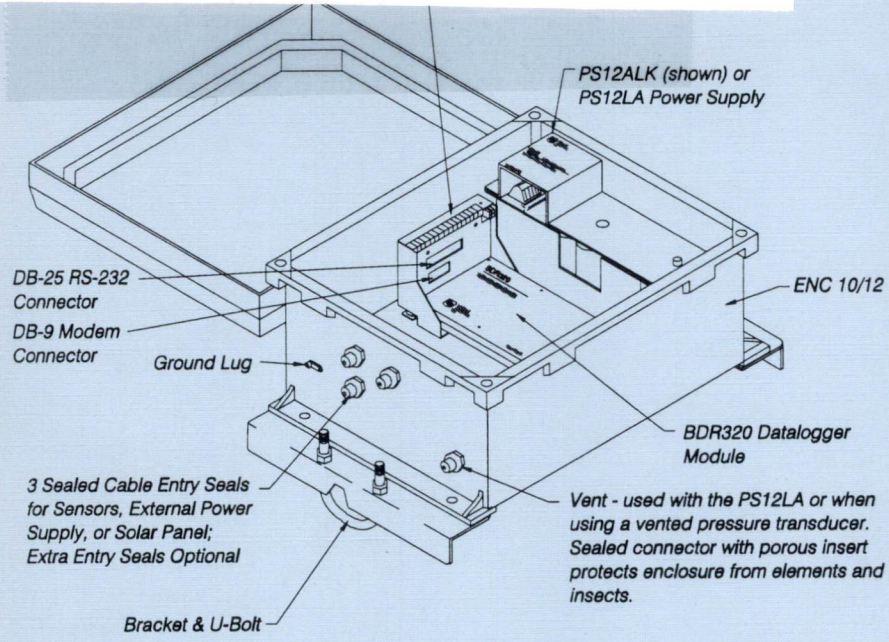
The BDR320

9-7-93

A Basic Data Recorder for Hydrology

CSI Book Update

Spec change: Current drain changed from 180 to 200 microamps.



FEATURES

- SDI-12 intelligent sensor interface
- Four single-ended or two differential analog input channels
- Four digital output channels for on/off control
- Two pulse counting channels
- Rugged, sealed enclosure
- Operating temperature range of -35° to +55° C
- Data retrieved by a laptop computer, SM192/716 Storage Module or telephone (including cellular)
- Analog accuracy of 0.1% over temperature range
- Autoranging analog input
- Clock accuracy of 1 minute per year over temperature range
- RS-232 interface for programming and data retrieval
- Prompted parameter entry for programming
- Flexible math and other processing functions
- Data storage for 30,000 values
- Extremely low quiescent power drain
- Low cost
- PC300 Datalogger Support Software
- 3 year warranty

DESCRIPTION

The BDR320 is designed for reliable, long-term, unattended monitoring of a limited number of sensors in harsh environments. Power consumption is minimal. With 4 single-ended or 2 differential analog inputs and 17-bit digital resolution, the BDR320 precisely measures temperature, pressure, force or position using common simple sensors. The device is ideally suited to stage recording or well monitoring where precision measurements are needed from only one or two sensors. Compatible sensors are:

- SDI-12 intelligent sensors
- potentiometers
- thermistors
- platinum resistance thermometers
- strain gage type load cells or pressure transducers
- switches in tipping bucket rain gages
- certain pulse output flow meters

The BDR320 is sold as a system consisting of: a sealed enclosure, power supply (alkaline or sealed rechargeable), wiring panel, datalogger module, and water-resistant cable connectors. The wiring panel has a bank of wire terminals for sensor inputs and control outputs. It also contains a standard CSI 9-pin port for the DC112 Telephone Modem and spark gaps for lightning protection. A 25-pin port functions as an RS-232 interface and a connection point for a Campbell Scientific SM192/716 Storage Module.

A laptop computer running Campbell Scientific's PC300 (included with the BDR320) BDR Support Software (MS-DOS) connects to the RS-232 interface for program entry, editing, or data retrieval. In addition to the programming language used in other Campbell dataloggers, the BDR320 includes a prompted parameter entry system which simplifies the programming of less complex tasks. Single character commands are used to enter the programming mode, set the clock, retrieve status information or retrieve stored data. A Model SM192 or SM716 Storage Module can also be used to retrieve data from the BDR320.

APPLICATIONS

- Stage recorder using a potentiometer, pressure transducer, or SDI-12 incremental shaft encoder.
- Well draw-down and slug tests using a pressure transducer. Logarithmic or other non-linear time scales for recording data can be programmed into the BDR320.
- Water quality recorder using SDI-12 water quality sensors.
- Precipitation recorder using a tipping bucket or weighing type precipitation gage.

BDR320 SPECIFICATIONS

The following electrical specifications are valid for an ambient temperature range of -35 to +55°C, unless stated otherwise.

ANALOG INPUTS

NUMBER OF CHANNELS: 2 differential or up to 4 single-ended

MEASUREMENT TYPES: single-ended and differential voltage, ratiometric half bridge and full bridge

ACCURACY: Single-ended or differential voltage: 0.1% of full scale
Ratiometric bridge measurements: 0.02% of full scale

INPUT RANGE, INTEGRATION TIME, RESOLUTION:

60 Hz Rejection PROM:

Full Scale Range mV	Integration ms	Resolution µV
Auto range		
-20 to +5000	≤16.7	3.1 to 49.5
Fixed range		
-20 to +80	50.0	1.0
-20 to +120	33.3	1.5
-20 to +250	16.7	3.1
-30 to +1000	5.3	10.2
-50 to +5000	1.08	49.5

50 Hz Rejection PROM:

Full Scale Range mV	Integration ms	Resolution µV
Auto range		
-20 to +5000	≤20.0	2.6 to 49.5
Fixed range		
-20 to +60	60.0	.9
-20 to +100	40.0	1.3
-20 to +230	20.0	2.6
-30 to +1000	5.3	10.2
-50 to +5000	1.08	49.5

INPUT NOISE VOLTAGE (on -20 to +80 mV range): 50 Hz: 1.5 µV RMS, 60 Hz: 1.76 µV RMS

COMMON MODE RANGE: ± 5 volts

INPUT CURRENT: 10 nanoamperes

INPUT RESISTANCE: 6 gigohms

ANALOG OUTPUTS

EXCITATION: A single excitation output for resistive bridge measurements; switched to 4.0 volts ± 50 mV at time of measurement. Maximum output current: 35 mA

NOTE: The precise value of the excitation voltage is measured during the BDR 320 calibration. Bridge measurements are ratiometric with an accuracy of 0.02% of full scale.

5V PORT: Continuous, 5 VDC ± 0.2 VDC
Current available: 72 mA maximum

PULSE COUNTERS

NUMBER OF CHANNELS: 2

INPUT SIGNAL: Switch closure	Channel 1	Channel 2
Max input frequency (Hz)	20	150.0
Min switch closure time (µs)	100	200.0
Min voltage pulse low time (µs)	100	200.0
Max debounce filter time (ms)	10	5.5
Max voltage input (V)	5.0	5.0
Result	Counts	Frequency

NOTE: Pulse count channel 1 activates the processor on each count requiring 13mA for 20 ms.

SDI-12

Compatible with SDI-12 standard version 1.0, October, 1988

DIGITAL CONTROL OUTPUTS

Four digital control outputs, enabled according to a programmed time or event. C1 can be set high or low continuously; C2, C3, C4 active only during program execution.

OUTPUT VOLTAGE (no load):
High, 5 V ± 0.1 V
Low, 0 V ± 0.1 V

OUTPUT RESISTANCE: 1000 ohms

RS-232 PORT - DB-25 CONNECTOR

FORMAT: ASCII, 8 bit, no parity, 1 start bit, 1 stop bit

TYPE: RS-232C

BAUD: 300, 1200, 9600

MODE: Full duplex, asynchronous

NOTE: This DB-25 connector functions as the Storage Module (SM192/716) port.

MODEM PORT

DB-9 connector for CSI modems

TRANSIENT PROTECTION

All input and output connections to the BDR320 are protected using RC filters and transzorbs or spark gaps.

POWER

POWER SUPPLY: 9 VDC minimum; 18 VDC maximum

CURRENT DRAIN: 200 microamps quiescent; 27 milliamps active.

DATA LOSS PROTECTION: If the power supply drops below 9.0 VDC, the datalogger enters a low power survival state where programming and data are maintained but program execution stops and communication ceases. Functions return to normal when adequate power is provided.

PROGRAMMING

PROMPT PROGRAMMING - program generation from prompted input

DIRECT PROGRAMMING - flexible instruction set; EDLOG3

MEASUREMENT INTERVAL - 1 second to 1440 minutes

PROCESSING - Numerical and transcendental operations for algorithm development

OUTPUT PROCESSING - Sample, average, totalize, maximize, minimize, histogram, wind vector, sample on max or min, standard deviation

COMPUTER COMMANDS SHORT LIST

STATUS - Listing of parameters critical to datalogger operation

DATA DIAGNOSTICS - Occurrences of run time errors are logged. Changes to real-time clock are also logged.

DATA RETRIEVAL - Retrieve all data, all since last retrieval, or time window; optional time tag, ASCII format.

DATA NOTES - Up to 1000 alpha-numeric characters.

DISPLAY INPUTS - Instantaneous measurements on command for on-site verification and calibration of sensors.

ADJUST OFFSET - Enter desired measurement value and offset is calculated automatically.

PHYSICAL

DATALOGGER & WIRING PANEL ONLY:
Size: 7.4 x 4.75 x 3.75 inches
Weight: 1.3 lbs.

WITH STANDARD ENCLOSURE:
Size: 15.5 x 11.4 x 6.9 inches
Weight: 11.0 lbs. (less battery)

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