# GE Grid Solutions

# Model HEA Multicontact Auxiliary

# Features and Benefits

- Electrically separate outputs available
- Various shaft lengths available
- Locks equipment out of service

# Applications

• Contact multiplication

## **Protection and Control**

• Trip and/or block close breaker control



High-speed multicontact relays to perform auxiliary functions on AC and DC circuits.



## Application

HEA high-speed multicontact auxiliary relays are applicable where it is desired that a number of operations be performed simultaneously from the operation of a single relay.

Typical functions that can be performed by these relays are:

- 1. trip the main circuit breaker of a system
- 2. trip station auxiliary breakers
- 3. trip main or auxiliary field breakers
- 4. trip and lock out all breakers on a bus

Perhaps the most important use of the HEA relay is in conjunction with differential relays which protect transformers, rotating apparatus, buses, etc.

### Construction

The HEA multicontact, hand-reset auxiliary relays are built with many parts common to the wellknown Type SB-1 control and transfer switches. The mechanical target on the escutcheon plate assembly indicates the position of the relay. The black target indicates the reset position and the orange target, the tripped position. To reset the relay after being tripped, the handle is turned clockwise as indicated by the arrow on the escutcheon plate.

Since the HEA relay is basically similar to the SB-1 switch, it is available with a shaft long enough to allow it to be mounted on panels with a thickness of from 1/8 inch to 2 inches thick, in increments of 1/16 inch.

Like the SB-1 switch, all HEA relays must be ordered for the specific panel thickness, otherwise the relay will be supplied with a shaft long enough to be mounted only on a 1/8 inch panel.

EXAMPLE: HEA61A222 for 3/4 inch panel relay number would be HEA61A222X12 (3/4 inch = 12/16 = \_\_\_\_\_ X12).

EXAMPLE: HEA63F272 for 1 1/2 inch panel relay number would be HEA6313272X24 (1-1/2 inch = 24/16 = \_\_\_\_\_ X24).

#### HEA61, HEA62, and HEA63

#### Operation

The operating shaft is held in the reset position by a positive roller latch which is especially constructed to resist shock arid vibration. It is released through the action of the operating coil, in attracting a hinged element.

All HEA relays are made so that they should not normally be tripped manually, although it is possible by removing the rear cover and releasing the hingedarmature element.

#### **Special Mounting**

HEA61A, 61B, 61C, 62C, 63C and 63G relays can be supplied with a bevel-gear drive which allows the relay to be mounted in locations where normally the depth is not sufficient. The relays can be mounted like the standard but the bevel-gear drive changes the direction by 90° of that portion of the relay that is behind the panel. The bevel-gear drive is available to change the direction up, down, left, or right.

To select the proper model number of the special relay, select the number of the standard relay desired (example: HEA61C230X2). If a right angle drive upward is desired, add the letters "Right-angle Up" to the standard model number. Hence, the model number would be HEA61CRU230X2 (for 1/8 inch panel).

#### **Contact Ratings**

The current-closing rating of the contacts is 50 A for voltages not exceeding 600 V. The contacts have a current-carrying capacity of 20 A continuously or 50 A for one minute. The interrupting ability of the contacts varies with the inductance of the circuit. The values (in amperes) given in Table 1, for DC inductive circuits, are based on the average trip coil.

#### **Burdens**

The burdens for the Type HEA relays are given in Table 2.

#### Model HEA - Table 1. Contact interrupting ratings

Circuit Volts	'	oninductive ober of Con		Amps Inductive Circuit Number of Contacts				
	1	2 in Series	4 in Series	1	2 in Series	4 in Series		
24 DC	6.0	30.0		4.0	20.0	30.0		
48 DC	5.0	25.0	40.0	3.0	15.0	25.0		
125 DC	2.5	11.0	25.0	2.0	6.25	9.5		
250 DC	0.75	2.0	8.0	0.7	1.75	6.5		
600 DC	0.25	0.45	1.35	0.15	0.35	1.25		
115 AC	40.0	50.0		24.0	50.0			
230 AC	25.0	50.0		12.0	25.0	40.0		
460 AC	12.0	25.0		5.0	12.0	20.0		
550 AC	6.0	12.0		4.0	10.0	15.0		

## HEA61 Hand Reset

#### Application

The HEA61 relay is a hand-reset high speed auxiliary relay. When it is used in conjunction with differential relays which are protecting transformers, rotating machines, buses, etc., it is preferred that the auxiliary relay be hand reset to prevent accidental reclosing of breakers when an internal fault has caused the differential relay to operate.

#### Operation

The HEA61 relay is available with 6, 10, or 16 main electrically separate contacts. In addition, there are 2 normally closed contacts that are wired for opening the operating coil circuit. See Figure 2.

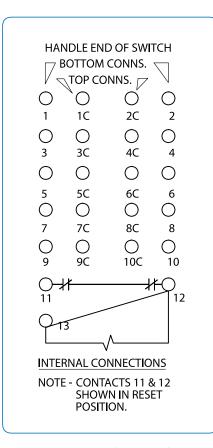


Fig. 2. Typical HEA61B relay contact arrangement

#### Model HEA

Table 2. Burden data of trip coil

Frequency	Coil Resis. Ohms at 25°C	AC Coil Current	Operating Range Volt	Rating of Protective Relay Target Coil Amps			
		Amps at (Rated Volts)		Universal Target Seal-in	SeparateTarget and Seal-in		
DC	1.2		14-30	2.0	1.0		
DC	4.5		28-60	2.0	1.0		
DC	23		70-140	0.2	1.0		
DC	103		140-280	0.2	0.2		
50/60 Hz		25	95-125	2.0			
50/60 Hz		14	190-250	2.0			
50/60 Hz		7	380-500	2.0			
	DC DC DC DC 50/60 Hz 50/60 Hz	Frequency   Ohms at 25°C     DC   1.2     DC   4.5     DC   23     DC   103     50/60 Hz	Coil Resis. Ohms at 25°CCurrent Amps at (Rated Volts)DC1.2DC4.5DC23DC10350/60 Hz2550/60 Hz14	Coil Resis.Current Amps at (Rated Volts)Operating Range VoltDC1.214-30DC4.528-60DC2328-60DC23140-280DC103140-28050/60 Hz2595-12550/60 Hz14190-250	Coil Resis.Current Amps at (Rated Volts)Operating Range VoltRelay Targ Universal Target Seal-inDC1.214-302.0DC4.528-602.0DC2370-1400.2DC103140-2800.250/60 Hz2595-1252.050/60 Hz14190-2502.0		

The time required to trip the relay, from the instant of energization of the coil to the closing of the contacts, is approximately 15 ms (1 cycle on 60 Hz basis) –slightly less for opening of the contacts. See Figure 3.

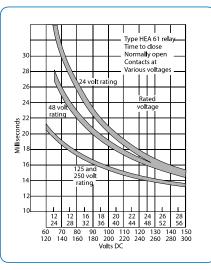


Fig. 3. Typical time-voltage characteristics of Type HEA61 relay

NOTE: When viewed from the handle end of the relay, the odd contacts are on the right-hand side and the even contacts are on the left-hand side starting at the handle end and proceeding to the rear of the relay. Normally, open contacts are the first contacts (nearest the handle) on the relay, in the reset position.

Example: HEA61B233 rated 125 VDC 3 NO (contact numbers 1, 2, and 3) 7 NC (contact numbers 4, 5, 6, 7, 8, 9, 10)

## HEA62 Hand Reset

The HEA62 relay is identical to the HEA61 with the exception that on the HEA62 there is a diode-resistor combination inserted across the coil circuit. See Fig. 4. This diode-resistor suppresses the surge sometimes caused by the interruption of the coil contacts on a DC circuit.

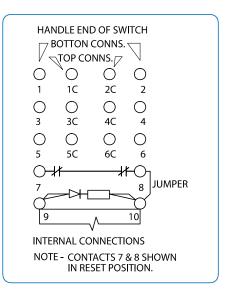


Fig. 4. Typical HEA62A relay contact arrangement

The diode-resistor combination is mounted on a small board that is mechanically attached beneath the trip coil frame. Although in most cases this diode-resistor combination is unnecessary, it is offered for those unusual conditions where the user might feel it necessary. The HEA62 is available only in the 62A, 62B, and 62C DC series.

## HEA63 Hand and Electric Reset

#### Application

The HEA63 relay is basically a standard HEA61 except it has a rotary solenoid which is used to electrically reset the relay and there are only certain contact sequences available (see Selection Guide). This relay is especially useful where the operator and the HEA63 relay are some distance apart.

#### Operation

The operation of the relay may be understood by referring to Fig. 5. When electrical resetting is desired, a contact or switch is closed which completes the HGA33 relay (which is a part of the overall HEA63 relay and is supplied automatically with the relay) coil circuit through a contact of the HEA relay. This contact is closed in the trip position. Closure of the HGA33 contacts energizes the rotary solenoid which imparts enough rotational force to the HEA shaft through a coupling to cause the HEA to reset and latch. When the HEA resets, the contact which energized the HGA33 coil opens and de-energizes the HGA33

relay. This HGA is of the time delay drop out variety with approximately 0.25 sec drop out time. The time delay insures that the HEA has fully latched. The contacts of the HGA33 then interrupt the rotary solenoid operating current. The HGA33 contacts have a high interrupting rating which is required because the rotary solenoid current is of a relatively high inductive magnitude.

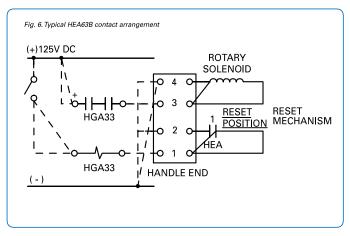
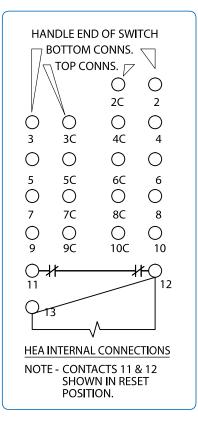


Fig. 6. Typical HEA63B contact arrangement

#### Model HEA

Rating (Volts)	Rotary Solenoid Coil Current (Amps)
24	26.8
48	13.5
125	5.5
250	2.8

#### Fig. 5. Typical schematic of HEA63 relay



## Model HEA61 Hand Reset Selection Guide

240   230   220   280   210   290   300   None   1-6     241   231   221   281   211   291   301   1   2-6     242   232   222   282   212   292   303   1-3   4-6     244   234   223   223   283   213   293   303   1-5   6   4     246   236   226   286   216   296   306   1-5   None   (1.8)     270   250   235   333   311   351   371   1   2-10     271   251   233   333   213   353   373   1-5   6-10     275   255   235   335   215   355   377   1-7   8-10     276   256   236   339   219   359   379   1-9   10   6     8   200   200   300	Group Contac	Arrangement	in Ib	Approx. Wt. in lbs (kg)	
Option   VDC   VDC   VDC   VDC   HZ   HZ   NO   Numbers N.C   Net     40   30   20   80   10   90   100   3:4   None     41   31   2:1   81   11   91   101   3   4   3     240   230   220   280   210   280   300   None   1:6     244   231   221   281   211   291   303   1:3   4:6     244   233   223   282   212   292   302   1:4   5:6   4     244   234   224   280   210   350   310   1:4   5:6   4     A   246   256   226   286   216   296   306   1:6   None   1:10     271   250   230   330   210   350   371   1   2:10   1:10   1:10   1:10					
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M   42   32   22   82   12   92   102   None   3-4   [13]     240   230   220   280   210   290   300   None   1-6     241   231   221   281   211   291   301   1   2-6     244   232   282   212   292   302   1-2   3-6     244   244   224   232   282   212   292   302   1-2   3-6     245   235   225   285   215   295   305   1-5   6   4     A   246   236   236   216   296   306   1-6   None   110     271   251   233   333   211   351   371   1   2-10     272   252   253   335   215   355   375   1-5   6-10     277   257   237   337			-		
240   230   220   280   210   290   300   None   1-6     241   231   211   221   281   211   291   301   1   2-6     242   232   222   282   212   292   302   1-2   3-6     244   234   223   223   285   213   293   303   1-5   4-6     244   234   224   284   214   294   304   1-4   5-6     245   235   225   285   216   296   306   1-6   None   (1.8)     270   250   230   330   210   350   370   None   1-10     271   251   231   333   213   354   374   1-4   5-10     272   252   233   335   215   355   375   1-5   6-10     274   254   234   340 <t< td=""><td></td><td></td><td></td><td>5</td></t<>				5	
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	71 51 31 11 91 111 1	2-14	-		
74 54 34  14 94 114 1-4 5-14   75 55 35  15 95 115 1-5 6-14   76 56 36  16 96 116 1-6 7-14   77 57 37  17 97 117 1-7 8-14   78 58 38  19 99 119 1-9 10-14   80 60 40  20 100 120 1-10 11-14   81 61 41  21 101 121 1-11 12-14   82 62 42  22 102 122 1-12 1314   83 63 43  24 104 124 1-14 None (3.6)   270 250 230 290 210 310 350 None 1-16   271 251 231 291 211 311	72 52 32 12 92 112 1-2	3-14	-		
75   55   35    15   95   115   1-5   6-14     76   56   36    16   96   116   1-6   7-14     77   57   37    17   97   117   1-7   8-14     78   58   38    18   98   118   1-8   9-14     79   59   39    20   100   120   1-10   11-14     80   60   40    21   101   121   1-11   12-14     81   61   41    22   102   122   1-12   13-14     82   62   42    23   103   123   1-13   14   8     V   84   64   44    24   104   124   1-14   None   (3.6)     271   251   231   291   211   3	73 53 33 13 93 113 1-3	4-14	-		
76 56 36  16 96 116 1-6 7-14   77 57 37  17 97 117 1-7 8-14   78 58 38  19 99 119 1-9 10-14   80 60 40  20 100 120 1-10 11-14   81 61 41  22 102 122 1-12 13-14   82 62 42  22 102 122 1-14 None (3.6)   V 84 64 44  24 104 124 1-14 None (3.6)   270 250 230 290 210 310 350 None 1-16   271 251 231 291 211 311 351 1 2-16   272 252 232 292 212 312 355 1-5 6-16   273 253 233 293 <td>74 54 34 14 94 114 1-4</td> <td>5-14</td> <td>-</td> <td></td>	74 54 34 14 94 114 1-4	5-14	-		
77 57 37  17 97 117 1-7 8-14   78 58 38  18 98 118 1-8 9-14   79 59 39  19 99 119 1-9 10-14   80 60 40  20 100 120 1-10 11-14   81 61 41  22 102 122 1-12 13-14   82 62 42  22 102 122 1-14 None (3.6)   V 84 64 44  24 104 124 1-14 None (3.6)   270 250 230 290 210 310 350 None 1-16   271 251 231 291 211 311 351 1 2-16   272 252 232 292 212 312 352 1-2 3-16   274 254 234 294 <td>75 55 35 15 95 115 1-5</td> <td>6-14</td> <td>_</td> <td></td>	75 55 35 15 95 115 1-5	6-14	_		
78   58   38    18   98   118   1-8   9-14     79   59   39    19   99   119   1-9   10-14     80   60   40    20   100   120   1-10   11-14     81   61   41    21   101   121   1-11   12-14     82   62   42    22   102   122   1-12   13-14     83   63   43    23   103   123   1-13   14   8     V   84   64   44    24   104   124   1-14   None   (3.6)     270   250   230   290   210   310   350   None   1-16     271   251   231   291   211   311   351   1   2-16     272   252   232   292   212	76 56 36 16 96 116 1-6	7-14	_		
79 59 39  19 99 119 1-9 10-14   80 60 40  20 100 120 1-10 11-14   81 61 41  21 101 121 1-11 12-14   82 62 42  22 102 122 1-12 13-14   83 63 43  23 103 123 1-13 14 8   V 84 64 44  24 104 124 1-14 None (3.6)   270 250 230 290 210 310 350 None 1-16   271 251 231 291 211 311 351 1 2-16   273 253 233 293 213 313 353 1-3 4-16   274 254 234 294 214 314 354 1-4 5-16   275 255 235 295 <td>77 57 37 17 97 117 1-7</td> <td>8-14</td> <td></td> <td></td>	77 57 37 17 97 117 1-7	8-14			
80   60   40    20   100   120   1-10   11-14     81   61   41    21   101   121   1-11   12-14     82   62   42    22   102   122   1-12   13-14     83   63   43    23   103   123   1-13   14   8     V   84   64   44    24   104   124   1-14   None   (3.6)     270   250   230   290   210   310   350   None   1-16     271   251   231   291   211   311   351   1   2-16     272   252   232   292   212   312   352   1-2   3-16     274   254   234   294   214   314   354   1-4   5-16     275   255   235   295   215 <td>78 58 38 18 98 118 1-8</td> <td>9-14</td> <td>_</td> <td></td>	78 58 38 18 98 118 1-8	9-14	_		
81 61 41  21 101 121 1-11 12-14   82 62 42  22 102 122 1-12 13-14   83 63 43  23 103 123 1-13 14 8   V 84 64 44  24 104 124 1-14 None (3.6)   270 250 230 290 210 310 350 None 1-16   271 251 231 291 211 311 351 1 2-16   272 252 232 292 212 312 352 1-2 3-16   273 253 233 293 213 313 353 1-3 4-16   274 254 234 294 214 314 354 1-4 5-16   275 255 235 295 215 315 355 1-5 6-16   276 256 236 29	79 59 39 19 99 119 1-9	10-14	_		
81 61 41  21 101 121 1-11 12-14   82 62 42  22 102 122 1-12 13-14   83 63 43  23 103 123 1-13 14 8   V 84 64 44  24 104 124 1-14 None (3.6)   270 250 230 290 210 310 350 None 1-16   271 251 231 291 211 311 351 1 2-16   272 252 232 292 212 312 352 1-2 3-16   273 253 233 293 213 313 353 1-3 4-16   274 254 234 294 214 314 354 1-4 5-16   275 255 235 295 215 315 355 1-5 6-16   276 256 236 29	80 60 40 20 100 120 1-10	11-14	-		
82   62   42    22   102   122   1-12   13-14     83   63   43    23   103   123   1-13   14   8     V   84   64   44    24   104   124   1-14   None   (3.6)     270   250   230   290   210   310   350   None   1-16     271   251   231   291   211   311   351   1   2-16     272   252   232   292   212   312   352   1-2   3-16     273   253   233   293   213   313   353   1-3   4-16     274   254   234   294   214   314   354   1-4   5-16     275   255   235   295   215   315   355   1-5   6-16     276   256   236   296   216 </td <td></td> <td>12-14</td> <td>-</td> <td></td>		12-14	-		
83   63   43    23   103   123   1-13   14   8     V   84   64   44    24   104   124   1-14   None   (3.6)     270   250   230   290   210   310   350   None   1-16     271   251   231   291   211   311   351   1   2-16     272   252   232   292   212   312   352   1-2   3-16     273   253   233   293   213   313   353   1-3   4-16     274   254   234   294   214   314   354   1-4   5-16     275   255   235   295   215   315   355   1-5   6-16     276   256   236   296   216   316   356   1-6   7-16     277   257   237   297   217<			•		
V   84   64   44    24   104   124   1-14   None   (3.6)     270   250   230   290   210   310   350   None   1-16     271   251   231   291   211   311   351   1   2-16     272   252   232   292   212   312   352   1-2   3-16     273   253   233   293   213   313   353   1-3   4-16     274   254   234   294   214   314   354   1-4   5-16     275   255   235   295   215   315   355   1-5   6-16     276   256   236   296   216   316   356   1-6   7-16     277   257   237   297   217   317   357   1-7   8-16     279   259   239   299   219 <t< td=""><td></td><td></td><td>Q</td><td>10</td></t<>			Q	10	
270   250   230   290   210   310   350   None   1-16     271   251   231   291   211   311   351   1   2-16     272   252   232   292   212   312   352   1-2   3-16     273   253   233   293   213   313   353   1-3   4-16     274   254   234   294   214   314   354   1-4   5-16     275   255   235   295   215   315   355   1-5   6-16     276   256   236   296   216   316   356   1-6   7-16     277   257   237   297   217   317   357   1-7   8-16     278   258   238   298   218   318   358   1-8   9-16     279   259   239   299   219   319   359				(4.5	
27125123129121131135112-162722522322922123123521-23-162732532332932133133531-34-162742542342942143143541-45-162752552352952153153551-56-162762562362962163163561-67-162772572372972173173571-78-162782582382982183183581-89-162792592392992193193591-910-162802602403002203203601-1011-162812612413012213213611-1112-162832632433032233233631-1314-162842642443042243243641-1415-16					
2722522322922123123521-23-162732532332932133133531-34-162742542342942143143541-45-162752552352952153153551-56-162762562362962163163561-67-162772572372972173173571-78-162782582382982183183581-89-162792592392992193193591-910-162802602403002203203601-1011-162812612413012213213611-1112-162832632433032233233631-1314-162842642443042243243641-1415-16			-		
2732532332932133133531-34-162742542342942143143541-45-162752552352952153153551-56-162762562362962163163561-67-162772572372972173173571-78-162782582382982183183581-89-162792592392992193193591-910-162802602403002203203601-1011-162812612413012213213611-1112-162822622423022223223621-1213-162832632433032233233631-1314-162842642443042243243641-1415-16			-		
2742542342942143143541-45-162752552352952153153551-56-162762562362962163163561-67-162772572372972173173571-78-162782582382982183183581-89-162792592392992193193591-910-162802602403002203203601-1011-162812612413012213213611-1112-162832632433032233233631-1314-162842642443042243243641-1415-16			-		
275 255 235 295 215 315 355 1-5 6-16   276 256 236 296 216 316 356 1-6 7-16   277 257 237 297 217 317 357 1-7 8-16   278 258 238 298 218 318 358 1-8 9-16   279 259 239 299 219 319 359 1-9 10-16   280 260 240 300 220 320 360 1-10 11-16   281 261 241 301 221 321 361 1-11 12-16   282 262 242 302 222 322 362 1-12 13-16   283 263 243 303 223 323 363 1-13 14-16   284 264 244 304 224 324 364 1-14 15-16			-		
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280   260   240   300   220   320   360   1-10   11-16     281   261   241   301   221   321   361   1-11   12-16     282   262   242   302   222   322   362   1-12   13-16     283   263   243   303   223   323   363   1-13   14-16     284   264   244   304   224   324   364   1-14   15-16			-		
281 261 241 301 221 321 361 1-11 12-16   282 262 242 302 222 322 362 1-12 13-16   283 263 243 303 223 323 363 1-13 14-16   284 264 244 304 224 324 364 1-14 15-16			-		
<u>282 262 242 302 222 322 362 1-12 13-16</u> <u>283 263 243 303 223 323 363 1-13 14-16</u> <u>284 264 244 304 224 324 364 1-14 15-16</u>			-		
283   263   243   303   223   323   363   1-13   14-16     284   264   244   304   224   324   364   1-14   15-16			-		
284 264 244 304 224 324 364 1-14 15-16			-		
			-		
<u>_ 285 265 245 305 225 325 365 1-15 16 8</u>			-		
		16	. 8	10 (4.5	

## Choosing an HEA

- 1) Decide if a Hand Reset or both Hand and electric Reset HEA is required
- 2) For an Electric Reset HWA go to step 3 For a Hand Reset HWA go to step 4
- 3) An HGA33 Auzilary Relay will accompany the HEA. The HGA is available as front or back connected.
- 4) Choose the number of contacts required and their action N.O and N.C)
- 5) Opening voltage of the HEA must be known

# Order Code breakdown

HEA61 * ***	** *	Contact option
A B C M		6 Contacts (plus 2 cotacts in coil circuit) 10 Contacts (plus 2 cotacts in coil circuit) 16 Contacts (plus 2 cotacts in coil circuit) 2 Contacts (plus 2 cotacts in coil circuit) 14 Contacts (plus 2 cotacts in coil circuit)
RU RD	xxx	Right angle up handle Right angle down handle Electrical data (see Group column under Selection
	X	guide) Panel thickness in inches

HEA63 * *** **	* Order Code Breakdown
Å B C D F G	<b>Contact Option</b> 5 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 9 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 15 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 5 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 9 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 15 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 9 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected 15 Contacts (plus 2 cotacts in coil circuit) with HGA33 aux relay front connected
RU	Right angle up handle
XXX	Electrical data (see Group column under Selection guide)
	X Panel thickness in inches

# Model HEA Hand and Electric Reset Selection Guide

Contact Arrangement Reset (latched) Position		Contact	Group With Front-connected Auxiliary (HGA33A)			– Contact	Group With Back-connected Auxiliary (HGA33B)				Approx Wt in Ibs (kg)		
Contact Numbers Norm open	Contact Numbers Norm Closed	Option	24 VDC	48 VDC	125 VDC	250 VDC	Option	24 VDC	48 VDC	125 VDC	250 VDC	Net	Ship
				5 Contact	(Plus 2 in Cor	tacts in Trip (	Circuit and 1	Contact in Re	set Circuit)				
None	2-6		241	331	221	211		241	331	221	211	14 (6.3)	
2	3-6		242	332	222	212	- - D	242	332	222	212		18 (8.2)
2-3	4-6	A	243	333	223	213		243	333	223	213		
2-4	5-6	A	244	334	224	214		244	334	224	214		
2-5	6		245	335	225	215		245	335	225	215		
2-6	None		246	336	226	216		246	336	226	216		
				9 Contact	(Plus 2 in Cor	ntacts in Trip	Circuit and 1	Contact in Re	eset Circuit)				
2	3-10		272	252	232	212	- - -	272	252	232	212		
2-3	4-10		273	253	233	213		273	253	233	213		
2-4	5-10		274	254	234	214		274	254	234	214		
2-5	6-10		275	255	235	215		275	255	235	215		
2-6	7-10	В	276	256	236	216	F	276	256	236	216	15 (6.8)	19 (8.6)
2-7	8-10		277	257	237	217		277	257	237	217	(0.0)	(0.0)
2-8	9-10		278	258	238	218		278	258	238	218		
2-9	10		279	259	239	219		279	259	239	219		
2-10	None		280	260	240	220		280	260	240	220		
				15 Contact	t (Plus 2 in Co	ntacts in Trip	Circuit and 1	Contact in F	eset Circuit)		_		
2-8	9-16		318	278	238	218		318	278	238	218		
2-9	10-16		319	279	239	219		319	279	239	219		
2-10	11-16		320	280	240	220		320	280	240	220		
2-11	12-16	С	321	281	241	221		321	281	241	221		
2-12	13-16		322	282	242	222	G	322	282	242	222	16 (7.2)	20
2-13	14-16		323	283	243	223		323	283	243	223	(7.2)	(9)
2-14	15-16		324	284	244	224		324	284	244	224		
2-15	16		325	285	245	225		325	285	245	225		
2-16	None		326	286	246	226		326	286	246	226		

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