Linde Material Handling

Automated Storage Solutions

R-MATIC (based on R16 HD)

Capacity 1.6 t | Series 1120

Precise and reliable automation solution for high-bay warehouses

- → Narrow working aisle width for higher density storage
- → Unique 3D camera for optimum load detection
- → Storage and retrieval up to a height of 11 meters
- → 360-degree safety monitoring to detect people or obstacles in the work area
- → Natural feature navigation without additional infrastructure

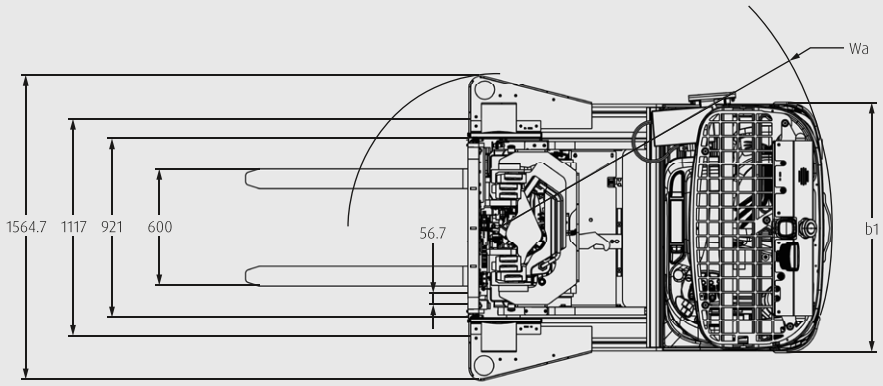
TECHNICAL DATA (According to VDI 2198)

Characteristics	1.1	Manufacturer		Linde MH	Linde MH	Linde MH	Linde MH
	1.2	Model		R 16 HD automated config. 1	R 16 HD automated config. 2	R 16 HD automated config. 3	R 16 HD automated config. 4
	1.2a	Series		1120	1120	1120	1120
	1.3	Power unit		Battery	Battery	Battery	Battery
	1.4	Operation		Automatic	Automatic	Automatic	Automatic
	1.5	Load capacity/Load	Q (t)	1.6	1.6	1.6	1.6
	1.6	Load centre	c (mm)	600	600	600	600
	1.8	Axle centre to fork face	x (mm)	342	342	342	198
	1.9	Wheel base	y (mm)	1453	1453	1453	1453
Wheels/Tyres	3.1	Tyres rubber, SE, Pneumatic, Polyurethane		Polyurethane	Polyurethane	Polyurethane	Polyurethane
	3.2	Tyre size, front	(mm)	Ø 360 × 130	Ø 360 × 130	Ø 360 × 130	Ø 360 × 130
	3.3	Tyre size, rear	(mm)	Ø 285 × 100	Ø 285 × 100	Ø 285 × 100	Ø 285 × 100
	3.5	Wheels, number front/rear (x = driven)		1x/2	1x/2	1x/2	1x/2
	3.7	Track width, rear	b11 (mm)	1167	1167	1167	1167
Dimensions	4.1	Mast/fork carriage tilt, forward/backward	a/b(°)	0/0	0/0	0/0	0/0
	4.2	Height of mast lowered	h1 (mm)	2980	3530	3930	4930
	4.3	Free lift	h2 (mm)	1739	2289	2689	3689
	4.4	Lift	h3 (mm)	6844	8444	9644	11344
	4.5	Height of mast, extended	h4 (mm)	7965/8414	9565/10014	10765/11214	12465/12914
	4.7	Height of overhead guard (cabin or A-frame)	h6(mm)	2495	2495	2495	2495
	4.8	Heigth of seat/stand on platform	h7 (mm)	910 – 1040	910 – 1040	910 – 1040	910 – 1040
	4.10	Height of reach legs	h8 (mm)	307.5 – 348	307.5 – 348	307.5 – 348	307.5 – 348
	4.19	Overal length	l1 (mm)	2515	2515	2515	2659
	4.20	Length to fork face	l2 (mm)	1370	1370	1370	1514
	4.21	Overal width front	b1/b2 (mm)	1290/1570	1290/1570	1290/1570	1290/1570
	4.22	Fork dimensions DIN ISO 2331	s/e/l (mm)	45 × 100 × 1150	45 × 100 × 1150	45 × 100 × 1150	45 × 100 × 1150
	4.23	Fork carriage to ISO 2328, class/type A, B		ISO 2B	ISO 2B	ISO 2B	ISO 2B
	4.24	Width of fork carriage	b3 (mm)	937	937	937	937
	4.25	Fork spread	b5 (mm)	471/710	471/710	471/710	471/710
	4.26	Distance between wheel arms/loading surfaces	b4 (mm)	920	920	920	920
	4.28	Reach travel	l4 (mm)	537	537	537	393
	4.31	Ground clearance, below mast	m1 (mm)	40	40	40	40
	4.32	Ground clearance, centre of wheelbase	m2 (mm)	44	44	44	44
	4.34.1	Aisle width for pallets 1000 × 1200 crossways (AUTOMATIC) [1]	Ast (mm)	3100	3100	3100	3240
	4.34.2	Aisle width for pallets 800 × 1200 along forks (AUTOMATIC) [2]	Ast (mm)	2990	2990	2990	3160
	4.35	Front turning radius auto mode	Wa_auto (mm)	1808	1808	1808	1808
	4.37	Length of chassis	l7 (mm)	1872	1872	1872	1872
Performance	5.1	Travel speed, (forward/backward)	(m/s)	1.95/0.75	1.95/0.75	1.95/0.75	1.95/0.75
	5.2	Lifting speed, with/without load	(m/s)	0.52/0.66	0.52/0.66	0.52/0.66	0.52/0.66
	5.3	Lowering speed with/without load	(m/s)	0.55/0.44	0.55/0.44	0.55/0.44	0.55/0.44
	5.4	Reach speed, with/without load	(m/s)	0.2	0.2	0.2	0.2
	5.8	Maximum climbing ability, with/without load	%	3/3	3/3	3/3	3/3
	5.10	Service brake		hydr./mech.	hydr./mech.	hydr./mech.	hydr./mech.
Drive	6.1	Drive motor rating S2 60 min	(kW)	6.5	6.5	6.5	6.5
	6.2	Lift motor rating at S3 15%	(kW)	14	14	14	14
	6.3	Battery according to DIN 43531/35/36/A, B, C no		3/3	3/3	3/3	3/3
	6.4	Battery voltage/rated capacity	(V/Ah)	48/560	48/560	48/560	48/700
	6.5	Battery weight (±5%)	(kg)	896	896	896	939
	6.6	Power consumption in relation to VDI cycle (15 cycles/1 h)	(kWh/h)	1.59	1.59	1.59	1.59

1) Depends on customer project conditions

2) Max. 25 mm overhang included

	Manufacturer		Linde MH	Linde MH	Linde MH	Linde MH
	Model		**R 16 HD automated config. 1**	**R 16 HD automated config. 2**	**R 16 HD automated config. 3**	**R 16 HD automated config. 4**
Dimensions AGV	Power unit compartment size		4 PZS	4 PZS	4 PZS	5 PZS
	Mast		6955/2980/1850	8555/3530/2400	9755/3930/ 2800	11455/4930/3800
	Maximum forks height	h310 (mm)	6924	8524	9724	11424
	Backrest height	h900 (mm)	1041/1490	1041/1490	1041/1490	1041/1490
	Maximum drop height	(mm)	6524	8124	9324	11024
	Maximum pick height	(mm)	6774	8374	9574	11274
	Localisation sensor scan height	h610 (mm)	2476	2476	2476	2476
	Front safety scan height	h810 (mm)	195	195	195	195
	Lateral safety scan height	h820 (mm)	195	195	195	195
	Rear safety scan height	h840 (mm)	103	103	103	103
	Rear turning radius (800/1000/1200 load width) auto mode	Wb_auto (mm)	1002/1065/1065	1002/1065/1065	1002/1065/1065	1137/1184/1184
	Front turning radius auto mode	Wa_auto (mm)	1808	1808	1808	1808
	Overall length manual	l1 (mm)	2515	2515	2515	2659
	Length to fork face	l2 (mm)	1370	1370	1370	1514
	Reach travel	l4 (mm)	537	537	537	393
	Ground clearance, below mast	m1 (mm)	40	40	40	40
	Ground clearance, centre of wheelbase	m2 (mm)	44	44	44	44
	Side shift actuator stroke	± mm	80	80	80	80
Accuracy AGV	Lift control accuracy	± mm	10	10	10	10
	Sideshift control accuracy	± mm	5	5	5	5
	Truck longitudinal positionning precision at standstill	± mm	20	20	20	20
	Truck lateral positionning precision at standstill	± mm	20	20	20	20
Speed AGV	Sideshifting speed	(m/s)	0.1	0.1	0.1	0.1
	Maximal lateral speed, with/without load	(m/s)	0.45/0.45	0.45/0.45	0.45/0.45	0.45/0.45
Detection devices AGV	Distance 3D camera to median plan	c1 (mm)	63	63	63	63
	Distance 3D camera to the backrest	c100 (mm)	26	26	26	26
	Distance 3D camera to the top of the forks	c110 (mm)	190	190	190	190
	Distance overhang sensors to the top of the forks	c2 (mm)	1432	1432	1432	1432
	Overhang sensors centerline distance	c200 (mm)	907	907	907	907
	Overhang sensors projection distance	c210 (mm)	1150	1150	1150	1150
	Distance rangefinder to median plan	c3 (mm)	11 (0...31)	11 (0...31)	11 (0...31)	11 (0...31)
	Distance rangefinder to median plan	c300 (mm)	20	20	20	20
	Distance vertical rangefinder to top of the forks	c4 (mm)	370	370	370	370
	Distance vertical rangefinder to median plan	c400 (mm)	56	56	56	56
	Curtain laser height	c5 (mm)	2272	2272	2272	2272
	Curtain laser projection distance	c500 (mm)	2530	2530	2530	2530
	Bluespot® height	c6 (mm)	2361	2361	2361	2361
	Bluespot® projection distance	c600 (mm)	4000	4000	4000	4000
	Inductive sensor "high" height	c7 (mm)	682	682	682	682
	Barcode reader 1D/2D, position 1	c9/c900 (mm)	80/876	80/876	80/876	80/876
	Barcode reader 1D/2D, position 2	c9/c900 (mm)	80/932	80/932	80/932	80/932
	Barcode reader 1D/2D, position 3	c9/c900 (mm)	788/876	788/876	788/876	788/876
	Barcode reader 1D/2D, position 4	c9/c900 (mm)	788/932	788/932	788/932	788/932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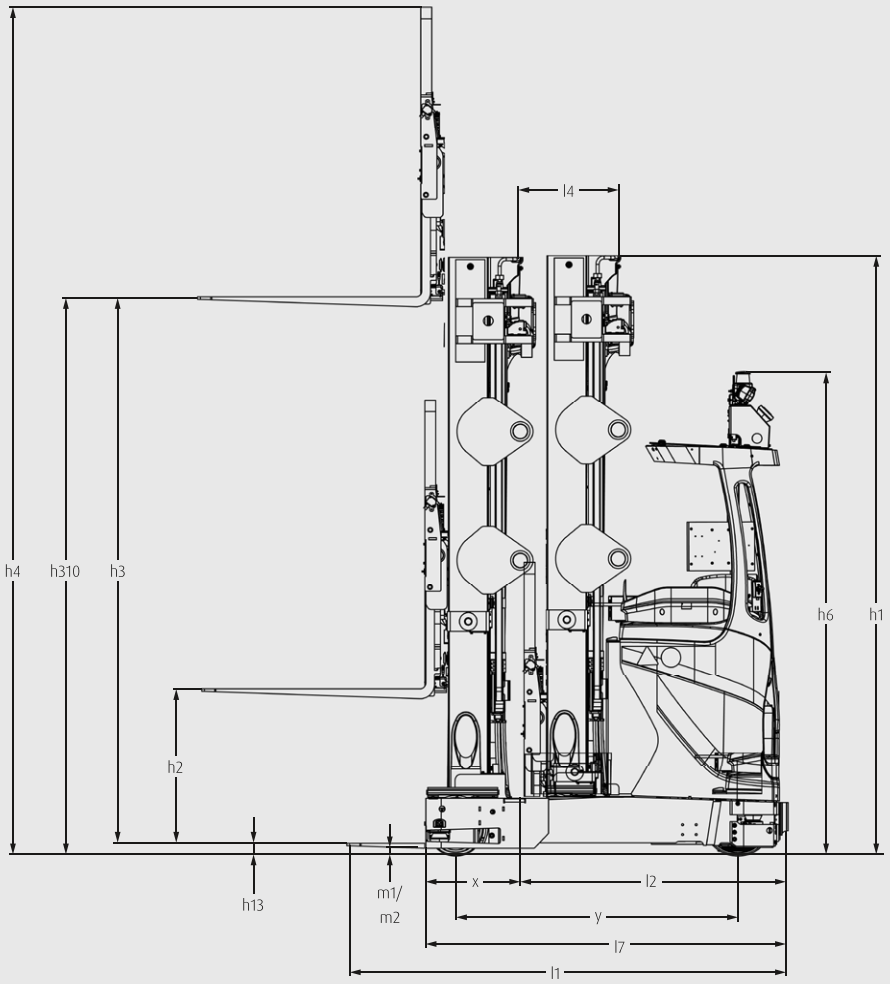
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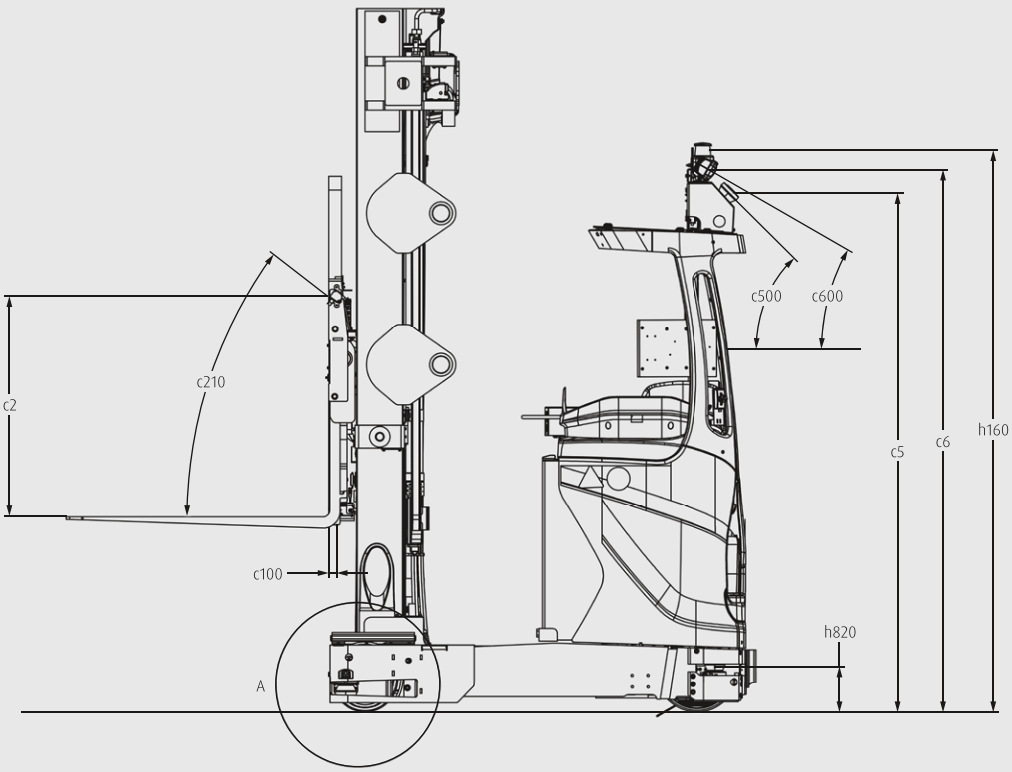
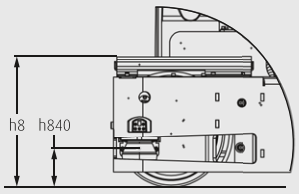
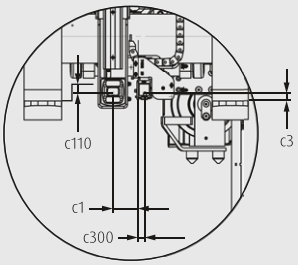




Detail A



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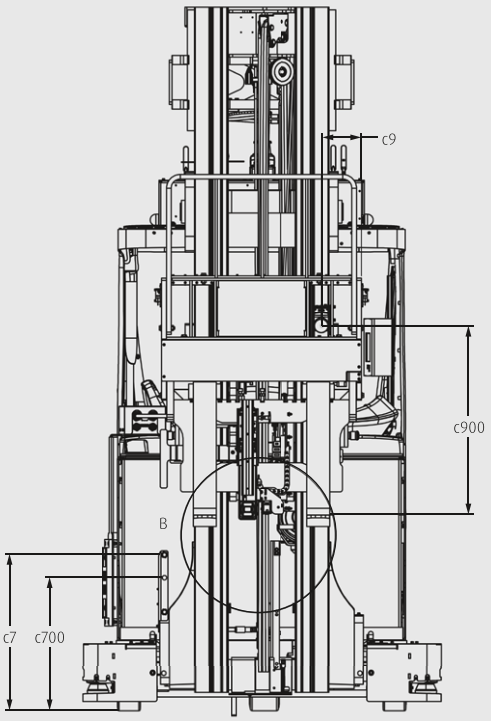


MAST TABLE

TRIPLEX MAST (in mm)

Series	1502							
Lift	**h3: 6844**		**h3: 8444**		**h3: 9644**		**h3: 11344**	
Height measurements	h1: 2980 h3: 6844	h2: 1739 h4: 7965	h1: 3530 h3: 8444	h2: 2289 h4: 9565	h1: 3930 h3: 9644	h2: 2689 h4:10765	h1: 4930 h3: 11344	h2: 3690 h4: 12465
Model								
R16 HD	○		○		○		●	

● Standard equipment ○ Optional equipment

h1: Height of mast, lowered **h2:** Free lift **h3:** Lift **h4:** Height of mast, extended

STANDARD AND OPTIONAL EQUIPMENT

	Model/Equipment	R16 HD
Off Board Software	Advanced routing algorithm	●
	Editor for the integration of different racking types	●
	Intelligent AGV load logic	○
	Interfaces to existing WMS, ERP, ...	●
	Interfaces with infrastructure: doors, conveyors, ...	●
	Linde WMS system	○
	E-mail updates on AGV performance	●
On Board Software	Load detection via 3D point cloud analysis	●
	Natural feature navigation	●
	User friendly Log-file analysis	●
	Self-calibration algorithm	●
Safety	Anti-drag or push detection of load unit	●
	2D curtain laser in front direction	●
	BlueSpot® for visual warning	●
	Additional emergency buttons on the mast	●
	Safety edges to detect tipping of the load in curves	○
	Audible warning alarms	○
Load Handling	3D camera perception for load detection	●
	2D barcode reader	○
	Overhang sensors	●
	Modular backrest heights	○
Environment	Wifi communication	●
	HMI – User monitor in cabin	●
	ComBox [1]	●
Mast / Forks	Choice of 4 × triplex masts	○
	ISO forks	●
	Other masts and forks as customer option	○
Energy	Lead-acid battery for manual charging	●
	4PzS-560 Ah TPPL [2]	○
	5PzS-700 Ah TPPL [2]	○
	17,5 kW TPPL [2] – Charger	○
	TPPL [2] – prepration vehicle for automatic charging	○
	Docking station for automatic charging	○

1) Communication Box 2) Thin Plate Pure Lead battery

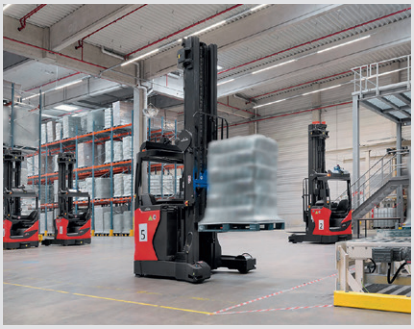
● Standard equipment ○ Optional equipment

CHARACTERISTICS

360 degree safety

Safety

→ 360° safety concept for personal protection all around the vehicle
→ 2D curtain laser in front of the vehicle to detect higher obstacles
→ Real time speed-adaptive detection fields
→ Copes with mixed environment with other vehicles and operators



Unique 3D load-perception

Handling

→ Handling of multiple load types through innovative 3D camera perception
→ Proven reliability for use up to 24/7
→ Optimised pick-and-drop processes
→ Speed adjustment to suit local situation
→ Touch screen with simple user interface
→ Overall control software for task, traffic and energy management
→ Opportunity charging for high vehicle availability

Low maintance design

Service

→ AGVs based on robust and well-known Linde MH base vehicles
→ Service coverage through the existing Linde MH network, supplemented by central hotline support
→ Extensive use of standard spare parts (independent of customer or AGV)
→ Improved stocking concept, reduced costs (compared to other AGV solutions)

Customer process focus as a standard

Sales and realisation

→ Project-specific automated solutions including dynamic simulation and proof of concept on site
→ If required, combination of manual handling processes and degree of automation, can be optimised to meet the customer's needs
→ One Linde MH contact person for the entire process from the first contact to the life cycle phase
→ Intelligent, scalable software solutions that give the customer the best control over their processes
→ Project management and commissioning according to Linde standards with uniform tools and templates throughout the network

Presented by:

Subject to modification in the interest of progress. Illustrations and technical details could include options and are not binding for actual constructions. All dimensions subject to usual tolerances.

Linde Material Handling

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