

Unique truck concept with forward-facing seat and side-mounted mast

Unobstructed visibility of the forks, load and travel route

warehouseNAVIGATION (optional)  
optimizes approach time and significantly increases productivity

High flexibility through modular design and RFID technology

Jungheinrich® proprietary 3-phase AC technology for dynamic movement

High level of efficiency: double benefit of energy regeneration and effective energy management

Innovative, reliable Lithium-Ion technology



## EFX 410–413

### Turret Truck (Man-Down) (2,200 - 2,750 lbs.)

The EFX 410-413 series of turret trucks, featuring lift heights up to 23 feet and a maximum capacity up to 2,750 lbs., is designed to provide maximum versatility in very narrow aisle (VNA) warehouses. These turret trucks can be used with wire or rail guidance, increasing productivity and combining applications in very narrow aisles, wide aisles and staging areas.

Designed for operator comfort and productivity, the EFX turret trucks include a spacious and ergonomic compartment, featuring a comfortable footwell for easy entry and exit, a cushioned seat with height and weight adjustments and an automotive-style pedal layout.

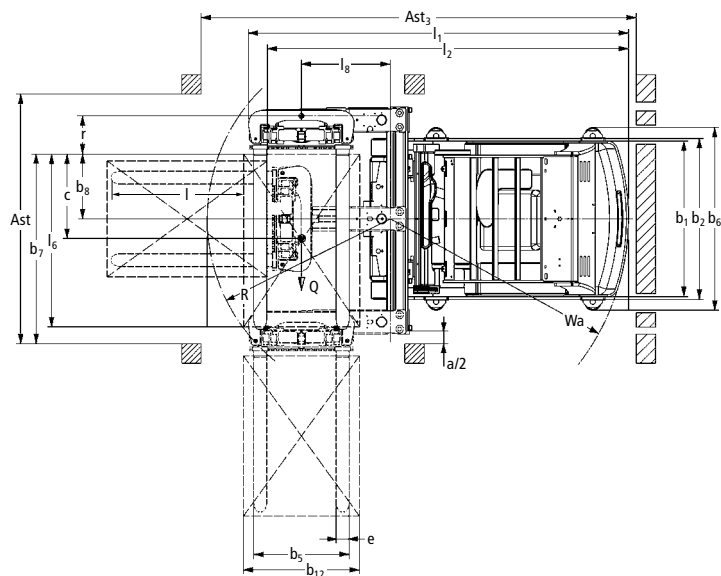
Large storage areas and a functional ergonomic design, which includes centrally-positioned controls, help the operator work faster and more confidently with less physical demand.

With its forward-facing seat and a side-mounted mast, the EFX series raises the bar on visibility by providing operators with an unobstructed view of the load, travel route and racking during operation. The premium operating console, with its adjustable height and angle and large display, is placed at the center of the truck for added visibility and easy and effective operation.

With its innovative features, the EFX defines state-of-the-art VNA technology:

- Ergonomic, thumb-activated control of hydraulic functions for lifting, lowering, swiveling and traversing.
- Electric power steering enables precise positioning.
- Important operating data is displayed in pictograms on the large, graphic display.
- A wide range of available options ensures the truck can be configured specifically for your application.

Technical drawing of a mobile robot, showing a side view and a top view. The side view includes dimensions:  $h_1$  (total height),  $h_2$  (height to the base of the mast),  $h_3$  (height of the mast),  $b_3$  (width of the mast),  $d_1$  (diameter of the front wheel),  $d_2$  (diameter of the rear wheel),  $s$  (height of the front wheel),  $l_3$  (length of the base),  $x$  (distance from the front wheel to the center of the base),  $y$  (distance from the center of the base to the rear wheel), and  $m_2$  (width of the rear wheel). The top view shows the robot's footprint with dimensions  $h_4$  (width of the mast),  $h_5$  (width of the base),  $h_6$  (width of the rear wheel), and  $h_7$  (width of the front wheel).



Standard Values For Working Aisle Widths									
Pallet Size		Stacking-in Depth		Clear Aisle Width (AST)*		Transfer Aisle (AST <sub>3</sub> ) Theoretical		Transfer Aisle (AST <sub>3</sub> ) Practical***	
With Rail Guidance									
in	mm	in	mm	in	mm	in	mm	in	mm
48 x 48	1,219 x 1,219	48.0	1,219	70	1,778	147.6	3,749	+20.0	+508
48 x 40	1,219 x 1,016	48.0	1,219	70**	1,778	131.3	3,335	+20.0	+508
With Wire Guidance									
in	mm	in	mm	in	mm	in	mm	in	mm
48 x 48	1,219 x 1,219	48.0	1,219	72	1,829	147.6	3,749	+40.0	+508
48 x 40	1,219 x 1,016	48.0	1,219	72	1,829	131.3	3,335	+40.0	+508

\* Up to h<sub>3</sub> = 157.5 inches; +0.8 inches for h<sub>3</sub> > 157.5-236.2; +2.8 inches for h<sub>3</sub> > 236.2 inches.

\*\* Lower values possible if lower rail guide rollers are used.

\*\*\* The practical transfer aisle width is a reference value.

Mast Table EFX 410 - 413 – Standard Mast Types								
	Collapsed Mast Height h <sub>1</sub>		Lift Height h <sub>3</sub>		Free Lift h <sub>2</sub> *		Extended Mast Height h <sub>4</sub> *	
	in	mm	in	mm	in	mm	in	mm
Two-stage mast ZT	91*	2,305*	118	3,000	2.6	66	148	3,772
	96	2,430	128	3,250	2.6	66	158	4,022
	101	2,555	137	3,500	2.6	66	168	4,272
	106	2,680	147	3,750	2.6	66	178	4,522
	111	2,805	157	4,000	2.6	66	187	4,772
	116	2,930	167	4,250	2.6	66	197	5,022
	121	3,055	177	4,500	2.6	66	207	5,272
	128	3,250	187	4,750	2.6	66	220	5,592
	132	3,375	196	5,000	2.6	66	230	5,842
	137	3,500	206	5,250	2.6	66	239	6,092
	142	3,625	216	5,500	2.6	66	249	6,342
	147	3,750	226	5,750	2.6	66	259	6,592
152	3,875	236	6,000	2.6	66	269	6,842	
Three-stage mast DZ (Full free-lift)	82*	2,100*	157	4,000	55.5	1,410	184	4,690
	86*	2,190*	167	4,250	59.1	1,500	194	4,940
	89*	2,280*	177	4,500	62.6	1,590	204	5,190
	93	2,370	187	4,750	66.1	1,680	214	5,440
	96	2,460	196	5,000	69.6	1,770	224	5,690
	100	2,550	206	5,250	73.2	1,860	233	5,940
	104	2,640	216	5,500	76.7	1,950	243	6,190
	107	2,730	226	5,750	80.3	2,040	253	6,440
	111	2,820	236	6,000	83.8	2,130	263	6,690
	114	2,910	246	6,250	87.4	2,220	273	6,940
	118	3,000	256	6,500	90.9	2,310	283	7,190
	121	3,090	265	6,750	94.4	2,400	293	7,440
125	3,180	275	7,000	98.0	2,490	302	7,690	

\*Overhead guard height 89.6 inches (2,276 mm) or 93.6 inches (2,377 mm) with warning light on overhead guard.

# Technical data

as of: 08/2013

Characteristics	1.1	Manufacturer			Jungheinrich		Jungheinrich		
	1.2	Model			EFX 410		EFX 413		
	1.3	Drive			electric		electric		
	1.4	Type of operation			turret truck		turret truck		
	1.5	Load capacity / rated load	Q	lb	kg	2,200	1,000	2,750	1,250
	1.6	Load center distance	c	in	mm	24.0	600	24.0	600
	1.8	Load distance, center of drive axle to load handler	x	in	mm	6.6	168	6.6	158
1.9	Wheelbase	y	in	mm	62.0	1,577	62.0	1,577	
Weights	2.1	Service weight including battery (see line 6.5)		lb	kg	11,200	5,080	11,817	5,360
	2.2	Axle loading – loaded, drive / load		lb	kg	10,715 / 2,866	4,860 / 1,300	11,839 / 2,910	5,370 / 1,320
	2.3	Axle loading – unloaded, drive / load		lb	kg	7,121 / 4,079	3,230 / 1,850	7,364 / 4,454	3,340 / 2,020
Wheels, Chassis	3.1	Tires			Vulkollan®		Vulkollan®		
	3.2	Tire size, drive		in	mm	1.6 x 5.7	295 x 144	11.6 x 5.7	295 x 144
	3.3	Tire size, load		in	mm	13.5 x 4.3	343 x 110	13.5 x 4.3	343 x 110
	3.5	Wheels – number, drive / load (x = driven wheels)				2 / 1x		2 / 1x	
	3.6	Track width, load side		in	mm	55.4	1,406	55.4	1,406
Dimensions	4.2	Collapsed mast height	h <sub>1</sub>	in	mm	110.4 <sup>1)</sup>	2,805	110.4 <sup>2)</sup>	2,805
	4.3	Free-lift	h <sub>2</sub>	in	mm	2.6	66	2.6	66
	4.4	Maximum fork height (MFH)	h <sub>3</sub>	in	mm	157.5 <sup>1)</sup>	4,000	157.5 <sup>2)</sup>	4,000
	4.5	Overall extended height (OAE)	h <sub>4</sub>	in	mm	187.8	4,772	187.8	4,772
	4.7	Overhead load guard (cab) height	h <sub>6</sub>	in	mm	89.6	2,277	89.6	2,277
	4.8	Seat height	h <sub>7</sub>	in	mm	47.4	1,205	47.4	1,205
	4.19	Overall length (without load)	l <sub>1</sub>	in	mm	123.4	3,135	123.4	3,135
	4.20	Length to fork face, head length	l <sub>2</sub>	in	mm	116.4	2,957	116.4	2,957
	4.21	Overall width	b <sub>1</sub> / b <sub>2</sub>	in	mm	47.6 / 61.0	1,210 / 1,550	47.6 / 61.0	1,210 / 1,550
	4.22	Fork dimensions, (thick / width / length)	s / e / l	in	mm	1.6 / 3.9 / 47.2	40 / 100 / 1,200	1.6 / 3.9 / 47.2	40 / 100 / 1,200
	4.23	Fork carriage ISO 2328, class / type A,B				2B		2B	
	4.24	Fork carriage width	b <sub>3</sub>	in	mm	35.0	890	35.0	890
	4.25	Overall fork width	b <sub>5</sub>	in	mm	33.5	850	33.5	850
	4.30	Insert dimension from vehicle centerline	b <sub>8</sub>	in	mm	16.7	425	16.7	425
	4.32	Ground clearance, center of wheelbase	m <sub>2</sub>	in	mm	3.3 / 17.3 <sup>3)</sup>	85 / 45 <sup>3)</sup>	3.3 / 1.7 <sup>3)</sup>	85 / 45 <sup>3)</sup>
	4.33	Aisle width, rail / wire (for 48 x 40 pallets)	Ast	in	mm	70 / 72	1,740 / 1,810	70 / 72	1,740 / 1,810
	4.35	Turning radius	Wa	in	mm	72.7	1,847	72.7	1,847
	4.38	Distance to swivel-forks' pivot point	l <sub>8</sub>	in	mm	33.2	843	33.2	843
	4.42	Pallet width	b <sub>12</sub>	in	mm	40.0	1,016	40.0	1,016
	4.43	Pallet length	l <sub>6</sub>	in	mm	48.0	1,219	48.0	1,219
	4.49	Distance – swivel-forks' pivot point to fork face	R	in	mm	10.5	267	10.5	267
		Distance – floor to top of battery roller		in	mm	13.0	329	13.0	329
Performance	5.1	Travel speed, loaded / unloaded		mph	km/h	5.0 / 5.0	9 / 9	5.0 / 5.0	9 / 9
	5.2	Lift speed, loaded / unloaded		ft / min	m / s	80.7 / 80.7 <sup>4)</sup>	0.41 / 0.41	80.7 / 80.7 <sup>4)</sup>	0.41 / 0.41
	5.3	Lowering speed, loaded / unloaded		ft / min	m / s	86.6 / 86.6	0.44 / 0.44	86.6 / 86.6	0.44 / 0.44
	5.4	Reach speed, loaded / unloaded		ft / min	m / s	39.4 / 39.4 <sup>5)</sup>	0.20 / 0.20	39.4 / 39.4 <sup>5)</sup>	0.20 / 0.20
	5.10	Service brake				regenerative		regenerative	
	5.11	Parking brake				electric spring-loaded		electric spring-loaded	
Electrical	6.1	Drive motor (rating S <sub>2</sub> 60 minutes)		HP	kW	9.25	6.9	9.25	6.9
	6.2	Lift motor rating at S <sub>3</sub> 15%		HP	kW	12.74	9.5	12.74	9.5
	6.4	Battery voltage		V		48		48	
		Battery, nominal capacity		Ah		625		750	
	6.5	Battery weight		lb	kg	1,793-1,981	855	2,117-2,340	1,010
Other	8.1	Type of drive control			3-phase AC drive control		3-phase AC drive control		
	8.4	Sound level at driver's ear			66.5		66.5		
	8.6	Steering			electric		electric		
1) EFX 410 with two-stage mast, 157.5 inch lift height and 110.4 inch collapsed mast height. 2) EFX 413 with two-stage mast, 157.5 inch lift height and 110.4 inch collapsed mast height. 3) Equipped with transponder readers. 4) Equipped with performance package up to 88.5 ft/min. 5) Equipped with performance package up to 59.0 ft/min.									

- 1) EFX 410 with two-stage mast, 157.5 inch lift height and 110.4 inch collapsed mast height.  
2) EFX 413 with two-stage mast, 157.5 inch lift height and 110.4 inch collapsed mast height.  
3) Equipped with transponder readers.  
4) Equipped with performance package up to 88.5 ft/min.  
5) Equipped with performance package up to 59.0 ft/min.

This specification sheet only provides technical values for the standard truck. Non-standard tires, different masts, additional equipment, etc., could produce other values. Rights reserved for technical changes and improvements.

# The Jungheinrich Advantage



Longer operating times

## Pioneering 3-phase technology

There are hundreds of thousands of Jungheinrich trucks with 3-phase AC technology in use worldwide today. The EFX uses constant application of this technology for drive, lift and steering. The advantages are:

- Lower energy consumption due to excellent efficiency in all motors.
- Stepless speed control of hydraulic motor.
- Optimal heat management allows for cooler operating temperatures.
- High torque for dynamic movement.
- Reduced maintenance resulting from the omission of wear-susceptible components (carbon brushes, commutator, contacts, etc.).

## Ergonomics and comfort

- Large footwell for easy entry and exit.
- Unobstructed view of the load and travel route.
- Cushioned comfort seat absorbs vibrations.
- Operating console with adjustable height and distance from the operator.
- Soft keys with numeric keypad.
- Ergonomic, single-handed operating lever controls hydraulic functions.

## Control and CAN-Bus system

- 70% fewer cables and plugs.
- All performance parameters can be adjusted.

## Economic energy management

- Doubled energy reclamation through regenerative braking and lowering.
- Longer operating times on a single battery charge (up to two shifts).
- Shorter charge times resulting in prolonged battery life.
- Run up to 16 hours on 1 charge.

## RFID transponder technology (optional)

- Continuous location identification for precise positioning and recognition of all warehouse areas.
- High flexibility regarding programming of truck performance limits based on location (end of aisle control, lift/travel cut-outs, travel speed reductions).
- Optimization of travel speed relative to floor conditions.

## Jungheinrich warehouseNAVIGATION (optional)

- The EFX can be linked to a Warehouse Management System (WMS) by a radio data terminal or scanner.
- Direct loading of each destination through the truck computer.
- Automatic vertical and horizontal positioning.
- RFID location detection ensures accuracy in reaching correct destinations.
- High level of flexibility in the warehouse with adaptation to existing WMS.
- Gain up to 25% higher throughput.
- Significantly increase productivity and throughput by eliminating pick-errors.

## Commissioning and maintenance

- Quick and reliable commissioning using "teach-in" process.
- Up to 500 operating hour service intervals.
- Electronic system with wear-free sensors.

## Integrated Jungheinrich Personnel Protection System (PPS)

- An available option that is factory-installed and integrated into the lift truck's electronic control system/CAN-Bus.
- Senses presence of pedestrians in working aisle and alerts operator; slows and/or stops the truck as programmed.

## Lithium-ion Package Advantages

- Fast charging with no need for battery exchanges
- Maintenance-free with no odors from gases or acidification
- Longer service life and lower maintenance compared with lead-acid batteries
- Charging can be interrupted at anytime
- 5-year battery warranty included

## Additional optional equipment

- Mechanical rail guidance.
- Wire guidance for precise control in the aisles without any mechanical wear of components.
- Synchronized rotation of forks.
- Modular system for lift/drive cut-outs and travel speed reduction.
- Jungheinrich radio data terminals with mechanical and electrical support for material flow management systems.

## Lithium-Ion technology

Jungheinrich Lithium-Ion batteries are energy efficient, compact and long lasting with fast charging times, no maintenance requirement and extended life expectancy".

- Innovative and reliable
- Significant long-term return on investment
- Allows for continuous truck availability 24/7
- 5-year guarantee

## Parts when you need them

Jungheinrich's Parts Fast or Parts Free Guarantee ensures next-business-day delivery by 5:00 PM of all Jungheinrich parts in the United States, or they're free, including freight. For customers in Canada and Mexico, the guarantee ensures shipping of parts within 24 hours from the time the order was placed by the dealer. See your local Jungheinrich dealer for program details.

\* Programs may be subject to change without notice and may vary by region. Please ask your local Jungheinrich dealer for complete terms and conditions.