Conveyor system XW

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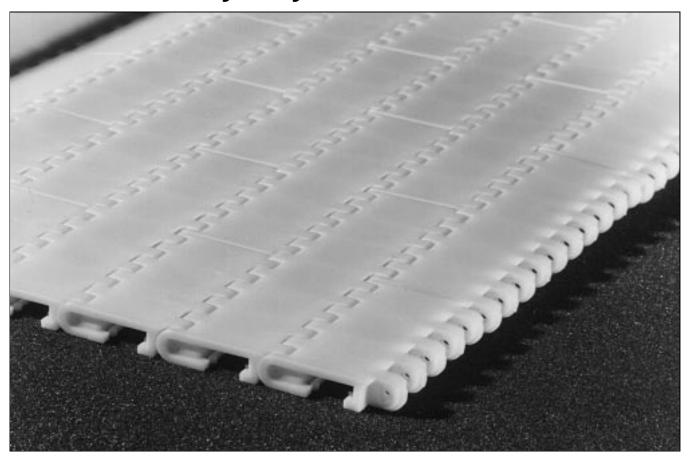
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FlexLink

FlexLink conveyor system XW



A FlexLink system for wide applications

The XW conveyor system offers many of the benefits of the original FlexLink system. The added advantage of a wide chain (up to 1200 mm) permits effective transport and accumulation in many different configurations.

Many accessory components of the original Flex-Link system will fit, including guide rail components and supports. Most components are attached by means of T-slot fasteners, ensuring maximum flexibility. Nothing is welded. Only a minimum of cutting and drilling will be required to install a conveyor and have it running.

This catalogue section covers the basic XW conveyor components. In addition to these, you will need guide rails and support system components. See catalogue sections *Conveyor accessories* and *Structural system XC*.

Typical applications

The XW conveyor system is designed for transport and accumulation of lightweight goods such as:

- Plastic and glass bottles
- Hygiene products
- · Food packages and tins
- Bearings and other cylindrical products

Technical specifications

Goods conveyed

Maximum weight per item _____ 25 kg

Conveyor data

Conveyor widths _____ 300/600/900/1200 mm

Conveyor speed, maximum ___ 30 m/min

Technical data

Drive units

Length of shaft, mm	300	600	900	1200
Maximum traction force, N	1750	1750	1500	1000

Chains

General specifications

Parameter	300	600	900	1200
Weight (plain chain) kg/m	3,2	6,4	9,6	12,8
Tensile strength at 20 °C, kN	26	52	78	104
For other temperatures: see below				
Permissible working tension at 20 °C, N	2000	4000	6000	8000
Also see diagram below				

Chain strength and expansion vs. temperature

Temperature (°C)	-20	0	20	40	60	80	100	120
Tensile strength factor	1,2	1,1	1,0	0,9	0,8	0,6	0,5	0,3
Linear expansion %	-0,4	-0,2	0	0,2	0,5	0,8	1,0	1,3

Friction coefficients

Friction between chain and slide rail

Polyethylene slide rail UHMW-PE	
XWCR 25 U new	0,10-0,15
XWCR 25 U after wear-in	0,20–0,25

The coefficient of friction is normally at the lower value at startup of a new conveyor. It will increase as the contact surfaces are wearing in. Lubrication will reduce the coefficient of friction.

Friction between chain and product

In most cases, the coefficient of friction for contact between plain chain and product is between 0,1 and 0,35. Always measure the friction between the chain and the actual product. The actual friction coefficients depend on the material and on the surface smoothness.

Temperature limits

FlexLink can operate continuously between –20 °C and +60 °C. Temperatures up to 100 °C can be tolerated for short periods (cleaning, rinsing).

Due to linear expansion, a conveyor must not operate at temperature changes exceeding 30° without adjustment of the structure width.

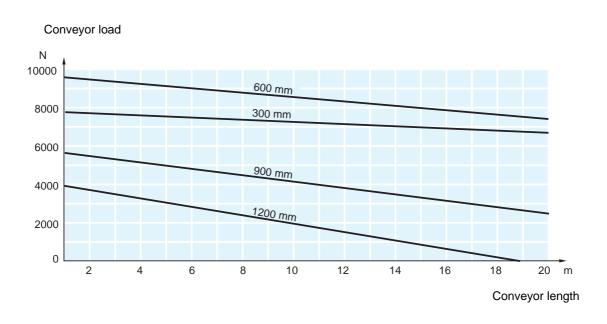
Effective track lengths

The following table lists the effective track lengths for drive units and idler end units. These should be considered when determining how much conveyor chain is required in a system.

Description	Effective track length
Standard drive unit	850 mm
Idler end unit	850 mm

Typical load limit

The diagram below shows the load limits for XW conveyors without accumulation, operating at a service factor of 1,0. Typical reduction for accumulation is 50 % if coefficient of friction between chain and product is 0,25.



Design guidelines

Design procedure

As in all design work it is essential to base the work on a specification of design requirements. Parameters to take into consideration include:

- · Surface pressure between chain and slide rail
- · Load on conveyor
- Conveyor width
- · Total length
- · Conveyor speed
- · Operating temperature

Layout considerations

The layout must ensure that the load is well distributed across the total width of the conveyor. The maximum load specification applies to a well distributed load.

It is important to minimize the total length of the conveyor. If the length versus total load exceeds the recommended value (see the diagram on page 3), the conveyor must be divided into two. If the applied load is heavier than recommended, please contact FlexLink Systems for alternative solutions.

Temperature

The plastic material used in the chain has a greater thermal expansion than the aluminium framework. This means that it is necessary to take thermal expansion into consideration when building and assembling the conveyor. If possible, the conveyor should be built at the final location, and in the environmental temperature typical of the operating environment.

Support system design

The XW conveyor can be used in many different applications and environments. This means that the requirements of the support structure will be very different from one application to another. The FlexLink product programme includes a comprehensive line of suitable support components, including beams, connecting hardware, feet, etc. A number of typical support solutions are presented on page 20. For more information, see catalogue section *Structural system XC*.

Guide rail design

The XW conveyor is designed for use with standard FlexLink guide rail components. For more information, see catalogue section *Conveyor accessories*.

Parts list

When you are satisfied with your layout, including support and guide rail components, you can easily compile a list of the parts required to build the conveyor. If you need additional information, do not hesitate to contact FlexLink Systems.

Chain tension calculations

Why calculate?

There are at least two reasons why you should estimate or calculate the maximum tension of the chain before you decide on a conveyor configuration:

- Drive unit capacity
- Tension limit of conveyor chain

Drive unit capacity limit/chain tension limit

The required drive motor output power P depends on

- Traction force F [N]
- Chain speed v [m/min]

The following equations apply:

$$P[W] = 1/60 \cdot F \cdot v$$

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$$P[W] = 1/9550 \cdot F \cdot r \cdot n$$

where \mathbf{r} is the drive sprocket wheel radius in mm, and \mathbf{n} is the rotational speed of the sprocket wheel in r.p.m.

Service factor

The maximum permissible chain tension depends on the number of conveyor starts and stops per hour. Many conveyors run continuously, whereas others start and stop frequently. It is obvious that frequent starts and stops increase the stress on the chain and on the drive unit.

The service factor (see table below) is used to derate for high frequency of starts and stops and for high chain speeds. Divide the tension limit obtained from the graphs by the service factor to get the derated tension limit. A high service factor can be reduced by providing a soft start/stop function.

Operating conditions	Service factor
Low to moderate speed or max. 1 start/stop per hour	1,0
Max 10 starts/stops per hour	1,2
Max. 30 starts/stops per hour	1,4
High speed, heavy load or more than 30 starts/stops per hour	1,6

Drive unit clutch adjustment

The slip clutch of the drive unit must be adjusted for a traction force lower than or equal to the calculated chain load limit, with the service factor taken into consideration.

Design guidelines

Traction force

The tension building up in the chain can be divided into several components:

- 1 Friction between loaded chain and slide rails.
- 2 Friction between accumulating products and top surface of chain.
- 3 Friction between unloaded chain and slide rails, for example on the underside of the conveyor beam.

The traction force F required to move the chain depends on the following factors:

Conveyor length	L
Product gravity load per m	
Transport	q _p
Accumulation	q _{pa}
Chain gravity load per m	qc
Friction coefficient	-
Between chain and slide rail	μ _r
Between chain and products	μ _p

Basic calculation procedure

For a conveyor with a total length of L from idler end unit to drive unit the following formulas apply.

Without accumulation (Figure A):

$$F = L \cdot (2q_c + q_p) \cdot \mu_r$$

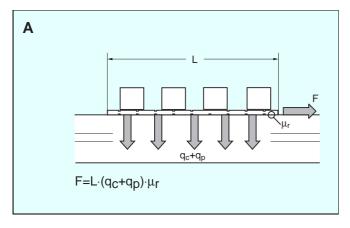
With accumulation (Figure B):

$$F = L \cdot [(2q_c + q_{pa}) \cdot \mu_r + q_{pa} \cdot \mu_p]$$

If the tension is too high

If the calculated traction force exceeds the chain capacity or the drive unit capacity, some modification will be necessary.

- Shorten the conveyor. In some cases, the layout could be changed so that the conveyor becomes shorter.
- Divide the conveyor into two separate conveyors with individual drive units.



Calculation example

The following example involves an accumulating conveyor with the following data:

Conveyor speed	5 m/min
Starts and stops	10/hour
Conveyor width	600 mm
Conveyor length	7 m
Friction coefficient µr	0,25
Friction coefficient µ _p	0,25
Load due to product weight	50 kg/m

Service factor

With a start/stop frequency of 10 per hour, the service factor is 1,2 (see table on page 4).

Load due to chain weight

$$q_c = 6.4 \text{ kg/m}$$

Since the weight of 300 mm wide chain is 3,2 kg/m (see page 8), the load due to the chain weight is 6,4 kg/m.

Calculations

The formula for an accumulating conveyor can be used to calculate the force F [N] required to drive the chain. With actual values inserted:

$$F = 7 \cdot [(2 \cdot 64 + 500) \cdot 0.25 + 500 \cdot 0.25] = 1974 \text{ N}$$

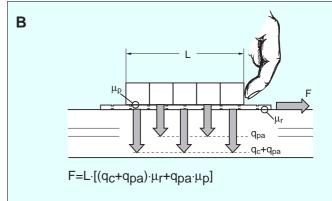
The standard drive unit for 600 mm chain has a maximum capacity of 2500 N for service factor 1,0 (see "Technical data", page 3). Taking the service factor 1,2 into consideration, the actual capacity in this example is 2500/1,2 N = 2083 N. Since this value is higher than the required value 1974 N, calculated above, the conveyor design is suitable for the application.

Power required

Applying the power formula (see page 4):

$$P = 1/60 \cdot 1974 \cdot 5 = 165 W$$

With an assumed total efficiency of motor and transmission of 75 % the required motor power is 165/0,75 = 220 W



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Installation procedure

Introduction

The method of building an XW conveyor consists of the following basic steps:

- Build the conveyor frame structure on the floor, excluding drive unit and idler end unit.
- Attach vertical support legs and feet to the conveyor, to place it at the planned height.
- Install drive unit and idler end unit.
- Install slide rail. See Appendix A in catalogue section APX for instructions on anchoring the slide rail.
 The same information is also available separately as a pamphlet (Publication 4263).
- · Install the conveyor chain.
- · Test the conveyor and adjust the slip clutch.

Preparations

- 1 Ensure that all materials and components required for the installation are available at the site. Check with the parts list.
- 2 Ensure that the necessary tools are available: No.13 wrench, knife, Ø4,2 drill, drilling machine.

Assembly of frame section

The cross bar connects the two frame profiles to form a conveyor frame. Standard FlexLink light support beam XCBL 3×44 is used for this purpose.

Use four cross bars for every 3 m length of frame section.

Assemble a 3 m straight section as follows:

- 1 Cut the cross bar beam (90°) to four lengths. Cutting length: see Table 1.
 - Drill holes if fastener vokes XCAF 44 will be used.
- 2 Attach four angle brackets XLFA 44 C or two fastener yokes XCAF 44 to the ends of the cross bars. Fastener yokes will provide a cost-effective, yet very rigid connection. Angle brackets permit some adjustment of the frame width, to compensate for errors in beam length and angle.
- 3 Connect the cross bar assembly to the two frame profiles. Tighten well on one side.
- 4 Measure the outside frame width and adjust as necessary. Then tighten all screws permanently. Outer frame width: see Table 1.
- 5 Install minimum one centre support profile XWCN 3, using hold-down bracket XWCP 20 to attach it to the cross bar. The number of centre support profiles depends on the load.

Note. The centre support profile must extend into the drive unit and idler end unit, up to the drive/idler wheel centre. See photo on page 18.

Do not install slide rails until after completion of the conveyor frame.

Basic conveyor structure

- Assemble the basic conveyor by connecting conveyor frame sections using connecting strips
 XWCJ 6×280 in the inner slot of the frame profile.
 (The outer slots should be reserved for connection to the support system, and for other external connections.) Use connecting pieces XLRJ 100 to connect the centre support profiles.
- 2 Connect support legs and feet to your basic conveyor in accordance with your layout. Try to locate support points close to joints between frame sections.
- 3 Install drive unit and idler end unit. Note that they both come with connecting strips included.

Table 1. Frame section dimensions

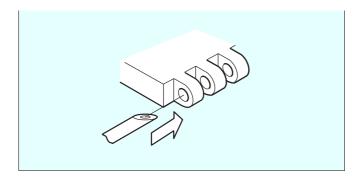
Nominal chain width (mm)	Actual chain width (mm)	Crossbar length (mm)	Frame outer width (mm)
300	299	259 ±0,5	303
600	597	557 ±0,5	601
2×300	_	561 ±0,5	605
900	896	857 ±0,5	901
3×300	_	862 ± 0.5	906
1200	1195	1155 ±0,5	1199

Installation procedure

Slide rail and chain

- 1 Install plastic slide rail on all profiles that would otherwise be in direct contact with the chain.
- 2 Secure the slide rails with two plastic screws XWAG 5. See Appendix A, catalogue section APX.
- 3 Release the friction coupling (slip clutch) so that the drive shaft is free to turn.
- 4 Install the chain, one length at a time, starting at the drive unit end. The chain can run in either direction. Feed the chain along the conveyor through the idler unit and back on the return side to the drive unit. Add chain lengths until the total length is sufficient. Connect chain sections using plastic rods with guide clips at each side to keep the rods in place. Do not connect the final joint yet.

The rods will slide in more easily if one end is cut at an angle. See figure.



Length of plastic rods:

Chain width (mm)	300	600	900	1200
Rod length (mm)	290 ±1	590 ±1	889 ±1	1188 ±1

- 5 Check that the plastic sprocket and idler wheels on drive unit and idler unit are correctly positioned in relation to the chain. Adjust as necessary: release the set screws and move the wheels slightly along the shaft until the chain seems to run smoothly.
- 6 Stretch the chain and remove link rows if necessary so that the chain will exhibit some slack at the drive unit.
- 7 Join the ends using an extra rod and guide clips.
- 8 Check the running direction of the conveyor, with the slip clutch loose. The drive unit pulls the chain. Do not run the conveyor with tightened slip clutch until you have ensured that the running direction is correct.
- 9 Tighten the slip clutch to a suitable friction. See instructions in Appendix B, catalogue section APX. The conveyor is now ready to be tested.

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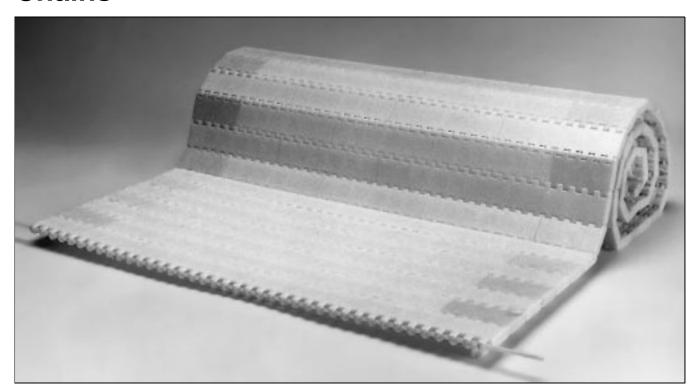
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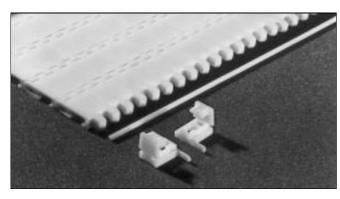
Chains

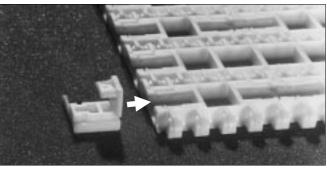


Description

The chain consists of plastic hinge-type links connected by plastic rods and locked by plastic snap-in guide clips. The clips also serve as lateral chain guides. See the illustration below.

The chain is woven together by 75 mm and 150 mm wide links. The assembled chain forms a wide, flat and tight conveyor surface. Four standard widths of chain can be delivered, from 300 mm up to 1200 mm. The 900 mm and 1200 mm wide chains come equipped with guide clips at the centre, in addition to those at the edges.





Material specifications

See Technical reference.

Technical specifications

Chain width	300/600/900/1200 mm
Chain weight	3,2 kg/m (300 mm
_	chain)
Chain pitch	38,1 mm
Chain break load	26 kN (300 mm chain)
Max. permissible	
chain tension	2000 N (300 mm chain)
Temperature range	−20 °C to +60 °C

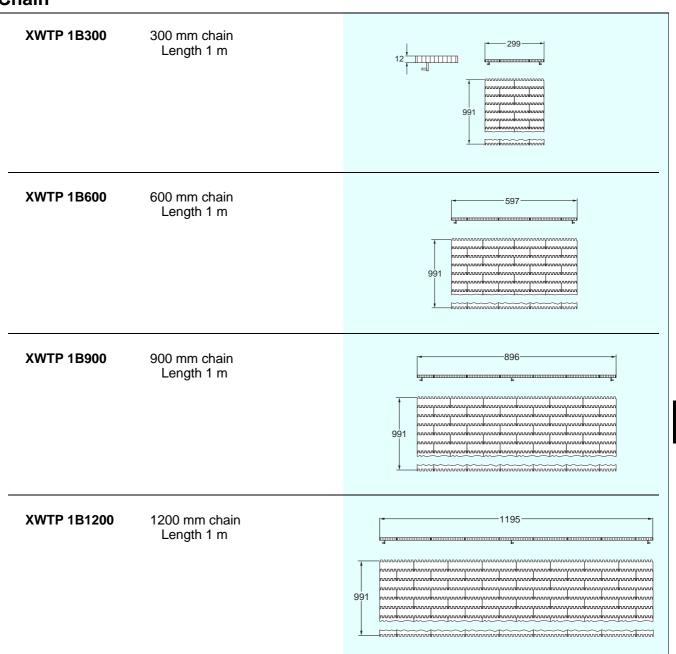
Tools and accessories

No special tools are required. The chain is lubricationfree. A new chain running on new slide rails, however, will need a few hours of running-in before it runs perfectly smoothly. For applications where absolutely smooth running is essential from start, a siliconebased lubricant (LDSS 450) is available.

Ordering information

- 1 The chain is delivered in assembled 1 m lengths. To calculate the total length required, remember to add 1,7 m for chain consumed by the idler and drive units. See "Technical data", page 3.
- Each 1 m chain length ordered requires one extra polyamide rod XWTD 5×3000 P, and one pair of chain guide clips 3904683 and 3904684 (one for each side).

Chain



XW

Accessories

XWTD 5×3000 P	Chain rod Length 3 m	4,4
3904683	Chain guide clip, right	24 [<u>ISS9F06E</u>]
3904684	Chain guide clip, left	24

Conveyor frame components



Description

Conveyor frame sections are built from the following components:

- Frame profile (3 m/6 m/cut to any length up to 6 m)
- Centre support profile
- Hold-down bracket for support profiles
- · Beam for cross bar
- · Angle bracket or fastener yoke
- · Mounting hardware.

Each 3 m frame section consists of two frame profiles connected by four cross bars. The conveyor chain slides on the top edges of the frame profiles, and returns on the bottom side. Plastic slide rails ensure a low friction contact between chain and conveyor frame.

One or more centre support profiles is used to prevent the centre portion of the chain from sagging with heavy loads. Centre support profile should be used every 150 mm, except for very light loads. 900 mm and 1200 mm wide conveyors require centre support profiles on the bottom side.

Suggested support layouts are shown on page 20. For support components refer to catalogue section *Structural system XC*.

Important

The cross-bar beams, when cut to the length specified on page 6, must fit closely to the XWCF frame profiles, otherwise the chain will not fit.

The centre support profile must extend into the drive/idler ends. See photo on page 18.

Material specifications

See Technical reference.

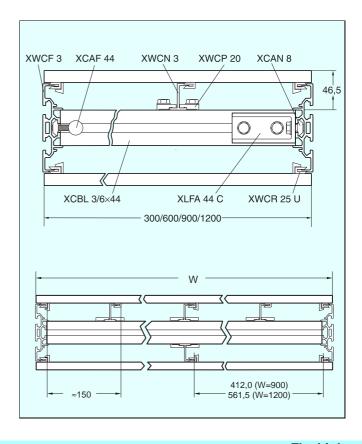
Technical specifications

Typical friction between chain and slide rails after runin:

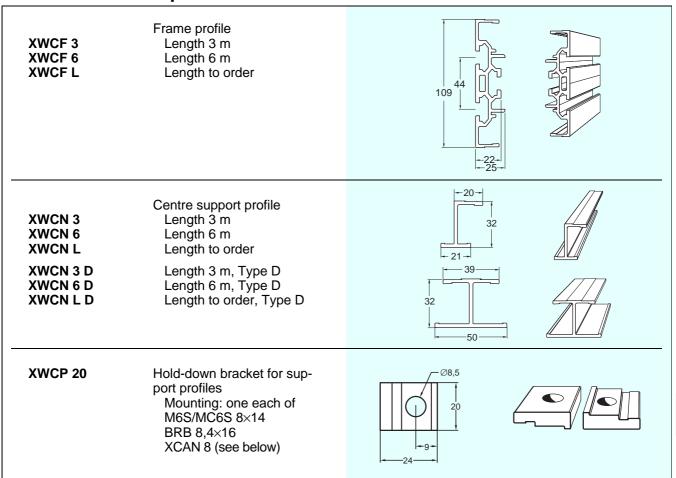
XWCR 25 U 0,25

Ordering information

Slide rail, connecting strips, and connecting sleeves must be ordered separately.



Frame section components



Slide rail



Cross bar beam and connecting devices

XCBL 3×44 XLFA 44 C XCAF 44 XCAN 8	Beam for cross bar Angle bracket Fastener yoke Slot nut for M8 screw	See catalogue section <i>Structural system XC</i> for details.
XLRJ 100	Connecting sleeve Length 100 mm Including set screws	29 21
XWCJ 6×280	Connecting strip Length 280 mm Including set screws	0 280

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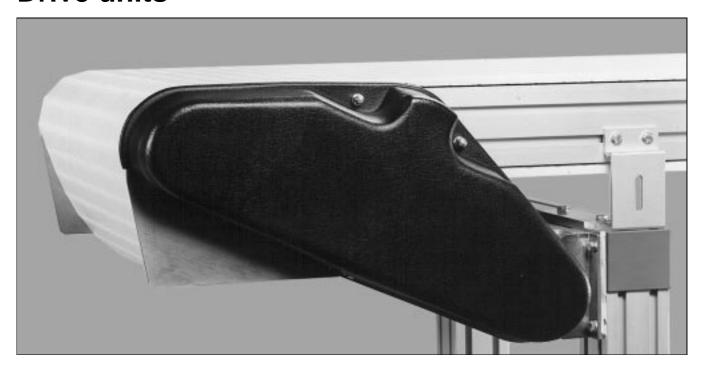
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Drive units



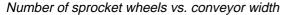
Description

The drive unit is positioned at one end of the conveyor. Two or more sprocket wheels on the drive shaft pull the chain on the top side of the conveyor frame. The chain returns on the bottom side. Support wheels on a separate shaft are used to guide the chain on the return side.

The motor drives the sprocket shaft over a chain transmission with a safety clutch. Two configurations are available: with motor on left hand side or on right hand side

A large number of speeds can be obtained by combining a gear ratio and chain sprockets. The conveyor speed is denoted by the first two digits in the designation code.

Drive units for 900 mm and 1200 mm conveyors include an additional shaft support at the centre, and an additional support wheel.



Width	300 mm	600 mm	900 mm	1200 mm
Sprocket wheels	2	4	6	8
Shaft supports			1	1

Material specifications

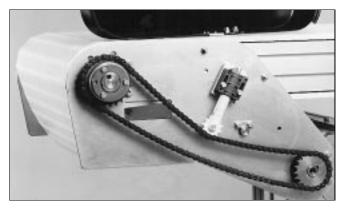
See Technical reference.

Technical specifications

Standard speed	5 m/min at 50 Hz
Number of teeth	
on sprocket wheel	12

Ordering information

- Connecting strips are included with the drive units.
- Slide rail must be ordered separately.



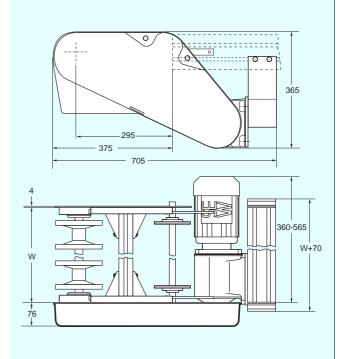


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End drive unit

Suspended motor Transmission on left-hand side

XWEB 0B300 L W=303 mm XWEB 0B600 L W=603 mm XWEB 0B900 L W=902 mm XWEB 0B1200 L W=1202 mm

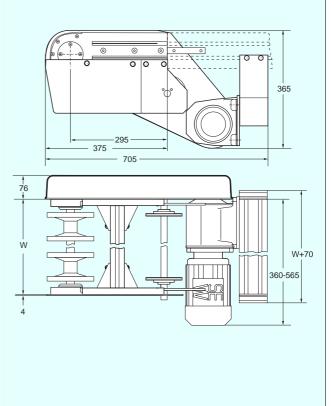


End drive unit

Suspended motor Transmission on

right-hand side

XWEB 0B300 R W=303 mm XWEB 0B600 R W=603 mm XWEB 0B900 R W=902 mm XWEB 0B1200 R W=1202 mm



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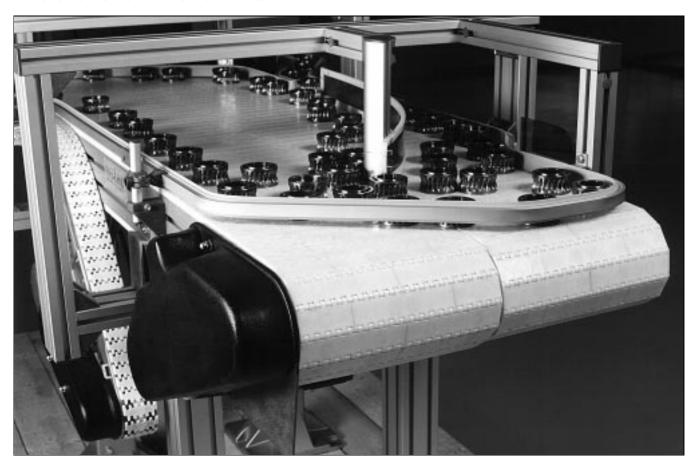
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Double drive units



Description

Double drive units are used to drive two adjacent 300 mm XW conveyor belts in opposite directions. This permits construction of high capacity accumulation tables.

The double drive unit is a normal end drive unit with a special drive shaft and a combination of drive wheels and idler wheels on the shaft. One double drive unit is required at each end of the conveyor.

Drive unit combinations

Double drive units can be delivered with left-mounted or right-mounted motors, and with the driven belt nearest to or farthest away from the motor. The following type codes are used:

LC = Left-mounted motor, driven belt near motor

LD = Left-mounted motor, driven belt away from motor

RC = Right-mounted motor, driven belt near motor

RD = Right-mounted motor, driven belt away from motor

Possible combinations are:

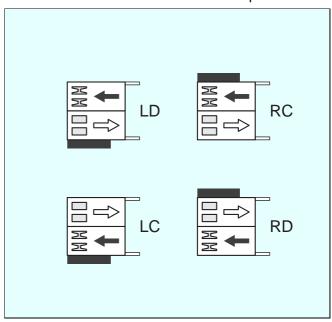
- · LC at one end, RD at the other end
- LD at one end, RC at the other end.

Technical specifications

Standard speed ______ 5 m/min at 50 Hz Number of teeth on sprocket wheel _____ 12

Ordering information

- Connecting strips are included with the drive units.
- · Slide rail must be ordered separately.
- Other belt widths can be delivered on special order.



Double 0-units

XWEB 0B600 LC

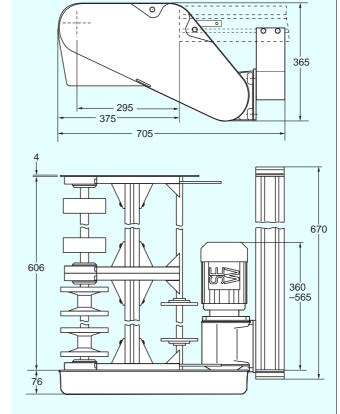
Double drive unit Type C Chain width 300 mm + 300 mm. Transmission on

left-hand side

XWEB 0B600 RC (not shown)

Double drive unit Type C Chain width 300 mm + 300 mm. Transmission on

right-hand side



XWEB 0B600 LD

Double drive unit Type D Chain width 300 mm + 300 mm. Transmission on

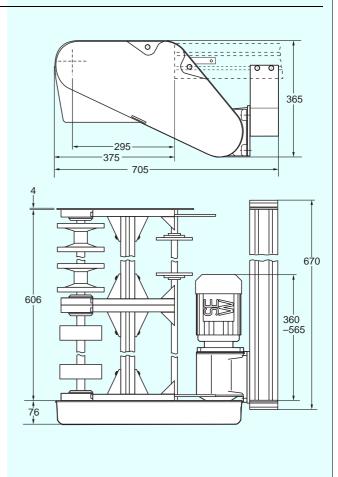
left-hand side

XWEB 0B600 RD

Double drive unit Type D Chain width 300 mm + (not shown)

300 mm. Transmission on

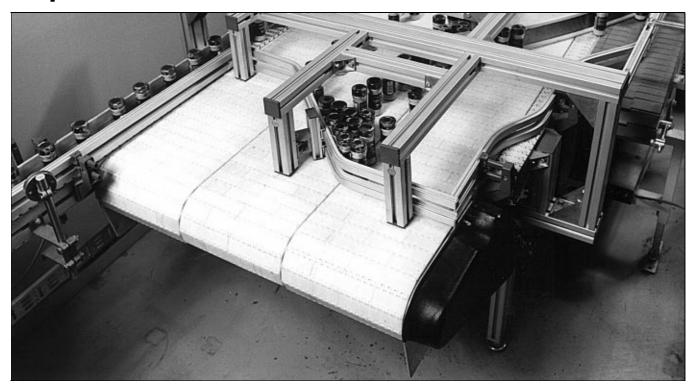
right-hand side



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Triple drive units



Description

Triple drive units are used to drive three adjacent 300 mm XW conveyor belts in opposite directions. This permits construction of high capacity accumulation tables.

The triple drive unit is a normal end drive unit with a special drive shaft and a combination of drive wheels and idler wheels on the shaft. One triple drive unit is required at each end of the conveyor.

Drive unit combinations

Triple drive units can be delivered with left-mounted or right-mounted motors, and with the centre or the two outer belts driven. The following type codes are used:

LA = Left-mounted motor, outer belts driven LB = Left-mounted motor, centre belt driven

RA = Right-mounted motor, outer belts driven

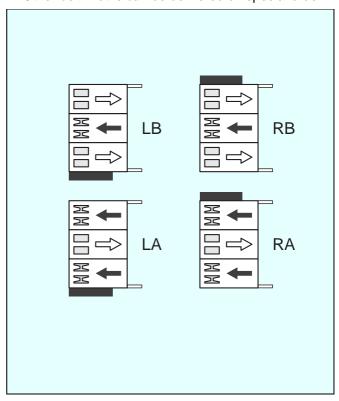
RB = Right-mounted motor, centre belt driven

Technical specifications

Standard speed ______ 5 m/min at 50 Hz Number of teeth on sprocket wheel _____ 12

Ordering information

- Connecting strips are included with the drive units.
- Slide rail must be ordered separately.
- Other belt widths can be delivered on special order.



Triple drive units

XWEB 0B900 LA Triple drive unit Type A

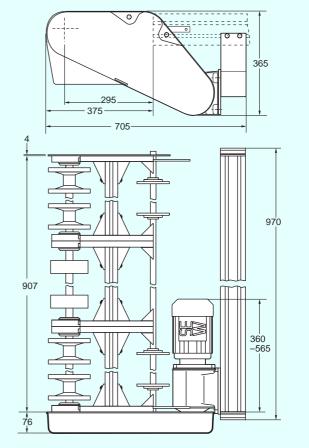
Chain width

300+300+300 mm. Transmission on left-hand side

XWEB 0B900 RA (not shown)

Triple drive unit Type A Chain width

300+300+300 mm. Transmission on right-hand side



XWEB 0B900 LB

Triple drive unit Type B Chain width

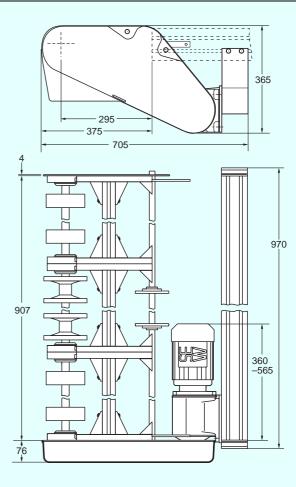
300+300+300 mm. Trans-

mission on left-hand side

XWEB 0B900 RB

Triple drive unit Type B Chain width (not shown)

300+300+300 mm. Transmission on right-hand side



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Idler end units



Description

The idler end unit is used to guide the chain from the return side of the conveyor up to the top side with a minimum of friction. The chain is guided by two or more idler wheels on a common, rotating shaft supported by SKF ball bearings.

Idler units for 900 mm and 1200 mm conveyors include an additional shaft support at the centre.

Number of idler wheels vs. conveyor width

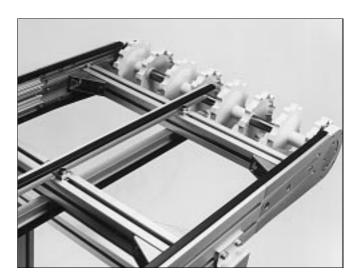
Width	300 mm	600 mm	900 mm	1200 mm
Idler wheels	2	4	6	8
Shaft supports			1	1

Material specifications

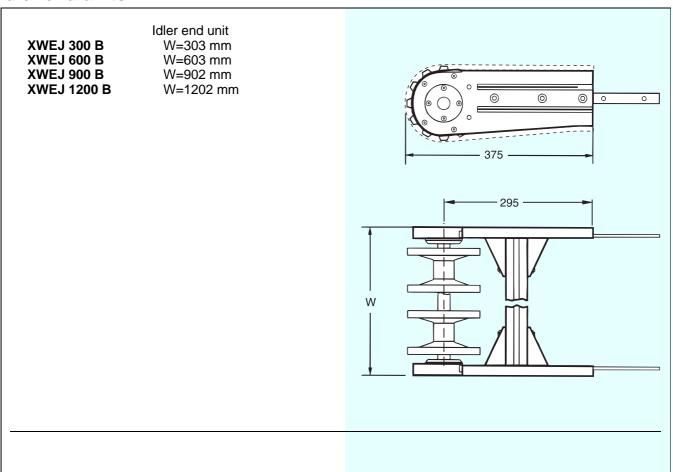
See Technical reference.

Ordering information

- Connecting strips are included with the idler end units.
- Slide rail must be ordered separately.

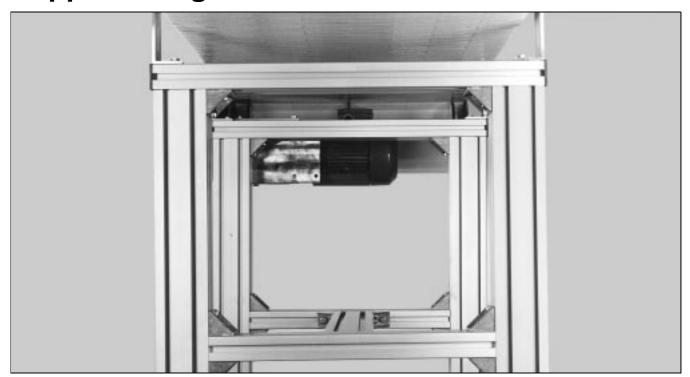


Idler end units



XW

Support designs



FlexLink structural system

The illustrations on this page show typical supports for the conveyor. All supports are built using components from FlexLink structural system XC.

Beam support brackets

The conveyor is connected to the support system by means of beam support brackets. Type A brackets XLCT 21×125 are suitable in most applications. See catalogue section *Conveyor accessories* for details.

