

# Drive Solutions for Material Handling.

Linde Hydraulics

*Linde*



# Material Handling Solutions. Our 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.



Machines that rotate a lot in their day-to-day work, such as the material handling machine shown here, benefit from a slew drive in a closed hydraulic circuit. This means the rest of the machine can be optimised to the work functions, regardless of the rotating mechanism performance. The configuration shown uses two fixed displacement motors in combination with a variable displacement pump with torque control. This combines a hydraulic proportional flow characteristic with a torque control characteristic. During acceleration, the pump swivels quickly thanks to the volume control and increases the torque in direct proportion to the acceleration setting of the joystick. The torque characteristics of the control dominate the movement. The movement is dynamic but never jerky, even when re-accelerating out of a run-out phase. The pump control forms the basis for load-independent, customisable run-out of the upper carriage in the neutral position of the joystick. Its position feedback control compensates for load influences.

The run-out behaviour of the upper-carriage when the joystick is in the neutral position is the same for every boom distance and clamshell load. During countercontrol, the run-out angle can be reduced additionally in a dosed manner. This transfers the core features of the LinDrive driving experience to the working hydraulics system: precision, dynamics and reliability with unrestricted machine control. The system is supplemented by the open circuit as a dual circuit setup. As such, significant lifting power can be achieved regardless of the swing movement. A self-regulating pump tandem and two valve blocks efficiently serve the different energy levels of the remaining actuators. The result is a dynamic machine that is easy and sensitive to operate for very high material handling performance with minimal loss, which does not cause fatigue.

# Application Example. Material Handling, 120 t.

## Equipment

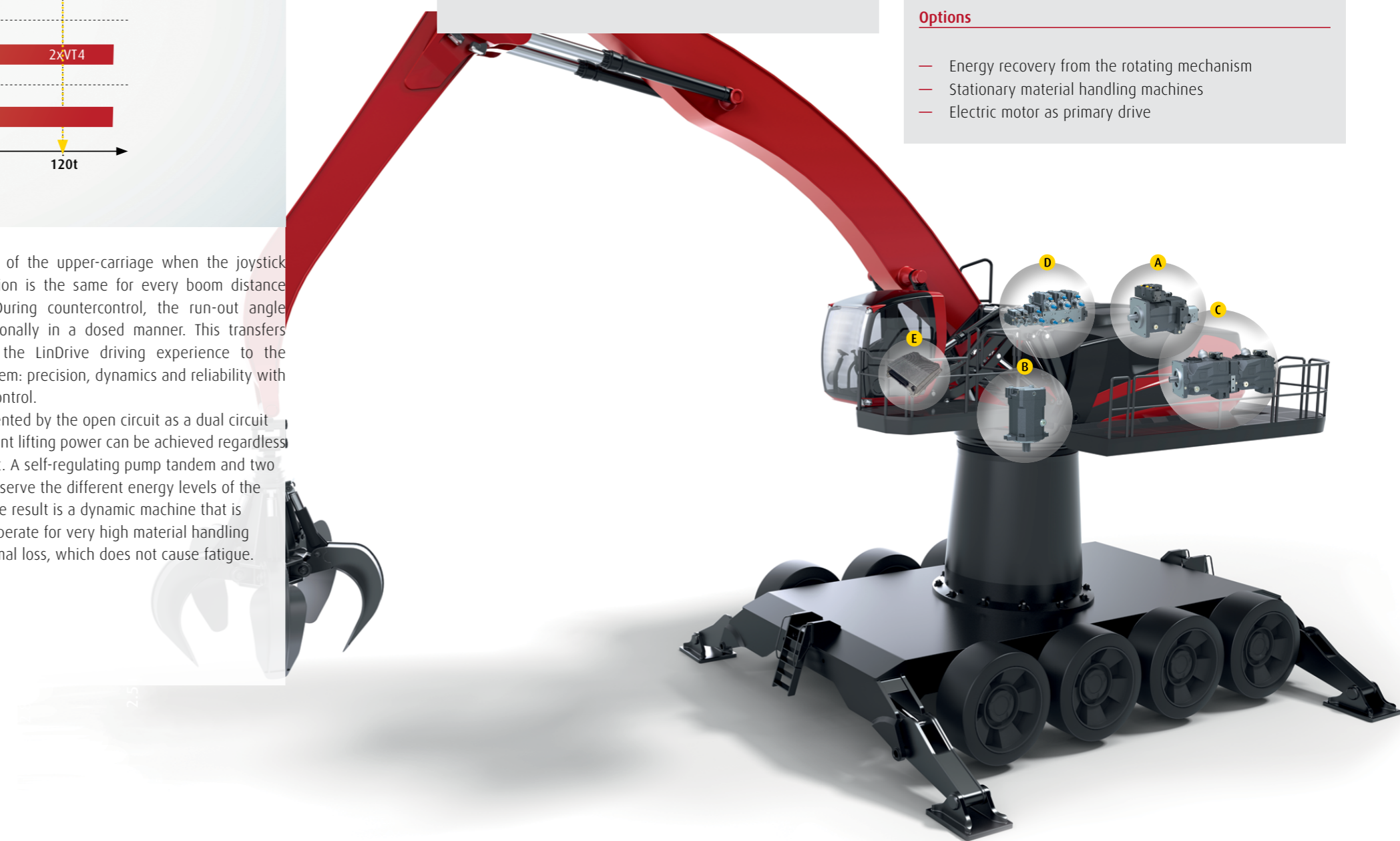
- A** 1x HPV 210-02 TC (pump for swing drive)
- B** 2x HMF 135-02 (motors for swing drive)
- C** 2x HPR 280-02 T E1L (tandem pump)
- D** 2x VT4 (directional control valves)
- E** 1x iCon (electronic control unit)

## Advantages

- Rotation independently of the remaining hydraulics system
- Precise rotating mechanism positioning via pre-controlled pump displacement feedback system
- Defined, load-independent and thus reproducible run-out behaviour
- Dosable countering
- The function "Turn in closed circuit" is increasingly beneficial for smaller material handling machines

## Options

- Energy recovery from the rotating mechanism
- Stationary material handling machines
- Electric motor as primary drive



# Technical Data Summary.

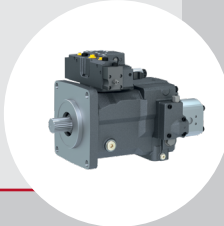
## Find the right product for your application.

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	4150	3600	3400	3200	2950	2500	2550
Nominal pressure	bar	450	450	450	450	450	450	450
Peak pressure (intermittent)	bar	500	500	500	500	500	500	500
Torque ( $\Delta p=430$ bar, charge pressure=20 bar)	Nm	374	519	719	929	1133	1438	1929
Corner Power (theor.) ( $V_{max} \times n_{max} \times \Delta p$ 430 bar)	kW	153	185	241	292	326	346	485
Weight (w/H1 control)	kg	46	49	66	72	113	132	164

**PRODUCT ADVANTAGES**

**HPV-02**

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

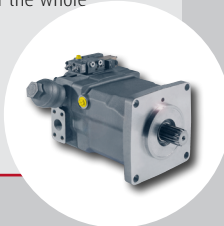


SELF-REGULATING PUMPS FOR OPEN CIRCUIT OPERATION										
HPR-02		95	105	135	165	210	280	105D	125D	165D
Max. displacement	cc/rev	95	105	135.7	165.6	210.1	281.9	210	250	331.2
Max. operating speed w/o pressurizing	rpm	2500	2500	2350	2200	2100	2000	2450	2400	2100
Max. oil flow	l/min	237.5	246.8	312.1	364.3	441.2	563.8	514.5	600.0	695.5
Nominal pressure	bar	350	420	420	420	420	420	420	380	420
Max. pressure (intermittent)	bar	420	500	500	500	500	500	500	420	500
Max. input torque	Nm	529	702	907	1107	1404	1884	1245	1245	1964
Corner power	kW	138	172.7	218.5	255	308.8	394.7	319.4	337	431.8
Weight	kg	44.5	50	65	89	116	165	96	113	177

**PRODUCT ADVANTAGES**

**HPR-02**

- 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



VARIABLE DISPLACEMENT MOTORS FOR CLOSED AND OPEN CIRCUITS											
HMV-02/HMF-02		35	55	75	105	135	165	210	280	105D	165D
Max. displacement	cc/rev	35.6	54.7	75.9	105	135.6	165.6	210	281.9	210	331.2
Max. operating speed at $V_{max}$	rpm	4500	4300	3800	3700	3200	3100	2700	2400	3300	2900
Max. speed at $V_{max}$	rpm	4800	4400	4100	3800	3500	3400	3000	2700	3400	3100
Max. operating speed at $V_{min}$	rpm	n.a.	4700	4400	4100	3700	3500	3200	2900	4100	3500
Max. speed at $V_{min}$	rpm	n.a.	5300	5000	4700	4000	3900	3500	3200	4400	3700
Max. pressure (intermittent)	bar	500	500	500	500	500	500	500	500	500	500
Output torque ( $\Delta p=430$ bar)	Nm	244	374	519	719	928	1133	1438	1929	1437	2267
Corner power	kW	115	184	239	309	360	415	482	586	677	878
Weight	kg	16	28	32	42	56	76	101	146	98	149

**PRODUCT ADVANTAGES**

**HMV-02/HMF-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



MAIN CONTROL VALVE IN MONOBLOCK DESIGN					
VW Monoblock		VW14	VW18	VW25	VT4
Max. flow per section from pump to actuator	l/min	150	250	400	700
Return flow through block	l/min	220	450	700	1000
Rated pressure	bar	420	420	420	420
Number and size of pump ports, according to SAE ISO 6162-2		1x 1½" (DN 38) or 2x 1½" (DN38)			

**PRODUCT ADVANTAGES**

**VW Monoblock**

- optimised for crane applications
- all advantages of LSC valve technology
- piloting hydraulic, electric or combined

