

# MSX series

1,250kg / 1,500kg

## Pedestrian high lift stacker with operator platform



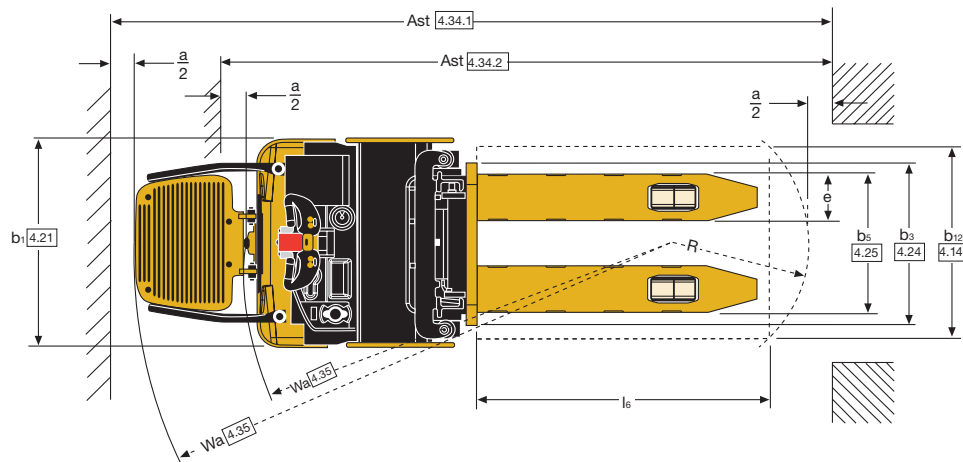
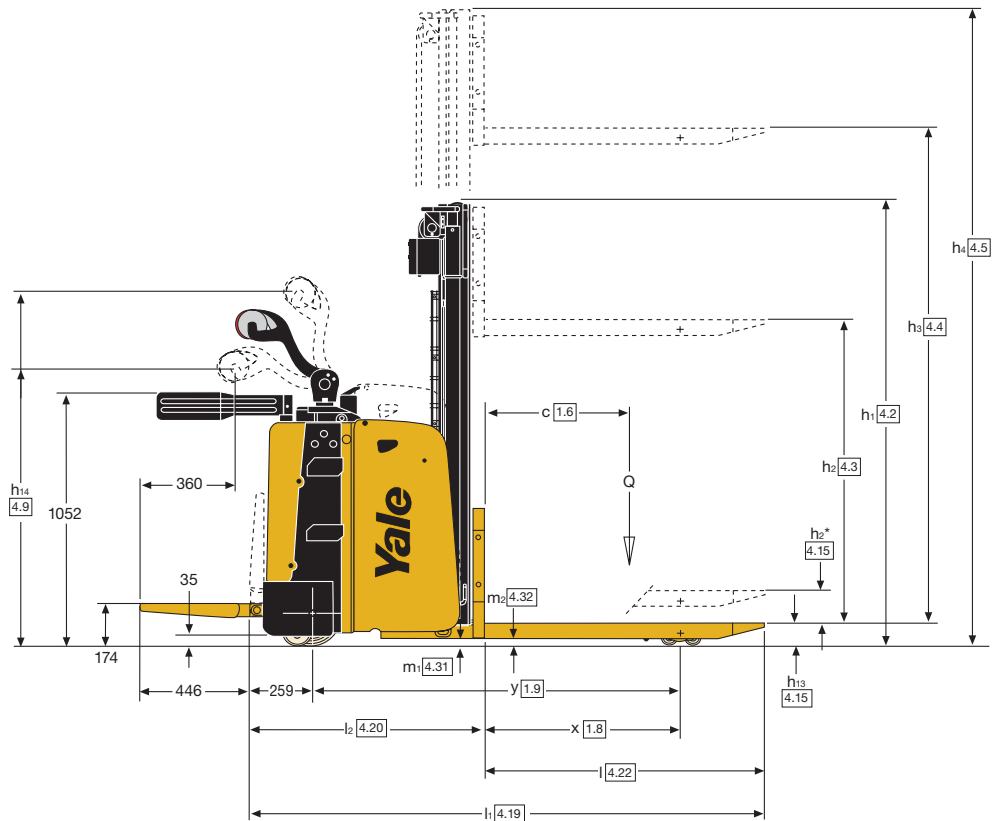
- Large operator platform
- COMBI-MOSFET Controller
- Yale AC Technology™
- Brushless power steering motor
- High manoeuvrability
- Dual purpose machine for pedestrian or ride on operation
- Initial lift option

## Truck Dimensions

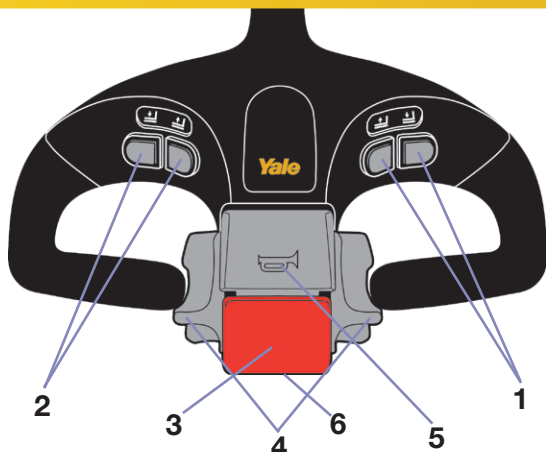
$$Ast = Wa + R + a$$

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

$$a = 200$$



## Tiller Head



- 1 proportional lift / lower buttons
- 2 on / off for low speed or initial lift (option)
- 3 travel direction inverter button
- 4 butterfly control buttons for direction and speed
- 5 horn
- 6 creep speed (opposite side)

## Mast details - MS12X, MS15X, MS12X IL, MS15X IL

Mast type	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 LFL	2768	100	1877	3330	406
	2968	100	1977	3530	418
	3168	100	2077	3730	428
	3368	100	2177	3930	442
	3768	100	2377	4330	466
	4168	100	2577	4730	490
2 stage FFL	2604	1260	1827	3166	405
	2804	1360	1927	3366	416
	3004	1460	2027	3566	426
	3204	1560	2127	3766	436
	3404	1660	2227	3966	446
	3604	1760	2327	4166	456
3 stage FFL	4004	1960	2527	4566	476
	4028	1260	1827	4590	510
	4328	1360	1927	4890	530
	4628	1460	2027	5190	550

<sup>(1)</sup> With free lift of 100 mm. <sup>(2)</sup> With load backrest for carriage h<sub>4</sub> + 528 mm. <sup>(3)</sup> All weights are: mast structures (weldment, cylinders, chain, pulley) + oil. EXCLUDED: forks, accessories.

## Mast details - MS12X SL, MS15X SL

Mast type	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 LFL	2768	100	1877	3330	406
	2968	100	1977	3530	418
	3168	100	2077	3730	428
	3368	100	2177	3930	442
	3768	100	2377	4330	466
	4168	100	2577	4730	490
2 stage FFL	2604	1260	1827	3166	405
	2804	1360	1927	3366	416
	3004	1460	2027	3566	426
	3204	1560	2127	3766	436
	3404	1660	2227	3966	446
	3604	1760	2327	4166	456
3 stage FFL	4004	1960	2527	4566	476
	4028	1260	1827	4590	510
	4328	1360	1927	4890	530
	4628	1460	2027	5190	550
	4798	1560	2127 <sup>(3)</sup>	5360	562
	5098	1660	2227 <sup>(3)</sup>	5660	586
	5398	1760	2327 <sup>(3)</sup>	5960	606
5998	1960	2527 <sup>(3)</sup>	6560	636	

<sup>(1)</sup> With free lift of 100 mm. <sup>(2)</sup> With load backrest for carriage h<sub>4</sub> + 528 mm. <sup>(3)</sup> Or with stabilizers or reduced capacity. <sup>(4)</sup> All weights are: mast structures (weldment, cylinders, chain, pulley) + oil. EXCLUDED: forks, accessories.

## Tyre size rear, combination b4

			b4 1050mm	b4 1250mm	
Tyres	3.7	Tread, rear (tyre size, rear = ø 85 x 70mm) <sup>(12)</sup>	b <sub>11</sub> (mm)	1178	1378
	3.7	Tread, rear (tyre size, rear = ø 125 x 50mm) <sup>(12)</sup>	b <sub>11</sub> (mm)	1132	1332
	4.21	Overall width (tyre size, rear = ø 85 x 70mm)	b <sub>1</sub> /b <sub>2</sub> (mm)	860 / 1305	860 / 1505
	4.21	Overall width (tyre size, rear = ø 125 x 50mm)	b <sub>1</sub> /b <sub>2</sub> (mm)	860 / 1214	860 / 1414
	4.26	Distance between wheel arms / loading surfaces	b <sub>4</sub> (mm)	1050	1250
	4.34.1	Aisle width for pallets 1000mm x 1200mm crossways (standing) (tyre size, rear = ø 85 x 70mm)	Ast <sub>1</sub> (mm)	2989 <sup>(1)</sup>	3040 <sup>(1)</sup>
	4.34.1	Aisle width for pallets 1000mm x 1200mm crossways (pedestrian) (tyre size, rear = ø 85 x 70mm)	Ast <sub>2</sub> (mm)	2540 <sup>(1)</sup>	2591 <sup>(1)</sup>
	4.34.1	Aisle width for pallets 1000mm x 1200mm crossways (standing) (tyre size, rear = ø 125 x 50mm)	Ast <sub>1</sub> (mm)	3003 <sup>(1)</sup>	3031 <sup>(1)</sup>
	4.34.1	Aisle width for pallets 1000mm x 1200mm crossways (pedestrian) (tyre size, rear = ø 125 x 50mm)	Ast <sub>2</sub> (mm)	2554 <sup>(1)</sup>	2582 <sup>(1)</sup>
	4.34.2	Aisle width for pallets 800mm x 1200mm lengthwise (standing) (tyre size, rear = ø 85 x 70mm)	Ast <sub>1</sub> (mm)	2978 <sup>(1)</sup>	3042 <sup>(1)</sup>
	4.34.2	Aisle width for pallets 800mm x 1200mm lengthwise (pedestrian) (tyre size, rear = ø 85 x 70mm)	Ast <sub>2</sub> (mm)	2529 <sup>(1)</sup>	2593 <sup>(1)</sup>
	4.34.2	Aisle width for pallets 800mm x 1200mm lengthwise (standing) (tyre size, rear = ø 125 x 50mm)	Ast <sub>1</sub> (mm)	2984 <sup>(1)</sup>	3032 <sup>(1)</sup>
	4.34.2	Aisle width for pallets 800mm x 1200mm lengthwise (pedestrian) (tyre size, rear = ø 125 x 50 mm)	Ast <sub>2</sub> (mm)	2535 <sup>(1)</sup>	2583 <sup>(1)</sup>

<sup>(1)</sup> With 3 stage mast +12mm

<sup>(12)</sup> Pedestrian version. For Stand-on version, front/rear are inverted.

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 MS12X-15X, MS12XIL-15XIL

<b>Distinguishing mark</b>	1.1	Manufacturer (abbreviation)		Yale	Yale	Yale	Yale
	1.2	Manufacturer's type designation		<b>MS12X</b>	<b>MS15X</b>	<b>MS12X IL</b>	<b>MS15X IL</b>
	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		Pedestrian / Stand-on	Pedestrian / Stand-on	Pedestrian / Stand-on	Pedestrian / Stand-on
	1.5	Rated capacity/Rated load	Q (kg)	1.25	1.5	1.25	1.5
	1.6	Load centre distance	c (mm)	600	600	600	600
	1.8	Load distance, centre of drive axle to fork <sup>(1)</sup>	x (mm)	713	713	811	811
	1.9	Wheelbase	y (mm)	1423	1423	1520	1520
	<b>Weights</b>	2.1	Service weight <sup>(6)</sup>	kg	1440 <sup>(4)</sup>	1440 <sup>(4)</sup>	1418 <sup>(4)</sup>
2.2		Axle loading, laden front/rear	kg	1012 / 1678	1106 / 1834	1003 / 1665	1112 / 1845
2.3		Axle loading, unladen front/rear	kg	1024 / 416	1024 / 416	1008 / 410	1036 / 421
<b>Tyres/chassis</b>	3.1	Tyres: polyurethane, tophane, vulkollan, front/rear		Vulkollan / Vulkollan	Vulkollan / Vulkollan	Vulkollan / Vulkollan	Vulkollan / Vulkollan
	3.2	Tyre size, front		254 x 90	254 x 90	254 x 90	254 x 90
	3.3	Tyre size, rear		85 x 70	85 x 70	85 x 70	85 x 70
	3.4	Additional wheels (dimensions)		125 x 50	125 x 50	125 x 50	125 x 50
	3.5	Wheels, number front/rear (x = driven wheels)		1x + 1 / 4	1x + 1 / 4	1x + 1 / 4	1x + 1 / 4
	3.6	Tread, front	b <sub>10</sub> (mm)	576	576	576	576
	3.7	Tread, rear	b <sub>11</sub> (mm)	398	398	378	378
<b>Dimensions</b>	4.2	Height, mast lowered	h <sub>1</sub> (mm)	2077	2077	1927	1927
	4.3	Free lift	h <sub>2</sub> (mm)	100	100	1360 <sup>(5)</sup>	1360 <sup>(5)</sup>
	4.4	Lift	h <sub>3</sub> (mm)	3168	3168	2804	2804
	4.5	Height, mast extended	h <sub>4</sub> (mm)	3730	3730	3366	3366
	4.6	Initial lift	h <sub>5</sub> (mm)	-	-	130	130
	4.9	Height drawbar in driving position min./max	h <sub>14</sub> (mm)	1220 / 1460	1220 / 1460	1220 / 1460	1220 / 1460
	4.10	Height of wheel arms	h <sub>8</sub> (mm) h <sub>13</sub>	85	85	85	85
	4.15	Height, lowered	(mm)	90	90	90	90
	4.19	Overall length (pedestrian) <sup>(2)</sup>	l <sub>1</sub> (mm)	2129	2129	2129	2129
	4.19	Overall length (standing) <sup>(2)</sup>	l <sub>1</sub> (mm)	2575	2575	2575	2575
	4.20	Length to face of forks (pedestrian) <sup>(2)</sup>	l <sub>2</sub> (mm)	969	969	969	969
	4.20	Length to face of forks (standing) <sup>(2)</sup>	l <sub>2</sub> (mm)	1415	1415	1415	1415
	4.21	Overall width	b <sub>1</sub> /b <sub>2</sub> (mm)	860	860	860	860
	4.22	Fork dimensions	s/e/l (mm)	65 / 180 / 1160	65 / 180 / 1160	55 / 195 / 1160	65 / 195 / 1160
	4.24	Fork-carriage width	b <sub>3</sub> (mm)	675	675	675	675
	4.25	Distance between fork-arms	b <sub>5</sub> (mm)	570	570	572	572
	4.26	Distance between wheel arms / loading surfaces	b <sub>4</sub> (mm) m <sub>1</sub>	-	-	-	-
	4.31	Ground clearance, laden, below mast	(mm)	30	30	30	30
	4.32	Ground clearance, centre of wheelbase	m <sub>2</sub> (mm)	22	22	25	25
	4.33	Load dimension b <sub>12</sub> x l <sub>6</sub> lengthwise	b <sub>12</sub> x l <sub>6</sub> (mm)	800 x 1200	800 x 1200	800 x 1200	800 x 1200
	4.34.1	Aisle width for pallets 1000mm x 1200mm crossways (standing) <sup>(1)</sup>	Ast (mm)	2996	2996	3135	3135
4.34.1	Aisle width for pallets 1000mm x 1200mm crossways (pedestrian) <sup>(1)</sup>	Ast (mm)	2553	2553	2697	2697	
4.34.2	Aisle width for pallets 800mm x 1200mm lengthwise (standing) <sup>(1)</sup>	Ast (mm)	2964	2964	2984	2984	
4.34.2	Aisle width for pallets 800mm x 1200mm lengthwise (pedestrian) <sup>(1)</sup>	Ast (mm)	2521	2521	2546	2546	
4.35	Turning radius (standing)	Wa (mm)	2133	2133	2226	2226	
4.35	Turning radius (pedestrian) <sup>(3)</sup>	Wa (mm)	1690	1690	1788	1788	
<b>Performance data</b>	5.1	Travel speed, laden/unladen (pedestrian)	km/h	4.3 / 4.3	4.3 / 4.3	4.3 / 4.3	4.3 / 4.3
	5.1	Travel speed, laden/unladen (standing)	km/h	7.3 / 7.3	7.3 / 7.3	7.3 / 7.3	7.3 / 7.3
	5.1.1	Travel speed, laden/unladen, backwards (pedestrian)	km/h	4.3 / 4.3	4.3 / 4.3	4.3 / 4.3	4.3 / 4.3
	5.1.1	Travel speed, laden/unladen, backwards (standing)	km/h	7.3 / 7.3	7.3 / 7.3	7.3 / 7.3	7.3 / 7.3
	5.2	Lift speed, laden/unladen	m/s	0.16 / 0.22	0.16 / 0.22	0.14 / 0.30	0.14 / 0.30
	5.3	Lowering speed, laden/unladen	m/s	0.28 / 0.26	0.28 / 0.26	0.28 / 0.14	0.28 / 0.14
	5.7	Gradeability, laden/unladen	%	8 / 10	8 / 10	8 / 10	8 / 10
	5.8	Max. gradeability, laden/unladen	%	8 / 10	8 / 10	8 / 10	8 / 10
	5.10	Service brake		Electromagnetic	Electromagnetic	Electromagnetic	Electromagnetic
	<b>Electric engine</b>	6.1	Drive motor S2 60 minute rating	kW	4.0	4.0	4.0
6.2		Lift motor, S3 15% rating	kW	3.0	3.0	3.0	3.0
6.3		Battery according to DIN 43531/35/36 A,B,C, no		no	no	no	no
6.4		Battery voltage/nominal capacity K5	V/Ah	24 / 375 <sup>(4)</sup>	24 / 375 <sup>(4)</sup>	24 / 375 <sup>(4)</sup>	24 / 375 <sup>(4)</sup>
6.5		Battery weight <sup>(6)</sup>	kg	291	291	291	291
8.1	Type of drive unit	kWh/h	AC-Controller	AC-Controller	AC-Controller	AC-Controller	
10.7	Sound pressure level at the driver's seat	dB (A)	< 70	< 70	< 70	< 70	

<sup>(1)</sup> With 3 stage mast +12mm

<sup>(2)</sup> With 3 stage mast +18mm

<sup>(3)</sup> Tiller in vertical position

<sup>(4)</sup> Available battery 315Ah; with battery 315Ah service weight -24kg

<sup>(5)</sup> With FFL mast 2 and 3 stage, when initial lift is lifted, +130mm

<sup>(6)</sup> With 3 stage mast -18mm

<sup>(7)</sup> These values may vary of +/- 5%

<sup>(8)</sup> Stacking aisle widths (lines 4.34.1 & 4.34.2) are based on the VDI standard calculation as shown on illustration. The British Industrial Truck Association recommends the addition of 100mm to the total clearance (dimension a) for extra operating margin at the rear of the truck.

<sup>(9)</sup> Pedestrian version. For Stand-on version, front/rear are inverted.

## VDI 2198 – General Specifications MS12X-15X, MS12XSL-15XSL

<b>Distinguishing mark</b>	1.1	Manufacturer (abbreviation)		Yale	Yale
	1.2	Manufacturer's type designation		<b>MS12X SL</b>	<b>MS15X SL</b>
	1.3	Drive: electric (battery or mains), diesel, petrol, fuel gas		Battery	Battery
	1.4	Operator type: hand, pedestrian, standing, seated, order-picker		Pedestrian / Stand-on	Pedestrian / Stand-on
	1.5	Rated capacity/Rated load	Q (kg)	1.5	1.5
	1.6	Load centre distance	c (mm)	600	600
	1.8	Load distance, centre of drive axle to fork <sup>(6)</sup>	x (mm)	632	660
	1.9	Wheelbase	y (mm)	1376	1404
	<b>Weights</b>	2.1	Service weight <sup>(7)</sup>	kg	1509 <sup>(4)</sup>
2.2		Axle loading, laden front/rear <sup>(12)</sup>	kg	1021 / 1988	1021 / 1988
2.3		Axle loading, unladen front/rear <sup>(12)</sup>	kg	1035 / 474	1035 / 474
<b>Tyres/chassis</b>	3.1	Tyres: polyurethane, tophane, vulkollan, front/rear		Vulkollan / Vulkollan	Vulkollan / Vulkollan
	3.2	Tyre size, front		254 x 90	254 x 90
	3.3	Tyre size, rear		85 x 70	125 x 50
	3.4	Additional wheels (dimensions)		-	-
	3.5	Wheels, number front/rear (x = driven wheels) <sup>(12)</sup>		1x / 4	1x / 4
	3.7	Tread, rear <sup>(9) (10) (12)</sup>	b <sub>11</sub> (mm)	978	932
	<b>Dimensions</b>	4.2	Height, mast lowered	h <sub>1</sub> (mm)	1877
4.3		Free lift	h <sub>2</sub> (mm)	100	100
4.4		Lift	h <sub>3</sub> (mm)	2768	2768
4.5		Height, mast extended	h <sub>4</sub> (mm)	3330	3330
4.9		Height drawbar in driving position min./max	h <sub>14</sub> (mm)	1220 / 1460	1220 / 1460
4.10		Height of wheel arms	h <sub>8</sub> (mm)	85	85
4.15		Height, lowered	h <sub>13</sub> (mm)	90	90
4.19		Overall length (pedestrian) <sup>(2)</sup>	l <sub>1</sub> (mm)	2202	2202
4.19		Overall length (standing) <sup>(2)</sup>	l <sub>1</sub> (mm)	2648	2648
4.20		Length to face of forks (pedestrian) <sup>(2)</sup>	l <sub>2</sub> (mm)	1003	1003
4.20		Length to face of forks (standing) <sup>(2)</sup>	l <sub>2</sub> (mm)	1448	1448
4.21		Overall width <sup>(9) (10)</sup>	b <sub>1</sub> /b <sub>2</sub> (mm)	860 / 1105	860 / 1014
4.22		Fork dimensions <sup>(5)</sup>	s/e/l (mm)	35 / 100 / 1200	35 / 100 / 1200
4.24		Fork-carriage width <sup>(9) (10)</sup>	b <sub>3</sub> (mm)	800	800
4.25		Distance between fork-arms <sup>(6)</sup>	b <sub>5</sub> (mm)	730	730
4.26		Distance between wheel arms / loading surfaces <sup>(9) (10)</sup>	b <sub>4</sub> (mm)	850	850
4.31		Ground clearance, laden, below mast	m <sub>1</sub> (mm)	30	30
4.32		Ground clearance, centre of wheelbase	m <sub>2</sub> (mm)	30	30
4.33		Load dimension b <sub>12</sub> x l <sub>6</sub> lengthwise	b <sub>12</sub> x l <sub>6</sub> (mm)	800 x 1200	800 x 1200
4.34.1		Aisle width for pallets 1000mm x 1200mm crossways (standing) <sup>(1) (9) (10) (11)</sup>	Ast (mm)	2988	3003
4.34.1		Aisle width for pallets 1000mm x 1200mm crossways (pedestrian) <sup>(1) (9) (10) (11)</sup>	Ast (mm)	2539	2554
4.34.2		Aisle width for pallets 800mm x 1200mm lengthwise (standing) <sup>(1) (9) (10) (11)</sup>	Ast (mm)	2978	2984
4.34.2		Aisle width for pallets 800mm x 1200mm lengthwise (pedestrian) <sup>(1) (9) (10) (11)</sup>	Ast (mm)	2529	2535
4.35	Turning radius (standing)	Wa (mm)	2084	2112	
4.35	Turning radius (pedestrian) <sup>(3)</sup>	Wa (mm)	1635	1662	
<b>Performance data</b>	5.1	Travel speed, laden/unladen (pedestrian)	km/h	4.3 / 4.3	4.3 / 4.3
	5.1	Travel speed, laden/unladen (standing)	km/h	7.3 / 7.3	7.3 / 7.3
	5.1.1	Travel speed, laden/unladen, backwards (pedestrian)	km/h	4.3 / 4.3	4.3 / 4.3
	5.1.1	Travel speed, laden/unladen, backwards (standing)	km/h	7.3 / 7.3	7.3 / 7.3
	5.2	Lift speed, laden/unladen	m/s	0.16 / 0.22	0.16 / 0.22
	5.3	Lowering speed, laden/unladen	m/s	0.3 / 0.28	0.3 / 0.28
	5.7	Gradeability, laden/unladen	%	5	5
	5.8	Max. gradeability, laden/unladen	%	5	5
5.10	Service brake		Electromagnetic	Electromagnetic	
<b>Electric engine</b>	6.1	Drive motor S2 60 minute rating	kW	4.0	4.0
	6.2	Lift motor, S3 15% rating	kW	3.0	3.0
	6.3	Battery according to DIN 43531/35/36 A,B,C, no		no	no
	6.4	Battery voltage/nominal capacity K5	(V) / (Ah)	24 / 375 <sup>(4)</sup>	24 / 375 <sup>(4)</sup>
	6.5	Battery weight <sup>(7)</sup>	kg	291	291
8.1	Type of drive unit		AC-Controller	AC-Controller	
10.7	Sound pressure level at the driver's seat	dB (A)	< 70	< 70	

<sup>(1)</sup> With 3 stage mast +12mm

<sup>(2)</sup> With 3 stage mast +18mm

<sup>(3)</sup> Tiller in vertical position

<sup>(4)</sup> Available battery 315Ah; with battery 315Ah service weight -24kg

<sup>(5)</sup> FEM forks

<sup>(6)</sup> With 3 stage mast -18mm

<sup>(7)</sup> These values may vary of +/- 5%

<sup>(8)</sup> Available b5 930 - 1130

<sup>(9)</sup> With combination b3 1000, b4 = 1050mm

<sup>(10)</sup> With combination b3 1200, b4 = 1250mm

<sup>(11)</sup> Stacking aisle widths (lines 4.34.1 & 4.34.2) are based on the VDI standard calculation as shown on illustration. The British Industrial Truck Association recommends the addition of 100mm to the total clearance (dimension a)

for extra operating margin at the rear of the truck.

<sup>(12)</sup> Pedestrian version. For Stand-on version, front/rear are inverted.

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# MSX series

Models: MS12-15X, MS12-15X IL, MS12-15X SL

## Tiller head and controls

The tiller head is designed for operator comfort featuring an ergonomic shaped handle with angled grips and integral hand guard. Large dimensioned, low effort butterfly buttons control direction of travel and speed as well as the electromagnetic brake. All controls are accessible without having to lift the hand from the handle. Dual lift and lower buttons are 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 actuated by thumb or forefinger. The creep speed control allows the truck to be operated with the tiller arm in the vertical position at reduced speed for manoeuvring in tight confines. 4 preset performance settings provide different performance levels for forward and reverse travel speeds, reverse current braking, release braking, lift speed and acceleration, easily selectable to suit driver preference.

The tiller arm is spring assisted and returns automatically to the vertical position when released.

## Instrumentation

The pallet truck's dashboard features a multi-function indicator displaying information on the status of the truck and alarm conditions should they occur. The most important operational information includes the battery discharge indicator, odometer and performance level. The red mushroom button can be pressed to stop the pallet truck immediately in case of emergency.

## Operator Platform

The large operator platform allows the operator to find their own comfortable driving position. Foldable side arms are high relative to the level of the platform, providing the operator with maximum comfort and stability when manoeuvring. The "man on board" sensor integrated into the platform prevents truck operation with no operator present.

Optional rear access and side access fixed protection types are available and are particularly suitable for shuttle activity over medium to long distances.

The top casing has compartments for stationery and other small objects with an optional A4 reading stand.

## Power-assisted steering

The electric motor completely eliminates steering effort, making the truck light and easy to steer in all working situations. The power steering reacts so quickly that there is no loss of performance compared to manual steering. Mechanical steering is standard on the MS12X model.

## Frame and forks

The frame is made of electro-welded sheets, surface treated and varnished with a 2-pack epoxy paint. The overall chassis width of 860mm makes the truck suitable for manoeuvring in the narrowest aisles.

Standard forks are 65mm thick, and have a low profile option of 55mm to allow the loading/unloading of non-standardised loads. The robust fork structure is made with two solid longitudinal members covered with a closing and reinforcing sheet. The IL versions ends of the forks are equipped with entry rollers to enhance the handling of bottom boarded pallets.

## Initial Lift (option) and lift

The initial lift increases the distance from the ground, allowing transfer on irregular surfaces, loading levels and ramps. The lift/lower control is provided by two proportional push buttons located to the left of the tiller. The adjustable pull rods give uniform lifting and lowering movement of the forks. The loading rollers are tandem HD (Heavy Duty) with lubrication points and sealed bearings. Speed is automatically reduced with load arms raised and traction is automatically cut when the forks are raised >1.5m (h3).

## Battery

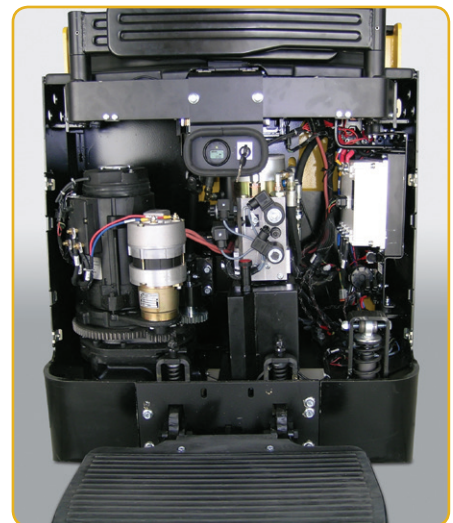
The battery compartment takes a battery of up to 24V - 345 Ah capacity, which, together with the characteristics of the traction motor, allows considerable flexibility in operation. A vertical battery extraction option is available.

## Rollers and wheels

All wheels are made from Vulkollan™. Tandem load wheels are standard, and tandem load wheels with twinned rollers and a fruit version are available as options. An optional suspension mounted castor enhances driveability and stability on imperfect flooring.

## Electric motors

The AC 4 Kw drive motor gives instant response to forward and reverse traction inputs, providing considerable torque.



The maintenance free motor (inspection intervals required every 1000 operating hours) provides low cost long operative life. The servo-steering with brushless type DC motor with permanent magnets is maintenance free and incorporates the electronic control system. The DC compound 3kw lifting motor provides power in excess of the truck's operative requirements.

## Traction – steering unit

The cast-iron gear train has helicoidal gears running immersed in an oil bath. The steering reduction is calculated to provide maximum performance in every

working situation. The motor is mounted vertically for efficient ventilation and to eliminate flexing stresses to the power cables to ensure reduced downtime. The steering is effected by gears, a maintenance and regulation-free system based on higher specification models

#### **Hydraulic unit**

The silent, powerful hydraulic pump, activated by the electric motor, is of double gear type. The transparent tank facilitates checking of the hydraulic oil level. Lowering is controlled by a solenoid valve activated directly by the tiller pushbuttons.

#### **Electronic controls**

The Combi MOSFET controller manages both the AC traction engine and the DC lifting motor and reduces the need for electrical contactors. Its high energy efficiency and high motor performance allow considerable hourly usage in operation, reducing battery charging. The combined characteristics of the traction motor and the control panel enhance efficiency of release and inversion braking, without reduction of autonomy, leaving the electromagnetic brake for parking and emergencies only. Electronic parameters are easily customised by a service technician. The operator can choose between 4 pre-set performance levels.

#### **Options**

Various options are available, including;

- Cold store to -30°C
- Wide range of masts
- Fixed side protection
- Fixed rear protection
- Twin-bed trolley for battery change
- Vertical battery extraction
- Load backrest
- Dust ingress protection on drive motor
- Reverse alarm.

# MSX series

Models: MS12-15X, MS12-15X IL, MS12-15X SL



## HYSTER-YALE UK LIMITED

trading as **Yale Europe Materials Handling**  
Centennial House, Frimley Business Park,  
Frimley, Surrey GU16 7SG, United Kingdom.



Tel: +44 (0) 1276 538500  
Fax: +44 (0) 1276 538559

[www.yale-forklifts.eu](http://www.yale-forklifts.eu)



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

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