

Sytronix – variable-speed pump drives

Energy-efficient | Powerful | Cost-effective





Sytronix variable-speed pump drives change the game with hydraulic systems and offer new opportunities for innovative designs. Energy-efficient solutions using components matched to the application and an in-depth knowledge of the technology are key.

Investment in energy saving technology using Bosch Rexroth hydraulics can provide fast returns, with energy savings up to 80%.

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Sytronix – energy-efficient variable-speed pump systems

Older machine designs focused on systems that had the capacity to deliver maximum performance, even though it might have only been for a fraction of the total cycle. Today there is a greater emphasis on reducing energy consumption and noise emissions. Higher energy prices and workplace environmental requirements have engineers rethinking their designs.

Using Sytronix (**smart interplay of hydraulics and electronics**) variable-speed pump drives can address these issues by combining the advantages of Bosch Rexroth technologies: reliability of high-performance hydraulics and energy-efficiency and dynamics of high-performance drives and electronics.

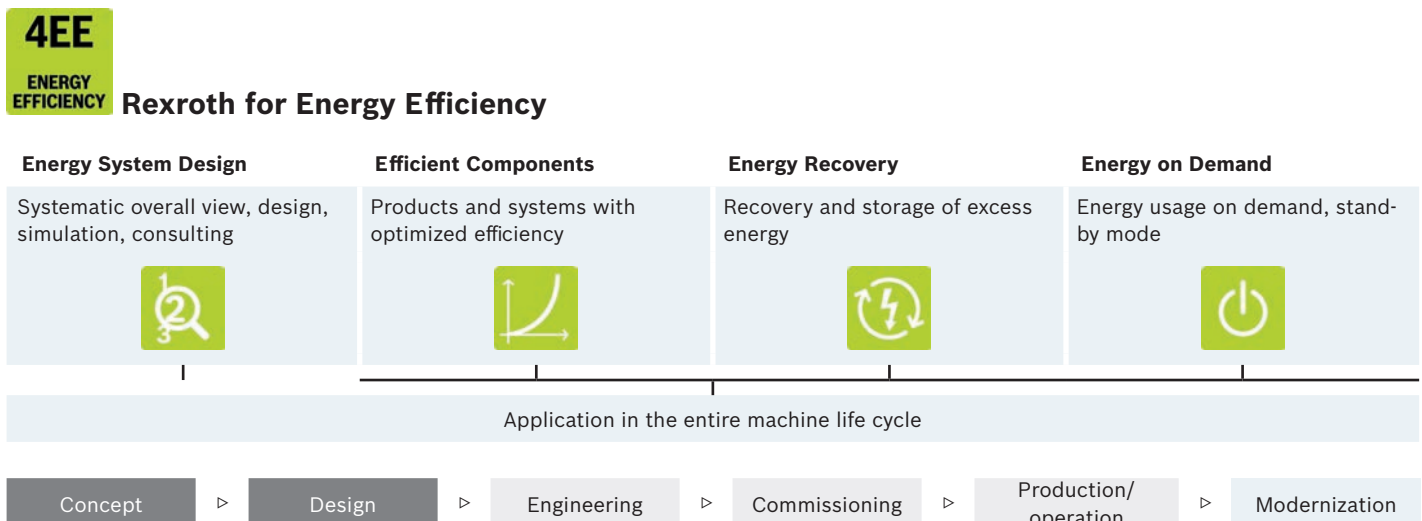
Sytronix drives combine matched electric motors, hydraulic pumps, and VFDs (variable frequency drives), which has the potential of significant energy savings and a considerable reduction in noise emissions at a cost that provides an attractive return on investment.

Energy on Demand – powerful hydraulics, intelligent control

By integrating the advantages of hydraulics with the control intelligence of electrical drives, motor speeds can be continually adjusted to match the machine’s requirements. The drive speed of the pump can be lowered to an energy-efficient, quiet level when the process requires less than full performance.

By having a major portion of the machine cycle time matched to the part-load requirement, energy is saved and noise is reduced.

Sytronix systems are part of Bosch Rexroth’s **4EE strategy** for system energy reduction.



Sytronix: efficient and versatile

To meet the requirements of pump drive systems – Sytronix systems can provide a number of key advantages:

- ▶ Energy savings up to 80%
- ▶ Reduction in noise emissions up to 20 dB (A)
- ▶ Low investment and reduced operating costs



Sytronix Advantages

Reduced energy consumption

Energy savings up to 80% to decrease operating costs and reduce CO2 emissions.

Lower noise emission

Sytronix drives can reduce the noise emission of the hydraulic power unit up to 20 dB (A). Meeting stringent noise specifications in certain market areas is easier and may be accomplished with noise control measures.

Easier installation and commissioning

Pre-configured Sytronix hydraulic pump drives and assemblies utilize matched components to provide complete pump drive systems. This results in short installation and commissioning times. Rexroth offers more than 100 drive configurations in three different performance classes.

Easier cooling

By lowering the average pump drive speed, variable-speed pump drives can significantly reduce generated heat, minimizing the cost and energy required to cool the hydraulic system.

Lower space requirements

Using Sytronix drives can lower space requirements for the hydraulic system:

- ▶ Compact design
- ▶ Simpler valve technology and reduced requirements for control electronics
- ▶ Reduced hydraulic fluid volume resulting in smaller reservoir requirements
- ▶ Reduction in space for cooling due to reduced heat loads and elimination of most noise containment hardware

More reliable operation

- ▶ Integrated system design using proven hydraulic and electrical components
- ▶ Condition monitoring and diagnosis available in the drive control electronics

Retrofit design assistance

Rexroth can provide customers with support throughout the retrofitting process, from planning to assembly to on-site commissioning.

Compliance with regulatory requirements

Sytronix variable-speed pump drives can assist with compliance for noise control (EU Directive 2003/10/EC) and electric motor energy efficiency (EU Regulation (EC) no. 640/2009).

Application areas

- ▶ **Wood and paper processing machines**
- ▶ **Plastics processing machines**
- ▶ **Die-casting machines**
- ▶ **Presses**
- ▶ **Machine tools**

Sytronix system overview

Scalable power and functionality

Sytronix variable-speed pump drives offer a comprehensive range of pumps, controllers, motors and software to suit a wide spectrum of applications. Rexroth provides machine manufacturers support during project planning, utilizing simulation models for system design and component selection. Scalability of performance and function allows for an optimal choice of system components.

When using a cascade system, multiple Sytronix drives can work together to efficiently generate the flow rate required for the process.

Sytronix systems are available as pre-configured systems or as individually configured components.

Always the right Sytronix system

Rexroth offers variable-speed pump drives in three performance classes:

Basic Dynamics

Sytronix FcP – frequency-controlled pump drive

FcP systems are suitable for standard applications with constant pressure control, for open hydraulic systems up to 90 kW. Typical applications are machine tool systems.

High Dynamics

Sytronix SvP – servo variable pump drive

SvP systems use the high dynamics of synchronous permanent magnet motors to achieve significant energy savings. Capabilities include axis control functions in both open and closed hydraulic circuits requiring high dynamic performance, as well as advanced electrical and electrohydraulic control. Plastics processing machines and presses are key sectors for this technology.

High Power and Dynamics

Sytronix DFE – variable-speed drive utilizing a pump with electronic pressure and flow control

DFE systems are suited for high performance applications requiring a favorable price-performance ratio. These systems utilize variable displacement piston pumps and are especially suited for retrofit installations in existing systems. Capable of axis control functions, these drives offer high performance in open hydraulic circuits, and can be used in machines with multiple hydraulic functions.

The Sytronix house

Sytronix

Variable-Speed Pump Drives

Preconfigured sets

Sytronix FcP



- Sets for constant pressure
- Pressure and flow control

Basic dynamic

Sytronix SvP



- Sets for axis control
- Pressure and flow control
- Force and velocity control
- Positioning

High dynamic

Sytronix DFE



- Sets for axis control
- Pressure and flow control with variable displacement pump
- Power control

High dynamic & high power

Individual Sytronix solutions

Customized solutions from the Rexroth extensive electrics and hydraulics program



- Communication via Ethernet and other fieldbuses
- Modular or compact power unit cluster
- Master/Slave operation
- Cascaded pumps
- Safety on Board
- Custom system functions



Sytronix selection guide

Requirements			Effective performance			
			From 1.5 to 30 kW	> 30 to 70 kW	> 70 to 90 kW	> 90 to 315 kW
Open and closed-loop axis control	Closed hydraulic circuit		SvP 7010			
	Open hydraulic circuit	One hydraulic circuit in the machine	DFE 5010/7010			
		Multiple hydraulic circuits in the machine				
Constant pressure system	Open hydraulic circuit		FcP 5010/7010			

The Sytronix selection guide shows the Rexroth Sytronix product family.

Open and closed-loop axis control

- ▶ For closed hydraulic circuits, Sytronix SvP speed-variable drives offer high dynamics and comprehensive electrical and electrohydraulic control options. In open hydraulic circuits, the Sytronix DFE system, utilizing electronic pump control of pressure/flow (p/Q), is an alternative option. DFE-based hydraulic drives offer an addition to the performance portfolio and are suitable for machines with multiple hydraulic circuits.
- ▶ In cascade systems, multiple Sytronix drives work together to efficiently generate the flow rate required for the process.

Constant pressure systems

- ▶ For constant pressure systems, cost effective Sytronix FcP drives using VFD driven asynchronous motors are suitable for conventional drives up to 90 kW.

Two options for sytronix systems

After choosing the appropriate product family using the selection guide, there are two options for the pump system to fit the requirements:

- ▶ **Pre-configured systems** from the product families of FcP, SvP or DFE using the selection guides (see next page).
- ▶ Assembly of **individual systems** by combining modules and components using application guidelines and system requirements. This can be done in collaboration with Rexroth applications specialists (see “Sytronix individual solutions” on page 43).

Selecting pre-configured systems

Use the following selection guides for each product family to determine your options based on the following three parameters.

Three steps for choosing a Sytronix system

1. **Select a flow**
▼
2. **Select a system pressure**
▼
3. **Select a performance level**

The Sytronix system key guides the user to a system selection. For a definition of the Sytronix system key, please see page 11.

Steps 1 + 2

Selection guide for flow, system pressure, and controller (e.g. Sytronix FcP 5010 with PGF)

Pumps ¹⁾ n _{max} = 3600 rpm					Motors ¹⁾								
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MOT-FC 411 (self-ventilated)								
					1.5	2.2	3	4	5.5	7.5	11	15	p _{nom} [kW]
					4200	4000	4000	4000	4000	4000	3800	3800	n _{max} [rpm]
					p _{eff} [bar]								
PGF2 006	006	250	210	23	67	98	135	176					
PGF2 008	008	250	210	29	53	78	107	139	193				
PGF2 011	011	250	210	39	40	58	80	104	144	196			
PGF2 013	013	250	210	47	33	48	66	86	119	162			
PGF2 016	016	250	210	57	27	40	55	71	99	135	198		
PGF2 019	019	250	210	68	23	34	47	61	84	114	168	228	
PGF2 ²⁾ 022	022	210	180	66	20	29	40	52	72	98	144	196	
					K [%]								
Controller	Rexroth Fv FVCA01.1	0K75			118	87							
		1K50			162	120							
		2K20					90						
		4K00					164	127	91				
		5K50						165	118	87			
		7K50							155	113			
		11K0								160	114	86	
15K0									157	118			

Selection example for system key

SYT-FCP5010-PGF ******* -S-FC2NS ******* -FV ******* -NNNN -----> SYT-FCP5010-PGF **047** -S-FC2NS **086** -FV **127** -NNNN

1
2
3
1
2
3

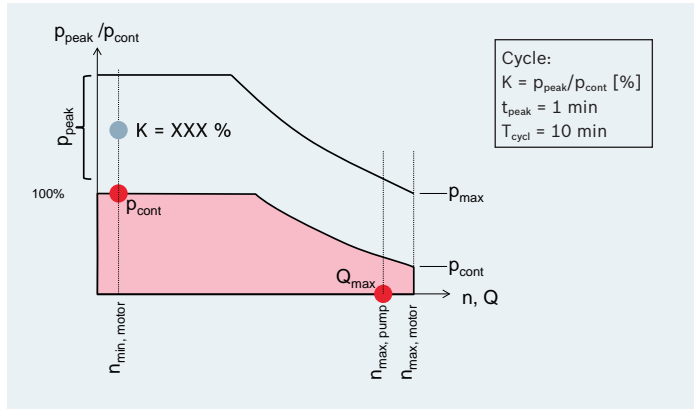
Step 3

The performance of your pump system is determined by the peak load that can be obtained in intermittent operation, without damage to the pump drive system. It is defined as the ratio p_{max}/p_{cont} and described as the factor K in %.

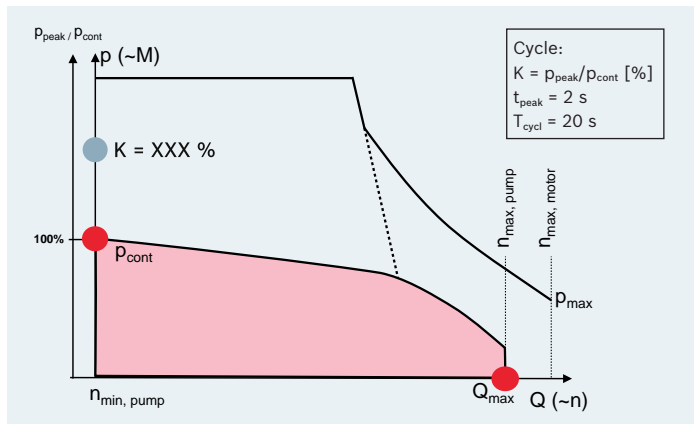
The individual pump-motor combinations determine the characteristic curves for the appropriate Sytronix system.

Sytronix selection guides for individually configured system components

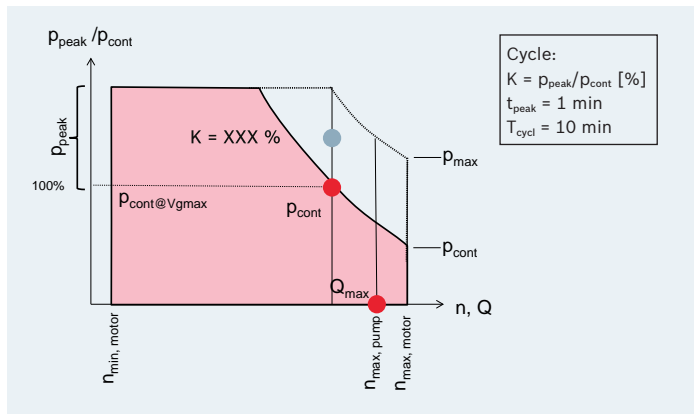
To configure a Sytronix system, all required components are available separately (see “Components” on page 47). Bosch Rexroth specialists can provide support for the selection process. Steps and selection guides are described in the section “Individual solutions” (see “Sytronix individual solutions” on page 43).



Performance curve, example FcP 5010 – forced ventilation, constant pump



Performance curve, example SvP 7010 – forced ventilation, constant pump



Performance curve, example DFE 5010 – self-ventilated, variable pump

Sytronix system key

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
SYT	-			-			-				-			-

Example

SYT	-	DFE	50	10	-	D10	xxx	-	S	-	FC2	N	A	xxx	-	FV	xxx	-	NNNN
-----	---	-----	----	----	---	-----	-----	---	---	---	-----	---	---	-----	---	----	-----	---	------

	Description	Pos.	Designation	Entry
System	Product line	01	Sytronix	SYT
	Product family	02	SvP FcP DFE	SVP FCP DFE
	Series	03	Rexroth Fv = 50 IndraDrive Hxx = 70	50 70
	Generation	04	10	10
Pump	Pump technology	05	PGH PGM PGF A10 A4 DFE-A10 DFE-A04	PGH PGM PGF A10 A04 D10 D04
	System flow	06	l/min	xxx
	Coupling	07	Direct Standard	D S
Motor/system pressure/controller	Motor technology	08	Servo = MSK Asynchronous = MOT-FC IE2 Servo asynchronous = MAD	MSK FC2 MAD
	Rated speed (winding)	09	1500 (0150) 2000 (0200) 3000 (0300)	F H N
	Motor cooling	10	Forced ventilation (IC 416) Self-ventilated (IC 411) Liquid-cooled Convection	A S L N
	Nominal pressure Motor-pump unit	11	bar	xxx
	Controller	12	Rexroth Fv frequency converter IndraDrive HCS IndraDrive HMV/HMS	FV HC HM
	Performance overload	13	%	xxx
Implementation	14		NNNN	

Sytronix FcP variable-speed pump drives

FcP system sets

Sytronix FcP (**f**requency **c**ontrolled **p**ump drive) systems consist of a motor-pump assembly with a standard asynchronous motor and a VFD with control electronics. With regard to dynamics, accuracy and functionality, the FcP product family covers standard performance hydraulic drives and is suitable in the following applications:

- ▶ Constant pressure systems up to 90 kW
- ▶ Applications with controlled volume flow profile or where alternating p/Q control is required
- ▶ Open hydraulic circuits
- ▶ Single quadrant operation

Starting with the basic FcP system, a PGF family internal gear pump is used for pressure and flow control. For higher pressure and performance, the PGH internal gear pump is utilized, as well as A10 and A4 axial piston variable displacement pumps. When used at high pressures, utilizing variable displacement piston pumps helps to reduce the torque on the electric motor so that a smaller drive can be selected.

FcP 5010 and FcP 7010 utilize different VFD drive electronics. Differences include the type and scope of communication and bus interfaces, as well as additional functionality and user interfaces.

Components

- ▶ Hydraulic pump
- ▶ Electric motor
- ▶ FVD with control electronics
- ▶ Pressure transducer

Applications

The FcP systems are energy-efficient variable-speed pump drives for constant pressure systems (e.g. machine tools) with open hydraulic circuits.

Sytronix FcP systems

Sytronix FcP key advantages:

- ▶ Cost-effective, energy-efficient drive
- ▶ Intuitive and easy setup and configuration
- ▶ Optional additional control features

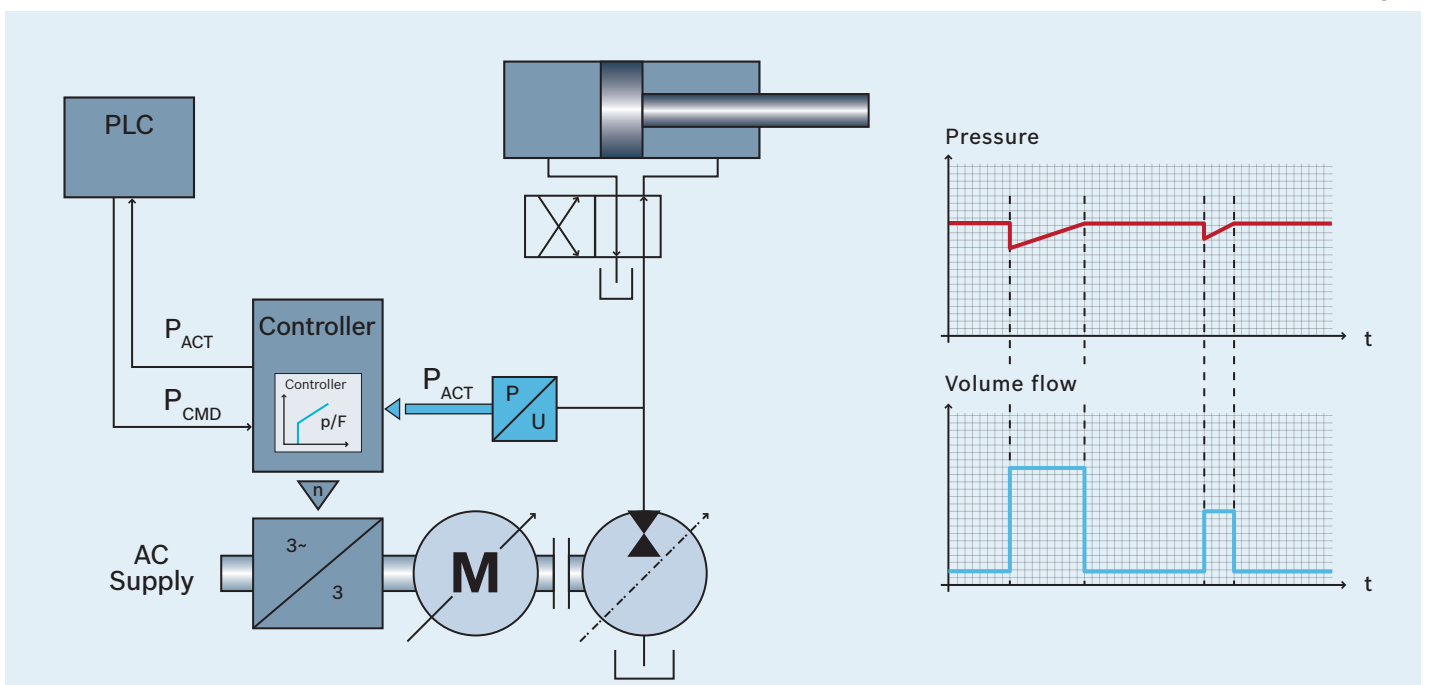


Function

In constant pressure systems, the drive controls the motor speed to maintain constant system pressure. This is accomplished by modulating the flow to provide constant system pressure independent of the flow demand. Use of additional hydraulic accumulators ensures fast pressure requirements in smaller systems. Conventional directional valves control the flow direction and determine the direction of travel the hydraulic actuator.

The desired pressure setting is determined by the machine control and used as a command value to the VFD. The VFD control compares the command value with the actual value measured by a pressure transducer and adjusts the motor speed accordingly.

FcP block diagram



FcP 5010

Features

- ▶ Performance up to 90 kW effective
- ▶ FcP 5010 based on the Rexroth Fv VFD offering standard control features and analog and PROFIBUS interfaces. Simple on-board configuration using the interface control panel.
- ▶ Single quadrant operation
- ▶ Pump protection

Components

- ▶ MOT-FC motor with forced or self-ventilation
- ▶ Pump types PGF, PGH, A10VZO-EZ4, and A4VSO
- ▶ Rexroth Fv VFD FVCA01.1 control

Applications

- ▶ Suitable for use in open hydraulic circuits for central pressure supply in assemblies with multiple axes: i.e. constant pressure systems. FcP is an energy-saving solution and can reduce hydraulic energy consumption by 30 to 70%, depending on the operational cycle. Typically a smaller displacement pump can be used and cooling requirements are reduced for the same hydraulic output.
- ▶ Systems up to 20 kW commonly used in machine tools
- ▶ Systems from 20 to 90 kW found in axis control in the metal processing and press industries. In these fields axial piston pumps optimized for higher system pressure operation are typically used



FcP5010 with PGF

Selection guide for Sytronix FcP 5010 with PGF

Pumps ¹⁾ n _{max} = 3600 rpm					Motors ¹⁾								p _{nom} [kW] n _{max} [rpm]
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MOT-FC 411 (self-ventilated)								
					1.5	2.2	3	4	5.5	7.5	11	15	
					4200	4000	4000	4000	4000	4000	3800	3800	
					p _{eff} [bar]								
PGF2	006	210	250	23	67	98	135	176					
PGF2	008	210	250	29	53	78	107	139	193				
PGF2	011	210	250	39	40	58	80	104	144	196			
PGF2	013	210	250	47	33	48	66	86	119	162			
PGF2	016	210	250	57	27	40	55	71	99	135	198		
PGF2	019	210	250	68	23	34	47	61	84	114	168	228	
PGF2 ²⁾	022	180	210	66	20	29	40	52	72	98	144	196	

Controller	Rexroth Fv FVCA01.1	K [%]											
		0K75	1K50	2K20	4K00	5K50	7K50	11K0	15K0				
		118	87										
		162	120	90									
				164	127								
					165	91							
						118	87						
						155	113						
							160	114					
								157	86				
									118				

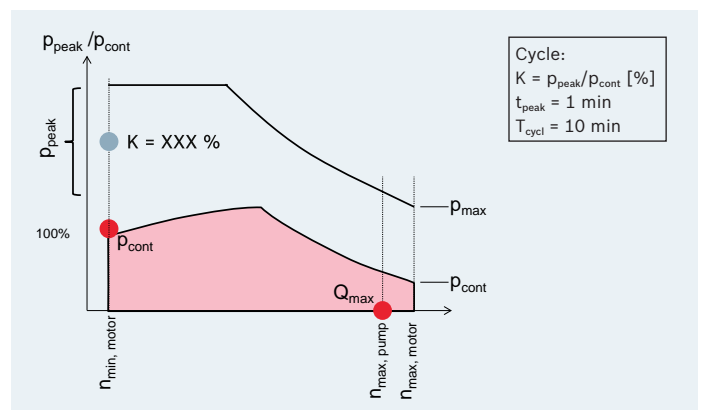
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" on page 61)

Selection example for system key

SYT-FCP5010-PGF ******* -S-FC2NS ******* -FV ******* -NNNN -----> SYT-FCP5010-PGF **047** -S-FC2NS **086** -FV **127** -NNNN

Detailed component information:

Motors: see "Motors" on page 48
 Pumps: data sheet 10213
 Controller: catalog R999000241 (DE), R999000242 (EN)



Performance curve for FcP 5010 – self-ventilated

FcP 5010 with PGH

Selection guide for Sytronix FcP 5010 with PGH

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾														p _{nom} [kW]	n _{max} [rpm]
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MOT-FC 411 (self-ventilated)							MOT-FC 416 (forced ventilation)								
					1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
					4200	4000	4000	4000	4000	4000	3800	3800	3800	3800	3800	2800	2800	2800	2800	2800
					p _{eff} [bar]															
PGH2	005	315	350	15	87	128	176	229												
	006	315	350	18	73	106	147	191	264											
	008	315	350	24	54	80	110	143	198	269										
PGH3	011	315	350	33	40	58	80	104	144	196	288									
	013	315	350	39	33	49	68	88	122	166	244									
	016	315	350	48	27	40	55	71	99	135	198	269								
PGH4	020	315	350	60	22	32	44	57	79	108	158	216								
	025	315	350	75	17	26	35	46	63	86	127	172	302							
	032	315	350	96		20	27	36	49	67	99	135	236	281						
	040	315	350	120		16	22	29	40	54	79	108	188	225	305					
	050	250	310	150			18	23	32	43	63	86	151	180	244					
PGH5	063	315	350	189/176*				18	25	34	50	68	120	143	193	237*	289*			
	080	315	350	240/224*					20	27	40	54	94	112	152	187*	228*	278*		
	100	315	350	300/280*					16	22	32	43	75	90	122	150*	182*	222*	303*	
	125	315	350	375/350*						17	25	34	60	72	98	120*	146*	178*	243*	
	160	210	260	480/448*							20	27	47	56	76	93*	114*	139*	190*	
	200	170	210	600/560*							16	22	38	45	61	75*	91*	111*	152*	
	250	135	170	750/700*								17	30	36	49	60*	73*	89*	121*	

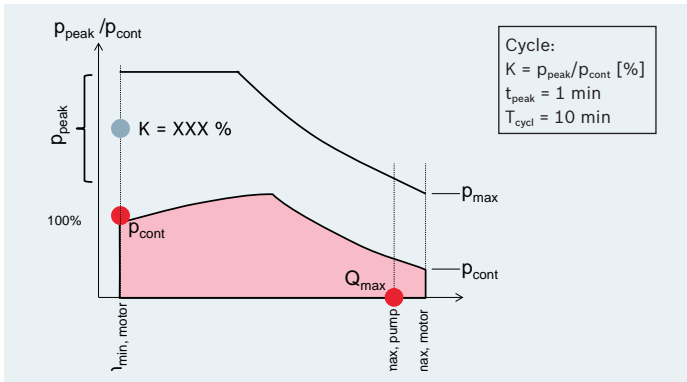
Controller		K [%]																	
Rexroth Fv FVCA01.1	OK75	118	87																
	1K50	162	120	90															
	2K20				164	127	91												
	4K00					165	118	87											
	5K50						155	113											
	7K50							160	114	86									
	11K0								157	118									
	15K0									139	115								
	18K5										157	129	110						
	22K0											176	150	111					
	30K0												188	139	112				
	37K0													176	142	117			
	45K0														164	136	111		
55K0															188	154	117		
75K0																185	141	117	
90K0																			

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" on page 61)

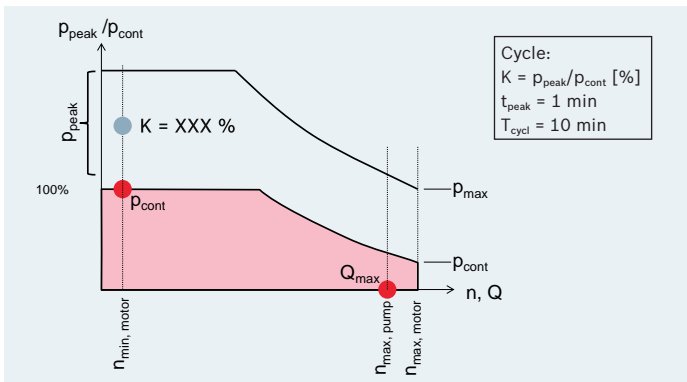
Selection example for system key

SYT-FCP5010-PGH *******-S-FC2NS *******-FV *******-NNNN -----> SYT-FCP5010-PGH **075**-S-FC2NS **127**-FV **114**-NNNN

1
2
3
1
2
3



Performance curve for FcP 5010 – self-ventilated with constant internal gear pump



Performance curve for FcP 5010 – forced ventilation with constant internal gear pump

Detailed component information:
 Motors: see “Motors” on page 48
 Pumps: data sheets 10227, 10223
 Controller: catalog R999000241 (DE), R999000242 (EN)

FcP 5010 with A10VZO-EZ4

Selection guide for Sytronix FcP 5010 with A10VZO-EZ4

Pumps ¹⁾						Motors ¹⁾																					
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)															p _{nom} [kW]	n _{max} [rpm]					
						1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75			90				
						p _{eff} [bar]																					
A10VZO-EZ4	010	250	315	3600	37	59	87	120	156	215	239	413	586	718	856												
	018	280	350	3300	59/50*	35	51	70	91	126	171	257	342	419	499	677	831*										
	028	280	350	3000	84/78*	22	33	45	58	81	110	162	220	269	321	435	534*	615*	794*								
	045	280	350	3000	135/126*	20	28	36	50	68	101	137	168	200	271	332*	405*	494*	674*	810*							
	071	280	350	2550	181			18	23	32	43	64	87	106	126	171	210	256	313	427	513						
	100	280	350	2300	230					16	23	31	45	62	75	90	122	150	182	222	303	364					
	140	280	350	2200	308							16	22	32	44	54	64	87	107	130	159	217	260				
	180	280	350	1800	324									17	25	34	42	50	68	83	101	124	169	202			

Controller	Rexroth Fv FVCA01.1	OK75 1K50 2K20 4K00 5K50 7K50 11K0 15K0 18K5 22K0 30K0 37K0 45K0 55K0 75K0 90K0	K [%]														
						118 162 120 164 127 165 118 155 113 160 114 157 118 186 139 115 157 129 110 176 150 111 188 139 112 176 142 117 164 136 111 188 154 117 185 141 117											

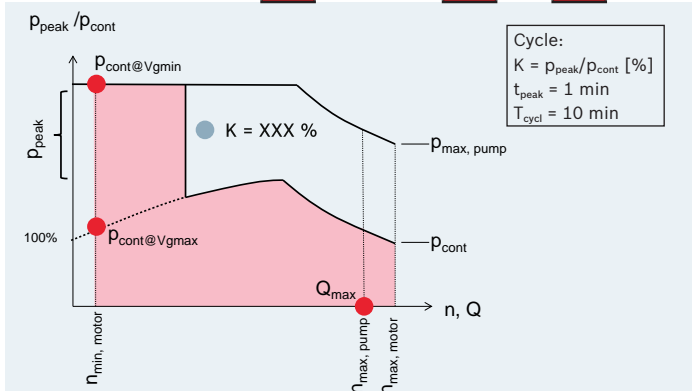
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-FCP5010-A10 ******* -S-FC2NS ******* -FV ******* -NNNN -----> SYT-FCP5010-A10 **084** -S-FC2NS **110** -FV **113** -NNNN

*** *** ***
084 110 113

Detailed component information:
 Motors: see "Motors" on page 48
 Pumps: data sheet 91485
 Controller: catalog R999000241 (DE), R999000242 (EN)



FcP 5010 with A4VSO

Selection guide for Sytronix FcP 5010 with A4VSO

Pumps ¹⁾						Motors ¹⁾															
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)									p _{nom} [kW]	n _{max} [rpm]					
						18.5	22	30	37	45	55	75	90	3800			3800	3800	2800	2800	2800
						p _{eff} [bar]															
A4VSO	040	350	400	2600	104	188	225	305	375												
	071	350	400	2200	156	106	127	172	211	257	313										
	125	350	400	1800	225	60	72	98	120	146	178	234	292								
	180	350	400	1800	324			68	83	101	124	169	202								
	250	350	400	1900	475				60	73	89	121	146								
	355	350	400	1700	603					51	63	85	103								
500	350	400	1500	750							61	73									
						K [%]															
Controller	Rexroth Fv FVCA01.1					15K0	115														
		18K5	129	110																	
		22K0	176	150	111																
		30K0				112															
		37K0				139															
		45K0				176					142	117									
		55K0								164	136	111									
		75K0									188	154	117								
		90K0										185	141	117							

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on "Motor-pump modules" on page 61)

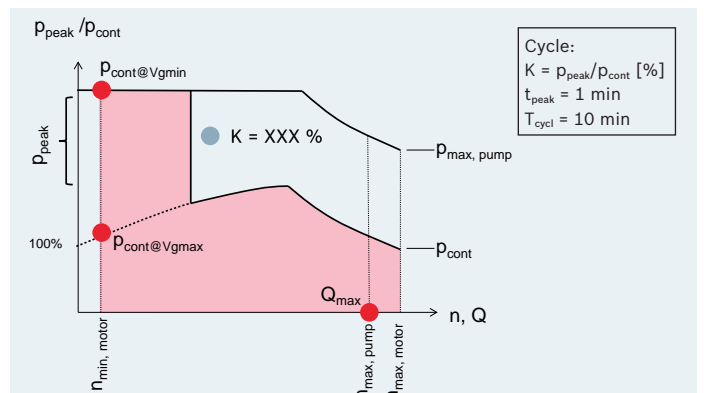
Selection example for system key

SYT-FCP5010-A04 ******* 1 -S-FC2NS ******* 2 -FV ******* 3 -NNNN -----> SYT-FCP5010-A04 **225** 1 -S-FC2NS **120** 2 -FV **112** 3 -NNNN

Detailed component information:

Motors: see "Motors" on page 48
 Pumps: data sheet 92050
 Controller: catalog R999000241 (DE), R999000242 (EN)

Performance curve for FcP 5010 – self-ventilated with axial piston pump with two-point adjustment



FcP 7010

Features

- ▶ Performance up to 90 kW effective
- ▶ Support for most industry standard buses: CANopen, PROFIBUS, sercos, EtherNet/IP, ProfiNet, and EtherCAT.
- ▶ Drive-integrated PLC for enhanced capabilities, based on IEC-61131
- ▶ Single quadrant operation
- ▶ “Safety on Board”, auto-tuning, pump protection, pressure ripple compensation, condition monitoring

Components

- ▶ MOT-FC motor with forced or self-ventilation
- ▶ Pump types PGF, PGH, A10VZO-EZ4, and A4VSO
- ▶ IndraDrive controller
- ▶ Exchangeable control section

Applications

- ▶ Similar to the FcP 5010 series, typical uses are in constant pressure systems for open hydraulic circuits and controlled axis movement. In addition, the FcP 7010 using the IndraDrive controller provides further functional control features.
- ▶ Systems up to 20 kW commonly used in machine tools
- ▶ Systems from 20 to 90 kW found in axis control in the metal processing and press industries. In these fields axial piston pumps optimized for higher system pressure operation are typically used



FcP 7010 with PGF

Selection guide for Sytronix FcP 7010 with PGF

Pumps ¹⁾ n _{max} = 3600 rpm					Motors ¹⁾									
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MOT-FC 411 (self-ventilated)									
					1.5	2.2	3	4	5.5	7.5	11	15	p _{nom} [kW]	
					4200	4000	4000	4000	4000	4000	3800	3800	n _{max} [rpm]	
					p _{eff} [bar]									
PGF2	006	250	210	23	67	98	135	176						
PGF2	008	250	210	29	53	78	107	139	193					
PGF2	011	250	210	39	40	58	80	104	144	196				
PGF2	013	250	210	47	33	48	66	86	119	162				
PGF2	016	250	210	57	27	40	55	71	99	135	198			
PGF2	019	250	210	68	23	34	47	61	84	114	168	228		
PGF2 ²⁾	022	210	180	66	20	29	40	52	72	98	144	196		

²⁾ n_{max} = 3000 rpm

Controller				K [%]									
Rexroth In- draDrive C	HCS01.1E	-W0008											
		-W0018		165	125	96	105						
		-W0028				146				140	100		
		-W0054									133	100	
	HCS02.1E	-W0070											

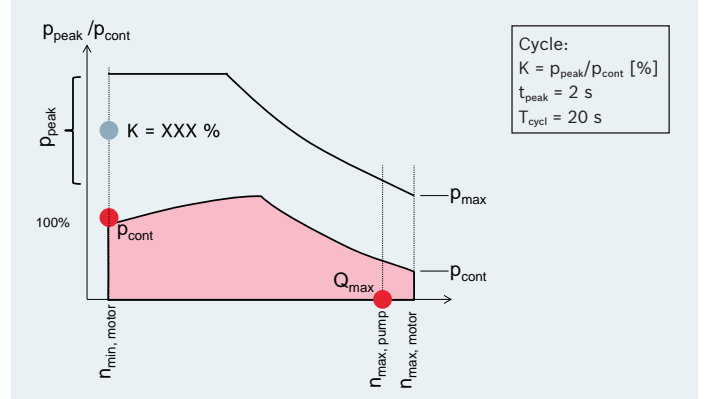
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-FCP7010-PGF ******* -S-FC2NS ******* -HC ******* -NNNN -----> SYT-FCP7010-PGF **047** -S-FC2NS **086** -HC **146** -NNNN

1
2
3
1
2
3

Detailed component information:
 Motors: see "Motors" on page 48
 Pumps: data sheet 10213
 Controller: catalogs R999000018 (DE), R999000019 (EN), R999000241 (DE), R999000242 (EN)



Performance curve for FcP 7010 – self-ventilated with constant internal gear pump

FcP 7010 with PGH

Selection guide for Sytronix FcP 7010 with PGH

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾														p _{nom} [kW] n _{max} [rpm]							
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MOT-FC 411 (self-ventilated)							MOT-FC 416 (forced ventilation)														
					1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90						
					p_{eff} [bar]																					
PGH2	005	315	350	15	87	128	176	229																		
	006	315	350	18	73	106	147	191	264																	
	008	315	350	24	54	80	110	143	198	269																
PGH3	011	315	350	33	40	58	80	104	144	196	288															
	013	315	350	39	33	49	68	88	122	166	244															
	016	315	350	48	27	40	55	71	99	135	198	269														
PGH4	020	315	350	60	22	32	44	57	79	108	158	216														
	025	315	350	75	17	26	35	46	63	86	127	172	302													
	032	315	350	96		20	27	36	49	67	99	135	236	281												
	040	315	350	120		16	22	29	40	54	79	108	188	225	305											
	050	250	310	150			18	23	32	43	63	86	151	180	244											
PGH5	063	315	350	189/176*			18	25	34	50	68	120	143	193	237*	289*										
	080	315	350	240/224*				20	27	40	54	94	112	152	187*	228*	278*									
	100	315	350	300/280*				16	22	32	43	75	90	122	150*	182*	222*	303*								
	125	315	350	375/350*					17	25	34	60	72	98	120*	146*	178*	243*	292*							
	160	210	260	480/448*						20	27	47	56	76	93*	114*	139*	190*								
	200	170	210	600/560*						16	22	38	45	61	75*	91*	111*	152*								
250	135	170	750/700*							17	30	36	49	60*	73*	89*	121*									

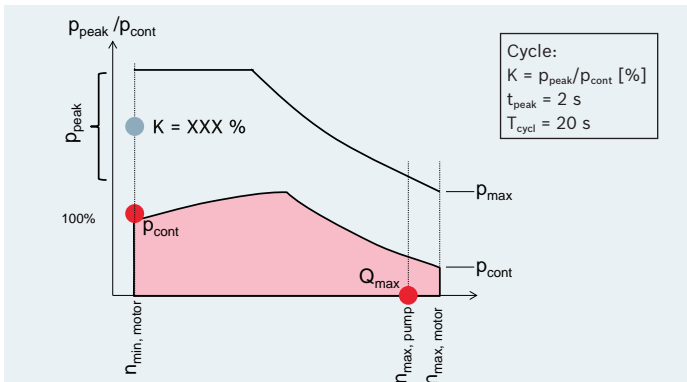
Controller		K [%]																								
Rexroth IndraDrive C	HCS01.1E	-W0008																								
		-W0018	165	125	96																					
		-W0028			146	105																				
	HCS02.1E	-W0054																								
		-W0070										140	100													
	HCS03.1E	-W0070											133	100												
-W0100													161	132	113											
-W0150														183	135	109										
-W0210															176	142	117									
																179	146	112								

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

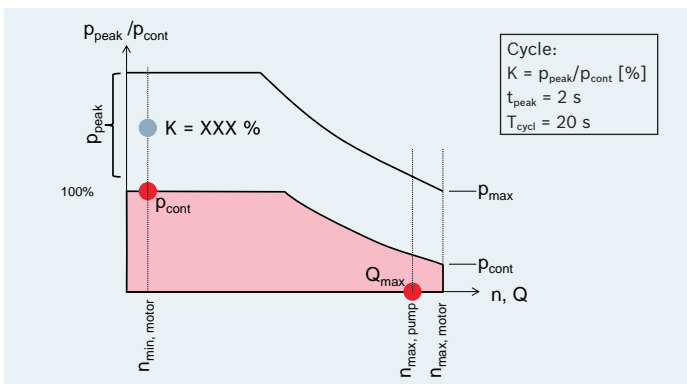
Selection example for system key

SYT-FCP7010-PGH ***-S-FC2NS ***-HC ***-NNNN -----> SYT-FCP7010-PGH 075-S-FC2NS 127-HC 100-NNNN

1
2
3
1
2
3



Performance curve for FcP 7010 – self-ventilated with constant internal gear pump



Performance curve for FcP 7010 – forced ventilation with constant internal gear pump

Detailed component information:
 Motors: see “Motors” on page 48
 Pumps: data sheets 10227, 10223
 Controller: catalog R999000018 (DE), R999000019 (EN)

FcP 7010 with A10VZO-EZ4

Selection guide for Sytronix FcP 7010 with A10VZO-EZ4

Pumps ¹⁾						Motors ¹⁾															p _{nom} [kW] n _{max} [rpm]		
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)																	
						1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90		
						4200	4000	4000	4000	4000	4000	3800	3800	3800	3800	3800	2800	2800	2800	2800	2800	2800	2800
						p _{eff} [bar]																	
A10VZO-EZ4	010	250	315	3600	37	59	87	120	156	215	239	413	586	718	856								
	018	280	350	3300	59/50*	35	51	70	91	126	171	257	342	419	499	677	831*						
	028	280	350	3000	84/78*	22	33	45	58	81	110	162	220	269	321	435	534*	615*	794*				
	045	280	350	3000	135/126*		20	28	36	50	68	101	137	168	200	271	332*	405*	494*	674*	810*		
	071	280	350	2550	181			18	23	32	43	64	87	106	126	171	210	256	313	427	513		
	100	280	350	2300	230				16	23	31	45	62	75	90	122	150	182	222	303	364		
	140	280	350	2200	308					16	22	32	44	54	64	87	107	130	159	217	260		
	180	280	350	1800	324						17	25	34	42	50	68	83	101	124	169	202		

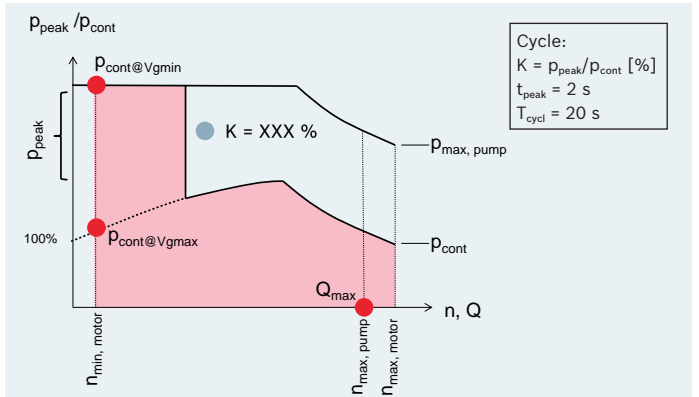
				K [%]																					
Controller	Rexroth IndraDrive C	HCS01.1E	-W0008	165	125																				
			-W0018		189	146	105																		
			-W0028				191	140	100																
			-W0054						187	133	100														
		HCS02.1E	-W0070									161	132	113											
			-W0100										183	135	109										
			-W0150											176	142	117									
			-W0120													179	146	112							

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see “Motor-pump modules” starting on page 61)

Selection example for system key

SYT-FCP7010-A10 ***
1 -S-FC2NS ***
2 -HC ***
3 -NNNN -----> SYT-FCP7010-A10 084
1 -S-FC2NS 110
2 -HC 140
3 -NNNN

Detailed component information:
 Motors: see “Motors” on page 48
 Pumps: data sheet 91485
 Controller: catalog R999000241 (DE), R999000242 (EN)



FcP 7010 with A4VSO

Selection guide for Sytronix FcP 7010 with A4VSO

Pumps ¹⁾						Motors ¹⁾								p _{nom} [kW] n _{max} [rpm]
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)								
A4VSO	040	350	400	2600	104	18.5	22	30	37	45	55	75	90	
	071	350	400	2200	156	3800	3800	3800	2800	2800	2800	2800	2800	
	125	350	400	1800	225									
	180	350	400	1800	324									
	250	350	400	1900	475									
	355	350	400	1700	603									
	500	350	400	1500	750									
						p _{eff} [bar]								
						188	225	305	375					
						106	127	172	211	257	313			
						60	72	98	120	146	178	234	292	
								68	83	101	124	169	202	
									60	73	89	121	146	
										51	63	85	103	
												61	73	
						K [%]								
Controller	Rexroth In- draDrive C	HCS02.1E	-W0070	132	113									
		HCS03.1E	-W0070 -W0100 -W0150 -W0210		183	135	109							
						176	142	117						
								179	146	112				

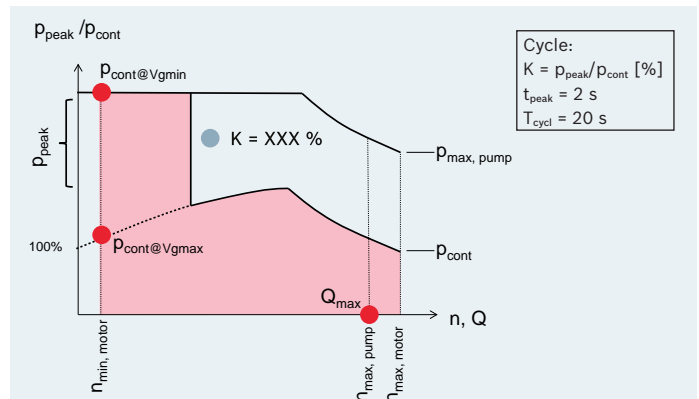
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-FCP7010-A04 ***
1 -S-FC2NS ***
2 -HC ***
3 -NNNN -----> SYT-FCP7010-A04 225
1 -S-FC2NS 120
2 -HC 142
3 -NNNN

Detailed component information:

Motors: see "Motors" on page 48
 Pumps: data sheet 92050
 Controller: catalog R999000241 (DE), R999000242 (EN)



Performance curve for FcP 5010 – self-ventilated with axial piston pump with two-point adjustment

Sytronix SvP variable-speed pump drives

SvP system

Sytronix SvP (servo variable pump drive) systems consist of a motor-pump assembly driven by a permanent magnet synchronous servo motor and servo controller.

In the family of Sytronix variable-speed pump drives, the Sytronix SvP offers the highest dynamic performance and control accuracy. SvP systems provide the broadest range of control functionality, from pressure and force control to flow and speed control to position control and alternating control.

The controller is part of Rexroth's proven IndraDrive family using the IndraWorks engineering tool as the interface. In addition to traditional hydraulic control functionality, the SvP system provides further functions of pressure ripple compensation, energy monitoring, productivity and condition monitoring, as well as maintenance and troubleshooting aids.

The SvP system can be configured for required communication interfaces by exchanging the CSH controller. The command and actual values of pressure, flow and position can then be commanded and monitored by a high level machine control system using either an analog interface or industry standard bus interfaces. The SvP provides easy and flexible integration into machine control systems.

Components

- ▶ Hydraulic pump
- ▶ Electric motor
- ▶ Frequency converter (VFD) or IndraDrive with controller
- ▶ Pressure transducer

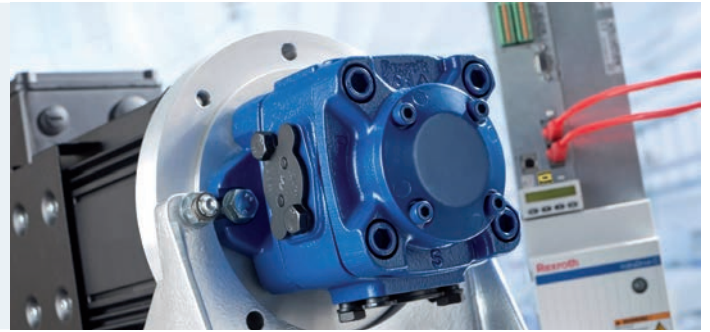
Applications

The system is suitable for use in either open or closed hydraulic systems controlling hydraulic axes.

Sytronix SvP systems

Sytronix SvP features key functions:

- ▶ High efficiency servo motors with a level of standard and direct pump mount versions
- ▶ High dynamics and control accuracy
- ▶ Broad range of control functionality



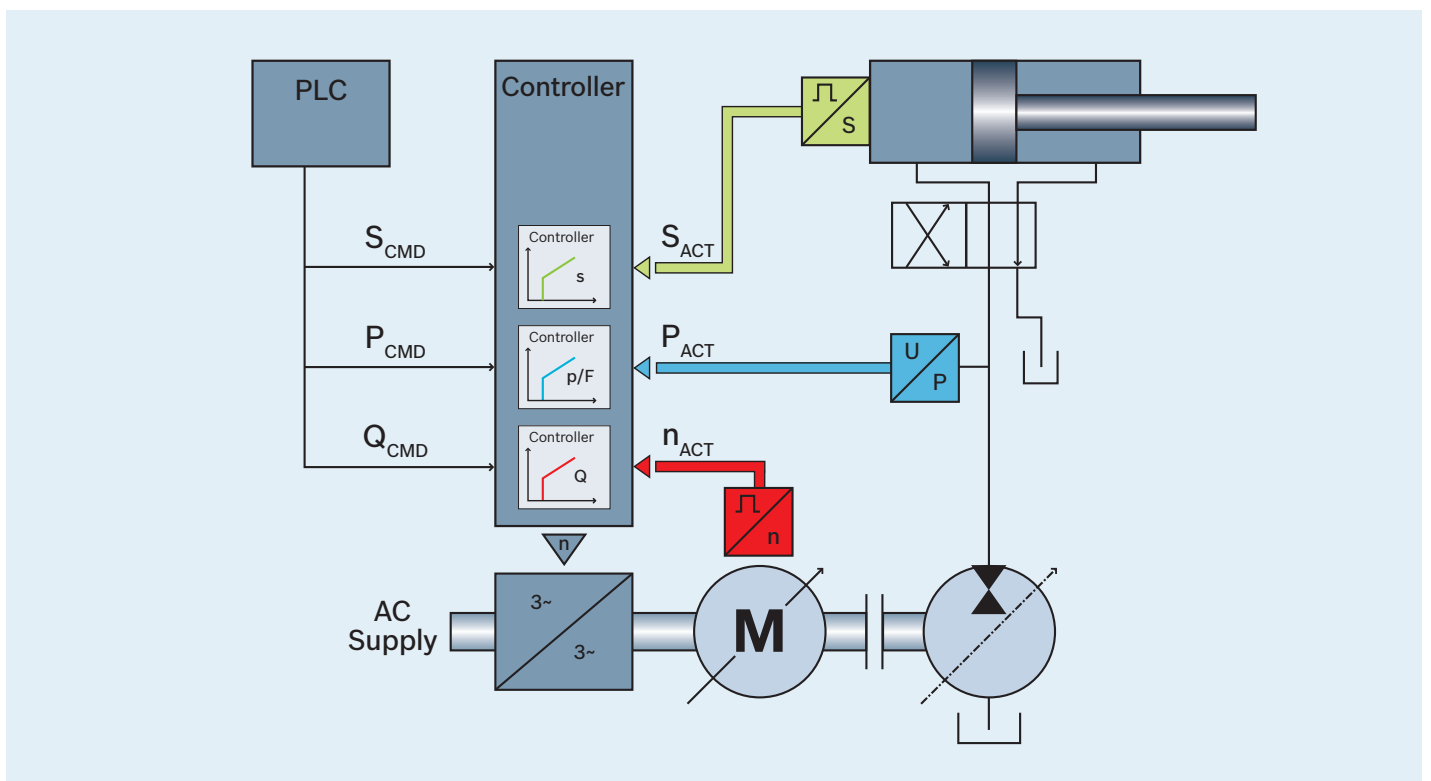
Features

Using an internal gear pump, type PGH or PGM, the required flow is controlled directly by motor speed.

The pumps are optimized for variable-speed operation and achieve a high overall efficiency due to low leakage, and operate with minimum noise.

In operation, sensors measure pressure, actuator position and the servo motor speed, which are used by the servo controller. Command values, which can be set by the machine control, are compared by the IndraDrive, which adjusts the pump drive speed to match the system requirements.

SvP block diagram



SvP 7010

Features

- ▶ Performance up to 70 kW effective
- ▶ Suitable for axis control in open and closed hydraulic systems
- ▶ Two quadrant operation

Components

- ▶ MSK motors with air cooling
- ▶ PGH and PGM pumps
- ▶ HCS and HMS IndraDrive controllers

Application

The SvP 7010 offers performance up to 70 kW and is ideal in the following application areas:

- ▶ Plastics processing machines
- ▶ Die-cast machines
- ▶ Injection molding machines
- ▶ Presses

The controller is optimized for Sytronix applications and compensates for the characteristics of hydraulic systems to provide optimal dynamics and accuracy.



SvP 7010 with PGM (4, 5), MSK with forced ventilation Standard coupling

Selection guide for Sytronix SvP 7010 with PGM

Pumps ¹⁾ $n_{max} = 3000 \text{ rpm}$					Motors ¹⁾ (forced ventilation)										M_{cont} [Nm]	M_{max} [Nm]		
Type	NG	p_{cont} [bar]	p_{max} [bar]	Flow [l/min]	MSK					MSK								
					C-0202	C-0300	D-0202	D-0300	E-0202	E-0300	F-0202	F-0300	B-0202	C-0202	D-0202	E-0202		
					48.0	48.0	75.0	75.0	105.0	105.0	124.5	124.5	152.0	204.0	263.0	293.0		
					110.0	110.0	160.0	160.0	231.0	231.0	310.0	310.0	320.0	425.0	520.0	630.7		
					p_{eff} [bar]													
PGM4	025	175	210	75	119	119	186	186										
	032	175	210	100	92	92	144	144										
	040	175	210	120	75	75	118	118	165	165								
	050	175	210	150	59	59	93	93	130	130	154	154	188					
	063	175	210	190	46	46	72	72	101	101	119	119	146					
PGM5	080	175	210	240									117	157				
	100	175	210	300									95	128	165	184		
	125	175	210	375									76	102	132	147		

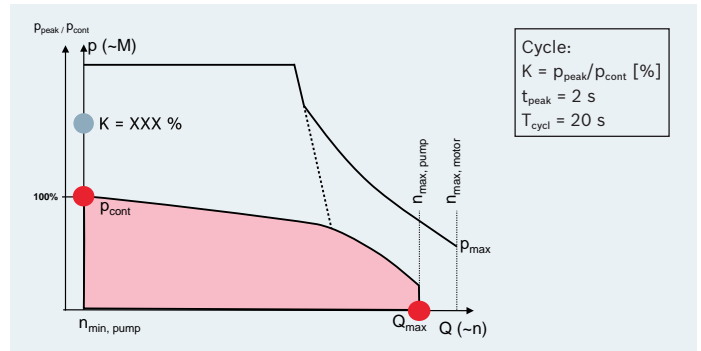
				K [%]															
Controller	Compact	HCS02.1E	-W0054																
			-W0070	149	123														
			-W0070	188	159	137													
		HCS03.1E	-W0100	227	199	171	135	130		118									
			-W0150			206	172	168	138	158	125	138	111						
			-W0210				212	214	184	217	176	188	155	128	115				
	HCS04.2E	-W0350																	
	Modular	HMS01.1N	-W0036	133	111														
			-W0054	199	169	145	111												
			-W0070		188	161	126	121											
-W0110				229	210	177	173	142	164	130	143	115							
-W0150						213	217	188	223	181	193	159	132	119					
-W0210								220		245		208	174	165					
-W0300													198	191					
-W0350																			

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPAS1 (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-SVP7010-PGM ******* -S-MSKNA ******* -HC ******* -NNNN -----> SYT-SVP7010-PGM **100** -S-MSKNA **144** -HC **172** -NNNN

Detailed component information:
 Motors: see motors starting on page 48
 Pumps: data sheet 10229
 Controller: catalog R999000018 (DE), R999000019 (EN)



Performance curve for SvP 7010 – forced ventilation

SvP 7010 with PGM (4, 5), MSK liquid-cooled Standard coupling

Selection guide for Sytronix SvP 7010 with PGM

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾ (liquid-cooled)				
Type	NG	P _{cont} [bar]	P _{max} [bar]	Flow [l/min]	MSK				
					B-0202	C-0202	D-0202	E-0202	
					152.0	204.0	263.0	293.0	M _{cont} [Nm]
					320.0	425.0	520.0	630.7	M _{max} [Nm]
					p _{eff} [bar]				
PGM4	025	175	210	75					
	025	175	210	100					
	032	175	210	120					
	040	175	210	150					
	050	175	210	190	155				
PGM5	063	175	210	240	125	179			
	080	175	210	300	102	146	182		
	100	175	210	375	81	117	145	171	
					K [%]				
Controller	Compact	HCS02.1E	-W0054						
			-W0070						
		HCS03.1E	-W0070						
			-W0100						
			-W0150						
	HCS04.2E	-W0210	129						
		-W0350	176	136	116				
	Modular	HMS01.1N	-W0036						
			-W0054						
			-W0070						
-W0110									
-W0150			134						
-W0210			181	140	119				
-W0300		183	158	141					
-W0350			179	164					

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPAS1 (see "Motor-pump modules" starting on page 61)

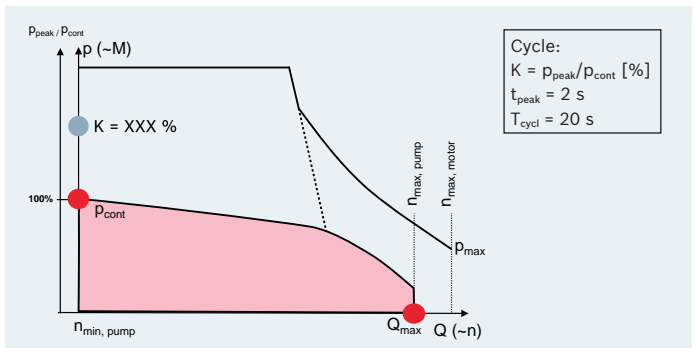
Selection example for system key

SYT-SVP7010-PGM ******* -S-MSKNL ******* -HC ******* -NNNN -----> SYT-SVP7010-PGM **240** -S-MSKNL **125** -HC **129** -NNNN

1
2
3
1
2
3

Detailed component information:

Motors: see motors starting on page 48
 Pumps: data sheet 10229
 Controller: catalog R999000018 (DE), R999000019 (EN)



Performance curve for SvP 7010 – liquid-cooled

SvP 7010 with PGH (2,3,4,5), MSK with forced ventilation Standard coupling

Selection guide for Sytronix SvP 7010 with PGH

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾ (forced ventilation)																M _{cont} [Nm]	M _{max} [Nm]							
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MSK071				MSK101				MSK133																
					C-0202	C-0300	D-0202	D-0300	E-0202	E-0300	C-0202	C-0300	D-0202	D-0300	E-0202	E-0300	F-0202	F-0300	B-0202	C-0202	D-0202	E-0202							
					p_{eff} [bar]																								
PGH2	005	315	350	15	217	217	318	318																					
	006	315	350	18	174	174	254	333	343																				
	008	315	350	24	138	138	202	202	264	272																			
PGH3	011	315	350	33	103	103	150	150	197	203	274	274																	
	013	315	350	39	85	85	124	124	163	168	227	227																	
	016	315	350	48	71	71	103	103	135	139	188	188	295	295															
PGH4	020	315	350	60	56	56	82	82	108	111	150	150	234	234	328	328													
	025	315	350	75	45	45	65	65	86	88	119	119	186	186	261	261	309	309											
	032	315	350	100	35	35	51	51	66	68	92	92	144	144	202	202	239	239	292										
	040	315	350	120	28	28	41	41	54	56	75	75	118	118	165	165	195	195	238	320									
	050	250	315	150	22	22	33	33	43	44	59	59	93	93	130	130	154	154	188	253									
PGH5	063	315	350	190	17	17	26	26	34	34	47	47	73	73	102	102	121	121	148	198	255	285							
	080	315	350	240			20	20	27	27	37	37	58	58	81	81	96	96	117	157	203	226							
	100	315	350	300			16	16	22	22	30	30	47	47	66	66	78	78	92	128	165	184							
	125	315	350	375					17	18	24	24	38	38	53	53	62	62	76	102	132	147							
	160	210	260	480					19	19	29	29	41	41	48	48	59	59	79	102	113								
	200	170	210	600					15	15	24	24	33	33	39	39	48	48	64	82	92								
250	135	170	750							19	19	26	26	31	31	38	38	51	66	73									
					K [%]																								
Controller	Compact	HCS02.1E	-W0012	226	175	177	146	132																					
			-W0028			244	251	229	206	170	149	123																	
			-W0054					215	188	159	137																		
		-W0070							237	227	199	171	135	130	118														
		HCS03.1E	-W0070									229	206	172	168	138	158	125	138	111									
			-W0100											212	214	184	217	176	188	155	128	115							
	-W0150														220	246	211	208	175	166									
	HCS04.2E	-W0350																	198	215									
	Modular	HMS01.1N	-W0020	197	149	150	123	112																					
			-W0036			237	243	206	186	152	133	111																	
			-W0054					243	227	199	169	145	111																
			-W0070							188	161	126	121																
-W0110									229	210	177	173	142	164	130	143	115												
-W0150											213	217	188	223	181	193	159	132	119										
-W0210											220	245	208	174	165														
-W0300															198	191													
-W0350																													

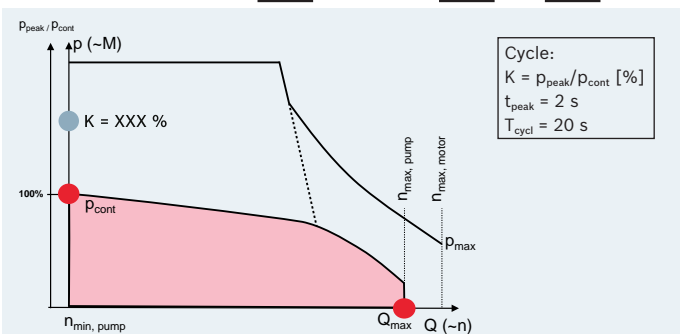
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPAS1 (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-SVP7010-PGH ******* -S-MSKNA ******* -HC ******* -NNNN -----> SYT-SVP7010-PGH **075** -S-MSKNA **088** -HC **170** -NNNN

Detailed component information:

Motors: see motors starting on page 48
Pumps: data sheets 10223, 10227
Controller: catalog R999000018 (DE), R999000019 (EN)



Performance curve for SvP 7010 – forced ventilation

SvP 7010 with PGH (4, 5), MSK liquid-cooled Standard coupling

Selection guide for Sytronix SvP 7010 with PGH

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾ (liquid-cooled)				
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MSK133				
					B-0202	C-0202	D-0202	E-0202	
					162.0	232.5	290.0	342.0	M _{cont} [Nm]
					300.0	400.0	500.0	583.0	M _{max} [Nm]
					p _{eff} [bar]				
PGH4	020	210	315	60					
	025	210	315	75					
	032	210	315	100	311				
	040	210	315	120	254				
	050	210	250	150	201				
PGH5	063	210	315	190	157	226	282	332	
	080	210	315	240	125	179	224	264	
	100	210	315	300	102	146	182	214	
	125	210	315	375	81	117	145	171	
	160	210	210	480	63	90	112	132	
	200	210	170	600	51	73	91	107	
	250	210	135	750	41	58	73	86	

Controller		K [%]			
Compact	HCS02.1E	-W0012			
		-W0028			
		-W0054			
	HCS03.1E	-W0070	129		
		-W0100	176	136	116
		-W0150		183	159
HCS04.2E	-W0210			142	
	-W0350			179	
Modular	HMS01.1N	-W0020			
		-W0036			
		-W0054			
		-W0070			
		-W0110	134		
		-W0150	181	140	119
		-W0210		183	158
		-W0300			179
		-W0350			164

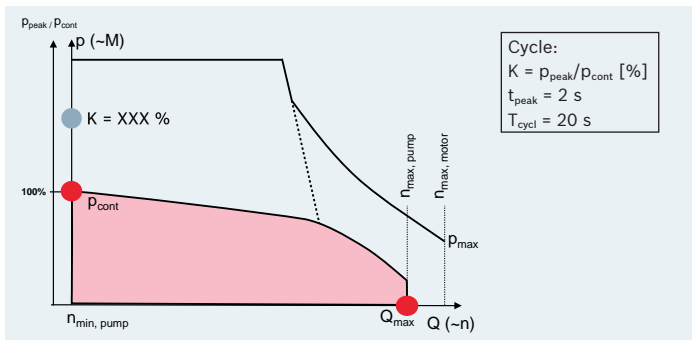
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPAS1 (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-SVP7010-PGH ******* -S-MSKNL ******* -HC ******* -NNNN -----> SYT-SVP7010-PGH **300** -S-MSKNL **146** -HC **140** -NNNN

1
2
3
1
2
3

Detailed component information:
 Motors: see motors starting on page 48
 Pumps: data sheet 10223
 Controller: catalog R999000018 (DE), R999000019 (EN)



SvP 7010 with PGH (4, 5), MSK with forced ventilation Direct coupling

Selection guide for Sytronix SvP 7010 with PGH

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾ (forced ventilation)															
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MSK101						MSK133						M _{cont} [Nm]	M _{max} [Nm]		
					C-0202	C-0300	D-0202	D-0300	E-0202	E-0300	F-0202	F-0300	B-0202	C-0202	D-0202	E-0202				
					48.0	48.0	75.0	75.0	105.0	105.0	124.5	124.5	152.0	204.0	263.0	293.0				
					110.0	110.0	160.0	160.0	231.0	231.0	310.0	310.0	320.0	425.0	520.0	630.7				
					p _{eff} [bar]															
PGH4	020	315	350	60	150	150	234	234	328	328										
	025	315	350	75	119	119	186	186	261	261	309	309								
	032	315	350	100	92	92	144	144	202	202	239	239								
	040	315	350	120	75	75	118	118	165	165	195	195								
	050	250	310	150	59	59	93	93	130	130	154	154								
PGH5	063	315	350	190									148	198	255	285				
	080	315	350	240									117	157	203	226				
	100	315	350	300									95	128	165	184				
	125	315	350	375									76	102	132	147				
	160	210	260	480									59	79	102	113				
	200	170	210	600									48	64	82	92				
	250	135	170	750									38	51	66	73				
					K [%]															
Controller	Compact	HCS02.1E	-W0012	149	123															
			-W0028	188	159	137														
			-W0054	227	199	171	135	130		118										
		HCS03.1E	-W0070		229	206	172	168	138	158	125	138	111							
			-W0100				212	214	184	217	176	188	155	128	115					
			-W0150						220		246	211	208	175	166					
	HCS04.2E	-W0210											198	215						
		-W0350																		
	Modular	HMS01.1N	-W0020	133	111															
			-W0036	199	169	145	111													
			-W0054		188	161	126	121												
			-W0070		229	210	177	173	142	164	130	143	115							
			-W0110				213	217	188	223	181	193	159	132	119					
			-W0150						220		245		208	174	165					
-W0210													198	191						
-W0300																				
-W0350																				

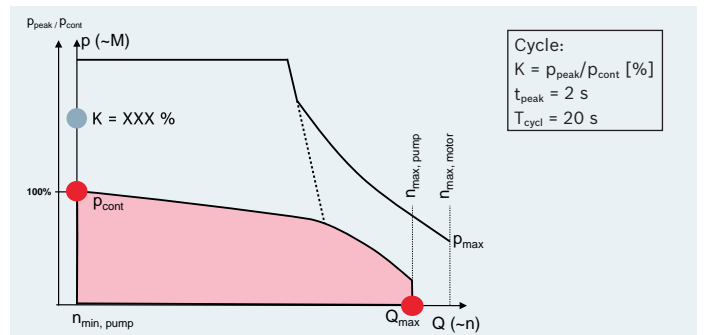
¹⁾ Pump and motor can also be ordered separately as motor-pump module MPA01 (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-SVP7010-PGH ******* -D-MSKNA ******* -HM ******* -NNNN -----> SYT-SVP7010-PGH **240** -D-MSKNA **203** -HM **198** -NNNN

1
2
3
1
2
3

Detailed component information:
 Motors: see motors starting on page 48
 Pumps: data sheet 10223
 Controller: catalog R999000018 (DE), R999000019 (EN)



Performance curve for SvP 7010 – forced ventilation

SvP 7010 with PGH (5), MSK liquid-cooled Direct coupling

Selection guide for Sytronix SvP 7010 with PGH

Pumps ¹⁾ n _{max} = 3000 rpm					Motors ¹⁾ (liquid-cooled)				
Type	NG	p _{cont} [bar]	p _{max} [bar]	Flow [l/min]	MSK133				
					B-0202	C-0202	D-0202	E-0202	
					162.0	232.5	290.0	342.0	M _{cont} [Nm]
					300.0	400.0	500.0	583.0	M _{max} [Nm]
					p _{eff} [bar]				
PGH5	063	210	315	190	157	226	282	332	
	080	210	315	240	125	179	224	264	
	100	210	315	300	102	146	182	214	
	125	210	315	375	81	117	145	171	
	160	210	210	480	63	90	112	132	
	200	210	170	600	51	73	91	107	
	250	210	135	750	41	58	73	86	
K [%]									
Controller	Compact	HCS02.1E	-W0012 -W0028 -W0054 -W0070						
				HCS03.1E	-W0070 -W0100 -W0150 -W0210	129			
		HCS04.2E	-W0350					136	116
					176	183	159	142	
							179	184	
Controller	Modular	HMS01.1N	-W0020 -W0036 -W0054 -W0070 -W0110 -W0150 -W0210 -W0300 -W0350						
					134				
					181	140	119		
						183	158	141	
							179	164	

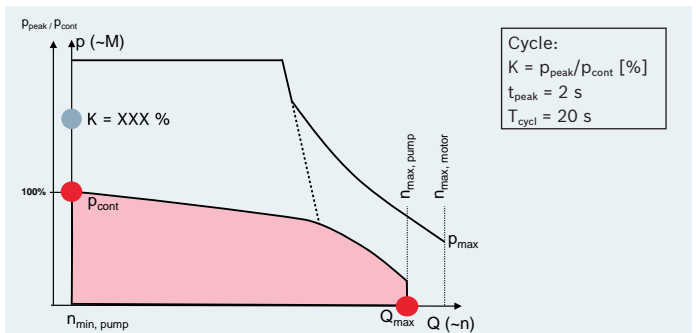
¹⁾ Pumps and motors can also be ordered separately as motor-pump module MPA01 (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-SVP7010-PGH ******* -D-MSKNA ******* -HM ******* -NNNN -----> SYT-SVP7010-PGH **240** -D-MSKNA **125** -HM **134** -NNNN

Detailed component information:

Motors: see motors starting on page 48
Pumps: data sheet 10223
Controller: catalog R999000018 (DE), R999000019 (EN)



Performance curve for SvP 7010 – liquid-cooled

Sytronix DFE variable-speed pump drives

DFE systems

Sytronix DFE systems consist of an electrohydraulically controlled axial piston pump, driven by a variable-speed asynchronous motor.

Pump drives DFE 5010 and DFE 7010 are based on the proven DFE pressure and flow pump control.

Using industry standard inverter duty motors, up to 315 kW, results in a high price/performance ratio and high performance capabilities.

When using the “teach-in” version, the machine cycle pressure and flow profile is stored in the DFE control electronics. This allows the DFE system to accelerate the electric motor ahead of a required flow demand.

In machines operating without a predictable operating cycle, such as wood and metal processing applications, a real-time mode can be used. The DFE controller calculates an optimal combination of motor speed and pump swivel angle to maximize energy savings.

Identical mechanical interfaces permit cost-effective retrofitting, e.g. of a DFE 5010, as a replacement for a DFEE by simply exchanging the integrated pump valve electronics.

The control system is available for A10 and A4 pumps and can thus be used for a wide variety of applications.

Components

- ▶ Axial piston variable pump with integrated control electronics
- ▶ MOT-FC standard asynchronous motor
- ▶ VFD to control motor speed
- ▶ Pressure transducer

Applications

Sytronix DFE is suitable for use in open hydraulic systems, with one or multiple hydraulic consumers, for control of pressure and flow.

Sytronix DFE systems

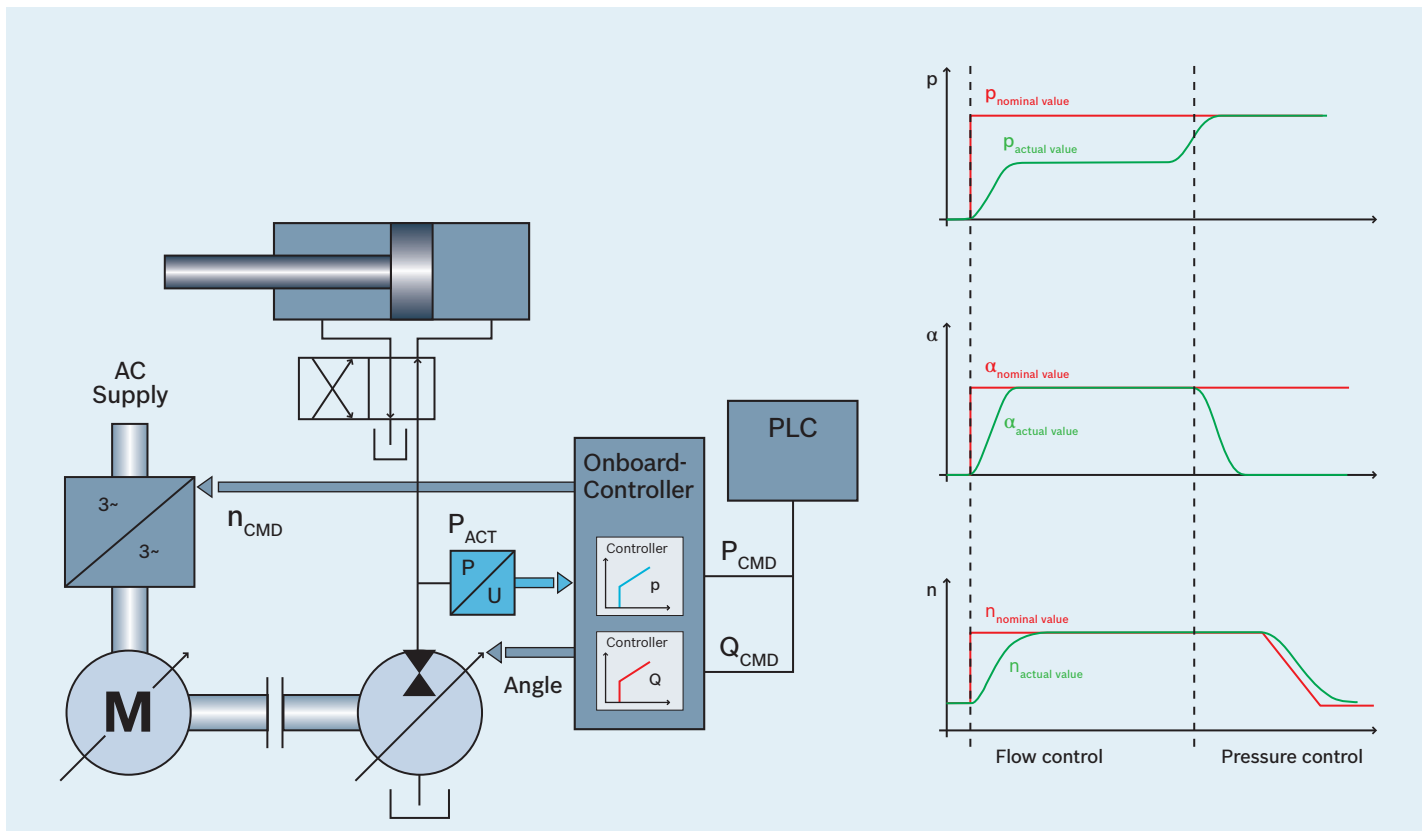
- ▶ Reduction of installed power by speed and flow control
- ▶ Easy retrofit for power units with variable displacement pumps
- ▶ High performance capability
- ▶ Multi-consumer system capability



Functionality

A DFE system utilizes an electrohydraulically controlled axial piston pump to command the pump's VFD drive. The digital on-board electronics calculate the optimal combination of swivel angle and motor drive based on system pressure. By reducing the pump swivel angle during pressure holding, the motor load is reduced and pump flow matches the system demand. With an optimally design, the power of installed electric motors can be reduced when compared to traditional designs.

DFE block diagram



DFE 5010

Features

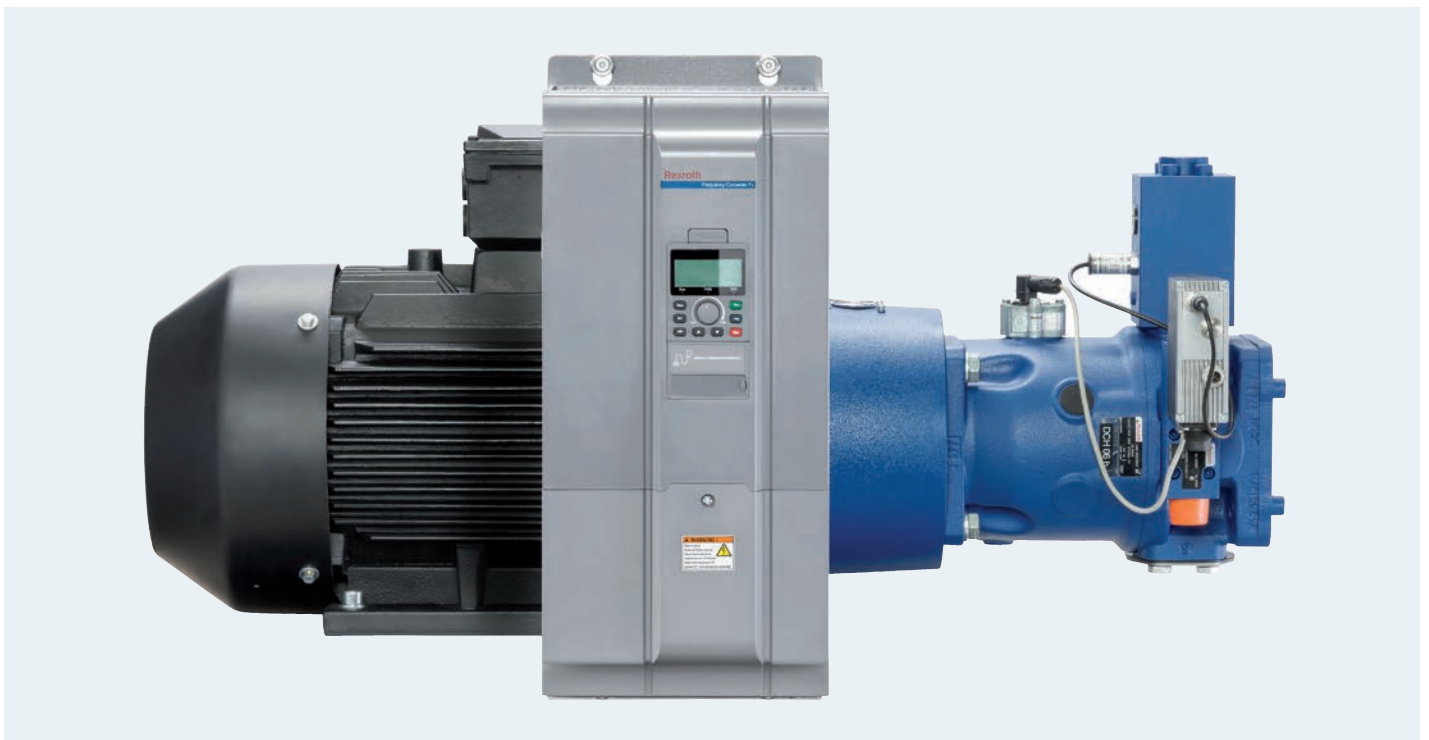
- ▶ Performance up to 90 kW effective
- ▶ Suitable for use in open hydraulic systems with one or more hydraulic consumers, with pressure and flow control.
- ▶ Two quadrant operation

Components

- ▶ MOT-FC motor with self-ventilation
- ▶ A10VSO and A4VSO pumps
- ▶ Rexroth Fv VFD drive

Applications

Covering a power range up to 90 kW, it is suited for use in presses, plastics processing machines, wood and metal industries.



DFE 5010 with A10

Selection guide for Sytronix DFE 7010 with A10VSO

Pumps ¹⁾						Motors ¹⁾															p_{nom} [kW] n_{max} [rpm]										
Type	NG	p_{cont} [bar]	p_{max} [bar]	n_{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)																									
						1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90										
						4200	4000	4000	4000	4000	4000	3800	3800	3800	3800	3800	2800	2800	2800	2800	2800	2800									
						p_{eff} [bar]																									
A10VSO	010	250	315	2550	181																										
	018	280	350	2300	230			18	23	32	43	64	87	106	126	171	210	256	313	427	513										
	028	280	350	2200	308			16	23	31	45	62	75	90	122	150	182	222	303	364											
	045	280	350	1800	324					16	22	32	44	54	64	87	107	130	159	217	260										
										17	25	34	42	50	68	83	101	124	169	202											
						K [%]																									
Controller	Rexroth FVCA01.1	OK75			118																										
		1K50			162	120																									
		2K20				164	127																								
		4K00					165	118																							
		5K50						155	113																						
		7K50							110																						
		11K0								114																					
		15K0									114																				
		18K5									157	118																			
		22K0									186	139	115																		
		30K0										157	129	110																	
		37K0											176	150	111																
		45K0												188	139	112															
		55K0													176	142	117														
75K0														164	136	111															
90K0															188	154	117														
																185	141	117													

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

Selection example for system key

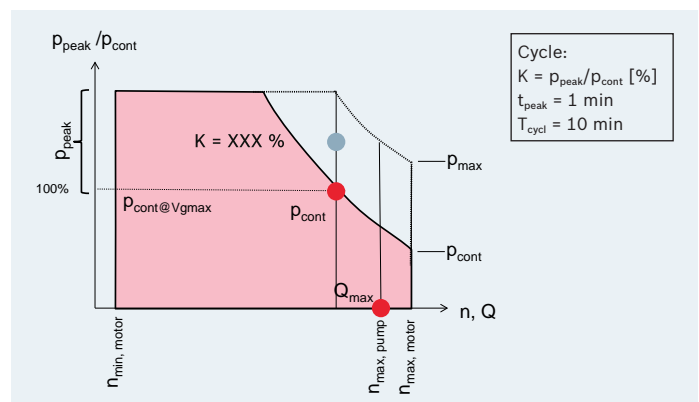
SYT-DFE5010-D10 ***
1-S-FC2NS ***
2-FV ***
3-N-NNN -----> SYT-DFE5010-D10 308
1-S-FC2NS 044
2-FV 139
3-N-NNN

Detailed component information:

Motors: see motors starting on page 48

Pumps: data sheet 62241

Controller: catalogs R999000241 (DE), R999000242 (EN)



Performance curve for DFE 5010 – self-ventilated

DFE 5010 with A4

Selection guide for Sytronix DFE 7010 with A10VSO

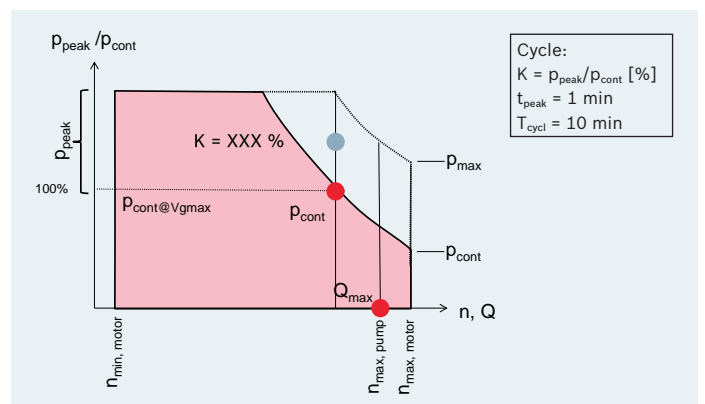
Pumps ¹⁾						Motors ¹⁾											
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)											
						18.5	22	30	37	45	55	75	90	p _{nom} [kW]	n _{max} [rpm]		
A4VSO	125	350	400	1800	225	3800	3800	3800	2800	2800	2800	2800	2800	2800			
	180	350	400	1800	324												
	250	350	400	1900	475												
	355	350	400	1700	603												
						p _{eff} [bar]											
						60	72	98	120	146	178	243	292				
								68	83	101	124	169	202				
									60	73	89	121	146				
										51	63	85	103				
						K [%]											
Controller	Rexroth FvCA01.1					15K0	115										
						18K5	129	110									
						22K0	176	150	111								
						30K0		188	139	112							
						37K0			176	142	117						
						45K0				164	136	111					
						55K0					188	154	117				
						75K0						185	141	117			
				90K0													

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

Selection example for system key

SYT-DFE5010-A04 ******* -S-FC2NS ******* -FV ******* -NNNN -----> SYT-DFE5010-A04 **475** -S-FC2NS **060** -FV **112** -NNNN

Detailed component information:
 Motors: see motors starting on page 48
 Pumps: data sheet 62242
 Controller: catalogs R999000241 (DE), R999000242 (EN)



Performance curve for DFE 5010 – self-ventilated

DFE 7010

Features

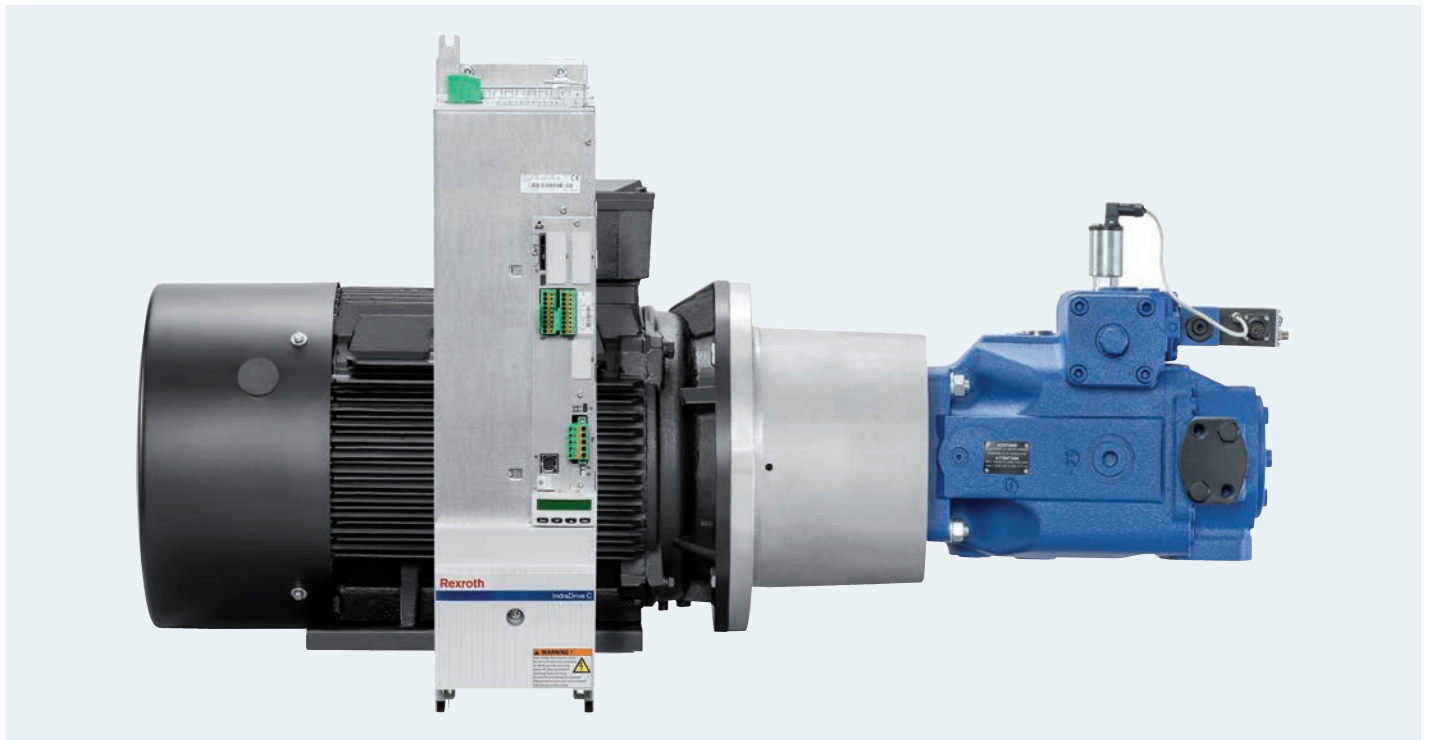
- ▶ Performance up to 315 kW effective
- ▶ Suitable for use in open hydraulic systems with one or multiple hydraulic consumers with pressure and flow control

Components

- ▶ MOT-FC motor with self-ventilation
- ▶ A10VSO and A4VSO pumps
- ▶ HCS IndraDrive VFD controller

Applications

Covering a power range up to 315 kW, it is particularly suited for use in harsh industrial environments, such as for presses, plastics processing machines, wood and metal industries.



DFE 7010 with A10

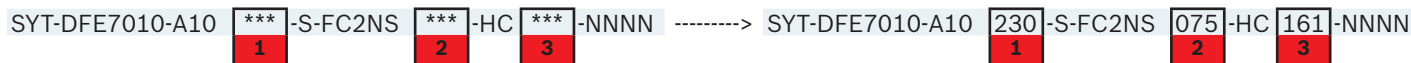
Selection guide for Sytronix DFE 7010 with A10VSO

Pumps ¹⁾						Motors ¹⁾															p _{nom} [kW]	n _{max} [rpm]
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)																
A10VSO	071	280	350	2550	181	1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	
	100	280	350	2300	230	4200	4000	4000	4000	4000	4000	3800	3800	3800	3800	3800	2800	2800	2800	2800	2800	2800
	149	280	350	2200	308	p _{eff} [bar]																
	180	280	350	1800	324	18	23	32	43	64	87	106	126	171	210	256	313	427	513			

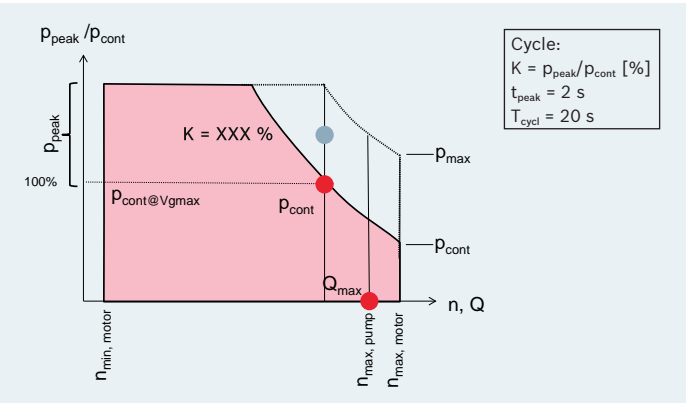
Controller	Compact	HCS01.1E	-W0008 -W0018 -W0028 -W0054	K [%]																		
				165	125	189	146	105	191	140	100	187	133	100	161	132	113	183	135	109	176	142
Controller	Compact	HCS02.1E	-W0070																			
		HCS03.1E	-W0070																			
			-W0100 -W0150 -W0210																			

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see “Motor-pump modules” starting on page 61)

Selection example for system key



Detailed component information:
 Motors: see motors starting on page 48
 Pumps: data sheet 10213
 Controller: catalogs R999000018 (DE), R999000019 (EN), R999000241 (DE), R999000242 (EN)



Performance curve for DFE 7010 – self-ventilated

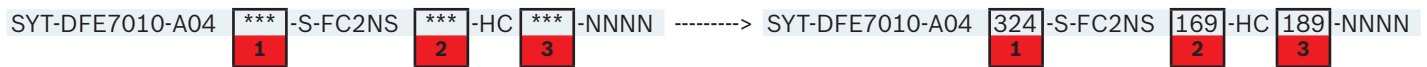
DFE 7010 with A4

Selection guide for Sytronix DFE 7010 with A4VSO

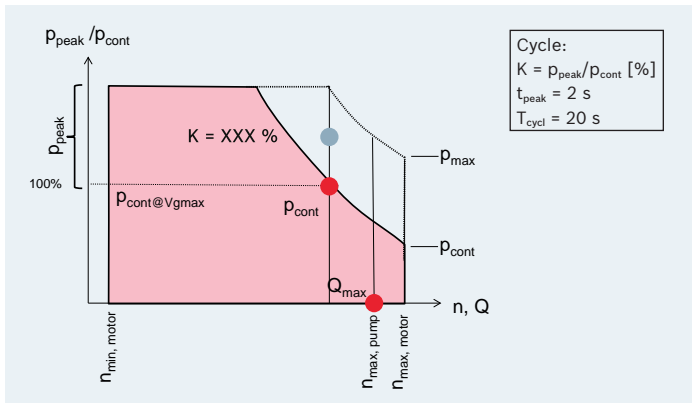
Pumps ¹⁾						Motors ¹⁾															
Type	NG	p _{cont} [bar]	p _{max} [bar]	n _{max} [rpm]	Flow [l/min]	MOT-FC 411 (self-ventilated)															
A40VSO	125	280	400	1800	225	18.5	22	30	37	45	55	75	90	110	132	160	200	250	315	p _{nom} [kW] n _{max} [rpm]	
	180	280	400	1800	324	3800	3800	3800	2800	2800	2800	2800	2800	2500	2500	2500	2500	2200	2200		
	250	280	400	1900	475	p _{eff} [bar]															
	355	280	400	1700	603	60	72	98	120	146	178	243	292	354							
						K [%]															
Controller	Compact	HCS02.1E		-W0070		132	113														
		HCS03.1E		-W0100			183	135	109												
				-W0150				176	142	117											
				-W0210						179	146	112									
		HCS04.2E		-W0350							189	158	129	108							
				-W0420								192	157	132	110						
				-W0520									192	161	134	107					
				-W0640											168	135	109				
				-W0790												172	139	110			
				-W1010													171	136			

¹⁾ Pump and motor can also be ordered separately as motor-pump module MPE (see "Motor-pump modules" starting on page 61)

Selection example for system key



Detailed component information:
 Motors: see motors starting on page 48
 Pumps: data sheet 10213
 Controller: catalogs R999000018 (DE), R999000019 (EN), R999000241 (DE), R999000242 (EN)



Performance curve for DFE 7010 – self-ventilated

Sytronix individual solutions

Individually Configured systems

In addition to preconfigured systems in the FcP, SvP, and DFE Sytronix series, the Sytronix product range also provides the option of configuring **individual solutions**. These systems can be planned and configured by combining modules and individual components, using questionnaires on application criteria and system parameters, in collaboration with Rexroth specialists.

Rexroth – synonymous with planning security

- ▶ Sytronix product range for customized solutions
- ▶ Products with excellent dynamics and control accuracy
- ▶ Proven product quality for high machine reliability
- ▶ Industry-specific consulting and engineering support
- ▶ Global Rexroth presence and support

Components and modules for Sytronix systems can be found in “Components” on page 47



8 steps for a system solution

Step	Example	Help
1 Determine system requirements <ul style="list-style-type: none"> ▶ Hydraulics schematic (open/closed circuit) ▶ General conditions (fluid, filtration, supply voltage, interface, or high-level control system, etc.) ▶ Load cycle (pressure, flow, worst case, etc.) ▶ Performance (control accuracy, dynamics) 	Pressure supply for core shooter system <ul style="list-style-type: none"> ▶ Open hydraulic circuit ▶ Constant pressure: 100 bar ▶ Average flow: 30 l/min ▶ Maximum flow: 100 l/min ▶ Fluid: HLP 46 ▶ Supply voltage: 400 VAC ▶ Analog set points ▶ High dynamic performance 	Guidelines for energy-efficient hydraulics assemblies Questionnaire
2 Select required Sytronix features <ul style="list-style-type: none"> ▶ Control quality ▶ Dynamics ▶ Open or closed circuit ▶ Pressure or flow control ▶ Alternating pressure/flow control ▶ Force control, speed control, position control 	SvP 70x0 <ul style="list-style-type: none"> ▶ Pressure control ▶ High dynamic performance 	FcP, SvP, DFE systems FcP: starting on page 12 SvP: starting on page 26 DFE: starting on page 35
3 Select pump <ul style="list-style-type: none"> ▶ Maximum pressure ▶ Maximum flow ▶ Minimum speed ▶ Open or closed loop 	PGH04-3X/050 internal gear pump <ul style="list-style-type: none"> ▶ Continuous nominal pressure: 315 bar ▶ Maximum flow: 150 l/min ▶ Open circuit 	SytronixSize program for system dimensioning Pumps starting on page 47
4 Determine drive requirements Load cycle conversion using pump displacement <ul style="list-style-type: none"> ▶ RMS torque, maximum torque ▶ Average speed, maximum speed 	Parameters <ul style="list-style-type: none"> ▶ RMS torque: 85 Nm ▶ Maximum torque: 118 Nm ▶ Average speed: 630 rpm ▶ Maximum speed: 2050 rpm 	SytronixSize program for system dimensioning
5 Select drive/motor combination <ul style="list-style-type: none"> ▶ Torques, speed ▶ Drive family ▶ Compact or modular power unit ▶ Electrical connection on the motor ▶ Motor cooling type ▶ Encoder 	IndraDrive C with MPA01 HCS03.1E-W0100-A-05-NNBV MPA01-PGH4P-NN-VBB-M11EBHA-S3F-NN <ul style="list-style-type: none"> ▶ Stall torque: 105 Nm ▶ Maximum torque: 180.6 Nm ▶ Maximum speed: 2,400 rpm 	SytronixSize program for system dimensioning Power units, motor-pump modules, motors starting on page 47

Step	Example	Help
6 Determine controller configuration (IndraDrive only) <ul style="list-style-type: none"> ▶ Interface to higher-level control system ▶ Encoder ▶ Inputs and outputs ▶ Safety technology 	ADVANCED controller without bus communication CSH01.1C-NN-ENS-NNN-MA1-NN-S-NN-FW <ul style="list-style-type: none"> ▶ High performance ▶ No bus communication ▶ IndraDyn standard encoder ▶ Standard operator panel ▶ Analog I/O extension 	Power units page 74
7 Define firmware functionality (IndraDrive only) <ul style="list-style-type: none"> ▶ Basic OPEN LOOP or CLOSED LOOP package ▶ Extension packages ▶ Motion logic ▶ Technology functions 	Basic CLOSED LOOP package with motion logic and SvP application software FWA-INDRV*-MPH-08VRS-D5-1-NNN-MP FWS_MLDSYx_IMC_xxVxx_D0_MP08 <ul style="list-style-type: none"> ▶ No extension packages ▶ Motion logic ▶ Application software for SvP systems 	Firmware page 76
8 Select accessories <ul style="list-style-type: none"> ▶ Line filters and line chokes ▶ Braking resistors, brake units ▶ Additional capacity ▶ Electrical connections ▶ Engineering software ▶ Pressure transducer ▶ Mechanical connections 	<ul style="list-style-type: none"> ▶ Line filter NFD03.1-480-130 ▶ Line choke HNL01.1E-0362-N0080-A-500-NNNN ▶ Power cable RKL0042/005.0 ▶ Encoder cable RKG0047/005.0 ▶ Basic accessories HAS01.1-255-NNN-CN ▶ Shield connection HAS02.1-005-NNN-NN ▶ Pressure transducer SUP-E01-SYT-HM20-10/250-H-K35-A-5 	Accessories starting on page 77 Motor-pump modules starting on page 61 Engineering tool IndraWorks

Selection guides

Energy-efficient hydraulics assembly – questionnaire

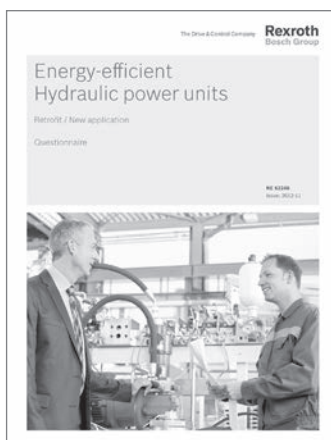
To implement a variable-speed drive solution, for retrofit or new applications, a customer-specific series of application conditions needs to be considered. This is in addition to the load profile of the machine. In hydraulics, critical factors such as the type of fluid, hydraulics schematic diagram, cooling requirements, and the presence of an accumulator can affect the configuration of a Sytronix system. Electrical parameters, such as supply voltage, the higher-level control system used, ambient temperatures, and performance required for the overall system are critical factors in the configuration of a Sytronix solution.

The questionnaire for energy-efficient hydraulic assemblies is intended as an aid for documenting all of the required information. Contact a Bosch Rexroth sales partner for more information.

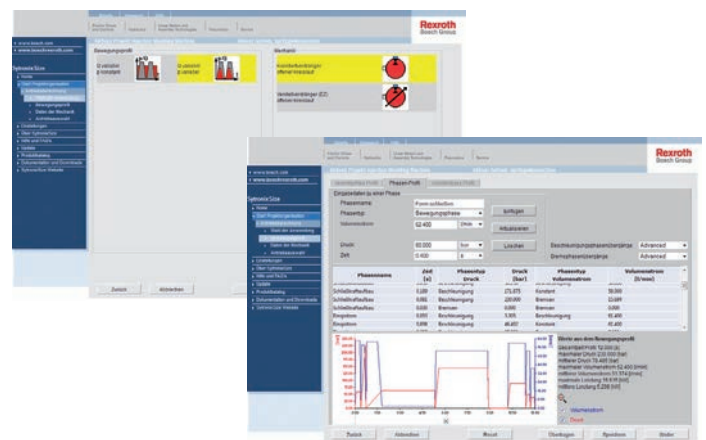
SytronixSize software tool

Sizing components to meet the machine’s energy requirement is key to an energy-efficient, cost-effective variable-speed drive solution. SytronixSize, Bosch Rexroth’s design tool, is configured to provide the answers. The choice of hydraulic pump is made using the design criteria followed by selection of the electric motor and matching VFD from the Bosch Rexroth product portfolio.

SytronixSize is only available for use by Bosch Rexroth applications specialists. Availability of SytronixSize to third parties is currently not planned due to legal restrictions. Inquire with a Bosch Rexroth sales partner for more information.



RE62246



Components



Rexroth offers a comprehensive range of pumps, power units, motors and control software for Sytronix variable-speed drives. Rexroth can provide support in the selection of individual components for custom designed Sytronix systems.

Motors 48

Synchronous and asynchronous motors for pump drives in Sytronix systems.

Pumps 53

Internal gear and axial piston pumps for a wide range of system pressures.

Motor-pump modules 61

Motor and pump units are available as preconfigured assemblies.

Controllers 68

Controllers with synchronous or standard motors.

Accessories 77

Extensive range of Rexroth accessories including line filters, braking resistors, line chokes, power and encoder cables, and auxiliary components for interconnect, attachment materials and assembly kits.

Motors

Synchronous and asynchronous motors for use in Sytronix variable-speed pump drive systems.

IndraDyn synchronous servo motors

- ▶ Maximum torques up to 495 Nm
- ▶ Environmental protection: IP65
- ▶ Choice of cooling systems
- ▶ High dynamic performance
- ▶ Compact design

Asynchronous servo motors

- ▶ Rated outputs up to 100 kW
- ▶ Maximum speeds up to 11,000 rpm
- ▶ Encoder systems for a wide range of applications
- ▶ Environmental protection: IP65
- ▶ Motor designed for easy maintenance

Standard asynchronous motors

- ▶ Energy efficiency class IE2 (Europe/Asia)
- ▶ NEMA Premium efficiency (North America)
- ▶ Low "total cost of ownership"
- ▶ Standard product series



MSK



MAD



MOT-FC

IndraDyn synchronous servo motor

MSK071, MSK101, MSK133



- ▶ Compact and powerful
- ▶ Broad performance range
- ▶ Multiple models to match load requirements
- ▶ Maximum torque up to 495 Nm
- ▶ Maximum speed up to 9,000 rpm

Features

- ▶ Maximum torques up to 495 Nm
- ▶ Axial or radial blower optional
- ▶ Environmental protection: IP65
- ▶ Choice of cooling

Product description

Outstanding features of the MSK range of motors include broad power range and model variants to match load requirements. Encoders are available in single or multi-turn versions. Additional options include shaft keyways, holding brakes, and increased runout to match any application. For applications with high continuous power operation, blowers are available as a retrofit. Environmental protection rating of IP65 for the single-phase powered blower enhances reliability.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Type			MSK071	MSK101	MSK133
Maximum speed	n_{Max}	rpm	3500 to 6000	3300 to 6000	3300
Continuous torque at stall	$M_{0.60K}$	Nm	12 to 23	32 to 70	152 to 293
Maximum torque	M_{Max}	Nm	44 to 84	110 to 231	320 to 630.7
Continuous current at stall	$I_{0.60K}$	A	5.2 to 20	14.9 to 58.3	63 to 115
Maximum current	I_{Max}	A	23.4 to 90.1	67.1 to 262.4	160 to 305
Moment of inertia	J	kgm ²	0.00173 to 0.0029	0.0065 to 0.0164	0.0476 to 0.09
Flange size	A	mm	140	192/208	260
Motor length	O	mm	272 to 352	350 to 688	653 to 803
Max. motor height	H	mm	202	262/276	368
Shaft diameter	D	mm	32	38	48
Weight		kg	13.9 to 23.5	28.3 to 53.5	91.6 to 146.0

Asynchronous servo motor MAD100, MAD130, MAD160, MAD180



- ▶ Maximum torque 850 kW
- ▶ Rated speed 500 rpm
- ▶ Maximum speed 3,000 rpm

Features

- ▶ Encoder systems for a wide range of applications
- ▶ Environmental protection: IP65
- ▶ Motor designed for easy maintenance

Product description

The high power density of the MAD motor series makes them ideal for use in metal forming machines with output torque up to 850 Nm.

High-resolution single and multi-turn encoders along with outstanding true running quality guarantee maximum accuracy. The motor's environmental protection rating IP65 includes the fan motor, making it suitable for use in harsh industrial environments. The easy-maintenance design of the motor allows for fan assembly exchange while the motor is in service.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Type			MAD100	MAD130	MAD160	MAD180
Rated torque	M_N	Nm	34 to 70	95 to 180	220/240	325/390
Maximum torque	M_{Max}	Nm	75.1 to 153.6	208.8 to 395.6	483.9/528.2	715.5/857.8
Rated power	P_N	kW	1.8 to 3.7	5 to 9.4	11.5/12.6	17/20.4
Rated current	I_N	A	5.3 to 10.1	12.8 to 24.2	26.1/27.6	38.2/39.7
Moment of inertia	J_R	kgm ²	0.019 to 0.0392	0.084 to 0.164	0.25/0.311	0.458/0.594
Flange size	A	mm	192	260	316	320
Motor length	O	mm	462 to 612	570 to 770	748/838	979/1,089
Max. motor height	H	mm	287	368	420	447/469
Shaft diameter	D	mm	32	42	55	60
Weight		kg	43 to 72	100 to 165	201/238	334/403

Standard asynchronous motor MOT-FC...: Europe/Asia



- ▶ For use with VFD or IndraDrive Bosch Rexroth recommends MOT-FC... standard asynchronous motors for FCP 5010/7010.

Features

- ▶ Motor design conforming to DIN EN 60034 (IEC 72)
- ▶ Standard asynchronous motors – MOT-FC... (IEC) for use outside of North America
- ▶ Environmental protection to IP55

Product description

Low voltage three-phase squirrel cage motors for VFD operation

Detailed information:

See media directory

Technical data

Mechanical version		IEC
Power range	kW	1.5 to 90
Nominal voltage	V	< 3 kW (230/460 V); > 3 kW (400/690 V)
Number of poles 1500 rpm		4
Energy efficiency		IE2
Type of construction (EN 60034-7)		IM B35; IM B 5, IM V1
Housing material		Aluminum (1.5 to 7.5 kW), gray cast iron (11 to 90 kW)
Cooling (EN 60034-6)		IC 411 (self-ventilated); IC 416 (forced ventilation)
Permissible ambient temperature	°C	-20 to +40
Permissible installation height	m	1000
Motor/winding protection (DIN EN 60947-8)		PTC
Terminal box position (IEC 60034-7 AMD 1)		Top

Standard asynchronous motor MOT-FC...: North America



- ▶ For use with VFDs and IndraDrive, Bosch Rexroth recommends MOT-FC... standard synchronous motors for FCP 5010/7010.

Features

- ▶ Motor version per NEMA MG1
- ▶ Standard asynchronous motors – MOT-FC... (NEMA) for use in North America
- ▶ Environmental protection to IP55

Product description

Low voltage three-phase squirrel cage motors for VFD operation (inverter duty)

Detailed information:

See media directory

Technical data

Mechanical version		NEMA
Power range	hp	2 to 125
Nominal voltage	V	208 to 230/460 V
Number of poles 1500 rpm		4
Energy efficiency		NEMA Premium efficiency
Type of construction (EN 60034-7)		Vertical or horizontal, with foot and flange, only flange
Housing material		Gray cast iron
Cooling (EN 60034-6)		TEFC (self-ventilated); TEFC (forced ventilation)
Permissible ambient temperature	°C	-20 to +40
Permissible installation height	m	1000
Motor/winding protection (DIN EN 60947-8)		PTC
Terminal box position (IEC 60034-7 AMD 1)		Left

Pumps

A variety of pump types can be used with Sytronix variable-speed drives.

Internal gear pumps

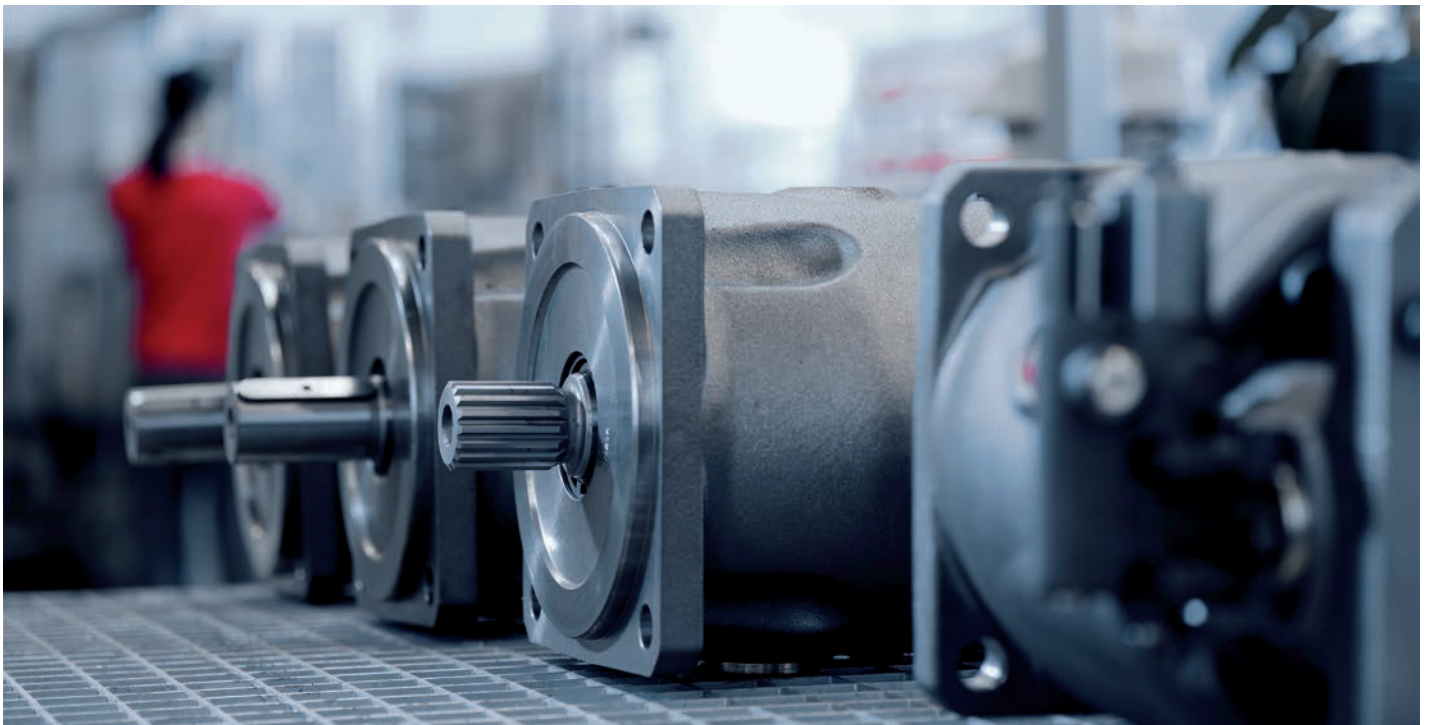
Internal gear pumps, type PGF-2X, PGH-2X, PGH-3X, and PGM-3X, are suitable for use in Sytronix systems. Operating in open hydraulic circuits, they are capable of a maximum continuous pressure of 315 bar, dependent on the type. Reverse rotation is permissible for 2 quadrant operation. The internal gear pumps are ideal for low noise requirements and use in pressure holding operation due to low internal leakage.

Axial piston pumps

The series A10 and A4 axial piston pumps are also suitable for use in Sytronix systems.

The A10 series can be used in pressure holding operation for long duration due to leakage flow being externally drained. They can also deliver flow in both directions for closed circuit operation, and additionally be used as motors.

The A4 series axial piston pumps are very robust and have proven successful in many press applications due to large displacements and pressure capability up to 400 bar. Suitable for extended pressure holding, these pumps are ideal for use in Sytronix drives thanks to an external leakage drain and wide range of drive speeds.



Internal gear pump

PGF-2X



- ▶ Long service life
- ▶ Suitable for wide range of viscosities and speeds
- ▶ Excellent suction characteristics
- ▶ Can be used in a variety of system sizes and combinations
- ▶ Can be combined with other pumps

Features

- ▶ Fixed displacement
- ▶ Low operating noise
- ▶ Low flow ripple
- ▶ High efficiency

Product description

PGF fixed displacement internal gear pumps are pressure-balanced to minimize internal leakage. They are suitable for low to medium power Sytronix drives, up to mid-pressure operation in industrial applications, such as machine tool applications.

Detailed information:

Data sheet 10213

Technical data

Frame size			2
Nominal size		NG	6 to 22
Displacement		cm ³	6.5 to 22.0
Pressure	p_{nom}	bar	210 ¹⁾
	p_{max}	bar	250
Speed	n_{min}	rpm	600
	n_{max}	rpm	3600
Flow [$v = 1500$ rpm]	q_{nom}	l/min	9.4 to 31.9
Fluid			HL mineral oil (DIN 51524 part 1); HLP mineral oil (DIN 5152 part 2); HEES fluids (DIN ISO 15380); HEPR fluids (DIN ISO 12380)
Temperature	HLP fluid	°C	-20 to +100
	Ambient	°C	-20 to +60
Filtration class		Class	20/18/15

¹⁾When NG = 22: $p_{nom} = 180$; $p_{max} = 210$; $n_{max} = 3000$

Internal gear pump

PGH-2X



- ▶ Size 2: Nominal size 5 to 8
- ▶ Size 3: Nominal size 11 to 16
- ▶ Maximum pressure 350 bar
- ▶ Maximum displacement 16 cm³
- ▶ Series 2X

Features

- ▶ Fixed displacement
- ▶ Low operating noise
- ▶ Low flow ripple
- ▶ High efficiency, even at low speeds and viscosities due to dynamic pressure balancing
- ▶ Suitable for wide range of viscosities and speeds
- ▶ Can be used in a variety of system sizes and combinations

Product description

PGH fixed displacement internal gear pumps are pressure balanced to minimize internal leakage. The driven pinion shaft is supported by hydrodynamic bearings and drives an internal toothed ring gear. Fluid is pumped within the gear tooth cavities and a sickle-shaped segment assembly. Axial sealing plates are dynamically pressure-balanced to ensure optimal sealing of the pump gears.

Detailed information:

Data sheet 10223

Technical data

System size			2	3
Nominal size			5 to 8	11 to 16
Displacement	V_g	cm ³	5.24 to 8.2	11.0 to 16.0
Speed	n_{min}	rpm	600	600
	n_{max}	rpm	3000	3000
Flow	q_v	l/min	7.5 to 11.8	15.8 to 23.0
Pressure	p_{nom}	bar	315	315
	p_{nom}	bar	350	350
Temperature	HLP fluid ¹⁾	°C	-10 to +80	-10 to +80
	Ambient	°C	-20 to +80	-20 to +80
Filtration class		Class	20/18/15	20/18/15

¹⁾ HLP mineral oil (DIN 51524)

Internal gear pump

PGH-3X



- ▶ Size 4: Nominal size 20 to 50
- ▶ Size 5: Nominal size 63 to 250
- ▶ Maximum pressure: 350 bar
- ▶ Maximum displacement: 250 cm³
- ▶ Series 3X

Features

- ▶ Fixed displacement
- ▶ Low operating noise
- ▶ Low flow ripple
- ▶ High efficiency, even at low speeds and viscosities due to dynamic pressure balancing
- ▶ Suitable for wide range of viscosities and speeds
- ▶ Suitable for use with HFC fluid

Product description

PGH fixed displacement internal gear pumps are pressure-balanced to minimize internal leakage. The driven pinion shaft is supported by hydrodynamic bearings and drives an internal toothed ring gear. Fluid is pumped within the gear tooth cavities and a sickle-shaped segment assembly. Axial sealing plates are dynamically pressure-balanced to ensure optimal sealing of the pump gears.

Detailed information:

Data sheet 10227

Technical data

System size			4	5
Nominal size			20 to 50	63 to 250
Displacement	V_g	cm ³	20.1 to 50.7	64.7 to 250.5
Speed	n_{min}	rpm	200	200
	n_{max}	rpm	3000	3000
Flow	q_v	l/min	28.9 to 72.8	92.8 to 359.6
Nominal pressure, continuous	p_N	bar	250/315	135 to 315

Internal gear pumps

PGM-3X



- ▶ High efficiency at low speeds and viscosities due to dynamic pressure balancing
- ▶ Suitable for a wide range of viscosities and speeds

Features

- ▶ Fixed displacement
- ▶ Very low operating noise
- ▶ Low flow ripple

Product description

PGM fixed displacement internal gear pumps are pressure-balanced to minimize internal leakage.

Available in large displacements and suitable for medium pressure operation, these pumps are ideally suited for variable-speed operation along with frequent pressure cycling and are ideal for use in plastics processing machines.

Detailed information:

Data sheet 10229

Technical data

System size			4	5
Nominal size			25 to 63	80 to 125
Displacement		cm ³	25.3 to 65.5	81.4 to 125.3
Pressure	p_{nom}	bar	175	175
	p_{max}	bar	210	210
Speed	n_{min}	rpm	200	200
	n_{max}	rpm	3000	3000
Flow [v = 1500 rpm]	q_{nom}	l/min	36.3 to 94.0	116.9 to 179.8
Fluid			HLP mineral oil (DIN 51524)	HLP mineral oil (DIN 51524)
Fluid temperature -HLP/HL		°C	-10 to +80	-10 to +80
Ambient temperature		°C	-20 to +60	-20 to +60
Filtration class			20/18/15	20/18/15

Axial piston pumps

A4VSO



- ▶ Modular design
- ▶ Fast control times
- ▶ Multiple through-drive options
- ▶ Visual swivel angle indicator
- ▶ No restrictions on mounting position
- ▶ Operation with HF fluid with restrictions

Features

- ▶ Variable displacement
- ▶ Excellent suction characteristics
- ▶ Low noise
- ▶ Long service life
- ▶ HFC operation with a special version, see RD 92053

Product description

A4VSO axial piston variable pumps feature a swashplate design and are suitable for open circuit operation.

Detailed information:

Data sheet 92050

Technical data

Nominal size			40 to 355
Displacement		cm ³	40 to 355
Pressure	p_{nom}	bar	350
	p_{max}	bar	400
Speed	n_{min}	rpm	On request
	n_{max}	rpm	1900 to 3200
Flow [n = 1500 rpm]	q_{nom}	l/min	60 to 533
Pump operation			Yes
Motor operation			No
Performance ($\Delta p = 350$ bar; $V_{g,max}$; n = 1500 rpm)	P_{max}	kW	35 to 311
Torque ($\Delta p = 350$ bar, $V_{g,max}$)	M_{max}	Nm	223 to 1976

Axial piston pump

A10VSO series 31/32



- ▶ Nominal size for series 31: 18 to 140
- ▶ Nominal size for series 32: 45 to 180
- ▶ Nominal pressure 280 bar
- ▶ Maximum pressure 350 bar
- ▶ Open circuit

Features

- ▶ Axial piston swashplate construction
- ▶ Excellent suction characteristics
- ▶ Low noise level
- ▶ Long service life
- ▶ Versatile range of controllers
- ▶ Fast control times
- ▶ Hydrostatic cradle bearings
- ▶ Low pressure ripple
- ▶ High efficiency
- ▶ Designed to minimize cavitation and suction port flow drops, and improve shaft sealing with case pressure peaks

Product description

The A10VSO variable displacement swashplate pump is usable in open circuit designs. Flow is proportional to drive speed and pump displacement. Swashplate can be used to control displacement of the pump.

Detailed information:

Data sheet 92711

Technical data

Series			31	32
Nominal size			18 to 140	45 to 180
Displacement		cm ³	18 to 140	45 to 180
Pressure	p_{nom}	bar	280	280
	p_{max}	bar	350	350
Speed	n_{min}	rpm	50	50
	n_{max}	rpm	2100 to 3900	1800
Flow (n = 1500 rpm)	q_{nom}	l/min	27 to 210	67.5 to 270
Pump operation			Yes	Yes
Motor operation			Yes	Yes
Performance ($\Delta p = 280$ bar) at $V_{g,max}$ and n = 1800 rpm	P_{max}	kW	15 to 117	38 to 151
Torque ($\Delta p = 280$ bar) at $V_{g,max}$	M_{max}	Nm	80 to 623	200 to 802

Axial piston pumps

A10FZO, A10FZG, A10VZO, A10VZG



- ▶ Proven A10 technology
- ▶ Optional through-drive
- ▶ High efficiency

Features

- ▶ Suitable for variable-speed operation
- ▶ Designed for start/stop service
- ▶ Capable of long pressure holding operation
- ▶ Usable as a pump or motor

Product description

As an advanced design of the proven A10 family of pumps, these products are specifically adapted for variable speed drives in energy-efficient systems.

A10 family axial piston pumps are available as fixed displacement pumps in open (A10FZO) or closed (A10FZG) circuits, or as variable displacement pumps in open (A10VZO) or closed (A10VZG) circuits.

Detailed information:

Data sheet 91485

Technical data

Type			A10FZO	A10FZG	A10VZO	A10VZG
Nominal size			6 to 45 ¹⁾	6 to 45 ¹⁾	10 to 180	10 to 63 ²⁾
Displacement		cm ³	6 to 10.6	6 to 10.6	10.8 to 180	10 to 63
Pressure	p_{nom}	bar	315	315	250 (NG10)/315	315
	p_{max}	bar	350	350	315 (NG10)/350	350
Speed	n_{min}	rpm	0	0	0	0
	n_{max}	rpm	3000 to 3600	3000	1800 to 3600	3000
Flow (n = 1500 rpm)	q_{nom}	l/min	9 to 67.5	9 to 67.5	15 to 270	15 to 94.5
Performance	P_{max}	kW	1.5 to 11.25	1.5 to 11.25	2.5 to 45	2.5 to 15.75
Torque	M_{max}	Nm	9.5 to 72	9.5 to 72	17 to 286	17 to 101

¹⁾ 58 to 63 on request ²⁾ On request

Motor-pump modules

A selection of standard motor-pump modules is available for Sytronix variable-speed pump drives, consisting of a motor, coupling and pump. The flexible solutions of preassembled modules are available in a variety of mounting configurations.

Module MPA01

The MPA01 module was developed specifically for the SvP 7010 system and features direct motor-pump coupling.

Module MPAS1

Like the MPA01, the MPAS1 module was also developed for the SvP 7010 system, but uses a conventional motor-pump coupling.

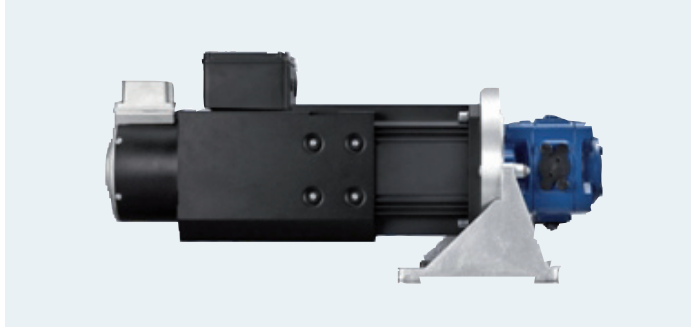
Modules MPES2 and MPES3

The MPES2 and MPES3 modules are used with FcP 5010, FcP 7010, DFE 5010, and DFE 7010 systems. These modules use conventional motor-pump coupling; MPES2 is designed for the European and Asian markets, while the MPES3 is designed for the North American market.



Module MPA01

MSK, PGH



- ▶ Direct coupling
- ▶ Reduced overall length
- ▶ Horizontal mounting

Features

- ▶ Available with 3 motor configurations
- ▶ Available with 8 pump configurations
- ▶ Mounting options: flange, foot mount or motor feet (only MSK133)

Product description

The MPA01 with direct coupling provides a compact solution, offering a range of motor and pump options.

Detailed information:

Assembly instructions R911339498, R911341599

Technical data

Motor	MSK101	MSK133	MSK133
Overall length	C, D, E, F	B, C, D, E	B, C, D, E
Cooling	Forced ventilation	Forced ventilation	Liquid-cooled
Pump	PGH4	PGH5	PGH5
Nominal size	20 to 50	63 to 250	63 to 250

Module MPAS1

MSK, PGM



- ▶ Horizontal mounting
- ▶ Standard motor-pump coupling

Features

- ▶ Available with 3 motor configurations
- ▶ Available with 2 pump configurations
- ▶ Mounting options: flange, foot mount

Product description

The MPAS1 utilizes conventional motor-pump coupling using a bell mount adapter.

Detailed information:

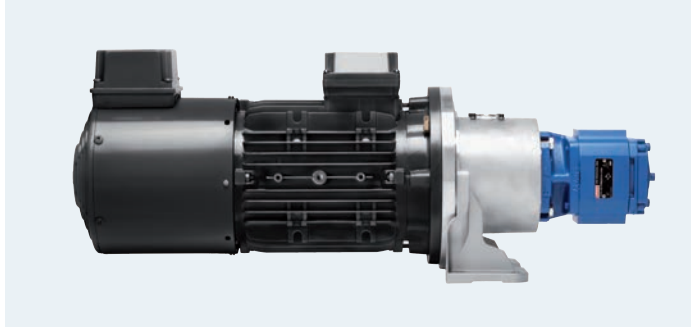
See media directory

Technical data

Motor	MSK071	MSK101	MSK101	MSK133
Overall length	C, D, E,	C, D, E, F	C, D, E, F	B, C, D, E
Cooling	Forced ventilation	Forced ventilation	Forced ventilation	Forced ventilation
Pump	PGH2, PGH3, PGH4, PGH5	PGM4	PGH3, PGH4, PGH5	PGM5
Nominal size	5 to 125	25 to 63	11 to 250	80 to 125
Motor	MSK133	MSK133	MSK133	MSK133
Overall length	B, C, D, E	B, C, D, E	B, C, D, E	B, C, D, E
Cooling	Liquid-cooled	Liquid-cooled	Forced ventilation	Liquid-cooled
Pump	PGM4	PGM5	PGH4, PGH5	PGH4, PGH5
Nominal size	63	80 to 125	32 to 250	32 to 250

Module MPES2

MOT-FC, PGF/PGH/A10VZO-EZ4/A10VSO/A4VSO



- ▶ Horizontal and vertical mounting

Features

- ▶ Wide range of motor-pump modules
- ▶ Available with a number of pump configurations, dependent on pump type
- ▶ Mounting options: varies, based on drive size

Product description

MPES2 is designed for the European and Asian markets. The MPES2 module uses a conventional motor-pump coupling and a bell mount adapter.

Detailed information:

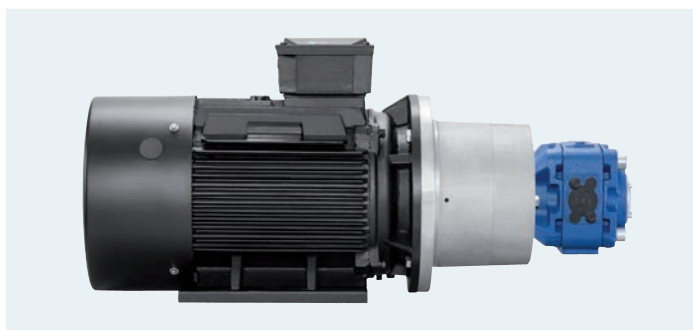
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Technical data

Motor		MOT-FC	MOT-FC	MOT-FC	MOT-FC
Performance	<i>kW</i>	1.5 to 15	1.5 to 15	18.5 to 90	1.5 to 90
Cooling		Self-ventilated	Self-ventilated	Forced ventilation	Self-ventilated
Pump		PGF2	PGH2, PGH3, PGH4, PGH5	PGH4, PGH5	A10VZO-EZ4
Nominal size		6 to 22	5 to 250	25 to 250	10 to 180
Motor		MOT-FC	MOT-FC	MOT-FC	
Performance	<i>kW</i>	18.5 to 90	3 to 90	18.5 to 90	
Cooling		Self-ventilated	Self-ventilated	Self-ventilated	
Pump		A4VSO (2-point adjustment)	A10VSO	A4VSO	
Nominal size		40 to 500	71 to 180	125 to 355	

Module MPES3

MOT-FC, PGF/A10VZO



Features

- ▶ Wide range of motor-pump modules
- ▶ Available with different pump configurations, depending on the pump type
- ▶ Mounting options: varies, based on drive size

Product description

MPES3 is designed for the North American market. The MPES3 module uses a conventional motor-pump coupling and a bell mount adapter. Can be mounted horizontally or vertically.

Detailed information:

See media directory

Technical data

Motor		MOT-FC (WEG)	MOT-FC (WEG)
Performance	hp	2 to 20	2 to 125
Cooling		Self-ventilated	Self-ventilated
Pump		PGF2	A10VZO-EZ4
Nominal size		6 to 22	10 to 180

Variable-speed pressure and flow control system

SYHDFEn-1X



- ▶ Infinitely variable flow control
- ▶ Long service life
- ▶ Real-time mode for non-cyclic processes
- ▶ Universal through drive

Features

- ▶ Pressure transducer (order separately)
- ▶ A4VSO axial piston variable displacement pump
- ▶ VT-DFPn-2X proportional valve with integrated electronic control system
- ▶ Swivel angle transducer
- ▶ Suitable for HFC fluids, per RD 92053

Product description

The SYHDFEn-1X electrohydraulically controls the displacement, pressure and power/torque of an axial piston variable displacement pump.

The control utilizes the following components:

- ▶ A4VSO axial piston variable displacement pump
- ▶ VT-DFPn-2X proportional pilot valve, with spool position feedback and integrated electronics.
- ▶ Pump displacement transducer swivel angle transducer
- ▶ Pressure transducer

Detailed information:

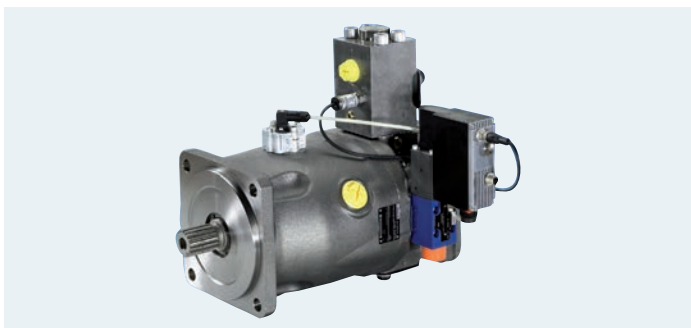
Data sheet 62242

Technical data

Nominal size			125	180	250	355
Displacement	$V_{g \max}$	cm ³	125	180	250	355
Max. speed	$n_{0 \max}$	rpm	1800	1800	1800	1500
Min. speed	n_{\min}	rpm	50	50	50	50
Max. flow at max. speed	$q_{v0 \max}$	l/min	225	324	450	533
Max. flow at $n_E = 1500$ rpm		l/min	186	270	375	533
Max. performance ($\Delta p = 280$ bar) at max. speed	$P_{0 \max}$	kW	131	189	263	311
Max. performance ($\Delta p = 280$ bar) at $n_E = 1500$ rpm		kW	109	158	219	311
Mass (without fluid)	m	kg	88	102	184	207
Suction pressure	p	bar	0.8 to 30	0.8 to 30	0.8 to 30	0.8 to 30
Max. permissible operating pressure	p_{\max}	bar	350	350	350	350
Min. operating pressure	p_{\min}	bar	≥20	≥20	≥20	≥20

Variable-speed pressure and flow control system

SYDFEn-3X



- ▶ Continuous flow adjustment
- ▶ Long service life
- ▶ With pulsation damping
- ▶ High-speed version
- ▶ Universal through drive

Features

- ▶ Pressure transducer
SYDZ pre-load sequence valve (optional)
- ▶ A10VSO.../32 variable displacement axial piston pump
- ▶ VT-DFPn-2X proportional valve with integrated electronic control system
- ▶ Swivel angle transducer

Product description

The SYDFEn-3X electrohydraulically controls the displacement, pressure and power/torque of an axial piston variable displacement pump.

The control utilizes the following components:

- ▶ A10VSO.../32 axial piston variable displacement pump
- ▶ VT-DFPn-2X proportional pilot valve, with spool position feedback and integrated electronics
- ▶ Swivel angle transducer
- ▶ Pressure transducer
- ▶ SYDZ pre-load sequence valve with pressure limiting function

Detailed information:

Data sheet 62241

Technical data

Nominal size			71	100	140	180
Displacement	$V_{g\ max}$	cm ³	71.1	100	140	180
Max. speed	$n_{0\ max}$	rpm	2550	2300	2200	1800
Min. speed	n_{min}	rpm	50	50	50	50
Max. flow at max. speed	$q_{v0\ max}$	l/min	181	230	308	324
Max. flow at $n_E = 1500$ rpm		l/min	106.7	150	210	270
Max. performance ($\Delta p = 280$ bar) at max. speed	$P_{0\ max}$	kW	84	107	144	151
Max. performance ($\Delta p = 280$ bar) at $n_E = 1500$ rpm		kW	50	70	98	125
Mass (without through drive, incl. pilot valve)	m	kg	49	71	75	80
Nominal pressure	p_{nom}	bar	280	280	280	280
Max. permissible operating pressure	p_{max}	bar	350	350	350	350
Min. operating pressure	p_{min}	bar	≥20	≥20	≥20	≥20

Drives

Drives

Drive units are VFDs consisting of a power supply and a controller for use with servo and standard motors. The controller contains all of the control functions and interfaces for installation in the drive. The power supply contains the power electronics to interface to the motor and provides the physical mounting location for the controller. The VFD converts the fixed amplitude and frequency line power into variable amplitude and frequency three-phase alternating current.

IndraDrive – compact drives

- ▶ Power range from 1.5 kW to 630 kW, with maximum current from 12 A to 1,535 A
- ▶ High overload capacity
- ▶ Compact design for single-axis applications
- ▶ Can be connected to a converter for cost-effective solutions
- ▶ Direct line connection from 200 VAC to 500 VAC

Rexroth Fv VFD

The Rexroth Fv VFD is the drive solution optimized for automation applications with a power range up to 90 kW

Firmware

Unit-specific software for automation applications. With the IndraDrive servo drives and the Rexroth Fv VFDs, firmware is stored in read-only memory. IndraDrive has the option of updating the firmware using CompactFlash



IndraDrive units

HCS02.1E-W0028/-W0054/-0070



- ▶ 2.5x overload capacity
- ▶ Maximum current from 12 A to 70 A
- ▶ Can be connected to a converter for cost-effective solutions
- ▶ Direct line connection from 200 VAC to 500 VAC

Features

- ▶ Continuous power from 1.5 kW to 11 kW
- ▶ Internal or external braking resistors

Product description

HCS02 series IndraDrive of drives integrate inverter and power supply in one unit. Contains line connections for compact construction making it suitable for single-axis applications.

Detailed information:

Instructions R911309635

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Continuous current ¹⁾	A	11.3 to 28.3
Maximum current	A	28.3 to 70.8
DC bus continuous power without/with choke	kW	5.1 to 9/5.1 to 14
Maximum output without/with choke	kW	8 to 14/10 to 19
Line voltage	V	3 AC 200 ... 500, 1 AC 200 ... 250 (±10 %)
Continuous line input current	A	13 to 30
Dependence of output on line voltage		at $U_{LN} < 400$ V: 1% power reduction per 4 V at $U_{LN} > 400$ V: 1% power gain per 5 V
Maximum braking power	kW	10 to 25
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)
Power consumption	W	14 to 23
Dimensions (H x W x D)	mm	65 to 105 x 352 x 252
Weight	kg	3.8 to 6.8

All data for nominal rating at 3 AC 400 V line voltage and 4 kHz switching frequency; ¹⁾ In case of output frequency less than 4 Hz the output current will be reduced

IndraDrive drives

HCS03.1E-W0070/-W0100/-W0150/-W0210



- ▶ Maximum current from 70 A to 210 A
- ▶ Direct line connection from 200 V to 500 V

Features

- ▶ Continuous power from 11 kW to 75 kW
- ▶ High overload capacity

Product description

HCS03 series IndraDrive of drives integrate inverter and power supply in one unit. Contains line connections for compact construction making it suitable for single axis applications.

Detailed information:

Instructions R911309635
Catalog R999000018 (DE), R999000019 (EN)

Technical data

Continuous current ¹⁾	A	45 to 145
Maximum current	A	70 to 210
DC bus continuous power without/with choke	kW	13 to 42/25 to 85
Maximum output without/with choke	kW	20 to 68/40 to 124
Line voltage (+10%/-15%)	V	3 AC 400 to 500
Continuous input line current	A	50 to 146
Dependence of output on line voltage		at $U_{LN} < 400$ V: 1% power reduction per 4 V decrease in voltage
Maximum braking power	kW	42 to 137
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)
Power consumption	W	22.5 to 30
Dimensions (H x W x D)	mm	125 to 350 x 440 x 315
Weight	kg	13 to 38

All data for nominal rating at 3 AC 400 V line voltage and 4 kHz switching frequency; ¹⁾ In case of output frequency less than 4 Hz the output current will be reduced

IndraDrive drives

HCS04



- ▶ Integrated RFI filter for industrial environments
- ▶ Through-hole technology
- ▶ Optimized for mounting in control cabinets
- ▶ Intelligent limitation and protection
- ▶ Decoupled DC control terminals
- ▶ Worldwide approval

Features

- ▶ Wide range of power and voltage
- ▶ Robust construction
- ▶ Comprehensive options

Product description

HCS04.2E converters are used to drive three-phase asynchronous and synchronous motors. They feature state-of-the-art components and technology and are suitable for drive and regenerative operation of motors in both rotary directions. When braking, regenerated energy is dissipated in braking resistors. HCS04.2E converters are stand-alone units with an internal controller and power supply and utilize forced air cooling.

Detailed information:

Data sheet R911327333

Catalog R999000018 (DE), R999000019 (EN)

Technical data

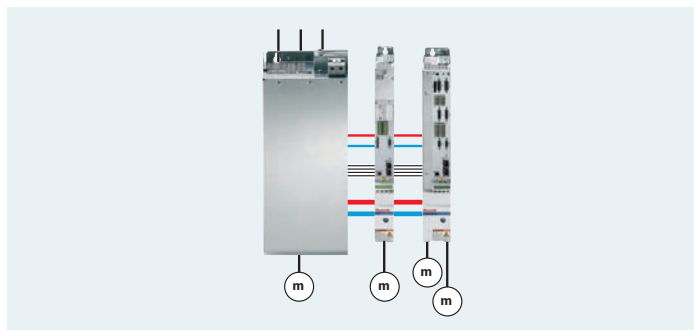
Typical motor rating	kW	High continuous load ¹⁾ : 132 to 630; high overload ²⁾ : 110 to 500
Continuous current	A	High continuous load ¹⁾ : 259 to 1,126; high overload ²⁾ : 215 to 930
Maximum current 60 s	A	High continuous load ¹⁾ : 311 to 1351; high overload ²⁾ : 323 to 1,395
Maximum current 2 s	A	High continuous load ¹⁾ : 350 to 1,520; high overload ²⁾ : 355 to 1,535
Continuous input line current ³⁾	A	High continuous load ¹⁾ : 226 to 1,037; high overload ²⁾ : 194 to 834
Line voltage	V	3 AC 380 to 480 (+10%/–15%)
Brake chopper		Internal/external
Permanent braking power	kW	85 to 400
Maximum brake power 10 s	kW	165 to 750
Control voltage, external	V	DC 24 (±20 %)
Dimensions (H x W x D)	mm	330 to 1,110 x 782 to 1,150 x 380
Weight, approx.	kg	74 to 300

All data for nominal rating at 3 AC 400 V line voltage and 4 kHz switching frequency with line or DC choke

¹⁾ Overload 20% for 60 s, 35% for 2 s; ²⁾ Overload 50% for 60 s, 65% for 2 s; ³⁾ With DC choke HLL

Drives, power supply units

HMV01.1E, HMV01.1R, HMV02.1R



- ▶ Energy-saving line regeneration
- ▶ Integrated line contactor
- ▶ Integrated braking resistor

Features

- ▶ Power range from 15 kW to 120 kW
- ▶ Direct line connection from 400 V to 480 V
- ▶ Protection to IP20

Product description

HMV power supply for modular HMS drive controllers.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Line voltage	V	3 AC 400 to 480 (+10 %/-15 %)
Supply frequency	Hz	48 to 62
DC bus continuous output	kW	18 to 120
Overload capacity		1.5x/1.5 to 2.5x
Suitable for cabinet depth	mm	HMx01: 400
Line contactor/brake chopper/brake resistor		internal ¹⁾ / internal ¹⁾ / internal ¹⁾
Control voltage DC 24 V		external
Protection category		IP20
Installation height	m	1,000 above sea level, with derating to 4,000 ²⁾
Ambient temperature	°C	0 to +40, with derating to +55
Cooling type		Air cooling
CE mark		Low Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC
Certifications/EMC		EN 61800-5-1, EN 61800-3, UL 508C, C22.2 No. 14-05/C3 (EN 61800-3)

All data for nominal rating at 3 AC 400 V line voltage and 4 kHz switching frequency; ¹⁾ Not applicable for HMV01.1R-W0120; ²⁾ HCS04 only up to 3,000 m

Controllers

IndraDrive HMS01, HMS02



- ▶ Space-saving design in multi-axis applications
- ▶ Can be powered via power supply unit
- ▶ Power sharing via common DC bus
- ▶ Can be connected to a converter for cost-effective solutions

Features

- ▶ Modular single-axis inverter
- ▶ Single-axis inverter with maximum current from 20 A to 350 A

Product description

HMS drive controllers for single and dual axes in the modular drive system. They have a power output to drive a motor and operate with HMV01/02 supply units and HCS02 and HC03 drive controllers.

Detailed information:

Instructions R911309635
Catalog R999000018 (DE), R999000019 (EN)

Technical data

Continuous current	A	12.1 to 250
Maximum current	A	20 to 350
DC bus capacity	mF	-/0.14/0.27
Control voltage, external	V	DC 24 ±20% (DC 24 ±5% when supplying motor holding brake)
Power consumption without control unit and motor brake	W	10 to 218 (including HAB blower unit)
Continuous current without control unit and motor brake	A	0.4 to 9.1 (including HAB blower unit)
Width	mm	50 to 350
Height	mm	352/440 ¹⁾
Depth	mm	252/309
Weight	kg	5.3 to 31.7

All data apply to nominal rating at 3 AC 400 V line voltage and 4 kHz switching frequency

¹⁾ Overall height HSM01.1N-W0350 with auxiliary fan HAB: 748 mm

Controllers

CSH01 ADVANCED controller



- ▶ Use with Sytronix SvP
- ▶ Option: safety on board
- ▶ Available with standard performance and functionality, CSB01 BASIC version, for use with Sytronix FcP and DFE_n

Features

- ▶ Solution for standard and high-end applications
- ▶ Integrated motion logic with advanced features
- ▶ Open interfaces for international use
- ▶ On request, certified safety technology per EN 13849-1 and EN 62061

Product description

ADVANCED controller offers the highest performance and dynamics. In addition to performance, a wide range of control communications and encoder interfaces are available. Digital and analog inputs and outputs are available in the base controller using an I/O expansion. The controller can be equipped with certified safety technology per EN 13849-1 and EN 62061, as an option. The ADVANCED controller is an ideal platform for a drive-integrated PLC with IndraMotion MLD. Using a PC with the engineering tool IndraWorks, a complete configuration and startup can be performed.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Control communication	Optional: analog interface, parallel interface, PROFIBUS, SERCOS 2, SERCOS III, Multi-Ethernet, CANopen, DeviceNet
Digital inputs	7
Digital inputs for measuring probe	2
Digital inputs/outputs (configurable)	4
Analog inputs	1
Analog outputs	2
Relay outputs	1

Fv frequency converter FVCA01.1 (-XXX-P002)



- ▶ Multiple operating modes to suit a variety of applications
- ▶ Simple operation and maintenance
- ▶ Removable fan
- ▶ LCD operator interface panel
- ▶ Advanced functionality and high performance

Features

- ▶ Quality and reliability
- ▶ Worldwide service
- ▶ CE-compliant
- ▶ UL-listed

Product description

The Rexroth Fv VFD is an optimal drive solution for automation of a variety of applications with power ratings up to 90 kW. It can operate in voltage/frequency (V/f), sensorless vector control (SVC), or field-oriented vector control (FOC) modes to suit a wide range of applications.

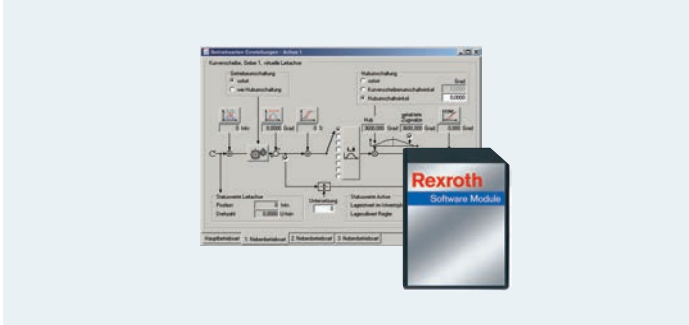
Detailed information:

Instructions R912003734 (DE), R912002625 (EN)
Catalog R999000241 (DE), R999000242 (EN)

Technical data

Rated motor power	kW	0.4 to 90
Nominal motor voltage	V	0 to 480
Line voltage	V AC	380 to 480
Supply frequency	Hz	50 to 60
Rated continuous current	A	1.3 to 183
Overload capacity (G-type)	%	180 (in 10 s)/150 (in 1 min)
Motor cable length (internal line filter C3)	m	5/10
Motor cable length (external line filter C3)	m	50/75
Ambient temperature	°C	-10 to +40
Controller		PID
Bus systems		Modbus/PROFIBUS
Display		LCD: Frequency, output voltage, output current, etc.

Firmware FWS



- ▶ Hydraulic power unit (HPU): constant pressure control
- ▶ Injection molding (IMC): p/Q control
- ▶ Position to force (PFC): p/F control

Features

- ▶ All standard functions included
- ▶ Function extensions
- ▶ Industry-specific functions
- ▶ Integrated IEC-compliant logic

Product description

The stock firmware can perform standard drive functions – from simple V/f control through positioning control mode. Extension packages provide options of electronic synchronization, servo functions and main spindle drives. The freely-programmable motion logic with integrated PLC conforming to IEC 61131-3 and ready-to-use functions enable simple execution of complex machine processes.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Technology functions	HPU	IMC	PFC
FcP 7010	p, Q, p const		p/F control
SvP 7010		p/Q control	p/F control

Accessories

A comprehensive range of accessories is available for your Sytronix system.

Line filters

Line filters ensure that the EMC limit values are adhered to and suppress leakage current generated by line capacitors.

Braking resistors

Braking resistors provide energy dissipation, in the form of heat, resulting from dynamic braking of the drive.

Line chokes

Line chokes reduce the harmonics coupled into the supply grid. As an IndraDrive accessory, they are used to increase the continuous DC bus output and to suppress harmonics.

Power and encoder cables

Power cables are used to connect the motor to the drive unit. Encoder cables are used to connect the feedback encoder to the drive.

Auxiliary components

Accessories for connecting modules, such as the HAS01, include bus bars, fastening materials, etc. Additional items include shielded motor cables for connecting to drive units (HAS02), mounting flange assemblies (HAS07) and commissioning cable (RKB0001).



Line filter

NFD03.1-480-007/-016/-030/-055/-075/-130/-180



- ▶ Fault-free operation per EN 61800-3, class A, group 2
- ▶ For cable lengths up to 75 m

Features

- ▶ Ensures compliance with EMC limits
- ▶ Matched to drives

Product description

Line filters limit generated EMC and suppress leakage current generated by line capacitors. The line filters are matched to the drive units and are scalable in regards to current, number of drives and motor cable length. They can be combined with shielded motor cables for operation conforming to EN 61800-3, Class A, Group 2, with single cables in lengths of up to 75 m.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Continuous current	A	7 to 180
Power dissipation	W	3.9 to 61
Width W	mm	50 to 130
Height H	mm	160 to 350
Depth D	mm	90 to 180
Weight	kg	0.7 to 10

All data apply to nominal rating at 3 AC 400 V line voltage.

Braking resistor

HLR01.1N-...



- ▶ Space-saving, compact design
- ▶ Uses exhaust air from the converter

Features

- ▶ For IndraDrive HCS03 drives
- ▶ Compact design
- ▶ High power dissipation
- ▶ Protection from environmental conditions

Product description

When using an HCS03 drive, dynamic braking may require braking resistors to dissipate a range of power consumption. The braking resistor is mounted directly above the drive and uses the drive's exhaust air for cooling. Robust construction and high voltage ratings of the resistor provide high-power dissipation. The resistors are constructed using flame-retardant materials and are fully encapsulated for protection from environmental conditions.

Detailed information:

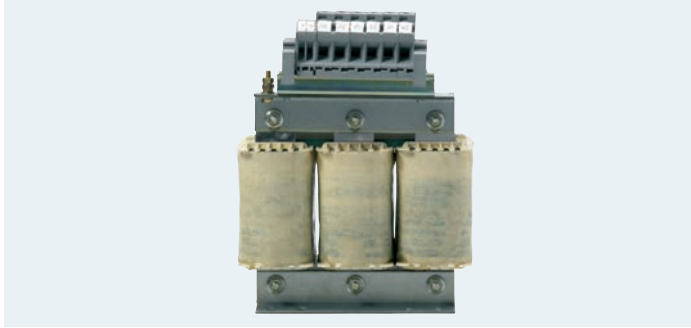
Catalog R999000018 (DE), R999000019 (EN)

Technical data

Maximum energy consumption	kWs	37 to 130	
Braking power	Duration	kW	0.3 to 1.08
	Err Max	kW	37 to 130
	t_{on}	s	1
	$t_{cycle\ time}$	s	120
Resistance	Ω	5.8 to 20.5	
Width	mm	123 to 350	
Height	mm	300	
Depth	mm	196 to 220	
Weight	kg	3 to 8	

Line choke

HNL01.1E-...



- ▶ Increased continuous DC bus output
- ▶ Compliance with EN 61000-2-4

Features

- ▶ Reduces line current harmonics
- ▶ Prevents coupled EMI

Product description

Using line chokes with inverters and inverter power supplies, an increase in DC bus continuous power can be achieved. In addition to reducing line harmonics coupling of EMI to the line is also reduced. When using power supplies with line regeneration, line chokes are always required. Using line chokes limits EMI for industrial networks per EN 61000-2-4.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

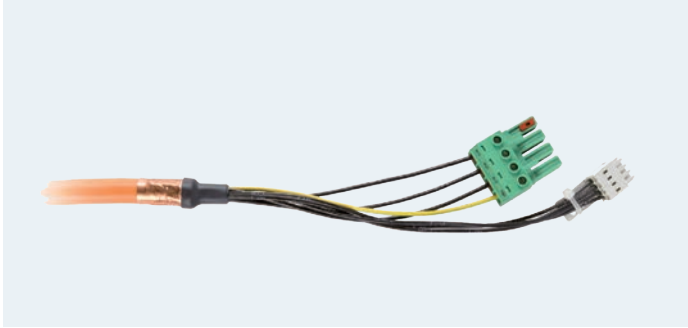
Technical data

Continuous current	A	12 to 760
Power dissipation	W	40 to 450
Nominal inductance	μH	3 x 55 to 3 x 1,000
Capacity	μF	–
Type		A/D/E/F
Width	mm	120 to 385
Height	mm	164 to 275
Depth	mm	61 to 440
Weight	kg	2.7 to 70

All data apply to nominal rating at 3 AC 400 V line voltage.

Power cable (motor terminal box)

RKL0037, RKL0039, RKL0040, RKL0041, RKL0042



- ▶ RGK3101 motor connection
- ▶ INK04602/INK0604/INK0605 cable
- ▶ RLS0721/INS0721/RLS0723 controller connection

Features

- ▶ Connection to motor terminals

Product description

Cable for connecting motors to drives. A wide range of cables are available from Rexroth for use with Sytronix.

Detailed information:

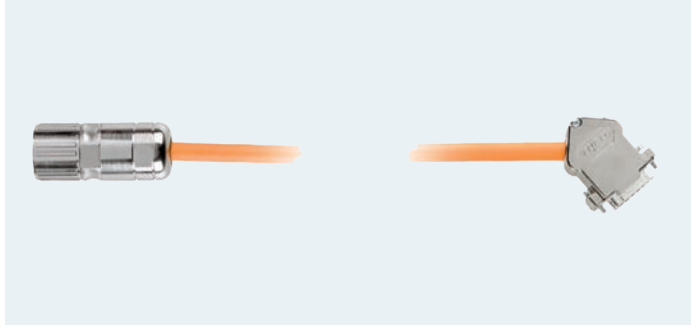
Catalog DOK-CONNEC-CABLE*INDRV-CA

Technical data

Type		RKL0037	RKL0039	RKL0040	RKL0041	RKL0042
Cable jacket diameter	mm	14.8	18.5	18.5	22.2	22.2
Power cable conductors	mm ²	2.5	6	6	10	10
Power/control cable operating voltage (UL)	V AC	600	600	600	600	600
Cable information		R911337067	—	R911337497	R911337070	R911337498

Encoder cable (motor terminal box)

RKG0047



- ▶ RGK3102/C01 encoder connector
- ▶ INK0448 cable
- ▶ INS0760/C01 controller connector

Features

- ▶ Plug-in connection

Product description

Cable used to connect the motor encoder to the encoder interface of the drive. This version only reflects a small part of the entire Rexroth offering, optimized for use with Sytronix. A wide range of cables are available from Rexroth for use with Sytronix.

Detailed information:

Catalog DOK-CONNEX-CABLE*INDRV-CA

Technical data

Terminal box connection		Mini-DIN, 8-pin
Raw cable diameter	mm	8.8
Control cable cross-section	mm ²	0.25
Control cable operating voltage (UL)	V AC	300
Clamping range	mm	4.8 to 11
Contacts		15
Cross-section	mm ²	0.2 to 0.5
Contact type		Crimp contact (pin)

Other accessories

HAS01, HAS02, HAS07, HAS08, RKB0001



- ▶ Basic accessories HAS01
- ▶ Shield connection HAS02
- ▶ Flange assembly kit HAS07
- ▶ Control cabinet assembly kit HAS08

Features

- ▶ RKB0001 module bus extension:
in length increments from 0.5 m to 40 m.

Product description

HAS01: The basic accessories contain all the mounting parts and mounting hardware. Depending on the application, a complete line of accessories is available.

HAS02: The shield connection plate is an EMC-compatible method of connecting the motor cable to the drive.

HAS07: For use with HCS04 converters which are installed with the HAS07 flange-mounting kit. Heat sinks are located outside the control cabinet. This reduces air conditioning of the control cabinet to a minimum.

HAS08: Assembly kit to install the HCS04 converter in a Rittal TS8 control cabinet.

Detailed information:

Catalog R999000018 (DE), R999000019 (EN)

Technical data

Type	HAS02.1-002	HAS02.1-004	HAS02.1-005	HAS02.1-008		
Components	HCS02.1E-W0028/ HCS02.1E-W0054/ HCS02.1E-W0070	HCS03.1E-W0070	HCS03.1E-W0100/ HCS03.1E-W0150	HCS03.1E-W0210		
Type	HAS07.1-330	HAS07.1-350	HAS07.1-430	HAS07.1-585		
Components	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640/ HCS04.2E-W0790		
Type	HAS08.1-002	HAS08.1-003	HAS08.1-004	HAS08.1-005	HAS08.1-006	HAS08.1-007
Components	HCS04.2E-W0350	HCS04.2E-W0420	HCS04.2E-W0520	HCS04.2E-W0640/ HCS04.2E-W0790	HCS04.2E-W1010/ HCS04.2E-W1240	HCS04.2E-W1540

Pressure transducers for hydraulic applications

HM20



- ▶ Maximum operating pressure: 400 bar
- ▶ Electrical connection: plug, 4-pin, M12x1
- ▶ Straight or angled mating plugs available
- ▶ Cable: 2 m and 5 m lengths

Features

- ▶ Sensor utilizing thick-film technology
- ▶ Stainless steel wetted surfaces
- ▶ Enhanced reliability including high burst pressure, reverse polarity, overvoltage and short-circuit protection
- ▶ Excellent temperature characteristics
- ▶ UL listed

Product description

Pressure transducers are used for measurement and control in hydraulic systems. Measured pressure produces a linear electrical output signal. A kit is available including plug and cable, and in three standard pressure ranges for Sytronix drives.

Detailed information:

Data sheet 30270

Technical data

Operating voltage	U	V DC	16 to 36
Output signals	U	V	0.1 to 10
	I	mA	4 to 20
Pressure range	p	bar	0 to 100/250/400
Accuracy class			0.5
Setting time (10 to 90 %)	t	ms	< 1
Temperature coefficient	T_c	%	< 0.1/10 K
Fluid temperature range	T_{Fluid}	°C	-40 to +90
Ambient temperature range	T_{Ambient}	°C	-40 to +85
Environmental rating			IP65/IP67
Electrical Connection			M12 plug, 4-pin
Pressure port			G1/4

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