



PLC, FIELDBUS AND INDUSTRIAL ETHERNET









Introduction: what is a Fieldbus?

Fieldbus is the name of a family of industrial <u>computer network</u> protocols used for real-time distributed control.

A complex <u>automated</u> industrial system usually needs a <u>distributed control</u> <u>system</u>, an organized hierarchy of controller systems, to function. In this hierarchy, there is usually an HMI (<u>Human Machine Interface</u>) at the top, where an operator can monitor or operate the system. This is typically linked to a middle layer of PLC (<u>programmable logic controllers</u>) via a non-<u>time-critical</u> communications system. At the bottom of the control chain is the fieldbus that links the PLCs to the components that actually do the work.



Original source: https://en.wikipedia.org/wiki/Fieldbus





Fieldbus: the past

In the **past** the main part of the connections between load cells and PLC were made via **analog signal**, amplifying the mV/V signal coming from a load cell to 0-10V or 4-20mA







Fieldbus: nowadays

All the biggest and most popular **PLC producers** <u>developed</u> their own **fieldbus communication protocols.**

Because of this, plant manufacturers and automation companies are «<u>chained»</u> to the PLC producer given that every component installed in the plant has to <u>«speak» the same language</u> as the PLC.

At the same time, if a complex automated industrial system is composed by hundreds of parts all «speaking» the same language, it will make things a lot easier both for the programmer and its whole management.





Fieldbus: LAUMAS solutions

Many PLC manufacturers produce specific weighing modules, compatible with their own PLCs, to handle the signal coming from the load cells. LAUMAS, as <u>specialist in process weighing</u>, <u>developed</u> a wide range of **weighing electronics** <u>compatible with all the fieldbuses</u>, in order to be as

versatile as possible and to offer to its customers the possibility to install LAUMAS products regardless of the PLC or fieldbus to be used.





Fieldbus: LAUMAS solutions

Our range of **weighing electronics** with integrated fieldbus is <u>suitable for any</u> <u>installation method:</u>

- Din rail
- Front panel
- Integrated with the load cell
- Hazardous area
- Wall mounting
- Column
- Desk















Fieldbus: solutions

Fieldbuses managed by LAUMAS:

PROFINET/IO	PROFU [®] Net	PROFIBUS/DP	₽₽₽₽ BUSD
EtherNet/IP	EtherNet/IP	DeviceNet	DeviceNet [®]
EtherCAT	Ether CAT.	Modbus/TCP/IP	Modbus
Ethernet/TCP/IP		Wi-Fi	Wi Fi
Modbus/RTU	Modbus-RTU	CANopen	CANOPER
POWERLINK	ethernet POWERLINK	CC-Link	CC-Link
SERCOS-III	SERCOS interface	IO-Link	⊗IO -Link





Fieldbus & Industrial Ethernet

Fieldbuses can be divided in 2 main families:

Fieldbus:

the connection is usually done via wire to a connector or directly to the terminal board.

CANopen, PROFIBUS/DP, DeviceNet, CC-Link, Modbus/RTU, IO-Link are all fieldbuses.

Industrial Ethernet:

the connection is done using a coaxial cable and RJ45 connectors.

PROFINET/IO, EtherNet/IP, Ethernet/TCP/IP, Modbus/TCP, EtherCAT, POWERLINK, SERCOS-III are all Industrial Ethernet.











Fieldbus: LAUMAS trend 2012-2019



Serial ports RS485-RS232 with Modbus/RTU protocol are excluded from data





Fieldbus 2019: LAUMAS share in %







HMS 2019







PLC: brands and Fieldbus

Fieldbuses <u>developed/associated</u> to PLC manufacturers:

Siemens (DE) = PROFINET/IO & PROFIBUS/DP

Allen Bradley (US) = EtherNet/IP & DeviceNet

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Omron (JP) = EtherCAT & EtherNet/IP
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Schneider (FR) = Modbus/TCP/IP – EtherNet/IP – CANopen

B&R (AT) = POWERLINK

Beckhoff (DE) = EtherCAT

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Mitsubishi (JP) = CC-Link
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Bosch Rexroth (DE) = SERCOS-III





PLC: brands and Fieldbus

European leader:

• Siemens with Profinet/IO

North & South American leader:

• Allen Bradley with Ethernet/IP

Other leaders worldwide:

- Omron with EtherCat and EtherNet/IP
- Schneider Electric with Modbus/TCP and CANopen
- Mitsubishi with CC-Link



PC: Ethernet/TCP/IP

Connection to PC: Protocol Ethernet/TCP/IP

This kind of protocol <u>is not associated</u> to any PLC manufacturer. It <u>is mainly used</u> to interface a device with a <u>company network</u> or a <u>PC</u> <u>software</u>.

PLC: fieldbus & configuration files

Every device and every fieldbus has its own **configuration file**.

The configuration files, always included with our electronics, <u>must be</u> <u>uploaded</u> onto the **PLC** and <u>are</u> <u>necessary</u> to allow the **PLC** to <u>recognize and manage</u> the devices within the communication network present in the automation system.

Configuration file names:					
PROFINET/IO	\rightarrow	GSDML			
PROFIBUS/DP	\rightarrow	GSD			
EtherNet/IP	\rightarrow	EDS			
DeviceNet	\rightarrow	EDS			
EtherCAT	\rightarrow	ESI			
CANopen	\rightarrow	EDS			
POWERLINK	\rightarrow	XDD			
CC-Link	\rightarrow	CSP			
SERCOS-III	\rightarrow	SDDML			

PLC: how to select the right Fieldbus?

Questions for the customer:

- Which kind of PLC do you need to connect to?
- Who is the producer?
- Which kind of input ports are available as standard on the PLC?

Fieldbus: how to use filters on web site

www.laumas.com

Weight transmitters

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Use the search filters to find the one that best suits your needs.

A PRODUCT?

Integration of a PROFINET Weight Transmitter in the TiA Portal

How to integrate a LAUMAS PROFINET IO Weight Transmitter in an automation system based on SIEMENS PLC.

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Thanks for your attention!