

# MS series

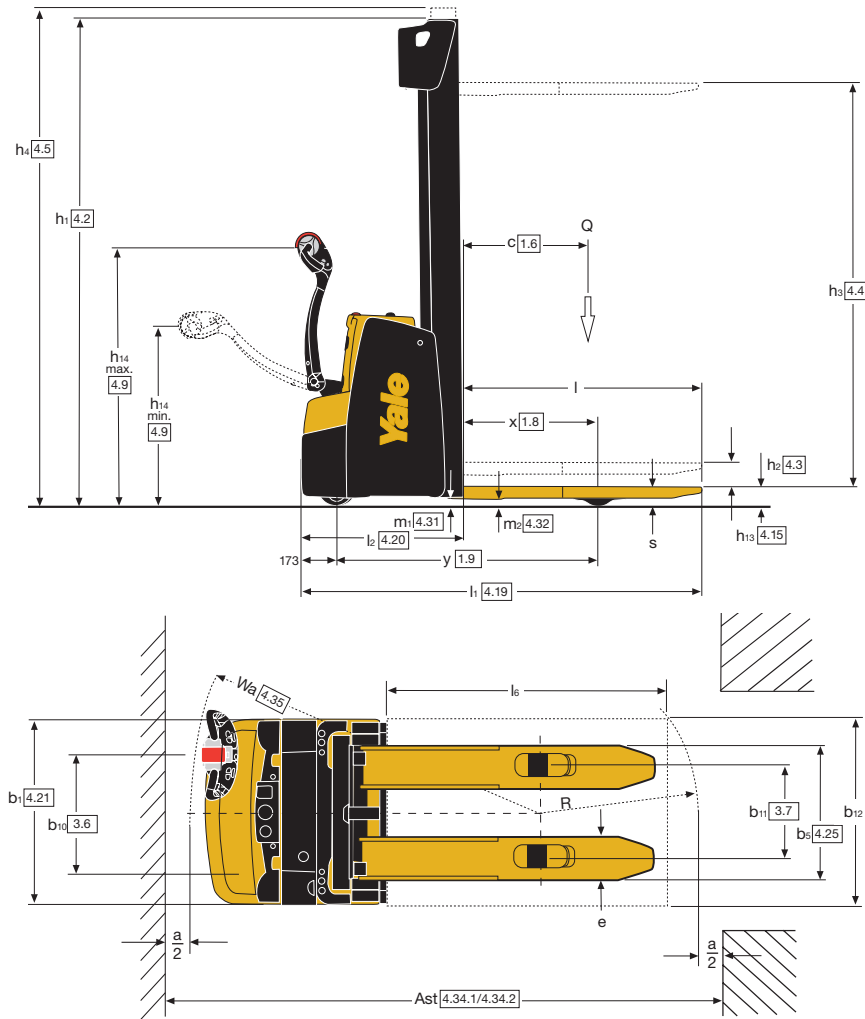
1,000kg / 1,200kg / 1,400kg / 1,600kg /  
2,000kg

## Pedestrian High Lift Stacker



- Vertically mid-mounted, horizontally off-set tiller arm
- Dual lift/lower controls on tiller head
- Excellent through-mast visibility
- Robust chassis design

## Truck Dimensions



## Mast details - MS10, MS12, MS14, MS16

Mast type	Model		$h_3$ (mm)	$h_2$ (mm)	$h_1$ <sup>(1)</sup> (mm)	$h_4$ <sup>(2)</sup> (mm)	Weight <sup>(3)</sup> (kg)
2 stage NFL	MS12 MS14 MS16	MS10	2800	100	1900 <sup>(4)</sup>	3328	329
			3000	100	2000 <sup>(4)</sup>	3528	343
			3200	100	2100	3728	356
			3400	100	2200	3928	369
			3600	100	2300	4128	382
			3800	100	2400	4328	395
			4000	100	2500	4528	409
2 stage FFL	MS12 MS14 MS16	MS10	4200	100	2600	4728	422
			2740	1418	1850 <sup>(4)</sup>	3268	341
			2940	1518	1950 <sup>(4)</sup>	3468	354
			3140	1618	2050	3668	367
			3340	1718	2150	3868	380
			3540	1818	2250	4068	393
			3740	1918	2350	4268	406
3 stage FFL	MS16	MS14	3940	2018	2450	4468	419
			4140	2118	2550	4668	432
			4040	1318	1850 <sup>(4)</sup>	4606	462
			4340	1418	1950 <sup>(4)</sup>	4906	481
			4620	1518	2050	5186	499
			4900	1618	2150	5466	518
			5180	1718	2250	5746	537
5460	1818	2350	6026	556			
5740	1918	2450	6306	575			
6020	2018	2550	6586	594			

<sup>(1)</sup> With free lift of 100 mm for NFL mast.  
<sup>(2)</sup> With load backrest ( $h=1000$ ) for carriage  $h_4 + 562\text{mm}$  (2 stage mast), + 524mm (3 stage mast), + 518mm (2 ton. mast).

<sup>(3)</sup> All weights are: mast structures (weldment, cylinders, chain, pulley) + oil EXCLUDED: forks, accessories  
<sup>(4)</sup> Not available with vertical extraction of battery BS200Ah

All values are nominal values and they are subject to tolerances. For further information, please contact the manufacturer.  
 Yale products might be subject to

change without notice.  
 Lift trucks illustrated may feature optional equipment.  
 Values may vary with alternative configurations.

## VDI 2198 – General Specifications

		Yale	Yale	Yale	Yale	Yale
Distinguishing mark	1.1	Manufacturer (abbreviation)		Yale	Yale	Yale
	1.2	Manufacturer's type designation		<b>MS10</b>	<b>MS12</b>	<b>MS14</b>
	1.3	Drive: electric (battery or mains), diesel, petrol, fuel gas		Electric (battery)	Electric (battery)	Electric (battery)
	1.4	Operator type: hand, pedestrian, standing, seated, order-picker		Pedestrian	Pedestrian	Pedestrian
	1.5	Rated capacity/Rated load	Q (t)	1.0	1200	1400
	1.6	Load centre distance	c (mm)	600	600	600
	1.8	Load distance, centre of drive axle to fork <sup>(1)</sup>	x (mm)	648	649	649
	1.9	Wheelbase	y (mm)	1204	1259	1259
	1.9	Wheelbase	y (mm)	1204	1259	1259
Weights	2.1	Service weight <sup>(2)</sup>	kg	956	1005	1038
	2.2	Axle loading, laden front/rear	kg	676 / 1280	708 / 1497	741 / 1697
	2.3	Axle loading, unladen front/rear	kg	642 / 314	663 / 342	688 / 350
Tyres/chassis	3.1	Tyres: polyurethane, tophane, vulkollan, front/rear		Tophane/Polyurethane	Tophane/Polyurethane	Tophane/Polyurethane
	3.2	Tyre size, front		230 x 70	230 x 70	230 x 70
	3.3	Tyre size, rear	ø mm x mm	85 x 100	85 x 100	85 x 70
	3.4	Additional wheels (dimensions)	ø mm x mm	150 x 54	150 x 54	150 x 54
	3.5	Wheels, number front/rear (x = driven wheels)	ø mm x mm	1x + 1/ 2	1x + 1/ 2	1x + 1/4
	3.6	Tread, front	b <sub>10</sub> (mm)	510	510	510
	3.7	Tread, rear	b <sub>11</sub> (mm)	400	400	400
Dimensions	4.2	Height, mast lowered	h <sub>1</sub> (mm)	2100	2100	2100
	4.3	Free lift	h <sub>2</sub> (mm)	100	100	100
	4.4	Lift	h <sub>3</sub> (mm)	3200	3200	3200
	4.5	Height, mast extended	h <sub>4</sub> (mm)	3728	3728	3728
	4.9	Height drawbar in driving position min./max.	h <sub>14</sub> (mm)	867 / 1223	867 / 1223	867 / 1223
	4.15	Height, lowered	h <sub>13</sub> (mm)	90	90	90
	4.19	Overall length <sup>(2)</sup>	l <sub>1</sub> (mm)	1878	1933	1933
	4.20	Length to face of forks <sup>(2)</sup>	l <sub>2</sub> (mm)	728	783	783
	4.21	Overall width	b <sub>1</sub> /b <sub>2</sub> (mm)	790	790	790
	4.22	Fork dimensions <sup>(14)</sup>	s/e/l (mm)	55 / 185 / 1150	55 / 185 / 1150	55 / 185 / 1150
	4.25	Distance between fork-arms <sup>(9)</sup>	b <sub>5</sub> (mm)	570	570	570
	4.31	Ground clearance, laden, below mast	m <sub>1</sub> (mm)	42	42	42
	4.32	Ground clearance, center of wheelbase	m <sub>2</sub> (mm)	32	32	32
	Performance data	5.1	Travel speed, with/without load	km/h	6 / 6	6 / 6
5.1.1		Travel speed, laden/unladen, backwards	km/h	6 / 6	6 / 6	6 / 6
5.2		Lift speed, laden/unladen	m/s	0.15 / 0.23	0.17 / 0.28	0.16 / 0.28
5.3		Lowering speed, laden/unladen	m/s	0.37 / 0.35	0.4 / 0.35	0.4 / 0.35
5.7		Gradeability, laden/unladen	%	5.1 / 12.4	4.3 / 11.7	3.7 / 11.3
5.8		Max. gradeability, laden/unladen	%	13.2 / 24.6	11.5 / 24.0	10.2 / 24.7
5.10		Service brake		Electromagnetic	Electromagnetic	Electromagnetic
6.1		Drive motor S2 60 minute rating	kW	1.2	1.2	1.2
6.2		Lift motor S3 15% rating	kW	2.2 <sup>(12)</sup>	3 <sup>(13)</sup>	3 <sup>(13)</sup>
6.3		Battery according to DIN 43531/35 /36 A,B,C, no		no	B	B
6.4	Battery voltage/nominal capacity K5	(V)/(Ah)	24V / 200Ah <sup>(4)</sup>	24V / 250Ah <sup>(5)</sup>	24V / 250Ah <sup>(6)</sup>	
6.5	Battery weight <sup>(3)</sup>	kg	185	212	212	
6.6	Energy consumption according to VDI cycle	kWh/h at no. of cycles	0.68 / 0.85	0.78 / 1.0	0.89 / 1.13	
8.1	Type of drive unit		AC-Controller	AC-Controller	AC-Controller	
10.7	Sound pressure level at the driver's position	dB(A)	67.6 / 64	67.6 / 64	67.6 / 64	

<sup>(1)</sup> With 3 stage mast -43mm

<sup>(2)</sup> With 3 stage mast +43mm, with 3 stage mast with load backrest +43mm, with 2 stage mast with load backrest +27mm

<sup>(3)</sup> These values may vary of +/-5%.

<sup>(4)</sup> Available batteries 24V / 150Ah (144kg); 24V / 200Ah Polypropylene case version (160kg); 24V / 150Ah Polypropylene case version (125kg)

<sup>(5)</sup> Available battery 24V / 210Ah (212kg); 24V / 250Ah Polypropylene case version (180kg + ballast 32kg)

<sup>(6)</sup> Available battery 24V / 210Ah (212kg); 24V / 315Ah (288kg); 24V / 375Ah (288kg); 24V / 250Ah Polypropylene case version (180kg + ballast 32kg); with 315/375Ah the wheelbase is increased y = +72 mm

<sup>(7)</sup> Available battery 24V / 315Ah (288kg)

<sup>(8)</sup> With forks 1400/1600mm +14kg

<sup>(9)</sup> Available b<sub>5</sub> 680mm: with b<sub>5</sub> 680mm, x -43 mm, l<sub>1</sub> and l<sub>2</sub> +43mm

<sup>(10)</sup> Value referred to S3 6%

<sup>(11)</sup> Value referred to S3 12%

<sup>(14)</sup> With 2 stage mast and b<sub>5</sub> = 570mm the s dimension increases 5mm for first 250mm at toe

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Lift trucks illustrated may feature optional equipment.

Values may vary with alternative configurations.

## Mast details - MS20

Mast type	Model	h <sub>3</sub> (mm)	h <sub>2</sub> (mm)	h <sub>1</sub> <sup>(1)</sup> (mm)	h <sub>4</sub> <sup>(2)</sup> (mm)	Weight <sup>(3)</sup> (kg)
2 stage NFL	MS20	2600	100	1900	3172	327
		2800	100	2000	3372	340
		3000	100	2100	3572	353
		3200	100	2200	3772	366
		3400	100	2300	3972	379
		3600	100	2400	4172	393
		3800	100	2500	4372	406
		4000	100	2600	4572	419

<sup>(1)</sup> With free lift of 100 mm for NFL mast.

<sup>(2)</sup> With load backrest (h=1000) for carriage h<sub>4</sub> + 562mm (2 stage mast), + 524mm (3 stage mast), + 518mm (2 ton. mast).

<sup>(3)</sup> All weights are: mast structures (weldment, cylinders, chain, pulley) + oil EXCLUDED: forks, accessories. All values are nominal values and they are

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# MS series

Models: MS10, MS12, MS14, MS16, MS20



## Tiller head and controls

The tiller head features an ergonomic shaped handle with angled grips and integral hand guard. Large, low-effort, butterfly buttons control direction of travel, speed and the electromagnetic brake - all without the operator's hand moving from the handle.

Left hand buttons operate slow speeds for fine positioning, right hand ones for proportional lifting and lowering. The horn is on top of the tiller head, actuated by the thumb or fore finger.

When activated, the travel direction inverter button (emergency stop), automatically reverses travel direction, stopping the truck.

The creep speed control allows all functions to be operated with the tiller in the vertical position at reduced speed for manoeuvring in tight confines.

## Tiller arm

The mid-mounted tiller arm is offset for enhanced visibility, spring assisted to return automatically to vertical. Minimum steering effort is required, the long tiller arm increases operating clearance.

## Dashboard instrumentation

The dashboard's Multifunctional Display Indicator (MDI) shows operating hours, battery discharge and error codes. Key control activates the truck. Pressing the stop button stops the truck immediately in an emergency.

## Chassis

The drive gear and main components are fully enclosed for maximum protection by the welded chassis. The compact width of 790mm is standard allowing the handling of loads in tight spaces, containers or for aisle stacking.

Load arms are integrated into the base frame, the strengthened frame and heavy duty covers reduce service and repair costs over the life of the machine.

## Mast and forks

The mast incorporates unique profiles to reduce mast channel width, allowing quick and easy maintenance and mast changes.

Lift cylinders and cross members are positioned for optimum visibility for critical heights with a wire mesh mast guard. Rollers are permanently lubricated and sealed for maximum service life.

Bolt-on mast types are also available and two and three stage with full free lift.

## Battery

Batteries from 24V-150Ah to 24V-375Ah.

Battery box types available are:

- Closed – vertical battery extraction.
- Open on left side – lateral battery extraction with a roller bed.

The connector handle aids easy battery connection and disconnection when charging or changing the battery.

## Wheels

Four wheel layout for control and traction with various compounds available for specific applications.

## Drive, castor and high-traction wheels:

One size drive and castor wheels is offered.

- Standard drive and castor wheels are Topthane 92Sh – ideal for high loads, high tear resistant and high elastic impact.
- High traction wheel (Redthane 75SH), long-distance wheel (DynaRoll Black 95SH), Vulkollan anti-static wheels are available as options.

## Load wheels:

Two sizes of load wheels are offered.

- 85mm x 98mm - single load wheel
- 85mm x 66mm - tandem load wheels

Standard load wheel is polyurethane.

Vulkollan 92 – applicable for high loads, high tear resistant and high elastic impact

## Electric motors

The maintenance free 1.27kW AC drive motor delivers instant response with considerable torque - long inspection intervals provide long, low-cost operational life.

The 2-3 kW DC lift motor provides the power output to match the truck's operational requirements.

## Traction – steering unit

The drive motor, connected directly to the transmission, runs in an oil bath. Mounted vertically for efficient ventilation, reducing flexing stresses to the power cables, ensuring reduced downtime.

## Hydraulic unit

The pump is driven by a heavy duty motor, inputs to it and the proportional valve are received from the controller to control lifting and lowering. Lift/lower functions are actuated from the tiller head via the Combi MOSFET controller.

A flow control valve regulates lowering speeds, a protection valve prevents further lowering in the event of a line break.

## Electronic controls

A Combi MOSFET controller regulates traction and pump operation, featuring automatic braking, regenerative braking and anti-roll-back/start-up on gradients. The functions can be adjusted via a plug-in console - operator and application performance requirements can be matched for maximum productivity.

## Options

A comprehensive range is available including:

- Design for the use in cold store environment:
  - Temperature stability: min.-30 °C
  - Low temperature hydraulic oil and lubrication grease
- Three configuration Acoustic alarm;
  - Travelling, forks leading
  - Travelling forks trailing
  - Travelling forks leading and trailing
- Stretch-wrap roll holder
- Bottle holder
- Universal support bracket
- Load backrest
- A4 document holder
- Lexan transparent mast guard.

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

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