

# aircraft...

igus® solutions for the aviation industry

■ plastics for longer life... igus

# ...interior

... [www.igus.com/aircraft](http://www.igus.com/aircraft)

IG-B19

# Reduce cost ...



**Thomas Miller**

dry-tech Division Manager

Tel: 1.888.803.1895

Email: tmiller@igus.com



**Joseph Ciringione**

e-chain systems®

Division Manager

Tel: 1.800.521.2747

E-mail: jciringione@igus.com

**Lightweight, quiet, small and reliable.**

igus® products fulfill the requirements set by the aircraft industry, with the added benefits of being either self-lubricating or lubrication-free, as well as completely maintenance-free.

The development of components for aircraft interiors requires focus on specific criteria. igus® offers a range of solutions for virtually any moving interior application.

- **Self-lubricating, or lubrication-free** – entirely clean operation and 100% maintenance-free thanks to igus® high-performance plastics (UL94 & V0 certification on request).
- **Lightweight** – thanks to the use of lightweight materials such as plastic, aluminum or carbon
- **Quiet** – igus® bearings, linear guides and Energy Chains® operate smoothly and quietly thanks to their unique design.
- **Small** – igus® products adapt to any installation space ... while remaining fully functional

For these reasons, igus® products are ideally suited for a variety of applications in the aircraft interior, including seating kinematics, in headrests that can be height-adjusted in fixed steps, in table extensions, footrest adjustments, mobile cabin partitions or for the adjustment, function and maintenance of entertainment systems. Customized parts and machined prototypes are always possible.

## Advantages of igus® products at a glance:

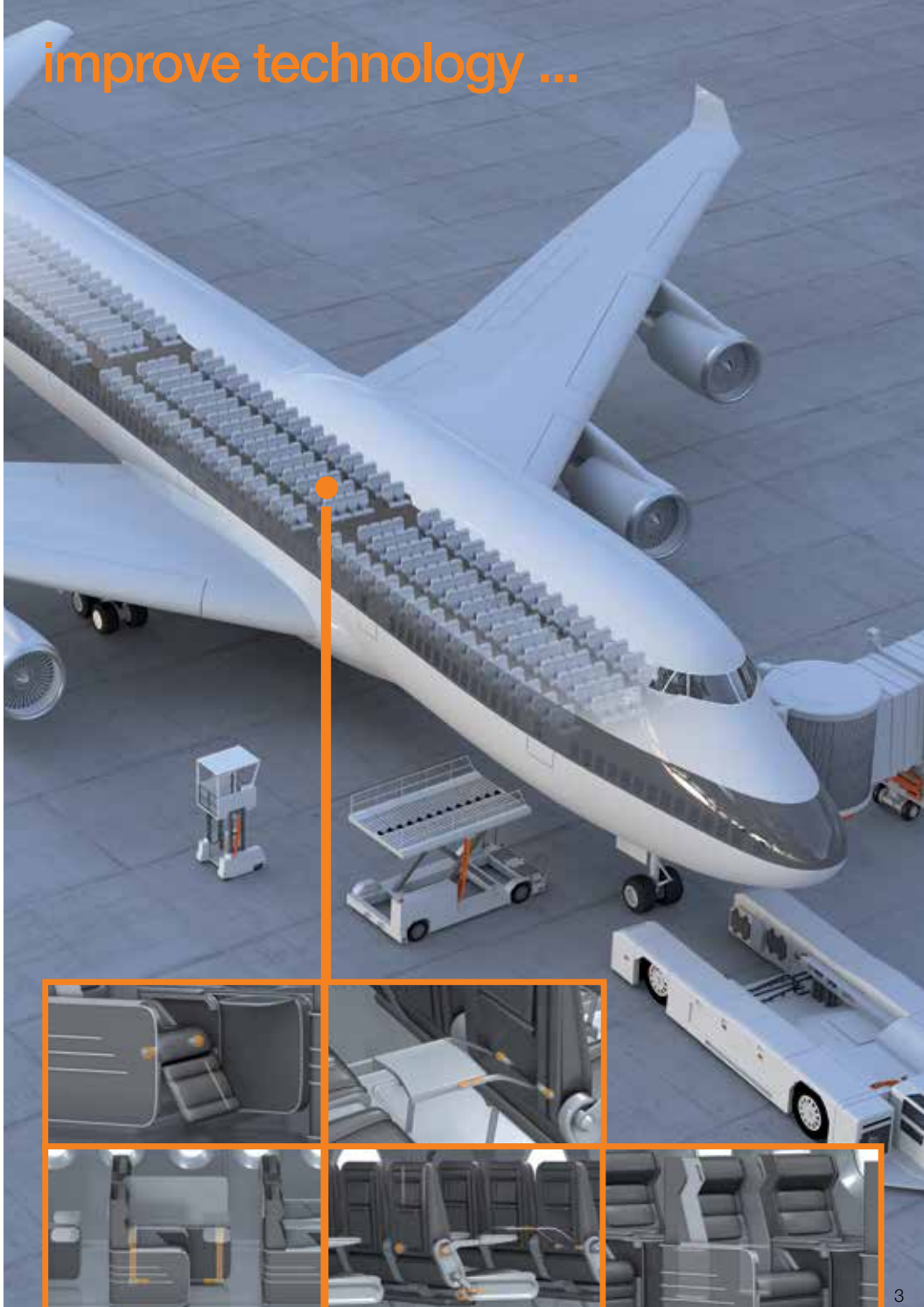
- Free from external lubrication and maintenance
- Weight savings
- Quiet operation
- Vibration dampening
- Available from stock

A wide range of online tools are also available to help reduce process costs and design time. igus products are shipped from stock as early as same-day. Visit our industry page for more information.

 [www.igus.com/aircraft](http://www.igus.com/aircraft)

We look forward to speaking with you.

improve technology ...



with motion plastics from igus®

# Save weight ...

with motion plastics from igus® ...



## Adjustable armrests



### iglide® G300 bearings

- Wear-resistant
- Many standard dimensions; also available in accordance with UL94 V0



### drylin® N flat guide

- Lightweight
- Installation height between 6 and 12 mm
- Various carriage options



## Adjustable leg and footrests



### iglide® clip bearings

- Easy assembly
- Captured with double flange
- Abrasion-resistant



### drylin® T rail guide

- Corrosion resistant
- Low weight
- Compact design
- Light and quiet



## Height-adjustable headrests



### drylin® NT telescopic guide

- Adjustable
- Optional adjustments in fixed steps
- Extremely quiet



### drylin® W profile guide

- Extensive linear toolkit
- Single or double rails
- Linear bearings and complete carriages
- Stop-motion profile guide available

# eliminate maintenance ...

## ... in aircraft cabins

### Table adjustment (economy class)



#### iglide® J plain bearings

- Vibration dampening
- Extremely low coefficient of friction
- For rotary, pivoting and linear movements



#### drylin® R shaft guides

- Same dimensions as ball bearings
- Durable due to hard anodized aluminum shafts



### Table extension (business class)



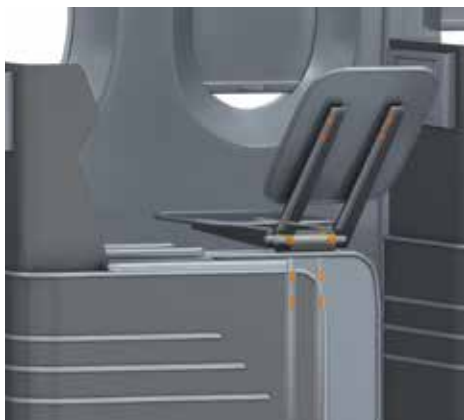
#### iglide® JVSM plain bearings

- Preloaded in a clearance-free manner
- Rattle-free
- Maintenance-free



#### drylin® T low profile linear guide system

- Compact design
- Same dimensions as recirculating ball bearings
- Carriages with V0 certification optional



### Cabin doors ...



#### iglide® J350 bearings

- Temperatures up to 356°F
- Classification in accordance with UL94 "Safety Tests for Flammability", V0 rating
- Wear resistant



#### SFRJ350 bar stock

- Bar stock up to Ø 65 mm
- For prototypes and small batch series
- Media-resistant



# ... Reduce noise level ...

with motion plastics from igus® ...



## Adjustments of tablets, smartphones, etc.



### igubal® EGLM spherical bearings

- Angle-compensation
- Very low weight
- Shock resistant



### drylin® W curved guide

- Customized radii
- Best possible field of view
- Self-lubricating adjustment



## Luggage compartment flap



### iglide® M250 bearings

- Excellent level of vibration dampening
- Durable against edge loads
- Thick-walled, DIN 1850



### drylin® W profile guide

- Precise guidance
- Curved; can be delivered with customized radii
- Hybrid bearings with integrated roller for easy movement



## Horizontal seat adjustment



### e-chain® micro

- For the smallest installation spaces and radii
- UL94-V2 (optional V0)
- Gentle on the cables



### e-chain® E-Z Chain®

- Easy to fill even when installed
- Flexible highly dynamic and quiet



# ...dampen vibrations ...

## ... in aircraft cabins

### TV monitor

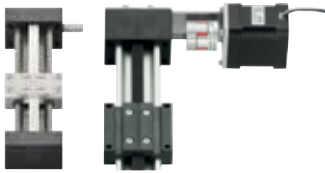


#### igubal® KSTM + ESTM pillow block bearings

- Lightweight
- Compensation for misalignments
- For all shaft materials
- Self-lubricating
- High fatigue strength
- Compensation for edge loads

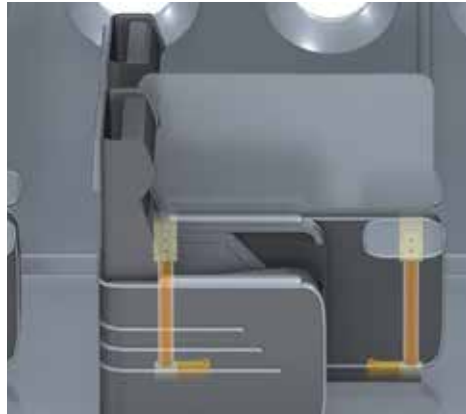


### Partitions



#### drylin® ZLW toothed belt axis

- Ready-to-install linear axes
- Lead screw or toothed belt drive
- Customized stroke lengths
- Can be configured with NEMA stepper motors or DC motors
- Lightweight and low noise
- Can also be delivered with a carbon linear guide (100% metal-free)



### Seat adjustment



#### e-chains® ZF for rotary applications

- Lightweight, low noise and abrasion-resistant
- Reliable cable guidance
- V0 and V2 fire classes possible
- Easy to fill and assemble
- Can be delivered pre-harnessed with chainflex® cables



# drylin® linear technology ...

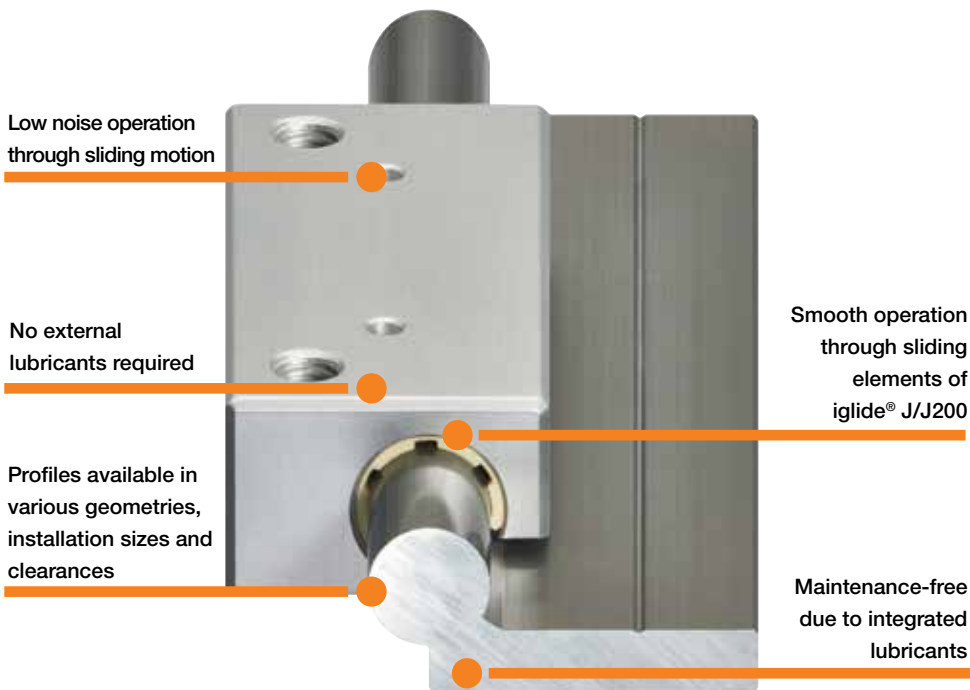
## Self-lubricating, maintenance-free linear guides

The entire line of drylin® linear solutions are based on the principle of sliding instead of rolling, utilizing iglide® high performance plastic materials as a sliding surface. All drylin® linear systems are 100% self-lubricating and maintenance-free.

Linear guides on rails or round shafts are available. drylin® drive-technology can supply ready-to-connect systems with lead screw drives or toothed belt drives, with or without motor. Besides freedom from maintenance and external lubrication, drylin® offers rugged construction and insensitivity to dirt, water, chemicals, heat, and impacts.

- Resistant to dirt due to dry operation
- Resistant to impacts and vibrations
- High static load capacity
- Suited for short-stroke applications
- Lightweight
- Vibration dampening
- Quiet operation
- Metric and imperial dimensions
- Special designs according to customer needs
- Available from stock

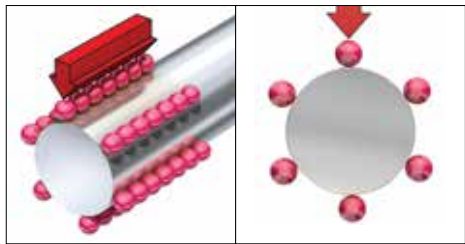
 [www.igus.com/drylin](http://www.igus.com/drylin)



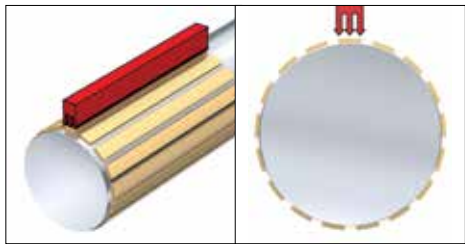


# ... sliding instead of rolling

## The principle of igus® linear technology



**"Conventional" rolling bearings – point contact**  
Force is transmitted via balls at certain points. The system requires lubrication to ensure proper functionality.



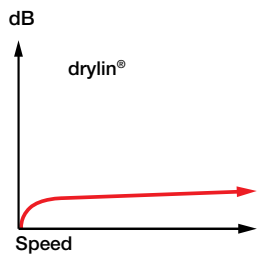
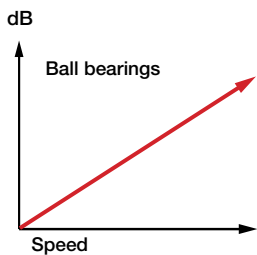
**drylin® plain bearings – surface contact**  
The force is transmitted two-dimensionally over liners or sliding elements. The system is self-lubricating and maintenance-free over the entire service life.



**Resistant to dirt, dust and moisture due to self-lubricating operation and integrated dirt channels.**

### Quiet operation

The quiet operation is also a benefit of sliding rather than rolling. Operation is much quieter compared to re-circulating ball systems. The sliding motion is extremely quiet and only a light friction noise is audible.



# Low noise, self-lubricating ...

igus® solutions for cabin fittings, such as:



## drylin® N low profile guide systems

- 100% self-lubricating
- Low installation height between 6 and 12 mm
- Lightweight
- Numerous carriage options including pre-tensioned

## drylin® W linear system

- Easy installation, maintenance-free
- Resistant to dirt due to dry operation
- Low weight and quiet operation
- Curved rail with floating bearing function for corner installations

## drylin® lead screw technology

- Efficient and durable dryspin® technology
- Self-locking trapezoidal and metric threads
- Lead screw nuts made from 5 iglide® materials



## drylin® T/R rails and shaft guides

- Interchangeable with ball bearings / recirculating ball bearings
- Adjustable linear carriages
- Replaceable liners
- 100% self-lubricating

## drylin® drive technology

- Linear assemblies with lead screw drive or toothed belt
- For manual or electrical adjustments
- Configuration with customized stroke lengths

## drylin® E drive technology

- Linear axes with stepper motors/DC motors
- Failsafe thanks to the use of encoders and initiators
- Can be combined for gantry configurations

# lightweight ... drylin® carbon

**25% lighter than aluminum – 75% lighter than steel**

Extremely lightweight yet extremely strong – our new, tribologically optimized drylin® linear systems made from plastic and carbon fiber combine these two specifications

- Extremely light
- Robust and reliable
- 100% self-lubricating
- Metal-free, non-magnetic
- X-ray transparent

## drylin® WSPC linear guide

The combination of the WSPC-06-30 double shaft profile, made from high-strength and durable carbon, and a linear carriage made from self-lubricating dry-tech material make this innovative system extremely lightweight and robust, while maintaining all the tried-and-tested specifications of a drylin® W linear guide.



- Extremely light
- Self-lubricating and maintenance-free
- Metal-free, non-magnetic
- Tribologically optimized

## drylin® SAW linear module

The structure of the drylin® linear module SAW is based on the self-lubricating drylin® W linear guide with a carbon rail profile and a dry-tech linear carriage. The lead screw drive can be configured with steel/stainless steel or hard anodized aluminum. The innovative use of carbon reduces the rail weight by approximately 25% compared to aluminum.



- Customized stroke lengths
- Trapezoidal or high helix screw drives
- For manual adjustments
- Lengths up to 300 mm

## drylin® ZLW toothed belt axis

The combination of tribologically optimized drylin® W linear guide made from carbon with dry-tech plastics in the carriage and end blocks make the ZLW-0630-P toothed belt axis the first completely metal-free toothed belt axis. The system is extremely lightweight and completely maintenance-free thanks to the uniform solid plastic construction within the end blocks. This is achieved, for example, by the use of xiros® ball bearings (with plastic or glass balls) which allow all bearings to operate dry and without the need for external lubrication.



- Lightweight
- Metal-free design, non-magnetic
- Neoprene toothed belt drive with glass fiber reinforcement
- Up to a length of 1,000 mm

# iglide® plastic plain bearings ...

## Plain bearings made from high-performance plastic materials – iglide®.

No external lubrication or maintenance required, while cutting costs and increasing service life, from stock and delivered as early as same-day. iglide® plastics signify the step between ordinary plastic bushing and tested, predictable machine element.

 [www.igus.com/iglide](http://www.igus.com/iglide)

- Self-lubricating
- Lightweight
- Maintenance-free
- High static loads
- Corrosion free
- Vibration dampening
- Metric and imperial dimensions
- Special dimension and designs

### Structure of iglide® plastic plain bearings:



# also according to UL94 V0

## iglide® plain bearings



### iglide® plastic plain bearing with V0 classification according to UL94

The material achieves the UL94 V0 rating and is therefore ideally suited for applications with stringent fire protection regulations (vehicle and aircraft interiors, building interior systems, etc.). Other properties are similar to the general purpose iglide® G300 material.

 [www.igus.com/GV0](http://www.igus.com/GV0)

- Self-lubricating and maintenance-free
- UL94 V0 rating
- High abrasion resistance
- Universal application
- Vertical burn test; CS-25.853 APP F Part 1a 1(ii) (12 seconds) is available for a selection of iglide® materials

## Self-aligning ...

### igubal® spherical bearings



### Dirt resistant igubal® spherical bearings

igubal® spherical bearings are self-aligning and made completely from engineered plastics. They are easy to assemble, adjust to all angular variances and able to replace special housing in many circumstances.

- Range of designs, including spherical, double spherical, flange and pillow block options
- Different spherical ball materials available
- Extremely cost-effective
- Service life can be calculated online

# igus® special parts

Customized special parts from quantities as low as 1 ...



Special parts made from tribo-plastics according to customer requirement



## Special parts made from iglide® materials

speedicut uses the entire range of iglide® bar stock materials and produces parts according to customer requirements very quickly. Speedicut easily and quickly creates a cost estimate based on a 3D model. The parts are then delivered within a few days.



## Additional customized components available, such as machined drylin® W rails.

Just ask and together we will develop the "one" component that is optimally suited for your application.



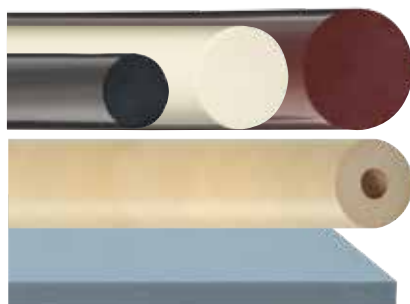
# Filaments and liners

... from the **dry-tech** bearing technology



## Simply cut and stick Tribo-Tape

- For lining tribologically stressed surfaces and shapes in a variety of ways
- Easy to cut and stick
- Less space required
- Optional self-adhesive back



## For free design – iglide® bar stock

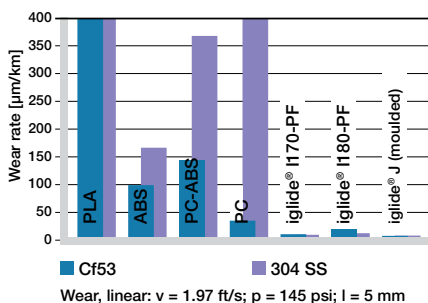
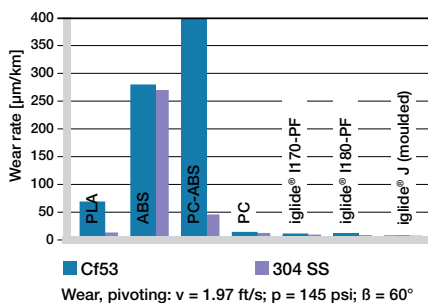
- iglide® materials as round bars, tubes and plates
- Over 20 iglide® materials to choose from
- Cut to required size without paying for offcuts
- Mechanical processing from quantities as low as 1
- Maintenance-free and predictable

## iglide® Tribo-Filament for 3D printers

Up to 50 times more  
abrasion-resistant than  
conventional 3D print  
materials



- Design custom parts or manufacture prototypes while also relying on the tested service life of igus® materials
- Select from three highly wear-resistant igus® materials: iglide® I170-PF, iglide® I180-PF and iglide® J260-PF
- Give it a try with our starter kits with 25 g each of iglide® I170 (in 1.75 mm), iglide® I180 and iglide® J260 (in 1.75 mm / 3 mm)



# e-chains® and chainflex® cables

## Over 100,000 components in the e-chain® modular kit ...

e-chain systems® are the lifeline of modern machines. They reduce downtime and increase the service life of cables and hoses. Plastic Energy Chains® have been developed, produced and tested by igus® since 1971. e-chain systems® carry sensitive bus, data and fiber optic cables, as well as energy forms such as electricity, gas, air and hydraulics.

- For extremely high dynamic loads and high demands for the service life
- For all environments and climates (from -40°F to +248°F)

- Many types of orientation and application
- Easy to clean
- Space-saving installation
- Also available made from detectable material or as ESD/ATEX version
- Enclosed or open construction types
- Easy assembly of the modular system on site, as well as quick retrofitting of cables

 [www.igus.com/e-chains](http://www.igus.com/e-chains)



### Lightweight, flexible, easy to fill – E-Z Chain®

- Easy to fill
- UL94-V2 (optional V0)
- Flexible dynamic and quiet
- Lightweight and cost-effective



### The system for all installation situations – the all-around E4-1 system

- Strong, snap open e-chain® for large unsupported lengths
- Can also be delivered as an enclosed tube
- Inner heights up to 6.38" (162 mm)

## chainflex® cables for highly flexible movements ...



### PVC control cables CF130-UL & CF140-UL

- For medium load requirements
- PVC outer jacket (CF140 shielded)
- Flame retardant



### TPE control cables CF98 & CF99

- For extremely high load requirements
- Particularly small radii
- TPE outer jacket (CF99 shielded)

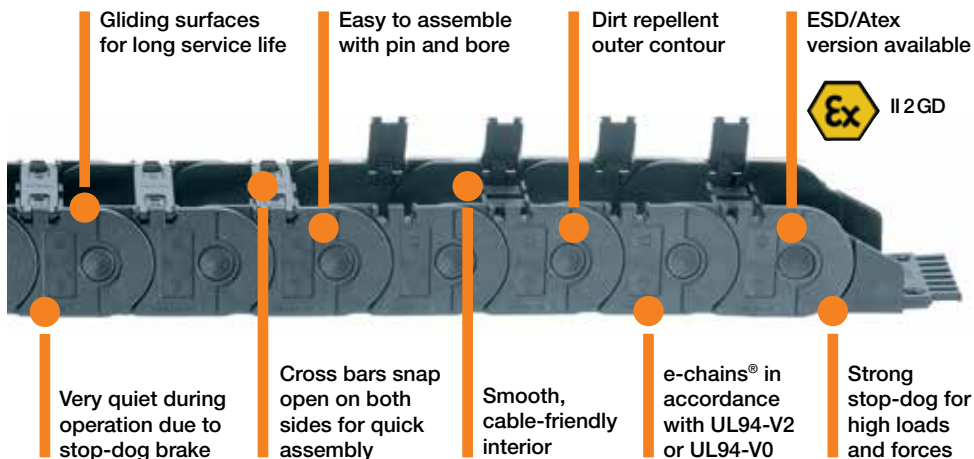


### PVC Ethernet cable CAT5/GigE CFBUS-PVC

- For medium load requirements
- PVC outer jacket
- Shielded
- Oil-resistant and flame-retardant

# ... for all movement types

## ...for tiny installation spaces, extreme loads



### Small, strong, flexible – E2 micro

- For the smallest installation spaces
- UL94-V2 (V0 optional)
- Strong, light and quiet
- For all installation orientations



### Excellent stability/size ratio – E2 mini

- Good size/strength ratio
- Quiet operation
- UL94-V2
- Snap open, easy to fill

## ... and long service life



### PVC motor cables CF885/CF886

igus® chainflex® M cable product range – costs up to 57% less than comparable chainflex® types.



### PVC motor cables CF31

- For high load requirements
- PVC outer jacket
- Shielded
- Oil-resistant and flame-retardant



### PVC hybrid servo cables CF220UL-H

For unsupported applications and medium duty for different drive manufacturers.

# igus® solutions for airport

## Not only in and on the aircraft ...

### Failsafe e-chain systems® and maintenance-free linear guides

... improve technology and reduce costs of the vehicles on the runway.

### Weather-resistant igus® plastic solutions

... help you to reduce logistics, assembly, time, and virtually eliminate the need for maintenance.

### Our energy supply solutions

... for failsafe guidance of cables as well as hydraulic and pneumatic hoses in almost all vehicles.

### Eliminating the need for external lubrication

... makes our plastic plain bearings and linear bearings maintenance-free and ideally suited for outdoor use.



Learn more at:



[www.igus.com/aircraft](http://www.igus.com/aircraft)

# ground handling

but also on the runway: igus® has a solution



**Boarding bridges:** Heavy loads and guiding many cables in a failsafe manner



**Ambulifts:** Stability and reliability during strong vibrations



**Aircraft tractors:** High resistance against dirt and other environmental conditions



**De-icing vehicles:** Failsafe operation at temperatures between -40°F and +248°F



**Container stackers:** e-chain® E4-1 – can be opened from both sides



**Boarding bridges:** For any movement and environment – e-chains® and chainflex® cables

# Services from igus® ...

## The igus® delivery service

More than 97% of components from the igus® catalog are available from stock.

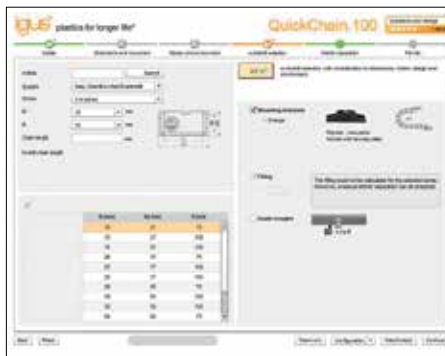
- More than 100,000 products from stock
- No minimum order quantity
- No minimum order price
- No cutting charges for cables
- No packaging costs



Quickly find products online, configure them and calculate their service life.

With our igus® product finder, quickly find the right product and calculate the estimated service life of igus® products in your application.

 [www.igus.com/online](http://www.igus.com/online)



## For any task – in any batch size

Different industries need different solutions. No matter your industry igus® offers customized support for special applications. igus® has more than 50 years of experience and specialized resources in many industries.



[www.igus.com/industries](http://www.igus.com/industries)



## Better for the environment



Because iglide® is free of external lubricants, no contaminants are discharged into the environment.

Additionally, the low weight of iglide® plastic plain bearings reduces power requirements, making them better for the environment



The **yes** – Young Engineers' Support – program is designed to support the design ideas of students, and educate them on the merits and benefits of plastic components.



[www.igus.com/yes](http://www.igus.com/yes)



Since 1987, More than 30 igus® products have been awarded by "IF Forum Design GmbH" in the "Industrial Design" category.



# quick & reliable



## igus® quality assurance

The goal of quality management at igus® is to recognize and fulfill customer expectations and to always be an expert partner and reliable supplier. To reach this goal, igus® always applies the highest standards in the production of products and is constantly developing new and innovative solutions.



## Modern and economic molding technology

igus® utilizes high tech, cost-effective solutions. Modern injection molding technology allows thousands of standard and countless custom components to be manufactured with high precision and quality.

## The igus® lab

The massive igus® lab (29,600 ft<sup>2</sup>) conducts more than two billion test cycles per year on more than 100 test rigs.

- Extensive test databases
- Customized tests on request

 [www.igus.com/test](http://www.igus.com/test)

## igus® motion plastics

One vision has been driving us for more than 50 years – motion plastics: innovative moving parts made of plastic that cost less and last longer. Our core technology consists of triboplastics – high-performance plastics which have been optimized for friction and wear. This technology has made us into a world-wide leader for developing and manufacturing energy supply systems and plain bearings.





## 46 Poland

**igus® Sp. z o.o.**  
Działowa 12/1C Street  
02-234 Warsaw  
Phone +48 22 8635770  
Fax +48 22 8635169  
info@igus.pl

## 47 Portugal

**igus® Lda.**  
R. Eng. Ezequiel Campos,  
239  
4100-231 Porto  
Phone +351 22 6109000  
Fax +351 22 8326321  
info@igus.pt

## 48 Romania

**TechCon Industry SRL**  
Calea Crangului nr. 60  
060345 Bucuresti  
Phone +40 21 2219-640  
Fax +40 21 2219-756  
automatizari@techcon.ro

## 48 Romania

**Hennlich SRL**  
Str. Pășii, Nr.17  
310106 Arad  
Phone +40 257 211119  
Fax +40 257 211021  
igus@hennlich.ro

## 49 Russia

**OOO igus®**  
40/22, Nikolayevskaya st.,  
bldg. 4, office 509-510  
Moscow, 100004  
info@igus.ru

## 49 Russia

**OOO Hennlich**  
Ozernaya 16  
building 1, office 4  
170026 Tver  
Phone +7 4822 787 180  
Fax +7 4822 630 180  
hennlich@hennlich.ru

## 50 Saudi Arabia

**AFI**  
Khalaf Bin Hesham Street  
Box 9998  
31423 Dammam  
Phone +966 38740033  
Fax +966 38470077  
marketing@afi.com.sa

## 51 Serbia + Montenegro

**Hennlich d.o.o. Beograd**  
Radomira Markovica 1/3  
11222 Beograd / Srbija  
Phone +381 11 63 098 17  
Fax +381 11 63 098 20  
office@hennlich.rs

## 52 Singapore-ASEAN HQ

**igus® Singapore Pte Ltd**  
15 Shaw Road, #03-02  
Singapore 367363  
Phone +65 6487-4411  
Fax +65 6487-1511  
info@igus.com.sg

## 53 Slovakia

**igus® Slovakia s.r.o.**  
Račianska 3  
849 01 Nitra  
Slovakia  
Mob. +421 949 459 409  
info@igus.sk

## 53 Slovakia

**Hennlich s.r.o.**  
Račianska 188  
SK-831 53 Bratislava  
Phone +421 2 50202504  
Fax +421 2 50202505  
info@hennlich.sk

## 54 Slovenia

**igus® d.o.o.**  
Tržaška c. 134  
1000 Ljubljana  
Slovenija  
Mob. +386 (0)30 601 610  
info@igus.si

## 54 Slovenia

**Hennlich, d.o.o.**  
Industrijska tehnika  
Podpart 33  
SI-4244 Podpart  
Phone +386 4 53206-10  
Fax +386 4 53206-20  
info@hennlich.si

## 55 South Africa

**igus® Pty. Ltd.**  
Unit 29  
Midline Business Park  
Off Le Roux & Richards Drive  
Midrand 1682  
Phone +27 11312-1848  
Fax +27 11312-1594  
sales.za@igus.de

## 56 South Korea

**igus® Korea Co. Ltd.**  
613-14 Namhondong,  
Namdonggu  
Incheon City, 405-846  
Phone +82 32 82129-11  
Fax +82 32 82129-13  
info@igus.kr

## 57 Spain

**igus® S.L.**  
C/ Ubalistona, 6  
Poligono Nal del Sucre  
08840 Viladecans - BCN  
Phone +34 936 473950  
Fax +34 936 473951  
igus.es@igus.es

## 58 Sweden

**igus® ab**  
Knut Pålss väg 8  
256 69 Helsingborg  
Phone +46 42 325270  
Fax +46 42 211585  
info@igus.se

## 58 Sweden - e-chains®

**OEM Automatic AB**  
Box 1011 Dalagatan 4  
573 28 Tranås  
Phone +46 75 2424100  
Fax +46 75 2424159  
info@autoem.se

## 58 Sweden - plain bearings

**Colly Components AB**  
P.O. Box 76  
164 94 Kista  
Phone +46 8 7030100  
Fax +46 8 7030841  
info@colly.se

## 59 Switzerland

**igus® Schweiz GmbH**  
Winkstr. 5  
4622 Eggenklingen  
Phone +41 62 3889797  
Fax +41 62 3889799  
info@igus.ch

## 60 Syria

**ETTS Systems**  
Al-Henna St. Shaban Building  
12650 Damascus  
Phone +96 311 332 5519  
Fax +96 311 334 2639  
info@ettssystem.com

## 61 Taiwan

**igus® Taiwan Company Ltd.**  
5F, No. 35, 24th Road  
Taichung Industrial Park  
Taichung 40605  
Phone +886 4 2358-1000  
Fax +886 4 2358-1100  
info@igus.com.tw

## 62 Thailand

**igus® Thailand Co., Ltd**  
30 Floor, Unit C1  
Thrapoom Tower  
1550 New Petchaburi Road  
Mekasarn Rathwai  
Bangkok 10400 Thailand  
Ph. Fax +66 632 652 7325  
info@igus.co.th

## 62 Thailand

**Autoflexible Advanced Engineering Co., Ltd.**  
111 Soi, Sukhumvit,  
62/1 Sukhumvit Rd.  
Bangkok, Phrakong,  
Bangkok 10260  
Phone +66 2 3112111  
Fax +66 2 3327900  
info@igus.th

## 63 Tunisia

**BOUDRANT**  
53, Avenue de Carthage  
1000 Tunis - Tunisia  
Phone +216 71340244  
Fax +216 71348910  
info@boudrant.com.tn

## 64 Turkey

**HIDREL Hidrolik Elemanlar**  
Sanayi ve Ticaret A.Ş.  
Pieremli Sk. No. 7  
Tatlı Mavi  
34420 Karsiyi / Istanbul  
Phone +90 212 2404981  
Fax +90 212 2920850  
info@hidrel.com.tr

## 65 United Arab Emirates

**Unigrup (FZE)**  
1st floor, Rossini  
Building M602  
Sharjah Intern. Airport Freezone  
P.O. Box 120500  
Sharjah - UAE  
Phone +971 5 5578386  
Fax +971 5 5578387  
automation@unigrup.ae

## 65 United Arab Emirates

**Power & Technology Trading Co. LLC**  
P.O. Box 33372 SHJ  
Sharjah - UAE  
Phone +971 5 5421300  
Fax +971 5 5422700  
sales@powertech.ae

## 66 United Kingdom

**igus®**  
Creswell Rd.  
Northampton NN4 7PW  
Phone +44 1604 677240  
Fax +44 1604 677242  
sales@igus.co.uk

## 67 Ukraine

**Cominpro Ltd.**  
Romena Riutana 12,  
Office 220  
61058 Kharkov  
Phone +38 0577174914  
Fax +38 0577174914  
cominpro@gmail.com

## 67 Ukraine

**Hennlich Ukraine LLC (HQ)**  
Kramatorska Street 15  
84100 Sloviansk City,  
Donetsky Region  
Phone +38 06262 33540  
hennlich@hennlich.com.ua

## 68 Uruguay

**Lamrique Rulemanes SA**  
Calica 1204  
Montevideo-Uruguay  
Phone +598 29021773  
Fax +598 29084824  
lamrique@lamrique.com.uy

## 69 USA

**igus® inc.**  
P.O. Box 14349  
East Providence  
RI 02914  
Phone +1 401 4382200  
Fax +1 401 4382720  
webmaster@igus.com

## 70 Venezuela

**Neumatica Rotonda C.A.**  
Prolong. Av. Michelena  
C.O. Altas Locales B-10 y  
B-11  
Valencia, Edo. Carabobo  
Phone +58 241 832.64.64  
Fax +58 241 832.32.50  
+58 241 838.88.18  
+58 241 832.62.83  
ventas@neumaticar.com

## 71 Vietnam

**igus® Singapore Pte Ltd**  
The Representative Office in HCMC  
Center Tower  
Unit 028, 4th Floor  
72-74 Nguyen Thi Minh Khai  
Street, District 3,  
Ho Chi Minh City, Vietnam  
Phone +84 8 6299 9197  
Fax +84 8 6299 9195  
info@igus.com

## igus® worldwide

### igus® offices

#### igus® distributors

#### 1 Germany

**igus® GmbH**  
Spicher Str. 1a  
51147 Köln  
P.O. Box 90 61 23  
51127 Köln  
Phone +49 2203 9648-0  
Phone +49 2203 9648-222  
info@igus.de, www.igus.de

#### 2 Argentina

**BorinTech SRL**  
Av. Elcano 4971  
C1427CH Buenos Aires  
Phone +5411 4556 1000  
Phone +5411 4556 1000  
igus@borintech.com

#### 3 Australia

**Treotham Automation Pty. Ltd.**  
14 Sydneyham Road  
Brookvale NSW 2100  
Phone +61 2 9907-1788  
Fax +61 2 9907-1775  
info@treotham.com.au

#### 4 Austria

**igus® polymer Innovations GmbH**  
Ort 55  
4843 Ampfing  
Phone +43 7675 4005-0  
Fax +43 7675 3203  
igus-austria@igus.at

#### 5 Belarus

**SODO Hennlich**  
Kharkovskaya Str. 90-8  
Minsk, 220015  
Phone +375 17 207-1628  
Fax +375 17 207-3921  
info@hennlich.by

#### 6 Belgium/Luxembourg

**igus® B.V.B.A.**  
Kolonel Begaultlaan 75  
3012 Willebe  
Phone +32 18 314431  
Fax +32 18 314439  
info@igus.be

#### 7 Bosnia & Herzegovina

**Hennlich d.o.o.**  
Domala Bjelečka 185  
Avaz Business Center  
71000 Sarajevo  
Phone +387 33 45 14 39  
Fax +387 33 45 14 39  
info@hennlich.ba

#### 8 Brazil

**igus® do Brasil Ltda.**  
Avenida Marginal Norte da  
via Anhanguera 53.780  
Vila Romi - Jundiaí  
CEP 13206-245 - SP  
Phone +55 11 3531-4487  
Fax +55 11 3531-4488  
vendas@igus.com.br

#### 9 Bulgaria

**igus® EOOD**  
2, Lul Ayer str., II/4, of. 4  
1404 Sofia, Bulgaria  
Phone +359 2 850 8409  
Fax +359 2 850 8409  
info@igus.bg

#### 9 Bulgaria

**Hennlich OOD, BG**  
4003 Plovdiv, Bulgaria  
147A, Brezovsko shose Str.  
Rota center, II, 3  
Phone +359 32 511 326  
Fax +359 32 621 929  
office@hennlich.bg

### 10 Canada

**igus® Office Canada**  
201 Millway Ave.  
UNIT 25  
Concord  
Ontario L4K 5K8  
Phone +1 905 7688448  
Fax +1 905 7688658  
webmaster@igus.com

#### 11 Chile

**Vendortec**  
San Martín 31 2097  
Maipo - Santiago  
Phone +56 2 7105825  
ventas@vendortec.cl

#### 12 China

**igus® Shanghai Co., Ltd.**  
No.48 Warehouse,  
11 Debiao Road, WGO FTZ,  
Shanghai 200131,  
P.R.China  
Shanghai 200131, P.R.C.  
Phone +86 21 51303100  
Fax +86 21 51303200  
master@igus.com.cn

#### 13 Colombia

**Colseim Ltda**  
Parque Industrial Gran  
Sabana  
Edificio / Building 32  
Tocancipá, CUN 251017  
Phone +57 1-519-0967  
info@colseim.com.co

#### 14 Costa Rica

**Enesa Equipos Neumáticos S.A.**  
Del Colegio Marista  
100 este, 200 sur, 25 este  
Urbanización Chiriales  
Alajuela, Costa Rica  
Phone +506 2440-2393  
Fax +506 2440-2393  
equiposneumaticos@enesa.net

#### 15 Croatia

**igus® d.o.o.**  
Ventilatorska 9  
10250 Lučko Zagreb  
Croatia  
info@igus.hr

#### 15 Croatia

**Hennlich, Industrijska d.o.o.**  
Stupničkobrelka 17  
Stupnički Olinč  
10255 Gorji Stupnik  
Phone +385 1 3874334  
Fax +385 1 3874336  
hennlich@hennlich.hr

#### 16 Czech Republic

**HENNLICH s.r.o.**  
Ceskokopalská 9  
412 01 Lhotačovice  
Phone -e-chains®  
+420 416 7113/32  
Phone Plain bearings  
+420 416 7113/39  
Fax +420 416 7119/99  
lin-tech@hennlich.cz

#### 17 Denmark

**igus® ApS**  
Postboks 243  
8800 Viborg  
Phone +45 86 803373  
Fax +45 86 803273  
info@igus.dk

#### 17 Denmark - e-chains®

**Solar A/S**  
Industrivej Vest 43  
6600 Vejen  
Phone +45 76 961200  
Fax +45 75 36 4759  
solar@solar.dk

### 18 Ecuador

**Ecuainetec**  
El Zumbado E3-32 y el Vanguard  
Quito  
Phone +593 2 2253757  
Fax +593 2 2461833  
info@ecuainetec.com.ec

#### 19 Egypt

**Fedcom Trading**  
Mohamed Fayed Sami & Co.  
12, El Mahad El Swisari St.  
Flat 10 - 2nd Floor, Zamelek  
Cairo - A.R. of Egypt  
Phone +202 2736237  
Fax +202 27363196  
mohamed.fayed@fedcom.com

#### 19 Egypt

**IEE International Company for Electrical Engineering**  
2nd floor, 25 Orabi St  
Down Town, Cairo  
Phone +202 25767370  
Fax +202 25767375  
kamel@iee-egypt.com

#### 20 Estonia

**igus® OU**  
Lõtsa 44  
Tallinn 11415  
Phone +372 667 5600  
Fax +372 667 5601  
info@igus.ee

#### 21 Finland

**SKS Mekaniikka Oy**  
Martinkyläntie 50  
01720 Vantaa  
Phone +358 20 7646522  
Fax +358 20 7646824  
mekaniikka@sk.fi

#### 21 Finland - chainflex®

**SKS Automaatio Oy**  
Martinkyläntie 50  
01720 Vantaa  
Phone +358 20 7646748  
Fax +358 20 7646820  
automaatio@sk.fi

#### 22 France

**igus® SARL**  
49, avenue des Pipinières  
Pars Médicis  
94260 Fresnes  
Phone +33 1 49840404  
Fax +33 1 49840394  
info@igus.fr

#### 23 Greece - e-chains®

**Chrimotor s.a.**  
71, Sp. Patsi str.  
115 55 Athens  
Phone +30 210 34 25574  
Fax +30 210 3425595  
info@chrimotor.gr

#### 23 Greece - Plain bearings

**J. & E. Papadopoulos S.A.**  
12 Piskodou str  
Piraeus, 185 40  
Phone +30 210 4113133  
Fax +30 210 4116781  
sales@papadopoulos-sa.com

#### 24 Hong Kong

**Sky Top Enterprises Ltd.**  
Room 1707, Block C, Viah Tat  
Ind Centre, Wah Sing Street,  
Kwai Chung, Hong Kong  
Phone +852 22434278  
Fax +852 22434279  
skytop@ctimail.com

#### 25 Hungary

**igus® Hungaria Kft.**  
Ipari Park u.10,  
1044 Budapest  
Phone +36 1 3096456  
Fax +36 1 4310374  
info@igus.hu

### 26 Hungary

**Tech-Con Kft.**  
Vésd utca 9-11  
1133 Budapest  
Phone +36 1 4124161  
Fax +36 1 4124171  
tech-con@tech-con.hu

#### 26 India

**igus® (India) Pvt. Ltd.**  
39/1, Sky No. 17/3  
Euro School Road,  
Dada Nekkund Industrial  
Area, - 2nd Stage  
Mahadivapur Post  
Bangalore 560048  
Phone +91 80 45127800  
Fax +91 80 45127802  
info@igus.in

#### 27 Indonesia

**PT Igus® Indonesia**  
Garman Center Suite 0040-6050  
Jalan Kapten Subianto Dj.  
BSD City  
Tangerang 15321  
Phone +62 21 537 61 83 / 84  
info@igus.co.id

#### 28 Iran

**Tameen Ehtiajati Fani Tehran (TAF CO.)**  
62, Farshar Ave., Unit 5  
15816 Tehran, Iran  
Phone +98 21-8831 76 51.2  
Fax +98 21-8882 02 68  
info@taf-co.com

#### 29 Ireland

**igus® Ireland**  
Caswell Rd  
Northampton NN4 7PW  
Phone +44 1604 577240  
Fax +44 1604 577242  
sales@igus.ie

#### 30 Israel

**Conlog LTD**  
P.O. Box 3205  
17 Hamelassim Str.  
Industrial Zone Kiyat Arie  
Petach-Tikva 49130  
Phone +972 3 9269595  
Fax +972 3 9263367  
conlog@conlog.co.il

#### 31 Italy

**igus® S.r.l.**  
Via delle Rovedine, 4  
23899 Robbiate (LC)  
Phone +39 039 5906.1  
Fax +39 039 5906.222  
igustel@igus.it

#### 32 Japan

**igus® k.k.**  
Arcscenter 15F, 1-2-1 Kishi,  
Sumida-ku Tokyo JAPAN  
Zip 130-0013  
Phone +81 358 192030  
Fax +81 358 192055  
info@igus.co.jp

#### 33 Jordan

**Al Hazam Adtech**  
Abu Alanda Street, Building No. 1  
Amman  
Phone +962 64 170100  
Fax +962 64 169993  
info.jod@adtech-trading.com

#### 34 Latvia

**igus® OÜ**  
Lõtsa 4A  
Tallinn 11415  
Phone +372 667 5600  
Fax +372 667 5601  
info@igus.ee

#### 35 Lebanon

**Mecanix Shops**  
Gebrai Safi  
Charles Helou Avenue  
Beirut  
Phone +961 1 486701  
Fax +961 1 490929  
mecanix@dm.net.lb

### 36 Lithuania

**Hitech UAB**  
Terminalo g. 3  
51469 Brulskiu k. (Kauno LEZ)  
Kauno raj.  
Phone +370 37 323271  
Fax +370 37 203273  
info@hitech.lt

#### 37 Macedonia, Albania, Kosovo

**Hennlich DOOEL**  
Boris Kidric 88  
zip: 1200, Tetovo MK  
Phone +389 44614411  
Mob. +389 76 200 770  
drian.gamil@hennlich.mk

#### 38 Malaysia

**igus® Malaysia Sdn Bhd**  
No. 19-1, Jalan Puri 1/3F  
Suryway Mas Commercial Centre  
47301 Petaling Jaya  
Selangor D.E.  
Phone +603 7880 5475  
Fax +603 7880 5479  
info@igus.my

#### 39 Morocco

**AFIT**  
5, Rue Amir Abdelkader  
20300 Casablanca  
Phone +212 522 833759  
Fax +212 522 618351  
soutia.vu@premiumnet.ma

#### 40 Mexico

**igus® Mexico S. de R.L. de C.V.**  
Boulevard Aeropuerto Miguel  
Alejandre 160 Int. 135  
Cd. Condesa Industrial Loma  
Loma, Estado de Mexico C.P. 52004  
Phone +52 726284 3185  
Fax +52 726284 3187  
lmarquez@igus.com

#### 41 Netherlands

**igus® B.V.**  
Starmengweg 9  
3769 BS Soesterberg  
Phone +31 346 353932  
Fax +31 346 353849  
igus.nl@igus.de

#### 41 Netherlands - Plain bearings

**Elcoo Holland BV**  
Kamerlingh Onnesweg 28  
NL-3316 GL Dordrecht  
Phone +31 78 6544777  
Fax +31 78 6544733  
info@elcoo.nl

#### 42 New Zealand

**Automation Equipment Ltd.**  
26 Tawn Place  
PO Box 5656  
Hamilton  
Phone +64 7 8490281  
Fax +64 7 8490422  
sales@autoequp.co.nz

#### 43 Norway

**ASI Automatik AS**  
Ingv. Ludvigssensgate 23  
3007 Drammen  
Phone +47 9006 1100  
info@asif.no

#### 44 Peru

**Profaco S.A.C.**  
Calle Bolivar 388/of. 203  
Miraflores  
Lima 18 - Perù  
Phone +51 1 2414370  
Fax +51 1 2428008  
ventas@profaco.com

#### 45 Philippines

**Silicon Exports Corp.**  
Suite 6A, 8414 Dr. A, Santos  
Ave., Sucat, 1700 Parañaque  
City  
Phone +63 2 8250126  
Fax +63 2 8250141  
info\_philippines@igus.com.sg



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igus® Inc.  
PO Box 14349, East Providence, RI 02914  
Tel: 800-521-2747 • Fax: 401-438-7270  
E-mail: [sales@igus.com](mailto:sales@igus.com)  
[www.igus.com](http://www.igus.com)

