

Dual Rating

CT / VT?

Variable Torque?


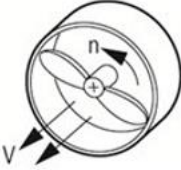
Constant Torque?

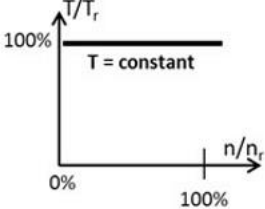
?

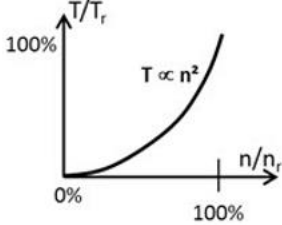
Dual Use/Dual Purpose?

Dual Rating?

High / Low overload?





Level 1	<ul style="list-style-type: none"> 1 – Fundamental – No previous experience necessary 2 – Basic – Basic knowledge recommended 3 – Advanced – Reasonable knowledge required 4 – Expert – Good experience recommended
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Original Application Note

Original document is the German version of this document.

Translation

All non-German language versions of this document are translations of the original application note.

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DANGER!
DANGEROUS ELECTRICAL VOLTAGE!

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA/IL) for the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automatic control functions.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specification, otherwise this may cause malfunction and/or dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes. Unlatching of the emergency-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been properly installed and with the housing closed.
- Wherever faults may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (e.g. by means of separate limit switches, mechanical interlocks etc.).
- The used device may have hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or device may destroy the device and may lead to serious injury or damage.
- The applicable national safety regulations and accident prevention recommendations must be applied to all work carried on live device.
- The electrical installation must be carried out in accordance with the relevant electrical regulations (e. g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing device must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the device using the operating software are permitted.
- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the device (increased motor speed or sudden standstill of motor). These measures include: – Other independent devices for monitoring safety related variables (speed, travel, end positions etc.).
 - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
 - Never touch live parts or cable connections of the device after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be alive after disconnection. Consider appropriate warning signs.

Disclaimer

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Content

- 1 General 6
- 2 The idea 6
- 3 Terms used in connection with Dual Rating..... 7
- 4 Example DG1-34087FN-C21C 7
- 5 References..... 9

1 General

- 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

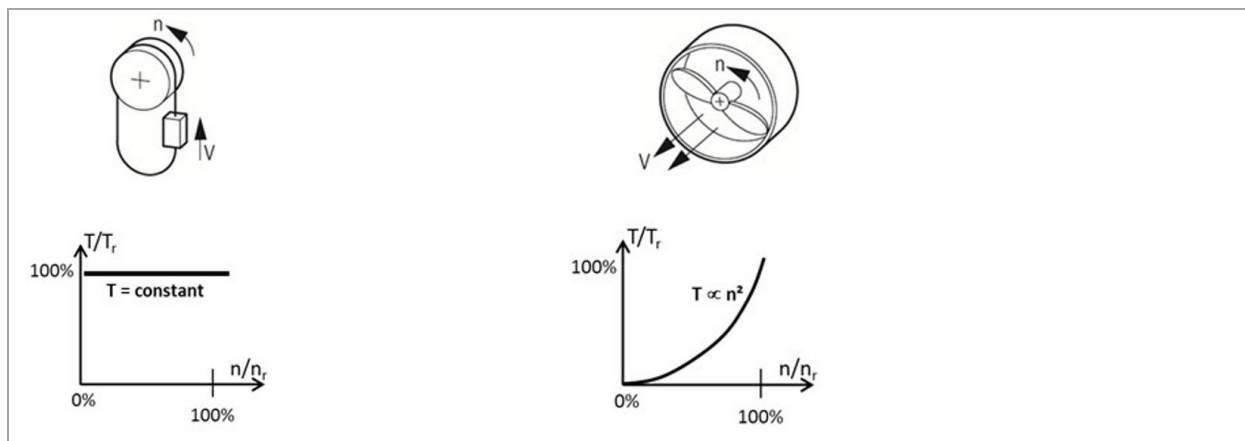


Figure 1: Values at 110% and 150% current

2 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.

3 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 form 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

4 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						
U _s 400 V AC, 3-phase / U _i 400 V AC, 3-phase Mains voltage (50/60Hz) U _{LN} : 380 (-15%) - 500 (+10%) V	45	60	105	55	75						DG1-34087FN-C21C 9702-4001-00P		

Figure 2: Example with a DG1 variable frequency drive

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

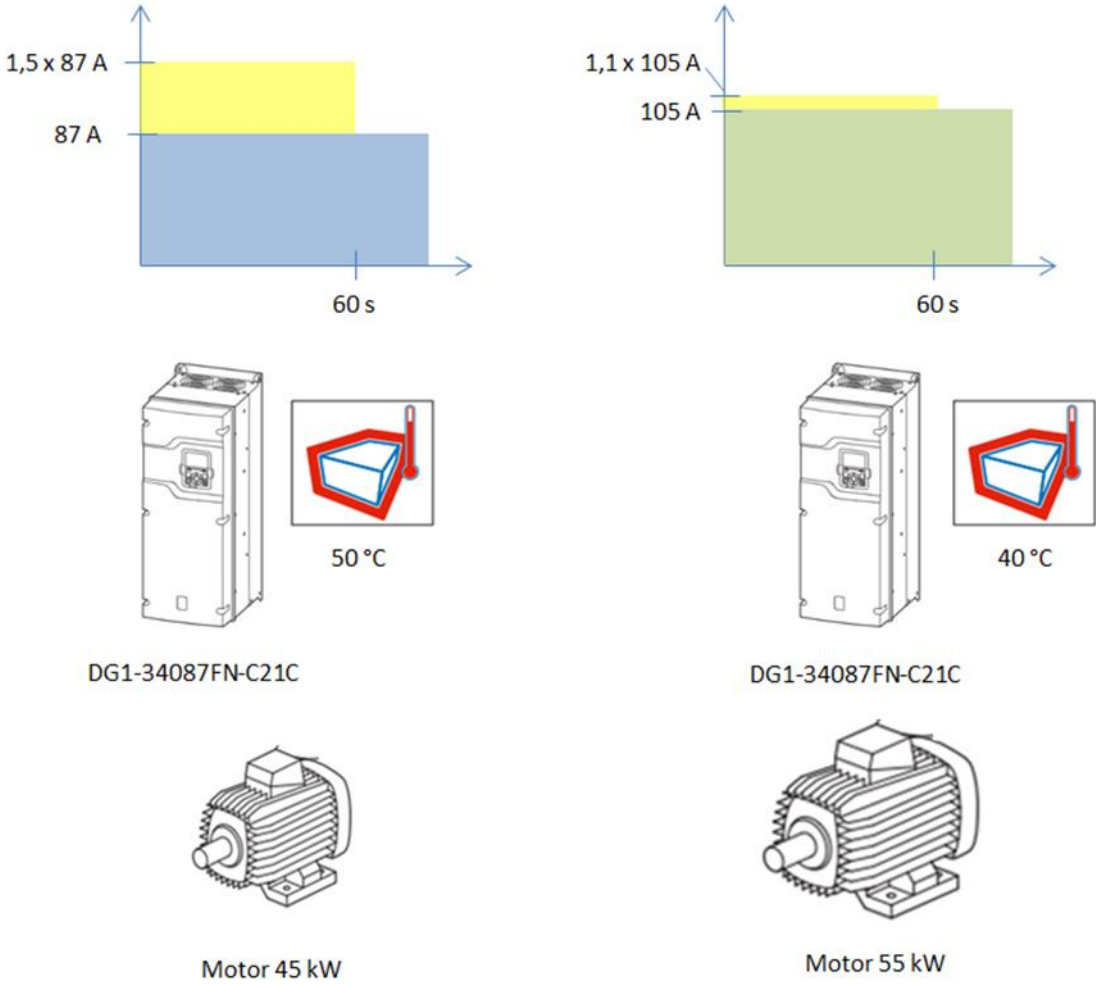


Figure 3: Inside current at 150% starting current

5 References

Documentation	
Manuals	DownloadCenter
Instruction Leaflets	DownloadCenter

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