

PowerXL™

Dual Rating – What exactly does that mean?

Variable Torque?


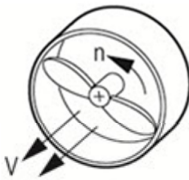
CT / VT?

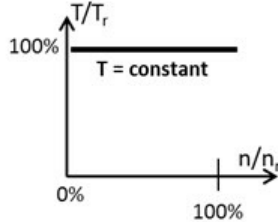
Constant Torque?

~~Dual Use/Dual Purpose?~~

Dual Rating?

?



T/T_r

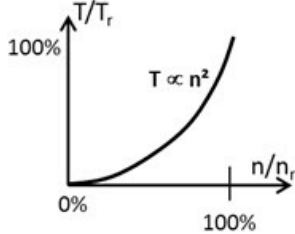
100%

0%

0% 100%

n/n_r

$T = \text{constant}$



T/T_r

100%

0%

0% 100%

n/n_r

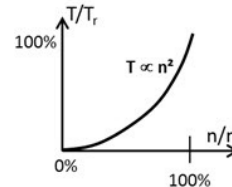
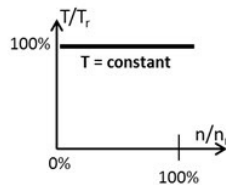
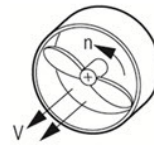
$T \propto n^2$

High / Low overload?

Level 1	<ul style="list-style-type: none"> 1 – Fundamental – No previous experience necessary 2 – Basic – Basic knowledge of Drives recommended 3 – Advanced – Basic knowledge of Drives required 4 – Expert – Good experience recommended
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The point is ...

- Rating of frequency inverters, taking the load characteristics into account.
- Not only the continuous current is of relevance, but also the one which is temporarily available (mostly 60 s) for acceleration.
- Different applications need different amounts of starting currents. Application where a high torque at low speeds is required, need more starting current than those with a low torque demand at low speeds, e.g. pumps and fans.
- Typical values are:
 - 150 % current for high starting torques
 - 110 % current for low starting torques



The idea

If a device is not fully loaded with a low starting current, it should be possible in theory to connect a motor with a higher rating. At a first glance, that appears very reasonable, but one condition expected is to be able to run a motor of the next size up. The thermal savings because of the reduced starting current are most likely not enough to achieve this. In applications requiring a reduced starting current, we often find a reduced ambient temperature which improves the cooling conditions. A typical “Dual Rating” looks like as follows:

- 150 % current at 50 °C
- 110 % current at 40 °C with a motor of the next higher power

In inverter type codes of multiple manufacturers one can find electrical data like power or current. In most cases these are the values, which can be achieved with 150 % starting current. But there are also others, taking the 110 % as a reference.

Consequence:

- Rating refers to 150 % → with reduced starting current the next higher motor can be connected.
- Rating refers to 110 % → with higher starting current the next higher inverter has to be chosen.

But: Not all drives have a „Dual Rating“. Please check information of the manufacturer. Eaton: the DG1 line is dual rated.

Terms used in connection with Dual Rating

- Dual Rating
 - Rating of frequency inverters for different modes of operation. The intention is to have the possibility to connect a different size of motor due to different conditions.
Example: Reduction of the starting current from 150 % down to 110 % and reduction of the ambient temperature from 50 °C down to 40 °C.
- Heavy Duty / Normal Duty
 - Heavy Duty is used for a possible starting current of 150 % rated current
 - Normal Duty is used for a possible starting current of 110 % rated current e.g. in pump and fan applications
- 110 / 150 (= low overload / high overload)
 - Synonyms for 110 % and 150 % starting current
- Constant Torque
 - Does NOT mean, that the frequency inverter is only capable to deliver a constant torque, but that it is rated for applications in which the torque demand is constant in the whole speed range.
- Variable Torque
 - The frequency inverter is used in applications where the torque demand changes with the speed (lower speed = lower torque demand).
- CT / VT
 - CT = Constant Torque
 - VT = Variable Torque

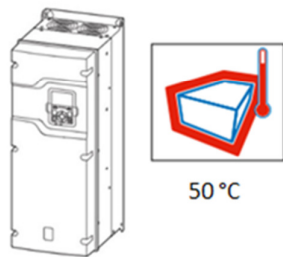
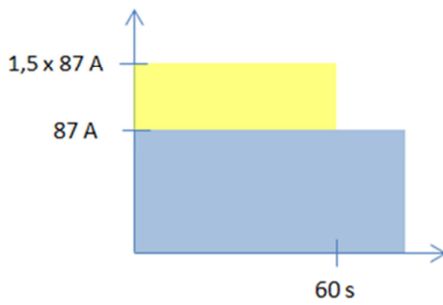
Wrap up:

- 110 % starting current = Normal Duty = 110 = variable torque = VT
- 150 % starting current = Heavy Duty = 150 = constant torque = CT

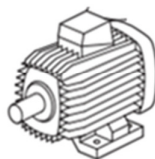
Example DG1-34087FN-C21C

Rated operational current ¹⁾	Assigned motor rating ^{1), 2), 3)}			Rated operational current ¹⁾	Assigned motor rating ^{1), 2), 3)}			Fitted with	Frame size	Degree of Protection	Part no. Article no.	Price see price list	Std. pack
$I_H = 150\%$ I_e A	$I_H = 150\%$ P kW	$I_H = 150\%$ P HP	$I_L = 110\%$ I_e A	$I_L = 110\%$ P kW	$I_L = 110\%$ P HP		Radio interference Brake chopper DC link choke Multi-line graphic display Additional PCB protection				DG1-34087FN-C21C 9702-4001-00P		
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} : 380 (-15%) - 500 (+10%) V 87			U_e 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} : 380 (-15%) - 500 (+10%) V 105						✓	-	✓	✓	✓

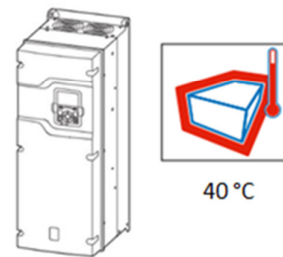
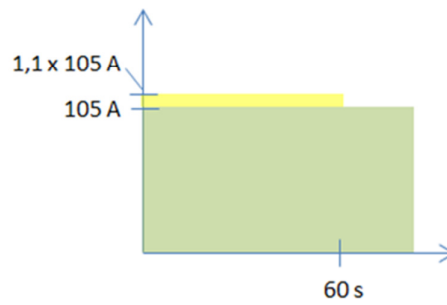
The current inside the type code refers to 150 % starting current.



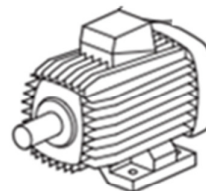
DG1-34087FN-C21C



Motor 45 kW



DG1-34087FN-C21C



Motor 55 kW