

November 1995

Data Sheet 8.20

## Description

The DLM uses digital techniques and a user definable transfer function in EPROM to convert an analog input signal X to an analog output function Y.

Typically, an application converts a signal from a non-linear transducer to a linear output signal; however, any single valued output Y can be generated as a function of input X. Thus, the DLM can also generate outputs that are functions of equations or discontinuous, complex curves.

The transfer function of the DLM may be specified by the user in a set of data point coordinates of input X versus output Y, or by mathematical expression(s) of  $y = f(x)$ . If the function is specified by coordinates, the units may be in DLM input/output parameters or in engineering and scientific values. The number of coordinates needed is only the amount required to accurately define the transfer function.

The DLM factory support software then interpolates and extrapolates the entered coordinates and calculates all data point addresses and all data values for the EPROM transfer function. If the transfer function is from a mathematical expression, then all data points and data values are calculated from that expression. Only the equation and the limits for the expression are needed.

The input and output of the DLM are divided into three segments defined as underrange, span, and overrange. See figure 1. The user has the ability to specify the characteristics of the output above or below the normal operating span. For both input and output, these ranges extend to  $-5\%$  and to  $+108\%$  of span.

Because the data values of the DLM are stored in EPROM, if the transfer function of a DLM needs to be modified or changed, only the EPROM needs to be exchanged.

The DLM can use a wide variety of standard process signals with input and output individually in either voltage or current mode. Input power may be ac or dc. The DLM provides full isolation between input, output, and power.

## Installation

Terminal connections and housing dimensions are included on the applicable housing sheet.



*The DLM, digital linearizing module converts input functions to customer specified output functions.*

## Features

- **Linearized outputs.** For non-linear input functions.
- **Customer specified transfer function.** Mathematical expressions or sets of input/output coordinates can be generated from customer definition. The transfer function can change by exchanging an EPROM only.
- **Input/Output/Power Isolation.** Full isolation between input, output and power.
- **Standard process signals.** Input and output may independently be either voltage or current mode.

### Specifications

<b>Characteristics</b>		<p><b>Output</b> <math>\pm 0.05\%</math> of span maximum</p> <p><b>Transfer Function:</b> The output can be any single valued function of the input.</p> <p><b>Weight</b> 12 to 22 ounces (340 to 623 grams) depending upon configuration.</p>	<p><b>Power</b> <b>24DC</b> 24Vdc, <math>\pm 10\%</math> <b>45DC</b> 45Vdc, <math>\pm 10\%</math> <b>117AC</b> 117Vac, <math>\pm 10\%</math>, 47-63 Hz <b>220AC</b> 220Vac, <math>\pm 10\%</math>, 47-63 Hz <b>240AC</b> 240Vac, <math>\pm 10\%</math>, 47-63 Hz 8 watts maximum</p>
<p><b>Front Panel Adjustments</b> <b>Output Span:</b> Multiturn potentiometer <b>Output Zero:</b> Multiturn potentiometer</p> <p><b>Internal Adjustments</b> <b>Input Span:</b> Multiturn potentiometer <b>Input Zero:</b> Multiturn potentiometer</p>	<p><b>Performance</b> <b>Calibration Capability:</b> Output <math>\pm 0.05\%</math> of span for linear function Input <math>\pm 1</math> data point <b>Input resolution:</b> 2047 data points <b>Underrange:</b> 0 to 99 (-5.5% to 0%) <b>Span:</b> 100 to 1900 (0% to 100%) <b>Overrange:</b> 1901 to 2046 (100% to 108%) <b>Output resolution:</b> 4096 data values <b>Underrange:</b> 0 to 199 (-5.5% to 0%) <b>Span:</b> 200 to 3800 (0% to 100%) <b>Overrange:</b> 3801 to 4095 (100% to 108%) <b>Output Update:</b> Every 0.164 seconds nominal <b>Ambient Temperature Range:</b> 0°C to +70°C (32°F to 158°F) <b>Ambient Temperature Effect:</b> <math>\pm 0.01\%</math>/°F of span maximum <b>Isolation:</b> Input, output, and power are isolated from each other with no dc path between them. <b>Ripple:</b> Output 10mV P/P with maximum span and maximum load Input <math>\pm 1</math> data point maximum <b>Load Effect:</b> Output <math>\pm 0.1\%</math> of span maximum <b>Line Voltage Effect:</b> Input <math>\pm 1</math> data point maximum</p>		
		<b>Ordering Specifications</b>	
	<p><b>Unit</b> <b>DLM</b></p> <p><b>Input</b> <b>Current:</b> <b>1-5MA</b> 1-5mA into 200<math>\Omega</math> <b>4-20MA</b> 4-20mA into 50<math>\Omega</math> <b>10-50MA</b> 10-50mA into 20<math>\Omega</math> <b>Voltage:</b> 1 M<math>\Omega</math> minimum input impedance <b>0-1DC</b> 0-1Vdc <b>1-5DC</b> 1-5Vdc <b>0-5MV</b> 0-5mV <b>0-10MV</b> 0-10mV <b>0-20MV</b> 0-20mV <b>0-50MV</b> 0-50mV <b>0-100MV</b> 0-100mV <b>0-200MV</b> 0-200mV <b>0-500MV</b> 0-500mV</p> <p><b>Output</b> <b>Current:</b> <b>1-5MA</b> 1-5mA into 4800<math>\Omega</math> maximum series resistance <b>4-20MA</b> 4-20mA into 1200<math>\Omega</math> maximum series resistance <b>10-50MA</b> 10-50mA into 480<math>\Omega</math> maximum series resistance <b>Voltage:</b> 20K ohm minimum parallel resistance <b>0-1DC</b> 0-1Vdc <b>0-5DC</b> 0-5Vdc <b>1-5DC</b> 1-5Vdc</p>	<p><b>Housings</b> <b>AB</b> Angle bracket mounting <b>CP</b> Conduit plate for use with standard units <b>EX</b> Explosion-proof aluminum, two conduit hubs <b>EXT</b> Explosion-proof aluminum, three conduit hubs <b>EXX</b> Explosion-proof aluminum, four conduit hubs <b>FG</b> Corrosion resistant fiberglass <b>GP</b> General purpose enclosure <b>NB</b> Standard aluminum case-no mounting brackets <b>OT</b> Oil-tight NEMA 12 enclosures <b>PA</b> Plug-in standard transmitter with connector <b>PST</b> Plug-in standard transmitter with connector and wall bracket <b>PT</b> Plug-in standard transmitter AC or DC power <b>STD</b> Standard enclosure <b>TCE</b> Housing option with transparent cover <b>UB</b> Standard housing with U-back bracket for surface mounting <b>WT</b> Water-tight NEMA 4 enclosure</p>	

**When ordering, specify:**

Unit / Input / Output / Power / Options [Housing]

**Model number example:**

DLM / 4-20MA / 4-20MA / 24DC / -TX [STD]

### Ordering Information

To construct the correct model number required to order a specific unit, use the appropriate bold face data from the specification table above. See model number example.

Transfer function characteristics must be submitted with each order. If the coordinates or

equations are submitted in engineering or scientific parameters, the transfer function must clearly define the relationship between the DLM input/output units and the engineering/scientific parameters (usually values for 0% and 100% of input and output).

### Application Information, Blending Control

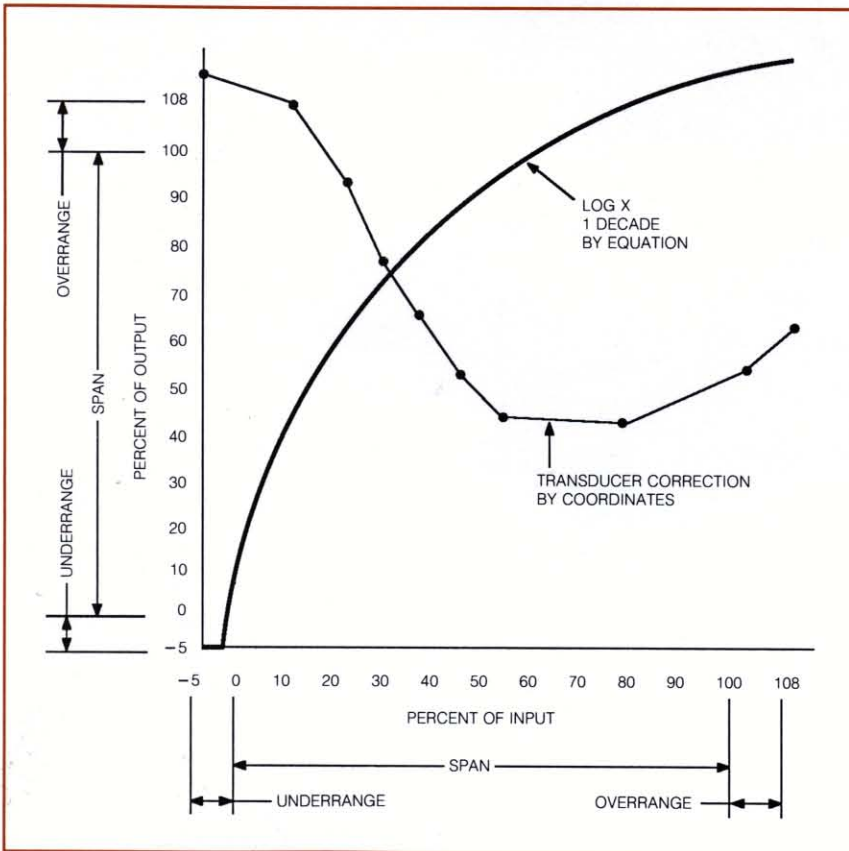
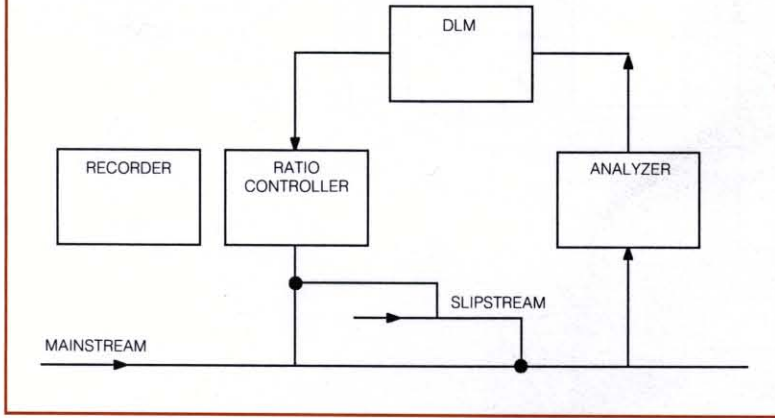


Figure 1. Typical Input/Output Curves

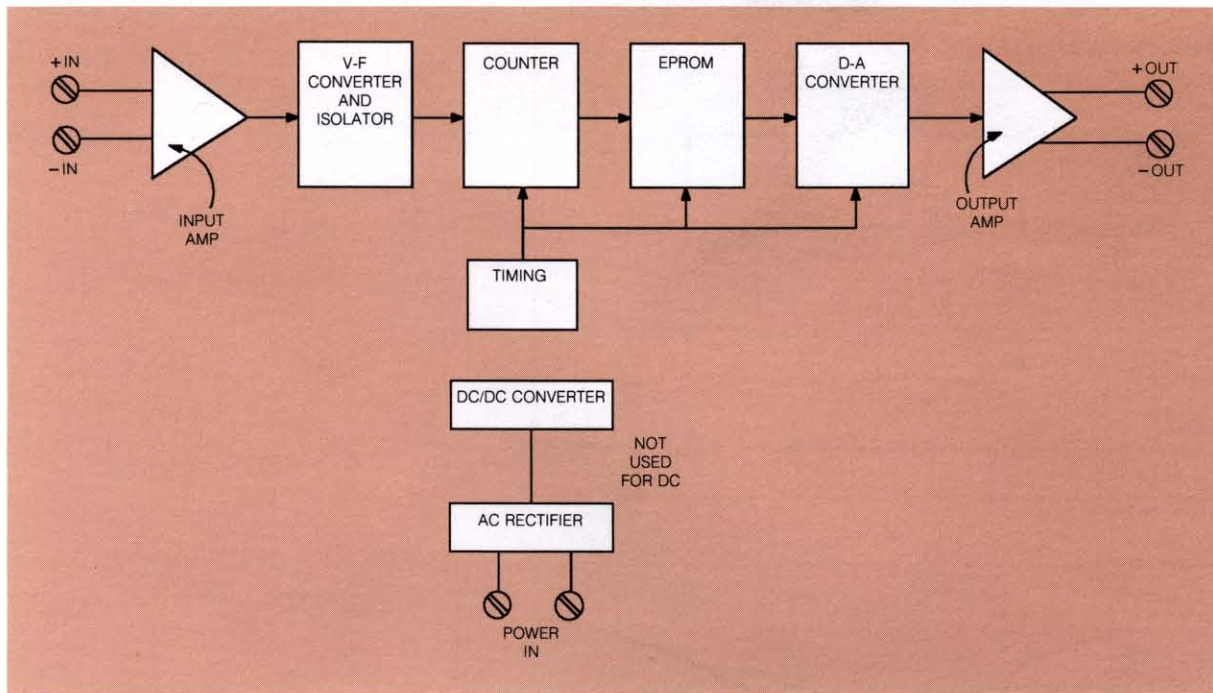


Figure 2. DLM Block Diagram