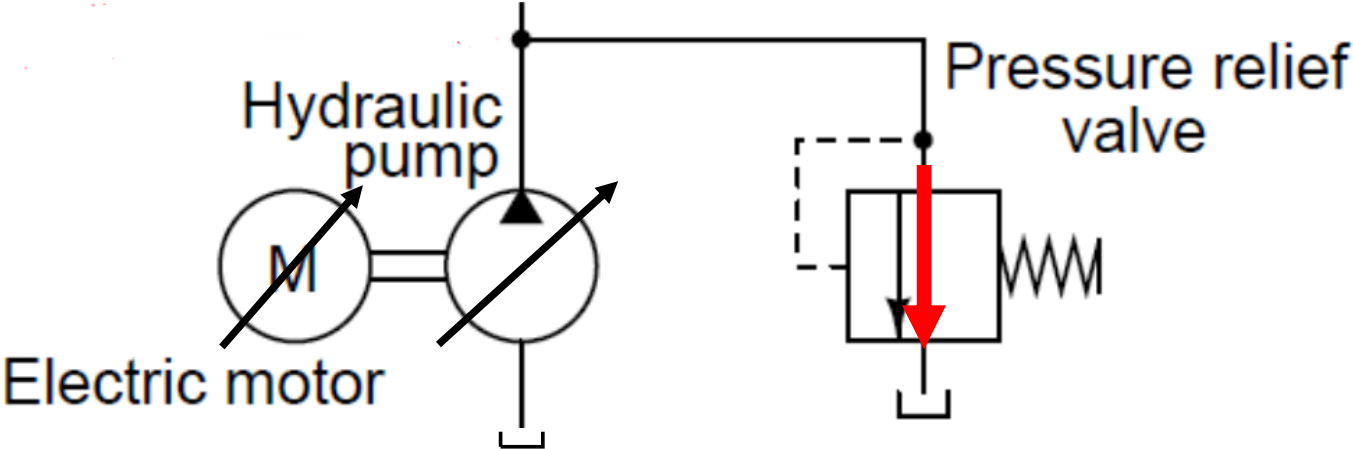


# Variable-Speed Pump Drive

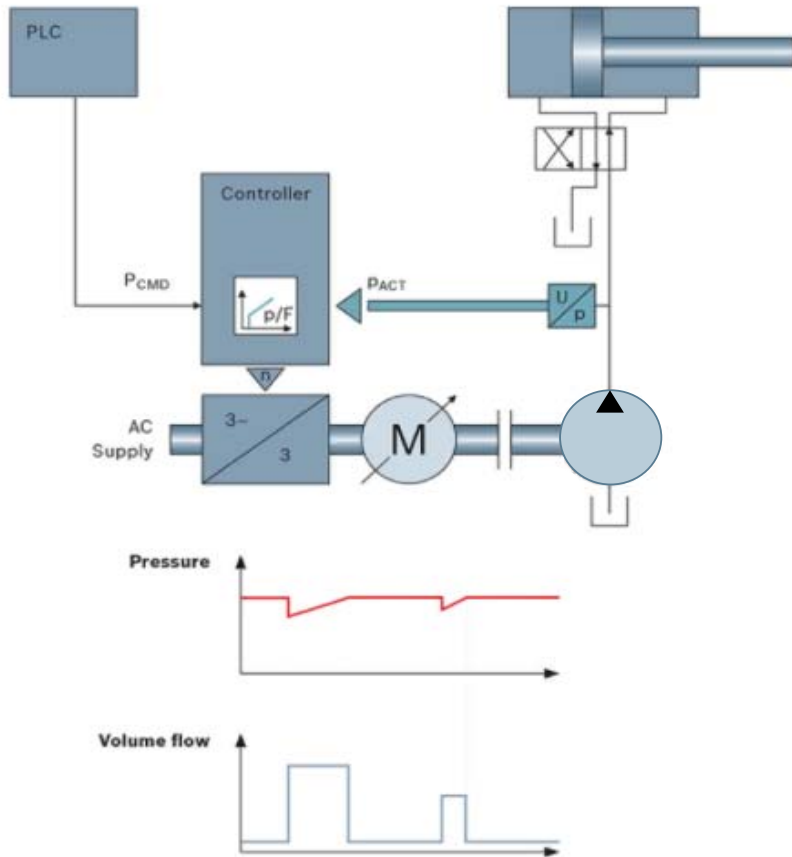
# Sytronix



# Sytronix – Variable speed pump drive



# Advantages and function



- Energy savings
- Less cooling capacity needed
- Less noise
- Downsizing
- Fixed/variable pump
- Sleep/wake
- STO (Safe Torque Off)
- Information: condition monitoring






# System overview

## Sytronix house

**4EE**  
ENERGY  
EFFICIENCY

### Sytronix

Pre-configured standard sets	Pressure Control Systems (p)	Pressure / Flow Control Systems (p/Q)	Pressure / Flow & Position Control Systems (p/Q, F/x)
	<p>DRn 5020</p> 	<p>DFEn      HS5n</p> 	<p>SvP 7020</p> 
<p>FcP 5020</p> 	<p>SvP 5020</p> 		

# System Overview

## Sample applications

Machine Tools



Wood & Paper



Metallurgy



Presses



Die Casting machines



Plastic Machines



**FcP 5020**  
Pressure control 0,25 ~ 18,5 kW

**DRn 5020**  
Pressure control 4.0 ~ 160 kW

<b>SvP 5020</b> p/Q-Regelung	9..65 kW
<b>SvP 7020</b> p/Q-Regelung, Pos.-regelung	9..80 kW
<b>SYDFE n</b> p/Q-Regelung	15..315 kW
<b>A4VSO..HS5n</b> p/Q Regelung	15.. 650kW

# System overview

## FcP 5020 – Standard system for small HPU's

### Function

- ✓ Pressure control
- ✓ Flow rate control
- ✓ Power limitation

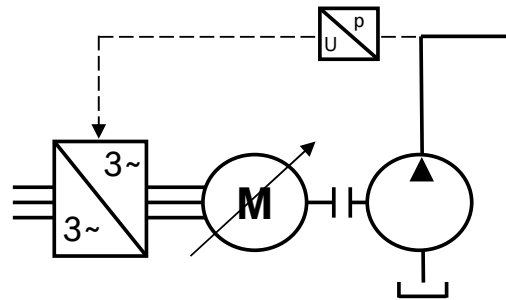
Force control

Position control

### For small standard HPU's

- Low noise level due to internal gear pumps
- Easy settings for pressure, flow and power limitation

### System overview



### Application examples



### Main applications

- Machine tool
  - General machinery
- Integrated in CytroPac and ABPAC

# Components

## FcP 5020 components

### Pump

PGF1,2



PGH2,3,4,5



A10VZO-EZ4



A4VSO-EZ

- Internal gear pumps PGF or PGH
- Axial piston pumps with 2-point controller EZ

### Motor MOT-FC



- Standard-Asynchronous Motors up to 315 kW
- Optimized for frequency converter operation (strong winding isolation, isolated bearings)

### Frequency converter



- Frequency converter EFC 5610
- Technology function for Sytronix FcP

### Accessories



- Pressure transducer
- Cable for commissioning
- EMC filter
- Coupling, bell housing



# System overview

## SvP 5020 – Medium dynamics & accuracy

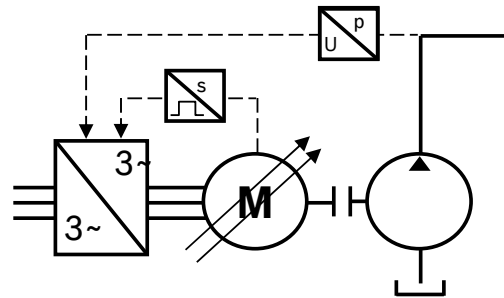
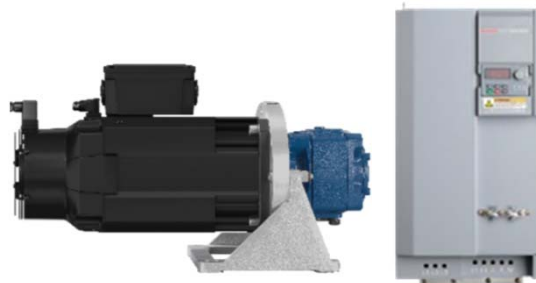
### Function

- ✓ Pressure control
- ✓ Flow rate control
- ✓ Power limitation
- Force control
- Position control

### For axis control

- Medium dynamics and accuracy
- Alternating p/Q control

### System overview



### Application examples



### Main applications

- Injection molding machines
- Presses with p/Q control



# Components

## SvP 5020 components

### Pump

PGM4



PGH2,3,4,5



A10VZO-EZ4



A4VSO-EZ

- Internal gear pumps PGM or PGH
- Axial piston pumps with 2-point control EZ

### Motor MS2N



- High-dynamic synchronous motor up to 80 kW
- Cooling types convection, forced or liquid (water/oil)
- Standard or direct coupling

### Frequency converter



- Frequency converter EFC 5610
- Technology function for Sytronix SvP

### Accessories



- Pressure transducer
- Cable for commissioning
- EMC filter
- Coupling, bell housing

# The Hydraulic Power Units of the Future

## The solution for your requirements



**The Future is uncompromisingly compact**

Less Space.  
More Power.



**The Future is really quiet**

Less Noise Emissions.  
More Flexibility.



**The Future conserves on Energy**

Less Consumption.  
More Efficiency.



**The Future is connected**

Less Surprises.  
More Availability.





# COMPACT. OPEN. READY.

## CytroMotion

DRIVEN BY EFFICIENCY



# CytroMotion – Driven by Efficiency

## System Architecture and Design

**6 Compensator**  
Stores the differential oil volume of cylinder rod in closed system

**1 Synchronous motor**  
Compact and powerful with integrated cooling and up to 6.2 kW nominal power

**4 Position sensor**  
Optional SSI position sensor with up to 0.5  $\mu\text{m}$  accuracy



**5 Manifold**  
With standardized functions such as hold, force limitation and force-reduced rapid traverse

**2 4Q-capable Internal Gear Pump**  
Low noise, Compact, Robust

**3 Cylinder**  
Based on standard cylinder CDH2 according ISO 6022

# CytroMotion – Driven by Efficiency

## Technical Information



**Force up-to 110 kN  
( ~11 metric tons)**

**Up to 6.2 kW nominal power**

**Speeds up-to 740 mm/s**

**Stroke up-to 800 mm**

# CytroForce

PUSH YOUR LIMITS



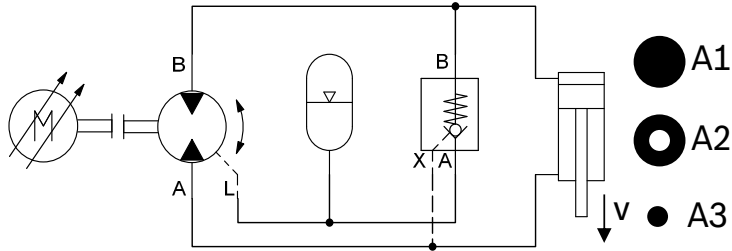
# CytroForce

## Push your Limits

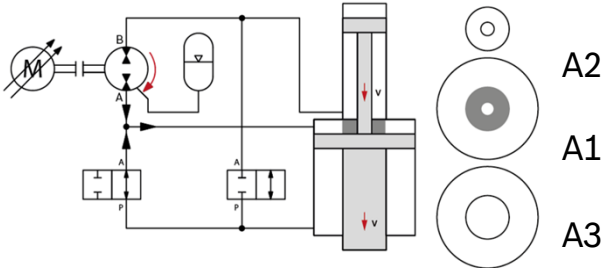


## A complete hydraulic system

**Cylinder A1 Schematics**



**Cylinder E1 Schematics**



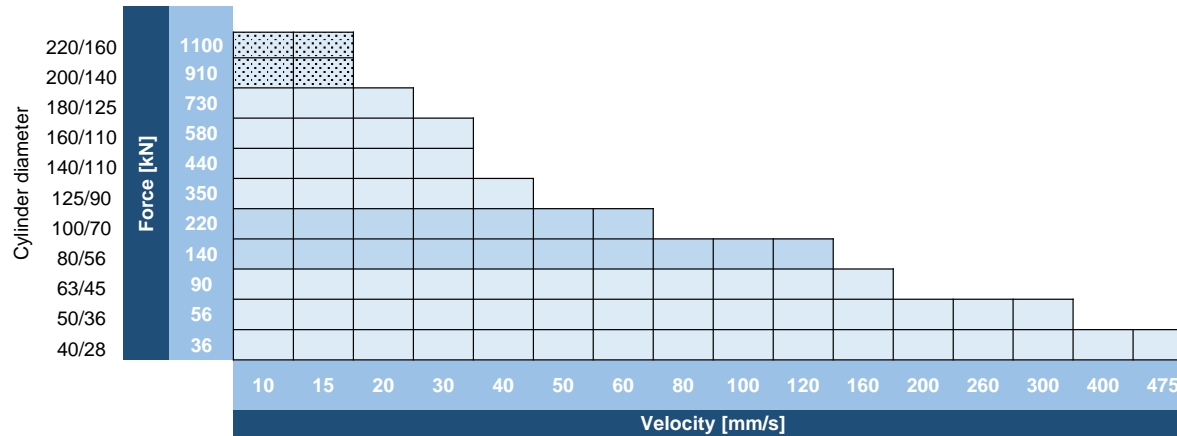


# CytroForce – PUSH YOUR LIMITS

## BE FAST

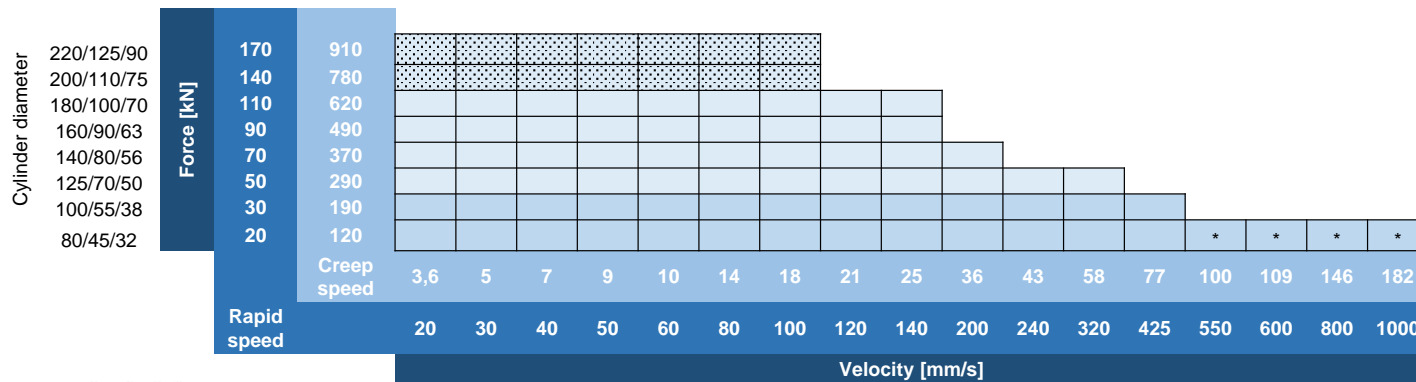
Split  
 Split (in preparation)  
 Integrated  
 \*only possible in creep speed

Single rod cylinder A1



**F = 4 .. 120 t**  
**v = up to 475 mm/s**  
**s = up to 1000 mm**

Tandem cylinder E1



**F = up to 100 t**  
**v = up to 800 mm/s**  
**s = up to 1000 mm**

# CytroPac – The Power Unit Revolution

## Compact, efficient, quiet and connected



### Compact

- Space saving design, Optimized tank design (reduced oil volume)
- Ideal for machine tools

### Efficient

- Variable speed pump drive for demand-based power
- Use of the latest heat pipe/transfer technology

### Quiet

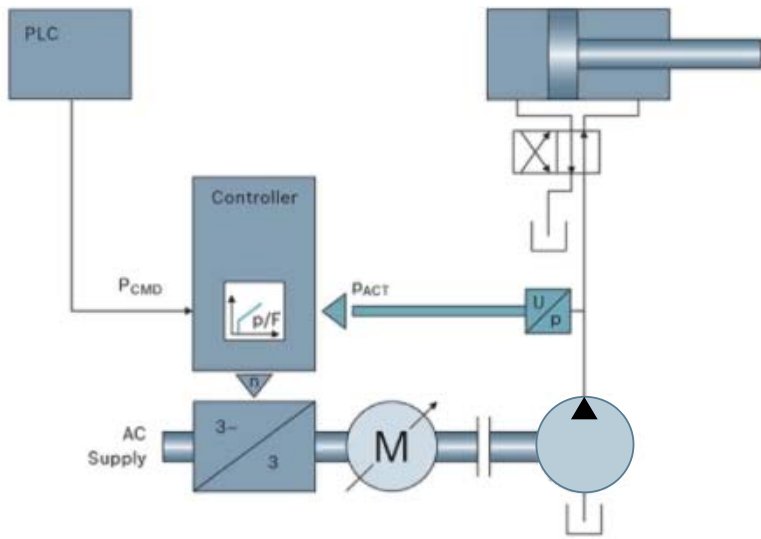
- Low noise thanks to innovative design

### Connected

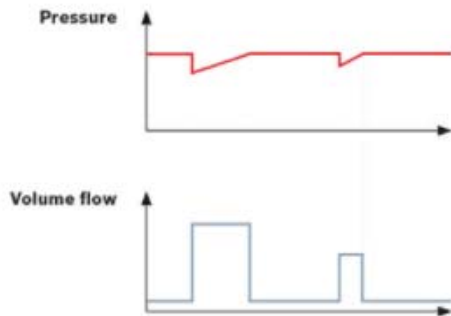
- Completely wired frequency converter with Multi-Ethernet interface

# CytroPac – The Power Unit Revolution

## Efficient – through variable speed pump drive



- Energy on Demand
- Lower noise emission
- Compact machine design
- Easier installation and reduced commissioning expenses



... distribution, as well as in the event of applications for industrial property rights.

# CytroPac - The Hydraulic Power Unit of the Future

## The Future is uncompromisingly compact

### Where it fits

Up to 240 bar

Maximum flow: 35 lit/min

Fluctuating flow: 10 liters

Up to 4 kW

Noise below 63 dB(A)



# CytroBox

## The solution for your requirements



**The Future is uncompromisingly compact**

Less Space.  
More Power.



**The Future is really quiet**

Less Noise Emissions.  
More Flexibility.



**The Future conserves on Energy**

Less Consumption.  
More Efficiency.



**The Future is connected**

Less Surprises.  
More Availability.



# CytroBox - The Hydraulic Power Unit of the Future

## Features before / after

Up to 315 bar	Up to 315 bar
Up to 150 l/min	Up to 160 l/min
600 Liter Oil Tank	150 Liter Oil Tank
2 m <sup>2</sup> Foot Print	0,5 m <sup>2</sup> Foot Print
>85 dB (A)	<75 dB (A)
Analog	Multi Ethernet Interface
Field data measurement	Field data acquisition
	IoT-ready

Application: Tire Press



More technical information: [www.boschrexroth.com/cytrobox](http://www.boschrexroth.com/cytrobox)



# CytroBox - The Hydraulic Power Unit of the Future

## The Future is uncompromisingly compact

**Less Space and More Power.**

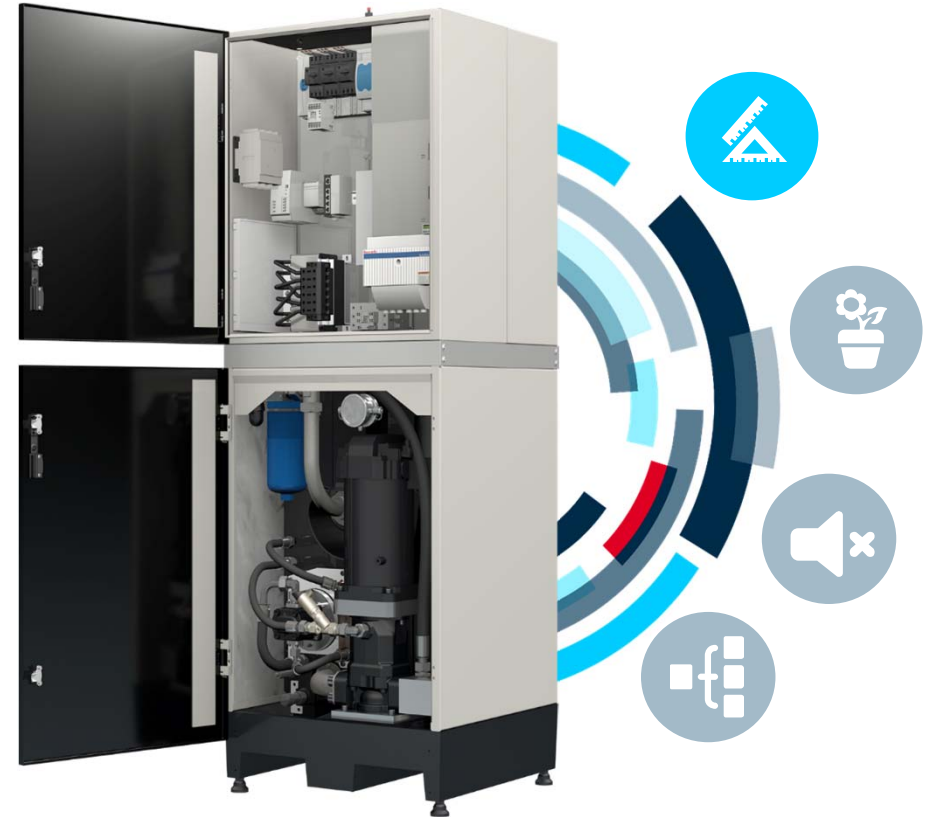
Decreased space usage in your factory

Passive oil treatment

Flow optimized reservoir design of 150 l

Foot print smaller than 0,5 m<sup>2</sup>

Lightweight material





# CytroBox - The Hydraulic Power Unit of the Future

## The Future is uncompromisingly compact



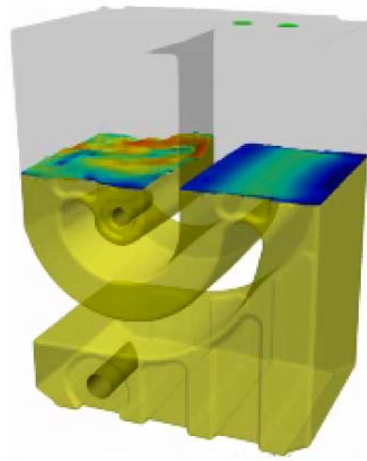
Conventional reservoir

CFD Simulation

CytroBox reservoir

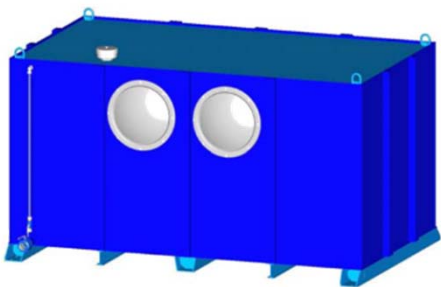
# 600

Liter



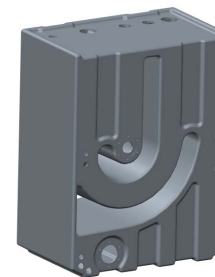
# 150

Liter



General conditions

**3-5x** Pump flow



Customer benefits

**80%** Weight reduction

**75%** Reduced oil volume

DCSN/SMH-SE | 18/11/2019

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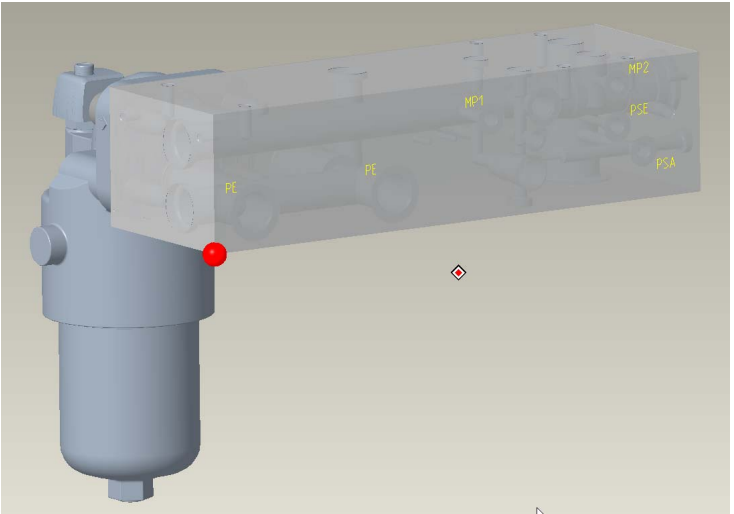
**rexroth**  
A Bosch Company

# CytroBox – STREAMLINE YOUR INSTALLATION

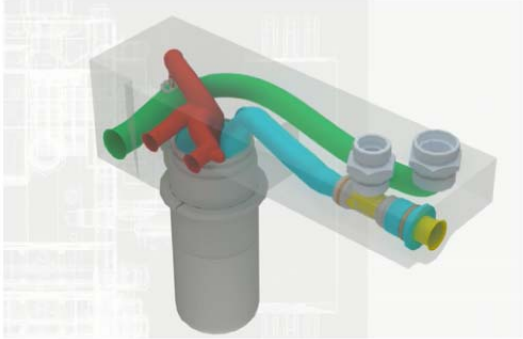
## Uncompromisingly compact– The Manifold



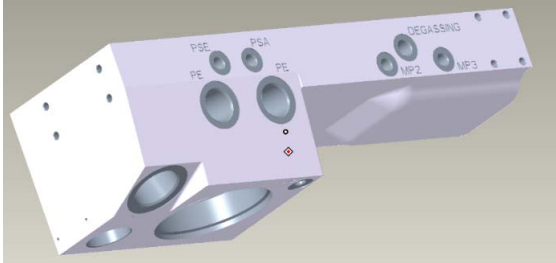
**Conventional Manifold**



**CFD Simulation**



**Manifold Solution CytroBox**



# CytroBox - The Hydraulic Power Unit of the Future

## The Future conserves on Energy



Application example: Tire Press

**>85 dB(A)**

**Asynchronous**

**1500 rpm**

**Variable Displ.**

**100 ccm**

**150 l/min**

**Motor**

**Max. Speed**

**Pump**

**Pump Size**

**160 l/min**

**< 75 dB(A)**

**Servo**

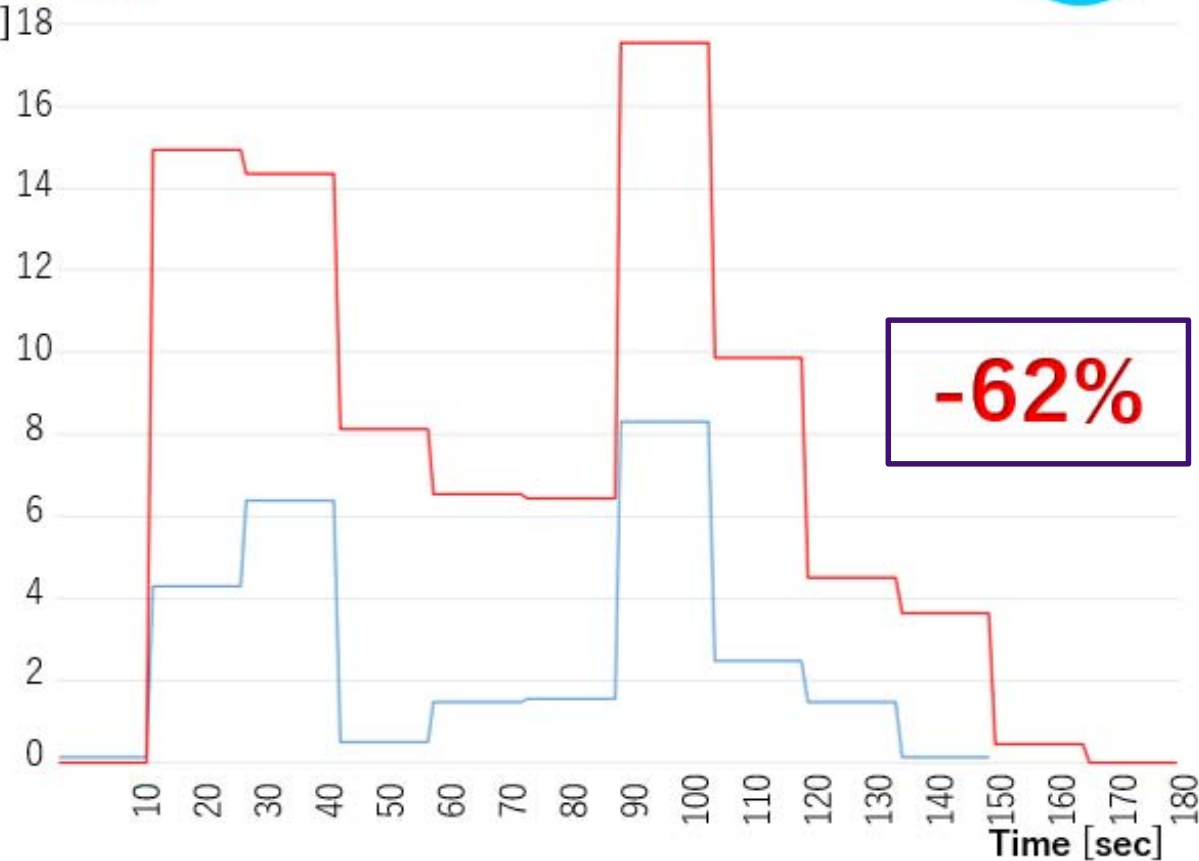
**2600 rpm**

**Fixed Displ.**

**63ccm**

**160 l/min**

Power [kW]



# CytroConect - MINIMIZE YOUR DOWNTIME

## The Easy-to-Use and Preventive IoT Service

Less Surprises. More Availability.

All information comfortable at hand at any time

IoT-ready = Multi-Ethernet & Open Core interface

Sensor Package pre-installed

- Pressure
- Oil level
- Temperature
- Filter pressure drop

- *Leakage flow and temp.*
- *Water*
- *Gas (air)*
- *Particles*

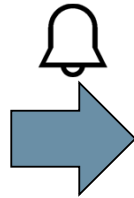
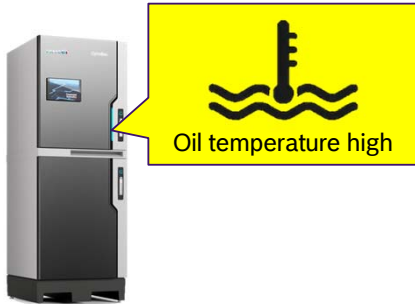
IO-Link



# CytroConnect Maintain package



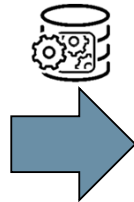
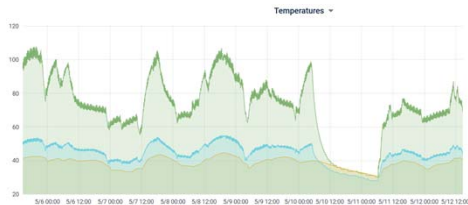
## Notification in case of unmanned shifts



### **\*\* Warning \*\***

Your CytroBox oil temperature is out of range.  
Please check the cooling water supply!

## Oil Lifetime calculation



### **\*\* Performance report \*\***

The System has reached 5,000 hours of operation.  
Based on current usage, we recommend an oil change in 4 weeks.

**Your digital Maintenance manual**

Free of charge monitoring service

All current sensor data available

Historical data up to 24 hours

Full access to historical data

Rules-based Analysis of Components

Direct Notifications and Warnings

Performance and Usage Reports

# Variable-Speed Pump Drive

Thank you!!

