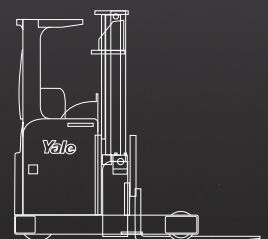


MR Series

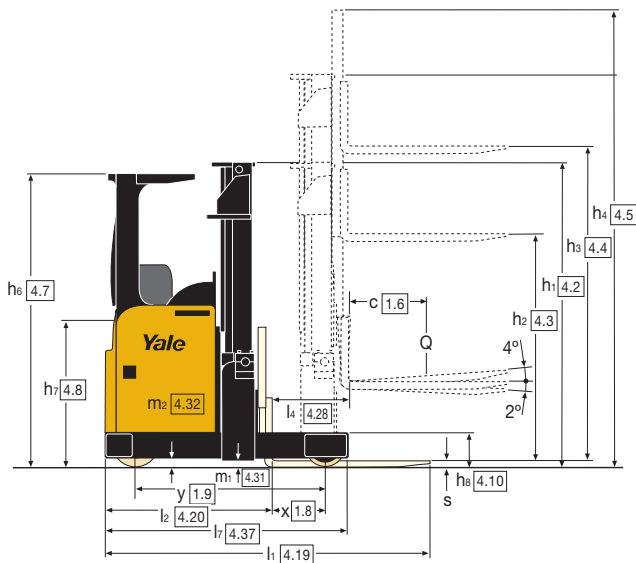
Reach Trucks with AC Technology

1,400kg, 1,600kg, 2,000kg and 2,500kg

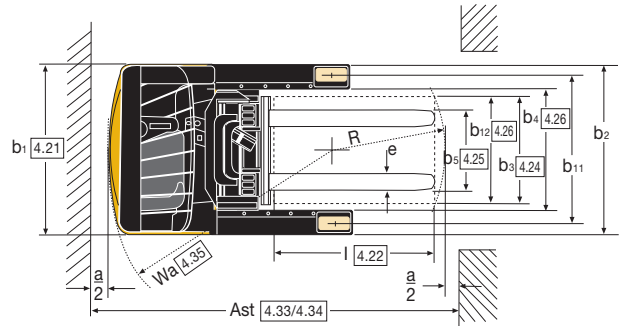


- AC technology on traction, hoist and steering motors
- PalmTech joystick control
- 360° steering
- Tilting fork carriage with integral sideshift
- Progressive fly by wire steering

Truck Dimensions



$$Ast = Wa + R + a \quad R = \sqrt{(l_6 - x)^2 + (b_{12})^2} \quad a = 200\text{mm}$$



Mast details - 3 stage full free lift

Model	Lift (h ₃) mm VDI 14.4	Free lift (h ₂) mm VDI 14.3	Height of mast lowered (h ₁) mm VDI 14.2	Height of mast extended (h ₄) mm VDI 14.5 ^(B)	Fork carriage tilt forwards/backwards
MR14, MR16, MR16N	4626	1555	2125	5676	2° / 4°
	5076	1705	2275	6126	2° / 4°
	5526	1855	2425	6576	2° / 4°
	6426	2155	2725	7476	2° / 4°
	6876	2305	2875	7926	2° / 4°
MR14H, MR16N, MR16H	7026	2455	3025	8076	2° / 4°
	7476	2605	3175	8526	2° / 4°
	8076	2805	3375	9126	2° / 4°
	8526	2955	3525	9576	2° / 4°
MR14H, MR16N	8726	3155	3725	9776	2° / 4°
MR16H	9026	3255	3825	10076	2° / 4°
	9176	3305	3875	10226	2° / 4°
	9476	3405	3975	10526	2° / 4°
MR20	4626	1555	2125	5676	2° / 4°
	5076	1705	2275	6126	2° / 4°
	5526	1855	2425	6576	2° / 4°
	6426	2155	2725	7476	2° / 4°
MR20H	4526	1555	2125	5576	2° / 4°
	4976	1705	2275	6026	2° / 4°
	5426	1855	2425	6476	2° / 4°
	6326	2155	2725	7376	2° / 4°
	6776	2305	2875	7826	2° / 4°
	7026	2455	3025	8076	2° / 4°
	7476	2605	3175	8526	2° / 4°
MR16H	8076	2805	3375	9126	2° / 4°
	8526	2955	3525	9576	2° / 4°
	9026	3255	3825	10076	2° / 4°
	9476	3405	3975	10526	2° / 4°
	10076	3705	4275	11126	2° / 4°
MR16HD 700Ah Battery	10526	3855	4425	11576	2° / 4°
	11426	4155	4725	12476	2° / 4°
	7502	2605	3165	8502	2° / 4°
	8102	2805	3365	9102	2° / 4°
	8552	2955	3515	9552	2° / 4°
	9028	3255	3815	10028	2° / 4°
	9478	3405	3965	10478	2° / 4°
	10078	3705	4265	11078	2° / 4°
	10528	3855	4415	11528	2° / 4°
	10978	4005	4565	11978	2° / 4°
MR20HD 700Ah Battery	11428	4155	4715	12428	2° / 4°
	9452	3255	3815	10452	2° / 4°
	9902	3405	3965	10902	2° / 4°
	10378	3705	4265	11378	2° / 4°
	10828	3855	4415	11828	2° / 4°
	11278	4005	4565	12278	2° / 4°
	10802	3705	4265	11802	2° / 4°
MR20HD 840Ah Battery	11252	3855	4415	12252	2° / 4°
	11702	4005	4565	12702	2° / 4°
	11728	4155	4715	12728	2° / 4°
	12152	4155	4715	13152	2° / 4°

^(B) Value determined with load backrest.

VDI 2198 - General Specifications

		Yale			Yale			Yale			Yale				
Characteristics	1.1	Manufacturer	Yale			Yale			Yale			Yale			
	1.2	Model designation	MR14			MR14H			MR16			MR16H			
	1.3	Power: battery, diesel, LPG, electric mains	Battery			Battery			Battery			Battery			
	1.4	Operation: manual, pedestrian, stand, seat, orderpicker	Seat			Seat			Seat			Seat			
	1.5	Load capacity	Q (kg)	1400		1400		1600		1600					
	1.6	Load centre	c (mm)	600		600		600		600					
	1.8	Load distance	x (mm)	465	393	321	480	408	336	515	443	371	443	371	
	1.9	Wheelbase	y (mm)	1435		1450		1485		1485					
	Weights	2.1	Unladen weight ^(A)	kg	2980		3440		3000		3680				
2.3		Axle loading without load, front/rear ^(A)	kg	2010	970		2220	1220		2010	990		2340	1340	
2.4		Axle loading forks advanced, with load front/rear ^(A)	kg	850	3530		770	4070		680	3920		800	4448	
2.5		Axle loading forks retracted, with load front/rear ^(A)	kg	1860	2520		1970	2870		1860	2740		2140	3140	
Wheels and Tyres		3.1	Tyres: rubber, polyurethane, tophane, vulkollan, front/rear	Polyurethane			Polyurethane			Polyurethane			Polyurethane		
	3.2	Tyre size, front	Ø 305 x 140			Ø 305 x 140			Ø 305 x 140			Ø 342 x 140			
	3.3	Tyre size, rear	Ø 250 x 100			Ø 285 x 100			Ø 350 x 100			Ø 350 x 100			
	3.5	No. of wheels front/rear (x=driven)	1X 2		1X 2		1X 2		1X 2			1X 2			
	3.6	Track width, front	b10 (mm)	-		-			-			-			
	3.7	Track width, rear	b11 (mm)	1126		1126			1136		1136				
	Dimensions	4.1	Tilt of mast/fork carriage forward/backward	Degrees	2 / 4		2 / 4		2 / 4		2 / 4				
4.2		Height of mast, lowered	h1 (mm)	2125		3025		2125		3025					
4.3		Free lift	h2 (mm)	1555		2455		1555		2455					
4.4		Lift height	h3 (mm)	4626		7026		4626		7026					
4.5		Height of mast, extended ^(B)	h4 ^(B) (mm)	5676		8076		5676		8076					
4.7		Height of overhead guard (cabin) ^(C)	h6 (mm)	2190		2190		2190		2190					
4.8		Seat height ^(D)	h7 (mm)	1075		1090		1075		1075					
4.10		Height of load arms	h8 (mm)	260 ^(E)		285 ^(L)		350 ^(L)		350 ^(L)					
4.19		Overall length ^(F)	l1 (mm)	2400	2472	2544	2400	2472	2544	2400	2472	2544	2472	2544	
4.20		Length to face of forks	l2 (mm)	1200	1272	1344	1200	1272	1344	1200	1272	1344	1272	1344	
4.21		Overall width	b1/b2 (mm)	1270		1270			1270		1270				
4.22		Fork dimensions	s/e/l (mm)	35	100	1200	35	100	1200	35	120	1200	35	120	1200
4.23		Fork carriage DIN 15173, Class/form A, B	2A		2A		2A		2A						
4.24		Fork carriage width	b3 (mm)	700		700		700		700					
4.25		Distance between fork-arms min/max	b5 (mm)	240 / 672		240 / 672		260 / 692		260 / 692					
4.26		Distance between load arms	b4 (mm)	900		900		900		900					
4.28		Reach distance	l4 (mm)	635	563	491	665	593	521	735	663	591	663	591	
4.31		Ground clearance under mast, with load ^(H)	m1 (mm)	75		75		75		75					
4.32		Ground clearance, centre of wheelbase ^(H)	m2 (mm)	75		75		75		75					
Performances		5.1	Travel speed, with/without load ^{(H)(K)}	km/h	13	13		13	13		13	13			
	5.2	Lift speed, with/without load ^(H)	m/s	0,36	0,52		0,36	0,52		0,36	0,52				
	5.3	Lowering speed, with/without load ^(H)	m/s	0,53	0,51		0,53	0,51		0,53	0,51				
	5.4	Reach speed, with/without load ^(H)	m/s	0,15	0,16		0,15	0,16		0,15	0,16				
	5.8	Max. gradeability with/without load ^(J)	%	12	18		12	18		12	18				
	5.9	Acceleration time with/without load ^(K)	s	4	6		4	6		4	6				
	5.10	Service brake	Electromagnetic			Electromagnetic			Electromagnetic / Hydraulic			Electromagnetic / Hydraulic			
	Power Unit	6.1	Drive motor, S2 60 minute rating	kW	6,4		6,4		6,4		6,4				
6.2		Lift motor, S3 25 % rating	kW	14		14		14		14					
6.3		Battery according to DIN 43531/35/36 A,B,C, no	43531 C			43531 C			43531 C			43531 C			
6.4		Battery voltage/capacity at 5 hours rate	V/Ah	48/420	48/560	48/700	48/420	48/560	48/700	48/420	48/560	48/700	48/560	48/700	
6.5		Battery weight (+/- 5%)	kg	750 - 1200		750 - 1200		750 - 1200		940 - 1200					
6.6		Energy consumption according to VDI cycle	kWh/h	3.62		3.72		4.01		4.01					
Other	8.1	Drive control	AC - MOSFET			AC - MOSFET			AC - MOSFET			AC - MOSFET			
	8.2	Working pressure for attachments	bar	140		140		160		160					
	8.3	Oil flow for attachments	l / min	20		20		20		20					
	8.4	Average noise level at operator's ear according to EN 12053	dB (A)	<70		<70		<70		<70					

^(A) Values refer to a truck equipped with the lowest mast (see line 4.2 to 4.5) and minimum battery available (see line 6.4 and 6.5).
For HD versions, values refer to a truck equipped with the highest mast (see line 4.2 to 4.5) and maximum battery available (see line 6.4 and 6.5).

^(B) Value determined with load backrest

^(C) With beacon h6 + 120mm

^(D) Seat stroke +/-30mm, intermediate step 380mm, floor plate 560mm

^(E) Overhead guard width 1100mm

^(F) Value determined with reach retracted

^(G) Value determined without stabilizer tabs

^(H) Values may vary with alternative lift heights

^(J) Values determined by wheel friction - if climbing ramps frequently (several times an hour), consult your dealer

^(K) Acceleration - 3 pre-set values available, selected by the operator - soft, medium, hard

Yale		Yale		Yale			Yale		Yale		Yale		Yale		1.1						
MR16N		MR16HD		MR20			MR20H		MR20HD		MR20W		MR25		1.2						
Battery		Battery		Battery			Battery		Battery		Battery		Battery		1.3						
Seat		Seat		Seat			Seat		Seat		Seat		Seat		1.4						
1600		1600		2000			2000		2000		2000		2500		1.5						
600		600		600			600		600		600		600		1.6						
395	305	357		503	431	359	431	359	352	280	461	389	526	454	1.8						
1435		1570		1550			1550		1570		1580		1650		1.9						
2940		5095		3470			3880		5235		3740		3920		2.1						
1890	1050	2690	2405	2400	1070		2450	1430	2780	2455	2450	1290	2480	1440	2.3						
630	3910	790	5905	800	4670		910	4970	915	6320	910	4830	720	5700	2.4						
1600	2940	2105	4590	2080	3390		2120	3760	2295	4940	2120	3620	2160	4260	2.5						
Polyurethane		Polyurethane		Polyurethane			Polyurethane		Polyurethane		Polyurethane		Polyurethane		3.1						
Ø 305 x 140		Ø 342 x 140		Ø 342 x 140			Ø 342 x 140		Ø 342 x 140		Ø 342 x 140		Ø 342 x 140		3.2						
Ø 285 x 100		Ø 350 x 100		Ø 350 x 100			Ø 350 x 100		Ø 350 x 100		Ø 350 x 100		Ø 350 x 127		3.3						
1X	2	1X	2	1X	2		1X	2	1X	2	1X	2	1X	2	3.5						
-		-		-			-		-		-		-		3.6						
986		1136		1136			1136		1136		1336		1163		3.7						
2 / 4		2 / 4		2 / 4			2 / 4		2 / 4		2 / 4		2 / 4		4.1						
2125		4715		2125			2875		4715		2125		2125		4.2						
1555		4156		1555			2305		4156		1555		1555		4.3						
4626		11428		4626			6776		12152		4526		4526		4.4						
5676		12428		5676			7826		13152		5576		5576		4.5						
2150		2195		2190			2190		2195		2190		2190		4.7						
1090		1090		1075			1075		1075		1075		1075		4.8						
285 ^(L)		350 ^(L)		350 ^(L)			350 ^(L)		350 ^(L)		350 ^(L)		350 ^(L)		4.10						
2470	2560	2643		2477	2549	2621	2549	2621	2648	2720	2549	2621	2554	2626	4.19						
1270	1360	1443		1277	1349	1421	1349	1421	1448	1520	1349	1421	1354	1426	4.20						
1130 ^(M)		1270		1270			1270		1270		1470		1270	1330	4.21						
35	120	1200	35	120	1200	40	120	1200	40	120	1200	40	120	1200	40	120	1200	45	120	1200	4.22
2A		2A		2A			2A		2A		2A		2A		4.23						
700		700		700			700		700		700		700		4.24						
260 / 692		260 / 692		260 / 692			260 / 692		260 / 692		260 / 692		260 / 692		4.25						
760		900		900			900		900		1100		900		4.26						
580	490	577		723	651	579	651	579	572	500	681	609	746	674	4.28						
75		70		75			75		70		75		75		4.31						
75		75		75			75		75		75		75		4.32						
2735	2801	2876		2776	2824	2875	2824	2875	2880	2934	2839	2888	2858	2904	4.33						
2831	2908	2977		2855	2914	2975	2914	2975	2981	3044	2914	2985	2932	2991							
2607	2661	2743		2667	2701	2742	2701	2742	2746	2791	2721	2759	2753	2786	4.34						
2782	2863	2930		2801	2864	2928	2864	2928	2935	3000	2872	2936	2877	2940							
1683		1797		1797			1797		1797		1832		1893		4.35						
1830		1980		1980			1980		1980		2010		2080		4.37						
13	13	13	13	13	13		13	13	13	13	13	13	13	13	5.1						
0,36	0,52	0,30	0,65	0,28	0,35		0,3	0,52	0,30	0,65	0,3	0,52	0,24	0,35	5.2						
0,53	0,51	0,60	0,52	0,50	0,51		0,54	0,51	0,60	0,52	0,54	0,51	0,50	0,51	5.3						
0,15	0,16	0,15	0,16	0,15	0,16		0,15	0,16	0,15	0,16	0,15	0,16	0,15	0,16	5.4						
12	18	10	15	10	15		10	15	10	15	10	15	10	15	5.8						
4	6	4	6	4	6		4	6	4	6	4	6	4	6	5.9						
Electromagnetic / Hydraulic		Electromagnetic / Hydraulic		Electromagnetic / Hydraulic			Electromagnetic / Hydraulic		Electromagnetic / Hydraulic		Electromagnetic / Hydraulic		Electromagnetic / Hydraulic		5.10						
6,4		6,4		6,4			6,4		6,4		6,4		6,4		6.1						
14		14		14			14		14		14		14		6.2						
43531 B		43531 C		43531 C			43531 C		43531 C		43531 C		43531 C		6.3						
48/420	48/560	48/700		48/560	48/700	48/840	48/700	48/840	48/700	48/840	48/700	48/840	48/700	48/840	6.4						
730 - 1000		1119		940 - 1390			1120 - 1390		1119 - 1306		1120 - 1390		1120 - 1390		6.5						
3.69		5.13		4.10			4.50		5.40		4.44		6.32		8.1						
AC - MOSFET		AC - MOSFET		AC - MOSFET			AC - MOSFET		AC - MOSFET		AC - MOSFET		AC - MOSFET		8.2						
160		190		190			190		220		190		220		8.3						
20		33		16			16		33		16		16		8.4						
<70		<70		<70			<70		<70		<70		<70								

Characteristics

Weights

Wheels and Tyres

Dimensions

Performances

Power Unit

Other

^(L) With top protection +15mm

^(M) With top protection +10mm

MR Series

Models: MR14, MR14H, MR16, MR16H, MR16N, MR16HD, MR20, MR20H, MR20HD, MR20W, MR25

Operator's compartment and steering

A large dimensioned intermediate step and padded handgrip facilitate easy on/off access. The spacious compartment affords generous leg and head room. A padded headrest is featured on the overhead guard upright.

Two full-suspension seats are available, both of which are adjustable for operator weight, fore/aft position and backrest angle. The Premium seat option features a low profile mechanical suspension with built in shock absorption and additional lumbar support, which help to minimise the effects of whole-body vibration. The backrest angle on the Premium seat is adjustable within a range of -5° to $+30^{\circ}$ and the easy suspension adjustment ensures optimum comfort for all operators (45-170kg).

The steering console is easily adjustable for length, tilt and plane to provide the optimum position for the operator. A release lever with gas spring allows the console to be raised to facilitate frequent on/off access. The steering console incorporates the steering wheel, display with keypad and function buttons for parking brake, 3 preset performance levels plus slow speed mode, and optional features such as traction cut-out override for battery change, 5th hydraulic function and load weight sensor.

The standard fly by wire steering features 360° rotation of the drive wheel for enhanced truck manoeuvrability. As an option 180° steering is offered. Speed reduction on cornering is automatic and can be adjusted. Steering sensitivity is automatically reduced as travel speed increases for enhanced straight line travel control over long distances. The padded steering wheel complete with spinner knob is housed in the adjustable console. Contoured left wrist rest provides a comfortable support to alleviate build-up of fatigue.

Foot controls are laid out in automotive style. The large dimensioned accelerator pedal provides a generous contact area and rest angle to minimise fatigue. The foot brake works electrically on the MR14 and MR16 models. On the

MR20, MR20H and MR25 models the foot brake also works hydraulically on the load wheels. Load wheel braking is optional on the MR16/MR16 H versions. A foot presence switch interlocked to traction requires the presence of the left foot. As an option floor mounted forward/reverse direction control via selector switches on the accelerator pedal is available (180° steering only).

Display

A comprehensive easy to read graphic display is provided featuring drive wheel position indicator with forward/reverse travel direction indicator, battery discharge indicator, hourmeter on power up, parking brake status, battery release status, selected performance level and alarm condition. A height indicator display is optional. The display may also be changed to show the alarm history detail or set up parameters. The 10 digit keypad can be configured for driver authorisation codes and the optional height preselector.

CANbus

The MR series features CANbus technology. With this proven technology used in the automobile sector point to point wiring is greatly reduced. Wiring harnesses are significantly simplified and reliability improved. Data transmission reliability using serial communication is enhanced. Service technicians can access any of the controllers or system computer via a single terminal with a handset or laptop to view the alarm history, run diagnostics or adjust performance settings.

Hydraulic controls

The PalmTech joystick is standard. All controls can be readily accessed with minimum hand movement. The primary hydraulic functions for lift/lower and reach/retract are operated by the 4 axis movement of the joystick. Diagonal movement provides simultaneous function operation for speedier load handling. Sideshift and fork tilt operation are actuated by rocker switches located on top of the joystick. Forward / reverse travel direction is selected by a contoured thumb actuated rocker switch. The horn switch is conveniently located under the little finger. A contoured sliding armrest provides support for the operator's forearm. Spring loaded it returns automatically to the rest

position on release. As an option individual 4 lever control with a rocker switch for forward/reverse travel direction and separate horn button is available.

Mast

Three stage full free lift masts with tilting carriage, integral sideshift and load back rest are offered as standard. The mast design with offset free lift cylinder and the widened inside window combined with angled cross bracing and high visibility fork carriage offer excellent visibility conditions through and past the mast for optimum load handling at different levels. The mast carriage features slow down and stop on reach and retract for smooth jolt free operation. With the mast carriage fully extended truck travel speed is automatically reduced. A height indicator and height pre-selector are available as an option and feature automatic speed slow down with raised forks. The load arms feature bolt-on replaceable wear strips. Front and side load wheel protection is featured as standard. Top side protection for handling pallets crossways over the load wheels is available as an option.

Traction motor and control

A powerful AC drive motor is standard across the model range. The drive motor remains in a fixed position to avoid flexing of the power cables. AC technology eliminates brushes and commutator as well as forward/reverse contactors for minimum motor maintenance. AC technology delivers high motor efficiency, powerful acceleration and braking torque as well as fast travel speed performance both laden and empty. The steering motor also uses AC technology and the gear on gear arrangement provides a positive mesh for precise steering control. On power up the drive wheel is automatically centred. A removable plate allows access to the drive tyre/gear reducer for servicing. The motor compartment including the hoist motor is ventilated.

The inverter converts DC current from the battery into AC current. It features adjustable parameter settings using a handset or laptop and includes self diagnostics and alarm history memory as well as thermal protection. The inverter compartment is fan cooled.

MR Series

Models: MR14, MR14H, MR16, MR16H, MR16N, MR16HD, MR20, MR20H, MR20HD, MR20W, MR25

Pump motor and control

The high performance AC pump motor is mounted on isolation pads for reduced vibration and noise. Hydraulic speeds are regulated by the RPM of the pump motor which controls the flow of oil. The hydraulic block is located at the base of the mast to reduce the length of hydraulic lines and potential maintenance. A microprocessor controls the electro-hydraulic valves. The inverter control provides energy efficient low noise operation. Hydraulic function performance can be adjusted by the technician.

Brakes

Normal electric service braking can be applied by releasing the accelerator pedal, changing travel direction or pressing the brake pedal. Regenerative braking is standard during all these conditions.

The braking force is adjustable. Hydraulic load wheel braking is available as standard on the MR20 / 20H / 25 and optional on the MR16 and MR16H. A powerful electromagnetic brake is used for the parking brake. It is activated automatically when the parking switch is applied, accelerator pedal is released, or the operator removes his foot from the foot presence switch.

Options

A comprehensive selection of options is available including;

- Cold store protection
- PVC seat
- Heated seat
- Height indicator
- Height pre-selector
- Foot direction control
- 180° steering
- 4 lever hydraulic control
- Side battery removal
- Load wheel brakes (MR16/MR16H)
- 5th hydraulic function
- Load weight indicator
- Flashing light
- Work lights
- Fork lowering cut-out



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CL

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CE



Safety. This truck conforms to the current EU requirements. Specification is subject to change without notice.

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Truck shown with optional equipment