

AMETEK®

PATRIOT SENSORS

Series 1995B

Gemco™

Micro-Set PLS

- Economical, Compact Six-Circuit Design (expandable to 30)
- Programmable Brake Monitor Displays Stop Time to .001 Seconds, Stopping Distance in Degrees, and Provides Brake Fault Output
- 12-Bit Resolution Provides Highly Accurate Brake Fault Calculations
- Fault-Check Self Diagnostics Monitor: Resolver, Microprocessor, Interconnecting Cables
- Program Security Input Prevents Unauthorized Program Changes
- Programmable Offset
- Mechanical and Solid-State Relay Outputs
- Programmable Motion Detect
- Nonvolatile Memory—No Memory Loss from Power Failure
- Multiple Program Storage for Fast Job Setup
- Speed-Induced Offsets for Variable Speed Presses
- Time-Based Outputs Available



Micro-Set Programmable Limit Switch

DESCRIPTION:

The 1995B Micro-Set PLS was designed for use in the mechanical press industry. It incorporates many features for safe, efficient press automation.

This completely self contained unit can turn up to 30 independent outputs (6 standard) on or off based on the rotary position of the press crank.

On-line brake monitoring checks the stopping time of the press against a customer-selected preset stopping time. It can also be used to check the stopping distance at any point in the stroke. A dedicated mechanical SPDT relay remains energized when stopping time is within tolerance. Once exceeded, the mechanical relay deenergizes to initiate a stoppage or warning signal.

On-line fault check provides automatic monitoring of all major programmable limit switch functions to ensure maximum protection. When activated, fault check immediately displays fault messages and deenergizes a dedicated mechanical SPDT relay.

A programmable motion detect output will energize a relay when the transducer speed exceeds the customer preprogrammed RPM value.

Software options further enhance the system by offering . . .

... **Multiple Programs** — Allows storage of job setups for future use. This saves reprogramming time and reduces the chance of programming errors when tooling is changed.

... **Speed-Induced Offsets** — On many variable speed presses, the limit switch outputs have to be adjusted when the speed increases or decreases. This option automatically adjusts specified circuits based on speed.

... **Time-Based Outputs** — Specified outputs can be programmed to turn on relative to rotary crank position and turn off based on a preset time (0.01–9.99 seconds).

When properly installed, Gemco cam/resolver packages and programmable limit switch systems will meet or exceed OSHA's federal register subpart 0, 1910.217 and ANSI B11.1 safety standards as we know them.

PROGRAMMING

The Micro-Set provides simple and versatile keypad programming, including the following features:

- Large, Easy-to-Read Keypad to Simplify Programming
- Large LED Display Readout shows Position, RPM, Programmed Information, Editing, Offset, and Error Codes
- Status Lights to Indicate Program Mode, Position/RPM, Fault Check, Enable/Disable, and Circuit On/Off
- Security Input to Prevent Unauthorized Personnel from Changing Programmed Functions

DISPLAY ERROR/FAULT MESSAGES

DISPLAY ERROR MESSAGE

EEE — INCORRECT PROGRAMMING SEQUENCE

DISPLAY FAULT MESSAGES

(FAULT-CHECK RELAY TURNS OFF)

- EE0 — Resolver Not Plugged in or Resolver Primary Open
- EE1 — Resolver Secondary S1-S3 Open or Shorted
- EE2 — Resolver Secondary S2-S4 Open or Shorted
- EE3 — Resolver Shorted — Primary Winding or Resolver Excitation Fault
- EE4 — Electronic Transducer Tracking Fault
- No Message — Microprocessor or 5-Volt Power Supply Failure



STANDARD FEATURES:

- Compact Six-Circuit Design (expandable to 30)
- Advanced Fault-Check Circuitry
- Resolver to Digital Accuracy and Repeatability of 1 part in 4096
- 360 Scale Factor
- Keypad Programming
- LED Indication of Active Output Devices
- Power Input of 110VAC 50/60 Hz
- Angular Position, RPM, and Brake Stopping Time Displayed
- Operating Speed 0–600 RPM with 1° Accuracy
- Industrial Duty Transducer with 3/4-inch Diameter Stainless Steel Shaft
- NEMA 12 or NEMA 4 Enclosures
- Programmable Through Zero
- Update Time 200 Microseconds
- High Noise Immunity
- Up to 360° Electrical Offset
- Programmable Motion Detection
- Brake Monitor Capability

OPTIONAL FEATURES:

- Multiple Programs
- Special Software upon Request
- Speed-Induced Offsets
- Time-Based Outputs

Micro-Set Programmable Limit Switch

GENERAL ORDERING INFORMATION — A Series 1995B PLS system consists of a resolver-type transducer, resolver-to-programmer cable assembly, and the programmer. The programmer consists of six limit switch outputs, one fault-check output, membrane keypad, programmable motion detect, and brake monitor. Optional output expansion modules will add six limit switch outputs per module, and up to four expansion modules can be driven by the programmer, making a total of thirty available limit switch outputs.

The resolver and resolver cable are ordered as separate items from page 5 of this catalog.

The programmer and expansion modules can be ordered as separate items for mounting in your own enclosure or mounted and prewired in an enclosure from the factory. To order as separate items, assemble the programmer part number by specifying the desired options and inserting an "X" as the last digit of the part number in the area labeled "enclosure type." The expansion module is then ordered as a separate item using the part number sequence starting with the number 1995E. The cable assembly between the programmer and output expansion module consists of two twisted pairs. A six-foot cable will be provided as standard with the output expansion module at no additional charge. The last digit of the output expansion module part number allows you to specify a cable assembly length of up to 300 feet. An additional charge will be added for every foot of cable length over the standard six-foot length.

The brake monitor function of the 1995B PLS requires an isolated contact that opens when the press's clutch/brake circuit is activated to stop the press. This isolated contact is used as an input to the 1995B PLS, which starts the internal timer. This timer monitors the time span between the input signal and the press's coming to a stop. If your press control circuit contains an auxiliary contact that opens when the clutch/brake circuit signals the press to stop, it can be wired to the 1995B PLS to perform this function. If an auxiliary contact is not available, the brake monitor input relay shown on page 5 can be purchased and wired across the 110VAC coil of the clutch solenoid to provide this input.

ORDERING DETAILS:

Resolver Assembly — The standard foot mount resolver number SD0284200 is a heavy duty assembly intended for a press environment. If your press already has a mechanical cam switch controlling the stroke of the press, this heavy duty resolver can be mounted near the cam switch and driven by a similar chain mechanism or direct coupling to the cam switch shaft. Gemco can supply a cam switch with integral resolver assembly. See Gemco catalog section 1980R for details.

Resolver Cable — The standard resolver cable number SD0401600L consists of a 15-foot length of cable with an Amphenol-type connector on one end that is compatible with the connector on the resolver assembly. Cable number SD0430800L is identical except that it has a right angle connector for use in areas where space at the rear of the resolver can be a problem. The length of the cable should always be specified as part of the description following the part number. This cable can be up to 3000 feet long.

Programmer — The programmer catalog number starts with the designation 1995B. This specifies the standard keypad, LED display, six limit switch outputs, one fault-check output, and standard software having one limit switch output that can be field programmed to operate as a motion detect output.

OUTPUT TYPE

The next portion of the numbering sequence specifies the type of output relay. Mechanical relays, AC solid-state and DC solid-state relays are available in any combination. The example in the catalog shows three AC and three DC solid-state relays being specified. There is a fixed price adder for any combination of relays other than all mechanical (6M). The fault-check relay will always be a mechanical relay regardless of the type of output relays specified. This ensures a fail-safe security.

SOFTWARE OPTIONS

Two software versions are available—standard and "P." The standard software provides the brake monitor display with output and the motion detect output. These two outputs use two of the six limit switch output relays on the programmer, leaving four output relays for normal limit switch functions. Output

relay number six will always operate as the brake monitor relay. This relay will remain energized until the programmed stopping time is exceeded and then deenergize to indicate a brake fault condition. The relay will remain deenergized until the fault reset input is activated by depression of a customer-supplied N.C. momentary contact push-button wired to the reset input. Relay number five is field programmable to operate as a normal limit switch output or as a motion detect output. When programmed for motion detect operation, it will turn on and off at a keypad-selectable RPM value. Typical uses for this output involve sealing in the operation of the press at specified RPM values and detecting broken chains.

Optional software package "P" adds multiprogram capabilities, speed offset, and time-based outputs to the standard features listed above.

Multiprogram — This feature allows the storage of multiple sets of output sequences that are preprogrammed based on the changing requirements of different tooling. When dies or tooling are changed, the new program is simply called up on the keypad and all outputs are automatically set to the new output sequences. The number of available programs will vary based on the number of output relays and setpoints programmed on each relay. A typical six-output system with one ON and one OFF setpoint per output will be capable of storing twenty programs in memory.

Speed Offset — This feature allows limit switch outputs one through five to be programmed to automatically advance and retard as machine velocity varies. The number of circuits affected by speed offset, the amount of offset, and the RPM range over which the offset develops are all programmable via the keypad. The amount of offset per RPM change will be the same for all outputs selected for this type of operation. This feature is used to compensate for the mechanical lag in mechanical actuators. It is wired in series with the top stop cam switch to provide automatic speed compensation in the clutch/brake circuit of variable speed presses.

Time-Based Outputs — These outputs are programmed to turn on based on position, and turn off based on a keypad-selectable time interval. Circuits one through five can be selected for this type of operation. These circuits cannot be programmed for speed offset and time-based outputs at the same time; therefore, the total combined number of speed offset and time-based outputs cannot exceed five.

ENCLOSURE TYPE

The programmer can be ordered as an open-chassis unit for mounting in an enclosure in the field. Insert an "X" in this location of the part number if the open-chassis version is desired.

A 12A or 4A in this location specifies a NEMA 12 or NEMA 4 enclosure with room for the programmer only. The other enclosure options provide room for the programmer and the number of output expansion modules noted.

All enclosures are provided with the programmer mounted on a swingplate with the LED display positioned behind a Plexiglas window in the enclosure door.

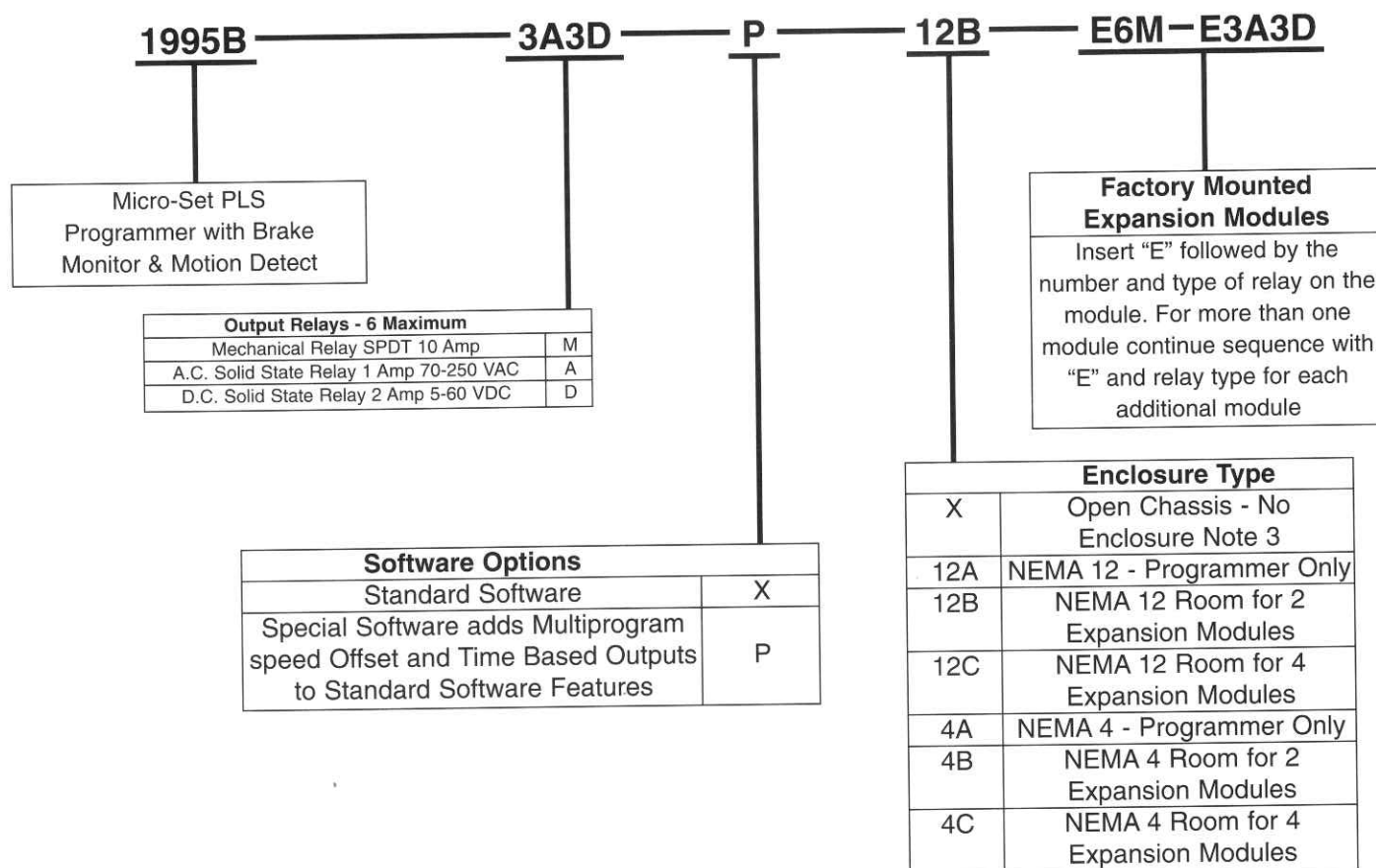
FACTORY-MOUNTED OUTPUT EXPANSION MODULES

This portion of the catalog number specifies the number of expansion modules and the type of output relays to be interwired at the factory. The "E" indicates one expansion module, and the following number indicates the quantity and type of output relays mounted on that module. When more than one output expansion module is required, each additional expansion module is specified by an "E" followed by the quantity and type of relay(s) on that module. The first expansion module will be factory labeled as circuits seven through twelve, the second as circuits thirteen through eighteen, etc. The example in the catalog shows a system having two output expansion modules. The first will have six mechanical relays labeled circuits seven through twelve. The second module will have three AC and three DC solid-state relays labeled circuits thirteen through eighteen. The total number of output expansion modules is four.

If the output expansion modules are not being ordered as factory-mounted and prewired in an enclosure, the programmer catalog number should end after the enclosure type is specified. The output modules are then ordered as separate items using the catalog number starting with 1995E.

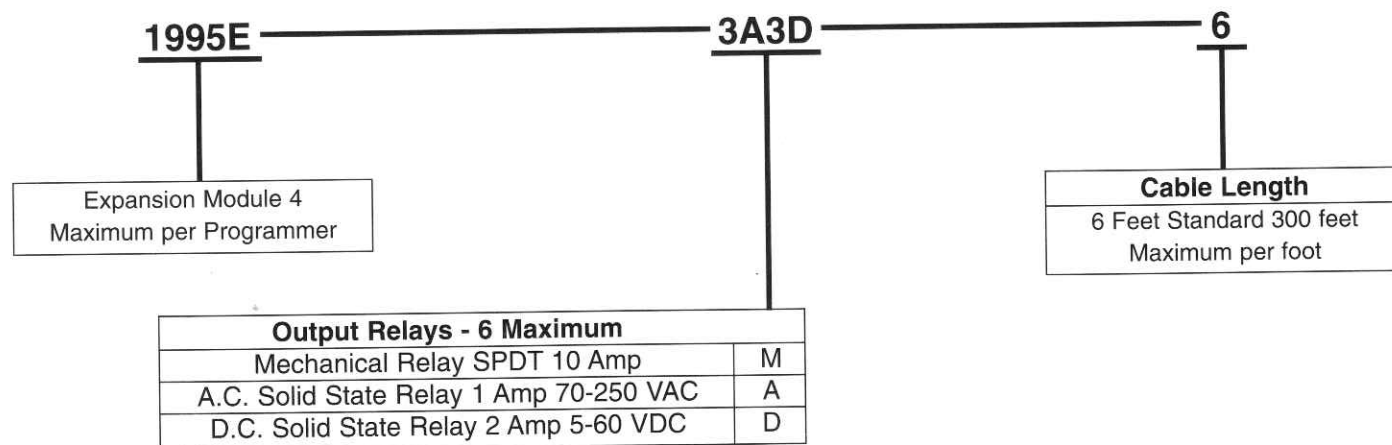
Micro-Set™ Programmable Limit Switch

Micro-Set PLS with Brake Monitor - Resolver Input CATALOG NUMBERING SEQUENCE Programmer with Factory-Installed Hardware Options



Note 3: When ordering open chassis versions of the programmable limit switch, end its part number at this point. Expansion modules must be ordered as separate items from page 4 of this section.

Output Expansion Modules Purchased as Separate Items

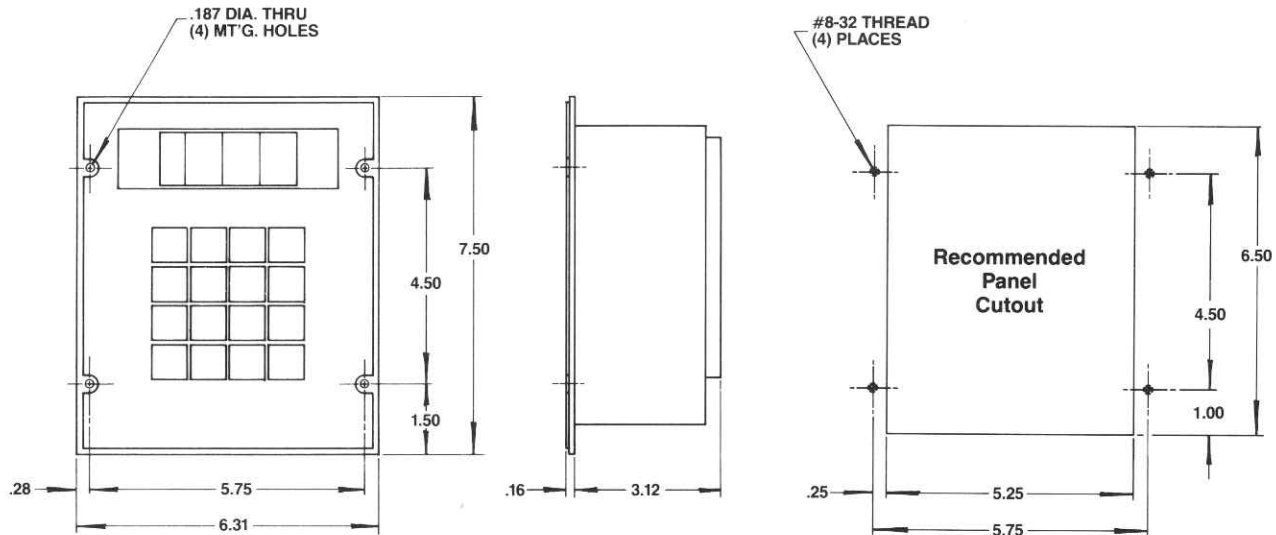


Micro-Set™ Programmable Limit Switch

RESOLVER AND RESOLVER CABLES	
Part Number	Description
SD0284200	Industrial Duty Foot Mount Resolver
19861536	Flange Mount Resolver
SD0401600L15	Resolver Cable-Straight Connector
SD0430800L15	Resolver Cable-Right Angle Connector
Note: Standard resolver cable length is 15 feet	
For longer lengths insert length in feet after L in part number - 3000 feet Maximum.	
See Catalog Section 1980R for Combination Camswitch/resolver Assemblies	
OPTIONAL BRAKE MONITOR INPUT RELAY	
SD0395100	Brake Monitor Input Relay - Solid State 110 VAC Input
SPARE PARTS	
04523022	Mechanical Output Relay SPDT 10 Amp
04523038	A.C. Solid State Relay 1 Amp 70-250 VAC
04523039	D.C. Solid State Relay 2 Amp 5-60 VDC
04521186	16 Place Terminal Strip Used on Programmer and Output Expansion Module
04521187	24 Place Terminal Strip Used on Programmer and Output Expansion Module
SD0401200L6	Output Expansion Module Cable Assembly - 6 foot. See Note
Note: Standard output expansion module cable assembly is 6 feet - 300 feet Maximum	
For longer lengths insert length in feet after L in part number - 300 feet Maximum	
REMOTE DISPLAY	
19951446	Remote Circular Display
MOUNTING KIT	
SD040406100	Shock Mounting Kit for 1995 PLS

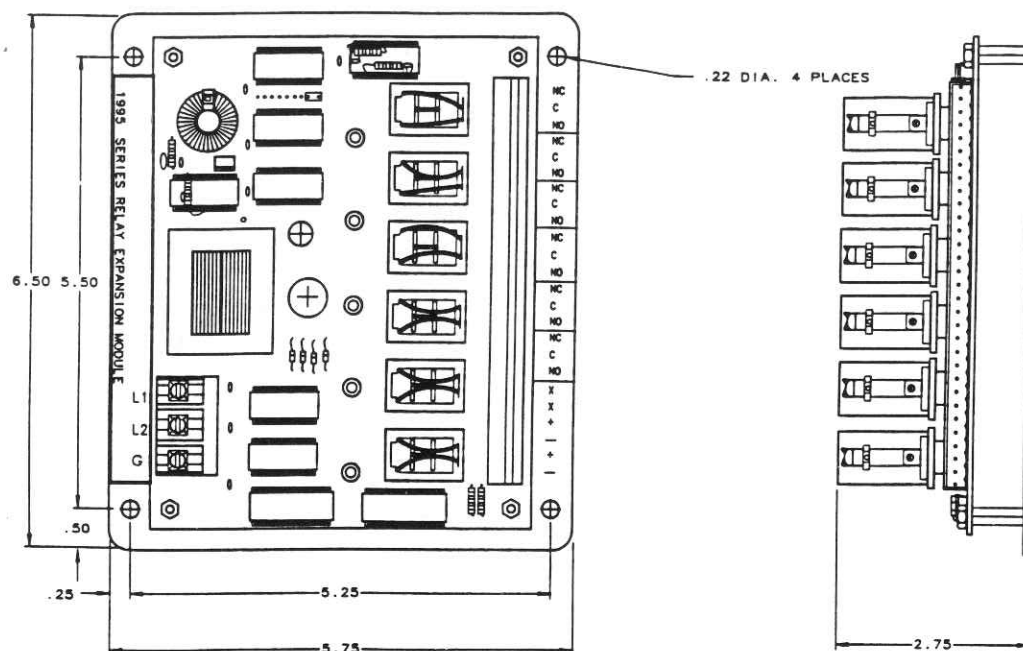
Micro-Set Programmable Limit Switch

MICRO-SET PROGRAMMER DIMENSIONS



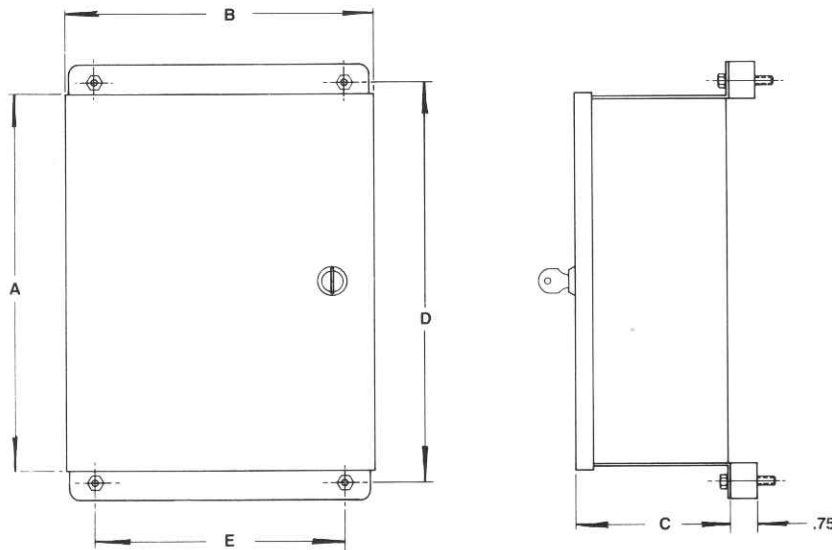
Standard Flange-Mounted Case

EXPANSION MODULE DIMENSIONS



Micro-Set Programmable Limit Switch

ENCLOSURE DIMENSIONS

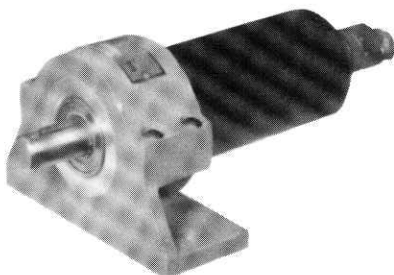
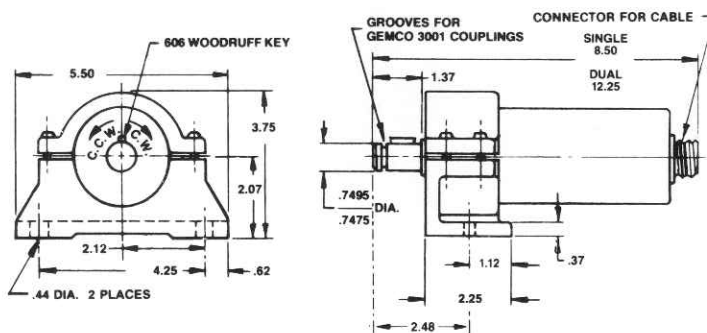


DIM.	NEMA 4A	NEMA 12A
A	14.64	11.46
B	11.89	9.43
C	6.89	5.15
D	15.04	12.00
E	9.44	7.50

DIM.	NEMA 4B	NEMA 12B
A	15.48	15.48
B	14.05	14.05
C	7.31	7.31
D	16.25	16.25
E	12.50	12.50

DIM.	NEMA 4C	NEMA 12C
A	20.82	20.82
B	14.05	14.05
C	7.31	7.31
D	21.58	21.58
E	12.50	12.50

STANDARD FOOT-MOUNTED RESOLVER



SERIES 1995 ROTARY REMOTE DISPLAY



- Large 3/4" L.E.D. digital display with L.E.D. bars every 10°
- Ideal for mechanical stamping presses and shears
- Center display can indicate position or RPM data
- Display can be located up to 1000 feet from programmer

Micro-Set

Programmable Limit Switch

SPECIFICATIONS

MICRO-SET PLS PROGRAMMER

Resolution	— 12 Bit (4096)
Scale Factors	— 360
Scan Time	— Standard 200 Microseconds
Temperature Range	— 32°F to 125°F (Operating) 0°F to 150°F (Storage)
Operating Voltage	— 110/120VAC 50/60 Hz 300mA

INPUTS

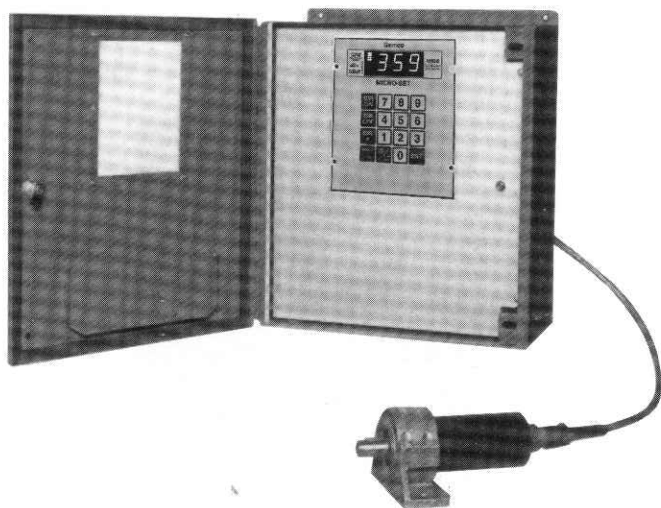
Transducer	— Resolver accurate to ± 6 arc minutes. Maximum mechanical speed of 2800 RPM.
Logic	— Fault Check and Security ± 5 VDC at 10 mA. May be operated by isolated contact, current sourcing, or current-sinking device.

OUTPUTS (Plug-in Relays)

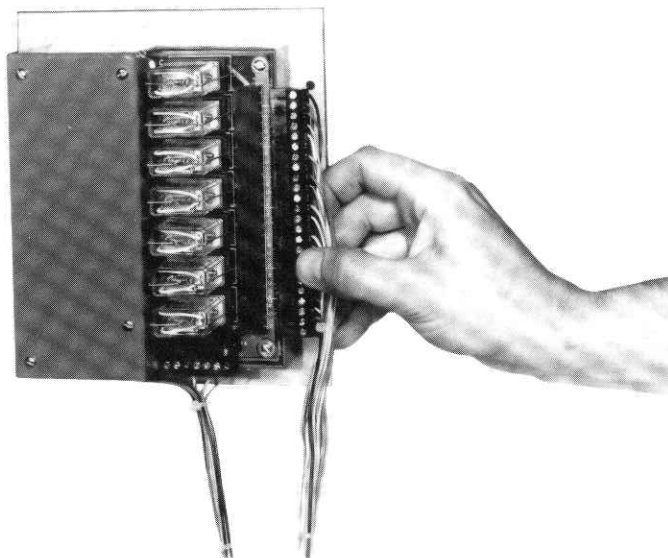
Mechanical Relays	— Single-pole, double-throw 10 Amp, pickup 2 ms, dropout 15 ms.
A.C. Solid-State Relays	— Single-pole, N.O., 1 Amp, 70 to 250VAC, zero voltage switching, leakage current 3 mA at 120VAC.
D.C. Solid-State Relays	— Single-pole, N.O., 2 Amps maximum, 5 to 60VDC, leakage current 2 mA maximum.

OUTPUT EXPANSION MODULE

Operating Voltage	— 110/120VAC, 50/60 Hz, 100mA
Temperature Range	— Same as programmer



MICRO-SET PLS MOUNTED IN NEMA 12 ENCLOSURE



Rear of flange-mounted case — wiring to plug-in connectors with screw terminals.

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PATRIOT SENSORS

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