LIFTMAK

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SPECIFICATION OF LIFTMAK MODELS LMFTC 8000/12000/15000/18000 TRUCK MOUNTED HYDRAULIC TELESCOPIC CUM ARTICULATED FOLDABLE CRANES

SCOPE & SALIENT FEATURES

Liftmak LMFTC 8000/12000/15000/18000 fully hydraulic and foldable cranes, built in India at ISO 9001:2000 certified Liftmak works in Gurgaon, India, offer unmatched utility and operational flexibility. Some of the applications are –

- Handling stores/materials self-loading them on truck, since the crane occupies only 1.50-1.70m lateral space on the truck chassis. The precise inching control of the crane makes it possible to position any load, say for example, transformer on pole with ease.
- Handling poles. As an option we can offer a special pole grab, which can assist in erection of the poles
- Log handling with log grab. The grab has a hydraulic rotator to position grab as required.
- Desilting of open drains with grab/clamshell. Clamshell is perforated to allow water to drain out, while retaining silt in the grab/clamshell.
- Drilling holes with hydraulic auger
- Overhead access of street lights/any elevated point, requiring access by man, with manlift basket.

Action photographs of Liftmak **LMFTC 8000/12000/15000/18000** hydraulic foldable cranes are as under. Kindly note that most customers have opted for mounting of crane at rear end of vehicle as rear mounting offers superior clear outreach (closer approach to load); however, there is no difficulty in mounting it behind drivers cabin, if so desired.

Above: Crane in folded position. Note that crane takes only 1.55m lateral space of chassis for mounting, leaving adequate space on truck body for 'self-loading'

Right: Crane with telescopic booms extended, boom raised and all 4-outriggers deployed. Note operator seated in comfort on seat mounted in elevated position on slew column for commanding visibility of hook irrespective of boom position Crane featured has max horizontal reach/height 9.5m/11m respectively

Note: The design featured above has now been improved with an in-line boom geometry as illustrated on pages 3 & 4

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Liftmak crane handling cable drums at JVVNL Jaipur

Liftmak crane handling transformer at JVVNL Jaipur

Liftmak LMFTC12000 crane lifting moment 12TM with two telescopic extensions. Note features of the crane:

- **Articulated cum telescopic booms**
- **Hydraulic winch**
- **4-point outriggers, with hydraulic out & hydraulic down movement**
- **Crane featured above has a reach of 10m**

Liftmak LMFTC8000 truck mounted hydraulic foldable crane handling poles

Note: The design featured above has now been improved with an in-line boom geometry as illustrated on pages 3 & 4

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Our customer list of similar hydraulic foldable truck mounted cranes exceeds 100 nos., making us the undisputed market leader in this field, in India. In India, we are the leading manufacturer of this product segment by virtue of the largest number of installations and most advanced design. Our superior product has been well received in the country. Prominent users include power distribution organisations, construction companies and central government organisations.

A few action photographs are as follows –

Observe above, the crane in transport position, where it is folded within 1.5m lateral space of the chassis, with outriggers flushed within body width of vehicle. Notice the in-line boom geometry, where the crane booms fold in between the twin columns over the slew

Below, you can perceive the long reach of the telescopic booms in fully extended position and all 4-outriggers positioned. The outriggers have hydraulic-out as well as hydraulic-down movement. You can see that the operator is seated comfortably on elevated operator seat fixed on slew column, from where the operator has full visibility of hook and load at all times.

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The pictures below show the following –

- ➔ Hydraulic wing body in partially opened position (right photos) and in fully opened position (left photos)
- ➔ The right photos clearly bring out the in-line boom geometry of Liftmak crane. The in-line boom geometry makes the crane robust and there are no off-centre loads as in case of other designs where all the booms of the crane are not in-line with slew centre
- ➔ The photographs show the crane handling load at full height with all booms in extended position.

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DESIGN CONCEPT

The design concept of hydraulic foldable knuckle boom crane requires the crane to occupy limited lateral space of the truck chassis on which it is to be mounted so as to allow the truck to be used as a goods carrier. The crane should fold on side of the vehicle in stowed position.

Conventional knuckle boom crane designs have the following design limitations, which Liftmak has overcome, to offer a no-compromise solution. The salient design concepts are as under:

Desired feature	Conventional hydraulic foldable knuckle boom crane design	Liftmak hydraulic foldable knuckle boom crane design
Slew: Should be continuous, unlimited and endless in both directions. All straight telescopic boom cranes have unlimited slew, which is essential.	**Slew:** It is limited to cover one circle (360°) plus some angle of overlap. In other words, angle of rotation is say 380°-400°. This means that once the angle of rotation has been completed, the crane has to be slewed in the opposite direction. This is a compromise and makes load handling difficult and sometimes impossible, if there is any obstruction on one side of vehicle/crane and if other vehicles are plying in the same area where crane is deployed. Limited slew has no advantage – however its disadvantages are obvious.	**Slew:** Liftmak crane has continuous, unlimited and endless slew in both directions. No compromise.
Boom geometry: All booms should be harmoniously in-line with the slew center when viewed from the top (i.e., in the vertical axis). This is so obvious and apparent that in fact it should not require to be stated. All truck/tractor mounted and self-propelled cranes have their booms in-line with the slew center, as they ought to be.	**Boom geometry:** Conventional designs have off-set boom geometry, ostensibly for the reason that unless the booms are offset with respect to each other, the crane cannot be folded on side. The off-set booms create off-center twisting load over slew system and represent a permanent potential structural weakness at the hinge point, where the booms become misaligned. The only reason why conventional foldable, knuckle-boom cranes have off-set booms is because of a design limitation, which erroneously leads the manufacturers to believe that unless they make a compromise on this account, the crane cannot be folded. Off-set booms have no advantage – however, its disadvantages are more than evident.	**Boom geometry:** Liftmak cranes have an in-line boom geometry. This is made possible by designing the crane so as to fold the booms in between the twin columns erected over the slew. Apart from making the design harmonious and robust, the twin main boom lifting cylinders (instead of a single cylinder in case of conventional design), add to safety as each of the cylinders can individually take the full load of the crane. No compromise.

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A pictorial explanation of the difference of crane with in-line booms vs off-set booms is as under:-

This photograph shows foldable crane with off-set boom geometry. This has the following drawbacks –

1. The hinge point (the point where the booms become misaligned) is an inherent structural weakness, since a side-ways twisting moment is applied there &
2. the final load at boom end is off-center with respect to the main boom and slew center resulting into unnecessary stresses on slew

Offset boom geometry offers no advantage; it only has disadvantages.

This photograph shows Liftmak crane with in-line boom geometry and is the same as per supplies made to DGS&D

The in-line design is clearly and evidently far more robust and a 'natural' design as contrasted with the offset boom design shown above. All straight telescopic cranes have an in-line boom geometry.

In the in-line design, the booms of the crane fold in between the twin columns over the slew column.

Also, this design has two cylinders to lift main boom as against only one cylinder in case of the crane with offset boom design, as can be seen below

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Desired feature	Conventional hydraulic foldable knuckle boom crane design	Liftmak hydraulic foldable knuckle boom crane design
Crane control: From top seat, elevated at slew column, so that the operator, seated in comfort, rotates with crane and observes hook from a high vantage point. All straight telescopic boom cranes, truck mounted, tractor mounted or self-propelled, have a similar arrangement	**Crane control:** Duplicated on sides of vehicle/truck. The operator has to stand on the ground to operate the crane, requiring an assistant to continuously signal boom movement, as the operator may not be able to see the hook, as he is standing on the ground (which also leads to rapid fatigue). When the crane booms are slewed on the opposite side of the vehicle, the operator has to stop crane operation, walk across to the opposite side of truck and then recommence crane operation, with whatever limited visibility he has.	**Crane control:** From top seat, elevated at slew column, so that the operator, seated in comfort, rotates with crane and observes hook from a high vantage point. No compromise.
Outriggers/Stabilizers: 4 nos., with hydraulic-out and hydraulic-down movement, with sufficient power and stroke to take full load of truck and load to be lifted. In other words, wheels of truck should lift off ground, when crane is being operated.	**Outriggers/Stabilizers:** 2 nos., invariably with mechanical pull-out and only hydraulic down movement. Disadvantages are obvious. By transferring load to vehicle, a side-wise twisting load is transferred to chassis frame (for which it is not designed), making it probable that eventually, chassis frame may weaken and crack.	**Outriggers/Stabilizers:** 4 nos., with hydraulic-out and hydraulic-down movement, with sufficient power and stroke to take full load of truck and load to be lifted. No compromise.
Winch: Required to lift load vertically, as derricking movement of booms (which moves in an arc) causes loads to swing dangerously. All straight boom cranes, even the previous generation electro-mechanical cranes have a winch. What is a crane without a winch?	**Winch:** Not available	**Winch:** Provided. No compromise.
Single push button electronic auto-levelling system (optional): This system ensures that the vehicle is leveled automatically, with a single push of a button/switch, thereby eliminating human error. In case vehicle is not leveled before crane is put to use, it can create instability and may result in toppling of the truck mounted crane.	**Single push button electronic auto-levelling system (optional):** Not available. Conventional designs provide only a spirit level indicator, which though theoretically adequate, is difficult to use, since operator's impatience does not practically ensure that vehicle is levelled before use.	**Single push button electronic auto-levelling system (optional):** Provided by us if opted by the customer. In fact, we can offer, as optional, further enhanced safety systems, such as a graphic display panel indicating load, reach, height etc., if so desired by our customers. Radio remote control for crane operation can also be provided by us to operate the crane. No compromise.

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SALIENT FEATURES

Salient features of Liftmak LMFTC hydraulic foldable truck mounted knuckle-boom cranes are as under:

➔ **Fully hydraulic >** All functions of our crane are fully hydraulic. The hydraulically operated functions are –

- Unlimited, endless, continuous full circle (and beyond) slew in both directions
- Derricking – i.e. lifting of main boom
- Dipper boom, for precise load location
- Telescopic booms
- Hydraulic winch
- All four outriggers. Both out & down movements of the outriggers/stabilizers are hydraulically operated

Being fully hydraulic, loads can be located and positioned with inch by inch accuracy and precision.

➔ **Self-loading design >** Our crane fully folds when not in use leaving entire deck/body of truck free for 'self-loading'. This feature enables you to transport materials on the same chassis on which the crane is mounted, thus enhancing the utility of the equipment. The crane booms fold in between the twin columns over the slew; i.e. an in-line boom geometry, unlike outdated designs which have off-set booms. Offset booms create off-center load on boom/slew and moreover a permanent potential structural weakness the point where booms are offset with respect to each other.

➔ **Unlimited continuous slewing range in both directions >** Our crane has unlimited endless slew in both directions, making load location easy, even in multi-task handling. This feature is a significant improvement as compared to conventional designs, which offer limited slew of 380-400 degree, making load handling difficult and sometimes impossible in area of overlap (near locking zone)

➔ **Elevated controls on slew column >** Our crane incorporates elevated controls on slew column and placed ergonomically near the operators seat. This allows the comfortably seated operator to have full visibility of hook and load at all times, irrespective of crane position. Many conventional designs offer compromised control at ground level, where operator has to stand on ground for crane operation.

➔ **Safety devices >** Liftmak **LMFTC** cranes are equipped with the following safety features to ensure safety exceeding standards specified in IS 4573/1982 –

- ✓ Automatic overload cut off with audio-visual alarm
- ✓ Load holding valves in all cylinders to lock movement in case of hose failure
- ✓ Outrigger to boom and boom to outrigger interlock* (*manual lever control) to ensure that crane cannot be operated unless outriggers are deployed and vice-versa
- ✓ Limit switch to prevent overhoisting of winch beyond desired level
- ✓ Hand operated pump for stowing crane and lowering load safely in case of engine/main pump failure
- ✓ Optional single button outrigger auto-levelling system, to level vehicle up to an accuracy of 0.5 degrees. Auto-levelling eliminates possibility of human error for levelling of the vehicle before the crane is operated.
- ✓ Optional graphic display indicating load, extension and height
- ✓ Optional load indicator at hook
- ✓ Optional radio control for crane operations by remote control
- ✓ Optional manlift basket at boom end for use of crane as access platform

TRUCK CHASSIS

Liftmak model **LMFTC 8000/12000/15000/18000** cranes are mountable on any MMV/HCV chassis having a wheel-base exceeding 3750mm as specified in the table on page 10

Mounting of the crane is feasible either at rear end of the vehicle (preferable as it offers better clear outreach) or behind drivers cabin of the vehicle (suitable in case materials having long length are to be self-loaded on the truck body, such as long girders, poles etc)

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POWER SUPPLY

Power for the hydraulic crane is provided by a hydraulic pump driven from chassis power take off unit only. The pump is of ample and sufficient output for normal smooth operation of the crane with low engine speed.

Hydraulic reservoir is incorporated in the main frame and hydraulic circuit is fully protected by efficient filters.

Pump and motor is of reputed make such as Dowty, Vickers, Danfoss or equivalent

HYDRAULIC HOSES

The hydraulic hoses are located so that they do not interfere with the movement of the crane, booms etc. Make of hoses offered is Dunlop/Swastik/Superseal or equivalent.

STRUCTURE

The booms are made from MS structural steel of good quality. Telescopic boom (as offered) sections are rigid, reinforced box section. All fabricated sections are rust inhibited from the inside while the exterior surfaces are pretreated and finished to give a glossy look.

STABILIZERS

Four hydraulic-out and hydraulic-down stabilizers, hydraulically powered, are provided, two at rear & two in front. Each of the stabilizers is operated independently, to allow levelling on uneven ground. Suitable level indicators are provided to check the level, both along the length as well as along the width of the chassis/vehicle.

When stowed, no part of the stabilizers protrude beyond the chassis

Suitable manually operated interlocks are provided to ensure that the stabilizers cannot be retracted until crane booms are stowed and also to ensure that booms cannot be operated until stabilizers are deployed.

As an option, a single push-button outrigger auto-levelling system is available, which automatically commands the outriggers to level the vehicle. The auto-levelling mechanism eliminates the possibility of human error in leveling the machine. Levelling of the vehicle before use is most important, to prevent the possibility of accident/toppling.

HYDRAULIC CYLINDERS

All crane motions are performed either by double acting hydraulic cylinders or hydraulic motors with automatic brake.

- The cylinder tubes are of ST52, cold drawn seamless tubes conforming to DIN 2391, having H8 tolerance and surface roughness Ra0.2 microns
- The piston rods are of CK45, hard chrome plated and ground steel rods having minimum 20 microns hard chrome plating and surface roughness Ra0.2 microns and corrosion resistance NSS ISO 3768 & ASS/ISO3769
- Piston glands are from EN8
- Seals are of Bushak, Shamban
- U-cup seal are of Polyurethane
- Hoses are tested to twice rated pressure and the bursting pressure shall be at least four times the rated pressure.

SLEWING

The hydraulic foldable crane models **LMFTC 8000/12000/15000/18000** are designed for continuous slewing by a high torque, low speed motor, through reduction gear box up to and beyond 360° in either direction – continuous, unlimited. Slewing speed is precisely controlled by using fine restrictors in the circuit.

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PERSONNEL CAGE/MANLIFT BASKET (OPTIONAL)

A special designed reinforced fibre-glass basket of size 1.1x0.7x1.1M approx. is provided. All attachment points are bonded to withstand most arduous use. The non-slip floor with drain holes is provided to give the operator safe working condition. The basket is insulated to withstand 600 volts, even though the platform is not to be used on live line. The basket is designed to carry a safe working load of 200 kgs. The hydraulic platform design is such that entry and exit into/from cage is easy. The cage is leveled by gravity, suitably stabilized by cylinders. Controls of the basket are at crane control station located at slew column.

CRANE CONTROLS

The hydraulic controls for all functions (except outriggers) are at top seat on slew column. This enables operator to have full visibility of load at all times. All control levers shall be self-centering and hooded for protection against accidental operations. A hand pump permitting lowering of the boom is provided at the base in case of vehicle engine/electrical system failure. The stabilizer controls are provided only at base, at rear of vehicle.

TECHNICAL SPECIFICATIONS

S.No	PARTICULARS	UNIT	MODEL LMFTC 8000	MODEL LMFTC 12000	MODEL LMFTC 15000	MODEL LMFTC 18000
1.	Lifting Moment	T x M	8.0	12.0	15.0	18.0
2.	Maximum standard reach with hydraulic extensions	MM	9500	9500	9500	9500
3.	Maximum optional reach with hydraulic extensions	M	Up to 11.0 10.0/10.5/11.0	Up to 11.0 10.0/10.5/11.0	Up to 12.0 10.0/10.5/11.0 11.5/12.0	Up to 12.0 10.0/10.5/11.0 11.5/12.0
4.	Lifting Capacity at max. standard reach of 9500mm	KG.	845	1265	1500	1800
5.	Max. height under hook above installation level	MM	10000	10000	10000	10000
6.	No. of hydraulic stabilizers	No.	4	4	4	4
7.	Slew Range – both directions	degrees	360°+ continuous, unlimited, endless	360°+ continuous, unlimited, endless	360°+ continuous, unlimited, endless	360°+ continuous, unlimited, endless
8.	Max. Height – Stowed (from installation level)	MM	2450	2750	2750	2750
9.	Stabilizers width stowed	MM	2200	2500	2500	2500
10.	Stabilizer width extended	MM	4300	4300	4300	4300
11.	Chassis G.V.W recommended	KG.	11000	16000	16000	16000
12.	Mounting space needed (either behind cabin or at vehicle rear)	MM	1500	1500	1700	1700

Note: In view of the constant developments and improvements, specifications are subject to change without notice.

- Other standard models available are LMFTC7500 (7.5TM), LMFTC25000 (25TM), LMFTC30000 (30TM).
- Hydraulic Winch is offered as standard on the above models (can be deleted if not needed).
- Additional Hydraulic / Manual extensions can be provided as optional extra.
- Controls are provided with elevated operators seat on the slew column.
- Optional:
  * Single button electronic auto-levelling of outriggers to level vehicle automatically
  * Load indicator at hook
  * Graphic display panel at crane control station indicating load, moment, reach
  * Grab, clamshell, log grab, pole grab, auger, manlift basket