

TOSHIBA INTERNATIONAL CORPORATION

CUSTOM ADJUSTABLE SPEED DRIVES

13131 WEST LITTLE YORK ROAD

HOUSTON, TX 77041

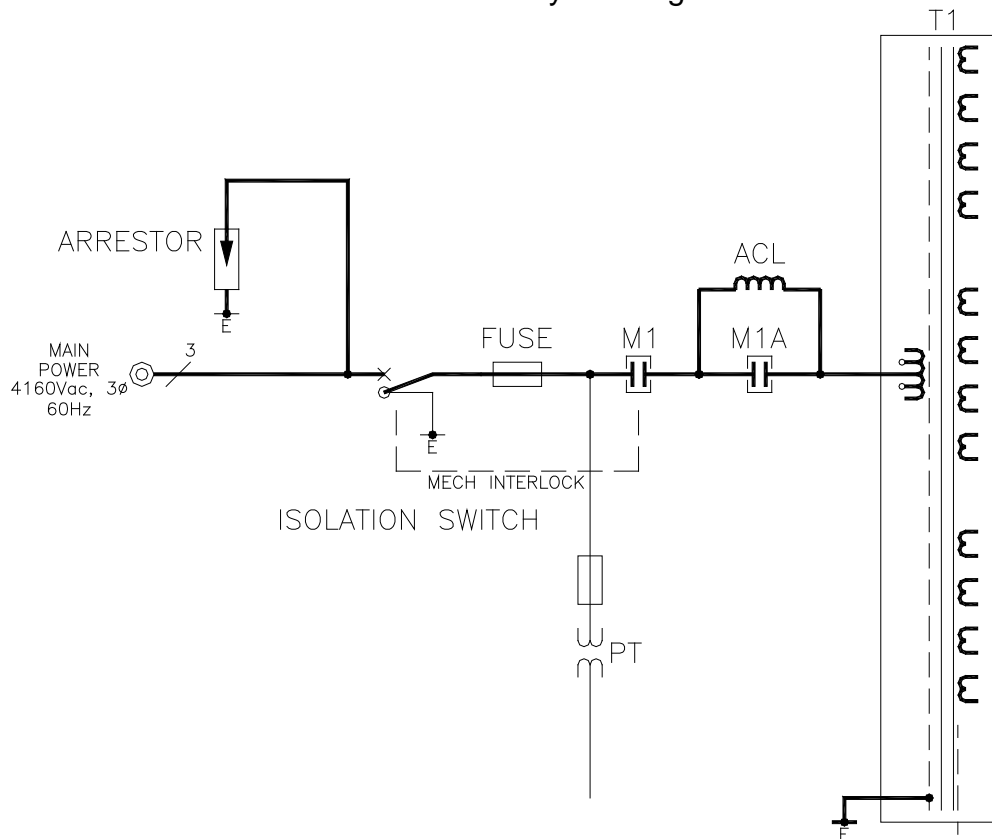
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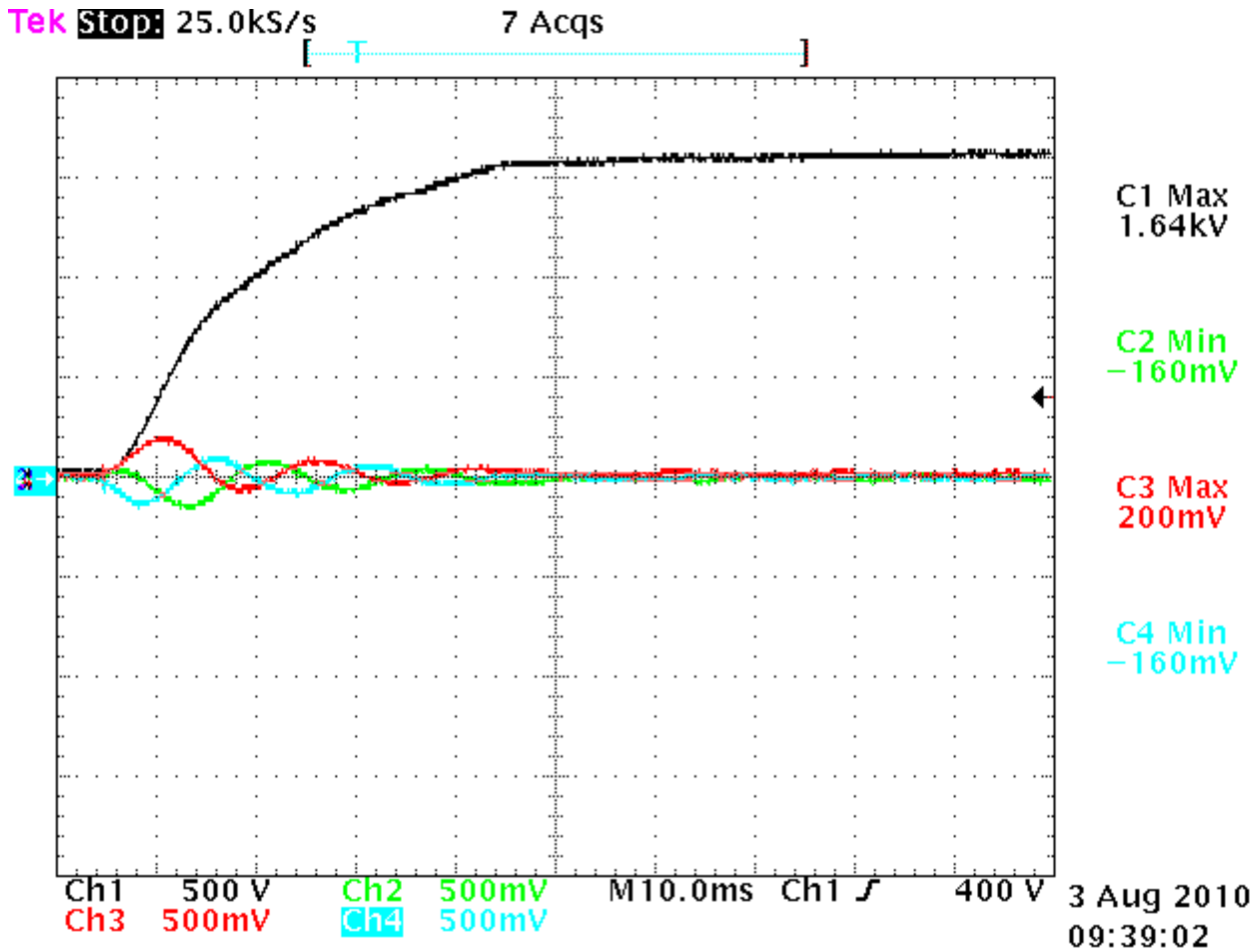
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APPLICATION GUIDELINE: Inrush Current of MV ASDs

Every T300MVi drive utilizes a reactor on the input to limit inrush current and charge the DC bus slowly. As shown in the figure below, isolation transformer T1 will have inrush current limited by the ACL when the isolation switch and M1 close. Current flows through the ACL until the DC bus derived from the transformer secondary is charged.



The current is significantly reduced compared to the normal inrush of a standard transformer. Transformer inrush can be as high as six to twelve times the full load current rating. On the next sheet is an oscilloscope waveform of the inrush current and the DC bus.



- C1 shows the DC bus which rises to full voltage in 40 mS.
- C2, C3, and C4 is the three phase inrush current showing a peak of 200 Amps (141Amps RMS). Typical inrush of the transformer as tested above is 647A RMS with a full load current rating of 97A RMS. Note that on the second cycle, inrush peak is less than half of the previous cycle. In less than 50mS (three cycles), the transformer inrush is finished.

Not every drive is limited to 150% of the full load current rating, some are higher. It depends on the reactor selected and the frame of the drive. The next chart shows the rating of several reactors used for drive design and expected inrush. The reactor tested above is PC34720P00.

Table 1.

ASD Rated Voltage	ASD Frame size	Charging Current (A)	Reactor X_L (Ω) 60Hz	Reactor L (mH)	Reactor Continuous Current (A)	Item Number	Drawing	Drawing Rev
2400	0, A2	167.8	8.3	21.9	6.9	PC34720P000	IG08CT01A	1
	B2	337.2	4.1	10.9	11.2	PC34720P001A	IG08CT01A	1
	1	337.2	4.1	10.9	11.2	PC34720P001	IG08CT01B	0
	D2	706.8	2.0	5.2	15.5	PC34720P003A	IG08CT01B	0
	3	706.8	2.0	5.2	15.5	PC34720P003	IG08CT01D	1
	4	1,225.2	1.1	3.0	26.4	PC34720P004	IG08CT01E	0
4160	0	159.4	15.1	40.0	6.5	PC34740P000	IG08CT01A	1
	1	356.1	6.7	17.9	7.5	PC34740P001	IG08CT01B	0
	2	446.1	5.4	14.3	10.6	PC34740P002	IG08CT01C	0
	3	718.3	3.3	8.9	14.2	PC34740P003	IG08CT01D	1
	4, G4P	1,087.2	2.2	5.9	21.2	PC34740P004	IG08CT01E	0
	H4P	1,087.2	2.2	5.9	42.4	PC34740P005	IG08CT01E	0
6600	A6S	167.1	22.8	60.5	4.7	PC34760P000	IG08CT01A	1
	B6S	333.6	11.4	30.3	8.9	PC34760P001	IG08CT01B	0
	C6S	445.3	8.6	22.7	11.4	PC34760P002	IG08CT01C	0
	D6S	612.6	6.2	16.5	13.7	PC34760P003	IG08CT01D	1
	F6S	1000.8	3.8	10.1	22.4	PC34760P004	IG08CT01E	0
13800	0	47.9	166.4	441.3	1.8	PC34790P000	IG08CT01F	0
	1	105.7	75.4	200.0	2.8	PC34790P001	IG08CT01G	0
	2	132.1	60.3	160.0	3.2	PC34790P002	IG08CT01H	0
	3	211.3	37.7	100.0	4.3	PC34790P003	IG08CT01I	0
	4, G4P	281.8	28.3	75.0	6.4	PC34790P004	IG08CT01J	0
	H4P	281.8	28.3	75.0	12.8	PC34790P005	IG08CT01J	0

For 4160V drives, expect the following one cycle RMS inrush current:

- 300-1000HP 160 Amps
- 1100-2000HP 360 Amps
- 2100-2500HP 446 Amps
- 2600-3500HP 718 Amps
- 3600-10,000HP 1088 Amps

This is a guide only, check with the marketing department for individual designs. Some drives are custom designed and may have a different reactor due to frame increase for higher overload or low motor power factor.