



# Relay and Timer Specifications

Bulletin 700

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# Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

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Updated 700-FE Economy Timing Relays	98
Updated 700-FS High Performance Timing Relays	102

# General Information

## Contact Data Tables

	Relay Type	Contact Arrangement	Contact Style	Contact Material	NEMA Pilot Duty <sup>(1)</sup>	AC and DC Switching Capability										
						1 mA	20 mA	50 mA	100 mA	1 A	3 A	5 A	10 A	20 A	25 A	30 A
IEC Relays	700-CF	Up to 8 form X or 8 form Y	cross stamped	Ag	A600 P600	24V	AC					DC				
	700S-CF	Up to 8 form X or 8 form Y	cross stamped	Ag	A600 P600	24 V	AC					DC				
	700-K	Up to 8 form X or 8 form Y	bifurcated	AgCu	A300 Q300	17V	AC					DC				
NEMA Relays	700-P	Up to 12 form X or 8 form Y	bifurcated	NiAg	A600 P600	10V	AC					DC				
	700-PK	Up to 12 form X or 8 form Y	single	AgCdO	2X A600 2X P600	10V	AC					DC (20 A Lighting Load)				
	700-PH	Up to 6 form X or 4 form Y	tandem	AgCdO	A600 P600	10V	AC					DC (35 A Lighting Load)				
	700-R	Up to 8 form A or form B	sealed sw.	W	B300 C600 P300	5V	AC					DC				
	700-RTC	Up to 4 form A or form B	sealed sw.	W	B600 P300	5V	AC					DC				
	700S-P	Up to 12 form X or 8 form Y	bifurcated	NiAg	A600 P600	10V	AC									

(1) See [NEMA Ratings and Test Values on page 5](#).

**Contact Data Tables**

	Relay Type	Contact Arrangement	Contact Style	Contact Material	NEMA Pilot Duty	AC and DC Switching Capability												
						1 mA	10 mA	50 mA	100 mA	1 A	3 A	5 A	10 A	20 A	25 A	30 A	35 A	
Timing Relays	700-FE	1 N.O.	single	AgCdO	D300			10V	AC DC (24V Max.)									
	700-FS	1, 2 form C	single	AgCdO	B300			10V	AC DC (24V Max.)									
General Purpose Relays	700-HA	2, 3 form C	single	AgNi	B300			10V	AC DC (24V Max)									
	700-HAX	2, 3 form C	bifurcated	Au/AgNi	B300	6V	AC DC (24V Max)											
	700-HB	2, 3 form C	single	AgNi	B300			10V	AC DC (24VMax.)									
	700-HC14	4 form C	single	Ag/Au	C300 Q300	10V	AC DC (30V Max.)											
	700-HC22	2 form C	single	AgNi	B300 Q300		10V	AC DC										
	700-HC24	4 form C	single	AgNi	C300 Q300		10V	AC DC (30V Max.)										
	700-HD	2, 3 form C	single	AgCdO	B300			10V	AC DC (24V Max)									
	700-HF	2, 3, 4 form C	single	AgCdO	B300			10V	AC DC (30V Max)									
	700-HG	1 form X, 1 form C, 2 form A, 2 form C	single	AgNi	A600			10V	AC DC (28V Max)									
	700-HHF45	1 form X	single	AgNi	A600			10V	AC DC (28V Max)									
	700-HHF62	2 form C	single	AgNi	B600			10V	AC DC (28V Max)									
	700-HHF73	3 form C	single	AgNi	B300			10V	AC DC (28V Max)									
	700-HJ	1, 2 form C	single	AgCdO	—			10V	AC DC (24V Max.)									
	700-HK36	1 form C	single	AgNi	B300			10V	AC DC (30V Max)									
	700-	1 form C	single	Au/AgNi	B300			10V	AC DC (30V Max)									
	700-HK32	2 form C	single	AgNi	B300			5V	AC DC (30V Max)									
700-	2 form C	single	Au/AgNi	B300			5V	AC DC (30V Max)										

## Contact Data Tables

	Relay Type	Contact Arrangement	Contact Style	Contact Material	NEMA Pilot Duty	AC and DC Switching Capability												
						1 mA	10 mA	50 mA	100 mA	1 A	3 A	5 A	10 A	20 A	25 A	30 A	35 A	
General Purpose Relays (continued)	700-HLS	Solid-State 1 N.O.	—	—	—	3V	—————					AC/DC						
	700-HLT	1 Form C	single	AgSnO	B300 R300	12V	—————					6 A	AC/DC					
	700-HLT__X	1 Form C	single	AgSnO	B300 R300	8V	—————					6 A	AC/DC					
	700-HP	2 Form C	single	AgNi	B300 Q300	5V (300 mW)	—————					8 A	AC/DC					
	700-HPX	2 Form C	single	AgNi + Gold	B300 Q300	5V (50 mW)	—————					8 A	AC/DC					
	700-HS	2 Form C	single	AgCdO	B300			10V	—————					AC DC	(30V Max)			
	700-HT	2 form C	single	AgNi	B300			10V	—————					AC DC	(30V Max)			

## NEMA Ratings and Test Values




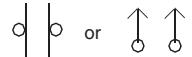
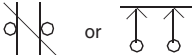

## NEMA Ratings and Test Values for AC Control Circuit Contacts at 50 or 60 Hz

Maximum Current [A]											
NEMA Contact Rating Designation	Thermal Continuous Test Current [A]	120V		240V		480V		600V		VA	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6.00	—	—	—	—	—	—	7200	720
A300	10	60	6.00	30	3.00	—	—	—	—	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B150	5	30	3.00	—	—	—	—	—	—	3600	360
B300	5	30	3.00	15	1.50	—	—	—	—	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C150	2.5	15	1.50	—	—	—	—	—	—	1800	180
C300	2.5	15	1.50	7.5	0.75	—	—	—	—	1800	180
C600	2.5	15	1.50	7.5	0.75	3.75	0.375	3	0.30	1800	180
D150	1.0	3.60	0.60	—	—	—	—	—	—	432	72
D300	1.0	3.60	0.60	1.8	0.30	—	—	—	—	432	72
D600	0.5	1.80	0.30	—	—	—	—	—	—	216	36
2X A300	20	120	12	60	6.00	—	—	—	—	14400	1440
2X A600	20	120	12	60	6.00	30	3.00	24	2.40	14400	1440

**NEMA Ratings and Test Values for DC Control Circuit Contacts**

Maximum Current [A]						
NEMA Contact Rating Designation	Thermal Continuous Test Current [A]	5...28V	125V	250V	301...600V	Make or Break at 300V or less [VA]
N150	10	10	2.2	—	—	275
N300	10	10	2.2	1.1	—	275
N600	10	10	2.2	1.1	0.40	275
P150	5.0	5.0	1.1	—	—	138
P300	5.0	5.0	1.1	0.55	—	138
P600	5.0	5.0	1.1	0.55	0.20	138
Q300	2.5	2.5	0.55	0.27	0.11	69
Q600	2.5	2.5	0.55	0.27	0.11	69
2X P600	10	10	2.2	1.1	0.40	275

**NEMA Definitions for Contact Arrangements**

Contact Arrangement	Description	Diagram
<b>Form A</b>	A Form A contact arrangement is one that has single-pole, single-throw, normally open contacts. The function of this arrangement is to close a circuit when actuated.	
<b>Form B</b>	A Form B contact arrangement is one that has single-pole, single-throw, normally closed contacts. The function of this arrangement is to open a circuit when actuated.	
<b>Form C</b>	A Form C contact arrangement is one that has single-pole, double-throw contacts with three terminals - one for normally open, one for normally closed, and one common. The function of this arrangement is to transfer a circuit when actuated.	
<b>Form X</b>	A Form X contact arrangement is one that has single-pole, single-throw, normally open double-make contacts. The function of this arrangement is to close a circuit when actuated.	
<b>Form Y</b>	A Form Y contact arrangement is one that has single-pole single-throw normally closed double-break contacts. The function of this arrangement is to open a circuit when actuated.	
<b>Form Z</b>	A Form Z contact arrangement is one that has single-pole, double-throw, contacts with four terminals — two for normally open and two for normally closed. The function of this arrangement is to open one circuit and close the other.	

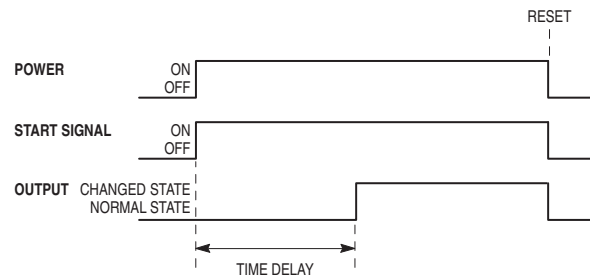
## Timing Relay Selection Criteria

Single Function Timers: Timers that have only 1 timing mode (for example, ON-Delay or OFF-Delay).

Multi-Function Timers: Timers that have 4...8 timing modes that are selected by turning the mode selection switch.

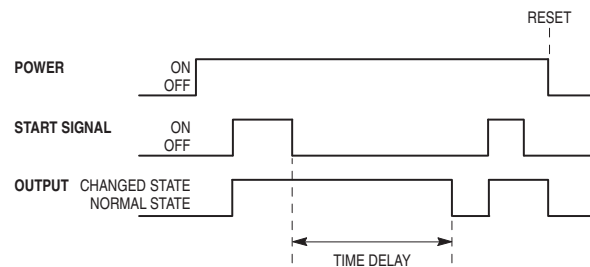
### ON-Delay or (Delay on Operate)

When power is applied continuously (or when power and a start signal are applied), the timing cycle begins. The output contacts change state after the time delay is completed. The contacts will return to their normal state when a reset signal is applied or power is removed.



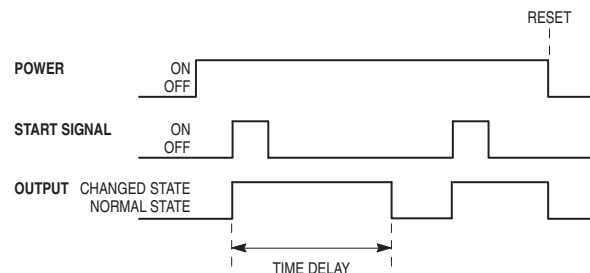
### OFF-Delay or (Delay on Release)

Power is applied continuously. When a start signal is applied, the output contacts change state immediately. When the start signal is removed, the timing cycle begins. The output contacts will return to their normal state once the time delay is completed. Reset will occur when a reset signal is applied or power is removed.



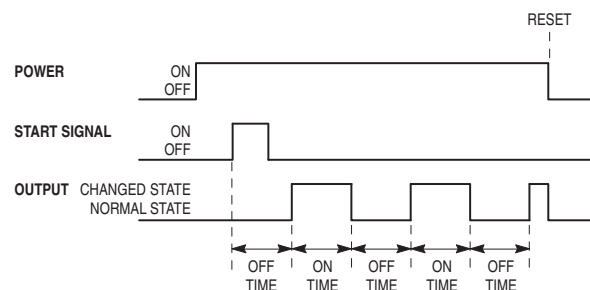
### One Shot or (Repeat Cycle)

Power is applied continuously. When a start signal is applied, the output contacts change state immediately and the timing cycle begins. The output contacts will return to their normal state once the time delay is completed. Reset will occur when a reset signal is applied or power is removed.



### Repeat Cycle or (Flicker)

Power is applied continuously. When a start signal is applied, the timing cycle begins. When the time delay is completed, the output contacts change state and the next timing cycle begins. This cycle will repeat until a reset signal is applied or power is removed.



## Flexibility

**Mounting** — Timing relays are available in several different models. They can be plugged into the same socket as the relay, or use a separate plug-in socket mounting.

**Contacts** — The contacts are of various types and ratings. See the appropriate specification pages for more details.

**Functionality** — Timing relays with multi-range and multi-function capability are available. Allowing you to stock one relay to cover a wide variety of applications.

**External Trigger Switch** — OFF-Delay, One-Shot, and other timer functions require an external trigger switch (from a relay or push button) to control the timing function. The external trigger switch will cause the timing function to start. In OFF-Delay, the trigger switch closes to energize the output and when the trigger switch opens the OFF-Delay starts to time out. At the end of the time delay, the output is de-energized and the output contacts return to their shelf state.





### Surge Suppression Information

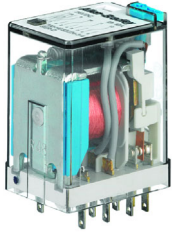
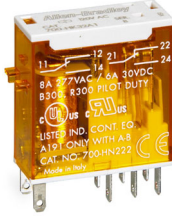
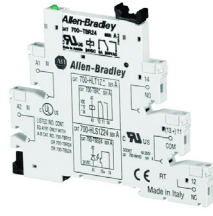
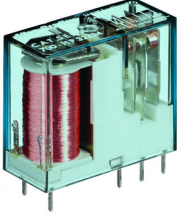
Photo	Cat. No.	For use with	Suppression Technique	Max. Relay Contact Dropout Time	Max. Transient Voltage Relative to System Voltage
	700-ADR	700-HA, -HB, -HK, -HP (6...220V DC)	Diode	3X	—
	700-ADL1	700-HC (6...24V DC)	Diode + LED	3X	—
	700-ADL1R	700-HB, -HA, -HK, -HP (6...24V DC)	Diode + LED	3X	—
	700-ADL2	700-HC (28...60V DC)	Diode + LED	3X	—
	700-ADL2R	700-HB, -HA, -HK, -HP (28...60V DC)	Diode + LED	3X	—
	700-ADL3	700-HC (110...220V DC)	Diode + LED	3X	—
	700-ADL3R	700-HB, -HA, -HK, -HP (110...220V DC)	Diode + LED	3X	—
	700-AR1	700-HB, -HA, -HC, -HK, -HP (6...24V AC/DC)	RC	No Effect	3
	700-AR2	700-HB, -HA, -HC, -HK, -HP (110...240V AC/DC)	RC	No Effect	—
	700-AV1R	700-HB, -HA, -HC, -HK, -HP (6...24V AC)	Varistor + LED	No Effect	—
	700-AV3R	700-HB, -HA, -HC, -HK, -HP (110...240V AC)	Varistor + LED	No Effect	—
700-CF Relay	700-CF built-in	—	Diode	—	6...10X
	100-FSC	100C, 700-CF	R-C Ckt	No Effect	3X
	100-FSV	100C, 700-CF	MOV	No Effect	—
	100-FSD	100C, 700-CF	Diode	70...95 ms	6...10X
	100-JE	100C, 700-CF	Diode	5X	6...10X
	700-N5	700-P, 700-N	RC	No effect	3X
	700-N24	700-P, 700-N	RC	No effect	3X
700-R Relay	700-R built-in	—	Diode	—	6...10X
	199-FSMA1, FSMA2	700-P, 700-H, 700-CF, 700DC-R	RC	No effect	3X
	199-FSMA9, 10, 11	700-P, 700-H, 700-CF, 700DC-R	MOV	No effect	—
	199-FSMZ	700-P, 700-H, 700-CF, 700DC-R	Diode	5X	—



# General Purpose Relays

## Product Overview

				
<b>Bulletin No.</b>	<b>700-HA</b>	<b>700-HB</b>	<b>700-HD</b>	<b>700-HF</b>
<b>Type</b>	<b>General-purpose Relay</b>	<b>General-purpose Relay</b>	<b>General-purpose Relay</b>	<b>General-purpose Relay</b>
<b>Features</b>	<ul style="list-style-type: none"> <li>Pin-style terminals</li> <li>Standard ON/OFF flag indicator</li> <li>Electrical schematic on face</li> <li>Clear cover for visual inspection</li> <li>Optional push-to-test and manual override</li> <li>Optional LED</li> </ul>	<ul style="list-style-type: none"> <li>Blade-style quick connect terminals</li> <li>Standard ON/OFF flag indicator</li> <li>Electrical schematic on face</li> <li>Clear cover for visual inspection</li> <li>Optional push-to-test and manual override</li> <li>Optional LED</li> </ul>	<ul style="list-style-type: none"> <li>Flange-mounted</li> <li>Blade-style quick connect terminals</li> <li>Clear cover for visual inspection</li> </ul>	<ul style="list-style-type: none"> <li>Square-base</li> <li>Plug-in quick connect solder terminals</li> <li>Optional push-to-test</li> <li>Optional LED</li> </ul>
<b>Contact Ratings</b>				
<b>Contact Form</b>	DPDT, 3PDT	DPDT, 3PDT	DPDT, 3PDT	DPDT, 4 PDT
<b>Contact Type</b>	Single	Single	Single	Single
<b>Contact Material</b>	AgNi, AgNi + Gold	AgCdO	AgCdO	AgCdO
<b>Operating Current, Under Resistive Load, Max</b>	700-HA: 10 A 700-HAX: 6 A	15 A	15 A	10 A
<b>Permissible Load, min</b>	700-HA: 10V, 5 mA 700-HAX: 6V 1 mA	10V, 10 mA	10V, 10 mA	5V, 100 mA
<b>Coil Ratings</b>				
<b>Coil Voltage</b>	AC: 6, 12, 24, 48, 110, 120, 230, 240, 277V DC: 6, 12, 24, 36, 48, 60, 80, 110, 125, 140, 220V	AC: 6, 12, 24, 120, 240V DC: 6, 12, 24, 48, 110V	AC: 6, 12, 24, 120, 208, 240V DC: 6, 12, 24, 48, 110V	AC: 6, 12, 24, 120, 240V DC: 6, 12, 24, 48, 110V
<b>Permissible Coil Voltage Variation</b>	80...110% of nom voltage at 50 Hz 80...110% of nom voltage at 60 Hz 80...110% of nom voltage at DC			85...110% of nom voltage at 50 Hz 85...110% of nom voltage at 60 Hz 80...110% of nom voltage at DC
<b>Electrical Ratings</b>				
<b>Dielectric Withstand Voltage</b>	Pole-to-pole: 2000V Contact-to-coil: 2000V Contact-to-frame: 2000V	Pole-to-pole: 2500V Contact-to-coil: 4000V Contact-to-frame: 2500V	Pole-to-pole: 2500V Contact-to-coil: 4000V Contact-to-frame: 2500V	Pole-to-pole: 1500V Contact-to-coil: 1500V Contact-to-frame: 1500V
<b>Electrical Service Life (Cycles)</b>	100,000 min	100,000 min	100,000 min	200,000 min 500,000 min (DPDT)
<b>Reference</b>				
<b>Certifications</b>	CE, cULus, cURus, CSA, Lloyds	CE, cULus, cURus, CSA, Lloyds	CE, UR, CSA, Lloyds	CE, UR, CSA
<b>Socket Catalog Numbers</b>	700-HN100, 700-HN101, 700-HN125, 700-HN126, 700-HN204, 700-HN205	700-HN153, 700-HN154	—	700-HN262, 700-HN264
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<b>Bulletin Number</b>	<b>700-HC</b>	<b>700-HK</b>	<b>700-HL</b>	<b>700-HP</b>
<b>Type</b>	Interposing/Isolation Relay	Interposing/Isolation Relay	Interposing/Isolation Relay	Interposing/Isolation Relay
<b>Features</b>	<ul style="list-style-type: none"> <li>• Blade-style terminals</li> <li>• Standard ON/OFF flag indicator</li> <li>• Electrical schematic on face</li> <li>• Clear cover for visual inspection</li> <li>• Optional push-to-test and manual override</li> <li>• Optional LED</li> </ul>	<ul style="list-style-type: none"> <li>• Optional pilot light</li> <li>• Retainer clip (comes with socket)</li> <li>• Low switching capacity</li> <li>• Push-to-test and manual override</li> </ul>	<ul style="list-style-type: none"> <li>• Ideal for PLC Interfaces</li> <li>• Built-in Coil Surge Protection</li> <li>• Fully Assembled Relay/Socket</li> <li>• Standard LED</li> <li>• Relay or Solid-state Output</li> <li>• Optional: Leakage Current</li> <li>• Suppression Solution</li> </ul>	<ul style="list-style-type: none"> <li>• PCB "Pin Style" mounting</li> <li>• 5 mm pin spacing</li> </ul>
<b>Contact Ratings</b>				
<b>Contact Form</b>	DPDT, 4PDT	SPDT, DPDT	SPDT 1 N.O. (SSR)	DPDT
<b>Contact Type</b>	Single	Single	Single	Single
<b>Contact Material</b>	AgNi, AgNi + Gold	AgNi, AgNi + Gold	AgSnO	AgNi, AgNi + Gold
<b>Operating Current, Under Resistive Load, Max</b>	10 A (DPDT) 7 A (4PDT)	8 A (DPDT), 16 A (SPDT)	6 A (SPDT), 2 A (SSR DC output), 2 A (SSR AC output)	8 A
<b>Permissible Load, min</b>	10V, 10 mA (Gold), 5V, 10 mA or 25V, 2 mA (Silver)	5V 60 mA (Silver), 5V 10 mA (Gold)	12V 6 mA (72 mW) Silver 8V, 2.5 mA (20 mW) Gold	5V 5 mA (50 mW) Gold, 5V 5 mA (300 mW) Silver
<b>Coil Ratings</b>				
<b>Coil Voltage</b>	<b>AC:</b> 6, 12, 24, 120, 240V <b>DC:</b> 6, 12, 24, 48, 110V	<b>AC:</b> 6, 12, 24, 120, 240V <b>DC:</b> 6, 12, 24, 48, 110V	<b>AC:</b> 12, 24, 48, 110, 120, 230, 240V <b>DC:</b> 12, 24, 48, 125, 230, 240V	<b>AC:</b> 6, 12, 24, 120, 240V <b>DC:</b> 6, 12, 24, 48, 110V
<b>Permissible Coil Voltage Variation</b>	80...110% of nom voltage at 50 Hz 80...110% of nom voltage at 60 Hz 80...110% of nom voltage at DC	80...110% of nom voltage at 50 Hz 80...110% of nom voltage at 60 Hz 73...110% of nom voltage at DC	85...110% of nom voltage at 50 Hz 85...110% of nom voltage at 60 Hz 80...110% of nom voltage at DC	80...110% of nom voltage at 50 Hz 80...110% of nom voltage at 60 Hz 73...150% of nom voltage at DC
<b>Electrical Ratings</b>				
<b>Dielectric Withstand Voltage</b>	Pole-to-pole: 1000V Contact-to-coil: 2000V Contact-to-frame: 2000V	Pole-to-pole: 1500V Contact-to-coil: 1500V Contact-to-frame: 1500V	Pole-to-pole: 1000V Contact-to-coil: 4000V Contact-to-frame: 1500V	Pole-to-pole: 2000V Contact-to-coil: 5000V
<b>Electrical Service Life (Cycles)</b>	100,000 min	100,000 min	100,000 min	100,000 min
<b>Reference</b>				
<b>Certifications</b>	CE, cULus, cURus, CSA, Lloyds	CE, UL, UR, CSA	CE, cURus, cULus, ABS	CE, cULus, cURus, CSA, Lloyds
<b>Socket Catalog Numbers</b>	700-HN103, 700-HN128, 700-HN104	700-HN121, 700-HN221, 700-HN122, 700-HN222, 700-HN223, 700-HN224	—	700-HN123, 700-HN230
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