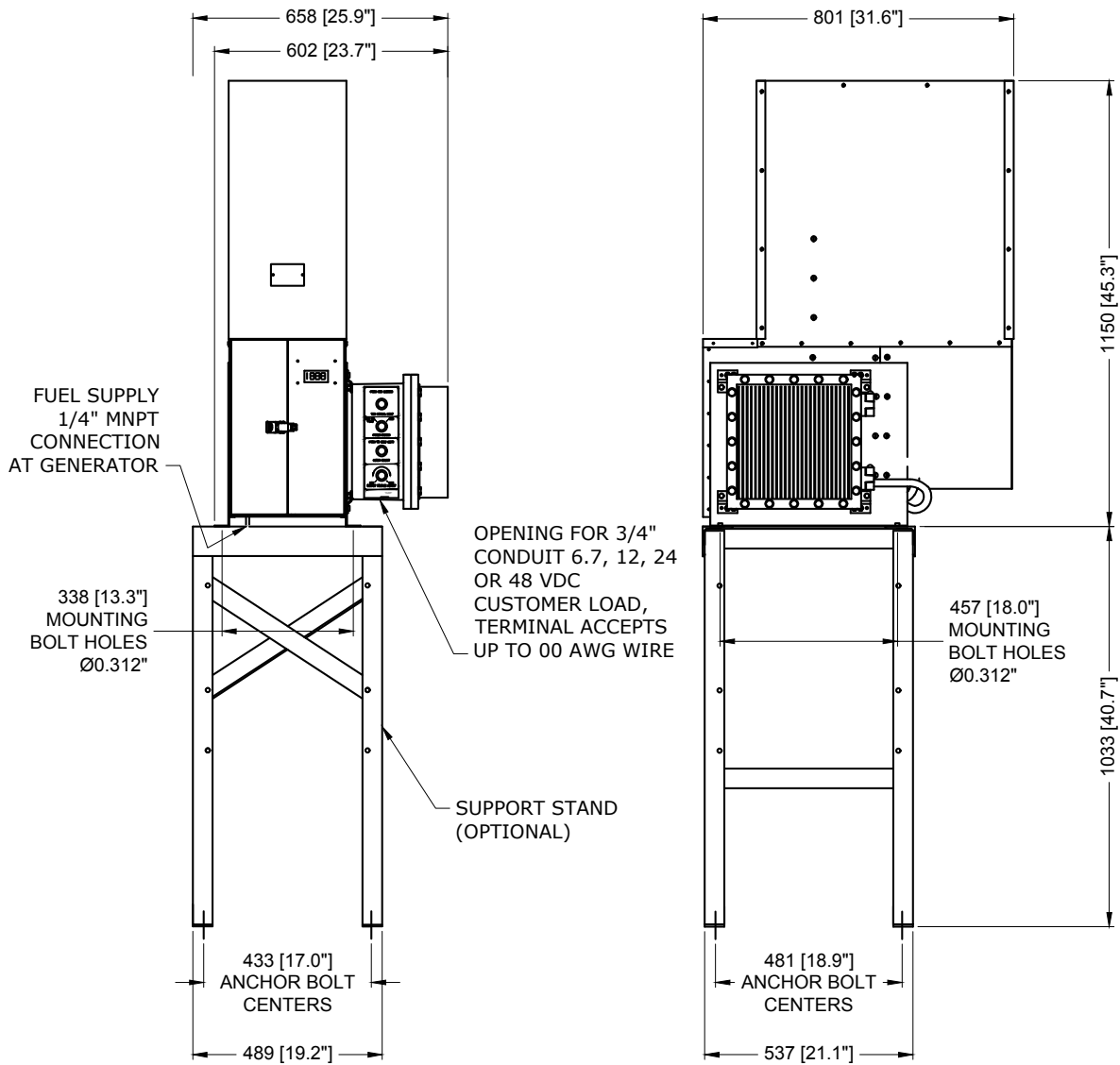


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# Typical Installation



- NOTES:  
1. GENERATOR WEIGHT: 130 Kg [286 lb]  
2. DIMENSIONS IN mm [INCHES].

MODEL: 1120  
DRW: 42359 rev2

# Model 1500 Thermoelectric Generators



## Hazardous Area Generator

Gentherm Global Power Technologies' \* (GPT) Model 1500 Thermoelectric Generator is Class 1, Div II Hazardous area rated. With no moving parts, it is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

## Power Specification

Power Rating at 20°C  
500 Watts at 24 volts

## Electrical

Adjustment: 24 V 24 - 30 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 00 AWG wire. Opening for two 3/4" conduit in the base of the cabinet.

## Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- CSA Certification
- Class 1, Div II, Group D, Temp T3

Note: Specifications shown are for standard configurations. Gentherm Global Power Technologies' \* (GPT) Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Specification data stated in this document is subject to change without notice. To verify these specifications are current, contact your Gentherm Global Power Technologies (GPT) sales representative.

\* Formerly Global Thermoelectric

## Fuel

**Natural Gas:** 48.0 m<sup>3</sup>/day (1695 Sft<sup>3</sup>/day)  
1000 BTU/Sft<sup>3</sup> (37.7 MJ/SM<sup>3</sup>) gas  
max 115 mg/Sm<sup>3</sup> (~170 ppm) /H<sub>2</sub>S  
max 120 mg/Sm<sup>3</sup>H<sub>2</sub>O

**Propane:** n/a at this time  
Max. Supply Pressure: 172 kPa (25 psi)  
Min. Supply Pressure: 103 kPa (15 psi)  
Fuel Connection: 1/4" MNPT

## Environmental

Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).  
Operating Conditions: Unsheltered operation  
Please contact GPT for operating conditions below -40°C or above +45°C.

## Materials of Construction

Cabinet: 316 SS  
Cooling Type: Natural Convection  
Fuel System: Aluminum & Stainless Steel

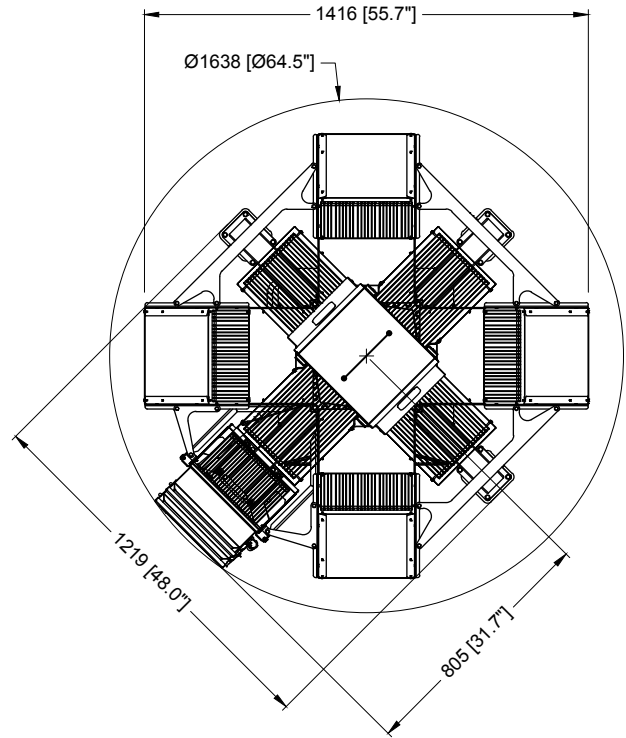
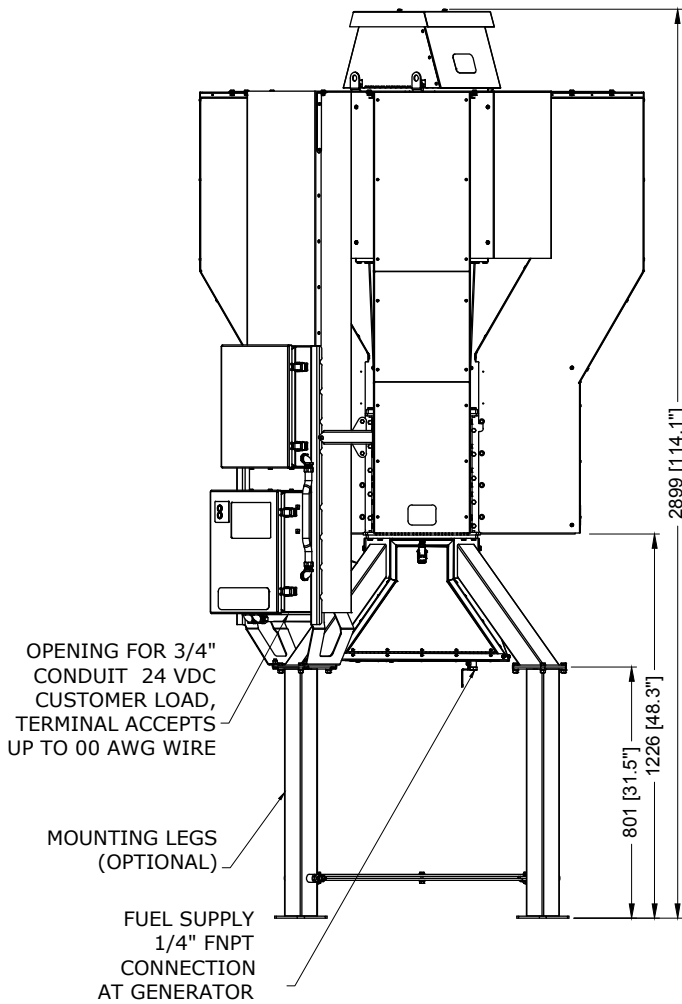


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# Typical Installation



**NOTES:**

1. GENERATOR WEIGHT: 700 kg [1530 lb]
2. DIMENSIONS IN mm [INCHES].

MODEL: 1500  
 DRW: 42362 rev2



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Model 1500 Thermoelectric Generators

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## CUSTOM DESIGNED SOLUTIONS REMOTE POWER TECHNOLOGY

Gentherm Global Power Technologies (GPT) is the leader in the remote power market globally. GPT is more than a TEG manufacturer. GPT has over 35 years of experience offering full turnkey designs, including the manufacture of complementary equipment for unique remote sites globally.

GPT offers innovative approaches in unique situations;

- ➔ Creating custom designed solutions that are simple to use
- ➔ Designed to be environmentally friendly
- ➔ Requiring minimal maintenance
- ➔ Around the world, with local service support ... if it's ever needed

### TEG Based Systems:

- ✓ **Natural Gas systems**  
ranging from 50 watts to 5 kW,
- ✓ **Tanked Fuel (Propane) systems**  
ranging from 50 watts to 500 watts
- ✓ **Products range from:**
  - ~ Single, off the shelf TEGs
  - ~ Turnkey Multi-TEG packages
  - ~ TEG Heat Recovery Systems (HRS) that are designed to capture the waste heat coming off the TEGs to heat remote electrical equipment shelters
  - ~ TEG Hybrid Solutions – which incorporate TEGs and solar to create a highly reliable “Green” solution
  - ~ Customized Cathodic Protection Packages available, current interrupters and remote monitoring options available upon request



\*TEG - Thermoelectric Generator

69178 Int'l

[www.GenthermGlobalPower.com](http://www.GenthermGlobalPower.com)

# Gentherm Global Power Technologies

## GPT ADVANTAGE:

- ➔ 40+ years' TEG manufacturing
- ➔ 35+ years designing comprehensive remote power solutions for unique remote sites globally
- ➔ Engineer stamped facility with full project team
- ➔ Complete system testing and full product warranty
- ➔ Proven cost effective reliable and low maintenance systems



## For more information visit our website:

[GenthermGlobalPower.com/Custom Solutions](http://GenthermGlobalPower.com/Custom%20Solutions)  
[GenthermGlobalPower.com/products/brochure-library](http://GenthermGlobalPower.com/products/brochure-library)

## ... WHEN SITE DOWNTIME ISN'T AN OPTION



The first TEG was designed for an Apollo space mission

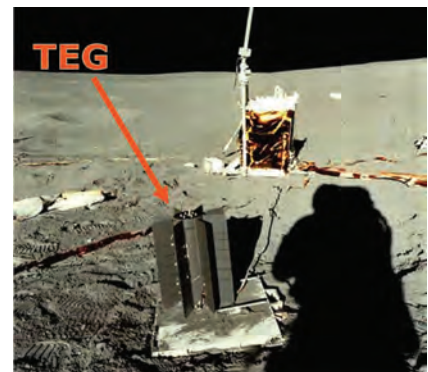


## Larger Power Systems:

- ✓ **Gentherm GlobalCharge System**
  - ~ Ideal for Valve Control on Liquid Pipelines and telecommunications applications
  - ~ Power system ranges from 400 watts to 4kW
  - ~ Fuel source: Natural gas, propane or diesel

## Custom Remote Power Package Options:

- ✓ Gas Pressure Reduction System (GPRS)
- ✓ Fuel Conditioning Systems (FCS)



NASA archive image – TEG on the moon



## Pipeline Power Skids



**Location:** West Virginia, Ohio, Michigan – USA

### **Project:**

Customer who is installing a natural gas pipeline requires reliable power skids for main line valve sites. The challenge is that the pipeline is very remote and bringing line power into these sites is very costly.

### **Scope of Supply:**

Gentherm Global Power Technologies (GPT) engineered a site deployable, stand-alone power skids consisting of the following:

- 550 watt ThermoElectric Generator (TEG).
- Gas Pressure Reduction System (GPRS).
- 6`x 8` metal instrumentation building.
- 3 days back-up power in batteries.
- Distribution panel and electrical controls to be housed in the metal buildings

**Size and Rating:** 500 watts @ 24vdc

**Quantity:** 32 systems

**Year of Supply/Commissioning:** 2016

68291 Rev0

## Cathodic Protection - Pipeline



**Location:** Bangladesh

**Project:** 30" Diameter x 60 Km long Pipeline Project

**Scope of Supply:**

Gentherm Global Power Technologies (GPT) engineered and manufactured customized hazardous area rated cathodic protection systems.

**Size and Rating:** 400 watts at 12 VDC and 800 watts at 24 VDC

**Quantity:** 2 systems consisting of a 4 x 1120 TEG system complete with cathodic protection interface panel, current interrupter panel, and a gas pressure reduction system and an 8 x 1120 TEG system complete with cathodic protection interface panel, current interrupter panel, and a gas pressure reduction system

**Year of Supply/Commissioning:** 2015

## Unmanned Wellhead Platform



**Location:** Gulf of Thailand

**Project:** Hazardous area rated thermoelectric generator power system for offshore unmanned wellhead platforms

**Scope of Supply:**

Gentherm Global Power Technologies (GPT) engineered and manufactured customized hazardous area rated TEG power systems for multiple offshore platforms to power the SCADA, PLC, and commutations systems

**Size and Rating:** 500 and 600 watts at 24 VDC

**Quantity:** 38 systems consisting of a 5 x 1120 and 6 x 1120 TEG system configuration complete with TEG Isolation junction box/control panel, TEG mounting stand and skid, fuel/electrical manifolds and a fuel gas conditioning system

**Year of Supply/Commissioning:** 2015

## Satellite Wellhead Platforms for Offshore Field Development



**Location:** Gulf of Thailand at the northern tip of the Malay Basin

**Project:** Hazardous area rated thermoelectric generator hybrid power system for offshore unmanned wellhead platforms

**Scope of Supply:**

Gentherm Global Power Technologies (GPT) engineered and manufactured customized hazardous area rated TEG Hybrid systems for multiple offshore platforms to power the SCADA, PLC, and radio and radar beacon systems

**Size and Rating:** Power systems ranging from 800 watts to 1300 watts

**Quantity:** 4 systems consisting of 3 - 12 x 1120 and 1 - 13 x 1120 TEG Hybrid system configuration complete with TEG Isolation junction box/control panel, TEG mounting stand and skid, fuel/electrical manifolds, battery isolation switch box, 4 – 2600 Ah battery system, 4050 watt PV system w/mounting frame, solar combiner box, and a fuel gas conditioning system

**Year of Supply/Commissioning:** 2015/2016

69887

# STANDARD GASEOUS FUEL SPECIFICATIONS FOR TEGS

## Gaseous fuels provided to Gentherm Global Power Technologies' (GPT) Thermoelectric Generators: <sup>(1)</sup>

1. Shall not contain any particulates larger than 30  $\mu\text{m}$  diameter, including but not limited to sand, dust, gums, crude oil, and impurities.
2. Shall not have a hydrocarbon dew point in excess of 0 °C (32 °F) at 170 kPa<sub>g</sub> (25 psig).
3. Shall not contain more than 115 mg/Sm<sup>3</sup> <sup>(2)</sup> (approx. 170 ppm) of H<sub>2</sub>S. <sup>(3)</sup>
4. Shall not contain more than 60 mg/Sm<sup>3</sup> (approx. 88 ppm) of Mercaptan Sulphur.
5. Shall not contain more than 200 mg/Sm<sup>3</sup> (approx. 294 ppm) of total Sulphur.
6. Shall not contain more than 10 % [CO<sub>2</sub>] and/or [N<sub>2</sub>] by volume, nor vary more than +/- 1 % [CO<sub>2</sub>] and/or [N<sub>2</sub>] during operation.
7. Shall not contain more than 120 mg/Sm<sup>3</sup> of water vapor.
8. Shall not contain more than 1 % by volume of free oxygen.
9. Shall have a nominal higher heating value (HHV) of:

Natural Gas:	37 MJ/m <sup>3</sup> (1000 BTU/cu.ft.) <sup>(1)</sup>
Propane/LPG:	93 MJ/m <sup>3</sup> (2500 BTU/ cu.ft.) <sup>(1)</sup>
Butane:	122 MJ/m <sup>3</sup> (3300 BTU/ cu.ft.) <sup>(1)</sup>
10. Shall not exceed 60 °C (140 °F) in temperature.

### Notes:

- (1) – For gaseous fuels outside of these specifications, please contact GPT.
- (2) – At 1 atm and 15 °C.
- (3) – Contact local representative or GPT if the H<sub>2</sub>S concentration is greater than 170ppm.

*A history of innovation and performance in the commercialization of advanced technology.*

**Gentherm Global Power Technologies - GPT** (Formerly Global Thermoelectric) was established in 1975 to commercialize the thermoelectric generator technology originally developed for the Apollo Space Program. Today, GPT is the world leader in the manufacturing and distribution of thermoelectric generators for use as remote power sources. The company produces a range of generators, from 5 to 550 watts, that use heat to directly produce electrical power for applications requiring up to 5,000 watts. The generator operates on natural gas, propane or LPG to provide highly reliable and cost effective remote power solutions for many applications including the telecommunications and oil and gas industries.

GPT operates manufacturing, applications engineering, and production engineering facilities in Bassano, Alberta. Its head office, engineering, and research and development facilities are located in Calgary, Alberta, Canada. Sales and marketing activities are conducted worldwide.



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