



COMBIVERT F6

DRIVE CONTROLLER 4 ... 400 kW

EN



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SYSTEM OVERVIEW

Automation with Drive

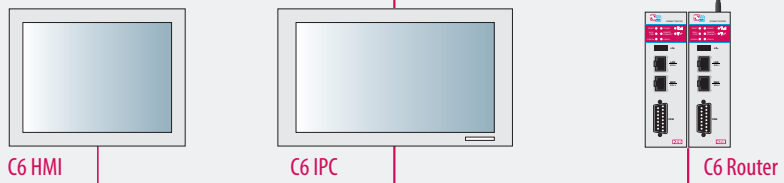
stands as a synonym for optimally selected combinations of control and automation solutions with the drive level at the end it is the key to successful machine concepts.

Let the following pages inspire you with regards to the diversity and performance of the COMBIVERT F6 drive controller, and help you to find a solution that reliably meets your requirements.

SOFTWARE



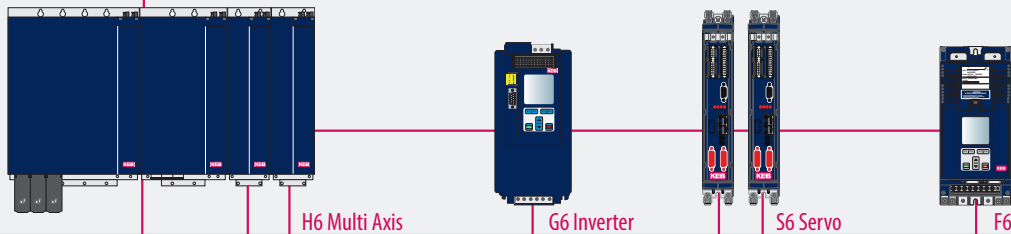
HMI



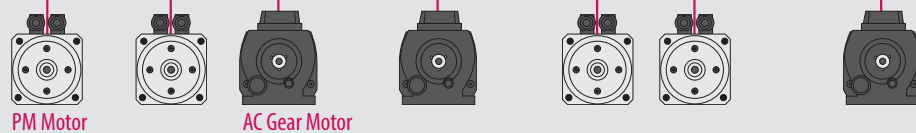
CONTROL



DRIVES



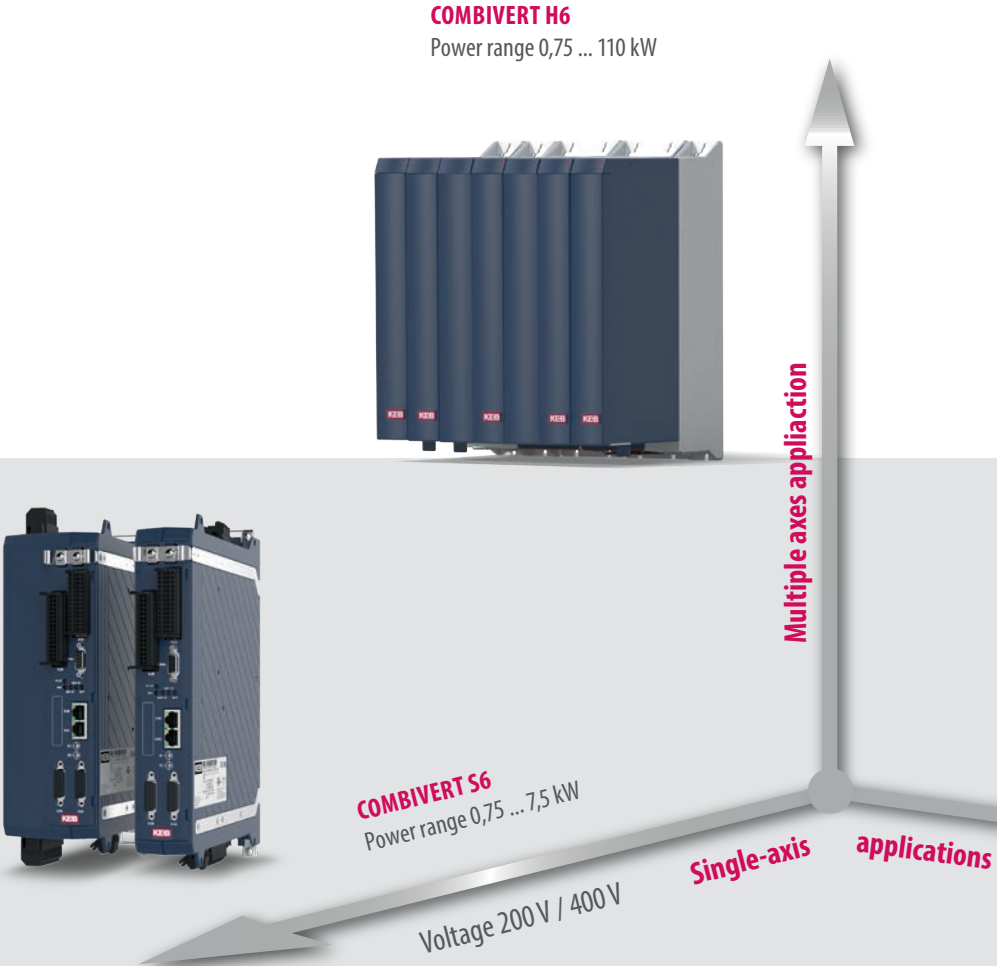
MOTORS



OPTIMALLY SELECTED COMPONENTS

Flexibility, functionality, efficiency and cost-effectiveness are the key requirements for today's drive system. The single axis drive controller COMBIVERT F6, in the power range from 4 to 400 kW is covering these requirements and is a perfect extension of the KEB drive portfolio.

The COMBIVERT F6 with its capability to operate different motor types, the various real-time communication to higher-level controllers, the choice of integrated Safety function modules or the cooling concept is the perfect drive controller for every machine. The intuitive PC tool COMBIVIS 6 makes the newly developed KEB drive platform easy to handle.



DRIVE BASED SAFETY

- Integrated Safety functionality
- Basic function STO in System version
- Additional High Level Safety in Application version

REAL - TIME COMMUNICATION

or simply serially

- Real-time Ethernet-based interfaces
- CAN
- RS232/485 for diagnostics or display

ALL IN ONE - UNIVERSAL MOTOR OPERATIONS

- Control for synchronous, asynchronous, IPM or synchronous reluctance motors
- Motor operation with encoder feedback or encoderless ASCL/SCL for precise speed control
- Motor temperature monitoring with PTC, KTY or PT1000 sensors
- Two-channel multi-encoder interface
- Integrated GTR7 brake transistor
- Integrated brake control and brake supply

ANALOG & DIGITAL I/O

supports actual machine concepts with

- 8 digital and 2 analog inputs
- 2 digital and 1 relay output
- 1 Analog output 0 ... 10 V



COMBIVERT F6
Power range 4 ... 400 kW

Voltage 400 V

**HIGHLIGHTS**

- Uncompromising integration, highest performance
- Modern realtime communication standards
- Integrated functional safety
- Particular compact size
- Modular design, flexible cooling systems

COMBIVERT F6 - VERSIONS

COMPACT

HIGHLY INTEGRATED AND ECONOMICAL

Highest integration, best performance and a good price/power ratio. These are the benefits of the F6-compact version.

In addition the integrated Safety function STO as per ISO 13849-Performance Level e/IEC 62061-SIL3 are available.

REALTIME ETHERNET INTEGRATED

ETHERCAT or VARAN

and communication interfaces as standard

CAN

DIAGNOSTIC RS 232/485

FUNCTIONAL SAFETY

INTERFACES

CAN interface
Realtime Ethernet

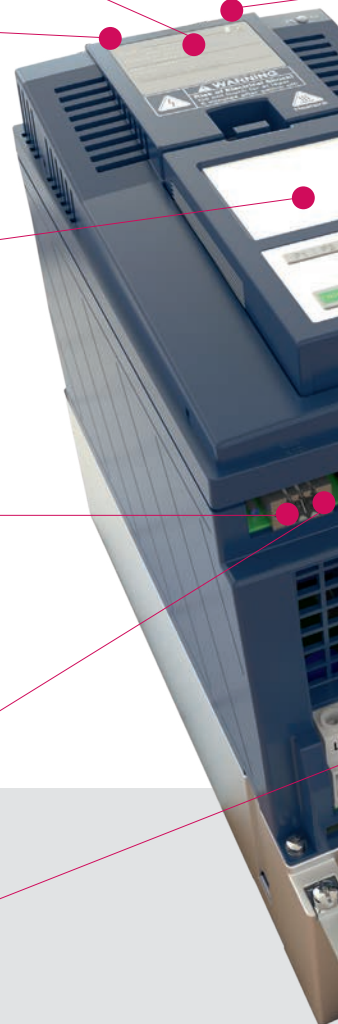
LCD DISPLAY

LCD Operator
Ethernet Operator
USB Operator

KTY/PTC/PT1000 EVALUATION

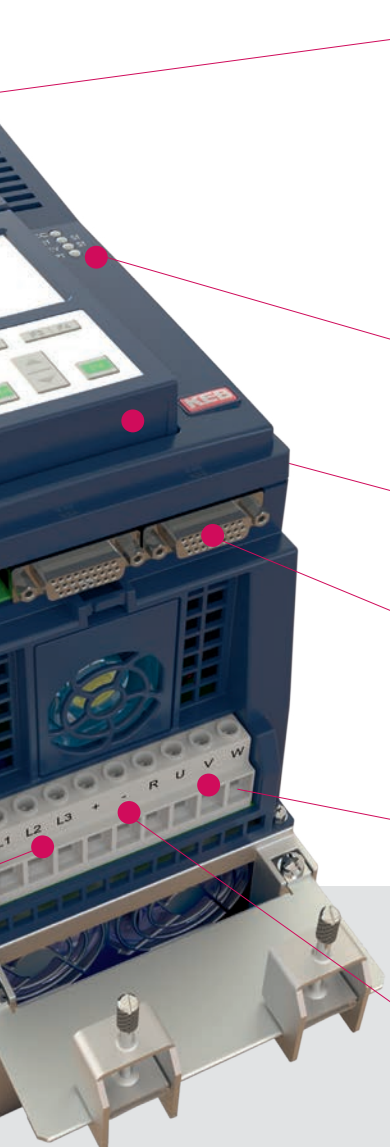
BRAKE CONTROL 24 V / 2 A

MAINS CONNECTIONS



HIGHLIGHTS

- Uncompromising integration, maximum performance
- Optimum price / performance relationship
- Safety function STO according to ISO 13849 PL e / IEC 62061- SIL 3
- Integrated Real-time EtherCAT and as communication interface CAN
- Diagnosis interface



I/O

- 8 digital inputs
- 2 digital outputs
- 1 relay
- 2 analog inputs
- 1 analog output
- 24V DC supply

STATUS LEDS

DIAGNOSTIC INTERFACE

MULTI ENCOER INTERFACES

- Resolver, EnDAT, HIPERFACE, BISS, SSI,
- Incremental HTL/TTL,
- Incremental output

MOTOR TERMINALS

DC SUPPLY TERMINALS

and braking resistor

APPLICATION

MODULAR AND FLEXIBLE

Modular and flexibility are the summarized characteristics of the F6-Application version.

STO and speed/position related safety functions as per ISO 13849.

REALTIME ETHERNET INTEGRATED

- ETHERCAT**
- PROFINET**
- POWERLINK**

and communication interfaces as standard

CAN

DIAGNOSTIC RS 232/485

ETHERNET **POWERLINK**

EtherNet/IP™

Safety over **EtherCAT®**



HIGHLIGHTS

- Flexible adaption in usage
- High Level Safety Function STO and SBC according to ISO 13849, PL e / IEC 62061- SIL 3
- Optionally version Safety Module 3 with up to three additional functions including SS1, SS2, SEL, SLI, SLP, SOS, SLA, SDI, SLS, SSM, SMS, SAR, SSR
- Real-time safety communication FSoE (Safety over EtherCAT)

KEB

EC Type-Examination Certificate



Reg.-Nr.No.: 01/205/5517.00/16

Prüfgegenstand Product tested	Sicherheitsfunktion STO auf der Steuerkarte des COMBIVERT F6-K Umrichter Safety function STO on control board within the COMBIVERT F6-K inverter	Zertifizier- behälter Certificate holder	KEB Karl E. Birkmann GmbH Friedenweg 26-28 32083 Bartrup-up Germany
Typbezeichnung Type designation	Steuerkarte / Control board 28F6-K0-0015, 28F6-K0-0011 zur Verwendung in den Umrichtern F6 zu be used in inverters auf 90Kva max.		
Prüfgrundlagen Codes and standards	EN 61800-5-2:2007 EN 61800-5-4:2007 EN 60951:2006 + AC:2010 + A1:2013 + AC:2018	EN ISO 13849-1:2015 EN 60554-1:2004 + A1:2006 + AC:2010 (in entwurf) IEC 61508 Parts 1-7:2010	
Bestimmungsbereich Intended application	Die Sicherheitsfunktion "Safe Torque Off" (STO) erfüllt die Anforderungen der Prüfgrundlagen (Cat. 4 / PL 4) nach EN ISO 13849-1, SIL 3 / SIL CL 3 nach EN 61800-5-2 / EN 60951 / IEC 61508 und kann in Anwendungen bis zu dieser Sicherheitsniveau eingesetzt werden. The safety function "Safe Torque Off" (STO) complies with the requirements of the relevant standards (Cat. 4, PL 4) in acc. to EN ISO 13849-1, SIL 3 / SIL CL 3 acc. to EN 61800-5-2 / EN 60951 / IEC 61508 and can be used in applications up to these safety levels.		
Besondere Bedingungen Specific requirements	Die Hinweise in der zugehörigen Installations- und Bedienungsanleitung sind zu beachten. The instructions of the associated installation and Operating Manual shall be considered. Es wird bestätigt, dass der Prüfgegenstand mit den Anforderungen nach Anhang I der Richtlinie 2006/42/EG über Maschinen übereinstimmt. It is confirmed that the product under test complies with the requirements for machines defined in Annex I of the EC Directive 2006/42/EC.		

Gültig bis / Valid until 2021-06-01

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. 968/M 303.01/16 vom 01.06.2016 dokumentiert sind.
Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen. Es wird ungültig bei jeglicher Änderung der Prüfgrundlagen für den angegebenen Verwendungszweck.
The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/M 303.01/16 dated 01.06.2016.
This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of the certificate for its planned application.

Berlin, 2016-06-01



Notified Body for Machinery, NB 0030 Dipl.-Ing. Eberhard Frejno

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Precisely Right.



HIGHLIGHTS

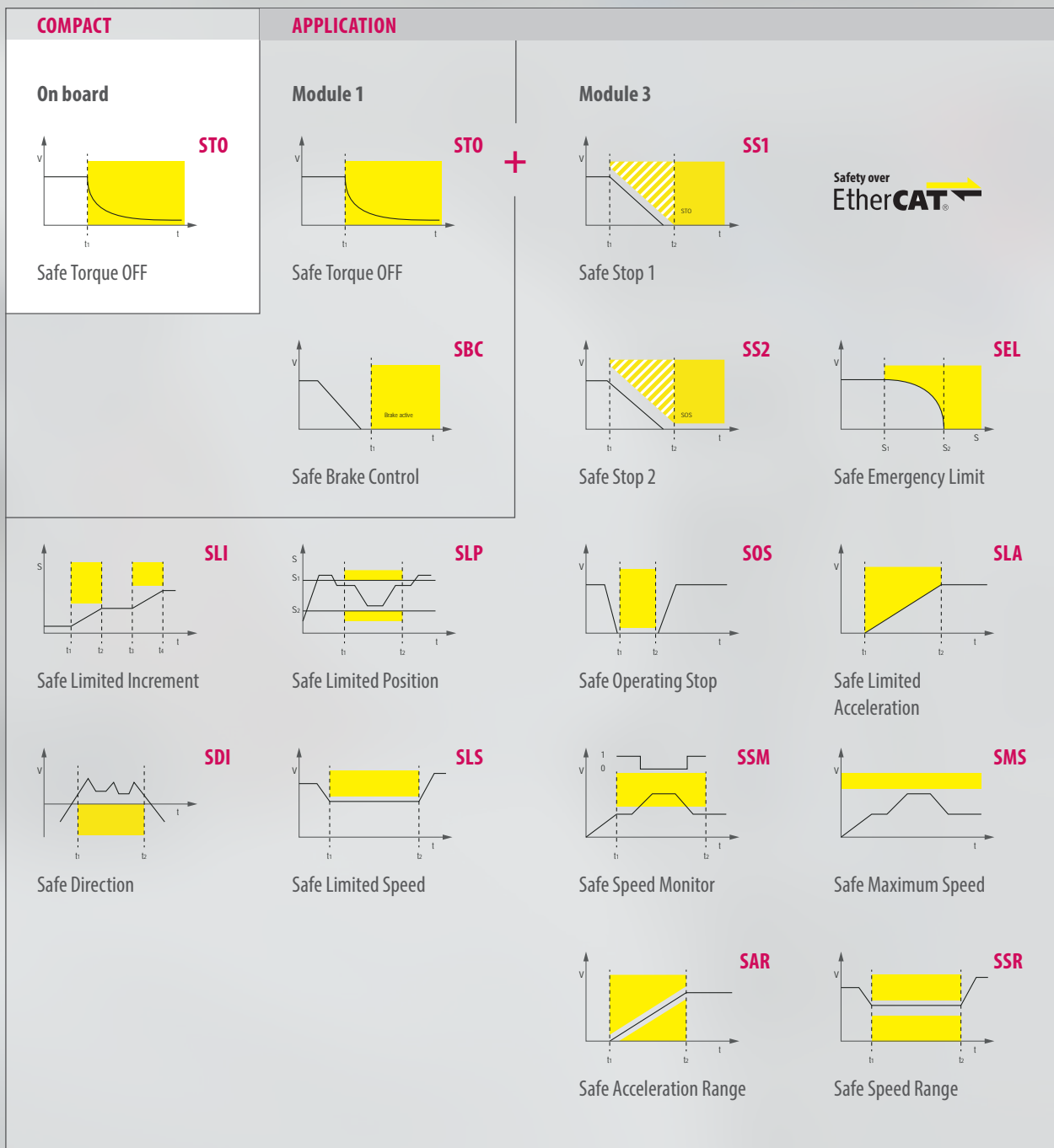
- Possible download of encrypted data packets through machine controllers
- Modular safety concept
- Dual channel ripple interface for cascading functional safety over multiple KEB drives
- Dual OSSD outputs for supply of the safe digital inputs (detection of wire break, shortcut and external supply)
- Safe parameterization through COMBIVIS 6 with protected operation levels

FUNCTIONAL SAFETY

SAFETY FUNCTIONS ACCORDING TO IEC 61508–SIL3, ISO 13849–PL e

With the drive-based-safety, safety functions are shifted into the drive platform and the costs of separate protective devices are reduced. The drive controllers COMBIVERT F6 are prepared for the different requirements in their modular structure.

In the compact version F6-K, STO is an „on board“ integrated component. The application version F6-A can be equipped with different safety modules. Depending on the requirement, basic functions with the SM1 and a wide range of functions are available with the SM3, which are addressed via safe inputs and outputs and safe FSoE communication. The full Safety System results in the interaction of the drive controllers with the KEB C6 Safety PLC and the C6 Safety I/Os.



Safety over
EtherCAT

COMBIVERT F6

TECHNICAL DATA

HOUSING		2					3				4		
		12	13	14	15	16	17	18	19	20	20	21	22
Device size													
Mains phases		3											
Rated output power	[kVA]	6.6	8.3	11.4	16.6	22.9	29	35	42	52	52	62	76
Typical rated motor power	[kW]	4	5.5	7.5	11	15	18.5	22	30	37	37	45	55
Rated output current 400V	[A]	9.5	12	16.5	24	33	42	50	60	75	75	90	110
Rated output current 480V (UL)	[A]	7.6	11	14	21	27	34	40	52	65	65	77	96
Short-term current limit (60 s / max).	[%]	150 / 216					150 / 180						
Rated input current 400V	[A]	13	17	21	31	43	55	59	66	82	82	99	121
Rated input current 480V (UL)	[A]	11	15	18	27	35	44	48	57	71	71	85	106
Rated switching frequency	[kHz]	8	8	4	4	4	2	2	2 / 4	2	4	2	2
Max. switching frequency	[kHz]	16											
Rated input voltage (AC)	[V]	3-phases 400 (UL: 480)											
Input voltage range (AC)	[V]	280 ... 550 ±0											
Input voltage range (DC)	[V]	390 ... 780 ±0											
Mains frequency	[Hz]	50 / 60 ±2											
Output voltage	[V]	3 x 0 ... U _{IN}											
Output frequency	[Hz]	0 ... 599 optional 0 ... 2000											

FLEXIBLE COOLING FOR DIFFERENT APPLICATIONS



In-built version air cooling



Through mount version air cooling



In-built version liquid-cooling with stainless steel pipes



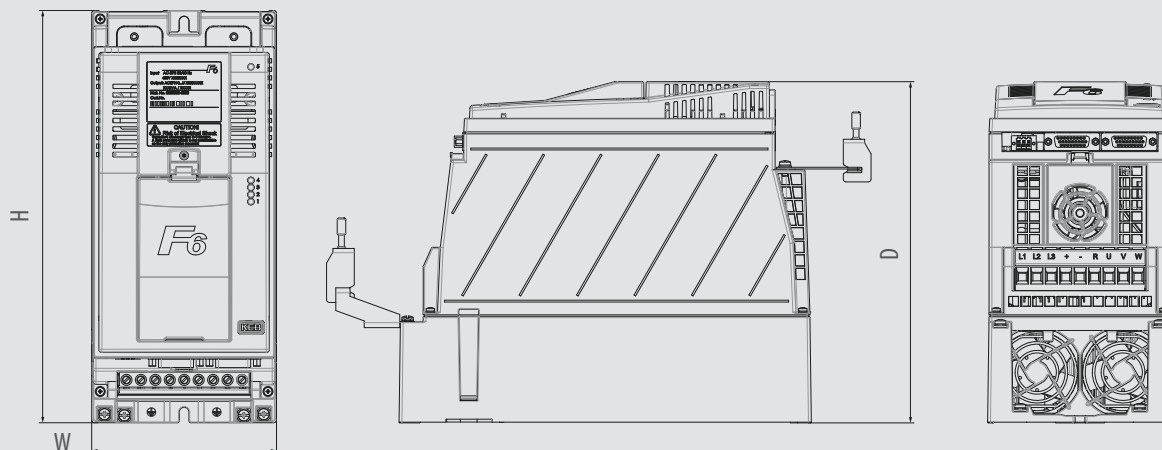
Through mount version liquid-cooling with stainless steel pipes

HOUSING		6				7*			8*				9*		
		21	22	23	24	25	26	27	27	28	29	30	30	31	32
Device size															
Mains phases		3													
Rated output power	[kVA]	62	80	104	125	145	173	208	208	256	319	395	395	436	492
Typical rated motor power	[kW]	45	55	75	90	110	132	160	160	200	250	315	315	355	400
Rated output current 400V	[A]	90	115	150	180	210	250	300	300	370	460	570	570	630	710
Rated output current 480V (UL)	[A]	77	96	124	156	180	210	240	240	302	414	477	477	515	590
Short-term current limit (60 s / max).	[%]	150 / 180				125 / 150									
Rated input current 400V	[A]	99	1265	158	189	221	263	315	315	390	485	600	600	660	745
Rated input current 480V (UL)	[A]	85	106	128	162	186	218	249	249	313	429	494	494	533	611
Rated switching frequency	[kHz]	8	4	2	2	4	4	2	4	4	2	2	4	2	2
Max. switching frequency	[kHz]	16													
Rated input voltage (AC)	[V]	3-phases 400 (UL: 480)													
Input voltage range (AC)	[V]	280 ... 550 ±0													
Input voltage range (DC)	[V]	390 ... 780 ±0													
Mains frequency	[Hz]	50 / 60 ±2													
Output voltage	[V]	3 x 0 ... U _{IN}													
Output frequency	[Hz]	0 ... 599 optional 0 ... 2000													

HOUSING	H** (mm)	W** (mm)	D** (mm)	AIR COOLING		LIQUID COOLING	
				in-built	through mount	in-built	through mount
2	290	130	240	X	X	-	-
3	340	170	261	X	X	-	-
4	375	224	272	X	X	X	X
6	525	249	272	X	X	X	X
7*	570	336	360	X	X	X	X
8*	860	336	360	X	X	X	X
9*	960	503	360	X	X	X	X

* in preparation

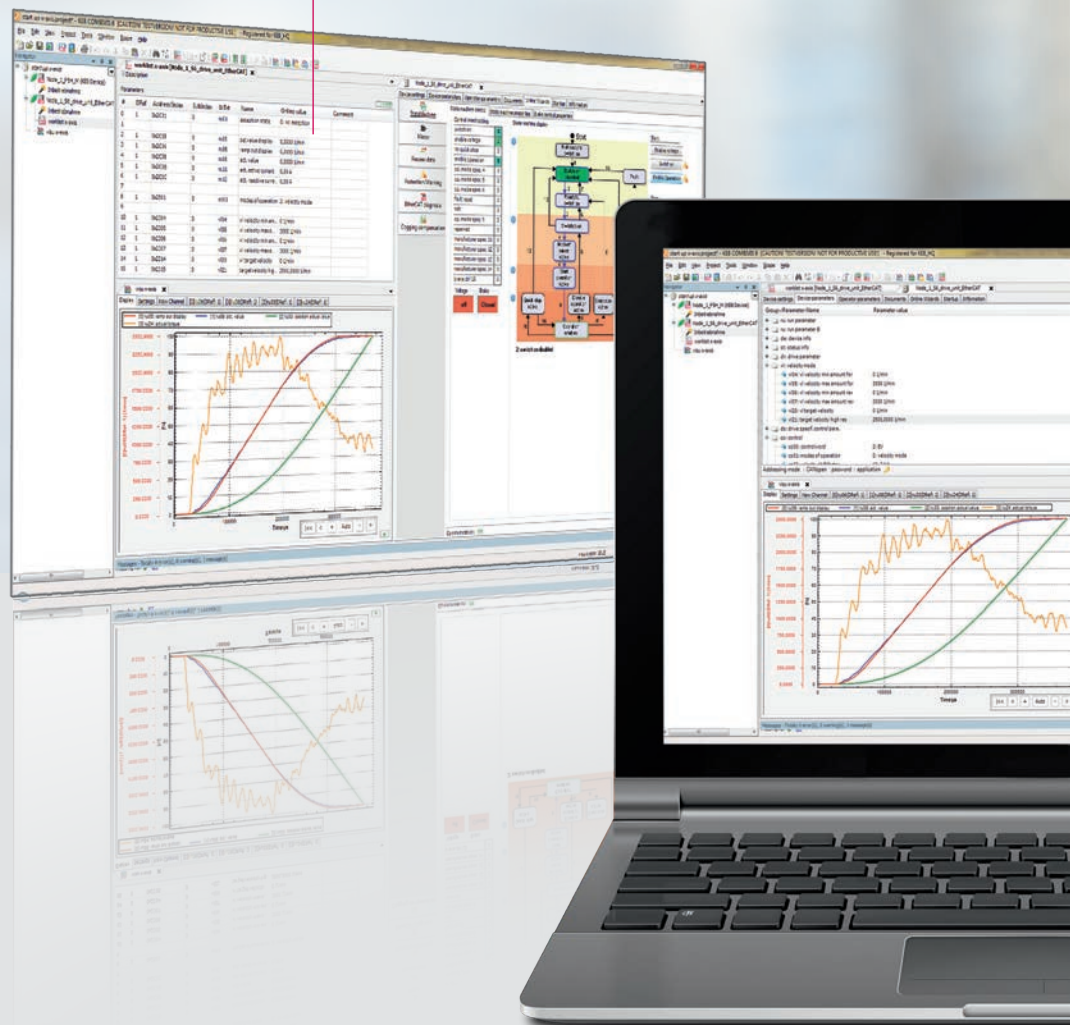
** air cooled in-built version



COMBIVIS 6 - THE TOOL FOR ALL TASKS

COMBIVIS 6

- Free and easy-to-use software for startup, administration and analysis
- Integrated start-up assistants (Wizards) for quick and easy configuration
- Direct access to device documentation
- 16 channel oscilloscope for extensive analysis
- Online parameter list comparison
- Parameterisation of key safety indicators and functions



COMBIVIS studio 6

The intelligent automation suite from KEB combines an assistant-guided component selection, fieldbus configuration, drive parameterisation, IEC 61131-3 project generation and motion control. Throughout the planning and layout phase, implementation of control sequences and multi-axis movement profiles, to start-up and fine tuning, the user is supported by a tool developed by experienced application engineers.

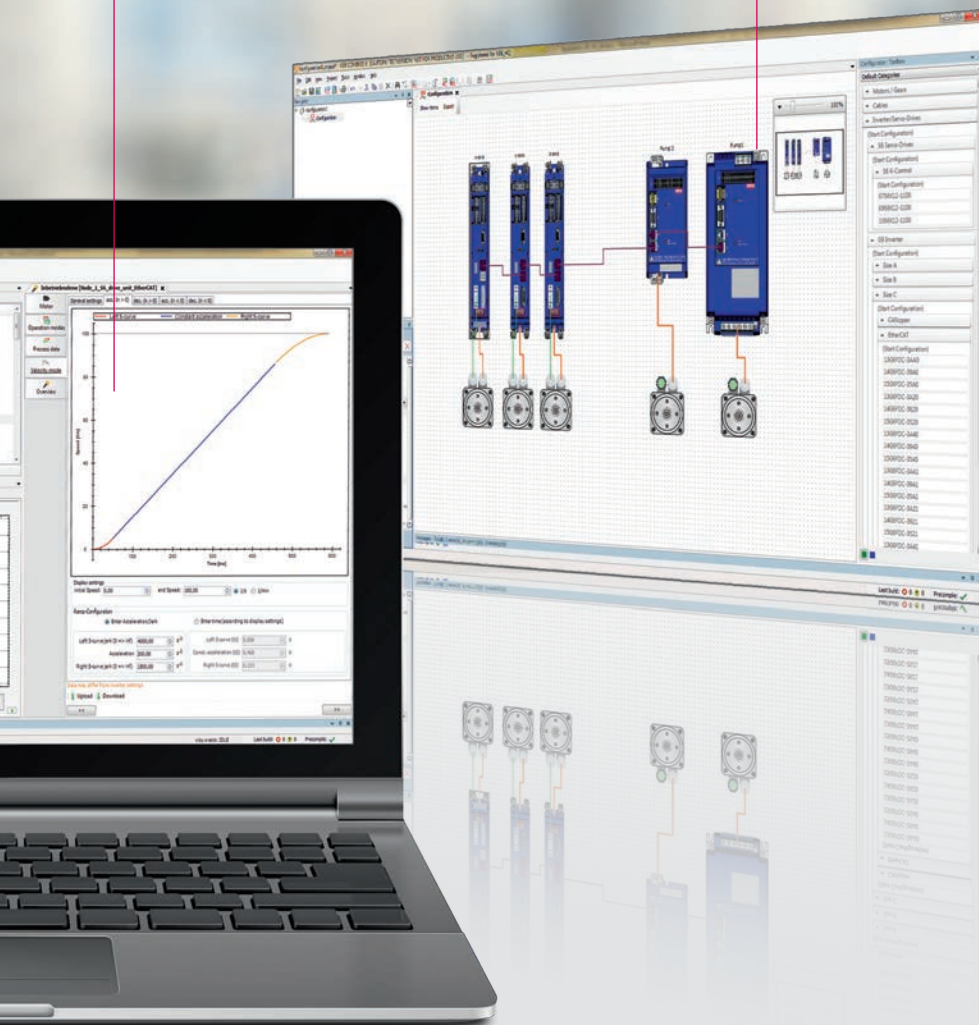
With a foundation built on libraries, devices and template databases, rapid and simple solutions can be generated for a wide range of applications.

COMMISSIONING ASSISTANT

- Complete user guidance through the commissioning process
- KEB Motor database, free for extensions
- Anti cogging
- Fieldbus diagnostic and optimisation

SYSTEM CONFIGURATION AS A NEW COMPONENT OF COMBIVIS

- Access to complete KEB product database
- Intuitive gear component selection and system configuration using drag and drop
- Selection assistant with display of compatible components
- Display of all interfaces and connection components
- Material number generator
- Extensive export function for quote list, Combivis Project, Excel ...



HIGHLIGHTS

- IEC 61131-3 Applications development
- Device and library database
- Product configuration
- Start-up and diagnosis assistant
- COMBIVIS studio HMI integration
- Document database

ACCESSORIES

STABLE OPERATION IN INDUSTRIAL ENVIRONMENT

An EMC-compliant assembly with efficient control cabinet and suppression system is the basis for safe operation of machinery and equipment. The current and voltage limiting COMBILINE modules are optimally designed to meet the requirements of the COMBIVERT F6 drive controller series and support the use through:



MAINS EMC FILTERS

Reduce the cable-fed emission to the required limits IEC 61800-3 - C1/C2. Further variants offer low leakage currents or the operation of special mains networks.

MAINS CHOKE

Reduce the input peak current draw and the mains distortion. By smoothing the input current draw, the lifetime of the drive is enhanced, in particular at constantly high utilization.

OUTPUT CHOKES AND FILTERS

Reduce the voltage and current stress of the motor winding.

COMBI FILTERS (EMC / OUTPUT CHOKE)

Space-saving combination, consistently adapted and optimised to the drive controller.

SINE-WAVE FILTERS

Protect the motor winding from voltage peaks and allow the use of long motor cables.

HARMONIC FILTERS

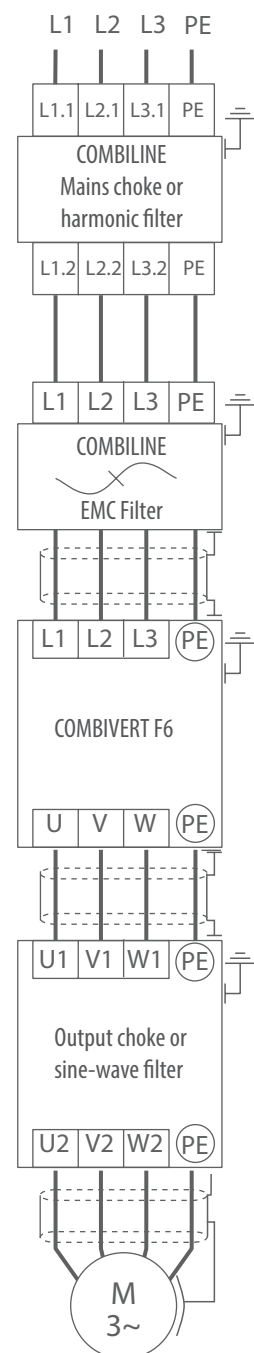
Reduce the low frequency mains distortion of B6-rectifier supplied devices. These harmonic filters are the new innovative solution to comply to most international standards. The integration to a switch gear layout is as simple as of mains chokes.

SINE-WAVE EMC FILTERS

Allow operation of motors with long motor cables even without screening.

HIGH PERFORMANCE FERRITE CORES

Reduces the values of du/dt 's also in the frequency range of the bearing currents.



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