VTD-A348-0111

AMERACE ELECTRONIC COMPONENTS

CATALOG - AGASTAT

ELECTROMECHANICAL RELAYS AND

ROTARY DRIVES

[PUB. # EMD-1].

RECEIVED
MAY 3 0 1996
SDC

VENDOR TECHNICAL DOCUMENT NUMBER : VTD-A348-0111

RECORD OF REVISIONS

TITLE OF DOCUMENT: AMERACE ELECTRONIC COMPONENTS CATALOG - AGASTAT ELECTROMECHANICAL RELAYS AND ROTARY DRIVES [PUB. # EMD-1].

REVISION	DATE	DESCRIPTION OF REVISION	REVISED BY
0	11/8/95	ORIGINAL ISSUE OF VTD SOURCE DOCUMENTS INCORPORATED: NONE	Travis Roth 1015 KLN

DRAWING LIST FOR VTD-A348-0111

VENDOR DRAWING.....	TITLE.....	RBS DRWG NUMBER.....

NONE INCLUDED

AGASTAT

Electromechanical Relays and Rotary Drives

4

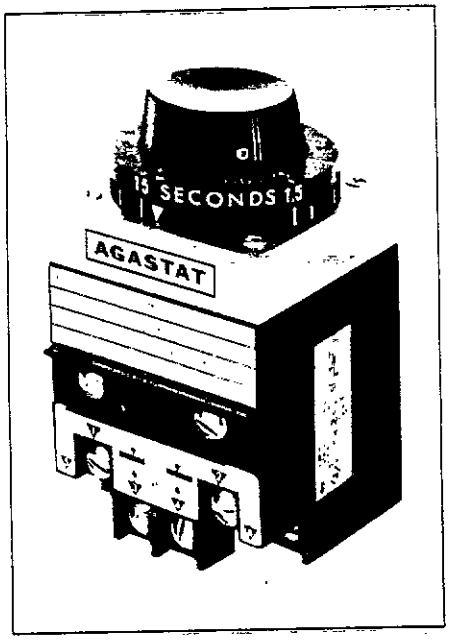
AMERACE
ELECTRONIC COMPONENTS

Table of contents

series 7000

industrial electropneumatic timing relays

AGASTAT® Series 7000 Electropneumatic Timing Relays are designed to give you years of trouble-free service. Simply built, with a minimum of moving parts, they come to you with a 2-year warranty from the acknowledged leader in this specialized field. Their unmatched accuracy and precision will let you initiate, delay, sequence, and program equipment actions over a wide range of applications. And their rugged construction will let you do it under the most severe operating conditions.



Design Features

- **Oversize Time-Calibrated Adjustment Knobs** — all ranges from milliseconds to 60 minutes are fully calibrated in linear increments. Large serrated knobs with high-resolution markings visible from all angles make this the most practical, easily-set timer available.
- **Inherent Transient Immunity**
- **Wide Range of AC & DC Operating Voltages**
- **Long Time Ranges** — from milliseconds to 60 minutes.
- **Front Terminals** — easy-to-reach screw terminals, all on the face of the unit, clearly identified.
- **Modular Assembly** — timing head, coil assembly and switchblock all individual modules, with coils and switches field-replaceable. Auxiliary switches can be added for greater switching flexibility.

Construction

There are three main components of Series 7000 Timing Relays:

Calibrated Timing Head uses no needle valve, recirculates air under controlled pressure through a variable orifice to provide linearly adjustable timing. Patented design provides instant recycling, easy adjustment and long service life under severe operating conditions.

Precision-Wound Potted Coil module supplies the initial motive force with minimum current drain. Total sealing without external leads eliminates moisture problems, gives maximum insulation value.

Snap-Action Switch Assembly — custom-designed over-center mechanism provides greater contact pressure up to transfer time for positive, no-flutter action. Standard switches are DPDT arrangement, with flexible beryllium copper blades and silver-cadmium oxide contacts. Special "timing-duty" design assures positive wiping action, sustained contact pressure and greater heat dissipation during long delay periods.

Each of these sub-assemblies forms a self-contained module which is then assembled at the factory with the other two to afford a wide choice of operating types, coil voltages, and timing ranges.

The modern squared design with front terminals and rear mounting permits the grouping of Series 7000 units side-by-side in minimum panel space. Auxiliary switches may be added in the base of the unit, without affecting the overall width or depth.

Operation

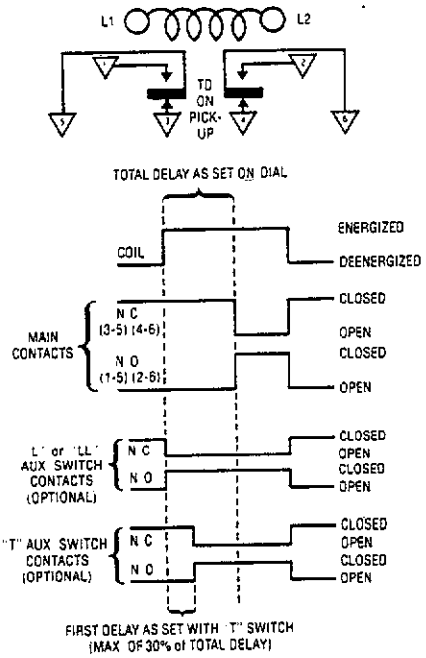
Two basic operating types are available. "On-delay" models provide a delay period on energization, at the end of which the switch transfers the load from one set of contacts to another. De-energizing the unit during the delay period immediately recycles the unit, readying it for another full delay period on reenergization.

In "Off-delay" models the switch transfers the load immediately upon energization, and the delay period does not begin until the unit is deenergized. At the end of the delay period the switch returns to its original position. Reenergizing the unit during the delay period immediately resets the timing, readying it for another full delay period on deenergization. No power is required during the timing period.

In addition to these basic operating types, "Double Head" models offer sequential delays on pull-in and drop-out in one unit, as described on page 4. With the addition of auxiliary switches the basic models provide two-step timing, pulse actuation for interlock circuits, or added circuit capacity.

On-Delay Model 7012

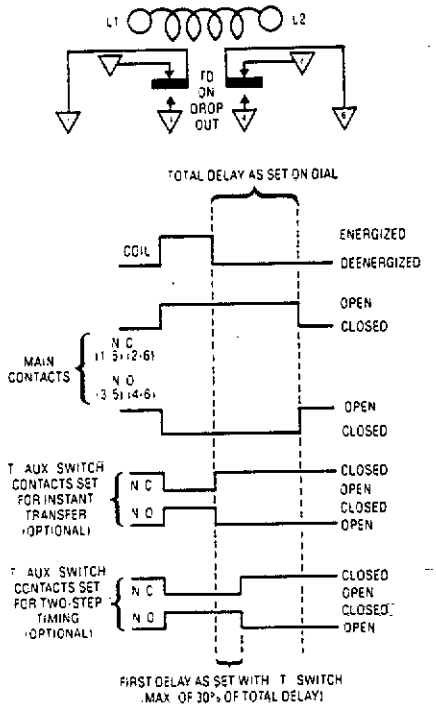
(Delay on pick-up)



Applying continuous voltage to the coil (L1-L2) starts a time delay lasting for the preset time. During this period the normally closed contacts (3-5 and 4-6) remain closed. At the end of the delay period the normally closed contacts break and the normally open contacts (1-5 and 2-6) make. The contacts remain in this transferred position until the coil is deenergized, at which time the switch instantaneously returns to its original position.

Deenergizing the coil, either during or after the delay period, will recycle the unit within .050 second. It will then provide a full delay period upon reenergization, regardless of how often the coil voltage is interrupted before the unit has been permitted to "time-out" to its full delay setting.

Off-Delay Model 7022
(Delay on drop-out)



Applying voltage to the coil (for at least .050 second) will instantaneously transfer the switch, breaking the normally closed contacts (1-5 and 2-6), and making the normally open contacts (3-5 and 4-6). Contacts remain in this transferred position as long as the coil is energized. The time delay begins immediately upon deenergization. At the end of the delay period the switch returns to its normal position.

Reenergizing the coil during the delay period will immediately return the timing mechanism to a point where it will provide a full delay period upon subsequent deenergization. The switch remains in the transferred position.

Auxiliary Switch Options

To increase the versatility of the basic timer models, auxiliary switches may be added to either on-delay or off-delay types. They switch additional circuits, provide two-step timing action, or furnish electrical interlock for sustained coil energization from a momentary impulse, depending on the type selected and its adjustment. Because of their simple attachment and adjustment features, they can be installed at the factory or in the field, by any competent mechanic. All auxiliary switches are SPDT with UL listings of 10A @ 125, 250, or 480 VAC. A maximum of one Code T or two Code L auxiliary switches may be added to each relay. The L or LL switch is available with on-delay relays only. The T switch is available with both the on-delay and off-delay relays.

Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)

1. Energizing coil begins time delay and transfers auxiliary switch.
2. Main switch transfers after total preset delay.
3. Deenergizing coil resets both switches instantly.

Auxiliary switch is non-adjustable.

Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)

1. Energizing coil begins time delay.
2. After first delay auxiliary switch transfers.
3. Main switch transfers after total preset delay.
4. Deenergizing coil resets both switches instantly. First delay is independently adjustable, up to 30% of overall delay. (Recommended maximum 100 seconds.)

Auxiliary Switch Options For Off-Delay

In these models the same auxiliary switch provides either two-step timing or instant transfer action, depending on the adjustment of the actuator.

Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)

1. Energizing coil transfers main and auxiliary switches instantly.
2. Deenergizing coil begins time delay.
3. After first delay auxiliary switch transfers.
4. Main switch transfers after total preset delay. First delay is independently adjustable, up to 30% of overall delay. (Recommended maximum 100 seconds.)

Instant Transfer (Auxiliary Switch Code T, maximum of 1 per relay.)

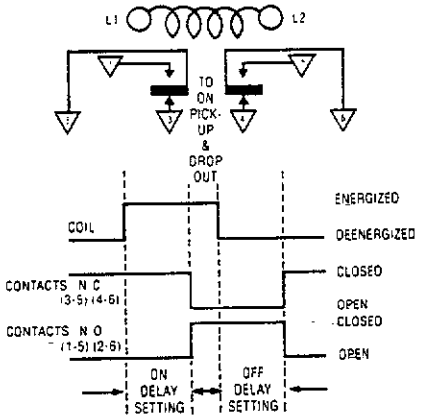
1. Energizing coil transfers main and auxiliary switches instantly.
2. Deenergizing coil resets auxiliary switch and begins time delay.
3. Main switch transfers after total preset delay.

Auxiliary switch is factory adjusted to give instant transfer operation, but may be easily adjusted in the field to provide two-step timing.

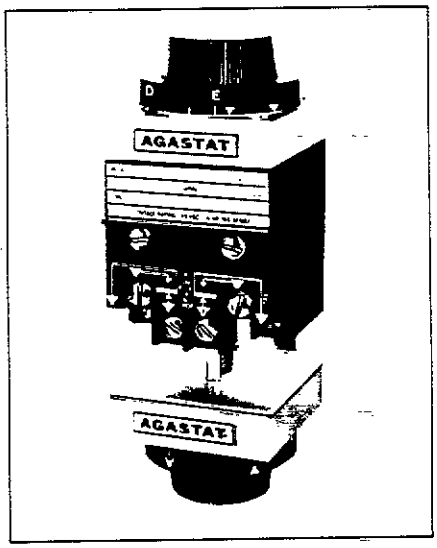
On-Delay, Off-Delay Model 7032
(Double Head)

The Double Head model provides delayed switch transfer on energization of its coil, followed by delayed resetting upon coil deenergization. Each delay period is independently adjustable.

In new circuit designs or the improvement of existing controls now using two or more conventional timers, the Double Head unit offers distinct advantages.



Its compact design saves precious panel space, while the simplified wiring reduces costly interconnection.



series
7000

industrial electropneumatic timing relays

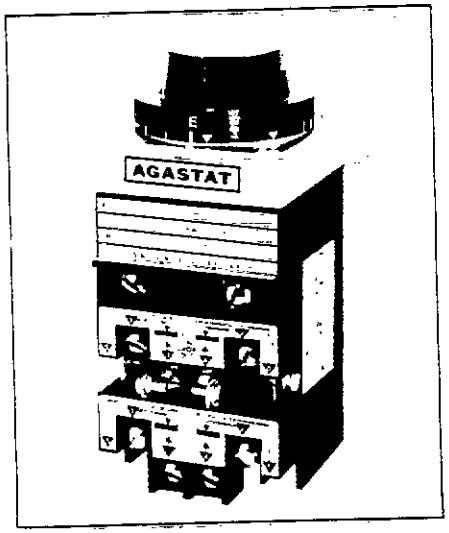
Four Pole Model 7014, 7024

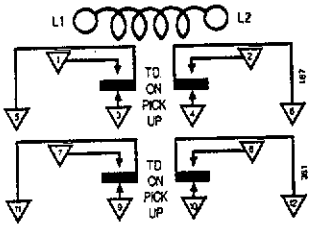
With the addition of an extra switch block at the bottom of the basic unit, this version of the Series 7000 offers four pole switch capacity with simultaneous timing or two-step timing. The two-step operation is achieved by factory adjustment to your specifications.

For two-step operation, a maximum timing ratio between upper and lower switches of 3:2 is recommended. Once adjusted at the factory, this ratio remains constant regardless of changes in dial settings. (Ex: if upper switch transfer is set on dial at 60 sec., minimum time on lower switch should be 40 sec.)

This Series 7000 unit offers many of the performance features found in basic models in the series — voltage ranges, timing and switch capacities are virtually identical.

Four pole models add approximately 1-¼" to the maximum height of the basic model, approximately 1/8" to the depth. They are designed for vertical operation only.





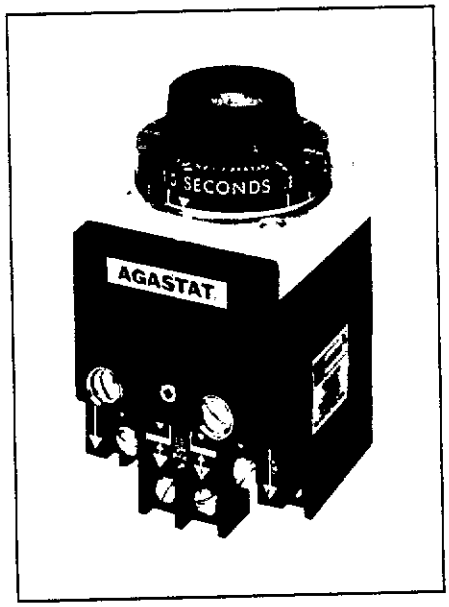
Surge/Transient Protection Option

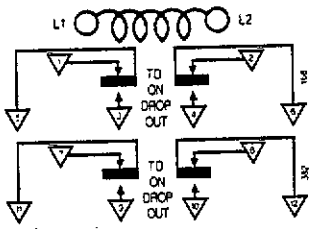
The newest addition to the AGASTAT® 7000 Series electropneumatic timer line protects electronic control circuits from transients and surges which are generated when the timer coil is activated. Built with a minimum of moving parts, the unit provides a fast response to rapidly rising voltage transients. The accurate, precision-made device is not polarity sensitive and permits the user to initiate, delay, sequence and program equipment actions over a wide range of applications under the most severe operating conditions.

It consists of a specially modified coil case, varistor, varistor cover, terminal extensions and cup washers so that normal terminations can be used. The varistor will not affect the operating characteristics of the 7000 timer. The varistor has bilateral and symmetrical voltage and current characteristics and therefore can be used in place of the back-to-back zener diodes. This characteristic also means that the coil will not be polarity sensitive.

Features

- Addition of kit will not affect operation of timer.
- Protect electronic control circuits from voltage transients generated by the timer coil.
- Fast response to the rapidly rising back E.M.F.
- High performance clamping voltage characteristics.
- U.L. recognized, (except varistor and coil together)
- Timer NOT polarity sensitive.





8

series
7000

industrial
electropneumatic
timing relays

SPECIFICATIONS

(All values shown are at nominal operating voltage and 25°C (77°F) unless otherwise noted.)

Operating Modes

Model 7012/7014: On-delay
(Delay on pick-up)
Model 7022/7024: Off-delay
(Delay on drop-out)
Model 7032: On-delay, Off-delay
(Double head)

Timing Adjustment

Timing is set by simply turning the calibrated dial to the desired time value. In the zone of approximately 25° separating the high and low ends of timing ranges A, D, E, and K, instantaneous operation (no time delay) will occur. All other ranges produce an infinite time delay when the dial is set in this zone.

Models 7014 and 7032 are available with letter-calibrated dials only. The upper end of the time ranges in these models may be twice the values shown.

Linear Timing Ranges

Time Range Code	Models 7012, 7022, 7024	Models 7014 7032
A	.1 to 1 Sec.	.2 to 2 Sec.
B	.5 to 5 Sec.	.7 to 7 Sec.
C	1.5 to 15 Sec.	2 to 20 Sec.
D	5 to 50 Sec.	10 to 100 Sec.
E	20 to 200 Sec.	30 to 300 Sec.
F	1 to 10 Min.	1.5 to 15 Min.
H	3 to 30 Min.	3 to 30 Min.
I	6 to 60 Min.	Not avail.
J	3 to 120 Cycle	Not avail.
K	1 to 300 Sec.	Not avail.

Repeat Accuracy

For delays of 200 seconds or less:

7012*, 7022, 7024	±5%
7014*	±10%
7032	±15%

For delays greater than 200 seconds:

7012*, 7022, 7014*, 7024	±10%
7032	±15%

* The first time delay afforded by Model 7012 with H (3 to 30 min.) and I (6 to 60 min.) time ranges or Model 7014 with H time range will be approximately 15% longer than subsequent delays due to coil temperature rise.

Temperature Variation

The time delay for the timing relay was set at an ambient temperature of 25°C (77°F).

The maximum shift in the average of three consecutive time delays from 25°C (77°F) was -20% and to -29°C (-20°F) was +20% at 74°C (165°F). The timing relay can be stored at -55°C (-67°F) to 74°C (165°F).

Reset Time

0.050 sec. (except model 7032)

Relay Release Time

0.050 sec. for on-delay models (7012/7014)

Relay Operate Time

0.050 sec. for off-delay models (7022/7024)

Operating Voltage Coil Data (for DPDT)

Coil Part Number	Code Letter	Rated Voltage	Operating* Voltage Range @ 60 Hz	Rated Voltage	Operating Voltage Range @ 50 Hz
7000	A	120	102-132	110	93.5-121
	B	240	204-264	220	187-242
	C	480	408-528		
	D	550	468-605		
	E	24	20.5-26.5		
AC	F			127	108-140
	G			240	204-264
	H	12	10.2-13.2		
	I	6	5.1-6.6		
	J	208	178-229		
	K	Dual Voltage Coil (Combines A&B)			
	L	Special AC Coils (L1, L2, etc.)			
7010	M	28	22.5-33.5		
	N	48	38.5-57.5		
	O	24	19.2-28.8		
	P	125	100-150		
	Q	12	9.6-14.4		
	R	60	48-74		
DC	S	250	200-300		
	T	550	440-660		
	U	16	12.8-19.2		
	V	32	25.6-38.4		
	W	96	76.8-115		
	Y	6	4.8-7.2		
	Z	220	176-264		
	X	Special DC Coils (X1, X2, etc.)			

Minimum operating voltages are based on vertically mounted 7012 units. 7012 horizontally mounted or 7022 vertically or horizontally mounted units will operate satisfactorily at minimum voltages approximately 5% lower than those listed.

AC units drop out at approximately 50% of rated voltage. DC units drop out at approximately 10% of rated voltage.

All units may be operated on intermittent duty cycles at voltages 10% above the listed maximums (intermittent duty - maximum 50% duty cycle and 30 minutes "on" time.)

*Four Pole Models:
Operational voltage range 90% to 120% for AC units; 85% to 120% for DC units.

Power Consumption

Approximately 8 watts power at rated voltage (all units).

Output/Life Contact Ratings

Contact Capacity in Amperes
(Resistive Load)

Contact Voltage	Min. 100,000 Operations	Min. 1,000,000 Operations
30 VDC	15.0	7.0
110 VDC	1.0	0.5
120 V 60 Hz	20.0	15.0
240 V 60 Hz	20.0	15.0
480 V 60 Hz	12.0	10.0

10 Amps Resistive, 240 VAC
1/4 Horsepower, 120 VAC/240 VAC
15 Amps 30 VDC
5 Amps, General Purpose, 600 VAC
} Per Pole

Series 7000 Surge/Transient Protection Option

Characteristics (For D.C. Timers Only)

Coil Voltage Nominal (DC)	Max Excess Energy Capacity	Max De-energization Transient Voltage
12V	0.4j	48V
24V	1.8j	93V
28V	1.8j	93V
32V	2.5j	135V
48V	3.57j	145V
60V	6j	250V
96V	10j	340V
110V	10j	340V
125V	10j	340V
220V	17j	366V
250V	17j	366V

Temperature Range

Operating: –30°C to +75°C
(–22°F to +167°F)
Storage: –40°C to +75°C
(–40°F to +167°F)

Surge Life

Applied 100,000 times continuously with the interval of 10 sec. at room temperature.

Below 68V: 12A
Above 68V: 35A

series
7000

industrial
electropneumatic
timing relays

Dielectric
Withstands 1500 volts RMS 60 Hz between terminals and ground. 1,000 volts RMS 60 Hz between non-connected terminals.

For dielectric specifications on hermetically sealed models consult factory.

Insulation Resistance
500 Megohms with 500 VDC applied.

Temperature Range
Operating temperature range -29°C to 74°C (-20°F to 165°F).
Storage temperature -55°C to 74°C (-67°F to 165°F).

Mounting/Terminals
Normal mounting of the basic unit is in a vertical position, from the back of the panel. A front mounting bracket is also supplied with each basic unit, for installation from the front of the panel. **All units are calibrated for vertical operation.** Basic models (7012, 7022) may also be horizontally mounted, and will be adjusted accordingly **when Accessory Y1 is specified in your order.**

Standard screw terminals (8-32 truss head screws supplied) are located on the front of the unit, with permanent schematic markings. Barrier isolation is designed to accommodate spade or ring tongue terminals, with spacing to meet all industrial control specifications.

The basic Series 7000 may also be panel mounted with the addition of a panelmount kit that includes all necessary hardware and faceplate. This offers the convenience of "out-front" adjustment, with large calibrated dial skirt knob. The modern faceplate and knob blend with advanced equipment and console designs, while the body of the unit and its wiring are protected behind the panel.

Other mounting options include plug-in styles and special configurations to meet unusual installation requirements. Contact factory for details.

Panelmount Option "X"

Agency Approvals

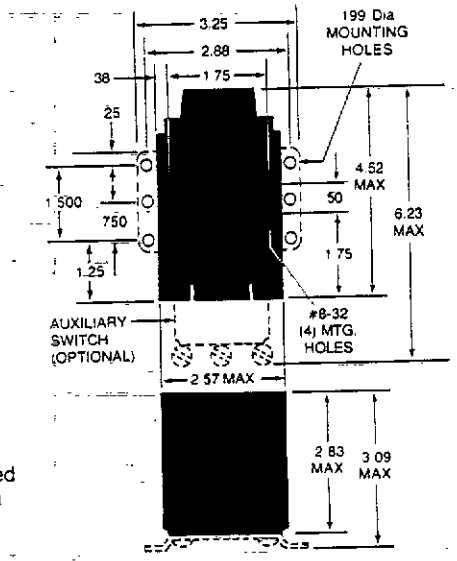
File No. E15631 — File No. LR29186 — FM APPROVED

AGASTAT® Series 7000 Timing Relays are also manufactured to MIL-SPEC requirements, and are QPL listed, conforming to requirements of MIL-C-2212F (SHIPS) with the exception of MIL-S-901. Consult factory for ordering information.
Exception: 7032 models and certain models with accessories are not UL listed.

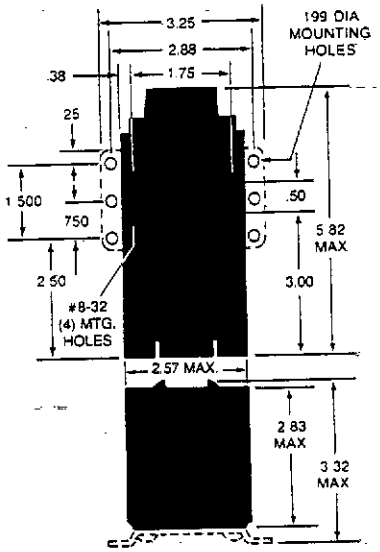
Approximate Weights
Models 7012, 7022 ..... 2 lbs. 4 ozs.
7014, 7024 ..... 2 lbs. 10 ozs.
7032 ..... 3 lbs. 5 ozs.
Weight may vary slightly with coil voltage.

DIMENSIONS (inches)

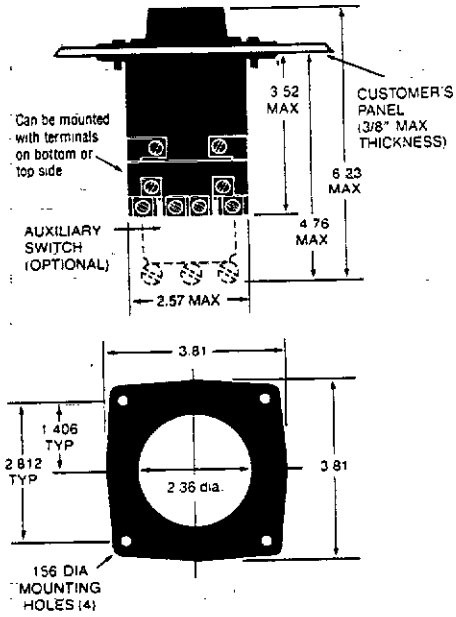
Basic Models 7012, 7022



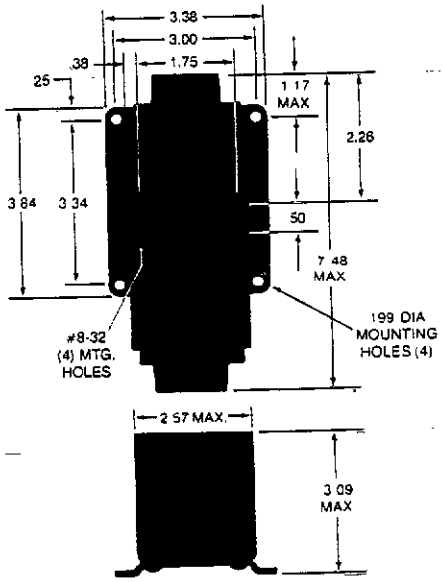
Models 7014, 7024



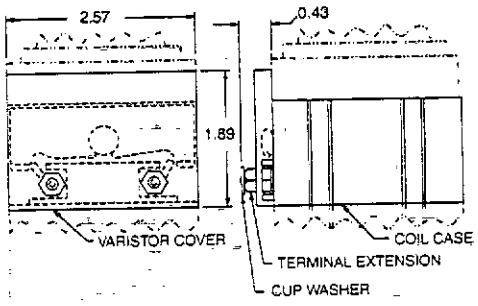
Panelmount Option "X"



Model 7032



Surge/Transient Protection Option



ORDERING INFORMATION

Catalog Number Code

70 **1** **2** **A** **D** **GZ**

Model Series
AGASTAT®
Series 7000
Timing Relay

Contact Arrangement
2 – Double Pole, Double Throw
1 3 4 – Four Pole, Double Throw

Operation
1 – On-Delay
2 – Off-Delay
3 – On-Delay Off-Delay (Double Head)

Coil Voltage
A – 120V 60 Hz 110V 50Hz
B – 240V 60Hz 220V 50Hz
C – 480V 60Hz
D – 550V 60Hz
E – 24V 60Hz
F – 127V 50Hz
G – 240V 50Hz
H – 12V 60Hz
I – 6V 60Hz
J – 208V 60Hz
K – Dual Voltage (combines A & B)
L – Special AC Coils (L1, L2, etc.)
M – 28 VDC
N – 48 VDC
O – 24 VDC
P – 125 VDC
Q – 12 VDC
R – 60 VDC
S – 250 VDC
T – 550 VDC
U – 16 VDC
V – 32 VDC
W – 96 VDC
Y – 6 VDC
Z – 220 VDC
X – Special DC Coils (X1, X2, etc.)

Time Range

Models 7012, 7022, 7024

Code
A – .1 to 1 sec.
B – .5 to 5 sec.
C – 1.5 to 15 sec.
D – 5 to 50 sec.
E – 20 to 200 sec.
F – 1 to 10 min.
H – 3 to 30 min.
I – 6 to 60 min.
J – 3 to 120 cyc.
K – 1 to 300 sec.

③ **Models 7014, 7032**

For Model 7032 specify separate time range code for each head. Example: AB. Any two ranges may be selected.

Code
A – .2 to 2 sec.
B – .7 to 7 sec.
C – 2 to 20 sec.
D – 10 to 100 sec.
E – 30 to 300 sec.
F – 1.5 to 15 min.
H – 3 to 30 min.

Factory Installed Options

2 4 A1 – Quick-Connect Terminals. Single, Male, .250 ± .032
2 4 A2 – Quick-Connect Terminals. Double, Male, .250 ± .032
2 5 6 B – Plug-in Connector, Male
1 3 GZ – Total Enclosure with Bottom Connection
1 2 4 H – Herm. Sealed (Consult Factory)
1 I1 – Tamperproof Cover-Opaque
1 I2 – Tamperproof Cover-Transparent
1 K – Explosionproof Enclosure
6 L – Auxiliary Switch One Instantaneous Form C contact (on-delay models only)
6 LL – Auxiliary Switch Two instantaneous Form C contacts (on-delay models only)
2 4 6 M – Dustight
1 2 5 6 P – Octal Plug Adapter
4 6 S – Dial Stops - Specify minimum & maximum settings
6 T – Auxiliary Switch One Form C contact (timed on on-delay models; timed or instantaneous on off-delay models)
⑦ V – Transient/Surge Protection to suppress internal coil transients
1 W – Watertight Enclosure
2 6 X – Panelmount Kit (Relay is calibrated for horizontal mounting)
2 Y1 – Calibration for Horizontal Mounting
1 2 Y2 – Compensating Spring for 2-way mounting. Factory installed for vertical operation; remove for horizontal operation. (Not compatible with H, M or P options)
4 5 6

① Not suitable for panelmounted models (option X).
② Not available on Four Pole Models.
③ Available with letter calibrated dials only. Upper end of time range may be twice the value shown.
④ Factory installed only.
⑤ Not available if unit is equipped with L, LL or T Auxiliary Switch or any type of enclosure.
⑥ Not available on On-Delay, Off-Delay (Double Head) models.
⑦ Not available with AC voltage coils.

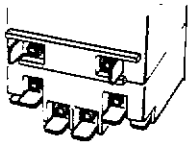
WARRANTY

This product is warranted against mechanical and electrical defects for a period of two years from date of shipment from factory if it has been installed and used in accordance with factory recommendations. Any field repairs or modifications to the original unit will void this warranty. Amerace Corporation's liability is limited to replacement of parts proved defective in workmanship or materials. (W-AB2)

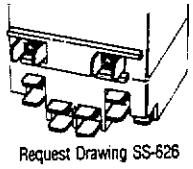
OPTIONS

Factory installed when ordered as part of the Catalog Number Code

A1 SINGLE QUICK-CONNECT TERMINALS DOUBLE A2

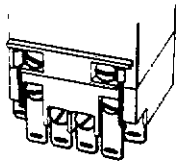
* 

Request Drawing SS-625

* 

Request Drawing SS-626

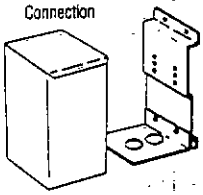
B PLUG-IN CONNECTORS



May be ordered separately as Catalog No. 700077-for 7012, 7022
Request Drawing SS-627
Used with Accessory "C" or "D", below

GZ TOTAL ENCLOSURE

with Knockouts for Bottom Connection

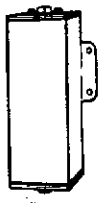


May be ordered separately as Catalog No. 700042-for 7012, 7022, 7014, 7024

3.16" W x 3.84" D x 7.63" H

Request Drawing SS-633

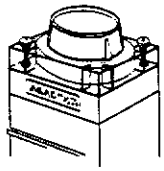
H HERMETICALLY SEALED ENCLOSURE

* 

with Solder Hook Terminals
Consult Factory for connector styles available

Request Drawing SS-526

I TAMPER-PROOF COVER



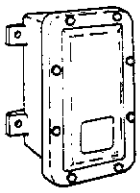
Request Drawing SS-634

May be ordered separately as Catalog No. 700062 (opaque black) or 700071 (transparent) — for 7012, 7022

Catalog No. 700072 (opaque black) or 700073 (transparent) — for 7014, 7024

Catalog No. 700064 (opaque black) or 700075 (transparent) — for 7032

K EXPLOSIONPROOF ENCLOSURE

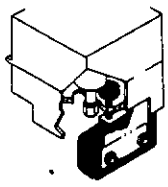


(Meets requirements for Class I, Groups C & D locations). May be ordered separately as: Catalog No. 700034

Request Drawing 32807-00

7.50"W x 6.00"D x 10.38"H

L AUXILIARY SWITCH

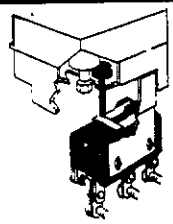


May be ordered separately as Catalog No. 700047- for 7012
Mounting hardware included.

Request Drawing SS-638

Model 7014 switch must be factory installed.

LL AUXILIARY SWITCH

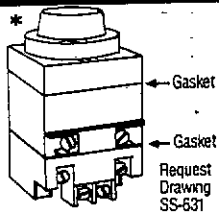


May be ordered separately as Catalog No. 700048 — for 7012

Request Drawing SS-621

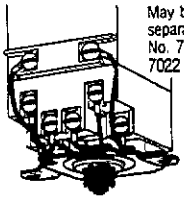
Model 7014 switch must be factory installed.

M DUSTIGHT

* 

Request Drawing SS-631

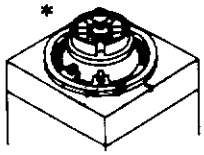
P OCTAL PLUG ADAPTER



May be ordered separately as Catalog No. 700097-for 7012, 7022

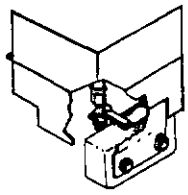
Request Drawing SS-630

S DIAL STOPS

* 

Request Drawing SS-632

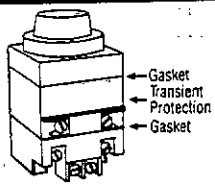
T AUXILIARY SWITCH



May be ordered separately as Catalog No. 700121 — For Two-Step Timing on 7012, 7022, 7014, 7024 — For Instant Transfer only on 7022, 7024
Mounting hardware included.

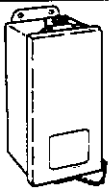
Request Drawing SS-641

V TRANSIENT/SURGE PROTECTION



May be ordered separately as Catalog No. 7010V*
*Insert DC coil voltage code M,N,O,P,Q,R,S,W,W, or Z from "Ordering Information." Other nominal voltage coils and Varistor voltages are available; consult factory.

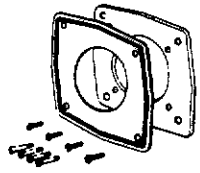
W WATERTIGHT ENCLOSURE (NEMA-4)



4.75"W x 4.44"D x 9.75"H
May be ordered separately as Catalog No. 700099-for 7012, 7022, 7014, 7024
700088-for 7032

Request Drawing SS-635

X PANELMOUNT KIT



Mounting hardware included. May be ordered separately as Catalog No. 700041 — for 7012, 7022

Request Drawing SS-583

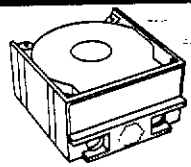
* Can only be ordered as a factory installed option. All other options can be ordered in kit form, or factory installed.

ACCESSORIES

Order separately by part number.

NOTE: These accessories are not appropriate for Double Head Model 7032.

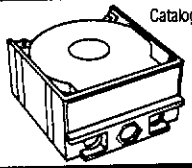
COIL ASSEMBLIES



AC ASSEMBLY Catalog No. 7000*
DC ASSEMBLY Catalog No. 7010*
DC ASSEMBLY, 550 VDC Catalog No. 7010-T

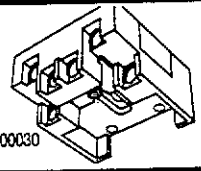
*Insert coil voltage code. (See "Ordering Information")

AC DUAL VOLTAGE COIL ASSEMBLY



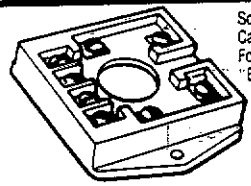
Catalog No. 7000K

SWITCHBLOCK ASSEMBLY



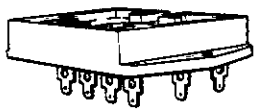
Catalog No. 700030

PLUG-IN RECEPTACLE (Accessory C)



Screw Terminals
Catalog No. 700137
For use with "B" option

PLUG-IN RECEPTACLE (Accessory D)

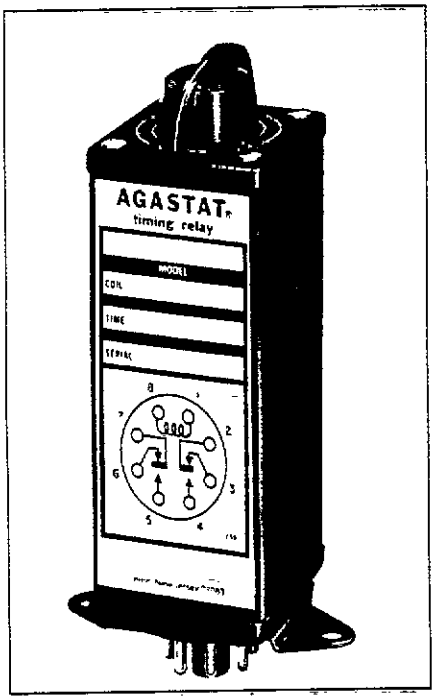


Quick connect Terminals
Catalog No. 700141
For use with "B" option

series 2100

miniature electropneumatic timing relay

AGASTAT® Series 2100 Miniature Timing Relays are available in both industrial and Mil-Spec configurations. They are time-tested, field-proven electrically actuated/pneumatically timed relays. In their space-saving and rugged construction they offer high accuracy, easy adjustment, either On-Delay or Off-Delay operation, and a wide selection of timing ranges and coil voltages.



Features

- High repeat accuracy over voltage and temperature extremes
- Instant recycling — easy linear adjustment
- Exclusive Dial Head adjustment — no needle valves
- Delay ranges from milliseconds to 3 minutes
- DPDT contacts
- Inherent transient immunity
- True 'Off-Delay' timing

Design

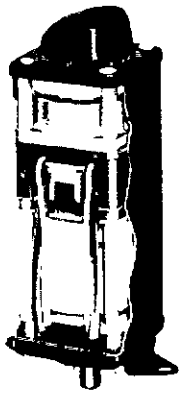
Sealed patented timing head circulates air under controlled pressure through a variable orifice to provide adjustable timing. Circular-path Dial Head principle replaces traditional needle valve.

Snap-action switch assembly provides sustained contact pressure during timing cycles. Special-design overcenter mechanism assures flutter-free load transfer after extended delay periods.

Precision-wound solenoid assembly supplies the basic motive force when the control circuit is closed.

Construction

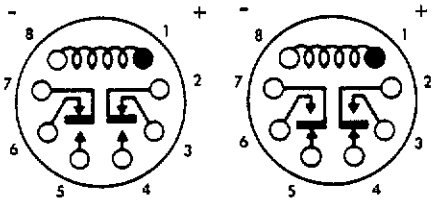
These assemblies are mounted in a rigid self-supporting framework within a steel enclosure. This rugged construction assures permanent alignment of all operating members, the key to this unit's long trouble-free operation.



Operation

Series 2112 (On-Delay) - Applying a continuous rated voltage to the solenoid coil starts the preset time delay. At the end of the delay period the NC contacts break and the NO contacts make. Contacts remain in this position until the coil is de-energized, when the switch instantaneously returns to its original position. De-energizing the coil, either during or after the delay period, will immediately (within .025 sec.) recycle the unit. It will then provide another full delay period on re-energization.

Series 2122 (Off-Delay) — Applying a rated voltage to the coil for at least .075 sec. (for accurate timing) will instantaneously transfer the switch, breaking the NC contacts and making the NO contacts. Contacts remain in this position as long as the coil is energized. The preset time delay period begins as soon as the coil is de-energized, at the end of which the switch returns to its original position. **No power is required during the timing period.** Re-energizing the coil, either during or after the delay period, will immediately start a new cycle with full delay period.



Series 2112 Series 2122

Specifications

All values listed are at nominal operating voltage and 25°C (77°F), unless otherwise noted.

Operating Mode

Series 2112: On-Delay (Delay on Pull-in)
Series 2122: Off-Delay (Delay on Drop-out)

Timing Adjustment

All standard models offer easy linear adjustment over one of nine timing ranges, listed below. For applications requiring frequent readjustment, the external knob model with calibrated dial is recommended. For tamper-proof installation or where readjustment is infrequent, the internal key model may be preferred. This model requires removal of the cover plate for timing adjustment. Hermetically sealed models provide a slotted adjusting screw under the cap nut on the top cover.

Timing Ranges — Seconds

Code				
	A	.03	to	.1
	B	.1	to	.3
	C	.15	to	1.0
	D	.375	to	3.0
	E	.750	to	10.0
	F	1.0	to	30.0
	G	2.0	to	60.0
	H	5.0	to	120.0
	J	5.0	to	180.0
	K	1.5	to	30.0 Cyc.
	L	3.0	to	120.0 Cyc.

Repeat Accuracy

NORMAL VERTICAL POSITION
@ 25°C (77°F) . . . ± 5% @ 85° C (185°F) . . . ±7% @ –55°C (–67°F) . . . ±8%

The average time between –55°C (–67°F) and 85°C (185°F) will be within ±20% of the average @ 25°C (77°F) with a proportionally reduced effect at lesser extremes.

In extremely short delay settings an additional .008 sec. variation may result on AC models due to "half cycle" alternating current effect.

SETTING TOLERANCE
Factory time setting, when specified, subject to additional ± 5% tolerance.

series
2100

miniature electropneumatic timing relay

Position Sensitivity
HORIZONTAL POSITION
Approximately 5% increase from the initial time in the vertical position.
INVERTED POSITION
Approximately 10% increase from the initial time in the vertical position.

Reset Time
2112 Series .025 sec.
2122 Series .075 sec.

Relay Release Time
.025 sec. 2112 series

Relay Operate Time
.075 sec. 2122 series

Transients
Insensitive to transients of ± 1500V for 10 milliseconds.

Dielectric
1000V RMS @ 60 Hz between non-connected terminals.

Operating Voltage
Coil Data

Code	Nominal Operating Voltage†	Current at Rated Voltage Amps ± 10%	Resistance Ohms ± 10%
M	12 vdc	.400	30
N	28 vdc	.210	131
P	48 vdc	.096	500
R	110 vdc	.034	3200
S	120V 60 Hz (2112 Series)	.088	190
S	120V 60 Hz (2122 Series)	.067	285
T	240V 60 Hz	.049	765
U	115V 400 Hz	.038	2600
Y	125 vdc	.037	3380

†Consult factory for other voltages and frequencies.

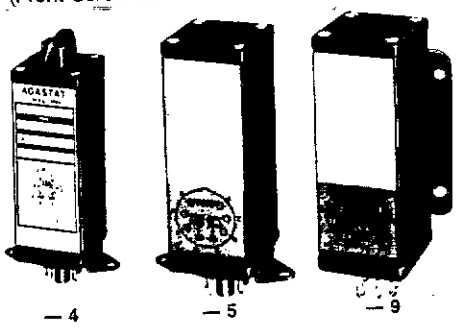
Contact Rating (DPDT Contacts)

	30 volts DC	110 volts DC	120 volts 60 Hz	120volts 400Hz	240 volts 60 Hz
Inductive	2 Amps	75 Amps	3 Amps	2 Amps	1.5 Amps
Resistive	10 Amps	1 Amp	10 Amps	10 Amps	5 Amps

Based on 100,000 operations electrical, 1,000,000 mechanical. Inductive and capacitive loads should not have inrush currents that exceed 5 times normal operating load.

Ambient Temperature Range
–55°C to 85°C (–67° to 185°F)
(Also available for higher temperature operation on special order.)

Mounting/Terminals
Chassis mounting tabs, octal plugs and external (–4) or internal (–5) adjustment. Panel mounting back plate, internal adjustment, and solder hook terminals (–9). (Front Screw Terminals also available.)



–4 –5 –9

Weight
Maximum, any unit ..... 17 ozs.

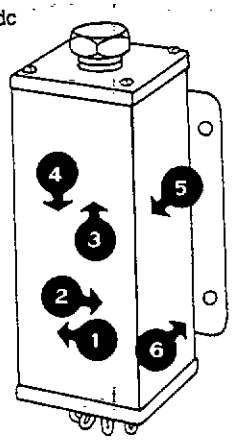
These are minimum standards; where more severe environmental conditions must be met, please consult the factory.

SPECIFICATIONS
The following specifications apply exclusively to MIL-SPEC and hermetically-sealed units.

SHOCK
Exceeds MIL-E-5272C, Proc. V
Contacts chatter-free . . . 30 g's
No structural damage . . up to 75 g's

VIBRATION
10 g's 5 to 500 cycles in accordance with specification MIL-E-5272C-1, Procedure XII. Contacts — Chatter-free. Actual "g" forces with regard to Shock, Acceleration and Vibration are monitored on the relay.

INSULATION RESISTANCE
1000 Megohms minimum with 500 vdc applied.



ACCELERATION
Withstands 10 g's Acceleration (position sensitive during timing).

The following g's may be applied in the direction indicated without contact opening:

Plane 1	2112 & 2122 units — 100 g's energized and deenergized
Plane 2	2112 & 2122 units — 100 g's energized and deenergized
Plane 3	2112 units — 80 g's energized and 100 g's deenergized 2122 units — 100 g's energized and 40 g's deenergized
Plane 4	2112 units — 100 g's energized and 20 g's deenergized 2122 units — 100 g's energized and deenergized
Plane 5	2112 & 2122 units — 100 g's energized and deenergized
Plane 6	2112 & 2122 units — 100 g's energized and deenergized

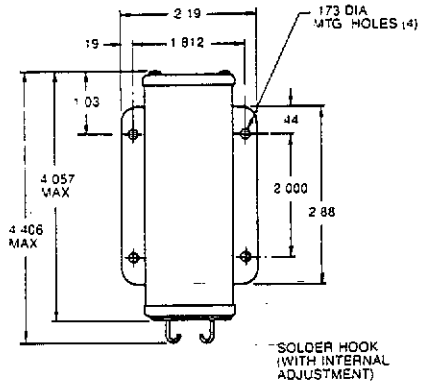
DIELECTRIC
In accordance with specification MIL-R-6106E (ASG). Also withstands 1,000 Volts RMS at 60 Hz between non-connected terminals.

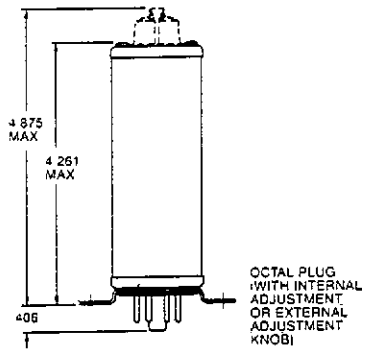
OTHER
AGASTAT® Miniature Timing Relays also conform to applicable MIL-Spec. requirements covering:

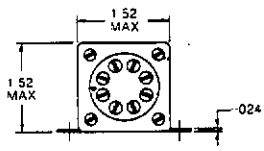
Moisture	Ozone
Humidity	Sunshine
Sand/Dust	Acoustic Noise
Salt Spray	Prolonged Storage

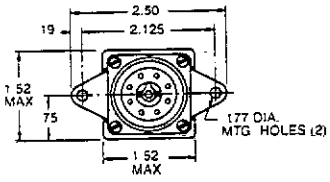
WARRANTY
This product is warranted against mechanical and electrical defects for a period of one year from date of shipment from factory if it has been installed and used in accordance with factory recommendations. Any field repairs or modifications to the original unit will void this warranty. Amerace Corporation's liability is limited to replacement of parts proved defective in workmanship or materials. (W-AB1)

DIMENSIONS — INDUSTRIAL MODELS
(inches)

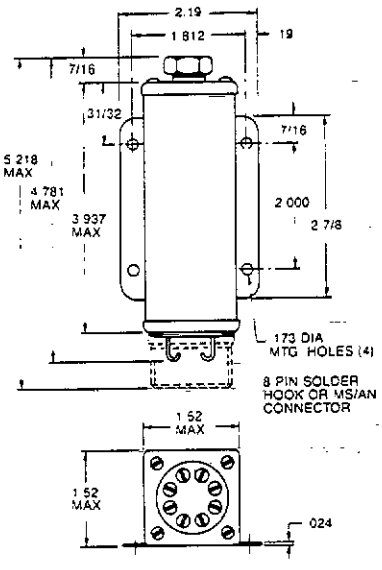




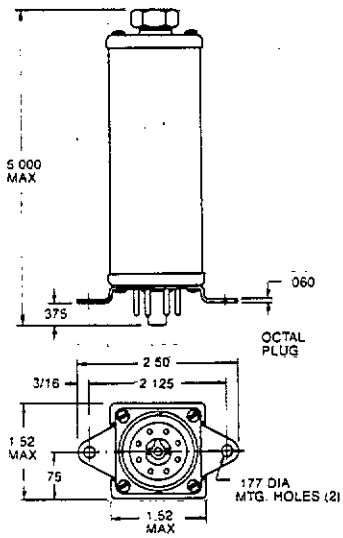




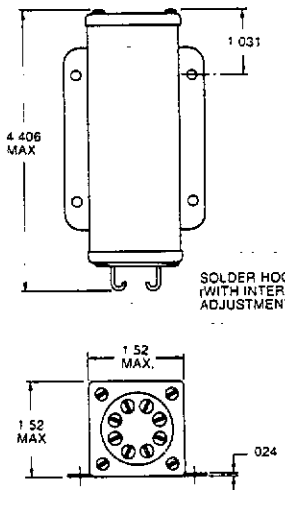
DIMENSIONS — MIL-SPEC & HERMETICALLY SEALED MODELS
(inches)



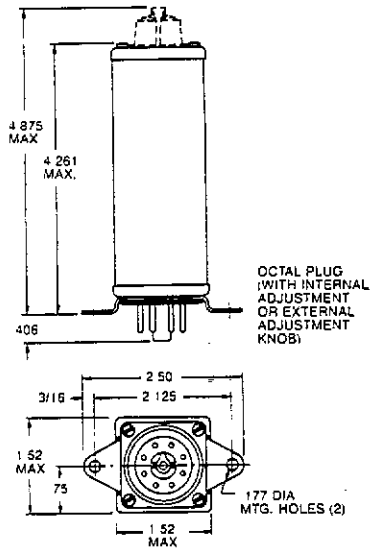
PANEL MOUNT
—H1, —H3



CHASSIS MOUNT
—H2



PANEL MOUNT
—9M



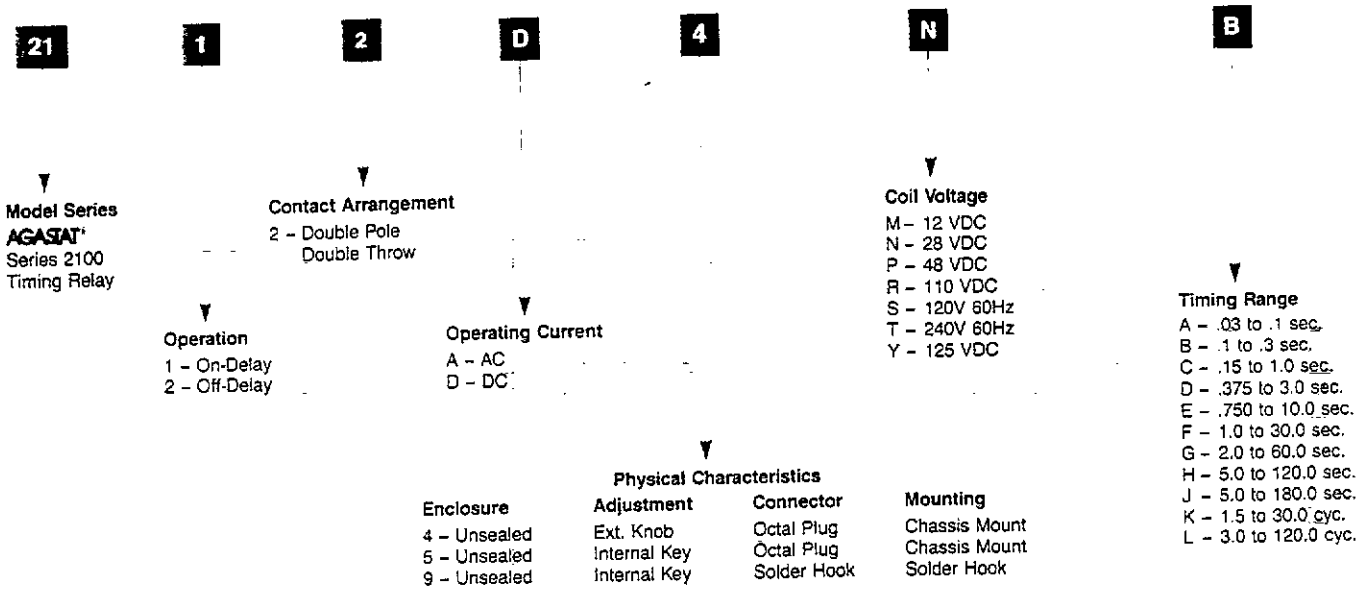
CHASSIS MOUNT
—4M, —5M

BASIC ENCLOSURE DIMENSIONS, AS WELL AS MOUNTING BRACKETS AND SOLDER HOOK HEADERS, ARE IDENTICAL IN ALL MODELS

14A

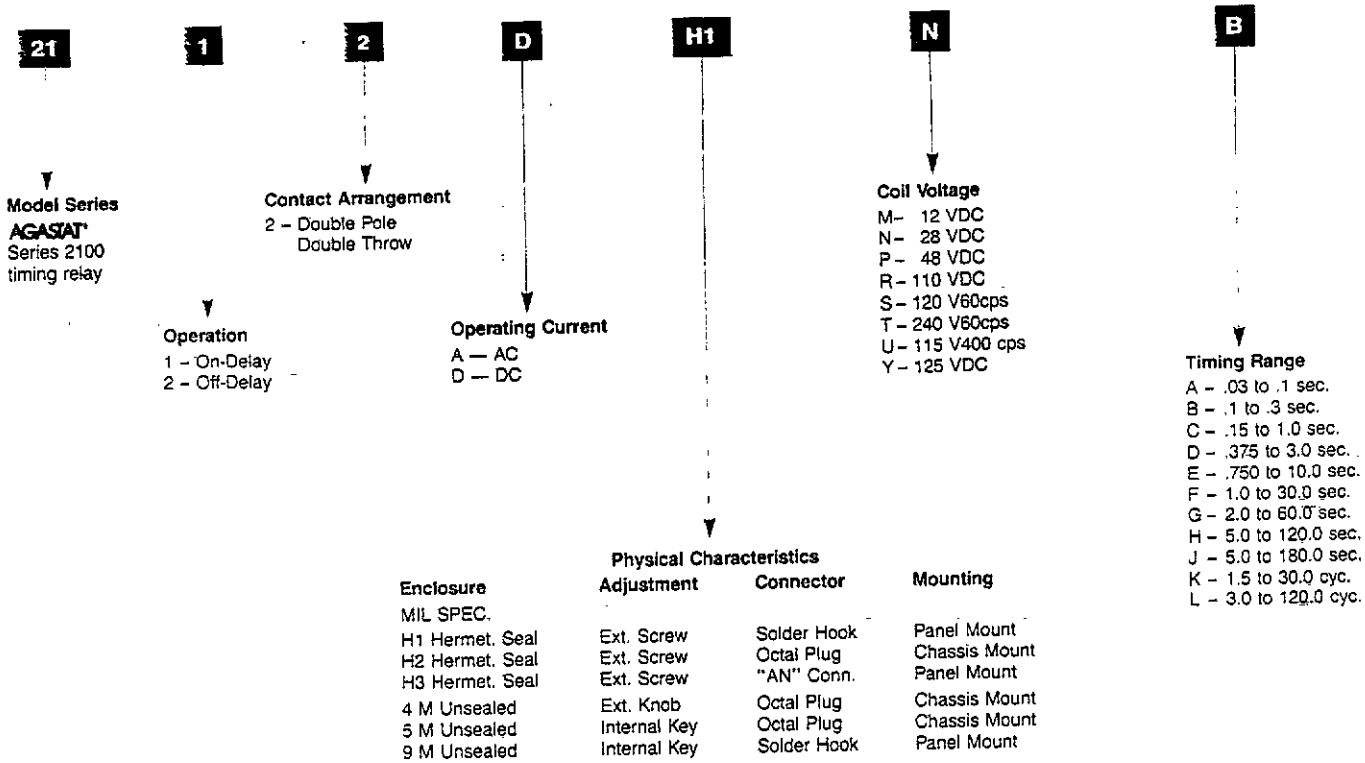
ORDERING INFORMATION — INDUSTRIAL MODELS

Catalog Number Code



ORDERING INFORMATION — MIL-SPEC & HERMETICALLY SEALED MODELS

Catalog Number Code

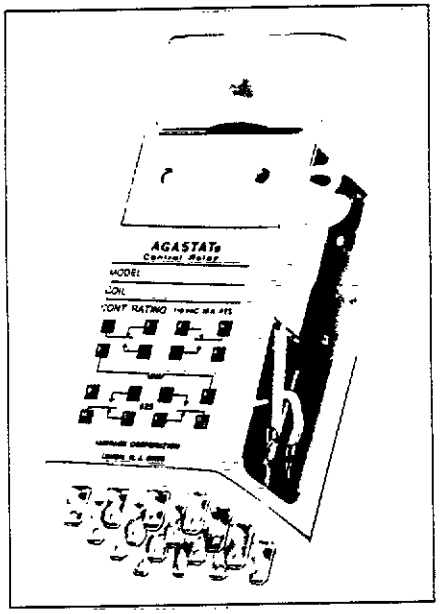


series

GP ML TR control relays

power/ logic relay | magnetic latch | time delay

Among the advances AGASTAT® Control Relays offer over existing designs is a unique contact operating mechanism. An articulated arm assembly amplifies the movement of the solenoid core, allowing the use of a short stroke coil to produce an extremely wide contact gap. The long support arms used in conventional relays are eliminated. Both current capacity and shock/vibration tolerance are greatly increased, as well as life expectancy.



Series GP Power Relay

Features

The AGASTAT® Control Relay is suitable for all demanding industrial applications. The GP relay occupies a very small panel space and may be mounted singly, in continuous rows, or in groups.

The relay is available with a screw terminal molded socket.

A magnetic blow-out device increases the DC current carrying capacity approximately ten times for both N.O. & N.C. contacts. In both AC and DC operation, the addition of this device will normally double the contact life, due to reduced arcing.

Design/Construction

AGASTAT® Control Relays are operated by a moving core electromagnet whose main gap is at the center of the coil. A shoe is fitted to the core which overlaps the yoke and further increases the magnetic attraction.

The coil itself is in the form of an elongated cylinder, which provides a low mean turn length and also assists heat dissipation. Since the maximum travel of the electromagnet does not provide optimum contact movement, an ingenious amplifying device has been designed.

This consists of a W-shaped mechanism, shown in figure 1. When the center of the W is moved vertically the lower extremities move closer to each other as can be seen in the illustration. The center of the W mechanism is connected to the moving core of the electromagnet and the two lower points are connected to the moving contacts.

Two of these mechanisms are placed side-by-side to actuate the four contact sets of the relay. The outer arms of the W mechanisms are leaf springs, manufactured from a flat piece of non-ferrous metal. These outer arms act as return springs for their corresponding contacts. This provides each contact with its own separate return spring, making the contacts independent.

The mechanical amplification of the motion of the electromagnet permits a greater distance between the contacts, while the high efficiency of the electromagnet provides a nominal contact force in excess of 100 grams on the normally open contacts.

All the contacts are positioned well away from the cover and are well ventilated and separated from each other by insulating walls.

The absence of metal-to-metal friction, the symmetrical design of the contact arrangement and the lack of heavy impacts provides a mechanical life of 100,000,000 operations.

For use in AC circuits, the relay is supplied with a built-in rectification circuit, thus retaining the high DC efficiency of the electromagnet. The current peak on energizing is also eliminated and consequently the relay can operate with a resistance in series (e.g. for high voltages or for drop-out by shorting the coil). The use of the rectification circuit offers still other advantages. The same model can operate at frequencies ranging from 40 to 400 cycles. Operation of the relay is crisp: even with a low AC voltage, there is a complete absence of hum and vibration.

The plastic dust cover has two windows through which the iron yoke protrudes to facilitate cooling and also to allow direct mounting of the relay irrespective of the terminals.

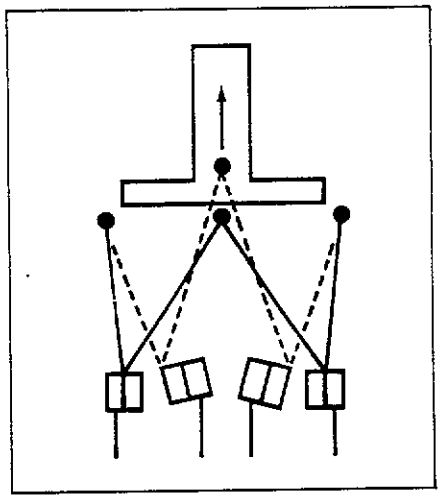


Figure 1

Diagram illustrates amplification obtained by articulated operating mechanism.

Series GP Logic Relay

The AGASTAT® logic relay is especially suitable for low voltage, low current control signal applications. It can be mounted singly, in continuous rows or in convenient groups. It is available with gold plated screw terminal, plug-in sockets.

For detailed product information, please refer to Bulletin EMD-2

Series ML Magnetic Latch

Features

The Series ML mechanically held relays offer exceptional reliability, and high contact density. They are suitable for applications where relays must be kept operating even in the event of supply voltage failure.

Design/Construction

The AGASTAT® Series ML relay has a single solenoid with a plunger core and characteristic GP type mechanical amplification. A magnet within the structure is polarized by the latching winding and holds the relay in the operated position after the energizing voltage is removed. Unlatching winding, which is wound in the opposite direction, neutralizes the polarity of the magnet and returns the relay to the unoperated position. Similar control may be obtained on AC circuits by means of built-in rectification.

The ML Relay therefore forms a magnetic storage device having contacts on both of the stable positions. Impact vibration or external stress will not cause the relay to transfer. This holding force compares favorably with similar mechanical devices and will withstand quite severe treatment.

In a DC circuit with a single wound coil, switching contacts would be necessary to change the current direction. This is the reason for the provision of a double wound coil, the latching winding being energized through the B1-B4 terminals and the de-magnetizing or unlatching winding through the B3-B4 terminals.

Since the double-wound coil does not have a continuous duty rating, voltage pulses to the coils should not exceed a ratio of 40% on, 60% off, with maximum power-on periods not to exceed 10 minutes.

If continuous energizing only is available, a resistor/capacitor network should be connected as shown in figure 2. In this case the shortest time between two operations must not be less than 5 seconds.

In an AC circuit the unlatching winding may be energized continuously. The resulting slight hum is not loud enough to be objectionable.

The relays are normally delivered polarized so that terminal B4 carries the negative voltage. To reverse the polarity, a deenergize/energize cycle should be carried out using a voltage 50% greater than the normal rating.

In both AC and DC applications the relay will always assume the energized position in the event of both windings being energized simultaneously.

It is advisable not to put another load in parallel with the windings of the ML relay.

ML Series Relay for DC operation with a resistor/capacitor network

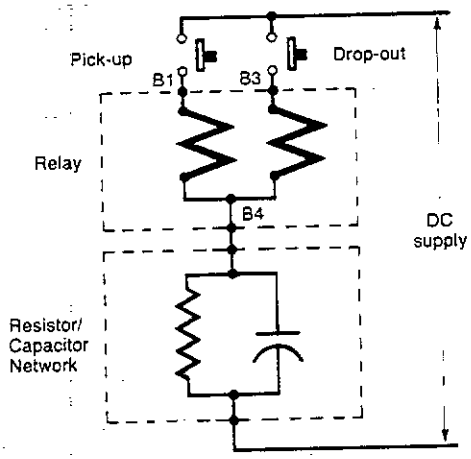


Figure 2

RC-Values

Nominal	R		C	
Voltage DC	ohms ± 5%	watts	μf	vdc
12	62	2	5000	15
24	240	2	2000	50
48	1000	2	500	100
125	6200	2	150	150

Series TR Time Delay

Features

The Series TR on delay timer combines the compactness of the AGASTAT® Series GP Relay with the traditional accuracy and dependability of AGASTAT® Solid State Timing Relays.

Design/Construction

Coupled with this advanced electromechanical design is a field-proven solid-state timing network, an adaptation of the circuit used in the AGASTAT® premium grade SSC Timer.

This unique circuit also obviates the need for supplementary temperature-compensation components, affording unusual stability over a realistically broad operating temperature range. It also provides transient protection and protection against premature switching of the output contacts due to power interruption during timing.

SPECIFICATIONS
(Series GP, ML, TR)

Operating Mode
Power/Logic Relay — Series GP
Magnetic Latch — Series ML
Time Delay (Delay on energization) — Series TR

Time Adjustment (Series TR only)
Internal Fixed
Internal Potentiometer

Timing Ranges (Series TR only)

.15 to 3 Sec.	4 to 120 Sec.
.55 to 15 Sec.	10 to 300 Sec.
1 to 30 Sec.	2 to 60 Min.
2 to 60 Sec.	1 to 30 Min.

Accuracy (Series TR only)
Repeat Accuracy ±2% at fixed temperature, voltage and off-time.
Overall Accuracy ±5% over combined rated extremes of temperature and voltage.

Reset Time (Series TR only)
.075 second

Operate Time (Series GP only)
Operate time at 20°C (68°F) and rated voltage:
Between energizing and opening of normally closed contacts/less than 18 milliseconds on AC and less than 15 milliseconds on DC.
Between energizing and closing of normally open contacts/less than 35 milliseconds on AC and less than 30 milliseconds on DC.
Between de-energizing and opening of normally open contacts/less than 70 milliseconds on AC and less than 8 milliseconds on DC.
Between de-energizing and closing of normally closed contacts/less than 85 milliseconds on AC and less than 25 milliseconds on DC.

Operate Time (Series ML only)

Time elapsed between energization and opening of closed contacts.
12 milliseconds max. when latching pulse duration is:
AC 80 milliseconds
DC 25 milliseconds
6 milliseconds max. when unlatching pulse duration is:
AC 40 milliseconds
DC 20 milliseconds

Transient Protection (Series TR only)

A 1500 volt transient of less than 100 microseconds, or 1000 volts of less than 1 millisecond will not affect timing accuracy.

Contacts

Number of contacts
4 single pole double throw

Nominal rating
10A @ 120 volts AC

(Series GP & TR)
Typical pressure between moving contact and
Normally closed contact:
30 grams
Normally open contact:
100 grams

(Series ML)
Typical pressure between moving contact and
Normally closed contact:
Min. 100 grams
Normally open contact:
Min. 100 grams

(Series GP power relay)
Contact resistance measured at terminals
250 milliohms @ 125V DC,
1 amp

Life

Load life - see chart page 17.
Mechanical life - 100 million operations.
(Series GP & TR)
10 million mechanical operations (Series ML)

Coil Operating Voltage

Series GP

	DC					50/60 Hz			
Nominal Coil Voltage	12	24	48	125	250	24	48	120	220
Minimum Pick-up voltage at 40°C	9.5	19	38	100	200	20	41	102	188
Maximum voltage for continuous use	13.5	27	53	143	275	27	53	137	245

For 380 volts AC
Use 6800 ohms 4 watt resistor in series with 220 volts AC relay

For 440 volts AC
Use 8200 ohms 6 watt resistor in series with 220 volts AC relay.

Coil drop-out voltages are between 10% and 40% of the rated operating voltages for both DC and AC (For example: in a 120V unit drop-out will occur between 12 and 48 volts.) DC relays will function with unfiltered DC from a full-wave bridge rectifier.

Series ML (± 15%)

Nominal Voltage		Pickup		Drop out	
		DC ohms	Current (mA)	DC ohms	Current (mA)
Code Letter	AC				
G	24	15	625	83	250
H	48	86	312	286	125
I	120	370	125	1470	50
J	220	1500	68	5800	28

		Pickup				Drop out			
		DC ohms		Current (mA)		DC ohms		Current (mA)	
	DC	with R-C	without R-C	with R-C	without R-C	with R-C	without R-C	with R-C	without R-C
A	12	71	9	169	1333	72	10	168	1200
B	24	275	35	87	686	285	44.5	84	540
C	48	1132	132	42	364	1178	178	41	270
D	125	7220	1020	18.2	122	7130	930	17.5	134

Series TR (–15% – 10%)

DC	AC
24 VDC	120V 50-60 Hz
125 VDC	

Power Consumption

SERIES GP

Typical power consumption at rated voltage is:
6VA for AC coils
6 Watts for DC coils.
There is no surge current during operation.

SERIES ML

AC: 7.5W for pick-up
3W for drop-out

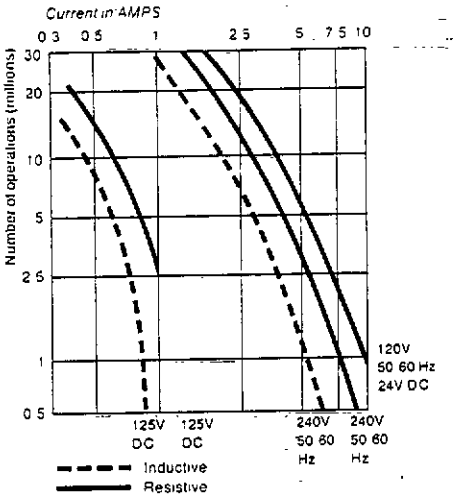
DC: without R/C network
15W for pick-up
13W for drop-out

DC: with R/C network
2W for pick-up
2W for drop-out

SERIES TR

Typical power consumption at rated voltage is:
6VA for AC coils
6 Watts for DC coils

Load Life Characteristics



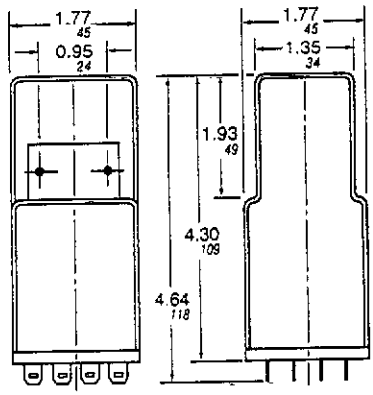
Insulation Resistance
Between all non-connected terminals as well as between non-connected terminals and the relay yoke: 1000 megohms at 500 volts DC.

Dielectric (Series GP & ML)
2000 volts RMS 60 Hz between points specified above.

Dielectric (Series TR)
2000 VAC between terminals and case and between mutually-isolated contacts.

Operating Temperature Range
0°C to 60°C (32°F to 140°F) (Series GP & ML)
0°C to 50°C (32°F to 122°F) (Series TR)

Dimensions inches / mm



Series GP Power Relay

Voltage	Current (Amps)	Power Factor or Time Constant	Number of Electrical Operations	Remarks
540V AC	3	COS φ = 0.5	15 000	2 contacts in series
380V AC	15	Resistive	10 000	2 contacts in parallel
380V AC	10	Resistive	200 000	
380V AC	3 x 3.3	COS φ = 0.8	200 000	3hp motor
220V AC	20	Resistive	20 000	2 contacts in parallel
220V AC	15	COS φ = 0.5	20 000	2 contacts in parallel
220V AC	10	Resistive	400 000	
220V AC	3 x 6	COS φ = 0.8	200 000	3hp motor
220V AC	5		1 500 000	Filament lamps
220V AC	5	Resistive	3 000 000	
220V AC	2.5	COS φ = 0.25	2 000 000	
220V AC	2	Resistive	15 000 000	
220V AC	1.25	Resistive	30 000 000	
120V DC	1.5	Resistive	20 000 000	with blow-out device
48V DC	10	Resistive	1 000 000	
48V DC	1.5	5 ms	18 000 000	

Shock (Series GP only)
The relay, when kept energized by means of one of its own contact sets, will withstand 40g shock load when operating on DC, and 150g shock load on AC.

Vibration (Series GP only)
Single axis fragility curve data are available on request at frequencies from 5 Hz to 33 Hz.

Mounting/Terminals
16 flat base pins.
Screw terminal sockets are available.

Agency Approvals
UL File No. E15631
CSA File No. LR29186
(Series GP & ML only)

Weight
Relay complete with cover:
10.9 oz. Net (Series GP & ML)
11 oz. Net (Series TR)

ORDERING INFORMATION
Catalog Number Code/Series GP and ML

GP — **A** — **N**

Model Series
AGASTAT®
Series GP – Power or Logic Relay
AGASTAT®
Series ML – Magnetic Latch Relay

Coil Voltage
A – 12 VDC
B – 24 VDC
C – 48 VDC
D – 125 VDC
F – 250 VDC*
G – 24 V 60 Hz
H – 48 V 60 Hz
I – 120 V 60 Hz
J – 220 V 60 Hz

Options
N – Magnetic Blow-out Device
Q – Light to indicate coil energization (with 120VAC, 125VDC, 220VAC, 250VDC voltages only)
R – internal diode to suppress coil deenergization transient*. (When used on DC unit, relay release time increases to the same value as the AC equivalent.)

* GP Series Only

See pages 19 and 20 for sockets and other accessories.

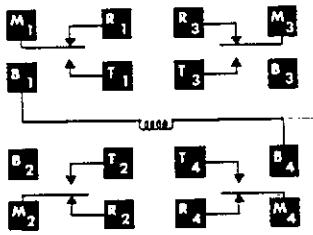
Wiring and Connections

SERIES GP

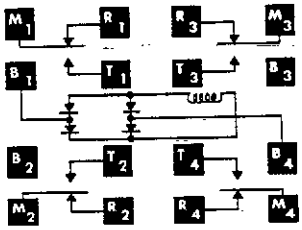
The 16 flat base pins are arranged in four symmetrical rows of four pins; the pitch in both directions being .394". Connection may be made to the relay by soldering. Sockets are available with screw terminals.

The internal wiring of the relay is also symmetrical as shown in the adjacent figure, allowing the relay to be inserted into the socket in either of two positions. Terminals B2 and B3 are provided as extra connections for special applications.

DC



A.C.

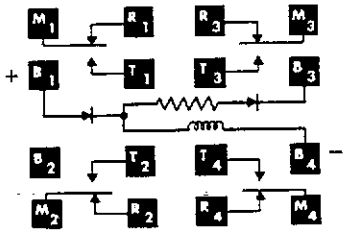


SERIES ML

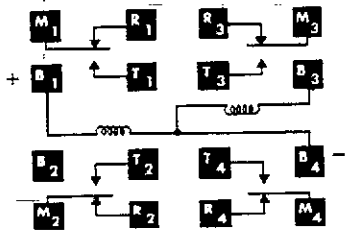
The ML Relay has three terminals for the windings: latching winding between terminals B1 and B4, unlatching winding between terminals B3 and B4. On DC supply terminal B4 is negative. The resistor/capacitor network connects in series with terminal B4.

The ML Relay is not symmetrical due to its three coil connections. When the relay is to be used with plug-in sockets, orienting pins (Cat. No. CR0188) should be used.

AC

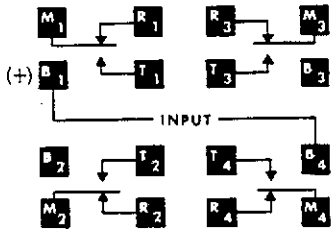


D.C.



SERIES TR

AC and DC



WARRANTY

This product is warranted against mechanical and electrical defects for a period of one year from date of shipment from factory if it has been installed and used in accordance with factory recommendations. Any field repairs or modifications to the original unit will void this warranty. Amerace Corporation's liability is limited to replacement of parts proved defective in workmanship or materials. (W-AB1)

Seismic and Radiation-Tested Models

GP, ML and TR models are available which have been tested to IEEE 323-1974 and IEEE 344-1975. Consult factory for details and special ordering information.

ORDERING INFORMATION

Catalog Number Code/TR series

TR **1** **4** **B** **1** **A** **N**

Model Series
AGASTAT®
Series TR - Time Delay Relay

Operation
1 – On-Delay

Output
4 – 4 PDT

Operating Voltage
B – 24 VDC
D – 125 VDC
I – 120V 50 - 60 Hz

Timing Adjustment
1 – Internal Fixed
3 – Internal Potentiometer

Timing Range
A – .15 to 3 Sec.
B – .55 to 15 Sec.
C – 1 to 30 Sec.
D – 2 to 60 Sec.
E – 4 to 120 Sec.
G – 10 to 300 Sec.
I – 2 to 60 Min.
N – 1 to 30 Min.

Options
N – Magnetic Blow-out Device

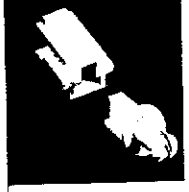
See pages 20 and 21 for sockets and other accessories.

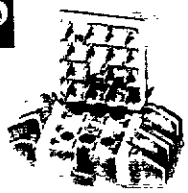
Accessories

Plug-in orienting pins (1 Set)

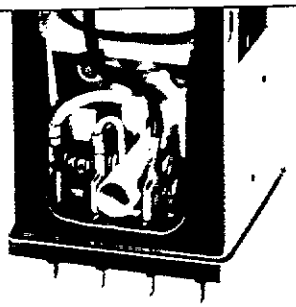
Cat. No. CR0188

For sockets:
CR0001
CR0002
CR0067





Magnetic blow out device
(for Series GP, ML & TR)



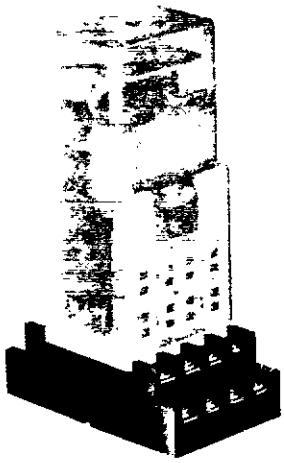
Cat. No. CR0190

Extracting handle

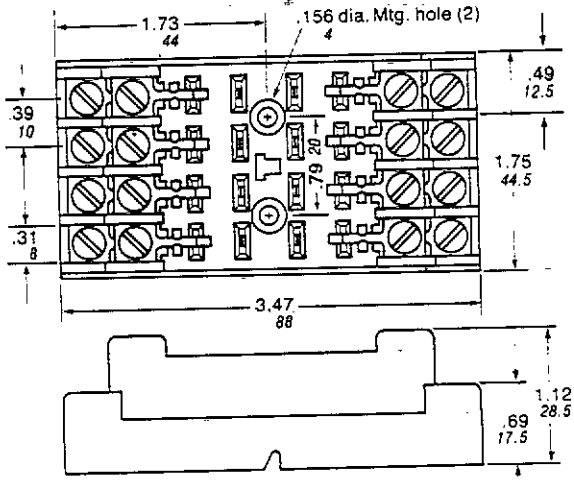
Cat. No. CR0179

Front connected sockets

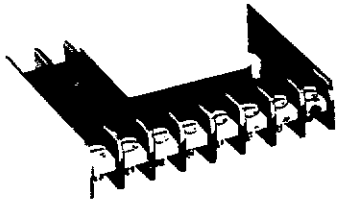
With captive
clamp terminals
Cat. No. CR0001

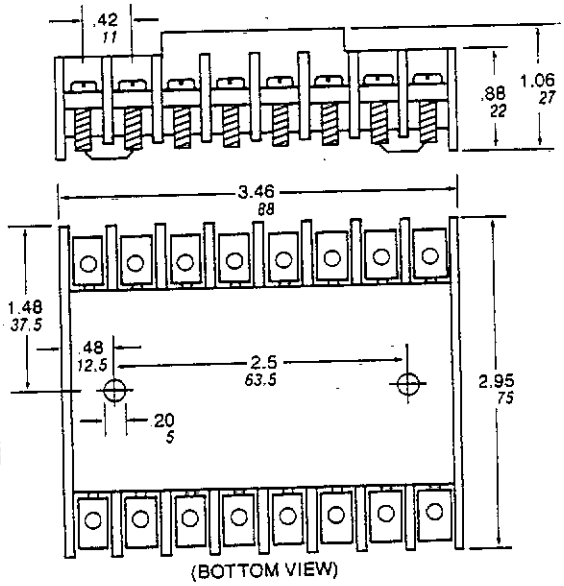


With (#6) binding
head screws
Cat. No. CR0002



With (#6) screw
terminals
Cat. No. CR0095





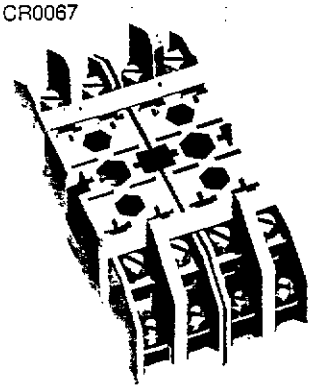
(BOTTOM VIEW)

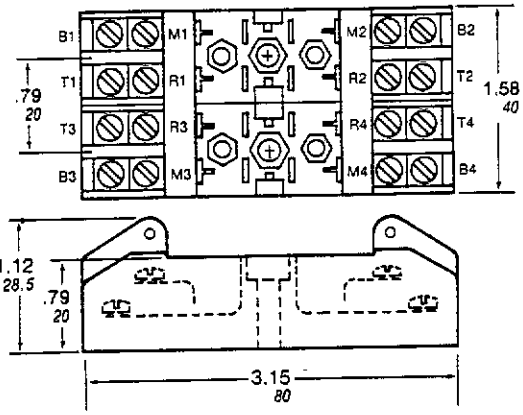
21

Accessories

Front connected sockets

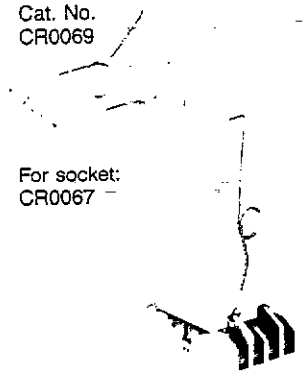
With (#6) screw terminals
Cat. No. CR0067





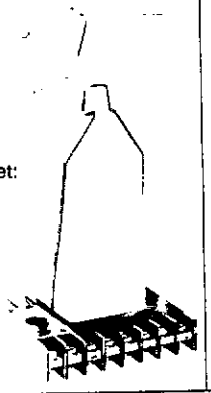
Locking springs

Cat. No.
CR0069



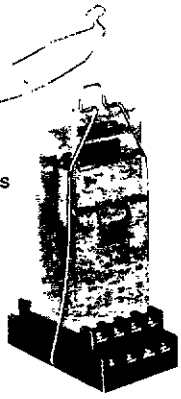
For socket:
CR0067

Cat. No.
CR0070



For socket:
CR0095

Cat. No.
CR0111



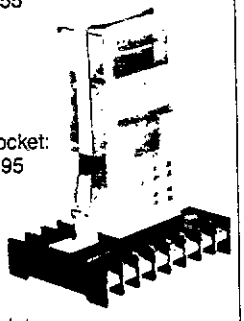
For sockets
CR0001
CR0002

Heavy duty locking straps

*Cat. No.
CR0133

For sockets:
CR0001
CR0002

*Cat. No.
CR0155



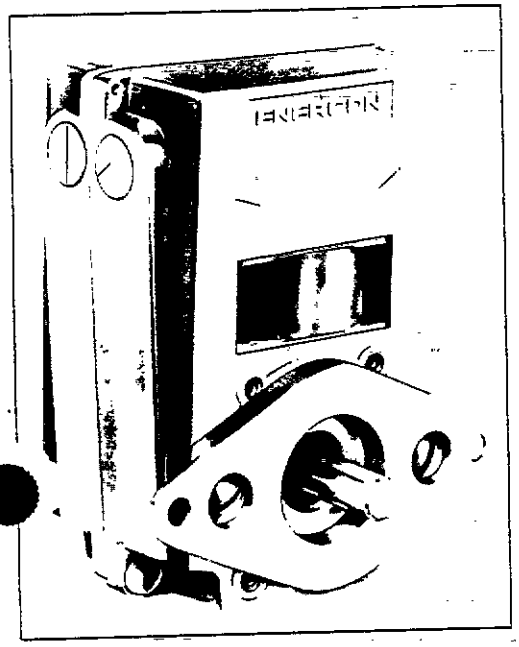
For socket:
CR0095

*Catalog number includes strap, strap plate and necessary brackets.

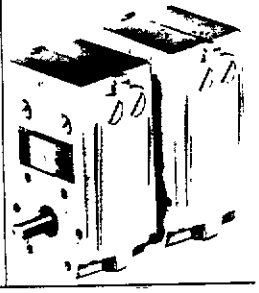
series
45

Rotary Drives

ENERCON® Series 45 Rotary Drives require no adjustment or maintenance, are permanently lubricated, protected against reverse rotation, produce no radio interference, and they are high impedance protected too. They are enclosed in rugged cases and mount in any position. With quiet, counterbalanced operation they accommodate up to 15 lbs axial thrust, and up to 5 lbs radial thrust loads on the shaft at ½ inch from the face.



SPECIFICATIONS

	Model 45* Single Frame Unidirectional Drive	Model 45 Tandem Frame Unidirectional Drive	Model 45 Tandem Frame Bidirectional Drive
			
Voltage Rating	120 Volts 60 Hertz		
No Load Speed Settings	6 to 25 RPM set at time of manufacture		3 to 12 RPM Set at time of manufacture
Duty Cycle	Continuous		
Typical Starting Torque	4-1/2 in. lb.	10 in. lb.	4-1/2 in. lb.
Nom. No Load/Load/ Stall Amps	0.2	0.4	0.2
Max. No Load/Load/ Stall Watts	8.0	15.0	8.0
Coil Insulation	Class H		
Max. No Load/Load/Stall Temperature Rise	110°C (230°F)		
Speed Control	Vary voltage or frequency		
Ambient Temp. Range	–29°C to 65°C (–20°F to 150°F)		
Weight	20 oz.	40 oz.	44 oz.

*Shown with optional mounting bracket.

Design Features

Accurate, reliable, low cost rotary positioning with a unique combination of operating features:

- Instant start, instant stop with full torque, no clutch or brake, no override
- Direct, slow speed rotary motion without gears
- Low current, low wattage, low temperature rise at no load, partial load or continuous stall
- Quiet, counterbalanced operation
- No radio interference
- Permanent lubrication
- Mounting in any position
- Enclosed cases
- No adjustment or maintenance required
- High impedance protection, U.L. recognized models available
- Protection against reverse rotation

Series 45
Gear Drive

(Phantom View of Gear Arrangement)

The use of a gear box will extend the speed or torque range of the basic Series 45.

The table represents the general values of No Load RPM from available gear ratios using one-step add-on gear box with resultant starting torques.

All gear drive models weigh 24 ounces.

Max. No Load RPM	Gear Ratio	Starting Torque (in.lbs.)
1	6:1	14
2	6:1	20
4	4:1	16
6	4:1	16
8	2:1	10
12	2:1	9
12-25 (Use Standard Model 45)		4-1/2
30	1:2	3
50	1:2	2

At any condition of load or speed the amps and watts rating will be the same as for the Basic Series 45.

Agency Approval

All Enercon 120VAC models.

UL File No. E37657 Guide No. XEIT2

Operating Characteristics

The operating characteristics of the Series 45 Drive are similar to other electrical and electro-mechanical devices but are sufficiently different that a good understanding of the capabilities of the drive will develop opportunities for new and different design applications. The following general characteristics will provide much of this information. If more detailed assistance is needed, contact Amerace.

Speed Rating

Speed Rating at no load is commonly used to state RPM of drive. This operating speed is determined by selections of springs and oscillator gaps at time of assembly. The basic Series 45 can be set at the factory to operate at a no load speed from 6 RPM minimum to 25 RPM maximum. A suitable no load speed between these values is chosen for each application and this value of RPM is used in describing speed rating of any particular unit. This value is also used in production testing. Adjustments are sealed at time of manufacture and any attempts to adjust speed or operation will void warranty.

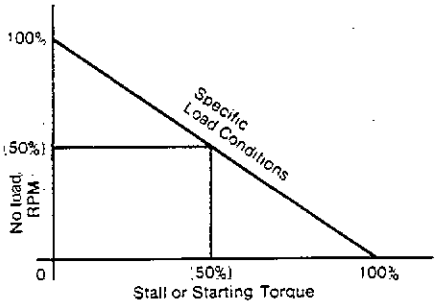
Torque

There are usually three torque values associated with each application. These are stall torque, starting torque and torque at load RPM.

Stall Torque is the ability to hold without rotational movement.

Starting Torque is the ability to begin angular motion under load. Usually stall and starting torque are considered to be the same value and the terms are used interchangeably.

Torque at Load RPM is the rotational force necessary to drive a given load at some speed. The Series 45 Drive is a variable torque device, that is: as the load is increased, the more torque the motor will apply, with resultant reduction in RPM. The speed-torque curve is represented as follows:



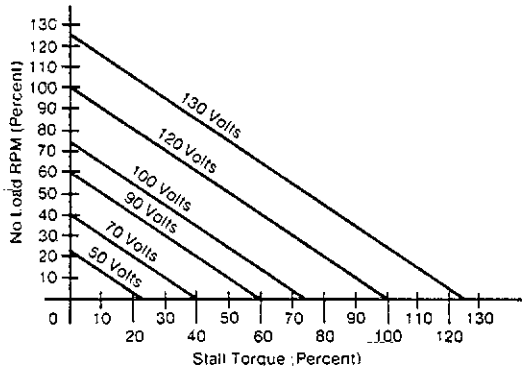
When a motor is manufactured for a specific no load speed, the motor has a specific starting torque output. See the table on page 25 for typical torque values, or contact factory for more detailed information.

Example

If this curve represented a drive set for 20 RPM no load speed with 4 in. lb. starting torque, (100%) the unit would be driving a 2 in. lb. load (50%) at 10 RPM (50%). Similar curves can be drawn for any values of no load speed and starting torque ratings.

Voltage

Drives are nominally rated at 120V for stated no load speeds and starting torques. Special coils can be provided for any voltage from 12V to 240V. Continuously rated units requiring UL recognition are checked for coil temperature at 120V. Speed can be varied by changing voltage. Variation from rated voltage would result in a family of speed-torque curves as follows:



Frequency

Standard units are nominally rated for operation at 60 hertz. Special units can be provided suitably adjusted for operation at any nominal frequency between 50 and 100 hertz. Since the strokes per second of the oscillators (and resulting RPM) are dependent upon frequency, the speed can be varied from a minimum of 6 RPM at 50 or 60 hertz to a maximum of 50 RPM at 100 hertz.

ORDERING INFORMATION

Catalog Number Code

45	10	A	F	09	N

Model Series
ENERCON® Series 45
Rotary Drive

Operating Voltage
A – 120 V 60 Hz
B – 240 V 60 Hz
E – 24 V 60 Hz
F – 120 V 50 Hz
G – 240 V 50 Hz
L – 24 V 50 Hz

Duty Cycle
F – Intermittent Duty (available with A or B operating Voltage only)
C – Continuous Duty

Options
N – None

Accessories
Description
Mounting Bracket for frame types 10 & 11 only
Catalog Number
450001

Frame Type
10 – Single Frame, Clockwise
11 – Single Frame, Counter-Clockwise
20 – Tandem Frame, Clockwise
21 – Tandem Frame, Counter-Clockwise
22 – Tandem Frame, Bi-Directional
30 – Gear Drive 1:2 Ratio, Counter-Clockwise
31 – Gear Drive 1:2 Ratio, Clockwise
32 – Gear Drive 2:1 Ratio, Clockwise
33 – Gear Drive 2:1 Ratio, Counter-Clockwise
34 – Gear Drive 4:1 Ratio, Clockwise
35 – Gear Drive 4:1 Ratio, Counter-Clockwise
36 – Gear Drive 6:1 Ratio, Clockwise
37 – Gear Drive 6:1 Ratio, Counter-Clockwise

24

No Load Motor Speed
01 – 1 RPM
02 – 2 RPM
ETC., through
50 – 50 RPM

Note: The following list indicates which speeds are available with particular Motor Frame types.

Motor frame Types	Available Speeds
10 & 11	6 to 25 RPM ± 15%
20 & 21	10 to 25 RPM ± 15%
22	3 to 12 RPM ± 15%
30 & 31	30 to 50 RPM ± 15%
32 & 33	3 to 12 RPM ± 15%
34 & 35	2 to 6 RPM ± 15%
36 & 37	1 to 4 RPM ± 15%

WARRANTY

This product is warranted against mechanical and electrical defects for a period of one year from date of shipment from factory if it has been installed and used in accordance with factory recommendations. Any field repairs or modifications to the original unit will void this warranty. Amerace Corporation's liability is limited to replacement of parts proved defective in workmanship or materials. (W-AB1)

Related AMERACE devices for science and industry

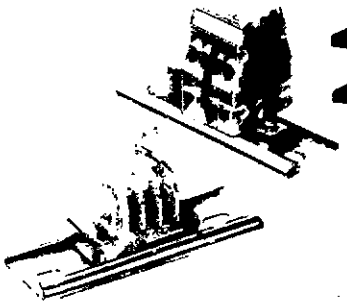
AMERACE has been manufacturing control devices and accessories for over 50 years to meet demanding industrial and scientific application needs. AMERACE products are generally acknowledged to be the most reliable, ingeniously designed, and meticulously manufactured products on the market today.

BUCHANAN® Terminal Blocks ...select from over 3,000 combinations

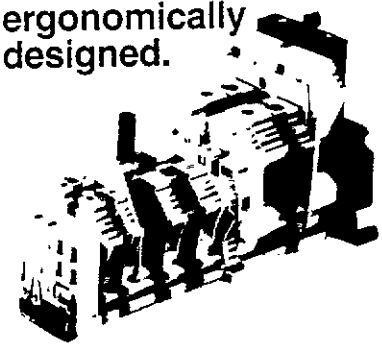
No other sectional terminal blocks give you as much freedom to design in your limited space. BUCHANAN® blocks give you all the variety you need: sizes from miniature to ultra heavy duty in phenolic, nylon or polypropylene — 300V or 600V — #30 AWG through 600 MCM wire range. Plus a variety of contact spacings and marking and mounting methods and an assortment of accessories. Already competitively priced, the feature-filled BUCHANAN line lets you cut costs even more by cutting installation time and inventory.

■ HIGH DENSITY TERMINAL BLOCKS
Single tier — .250" circuit spacing; 48 circuits per foot. Double tier — .235" circuit spacing; 102 circuits per foot.

Request Catalog G-110.



BUCHANAN® -CIAMA Terminal Blocks ...Metric, IEC-Type, ergonomically designed.



Only BUCHANAN ⓒ terminal blocks give you IEC specs and performance and time-tested BUCHANAN value.

Some call these blocks "ergonomically designed." We call them easy to use — and versatile. And easily available in 7 series from 5mm to 54mm in the widest range of IEC block types, options, and accessories.

Truly the top line for your bottom line, these blocks combine low cost, easy handling, easy installation, easy marking and trouble-free performance to give you the BUCHANAN lowest-installed-cost advantage.

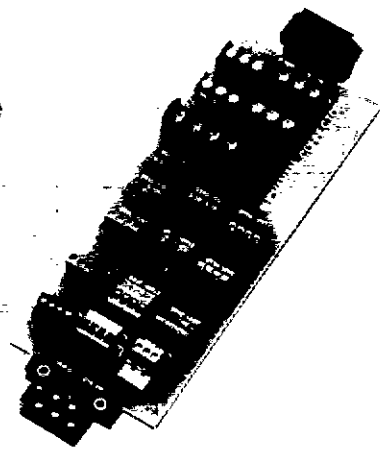
- Broad line — including caution blocks — covers wide variety of applications
- UL94V-0 flammability rating standard for tough, polyamide housings
- Universal mounting — blocks snap in and out of all four types of mounting rails
- Easy, convenient, quick computer-generated marking system

Request Catalog BC-110.

BUCHANAN® Electronic Connectors ...maximum performance at lowest applied cost.

When it comes to connecting discrete wires to electronic circuitry on PC boards, BUCHANAN gives you a complete family to choose from. At lowest applied cost, you get top-of-the-line quality and the industry's widest range of electronic connecters. No special tools or skills for field wiring — that means minimal installation and service time. Wide choice of sizes, shapes, and connection options. Designed for milliamps to 50 amp loads.

Request Catalogs I/O-100 and I/O-200.

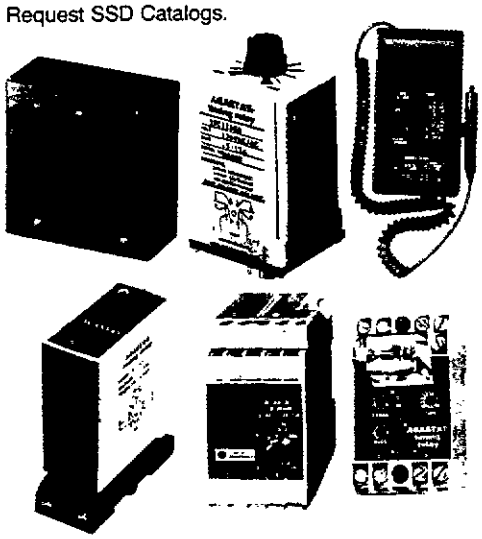


AGASTAT® Solid State Timing and Protective Relays ...most advanced, diversified, and complete line.

The reliability, performance, and versatility of AGASTAT® Timing and Protective Relays are acknowledged throughout the industrial-control and electronic-systems fields.

This product line has virtually every timing and protective relay you will ever need, in readily available, shelf-stocked standard designs . . . at highly competitive prices.

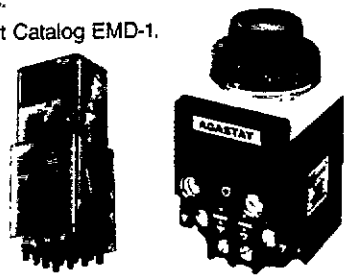
Request SSD Catalogs.



AGASTAT® Electromechanical Relays ...the premier line in the industry.

The most rugged, reliable timing line is designed for harsh environments and severe conditions where timing is a critical function. Provides a degree of accuracy and versatility matched only by sophisticated electronic controls.

Request Catalog EMD-1.



For complete engineering specifications and application information on any of these Amerace products, call or write:
Amerace Electronic Components
7474 Utilities Road, Punta Gorda, FL 33982
Tel. (813) 575-8400 • FAX. (813) 575-8484

Amerace Corporation cannot recommend the use of its products in the containment areas of nuclear power generating stations.

© 199 erace Corporation

AMERACE
ELECTRONIC COMPONENTS
7474 UTILITIES ROAD, PUNTA GORDA, FL. 33982
TEL. (813) 575-8400 • FAX. (813) 575-8484

EMD-1
July 1994
Supersedes 6/93

Printed in U.S.A.