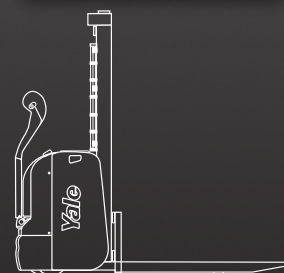


MS, MSIL Series

Pedestrian Stacker

1,000kg, 1,200kg, 1,400kg and 1,600kg



- Combi MOSFET AC and DC control
- AC drive motor
- Dual lift/lower controls on tiller head
- Panorama mast
- Low mounted tiller arm

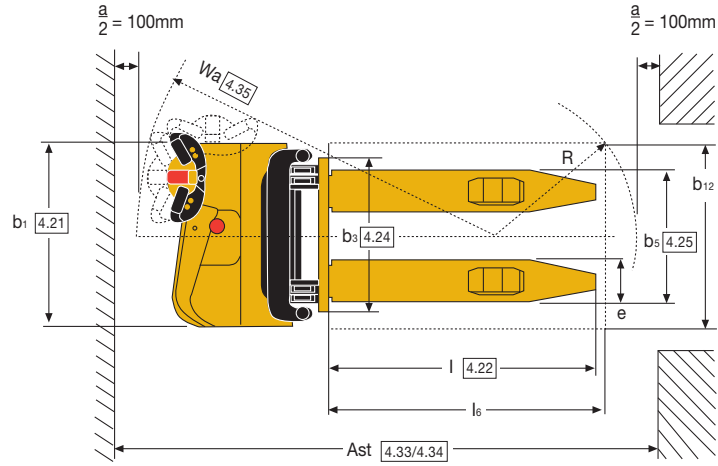
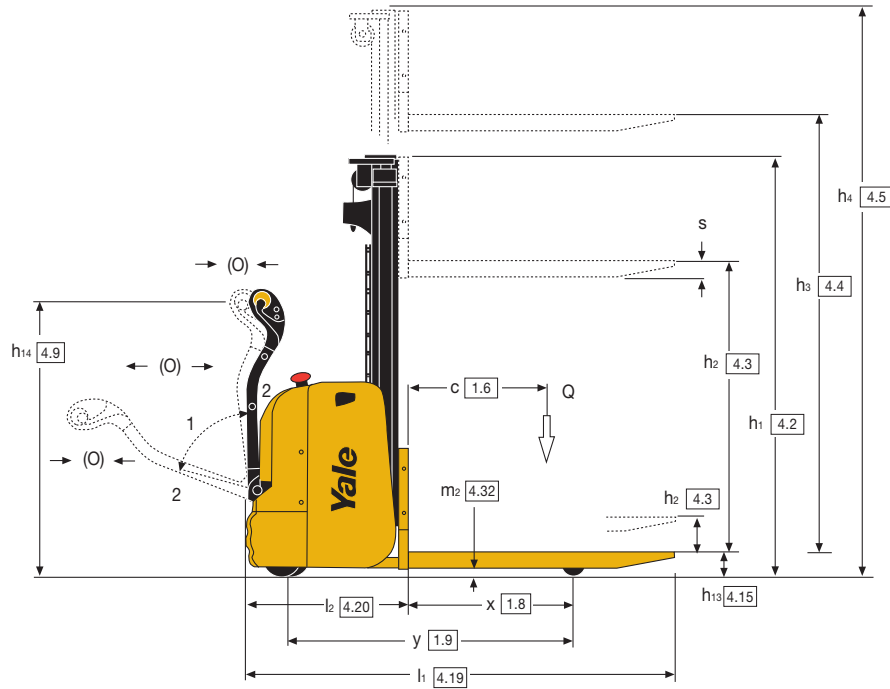
Yale 
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Truck Dimensions

$$Ast = Wa + R + a$$

$$R = \sqrt{(l_6 - x)^2 + \left(\frac{b_{12}}{2}\right)^2}$$

$$a = 200\text{mm}$$



Mast details - MS10E

Mast type	Lift height (mm)	Maximum fork height (mm)	Height of mast, lowered (mm)	Free lift (mm)	Height of mast, raised (mm)
1 stage FFL	1760*	1845	2320	1760*	2330
2 stage LFL	2860	2945	1935	100	3315**
	3260	3345	2135	100	3715**
	3460	3545	2235	100	3915**

* Forks raised 100mm. ** + 525 mm with Load Backrest

Mast details - MS10

Mast type	Lift height (mm)	Maximum fork height (mm)	Height of mast, lowered (mm)	Free lift (mm)	Height of mast, raised (mm)
1-stage	1260	1350	1820	1260	1830
	1360	1450	1920	1360	1930
	1460	1550	2020	1460	2030
	1560	1650	2120	1560	2130
	1760	1850	2320	1760	2330
2-stage LFL	2830	2920	1870*	100	3383
	3030	3120	1970*	100	3583
	3230	3320	2070*	100	3783
	3430	3520	2170*	100	3983
	3830	3920	2370*	100	4383

* Forks raised 100mm (VDI 2198).

Mast details - MS12

Mast type	Lift height (mm)	Maximum fork height (mm)	Height of mast, lowered (mm)	Free lift (mm)	Height of mast raised (mm)
1-stage	1260	1350	1820	1260	1830
	1360	1450	1920	1360	1930
	1460	1550	2020	1460	2030
	1560	1650	2120	1560	2130
	1760	1850	2320	1760	2330
2-stage (LFL)	2830	2920	1870*	100	3385
	3030	3120	1970*	100	3583
	3230	3320	2070*	100	3785
	3430	3520	2170*	100	3985
	3830	3920	2370*	100	4385
	4230	4320	2570*	100	4785
2-stage (FFL)	2603	2693	1820	1260	3164
	2803	2893	1920	1360	3364
	3003	3093	2020	1460	3564
	3203	3293	2120	1560	3764
	3403	3493	2220	1660	3964
	3603	3693	2320	1760	4164
	4003	4093	2520	1960	4564
3-stage (FFL)	4027	4117	1820	1260	4588
	4327	4417	1920	1360	4888

Mast details - MS14

Mast type	Lift height (mm)	Maximum fork height (mm)	Height of mast, lowered (mm)	Free lift (mm)	Height of mast raised (mm)
2-stage (LFL)	2765	2855	1870*	100	3335
	2965	3055	1970*	100	3535
	3165	3255	2070*	100	3735
	3365	3455	2170*	100	3935
	3765	3855	2370*	100	4335
	4165	4255	2570*	100	4735
2-stage (FFL)	2603	2693	1820	1260	3164
	2803	2893	1920	1360	3364
	3003	3093	2020	1460	3564
	3203	3293	2120	1560	3764
	3403	3493	2220	1660	3964
	3603	3693	2320	1760	4164
	4003	4093	2520	1960	4564
3-stage (FFL)	4027	4117	1820	1260	1588
	4327	4417	1920	1360	4888

Mast details - MS16

Mast type	Lift height (mm)	Maximum fork height (mm)	Height of mast, lowered (mm)	Free lift (mm)	Height of mast raised (mm)
2-stage (LFL)	2765	2855	1870*	100	3335
	2965	3055	1970*	100	3535
	3165	3255	2070*	100	3735
	3365	3455	2170*	100	3935
	3765	3855	2370*	100	4335
	4165	4255	2570*	100	4735
2-stage (FFL)	2603	2693	1820	1260	3164
	2803	2893	1920	1360	3364
	3003	3093	2020	1460	3564
	3203	3293	2120	1560	3764
	3403	3493	2220	1660	3964
	3603	3693	2320	1760	4164
	4003	4093	2520	1960	4564
3-stage (FFL)	4027	4117	1820	1260	4588
	4327	4417	1920	1360	4888
	4627	4717	2020	1460	5188
	4797	4887	2120	1560	5358
	5097	5187	2220	1660	5658
	5397	5487	2320	1760	5958

* Forks raised 100mm (VDI 2198).

VDI 2198 - General Specifications

Characteristics	1.1	Manufacturer		Yale	Yale	Yale
	1.2	Model designation		MS10E	MS10	MS12
	1.3	Power: battery, diesel, LPG, electric mains		Battery	Battery	Battery
	1.4	Operation: manual, pedestrian, stand, seat, order picker		Pedestrian	Pedestrian	Pedestrian
	1.5	Load capacity	Q (kg)	1000	1000	1200
	1.6	Load centre	c (mm)	600	600	600
	1.8	Load distance	x (mm)	677 ^(A)	714	744 ⁽¹⁾
	1.9	Wheelbase	y (mm)	1225	1225	1315
	Weights	2.1	Unladen weight	kg	745	880
2.2		Axle loading laden, front/rear	kg	555 - 1190	660 / 1220	740 / 1420
2.3		Axle loading unladen, front/rear	kg	515 - 230	610 / 270	670 / 290
Wheels & Tyres	3.1	Tyres - rubber, polyurethane, front/rear		Poly / Poly	Poly / Poly ⁽⁵⁾	Poly / Poly ⁽⁵⁾
	3.2	Tyre size - front		230 x 75	230 x 75	230 x 75
	3.3	Tyre size - rear		85 x 74.5	85 x 100	85 x 100
	3.4	Additional wheels (dimensions)		150 x 50	150 x 50	150 x 50
	3.5	Wheels - number front/rear (x = driven)		1x - 1/2	1 x + 1/2	1 x + 1/2
	3.6	Track width - front	b ₁₀ (mm)	515	515	515
	3.7	Track width - rear	b ₁₁ (mm)	420	400	400
Dimensions	4.2	Height of mast, lowered	h ₁ (mm)	See table	See table	See table
	4.3	Free lift	h ₂ (mm)	See table	See table	See table
	4.4	Lift height	h ₃ (mm)	See table	See table	See table
	4.5	Height of mast extended	h ₄ (mm)	See table	See table	See table
	4.6	Initial lift	h ₅ (mm)	-	-	-
	4.9	Height of tiller arm in working position, min./max.	h ₁₄ (mm)	695 / 1196	695 / 1196	695 / 1196
	4.15	Height, forks lowered	h ₁₃ (mm)	85	90	90
	4.19	Overall length	l ₁ (mm)	1892 ⁽⁶⁾	1852	1912 ⁽⁶⁾
	4.20	Length to front face of forks	l ₂ (mm)	732 ⁽⁶⁾	692	752 ⁽⁶⁾
	4.21	Overall width	b ₁ /b ₂ (mm)	800	800	800
	4.22	Fork dimensions	s/e/l (mm)	65 / 180 / 1160	65 / 180 / 1160	65 / 180 / 1160
	4.24	Fork carriage width	b ₃ (mm)	675	675	675
	4.25	Maximum width across forks	b ₅ (mm)	570	570	570
	4.31	Ground clearance beneath mast, with load	m ₁ (mm)	30	22	22
	4.32	Ground clearance, centre of wheelbase	m ₂ (mm)	20	30	30
4.33	Aisle width for pallets 1000 x 1200 wide	A _{st} (mm)	2242 ⁽⁷⁾	2405	2478 ⁽⁸⁾	
4.34	Aisle width for pallets 800 x 1200 long	A _{st} (mm)	2386 ⁽⁷⁾	2369	2433 ⁽⁸⁾	
4.35	Turning radius	W _a (mm)	1528	1540	1626	
Performance	5.1	Travel speed, with/without load	km/h	5.6 / 6.0	5.5 / 6.0	5.5 / 6.0
	5.2	Lift speed, with/without load	m/s	0.10 / 0.20	0.13 / 0.18	0.12 / 0.18 ⁽¹²⁾
	5.3	Lowering speed, with/without load	m/s	0.2 / 0.25	0.30 / 0.25	0.30 / 0.25
	5.8	Max. gradeability, with/without load	%	8 / 10	7 / 10	7 / 10
	5.10	Service brake		Electromagnetic	Electromagnetic	Electromagnetic
Motor	6.1	Drive motor rating (S2 60 min)	kW	1	1.2	1.2
	6.2	Lift motor rating (S3 15%)	kW	2	2	2
	6.3	Battery to DIN 43531/35/36 A, B, C, no		no	no	43535 B
	6.4	Battery voltage/capacity (5 hour rate)	V/Ah	24 / 150	24 / 150 (200)	24 / 210 (250)
	6.5	Battery weight (+/- 5%)	kg	150	150 (144-185)	222 (212)
Other	8.1	Drive control		MOSFET	MOSFET	MOSFET
	8.4	Average noise level at operator's ear	dB (A)	65	< 70	< 70

MS10E

^(A) + 37 mm 1 stage mast

^(B) - 37 mm 1 stage mast

^(C) - 29 mm 1 stage mast

MS10 - 16 (all models)

⁽¹⁾ With three stage mast : - 50mm

⁽²⁾ With three stage mast : - 18mm

⁽³⁾ With three stage mast : +175kg

⁽⁴⁾ With three stage mast : +115kg

⁽⁵⁾ Multi-compound available

⁽⁶⁾ With three stage mast : + 50mm

⁽⁷⁾ With three stage mast : + 18mm

⁽⁸⁾ With three stage mast : + 22mm

⁽⁹⁾ With three stage mast : + 38mm

⁽¹⁰⁾ With three stage mast : + 8mm

⁽¹¹⁾ With three stage mast : + 14mm

⁽¹²⁾ With three stage mast : 0.10 / 0.18

Yale	Yale	Yale	Yale	Yale	Characteristics
MS14	MS14	MS16	MS14IL	MS16IL	
Battery	Battery	Battery	Battery	Battery	
Pedestrian	Pedestrian	Pedestrian	Pedestrian	Pedestrian	
1400	1400	1600	1400	1600	
600	600	600	600	600	
712 ²⁾	712 ²⁾	712 ²⁾	818 ²⁾	818 ²⁾	
1315	1385	1385	1529	1529	Weights
1000 ⁴⁾	1120 ⁴⁾	1120 ⁴⁾	1200 ⁴⁾	1200 ⁴⁾	
570 / 1830	810 / 1710	875 / 1845	900/1700	950/1850	
695 / 305	760 / 360	760 / 360	800/400	800/400	Wheels & Tyres
Poly / Poly ⁵⁾	Poly / Poly ⁵⁾	Poly / Poly ⁵⁾	Poly / Poly ⁵⁾	Poly / Poly ⁵⁾	
230 x 75	230 x 75	230 x 75	230 x 75	230 x 75	
85 x 70	85 x 70	85 x 70	85 x 70	85 x 70	
150 x 50	150 x 50	150 x 50	150 x 50	150 x 50	
1 x +1/4	1 x +1/4	1 x +1/4	1x+1/4	1x+1/4	
515	515	515	515	515	
400	400	400	375	375	Dimensions
See table	See table	See table	See table	See table	
See table	See table	See table	See table	See table	
See table	See table	See table	See table	See table	
See table	See table	See table	See table	See table	
-	-	-	130	130	
695 / 1196	695 / 1196	695 / 1196	695/1196	695/1196	
90	90	90	90	90	
1944 ⁷⁾	2013 ⁷⁾	2013 ⁷⁾	2052 ⁷⁾	2052 ⁷⁾	
784 ⁷⁾	853 ⁷⁾	853 ⁷⁾	892 ⁷⁾	892 ⁷⁾	
800	800	800	860	860	
65 / 180 / 1160	65 / 180 / 1160	65 / 180 / 1160	65 / 195 / 1160	65 / 195 / 1160	
675	675	675	675	675	
570	570	570	570	570	
22	22	22	30+130	30+130	
30	30	30	30+130	30+130	
2492 ¹⁰⁾	2558 ¹⁰⁾	2558 ¹⁰⁾	2587 ¹⁰⁾	2587 ¹⁰⁾	
2457 ¹¹⁾	2523 ¹¹⁾	2523 ¹¹⁾	2513 ¹¹⁾	2513 ¹¹⁾	
1626	1692	1692	1760	1760	
5.5 / 6.0	5.5 / 6.0	5.5 / 6.0	5.0 / 5.0	5.0 / 5.0	Performance
0.15 / 0.22	0.15 / 0.22	0.15 / 0.22	0.15 / 0.22	0.15 / 0.22	
0.30 / 0.25	0.30 / 0.25	0.30 / 0.25	0.3 / 0.25	0.3 / 0.25	
7 / 10	7 / 10	7 / 10	7 / 10	7 / 10	
Electromagnetic	Electromagnetic	Electromagnetic	Electromagnetic	Electromagnetic	Motor
1.2	1.2	1.2	1.2	1.2	
3	3	3	3	3	
43535 B	43535 B	43535 B	No	No	
24 / 210 (250)	24 / 315 (375)	24 / 315 (375)	24 / 315 (375)	24 / 315 (375)	
222 (212)	288	288	267 (291)	267 (291)	Other
MOSFET	MOSFET	MOSFET	MOSFET	MOSFET	
< 70	< 70	< 70	< 70	< 70	

MS, MSIL Series

Models: MS10E, MS10, MS12, MS14, MS14IL, MS16, MS16IL

Tiller head and controls

The tiller head is designed for operator comfort and features an ergonomic shaped handle with angled grips and integral hand guard. Large, low effort, butterfly buttons control the direction of travel and speed as well as the electromagnetic brake. All controls are accessible without the operators hand being removed from the handle.

Lift and lower buttons are conveniently located on the tiller head and can be readily accessed for left or right hand use. The travel direction inverter button is designed for maximum angle of contact with the operator's body. When activated, the direction of travel is automatically reversed and the truck comes to a stop. The horn is located on top of the tiller head and can be actuated by the thumb or fore finger. The creep speed control allows all functions of the truck to be operated with the tiller arm in the vertical position when operated at reduced speed for manoeuvring in tight confines.

Tiller arm

The tiller arm is mounted onto the drive unit. The offset position increases visibility around the mast. The low anchor point requires the minimum steering effort and the long tiller arm increases the operating clearance when working inside the truck's envelope. The tiller arm is spring assisted and returns automatically to the vertical position when released.

The tiller must be in the operating position, or the creep speed button depressed for the truck to be fully operational, including traction and mast operations.

Dashboard instrumentation

The truck's dash board features a battery discharge indicator and hour meter. The red mushroom shaped button can be pressed to stop the truck immediately in case of an emergency.

Chassis

The drive gear and main components are fully enclosed for maximum protection by the all welded chassis. The chassis is surface treated and painted with two pack epoxy paint. The compact chassis width of 800mm is standard across the range allowing the handling of loads in tight spaces, containers or in aisle stacking applications.

Mast and Forks

2 stage clear view masts are featured on all models. For durability the mast guard is made from wire mesh. A transparent guard is available as an option. A variety of bolt-on mast types are offered depending on the model including single, two and three stage with full free lift. Rollers are permanently lubricated and sealed for maximum service life. The standard fork section is 65mm; a slim line option with a 55 mm profile is available for handling cage pallets length wise in block stacking operations.

Battery

A selection of batteries is available from 24V - 150 Ah to 24V - 375 Ah to provide a choice of power options. On the MS10E, the battery charger is built into the truck.

Wheels

Wheels are manufactured from various compounds to suit specific applications. Load wheels are contained within the chassis to avoid any impact with the load unit.

Electric motors

The MS10E features a powerful 1 kW SEM traction motor, which guarantees an excellent response to operating commands and maintains sufficient torque in various situations. Maintenance is limited; with inspection intervals recommended every 500 hours of service for a long operational life. The lift motor is a 2kW DC compound motor, which makes light work of any workload.

The MS10-16 features a 1,2kW AC drive motor, which delivers instant response to forward and reverse traction inputs and providing considerable torque. The maintenance free motor also has long inspection intervals and provides a 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 is connected directly to the helicoidal gear transmission running in an oil bath. The motor is mounted vertically for efficient ventilation and to reduce flexing stresses to the power cables, ensuring reduced downtime.

Hydraulic unit

A heavy duty compound wound motor drives the pump. Inputs to the motor

and proportional valve are received from the controller to control lifting and lowering performance. Lift/lower functions are actuated directly from the tiller head controls via the Combi MOSFET controller. The MS10 and MS12 feature on/off buttons with soft stop control. The MS14 and MS16 feature proportional control for the right side control buttons and on/off buttons with soft stop on the left side. A flow control valve regulates lowering speeds and a protection valve prevents further lowering in the event of a line break. A transparent oil reservoir allows the oil level to be easily checked.

Electronic controls

The MS10E features a Combi MOSFET controller, which regulates both the SEM traction motor and the DC lift motor. On the MS10-16, a new generation AC/DC Combi MOSFET controller is used to regulate both traction and pump operation. High energy efficiency and motor performance allows considerable hourly operational usage. Smooth progressive control is available at all times. The controller features automatic braking (reverse current braking) and regenerative braking on release of the butterfly buttons as well as anti roll-back/start-up on gradients. Using a plug-in console, the controller can be adjusted for forward and reverse travel speeds, reverse current braking, release braking, acceleration, lift and lowering speeds, ramp performance and deceleration on lifting and lowering. The operator and application performance requirements can be easily matched to ensure maximum productivity.

Options

A comprehensive range of options including:

- Selection of drive wheels
- Cold store -30°C
- Load backrest
- A4 document holder

MS, MSIL Series

Models: MS10E, MS10, MS12, MS14, MS14IL, MS16, MS16IL



MS, MSIL Series

Models: MS10E, MS10, MS12, MS14, MS14IL, MS16, MS16IL



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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.

Publication part no. 258979879 Rev.08

Printed in The United Kingdom (0712HG) EN

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Truck shown with optional equipment