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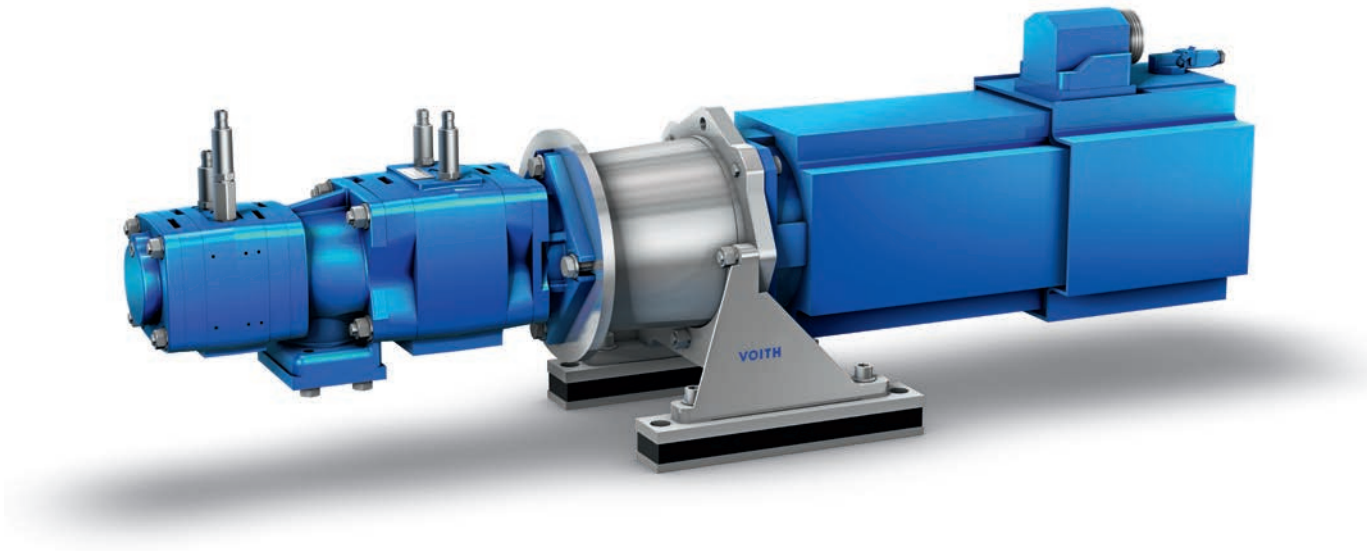
DrivAx IPS
Variable speed pump drives
Product data sheet



Advantages

+ Up to 70 % potential energy savings in hydraulic systems
+ Reduced noise emissions
+ Industry 4.0 ready
+ Low power loss in the system

DrivAx servo drives
Efficient drive technology for high productivity

DrivAx servo drives combine the advantages of hydraulics with the advantages of servo drives. The result: energy-efficient drives with low heat and noise emissions and at the same time high robustness, power density and dynamics.

DrivAx servo drives consist of a variable speed pump and a servo motor, which simultaneously serves as drive and control for the actuator.

They are suitable for all linear movements requiring high forces and precision. At the same time, they are highly productive while protecting the environment, climate and resources.

Perfectly adaptable to your requirements, DrivAx servo drives are available in various system configurations:
- Motor pump combination
- Self-contained drives
- Application-specific system solutions

Machine and equipment manufacturer
Why you should rely on DrivAx servo drives?

The allrounder with a modular set-up

DrivAx servo drives supports all common standard interfaces, enabling them to be easily integrated into existing machines. Various pre-configured modules allow optimal dimensioning of the system, precisely matching to your application. Furthermore, the drive can be scaled and synchronized to cover all conceivable force spectra. The allrounder for all applications.

Less is always more – no servo valves required

The drive technology of the future works without a complex infrastructure. DrivAx drives are based on a combination of a servo motor and a variable speed pump. The servo motor drives the system and precisely controls the force, movement, and position of the actuator. Control valves, hydraulic power units and complex piping are no longer required. True to the principle: less is more.

Easily integrated, rapidly enabled

DrivAx drives are compact, optionally self-contained systems and therefore very easy to integrate into machines. A mechanical interface, an electrical connection, and data connections for the sensor system are all that is needed. As there is no need for complex power unit pipings, valve technology cabling, and filtering of the hydraulic fluid, you save a lot of time while designing and commissioning your machine. For lean mechanical engineering without compromise.

2002 2011 2012 2014

Operators of machines and plants
Why you should rely on DrivAx servo drives?

Increase productivity, save resources

No proportional valves, but the pump regulates the volume flow and pressure. Only as much electrical energy as the process actually requires is converted into power. Efficiency at its best. And at the same time, electricity costs and CO_2 emissions are reduced. It's not just the environment that benefits.

The reliable endurance runner

DrivAx servo drives are compact power packs with a high level of endurance and low maintenance. The actuator is practically wear-free in operation, while proven pump technology and reduced system complexity guarantee long maintenance intervals. Compared to electromechanical solutions, the lifetime is increased by 80%, even in highly demanding operating conditions.

Intelligent solutions for Industry 4.0

DrivAx servo drives work precisely, with high forces, while paving the way for sustainable, climate-friendly production processes. Intelligent sensors and electronics control, regulate and monitor the drive system, which not only enables high machine productivity but also gives the system diagnostic capability – ready for Condition Monitoring and Predictive Maintenance.

Less oil, good for the environment

DrivAx servo drives only consume as much energy as is currently needed in the process. This not only reduces electricity costs, but also the heat input into the hydraulic medium and the necessary cooling effort are reduced. Hydraulic fluid can be reduced by up to 90 %. Green light for clean technology.

DrivAx CLCP

2016

DrivAx RQ4

2021

DrivAx IQ4

2022

Innovative hydraulics
Variable speed pump drives

Unprecedented functionality is achieved within your hydraulic system when installing our variable speed pump drives. Compared to other hydraulic systems utilizing classic valve technology, energy savings of up to 70 % can be achieved. This saving stems from the reduced cooling capacity and the reduced fluid volume. Additionally, noise emission is reduced by up to 20 db(A) in most applications.

Servo pump drives control the pressure or the volume flow, converting electrical energy into hydraulic energy, which is needed in the hydraulic system. The use of classic valve technology within the system can be either partially or completely omitted. If omitted, it simplifies the hydraulic system considerably.

Our specialists ensure you have a customized, ready-to-run variable speed pump system, all from a single source. Utilizing the cycle data from your machine or system, we determine the required pressures and volume flows. The pump system is then designed based on this information.

Technical data

Maximum power per drive	250 kW
Maximum volume flow per pump	625 l / min
Maximum accuracy of pressure control	± 1 bar
Maximum operating pressure	345 bar

Properties
- Radial and axial gap internal gear pump compensation
- Volume flow control for speed or position
- Pressure control for force
- Volume flow and pressure control possible
- Usual field bus
- Monitoring

Applications
- Plastics machinery
- Die-casting machines
- Presses
- Machine tools
- Metallurgy
- Woodworking machinery
- Paper machines

DrivAx IPS

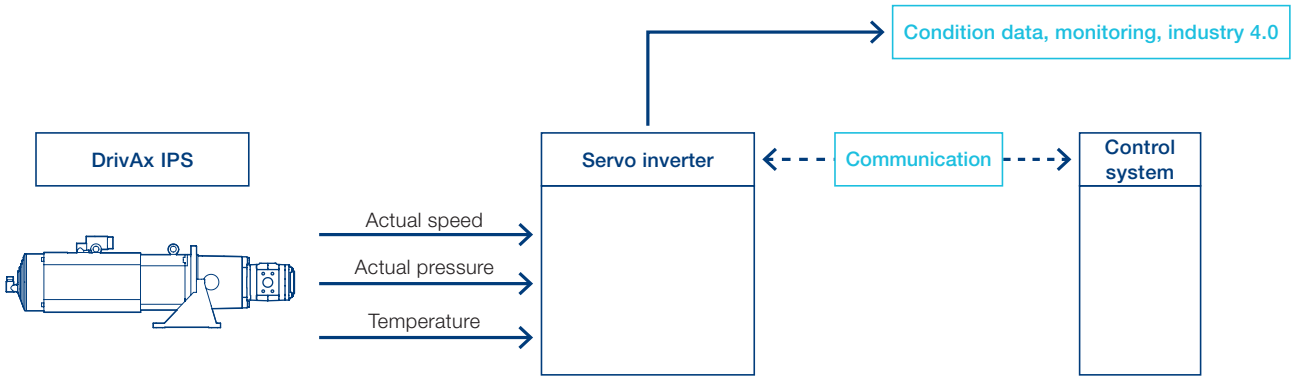
Innovative technology
Industry 4.0 ready

The measurement and recording of up-to-date information by the servo inverter, based on the status of individual components and system diagnostics, facilitates easy integration within the framework of Industry 4.0.

Our components record, control and transmit the most diverse operating parameters such as pressure, acceleration and temperature. Also within the scope of condition monitoring, we have the potential to measure and record data such as oil levels, filter state, component and system efficiency. The hub, the servo inverter, connects to a higher-level control system and enables data exchange and the integration of the unit.

An intelligent Voith servo pump drives signal, under load, any wear-related efficiency loss detected in the system. The higher-level control system receives this data, facilitating maintenance planning and scheduling at an early stage and effectively preventing machine and plant downtime. As a result, on-site service requirements can also be reduced by as much as 70 %.

System integration



Advantages and benefits at a glance

Features	Advantages	Benefits
Reduced pump speed in the part load range and outside the machine cycle	Up to 70% potential energy savings in hydraulic systems	+ **With considerably lower energy costs, you reduce the total cost of ownership (TCO) for your machine or system**
	Noise emissions are reduced by up to 20 dB(A)	+ **Reduced cost and effort for noise abatement; workplace costs guidelines can often be met without the need for additional measures**
Integrated process monitoring	The drive system has its own diagnostics and is Industry 4.0 ready	+ **Maintenance needs can be detected early and extremely quickly** + **Downtime of the machine or plant is considerably less** + **On-site service calls can be reduced by up to 70%**
Volume-flow or pressure control directly via the pump system – not using valves	Hydraulic power loss in the system is lower	+ **Your cooling system is simpler, saving you investment costs**
	The level of heat introduced into the hydraulic system is lower	+ **Lower cooling power results in lower operating costs** + **Components have a longer service life** + **Reduced oil management costs thanks to lower load on the pressure fluid**
Low mass moment of inertia of the internal gear pump	Highly dynamic control	+ **Actuator cycle times can be shortened by up to 50%**
Control parameters of the servo pump integrated into the servo inverter	Voith DrivAx IPS are delivered ready to go	+ **This reduces the development times and costs associated with your machine or system** + **Integration into existing control concepts is easy** + **Our servo pump systems are ideal for retrofit solutions**

A wide range for optimal solutions

Designs

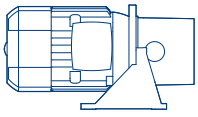
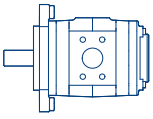
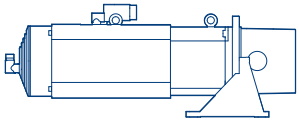
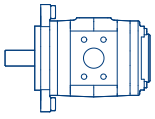
Variable speed pumps in their simplest form are frequency controlled and consist of three main components:

1. Variable frequency drive (VFD)
2. Asynchronous motor
3. Voith internal gear pump

Should your hydraulic system have high control engineered requirements, servo pump drives are the ideal solution. In their basic form, these pump drives consist of three main components:

1. Servo converter
2. Synchronous servo motor
3. Voith internal gear pump

Possible combinations

Variable speed pumps, frequency-controlled						DrivAx IPS					
Variable frequency drive (VFD)	+	Asynchronous motor	+	IPV (High-pressure, up to 345 bar)		Servo inverter	+	Synchronous servo motor	+	IPS (High-pressure, up to 345 bar)	
											

An impressive comparison

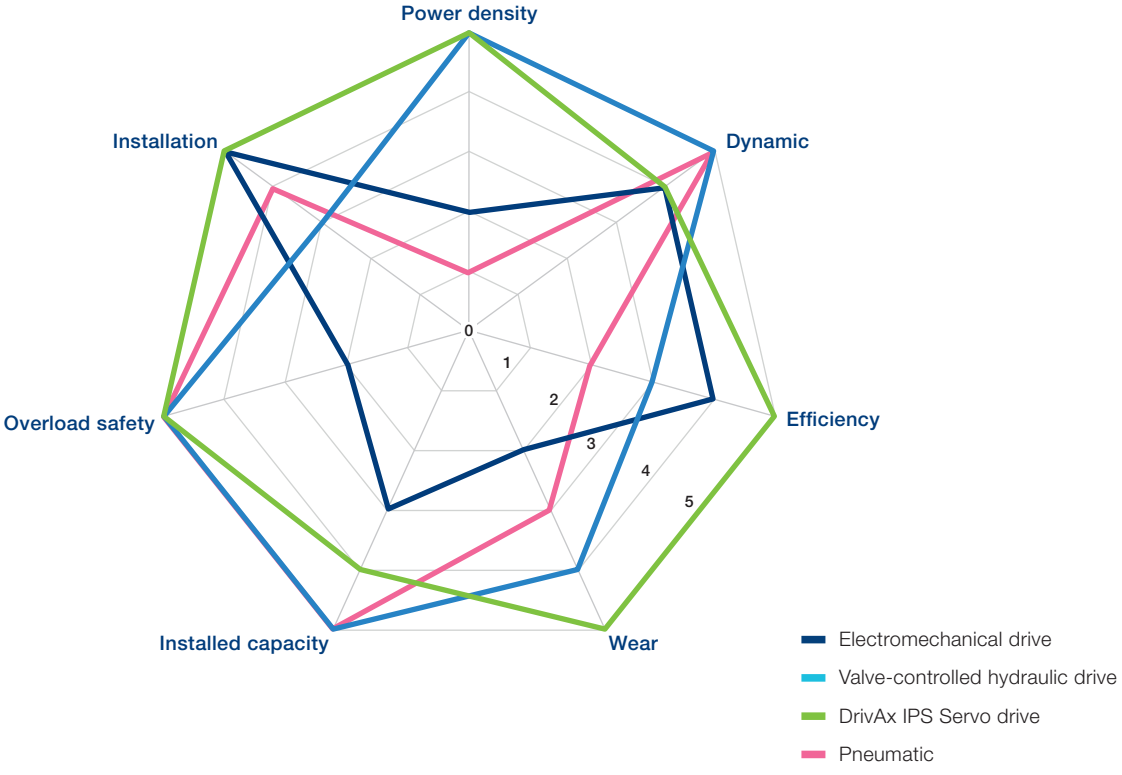
Conventional hydraulic systems usually have constant volume flows. As a result, these systems have virtually constant energy consumption.

Using servo pumps makes it possible to vary the volume flows in hydraulic systems. In the part load range and outside the machine cycle, the servo pumps operate at lower speeds or stop altogether. Servo pumps reduce the energy consumption by up to 70 %.

Servo pump drives also reduce the hydraulic system total cost of ownership (TCO) by up to 35 %.

Lastly, amortization of the servo pump drive is usually achieved within one to two years.

Comparison of different drive systems



General technical data internal gear pump

Design	Internal gear pump with radial and axial sealing gap compensation
Type	IPS
Mounting types	SAE hole flange; ISO 3019/1
Line mounting	SAE suction and pressure flange J 518 C Code 61 / 62
Sense of rotation	left or right hand rotation
Mounting position	any
Shaft load	for details please contact J.M. Voith SE & Co. KG
Input pressure	0.8…3 bar absolute pressure (at start up for short time 0.6 bar)
Preload pressure. pressure port (in reversing mode)	for details please contact J.M. Voith SE & Co. KG
Pressure fluid	HLP mineral oils DIN 51524. part 2 or 3
Viscosity range of the pressure fluid	10…300 mm^2s^{-1} (cSt). up to n = 1 800 min^{-1} 10…100 mm^2s^{-1} (cSt). up to n_{max}
Permissible start viscosity	max. 2 000 mm^2s^{-1} (cSt)
Permissible temperature of the pressure fluid	-20 ... + 80 °C
Required purity of the pressure fluid according	Class 19 / 17 / 14 (ISO 4406). Class 8 (NAS 1638)
Filtration	filtration quotient min. $\beta_{20} \geq 75$. recommended $\beta_{10} \geq 100$ (longer life)
Permissible ambient temperature	-20 ... + 60 °C

Static characteristics

Type. size – delivery	Displacement per revolution [cm^3]	Speed min. [min^{-1}]	Speed max. [min^{-1}]	Delivery at 1 500 rpm [l/min]	Delivery at n_{max} [l/min]	Con-tinuous pressure [bar]	Peak pressure at 1 500 rpm [bar]	Moment of inertia [kg cm^2]
IPS 3 – 3,5	3.6	400	3600	5.4	13.0	330	345	0.34
IPS 3 – 5	5.2	400	3600	7.8	18.7	330	345	0.42
IPS 3 – 6,3	6.4	400	3600	9.6	23.0	330	345	0.49
IPS 3 – 8	8.2	400	3600	12.3	29.5	330	345	0.58
IPS 3 – 10	10.2	400	3600	15.3	36.7	330	345	0.70
IPS 4 – 13	13.3	400	3600	19.9	47.9	330	345	2.25
IPS 4 – 16	15.8	400	3600	23.7	56.9	330	345	2.64
IPS 4 – 20	20.7	400	3600	31.0	74.5	330	345	3.29
IPS 4 – 25	25.4	400	3600	38.1	91.4	300	330	3.70
IPS 4 – 32	32.6	400	3600	48.9	117.4	250	280	4.44
IPS 5 – 32	33.1	400	3000	49.6	99.3	315	345	8.62
IPS 5 – 40	41.0	400	3000	61.5	123.0	315	345	10.20
IPS 5 – 50	50.3	400	3000	75.4	150.9	280	315	11.60
IPS 5 – 64	64.9	400	3000	97.3	194.7	230	250	14.40
IPS 6 – 64	64.1	400	2600	96.1	166.7	300	330	25.73
IPS 6 – 80	80.7	400	2600	121.0	209.8	280	315	30.90
IPS 6 – 100	101.3	400	2600	151.9	263.4	250	300	36.10
IPS 6 – 125	126.2	400	2600	189.3	328.1	210	250	43.70
IPS 7 – 125	125.8	400	2500	188.7	314.5	300	330	84.05
IPS 7 – 160	160.8	400	2500	241.2	402.0	280	315	102.60
IPS 7 – 200	202.7	400	2500	304.0	503.8	250	300	119.00
IPS 7 – 250	251.7	400	2500	377.5	629.3	210	250	144.50

The values given apply for

- Pumping of mineral oils with a viscosity of 20…40 mm^2s_{-1}
- An input pressure of 0.8…3.0 bar absolute

Notes

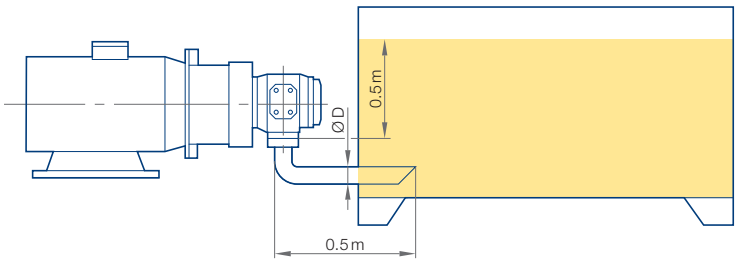
- Peak pressures apply for 15 % of operating time with a maximum cycle time of 1 minute.
- Please consult us about peak pressures at non-standard speeds.
- Due to production tolerances. the pump volume may be reduced by up to 1.5 %.
- The values for min. and max. speed are dependent on pressure! Please see exact dates on the diagrams from the following pages. At speeds below 400 rpm the pressure must be reduced according to the curve. At high speeds this may be the case as well.
- The pump can be temporarily operating below the specified minimum speed in pressure-hold function. The holding time and the rotational speed required for this purpose is obtained in dependence of the viscosity and of the operating pressure levels. For design details please contact J.M. Voith SE & Co. KG.

Dynamic characteristics

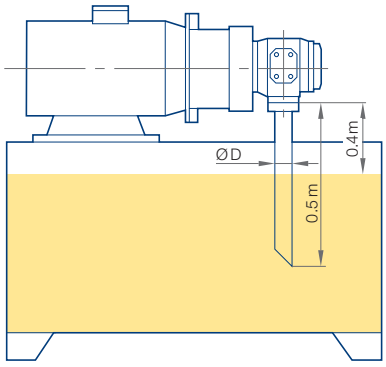
Admissible acceleration [rad/s²]

Size	Delivery	Operation mode A	Operation mode B	Size	Delivery	Operation mode A	Operation mode B	Size	Delivery	Operation mode A	Operation mode B
IPS 3	3,5	4200	4200	IPS 5	32	8911	5582	IPS 7	125	6053	3811
	5	4200	4200		40	7129	4442		160	6724	4250
	6,3	4200	4200		50	9628	6067		200	7349	4658
	8	4200	4200		64	7403	4643		250	5894	3727
	10	4200	4200								
IPS 4	13	6908	4170	IPS 6	64	7533	4739				
	16	6923	4199		80	5937	3718				
	20	6140	3715		100	7552	4768				
	25	6241	3801		125	6026	3792				
	32	8985	5606								

Operation mode A



Operation mode B



Ø D = Diameter suction flange pump housing

The values given apply for

- Dimensioning of the suction port according to operating case A or B
- Pumping of mineral oils with a viscosity of 20 … 60 $mm^2 s^{-1}$ (cSt)

Notes

- Pressure can be built up from standstill when the pump is fully vented. System-related emptying of the pump must be prevented after initial startup.
- The volumetric flow can be freely adjusted via the speed; attention must be paid to the respective pump-specific characteristics.
- Highly dynamic deceleration can be realized, the pressure at the suction side must not exceed the limit value.
- It can be reversed in a highly dynamic manner to reduce pressure peaks or to realize a generator operation. The pressure on the pressure side must not fall below the applied suction pressure.
- The maximum acceleration must be adapted to the installation situation, the viscosity and the suction pressure. Please consult table dynamic characteristics.
- High pressures can be generated at low speeds, attention must be paid to the temperature of the pump. The permissible temperature of the hydraulic fluid must never be exceeded.
- To ensure safe operation, the cycle at the pump should be tested for critical operating points using appropriate sensors and at least 1 kHz sampling rate.

Diagram IPS 3 and IPS 4 – Continuous pressure depending on the speed

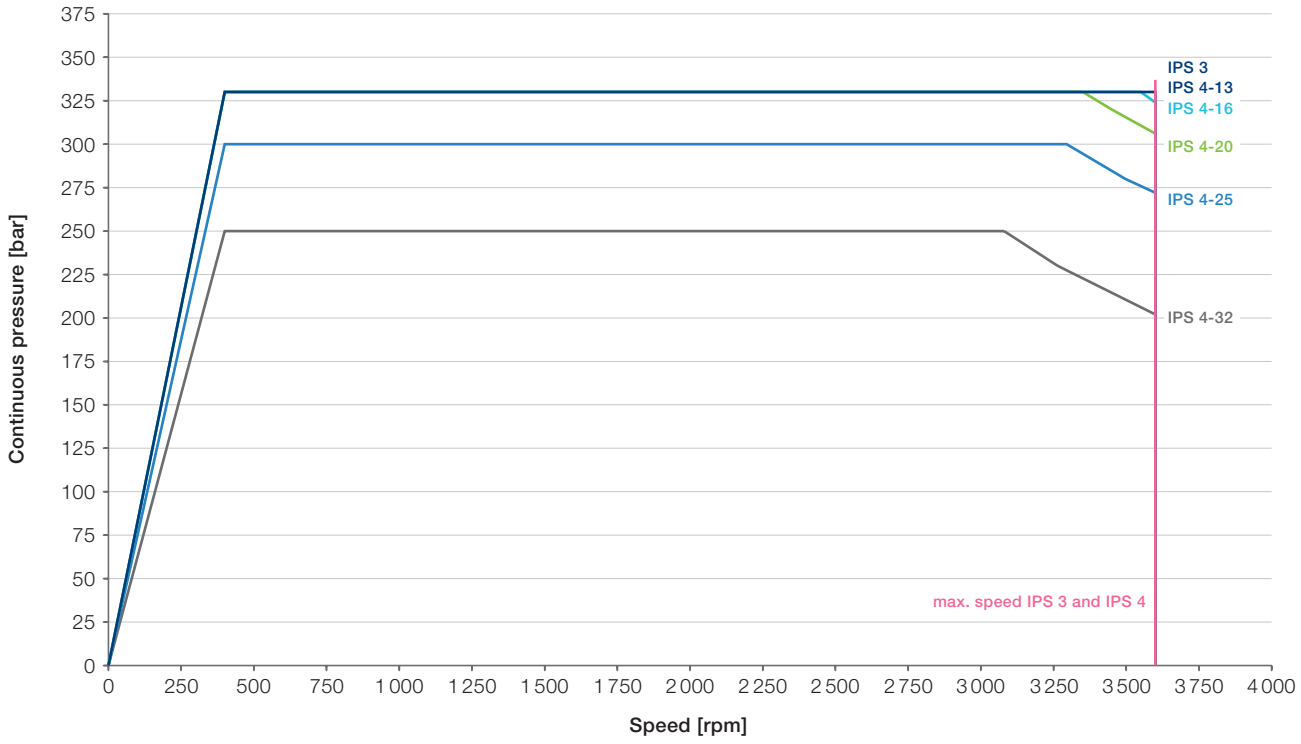


Diagram IPS 5 – Continuous pressure depending on the speed

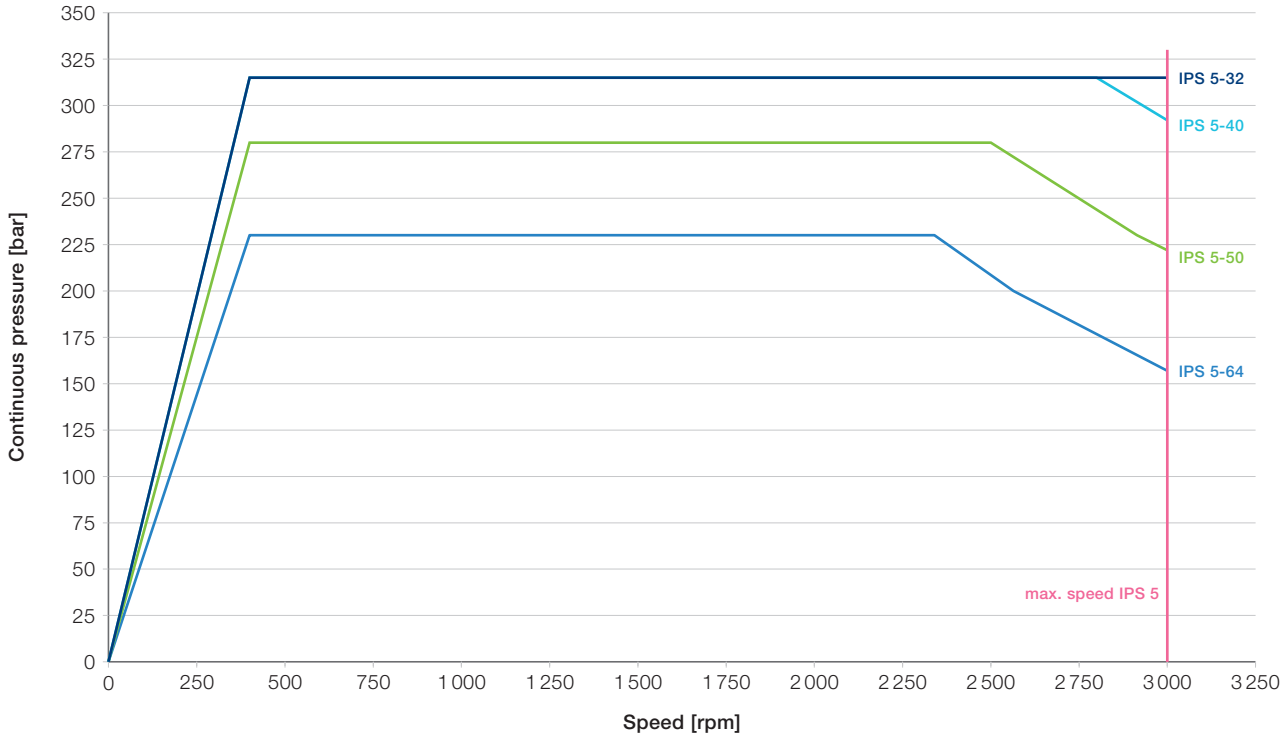


Diagram IPS 6 – Continuous pressure depending on the speed

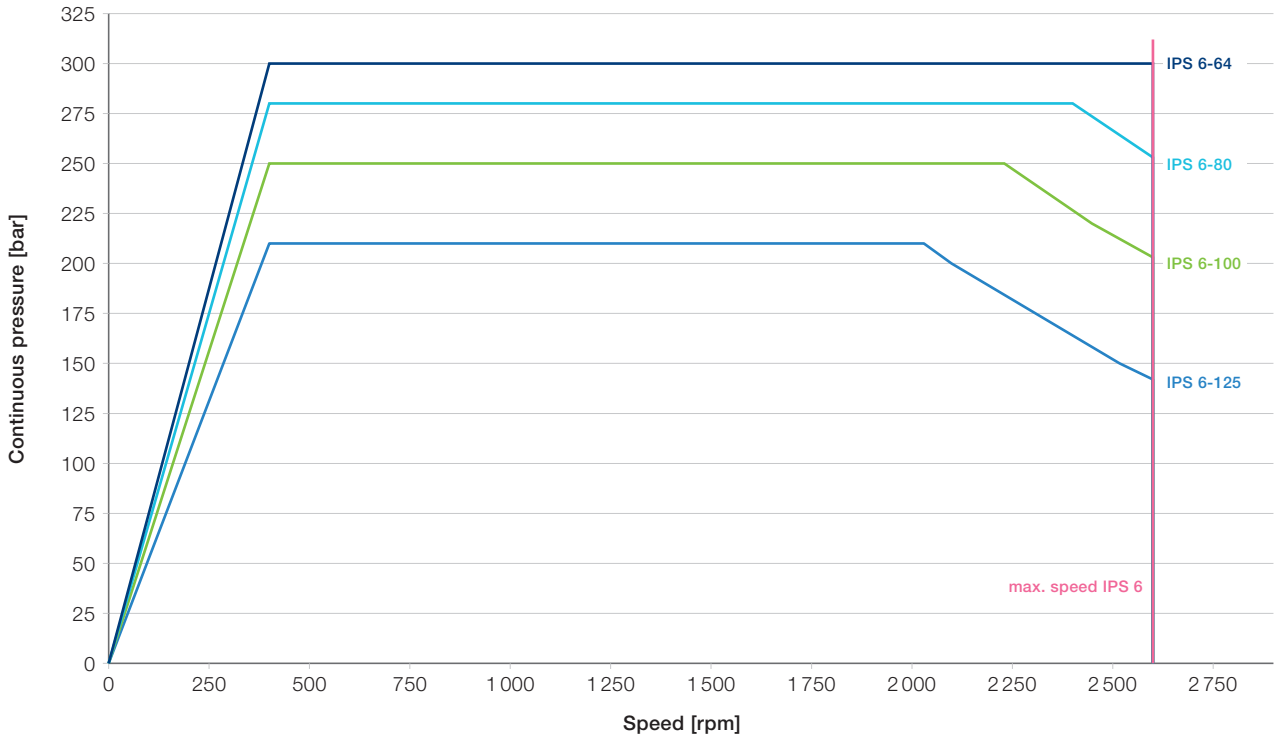
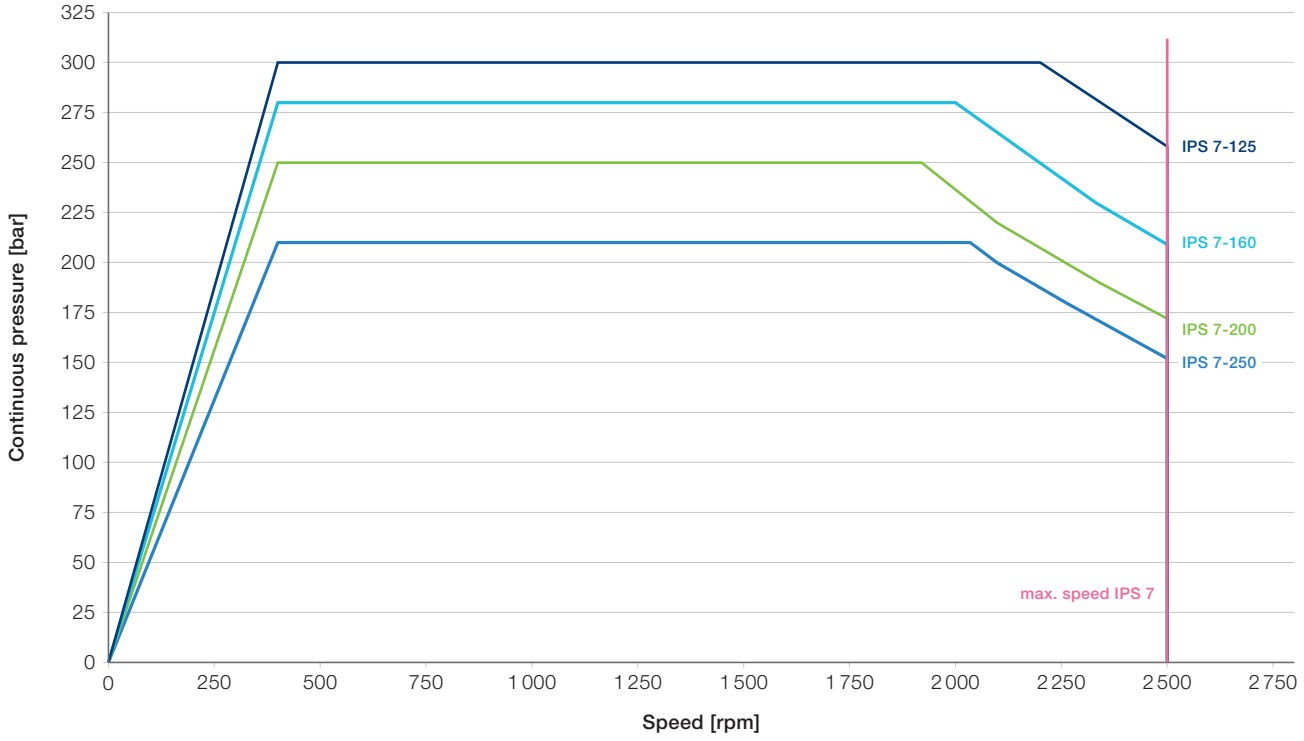


Diagram IPS 7 – Continuous pressure depending on the speed



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