COMBIVERT **F6**

DRIVE CONTROLLER **2.2 kW ... 450 kW**

EN

KEB

CONTENT PAGE

SYSTEM OVERVIEW

Automation **with Drive**
stands for the optimally selected combination of control and automation with the drive package as 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.

IIOT

IIoT & Edge-Platform


Analytics


Monitoring


Management


Service

CONTROL SOFTWARE

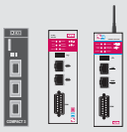
Visualisation

HMI

Engineering


Control Software

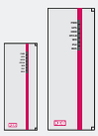
Remote Control

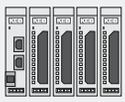

Router

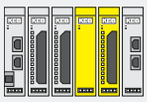
CONTROL HARDWARE


Web HMI


Embedded Control


IPC


I/O


Safety PLC

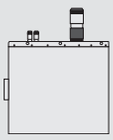
DRIVES


Inverter


Servo Drive


Drive Controller

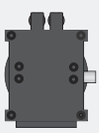

Pitch Drive


eMobility Drive

MOTORS


PM Motor


AC Motor


PM Gear Motor


AC Gear Motor

BRAKES & CLUTCHES


Permanent Magnet Brake


Spring Applied Brake


Electromagnetic Brake


Electromagnetic Clutch

BENEFITS AT A GLANCE

OPTIMALLY SELECTED COMPONENTS

Flexibility, functionality, efficiency and cost-effectiveness are the key requirements for today's drive system. In single-axis drive controller applications in the power range from 2.2 kW to 450 kW, COMBIVERT F6 covers these requirements and is the universal solution for all drive tasks.

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 COMBIVIS 6 PC tool makes it easy to operate the drives developed by KEB.

DRIVE BASED SAFETY

Integrated Safety functionality:
- Basic function STO in Compact variant
- Additional High Level Safety in Application variant
- Encoderless safety in variant PRO

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 brake transistor
- Integrated brake control

REAL - TIME COMMUNICATION

Or simply serially:
- Real-time Ethernet-based interfaces
- CAN
- RS232/485 for diagnostics or display

ANALOG & DIGITAL

Supports actual machine concepts with:
- 8 digital and 2 analog inputs
- 2 digital and 1 relay output
- 1 analog output 0 V ... 10 V

HIGHLIGHTS

- Best speed and torque performance
- Modern realtime communication standards
- Integrated functional safety
- Particular compact size
- Modular design, flexible cooling systems

DEVICE VARIANTS FOR SPECIAL REQUIREMENTS

HIGH SPEED

Whether for asynchronous, synchronous, synchronous reluctance or IPM motors: All motor types can be controlled and operated by the COMBIVERT F6 or COMBIVERT S6 drive controllers with high speeds of up to 120,000 revolutions per minute using the ASCL or SCL method with highly dynamic sensorless control. Depending on individual requirements, this is possible with or without an encoder. This means that nothing stands in the way of motor use in high-speed applications.

- Drives with outputs up to 450 kW
- Suitable sine filters for high-speed requirements
- Highest performance for many motor designs
- Up to 120,000 revolutions
- Output frequencies up to 2,000 Hz
- Control methods SCL, ASCL, ASiCL
- Multi-encoder interface for many encoder variants

PEAK POWER DRIVES

Optimised for applications with increased short-term overload and switching frequencies, for example in hoists, cranes or lift systems. The combination of special software for lift applications provides the following features:

- Automatic inertia determination of the entire system
- Pointed arc run
- Travel counter and change of direction counter
- Safe brake monitoring
- Emergency programmes in the event of earthquakes, evacuations, etc.
- Easy commissioning via elevator app on the smartphone
- Universal control via CANopen Lift, DCP, serial, Ethernet, digital parallel, analogue and others
- Event and error logs with time stamp
- Automatic calibration of the motor data

CANopen®

COMBIVERT **F6** - VARIANTS

FUNCTIONAL SAFETY

INTERFACES

CAN interface
Realtime Ethernet
Modbus

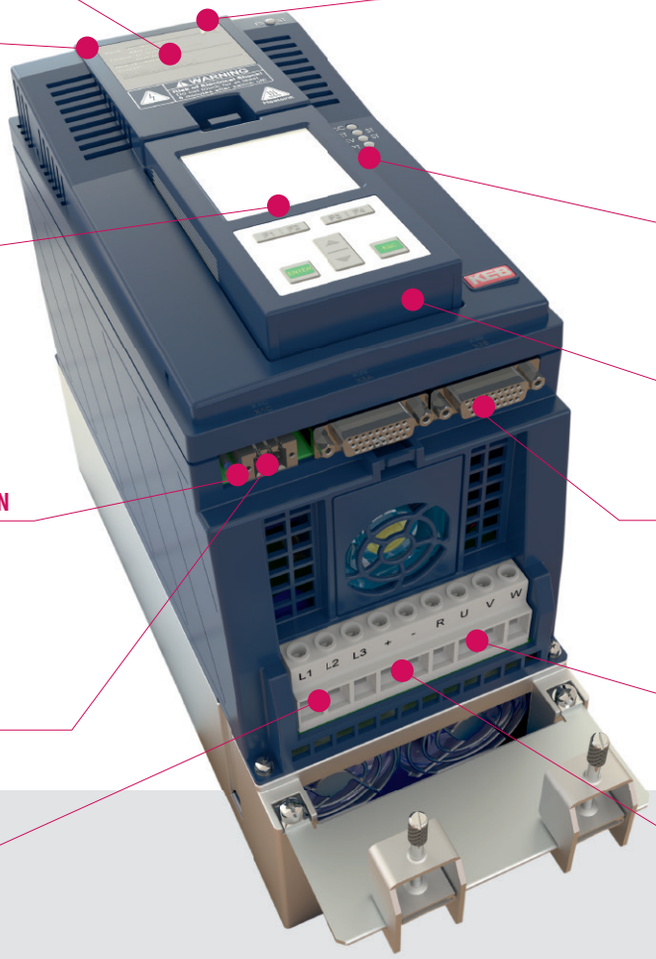
LCD DISPLAY

LCD Operator
Ethernet Operator
USB Operator

PTC/KTY/PT1000 EVALUATION

BRAKE CONTROL 24 V / 2 A

MAINS CONNECTIONS



I/O

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

STATUS LEDS

DIAGNOSTIC INTERFACE

MULTI ENCOCER INTERFACES

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

MOTOR TERMINALS

DC SUPPLY TERMINALS

and braking resistor

EtherCAT® Safety over EtherCAT® VARAN CANopen®

HIGHLIGHTS

- Universally usable for many motor technologies
- Highest performance in torque, speed and position control
- Uncompromising integration
- User-friendly
- Scalable safety functions...

COMPACT
HIGHLY INTEGRATED AND ECONOMICAL

STO

REALTIME ETHERNET

EtherCAT OR VARAN

Communication interface

CAN
DIAGNOSTIC RS232/485

APPLICATION
MODULAR AND FLEXIBLE

STO, SBC and speed/position related safety functions

REALTIME ETHERNET

EtherCAT
PROFINET
POWERLINK
EtherNet/IP
Modbus TCP

Communication interface

CAN
DIAGNOSTIC RS232/485

PRO
ENCODERLESS SAFETY

STO, SBC and speed related safety functions without encoder feedback

REALTIME ETHERNET

EtherCAT
PROFINET

Communication interface

CAN
DIAGNOSE RS232/485
Ethernet
Modbus RTU
Modbus TCP

PROFIsafe · Modbus · PROFINET · ETHERNET POWERLINK · EtherNet/IP

HIGHLIGHTS

- Brake handling
- Power-off
- DC-brake
- PID controller
- Round table function
- Recipe management
- Multi motor handling
- Anti cogging
- Liquid cooling management
- Protective function for submounted braking resistors

SAFETY FUNCTIONS IN THE DRIVE

BASIS FOR SAFETY

COMPACT

In the Compact variant, the COMBIVERT F6 and S6 drive controllers are equipped with Safe-Torque-Off (STO).

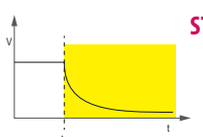
SAFETY FUNCTIONS WITH SPEED AND POSITION MONITORING

APPLICATION

The device variant Application is available in two versions. In addition to STO, Module 1 adds safe brake control (SBC) which provides a safe 24 V supply for the brakes.
Module 3 offers safe motion functionality according to IEC 61800-5-2 through speed and position detection using encoders.
The error reaction time is shortened and costs are reduced by reducing the number of separate protective devices. Module 3 also offers the option of controlling all available safety functions and limit values via Safety over EtherCAT or PROFIsafe.

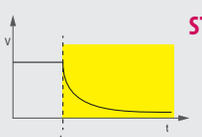
COMPACT | **APPLICATION**

on board



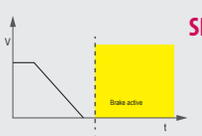
Safe Torque OFF

Module 1



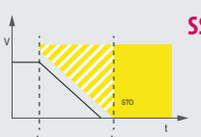
Safe Torque OFF

+

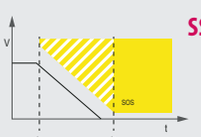


Safe Brake Control

Module 3



Safe Stop 1

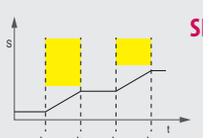


Safe Stop 2

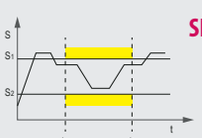
Safety over EtherCAT®

PROFIsafe

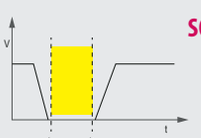
Safe Emergency Limit



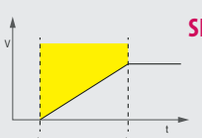
Safely-Limited Increment



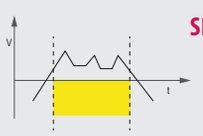
Safely-Limited Position



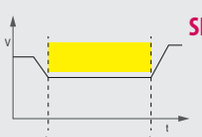
Safe Operating Stop



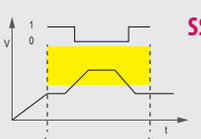
Safely-Limited Acceleration



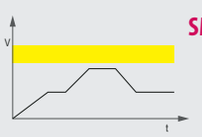
Safe Direction



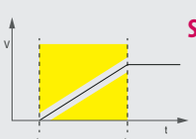
Safely-Limited Speed



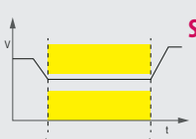
Safe Speed Monitor



Safe Maximum Speed



Safe Acceleration Range



Safe Speed Range

ENCODERLESS SAFETY FUNCTIONS

PRO

The Pro device variant of the COMBIVERT F6 and S6 drive controllers offers advanced safety functions without having to use a safety encoder. The device determines the safe velocity parameters from the pulse width modulation (PWM) of the motor supply.

In addition to STO, Module 5 is equipped with a safe brake control (SBC), which provides a safe 24 V supply for braking operation as well as a monitoring of the switching status of the brake via microswitch evaluation.

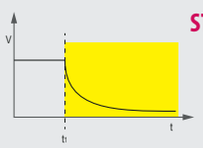
Module 5 also offers the option of controlling all available safety functions via Safety over EtherCAT (FSoE).

PRO

Module 5

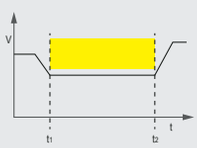
Safety over EtherCAT®

STO



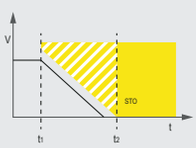
Safe Torque OFF

SLS



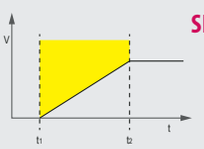
Safely-Limited Speed

SS1



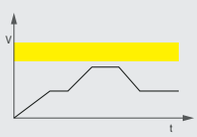
Safe Stop 1

SLA



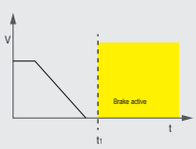
Safely-Limited Acceleration

SMS



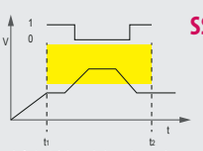
Safe Maximum Speed

SBC



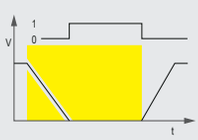
Safe Brake Control

SSM



Safe Speed Monitor

SDLC



Safe Door-Lock Control

WHY USE DRIVE-BASED SAFETY (SAFE MOTION)?

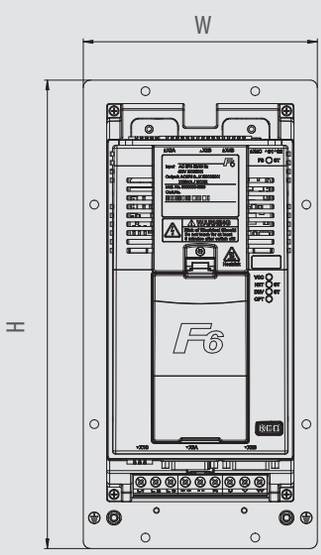
- Less wiring – remove contactors and other traditional safety components
- Fast reaction – direct handling inside the drive
- Easy to operate – up to 8 different safety setups per function
- Cost savings compared to traditional safety solution

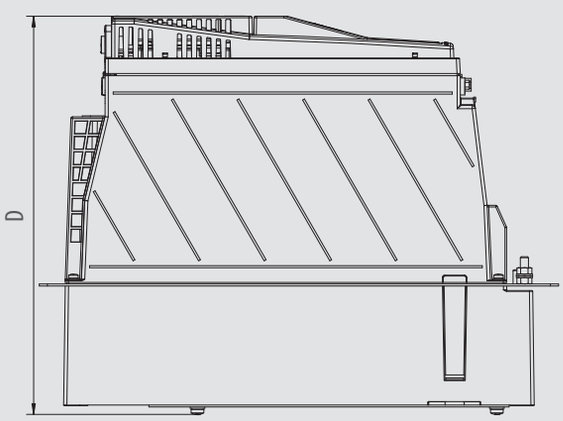
TECHNICAL DATA

HOUSING		**F6-2**				**F6-3**			**F6-4**	**F6-6**		
Device size		**10**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Rated output power	[kVA]	4.4	7	9,6	13	19	25	30	34	46	58	70
Typical rated motor power	[kW]	2.2	4	5.5	7.5	11	15	18,5	22	30	37	45
Rated output current 230 V	[A]	11	17.5	24	33	48	60	75	85	115	145	175
Rated output current 240 V (UL)	[A]	11	17.5	24	33	48	60	75	85	115	145	175
Short-term current limit (60 s / max.)	[%]	150 / 216		150 / 180		150 / 216			150 / 180	150		
Rated input current 230 V	[A]	16.5	22	30	41.5	57	68	82	101	126	156	189
Rated input current 240 V (UL)	[A]	16.5	22	30	41.5	57	68	82	101	126	156	189
Rated switching frequency	[kHz]	8	4	4	4	2	4	2	4	8	4	2
Max. switching frequency	[kHz]	16										
Mains phases		3										
Rated input voltage (AC)	[V]	230 (UL: 240)										
Input voltage range (AC)	[V]	170 ... 264										
Input voltage range (DC)	[V]	240 ... 373										
Mains frequency	[Hz]	50 / 60 ±2										
Output voltage	[V]	3 x 0 ... U_{IN}										
Output frequency	[Hz]	0 ... 599 (optional 0 ... 2.000)*										

** The maximum possible output frequency depends on the switching frequency*

PUSH-THROUGH VARIANT





COMBIVERT **F6 400 V**

HOUSING		**F6-2**					**F6-3**				**F6-4**			
Device size		**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**19**	**20**	**21**	**22**
Rated output power	[kVA]	6.6	8.3	11.4	16.6	22.9	29	35	42	52	42	52	62	76
Typical rated motor power	[kW]	4	5.5	7.5	11	15	18.5	22	30	37	30	37	45	55
Rated output current 400 V	[A]	9.5	12	16.5	24	33	42	50	60	75	60	75	90	110
Rated output current 480 V (UL)	[A]	7.6	11	14	21	27	34	40	52	65	52	65	77	96
Short-term current limit (60 s / max.)	[%]	150 / 216			150 / 180									
Rated input current 400 V	[A]	13	17	21	31	43	55	59	66	82	66	82	99	121
Rated input current 480 V (UL)	[A]	11	15	18	27	35	44	48	57	71	57	71	85	106
Rated switching frequency	[kHz]	8	8	4	4	4	2	2	2 / 4	2	4	4	2	2
Max. switching frequency	[kHz]	16												
Mains phases		3												
Rated input voltage (AC)	[V]	400 (UL: 480)												
Input voltage range (AC)	[V]	280 ... 550												
Input voltage range (DC)	[V]	390 ... 780												
Mains frequency	[Hz]	50 / 60 ±2												
Output voltage	[V]	3 x 0 ... U_{IN}												
Output frequency	[Hz]	0 ... 599 (optional 0 ... 2,000)*												

** The maximum possible output frequency depends on the switching frequency*

MECHANICAL DIMENSIONS

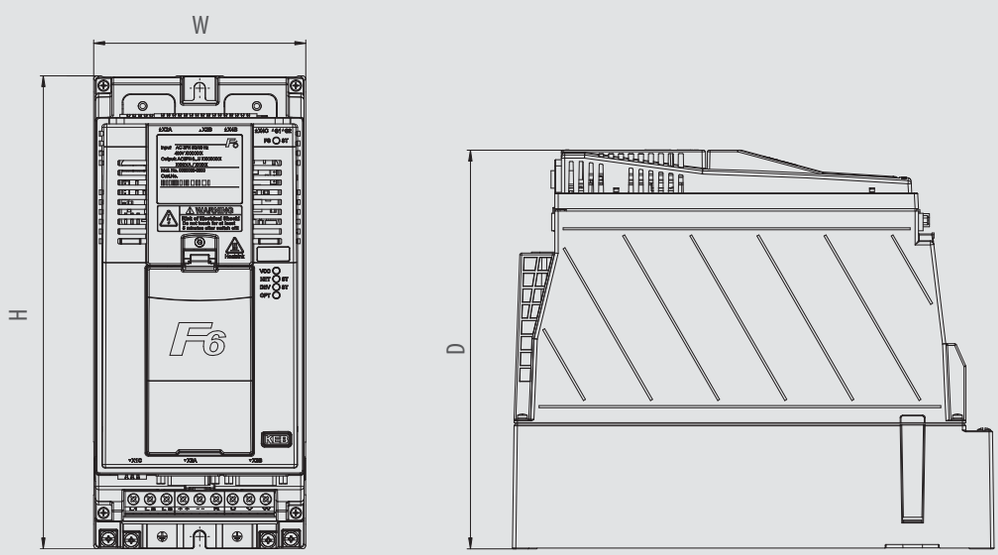
HOUSING	**H**** (mm)	**W**** (mm)	**D**** (mm)	**AIR COOLING**		**LIQUID COOLING**	
				built-in	push-through	built-in	push-through
2	290	130	240	X	X	-	-
3	340	170	261	X	X	X	X
4	375	224	272	X	X	X	X
6	525	249	272	X	X	X	X
7	570	336	360	X	X	X	X
8	860	336	360	X	X	X	X
9	960	503	360	X	X	X	X

*** air-cooled built-in variant*

HOUSING		F6-6				F6-7				F6-8			F6-9			
Device size		**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**28**	**29**	**30**	**30**	**31**	**32**	**33****
Rated output power	[kVA]	62	80	104	125	145	173	208	256	256	319	395	395	436	492	554
Typical rated motor power	[kW]	45	55	75	90	110	132	160	200	200	250	315	315	355	400	450
Rated output current 400 V	[A]	90	115	150	180	210	250	300	370	370	460	570	570	630	710	800
Rated output current 480 V (UL)	[A]	85	106	124	156	180	210	260	325	302	414	477	477	515	590	719
Short-term current limit (60 s / max.)	[%]	150 / 180				125 / 150						150 / 180	125 / 150			
Rated input current 400 V	[A]	99	126	158	189	221	263	315	390	390	485	600	600	700	746	840
Rated input current 480 V (UL)	[A]	85	106	128	162	186	217	269	337	374	429	494	494	533	611	744
Rated switching frequency	[kHz]	8	4	2/4/(8**)	2	4	4	2	2	4	2	2	2	2	2	2
Max. switching frequency	[kHz]	16											4			
Mains phases		3														
Rated input voltage (AC)	[V]	400 (UL: 480)														
Input voltage range (AC)	[V]	280 ... 550														
Input voltage range (DC)	[V]	390 ... 780														
Mains frequency	[Hz]	50 / 60 +/- 2														
Output voltage	[V]	3 x 0 ... U_{IN}														
Output frequency	[Hz]	0 ... 599 (optional 0 ... 2,000)*														

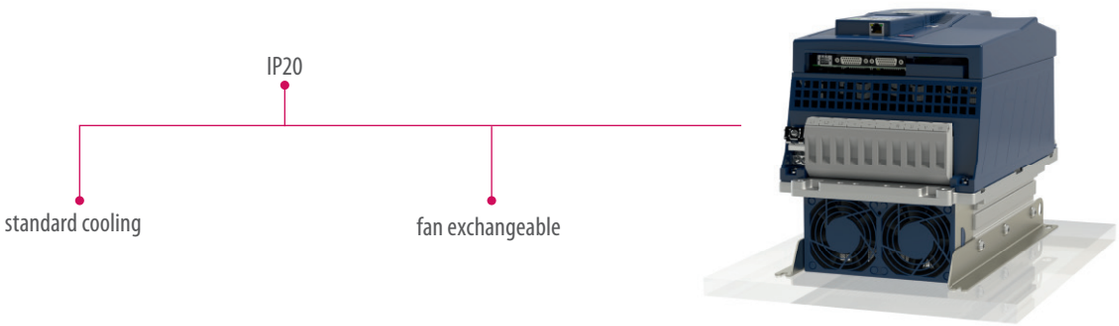
** The maximum possible output frequency depends on the switching frequency*
*** Liquid-cooled only*

BUILT-IN VARIANT

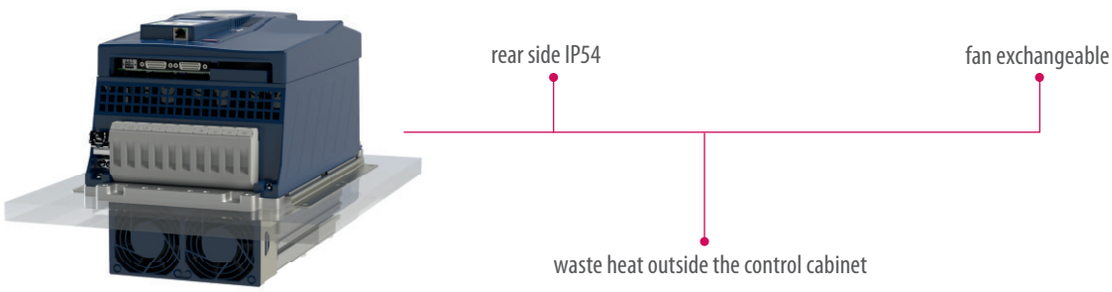


FLEXIBLE COOLING FOR DIFFERENT APPLICATIONS

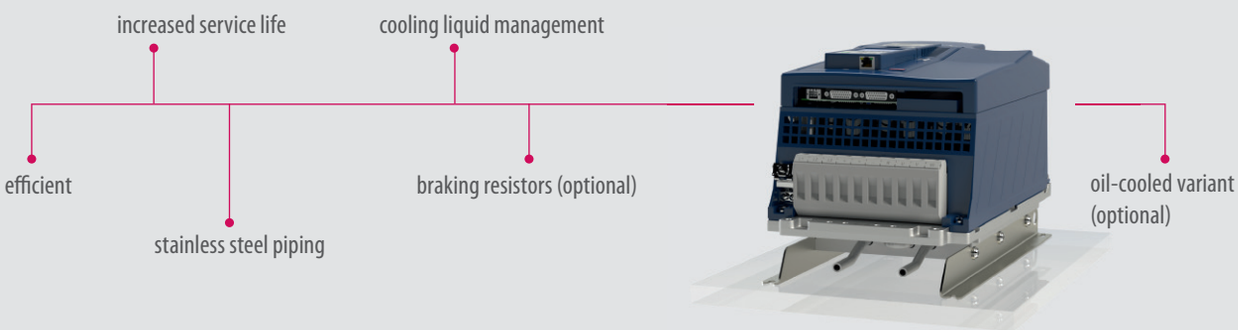
Air-cooled built-in variant



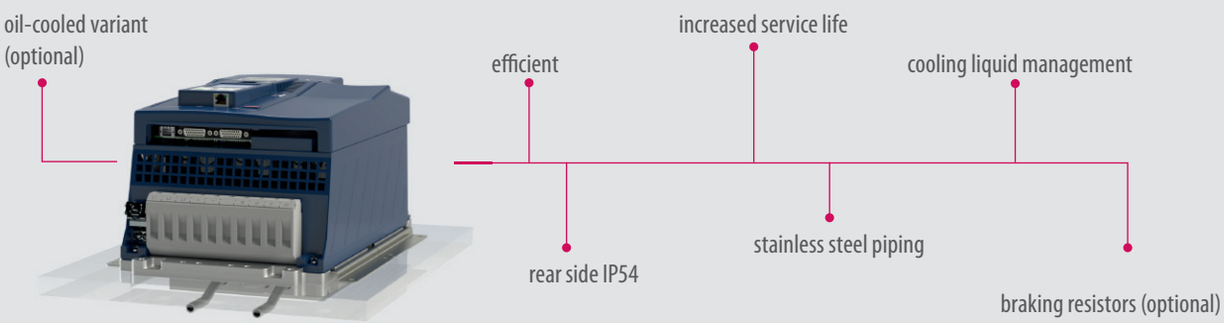
Air-cooled push-through variant



Liquid-cooled built-in variant



Liquid-cooled push-through variant



COMBIVIS 6 - THE TOOL FOR ALL TASKS

COMBIVIS 6

Commissioning software for parameterisation, diagnostics and project management

- 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 automation suite for complete system creation

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.

INTEGRATED DEVELOPMENT ENVIRONMENT

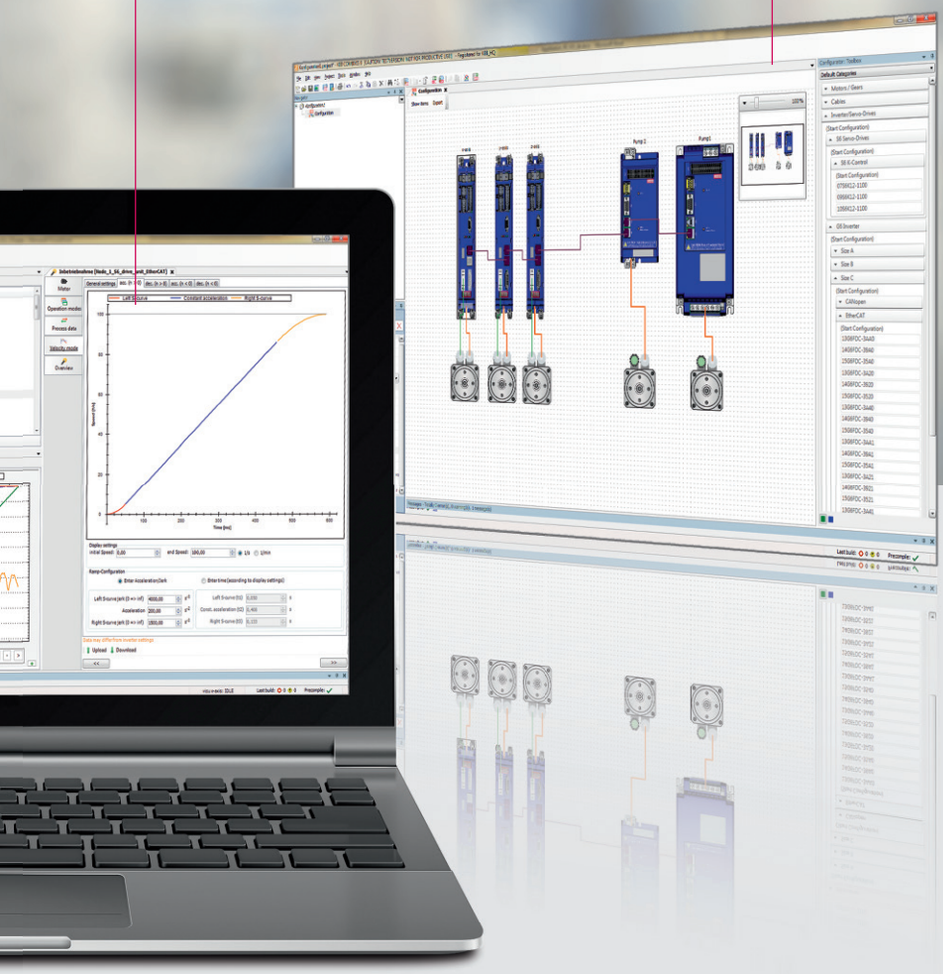
COMMISSIONING ASSISTANT

Wizards: easy start-up and diagnosis with the help of intuitive graphical user interfaces

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

SYSTEM CONFIGURATION AS A COMPONENT OF COMBIVIS

- Access to 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 ...



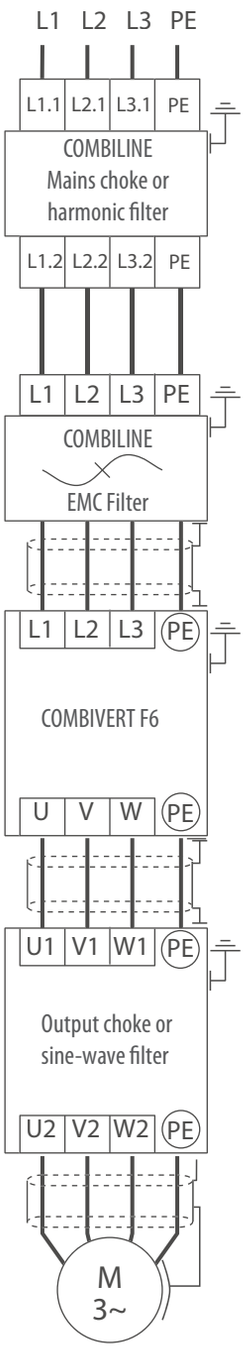
HIGHLIGHTS

- 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, additionally available as submounted filter for COMBIVERT F6.

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.

INPUT / OUTPUT COMBI FILTERS
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 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 PERFOMANCE FERRITE CORES
Reduces the values of du/dt's also in the frequency range of the bearing currents.

KEB COMPANIES

Austria | KEB Automation GmbH
Ritzstraße 8 4614 Marchtrenk Austria
Phone: +43 7243 53586-0 Fax: +43 7243 53586-21
E-Mail: info@keb.at Web: keb-automation.com

Benelux | KEB Automation KG
Boulevard Paepsem 20 – Paepsemlaan 20 1070 Anderlecht Belgium
Phone: +32 2 447 8580
E-Mail: info.benelux@keb.de Web: keb-automation.com

Canada | KEB Canada
2010 Winston Park Dr., Suite 200 Oakville, ON L6H 5R7 Canada
Phone: +1 905 617 2352
E-Mail: sales@keb-automation.ca Web: keb-automation.ca

Czech Republic | KEB Automation s.r.o.
Videnska 188/119d 61900 Brno Czech Republic
Phone: +420 544 212 008
E-Mail: info@keb.cz Web: keb-automation.com

France | Société Française KEB SASU
Z.I. de la Croix St. Nicolas 14, rue Gustave Eiffel
94510 La Queue en Brie France
Phone: +33 149620101 Fax: +33 145767495
E-Mail: info@keb.fr Web: keb-automation.com

Germany | **Geared Motors**
KEB Antriebstechnik GmbH
Wildbacher Straße 5 08289 Schneeberg Germany
Phone: +49 3772 67-0 Fax +49 3772 67-281
E-Mail: info@keb-drive.de Web: keb-automation.com

Germany | **Headquarters**
KEB Automation KG
Südstraße 38 32683 Barntrup Germany
Phone: +49 5263 401-0
E-Mail: info@keb.de Web: keb-automation.com

Italy | KEB Italia S.r.l. Unipersonale
Via Newton, 2 20019 Settimo Milanese (Milano) Italy
Phone: +39 02 3353531 Fax: +39 02 33500790
E-Mail: info@keb.it Web: https://blog.keb.it

Japan | KEB Japan Ltd.
711-103 Fukudayama, Fukuda,
Shinjo-shi Yamagata 996-0053 Japan
Phone: +81 233 292800 Fax: +81 233 292802
E-Mail: info@keb.jp Web: keb.jp

P. R. China | KEB Power Transmission Technology (Shanghai) Co. Ltd.
No. 435 QianPu Road Chedun Town Songjiang District
201611 Shanghai P. R. China
Phone: +86 21 37746688 Fax: +86 21 37746600
E-Mail: info@keb.cn Web: keb.cn

Poland | KEB Automation KG
Phone: +48 604 077 727
E-Mail: roman.trinczek@keb.de Web: keb-automation.com

Republic of Korea | KEB Automation KG
Room 1112, Hanju 4th 501 Pyeonghwa-ro 322beon-gil
Uijeongbu-si 11706 Gyeonggi-do Republik Korea
Phone: +82 10 3101 3902
E-Mail: vb.korea@keb.de Web: keb-automation.com

Spain | KEB Automation KG
c / Mitjer, Nave 8 - Pol. Ind. LA MASIA
08798 Sant Cugat Sesgarrigues (Barcelona) Spain
Phone: +34 93 8970268
E-Mail: vb.espana@keb.de Web: keb-automation.com

Switzerland | KEB Automation AG
Barzloostrasse 1 8330 Pfaeffikon/ZH Switzerland
Phone: +41 43 2886060
E-Mail: info@keb.ch Web: keb-automation.com

United Kingdom | KEB (UK) Ltd.
5 Morris Close Park Farm Industrial Estate
Wellingborough, Northants, NN8 6XF United Kingdom
Phone: +44 1933 402220 Fax: +44 1933 400724
E-Mail: info@keb.co.uk Web: keb-automation.com

United States | KEB America, Inc.
5100 Valley Industrial Blvd. South
Shakopee, MN 55379 United States
Phone: +1 952 2241400 Fax: +1 952 2241499
E-Mail: info@kebamerica.com Web: kebamerica.com

KEB'S GLOBAL PARTNER NETWORK

Automation **with Drive** **keb-automation.com**

KEB Automation KG Suedstrasse 38 32683 Barntrup Germany Phone +49 5263 401-0 E-Mail: info@keb.de