

Drive Solutions for Cranes.

Linde Hydraulics

Linde



Linde Hydraulics. Turning Power into Motion.

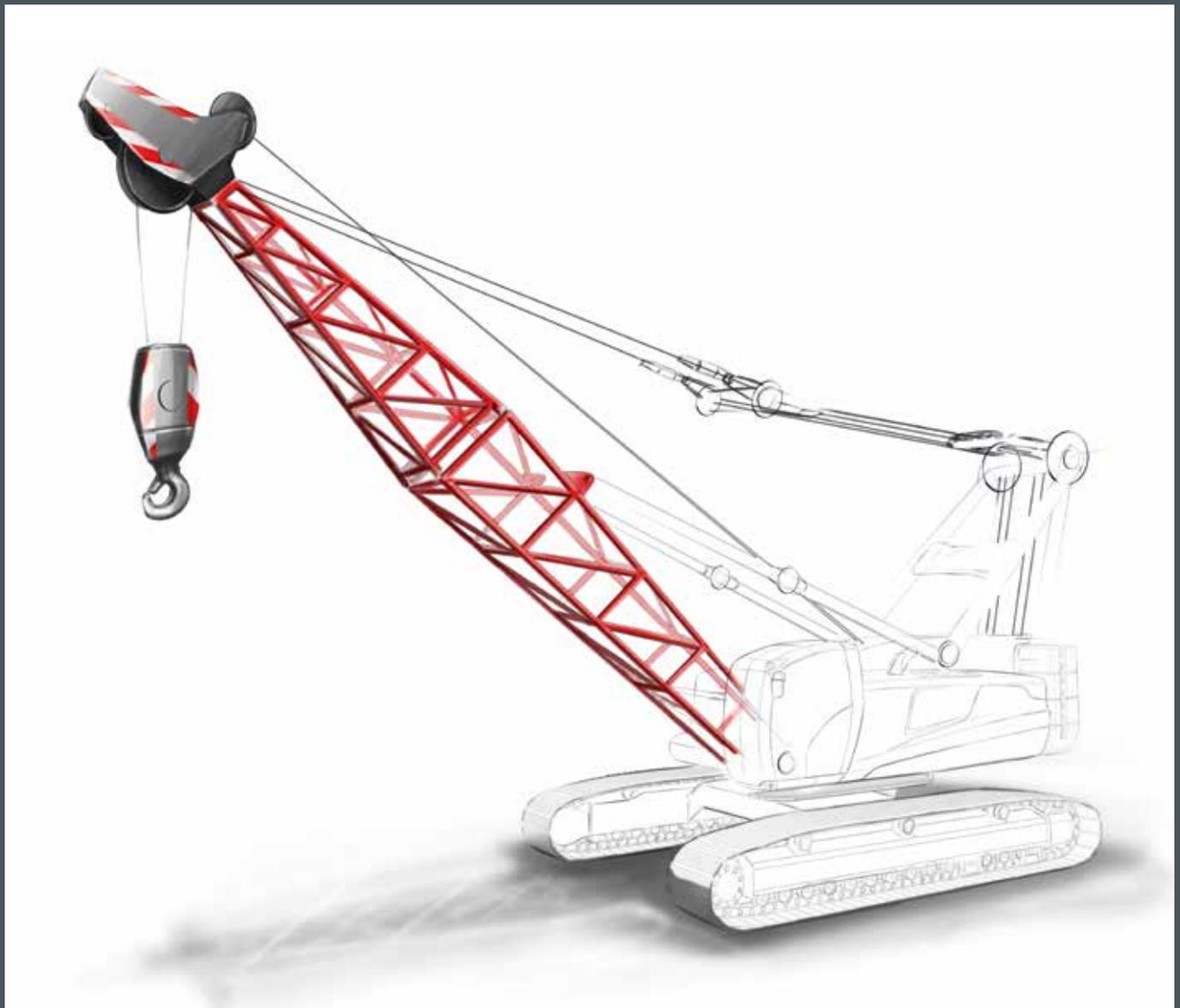
At Linde Hydraulics we have always had a passion for converting power into motion. This passion is driven by customer care, a thirst for knowledge and a love of innovation. We power ideas, machines and markets, both today and in the future.

We combine components to a system and create efficient overall solutions thanks to our intelligent blend of hydraulics, electronics and mechanics. Our aspiration can be summed up by one simple concept: Adding customer value through application expertise and the pursuit of system perfection.

Linde Hydraulics makes all of this possible due to a combination of partnership, responsibility and the highest level of commitment.

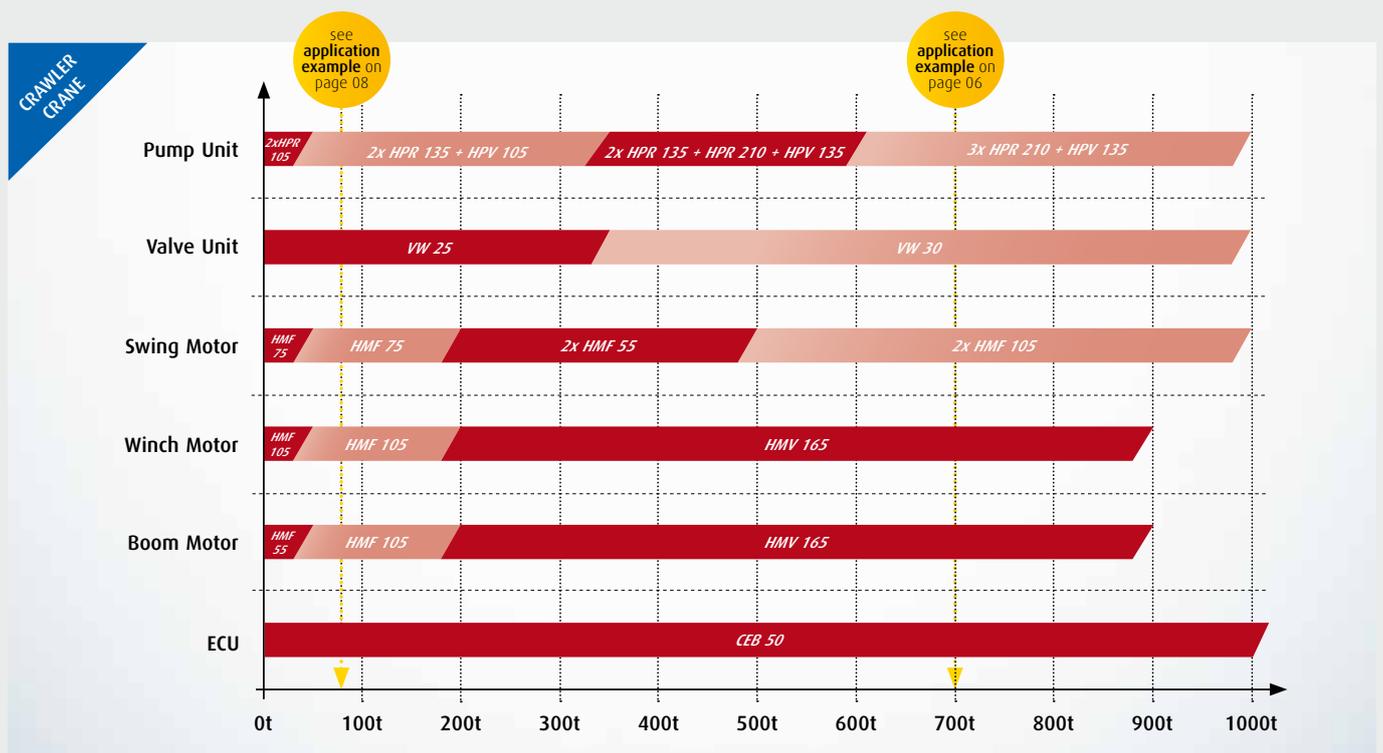
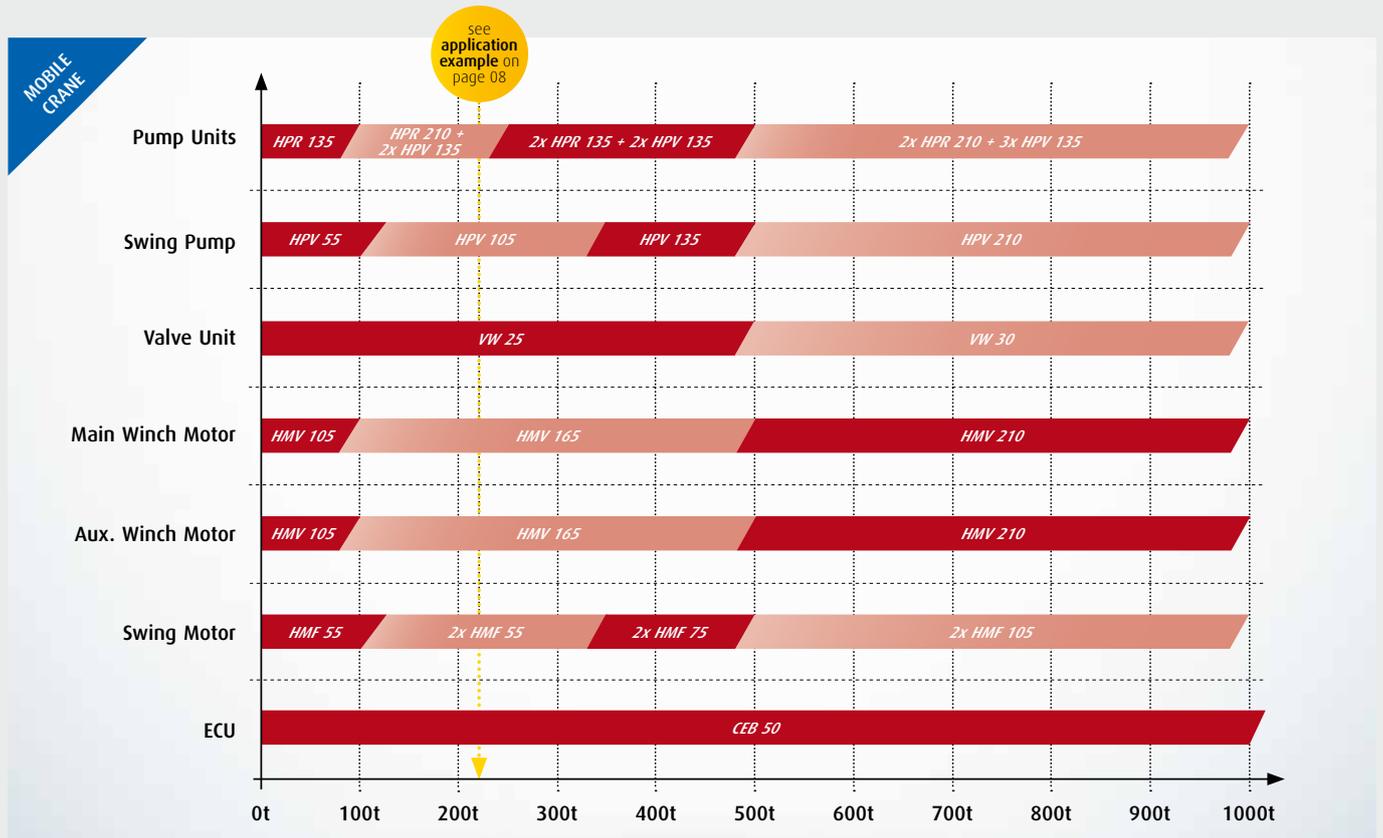
For us, partnership is an important, indispensable part of product development and quality assurance. Therefore, we add our knowledge, experience and international market expertise to help you exceed your customers' expectation. We strive to be your best partner from initial contact to project engineering and product development, all the way through prototype commissioning, serial production and training your teams.

Our interpretation of the term customer orientation is superior service and availability: worldwide, at any place. With companies in Europe, USA and China along with a great international network distributors we guarantee you the best possible customer service.



Portfolio.

By the logic combination of individual products that perfectly complement each other we offer solutions for almost every class of machines. Due to these capabilities we can always offer the best possible system to our customers.



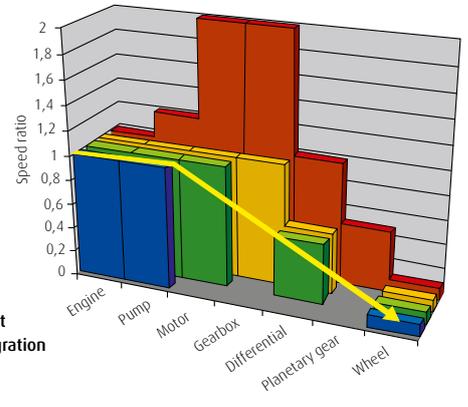
Low Speed Concept.

Hydrostatic drive systems have proven to be superior over hydrodynamic drives systems in various types of machines.

Beyond the general advantages of the hydrostatic drive, Linde drive systems offer an unbeatable driving experience in terms of precision, dynamics and reliability.

Standard hydraulic motors at low speeds in their starting phase cannot generate the necessary torque. Therefore, the power of the fast spinning hydraulic motors has to be reduced by means of several step gearboxes down to the speed needed on the wheel. Somewhat higher windage losses and poorer mechanical efficiency are benevolently accepted in this context.

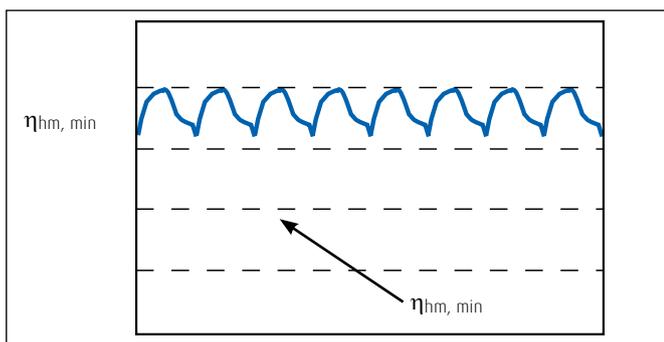
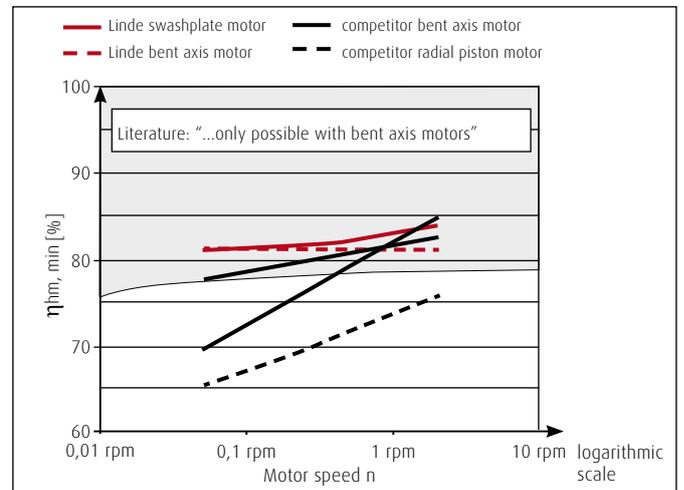
Quite the opposite holds true for the motors by Linde Hydraulics: The motors of the Series 02 are capable of transmitting the required torque even at low speed and make it possible to start smoothly and sensitively. Therefore, additional gear ratios for rpm reduction are not necessary.



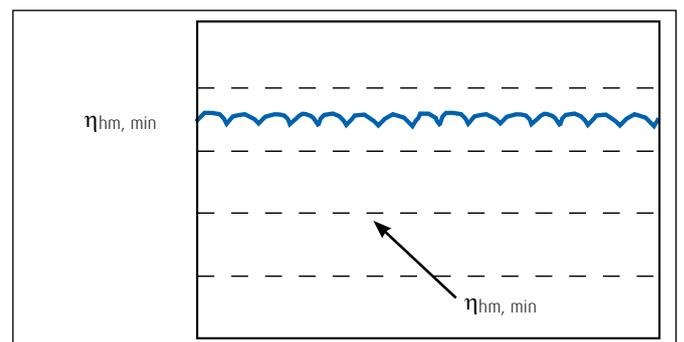
Linde drive units offer

- load independent, direct unit control
- various types of controls
- reliable and robust yet most compact design
- high power density
- through drive capability for pumps and motors
- smooth and sensitive operation even at low speeds
- low noise
- jerk-free and steady low speed behaviour
- uniformly high torque for smooth start up
- fuel saving in all operating situations
- elimination of mechanical gearboxes
- quieter through speed reduction
- less maintenance because of simplified drive concept
- increased service life of the transmission

Starting torque comparison



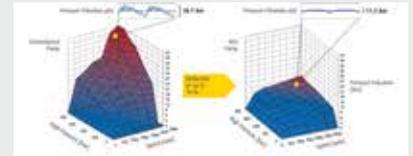
typical bent axis motor



Linde swashplate motor

SPU Silencer.

Noise optimization by commutation.



Legal emission regulations force manufacturers of mobile machinery to optimize the noise emission of their products. Since secondary measures tend to be expensive and less efficient Linde prefers to fight the noise where it is generated: by optimally connecting an additional volume directly next to the commutation of the HPR-02 pump, Linde Hydraulics invented the SPU silencer. The adaptive SPU reduces flow and pressure pulsations in the regulating pump over the entire range of operation – without loss of power.

Compared to a customary variable pump, an HPR-02 with SPU reduces pulsation level by up to 70 %, independently of pressure, speed and temperature! The pulsations transmitted to system components and machine structure are significantly less, making the machine quieter.

Product advantages

- low noise level inside the cabin and outside: obvious relief for driver and environment
- self-adapting wide scale reduction of pulsation over the whole range of operation: independent of pressure, speed and temperature
- no need of costly measures for additional noise dampening
- significantly reduced noise peaks
- no effect on function and performance
- minor increase of weight and mounting space
- simple and robust design
- immediately usable, maintenance-free

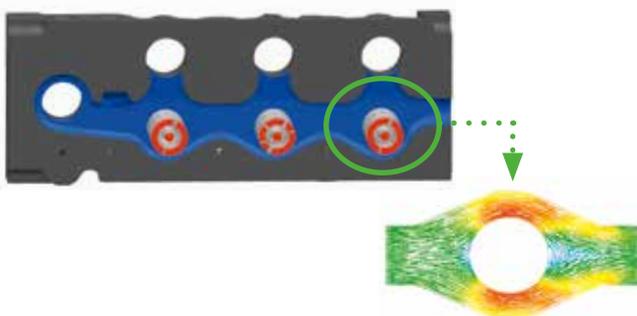
Main control valve design.

Increased efficiency.

The new monoblock design from Linde features a special layout of the supply channels, i.e. of the pump pressure line and the return channels to the tank. This layout has already been proven to work in the control plates of the VT modular system, and has demonstrated that it results in lower losses. The layout also ensures that the monoblocks can be fully extended to include sandwich valves even in the same nominal size.

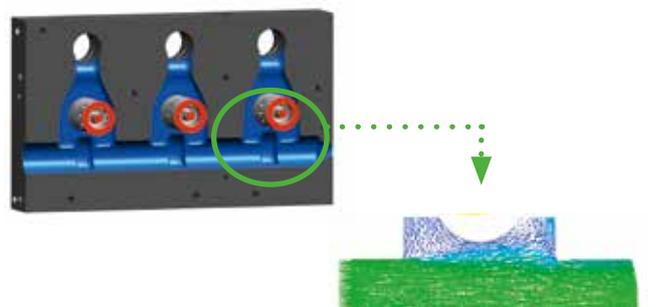
Advantages

- low-loss individual sections with only single perfusion from the pump to the actuator
- wide dimensions of main channels and their well-positioned flow layout ensure excellent efficiency throughout the entire unit
- section sizes and control types can be freely combined



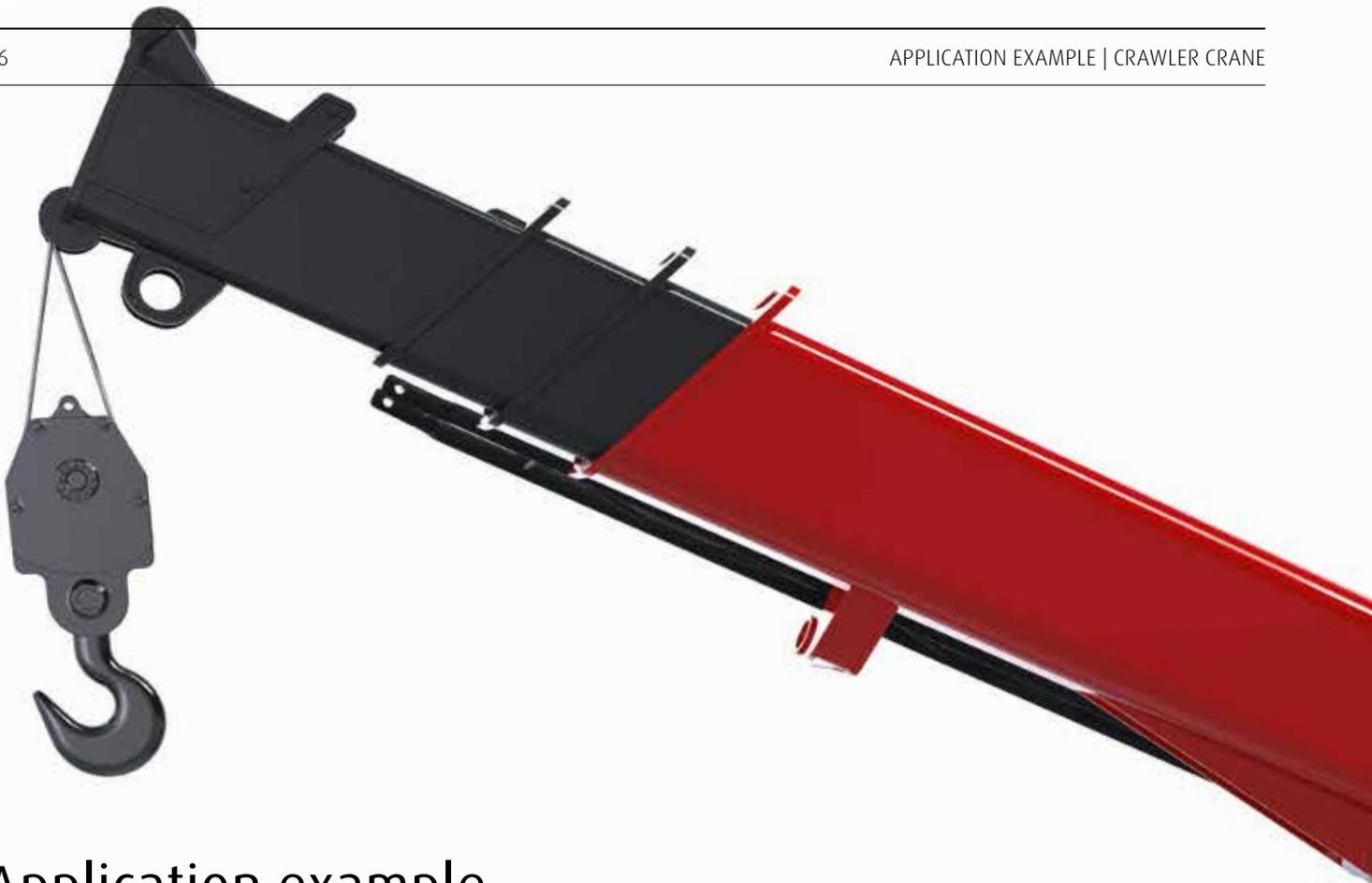
Conventional monoblock design

- oil flow circulates in the supply channels around the directional control valve sections
- shock losses due to circulation
- the further away a section is from the pump connection, the greater the loss in pressure



New Linde monoblock design

- supply channels positioned below valve sections
- flow loss reduced by 85%
- pressure loss virtually identical for all sections, regardless of the distance from the pump connection (measurement: only 1.5 bar from pump inlet via six directional control valves at 600 l/min)



Application example. Crawler crane, 700 t.

Equipment

- A** 2x HPR 210-02 (pump tandem)
- B** 2x HMR 135-02 (travel motors)
- C** 1x HMF 105-02 P (swing drive motor)
- D** 1x HMV 105-02 E2 (hoist motor)
- E** 1x VT8 (directional control valves)
- F** 1x Electronic control unit

Advantages

- excellent low speed and true running behaviour of the motors
- no jolting thanks to the control concept of the machine as a whole
- can be electrically controlled and retrofitted, even for individual sections

Options

- system scope and level of electrification can be scaled
- partial automation

The crawler crane utilises the full benefits of LSC technology: the combined movement of individual functions without mutual interactions or influences in all load situations ensures perfect positioning. Furthermore, the crane also benefits from jolt-free lifting and no lowering of loads at the start of the movement.

The crane's design as a two-circuit system with two high-pressure self-regulating pumps for different pressure levels increases the demand-specific supply to the actuators, which makes the machine even more efficient. This ensures excellent load capacity in all working conditions. The superb low speed behaviour and the smooth, even running characteristic of the Linde motors is particularly noticeable when it comes to lifting and lowering

the hook. The individual valve sections in the control plates of the VT modular family can be actuated fully hydraulically or electro-hydraulically. The two types of control can also be combined in one control plate.

Thanks to the electronic controller, selected functions can also be operated by remote control or partially automated. Sophisticated safety systems are also possible, which can be implemented via locking mechanisms or through proportionally slower reactions from individual actuators in given situations.

Even without the use of position sensors, the machine can be equipped with the functions of the LSC+ system. In particular, this includes switching between rough control or fine control, or overriding the LS signal if load-dependent machine reactions are required. The maximum efficiency of single actuators is achieved, when they are controlled purely via the pump with fully open directional control valve pistons.



Application example.

Mobile crane, 220 t.

Equipment

- 2x HPR 135-02 TL2 (tandem pump)
- 1x HPV 105-02 E1 (swing pump)
- 1x HVM 165-02 (main winch motor)
- 1x HVM 165-02 (aux. winch motor)
- 1x VW 25 (valve monoblock)
- 1x Electronic control unit

Advantages

- excellent low speed and true running behavior of the motors
- no jolting thanks to the control concept of the machine as a whole
- can be electrically controlled and retrofitted, even for individual sections



Application example.

Crawler crane, 80 t.

Equipment

- 2x HPR 135-02 TL2 (tandem pump)
- 1x HPV 105-02 E1 (swing pump)
- 1x HVM 165-02 (main winch motor)
- 1x HVM 165-02 (aux. winch motor)
- 1x VW 25 (valve monoblock)
- 1x Electronic control unit

Advantages

- excellent low speed and true running behavior of the motors
- no jolting thanks to the control concept of the machine as a whole
- can be electrically controlled and retrofitted, even for individual sections



Technical data summary.

Find the right product for your application.

Linde products have proven to be reliable and robust. All of our products are excellent in their individual performance and outstanding when combined with each other in a complete system. Below you find the general technical data of the components shown in this brochure. Please be invited to find more detailed information about these units and their proper application in the specific datasheets and explore our overall catalogue along with other brochures for additional interesting fields of applications.

VARIABLE DISPLACEMENT MOTORS FOR CLOSED AND OPEN CIRCUITS								
HMV-02		55	75	105	135	165	210	280
Max. displacement	cc/rev	54.7	75.9	105	135.6	165.6	210	281.9
Max. operating speed at V_{max}	rpm	4300	3800	3700	3200	3100	2700	2400
Max. speed (intermittent) at V_{min}	rpm	5300	5000	4700	4000	3900	3500	3200
Nominal pressure	bar	420	420	420	420	420	420	420
Peak pressure (intermittent)	bar	500	500	500	500	500	500	500
Continuous output torque	Nm	218	302	418	540	659	836	1122
Max. output torque	Nm	366	507	702	906	1107	1404	1884
Continuous power	kW	93	120	153	181	214	236	282
Max. power	kW	157	202	257	304	359	397	474
Weight	kg	28	32	42	56	76	101	146

PRODUCT ADVANTAGES

HMV-02

- jerk-free low speed
- high starting torque
- large conversion range
- zero angle possible
- dynamic response
- PTO through-drive motor
- compact design
- high power density
- high reliability
- long service life



SELF-REGULATING MOTORS FOR OPEN AND CLOSED CIRCUIT OPERATION							
HMR-02		55	75	105	135	165	210
Max. displacement	cc/rev	54.7	75.9	105	135.6	165.6	210
Max. operating speed at V_{max}	rpm	4300	3800	3700	3200	3100	2700
Max. speed (intermittent) at V_{min}	rpm	5300	5000	4700	4000	3900	3500
Nominal pressure	bar	420	420	420	420	420	420
Peak pressure (intermittent)	bar	500	500	500	500	500	500
Continuous output torque	Nm	218	302	418	540	659	836
Max. output torque	Nm	366	507	702	907	1107	1404
Continuous power	kW	93	120	153	181	214	236
Max. power	kW	157	202	257	304	359	397
Weight	kg	28	32	42	56	76	101

PRODUCT ADVANTAGES

HMR-02

- steady low speed behaviour
- high starting torque
- large conversion range
- PTO Through-Drive Motor
- compact design
- high power density
- high reliability
- long service life
- dynamic response



FIXED DISPLACEMENT MOTORS FOR OPEN AND CLOSED CIRCUIT OPERATION								
HMF-02		28	35	55	63	75	105	135
Max. displacement	cc/rev	28.6	35.6	54.7	63	75.9	105	135.6
Max. operating speed	rpm	4500	4500	4300	3900	3800	3700	3200
Max. speed (intermittent)	rpm	4800	4800	4400	4200	4100	3800	3500
Nominal pressure	bar	420	420	420	420	420	420	420
Peak pressure (intermittent)	bar	500	500	500	500	500	500	500
Continuous output torque	Nm	114	142	218	251	302	418	540
Max. output torque	Nm	191	238	366	421	507	702	906
Continuous power	kW	54	67	93	102	120	153	181
Max. power	kW	87	108	157	166	202	257	304
Weight	kg	16	16	19	23	26	33	39

PRODUCT ADVANTAGES

HMF-02

- steady low speed
- high starting torque
- compact design
- high power density
- high reliability
- long service life
- available with integrated directional control valve for direct swing drive control



VARIABLE PUMPS FOR CLOSED CIRCUIT OPERATION								
HPV-02		55	75	105	135	165	210	280
Max. displacement	cc/rev	54.7	75.9	105	135.7	165.6	210.1	281.9
Permissible speed	rpm	3900	3400	3200	3000	2750	2300	2400
Max. speed (intermittent)	rpm	4100	3600	3400	3200	2950	2500	2550
Nominal pressure	bar	420	420	420	420	420	420	420
Peak pressure (intermittent)	bar	500	500	500	500	500	500	500
Continuous input torque	Nm	218	302	418	540	659	836	1122
Max. input torque	Nm	353	489	677	875	1067	1354	1818
Continuous power	kW	75	98	127	153	173	201	235
Max. power	kW	122	159	206	247	279	326	381
Weight w/M1R control	kg	42	47	58	72	95	132	158

PRODUCT ADVANTAGES

HPR-02

- compact design
- high power density
- dynamic response
- high reliability
- long service life
- noise-optimized
- precise and load-independent



SELF-REGULATING PUMPS FOR OPEN CIRCUIT OPERATION											
HPR-02		55	75	105	135	165	210	105D	280	125D	165D
Max. displacement	cc/rev	55	75.9	105	135.7	165.6	210.1	210	281.9	252	331.2
Continuous rated speed (*1)	rpm	2700	2500	2500	2350	2200	2100	2450	2000	2400	2150
Continuous rated speed (*2)	rpm	2900	2700	2700	2550	2400	2300	2650	2200	2600	2350
Max. oil flow	l/min	148.5	189.8	246.8	312.1	347.8	420.2	493.5	507.4	579.6	695.5
Nominal pressure	bar	420	420	420	420	420	420	420	420	350	420
Peak pressure (intermittent)	bar	500	500	500	500	500	500	500	500	420	500
Continuous input torque	Nm	219	302	418	540	659	836	836	1122	1003	1318
Max. input torque	Nm	368	507	702	907	1107	1404	1245	1884	1404	1964
Continuous power	kW	61.9	79.1	102.8	130.0	144.9	175.1	205.6	211.4	241.5	289.8
Max. power	kW	104	132.8	172.7	218.5	243.4	294.1	306.7	355.2	338.1	431.8
Weight	kg	39	39	50	65	89	116	96	165	113	177

PRODUCT ADVANTAGES

HPR-02

- optimum interaction with Linde LSC control valves
- energy saving operation by 'flow on demand'-control
- dynamic response
- excellent suction up to rated speed
- noise optimization over the whole range of operation
- compact design
- high power density
- high reliability
- long working life



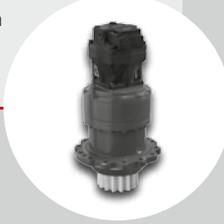
(*1) w/o pressurizing, 1,0 bar abs / (*2) w/o pressurizing, 1,2 bar abs

SWING DRIVES								
PMT / PMTE*		650	1000	*2000	*3000	*4000	*6000	*4000
Number		1	1	1	1	1	1	2
Ratios		19-110	20-115	37-45	16-30	16-21	24-35	16-21
Max. output torque	Nm	7000	10000	8500	15000	18000	32000	18000x2
Motor displacement	cc	47-125	14-125	72	110	180	180	180x2
Max. pressure	bar	350	350	350	350	350	350	350
Typical excavator size	t	n.a.	n.a.	12-16	16-22	23-27	27-37	37-50
Weight	kg	100	135	130	200	230	310	230x2

PRODUCT ADVANTAGES

PMT / PMTE

- very high radial load capacity
- reliability and Durability
- accuracy and Quietness
- high pressure technology for increased efficiency of the hydraulic system



TRAVEL DRIVES WITH INTEGRATED HYDRAULIC MOTOR								
PMCI		1200	2500	3000	4000	4500	6000	9000
Max. output torque	Nm	12000	20000	30000	40000	45000	62000	90000
Max. displacement	cc	55	72	72	110	110	180	180
Available ratios	i	30-53	55	56-125	63-120	55-135	60-162	65-183
Park brake torque	Nm	165	240	240	335	335	600	600
Max. pressure	bar	350	350	350	350	350	350	350
Typical excavator size	t	6-7	11-15	16-18	19-23	23-26	27-36	37-50
Weight	kg	90	175	175	245	245	370	490

PRODUCT ADVANTAGES

PMCI

- high pressure motors for increased efficiency
- high load capacity
- toughness and reliability
- smooth operation
- easy to maintain
- wide range of ratios
- suitable also for arctic applic. down to -40° C



MAIN CONTROL VALVE IN MONOBLOCK DESIGN				
		VW18	VW25	VW30
Max. flow per section from pump to actuator	l/min	250	400	600
Return flow through block	l/min	450	700	1000
Rated pressure	bar	400 (420 after clarification)		
Number and size of pump ports, according to SAE ISO 6162-2		1x 1¼" (DN 32)	1x 1½" (DN 38) or 2x 1¼" (DN 32)	2x 1½" (DN 38)

PRODUCT ADVANTAGES
VW30M3
<ul style="list-style-type: none"> all advantages of the LSC valve technology compact design full-size expandability high efficiency achieved by flow-optimized channels, even for applications with numerous actuators



MAIN CONTROL VALVE IN MODULAR DESIGN			
VT Modular		VW25	VW30
Max. flow per section from pump to actuator	l/min	400	600
Return flow through block	l/min	1000	
Rated pressure	bar	400 (420 after clarification)	
Number and size of pump ports, according to SAE ISO 6162-2		1x 1½" (DN 38) or 2x 1½" (DN 38)	

PRODUCT ADVANTAGES
VT Modular
<ul style="list-style-type: none"> all advantages of the LSC valve technology easy to configure building block system adjustable to the target application quick availability ideal for machines with low production volume piloting hydraulic, electric or combined



Well-informed. Our current Media at a Glance.



Product Catalogue

- Turning Power into Motion. Product catalogue.

Brochures

- Drive Systems for Construction Machines.
- Drive Systems for Agricultural Machines.
- Drive Solutions for selected applications such as ...
Cranes, Dozers, Excavators, Rollers and Wheeled Loaders.
- LSC. Directional control valves.

Data Sheets

- HPV-02. Variable pumps for closed loop operation.
- HPR-02. Self-regulating pumps for open loop operation.
- HMF/A/V/R-02. Hydraulic motors for open and closed loop.
- iCon. Electronic drive controller.
- VT modular. Modular system for LSC manifold valve plates.



How to reach us.

Post Linde Hydraulics GmbH & Co. KG
Grossostheimer Str. 198
63741 Aschaffenburg, Germany

Phone +49.60 21.150-00 switchboard
Fax +49.60 21.150-142 61

E-Mail info@linde-hydraulics.com
Internet www.linde-hydraulics.com

Linde Hydraulics Worldwide.

- (E) Linde Hydraulics Iberica
Avda. Prat de la Riba, 181, 08780 Palleja (Barcelona), Phone +34 93 663 32 58, info@linde-hydraulics.com.es
- (F) Linde Hydraulics France
1, rue du Maréchal de Lattre de Tassigny, 78990 Elancourt, Phone +33 1 30 68 45 40, info.fr@linde-hydraulics.com
- (GB) Linde Hydraulics UK
12-13 Eyston Way, Abingdon Oxfordshire OX14 1TR, Phone +44 1235 522 828, enquiries@lindehydraulics.co.uk
- (I) Linde Hydraulics Italia
Viale dell'Unione Europea, 33, 21013 Gallarate (VA), Phone +39 0331 1824910, info.it@linde-hydraulics.com
- (USA) Linde Hydraulics USA
5089 Western Reserve Road, Canfield Ohio 44 406, Phone +1 330 533 6801, info.us@linde-hydraulics.com
- (BR) Linde Hydraulics do Brasil
Rua Victorino, 134 Jardim Mutinga 06463-290 - SP, Brazil, Phone +55 11 99 18 20 438, info.br@linde-hydraulics.com
- (VRC) Linde Hydraulics China
No. 197 Fushou East Road, 261000 Weifang, Phone +86 536 50 75 268, info@linde-hydraulics.com.cn
No. 89 Jinshang Road, 361009 Xiamen, Phone +86 592 53 87 701, info@linde-hydraulics.com.cn

Visit www.linde-hydraulics.com/worldwide to find a dealer close to you.



Turning Power into Motion.

