

Throughout this catalog you will find the following terms and formulas:

Application-Icons



Unsupported - short travels



Gliding - long travels



Vertical hanging



Vertical standing



Side-mounted



Rotary motion



Horizontal and vertical



Nested



Side by side

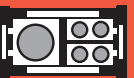
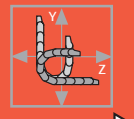


Combined motions

Short cut	Description	
α	= The rotation angle of the rotating machine element	[°]
ΔM	= Deviation of the center point	[mm]
a	= Acceleration	[m/s ²]
AR	= Outer radius, E-Chain®	[mm]
Ba	= Outer E-Chain® width	[mm]
Bi	= Inner E-Chain® width	[mm]
B_{Ra}	= Guide trough outer width	[mm]
B_{Ri}	= Guide trough inner width	[mm]
D	= Over length E-Chain® radius in final position	[mm]
D_2	= Over length for long travels gliding	[mm]
FL_B	= Unsupported length with sag	[m]
FL_G	= Unsupported straight length	[m]
FL_U	= Unsupported lower run	[m]
FZ_{max}	= Maximum additional load	[kg/m]
H	= Nominal clearance height	[mm]
ha	= Outer E-Chain® height	[mm]
H_F	= Required clearance height	[mm]
hi	= Inner E-Chain® height	[mm]
H_{Ra}	= Outer trough height	[mm]
H_{Ri}	= Inner trough height	[mm]
IR	= Inner radius, E-Chain®	[mm]
K	= Add-on for bending radius (K is taken from the data tables of the individual igus® Series)	[mm]
K_2	= Further add-on if the mounting bracket location is set lower (for long travels)	[mm]
L_K	= E-Chain® length	[mm]
n	= Number of links	[1]
n_{Mon}	= Number of installation sets (left/right)	[1]
n_{RI}	= Number of trough-sets (left/right)	[1]
R	= Bending radius	[mm]
RBR	= "Reverse bending radius"	[mm]
S	= Length of travel	[mm]
$S/2$	= Half length of travel	[mm]
T	= Pitch	[mm]
v	= Speed (travel)	[m/s]
X_1	= Inner machine-construction space (TwisterChain®)	[mm]
X_2	= Outer radius chain, including clearance (TwisterChain®)	[mm]

Formula	Description
$2 \times FL_B$	= Calculation of maximum travel length, unsupported with sag
$2 \times FL_G$	= Calculation of maximum travel length, unsupported straight
$B_{RI} \geq Ba + 5$	= Calculation of the minimum guide trough width
$H_{RI} \geq 2 \times ha$	= Calculation of the minimum guide trough height
$K = \pi \times R$	= Add-on for bending radius
$L_K = S/2 + \Delta M + K$	= Calculation of chain lengths For all types of applications, fixed end is outside the center of travel
$L_K = S/2 + K$	= Calculation of chain lengths For all types of applications, fixed end in the center of travel, except rotary movements and most long travels
$L_K = S/2 + K + K_2$	= Calculation of chain lengths for long travels, fixed end in the center of travel

PDF: www.igus.com/echainpdf.asp
 Specs/CAD/RFQ: www.igus.com/echain.asp
 RoHS info: www.igus.com/RoHS.asp



Calculation of Chain Length

If the fixed end of the Energy Chain® is located in the center of the travel, the chain length “ L_K ” is calculated by using half the length of travel and adding the value “ K ” for the curved length. (You can obtain the value “ K ” from the tables in the catalog.) Placing the fixed end in the **center** of the travel is the most **cost-effective solution** because it requires the shortest Energy Chain®, cables and hoses.



Fixed end in the center of the travel is the most favorable solution.



L_K = chain length
 S = length of travel
 K = $\pi \times R$
Standardized in Value K , depending on the bending radius
 R = bending radius
 ΔM = deviation from the center point

Diagrams “unsupported” length,
► Page 1.10

This formula is generally valid for **all types of applications** if the fixed end is in the center of the travel.
Exceptions: rotary movements and most long travels.

$$L_K = \frac{S}{2} + K$$

This formula is valid if the fixed end is **outside** the center of the travel.

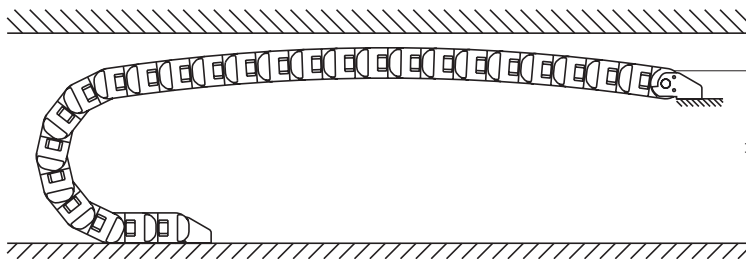
$$L_K = \frac{S}{2} + \Delta M + K$$

Camber

“Camber” is the curve of the upper run along its unsupported length. All igus® Energy Chains are manufactured with camber, special “no camber” (NC) Energy Chains® are available upon request. The camber allows for longer unsupported lengths and increases service life and operating safety. In the **Installation Dimensions** section of each respective Energy Chain® description, you will find the measurement H_F , which specifies the **necessary clearance height**, taking the camber into account. The camber allows for longer unsupported lengths and increases service life and operating safety. Upon request, we can deliver Energy Chains® without camber for restricted space applications; however, these “no camber” chains do not have the same load-bearing capacity. Please consult igus®.



H = nominal clearance height
 H_F = required clearance height

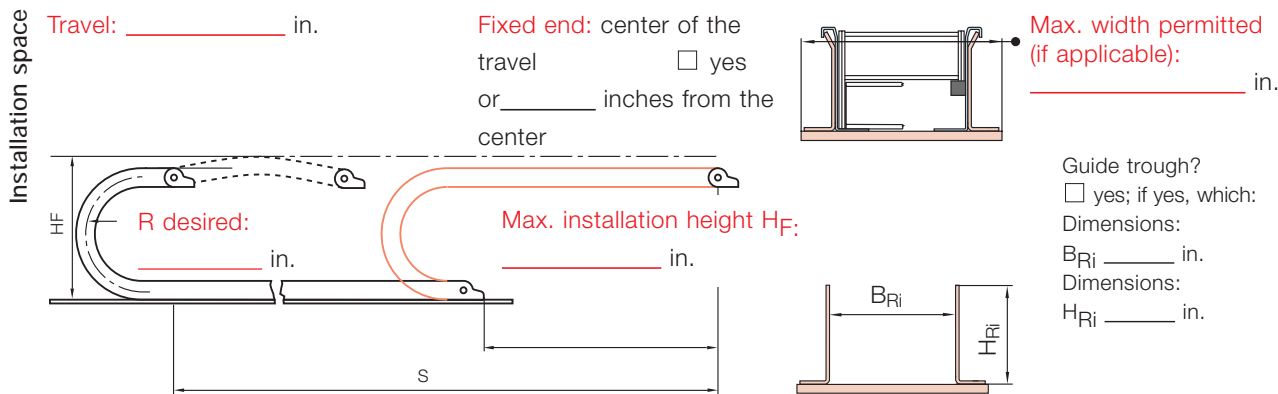


Necessary clearance height depends on the camber of the Energy Chain®. Find values for necessary clearance height “ H_F ” on each product page.

Principle of camber for igus® Energy Chains® H_F = required installation height

Date:	Telephone: 1-800-521-2747
	Fax: 1-401-438-7270
From:	To: igus®, inc. P.O. Box 14349 East Providence, RI 02914

Please supply us with as much application data as possible. Items highlighted in red must be filled out for analysis. You will receive a complete analysis with cable/hose layout proposal and quote by the end of the next business day. Please contact us if you have any questions.



Assembly point (floor, wall, console, etc.): _____ in. Span (Standard = 6.5 ft.): _____ in.

Dynamics Speed: _____ (f/s) Acceleration: _____ (f/s²)

Cycles/Day: _____ Days/Year: _____ Outer diameter: _____

Environment Temperature (°F): _____ Humidity (%): _____ Dust, dirt, chips: _____

Special parameters: _____

	Number	Manufacturer/Type, No.	Conductor/AWG	Outer Dia.	Weight lbs/ft.	Bending radius

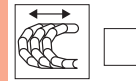
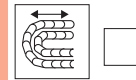
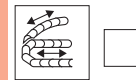
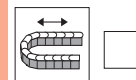
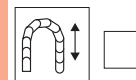
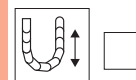
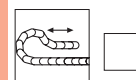
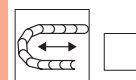
Further individual components desired:

- | | | | |
|------------------------------------|--------------------------|-------------------------|--------------------------|
| Energy Chains® / Energy Tubes | <input type="checkbox"/> | Energy Chain® | <input type="checkbox"/> |
| Chainflex® cables/special conduits | <input type="checkbox"/> | Energy Tube | <input type="checkbox"/> |
| Guide troughs | <input type="checkbox"/> | To be opened: | |
| Strain relief | <input type="checkbox"/> | On both sides | <input type="checkbox"/> |
| Harnessing | <input type="checkbox"/> | Along the outer radius | <input type="checkbox"/> |
| On-site assembly | <input type="checkbox"/> | Along the inner radius | <input type="checkbox"/> |
| Other: _____ | | Special requests: _____ | |
| | | igus® System guarantee? | <input type="checkbox"/> |

Please copy, fill in and fax. Thank you.

Type of Application

(check all that apply)



igus® Energy Chain Systems®

Telephone 1-800-521-2747
 Fax 1-401-438-7270

Internet: <http://www.igus.com>
 email: sales@igus.com
 QuickSpec: <http://www.igus.com/qs/echain.asp>



Long travels (441 m) with igus® Rol Energy Chain® Long travel applications



High fill weights (60 kg/m) with System E4. Fill weights/Load diagrams



Multi-axis E-Chains® Easy Triflex® on a production line, combined movements



ReadyChain under water. System E4 and Chainflex® CF9, ReadyChain



ReadyChain with combined motions on tooling machines



Series E6-52 high speed (15 m/s) low noise operation, optimized noise level



Crash test unit: 22 m/s speed and 784 m/s² acceleration, Travel speed



Complex movements with igus® Triflex® R, combined movements



Cleanroom and Triflex® R Technical Environment



Extension links for E2 and E4 for large conduits, Cable and Hoses



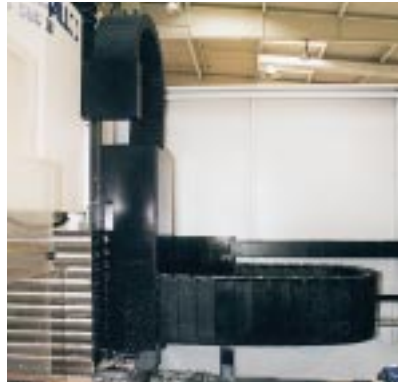
Zig-zag movements, 36 m height with E4/4. Zig-zag movements



igus® System E6 - High acceleration and ESD safety, ESD & ATEX



Ununsupported application System E4, up to 164 ft/s (50 m/s) speed



Ununsupported, side-mounted E4 Series R188



Ununsupported application System E4



Gliding application System E4, up to 1641 ft (500 m) realized



Gliding, side-mounted Series E4/4



Gliding application System E4



Vertical, standing Series E4/light, up to 19.69 ft (6 m) possible



Rotary movement System E4



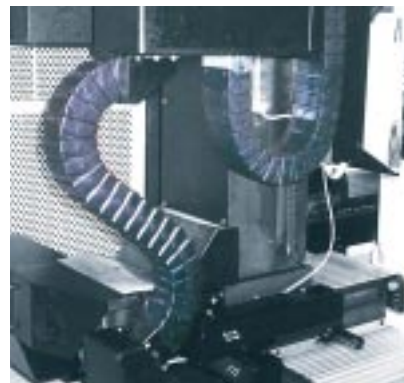
Vertical, standing Series E4/light



Vertical, hanging Series E4 up to 131 ft(40 m) possible



Spiral and rotary movement TwisterChain®



Combined movement Series Triflex®

PDF: www.igus.com/echainpdf.asp
 Specs/CAD/RFO: www.igus.com/echain.asp
 RoHS info: www.igus.com/RoHS.asp

