EMCS SYSTEM

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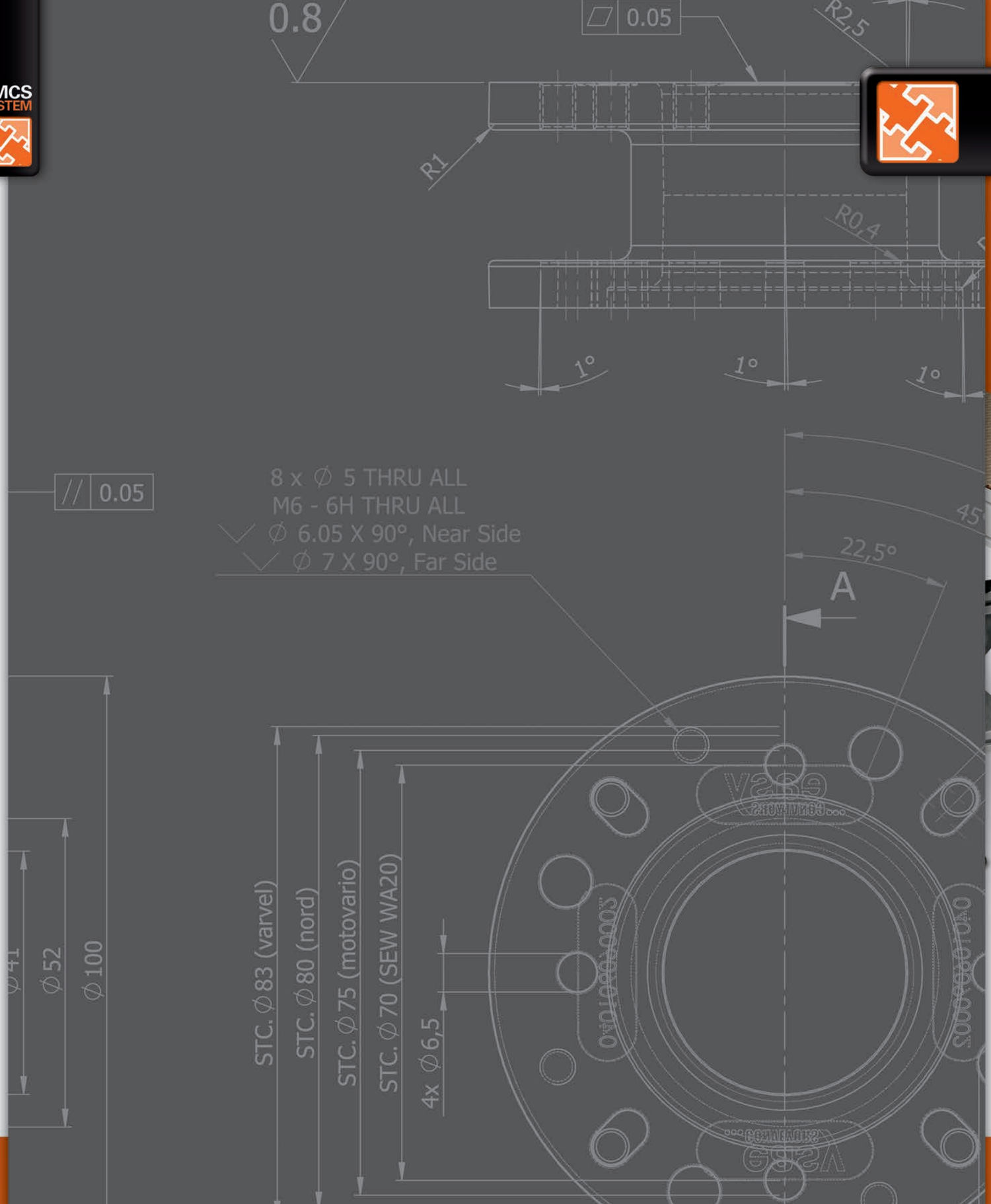
EMCS SYSTEM CONTENT



EMCS SYSTEM

Mat Top Conveyor
Gliederbandförderer
Convoyeur à tapis haut
Transportador de banda articulada

EMCS HEAD DRIVE

MODULAR CHAIN SYSTEM

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EMCS SYSTEM

EMCS HEAD DRIVE

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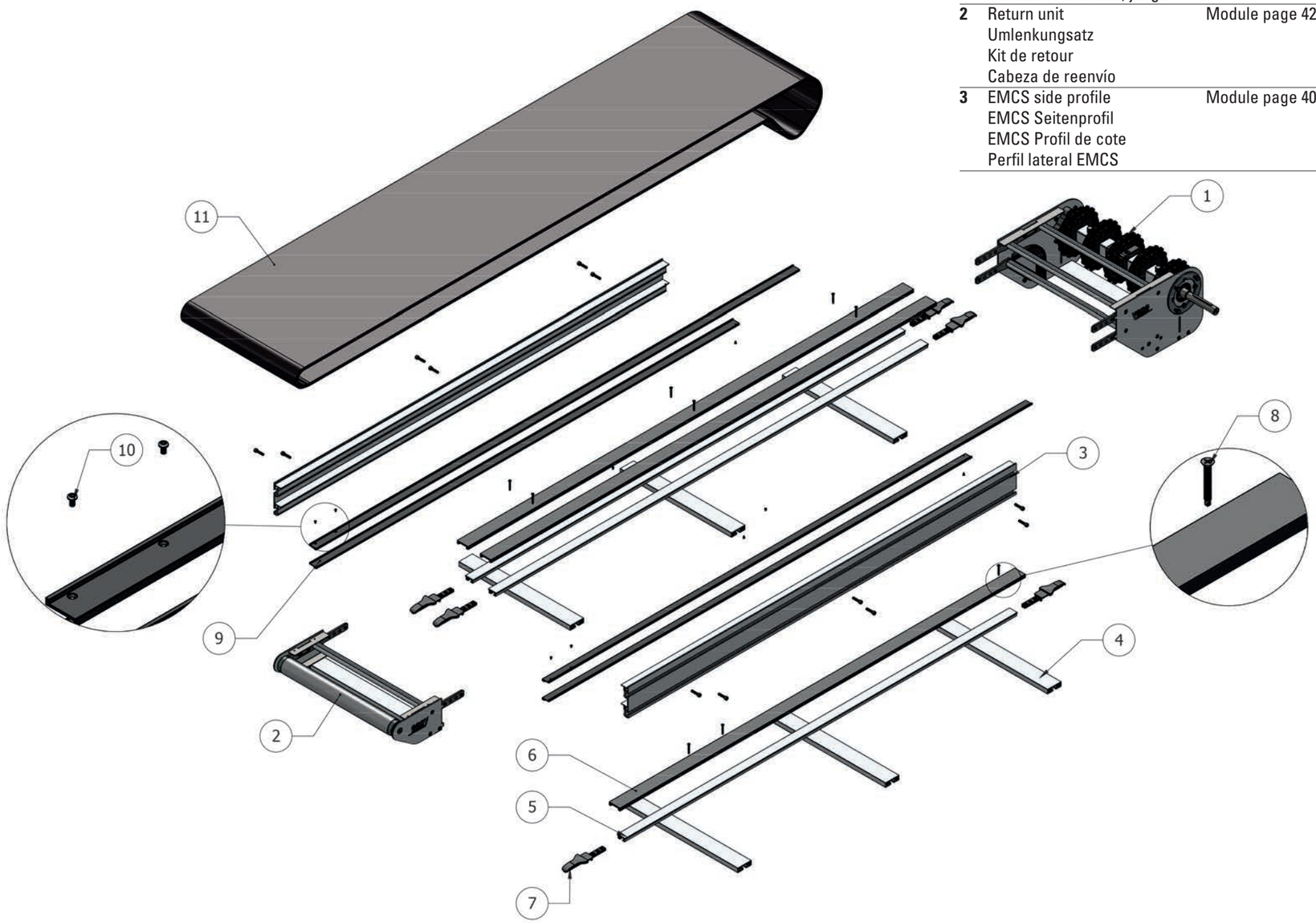

1	Head drive unit Kopfantrieb - Satz Ensemble Entraînement Direct Cabeza de tracción, juego	Module page 412 - 419
2	Return unit Umlenkungsatz Kit de retour Cabeza de reenvío	Module page 420 - 421
3	EMCS side profile EMCS Seitenprofil EMCS Profil de cote Perfil lateral EMCS	Module page 408 - 411
4	Straight connector Längsverbinder Connecteur droit Conector longitudinal	Module page 408 - 411
5	Belt support Gurt Unterstützung Courroie support Banda de soporte	Module page 408 - 411
6	Belt support Gurt Unterstützung Courroie support Banda de soporte	Module page 408 - 411
7	Belt support Gurt Unterstützung Courroie support Banda de soporte	Module page 408 - 411
8	Head screw Kopf Schraube Vis sans tête Cabeza Husillo	Module page 408 - 411
9	Slide profile Gleitprofil Glissez le profil Perfil de deslizamiento	Module page 408 - 411
10	Rokut rivet Kunstoff Popnail Popnail en plastique Popnail plástico	Module page 408 - 411
11	EMCS Chain EMCS Kette EMCS chaine Cadena EMCS	Module page 422 - 423

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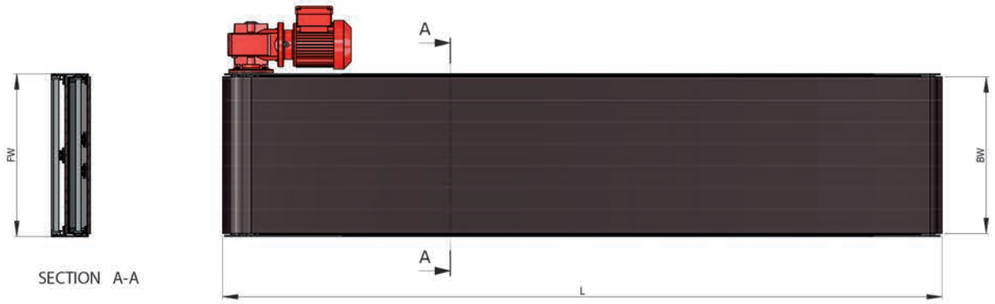
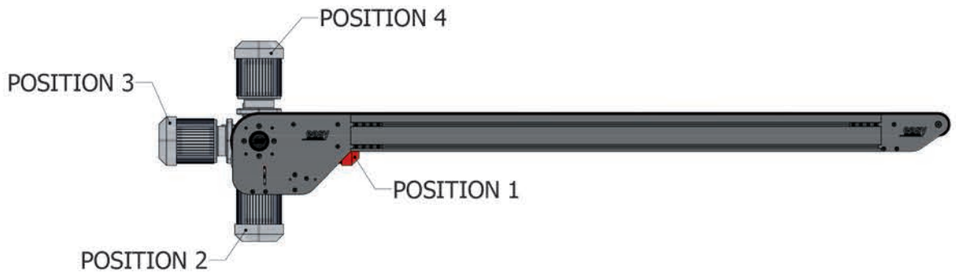


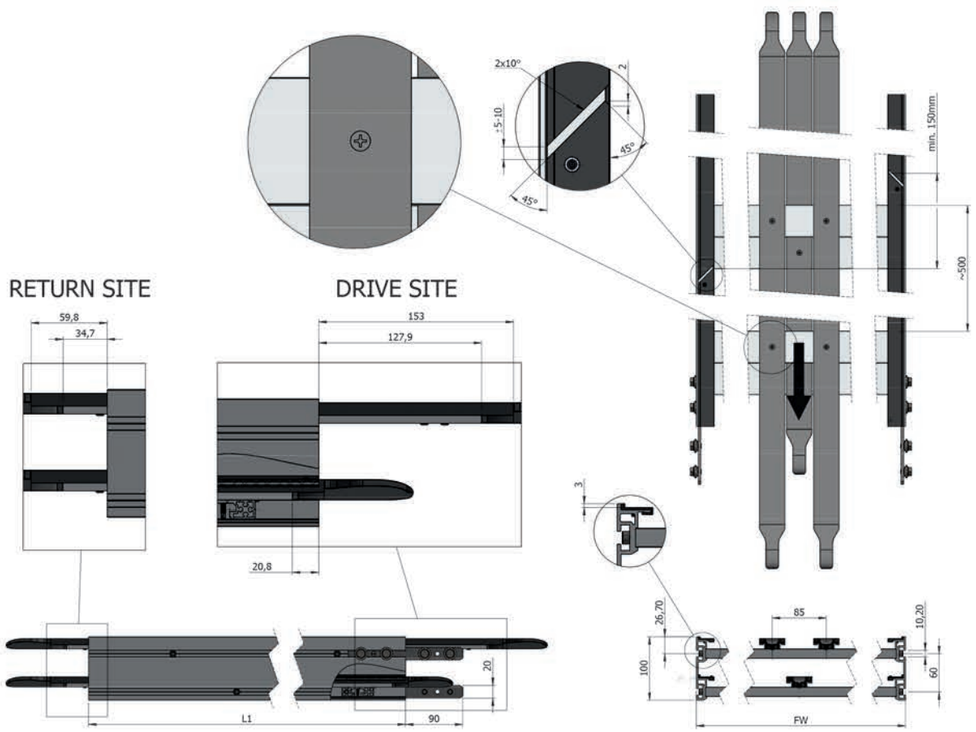


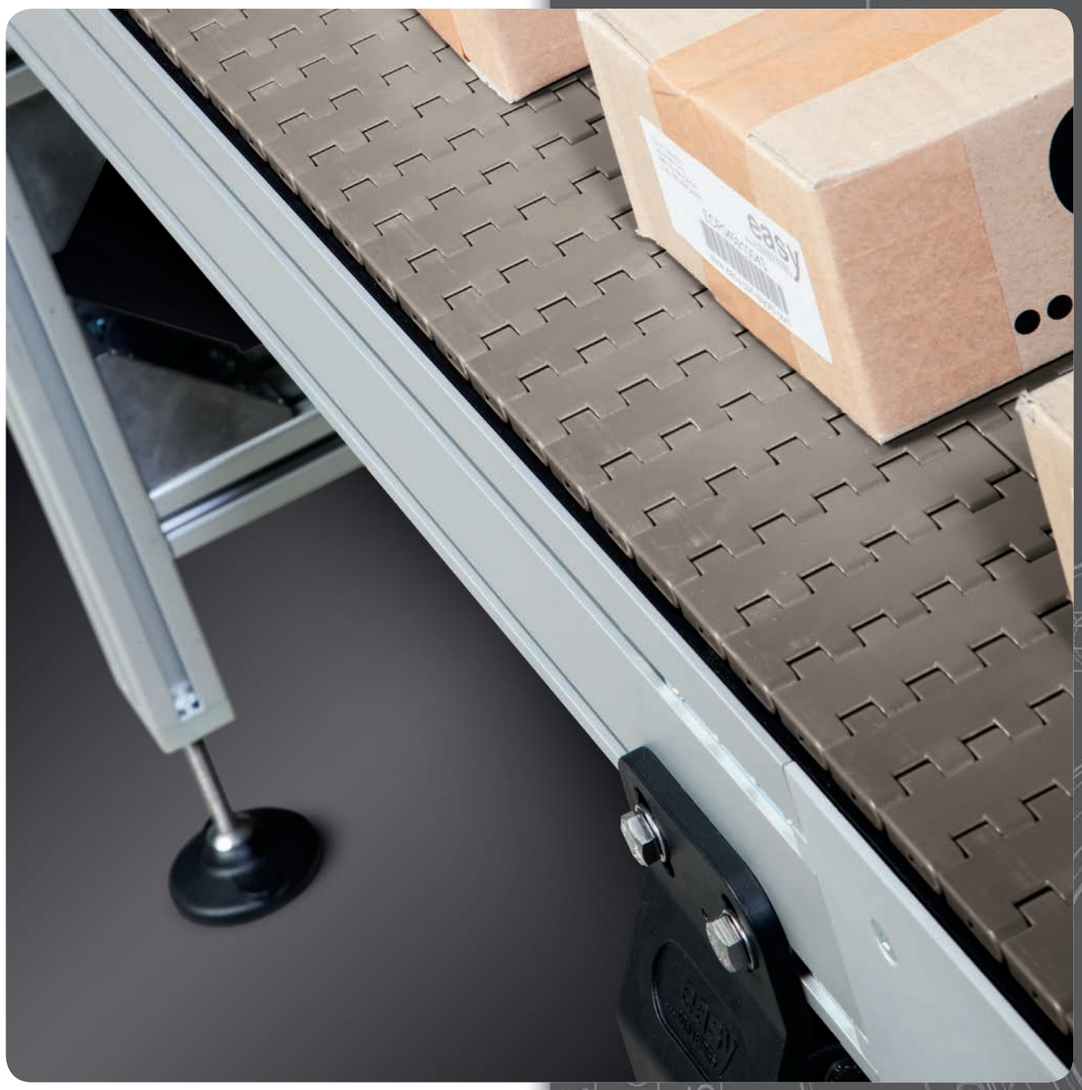
EMCS HEAD DRIVE	Dimensions - Abmessungen - Dimensions - Dimensiones						
L =	Individual von **785 -22.000 mm** I 30,91 - 866,14″ inch All lengths in between possible						
FW =	**186**	**271**	**356**	**441**	**528**	**698**	**868 mm**
	7,32″	10,67″	14,02″	17,36″	20,79″	27,48″	34,17″ inch
BW =	**170**	**255**	**340**	**425**	**510**	**680**	**850 mm**
	6,69″	10,04″	13,39″	16,73″	20,08″	26,77″	33,47″ inch
V ≈	Max. 45 mtr./min **|** 148 Foot/min (dry condition)						
Breaking load, Bruchlast, Charge de rupture, Carga de rotura						21600 – 35000 N/mtr	
Support legs, Stützen, Supports, Patas de apoyo						Module page 424-433	
Side guiding, Seitenführungen, Guidage latéral, Guiado lateral						Module page 434-437	

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

EMCS SYSTEM

MODULE PAGES

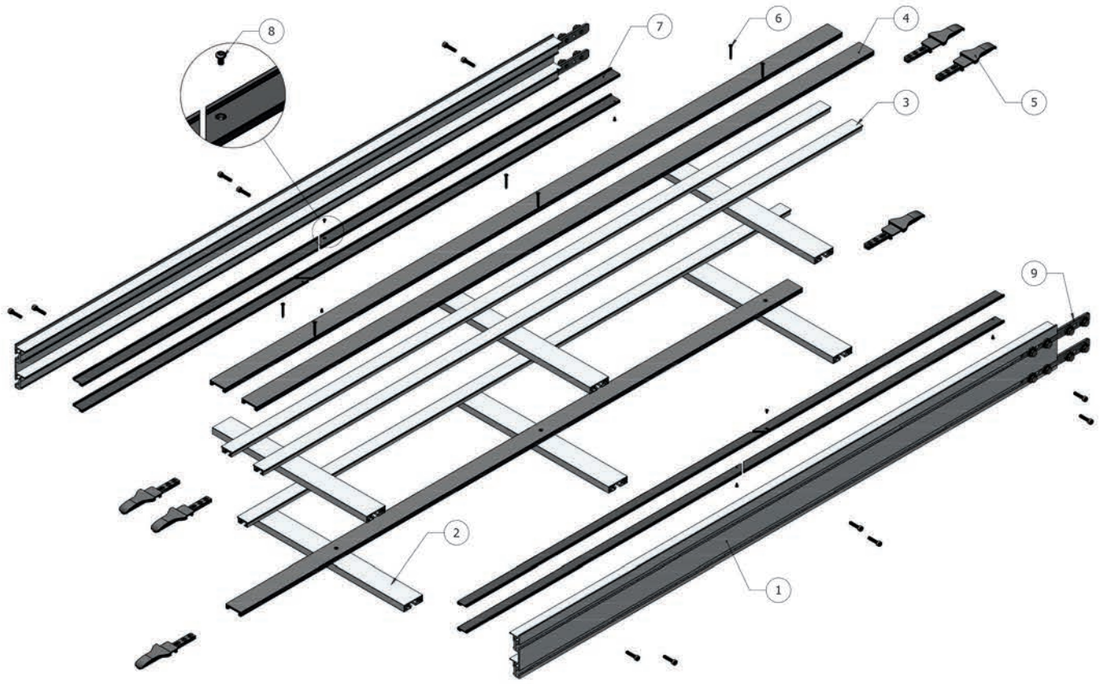




Dimensions - Abmessungen - Dimensions - Dimensiones

EMCS FRAME	Dimensions - Abmessungen - Dimensions - Dimensiones						
FW =	**186**	**271**	**356**	**441**	**528**	**698**	**868 mm**
	7,32"	10,67"	14,02"	17,36"	20,79"	27,48"	34,17" inch

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	Side profile
2	Straight connector
3	Belt support; Aluminium side guide profile
4	Belt support; Guide wear strip
5	Belt support; Guide end 40
6	Self-drilling countersunk head screw
7	Slide profile
8	Rokut rivets
9	Profile connector set

Art Nr. Pos 1		
EMCS041205000000		1 piece
Material	Aluminium, 10 micron anodized	

Art Nr. Pos 2		
EMCS041205000170	EMCS STRAIGHT CONNECTOR - 15x50; 170	1 connector, with fasteners
EMCS041205000255	EMCS STRAIGHT CONNECTOR - 15x50; 255	1 connector, with fasteners
EMCS041205000340	EMCS STRAIGHT CONNECTOR - 15x50; 340	1 connector, with fasteners
EMCS041205000425	EMCS STRAIGHT CONNECTOR - 15x50; 425	1 connector, with fasteners
EMCS041205000510	EMCS STRAIGHT CONNECTOR - 15x50; 510	1 connector, with fasteners
EMCS041205000680	EMCS STRAIGHT CONNECTOR - 15x50; 680	1 connector, with fasteners
EMCS041205000850	EMCS STRAIGHT CONNECTOR - 15x50; 850	1 connector, with fasteners
Material	Aluminium	

Art Nr. Pos 3		
ETS040809000000	Belt support; Aluminium side guide profile	1 piece; L=5,6 mtr
Material	Aluminium anodized	

Art Nr. Pos 4		
ECP040103000000	Belt support; Guide wear strip	1 piece; L=3 mtr
Material	PE Black	

Art Nr. Pos 5		
ETS040809050000	Belt support; Guide end 40	1 set, with fasteners
Material	PA FG	

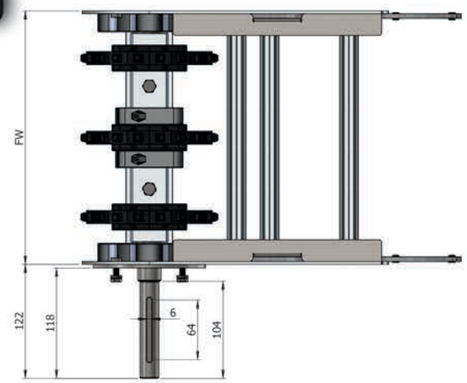
Art Nr. Pos 6		
BV7504P4232VZ	Self-drilling countersunk head screw; 4,2 x 32	100 pieces
Material	Steel galvanized, Stahl verzinkt, Acier galvanisé, Acero galvanizado	

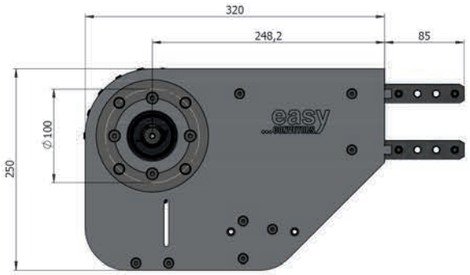
Art Nr. Pos 7		
EMCP041208010000	EMCS Slide profile 25x2; TCP	1 roll L=25mtr

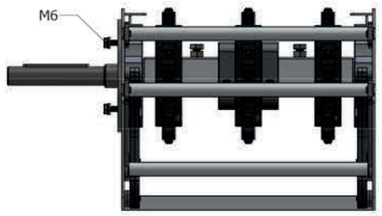
Art Nr. Pos 8		
EMPT040705000005	Rokut rivets	250 pieces
Material	Nylon 6.6	

Art Nr. Pos 9		
EMPT040705000006	Profile connector set	2 pieces, with fasteners
Material	Steel galvanized, Stahl verzinkt, Acier galvanisé, Acero galvanizado	

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta







Dimensions - Abmessungen - Dimensions - Dimensiones

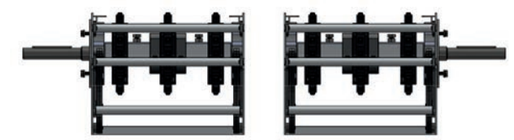
EMCS HEAD DRIVE UNIT	Dimensions - Abmessungen - Dimensions - Dimensiones						
FW =	**186**	**271**	**356**	**441**	**528**	**698**	**868 mm**
	7,32"	10,67"	14,02"	17,36"	20,78"	27,48"	34,17" inch

FOR ALUMINIUM SYSTEM

Left	Right			
EMCS041201010170L	EMCS041201010170R	186mm	7,32"	EMCS HEAD DRIVE UNIT SAF37; 170 TYPE 1
EMCS041201010255L	EMCS041201010255R	271mm	10,67"	EMCS HEAD DRIVE UNIT SAF37; 255 TYPE 1
EMCS041201010340L	EMCS041201010340R	356mm	14,02"	EMCS HEAD DRIVE UNIT SAF37; 340 TYPE 1
EMCS041201010425L	EMCS041201010425R	441mm	17,36"	EMCS HEAD DRIVE UNIT SAF37; 425 TYPE 1
EMCS041201010510L	EMCS041201010510R	528mm	20,78"	EMCS HEAD DRIVE UNIT SAF37; 510 TYPE 1
EMCS041201010680L	EMCS041201010680R	698mm	27,48"	EMCS HEAD DRIVE UNIT SAF37; 680 TYPE 1
EMCS041201010850L	EMCS041201010850R	868mm	34,17"	EMCS HEAD DRIVE UNIT SAF37; 850 TYPE 1

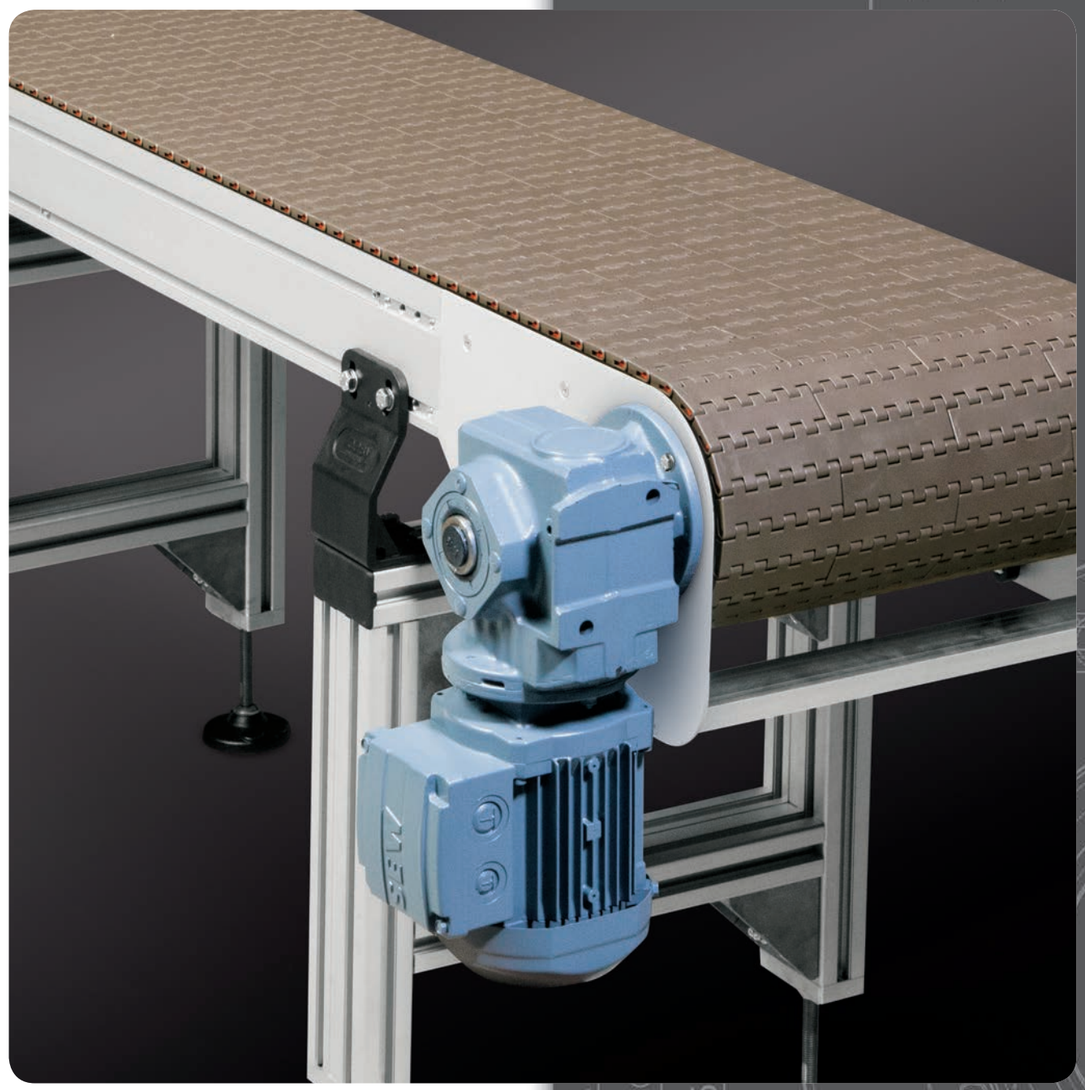
Suitable for, Geeignet für, Convient pour, Adecuado para	SEW WITH FLANGE 120;
Gearbox	Not included
Package	Set incl. drive set and drive roller

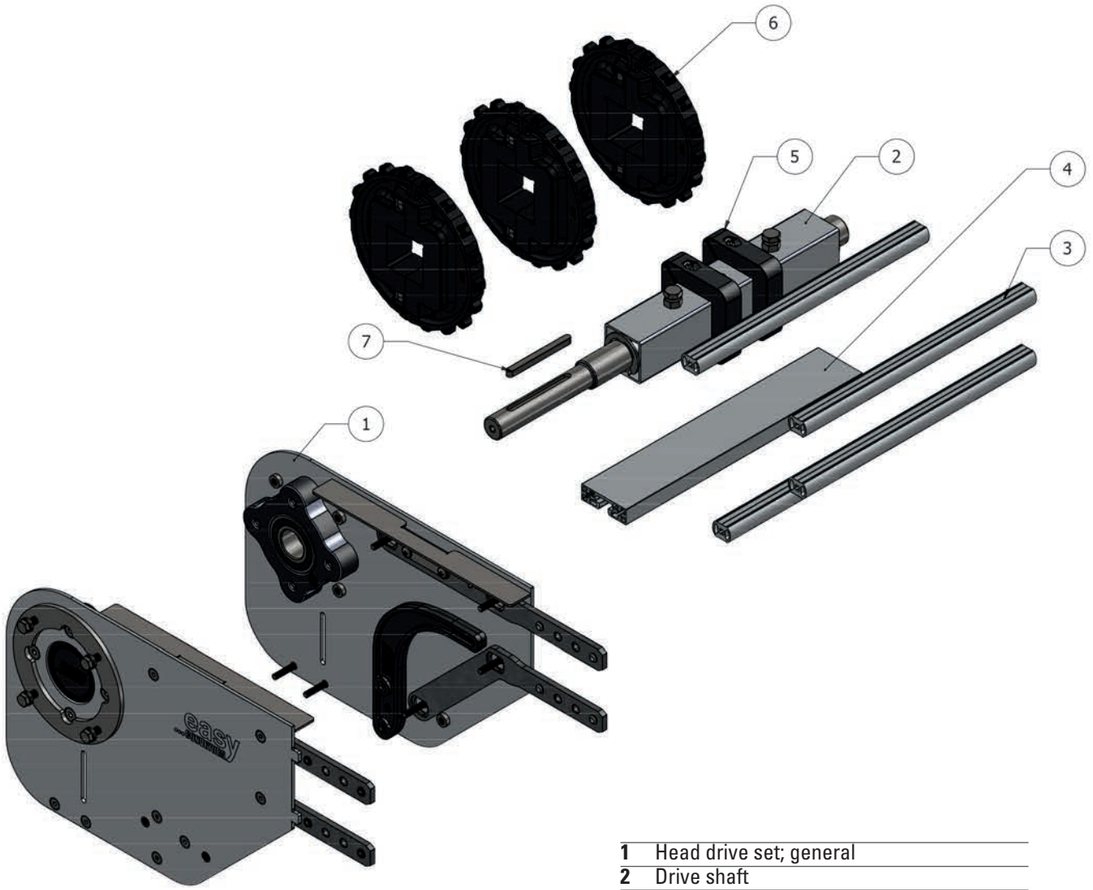
Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



Left

Right





1	Head drive set; general
2	Drive shaft
3	Drive / return connector
4	Drive support connector
5	Split shaft collar
6	Sprocket wheel
7	Parallel key

Art Nr. Pos 1	For Aluminium system
EMCS041201000000	EMCS HEAD DRIVE SET SAF37; GENERAL TYPE 1
Material	AL+Stainless steel, AL+Edelstahl, AL+Acier inoxydable, AL+Acero inoxidable + PA 6.6
Package:	1 pc
	SPROCKETS AND GEARMOTOR NOT INCLUDED

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

Art Nr. Pos 2	For Aluminium system	
041208000170	EMCS DRIVE SHAFT AL; 170 - SAF37	1
041208000255	EMCS DRIVE SHAFT AL; 255 - SAF37	1
041208000340	EMCS DRIVE SHAFT AL; 340 - SAF37	1
041208000425	EMCS DRIVE SHAFT AL; 425 - SAF37	1
041208000510	EMCS DRIVE SHAFT AL; 510 - SAF37	1
041208000680	EMCS DRIVE SHAFT AL; 680 - SAF37	1
041208000850	EMCS DRIVE SHAFT AL; 850 - SAF37	1
141Nm	Max. Torque, Couple, Esfuerzo de torsion, Drehmoment	
Material	Stainless steel shaft with aluminum roller tube, Welle aus Edelstahl mit Rolle aus Alu-Rohr, Arbre en Acier inoxydable avec tube d'enroulement en aluminium, Eje de Acero inoxidable con rodillos en tubo de aluminio	

Art Nr. Pos 3			Material
041204010170	EMCS DRIVE/RETURN CONNECTOR Ø20; 170	1	AL
041204010255	EMCS DRIVE/RETURN CONNECTOR Ø20; 255	1	AL
041204010340	EMCS DRIVE/RETURN CONNECTOR Ø20; 340	1	AL
041204010425	EMCS DRIVE/RETURN CONNECTOR Ø20; 425	1	AL
041204010510	EMCS DRIVE/RETURN CONNECTOR Ø20; 510	1	AL
041204010680	EMCS DRIVE/RETURN CONNECTOR Ø20; 680	1	AL
041204010850	EMCS DRIVE/RETURN CONNECTOR Ø20; 850	1	AL

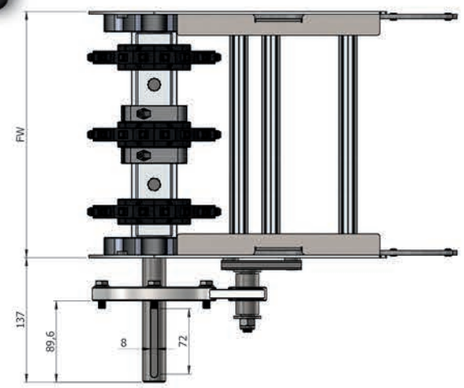
Art Nr. Pos 4			Material
041204020170	EMCS DRIVE SUPPORT CONNECTOR 15x50; 170	1	AL
041204020255	EMCS DRIVE SUPPORT CONNECTOR 15x50; 255	1	AL
041204020340	EMCS DRIVE SUPPORT CONNECTOR 15x50; 340	1	AL
041204020425	EMCS DRIVE SUPPORT CONNECTOR 15x50; 425	1	AL
041204020510	EMCS DRIVE SUPPORT CONNECTOR 15x50; 510	1	AL
041204020680	EMCS DRIVE SUPPORT CONNECTOR 15x50; 680	1	AL
041204020850	EMCS DRIVE SUPPORT CONNECTOR 15x50; 850	1	AL

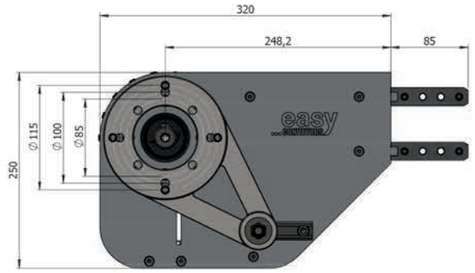
Art Nr. Pos 5		
040706000018	Split shaft collar	10
Material	PA FG	

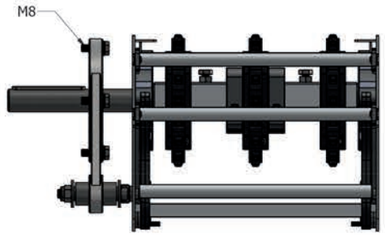
Art Nr. Pos 6		
041308060001	EMCS SPROCKET WHEEL; TYPE 2 Z=18, Bore Square 40	1
Pitch diameter	Ø146.3	
Material	Reinforced PA + Stainless Steel	

Art Nr. Pos 7		
BV688587080A4	Parallel key	100 pieces
Material	Stainless steel, Edelstahl, acier inoxydable, acero inoxidable	

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta







Dimensions - Abmessungen - Dimensions - Dimensiones

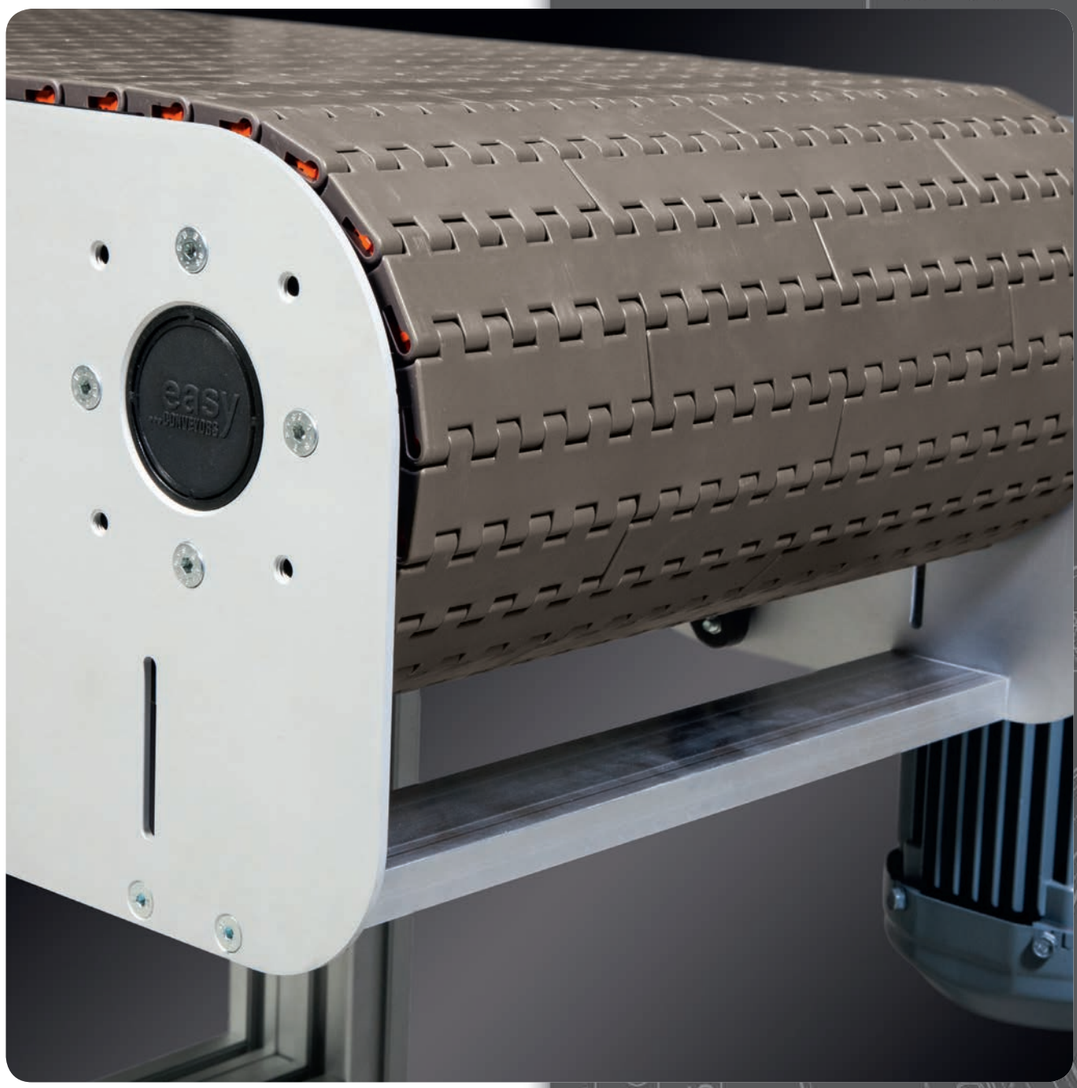
EMCS HEAD DRIVE UNIT	Dimensions - Abmessungen - Dimensions - Dimensiones						
FW =	**186**	**271**	**356**	**441**	**528**	**698**	**868 mm**
	7,32″	10,67″	14,02″	17,36″	20,78″	27,48″	34,17″ inch

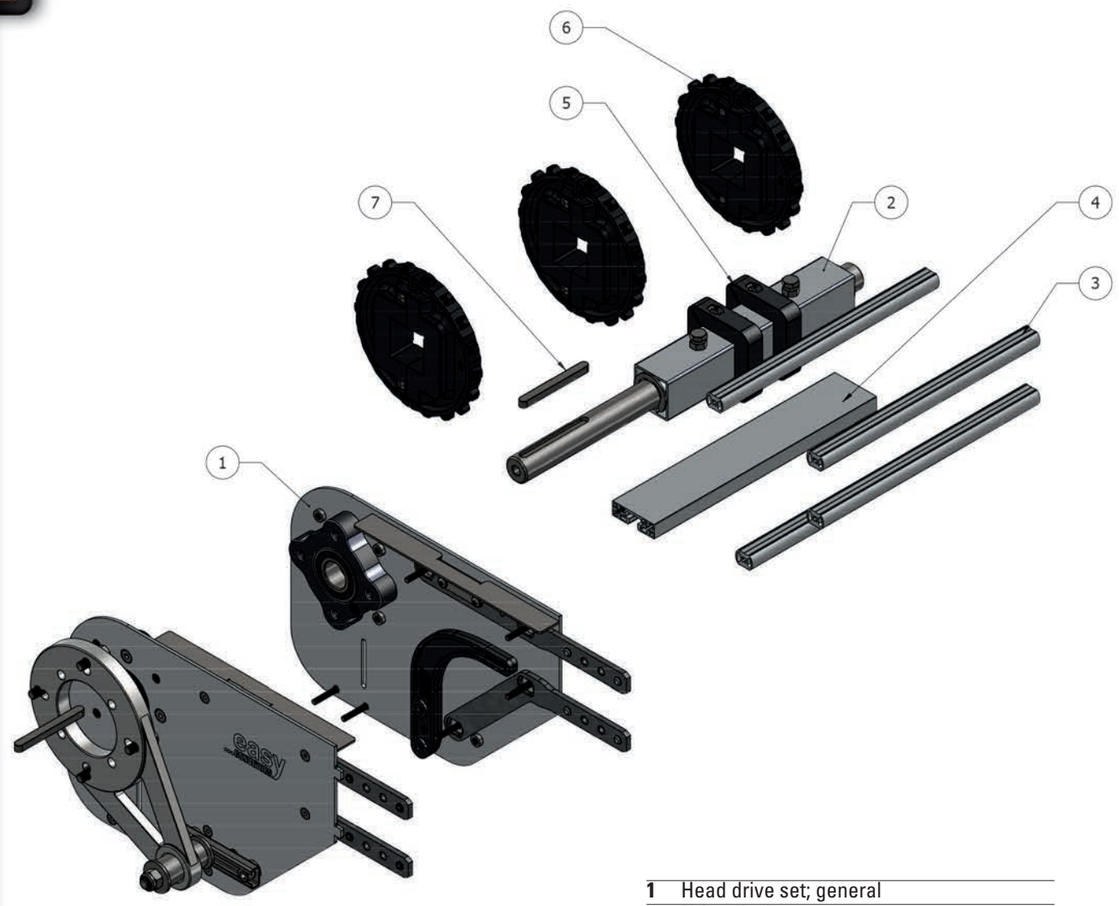
FOR ALUMINIUM SYSTEM

Left	Right			
EMCS041202010170L	EMCS041202010170R	186mm	7,32″	EMCS HEAD DRIVE UNIT SA47; 170 TYPE 1
EMCS041202010255L	EMCS041202010255R	271mm	10,67″	EMCS HEAD DRIVE UNIT SA47; 255 TYPE 1
EMCS041202010340L	EMCS041202010340R	356mm	14,02″	EMCS HEAD DRIVE UNIT SA47; 340 TYPE 1
EMCS041202010425L	EMCS041202010425R	441mm	17,36″	EMCS HEAD DRIVE UNIT SA47; 425 TYPE 1
EMCS041202010510L	EMCS041202010510R	528mm	20,78″	EMCS HEAD DRIVE UNIT SA47; 510 TYPE 1
EMCS041202010680L	EMCS041202010680R	698mm	27,48″	EMCS HEAD DRIVE UNIT SA47; 680 TYPE 1
EMCS041202010850L	EMCS041202010850R	868mm	34,17″	EMCS HEAD DRIVE UNIT SA47; 850 TYPE 1

Suitable for, Geeignet für, Convient pour, Adecuado para	SEW SA47, SEW WA37, VARVEL MRS 50, NORD SK-1SI 50, MOTOVARIO NMRV 50;
Gearbox	Not included
Package	1

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta





1	Head drive set; general
2	Drive shaft
3	Drive / return connector
4	Drive support connector
5	Split shaft collar
6	Sprocket wheel
7	Parallel key

Art Nr. Pos 1	For Aluminium system
EMCS041202000000	EMCS HEAD DRIVE SET SA47; GENERAL TYPE 1
Material	AL+Stainless steel, AL+Edelstahl, AL+Acier inoxydable, AL+Acero inoxidable + PA 6.6
Package:	1 pc
	SPROCKETS AND GEARMOTOR NOT INCLUDED

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

Art Nr. Pos 2	For Aluminium system	
041208010170	EMCS DRIVE SHAFT AL; 170 - SA47	1
041208010255	EMCS DRIVE SHAFT AL; 255 - SA47	1
041208010340	EMCS DRIVE SHAFT AL; 340 - SA47	1
041208010425	EMCS DRIVE SHAFT AL; 425 - SA47	1
041208010510	EMCS DRIVE SHAFT AL; 510 - SA47	1
041208010680	EMCS DRIVE SHAFT AL; 680 - SA47	1
041208010850	EMCS DRIVE SHAFT AL; 850 - SA47	1
276Nm	Max. Torque, Couple, Esfuerzo de torsion, Drehmoment	
Material	Stainless steel shaft with aluminum roller tube, Welle aus Edelstahl mit Rolle aus Alu-Rohr, Arbre en Acier inoxydable avec tube d'enroulement en aluminium, Eje de Acero inoxidable con rodillos en tubo de aluminio	

Art Nr. Pos 3			Material
041204010170	EMCS DRIVE/RETURN CONNECTOR Ø20; 170	1	AL
041204010255	EMCS DRIVE/RETURN CONNECTOR Ø20; 255	1	AL
041204010340	EMCS DRIVE/RETURN CONNECTOR Ø20; 340	1	AL
041204010425	EMCS DRIVE/RETURN CONNECTOR Ø20; 425	1	AL
041204010510	EMCS DRIVE/RETURN CONNECTOR Ø20; 510	1	AL
041204010680	EMCS DRIVE/RETURN CONNECTOR Ø20; 680	1	AL
041204010850	EMCS DRIVE/RETURN CONNECTOR Ø20; 850	1	AL

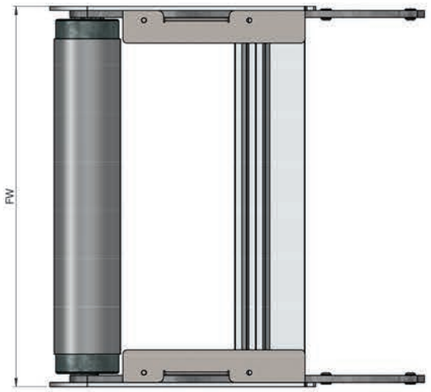
Art Nr. Pos 4			Material
041204020170	EMCS DRIVE SUPPORT CONNECTOR 15x50; 170	1	AL
041204020255	EMCS DRIVE SUPPORT CONNECTOR 15x50; 255	1	AL
041204020340	EMCS DRIVE SUPPORT CONNECTOR 15x50; 340	1	AL
041204020425	EMCS DRIVE SUPPORT CONNECTOR 15x50; 425	1	AL
041204020510	EMCS DRIVE SUPPORT CONNECTOR 15x50; 510	1	AL
041204020680	EMCS DRIVE SUPPORT CONNECTOR 15x50; 680	1	AL
041204020850	EMCS DRIVE SUPPORT CONNECTOR 15x50; 850	1	AL

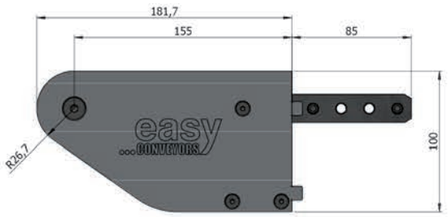
Art Nr. Pos 5		
040706000018	Split shaft collar	10
Material	PA FG	

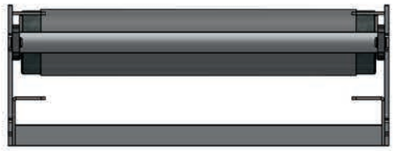
Art Nr. Pos 6		
041308060001	EMCS SPROCKET WHEEL; TYPE 2 Z=18, Bore Square 40	1
Pitch diameter	Ø146.3	
Material	Reinforced PA + Stainless Steel	

Art Nr. Pos 7		
BV688587080A4	Parallel key	100 pieces
Material	Stainless steel, Edelstahl, acier inoxydable, acero inoxidable	

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta







Dimensions - Abmessungen - Dimensions - Dimensiones

Art. Nr.		FW =		
EMCS041204010170	EMCS RETURN UNIT; 170 TYPE 1	186 mm	7,32" inch	1 set
EMCS041204010255	EMCS RETURN UNIT; 255 TYPE 1	271 mm	10,67" inch	1 set
EMCS041204010340	EMCS RETURN UNIT; 340 TYPE 1	356 mm	14,02" inch	1 set
EMCS041204010425	EMCS RETURN UNIT; 425 TYPE 1	441 mm	17,36" inch	1 set
EMCS041204010510	EMCS RETURN UNIT; 510 TYPE 1	528 mm	20,79" inch	1 set
EMCS041204010680	EMCS RETURN UNIT; 680 TYPE 1	698 mm	27,48" inch	1 set
EMCS041204010850	EMCS RETURN UNIT; 850 TYPE 1	868 mm	34,17" inch	1 set
Package	Set incl. return set and return roller			

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

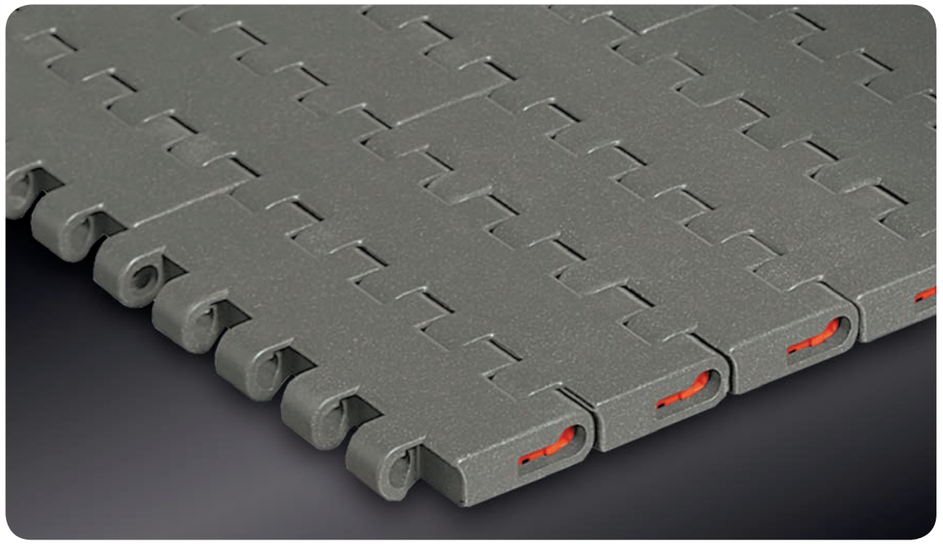
1	Return set; general
2	Return roll
3	Drive / return connector
4	Return connector

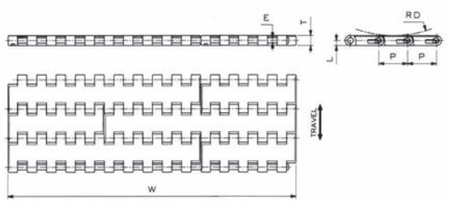
Art Nr. Pos 1		
EMCS041204000000		1 piece, incl fasteners

Art Nr. Pos 2		
041208040170	EMCS RETURN ROLL TYPE 1; 170	1
041208040255	EMCS RETURN ROLL TYPE 1; 255	1
041208040340	EMCS RETURN ROLL TYPE 1; 340	1
041208040425	EMCS RETURN ROLL TYPE 1; 425	1
041208040510	EMCS RETURN ROLL TYPE 1; 510	1
041208040680	EMCS RETURN ROLL TYPE 1; 680	1
041208040850	EMCS RETURN ROLL TYPE 1; 850	1
Diameter pulley	Ø47,2	
Material	Stainless steel shaft with aluminum roller tube, end caps galvanized steel, Welle aus Edelstahl mit Rolle aus Alu-Rohr, Endkappen Stahl verzinkt, Arbre en Acier inoxydable avec tube d'enroulement en aluminium, Eje de Acero inoxidable con rodillos en tubo de aluminio, tapaz en acero galvanizado	

Art Nr. Pos 3		Art Nr. Pos 4			Material
041204010170	Ø20; 170	041204030170	15x50; 170	1	AL
041204010255	Ø20; 255	041204030255	15x50; 255	1	AL
041204010340	Ø20; 340	041204030340	15x50; 340	1	AL
041204010425	Ø20; 425	041204030425	15x50; 425	1	AL
041204010510	Ø20; 510	041204030510	15x50; 510	1	AL
041204010680	Ø20; 680	041204030680	15x50; 680	1	AL
041204010850	Ø20; 850	041204030850	15x50; 850	1	AL

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



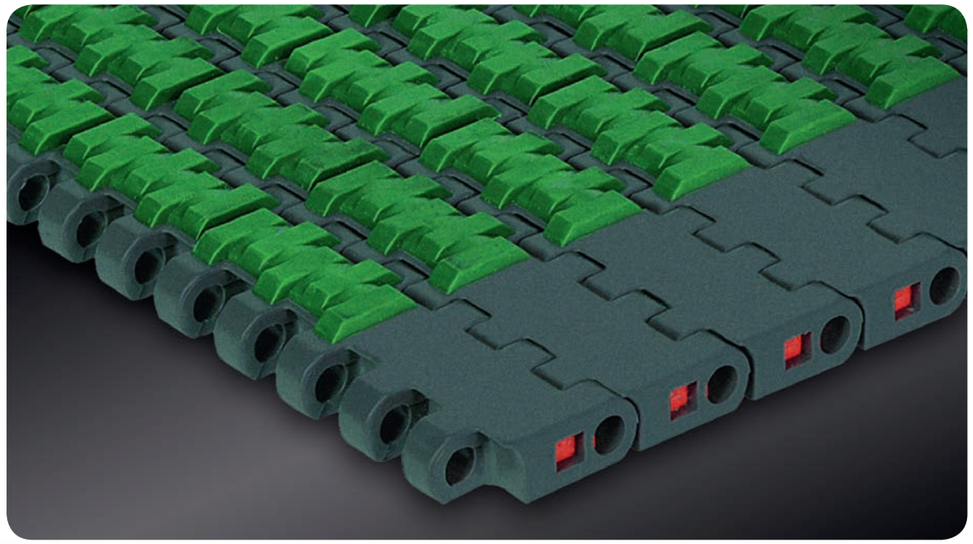


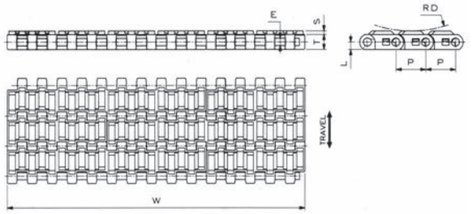
E	4,60mm
T	8,70mm
L	4,35mm
P	25,40mm
RD	20,00mm

Dimensions - Abmessungen - Dimensions - Dimensiones

Art. Nr.	BW =	Weight kg/m²	Weight Lbs/ft
EMCP041208000170	170	1.29	0.87
EMCP041208000255	255	1.93	1.30
EMCP041208000340	340	2.57	1.73
EMCP041208000425	425	3.20	2.15
EMCP041208000510	510	3.84	2.58
EMCP041208000680	680	5.11	3.43
EMCP041208000850	850	6.38	4.29

Material	LW (acetal resin)
Pin material	PP
Max. load capacity	Straight 21.600 N/mtr
Package	1 box; L=3,048mtr (10 feet)
Color	



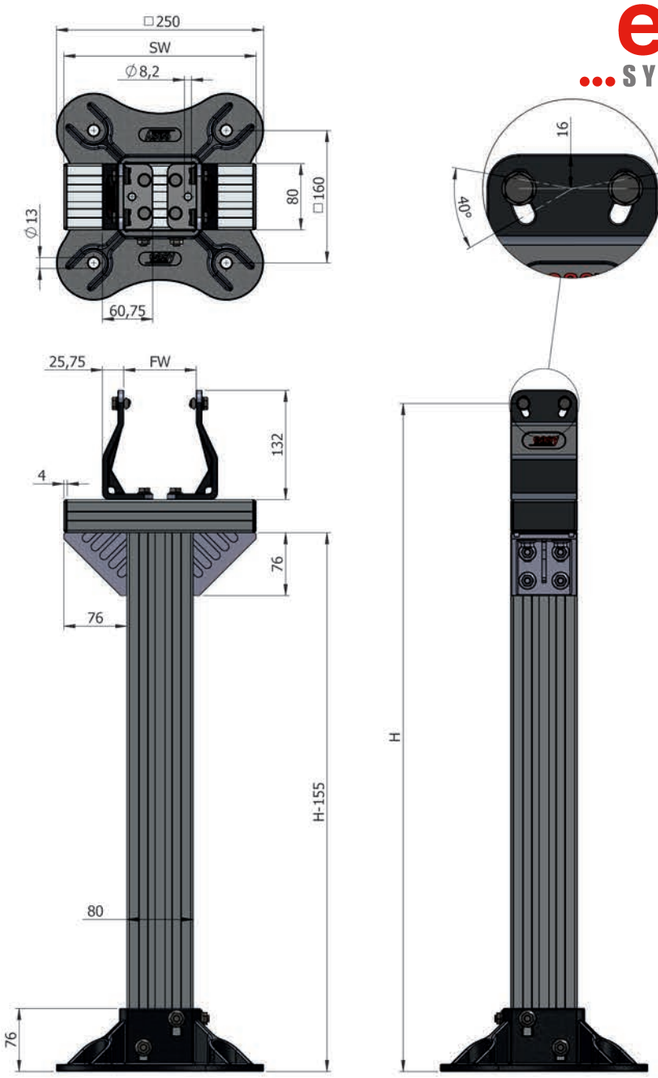


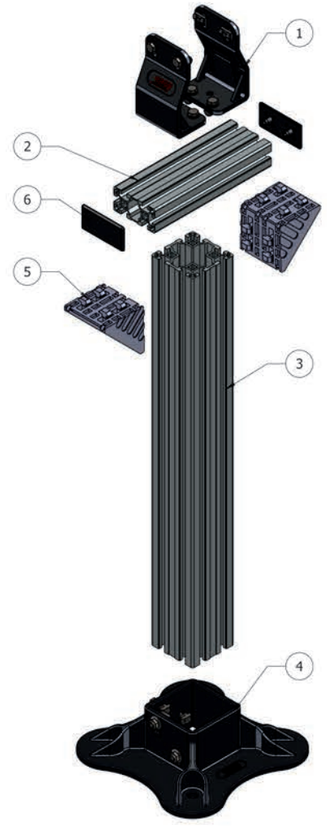
E	4,60mm
T	8,70mm
L	4,35mm
P	25,40mm
RD	20,00mm
S	3,00mm

Dimensions - Abmessungen - Dimensions - Dimensiones

Art. Nr.	BW =	Weight kg/m²	Weight Lbs/ft
EMCP041208010255	255	2.73	1.83
EMCP041208010340	340	3.68	2.47
EMCP041208010425	425	4.63	3.11
EMCP041208010510	510	5.58	3.75
EMCP041208010680	680	7.48	5.03
EMCP041208010850	850	9.38	6.30

Material	LW (acetal resin)
Pin material	PBT
Rubber material	Thermoplastic
Rubber hardness	80 sha
Max. load capacity	Straight 35.000 N/mtr
Package	1 box; L=1,524mtr (60 pitches)
Color	
Friction color	





1	L support bracket
2	Profile 40x80 L
3	Profile 80x80 L
4	Support base
5	Bracket 80
6	Cap 40x80

Dimensions - Abmessungen - Dimensions - Dimensiones

FW =

SW Min = **232 mm** 9,13" inch

We advise a maximum (FW) than 400 mm, Wir empfehlen eine maximale Breite von 400 mm

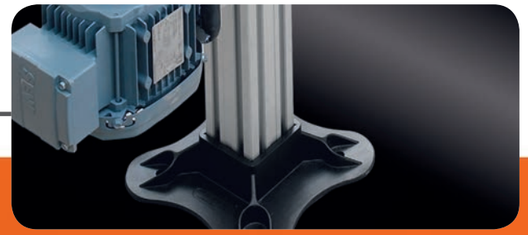
Se aconseja un máximo de ancho de 400 mm, Nous vous conseillons une gamme maximale de 400 mm

H Max = **1200 mm** 47,25" inch

Always fasten to the floor, Immer am Boden befestigen

Siempre sujete al suelo, Toujour attacher à l'étage

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



Art Nr. Pos 1	Material	
ETS040808020000 I L support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2	Material	
020102070008 I Profile 40x80L, L= 6070 mm	AL	1

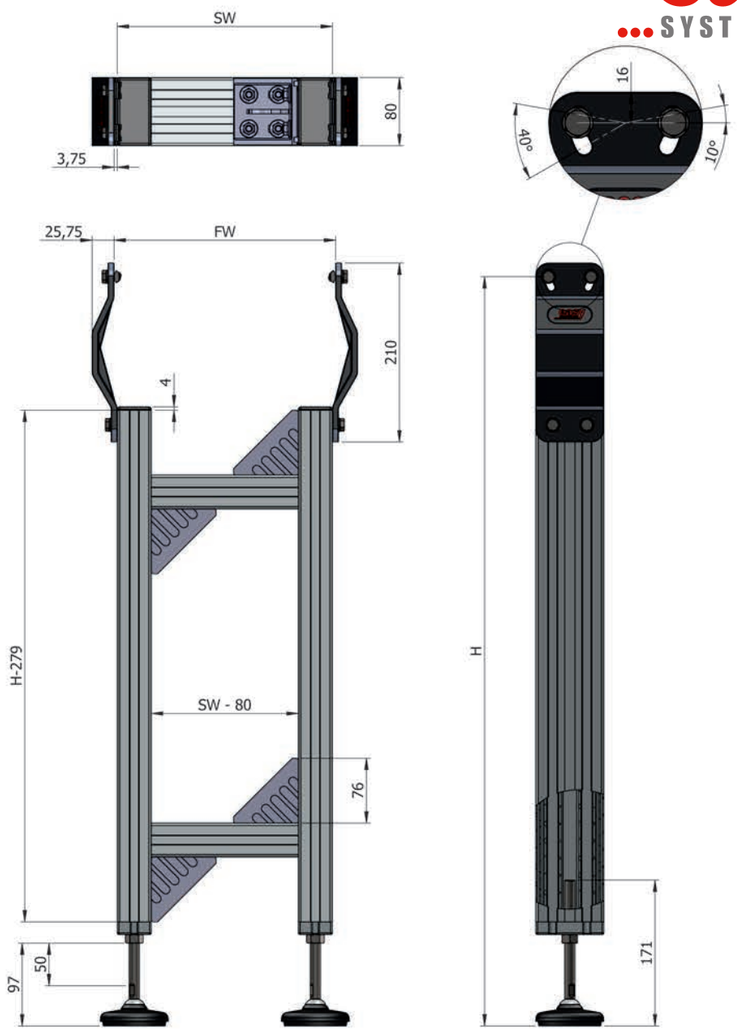
Art Nr. Pos 3	Material	
020102070009 I Profile 80x80L, L= 6070 mm	AL	1

Art Nr. Pos 4	Material	
ETS040808040000 I Support base	AL RAL9005	1

Art Nr. Pos 5	Material	
020102160001 I Bracket 80x80	AL	1 piece, incl. fasteners

Art Nr. Pos 6	Material	
020102140000 I CAP 40x80	PA FG	10

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



Dimensions - Abmessungen - Dimensions - Dimensiones		
FW =		
SW Min =	**156 mm**	6,14” inch
H Max =	**1200 mm**	47,25” inch

Always fasten to the floor, Immer am Boden befestigen
Siempre sujete al suelo, Toujour attacher à l’étage

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

1	I support bracket
2	Profile 40x80L
3	Profile 40x80L
4	Foot plate 40x80L
5	Hinged feet Ø80
6	Hexagon nut
7	Bracket 80
8	Cap 40x80

Art Nr. Pos 1	Material	
ETS040808030000 I I support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2 + 3	Material	
020102070008 I Profile 40x80L, L= 6070 mm	AL	1

Art Nr. Pos 4	Material	
020102150000 I Foot plate 40x80L	AL	1 piece, incl. fasteners

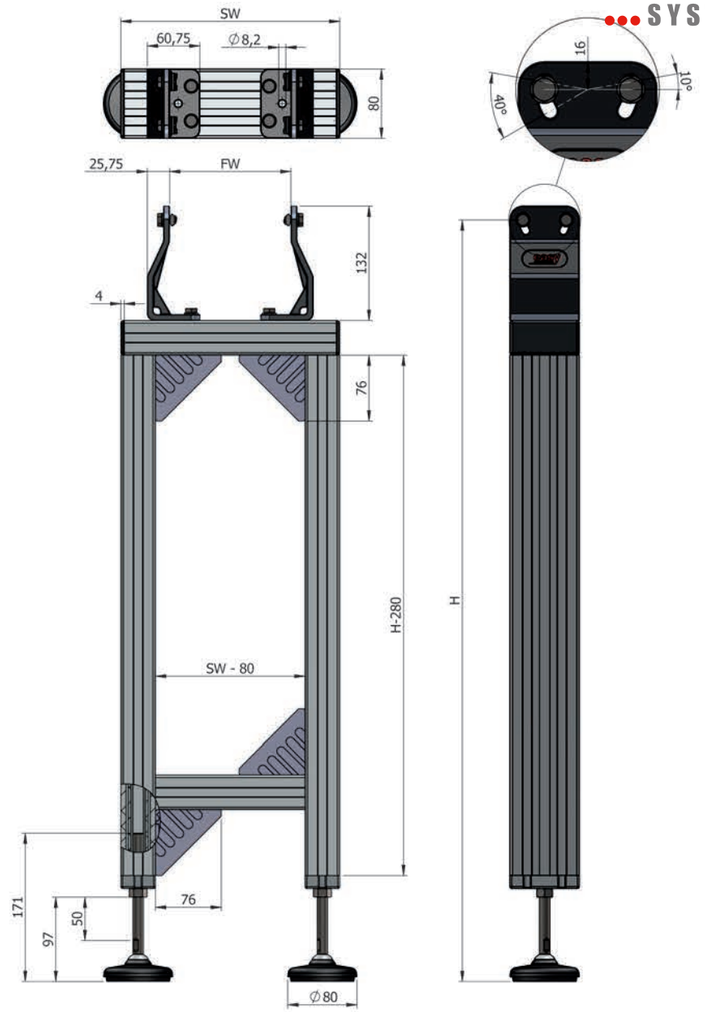
Art Nr. Pos 5	Material	
040707020003 I Hinged feet Ø80	Screw jack: Stainless steel, Foot: Synthetic plastic	1

Art Nr. Pos 6	Material	
BV093412000A2 I Hexagon nut	Stainless steel, Edelstahl, Acier inoxydable, Acero inoxidable	100

Art Nr. Pos 7	Material	
020102160001 I Bracket 80	AL	1 piece, incl. fasteners

Art Nr. Pos 8	Material	
020102140000 I Cap 40x80	PA FG	10

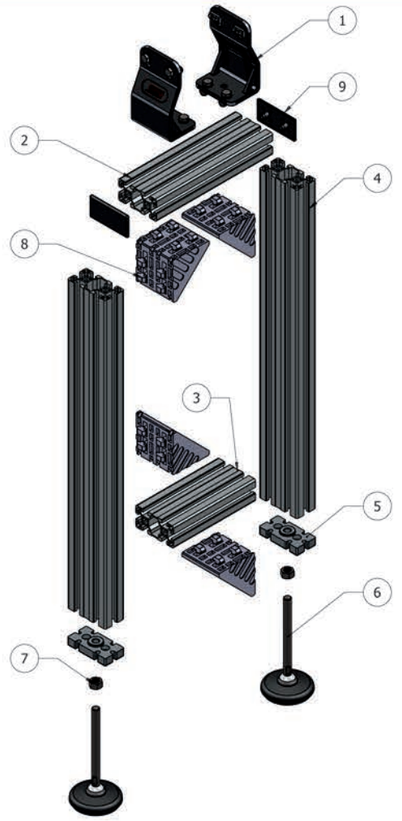
Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



Dimensions - Abmessungen - Dimensions - Dimensiones		
FW =		
SW Min =	**232 mm**	9,13" inch
H Max =	**1200 mm**	47,25" inch

Always fasten to the floor, Immer am Boden befestigen
Siempre sujete al suelo, Toujour attacher à l'étage

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta



1	L support bracket
2	Profile 40x80L
3	Profile 40x80L
4	Profile 40x80L
5	Foot plate 40x80
6	Hinged feet Ø80
7	Hexagon nut
8	Bracket 80
9	Cap 40x80

Art Nr. Pos 1	Material	
ETS040808020000 I L support bracket	PA FG	1 set of 2 pieces, incl. fasteners

Art Nr. Pos 2 + 3 + 4	Material	
020102070008 I Profile 40x80L, L= 6070 mm	AL	1

Art Nr. Pos 5	Material	
020102150000 I Foot plate 40x80L	AL	1 piece, incl. fasteners

Art Nr. Pos 6	Material	
040707020003 I Hinged feet Ø80	PA FG + stainless steel, PA + edelstahl PA Acier inoxyable, PA + acevo inoxidable	1

Art Nr. Pos 7	Material	
BV093412000A2 I Hexagon nut	Stainless steel	100

Art Nr. Pos 8	Material	
020102160001 I Bracket 80	AL	1 piece, incl. fasteners

Art Nr. Pos 9	Material	
020102140000 I Cap 40x80	PA FG	10

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

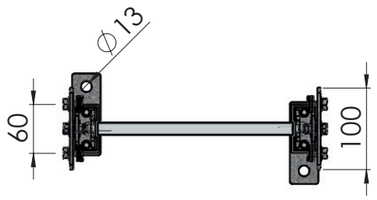
EMCS SYSTEM

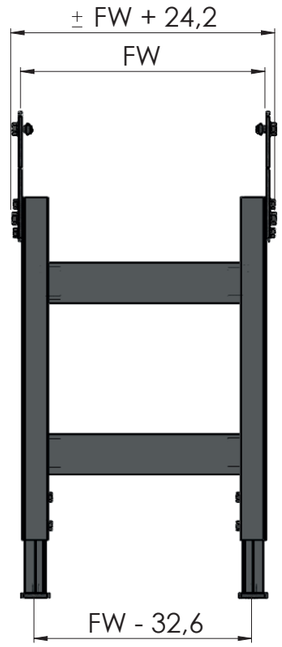
Mat Top Conveyor
Gliederbandförderer
Convoyeur à tapis haut
Transportador de banda articulada

LEG SUPPORT

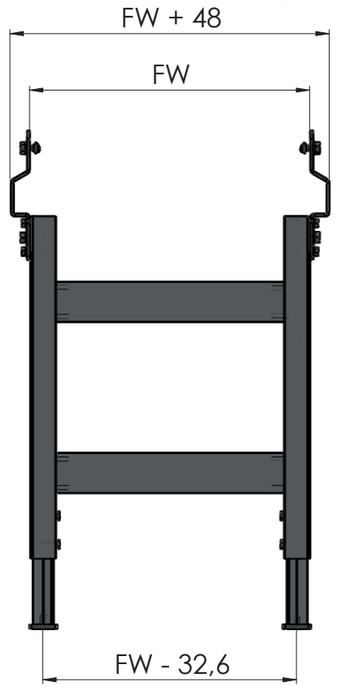
EBS, EMBS, ETS AND EMCS IN HEIGHT ADJUSTABLE

easy ...SYSTEMS





EBS, ETS & EMCS CONFIGURATION



EMBS CONFIGURATION

TECHNICAL DATA

General technical data	
Max. load capacity	200 kg
Min. Adjustable Height	±325 mm
Max. Adjustable Height	±2500 mm
Number of cross members	Type 01 & 02 – 1 piece
	Type 03 & 04 – 2 pieces
	Type 05 – 3 pieces
Side Profile	
Suitable side profile material	Aluminium

Others on request, Andere auf Anfrage,
Autres sur demande, Otros sobre consulta

Type selection

	Conveyor System				
	EBS 40	**EBS 80**	**ETS**	**EMBS**	**EMCS**
Type	Adjustable Height [mm]*				
01.	325 – 400	325 – 440	355 – 430	360 – 435	335 – 470
02.	395 – 540	435 – 580	425 – 570	430 – 575	465 – 610
03.	535 – 820	575 – 860	565 – 850	570 – 855	605 – 890
04.	815 – 1380	855 – 1420	845 – 1410	850 – 1415	885 – 1450
05.	1375 – 2500	1415 – 2540	1405 – 2530	1410 – 2535	1445 – 2570

General Support Stand CONFIGURATOR

Please create the reference number with the following configurator.

1 TYPE
GSS

2 Conveyor System
EBS 40 | EBS 80 | ETS | EMBS | EMCS

3 System Width
Enter Conveyor System Width
Standard:

EBS 40	EBS 80	ETS	EMBS	EMCS
100	200	80	255	170
200	400	140	340	255
300	600	200	425	340
400	800		510	425
500	1000			510
600	1200			680
				850

Special: On request

4 Height
01 | 02 | 03 | 04 | 05

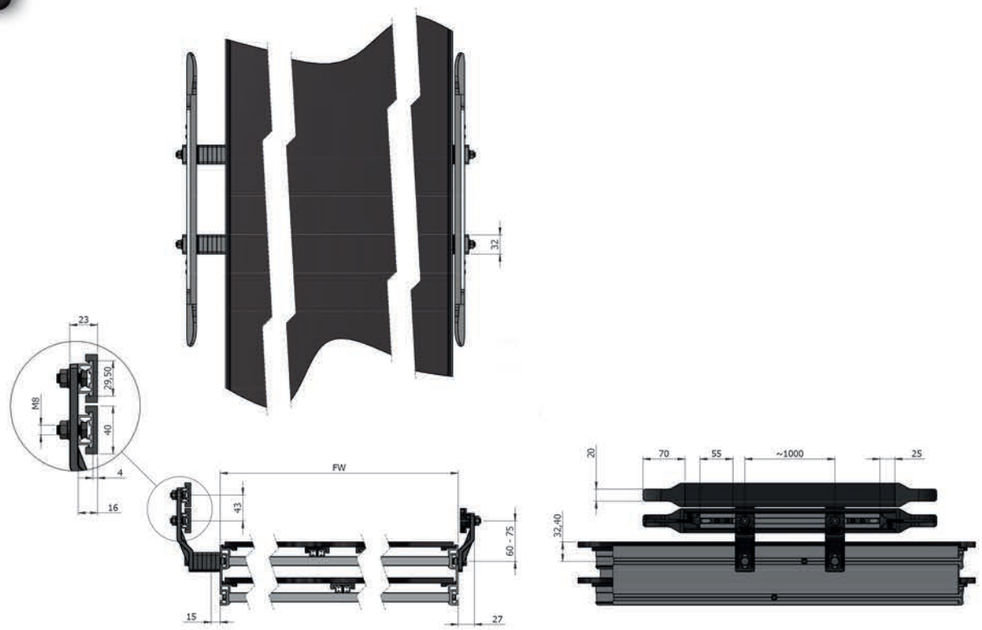
1		2		3		4
GSS	-		-		-	

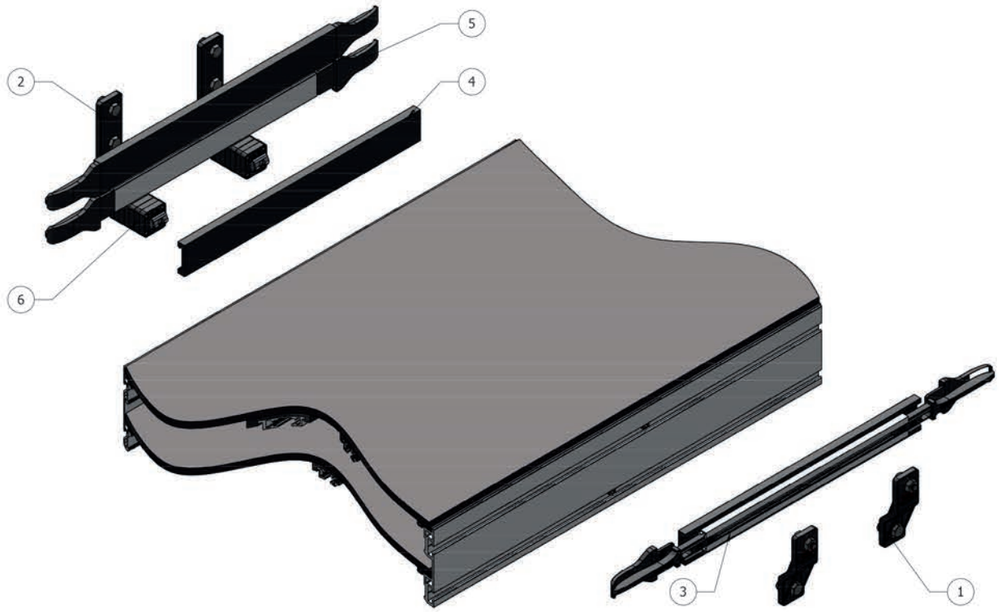
ORDER EXAMPLE

Example for a reference number:
GSS – ETS – 140 – 03

This reference number stand for a General Support Stand with the clearance for an ETS 140 conveyor type with an adjustable top of belt height between 565 mm and 850 mm.

Note:
1. Longitudinal or diagonal cross members are not included.
2. Dependable on conveyor speed, load, start/stops, etc. additional cross members noted under '1.' are not included.





1	Side guiding bracket short
2	Side guiding bracket long
3	Side guide profile AL
4	Side guide cover
5	Guide end
6	Guide spacer

Art Nr. Pos 1	Material	
ETS040809010000 I Side guiding short	PA FG	1 piece, incl. fasteners

Art Nr. Pos 2	Material	
ETS040809020000 I Side guiding long	PA FG	1 piece, incl. fasteners

Art Nr. Pos 3	Material	
ETS040809000000 I Side guide profile AL	AL	1 piece; L=5.6mtr

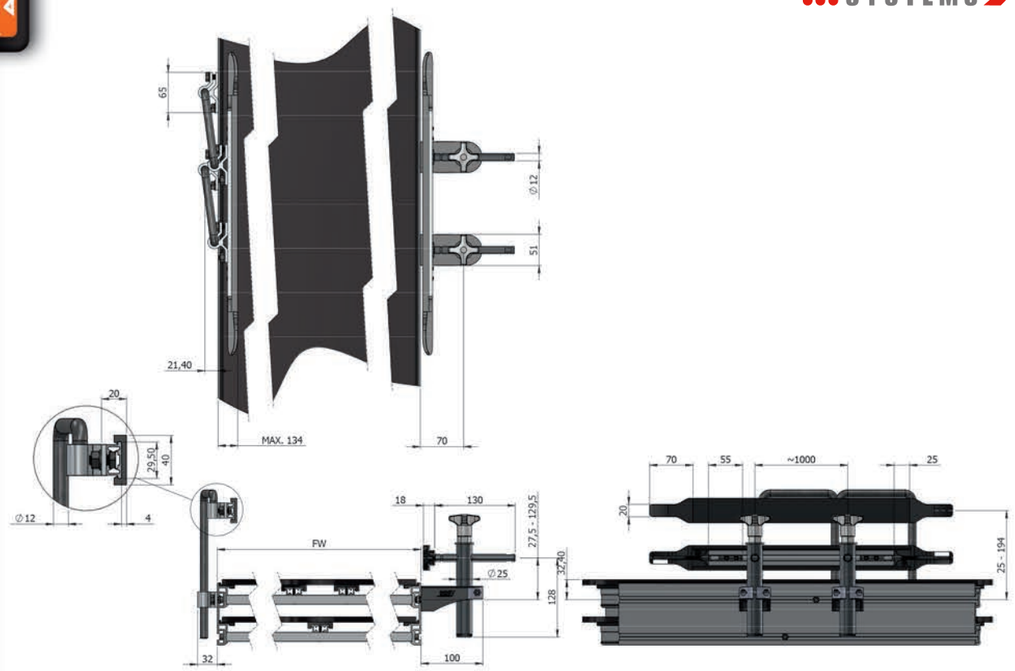
Art Nr. Pos 4	Material	
ECP040103000000 I Side guiding cover	PE	1 piece; l=3mtr

Art Nr. Pos 5	Material	
ETS040809050000 I Guide end 40	PA FG	1 set of pieces, incl. fasteners

Art Nr. Pos 6	Material	
ETS040809040000 I Guide spacer	PA FG	10

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta



1	Adjustable side guide
2	Adjustable side guide
3	Side guide profile
4	Side guide cover
5	Guide end

Art Nr. Pos 1	Material	
ETS040809030000 I Side guide	PA FG + stainless steel, PA + edelstahl PA Acier inoxyable, PA + acevo inoxidable	1 piece, incl. fasteners

Art Nr. Pos 2	Material	
ERA040409010000 I Side guide	AL + steel galvanised, AL + stahl verzinkt AL + Acier galvanisé, AL + Acero galvanizado	1 piece, incl. fasteners

Art Nr. Pos 3	Material	
ETS040809000000 I Side guiding profile	AL	1 piece; L=5.6mtr

Art Nr. Pos 4	Material	
ECP040103000000 I Side guide cover	PE	1 piece; l=3mtr

Art Nr. Pos 5	Material	
ETS040809050000 I Guide end 40	PA FG	1 set of pieces, incl. fasteners

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

Others on request, Andere auf Anfrage, Autres sur demande, Otros sobre consulta

This technical manual has been developed to assist you with specific engineering information when a new conveyor is designed as well as when an existing conveyor is going to be modified. Terms like TPM (Total Productive Maintenance) and SMED (Single Minute Exchange of Dies) are getting more and more important. With the right choice of chains and components you can design your conveyors to meet these principles. A large part of our program suits these principles. With this manual we intend to create some "CONVEYOR AWARENESS". As you will notice, most attention will be given to the construction details for the modular belt or chain, because this is the 'moving part' in a conveyor and therefore more critical when it comes to construction details. We also emphasize on guides as together with the belts, these are in direct contact with the customer's product and therefore of utmost importance. The right choice of type, style of the side guides can make the difference between a medium and a high production efficiency of a filling line.

For additional data and information about technical details of our products please refer to:

- Conveyor Belts catalogue
- Conveyor Roller catalogue
- Conveyor Chain catalogue
- Conveyor Support catalogue
- Conveyor Side guiding catalogue

Contact us To contact your local Technical Support check our website www.easy-conveyors.com or send an email to: info@easy-conveyors.com We cannot take responsibility for imperfections, damage or injuries due to wrong conveyor design, poor installation or improper use of our products made with or without reference to the information in this manual. We appreciate your suggestions to improve this Engineering Manual.

Selecting the size

A product's center of gravity, its inherent stability and its contours determine whether it is suited for transport on a mat top, table top, belt or roller conveyor system. The size of the conveyor system is selected according to the conveyed products, dimensions and weight. The maximum product width depends on its shape and the position of its center of gravity.

EMCS designs

The EMCS version in aluminum is an economic solution for many transport tasks. Open profiles prevent large amounts of contaminants from accumulating in the system and are especially easy to clean. The stainless steel version is used in areas that require wet cleaning or the use of acidic or alkaline cleaning agents to comply with stringent hygiene rules, as for primary packaging in the food industry.

Notes on system layout

- Using a center drive is similar to the conveyor system with the "sag" modules. The only exception is that it can be used in a reversing operation. However, it cannot handle the same heavy loads!
- There is a limit on the maximum weight of the transported product and the maximum length of the conveyors due to the permissible belt tensile force.
- The maximum width of a transported product depends on the position of its center of mass and the lateral guides.
- When using a conveyor with cleats for vertical transport, the maximum weight of a single product is limited by the strength of the cleats.
- Accumulation operation is not possible with static friction belt or cleated belt.
- Pay attention that the slide rails and section profiles are clean when assembling the system. Metal shavings or dust are highly abrasive and cause an extreme amount of wear!
- Accumulation must never occur at the drive wheels.
- Depending on the system's construction and the product being conveyed, certain places pose a risk of pinching / crushing. Appropriate safety devices must be provided in the operating area, as required. Also observe the notes in the assembly instructions which can be found in the download section at http://www.easy-conveyors.com
- Avoid conveying materials with a temperature higher than 60°C
- The maximum pulling force of the EMCS belt solid top on the straight is 21.600 N / m (this is Newton per meter width of the belt) and the EMCS belt with a rubber surface has a maximum pulling force from 35.000 N / m.

Conveyor length

Conveyor length depends on

- Chain/belt type
- Lubrication
- Product
- Load
- Etc.

Operating temperatures

Dry : -40°C to + 80°C

wet : 0°C to + 65°

Type	Max. advisable length [m]
Plastic chains,	22 - 30mtr

These are indicative figures. In any case it is recommended to double check the conveyor length by calculating the resulting chain pull.

A phenomenon called slip stick effect occurs unpredictably. It depends on speed, load, construction and lubrication. Pulsating dynamic forces are the result and affect the service life of all components of a conveyor. More importantly it influences product handling in a negative way. Long conveyors should be avoided in such cases.

Long conveyors result in high chain load, which affects many components of the conveyor and their wear life.

Conveyor speed

Maximum speed in m/min

Type	Max. advisable length [m]		
	Dry	Water	Water & Soap
Plastic chains,	45	80	115

Under abrasive or high load conditions the maximum speed is reduced. Higher speed causes higher wear in any case. For higher wear resistant materials contact our technical support.

Sprocket position for belts

Nominal belt width	Recommended number of sprockets/ idler wheels
170	2
255	3
340	4
425	5
510	6
680	8
850	10

Fix only one sprocket (centre sprocket), if the belt is running without positioners or any other lateral guide.

WEAR STRIPS

Construction:
There are different ways of supporting a chain or belt with wear strips:
- Parallel support => this way is as default for our systems;
- Heavy duty support => in case of heavy load and/or high impact;

Make sure the wear strip is chamfered at the entry side and that there's enough space between the lengths of wear strip to absorb thermal expansion:

Thermal expansion TCP: 10-15 mm/m +10 °C (K)

Thermal expansion TCS: 0.10-0.15 mm/m / °C

Heavy duty support: In case of heavy loads or high impact, it's advisable to support the belt. Bear in mind that a heavy duty support can also easily collect dust and dirt. Make sure abrasives can leave the system.

Selection of wear strip material:

Wear strip material	Plastic chains	
	Dry	Lubricated
TCS	recommended	possible
TCP	possible	possible

Temperature limits of wear strip materials must be considered.

TCS
- UHMWPE with built in dry lubricant
- Offers even lower coefficient of friction and less noise emission than standard UHMWPE
- Basic material properties are similar to UHMWPE

TCP
- To be used in slightly abrasive conditions
- Absorption of humidity to be considered

APPLICATIONS

Static electricity
Anti Static (AS) chain and belt material has the following properties: Surface resistivity: 10^5 Ω/sq (According to IEC60093 test method) Volume resistivity: 10^3 Ωm

In order to avoid sparks:
- It must be assured on site that the electric charge is dissipated to the ground.
- Wear strips must be conductive and grounded.
- Sprockets and idler wheels must be conductive and grounded.

For further information regarding use of our AS chains in hazardous areas please contact our Technical Support.

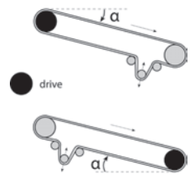
Noise reduction
- When designing a layout use multiple strand or wider belt running at a lower speed rather than single stand or narrow belt running at higher speed.
- Avoid chain/belt colliding with conveyor parts.
- Reduce speed differentials and thus product impact.
- Adjust sprockets/idlers according to our recommendation in the catalogue
- Use materials with optimized sliding properties (e.g. TCS wear strips, product guides).
- Apply lubrication..

Inclined and declined conveyors
Maximum angles to avoid product sliding down on the chain

Chain type	Lubricated	Dry
Plastic chains/belt	2.5°	4.5°
Rubber top chains plastic	12 / 15°	15 / 20°

Pollution on the chain as well as on the product surface influences the maximum angles negatively.

Declines:



tan(α) > friction coefficient between chain and wearstrips Soft start/ stop is recommended.

tan(α) < friction coefficient between chain and wearstrips Soft start/ stop is recommended.

Dynamic tensioner is in both cases recommended.

Inclines:

Drive is normally located at the upper end. Soft start/stop is recommended.

Dynamic tensioner is recommended.

Accumulation
Accumulation of products results in increased load on the chain as well as in increased wear on chain/belt and product.

Cleaning:
The cleaning regime needs to be re-evaluated when going away from wet lubrication because:
- Wet lubricant has also cleaning effect
- More dedicated cleaning is required f.e. where product loss occurred

---

Product quality:
The type and quality of the material has an influence on the behavior on the conveyors like:

- Quality of PET
- Quality of Cans
- Quality of Glass

- Raw material	- Steel/ aluminum	- Raw material; origin
- Colorants	- Painted or varnished	- New or returnable
- Blockers	- Design	- Design
- Other additives	- Material thickness	- Surface finish of bottle
- Design/ settings of machine		

Process:
When designing a layout please bear in mind that the line is going to run without wet lubrication. Think about:

- Wider conveyors -> slower speed
- Longer inliners/outliners
- Shorter buffer sections [?] Back Line Pressure
- Optimized line controls
- Larger radius curves

Mechanical:
Some small mechanical issues on conveyors that seem not to create problems need to be addressed when going away from wet lubrication. Make sure that the chains/belts are running completely free (without obstruction). Some points of attention:

- TCS wear strips and curves with built-in lubricant can replace the wet lubrication to a certain extent.
- Perfect alignment of different sections.
- Smooth transfers of wear strips.
- Stable and straight side guides at right position.
- Positioning of sprockets and idlers.

Factor H:
The most important factor is the Human Factor: the people that are dealing with the line.

- How do the local people deal with the line?
- Who's responsible?
- How are the contracts made?
- 'Mind set' change when reducing lubrication!
- Never mix products! -> f.e. teflon spray in combination with dry lubricant creates high friction

---

So, is Dry Lubricant a good idea?

- Yes, in a good number of cases it brings interesting advantages.
- But be aware of the down side to get the full benefit!

Completely dry may be better?

- In certain areas of the bottling line and certain products: yes
- Depalletiser + outfeed conveyors
- Labeling, coding and packaging areas
- Cans and PET and even glass
- Beware of abrasives & chemicals

EMCS Calculation information:
Easy Modular Chain is a used design to convey carton, plastic,glass products etc., small sized products and unstable containers (for example PET bottles with petaloid base). In most applications the load on the belt can be relatively high because:

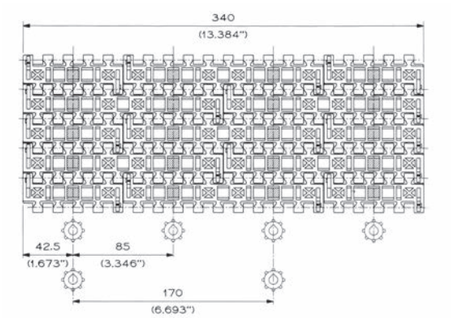
- The products are heavy
- There is usually no lubrication

Therefore it is very important that every application of a side flexing belt is calculated prior to fixing the final layout of the line. Our Technical Support department will be glad to assist you with the calculations.

Sprocket positions and supporting wheels:
Since these belts are not symmetrical to the middle axis, please note that the precise sprocket position also depends on the running direction of the belt. The right position for both directions is given in the sketches below.

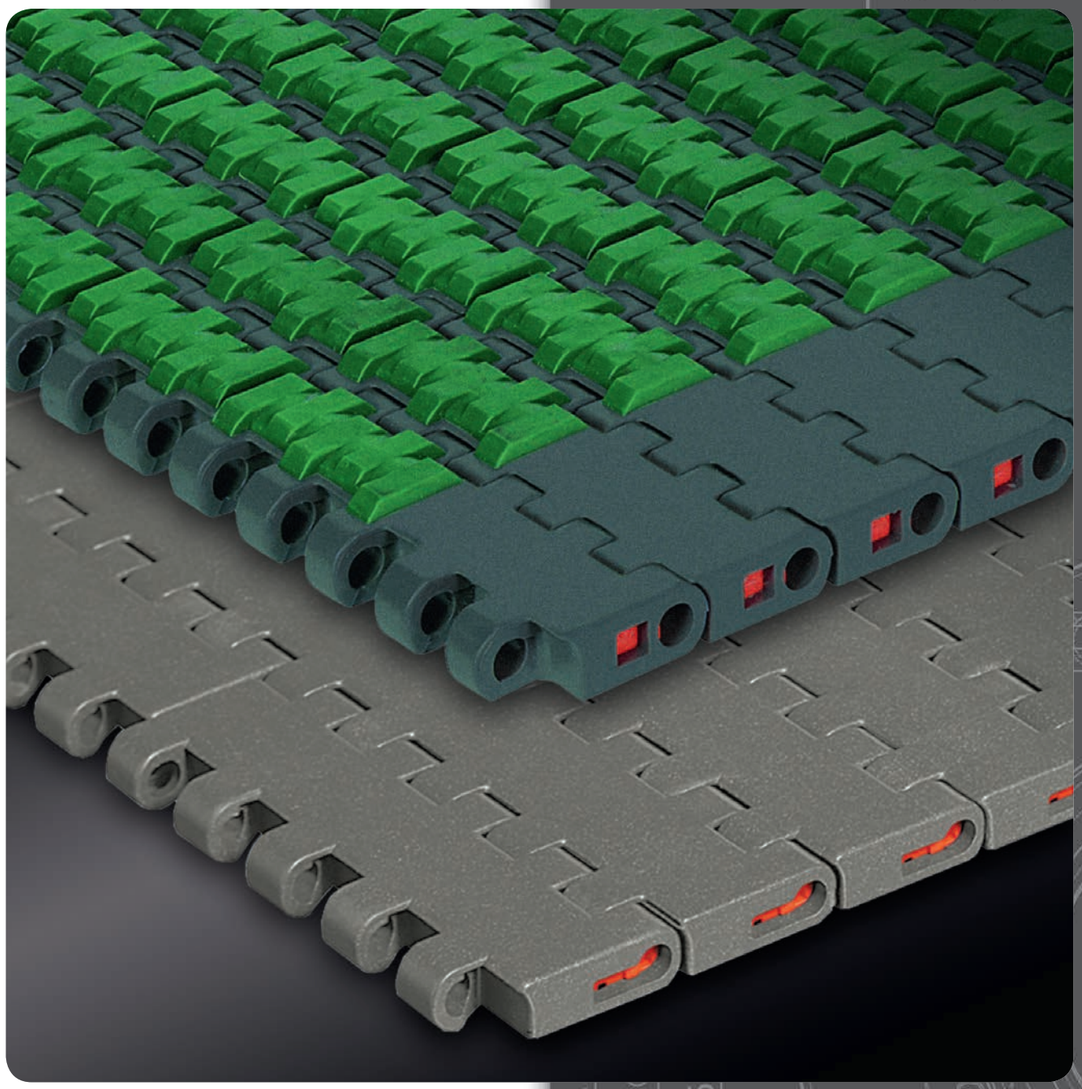
Note: Precise position of the sprockets must be determined during the installation to obtain optimum alignment.

MODULAR BELTS:
For other widths please always consider the same first pocket position dimension of 42,5 mm (1.673") from belt edge, and 85 mm (3.346") spacing between other consecutive pockets.
A spacing of 170 mm (6.693") between idler sprockets (or wheels) should normally be used on idler shaft.
The example refers to a 340 mm (13.384") wide belt.



Recommended number of sprockets and idler wheels, summary:

EMCS	
170	2
255	3
340	4
425	5
510	6
680	8
850	10



Product handling Forces due to acceleration:
The force necessary to accelerate the chain and products is calculated by:

$$F = M * a$$

F = force in [N]
M = mass of chain and product in [kg]
a = acceleration in [m/s²]

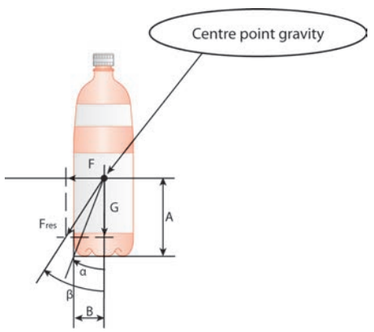
This extra force is working not only on the chain but also on the bearings, the drive unit and the structure. Frequent start-stops create an extra fatigue load on the chain and thus shorten the life time of the chain. In the calculation there's a factor included depending on number of start-stops per hour. Soft starts or frequency controllers are always advisable. Not only for the life time of the chain but also for smoother product handling and avoiding problems at start-up with products particularly unstable.

Maximum acceleration:
The max acceleration force on a product to be able to 'take along' the product with the chain is depending on the friction between product and chain. Maximum acceleration $\mathbf{a}_{max}$ can be calculated with:

$$a_{max} = \frac{F_{max}}{M} = \frac{W * \mu}{M} = \frac{M * g * \mu}{M} = g * \mu$$

W = weight of product in [N]
M = weight of product in [kg]
μ = coefficient of friction between chain and product
g = gravitational acceleration = 9.81 m/s²

Maximum force on products to avoid tip page:
The maximum acceleration without products falling over is depending on the shape (position of centre of gravity), the weight and the material of the product. This is for instance also important when the product is being conveyed onto a dead plate. See below sketch:



G = weight product
F = horizontal force on product
F_{res} = horizontal force on product

The force F is the force due to acceleration or deceleration of the product (F=M*a), or due to a different cause like other bottles or a side guide. The bottle will tip over when the angle ß is larger than angle α. Angle α is determined by the diameter of the foot print of the product (B= ½ * diameter) and the height of the centre point of gravity (=A).
Angle ß is determined by the horizontal force on the bottle (= F) relative to the weight of the bottle (= G).
The max force F is found by following formula:

$$\frac{F_{max}}{G} = \frac{B}{A} \rightarrow F_{max} = G * \frac{B}{A}$$

or

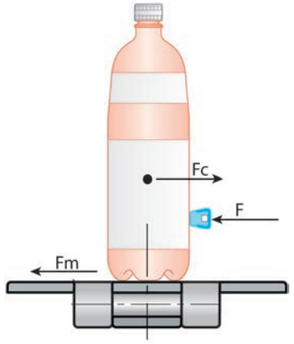
$$\mu < \frac{B}{A} \longrightarrow \text{OK}$$

$$\mu > \frac{B}{A} \longrightarrow \text{not OK}$$

MSV= maximum speed variation

$$MSV = \sqrt{2 * g\left(\sqrt{H^2 + B^2} - H\right)}$$

Centrifugal forces:
When a product is being conveyed through a curve there's a centrifugal force working on the product. This force on the product is compensated by the friction between chain and product and by a side guide.



The centrifugal force is calculated with:

$$F_c = \frac{M * v^2}{r}$$

M= weight of the product
v = speed
r = centre radius of the curve

Friction force between chain and product is calculated with:

$$F_m = M * g * \mu$$

g = gravitational acceleration
μ = coefficient of friction between chain and product.

The minimum force F that needs to be generated by the side guide is:

$$F = F_c - F_m = M * \left[\frac{v^2}{r} - g * \mu \right]$$

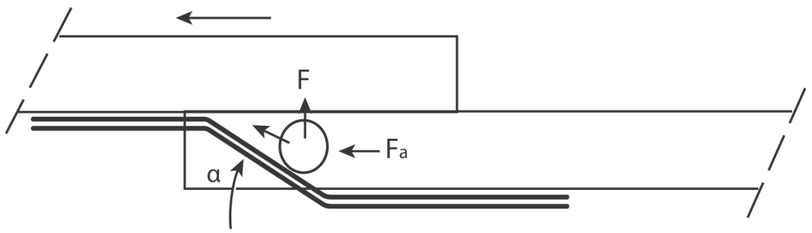
Pressure of accumulating products:

When a product is standing still (e.g. against a stopper or guide), the chain running underneath the product creates a force on the product equal to the weight of the product multiplied by the coefficient of friction between chain and product. Each following product is pushing with the same force against the next product, so the resulting force is proportional to the total weight of products upstream.

$$F_a = W_a * L_a * \mu$$

Fa = accumulation force
Wa = weight of the accumulating products in Kg/m.
La = length of accumulation in m
μ = coefficient of friction between chain and product.

Side transfer action:



Pushing the product sideward creates a force F on the product against the side guide

$$F = F_a * \sin(\alpha) = W_a * L_a * \mu * \sin(\alpha)$$

(see explanation of symbols above)

Nowadays cans and bottles are becoming thinner and thinner. At the same time more and more installations are running with less or no lubrication and are so increasing the coefficient of friction.

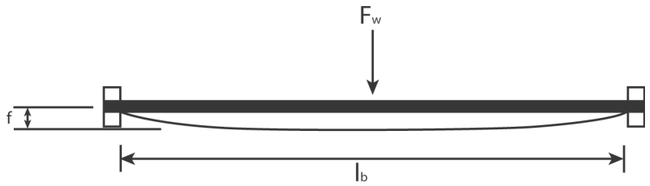
That's why it's important to take also these forces on the products into consideration. In the above mentioned formula the angle α plays an important role in a smooth transfer and reduced forces on the products. This angle should be kept a small as possible.

Shaft size:

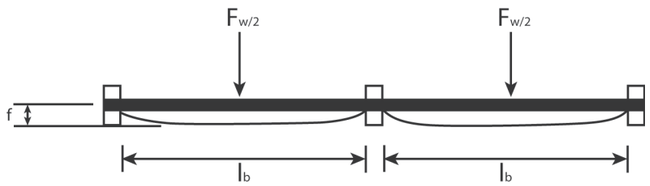
The shaft must fulfill the following conditions:

- max shaft deflection under full load (Fw). fmax is 2.5 mm. If the calculated shaft deflection exceeds this max value, select a bigger shaft size.
- Torque at max load must be below critical value

Shaft deflection can be calculated with following formula:



$$f = 0.013 * F_w * \frac{l_b^3}{E * I} \ [mm]$$



$$f = \frac{1}{370} * F_w * \frac{l_b^3}{E * I} \ [mm]$$

For uni-directional head drive Fw = Ts
For bi-directional centre drive Fw = 2 * Ts
For uni-directional pusher drives Fw = 2.2 * Ts

Shaft size [mm]	Inertia [mm4]
Ø20	7850
Ø25	19170

Shaft material	Modulus of elasticity E [N/mm2]	Shearing strenght [N/mm2]
Stainless steel (low strength)	195000	60

The torque on the shaft is calculated with:

$$T_{max} = F_W * \frac{d_p}{2} * 10^{-3} \quad [Nm]$$

$$T_{adm} = \eta_{adm} * \frac{d^3_w}{5000} \quad [Nm]$$

T_{max} = maximum torque
T_{adm} = admissible torque

η_{adm} = admissible shearing strength [N/mm²]

for max. admissible shearing strength see table below:

	Maximum allowable torque
Shaft diam. [mm]	Stainless steel [Nm]
Ø20	141
Ø25	276

Bearings:

Relubrication is depending on the operating conditions. Dust, load, humidity, temperature, vibrations: all affect the relubrication interval. Below table show indicative values for relubrication intervals. Please note that all our bearing are pre-greased in the factory. These is no need for immediate re-greasing. Furthermore, regreasing should be done in small amounts and with care.

Use conditions	Temperature	Re-lubrification period
Clean	up to 50°C	1-2 years
Clean	50 ÷ 70 °C	4 -8 months
Clean	70 ÷ 100 °C	1 - 3 months
Dirty	up to 70°C	2 - 8 week
Dirty	70 ÷ 100 °C	2 - 4 week
Humid + wet	-	1 - 2 week

Standard PIN Material

(PP) Polypropylene

(PBT) Polybutylene Terephthalate

Standard Flight Material

(LW) DuPont™ Delrin® special acetal resin

It offers better wear resistance for more demanding applications.

Consistently low coefficients of friction.

(UP) DuPont™ Delrin® special acetal resin

It offers better wear resistance for more demanding applications.

Consistently low coefficients of friction.

Rubber materials

Applications

Packaging lines (cardboard, shrink packs).

Paper and cardboard boxes.

General conveying on inclined conveyors.

HF Modular Belts

Modules are available in:

• UP - DuPont™ Delrin® special acetal resin.

High friction surface is thermoplastic rubber (see table below).

MATERIAL	COLOUR	AVERAGE HARDNESS	NON SUITABLE WITH	RESISTANT TO
THERMOPLASTIC	GREEN	80 ShA	STRONG ACIDS AND BASES	OILS

Benefits

- Outstanding rubber retention (Patent Pending).
- Excellent and reliable rubber grip.
- Large sliding surface for extended wear life.
- Wide sprocket tooth for reliable drive and extended life.
- The maximum angle of the ramp is a function of type, shape and material of the product to be conveyed.

Temperature and other environmental conditions can influence maximum value of the incline.

Storage of plastic chains and belts

- Materials of our plastic chains and belts offer best stability and resistance against environmental effects at appropriate storage:
  - in the original packaging,
  - without environmental radiation / UV light,
  - dry- in a non aggressive environment - a temperature between 5°C and 35°C

- First IN, First OUT.
  We have applied that procedure in our logistic department.
  We recommend this procedure to any external warehouse.

- Do not stack pallets or other heavy goods on top of chain packs. Chains inside the packs might get damaged.
- Do not stack chain packs higher than the original stacking height – as dispatched from our shipping department.

Coefficients offriction

Below listed coefficients can be used as a guideline. Dependent on environmental and application requirements (temperatures, lubricant, material combinations, dirt/debris, product and chain/belt surfaces, etc.) the coefficients are subject to variation.

Coefficient of friction between chain and wearstrip:

Friction coefficient Chain/Slide rail (μ_T)

	Dry	Dry	Dry	Water	Water & Soap	Oil
	Normal	Dirty	Rough			
Straight sections **TCP**	0,2	0,4	0,5	0,16	0,10	0,10
Straight sections **TCS**	0,18	0,35	0,45	0,14	0,10	0,10

Friction coefficient Belt/Drive & Return (μ_R)

	Dry	Dry	Dry	Water	Water & Soap	Oil
	Normal	Dirty	Rough			
Head drive unit	0,3	0,40	0,50	0,24	0,15	0,15
Return unit	0,3	0,40	0,50	0,24	0,15	0,15
Center drive unit	1,0	1,35	1,70	0,8	0,5	0,5

Coefficient of friction between chain and product (μ_{ST}):

Lubrication	Product material					
	Paper carton	Metal (steel)	Aluminum	Plastics incl, PET	Glass (return)	New glass, ceramics
Dry	0,28	0,25	0,25	0,21	0,24	0,20
Water		0,20	0,18	0,16	0,18	0,15
Water & Soap		0,15	0,14	0,13	0,14	0,12

EMCS SYSTEM

easy ...SYSTEMS

Chemical resistance

Data shown in the table was taken from laboratory tests performed on unstrained samples and are merely indicative, Chemical resistance under normal working conditions can depend on various factors, such as stress and temperature, concentration of the chemical agent and duration of its effects, Valid for ambient temperature (21°C)

Chemical agent	METALS								PLASTICS												RUBBERS							
	EXTRA		AISI 304		AISI 316		OT.NI		POM		PBT		PP		PA		PE		EPDM		NBR		SEBS		VITON	
	C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %	
Acetic Acid	5	☆	20	☆	100	☆		O	5	●	10	☆	40	☆	10	●	10	☆	25	☆		●	25	O	20	●
Acetone		☆	25	☆		☆		☆		O		O		☆	100	☆		☆		☆		●		O		●
Acrylonitrile						☆								☆	100	☆				☆		●		O		●
Aluminium chloride				O	10	O								O	10	☆				☆		☆		☆	SA	☆
Aluminium sulphate					SA	☆								☆	10	☆		☆		☆		☆		☆	SA	☆
Amyl alcohol				☆		☆						☆		☆	10	☆		☆		☆				☆		☆
Ammonia		☆	100	☆		☆		●		☆		O	30	☆	10	☆		☆		☆		O		O		O
Ammonium chloride				O		☆							10	☆	10	☆				☆		☆		☆	SA	☆
Aniline		☆		☆		☆								☆	100	O	3	☆		●		●		●		☆
Barium chloride				O	SA	☆								☆	10	☆				☆		☆		☆		☆
Beer		☆		☆		☆		☆		☆				☆		☆		☆		☆		☆		☆		☆
Benzene		☆	70	O		☆				☆		●		☆				O		●				●		
Benzoic acid			100	☆	SA	☆						☆	SA	☆	SA	O				●		☆		●		☆
Benzol				☆		☆		☆		☆		☆		O	100	☆		O		●		●		●		O
Boric acid		O	SA	☆		☆					10	☆	SA	☆	10	☆	SA	☆		☆		☆		☆	SA	☆
Brine	10	●		O		☆						☆		O		O		☆		☆				O		
Butter				☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		O		☆
Butyl acetate						☆						O		O	100	☆				O				O		●
Butyl alcohol				☆										☆	100	☆				☆		O		☆		☆
Butyl glycole						☆								☆	100	☆				☆				☆		
Calcium chloride		●		O		☆		☆				☆	50	☆	10	☆	SA	☆		☆		☆		☆	SA	☆
Carbon sulphide				☆		☆				☆				☆	100	☆				●		●		●		☆
Carbon tetrachloride			10	☆				☆		☆				●		☆						●				☆
Chlorine water		●		●		O				●		●		●				●	3	O			3	O		
Chloroform		O	10	☆		☆		☆		●		●		O	100	●		●		●		●		●		☆
Chromic acid			25	☆	50	O						O			1	O			50	O		●	50	●	50	☆
Citric acid	10	☆		☆	SA	☆		●		O	10	☆	10	☆	10	O		☆		☆		☆		☆	SA	☆
Cyclohexane						☆						☆		☆	100	☆				●		☆		●		☆
Cycloexanol						☆						☆		☆	100	☆				●		☆		O		☆
Decalin						☆						O		O		☆				●		○		●		●
Dioxane						☆						☆		O		☆				O		●		●		
Distilled water		☆	10	☆		☆		☆		☆		☆		☆		☆		☆		☆				☆		●
Ethyl acetate				O		☆						O		☆	100	☆						●				O
Ethyl alcohol				☆						☆			96	☆	96	☆						O				☆
Ethyl chloride				☆				O						●	100	☆		O				O				●
Ethyl ether						☆						☆		☆	100	☆										☆
Ferric chloride				O		☆					10	☆		☆	10	☆				☆		☆		☆	SA	☆
Food fats		☆	100	☆		☆				☆		☆				☆		☆		O		☆		O		☆
Food oils		☆		☆		☆				☆				☆		☆		☆				☆				☆
Formaldehyde		☆		☆		☆		☆		☆		☆	40	☆	30	☆		O		O		O		O	40	●
Formic acid	2	O		●	100	☆		☆	10	●		O			10	●	10	●		☆		●		☆		O
Freon 12				☆								☆				☆						☆				☆
Fresh water		☆		☆		☆						☆		☆		☆		☆		☆		☆		☆		☆
Fruit juice		☆		O		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Gasoline		☆		☆		☆		O				O		O		☆		O		●		O		●		☆
Glycerine		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆		☆
Hydrocloric acid		●		●		●		O	35	●	20	O	30	☆		●	35	☆	15	☆		O	15	☆	37	☆
Hydrofluoric acid				●		●							40	☆		●	70	☆				●			48	☆
Hydrogen peroxide	3	☆		☆	100	☆										●			30	O		●	30	●	90	☆
Isopropyl alcohol						☆						☆		☆		☆				☆				☆		☆
Lactic acid		O				☆		●		☆	10	☆	20	☆		☆		☆		O		☆		O		☆
Linseed oil				☆		☆				☆		☆		☆		☆		☆		O		☆		●		

Chemical agent	METALS								PLASTICS												RUBBERS							
	EXTRA		AISI 304		AISI 316		OT.NI		POM		PBT		PP		PA		PE		EPDM		NBR		SEBS		VITON	
	C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %		C %	
Magnesium chloride				O		☆						☆		☆		☆				☆		☆		☆	SA	☆
Methyl acetate				O		☆						O		☆		☆				O		●		●		●
Methyl alcohol			80	☆		☆		☆		☆		☆				☆				☆		O		☆		O
Methylene chloride		O		O		☆				●		●		O		☆		O		●		●		●		O
Milk		☆		☆		☆		☆		☆		☆		☆		☆		☆		O		☆		☆		☆
Mineral oil				☆		☆				☆		☆		☆		☆		☆		●		☆		●		☆
Nitric acid	25	O	65	☆						☆				☆		●		O			10	●			70	☆
Nitrobenzene						☆						☆		☆		☆				●		●		O		O
Oleic acid		O		☆		☆		☆				☆		☆		☆		O		●		O		●		O
Oxalic acid			65	☆		☆					10	☆		☆		O				O		O		O		☆
Paraffin						☆				☆		☆						☆		O				●		
Petroleum				☆		☆		☆		☆		☆		☆		☆		●		●		☆		●		☆
Petroleum ether				☆		☆		☆		☆		O		☆		☆				●		●		●		☆
Phenol				☆		☆						●		☆		●				O		●		O		☆
Phosphoric acid	25	O		●		☆		●		●		●		☆		●		☆		☆	20	O		☆	85	☆
Potassium bichromate					SA	☆						O		☆		O				☆		O		O	SA	☆
Potassium bromite						☆						☆		☆		☆				☆		☆		☆		☆
Potassium hydroxide		☆	50	☆		☆				●		●		☆		☆		☆		☆		☆		☆		☆
Potassium permanganate				☆		☆						☆		☆		●			10	☆		●	10	O		☆
Sea water		●		☆		☆		☆		O		☆		☆		☆		☆		☆		☆		O		☆
Silicone oil						☆						☆		☆		☆				☆				☆		☆
Silver nitrate				O		☆								☆		☆				O						☆
Sodium carbonate		☆	100	☆	SA	☆				☆	10	☆		☆		☆		☆		☆		☆		☆		☆
Sodium chloride		O		O		☆		☆		☆				☆		☆		☆		☆		☆		☆	SA	☆
Sodium hydroxide	40	☆		☆	60	☆					10	●		☆						☆				☆		
Sodium hypochlorite				●	SA	O				●	10	O		☆		☆	10	☆		●	10	O	5	☆		
Sodium silicate			100	☆		☆										☆				☆		☆		☆		☆
Sodium sulphate			100	☆		☆										☆				O		☆		☆		☆
Soft drinks				☆		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Suds				☆		☆				☆	10	☆		☆		☆		☆		☆		☆		☆		☆
Sulphuric acid		●		●		O		☆		●	2	☆		☆		●		O	50	☆		●	50	O	95	☆
Tartaric acid		☆	50	☆		☆		●		O	50	☆		☆		☆		☆		O		☆		☆		☆
Tetrahydrofuran						☆						☆		O		☆				●		●		●		●
Tetralin				●		☆						☆		●		☆				●		●		●		☆
Tincture of iodine				O		☆		●						☆		●		☆		O		●		O		☆
Toluol		☆				☆						☆		☆		☆				●		●		●		O
Transformer oil		☆				☆						☆		O		☆				●		☆		●		☆
Tricholoethylene				●	100	☆						●		O		O				●		●		●		☆
Triethanolamin						☆						☆		☆		☆				O		●		O		●
Turpentine		☆		☆		☆				●		☆						●		●				●		
Vaseline						☆						☆				☆		O		●		☆		●		☆
Vegetable juice		☆		☆		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Vegetable oils		☆		☆		☆				☆		●		☆		☆		☆		O		☆		O		☆
Vinegar		☆		☆	100	☆		☆		☆	10	☆		☆		☆		☆	25	☆		O	25	O		●
Water and soap		☆		☆		☆				☆		☆		☆		☆		☆		☆		☆		☆		☆
Whisky		☆		☆		☆		☆		☆		☆		☆		☆				☆		☆		☆		☆
Wine		☆		☆		☆		☆		☆		☆		☆		☆		O		☆		☆		☆		☆
Xilol		☆		☆		☆		O		●		☆		●		☆		☆		●		●		●		☆

ABBREVIATION

C = concentration
SA = saturated

☆ = good resistance
● = insufficient resistance (not recommended)

O = fairly good resistance depending on use conditions
blank spaces = no tests performed

EMCS SYSTEM

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Parameters affecting wear rate

Operating conditions:
- Load
- Speed
- Number of starts per hour- No soft start/frequency inverter controlled drive
- Product accumulation
- Lubrication
- Water quality
  - Concentration of chlorines
  - Water hardness
  - Contaminations
  - Discontinuous water supply
- Lubricant
  - Suitability/performance
  - Dosing
  - Efficiency of nozzles

Cleaning:
- Cleaning agent
  - Frequency
  - Intensity
  - Rinsing
  - Concentration
  - Temperature
- Chemical attack

Environment:
- Temperature
- Humidity
- Wear increasing media/abrasives
- Corrosion
- Cleanliness- Soil e,g, from construction work

Conveyor components:
- Material quality
- Construction
- Dimensional accuracy of
  - Wear strips
  - Sprockets
  - Idlers
  - Return rollers
  - Shaft alignment

Conveyor construction:
- Choice of chain/belt
- Suitability of selected chain/belt for the application
- Mounting of wear strips
  - Flatness
  - Chamfers
  - Raised portions
  - Expansion compensation gaps

Changed/modified conditions:
- Modification of conveyor or its parts/components
  - Maintenance
  - Overhaul

Cleaninginstructions

Cleaning is necessary to:
- minimize dirt and debris built up
- keep bacteriological situation under control
- elongate service life of chains/belts
- ensure smooth running of chain/belt for optimum product stability
- prevent crashes due to f,e, glass debris
- prevent malfunction due to sticky residues
- keep friction low

Frequency:

As a rule of thumb we say that cleaning the line once every week is sufficient,

Of course in practice depending on the circumstances this can be more frequent (f,e, during product changes in case of product loss or other pollution) or less frequent in a relatively clean environment,

In the direct surrounding of the filler cleaning will be more frequent anyway, Depending also on the bacteriological situation it may be necessary to clean at least once a day or once every shift,

Also chemicals coming f,e, from a pasteurizer may ask for more frequent cleaning to prevent the chemicals from affecting the chain/belt materials,

In a can line where aluminum cans are filled, there's the aluminum oxide that has to be kept under control, This can occur also far away from filler-pasteurizer, where the line is running dry, When the cans are accelerating on an inliner the remaining drops will fall down with the aluminum oxide on the chain causing a highly abrasive sludge to built up on the inliner, Therefore it may be necessary to clean more frequent also further down the line due to 'local' circumstances,

Method:

Important for an optimum service life of the chains and belts is a general inspection on the conveyors already during operation, Listen for strange –rattling or squeaking- noises, Check transfer plates, return rollers, bearings, etc, Make sure the chain/belt is still running free without extra load or obstruction, Often the service life of a chain/belt is reduced for mechanical reasons that can be sorted easily,

When cleaning we advice to go thru following steps:

1. Check for foreign parts on the conveyor, Check also the return part,
2. Rinse with warm (max 60°) or cold water thoroughly while chain/belt is running,
3. Use mild (PH-5-9) detergent according to suppliers instructions,
4. If necessary clean mechanically (brush) when pollution is hard to remove,
5. Rinse thoroughly with warm (max 60°) or cold water, Make sure all detergent is rinsed off while chain/belt is running,
6. Final mechanical check that chain/belt is running free and without obstruction, During this process it's important not to forget to clean in between carry and return section and underneath where the return support system is,

Especially with plastic chains/belts the detergent in use needs to be checked for compatibility with the plastic materials of the chain/belt,

General:

As obvious as it seems, cleaning is important! Since nowadays pressure on production rates and production costs are getting higher and higher, companies tend to look at cleaning when trying to cut costs,

Less time and resources are available while at the same time the capacity of the lines (and thus pollution and product loss) has to go up,

When companies are setting up a cleaning regime they tend to focus on the individual machines (mainly filler and surrounding) and not so much on the conveyors, Therefore we want to promote 'CONVEYOR AWARENESS' in this respect,

Dry versus wet:

When a wet lubricant is in use (water & soap) product loss is normally flushed off by the water & soap, Often the soap also has a 'cleaning function' built in, But wet circumstances also attract dust and dirt and wet circumstances will increase the growth of bacteria, When a line is standing still during a stop or during the weekend without cleaning, the lubricant will dry in which may cause pollution and changing sliding characteristics of the chains/belt after several times,

Under dry circumstances the conveyors generally remain cleaner, But product loss needs to be cleaned to avoid functional problems of the line,

Therefore functionally speaking wet lubrication is more safe but requires just as well regular cleaning and is a high cost factor,

All together with the present state of conveyor technology it is possible to run a major part of a glass, can or a PET line dry taken into consideration that a regular cleaning regime is in place,

Inspection procedure

1. Inspect chains for unusual wear patterns or damage,
2. Look for excessive gaps between chain flights,
3. Check conveying surface for Flatness, bent or broken Flights,
4. Inspect hold-down tabs or beveled sliding surfaces for excessive wear,
5. Review chain catenary sag for proper amount,
6. If take-ups are used, check that take-up tension is not excessive, Do not preload chain,

7. Check all idlers, rollers, turn discs and sprockets for freedom of rotation,
8. Examine sprockets for excessive wear,
9. Look for debris build up in sprocket tooth pockets,
10. Check for excessive guide ring wear,
11. Check all wear strips and fasteners for excessive wear,
12. Check all transfer points, dead plates, turn tables, turn discs and sprockets for proper elevation and alignment,
13. Review function of lubrication system,
14. Inspect general cleanliness of conveyor system,

Installationprocedure

1. Check all sprockets, idlers, turn discs and rollers for proper elevation and alignment with regard to the conveyor tracks,
2. Check all wear strips (carrying and return), dead plates, dividers and transfers mechanism for proper location, elevation, spacing and Flatness,
3. Check all fasteners for proper tightness (torque), Fasteners used on wear strips and dead plates must have recessed heads,
4. Check all conveyor splice points for proper elevation, alignment and fastening,
5. Inspect conveyor system for obstructions by pulling a short section of chain (1 meter) through the entire conveyor,
6. Check lubrication system (if present),
7. Install conveyor chain, assuring that the following has been done:
   - A Check for correct direction of chain travel,
   - B Assemble chain in 3 meters sections and avoid twisting or damaging the chain,
   - C Connect chain sections on the conveyor, Make sure that the connecting pins are not protruding,
   - D Adjust chain catenary (sag) to the proper elevation, Note: readjustment is usually necessary after a certain operating time,
8. Insure that lubricant is evenly dispersed through conveyor system,
9. Start up conveyor by jogging and/or using short running periods before loading the system, Be alert to unusual noises or actions, If a problem should occur, refer to the trouble shooting guide,

Replacement criteria

Chains must be replaced when:
- The chain starts to jump on the sprocket due to elongation, This may start to happen at 3% elongation or more,
- The thickness of the plate has been reduced by 50%,
- The surface becomes uneven or scratched causing stability problems,
- The hinge is worn to an extend that the pins protrude

Belts must be replaced when:
- The belt starts to jump on the sprocket due to elongation, This may start to happen at 3% elongation or more,
- The thickness of the module has been reduced by 1 mm from the top and from the bottom,
- The surface becomes uneven or scratched causing stability problems,

Sprockets and Idlers must be replaced when::
- teeth are worn flat
- chain/ belt does not release well
- teeth are damaged
- bore of idler is worn out and idler starts to oscillate
- hub or keyway are damaged
- new chain/ belt is installed

Wear strip must be replaced when:
- thickness is reduced by 50% and stability problems occur
- dirt or debris is embedded
- Fixing rivets protrude.

Layout procedure for a EMCS conveyor system

Task definition:
Determine number and position of the work steps, calculate the available space.

▼

Plan rough system layout:
Lengths, segments, curves, slopes (sketch) ◄

▼

Product-specific data:
Determine conveyed material data:
Dimensions, mass, friction figures, antistatic environment needed?

▼

Production-specific data:
Determine conveyor parameters:Speed, conveyed material spacing and cycle, number of start-up operations/h, accumulation section

▼

Detailed system layout planning:
Accumulation sections, product interchange points
▶ **www.easy-conveyor.com**

▼

Chain tensile force calculation F
▶ **Examples 1-2-3, page 496-498-500**

▼

F<$F_{permissible}$ (page 497 & 499):

YES **NO ▶**

▼

F<<$F_{permissible}$ (oversized) ▶

NO **YES ▶**

▼ ▼

Check drive torque:

$$\frac{M * 2}{\varnothing TK} \geq F$$

OK? **YES** **NO ▶**

▼

[✔]

EMCS SYSTEM

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Needed data

- The length and/or width of the belt conveyor (mm)
- The width of the belt (mm)
- Wanted speed (mtr/min)
- Product weight (Kg)
- Product length (mm) **[!]** (in direction of transport)
- Amount of products on the conveyor (pcs)
- Product to transport (bakery, food, plastic, cardboard, glass or metal)
- Slide profile (TCP / TCS)
- State of contact surfaces between slide rail/chain -(dry normal -dirty -rough/Water/Water & Soap/Oil)
- State of contact surfaces between goods/chain (dry/water/water & soap)
- Ambient temperature (°C)
- Start/Stop each hour (pcs/hr)
- Frequency controller (Yes or No)
- Accumulation (Yes or No)
- Amount of products to accumulate (pcs)
- Running hours per day
- Type of loading

Belt Weight FLAT TOP

Wideness	Kg/m	N/m	Max. load
170	1,29	12,65	3672
255	1,96	19,23	5508
340	2,57	25,21	7344
425	3,20	31,39	9180
510	3,84	37,67	11016
680	5,11	50,13	14688
850	6,38	62,59	18360

Belt Weight FRICTION TOP

Wideness	Kg/m	N/m	Max. load
255	2,73	26,78	8925
340	3,68	36,10	11900
425	4,63	45,42	14875
510	5,58	54,74	17850
680	7,48	73,38	23800
850	9,38	92,02	29750

Weight of the roles (Kg) (without drive pulley)

85	0,44695
170	0,73313
255	1,01930
340	1,30547
425	1,59165
510	1,88456
680	2,45691
850	3,02926

Application factor C_1

Approach procedures /h	Application factor
0-1	1
2-10	0,83
11-30	0,71
>30	0,62

Breaking force (max -40°C / +80°C) C_2

Temperature °C	Breaking force factor
0	1,12
20	1,0
40	0,96
60	0,92

Factor C_3 Breakaway torque

Temperature °C	Breaking force factor
0,09 kW	2,1
0,12 kW	2.4
0,18 kW	1,8
0,25 kW	1,8
0,37 kW	1,8
0,55 kW	2,1
0,75 kW	2,2
1,1 kW	2,0
Frequency controller	1,5

MOTOR SELECTION

The drive torque of the selected gear motor must be greater than the calculated required drive torque.
There are the following options to reduce the required drive torque:

- reduce the chain tensile force (F).
- reduce the speed (v) and use a gear motor with a higher drive torque.
- change the operating conditions (e. g. the ambient temperature)

Procedure for both calculations:

- Divide the conveyor section into segments. Segment 1 starts at the traction stand (e.g. at the return unit, at the connecting drive outlet), the last segment ends at the drive unit. The division is made according to operating mode (conveying operation / accumulation operation). When using horizontal or vertical curves the segment ends after the curve.
- Calculate the individual segments in ascending order. The chain tensile force of the current segment will enter the calculation of the following segment as a counter force. The result of the last segment is the required chain tensile force to operate the conveyor.
- The tensile force resulting from the chain return can generally be overlooked.

Exceptions:

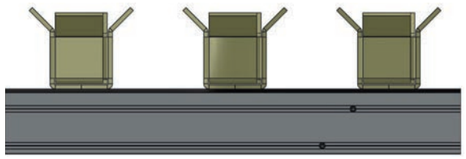
- The section load of the goods is lower than that of the chain (round trip):

$q_F \leq 2 * q_K$

In these cases, the first segment begins at the head drive outlet.

EMCS Straight

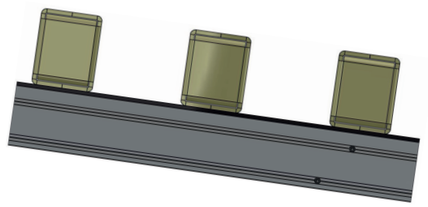
$$F_U = \mu_T * g * \left(m + \frac{m_B}{2} \right) + \mu_R * g \left(\frac{m_B}{2} + m_R \right)$$



EMCS Incline/Decline (Dynamic tensioner is in both cases recommended.)

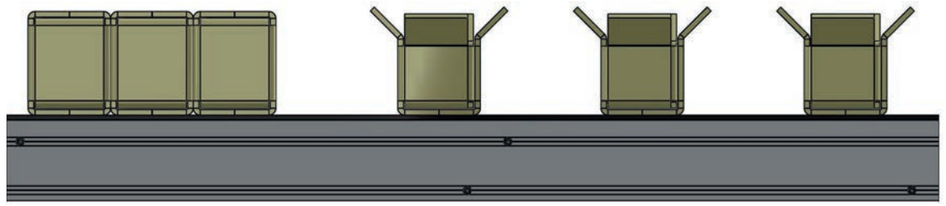
(-)

$$F_U = \mu_T * g * \left(m + \frac{m_B}{2} \right) + \mu_R * g \left(\frac{m_B}{2} + m_R \right) + g * m * \sin \alpha$$



EMCS Accumulation (is not possible when using a friction or a cleated belt)

$$F_U = \mu_T * g * \left(m + \frac{m_B}{2} \right) + \mu_R * g \left(\frac{m_B}{2} + m_R \right) + \mu_{ST} * g * m$$



$$F_{MAX} = F_{perm.} * C_1 * C_2$$

$$M_N = \frac{F_U * (d_A / 2)}{1000}$$

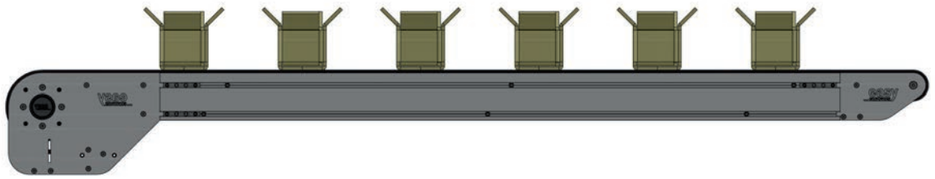
$$M_H = M_N * C_3$$

$$P_A = \frac{F_U * \nu}{1000}$$

$$P_M = \frac{P_A}{\eta}$$

LIST OF APPLIED ABBREVIATIONS

F_U	= Chain Tensile force (at the drive pulley) (N)	M_H	= Run-up Torque (Nm)
$F_{perm.}$	= Permissible load capacity	P_A	= Mechanical Drive Power (kW)
F_i	= Chain tensile force of individual segments (N)	P_M	= Motor Power (kW)
g	= 9,81 (m/s²)	η	= Efficiency (%)
m	= Total product mass (Kg)	A_Z	= Amount of Accumulation
m_B	= Mass of the belt (Kg)	α	= Angle for Incline or Decline (°)
m_R	= Mass of the rolls (Kg)	R_H	= Running hours / day
μ_R	= Friction coefficient Belt/Drive & Return	S_S	= Start/Stops /hr
μ_{ST}	= Friction coefficient accumulation	U_L	= Uniform Load
μ_T	= Friction coefficient Belt/Top plate	V_L	= Variable Load
ν	= Belt speed (mtr/min)	S_L	= Shock Load
M_N	= Nominal Torque (Nm)		



Example 1: Calculation EMCS Straight;	
Conveyor system	: EMCS
Conveyor Length	: 3000mm
Belt width	: 425mm
Belt	: Flat top
Product weight	: 1 kg
Product Length	: 400mm
Products on the system	: 6 pieces
Product material	: cardboard
Environment Temperature	: 20° C
Contact surface between slide rail/chain	: Dry, normal
Contact surface between goods/chain	: Dry
Start/Stop	: 0-1 / h
Slide profile	: TCP
Position of conveyor	: straight
Wanted speed	: 10 mtr/min
Accumulation	: No
Number of products to accumulate	: 0
Frequency controller	: Yes
Running hours per day	: 8 hr
Type of loading	: Uniform Load

ν	= 0,166m/s
μ_R	= 0.3
μ_{ST}	= 0.21
μ_T	= 0.2
C_1	= 1.0
C_2	= 1.0

C_3	= 1,5
d_A	= Ø146.27mm
m	= 6 Kg (6*1Kg)
m_B	= 35.43 Kg
m_R	= 1,59 Kg

EMCS Straight

$$F_U = \mu_T * g * \left(m + \frac{m_B}{2} \right) + \mu_R * g * \left(\frac{m_B}{2} + m_R \right)$$

$$F_U = 0{,}2 * 9{,}81 * \left(6{,}00 + \frac{35{,}43}{2} \right) + 0{,}3 * 9{,}81 * \left(\frac{35{,}43}{2} + 1{,}59 \right)$$

F_U = **103,346 N**

Permissible tensile force:

$F_{U\,max} = F_{perm.} * C_1 * C_2$

$F_{U\,max} = 9180 * 1{,}00 * 1{,}00$

$F_{U\,max} = 9180{,}00$

$F_{U\,max} \approx$ **9180 N** $F_U = 103{,}35$ N **System is OK**

Nominal Torque:

$$M_N = \frac{F_U * \left(d_A / 2 \right)}{1000}$$

$$M_N = \frac{103{,}35 * \left(146{,}27 / 2 \right)}{1000}$$

M_N = **7,56 Nm**

Run-up Torque:

$M_H = M_N * C_4$

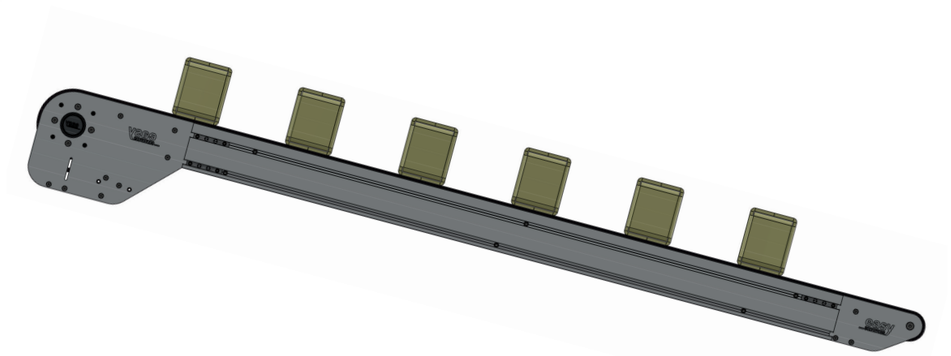
$M_H = 7{,}56 * 1{,}5$

M_H = **11,34 Nm**

$$P_A = \frac{103{,}35 * 0.166}{1000}$$

P_A = **0.017 kW**

$P_M = \frac{P_A}{\eta}$ [kW] Chose, the next larger standard motor



Example 2: Calculation EMCS Incline	
Conveyor system	: EMCS
Conveyor Length	: 3000mm
Belt width	: 255mm
Belt	: Friction top
Product weight	: 2,5 kg
Product Length	: 400mm
Products on the system	: 6 pieces
Product material	: cardboard
Environment Temperature	: 20° C
Contact surface between slide rail/chain	: Dry, normal
Contact surface between goods/chain	: Dry
Start/Stop	: 0-1 / h
Slide profile	: TCP
Position of conveyor	: incline - 15°
Wanted speed	: 10 mtr/min
Accumulation	: No
Number of products to accumulate	: 0
Frequency controller	: Yes
Running hours per day	: 8 hr
Type of loading	: Uniform Load

ν	= 0,166m/s
μ_R	= 0.3
μ_{ST}	= 0.21
μ_T	= 0.2
C_1	= 1.0
C_2	= 1.0

C_3	= 1,5
d_A	= Ø146.27mm
m	= 15 Kg (6*2,5Kg)
m_B	= 51,26 Kg
m_R	= 1,59 Kg

EMCS Incline/Decline (-)

$$F_U = \mu_T * g * \left(m + \frac{m_B}{2} \right) + \mu_R * g * \left(\frac{m_B}{2} + m_R \right) + g * m * \sin\alpha$$

$$F_U = 0{,}2 * 9{,}81 * \left(15{,}00 + \frac{51{,}26}{2} \right) + 0{,}3 * 9{,}81 * \left(\frac{51{,}26}{2} + 1{,}59 \right) + 9{,}81 * 15{,}00 * 0{,}26$$

F_U = **197,896 N**

Permissible tensile force:

$F_{U\,max} = F_{perm.} * C_1 * C_2$

$F_{U\,max} = 14875 * 1{,}00 * 1{,}00$

$F_{U\,max} = 14875$

$F_{U\,max} \approx$ **14875 N** F_U = 197,896 N **System is OK**

Nominal Torque:

$$M_N = \frac{F_U * (d_A / 2)}{1000}$$

$$M_N = \frac{197{,}9 * (146{,}27 / 2)}{1000}$$

M_N = **14,47 Nm**

Run-up Torque:

$M_H = M_N * C_4$

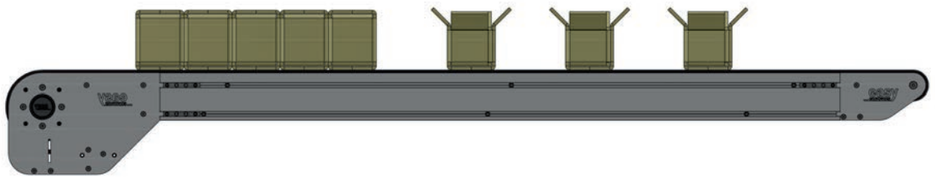
$M_H = 14{,}47 * 1{,}5$

M_H = **21,71 Nm**

$$P_A = \frac{197{,}9 * 0.166}{1000}$$

P_A = **0.033 kW**

$P_M = \frac{P_A}{\eta}$ [kW] Chose, the next larger standard motor



Example 3: calculation EMCS Straight

Conveyor system	: EMCS
Conveyor Length	: 3000mm
Belt width	: 425mm
Belt	: Flat top
Product weight	: 2,5 kg
Product Length	: 400mm
Products on the system	: 8 pieces
Product material	: cardboard
Environment Temperature	: 20° C
Contact surface between slide rail/chain	: Dry, normal
Contact surface between goods/chain	: Dry
Start/Stop	: 0-1 / h
Slide profile	: TCP
Position of conveyor	: straight
Wanted speed	: 10 mtr/min
Accumulation	: Yes
Number of products to accumulate	: 5
Frequency controller	: Yes
Running hours per day	: 8 hr
Type of loading	: Uniform Load

ν	= 0,166m/s
μ_R	= 0.3
μ_{ST}	= 0.21
μ_T	= 0.2
C_1	= 1.0
C_2	= 1.0

C_3	= 1,5
d_A	= Ø146.27mm
m	= 20 Kg (8*2,5Kg)
m_B	= 35,43 Kg
m_R	= 1,59 Kg

EMCS Accumulation (is not possible when using a friction or a cleated belt)

$$F_U = \mu_T * g * \left(m + \frac{m_B}{2} \right) + \mu_R * g * \left(\frac{m_B}{2} + m_R \right) + \mu_{ST} * g * m$$

$$F_U = 0{,}2 * 9{,}81 * \left(20{,}00 + \frac{35{,}43}{2} \right) + 0{,}3 * 9{,}81 * \left(\frac{35{,}43}{2} + 1{,}59 \right) + 0{,}21 * 9{,}81 * 12{,}50$$

F_U = **156,57 N**

Permissible tensile force:

$F_{U\,max} = F_{perm.} * C_1 * C_2$

$F_{U\,max} = 9180 * 1{,}00 * 1{,}00$

$F_{U\,max} = 9180{,}00$

$F_{U\,max} \approx$ **9180 N** F_U = 156,565 N **System is OK**

Nominal Torque:

$$M_N = \frac{F_U * \left(d_A / 2 \right)}{1000}$$

$$M_N = \frac{156{,}57 * \left(146{,}27 / 2 \right)}{1000}$$

M_N = **11,45 Nm**

Run-up Torque:

$M_H = M_N * C_4$

$M_H = 11{,}45 * 1{,}5$

M_H = **17,18 Nm**

$$P_A = \frac{156{,}57 * 0.166}{1000}$$

P_A = **0.026 kW**

$P_M = \frac{P_A}{\eta}$ [kW] Chose, the next larger standard motor

Conclusion

You can see above that the motor and also the conveyor system are selected because of the input. Also you can see that some values cause a certain overload situation for the system, motor or both.

There are a few options to prevent an overload.

- Lower the speed
- Lower the amount of product on the conveyor
- Less Start/Stops
- Less Accumulation
- Change type of loading
- Shorten the conveyor
- Choose another conveyor system
- Less running hours per day.

Choose another transport system. (roller conveyor, belt conveyor or tabletop conveyor)

EMCS SYSTEM

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Chain/belt jumps on sprocket

Possible causes	Remedy
Chain/belt is enlongated e.g. due to wear or overloaded	Replace chain/belt and sprocket. Check other components as well. Eliminate cause of overload.
Improper catenary sag	Check dimensions and adjust
Sprocket is worn	Replace sprocket
Wrong sprocket type	Install correct sprocket
Misaligned sprocket	Check and adjust
Improper sprocket position	Check and adjust position

Chain/belt does not release well

Possible causes	Remedy
Incorrect sprocket dimension or type	Check and replace sprocket
Sticky residue	Clean chain/sprocket or renew
Improper catenary sag	Check dimensions and adjust

Slip stick operation

Possible causes	Remedy
Slip stick	Use lubrication Reduce chain/belt tension by shortening the conveyor
Return roller diameter too small	Install larger rollers
Chain/belt catches the conveyor	Remove obstructions. Check return part as well
Improper catenary sag	Check dimension and adjust

Damaged chain hinges

Possible causes	Remedy
Overloading	Eliminate cause of overloading Check sprockets and other components Replace chain/belt Replace components if necessary
Blocking and obstructions	Check the complete conveyor
Exceeding the minimum backflex radius	Check conveyor construction
Too small radius for side flexing chain	Check minimum radius of chain and adjust accordingly

Elongation

Possible causes	Remedy
Overloading	Eliminate cause of overloading Check sprockets and other components Replace chain/belt Replace components if necessary
Wear from dirt in hinges	Improve cleaning or Use HB pins

Rapid curve wear

Possible causes	Remedy
Overheating	Use EXTRA curve or TCS
Embedded abrasives	Replace curve

Chain drifts sideways on sprockets

Possible causes	Remedy
Bad shaft/sprocket alignment	Adjust or use collars
Conveyors is not level	Adjust

Cracked hinge eyes

Possible causes	Remedy
Stress-corrosion caused by incompatible chemicals	Check chemicals compatibility with chain/belt material Use appropriate chemicals

Chains for magnetic system releases from curve

Possible causes	Remedy
Worn curve	Replace curver
Improper chamfering of the infeed or other obstructions	Check and adjust/rework
No soft start-up	Install frequency inverter drives
Curve not mounted level	Check and adjust

Corroded steel chain

Possible causes	Remedy
Incompatible combination of chain material and chemicals	Use only compatible chemicals
May occur even with stainless steel	Consider higher graded material

Excessive chain/belt wear

Possible causes	Remedy
Pollution	Improve cleaning
Failing lubrication	Check lubrication system Contact lubricant supplier
Obstructions	Check all sections
Debris in return part	Clean conveyor Install roller with larger diameter

Sprockets don't slide on shaft when belt extends due to temperature increase

Possible causes	Remedy
Pollution	Improve cleaning
Axial fixing incorrect	Re-adjust axial fixing according to temperature situation
Wrong bore tolerance	Replace by sprockets with PLUS tolerance

Rapid wear on sprockets

Possible causes	Remedy
Abrasive conditions	Improve cleaning Use steel sprockets

Please contact technical support at any time in case of doubt.