An Efficient and Reliable Alternative to Solar Panels

Parker’s DB1 Differential Pressure Battery Charger is a versatile alternative to solar panel systems that are used to power electronic instruments on gas pipelines. Unlike solar panels, the DB1 can be installed in almost any location and is unaffected by shade, snow, freezing rain, ice, or dust build-up.

In applications such as wireless communications at remote monitoring sites, the DB1 produces a 12- or 24-volt power output to keep the battery fully charged. The battery’s temperature and charge level are continuously monitored and the DB1 produces up to 50 watts to keep it charged.

Product Features:

- Free uninterruptible power 24/7
- 10, 20 and 50 watt units available
- RS-485 Serial / Ethernet MODBUS protocol
- 12 or 24 volts – field selectable
- Consumes no gas
- Emission free
- Class I, Division 1, Group D certified
- Operates in parallel with station regulators
- Only 30-65 SCFM bypass flow when charging
- Maintenance free
- Compact design eliminates theft and vandalism

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Introduction to the DB1

The DB1 Differential Pressure Battery Charger is an efficient and reliable alternative to solar panel systems that are used to power electronic instruments on gas pipelines. In applications where a lead acid battery is used to provide high peak power for short burst requirements (such as for wireless communications at remote monitoring sites), the DB1 produces a 12- or 24-volt power output to keep the battery fully charged. The battery’s temperature and charge level are continuously monitored and the DB1 produces up to 50 watts to keep it charged.

Unlike solar panels, the DB1 can be installed in almost any location and is unaffected by shade, snow, freezing rain, ice, dust build-up, or birds.

The DB1 battery charger uses the differential pressure developed across a pressure regulator* on natural gas pipelines to run a small turbine-powered Generator. Controlled start-up for the DB1 makes turning the system ON as simple as flipping a switch. The Generator output is used to charge a lead acid battery – similar to Parker’s Thermo-Electric Chargers (TECs). Unlike the TECs, the DB1 does not consume any natural gas. Power is produced by allowing a small portion of the gas to flow through a turbine, bypassing the pressure regulating valve. The amount of gas flowing through the DB1 turbine is low relative to the total line flow, and remains stable, keeping the DB1 transparent to the pressure control system. The pressure regulator automatically adjusts for the slight decrease in flow resulting when the DB1 runs.

The power produced by the DB1 is micro-processor controlled to provide the ideal temperature compensated battery charging current and voltage to the battery. The DB1 also provides internal diagnostics to detect possible system problems. The system status can be locally or remotely monitored using the open collector alarm output. An optional communications controller is available to provide real-time communications with the DB1.

* See ‘System Regulator’ on page 3 diagram
DB1 Installation Overview

- Powered by natural gas up to 1440 psig system pressures
- Microprocessor controlled simple start up and diagnostics
- Optional real-time communications controller: RS-485 serial / ethernet MODBUS protocol
- Integrated temperature compensated charger with remote battery temperature sensor
- User configurable operating characteristics
- Status output for remote monitoring
- Controller firmware field upgradable
- Direct mount (on pipeline) or optional 2" pipe mount

Minimum Required Pressure Differential
65 PSIG for 10 watts
85 PSIG for 20 watts
125 PSIG for 50 watts
DB1 System Overview

System Overview

The DB1 system consists of three main components: the Generator, the Controller (or Optional Communications Controller), and the Battery Interface Module. The Generator is installed on or near the pipeline, typically in a division 1 or 2 hazardous location.

The Controller and Battery Interface Module should be mounted on or near the battery, in a safe area location.

The above diagram shows the system wiring between the Generator, Controller and Battery Interface Module. The Generator and the Controller each have a micro-processor. By using separate micro-processors, the Generator can monitor itself, monitor the communications link to the Controller, and shut the Control Valve using power from the Generator (until the turbine stops) if necessary. The Generator monitors RPM, charge current, control valve operation, and output voltage while simultaneously controlling the charging process. All other parameters (battery voltage, battery temperature, remote shut-down input, alarm output, status LEDs) are monitored and managed by the Controller micro-processor. The DB1 can be monitored without removing the cover on the Generator’s explosion-proof enclosure. A battery temperature sensor, the battery interface field terminals, and over-current protection are provided in a Battery Interface Module mounted on or as close to the battery as possible.
DB1 Model Number Options

Example: DB1-20-COMVCH — 20 Watt DB1 with Optional MODBUS and Carbon Steel Mounting Kit

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB1-10</td>
<td>10 Watt Differential Pressure Battery Charger</td>
</tr>
<tr>
<td>DB1-20</td>
<td>20 Watt Differential Pressure Battery Charger</td>
</tr>
<tr>
<td>DB1-50</td>
<td>50 Watt Differential Pressure Battery Charger</td>
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</tbody>
</table>

Note: DB1 models include 1 ea. Software Interface Cable (DB1 to USB) w/DB Monitor Software (SK-DB1-003)

<table>
<thead>
<tr>
<th>Option Codes*</th>
<th>Option Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM</td>
<td>RS-485 Serial / Ethernet MODBUS Protocol – includes 1 ea. RS-485 cable (SK-DB1-004) and 1 ea. Ethernet cable (SK-DB1-005)</td>
</tr>
<tr>
<td>VCH</td>
<td>Carbon Steel Remote Mount Kit for Mounting to 2&quot; Pipe Stand</td>
</tr>
<tr>
<td>VSH</td>
<td>Stainless Steel Remote Mount Kit for Mounting to 2&quot; Pipe Stand</td>
</tr>
</tbody>
</table>

*Note: A dash appears before the first option code. If multiple options are ordered, each option code immediately follows the preceding option code; e.g., there is no dash or space between codes after the first one. See example above.

Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P8-214-A0</td>
<td>3/4&quot; NPT Pipe Union</td>
</tr>
<tr>
<td>P8-215-C0</td>
<td>1/2&quot; 316 SS Ball Valve</td>
</tr>
<tr>
<td>SK-DB1-003</td>
<td>Software Interface Cable (DB1 to USB) w/DB Monitor Software (1 ea. Included with DB1 Models)</td>
</tr>
<tr>
<td>SK-DB1-004</td>
<td>RS-485 Cable (1 ea. Included with COM Option)</td>
</tr>
<tr>
<td>SK-DB1-005</td>
<td>Ethernet Cable (1 ea. Included with COM Option)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS-C9E-500-CL</td>
<td>0 – 2,000 psi Gauge (316 SS, Liquid-Filled, 1/4&quot; MNPT Center Back Mount with 2-1/2&quot; Dial)</td>
</tr>
<tr>
<td>SS-C9E-516-CL</td>
<td>0 – 300 psi Gauge (316 SS, Liquid-Filled, 1/4&quot; MNPT Center Back Mount with 2-1/2&quot; Dial)</td>
</tr>
<tr>
<td>SS-C9E-517-CL</td>
<td>0 – 600 psi Gauge (316 SS, Liquid-Filled, 1/4&quot; MNPT Center Back Mount with 2-1/2&quot; Dial)</td>
</tr>
<tr>
<td>SS-C9E-518-CL</td>
<td>0 – 1,000 psi Gauge (316 SS, Liquid-Filled, 1/4&quot; MNPT Center Back Mount with 2-1/2&quot; Dial)</td>
</tr>
</tbody>
</table>

DB Field Installations

The DB1 is perfect for remote locations requiring power, and the communications controller allows real-time monitoring of the device. Also, the theft and vandalism associated with solar panels are not an issue with the DB1’s compact, sturdy design.

Unlike solar panels, the DB1 keeps remote batteries charged in any weather condition. As shown here, a winter freeze or even an overcast day won’t affect the DB1’s operation.
## Detailed Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazardous Location Classification</strong></td>
<td>Class I, Division 1, Group D certified</td>
</tr>
<tr>
<td><strong>Charger Output</strong></td>
<td>12/24V (temp comp) for Lead Acid Batteries</td>
</tr>
<tr>
<td><strong>Output Power when Charging</strong></td>
<td>10, 20 or 50 Watts continuous at 68°F (20°C) ambient</td>
</tr>
<tr>
<td><strong>Remote Battery Temperature Sensor</strong></td>
<td>Silicone diode</td>
</tr>
<tr>
<td><strong>Alarm Status &amp; Notification</strong></td>
<td>LED &amp; NPN Open Collector (2) 30V Max, 200mA Max</td>
</tr>
<tr>
<td><strong>Transient Protection</strong></td>
<td>Bi-directional TVS 1500 Watts peak pulse power</td>
</tr>
<tr>
<td><strong>Battery Short Circuit Protection</strong></td>
<td>10 amp PTC Over Current Protection</td>
</tr>
<tr>
<td><strong>Electrical Connections</strong></td>
<td>½&quot; NPT Rigid Conduit Opening (2) [Explosion Proof]</td>
</tr>
<tr>
<td><strong>Wire Connections</strong></td>
<td>Terminal Strip w/Screw Clamp, 14 AWG max</td>
</tr>
<tr>
<td><strong>Communications</strong></td>
<td>RS-485 Serial / Ethernet MODBUS Protocol</td>
</tr>
<tr>
<td><strong>Inlet Gas Supply Pressure</strong></td>
<td>1440 psig Maximum</td>
</tr>
<tr>
<td><strong>Gas Flow During Charge Cycle</strong></td>
<td>30 SCFM @ 10 Watts, 65 psig differential 40 SCFM @ 20 Watts, 85 psig differential 65 SCFM @ 50 Watts, 125 psig differential</td>
</tr>
<tr>
<td><strong>Gas Supply Connections</strong></td>
<td>Inlet 3/8” OD SS Tubing, Outlet 3/4” FNPT</td>
</tr>
<tr>
<td><strong>Operating Temperature Range</strong></td>
<td>-20°C (-4°F) to 40°C (104°F)</td>
</tr>
<tr>
<td><strong>Enclosure</strong></td>
<td>Cast Aluminum A356-T6,316 SS NEMA 4X</td>
</tr>
<tr>
<td><strong>Mounting Configuration</strong></td>
<td>Direct mount, or optional 2” pipe mount</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>15 pounds</td>
</tr>
</tbody>
</table>
DB1 Monitor Software

Monitor Main Menu

Charger Set-Up

Alarm Configurator

Quick View

Event Log

MODBUS Configurator
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