

# Differential Pressure Battery Chargers

Converting Pipeline Energy to Battery Power



## 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.



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## Product Features:

- Free uninterruptible power 24/7
- 10, 20 and 50 watt units available
- RS-485 Serial / Ethernet MODBUS protocol communications option
- Severe service option - wetted parts suitable up to 8% H<sub>2</sub>S and 8% CO<sub>2</sub>
- 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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# DB1 Overview

## Introduction to the DB1

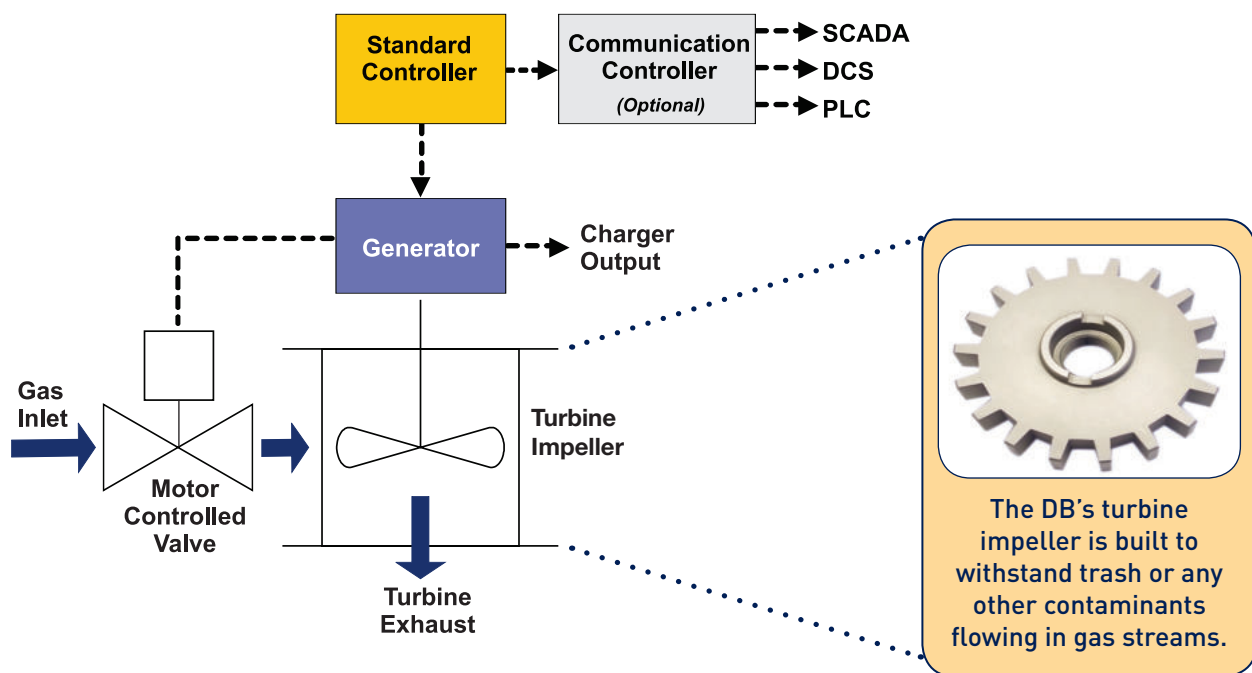
The DB1 Differential Pressure Battery Charger is an efficient and reliable alternative to solar panel systems that are used to power electronic instruments on gas pipelines. In applications where a lead acid battery is used to provide high peak power for short burst requirements (such as for wireless 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.

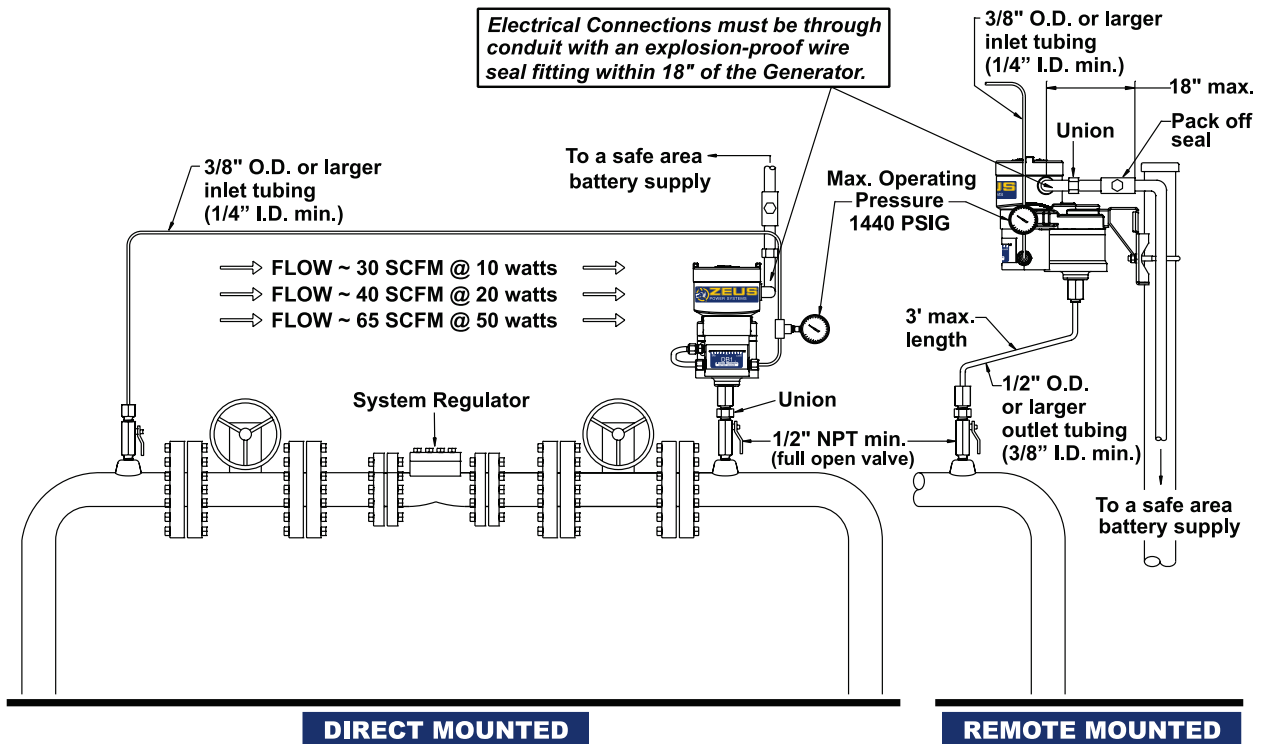
\* See 'System Regulator' on page 3 diagram



# DB1 Installation Overview



- Powered by natural gas up to 1440 psig system pressures
- Severe service option - wetted parts suitable up to 8% H<sub>2</sub>S and 8% CO<sub>2</sub>
- 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
- Status output for remote monitoring
- Controller firmware field ungradable



## Minimum Required Pressure Differential

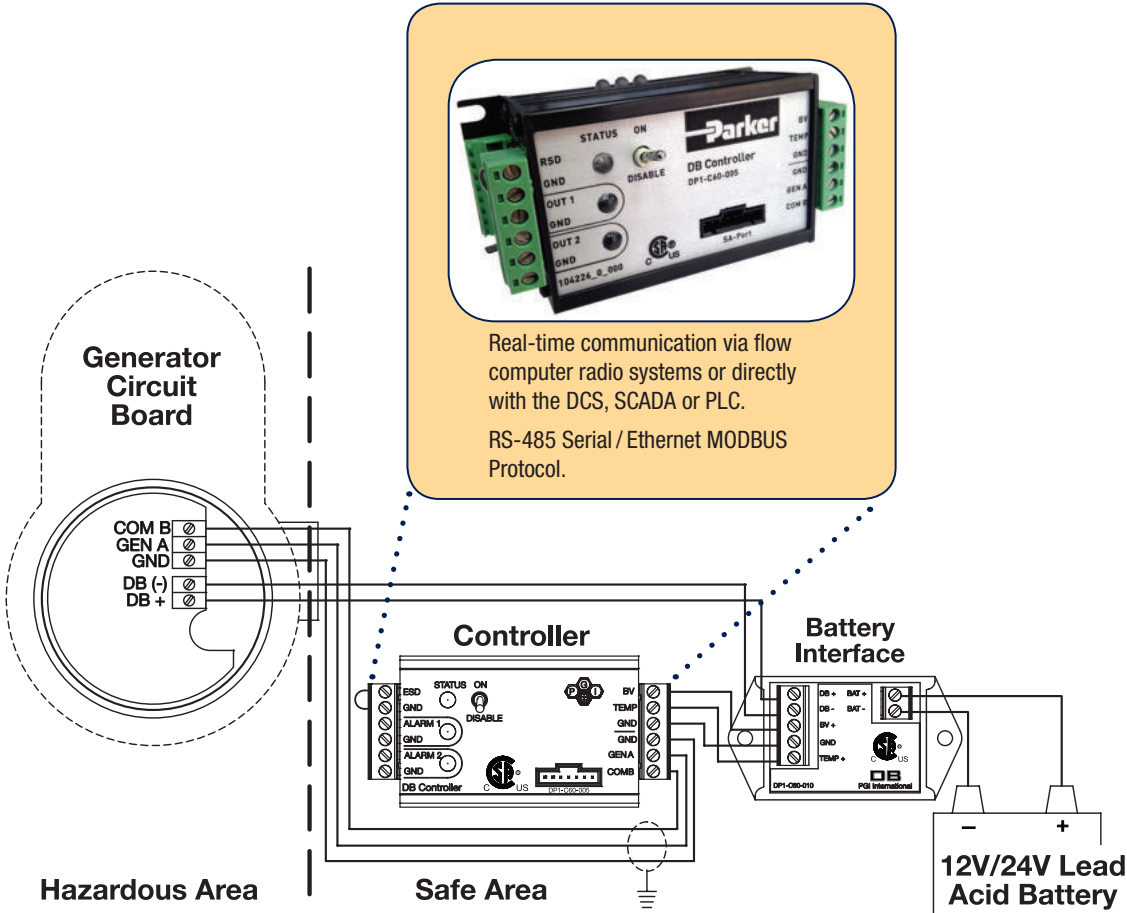
65 PSIG for 10 watts  
 85 PSIG for 20 watts  
 125 PSIG for 50 watts

# 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

Model Number	Description	
DB1-10	10 Watt Differential Pressure Battery Charger	
DB1-20	20 Watt Differential Pressure Battery Charger	
DB1-50	50 Watt Differential Pressure Battery Charger	
<b>Note:</b> DB1 models include 1 ea. Software Interface Cable (DB1 to USB) w/DB Monitor Software (SK-DB1-003)		
	– Option Codes*	Option Description
	– COM	RS-485 Serial / Ethernet MODBUS Protocol – includes 1 ea. RS-485 cable (SK-DB1-004) and 1 ea. Ethernet cable (SK-DB1-005)
	– SVR	Severe Service - wetted parts suitable up to 8% H <sub>2</sub> S and 8% CO <sub>2</sub>
	– VCH	Carbon Steel Remote Mount Kit for Mounting to 2" Pipe Stand
	– VSH	Stainless Steel Remote Mount Kit for Mounting to 2" Pipe Stand

\*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.



The severe service option is identified by a yellow lid.

## Accessories

Part Number	Description
P8-214-A0	3/4" NPT Pipe Union
P8-215-C0	1/2" 316 SS Ball Valve
SK-DB1-003	Software Interface Cable (DB1 to USB) w/DB Monitor Software (1 ea. Included with DB1 Models)

Part Number	Description
SK-DB1-004	RS-485 Cable (1 ea. Included with COM Option)
SK-DB1-005	Ethernet Cable (1 ea. Included with COM Option)
SS-C9E-500-CL	0 – 2,000 psi Gauge (316 SS, Liquid-Filled, 1/4" MNPT Center Back Mount with 2-1/2" Dial)
SS-C9E-516-CL	0 – 300 psi Gauge (316 SS, Liquid-Filled, 1/4" MNPT Center Back Mount with 2-1/2" Dial)

## 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



**Compact Design**  
7" W x 10" D x 12" H

## Detailed Specifications

<b>Hazardous Location Classification</b>	Class I, Division 1, Group D certified
<b>Charger Output</b>	12/24V (temp comp) for Lead Acid Batteries
<b>Output Power when Charging</b>	10, 20 or 50 Watts continuous at 68°F (20°C) ambient
<b>Remote Battery Temperature Sensor</b>	Silicone diode
<b>Alarm Status &amp; Notification</b>	LED & NPN Open Collector (2) 30V Max, 200mA Max
<b>Transient Protection</b>	Bi-directional TVS 1500 Watts peak pulse power
<b>Battery Short Circuit Protection</b>	10 amp PTC Over Current Protection
<b>Electrical Connections</b>	½" NPT Rigid Conduit Opening (2) [Explosion Proof]
<b>Wire Connections</b>	Terminal Strip w/Screw Clamp, 14 AWG max
<b>Communications</b>	RS-485 Serial / Ethernet MODBUS Protocol (-COM Option)
<b>Severe Service</b>	Wetted parts suitable up to 8% H <sub>2</sub> S and 8% CO <sub>2</sub> (-SVR Option)
<b>Inlet Gas Supply Pressure</b>	1440 psig Maximum
<b>Gas Flow During Charge Cycle</b>	30 SCFM @ 10 Watts, 65 psig differential 40 SCFM @ 20 Watts, 85 psig differential 65 SCFM @ 50 Watts, 125 psig differential
<b>Gas Supply Connections</b>	Inlet 3/8" OD SS Tubing, Outlet 3/4" FNPT
<b>Operating Temperature Range</b>	-20°C (-4°F) to 40°C (104°F)
<b>Enclosure</b>	Cast Aluminum A356-T6, 316 SS NEMA 4X

# DB1 Monitor Software

## Monitor Main Menu

DB Monitor Version 2.0.0.0

File View Setup Calibrate Test Help

I.D. Status Configuration MODBUS

**Battery**  
13.27 Volts 70 °F

**Charger**  
**Setpoints**  
 Full Charge: 15.15 V  
 Low Battery: 12.20 V  
 Charge Current: 4000 mA  
**Generator**  
 Charging 50.4 Watts  
 13.74 Volts  
 3670 mAmps  
 2304 RPM  
 Avg Charge Time: 0:00:50  
 Avg Discharge Time: 21:52:02  
 Avg Total Cycle Time: 21:52:52  
 Total Run Time: 0:30:22  
 Service Due In: 4,999 hours

Event Clock  
08:19:24 AM  
05/16/13

Alarm Output1 Alarm Output2

RSD Run Enabled

COM22 | Online - Retrieving MODBUS Address

## Charger Set-Up

Setup Charger

12 Volt Lead Acid  
 24 Volt Lead Acid

Low Battery % of Discharge: 20%

Settings at 71°F  
 Full Charge: 15.12 V  
 Low Battery: 12.20 V

Fahrenheit  
 Celsius

Enable RSD Input

DB Save Exit

## Alarm Configurator

Setup Alarms -- Map Alarms to Outputs

**Major Alarms**  
 Major alarms will disable the generator when detected. (No charging). The Alarm LED will flash red and the Alarm Output driven low on the selected outputs.

Num.	Output 1	Output 2	Description
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lost Generator Communications Link (Non-Latched)
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Control Valve is Full Open but no RPM Detected (Latched)
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Control Valve Failed (Latched)
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Generator RPM or Voltage Output Too High (Latched)
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Turbine RPM Sensor Failed (Latched)
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Control Valve Position Sensor Failed (Latched)

**Minor Alarms**  
 Minor alarms are informative. Alarms 7, 9 & 13 also disable the generator (no charging). The Alarm LED will flash yellow and the Alarm Output driven low on the selected outputs.

Num.	Output 1	Output 2	Description
7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Controller Switch is in Disable Position (Non-Latched)
8	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unable to Generate Maximum Power with Control Valve Full Open (Latched)
9	<input type="checkbox"/>	<input checked="" type="checkbox"/>	RSD (Remote Shut Down) Input Detected (Non-Latched)
10	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Generator Run Time Service Due (Latched)
11	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature Sensor Failed (Non-Latched)
12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unable to Reach Full Battery Charge (Non-Latched)
13	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Modbus Shut Down (Latched)

- Latched alarms require the operator to make repairs and/or reset the charger to clear the alarm.  
 - Non-Latched alarms are automatically cleared after the condition is removed.

DB Save Exit

## Quick View

DB Gauges

**Battery**  
13.27 V 71°F

Charger

Volts, Amps, Watts, RPM gauges.

Stsby Charging Disabled

Exit

## Event Log

Event Log

Save Clear all Events Tag New Events As Read

Total Events: 79 No Events to display  
 New Events: 79 No new Events to display  
 Marked as Read: 0  
 Displayed: 79

79 out of 79 Events

Count	Time Stamp (mm/dd/yy)	Battery	Event
1	05/16/13, 08:24:21 AM	13.14V	ALARM on Output2 Active
2	05/16/13, 08:24:20 AM	13.15V	Generator Stopped
3	05/16/13, 08:24:20 AM	13.15V	ON/Disable switch in DISABLE position
4	05/16/13, 08:22:04 AM	12.88V	Generator Started
5	05/16/13, 08:21:59 AM	13.16V	Power ON
6	05/16/13, 08:21:31 AM	13.02V	ALARM on Output2 Active
7	05/16/13, 08:21:30 AM	13.02V	Generator Stopped
8	05/16/13, 08:21:30 AM	13.02V	ON/Disable switch in DISABLE position
9	05/16/13, 08:20:16 AM	12.84V	Test charge current set
10	05/16/13, 08:20:16 AM	12.84V	Using Test Power Value
11	05/16/13, 08:20:09 AM	12.88V	Generator Started
12	05/16/13, 08:20:03 AM	13.16V	Power ON
13	05/16/13, 08:19:43 AM	13.08V	ALARM on Output2 Active

Stop Exit

## MODBUS Configurator

DB Monitor Version 2.0.0.0

File View Setup Calibrate Test Help

I.D. Status Configuration MODBUS

MODBUS unit address: 1 Protocol Mode: RTU

Connection Port:  RS 485  Ethernet

Settings  
 Baud: 9600  
 Data Bits / Protocol Mode: 8 / RTU  
 Parity: None  
 Stop Bits: 1

DB Save

COM22 | Online - Retrieving Settings

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Safety Guide – See [www.parker.com/safety](http://www.parker.com/safety).

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Bulletin PGI-DB 1/2016-DDP



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