

SI

TECHNICAL GUIDE

Steel Light Crane System

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2 GENERAL INTRODUCTION

2.1 About this manual

This technical guide describes the KS crane product content and basic selection rules. The technical guide supports other sales tools for proper product selection. This document includes the standard products available in the price lists and the sales configurator, as well as certain special applications that require separate offer engineering.

2.2 Symbols used in this manual

The readers should familiarize themselves with the following symbols which are used in this manual.



Note: A note indicates items which require special attention from the reader. There is no obvious risk of injury associated with the notes.

2.3 Terminology

Light crane system	Assembly of lifting equipment, crane bridges, trolleys, and tracks with their suspensions for lifting operations.
Crane bridge	Steel rail carrying the lifting device and supported on trolleys running on tracks.
Track	Stationary steel rail on which a crane bridge or lifting device is running. A track consists of one or more track lines. In light crane systems, a track can be removed from the supporting building structures without influence on the strength of the supporting structures.
Suspension	All necessary clamps, hanger rods, and other fittings by which a track is suspended from a building or other supporting structure.
Monorail	Stationary steel rail on which the lifting device is running. The monorail together with a lifting device is a particular type of a light crane system.
Span	Horizontal distance between the centers of the crane track rails.
Rated capacity	Maximum net load that the crane is designed to lift for a given crane configuration and load location during normal operation.
Lifting device	The equipment needed for lifting and lowering the load.

2.4 About this product

The KS crane is a modular light crane system based on steel rails, which are proposed as kits, for manual or motorized operations. The crane kits can be used for suspending different lifting devices, although this document and the quick selection tables focus on the electric chain hoist. The lifting device is excluded from the crane kit and has to be calculated separately.

The crane system is designed to be suspended from a building or from a secondary steel structure, for example, a free standing system. The suspension is realized as a pendular system that allows horizontal displacements and downward forces. A civil engineer must calculate the strength of the support structure, to ensure that it can support the forces that are involved when the crane is in operation.

This product is typically selected because of its robustness, proven design, cost efficiency, modular design, and easy installation. It is also used for the creation of complex circuits.

2.4.1 Technical regulations

This state-of-the-art product has been designed and manufactured to conform to European and international standards and directives:

- European directive 2006/42/EC.

The standards and directives to which the product conforms are stated in the Declaration of Conformity or the Declaration by Manufacturer delivered with the product.

This light crane system has been designed for A4 application according to FEM1.001: 1998 booklet 2: classification and loading on structures and mechanisms.

A crane is classified based on the total duration of use (number of hoisting cycles) and the load spectrum.

The total duration of use is divided in utilization classes (from U0 to U9). The load spectrum is also divided in classes (from Q1 to Q4).

Utilization classes

Class	Total duration of use [n_{max}]		
U0	-	$n_{max} \leq$	16 000
U1	16 000	$< n_{max} \leq$	32 000
U2	32 000	$< n_{max} \leq$	63 000
U3	63 000	$< n_{max} \leq$	125 000
U4	125 000	$< n_{max} \leq$	250 000
U5	250 000	$< n_{max} \leq$	500 000
U6	500 000	$< n_{max} \leq$	1 000 000
U7	1 000 000	$< n_{max} \leq$	2 000 000
U8	2 000 000	$< n_{max} \leq$	4 000 000
U9	4 000 000	$< n_{max}$	-

* n_{max} = Number of hoisting cycles.

Load spectrum classes

Class	Load spectrum factor [k_p]		
Q1	-	$k_p \leq$	0.125
Q2	0.125	$< k_p \leq$	0.250
Q3	0.250	$< k_p \leq$	0.500
Q4	0.500	$< k_p \leq$	1.000

Group classification

Load spectrum class	Class of utilization										
	U0	U1	U2	U3	U4	U5	U6	U7	U8	U9	U0
Q1	A1	A1	A1	A2	A3	A4	A5	A6	A7	A8	A1
Q2	A1	A1	A2	A3	A4	A	A6	A7	A8	A8	A1
Q3	A1	A2	A3	A4	A5	A6	A7	A8	A8	A8	A1
Q4	A2	A3	A4	A5	A6	A7	A8	A8	A8	A8	A2

Explanatory table

Ax	Application with safety margin
A4	Acceptable application
Ax	Application not acceptable

All tables in this document are given for the utilization class U2 and the load spectrum Q4 (spectrum factor $k_p = 1$).

See chapter Calculating the load spectrum and determining the rated capacity for calculation of the load spectrum factor k_p . Refer to chapter Examples of calculations for an example of verification of classification group.

2.4.2 Safety regulations

This state-of-the-art product has been designed and manufactured to conform to European and international standards and directives:

- European directive 2006/42/EC.

Safety instructions for installation and operation are detailed in the installation instructions and in the Operator's manual delivered with the product. They must be read and understood before proceeding and followed during the entire lifetime of the product.

2.4.3 Installation of light crane system

The crane must be installed by using genuine parts that are supplied and/or approved by the manufacturer. Components from any other source may cause a risk for the equipment or personnel, and void the warranty.

The installation instructions are provided with the delivery in paper, and, if requested, in electronic format (for example, a pdf file). The format depends on the requested documentation delivery format indicated separately on the order for each particular order number.



Note: The installation procedure requires special skills and suitable tools to ensure safe and reliable operation of the product.

It is recommended that only authorized service personnel or an experienced service technician who is authorized by the manufacturer of the product carries out the installation work.

2.4.4 Inspection, preventive maintenance

Light crane systems and monorails are built with modular components that require low maintenance. The fixing torque of the bolted connection sets must be checked periodically, similar to the condition of the safety components and wearing parts. The correct maintenance interval depends on the actual use of the crane, at a minimum once a year.

Inspection intervals

Utilization	Interval
Single shift usage	Every 12 months
Double shift usage	Every 8 months
Three shift usage	Every 6 months

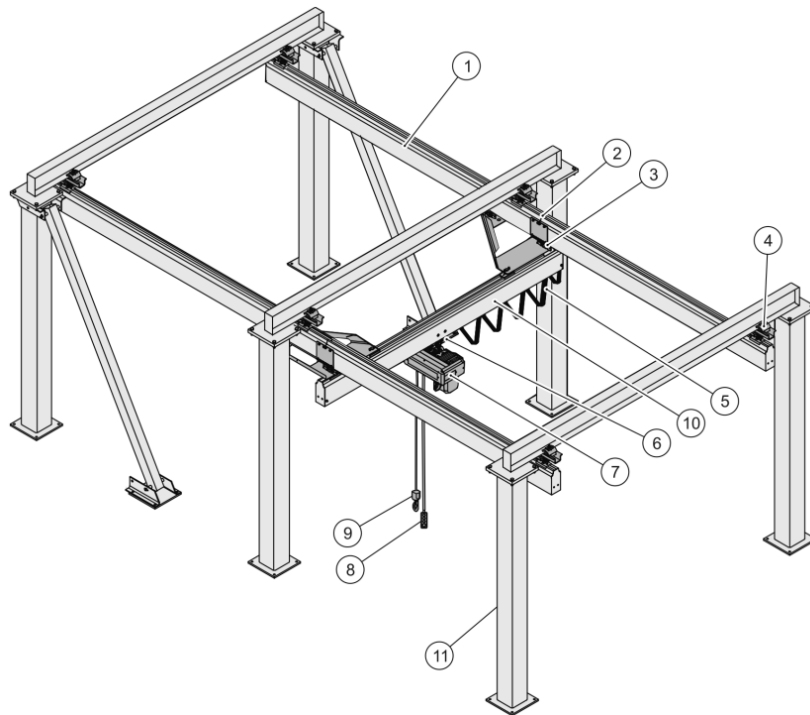


Note: This table is a general guideline. The needed inspection interval may be shorter, depending on other factors, such as environmental conditions.



Note: Instructions for proper maintenance are included in the (crane) Operator's manual.

Typical (but not limited to these points) **inspection points** are highlighted in the following illustration:



1	Track <ul style="list-style-type: none"> • Condition and shape of rails • Condition of driving surface • Locking and condition of end stops and end plate sets 	7	Lifting device <ul style="list-style-type: none"> • Function of safety equipment (e.g. limit switches) • Tightening of lifting device suspension parts • Condition and shape of load chain or rope • Lubrication of load chain or rope • Overall condition of lifting device
2	Connection set <ul style="list-style-type: none"> • Tightening of bolts • Contact between the rails 	8	Pendant controller <ul style="list-style-type: none"> • Function and condition of push buttons • Function of emergency stop
3	Crane bridge trolley <ul style="list-style-type: none"> • Locking clip of load shaft • Condition of wheels • Rotation of guiding wheels • Tightening of crane bridge suspension bolts • Condition of crane bridge suspension eye 	9	Load hook <ul style="list-style-type: none"> • Condition and shape of load hook
4	Suspension <ul style="list-style-type: none"> • Safety pins • Tightening of nuts • Condition of suspension rod • Condition of upper and lower bearing parts • Shape of suspension profile 	10	Crane bridge <ul style="list-style-type: none"> • Condition and shape of rails • Condition of driving surface • Locking and condition of end stops and end plate sets
5	Power feeding system <ul style="list-style-type: none"> • Condition of wheels • Fixing of cable or hose suspension • Tightening of wiring connections 	11	Supporting structure <ul style="list-style-type: none"> • Tightening of fixing bolts • Overall condition
6	Push trolley for lifting device <ul style="list-style-type: none"> • Locking clip of load shaft • Condition of wheels • Rotation of guiding wheels 		

2.4.5 Other relevant documents

Other documents that are related to the complete product selection or delivery are, for example:

- Crane Operator's manual
- Crane Assembly instructions
- Spare part manual
- Technical guide for the selected lifting device
- Owner's manual for the selected lifting device
- Installation and service instructions for the selected lifting device
- User instructions for sales configurator.

3 PRODUCT RANGE

3.1 Environmental conditions

This product is designed for indoor use in typical industrial environments. Typical customer segments are, for example, the automotive industry and general manufacturing.

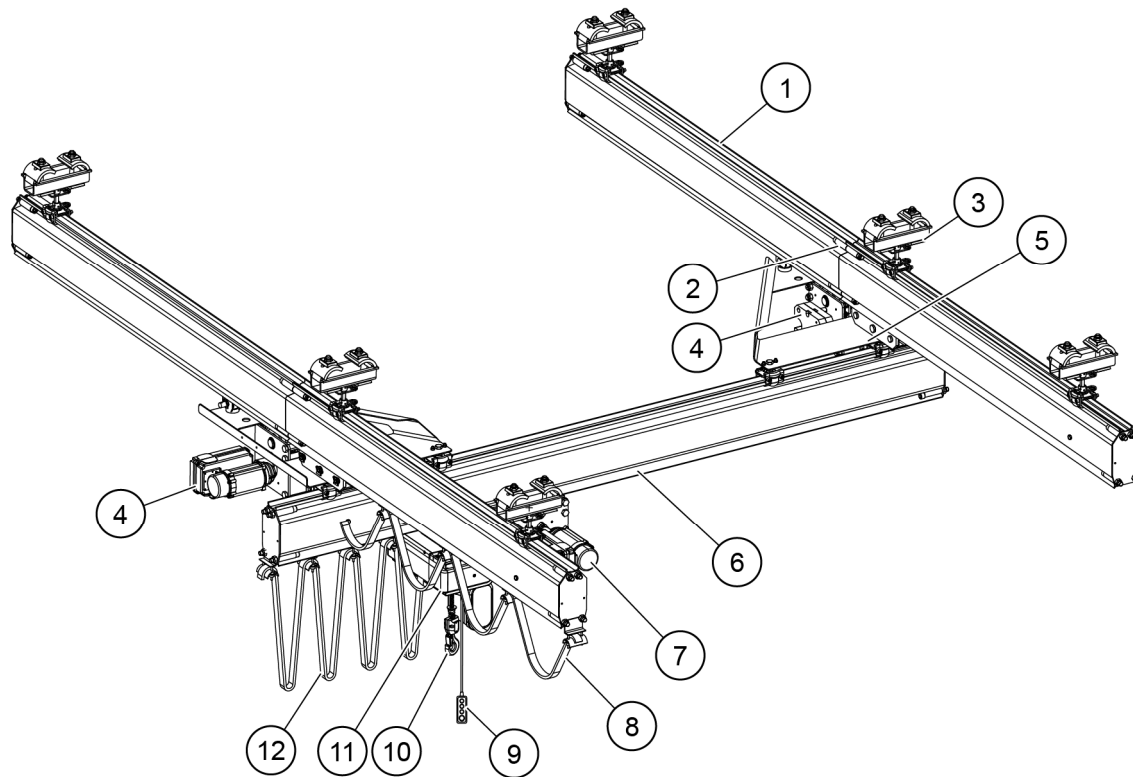
- Rated capacity range is up to 2000 kg.
- Temperature range is from -10 °C to +40 °C.
- Atmospheric corrosivity category is C2 according to EN ISO 12944-2.



Note: This document does not include products for Hazardous Environments (explosive atmosphere).

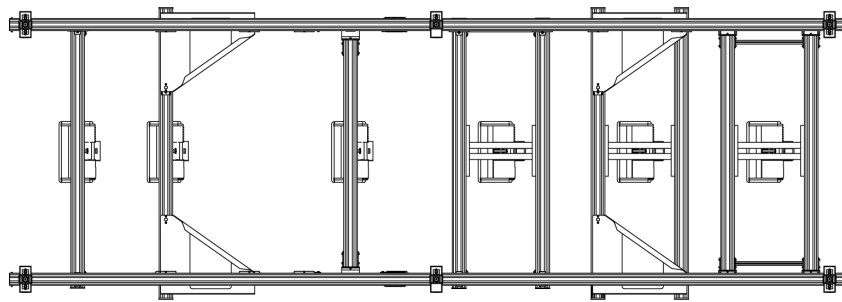
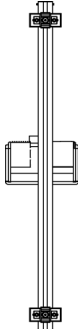
3.2 Steel light crane kit at a glance

A steel light crane kit is built with the following components:



Pos.	Component	Scope of the crane kit
1	Track rails, end stops, and end plate sets	Yes
2	Connection set	Yes
3	Suspension	Yes
4	Bridge motor trolley	Yes
5	Crane bridge kit (single girder rigid in the example)	Yes
6	Crane bridge rail	Yes
7	Hoisting motor trolley	Yes
8	Power supply for track (flat cable in the example)	Yes
9	Pendant controller	No
10	Hook	No
11	Lifting device	No
12	Power supply for crane bridge (flat cable in the example)	Yes

3.2.1 Compatibility matrix - Crane system and lifting device

Crane bridge type		Single girder			Double girder			Monorail/ circuit
								
		Articulated	Rigid	Low headroom	Articulated	Rigid	Low headroom	Monorail/ circuit
Max. rated capacity [kg]		1600	2000	2000	2000	2000	2000	2000
Traveling motors	Lifting device	OK	OK	OK	OK	OK	OK	OK
	Crane bridge	Option	OK	OK	OK	OK	OK	n/a
Lifting device	ECH	OK	OK	OK	OK	OK	OK	OK
	ATB	OK	OK	OK	Option	Option	Option	OK
	ATL	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	HCB	OK	OK	OK	Option	Option	Option	OK
	BH	Option	Option	Option	Option	Option	Option	Option

Abbreviations	
ECH	Electric chain hoist
ATB	Air balancer
ATL	Vertical lifter
HCB	Hand chain block (manual lifting equipment)
BH	Belt hoist
OK	Available as a standard solution
n/a	Not available
Option	Upon special arrangement with the Sales Support team

3.2.2 Compatibility matrix - Track size and crane bridge size

		Crane bridge profile			Crane bridge traveling motor		Crane bridge power supply (along the track)			
		UKA20	UKA30	UKA40	UKTM	UKTM2	Festoon		Conductor lines ¹⁾	
							Cable support	Hose support	RC4	Inner conductors
Track profile	UKA20	OK	OK	OK	n/a	n/a	OK	OK	OK	n/a
	UKA30	OK	OK	OK ¹⁾	OK	OK	OK	OK	OK	n/a
	UKA40	OK	OK	OK	OK	OK	OK	OK	OK	OK
Lifting device traveling motor	UKTM	n/a	OK	OK						
	UKTM2	n/a	OK	OK						
Lifting device power supply (along the crane bridge)	Festoon cable support	OK	OK	OK						
	Festoon hose support	OK	OK	OK						
	RC4/RC7	RC4 only	OK	OK						
	Inner conductors	n/a	n/a	OK						

¹⁾For details on the enclosed conductor lines, see chapter Parallel enclosed conductors.

3.2.3 Compatibility matrix - Circuits and components*

		Track profile		Specific components for circuits				Motor trolley	
		UKA30	UKA40	Switch	Turntable	Maintenance hatch	Curves	UKTM	UKTM2
Power supply	Festoon	OK	OK	n/a	n/a	OK	OK	OK	OK
	RC4	OK	OK	n/a	n/a	OK	OK	OK	OK
	Inner conductors	n/a	OK	OK	OK	OK	OK	OK	OK
Track profile	UKA30			n/a **	n/a **	n/a **	OK	OK	OK
	UKA40			OK	OK	OK	OK	OK	OK
Components	Switch	n/a	OK					OK	n/a
	Turntable	n/a	OK					OK	n/a
	Maintenance hatch	n/a	OK					OK	OK
	Curves	OK	OK					OK	OK

*NOTE: The UKA20 profile is only available as a monorail version, not circuit.

**NOTE: The PS4J010 connection set enables the use of the UKA30 tracks with specific components.

3.3 Suspended cranes (downward forces)

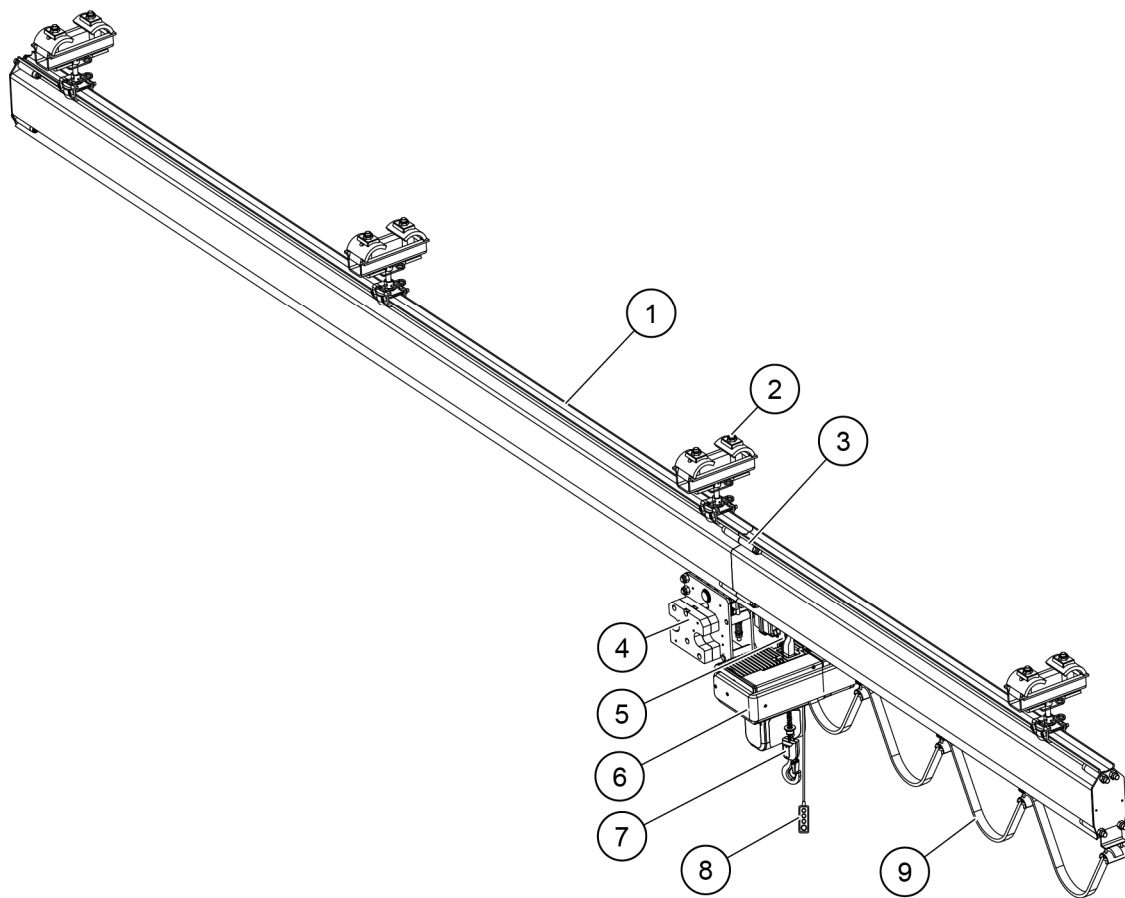
Typically, cranes and monorails have only downward forces. With telescopic construction, or a combination of long outreach, high capacity, short span, it is possible that also upward forces occur. This document covers the downward forces. For information about upward forces, contact the Sales Support team.

3.3.1 Straight monorail

A monorail system is used for the linear transport of the material. Restrictions in the lateral movement of some lifting devices may cause side-pulling. If a lateral movement beyond the limitations is required, for example, for assembly type of work, a more suitable girder crane type can be selected instead.

The length of a monorail is limited by the power supply and heat expansion, the maximum value is set at 100 m for the standard application.

For information on the optional double monorail configuration, contact the Sales Support team.



Pos.	Part	Description
1	Monorail track	The lifting device moves along the monorail track.
2	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
3	Connection set	The track segments are connected to each other to form the track.
4	Motor trolley	The motor trolley is used where motorized movement of the lifting device is required.
5	Push trolley	The lifting device is mounted on a trolley which runs inside the track rail.
6	Lifting device	The lifting device lifts and lowers the load.
7	Hook	The hook is used to attach the load for lifting.
8	Pendant controller	The lifting device is operated using the pendant controller.
9	Power supply system (track)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).

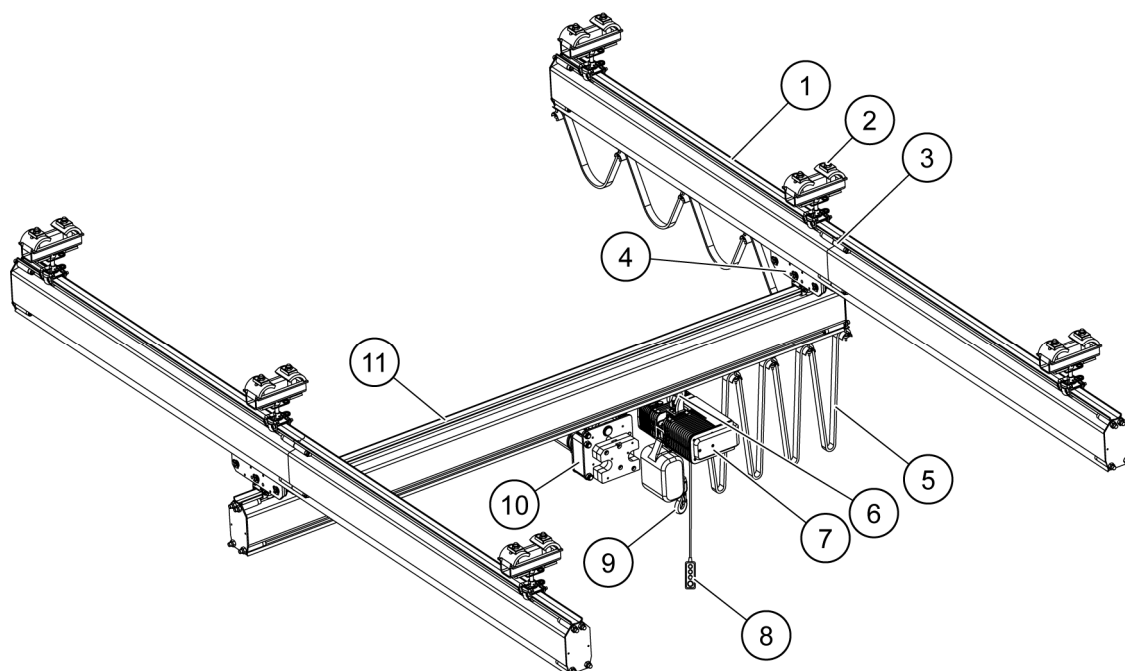
3.3.2 Single girder articulated crane bridge

Girder cranes are used for two-dimensional travel. The articulated crane is recommended for manually operated crane bridge motions.

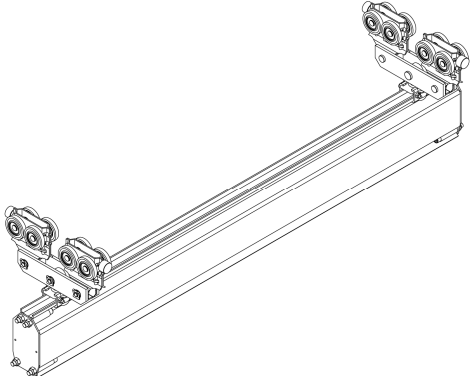
Cranes with a single girder articulated crane bridge are light and efficient tools for assembly work with manual movement. The crane bridge suspension allows the crane bridge to skew while pulling it along the track, which, combined with the low dead weight, reduces the efforts to move the load.

The articulated crane construction does not allow traveling motors for crane bridge travel, but rigid or low headroom construction can be used instead. Only one connection per crane bridge profile is allowed.

The recommended minimum span is 600 mm for the UKA20 bridges and 700 mm for the UKA30 and UKA40 bridges. If the crane span is more than 6 m, the increased skewing effect can affect the performance of the crane.



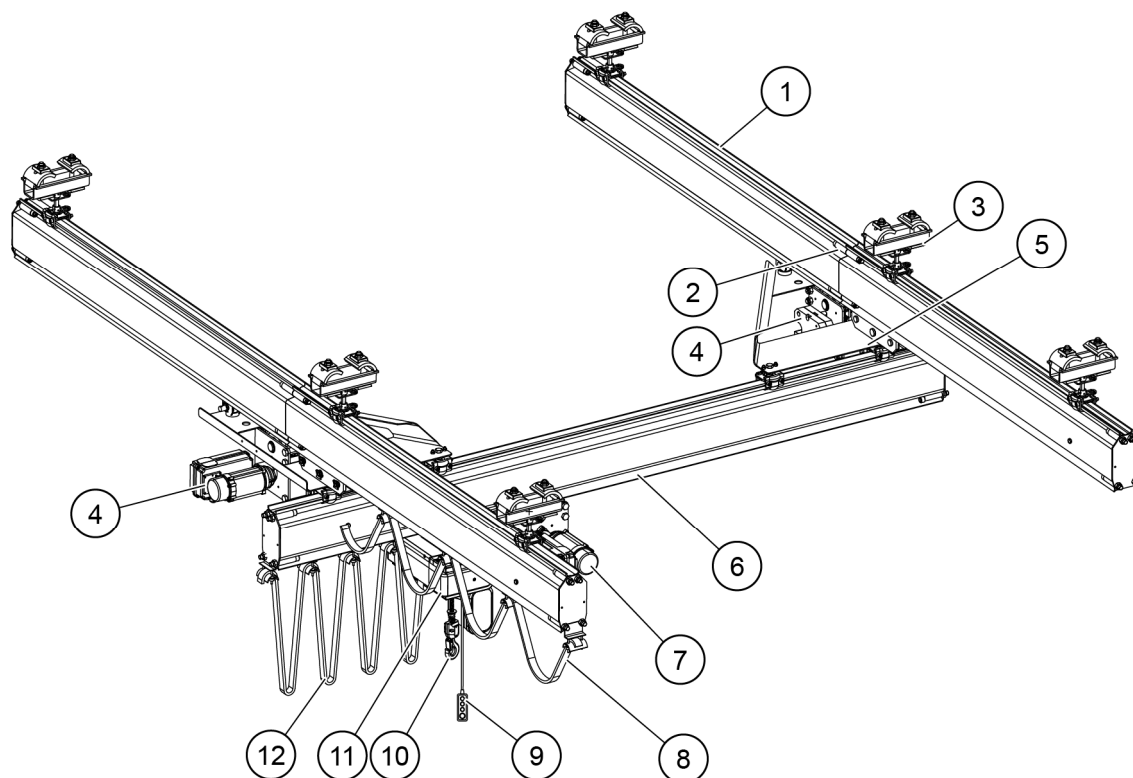
Pos.	Part	Description
1	Track	An overhead track is made up of rails and is used for the crane bridge to move along its length.
2	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
3	Connection set	The rails are connected to each other to form the track.
4	Crane bridge trolley	The crane bridge is mounted on trolleys which run inside the track rails.
5	Power supply system (crane bridge)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
6	Push trolley	The lifting device is mounted on a trolley which runs inside the track rail.
7	Lifting device	The lifting device lifts and lowers the load.
8	Pendant controller	The crane is operated using the pendant controller.
9	Hook	The hook is used to attach the load for lifting.
10	Motor trolley	The motor trolley is used where motorized movement of the lifting device is required.
11	Crane bridge	The crane bridge is also made up of rails and is used for the lifting device to move along its length.

Bridge kit contents	
<ul style="list-style-type: none">• Push trolleys (2)• Bridge suspensions (2)• End plate sets (2) <p>*Note: Rails are not included in the bridge kit, they are selected separately.</p>	

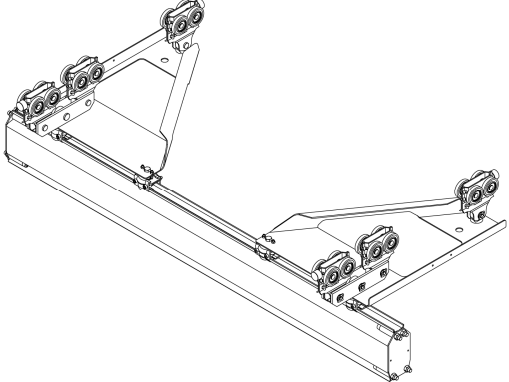
3.3.3 Single girder rigid crane bridge

Cranes with a single girder rigid crane bridge are suitable for both manual and motorized use. The triangle pieces keep the crane bridge always fully perpendicular to the track, and allow for a crane bridge length up to 12 m for the UKA40. As it is the recommended solution for the motorized crane bridge motion, the single girder rigid crane bridge is available for the UKA30 and UKA40 rails. To optimize the bridge approach, the crane bridge motor trolleys can be installed inside the triangle plates.

Only one connection per crane bridge profile is allowed. Due to the size of the triangle pieces, the minimum span is 2 m.



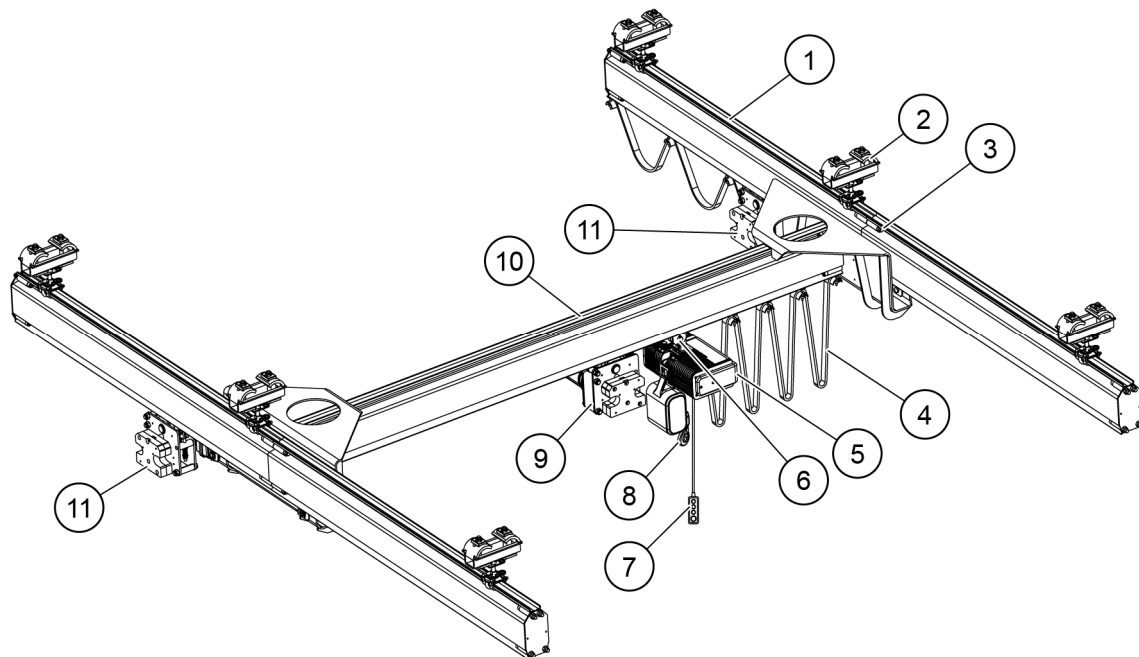
Pos.	Component	Description
1	Track	An overhead track is made up of rails and is used for the crane bridge to move along its length.
2	Connection set	The rails are connected to each other to form the tracks.
3	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
4	Motor trolley	The motor trolley is used where motorized movement of the crane bridge is required.
5	Crane bridge trolley	The crane bridge is mounted on trolleys which run inside the track rails.
6	Crane bridge	The crane bridge is also made up of rails and is used for the lifting device to move along its length.
7	Motor trolley	The motor trolley is used where motorized movement of the lifting device is required.
8	Power supply system (track)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
9	Pendant controller	The crane is operated using the pendant controller.
10	Hook	The hook is used to attach the load for lifting.
11	Lifting device	The lifting device lifts and lowers the load.
12	Power supply system (crane bridge)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).

Bridge kit contents	
<ul style="list-style-type: none">• Push trolleys (4)• Triangle kits (2)• End plate sets (2) <p>*Note: Rails are not included in the bridge kit, they are selected separately.</p>	

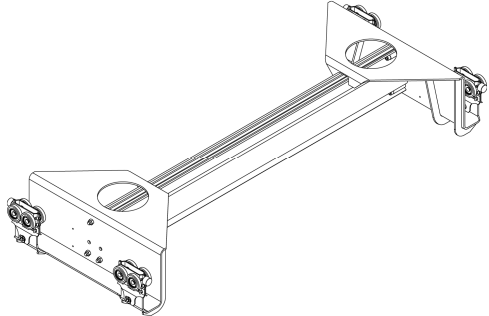
3.3.4 Single girder low headroom crane bridge

The low headroom construction significantly reduces the total height of the system and therefore increases the hook stroke. The low headroom construction keeps the crane bridge always fully perpendicular to the track, and prevents any skewing effect. It also allows for longer spans than the articulated or rigid ones. In this configuration, there is no crane bridge outreach. Only one connection per crane bridge profile is allowed.

The minimum span is 1000 mm.



Pos.	Part	Description
1	Track	An overhead track is made up of rails and is used for the crane bridge to move along its length.
2	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
3	Connection set	The rails are connected to each other to form the track.
4	Power supply system (crane bridge)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
5	Lifting device	The lifting device lifts and lowers the load.
6	Push trolley	The lifting device is mounted on a trolley which runs inside the track rail.
7	Pendant controller	The crane is operated using the pendant controller.
8	Hook	The hook is used to attach the load for lifting.
9	Motor trolley	The motor trolley is used where motorized movement of the lifting device is required.
10	Crane bridge	The crane bridge is also made up of rails and is used for the lifting device to move along its length.
11	Motor trolley	The motor trolley is used where motorized movement of the crane bridge is required.

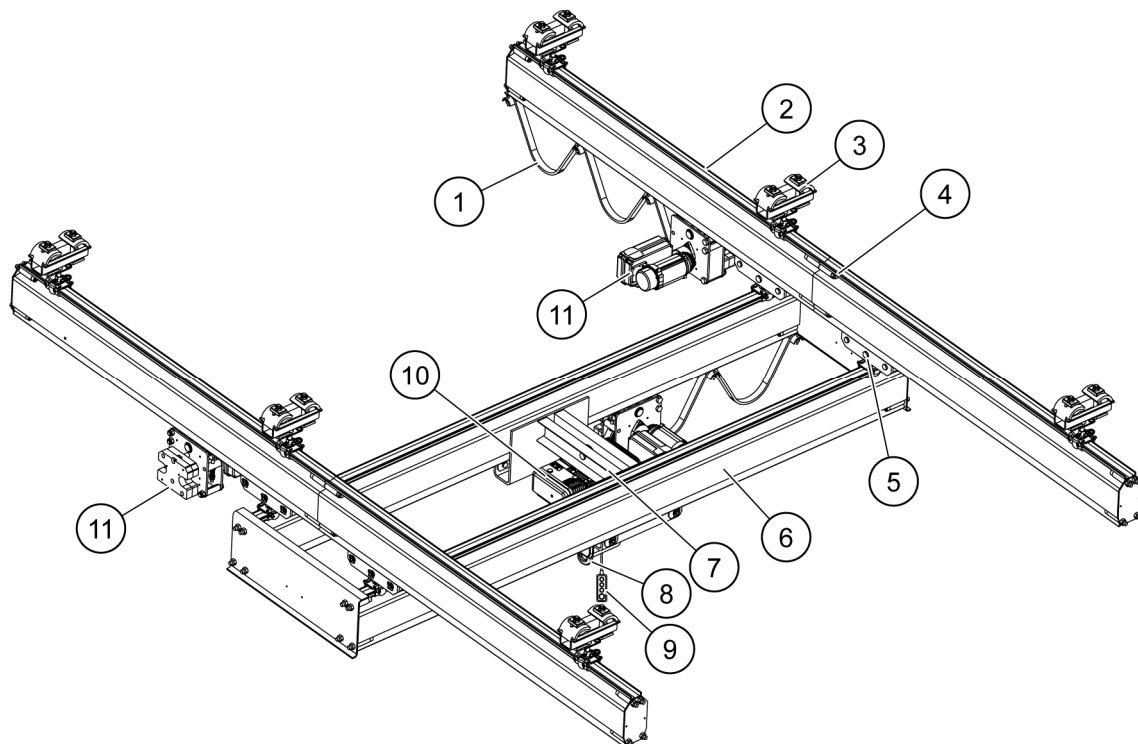
Bridge kit contents	
<ul style="list-style-type: none">• Push trolleys (4)• Low headroom supports (2) <p>*Note: Rails are not included in the bridge kit, they are selected separately.</p>	

3.3.5 Double girder articulated crane bridge

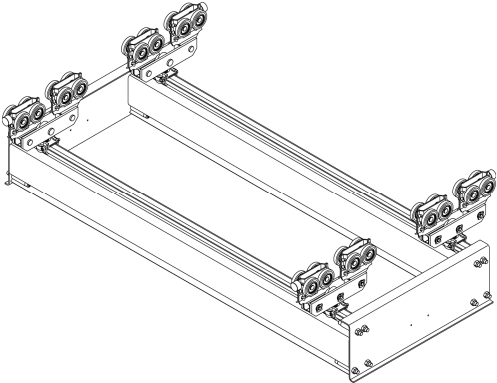
A crane with a double girder articulated crane bridge enables a longer span and/or higher loads than a single girder crane. It also provides improved headroom as the push trolley is located between the girders. The articulated crane is recommended for manually operated crane bridge motions.

The maximum length of the crane bridge is limited by load or outreach. Only one connection per crane bridge profile is allowed.

The recommended minimum span is 600 mm for the UKA20 bridges and 700 mm for the UKA30 and UKA40 bridges.



Pos.	Part	Description
1	Power supply system (track)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
2	Track	An overhead track is made up of rails and is used for the crane bridge to move along its length.
3	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
4	Connection set	The rails are connected to each other to form the track.
5	Crane bridge trolley	The crane bridge is mounted on trolleys which run inside the track rails.
6	Crane bridge	The crane bridge is also made up of rails and is used for the lifting device to move along its length.
7	Push trolley	The lifting device is mounted on a trolley which runs inside the crane bridge rail.
8	Hook	The hook is used to attach the load for lifting.
9	Pendant controller	The crane is operated using the pendant controller.
10	Lifting device	The lifting device lifts and lowers the load.
11	Motor trolley	The motor trolley is used where motorized movement of the crane bridge or lifting device is required.

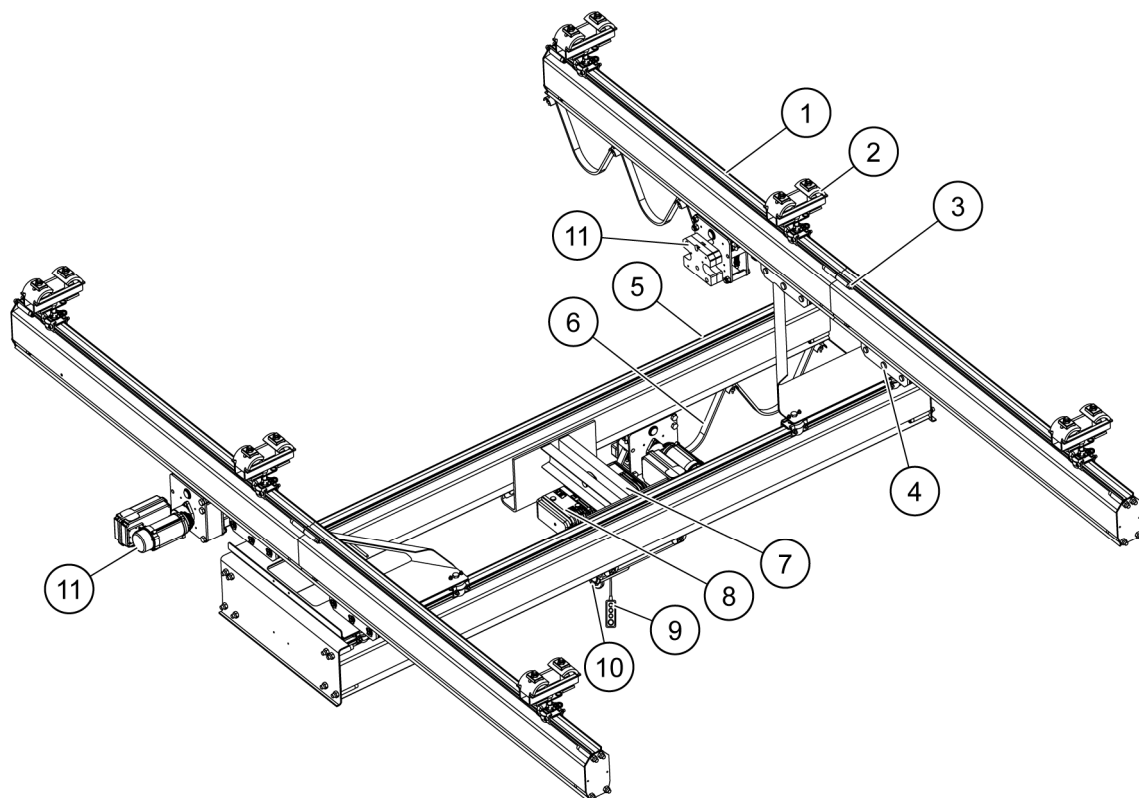
Bridge kit contents	
<ul style="list-style-type: none">• Push trolleys (4)• Bridge suspensions (4)• End plate sets (2) <p>*Note: Rails are not included in the bridge kit, they are selected separately.</p>	

3.3.6 Double girder rigid crane bridge

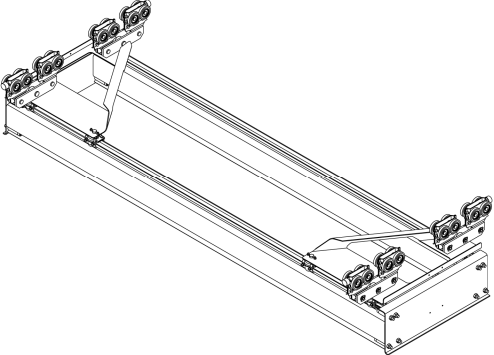
A crane with a double girder rigid crane bridge is suitable for both manual and motorized use. Triangle pieces keep the crane bridge always fully perpendicular to the track. As the recommended solution for motorized crane bridge motion, the double girder rigid crane bridge is available in UKA30 and UKA40 profiles. To optimize the bridge approach, the crane bridge motor trolleys can be installed inside the triangle plates.

Due to the size of the triangle pieces, the minimum span is 2 m.

The maximum length of the crane bridge is limited by load, the B dimension of the crane bridge profile, or outreach. Only one connection per crane bridge profile is allowed.



Pos.	Component	Description
1	Track	An overhead track is made up of rails and is used for the crane bridge to move along its length.
2	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
3	Connection set	The rails are connected to each other to form the tracks.
4	Crane bridge trolley	The crane bridge is mounted on trolleys which run inside the track rails.
5	Crane bridge	The crane bridge is also made up of rails and is used for the lifting device to move along its length.
6	Power supply system (crane bridge)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
7	Push trolley	The lifting device is mounted on a trolley which runs inside the crane bridge rail.
8	Lifting device	The lifting device lifts and lowers the load.
9	Pendant controller	The crane is operated using the pendant controller.
10	Hook	The hook is used to attach the load for lifting.
11	Motor trolley	The motor trolley is used where motorized movement of the crane bridge or lifting device is required.

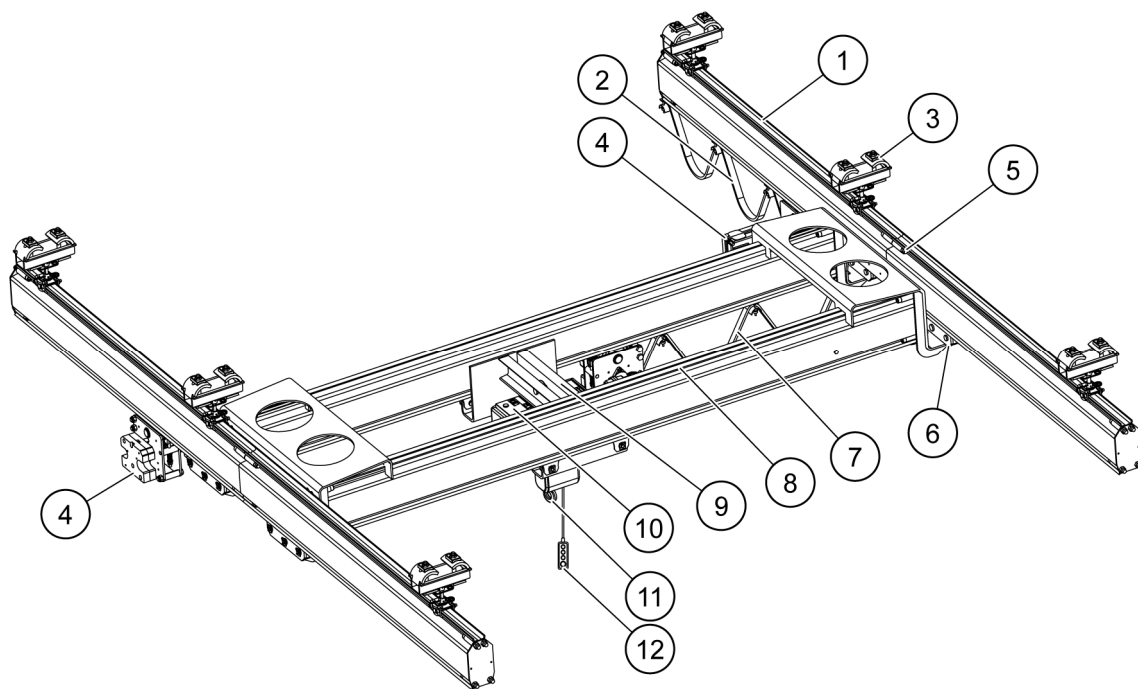
Bridge kit contents	
<ul style="list-style-type: none"> • Push trolleys (4) • Triangle kits (2) • End plate sets (2) <p>*Note: Rails are not included in the bridge kit, they are selected separately.</p>	

3.3.7 Double girder low headroom crane bridge

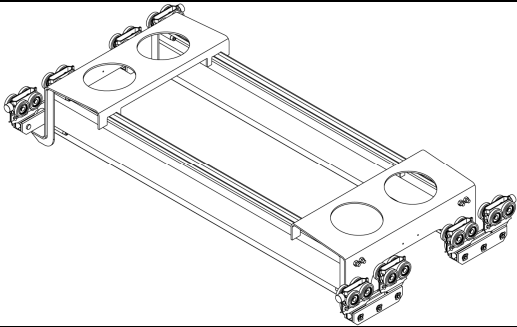
The double girder low headroom crane bridge is the most compact solution, providing a remarkable low headroom and the maximum possible hook stroke.

The low headroom construction allows longer spans than the articulated or rigid ones. In this configuration, there is no crane bridge outreach. Only one connection per crane bridge profile is allowed.

The minimum span is 1000 mm.



Pos.	Part	Description
1	Track	An overhead track is made up of rails and is used for the crane bridge to move along its length.
2	Power supply system (track)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
3	Suspension	The crane can be suspended off the ceiling or other overhead structure from support brackets.
4	Motor trolley	The motor trolley is used where motorized movement of the crane bridge or lifting device is required.
5	Connection set	The rails are connected to each other to form the track.
6	Crane bridge trolley	The crane bridge is mounted on trolleys which run inside the track rails.
7	Power supply system (crane bridge)	The power supply systems supplies power to the lifting device and motor trolley (if equipped).
8	Crane bridge	The crane bridge is also made up of rails and is used for the lifting device to move along its length.
9	Push trolley	The lifting device is mounted on a trolley which runs inside the crane bridge rail.
10	Lifting device	The lifting device lifts and lowers the load.
11	Hook	The hook is used to attach the load for lifting.
12	Pendant controller	The crane is operated using the pendant controller.

Bridge kit contents	
<ul style="list-style-type: none">• Push trolleys (4)• Low headroom supports (2) <p>*Note: Rails are not included in the bridge kit, they are selected separately.</p>	

3.4 Advanced suspended cranes

3.4.1 Circuit monorails

It is possible to build non-straight monorails by using components like curves, switches, and turntables. Refer to chapter Components for circuits and monorails for data about these components.

Every circuit must be subject to a specific design study. The study is needed to check the feasibility, specify the rail lengths, define the suspension locations, and to ensure that the final product is in good shape. A list of input data has to be completed before starting any study.

For more information about this option, contact the Sales Support team.

3.4.2 Long outreach crane bridges

As a standard solution in normal circumstances, and for safety reasons, the load and the lifting device should always be located inside the crane area (between the tracks). However, it is possible to extend the girder of the articulated and rigid crane bridges for the festoon storage area. This possibility is limited to the maximal length of the rails, as only one connection is allowed on the bridge girders.

For more information about this option, contact the Sales Support team.

3.4.3 Telescopic crane bridges

The telescopic crane allows a greater outreach through a second girder moving under the main girder crane. This solution can be required when it is not possible to place the track above the lifting or lowering position of the load. The purpose of the solution is to lift or lower the load out of the span. The load must be moved inside the span area to allow a long travel.

For more information about this option, contact the Sales Support team.

3.4.4 Extended cross travel crane bridges

In situations where a remarkable long travel distance is required for the crane bridge, specific arrangements with three tracks are possible. In this case, the rigid motorized crane bridges are mandatory.

For more information about this option, contact the Sales Support team.

3.4.5 Energy power supply by inner conductors inside UKA40 rails

As a standard variant, the power supply is provided through a festoon cable under the profile or through parallel enclosed conductor lines. As an option, the power supply can be achieved with inner conductors inside the UKA40 rails.

This solution, called the UKA40-S, provides a versatile power supply. It can be used especially for the circuit monorails that are fitted with switches and turntables, for the use in situations where other power supply solutions cannot be used. It can be used as well in systems with more than two crane bridges under the track.

For more information about this option, contact the Sales Support team.

3.4.6 Redundant safety

When intensive operation of the cranes is required, under conditions where the customer does not allow the interruption of the working area, it is possible to install safety redundant devices on the articulated single girder bridges and on the suspensions. Other bridge types are safety redundant by design, as each bridge trolley is linked to the track by at least two push trolleys.

For detailed information about this option, contact the Sales Support team.

4 LIGHT CRANE SYSTEM CONFIGURATION

4.1 Selection of crane type

The following table summarizes the main criteria that is to be considered when selecting the crane type:

Selection criteria		Single girder crane bridge			Double girder crane bridge			Monorail/ circuit
		Articulated	Rigid	Low headroom	Articulated	Rigid	Low headroom	
Transportation method	Linear	+	+	+	+	+	+	++
	2-dimensional	++	++	++	++	++	++	n/a*
Rated capacity [kg]	63 to 1250	++	++	++	+	+	+	++
	1250 to 2000	+	+	+	++	++	++	+
Span [m]	< 6	++	+	+	+	+	+	n/a
	> 6	+	++	+	++	++	++	n/a
Position of load on crane bridge during crane bridge travel	In between track profiles	++	+	+	+	+	+	n/a
	In outreach area	+	++	n/a	+	++	n/a	n/a
Limited height (under roof)		n/a	n/a	++	+	+	++	n/a

*NOTE: Available upon request through the Sales Support team.

Explanations	
++	recommended
+	possible
n/a	not applicable

4.2 Quick selection

Quick selection helps with quickly determining the required profile sizes for the crane.



Note: The results of the quick selection must be evaluated with the sales configurator.



Note: The quick selection tables and the graphs for determining the rail type are based on an outreach of 150 mm. It means that the load is always located between the track profiles.

The outreach can be extended for storing the festoon trolleys. See chapter Festoon under profile for the calculation of the number of the festoon trolleys required.

For longer load-supporting outreaches, contact the Sales Support team.



Note: For limitations on the hook approach, see the following chapters of this document:

- Chapter Crane dimensions for the minimum distance between the hook and the end of the rail.
- Chapter Energy supply for details regarding the space requirements for energy supply.

The measurements were calculated considering a predetermined lifting device weight. If a different lifting device weight or crane span is needed, the detailed calculations in the following chapter must be executed.

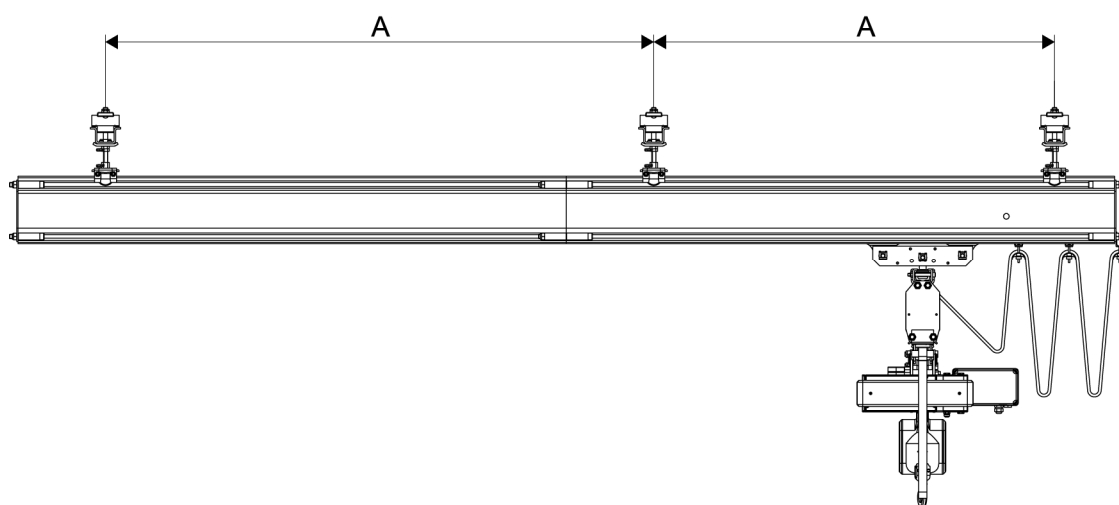
All given values are maximum values, and they are given in millimeters [mm]. The deflection criteria that are used is $L/500$.

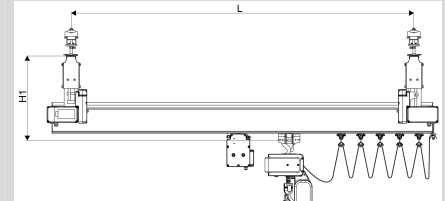
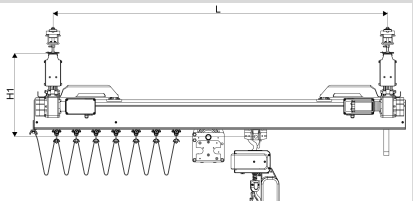
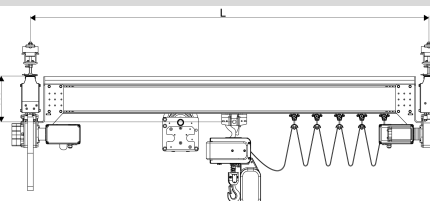
The quick selection tables and graphs are applicable for single bridge configurations. For configurations with multiple bridges, contact the Sales Support team.

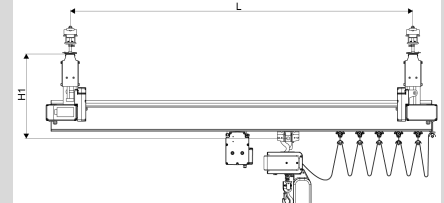
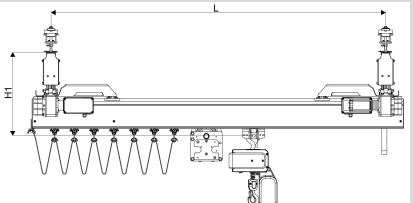
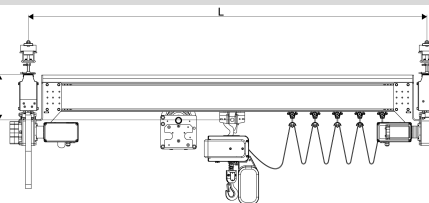
4.2.1 Single girder crane bridges

The following abbreviations are used in the quick selection table:

L max.	Maximum distance between tracks (= span)
A max.	Maximum distance between suspensions on the track
H1	$H1 = H_T + H_B$ H_T : Height of track (between top of track profile and top of crane bridge profile) H_B : Height of the crane bridge or monorail (between the top of the crane bridge or monorail profile and the top of the push trolley bolt). Refer to chapter Crane dimensions for the complete list of dimensions.



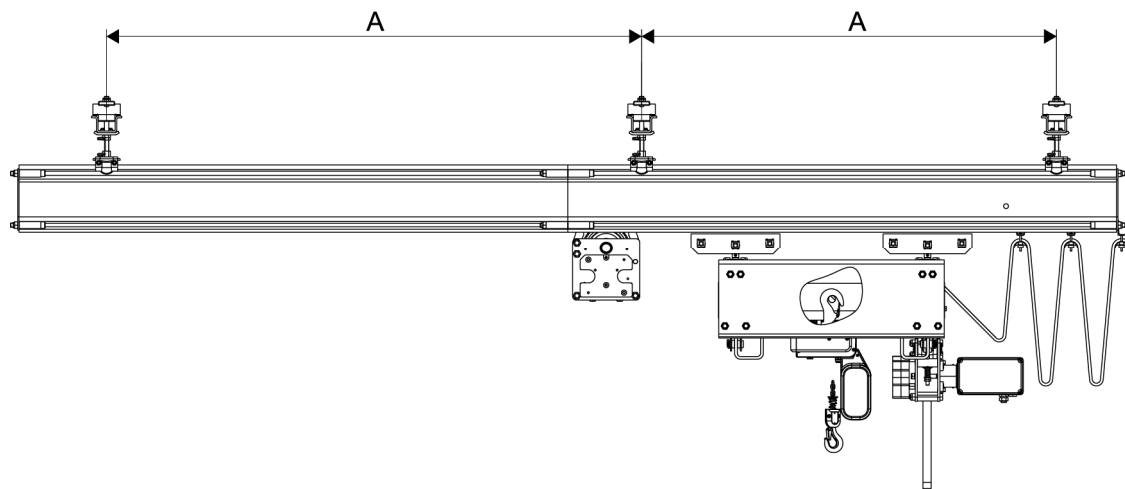
Single girder cranes																			
Articulated						Rigid						Low headroom							
																			
Crane bridge		Track				Crane bridge		Track				Crane bridge		Track					
L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1		
Rated capacity 63 kg, lifting device weight 30 kg																			
5890	UKA20	5290	UKA20	PS2B410	405	n/a						6110	UKA20	5170	UKA20	PS2B160	151		
		8240	UKA30	PS2B415	470.5									8090	UKA30	PS2B165	216		
		11560	UKA40	PS2B415	530.5									11430	UKA40	PS2B165	276		
8820	UKA30	7490	UKA30	PS3B110	520.5	8820	UKA30	7310	UKA30	PS3B130	526	9040	UKA30	7150	UKA30	PS4B160	216.5		
		10870	UKA40	PS3B110	580.5			10690	UKA40	PS3B130	586			10530	UKA40	PS4B160	276.5		
12060	UKA40	6600	UKA30	PS4B110	580.5	12060	UKA40	6470	UKA30	PS4B130	586	12280	UKA40	6360	UKA30	PS4B160	276.5		
		9950	UKA40	PS4B110	640.5			9800	UKA40	PS4B130	646			9680	UKA40	PS4B160	336.5		
Rated capacity 125 kg, lifting device weight 30 kg																			
4940	UKA20	4590	UKA20	PS2B410	405	n/a						5160	UKA20	4550	UKA20	PS2B160	151		
		7490	UKA30	PS2B415	470.5									7410	UKA30	PS2B165	216		
		10870	UKA40	PS2B415	530.5									10790	UKA40	PS2B165	276		
7880	UKA30	6940	UKA30	PS3B110	520.5	7880	UKA30	6790	UKA30	PS3B130	526	8100	UKA30	6680	UKA30	PS4B160	216.5		
		10310	UKA40	PS3B110	580.5			10160	UKA40	PS3B130	586			10030	UKA40	PS4B160	276.5		
11240	UKA40	6220	UKA30	PS4B110	580.5	11240	UKA40	6110	UKA30	PS4B130	586	11460	UKA40	6020	UKA30	PS4B160	276.5		
		9520	UKA40	PS4B110	640.5			9390	UKA40	PS4B130	646			9290	UKA40	PS4B160	336.5		
Rated capacity 160 kg, lifting device weight 30 kg																			
4560	UKA20	4290	UKA20	PS2B410	405	n/a						4780	UKA20	4270	UKA20	PS2B160	151		
		7130	UKA30	PS2B415	470.5									7090	UKA30	PS2B165	216		
		10510	UKA40	PS2B415	530.5									10460	UKA40	PS2B165	276		
7450	UKA30	6660	UKA30	PS3B110	520.5	7450	UKA30	6530	UKA30	PS3B130	526	7670	UKA30	6440	UKA30	PS4B160	216.5		
		10010	UKA40	PS3B110	580.5			9870	UKA40	PS3B130	586			9770	UKA40	PS4B160	276.5		
10830	UKA40	6020	UKA30	PS4B110	580.5	10830	UKA40	5920	UKA30	PS4B130	586	11050	UKA40	5850	UKA30	PS4B160	276.5		
		9290	UKA40	PS4B110	640.5			9170	UKA40	PS4B130	646			9090	UKA40	PS4B160	336.5		
Rated capacity 250 kg, lifting device weight 30 kg																			
3870	UKA20	3710	UKA20	PS2B410	405	n/a						4090	UKA20	3740	UKA20	PS2B160	151		
		6370	UKA30	PS2B415	470.5									6390	UKA30	PS2B165	216		
		9690	UKA40	PS2B415	530.5									9720	UKA40	PS2B165	276		
6580	UKA30	6050	UKA30	PS3B110	520.5	6580	UKA30	5950	UKA30	PS3B130	526	6800	UKA30	5910	UKA30	PS4B160	216.5		
		9330	UKA40	PS3B110	580.5			9210	UKA40	PS3B130	586			9160	UKA40	PS4B160	276.5		
9930	UKA40	5580	UKA30	PS4B110	580.5	9930	UKA40	5500	UKA30	PS4B130	586	10150	UKA40	5450	UKA30	PS4B160	276.5		
		8750	UKA40	PS4B110	640.5			8650	UKA40	PS4B130	646			8590	UKA40	PS4B160	336.5		
Rated capacity 320 kg, lifting device weight 35 kg																			
3480	UKA20	3360	UKA20	PS2B410	405	n/a						3700	UKA20	3420	UKA20	PS2B160	151		
		5870	UKA30	PS2B415	470.5									5930	UKA30	PS2B165	216		
		9110	UKA40	PS2B415	530.5									9190	UKA40	PS2B165	276		
6040	UKA30	5640	UKA30	PS3B110	520.5	6040	UKA30	5560	UKA30	PS3B130	526	6260	UKA30	5540	UKA30	PS4B160	216.5		
		8830	UKA40	PS3B110	580.5			8730	UKA40	PS3B130	586			8710	UKA40	PS4B160	276.5		
9310	UKA40	5260	UKA30	PS4B110	580.5	9310	UKA40	5190	UKA30	PS4B130	586	9530	UKA40	5160	UKA30	PS4B160	276.5		
		8350	UKA40	PS4B110	640.5			8260	UKA40	PS4B130	646			8220	UKA40	PS4B160	336.5		
Rated capacity 500 kg, lifting device weight 35 kg																			
5120	UKA30	4890	UKA30	PS3B110	520.5	5120		UKA30	4840	UKA30	PS3B130	526	5340	UKA30	4870	UKA30	PS4B160	216.5	
		7860	UKA40	PS3B110	580.5				7780	UKA40	PS3B130	586			7820	UKA40	PS4B160	276.5	
8160	UKA40	4660	UKA30	PS4B110	580.5	8160		UKA40	4610	UKA30	PS4B130	586	8380	UKA40	4610	UKA30	PS4B160	276.5	
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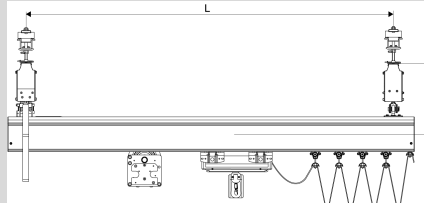
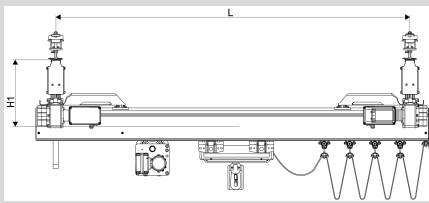
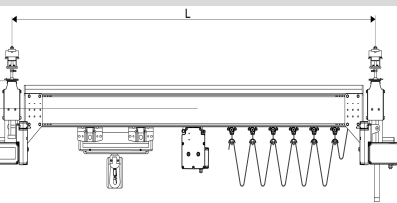
Single girder cranes																		
Articulated						Rigid						Low headroom						
																		
Crane bridge		Track				Crane bridge		Track				Crane bridge		Track				
L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1	
Rated capacity 630 kg, lifting device weight 35 kg																		
4650	UKA30	4500	UKA30	PS3B110	520.5	4650	UKA30	4450	UKA30	PS3B130	526	7530	UKA40	4280	UKA30	PS4B130	60	
		7310	UKA40	PS3B110	580.5			7240	UKA40	PS3B130	586			7000	UKA40	PS4B130	120	
7530	UKA40	4320	UKA30	PS4B110	580.5	7530	UKA40	4280	UKA30	PS4B130	586	7750	UKA40	4300	UKA30	PS4B160	120	
		7060	UKA40	PS4B110	640.5			7000	UKA40	PS4B130	646			7020	UKA40	PS4B160	180	
Rated capacity 800 kg, lifting device weight 60 kg																		
4150	UKA30	4040	UKA30	PS3B110	520.5	4150	UKA30	4010	UKA30	PS3B130	526	4370	UKA30	4080	UKA30	PS4B160	216.5	
		6650	UKA40	PS3B110	580.5			6600	UKA40	PS3B130	586			6700	UKA40	PS4B160	276.5	
6800	UKA40	3920	UKA30	PS4B110	580.5	6800	UKA40	3890	UKA30	PS4B130	586	7020	UKA40	3920	UKA30	PS4B160	276.5	
		6470	UKA40	PS4B110	640.5			6430	UKA40	PS4B130	646			6470	UKA40	PS4B160	336.5	
Rated capacity 1000 kg, lifting device weight 60 kg																		
3760	UKA30	3680	UKA30	PS3B120	531.5	3760	UKA30	3650	UKA30	PS3B140	537	3980	UKA30	3750	UKA30	PS4B160	222	
		6100	UKA40	PS3B120	591.5			6060	UKA40	PS3B140	597			6200	UKA40	PS4B160	282	
6230	UKA40	3590	UKA30	PS4B120	591.5	6230	UKA40	3570	UKA30	PS4B140	597	6450	UKA40	3620	UKA30	PS4B160	282	
		5970	UKA40	PS4B120	651.5			5940	UKA40	PS4B140	657			6010	UKA40	PS4B160	342	
Rated capacity 1250 kg, lifting device weight 60 kg																		
3360	UKA30	3320	UKA30	PS3B120	531.5	3360	UKA30	3280	UKA30	PS3B140	537	3580	UKA30	3480	UKA30	PS4B160	222	
		5660	UKA40	PS3B120	591.5			5630	UKA40	PS3B140	597			5790	UKA40	PS4B160	282	
5660	UKA40	3170	UKA30	PS4B120	591.5	5660	UKA40	3140	UKA30	PS4B140	597	5880	UKA40	3250	UKA30	PS4B160	282	
		5530	UKA40	PS4B120	651.5			5500	UKA40	PS4B140	657			5590	UKA40	PS4B160	342	
Rated capacity 1600 kg, lifting device weight 70 kg																		
2660	UKA30	2690	UKA30	PS3B120	531.5	2660	UKA30	2670	UKA30	PS3B140	537	2880	UKA30	2900	UKA30	PS4B160	222	
		5120	UKA40	PS3B120	591.5			5100	UKA40	PS3B140	597			5300	UKA40	PS4B160	282	
5070	UKA40	2570	UKA30	PS4B120	591.5	5070	UKA40	2550	UKA30	PS4B140	597	5290	UKA40	2660	UKA30	PS4B160	282	
		5000	UKA40	PS4B120	651.5			4980	UKA40	PS4B140	657			5080	UKA40	PS4B160	342	
Rated capacity 2000 kg, lifting device weight 70 kg																		
2160	UKA30	2220	UKA30	PS3B120	531.5	2160	UKA30	2210	UKA30	PS3B140	537	2380	UKA30	2460	UKA30	PS4B160	222	
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4000	UKA40	2110	UKA30	PS4B120	591.5	4000	UKA40	2100	UKA30	PS4B140	597	4200	UKA40	2210	UKA30	PS4B160	282	
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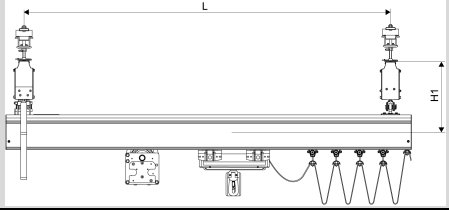
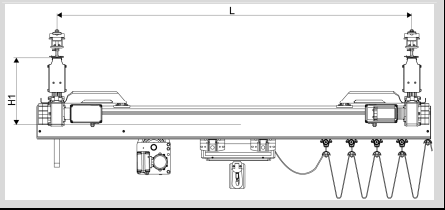
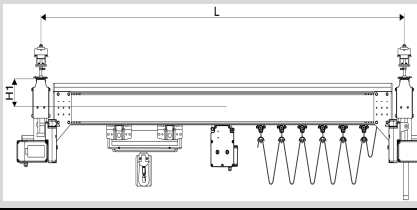
4.2.2 Double girder crane bridges

The following abbreviations are used in the quick selection table:

L max.	(=span) Maximum distance between tracks
A max.	Maximum distance between suspensions on the track
H1	$H1 = H_T + H_B$ H_T : Height of track (between top of track profile and top of crane bridge profile) H_B : Height of the crane bridge or monorail (between top of crane bridge or monorail profile and top of push trolley bolt). Refer to chapter Crane dimensions for the complete list of dimensions.



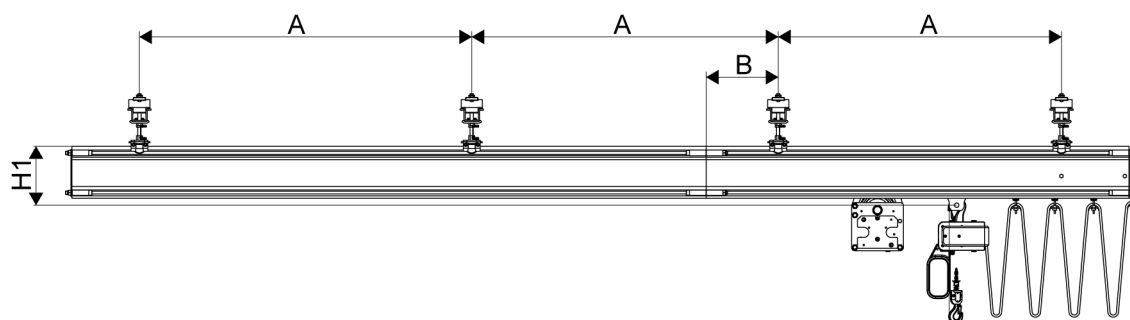
Double girder cranes																	
Articulated						Rigid						Low headroom					
																	
Crane bridge		Track				Crane bridge		Track				Crane bridge		Track			
L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1
Rated capacity 63 kg, lifting device weight 30 kg																	
6630	UKA20	4470	UKA20	PS2B510	201							6850	UKA20	4450	UKA20	PS2B260	-55
		7320	UKA30	PS2B515	266.5									7300	UKA30	PS2B265	10
		10700	UKA40	PS2B515	326.5									10680	UKA40	PS2B265	70
9260	UKA30	6120	UKA30	PS3B210	358.5	9260	UKA30	6050	UKA30	PS3B230	360.5	9480	UKA30	6050	UKA30	PS4B260	51
		9410	UKA40	PS3B210	418.5			9320	UKA40	PS3B230	420.5			9330	UKA40	PS4B260	111
12400	UKA40	5140	UKA30	PS4B210	418.5	12400	UKA40	5090	UKA30	PS4B230	420.5	12620	UKA40	5110	UKA30	PS4B260	51
		8190	UKA40	PS4B210	478.5			8130	UKA40	PS4B230	480.5			8160	UKA40	PS4B260	111
Rated capacity 125 kg, lifting device weight 30 kg																	
5920	UKA20	4050	UKA20	PS2B510	201							6140	UKA20	4050	UKA20	PS2B260	-55
		6800	UKA30	PS2B515	266.5									6810	UKA30	PS2B265	10
		10160	UKA40	PS2B515	326.5									10170	UKA40	PS2B265	70
8700	UKA30	5810	UKA30	PS3B210	358.5	8700	UKA30	5750	UKA30	PS3B230	360.5	8920	UKA30	5760	UKA30	PS4B260	51
		9040	UKA40	PS3B210	418.5			8960	UKA40	PS3B230	420.5			8980	UKA40	PS4B260	111
11950	UKA40	4950	UKA30	PS4B210	418.5	11950	UKA40	4910	UKA30	PS4B230	420.5	12170	UKA40	4930	UKA30	PS4B260	51
		7940	UKA40	PS4B210	478.5			7880	UKA40	PS4B230	480.5			7920	UKA40	PS4B260	111
Rated capacity 160 kg, lifting device weight 30 kg																	
5590	UKA20	3850	UKA20	PS2B510	201							5810	UKA20	3870	UKA20	PS2B260	-55
		6540	UKA30	PS2B515	266.5									6560	UKA30	PS2B265	10
		9880	UKA40	PS2B515	326.5									9910	UKA40	PS2B265	70
8410	UKA30	5650	UKA30	PS3B210	358.5	8410	UKA30	5590	UKA30	PS3B230	360.5	8630	UKA30	5610	UKA30	PS4B260	51
		8840	UKA40	PS3B210	418.5			8770	UKA40	PS3B230	420.5			8790	UKA40	PS4B260	111
11710	UKA40	4850	UKA30	PS4B210	418.5	11710	UKA40	4820	UKA30	PS4B230	420.5	11930	UKA40	4840	UKA30	PS4B260	51
		7800	UKA40	PS4B210	478.5			7750	UKA40	PS4B230	480.5			7790	UKA40	PS4B260	111
Rated capacity 250 kg, lifting device weight 30 kg																	
4950	UKA20	3440	UKA20	PS2B510	201							5170	UKA20	3480	UKA20	PS2B260	-55
		5960	UKA30	PS2B515	266.5									6020	UKA30	PS2B265	10
		9220	UKA40	PS2B515	326.5									9290	UKA40	PS2B265	70
7780	UKA30	5280	UKA30	PS3B210	358.5	7780	UKA30	5230	UKA30	PS3B230	360.5	8000	UKA30	5260	UKA30	PS4B260	51
		8370	UKA40	PS3B210	418.5			8310	UKA40	PS3B230	420.5			8350	UKA40	PS4B260	111
11140	UKA40	4620	UKA30	PS4B210	418.5	11140	UKA40	4590	UKA30	PS4B230	420.5	11360	UKA40	4610	UKA30	PS4B260	51
		7480	UKA40	PS4B210	478.5			7440	UKA40	PS4B230	480.5			7470	UKA40	PS4B260	111
Rated capacity 320 kg, lifting device weight 35 kg																	
4540	UKA20	3180	UKA20	PS2B510	201							4760	UKA20	3230	UKA20	PS2B260	-55
		5580	UKA30	PS2B515	266.5									5650	UKA30	PS2B265	10
		8750	UKA40	PS2B515	326.5									8840	UKA40	PS2B265	70
7340	UKA30	5010	UKA30	PS3B210	358.5	7340	UKA30	4970	UKA30	PS3B230	360.5	7560	UKA30	5010	UKA30	PS4B260	51
		8020	UKA40	PS3B210	418.5			7970	UKA40	PS3B230	420.5			8020	UKA40	PS4B260	111
10720	UKA40	4440	UKA30	PS4B210	418.5	10720	UKA40	4410	UKA30	PS4B230	420.5	10940	UKA40	4440	UKA30	PS4B260	51
		7230	UKA40	PS4B210	478.5			7190	UKA40	PS4B230	480.5			7230	UKA40	PS4B260	111
Rated capacity 500 kg, lifting device weight 35 kg																	
3860	UKA20	4870	UKA30	PS2B515	266.5							4080	UKA20	4970	UKA30	PS2B265	10
		7830	UKA40	PS2B515	326.5									7970	UKA40	PS2B265	70
6500	UKA30	4500	UKA30	PS3B210	358.5	6500	UKA30	4470	UKA30	PS3B230	360.5	6720	UKA30	4520	UKA30	PS4B260	51
		7310	UKA40	PS3B210	418.5			7270	UKA40	PS3B230	420.5			7340	UKA40	PS4B260	111
9840	UKA40	4080	UKA30	PS4B210	418.5	9840	UKA40	4060	UKA30	PS4B230	420.5	10060	UKA40	4100	UKA30	PS4B260	51
		6710	UKA40	PS4B210	478.5			6680	UKA40	PS4B230	480.5			6730	UKA40	PS4B260	111

Double girder cranes																	
Articulated						Rigid						Low headroom					
																	
Crane bridge		Track				Crane bridge		Track				Crane bridge		Track			
L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1	L max.	Profile	A max.	Profile	Bridge kit	H1
Rated capacity 630 kg, lifting device weight 35 kg																	
6030	UKA30	4200	UKA30	PS3B210	358.5	6030	UKA30	4180	UKA30	PS3B230	360.5	6250	UKA30	4240	UKA30	PS4B260	51
		6890	UKA40	PS3B210	418.5			6850	UKA40	PS3B230	420.5			6940	UKA40	PS4B260	111
9310	UKA40	3860	UKA30	PS4B210	418.5	9310	UKA40	3850	UKA30	PS4B230	420.5	9530	UKA40	3880	UKA30	PS4B260	51
		6380	UKA40	PS4B210	478.5			6350	UKA40	PS4B230	480.5			6410	UKA40	PS4B260	111
Rated capacity 800 kg, lifting device weight 60 kg																	
5480	UKA30	3850	UKA30	PS3B210	358.5	5480	UKA30	3830	UKA30	PS3B230	360.5	5700	UKA30	3890	UKA30	PS4B260	51
		6360	UKA40	PS3B210	418.5			6330	UKA40	PS3B230	420.5			6430	UKA40	PS4B260	111
8630	UKA40	3590	UKA30	PS4B210	418.5	8630	UKA40	3570	UKA30	PS4B230	420.5	8850	UKA40	3620	UKA30	PS4B260	51
		5960	UKA40	PS4B210	478.5			5940	UKA40	PS4B230	480.5			6000	UKA40	PS4B260	111
Rated capacity 1000 kg, lifting device weight 60 kg																	
5040	UKA30	3560	UKA30	PS3B210	358.5	5040	UKA30	3540	UKA30	PS3B230	360.5	5260	UKA30	3620	UKA30	PS4B260	51
		5920	UKA40	PS3B210	418.5			5890	UKA40	PS3B230	420.5			6000	UKA40	PS4B260	111
8060	UKA40	3320	UKA30	PS4B210	418.5	8060	UKA40	3300	UKA30	PS4B230	420.5	8280	UKA40	3380	UKA30	PS4B260	51
		5600	UKA40	PS4B210	478.5			5580	UKA40	PS4B230	480.5			5650	UKA40	PS4B260	111
Rated capacity 1250 kg, lifting device weight 60 kg																	
4620	UKA30	3110	UKA30	PS3B210	358.5	4620	UKA30	3090	UKA30	PS3B230	360.5	4840	UKA30	3240	UKA30	PS4B260	51
		5470	UKA40	PS3B210	418.5			5450	UKA40	PS3B230	420.5			5570	UKA40	PS4B260	111
7480	UKA40	2850	UKA30	PS4B210	418.5	7480	UKA40	2830	UKA30	PS4B230	420.5	7700	UKA40	2920	UKA30	PS4B260	51
		5220	UKA40	PS4B210	478.5			5210	UKA40	PS4B230	480.5			5280	UKA40	PS4B260	111
Rated capacity 1600 kg, lifting device weight 70 kg																	
4150	UKA30	2540	UKA30	PS3B210	358.5	4150	UKA30	2530	UKA30	PS3B230	360.5	4370	UKA30	2670	UKA30	PS4B260	51
		4970	UKA40	PS3B210	418.5			4960	UKA40	PS3B230	420.5			5090	UKA40	PS4B260	111
6810	UKA40	2360	UKA30	PS4B210	418.5	6810	UKA40	2350	UKA30	PS4B230	420.5	7030	UKA40	2430	UKA30	PS4B260	51
		4780	UKA40	PS4B210	478.5			4770	UKA40	PS4B230	480.5			4850	UKA40	PS4B260	111
Rated capacity 2000 kg, lifting device weight 70 kg																	
3770	UKA30	2110	UKA30	PS3B210	358.5	3770	UKA30	2100	UKA30	PS3B230	360.5	3990	UKA30	2230	UKA30	PS4B260	51
		4510	UKA40	PS3B210	418.5			4490	UKA40	PS3B230	420.5			4670	UKA40	PS4B260	111
6230	UKA40	1970	UKA30	PS4B220	424	6230	UKA40	1970	UKA30	PS4B240	426	6450	UKA40	2050	UKA30	PS4B260	51
		4230	UKA40	PS4B220	484			4220	UKA40	PS4B240	486			4390	UKA40	PS4B260	111

4.2.3 Monorail

The following abbreviations are used in the quick selection table:

A max.	Maximum distance between suspensions on the track
B max	Maximum distance between suspension and connection between track or monorail segments
H1	Height of the monorail (between top of monorail profile and top of push trolley bolt)



Monorail			
A max.	Profile	Push trolley	H1
Rated capacity 63 kg, lifting device weight 30 kg			
5890	UKA20	PS2T010	151
8820	UKA30	PS4T100	216.5
12060	UKA40	PS4T100	276.5
Rated capacity 125 kg, lifting device weight 30 kg			
4940	UKA20	PS2T010	151
7880	UKA30	PS4T100	216.5
11240	UKA40	PS4T100	276.5
Rated capacity 160 kg, lifting device weight 30 kg			
4560	UKA20	PS2T010	151
7450	UKA30	PS4T100	216.5
10830	UKA40	PS4T100	276.5
Rated capacity 250 kg, lifting device weight 30 kg			
3870	UKA20	PS2T010	151
6580	UKA30	PS4T100	216.5
9930	UKA40	PS4T100	276.5
Rated capacity 320 kg, lifting device weight 35 kg			
3480	UKA20	PS2T010	151
6040	UKA30	PS4T100	216.5
9310	UKA40	PS4T100	276.5
Rated capacity 500 kg, lifting device weight 35 kg			
5120	UKA30	PS4T100	216.5
8160	UKA40	PS4T100	276.5
Rated capacity 630 kg, lifting device weight 35 kg			
4650	UKA30	PS4T100	216.5
7530	UKA40	PS4T100	276.5
Rated capacity 1000 kg, lifting device weight 60 kg			
3760	UKA30	PS4T100	216.5
6230	UKA40	PS4T100	276.5
Rated capacity 1250 kg, lifting device weight 60 kg			
3360	UKA30	PS4T200	222
5660	UKA40	PS4T200	282
Rated capacity 1600 kg, lifting device weight 70 kg			
2660	UKA30	PS4T200	222
5070	UKA40	PS4T200	282
Rated capacity 2000 kg, lifting device weight 70 kg			
2160	UKA30	PS4T200	222
4000	UKA40	PS4T200	282

4.3 Detailed calculation

4.3.1 Data required for calculation

The selection of a proper crane system requires knowledge of the crane operation environment, limits of the components, geometry of the crane, type of load (including the dynamic factor), and the product weights.

To determine the suitable product and profiles, the product weights must be calculated. The calculations are explained in the following sections and summarized in the following table.

Rails			
Product	Description	Suitability	Weight [kg/m]
UKA20	Rail	Crane bridge and track	10
UKA30	Rail	Crane bridge and track	19.1
UKA40	Rail	Crane bridge and track	28.9

Trolleys					
Product	Description		Suitability		Weight [kg]
	Trolley type	Max. [kg]	Track rail	Crane type	
PS2T010	Push trolley, single	400	UKA20	Single girder crane bridges and monorails	2.3
PS4T100	Push trolley, single	1100	UKA30, UKA40	Single girder crane bridges and monorails	3.1
PS4T200	Push trolley, double	2200	UKA30, UKA40	Single girder crane bridges and monorails	12.2
PS4T400	Swiveling push trolley, double	2200	UKA30, UKA40	Circuit with curves or switches	15.2
PS2T500	Push trolley	500	UKA20	Double girder crane bridges	33.0
PS4T500	Push trolley	2500	UKA30, UKA40	Double girder crane bridges	52.0
UKTM	Motor trolley	-	UKA30, UKA40	Cranes, monorails, circuits	42.0
UKTM2	Motor trolley	-	UKA30, UKA40	Cranes and straight monorails	24.0

Lifting devices and bridge kits	
Product	Description
Lifting devices	Refer to the lifting device technical documentation
Bridge kit	See chapter Crane dimensions



Note: The results of the detailed calculation must be evaluated with the sales configurator.

4.3.2 Calculating load spectrum and determining rated capacity

All the tables in this chapter are given for a load spectrum of $k_p = 1$, spectrum class Q4, and utilization class U2 (maximum number of hoisting cycles = 63000 at full capacity).

When a higher number of cycles is required, the rated capacity must be increased compared to the real load. Increasing the capacity is done to decrease the load spectrum, and in that way to stay in the A4 application class.

The load spectrum is calculated as follows:

$$k_p = \sum_{i=1}^r \left(\frac{ml_i}{RC} \right)^3 \cdot \frac{n_i}{n_{max}}$$

Abbreviations	
ml	Real lifted loads
n	Number of hoisting cycles when the hoisted load is equal to ml
n_{max}	Number of hoisting cycles determining the total duration of use
RC	Rated capacity

4.3.3 Determining rail type

The following graphs show the maximal crane spans and loadings in respect of two criteria: the maximum deflection and the maximum stress in the rail. The loading is not the same as the rated capacity. The weight of the lifting device and the motor trolley, as well as any possible extra weight – such as the weight of the power feeding lines and the handling equipment – have to be added to the lifted load. The loading calculations differ for the two following criteria:

- Maximum deflection criteria that considers the static load, and is aimed to prevent the self-movement of the lifted load.
- Maximum stress criteria that considers the dynamic factor given by the hoisting movement and that is aimed to prevent the fatigue of the rail.

These curves can be used for the crane bridge span and the maximum distance between the track suspensions for crane systems with one single crane bridge. In this case, the crane bridge dead weight must be added.

Other limits that can reduce the maximum span are, among others, the outreach, the length of the segment (only one connection is allowed on girders), and the loading of the suspensions.

Note: In addition to the maximum span, the following points must be checked:



- Maximum outreach
- Trolley and suspension capacities
- Connection positions on the track.

Abbreviations that are used in the calculations

RC	Rated capacity	BW	Bridge kit weight
HW	Lifting device weight	PTL	Push trolley loading
TW	Push trolley weight	CBL	Crane bridge loading
MW	Motor trolley weight	TL	Track loading
PLW	Profile linear weight	SL	Suspension loading
PL	Bridge rail length (including outreaches)	A	Distance between suspensions
GN	Girder number (number of girders on the bridge, e.g. SG/DG)	MM	Moving mass
HF	Horizontal force	Dynfactor	Dynamic factor given by acceleration during lifting motion Dynfactor = 0.25

Push trolley selection

Select the trolley for the lifting device according to the loading limit:

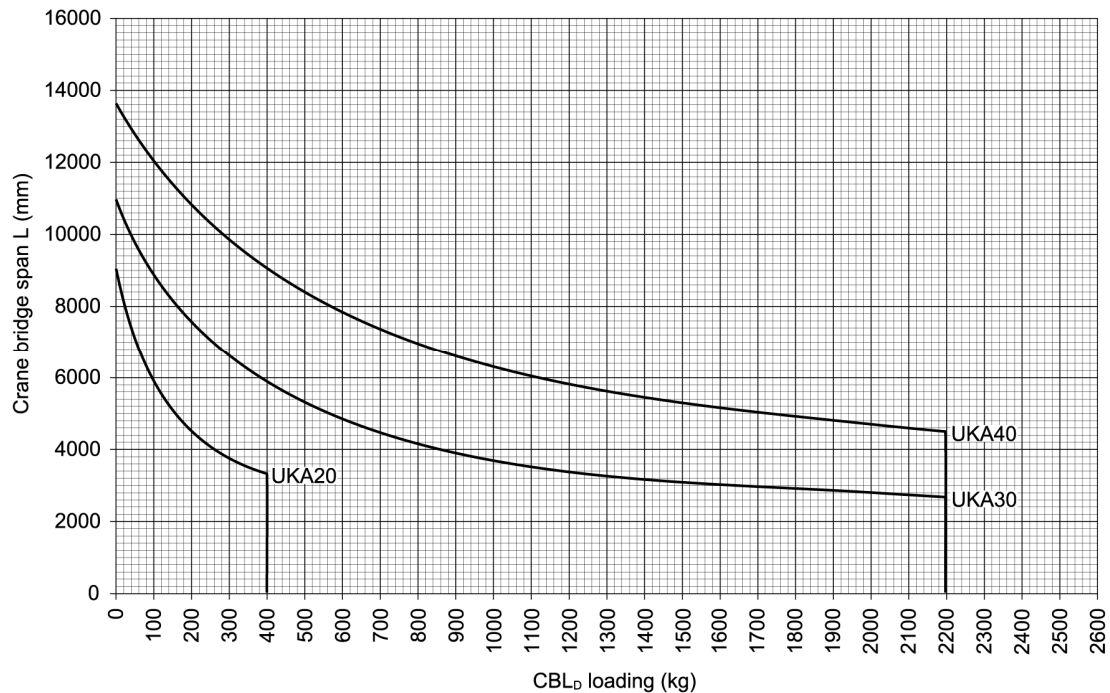
$$PTL = RC + HW$$

Trolley loading limitations:

Trolley type	Crane type (use case)					Loading limit [kg]
	Single girder	Double girder	Single trolley single girder	Double trolley single girder	Circuit with curves	
PS2T010	UKA20					400
PS2T500		UKA20				600
PS4T100			UKA30/UKA40		UKA30/UKA40	1100
PS4T200				UKA30/UKA40		2200
PS4T400					UKA30/UKA40	2200
PS4T500		UKA30/UKA40				2500

For more information on the trolleys, see chapter Trolleys.

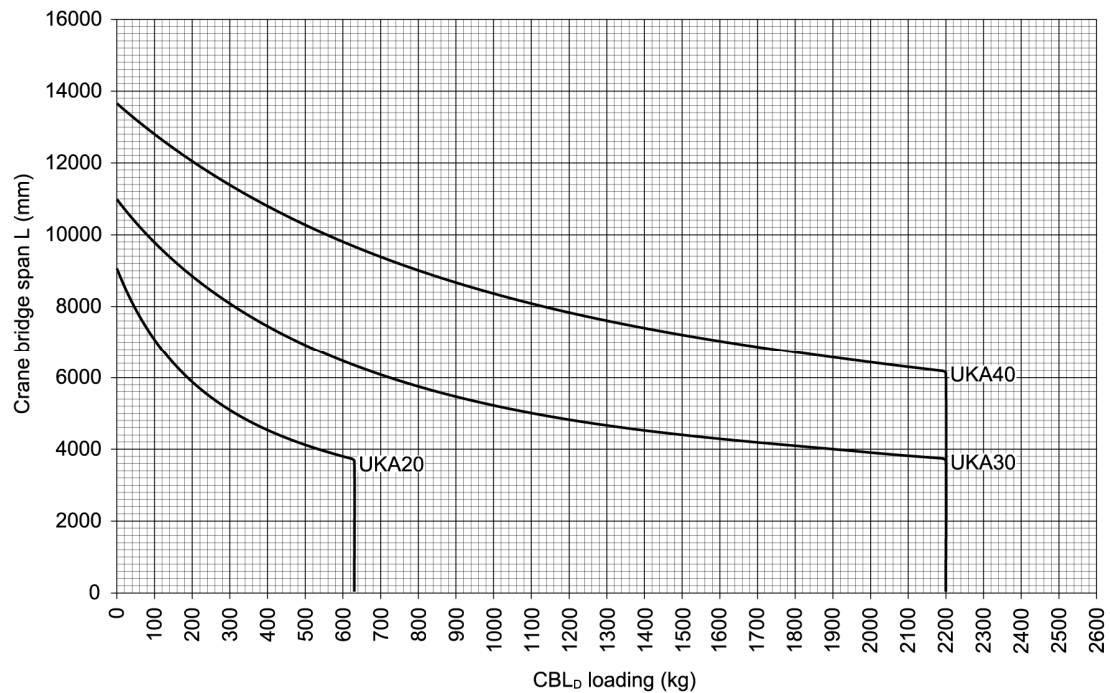
Single girder crane bridges, deflection criteria L/500



Loading calculation:

$$CBL_D = RC + HW + TW + MW$$

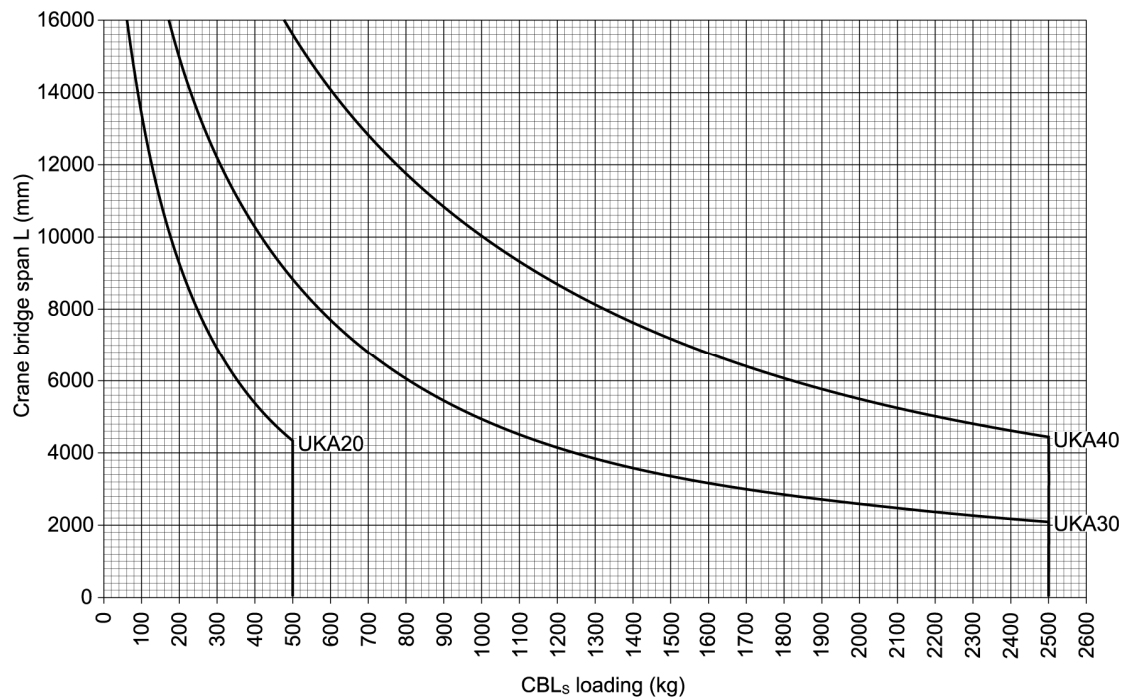
Double girder crane bridges, deflection criteria L/500



Loading calculation:

$$CBL_D = RC + HW + TW + MW$$

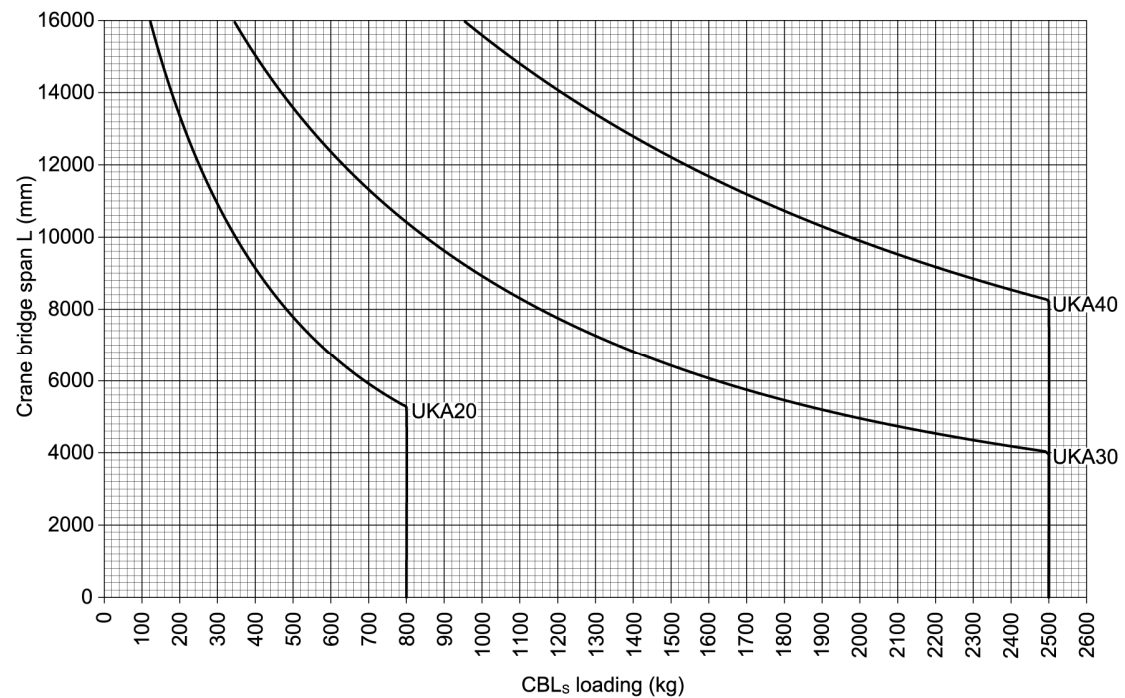
Single girder crane bridges, stress criteria



Loading calculation:

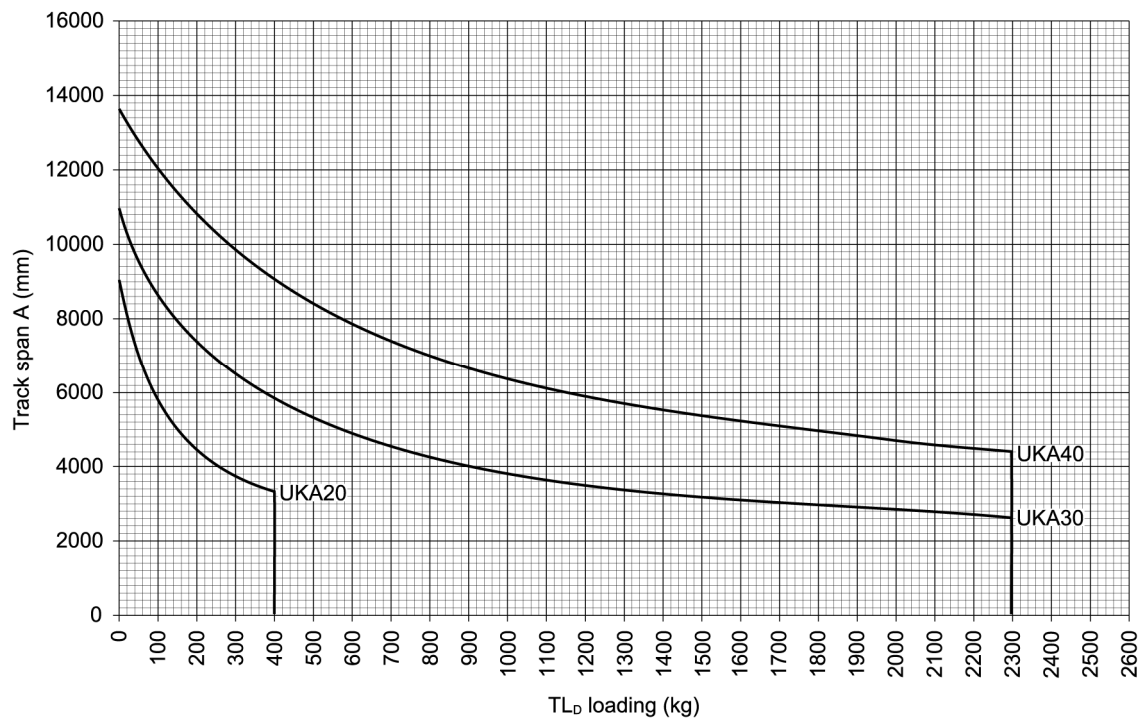
$$CBL_s = RC * (1 + Dynfactor) + HW + TW + MW$$

Double girder crane bridges, stress criteria



Loading calculation:

$$CBL_s = RC * (1 + Dynfactor) + HW + TW + MW$$

Tracks and monorails, deflection criteria L/500

Loading calculation:
Track:

$$TL_D = CBL_D + \frac{PLW * PL * GN}{2} + \frac{BW}{2} + MT$$

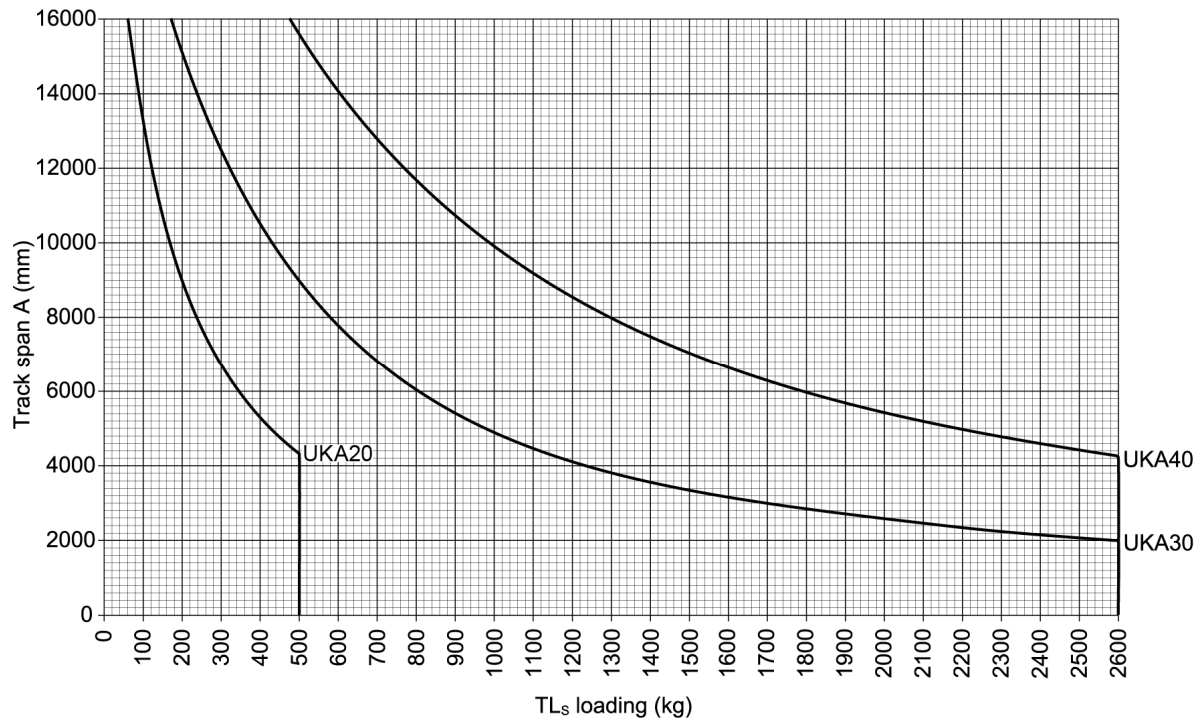
Check that the track loading is lower than the crane bridge trolley limit. The crane bridge trolley type is given in the bridge kit reference tables in chapter Crane dimensions.

Track	Bridge trolley	Loading limit [kg]
UKA20	Single push trolley	500
UKA30/40	Single push trolley	1100
UKA30/40	Double push trolley	2300

Monorail:

$$TL_D = RC + HW + TW + MW$$

Tracks and monorails, stress criteria



Loading calculation:

Track:

$$TL_s = CBL_s + \frac{PLW * PL * GN}{2} + \frac{BW}{2} + MT$$

Monorail:

$$TL_s = RC * (1 + Dynfactor) + HW + TW + MW$$

4.3.4 Suspension limits and forces back to supporting structure

The suspension loading is calculated as follows:

$$SL = TL_s + PLW * A$$

The suspension loading is limited to 3000 kg.

The vertical force back to the supporting structure to be considered for checking is calculated without the dynamic factor:

$$VF = TL_D + PLW * A$$

The horizontal force back to the supporting structure to be considered for checking is 10% of the moving mass:

$$MM = CBL_D + PLW * PL * GN + BW + MT$$

$$HF = MM * 0.1$$

4.3.5 Examples of calculations*

Load spectrum calculation

A crane is used to load a machine. The rated capacity of the crane is 500 kg. The lifting equipment is fitted with a lifting beam which weighs 120 kg. The parts weigh 300 kg, and are lifted from the floor and lifted on the machine on which they are lowered. After removing the part, the lifting beam is lifted and lowered to get the next part.

There are two hoisting cycles per production cycle (one with the load + one with the lifting beam only).

Spectrum factor calculation:

$$k_p = \left(\frac{420}{500}\right)^3 * \frac{1}{2} + \left(\frac{120}{500}\right)^3 * \frac{1}{2} = 0.303$$

The spectrum class is Q3. The maximum number of hoisting cycles to respect the utilization group A4 is 125000 as per utilization class U3.

*NOTE: All the calculations are done using the SI units 'kg' and 'mm'.

Example 1: Monorail

Monorail	
Description	[kg]
Rated capacity required [RC]	500
Lifting device weight [HW]	50
Manual movement	-

Trolley selection

- $PTL = 500 \text{ kg} + 50 \text{ kg} = 550 \text{ kg}$
- Push trolleys allowed: PS4T100
- PS4T200 does not bring any added value
- PS2T500 and PS4T500 are for double girder bridges only, not suitable for monorail

Rail type selection

Push trolley	RC	HW	TW	MT	TL _D	TL _S
PS4T100	500	50	3.1	0	553.1	678.1

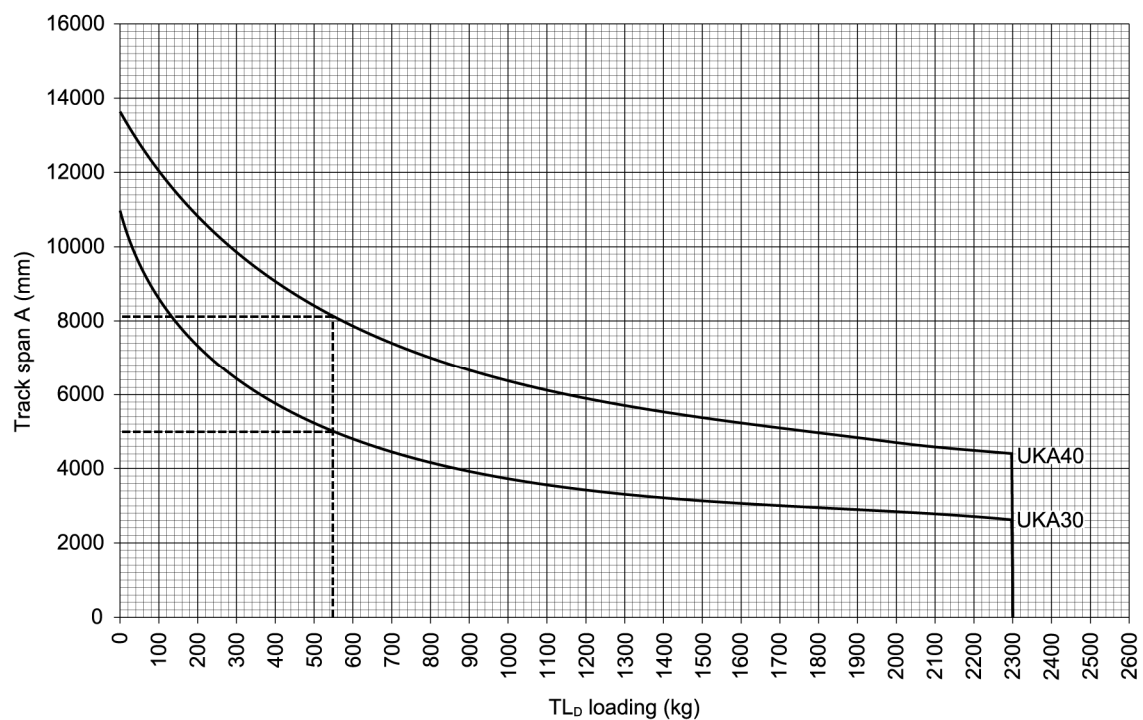


Figure 1. Span graph Monorail crane bridge deflection UKA30/40

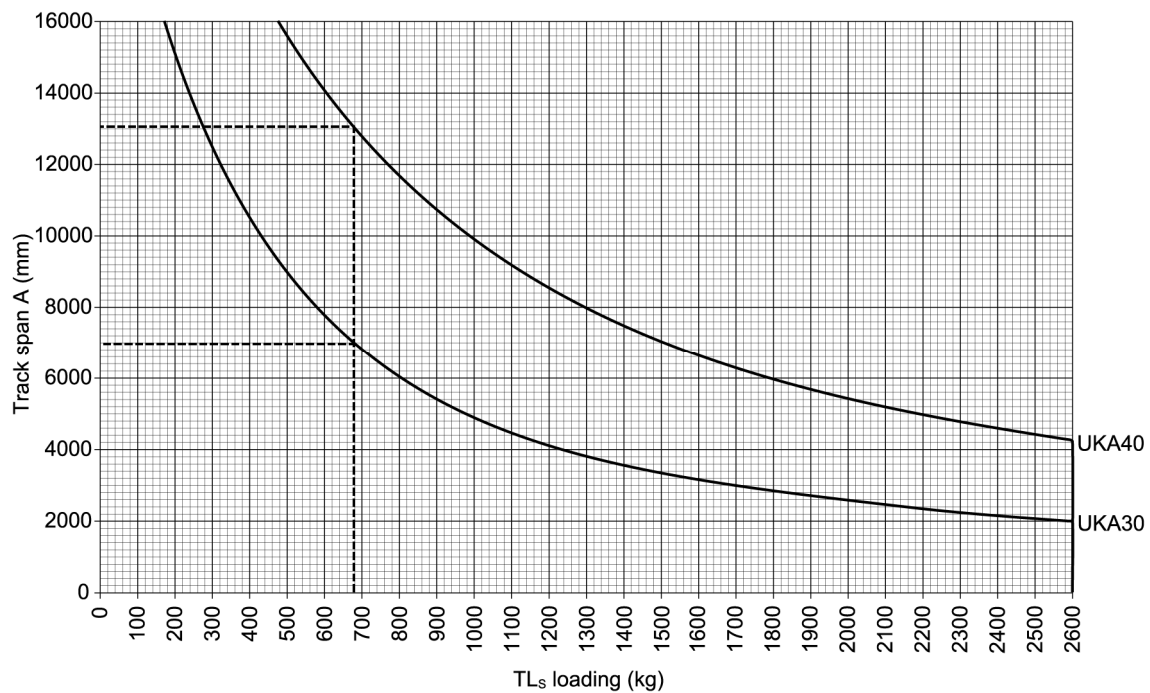


Figure 2. Span graph Monorail crane bridge stress UKA30/40

Maximum distance between suspensions

Track	Deflection criteria [mm]	Stress criteria [mm]
UKA20	Not supported	
UKA30	5050	6960
UKA40	8080	13040

Suspension loading and vertical force to the structure

Track	TL _s	PLW [kg/m]	A [kg]	TL _D [kg]	SL [kg]	VF [kg]
UKA30	678.1	10	5.05	553.1	728.6	603.6
UKA40	678.1	19.1	8.08	553.1	832.4	707.4

Example 2: Light crane system

Light crane system	
Description	Unit or type
Rated capacity required [RC] [kg]	453.6
Lifting device weight [HW] [kg]	45.4
Cross travel direction movement	motorized
Long travel direction movement	manual
Required span [L] [m]	5.48
Outreach [mm]	150

According to the requirements, an articulated crane bridge can be used in this example. To evaluate the most suitable crane bridge type, this example shows calculations with different alternatives.

Trolley selection

- $PTL = 453.6 \text{ kg} + 45.4 \text{ kg} = 499 \text{ kg}$
- Push trolleys allowed: PS4T100 (single girder bridge), PS2T500, PS4T500 (double girder bridges)
- Push trolley PS4T200 is not required because PTL is lower than 1100 kg.

Rail type selection

First calculate the crane bridge loading:

$$CBL = RC + HW + TW + MW$$

Push trolley	RC	HW	TW	MT	CBL _D	CBL _S
PS2T500	453.6	45.4	33	24	556	669.4
PS4T100	453.6	45.4	3.1	24	526.1	639.5
PS4T500	453.6	45.4	52	24	575	688.4

*NOTE: The values here for the PS2T500 and the PS4T500 push trolleys are for double girder cranes. The PS4T100 values are for a single girder crane.

Maximum span allowed

Use the CBL values in the single or double girder graphs to check the maximum span L.

Single girder crane bridge

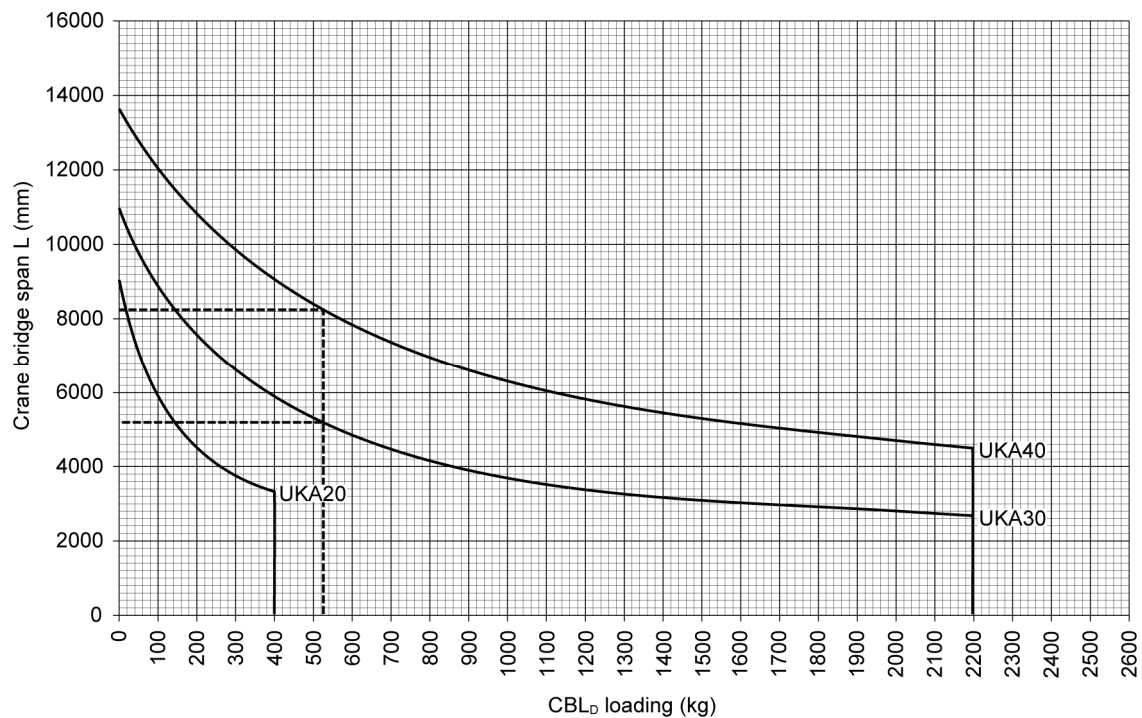


Figure 1. Span graph single girder crane bridge deflection UKA20, UKA30/40

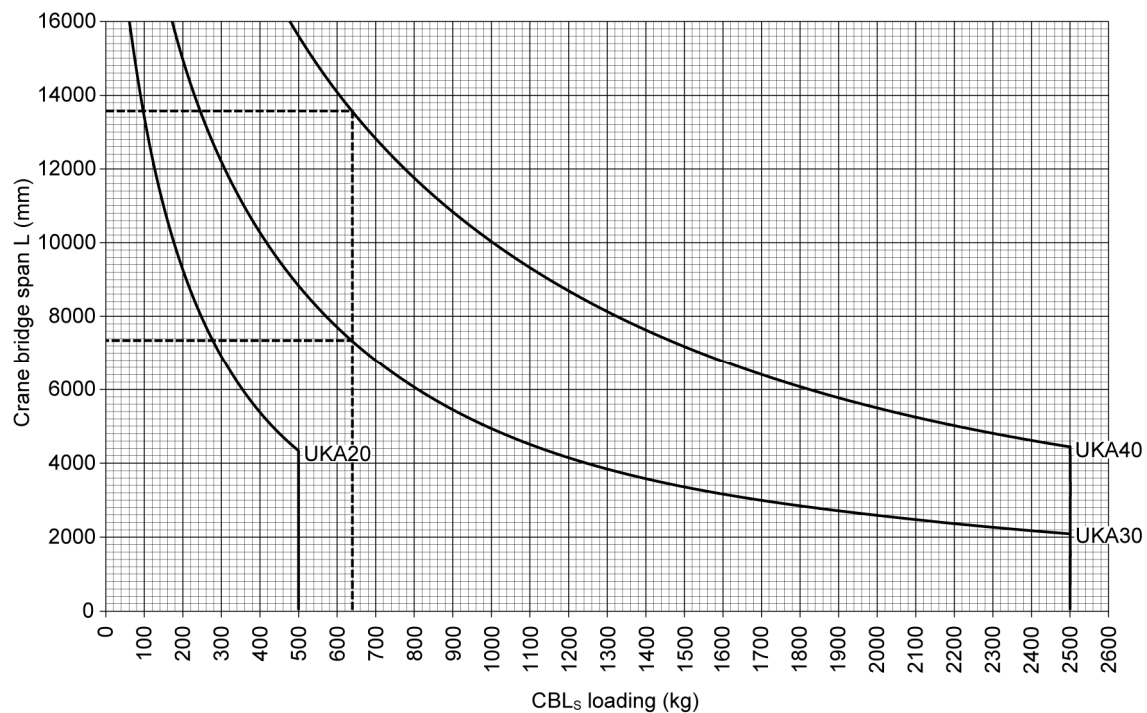


Figure 2. Span graph single girder crane bridge stress UKA20, UKA30/40

Double girder crane bridge

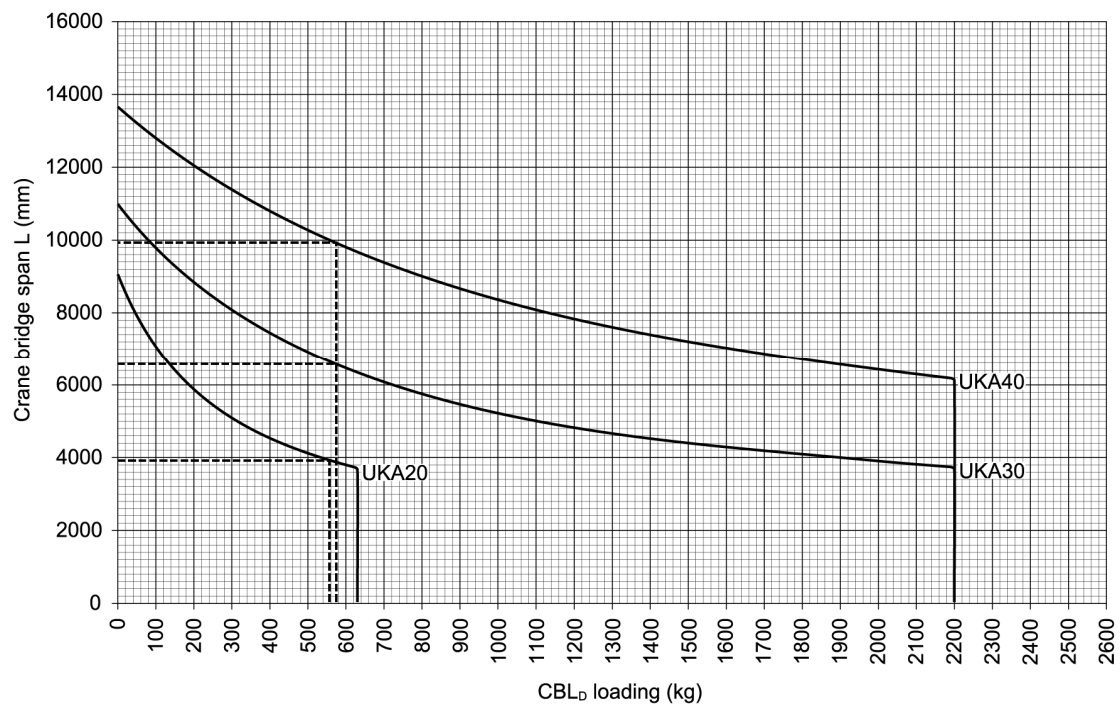


Figure 3. Span graph double girder crane bridge deflection UKA20, UKA30/40

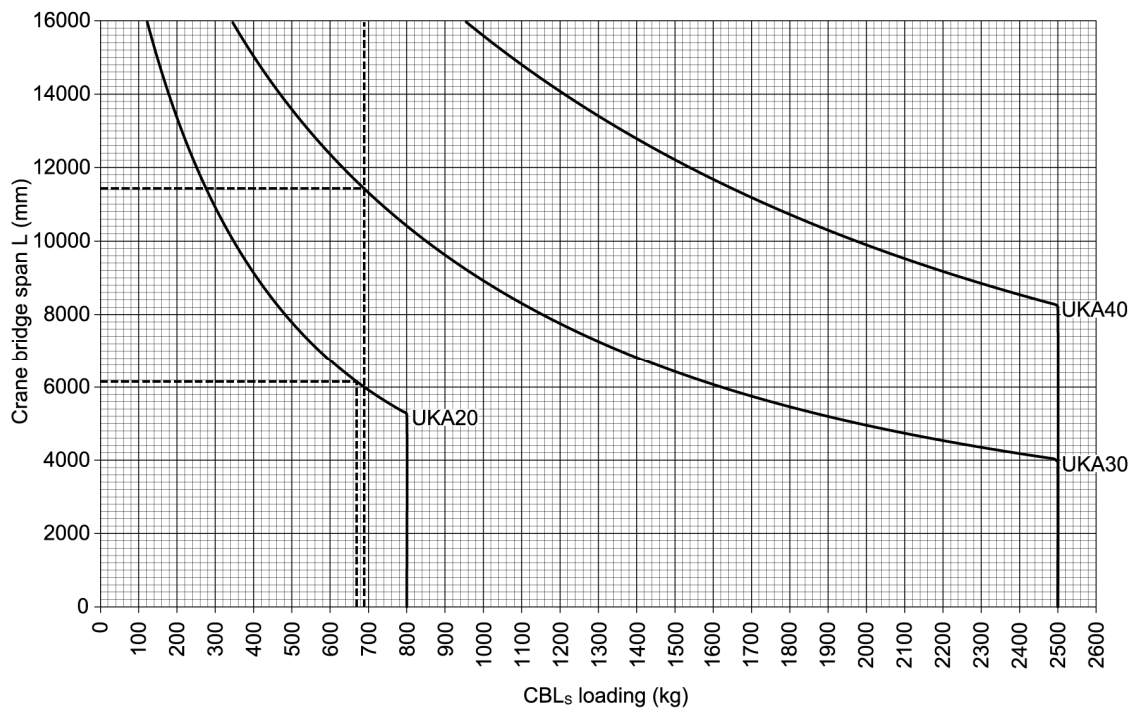


Figure 4. Span graph double girder crane bridge stress UKA20, UKA30/40

The profile and the crane bridge type that are suitable with the required span are:

Track	Crane bridge type	Bridge kit reference
UKA40	Single girder articulated	PS4B110
UKA30	Double girder articulated	PS3B210
UKA40	Double girder articulated	PS4B210

Calculating the maximum distance between suspensions

First calculate the track loading:

$$TL_D = CBL_D + \frac{PLW * PL * GN}{2} + \frac{BW}{2} + MT$$

$$TL_S = CBL_S + \frac{PLW * PL * GN}{2} + \frac{BW}{2} + MT$$

Bridge type	CBL _D	CBL _S	PLW [kg/m]	PL x GN	BW	MT	TL _D	TL _S
PS4B110	526.1	639.5	28.9	5.48x1	16.1	0	613.3	726.7
PS3B210	575	688.4	19.1	5.48x2	45.4	0	702.4	815.8
PS4B210	575	688.4	28.9	5.48x2	49.5	0	758.1	871.5

Bridge type	Track	Bridge trolley	Loading limit [kg]
PS4B110	UKA30	Single push trolley	1250
PS3B210	UKA30/40	Single push trolley (x 2)	2500
PS4B210	UKA30/40	Single push trolley (x 2)	2500

The bridge kit PS4B210 is not required as lighter solutions can be used.

Use the TL value in the following Track graph to find the maximum distance between the suspensions (A).

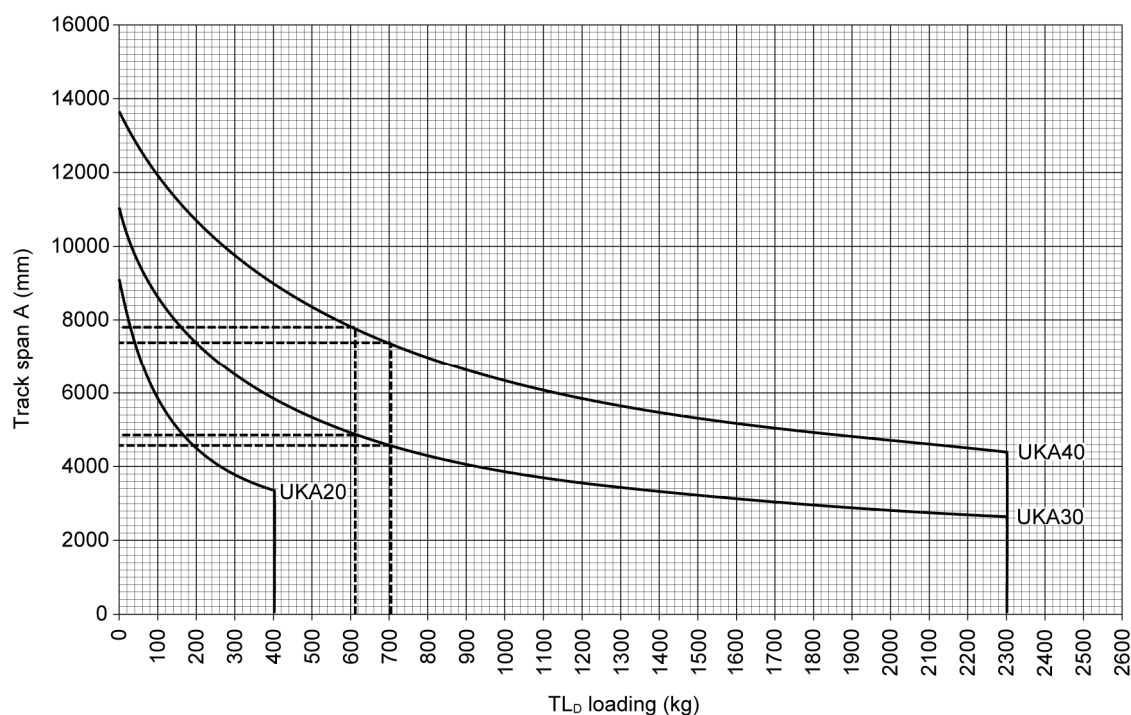


Figure 5. Span graph track rail and monorail crane bridge deflection UKA20, UKA30/40

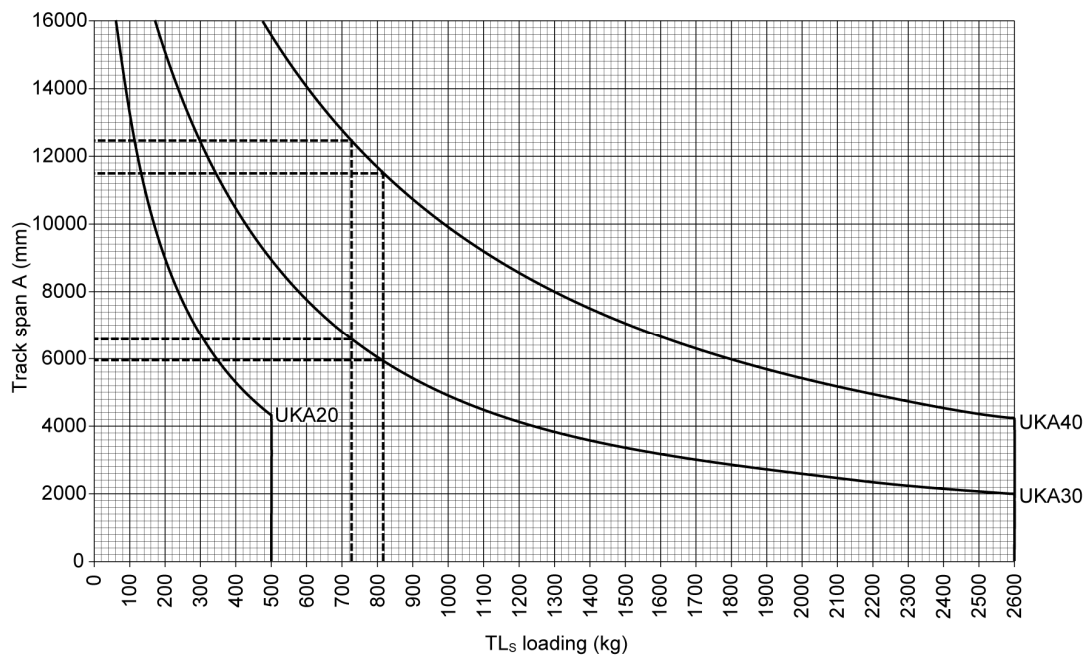


Figure 6. Span graph track rail and monorail crane bridge stress UKA20, UKA30/40

Maximum distance between suspensions

Maximum distance			
Bridge type	Track	Deflection criteria [mm]	Stress criteria [mm]
PS4B110	UKA30	4830	6560
PS4B110	UKA40	7780	12460
PS3B210	UKA30	4400	5940
PS3B210	UKA40	7170	11500

Suspension loading

$$SL = TL + PLW * A$$

Bridge type	Track	TL _s	PLW [kg/m]	A	TL _D	SL	VF
PS4B110	UKA30	726.7	19.1	4.83	613.3	819	705.6
PS4B110	UKA40	726.7	28.9	7.78	613.3	951.5	838.1
PS3B210	UKA30	815.8	19.1	4.4	702.4	899.9	786.4
PS3B210	UKA40	815.8	28.9	7.17	702.4	1023	909.6

Moving mass

$$MM = CBL + PLW * PL * GN + BW + MT$$

Bridge type	CBL _D	PLW [kg/m]	PL x GN	BW	MT	MM
PS4B110	526.1	28.9	5.48 x 1	16.1	0	700.8
PS3B210	575	19.1	5.48 x 2	45.4	0	829.7

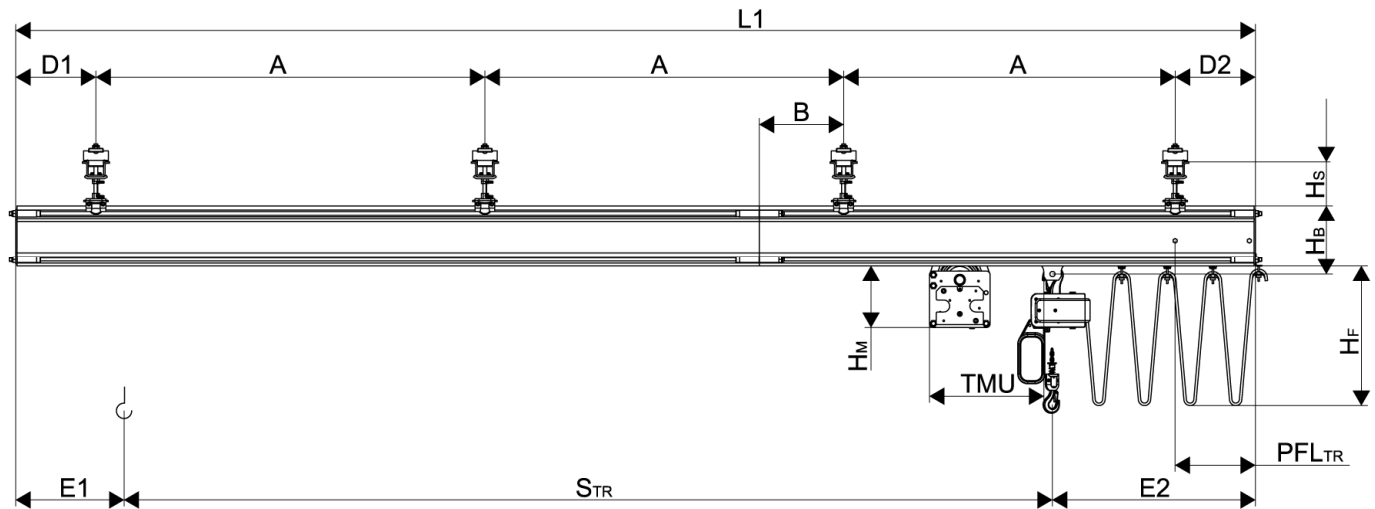
¹⁾Profile length to be multiplied by 2 for double girder bridges.

4.4 Crane dimensions

The following is a list of measurements and dimensions used in the crane diagrams and specification tables:

L1	Length of the monorail or track
L2	Length of the crane bridge
D1	Outreach of the track or monorail, without festoon
D2	Outreach of the track or monorail, with festoon
D3	Outreach of the crane bridge, without festoon
D4	Outreach of the crane bridge, with festoon
E1	Distance between the end of the track or monorail and the push trolley bolt axle (hook approach), without festoon
E2	Distance between the end of the track or monorail and the push trolley bolt axle (hook approach), with festoon
E3	Distance between the end of the crane bridge and the push trolley bolt axle (hook approach), without festoon
E4	Distance between the end of the crane bridge and the push trolley bolt axle (hook approach), with festoon
A	Distance between the suspensions on the track
A_{MAX}	Maximum distance between the suspensions, that depends on the total load and the rail width, has to be calculated according to the instructions given in chapter Detailed calculation
B	Maximum distance between the suspension and the connection between the track or monorail segments
L	Distance between the tracks, for which the maximum value must be calculated according to the instructions given in chapter Detailed calculation, depending on the total load and the rail width
H_T	Height of the track (between the top of the track profile and the top of the crane bridge profile)
H_B	Height of the crane bridge or monorail (between the top of the crane bridge or monorail rail and the top of the push trolley bolt)
H_S	Height of the suspension, see chapter Interfaces with support steel works
H_C	Height of the lower part of the crane bridge kit (console)
H_L	Height of the lower part of the push trolley
H_U	Height of the upper part of the push trolley
H_M	Height of the motor trolley below profile (see chapter Motor trolleys UKTM and UKTM2)
H_F	Height of the festoon below profile (800 mm)
S	Hook stroke
S_{TR}	Travel along the track
S_{BR}	Travel along the crane bridge
TMU	Length of the motor trolley, that is based on the UKTM2 motor trolley, is to be added to the E1 or E2 depending on which side of the push trolley the UKTM2 is fitted
PFL_{TR}	Length of the festoon on the track for power feeding
PFL_{BR}	Length of the festoon on the crane bridge for power feeding
NFT_{TR}	Number of the festoon trolleys on the track
NFT_{BR}	Number of the festoon trolleys on the crane bridge

4.4.1 Monorail



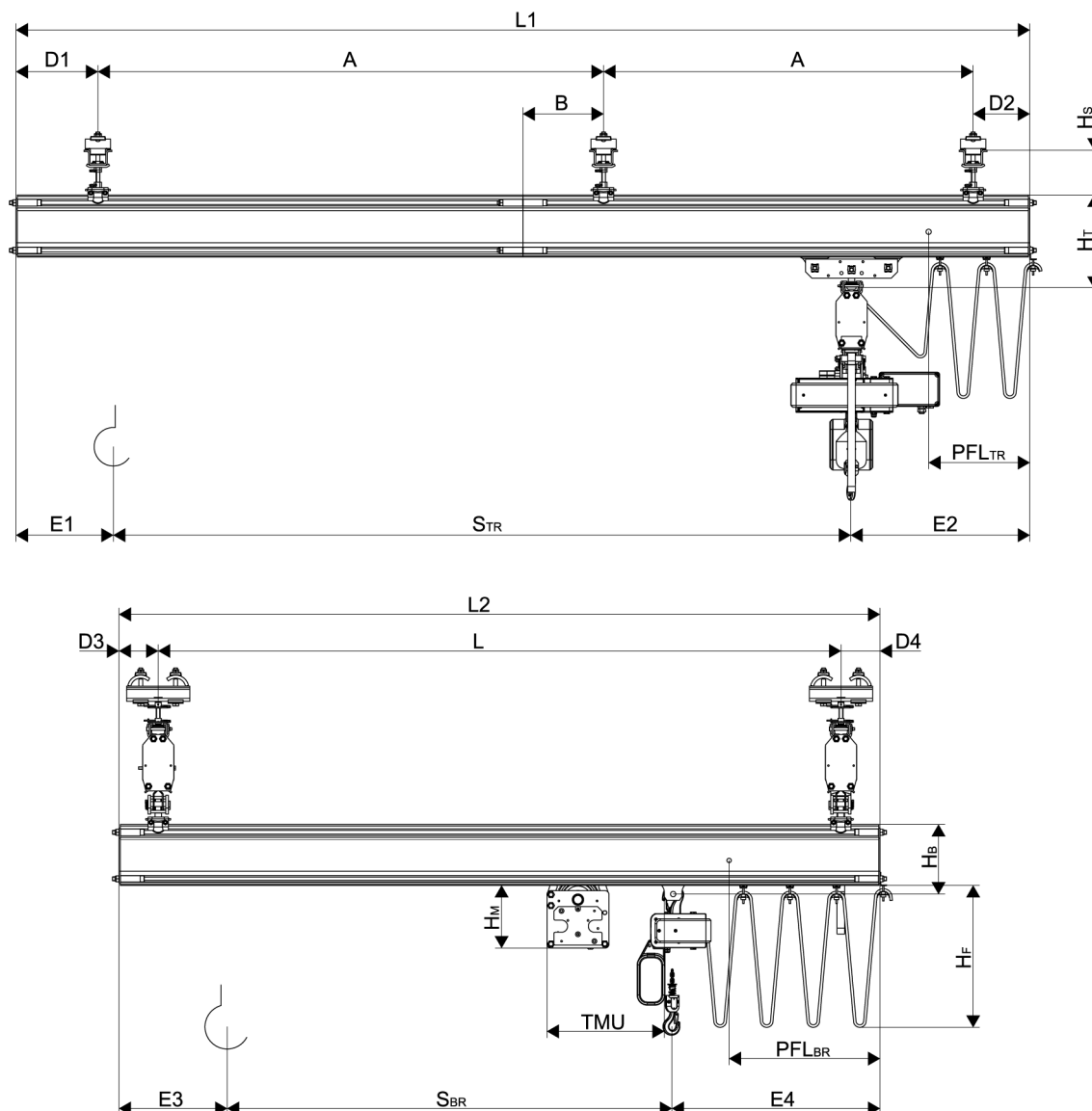
Dimensions									
Trolley type	Track	Bridge trolley	E1	TMU	E2	PFL	H _B	D1, D2	B
PS2T010	UKA20	Single	80	n/a	80 + PFL	20+110 x NFT	151	150	*
PS4T100	UKA30	Single	110	400	110 + PFL	20+110 x NFT	216.5	150	*
PS4T100	UKA40	Single	110	400	110 + PFL	20+110 x NFT	276.5	150	*
PS4T200	UKA30	Double	255	400	255 + PFL	20+110 x NFT	222	150	*
PS4T200	UKA40	Double	255	400	255 + PFL	20+110 x NFT	282	150	*

*Note: B min. 150 mm, B max., see the following table.

B _{max} [mm]		
Load [rated capacity] [kg]	UKA20, UKA30	UKA40
<1000	No limit	No limit
1000 <load <1200	No limit	2300
1200 <load <1400	No limit	1900
1400 <load <1600	No limit	1600
1600 <load <1800	No limit	1400
1800 <load <2000	No limit	1200

See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

4.4.2 Single girder articulated crane bridge



Dimensions									
Bridge type	Track	Crane bridge	Bridge trolley	E1	TMU	E2	PFL _{TR}	D1, D2	B
PS2B410	UKA20	UKA20	Single	80	n/a	80 + PFL	20+110 x NFT	150	*
PS2B415	UKA30/40	UKA20	Single	110	n/a	110 + PFL	20+110 x NFT	150	*
PS3B110	UKA30/40	UKA30	Single	110	n/a	110 + PFL	20+110 x NFT	150	*
PS3B120	UKA30/40	UKA30	Double	255	n/a	255 + PFL	20+110 x NFT	150	*
PS4B110	UKA30/40	UKA40	Single	110	n/a	110 + PFL	20+110 x NFT	150	*
PS4B120	UKA30/40	UKA40	Double	255	n/a	255 + PFL	20+110 x NFT	150	*

*Note: B min. 150 mm, B max., see table in chapter Monorail.

Dimensions									
Bridge type	Track	Crane bridge	Push trolley	E3	TMU	E4	PFL _{BR}	D3	D4
PS2B410	UKA20	UKA20	Single	80	n/a	80 + PFL	20+110 x NFT	150	150
PS2B415	UKA20	UKA20	Single	80	n/a	80 + PFL	20+110 x NFT	150	150
PS3B110	UKA30/40	UKA30	Single	110	400	110 + PFL	20+110 x NFT	150	150
PS3B120	UKA30/40	UKA30	Double	255	400	255 + PFL	20+110 x NFT	150	150
PS4B110	UKA30/40	UKA40	Single	110	400	110 + PFL	20+110 x NFT	150	150
PS4B120	UKA30/40	UKA40	Double	255	400	255 + PFL	20+110 x NFT	150	150

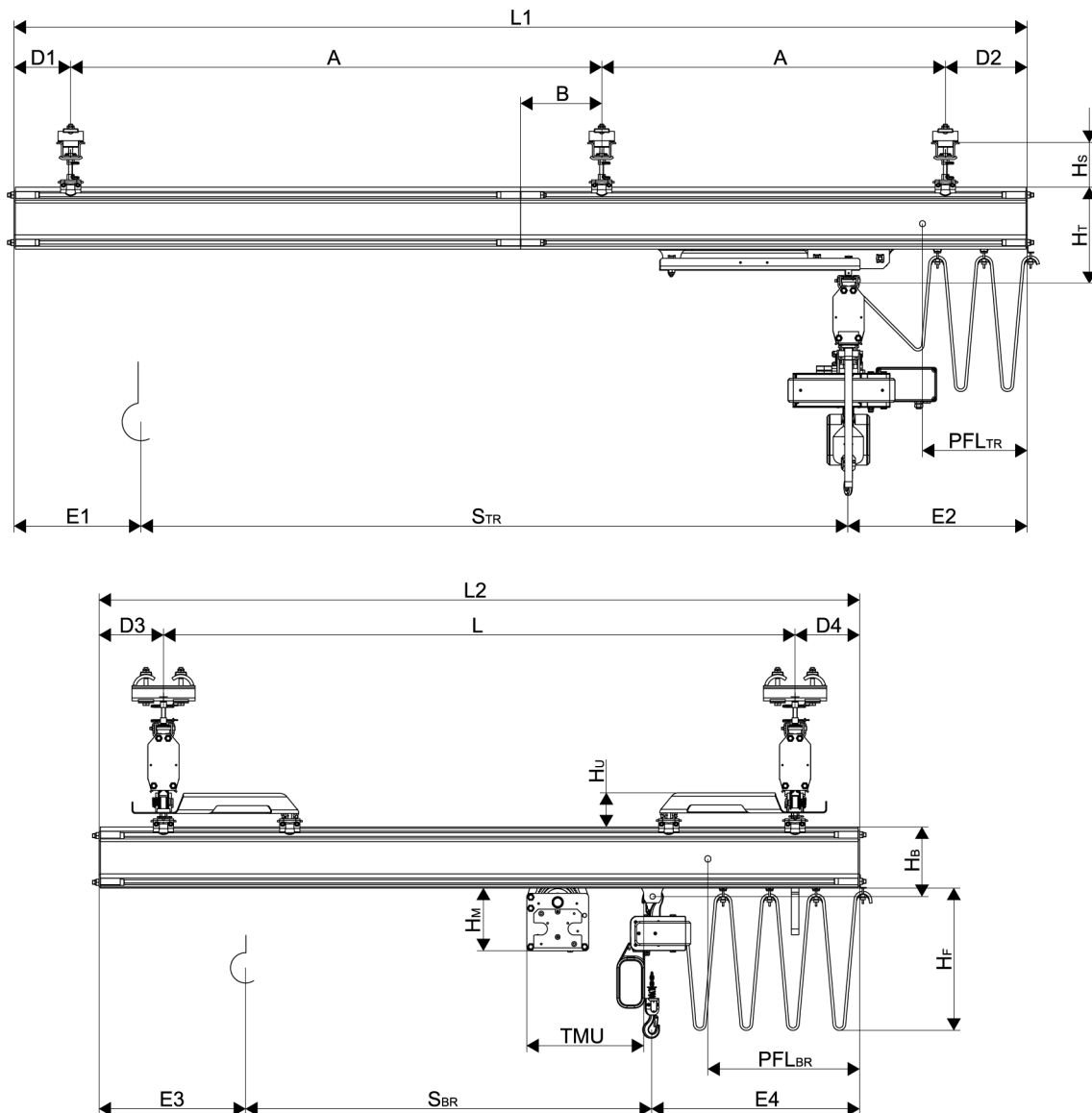
See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

Bridge kit references and weights (kg)

Dimensions						
Bridge type	Track	Crane bridge	Push trolley	Weight	H _T	H _B
PS2B410	UKA20	UKA20	Single	8.7	254	151
PS2B415	UKA30	UKA20	Single	11	319.5	151
PS2B415	UKA40	UKA20	Single	11	379.5	151
PS3B110	UKA30	UKA30	Single	13.5	304	216.5
PS3B110	UKA40	UKA30	Single	13.5	364	216.5
PS3B120	UKA30	UKA30	Double	28.7	309.5	222
PS3B120	UKA40	UKA30	Double	28.7	369.5	222
PS4B110	UKA30	UKA40	Single	13.8	304	276.5
PS4B110	UKA40	UKA40	Single	13.8	364	276.5
PS4B120	UKA30	UKA40	Double	29.2	309.5	282
PS4B120	UKA40	UKA40	Double	29.2	369.5	282

A_{MAX}	sMaximum distance between the suspensions, that depends on the total load and the rail width, has to be calculated according to the instructions given in chapter Detailed calculation
H_T	Height of the track (between the top of the track profile and the top of the crane bridge profile)
H_B	Height of the crane bridge or monorail (between the top of the crane bridge or monorail rail and the top of the push trolley bolt)
H_S	Height of the suspension, see chapter Interfaces with support steel works
H_C	Height of the lower part of the crane bridge kit (console)
H_L	Height of the lower part of the push trolley
H_U	Height of the upper part of the push trolley
H_M	Height of the motor trolley below profile (see chapter Motor trolleys UKTM and UKTM2)
H_F	Height of the festoon below profile (800 mm)
S	Hook stroke
S_{TR}	Travel along the track
S_{BR}	Travel along the crane bridge
PFL_{TR}	Length of the festoon on the track for power feeding
PFL_{BR}	Length of the festoon on the crane bridge for power feeding
NFT_{TR}	Number of the festoon trolleys on the track
NFT_{BR}	Number of the festoon trolleys on the crane bridge

4.4.3 Single girder rigid crane bridge



Dimensions									
Bridge type	Track	Crane bridge	Bridge trolley	E1	TMU	E2	PFL _{TR}	D1, D2	B
PS3B130	UKA30/40	UKA30	Single	810	0	110 + PFL	20+110 x NFT	150	*
PS3B140	UKA30/40	UKA30	Double	810	0	255 + PFL	20+110 x NFT	150	*
PS4B130	UKA30/40	UKA40	Single	810	0	110 + PFL	20+110 x NFT	150	*
PS4B140	UKA30/40	UKA40	Double	810	0	255 + PFL	20+110 x NFT	150	*

*Note: B min. 150 mm, B max., see table in chapter Monorail.

The motor trolleys fit inside the triangle part, so no additional length is required.

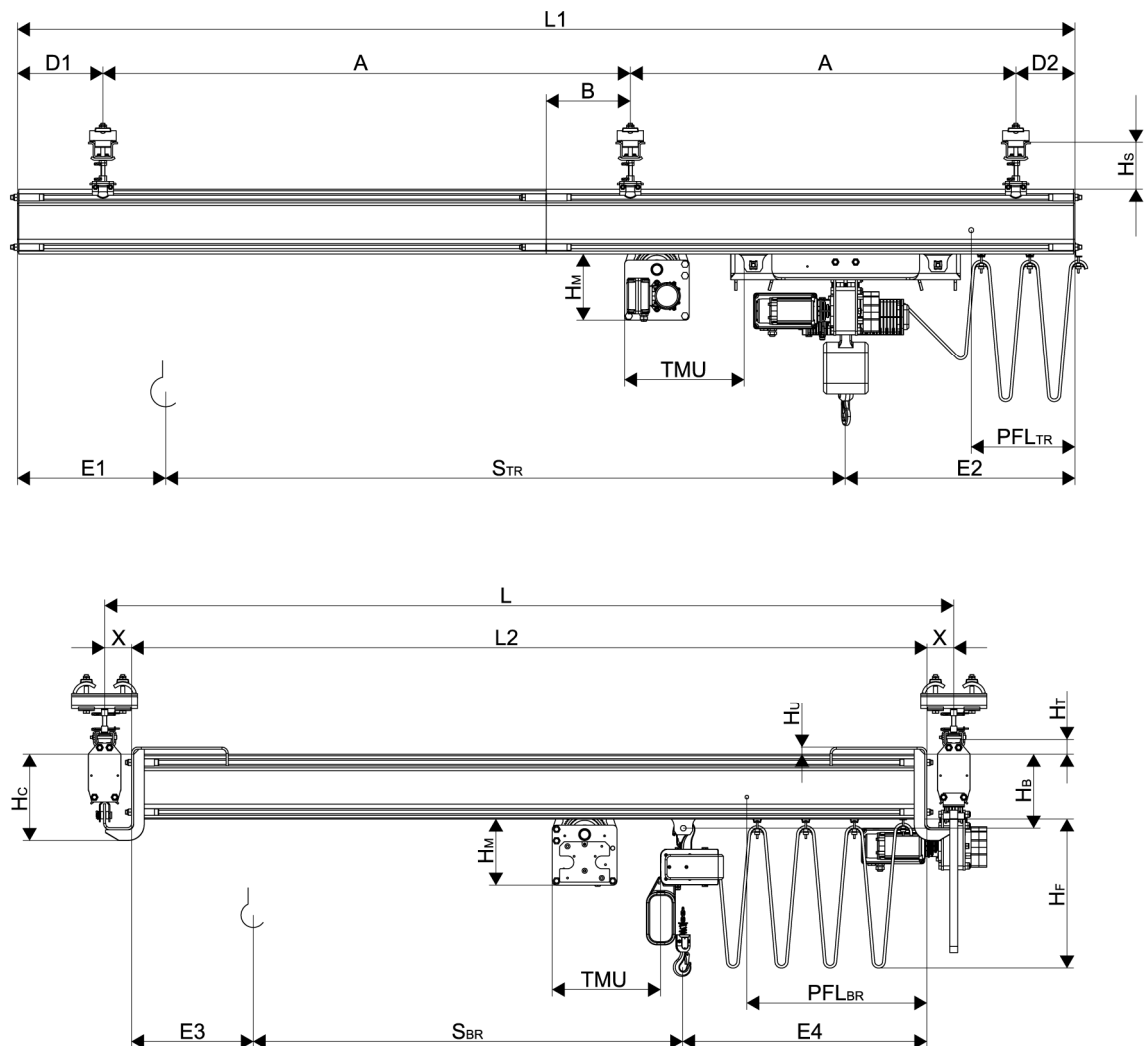
Dimensions									
Bridge type	Track	Crane bridge	Push trolley	E3	TMU	E4	PFL _{BR}	D3	D4
PS3B130	UKA30/40	UKA30	Single	110	400	110 + PFL	20+110 x NFT	150	150
PS3B140	UKA30/40	UKA30	Double	255	400	255 + PFL	20+110 x NFT	150	150
PS4B130	UKA30/40	UKA40	Single	110	400	110 + PFL	20+110 x NFT	150	150
PS4B140	UKA30/40	UKA40	Double	255	400	255 + PFL	20+110 x NFT	150	150

See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

Bridge kit references and weights (kg)

Dimensions								
Bridge type	Track	Crane bridge	Push trolley	Weight	H _T	H _B	H _U	
PS3B130	UKA30	UKA30	Single	45.1	309.5	216.5	131	
PS3B130	UKA40	UKA30	Single	45.1	369.5	216.5	131	
PS3B140	UKA30	UKA30	Double	59.7	315	222	131	
PS3B140	UKA40	UKA30	Double	59.7	375	222	131	
PS4B130	UKA30	UKA40	Single	45.7	309.5	276.5	131	
PS4B130	UKA40	UKA40	Single	45.7	369.5	276.5	131	
PS4B140	UKA30	UKA40	Double	60	315	282	131	
PS4B140	UKA40	UKA40	Double	60	375	282	131	

4.4.4 Single girder low headroom crane bridge



$X = 110 \text{ mm}$.

Dimensions									
Bridge type	Track	Crane bridge	Bridge trolley	E1	TMU	E2	PFL _{TR}	D1, D2	B
PS2B160	UKA20	UKA20	Double	380	n/a	380 + PFL	20+110 x NFT	150	*
PS2B165	UKA30/40	UKA20	Double	410	400	410 + PFL	20+110 x NFT	150	*
PS4B160	UKA30/40	UKA30	Double	460	400	460 + PFL	20+110 x NFT	150	*
PS4B160	UKA30/40	UKA40	Double	460	400	460 + PFL	20+110 x NFT	150	*

*Note: B min. 150 mm, B max., see table in chapter Monorail.

Dimensions							
Bridge type	Track	Crane bridge	Push trolley	E3	TMU	E4	PFL _{BR}
PS2B160	UKA20	UKA20	Single	190	n/a	190 + PFL	20+110 x NFT
PS2B165	UKA30/40	UKA20	Single	190	n/a	190 + PFL	20+110 x NFT
PS4B160	UKA30/40	UKA30	Single	220	400	220 + PFL	20+110 x NFT
PS4B160	UKA30/40	UKA30	Double	365	400	365 + PFL	20+110 x NFT
PS4B160	UKA30/40	UKA40	Single	220	400	220 + PFL	20+110 x NFT
PS4B160	UKA30/40	UKA40	Double	365	400	365 + PFL	20+110 x NFT

See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

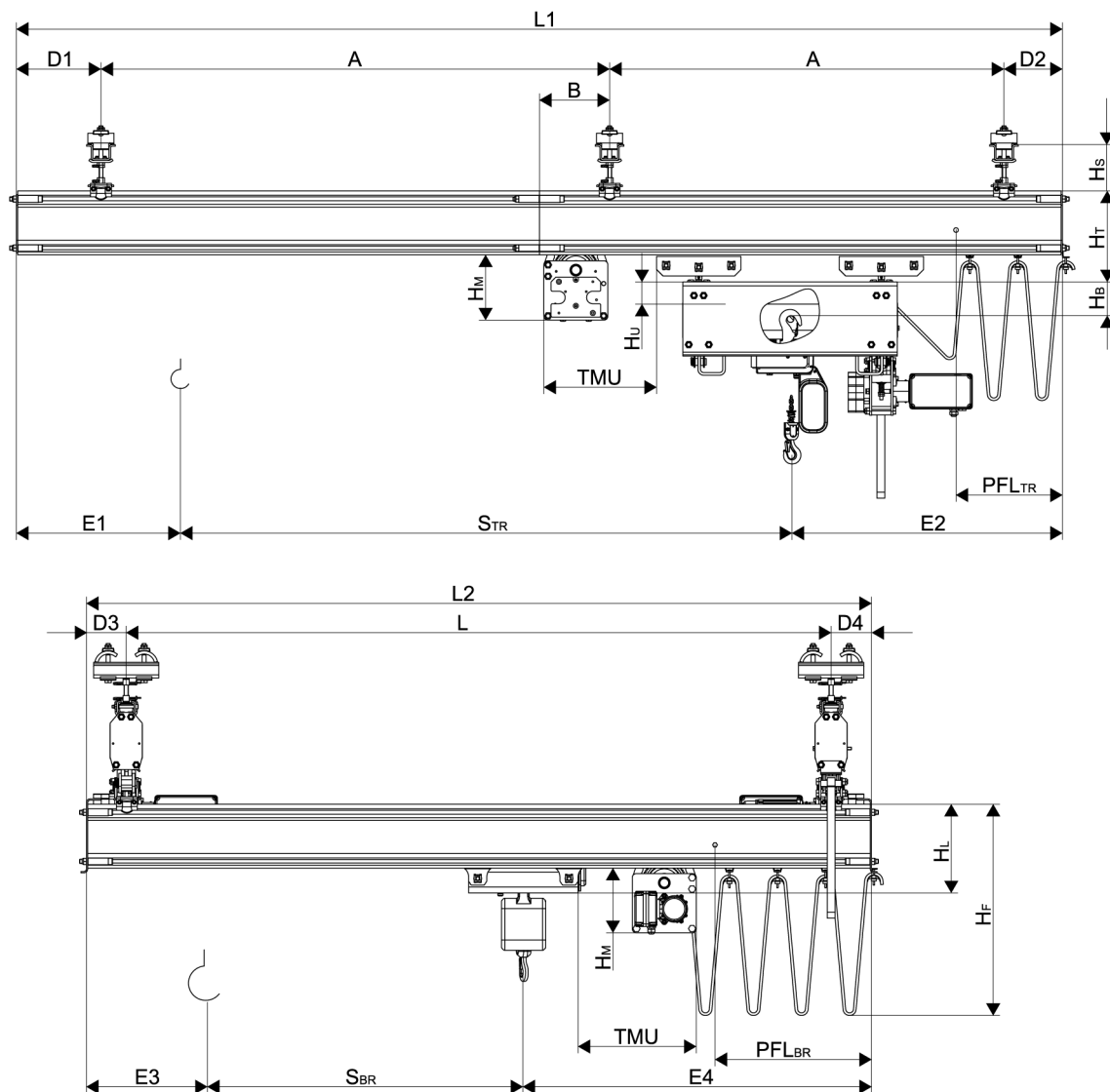
Bridge kit references and weights (kg)

Dimensions								
Bridge type	Track	Crane	Push trolley	Weight [kg]	H _T	H _B	H _C	H _U
PS2B160	UKA20	UKA20	Single	36.4	0	151	205	32
PS2B165	UKA30	UKA20	Single	43.3	65	151	205	32
PS2B165	UKA40	UKA20	Single	43.3	125	151	205	32
PS4B160	UKA30	UKA30	Single	86.8	0	216.5	326	28
PS4B160	UKA40	UKA30	Single	86.8	60	216.5	326	28
PS4B160	UKA30	UKA30	Double	86.8	0	222	326	28
PS4B160	UKA40	UKA30	Double	86.8	60	222	326	28
PS4B160	UKA30	UKA40	Single	86.8	0	276.5	326	28
PS4B160	UKA40	UKA40	Single	86.8	60	276.5	326	28
PS4B160	UKA30	UKA40	Double	86.8	0	282	326	28
PS4B160	UKA40	UKA40	Double	86.8	60	282	326	28



Note: A negative H_T value means that the crane bridge is higher than the track.

4.4.5 Double girder articulated crane bridge



Dimensions									
Bridge type	Track	Crane bridge	Bridge trolley	E1	TMU	E2	PFL _{TR}	D1, D2	B
PS2B510	UKA20	UKA20	Single	380	n/a	380 + PFL	20+110 x NFT	150	*
PS2B515	UKA30/40	UKA20	Single	410	400	410 + PFL	20+110 x NFT	150	*
PS3B210	UKA30/40	UKA30	Single	460	400	460 + PFL	20+110 x NFT	150	*
PS3B220	UKA30/40	UKA30	Double	605	400	605 + PFL	20+110 x NFT	150	*
PS4B210	UKA30/40	UKA40	Single	460	400	460 + PFL	20+110 x NFT	150	*
PS4B220	UKA30/40	UKA40	Double	605	400	605 + PFL	20+110 x NFT	150	*

*Note: B min. 150 mm, B max., see table in chapter Monorail.

Dimensions									
Bridge type	Track	Crane bridge	Push trolley	E3	TMU	E4	PFL _{BR}	D3	D4
PS2B510	UKA20	UKA20	Double	240	n/a	240 + PFL	20+110 x NFT	150	150
PS2B515	UKA30/40	UKA20	Double	240	n/a	240 + PFL	20+110 x NFT	150	150
PS3B210	UKA30/40	UKA30	Double	285	400	285 + PFL	20+110 x NFT	150	150
PS3B220	UKA30/40	UKA30	Double	285	400	285 + PFL	20+110 x NFT	150	150
PS4B210	UKA30/40	UKA40	Double	285	400	285 + PFL	20+110 x NFT	150	150
PS4B220	UKA30/40	UKA40	Double	285	400	285 + PFL	20+110 x NFT	150	150

*The B max. dimension also applies between the crane bridge suspension and the connection set fitted on the crane bridge.

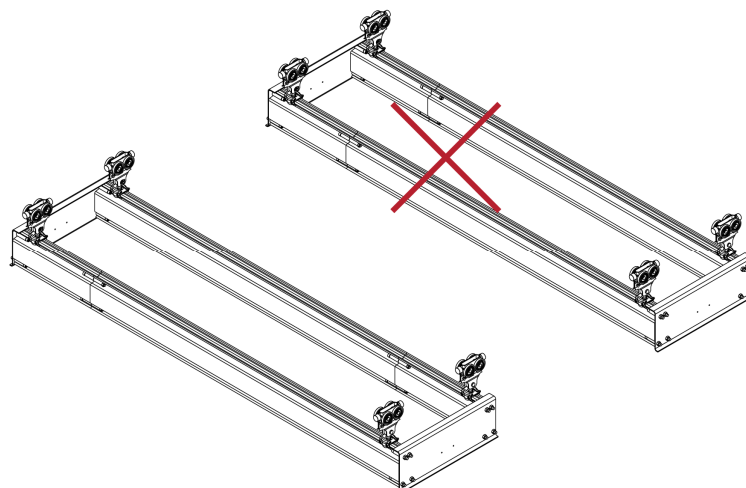
See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

Bridge kit references and weights (kg)

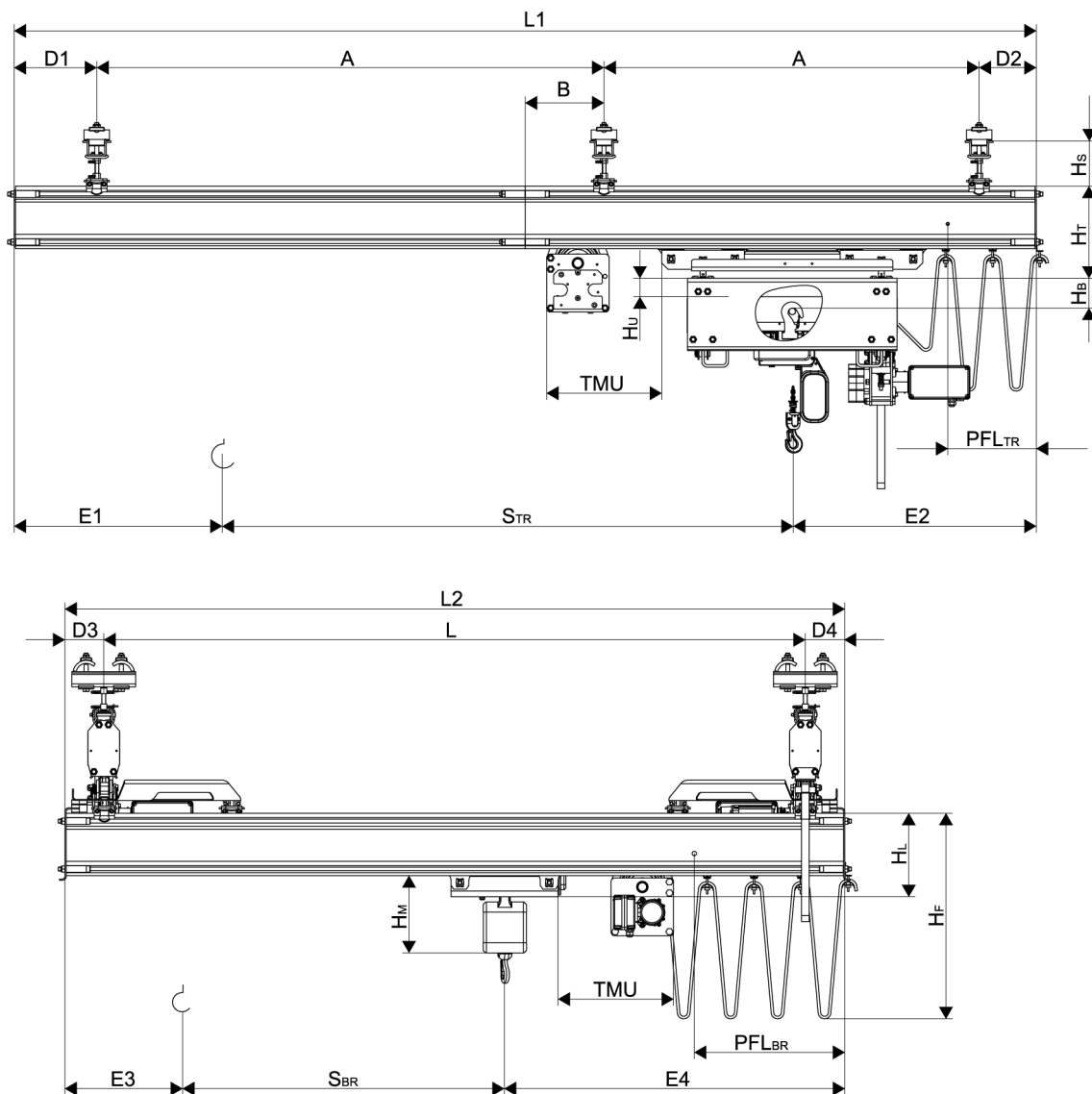
Dimensions									
Bridge type	Track	Crane bridge	Push trolley	Weight	H _T	H _B	H _U	H _L	
PS2B510	UKA20	UKA20	Double	17	255.5	-54.5	-80	201	
PS2B515	UKA30	UKA20	Double	24.5	321	-54.5	-80	201	
PS2B515	UKA40	UKA20	Double	24.5	381	-54.5	-80	201	
PS3B210	UKA30	UKA30	Double	41	307.5	51	1	281.5	
PS3B210	UKA40	UKA30	Double	41	367.5	51	1	281.5	
PS3B220	UKA30	UKA30	Double	70	313	51	1	281.5	
PS3B220	UKA40	UKA30	Double	70	373	51	1	281.5	
PS4B210	UKA30	UKA40	Double	45	307.5	111	61	341.5	
PS4B210	UKA40	UKA40	Double	45	367.5	111	61	341.5	
PS4B220	UKA30	UKA40	Double	74	313	111	61	341.5	
PS4B220	UKA40	UKA40	Double	74	373	111	61	341.5	



Note: The connection sets on the girders must be installed diagonally.



4.4.6 Double girder rigid crane bridge



Dimensions									
Bridge type	Track	Crane bridge	Bridge trolley	E1	TMU	E2	PFL _{TR}	D1, D2	B
PS3B230	UKA30/40	UKA30	Single	460	400	460 + PFL	20+110 x NFT	150	*
PS3B240	UKA30/40	UKA30	Double	605	400	605 + PFL	20+110 x NFT	150	*
PS4B230	UKA30/40	UKA40	Single	460	400	460 + PFL	20+110 x NFT	150	*
PS4B240	UKA30/40	UKA40	Double	605	400	605 + PFL	20+110 x NFT	150	*

*Note: B min. 150 mm, B max., see table in chapter Monorail.

The motor trolleys fit inside the triangle part, so no additional length is required.

Dimensions									
Bridge type	Track	Crane bridge	Push trolley	E3	TMU	E4	PFL _{BR}	D3	D4
PS3B230	UKA30/40	UKA30	Double	285	400	285+PFL	20+110 x NFT	150	150
PS3B240	UKA30/40	UKA30	Double	285	400	285+PFL	20+110 x NFT	150	150
PS4B230	UKA30/40	UKA40	Double	285	400	285+PFL	20+110 x NFT	150	150
PS4B240	UKA30/40	UKA40	Double	285	400	285+PFL	20+110 x NFT	150	150

*The B max. dimension also applies between the crane bridge suspension and the connection set fitted on the crane bridge.

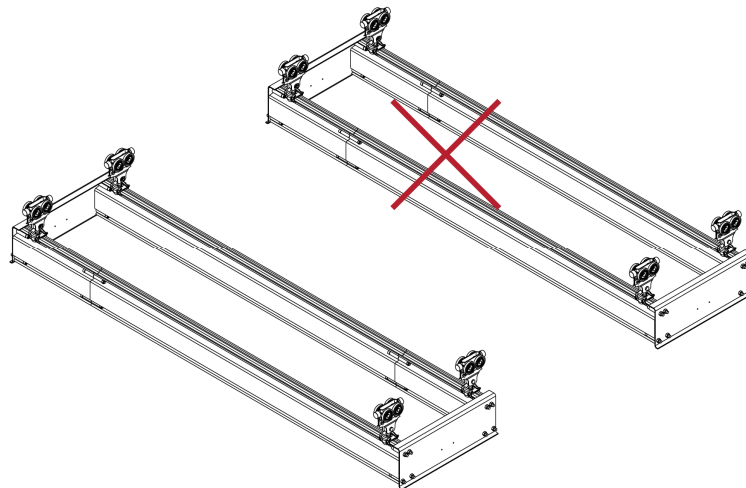
See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

Bridge kit references and weights (kg)

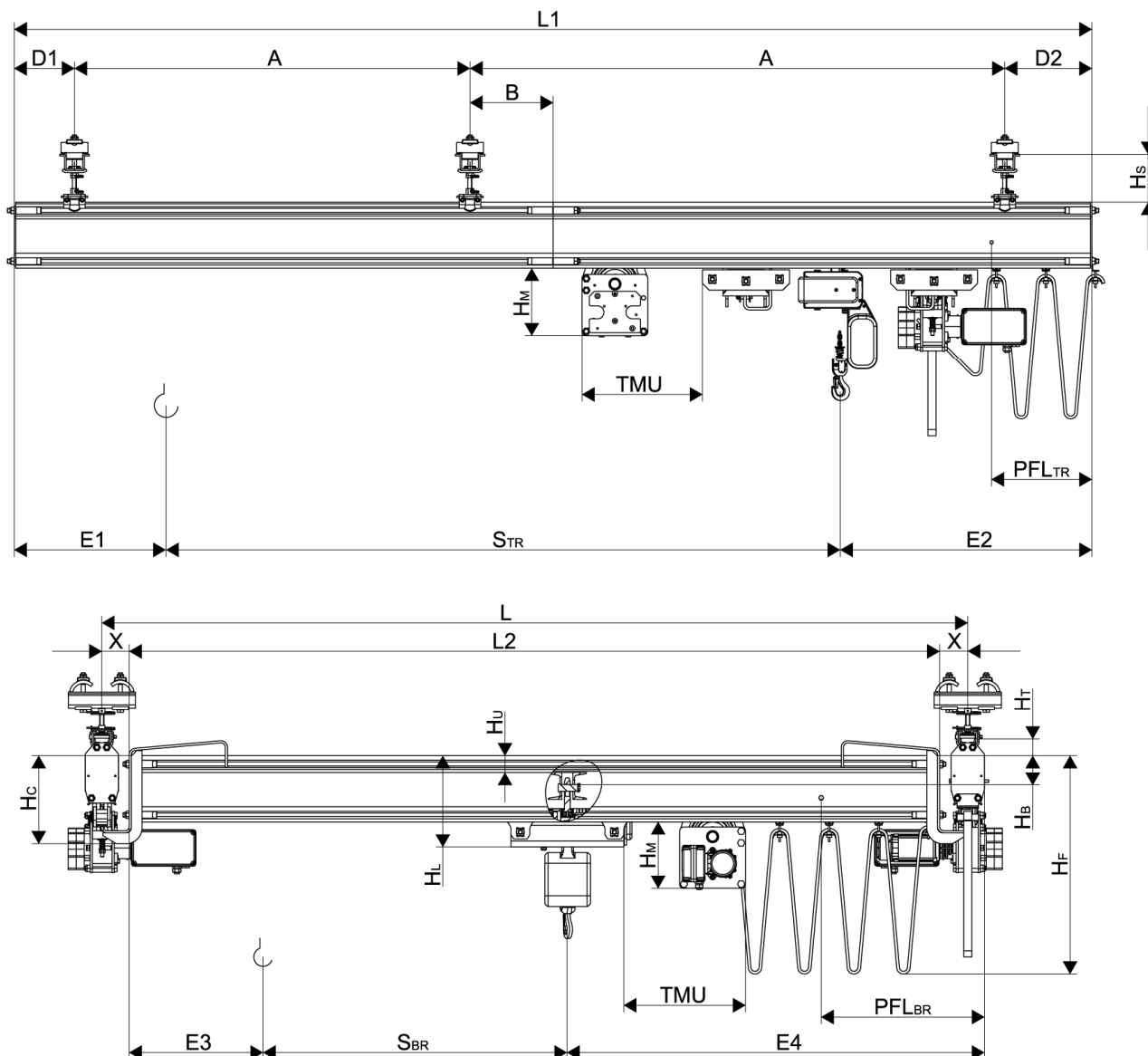
Dimensions								
Bridge type	Track	Crane bridge	Push trolley	Weight	H _T	H _B	H _U	H _L
PS3B230	UKA30	UKA30	Double	63	309.5	51	131	281.5
PS3B230	UKA40	UKA30	Double	63	369.5	51	131	281.5
PS3B240	UKA30	UKA30	Double	78	315	51	131	281.5
PS3B240	UKA40	UKA30	Double	78	375	51	131	281.5
PS4B230	UKA30	UKA40	Double	67	309.5	111	131	341.5
PS4B230	UKA40	UKA40	Double	67	369.5	111	131	341.5
PS4B240	UKA30	UKA40	Double	82	315	111	131	341.5
PS4B240	UKA40	UKA40	Double	82	375	111	131	341.5



Note: The connection sets on the girders must be installed diagonally.



4.4.7 Double girder low headroom crane bridge



$X = 110 \text{ mm}$.

Dimensions									
Bridge type	Track	Crane bridge	Bridge trolley	E1	TMU	E2	PFL _{TR}	D1, D2	B
PS2B260	UKA20	UKA20	Single	380	n/a	380 + PFL	20+110 x NFT	150	*
PS2B265	UKA30/40	UKA20	Single	410	400	410 + PFL	20+110 x NFT	150	*
PS4B260	UKA30/40	UKA30	Single	460	400	460 + PFL	20+110 x NFT	150	*
PS4B270	UKA30/40	UKA30	Double	605	400	605 + PFL	20+110 x NFT	151	*
PS4B260	UKA30/40	UKA40	Single	460	400	460 + PFL	20+110 x NFT	152	*
PS4B270	UKA30/40	UKA40	Double	605	400	605 + PFL	20+110 x NFT	153	*

*Note: B min. 150 mm, B max., see table in chapter Monorail.

Dimensions							
Bridge type	Track	Crane bridge	Push trolley	E3	TMU	E4	PFL _{BR}
PS2B260	UKA20	UKA20	Double	350	n/a	350 + PFL	20+110 x NFT
PS2B265	UKA30/40	UKA20	Double	350	n/a	350 + PFL	20+110 x NFT
PS4B260	UKA30/40	UKA30	Double	395	400	395 + PFL	20+110 x NFT
PS4B270	UKA30/40	UKA30	Double	395	400	395 + PFL	20+110 x NFT
PS4B260	UKA30/40	UKA40	Double	395	400	395 + PFL	20+110 x NFT
PS4B270	UKA30/40	UKA40	Double	395	400	395 + PFL	20+110 x NFT

*The B max. dimension also applies between the crane bridge suspension and the connection set fitted on the crane bridge.

See chapter Festoon under profile for the calculation of the number of the festoon trolleys (NFT) required.

Bridge kit references and weights (kg)

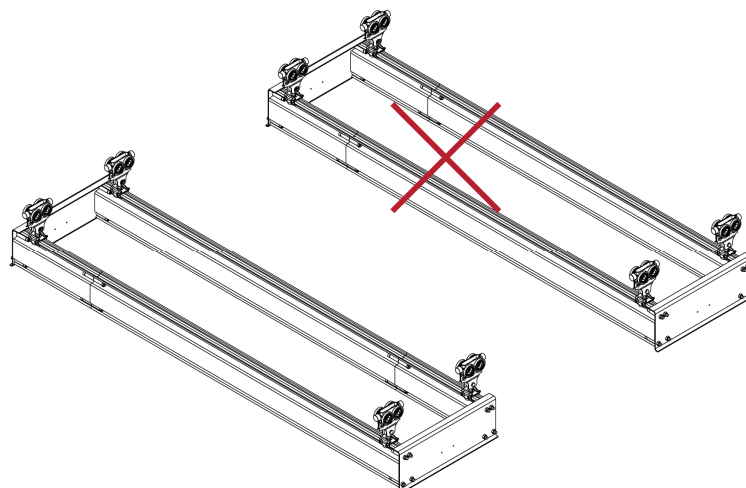
Dimensions									
Bridge type	Track	Crane bridge	Push trolley	Weight	H _T	H _B	H _C	H _U	H _L
PS2B260	UKA20	UKA20	Double	36.5	0	-55	205	-80	201
PS2B265	UKA30	UKA20	Double	43.5	65	-55	205	-80	201
PS2B265	UKA40	UKA20	Double	43.5	125	-55	205	-80	201
PS4B260	UKA30	UKA30	Double	80.5	0	51	326	1	281.5
PS4B260	UKA40	UKA30	Double	80.5	60	51	326	1	281.5
PS4B260	UKA30	UKA40	Double	80.5	0	51	326	1	281.5
PS4B260	UKA40	UKA40	Double	80.5	60	51	326	1	281.5
PS4B270	UKA30	UKA30	Double	110	5.5	111	326	61	341.5
PS4B270	UKA40	UKA30	Double	110	65.5	111	326	61	341.5
PS4B270	UKA30	UKA40	Double	110	5.5	111	326	61	341.5
PS4B270	UKA40	UKA40	Double	110	65.5	111	326	61	341.5



Note: A negative H_U or H_T value means that the crane bridge is higher than the track.



Note: The connection sets on the girders must be installed diagonally.



5 CRANE COMPONENTS IN DETAIL

5.1 Interfaces with support steel works

The suspensions are an important part of a light crane system. Their articulated construction minimizes the horizontal stresses that are transmitted to the building structure. The suspension clamping part of the profile is the same for the UKA30 and the UKA40 – for the UKA20 profile, a specific clamping part has been designed. All parts above the clamping part are identical for all rail widths. Thus, any suspension type can be selected for any rail width.

The suspensions can easily be adjusted vertically on the site. In the range of ± 30 mm, the adjustment is done with threaded bars, and for a wider range, by a simple cutting-at-length procedure, according to the building configuration. The possibility for adjustment enables compensating for the possible unevenness of the building structure.

Limiting values

All the suspensions are designed for a maximum load of 3000 kg (considering the dynamic factor value of 0.25). See chapter Detailed calculation for the calculation of the suspension load.

The articulated construction allows for a slight misalignment during the assembly and the operation. This means, that it also makes it possible to cope with the building structure tolerances (see scheme). The maximum angle between the suspension rod and the vertical direction is 5° , therefore allowing the pendulating of the crane to minimize the horizontal stresses towards the supporting structure.

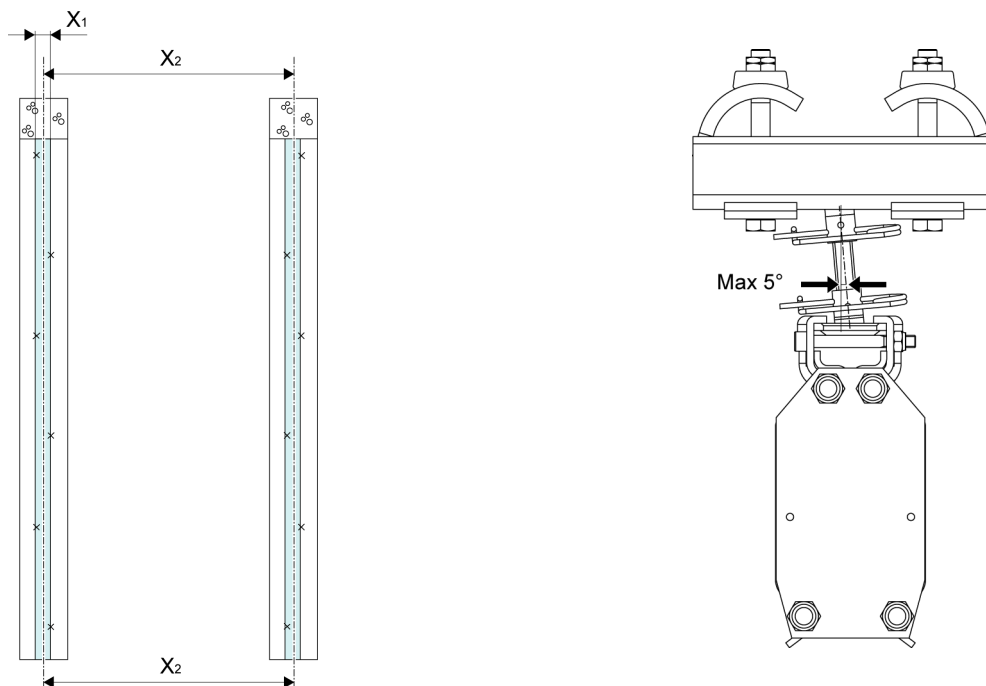


Figure 7. $X_1 = \pm 5$ mm, $X_2 = \pm 5$ mm.

Suspension range

The suspensions are available in different sizes and shapes, depending on the existing building structure. They can be connected to either an I- or an H-beam with a width of 80–300 mm, or directly to a ceiling or a concrete beam.

For information on suspensions for inclined building structures, see chapter Articulated suspensions.

Safety locking

When the height is adjusted, the threaded rod is locked with safety pins at the top and at the bottom, to prevent any rotation of the suspension nuts.

5.2 Suspension types with current suspension design

5.2.1 Suspension for I-beam structure

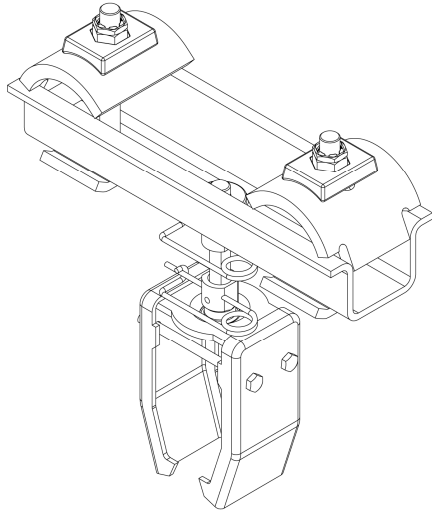


Figure 8. Short suspension type for UKA 20

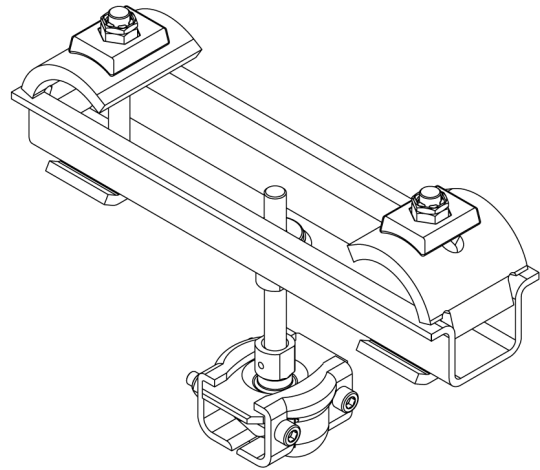


Figure 9. Short suspension type for UKA 30/40

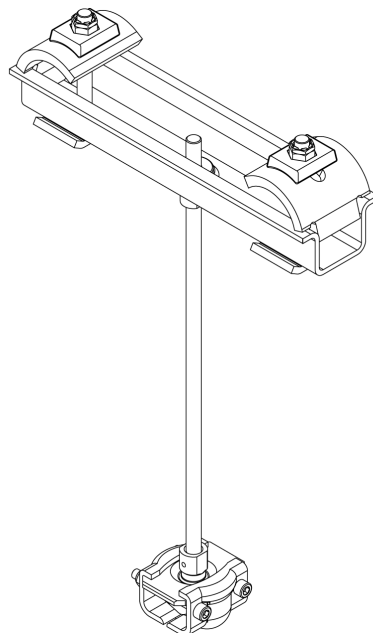


Figure 10. Long suspension type for UKA 20 and UKA 30/40

SUSPENSION DIMENSIONS

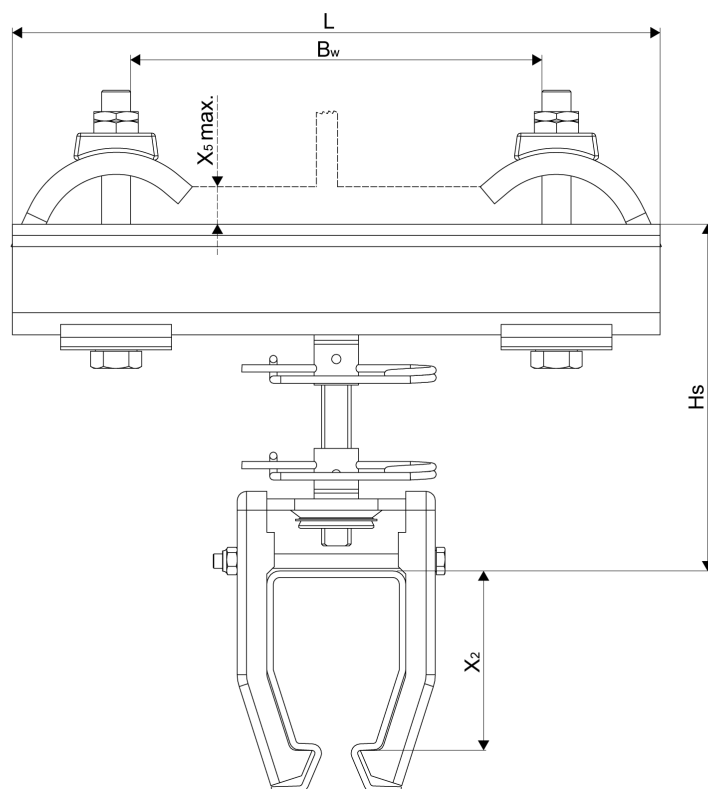


Figure 11. UKA 20 suspension dimensions

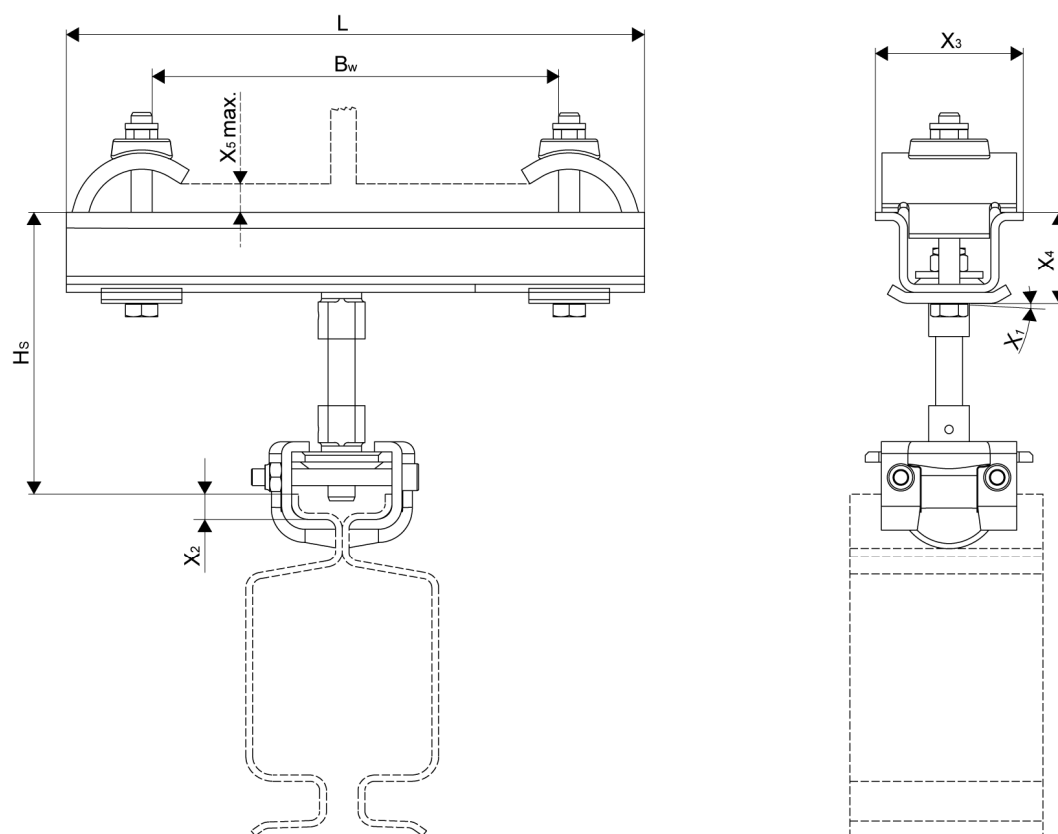


Figure 12. UKA 30/40 suspension dimensions

Type	Rail size	H _s ²⁾ [mm]		Beam width Bw [mm]		Suspension profile length L [mm] ¹⁾	Type code
		min.	max.	min.	max.		
Short	UKA20	155	253	80	120	250	Brand product code
				80	220	350	Brand product code
				160	300	430	Brand product code
Long		155	611	80	120	250	Brand product code
				80	220	350	Brand product code
				160	300	430	Brand product code
Short	UKA30/40	142	238	80	120	250	Brand product code
				80	220	350	Brand product code
				160	300	430	Brand product code
Long		142	598	80	120	250	Brand product code
				80	220	350	Brand product code
				160	300	430	Brand product code
Fixing part for side support	All	n/a	n/a	80	120	250	PS4R 100 250
				80	220	250	PS4R 100 350
				160	300	430	PS4R 100 040

¹⁾Length of the Omega channel.

²⁾If H_s > 350 mm: Side supports are required, see chapter Extension sets and side supports.

Dimension	UKA 20 [°] / [mm]	UKA30/40 [°] / [mm]
X ₁	±5°	±5°
X ₂	97	15
X ₃	110	110
X ₄	68	68
X ₅	25	25

5.2.2 Suspension for straight ceiling

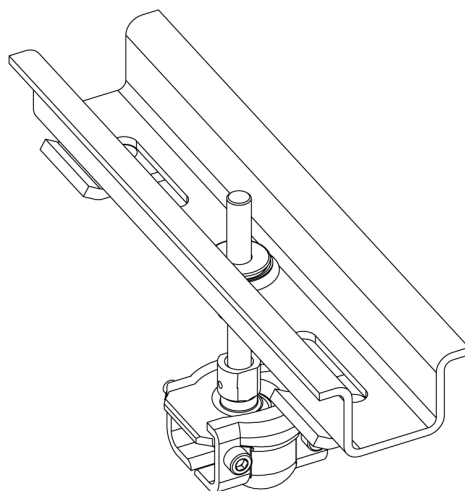


Figure 13. Short suspension type for UKA 20 and UKA 30/40

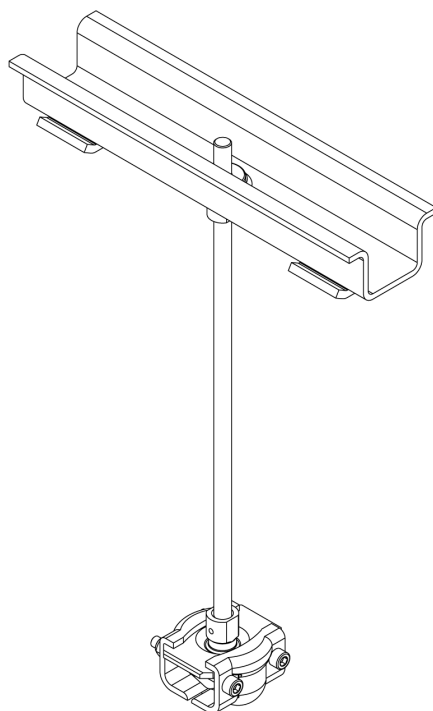


Figure 14. Long suspension type for UKA 20 and UKA 30/40

SUSPENSION DIMENSIONS

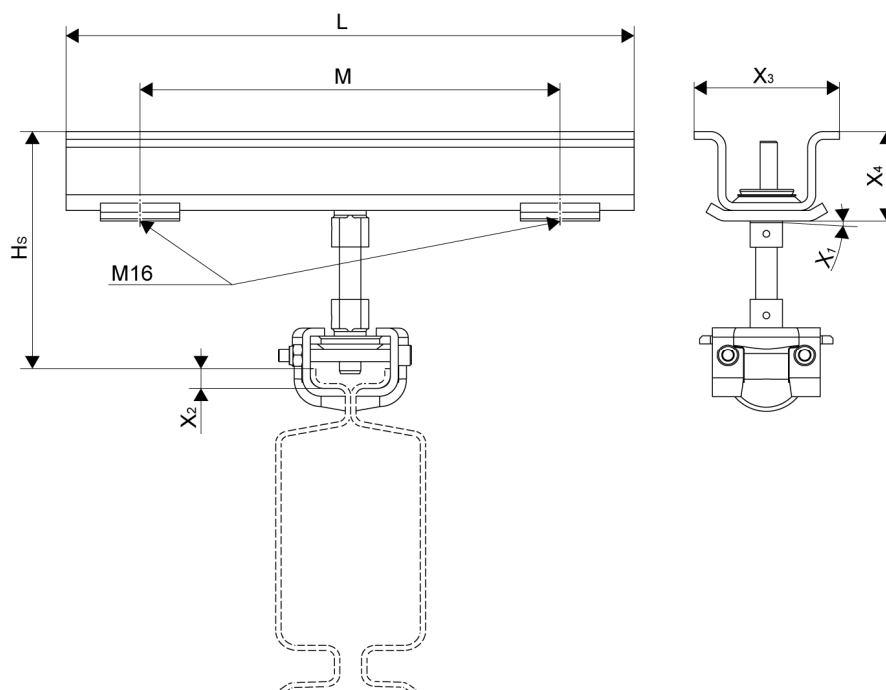


Figure 15. UKA 20 and UKA 30/40 suspension dimensions

Type	Rail size	H _s ²⁾ [mm]		Distance between fixing bolts M [mm]		Suspension profile length L [mm] ¹⁾	Type code
		min.	max.	min.	max.		
Short	UKA20	155	253	98	138	250	Brand product code
				98	238	350	Brand product code
				178	318	430	Brand product code
Long		155	611	98	138	250	Brand product code
				98	238	350	Brand product code
				178	318	430	Brand product code
Short	UKA30/40	142	238	98	138	250	Brand product code
				98	238	350	Brand product code
				178	318	430	Brand product code
Long		142	598	98	138	250	Brand product code
				98	238	350	Brand product code
				178	318	430	Brand product code
Fixing part for side support	All	n/a	n/a	98	138	250	PS4R 090 250
				98	138	350	PS4R 090 350
				178	318	430	PS4R 090 430

¹⁾Length of the Omega channel.

²⁾If H_s > 350 mm: Side supports are required, see chapter Extension sets and side supports.

The ceiling suspensions are supplied without the fixing items. See chapter Bracket type suspension.

Obey the local regulations concerning the fixings on the ceiling.

Dimensions	UKA20 [°] / [mm]	UKA30/40 [°] / [mm]
X ₁	±5°	±5°
X ₂	97	15
X ₃	110	110
X ₄	68	68

5.2.3 Bracket type suspension

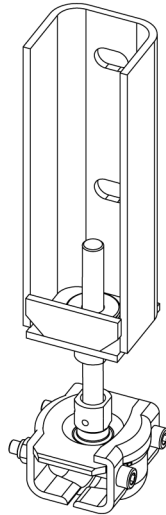


Figure 16. Short suspension type for UKA 20 and UKA 30/40

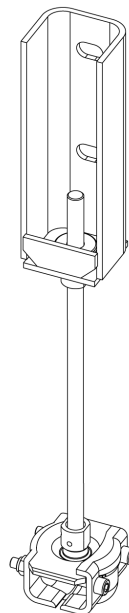


Figure 17. Long suspension type for UKA 20 and UKA 30/40

SUSPENSION DIMENSIONS

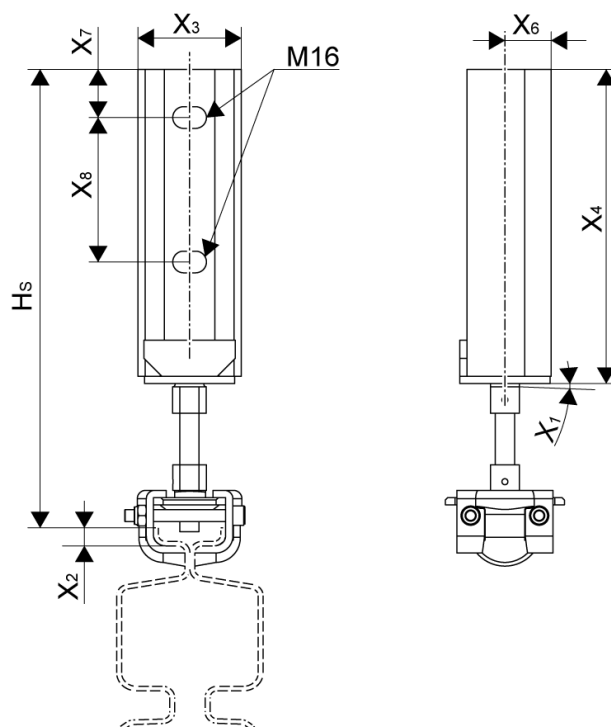


Figure 18. UKA 20 and UKA 30/40 suspension dimensions

Type	Rail size	H _s [mm] ¹⁾		Type code
		min.	max.	
Short	UKA20	355	451	Brand product code
Long			855	Brand product code
Short	UKA30/40	340	434	Brand product code
Long			794	Brand product code

¹⁾If H_s > 350 mm: Side supports are required, see chapter Extension sets and side supports.

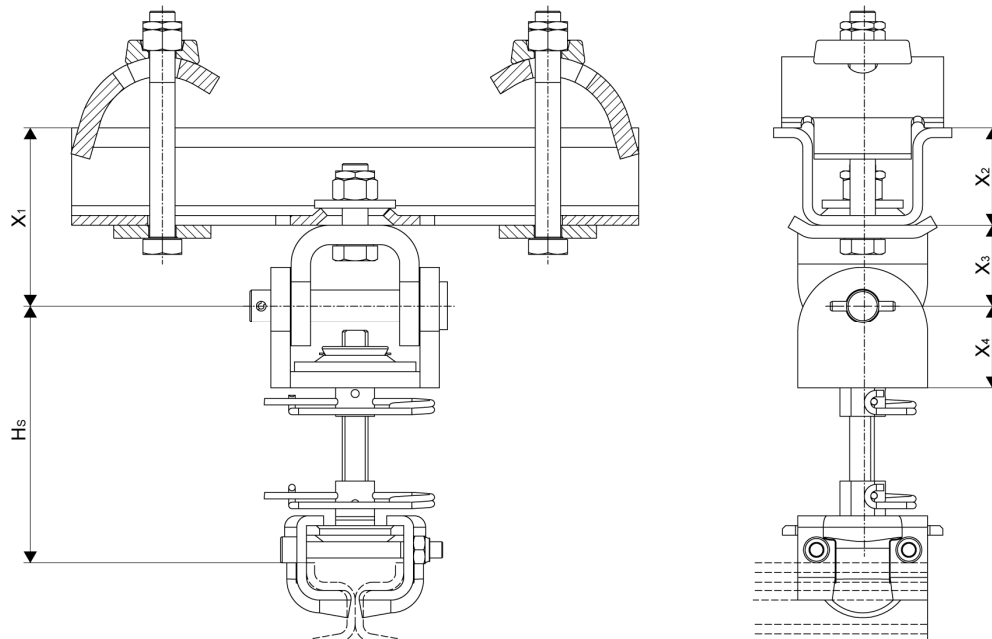
Dimensions	UKA20 [mm]	UKA30/40 [mm]
X ₁	±5°	±5°
X ₂	97	15
X ₃	86	86
X ₄	261	261
X ₆	37.5	37.5
X ₇	40	40
X ₈	120	120

The bracket suspensions are supplied without the fixing items. These items must be selected according to the material of the supporting structure (M16 8.8).

5.2.4 Articulated suspensions

When the light crane system has to be mounted on a non-horizontal structure (for example, a metallic structure of a roof), the pendulation angle of the standard suspension may not allow the threaded rod to be vertical.

Articulated suspension add-on is a component that is installed below the upper suspension profile to allow the use of structure with slope until 20°. The height increases 90 mm and the HS dimension decreases 20 mm compared to a standard suspension (but measured from articulation shaft).



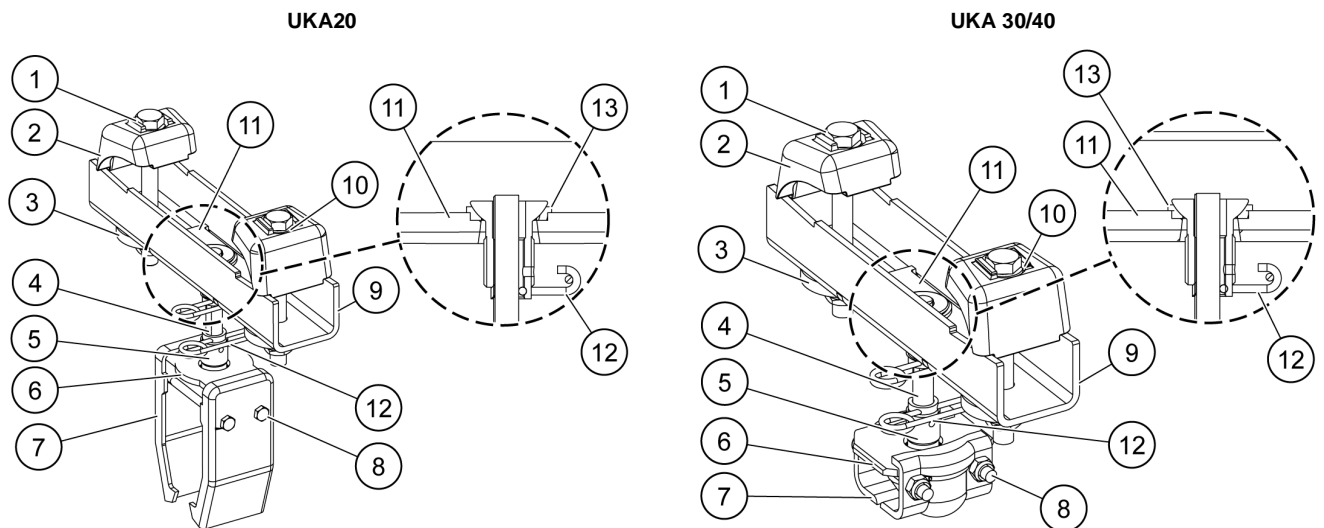
Dimensions [mm]	
X₁	110
X₂	60
X₃	50
X₄	69

TYPE CODE TABLE

Type	Rail size	Suspension type	Profile length [mm]	Type code
Short	UKA20	I-beam suspension	350	PS2R425350
Long		I-beam suspension	350	PS2R445350
Short	UKA30/40	I-beam suspension	350	PS4R025350
Long		I-beam suspension	350	PS4R045350
Short	UKA20	I-beam suspension	430	PS2R425430
Long		I-beam suspension	430	PS2R445430
Short	UKA30/40	I-beam suspension	430	PS4R025430
Long		I-beam suspension	430	PS4R045430
Short	UKA20	Straight ceiling	350	PS2R415350
Long		Straight ceiling	350	PS2R435350
Short	UKA30/40	Straight ceiling	350	PS4R015350
Long		Straight ceiling	350	PS4R035350
Short	UKA20	Straight ceiling	430	PS2R415430
Long		Straight ceiling	430	PS2R435430
Short	UKA30/40	Straight ceiling	430	PS4R015430
Long		Straight ceiling	430	PS4R035430
Short	UKA20	Bracket type	-	PS2R4055
Long		Bracket type	-	PS2R465
Short	UKA30/40	Bracket type	-	PS4R055
Long		Bracket type	-	PS4R065

5.3 Suspension types with suspension design upgrade 01/15*

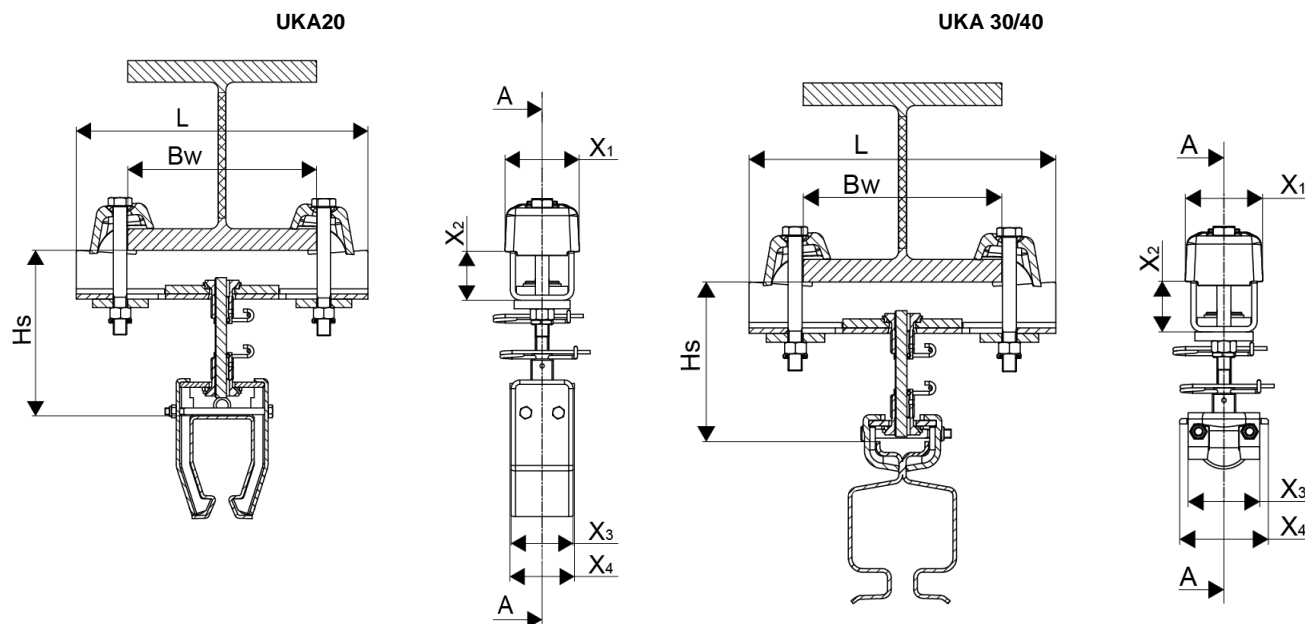
5.3.1 Suspension for I-beam structure



Pos.	Part	Description
1	Fastening	Used to fasten the suspension parts to the I-beam.
2	Beam clamp	The beam clamps rest on either side of the I-beam.
3	Profile fixing plate	The profile fixing plates spread the forces across the metal U profile.
4	Threaded bar	The threaded bar supports the weight of the crane and allows height adjustment.
5	Suspension nut	The suspension nut connects the threaded bar to other suspension parts.
6	Suspension plate	The suspension plate links the track supports to the suspension nut.
7	Track support	The track supports fasten the track profile to the suspension.
8	Screw	The screws tighten the track supports onto the track.
9	Upper suspension profile	Used to fasten the suspension parts to the I-beam.
10	Spherical washer	Ensure the correct tightening of the fastening.
11	Reinforcement plate	Spread the forces across the upper suspension profile
12	Safety pin	The safety pins prevent the rotation of the threaded bar.
13	Washer plate	The washer plate works as a slide bearing between the suspension parts.

*NOTE: Availability suspect to further notice.

SUSPENSION DIMENSIONS

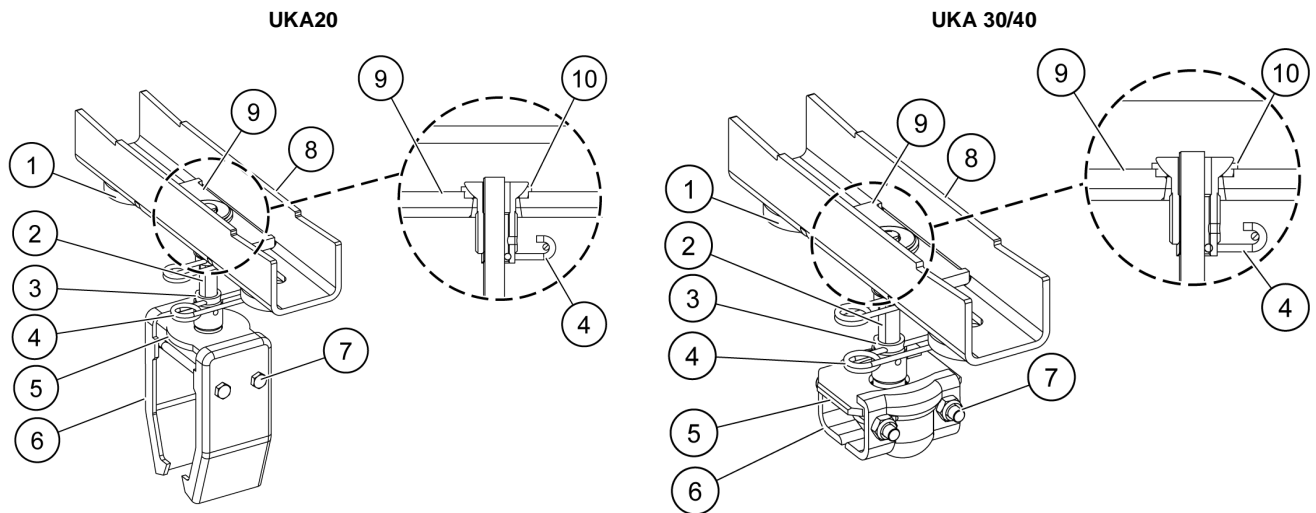


Type	Rail size	H _s [mm]		Beam width B _w [mm]		Suspension profile length L [mm]	Type code
		min.	max.	min.	max.		
Short	UKA20	153.5	263.5	80	150	250	PS2R420250-15
				150	220	350	PS2R420350-15
				220	300	430	PS2R420430-15
Short	UKA30/40	138	248	80	150	250	PS4R020250-15
				150	220	350	PS4R020350-15
				220	300	430	PS4R020430-15
Long	UKA20	153.5	623.5	80	150	250	PS2R440250-15
				150	220	350	PS2R440350-15
				160	300	430	PS2R440430-15
Long	UKA30/40	138	608	80	150	250	PS4R040250-15
				150	220	350	PS4R040350-15
				220	300	430	PS4R040430-15
Fixing part for side support ¹⁾		n/a	n/a	80	150	250	PS4R100250-15
				150	220	350	PS4R100350-15
				220	300	430	PS4R100430-15

¹⁾ If H_s > 350 mm: Side supports are required, see chapter Extension sets and side supports.

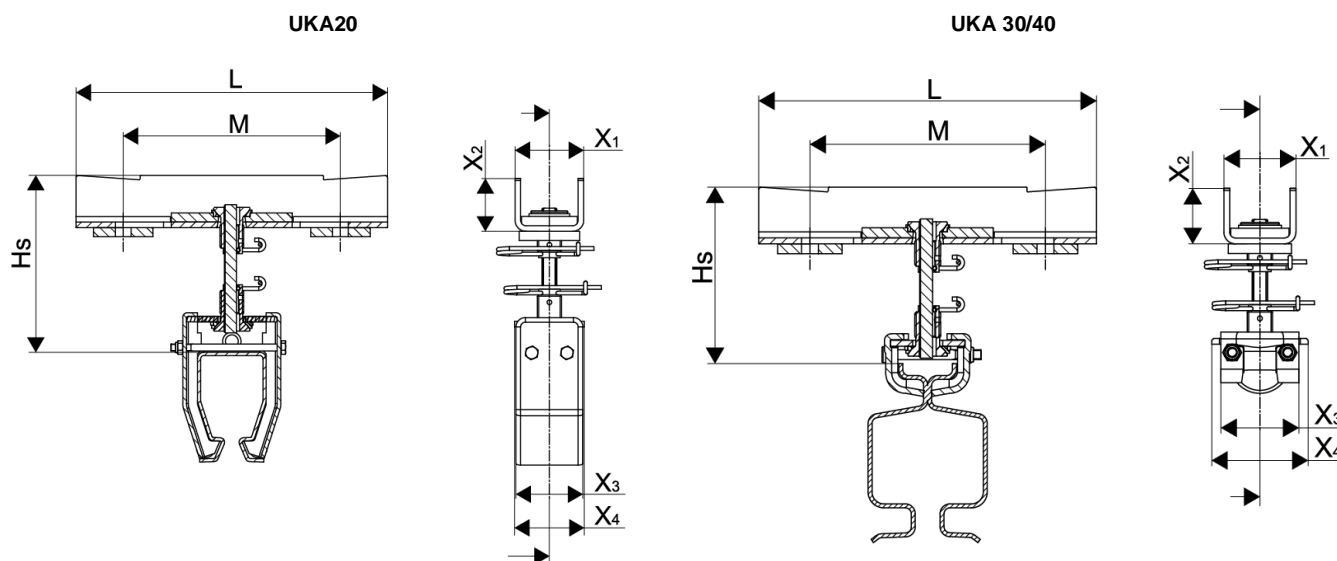
Dimensions [mm]		
Dimension	UKA20	UKA 30/40
X ₁	86	86
X ₂	57	57
X ₃	72	80
X ₄	75	99

5.3.2 Suspension for straight ceiling



Pos.	Part	Description
1	Profile fixing plate	The profile fixing plates spread the forces across the metal U profile.
2	Threaded bar	The threaded bar supports the weight of the crane and allows height adjustment.
3	Suspension nut	The suspension nut connects the threaded bar to other suspension parts.
4	Safety pin	The safety pins prevent the rotation of the threaded bar.
5	Suspension plate	The suspension plate links the track supports to the suspension nut.
6	Track support	The track supports fasten the track profile to the suspension.
7	Screw	The screws tighten the track supports onto the track.
8	Upper suspension profile	Used to fasten the suspension parts to the building structure.
9	Reinforcement plate	Spread the forces across the upper suspension profile
10	Washer plate	The washer plate works as a slide bearing between the suspension parts.

SUSPENSION DIMENSIONS



Type	Rail size	H _s [mm]		Distance between fixing bolts M [mm]		Suspension profile length L [mm]	Type code
		min.	max.	min.	max.		
Short	UKA20	153.5	263.5	98	168	250	PS2R410250-15
				168	238	350	PS2R410350-15
				238	318	430	PS2R410430-15
Short	UKA30/40	138	248	98	168	250	PS4R010250-15
				168	238	350	PS4R010350-15
				238	318	430	PS4R010430-15
Long	UKA20	153.5	623.5	98	168	250	PS2R430250-15
				168	238	350	PS2R430350-15
				238	318	430	PS2R430430-15
Long	UKA30/40	138	608	98	168	250	PS4R030250-15
				168	238	350	PS4R030350-15
				238	318	430	PS4R030430-15
Fixing part for side support ¹⁾	-	n/a	n/a	98	168	250	PS4R090250-15
				168	238	350	PS4R090350-15
				238	318	430	PS4R090430-15

¹⁾If H_s > 350 mm: Side supports are required, see chapter Extension sets and side supports.

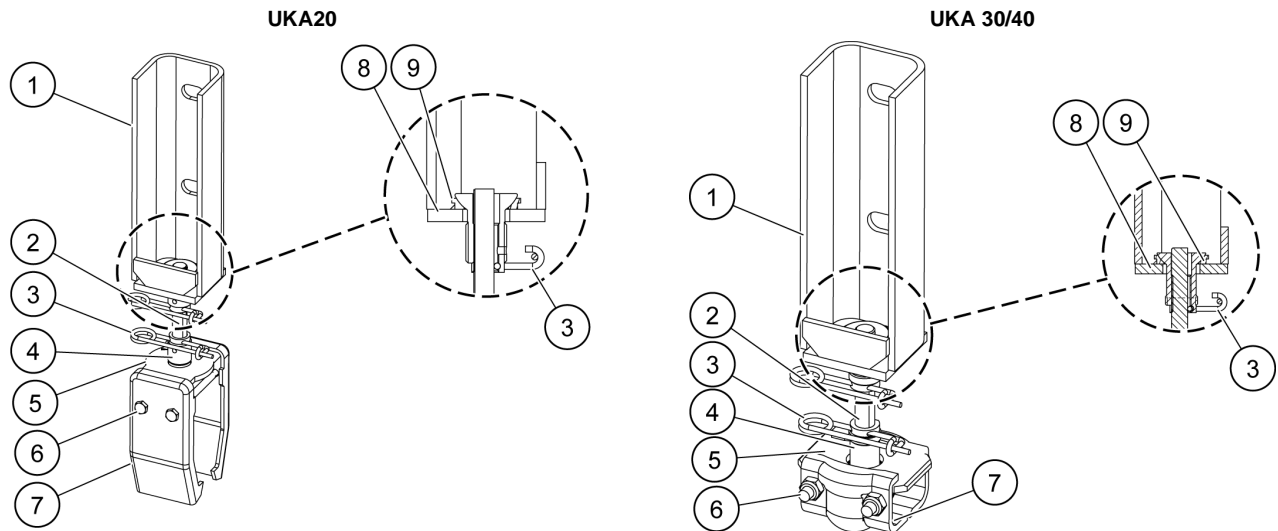
Dimensions [mm]		
Dimension	UKA20	UKA 30/40
X ₁	74	74
X ₂	57	57
X ₃	72	80
X ₄	75	99

Use M16 8.8 screws for anchor bolts.



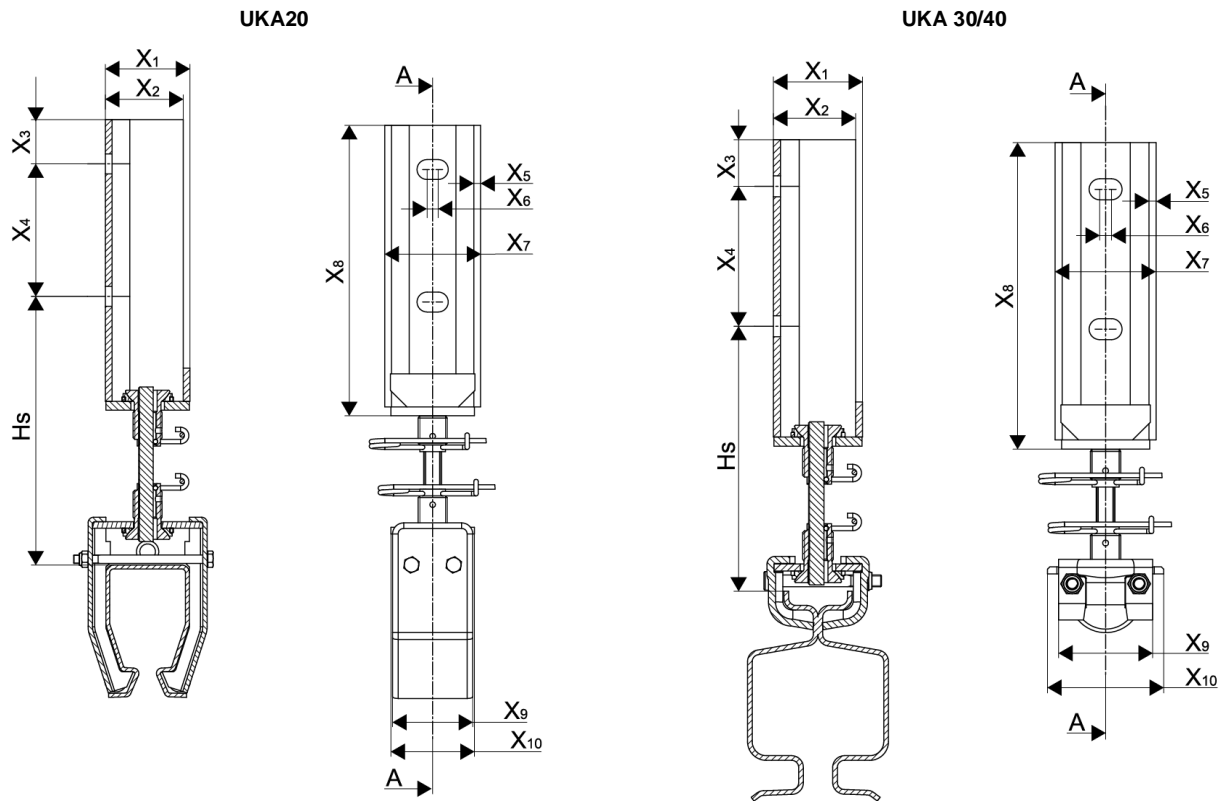
Note: Obey the local regulations concerning the fixings on the ceilings.

5.3.3 Bracket type suspension



Pos.	Part	Description
1	Upper suspension profile	Used to fasten the suspension parts to the building structure.
2	Threaded bar	The threaded bar supports the weight of the crane and allows height adjustment.
3	Safety pin	The safety pin prevents rotation of the threaded bar.
4	Suspension nut	The suspension nut connects the threaded bar to other suspension parts
5	Suspension plate	The suspension plate links the track supports to the suspension nut.
6	Screw	The screws tighten the track supports onto the track.
7	Track support	The track supports fasten the track profile to the suspension.
8	Reinforcement plate	Spreads the forces across the upper suspension profile
9	Washer plate	The washer plate works as a slide bearing between suspension parts.

SUSPENSION DIMENSIONS



Type	Rail	H _s [mm]		Height between fixing bolts [mm]	Bracket height [mm]	Type code
		min.	max.			
Short	UKA20	203.5	313.5	120	261	PS2R450-15
Short	UKA30/40	188	298	120	261	PS4R050-15
Long	UKA20	203.5	673.5	120	261	PS2R460-15
Long	UKA30/40	188	658	120	261	PS4R060-15
Fixing part for side support ¹⁾	-	n/a	n/a	120	261	PS4R110-15

¹⁾If H_s > 350 mm: Side supports are required, see chapter Extension sets and side supports.

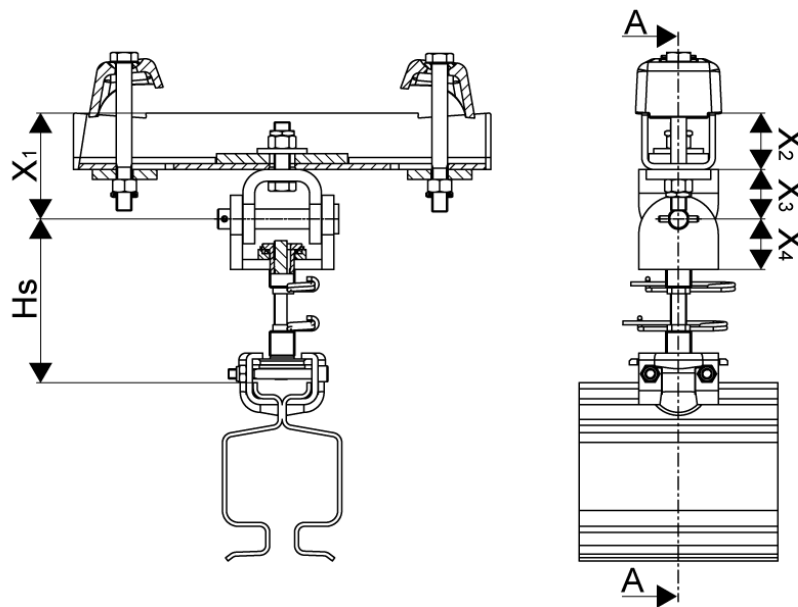
Dimensions [mm]		
Dimension	UKA20	UKA 30/40
X ₁	76	76
X ₂	70	70
X ₃	40	40
X ₄	120	120
X ₅	6	6
X ₆	10	10
X ₇	86	86
X ₈	261	261
X ₉	72	80
X ₁₀	75	99

Use M16 8.8 screws for anchor bolts.

5.3.4 Articulated suspensions

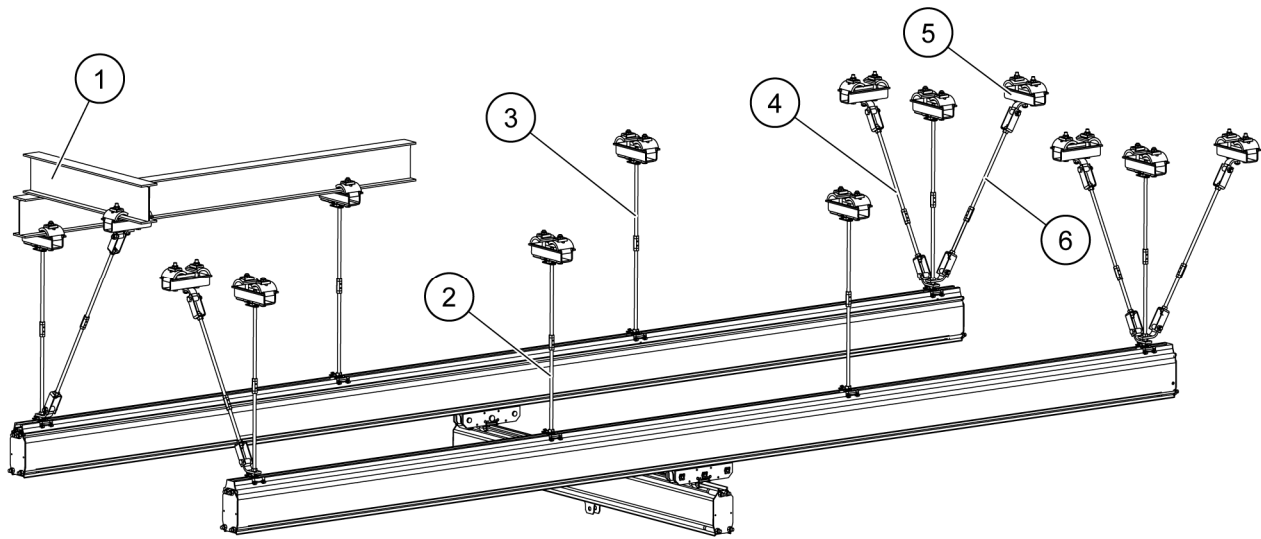
When the light crane system has to be mounted on a non-horizontal structure (for example, the metallic structure of a roof), the pendulation angle of the standard suspension may not allow the threaded rod to be vertical.

The articulated suspension add-on is a component that is installed below the upper suspension profile, to allow the use of a structure with a slope until 20°. The height increases 97 mm.



Dimensions [mm]	
X ₁	107
X ₂	57
X ₃	50
X ₄	51

5.3.5 Extension sets and side supports



Pos.	Part	Description
1	Building structure	The crane is attached to the building structure (not supplied), or a free standing structure.
2	Suspension assembly	The interface between the track and the building structure.
3	Extension set	The suspension can be extended if necessary.
4	Lateral side support	Prevents lateral movement of the crane.
5	Side support bracket	The side support is attached to a suspension with the side support bracket.
6	Longitudinal side support	Prevents longitudinal movement of the crane.

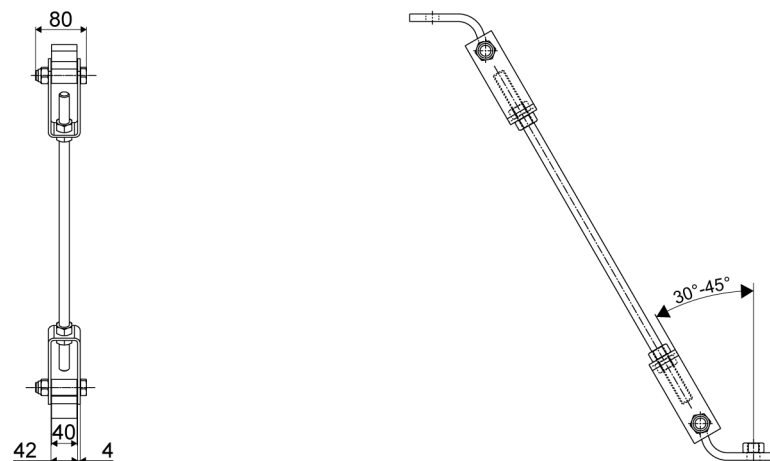


Figure 19. Front and side view of a side support assembly

When the suspending height (H_S) exceeds the maximum nominal values that are stated in the previous tables, it is possible to add 500-mm long extension sets, with a maximum amount of two (2) extension sets per suspension. The maximum value for the suspending height H_S is 1480 mm.

Depending on the height of the suspensions, rated capacity, and rail type, the side supports are required to prevent excessive movements of the crane. The longitudinal side supports are placed at the end of the track, in the track direction. The lateral side supports are located perpendicularly all along the track. The angle of the side supports must be within the range of 30°–45°.

The following tables summarize the calculations of the quantities of the side supports that are required depending on the working conditions and the profile sizes.

- Short suspensions: No side supports are required.
- Long suspensions, when the suspending height H_S is less than 350 mm: No side supports are required.
- Long suspensions, when the suspending height H_S is more than 350 mm: Side supports are required.

Longitudinal side supports

Rated capacity [kg]	[mm]	[mm]	[mm]	[mm]
	350 < H_S ≤ 500	500 < H_S ≤ 700	700 < H_S ≤ 1000	H_S > 1000
≤ 500	1 per track line	1 per track line	1 per track line	1 at each end
≤ 1000	1 per track line	1 per track line	1 at each end	1 at each end
≤ 2000	1 per track line	1 at each end	1 at each end	1 at each end

Lateral side supports

Rated capacity [kg]	[mm]	[mm]	[mm]	[mm]
	350 < H_S ≤ 500	500 < H_S ≤ 700	700 < H_S ≤ 1000	H_S > 1000
≤ 500	1 at each end	1 at each end	1 at each end	2 at each end
≤ 1000	1 at each end	1 at each end	2 at each end	2 at each end
≤ 2000	1 at each end	2 at each end	2 at each end	2 at each end

Maximum distance between consecutive side supports

Rated capacity [kg]	[mm]	[mm]	[mm]	[mm]
	350 < H_S ≤ 500	500 < H_S ≤ 700	700 < H_S ≤ 1000	H_S > 1000
≤ 500	1 every X m ¹⁾	1 every X m	1 every X m	2 every X m
≤ 1000	1 every X m	1 every X m	2 every X m	2 every X m
≤ 2000	1 every X m	2 every X m	2 every X m	2 every X m

¹⁾ Value for X.

Rail type	X [m]
UKA20	10
UKA30	15
UKA40	20

Type codes

Part	Type code
Extension set for suspension	PS4R080
Side support	PS4R070
Extension set for side support	PS4R085

Extension sets for suspensions use threaded rods with a flat section to enable the securing with safety pins.
 Extension sets for side supports use round threaded rods and are secured with conternuts.

Fixing parts for side supports

Suspension profile length L [mm]	Suspension type		
	Bracket	I-beam	Straight ceiling
250	PS4R110	PS4R100250	PS4R090250
350	-	PS4R100350	PS4R090350
430	-	PS4R100430	PS4R090430

5.4 Rail profiles

MATERIAL CHARACTERISTICS

Material	S235JR according to EN10025
E modulus [MPa]	212000
Poisson ratio	0.28
Density [kg/m³]	7850

DIMENSIONS

Profile type	UKA20		UKA30		UKA40	
Inertia [mm⁴]	2208500		755800		21975000	
Linear weight [kg]	10		19.1		28.9	
Length [mm]	Weight [kg]	Type code	Weight [kg]	Type code	Weight [kg]	Type code
1000	10.25	PS2P100	20.15	PS3P100	29.8	PS4P100
2000	20.15	PS2P200	39.1	PS3P200	58.05	PS4P200
3000	30.05	PS2P300	58.05	PS3P300	86.95	PS4P300
4000	39.9	PS2P400	77	PS3P400	114.95	PS4P400
5000	49.8	PS2P500	95.95	PS3P500	144.15	PS4P500
6000	59.7	PS2P600	114.85	PS3P600	172.75	PS4P600
7000	71.8	PS2P700	141.1	PS3P700	202.3	PS4P700
8000	79.5	PS2P800	152.75	PS3P800	229.9	PS4P800

Surface treatment

The UKA profiles are protected against corrosion, and finished using the following methods:

- Standard version: Epoxy powder painting RAL1028, 60-80 µm.
- PL option: Hot dip galvanization with a 70-µm mean thickness according to the ISO1461, which is convenient for the C4 area. This option is available for the 6 m long maxi profiles.

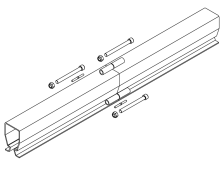
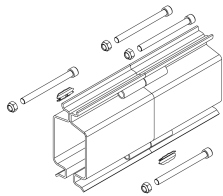
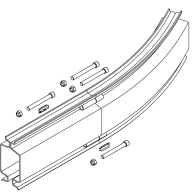
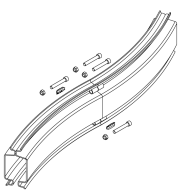
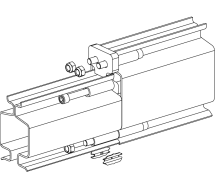
For heavily loaded UKA40 rails, a maximum B dimension between the connection and the suspension must be respected:

Maximum dimensions	
Load [rated capacity] [kg]	B _{max} [mm]
<1000	No limit
1000 <load <1200	2300
1200 <load <1400	1900
1400 <load <1600	1600
1600 <load <1800	1400
1800 <load <2000	1200

5.5 Connection sets

The connections enable the construction of high-span bridges, long-distance monorails, and tracks. The accurate rolling of the rails and the welding of the tubes ensure a smooth transfer from one rail segment to another, when the trolley is running along the bridge or the track. Specific connections for curved rails enable the construction of the circuits.

The design of the rail connection sets ensures a total safety and a high precision after the assembly. The 8.8 screws are bolted with prevailing torque-type hexagon nuts (with non-metallic insert) to prevent the loose of the tightening. The connections guides align the rail segments, allowing a smooth transfer.

	UKA20	UKA30/40	UKA30/40	UKA30/40	UKA30-40
Profile					
Type code	PS2E020	PS4E020	PS4E040	PS4E050	PS4J010
Connection type	Straight-straight	Straight-straight	Straight-curve	Curve-curve	Junction (UKA30-40)
Weight [kg]	0.5	1.5	1.2	1.0	3.0
Screws [nbr]	3	4	4	4	2
Screw size	M12-120	M16-180	M16-140	M16-100	M16-100, M16-120, M16-180

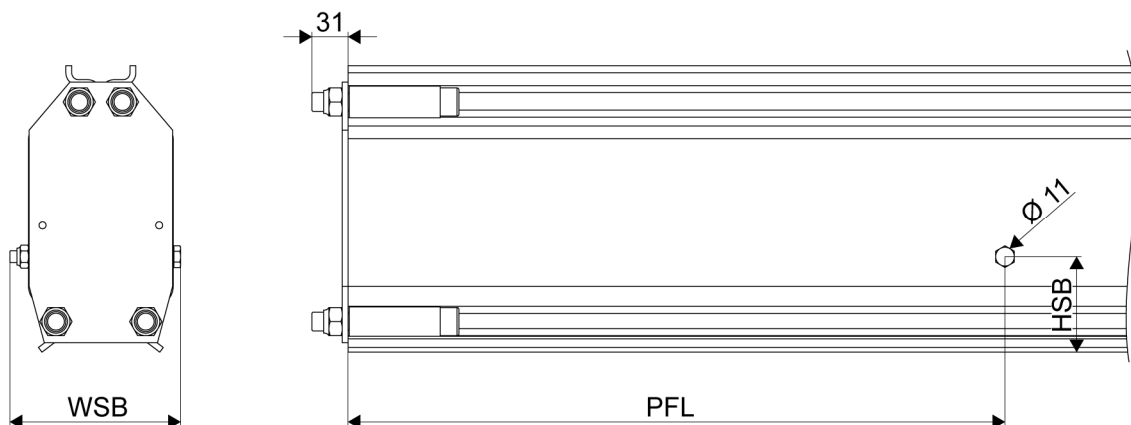
The connection set for the junction UKA30/UKA40 is a specific connection set, the PS4J010, that enables the connection of the UKA30 and UKA40 rails to each other. It therefore permits the use of the circuit components (switches, turntable, maintenance hatch) on circuits built with the UKA30 rails.

5.6 End plate sets and end stops

The end plates are fixed to the ends of the monorails, tracks, and girders. They provide the function of visually closing the rails and preventing the trolley from falling off the rail. The end plates are fixed on the rails by the same tubes, allowing the junction of the rails.

When the festoon power supply is used, an extra drilling has to be done during the assembly for the additional end stop. The drilling prevents the load trolley from causing damages to the festoon trolleys.

The end plate sets are not supplied for the low headroom crane bridges, as their functions are integrated in the design of the low headroom consoles.



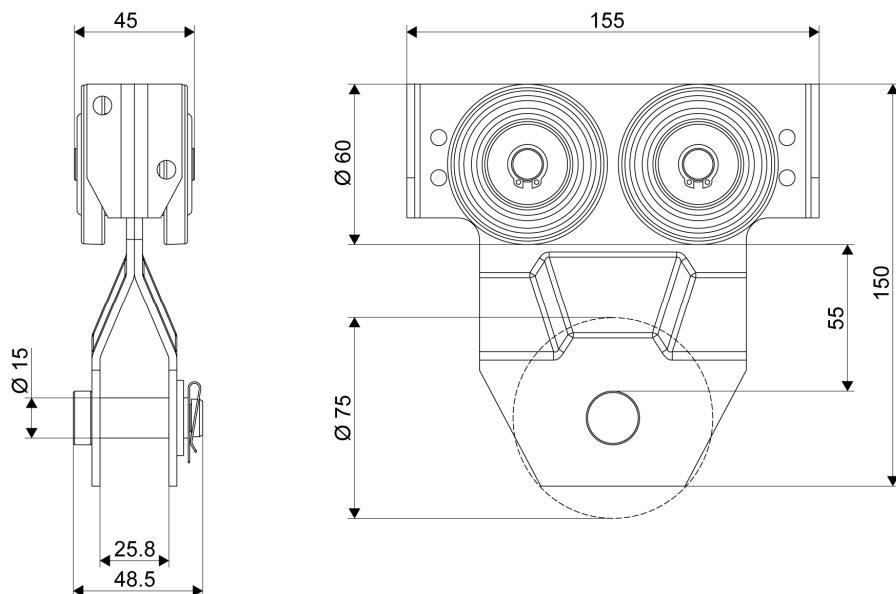
Profile	Crane type	Type code	Weight [kg]	WSB [mm]	HSB [mm]	PFL [mm]
UKA20	Monorail, runway, and single girder	PS2E010	0.6	90	78.5	60+110xNFT
UKA30		PS3E010	1.7	140	100	
UKA40		PS4E010	2.0	140	100	
UKA20	Double girder	PS2E030	5.1	90	78.5	
UKA30		PS3E030	11	140	100	
UKA40		PS4E030	13.1	140	100	

5.7 Trolleys

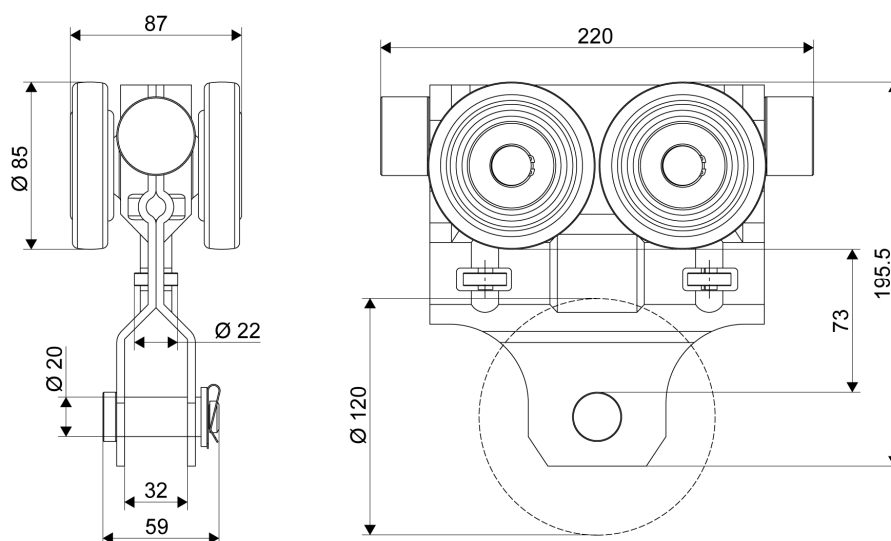
5.7.1 General characteristics

- Steel plate frame, electroplated for corrosion protection.
- Support wheels made of wear-resistant plastic, mounted on a maintenance-free ball bearing.
- For the UKA30/40 only:
 - Guiding wheels with maintenance-free ball bearing. The bearing minimizes the friction from side forces and prevents the crane bridge from getting stuck, especially with articulated crane bridges.
 - Rubber buffers at each end to damper the shock against the end plates and end stop.
 - Modular system allowing the later motorization of an existing crane (for the UKA30 and UKA40 rails).

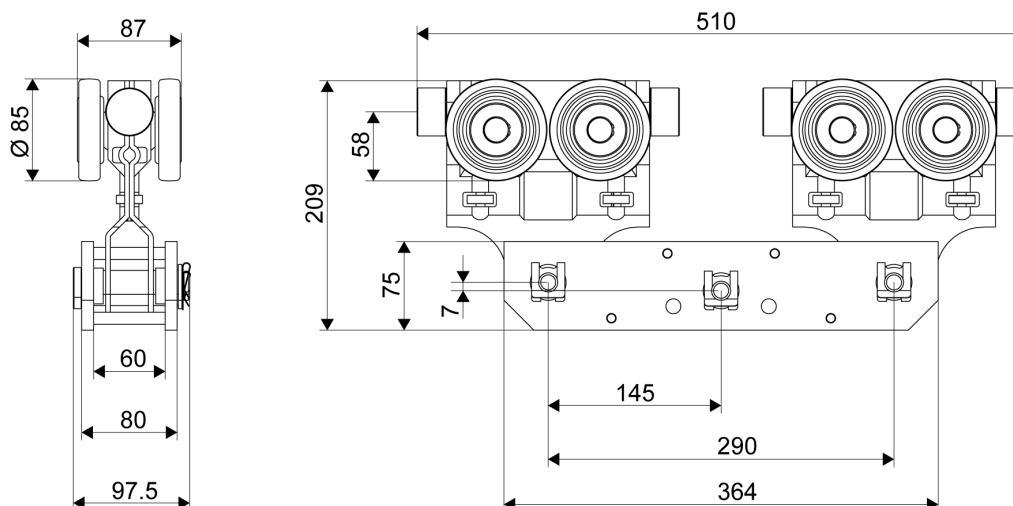
5.7.2 Single push trolley



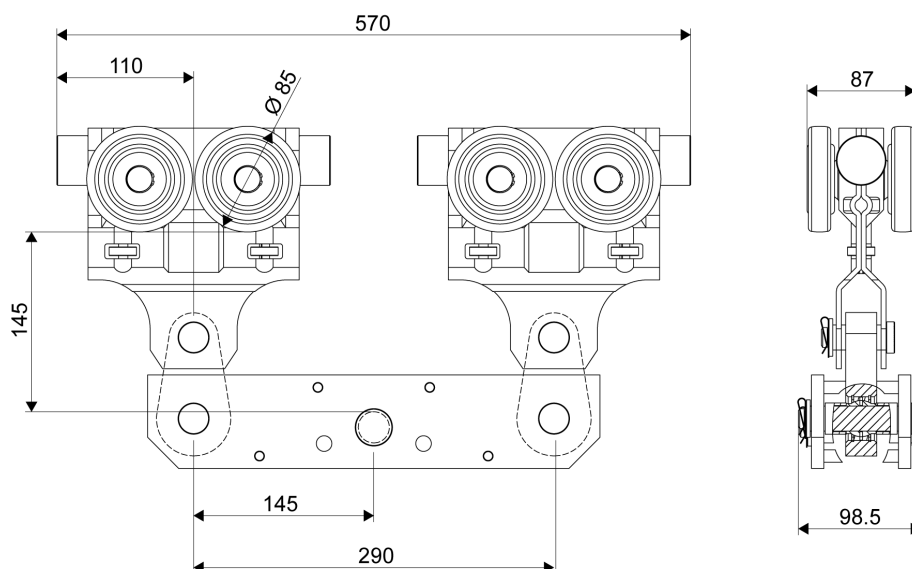
Trolley type	PS2T010
Maximum load on the bolt [kg]	400
Profile compatibility	UKA20
Weight [kg]	1.3



Trolley type	PS4T100
Maximum load on the bolt [kg]	1100
Profile compatibility	UKA30, UKA40
Weight [kg]	3.2

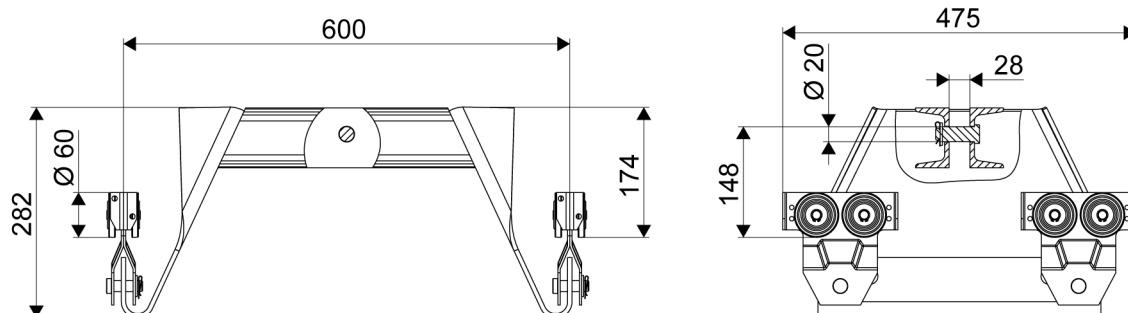


Trolley type	PS4T200
Maximum load on the bolt [kg]	2200
Profile compatibility	UKA30, UKA40 (straight rails only)
Weight [kg]	12.2

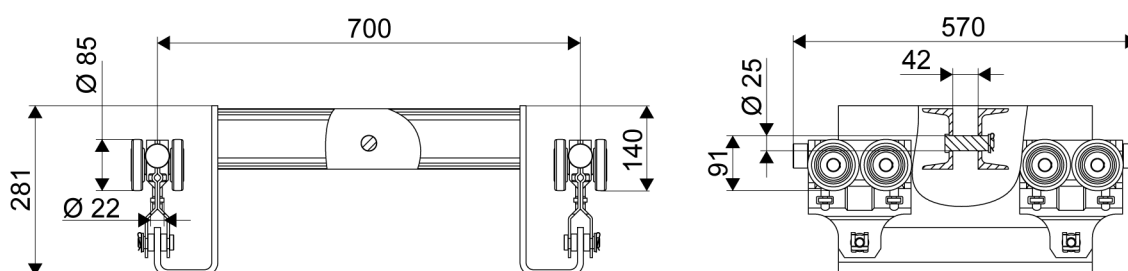


Trolley type	PS4T400
Maximum load on the bolt [kg]	2200
Profile compatibility	Monorail UKA30, UKA40 with curves
Weight [kg]	15.0

5.7.3 Double push trolley

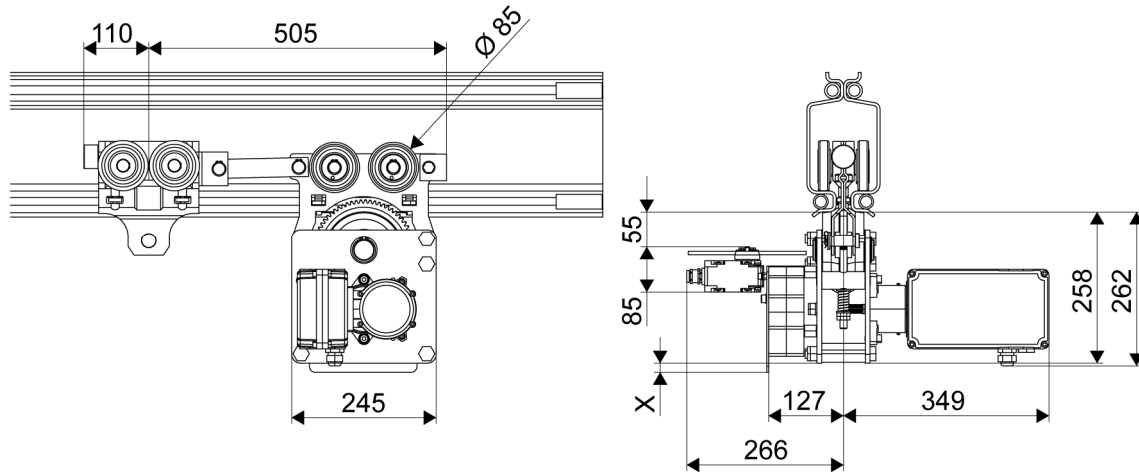


Trolley type	PS2T500
Maximum load on the bolt [kg]	600
Profile compatibility	UKA20
Weight [kg]	25.5



Trolley type	PS4T500
Maximum load on the bolt [kg]	2500
Profile compatibility	UKA30, UKA40
Weight [kg]	56.0

5.7.4 Motor trolleys UKTM and UKTM2



Trolley type	UKTM	UKTM2
Profile compatibility	UKA30, UKA40	UKA30, UKA40
Weight [kg]	43	24
H_M	257.5	272.5

The use of the motor trolleys is recommended in the following cases:

Criteria	Units	Long travel motorized	Cross travel motorized
Rated capacity [kg]	> 1000	Recommended	Recommended
Long span [m]	> 6	Recommended	Possible, not necessary
Long travel along track	> 20	Recommended	Possible, not necessary
Difficult or hindered access to the load preventing manual operation	-	Recommended	Recommended
Height of hook during travel too high to be reached	-	Recommended	Recommended
Installation height of the crane (lifting device trolley) [m]	> 5	Recommended	Recommended
Work in outreach area	-	Recommended	Possible, not necessary

To get an overview of the mounting positions and possible combinations, see chapter Trolleys.

The motor trolleys can be mounted between the festoon and the push trolley or on the opposite side of the festoon, depending on the hook approach requirements. The single girder rigid bridges are designed to have the motor trolley inside the triangle plate, and are in this way saving in the hook approach.

The UKTM motor trolleys are designed to push or pull the manual lifting device or the crane bridge trolleys. The trolleys are fitted with the latest generation of the TMK motors. This motor enables a large variety of speed combinations, thanks to a simple fitting (dual* or stepless speed) to the products. To increase the safety, the use of the traveling limit switches is recommended to prevent excessive stress towards the end plates.

The UKTM motor trolleys are attached directly to the manual trolley (lifting device or crane bridge trolley) with a rigid connection. They can easily be added at a later phase to an existing 'manual' installation. Articulated connections are available for circuits including curves.

A rubber wheel ensures the trolley motion. A spring-loaded device adjusts the pressure of the rubber wheel against the profile.



Note: The UKTM motor trolleys are not available with the UKA20 rails. Refer to chapter Steel light crane kit at a glance for the compatibility matrix.

*NOTE: The dual speed version is only available through the Sales Support team.

Technical data for the TMK motor in the UKTM motor trolleys

The TMU units that are used in UKTM motor trolleys are driven with fixed voltages and frequencies. An integrated inverter in the UKTM motor trolley enables the utilization of the different power supply characteristics. The technical data is therefore the same for all line voltages.

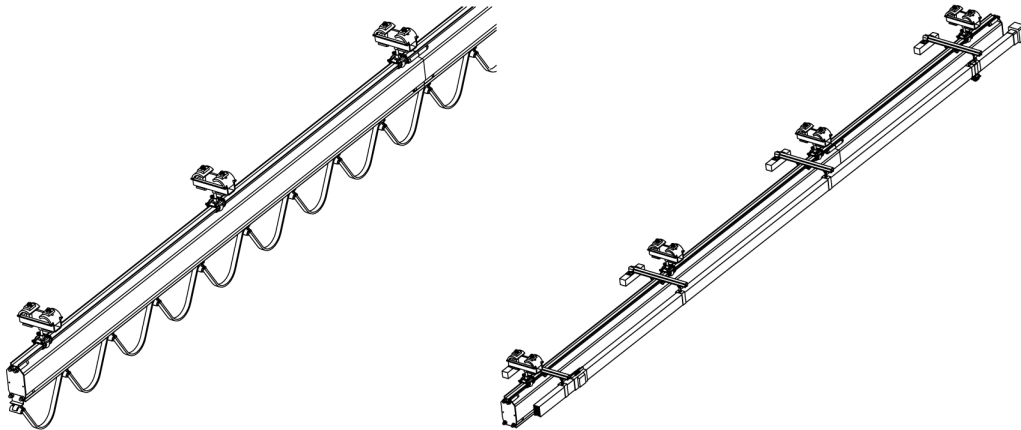
The scope of the standard power supply covers the voltages 380–480 V, under the frequency of 50 or 60 Hz. If the power voltages are outside of the range (min. 230 V, max. 600 V), transformers are supplied for each motor trolley.

Technical feature	UKTM	UKTM2				
Motor code	MF06MK200	MF06MK200				
Speed control	Inverter TMK003	Inverter TMK003				
Duty factor [%]	S3-40	S3-40				
Main supply voltage [V] (-15%...+10%, 3 phases)	380-480	380-480				
Main supply voltage frequency [Hz]	45...66	45...66				
Max current (starting) [A]	5.4	5.4				
Control voltage for digital inputs [V] (15±5 mA)	42-240	42-240				
Nominal power [W]	0.4	0.15				
IP class	IP55	IP55				
Rated capacity to carry [kg]	2000	1000	1250	1600	2000	
Speed range [m./min]: (18.5-34.1)	34.1	34.1	29.2	23.4	18.5	
Min. acceleration and deceleration times (s): (1.5-5.5)	5.5	1.5	2.5	4	5.5	

5.8 Energy supply

Three different solutions are available to supply electricity for the lifting devices and motor trolleys:

- Festoon under the profile for the electric flat cable or pneumatic hoses (pneumatic lifting devices)
- Parallel enclosed conductors
- Inner conductors (UKA40 only).



A main isolation switch – with type code UME104 – can be provided for any power supply type to disconnect the light crane system from the main power supply.

A raising cable between the main isolation switch and the system is also available. It includes a 3-m long steel pipe, of 5 m of round cable.

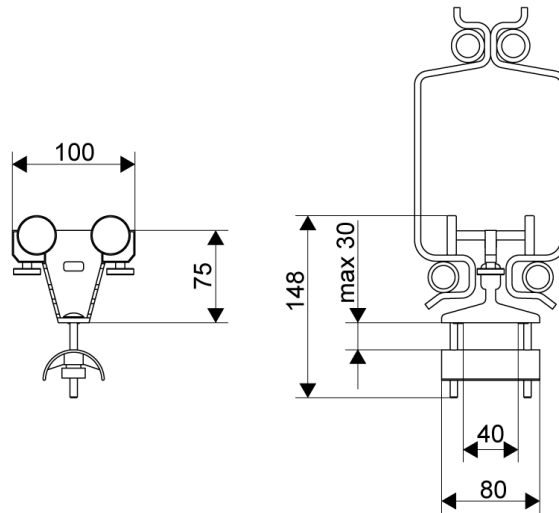
5.8.1 Festoon under profile

The festoon trolleys support both the flat electric cable and the pneumatic hoses. They run inside the profile. This solution is an economical and ideal alternative for light-duty applications up to a maximum length of 35 m of electric flat cable, and with only one crane bridge.

If necessary, the crane bridge outreach can be extended to make room for storing the festoon. This solution increases the load to be lifted for a given crane bridge length or the hook stroke for a given span.

Electrical flat cable

The flat cable festoon systems consist of a flat cable that the cable trolleys support. A connection box, end attachment part, towing chain, and carabiners are also part of the supply.



The cable storage area must be considered in the hook approach, and it is calculated as follows:

$$NFT = \text{rounded up} \left(\frac{S[m] * 1.25}{1.6} \right) - 1$$

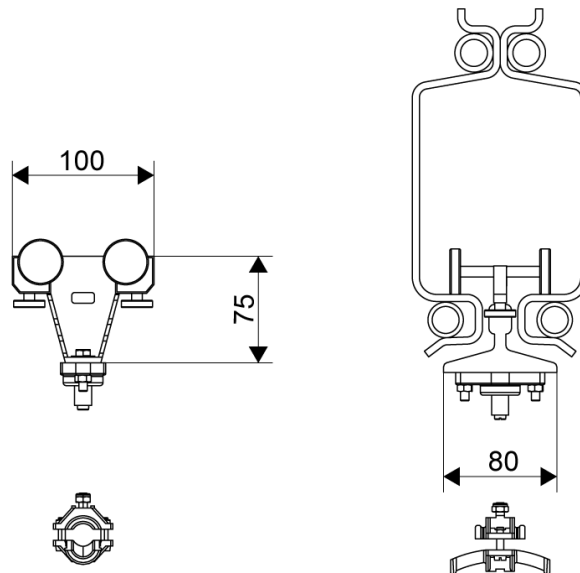
$$PFL = NFT * FTW + 20mm$$

See chapter Crane dimensions for the list of abbreviations used.

Rail size	Type code	Festoon trolley width [mm]	Trolley capacity [kg]
UKA20	PS2F030	100	6.3
UKA30/40	PS4F030	100	6.3

Pneumatic hose

The cable trolleys support the pneumatic hoses through a ball end joint that allows the spiral to extend.



The cable storage area must be considered in the hook approach, and it is calculated as follows:

$$NFT = \text{rounded up} \left(\frac{S[m] * 1.25}{1.6} \right) - 1$$

$$PFL = NFT * FTW + 20mm$$

See chapter Crane dimensions for the list of abbreviations used.

Rail size	Type code	Festoon trolley width [mm]	Trolley capacity [kg]	Spiral hose support	
				Hose diameter [mm]	Type code
UKA20	PS2F030	100	6.3	10-16	PS2F050-10/16
UKA20				17-25	PS2F050-17/25
UKA20				26-36	PS2F050-26/36
UKA20				37-50	PS2F050-37/50
UKA30/40	PS4F030	100	6.3	10-16	PS4F050-10/16
UKA30/40				17-25	PS4F050-17/25
UKA30/40				26-36	PS4F050-26/36
UKA30/40				37-50	PS4F050-37/50

Rail size	Type code	Festoon trolley width [mm]	Trolley capacity [kg]	Spiral hose support	
				Hose diameter [mm]	Type code
UKA20	PS2F030	100	6.3	10-16	PS2F050-10/16
				17-25	PS2F050-17/25
				26-36	PS2F050-26/36
				37-50	PS2F050-37/50
UKA30/40	PS4F030	100	6.3	10-16	PS4F050-10/16
				17-25	PS4F050-17/25
				26-36	PS4F050-26/36
				37-50	PS4F050-37/50

Example of a calculation (continued from the Example 2 in the chapter Examples of calculations)

Lifting device trolley	Crane bridge				Track	
Type	Type	Span L [m]	Outreach [m]	Profile length [m]	Type	Length [m]
Single push trolley PS4T100	Single girder articulated PS4B110	5.48	0.15	5.8	UKA40	12.2

$$S_{BR} = 5800 - 2 * 110 = 5580$$

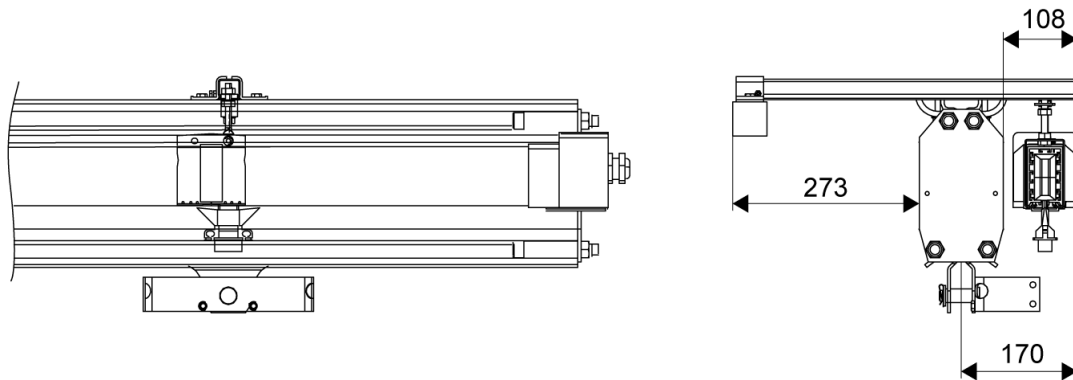
$$NFT_{BR} = \text{rounded up} \left(\frac{5.58 * 1.25}{1.6} \right) - 1 = 4$$

$$PFL_{BR} = NFT_{BR} * FTW + 20mm = 420mm$$

$$NFT_{TR} = \text{rounded up} \left(\frac{11.9 * 1.25}{1.6} \right) - 1 = 9$$

$$PFL_{BR} = NFT_{BR} * FTW + 20mm = 920mm$$

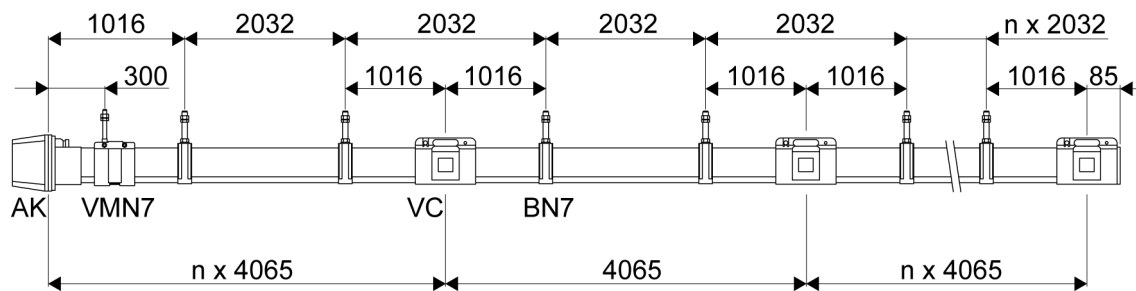
5.8.2 Parallel enclosed conductors



The use of the parallel enclosed conductors is recommended in the following situations: when the track length is more than 35 m, when there are more than two crane bridges, or when height-saving is needed. The parallel enclosed conductors also enable the use of the complete crane bridge length, which saves in the hook approach, especially in the low headroom crane bridges.

The enclosed conductors are delivered in segment lengths of 4 m. The distance between the supports is around 2 m.

Example of an installation with end feed



As a standard solution, the parallel enclosed conductors bear the type Akapp RC4 or RC7, depending on the electric kits and the motorized movements required.

Enclosed conductor	Conductors [nbr]	Max. current [A]	Height [m]	Width [m]	Collector trolley length [m]	Electric kits ¹⁾
Akapp RC4	4	40	87	52	210	Track, A
Akapp RC7	7	40	87	52	210	B, C

¹⁾Track: The conductor line along the track. A, B, C: The conductor line along the crane bridge.

The specially designed towing arms link the collector trolley to the push trolley, providing a continuous electrical connection.

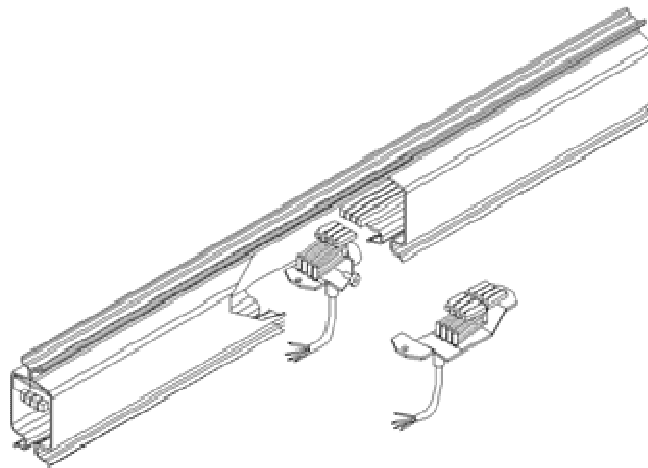
For more detailed information, see the product documentation provided by the manufacturer.

5.8.3 Inner conductors for UKA40 rails (UKA40-S)

The UKA40 rails can have inner conductors inside the profile to feed power to the bridge and to the hoist running on it. A collector trolley is connected between the push trolley and the motor trolley, so the brushes are protected against shocks at the end of the rails. If manually motioned circuits with a switch and/or a turntable are used, an extra push trolley supports the collector trolley.

In circuits with a switch and/or a turntable, a double set of brushes on the collector trolley prevent spurious power losses when passing from one conductor line segment to the next one. The solution ensures the electrical continuity.

Inner conductors are recommended for circuit monorails that are fitted with switches and turntables, where other power supply solutions cannot be used. They are also applicable for systems with more than two bridges.



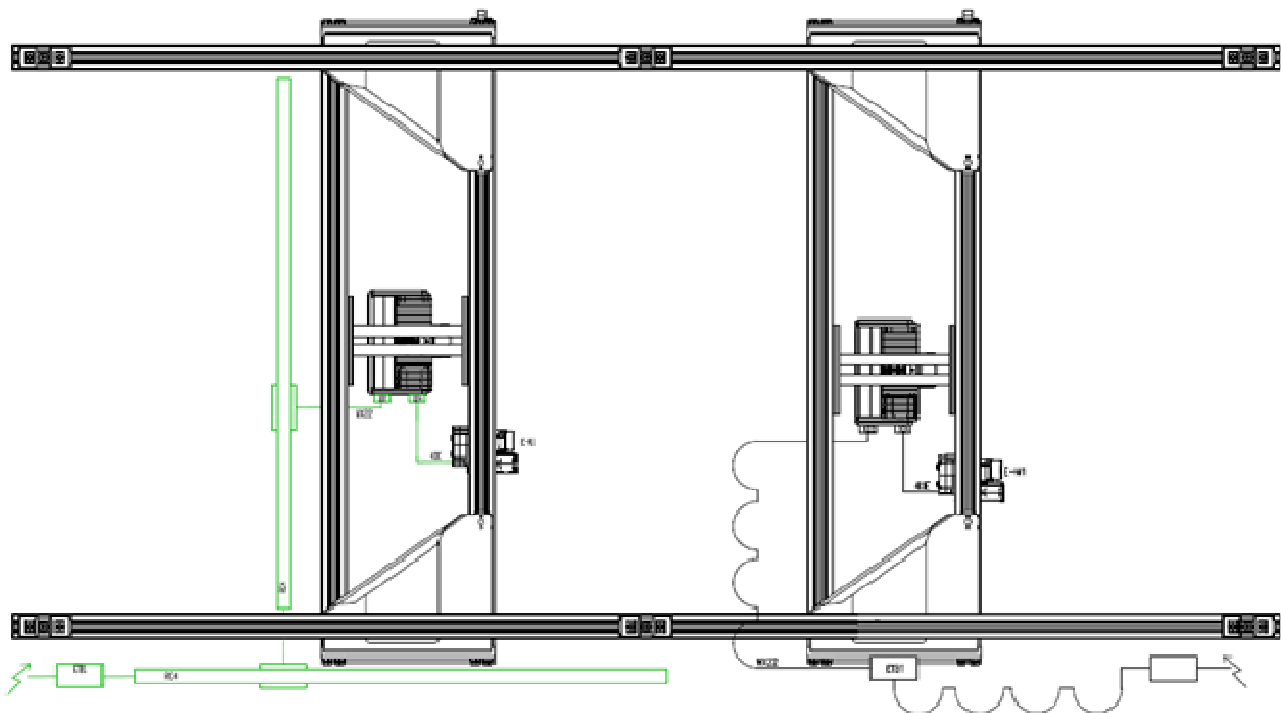
5.9 Electric kits for motor trolleys

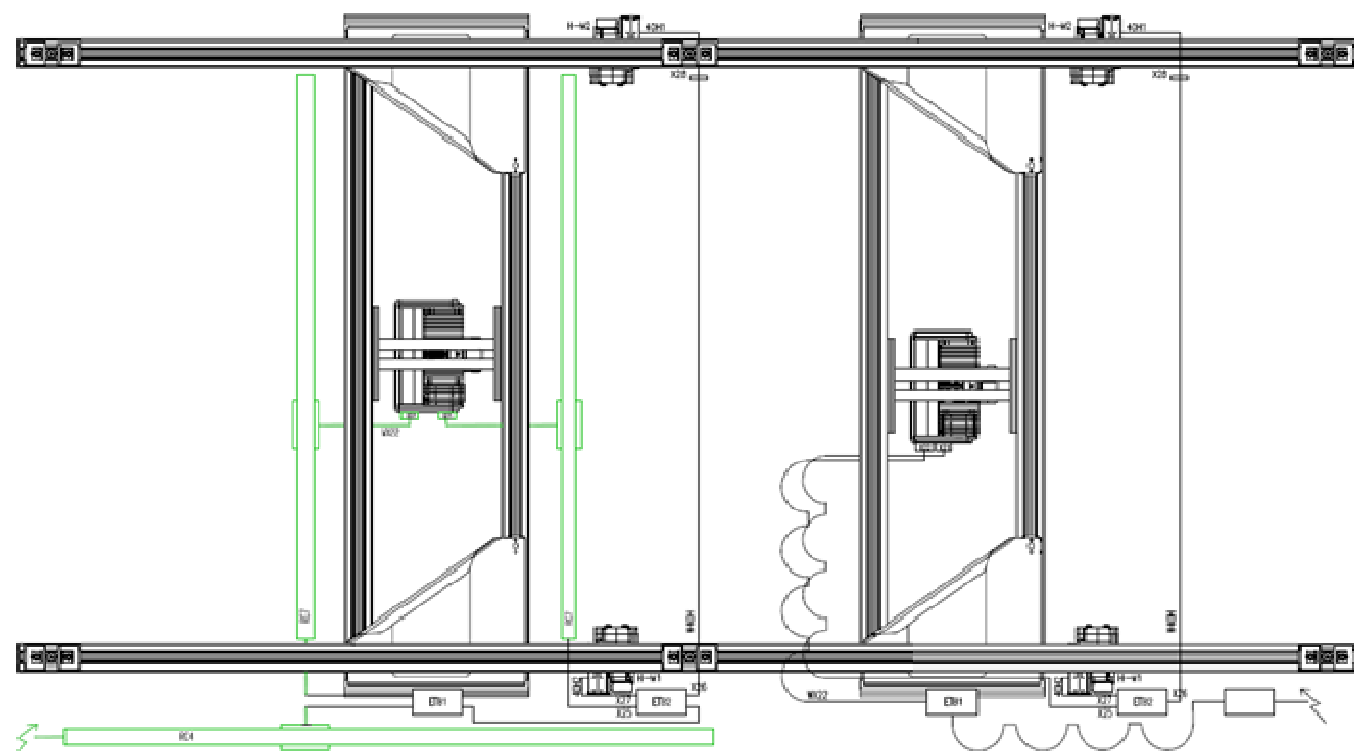
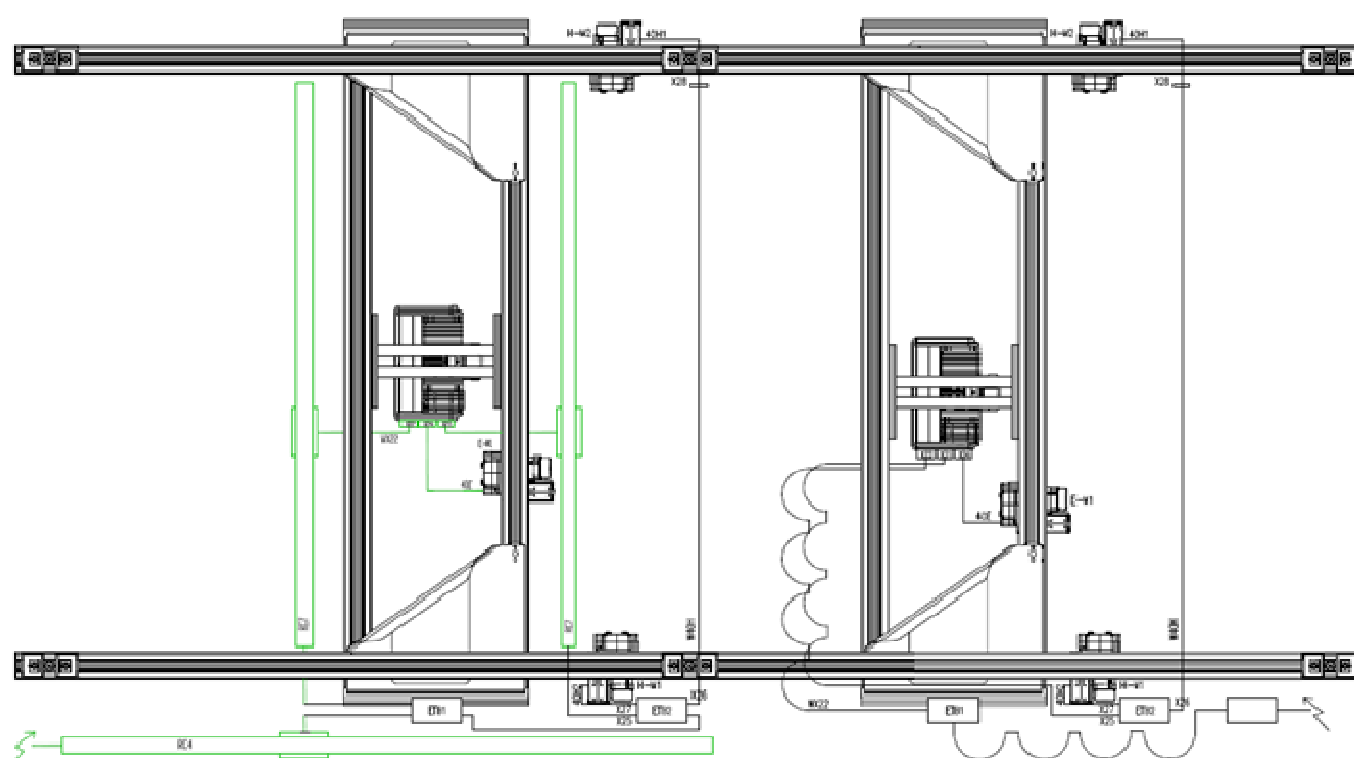
The motor trolleys are supplied with an electric kit which does not require any particular wiring. The installation is made easy with “plug & play” -connections between the flat cables, motors, and electrical cubicles. Each end has a number to simplify the assembly on site, without a diagram.

The motors are fed through the lifting device electrical cubicle, which is delivered as adapted to the required motions (cross and/or long travel). No extra contactors are needed.

The available solutions are the flat cable festoon, the parallel enclosed conductors, and the inner conductors (UKA40 only). The default solution is the flat cable festoon. For more information, contact the Sales Support team.

Electric kit “A” for lifting device alone and/or with cross travel



Electric kit “B” for lifting device and long travel

Electric kit “C” for lifting device, cross travel, and long travel


6 COMPONENTS FOR CIRCUITS AND MONORAILS

The additional components are designed to build complex circuits allowing to distribute the lifting capacities.

Every circuit must be subject of a specific design study. The study is used to check the feasibility, specify the rail lengths, define the suspension locations, and ensure that the final product is in good shape.

For more information about this option, contact the Sales Support team.

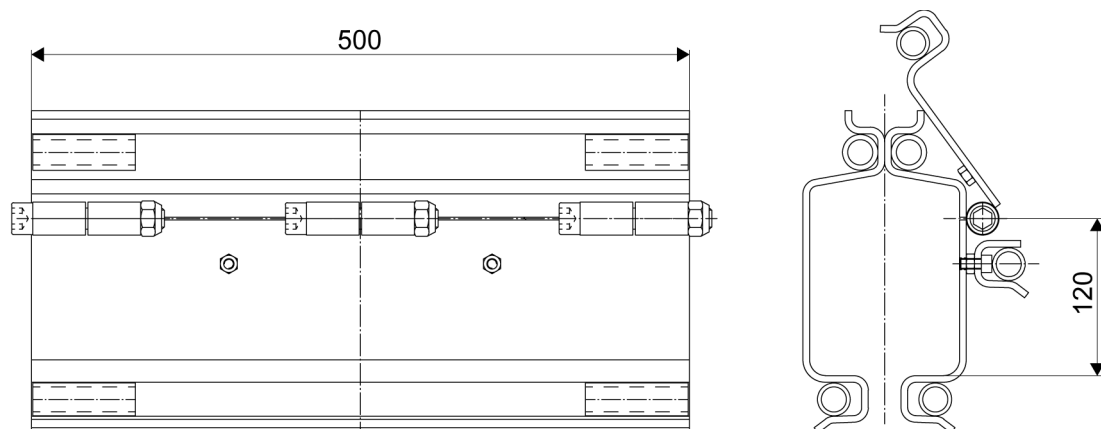
6.1 Maintenance hatch

The maintenance hatches enable the access to the trolleys for inspection and maintenance. They are available for the UKA40 rails only. However, it is possible to install the UKA40 maintenance hatch in a UKA30 circuit using the rail junction set PS4J010.

Two models are available:

Rail size	Type code	Power supply	Length [mm]
UKA40	PS4O010	All power supply possibilities	500
UKA40-S	PS4O015*	Inner conductor	1000

*NOTE: Under development.



6.2 Curved rails

The curved rails are available in different angles:

Angle [°]	UKA30		UKA40		Suspension diagram
	Weight [kg]	Type code	Weight [kg]	Type code	
10	5.57	PS3C100	8.15	PS4C100	
15	7.66	PS3C150	11.89	PS4C150	
30	15.49	PS3C300	23.11	PS4C300	
45	22.93	PS3C450	34.39	PS4C450	
60	30.37	PS3C600	45.56	PS4C600	
90	45.25	PS3C900	68.02	PS4C900	

EXPLANATORY LEGEND

Symbol	Description
o	Suspension
-	Connection

The curved rails can be combined with a flat cable power feeding line festoon under the rail, parallel feeding line (only with a standard radius), and inner conductors (UKA40 only).

The standard radius is 1500 mm. Other radii are available at request, with the limitation of a minimum radius of 1000 mm. The motor trolleys and inner conductors require a minimum radius of 1500 mm.

The suspensions diagram must be drafted. Contact the Sales Support Team.

6.3 Switches

The switches are available for the rail size UKA40 only, as they are normally combined with inner conductors inside the profile. The use of a flat cable festoon can lead to issues during the operation, and parallel feeding rails are not compatible with the switch design.

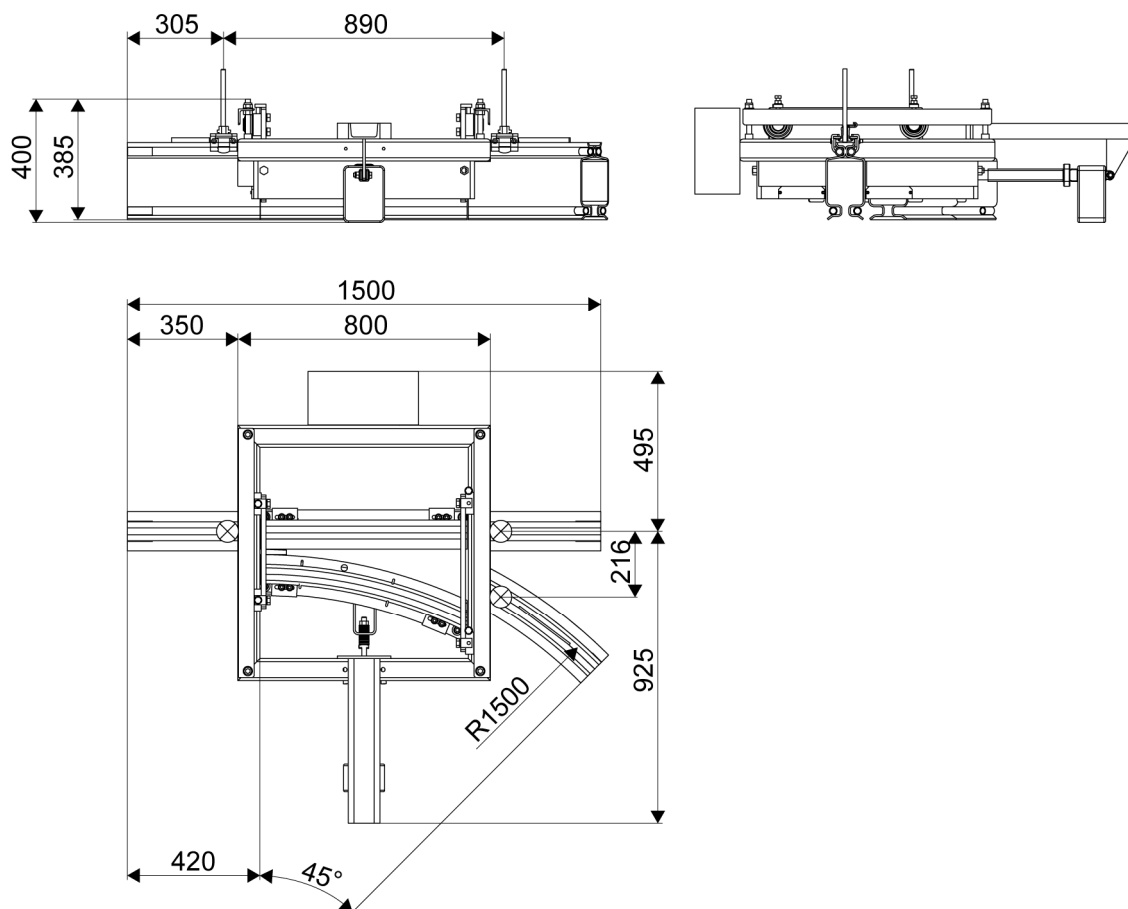
The switches are made of a mobile frame that is fitted with rollers sliding in a fixed frame. The adjustable buffers ensure the accurate positioning of the mobile frame. This adjustment must be done after the circuit has been erected.

There are both right and left switches available, and the direction of the exit curve is 45°. An extra 45° curve must be added to get an exit at 90°.

Each switch requires the support of three (3) suspensions that are fitted at the end of every exit. In addition, the rails that the switch is connected to must be supported at the immediate vicinity of the connection sets.

The switches can be driven either manually or by an electric cylinder. As an option, a pneumatic cylinder can drive the switch (contact the Sales Support Team). When an electric cylinder drives the switch, the switch is supplied with a control panel that is installed in the near vicinity of the switch. In this way, the switch is operated under the direct visual control of the operator. The driving of the electrical cylinder requires a 230-VAC / 50-Hz / 0.15-kW single phase power supply.

Rail size	Electric		Manual	
	Left	Right	Left	Right
UKA40	PS4S100	PS4S200	PS4S300	PS4S400
UKA40-S	PS4S150	PS4S250	PS4S350	PS4S450



6.4 Turntable

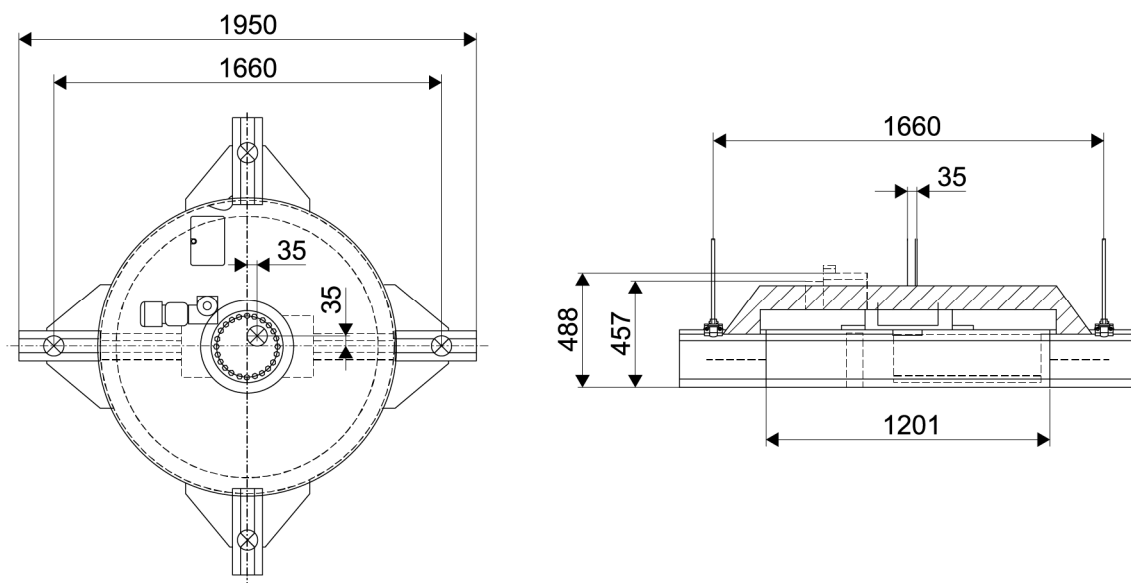
The turntable is available for the rail size UKA40 only, as it is normally combined with inner conductors inside the profile.

The turntables are made of a mobile circular frame that turns 90° to the left and right inside a fixed round frame. The mobile frame is fitted with a slipping clutch.

The turntable requires the support of five (5) suspensions, one fitted at the end of every exit, and one at the center of the frame. In addition, the rails that the turntable is connected to, must be at the immediate vicinity of the connection sets.

An electric motor drives the turntable. The supply includes a control panel which must be installed in the near vicinity of the switch, so that the switch is operated under the direct visual control of the operator. The driving of the electrical motor requires a 400-V / 50-Hz / 0.15-kW / 3-phases power supply.

Rail size	Turntable
UKA40	PS4TT001
UKA40-S	PS4TT002



6.5 Area end stop

The area end stops make it possible to keep the bridges on a runway separate from each other, to prevent a collision or an overloading of the suspensions. The end stops can be easily added on the runway and moved from one place to another simply by screwing and unscrewing the fastener.

Rail size	Area end stop
UKA20	PS2O020
UKA30/UKA40	PS4O020

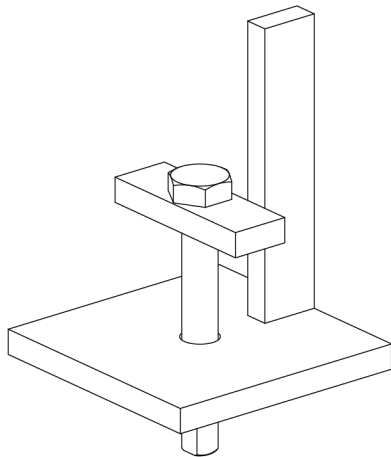


Figure 20. Area end stop PS2O020

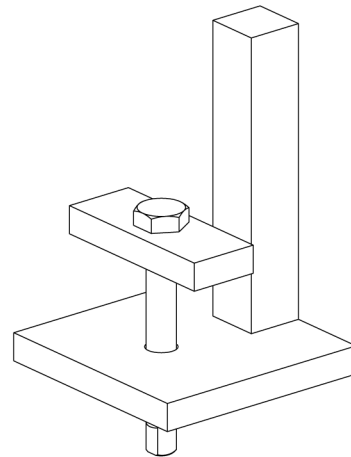


Figure 21. Area end stop PS4O020

6.6 Distance buffer

When a minimum distance between the bridges must be respected, but the bridges must be able to cover the widest possible area, it is possible to include a distance buffer between the bridges. This kind of solution may be required for example to prevent a suspension overloading when heavily loaded bridges are used.

- If the distance between the bridges is less than 800 mm, the required number of simple push trolleys is added between the bridges.
- If the distance between the bridges is greater than 800 mm, a hollow profile, that is cut to length, is used to link two simple push trolleys to each other.