

Connected Hydraulics

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BEYOND
LIMITS 

Agenda

1. Overview
2. Connectivity structure
3. New product IO-Link
4. Electronic control
5. IoT Gateway
6. Service
7. Products and Solutions

Connected Hydraulics
BEYOND
LIMITS 

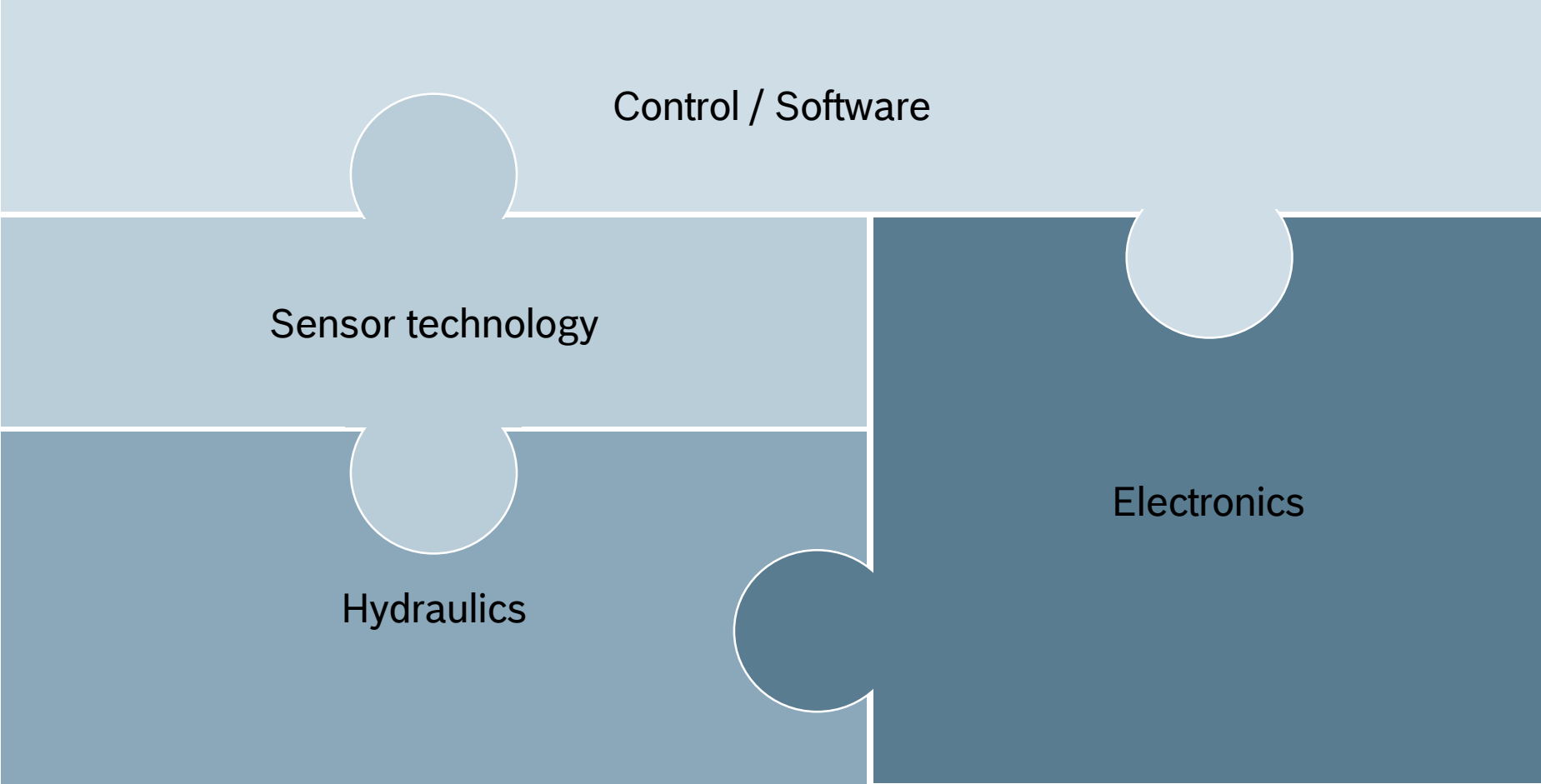
Connected Hydraulics to fit for i4.0

The Journey To Realize Connected Hydraulics And Industry 4.0 Has Started



Connected Hydraulics to fit for i4.0

I4.0 System overview for the hydraulics



Connected Hydraulics to fit for i4.0

Connectivity of Hydraulic valves and pumps

i4.0
CONNECTED
INDUSTRY

Machine Control



Industry sectors

sercos
the automation bus

PROFINET
Industrial Ethernet

EtherCAT
Technology Group

EtherNet/IP

VARAN

ETHERNET POWERLINK

PROFIBUS

Connectivity

+-10 V
4..20 mA

Valve w/
analog interface

Series

i4.0
CONNECTED
INDUSTRY

IO-Link

Valve w/
IO-Link

New 2017

i4.0
CONNECTED
INDUSTRY

safety

Valve w/ integrated
field bus (IFB)

Prototype, SOP E2018

i4.0
CONNECTED
INDUSTRY

safety

Valve w/ integrated
axis controller (IAC)

Series

i4.0
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INDUSTRY

Pump control:
analog or fieldbus
SYDFE(D)

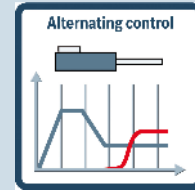
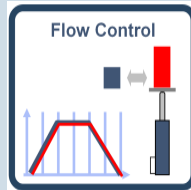
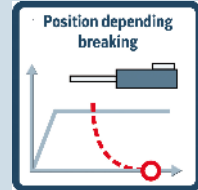
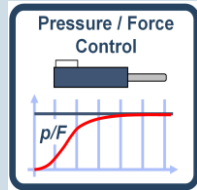
Series



Identical safety interface for valves (Hardware-signals / safe stop/ safe direction)

Connected Hydraulics to fit for i4.0

Motion Control



ETHERNET
POWERLINK

EtherNet/IP™



sercos
the automation bus

EtherCAT™
Technology Group

PROFI®
INDUSTRIAL ETHERNET
NET

IAC-Multi-Ethernet



Motion Control from Bosch Rexroth

Scalable in

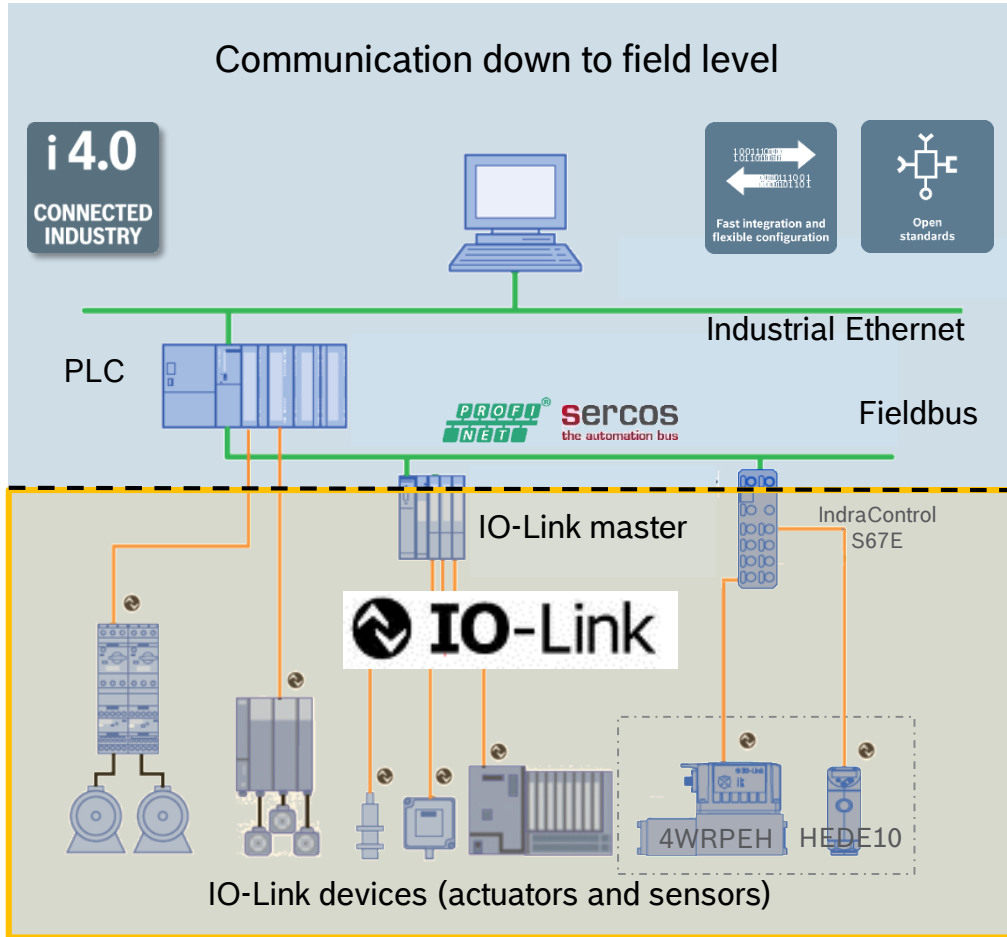
- Software
- Function
- Communication
- Hardware
- Performance

i4.0
CONNECTED
INDUSTRY



Connected Hydraulics to fit for i4.0

What is IO-Link?

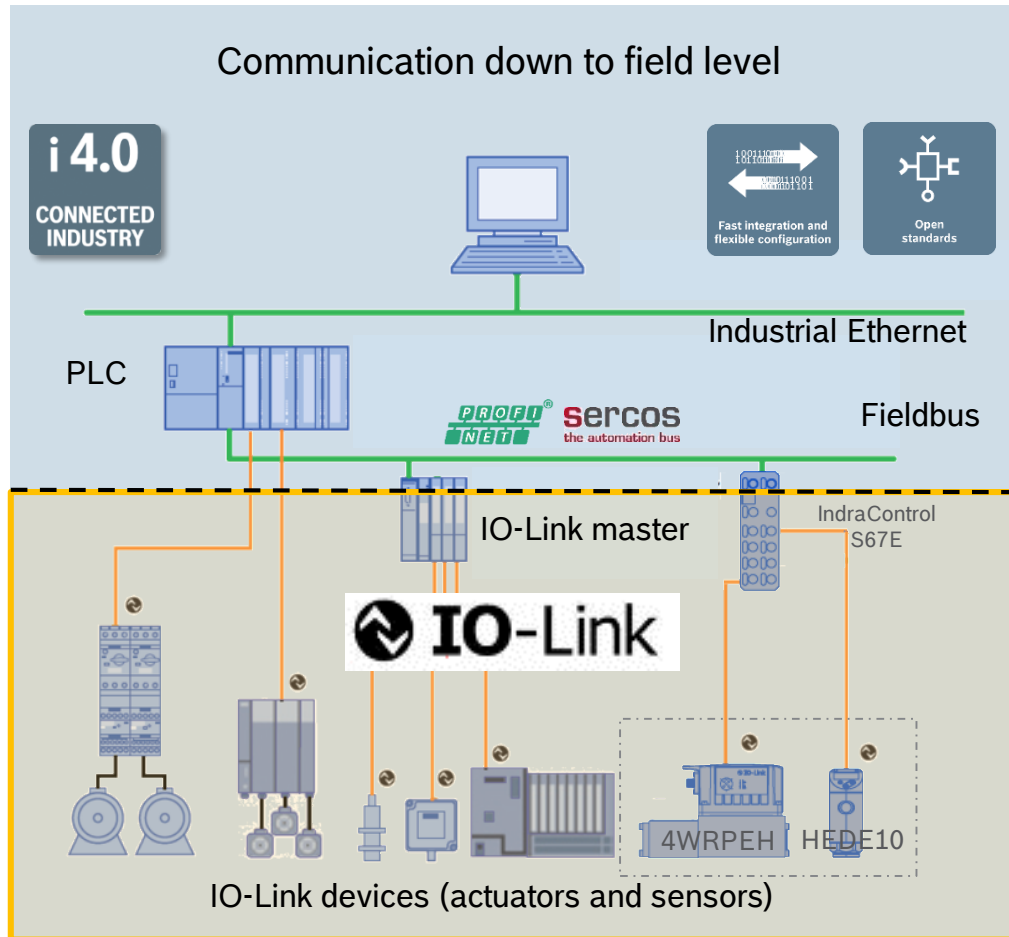


- I/O technology standardized worldwide for connectivity of intelligent sensors and actuators to automation systems
- IO-Link system consists of IO-Link master and IO-Link devices (sensors and actuators)
- Point-to-point connection, no fieldbus
- IO-Link consortium set up with 90 manufacturers of actuators, sensors and controls, including Rexroth
- Increasingly establishing as industrial standard for sensors



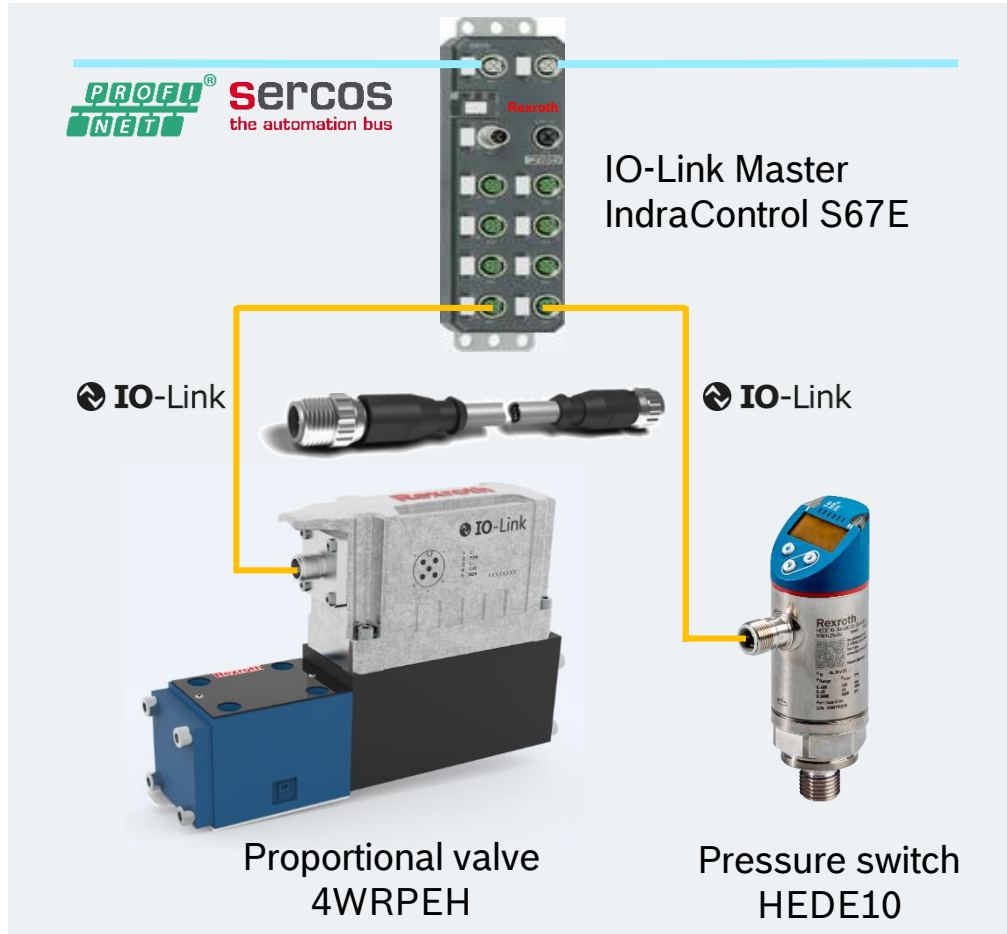
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IO-Link Master and Devices



- IO-Link master
 - Interface to the higher-level PLC via fieldbus
 - Control of communication with IO-Link devices (sensors and actuators)
 - has several IO-Link ports (channels), one IO-Link device can be connected per port
- IO-Link devices - sensors and actuators
 - Standard devices with analog and/or binary inputs/outputs, but with additional IO-Link interfaces
- IO-Link device description (IODD) (IO device description)
 - contains device specific parameter information of the sensors and actuators, such as
 - information on identification
 - device parameters
 - as well as process and diagnostic data

Connected Hydraulics to fit for i4.0 IO-Link products of Rexroth



- **Cost reduction through standardized installation**
 - Standardized, non-shielded M12-cables up to 20 m
 - One type of ports for all kinds of devices
- **Efficient engineering due to Plug & Play**
 - Configuration of all devices with only a few clicks
 - Automatic data storage of parameters in the IO-Link master and easy replacement of the devices
- **Universal usage thanks to open standard**
 - IO-Link is independent of manufacturers
 - Actuator supply of up to 2A, cycle times of up to 400 μ s
- **Increase in system productivity**
 - Diagnostic function allows predictive maintenance concepts
 - Localization of products in the machine or remotely

Connected Hydraulics to fit for i4.0

Proportional valves with digital interface IO-Link

i4.0
CONNECTED
INDUSTRY

Directional valves

Market
introduction
at HMI 2017



4WRPEH...3X

NG6 SOP
10/2017



IO-Link

Short-term
available after NG6

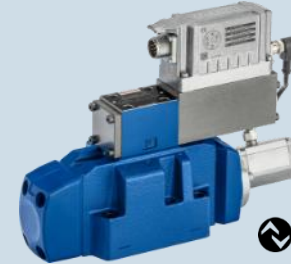


4WRPE10...3X



IO-Link

4WRLE...4X



IO-Link

Pressure valves

Future
consideration

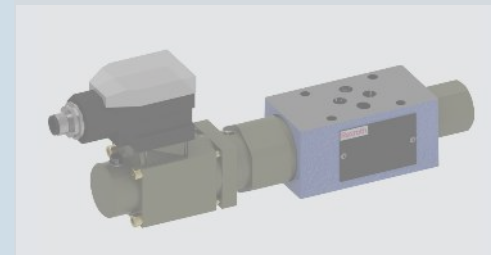
DBETA..6X



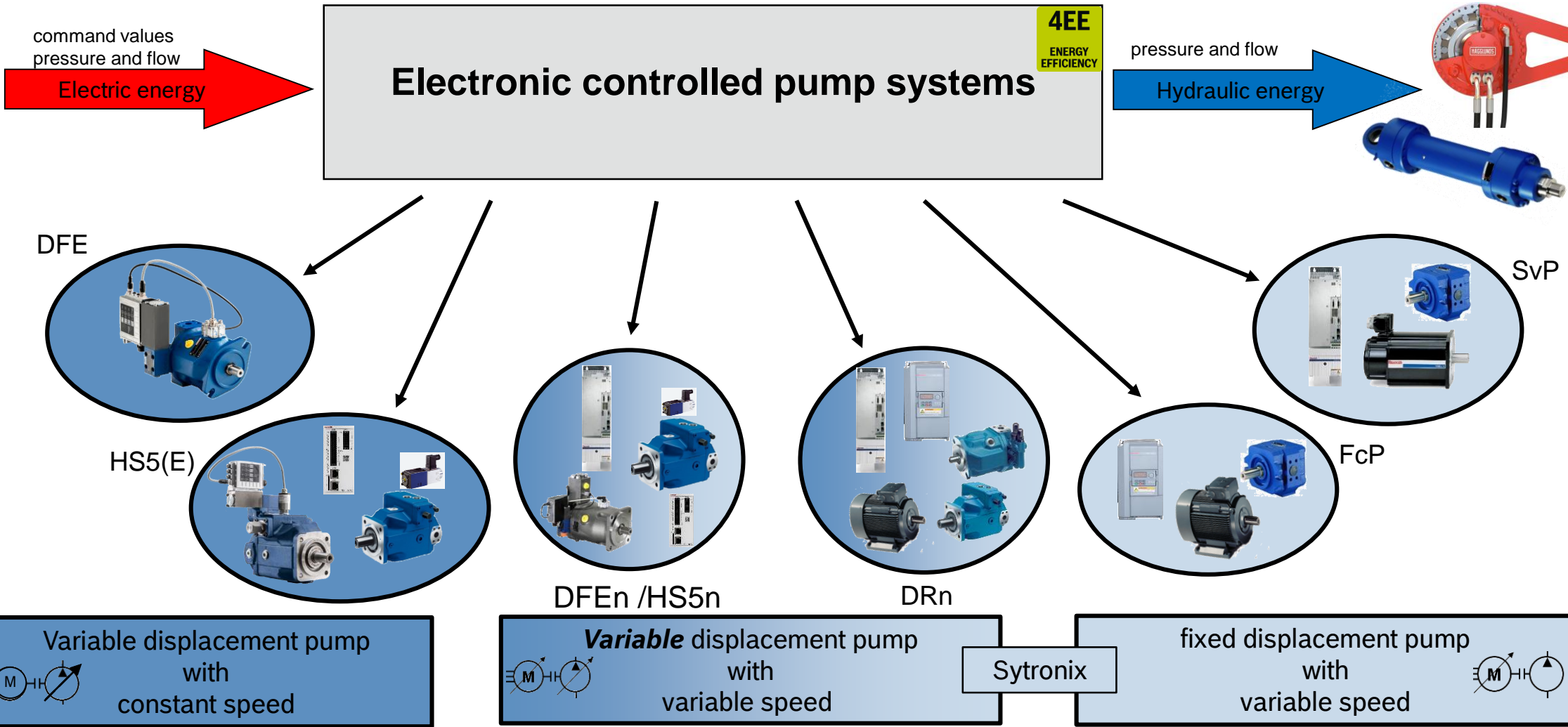
DREME..6X



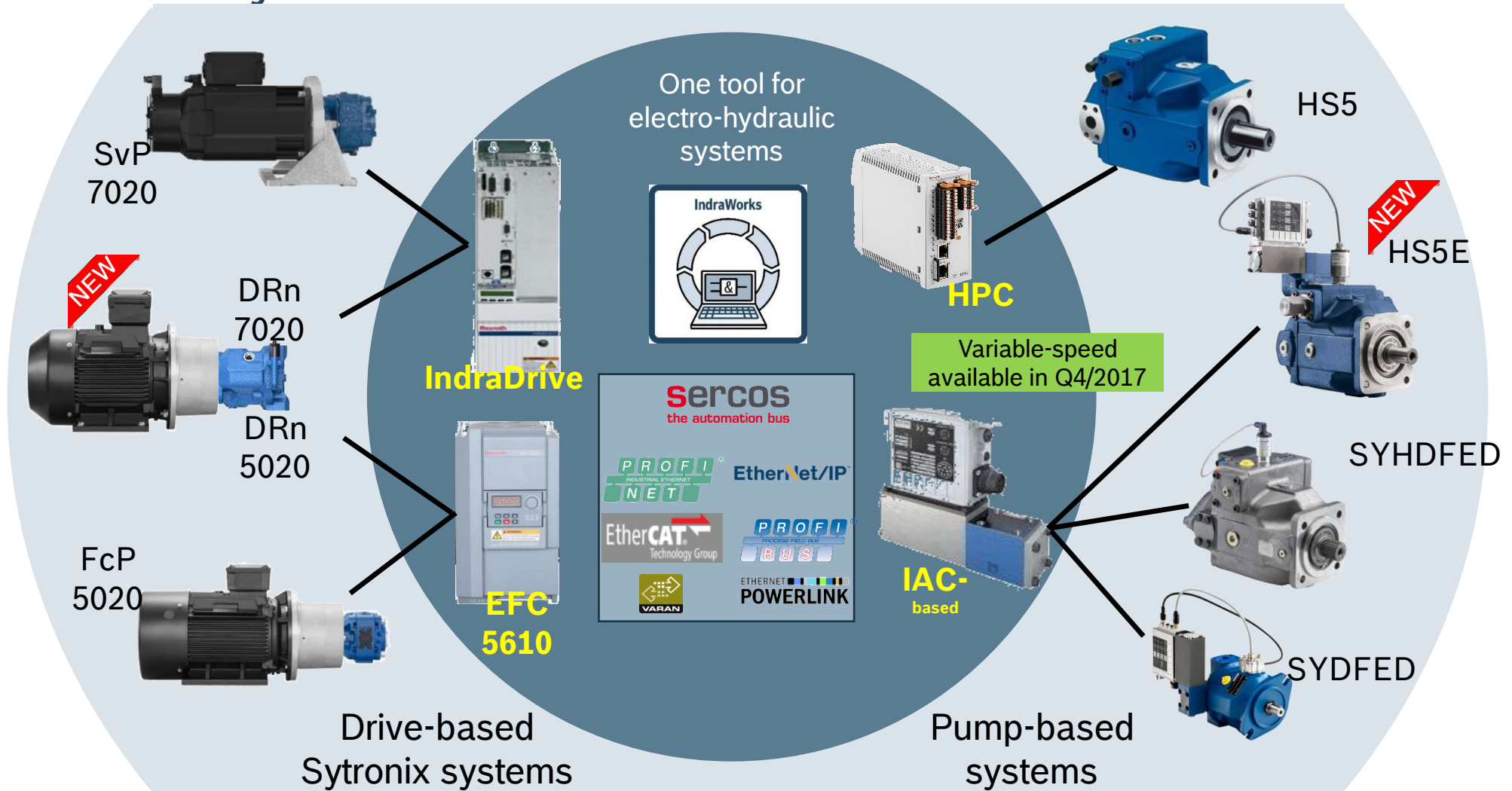
(Z)DREE6..1X



Connected Hydraulics to fit for i4.0



Connected Hydraulics to fit for i4.0



i4.0

CONNECTED INDUSTRY

MULTI-ETHERNET

OPEN CORE ENGINEERING

4EE

ENERGY EFFICIENCY

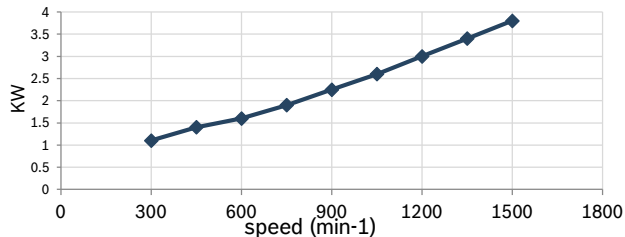
Connected Hydraulics to fit for i4.0

4EE
ENERGY EFFICIENCY

Variable speed
vs.
constant speed

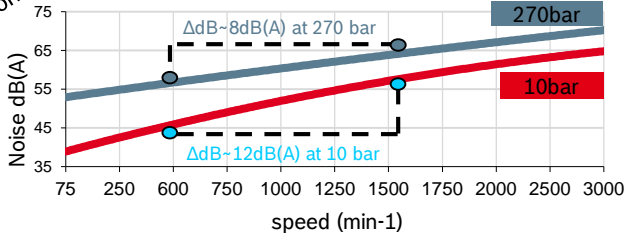


Saving energy



Noise reduction

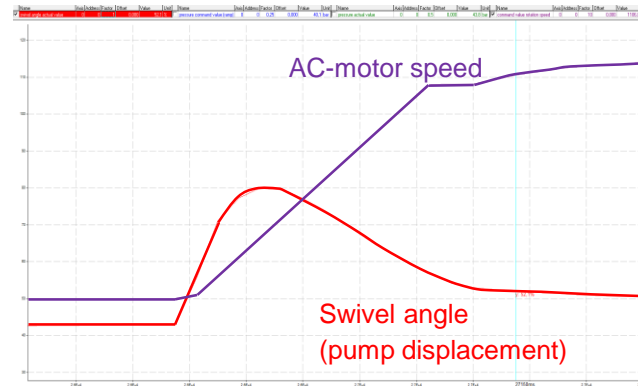
Noise reduction
example axial
piston pump A10



AC-motor and variable pump
vs.
Variable AC-motor and fixed pump



Control performance

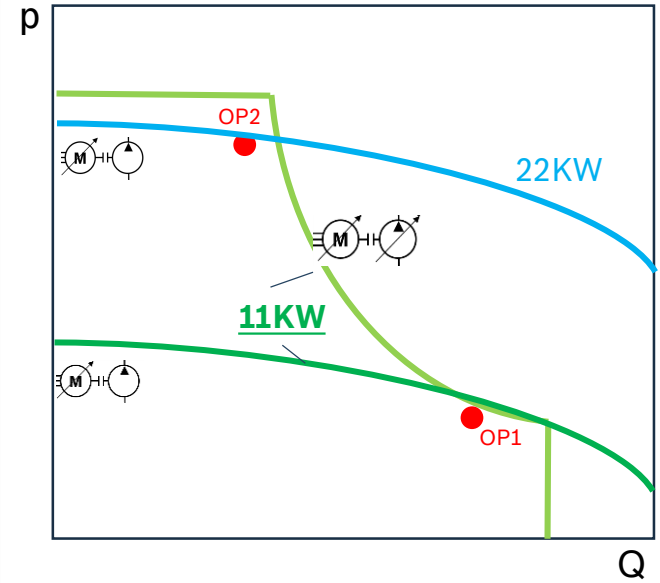


Pump controller
is 5-10 times faster than
AC-motor

Variable motor and variable pump
vs.
Variable motor and fixed pump



Downsizing of motor









Connected Hydraulics to fit for i4.0

Overview Electronic Controlled Pump Systems

Sytronix

4EE
ENERGY
EFFICIENCY

Pressure / Flow Control Systems (p/Q)	Pressure Control Systems (p)	Pressure / Flow Control Systems (p/Q)	Pressure / Flow & Position Control Systems (p/Q, F/x)
<p>SY(H)DFEx 10 ~ 352 kW</p> 	<p>DRn 5020 / 7020 4.0 ~ 315 kW*</p> 	<p>SY(H)DFEn 5020 / 7020 15 ~ 315 kW</p> 	<p>SvP 7020 9 ~ 80 kW</p> 
<p>HS5(E) 35 ~ 583 kW</p> 	<p>FcP 5020 0.4 ~ 18.5 kW*</p> 		

Pre-configured standard sets

* Recommended power values










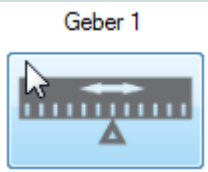
Kevin Chiu DCTW/SLH DCTW/SLM | 7/28/2017

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Connected Hydraulics to fit for i4.0

MLC for hydraulic drives



Programming	Axes	Communication	Encoder
  	<p>1-Axis</p>  <p>2-Axes</p> 	   	 <p>Absolute value</p> <p>Incremental</p> <p>Analog</p>

- **Safety functions** – up to PL e/Cat. 4 in accordance with ISO 13849 respectively SIL3 in accordance with IEC 62061
- **Open in programming**
 - Open programming with IEC 61131-3 PLCopen function libraries
- **Open in communication**
 - Connectivity with sercos & Multi-Ethernet
- **Open for specific control know-how**
 - Open controller for custom-designed functions integration of simulation tools

Connected Hydraulics to fit for i4.0

Highly efficient automation



IndraControl L45 and L75
up to 32 hydr. axes



IndraControl XM21 and XM22
up to 8 hydr axes



IndraControl VPBx
up to 45 hydr. axes

sercos

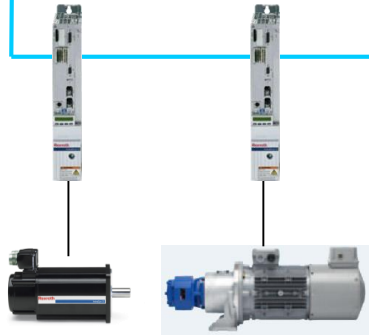
VT-HPC NEW

HS5
HS5E

VT-HMC

IP20 Inline Block I/O
4 axes

IndraControl S20
2 axes



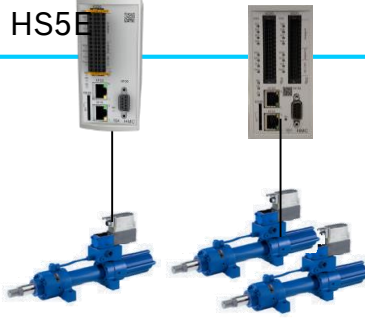
Electrical drive

Hybrid drive (Sytronix)

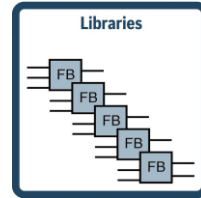
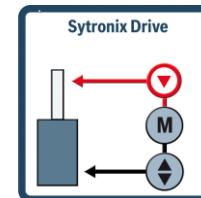
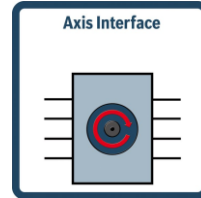
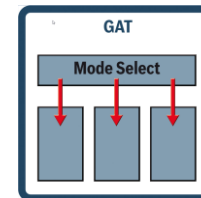
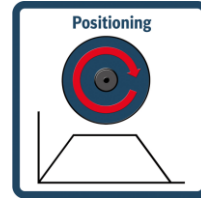
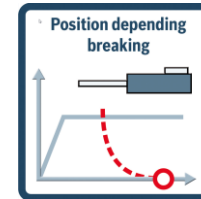
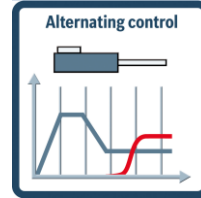
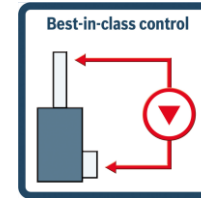
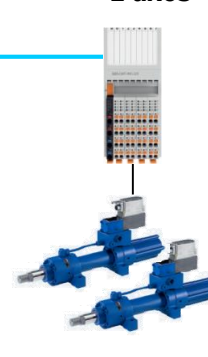
IAC-Multi-Ethernet



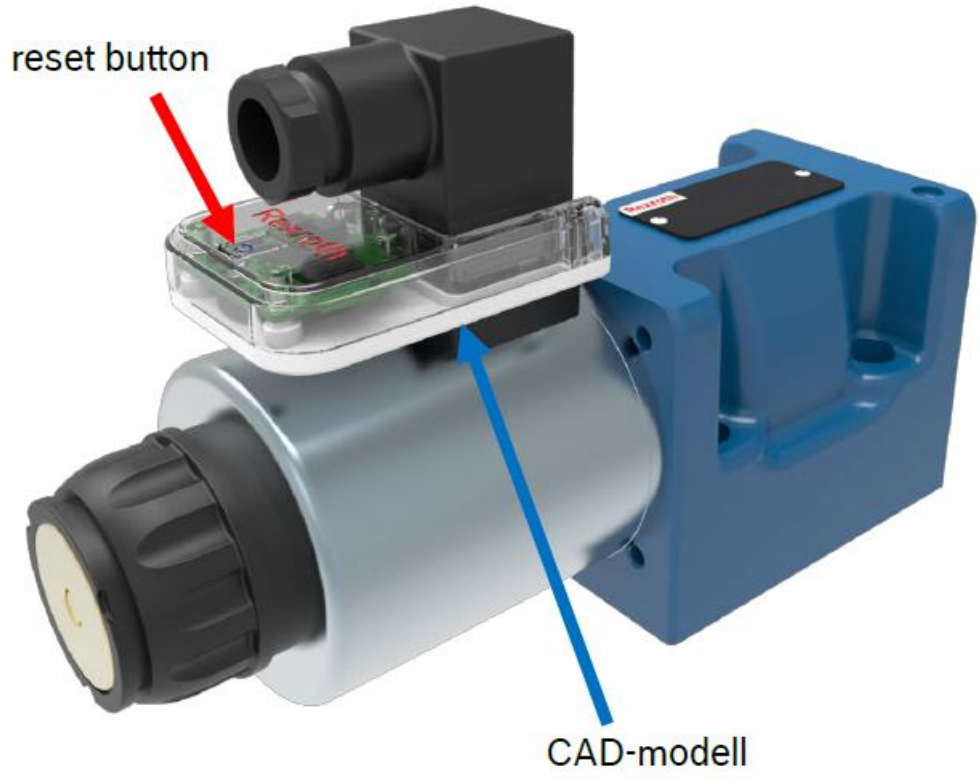
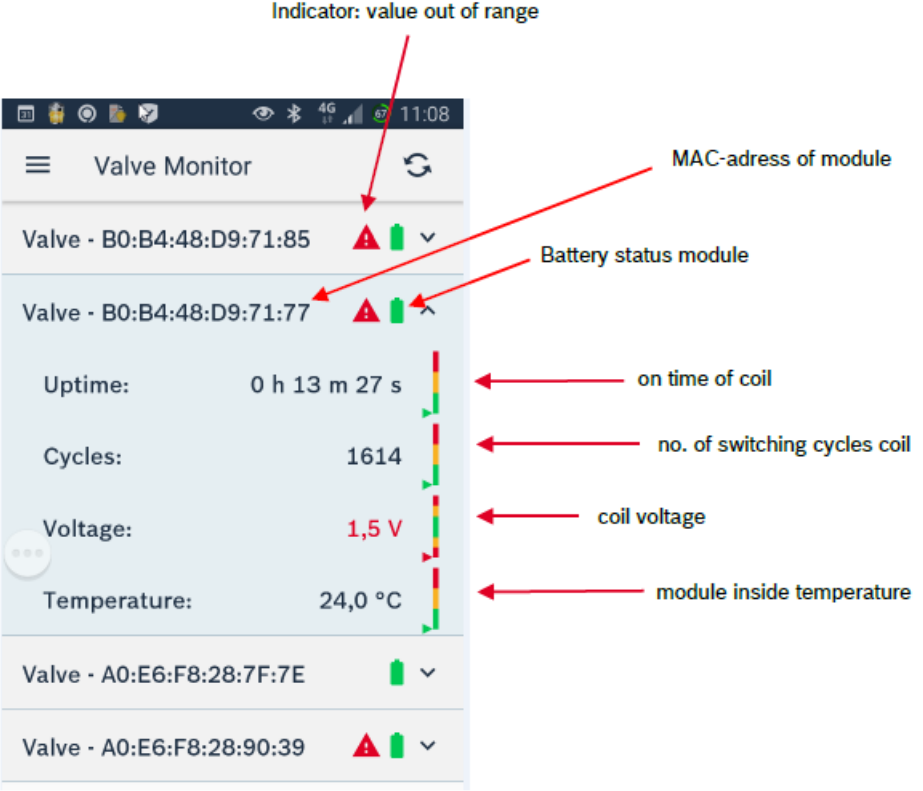
Pump control



Hydraulic axes



Connected Hydraulics to fit for i4.0 CM-Modul Valve Monitor



App for iOS > version 5 and Android > version 4.3

Connected Hydraulics to fit for i4.0 Intelligence and connectivity @ AB

User Experience

- Setup, Configuration
- Usage, Operations
- Maintenance, Service

Additional Sensors:

- Fluid condition
- Pressure
- Temperature

New intelligent Sensor node "IndraControl FM" (DC)

- Micro PLC
- Web Server
- Inputs / Outputs
- Connectivity (Fieldbus, OCI...)

Multi Ethernet and optional Wifi

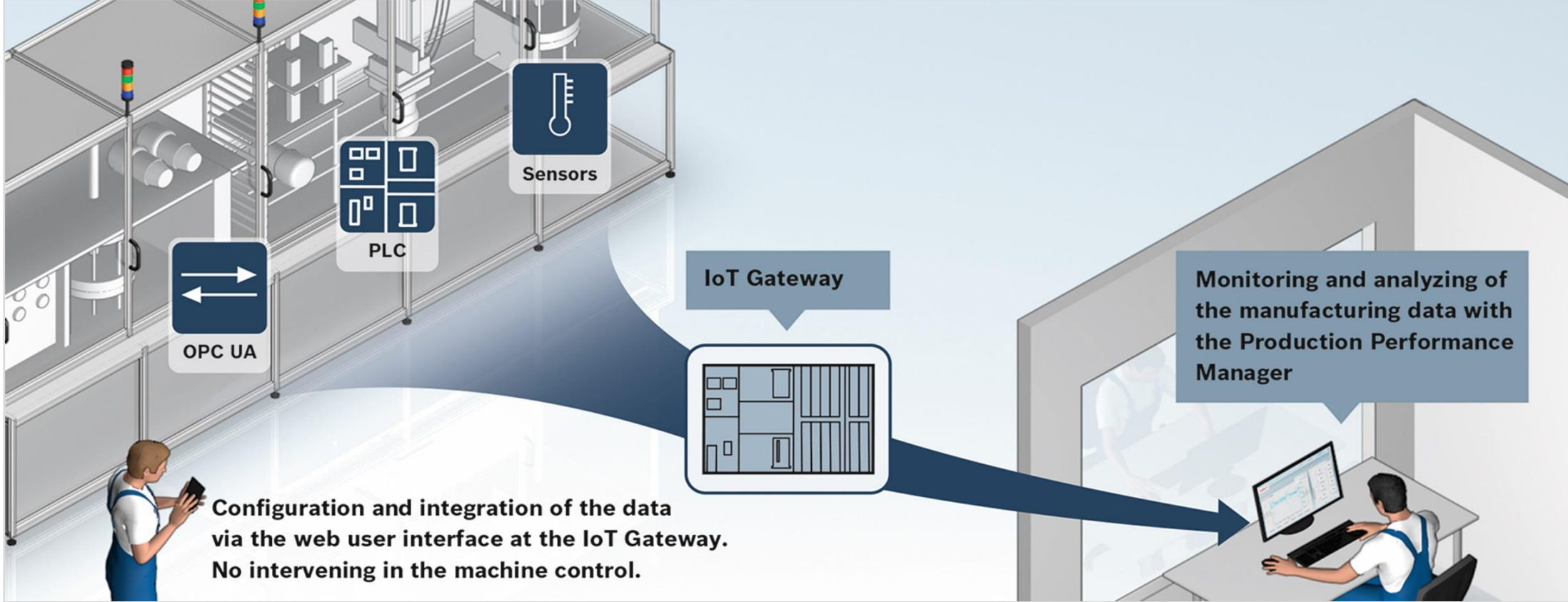
platform independent WebApp

Industry 4.0 Capability

Open Core Engineering		Visualization by Web App
Decentralized Intelligence with Algorithms for Evaluation		Interface to Big Data Systems (e.g. DAS, ODIN, ...)

Connected Hydraulics to fit for i4.0

IoT Gateway for a fast way in to Industry 4.0





My devices All devices

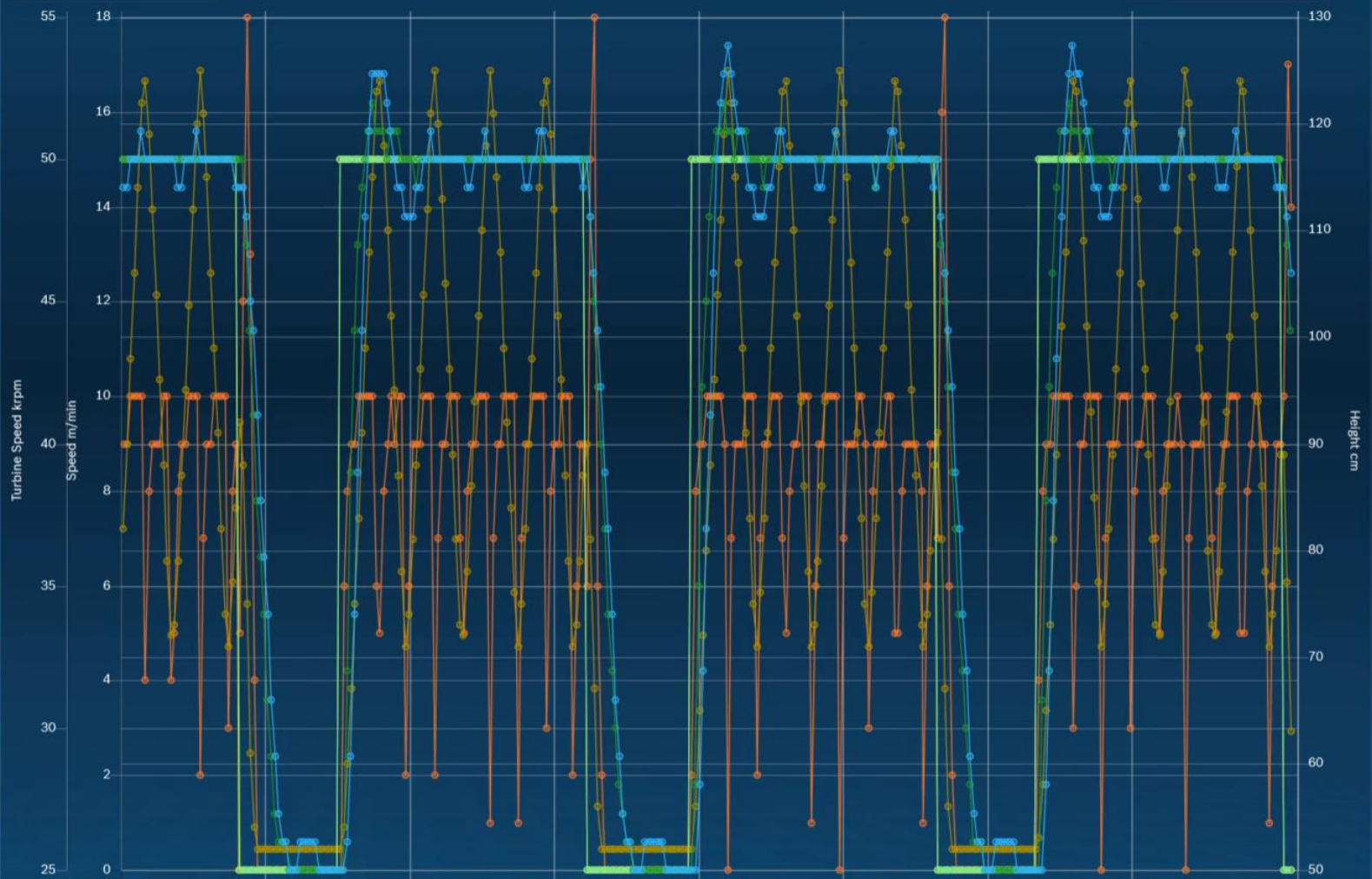


OK	Δ 0	OK	Δ 0	OK	Δ 0
	⊙ 0		⊙ 0		⊙ 0
Paint Booth Atomizer 1/2...	Pretreatment	UTA 3 Paint Booth Air Con...			
OK	Δ 0	OK	Δ 0	OK	Δ 0
	⊙ 0		⊙ 0		⊙ 0
IoTGateway_System	Ovens/Cooling/Flash-Off	E Coat Electrical			
OK	Δ 0				
	⊙ 0				
E Coat Process					

Live Historic Events Rules Details

PPH 1/2

Number of measurements: Auto



Connected Hydraulics to fit for i4.0

Service ODiN (Online Diagnostics Network)



DIGITAL ANALOG I/O

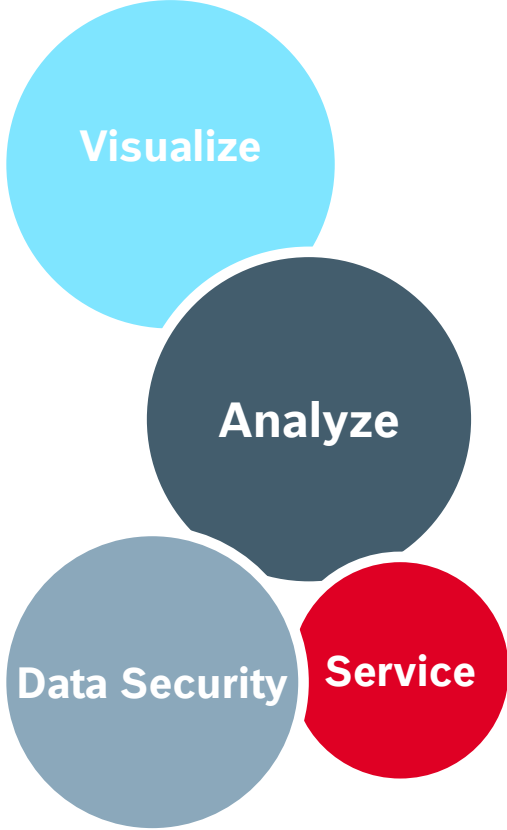
Bluetooth SMART

ETHERNET MULTIMEDIA

USB

IO-Link

OPC UA



Connected Hydraulics to fit for i4.0

Service ODiN (Online Diagnostics Network)

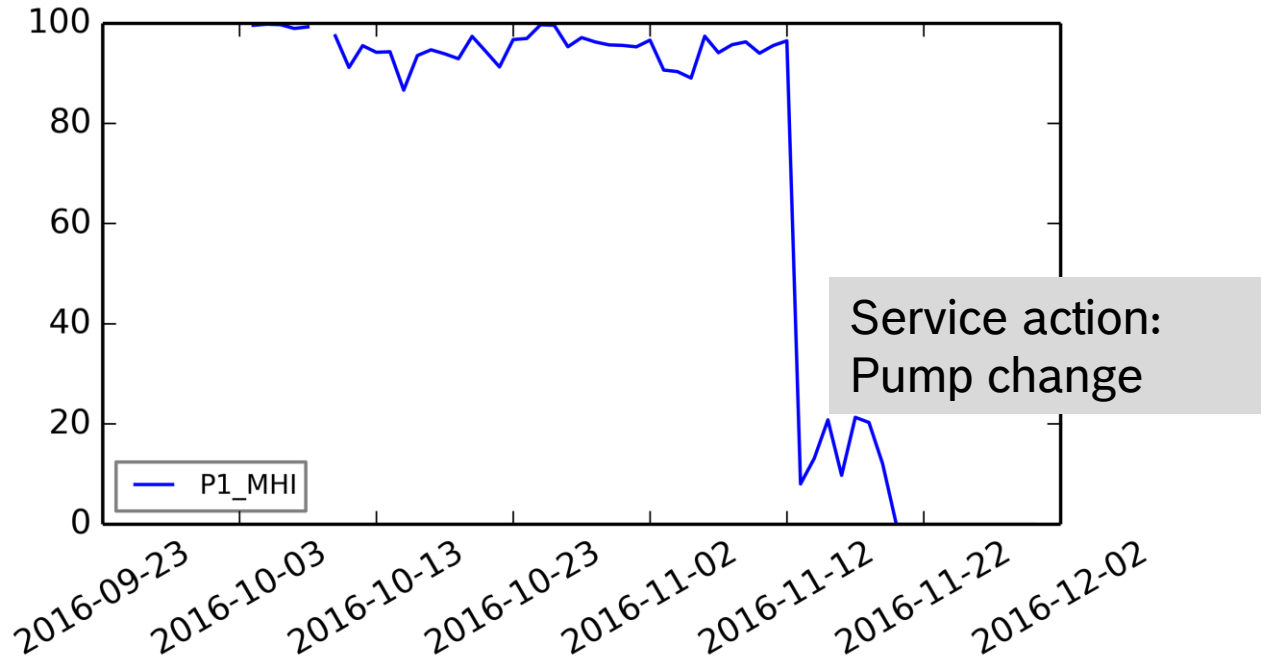


ODiN Video



Connected Hydraulics to fit for i4.0

Fault Detection on a Pump in a Foundry



Result:
Prediction of a bearing fault
Pump fully functional until service
Unplanned stop was avoided
Minimal effect on production, pump was changed on a weekend

Connected Hydraulics to fit for i4.0

Products and Solutions

Products, systems & Services

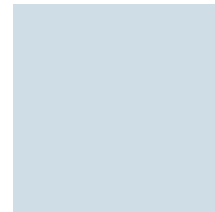
Variable-speed pump drives
Sytronix



Power Unit
CythroPac



Power Unit
ABPAC



Control valves
IAC Multi-Ethernet



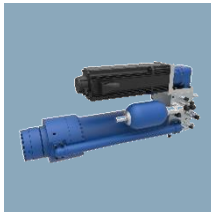
Hydraulic Motion Control
VT-HMC



Hydraulic Pump Control
VT-HPC



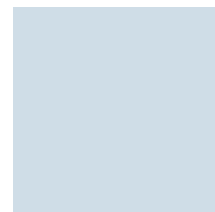
Self Content Actuator
SHA



Control system
SYDFEx



Drive System
Hägglunds Drive System



Control
MLC for Hydraulics



Predictive Maintenance
ODiN



Data processing device
IoT Gateway



Thank you for your attention! Questions?

更多的訊息 <https://www.boschrexroth.com/zh/tw>

