Linde Material Handling

Logistic Train Solutions

LT10 – LT20 C/B/BM

Capacity 1.0 – 2.0 t | Series 8970-01

Future-proof tugger train combining outstanding safety and flexibility

→ Efficient solution for bundling ground-level transports of large quantities of materials over long distances

→ Flexible combination of different frame variants for transporting different loads and goods

→ Compatible to LMH trolleys or adaption to customer-specific load carriers

→ Can be operated with both manual and automated tow tractors and thus be integrated into digital processes

TECHNICAL DATA (According to VDI 2198)

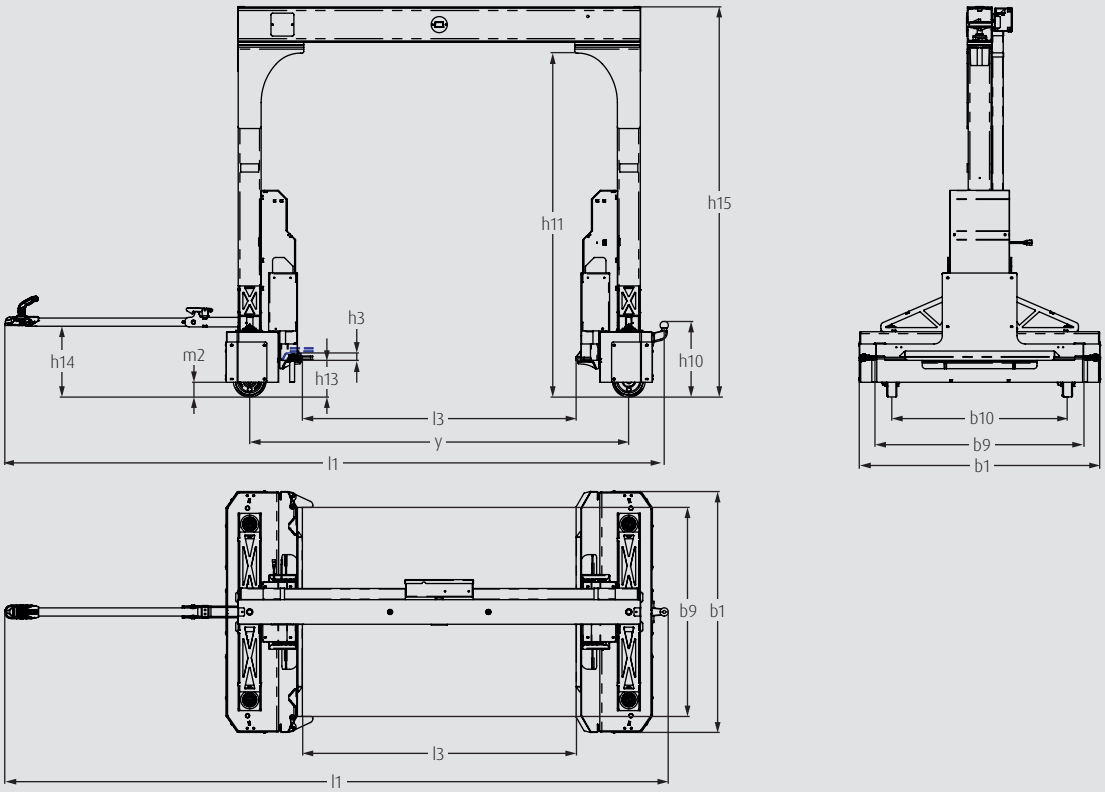
Representative models have been used for simplicity. For final data, which may vary depending on customer-specific scope and configuration, please contact your local distributer.

Characteristics	1.1	Manufacturer		Linde	Linde	Linde	Linde	Linde
	1.2	**Model**		**LT10-B**	**LT10-BM**	**LT16-BM**	**LT10-C**	**LT20-C**
	1.2a	Series		8970-01	8970-01	8970-01	8970-01	8970-01
	1.5	Load capacity / Load	Q (t)	1.0	1.0	1.6	1.0	2.0
	1.9	Wheelbase	y (mm)	2314	2614	2614		
Weights	2.1	Service weight	(kg)	740	910	945		
Wheels / Tyres	3.1	Tyres: solid rubber, superelastic, pneumatic, polyurethane		PU	PU	PU		
	3.2	Tyre size, front		Ø 200 × 50	Ø 200 × 50	Ø 200 × 60		
	3.3	Tyre size, rear		Ø 200 × 50	Ø 200 × 50	Ø 200 × 60		
	3.5	Wheels, number front/rear		2 / 2	2 / 2	2 / 2		
	3.6	Tread, front	b10 (mm)	1072	1072	1072		
	3.7	Tread, rear	b11 (mm)	1072	1072	1072		
Dimensions	4.2.1	Overall height	h15 (mm)	2383	2383	2383		
	4.4	Lift	h3 (mm)	50 [1]	50 [1]	50 [1]		
	4.4a	Lift function		Electrical	Electrical	Electrical		
	4.9	Height drawbar	h14 (mm)	432	432	432		
	4.12	Coupling height	h10 (mm)	461	461	461		
	4.13	Loading height, unladen	h11 (mm)	2100	2100	2100		
	4.15	Height, lowered	h13 (mm)	220	220	220		
	4.16	Length of loading surface	l3 (mm)	1670	837 – 1640 [2]	837 – 1640 [2]		
	4.18	Width of loading surface	b9 (mm)	1276	1276	1276		
	4.19	Overall length	l1 (mm)	4050 / 2950 [3]	4350 / 3250 [3]	4350 / 3250 [3]		
	4.21	Overall width	b1	1470	1470	1470		
	4.22	Fork dimensions	s / e / l (mm)	–	–	–		
	4.32	Ground clearance, centre of wheelbase	m2 (mm)	90	90	90		
	4.33	Load dimension	b × l (mm)	1260 × 1660 [4]	2 × 860 × 1260 [5] / 1 × 1260 × 1660 [4]	2 × 860 × 1260 [5] / 1 × 1260 × 1660 [4]		
	4.34	Aisle width	Ast (mm)	6500 [6]	6500 [6]	6500 [6]		
	4.34b	Aisle width for 90°-curve	Ast1 (mm)	3500 [6]	3500 [6]	3500 [6]		
	4.35	Turning radius	Wa (mm)	2750 [7]	2750 [7]	2750 [7]		
Performance	5.1	Travel speed, with / without load	(km / h)	15	15	15		
	5.2	Lifting speed, with / without load	(m / s)	0.011 / 0.015	0.011 / 0.015	0.011 / 0.015		
	5.7	Climbing ability, with / without load	(%)	7.0 [8]	7.0 [8]	7.0 [8]		
	5.10	Service brake		without	without	without		
Drive	6.2	Lift motor rating at S3 15 %	(kW)	0.24	0.24	0.24		
Others	10.8	Towing coupling, design / type, DIN 15 170		Ø 50 [9]	Ø 50 [9]	Ø 50 [9]		

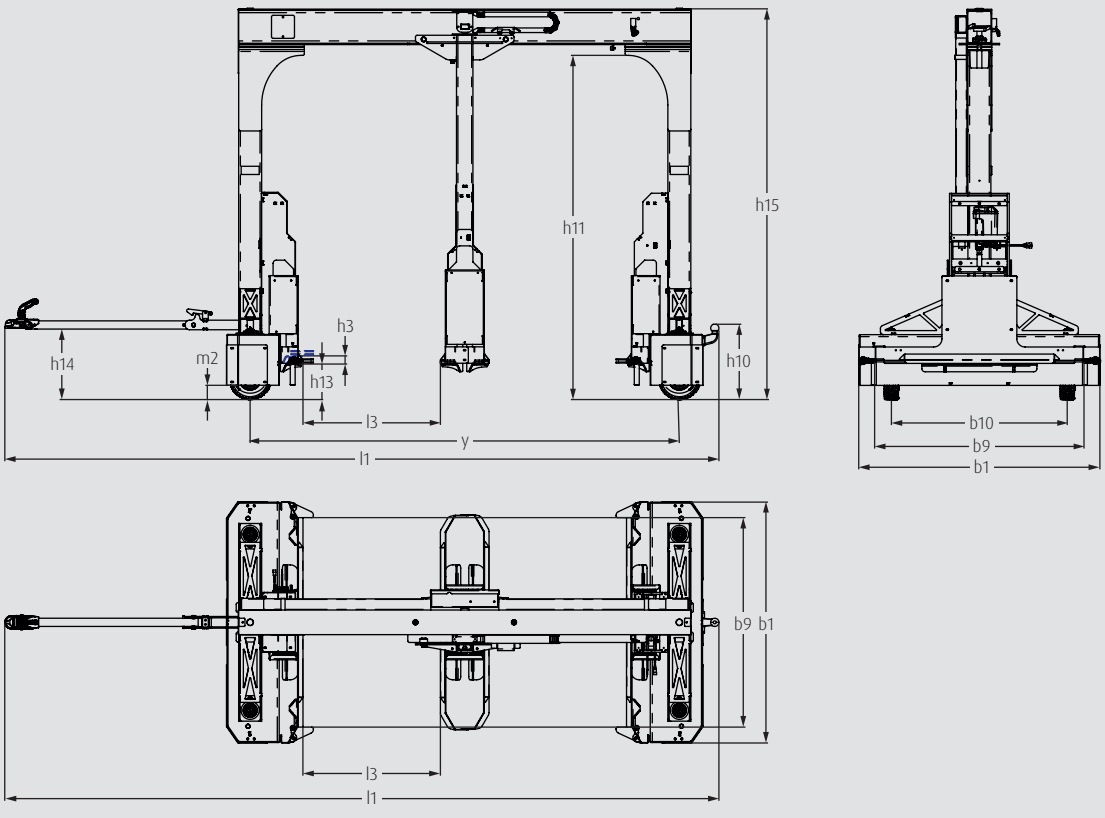
Available from 2022

1) On LT-B and LT-BM the lifting profiles first of all move out horizontally by 60 mm and then vertically by 50 mm
2) Middle support in middle position: l3 = 837 mm; middle support completely moved to side: l3 = 1640 mm
3) Tiller / tow bar in vertical position
4) Equal to standard dimensions of LMH Trolley TR1600x1200: Outer dimensions incl. fang corners = 1660 × 1260 mm; Outer dimensions of basic frame without fang corners = 1610 × 1210 mm
5) Equal to standard dimensions of LMH Trolley TR1200x800: Outer dimensions incl. fang corners = 1260 × 860 mm; Outer dimensions for basic frame without fang corners = 1210 × 1810 mm
6) For a tow tractor with 1 or 2 frames inclusive a safety space of 1000 mm (a / 2 = 500 mm on each side). Recommendation: The longer the train, the bigger the safety distance in order to cover a potential driver uncertainty
7) Without safety space
8) In case of gradients the max. allowed speed is 6 km / h. Up to 7 % ramp possibility to operate the frames without driving a radius. Ramps beyond this value needs to be reviewed in detail
9) Coupling ball hook

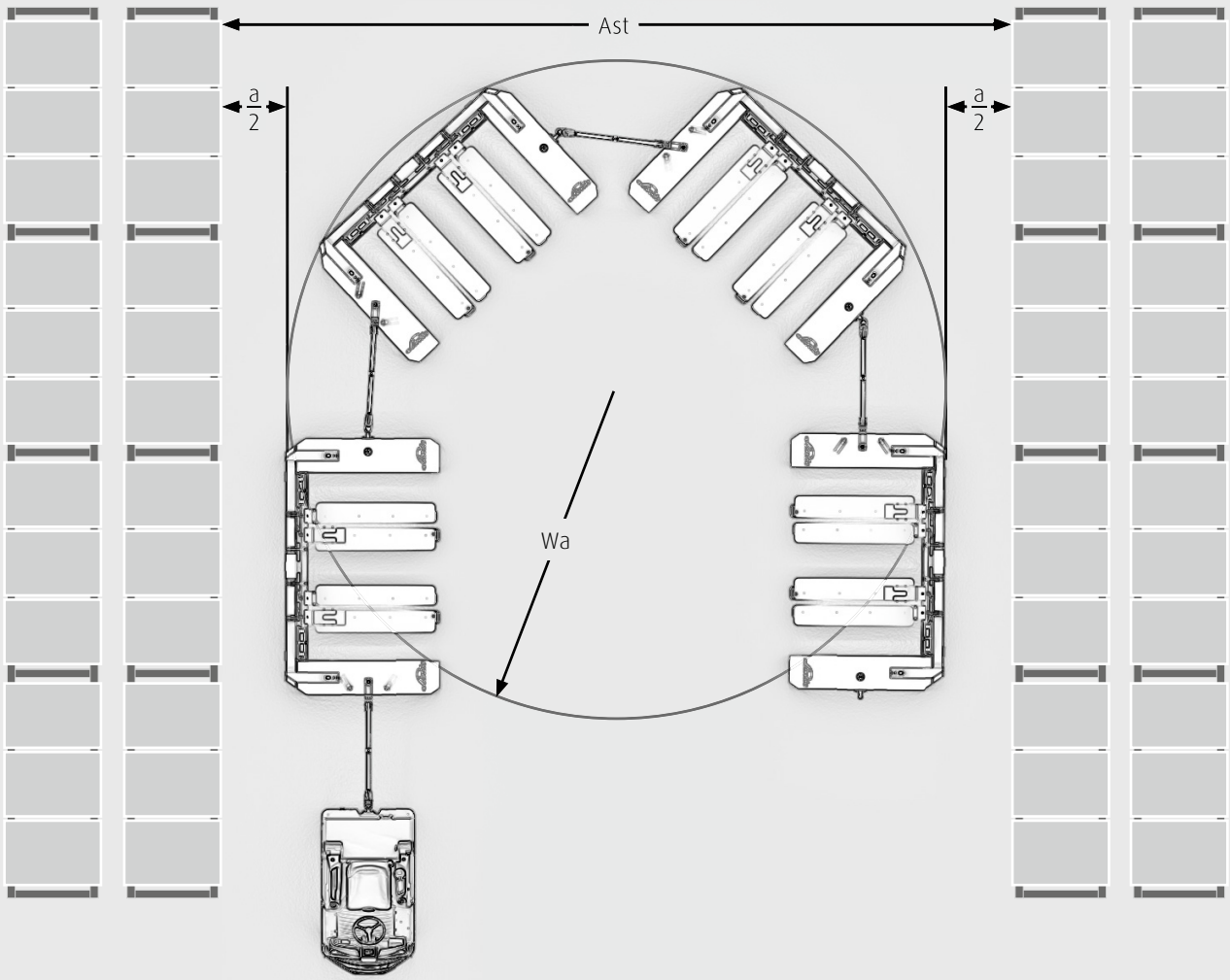
LT10-B



LT10-BM / LT16-BM



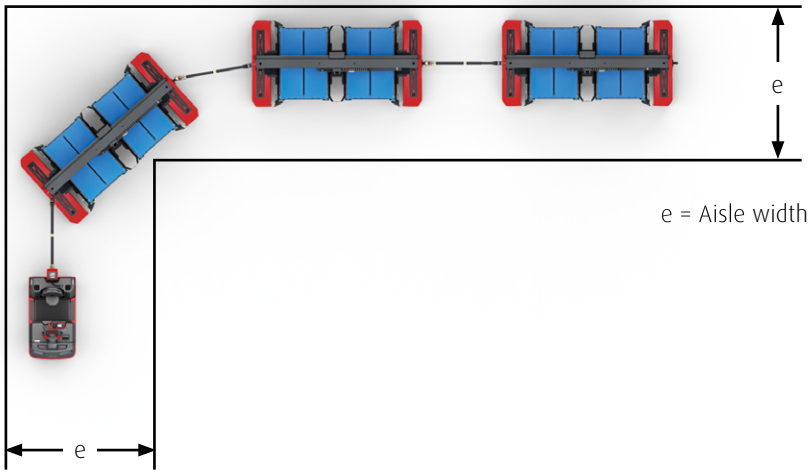
AST



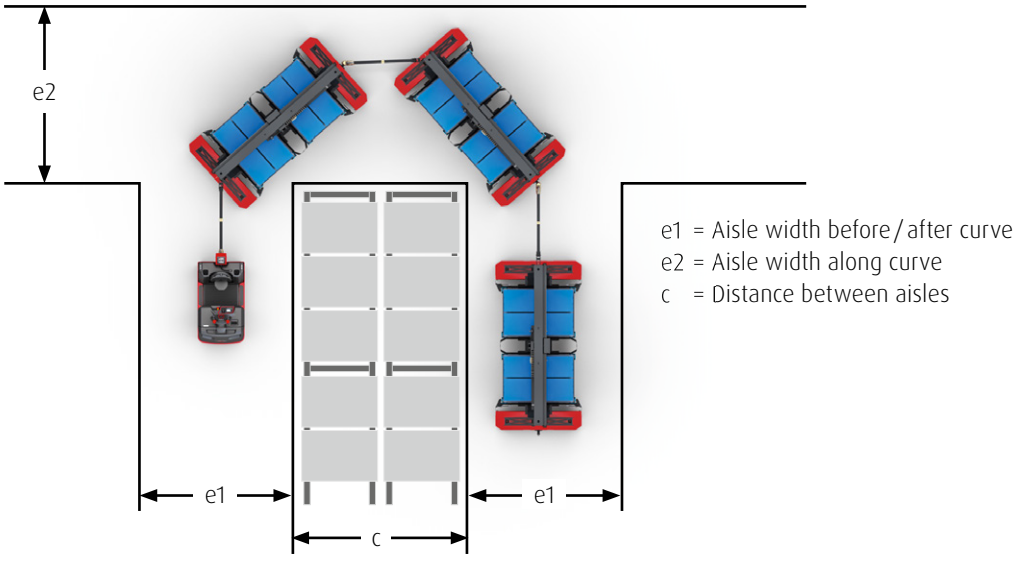
AISLE WIDTHS

Frame type	Frame size	Total frames per train	Total loads per train	Total train length/mm	e /mm [4) 5)]	e1/mm [4) 5)]	e2/mm [4) 5)]	c/mm
LT10-B	For 1 × TR1600x1200	1	1	5481 [2)] / 5835 [3)]	2400	2400	2400	3000
		2	2	9461 [2)] / 9815 [3)]	2400	2400	2400	3000
		3	3	13441 [2)] / 13795 [3)]	2600	2600	2600	3000
LT10-BM / LT16-BM	For 2 × TR1200x800 / 1 × TR1600x1200 [1)]	1	2 / 1 [1)]	5781 [2)] / 6135 [3)]	2500	2500	2500	3000
		2	4 / 2 [1)]	10061 [2)] / 10415 [3)]	2500	2500	2500	3000
		3	6 / 3 [1)]	14341 [2)] / 14695 [3)]	2700	2700	2700	3000
LT10-C / LT20-C	For 2 × TR1200x800	1	2	Available from 2022				
		2	4					
		3	6					

90°-CURVES



180°-CURVES (SAMPLE AISLE CHANGE)



1) When the middle support is completely moved to side
2) In combination with a P40 C B / P40 C / 60 C of series 4595. Remark: Values are calculated; final values may differ slightly
3) In combination with a P60 / P80 of series 1191. Remark: Values are calculated; final values may differ slightly
4) Without a safety space. We recommend to add a safety space of 1000 mm (a / 2 = 500 mm on each side).
   Recommendation: The longer the train, the bigger the safety distance in order to cover a potential driver uncertainty.
5) Without oncoming traffic

LOGISTIC TRAIN SYSTEM OVERVIEW

TOW TRACTORS

P20

P40 C / P60 C

P60 / P80

P250

FRAMES

C-Frame

LT10-C LT20-C

B-Frame

LT10-B

BM-Frame

LT10-BM LT16-BM

TROLLEYS

TR800x600 TR1200x800 TR1200x1000 TR1600x1200

STANDARD AND OPTIONAL EQUIPMENT

	Model / Equipment	LT10-B	LT10-BM	LT16-BM	LT10-C	LT20-C
Safety	Mechanical load protection with automatic locking after insertion	●	●	●	●	●
	Travel prevention with lowered frames and deactivated lowering function during travel	●	●	●	●	●
	Two-axle-design with central load space and wide wheelbase for high driving safety	●	●	●	●	●
	Patented lifting mechanism of forks with tilt function for continuous ground clearance	–	–	–	●	●
	Weather protection with one or two openings to secure loads in outdoor applications	○	○	○	○	○
	Anti-slip mat for forks and lifting profiles	○	○	○	○	○
	Emergency switches and penetration protection in customer specific position for automation [1]	○	○	○	○	○
Service	5,7" touch display on tow tractor: Condition of all connected frames visible at a glance	●	●	●	●	●
	Maintenance-free and electrically monitored lifting motors	●	●	●	●	●
	Hour meter to match service intervals with tow tractor	●	●	●	●	●
	Coupling ball hook with backflash-free coupling system	●	●	●	●	●
	Frame specific spare parts list available through scanning of QR-Code on nameplate	●	●	●	●	●
Operation / Load Handling	Loading and unloading at ground level	●	●	●	●	●
	One-sided load handling with trolleys while loading	●	●	●	●	●
	Both-sided load handling with trolleys while loading	●	●	●	–	–
	Both-sided load handling with pallets while loading and unloading (upon request)	○	○	○	–	–
	Pull out of trolley from frame while unloading in direction of operator	●	●	●	●	●
	Push-through-option: Push out of load from frame while unloading in both directions	○	○	○	–	–
	Fork ejection mechanism with ergonomic support of operator while unloading	–	–	–	●	●
	Middle support: Movable by hand against driving direction for flexible handling (raster = 20 mm)	–	●	●	–	–
	Opening on right side (can also be changed afterward by a service technician)	–	–	–	●	●
	Opening on left side (can also be changed afterward by a service technician)	–	–	–	○	○
	Linde trolleys in various designs for the insertion into Logistic Train frames	○	○	○	○	○
	Frame size for 1 × Linde trolley TR1200x800	○	○	○	○	–
	Frame size for 1 × Linde trolley TR1200x1000	○	○	○	○	–
	Frame size for 1 × Linde trolley TR1600x1200	●	●	●	●	–
	Frame size for 2 × Linde trolleys TR800x600	–	○	○	○	○
	Frame size for 2 × Linde trolleys TR1200x800	–	●	●	○	●
	Frame size for 2 × Linde trolleys TR1200x1000	–	○	○	○	○
	Frame size for 1 × Linde trolley TR1200x800 or 2 × Linde trolleys TR800x600 [2]	–	○	○	○	○
	Frame size for 1 × Linde trolley TR1600x1200 or 2 × Linde trolleys TR1200x800 [2]	–	●	●	○	○
	Further frame sizes according to customer specific trolleys upon request	○	○	○	○	○
	LMH tugger train guidance system with step-by-step-support for dynamic route processes [1]	○	○	○	○	○
Electronics	Electrical lifting powered by low-noise motors [3]	●	●	●	●	●
	Lift height of 50 mm: Raising of load by 35 mm after free lift	●	●	●	●	●
	Increased lift heights: 80 mm at LT-B and LT-BM / 100 mm at LT-C (other heights upon request)	○	○	○	○	○
	Lifting control unit centrally on tow tractor within touch display (splash-proof)	●	●	●	●	●
	Standardized interface with pre-defined functions for manual and AGV-mode	●	●	●	●	●
	Decentralized control units in frames (I / Os; IP67 protection)	●	●	●	●	●
	Modular plug-and-play connectors between frames and to tow tractor (IP66 protection)	●	●	●	●	●
	Extension of the connector with further interface functions for automation [1]	○	○	○	○	○
	Buttons on frame with customized functions for automation [1]	○	○	○	○	○
Workplace	Lifting mode selection on touch display between simultaneous and single lifting mode	●	●	●	●	●
	Simultaneous lifting: All frames lifted / lowered as soon as driver steps into / out of tow tractor	●	●	●	●	●
	Single lifting: To be lowered / lifted frame can be selected manually on touch display	●	●	●	●	●
	Lifting activation directly on frame (upon request)	○	○	○	○	○
Attachment / Forks	Fork-pair: Centered lifting of trolley with wide support surface for safe pick-up	–	–	–	●	●
	Lateral adjustment of fork positions (manual)	–	–	–	●	●
	Pair of lifting profiles: Lateral lifting of trolley (middle support equipped with additional pair)	●	●	●	–	–
	Patented 2-step-lifting (horizontal and vertical) for flexible handling with lifting profiles	●	●	●	–	–
Axles and Tyres	Polyurethane (PU; shore 75) 200 × 50 – non-marking (colour: red)	●	●	–	●	–
	Polyurethane (PU; shore 92) 200 × 60 – non-marking (colour: light brown)	○	○	●	○	●
	Superelastic (SE) 250 × 85 with suspension – weakening of vibrations (colour: black)	○	○	–	○	–
	Superelastic (SE) 250 × 130 with suspension – weakening of vibrations (colour: black)	○	○	○	○	○
Drive and Brake-System	Mechan. 4-wheel-steering: Smallest turning circles and high directional stability without pulling out	●	●	●	●	●
	Frame compatibility: Using of LT-C, LT-B and LT-BM within one tugger train	●	●	●	●	●
	Compatibility to Linde tow tractors P20, P40C / P60C, P60 / P80, P250 and AGV-tractor P-Matic [1]	○	○	○	○	○
	Brakes for customer specific applications (upon request)	○	○	○	○	○
Lighting	Rotating beacon incl. LED lamp – visibility of the frame in dark areas	○	○	○	○	○
	Rear lights (2x) for last frame – winker, tail lights, brake lights and license plate light (ISO 1724)	○	○	○	○	○
	Linde BlueSpot at rear as a visual signal for pedestrians and driver	○	○	○	○	○

● Standard equipment ○ Optional equipment – Not available

1) Consulting, solution engineering and realization in a separate project

2) Flexibility: With 1 frame design it is possible to transport either 2 trolleys or 1 big trolley. At LT-C with a special load handling equipment and locking device; at LT-BM possible by simply moving the middle support completely to side

3) LT10-C: 2 lifting motors; LT20-C: 4 lifting motors; LT10-B: 2 lifting motors; LT10-BM: 3 lifting motors; LT16-BM: 4 lifting motors

CHARACTERISTICS

Fork unlocking device with ergonomic fork ejection mechanism on LT-C

Ergonomics

→ Ideal support of the driver with load handling at ground level and convenient control of the lifting function with different modes
→ Fork ejection mechanism on C-Frames and push-through-option on Bridge-Frames for ergonomic support during handling of also heavy loads
→ Simple and quick coupling of frames via plug and play
→ Low-noise trains with electrical lifting function reduce acoustic stress

Middle support on LT-BM: Movable against the driving direction

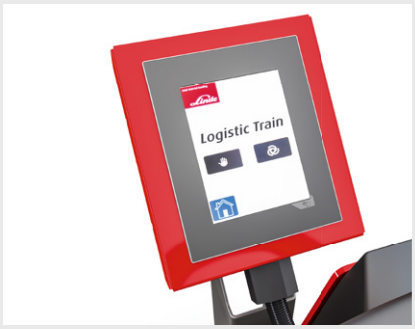
Handling

→ Precise maneuverability and smallest turning radius thanks to the 4-wheel-steering which is perfectly matched to the frame size
→ Fast lifting function when getting on and off simplifies and accelerates loading and unloading
→ Movable middle support for highest flexibility with different load sizes
→ Patended lifting profile mechanism with 2-step-lifting ensures flexible adaption to trolleys and pallets as well as a smooth loading and unloading
→ Prepared for automation through standardized interfaces

Optional safety package: Weather protection, suspended SE-wheels, rotating beacon and rear lights

Safety

→ Mechanical load protection on all frames with automatic locking after insertion protects the transport goods and accelerates the loading process
→ High directional stability and tipping stability without pull out of the frames
→ Start-up interlock with lowered frames and deactivated lowering function during travel prevent accidents
→ Patented lifting mechanism of forks with tilt function for continuous ground clearance of raised trolleys even at highest payloads
→ Optional: Weather protection, robust SE-wheels and different lighting options for outdoor applications



Touch Display on tow tractor: Selection of lifting mode and information about condition of connected frames

Service

→ Hour meter and visualization on touch display allow impeccable registration of the condition of all frames
→ Maintenance-free lift motors and virtually wear-free connection minimize service costs
→ Low maintenance and good maintenance accessibility thanks to the two-axle design
→ Frame specific spare parts list available through scanning of QR-Code on nameplate

Presented by:

Linde Material Handling

Linde Material Handling GmbH
Carl-von-Linde-Platz | 63743 Aschaffenburg | Germany
Phone + 49 6021 99 0 | Fax + 49 6021 99 1570
www.linde-mh.com | info@linde-mh.com

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