Sytronix variable-speed pump drives

Energy-efficient | Powerful | Cost-effective
### Pressure and Flow Control Product Overview

1. Sytronix FcP
2. Sytronix DRn
3. Sytronix SvP
4. Sytronix EPn
5. Sytronix DFEn
6. Sytronix DFED
7. HPC
8. IAC
9. Open Core Interface
10. Pumps and Drive Overview
## Sytronix

<table>
<thead>
<tr>
<th>Constant pressure</th>
<th>p/Q</th>
<th>p/Q, F/x</th>
</tr>
</thead>
</table>
| Drives for pressure control  
  - Pressure control | Drives for axis control  
  - Pressure and flow control  
  - Power limitation | Drives for axis control  
  - Pressure and flow control  
  - Force and velocity control  
  - Position and Force control |

**DRn 7020**  
18.5 ~ 630 kW  
New

**DFEn 5020/7020**  
15 ~ 315 kW  
HFC fluid optional multiple pumps/circuits  
High dynamic

**SvP 7020**  
9 ~ 80 kW  
Position and force control

**FcP 5020/7020**  
0.4 ~ 18.5 kW  
New drives

**EPn 7020**  
15 ~ 250 kW  
Medium dynamic  
New

New motors  
New drives
Sytronix FcP – Constant pressure system for small HPU

<table>
<thead>
<tr>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard dynamics</td>
</tr>
<tr>
<td>Standard accuracy</td>
</tr>
<tr>
<td>energy efficient</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Pressure control</td>
</tr>
<tr>
<td>✔ (Flow rate control)</td>
</tr>
<tr>
<td>Force control</td>
</tr>
<tr>
<td>Speed control</td>
</tr>
<tr>
<td>Position control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>pressure</td>
</tr>
<tr>
<td>flow</td>
</tr>
</tbody>
</table>

**Sytronix FcP**

**Application samples**
- Machine tool, general machinery

**Constant pressure HPU**
- Low noise level due to internal gear pumps
- Easy commissioning

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Sytronix DRn – Constant pressure system for high power

Performance

- Standard dynamics
- Energy efficient
- Standard accuracy

Function

- Pressure control
- Flow rate control
- Force control
- Speed control
- Position control

Operation mode

- Pressure
- Flow

System

Application samples

- Metallurgy, general machinery

Constant pressure system

- Small footprint in cabinet and machine
- Retrofit possible w/o pump modification
- Easy commissioning
- Ready for i4.0
Functionality

- Drive speed adaptation to reduce energy consumption and noise level
- Boost function to avoid pressure drops at load changes
  - Automatic mode
  - trigger by digital input
- Hydraulic load observer
  - By model
  - By swivel angle sensor
- Fan monitoring to avoid motor overload at low drive speeds
  (self cooled motors)
- Suppression of defined drive speed window to avoid resonance frequencies hydraulic circuit and machine housing
- Communication by analog input or master communication
- Setup by Indraworks dialog or master communication
  (parameter list)
Sytronix SvP – High Dynamics & Accuracy

**Performance**
- High dynamics
- High accuracy
- Energy efficient

**Function**
- Pressure control
- Flow rate control
- Force control
- Speed control
- Position control

**Operation mode**
- Pressure
- Flow

---

**System**

---

**Application samples**

- **Injection molding machine**
  - Axis control
    - High performance required
    - p/Q control

- **Press brake**
  - Axis control
    - High performance required
    - Force control
    - Speed control
    - Position control
Quadrant Operation / Control functions

**2 Quadrant Operation**
- Motor operation
- Pump operation
- Internal gear pump

**4 Quadrant Operation**
- Motor operation
- Pump operation
- Axial piston pump

**Control functions:**

- Open loop:
  - flow control

- Closed loop:
  - pressure control
  - speed control
  - force control
  - position control

- Alternating control:
  - pressure/flow
  - pressure/force
  - position/force

*Over ETO process*
Sytronix EPn – p/Q – control system for high power

### Function
- **Pressure control**
- **Flow rate control**
- **Force control**
- **Speed control**
- **Position control**

### Operation mode
- **Pressure**
- **Flow**

### System

### Performance
- **High dynamics**
- **Medium accuracy**
- **Energy efficient**

### Application samples
- Scrap presses, extrusion press

### Axis control
- High repeat accuracy
- Pressure control
- Flow rate control with a high adjustment range
- Power limitation
- Easy retrofit for pumps EP, EO, DFE, HS4
Sytronix DFEn – High Dynamic & Power

Control functions
- Pressure control
- Flow control
- Power control
  - Force control
  - Velocity control
  - Position control

Quadrant Operation

<table>
<thead>
<tr>
<th>Pressure control</th>
<th>Flow control</th>
<th>Power control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 flow</td>
<td></td>
<td>1 pressure</td>
</tr>
</tbody>
</table>

System

Application
- Injection molding machine
  - Axis control
    - High dynamic required
    - Pressure control
    - Flow control

Paper
- Constant pressure system
  - High dynamic required
  - Pressure control

High Dynamics
High Power
energy efficient
Sytronix DFED – High Dynamic & Power

SY(H)DFED – Go Multi Ethernet

- **Scalable** – consistent in performance and function
- **Best-in-Class** – motion control for hydraulics – expertise in challenging applications
- **Open**
  - Ethernet-based communication
- **Easy to use** –
  - with the intuitive engineering tool IndraWorks
- **Benefit** –
  - highest control quality and performance

New digital electronics
VT-HPC Pump Controller for A4VS..HS5

System overview

- PROFIBUS
- Multi-Ethernet
- TCP/IP

- Set-point-/Actual
- Diagnosis

VT-HPC-1-1X/M-0-00/00  R901413449
VT-HPC-1-1X/M-P-00/00  R901413446

HM20-2X
0,1..10V 4..20mA
Connection Type: M12

Swivel Angle Sensor
Analog (Volts / Current)
Connection Type: M12

A4-VS..HS5
NG40 – NG1000
Pressure 450 Bar,

4WRPH6-855
NO Spool position feedback
Needed on solenoid!

R901413449
R901413446

HM20-2X
0,1..10V 4..20mA
Connection Type: M12

13
Integrated axis controller IAC-Multi-Ethernet

**4WRPDH 6 and 10**
Direct operated servo solenoid

**4WRLD 10 and 16**
Pilot operated Servo Solenoid

**5WRPQ10**
Direct operated P/Q servo solenoid

### Size (Nenngrößen)

<table>
<thead>
<tr>
<th>Nenngröße</th>
<th>6</th>
<th>10</th>
</tr>
</thead>
</table>

### Flow characteristic (Kennlinie)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Kennlinie L</th>
<th>Kennlinie P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knick 60% (nur NG6)</td>
<td>Knick 40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Fail Safe Setting

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Kennlinie L</th>
<th>Kennlinie P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knick 60% (nur NG6)</td>
<td>Knick 40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A**
- **B**
- **C**
- **D**
- **E**
- **F**
- **G**
- **H**
- **I**
- **J**
- **K**
- **L**
- **M**
- **N**
- **O**
- **P**
- **Q**
- **R**
- **S**
- **T**
- **U**
- **V**
- **W**
- **X**
- **Y**
- **Z**

≥ lieferbar

1. ab Nennvolumenstrom 40 l/min
2. ab Nennvolumenstrom 40 l/min
3. ab Nennvolumenstrom 40 l/min
Sensor Interfaces

**Pressure sensor**
- **I.e: HM20**
  - max. 2 external pressure sensors
  - 4...20 mA or 0..10V (selectable)
  - Resolution 12 Bit

**Position sensors (digital)**
- **SSI-Feedback**
  - Absolute Length measurement
  - Coding => Gray scale
  - Data length: selectable
  - Alarm Bit nicht auswertbar
  - Parity Bit nicht auswertbar

- **EnDat 2.2: Feedback**
  - Absolute Length measurement
  - Higher Positioning accuracy for synchronization and Dynamics

- **Sine Wave Feedback**
  - Relative Length measurement
  - Higher Positioning accuracy for synchronization and Dynamics
Open Core Engineering

Program your test application, acquire and analyze Measurement Data with

NIs SoftMotion Module and Open Core Interface
Develop your specific algorithms and models for flexible and adaptive machines within

Run them on Rexroth drives and controls. All control data can easily be accessed using Open Core Interface
## Sytronix Pumps

<table>
<thead>
<tr>
<th></th>
<th>PGF1</th>
<th>PGF2</th>
<th>PGH2,3, 4,5</th>
<th>A10 VZO</th>
<th>A15 VSO</th>
<th>A4 VSO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proven pump for small systems</td>
<td>Proven pump for medium systems</td>
<td>Proven for high pressure range</td>
<td>Variable speed variant of proven A10VZO</td>
<td>Continuous flow rate variation of proven A15VSO</td>
<td>High pressure pump for heavy duty applications</td>
</tr>
<tr>
<td></td>
<td>FcP</td>
<td>FcP</td>
<td>FcP, SvP</td>
<td>SvP, DRn, DFEn (VSO)</td>
<td>EPn, DRn</td>
<td>SvP, DRn, DFEn</td>
</tr>
<tr>
<td></td>
<td>Silent internal gear pumps with fixed displacement</td>
<td>Variable axial piston pumps reduce displacement (motor torque) during part-load operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cont. pressure</td>
<td>up to 210 bar</td>
<td>up to 210 bar</td>
<td>up to 315 bar</td>
<td>up to 280 bar</td>
<td>up to 350 bar</td>
<td>up to 350 bar</td>
</tr>
<tr>
<td>Max. pressure</td>
<td>250 bar</td>
<td>250 bar</td>
<td>350 bar</td>
<td>350 bar</td>
<td>420 bar</td>
<td>400 bar</td>
</tr>
<tr>
<td>Max. flow</td>
<td>7 l/min</td>
<td>32 l/min</td>
<td>360 l/min</td>
<td>324 l/min</td>
<td>504 l/min</td>
<td>1125 l/min</td>
</tr>
<tr>
<td>Data sheet</td>
<td>RE 10213</td>
<td>RE 10213</td>
<td>RE 10227</td>
<td>RE 91485</td>
<td>RE 92800</td>
<td>RE 92050</td>
</tr>
</tbody>
</table>
# EFC 5610 frequency converter

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency converter</td>
<td>EFC 5610</td>
</tr>
<tr>
<td>Motor power</td>
<td>0.4 – 90 kW</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>1x AC 230 V</td>
</tr>
<tr>
<td></td>
<td>3 x AC 400 V</td>
</tr>
<tr>
<td>Tolerance $U_{LN}$</td>
<td>1 AC -10%/+10%</td>
</tr>
<tr>
<td></td>
<td>3 AC -15%/+10%</td>
</tr>
<tr>
<td>Current</td>
<td>60.8 – 176 A</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 ... 60 (±5%)</td>
</tr>
<tr>
<td>Overload capability</td>
<td>150% (60s) / 200% (1s)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-10 ... +45°C</td>
</tr>
<tr>
<td>Bus systems</td>
<td>Modbus, PROFIBUS, CANopen,</td>
</tr>
<tr>
<td></td>
<td>Multi-Ethernet</td>
</tr>
<tr>
<td>I/O</td>
<td>2 analog inputs</td>
</tr>
<tr>
<td></td>
<td>1 analog output 0...10V</td>
</tr>
</tbody>
</table>

- Space saving installation due to compact construction
- Engineering interface by E/A- and Field bus module
- High overload capacity: Heavy Duty (HD) operation with 150% for 60s
- EMC-Class C1 (building)
- IP20; CE; UL
- Integrated interface: Mini-USB
## IndraDrive C Servo Controller

- Control section CSB and CSH
- Power supply and inverter in one unit
- Communication
  - Analog
  - CANopen
  - Proﬁbus
  - MultiEthernet
- Feed-in optional
- Flow rate extension

<table>
<thead>
<tr>
<th>Servo Drive Type</th>
<th>IndraDrive C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>HCS02</td>
</tr>
<tr>
<td><strong>Line Voltage</strong></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage 3 phase</td>
<td></td>
</tr>
<tr>
<td>TN-S, TN-C, TT</td>
<td></td>
</tr>
<tr>
<td><strong>Line Voltage</strong></td>
<td>400 – 500V</td>
</tr>
<tr>
<td><strong>Tolerance ULN</strong></td>
<td>+10 % / -15%</td>
</tr>
<tr>
<td><strong>Nominal current input</strong></td>
<td>11 –28A</td>
</tr>
<tr>
<td><strong>Max current</strong></td>
<td>28 – 70A</td>
</tr>
<tr>
<td><strong>Input frequency</strong></td>
<td>50 – 60 Hz</td>
</tr>
<tr>
<td><strong>Input frequency tolerance</strong></td>
<td>±2 Hz</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>0 to +40°C, 55°C with derate</td>
</tr>
</tbody>
</table>