Yale®
People. Products. Productivity.™

MR series

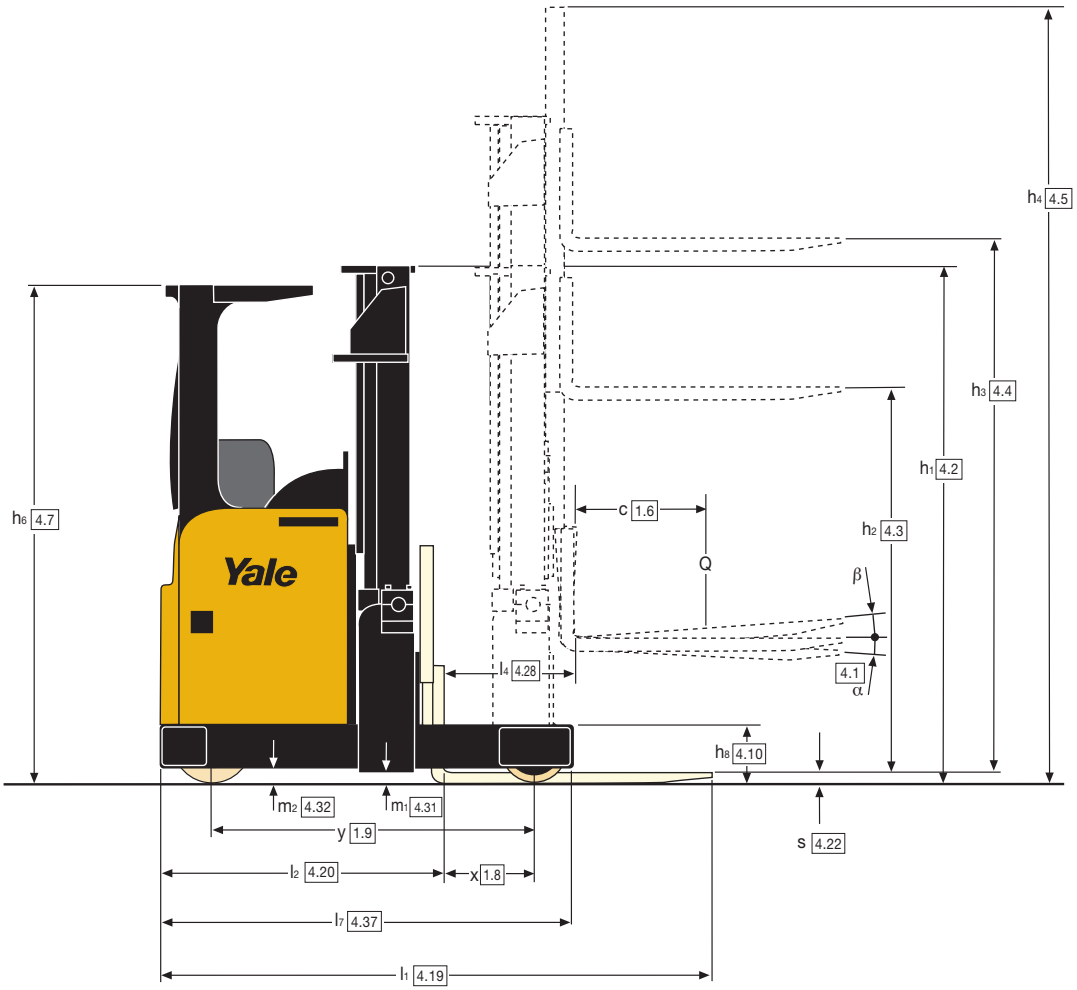
Reach Trucks

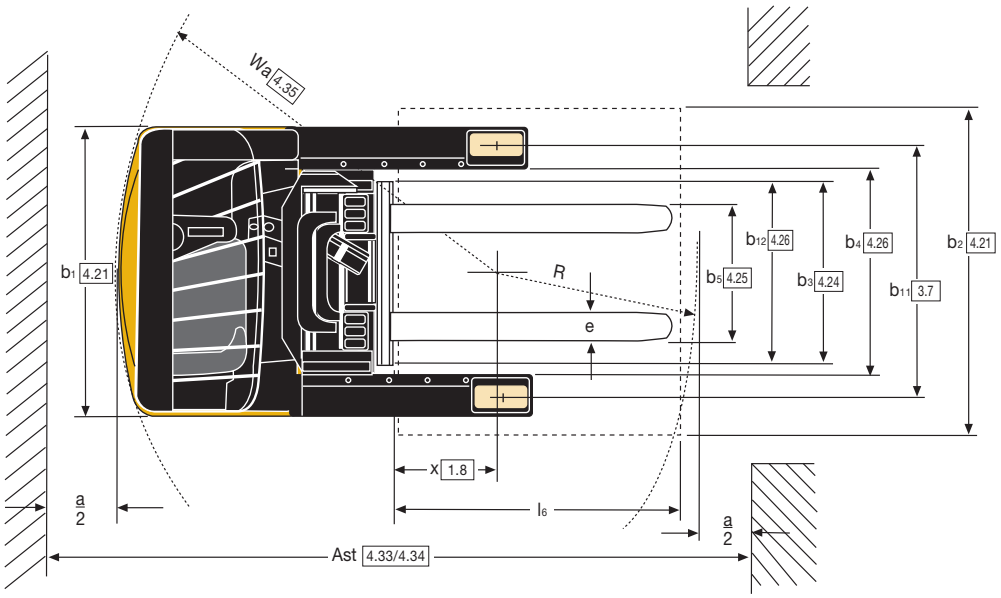
1,400kg / 1,600kg / 2,000kg / 2,500kg

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

Truck Dimensions

$$Ast = Wa + R + a = Wa + (\sqrt{(l_6 + x)^2 + (b_{12}/2 - b_{13})^2} + a$$





Mast details - 3 stage full free lift (excluding Heavy Duty)

	Model			Lift (h_3) mm	Free lift (h_2) mm	Height of mast lowered (h_1) mm	Height of mast extended (h_4)[H] mm
Mast BETA Profile			MR14	4626	1555	2125	5211
				5076	1705	2275	5661
			MR16	5526	1855	2425	6111
				5976	2005	2575	6561
			MR16N	6126	2055	2625	6711
				6276	2105	2675	6861
				6426	2155	2725	7011
				6876	2305	2875	7461
Mast HE Profile	MR16H	MR14H	MR16N	7026	2455	3025	7611
				7476	2605	3175	8061
				8076	2805	3375	8661
				8276	3005	3575	8861
				8526	2955	3525	9111
				8726	3155	3725	9311
				9026	3255	3825	9611
				9476*	3405	3975	10061
	MR20			4626	1555	2125	5211
				5076	1705	2275	5661
				5526	1855	2425	6111
				6426	2155	2725	7011
	MR20W	MR25		4526	1555	2125	5111
				4976	1705	2275	5561
				5426	1855	2425	6011
				6326	2155	2725	6911
		MR20H		6776	2305	2875	7361
				7026	2455	3025	7611
				7476	2605	3175	8061
				8076	2805	3375	8661
				8276	3005	3575	8861
				8526*	2955	3525	9111
				9026*	3255	3825	9611
				9176	3305	3875	9761
				9476*	3405	3975	10061
				10076*	3705	4275	10661
				10526*	3855	4425	11111
				11426*	4155	4725	12011

[H] Value determined without load backrest, carriage set at 480mm from the ground with load backrest add 467.5mm.

* Values marked are intended for reinforced mast.
Note: h3 8526 reinforced only for models MR20H and MR20W.

Mast details - 3 stage full free lift - Heavy Duty (1,600kg / 2,000kg)

	Model		Lift (h_3) mm	Free lift (h_2) mm	Height of mast lowered (h_1) mm	Height of mast extended (h_4)[H] mm
Mast HD Profile	MR20HD 840Ah Battery	MR16HD	7502	2606	3165	8198
			8102	2806	3365	8798
			8552	2956	3515	9248
		MR20HD 700Ah Battery	9002	3106	3665	9698
			9452	3256	3815	10148
			9902	3406	3965	10598
			10352	3556	4115	11048
			10802	3706	4265	11498
			11252	3856	4415	11948
			11702	4006	4565	12398
		MR20HD 700Ah Battery	9028	3256	3815	9724
			9478	3406	3965	10174
			10378	3806	4365	11074
			10828	3956	4515	11524
			11278	4106	4665	11974
			10078	3706	4265	10774
			10528	3856	4415	11224
			10978	4006	4565	11674
			11428	4156	4715	12124
			11728	4156	4715	12424
			12152	4156	4715	12848

[H] Value determined without load backrest, carriage set at 480mm from the ground with load backrest add 353mm.

VDI 2198 - General Specifications

Distinguishing mark	1.1	Manufacturer (abbreviation)		Yale	Yale	Yale	Yale
	1.2	Manufacturer's type designation		**MR14**	**MR14H**	**MR16**	**MR16H**
	1.3	Drive: electric (battery or mains), diesel, petrol, fuel gas		Battery	Battery	Battery	Battery
	1.4	Operator type: hand, pedestrian, standing, seated, order-picker		Seated	Seated	Seated	Seated
	1.5	Rated capacity/rated load	Q (kg)	1400	1400	1600	1600
	1.6	Load centre distance	c (mm)	600	600	600	600
	1.8	Load distance, centre of drive axle to fork	x (mm)	321 / 393 / 465	336 / 408 / 480	371 / 443 / 515	371 / 443
	1.9	Wheelbase	y (mm)	1435	1450	1485	1485
Weights	2.1	Service weight [A]	kg	2980	3440	3000	3680
	2.2	Axle loading, laden front/rear [A]	kg	2010 / 970	2220 / 1220	2010 / 990	2340 / 1340
	2.3	Axle loading, fork advanced, laden front/rear [A]	kg	850 / 3530	770 / 4070	680 / 3920	800 / 4448
	2.5	Axle loading, fork retracted, unladen front/rear [A]	kg	1860 / 2520	1970 / 2870	1860 / 2740	2140 / 3140
Tyres/chassis	3.1	Tyres: polyurethane, topthane, 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	Wheels, number front/rear (x = driven wheels)		1X / 2	1X / 2	1X / 2	1X / 2
	3.6	Tread, front	b10 (mm)	-	-	-	-
	3.7	Tread, rear	b11 (mm)	1126	1126	1136	1136
Dimensions	4.1	Tilt of mast/fork carriage forward/backward	α /β (°)	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	h3 (mm)	4626	7026	4626	7026
	4.5	Height, mast extended [B]	h4 (mm)	5676	8076	5676	8076
	4.7	Height of overhead guard (cabin) [C]	h6 (mm)	2190	2190	2190	2190
	4.8	Seat height/stand height [D]	h7 (mm)	1090	1090	1090	1090
	4.10	Height of wheel arms	h10 (mm)	260 [M]	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 ISO2331	s/e/l (mm)	35 / 100 / 1200	35 / 100 / 1200	35 / 120 / 1200	35 / 120 / 1200
	4.23	Fork carriage ISO 2328, class/type A,B		2A	2A	2A	2A
	4.24	Fork carriage width	b3 (mm)	700	700	700	700
	4.25	Distance between fork arms	b5 (mm)	240 / 672	240 / 672	260 / 692	260 / 692
	4.26	Distance between wheel arms / loading surfaces	b4 (mm)	900	900	900	900
	4.28	Reach distance	l (mm)	635 / 563 / 491	665 / 593 / 521	735 / 663 / 591	663 / 591
	4.31	Ground clearance, laden, below mast [H]	m1 (mm)	75	75	75	75
	4.32	Ground clearance, centre of wheelbase [H]	m2 (mm)	75	75	75	75
	4.34.1	Aisle width for pallets 1000mm x 1200mm crossways	Ast (mm)	2692 / 2742 / 2794	2696 / 2745 / 2797	2708 / 2755 / 2805	2755 / 2805
		Aisle width for pallets 1000mm x 1200mm lengthways	Ast (mm)	2777 / 2837 / 2899	2779 / 2839 / 2900	2784 / 2843 / 2904	2843 / 2904
	4.34.2	Aisle width for pallets 800mm x 1200mm crossways	Ast (mm)	2575 / 2613 / 2656	2582 / 2619 / 2661	2600 / 2634 / 2674	2634 / 2674
		Aisle width for pallets 800mm x 1200mm lengthways	Ast (mm)	2725 / 2789 / 2854	2726 / 2789 / 2854	2729 / 2792 / 2857	2792 / 2857
	4.35	Turning radius	Wa (mm)	1688	1702	1736	1736
	4.37	Length across load arms	l7 (mm)	1815	1845	1915	1915
Performance data	5.1	Travel speed, laden/unladen [H] [K]	km/h	13 / 13	13 / 13	13 / 13	13 / 13
	5.2	Lift speed, laden/unladen [H]	m/s	0,36 / 0,52	0,36 / 0,52	0,36 / 0,52	0,36 / 0,52
	5.3	Lowering speed, laden/unladen [H]	m/s	0,53 / 0,51	0,53 / 0,51	0,53 / 0,51	0,53 / 0,51
	5.4	Reaching speed, laden/unladen [H]	m/s	0,15 / 0,16	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	10 / 15
	5.9	Acceleration time with/without load [K]	s	6 / 4	6 / 4	6 / 4	6 / 4
	5.10	Service brake		Electromagnetic	Electromagnetic	Electromagnetic / Hydraulic	Electromagnetic / Hydraulic
Electric-engine	6.1	Drive motor rating S2 60 min	kW	6,4	6,4	6,4	6,4
	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		43531 C	43531 C	43531 C	43531 C
	6.4	Battery voltage/nominal capacity K5	(V) / (Ah/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	kg	750 - 1200	750 - 1200	750 - 1200	940 - 1200
	6.6	Energy consumption according to VDI cycle	kWh/h @ Nr of Cycles	3.62	3.82	3.72	4.01
	8.1	Type of drive unit		AC - MOSFET	AC - MOSFET	AC - MOSFET	AC - MOSFET
Addition data	10.1	Operating pressure for attachments	bar	140	140	160	160
	10.2	Oil volume for attachments	l/min	20	20	20	20
	10.7	Sound pressure level at the driver's seat	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 -90/+120mm, seat height adjustment +/-10mm

[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

Yale	Yale	Yale	Yale	Yale	Yale	Yale	1.1	Distinguishing mark
MR16N	**MR16HD**	**MR20**	**MR20H**	**MR20HD**	**MR20W**	**MR25**	1.2	
Battery	Battery	Battery	Battery	Battery	Battery	Battery	1.3	
Seated	Seated	Seated	Seated	Seated	Seated	Seated	1.4	
1600	1600	2000	2000	2000	2000	2500	1.5	
600	600	600	600	600	600	600	1.6	
305 / 395	357	359 / 431 / 503	431 / 359	280 / 352	389 / 461	454 / 526	1.8	
1435	1570	1550	1550	1570	1580	1650	1.9	
2940	5095	3470	3880	5235	3740	3920	2.1	Weights
1890 / 1050	2690 / 2405	2400 / 1070	2450 / 1430	2780 / 2455	2450 / 1290	2480 / 1440	2.2	
630 / 3910	790 / 5905	800 / 4670	910 / 4970	915 / 6320	910 / 4830	720 / 5700	2.3	
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	Tyres/chassis
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	Dimensions
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	1090	1090	1090	1090	1090	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 (E)	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	4.34.1	
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	4.34.2	
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	Performance data
0,36 / 0,52	0,30 / 0,65	0,28 / 0,35	0,30 / 0,52	0,30 / 0,65	0,30 / 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	
6 / 4	6 / 4	6 / 4	6 / 4	6 / 4	6 / 4	6 / 4	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	Electric-engine
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	6.6	
AC - MOSFET	AC - MOSFET	AC - MOSFET	AC - MOSFET	AC - MOSFET	AC - MOSFET	AC - MOSFET	8.1	
160	190	190	190	220	190	220	10.1	Addition data
20	33	16	16	33	16	16	10.2	
<70	<70	<70	<70	<70	<70	<70	10.7	

frequently (several times an hour), consult your dealer

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

(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 lumber 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° 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.

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

MR series

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

People. Products. Productivity.™

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Country of Registration: England. Company Registration Number: 02636775

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

Truck shown with optional equipment

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