Remote monitoring with Global Water's RM100 Wireless Communication System, shown here with a SP102 Solar Panel

CHAPTER 6.
DATA RECORDING AND REMOTE MONITORING

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GL500-7-2 Global Logger

Multichannel Datalogger for Recording a Variety of Sensor Signals

Features

- Includes both USB and serial communication ports
- Four sample modes: 10 times per second, timed, logarithmic, and exception
- Monitor up to 9 sensors at a time in addition to battery voltage
- Battery powered for remote locations
- User friendly Windows™ and Windows™ CE-based PDA software included
- Accepts any 4-20 mA input

Specifications

Datalogger

Memory	Non-volatile flash memory
Power	4.2 VDC min to 24.0 VDC absolute max Standby current: 70µA typical Logging current: 5mA typical + sensor current
Analog Sensor Inputs	4-20 mA (0-5VDC as factory option) Resolution: 12-bit, 4096 steps Channels: 7 input channels + battery voltage monitor Sensor warm-up time: Programmable 0-60 sec
Digital Inputs	Two independent pulse counters Maximum input voltage: 24VDC Maximum frequency: 100Hz Minimum pulse width: 2mS Maximum count: 65,535 (16-bit)
Sample Now Input	Sample-on-demand input, software enabled Maximum input voltage: 24VDC Minimum pulse width: 2mS
Sample Modes	Fixed Interval: Programmable from 1 sec to >1 yr High Speed: 10 samples per sec Logarithmic Sample Rate: Approximation Exception: Log only on deviation from previous reading
Storage Capacity	40,879 Recordings for all inputs plus time stamp
Data Overwrite	Select memory wrap or unwrap (unwrap will stop logging data once memory is full)
Communication Ports	RS-232 DB9 and USB Type B
Selectable Baud Rates	9600, 19200, 28800, 38400, 57600, 115200
Clock	Synchronizes to the time and date of user's computer
Operating Temperature	Industrial, -40 to +185°F (-40 to +85°C) (battery may not apply)
Enclosure	Expanded UV protected PVC
Dimensions	5 x 2 x 3 in (12.7 x 5 x 7.6 cm)
Weight	1.5 lbs (680 g)

Global Logger II PC Software

Compatibility	Microsoft's Windows™ 98, ME, 2000, NT, XP, and Vista
Features	Tabular display/printout; data in standard spreadsheet format (CSV); programmable alarm start and stop times; field calibration software and help files included

Windows™ CE PDA Software

Compatibility	Microsoft's Windows™ CE and Mobile compatible

Optional Enclosure

Materials	UV protected PVC
Battery	12 Volt, 2.2 A/hr, rechargeable (Gell Cell)
Dimensions	9 x 7.5 x 4.5 inches (22.9 x 19 x 11.4 cm)
Weight	3.5 lbs (1.6 kg) with datalogger

Description

Global Water's rugged GL500-7-2 Global Logger offers state-of-the-art technology for continuous datalogging, storage, and retrieval. The logger features 7 analog channels and 2 digital channels for data recording. It also offers USB and serial communication ports for easy communication with a Windows™-based PC or PDA.

Powerful Recording

The GL500-7-2 can record over 40,000 readings and has four unique recording options: fast (10 samples per second), programmable interval (1 second to multiple years), logarithmic, and exception. The datalogger also has a sample on demand input that triggers a recording of special events. Daily start and stop alarm times can be programmed to limit recording intervals.

Smart Software

The GL500-7-2 includes Windows™-based Global Logger II software, which makes accessing stored data and setting options easy. The software provides many useful features, such as real time readout, measurement interval and engineering unit selection, station ID setting, and sensor calibration. The Global Logger also includes Windows™ CE-based PDA software for simple data collection in the field. Downloaded data can easily be opened in any PC spreadsheet program for analysis and graphic presentation.

Compatible with Many Sensors

The Global Logger includes 7 channels that can accept any 4-20 mA sensor, including many of Global Water's level, water quality,

Ordering & Options

Global Logger

Order No.	Description
GL500-7-2	Global Logger (with 7 analog and 2 pulse channels) [1]

1) Includes 7 analog channels, 2 pulse channels, USB and serial communication ports, Windows™ PC and PDA software, and cables. An external 12 VDC power source is required.

Accessories

Order No.	Description
GL450-7-1	Datalogger Enclosure Upgrade [2]
GL500-DISP	Single-Channel Display for Enclosure [3]
GL500-Mod	Modem Package [4]
SP101	Solar Panel (2 watt), see page 128
SP102	Solar Panel (5 watt), see page 128
BC100	Smart Charger, see page 128
PDAWL16	Deluxe PDA Package
AK1500	Bluetooth External Adapter

2) Includes weather-resistant enclosure with 8 ports, rechargeable 12 VDC battery (that fits inside enclosure with datalogger, and a battery charger.

3) Allows user to view one data channel in addition to datalogging. Logger will record data while data is displaying.

4) Includes standard telephone modem and modem adapter cable.

5) Handheld PDA package with a custom serial cable for the Global Logger.

GL500-2-1 Global Logger

Three Channel Datalogger for Data Recording

Features

- Rugged and easy to use
- Records over 81,000 readings
- Accepts any 4-20 mA signal
- Battery-powered for remote monitoring
- User friendly Windows™ and Windows™ CE-based PDA software included

Description

The GL500-2-1 Global Logger features two analog channels and one digital channel for recording data. The datalogger records over 81,000 readings and has four unique recording options: fast (10 samples per second), programmable interval (1 second to multiple years), logarithmic, and exception. Start and stop alarm times can be programmed to synchronize multiple loggers, delay sampling until a preset time, or limit the number of recordings during a day. The GL500U-2-1 USB model is great for direct connection to your laptop or desktop PC. The GL500S-2-1 serial (RS-232) model is best for communication via modem, CE-based PDA, or Bluetooth data downloads.

Powerful Monitoring

The GL500-2-1 can monitor two 4-20 mA sensors (0-5 volt inputs are available as a factory option) and features a scalable digital input that accepts switch closure signals and pulses from various external devices. The logger provides switched power to the sensors based on the programmable sample interval and sensor warm up time settings. Two- and three-wire sensors can be quickly connected to the datalogger's internal terminal strip and calibrated via the included Global Logger II software. The GL500S-2-1 can be accessed through dial-out to an optional remote modem (GL500-Mod) attached to the serial communication port.

Smart Software

The GL500-2-1 includes Global Logger II Windows™ and Windows™-CE PDA software, which allow for easy setup, calibration, upload, and transfer to a spreadsheet program.

Specifications

Power	Two 9VDC alkaline batteries standard. 8 VDC min. to 24.0 VDC absolute max. Standby Current: 65µA typical Logging Current: 5mA typical plus sensor current
Analog Inputs	4-20 mA, 0-5VDC inputs as a factory option Resolution: 12-bit, 4096 steps 2 channels + battery monitor Sensor warm-up time: Programmable 0-60 sec
Digital Input	Switch closure or pulse input Maximum Count: 65,535 (16-bit) Maximum Input Voltage: 24VDC Maximum Frequency: 100Hz Minimum Pulse Width: 2mS
Sample Modes	Fixed Interval: Programmable from 1 sec. to >1 year High Speed: 10 samples/sec. Logarithmic Sample Rate: Approximation Exception: Log only on programmable deviation from previous reading
Storage Capacity	81,759 recordings of all inputs plus time stamp
Communication Port	GL500S-2-1: RS-232 4-pin circular connector GL500U-2-1: USB Type B Selectable Baud Rates: 9600, 19200, 28800, 38400, 57600, 115200
Clock	Synchronizes to user's computer
Data Overwrite	Select memory wrap or unwrap
Operating Temperature	Industrial, -40 to +185°F (-40 to +85°C) (batteries may not apply)
Software	See for GL500-7-2.
Dimensions	3 x 3 x 3 inch (7.6 x 7.6 x 7.6 cm)
Weight	0.5 lb (227 g)

Ordering & Options

Global Loggers

Order No.	Communication Port
GL500U-2-1	USB
GL500S-2-1	RS-232 Serial

Accessories

Order No.	Description
GL450-2-1	Weatherproof Enclosure [1]
PDAWL16	Deluxe PDA Package[2]
GL500-Mod	Modem Package [2]
AK1500	Bluetooth External Adapter[2]

1) Additional batteries not included.

2) Compatible only with GL500S-2-1 serial version.

and weather sensors. The datalogger also includes two scalable digital inputs that accept switch closure signals from rain gauges or relays, as well as pulses from various external monitoring and control devices. The logger provides switched power to analog sensors based on sample interval and sensor warm-up time settings. You can quickly connect sensors to the datalogger's terminal strips, and you can easily calibrate sensors using the Global Logger II software. Please contact Global Water regarding 0-5 volt inputs, which are available as a factory option.

Remote Communication Options

The GL500-Mod Modem Package (see Options & Ordering) and the RM100 Wireless Communication System (see page 126) add remote communication capabilities to your Global Logger, allowing you to access your sensors via a remote modem attached to the GL500's serial communication port. For other remote options, select the SIT65 for satellite-to-web communications (see page 127).

Accessories to Meet Your Needs

We offer solar panels and a battery charger to support your datalogger installation (see page 128). We also offer the optional GL450-7-1 rugged, lockable, and weather resistant enclosure for added protection (a 12VDC rechargeable battery and battery charger are included), as well as an optional display (Order No. GL500-DISP) for the enclosure. In addition, we offer the PDAWL16 Deluxe PDA Package and AK1500, external Bluetooth adapter, for easy data retrieval.

Applications

Ideal for monitoring a variety of environmental parameters, including water level, flow rate and total flow, rain level, weather conditions, and water quality.

Modular and Integrated Data Recording Solutions

Providing Modular Data Recording Products and Designing Integrated Data Recording Systems

Description

Global Water offers both modular and integrated data recording solutions, including modular products that you can easily put together, as well as fully integrated systems that meet your specific needs.

Our powerful and rugged Global Loggers provide continuous data recording and a user-friendly interface for our highly accurate level, water quality, and weather sensors. An extension package allows you to easily access the Global Logger via a remote modem. Alternatively, we offer a variety of data recorders with built-in cellular, satellite, and radio remote communication capabilities. Our FC200 Open Channel Flow Monitor or PC300 Process Controller can be incorporated for real-time display and capable output signals. These signals can be used to control a variety of external instruments, including our heavy duty samplers and alarms, as well as other devices. We also offer numerous accessories to support your data recording system, including data collection devices, heavy-duty enclosures, and power options such as batteries and solar panels.

SOLUTIONS

We offer modular products that you can easily put together, as well as fully integrated systems that meet your specific needs. Our powerful and rugged Global Loggers provide continuous data recording and a user-friendly interface for our highly accurate level, water quality, and weather sensors.

Global Loggers

Our rugged GL500-Series Global Loggers offer state-of-the-art technology for continuous datalogging, storage, and retrieval. The loggers have four unique recording options: fast (10 samples per second), programmable interval (1 second to

Ordering & Options*

Monitoring Instrumentation

Order No.	Description
GL500-7-2	Global Logger with 7 Analog and 2 Pulse Channels, see page 122
GL500U-2-1	USB Global Logger with 2 Analog and 1 Pulse Channels, see page 123
GL500S-2-1	Serial Global Logger with 2 Analog and 1 Pulse Channels, see page 123
SIT65	Satellite Internet Telemetry, see page 127
FC200	Open Channel Flow Monitor, see page 26
PC300	Process Controller, see page 132

Remote Communication/Alarm Options

Order No.	Description
GL500-Mod	Modem Package for Serial Global Loggers
RM100-CSK	Client/Server Wireless Communication System, see page 126
AD200-4	Voice Autodialer with 4 Inputs, see page 138
WA400-AC	Strobe and Sounder Alarm with AC Power, see page 137

* Please see product pages for specifications and options.

4-20 mA Sensors

Order No.	Description
WL400	Water Level Sensor, see page 6
WQ101	Temperature Sensor, see page 60
WQ201	pH Sensor, see page 60
WQ301	Conductivity Sensor, see page 61
WQ-FDO	Optical Dissolved Oxygen Sensor, see page 62
WQ401	Dissolved Oxygen Sensor, see page 63 for ranges
WQ730	Turbidity Sensor, see page 64
WE100	Barometric Pressure Sensor, see page 106
WE300	Solar Radiation Sensor, see page 106
WE550	Wind Speed Sensor, see page 107
WE570	Wind Direction Sensor, see page 107
WE600	Humidity Sensor, see page 108
WE700	Temperature Sensor, see page 108
WE710	Flat Surface Temperature Sensor, see page 112

Packaged Systems

Order No.	Description
FSS-STD	Flow Sampling System, see page 46
WQS-STD	Water Quality Sampling System, see page 48
WQMS	Water Quality Monitoring System, see page 58
WE800	Datalogging Weather Station, see page 104
WE900	4-20 mA Weather Station, see page 104

Enclosures and Power Options

Order No.	Description
PDAWL16	Deluxe PDA Download Package
GL450-7-1	Weather-Resistant Enclosure with Battery Pack for GL500-7-2
GL450-2-1	Weatherproof Enclosure for GL500-2-1
BC100	Smart Charger, see page 128
SP101	Solar Panel (2 watt), see page 128
SP102	Solar Panel (5 watt), see page 128
SP140	Solar Panel (40 watt), see page 128

Customization & Integration

Please contact us for more information about customization and integration.

multiple years), logarithmic, and exception. Start and stop alarm times can be programmed to synchronize multiple loggers, delay sampling until a preset time, or limit the number of recordings during a day. The Global Loggers include user-friendly Windows™-based PC and PDA software for easy data collection, data retrieval, and set up.

Remote Communication Options

The GL500-Mod Modem Package and RM100 Radio Transceiver System add remote communication capabilities to your Global Logger, allowing you to access your sensors via a remote modem attached to the GL500's serial communication port. In lieu of the Global Logger, you can drop in one our data monitoring instruments with built-in remote communication capabilities, such as the SIT65 for satellite-to-web communications.

Modular Solutions

Our products are designed to be easily connected together into systems. We attempt to keep most of our products in stock, which means we can ship components to you for immediate or short term delivery. You can easily wire these parts together to customize your own data recording system, and you can reconfigure and expand as required without difficulty.

Integrated Solutions

Many of our clients prefer fully connected and tested systems that will work out-of-the-box with little or no assembly required. Our sales engineers will work with you to design a system to address your application, and our technical engineers will build and test this system at our factory prior to shipment. Please contact us to learn more about factory customization and system integration.

(Solar panels sold separately.)

RM100 Wireless Communication System

Wireless Point-to-Multipoint Radio Transceiver System

Features

- Retrieve data from remote sites
- Works with most Global Water serial loggers
- Easy to use Global Access software included

Specifications

Output Power	1000mW
Transmission Range	Up to 15 miles (32 km) line-of-sight
Receiver Sensitivity	-100dBm typical @ 76.8kbps RF data rate
Frequency	902 to 928, FHSS (USA)*
Network Topologies	Point-to-Point, Point-to-Multipoint
Channels	32
Antenna Connector	RPSMA Jack
Power Consumption	40mA receive, 400mA transmit (@ 12 VDC)
Power Requirement	7 to 18 VDC
Operating Conditions	Temp -40 to +176°F (-40 to +80°C); 10% to 90% humidity (non-condensing)
Serial Connector	DB9
Serial Cord Length	6 feet (183 cm)
Dimensions	4-3/4 x 2-3/4 x 1-1/8 inch (12 x 7 x 2.9 cm)
Weight	7 oz (170 g)

* Transceivers are USA FCC compliant and do not necessarily comply with regulations in other countries.

Ordering & Options

Remote Wireless Packages

Order No.	Description
RM100-SFL	Server Package, Fixed Location
RM100-SMP	Server Package, Mobile
RM100-CSR	Client Package, Short Range
RM100-CLR	Client Package, Long Range
RM100-CSK	Client/Server Kit

Description

Global Water's RM100 Wireless Point-to-Multipoint Communication System uses powerful radio transceivers to seamlessly connect you with your remote monitoring sites from the comfort of your office or vehicle.

Powerful Radio Modem

The RM100 uses a rugged, industrial 2-way radio modem that is designed for seamless communications with Global Water's serial dataloggers (including the WL16S on page 2, the GL500-7-2 on page 122, and the GL500S-2-1 on page 123). The powerful 1-watt, 900mHz radio requires no license and is capable of line-of-site communications of up to 15 miles (24 km) with the proper antenna. Built-in error correction assures accurate data transfer. Each radio unit has a unique address so you never have to worry about cross-talk or interference between one unit and another.

Capable Software

The RM100 includes Global Access communications software, which has an easy to use, intuitive interface. The software's built-in address book allows you to quickly set up your monitoring sites with unique identifiers and names, and you can add new sites at any time. Used in conjunction with our Global Logger datalogging software, you can get a current reading from any of your sensors, download the logged data, autopoll data, sample continuously, and even reprogram your logger just as though you were right on the site.

Accessories

Order No.	Description
AN100-OD6	Omni-directional 6dBi Antenna
AN100-OM5	Omni-directional 5dBi Mobile Antenna w/Magnetic Base
AN100-YA9	Yagi Directional 9dBi Antenna
AN100-YA13	Yagi Directional 13dBi Antenna
RM100-SPMB	Solar Panel Mounting Kit
SP101-SP102	Solar Panels, see page 128
BC100	Smart Charger, see page 128
00-009	12V, 2.2 Ahr Battery for Datalogger

Packaged Systems

The RM100 series units are offered in four pre-configured, ready to deploy packages, as well as one convenient starter kit. Everything you need is included to get your system up and running quickly. One server (base) unit and one client (remote) unit are required to make a complete system. Many remote units can report back to a single base. We can also configure a custom system for your application— please call us regarding this option.

- RM100-SFL Server, Fixed Location: This package is the best choice when using an existing enclosure or for an interior installation where AC power is available. The package includes a server modem, RS-232 serial cable, AC adaptor, 25 ft (7.6 m) antenna cable, permanent mount 6dBi omni-directional antenna with 2 inch (5.1 cm) pole mount hardware, 3dBi stubby antenna for testing and setup, manual, and software.
- RM100-SMP Server, Mobile Platform: This package is ideal for short-term monitoring projects where AC power is not available or for doing drive-by data collection. The package includes the server modem mounted inside a weatherproof case, AC charger, RS-232 serial cable, magnetic base 5dBi mobile omni-directional antenna with 4 ft (1.2 m) cable, manual, and software. (For AC powering, we recommend the optional BC100 Smart Charger.)
- RM100-CSR Client, Short Range: This

SIT65 Satellite Internet Telemetry

Datalogger with Satellite Internet Capabilities

package is the perfect choice for applications where your remote monitoring stations are under 10 miles line-of-sight. This package includes a weatherproof case with mounting hardware for 2 inch (5.1 cm) diameter pole, client radio with 5Ahr battery, radio to logger serial cable, smart charger, 15 ft (4.6 m) antenna cable, 9dBi Yagi antenna with 2 inch (5.1 cm) hardware, manual, and software. For long term monitoring we also offer optional solar panels and mounting kits (see Ordering & Options).

- RM100-CLR Client, Long Range: For monitoring sites that are up to 15 miles line-of-sight or shorter range sites where you may have a few obstructions, this package features a higher gain antenna. The package includes a weatherproof case with mounting hardware for 2 inch (5.1 cm) diameter pole, client radio with 5Ahr battery, radio to logger serial cable, smart charger, 15 ft (4.6 m) antenna cable, 13dBi Yagi antenna with 2 inch (5.1 cm) hardware, manual, and software. For long term monitoring we also offer optional solar panels and mounting kits (see Ordering & Options).
- RM100-CSK Client/Server Starter Kit: This kit is ideal for those who have experience in electronic instrumentation. We make it easy for you to install and configure a system to interface with one of our Global Water serial dataloggers (see pages 122 and 123). The RM100-CSK includes one server, one client, two 6 inch (15.2 cm) rubber coated stubby antennas, RS-232 serial cable, radio to logger serial cable, 2 AC adaptors, manual, and software.

Description

Global Water's SIT65 Satellite Internet Telemetry provides the easiest and most economical way to collect environmental data remotely. The remote telemetry system uses the latest satellite and Internet technologies to bring data to your computer in near real time. The system includes a data transmitter and a rechargeable battery enclosed in a rugged, rain proof, and lockable enclosure; a ground-to-satellite antenna; and mounting hardware.

Flexible Inputs and Outputs

The SIT65 system will interface with most sensors, including all of Global Water's rugged 4-20 mA sensors. The system includes up to eight analog inputs, five factory programmable status/accumulator inputs, and up to five open collector outputs.

Simple Installation and Operation

The SIT65 is simple to set up and operate: just hook up your sensors, point the antenna to the sky, and turn on your telemetry equipment. Satellite service is available anywhere in the world. Data is transmitted based on programmed time intervals and/or alarms and is transferred via satellite and Internet to a dedicated web page. You can monitor and collect data anywhere you have web access.

Power Options

The SIT65 includes a 5 AH gel cell battery and a NEMA 4 enclosure. For long term AC power, we recommend the AC Charger. We also offer solar panels to support your remote installation. A Smart Charger is recommended for all solar powered installations (see Ordering & Options below).

Features

- Remote data and control guaranteed!
- Receive data by Internet
- Near real time data and control
- Text alarms to your cell phone or e-mail
- Easy installation
- Low cost/economical

Specifications

Inputs	Up to 8 analog (4-20mA, 0-1mA, 0-500uA, 0-5VDC or 0-10VDC) Up to 3 digital status or accumulator inputs Dedicated Battery Voltage Monitor
Outputs	Up to 2 open collector control outputs
Powery	12VDC
Battery	Rechargeable 12V 5AH Gel Cell
Current Draw	5mA minimum standby 80mA receiving 2A transmitting
Operating Temperature	-40 to +140°F (-40 to +60°C) Battery may not apply
Humidity	0-100% non-condensing
Antenna Cable	16 ft standard
Dimensions	Interior: 10 x 12 x 6 in (25.4 x 30.5 x 15.2 cm) Outer Lid: 12 x 14 in (30.5 x 35.5 cm)
Weight	21 lbs (9.5 kg) shipping weight

Ordering & Options

Order No.	Description
SIT65	Satellite Internet Telemetry [1]
FM0100	Subscription Service
SIT65-CBL	Additional Antenna Cable
FE0400	AC Charger [3]
BC100	Smart Charger [4], see page 128
SP101	Solar Panel (2 watt), see page 128
SP102	Solar Panel (5 watt), see page 128
SP140	Solar Panel (40 watt), see page 128

1) Includes a transmitter, antenna with 12 ft cable, rugged NEMA 4 enclosure, a rechargeable 5 AH gel cell battery, and mounting hardware.

2) Subscription service costs can vary. Please call us for pricing.

3) Use the AC Charger for continuous AC operation to maintain the charge to your SIT65's battery.

4) A Smart Charger is recommended for all solar panel installations.

Sizing Your Solar System

Remote monitoring sites are by nature low powered. If your site performs a significant level of control, it will be grid or battery powered, and you won't need solar power.

For remote monitoring and limited on-off control, you will probably have a low powered site that you will need to keep powered at all times. Because solar power goes on and off as the sun goes up and down, a site should never be powered directly from solar power. Instead, a site will actually be battery powered with a solar charging system.

To solar power your remote site, you will need to calculate the battery size and the solar panel size. The battery should be sized to run the site for three days without any solar charging. This will cover you for several days of bad weather in a row, since even on cloudy and stormy days there will some solar charging taking place.

First, calculate the AVERAGE CURRENT draw for the site. Most remote sites have a sleep or standby mode and come up to full power only when a reading is taken or a control is ordered. For a record-only or transmit-only remote site, the current draw for the site is usually very low (usually one milliamp or less). Call this the STANDBY CURRENT. For a 2-way radio system, the radio receiver must stay on continuously to receive commands from the central site, and therefore the standby current is much larger (300mA or more). When the remote site takes a reading or transmits a radio signal, it usually comes on to full power, warms up the sensors for sev-

Continued on Next Page . . .

SP-Series Solar Panels

2 or 5 Watt Supplemental Power

Description

Our rugged 2W SP101, 5W SP102 , and 40W SP140 Solar Panels are easy to install and offer reliable solar charging for your remote monitoring station.

Specifications

Power	SP101; 2 watt, 15 volt minimum SP102: 5 watt, 15 volt minimum SP140: 40 watt, 15 volt minimum

Ordering & Options

Order No.	Description
SP101	Solar Panel (2 watt)
SP102	Solar Panel (5 watt)
SP140	Solar Panel (40 watt)

BR100 Boost Regulator

12 to 24 Volt Boost Regulator

Description

The high quality, compact, and durable BR100 powers 24 volt sensors in 12 volt systems and includes a shutdown mode to conserve power.

Specifications

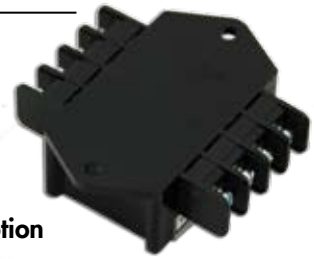
Input Voltage	8 to 16 VDC
Output Voltage	24 VDC
Continuous Output Current	200 mA
Current Limit	230 mA
Shutdown Current	<1 µA
Shutdown Input Voltage	Vin < 2 VDC
Short Circuit Protection	5 seconds maximum
Dimensions	3 x 2.2 x 1.2 in (7.6 x 7.1 x 3 cm)
Weight	3.1 oz (96 g)

Ordering & Options

Order No.	Description
BR100	Boost Regulator

CS100 Signal Splitter

Divides Single 4-20 mA Signal



Description

The high quality, compact, and durable CS100 divides a single 4-20 mA signal into two separate non-isolated 4-20 mA outputs.

Specifications

Supply Voltage	10 to 30 VDC
Input Voltage	0 to 21 mA
Supply Current	5mA plus both output currents
Output Accuracy	± 0.1%
Output Load	100 to 400ohms
Dimensions	3 x 2.8 x 1.2 inch (7.6 x 7.1 x 3 cm)
Weight	3.4 oz (106 g)

Ordering & Options

Order No.	Description
CS100	4-20 mA Signal Splitter

BC100 Smart Charger

Overcharge Protection

Description

The compact, and durable BC100 Smart Charger prevents overcharging of batteries during continuous charging or in solar applications.

Specifications

Input Voltage	15 to 30 VDC
Output Float Voltage	13.8 VDC
Overcharge Threshold	14.2 VDC
Bulk Charge Threshold	12.8 VDC
Maximum Output Current	0.75 A
Power Dissipation	10 Watts
Supply Current	<2.5mA
Dimensions	3.0 x 2.2 x 1.2 in (7.6 x 7.1 x 3 cm)
Weight	3.1 oz (96 g)

Ordering & Options

Order No.	Description
BC100	Smart Charger

4015 Converter

SDI-12 to Analog Converter

Features

- 0-1mA, 0-20mA, 4-20 mA, or 0-5V outputs
- Master or "listen only" modes
- Programmable full scale and zero values
- High conversion accuracy
- DIN rail mountable

Description

The 4015 SDI-12 to Analog Converter provides a highly accurate interface between an SDI-12 serial communications bus and an analog measurement system. The converter can either act as a SDI-12 master by polling a sensor on a timed basis, or it can act as a "listen only" external recorder that polls the sensor. Each 4015 responds to a single SDI-12 address and parameter, and multiple converters can be used to translate several sensor parameters. The 4015 can be configured to provide a 0-1mA, 0-20mA, or 4-20 mA current output with 0-5 volt output always available.

Specifications

Communication	SDI-12 (version 1.1 compliant)
Resolution	12 bit
Accuracy	Better than 0.1%
Wire Size	#24-#14 AWG
Connections	Screw terminal
Mounting	DIN rail (35mm)
Power Supply	10 to 33 VDC; 8mA + output (max) during read
Operating Temp	-22 to 140°F (-30 to 60°C)
Dimensions	3.5 x .75 x 2.1 inch (89 x 19 x 53 mm)
Weight	1.9 oz (54 g)

Ordering & Options

Order No.	Converter Type
4015	SDI-12 to Analog

4046 Converter

Analog to SDI-12 Converter

Features

- Convert two analog sensors and one pulse counter
- Programmable slopes and offsets
- Monitor battery voltage and temperature
- DIN rail mountable

Description

The 4046 Analog to SDI-12 Converter provides a highly capable interface to convert inputs from two analog sensors and one pulse counter to an SDI (serial data interface). The 4046 also provides internal measurements of battery voltage and ambient temperature (the temperature scale can be set in either °F or °C). The unit responds to all basic SDI commands and enters into a low power sleep state when it is not being polled. The 4046 also has user programmable slope and offset values, as well user programmable sensor warm-up time settings.

Specifications

Communication	Gnd, +12VDC, (2) Analog 0-5VDC, Tipping Bucket (contact closure to ground)
Inputs	12 bit
Wire Size	#24-#14 AWG
Connections	Screw terminal
Mounting	DIN rail (35mm)
Sensor Power	12VDC or 5VDC (jumper selectable)
Power Supply	12 VDC, <200µA during sleep, <1A for sensor power
Operating Temp	-22 to 140°F (-30 to 60°C)
Dimensions	3.5 x .75 x 2.1 inch (89 x 19 x 53 mm)
Weight	1.9 oz (54 g)

Ordering & Options

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4046	Analog to SDI-12

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eral seconds, and then records and/or transmits the data. Call this the ON CURRENT. The AVERAGE CURRENT = STANDBY CURRENT + ON CURRENT x % ON time. The STANDBY CURRENT and ON CURRENT can be calculated from instrument and sensor specifications.

For example, if the STANDBY CURRENT = 10 mA, the ON CURRENT = 1 A , and the site is at high power (ON) for 10 seconds every 10 minutes, we will have 10mA continuous plus 1 A for 10 seconds out of 600 seconds. Or, 1A/ 60 = 17mA. So your AVERAGE CURRENT is 10mA + 17mA = 27mA. Batteries are rated in Ampere Hours (AH). A 1 AH battery will supply one ampere for one hour. In our example, we want to power a site drawing 0.027A for 3 days (72 hours) or 0.027A x 72 hours = 1.9 AH. So we will need a 2 AH battery at minimum, but a 4 or 5 AH battery would be sensible

Sizing the solar panel for your remote monitoring site is a lot easier. To take into account weather, latitude, season, night time loss, etc., the rule of thumb is to size the panel 10 x the AVERAGE CURRENT. In the case of our earlier example, the AVERAGE CURRENT (.027A) x 10 = 270mA. So a 300 or 350mA panel will cover you, and you may want a slightly bigger solar system if your monitoring site is in the far north or south.

You should face the panel south at a 45° angle. Any panel size above 80mA will need a voltage regulator or smart charger so that you don't damage the battery by over charging.

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