

HANDBOOK OF INSTRUCTIONS

AGASTAT[®]

time / delay / relays



Industry's Finest Time Delay Relay

AGA
DIVISION

ELASTIC STOP NUT CORPORATION OF AMERICA
ELIZABETH 3, NEW JERSEY

INTRODUCTION

1. GENERAL.

These instructions cover the installation, operation and maintenance of the AGASTAT, a solenoid operated, pneumatically timed, delay relay, manufactured by AGA Division, Elastic Stop Nut Corporation, Elizabeth 3, New Jersey.

2. USE.

The Agastat is a solenoid operated, pneumatically timed instrument for introducing a predetermined time delay into electrical circuits.

3. TYPE DESIGNATION.

The type designation on an Agastat consists of two letters and two numbers, and has the following significance: —

- a. The letters indicate the current; ND and NF direct current; NE alternating current.
- b. The first of the two numbers indicates the operating sequence; 1, that the time delay starts after the coil

is energized and, 2, that the time delay starts after the coil is de-energized.

c. The second of the two numbers indicates the switching arrangement; 1, double break contacts with one set normally open and one set normally closed (alternately single pole, double throw) and, 2, double pole, double throw, single break.

d. A letter after the second number indicates a special type of mounting.

4. SHIPPING DATA.

The Agastat is fully assembled when shipped, cellophane wrapped, and packed in a reinforced fibre box 3 x 3 x 5 1/8 inches. Name plate data are shown on the Agastat and on the outside of the box. The boxed NE and NF Agastat weigh approximately 2 pounds; the ND Agastat weighs 2 1/2 pounds boxed.

DESCRIPTION

GENERAL.

a. The Agastat is made in two types for direct current operation, and two corresponding types for alternating current operation.

In addition, the direct current Agastats are made for momentary energization as well as continuous energization.

The two types are:

Type 1 — The time delay starts when the coil is energized.

Type 2 — The time delay starts when the coil is de-energized.

b. Each of the six models may, in turn, be equipped with either of two switching arrangements, thus making a total of twelve basic models.

c. The overall dimensions of an Agastat are 2 1/2 x 2 1/2 x 4 3/4 inches. (DC continuous energized overall dimensions 2 1/2 x 2 1/2 x 5 1/4 inches). It has four #8-32 mounting holes, tapped in the back, spaced 1 3/4 x 1 1/2 inches.

A mounting bracket is available for front of panel mounting.

The 12 basic Agastat models are:—

MODEL NO.	TYPE	SWITCH ARRANGEMENT	CURRENT
NE-11	1	SPDTDB	AC Continuous Duty
NE-12	1	DPDTSB	AC Continuous Duty
NE-21	2	SPDTDB	AC Continuous Duty
NE-22	2	DPDTSB	AC Continuous Duty
ND-11	1	SPDTDB	DC Continuous Duty
ND-12	1	DPDTSB	DC Continuous Duty
ND-21	2	SPDTDB	DC Continuous Duty
ND-22	2	DPDTSB	DC Continuous Duty
NF-11	1	SPDTDB	DC Intermittent Duty
NF-12	1	DPDTSB	DC Intermittent Duty
NF-21	2	SPDTDB	DC Intermittent Duty
NF-22	2	DPDTSB	DC Intermittent Duty

DETAILED.

The Agastat consists of a name plate, a self-contained timing head assembly, coil assembly, core and spindle assembly, and terminal block and switch assembly.

a. NAME PLATE. — The name plate is mounted on the face of the instrument and is marked to show type, timing, coil voltage and serial number.

b. TIMING HEAD ASSEMBLY. — The timing head assembly is self-contained. Its principal components are an adjusting screw, a housing, a diaphragm, a diaphragm spring, a valve and a spring.

(1) The adjusting screw is made of stainless steel and is tapered.

(2) On the outside of the top of the pressed steel housing an Esna self-locking nut holds the adjusting screw.

(3) The diaphragm is installed across a concavity in the pressed metal housing to form an air chamber above the diaphragm.

(a) The inlet to this air chamber is through a flat-seated valve in the diaphragm.

(b) The outlet from this air chamber is through an orifice in the housing.

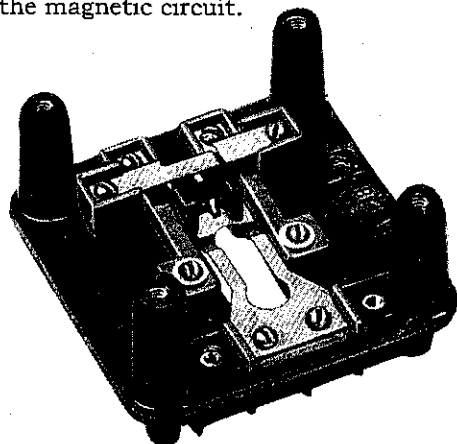
A neoprene cap encases the housing. It is externally marked on top with INCREASE and DECREASE arrows to show direction of rotation of the screw to adjust the timing.

c. COIL ASSEMBLY. — The coil assembly consists of a coil, coil box and coil box cover.

(1) The following is a tabulation of Agastat standard coils.

CURRENT	CYCLE	VOLTAGE
Direct	—	6 12 24 48 115 230
Alternating	60	6 12 24 48 110 220 440

(2) The coil box and coil box cover totally enclose the coil, and are made of steel to form a part of the magnetic circuit.



Agastat Terminal Block (upperside) showing Switch Assembly

d. CORE AND SPINDLE ASSEMBLY.

The assembly includes a magnetic core, operating springs, a spindle and collar.

(1) The upper end of the spindle is attached to the timing head diaphragm coupling.

(2) The spindle passes through the magnetic core.

(a) In an Agastat which operates after the coil is energized, the spindle moves freely in the core.

(b) In an Agastat which operates after the coil is de-energized, the spindle is permanently affixed to the core.

(3) The collar at the lower end of the spindle engages the switch.

e. TERMINAL BLOCK AND SWITCH ASSEMBLY. — The principal components of the terminal block and switch assembly are a base, a switch assembly and contacts.

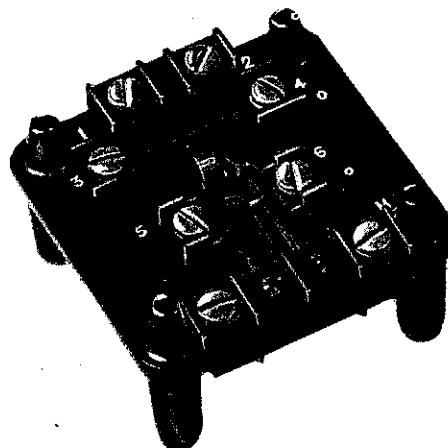
(1) The base is phenolic and is molded with insulating barriers and brass inserts tapped to receive #6-32 terminal screws. It supports the switch assembly, and holds the terminals.

(2) The switch assembly consists of a lever, (yoke), springs and contacts assembled to the terminal block. Switch springs are made of beryllium copper.

(3) Contacts are made of fine silver and have the following rated carrying capacity:

	SINGLE BREAK	DOUBLE BREAK
0- 32 Volts, DC	5 amperes	10 amperes
110-220 Volts, DC	.1 ampere	.2 amperes
115 Volts, 60 cycle	5 amperes	15 amperes
230 Volts, 60 cycle	3.3 amperes	10 amperes
440-550 Volts, 60 cycle	1.6 amperes	5 amperes

Contacts 1, 2, 3 and 4 are of rigid type which is standard. Flexible contacts can be furnished when required, at a small extra cost.



Agastat Terminal Block (underside) showing Terminals

OPERATION

PRINCIPLES OF OPERATION.

(a) TIMING.

(1) The time-delay is accomplished by restricting the flow of air through the needle valve orifice in the timing head.

(2) Air is drawn into the air chamber of the timing head through the inlet valve in the diaphragm and forced out of the chamber through the needle valve orifice. The adjusting screw regulates the rate of flow.

(b) MAGNETIC IMPULSION AND SWITCHING — The coil, together with the core and spindle assembly, functions as a solenoid. It is this solenoid which activates the two types of Agastat.

(1) The Type 1 Agastat (time delay starts when coil is energized) functions as follows:

When this Agastat is in the de-energized state the weight of the core plus the force of the recycling spring holds the diaphragm spring in the timing head in the cocked position, making it ready for action.

Thus, when the control circuit is energized solenoid action takes place, seating the core and permitting the diaphragm spring to act. It starts to compress, forcing air out through the timing orifice and at the same time lifting the spindle, which moves freely in the core.

At the expiration of the predetermined delay interval, the collar on the lower end of the spindle trips the switch, breaking one set of contacts and making another.

The switch remains in this transferred position until the control circuit is de-energized, at which time the weight of the core plus the force of the recycling spring causes instantaneous recycling, restoring contacts to their original position.

(2) The Type 2 Agastat (time delay starts when coil is de-energized) functions as follows:

When this Agastat is in the de-energized state the diaphragm spring is compressed and both the core and spindle are in the "up" position.

Thus when the control circuit is energized, solenoid action takes place, seating the core. However, since in this Agastat the core is permanently affixed to the spindle, and the spindle likewise is fastened in the head, when this seating action takes place, the diaphragm spring in the head is cocked and the switch tripped simultaneously, breaking one set of contacts and making another.

The switch remains in this transferred position as long as the control circuit is energized. When the control circuit is de-energized, the diaphragm spring is permitted to act, forcing air out through the timing orifice, lifting the core and spindle. At the expiration of the predetermined delay interval the collar on the lower end of the spindle trips the switch, restoring the contacts to their original position.

OPERATING INSTRUCTIONS.

- a. Check voltage of control circuit at terminals MM
- b. Make or break circuit.
- c. Check operation and timing.
- d. Timing adjustment should be gradual.

NOTE

We do not recommend the replacement of Agastat parts in the field, with the possible exception of the Terminal Block and Switch Assembly as described on page 7 See Warranty.

PREPARATION FOR USE

GENERAL.

a. The Agastat is furnished so that it may be front or back mounted directly to the panel. Special mounting plates are also available if required.

b. The Agastat is designed for vertical mounting. However, it can be furnished to operate in any position.

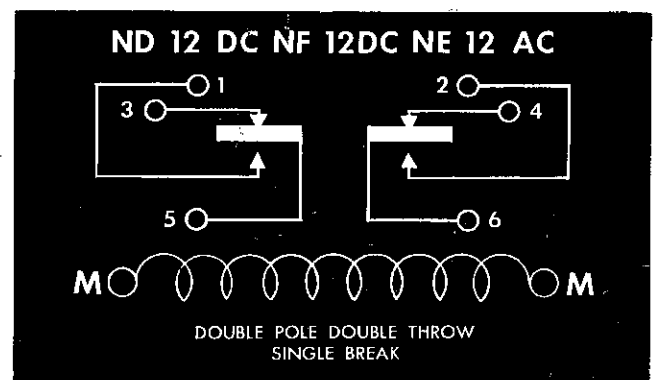
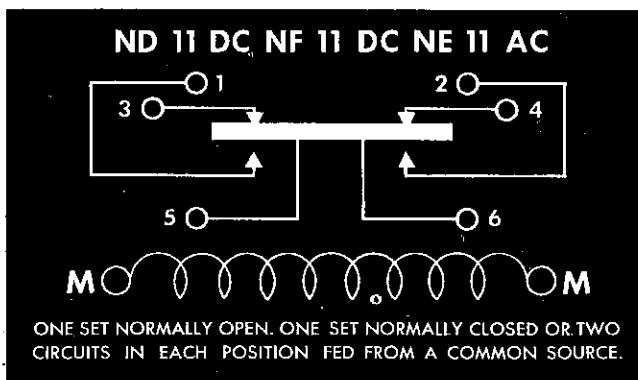
INSTALLATION.

a. Mount the Agastat in an upright position, using the four mounting holes tapped in back of the coil box or mounting plate.

b. Connect into the circuit.

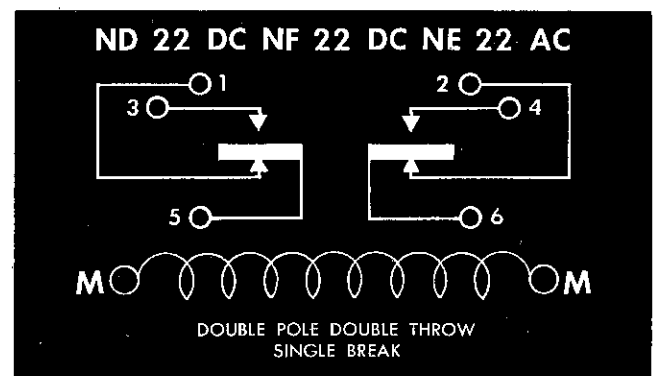
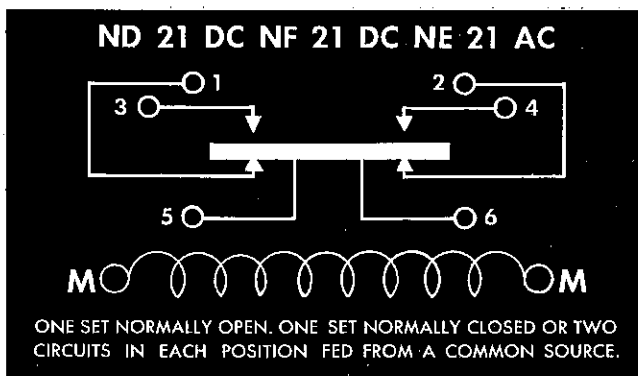
CONTACT ARRANGEMENT, TYPE 1

Time delay starts when coil is energized — control circuit closed



CONTACT ARRANGEMENT, TYPE 2

Time delay starts when coil is de-energized — control circuit opened



SERVICE INSPECTION, MAINTENANCE AND LUBRICATION

GENERAL.

If replacement of parts is attempted in the field the procedure described should be followed.

SERVICE TOOLS REQUIRED.

There are no special service tools required. Due to the restricted area in which adjustments have to be made, it is desirable to have the following tools available in a thickness less than $\frac{1}{8}$ -inch: open-end, straight wrenches in $\frac{15}{64}$, $\frac{5}{16}$ and $\frac{1}{4}$ inch sizes; 6-inch, long-nose gas pliers; and, a screw driver.

SERVICE INSPECTION.

The only service inspection required is that customarily given to all electrical apparatus.

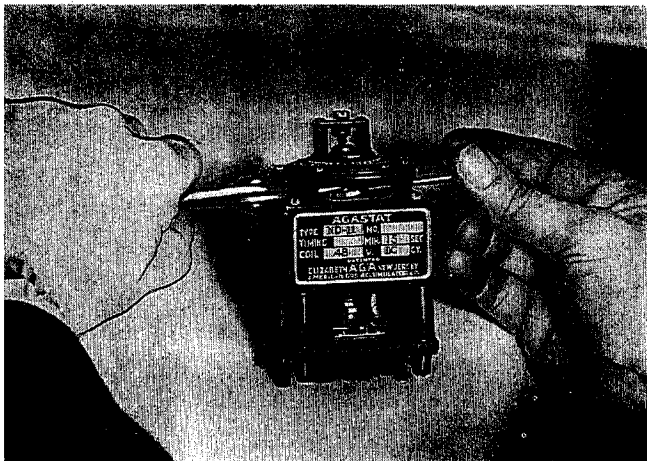
MAINTENANCE.

a. Timing adjustment. — To increase the time delay turn the adjusting screw as marked by the arrow **INCREASE**. To decrease the time delay turn the screw as marked by the arrow **DECREASE**.

b. Replacement of parts.

(1) TIMING HEAD ASSEMBLY.

(a) Disassembly.



Timing Head Coupling held Securely with Wrench or Pliers

1. Remove cap.
2. Hold timing head coupling with wrench or pliers: Loosen lock nut.
3. Remove four holding screws.



Timing Head Coupling and Lock Nut

4. Turn timing head assembly counter-clockwise until disengaged.

(b) Reassembly.

1. Pull new timing head coupling all the way down.

2. Place timing head assembly in position, and turn it clockwise to engage thread. Continue to turn until the bottom of the coupling touches the lock nut.

3. Replace four holding screws. Tighten.

4. Adjust the spindle.

- a. Release regulating screw to permit free flow of air through orifice.

- b. Trip switch in bolt positions by pushing spindle up and pulling spindle down.

- c. Repeat adjustment if necessary.

- d. Tighten lock nut.

CAUTION: *Timing head coupling must be held securely with wrench or pliers to prevent turning when lock nut is tightened.*

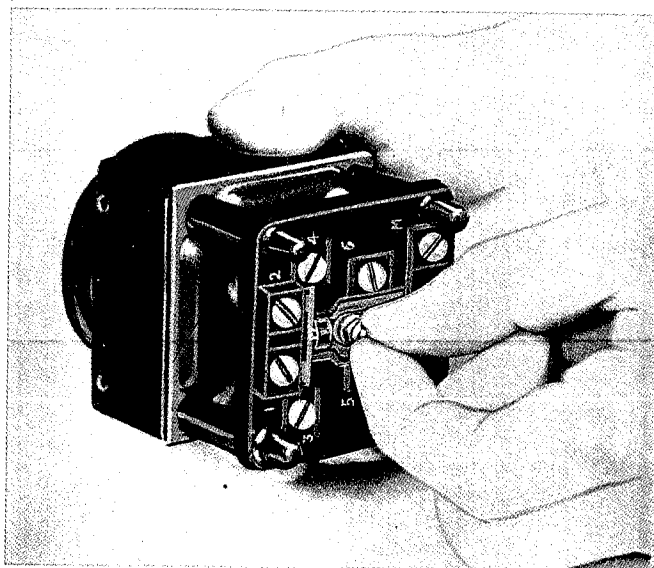
- e. Replace cap.

- f. Reset timing.

(2) COIL ASSEMBLY.

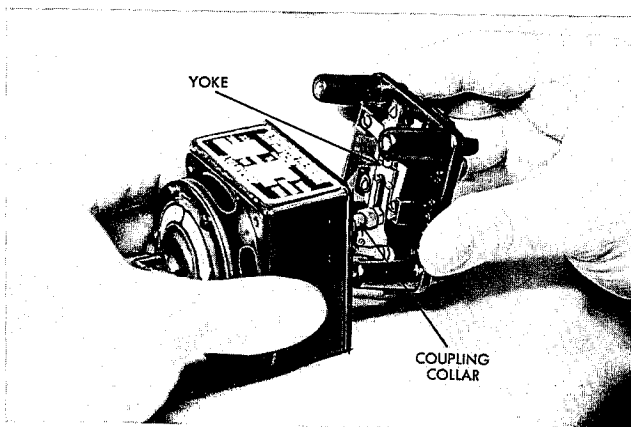
(a) Disassembly.

1. Hold timing head coupling with wrench or pliers and loosen lock nut.



Push Spindle Up and Pull Spindle Down

2. Remove four holding screws.
3. Turn timing head counter-clockwise until disengaged.
4. Move terminal block and switch assembly so that the coupling collar on the spindle comes free of yoke (lever) without damaging switch.
5. Disconnect coil leads.
6. Remove coil box cover and remove coil.



Coupling Collar on Spindle Free of Yoke (lever)

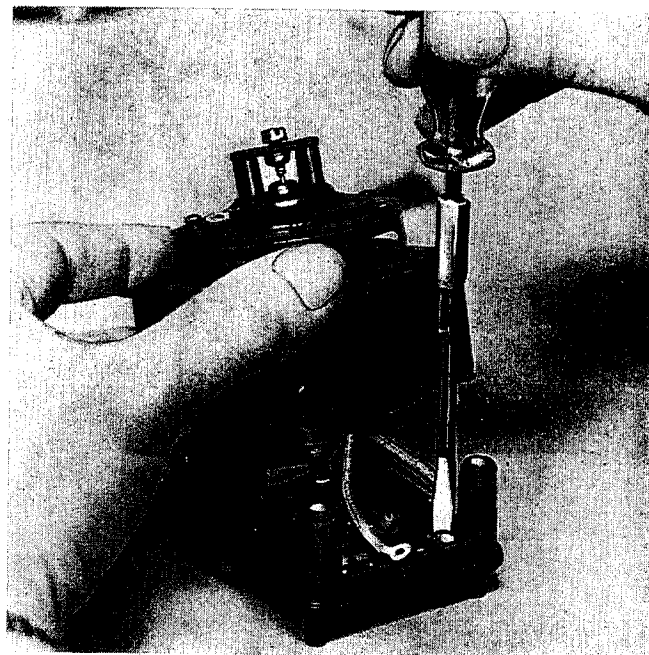
(b) Reassembly.

1. Place new coil in coil box. Pull coil leads through hole in coil box cover.
2. Place terminal block and switch assembly in position and connect coil leads.
3. Pull timing head coupling all way down.

4. Place timing head assembly in position and turn it clockwise to engage thread. Continue to turn until bottom of coupling touches lock nut. Replace four holding screws. Tighten.

5. Adjust spindle.

- a. Release regulating screw to permit free flow of air through orifice.
- b. Push spindle UP.
- c. Pull spindle DOWN.
- d. If switch does not trip in both positions repeat adjustment.
- e. Tighten lock nut.



Disconnect Coil Leads

CAUTION: *Timing head coupling must be held securely with wrench or pliers to prevent turning when lock nut is tightened.*

f. Reset timing.

(3) TERMINAL BLOCK AND SWITCH ASSEMBLY.

(a) Disassembly.

1. Remove four holding screws.
2. Move terminal block and switch assembly so that the coupling collar on the spindle comes free of yoke without damaging switch.
3. Disconnect coil leads.

(b) Reassembly.

1. Connect coil leads.
2. Place terminal block and switch assembly in position and fasten by replacing four holding screws.

5. LUBRICATION.

No lubrication is required.

AGASTAT SELECTION DATA

There Is an Agastat for Every Time Delay Requirement.

To Select the Proper Agastat for Your Particular Need:

Example: NE-11. NE indicates A.C.; 11 indicates type 1, single pole.

Example: NE-22. NE indicates A.C.; 22 indicates type 2, double pole.

For D.C. models see note below.

Each letter in the model number is significant:

Model No.	Contact Arrangement	Description
NE-11 *	SPDTDB	Slow make—Instantaneous break.
NE-12 *	DPDTSB	Slow make—Instantaneous break.
NE-21 *	SPDTDB	Instantaneous make—Slow break.
NE-22 *	DPDTSB	Instantaneous make—Slow break.
NEH-11 *	SPDTDB	Slow make—Instantaneous break. plus instant break—make—contact.
NEH-12 *	DPDTSB	Slow make—Instantaneous break. plus instant break—make—contact.
NEH-21 *	SPDTDB	Instantaneous make—Slow break plus one instant make contact plus one time delayed contact.
NEH-22 *	DPDTSB	Instantaneous make—Slow break plus one instant make contact plus one time delayed contact.
NET-11 *	SPDTDB	Two Step Delay or momentary impulse.
NET-12 *	DPDTSB	Two Step Delay or momentary impulse.
NET-21 *	SPDTDB	Instantaneous make two step delay or momentary impulse on drop out.
NET-22 *	DPDTSB	Instantaneous make two step delay or momentary impulse on drop out.
NED-11 *	SPDTDB	Adjustable delay in both directions i.e. make and break.—
NED-12 *	DPDTSB	Adjustable delay in both directions i.e. make and break.—
NEP-11 *	SPDTSB	Slow make proportional break and hence re-make.
NEP-12 *	DPDTSB	Slow make proportional break and hence re-make.
NEF-11 *	SPDTDB	Approximately equal time delay in both directions i.e. make and break.
NEF-12 *	DPDTSB	Approximately equal time delay in both directions i.e. make and break.
NEU-11	SPDTDB	Same as NE-11—U/L approved.
NEU-21	SPDTDB	Same as NE-21—U/L approved.
NEUH-11	SPDTDB	Same as NEH-11—U/L approved.
NEUH-21	SPDTDB	Same as NEH-21—U/L approved.

* These units available in D.C. both Continuous Duty, (Substitute "D" for "E" i.e. ND-11).—and Intermittent Duty, (Substitute "F" for "E" i.e. NF-11).

When ordering AGASTAT be sure to specify voltage, time setting and mounting position if other than vertical mounting is contemplated.

WARRANTY

The AGASTAT time delay relay 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. New parts will be furnished free of charge in exchange for parts which have proved defective. The furnishing of these parts shall constitute fulfillment of the Company's obligations and liabilities.

AGA
DIVISION

ELASTIC STOP NUT CORP. OF AMERICA

ELIZABETH 3

NEW JERSEY