

WELCOME TO YOUR
INNOVATIVE
PARTNER



KALMAR
MOTOR AB ●



ACCESSIBILITY:

24 HOURS A DAY

DAYS A YEAR

365

If it flies, we move it – quickly and carefully

Kalmar Motor has worked in the same field for more than 40 years. We develop and manufacture aircraft tractors.

We move commercial aviation aircraft of all sizes. Quickly and carefully with accessibility 24 hours a day and 365 days a year. That requires more than muscles.

By combining simplicity with the latest cutting edge technology, we create tractors that last longer, require less service, and offer a level of comfort that enables drivers to achieve top performance.

TBL comes from Kalmar

Several of the functions that are now standard for aircraft tractors were developed by us. Kalmar has become a synonym for towbarless tractors (TBL), first

launched in 1989. Even today, Kalmar offers a unique TBL function that allows attachment without having to lift or move the plane.

All the tractors from Kalmar Motor are equipped with conventional transmission with the latest automatic transmission technology. This means seamless gear shifts, and smooth driving with lower fuel consumption, greater dependability, and a longer life compared to hydrostatic drive systems.

A work environment for long shifts

All tractors have the same standard cab with the driver positioned centrally and the same line of sight in both directions. The fact that several models have the same cab makes for faster training. Thanks to the latest CAN bus technology, all the information is available on a

monitor in front of the driver. Cabs and wheel axles have hydropneumatic suspension to ensure the highest level of comfort.

The drivers seat rotates 180 degrees. The steering wheel, controls and instruments also move and adjust themselves so that the driver always drives facing forwards, regardless of the direction. The three largest tractors also have cabins that can be raised or lowered.

Tow even without personnel in the cockpit

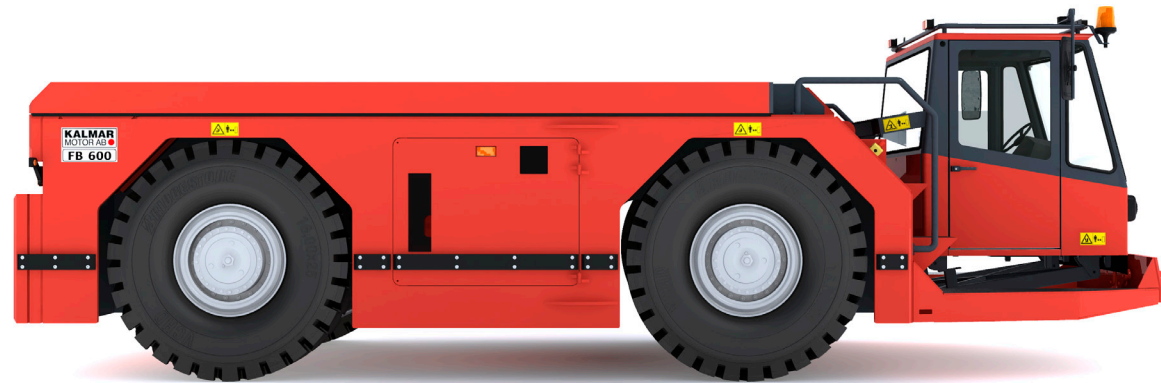
The TBL 50 is the only tractor on the market that can handle a wide range of commuter aircraft with formal NTO approvals. This is possible thanks to the very sophisticated patented cradle design combined with the F.A.C.T.® System. These two systems control the tractive and braking forces as well as the torque and angle in

an extremely accurate way. This makes it possible to achieve the very tough requirements set by the airframe manufacturers for handling commuter aircraft. The cradle also have the very unique feature of a mechanical torque release, similar to the fuse pin in a tow-bar. Combined this makes the TBL 50 unique on the market today. We also implement the same type of force control system to the Kalmar conventional towing tractors, to reduce the risk if an over sized conventional tractor is used.

Kalmar Motor has the right tractor for every airport, and for every kind of aircraft used in commercial aviation, from regional aircraft to the largest aircraft in use, the Airbus A380.

PRESENTING OUR PRODUCT RANGE

You can find more facts about, and pictures of, all of our models at www.kalmarmotor.se

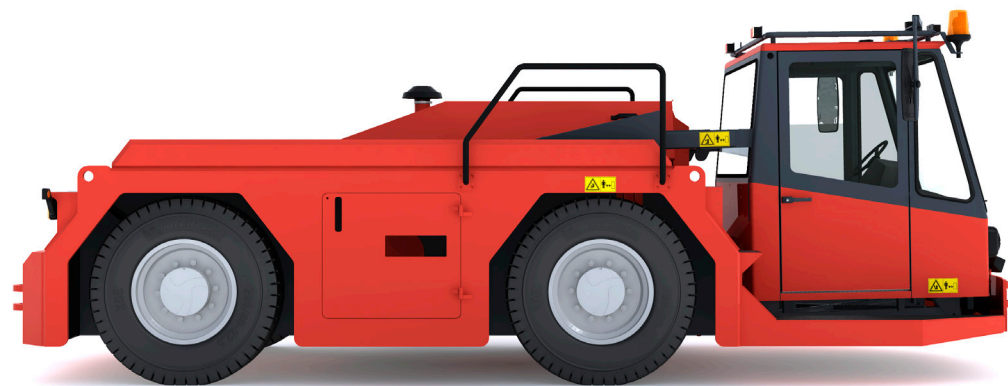


Kalmar FB 600 - Tow Tractor

Tow tractor for pushback and maintenance towing of aircraft with takeoff weights up to 650 tonnes. Diesel engine, Power Shift transmission and 4 wheel drive. Tractive effort over 400 kN.

Hydraulic suspension system with comfort equal to that of a passenger car.

The cab can be raised and lowered. Rotating seat enables driver to always be seated in travel direction. Combined with steering on all four wheels, lockable on the rear axle, you have unique manoeuvrability with maximum precision.

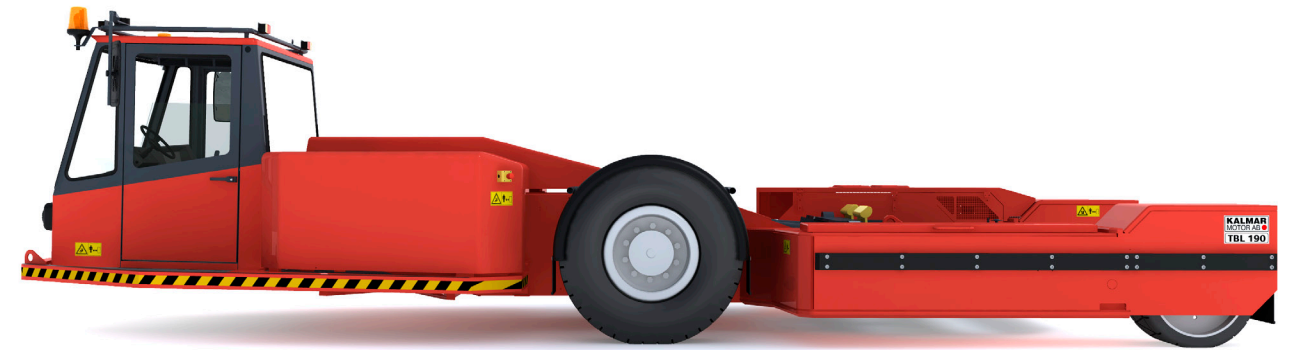


Kalmar FB 250 - Tow Tractor

Tow tractor for pushback and maintenance towing of aircraft with takeoff weights up to 250 tonnes. Diesel engine, Power Shift transmission and 4 wheel drive. Tractive effort 160 kN.

Hydraulic suspension system with comfort equal to that of a passenger car.

The cab can be raised and lowered. The entire drivers console rotate for shunting in both directions without adjustment of the tow bar. Steering on all four wheels ensures optimal manoeuvrability, and the lockable steering on the rear axle improves precision.



Kalmar TBL 190 - Towbarless Tractor

A powerful tractor for pushback and high-speed towing of aircraft with takeoff weights up to 300 tonnes, from Embraer 170 to B777/A340. Docking is executed without moving the aircraft. The suspended cab can be raised and lowered, and the driver's console with instrumentation and controls can rotate.



Kalmar TBL 180 - Towbarless Tractor

An efficient tractor with low maintenance costs, for pushback and intergate towing of aircraft ranging in size from Fokker 70 to B767/A300. Docking is executed without moving the aircraft. The maximum NLG weight is 23,000 kg. The tractor has Kalmar Motor's unique suspension system and a first-rate working environment with a rotating driver's console.



Kalmar TBL 50 - Towbarless Tractor

Tow tractor for pushback and maintenance towing of commuter aircraft such as ATR, Dash 8, Embraer, Saab, CRJ etc. Docking is executed without moving the aircraft. New technology in the cradle, with F.A.C.T.® force monitoring. The maximum NLG weight is 11,000 kg. The tractor has Kalmar Motor's unique suspension system and a first-rate working environment with a rotating driver's console.



HYBRID

5% DIESEL AND 95% ELECTRICITY

Kalmar Motor has developed a new hybrid drive vehicle with accessibility equivalent to that of conventional diesel drives, but at a fraction of the conventional drive operating costs, and with emissions far below what would be possible in a combustion engine, regardless of the purification technology used.

Latest contribution in the product range is an environmental friendly hybrid powered TBL, with state of the art technology. Batteries are of the latest generation Lithium-ion type and tractor regenerates power from brakes and hydraulics. Tractor can be used for a full 8-hour shift without recharge because of the high capacity batteries and low energy consumptions. Recharge is normally made from electric power line, but with a small diesel engine that automatically cuts in and charge the batteries there is no risk of being stranded.

Full power all the time

This technology is currently available on two of our tractors, the TBL 50 and the TBL 180. The powertrain is completely electric. The diesel engine will charge the batteries when needed. This means that full power is available at all times, regardless of the percentage charged.

During deceleration the electric motors function as generators charging the batteries, transforming the

aircraft moving mass into energy. Since batteries can be charged even during short stops, they are able to drive the tractor the majority of the time.

As the diesel engine is used only to produce electricity, it can be driven at a constant rotation speed, optimized for the best fuel economy and efficient exhaust purification.

Field proven and ready to go

With the experience from use in Scandinavian summer and winter conditions, these tractors match the accessibility of our diesel-driven equivalents. The diesel engines run an average of five percent of a shift, while during the remaining 95 percent of the time, the tractors operate on electricity.

Electric powered tractors not only improve the environmental profile of the airport, but also save money, as electricity is cheaper than diesel. In addition, since they don't produce emissions, they can be driven indoors.



- 1 Cabin can be raised and lowered.
- 2 Rotating seat and controls. Driver always facing forward.
- 3 Center positioned driver gives excellent visibility and safe control.
- 4 Steering on all four wheels for tight corners, plus lockable steering on rear axle, for maximum precision.
- 5 Instruments are grouped on a monitor in front of the driver. It has space for images from two cameras that monitor critical angles.
- 6 Axles and cabin have hydraulic suspension and the driver's seat has air suspension.
- 7 Unique Power Control System enable safe handling of all aircraft types.



- 1 Attachment can be done without having to lift or move the plane.
- 2 F.A.C.T.® force monitoring. Patented technology monitors the load on the plane during towing.
- 3 Electric system with the latest CAN bus technology for easier service and better accessibility.
- 4 Simple design with the help of cutting edge technology results in greater accessibility and shorter down-time for service.
- 5 Direct drive automatic transmission ensure smooth operation and long lasting performance.
- 6 Advanced hybrid drive with LiFePO4 batteries comes as an option.
- 7 Rotating seat and controls. Driver always facing forward.
- 8 Center positioned driver gives excellent visibility and safe control.
- 9 Instruments are grouped on a monitor in front of the driver. It has space for images from two cameras that monitor critical angles.
- 10 Unique cabin suspension give a supreme comfort and safety.

TRACTORS AND AIRCRAFT TYPES

Saab 340				
Dash 8/100-300				
Fokker 50				
CRJ 200				
ERJ 145				
Saab 2000				
ATR 47/72	TBL 50			
Dash 8/Q400				
CRJ 700-900				
BAE146/Avro70-100			FB 150	
Fokker 28/70/100				
ERJ 170				
ERJ 190				
DC 9				
MD 80				
MD 90				
B737		TBL 180		
A318-321			TBL 190	
B727				
B757				
A310				
A300				
B767				FB 600
DC 10				
A330-A340/300				
MD 11				
B777				
A340/600				
B747				
A380				

Recommendation only! For more details, contact Kalmar Motor.

WASTE TIME MACHINE

Air traffic continues to increase, with more and more planes taking off and landing on existing runways. Each plane in the wrong place or being towed reduces the capacity of the entire airport. That's why aircraft tugs have never been as important as they are today.



Examples of customers who use our products



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HOURS
A DAY **365**

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