

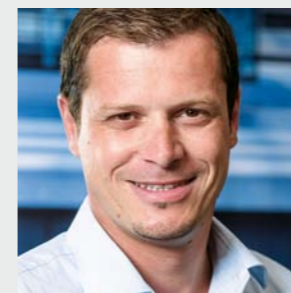
IFE E4 DOOR DRIVE UNIT

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**SMALLER, LIGHTER, STRONGER:
IFE E4 DOOR DRIVE UNIT**

IFE E4 DOOR DRIVE UNIT ONE TYPE, FOR SPEEDS FROM 50 TO 189 KM/H



Gregor Fahrnberger
Systems Engineer

COMPACT DESIGN MEETS MATURE TECHNOLOGY. With its compact design and mature technology, IFE E4 sets new standards for ease of installation whilst delivering high levels of safety, performance, reliability and with reduced life-cycle costs.

“All drive system components have been developed and validated with the focus on maximizing its service life. Serial production units are smaller and lighter, yet still stronger and above all easier to maintain,” says Gregor Fahrnberger commenting on the new drive unit.

The system is modular and can be used for opening widths from 1200 to 2000 mm.

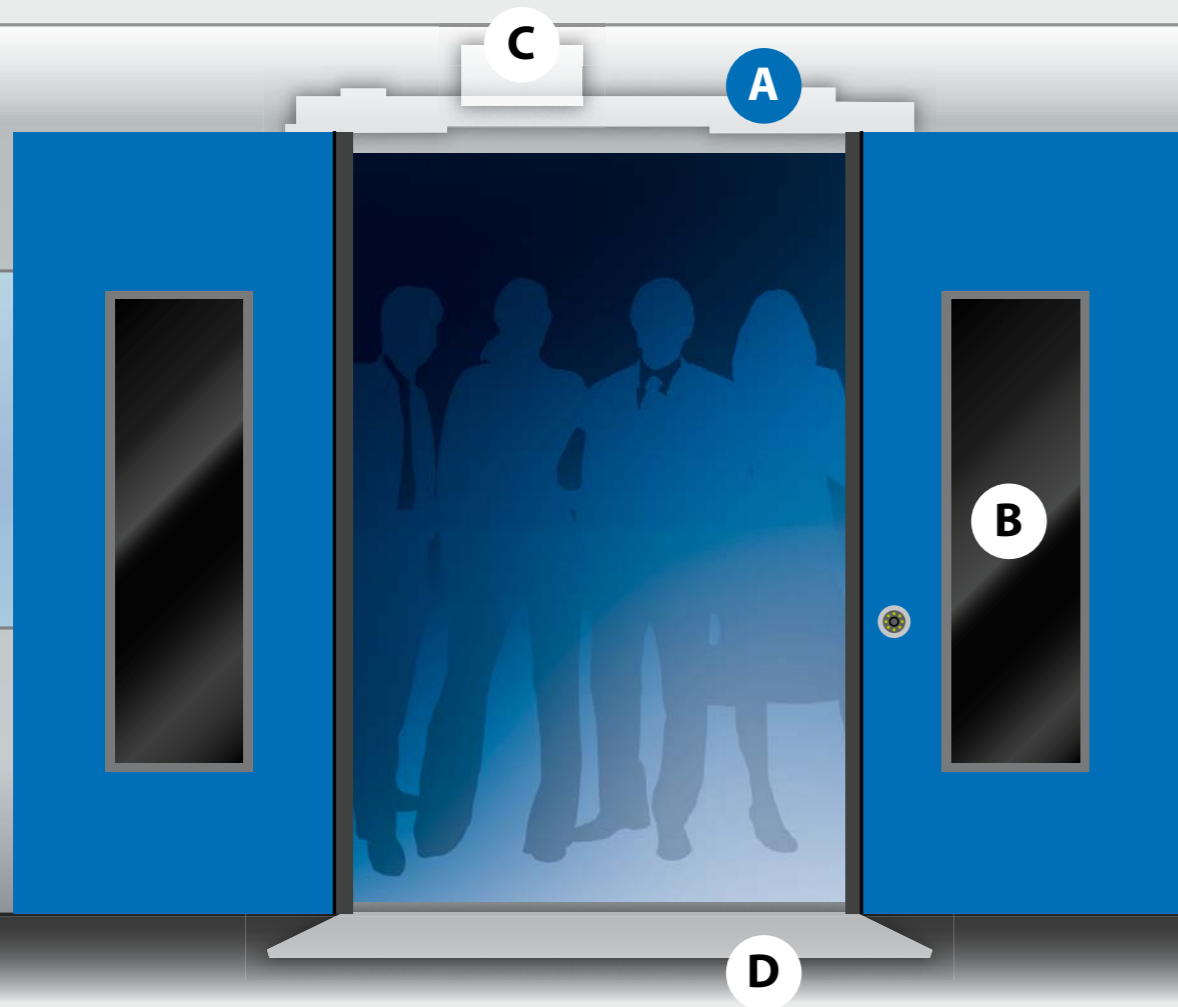
SMALLER, LIGHTER, STRONGER: THE ADVANTAGES AT A GLANCE

- 20% lighter
- 44% less components
- Floor-level locking device fitting in the installation space of a rotary column
- Four over dead center lockings
- Continuous lock monitoring
- Standard solution already includes SIL2
- Multifunction emergency unlocking device
- Linear guiding system allows for deformation
- Reduced installation times
- No adjustment needed
- Reduced maintenance expense
- Reduced life-cycle costs



1 Emergency unlocking device on the door drive unit | 2 Serial production was taken up in the manufacturing plant even before the market launch | 3 An IFE E4 access system installed on a double-decker coach of Deutsche Bahn

IFE E4 DOOR DRIVE UNIT WELCOME TO THE FUTURE



A

IFE E4 Door Drive Unit

Smaller, lighter, stronger.
Compact design, reduced to the essentials, mature and proven technology along with easy installation and reduced maintenance effort are setting new standards.

B

IFE AN/AI Door Leaves

Maximum passenger comfort. The new door leaves stand out thanks to a sound insulation value which is improved by a factor of 3 to 4, to a heat transfer coefficient reduction of 50% and to a weight reduction.

C

IFE FLEX Control

Small, universal, reliable.
The new door control unit features a compact design and a smart all-voltage energy supply with adaptive operating modes, reducing the total power loss by 25%.

D

IFE X4 Sliding Step

Minimal installation space – maximum function. The step is designed to reduce weight, number of components and installation height. The simplified guiding system prevents jamming or sluggish movement.

IFE E4 DOOR DRIVE UNIT IN DETAIL



IFE E4 DOOR DRIVE UNIT IN DETAIL



INCREASED SAFETY THANKS TO OVER DEAD CENTER LOCKS

The access system is kept securely closed at all four corners through the use of over dead center locks. In addition, sensors can also continuously monitor this position.



ADJUSTMENT-FREE DESIGN FOR THE ENTIRE STRUCTURE

Adjustments are not necessary during installation and maintenance thanks to the adjustment-free design of the door drive unit. Adjustment is not even required when components are exchanged.



RUGGED DOOR LEAF GUIDING SYSTEM

A linear guiding system that allows for deformations and a debris- and dirt-resistant design ensures a reliable function over the entire life cycle even when particularly wide and heavy door leaves are used.



PERFECT INTEGRATION OF THE SYSTEM INTO THE VEHICLE

The clearly defined connecting points to the carbody provide for a simplified installation with significant time savings. The installation time may be reduced even more by using installation jigs.



MAINTENANCE-FREE DOOR DRIVE UNIT

The door leaves are directly driven via rack and pinion. This drive type is free from wear, almost backlash-free and thus enables a very sensitive and precise door control. In addition, the drive concept guarantees maintenance-free operation over the entire service life, even for the bearings and the gear unit.



ACTIVE FLOOR-LEVEL LOCKING DEVICE FOR MORE SAFETY

The active locking of the door leaf bottom which is secured against lift-off only requires the space of a classic rotary column. This sets completely new standards for the load-bearing capacity of the access system, which is also adjustment-free.

OUR PATH TO THE VALIDATED PRODUCT

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THE LATEST GENERATION

IFE SYSTEMS combine long-standing know-how and proven technology. Current market demands, modern production processes and operational experience accumulated with half a million access systems have characterized the development of the 4th generation.

Each component of the access system has its own highlights: "Smaller, lighter, stronger. These attributes best describe the IFE E4 drive system", proudly explains



Michael Ernst (development engineer for drive systems). "Smallest installation space requirements, reduced number of parts and integration of low-maintenance, high-stability guiding and drive components as well as a high availability of spare parts guarantee the reliability of the entire system." And using the same components for a modular range of door opening widths of up to two meters is also unique.

The increasing demands for sound and heat insulation for an entire vehicle can only be met with technologically advanced door leaves. An ambitious goal that has even been achieved, reaching never before seen levels thanks to new insulation materials and optimized profiles.



Alfred Oberhuber (testing engineer) is convinced: "The extensive testing facilities and vali-

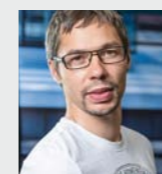


- 1 Perfect processes for glass installation |
- 2 Automated machining of a door leaf profile in serial production |
- 3 Sound measurement room at IFE Kematen to check sound insulation values |
- 4 Application of dynamic and static loads on a full-scale access system in the in-house hydropulse system |
- 5 Temperature-difference climatic chamber in the IFE validation center to simulate winter conditions through additional use of ice- and snow-making systems



ENTRANCE SYSTEMS RAIL VEHICLE SYSTEMS

dation methods IFE has at its disposal were essential in achieving our goals. With our temperature-difference climatic chamber, the sound measurement room and the hydropulse system for applying dynamic loads, we can test complete full-scale access systems. Without this combination of expertise and world class facilities such accurate test results cannot be achieved."



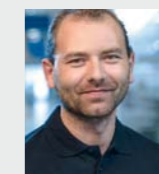
Johann Wilfinger (development engineer of sliding step) emphasizes what is likely the sliding step team's most convincing argument in the development of the new system – the installation space: "A sliding step should not have an installation height of more than 50 mm in order to avoid integration problems in many vehicles. The biggest challenge for our team was simplifying the guiding

system in such a way as to prevent jamming, reduce the number of components and integrate weight detection in the simplest possible way and to manage all of this without exceeding an installation height of 50 mm." The result is the new IFE X4 sliding step. Thanks to its adjustment-free construction and improved drive concept, it is particularly resistant against environmental conditions and requires little maintenance.



Matthias Zöchmann (controls development engineer) and his team dealt with reducing the number of components and installation height while developing a high-performance, reliable control unit which already complies with the SIL2 guidelines as a standard. "Thanks to the flexible adaptation of the operating modes to the current

operating situation, the total power loss is reduced by 25% compared to the previous model. In addition, the installation height was reduced by 25% and the weight lowered by 50%.



"Early integration of the production facilities is necessary for a product's success," insists **Milan Brtnik** (process engineer). "The initial prototypes were produced on series production machines which allowed us to eliminate potential manufacturing problems early on in the development phase. This provided for optimal series production."

Indeed, the components of the access system are already in series production at the time of market launch. Only fully validated and serialized products can be safely produced and successfully installed and operated over the long-term.