



COMBIVERT F6

INSTRUCTIONS FOR USE | INSTALLATION F6 PEAK POWER

Translation of the original manual
Document 20260916 EN 01



Preface

The hardware and software described in this document are products of KEB. The information contained in this document is valid at the time of publishing. KEB reserves the right to update this document in response to misprints, mistakes or technical changes.

Signal words and symbols

Certain procedures within this document can cause safety hazards during the installation or operation of the device. Refer to the safety warnings in this document when performing these procedures. Safety signs are also located on the device where applicable. A safety warning is marked by one of the following warning signs:

DANGER	Dangerous situation, which will cause death or serious injury if this safety warning is ignored.
WARNING	Dangerous situation, which may cause death or serious injury if this safety warning is ignored.
CAUTION	Dangerous situation, which may cause minor injury if this safety warning is ignored.
NOTICE	Situation, which can cause damage to property if this safety warning is ignored.

RESTRICTION

Used when the following statements depend on certain conditions or are only valid for certain ranges of values.



Used for informational messages or recommended procedures.

More symbols

- ▶ This arrow starts an action step.
- / - Enumerations are marked with dots or indents.
- => Cross reference to another chapter or another page.



Note to further documentation.
www.keb.de/service/downloads



Laws and guidelines

KEB Automation KG confirms with the EC declaration of conformity and the CE mark on the device nameplate that it complies with the essential safety requirements.

The EC declaration of conformity can be downloaded on demand via our website.

Warranty and liability

The warranty and liability on design, material or workmanship for the acquired device is given in the general sales conditions.



Here you will find our general sales conditions.
www.keb.de/terms-and-conditions



Further agreements or specifications require a written confirmation.

Support

Although multiple applications are referenced, not every case has been taking into account. If you require further information or if problems occur which are not referenced in the documentation, you can request the necessary information via the local KEB agency.

The use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the customer.

The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the intended use. However, they are regarded as being only informal and changes are expressly reserved, in particular due to technical changes. This also applies to any violation of industrial property rights of a third-party. Selection of our units in view of their suitability for the intended use must be done generally by the user.

Tests can only be done within the intended end use of the product (application) by the customer. They must be repeated, even if only parts of hardware, software or the unit adjustment are modified.

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1 Product Description

COMBIVERT F6 Peak Power devices are characterised by their particularly high overload capacity.

1.1 Validity of these instructions

These Gebrauchsanleitung describe the Peak Power devices of the COMBIVERT F6 series. These Gebrauchsanleitung

- contain only supplementary technical data.
- is only valid in connection with the corresponding power unit manual of the COMBIVERT F6 => [F6 Instructions for use](#).

The Peak Power device corresponds to the following identifier:

Drive controller	Material number
COMBIVERT F6 housing size 2	16F6A32-3EB1

2 Device data of the Peak Power devices

2.1 Overview of the 400 V devices

The technical data are for 2/4-pole standard motors. With other pole numbers the drive controller must be dimensioned onto the rated motor current. Contact KEB for special or medium frequency motors.

Device size		16
Housing		2
Rated power		
Rated apparent output power	S_{out} / kVA	22.9
Max. rated motor power	¹⁾ P_{mot} / kW	15
Drive controller (input)		
Rated input voltage	U_N / V	400 (UL: 480)
Input voltage range	U_{in} / V	280...528
Mains phases		3
Mains frequency	f_N / Hz	50 / 60 ±2
Rated input current @ $U_N = 400V$	I_{in} / A	43
Rated input current @ $U_N = 480V$	I_{in_UL} / A	35
Insulating resistance @ $U_{dc} = 500V$	R_{iso} / MΩ	> 20
Drive controller (output)		
Output voltage	U_{out} / V	0... U_{in}
Output frequency	²⁾ f_{out} / Hz	0...599
Output phases		3
Rated output current @ $U_N = 400V$	I_N / A	33
Rated output current @ $U_N = 480V$	I_{N_UL} / A	27
Rated output overload (60 s)	^{3) 4)} I_{60s} / %	150
Software current limit	³⁾ I_{lim} / %	190
Overcurrent	³⁾ I_{OC} / %	230
Rated switching frequency	f_{SN} / kHz	4
Max. switching frequency	⁵⁾ f_{S_max} / kHz	8
Power dissipation at rated operation	¹⁾ P_D / W	336
Overload cycle in rated operation		
Overload current over time	¹⁾ I_{OL} / %	„2.2 Overload characteristic (OL)“
Maximum current 0Hz/50Hz at $f_s=2$ kHz	I_{out_max} / %	127 / 230
Maximum current 0Hz/50Hz at $f_s=4$ kHz	I_{out_max} / %	100 / 230
Maximum current 0Hz/50Hz at $f_s=8$ kHz	I_{out_max} / %	73 / 230

continued on the next page

Device size		16
Housing		2
Overload cycle 180s		
Max. output current	$I_{out_max_180s} / \%$	150
Overload time	t_{OL_180s} / s	60
Recovery time	$t_{recover_180s} / s$	120
Max. output current during recovery time	$I_{recover_180s} / \%$	75
Overload cycle 15s		
Max. output current	$I_{out_max_15s} / \%$	200
Overload time	t_{OL_15s} / s	3
Recovery time	$t_{recover_15s} / s$	12
Max. output current during recovery time	$I_{recover_15s} / \%$	75
Braking option		
Max. braking current	I_{B_max} / A	47
Min. braking resistor value	R_{B_min} / Ω	18
Braking transistor	⁶⁾	Max. cycle time: 120s; ED: 50 %
Protection function for braking transistor		No protection function available
Table 1: Overview of Peak Power devices housing size 2		

- ¹⁾ Rated operation corresponds to $U_N = 400 V$, rated switching frequency, output frequency = 50 Hz (4-pole standard asynchronous motor).
- ²⁾ The output frequency must be limited by way that it does not exceed 1/10 of the switching frequency. Devices with higher maximum output frequency are subject to export restrictions and are only available on request.
- ³⁾ The values refer in % to the rated output current I_N .
- ⁴⁾ Observe limitations „2.2 Overload characteristic (OL)“.
- ⁵⁾ A detailed description of the derating „2.4 Switching frequency and temperature“.
- ⁶⁾ The cyclic duration factor is additionally limited by the used braking resistor

2.2 Overload characteristic (OL)

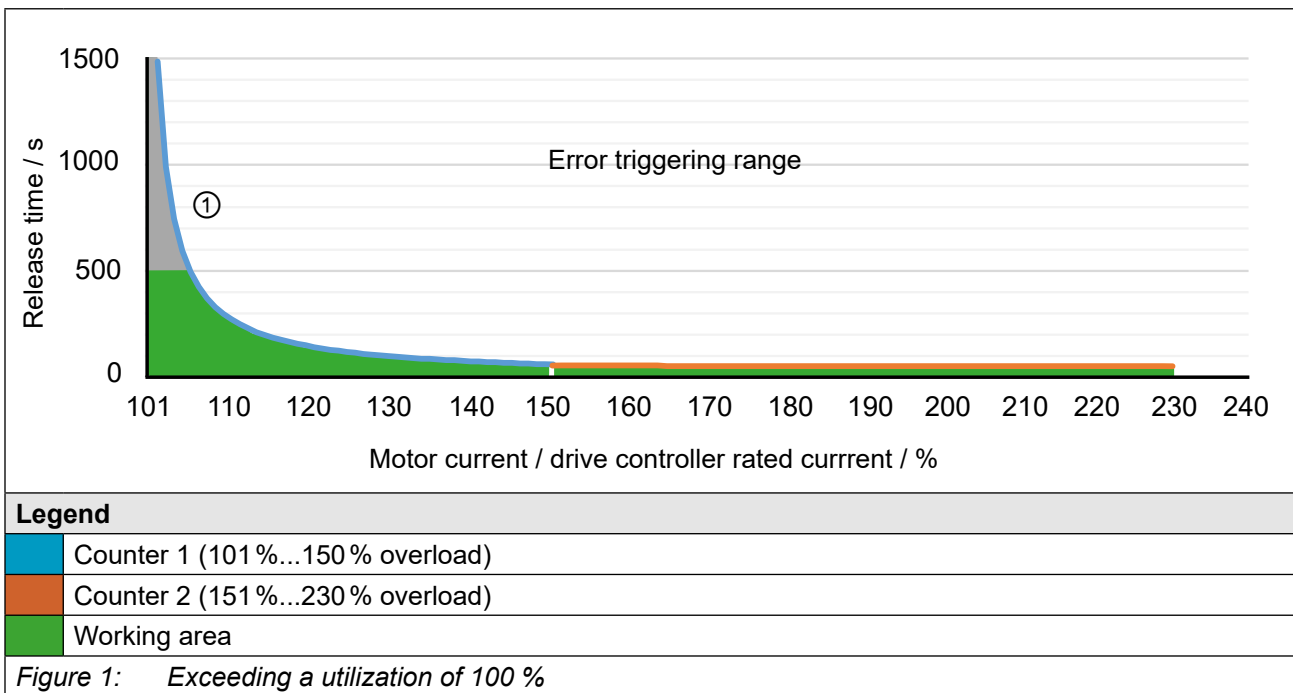
Peak Power drive controllers can be operated in the overload range for a certain period of time.

Exceeding a utilization of 100 %

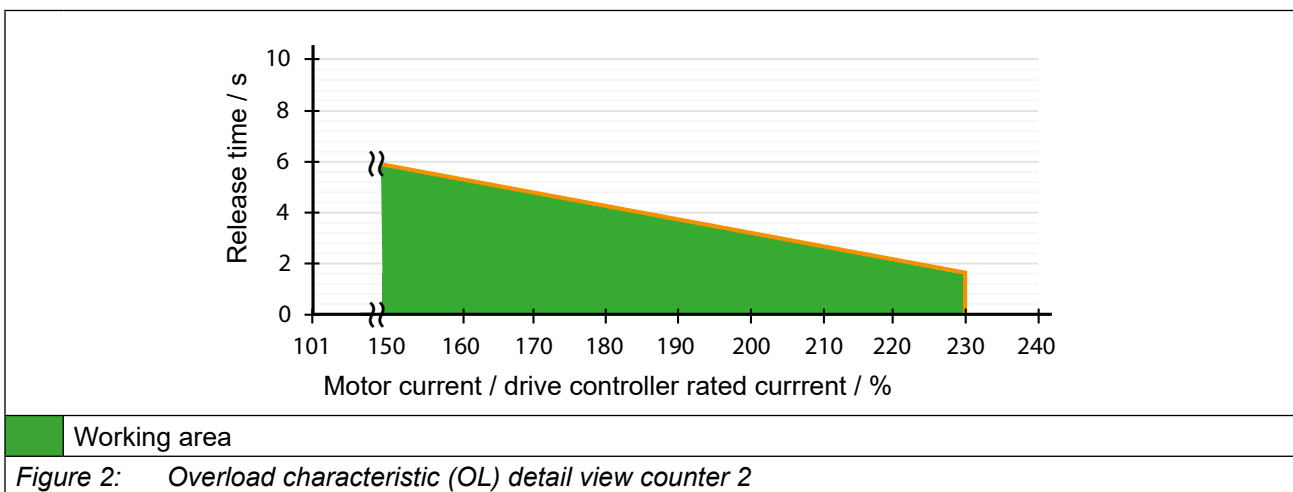
The overload characteristic (OL) for Peak Power drive controllers is realised via two different counters. The first counter describes the behaviour of the drive controller between 101 % and 150 % utilization. The second counter describes the behaviour between 151 % and 230 % utilization.

On exceeding a utilization of 101 % the overload integrator starts.

If the utilization is outside the working range, error "Error! Overload (OL)" is triggered.



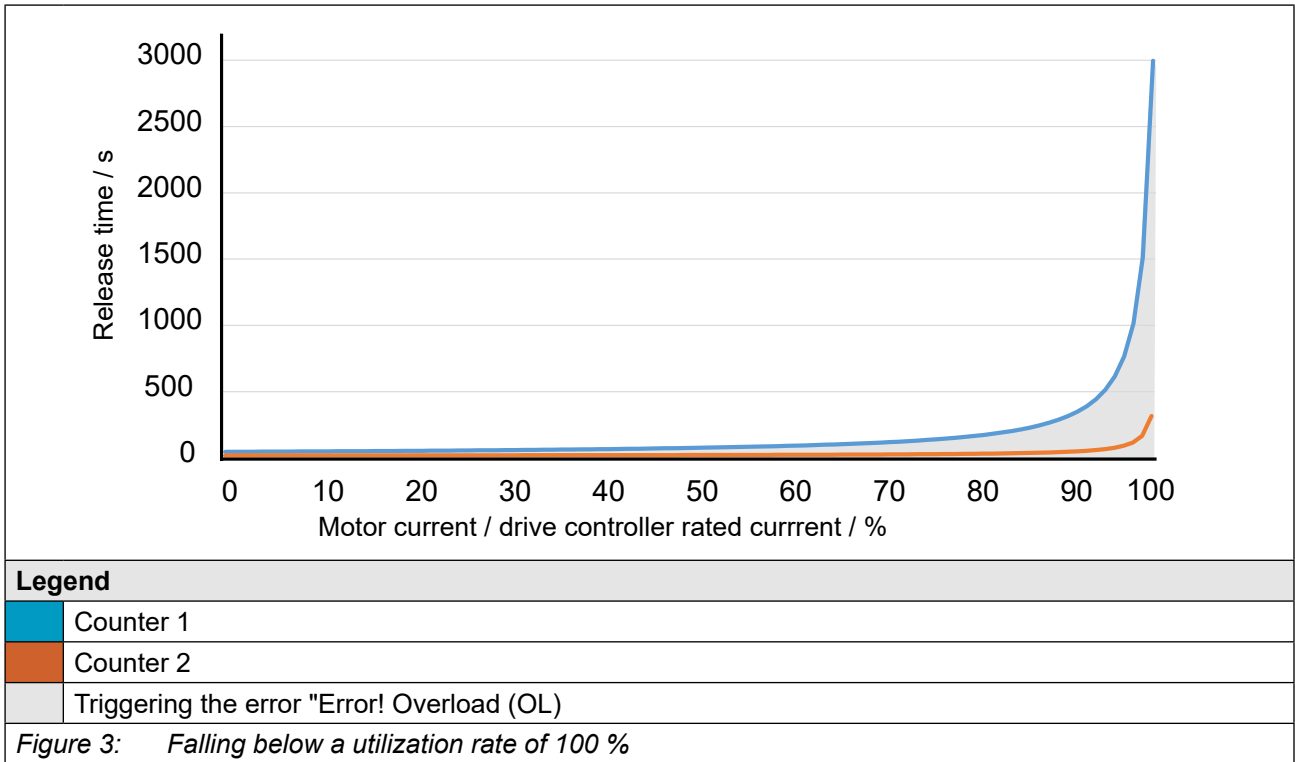
Detail view counter 2



Falling below a utilization rate of 100 %

When the load falls below 100 %, the overload integrator counts down.

If the time is too short or the utilization is too high in the recovery phase, error "Error! Overload (OL)" is triggered.

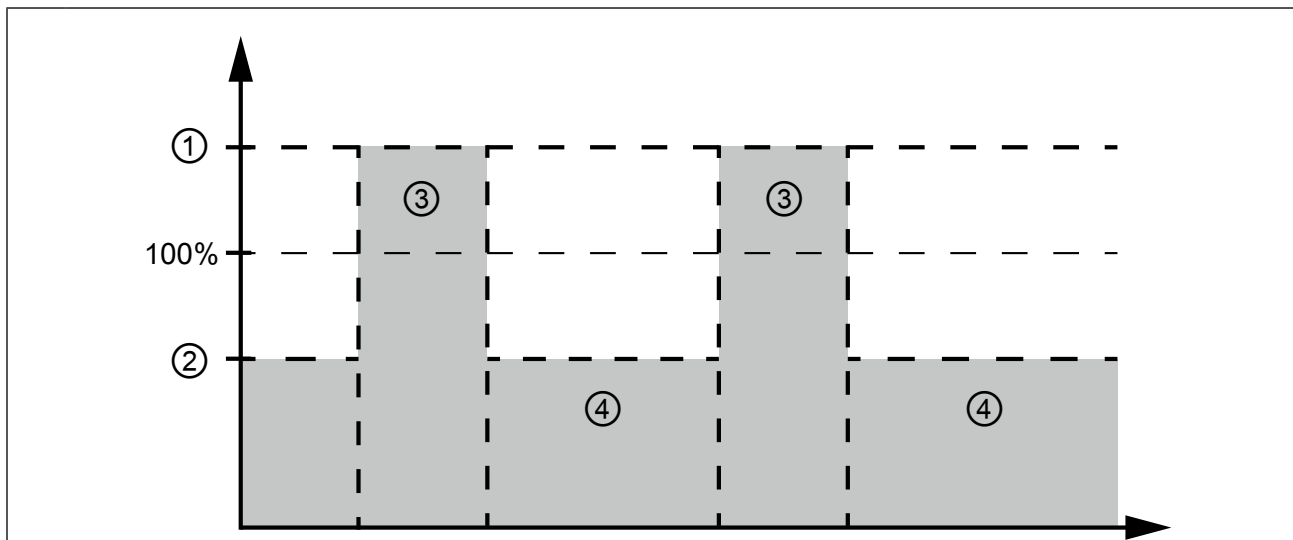


OVERLOAD CHARACTERISTIC (OL)

2.2.1 Example of overload cycles

		Overload cycle 15s	Overload cycle 180s
Max. output current	$I_{out_max} / \%$	200	150
Overload time	t_{OL} / s	3	60
Recovery time	$t_{recover} / s$	12	120
Max. output current during recovery time	$I_{recover} / \%$	75	75

Table 2: Overload cycles



Legend

1	Max. output current
2	Max. output current during recovery time
3	Overload time
4	Recovery time

Figure 4: Example overload cycles

Restrictions:

- The thermal design of the heat sink is based on the rated operation. The following values are taken into account: Rated output current, ambient temperature, rated switching frequency, rated voltage.
- At high ambient temperatures and/or high heat sink temperatures (for example, by preceding utilization nearby 100%) the drive controller can change to overtemperature error before triggering the protective function OL.
- At low output frequencies or switching frequencies higher than the rated switching frequency, the frequency-dependent maximum current can be exceeded before and error OL2 can be triggered („[2.3 Frequency-dependent maximum current \(OL2\)](#)“).

After a cooling down period, the integrator can be reset now. The drive controller must remain switched on during the cooling down phase.

Operation in the range of the thermal overload limit

Due to the high steepness of the overload characteristic, the duration of a permissible overload in this range ① cannot be determined exactly. Therefore, the design of the drive controller should be assumed to have a maximum overload time of 300s => „[Figure 1: Exceeding a utilization of 100 %](#)“.

2.3 Frequency-dependent maximum current (OL2)

The characteristics of the maximum currents for a switching frequency which are depending on the output frequency are different for each drive controller, but the following rules are generally applicable for housing 2:

- Applies for the rated switching frequency: at 0 Hz the drive controller can provide at least the rated output current.
- Lower maximum currents apply for switching frequencies > rated switching frequency.

If error (OL2) shall be triggered on exceeding the maximum currents or if the switching frequency is automatically reduced "Derating" can be adjusted in the drive controller parameters.

The following characteristic curves indicate the permissible maximum current for the output frequency values 0 Hz, 3.1 Hz, 6.2 Hz, 12.5 Hz, 25 Hz and 50 Hz. Device size 16 (OC level: 230 %) is shown as an example.

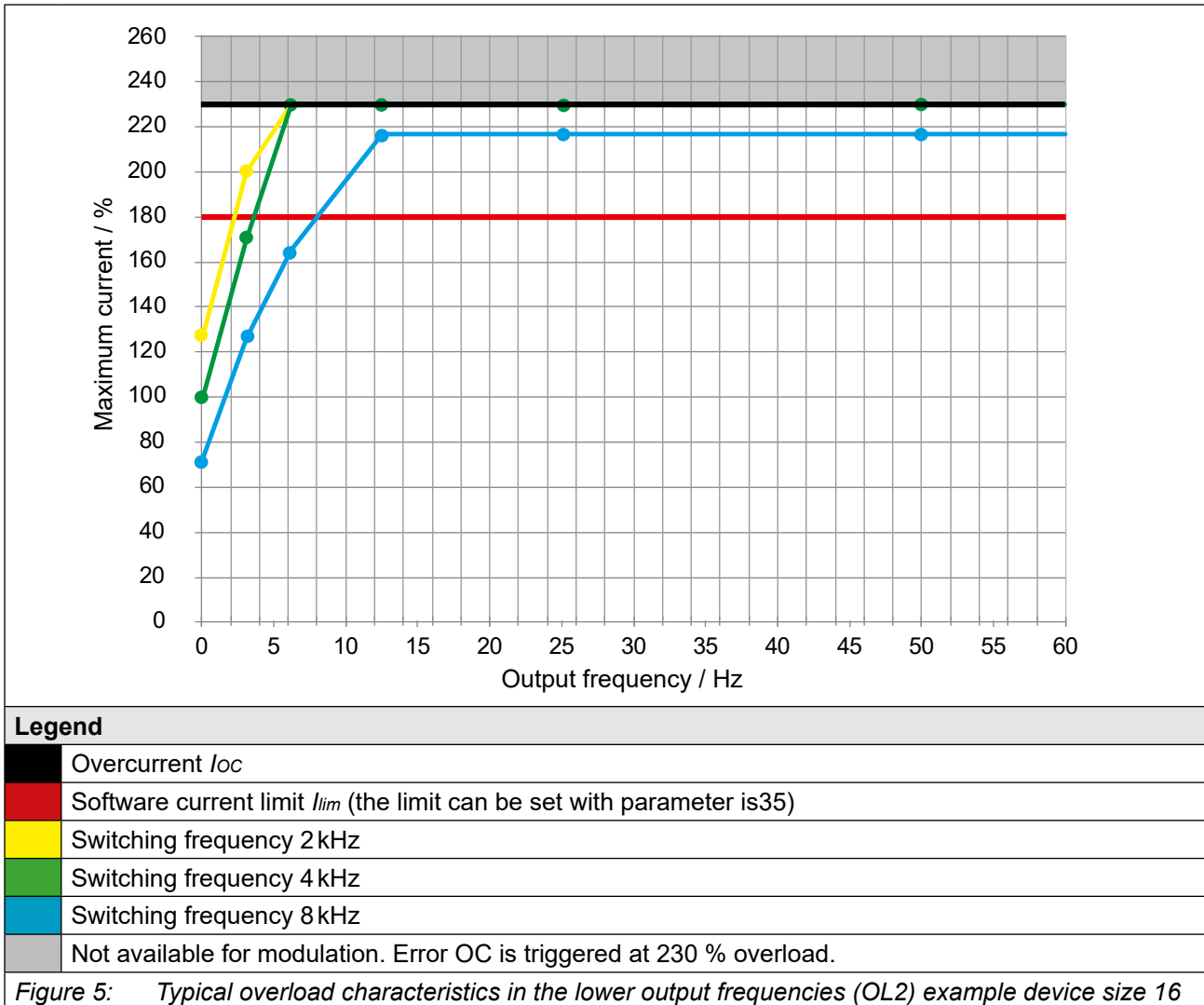


Figure 5: Typical overload characteristics in the lower output frequencies (OL2) example device size 16



The frequency-dependent maximum current I_{out_max} refers in % to the rated current I_N .

The current remains constant from the last specified output frequency value.



The values for the respective device size are listed in the following tables.

Frequency-dependent maximum current

Device size		16					
Rated switching frequency		4					
Output frequency	f_{out} / Hz	0	3.1	6.2	12.5	25	50
Frequency-dependent maximum current @ f_s I_{out_max} / % <i>Basic Time Period = 62.5 μs (Parameter is22=0)</i>	2 kHz	127	203	230	230	230	230
	4 kHz	100	173	230	230	230	230
	8 kHz	73	127	167	230	230	230
Frequency-dependent maximum current @ f_s I_{out_max} / % <i>Basic Time Period = 71.4 μs (Parameter is22=1)</i>	1.75 kHz	127	203	230	230	230	230
	3.5 kHz	107	180	230	230	230	230
	7 kHz	80	139	183	222	222	222
Frequency-dependent maximum current @ f_s I_{out_max} / % <i>Basic Time Period = 83.3 μs (Parameter is22=2)</i>	1.5 kHz	127	203	230	230	230	230
	3 kHz	114	188	230	230	230	230
	6 kHz	86	150	200	226	226	226
Frequency-dependent maximum current @ f_s I_{out_max} / % <i>Basic Time Period = 100 μs (Parameter is22=3)</i>	1.25 kHz	127	203	230	230	230	230
	2.5 kHz	121	196	230	230	230	230
	5 kHz	93	161	217	230	230	230

Table 3: Frequency-dependent maximum current for device size 16

2.4 Switching frequency and temperature

Device size		16
Rated switching frequency	¹⁾ f_{SN} / kHz	4
Max. switching frequency	¹⁾ f_{S_max} / kHz	8
Min. switching frequency	¹⁾ f_{S_min} / kHz	1,25
Max. heat sink temperature	T_{HS} / °C	95
Temperature for derating the switching frequency	T_{DR} / °C	80
Temperature for uprating the switching frequency	T_{UR} / °C	70
Temperature for switching to rated switching frequency	T_{EM} / °C	85

Table 4: Switching frequency and temperature of the device size 16

¹⁾ The output frequency is to be limited in such a way that it does not exceed 1/10 of the switching frequency.

The drive controller cooling is designed by way that the heat sink overtemperature threshold is not exceeded at rated conditions.

A switching frequency higher than the rated switching frequency also produces higher losses and thus a higher heat sink heating.

If the heat sink temperature reaches a critical threshold (T_{DR}), the switching frequency can be reduced automatically step by step. This prevents that the drive controller switches off due to overheating of the heat sink. If the heat sink temperature falls below T_{UR} , the switching frequency is increased back to the setpoint. At temperature T_{EM} the switching frequency is immediately reduced to rated switching frequency. "Derating" must be activated, for this function to work.

3 Revision History

Version	Date	Description
01	2022-03	Completion of the series version

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