



**KEB**

# **THEATRE AND STAGE AUTOMATION**

EN - V 1.0

FOR OVER 40 YEARS, KEB HAS BEEN SUPPLYING  
POWER TRANSMISSION AND MOTION CONTROL  
SOLUTIONS FOR THEATRE MACHINERY, AMUSEMENT  
AND SPORTS VENUES, AND MECHANIZED  
STRUCTURES.



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MECHANICAL

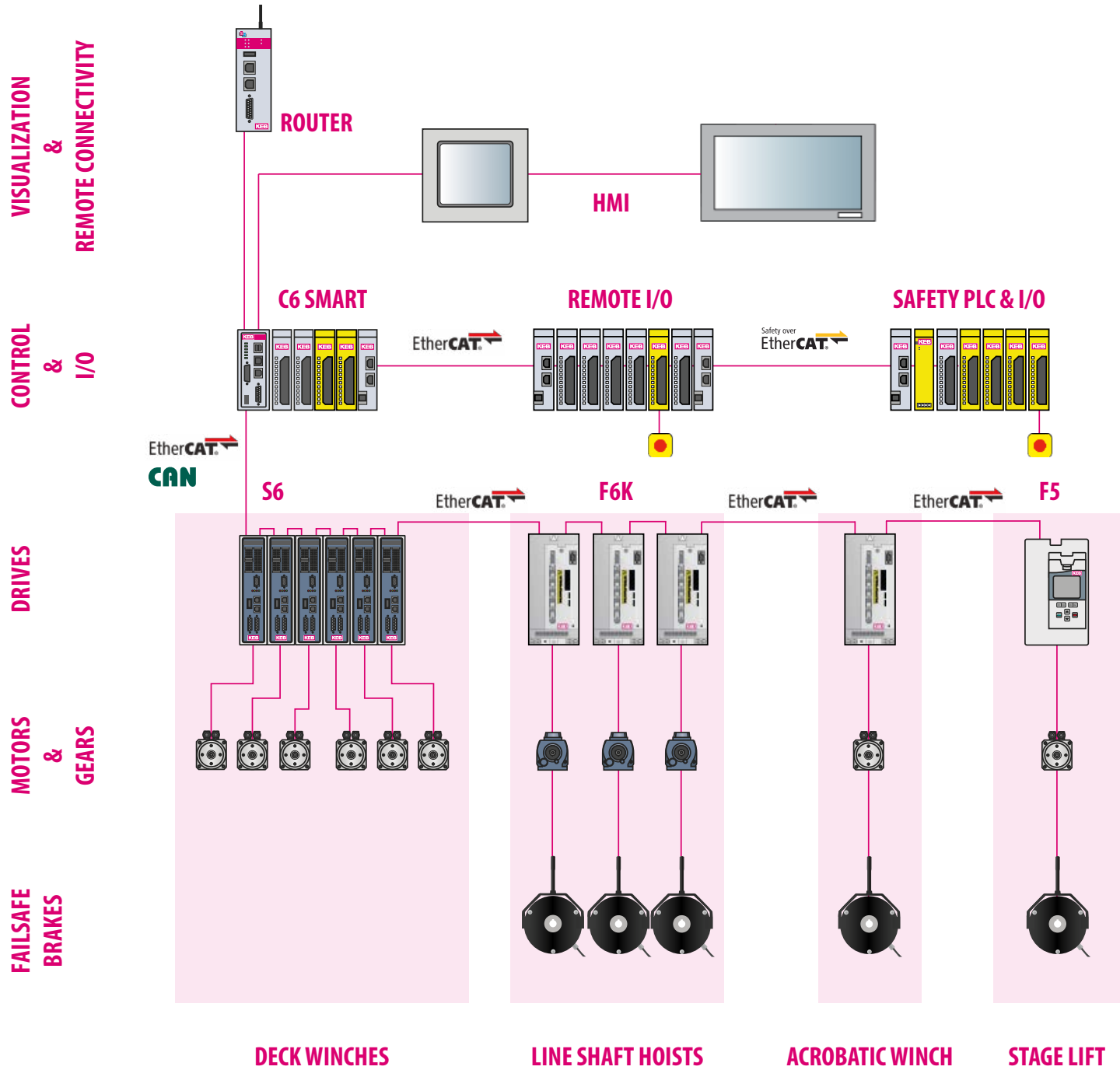
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## THE SHOW MUST GO ON

Precise. Repeatable. Reliable. Proven.

That is what describes KEB automation products and the machines we power. KEB offers a full theatre automation portfolio ranging from hoist brakes to HMI touchscreen displays. KEB products allow the design of precise stage machinery that is repeatable and reliable, show after show.

KEB is the workhorse behind the scenes. Our products have been used on a variety of machine designs across a wide range of hoists, winches, lifts, trolleys, and doors.

With a worldwide presence KEB is there to support our product wherever it might end up - so the show can go on.



KEB gearmotors are used in Paris' Opéra Garnier

KEB brakes, gearmotors, and drives can be found on a variety of equipment in some of the most high-profile installations around the world.



- Theatre and opera machinery
- Concerts
- Mechanized structures
- Acoustic banner hoists
- People flying winches
- Amusement park rides

### THEATRE & STAGE MACHINERY



### CONCERT & ENTERTAINMENT VENUES



### ARTISTIC & CULTURAL EXHIBITS



### ANIMATRONICS & ROBOTS



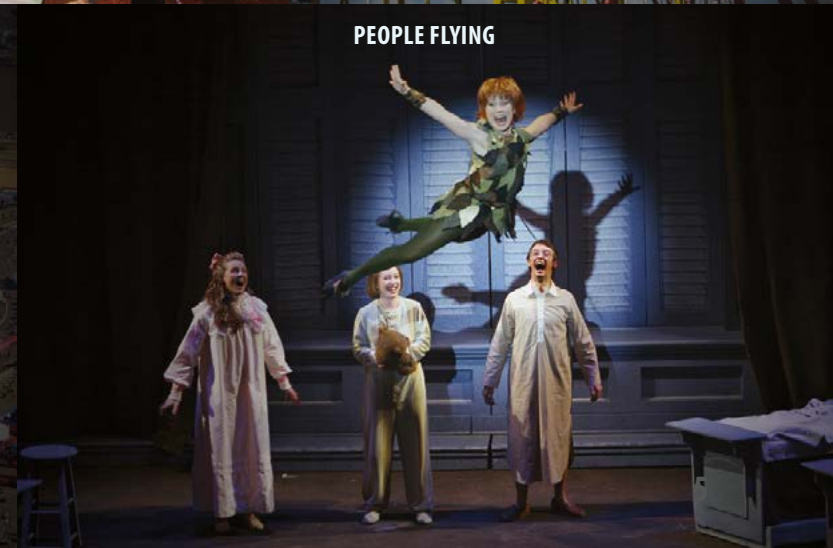
### AMUSEMENT PARKS



### STADIUMS & STRUCTURES



### PEOPLE FLYING



# YOUR GLOBAL PARTNER

## KEB

For over 40 years, KEB has been an innovative designer and manufacturer of automation products. More than just a component supplier, KEB works with their customer-partners to provide the optimum solution for the application.

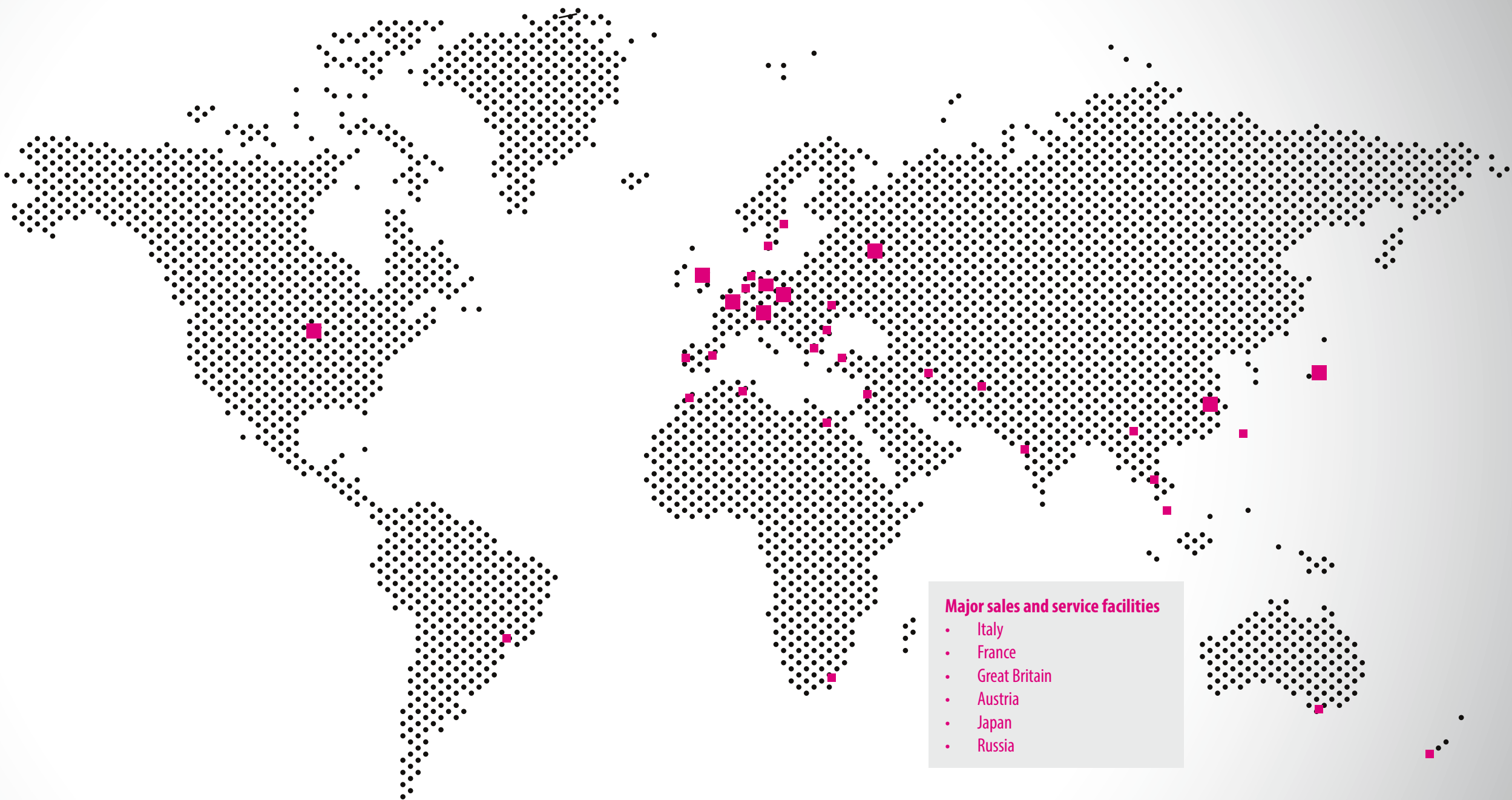
Trust KEB with your next project.

- 4 global production sites
- 9 subsidiaries
- 37 representatives and service partners
- 1,200+ employees
- Annual sales: ~\$250M USD

# KEB AMERICA

KEB America, Inc. is headquartered in Shakopee, MN, a suburb outside of Minneapolis. KEB America has full design and manufacturing capabilities in its 86,000 sq ft facility to provide our North American clients with local service and support. KEB America's facility is ISO 9001:2008 certified.

## PRODUCTION SITES



- Major sales and service facilities**
- Italy
  - France
  - Great Britain
  - Austria
  - Japan
  - Russia

BRAKES

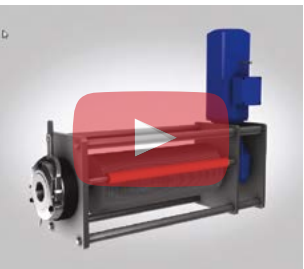
Single disc spring-set brake  
(5 ... 1,500 Nm)



HIGHLIGHTS

- Silent operation - less than 65dB at 1 meter (option)
- Dynamic and holding applications possible
- Encapsulated DC coil (rectifiers for AC input voltage available)
- Redundant spring design
- Horizontal or vertical mount
- Mounting flange options
- Microswitch for engagement feedback (option)
- Dust protection ring, IP44 (option)
- Hand release (option)

See How They Work



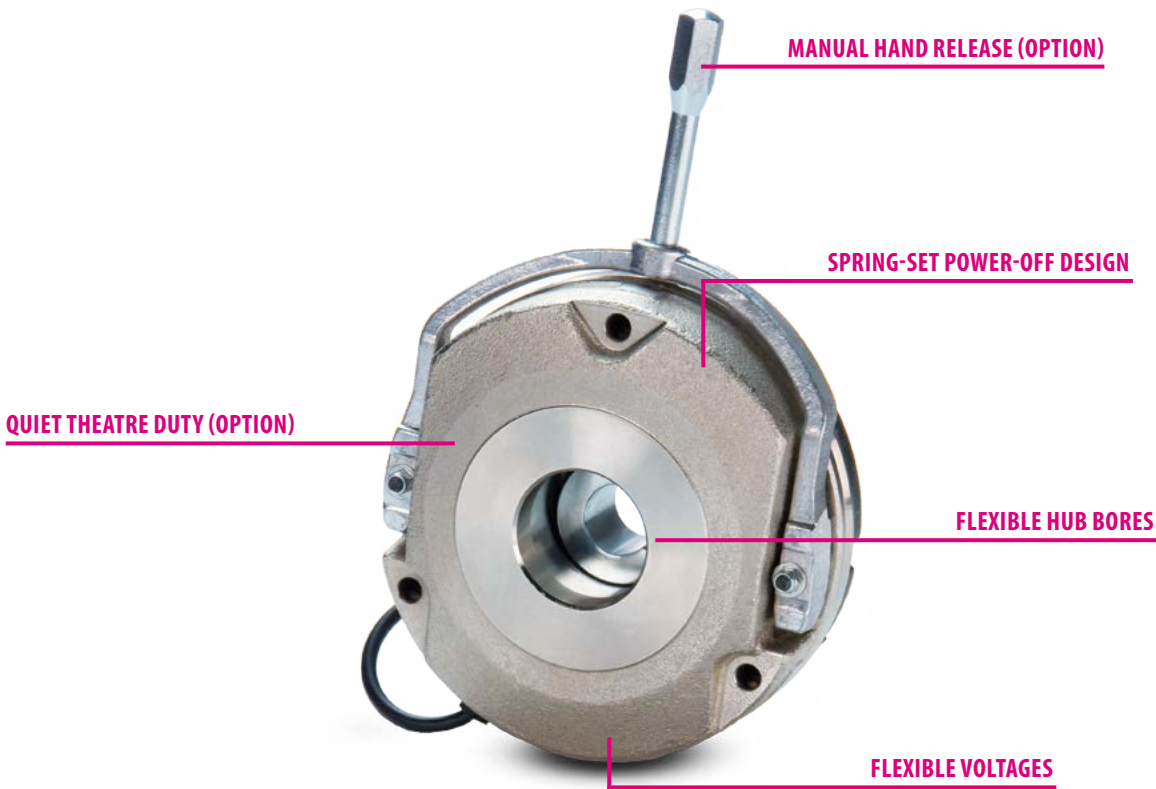
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KEB spring-applied DC brakes provide failsafe power-off brake engagement. The brakes are released when power is applied to the electromagnetic coil.

The spring-set brakes are designed to last even in the toughest applications. Each brake has multiple springs rated for 10+ million cycles. The brake operation is very basic – the only moving part is the armature. No linkages. No solenoids. No moving parts to wear and replace.

KEB's single disc spring-set brake comes in two versions. Version N is designed for dynamic applications with regular brake engagements at high speeds. Version H is designed for static (holding) applications with the capability to handle emergency stops.



BRAKES

Single disc spring-set brake  
(5 ... 1,500Nm)

SIZE	VERSION N		VERSION H		A	B	ØD <sub>H7</sub> MAX.	L	P	T	X	a	WEIGHT (KG)
	M <sub>2N</sub> <sup>1)</sup> (NM)	P <sub>20</sub> (W)	M <sub>2N</sub> <sup>1)</sup> (NM)	P <sub>20</sub> (W)									
02	5	25	7.5	25	85	72	15*	37.7	3x4.5	500	0.2	105.5	1
03	10	30	15	30	102	90	20	41.7	3x5.5	500	0.2	113	1.5
04	20	30	30	30	127	112	25	51.7	3x6.5	500	0.2	128	3
05	36	48	50	48	147	132	30	57.7	3x6.5	500	0.2	168	4.5
06	70	62	90	75	164	145	35*	68.8	3x9	500	0.3	176	7
07	100	65	150	90	190	170	45	75.5	3x9	750	0.3	225	10
08	150	75	225	90	218	196	60	87.4	3x9	750	0.4	235	16
09	250	80	375	115	253	230	60	101.7	3x11	750	0.4	256	26
10	500	130	750	180	307	278	75	110.8	6x11	750	0.5	335	39
11	1,000	180	1,500	280	363	325	90	134.5	6x13	1,000	0.6	**	80

1) Rated torque after running in process

\* Only available with keyway according to DIN 6885/3

\*\* Mechanical release with hexagon screw

All dimensions in mm

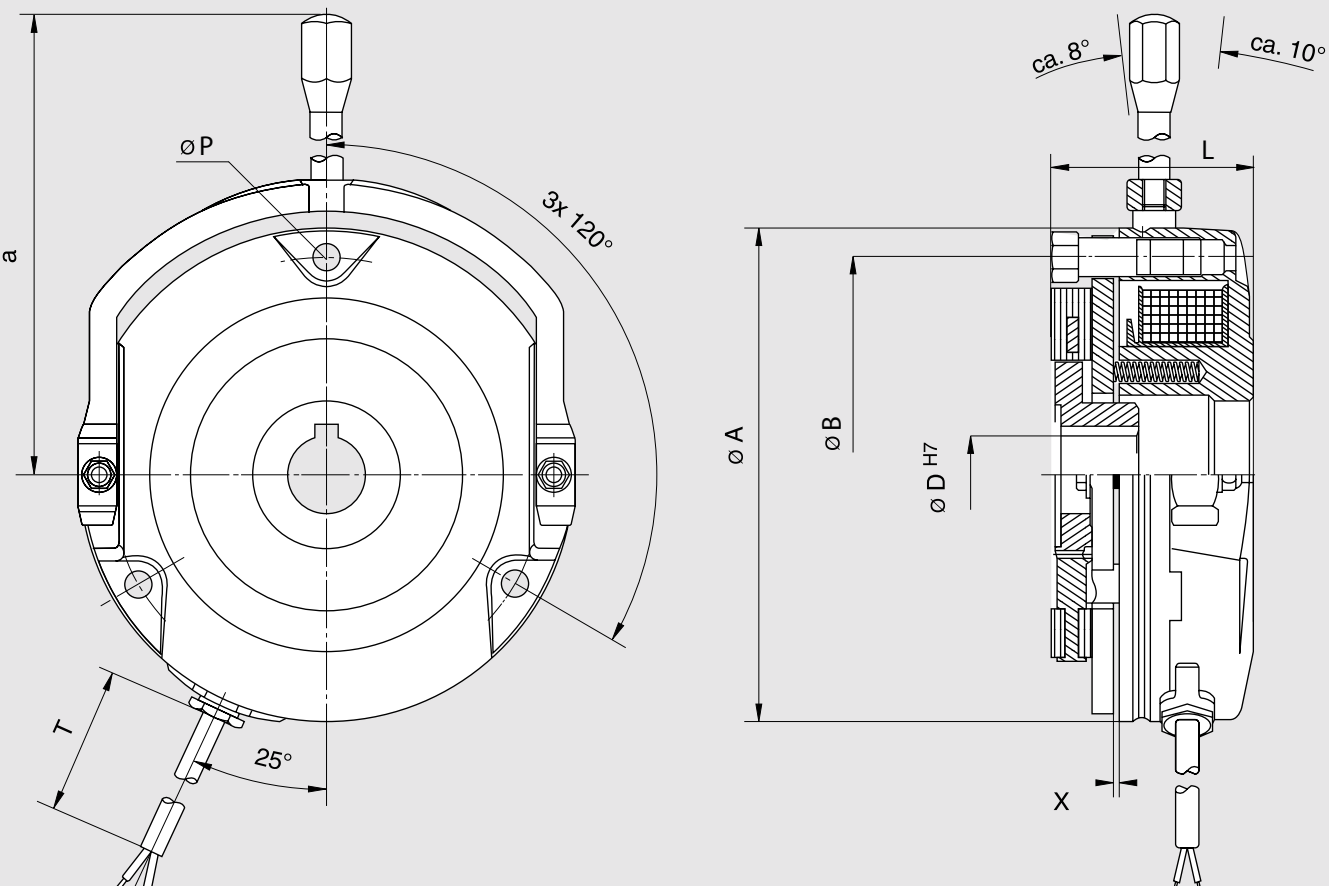
Keyway according to DIN 6885/1

English bore and keyways available

100% on time duty cycle

Standard protection of IP20

ISO Class F (Class H upon request)



LOAD BRAKES

Spring-set load brake  
(250 ... 1,500 Nm)



HIGHLIGHTS

- Noise reduced - less than 65dB at 1 meter
- Manual release bolts standard
- Internal and external mounting options (integrated)
- Rubber dust protection ring with IP44 rating
- 10 ft. 500W cable leads
- Microswitch and hand release options

KEB's load brakes are specially designed for theatre applications. The brakes are typically placed on the drum side of a hoist. Their small footprint allows them to be placed in compact winch designs.

HAND RELEASE (OPTION)

INTEGRATED FLANGE

QUIET THEATRE DUTY

MICROSWITCH (OPTION)

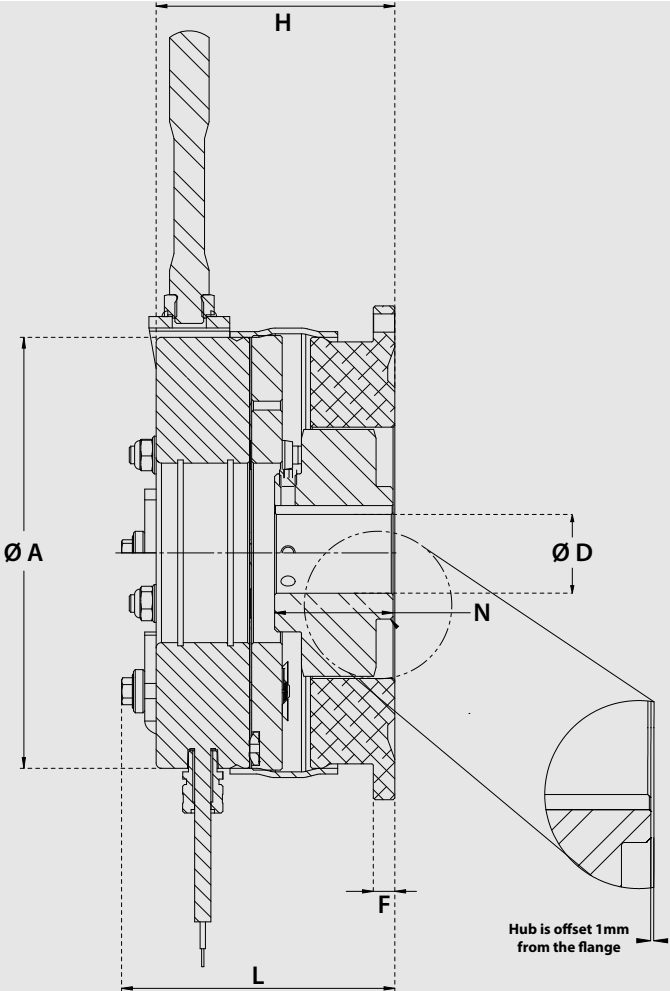
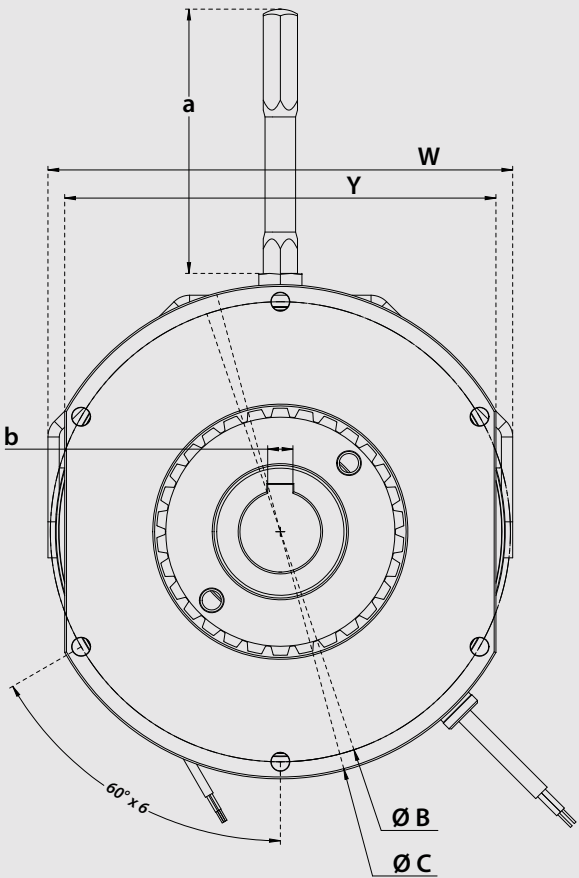
10 FOOT LEADWIRE

LOAD BRAKES

STATIC TORQUE (NM)	A	a	B**	C**	ØD <sub>F7</sub> (MAX)*	F	H	L***	N	W	Y	WEIGHT (KG)
250	240	400	256	275	65	12	128	148	66	259	240	29
500												
750												
1000												
1250												
1500												

All dimensions in mm - English bore and keyways available  
\*Sizes larger than 65mm are possible but below drawing will change - contact KEB for details  
\*\* Internal mounting options available - contact KEB for details  
\*\*\* Without optional hand release L = 143mm

Max. Speed = 600 RPM  
Rated Power = 135 W  
100% on time duty



KEB load brakes are used on JR Clancy's PowerLift® Hoist.

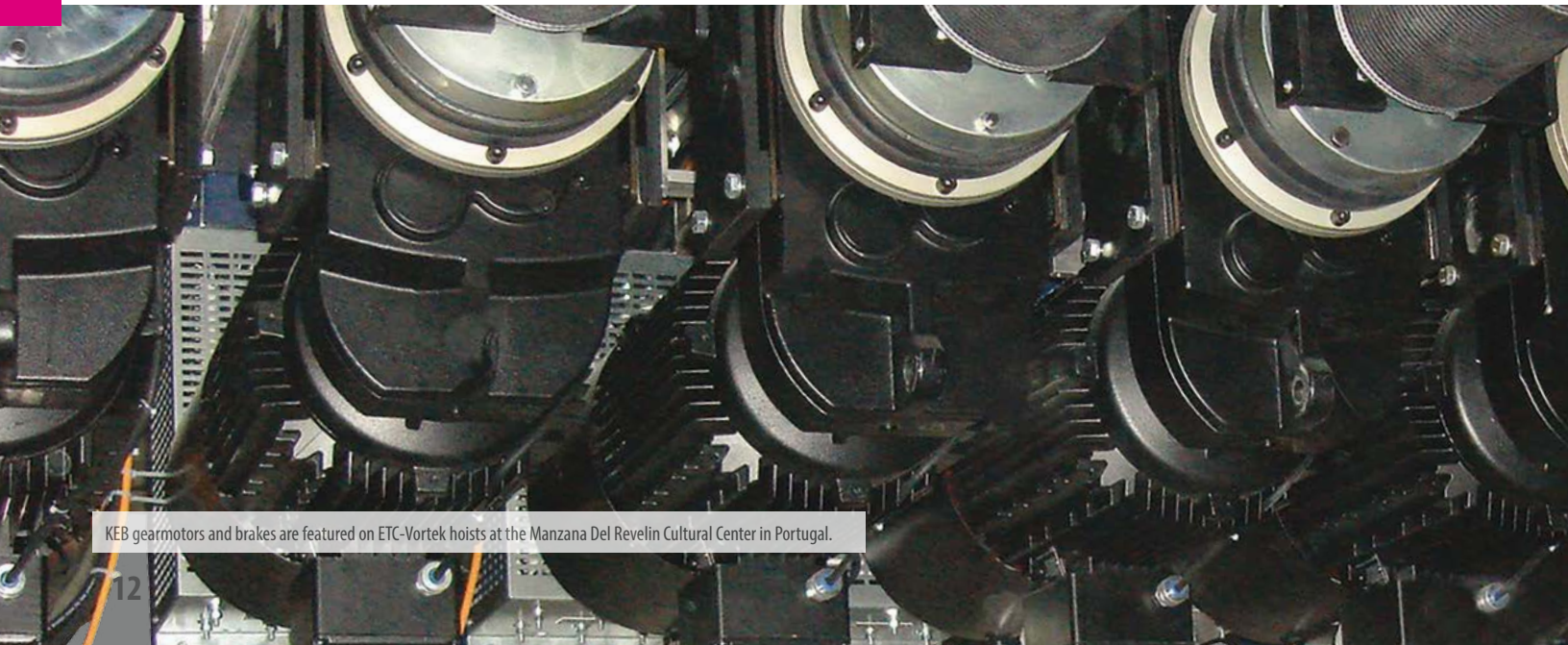
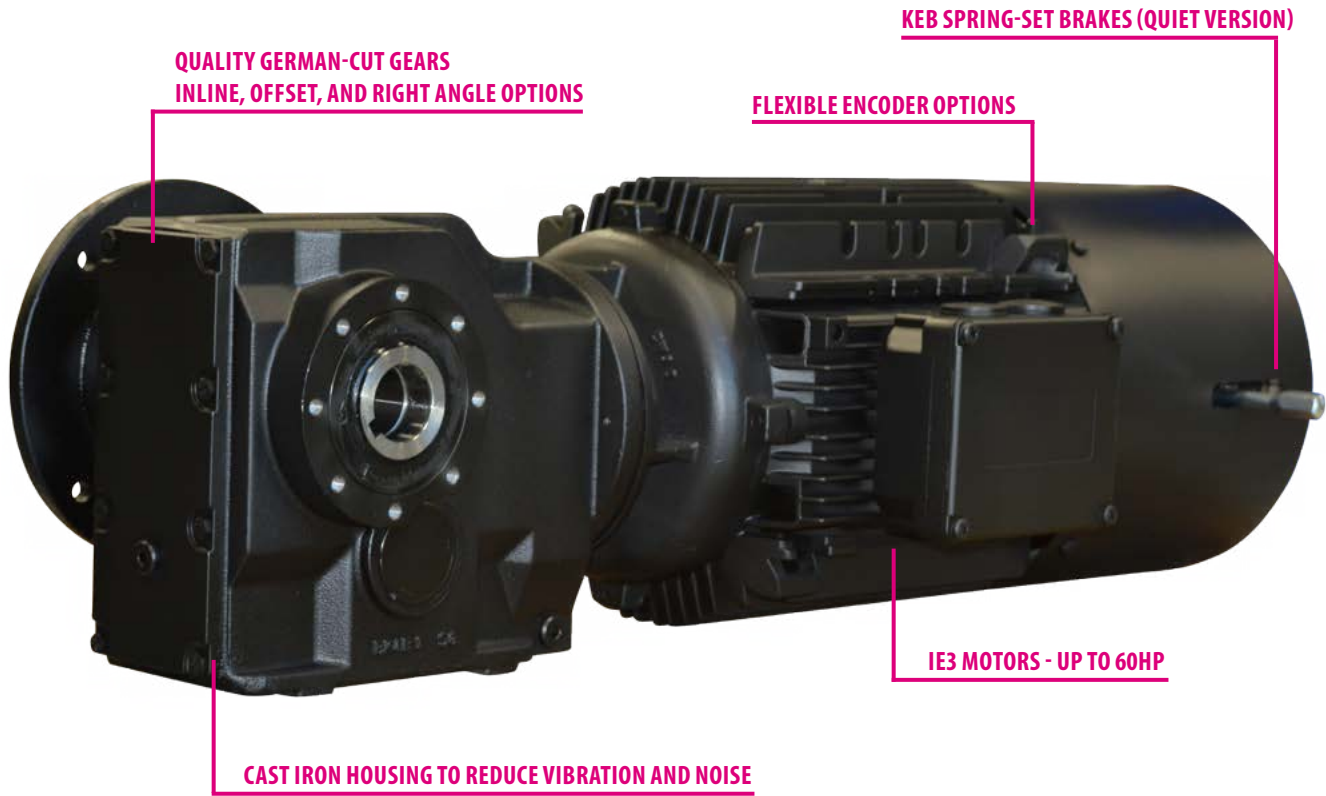
## GEARMOTORS

### Integral gearmotors



#### HIGHLIGHTS

- Induction or servo motor (up to 60Hp)
- Flexible flange options
- Fanless motor for S2 duty - reduced noise version
- Prepared for handwheel (option)
- KEB brake technology with noise reduced, hand release, and microswitch options available
- Forced ventilation options for sustained operation at low speeds



KEB gearmotors and brakes are featured on ETC-Vortek hoists at the Manzana Del Revelin Cultural Center in Portugal.

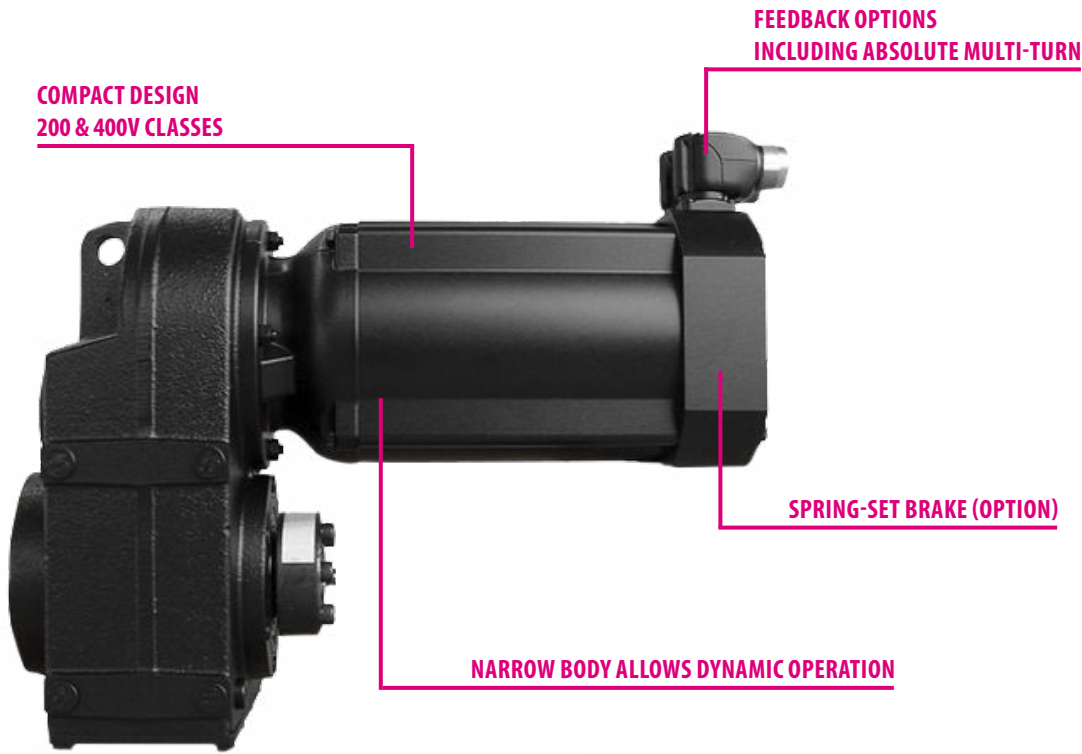
## MOTORS

### PM servo motors



#### HIGHLIGHTS

- Motors up to 82 Nm nominal torque
- Compatible with KEB integral gear product (inline, offset and right angle)
- Small diameter for under-hung drum designs
- Option with KEB spring-set brake
- Variety of feedback devices supported including absolute encoders
- Quick connect power and feedback connectors



### Rectifiers

TYPE	PART #	INSTALLATION VOLTAGE	OUTPUT VOLTAGE (VDC)	RATED CURRENT <sup>(1)</sup>	DC SIDE SWITCHING	UL
HALF-WAVE	0291010-CE07	275VAC	VAC <sub>Input</sub> * .45	1.0A	Yes	Yes
FULL-WAVE	0291020-CE07	275VAC	VAC <sub>Input</sub> * .90	2.0A	Yes	Yes
OVEREXCITATION <sup>(2)</sup>	9098200-CE09	300VAC	OEX <sup>(2)</sup>	1.2A	Yes	Yes
HALF-WAVE	0491010-CE07	500VAC	VAC <sub>Input</sub> * .45	1.0A	Yes	Yes
FULL-WAVE	0491020-CE07	500VAC	VAC <sub>Input</sub> * .90	2.0A	Yes	Yes
OVEREXCITATION <sup>(2)</sup>	9098200-001U	500VAC	OEX <sup>(2)</sup>	1.2A	Yes	Yes
HALF-WAVE	0591010-CE09	600VAC	VAC <sub>Input</sub> * .45	1.0A	No <sup>(3)</sup>	Yes

(1) Rating at 45°C; Units can be placed in parallel for added capacity.  
 (2) Overexcitation provides full-wave rectification for approx. 300ms, then steps down to half-wave. Advantage: improved brake release time.  
 (3) Available, but not built into rectifier.



## DRIVES

### F5 inverter



#### HIGHLIGHTS

- Worldwide platform: 230 and 480V classes (up to 1000Hp)
- Internal 32-bit positioning control
- SIL3 Safe-Torque-Off (STO) safety option
- Integrated brake handling with Pre-Torque™
- Dual channel encoder card
- Supports 10+ communication protocols including EtherCAT

KEB's F5 & S6 inverters feature an internal positioning module which allows for easy coordinated hoist positioning. One possible implementation is to have a master control simply provide a set position to the drive through the communication bus and the drive handles the position profile. Both drive platforms are capable of operating at 16kHz switching frequency with automatic derate. This provides silent operation from the drive.

KEB's drives feature dual encoder channels which can be configured as inputs or outputs. This makes evaluating the hoists speed feedback very easy. A sample implementation is to compare the motor feedback and speed feedback from the drum side of a theater winch. The KEB drive can continuously evaluate the two signals with an internal gearing ratio and determine if an e-stop is necessary.



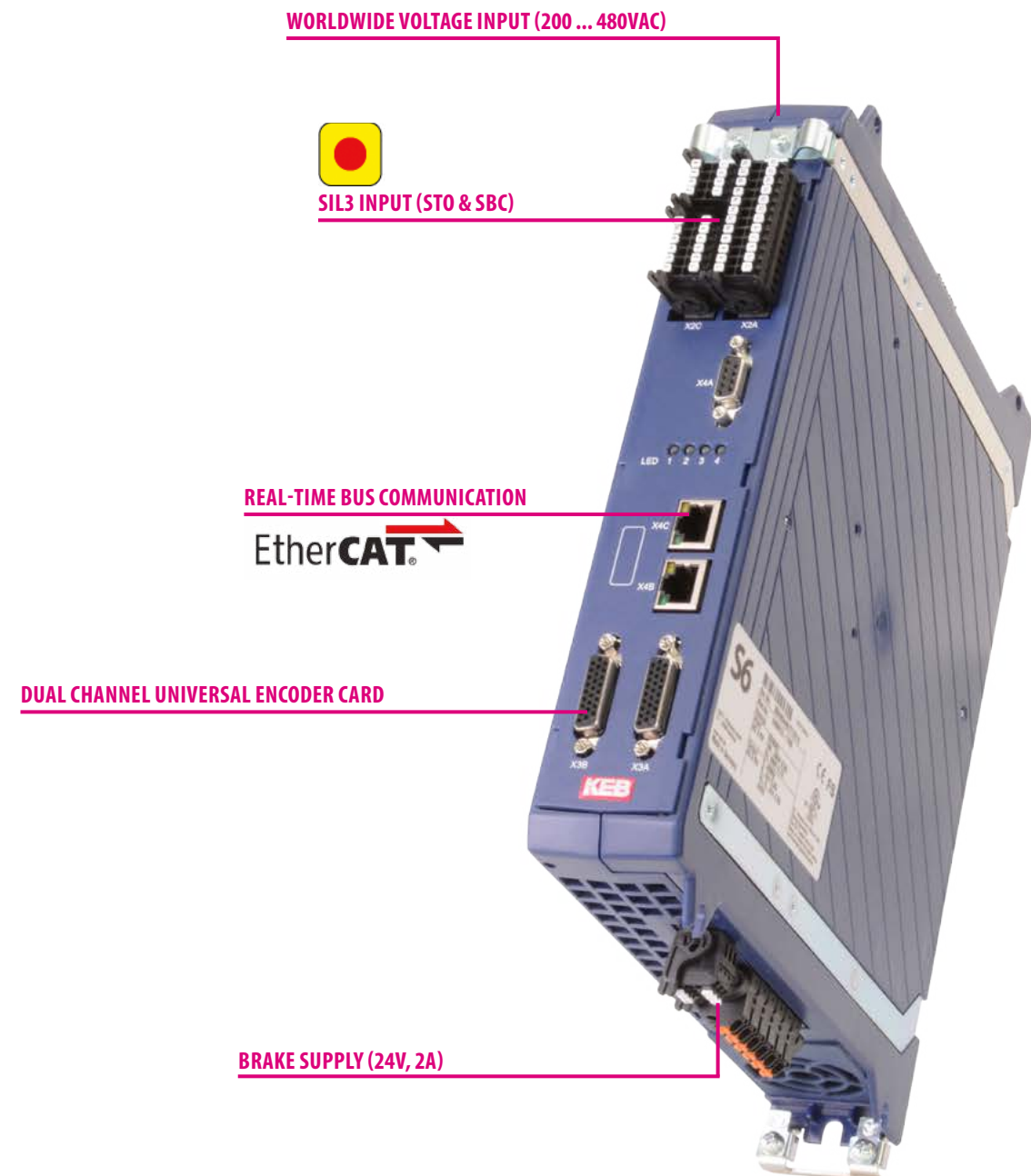
## DRIVES

### S6 servo drive



#### HIGHLIGHTS

- Up to 5.5kW
- 200 ... 480VAC input
- Real-time communication: EtherCAT standard
- Narrow profile (book mount style)
- Quiet operation (16kHz maximum)
- SIL3 safety functionality including STO and SBC



## CONTROL

### C6 Smart embedded control

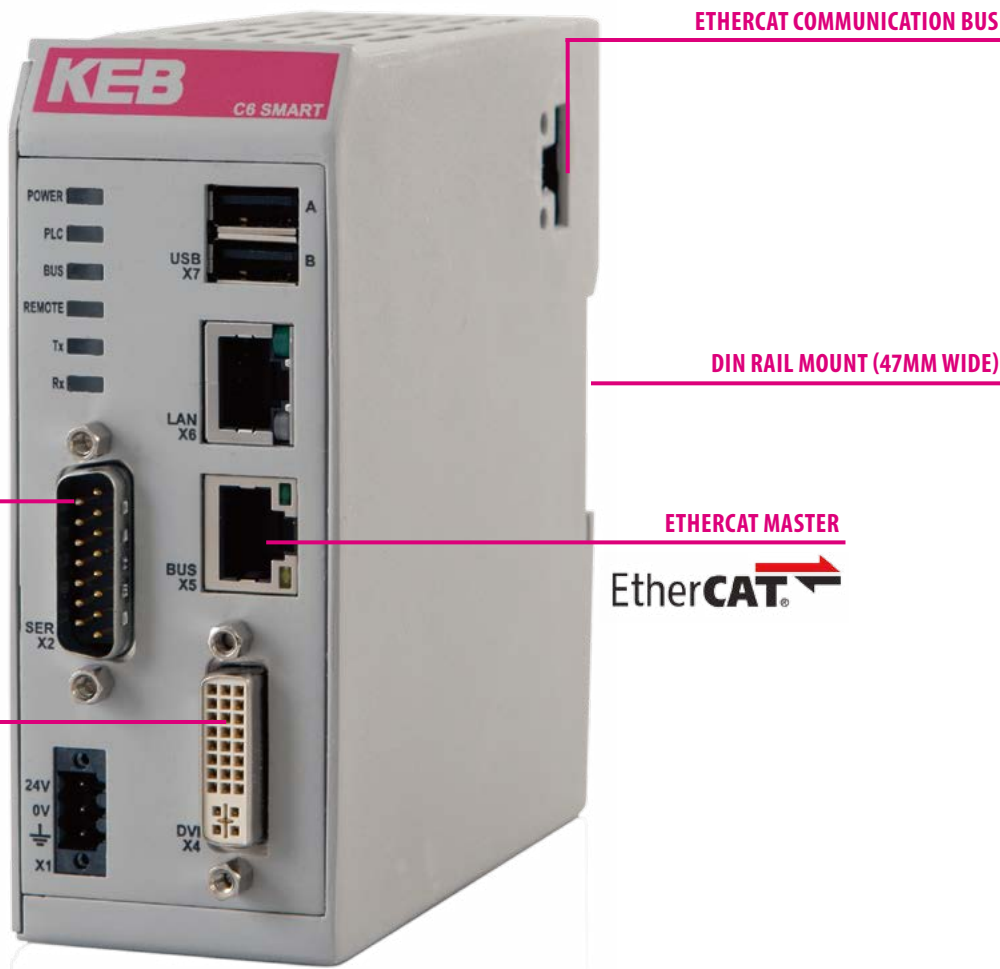


#### HIGHLIGHTS

- ARM Cortex™-A9 powered
- 32-bit processor for motion and camming profiles
- Integrated micro UPS for critical applications
- Integrated EtherCAT E-bus for expandable I/O
- DVI port for visualization handling

The C6 Smart is ideal for theatre applications requiring the synchronization of multi-axis motion control. The Smart features an EtherCAT master for real-time performance. A quad-core version with a DVI output allows the Smart to handle the system visualization as well.

A micro-UPS with 512KB of persistent/retain memory to protect against power outages is included as standard on the Smart. Also standard is 8 GB of on-board memory for application. The Smart includes a Combivis Connect™ license which allows a user to securely and easily remote connect to the machine through an internet connection.



## CONTROL

### C6 remote I/O



#### HIGHLIGHTS

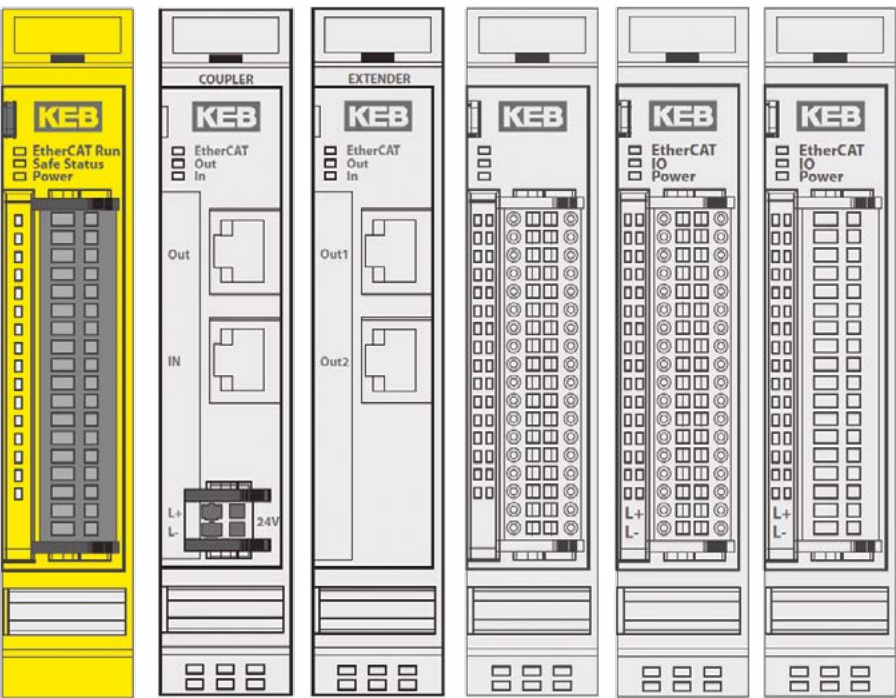
- EtherCAT communication bus
- Expandable and scalable
- DIN mount
- Large number of options and configurations possible

KEB's line of remote EtherCAT I/O is scalable and many options for analog and digital signals are available. The modules are DIN rail mounted and easily snap into each other. The units are only 25mm wide and are capable of 32 discrete inputs/outputs.

### Available modules

- EtherCAT bus coupler
- EtherCAT I/O extender
- Digital in (16 or 32)
- Digital mixed (16 in, 16 out)
- Analog in, voltage (13 bit, 8 single or 4 differential)
- Analog in, voltage (13 bit, 16 single or 8 differential)
- Analog in, current (16 bit, 4 or 8)
- Analog out (12/16 bit, 4)
- Temperature in, Ni100 (16 bit, 4 or 8)
- Temperature in, Ni1000 (16 bit, 4 or 8)
- Temperature, thermocouples (16 bit, 4 or 8 in)
- Fast counter / encoder (max. 400kHz)
- Stepper / brushless DC control

<b>FIELDBUS</b>	EtherCAT 100 Mbps/s
<b>DIMENSIONS (W X H X D)</b>	12 x 120 x 90 mm
<b>INSTALLATION</b>	35 mm DIN top-hat rail
<b>E-BUS CONNECTION</b>	Side plug (EtherCAT)
<b>POWER SUPPLY</b>	24VDC -20% +25%
<b>OPERATING TEMPERATURE</b>	0 ... 55° C
<b>PROTECTION CLASS</b>	IP20



## CONTROL

### HMI and panel IPCs

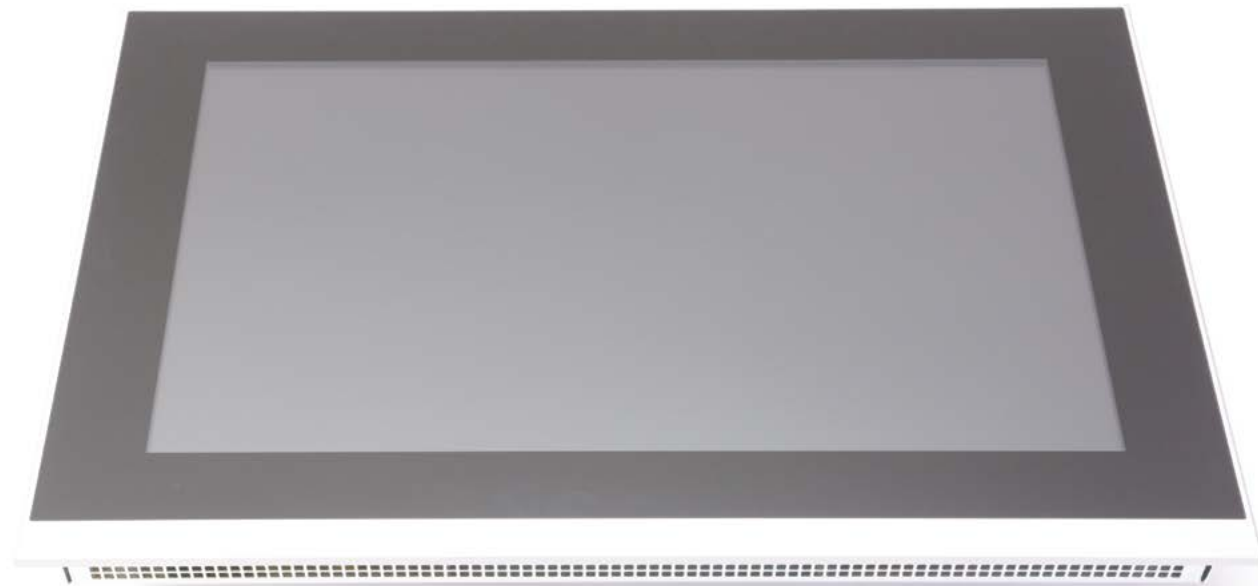


#### HIGHLIGHTS

- Fanless panel or IPC box up to 50° C operating temperature
- Intel® Bay Trail Platform with 64 bit architecture
- LED backlight TFT LCD display with 16 million colors in range of formats
- Slim version available for installations with limited space
- Two operating systems tailored to the application
- Smart memory concept for maximum flexibility in application

Industrial grade HMIs and Panel IPCs from KEB are designed to last, especially in demanding environments. They have no fans or moving parts and a tough front panel that is rated IP66.

KEB HMIs are available in a wide range of sizes and formats and have beautiful displays for putting all the right information at your fingertips. Choose from capacitive touch technology for accurate responses to taps, touches, and swipes, or resistive touch technology that responds to a pen, stylus, or gloved hand.



## CONTROL

### VPN router

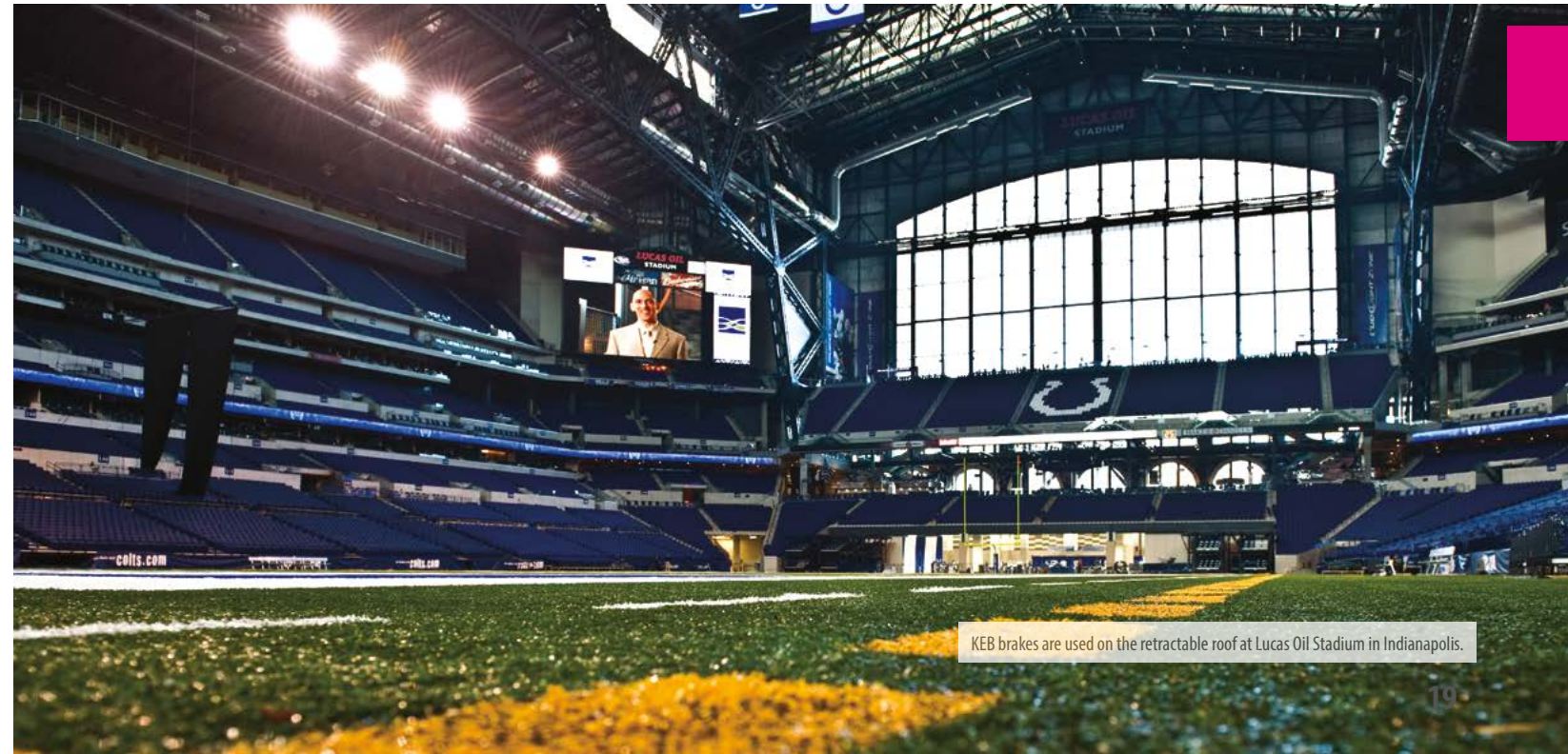


#### HIGHLIGHTS

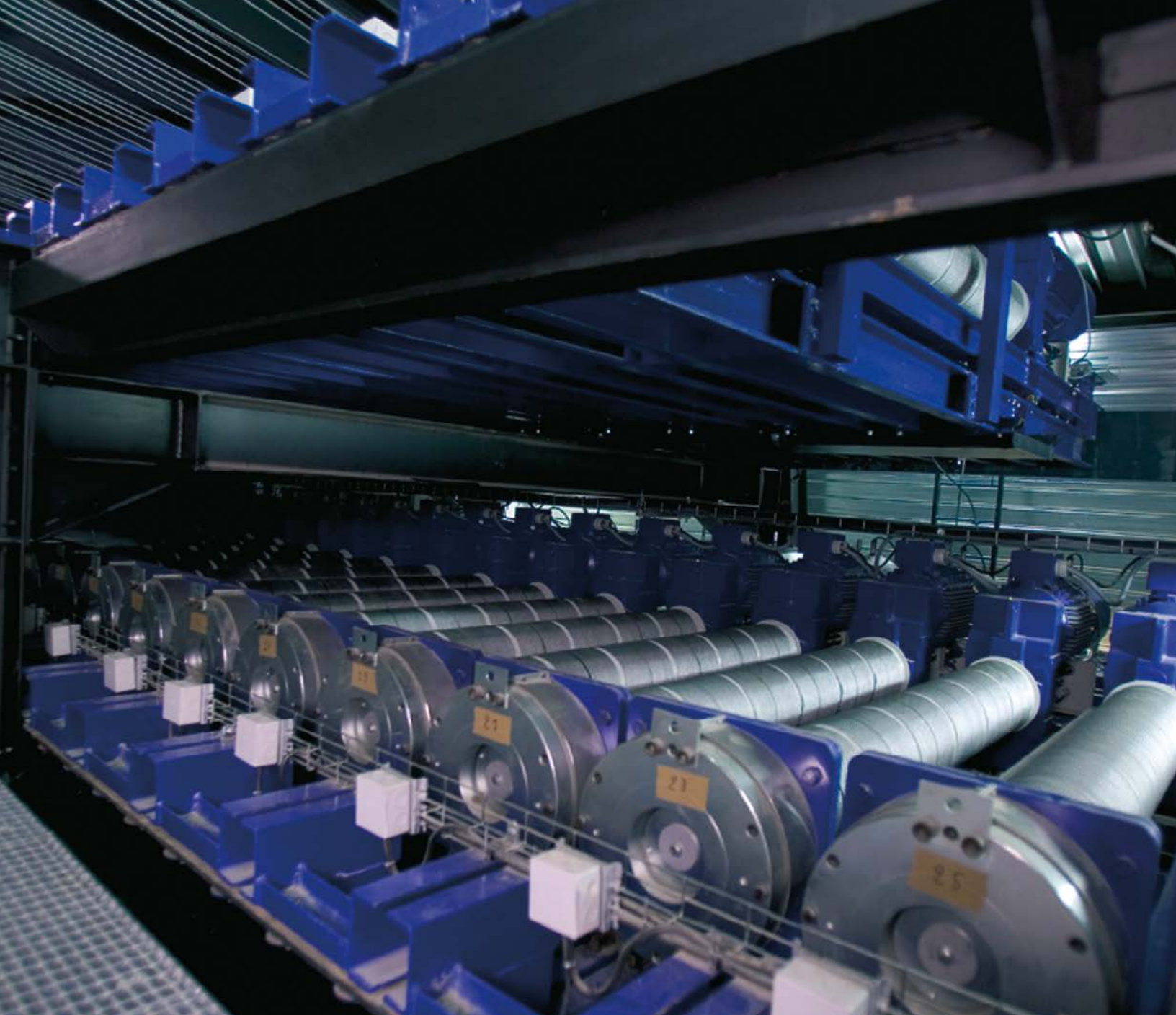
- Remote monitoring using Ethernet
- Worldwide support from redundant servers
- 2G/3G/3G+ cellular modem available
- Access to remote devices via Ethernet or serial interface
- Optional HMI functionality for data logging, diagnostics, and notifications

Some installations can be in tight, hard-to-reach spaces. That's where KEB's VPN Router shines. Connect to any PLC on your network for monitoring and diagnostics without having to crawl into potentially dangerous situations.

Our C6 Router comes in four versions to best suit your installation. With or without HMI functionality, with or without the ability to connect via cellular modem. The C6 Router is the ideal tool to put it all together and create your perfect, functional automated system.



KEB brakes are used on the retractable roof at Lucas Oil Stadium in Indianapolis.



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