

## USING THE QUICK GUIDE

- Serves for safe handling with the KEB drive controller.
- Provides information on handling, assembly and installation.
- Remains for later use at the drive controller.
- Does **not** replace the electronically provided instructions for use.

This manual is intended exclusively for persons who are familiar with the logistics and installation. The person must have the following qualifications:

- Knowledge and understanding of the safety instructions.
- Skills for installation and assembly.
- Understanding of the function in the used machine.
- Detection of hazards and risks of the electrical drive technology.
- Knowledge of IEC 60364-5-54.
- Knowledge of national safety regulations (e.g. DGUV Regulation 3).

## SAFETY INSTRUCTIONS

### ⚠ DANGER Interventions by unauthorized personnel!

#### Danger to life by electric shock and malfunction!

- Modification or repair is only permitted by KEB authorised personnel.

### NOTICE

#### Getting more documentation

#### Hazards and risks through ignorance.

- Open the KEB homepage at [www.keb.de](http://www.keb.de).
- By entering the material number in the search field, you will get the corresponding parts of the instructions for use.
- Read the instructions for use carefully!
- Observe the safety and warning instructions!
- If you have any questions, please contact [service@keb.de](mailto:service@keb.de)!

## TRANSPORT

The transport must be carried out by instructed persons, observing the following instructions.

### ⚠ CAUTION Maximum design edges and high weight!

#### Contusions and bruises!

- Never stand under suspended loads.
- Wear safety shoes.
- Secure drive controller accordingly when using lifting gear.

### NOTICE

#### Behaviour in case of transport damage

- When receiving goods, check the device for transport damage such as deformations or loose parts.
- In case of damage, contact the carrier immediately.
- Do not operate the device in case of transport damage!

## STORAGE

Do not store drive controllers

- in the environment of aggressive and/or conductive liquids or gases.
- in locations exposed to direct sunlight.
- outside the specified environmental conditions.

## UNPACKING AND CHECKING

- Make sure that no components are bent and/or isolation distances are changed.
- The device must not be put into operation in case of mechanical defects. There is no compliance with applicable safety standards any more.



The electrolytic capacitors of the DC link must be reformed if the drive controller was stored or out of operation for more than one year. See [www.keb.de/inc/search](http://www.keb.de/inc/search) with search term "electrolytic capacitors".

## INSTALLATION

### ⚠ Drive controllers contain electrostatic sensitive components.

- Avoid contact.
- Wear ESD-protective clothing.

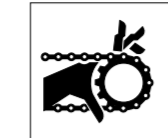
- Do not allow moisture or mist to penetrate the unit. Mount the drive controller according to the required degree of protection.

- Make sure that no small parts fall into the device during assembly and wiring (drilling chips, screws etc.). This also applies to mechanical components, which can lose small parts during operation.

- The device is intended for the use in a pollution degree 2 environment.
- Maximum ambient temperature 45°C
- UL/CSA: For push-through versions, the part of tends to "NEMA Type 1".
- UL/CSA: Use only 75°C copper cables for UL-compliant connections for all power connections!
- CSA: For installations according to the Canadian National Standard C22.2 No. 274-13 overvoltage category III.

## START-UP AND OPERATION

### ⚠ WARNING Function of the drive controller determines the machine manufacturer!



### ⚠ WARNING Triggering of overcurrent protection devices

#### Risk of fire or electric shock!

- Triggering of an overcurrent protection device will be a hint for an overload or short circuit. Triggering a RCD may be caused by a leakage current.
- In order to reduce the risk of fire or electric shock, live parts and other components of the controller should be checked and replaced in case of damage.
- If the contacts of an overload relay are burned, the complete relay must be replaced.

### ⚠ CAUTION High sound pressure level during operation!

#### Hearing damage possible!

- Wear hearing protection!

## MAINTENANCE

### ⚠ DANGER Unauthorized exchange, repair and modifications!

#### Unpredictable malfunctions!

- The function of the drive controller is dependent on its parameterization. Never replace without knowledge of the application.
- Modification or repair is permitted only by KEB Automation KG authorized personnel.
- Only use original manufacturer parts.

The following maintenance work has to be carried out when required, but at least once a year by authorised and trained personnel.

- Clean the drive controller from dirt and dust deposits. Pay attention especially to cooling fins and protective grid of the fans.
- Check the function of the fans of the drive controller. The fans must be replaced in case of audible vibrations or squeak.
- Make a visual test of the cooling circuit for leaks and corrosion at liquid-cooled drive controllers.
- In case of malfunction, unusual noises or smells inform a person in charge!
- In case of failure, please contact the machine manufacturer. Only the machine manufacturer knows the parameterisation of the used drive controller and can provide an appropriate replacement or induce the maintenance.

## INSTALLATION / ELECTRICAL CONNECTION

### ⚠ DANGER Voltage at the terminals and in the device!

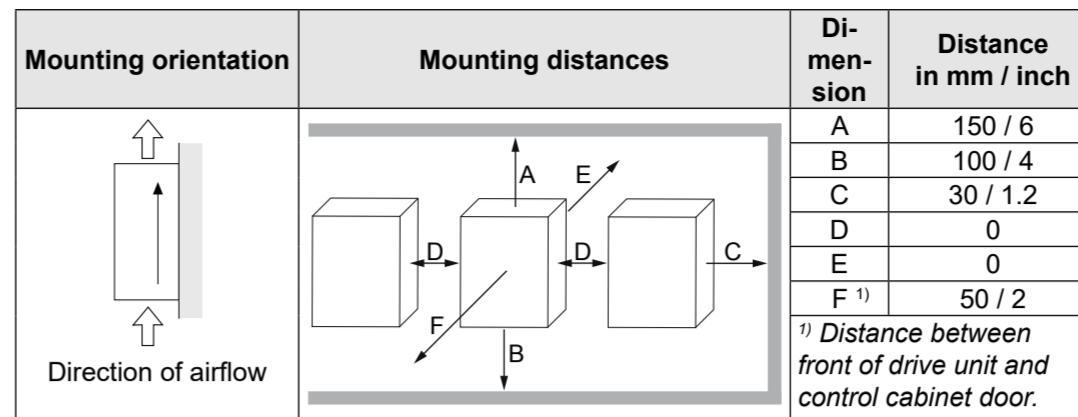
#### Danger to life by electric shock!

- Never work under voltage on the open device or touch exposed parts.
- For any work on the unit switch off the supply voltage and secure it against switching on.
- Wait until the mechanical drive system has stopped in order that no regenerative energy can be generated.
- Wait until the DC link capacitors are discharged (5 minutes). Verify by measuring the DC voltage at the terminals.
- If personal protection is required, install suitable protective devices for drive controllers.
- Never bridge upstream protective devices (also not for test purposes).
- Connect the protective earth conductor properly to drive controller and motor.
- Leakage current higher than 3.5 mA: The minimum cross section of the protective earth conductor must comply with local safety regulations for protective earth conductors for equipment with high leakage current.
- Install all required covers and protective devices for operation.
- Residual current: This product can cause a DC current in the protective earth conductor. When a residual current device (RCD) or a residual current monitor (RCM) is used for the protection of direct or indirect contact, only a RCD or RCM of Type B is permitted for this product on the power supply side.

For a trouble-free and safe operation, please pay attention to the following instructions:

- Check for reliable fit of the device connections in order to minimize contact resistance and avoid sparking.
- Connection of the drive controller is only permissible on symmetrical networks with a maximum line voltage (L1, L2, L3) with respect to earth (N/PE) of maximum 300 V. USA UL: 480/277 V. An isolating transformer must be used for supply networks which exceed this value. In case of non-compliance the control circuits are no longer considered as "safe separate circuit".
- Within systems or machines the person installing electrical wiring must ensure that an existing or new wired safe ELV circuits the EN requirement for safe insulation is still met!
- For drive controllers that are not isolated from the supply circuit (in accordance with EN 61800-5-1) all control lines must include other protective measures (e.g. double insulation or shielded, earthed and insulated).

## MOUNTING DISTANCES



## PROTECTION

### NOTICE

#### Important:

#### UL/CSA Branch Circuit Protection

COMBIVERT	Housing	Input voltage		Max. fuse size					
		IEC	UL	UL					
				AC 3ph	IEC	JDDZ/7 Class "J"	SCCR	JFHR2/8 <sup>1)</sup>	SCCR
10F6	2	230V	240V	20A	25A	5 kA	30 kA	25A	30 kA
12F6				32A	40A			40A	
13F6				35A	50A			50A	
14F6				50A	70A			63/70A	
12F6				20A	15A			16A	
13F6				25A	20A			20A	
14F6	25A	25A	25A						
15F6	35A	35A	35A						
16F6	50A	50A	50A						
15F6	3	230V	240V	80A	80A	5 kA	30 kA	80A	30 kA
16F6				80A	90A			90/100A	
17F6				100A	110A			125A	
17F6				63A	45A			50A	
18F6				80A	60A			50A	
19F6				80A	70A			70/80A	
20F6	100A	90A	90/100A						
18F6	4	230V	240V	125A	110A	10 kA	100 kA	125A	100 kA
18F6				80A	60A			50A	
19F6				80A	70A			80A	
20F6				100A	90A			100A	
21F6				125A	110A			125A	
22F6				160A	125A			125A	
19F6	6	230V	240V	160A	TBD	18 kA	100 kA	TBD	100 kA
20F6				200A	TBD			400A	
21F6				250A	TBD			400A	
21F6				125A	110A			125A	
22F6				160A	150A			160/175A	
23F6				200A	175A			180/200A	
24F6	250A	200A	200A						
25F6	250A	250A	250A						
26F6	7	400V	480V	315A	300A	18 kA	100 kA	315A	100 kA
27F6				350A	350A			350A	
28F6				400A	450A			450A	
27F6				500A	400A			400A	
28F6				500A	500A			500A	
29F6				630A	600A			550/600A	
30F6	630A	600A	600/630A						
30F6	9	400V	480V	630A	601A	30 kA	100 kA	630A	100 kA
31F6				700A	700A			700A	
32F6				800A	800A			800A	
33F6				900A	900A			900A	

<sup>1)</sup> Information on the manufacturers of UL approved fuses are available in the instructions for use of the corresponding housings.

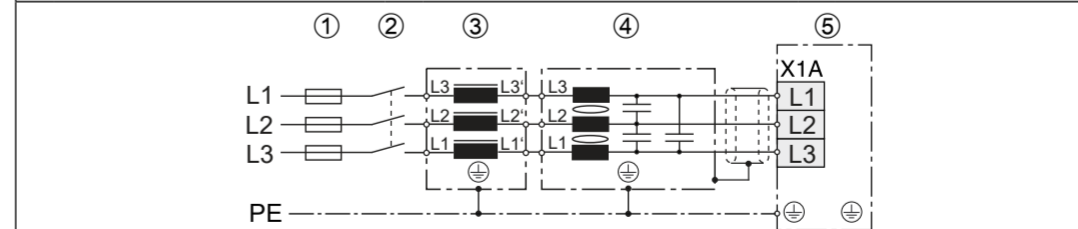
## BRAKING TRANSISTOR

F6 Housing	Max. cycle time in t / s	Max. cyclic duration factor in % <sup>1)</sup>
2, 3, 4, 6, 7, 8	120	50
9	120	25

<sup>1)</sup> The cyclic duration factor is additionally limited by the used braking resistor.

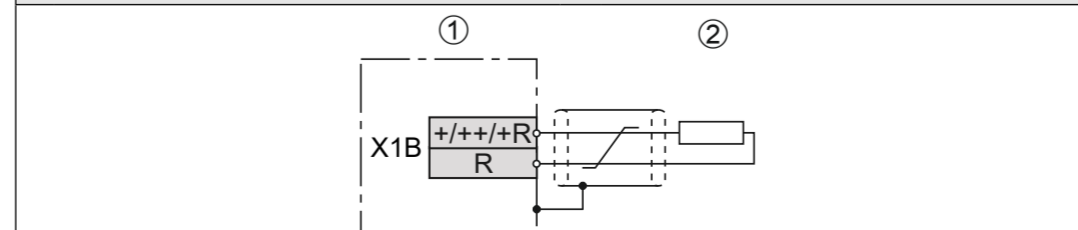
## WIRING

### Mains connection 3-phase (L1, L2, L3)

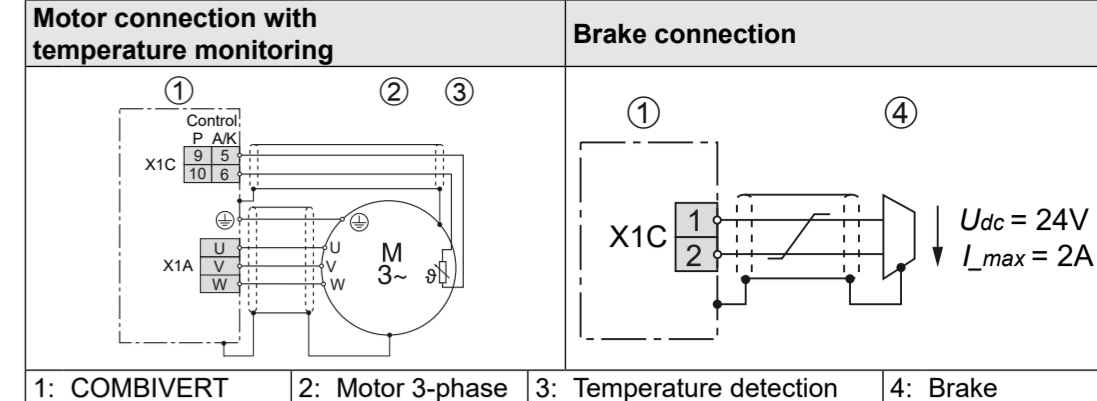


1: Mains fuse	3: Mains choke (option)	5: COMBIVERT
2: Mains contactor	4: HF filter (option)	

### Connection brake resistor

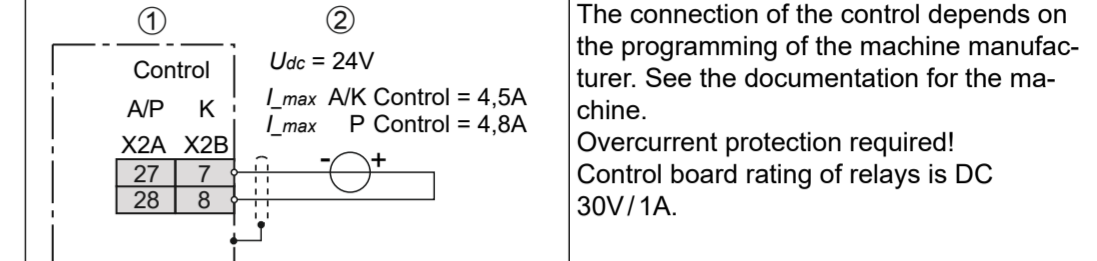


1: COMBIVERT	2: Braking resistor
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1: COMBIVERT 2: Motor 3-phase 3: Temperature detection 4: Brake

## 24V supply control unit



1: COMBIVERT 2: 24V supply

Housing	No. from Table 2 Terminal block(s)							
	X1A				X1C	X2A-D	FAN	PE
	L1, L2 (N), L3	U, V, W	+, -, ++, --, R, +R, PB	all PINs				
F6 2	2	2	2	1	1			6
F6 3	4	4	3 <sup>1)</sup> /4					7
F6 4	5	5	5					8
F6 6	9	9	9					9
F6 7	10	10	10					10
F6 8	11	11	11			13		11
F6 9	12	12	12					12

Table 1: Assignment of terminals to terminal numbers

<sup>1)</sup> The specification applies only to terminals R and +R.

No. from Table 1	Mounting type	Permissible cross section		Tightening torque	
		mm² with wire end ferrule	AWG without wire end ferrule	Nm	lb inch
1	Push-In terminal	0.14...1.5 <sup>1)</sup>	–	–	–
2	Screw terminal	2.5...10	26...6	1.5	13
3	Screw terminal	0.5...16	20...6	1.2...1.5	11...13
4	Screw terminal	0.5...35	20...2	2.5...4.5	23...40
5	Screw terminal	1.5...35	16...1	3.2...3.7	28...32
6	M4 screw <sup>2)</sup>	–	–	1.3	11
7	M5 bolt <sup>2)</sup>	–	–	6...8	53...70
8	M6 bolt <sup>2)</sup>	–	–	6.1...12	54...106
9	M8 bolt <sup>2)</sup>	–	–	10...15	88...132
10	M10 bolt <sup>2)</sup>	–	–	25	220
11	M12 bolt <sup>2)</sup>	–	–	35	310
12	M16 bolt <sup>2)</sup>	–	–	35	310
13	Screw terminal	0.2...4 1.5 max. with 2 conductors	24...10 14 max. with 2 conductors	0.5...0.6	4.5...5.3

Table 2: Assignment of terminal number to cross section and tightening torque

<sup>1)</sup> Malfunctions caused by loose cable connections and too short wire end ferrules!

- Use wire end ferrules according to table 3 Wire end ferrules and stripping length.
- Strip cable according to table 3 Wire end ferrules and stripping length.

<sup>2)</sup> For crimp connectors.

- Cable cross-sections and fuses must be dimensioned according to the design of the machine manufacturer. Specified minimum / maximum values may not be fallen below / exceeded.

Cross section	Wire end ferrule	Metal sleeve length	Stripping length
0.50 mm²	with plastic collars (DIN 46228-4)	10 mm	12 mm
0.75 mm²		12 mm	14 mm
1.00 mm²		12 mm	15 mm
1.50 mm²	without plastic collars (DIN 46228-1)	10 mm	10 mm
0.14...1.5 mm² single or finewire	without wire end ferrule	–	10...15 mm

Table 3: Wire end ferrules and stripping length

## FLUID COOLER

F6 Housing	Volume flow Water Q / l/min	Volume flow Oil Q / l/min	Connection	
			Water Pipe d / mm	Oil Thread
3	3... 15	–	10	–
4, 6	5... 15	15...25	10	G 1/2
7	6...20	–	12	–
8, 9	10...33	–	15	–

- Maximum pressure for liquid-cooled drive controllers 10 bar (145 psi).
- Temperature range fluid cooler, water: 5...40°C, oil: 40...55°C.



The volume flow depends on the power dissipation. See instructions for use.



Observe information on fluid coolers. See instructions for use.



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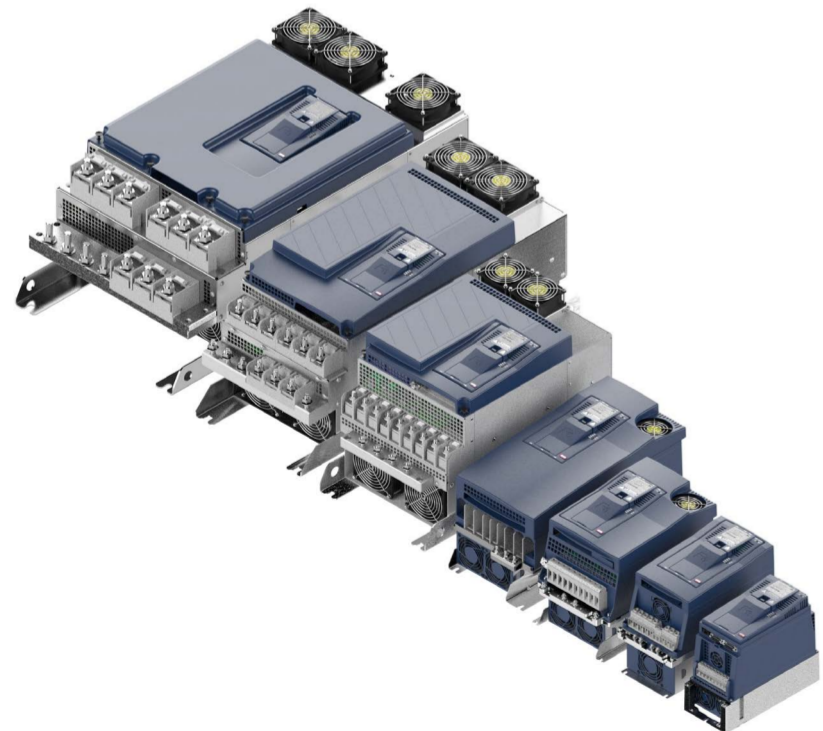
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# COMBIVERT F6

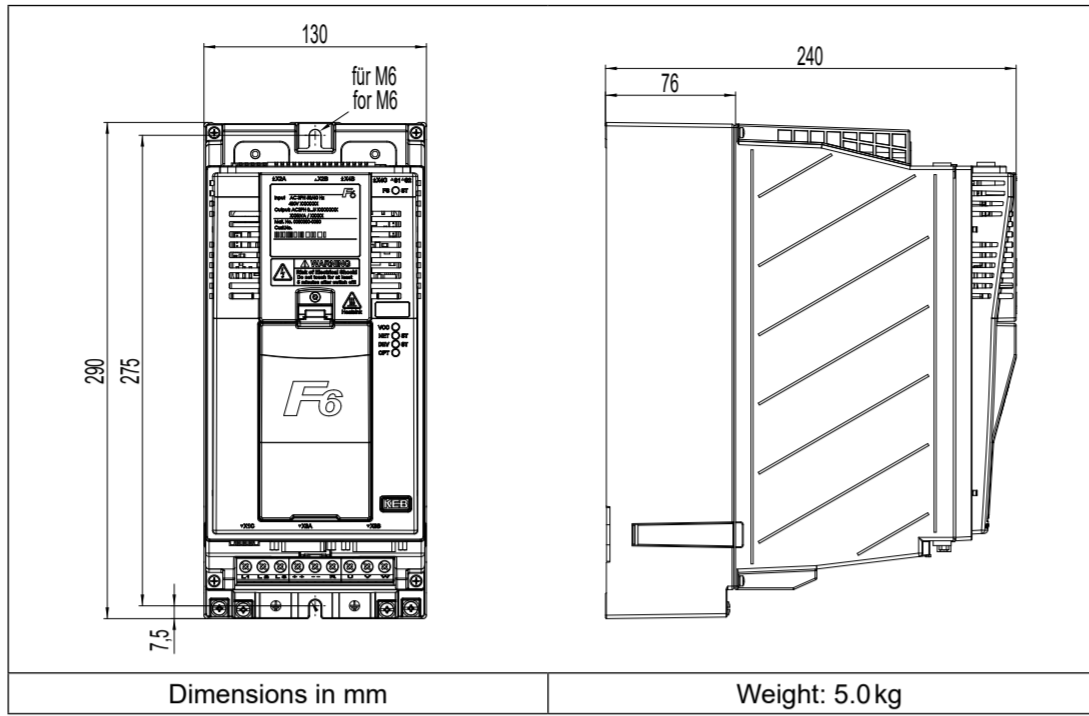
QUICK START GUIDE

Translation of the original manual  
 F6 Series Housing 2, 3, 4, 6, 7, 8, 9  
 Document 20162225 EN 10

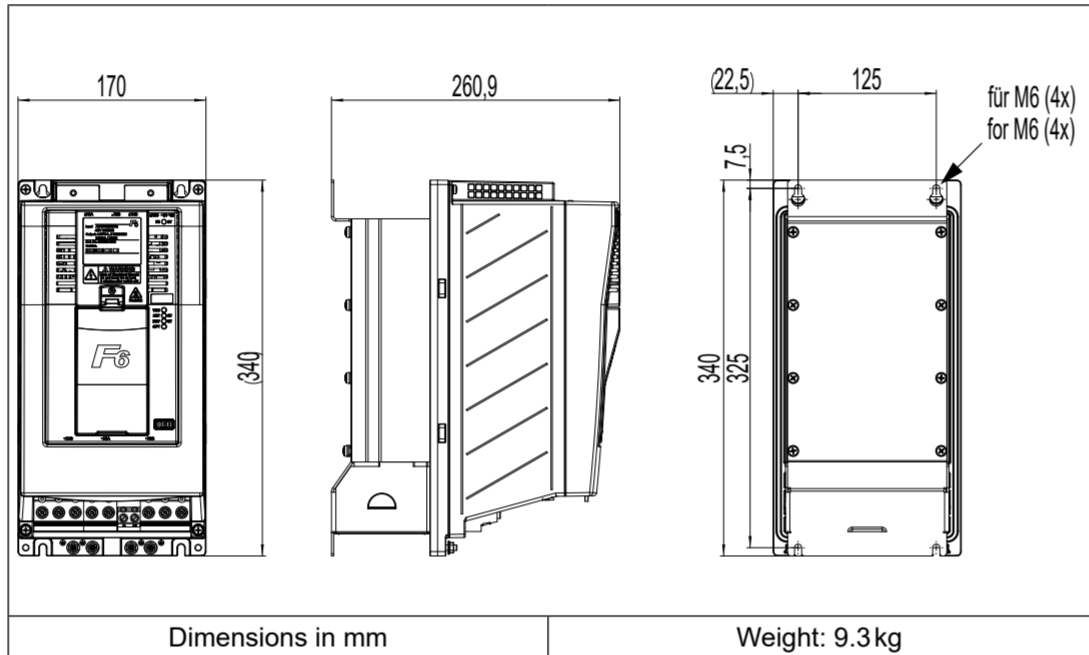
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## HOUSING DIMENSIONS

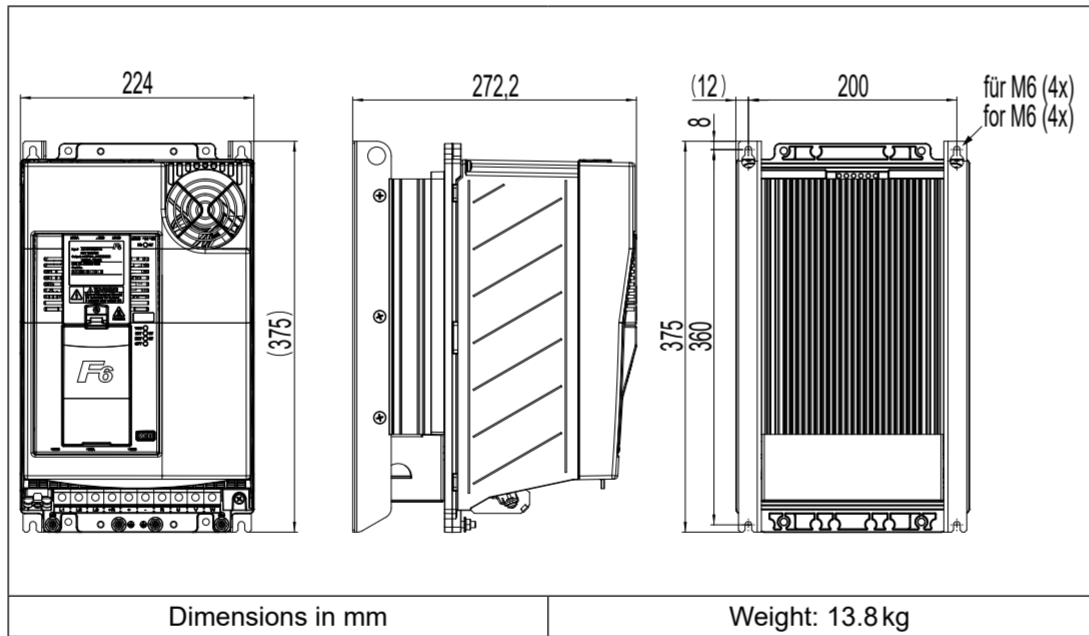
### HOUSING 2 BUILT-IN VERSION



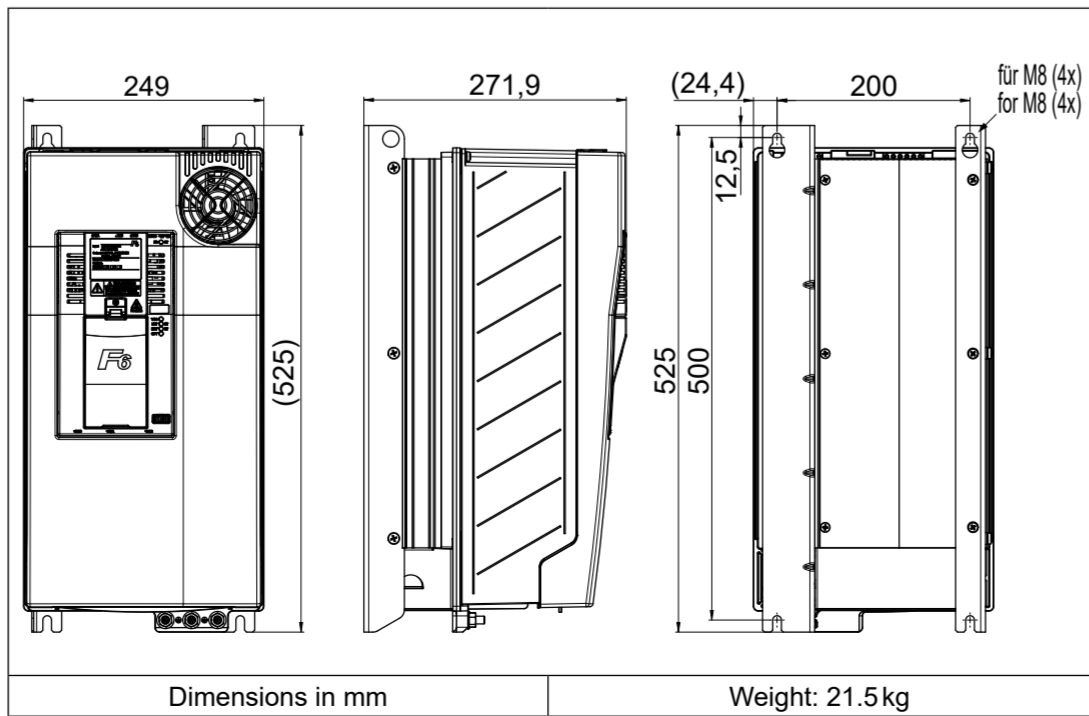
### HOUSING 3 BUILT-IN VERSION



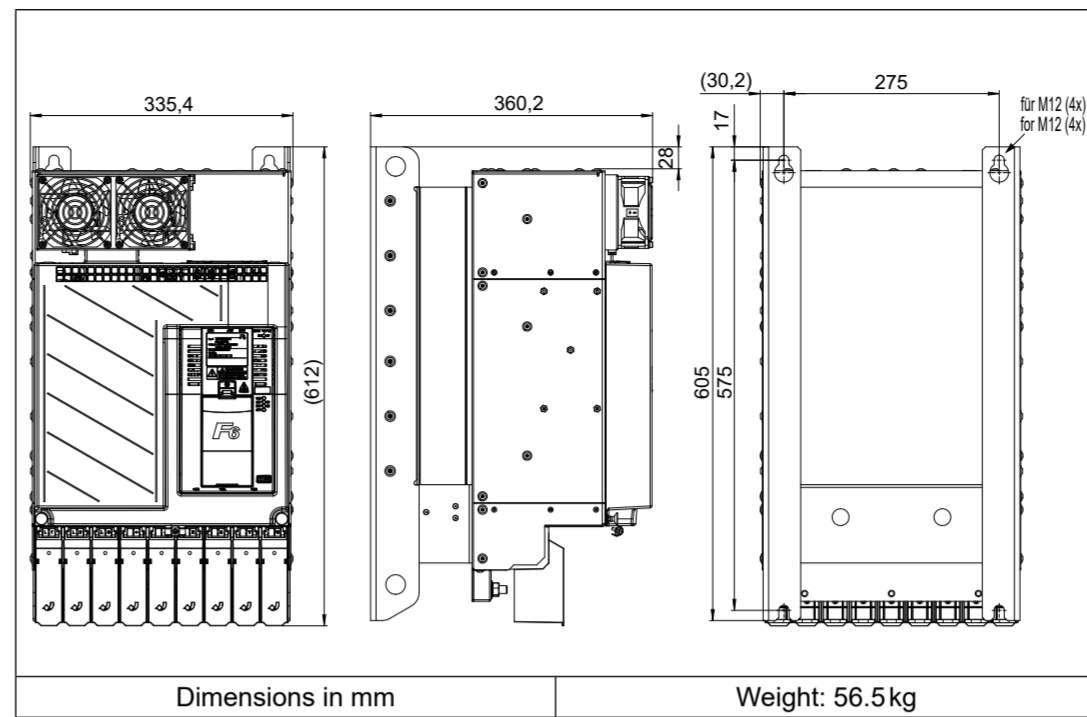
### HOUSING 4 BUILT-IN VERSION



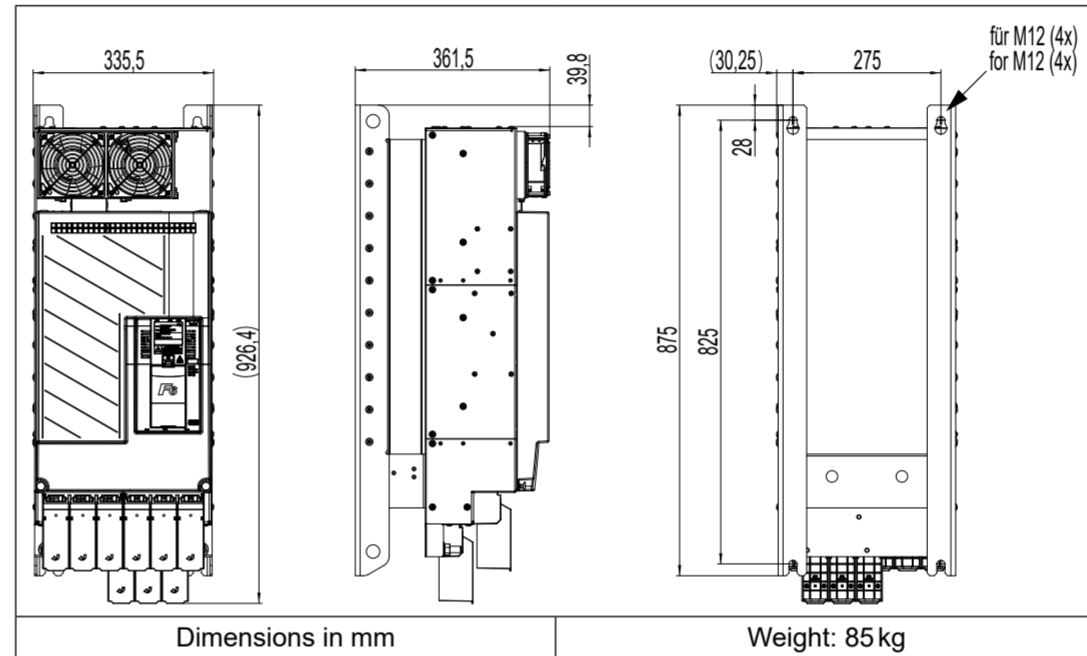
### HOUSING 6 BUILT-IN VERSION



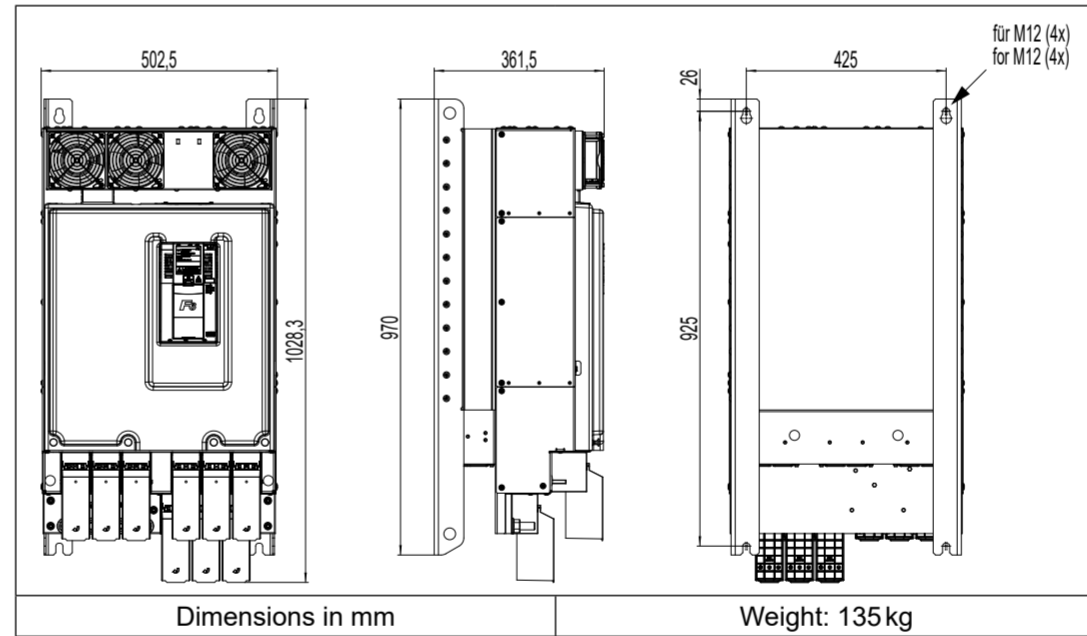
## HOUSING 7 BUILT-IN VERSION



## HOUSING 8 BUILT-IN VERSION



## HOUSING 9 BUILT-IN VERSION



**i** The housing dimensions of other model variants can be found in the instructions for use of the corresponding housings.

## CERTIFICATION

### CE certification

**CE certification**  
 KEB products meet the requirements of the valid European and national directives. The conformity has been proven. The corresponding declarations can be downloaded from our website by entering the material number in the search field.

### FS certification

**FS** For devices with FS logo on the nameplate, the corresponding KEB safety manual must be observed!

During the UL evaluation, only electrical safety and risk of fire aspects were investigated. Functional safety aspects were not evaluated. Devices with safety function are limited to a service life of 20 years. Then the devices must be replaced.

See [www.keb.de/hc/search](http://www.keb.de/hc/search) with search term "safety manual".

## UL certification

### NOTICE

### UL certification

Only devices with UL logo on the name plate are certified.



For compliance with UL for use in the North American and Canadian Market, the following additional information must be observed (English original text):

### BRANCH CIRCUIT PROTECTION

- ▶ Integral solid state short circuit protection does not provide branch circuit protection.
- ▶ Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes".
- ▶ CSA: For Canada: Branch circuit protection must be provided in accordance with the Canadian Electrical Code, Part I.

### WARNING

▶ THE OPENING OF THE BRANCH-CIRCUIT PROTECTIVE DEVICE MAY BE AN INDICATION THAT A FAULT HAS BEEN INTERRUPTED. TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CURRENT-CARRYING PARTS AND OTHER COMPONENTS OF THE CONTROLLER SHOULD BE EXAMINED AND REPLACED IF DAMAGED. IF BURNOUT OF THE CURRENT ELEMENT OF AN OVERLOAD RELAY OCCURS, THE COMPLETE OVERLOAD RELAY MUST BE REPLACED.

### AVERTISSEMENT

▶ LE DÉCLENCHEMENT DU DISPOSITIF DE PROTECTION DU CIRCUIT DE DÉRIVATION PEUT ÊTRE DÙ À UNE COUPURE QUI RÉSULTE D'UN COURANT DE DÉFAUT. POUR LIMITER LE RISQUE D'INCENDIE OU DE CHOC ÉLECTRIQUE, EXAMINER LES PIÈCES PORTEUSES DE COURANT ET LES AUTRES ÉLÉMENTS DU CONTRÔLEUR ET LES REMPLACER S'ILS SONT ENDOMMAGÉS. EN CAS DE GRILLAGE DE L'ÉLÉMENT TRAVERSÉ PAR LE COURANT DANS UN RELAIS DE SURCHARGE, LE RELAIS TOUT ENTIER DOIT ÊTRE REMPLACÉ.

### GROUNDING SYSTEM

- ▶ All 480Vac / 3-ph Models:  
 „Only for use in non-corner grounded type WYE source not exceeding 277 V phase to ground“ (or equivalent).
- ▶ All 200-240Vac / 3-ph Models:  
 “Only for use in non-corner grounded type WYE source not exceeding 139 V phase to ground” (or equivalent).

## UK Conformity Assessed

### UK Conformity Assessed

KEB products with the listed logo meet the requirements and guidelines of Great Britain. The corresponding information can be obtained on our website by entering the material number in the search field or from our authorised contact person below:

KEB(UK) Ltd.  
 5 Morris Cl, Park Farm Industrial Estate,  
 Wellingborough NN8 6XF, UK

## DISPOSAL

- ▶ For professional disposal, follow the instructions in the instructions for use

## INSTRUCTIONS FOR USE



- ▶ Open the KEB homepage at [www.keb.de](http://www.keb.de).
- ▶ By entering the material number in the search field, you will get the corresponding parts of the instructions for use.
- ▶ Read the instructions for use carefully!

KEB Online	<a href="http://www.keb.de">www.keb.de</a>	KR	다른 언어도 사용할 수 있습니다.
BG	Други налични езици.	HR	Ostali dostupni jezici.
CN	其他语言可用。	HU	Más elérhető nyelvek.
CZ	Jiné jazyky k dispozici.	LV	Citas pieejamās valodas.
DK	Andre sprog til rådighed.	LT	Kitos kalbos.
DE	Weiteren Sprachen verfügbar.	MT	Lingwi oħra disponibbli.
EN	Other languages available.	NL	Andere talen beschikbaar.
EE	Muud keeled on saadaval.	PL	Inne dostępne języki.
ES	Otros idiomas disponibles.	PT	Outros idiomas disponíveis.
FI	Muut kielet saatavilla.	RO	Alte limbi disponibile.
FR	Autres langues disponibles.	RU	Доступны другие языки.
GR	Άλλες διαθέσιμες γλώσσες.	SE	Andra språk finns tillgängliga.
IE	Teangacha eile ar fáil.	SK	Iné jazyky sú k dispozícii.
IT	Altre lingue disponibili.	SI	Drugi jeziki so na voljo.
JP	他の言語も利用できます。	TR	Mevcut diğer diller.