AMETEK®
PATRIOT SENSORS

- Economical, Compact Six-Circuit Design (expandable to 30)

- 12-Bit Resolution With 200 Microsecond Update Time

- Replaces Cam and Fixed Arm Limit Switches

- 360 or 1000 Scale Factors Available

- Fault-Check Self Diagnostics Monitor: Resolver, Microprocessor, Interconnecting Cables

- Program Security Input Prevents Unauthorized Program Changes

- Programmable Offset up to 360˚

- 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 Machines

- Time-Based Outputs Available

- Keypad Programming With Display and Active Output LEDs

- Input Power 115VAC 50/60 Hz; 230VAC Optional

- NEMA 4 or 12 Enclosure Option

DESCRIPTION:

The 1995A PLS was designed for use in rotary and/or rotary-to-linear applications. It incorporates many features for safe, efficient operation.

This completely self-contained unit can operate up to 30 independent outputs (six standard) based on the rotary position of the resolver.

It offers an on-line fault check that provides an automatic, inprocess mechanism to verify that all major programmable limit switch functions are operating properly. The fault-check output can be energized by activating the fault-check enable input. The output is a mechanical relay that is energized during normal operation, having 1 N.O. and 1 N.C. contact.

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 machines, 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 position and turn off based on a preset time (0.01 - 9.99 seconds).

PROGRAMMING

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

- Large, Easy-to-Read Keypad to Simplify Programming
- Status Lights to Indicate Program Mode, Position/RPM, Fault Check, Enable/ Disable, and Circuit On/Off
- Large LED Display Readout Shows Position, RPM, Programmed Information, Editing, Offset, and Error Codes
- 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

GENERAL ORDERING INFORMATION — A Series 1995A PLS system consists of a resolver-type transducer, resolver-to- programmer cable assembly and the programmer which provides six limit switch outputs and one fault-check output. The optional output expansion module will add six additional 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 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 up to 300 ft. long. An additional charge will be added for every foot of cable length over the standard six-foot length.

The reset-to-preset function of the 1995A requires an isolated contact closure. The isolated contact is used as an input to the 1995A PLS, which upon closure will reset the unit to its preprogrammed reset value. If an auxiliary contact is available, it can be wired to the 1995A PLS to perform this function. If an auxiliary contact is not available, the reset input relay shown on page 3 can be purchased and wired to a 110VAC circuit to provide this input.

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, and any combination can be specified. 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.

SOFTWARE OPTIONS

Two software versions are available - standard and "P." The standard software provides the reset-to-preset input and motion detect output. The first five relays function as normal limit switch outputs. Relay number six 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.

Optional software package "P" adds multiprogram capabilities, speed offset, and time-based outputs to the standard features listed above (update time increases with "P" option).

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 six 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.

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 six 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 six.

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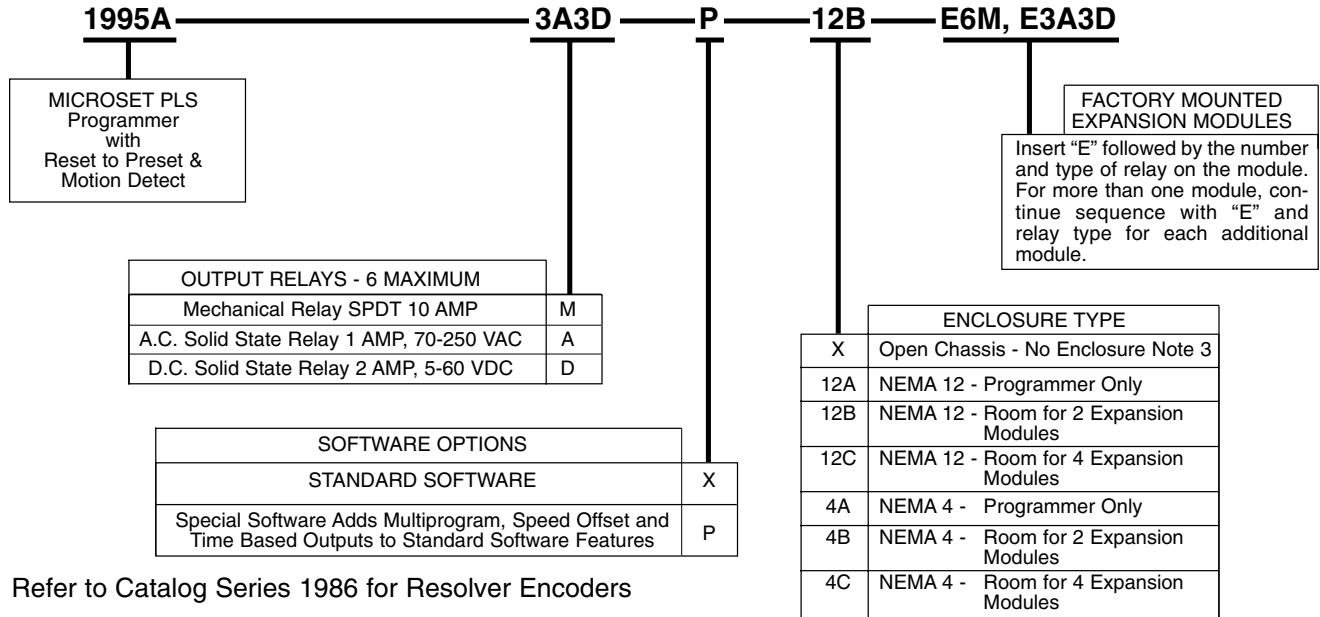
All enclosures are provided with the programmer mounted on a swingplate with the LED display positioned behind a Plexiglas window in the enclosure door.

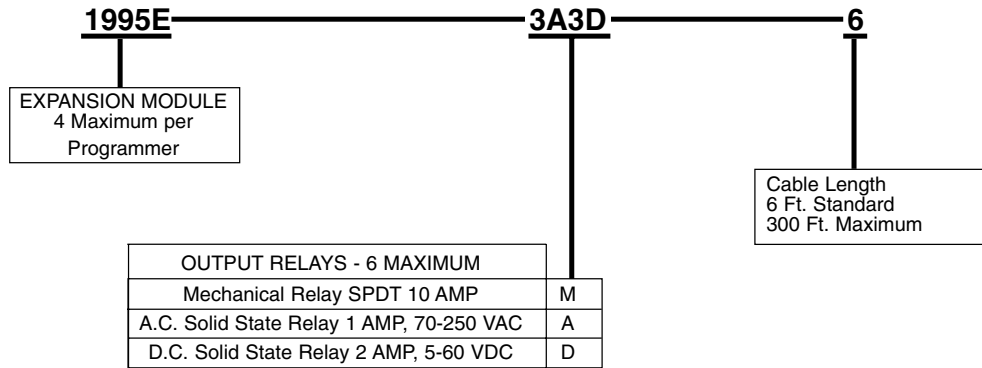### FACTORY-MOUNTED OUTPUT EXPANSION MODULES

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.

CATALOG NUMBERING SEQUENCE
Programmer with Factory Installed Hardware Options

1995A ——————————— **3A3D** —— **P** ——**12B** —— **E6M, E3A3D**

MICROSET PLS
Programmer
with
Reset to Preset &
Motion Detect

FACTORY MOUNTED
EXPANSION MODULES

Insert "E" followed by the number and type of relay on the module. For more than one module, continue sequence with "E" and relay type for each additional module.

OUTPUT RELAYS - 6 MAXIMUM	
Mechanical Relay SPDT 10 AMP	M
A.C. Solid State Relay 1 AMP, 70-250 VAC	A
D.C. Solid State Relay 2 AMP, 5-60 VDC	D

ENCLOSURE TYPE	
X	Open Chassis - No Enclosure Note 3
12A	NEMA 12 - Programmer Only
12B	NEMA 12 - Room for 2 Expansion Modules
12C	NEMA 12 - Room for 4 Expansion Modules
4A	NEMA 4 - Programmer Only
4B	NEMA 4 - Room for 2 Expansion Modules
4C	NEMA 4 - Room for 4 Expansion Modules

SOFTWARE OPTIONS	
STANDARD SOFTWARE	X
Special Software Adds Multiprogram, Speed Offset and Time Based Outputs to Standard Software Features	P

Refer to Catalog Series 1986 for Resolver Encoders

Output Expansion Modules Purchased as Separate Items

1995E ——————————— **3A3D** ——————————— **6**

EXPANSION MODULE
4 Maximum per
Programmer

Cable Length
6 Ft. Standard
300 Ft. Maximum

OUTPUT RELAYS - 6 MAXIMUM	
Mechanical Relay SPDT 10 AMP	M
A.C. Solid State Relay 1 AMP, 70-250 VAC	A
D.C. Solid State Relay 2 AMP, 5-60 VDC	D

OPTIONAL RESET-TO-PRESET INPUT RELAY

PART NUMBER	DESCRIPTION
SD0395100	Reset Input Relay - Solid State 110V AC Input

SPECIFICATIONS

MICRO-SET PLS PROGRAMMER

Resolution	— 12 Bit (4096)
Scale Factors	— 360 or 1000 ("P" option 360 only)
Scan Time	— Standard 200 Microseconds (Time increases with "P" option)
Temperature Range	— 32˚F to 125˚F (Operating)
	0˚F to 150˚F (Storage)
Operating Voltage	— 110/120VAC 50/60 Hz 300mA; Optional 230VAC 50/60 Hz consult factory

INPUTS

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

OUTPUTS (Plug-in Relays)

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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; Optional 230VAC 50/60 Hz consult factory
Temperature Range	— Same as programmer

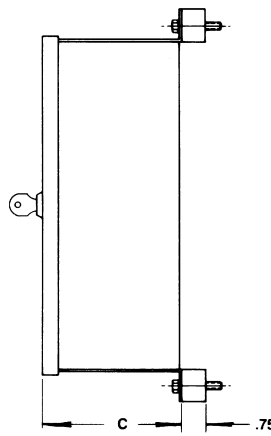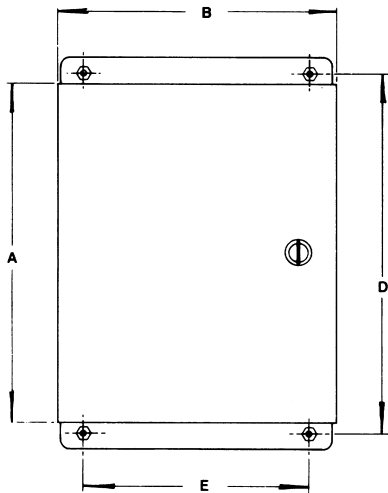## MICRO-SET PROGRAMMER DIMENSIONS
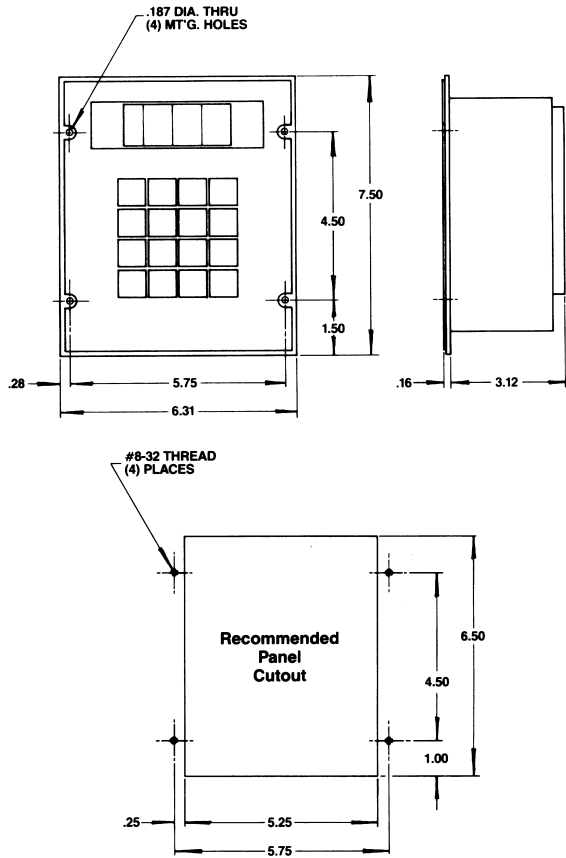
EXPANSION MODULE DIMENSIONS
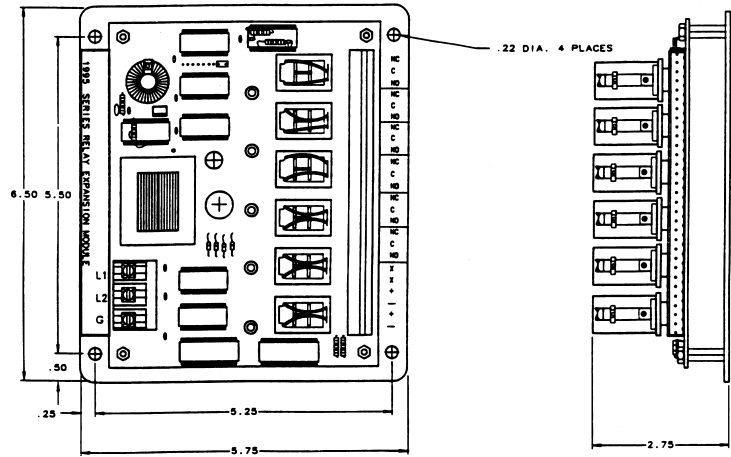
ENCLOSURE DIMENSIONS

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

AMETEK®

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