

Description

The DRM Data Recorder Module provides a simple and accurate method to collect, store and evaluate process (temperature, pressure, level and flow) data for trending, troubleshooting, alarming and calibration.

The DRM is the ideal replacement for troublesome strip and circular chart recorders. It collects current (e.g., 4-20mA) and voltage (e.g., 1-5V) process signals from signal transmitters, conditioners and other analog devices, and safely stores the collected values in digital form. The DRM then transfers the data directly into a wide range of popular personal computers via an RS-232C format. Once downloaded, the menu-driven DRM Support Software is used to display the data in report or graph form. Custom reports and graphs can also be created by transferring the data into compatible data base programs.

For collecting stored data from the DRM without removing the unit from its collection location, Moore Industries offers the DTM Data Transfer Module. The rugged, hand-held DTM collects information from up to 15 DRMs, stores the data, then downloads it into a PC (see back page for details).



The DRM Data Recorder Module collects, stores and directly transfers process data into a PC for playback and analysis.

Features

- **Digital data collection and transfer.** Performs safe and accurate data collection while reducing costs by eliminating the need to perform time-consuming and often inaccurate manual paper-to-computer data transfer.
- **Compatible with popular computers.** Using the DRM Support Software, the DRM downloads directly into a wide range of popular PCs for instant data readout and analysis. Custom reports and graphs can be created using popular data base programs.
- **Battery- or externally-powered.** Internal batteries provide unattended operation for a minimum of three years making the DRM ideal for use in remote and hard-to-get-at locations. The recorder will also operate indefinitely from an external Vdc power supply.
- **Time stamps data.** When collected, data is automatically time stamped to make precise tracing and identification of individual process events fast and simple.
- **Loop integrity protection.** The 4-20mA input DRM incorporates a removable terminal block with a diode assembly to allow removal of the DRM without interrupting the current loop.

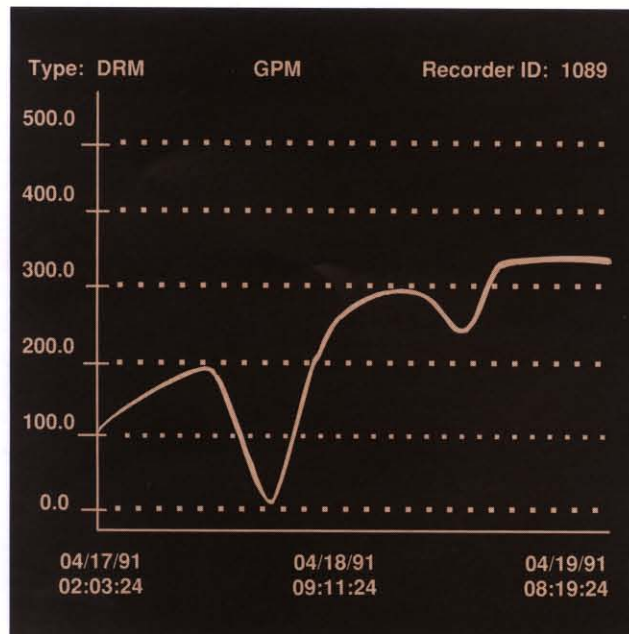


Figure 1. The DRM Support Software is Used to Plot and Display Collected Process Values in Engineering Units

DRM & DTM

Data Recorder Module and Data Transfer Module

Specifications—DRM

Characteristics

Performance **Storeable Values:** Records any combination of minimum, maximum and/or average values
Memory Capacity: Stores 1,600, 3,236 or 6,512 values; unit continues recording data until downloaded
Sample Rate: Samples input once per second
Recording Interval: Recording interval can range from once per second to once every eight hours; recording period selected must be evenly divisible into 24 hours
Sample Accuracy: Current Input Models: $\pm 0.004\%$ of span/ $^{\circ}\text{C}$ for 0-50 $^{\circ}\text{C}$ ambient temperature changes
Voltage Input Models: 0-1, 0-5V: $\pm 0.008\%$ of span/ $^{\circ}\text{C}$ and 0-10: $\pm 0.02\%$ of span/ $^{\circ}\text{C}$ for 0-50 $^{\circ}\text{C}$ ambient temperature changes
Resolution: 0.1% (10 bits)
Isolation: Output is opto-isolated from the case, power, and the input; 500Vac continuous
RFI/EMI Protection: Less than $\pm 0.1\%$ of span change in any data value with field strengths of 10 V/m and frequencies from 20 to 500 MHz per SAMA Standard PMC 33.1

Ambient Temperature **Operating Range:** -25 $^{\circ}\text{C}$ to +60 $^{\circ}\text{C}$ (-13 $^{\circ}\text{F}$ to +140 $^{\circ}\text{F}$)

Adjustments **Zero:** $\pm 1.5\%$ of span nominal via internal potentiometer
Span: $\pm 2\%$ of span nominal via internal potentiometer
Interaction: No interaction between span and zero adjustments

Clock Accuracy: $\pm 0.01\%$ of total recording period
Programmable Clock: Calendar clock month/day/year and hour/minute/second is user-selectable via support software; a separate stored clock value gives date and time of last user programming change

Alarm Type: Low power transistor (FET) switch
Max. Voltage: 30Vdc
Max. Current: 100mA
On/Off Impedance: 15 ohms/1 Megohm, nominal
Threshold: Trip points for HI and/or LO alarms are user-selectable via the support software within entire input range with a resolution of 8 bits (1 part in 256)

Weight 11 oz. (312 grams) without cable; 14 oz. (397 grams) with cable

Ordering Specifications

Unit DRM Data Recorder Module

Input **0-20MA** 0-20mA (will withstand up to 35mA inputs without damage); specific range configured via support software; Input Impedance: 50 Ω nominal
0-1V
0-5V
0-10V

(Units accepting voltage inputs will withstand up to 150% peak without damage; Input Impedance: 1 megohm)

Output **RS232** RS-232C compatible serial communication interface; Bit Format: 1 start, 8 data, 1 stop; Baud Rate: 300; 1,200; 9,600 auto-selected (unit

Output (continued) automatically adapts host computer when directly connected); Connector: 9-pin miniature "D-sub" receptacle connector

Power **9-42DC** 9 to 42Vdc, 5mA typical, or 45 milliwatts nominal; Internal Power: Two 3.5Vdc., 1.7 Ah, replaceable lithium batteries (SAFT LITHIUM LS6-BA or equivalent); Operating Life: At 25 $^{\circ}\text{C}$ (77 $^{\circ}\text{F}$), when DRM is used exclusively in data gathering operating mode, the internal batteries operate the unit a minimum of three years; Battery Shelf Life: 5 years; Storage Capacitor: Allows Battery replacement within 60 seconds without loss of unit function and performance
Backup: When sufficient external power is applied (i.e., 9V), the internal batteries are in standby mode. On loss of external power, unit runs on internal batteries

Housing DIN DIN-style housing mounts on G-type or Top Hat rail

Accessories **NOTE: Order as separate items using the part number (P/N) listed:**
P/N 800-837-52 Replacement batteries
P/N 143-75001-01* 5 1/4" disk containing DRM Support Software
P/N 143-75001-02* 3 1/2" disk containing DRM Support Software
P/N 801-838-26** 9 pin male x 9 pin female cable (4 ft. long)
P/N 801-839-26** 9 pin male x 25 pin female cable (4ft. long)

When ordering, specify: Unit / Input / Output / Power / [Housing]
Model number example: DRM / 0-20MA / RS232 / 9-42DC / [DIN]

*One software package is required for operation.
**One cable is required to connect the DRM to a computer.

Operation

The DRM Data Recorder Module converts a current or voltage loop input into a series of values which are stored in a secure solid state memory. Sampling the input once per second, the DRM can store up to 6,512 minimum, average or maximum sample values (i.e., MIN, AVG or MAX, or all at the same time, or MAX + MIN, MIN + AVG, or MAX + AVG) at user-defined intervals. The interval can be selected within a range from once per second to once every eight hours. If memory capacity is set for 6,512 average values and the recording period is set for once per minute, the DRM can record up to 108.5 hours.

The DRM can then be removed from its collection location and plugged into the serial communications port of a host computer via an RS-232 interface. The data may also be collected from the DRM using the DTM Data Transfer Module (see back page for details).

*The DRM can perform square root extraction and has an accumulator which is incremented every second by the current reading. It also has an alarm logging function that can be turned on or off where the DRM does not record until the input exceeds an alarm set point.

Support Software

Moore Industries' user-friendly DRM Support Software retrieves data directly from the DRM or from the DTM. Using the transferred information, the software performs the computations necessary to store and display graphs and print out the time stamped data records.

The software is also used to initially program the DRM. By processing user-entered menu choices, the software sends the proper commands to the recorder so that a number of parameters may be programmed including: recorder ID, time/date settings, recording rate, alarm levels, and statistics to record. IBM-PC compatible, the support software is supplied on either a 5-1/4 inch double-sided, double density floppy disk or a 3-1/2 inch floppy disk in MS-DOS format. To use the support software, the following equipment is required:

- IBM, AT & T, Compaq or other true compatible (consult the factory for a complete list of compatible computers);
- At least 512K of memory;
- One double-sided, double density disk drive (Two preferred);
- A CGA, EGA, or Monochrome graphics card;
- A compatible monitor (CGA, EGA, or Monochrome);

- An optional IBM compatible graphics printer;
- A serial communications port configured as COM 1 or COM 2; and
- An MS-DOS operating system (version 2.11 or later).

Software Main Menu

The DRM Support Software features an easy-to-read main menu that displays a summary of the DRM's status, main menu selections and quick plot graph (see Figure 2.).

Recorder Status—The top half of the screen is devoted to a summary of the recorder's status. The unit's clock setting, alarm status, and storage capacity are all displayed along with other pertinent information such as: Line 4 indicates whether the values being saved are minimums, averages or maximums; Line 6 indicates the length of the user-specified recording period in HH/MM/SS format; and Line 7 indicates how much data (in units of time) are stored in the recorder's memory. Note that when the memory is full the Line 7 value remains constant since at the end of each recording period the oldest data is discarded to permit storage of the most recently recorded value.

Main Menu Selections—Main menu selections (F1–F6) are presented in the lower left portion of the screen. Of these, the two functions that will likely be performed the most are: Analyze Recorder Data (F1) which is used mostly for displaying, graphing, and printing recorder data; and Program the Recorder (F2) which is used to program the parameters in the Recorder Status (upper) portion of the menu (i.e., the clock, alarms, recording period, storage capacity, etc.). Other main menu selection functions include: Process Another Recorder or DTM (F3); Change Baud Rate (F4); and Emulating a Dumb Terminal (F5). A Utilities function (F6) is also included and is used for system configuration or to scale the recorder to the appropriate engineering units.

Quick Plot—This portion, which is located on the lower right portion of the screen, is used to provide an unscaled graphic summary of the data contained in the recorder. This can be done without having to perform a detailed analysis of the data (which can be performed using the "Analyze Recorder Data" selection function — F1). The Quick Plot function, therefore, can be used to tell if the attached recorder contains data that is of further interest.

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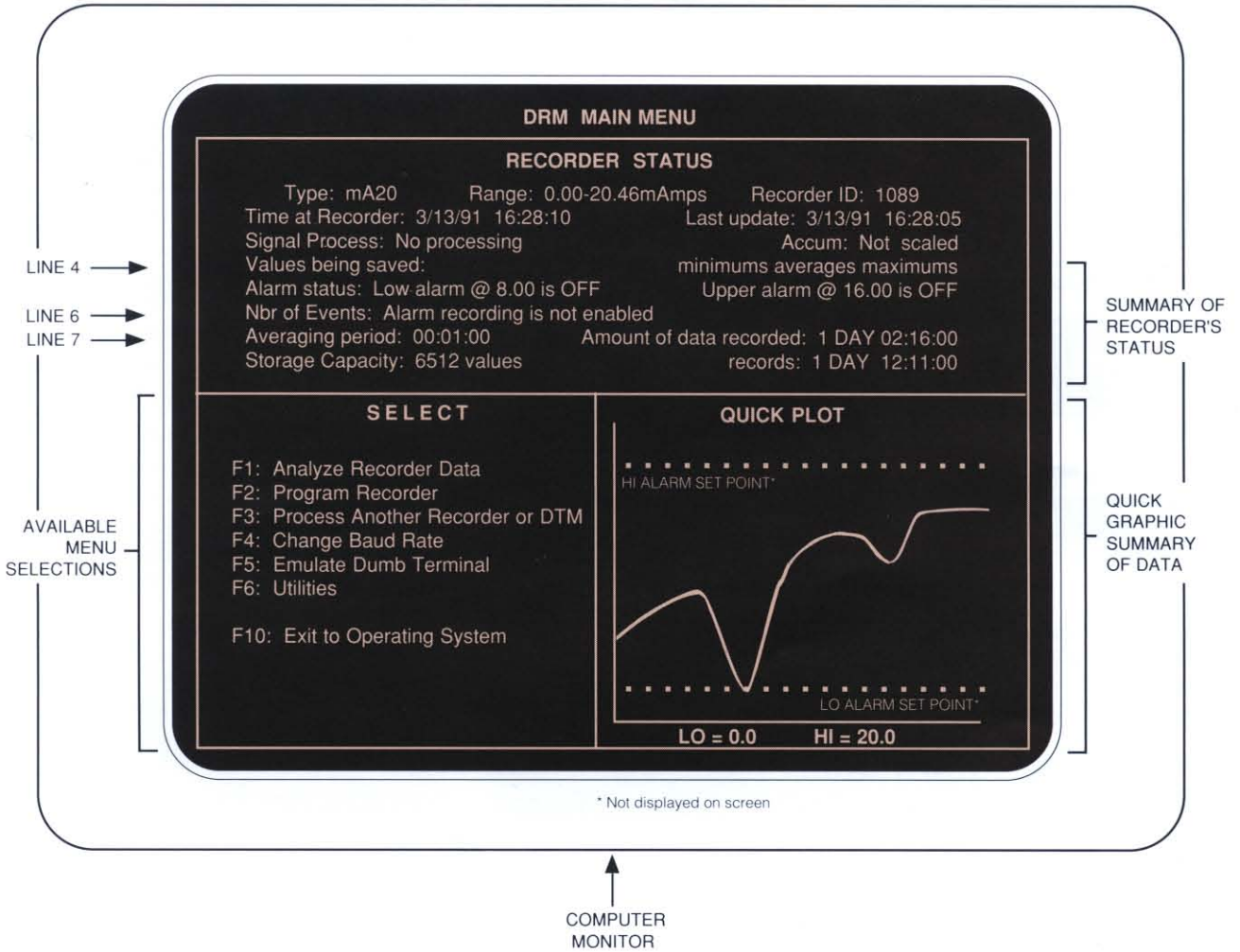


Figure 2. Graphical Presentation of DRM Support Software Screen.

DRM & DTM

Data Recorder Module and Data Transfer Module

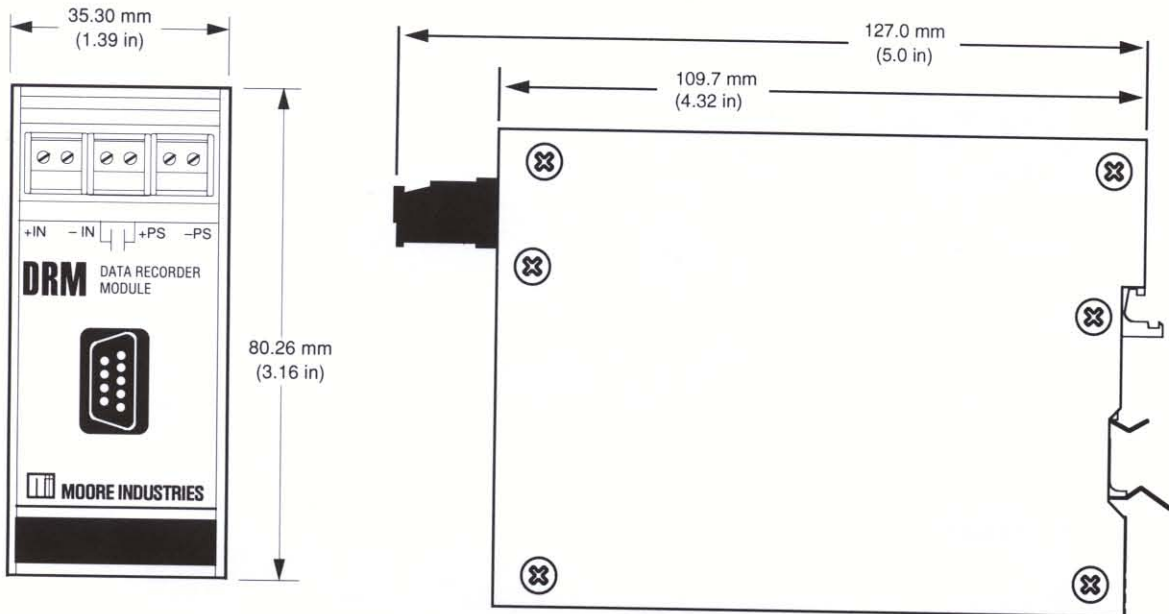


Figure 3. DRM Installation Dimensions.

Ordering Information

To construct the correct model number, use the bold face data from the DRM and/or DTM Specification tables listed under "Ordering Specifications". For assistance during this procedure, refer to the model number example presented in the Specification table.

Installation

The DRM's DIN-style housing is designed for high density mounting on a G-type DIN rail. Installation dimensions for the DRM are presented in Figure 3 above. Moore Industries also offers a variety of NEMA 4X enclosures for installing the DRM in locations requiring protection from dust, moisture and corrosion.

DRM Signal	9 PIN DRM Connector	9 Pin RS232 PC Connector	25 Pin RS232 PC Connector
Data Carrier Detect	1	1	1
Serial Transmit Data	2	2	3
Serial Receive Data	3	3	2
Clear to Send	5	7	4
GND	7	5	7

Figure 4. DRM Connector Information

DRM & DTM

Data Recorder Module and Data Transfer Module

Specifications—DTM

Characteristics	Ordering Specifications	
<p>Performance Data Storage: Capacity: 128 Kbytes; Equivalent DRM Capacity: Approximately 97,680 values, such as 15 DRM contents with maximum of 6,512 values, 60 DRM contents with maximum of 1,600 values; or any com- bination of records totalling less than 97,680 values</p> <p>Ambient Temperature Operating Range: -25°C to +60°C (-13°F to +140°F) Storage Range: -40°C to +70°C (-40°F to +158°F)</p> <p>Weight 1 lb. 10 oz. (732 grams)</p> <p>Dimensions 2.13" (54.1mm) x 7.0" (177.8mm) x 4.09" (103.8mm)</p>	<p>Unit DTM Data Transfer Module</p> <p>Input RS232 RS-232C from DRM Data Recorder Module</p> <p>Output RS232 RS-232C compat- ible serial communication interface; Baud Rate: 9600 baud; Bit Format: 1 start, 8 data, 1 stop; Cable Connectors: DTM unit includes two perman- ently attached 9-pin minia- ture "D-sub" connector cables; A 30-inch cable (plug connector) allows connection to a DRM and a 6-inch cable (receptacle connector) allow connec- tion to the DRM RS-232C interface cable</p>	<p>Power BATTERY Two 3.0V dc, 1.0 Ah, replaceable lithium batteries (SANYO CR12600SE or equivalent); Operating Life: At 25°C (77°F), internal power batteries will operate DTM for a minimum of 10,000 data transfers; Battery Shelf Life: 5 years</p> <p>Housing HH Hand Held Housing; non-corrossive and impact resistant with lanyard handle for carrying the unit or attaching it to a pipe or railing</p> <p>Accessories NOTE: Order as separate items using the part number (P/N) listed: P/N 800-836-52 Replace- ment batteries P/N 203-231-11 Carrying case</p>
<p>When ordering, specify: Unit / Input / Output / Power [Housing] Model number example: DTM / RS232 / RS232 / BATTERY [HH]</p>		

Data Transfer Module (DTM)

The rugged, hand-held DTM Data Transfer Module (DTM) collects data from up to 15 remotely-located DRM Data Recorder Modules and transfers the data directly into a PC. The DTM allows data to be collected from the DRM without removing the unit from its sampling location.

Two integral cables are provided with the DRM: One is used to connect the DTM to the DRM during data transfer; the other connects the DTM to a cable that connects to the RS-232 port on the host computer for downloading.

Operation—Information is downloaded from the DRM to the DTM by connecting the DTM to the DRM and pushing a button located on top of the DTM. Indication of remaining DTM memory capacity can be determined by pushing the button on top of the unit and viewing the LED also located on the top of the unit's housing. The DTM transfers col-

lected data to the computer using the support software.

Memory—Any combination of process data records totaling up to 120 Kbytes can be stored in a single DTM. This is equivalent to the contents of 15 separate DRM Data Recorder Modules with up to 6,512 values each.

Downloading—When downloading the process data, the host computer can be instructed through the support software to generate separate data files for each individual data set. These data files can then be analyzed at a later time along with any other data files that might have been directly downloaded from any other individual recorders. After downloading, the DTM memory may be cleared using the support software so that it may collect 15 sets of fresh process data.

It is also possible to perform the data transfer from the DRM to the host computer using a modem on each end of the communication line.



United States
Tel: (818) 894-7111
FAX: (818) 891-2816

Australia
Tel: (02) 525-9177
FAX: (02) 525-7296

Belgium
Tel: 03/235.35.44
FAX: 03/271.00.17

Netherlands
Tel: (0)344-617971
FAX: (0)344-615920

United Kingdom
Tel: 01293 514488
FAX: 01293 536852