HEAVY LIFT TRUCKS 33 – 50 TONNES

TECHNICAL INFORMATION KALMAR DCE330, DCF370-500, DIESEL

INTRODUCTION

Welcome to a new world of heavy-duty handling

The old trendsetter of the world, the Kalmar heavy-duty lift truck has, in our new series, got so much more than a simple facelift. We talk about an entirely new machine based on long experience and smart utilisation of the lastest technology. A machine loaded with customer value.

The heavy-duty lift trucks have been developed for a broad spectrum of heavy handling applications. Very strong emphasis has been put on providing our customers, not only a machine, but productivity and cost efficiency.

This is a machine generation which reflects the overall increased demands and requirements among our customers all over the world.

The Two basic elements in heavy-duty handling.
Based on our experience from more than 10.000 predecessors operating worldwide, the new Kalmar has gone through an aggressive product development, where we have scrutinised and improved every detail, component and system.

We have learnt that demanding customers have two main priorities when it comes to machine choice and decision – productivity and cost efficiency. All other aspects are there to fulfil these priorities and add even more customer value.

When appropriate simple technical solutions were available we applied them, and when the need was for more sophisticated systems we installed them to increase your productivity and cost efficiency.

And there is of course, exciting new leveraging technology under the skin in order to provide the best everyday performance and availability.

Finally, the technical optimisation of the new Kalmar series means that you will get the best technology available but still have the feeling of having a reliable, simple, safe and hard working machine.

This is what it's all about. But of course you have to add "at the lowest operational cost possible".

ERGONOMICS

Made for top performance in heavy-duty handling

To obtain the maximum out of your investment, you can never underestimate the importance of the drivers' working environment. High productivity requires full driver concentration and efficiency to keep up handling speed, but also to avoid accidents causing injuries and costly damages.

This is what ergonomics is all about. Being comfortable and aware.

The driver environment in Kalmar Heavy Lift Trucks is the efficient Spirit Delta high visibility cabin; appreciated by professional drivers, proven on thousands of Kalmar medium heavy lift trucks and container handlers all over the world.

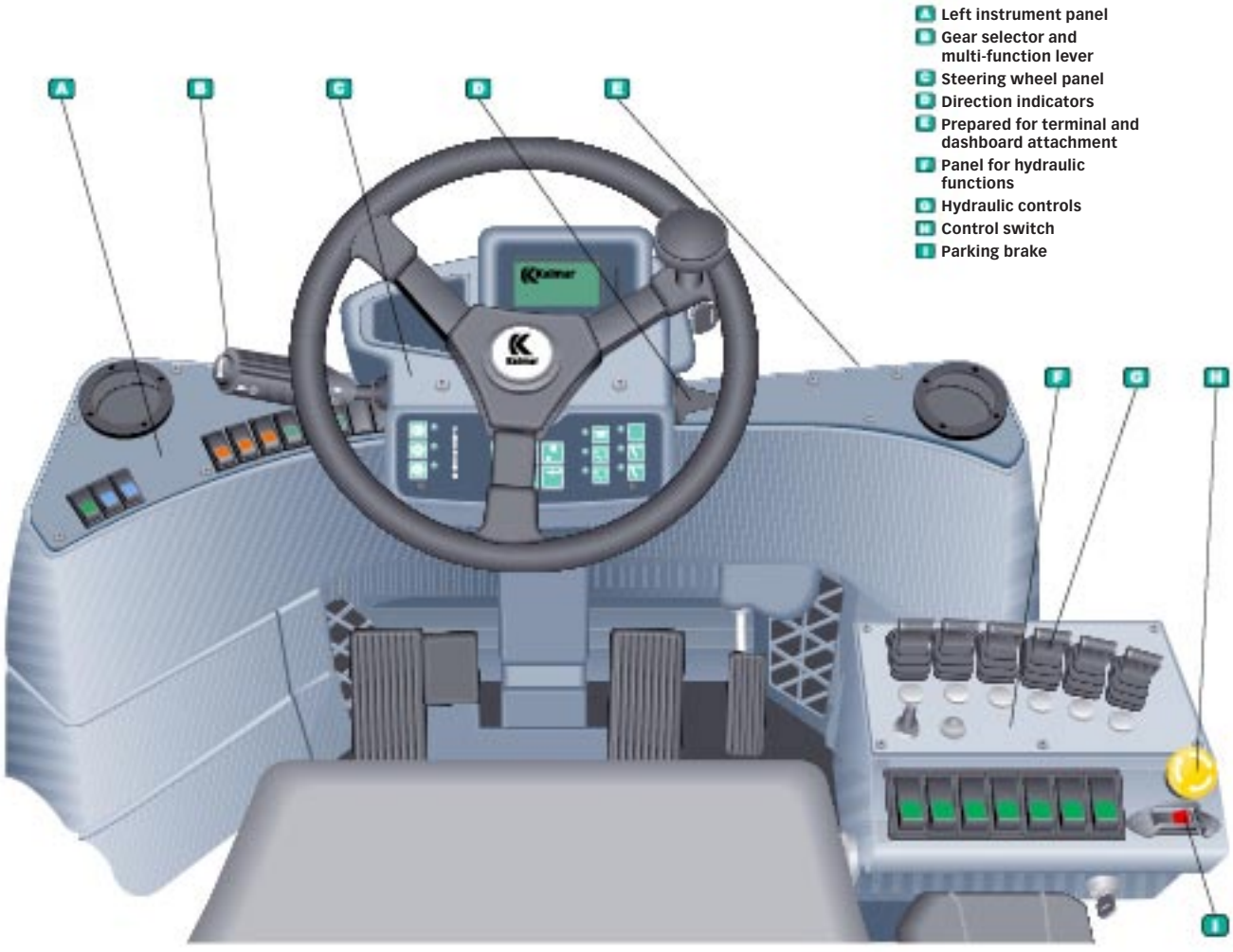
We focus on four important ergonomic areas:

- Operation
- Visibility
- Sound and vibrations
- Climate

The result is a cabin where everything is optimised to improve driver performance.

Consider this:

- Individually adjustable controls, steering wheel and seat.
- Intuitively positioned instruments.
- Switches and buttons with lights.
- Comfort pedals.
- Electronic accelerator.
- Central operation/warning display.
- Separately suspended and isolated cabin.
- Shock absorption to minimise vibrations.
- Maximum sound level inside is 70 dB (A).
- Generous interior dimensions and floor space.
- Optimised visibility – 360˚ all around.
- Electronically controlled heating/ventilation.
- Filters for fresh air and recirculation.
- High performance air conditioning system, optional.
- Pollen filter, optional.



CAPACITY AND DIMENSIONS

Match your specific handling requirements

When we designed the new Kalmar series we already knew the detailed status of all the main alternatives on the market. Hence, we designed a machine which meets or exceeds the specifications of the others – on the spec sheet and in reality.

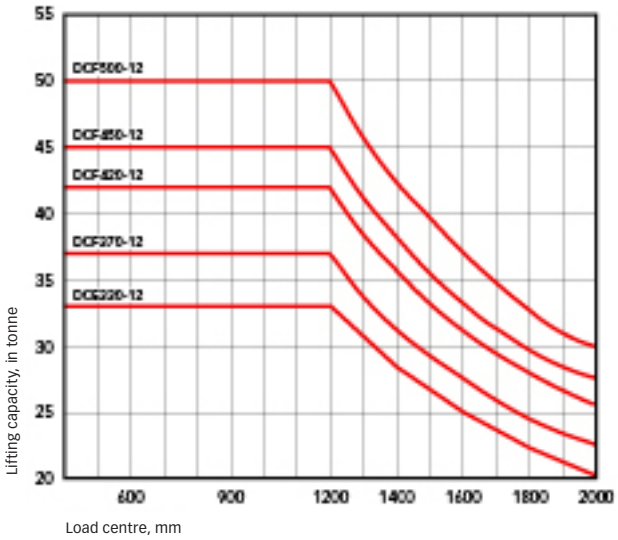
You can choose between several basic models, each optimised according to lifting capacity – stability – overall dimensions – weight – and driving performance.

Four models covering loads between 37 – 50 tonnes, specified for a comprehensive range of lifting heights at 1200 mm load centre, including the side-shift/fork positioning carriage. This means that you may easily find the right machine or combination of machines to suit your operational requirements.

The design of the chassis, mast and carriage has resulted in machines with very good dimensional-, stability- and operational characteristics.

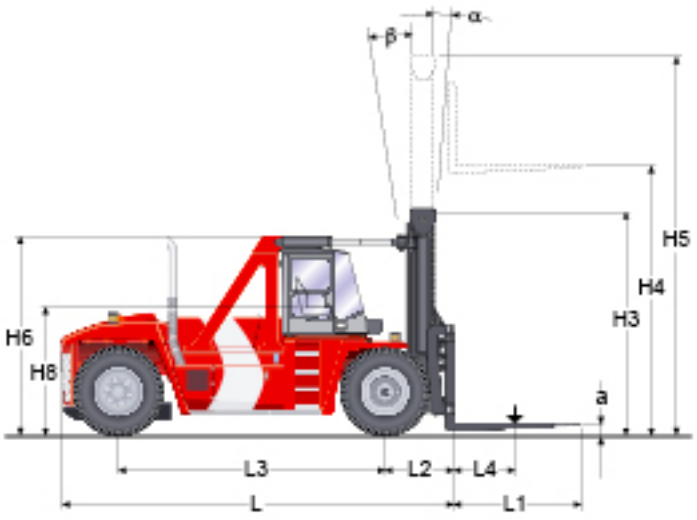
In spite of its size and capacity the machines have short turning radius. Together with the optimised visibility and good manoeuvrability, it saves site space and makes the machine a smooth operator in confined spaces. The counterweight and lifting height requirements have been matched with a modern chassis to keep down the overall weight but with no sacrifice in stability.

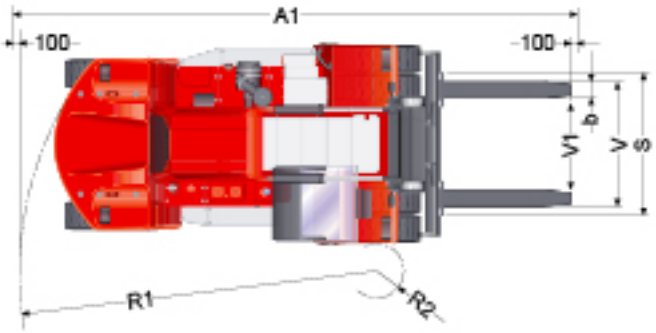
Additionally, we have ensured that every single detail, component and system have been selected and manufactured to provide the highest possible reliability.



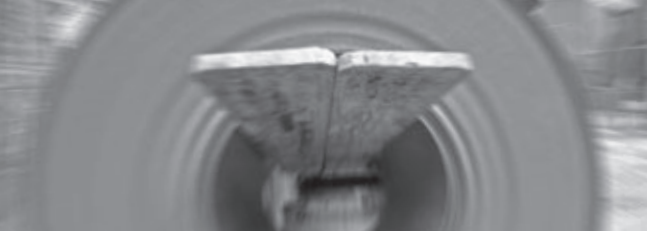
DCE330, DCF370-500 models: Full lifting capacity up to 5000 mm lift height with duplex/duplex freelift masts and integrated sideshift/fork positioning carriage.

Dimensions				
Lifting	Lift capacity	Rated – At max. lifting height		kg
		Load centre	L4	mm
Dimensions	Truck	Length, without forks	L	mm
		Width	B	mm
		Height, basic machine	H6	mm
		Seat height	H8	mm
		Distance between centre of front axle – front face of fork arm	L2	mm
		Wheelbase	L3	mm
		Track (c-c), front – rear	S	mm
		Turning radius, outer	R1	mm
		Turning radius, inner	R2	mm
		Ground clearance, min.		mm
		Max. height when tilting cab	T1	mm
		Max. width when tilting cab	T2	mm
		Min. aisle width for 90° stacking with forks	A1	mm
	Standard duplex mast	Lifting height	H4	mm
		Mast height, min.	H3	mm
		Mast height, max.	H5	mm
		Mast tilting, forwards – backwards	α – β	°
		Ground clearance, min.		mm
	Forks	Width	b	mm
		Thickness	a	mm
		Length of fork arm	l	mm
		Width across fork arms, max. – min.	V	mm
		Sideshift ± at width across fork arms	V1 – V	mm
Weight	Service weight			kg
	Axle load front	Unloaded		kg
		At rated load		kg
	Axle load back	Unloaded		kg
		At rated load		kg
Wheels, brakes and steering	Wheels/tyres	Type		
		Dimensions, front – rear		inch
		Number of wheels, front – rear (*driven)		
		Pressure		MPa
	Steering system	Type – manoeuvring		
	Service brake system	Type – affected wheels		
	Parking brake system	Type – affected wheels		
Misc.	Hydraulic pressure	Max.		MPa
	Hydraulic fluid volume			l
	Fuel volume			l





	DCE330-12	DCE330-12LB	DCF370-12	DCF420-12	DCF450-12	DCF500-12
	33000 – 33000	33000 – 33000	37000 – 37000	42000 – 42000	Model under construction	Model under construction
	1200	1200	1200	1200		
	6925	6925	7345	7845		
	3410	3410	4150	4150		
	3650	3650	3725	3725		
	2300	2300	2350	2350		
	1125	1125	1295	1295		
	4750	4750	5000	5500		
	2540 – 2440	2540 – 2440	3030 – 2600	3030 – 2600		
	6600	6600	6900	7400		
	950	950	1000	1100		
	300	300	300	300		
	3800	3800	–	–		
	3850	3850	–	–		
	10325	10325	10795	11295		
	5000	5000	5000	5000		
	4520	4520	5060	5060		
	7020	7020	7560	7560		
	5 – 10	5 – 10	5 – 10	5 – 10		
	–	–	–	–		
	300	300	300	300		
	110	110	110	110		
	2400	2400	2400	2400		
	2750 – 1550	2750 – 1550	2750 – 1950	2750 – 1950		
	300 – 2150	300 – 2150	200 – 2350	200 – 2350		
	41950	41950	49300	51900		
	19950	19950	25500	27400		
	69600	69600	81000	88600		
	22000	22000	23800	24500		
	5350	5350	5300	5500		
	Pneumatic	Pneumatic	Pneumatic	Pneumatic		
	16.00×25 – 16.00×25	16.00×25 – 16.00×25	18.00×25 – 18.00×25	18.00×25 – 18.00×25		
	4* – 2	4* – 2	4* – 2	4* – 2		
	1,0	1,0	1,0	1,0		
	Servo assisted – Steering wheel					
	Wet disc brakes – Drive wheel					
	Spring brake – Drive wheel					
	17,0	17,0	15,0	17,0		
	600	600	600	600		
	400	400	400	400		



LIFTING PERFORMANCE

Versatility provides productivity

The standard lifting equipment of Kalmar is an integrated assembly consisting of a free visibility duplex mast, side-shift/fork positioning carriage and forks, hydraulics and control system. This is to ensure you get a reliable and good running machine with high availability even after long shifts and high load stresses in general cargo handling.

A major objective in the development process has been to combine optimum functionality for the driver together with high performance in lifting and load handling.

The mast and carriage are computer designed and optimised (FEM and Catia V5) which allowed for a decrease in the front axle weight. Together with Kalmar's integrated high capacity carriage it allows you to fully utilise the capabilities of mast tilt, side-shift at full lifting height and full capacity. No compromises.

Full visual contact with the load and attachement, is provided by the Spirit Delta cabin and the open design of the mast and carriage.

Due to the wide range of optional equipment the machines can be equipped with a lifting equipment adapted to almost every application.

Mast		DCE330			DCF370-420			DCF450-500		
	Lift-height	Mast height		Free-lift	Mast height		Free-lift	Mast height		Free-lift
	H4	Min. H3	Max. H5	H2	Min. H3	Max. H5	H2	Min. H3	Max. H5	H2
Duplex, clear view, standard	4000	4020	6020	–	–	–	–	–	–	–
	4500	4270	6520	–	4860	7070	–	5410	7620	–
	5000	4520	7020	–	5110	7520	–	5660	8120	–
	5500	4770	7520	–	5360	8070	–	5910	8620	–
	6000	5020	8020	–	5610	8570	–	6160	9120	–
	6500	5270	8520	–	5860	9070	–	6410	9620	–
	7000	5520	9020	–	5860	9070	–	6660	10120	–
Duplex, clear view, free lift	4000	4020	6020	2000	4610	6570	2000	–	–	–
	4500	4270	6520	2250	4860	7070	2250	–	–	–
	5000	4520	7020	2500	5110	7570	2500	–	–	–
	5500	4770	7520	2750	5360	8070	2750	–	–	–
	6000	5020	8020	3000	5610	8570	3000	–	–	–
	6500	5270	8520	3250	5860	9070	3250	–	–	–
	7000	5520	9020	3500	6110	9570	3500	–	–	–

Triplex mast available on request, please contact Product line Heavy Lift Trucks

1 Duplex standard mast

The Duplex mast is a well proven design which minimises the concealed angles for the driver.

2 Duplex free-lift mast

The Duplex mast is also available in a Free-lift version for certain lifting heights and models, providing full free-lift as well as exceptionally good through visibility.

1 Standard carriage
The standard fork carriage is equipped with manually adjustable steel forks made of high strength steel. The carriage is of free visibility type.

2 Carriage for steel application
As option the mast will be equipped with Kalmars hydraulically operated carriage of free visibility type. This includes sideshift, individual positioning of forks, levelling. The forks could be positioned against each other to become sort of a flexible coil ram.

1 Fork shaft system
A smooth way to improve handling flexibility is to use the fork shaft system. The system enables the driver to quick and easy change between different carriers or attachments like extra long forks, coil ram, inverted forks etc. The carriage is equipped with a separate shaft holder.

2 Coil ram
The coil ram is made for intensive handling of heavy coils, is mounted directly on the carriage and supported with a side-shift function.

3 Top-lift attachment
The container top-lift attachment is available in two fixed sizes – 20" and 40". It is used together with either standard forks or inverted forks. The hydraulics for the twist-locks is connected through quick couplings.

4 Inverted forks
The inverted forks are easily mounted on the fork shaft system. They are used as carrier for the top lift attachments. The inversion also means that the basic lifting height is maintained.

The basic set up

A key factor for heavy duty handling productivity is the basic machine set up. Heavy loads and high lifting speed, for example, put critical demands on the engine and hydraulic power support. Fast positioning during the handling cycle requires precise control with tight turning radius, effective and reliable brakes and high engine torque. Fast handling requires good stability, reliable brakes and smooth transmission.

Of course, all the working components and systems have to cope with the most demanding stresses during long shifts and heavy operations everyday.

We have put highest priority on overall technical reliability. Looking at the choice of each component, long running cycle times and how it all comes together. We have incorporated into the Heavy Lift Trucks several major components and systems from our extremely reliable DRF reachstacker. More than 1.000 of these machines have been delivered in the past few years and have proven the durability of the components and systems, and its low running costs.

1 Chassis
The frame forms the basis of the machine's lifting and manoeuvring characteristics and was designed exclusively for heavy duty operation. The beam construction, along with its width, makes the Heavy Lift Trucks stable, torsion resistant and service-friendly.

The frame is 3D modulated (Catia V5) and designed (FEM) in order to eliminate critical tensions under various kinds of strain. The mechanically welded chassis has been optimised according to strength, weight and stability.

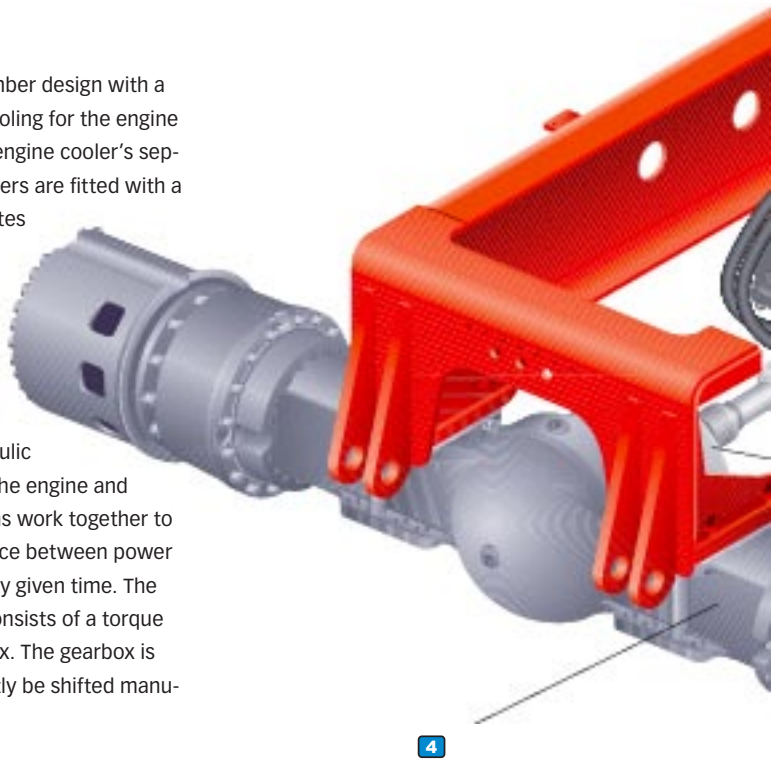
2 Engine
The Volvo engines provide power for driving and the working hydraulics. The engines are low-emission turbo diesels with fuel injectors and intercoolers. The design of the combustion chambers, along with the precise fuel injection control, ensures more efficient combustion to provide lower emissions with increased torque and power. The engines meet the Tier 3 requirements, and the sound and vibration standards.

The radiator is a 3 chamber design with a single fan to provide cooling for the engine and transmission. The engine cooler's separate expansion chambers are fitted with a level sensor that indicates low coolant level.

3 Transmission
The transmission transfers power from the engine to the hydraulic pumps and drive line. The engine and gearbox control systems work together to find the optimum balance between power and fuel economy at any given time. The transmission system consists of a torque converter and a gearbox. The gearbox is automatic, but can partly be shifted manually.

4 Drive line
The propeller shaft and drive axle transfer the power from the transmission to the driving wheels. The mountings on the propeller shaft are fitted with cross-flanges for optimum strength. The drive axle gears down in two stages, differential and hub reduction. The engine provides maximum torque at the drive wheels, which spares the transmission.

5 Steering system
The steering axle is built from a single piece of high strength steel, which means fewer parts requiring less maintenance and higher structural integrity. The suspension points on the steering axle utilise a maintenance-free plastic. The hydraulics that feed oil to the steering cylinder are optimised for enhanced driving feel. The orbitrol and the priority valve jointly provide gentle, yet precise, steering movements.



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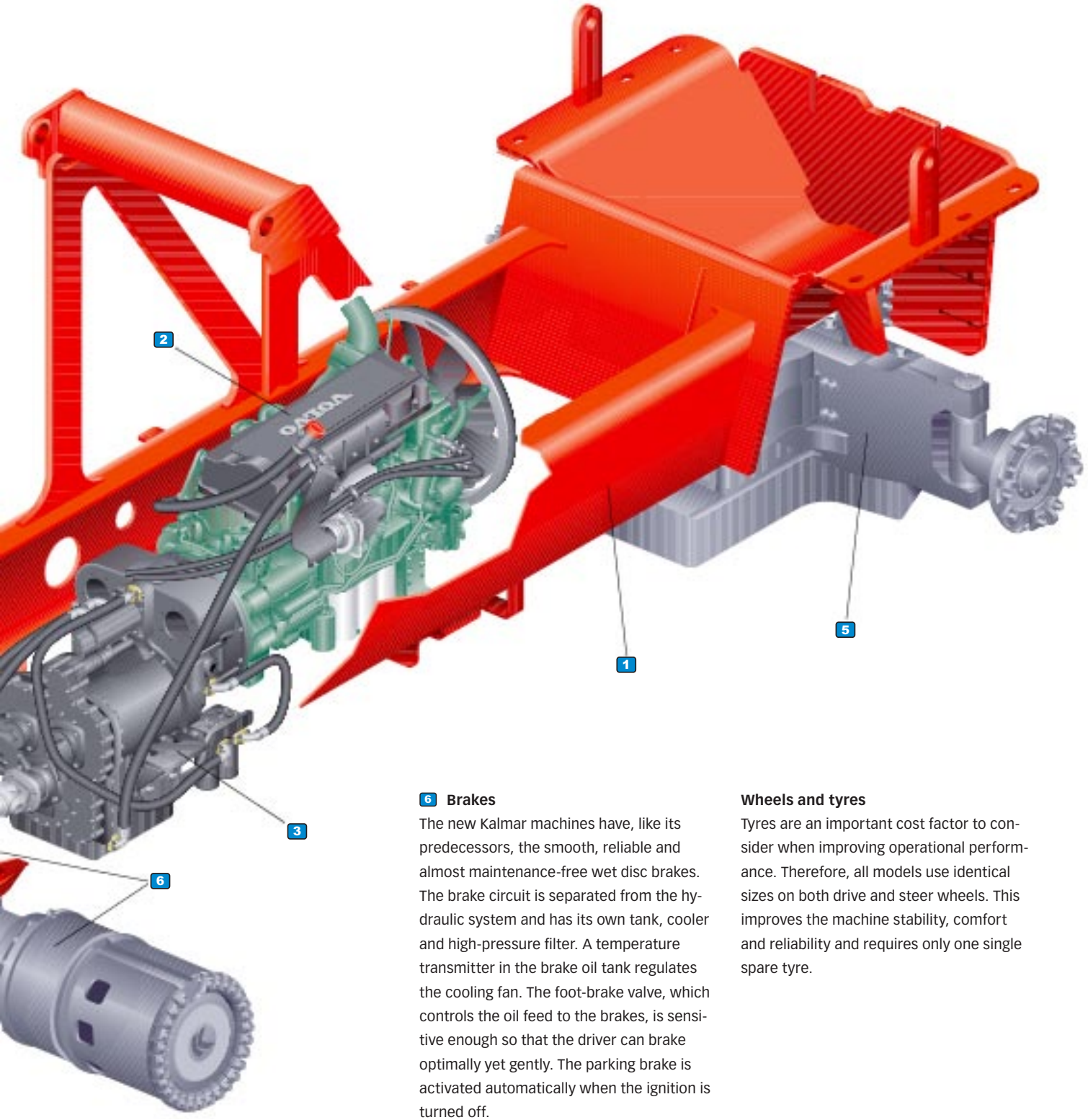


6 Brakes

The new Kalmar machines have, like its predecessors, the smooth, reliable and almost maintenance-free wet disc brakes. The brake circuit is separated from the hydraulic system and has its own tank, cooler and high-pressure filter. A temperature transmitter in the brake oil tank regulates the cooling fan. The foot-brake valve, which controls the oil feed to the brakes, is sensitive enough so that the driver can brake optimally yet gently. The parking brake is activated automatically when the ignition is turned off.

Wheels and tyres

Tyres are an important cost factor to consider when improving operational performance. Therefore, all models use identical sizes on both drive and steer wheels. This improves the machine stability, comfort and reliability and requires only one single spare tyre.

DRIVING PERFORMANCE

The basic set up is a key factor for high productivity

Standard engines					Volvo TAD760VE Dana TE17000	Volvo TAD952VE Dana TE32000	Volvo TAD1250VE* Dana TE32000
Drive train	Engine	Manufacturer – type designation			Volvo – TAD760VE (Turbo-Intercooler)	Volvo – TAD952VE (Turbo-Intercooler)	Volvo – TAD1250VE (Turbo-Intercooler)
		Fuel – type of engine			Diesel – 4-stroke	Diesel – 4-stroke	Diesel – 4-stroke
		Rating ISO 3046 – at revs	kW/rpm		180 – 2200	252 – 1900	260 – 1600 (247 – 1950)
		Peak torque ISO 3046 – at revs	Nm-rpm		1100 – 1500	1735 – 1300	1760 – 1400
		Number of cylinders – displacement		cm^3	6 – 7150	6 – 9400	6 – 12130
		Fuel consumption, normal driving		l/h	16	20	20
	Gearbox	Manufacturer – type designation			Dana – TE17000	Dana – TE32000	Dana – TE32000
		Clutch, type			Torque converter	Torque converter	Torque converter
		Gearbox, type			Powershift	Powershift	Powershift
		Numbers of gears, forward – reverse			3 – 3	4 – 4	4 – 4
	Alternator	Type – power		W	AC – 1920	AC – 1920	AC – 1920
	Starting battery	Voltage – capacity		V–Ah	2×12 – 140	2×12 – 140	2×12 – 140
	Driving axle	Manufacturer – type			AxleTech – Differential and hub reduction	AxleTech – Differential and hub reduction	AxleTech – Differential and hub reduction
	Noise level	LpAZ (inside**) Sprit Delta		dB(A)	72	72	72
		LwA (outside***)		dB(A)	–	–	–

* Optional engine on DCF370-420

Performance – DCE330-12					Volvo TAD760VE Dana TE17000	Volvo TAD950VE Dana TE17000	Cummins QSB6,7 Dana TE17000
Performance	Lifting speed	unloaded		m/s	0,35	0,35	0,35
		at rated load		m/s	0,18	0,18	0,18
	Lowering speed	unloaded		m/s	0,38	0,38	0,38
		at rated load		m/s	0,47	0,47	0,47
	Travelling speed, forward – reverse	unloaded		km/h	27,5 – 27,5	27,5 – 27,5	27,5 – 27,5
		at rated load		km/h	25,5 – 25,5	25,5 – 25,5	25,5 – 25,5
	Gradeability	Max.	unloaded	%	52,5	52,5	52,5
			at rated load	%	27,5	27,5	27,5
		At 2 km/h	unloaded	%	36,5	36,5	36,5
			at rated load	%	19,5	19,5	19,5
	Drawbar pull	Max.		kN	209	209	209

Performance – DCE330-12LB					Volvo TAD760VE Dana TE17000	Volvo TAD950VE Dana TE17000	Cummins QSB6,7 Dana TE17000
Performance	Lifting speed	unloaded		m/s	0,35	0,35	0,35
		at rated load		m/s	0,18	0,18	0,18
	Lowering speed	unloaded		m/s	0,38	0,38	0,38
		at rated load		m/s	0,47	0,47	0,47
	Travelling speed, forward – reverse	unloaded		km/h	27,5 – 27,5	27,5 – 27,5	27,5 – 27,5
		at rated load		km/h	25,5 – 25,5	25,5 – 25,5	25,5 – 25,5
	Gradeability	Max.	unloaded	%	52,5	52,5	52,5
			at rated load	%	27,5	27,5	27,5
		At 2 km/h	unloaded	%	36,5	36,5	36,5
			at rated load	%	19,5	19,5	19,5
	Drawbar pull	Max.		kN	209	209	209

Performance – DCF370-12					Volvo TAD952VE Dana TE32000	Volvo TAD1250VE Dana TE32000	Cummins QSM11 Dana TE32000
Performance	Lifting speed	unloaded		m/s	0,34	0,34	0,34
		at rated load		m/s	0,27	0,27	0,27
	Lowering speed	unloaded		m/s	0,22	0,22	0,22
		at rated load		m/s	0,40	0,40	0,40
	Travelling speed, forward – reverse	unloaded		km/h	24 – 24	24 – 24	24 – 24
		at rated load		km/h	20 – 20	20 – 20	20 – 20
	Gradeability	Max.	unloaded	%	35	35	35
			at rated load	%	43	43	43
		At 2 km/h	unloaded	%	35	35	35
			at rated load	%	28	28	28
	Drawbar pull	Max.		kN	379	379	379

** Noise level according to DIN 45635 part 36 *** Noise level according to 2000/14/EC

Optional engines					Volvo TAD950VE Dana TE17000	Cummins QSB6,7 Dana TE17000	Cummins QSM11 Dana TE32000
Drive train	Engine	Manufacturer – type designation			Volvo – TAD950VE (Turbo-Intercooler)	Cummins – QSB6,7 (Turbo-Intercooler)	Cummins – QSM11 (Turbo-Intercooler)
		Fuel – type of engine			Diesel – 4-stroke	Diesel – 4-stroke	Diesel – 4-stroke
		Rating ISO 3046 – at revs	kW/hp-rpm		210 – 1800	194 – 2200	261 – 2000
		Peak torque ISO 3046 – at revs	Nm-rpm		1275 – 1000-1500	990 – 1400	1830 – 1100-1400
		Number of cylinders – displacement		cm^3	6 – 9400	6 – 6700	6 – 10800
		Fuel consumption, normal driving		l/h	20	20	20
	Gearbox	Manufacturer – type designation			Dana – TE17000	Dana – TE17000	Dana – TE32000
		Clutch, type			Torque converter	Torque converter	Torque converter
		Gearbox, type			Powershift	Powershift	Powershift
		Numbers of gears, forward – reverse			3 – 3	3 – 3	4 – 4
	Alternator	Type – power		W	AC – 1920	AC – 1920	AC – 1920
	Starting battery	Voltage – capacity		V–Ah	2×12 – 140	2×12 – 140	2×12 – 140
	Driving axle	Manufacturer – type			AxleTech – Differential and hub reduction	AxleTech – Differential and hub reduction	AxleTech – Differential and hub reduction
	Noise level	LpAZ (inside**) Sprit Delta		dB(A)	72	72	72
		LwA (outside***)		dB(A)	–	–	–

Performance – DCF420-12					Volvo TAD952VE Dana TE32000	Volvo TAD1250VE Dana TE32000	Cummins QSM11 Dana TE32000
Performance	Lifting speed	unloaded		m/s	0,34	0,34	0,34
		at rated load		m/s	0,27	0,27	0,27
	Lowering speed	unloaded		m/s	0,22	0,22	0,22
		at rated load		m/s	0,40	0,40	0,40
	Travelling speed, forward – reverse	unloaded		km/h	24 – 24	24 – 24	24 – 24
		at rated load		km/h	20 – 20	20 – 20	20 – 20
	Gradeability	Max.	unloaded	%	35	35	35
			at rated load	%	43	43	43
		At 2 km/h	unloaded	%	35	35	35
			at rated load	%	28	28	28
	Drawbar pull	Max.		kN	379	379	379

Performance – DCF450-12					Volvo TAD1250VE Dana TE32000	Cummins QSM11 Dana TE32000
Performance	Lifting speed	unloaded		m/s	Model under construction	
		at rated load		m/s		
	Lowering speed	unloaded		m/s		
		at rated load		m/s		
	Travelling speed, forward – reverse	unloaded		km/h		
		at rated load		km/h		
	Gradeability	Max.	unloaded	%		
			at rated load	%		
		At 2 km/h	unloaded	%		
			at rated load	%		
	Drawbar pull	Max.		kN		

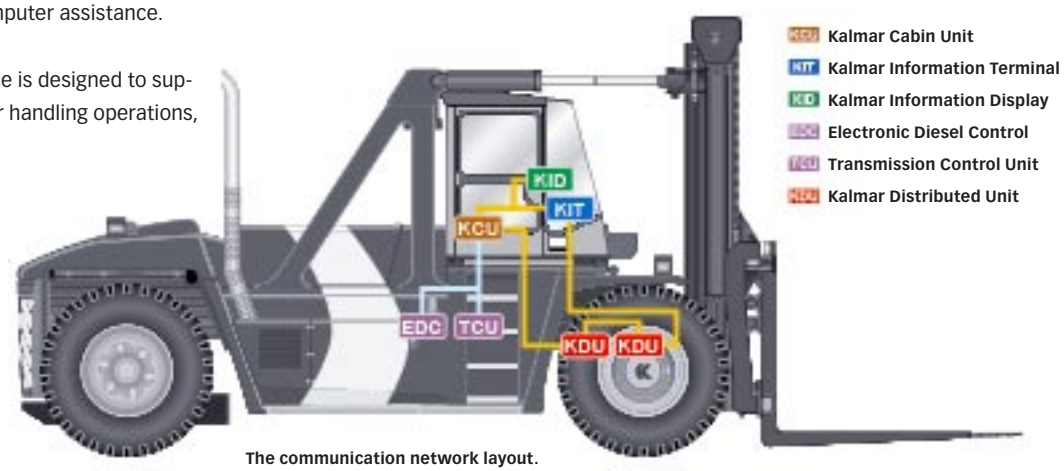
Performance – DCF500-12					Volvo TAD1250VE Dana TE32000	Cummins QSM11 Dana TE32000
Performance	Lifting speed	unloaded		m/s	Model under construction	
		at rated load		m/s		
	Lowering speed	unloaded		m/s		
		at rated load		m/s		
	Travelling speed, forward – reverse	unloaded		km/h		
		at rated load		km/h		
	Gradeability	Max.	unloaded	%		
			at rated load	%		
		At 2 km/h	unloaded	%		
			at rated load	%		
	Drawbar pull	Max.		kN		

The simple way to reach new levels of utilisation

All vehicles today – cars, highway trucks, wheel-loaders, cranes etc – are constructed with more and more sophisticated components and systems. Each part interacts closely with the others and to reach the full potential requires computer assistance.

This built-in intelligence is designed to support and leverage your handling operations, not confuse it.

The new Kalmar series posses a well proven, thoroughly tested and optimised control system, which supports your driver, mechanics and financial controller. And it is simple to use.



The communication network layout.

The reliable distributed control system.
Two things are needed for a command initiated by the driver to result in a particular function, or for several functions to work together: power supply and communication.

The power-feed supplies the machine's electrical or electro-hydraulic functions with voltage. The communication system controls and checks that the functions have been activated, waits in standby mode or indicates faults.

Communication
The distributed power-feed and communication network consists of electrical components and a microcomputer-based system for controlling and monitoring the functions.

The most important components in the network are the control units (nodes). They distribute control of the machine's functions. Each node has its own processor. The nodes integrate with each other and all communication; control signals and signal information are sent via data buses.

The nodes transmit their signals in messages on the network. Each message contains several signals and has its own address. Any units that need to know the status of a signal listen out for the address of the signal's message. All the nodes in the network listen to each other.

CAN-bus is a two-wire transfer of data and a definition of a bus type. CAN-bus technology has been chosen because it provides a reliable, robust transfer of data and is difficult to disrupt. CAN-bus loops have been used in Kalmar machines since 1995.

The greatest benefit of using CAN-bus technology is that the amount of cabling can be reduced. All that is needed to establish communication are two data-bearing leads and two leads for feeding the nodes' processors. The network loop for both the CAN-bus and the nodes' processor feed are redundant.

The Kalmar Cabin Unit (KCU) is the control node for the entire network. There are several nodes, called KDUs (Kalmar Distribution Units), in the network. Each node is positioned near to the functions it is designed to deal with.

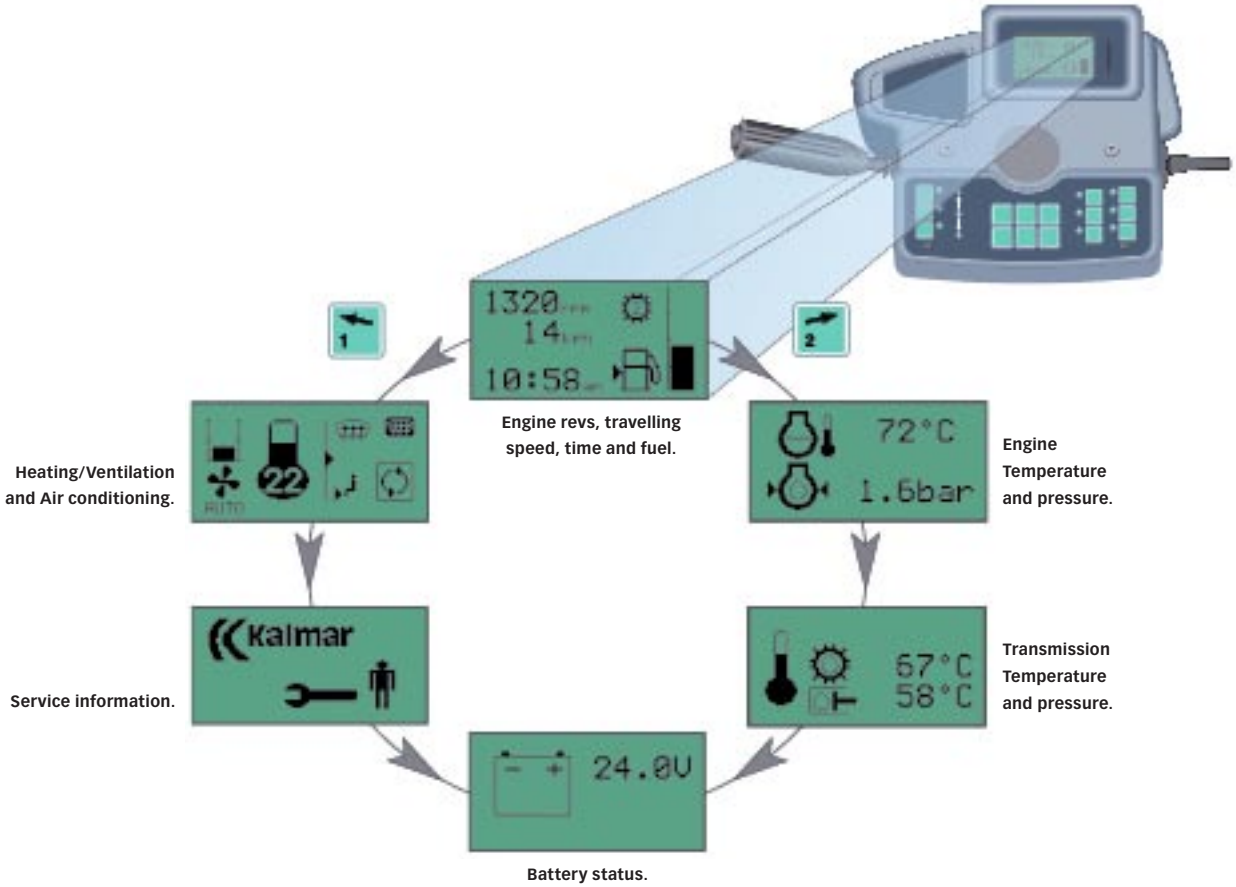
The Transmission Control Unit (TCU), which is the gearbox node, deals with the gearbox. The unit is connected in a separate CAN-bus loop with the EDC engine node (Engine Diesel Control) and KCU. The engine node controls the fuel injection and receives its control signals from its own transmitters on the engine.

Power supply
Power-feed for the functions differ from the feed required for communication and feeding of the nodes' processors. Each distribution unit (node) in the distributed network is fed voltage from one of the power distribution boxes. The distribution boxes are located inside the cabin and on one side of the frame. The distribution units (nodes) guide power from the distribution box to the required functions based on the instructions in the messages from the communication network.

Control functions – support the driver.
The driver and machine communicate very simple via the Kalmar Information Terminal (KIT) and the Information Display located right in front of the driver in the cabin. The two-way communication – from the driver to the machine and opposite – is handled by the KCU (Kalmar Cabin Unit) which is the control node for the entire network.

Information to the driver comprises alarm warnings, operating details and action-guided information. Messages, status, fault indications etc are presented on the Information Display (KID), while warnings and other monitoring indications are presented to the left.

Messages are only presented when they are relevant to the driver and the operation. The driver can focus on the job instead of checking meters and indicators.



AVAILABILITY

We have made sure your investment becomes profitable

To understand the full potential of your investment requires being aware of the details, features and technical matters in a machine like the new Kalmar.

But when it comes to availability it is critical that it operates constantly and is kept in good condition with an absolute minimum of maintenance and repairs.

Less stops for planned mainenance.
The service intervals have been extended to 500 hours, which means that you don't have to take the machine out of work more than 6 times a year (3.000 hours utilisation).

The DCF is designed for fast daily inspection and preventive maintenance. All checkpoints are easy accessible and concentrated to specific locations. Lubrication free components or central lubrication points have been utilised. The wet disc brake system is practically maintenance free.

The indicator and monitoring support built into our control system make sure that the machine won't be misused or maintained incorrectly. The driver and mechanics will always get indications and guidance in time to avoid unnecessary and costly wear and tear or technical breakdowns. No unwanted stops.

A safe communication network
The control and monitoring system is the new Kalmar control system, but already successfully applied in more than 1.000 Kalmar machines worldwide.

This new reduntant CAN-bus system is proven to be excellent in functionality and reliability. The network of control nodes allows for less wiring and connectors which reduces the number of sources of error. The power-feed for each node and the transfer of control signals are independent of the other nodes, which means the risk of disruption becomes minimal. The redundant design means that there are always two paths to choose to maintain communication, which results in extra safety and reliability.

Reliability starts already at the concept stage.
One of the guiding principles in designing the DCF was to minimise the number of potential sources of error. Therefore the machines consist of as few components and moving parts as possible. The functionality and operational reliability is assured by extensive testing.

To increase workplace safety the machine can be fitted with alcohol interlock.

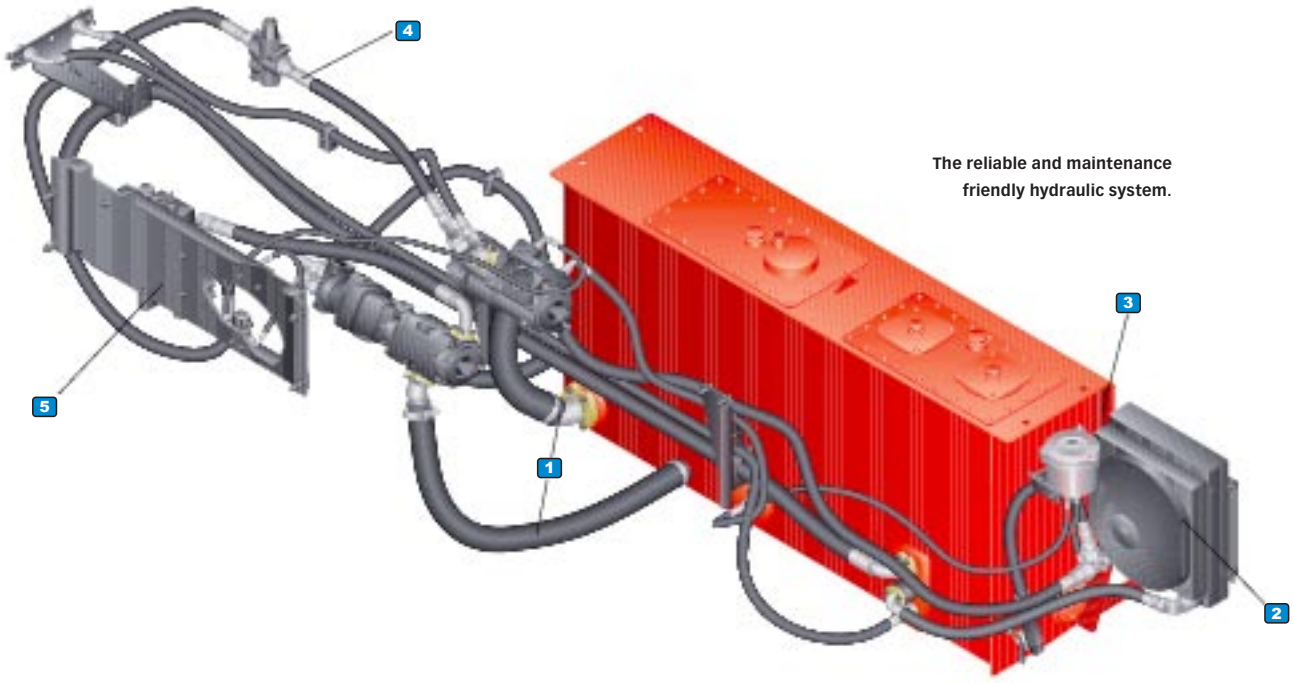
The hydraulic system is critical.
No other part of the machine is working so hard under continuous pressure. To secure the reliability we have minimised the number of hydraulic components and couplings.

To ensure optimum oil pressure and security regardless of the handling operation the hydraulic system is based on three fixed displacement vane pumps – one for the brake system, cooling and filtering, one for working hydraulics and one supporting both steering and working hydraulics.

The distribution of pressure between working hydraulics and steering is done by the priority valve which ensures that the steering always receives enough pressure. The hydraulic oil pump for load handling is disconnected during forward driving, to use the engine power to best effect.

All three pumps interact together, using the same oil tank and filters, which are located inside the tank. The system is equipped with one oil cooler and a separate fan to secure the right oil temperature, to match the hydraulic brake heat generation as well as feeding the overall system during tough handling cycles.

Oil supply and temperature control is handled through Kalmars distributed control system. All indications are presented when appropriate on the Kalmar Information Display (KID) in the cabin.



The reliable and maintenance friendly hydraulic system.

Other improving features:

1. Large dimensions of hydraulic hoses improves the hose´s lifetime (slower flow, less friction and less heating).
2. Thermostatic cooling of both the main system and the brake system improves the oil lifetime (temperature control, optimised working temperature).
3. High density filter improves the oil lifetime (clean oil).
4. ORFS – leak proof couplings all around improves reliability (minimises leakage).
5. All main hydraulic components at ground level are gathered on a separate plate, bolted to the chassis and therefore simple to remove.

Contact information:

Kalmar global partner

Local presence
Kalmar is a global supplier of heavy materials handling equipment and services for ports, terminals, industry and intermodal handling.

Local presence means that we can support our customers throughout the product's life cycle, wherever they are located.

There are 17 Kalmar sales companies that support dealers and agents in 140 countries around the world.

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