



# Characteristic Curves for Magnum DS Circuit Breaker using Digitrip 1150 and Magnum Circuit Breaker using Digitrip 1150i

This envelope contains the following time-current curves:

Curve Description	Curve No.
Long Delay $I^2t$ , Short Delay Flat and $I^2t$ response Time-Phase Current Characteristic Curve based on $I_r$ , for types Magnum and Magnum DS Circuit Breakers	70C1034
Long Delay $I^4t$ , Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for types Magnum and Magnum DS Circuit Breakers	70C1035
IEEE Moderately Inverse, Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for Magnum DS Circuit Breaker	70C1038
IEEE Very Inverse, Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for Magnum DS Circuit Breakers	70C1039
IEEE Extremely Inverse, Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for Magnum DS Circuit Breakers	70C1040
IEC-A Normal Inverse, Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for Magnum Circuit Breakers	70C1031
IEC-B Very Inverse, Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for Magnum Circuit Breakers	70C1032
IEC-C Extremely Inverse, Short Delay Flat Time-Phase Current Characteristic Curve based on $I_r$ , for Magnum Circuit Breakers	70C1033
Instantaneous Time-Phase Current Characteristic Curve based on $I_n$ , for Magnum and Magnum DS Circuit Breakers	70C1043
Ground (Earth) Fault Flat and $I^2t$ - Trip or Alarm Only (LSIA style) Time-Ground Current Characteristic Curve based on $I_n$ , for Magnum and Magnum DS Circuit Breakers	70C1041

### Definitions

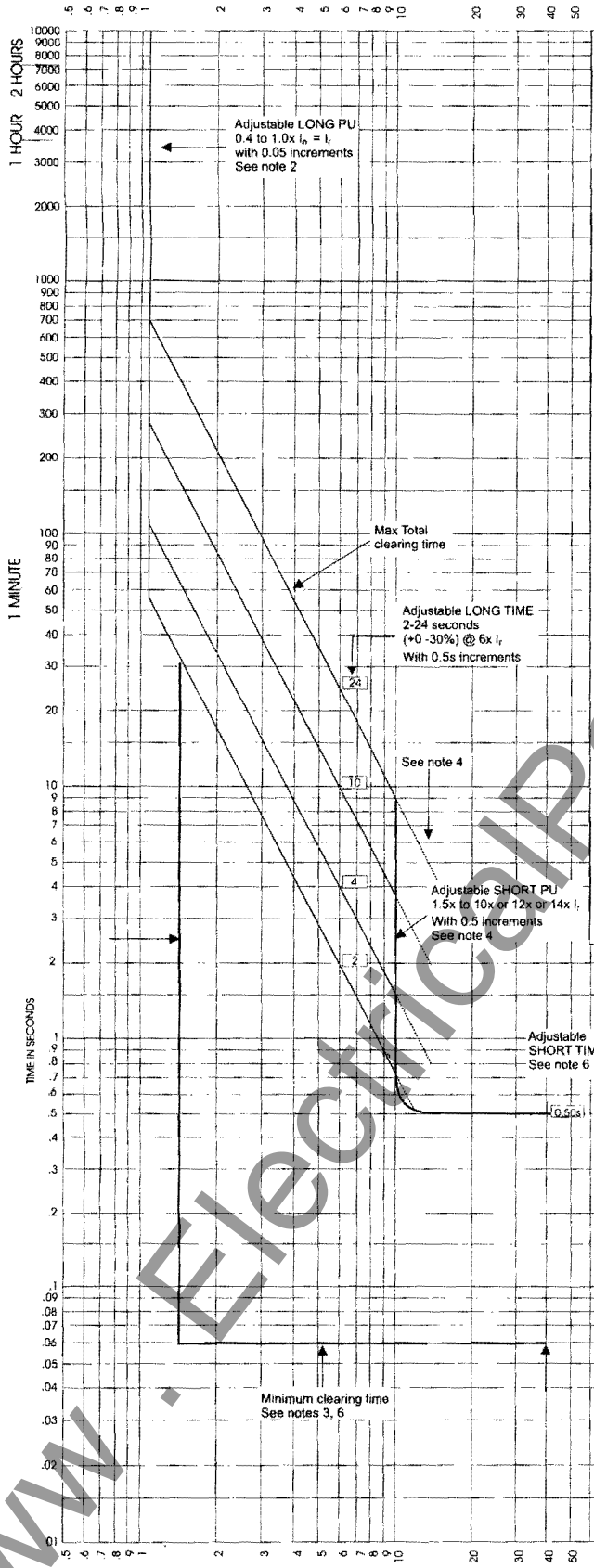
$I_n$  is the maximum value of continuous current for which the trip unit can be set.

$I_n$  is the basis (or reference) for both the Instantaneous and the Ground protection current settings.

The Ampere value of  $I_n$  is printed on the Rating Plug.

$I_r$  is the basis for both the Long Delay and Short Delay protection current settings.

The Ampere value of  $I_r$  is the Long Delay Pickup Setting  $\times I_n$ .



**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum and Magnum DS Circuit Breakers

Response: Long Delay (I<sup>2</sup>T) & Short Delay Trip (FLAT & I<sup>2</sup>T)  
This curve is for 50Hz or 60Hz applications.

Available Sensors and Matching Rating Plug in Amperes		
200A	800A	2500A
250A	1000A	3000A
300A	1200A	3200A
400A	1250A	4000A
600A	1600A	5000A
630A	2000A	6300A

**Notes:**

- There is a memory effect that can act to shorten the Long Delay. The memory effect comes into play if a current above the LONG PU value exists for a time, and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately five minutes is required between overloads to completely reset memory.
- This curve shown as a multiple of the LONG PU Setting (I<sub>L</sub>). The actual Pickup point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110% of the I<sub>L</sub> current, with a ±5% tolerance.

LongTIME Curve Equation:

$$\text{Trip} = \text{LongTIME} * 36 / I^2$$

where I is a multiple of I<sub>L</sub>.

The SHORT TIME function and the LongTIME function act independently and the entire set of LongTIME curves continue to be active even after the curves intersect.

- With zone interlocking on Short Delay utilized and no restraining signal, the minimum SHORT TIME band (0.10s) applies regardless of the SHORT TIME setting.
- SHORT PU (Max M1 setting) is an additional setting, based on I<sub>L</sub> (Plug), that can extend out where the SHORT PU will function.

Standard Breaker:

- 200A through 1250A M1=14x I<sub>L</sub>
- 1600A, 2000A, 2500A M1=12x I<sub>L</sub>
- 3000A, 3200A M1=10x I<sub>L</sub>

Double Wide Breaker:

- 2000A, 2500A M1=14x I<sub>L</sub>
- 3200A, 4000A, 5000A M1=12x I<sub>L</sub>
- 6300A M1=10x I<sub>L</sub>

- The SHORT PU points have 100% ± 5% tolerance.
- SHORT SLOPE: FLAT  
Tolerance is +0/-80 ms for all settings except  
0.10s setting is 0.06 to 0.13  
0.20s setting is 0.15 to 0.22
- SHORT SLOPE: I<sup>2</sup>T  
I<sup>2</sup>T slope flattens out at 8 x I<sub>L</sub> for top of band with FLAT time minimum value prevailing for bottom of band.

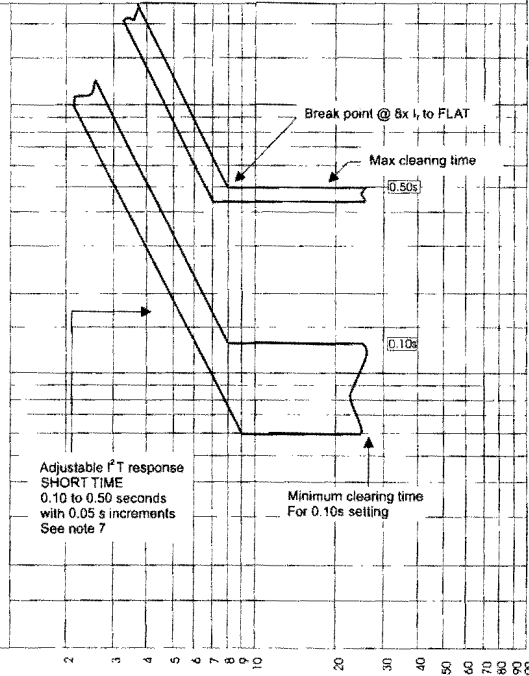
Curve Trip Equation: Trip = SHORT TIME \* 64 / I<sup>2</sup>, where I is a multiple of I<sub>L</sub> (top)

Curve Trip Equation: Trip = SHORT TIME \* 64 / I<sup>2</sup> \* 0.70 (bottom)

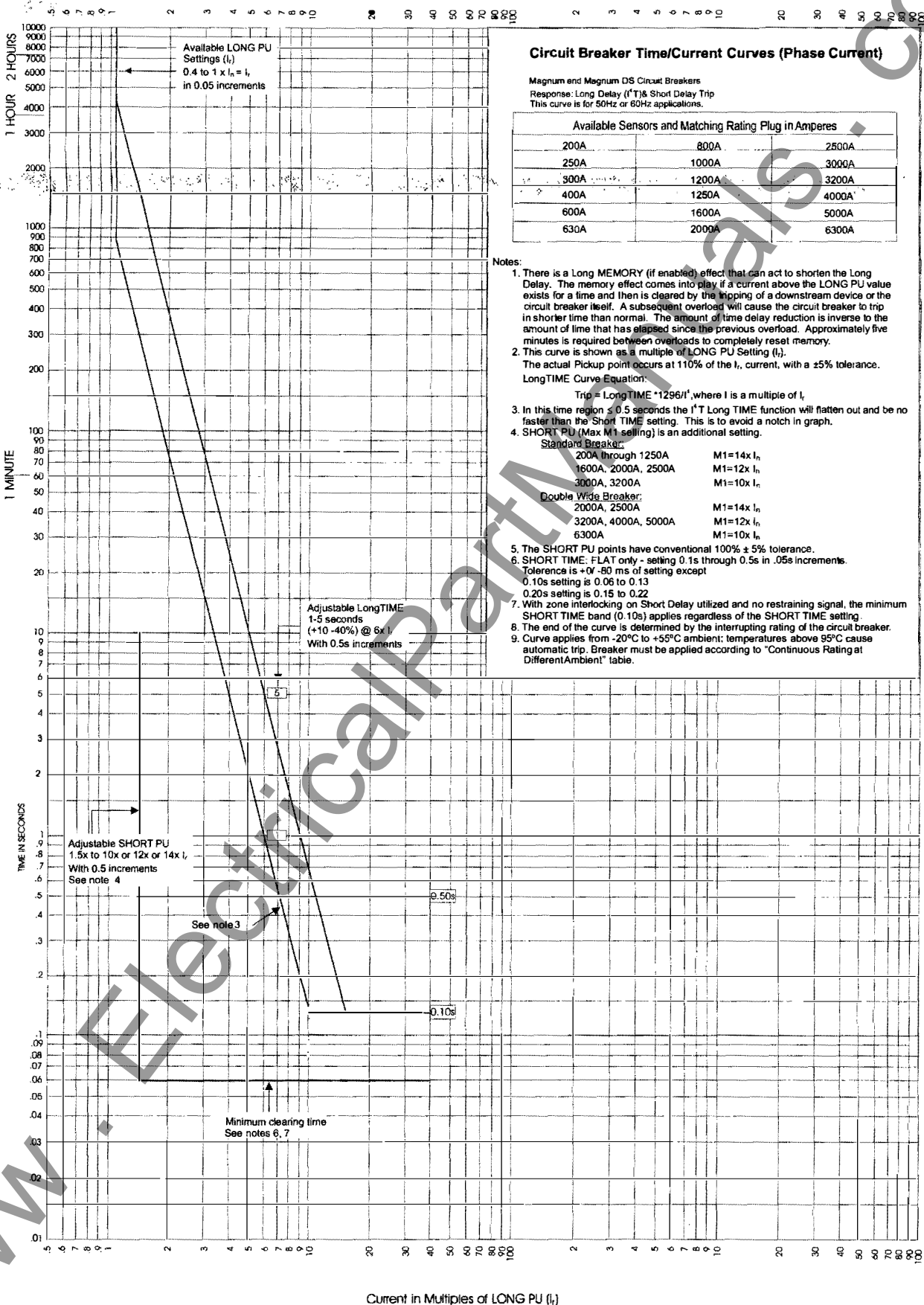
The above equations indicate tolerance is +0/-30% for all settings except  
0.10s is +30%-25%  
0.20s is +10%-25%

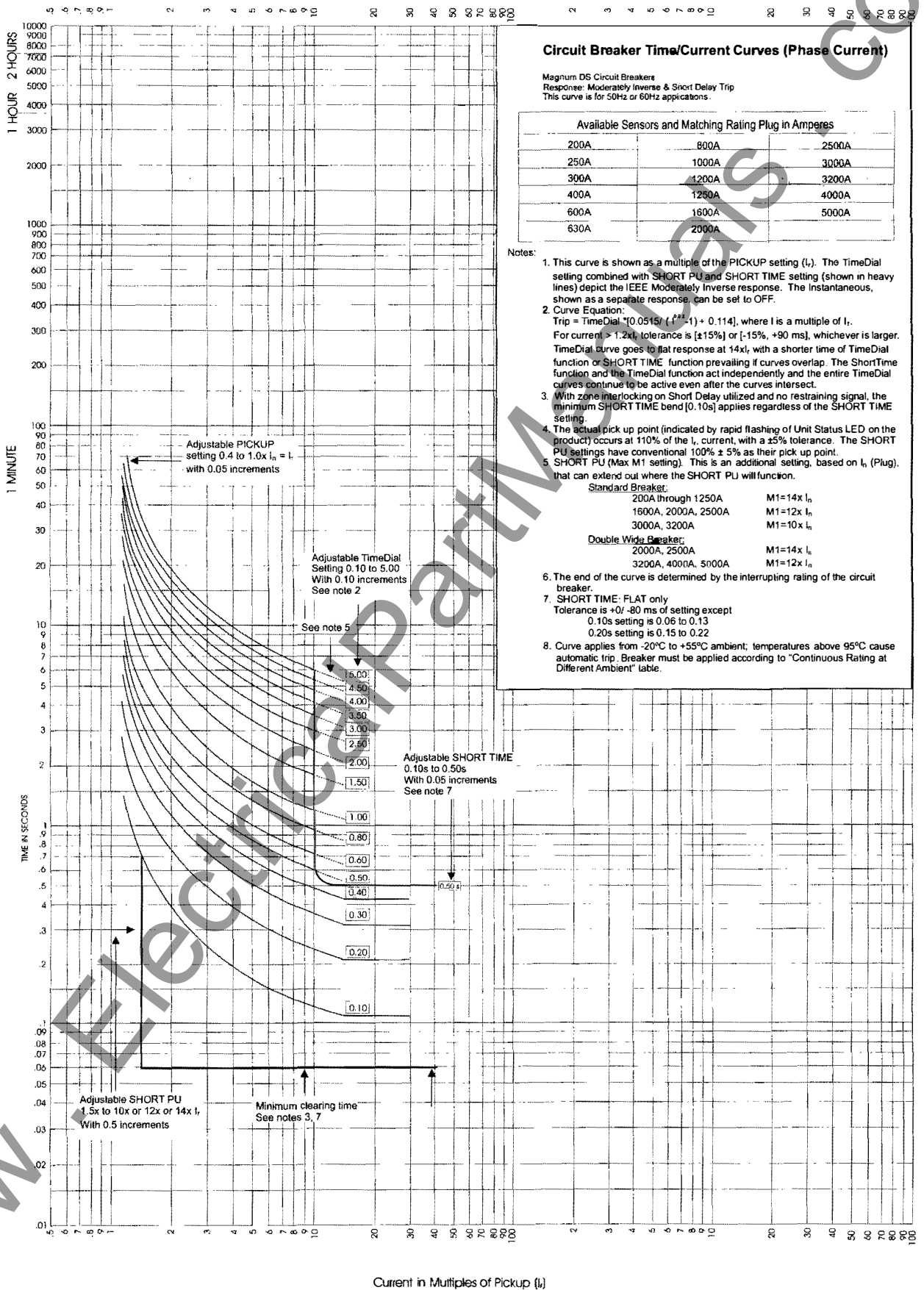
For all curves the lower flat response time value projected to I<sup>2</sup>T line will determine the other Break Point and shape of the curve

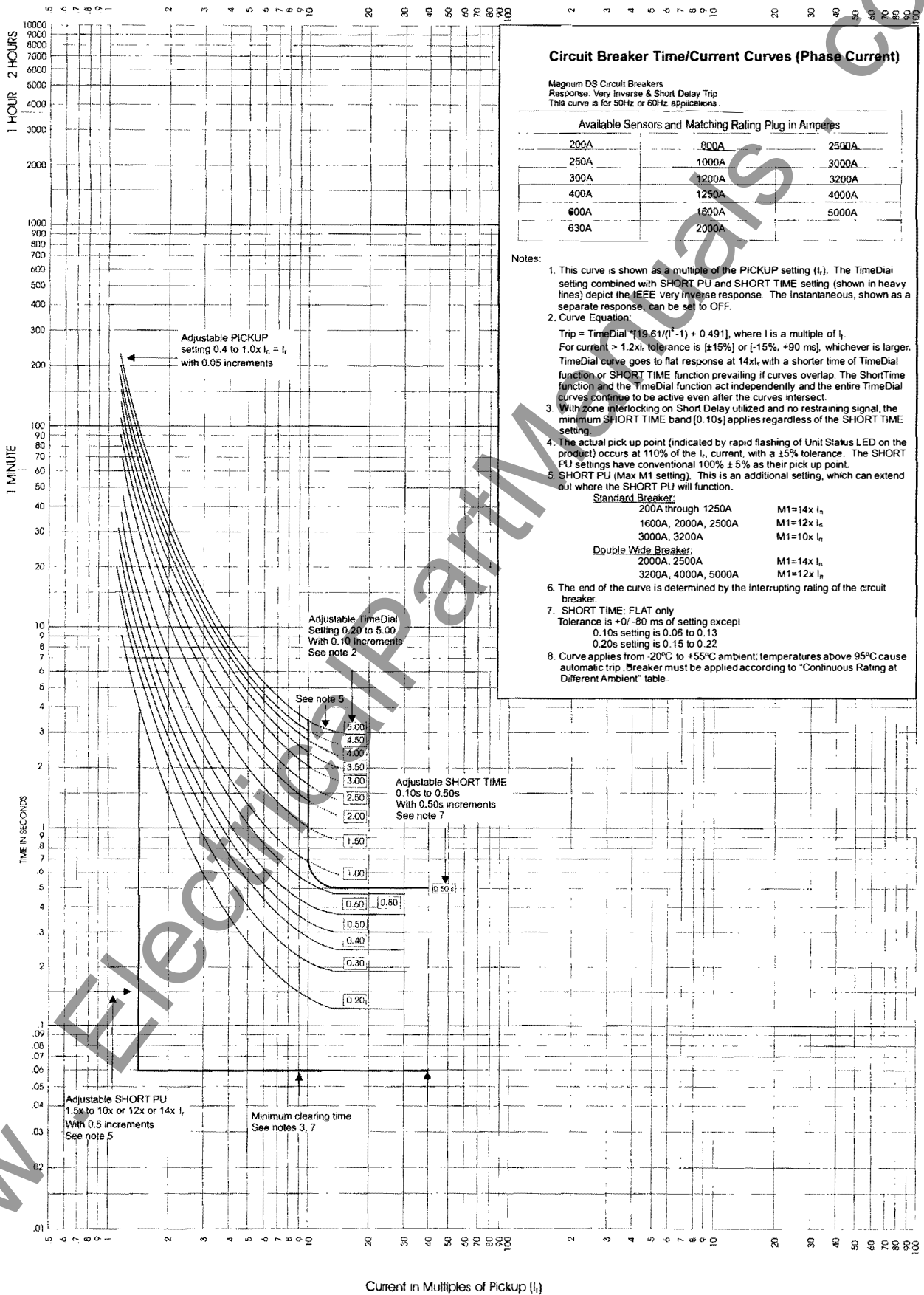
- The end of the curve is determined by the interrupting rating of the circuit breaker.
- Curve applies from -20°C to +55°C ambient; temperatures above 95°C cause automatic trip. Breaker must be applied according to "Continuous Rating at Different Ambient" table.



Current in Multiples of LONG PU (I<sub>L</sub>)







**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum DS Circuit Breakers  
Response: Very Inverse & Short Delay Trip  
This curve is for 50Hz or 60Hz applications.

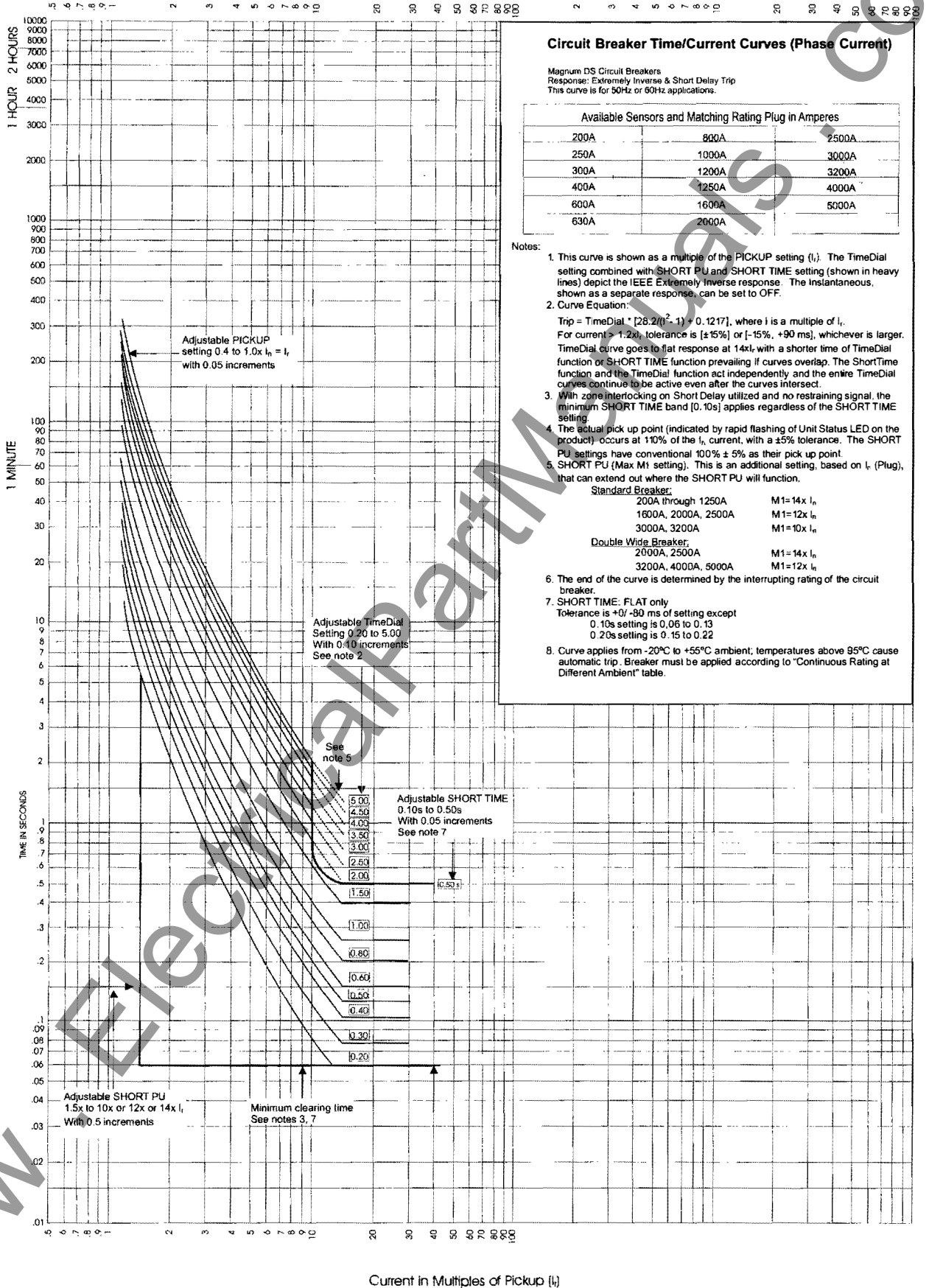
Available Sensors and Matching Rating Plug in Amperes

200A	800A	2500A
250A	1000A	3000A
300A	1200A	3200A
400A	1250A	4000A
600A	1600A	5000A
630A	2000A	

Notes:

- This curve is shown as a multiple of the PICKUP setting ( $I_1$ ). The TimeDial setting combined with SHORT PU and SHORT TIME setting (shown in heavy lines) depict the IEEE Very Inverse response. The Instantaneous, shown as a separate response, can be set to OFF.
- Curve Equation:  
Trip = TimeDial \* [19.61/(I<sup>1.1</sup> - 1) + 0.491], where I is a multiple of  $I_1$ .  
For current > 1.2x, tolerance is  $\pm 15\%$  or [-15%, +90 ms], whichever is larger. TimeDial curve goes to flat response at 14x $I_1$ , with a shorter time of TimeDial function or SHORT TIME function prevailing if curves overlap. The ShortTime function and the TimeDial function act independently and the entire TimeDial curves continue to be active even after the curves intersect.
- With zone interlocking on Short Delay utilized and no restraining signal, the minimum SHORT TIME band [0.10s] applies regardless of the SHORT TIME setting.
- The actual pick up point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110% of the  $I_1$  current, with a  $\pm 5\%$  tolerance. The SHORT PU settings have conventional 100%  $\pm 5\%$  as their pick up point.
- SHORT PU (Max M1 setting). This is an additional setting, which can extend out where the SHORT PU will function.  

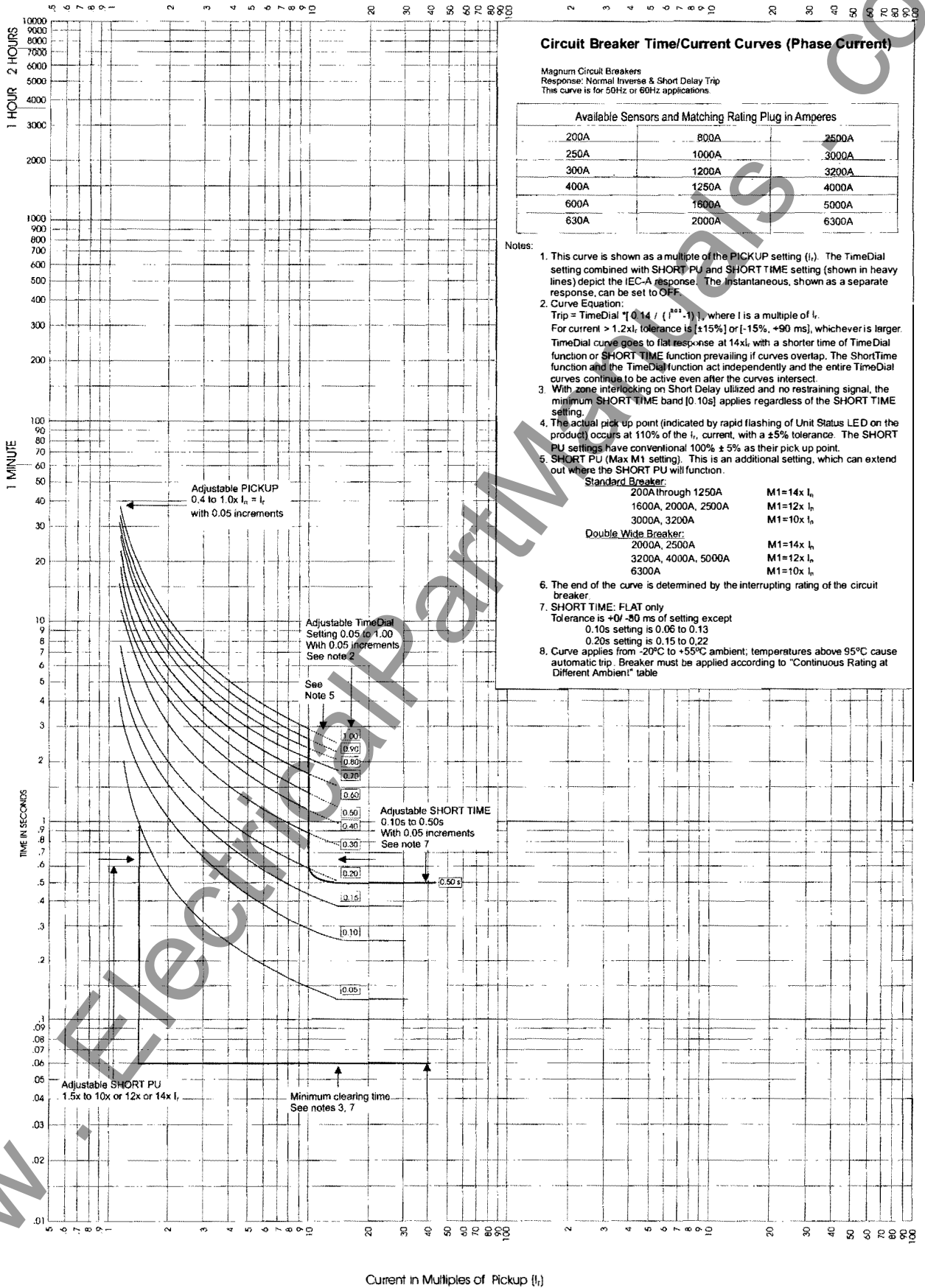
<b>Standard Breaker:</b>		
200A through 1250A	M1=14x $I_1$	
1600A, 2000A, 2500A	M1=12x $I_1$	
3000A, 3200A	M1=10x $I_1$	
<b>Double Wide Breaker:</b>		
2000A, 2500A	M1=14x $I_1$	
3200A, 4000A, 5000A	M1=12x $I_1$	
- The end of the curve is determined by the interrupting rating of the circuit breaker.
- SHORT TIME: FLAT only  
Tolerance is +0/-80 ms of setting except  
0.10s setting is 0.06 to 0.13  
0.20s setting is 0.15 to 0.22
- Curve applies from -20°C to +55°C ambient; temperatures above 95°C cause automatic trip. Breaker must be applied according to "Continuous Rating at Different Ambient" table.



**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum DS Circuit Breakers  
Response: Extremely Inverse & Short Delay Trip  
This curve is for 50Hz or 60Hz applications.

- Notes:
- This curve is shown as a multiple of the PICKUP setting (I<sub>n</sub>). The TimeDial setting combined with SHORT PU and SHORT TIME setting (shown in heavy lines) depict the IEEE Extremely Inverse response. The instantaneous, shown as a separate response, can be set to OFF.
  - Curve Equation:  
Trip = TimeDial \* [28.2/(I<sup>2</sup> - 1) + 0.1217], where i is a multiple of I<sub>n</sub>.  
For current > 1.2x I<sub>n</sub>, tolerance is [±15%] or [-15%, +90 ms], whichever is larger. TimeDial curve goes to flat response at 14x I<sub>n</sub>, with a shorter time of TimeDial function or SHORT TIME function prevailing if curves overlap. The ShortTime function and the TimeDial function act independently and the entire TimeDial curves continue to be active even after the curves intersect.
  - With zone interlocking on Short Delay utilized and no restraining signal, the minimum SHORT TIME band [0.10s] applies regardless of the SHORT TIME setting.
  - The actual pick up point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110% of the I<sub>n</sub> current, with a ±5% tolerance. The SHORT PU settings have conventional 100% ± 5% as their pick up point.
  - SHORT PU (Max M1 setting). This is an additional setting, based on I<sub>n</sub> (Plug), that can extend out where the SHORT PU will function.  
Standard Breaker:  
200A through 1250A M1=14x I<sub>n</sub>  
1600A, 2000A, 2500A M1=12x I<sub>n</sub>  
3000A, 3200A M1=10x I<sub>n</sub>  
Double Wide Breaker:  
2000A, 2500A M1=14x I<sub>n</sub>  
3200A, 4000A, 5000A M1=12x I<sub>n</sub>
  - The end of the curve is determined by the interrupting rating of the circuit breaker.
  - SHORT TIME: FLAT only  
Tolerance is +0/-80 ms of setting except  
0.10s setting is 0.06 to 0.13  
0.20s setting is 0.15 to 0.22
  - Curve applies from -20°C to +55°C ambient; temperatures above 95°C cause automatic trip. Breaker must be applied according to "Continuous Rating at Different Ambient" table.



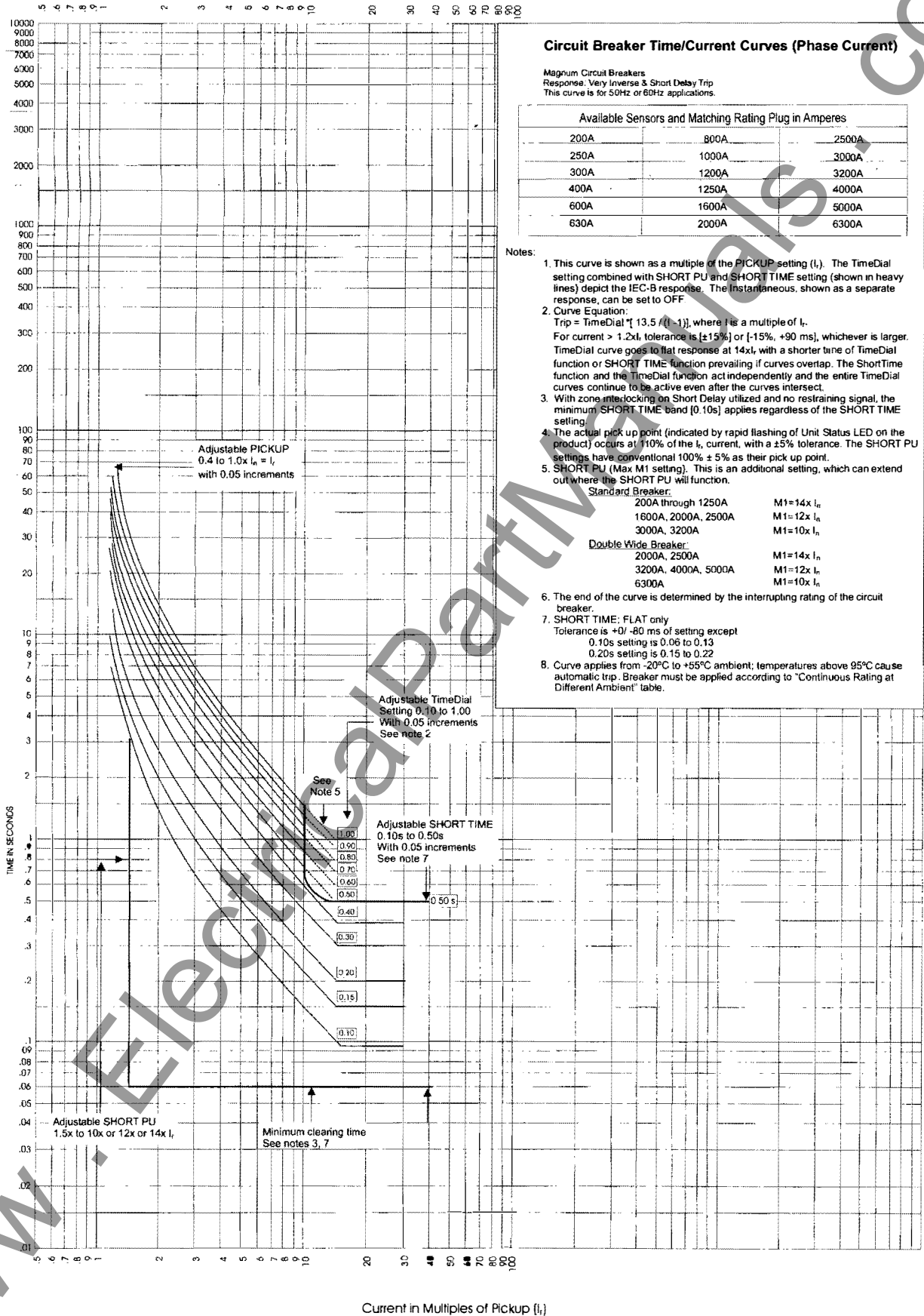
**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum Circuit Breakers  
Response: Normal Inverse & Short Delay Trip  
This curve is for 50Hz or 60Hz applications.

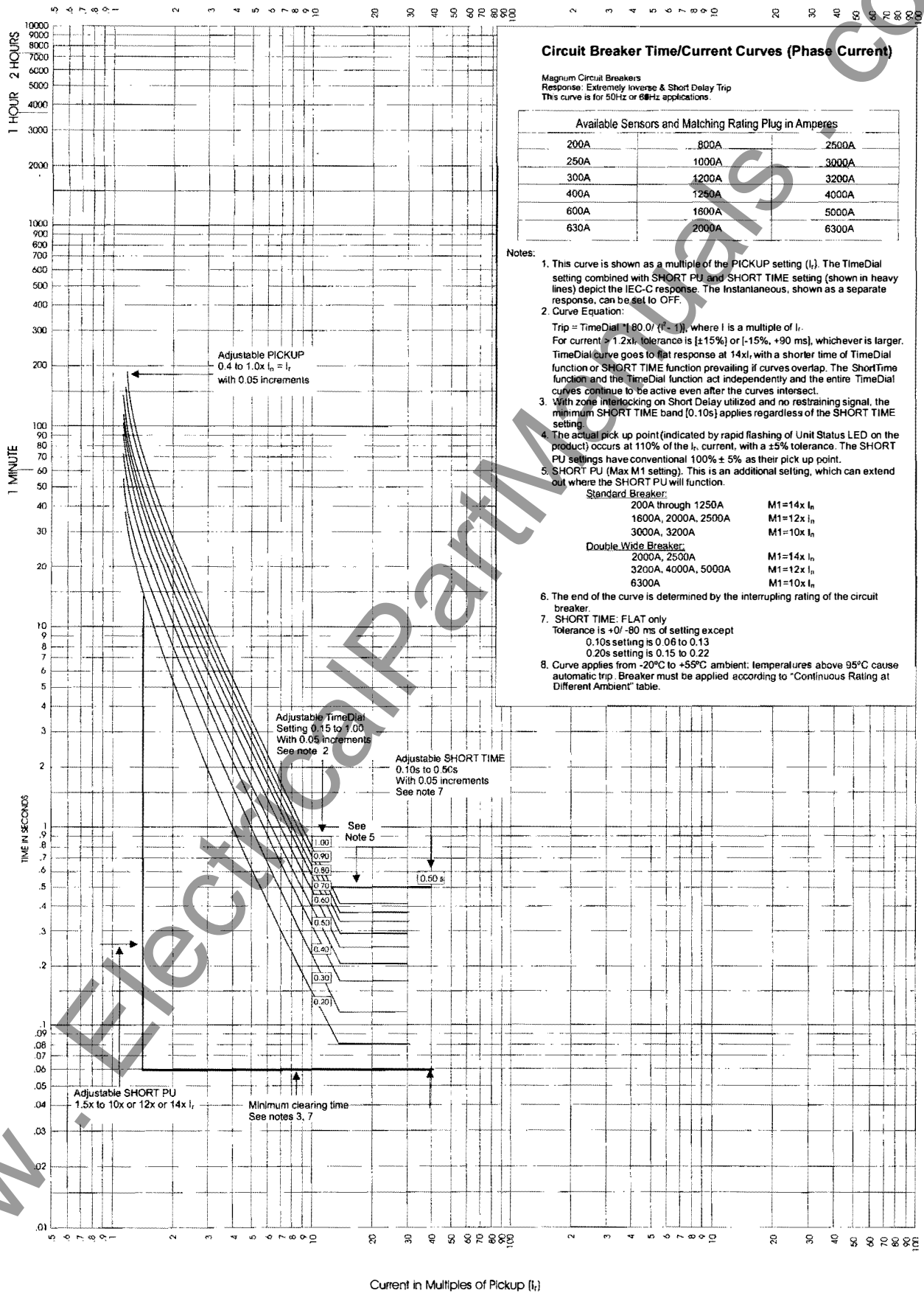
Available Sensors and Matching Rating Plug in Amperes		
200A	800A	2500A
250A	1000A	3000A
300A	1200A	3200A
400A	1250A	4000A
600A	1600A	5000A
630A	2000A	6300A

- Notes:
- This curve is shown as a multiple of the PICKUP setting (I<sub>t</sub>). The TimeDial setting combined with SHORT PU and SHORT TIME setting (shown in heavy lines) depict the IEC-A response. The instantaneous, shown as a separate response, can be set to OFF.
  - Curve Equation:  
Trip = TimeDial \* [0.14 / (I<sub>t</sub><sup>0.02</sup> - 1)]<sup>1.1</sup>, where I<sub>t</sub> is a multiple of I<sub>n</sub>.  
For current > 1.2xI<sub>n</sub>, tolerance is [±15%] or [-15%, +90 ms], whichever is larger. TimeDial curve goes to flat response at 14xI<sub>n</sub>, with a shorter time of TimeDial function or SHORT TIME function prevailing if curves overlap. The ShortTime function and the TimeDial function act independently and the entire TimeDial curves continue to be active even after the curves intersect.
  - With zone interlocking on Short Delay utilized and no restraining signal, the minimum SHORT TIME band (0.10s) applies regardless of the SHORT TIME setting.
  - The actual pick up point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110% of the I<sub>n</sub> current, with a ±5% tolerance. The SHORT PU settings have conventional 100% ± 5% as their pick up point.
  - SHORT PU (Max M1 setting). This is an additional setting, which can extend out where the SHORT PU will function.  

<b>Standard Breaker:</b>		
200A through 1250A	M1=14x I <sub>n</sub>	
1600A, 2000A, 2500A	M1=12x I <sub>n</sub>	
3000A, 3200A	M1=10x I <sub>n</sub>	
<b>Double Wide Breaker:</b>		
2000A, 2500A	M1=14x I <sub>n</sub>	
3200A, 4000A, 5000A	M1=12x I <sub>n</sub>	
6300A	M1=10x I <sub>n</sub>	
  - The end of the curve is determined by the interrupting rating of the circuit breaker.
  - SHORT TIME: FLAT only  
Tolerance is +0/-80 ms of setting except  
0.10s setting is 0.06 to 0.13  
0.20s setting is 0.15 to 0.22
  - Curve applies from -20°C to +55°C ambient; temperatures above 95°C cause automatic trip. Breaker must be applied according to "Continuous Rating at Different Ambient" table







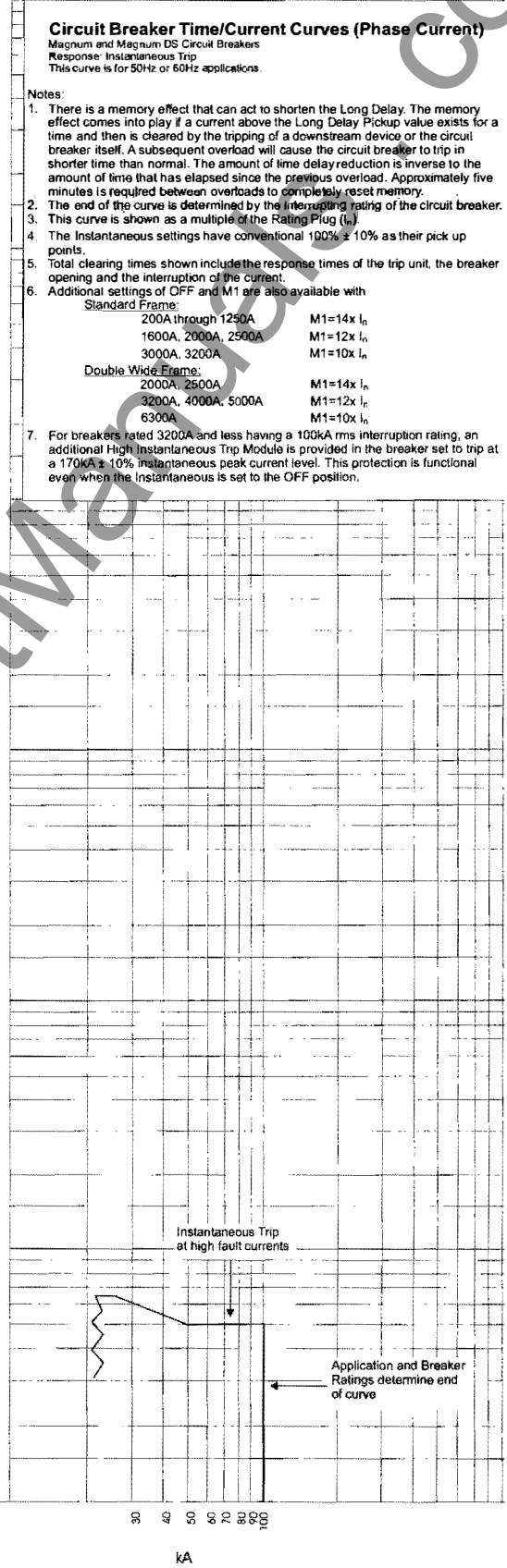
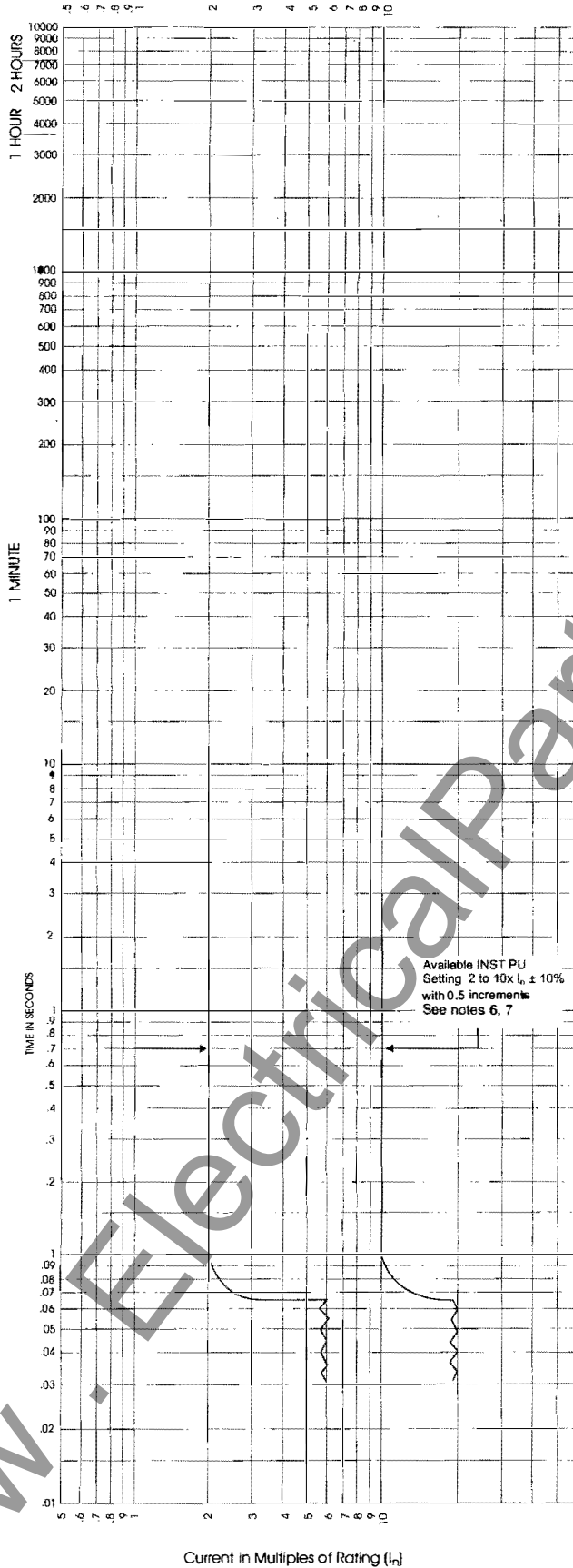
**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum Circuit Breakers  
Response: Extremely Inverse & Short Delay Trip  
This curve is for 50Hz or 60Hz applications.

Available Sensors and Matching Rating Plug in Amperes		
200A	800A	2500A
250A	1000A	3000A
300A	1200A	3200A
400A	1250A	4000A
600A	1600A	5000A
630A	2000A	6300A

- Notes:
- This curve is shown as a multiple of the PICKUP setting (I<sub>1</sub>). The TimeDial setting combined with SHORT PU and SHORT TIME setting (shown in heavy lines) depict the IEC-C response. The instantaneous, shown as a separate response, can be set to OFF.
  - Curve Equation:  
Trip = TimeDial \* 180.0 / (I<sub>n</sub> - 1), where I<sub>n</sub> is a multiple of I<sub>1</sub>.  
For current > 1.2x<sub>1</sub>, tolerance is [±15%] or [-15%, +90 ms], whichever is larger. TimeDial curve goes to flat response at 14x<sub>1</sub>, with a shorter time of TimeDial function or SHORT TIME function prevailing if curves overlap. The ShortTime function and the TimeDial function act independently and the entire TimeDial curves continue to be active even after the curves intersect.
  - With zone interlocking on Short Delay utilized and no restraining signal, the minimum SHORT TIME band [0.10s] applies regardless of the SHORT TIME setting.
  - The actual pick up point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110% of the I<sub>n</sub> current, with a ±5% tolerance. The SHORT PU settings have conventional 100% ± 5% as their pick up point.
  - SHORT PU (Max M1 setting). This is an additional setting, which can extend out where the SHORT PU will function.
 

<u>Standard Breaker:</u>	
200A through 1250A	M1=14x I <sub>n</sub>
1600A, 2000A, 2500A	M1=12x I <sub>n</sub>
3000A, 3200A	M1=10x I <sub>n</sub>
<u>Double Wide Breaker:</u>	
2000A, 2500A	M1=14x I <sub>n</sub>
3200A, 4000A, 5000A	M1=12x I <sub>n</sub>
6300A	M1=10x I <sub>n</sub>
  - The end of the curve is determined by the interrupting rating of the circuit breaker.
  - SHORT TIME: FLAT only  
Tolerance is +0/-80 ms of setting except  
0.10s setting is 0.06 to 0.13  
0.20s setting is 0.15 to 0.22
  - Curve applies from -20°C to +55°C ambient; temperatures above 95°C cause automatic trip. Breaker must be applied according to "Continuous Rating at Different Ambient" table.



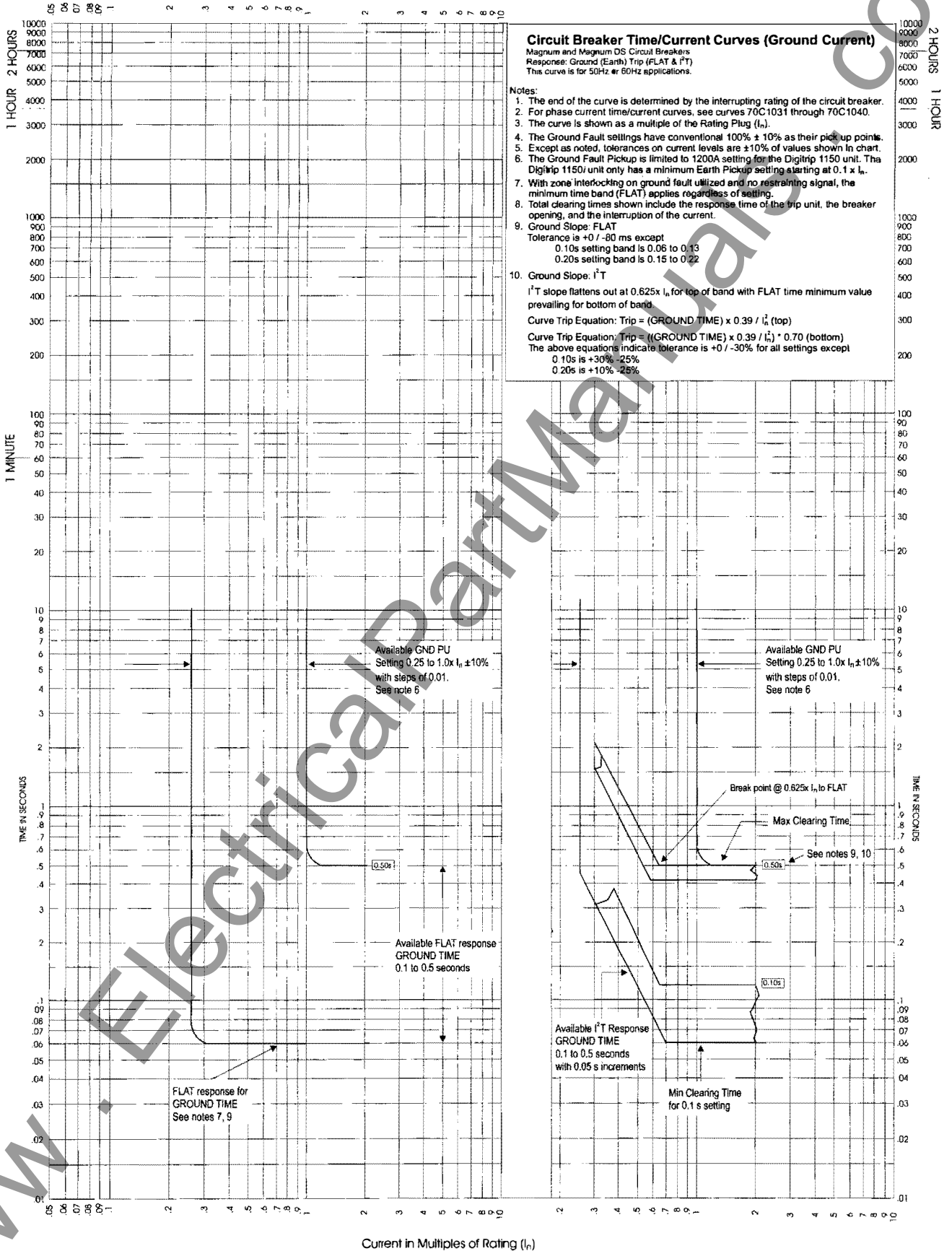
**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum and Magnum DS Circuit Breakers  
 Response: Instantaneous Trip  
 This curve is for 50Hz or 60Hz applications.

**Notes:**

1. There is a memory effect that can act to shorten the Long Delay. The memory effect comes into play if a current above the Long Delay Pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately five minutes is required between overloads to completely reset memory.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. This curve is shown as a multiple of the Rating Plug ( $I_n$ ).
4. The Instantaneous settings have conventional  $100\% \pm 10\%$  as their pick up points.
5. Total clearing times shown include the response times of the trip unit, the breaker opening and the interruption of the current.
6. Additional settings of DFF and M1 are also available with
 

<b>Standard Frame:</b>	
200A through 1250A	M1=14x $I_n$
1600A, 2000A, 2500A	M1=12x $I_n$
3000A, 3200A	M1=10x $I_n$
<b>Double Wide Frame:</b>	
2000A, 2500A	M1=14x $I_n$
3200A, 4000A, 5000A	M1=12x $I_n$
6300A	M1=10x $I_n$
7. For breakers rated 3200A and less having a 100kA rms interruption rating, an additional High Instantaneous Trip Module is provided in the breaker set to trip at a  $170kA \pm 10\%$  instantaneous peak current level. This protection is functional even when the Instantaneous is set to the OFF position.



# MOUNTING- INSTRUCTION

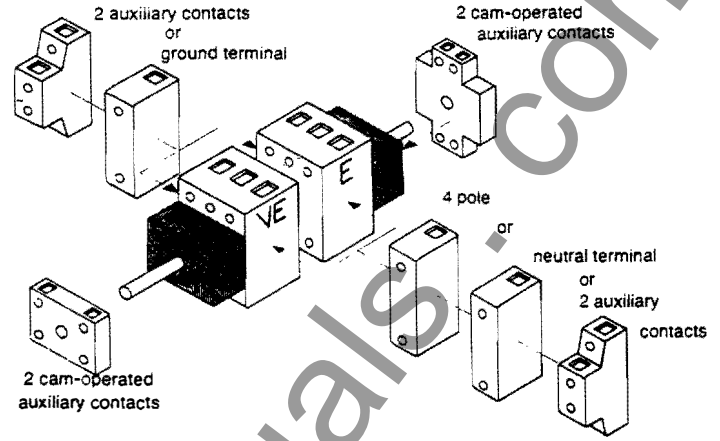
## FOR TYPE KG – SWITCHES

The flexibility of the modular system offers maximum variability even for retrofitting purposes. The additional modules can be retrofitted on site with the switch already installed, the only exception being the cam-operated auxiliary contacts.

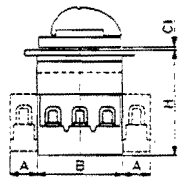
### MOUNTING OF ADDITIONAL MODULES

The mounting of additional modules, like ground terminal, neutral terminal, auxiliary contacts or a fourth pole, is accomplished by slipping the module from the shaft-side into the slot integrated on the left and right side of the switch, as far as a click can be heard.

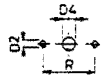
Note: If the isolator has been installed and is operational, ensure that the incoming supply is disconnected before fitting additional modules. A switch can be equipped with one module each left and right.



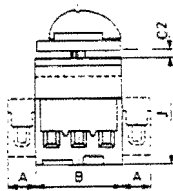
### Mounting E



KG20/KG32



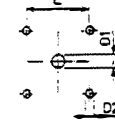
### Mounting VE



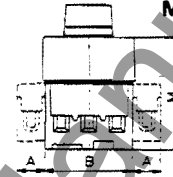
KG20/KG32



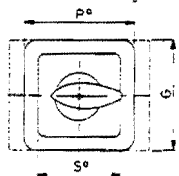
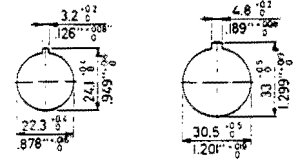
KG20A-KG100C



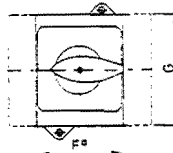
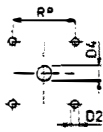
### Mounting VE2



Mounting FT1, FT2:  
KG20A/KG32A



KG20A-KG100C



22mm

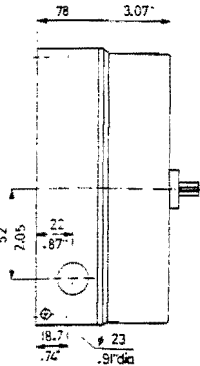
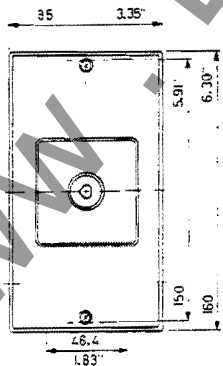
30mm

Dimensions mm  
inch

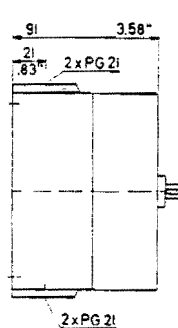
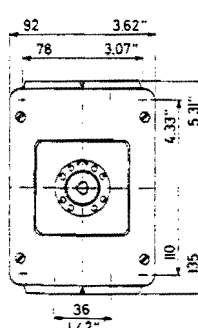
Type	Cam-operated auxiliary contacts	A*)	B	C1	C2	D1	D2	D3	D4	E	F	G	H	J	K	L	M	N	O	P	R	S	
KG20/	without	13,5	42,0	1-4	12,0	6,5	3,2	4,1	8,0	20,0	30,0	54,0	50,8 2,00	50,0 1,97	22,0 ±0,5	60,0 ±0,5					20,0	30,0	
KG32	with	.58	1,65	.04-.16	.47	.26	.13	.16	.31	.79	1,18	2,13	59,8 2,35	59,0 2,32	.87 ±0,2	2,36 ±0,2					.79	1,18	
KG20A/	without	13,5	42,0	1-4	12,0	6,5	4,1	4,1	8,5	36,0	48,0	54,0	53,8 2,12	50,0 1,97	22,0 ±0,5	60,0 ±0,5	57,0 2,24	42,0	37,0	48,0	36,0	48,0	
KG32A	with	.53	1,65	.04-.16	.47	.26	.16	.16	.37	1,42	1,89	2,13	62,8 2,47	59,0 2,32	.87 ±0,2	2,36 ±0,2	66,0 2,60	1,65	1,48	1,89	1,42	1,89	
KG20B/	without	13,5	42,0	1-4	13,5	9,0	4,1	4,1	9,5	48,0	64,0	54,0	53,8 2,12	50,0 1,97	22,0 ±0,5	60,0 ±0,5					64,0	48,0	64,0
KG32B	with	.53	1,65	.04-.16	.58	.35	.16	.16	.37	1,89	2,52	2,13	62,8 2,47	59,0 2,32	.87 ±0,2	2,36 ±0,2					2,52	1,89	2,52
KG41/	without	16,0	50,0	1-4	12,0	9,0	4,1	4,1	.37	36,0	46,0	64,0	60,5 2,38	61,0 2,40	25,0 ±0,5	70,0 ±0,5	64,0 2,52	52,4	45,0		64,0	36,0	48,0
KG64	with	.53	1,37	.04-.16	.47	.35	.16	.16		1,42	1,89	2,52	70,5 2,78	68,0 2,68	25,0 ±0,5	90,0 ±1,0	74,0 2,91	2,06	1,77				
KG41B/	without	16,0	50,0	1-4	13,5	9,0	4,1	4,1	9,5	46,0	64,0	64,0	60,5 2,38	61,0 2,40	25,0 ±0,5	70,0 ±0,5					64,0	48,0	64,0
KG64B	with	.53	1,97	.04-.16	.53	.35	.16	.16	.37	1,89	2,52	2,52	70,5 2,87	68,0 2,80	25,0 ±0,2	90,0 ±0,2					2,52	1,89	2,52
KG80/	without	22,0	70,0	1-4	13,5	9,0	4,1	5,2	9,5	48,0	64,0	80,0	70,5 2,78	68,0 2,68	25,0 ±0,5	90,0 ±1,0	70,0 2,76	70,0 2,76	45,0 1,77		86,0	48,0	64,0
KG100	with	.87	2,76	.04-.16	.53	.35	.16	.20	.37	1,89	2,52	3,15	80,6 3,17	78,0 3,07	.98 ±0,2	3,54 ±0,4					3,46	1,89	2,52
KG80C/	without	22,0	70,0	1-4	13,5	9,0	5,2	5,2	9,5	68,0	86,0	80,0	70,5 2,78	68,0 2,68	25,0 ±0,5	90,0 ±1,0					86,0	68,0	86,0
KG100C	with	.87	2,76	.04-.16	.53	.35	.20	.20	.37	2,68	3,46	3,15	80,6 3,17	78,0 3,07	.98 ±0,2	3,54 ±0,4					3,46	2,68	3,46

\*) Lateral auxiliary contact block. KG20/KG32: 10 mm, .39 inch  
KG41/KG100C: 11 mm, .43 inch

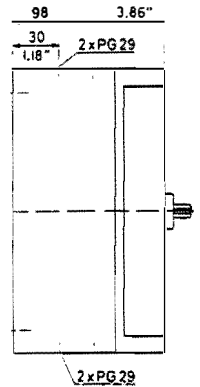
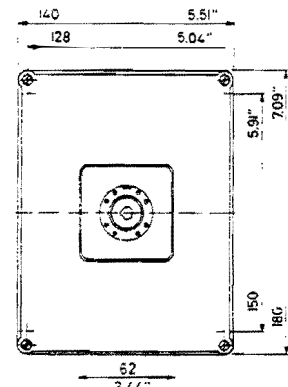
### Mounting KL: KG20B/KG32B



### Mounting PFB/PFE: KG41/KG64



### Mounting PFB/PFE: KG80/KG100



Switches may only be mounted, connected and set into operation by qualified persons according to the accepted rules of technology. Do neither lubricate nor treat contacts.

## TECHNICAL DATA

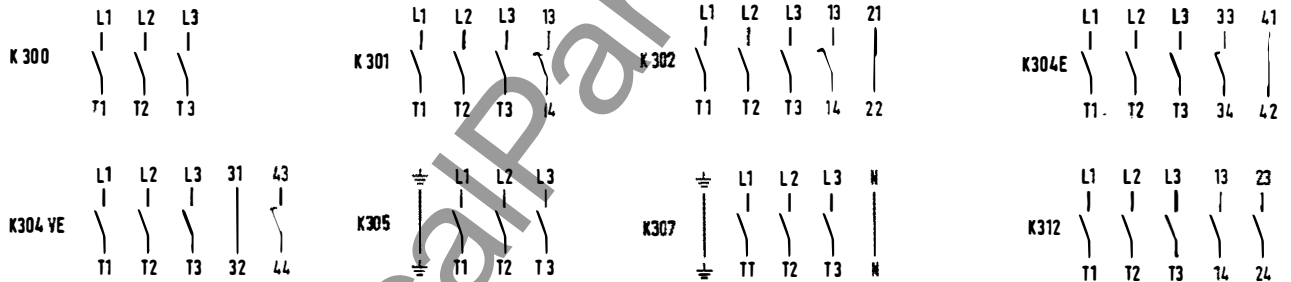
Type	Specification	Thermal rated current UL cat. AC21 General Use	AC11 110V 380V 240V 440V Pilot Duty	Volt	AC3-Direct-on-line rating												Standard motor load													
					3phase-3pole						1phase-2pole						3phase-3pole						1phase-2pole							
					110 120	220 240	380 415	440 480	500	550 600	660	110 120	220 240	277 300	440 480	500	550 600	660	110 120	220 240	380 440	500	550 600	660	110 120	220 240	380 440	500	550 600	660
KG 20/KG 20A/KG 20B	IEC, VDE, BS, SEV UL, CSA	25 A	--	kW HP	1,5 1,5	3 3	5,5 5	5,5 5	5,5 5	5,5 5	5,5 5	0,55 0,5	1,5 1,5	2 2	3 3	3 3	3 3	3 3	3 3	3 3	1,8 1,8	4 4	7,5 7,5	7,5 7,5	7,5 7,5	0,75 0,75	2 2	3,7 3,7	7 7	
KG 32/KG 32A/KG 32B	IEC, VDE, BS, SEV UL, CSA	32 A	--	kW HP	2 2	4 5	7,5 10	7,5 10	7,5 10	7,5 10	7,5 10	0,75 0,75	2,2 2,2	3 3	3,7 3,7	3,7 3,7	3,7 3,7	3,7 3,7	3,7 3,7	3,7 3,7	2,5 2,5	5,5 5,5	11 11	11 11	11 11	1,1 1,1	3 3	5,5 5,5	5,5 5,5	
KG 41/KG 41B	IEC, VDE, BS, SEV UL, CSA	40 A	--	kW HP	3 3	7,5 7,5	11 10	11 15	15 15	11 15	11 15	1,5 1,5	3 3	5 5	5,5 5,5	5,5 5,5	7,5 7,5	7,5 7,5	7,5 7,5	7,5 7,5	3,7 3,7	7,5 7,5	15 15	18,5 18,5	15 15	2,2 2,2	4 4	7,5 7,5	8,5 8,5	7,5 7,5
KG 64/KG 64B	IEC, VDE, BS, SEV UL, CSA	63 A	--	kW HP	4 5	11 10	18,5 15	18,5 20	22 20	15 20	15 20	2,2 2,2	4 5	7,5 7,5	7,5 7,5	11 10	11 10	11 10	11 10	7,5 7,5	5,5 5,5	11 11	22 22	30 30	18,5 18,5	3 3	5,5 5,5	11 11	15 15	11 11
KG 80/KG 80C	IEC, VDE, BS, SEV UL, CSA	80 A	--	kW HP	7,5 7,5	15 20	22 30	22 40	30 50	18,5 50	18,5 50	3 3	7,5 10	11 15	11 20	15 20	15 20	15 20	15 20	7,5 7,5	7,5 7,5	18,5 18,5	30 30	37 37	22 22	4 4	10 10	15 15	18,5 18,5	15 15
KG 100/KG 100C	IEC, VDE, BS, SEV UL, CSA	100 A	--	kW HP	8,5 10	18,5 25	30 40	30 50	37 50	22 50	22 50	4 5	8,5 15	15 15	15 25	18,5 30	18,5 30	18,5 30	18,5 30	11 11	10 10	22 22	37 37	45 45	30 30	4,5 4,5	11 11	18,5 18,5	22 22	18,5 18,5
Aux. contacts	IEC, VDE, BS, SEV	10 A	2,5A 1,5A Heavy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KG 20 - KG 32B	UL, CSA	10 A	600V A.C.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	IEC, VDE, BS, SEV	16 A	6A 4A Heavy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KG 41 - KG 100C	UL, CSA	10 A	600V A.C.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

### ADDITIONAL INFORMATION FOR APPLICATIONS ACCORDING TO UL AND CSA SPECIFICATIONS

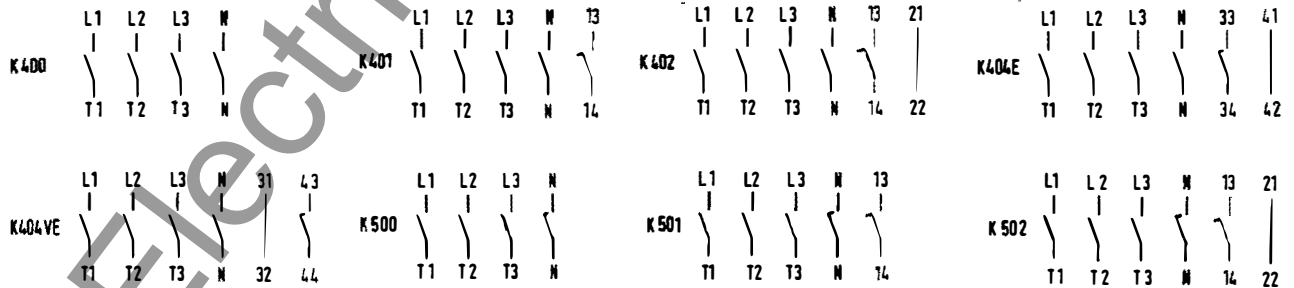
Switch type	Type of wire	Temperature rating of wire	Torque value for field wiring terminals	Short circuit protection according to UL
KG20/KG20A/KG20B; KG32/KG32A/KG32B KG41/KG41B; KG64/KG64B KG80/KG80C; KG100/KG100C	use copper wire only	60/75°C 60/75°C 75°C	15 lb-in. / 1,7 Nm 25 lb-in. / 2,8 Nm 27 lb-in. / 3,0 Nm	These devices are suitable for use on circuits capable of delivering not more than 10kA rms symmetrical amperes, 600V ac max. when protected by Type RK1 fuses.

## WIRING DIAGRAM

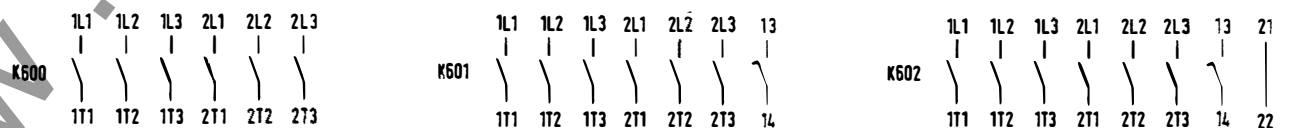
### ON/OFF SWITCHES 3pole



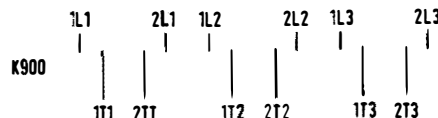
### ON/OFF SWITCHES 4pole



### ON/OFF SWITCHES 6pole



### DOUBLE-THROW SWITCH WITH CENTER 'OFF' 3pole

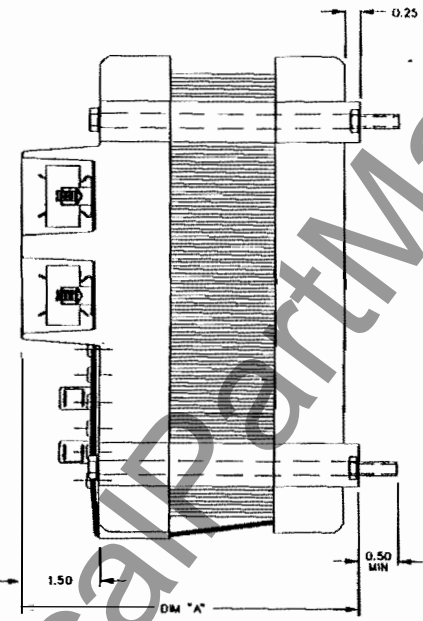
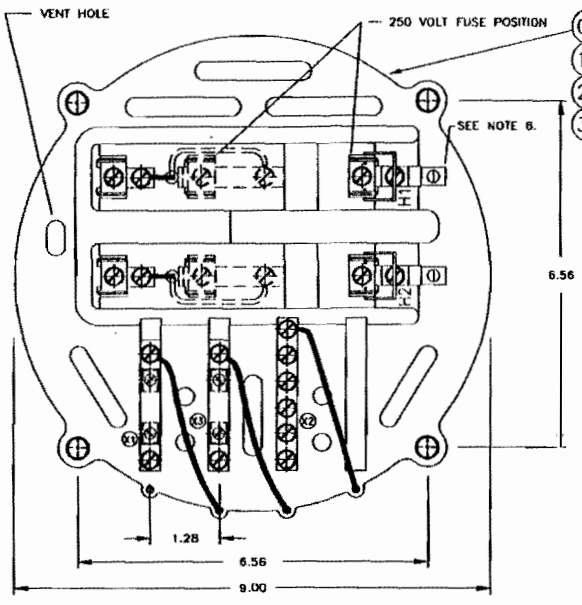


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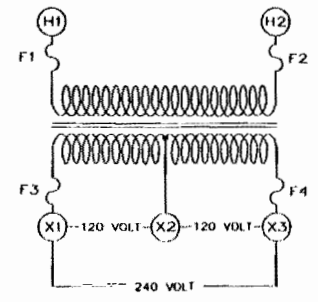
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- NOTES:
1. INSULATION LEVEL: 0.6 kV, CLASS H (180°C).
  2. FREQUENCY: 60 Hz.
  3. APPLICATION: CONTROL POWER TRANSFORMER FOR LINE TO LINE PRIMARY CONNECTION WITH DUAL SECONDARY OPERATION - 240/120 VOLTS - SEE CONNECTION DIAGRAM BELOW. (PRIMARY AND SECONDARY FUSE CLIPS SUPPLIED). FUSE RATINGS PER TABLE. THIS TRANSFORMER MAY HAVE VERY HIGH INRUSH CURRENTS. THEREFORE TYPE RK-5 FUSES MUST BE USED.
  4. TERMINALS ARE 10-32 PLAIN BRASS, PAN HEAD SCREWS.
  5. MOUNTING BOLTS (4) ARE 1/4"-20, ZINC PLATED.
  6. VENDOR TO SUPPLY ILSCO TERMINAL LUGS (SLU-25), OR PROVISION TO ACCEPT #10 RING TERMINALS.
  7. UL RECOGNITION IS UNDER FILE E161807, MANUFACTURED AND TESTED TO UL STANDARD 505.

I.T.I. MODEL	RATING @ 40°C	TOTAL WATTS DISSIPATED (APPROX)	DIM "A"	APPROX WEIGHT
401	1 kVA	50	5.60	30
402	2 kVA	80	6.55	35
403	3 kVA	100	7.25	40
405	5 kVA	170	8.75	60

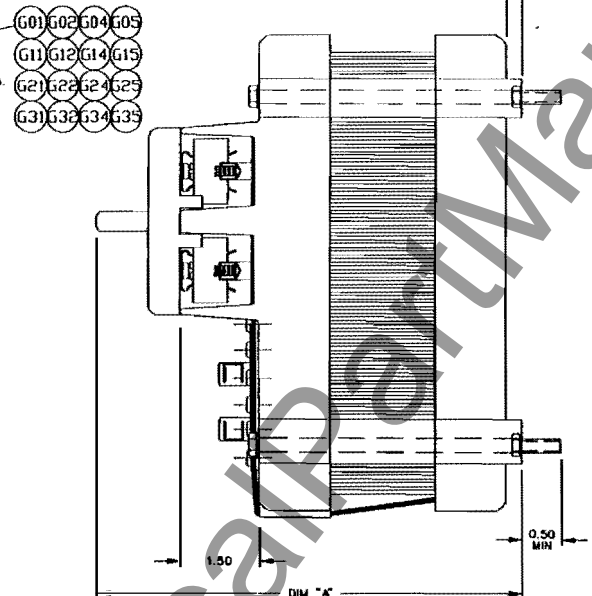
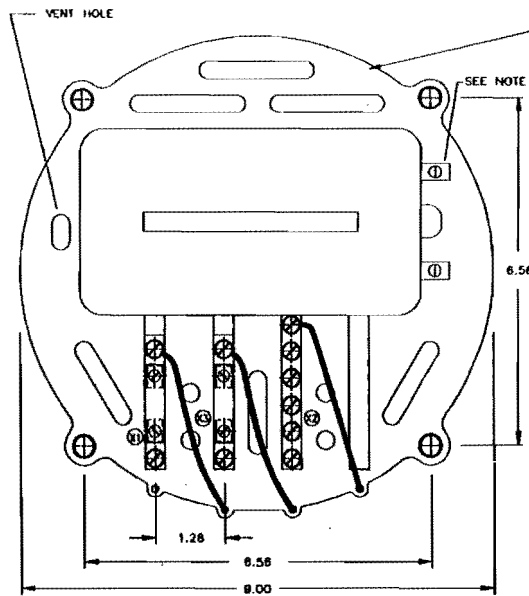


PRI L-L VOLTS (H1-H2)	1 kVA - MODEL 401				2 kVA - MODEL 402				3 kVA - MODEL 403				5 kVA - MODEL 405				
	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	
600	H01	401-600	1.67	RK-5, 5A 600 VOLT TYPE FRS-R	H11	402-600	3.33	RK-5, 8A 600 VOLT TYPE FRS-R	H21	403-600	5.00	RK-5, 12A 600 VOLT TYPE FRS-R	H31	405-600	8.33	RK-5, 20A 600 VOLT TYPE FRN-R	
480	H02	401-480	2.08	RK-5, 5A 600 VOLT TYPE FRS-R	H12	402-480	4.17	RK-5, 10A 600 VOLT TYPE FRS-R	H22	403-480	6.25	RK-5, 15A 600 VOLT TYPE FRS-R	H32	405-480	10.42	RK-5, 25A 600 VOLT TYPE FRN-R	
240	H04	401-240	4.17	RK-5, 10A 600 VOLT TYPE FRS-R	H14	402-240	8.33	RK-5, 20A 600 VOLT TYPE FRS-R	H24	403-240	12.50	RK-5, 30A 600 VOLT TYPE FRS-R	H34	405-240	20.83	RK-5, 50A 250 VOLT TYPE FRN-R	
208	H05	401-208	4.81	RK-5, 12A 600 VOLT TYPE FRS-R	H15	402-208	9.62	RK-5, 20A 600 VOLT TYPE FRS-R	H25	403-208	14.42	RK-5, 30A 600 VOLT TYPE FRS-R	H35	405-208	24.04	RK-5, 60A 250 VOLT TYPE FRN-R	
SEC: X1 & X3		4.17	6 AMP MAX			8.33	12 AMP MAX			12.50	20 AMP MAX			20.83	30 AMP MAX		

405-240 & 405-208 PRIMARY FUSES ARE 250 VOLT (BUSSMANN, TYPE FRN-R, 13/16 x 3 INCHES).  
 401-600 THRU 405-480 PRIMARY FUSES ARE 600 VOLT (BUSSMANN, TYPE FRS-R, 13/16 x 5 INCHES).  
 SECONDARY FUSE RATINGS LISTED ABOVE - USE BUSSMANN TYPE TNG, TIME DELAY FUSES.

TOLERANCES - SEE DRAWING 348A980 (UNLESS OTHERWISE NOTED)

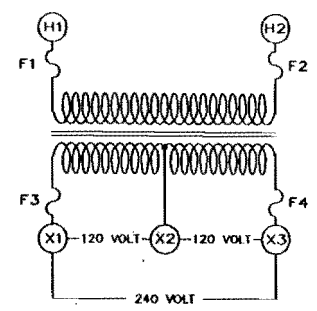
<b>REVISION DATA</b> 1 CHANGE MODIFIED CPT ITEMS 02 H01 THRU H05 PER 0123822405 REV. F. ADDED CPT GROUPS G01 THRU G35 PER 0123822406 REV. D. MODIFIED ITEMS 41, 42 & 43 PER 0815822559 REV. C TO BECOME ITEM 99. R. HARTMAN 1-11-96 SHEETS 5 & 6 WERE NOT ON. (ADDED) ITEMS 51 THRU 54 & GROUPS 51 THRU 54). J. BARTHOLMEW 4/24/96 ***REPLIN*** APERTURE CARD MIS-PRINT (SHEET 6). J. BARTHOLMEW 4/29/96	ORIGINAL BY R. HARTMAN APPROVED BY N. ROWE REF INFO	DATE: 12/18/95 DATE:	 <b>Cutler-Hammer</b> PDAD ASHEVILLE, NC 28813 USA	TITLE <b>CONTROL POWER TRANSFORMER TOROIDAL</b>		B 114B738 DS
	ID #	SIZE B3 FSCM NO 88725 SHEET REV 03 OF 06		ACAD DWG NO 114B738		



- NOTES:
- INSULATION LEVEL: 0.6 kv, CLASS II (180°C).
  - FREQUENCY: 60 Hz.
  - APPLICATION: CONTROL POWER TRANSFORMER FOR LINE TO LINE PRIMARY CONNECTION WITH DUAL SECONDARY OPERATION - 240/120 VOLTS - SEE CONNECTION DIAGRAM BELOW. (PRIMARY AND SECONDARY FUSE CLIPS SUPPLIED). FUSE RATINGS PER TABLE. THIS TRANSFORMER MAY HAVE VERY HIGH INRUSH CURRENTS. THEREFORE TYPE RK-5 FUSES MUST BE USED.
  - TERMINALS ARE 10-32 PLAIN BRASS, PAN HEAD SCREWS.
  - MOUNTING BOLTS (4) ARE 1/4-20, ZINC PLATED.
  - VENDOR TO SUPPLY ILSCO TERMINAL LUGS (SLU-25), OR PROVISION TO ACCEPT #10 RING TERMINALS.
  - UL RECOGNITION IS UNDER FILE E161807. MANUFACTURED AND TESTED TO UL STANDARD 506.
  - FUSE PULLER IS CLASSIFIED AS A FUSE HOLDER AND IS FOR ISOLATION ONLY!! DO NOT DISCONNECT UNDER LOAD.

I.T.I. MODEL	RATING @ 40°C	TOTAL WATTS DISSIPATED (APPROX)	DIM "A"	APPROX WEIGHT
401	1 kVA	50	7.35	30
402	2 kVA	80	8.30	35
403	3 kVA	100	9.00	40
405	5 kVA	170	10.50	60

PRI L-L VOLTS (H1-H2)	1 kVA - MODEL 401				2 kVA - MODEL 402				3 kVA - MODEL 403				5 kVA - MODEL 405			
	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE
600	G01	401-600FP	1.67	RK-5, 5A 600 VOLT TYPE FRS-R	G11	402-600FP	3.33	RK-5, 10A 600 VOLT TYPE FRS-R	G21	403-600FP	5.00	RK-5, 12A 600 VOLT TYPE FRS-R	G31	405-600FP	8.33	RK-5, 20A 600 VOLT TYPE FRS-R
480	G02	401-480FP	2.08	RK-5, 5A 800 VOLT TYPE FRS-R	G12	402-480FP	4.17	RK-5, 10A 800 VOLT TYPE FRS-R	G22	403-480FP	6.25	RK-5, 15A 800 VOLT TYPE FRS-R	G32	405-480FP	10.42	RK-5, 25A 800 VOLT TYPE FRS-R
240	G04	401-240FP	4.17	RK-5, 10A 600 VOLT TYPE FRS-R	G14	402-240FP	8.33	RK-5, 20A 600 VOLT TYPE FRS-R	G24	403-240FP	12.50	RK-5, 30A 600 VOLT TYPE FRS-R	G34	405-240FP	20.83	RK-5, 50A 250 VOLT TYPE FRN-R
208	G05	401-208FP	4.81	RK-5, 12A 800 VOLT TYPE FRS-R	G15	402-208FP	9.62	RK-5, 20A 800 VOLT TYPE FRS-R	G25	403-208FP	14.42	RK-5, 30A 800 VOLT TYPE FRS-R	G35	405-208FP	24.04	RK-5, 60A 250 VOLT TYPE FRN-R
SEC: X1 & X3			4.17	6 AMP MAX	8.33			12 AMP MAX	12.50			20 AMP MAX	20.83			30 AMP MAX



405-240 & 405-208 PRIMARY FUSES ARE 250 VOLT (BUSSMANN TYPE FRN-R, 13/16 x 3 INCHES).  
 401-600 THRU 405-480 PRIMARY FUSES ARE 600 VOLT (BUSSMANN TYPE FRS-R, 13/16 x 5 INCHES).  
 SECONDARY FUSE RATINGS LISTED ABOVE - USE BUSSMANN TYPE FNQ, TIME DELAY FUSES.

TOLERANCES - SEE DRAWING 348A980 (UNLESS OTHERWISE NOTED)

SIZE	SHEET 02	ACAD	114B738	DS
B	REV 03	DWG NO		

GROUP 99

41 FUSE PULLER TOROIDAL C.P.T.  
1-5 KVA. TOP COVER

42 CONVERSION KIT INSTALLATION:  
FOR THE 401-405 (1KVA,2KVA,3KVA,5KVA)

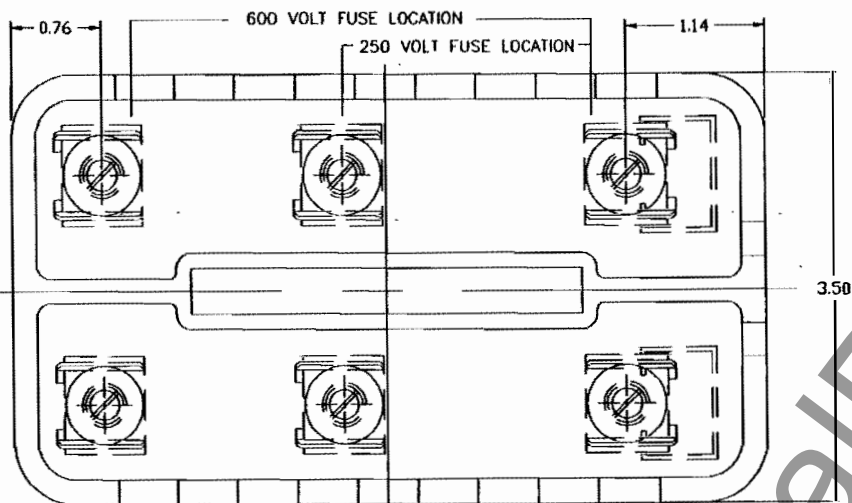
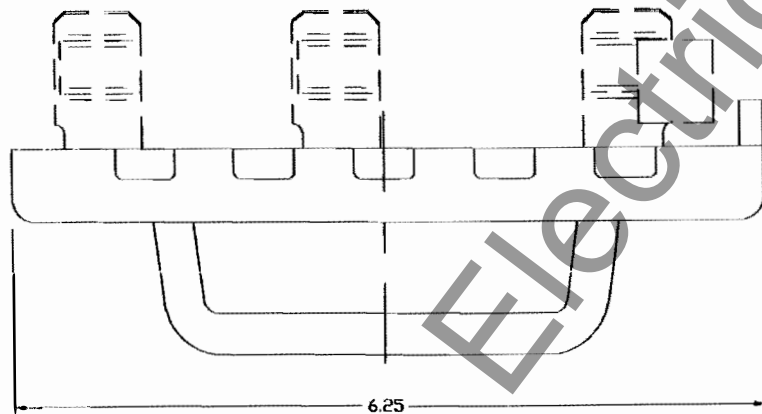
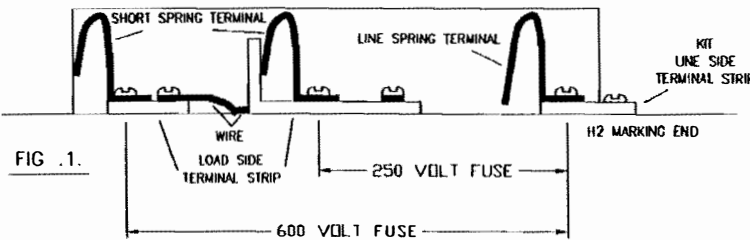


FIG. 2.



SECTION OF H2 (SIDE VIEW FROM SECONDARY TERMINAL SIDE).



PARTS LIST REQUIRED FOR CONVERSION TO FUSE PULLER	
QUANTITY (EACH)	DESCRIPTION
1	FUSE PULLER HANDLE (WITH INSERTS)
2	FUSE CONTACT - SHORT SPRING TERMINAL
2	FUSE CONTACT - LINE SPRING TERMINAL
2	10-32 x 3/8 BRASS PAN-HEAD SCREW
2	LINE SIDE TERMINAL STRIP
1	THIS INSTALLATION INSTRUCTION SHEET

THIS FUSE HOLDER KIT IS APPLICABLE TO PART No. 114B738

TOLERANCES - SEE DRAWING 348A980 (UNLESS OTHERWISE NOTED)

SIZE	SHEET 03	ACAD	114B738	DS
B	REV 03	(V6 NI)		



4

3

2

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WHEN CHANGING OUT A CPT MADE TO DRAWING 4601B06 WITH A CPT MADE TO DRAWING 114B738 THERE ARE SEVERAL THINGS YOU MUST BE AWARE OF.

THE ORIGINAL DRAWING 4601B06 HAD TWO SEPARATE SECONDARY 120 VOLT WINDINGS WHICH COULD BE PUT IN PARALLEL IF ONLY 120 VOLTS WAS GOING TO BE REQUIRED, OR THE TWO WINDINGS COULD BE CONNECTED TO SERIES TO GIVE A 120/240 VOLT THREE WIRE OUTPUT. THE CPTS DRAWING 114B738 HAVE A 240 VOLT WINDING WITH A CENTER TAP AT 120 VOLTS. THIS CONNECTION IS EFFECTIVELY THE SAME SERIES CONNECTION AS SUPPLIED IN CPTS DRAWING 4601B06. IF THE ORIGINAL TRANSFORMER SUPPLIED WAS A DRAWING 4601B06 AND BOTH WINDINGS WERE CONNECTED IN PARALLEL SO ONLY 120 VOLTS WOULD BE AVAILABLE, THEN THE LOADS (ALL 120 VOLTS) IN DRAWING 114B738 SHOULD BE DIVIDED AS EQUALLY AS POSSIBLE WITH HALF THE LOAD BETWEEN WINDING X1 & X2 AND WINDING X2 & X3. X2 WOULD THEN BE THE NEUTRAL OR GROUND POINT. IF A DRAWING 4601B06 TRANSFORMER, WHICH HAS ITS SECONDARY WINDING AS TWO SEPARATE 120 VOLT TWO WIRE CIRCUITS, CAUTION SHOULD BE USED THAT THE GROUNDED TERMINALS (USUALLY X2 & X4) ARE BOTH CONNECTED TO THE X2 WINDING OF DRAWING 114B738 CPTS.

TO IDENTIFY IF YOU HAVE A DRAWING 4601B06 CPT, PLEASE NOTE THAT THESE CPTS HAVE FOUR SECONDARY BRASS BARS, 0.375" X 2.88" ON THE TOP COVER AND DO NOT HAVE SECONDARY FUSES.

ADDITIONALLY, CPT DRAWING 114B738 ARE NOW EQUIPPED WITH TWO SECONDARY FUSES MOUNTED ON THE TRANSFORMER. THESE FUSES ARE CHOSEN TO PROTECT THE TRANSFORMER AT 125% OF KVA RATING AND PREVENT OVERLOAD. THE PRIMARY FUSES ARE TYPE RK AND CHOSEN TO BE RATED AT 250% OF THE TRANSFORMER PRIMARY CURRENT RATING.

DRAWING 4601B06 CPTS USED SEPARATELY MOUNTED SECONDARY FUSES FOR THE CPT PROTECTION. IF THERE IS ONLY ONE SET OF FUSES IN THE SECONDARY FOR A SINGLE LOAD THOSE FUSES ARE SUFFICIENT FOR CPT PROTECTION. HOWEVER, WITH DRAWING 4601B06 THERE IS A POSSIBILITY THAT THE TOTAL AMPACITY OF MULTIPLE FUSES WILL EXCEED THE FUSE VALUE REQUIRED TO PROTECT THE CPT. THEREFORE, CPT DRAWING 114B738 HAVE TWO FUSES OF THE CORRECT RATING SO AS NOT TO EXCEED THE 125% RATING OF THE CPT.

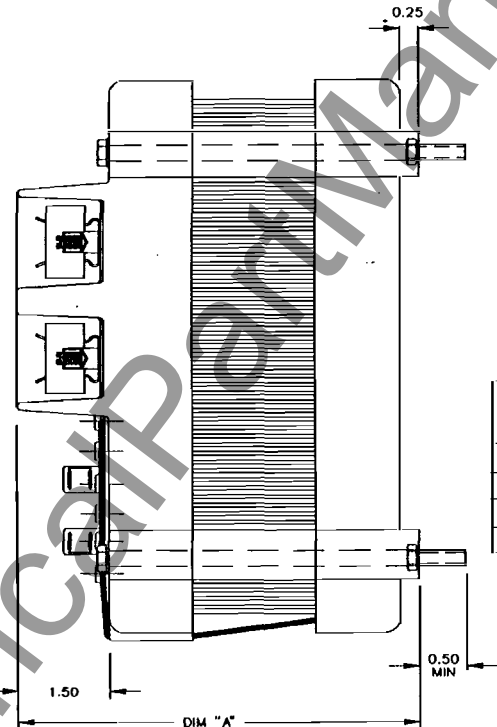
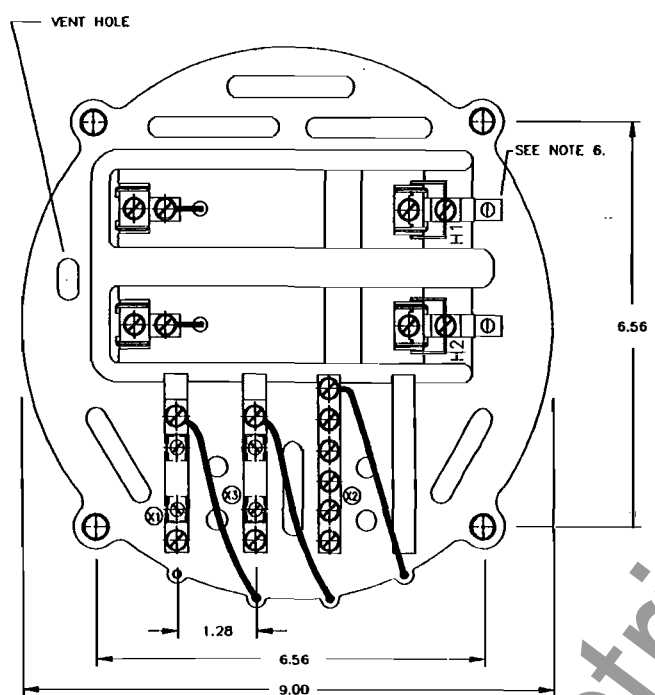
TOLERANCES - SEE DRAWING 348A980 (UNLESS OTHERWISE NOTED)

SIZE	SHEET	04
B	REV	03

ACAD	DMG NO

114B738

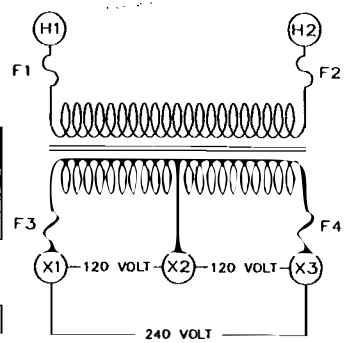
DS



- NOTES:
1. INSULATION LEVEL: 0.6 kV, CLASS H (180°C).
  2. FREQUENCY: 50 Hz.
  3. APPLICATION: CONTROL POWER TRANSFORMER FOR LINE to LINE PRIMARY CONNECTION WITH DUAL SECONDARY OPERATION - 240/120 VOLTS - SEE CONNECTION DIAGRAM BELOW. (PRIMARY AND SECONDARY FUSE CLIPS SUPPLIED). FUSE RATINGS PER TABLE. THIS TRANSFORMER MAY HAVE VERY HIGH INRUSH CURRENTS. THEREFORE TYPE RK-5 FUSES MUST BE USED.
  4. TERMINALS ARE 10-32 PLAIN BRASS, PAN HEAD SCREWS.
  5. MOUNTING BOLTS (4) ARE 1/4-20, ZINC PLATED.
  6. VENDOR TO SUPPLY ILSCO TERMINAL LUGS (SLU-25), OR PROVISION TO ACCEPT #10 RING TERMINALS.

I.T.I. MODEL	RATING @ 40°C	TOTAL WATTS DISSIPATED (APPROX)	DIM "A"	APPROX WEIGHT
401	1 kVA	50	6.10	35
402	2 kVA	80	7.30	40
403	3 kVA	100	8.00	45
405	5 kVA	170	8.75	60

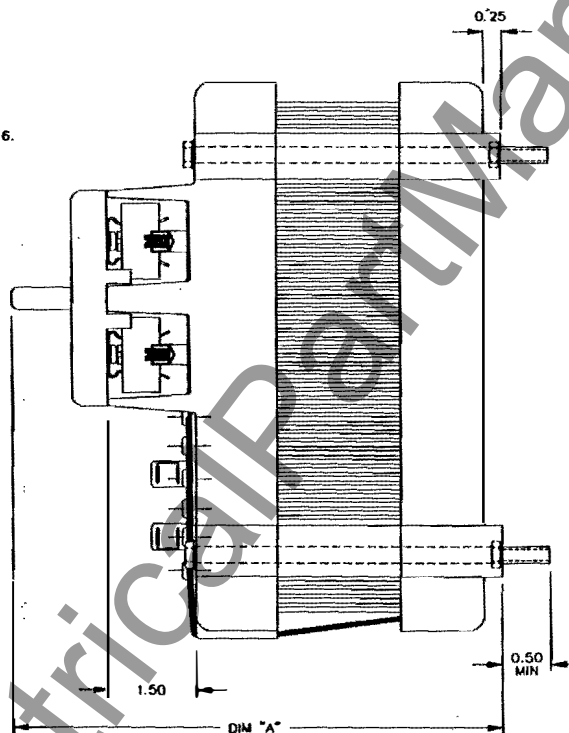
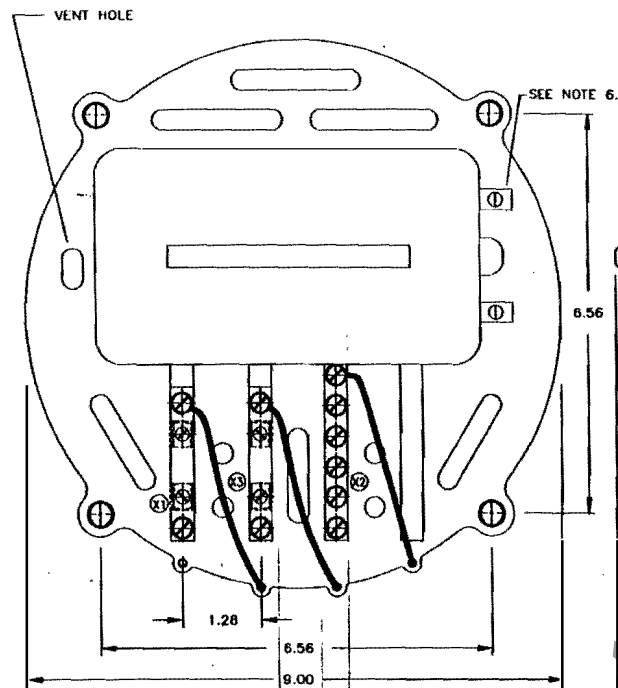
PRI VOLTS (H1-H2)	1 kVA - MODEL 401				2 kVA - MODEL 402				3 kVA - MODEL 403				5 kVA - MODEL 405				
	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	
380	H51	401-380	2.63	RK-5, 6A 600 VOLT TYPE FRS-R	H52	402-380	5.26	RK-5, 12A 600 VOLT TYPE FRS-R	H53	403-380	7.89	RK-5, 17.5A 600 VOLT TYPE FRS-R	H54	405-380	13.16	RK-5, 30A 600 VOLT TYPE FRS-R	
SEC: X1 & X3		4.17	6 AMP MAX			8.33	12 AMP MAX			12.50	20 AMP MAX			20.83	30 AMP MAX		



PRIMARY FUSES ARE 600 VOLT (BUSSMANN: TYPE FRS-R, 13/16 x 5 INCHES).  
 SECONDARY FUSE RATINGS LISTED ABOVE - USE BUSSMANN TYPE FNQ, TIME DELAY FUSES.

TOLERANCES - SEE DRAWING 348A980 (UNLESS OTHERWISE NOTED)

SIZE B	SHIFT 05	ACAD DWG NO	114B738	IJS
REV 03				

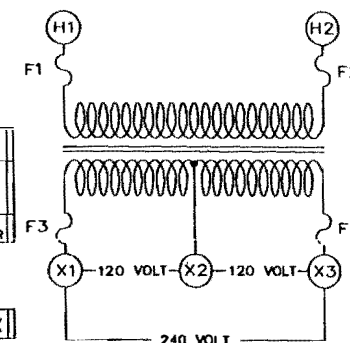


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6. VENDOR TO SUPPLY ILSCO TERMINAL LUGS (SLU-25), OR PROVISION TO ACCEPT #10 RING TERMINALS.
7. FUSE PULLER IS CLASSIFIED AS A FUSE HOLDER AND IS FOR ISOLATION ONLY!! DO NOT DISCONNECT UNDER LOAD.

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	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE	W/C-H NO.	CATALOG NUMBER	RATED AMPS	FUSE
380	G51	401-380FP	2.63	RK-5, 6A 600 VOLT TYPE FRS-R	G52	402-380FP	5.26	RK-5, 12A 600 VOLT TYPE FRS-R	G53	403-380FP	7.89	RK-5, 17.5A 600 VOLT TYPE FRS-R	G54	405-380FP	13.16	RK-5, 30A 600 VOLT TYPE FRS-R
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TOLERANCES - SEE DRAWING 348A980 (UNLESS OTHERWISE NOTED)

SIZE	SHEET	06	ACAD	114B738	JJS
B	REV	03	DWG NO		