This Application Note applies to the Unidrive M700 Drive Series

Overload and I^2t Protection

Normal Duty versus Heavy Duty:
For ease of explanation and clarity, this Application Note will use a real world drive and motor combination. In this case, the drive will be a UnidriveM700 032 00050, and the motor will be a 067EDA30XAFMA075140.

Note:
The snips herein were all taken from the Unidrive M700-702 User Guide.

UnidriveM700 032 00050 Normal and Heavy Duty Ratings:
The highlighted values below will be referenced in this note

Table 2-1 200 V drive ratings (200 V to 240 V ±10 %)

Model		Normal Duty				Heavy Duty				
		Maximum continuous output current	Nominal power at 230 V	Motor power at 230 V	Peak current	Maximum continuous output current	Open loop peak current	RFC peak current	Nominal power at 230 V	Motor power at 230 V
		A	kW	hp	A	A	A	A	kW	hp
Frame size 3	03200050	6.6	1.1	1.5	7.2	5	7.5	10	0.75	1
	03200066	8	1.5	2	8.8	6.6	9.9	13.2	1.1	1.5
	03200080	11	2.2	3	12.1	8	12	16	1.5	2
	03200106	12.7	3	3	13.9	10.6	15.9	21.2	2.2	3

The 5.0 Amp continuous rating for Heavy Duty and 6.6 Amp continuous rating for Normal Duty are the available current outputs plotted on the Y-axis in the graph below. The 1.5 Amp Stall Current motor rating can be plotted into the X-Axis of the same graph. RFC mode will be used in this example. The drive will be capable of producing 10.0 (5.0 x 200%) Amps peak in Heavy Duty Mode and 7.26 (6.6 x 110%) Amps peak in Normal Duty Mode. The entered value of Pr 5.007 (Motor Rated Current) determines if the drive can be Heavy Duty rated or stays at the Normal Duty rating. If Pr 5.007 is less than or equal to the continuous current rating of the drive or in this case 5.0 Amps, the drive is in Heavy Duty operation. In this example the motor nameplate stall current rating of 1.5 amps is used, which makes the drive operate at the Heavy Duty rating.

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2.3 Ratings

The drive is dual rated. (5.007)
The setting of the motor rated current determines which rating applies - Heavy Duty or Normal Duty.
The two ratings are compatible with motors designed to IEC60034.
The graph aside illustrates the difference between Normal Duty and Heavy Duty with respect to continuous current rating and short term overload limits.

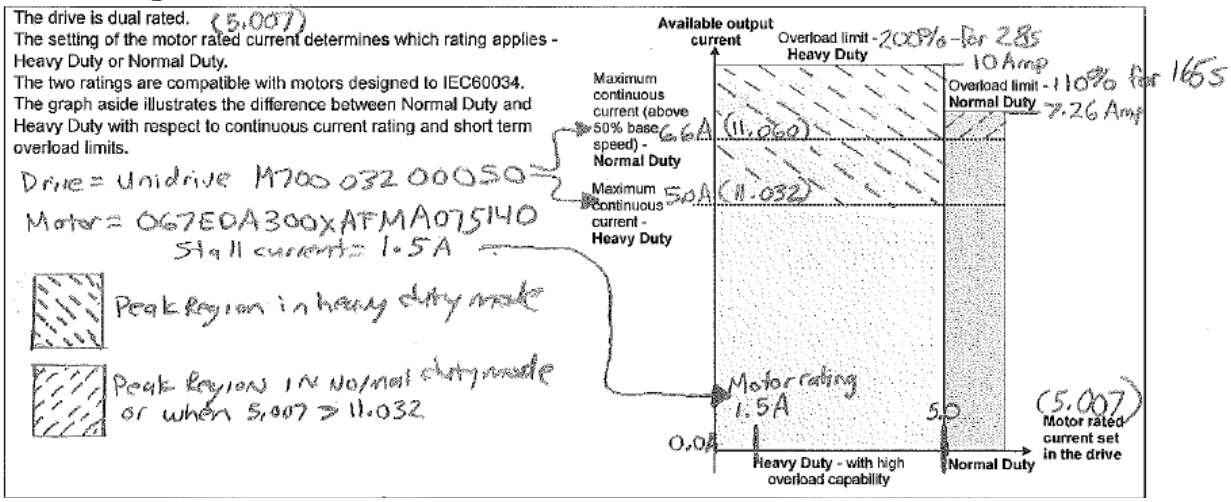


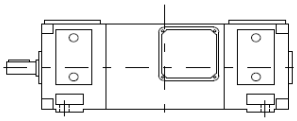
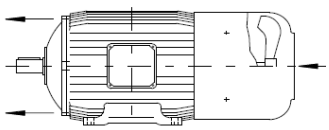
Table 2-5 Typical overload limits

Operating mode	RFC from cold	RFC from 100 %	Open loop from cold	Open loop from 100 %
Normal Duty overload with motor rated current = drive rated current	110 % for 165 s	110 % for 9 s	110 % for 165 s	110 % for 9 s
Heavy Duty overload with motor rated current = drive rated current (size 8 and below)	200 % for 28 s	200 % for 3 s	150 % for 60 s	150 % for 7 s
Heavy Duty overload with motor rated current = drive rated current (size 9E and 10)	170 % for 42 s	170 % for 5 s	150 % for 60 s	150 % for 7 s

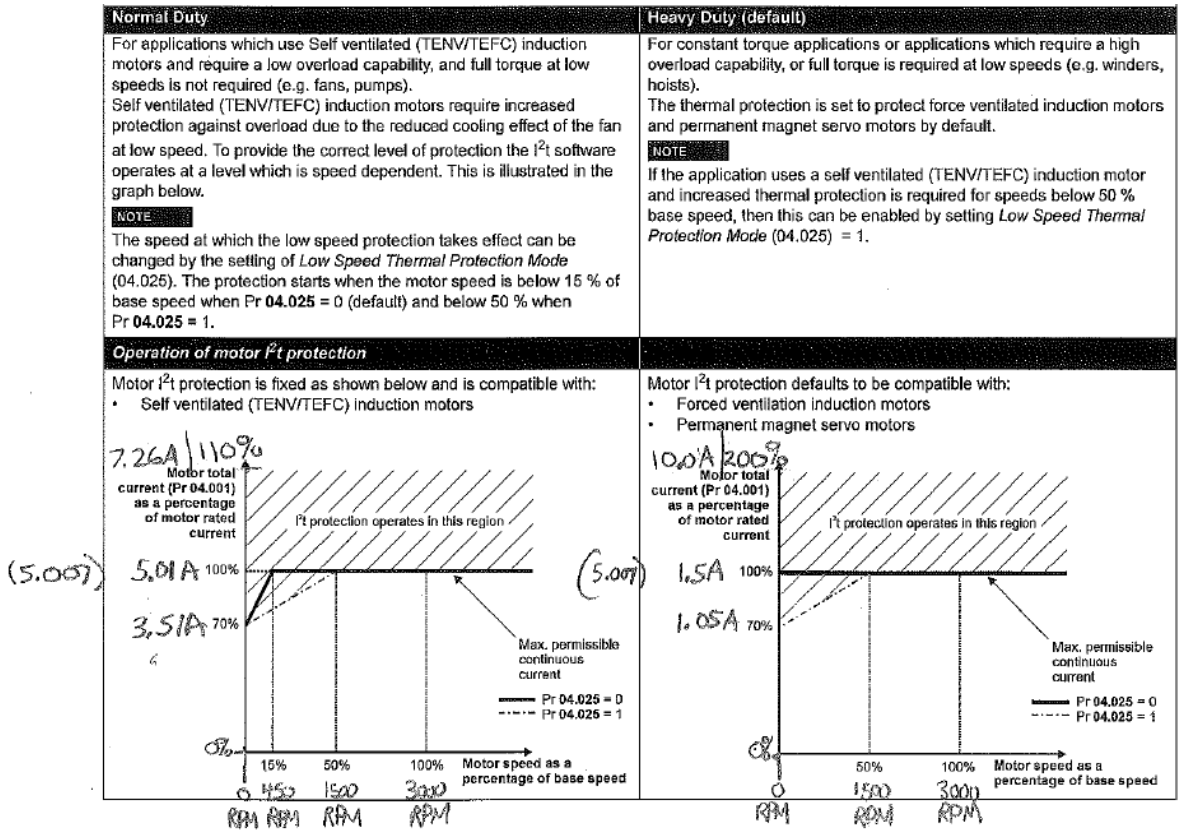
Generally the drive rated current is higher than the matching motor rated current allowing a higher level of overload than the default setting.
The time allowed in the overload region is proportionally reduced at very low output frequency on some drive ratings.

Operation of motor I^2t protection:

Self-ventilated induction motors (TENV/TEFC) run in Normal Duty operation is referenced in the User's Guide. Basically the slower the motor turns, the cooling effects of the motor are reduced.

	Enclosure IP 44 - IP 55 (type G..Z) **Totally-enclosed nonventilated (TENV)** Cooling without using a fan, only by natural ventilation and radiation on the totally enclosed motor surface.
	Enclosure IP 44 - IP 55 (type G..ZE) **Totally-enclosed fan-cooled (TEFC)** Cooling air is blown over the totally enclosed motor surface by a fan mounted on the shaft.

The same drive and motor combination is used for this example. For clarity sake, the current and base speed rating of the induction motor in Normal Duty operation is also kept the same as the servo example. Normal Duty is on the left and Heavy Duty is on the right. Since Pr 5.007 is over 5.0 Amps, the graph on the left indicates Normal Duty. As the graphs show, the I^2t protection is extended in the lower speed region. The main difference is that in Heavy Duty operation, Low Speed Thermal Detection Mode is only in effect with Pr 4.025 set to 1 (ON), and when the motor is rotating at 50% of base speed.



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