

Holger Müller

müller+krahmer GmbH

Connection to manufacturing and IIoT - fieldbus interfaces for LabVIEW

Abstract

Interfaces for communicating with diverse fieldbuses are crucial for integrating LabVIEW into modern networked production. Requirements range from easy integration at moderate transfer rates to fast real-time. Specific applications also require configuration of bus devices or automatic change of bus protocol. Different platforms have to be taken into account as well as varying network topologies in which the LabVIEW application can be master or slave.

The presentation shows both turn-key solutions and customer-specific applications that fulfil this range of requirements.

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müller+krahmer GmbH - Profile

- Automation and
  Technical Data Management

- Software platforms:
  DIAdem, LabVIEW, TwinCAT

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müller+krahmer GmbH - Services

- Customized applications
- Application assistance
- Trainings

Why fieldbuses?

- Test of bus devices
- Connection to PLC, sensors and actuators with fieldbus interfaces
- Measurement: sensor connection without interference
- Integration into IIoT / Industry 4.0

Why fieldbuses?

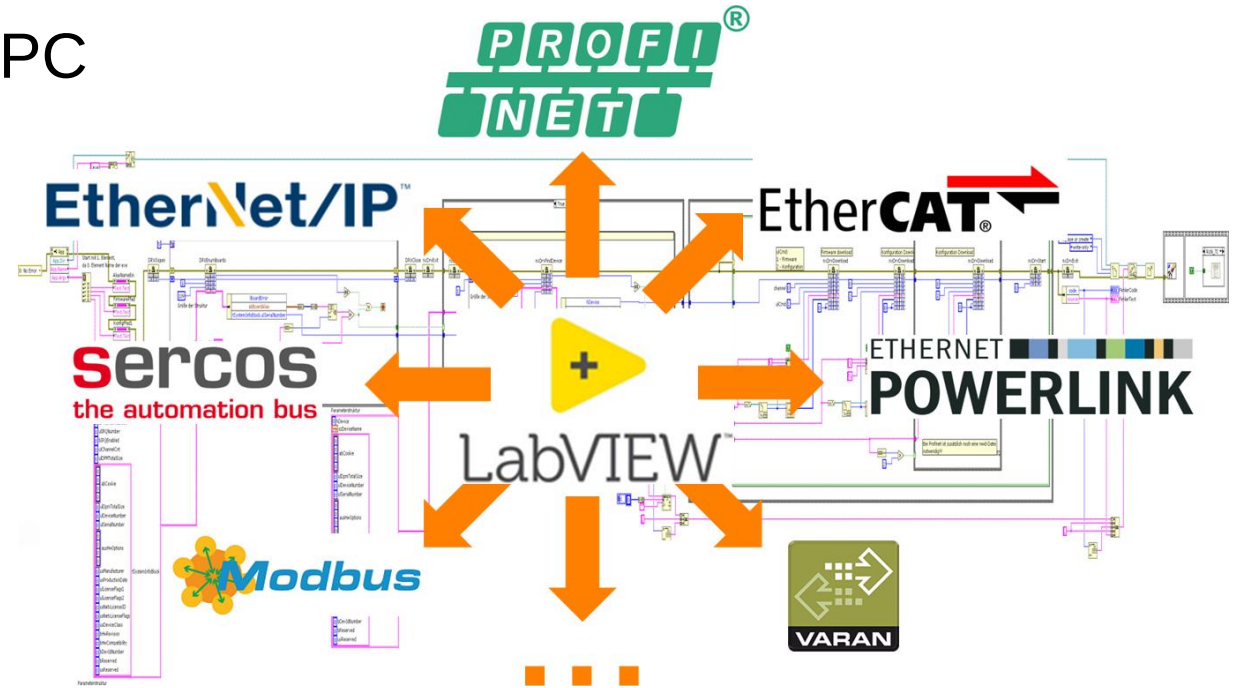
- Data transfer without company IT interaction
- Turnkey solutions for fast and stable data transmission
- No need of individual wiring - integration as part of the automation

Which fieldbuses?

- Real-Time Ethernet (RTEN-) fieldbuses - Profinet, EtherCAT, SERCOS III …
- "Wired" fieldbuses - Profibus, CAN / CANopen
- Communication system IO-Link

LabVIEW* and Real-Time Ethernet

- * on PC



LabVIEW and Real-Time Ethernet

- Universal platform: Hilscher netX
- Physical integration: internally ⇔ externally
- Internal interface: Hilscher PC cards CIFX - PCI 104, Mini PCI, M.2, Mini PCI Express, CompactPCI, PCI Express, PCI

LabVIEW and Real-Time Ethernet

- External interface: Hilscher LAN gateway netHOST
- One API for CIFX and netHost
- All common Real-Time Ethernet protocolls supported

LabVIEW and Real-Time Ethernet



EtherCAT
PROFINET
PROFIBUS
CC-Link
CC-Link IE Field
CC-Link IE Field Basic
sercos the automation bus
DeviceNet
CANopen
Modbus
EtherNet/IP
ETHERNET POWERLINK
ASi
VARAN



Real-Time Ethernet Libraries for LabVIEW

- Bus interface for Hilscher CIFX
  - Cyclic read / write access to the interface
  - Optionally master or slave
- Bus configuration for Hilscher CIFX
  - Exchange of firmware (Real-Time Ethernet protocoll)
  - Exchange of configuration (Sycon.net Project)

Real-Time Ethernet Libraries for LabVIEW

- Profinet configuration for Hilscher CIFX
  - Set of IO-Device's Profinet station name
  - Set of IO-Device's IP address
  - Reset of IO-Devices to factory defaults (Reset of station name and IP address)
  - Bus scan (Identification of IP address, subnet mask, gateway, name, product type and MAC address of the connected IO devices)

Real-Time Ethernet Libraries for LabVIEW

- EtherCAT bus scan for Hilscher CIFX
  - Bus scan (Identification of vendor ID, product code, revision number, serial number and port status of the connected EtherCAT slaves)

LabVIEW and fieldbuses in Real-Time via TwinCAT

LabVIEW™



LabVIEW and Fieldbuses in Real-Time via TwinCAT

- Relocation of all real-time-critical processes to the TwinCAT ‘driver’ level
  - Data acquisition and output
  - Scaling, control and calculation
  - Data storage

- Communication via (non-real-time capable) Software interface

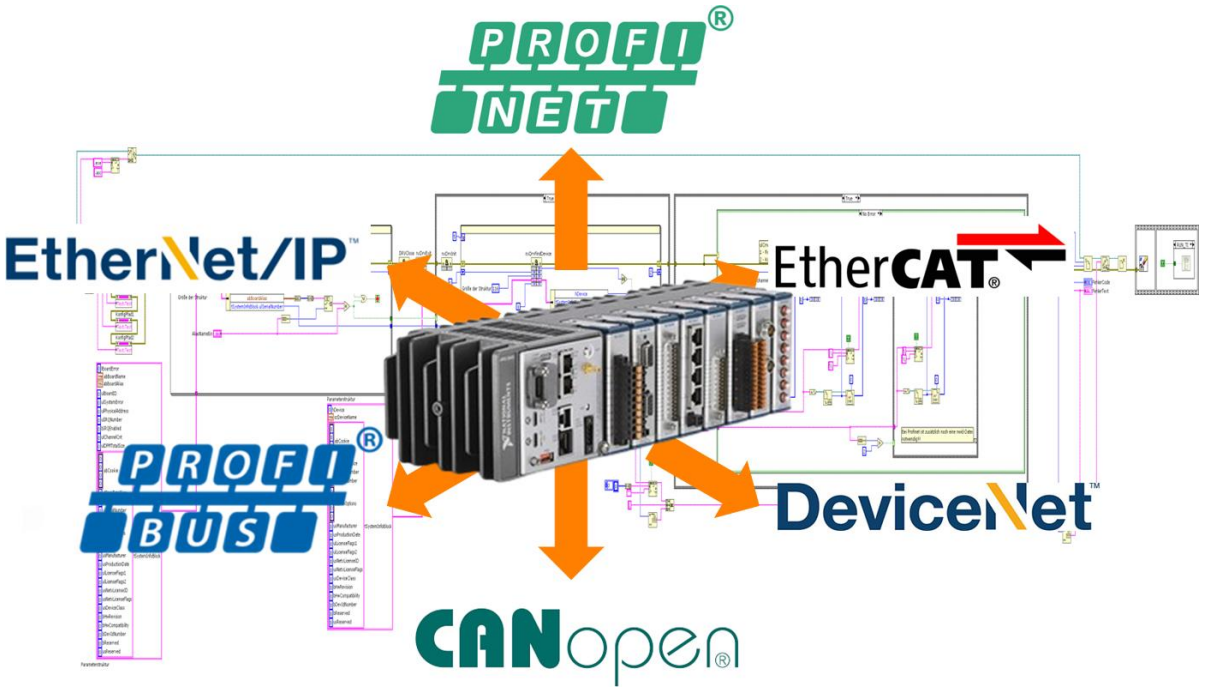
Extending TwinCAT using LabVIEW

- Multibus-capable interface for TwinCAT
- Bi-directional interface to Hilscher cifX
- Cyclic and acyclic data exchange

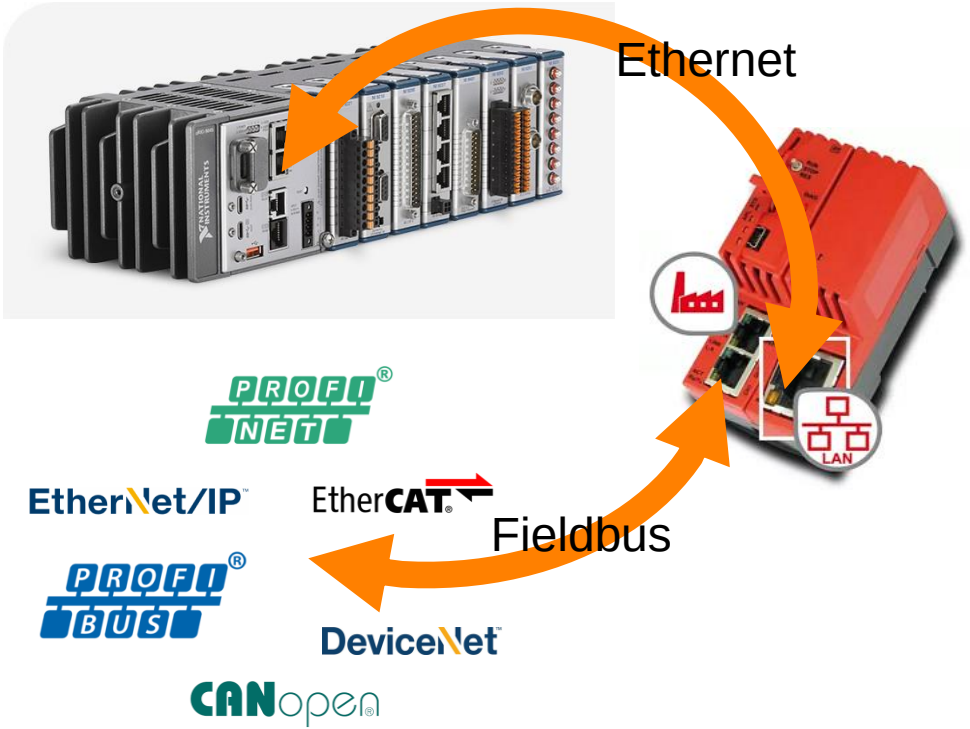
LabVIEW and IO-Link

- IO-Link-Master AL1320 by ifm with IoT interface
- LabVIEW IO-Link library

New: LabVIEW RT and Fieldbuses



New: LabVIEW RT and Fieldbuses



New: LabVIEW RT and Fieldbuses

- Universal platform: Hilscher netX
- Physical integration: externally
- External interface: Hilscher LAN gateway netHOST
- EtherNet/IP, PROFINET, EtherCAT, PROFIBUS, DeviceNet, CANopen

New: Fieldbus Libraries for LabVIEW RT

- Bus interface for Hilscher netHost
  - Cyclic read / write access to the interface

- Option: Bus configuration for Hilscher netHost
- Option: Profinet configuration for Hilscher netHost
- Option: EtherCAT bus scan for Hilscher netHost

Coming soon: LabVIEW RT / FPGA and Fieldbuses





Coming soon: LabVIEW RT / FPGA and Fieldbuses

- Multi-Bus Real-Time Ethernet interface:
  ProfiNET, EtherCAT, Ethernet/IP, SERCOS III …
- Fast read / write access
- Optionally master or slave

LabVIEW RT / FPGA and Fieldbuses





LabVIEW RT / FPGA and Fieldbuses

- EtherCAT Master
- Module for
  - CAN / CANopen / LIN
  - Profibus (no longer available)
  - Profinet (no longer available)

LabVIEW RT / FPGA and RTEN-Gateways







CANopen CC-Link DeviceNet EtherCAT EtherNet/IP

Modbus ETHERNET POWERLINK sercos the automation bus PROFINET PROFIBUS

LabVIEW RT / FPGA and Real-Time Ethernet

- EtherCAT master as universal interface
- Direct connection to EtherCAT devices (Master and Slave)
- Connection to other RTEN busses via gateways

LabVIEW RT / FPGA and other Fieldbuses



LabVIEW RT / FPGA and other Fieldbuses

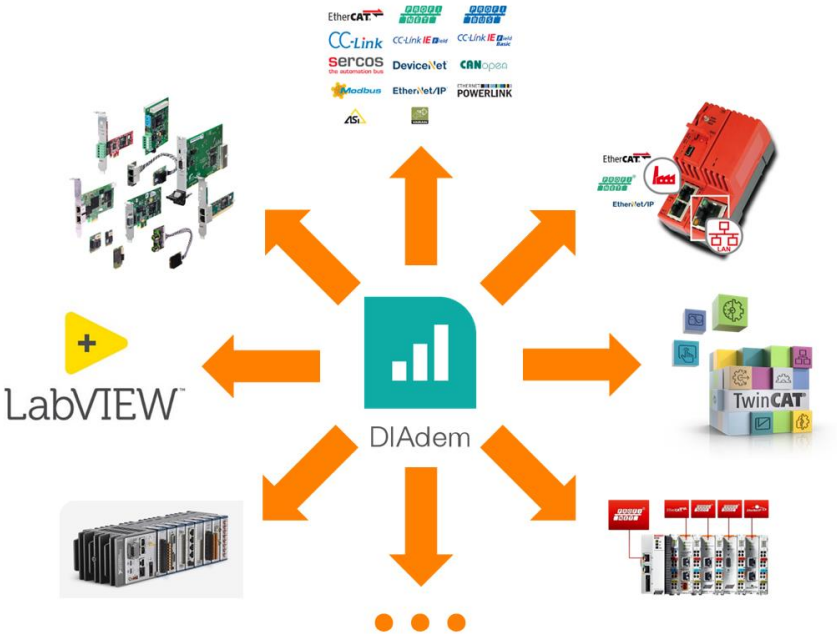
- EtherCAT master as universal interface

- Connecting other fieldbuses via embedded EtherCAT Slave PC and couplers to:
  - CAN / CANopen
  - Profibus
  - Profinet
  - IO-Link
  - …

LabVIEW RT / FPGA and other Fieldbuses

- Bus connection at RT level instead at FPGA
- Easier and faster implementation
- Use of assistents / wizards (bus scan, device detection)

Excursion: DIAdem and Fieldbuses



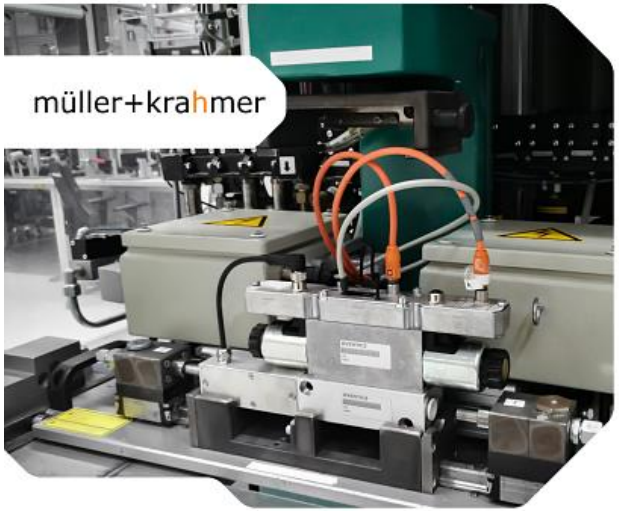
Excursion: DIAdem and Fieldbuses

- DIAdem can measure, control and visualise
- All solutions shown are also available for DIAdem

Use case: LabVIEW and RTEN

- Success Story by Hilscher and müller+krahmer

hilscher



cifX

PC-based Automation with unified Interfaces for all Formats and Protocols

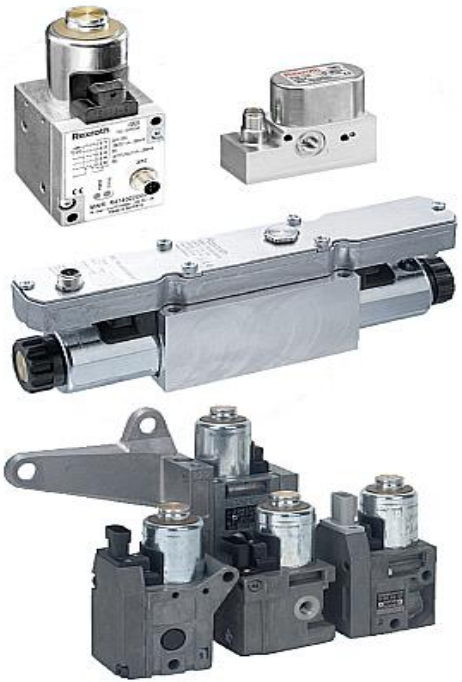
müller+krahmer GmbH realizes pneumatic test benches with the capability to change protocols on the fly with the help of Hilscher cifX PC cards.

empowering communication

müller+krahmer

Use case: Pneumatic Teststands





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Use case: Hydraulic Pump Teststand



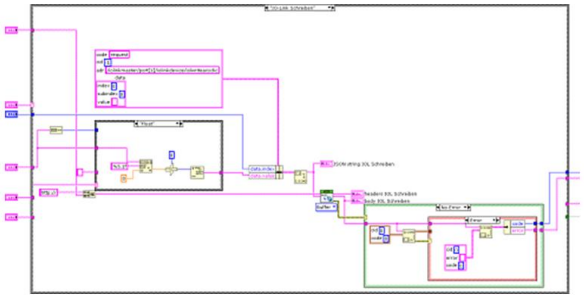


Use case: Test of IO-Link Sensors

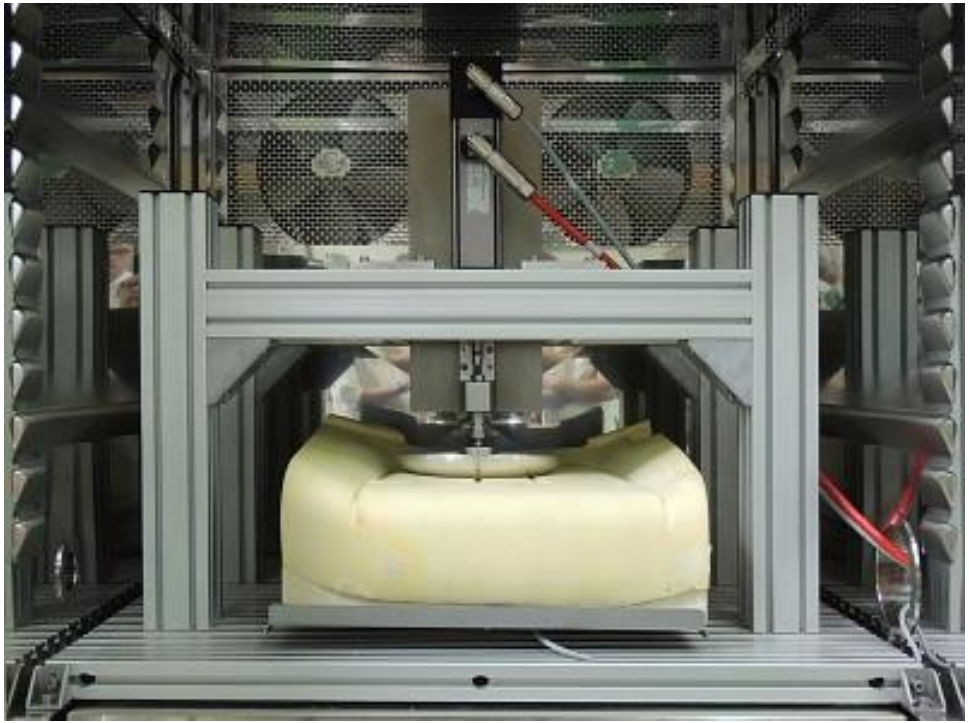


LabVIEW™

IO-Link



Use case: Seat Foam Test



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Contact

mueller+krahmer GmbH
Koenitzer Strasse 14, 07338 Kaulsdorf, Germany
Phone: +49 36733 / 2328 - 6 | Fax: +49 36733 / 2328 - 7
E-Mail: email@mueller-krahmer.de
Web: www.mueller-krahmer.de