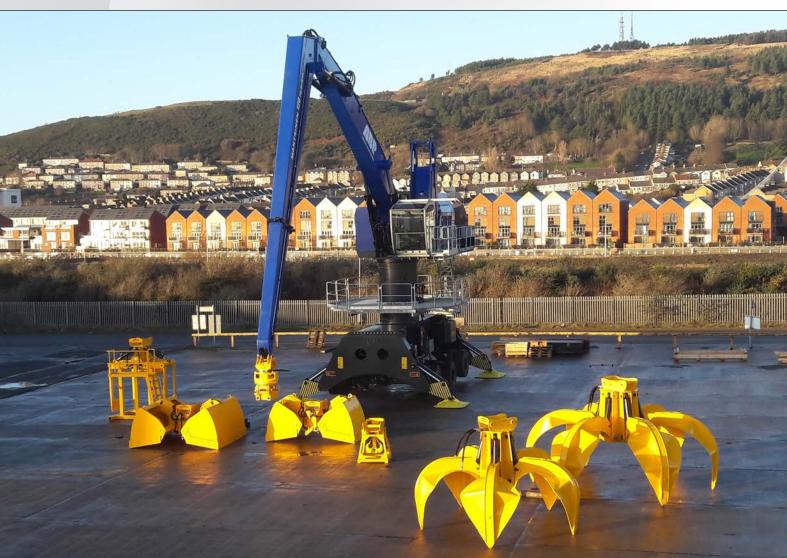
## MANTSINEN GLOBAL PORT EQUIPMENT ATTACHMENTS



## ROTATORS & QUICK COUPLERS









Mantsinen rotators: over 20 years of experience.

#### QUICK COUPLERS

When a machine works with several attachments the Mantsinen quick coupler is the means to keep the machine working efficiently, always having the optimum attachment. The attachment change takes only 10 minutes. MC620 is rated at 25 000 kg and MC720 at 50 000 kg. Both quick couplers and fixed rotators are available with sliprings for magnet or electrical signals.

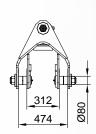
#### FIXED ROTATORS

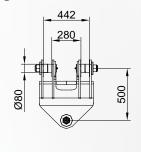
Mantsinen rotators incorporate a two-row slewing ring and two external hydraulic motors. This guarantees a smooth and precise yet strong rotation with a moderate hydraulic pressure. Mantsinen R3 is rated at SWL 25 000 kg and R4 at SWL 50 000 kg. Mantsinen adapters for your existing attachments will allow you to use them with Mantsinen rotators or quick coupling.

## MANTSINEN Rotators & Quick Couplers **TECHNICAL SPECIFICATIONS**

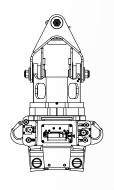
#### SWL 25 000 kg

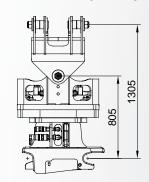
LINK L3A, 155 kg





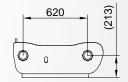
QUICK COUPLER R3-MC620, 965 kg (=810 kg + link 155 kg)



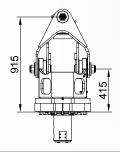


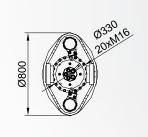
ADAPTER FOR QUICK COUPLER MC620, 195 kg





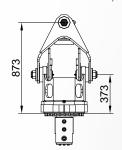
FIXED ROTATOR R3, 515 kg (=360 kg + link 155 kg)

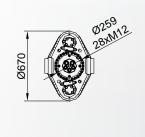




SWL 20 000 kg

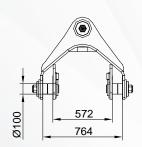
FIXED ROTATOR R25, 395 kg (=240 kg + link 155 kg)

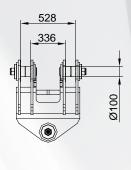




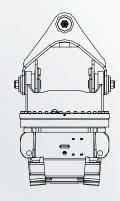
#### SWL 50 000 kg

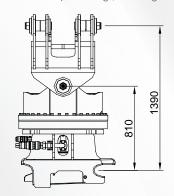
LINK L4A, 290 kg



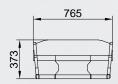


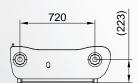
QUICK COUPLER R4-MC720, 1 470 kg (=1180 kg + link 290 kg)



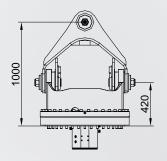


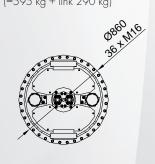
ADAPTER FOR QUICK COUPLER MC720, 300 kg





FIXED ROTATOR R4, 885 kg (=595 kg + link 290 kg)





Specifications subject to change without prior notice.

The photographs and drawings in this brochure are for illustrative to

The photographs and drawings in this brochure are for illustrative purposes only. Refer to the Operator's Manual for instructions on the proper use of this equipment.



## **CLAMSHELL BUCKETS**









Clamshell buckets from 1,5 m<sup>3</sup> to 20 m<sup>3</sup>.

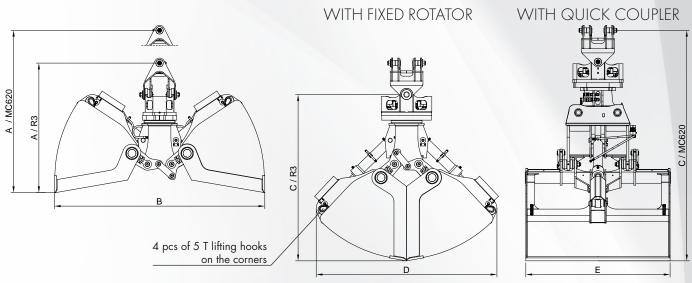
#### CLAMSHELL BUCKETS

From light and smooth to heavy and abrasive materials, from small to big machines, there is a Mantsinen bucket for the job.

Mantsinen clamshell buckets work with cereals, fertilizers, fodder, salt, coal, soil, gravel and ores, just to name a few different materials. For extremely abrasive or corrosive materials there are special abrasive resistant or stainless steel shells for the buckets.

Most sizes are available as either two- or four-cylinders versions. For light materials, like cereals, Mantsinen has developed a HBL series, a lighter version to maximise capacity. For heavy machines there is the HBH series of buckets up to  $20m^3$ , with SWL 25 tons.

## MANTSINEN Clamshell Buckets TECHNICAL SPECIFICATIONS



					-						-		
Model	Capacity m³	A / R3 [mm]	A / MC620 [mm]	B [mm]	C / R3 [mm]	C / MC620 [mm]	D [mm]	E [mm]	Weight/ R3* [kg]	Weight/ MC620** [kg]	SWL [kg]		
LIGHT HBL	SERIES												
HBL 15-2	1,5	1 990	2 480	2 450	2 680	3 160	2 270	1 520	2 120	1 920	8 000		
HBL 20-2	2,0	1 990	2 480	2 800	2 850	3 330	2 360	1 520	2 200	2 000	8 000		
HBL 25-2	2,5	1 990	2 480	2 800	2 850	3 330	2 360	1 870	2 280	2 080	8 000		
HBL 30-2	3,0	2 040	2 530	3 320	3 120	3 600	2 815	1 500	2 720	2 520	8 000		
STANDARD	HB SERIE:	S											
HB 20-2	2,0	2 015	2 540	2 920	2 940	3 460	2 920	1 500	3 150	2 960	10 000		
HB 25-2	2,5	2 035	2 560	3 130	3 030	3 555	2 925	1 500	3 270	3 080	10 000		
HB 30-2	3,0	2 055	2 575	3 340	3 140	3 660	2 920	1 500	3 390	3 200	10 000		
HB 35-2	3,5	2 055	2 575	3 340	3 140	3 660	2 920	1 670	3 450	3 270	10 000		
HB 40-2	4,0	2 055	2 575	3 340	3 140	3 660	2 920	1 850	3 580	3 400	10 000		
HB 50-2	5,0	2 055	2 575	3 340	3 140	3 660	2 920	2 290	3 830	3 660	10 000		
HB 60-2	6,0	2 055	2 575	3 340	3 140	3 660	2 920	2 740	4 090	3 930	10 000		
HB 70-2	7,0	2 070	2 595	3 580	3 260	3 780	3 000	2 740	4 250	4 110	10 000		
HB 80-2	8,0	2 115	2 635	4 010	3 480	4 000	3 425	2 290	4 200	3 990	10 000		
HB 40-4	4,0	2 055	2 575	3 340	3 140	3 660	2 920	1 950	4 580	4 400	15 000		
HB 50-4	5,0	2 015	2 535	3 340	3 100	3 620	2 920	2 290	4 750	4 600	15 000		
HB 60-4	6,0	2 015	2 535	3 340	3 100	3 620	2 920	2 740	5 040	4 850	15 000		
HB 70-4	7,0	2 025	2 545	3 575	3 210	3 730	3 000	2 740	5 262	5 070	15 000		
HB 80-4	8,0	2 070	2 590	4 020	3 440	3 960	3 425	2 290	5 370	5 180	15 000		
HB 100-4	10,0	2 075	2 595	4 010	3 430	3 955	3 425	2 940	5 560	5 370	15 000		
HB 120-4	12,0	2 120	2 640	4 620	3 740	4 265	3 890	2 520	6 270	6 070	15 000		
HB 140-4	14,0	2 120	2 640	4 620	3 740	4 265	3 890	2 940	6 490	6 300	15 000		
HB 180-4	18,0	2 370	2 890	5 100	3 960	4 480	4 215	2 940	7 090	6 900	15 000		
HEAVY HB	HEAVY HBH SERIES WITH R4 OR MC720 - ADDITIONAL LIFTING HOOKS, SWL 9500 KG / HOOK												
HBH 140-4	14,0	4 020	4 410	5 060	5 790	6 180	4 200	2 800	9 900	9 600	25 000		
HBH 200-4	20,0	4 075	4 465	5 730	6 130	6 520	4 790	2 800	10 650	10 350	25 000		

<sup>\*</sup> The weight with fixed rotator, but excluding link



 $<sup>\</sup>ensuremath{^{*\,*}}$  The weight with adapter, but excluding quick coupler and link

<sup>•</sup> Also available with R4 fixed rotator and MC720 quick coupler system

## **ORANGE PEEL GRABS**









Heavy-duty grabs for hard work with tough machines.

#### ORANGE PEEL GRABS

Mantsinen orange peel grabs are designed for hard work with big machines.

Our unique grab frame design, made of steel plates running from the top all the way to the pivot points of the tines, makes the grab extremely resistant to the repetitive shocks of scrap handling.

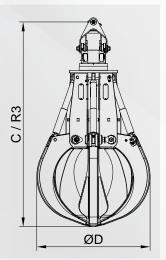
Mantsinen orange peel grabs are available with 4 - 6 tines and with either closed, semi-open or open tine form.

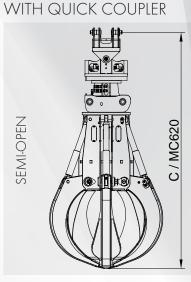
Mantsinen range includes orange peel grabs from 0,8 m³ to 9,0 m³. All orange peel grabs are available with both Mantsinen quick coupling systems or fixed rotarors.

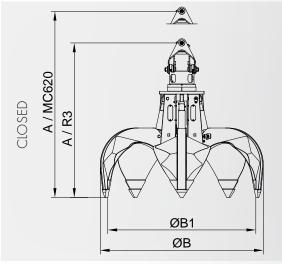
## MANTSINEN Orange Peel Grabs TECHNICAL SPECIFICATIONS

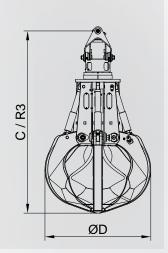
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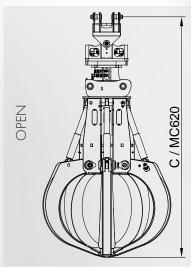
#### WITH FIXED ROTATOR











Model	Capacity m <sup>3</sup>	A / R3 [mm]	A / MC620 [mm]	ØB [mm]	ØB1 [mm]	C / R3 [mm]	C / MC620 [mm]	ØD [mm]	Weight R3* [kg]	Weight MC620** [kg]	SWL [kg]
HG 08-5	0,8	2 790	3 360	2 445	2 640	3 165	3 720	1 680	2 590	2 380	10 000
HG 11-5	1,1	2 830	3 405	2 860	2 640	3 275	3 830	1 885	2 730	2 520	10 000
HG 15-5	1,5	2 900	3 475	2 940	3 165	3 440	3 995	2 035	2 830	2 620	10 000
HG 20-5	2,0	3 230	3 800	3 590	3 370	3 845	4 400	2 180	3 320	3 110	10 000
HG 25-5	2,5	3 240	3 810	3 630	3 400	3 865	4 435	2 330	3 460	3 260	10 000
HG 30-5	3,0	3 275	3 845	3 780	3 540	3 960	4 520	2 475	3 621	3 410	10 000
HG 40-5	4,0	3 365	3 935	4 140	3 865	4 150	4 700	2 620	3 750	3 500	10 000
HG 50-5	5,0	3 485	4 055	4 450	4 140	4 365	4 920	2 920	4 600	4 390	10 000
HG 60-6	6,0	3 635	4 200	4 920	4 535	4 500	5 060	2 810	6 100	6 000	10 000
HG 75-6	7,5	4 530	4 240	5 120	4 720	4 530	5 160	3 340	6 680	6 560	10 000
HG 90-6	9,0	3 780	4 370	5 620	5 240	4 870	5 460	3 380	6 880	6 760	10 000

- \* The weight with fixed rotator, but excluding link
- \*\* The weight with adapter, but excluding quick coupler and link
- Also available with R4 fixed rotator and MC720 quick coupler system
- All specifications are for grabs with semi-open tines

Weights are for grabs with semi-open tines



Specifications subject to change without prior notice.

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Refer to the Operator's Manual for instructions on the proper use of this equipment.

## SQUARE ORANGE PEEL GRABS







Unique design for unloading or loading trucks and wagons.

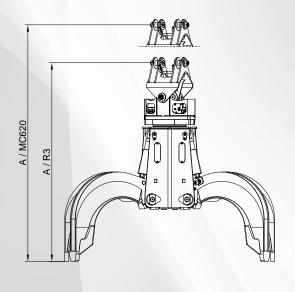
#### SQUARE ORANGE PEEL GRABS

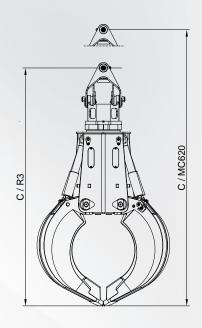
Mantsinen SG 22-6 is the special six-tine square orange peel grab designed for wagons and trucks.

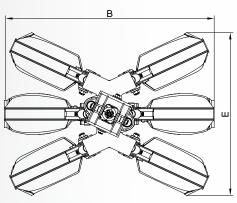
Thanks to the optimal dimensions of Mantsinen SG 22-6, the handling capacity can be doubled compared with five tine orange peel grabs. Consequently, the truck or railroad wagon loading time can be cut to half.

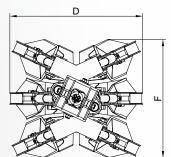
The use of bigger machines becomes more economical and the utilization of the machine increases considerably.

The SG 22-6 is available either with our quick coupler adapter for MC620 or with our fixed rotator P2









- \* The weight with fixed rotator, but excluding link
- \* \* The weight with adapter, but excluding quick coupler and link
- Also available with R4 fixed rotator and MC720 quick coupler

Model	Capacity m³	A / R3 [mm]	A / MC620 [mm]	B [mm]	C / R3 [mm]	C / MC620 [mm]	D [mm]	E [mm]	F [mm]	Weight R3* [kg]	Weight MC620** [kg]	SWL [kg]
SG 22-6	2,2	2 910	3 470	3 080	3 440	4 030	1 950	2 390	1 740	3 600	3 500	10 000



### **WASTE BALE GRABS**



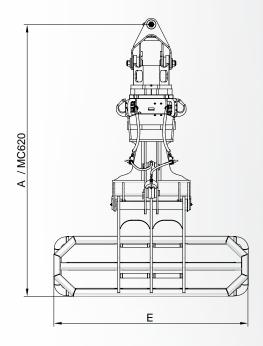


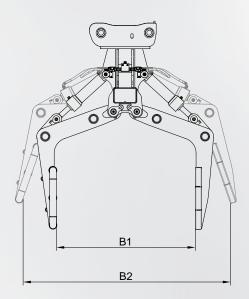


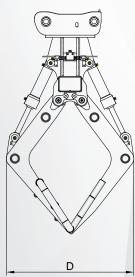
Versatile solution designed for loading or unloading waste bales

#### WASTE BALE GRABS

We can tailor a waste bale grab according to your needs, for loading or unloading of single or multiple bales of different sizes. The blades can be equipped with rollers, and one blade can be hydraulically shut off.







- \* The weight with adapter, but excluding quick coupler and link
- Also available with R3 / R4 fixed rotator and MC720 quick coupler

Model	A / MC620 [mm]	B1 [mm]	B2 [mm]	D [mm]	E [mm]	Weight [kg]	SWL [kg]
WBG MC620	3 500	1 790	2 850	1 640	2 390	2 500	6 000



## **TIP-TO-TIP GRAPPLES**









Excellent productivity for large scale wood handling.

#### TIP-TO-TIP ROUNDWOOD GRAPPLES

Mantsinen Logistics Services' annual 20 million ton wood handling has made us the specialist in roundwood grapples. The tip-to-tip grapples are the choice especially for ship loading and unloading.

The design of the tines is optimized for handling large, continuous wood piles, entering and exiting the pile with minimum tangle, even with short wood.

The two heavy chains in the middle of the grapple keep even a single stem in place.

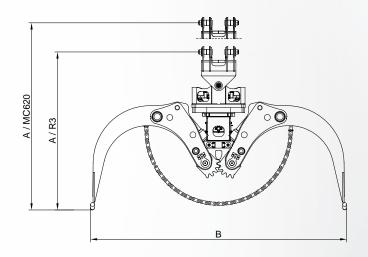
Like most Mantsinen attachments, roundwood grapples are available with fixed rotator or with quick coupling system.

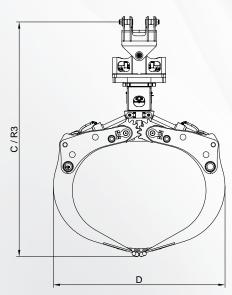
Tip-To-Tip grapple comes in sizes from  $1.6 \text{ m}^2$  to  $3.6 \text{ m}^2$ .

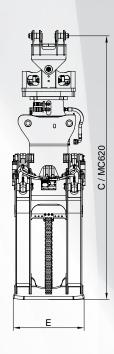
## MANTSINEN Tip-To-Tip Grapples TECHNICAL SPECIFICATIONS

WITH FIXED ROTATOR

WITH QUICK COUPLER







Model	Area m²	A /R3 [mm]	A / MC620 [mm]	B [mm]	C / R3 [mm]	C / MC620 [mm]	D [mm]	E [mm]	Weight R3* [kg]	Weight MC620** [kg]	SWL [kg]
RGT 16	1,6	2 025	2 620	3 200	2 970	3 565	2 240	1 090	2 650	2 490	10 000
RGT 18	1,8	2 085	2 680	3 335	3 060	3 655	2 310	1 090	2 700	2 540	10 000
RGT 20	2,0	2 110	2 705	3 530	3 145	3 740	2 350	1 090	2 780	2 620	10 000
RGT 25	2,5	2 195	2 790	3 850	3 340	3 935	2 580	1 090	2 940	2 780	10 000
RGT 30	3,0	2 355	2 950	4 065	3 510	4 105	2 880	1 090	3 060	2 900	10 000
RGT 36	3,6	2 340	2 930	4 270	3 650	4 240	3 210	1 090	3 410	3 150	10 000

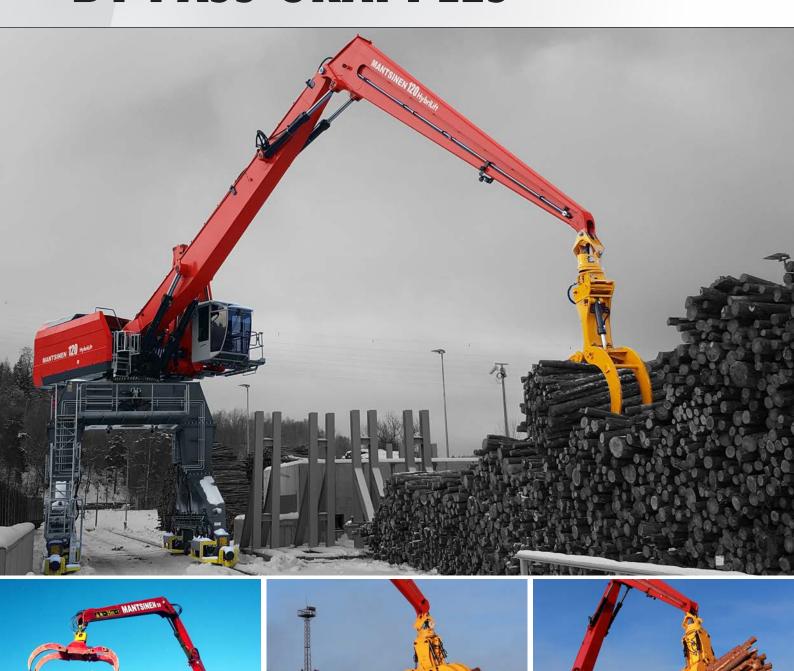
<sup>\*</sup> The weight with fixed rotator, but excluding link



 $<sup>^{**}</sup>$  The weight with adapter, but excluding quick coupler and link

<sup>•</sup> Also available with R4 fixed rotator and MC720 quick coupler

## **BY-PASS GRAPPLES**



By-pass grapple for trucks and wagons.

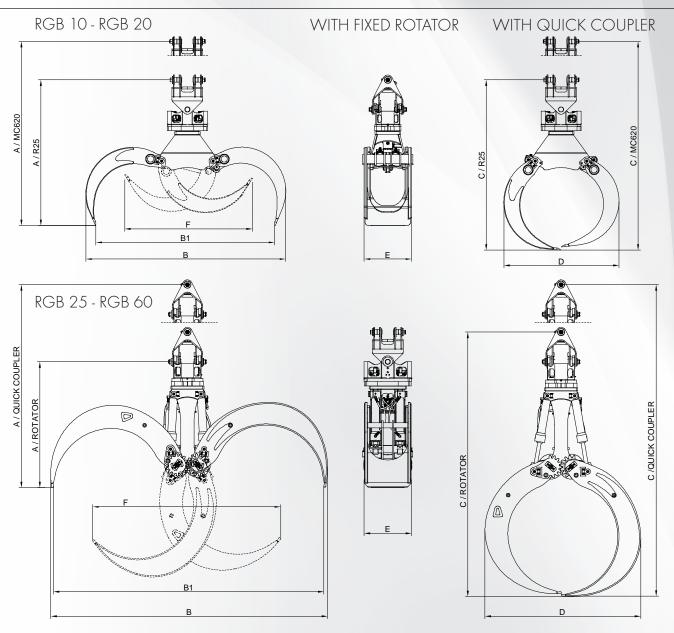
#### BY-PASS ROUNDWOOD GRAPPLES

Mantsinen Logistic Services has served as an ideal testing ground for our roundwood grapples: 20 million tons of round wood handled annually requires a sturdy but light design. Sizes are available from 1,0 m² to 6,0 m².

Like most Mantsinen attachments, roundwood grapples are available with either quick coupler or fixed rotator.

When equipped with an adapter for Mantsinen quick coupling system, the grapple can be changed in a few minutes.

## MANTSINEN By-Pass Grapples TECHNICAL SPECIFICATIONS



Model	Area m²	A / R25 [mm]	A / MC620 [mm]	B [mm]	B1 [mm]	C / R25 [mm]	C / MC620 [mm]	D [mm]	E [mm]	F [mm]	Weight R25* [kg]	Weight MC620** [kg]	SWL [kg]
RGB 10	1,0	2 450	3 000	2 900	2 420	2 670	3 180	1 810	800	1 800	1 530	1 480	10 000
RGB 14	1,4	2 300	2 840	3 600	3 430	2 950	3 480	1 880	800	2 160	1 760	1 600	10 000
RGB 16	1,6	2 760	3 310	3 590	3 080	3 160	3 680	2 030	800	2 600	1 780	1 740	10 000
RGB 20	2,0	2 800	3 320	3 900	3 380	3 220	3 740	2 130	800	2 770	1 800	1 750	10 000

Model	Area m²	A / R4 [mm]	A / MC620 [mm]	B [mm]	B1 [mm]	C / R4 [mm]	C / MC620 [mm]	D [mm]	E [mm]	F [mm]	Weight R4* [kg]	Weight MC620** [kg]	SWL [kg]
RGB 25	2,5	2 780	3 360	4 450	4 330	5 150	4 930	2 660	830	3 320	3 500	3 100	10 000
RGB 60	6,0	4 800	5 380	5 840	4 760	5 600	5 380	3 930	1 220	4 350	7 300	6 900	25 000

- \* The weight with fixed rotator, but excluding link
- $\ensuremath{^{*\,*}}$  The weight with adapter, but excluding quick coupler and link
- Also available with R4 fixed rotator and MC720 quick coupler

Specifications subject to change without prior notice.

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Refer to the Operator's Manual for instructions on the proper use of this equipment.



## LIFTING HOOKS









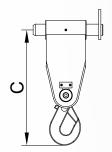
From SWL 15 t single hook to SWL 50 t anchor hook.

#### LIFTING HOOKS

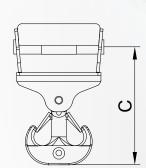
Lifting hook is an essential tool in many port operations. Several sizes are available for different purposes. Anchor hooks will be delivered with a parking cradle. When equipped with an adapter for Mantsinen quick coupling system, the attachment can be changed in a few minutes.

## MANTSINEN Lifting Hooks TECHNICAL SPECIFICATIONS

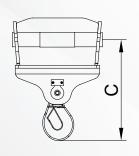
STICK ATTACHED HOOK



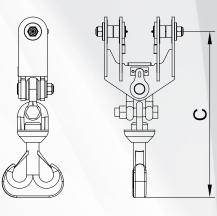
ANCHOR HOOK MC620



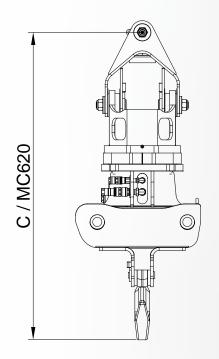
SINGLE HOOK MC620

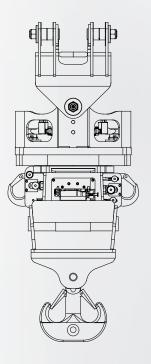


STICK ATTACHED ANCHOR HOOK 25 T

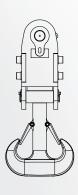


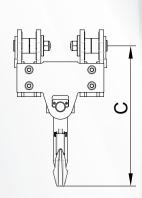
ANCHOR HOOK WITH QUICK COUPLER MC620





STICK ATTACHED ANCHOR HOOK 50 T





Model	C [mm]	C / MC620 [mm]	Weight* [kg]	SWL [kg]
Stick attached hook **	795	-	110	15 000
Anchor hook MC620	1 060	2 360	490	25 000
Anchor hook MC720	1 080	2 380	520	50 000
Single hook MC620	695	1 995	220	15 000
Stick attached anchor hook 25 ***	1 140	-	150	25 000
Stick attached anchor hook 50 ***	970	-	310	50 000

<sup>\*</sup> The weight with adapter, but excluding quick coupler and link

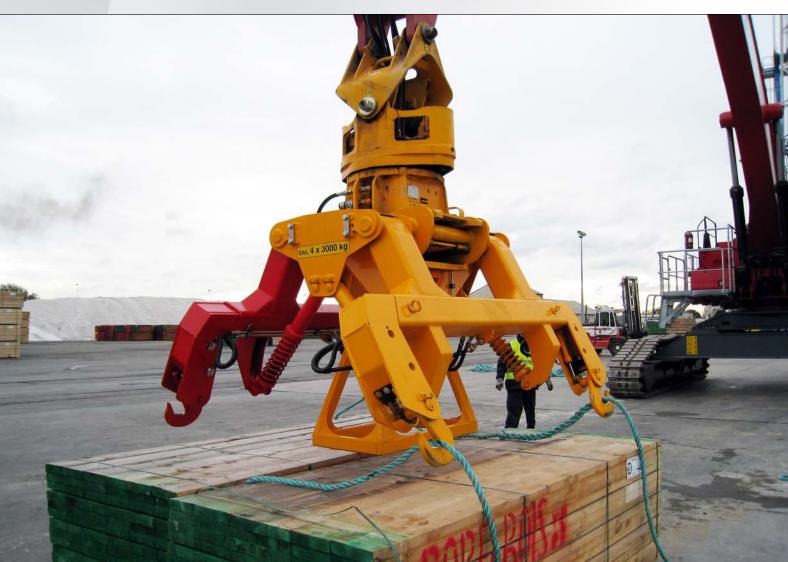


<sup>\*\*</sup> Hook attached directly to the end of stick

<sup>\*\*\*</sup> Hook attached directly to the end of stick, manually rotated

<sup>•</sup> Also available with R4 fixed rotator and MC720 quick coupler

## SAWN TIMBER SPREADERS









Automatic release hooks improve safety and efficiency.

#### SAWN TIMBER SPREADERS

Patented Mantsinen sawn timber spreader ensures easy and gentle loading.

The operator controlled release hooks reduce manual labour and increase safety and efficiency. Mantsinen sawn timber spreaders are available with either manual or hydraulic length adjustment.

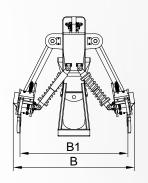
Sawn timber spreaders work hydraulically and need no pressurized air from the material handler.

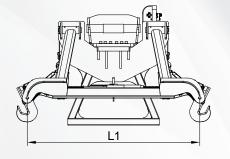
When equipped with an adapter for Mantsinen quick coupling system, the sawn timber spreader can be changed in a few minutes.

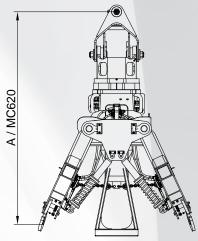
## MANTSINEN Sawn Timber Spreaders TECHNICAL SPECIFICATIONS

FIXED LENGTH

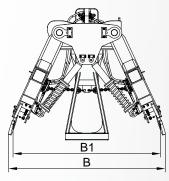
#### WITH QUICK COUPLER

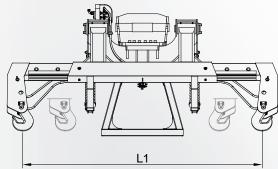


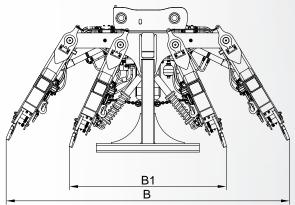




#### EXTENDABLE LENGTH







Model	A / MC620 [mm]	B1 [mm]	B [mm]	L1 [mm]	Weight MC620* [kg]	SWL [kg]
FIXED LENGTH						
LSF MC620	2 290	1 260	1 420	2 050	850	4 x 2 500
extendable length						
LSE MC620 with manual length adjustment	2 410	min 650 max 1 800	1 830	min 1 800 max 2 800	1 450	4 x 3 000
LSH MC620 with hydraulic length adjustment	2 410	min 650 max 1 800	1 830	min 1 800 max 2 800	1 450	4 x 3 000
LSH MC620 with hydraulic length adjustment	2 800	1 830	3 300	min 2 150 max 3 150	2 600	8 x 3 000

- \* The weight with adapter, but excluding quick coupler and link
- Also available with R4 fixed rotator and MC720 quick coupler



## **BIG BAG SPREADERS**









# Configurations from four to ten bags.

#### **BIG BAG SPREADERS**

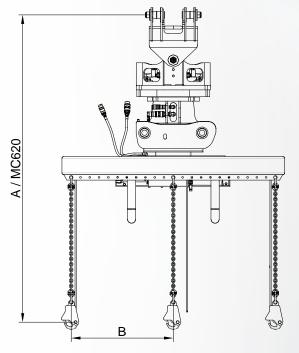
Mantsinen big bag spreaders are available in different configurations from four to ten bags. Big bag spreaders can be customized to suit different big bag designs.

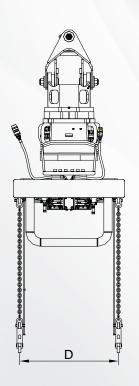
Big bag spreaders feature operator controlled automatic release hooks. This ensures safety and efficiency as no people are required to unhook the bags. Like most Mantsinen attachments, big bag spreaders are available with either quick coupling or fixed rotator.

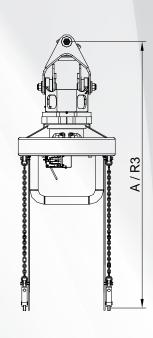
## MANTSINEN Big Bag Spreaders TECHNICAL SPECIFICATIONS

#### WITH QUICK COUPLER

#### WITH FIXED ROTATOR

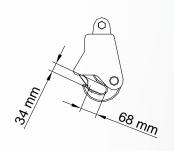


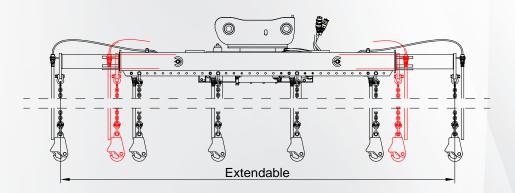




PICTURE OF BBS 3-6







Model	A / R3 [mm]	A/ MC620 [mm]	B [mm]	D [mm]	Weight R3* [kg]	Weight MC620** [kg]	SWL [kg]			
BBS 4-2	2 830	3 430	2 000	1 000	1 160	1 000	4 x 2 000			
BBS 3-6	2 830	3 430	2 x 1 000	1 000	1 160	1 000	6 x 1 500			
BBS 4-8	2 830	3 430	3 x 1 000	1 000	1 360	1 200	8 x 1 000			
BBS 5-10	2 830	3 430	4 x 1 000	1 000	1 460	1 300	10 x 1 000			
extendable length										
BBSE 6-12	2 830	3 430	5 x 1 000	1 000	1 520	1 360	12 x 1 000			

- \* The weight with fixed rotator, but excluding link
- $\ensuremath{^{*\,*}}$  The weight with adapter, but excluding quick coupler and link
- Also available with R4 fixed rotator and MC720 quick coupler



## **PULP BALE SPREADERS**









Automatic release hooks increase safety of operations.

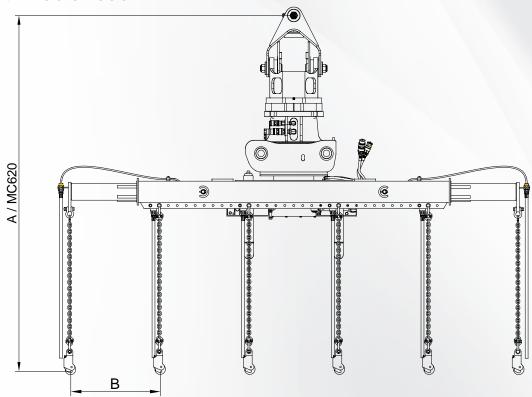
#### PULP BALE SPREADERS

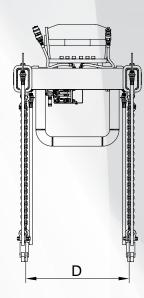
Mantsinen pulp bale spreaders are available in three, four, five and six bale versions, which makes them easily adaptable to different machine sizes. Automatic release hooks reduce manual labour to minimum and increase safety.

Pulp bale spreader works hydraulically and it needs no pressurized air from the material handler. When equipped with an adapter for Mantsinen quick coupling system, the spreader can be changed in a few minutes.

## MANTSINEN Pulp Bale Spreaders TECHNICAL SPECIFICATIONS

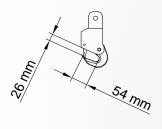
#### WITH QUICK COUPLER





PICTURE OF BBS 6-12

#### HOOK



Model	A / R3 [mm]	A / MC620 [mm]	B [mm]	D [mm]	Weight R3* [kg]	Weight MC620** [kg]	SWL [kg]
BS 3-6	1 960	2 560	850	1 000	1 120	960	6 x 1 500
BS 4-8	1 960	2 560	850	1 000	1 160	1 000	8 x 1 500
BS 5-10	1 960	2 560	850	1 000	1 360	1 200	10 x 1 000
BS 6-12	1 960	2 560	850	1 000	1 460	1 300	12 x 1 000

- \* The weight with fixed rotator, but excluding link
- $\ensuremath{^{*\,*}}$  The weight with adapter, but excluding quick coupler and link
- Also available with R4 fixed rotator and MC720 quick coupler



## MANTSINEN COIL CLAMP CC 40

#### **CONTAINER SPREADERS**







Customised for effective steel coil handling.

Mantsinen coil clamp is customised for effective handling of steel products.

With an SWL of impressive 40 metric tons, Mantsinen CC 40 will revolutionize steel coil handling. With Mantsinen Material Handler, productivity of 60 cycles per hour can be achieved.



Container spreaders

Make your hydraulic material handler into the most efficient container crane with our container spreaders. We have fixed spreaders for 20' or 40' containers and a telescopic 20'/40' one, all with either a fixed rotator or our MC 720 quick connecting system.

## MANTSINEN PALLET FORKS

#### **CUSTOMISED ATTACHMENTS**







Single and multiple pallet handling.

Mantsinen manufactures pallet forks for single and multiple pallet handling.

The shape and size of the forks can be adapted to the pallets to be handled. A parking stand facilitates attaching the fork to the quick coupler.







We can adapt our current range of products to suit your operations or create something new that will meet the requirementns.

Thanks to Mantsinen inhouse R&D, we are able to customise attachments according to your needs. Mantsinen R&D follows the relevant ISO standards and will take into consideration country-specific health and safety requirements and regulations.

Mantsinen has delivered several customised attachments, which are not listed in this brochure, so the attachment you need might already be ready.

Challenge our team and ask for a solution - Mantsinen will find the answer to handle more load with less energy.





