TECHNICAL GUIDE

ProfileMaster PLUS ST

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ORIGINAL INSTRUCTIONS

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1 MANUFACTURER

SWF Krantechnik GmbH

Boehringerstrasse 4

D-68307 MANNHEIM

GERMANY

2 SUPPLEMENTARY DOCUMENTS AND OTHER MANUALS

Technical data	ProfileMaster Plus AL technical guide	231 015 44
	Anchor bolt connection	231 014 44
Test and inspection booklet	ST installations (only in German)	B92203193
Operating instructions	ProfileMaster Plus ST suspension crane operating manual	231 016 44
	Chain hoist operating instructions	Included in the chain hoist scope of delivery.

3 PROFILEMASTER PLUS ST CRANE CONSTRUCTION KIT

3.1 General

The crane construction kit is the efficient and reliable solution for the construction of suspension cranes.

The construction kit consists of standardized mechanical and control components. This facilitates planning, erection and maintenance. Installations can be altered and extended at any time.

Installations can range from a straight connection between two workplaces with only a few meters of track to solutions covering working areas with up to 6 cranes per crane runway. ProfileMaster Plus ST installations can be easily adapted to new requirements.

ProfileMaster Plus ST crane installations utilize the free space above working and production areas. Valuable production floor space is not sacrificed for materials handling tasks.

Regulations

ProfileMaster Plus ST installations and components are dimensioned on the basis of DIN 15018, H1 B3.

Relevant industrial safety regulations and codes of practice as stipulated in DGUV Regulation 52 crane accident prevention regulations must be observed for planning, project engineering and operating ProfileMaster Plus ST installations.

ProfileMaster Plus ST cranes designed in accordance with the project drafting instructions contained in this manual are manufactured in accordance with generally accepted engineering standards and comply with relevant codes of practice concerning the safeguarding of machinery and prevention of accidents, including German technical equipment legislation, accident prevention (UVV) and DIN VDE regulations, and the EC Machinery Directive.

Manufacturer's and conformity declarations and "ProfileMaster Plus ST installation" test and inspection booklet for suspension cranes are included in the delivery.

Instructions in the operating and assembly instructions must be complied with.

Spare parts

We urgently recommend that only spare parts and accessories approved by us be used. Only then can we ensure the safety and normal service life of the equipment.

Spare parts not approved by us can cause damage, malfunctions or complete failure of the installation.

The use of unauthorized spare parts may render null and void any claims for warranty, service, damages or liability against the manufacturer or his appointed personnel, dealers and representatives.

Inspection

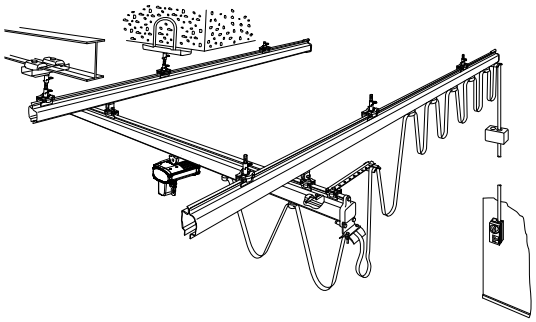
ProfileMaster Plus ST suspension cranes require little maintenance. However, 1-2 months after an installation is put into operation, all bolted connections of suspension fittings, track sections and end caps, the pins/bolts connecting hoists to trolleys, and crane girders to runway and track trolleys should be checked and retightened or secured as necessary. This check should be repeated at least once a year.

For further information see the "ProfileMaster Plus ST suspension crane operating manual", see Supplementary documents and other manuals (page 8).

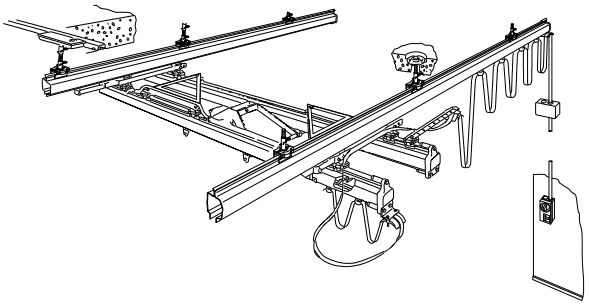
Information

It is important that all members of staff responsible for erection, safe operation and maintenance of ProfileMaster Plus ST installations receive the ProfileMaster Plus ST operating manual and all relevant documents.

Single-girder suspension crane



Double-girder suspension crane



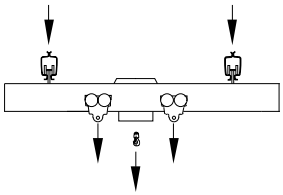
3.2 Structure of the crane construction kit

General

ProfileMaster Plus ST installations are of modular design. The basic construction kit consists of simple, well engineered components. Standardized connection dimensions ensure rapid erection and allow existing installations to be easily modified or extended.

The modular construction kit is designed for normal operating conditions.

The modular construction kit is designed for suspended loads with centric load transmission.

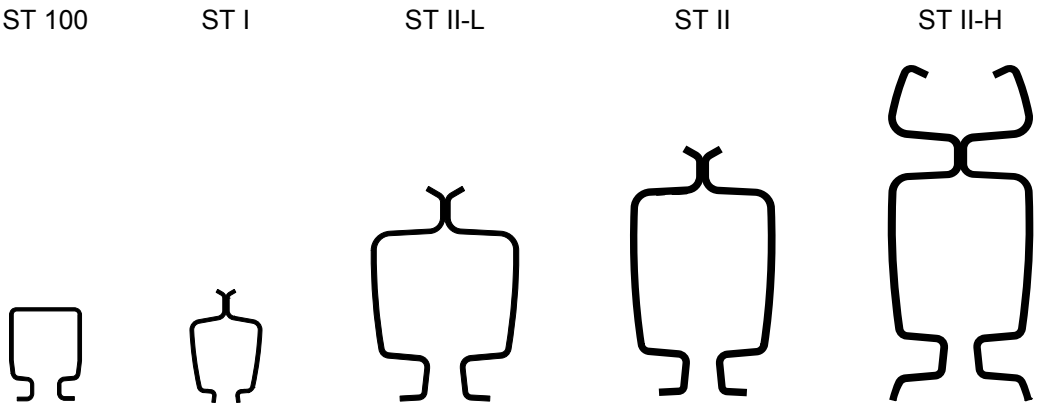


3.3 Design principles

- Project drafting/engineering based on reliable static analysis
- Series-produced standard components which have been thoroughly tried and tested
- Tailored installations designed for full compliance with safety regulations and standards
- Low-maintenance systems
- Simple, fast erection
- Detailed technical documentation

3.3.1 Profile sections

The basic elements of the ProfileMaster Plus ST crane construction kit are cold-rolled special track sections made of steel that have a smooth surface finish, high rigidity and low deadweight. Special guide surfaces and slightly inclined running surfaces guarantee smooth trolley travel. The rails are of inside-running design to protect trolleys and internal (enclosed) busbars.

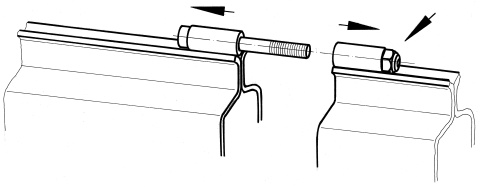


3.3.2 Rail joint

All components of each size have the same connection dimensions and can be easily assembled with bolted connections.

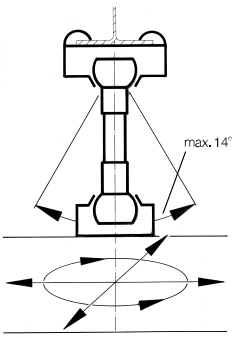
- Positive and non-positive connections
- Adjustable (within the coupling tube/screw tolerance range)
- Torque transmission via the track joint

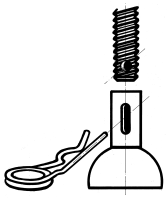
Rail joint



3.3.3 Suspension system

- Flexible track suspension (minimum lateral forces transmitted to the track system)
- Ball-and-socket universal joint suspension (minimum torque transmission to roof and ceiling superstructures)
- Low-maintenance ball-and-socket joints with plastic sockets
- Any angle possible between superstructure and rail
- Threaded connections for height adjustment
- Spring clip through cross hole locks connection
- Slotted holes for height adjustability
- Universal suspension fittings for virtually any superstructure – provided as standard
- High suspension load-bearing capacities adapted to the rail system
- Low headroom dimension possible with short suspension fittings





3.3.4 Horizontal forces

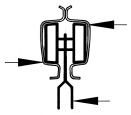
Only minimum horizontal forces are transmitted to the support superstructure thanks to the articulated suspension design.

For cranes, this does not exceed 10% of trolley load K. For single and double-rail tracks, the value amounts to 5% of K.

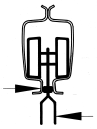
3.3.5 Trolleys

- Quiet, smooth operation with plastic travel wheels mounted in anti-friction bearings
- High vertical load-bearing capacity
- Long service life
- Horizontally guided in the track profile
- Flexible and torque-free load connection via pin
- Horizontal load-bearing capacity up to 10% of the suspended vertical load

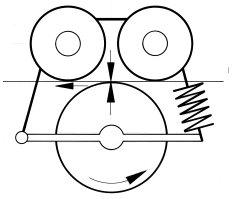
ST 100, I



ST II-L, II, II-H



3.3.6 Travel drives



Quiet-running fiction wheels with a high friction coefficient ensure reliable transmission of the drive torque. Used in ST II-L, II, II-H systems with special trolleys. Pressure applied by springs.

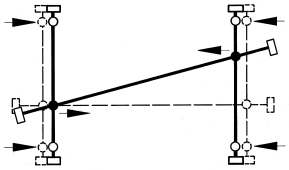
3.3.7 Combined crane installations

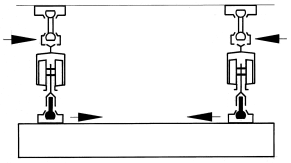
Cranes and crane runways made of different section types can be combined.

3.3.8 Push-travel cranes

No skewing forces and flexibility of the tracks on ball-and-socket universal joint suspensions.

Push-travel cranes





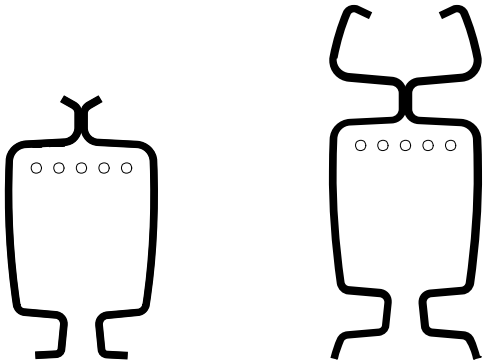
3.3.9 Electric travel cranes

Single-girder and double-girder designs with rigid crane trolleys or as braced double-girder cranes.

3.3.10 Power supply

Flat cable power lines run on cable sliders or cable trolleys in the same track section in ST 100, I, II-L, II, II-H installations. Integrated 5-pole busbar for ST II and ST II-H. Protected against accidental contact. Current collector trolleys with double pantograph arms.

Integrated conductor rails



3.3.11 Electric and control equipment

Standard controls for push-travel and electric-travel trolleys and cranes with hoists.

3.3.12 Corrosion protection

ST components are protected against corrosion as standard. Corrosion protection meets at least category C2-M requirements. Suspension components are galvanized, standard series-produced track sections are powder-coated, other components are provided with a painted finish; special coating is possible.

3.3.13 Ambient conditions

ST installations are designed for operation indoors and for temperatures ranging from -20 °C to +70 °C.

4 PROFILEMASTER PLUS ST CLASSIC – PLANNING AND PROJECT DRAFTING

The following sections provide an overview of the applications for which ST profile sections can be used:

Suspension crane of single and double-girder design.

4.1 Project drafting of suspension crane installations

All information and data necessary for project engineering must be collected for drafting ProfileMaster Plus ST installation projects. The project drafting sheet in Project engineering sheet for ProfileMaster Plus ST equipment (page 16) should be used for this purpose.

As a basis for planning, a sketch or drawing should be provided showing a scale representation of the track layout, position of the suspensions and joints and the number of carriers or cranes, see Examples and symbols (page 14).

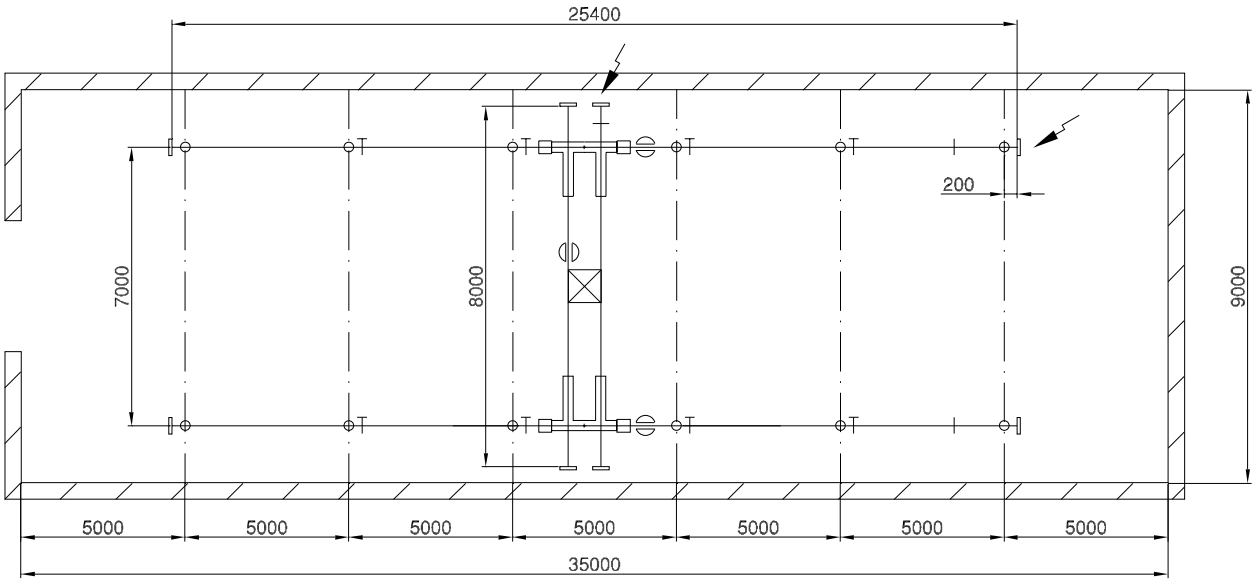
All installations must be dimensioned in such a way that the end caps and internal buffer stops are not approached during normal operation.

4.2 ProfileMaster Plus ST product configurator

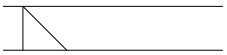
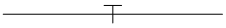
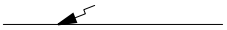
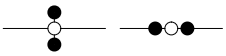
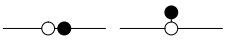
We recommend you use the ProfileMaster Plus ST product configurator for project engineering suspension crane installations. Please refer to our homepage at www.swfkrantechnik.com

4.3 Examples and symbols

Double-girder crane



Symbols for use in drawings

Direction of travel		Rigid crane trolley	
Straight section		Bracing frame	
Curved section		Double-rail crab	
Joint bolt set		Travel drive	
Internal buffer stop		Travel drive with limit switch	
End cap with buffer		Limit switch actuator	
Suspension		Powerfeed	
V-type suspension fitting		Power supply	
Stiffener		Current collector	
Trolley		Current collector maintenance section	

4.4 Project engineering sheet for ProfileMaster Plus ST equipment

Customer		Project no. Customer no. Customer	
		Person responsible	Date
		Dept./Sales office	
Stage of customer's planning Financial planning for investments ☐ Tech. ☐ Prelim. ☐ Detailed planning Implementation expected _____ ☐ Invitation to tender ☐ Order soon to be placed	**Scope of required quotation** ☐ Budget offer ☐ Detailed quotation ☐ with steelwork Quotation deadline _____	☐ excl. ☐ with erection	☐ incl. sketch Delivery deadline _____
Type of installation ☐ Single-girder crane ☐ Double-girder crane		ST crane section _____ ST crane section _____	ST track section _____
Technical data SWL Track length Crane length	_____ kg _____ m _____ m	Average operating time Crane span dimension Load hook distance for several loads Highest hook position above floor	_____ hours/day _____ m _____ m _____ m
Installation site _____ Type of superstructure/suspension methods/flange _____ Clear height from floor to bottom edge of superstructure _____			
Hoist unit Electric chain hoist type _____ Hook path _____ m		Lifting speed v	_____ / _____ m/min
Travel speeds Travelling hoist Crane	☐ Manual ☐ Manual	☐ Electric, v = ☐ Electric, v =	_____ / _____ m/min _____ / _____ m/min
Power supply On the crane On the track	☐ Trailing cable ☐ Trailing cable	☐ Integrated conductor line ☐ Integrated conductor line	☐ External conductor line ☐ External conductor line
Current type Operating voltage	_____ V,	_____ HZ	
Type of control ☐ From trolley	☐ From crane	☐ Mobile	☐ Wireless
Additional information (e.g. special ambient conditions)			
Special commercial conditions			

4.5 Profile load capacities according to the diagram

The diagram showing the load capacity of the profile sections provides the basis for determining the profile section sizes for cranes and tracks, crane span dimensions lKr and distances between suspensions lw.

The crane span and distances between suspensions which are permitted for the individual crane and track sections can be read off for a given load.

Ensure compliance with the permissible length of overhang, distances of joints from suspension assemblies, and maximum loads on suspension assemblies and trolleys.

(Curves apply if hoists are used with lifting speeds up to 16 m/min. For higher lifting speeds, see Hoist units with ProfileMaster Plus ST (page 25) Hoist units with ProfileMaster Plus ST.)

Selecting the section

Determining the distance between suspensions or crane span:

1. Determining the distance between suspensions or crane span:
2. Determine the maximum value for lw and lKr in the diagram (where it intersects the limit curve)
3. Select the most suitable profile section

Push travel

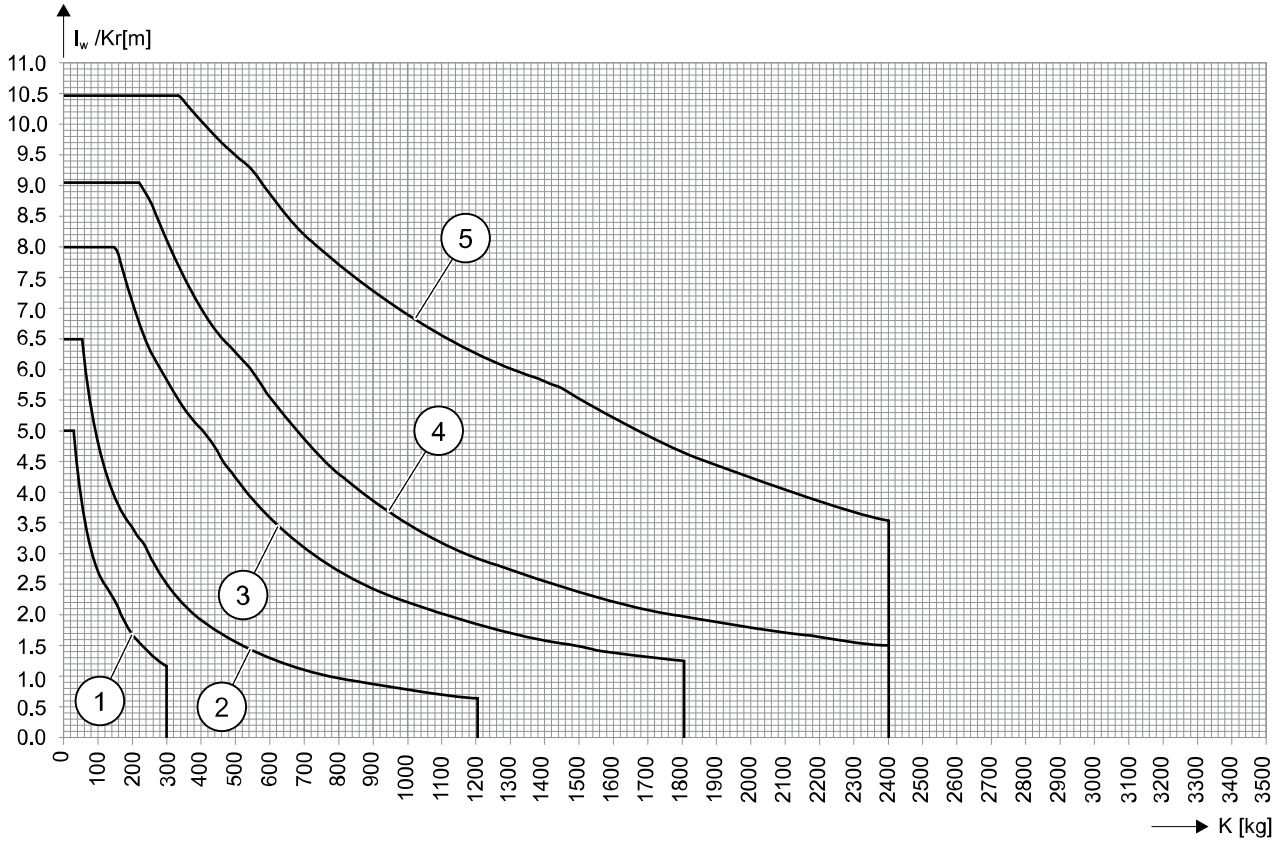
All profile section sizes

Suitable for electric travel

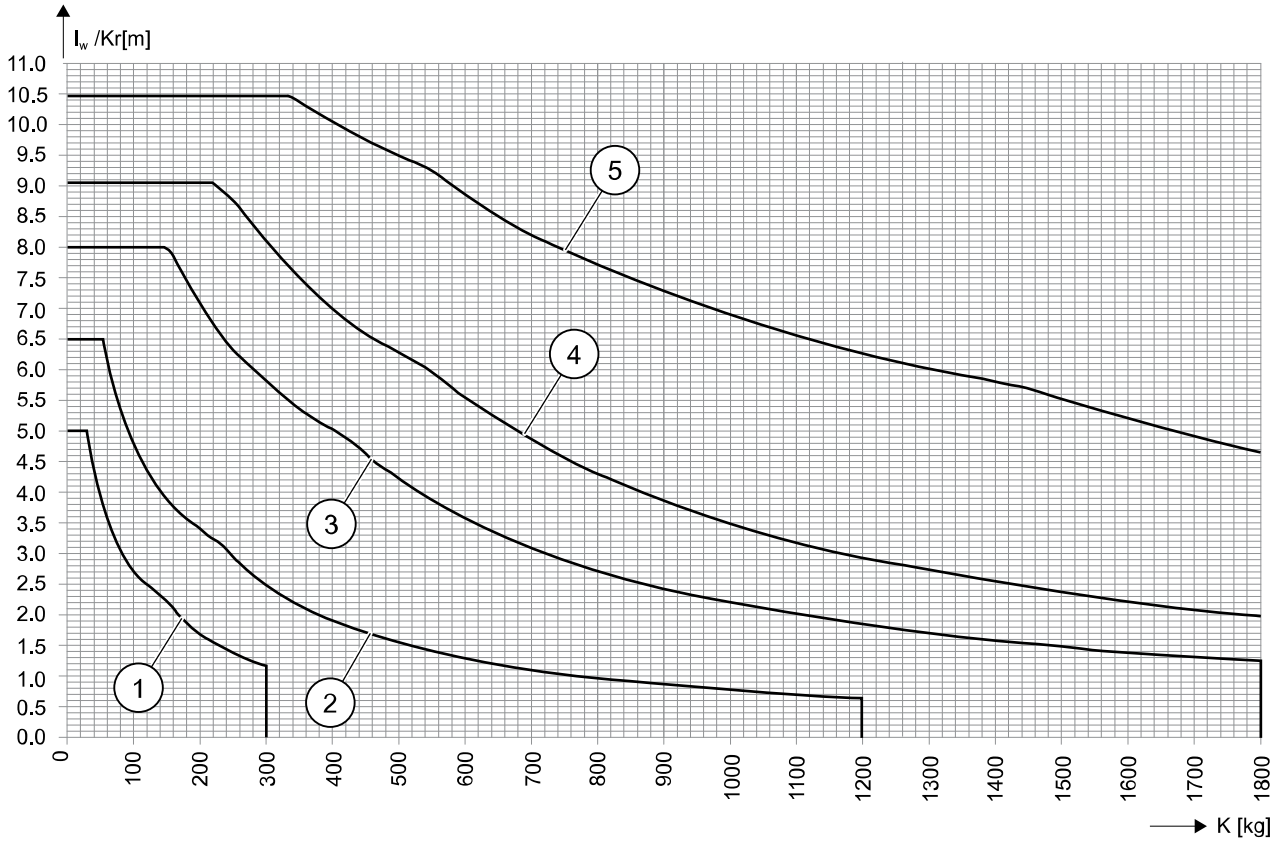
ST II-L, ST II, ST II-H

Technical values

ST profile section	ST 100	ST I	ST II- L	ST II	ST II - H
Moment of inertia	26 cm^4	80 cm^4	345 cm^4	660 cm^4	1647 cm^4
Neutral axis	35 mm from lower edge	Approx. profile center			
Material	S235				S355



1. ST 100
2. ST I
3. ST II-L
4. ST II
5. ST II-H



1. ST 100
2. ST I
3. ST II-L
4. ST II
5. ST II-H

K = Load on the profile section

l_w = Distance between suspensions

l_{Kr} = Crane span dimension

Important: - - - Limit curves for maximum length of straight sections. Pay attention to the distance between supports and distances of joints (see Calculating load GAB on one suspension fitting (page 20)).

Lifted load coefficient ψ and dead load coefficient φ to DIN 15018 for crane group H1, B3 as well as the dead load of each loaded girder are already considered in the calculation diagrams.

4.6 Steps for project drafting and technical specification

Calculating load K

Double-girder crane

The girder with the least favorable load (RF friction-wheel drive) is considered in the following	$K = 0.5 (G_H + G_3 + G_{RFK})$

Crane runway

Load does not travel on overhung portion of crane girder	$K = G_H + G_3 + 0.50 (G_1 + G_2)$
Load travels on overhung portion of crane girder	$K = G_H + G_3 + 0.80 (G_1 + G_2)$
Crane travels on more than two crane runway tracks (centre track)	$K = G_H + G_3 + 0.65 (G_1 + G_2)$

Where:

G_H = SWL including load handling attachment

G_1 = Crane girder dead load including fittings

G_2 = Dead load of crane trolleys including fittings (both ends together)

G_3 = Dead load of trolley including hoist, cross-travel drive and fittings

G_{RFK} = Dead load of cross-travel drive and fittings

4.7 Reading off from the diagram

A distinction is made between a concentrated load, two identical loads or more than two identical loads in one panel.

4.7.1 Crane span dimension l_{Kr}

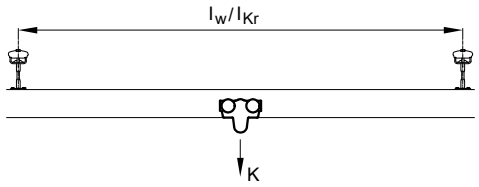
e_{Ka} = Distance between cross-travel trolleys or wheel axles

4.7.2 Distance between suspensions l_w

e_{KT} = Distance between crane trolleys or wheel axles

4.7.3 Concentrated load

For the (concentrated) load K in the panel between supports, the permissible limit for l_w or l_{Kr} can be read off direct from the diagram.



4.7.4 Several loads

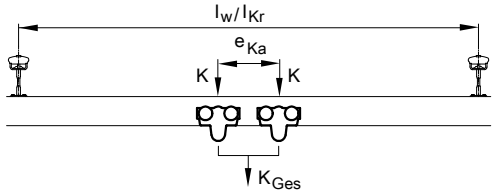
For two or more loads at a maintained distance in one panel, the max. l_w or l_{Kr} must never exceed the permissible limit for one of the individual loads.

4.7.5 Two identical loads or load bar

By adding both loads, a total load K_{Ges} is obtained for which the limits $l_{w(KGes)}$ or $l_{Kr(KGes)}$ are taken from the diagram. This limit can be increased using the following formula:

max. $l_w = l_{w(KGes)} + 0.9 \times e_{Ka}$ (or e_{KT})

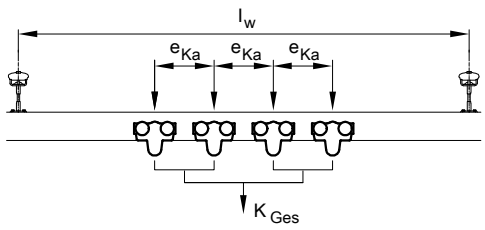
max. $l_{Kr} = l_{Kr(KGes)} + 0.9 \times e_{Ka}$ (or e_{KT})



4.7.6 More than two identical loads at equal distances

The loads in one panel between supports are added up and a total load K_{Ges} is obtained, for which the limit $l_w(K_{Ges})$ is taken from the diagram. This limit can be increased using the following formula:

max. $l_w = l_{w(KGes)} + n/2 \times e_{Ka}$ (or e_{KT}); n = number of loads K



4.8 Calculating load GAB on one suspension fitting

The suspension fitting with the worst-case load is considered in the following.

Table 1. Max. permissible load G_{AB} on one suspension fitting

max. G_{AB}	ST 100	ST I	ST II/M10	ST II-L	ST II	ST II-H/M16	ST II-H/M20
[kg]	400	750	750	1400	1700	1700	2600

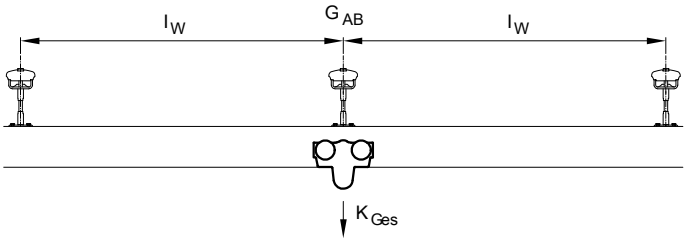
4.8.1 Concentrated load

The load on one suspension is calculated from value K for suspension crane tracks and from the proportional track girder dead load.

Proportional track girder dead load = max. distance between suspensions x track girder weight/m x 1.25

G_B = Track girder weight/m; l_w = Max. distance between suspension fittings

$G_{AB} = K_{Ges} + G_B \times l_w \times 1.25$



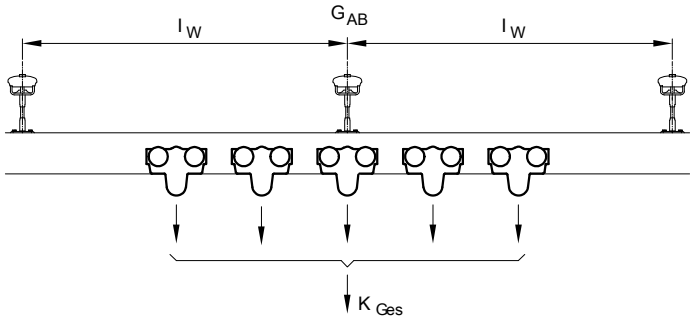
4.8.2 Two or more loads in one of the two panels between suspensions

The load on one suspension is determined from the sum total of all concentrated loads in two panels and from the proportional track dead load. If the load on one suspension determined according to this formula exceeds the permissible limit, one or both of the following measures are required:

- Reduce the distance between suspensions by providing additional suspensions
- Distribute the load by spacing loads at a safe distance

$G_{AB} = K_{Ges} + G_B \times l_w \times 1.25$

Several identical loads



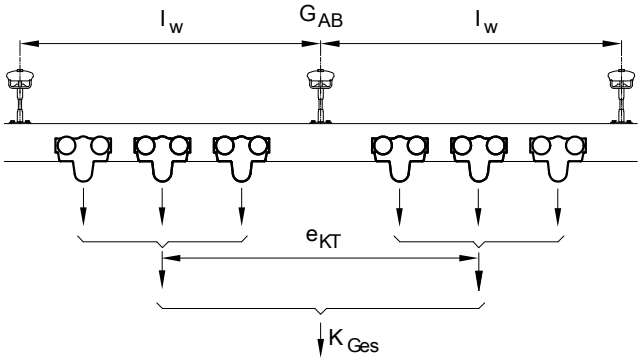
4.8.3 Two loads or groups of loads at a distance e_{KT}

$e_{KT} = 0.5 \times l_w : G_{AB} = 0.9K_{Ges} + G_B \times l_w \times 1.25$

$e_{KT} = l_w : G_{AB} = 0.7K_{Ges} + G_B \times l_w \times 1.25$ (load distance = distance between suspensions)

$e_{KT} = 1.5 \times l_w : G_{AB} = 0.5K_{Ges} + G_B \times l_w \times 1.25$

Identical load groups



4.9 System dimensions and system limits

4.9.1 Overhang

		ST 100	ST I	ST II-L, II	ST II-H
Shortest possible overhang	U_{min} [mm]	65	70	120	60
Project engineering values for overhang	u [mm]	100	200	300	300

The stability of the track section should be checked for short tracks and crane girders. (Multiply load on overhang by a factor of 1.2, crane girder forms counter-torque).

ST tracks and cranes must not be lifted (e.g. where the load is on the overhang).

If the girder is unstable (girder is lifted, suspension is relieved of load), the suspension is subjected to impact loading which causes wear and can lead to premature failure of the connection.

4.9.2 Crane overhang

The maximum and minimum lengths of overhang for cranes can be found in the crane selection table. They are directly related to the crane girder length.

The length of overhang u can be increased for

- flat cable supply lines by the length of the accumulated cable carriers at the end of the track where they accumulate,
- unloaded spacer trolleys – by the corresponding overall dimension.

The overhang at either end of the crane applicable to double-girder cranes running on more than two crane runway tracks is that shown in the selection table for cranes with the same load capacity and comparable span.

4.9.3 Track overhang

Refer to the crane selection tables for the maximum lengths of overhang u (for single-girder cranes).

4.9.4 Approach dimension

Approach dimension lan (load hook center to girder end) is derived from the dimensions of the individual components.

4.9.5 Permissible distance of joint from suspension st

Except for ST II-H, a suspension must be fitted close to every joint. The load capacity of the rail joint can only be ensured by using genuine profile sections.

			ST 100	ST I	ST II-L	ST II	ST II-H
Minimum distance [mm]	st_{min}	$l_w \leq 5$ m	65	70	120	120	50 [1]
			0.05 x l_w				
Maximum permissible distance [mm]	st_{max}	$l_w > 5$ m	0.1 x l_w				any for tracks
							0.25 x span dimension l_{Kr} for cranes

Crane girder lengths	ST 100	ST I	ST II-L	ST II	ST II-H
Articulated single-girder cranes, push travel [2]	1–4 m	1–6 m	1–8 m		1–14 m
Rigid single-girder cranes, push [2] or electric travel	-		1.8–6 m		2–8 m
Double-girder cranes, braced, push [2] or electric travel	3–5 m (push travel only)	3–9 m	3–10 m	3–12 m	2–14 m
Rigid double-girder cranes, push [2] or electric travel	-				3–14

ST 100, I, II-L, II single-girder cranes must only be made of one rail section without any joint in the girder. Refer to the corresponding table on the next page for cranes that have girders made up of more than one section.

[1] The track suspension clamp must be fully located on one of the two connected profile sections.

[2] The push-travel capability of larger cranes is limited.

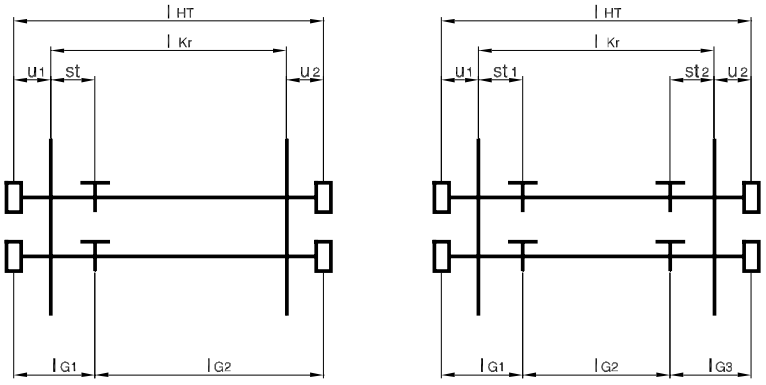
4.9.6 Double-girder cranes with rail joint

In the case of double-girder cranes, the individual girders of which consist of several straight sections due to the length of crane required, the permissible distance of joint from suspension fitting must be taken into consideration.

4.9.7 Construction of double-girder cranes with assembled girders

These cranes must be assembled as indicated in the table below. **Single-girder cranes are constructed without a rail joint owing to lateral forces and the buffer joint; ST II-H is an exception to this rule.**

Double-girder cranes



4.9.8 Examples for assembled cranes

	ST I				ST II-L, II				ST II-H			
Crane girder length	Span	Straight track sections			Span	Straight track sections			Span	Straight track sections		
l_{HT}	l_{Kr}	l_{G1}	l_{G2}	l_{G3}	l_{Kr}	l_{G1}	l_{G2}	l_{G3}	l_{Kr}	l_{G1}	l_{G2}	l_{G3}
7	4.00 - 4.20	1.25	5.75	-	-				-			
	4.20 - 4.85	1.00	6.00									
	4.85 - 5.60	1.25	5.75									
	5.60 - 6.20	1.00	6.00									
	6.20 - 6.60	0.75	6.25									
8	5.30 - 5.60	1.75	6.25	-	-				-			
	5.60 - 6.20	1.50	6.50									
	6.20 - 6.60	1.25	6.75									
9	-				5.00 - 5.60	2.25	6.75	-	5.00 - 5.50	3.00	6.00	-
					5.60 - 6.20	2.00	7.00		5.50 - 8.85	2.00	7.00	
					6.20 - 6.70	1.75	7.25		-			
					6.70 - 7.60	1.50	7.50					
					7.60 - 8.75	1.00	8.00					
10	-				6.00 - 6.20	2.50	7.50	-	5.50 - 6.70	3.00	7.00	-
					6.20 - 6.70	2.25	7.75		6.70 - 9.85	2.00	8.00	
					6.70 - 7.50	2.00	8.00		-			
					7.50 - 7.80	1.75	6.50	1.75				
					7.80 - 8.80	1.50	7.00	1.50				
					8.80 - 9.00	1.00	8.00	1.00				
11	-				7.00 - 7.25	1.50	8.00	1.50	6.50 - 8.00	3.00	8.00	-
					7.25 - 7.80	2.25	6.50	2.25	8.00 - 10.50	2.00	7.00	2.00
					7.80 - 8.80	2.00	7.00	2.00	-			
					8.80 - 9.00	1.50	8.00	1.50				
12	-				8.00 - 8.70	2.50	7.00	2.50	7.50 - 9.00	3.00	6.00	3.00
					8.70 - 9.00	2.25	7.50	2.25	9.00 - 10.50	2.00	8.00	2.00
13	-				-				8.60 - 10.50	3.00	7.00	3.00
14	-				-				9.85 - 10.50	3.00	8.00	3.00

4.9.9 Possible combinations of sections for crane and crane runway

Crane / Track	ST 100	ST I	ST II-L	ST II	ST II-H
ST 100	X	X	(X)	(X)	(X)
ST I			X		
ST II-L	(X)			X	X
ST II					
ST II-H					

X = recommended

(X) = possible, not recommended

4.9.10 Drives

Cranes with a girder length of 6 m or more must be fitted with electric long-travel drives if long travel is to be possible with the trolley in a position outside the central third of the crane girder length. It also is advisable for crabs and cranes with a load capacity greater than 1000 kg to be fitted with electric travel drives.

Travel speeds: 7 to 27 m/min.

4.9.11 Deflection

Under live loading, the deflection of cranes in accordance with the diagram or selection table is always below 1/350 of the span. If the maximum spacing between supports/crane span is selected from the middle load range in the selection diagram, the deflection ratio ranges up to

1/500. Monorail tracks and crane runways that have more than 2 panels between suspensions have deflection ratios of less than 1/450. Deflection of cranes and tracks can be reduced by using larger ProfileMaster Plus ST profile sections.

4.10 Hoist units with ProfileMaster Plus ST

Higher lifting speeds

The layout diagram shown in section 3.5 is valid for SWF chain hoists with lifting speeds up to max. 16 m/min.

The use of other chain hoists can in result in an overload of the crane installation in borderline cases. Higher lifting speeds and weights can be considered by means of the following factor using the diagrams:

GHnew = GH x (0.97 + 0.002 x vH)

vH = lifting speed in m/min

4.11 Selection tables for ProfileMaster Plus ST single and double-girder cranes

The following selection tables show a few of the many possible combinations for building crane installations with ProfileMaster Plus ST. Use ProfileMaster Plus ST product configurator for precise specification of installations.

lw data apply to one crane on the crane runway. Crane girder overhangs are always the same on both sides of the crane. Deflection limits: cranes, tracks: 1/350, frequency >= 2.8 Hz

Where there are several cranes on the same crane runway, the end carriages of single-girder cranes must always be designed as double or quadruple trolleys. Distances between suspensions lw must then be calculated separately. Intermediate lengths for crane girders are possible. Data calculated on the basis of cranes of standard design for standard components and without special fittings.

Check suspension loads.

Classification to DIN 15018, H1 B3

l_{HT}	Crane girder length
l_{Kr}	Crane span dimension
l_w	Distance between suspension fittings

Suspension loads on request

All dimensions in m

4.11.1 Load capacity: 50 kg, hoist weight: 30 kg, max. lifting speed: 30 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_{Kr}			l_w				l_{Kr}			l_w			
			Min.	-	Max.	ST 100	ST I	ST II-L	ST II	Min.	-	Max.	ST 100	ST I	ST II-L	ST II
Crane girder section, crane girder length	ST 100	1	0.80	-	0.85	3.00	5.25	8.00	9.00		-		-	-	-	-
		2	1.70	-	1.85	2.95	5.15	8.00	9.00	1.50	-	1.85	2.70	4.65	8.00	9.00
		3	2.55	-	2.85	2.90	5.05	8.00	9.00	1.60	-	2.85	2.40	4.10	8.00	9.00
		4		-		-	-	-	-	2.20	-	3.85	2.35	4.00	8.00	9.00
		5		-		-	-	-	-	3.00	-	4.00	2.35	4.00	8.00	9.00
	ST I	1	0.80	-	0.85	2.95	5.20	8.00	9.00		-		-	-	-	-
		2	1.65	-	1.85	2.85	5.00	8.00	9.00	1.50	-	1.85	2.65	4.55	8.00	9.00
		3	2.40	-	2.85	2.80	4.85	8.00	9.00	1.50	-	2.85	2.35	3.95	8.00	9.00
		4	3.05	-	3.85	2.70 [1)]	4.75	8.00	9.00	2.00	-	3.85	2.25	3.80	7.70	9.00
		5	3.65	-	4.85	2.60 [1)]	4.60	8.00	9.00	2.50	-	4.81	2.20	3.70	7.45	9.00
		6	4.75	-	5.35	2.65 [1)]	4.60	8.00	9.00	3.00	-	5.85	2.15	3.65	7.30	9.00
		7		-		-	-	-	-	4.05	-	6.50	2.15	3.65	7.35	9.00
		8		-		-	-	-	-	5.35	-	6.50	2.15	3.70	7.40	9.00
	ST II-L	2	1.45	-	1.75	2.65 [1)]	4.70	8.00	9.00	1.50	-	1.75	2.50	4.30	8.00	9.00
		3	2.00	-	2.75	2.55 [1)]	4.45	8.00	9.00	1.50	-	2.75	2.15	3.70	7.40	9.00
		4	2.50	-	3.75	2.40 [1)]	4.25	8.00	9.00	2.00	-	3.75	2.05 [3)]	3.50	7.00	9.00
		5	2.90	-	4.75	2.30 [1)]	4.05	8.00	9.00	2.50	-	4.75	2.00 [3)]	3.35	6.70	9.00
		6	3.25	-	5.75	2.25 [1)]	3.90	8.00	9.00	3.00	-	5.75	1.90 [3)]	3.20	6.45	8.95
		7	4.00	-	6.75	2.20 [3)]	3.85	7.95	9.00	3.60	-	6.75	1.90 [3)]	3.15	6.30	8.70
		8	5.00	-	7.75	2.20 [3)]	3.85	7.90	9.00	4.60	-	7.75	1.85 [3)]	3.10	6.25	8.60
		9		-		-	-	-	-	5.60	-	8.00	1.85 [3)]	3.05	6.10	8.45
		10		-		-	-	-	-	6.60	-	8.00	1.80 [3)]	3.00	6.00	8.30
	ST II	2	1.35	-	1.75	-	4.55	8.00	9.00	1.50	-	1.75	-	4.15	8.00	9.00
		3	1.85	-	2.75	-	4.25	8.00	9.00	1.50	-	2.75	-	3.55	7.15	9.00
		4	2.25	-	3.75	-	4.05	8.00	9.00	2.00	-	3.75	-	3.35	6.75	9.00
		5	2.60	-	4.75	-	3.85	7.85	9.00	2.50	-	4.75	-	3.20	6.40	8.85
		6	3.00	-	5.75	-	3.70	7.60	9.00	3.00	-	5.75	-	3.10	6.15	8.50
		7	4.00	-	6.75	-	3.70	7.60	9.00	3.50	-	6.75	-	3.00	5.95	8.25
		8	5.00	-	7.75	-	3.70	7.55	9.00	4.00	-	7.75	-	2.90	5.75	7.95
		9		-		-	-	-	-	5.00	-	8.75	-	2.85	5.70	7.85
		10		-		-	-	-	-	6.00	-	9.00	-	2.80	5.60	7.70
		11		-		-	-	-	-	7.00	-	9.00	-	2.75	5.45	7.55
		12		-		-	-	-	-	8.00	-	9.00	-	2.70	5.35	7.40

[1)] Two trolleys on each end of crane

4.11.2 Load capacity: 80 kg, hoist weight: 30 kg, max. lifting speed: 30 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_{Kr}			l_w				l_{Kr}			l_w			
			Min.	-	Max.	ST 100	ST I	ST II-L	ST II	Min.	-	Max.	ST 100	ST I	ST II-L	ST II
Crane girder section, crane girder length	ST 100	1	0.75	-	0.85 [2]	2.70 [1]	4.70	8.00	9.00	-			-	-	-	-
		2	1.55	-	1.85 [2]	2.50 [1]	4.40	8.00	9.00	1.50		1.85	2.45	4.20	8.00	9.00
		3	2.40	-	2.60 [2]	2.50 [1]	4.35	8.00	9.00	1.75	-	2.85	2.20	3.75	7.55	9.00
		4		-		-	-	-	-	2.40	-	3.50	2.15	3.70	7.40	9.00
		5		-		-	-	-	-	3.25		3.50	2.15	3.65	7.40	9.00
	ST I	1	0.80	-	0.85	2.55 [1]	4.50	8.00	9.00		-		-	-	-	-
		2	1.70	-	1.85	2.50 [1]	4.35	8.00	9.00	1.50	-	1.85	2.40	4.10	8.00	9.00
		3	2.50	-	2.85	2.45 [1]	4.25	8.00	9.00	1.60	-	2.85	2.15	3.65	7.30	9.00
		4	3.25	-	3.85	2.40 [1]	4.20	8.00	9.00	2.20	-	3.85	2.10 [3]	3.50	7.05	9.00
		5	3.90	-	4.55	2.35 [1]	4.10	8.00	9.00	2.70	-	4.85	2.05 [3]	3.45	6.90	9.00
		6		-		-	-	-	-	3.20	-	5.85	2.00 [3]	3.35	6.70	9.00
		7		-		-	-	-	-	4.50	-	6.10	2.00 [3]	3.40	6.85	9.00
		8		-		-	-	-	-	5.75	-	6.10	2.05 [3]	3.40	6.85	9.00
	ST II-L	2	1.55	-	1.75	2.35 [1]	4.15	8.00	9.00	1.50		1.75	2.30	3.95	7.90	9.00
		3	2.20	-	2.75	2.25 [1]	3.95	8.00	9.00	1.50		2.75	2.00 [3]	3.35	6.75	9.00
		4	2.75	-	3.75	2.20 [1]	3.80	7.85	9.00	2.00	-	3.75	1.90 [3]	3.20	6.45	8.90
		5	3.25	-	4.75	2.10 [1]	3.70	7.55	9.00	2.50	-	4.75	1.85 [3]	3.10	6.20	8.55
		6	3.70	-	5.75	2.05 [1]	3.55	7.30	9.00	3.00	-	5.75	1.80 [3]	3.00	6.00	8.25
		7	4.05	-	6.75	2.00 [1]	3.45	7.10	9.00	3.60		6.75	1.75 [3]	2.95	5.85	8.10
		8	5.25	-	7.75	2.00 [1]	3.50	7.15	9.00	4.60		7.75	1.75 [3]	2.90	5.85	8.05
		9		-		-	-	-	-	5.60		8.00	1.75 [3]	2.90	5.75	7.95
		10		-		-	-	-	-	6.60	-	8.00	1.70 [3]	2.85	5.65	7.85
	ST II	2	1.45	-	1.75	-	4.05	8.00	9.00	1.50	-	1.75	-	3.85	7.70	9.00
		3	2.05	-	2.75	-	3.85	7.90	9.00	1.50	-	2.75	-	3.30	6.60	9.00
		4	2.55	-	3.75	-	3.65	7.55	9.00	2.00	-	3.75	-	3.10	6.25	8.60
		5	2.95	-	4.75	-	3.50	7.20	9.00	2.50		4.75	-	3.00	5.95	8.25
		6	3.30	-	5.75	-	3.40	6.95	9.00	3.00		5.75	-	2.90	5.75	7.95
		7	4.00	-	6.75	-	3.35	6.85	9.00	3.50	-	6.75	-	2.80	5.60	7.70
		8	5.00	-	7.75	-	3.35	6.85	9.00	4.00	-	7.75	-	2.70	5.40	7.50
		9		-		-	-	-	-	5.00	-	8.75	-	2.70	5.35	7.40
		10		-		-	-	-	-	6.00	-	9.00	-	2.65	5.30	7.30
		11		-		-	-	-	-	7.00	-	9.00	-	2.60	5.20	7.15
		12		-		-	-	-	-	8.00	-	9.00	-	2.55	5.10	7.05

[1] Two trolleys on each end of crane

[2] Double trolley unit

[3] Four trolleys on each end of crane

4.11.3 Load capacity: 125 kg, hoist weight: 30 kg, max. lifting speed: 30 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_{Kr}			l_w				l_{Kr}			l_w			
			Min.	-	Max.	ST 100	ST I	ST II-L	ST II	Min.	-	Max.	ST 100	ST I	ST II-L	ST II
Crane girder section, crane girder length	ST 100	1	0.75	-	0.85 2)	2.30 1)	4.00	8.00	9.00		-		-	-	-	-
		2	1.55	-	1.85 2)	2.15 1)	3.75	7.75	9.00	1.50	-	1.85	2.20	3.70	7.40	9.00
		3		-		-	-	-	-	1.85	-	2.85	2.00 3)	3.35	6.75	9.00
		4		-		-	-	-	-	2.55	-	3.05	1.95 3)	3.30	6.65	9.00
	ST I	1	0.80	-	0.85	2.20 1)	3.80	7.85	9.00		-		-	-	-	-
		2	1.75	-	1.85	2.15 1)	3.75	7.70	9.00	1.50	-	1.85	2.15	3.65	7.35	9.00
		3	2.60	-	2.85	2.10 1)	3.70	7.55	9.00	1.75	-	2.85	1.95 3)	3.25	6.55	9.00
		4	3.40	-	3.85	2.10 1)	3.60	7.45	9.00	2.40	-	3.85	1.90 3)	3.20	6.40	8.85
		5		-		-	-	-	-	3.00	-	4.85	1.85 3)	3.10	6.25	8.65
		6		-		-	-	-	-	3.65	-	5.25	1.85 3)	3.10	6.15	8.50
		7		-		-	-	-	-	4.90	-	5.25	1.85 3)	3.10	6.25	8.60
	ST II - L	2	1.60	-	1.75	2.05 1)	3.60	7.40	9.00	1.50	-	1.75	2.10 3)	3.55	7.10	9.00
		3	2.35	-	2.75	2.00 1)	3.50	7.15	9.00	1.50	-	2.75	1.80 3)	3.05	6.10	8.40
		4	3.00	-	3.75	-	3.40	6.95	9.00	2.00	-	3.75	1.75 3)	2.90	5.80	8.00
		5	3.60	-	4.75	-	3.30	6.75	9.00	2.50	-	4.75	1.70 3)	2.80	5.60	7.75
		6	4.10	-	5.75	-	3.20	6.55	9.00	3.00	-	5.75	1.65 3)	2.75	5.45	7.50
		7	4.70	-	6.75	-	3.15	6.45	8.90	3.60	-	6.75	1.65 3)	2.70	5.35	7.40
		8	6.05	-	7.75	-	3.20	6.50	9.00	4.60	-	7.75	1.65 3)	2.70	5.35	7.40
		9		-		-	-	-	-	5.60	-	8.00	1.60 3)	2.65	5.30	7.30
		10		-		-	-	-	-	6.60	-	8.00	1.60 3)	2.65	5.25	7.25
	ST II	2	1.55	-	1.75	-	3.55	7.25	9.00	1.50	-	1.75	-	3.45	6.95	9.00
		3	2.25		2.75	-	3.40	6.95	9.00	1.50	-	2.75	-	3.00	5.95	8.20
		4	2.80	-	3.75	-	3.30	6.70	9.00	2.00	-	3.75	-	2.85	5.65	7.80
		5	3.35	-	4.75	-	3.15	6.50	9.00	2.50	-	4.75	-	2.75	5.45	7.50
		6	3.80	-	5.75	-	3.05	6.30	8.70	3.00	-	5.75	-	2.65	5.25	7.25
		7	4.20	-	6.75	-	3.00	6.10	8.45	3.50	-	6.75	-	2.60	5.10	7.05
		8	5.00	-	7.75	-	2.95	6.05	8.40	4.00	-	7.75	-	2.50 3)	5.00	6.90
		9		-		-	-	-	-	5.00	-	8.75	-	2.50 3)	4.95	6.85
		10		-		-	-	-	-	6.00	-	9.00	-	2.50 3)	4.90	6.80
		11		-		-	-	-	-	7.00	-	9.00	-	2.45 3)	4.85	6.70
		12		-		-	-	-	-	8.00	-	9.00	-	2.40 3)	4.80	6.60

1) Two trolleys on each end of crane

2) Double trolley unit

3) Four trolleys on each end of crane

4.11.4 Load capacity: 160 kg, hoist weight: 35 kg, max. lifting speed: 20 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_w			l_{Kr}				l_w			l_{Kr}			
			Min.	-	Max.	ST100	STI	ST II-L	ST II	Min.	-	Max.	ST100	ST I	ST II-L	ST II
Crane girder section, crane girder length	ST 100	1	0.75	-	0.85 2)	2.05 1)	3.60	7.35	9.00		-		-	-	-	-
		2	1.60	-	1.85 2)	-	3.40	6.95	9.00	1.50	-	1.85	2.00 3)	3.40	6.80	9.00
		3		-		-	-	-	-	1.90	-	2.75	1.85 3)	3.10	6.20	8.60
		4		-		-	-	-	-	2.70	-	2.75	1.85 3)	3.05	6.10	8.45
	ST I	1		-		-	-	-	-		-		-	-	-	-
		2	1.75	-	1.85	-	3.35	6.90	9.00	1.50	-	1.85	2.00 3)	3.35	6.70	9.00
		3	2.65	-	2.85	-	3.30	6.80	9.00	1.80	-	2.85	1.80 3)	3.05	6.05	8.40
		4		-		-	-	-	-	2.55	-	3.85	1.80 3)	2.95	5.95	8.20
		5		-		-	-	-	-	3.20	-	4.75	1.75 3)	2.90	5.85	8.05
		6		-		-	-	-	-	3.90	-	4.75	1.75 3)	2.90	5.75	7.95
	ST II-L	2	1.65	-	1.75	-	3.25	6.70	9.00	1.50	-	1.75	1.95 3)	3.30	6.60	9.00
		3	2.45	-	2.75	-	3.20	6.50	9.00	1.50	-	2.75	1.70 3)	2.80	5.65	7.75
		4	3.15	-	3.75	-	3.10	6.35	8.80	2.05	-	3.75	1.65 3)	2.70	5.40	7.45
		5	3.80	-	4.75	-	3.05	6.20	8.60	2.55	-	4.75	1.60 3)	2.65	5.25	7.20
		6	4.35	-	5.75	-	2.95	6.05	8.40	3.00	-	5.75	1.55 3)	2.55	5.05	7.00
		7	5.15	-	6.75	-	2.90	6.00	8.30	3.60	-	6.75	-	2.50 3)	5.00	6.90
		8	6.40	-	7.15	-	2.95	6.05	8.35	4.60	-	7.75	-	2.50 3)	5.00	6.90
		9		-		-	-	-	-	5.60	-	8.00	-	2.50 3)	5.00	6.85
		10		-		-	-	-	-	6.60	-	8.00	-	2.50 3)	4.95	6.80
	ST II	2	1.60	-	1.75	-	3.20	6.60	9.00	1.50	-	1.75	-	3.25 3)	6.45	8.95
		3	2.35	-	2.75	-	3.10	6.40	8.85	1.50	-	2.75	-	2.75 3)	5.50	7.60
		4	3.00	-	3.75	-	3.00	6.20	8.55	2.00	-	3.75	-	2.65 3)	5.25	7.25
		5	3.55	-	4.75	-	2.90	6.00	8.30	2.50	-	4.75	-	2.55 3)	5.05	7.00
		6	4.10	-	5.75	-	2.75	5.85	8.10	3.00	-	5.75	-	2.50 3)	4.90	6.80
		7	4.55	-	6.75	-	2.80 1)	5.70	7.90	3.50	-	6.75	-	2.40 3)	4.80	6.60
		8	5.00	-	7.75	-	2.70 1)	5.55	7.70	4.00	-	7.75	-	2.30 3)	4.70	6.45
		9		-		-	-	-	-	5.00	-	8.75	-	2.30 3)	4.70	6.45
		10		-		-	-	-	-	6.00	-	9.00	-	2.30 3)	4.65	6.40
		11		-		-	-	-	-	7.00	-	9.00	-	2.25 3)	4.60	6.35
		12		-		-	-	-	-	8.00	-	9.00	-	2.20 3)	4.55	6.30

1) Two trolleys on each end of crane

2) Double trolley unit

3) Four trolleys on each end of crane

4.11.5 Load capacity: 200 kg, hoist weight: 35 kg, max. lifting speed: 20 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_{Kr}			l_w				l_{Kr}			l_w			
			Min.	-	Max.	ST I	ST II-L	ST II	ST II-H	Min.	-	Max.	ST I	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST I	1		-		-	-	-	-		-		-	-	-	-
		2	1.75	-	1.85	3.10	6.35	8.75	10.50	1.50	-	1.85	3.10	6.25	8.60	10.50
		3	2.65	-	2.85	3.05	6.25	8.65	10.50	1.90	-	2.85	2.85	5.65	7.85	10.50
		4		-		-	-	-	-	2.60	-	3.85	2.80	5.55	7.70	10.50
		5		-		-	-	-	-	3.30	-	4.35	2.75	5.45	7.55	10.50
		6		-		-	-	-	-	4.10	-	4.35	2.70	5.40	7.50	10.50
	ST II-L	2	1.70	-	1.75	3.00	6.15	8.55	10.50	1.50	-	1.75	3.10	6.15	8.50	10.50
		3	2.50	-	2.75	2.95	6.05	8.35	10.50	1.55	-	2.75	2.65	5.30	7.30	10.50
		4	3.25	-	3.75	2.80	5.90	8.15	10.50	2.20	-	3.75	2.55	5.10	7.05	10.50
		5	3.95	-	4.75	2.70	5.80	8.00	10.50	2.75	-	4.75	2.50 [2]	4.95	6.85	10.50
		6	4.55	-	5.75	2.75 [1]	5.65	7.85	10.50	3.20	-	5.75	2.40 [2]	4.85	6.65	10.50
		7	5.45	-	6.50	2.75 [1]	5.65	7.80	10.50	3.65	-	6.75	2.30 [2]	4.70	6.50	10.25
		8		-		-	-	-	-	4.60	-	7.75	2.35 [2]	4.70	6.50	10.25
		9		-		-	-	-	-	5.60	-	8.00	2.30 [2]	4.70	6.50	10.25
		10		-		-	-	-	-	6.65	-	8.00	2.30 [2]	4.70	6.45	10.20
	ST II	2	1.65	-	1.75	2.95	6.10	8.40	10.50	1.50	-	1.50	3.05	6.05	8.40	10.50
		3	2.40	-	2.75	2.85	5.90	8.20	10.50	1.50	-	2.75	2.60	5.15	7.15	10.50
		4	3.10	-	3.75	2.70	5.75	8.00	10.50	2.05	-	3.75	2.50 [2]	4.95	6.80	10.50
		5	3.70	-	4.75	2.75 [1]	5.60	7.80	10.50	2.50	-	4.75	2.35 [2]	4.75	6.60	10.35
		6	4.30	-	5.75	2.65 [1]	5.50	7.60	10.50	3.00	-	5.75	2.25 [2]	4.65	6.40	10.10
		7	4.80	-	6.75	2.55 [1]	5.35	7.40	10.50	3.50	-	6.75	2.20 [2]	4.55	6.25	9.85
		8	5.50	-	7.75	2.50 [1]	5.30	7.30	10.50	4.00	-	7.75	2.10 [2]	4.45	6.10	9.65
		9		-		-	-	-	-	5.00	-	8.75	2.15 [2]	4.45	6.15	9.65
		10		-		-	-	-	-	6.00	-	9.00	2.10 [2]	4.45	6.10	9.60
		11		-		-	-	-	-	7.00	-	9.00	2.10 [2]	4.40	6.05	9.55
		12		-		-	-	-	-	8.00	-	9.00	2.05 [2]	4.35	6.00	9.45

[1] Two trolleys on each end of crane

[2] Four trolleys on each end of crane

4.11.6 Load capacity: 250 kg, hoist weight: 35 kg, max. lifting speed: 20 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_{Kr}			l_{Kr}				l_w			l_{Kr}			
			Min.	-	Max.	ST I	ST II-L	ST II	ST II-H	Min.	-	Max.	ST I	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST I	1		-		-	-	-	-		-		-	-	-	-
		2	1.80	-	1.85	2.70	5.80	8.00	10.50	1.50	-	1.85	2.90	5.75	7.95	10.50
		3		-						1.95	-	2.85	2.65	5.25	7.30	10.50
		4		-		-	-	-	-	2.70	-	3.85	2.60	5.20	7.15	10.50
		5		-		-	-	-	-	3.45	-	4.00	2.55	5.10	7.05	10.50
	ST II-L	2	1.70	-	1.75	2.75 [1]	5.65	7.80	10.50	1.50	-	1.75	2.85	5.75	7.90	10.50
		3	2.55	-	2.75	2.70 [1]	5.55	7.70	10.50	1.60	-	2.75	2.50 [2]	4.95	6.85	10.50
		4	3.30	-	3.75	2.60 [1]	5.45	7.55	10.50	2.30	-	3.75	2.40 [2]	4.80	6.65	10.50
		5	4.05	-	475	2.50 [1]	5.35	7.40	10.50	2.90	-	4.75	2.30 [2]	4.70	6.50	10.20
		6	4.75	-	5.75	2.45 [1]	5.25	7.30	10.50	3.40	-	5.75	2.20 [2]	4.60	6.30	9.95
		7	5.70	-	5.95	2.45 [1]	5.25	7.25	10.50	3.90	-	6.75	2.15 [2]	4.45	6.15	9.70
		8		-		-	-	-	-	4.60	-	7.75	2.10 [2]	4.45	6.10	9.65
		9				-	-	-	-	5.70	-	8.00	2.15 [2]	4.45	6.15	9.65
		10				-	-	-	-	7.00	-	8.00	2.15 [2]	4.45	6.15	9.70
	ST II	2	1.65	-	1.75	2.70 [1]	5.60	7.75	10.50	1.50	-	1.75	2.85	5.65	7.80	10.50
		3	2.45	-	2.75	2.60 [1]	5.45	7.55	10.50	1.55	-	2.75	2.40 [2]	4.85	6.65	10.50
		4	3.20	-	3.75	2.50 [1]	5.35	7.40	10.50	2.15	-	3.75	2.30 [2]	4.65	6.45	10.15
		5	3.90	-	4.75	2.40 [1]	5.20	7.25	10.50	2.70	-	4.75	2.20 [2]	4.55	6.25	9.85
		6	4.50	-	5.75	2.35 [1]	5.10	7.10	10.50	3.15	-	5.75	2.10 [2]	4.40	6.05	9.55
		7	5.10	-	6.75	2.25 [1]	5.00	6.95	10.50	3.60	-	6.75	2.00 [2]	4.25	5.90	9.30
		8	5.95	-	7.75	2.35 [2]	5.00	6.90	10.50	4.00	-	7.75	1.95 [2]	4.15	5.75	9.05
		9		-		-	-	-	-	5.00	-	8.75	1.95 [2]	4.20	5.75	9.10
		10				-	-	-	-	6.00	-	9.00	1.95 [2]	4.20	5.75	9.10
		11		-		-	-	-	-	7.00	-	9.00	1.95 [2]	4.15	5.75	9.05
		12		-		-	-	-	-	8.05	-	9.00	1.90	4.15	5.70	9.00

[1] Two trolleys on each end of crane

[2] Four trolleys on each end of crane

4.11.7 Load capacity: 315 kg, hoist weight: 55 kg, max. lifting speed: 15 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_{Kr}			l_w				l_{Kr}			l_w			
			Min.	-	Max.	ST I	ST II-L	ST II	ST II-H	Min.	-	Max.	ST I	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST I	1	0.75	-	0.85 [2]	2.55 [1]	5.40	7.45	10.50		-		-	-	-	-
		2	1.60-	-	1.85 [2]	2.30 [1]	5.10	7.05	10.50	1.50	-	1.85	2.60	5.15	7.10	10.50
		3		-		-	-	-	-	2.00	-	2.85	2.35 [3]	4.75	6.55	10.35
		4		-		-	-	-	-	2.80	-	3.55	2.30 [3]	4.70	6.50	10.20
	ST II - L	2		-		-	-	-	-	1.50	-	1.75	2.60	5.15	7.15	10.50
		3	2.60	-	2.75	2.35 [3]	4.95	6.85	10.50	1.70	-	2.75	2.20 [3]	4.50	6.25	9.85
		4	3.45	-	3.75	2.30 [3]	4.85	6.75	10.50	2.40	-	3.75	2.10 [3]	4.40	6.10	9.60
		5	4.20	-	4.75	2.25 [3]	4.80	6.65	10.50	3.05	-	4.75	2.05 [3]	4.30	5.95	9.40
		6	4.95	-	5.20	2.20 [3]	4.75	6.55	10.35	3.65	-	5.75	2.00 [3]	4.25	5.85	9.20
		7		-		-	-	-	-	4.20	-	6.75	1.90 [3]	4.15	5.70	9.00
		8		-		-	-	-	-	4.90	-	7.15	1.90 [3]	4.10	5.65	8.90
		9		-		-	-	-	-	6.15	-	7.15	1.90 [3]	4.15	5.70	8.95
	ST II	2	1.70	-	1.75	2.35 [3]	4.95	6.90	10.50	1.50	-	1.75	2.55	5.10	7.05	10.50
		3	2.55	-	2.75	2.30 [3]	4.85	6.75	10.50	1.65	-	2.75	2.10 [3]	4.45	6.10	9.60
		4	3.35	-	3.75	2.25 [3]	4.80	6.65	10.50	2.30	-	3.75	2.05 [3]	4.30	5.95	9.35
		5	4.05	-	4.75	2.15 [3]	4.70	6.50	10.30	2.90	-	4.75	1.95 [3]	4.20	5.75	9.10
		6	4.75	-	5.75	2.10 [3]	4.60	6.40	10.10	3.45	-	5.75	1.90 [3]	4.10	5.60	8.85
		7	5.40	-	6.75	2.05 [3]	4.55	6.30	9.95	3.90	-	6.75	1.80 [3]	4.00	5.50	8.65
		8	6.40	-	7.20	2.05 [3]	4.55	6.30	9.95	4.35	-	7.75	1.75 [3]	3.85	5.35	8.45
		9		-		-	-	-	-	5.00	-	8.75	1.75 [3]	3.80	5.30	8.35
		10		-		-	-	-	-	6.05	-	9.00	1.75 [3]	3.80	5.30	8.40
		11		-		-	-	-	-	7.40	-	9.00	1.75 [3]	3.85	5.35	8.45
		12		-		-	-	-	-	8.65	-	9.00	1.75 [3]	3.85	5.35	8.45

[1] Two trolleys on each end of crane

[2] Double trolley unit

[3] Four trolleys on each end of crane

4.11.8 Load capacity: 400 kg, hoist weight: 55 kg, max. lifting speed: 15 m/min

	Profile	l_{HT}	Single-girder crane							Double-girder crane						
			l_w			l_{Kr}				l_w			l_{Kr}			
			Min.	-	Max.	ST I	ST II-L	ST II	ST II-H	Min.	-	Max.	ST I	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST I	1	0.75	-	0.85 [3]	2.80 [1]	5.70	7.85	10.50		-		-	-	-	-
		2	1.25	-	1.85 [3]	2.10 [2]	4.55	6.35	10.00	1.50	-	1.85	2.30 [2]	4.70	6.50	10.20
		3		-		-	-	-	-	2.05	-	2.85	2.05 [2]	4.35	6.00	9.50
		4		-		-	-	-	-	2.90	-	3.20	2.05 [2]	4.30	5.95	9.40
	ST II-L	2		-		-	-	-	-	1.50	-	1.75	2.35 [2]	4.75	6.55	10.30
		3	2.65	-	2.75	2.00	4.50	6.20	9.85	1.75	-	2.75	1.95 [2]	4.20	5.75	9.10
		4	3.50	-	3.75	2.00 [2]	4.40	6.15	9.70	2.50	-	3.75	1.90 [2]	4.10	5.65	8.90
		5	4.30	-	4.55	1.95 [2]	4.30	6.05	9.60	3.20	-	4.75	1.85 [2]	4.05	5.55	8.75
		6		-		-	-	-	-	3.85	-	5.75	1.80 [2]	3.95	5.45	8.55
		7		-		-	-	-	-	4.45	-	6.50	1.75 [2]	3.85	5.35	8.40
		8		-		-	-	-	-	5.20	-	6.50	1.75 [2]	3.80	5.30	8.35
		9		-		-	-	-	-	6.45	-	6.50	1.75 [2]	3.80	5.35	8.40
	ST II	2		-		-	-	-	-	1.50	-	1.75	2.30 [2]	4.70	6.50	10.20
		3	2.60	-	2.75	2.00 [2]	4.40	6.15	9.75	1.70	-	2.75	1.90 [2]	4.10	5.65	8.90
		4	3.40	-	3.75	1.95 [2]	4.25	6.05	9.60	2.40	-	3.75	1.85 [2]	4.00	5.50	8.70
		5	4.20	-	4.75	1.90 [2]	4.15	5.95	9.45	3.05	-	4.75	1.80 [2]	3.90	5.40	8.50
		6	4.90	-	5.75	1.85 [2]	4.05	5.90	9.30	3.65	-	5.75	1.70 [2]	3.75	5.25	8.30
		7	5.60	-	6.50	1.80 [2]	3.95	5.80	9.20	4.20	-	6.75	1.65 [2]	3.60	5.15	8.15
		8		-		-	-	-	-	4.70	-	7.75	1.65 [2]	3.50	5.05	7.95
		9		-		-	-	-	-	5.20	-	8.75	1.30 [2]	3.40	4.95	7.80
		10		-		-	-	-	-	6.55	-	8.95	1.60 [2]	3.50	5.05	7.95
		11		-		-	-	-	-	7.80	-	8.95	1.65 [2]	3.50	5.05	7.95

[1] Two trolleys on each end of crane

[2] Four trolleys on each end of crane

[3] Quadruple trolley unit

4.11.9 Load capacity: 500 kg, hoist weight: 75 kg, max. lifting speed: 15 m/min

	Profile	l_{HT}	Single-girder crane						Double-girder crane					
			l_{Kr}			l_w			l_{Kr}			l_w		
			Min.	-	Max.	ST II-L	ST II	ST II-H	Min.	-	Max.	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST II-L	2		-		-	-	-	1.50	-	1.75	4.30	5.90	9.35
		3	2.70	-	2.75	3.85 [1)]	5.55 [1)]	8.80 [1)]	1.80	-	2.75	3.75	5.25	8.30
		4	3.55	-	3.70	3.80 [1)]	5.50 [1)]	8.70 [1)]	2.60	-	3.75	3.65	5.15	8.15
		5		-		-	-	-	3.35	-	4.75	3.55	5.10	8.00
		6		-		-	-	-	4.05	-	5.75	3.45	5.00	7.90
		7		-		-	-	-	4.70	-	5.85	3.35	4.95	7.75
		8		-		-	-	-	5.55	-	5.85	3.30	4.90	7.70
	ST II	2		-		-	-	-	1.50	-	1.75	4.25	5.85	9.25
		3	2.65	-	2.75	3.80 [1)]	5.50 [1)]	8.75 [1)]	1.75	-	2.75	3.65	5.20	8.15
		4	3.50	-	3.75	3.75 [1)]	5.45 [1)]	8.60 [1)]	2.50	-	3.75	3.50	5.05	8.00
		5	4.30	-	4.75	3.65 [1)]	5.40 [1)]	8.50 [1)]	3.20	-	4.75	3.40	4.95	7.85
		6	5.10	-	5.70	3.60 [1)]	5.35 [1)]	8.40 [1)]	3.85	-	5.75	3.30	4.90	7.70
		7		-		-	-	-	4.45	-	6.75	3.20	4.75	7.55
		8		-		-	-	-	5.00	-	7.75	3.10	4.60	7.40
		9		-		-	-	-	5.75	-	8.05	3.05	4.55	7.35
		10		-		-	-	-	7.00	-	8.05	3.10	4.60	7.40
	ST II - H	2	1.70	-	1.85	3.85 [1)]	5.55 [1)]	8.75 [1)]	1.50	-	1.85	4.20	5.80	9.15
		3	2.55	-	2.85	3.70 [1)]	5.45 [1)]	8.60 [1)]	1.70	-	2.85	3.50	5.05	7.95
		4	3.35	-	3.85	3.60 [1)]	5.35 [1)]	8.45 [1)]	2.35	-	3.85	3.35	4.90	7.75
		5	4.15	-	4.85	3.50 [1)]	5.25 [1)]	8.30 [1)]	3.00	-	4.85	3.20	4.75	7.55
		6	4.85	-	5.85	3.40 [1)]	5.20 [1)]	8.20 [1)]	3.55	-	5.85	3.05	4.55	7.35
		7	5.50	-	6.85	3.35 [1)]	5.10 [1)]	8.05 [1)]	4.05	-	6.85	2.95	4.40	7.20
		8	6.15	-	7.85	3.25 [1)]	4.95 [1)]	7.95 [1)]	4.55	-	7.85	2.85	4.20	7.00
		9	6.80	-	8.85	3.15 [1)]	4.85 [1)]	7.85 [1)]	5.00	-	8.85	2.75	4.05	6.85
		10	8.00	-	9.15	3.20 [1)]	4.90 [1)]	7.90 [1)]	5.50	-	9.85	2.70	3.95	6.75
		11		-		-	-	-	6.50	-	10.50	2.70	3.95	6.75
		12		-		-	-	-	7.50	-	10.50	2.70	3.95	6.75
		13		-		-	-	-	8.60	-	10.50	2.70	3.95	6.75
		14		-		-	-	-	9.85	-	10.50	2.70	3.95	6.75

[1)] Two trolleys on each end of crane

4.11.10 Load capacity: 630 kg, hoist weight: 75 kg, max. lifting speed: 15 m/min

	Profile	l_{HT}	Single-girder crane						Double-girder crane					
			l_{Kr}			l_w			l_{Kr}			l_w		
			Min.	-	Max.	ST II-L	ST II	ST II-H	Min.	-	Max.	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST II-L	2	1.55	-	1.75 [2]	3.30 [1]	5.05 [1]	8.05 [1]	1.50	-	1.75	3.90	5.40	8.55
		3	2.45	-	2.75 [2]	3.25 [1]	5.00 [1]	8.00 [1]	1.85	-	2.75	3.25	4.80	7.60
		4		-		-	-	-	2.65	-	3.75	3.15	4.70	7.50
		5		-		-	-	-	3.45	-	4.75	3.10	4.60	7.40
		6		-		-	-	-	4.20	-	5.30	2.95	4.40	7.20
		7		-		-	-	-	4.90	-	5.30	2.90	4.30	7.10
	ST II	2	1.50	-	1.75 [2]	3.30 [1]	5.00 [1]	8.00 [1]	1.50	-	1.75	3.85	5.40	8.45
		3	2.45	-	2.75 [2]	3.20 [1]	4.90 [1]	7.90 [1]	1.80	-	2.75	3.20	4.70	7.50
		4	3.30	-	3.75 [2]	3.15 [1]	4.85 [1]	7.85 [1]	2.60	-	3.75	3.10	4.60	7.40
		5	4.15	-	4.75 [2]	3.10 [1]	4.75 [1]	7.75 [1]	3.35	-	4.75	3.00	4.45	7.25
		6		-		-	-	-	4.00	-	5.75	2.85	4.25	7.05
		7		-		-	-	-	4.65	-	6.75	2.80	4.15	6.95
		8		-		-	-	-	5.30	-	7.30	2.75	4.05	6.85
		9		-		-	-	-	6.10	-	7.30	2.70	4.00	6.80
	ST II-H	2	1.50	-	1.85 [2]	3.25 [1]	4.95 [1]	7.95 [1]	1.50	-	1.85	3.80	5.30	8.40
		3	2.40	-	2.85 [2]	3.15 [1]	4.80 [1]	7.80 [1]	1.75	-	2.85	3.05	4.55	7.35
		4	3.25	-	3.85 [2]	3.05 [1]	4.70 [1]	7.70 [1]	2.45	-	3.85	2.95	4.40	7.20
		5	4.05	-	4.85 [2]	3.00 [1]	4.60 [1]	7.60 [1]	3.15	-	4.85	2.85	4.20	7.00
		6	4.80	-	5.85 [2]	2.95 [1]	4.50 [1]	7.50 [1]	3.75	-	5.85	2.70	4.00	6.80
		7	5.50	-	6.85 [2]	2.85 [1]	4.40 [1]	7.40 [1]	4.30	-	6.85	2.60	3.85	6.65
		8	6.20	-	7.85 [2]	2.80 [1]	4.30 [1]	7.35 [1]	4.85	-	7.85	2.55	3.75	6.55
		9	6.85	-	8.20 [2]	2.75 [1]	4.20 [1]	7.25 [1]	5.35	-	8.85	2.45	3.60	6.40
		10	7.85	-	8.25 [2]	2.75 [1]	4.20 [1]	7.25 [1]	5.80	-	9.85	2.40 [3]	3.50 [3]	6.25
		11		-		-	-	-	6.50	-	10.50	2.40 [3]	3.45 [3]	6.25
		12		-		-	-	-	7.85	-	10.50	2.40 [3]	3.55 [3]	6.30
		13		-		-	-	-	9.15	-	10.50	2.40	3.55	6.35
		14		-		-	-	-	10.35	-	10.50	2.40	3.55	6.35

[1] Two trolleys on each end of crane

[2] Double trolley unit

[3] Four trolleys on each end of crane

4.11.11 Load capacity: 800 kg, hoist weight: 75 kg, max. lifting speed: 15 m/min

	Profile	l_{HT}	Single-girder crane						Double-girder crane					
			l_{Kr}			l_w			l_{Kr}			l_w		
			Min.	-	Max.	ST II-L	ST II	ST II-H	Min.	-	Max.	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST II-L	2	1.55	-	1.75 [2)]	2.75 [1)]	4.20 [1)]	7.25 [1)]	1.50	-	1.75	3.35	4.90	7.75
		3	2.50	-	2.70 [2)]	2.70 [1)]	4.15 [1)]	7.20 [1)]	1.90-	-	2.75	2.80	4.15	6.95
		4		-		-	-	-	2.75	-	3.75	2.75	4.05	6.85
		5		-		-	-	-	3.55	-	4.75	2.70	4.00	6.80
		6		-		-	-	-	4.35	-	4.80	2.60	3.85	6.65
	ST II	2	1.55-	-	1.75 [2)]	2.75 [1)]	4.20 [1)]	7.25 [1)]	1.50	-	1.75	3.30	4.90	7.70
		3	2.45	-	2.75 [2)]	2.70 [1)]	4.10 [1)]	7.15 [1)]	1.85	-	2.75	2.75	4.05	6.85
		4	3.35	-	3.75 [2)]	2.65 [1)]	4.05 [1)]	7.10 [1)]	2.65	-	3.75	2.70	3.95	6.75
		5		-		-	-	-	3.45	-	4.75	2.60	3.85	6.65
		6		-		-	-	-	4.20	-	5.75	2.50	3.70	6.50
		7		-		-	-	-	4.90	-	6.60	2.45	3.65	6.40
		8		-		-	-	-	5.55	-	6.60	2.40	3.55	6.35
		9		-		-	-	-	6.40	-	6.60	2.40 [3)]	3.55 [3)]	6.30 [3)]
	ST II-H	2	1.50-	-	1.85 [2)]	2.70 [1)]	4.15 [1)]	7.15 [1)]	1.50	-	1.85	3.25	4.85	7.60
		3	2.40	-	2.85 [2)]	2.65 [1)]	4.05 [1)]	7.10 [1)]	1.80	-	2.85	2.65	3.95	6.75
		4	3.30	-	3.85 [2)]	2.60 [1)]	3.95 [1)]	7.00 [1)]	2.55	-	3.85	2.60	3.80	6.60
		5	4.10	-	4.85 [2)]	2.55 [1)]	3.90 [1)]	6.95 [1)]	3.25	-	4.85	2.50	3.70	6.50
		6	4.90	-	5.85 [2)]	2.50 [1)]	3.80 [1)]	6.85 [1)]	3.95	-	5.85	2.40 [3)]	3.55 [3)]	6.30 [3)]
		7	5.70	-	6.85 [2)]	2.45 [1)]	3.75 [1)]	6.80 [1)]	4.55	-	6.85	2.35 [3)]	3.45 [3)]	6.20 [3)]
		8	6.45	-	7.40 [2)]	2.40 [1)]	3.70 [1)]	6.70 [1)]	5.15	-	7.85	2.30 [3)]	3.35 [3)]	6.10 [3)]
		9	7.15	-	7.40 [2)]	2.35 [1)]	3.60 [1)]	6.65 [1)]	5.70	-	8.85	2.25 [3)]	3.25 [3)]	6.00 [3)]
		10		-		-	-	-	6.20	-	9.85	1.90 [3)]	3.15 [3)]	5.90 [3)]
		11		-		-	-	-	7.15	-	10.00	1.90 [3)]	3.15 [3)]	5.90 [3)]
		12		-		-	-	-	8.40	-	10.00	2.20 [3)]	3.20 [3)]	5.90 [3)]
		13		-		-	-	-	9.65	-	10.00	2.20 [3)]	3.20 [3)]	5.95 [3)]

[1)] Two trolleys on each end of crane

[2)] Double trolley unit

[3)] Four trolleys on each end of crane

4.11.12 Load capacity: 1000 kg, hoist weight: 85 kg, max. lifting speed: 15 m/min

	Profile	l_{HT}	Single-girder crane						Double-girder crane					
			l_{Kr}			l_w			l_{Kr}			l_w		
			Min.	-	Max.	ST II-L	ST II	ST II-H	Min.	-	Max.	ST II-L	ST II	ST II-H
Crane girder section, crane girder length	ST II-L	2	1.55	-	1.75 [2]	2.25 [1]	3.50 [1]	6.50 [1]	1.50	-	1.75	2.75	4.10	6.90
		3		-		-	-	-	1.90	-	2.75	2.35 [3]	3.45 [3]	6.20 [3]
		4		-		-	-	-	2.80	-	3.75	2.35 [3]	3.40 [3]	6.15 [3]
		5		-		-	-	-	3.65	-	4.30	2.30 [3]	3.35 [3]	6.10 [3]
	ST II	2	1.55	-	1.75 [2]	2.25 [1]	3.45 [1]	6.50 [1]	1.50	-	1.75	2.75	4.05	6.85
		3	2.50	-	2.75 [2]	2.25 [1]	3.40 [1]	6.45 [1]	1.90	-	2.75	2.35 [3]	3.40 [3]	6.15 [3]
		4		-		-	-	-	2.75	-	3.75	2.30 [3]	3.35 [3]	6.10 [3]
		5		-		-	-	-	3.55	-	4.75	2.25 [3]	3.30 [3]	6.00 [3]
		6		-		-	-	-	4.35	-	5.75	2.20 [3]	3.20 [3]	5.95 [3]
		7		-		-	-	-	5.10	-	5.90	1.95 [3]	3.15 [3]	5.90 [3]
		8		-		-	-	-	5.80	-	5.90	1.55 [3]	3.10 [3]	5.80 [3]
	ST II-H	2	1.55	-	1.85 [2]	2.25 [1]	3.40 [1]	6.45 [1]	1.50	-	1.85	2.70	4.00	6.80
		3	2.45	-	2.85 [2]	2.20 [1]	3.35 [1]	6.40 [1]	1.85	-	2.85	2.30 [3]	3.35 [3]	6.05 [3]
		4	3.35	-	3.85 [2]	2.15 [1]	3.30 [1]	6.35 [1]	2.65	-	3.85	2.25 [3]	3.25 [3]	6.00 [3]
		5	4.20	-	4.85 [2]	2.80 [3]	3.90 [3]	6.30 [3]	3.40	-	4.85	1.90 [3]	3.15 [3]	5.90 [3]
		6	5.05	-	5.85 [2]	2.75 [3]	3.85 [3]	6.25 [3]	4.10	-	5.85	1.45 [3]	3.10 [3]	5.80 [3]
		7	5.85	-	6.60 [2]	2.70 [3]	3.80 [3]	6.20 [3]	4.80	-	6.85	1.20 [3]	3.00 [3]	5.70 [3]
		8		-		-	-	-	5.45	-	7.85	1.05 [3]	2.95 [3]	5.65 [3]
		9		-		-	-	-	6.05	-	8.85	0.95 [3]	2.85 [3]	5.55 [3]
		10		-		-	-	-	6.65	-	9.25	0.85 [3]	2.80 [3]	5.45 [3]
		11		-		-	-	-	7.70	-	9.25	0.85 [3]	2.80 [3]	5.50 [3]
		12		-		-	-	-	8.90	-	9.25	0.90 [3]	2.85 [3]	5.50 [3]

[1] Two trolleys on each end of crane

[2] Double trolley unit

[3] Four trolleys on each end of crane

4.11.13 Load capacity: 1250 kg, hoist weight: 115 kg, max. lifting speed: 10 m/min

	Profile	l_{HT}	Single-girder crane					Double-girder crane				
			l_{Kr}			l_w		l_{Kr}			l_w	
			Min.	-	Max.	ST II	ST II-H	Min.	-	Max.	ST II	ST II-H
Crane girder section, crane girder length	ST II	2		-		-	-	1.50	-	1.75	3.45 [1]	6.10 [1]
		3		-		-	-	2.00	-	2.75	3.00 [1]	5.60 [1]
		4		-		-	-	2.85	-	3.75	2.95 [1]	5.55 [1]
		5		-		-	-	3.70	-	4.75	2.90 [1]	5.50 [1]
		6		-		-	-	4.55	-	5.25	2.85 [1]	5.45 [1]
	ST II-H	2		-		-	-	1.50	-	1.85	3.40 [1]	6.05 [1]
		3		-		-	-	1.95	-	2.85	2.25 [1]	5.55 [1]
		4		-		-	-	2.80	-	3.85	2.90 [1]	5.45 [1]
		5		-		-	-	3.60	-	4.85	2.30 [1]	5.40 [1]
		6		-		-	-	4.35	-	5.85	1.85 [1]	5.30 [1]
		7		-		-	-	5.10	-	6.85	1.55 [1]	5.25 [1]
		8		-		-	-	5.75	-	7.85	1.35 [1]	5.20 [1]
		9		-		-	-	6.45	-	8.25	1.20 [1]	5.15 [1]
		10		-		-	-	7.05	-	8.25	1.10 [1]	5.05 [1]

[1] Four trolleys on each end of crane

4.11.14 Load capacity: 1600 kg, hoist weight: 115 kg, max. lifting speed: 10 m/min

	Profile	l_{HT}	Single-girder crane					Double-girder crane				
			l_{Kr}			l_w		l_{Kr}			l_w	
			Min.	-	Max.	ST II	ST II-H	Min.	-	Max.	ST II	ST II-H
Crane girder section, crane girder length	ST II	2		-		-	-	1.50	-	1.75	2.90 [1)]	5.50 [1)]
		3		-		-	-	2.00	-	2.75	1.10 [1)]	5.05 [1)]
		4		-		-	-	2.90	-	3.75	1.00 [1)]	5.05 [1)]
		5		-		-	-	3.80	-	4.45	1.00 [1)]	5.00 [1)]
	ST II-H	2		-		-	-	1.50	-	1.85	2.90 [1)]	5.50 [1)]
		3		-		-	-	2.00	-	2.85	1.00 [1)]	5.00 [1)]
		4		-		-	-	2.85	-	3.85	0.95 [1)]	4.95 [1)]
		5		-		-	-	3.70	-	4.85	0.90 [1)]	4.90 [1)]
		6		-		-	-	4.50	-	5.85	0.85 [1)]	4.85 [1)]
		7		-		-	-	5.25	-	6.85	0.80 [1)]	4.80 [1)]
		8		-		-	-	6.00	-	7.40	0.80 [1)]	4.75 [1)]
		9		-		-	-	6.70	-	7.40	0.75 [1)]	4.70 [1)]

[1)] Four trolleys on each end of crane

4.11.15 Load capacity: 2000 kg, hoist weight: 115 kg, max. lifting speed: 5 m/min

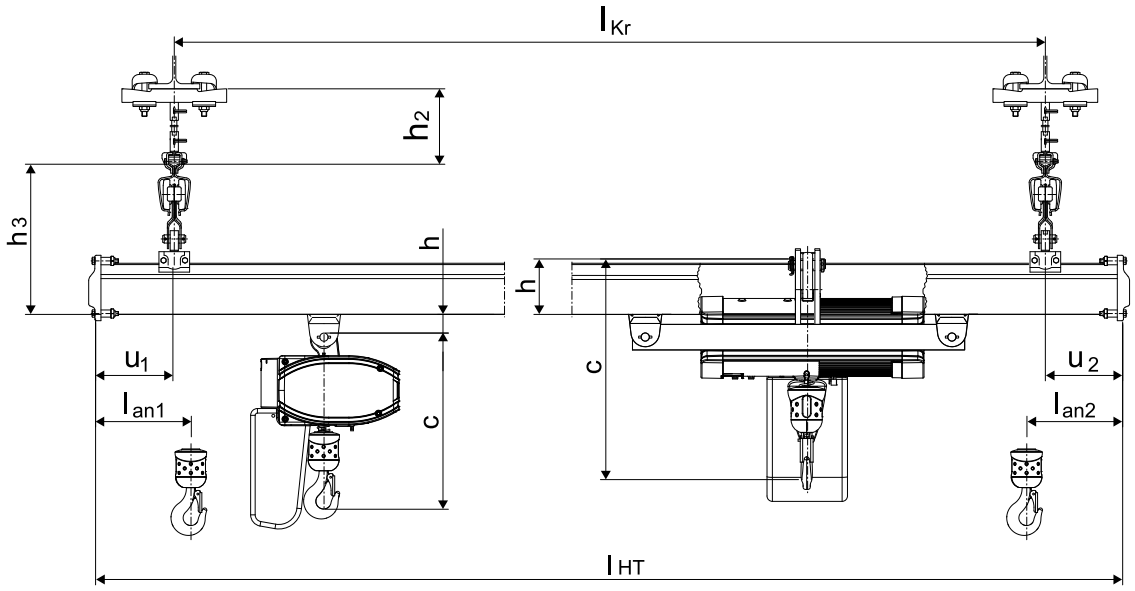
	Profile	l_{HT}	Single-girder crane					Double-girder crane				
			l_{Kr}			l_w		l_{Kr}			l_w	
			Min.	-	Max.	ST II	ST II-H	Min.	-	Max.	ST II	ST II-H
Crane girder section, crane girder length	ST 100	2		-		-	-	1.50	-	1.75	1.00 [1)]	5.00 [1)]
		3		-		-	-	2.05	-	2.75	0.70 [1)]	4.60 [1)]
		4		-		-	-	2.95	-	3.75	0.70 [1)]	4.55 [1)]
	ST II-H	2		-		-	-	1.50	-	1.85	1.00 [1)]	5.00 [1)]
		3		-		-	-	2.00	-	2.85	0.70 [1)]	4.55 [1)]
		4		-		-	-	2.90	-	3.85	0.65 [1)]	4.55 [1)]
		5		-		-	-	3.90	-	4.85	0.65 [1)]	4.50 [1)]
		6		-		-	-	4.95	-	5.85	0.65 [1)]	4.50 [1)]
		7		-		-	-	6.00	-	6.70	0.65 [1)]	4.50 [1)]

[1)] Four trolleys on each end of crane

4.12 Structural dimensions for cranes

Single-girder crane

Double-girder crane



Dimension h_2 [mm] (suspension from I-beam superstructures with upper suspension bracket)								
	Short suspension fitting		Length of suspension rod for spring clip					
	without height adjustment	with height adjustment	80	100	300	600	1000	3000
ST 100	65	100	155	-	375	675	1075	-
ST I	60	95	150		370	670	1070	
ST II, II-L	110	140	-	220	420	720	1120	3120
ST II-H	75	107		185	385	685	1085	3085
ST II-H / M20	-	107		185	385	685	1085	-

Dimension h_3 [mm]																					
Cranes																					
ST crane runway		100			I				II-L				II				II-H				
ST crane girder		100	I	II-L	100	I	II-L	II	100	I	II-L	II	100	I	II-L	II	II-H	I	II-L	II	II-H
Track trolleys	Single	242	272	337	272	302	367	397	320	350	415	445	350	380	445 [1]	475 [1]	508	433	492	522	555
	Double	252	282	347	282	312	377	407	335	365	430	460	365	395	460 [1]	490 [1]	523	448	507	537	570
	Quadruple	-			-	375	440	470	-				-					-			

[1] This also applies to rigid crane end carriages

Dimension h [mm] (to top edge of pin)						
Cranes						
ST		100	I	II-L	II	II-H
Crab trolleys	Single	41	38	35		19
	Double	51	48	50		34
	Quadruple	-	100	-		-
	Crab frame	-45	-88	-144		-159

The lifting height of double-girder cranes is higher than that of single-girder cranes, since the hoist is mounted between the two crane girders.

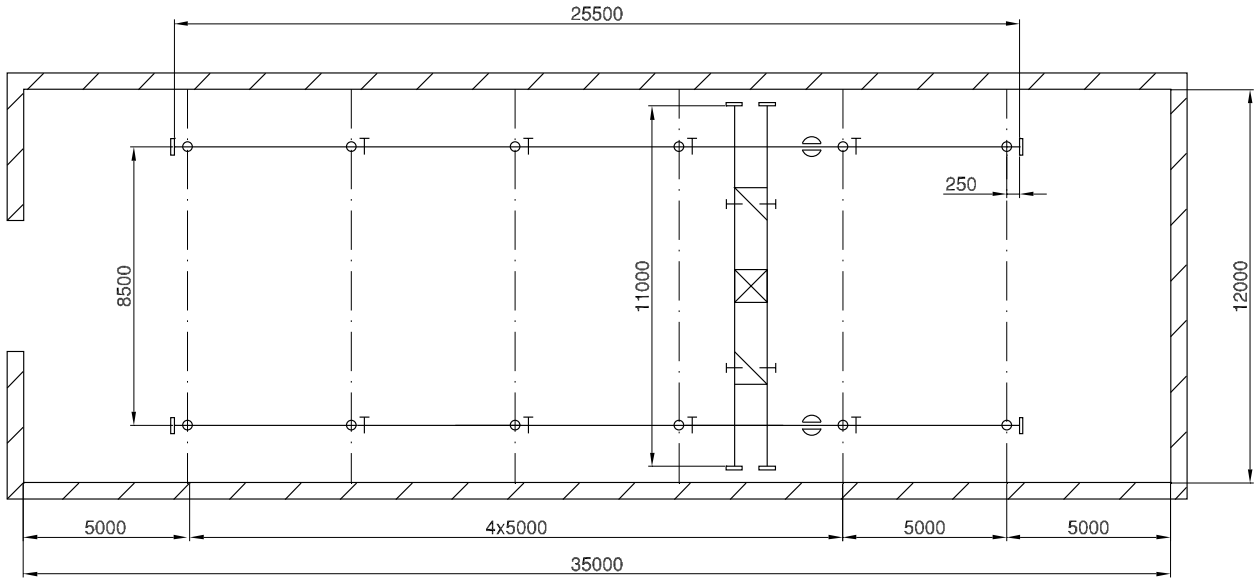
Dimension c = hoist headroom dimension

For l_w, l_{Kr}, l_{HT}, see diagram (Profile load capacities according to the diagram (page 17)) and selection tables (Selection tables for ProfileMaster Plus ST single and double-girder cranes (page 25))

u, st, l_{an} according to specification and individual dimensions of components.

4.13 Project examples

Crane installation



Project

A crane installation for a load capacity of 250 kg is to be fitted inside a building that utilizes the entire floor area as effectively as possible. The other conditions are practically the same as those in the monorail track example.

Solution

Cranes designed according to the single and double-girder crane selection table. The long and cross-travel motions should be electrically powered. ST II double-girder crane girder length 11 m.

Span l_{Kr} = 8 – 8.8 m, selected 8.5 m

Distance between suspensions l_w = Distance between roof trusses = 5 m

Load on suspension $G_{AB} = K_{Ges} + G_B \times l_w \times 1.25$;

where $K_{Ges} = G_H + G_3 + 0.8\ (G_1 + G_2)$

G_H =	SWL	250 kg
G_1 =	2 x straight sections of 7 m	238 kg
	4 x straight sections of 2 m	136 kg
	2 x internal buffer stops	0.4 kg
	4 x end caps with buffers	2.4 kg
	2 x bracing frames	14.5 kg
	4 x joint bolt sets	1.6 kg
		392.9 kg
G_3 =	1 x hoist unit	28 kg
	1 x crab frame	19.6 kg
	4 x trolleys	8 kg
	1 x friction-wheel travel drives	15.5 kg
		71.1 kg
G_2 =	2 x trolley combinations	21.4 kg
	2 x friction-wheel travel drives	31 kg
	4 x crane suspension fittings	4.8 kg
	Electric equipment	Approx. 10 kg
		67.2 kg

K_{Ges} = 250 kg + 71.1 kg + 0.8 (392.9 kg + 67.2 kg) = 689.18 kg

Thus

G_{AB} = 689.18 kg + 17 kg/m x 5 m x 1.25 = 795.43 kg < 1700 kg

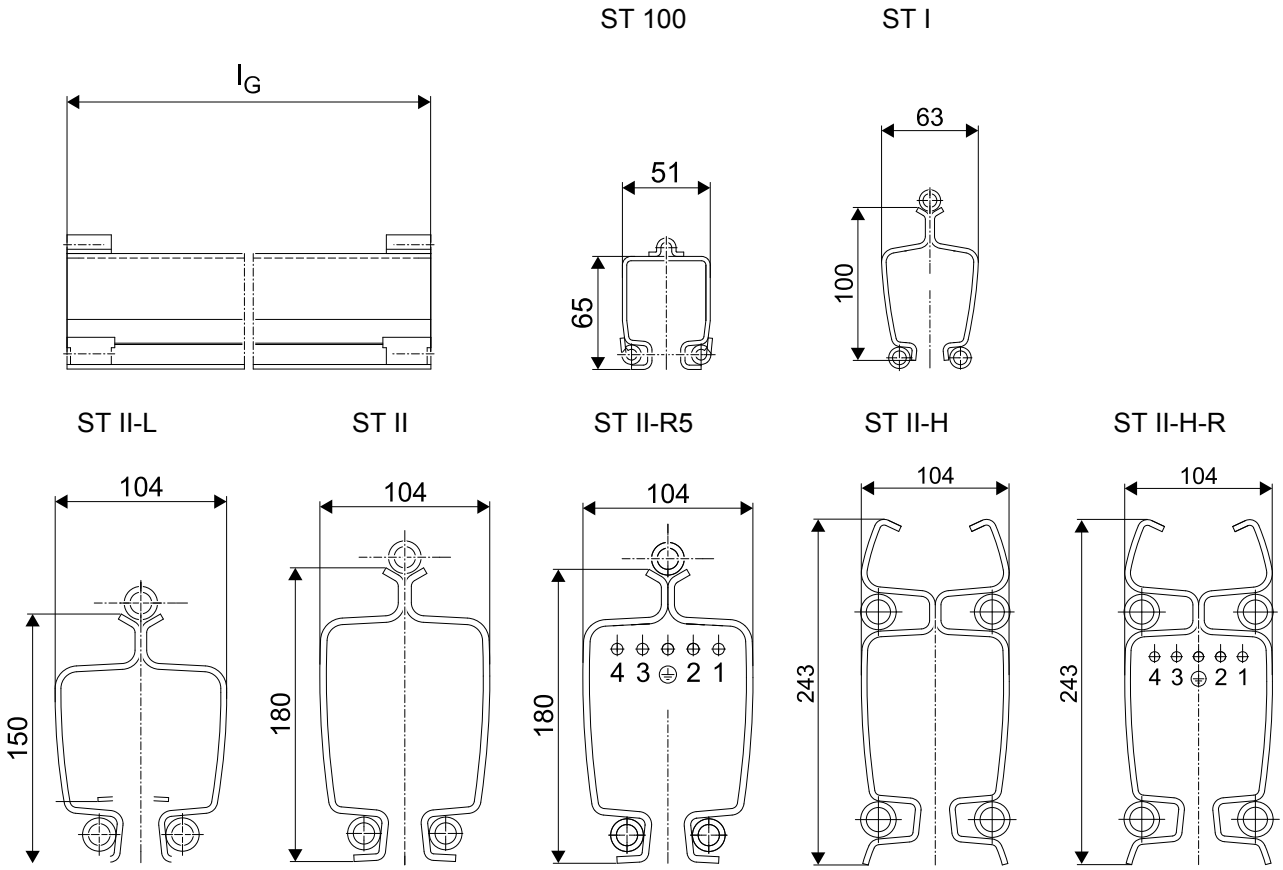
Available hook path	
LE girder to floor dimension	5800 mm
Dimension c	– 409 mm
Dimension h	+ 144 mm
Dimension h_3	– 475 mm
Dimension h_2 with 100 mm suspension rod	– 220 mm
	4840 mm

The chain hoist can be ordered with a hook path of 5 m.

5 BASIC COMPONENTS FOR CRANE RUNWAY, CRANE GIRDER

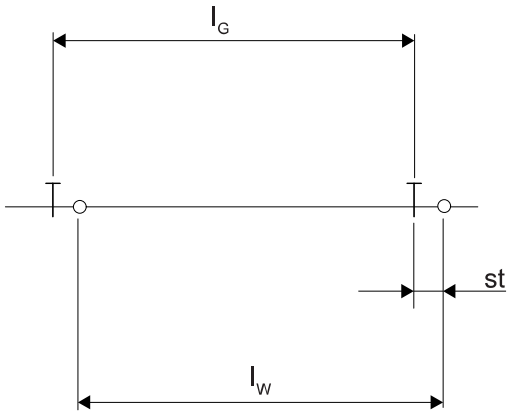
5.1 Crane and track elements

5.1.1 Straight track sections



Item	Length l_G		ST 100	ST I	ST II-L	ST II	ST II-R	ST II-H	ST II-H-R
1	1000 mm	Weight [kg]	4.10	6.40	13.20	17.00	18.20	25.00	26.22
		Part no.	984 701 44	980 224 44	984 201 44	982 224 44	873 551 44	858 201 44	858 951 44
	2000 mm	Weight [kg]	8.20	12.80	26.40	34.00	36.40	48.70	51.14
		Part no.	984 702 44	980 226 44	984 202 44	982 226 44	873 552 44	858 202 44	858 952 44
	3000 mm	Weight [kg]	12.30	19.20	39.60	51.00	54.60	72.40	76.06
		Part no.	984 703 44	980 228 44	984 203 44	982 228 44	873 553 44	858 203 44	858 953 44
	4000 mm	Weight [kg]	16.40	25.60	52.80	68.00	72.80	96.10	100.97
		Part no.	984 704 44	980 230 44	984 204 44	982 230 44	873 554 44	858 204 44	858 954 44
	5000 mm	Weight [kg]	20.50	32.00	66.00	85.00	91.00	119.80	125.89
		Part no.	984 705 44	980 232 44	984 205 44	982 232 44	873 555 44	858 205 44	858 955 44
	6000 mm	Weight [kg]	24.60	37.80	79.20	102.00	109.20	143.50	150.80
		Part no.	984 706 44	980 286 44	984 206 44	982 234 44	873 556 44	858 206 44	858 956 44
	7000 mm	Weight [kg]	-	-	92.40	119.00	127.40	167.20	175.68
		Part no.			984 207 44	982 236 44	873 557 44	858 207 44	858 957 44
	8000 mm	Weight [kg]	-	-	105.60	132.00	145.60	190.90	200.58
		Part no.			984 322 44	982 235 44	873 558 44	858 208 44	858 958 44
	Special length l_G	min. [mm]	120	150	300	300	300	400	400
		max. [mm]	6000	6000	8000	8000	8000	8000	8000

Suspension fittings and joints



The ends of ProfileMaster Plus ST straight track sections, made of special cold-rolled profiles, are fitted with three or four tube sections for bolting the individual track sections together or for fitting the end cap with buffer.

See section System dimensions and system limits (page 22) for distance between suspensions lw and distance of joint from suspension fitting st.

Designation of the sliding contacts:

1 = L1

2 = L2

 = PE

3 = L3

4 = Control conductor

ST II-R and ST II-H-R straight track sections are fitted with five internal busbars (10 mm^2 cross-section, up to 60 A, 500 V) which are enclosed over their entire length.

If no control functions or zero have to be transmitted, only 4 conductors are connected.

ST straight sections without protective earth conductor on application.

In the ST II-R model, the centrally arranged, green-yellow rail is the protective earth conductor.

Type of enclosure

IP 23 to DIN 40050.

Finish: powder-coated, daffodil yellow (RAL 1007)

5.1.2 Coupling tube

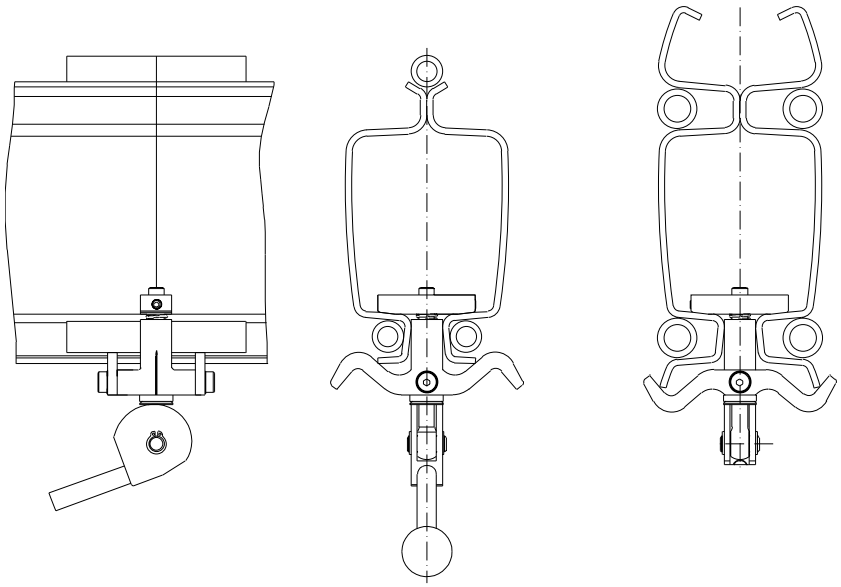
Item	Designation		ST 100	ST I	ST II-L, II, II-R	ST II-H, II-H-R
1a	Coupling tube	Quantity	30	30	30	16
		Weight [kg]	0.40	0.63	2.38	2.58
		Part no.	984 725 44	980 814 44	851 396 44	858 890 44

The full load capacity of the rail joint is not available if coupling tubes are welded on at a later date.

Shortened rail sections should be located at the end of the track.

The end cap can be attached with a profile end section, see Profile end section (item 170) (page 47).

5.1.3 Aligning device



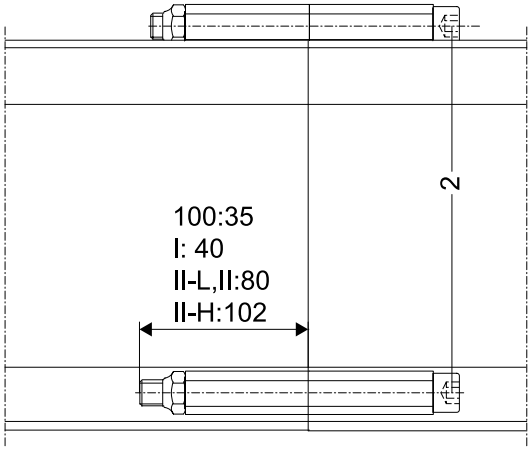
Item	Designation		ST II-L, II, II-H
180	Aligning device	Weight [kg]	0.83
		Part no.	858 420 44

This device simplifies alignment of the profile sections with each other when tracks are joined together.

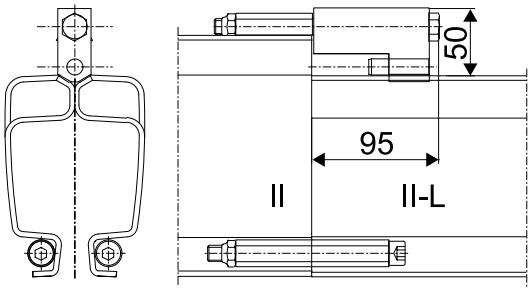
5.2 Joint bolt set

Joint bolt set (item 2) and conductor connector (item 3)

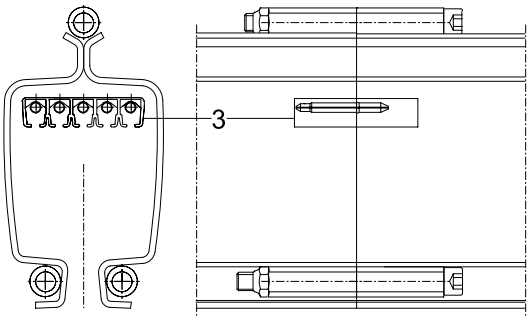
Joint bolt set



Adapter joint bolt set



ST II-R conductor connector



Item	Designation		ST 100	ST I	ST II-L	ST II	ST II-R	ST II-H	ST II-H-R
2	Joint bolt set	Weight [kg]	0.05	0.12	0.44			1.42	
		Part no.	984 558 44	980 273 44	982 273 44			858 258 44	
	Adapter joint bolt set	Weight [kg]	-	-	1.06	-	-		
		Part no.			984 258 44				
3	Conductor joint set	Weight [kg]					0.07	-	0.07
		Part no.					873 649 44		873 649 44

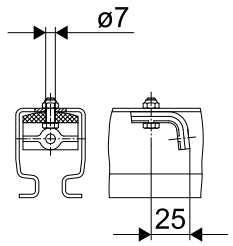
The joint bolt set for a track joint consists of nuts and bolts. An adapter joint bolt set is used for connecting ST II-L straight sections with ST II track sections.

For ST II-R sections, a busbar joint set is required in addition to the bolted connection at each track joint. The kit consists of five busbar connectors which are pressure-fitted to establish electric contact, and one plastic connector ensuring the mechanical connection of the conductor rail system.

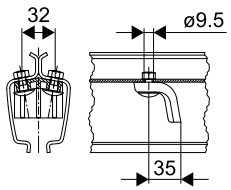
Finish: galvanized joint bolt set, black

5.3 Internal buffer stop (item 6)

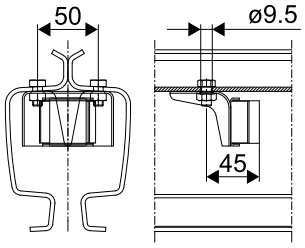
ST 100



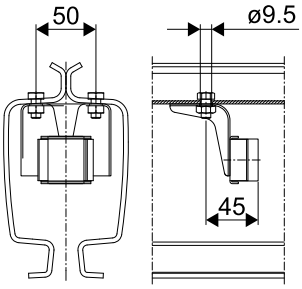
ST I



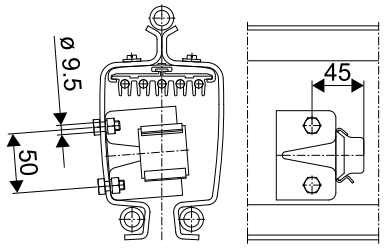
ST II-L



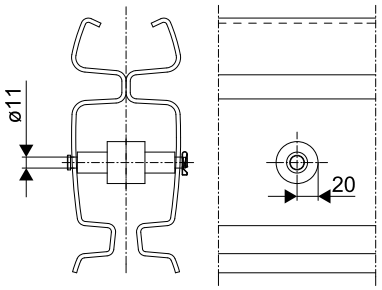
ST II



ST II-R



ST II-H



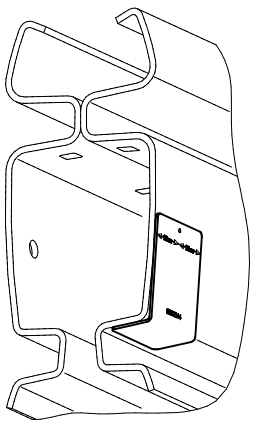
Item	Designation		ST 100	ST I	ST II-L	ST II, II-R	ST II-H, II-H-R
6	Internal buffer stop	Weight [kg]	0.04	0.05	0.20	0.20	0.28
		Part no.	984 545 44	980 130 44	984 355 44	982 120 44	858 120 44

The internal buffer stop is fitted as a means of protection for accumulated cable sliders, and in the case of ST II-L/ II/ II-H for accumulated cable trolleys or for limiting crane or hoist trolley travel. Drill holes in the top or side of the track section to secure the internal buffer stop. A buffer must fitted in both rails of double-rail systems and double-girder cranes. ST II-H internal buffer stops can also be used for ST II-L, ST II and ST II-R.

Finish:

ST 100, ST I plastic, black

ST II-L, ST II, ST II-H steel, galvanized.

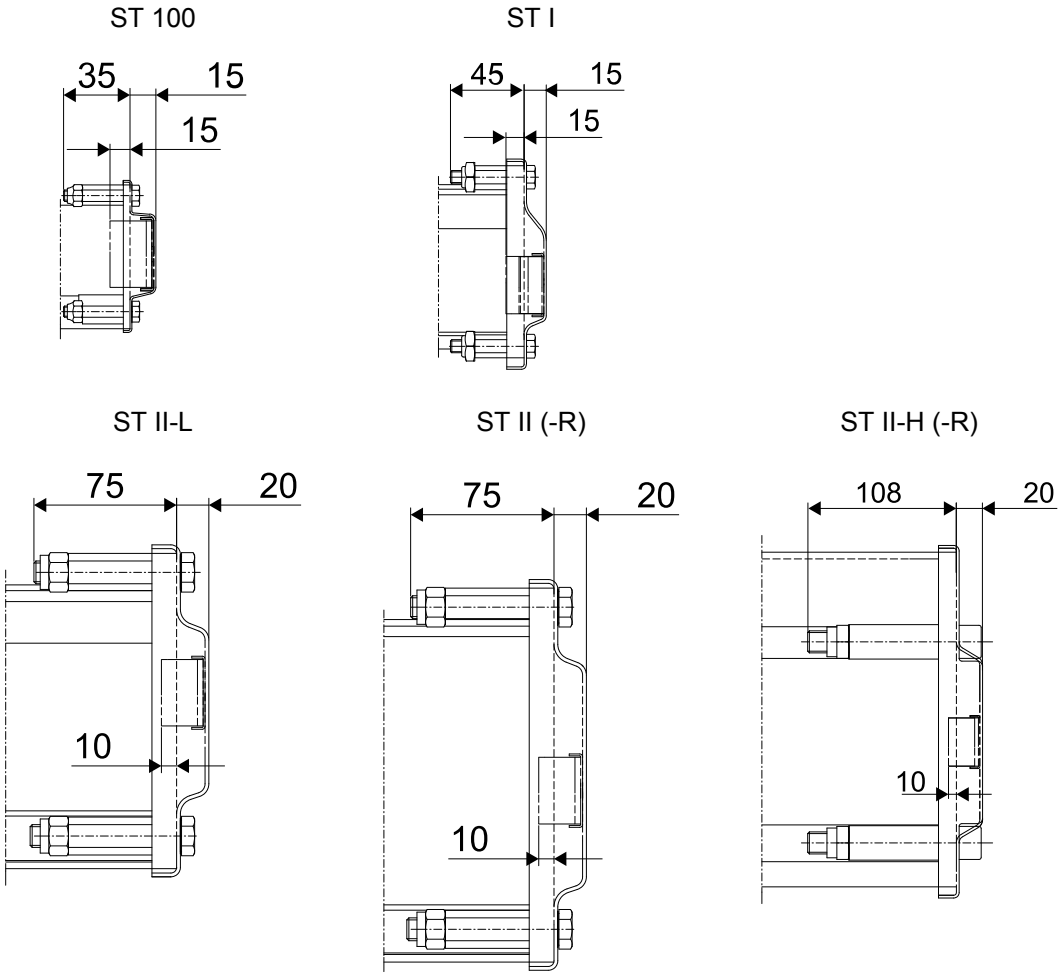


Item	Designation		ST II-L, II, II-H
175	Drilling template	Weight [kg]	0.06
		Part no.	858 121 44

The drilling template is suitable for the use of buffer part no. 858 120 44 or for profile end section part no. 858 124 44.

Finish: galvanized

5.4 End cap with buffer (item 7)



Item	Designation		ST 100	ST I	ST II-L	ST II	ST II-R	ST II-H	ST II-H-R
7	End cap with buffer	Weight [kg]	0.10	0.27	0.62	0.60	0.73	1.74	1.77
		Part no.	984 540 44	980 126 44	984 126 44	982 126 44	873 611 44	858 126 44	858 920 44

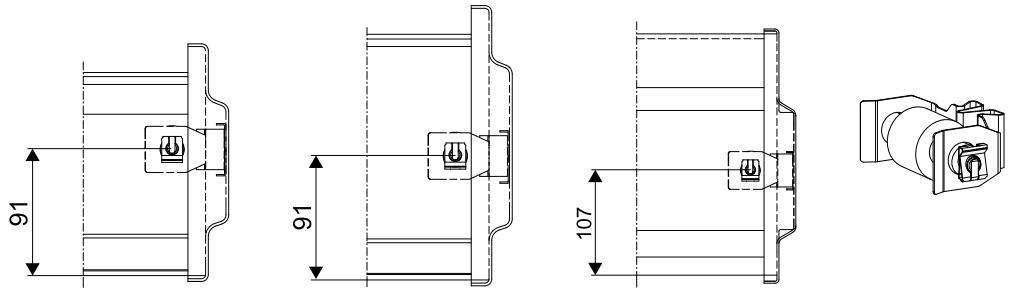
An end cap with buffer must be fitted at the ends of tracks and crane girders. The ST II-R end cap with buffer is fitted with an additional end cap for the busbars. End caps must not be approached in normal operation.

Finish:

ST 100, I, II-L, II, steel, galvanized.

5.5 Profile end section (item 170)

ST II-L ST II ST II-H



Item	Designation		ST I	ST II-L, II, II-R, II-H, II-H-R
170	Profile end section	Weight [kg]	-	0.35
		Part no.	-	858 124 44

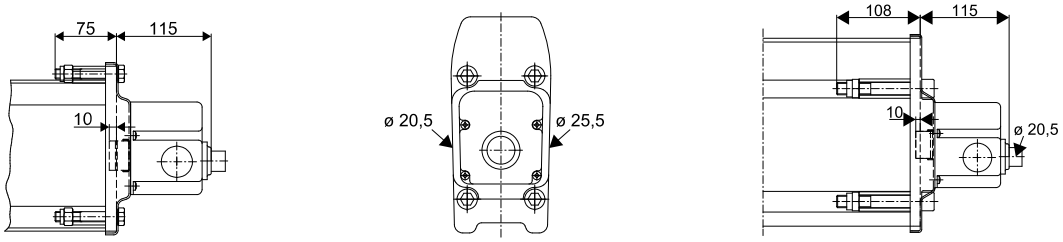
The profile end section is a combination of internal buffer stop and an end cap. After a profile section has been shortened, this assembly can be used to create a safe and reliable end for the profile section without the need to weld the coupling tubes on again. Remove the rubber stop from the end cap and clip the spring element of the profile end section into place. The end cap must be ordered separately. For drilling template, see Internal buffer stop (item 6) (page 45).

Finish: galvanized, stainless steel

5.6 ProfileMaster Plus ST II-R components

5.6.1 Powerfeed end cap (item 8)

ST II-R ST II-H-R



Item	Designation		ST II-R	ST II-H-R
8	Powerfeed end cap	Weight [kg]	0.80	2.00
		Part no.	873 605 44	858 926 44

The powerfeed end cap is used to supply power to the end of a ST rail. It consists of an end cap with buffer and a terminal box.

The terminal box includes an M20 union on its end face. Prepared openings of 20.5 mm and 25.5 mm in diameter are provided on the side (max. connection cross-section 10 mm²).

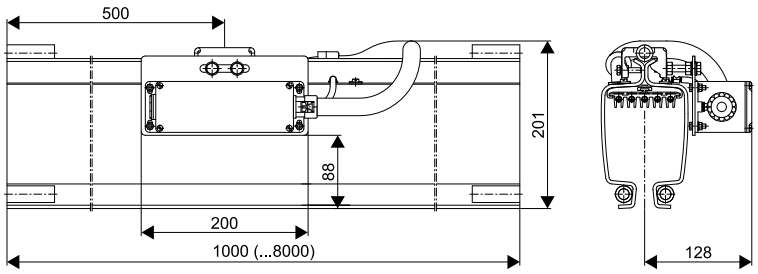
The powerfeed end cap is supplied pre-assembled with attached plug connectors and connecting cables. Powerfeed end caps without protective earth conductor available on application.

The powerfeed end cap has CSA approval.

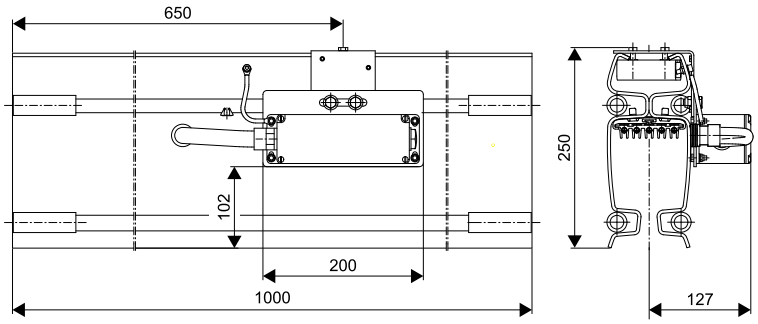
Finish: galvanized cap, black plastic terminal box

5.6.2 Line powerfeed section (item 9)

ST II-R



ST II-H-R



Item	Designation			ST II-R	ST II-H-R
9	Line powerfeed	L = 1000 mm	Weight [kg]	20.10	29.60
			Part no.	854 315 44	854 465 44
		Lmax = 8000 mm	Weight [kg]	1.9 + 18.2 kg/m	-
			Part no.	517 870 46	
	Line powerfeed for raised cranes		Weight [kg]	1.67 + 18.2 kg/m	1.50 + 26.22 kg/m
			Part no.	715 285 46	715 295 46

The line powerfeed section is a straight section, 1000 mm in length, fitted with five busbars and a ready-wired terminal box (max. connecting cable conductor cross-section 10 mm^2). This component can be used as an additional powerfeed point on long tracks to avoid excessive voltage drop.

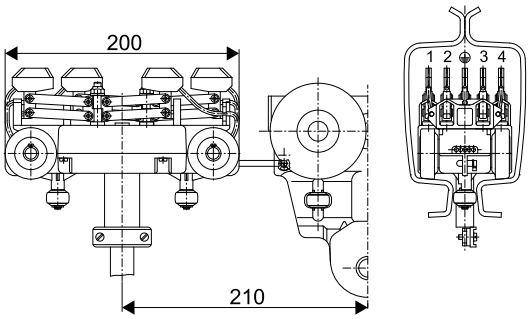
ST II-R is available in straight sections up to a maximum length of 8 m. The line powerfeed is 500 mm from one end. The total length must be specified in the order.

Line powerfeed sections for raised cranes have shortened conductor rails at each end and cannot be installed in tracks.

The line powerfeed has CSA approval.

Finish: daffodil yellow (RAL 1007)

5.6.3 Current collector trolley (item 12)



Designation of the sliding contacts:

1 = L1

2 = L2

= PE

3 = L3

4 = Control conductor

Item	Designation		ST II-R, II-H-R	
			4-pole	5-pole
12	Current collector trolley	Weight [kg]	1.50	1.50
		Part no.	873 684 44	873 685 44
	Current collector trolley with CSA approval	Weight [kg]	1.50	1.50
		Part no.	873 977 44	873 978 44

For reliable current collection, the 5-pole ST II-R current collector is fitted with two sliding contacts mounted on individually spring-loaded double pantographs for each conductor rail. The connecting cable is 2 m long. Maximum load: 15 A at 100% cyclic duty factor.

The current collector trolley is guided by two support rollers in the track section and runs on four plastic wheels mounted on anti-friction bearings which are lubricated for life. The traction resistance is approx. 2 kg. A coupling is used for connection to a ST II load trolley.

Collector trolleys must always be arranged to run between two trolleys. These are used to protect against collisions.

Current collector trolleys without protective earth conductor available on application.

Finish: black

5.7 Information plates

Capacity plate (item 15)

Name plate (item 16)

250 KG

SWF KRANTECHNIK ProfileMaster PLUS ST

Item	Designation	Load capacity [kg]	ST 100/ST I h = 40 mm Part no.	ST II-L / ST II/ST II-H h = 60 mm Part no.
15	Capacity plate	**63**	854 031 44	-
		125	854 032 44	854 041 44
		160	854 033 44	-
		250	854 034 44	854 042 44
		320	854 035 44	-
		500	854 036 44	854 043 44
		630	-	854 044 44
		800	-	854 045 44
		1000	-	854 046 44
		1250	-	854 047 44
		1600	-	854 048 44
		2000	-	854 049 44
16	Name plate	-	854 081 44	854 082 44

Capacity plates must be fitted to both sides of all crane bridges. The load capacity stated on the hoist and on the crane must be identical.

Capacity plates measuring 60 mm in height should be used for ST II-L section sizes and larger.

Type:

Self-adhesive foil

6 TRACK SUSPENSION

6.1 Notes and overview

The examples of track suspensions shown on the following pages are only some of the many combinations possible by using standard series-manufactured track suspension components.

Supporting structure

The owner is responsible for verification of superstructure/support structure.

Short suspension fitting

Particularly low suspension heights can be achieved by using short suspension arrangements.

Sloping superstructure

Suspension from sloping superstructures is also possible.

Stiffeners

On long suspension arrangements, with suspension rod lengths from approx. 600 mm upwards, undesirable pendulation of the track may occur. (This can already occur in small installations and when electric drives are used with short suspensions). This can be limited by fitting longitudinal and lateral stiffeners.

Transverse stiffeners should be fitted approx. every 15 m for ST 100, I and approx. every 20 m for ST II-L, II for crane runway tracks. One stiffener is usually sufficient in the longitudinal direction. All crane runways must be provided with stiffeners.

Transverse and longitudinal stiffeners are of V-type stiffener design. In individual cases (see Stiffeners section), single lateral stiffeners are sufficient to restrict undesirable track swing. Pairs of stiffeners have to be fitted on one side to avoid pressure in the sloping stiffener.

V-type suspension fittings

V-type suspension fittings may also replace missing suspension points in vertical suspension arrangements. Max. vertical dimension as for vertical suspension arrangements.

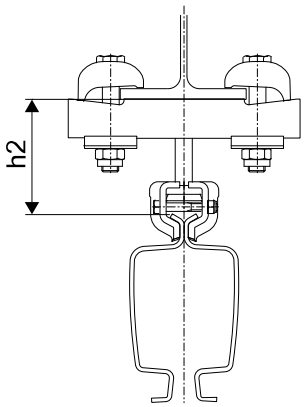
Load capacity, dimensions for suspension from I-beam superstructures, height compensation

Profile			ST 100	ST I	ST II / M10	ST II-L	ST II	ST II-H / M16	ST II-H / M20
Thread			M10			M16 x 1.5			M20 x 1.5
Load capacity [1]		[kg]	400	750		1400	1700		2600
Suspension dimension h_2	Suspension with suspension rod 80/100	[mm]	155 ± 9	150 ± 9	165 ± 9	220 ± 14	220 ± 14	185 ± 14	185 ± 14
	Short suspension arrangement with height adjustment	[mm]	100 ± 4	95 ± 4	105 ± 4	140 ± 7	140 ± 7	107 ± 7	107 ± 7
	Short suspension arrangement without height adjustment	[mm]	65	60	-	110	110	75	-
h_1	Max. suspension rod length	[m]	1	2	2	3	3	3	1

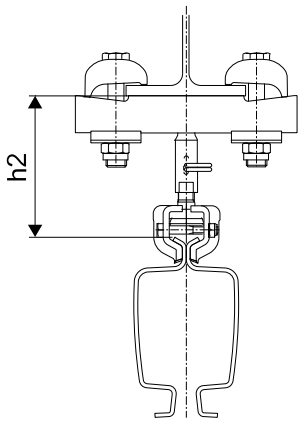
[1] Static or alternating load

Examples

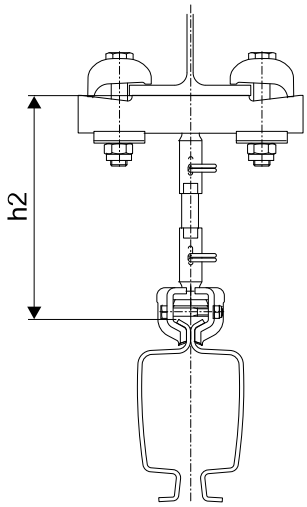
Short



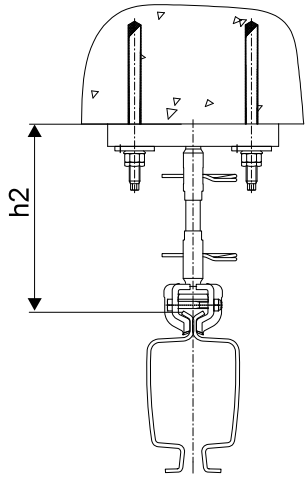
Short, adjustable



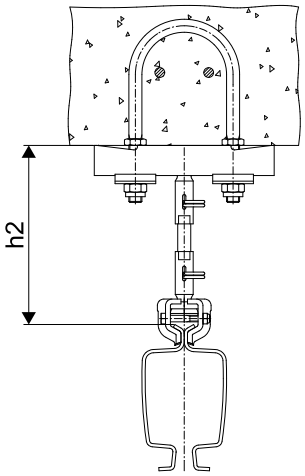
Standard



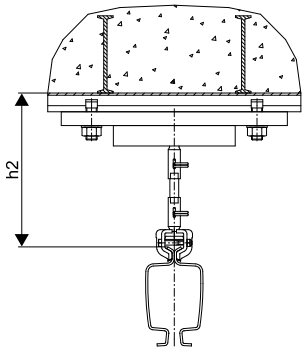
On anchor bolts



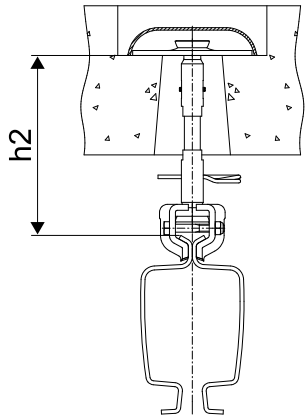
From U-bolt



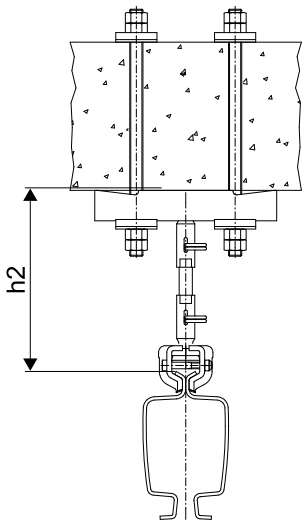
For Halfen rail



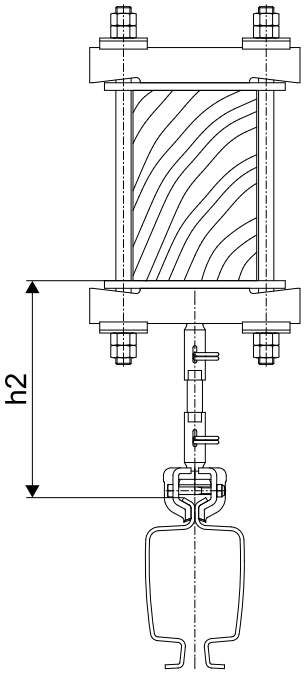
With floor plate



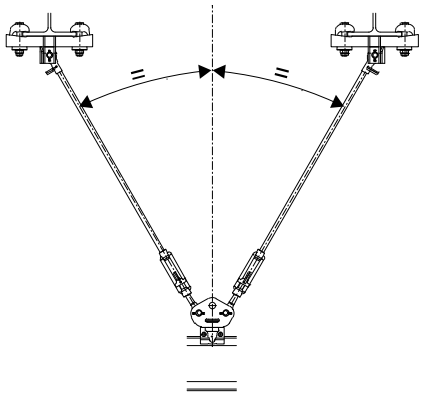
Drilled



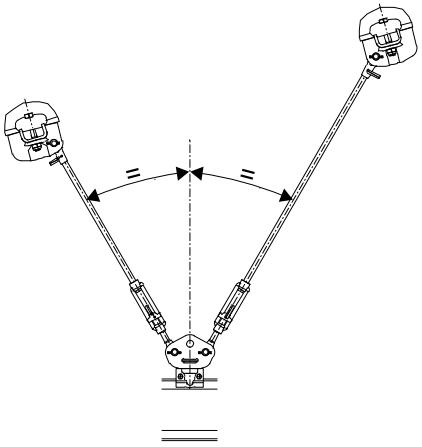
On wooden beam



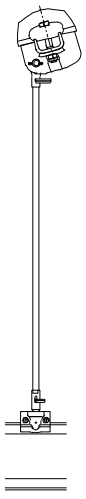
V-type suspension fitting



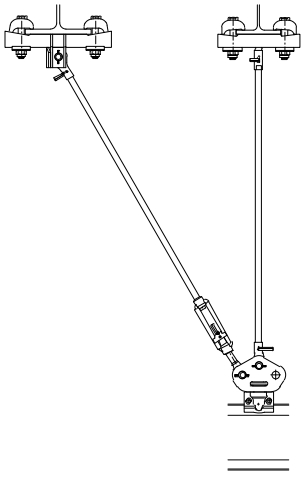
Sloping V-type suspension



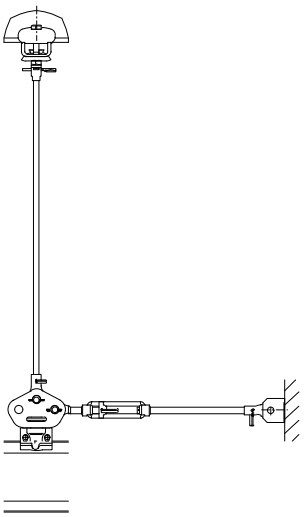
Sloping suspension



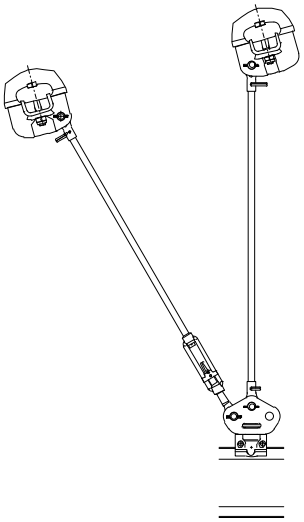
Lateral stiffener



Lateral stiffener



Sloping stiffener



6.2 Vertical suspension on I-beams

6.2.1 I-beam assignment

Section category		Suitable for profile sections		
		I	IPE	HE-B (IPB)
ST 100, I, II/M10	Upper suspension bracket A	140 - 260	120 - 270	100 - 140
	Upper suspension bracket B	-	220 - 450	120 - 200
ST II-L, II, II-H	Upper suspension bracket A	140 - 320	140 - 270	100 - 120
	Upper suspension bracket B	220 - 450	180 - 500	100 - 200
ST II-H /M20	Suspension plate B	220 - 450	180 - 500	100 - 200

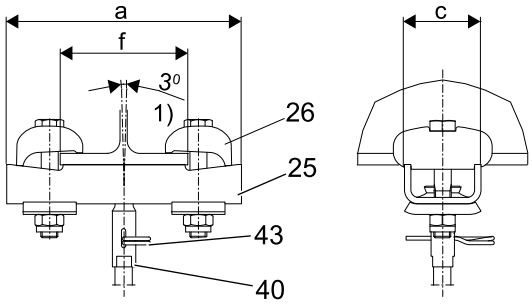
Upper suspension bracket A can be used on roof structures and steel profile sections; upper suspension bracket B (ends project beyond bearing surface) is only suitable for steel profile sections.

The special clamp design ensures that the bolt of the clamp is always vertical regardless of the beam flange thickness.

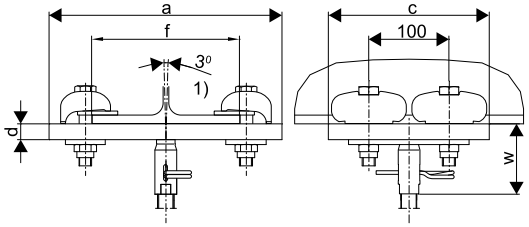
6.2.2 Suspension with suspension rod

Attachment to steel profile section

ST 100, I, II-L, II, II-H /M16



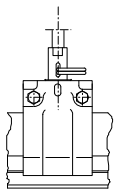
ST II-H /M20



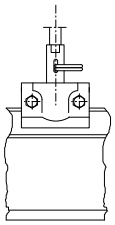
1) Max. girder gradient ± 1.5°

Attachment on the track

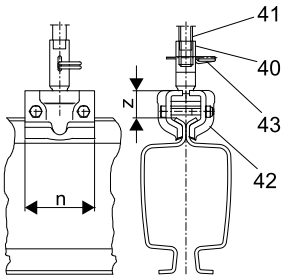
ST 100



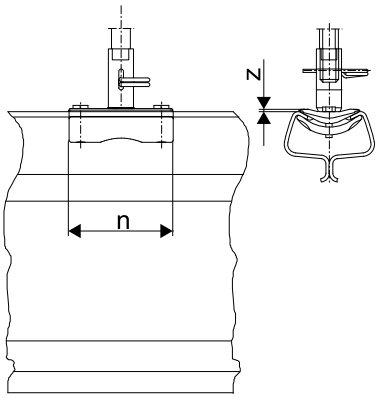
ST I



ST II-L, II



ST II-H



Section category							Upper suspension bracket A				Upper suspension bracket/suspension plate B			
	h2	m	n	w	x	z	a	f	c	d	a	f	c	d
ST 100	75 + h1 ±9	M10	60	60	65	25	205	66 - 142	70	27	270	110 - 210	70	23
ST I	70 + h1 ± 9	M10	60	60	60	20								
ST II /M10	85 + h1 ± 9	M10	80	60	65	30								
ST II-L	120 + h1 ± 14	M16 x 1.5	80	95	90	30	221	71 - 139	72	37	290	100 - 208	76	36
ST II	120 + h1 ± 14	M16 x 1.5	80	95	90	30								
ST II-H /M16	85 + h1 ± 14	M16 x 1.5	90	95	55	6								
ST II-H /M20	85 + h1 ± 14	M20 x 1.5	90	90	65	6	-				290	96 - 208	200	20

Complete suspension fittings, pre-assembled

Item	Designation		Upper suspension bracket Type		ST 100	ST I	ST II-L	ST II	ST II-H / M16	ST II-H / M20
					Max. load on suspension					
					400 kg	750 kg	1400 kg	1700 kg		2600 kg
30	Complete suspension with suspension rod Length h_1 [mm]	80	A	Weight [kg]	2.50	2.06	-	-	-	-
				Part no.	984 641 44	980 497 44				
			B	Weight [kg]	2.70	2.27				
				Part no.	517 687 46	980 800 44				
		100	A	Weight [kg]	-	-	4.09		4.12	-
				Part no.			851 147 44		858 147 44	
			B	Weight [kg]			4.89		4.92	12.98
				Part no.			851 149 44		858 149 44	858 264 44
		300	A	Weight [kg]	2.61	2.17	4.37		4.40	-
				Part no.	517 688 46	980 498 44	851 148 44		858 148 44	
			B	Weight [kg]	2.81	2.38	5.17		5.20	13.39
				Part no.	517 689 46	980 801 44	851 151 44		858 151 44	715 721 46
		600	A	Weight [kg]	2.76	2.32	4.79		4.82	-
				Part no.	517 690 46	517 698 46	517 704 46		715 320 46	
			B	Weight [kg]	2.96	2.53	5.59		5.62	14.02
				Part no.	517 691 46	517 699 46	517 705 46		715 322 46	715 723 46
		1000	A	Weight [kg]	2.96	2.52	5.35		5.38	-
				Part no.	517 692 46	517 700 46	517 706 46		715 321 46	
			B	Weight [kg]	3.16	2.73	6.15		6.18	14.85
				Part no.	517 693 46	517 701 46	517 707 46		715 323 46	715 725 46

Suspension fitting component parts

Item	Designation		Qty/susp.		ST 100	ST I	ST II-L	ST II	ST II-H /M16	ST II-H /M20
					Max. load on suspension					
					400 kg	750 kg	1400 kg	1700 kg		2600 kg
25	Upper suspension bracket A		1	Weight [kg]	0.76		1.20			-
				Part no.	980 302 44		982 302 44			
	Upper suspension bracket B/ suspension plate B			Weight [kg]	0.96		2.00			11.50
				Part no.	980 304 44		982 304 44			858 304 44
26	Upper suspension clamp		2	Weight [kg]	0.42		0.85			4 off incl.
				Part no.	980 326 44		982 326 44			
40	Ball-head suspension rod		2	Weight [kg]	0.08		0.16			0.27
				Part no.	980 333 44		982 333 44			858 343 44
41	Suspension rod Length h1 [mm]	80	1	Weight [kg]	0.04		-	-	-	-
				Part no.	980 346 44					
		100		Weight [kg]	-	-	0.14			0.21
				Part no.			982 446 44			850 346 44
		300		Weight [kg]	0.15		0.42			0.62
				Part no.	980 347 44		982 447 44			850 347 44
		600		Weight [kg]	0.30		0.84			1.25
				Part no.	980 348 44		982 448 44			850 348 44
		1000		Weight [kg]	0.50		1.40			2.08
				Part no.	980 349 44		982 449 44			850 349 44
		3000		Weight [kg]	-	-	4.20			-
				Part no.			982 445 44			
42	Track suspension clamp		1	Weight [kg]	0.68	0.25	0.69		0.72	0.66
				Part no.	984 550 44	980 260 44	982 260 44		858 260 44	858 280 44
43	Spring clip		2	Weight [kg]	0.01		0.02			0.04
				Part no.	342 200 99		342 201 99			342 202 99

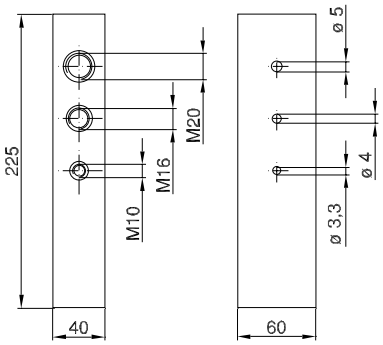
The ball-head suspension rod (item 40) and suspension rod coupling (item 50) are provided with slotted holes. The threaded rod (item 41) has a cross-hole at both ends. If standard threaded suspension rods have to be shortened, a new transverse hole must be drilled at the end of the threaded rod.

Finish: galvanized

Wearing parts

Item	Designation		ST 100, I	ST II (M16)	ST II (M20)
42d	Sliding shell for ball-head suspension rod/ball-head bolt (25 off)	Weight [kg]	0.02	0.05	-
		Part no.	980 815 44	851 394 44	
	Sliding shell for ball-head suspension rod/ball-head bolt (1 off)	Weight [kg]	-	-	0.025
		Part no.			850 342 44

Drilling jig (item 38)

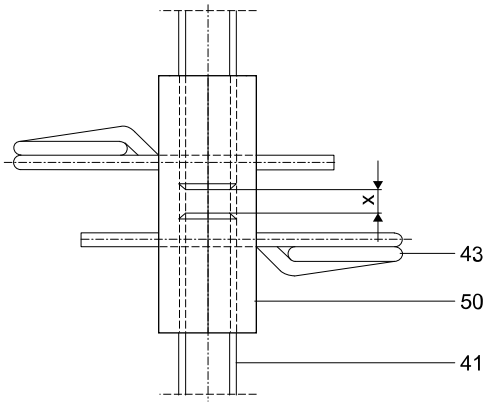


The drilling jig facilitates drilling transverse holes in suspension rods after they have been shortened on site. This ensures that the distance to the end of the rod is reliably maintained.

Item	Designation		
38	Drilling jig for suspension rods	Weight [kg]	3.92
		Part no.	982 017 44

Finish: galvanized

6.2.3 Coupling for suspension rod (item 50)



	x
ST 100, I	0-3
ST II-L, II	0-4

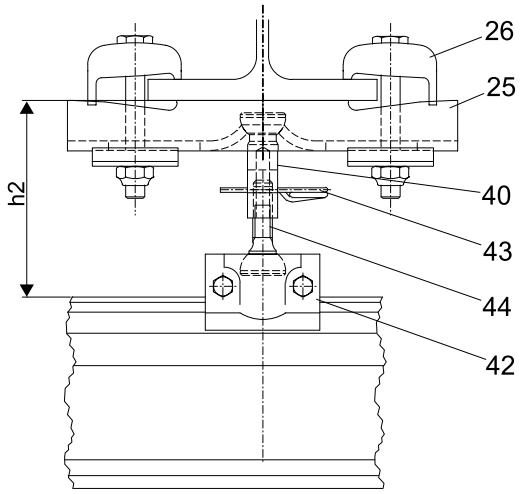
Item	Designation		ST 100, I	ST II-L, II, II-H/M16	ST II-H /M20
50	Coupling for suspension rod	Weight [kg]	0.06	0.15	-
		Part no.	980 277 44	982 277 44	-
43	Spring clip	Weight [kg]	0.01	0.02	0.04
		Part no.	342 200 99	342 201 99	342 202 99

Use couplings to connect several suspension rods.

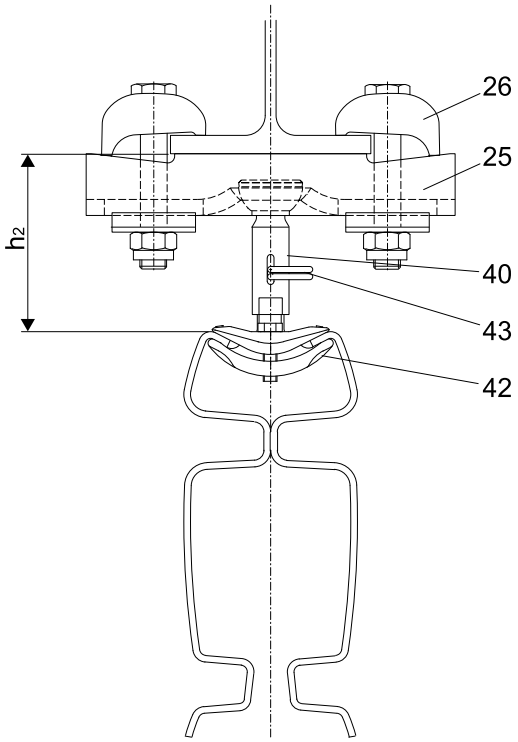
Finish: galvanized

6.2.4 Short suspension arrangement with height adjustment (item 31)

ST 100, I, II-L, II



ST II-H



	h_2
ST 100	100 ± 4
ST I	95 ± 4
ST II-L/II	140 ± 7
ST II-H /M16	107 ± 7
ST II-H /M20	107 ± 7

Complete suspension fittings, pre-assembled

Item	Designation	Upper suspension bracket		ST 100	ST I	ST II-L	ST II	ST II-H / M16	ST II-H / M20
				Max. load on suspension					
		Type		400 kg	750 kg	1400 kg	1700 kg		2600 kg
31	Complete suspension fitting Short suspension arrangement with height adjustment	A	Weight [kg]	2.43	1.99	3.91		3.81	-
			Part no.	984 640 44	980 700 44	851 365 44		858 145 44	
		B	Weight [kg]	2.63	2.20	4.71		4.72	12.71
			Part no.	517 685 46	980 701 44	851 366 44		858 146 44	858 345 44

Suspension fitting component parts

Item	Designation	Qty/ susp.		ST 100	ST I	ST II-L	ST II	ST II-H / M16	ST II-H / M20
				Max. load on suspension					
				400 kg	750 kg	1400 kg	1700 kg		2600 kg
25	Upper suspension bracket A	1	Weight [kg]	0.76		1.20			-
			Part no.	980 302 44		982 302 44			
	Upper suspension bracket B/ suspension plate B		Weight [kg]	0.96		2.00			11.50
			Part no.	980 304 44		982 304 44			858 304 44
26	Upper suspension clamp	2	Weight [kg]	0.42		0.85			
			Part no.	980 326 44		982 326 44			4 off incl.
40	Ball-head suspension rod	1	Weight [kg]	0.08		0.16			0.27
			Part no.	980 333 44		982 333 44			858 343 44
42	Track suspension clamp	1	Weight [kg]	0.68	0.25	0.25		0.72	0.40
			Part no.	984 550 44	980 260 44	982 260 44		858 260 44	858 280 44
43	Spring clip	1	Weight [kg]	0.01		0.02			0.04
			Part no.	342 200 99		342 201 99			342 202 99
44	Ball-head bolt	1	Weight [kg]	0.06		0.14			0.25
			Part no.	980 283 44		982 283 44			858 283 44

A particularly low suspension height can be achieved using the ball-head bolt/ball-head suspension rod connection arrangement with spring clip. Slotted holes facilitate height adjustment.

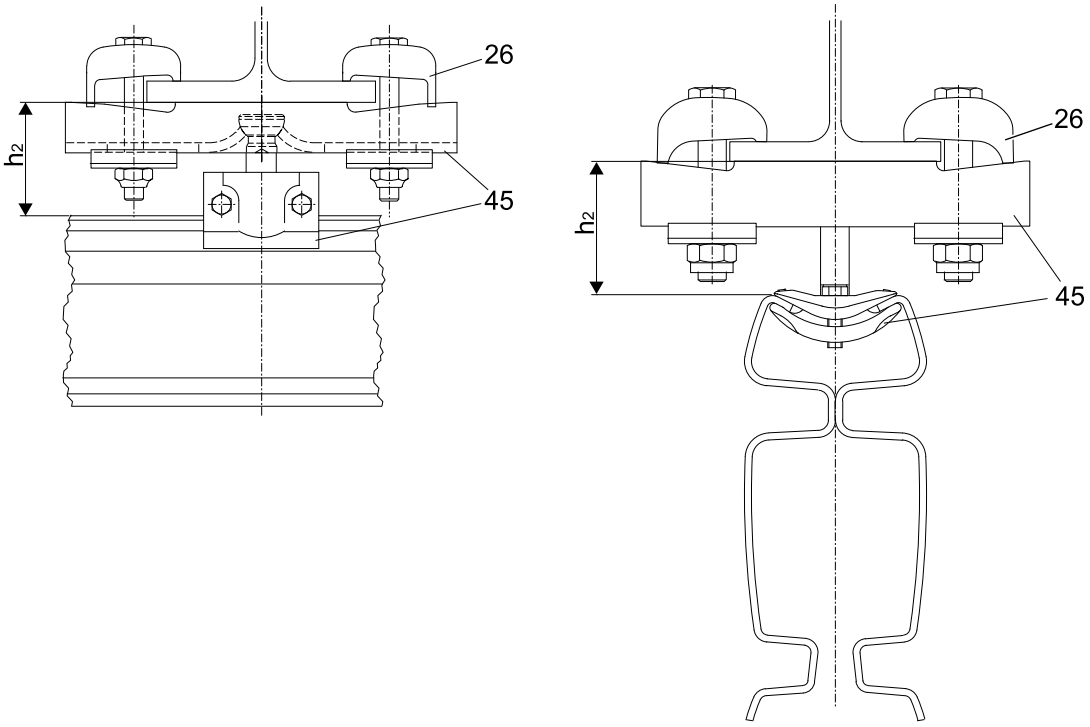
Finish: galvanized

Wearing parts

Item	Designation		ST 100, I	ST II (M16)	ST II (M20)
42d	Sliding shell for ball-head suspension rod/ball-head bolt (25 off)	Weight [kg]	0.02	0.05	-
		Part no.	980 815 44	851 394 44	
	Sliding shell for ball-head suspension rod/ball-head bolt (1 off)	Weight [kg]	-	-	0.025
		Part no.			850 342 44

6.2.5 Short suspension arrangement without height adjustment (item 45)

Short suspension arrangement (without height adjustment)



	h_2
ST 100	65
ST I	60
ST II-L, II	110
ST II-H	75

Suspension fitting component parts

Item	Designation	Upper suspension bracket Type		ST 100	ST I	ST II-L	ST II	ST II-H
				Max. load on suspension				
				400 kg	750 kg	1400 kg	1700 kg	
26	Upper suspension clamp (2 off/susp.)		Weight [kg]	0.42		0.85		
			Part no.	980 326 44		982 326 44		
45	Short suspension arrangement without height adjustment	A	Weight [kg]	On application	1.15	2.11		2.07
			Part no.		980 370 44	982 370 44		858 370 44
		B	Weight [kg]	On application	1.35	2.92		2.95
			Part no.		980 371 44	982 371 44		858 371 44

Particularly low suspension heights can be achieved by using a short suspension arrangement. **The height of the track cannot be compensated, which means the superstructure must be perfectly level.**

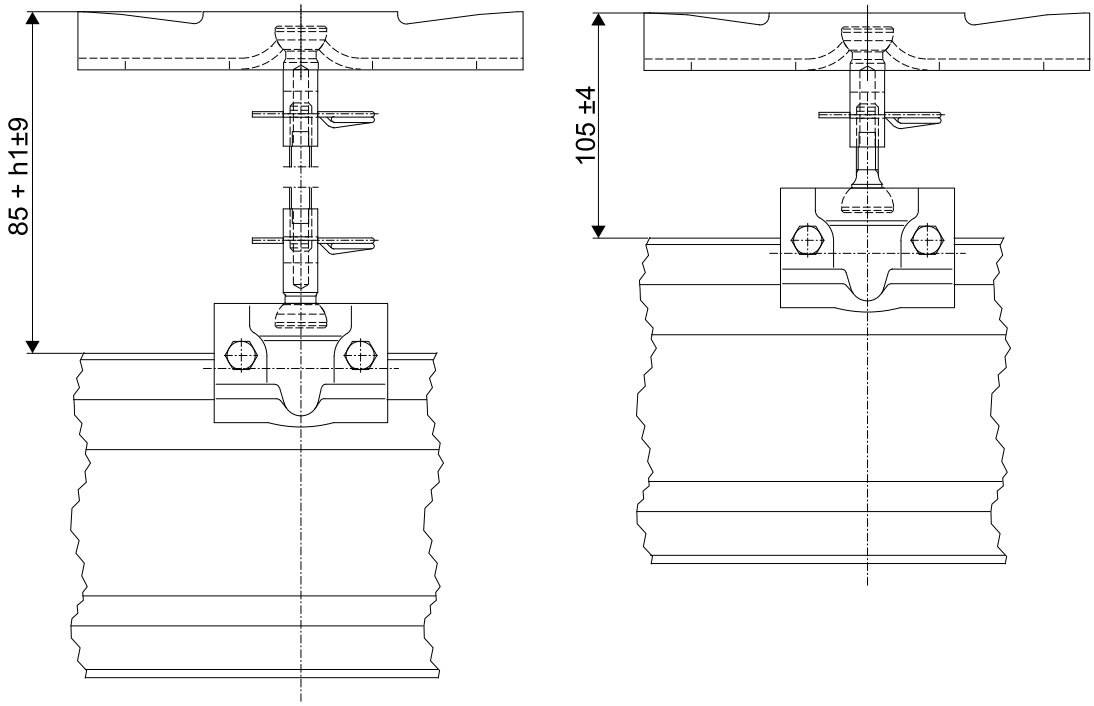
The clamps (26) must be ordered separately.

The minimum flange width when using short suspension fittings is 75 mm.

Finish: galvanized

6.2.6 ST II/M10 suspension clamp (item 52)

ST II/M10 suspension



Item	Designation		ST II-L, II
52	ST II/M10 suspension clamp	Weight [kg]	0.70
		Part no.	980 250 44

In addition to standard ST II track suspension fittings with a load capacity of 1700 kg, ST II/M10 track suspension fittings are also available for installations for low loads. These suspension arrangements consist of ST I components and a special ST II track suspension clamp to accommodate ST I ball-head suspension rods.

Maximum permissible load per ST II/M10 suspension: 750 kg

Possible applications

ST crane installations with suspension loads less than 750 kg according to special calculation and verification with the formulae from ProfileMaster Plus ST Classic – planning and project drafting (page 14).

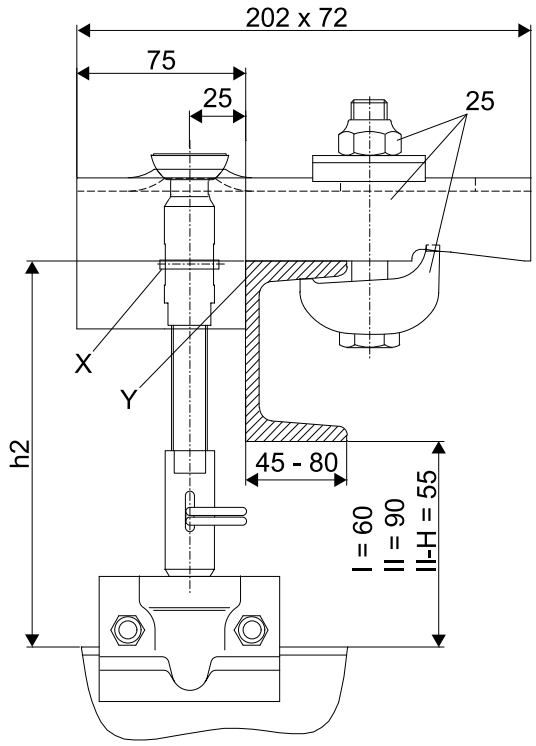
Overloading of the suspension must be avoided; particular attention must be paid to any changes in the installation.

ST II track suspension clamps (982 260 44) must not be combined with ST I suspension elements.

The use of ST II/M10 suspensions must be clearly indicated in drawings and in the test and inspection booklet.

Finish: galvanized

6.3 Vertical suspension from U-sections



	h_2	
ST I	20 + h1 ± 9	> track section height + 60
ST II	50 + h1 ± 14	> track section height + 90
ST II-H	15 + h1 ± 14	> track section height + 55

U-type suspension brackets can be used on U-shaped steel profile sections (DIN 1026).

The max. suspension load must be observed as specified in the table:

Item	Profile	Weight [kg]	Part no.	Max. suspension load G_{AB} [kg]	Steel girder section
25	ST I	2	980 377 44	750	U 80 - U 220
	ST II-L ST II STII-H/M16	3.49	984 377 44	750	U 80 - U 100
				1000	U 120 - U 140
				1250	U 160
				1400	U 180
				1500	U 200 - U 220

The free swing angle of the suspension fitting may be limited by the steel profile section. Use stiffeners, as required, to avoid any collision during operation.

Secure the connection between the ball-head suspension rod and the suspension rod with the enclosed spring pin (see “X”)

Edge “Y” of the upper suspension bracket must be in close contact with the profile section.

The ball-head suspension rod, spring clip and suspension clamp must be ordered separately.

Finish: galvanized

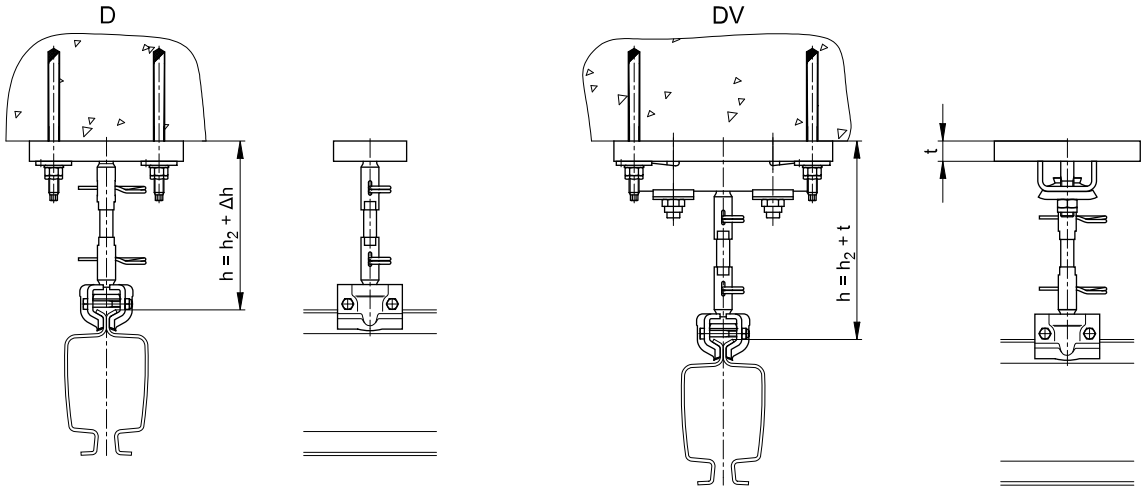
The loads specified for individual profile sections must not be exceeded.

The owner is responsible for verification of U-sections.

6.4 Ceiling attachment

6.4.1 Suspension with anchor bolt connection

Anchor bolt connection

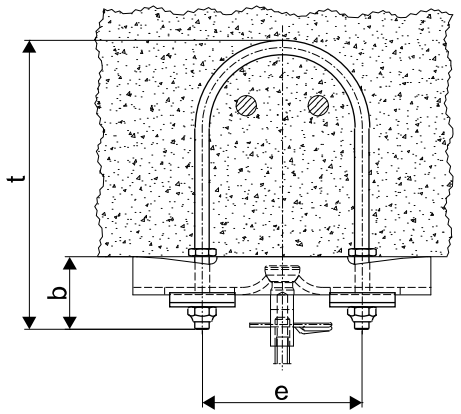


ST equipment can be attached to concrete superstructures by anchor bolts. Anchor bolts must be used that are approved for use with dynamic loads. They must be installed by trained personnel and an installation report must be compiled.

For further information see “Anchor bolt connection technical data” manual, see Supplementary documents and other manuals (page 8).

6.4.2 U-bolt with upper suspension bracket A

U-bolt (item 27)



	b	e	t
ST 100, I	50	110	200
ST II-L, II, II-H	70	120	225

Item	Designation	Qty/susp.		ST 100, I	ST II-L, II, II-H/M16
27	U-bolt (complete)	1	Weight [kg]	0.67	1.43
			Part no.	980 330 44	982 330 44

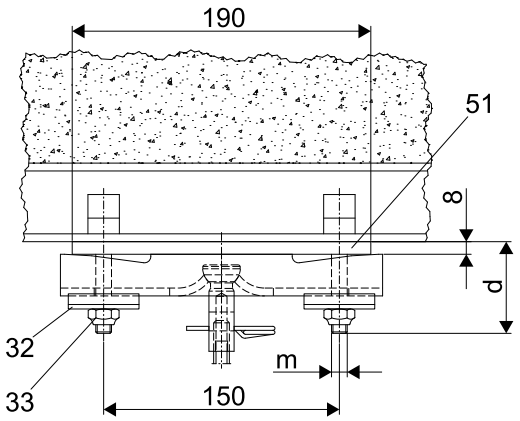
For new buildings, U-bolts can be cast in reinforced ceilings at the ST track suspension points while the building is still under construction. This must be discussed with the structural engineer. U-bolts are used to secure upper suspension bracket A.

To make it possible to align the track, the U-bolts should be cast in at right angles to the direction of the track.

Finish: galvanized

6.4.3 Suspension from ceiling section rails with upper suspension bracket A

Packing plate (item 32), locknut (item 33), packing plate for upper suspension bracket (item 51)



	d	m[1)]
ST 100, I	70	M10
ST II-L, II, II-H/M16	80	M16

[1)] Or as indicated for cast-in section rail for upper suspension bracket H. See data referring to cast-in section rail for tightening torque.

Item	Designation	Qty/susp.		ST 100, I	ST II-L, II, II-H/M16
32	Packing plate	2	Weight [kg]	0.18	0.26
			Part no.	980 429 44	984 329 44
33	Locknut	2	Weight [kg]	-	-
			Part no.	334 610 44	334 614 44
35	Packing plate for upper suspension bracket	1	Weight [kg]	1.75	
			Part no.	984 088 44	

Suspension may only be from cast-in section rails that are approved for dynamic loads.

A-type upper suspension brackets are secured to ceiling section rails using a packing plate and two special bolts with nuts and tab washers. The M10 for ST 100, I and M16 for ST II-L, II special bolts should be provided by the customer or can be supplied on application (specify section rail type).

This ProfileMaster Plus ST suspension fitting must be regarded as a concentrated load on the section rail.

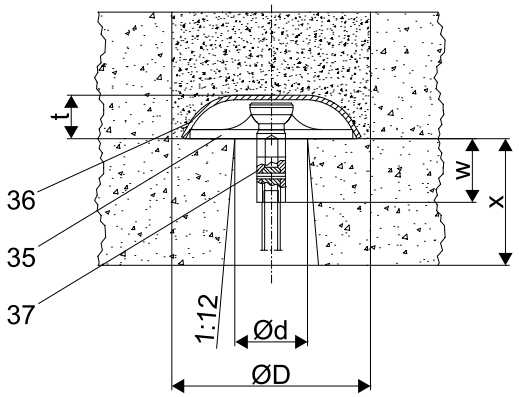
Pay attention to the load capacity and the correct length of the special bolts.

Upper suspension brackets H with bore hole spacing ≥ 250 mm count as dual load suspensions.

Finish: galvanized

6.4.4 Suspension with floor fixture plate and cover

Floor fixture plate (item 35), cover for floor fixture plate (item 36), spring pin (item 37)



	d	D	t	w
ST 100, I	40	110	25	35
ST II-L, II, II-H/M16	60	150	28	60

Item	Designation		ST 100, I	ST II-L, II, II-H/M16
35	Floor slab	Weight [kg]	0.25	0.42
		Part no.	980 336 44	982 336 44
36	Cover	Weight [kg]	0.20	0.35
		Part no.	980 338 44	982 338 44
37	3 x 18 spring pin	Weight [kg]	-	-
		Part no.	345 095 99	-
	4 x 26 spring pin	Weight [kg]	-	-
		Part no.	-	345 008 99

In existing concrete buildings it is impossible to install a steel profile section without losing headroom. In such cases it is possible to make a hole in the ceiling at the suspension point and to use a floor fixture plate for the ball-head suspension rod with the cover for the floor fixture plate. The connection between the suspension rod and the ball-head suspension rod is often no longer accessible for maintenance and the two rods must be secured relative to each other by a spring pin instead of a spring clip. Arrangement of these suspension fittings, the loads to which they are subjected and dimension X should be agreed with the structural engineer responsible.

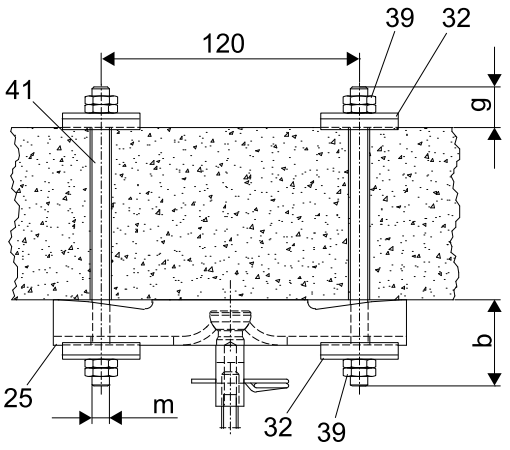
Finish: galvanized

6.4.5 Suspension with upper suspension bracket A or suspension plate B and suspension rods

Nut for suspension rod (item 39)

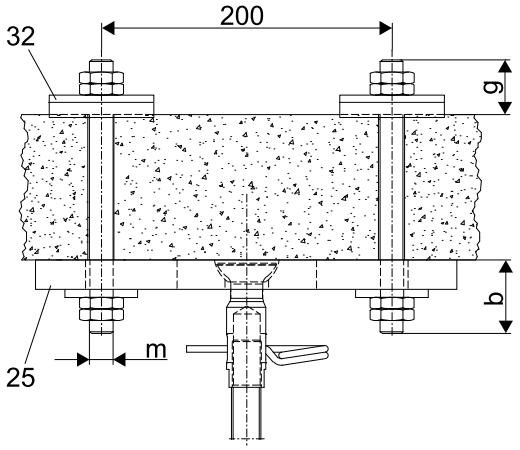
Upper suspension bracket A

for ST 100, I, II-L, II/M16



Suspension plate B

for ST II-H/M20



	b	g	m
ST 100, I	60	35	M10
ST II-L, II, II-H/M16, II-H/M20	85	50	M16 x 1.5

Item	Designation	Qty/susp.		ST 100, I	ST II-L, II, II-H/M16	ST II-H /M20
25	Upper suspension bracket A	1	Weight [kg]	0.76	1.15	-
			Part no.	980 302 44	982 302 44	-
	Upper suspension plate B without upper suspension clamp	1	Weight [kg]	-	-	8.71
			Part no.	-	-	858 306 44
32	Packing plate	4	Weight [kg]	0.18	0.26	
			Part no.	980 429 44	984 329 44	
39	Nut for suspension rod	8	Weight [kg]	-	-	-
			Part no.	150 509 99	150 678 99	-
		16	Weight [kg]	-	-	-
			Part no.	-	-	150 678 99

Item	Designation		Qty/susp.		ST 100, I	ST II-L, II, II-H/M16	ST II-H /M20
41	Suspension rod Length h_1 [mm]	80	1	Weight [kg]	0.04	-	
				Part no.	980 346 44		
		100		Weight [kg]	-	0.14	
				Part no.		982 446 44	
		300		Weight [kg]	0.15	0.42	
				Part no.	980 347 44	982 447 44	
		600		Weight [kg]	0.30	0.84	
				Part no.	980 348 44	982 448 44	
		1000		Weight [kg]	0.50	1.40	
				Part no.	980 349 44	982 449 44	
		3000		Weight [kg]		4.20	
				Part no.	-	982 445 44	

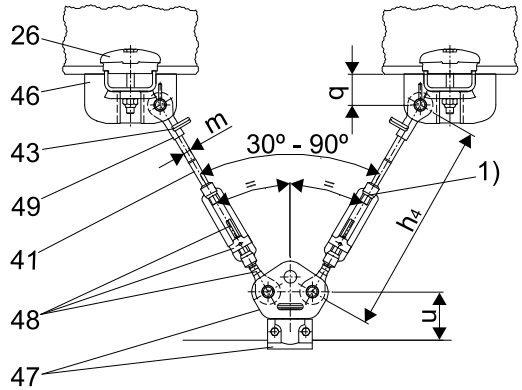
A-type upper suspension brackets can also be secured to solid ceilings by using suspension rods with counter-plates. The transmission of forces to the concrete ceiling must be agreed with the structural engineer.

The distance between suspension rods for M20 suspensions (M16 x 1.5) measures: 200 x 100 m.

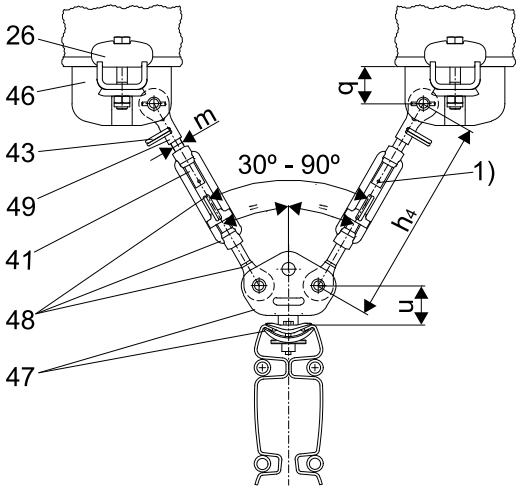
6.5 V-type suspension fitting

ST 100, I, II-L, II

(Load capacity, see Notes and overview (page 51))



ST II-H (up to 1700 kg)



1) No spring clip fitted here

h_1 = suspension rod length

	h_4	m	q	r	u
ST 100	h_1 + 155 ± 30	M10	40	45	65
ST I					60
ST II-L, II	h_1 + 220 ± 40	M16 x 1.5	55	65	75
ST II-H					60

Item	Designation		Qty/susp.		ST 100	ST I	ST II-L	ST II	ST II-H
					Max. load on suspension				
					400 kg	750 kg	1400 kg	1700 kg	
26	Upper suspension clamp		4	Weight [kg]	0.43		0.85		
				Part no.	980 326 44		982 326 44		
41	Suspension rod Length h_1 [mm]	80	2	Weight [kg]	0.04		-	-	-
				Part no.	980 346 44				
		100		Weight [kg]	-	-	0.14		
				Part no.			982 446 44		
		300		Weight [kg]	0.15		0.42		
				Part no.	980 347 44		982 447 44		
		600		Weight [kg]	0.30		0.84		
				Part no.	980 348 44		982 448 44		
		1000		Weight [kg]	0.50		1.40		
				Part no.	980 349 44		982 449 44		
		3000		Weight [kg]	-	-	4.20		
				Part no.			982 445 44		
43	Spring clip		2	Weight [kg]	0.01		0.02		
				Part no.	342 200 99		342 201 99		
46	V-type upper suspension bracket B		2	Weight [kg]	1.48		3.03		
				Part no.	980 360 44		984 075 44		
47	V-type suspension clamp		1	Weight [kg]	1.02	0.86	2.11		2.45
				Part no.	984 549 44	980 395 44	984 080 44		858 080 44
48	Suspension rod strainer		2	Weight [kg]	0.25		0.79		
				Part no.	980 310 44		984 085 44		
49	Hinged end piece		2	Weight [kg]	0.10		0.30		
				Part no.	980 315 44		984 083 44		
54	Pin with BoClip for third hinged end piece			Weight [kg]	0.08		0.16		
				Part no.	851 305 44		851 317 44		

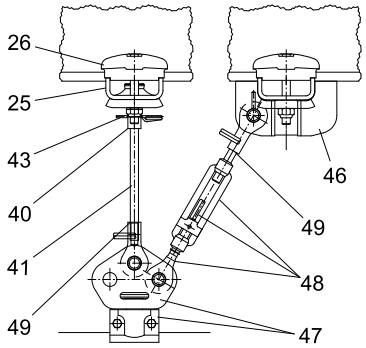
The maximum permissible loads correspond to those for vertical suspension arrangements.

V-type suspensions are fitted as shown in the diagrams. V-type hinged suspension clamp (item 47) and V-type upper suspension bracket (item 46) are connected to each other by suspension rod strainer (item 48), suspension rod (item 41) and hinged end piece (item 49). Each bolted connection with a hinged end piece must be secured with a spring clip (item 43).

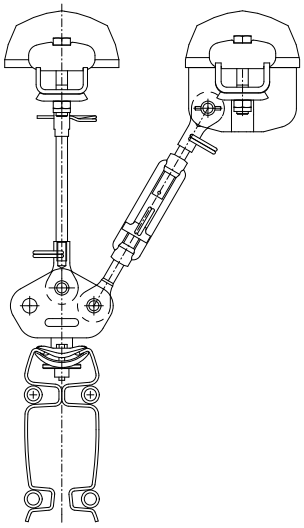
Finish: galvanized

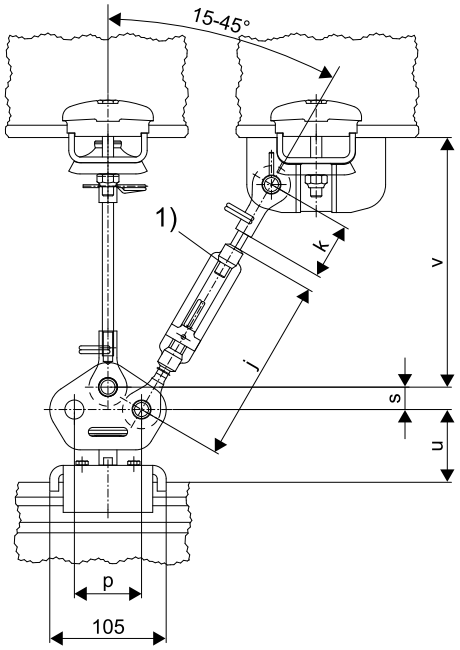
6.6 Stiffener

ST 100, I, II-L, II



ST II-H





1) No spring clip fitted here

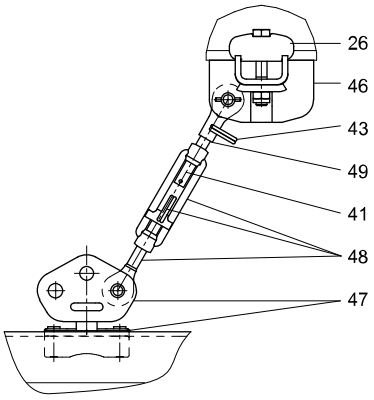
	j	k	p	s	u	v
ST 100	165 ± 15	50	60	20	65	h_1 + 65 ± 4
ST I					60	
ST II-L, II	235 ± 20	65	90	25	75	h_1 + 100 ± 7
ST II-H					60	

Item	Designation	Qty/ susp.		ST 100	ST I	ST II-L	ST II	ST II-H
				Max. load on suspension				
				400 kg	750 kg	1400 kg	1700 kg	
25	Upper suspension bracket A	1	Weight [kg]	0.65		1.20		
			Part no.	980 302 44		982 302 44		
	Upper suspension bracket B/suspension plate B		Weight [kg]	0.85		2.40		
			Part no.	980 304 44		982 304 44		
26	Upper suspension clamp	4	Weight [kg]	0.45		1.00		
			Part no.	980 326 44		982 326 44		
40	Ball-head suspension rod	1	Weight [kg]	0.80		0.15		
			Part no.	980 333 44		982 333 44		

Item	Designation		Qty/ susp.		ST 100	ST I	ST II-L	ST II	ST II-H
					Max. load on suspension				
					400 kg	750 kg	1400 kg	1700 kg	
41	Suspension rod length h_1 [mm]	80	1+1	Weight [kg]	0.04		-	-	-
				Part no.	980 346 44				
		100		Weight [kg]	-	-	0.14		
				Part no.			982 446 44		
		300		Weight [kg]	0.15		0.42		
				Part no.	980 347 44		982 447 44		
		600		Weight [kg]	0.30		0.84		
				Part no.	980 348 44		982 448 44		
		1000		Weight [kg]	0.50		1.40		
				Part no.	980 349 44		982 449 44		
		3000		Weight [kg]	-	-	4.20		
				Part no.			982 445 44		
43	Spring clip		3	Weight [kg]	0.01		0.02		
				Part no.	342 200 99		342 201 99		
46	V-type upper suspension bracket B		1	Weight [kg]	1.39		3.20		
				Part no.	980 360 44		984 075 44		
47	V-type suspension clamp		1	Weight [kg]	1.10	1.00	2.20		2.45
				Part no.	984 549 44	980 395 44	984 080 44		858 080 44
48	Suspension rod strainer		1	Weight [kg]	0.29		0.85		
				Part no.	980 310 44		984 085 44		
49	Hinged end piece		2	Weight [kg]	0.10		0.30		
				Part no.	980 315 44		984 083 44		
54	Pin with BoClip for third hinged end piece			Weight [kg]	0.08		0.16		
				Part no.	851 305 44		851 317 44		

Sloping stiffener, in combination with M20

ST II-H



	j	k	p	s	u	v
ST II-H	235 ± 20	65	90	25	60	h_1 + 100 ± 7

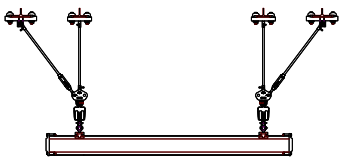
Item	Designation		Qty/susp.		ST II-H
26	Upper suspension clamp		2	Weight [kg]	0.45
				Part no.	982 326 44
41	Suspension rod length h_1 [mm]	100	1	Weight [kg]	0.16
				Part no.	982 446 44
		300		Weight [kg]	0.47
				Part no.	982 447 44
		600		Weight [kg]	0.80
				Part no.	982 448 44
		1000		Weight [kg]	1.40
				Part no.	982 449 44
43	Spring clip		1	Weight [kg]	0.02
				Part no.	342 201 99
46	V-type upper suspension bracket B		1	Weight [kg]	3.20
				Part no.	984 075 44
47	V-type suspension clamp		1	Weight [kg]	2.45
				Part no.	858 080 44
47a	Filler plates for sloping surface		1	Weight [kg]	-
				Part no.	
48	Suspension rod strainer		1	Weight [kg]	0.85
				Part no.	984 085 44
49	Hinged end piece		1	Weight [kg]	0.30
				Part no.	984 083 44

Stiffener on one side only, not a load-bearing suspension

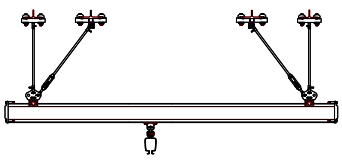
Stiffeners are fitted as shown in the diagrams. V-type hinged suspension clamp (item 47) and V-type upper suspension bracket (item 46) are connected to each other by suspension rod strainer (item 48), suspension rod (item 41) and hinged end piece (item 49). Each bolted connection with a hinged end piece must be secured with a spring clip (item 43). For wall fixture, see Wall fixture (page 76).

Finish: galvanized

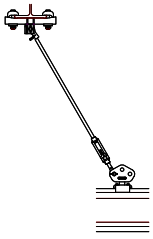
Crane runway stiffener, perpendicular direction



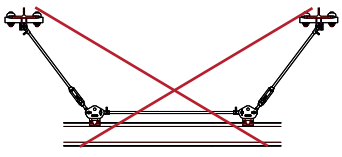
Track stiffener, longitudinal direction



Only for ST II-H /M20



Not permitted for any profile sections

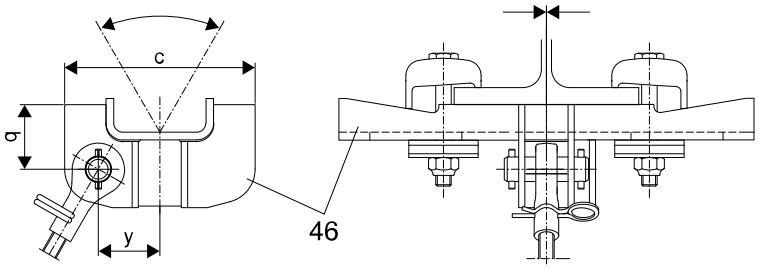


6.7 Component parts for V-type suspension/stiffener arrangement

6.7.1 V-type upper suspension bracket (item 46)

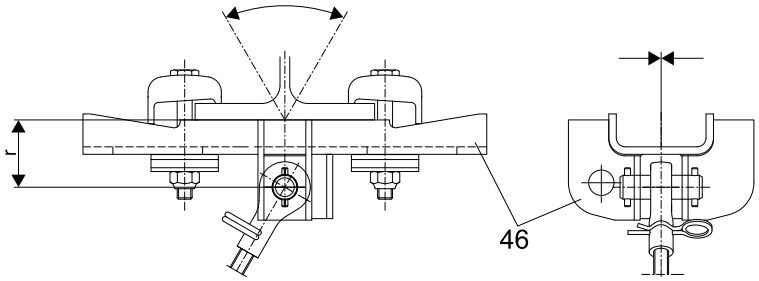
Pin axis parallel to V-type upper suspension bracket

1. May slope in this plane 2. Additional sloping plane is not possible



Pin axis perpendicular to V-type upper suspension bracket

1. May slope in this plane 2. Additional sloping plane is not possible



	c	q	r	y
ST 100, I	125	40	45	40
ST II-L, II, II-H	150	55	65	50

Item	Designation		ST 100	ST I	ST II-L	ST II, II-H
			Max. load on suspension			
			400 kg	750 kg	1400 kg	1700 kg
46	V-type upper suspension bracket B	Weight [kg]	1.48		3.03	
		Part no.	980 360 44		984 075 44	

V-type upper suspension brackets have a pin with spring pins (no hinged end piece).

Possible mounting configurations

Fit V-type upper suspension brackets to the superstructure in the same way as vertical suspension arrangements (e.g. with upper suspension clamps).

V-type upper suspension brackets are the same size as upper suspension bracket B (the ends are higher).

Upper suspension bracket A is not used for stiffeners/V-type suspensions because the girders which fit upper suspension bracket A do not always absorb the lateral and torsion forces. For smaller girders: adapters available on request.

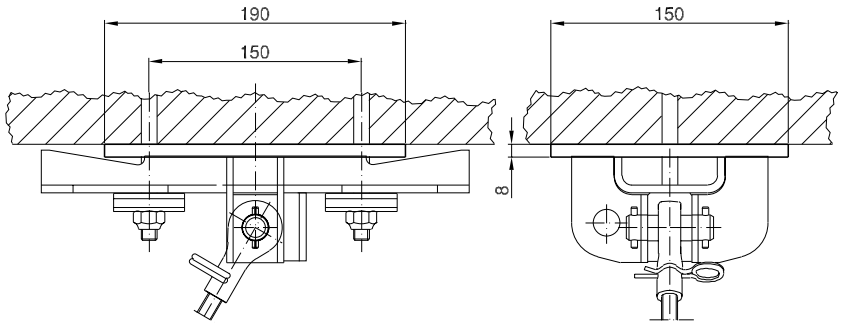
The V-type upper suspension bracket is designed for connecting **one** suspension rod by means of a hinged end piece (item 49) (pin axis either parallel or perpendicular to V-type upper suspension bracket). If two or more connections are fitted, a corresponding number of V-type upper suspension brackets must be fitted next to each other.

The pin axis of the V-type upper suspension bracket must always be horizontal and parallel to the pin axis of the V-type hinged suspension clamp (item 47) and perpendicular to the suspension rod axis. V-type upper suspension brackets on sloping superstructures must be anchored against movement. If a V-type upper suspension bracket is not fitted to steel sections, the packing plate (item 51) must be used.

Finish: galvanized

6.7.2 Packing plate for upper suspension bracket (item 51)

ST 100, I, II-L, II, II-H packing plate for upper suspension bracket (1700 kg)

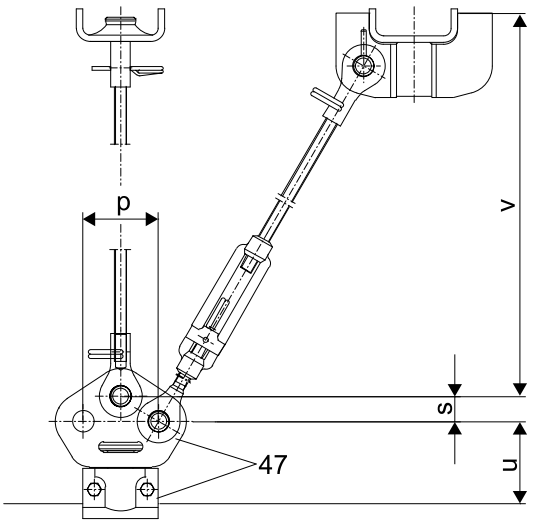


Item	Designation		ST 100, I, II-L, II, II-H
51	Packing plate for upper suspension bracket	Weight [kg]	1.75
		Part no.	984 088 44

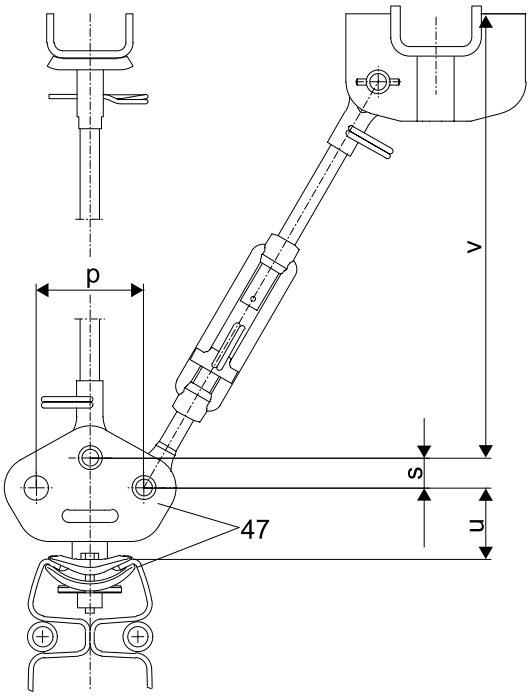
If the V-type upper suspension bracket is not fitted to steel sections, packing plate (item 51) must be used. This is to ensure that the V-type upper suspension bracket is properly fitted to solid ceilings, ceiling section rails, etc.

6.7.3 V-type hinged suspension clamp (item 47)

ST100, I, II-L, II



ST II-H



h_1 = suspension rod length

	p	s	u	v
ST 100	60	20	65	h_1 + 65 ± 4
ST I			60	
ST II-L, II	90	25	75	h_1 + 100 ± 7
ST II-H			60	

Item	Designation		ST 100	ST I	ST II-L	ST II	ST II-H
			Max. load on suspension				
			400 kg	750 kg	1400 kg	1700 kg	
47	V-type suspension clamp	Weight [kg]	1.02	0.86	2.11		2.45
		Part no.	984 549 44	980 395 44	984 080 44		858 080 44
54	Pin with BoClip for third hinged end piece	Weight [kg]	0.08		0.16		
		Part no.	851 305 44		851 317 44		

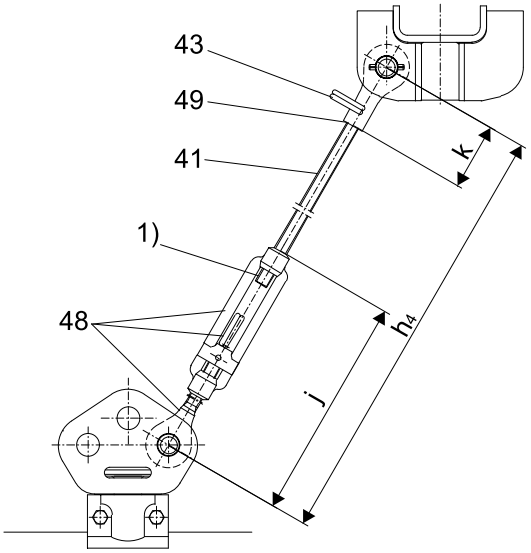
Possible mounting configurations

The V-type hinged suspension clamp (item 47) consists of a suspension clamp, V-type hinge and two pins with spring pins.

The V-type hinged suspension clamp is designed for a maximum of three suspension rod connections (suspension rod strainer or hinged end piece). On a V-type suspension arrangement, the rods are fitted to the outer holes, on a lateral stiffener to the center and one outer hole.

The V-type hinge can be adjusted in the suspension clamp to any angle in relation to the track, however, the pin axis must always be perpendicular to the suspension rod axis. Where three hinged end pieces are used, one additional pin with a BoClip must be ordered.

6.7.4 Spring clip (item 43), suspension rod strainer (item 48) and hinged end piece (item 49)



1) No spring clip fitted here

h_1 = suspension rod length

	h_4	j	k
ST 100, I	h1 + 155 ± 30	165 ± 15	60
ST II-L, II, II-H	h1 + 220 ± 40	235 ± 20	65

Item	Designation	Qty/ susp.		ST 100	ST I	ST II-L	ST II, II-H
43	Spring clip	2	Weight [kg]	0.01		0.02	
			Part no.	342 200 99		342 201 99	
48	Suspension rod strainer		Weight [kg]	0.25		0.79	
			Part no.	980 310 44		984 085 44	
49	Hinged end piece		Weight [kg]	0.10		0.30	
			Part no.	980 315 44		984 083 44	

Possible mounting configurations

Suspension rod strainer (item 48) and hinged end piece (item 49) together with one suspension rod connect the upper and lower parts of the V-type suspension fitting/suspension fitting with stiffener/sloping suspension fitting. The suspension rod strainer consists of a strainer nut, hinged end piece with left-hand thread, retaining cap and a spring clip.

If the length of the suspension rods can be determined exactly, the track can also be suspended without a suspension rod strainer. In this case, a hinged end piece (item 49) is used at the top and bottom, and the V-type upper suspension brackets can be pulled apart to level the track.

Length of the suspension rod thread in the hinged end piece:

ST 100, I: 20 mm

ST II-L, II: 25 mm

Length of the left-hand thread of the hinged end piece and of the suspension rod thread in the strainer nut:

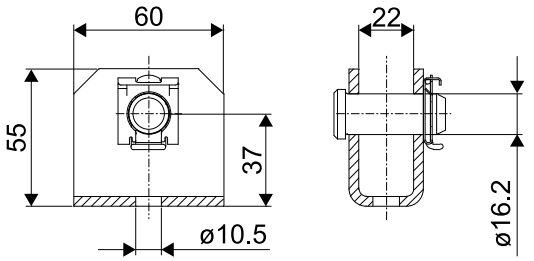
ST 100, I: 45 mm

ST II-L, II: 60 mm at full ± adjustment.

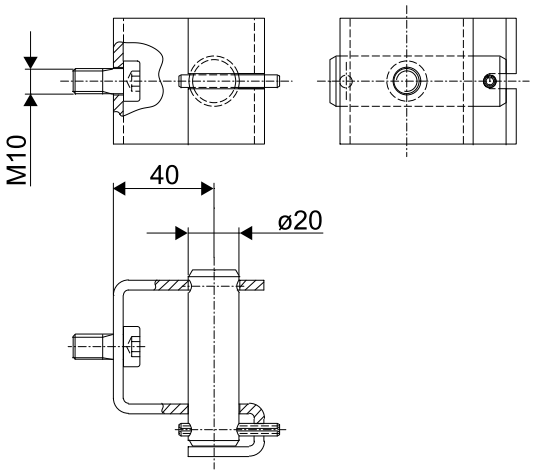
One spring clip (item 43) is required for every connection between a hinged end piece (item 49) and suspension rod (item 41). Only the connection between the strainer nut and suspension rod does not feature a spring clip.

6.7.5 Wall fixture

ST 100, ST I



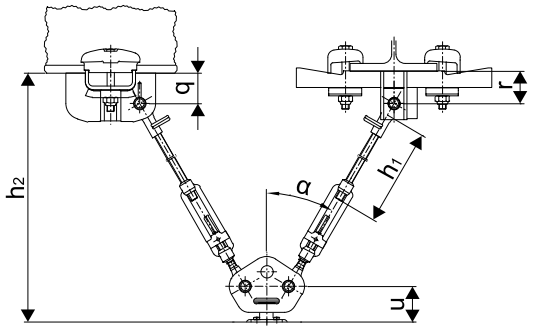
ST II-L, ST II



Item	Designation		ST 100, I	ST II-L, II, II-H
34	Hinged block/connection block	Weight [kg]	0.21	0.46
		Part no.	980 272 44	850 399 44
54	Pin with BoClip	Weight [kg]	0.08	-
		Part no.	851 305 44	-

The hinged block/connection block can be used as a wall anchorage for a stiffener arrangement, see Stiffener (page 69).

6.8 Determining suspension rod length h1 for V-type suspensions and stiffeners



	q	r	u
ST 100	40	45	65
ST I			60
ST II-L, II	55	65	75
ST II-H			60

Suspension rod length h_1 can be determined depending on:
- ST profile section,
- Steel superstructure alignment,
- Distance between lower edge of steel structure and upper edge of ST profile section (dimension h2),
- Opening angle α.

The following simplified formulas can be used, since the suspension rod strainer offers a wide range of adjustment.

ST 100, ST I → $h_1 = \{ (h_2 - 105) / \cos \alpha \} - 155$

ST II → $h_1 = \{ (h_2 - 140) / \cos \alpha \} - 220$

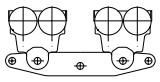
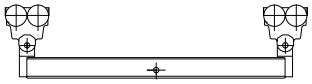
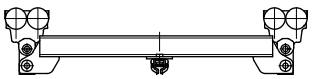
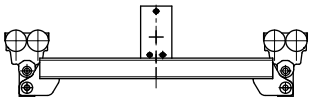
7 TROLLEYS AND TROLLEY COMBINATIONS

7.1 Possible applications

X Possible

O Can be used in special cases

- Cannot be used

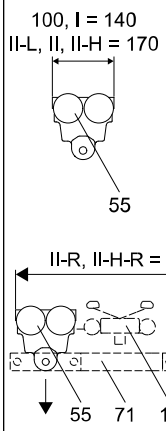
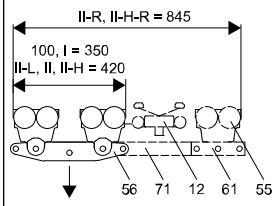
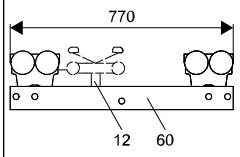
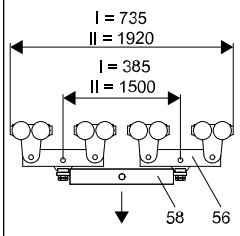
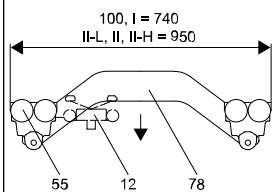
Item	Designation	Fig.	Connected by	Profile section [1]	Long-travel unit		
					Single-girder crane		Double-girder crane
					Push travel	Electric travel	
55	Classic single trolley		1 pin	100, I, II	X	-	X
56 57	Double trolley with articulated frame			100, I, II	X	-	X
59	Load bar 600		1 pin	II	X	-	o
60	Type A load bars			I, II	X	-	o
66	Type B load bars		2 pins	I, II	-	X	X
62	Rigid crane end carriage		Rigid	II	X	X	X
67	Raised crane end carriage			II	X	X	X

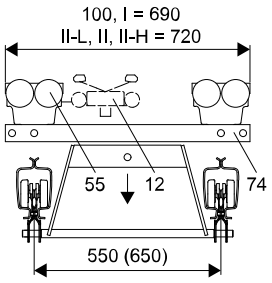
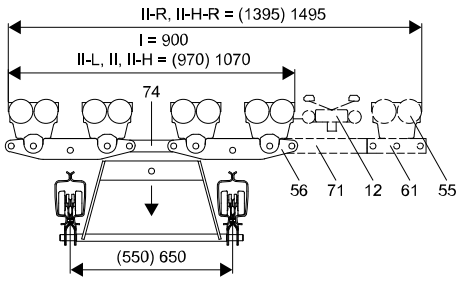
[1] II stands for II-L, II, II-R, II-H, II-H-R

7.2 Trolley combinations

The following criteria must be considered when selecting a trolley or a combination of trolleys:

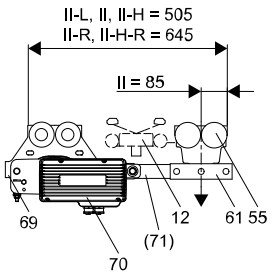
- Load on the trolley or combination of trolleys
- Type of load attached (e.g. single or double-girder crane or double-rail crab)
- Push or electric travel
- Type of power supply system
- If fittings are attached to the trolley, ensure that full system flexibility is maintained. The load handling attachment and load must be flexibly suspended from the trolleys.
- Buffers must be provided if a number of cranes run on the same crane runway (see Buffers and end stops (page 107)).

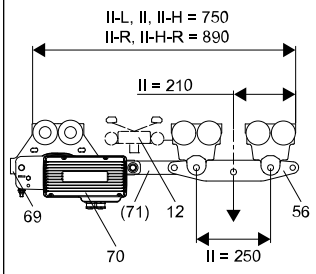
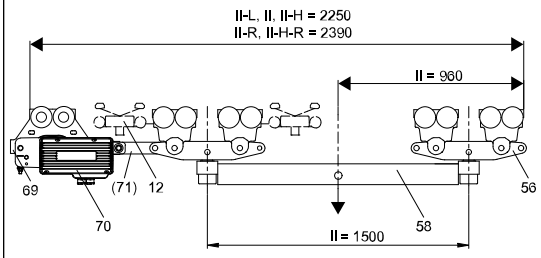
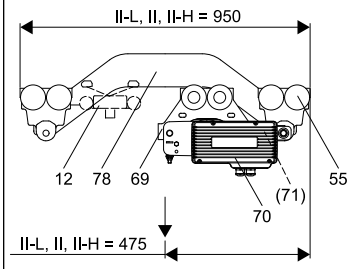
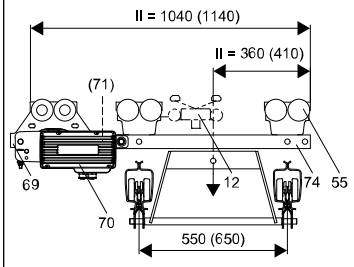
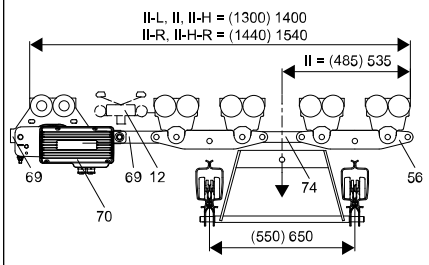
Trolley combination	ST 100			ST I			ST II-L, II, II-H			ST II-R, II-H-R		
	Qty.	Item	Part no.	Qty.	Item	Part no.	Qty.	Item	Part no.	Qty.	Item	Part no.
1 Trolley 	1	55	984 530 44	1	55	980 610 44	1	55	982 110 44	2	55	982 110 44
										2	61	982 505 44
										1	71	982 345 44
										1	12	873 68 44
Weight		0.70 kg			0.75 kg			1.90 kg			7.64 kg	
2 Double trolley 	2	55	984 530 44	1	56	980 322 44	1	56	851 132 44	1	55	982 110 44
	1	57	980 305 44							1	56	851 132 44
										1	61	982 505 44
										1	71	982 345 44
										1	12	873 68 44
Weight		2.40 kg			2.50 kg			5.68 kg			10.62 kg	
3 							1	60	858 605 44	1	60	858 605 44
										1	12	873 68 44
Weight								9.17 kg			10.67 kg	
4 Quadruple trolley 				2	56	980 322 44	2	56	851 132 44	1	55	982 110 44
				1	58	980 115 44	1	58	as per dwg.	2	56	851 132 44
										1	58	as per dwg.
										1	61	982 505 44
										1	71	982 345 44
										1	12	873 68 44
Weight					8.12 kg							
5 Double-rail crab 	4	55	984 530 44	4	55	980 610 44	4	55	982 110 44	4	55	982 110 44
	1	78	980 600 44	1	78	980 600 44	1	78		1	78	
										1	12	873 68 44
Weight		15.83 kg			15.38 kg							

Trolley combination	ST 100			ST I			ST II-L, II, II-H			ST II-R, II-H-R		
	Qty.	Item	Part no.	Qty.	Item	Part no.	Qty.	Item	Part no.	Qty.	Item	Part no.
6 Trolley for double-girder crane	2	55	984 530 44	2	55	980 610 44	2	55	982 110 44	2	55	982 110 44
	1	74	980 595 44	1	74	980 595 44	1	74	982 595 44	1	74	982 595 44
										1	12	873 68 44
												
Weight	3.40 kg			3.50 kg			7.50 kg			9.00 kg		
7 Double trolley for double-girder crane				2	56	980 322 44	2	56	851 132 44	1	55	982 110 44
				1	74	980 590 44	1	74	982 591 44	2	56	851 132 44
									(982 440 44)	1	61	982 505 44
										1	71	982 345 44
										1	74	982 591 44
												(982 440 44)
										1	12	873 68 44
												
Weight				6.00 kg			12.56 kg			17.50 kg		

Separate calculations based on the individual component parts must be carried out for trolley combinations with load bars. See the following pages for details.

1) Weight indicated does not include friction-wheel travel drive

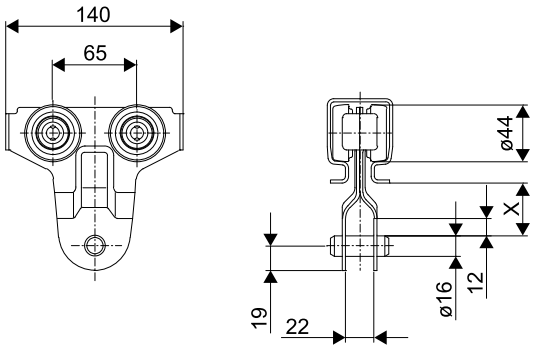
Trolley combination	ST II-L, II, II-H			ST II-R, II-H-R		
	Qty.	Item	Part no.	Qty.	Item	Part no.
11 Trolley with travel drive	1	55	982 110 44	1	55	982 110 44
	1	61	982 505 44	1	61	982 505 44
	1	69	858 480 44	1	69	858 490 44
	1	70	Travel drive	1	70	Travel drive
				1	12	873 68 44
						
Weight 1)	6.65 kg			8.50 kg		

Trolley combination	ST II-L, II, II-H			ST II-R, II-H-R		
	Qty.	Item	Part no.	Qty.	Item	Part no.
12 Double trolley with travel drive	1	56	851 132 44	1	56	851 132 44
	1	69	858 480 44	1	69	858 490 44
	1	70	Travel drive	1	70	Travel drive
				1	12	873 68 44
						
Weight 1)		9.63 kg			11.48 kg	
14 Quadruple trolley with travel drive	2	56	851 132 44	1	55	982 110 44
	1	58	as per dwg.	2	56	851 132 44
	1	69	858 480 44	1	58	as per dwg.
	1	70	Travel drive	1	69	858 490 44
				1	70	Travel drive
				1	12	873 68 44
Weight 1)						
15 Double-rail crab with travel drive	4	55	982 110 44	4	55	982 110 44
	1	69	858 480 44	1	69	858 480 44
	1	70	Travel drive	1	70	Travel drive
	1	78		1	78	
				1	71	984 307 44
				1	12	873 68 44
Weight 1)						
16 Trolley with travel drive for double-girder crane	2	55	982 110 44	2	55	982 110 44
	1	69	858 480 44	1	69	858 480 44
	1	70	Travel drive	1	70	Travel drive
	1	74	982 595 44	1	74	982 595 44
				1	12	873 68 44
Weight 1)		11.45 kg			12.95 kg	
17 Double trolley with travel drive for double-girder crane	2	56	851 132 44	2	56	851 132 44
	1	69	858 480 44	1	69	858 490 44
	1	70	Travel drive	1	70	Travel drive
	1	74	982 591 44	1	74	982 591 44
			(982 440 44)			(982 440 44)
				1	12	873 68 44
Weight 1)		16.51 kg			18.36 kg	

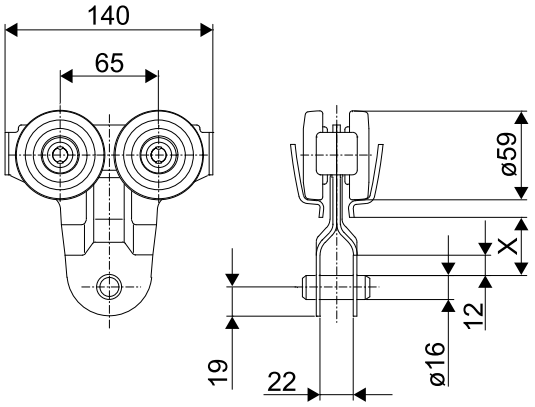
7.3 Single trolleys

7.3.1 Classic trolleys

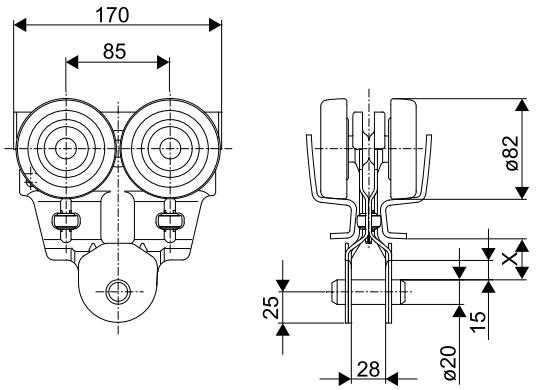
ST 100



ST I



ST II-L, II, II-H



	ST 100	ST I	ST II-L, II	ST II-H
X [mm]	41	38	35	19

Item	Designation		ST 100	ST I	ST II-L, II, II-H
			Max. load		
			100 kg	300 kg	600 kg
55	Single trolley	Weight [kg]	0.70	0.75	1.90
		Part no.	984 530 44	980 610 44	982 110 44

The permissible load on trolleys is reduced for:

Continuous temperature [°C]	Possible load [%]
-20	50
-15	80
-10 to +40	100
+50	90
+60	75
+70	50

The load handling attachment and load must be flexibly suspended.

Quiet-running ST trolleys are fitted with four plastic travel wheels mounted in permanently lubricated anti-friction bearings.

ST II-L-, ST II trolleys have two additional special horizontal guide rollers. The trolley side cheek protrudes beyond the travel wheels in the direction of travel as protection against collision damage.

Connection option for link bars, etc.

ST 100, ST I, ST II: link bar (item 61)

The **start-up traction resistance** of a loaded trolley is approx. 1–1.5% of the attached load. Approx. 0.5% with steady motion.

The side guide rollers of ST II trolleys and all pins can be replaced.

Finish:ST 100, I, II-L, II: black (RAL 9005)

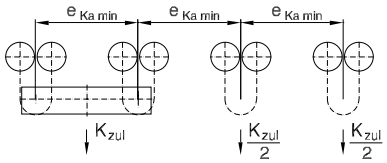
Wearing parts

Item	Designation		ST 100, I	ST II-L, II, II-H
	Side guide rollers (20 off), spring pins (20 off), sealing rings (45 off)	Weight [kg]	-	0.34
		Part no.		851 395 44
54	Pin with BoClip	Weight [kg]	0.08	0.16
		Part no.	851 305 44	851 317 44

7.3.2 Minimum trolley spacing

The minimum permissible spacing dimensions between single or multiple trolleys at maximum load are determined by the trolley center distances of the articulated frames and load bars.

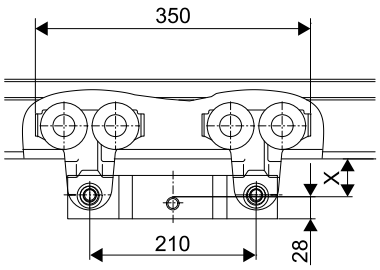
Pay attention to permissible distances between suspensions and loads.



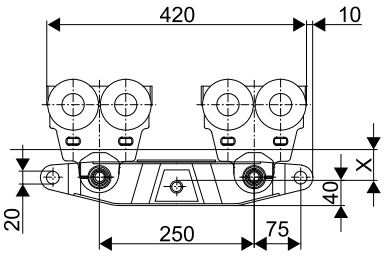
	Minimum trolley spacing [mm]	Max. load on single trolley [kg]
ST 100	210	100
ST I	200 400	200 300
ST II-L, II	250	600

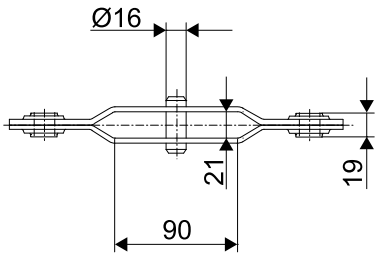
7.4 Articulated frame

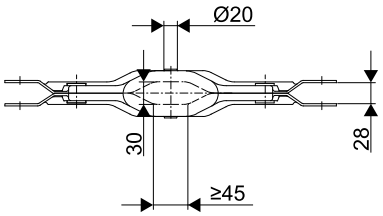
ST 100, I



ST II-L, II, II-H







	ST 100	ST I	ST II-L, II	ST II-H
X [mm]	51	48	50	34

Item	Designation		ST 100	ST I	ST II-L, II
			Max. load		
			200 kg	400 kg	1200 kg
56	Double trolley, completed	Weight [kg]	2.40	2.50	5.68
	(articulated frame + 2 trolleys)	Part no.	On application	980 322 44	851 132 44
57	Articulated frame	Weight [kg]	1.00	1.00	1.88
		Part no.	980 305 44		982 305 44

A double trolley for travel on straight tracks is created by joining two trolleys using an articulated frame. Holes drilled in the ends of ST II-L, II articulated frames are provided for connecting spacer bars and link bars (see Travel drives for crabs and cranes (page 98)), they are not designed for connecting loads.

Finish:

ST 100, I, II-L, II, ST II-H: black (RAL 9005)

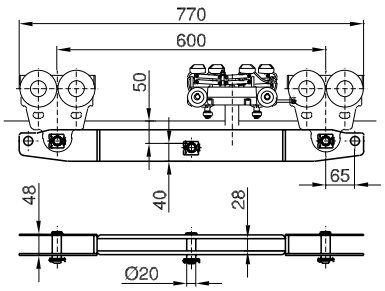
Wearing parts

Item	Designation		ST 100, I	ST II-L, II, II-H
	Side guide rollers (20 off), spring pins (20 off), sealing rings (45 off)	Weight [kg]	-	0.34
		Part no.		851 395 44
54	Pin with BoClip	Weight [kg]	0.08	0.16
		Part no.	851 305 44	851 317 44

7.5 Load bars for travel on straight tracks for trolleys and cranes with a supporting pin

7.5.1 Load bar 600, ST II (items 59, 60)

Load bar 600



Load bar 600, ST II for use in ST II-R crane installations (also ST II-L and II) and as trolley and single-girder crane trolley load bar.

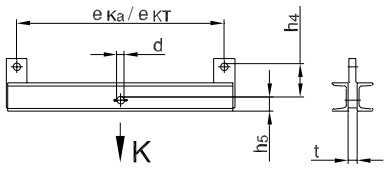
The ST II-R current collector trolley is protected against collisions between the trolleys.

Item	Designation		ST II-L, II, II-H
			Max. load
			1200 kg
60	Load bar 600, completed	Weight [kg]	9.17
		Part no.	858 605 44
59	Load bar 600	Weight [kg]	5.37
		Part no.	858 600 44

Finish: black (RAL 9005)

7.5.2 Type A load bar (item 59)

Load bar for crane trolleys (EHK)



See Articulated frame (page 83)

Item	Track	e_{KT} [mm]	K_{max} [kg]	h_5 [mm]	h_4 [mm]	d [mm]	t [mm]	Weight [kg]	Part no.
59	ST I	600	780	35	65	20	25	6.43	715 800 46
		1000	770					15.82	715 801 46
		1200						18.66	715 802 46
		1600	760					24.32	715 803 46
		2000						29.99	715 804 46
	ST II-L, ST II, ST II-H	1000	1300	40	72	20	25	16.13	715 821 46
		1200						18.96	715 822 46
		1600			87			29.65	715 823 46
		2000			107			44.24	715 824 46
		1000	2360	50	97	30	30	23.72	715 831 46
		1200						27.94	715 832 46
		1600	2340		117			45.28	715 833 46
		2000	2320		137			66.59	715 834 46

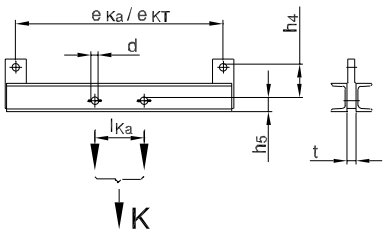
Finish:

ST I, II-L, II, II-H: black (RAL 9005)

7.6 Load bars for travel on straight tracks for trolleys and cranes with two supporting pins

7.6.1 Type B load bar

Load bar for crane trolleys (ZHK) (2 loads arranged symmetrically with reference to the center)



Item	Track	eKT [mm]	lKa [mm]	Kmax [kg]	h5 [mm]	h4 [mm]	d [mm]	t [mm]	Weight [kg]	Part no.
66	ST I	1000	550	780	35	65	20	25	9.87	715 811 46
		1200							11.50	715 812 46
		1600		760					24.38	715 813 46
		2000							30.04	715 814 46
	ST II-L, ST II, ST II-H	1000	550	2370	40	72	20	25	16.18	715 841 46
			650							715 851 46
		1200	550						19.02	715 842 46
			650							715 852 46
		1600	550	2350		107			35.81	715 843 46
			650							715 853 46
		2000	550	2330		127			55.34	715 844 46
			650							715 854 46

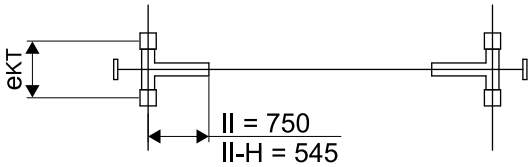
Finish:

ST I, II-L, II, II-H: black (RAL 9005)

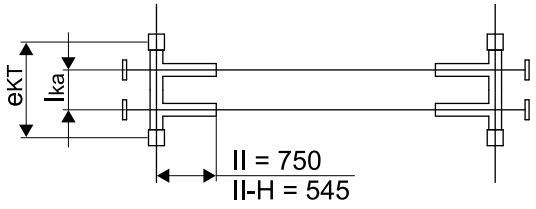
7.7 ProfileMaster Plus ST Classic rigid crane end carriages

7.7.1 Crane end carriage, rigid (standard height) (item 62)

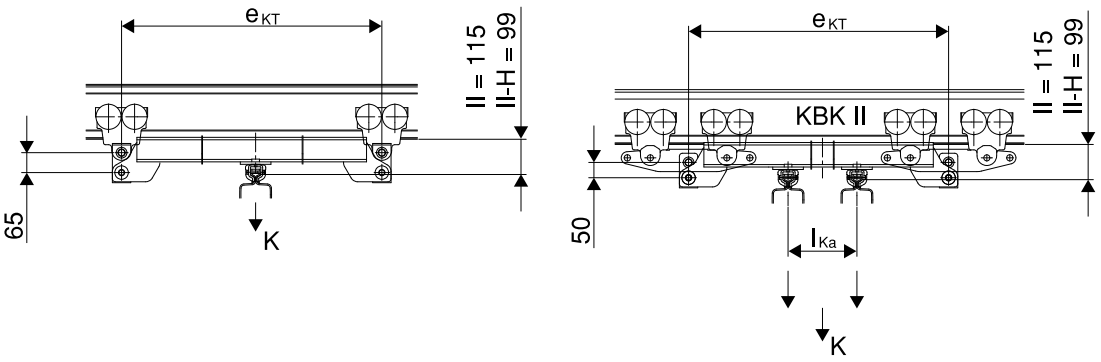
Single-girder crane



Double-girder crane



ST II, II-H on ST II, II-H



Rigid crane trolleys make it possible to build parallel-running single and double-girder cranes. Rigid single-girder cranes can be fitted with electric travel drives, as can rigid double-girder cranes. Two crane end carriages are needed for each crane to make up the crane trolleys; trolleys and articulated frames must be ordered separately. Crane suspensions, spacer bars and bracing frames for double-girder cranes are not required.

Cranes should be designed according to the crane selection table. Shorter suspension plates D can be employed when double trolleys are used. The RF friction-wheel travel drive link, link bars, spacer bars or buffer attachments can be fitted using the single-trolley link, part no. 982 505 44 or using the articulated frame.

Maximum crane girder length for single-girder cranes:

- ST II = 6 m
- ST II-H = 8 m

Distance of joint from suspension (st) on the crane must be 150–450 mm or more than 850 mm.

Finish:daffodil yellow (RAL 1007)

Item	Designation	Track	e_{KT} [mm]	Trolley type [1]	K_{max} [kg]		Crane girder ST II	Crane girder ST II-H
62	Single-girder crane end carriages, rigid	ST II-L, II, II-H	1000	E	1150	Weight [kg]	32.00	28.65
						Part no.	715 324 46	715 549 46
			1200	E		Weight [kg]	35.40	32.10
						Part no.	715 327 46	715 557 46
			1600	E		Weight [kg]	42.30	39.00
						Part no.	715 327 46	715 557 46
			2000	E		Weight [kg]	49.20	45.90
						Part no.	715 327 46	715 557 46
			1000	D	1300	Weight [kg]	31.70	28.40
						Part no.	715 326 46	715 550 46
					2300	Weight [kg]	-	-
						Part no.		
			1200	D	1300	Weight [kg]	35.10	31.90
						Part no.	715 329 46	715 558 46
					1970	Weight [kg]	-	-
						Part no.		
			1600	D	1300	Weight [kg]	42.00	38.80
						Part no.	715 329 46	715 558 46
					1470	Weight [kg]	-	-
						Part no.		
			2000	D	1170	Weight [kg]	48.90	45.70
						Part no.	715 329 46	715 558 46
					1170	Weight [kg]	-	-
						Part no.		
	Double-girder crane end carriages, rigid l_{Ka} = 550 mm	ST II-L, II, II-H	1200	E	1140	Weight [kg]	43.20	37.50
						Part no.	715 330 46	715 561 46
			1600	E		Weight [kg]	50.20	44.40
						Part no.	715 330 46	715 561 46
			2000	E		Weight [kg]	57.00	51.30
						Part no.	715 330 46	715 561 46
			1200	D	2340	Weight [kg]	42.90	37.30
						Part no.	715 332 46	715 562 46
			1600	D	2250	Weight [kg]	49.80	44.20
						Part no.	715 332 46	715 562 46
			2000	D	1620	Weight [kg]	56.70	51.10
						Part no.	715 332 46	715 562 46
	Double-girder crane end carriages, rigid l_{Ka} = 650 mm		1300	D	2350	Weight [kg]	44.60	39.10
						Part no.	715 333 46	715 564 46
			1600	D		Weight [kg]	49.80	44.20
						Part no.	715 333 46	715 564 46
			2000	D	1740	Weight [kg]	56.70	51.10
						Part no.	715 333 46	715 564 46

1) E = Single trolley

2 trolleys on each end of crane

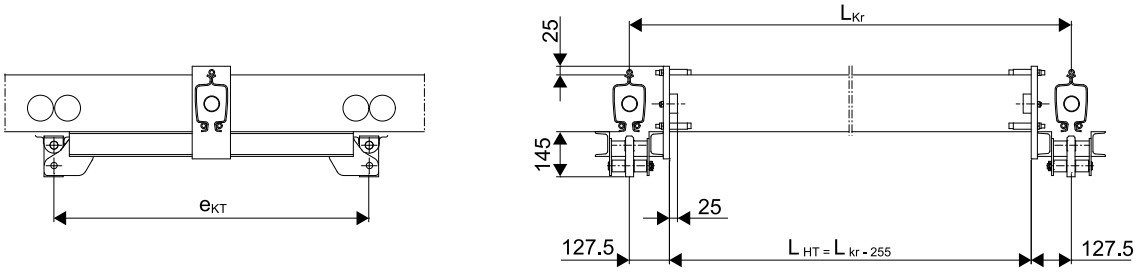
D = Double trolley

4 trolleys on each end of crane

7.7.2 Crane end carriage, rigid, raised

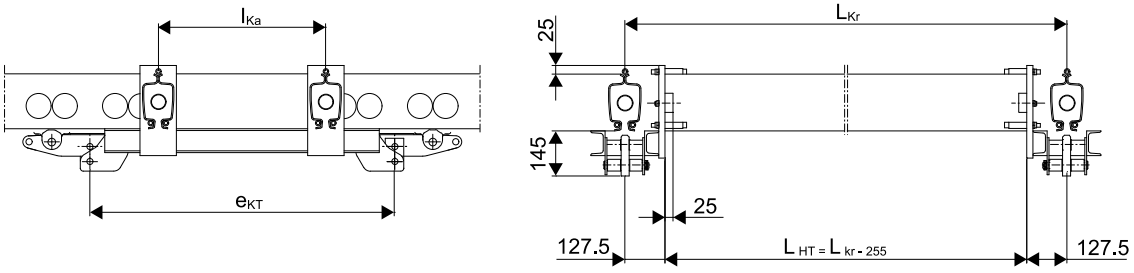
ST II-L/II crane end carriage, raised,

Single-girder suspension crane (EHK)



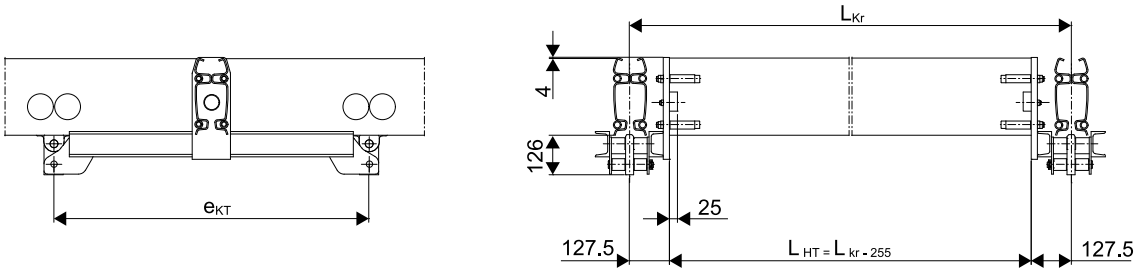
ST II-L/II crane end carriage, raised,

Double-girder suspension crane (ZHK)



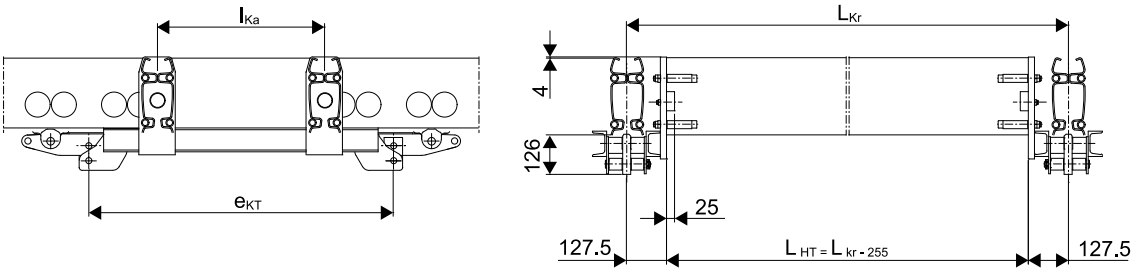
ST II-H crane end carriage, raised,

Single-girder suspension crane (EHK)



ST II-H crane end carriage, raised,

Double-girder suspension crane (ZHK)



Load capacity [kg]	ST II-L				ST II				ST II-H							
	Single-girder crane [1]		Double-girder crane		Single-girder crane [1]		Double-girder crane		Single-girder crane		Double-girder crane					
	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]	l_{HT} [m]	l_{Kr} [m]
160	5.00	5.255	6.00	6.255	6.00	6.255	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
200	5.00	5.255	6.00	6.255	6.00	6.255	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
250	5.00	5.255	6.00	6.255	6.00	6.255	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
315	4.00	4.255	6.00	6.255	6.00	6.255	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
400	3.50	3.755	6.00	6.255	6.00	6.255	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
500	3.00	3.255	5.50	5.755	5.50	5.755	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
630	2.50	2.755	5.00	5.255	4.30	4.555	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255	8.00	8.255
800	2.00	2.255	4.20	4.455	3.30	3.555	6.50	6.755	7.00	7.255	8.00	8.255	8.00	8.255	8.00	8.255
1000			3.80	4.055			5.50	5.755	5.60	5.855	6.00	6.255	8.00	8.255	8.00	8.255
1250															7.50	7.755
1600															6.60	6.855
2000															6.00	6.255
e_{KT} [mm]	1000		1000		1000		1000		1000		1000		1000		1200	
l_{Ka} [mm]			550				550				550		550		650	
Weight [kg]	31.00		36.70		31.60		37.80		34.08		41.36		39.50		47.10	
Part no.	715 336 46		715 340 46		715 338 46		715 342 46 [3]		715 386 46		715 388 46		715 390 46		715 392 46	
Trolley [2]	E		E		E		E		E		E		D		D	

1) Only for push travel

2) E = Single trolley

2 trolleys on each end of crane

D = Double trolley

4 trolleys on each end of crane

3) Alternatively for trolley type “D”: 715 344 46

ProfileMaster Plus ST cranes with raised girders of single or double-girder design can be used where height is very limited, e.g. in low rooms. The crane runway must be made of ST II-L, II or II-H sections.

The crane girders are arranged at the same height between the crane runways using raised crane end carriages.

If ST II-R is used for the crane girders, the ST II-R sections must be ordered complete with a line powerfeed arrangement and conductor rails shortened by 20 mm at each end, see ProfileMaster Plus ST II-R components (page 47).

The crane end buffers are already included in the crane end carriages.

An internal buffer stop should be fitted to protect the accumulated cable sliders and cable trolleys.

Cranes fitted with raised crane end carriages are rigid, which means that **ST II-H single-girder cranes and ST II and ST II-H double-girder cranes can also be fitted with electric travel drives**.

The travel drives are connected in the same way as for rigid cranes.

Crane suspensions, spacer bars for double-girder cranes and bracing frames are not required.

The trolleys must be ordered separately.

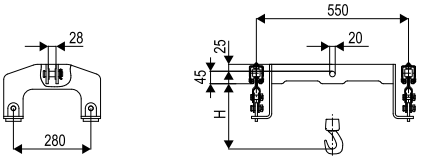
There must be no track joints in the crane girder.

Finish: crane end carriages, daffodil yellow (RAL 1007)

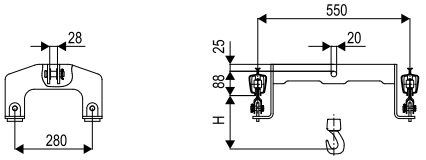
8 DOUBLE-RAIL CRAB

Crab frame (item 78)

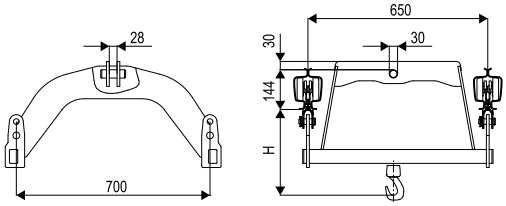
100



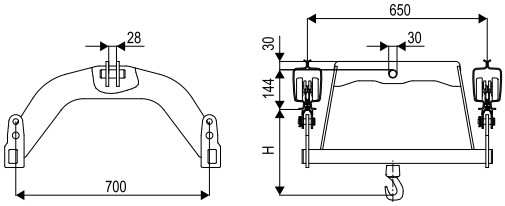
I



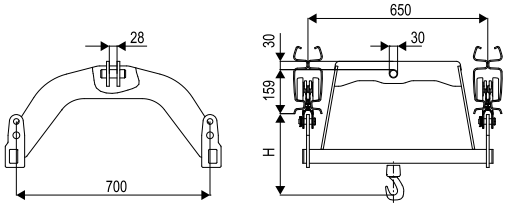
II-L



II



II-H



Item	Designation		ST 100	ST I	ST II-L, II, II-H
			Max. load		
			200 kg	600 kg	2200 kg
		Dimension l_{Ka} [mm]	550		650
78	Crab frame	Weight [kg]	8.90	8.90	25.24
		Part no.	855 370 44 [1)]	855 370 44	855 570 44
	Lowered arrangement	Weight [kg]	0.65	-	
		Part no.	517 865 46		

[1)] The standard crab frame cannot pass under the crane runway, pay attention to approach dimensions.

Crab frames fitted with four trolleys and the hoist form a double-rail crab for double-girder cranes.

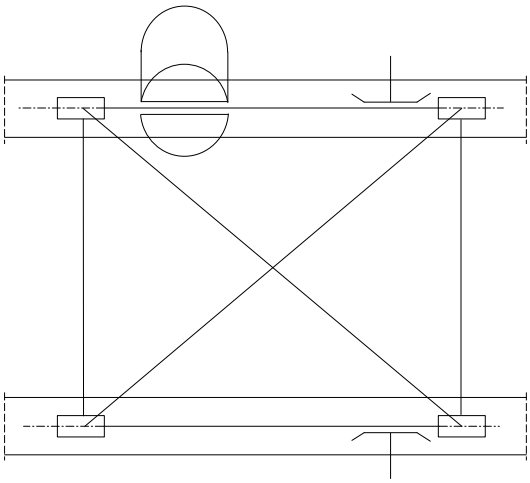
The crab frame can pass under bracing frames, spacer bars or crane end carriages. The ST II crab frame can also be used for ST II-L (unable to pass under the crane runway).

It is not possible to pass under ProfileMaster Plus ST 100 as standard. If this is necessary, a suspension arrangement is required.

Electric travel drives and current collectors (ST II-R, DEL) can be fitted both inside and outside the crab frame.

Finish: black (RAL 9005)

RF trolley in crab frame



Electric travel drive connection inside the crab frame

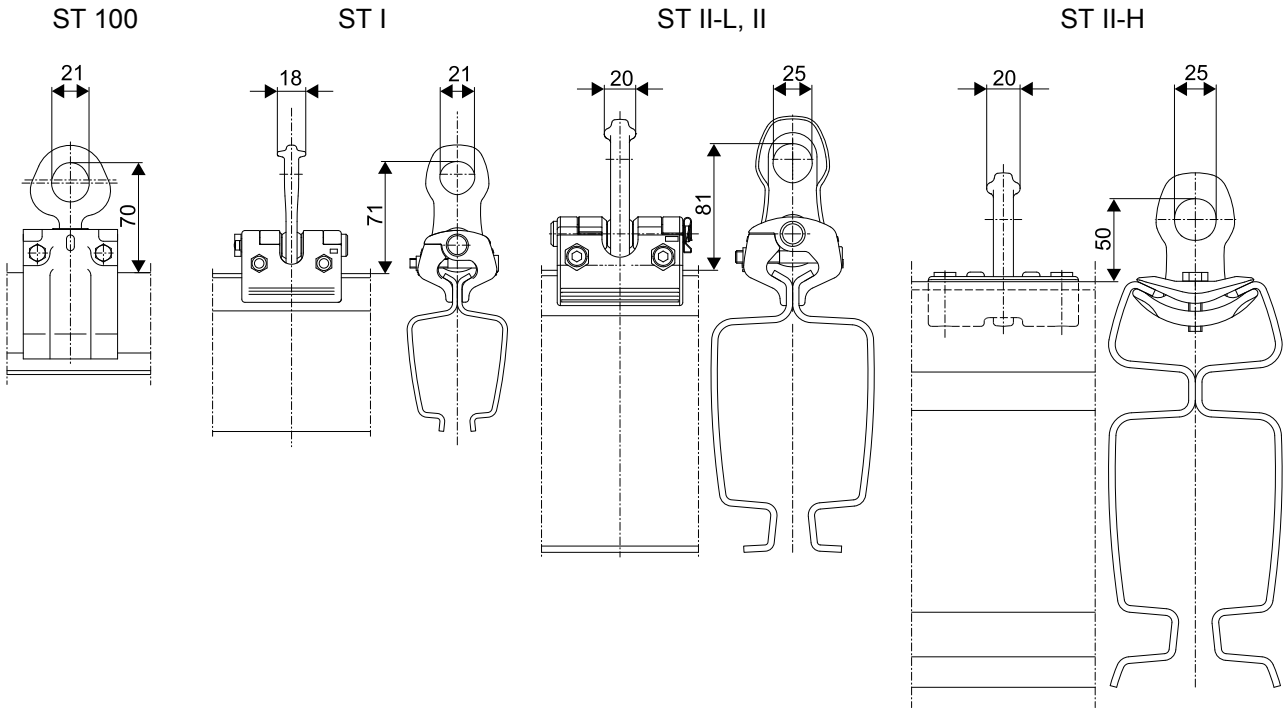
Profile	Crab frame	With	Part no.
ST II	855 570 44	Trolley with short link bar and coupling 125	858 480 44 + 855 574 44
ST II-L			
ST II-H			

Wearing parts

Item	Designation		ST 100, I	ST II-L, II, II-H
54	Pin with BoClip	Weight [kg]	0.18	
		Part no.	851 318 44	

9 PARTS FOR BUILDING CRANES

9.1 Crane suspension eye (item 75)



Item	Designation		ST 100	ST I	ST II-L, II	ST II-H
			Max. load			
			400 kg	600 kg	1400 kg	1400 kg
75	Crane suspension eye	Weight [kg]	0.60	0.66	1.24	1.00
		Part no.	984 535 44	980 555 44	851 555 44	858 555 44

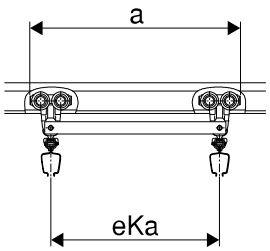
Crane suspension eyes connect crane girders with single or multiple trolleys running on crane runways. Maintenance-free pivot bearings are fitted in the lower pivot point on ST I and ST II. The suspension eye and track suspension clamp are permanently connected to each other before leaving the factory. The unit should not be used as a swivel joint.

Finish: galvanized, black

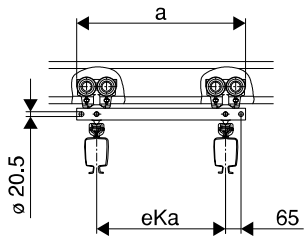
9.2 Spacer bar for crane trolleys (item 74)

For single trolley

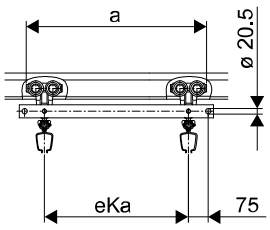
ST 100, I



ST II-L, II, II-H



With connection



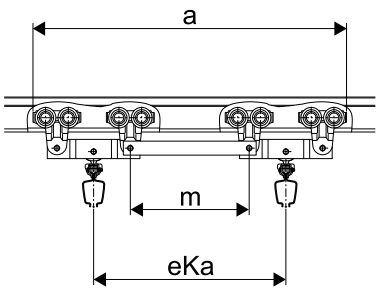
e_{Ka} [mm]	ST 100 ST I a [mm]	ST II-L ST II ST II-H a [mm]
550	690	720
650	-	820
800	-	970
1000	-	1170

Item	Designation	eKa	Connection possible [1]		ST 100, I	ST II-L, II, II-H
74	Spacer bar for single trolleys	550	No	Weight [kg]	2.00	-
				Part no.	980 595 44	
		550	Yes	Weight [kg]	1.86	3.70
				Part no.	855 068 44	982 595 44
		650	Yes	Weight [kg]	-	4.09
				Part no.		517 861 46
		800	Yes	Weight [kg]		4.80
				Part no.		715 121 46
		1000	Yes	Weight [kg]		5.74
				Part no.		715 123 46

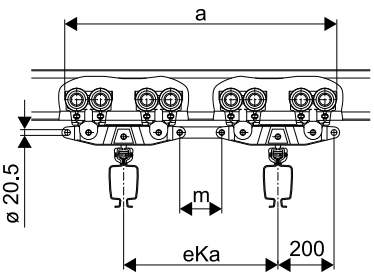
[1] e.g. buffer, spacer trolley

For double trolley

ST 100, I



ST II-L, II



e_{Ka}	ST 100, I		ST II-L, II, II-H	
	a	m	a	m
[mm]	[mm]	[mm]	[mm]	[mm]
550	900	340	970	150
650	-	-	1070	250
800			1220	400
1000			1420	600

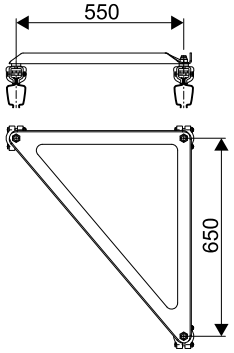
Item	Designation	eKa	Connection possible [1]		ST 100, I	ST II-L, II, II-H
74	Spacer bar for double trolleys	550	No	Weight [kg]	1.00	-
				Part no.	980 590 44	
		550	Yes	Weight [kg]	-	1.30
				Part no.		982 591 44
		650	Yes	Weight [kg]		1.20
				Part no.		982 440 44
		800	Yes	Weight [kg]		1.55
				Part no.		715 125 46
		1000	Yes	Weight [kg]		2.05
				Part no.		715 127 46

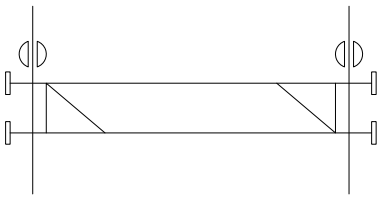
[1] e.g. buffer, spacer trolley

Finish: black (RAL 9005)

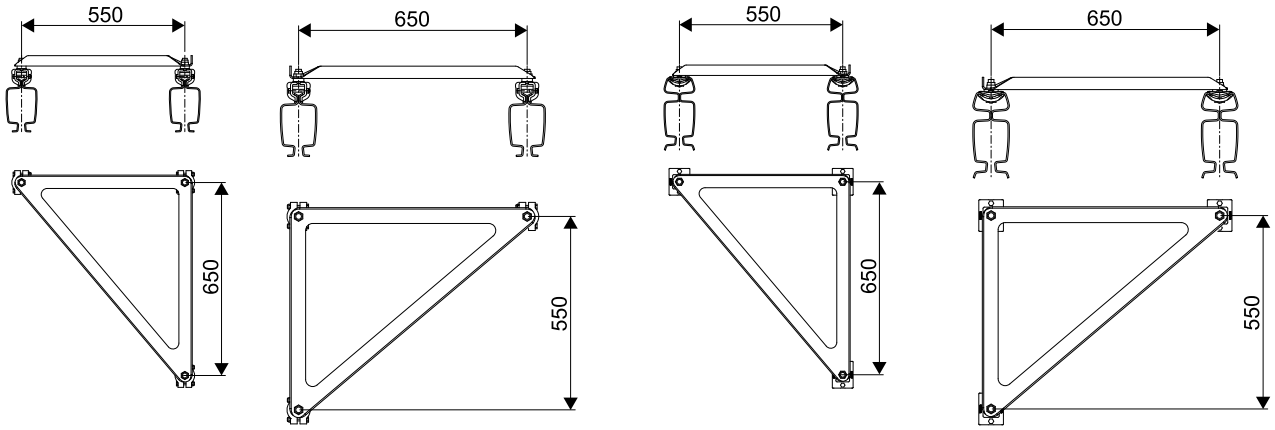
9.3 Bracing frame (item 79)

ST I





ST II-L, II ST II-L, II ST II-H ST II-H



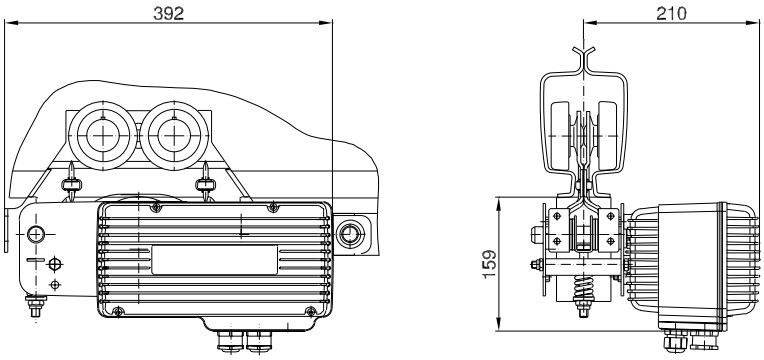
Item	Designation		ST 100	ST I, II-L, II	ST II-H
79	Bracing frame 550/650	Weight [kg]	6.73	7.13	7.78
		Part no.	517 864 46	982 435 44	858 435 44

Bracing frames must be fitted close to the crane runway on the crane girders of flexibly connected double-girder cranes to reduce their tendency to skew. Bracing frames should be fitted at the ends and near the centre of the crane girders on double-girder cranes that travel on three tracks.

Finish: black (RAL 9005)

10 TRAVEL DRIVES FOR CRABS AND CRANES

10.1 RF 125 friction-wheel travel drive (item 70)



Technical data

Table 2. TD E22-C BL DC motor with worm gearbox

Travel speed [m/min]	Output [W]	CDF [%]	Voltage [V]	Frequency [Hz]	Max. displaceable lifted load incl. dead load [kg]	Weight [kg]	Part no.
7/27 [1)]	50/200	20/40	3 ~ 220 - 480	50/60	2200	6.9	716 904 45

[1)] By programming the parameters can be changed to:
- max. 8/33 m/min with partial load
- min. 3/16 m/min

The RF 125 friction-wheel travel drive is a drive unit specially developed for crane requirements with regulated acceleration and braking for loads up to 2000 kg.

Finish: black (RAL 9005)

10.1.1 Drive data

The output of the pneumatic travel motor is transmitted to the bottom flange of the rail by means of a friction wheel. The friction wheel is pressed against the bottom flange of the rail by means of a pressure spring.

A permanent-field DC worm geared motor serves as the drive motor.

The speed of DC motors can be controlled very well, enabling smooth acceleration and braking of the drive to be achieved. This facilitates travel with little sway.

The worm geared motor is of self-braking design, which eliminates the need for a holding brake.

10.1.2 Control system

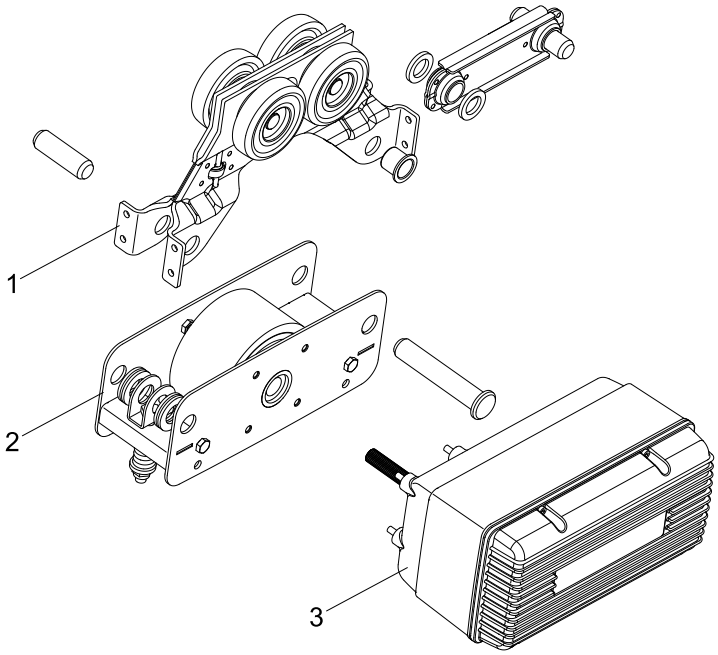
The control board features a wide voltage range input (220 - 480 V/50/60 Hz). The line voltage supplies a regulated link. The motor is supplied from the link by a PWM power module. Ramps are output for start-up and braking. The moving motor is braked with electric control and stopped by a short circuit of the armature winding.

The control system includes the following features as standard:

- Plug connections for all inputs and outputs;
- Line voltage relayed to the chain hoist;
- Limit switch inputs;
- Fast-to-slow limit switch inputs;

- 7-segment display visible through a window from the outside for operating status, error messages, parameter programming;
- Programmable parameters for speed, acceleration, etc.;
- Temperature monitoring and cut-off on overheating;
- Control with tri-state signals (half-wave evaluation) or with PWM signals
- Optimum long travel characteristics thanks to master/slave operation with up to 3 drives (1 master, 2 slaves)
- Simple parameter programming by control pendant or by separately available keypad terminal.

10.1.3 RF 125 rocker, ST II-L, II, II-H (item 135)



1. Tractor trolley
2. RF 125 rocker
3. E22 travel drive

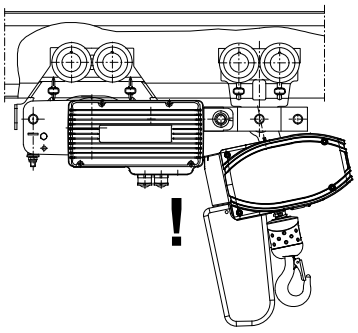
Item	Designation		ST II-L, II, II-H
135	RF 125 rocker	Weight [kg]	4.40
		Part no.	858 245 44

Finish: black (RAL 9005); galvanized

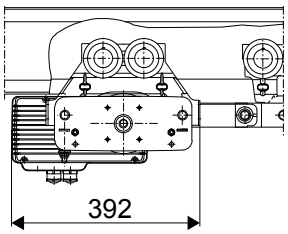
10.1.4 Possible mounting configurations

RF 125 friction-wheel travel drives can be fitted in various ways, whereby the following must be considered (see also example for ordering):

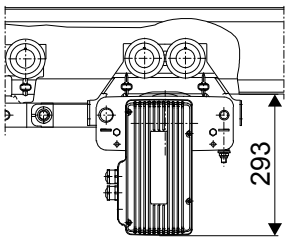
Long link bar required.



Consider approach dimension.



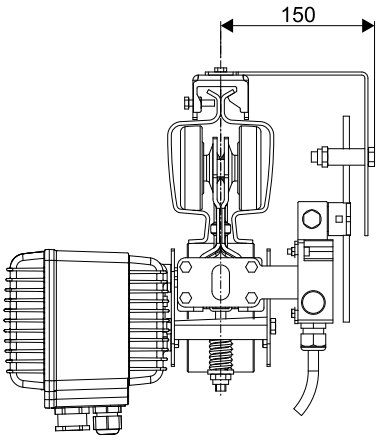
Consider overall height.



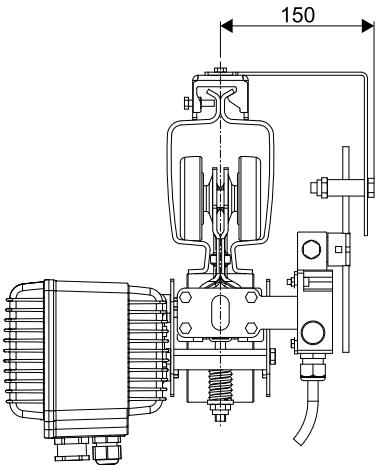
1 130 tractor trolley Part no. 858 480 44	1 RF 125 rocker Part no. 858 245 44	1 E22-C travel drive Part no. 716 950 45
1 270 tractor trolley Part no. 858 490 44		

10.2 Travel limit switches, RF 125 limit switch fitting (items 141, 142)

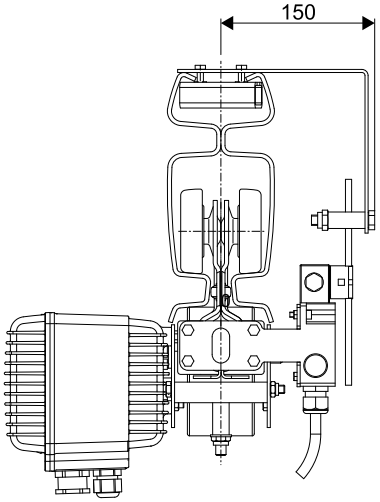
ST II-L



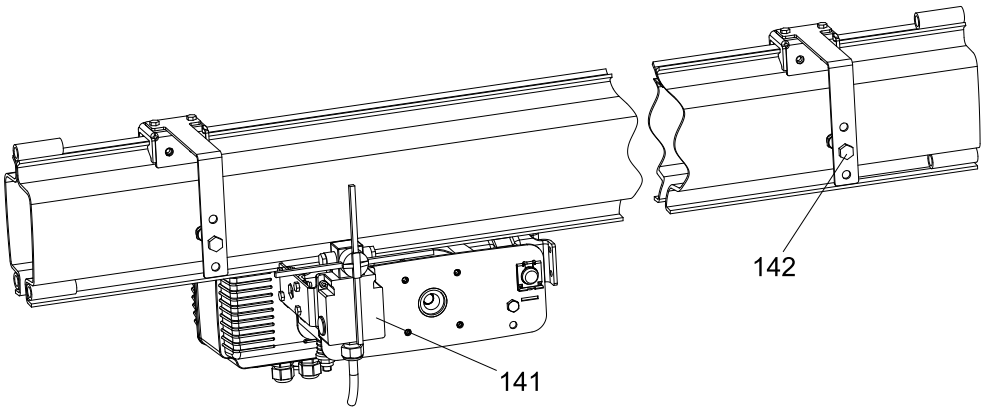
ST II



ST II-H



Example for ST II



Item	Designation		ST II-L, II	ST II-H
141	Limit switch (set)	Weight [kg]	0.85	
		Part no.	858 351 44	
142	Switching vane (2 off)	Weight [kg]	0.60	0.66
		Part no.	851 352 44	858 352 44

Contents

Limit switch fittings are designed to be used with RF 125 travel drives on ST II-L, ST II and ST II-H. They can be used for reliable switch-over from fast to slow travel, or from slow travel to the stop function (requires two switching vanes for two-stage cut-off).

This is utilized when travel against the limit stops needs to be avoided.

The limit switch cpl. includes the switch, the trolley fitting and the pre-assembled electric cable to the drive.

The switching vane cpl. includes two switching vanes to actuate the switch including the fittings for attachment to the rail.

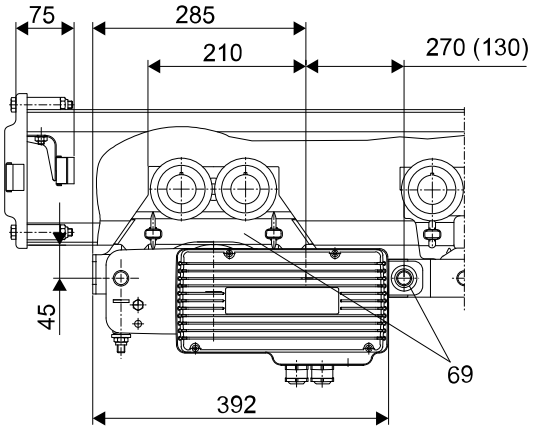
Finish: galvanized

11 TROLLEYS FOR TRAVEL DRIVES

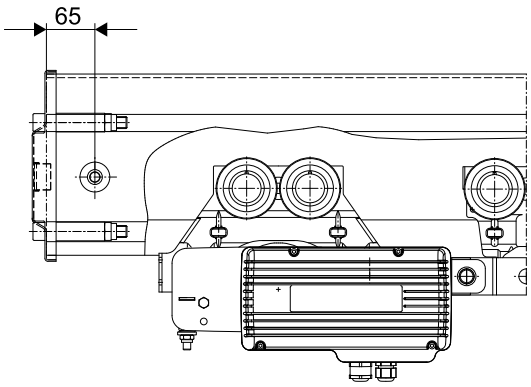
RF trolley (item 69)

Coupling (Item 71a)

ST II-L, ST II, ST II-R



ST II-H, ST II-H-R



Item	Designation		ST II-L, II, II-H
69	Tractor trolley with short link bar 130	Weight [kg]	3.95
		Part no.	858 480 44
	Tractor trolley with long link bar 270	Weight [kg]	4.30
		Part no.	858 490 44
71a	125 trolley coupling	Weight [kg]	0.25
		Part no.	984 307 44

Trolley for ST profile section	ST II-L	ST II	ST II-H
RF 125	X	X	X

Finish: ST II: black (RAL 9005)

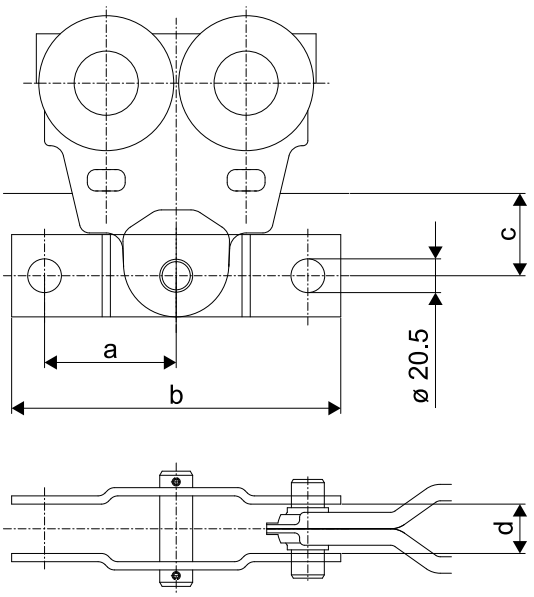
12 COUPLING ELEMENTS AND SPACER BARS

12.1 Single-trolley link

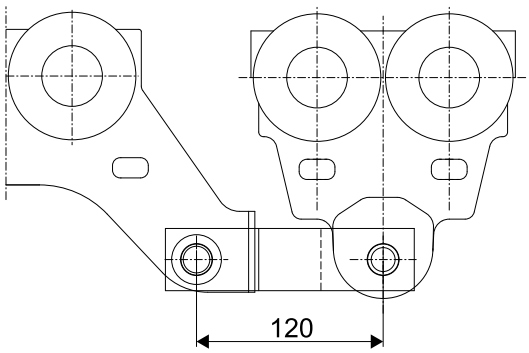
Link for single trolley (item 61)

125 trolley coupling (item 71a)

ST single-trolley link



Trolley coupling 125 II-L, II, II-H



	a	b	c	d
ST I	75	190	46	27
ST II	80	200	45	28
ST II-H			29	

Item	Designation		ST 100, I [1)]	ST II-L, II, II-H
61	Link for single trolley	Weight [kg]	0.70	0.80
		Part no.	855 070 44	982 505 44
71a	125 trolley coupling	Weight [kg]	-	0.25
		Part no.		984 307 44

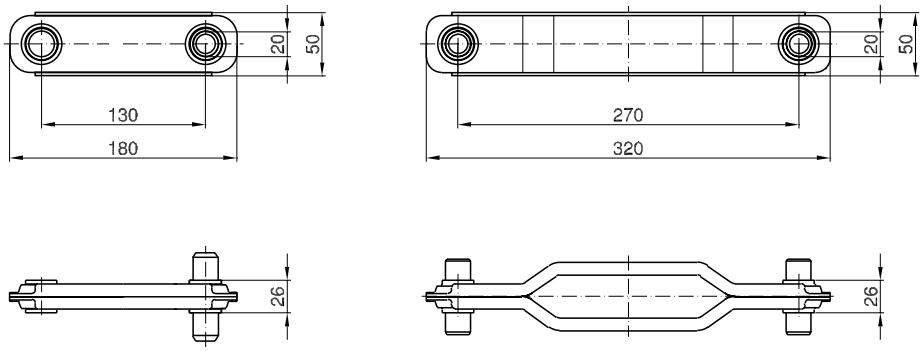
[1)] ST II link bars can be connected.

The link bar provides an additional means for connecting the various trolley combinations for single trolleys. The 125 trolley coupling (item 71a) is used to connect the friction-wheel travel drive in the crab frame.

Finish: black metal parts (RAL 9005); galvanized pins

12.2 Link bar

ST I, II-L, II, II-H link bar



Item	Designation		ST I, II-L, II, II-H
71	Link bar, short	Weight [kg]	0.56
		Part no.	982 340 44
	Link bar, long	Weight [kg]	0.74
		Part no.	982 345 44

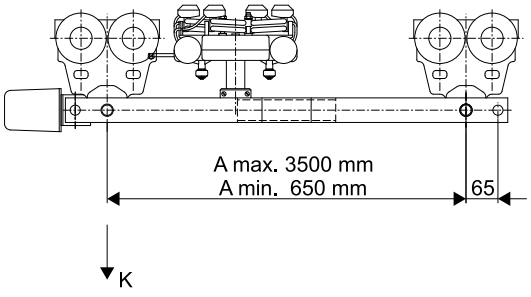
Finish: black metal parts (RAL 9005); galvanized pins

12.3 Spacer bars for ST II-L, II, II-H straight track (item 76)

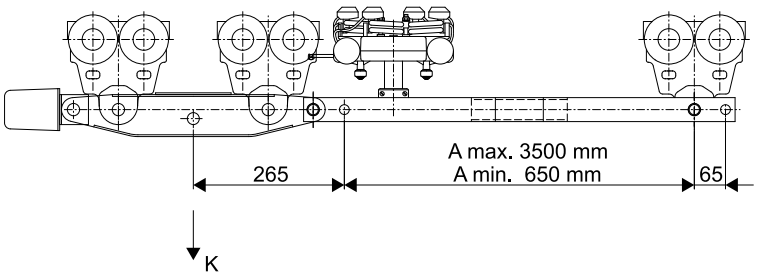
(ST 100, ST I on application)

Examples

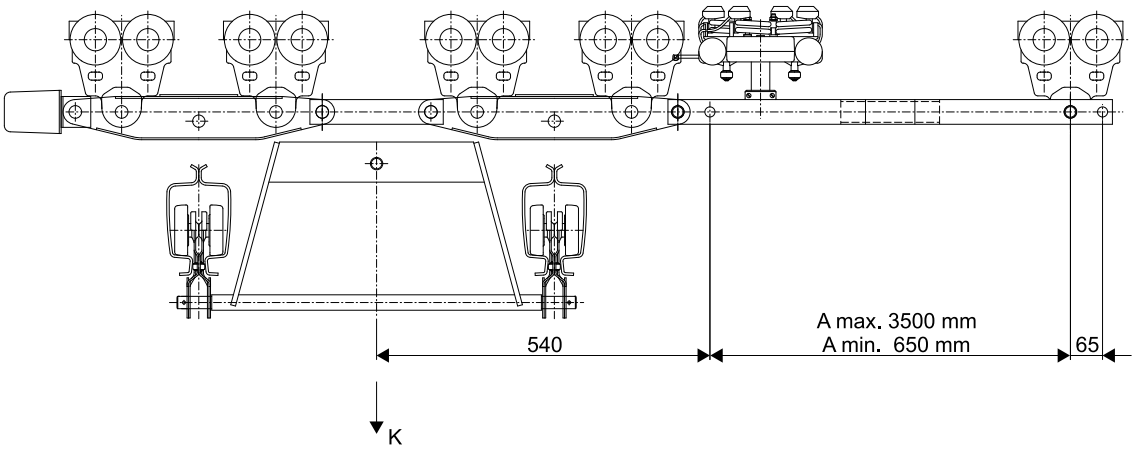
Spacer bar with two open ends, not for curved track, on single trolley



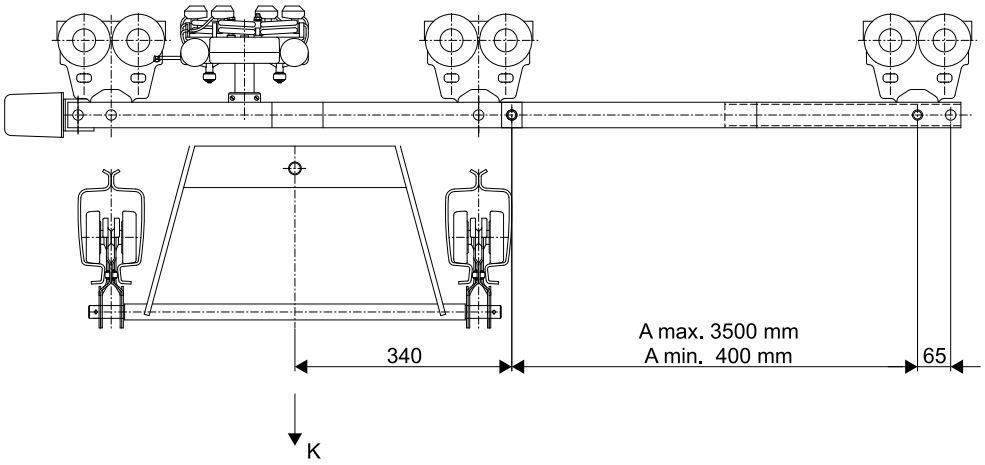
Spacer bar with two open ends, not for curved track, on double trolley



Spacer bar with two open ends, not for curved track, on double trolley for double-girder crane

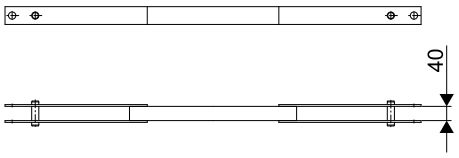


Spacer bar with one open end, not for curved track, on single trolley for double-girder crane

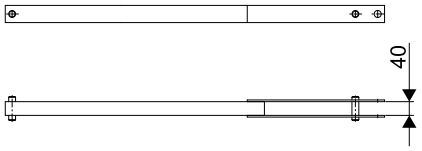


Components

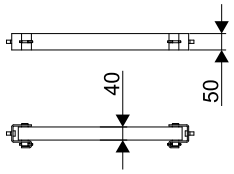
Spacer bar with two open ends



Spacer bar with one open end



Spacer bar with hinged blocks on both ends



Item	Designation	Length [mm]	Length A [1] [mm]			ST II-L, II, II-H
		fixed	Min.	Max.		
76	Spacer bar with one open end	-	400	3500	Weight [kg]	5.2 [kg/m]
					Part no.	204 802 46
	Spacer bar with two open ends	-	650	3500	Weight [kg]	5.2 [kg/m]
					Part no.	204 801 46

[1] Specify length A

Spacer bars are used to distribute loads safely by separating several single or double-girder cranes running on the same crane runway. The deadweight of the spacer bar must be included in load K when selecting the crane runway. Current collector trolleys or RF travel drives must always be connected to the load trolley.

Finish:

ST II metal parts black (RAL 9005),

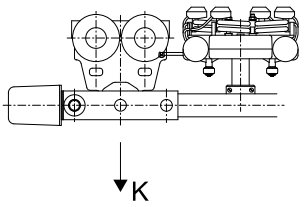
Galvanized pins, nuts and bolts.

13 BUFFERS AND END STOPS

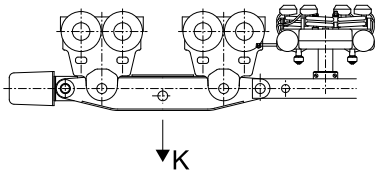
ST I, II-L, II, II-H buffer (item 98)

Examples

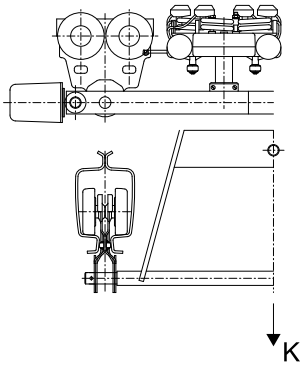
Fitted to single-trolley link



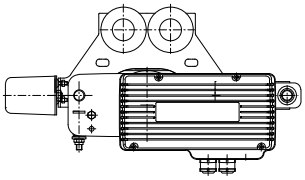
Fitted to articulated frame



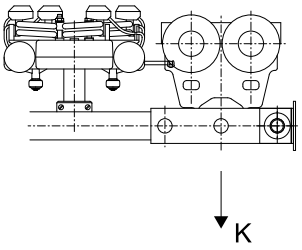
Spacer bar for double-girder crane, special spacer bar



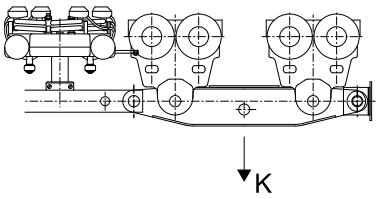
Fitted to trolley unit for RF



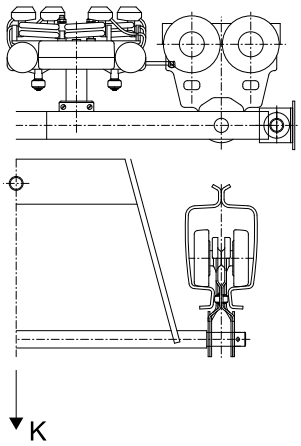
Fitted to single-trolley link



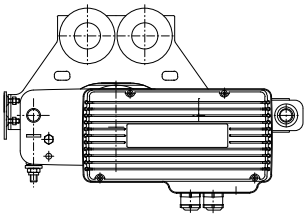
Fitted to articulated frame



Spacer bar for double-girder crane, special spacer bar

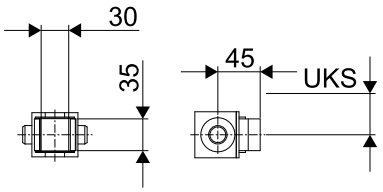


Fitted to trolley unit for RF

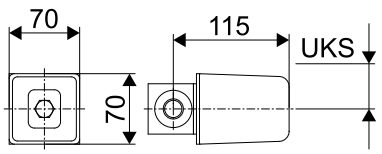


Components

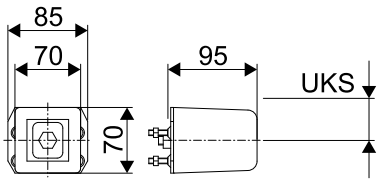
Rubber end stop



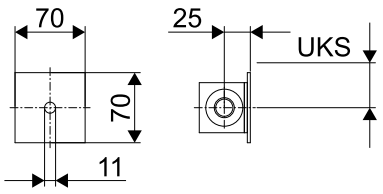
Buffer fitting (foamed plastic)



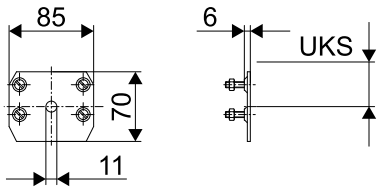
RF buffer fitting (foamed plastic)



Buffer plate



RF buffer plate



UKS = lower edge of profile section	
ST I	46 mm
ST II	45 mm
ST II-H	29 mm

Item	Designation		ST II-L, II, II-H
98	Rubber end stop	Weight [kg]	0.39
		Part no.	982 395 44
	Buffer fitting (foamed plastic)	Weight [kg]	0.49
		Part no.	982 378 44
	RF buffer fitting (foamed plastic)	Weight [kg]	0.45
		Part no.	858 375 44
	Buffer plate	Weight [kg]	0.43
		Part no.	982 377 44
	RF buffer plate	Weight [kg]	0.16
		Part no.	858 374 44

Limit stops with rubber buffers are fitted into the track section to limit long and cross-travel motions in ST II installations (end cap with buffer, internal buffer stop).

The impact energy resulting from running against limit stops is absorbed by sway of the crane installation (crane girder and track suspension) and the friction occurring in the joints.

To lessen the impact forces of several cranes on the same crane runway and/or to reduce the noise of impact, buffers should be provided between the trolleys or cranes.

For push-travel hoist trolleys and cranes, rubber stops are used for normal operating conditions, and cellular plastic buffers for a high degree of impact absorbency (buffer against buffer plate).

Electrically driven travelling hoists and cranes are fitted with cellular plastic buffers (plastic buffer against buffer plate). Where travel speeds exceed 21 m/min, the ends facing each other must be fitted with identical buffers (cellular plastic buffer against cellular plastic buffer). ST 100, ST I buffers on application.

Finish:

Black metal parts (RAL 9005); galvanized pins, nuts and bolts

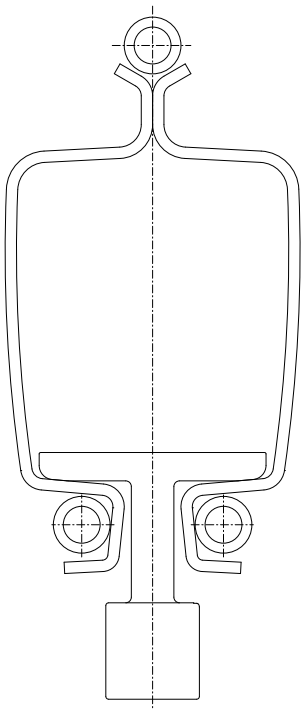
14 POWER SUPPLY TO CRABS AND CRANES

14.1 Trailing cable, general information

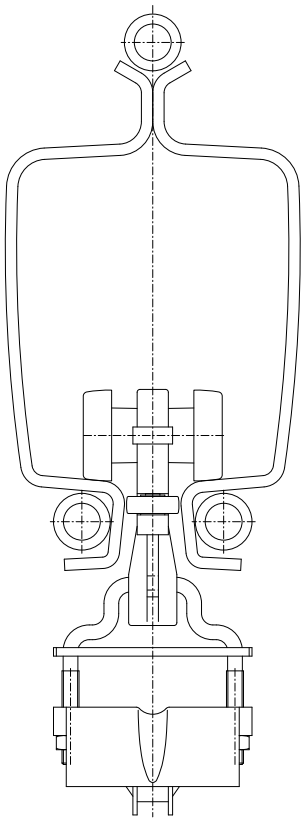
A cable running on cable sliders and larger or several cables running on cable trolleys in the ProfileMaster Plus ST section is the most economical power supply system.

ST 100, I, II-L, II, II-H trailing cable

with cable slider



with cable trolley



Long tracks

Cable trolleys should be used for longer tracks, electric long and cross-travel drives and when flat cables with outside dimensions greater than 8 mm x 22 mm or when several flat cables are used.

Number of cable sliders or cable trolleys

The quantity of cable sliders or cable trolleys required for a crane or track must be calculated taking into consideration cable sag and track or crane girder length. Cable sliders must only be used on straight tracks and only up to track lengths of approx. 30 m for ST 100, I or 40 m for ST II-L, II and for 4x1.5 mm^2 or 4x2.5 mm^2 flat cable (max. 8 mm x 22 mm external dimensions).

Max. trailing cable length with cable trolleys:

50 m for push-travel load, 70 m for electric-travel load.

Required cable length = Track and crane girder length in m x 1.2 + length of supply cables in m

Required quantity of cable carriers (track or crane) = {(track or crane girder length [m])/cable sag [m] x 2} - 1

Approach dimension

The approach dimension of the crane or travelling hoist is increased by the distance required for close accumulation of cable sliders and cable trolleys. Install an internal buffer stop to protect the accumulated cable carriers.

Two cranes on one track

If two crane girders operate on one crane runway, power supply can be provided via one flat cable for each of them from opposite ends of the track.

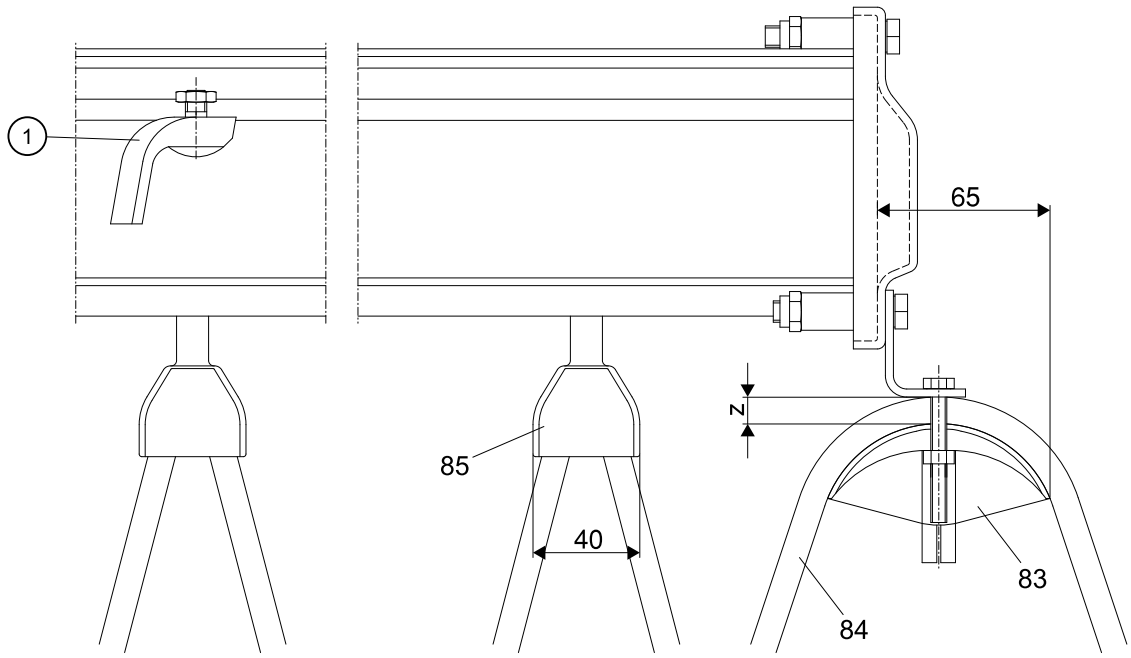
More than two cranes on one track

Power supply by flat cable is not provided as standard if more than two crane girders operate on one runway. In these cases, power must be supplied via a conductor line.

14.2 Trailing cable components and fittings

14.2.1 Rail end cable clamp (item 83), flat cable (item 84) and cable slider (item 85)

Flat cable with rail end cable clamp and cable slider



1. Internal buffer stop

	z
ST 100, I, II-L, II, II-H	max. 23 x 50 wide

Item	Designation	No. of conductors x rated cross-section [mm²]	External dimensions [mm]		ST 100, I	ST II-L, II	ST II-H
83	Rail end clamp			Weight [kg]	0.15		0.21
				Part no.	982 114 44		858 114 44
84	Flat cable with PE	4 x 1.5	19 x 8	Weight [kg]	0.21 [kg/m]		
				Part no.	471 352 44		
		4 x 2.5	21 x 8	Weight [kg]	0.26 [kg/m]		
				Part no.	504 208 44		
		8 x 1.5	33 x 8	Weight [kg]	0.34 [kg/m]		
				Part no.	504 226 44		
		13 x 1.5	31 x 12	Weight [kg]	0.55 [kg/m]		
				Part no.	895 171 44		
85	Cable slider for 4 x 1.5 mm² and 4 x 2.5 mm² flat cable			Weight [kg]	0.03	0.04	
				Part no.	980 850 44	851 850 44	

Rail end cable clamps are bolted to the end cap with buffer. This provides strain relief of the flat cable to the terminal box and a favourable fixing point for the cable between the crane girder and track girder.

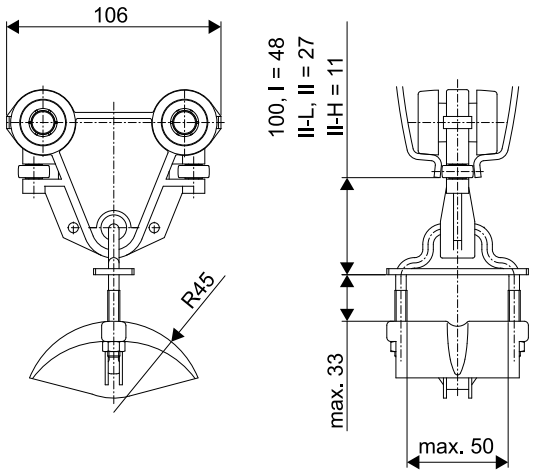
Finish: galvanized

The plastic-sheathed flat cable (cold-resistant) can be used in buildings with a dry or humid atmosphere, or in the open. Flat cable is flexible in one plane. Temperature range from -20 °C to +70 °C.

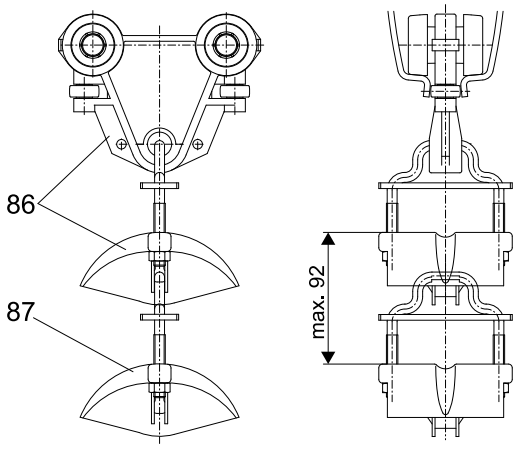
Cable sliders with a cable locking screw are suitable for one flat cable with maximum external dimensions of 8 mm x 22 mm. They are made of temperature-resistant plastic. Temperature range from -20 °C to +70 °C.

14.2.2 Cable trolley (item 86) and stirrup with clamping plate (item 87)

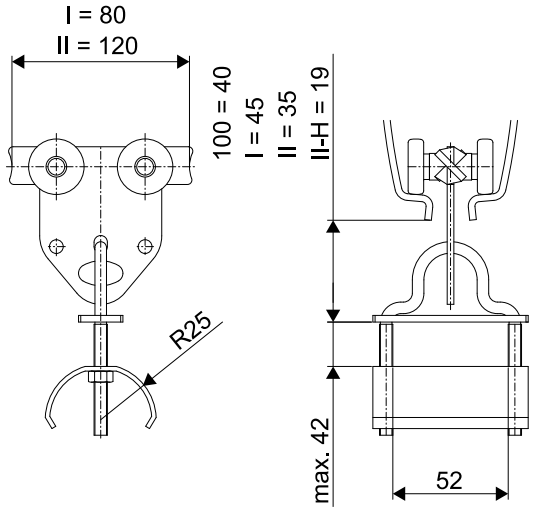
Cable trolley (plastic, item 86)



Stirrup with clamping plate (plastic, item 87)



Cable trolley (steel, item 86)



Item	Designation	Max. load [kg]		ST 100, I	ST II-L, II, II-H
86	Cable trolley (steel, galvanized)	40	Weight [kg]	0.30	0.50
			Part no.	984 605 44	855 085 44
	Cable trolley (plastic)	25	Weight [kg]	0.25	0.22
			Part no.	980 460 44	982 470 44
87	Stirrup with clamping plate (45 mm radius)	1)	Weight [kg]	0.10	
			Part no.	980 470 44	

1) Only for plastic cable trolley. Several hangers can be arranged below each other. However, the total load of the additional hangers must not exceed 5 kg.

The basic element of the cable trolley is the light-duty trolley (see Single trolleys (page 82)).

Cables, compressed air or water hoses can be supported. The cable trolley has bore holes for strain relief cords.

Finish:

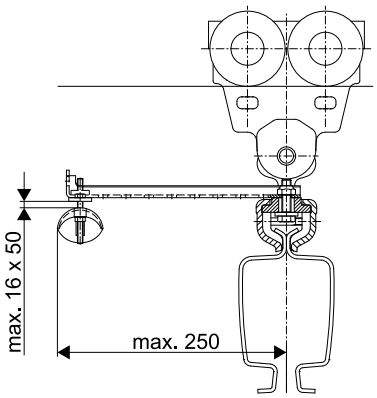
Plastic, black; axle with ball bearing: steel,

Travel wheels: plain plastic

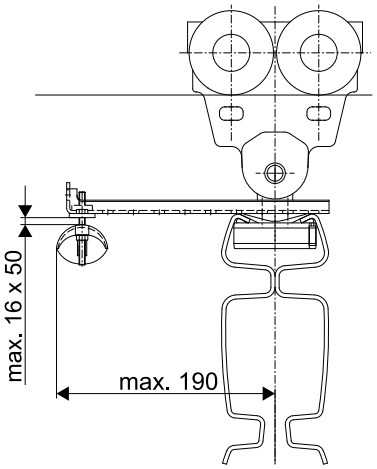
Temperature range -20 °C to +70 °C.

14.2.3 Crane girder cable clamp (item 80)

ST 100, I, II-L, II



ST II-H



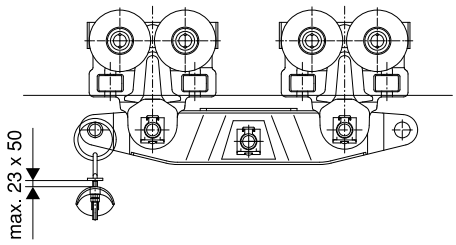
ST II-H: adjustable, max. 190

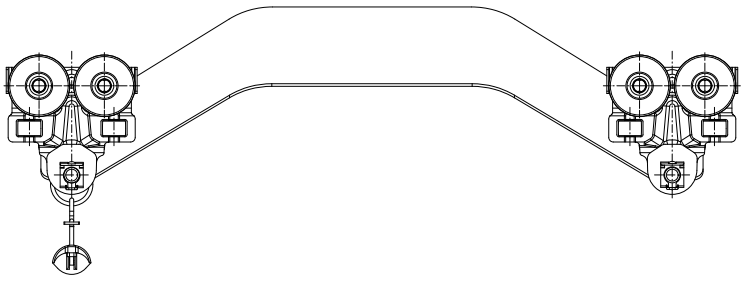
Item	Designation		ST 100	ST I, II-L, II	ST II-H
80	Crane girder cable clamp	Weight [kg]	0.70	1.20	0.83
		Part no.	984 680 44	980 680 44	858 680 44

Crane girder cable clamps can be used for ST 100, I, II-L, II, II-H push-travel single/double-girder cranes to prevent the flat cable running from the crane runway to the crane girder from being subjected to side pull.

14.2.4 Crab frame cable clamp (item 81)

Examples



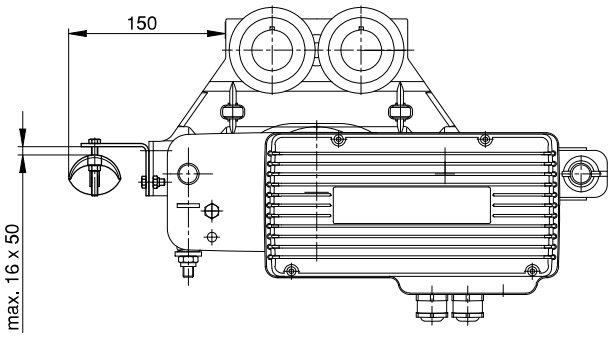


Item	Designation		ST 100, I, II-L, II
81	Crab frame cable clamp	Weight [kg]	0.10
		Part no.	982 577 44

Crab frame cable clamps can be suspended from the trolleys of ST 100, I, II-L, II push-travel double-rail crabs to relieve the strain on the hoist terminals.

The cable clamp can also be used on other trolleys with an additional pin, as an option (see examples).

14.2.5 RF trolley cable clamp (item 82)



Item	Designation		ST II-L, II, II-H
82	RF trolley cable clamp	Weight [kg]	0.26
		Part no.	858 578 44

RF trolley cable clamps can be fitted to electric-travel crabs/ST II-L, II cranes to relieve the strain on the terminals.

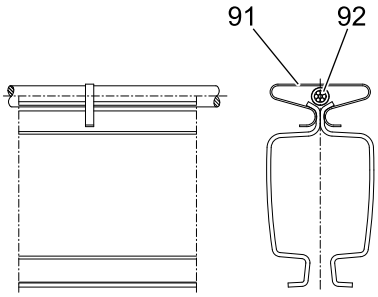
Finish: galvanized

14.3 Round cable and crane drive connection

Clip for round cable (item 91)

Round cable (item 92)

Clip for round cable



Item	Designation		ST I, II-L, II
91	Clip for round cable on ST I, II-L, II	Weight [kg]	-
		Part no.	982 124 44
92	3 x 0.5 mm² round cable	Weight [kg]	0.042
		Part no.	894 725 44
	4 x 1.5 mm² round cable, 1 kV	Weight [kg]	0.109
		Part no.	471 954 44
	7 x 1.5 mm² round cable, 1 kV	Weight [kg]	0.178
		Part no.	471 957 44
	8 x 1.5 mm² round cable, 500 V	Weight [kg]	0.250
		Part no.	894 136 44
	10 x 1.5 mm² round cable, 1 kV	Weight [kg]	0.388
		Part no.	471 960 44

A round cable has to be laid along the crane girder to complete the electric connection between the two travel drives on the track girder for electric-travel cranes.

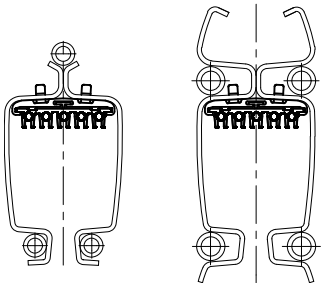
If an RF 125 is used with TD E22-C BL:
- To connect the crane bridge enclosure with the (master) drive:
  - One 8 x 1.5 mm^2 round cable
- To connect both drives (master/slave):
  - One 4 x 1.5 mm^2 round cable and one 3 x 0.5 mm^2 round cable

Required cable length to connect the two drives:

Crane span dimension l_{Kr} + 2.5 m.

The round cable is clipped to the crane girder at intervals of 0.5 m for ST I, II-L, II (l_{Kr} x 2 + 1) and placed in the upper part of the profile section without any clips for ST II-H.

14.4 ST II-R, ST II-H-R integrated busbar



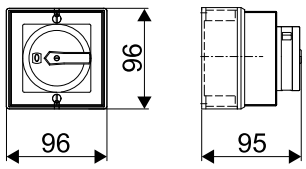
ST II-R and ST II-H-R profile sections are fitted with five internal conductors. Power can be supplied via powerfeed end caps or line powerfeeds. For this purpose, the current collector trolley provides four or five sprung double sliding contacts.

The track system should be provided with a maintenance section (item 11) for better maintenance of the current collector trolleys (to check or replace the sliding contacts or replace the complete current collector trolley).

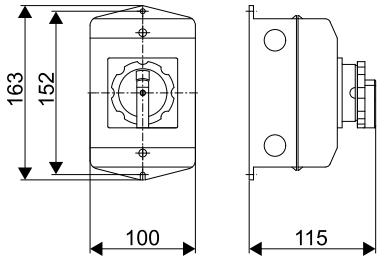
See ProfileMaster Plus ST II-R components (page 47).

14.5 Mains connection switch/isolating switch

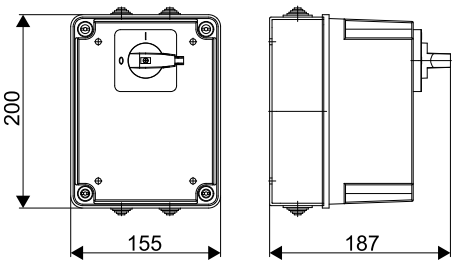
DT 16a



DT 25a



DT 25a-S



Item	Designation	Size	Voltage [V]	Current [A]		
88	Load isolating switch	DT 16a	≤ 500	Max. 20	Weight [kg]	0.32
					Part no.	575 479 44
		DT 25a	≤ 690	Max. 25	Weight [kg]	0.40
					Part no.	575 480 44
		DT 25a-S			Weight [kg]	1.41
					Part no.	473 037 44

Fuse links and inserts for DT 25a-S

Rated current [A]	D fuse link, delayed action Part no.	D screw-in adapter for fuse insert Part no.
6	451 663 99	504 905 99
10	451 643 99	504 906 99
16	451 644 99	504 907 99
20	451 645 99	504 908 99
25	451 646 99	504 909 99

Switch-isolators are suitable for use as mains connection or isolating switches.

Mains connection switch: stationary switch-isolator for a crane installation with one or more cranes/travelling hoists.

Isolating switch: on-board switch-isolator on cranes or travelling hoists on a common power supply line (conductor line).

Switch-isolators can be locked in the OFF (0) position against unauthorized restoration of the power supply by up to three padlocks.

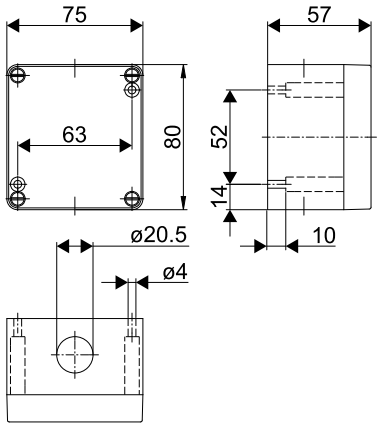
Two M20 x 1.5 cable entries are available. IP 55 enclosure.

DT 16a switch-isolator without fuses,

DT 25a switch-isolator without fuses,

DT 25a-S switch-isolator with fuse base for 3 fuses.

14.6 Terminal box (item 94)



Item	Designation		
94	Terminal box	Weight [kg]	0.40
		Part no.	504 650 44

A terminal box must be provided as the junction with the fixed round-section cable when flat cables are used to supply power to ProfileMaster Plus ST installations.

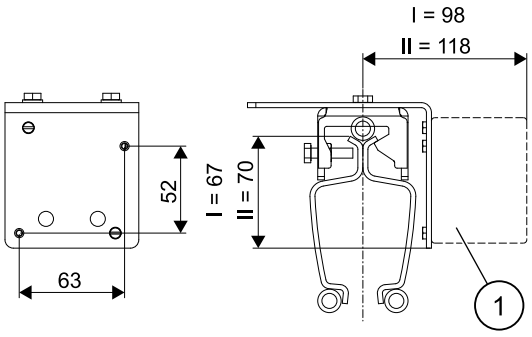
See Cable union sets (items 190, 191) (page 122) for cable sets.

Finish: aluminum enclosure with 6 modular spring-loaded terminals (grey) up to (2.5 mm^2) fitted on mounting rail, light grey (RAL 7035)

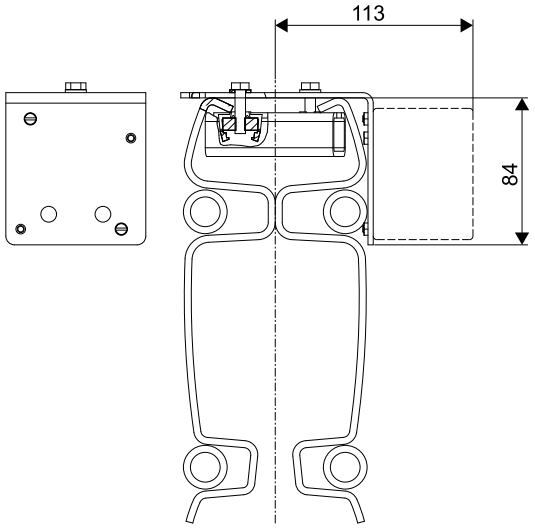
14.7 Mounting brackets for switches and terminal boxes

14.7.1 Mounting bracket for terminal box (item 92)

ST I, ST II-L, ST II



ST II-H



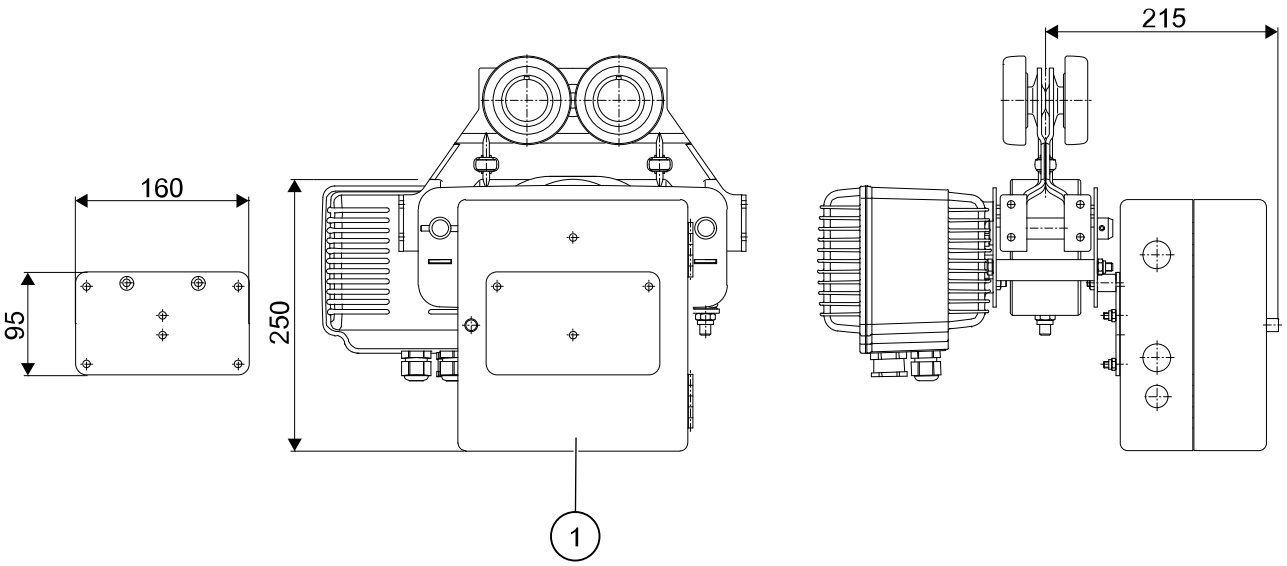
1. Terminal box 504 650 44

Item	Designation		ST I, II-L, II	ST II-H
92	Mounting bracket for terminal box	Weight [kg]	0.51	0.57
		Part no.	984 695 44	858 695 44

The mounting bracket is used to attach the terminal box (part no. 504 650 44).

Finish: galvanized

14.7.2 Mounting bracket for enclosure on RF 125 (item 92)



1. Enclosure, part no. 772 407 45

Item	Designation		ST II-L, II, II-H
92	RF 125 enclosure mounting bracket	Weight [kg]	0.50
		Part no.	851 53344

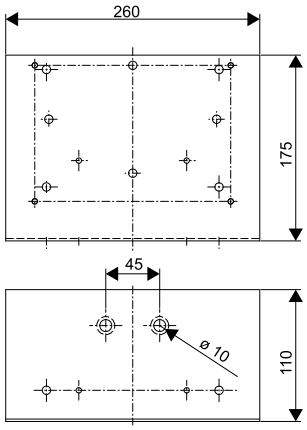
The mounting bracket is used to attach the enclosure, part no. 772 407 45.

Finish: black

14.7.3 Attachment bracket (item 93)

Small attachment bracket

for a, b

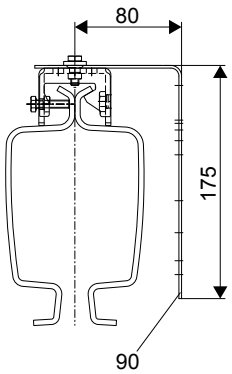


Item	Designation		
93	Small attachment bracket	Weight [kg]	0.70
		Part no.	851 222 44

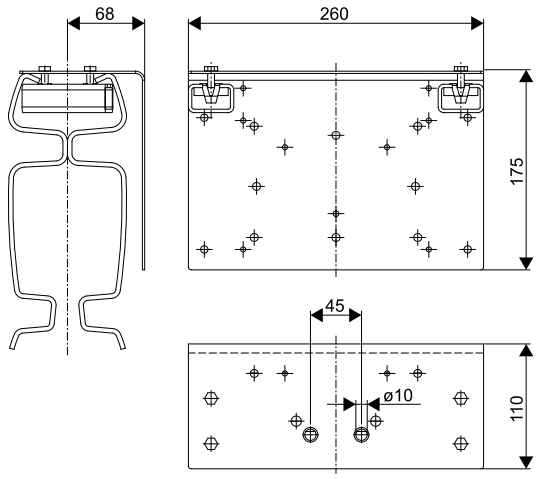
Item	Designation		Part no.
a	Mains connection/isolating switch	DT 16 a	575 479 44
b		DT 25 a	575 480 44
		DT 25 a-S	473 037 44

14.7.4 Bracket for isolating switch/terminal box with mounting bracket, small (item 90)

ST 100, I, II-L, II



ST II-H



Item	Designation		ST 100	ST I, II-L, II	ST II-H
90	Bracket for isolating switch	Weight [kg]	On application	1.40	1.64
		Part no.		851 224 44	858 224 44

Brackets can be used for mounting switches, small terminal boxes, counterweights and similar parts. Mounting bracket, fastening bolts and nuts for switch included.

Finish: galvanized

15 PROFILEMASTER PLUS ST STANDARD ELECTRIC EQUIPMENT

15.1 General

A control system with contactor control or a frequency inverter is used depending on the hoist unit.

The chain hoists have 24 V AC or 48 V AC control voltage.

Conversion

Systems can be converted to wireless controls.

Electromagnetic compatibility (EMC)

The equipment complies in full with the provisions of the EC EMC Directives.

Regulations

All component parts and assemblies fully comply with relevant rules and regulations. All relevant national or local regulations must be taken into account when planning electric equipment.

Important requirements from the standards

1. It must be possible to cut off all phases of the main power supply line by means of one mains connection switch. This switch must be protected against unauthorized restoration of the power supply.
2. An isolator which can be locked should be provided for each hoist if several of these, operating on one track, are fed through one and the same power supply line.
3. Each hoist must be fitted with an emergency-stop device which brings the motion drives to a standstill and interrupts the power supply to these drives.
4. A crane switch is required for
   - electrically powered cranes,
   - cross-travel drives with an output greater than 500 W.
5. Installation of a protective earth conductor, marked green/yellow over its entire length, is obligatory. It must not be possible for earth conductor current collectors to be swapped for phase collectors. Electric chain hoists are connected to the protective earth circuit of the installation. Protection of the ProfileMaster Plus ST rails and the trailing cable power supply lines is achieved by the use of safety class II equipment or equivalent insulation. Therefore, a connection to the protective earth circuit is not necessary.

Power supply

The required power supply system should be selected and separately ordered in accordance with the ProfileMaster Plus ST standard electric equipment table.

When specifying the power supply line, the total length of the supply lines along the crane runway and crane bridge must be added and checked to ensure that it is within the maximum permissible voltage drop according to section 18.5.

The “Cable union sets” section lists the small parts sets required for assembly and installation.

15.2 Standard elec. equip.

Selection table for installations with 2-stage TD E22-C BL chain hoist					Item	Required cable(s) on the crane bridge					the crab	
Travel motion	Power supply on the crane bridge	Lifting/lowering 2 speeds	Cross travel 2 speeds	Long travel 2 speeds	2, 5, 10 (hoist size)	EHK, ZHK drawing, see Schematic diagrams of cable arrangements and cable clamps (page 123)	4 x 1.5 flat cable Part no. 471 352 44	13 x 1.5 flat cable Part no. 895 171 44	3 x 0.5 round cable Part no. 894 725 44	4 x 1.5 round cable Part no. 471 954 44	EU-K cable set Part no. 772 406 45	Required number of poles on the crane bridge (PE = protective earth conductor)
Manual	Trailing cable	O			x	1	1					3+PE
Electric		O	O		x	2	1				1	3+PE
Electric with crane switch contactor		O	O		A	3	1				1	3+PE
		O		O	B	7		1	1	1		8+PE
	Conductor line	O		O	B				1	1		8+PE
	Trailing cable	O	O	O	A	6		1	1	1	1	8+PE
	Conductor line	O	O	O	A				1	1	1	8+PE

x = No item required

The following components must be ordered:

Item	Designation	Part no.
A	Crane bridge enclosure	772 407 45
A	RF 125 enclosure mounting bracket	851 533 44
B	Crane bridge enclosure	772 407 45
	RF 125 enclosure mounting bracket	851 533 44

The cables listed in the selection tables are not included in the electric items and must therefore be ordered separately.

Flat and round cables are supplied by the meter, whereas the cables for the travelling hoist are prepared in suitable lengths.

15.3 Cable union sets (items 190, 191)

Item	Designation			ST II-H, II-H-R
190	Flat cable set	4 x 1.5 mm^2	Weight [kg]	0.11
			Part no.	873 989 44
		4 x 2.5 mm^2	Weight [kg]	0.15
			Part no.	873 990 44
		13 x 1.5 mm^2	Weight [kg]	0.10
			Part no.	873 991 44
191	Round-section cable set	5 x 1.5 mm^2	Weight [kg]	0.11
			Part no.	873 992 44

The cable sets include all small parts needed for the cabling and wiring of ProfileMaster Plus ST installations when series components are used.

Assignment of the sets for the given application is described below. Contents of the cable sets:

873 989 44: 2 x M20 flat cable twist-type entry glands, M20 counter-nut, M25-M20 reducer, M25 counter-nut, M20 union

873 990 44: 2 x M25 flat cable twist-type entry glands, 2 x M20 counter-nuts, 2 x M20-M25 adapters, M20 union

873 991 44: 2 x M25 flat cable twist-type entry glands

873 992 44: 2 x M25 counter-nuts, 2 x M20 counter-nuts, 1 x M25-M20 reducer, 2 x M25 unions, 2 x M20 unions

Assignment of cable sets:

- Power supply to crane runway:
  - 4 x 1.5 mm^2 trailing cable: 1 x 873 989 44 per powerfeed point
  - 4 x 2.5 mm^2 trailing cable: 1 x 873 990 44 per powerfeed point
  - Conductor line: no cable set required
- Crane power supply (see table below)

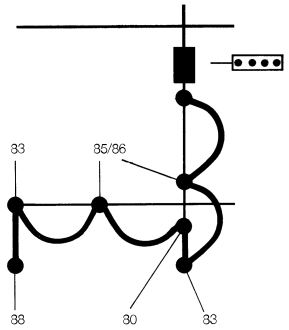
Electric motion			Isolating switch on the crane	Crane power supply (per crane):				
				Conductor line	Trailing cable			
Lifting	Cross travel	Long travel			1.5 mm^2 cross-section		2.5 mm^2 cross-section	
					4 x 1.5 mm^2	13 x 1.5 mm^2	4 x 2.5 mm^2	4 x 2.5 mm^2 + 8 x 1.5 mm2
O								
O			O	1 x 873 992 44	1 x 873 989 44		1 x 873 990 44	
O	O							
O	O		O	1 x 873 992 44	1 x 873 989 44		1 x 873 990 44	
O		O		2 x 873 992 44		1 x 873 991 44		1 x 873 989 44
O		O	O	3 x 873 992 44		1 x 873 991 44 1 x 873 992 44		1 x 873 990 44 1 x 873 992 44
O	O	O		2 x 873 992 44		1 x 873 991 44		1 x 873 989 44
O	O	O	O	3 x 873 992 44		1 x 873 991 44 1 x 873 992 44		1 x 873 990 44 1 x 873 992 44

15.4 Schematic diagrams of cable arrangements and cable clamps

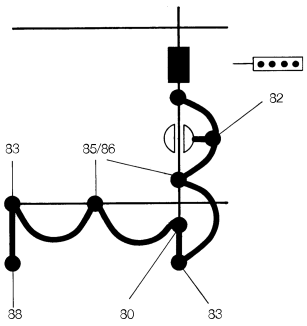
Key to symbols		Item	Designation	Section
●	Cable clamp	80	Crane girder cable clamp	Trailing cable components and fittings (page 111)
▬ ▬ ▬	Round cable (item 92), rigidly mounted on the crane bridge	81	Crab frame cable clamp	Trailing cable components and fittings (page 111)
▬▬	Flat cable (item 84), freely suspended	82	RF trolley cable clamp	Trailing cable components and fittings (page 111)
	Double-rail crab with cable entry on the hoist unit	85	Cable slider	Trailing cable components and fittings (page 111)
	RF (friction-wheel travel drive)	88	Mains connection switch	Mains connection switch/ isolating switch (page 116)
	Control element	91	Clip for round cable	Trailing cable components and fittings (page 111)

Single-girder crane

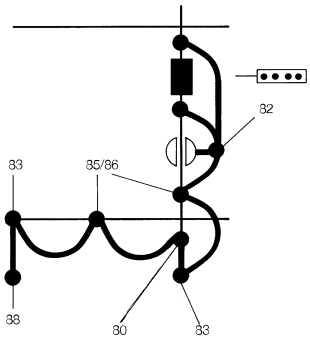
EHK 1



EHK 2

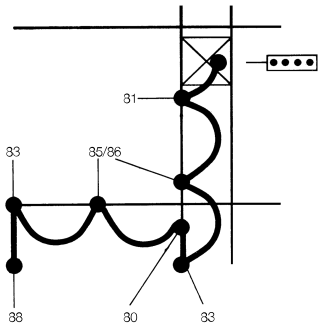


EHK 3

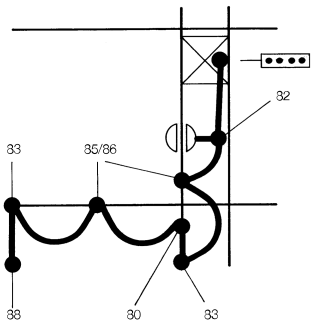


Single-girder crane, rigid/double-girder crane

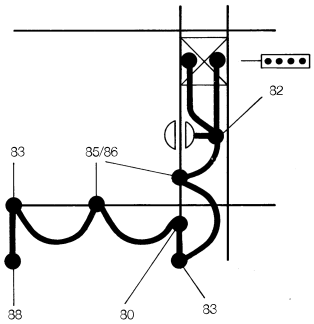
ZHK 1



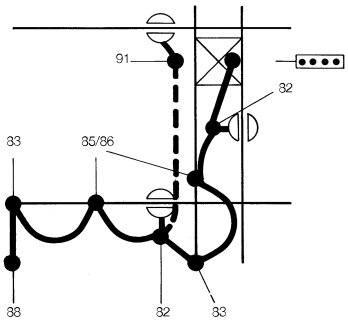
ZHK 2



ZHK 3



ZHK 6



ZHK 7