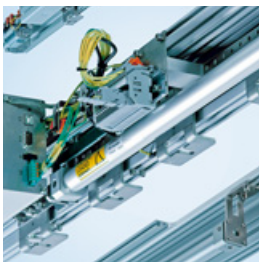
Polarteknik

Door Systems



Polarteknik Door Systems

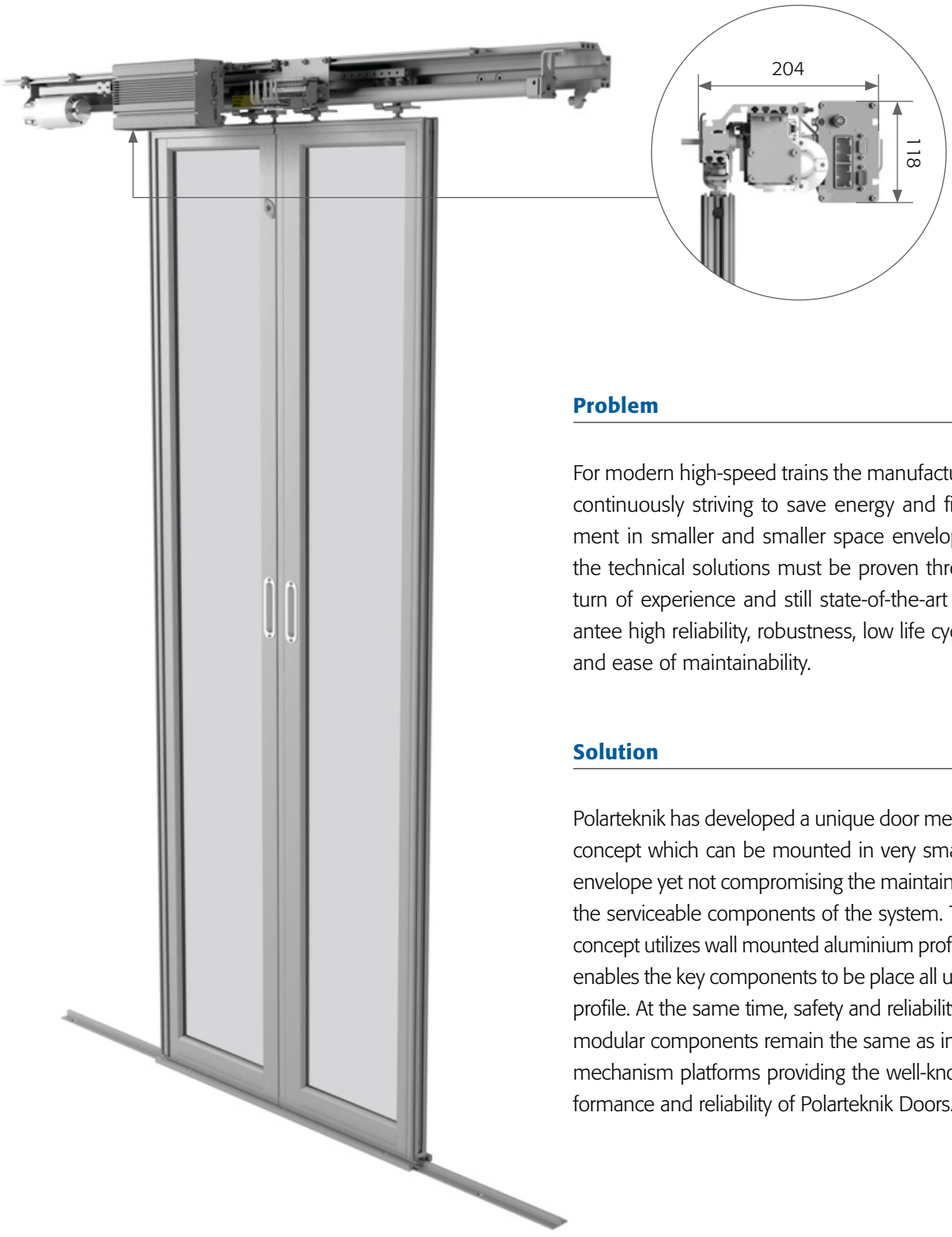
Polarteknik is Leading European company to supply and design fire barrier Gangway door systems for rail vehicles. We are supplier in most of the new European high speed, very high speed and intercity trains. Our product range also includes complete fire barrier walls, Automatic single, double leaf sliding doors, telescopic and curved doors. Product can be used in modern as well as refurbished passenger coaches to increase the passenger comfort and safety.

Our knowledge of customer requirements, combined with unparalleled expertise in compact door systems for rail vehicles from the world's leading manufacturers, places us in the best possible position to provide our customers with first rate service. Polarteknik has a great deal of experience in producing fire barrier doors in compliance with prevailing national and international norms in the target countries.

Tomorrow´s solutions today

Polarteknik Door Systems

Double leaf sliding doors in low space envelope



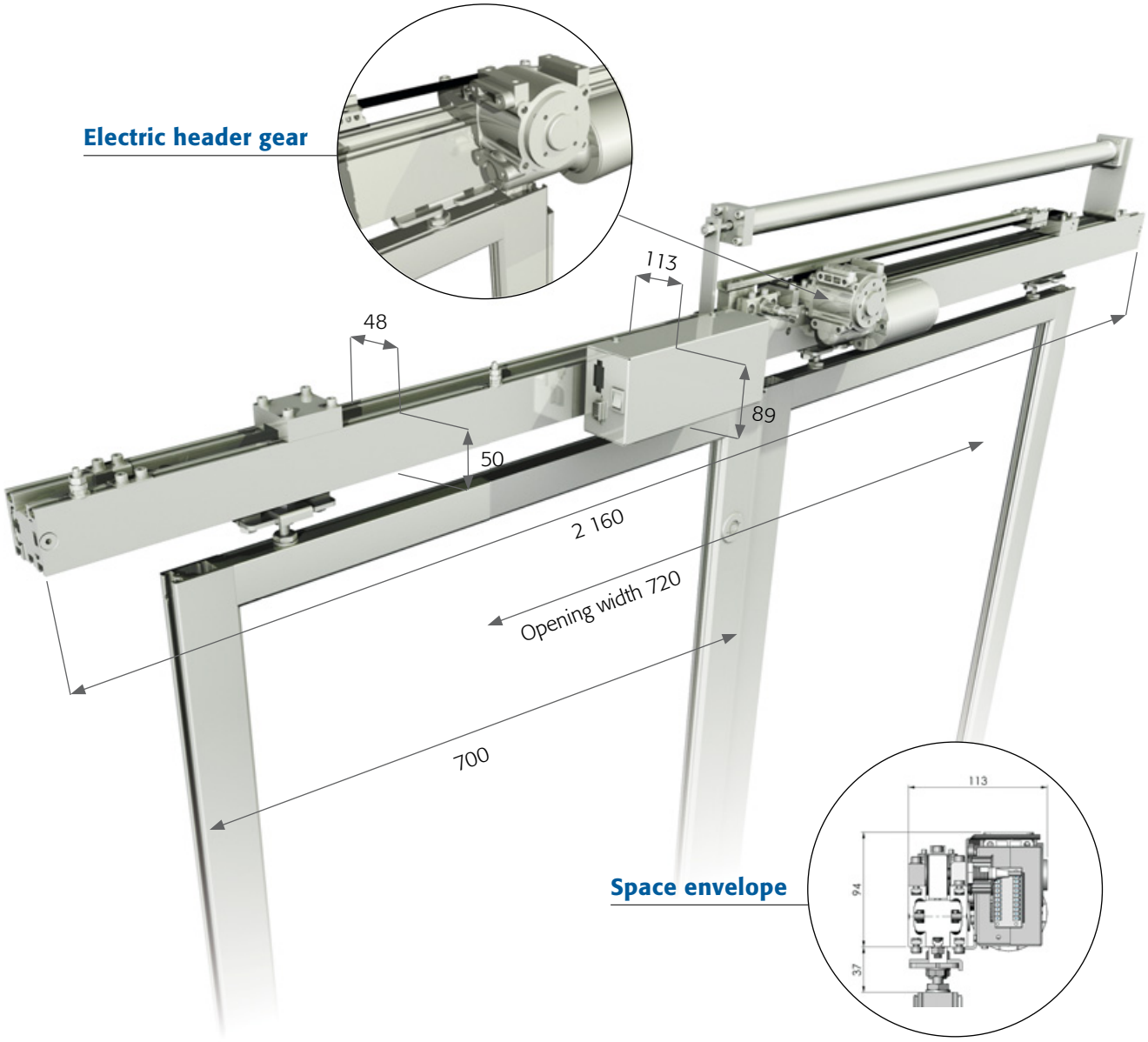
Problem

For modern high-speed trains the manufacturers are continuously striving to save energy and fit equipment in smaller and smaller space envelopes. Yet, the technical solutions must be proven through return of experience and still state-of-the-art to guarantee high reliability, robustness, low life cycle costs and ease of maintainability.

Solution

Polarteknik has developed a unique door mechanism concept which can be mounted in very small space envelope yet not compromising the maintainability of the serviceable components of the system. The new concept utilizes wall mounted aluminium profile which enables the key components to be place all under the profile. At the same time, safety and reliability related modular components remain the same as in existing mechanism platforms providing the well-known performance and reliability of Polarteknik Doors.

Single and Double leaf sliding doors



Note: This drawing is given only as information of a standard solution. We are able to modify the layout of the door mechanism in order to suit the customers doorway header space envelope. Please contact us if You require more details.

POLARTEKNIK
FIRE DOORS

Polarteknik, having designed and supplied thousands of door components and systems for almost twenty years, continues with top level integrated compact door systems. Co-operation with our customers has been a key to develop the modular doors of lowest LCC-values in the market. Our experience and reliable construction gives customer the best choice during the whole project in modern as well as refurbished passenger coaches to increase the passenger comfort.

Technical specifications

• Mechanism weight	10 to 12,5 kg
• Opening time, adjustable	2,5 to 6 sec
• Closing time, adjustable	3,5 to 8 sec
• Nominal reversing force	80 N
• Manual opening force	60 N to 150 N
• Operating temperature	-25 to +50°C
• Operating power	24/36/72/110 V DC
• Control unit according to	EN 50155
• Control unit	See page 21
• Power consumption idle-state	4 W
• Power consumption nominal	7 - 14 W

Advantages

- Compact modular design – easy to install and maintain
- Manual, electrically or pneumatically driven
- Microprocessor-controlled with integrated safety functions
- Lightweight with low space requirements
- Adjustable for varying spaces and different environments
- Designed to last 30 years of operation
- Minimal need for maintenance
- Smooth and silent operation
- All components and materials are of high quality and thoroughly tested
- Fire doors are tested against 20 minutes integrity
- No scheduled part exchanges first 10 years of operation

Characteristics

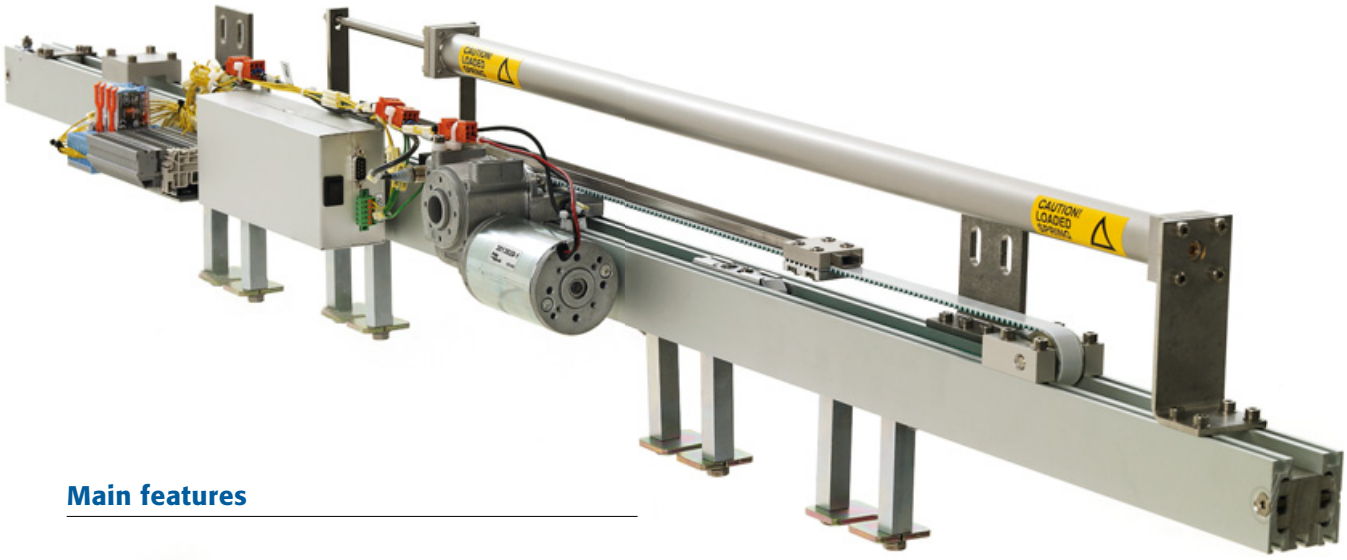
- Passenger operated pushbuttons or photocell detection
- Obstacle detection
- Release function
- Recovery timer
- Centralized opening option
- Monitoring and diagnostics through RS485 network
- Fault diagnosis display
- Emergency off-switch
- Operational parameter setting through RS232 interface
- Available with forced closing function
- Available with different openings
- Available with customized or standard door leaves
- Large operating temperature range

Norms

Our door products are used in projects all over Europe. Our sliding doors can be made to fulfil the international and national norms such as:

- BS norms (United Kingdom)
- DIN norms (Germany)
- EN norms (Europe)
- GOST norms (Russia)
- ISO norms (International)
- NF norms (France, Belgium, Italy)
- PNK norms (Poland)
- UNI norms (Italy)

Single and Double leaf sliding doors – DSYS2



Main features

- Compact modular design – easy to install and maintain
- Electrically or pneumatically powered
- Microprocessor-controlled with integrated safety functions
- Lightweight with low space requirements
- Adjustable for varying spaces and different environments
- Designed to last 30 years of operation
- Minimal need for maintenance
- Smooth and silent operation
- All components and materials are of high quality and thoroughly tested
- Fire doors are tested against 20 minutes integrity
- Available both automatic and manual versions
- EW/EI 15 – 30 available

Technical specifications

• Mechanism weight	10 to 12,5 kg
• Max. door leaf weight	60 kg or 2 x 40 kg
• Opening time, adjustable	2,5 to 6 sec.
• Closing time, adjustable	3,5 to 8 sec.
• Nominal reversing force	80 N
• Manual opening force (force closing device)	90–150 N
• Operating temperature	-25 to +50°C
• Storage temperature	-40 to +70°C
• Operating voltage	24/36/72/110 VDC
• Control unit according to	EN 50155
• Open and close and lock available	

Opening the doors for innovation

Engineering and Teamwork

Polarteknik's teamwork approach empowers individuals and gives them responsibility, while encouraging easy sharing of information. The free flow of information through the organisation allows decisions to be made where the knowledge is. Our customers benefit from our flexibility and decisiveness.
Polarteknik is firmly committed to its quality control system, which is under constant development. Our design and control make good use of state-of-the-art technology. We are in close cooperation with universities and independent testing laboratories to ensure that our project development process has the latest and best scientific knowledge available.

Single and Double leaf sliding doors – DSYS4

Main features

- Shares modular components with the DSYS2 standard door
- Lightweight and economical solution
- Minimal space envelope e.g. height 130 mm
- Suitable for doorleaf weights up to 45 kg
- Optimized for low maintenance cost

Technical specifications

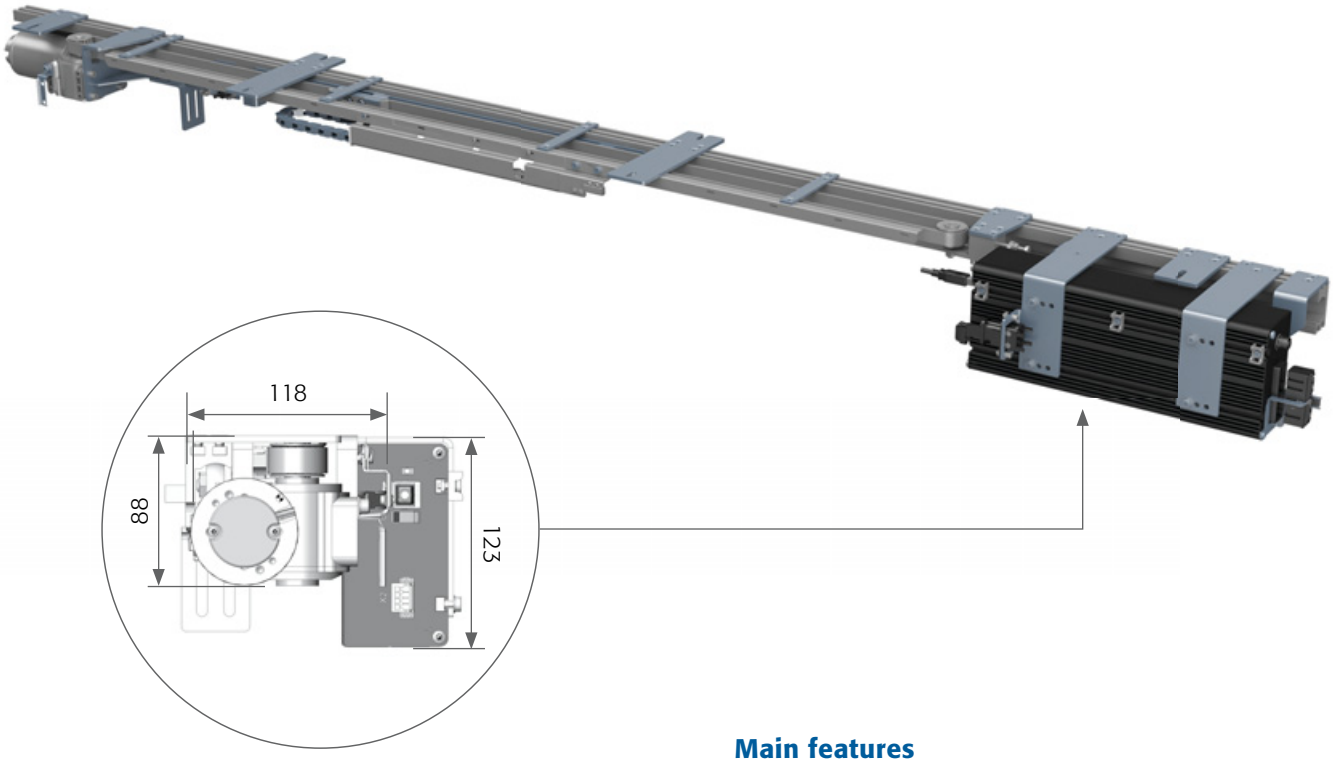
• Mechanism weight	10 kg
• Max. door leaf weight	45 kg
• Opening time, adjustable	2,5 to 6 sec.
• Closing time, adjustable	3,5 to 8 sec.
• Nominal reversing force	80 N
• Manual opening force (force closing device)	70 – 150 N
• Operating temperature	-25 to +50°C
• Storage temperature	-40 to +70°C
• Operating voltage	24/36/72/110 VDC
• Control unit according to	EN 50155
• Open and close and lock available	

Reliability – doors that open when they need to

Production

Polarteknik's area of expertise is the final assembly and testing of door units. Flexibility and high quality are our bywords, and the quality requirements of our customers always come first. Each door assembled by us undergoes a rigorous testing procedure. We have built our network of subcontractors carefully and hold them to the same exacting demands as our own operations.

For small space envelopes – Single leaf sliding door mechanism DSYS4 Evo



Main features

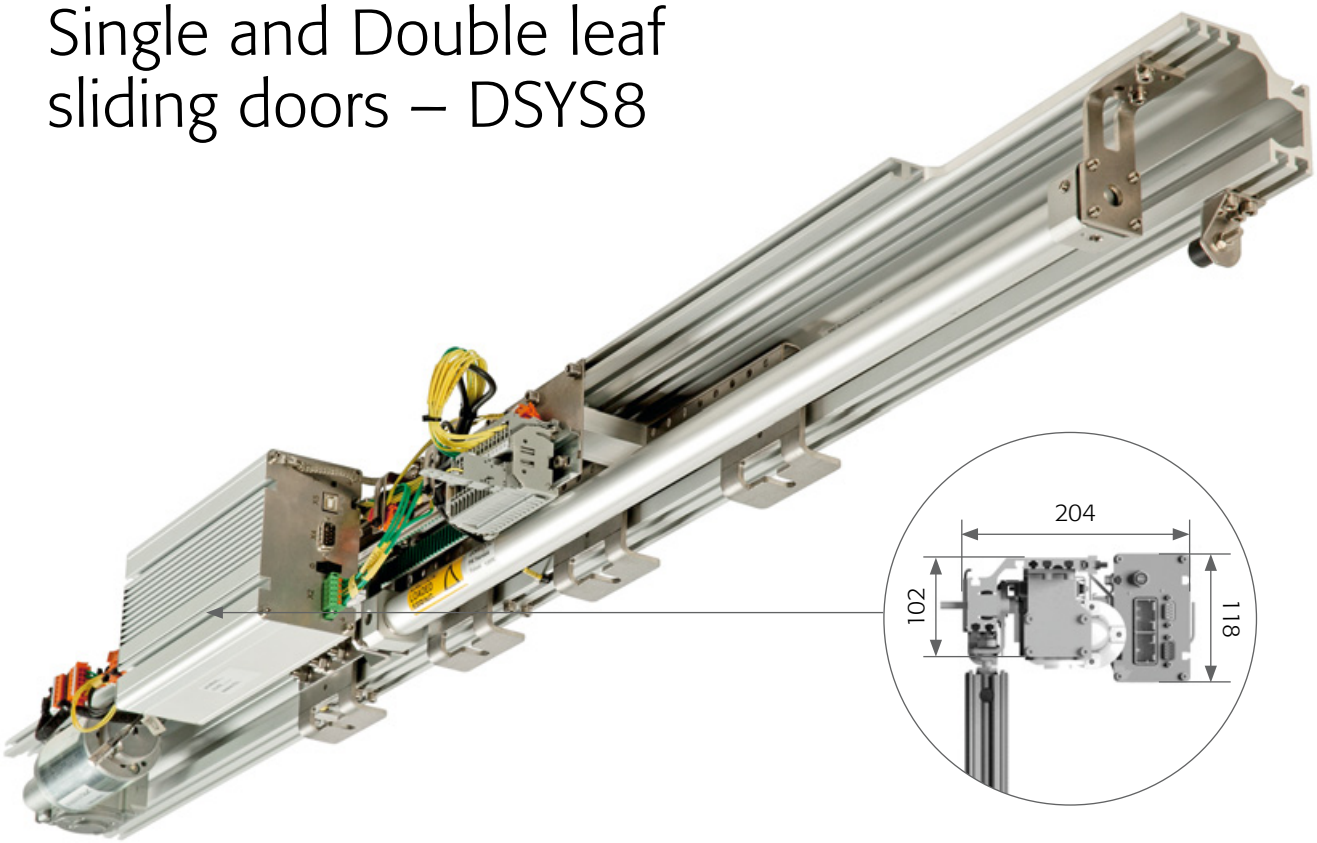
- Further developed from our DSYS4 family
- Excellent for low space envelope
- Smallest 120x90 cross section with DCU relocated
- New Carriage and energy transfer solutions
- Shares main modular components from DSYS4

CO2 performance

Lifecycle cost and weight

OEM train manufacturers are always trying to save space and weight. Polarteknik has been manufacturing Aluminium door systems for 35 years. That converts into savings in electricity or fuel when weight can be considerably lower than comparable systems in stainless steel.
A simple calculation shows with 35 years fleet life the saving can be between 2000€–4000€ per unit per year in energy costs. That also means lower CO2 footprint and directly contributes to sustainability. Ask for your calculation now and RFQ for a light weight systems with low (LCC) life cycle costs.

Single and Double leaf sliding doors – DSYS8



Main features

- Shares modular components with the DSYS2 standard doors
- Very low space envelope e.g. height 120mm
- Good accessibility for maintenance
- Doorleaves also available

Technical specifications

• Mechanism weight	13 kg
• Max. door leaf weight	50 kg
• Opening time, adjustable	2,5 to 5 sec.
• Closing time, adjustable	3,5 to 8 sec.
• Nominal reversing force	80 N
• Manual opening force /*	60 N
• Operating temperature	- 25 to + 50°C
• Storage temperature	- 40 to + 70°C
• Operating voltage	24/36/72/110 VDC
• Control unit according to	EN 50155

*/ without mechanical closing device level position and power off 90–150 N with mechanical closing device

Quality assurance – 100% serial testing

Testing and validation

All of the products are serial tested to assure compliance with the standards and customer requirements. Testing includes electrical testing, functional testing, dimensional and visual checks.
Quality systems include IRIS, ISO9001, ISO 14001 and we have certificates for EN17460 Adhesives and EN15085-2 CL4-welding.

Double leaf sliding telescopic doors

Note: This drawing is given only as information of a standard solution. We are able to modify the layout of the door mechanism in order to suit the customers doorway header space envelope. Please contact us if You require more details.

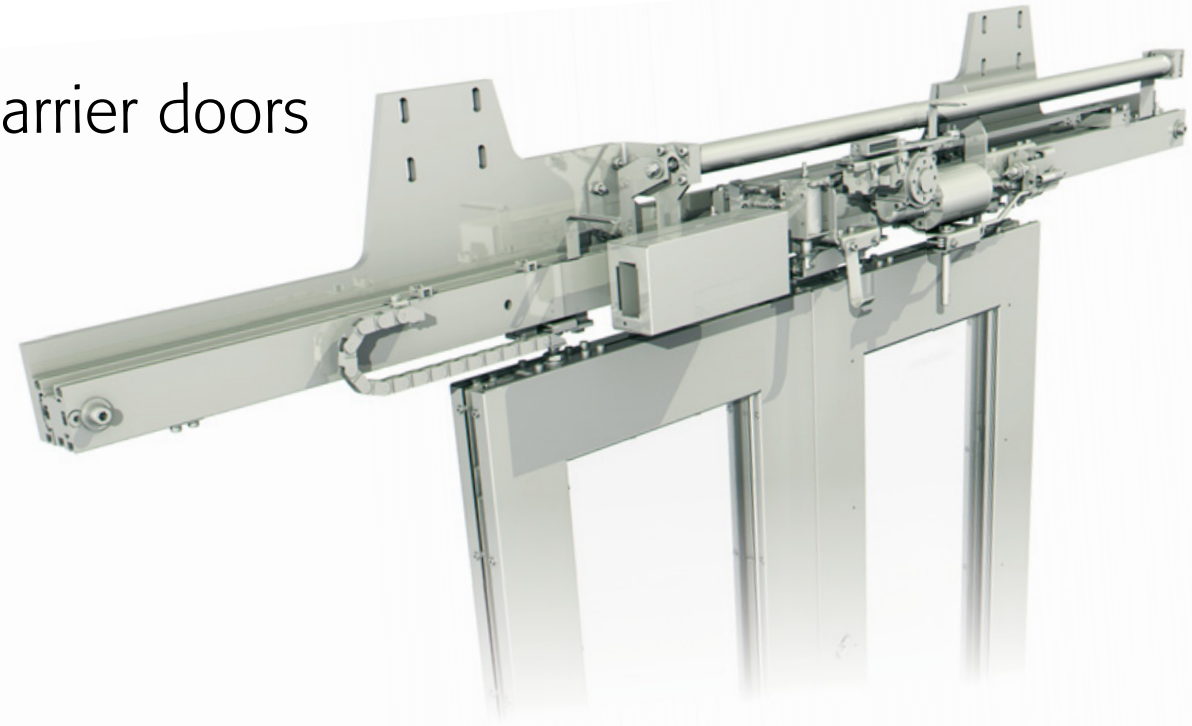
Main features

- Shares modular components with the DSYS2 standard door
- Lightweight and economical solution
- Minimal space envelope e.g. 1235mm length for 790mm opening
- Optimized for low maintenance cost

Technical specifications

• Mechanism weight	11 kg
• Max. door leaf weight	45 kg
• Opening time, adjustable	2,5 to 6 sec.
• Closing time, adjustable	3,5 to 8 sec.
• Nominal reversing force	80 N
• Manual opening force (force closing device)	70 – 150 N
• Operating temperature	-25 to +50°C
• Storage temperature	-40 to +70°C
• Operating voltage	24/36/72/110 VDC
• Control unit according to	EN 50155
• Open and close and lock available	

Fire Barrier doors



Fire tests done for Polarteknik Doors in connection with customer project, EI class

Door type	Standard	Requirement / passed	Year	Report	Remarks
Double-leaf 750 mm	EN 1634-1	Integrity EI-30	2009	Interver	Glass 16 mm
Double-leaf 600 mm	BS 476	Integrity EI-30	2009	VTT-S-6301-09	Glass 19 mm
Double-leaf 700 mm	EN 1634-1	Integrity EI-15	2012	Customer	Glass 16 mm
Single-leaf 580 mm	EN 1634-1/ VNPB-03	Integrity E30I15	2012	Customer	Glass 10 mm
Single-leaf 1000 mm	EN 1634-1	Integrity E15I15	2012	Customer	Glass 10 mm
Double leaf 1100 mm	EN 1634-1	Integrity EI-30	2012	No. 2012-B-5706	Glass 18 mm
Double leaf 1050 mm	EN 1634-1	Integrity EI-15	2012	No. 2012-B-2900	Glass 10 mm
Hinge door 732 mm	EN 1634-1/ VNPB-03	Integrity E30I15	2012	0668408	Glass 10 mm
Double leaf 800 mm	EN 1634-1/ VNPB-03	Integrity EI-15	2013	Customer	Glass 10 mm
Double-leaf 600 mm	EN1634-1	Integrity EI-20	2016	Customer	Glass 14 mm
Double leaf 600 mm	BS 476	Integrity EI-20	2016	Customer	Glass 14 mm
Double leaf 680 mm	EN 1634-1	Integrity EI-20	2017	VTT-S-02314-17	Panel door
Single leaf 850 mm	EN 1634-1	Integrity EI-30	2020	EUFI29-20002634	Glass 18 mm
Double leaf 1022 mm	EN 1363-1 / EN 1364-1 / EN 45545-3	Integrity E30I15	2024	P000454155/01	Glass 12 mm

Performance and details

- Fire integrity and insulation from 15 to 30 minutes (EI15-EI30)
- Glass thickness 10 to 20 mm
- Effective sound insulation
- Pocket mounting

POLARTEKNIK FIRE DOORS [30 min.]

POLARTEKNIK FIRE DOORS [15 min.]

Fire tests done for Polarteknik Doors in connection with customer project, E-EW class

Door type	Standard	Requirement / passed	Year	Report	Remarks
Double-leaf 603 mm	BS 476	Integrity 20 minutes	2001	VTT/RTE4256/01	Glass 6 mm, silicone rubber
Double-leaf 755 mm	BS 476	Integrity 20 minutes	2004	Chilt/RF04028	Glass 6 mm, 3 part sealing
Single-leaf 920 mm	EN 1634-1	Integrity 15 minutes	2006	VTT-S-3140-06	Glass 6 mm, silicone rubber
Single-leaf 820 mm	EN 1634-1	Integrity E15 / EW15	2006	VTT-S-9714-06	Glass 8 mm, silicone rubber
Double-leaf 755 mm	BS 476	Integrity 20 minutes	2006	Warrington 159968	Glass 6 mm, silicone rubber
Double-leaf 1100 mm	EN 1634-1	Integrity 15 minutes	2007	VTT-S-4887-07	Glass 8 mm, silicone rubber
Single-leaf 715 mm	EN 1634-1	Integrity E15 / EW15	2007	VTT-S-7793-07	Glass 8 mm, silicone rubber
Double-leaf 715 mm	EN 1634-1	Integrity E15 / EW15	2007	Licof-Afiti	Glass 6 mm, silicone rubber
Single-leaf 715 mm	EN 1634-1	Integrity E15 / EW15	2007	VTT-S-10380-07	Glass 8 mm, silicone rubber
Single-leaf 715 mm	EN 1634-1	Integrity E15 / EW15	2007	Licof-Afiti	Glass 8 mm, silicone rubber
Double-leaf 840 mm	BS 476	Integrity 20 minutes	2010	VTT-S-5274-10	Glass 6 mm, silicone rubber
Double leaf 1100 mm	EN 1634-1	Integrity E20	2013	No. 2013-B-5855	Glass 6 mm
Double leaf 650 mm	EN 1634-1	Integrity E20	2014	Customer	Glass 7 mm
Single-leaf 800 mm	EN 1634-1	Integrity EW20	2016	20160334	Glass 8 mm
Double leaf 810 mm	EN 1634-1	Integrity EW15	2017	VTT-S-01301-17	Glass 6 mm
Curved single leaf 880 mm	EN 1634-1	Integrity EW30	2017	20170618	Panel door
Double leaf 800 mm	EN 1634-1	Integrity EW20	2017	20170323	Glass 7 mm
Double leaf 800 mm	EN 1634-1	Integrity EW15	2020	EUFI29-19006079	Glass 22 mm
Double leaf 1100 mm	EN 1634-1	Integrity E20	2021	EUFI29-21001851-T2	Glass 6 mm
Double leaf 1000 mm	EN 1634-1	Integrity E15	2021	EUFI29-21001851-T1	Glass 6 mm
Double leaf 940 mm	EN 1634-1	Integrity E30	2022	EUFI29-23000513	Glass 8 mm
Double leaf 770 mm	EN 1634-1	Integrity E20	2023	EUFI29-21002413	Glass 6 mm
Double leaf 1100 mm	EN 1634-1	Integrity EW15	2023	EUFI29-22005586	Glass 6 mm
Double leaf partition	EN 1634-1	Integrity E15	2023	EUFI29-23001361	Glass 8 mm
Double leaf 600 mm	EN 1634-1	Integrity E15	2023	20230612	Glass 6 mm
Double leaf partition	EN 1634-1	Integrity E15	2023	20230942/01	Glass 8 mm
Double leaf 855 mm	EN 1634-1	Integrity E15	2024	1000-24T2MLAU	Glass 8 mm
Double leaf 810 mm	EN 1634-1	Integrity E15	2025	047-25T2MLAU	Glass 6 mm
Double leaf 700 mm	EN 1634-1	Integrity E15	2026	004-26T2MLAU	Glass 8 mm

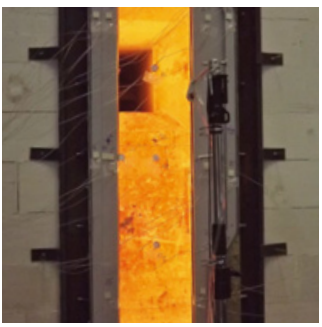
Performance and details

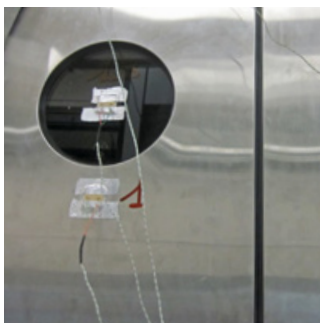
- Fire integrity EW15 to 30 min
- Glass thickness 6 to 22 mm
- Effective sound insulation
- Pocket or surface mounting

Materials according to

- BS6853 (BS 476)
- DIN 5510
- EN45545 (EN 1634-1)
- NF F 16-101/2
- UNI CEI 11170-3

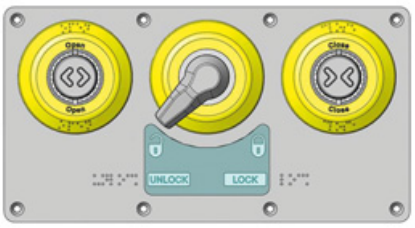
POLARTEKNIK
FIRE DOORS





Curved doors

Operation panel



Main features

- Customizable to different module space envelope
- Compliant TSI-PRM and assistant opening with the DSYS2 standard doors
- Doorleaves also available
- Variants are 1-leaf and 2-leaf bi-parting
- Available both automatic and manual versions
- Now available with fire integrity rating EW30

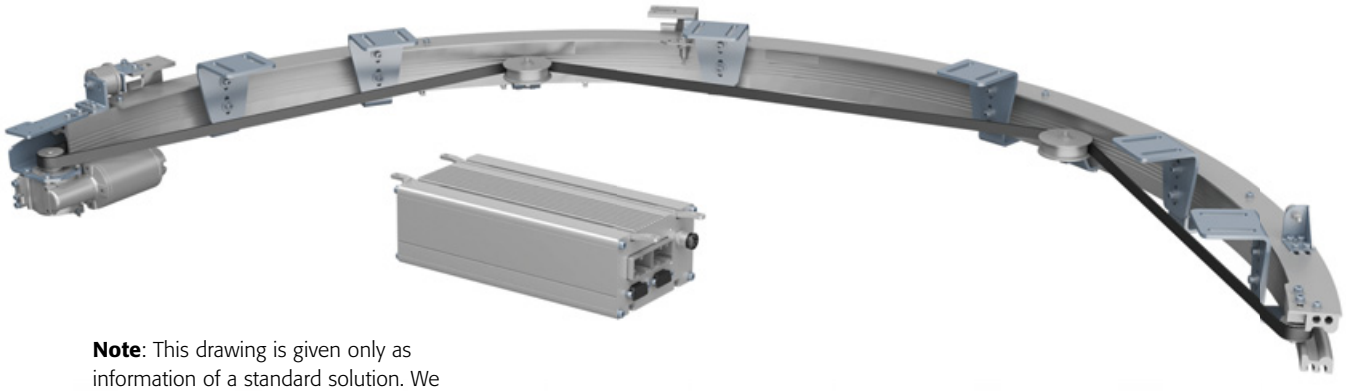
Technical specifications

Mechanism weight	5 to 7 kg
Max. door leaf weight	40 kg
Opening time, adjustable	2,5 to 5 sec.
Closing time, adjustable	3,5 to 6 sec.
Nominal reversing force	80 N
Manual opening force /*	60 N
Operating temperature	-25 to +50°C
Storage temperature	-40 to +70°C
Operating voltage	24/36/72/110 VDC
Control unit according to	EN 50155

- Different open and close and locks available
- See page 22 for some optional accessories

*/ without mechanical closing device level position and power off 90–150 N with mechanical closing device

Curved door mechanism for Universal Access Toilets – DSYS10



Note: This drawing is given only as information of a standard solution. We are able to modify the layout of the door mechanism in order to suit the customers doorway space envelope. Please contact us if You require more details.

Main features

- Shares modular components with the DSYS2 standard door, different profile
- Available in various curve radiuses
- Available both automatic and manual versions
- Optimized for low maintenance cost
- Fully TSI-PRM compliant with e.g. assistant opening and voice module controls
- Different open and close and locks available
- Polarteknik has supplied thousands of curved door mechanisms/ door systems to various integrators

Technical specifications

• Mechanism weight	21 kg
• Max. door leaf weight	50 kg
• Opening time, adjustable	3,5 to 5 sec.
• Closing time, adjustable	3,5 to 8 sec.
• Nominal reversing force	60 N
• Manual opening force /*	60 N
• Operating temperature	- 25 to + 50°C
• Storage temperature	- 40 to + 70°C
• Operating voltage	24/110 VDC
• Control unit according to	EN 50155

*/ without mechanical closing device level position and power off 90–150 N with mechanical closing device

Highly recyclable

Environment

Polarteknik is pleased that its persistent work in developing the operations and products to be more sustainable has been recognized. Our EcoVadis and ISO14001 ratings prove the strong commitment towards sustainability for the external and internal stakeholders. It is also a concrete proof of our commitment to sustainability in practise.

We use recycled aluminium in our products.

Partition wall concept

This principle serves primarily the following objectives:

- To reduce the number of managed items
- To divide physically large assemblies into more manageable units
- To reduce the number of components to be installed
- To minimize the number of electrical connections to be made
- To minimize the required adjustment steps during installation
- To speed up the required routine tests
- To help the commissioning process by providing pre-tested units

Acting by networking

- sourcing components, sub-supplies and services

Manufacturing the product

- procure, produce, assemble, test, dispatch

Carrying system responsibility

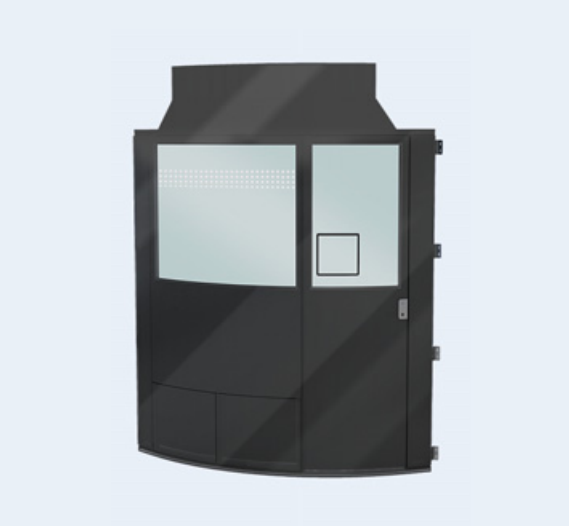
- one-stop-shop service to customer

Our doors to your door – reliably and fast

Packing and delivery

All our doors are carefully packaged in sturdy and easily unloaded cardboard crates designed to ensure safe delivery anywhere in the world. All required documents for shipping and quality control are naturally included with each shipment. In Europe, we can deliver our doors to customers within one week. Tilting sensors and shock sensors can be included to trace possible mishandling during freight.

Partition walls without fire integrity



Main features

- All components and materials are of high quality and throughly tested
- Sliding door mechanism pre-assembled and tested
- Minimized amount of assembly modules
- Easy service access for internal components
- Easy integration to train systems
- Optimized for low maintenance cost
- Flexible scope of supply

Technical specifications

- Straight or curved architecture
- Surface coats: Anodization, wet paint, powder coat, chrome, anti-graffiti
- Pocket or surface mounted doorleaves
- Open and close locks available
- Force closing device optional
- Nominal weight from 100 kg
- Remote open function

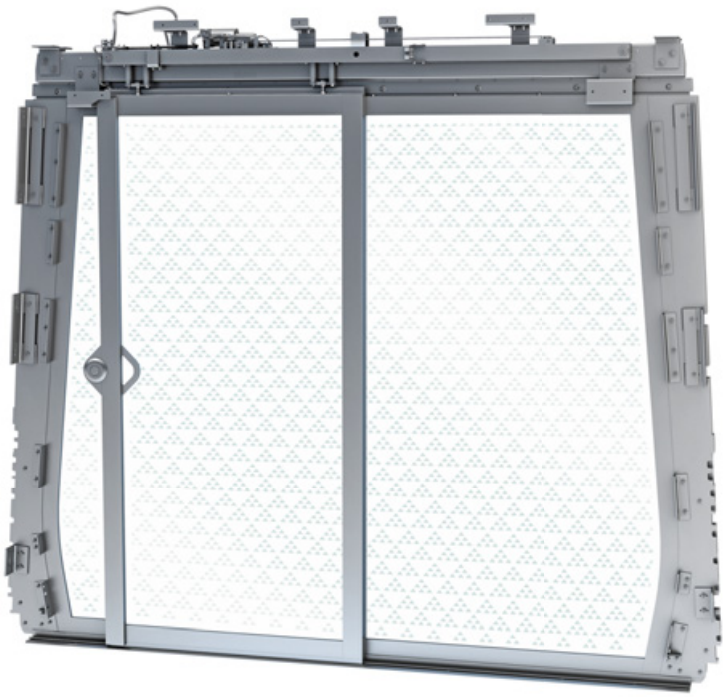
Fire barrier body-end and partition walls

Gangway partition cassette

- Full partition wall with fire resistance of EW15
- Aluminium body and surface plates
- Manual with force closing spring
  (can be offered as automatic)

Full glass partition

- Automatic version; push button or IR-sensor operated door system
- Fire protection EW20- design according to EW30 requirements (new profile system)
- Fire interfaces are included in the system scope of supply => total responsibility
- High-quality finish – chromating,powder painting or anodized natural color available
- Free control unit positioning for optimal accessibility during maintenance
- Optional features: TCMS bus connectivity (MVB, RS485, Ethernet coming soon) in automatic version.
- Glass 8mm E15..E30 available with sandblasting effect to provide unique visual outlook



Fire barrier cabin back walls and doors

- Fire interfaces are included in the system scope of supply => total responsibility
- High-quality finish – chromating, powder painting or anodized natural color available
- Fire protection rating between EI20-EI45
- Manual swing door or automatic bi-parting door function
- All components and materials are of high quality and throughly tested
- Minimized amount of assembly modules
- Intricate locking and emergency exit devices designed as per customer requirement

Fire barrier special products

Engine room walls

Products for the most demanding areas in the train. These products can be used to separate driver from engine room area or passenger are with extreme safety. G-forces, pressure-variations, air leaks and fire integrity requirements are well met this product range

- Manual operation and locking
- Robust safety features
- Can be custom designed to meet your highest safety, pressure, temperature, and insulation requirements.
- Complete integrated partition with customer specific interface design
- Emergency exit

Fire curtains

In the event of a fire, every second counts. Our Fire Curtain system deploys rapidly, instantly isolating the affected area, preventing the spread of flames. Fire Curtain takes up minimal space, ensuring that emergency exits remain unobstructed. This allows for smoother evacuations and quicker response times for emergency personnel.

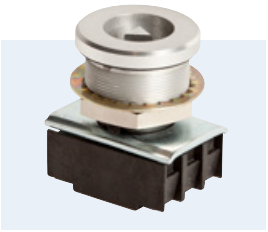
- Weight under 60kg
- Electrical or manual operation
- 60mm total thickness
- Fire integrity or just weather seal for depot manoeuvring.
- Integrates well into Gangway structures.
- With/ without window
- Solution for open gangways

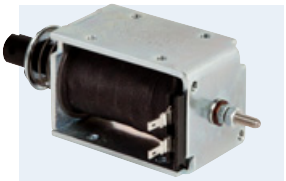
Door Control unit D55 and D56 main features

	D55	D56
Architecture	Single processor	Dual-processor architecture with cybersecurity features
I/O periphery		
Input voltage	24, 36, 72, 110VDC	72, 110VDC
Digital inputs 2,4mA / 24V	8	14
Isolated inputs	8	2
Outputs nominal 100mA/800mA total output 2A,	4 x 800mA outputs with PWM 12 x 100mA outputs	4 x 800mA outputs with PWM 12 x 100mA outputs
USB 2.0	1	1
Ethernet 10/100Base-TX M12F	1	1
Networks		
Ethernet	Modbus over ethernet Ethernet with customer specification	Ethernet UDP, Ethernet, Modbus, Profinet, Sibas, CIP, Webmaint, IPTCom
CAN	x (add on card)	NA
MVB	x (add on card)	NA
RS485	x (add on card)	NA
Standards and compliances		
DC power supply EN50155	-30/+25%	Class C1, Table 8, A Class S2, Table 6
Clearance and creepage EN 50124-1:2017	C	C
Electrical safety	Galvanic isolation	Separated extra-low voltage (SELV) compatibility
EMC EN 50121-3-2:2016	C	C
MTBF EN 61709:2017	FIT 215000	FIT 250000
IP EN60529:2014	IP20	IP20
Temperature EN50155	TX	Class OT4, -40 °C to +70 °C Class ST1, OTx + 15 °C Class H1
Vibration EN 61373:2010, Category 1, Class B	C	C
Humidity EN 50125-1:2014 Yearly average ≤ 75 % relative humidity	C	C
EN50128:2011 EN50657:2017 EN 50716:2023	SIL 0 NA NA	SIL 0 Basic Integrity Basic Integrity
Productional IPC-A-610, Class 2 IPC-A600, Class 2 EN45545-2:2015 EN50155-1:2017	C	C
Dimensions		
L x W x H (mm), Weight (g)	226 x 118 x 70, 1375	PCB 338 x 118 x 62
HMI		
User interface for investigation and service	Separate Java programme	Web-based maintenance interface with role-based access control

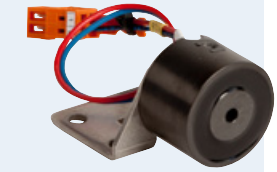
Accessories

Rotary switches, press switches, magnets and solenoids

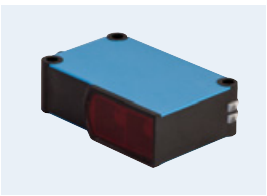
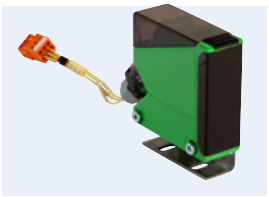


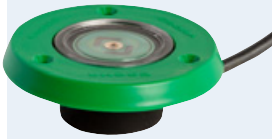



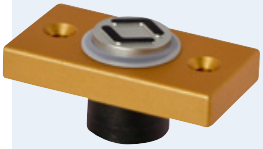




Photocells, opening switches and energy transfer chain




Force closing device

Accessories and customer specific devices

Polarteknik can provide off-the-shelf components and customer tailored accessories and assemblies as per request. Different activation, safety, power and filtration devices are a common addition to the tailor made door systems and partitions. Mechanical accessories can include e.g. handles, counter frame profiles, partition panels, covers and brackets.

All of the proposed solutions share the value of return of experience from previous projects supplied and compliance and longevity testing where applicable.

Quality and Certificates

IRIS3
(TS22163)

ISO9001
(Quality)

ISO14001
(Environment)

Ecovadis
(Environment)

EN17460
(Adhesive)

DIN15085-2
(Welding)

UN goals

WE
AT POLARTEKNIK

INNOVATE / DESIGN / MANUFACTURE / TAILOR / SOLVE IT AND BRING IT

FOR AN ELEVATED ONBOARD EXPERIENCE

Polarteknik Oy
Tehtaankatu 4
32700 Huittinen
Finland
Tel. +358 (0)10 739 6111
info@polarteknik.fi
www.polarteknik.fi

Polarteknik UK
Unit 3 Garamonde Drive
Wymbush, Milton Keynes,
Buckinghamshire, MK8 8DF
United Kingdom
Tel: +44 (0)1908 265652
sales@polarteknik.co.uk
www.polarteknik.co.uk

2026

Polarteknik