

# Time Based Brake Monitor Model BM-1600 with Rotary Encoder for Air Clutch/Brake Power Presses

**Brake**

Warning  Failure

**Brake Monitor**  
*Rotary Based*

Drive Failure

Brake On

Ready

Not Ready

Stop Time (mSec)

RPM

Brake Warning Time (mSec)

Brake Limit Time (mSec)

REV - FWD +

TIME

Model **BM-1600**  
(Rotary Based)

**Pressroom** *Electronics*<sup>TM</sup>

[www.pressroomelectronics.com](http://www.pressroomelectronics.com) Made in the USA



SELECT BRAKE WARNING TIME

SELECT BRAKE LIMIT TIME

RUN

RESET

# Time Based Brake Monitor/Stopping Performance Monitor

## Model BM-1600 (Rotary Encoder Based)

### Brake Warning Indicator

Yellow light illuminates when the setpoint is exceeded. Excellent input for the press operator and for maintenance.

### Drive Failure

Red LED illuminates when the pulses from the encoder disappear while the brake remains released.

### Brake On

Yellow LED illuminates when power to the dual solenoid valve drops out.

### Ready

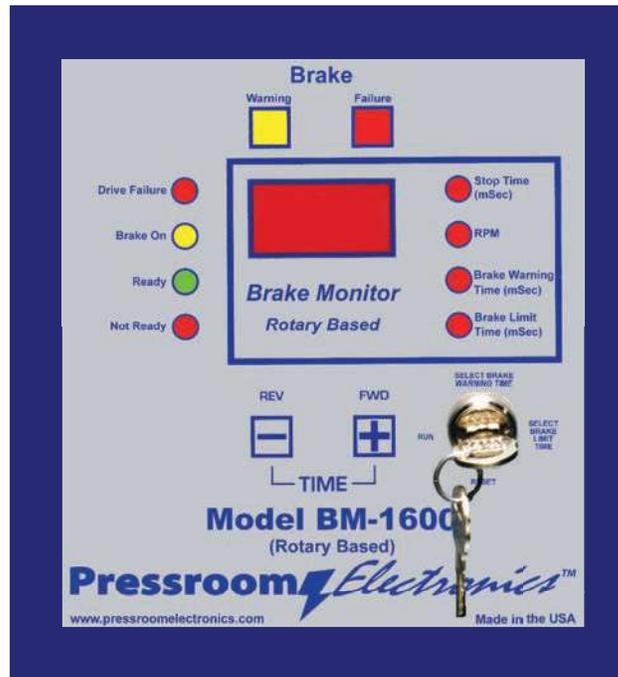
Green LED illuminates when all systems are go.

### Not Ready

Red LED illuminates when the brake monitor safety relays have dropped out (i.e., drive failure, internal failure, etc.)

### +/- Pushbuttons

The +/- pushbuttons are used to set the time values in milliseconds for the brake warning and the brake limit setpoints.



### Brake Failure Indicator

Red LED illuminates when the actual brake stopping time exceeds the programmed brake limit setpoint.

### Stop Time

Displayed in milliseconds after every stop in machine cycle and the red LED is illuminated.

### RPM/SPM

Displayed during each press cycle when the red LED is illuminated.

### Brake Warning Time

Displayed in milliseconds when the red LED is illuminated.

### Brake Limit Time

Setpoint is displayed in milliseconds when the red LED is illuminated.

### System Programming Security and Safety

Keyed selector switch controls:

- Brake Warning Time Setpoint
- Brake Limit Time Setpoint
- System Reset
- System Run

## How the BM-1600 Brake Monitor Works

The BM-1600 is a time based brake monitor that utilizes a high resolution rotary encoder and controller to measure the brake stopping time in milliseconds and also the RPM/SPM of the press. The rotary encoder is attached to the subject machine and is driven on a 1:1 ratio by the power press crankshaft. The brake stopping time of the machine will be displayed on every stop and can be easily read on the bright red light emitting diode (LED) display on the front panel of the unit. The RPM/SPM of the machine will be displayed during the machine cycle.

Individual LED indicators are visible and easily define the existing status of the unit during the press cycle (shown above). All system programming and diagnostics are front panel mounted and controlled which will minimize downtime while enhancing operator safety and press maintenance. All operating mode selections are supervisory controlled by a keyed

selector switch which meets all OSHA and ANSI standards for mode selection supervisory control.

To program the Brake Warning Time and the Brake Limit Time setpoints, the user inserts the programming key into the lock and turns to the desired position (status LED illuminates). By depressing the +/- buttons to the desired time setting and turning the key back to the Run position, the new warning/failure time setpoints are saved. All errors and time value setpoints are permanently stored in the EEPROM memory which does not require a battery backup. The user cannot change or reprogram the Brake Warning or Brake Limit setpoints while the encoder is in motion, which is an additional safety feature.

The dual force-guided captive contact safety output relays of the BM-1600 are always de-energized when the

programming key is not in the Run position. When the key is in the Run position, the safety output relays are always energized as long as there are no internal or external faults detected. When a fault is detected, it is recorded within the system in non-volatile memory along with the last stopping time. If the power to the Brake Monitor System is removed and reapplied, the last error to occur will come back up and prevent any further use until the programming key is used. Only the key turned to the reset position can clear a fault. If no fault occurred but the programming key is moved into the reset position, the output relays will de-energize as a safety feature. Motion detection will still be monitored while in the Reset position even if the encoder is turning.

# Time Based Brake Monitor/Stopping Performance Monitor

## Model BM-1600 (Rotary Encoder Based)

### OSHA/ANSI Compliance

The BM-1600 system complies with OSHA code 29 CFR 1910.217 and ANSI Code B11.1-2009 for brake monitoring and control reliability standards. The unit will automatically prevent the activation of a successive stroke if the stopping time deteriorates beyond the brake limit setpoint. Required on any press that has a single stroke mode and uses either a two-hand control, light curtain or type B gate system.

### Non-volatile EEPROM Memory

All diagnostic faults and brake setpoints are permanently saved in non-volatile memory which does not require battery backup. Information is retained indefinitely after a power loss or machine shutdown.

### Advanced Design

The advanced circuitry and user

friendly design on the BM-1600 allows both programming and status monitoring to be performed from the front of the compact panel. There is no need to enter the control panel to adjust switches or thumbwheels which will enhance both safety and productivity.

### System Self Diagnostics

Control displays status and system fault codes are on the LED display. A detailed definition, cause, and cure listing is supplied within each installation and operation manual.

### Predictive Maintenance Diagnostic Tool

The unique "brake warning" feature on the BM-1600 allows for predictive maintenance to be scheduled on the machine, which will minimize downtime. Factors which will be monitored and affect stopping time:

machine cycle speed, counter-balance air supply, tooling weight, clutch air supply, exhaust restrictions, brake wear adjustment, and clutch wear adjustment.

### 90° and 270° Stop Time Measurement Built-In

The built-in 90° press stop feature initiates a stop signal at the 90° and the 270° position in the downstroke. This is required information when calculating the location of point of operation guarding systems or palm button assemblies.

### Complete Package Supplied

Everything you need to install and operate the BM-1600 is supplied.

- BM-1600 Brake Monitor Controller
- Model E-160 Encoder
- 20' (6m) of encoder cable
- Dimensional and technical data
- Installation and operation manual

## Standard Features

- Control reliable design
- Dual captive contact safety relays
- Bright red LED display
- Non-volatile EEPROM memory
- Flat unobtrusive design
- Drive failure detection
- Motion detector
- Automatic 90° and 270° press stop
- Programming security with keyed selector switch
- Very easy to program and to adjust limits
- System self-diagnostics with display codes
- External diagnostic display
- System status indicators (LED's)
- Solid state indicators - No incandescent bulbs to burn out
- Designed specifically for the rigorous metal stamping/metal forming industry
- Interfaces easily with all types of press controls; solid state or relay logic
- Installs with ease on OEM, retrofit, or rebuild projects
- Front panel mount for installation into an existing control panel
- Made in USA

## Specifications

### Controller

*Power Requirements* - 120 +/- 10% VAC, 50-60 Hz  
24 VDC +/- 10% (optional)

*Power Consumption* - 8 watts (Relays on)

*Temperature Range* - 0° to 50° Celsius

*Relay Configuration* - Dual self-checking force-guided captive contact safety relays

### Relay Contact Rating

8 amps @ 250VAC resistive for safety relays

4 amps @ 250VAC resistive for alarm relay

*System Accuracy* - +/- 1 millisecond

*Setpoints* - Drive Failure (1 to 25 tenths of a second)  
Brake Warning (1 to 999 milliseconds)  
Brake Failure (1 to 999 milliseconds)

*Enclosure* - NEMA 12 (IP 64) Steel

### Indicators:

Brake Fault - Red LED

Drive Failure - Red LED

Ready - Green LED

Stop Time Display - Red LED

Brake Warning Setpoint - Red LED

Brake Warning - Yellow LED

Brake ON - Yellow LED

Not Ready - Red LED

RPM - Red LED

Brake Limit Setpoint - Red LED

### NEMA 12 Enclosure Dimensions -

8" (203mm) Height x 7" (178mm) Width x 4" (102mm) Depth

*Front Panel Mount* - 8" (203mm) Height x 7" (178mm) Width x 4" (102mm) Depth

**Encoder** (Part # E-160 — CW or CCW Rotation Capable)

*Cable* - 20' (6m) supplied standard; 100' (30m) max.

Gauge: 20 AWG - 3 connectors plus drain

Rating: 300 VAC @ 60 C

*Shaft Loading* - Radial: 35 lbs; Axial: 40 lbs.

*Temperature Range* - 0° to 50° Celsius

*Dimensions* - 5.5" (140mm) Height x 3.75" (95mm) Width x 3-9/16 (90mm)

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The BM-1600 is a time-based brake monitor that utilizes a high resolution rotary encoder and controller to measure the brake stopping time in milliseconds and also the RPM of the press. The rotary encoder is attached to the subject machine and is driven on a 1:1 ratio by the power press crankshaft. The brake stopping time of the machine will be displayed on every stop and can be easily read on the bright red light emitting diode (LED) display on the front panel of the unit. The RPM/ of the machine will be displayed during the machine cycle.

- BM-1600 Brake Monitor System includes:
- BM-1600 controller (BM)
  - E-1600 Encoder (supplied standard)
  - 20' (6m) encoder cable
  - Dimensions and technical data
  - Installation and operation manual

- BM-1600D Brake Monitor System and Dual-Shaft Encoder System includes:
- BM-1600D controller (BMD)
  - EN-1600D Dual-Shaft Encoder
  - 20' (6m) encoder cable
  - Dimensions and technical data
  - Installation and operation manual



BM-1600 in NEMA 12 (IP 64) steel enclosure.

### ORDERING PROCEDURE FOR BM-1600

1. Select **BM** or **BDM** for encoder style
2. Specify Mounting Style
  - F** ..... Front Panel Mounting to be installed in an existing control panel.
  - C** ..... Stand alone NEMA12 (IP 64) steel enclosure.
3. Specify Controller input power
  - 1** ..... 24VDC
  - 2** ..... 120VAC 50-60Hz
  - 3** ..... 240VAC 50-60Hz
4. Specify Clutch/Brake Valve Coil Voltage
  - 1** ..... 24VDC
  - 2** ..... 120VAC 50-60Hz
5. Encoder Connector Cable
  - 20' (6m) is supplied standard. If additional length is needed, specify in feet. 100' (30m) max.

### EXAMPLE PART NUMBER

<b>BM</b>	-	<b>C</b>	-	<b>2</b>	-	<b>2</b>	-	<b>20</b>
<u>BM</u> -1600		Mounting Style		Input Power		Clutch/Brake Valve Voltage		Encoder Cable (in feet)
or <u>BMD</u> for dual shaft encoder.								

### YOUR PART NUMBER

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