

Justifying Fieldbus



EMERSON™
Process Management

Agenda

- **Fieldbus Savings from Physical Installation**
- **Commissioning**
- **Maintenance**



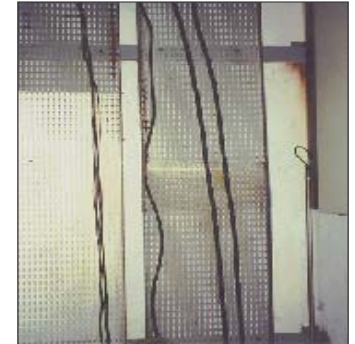
Fieldbus basic Benefits - I

- Physical

- Reduced wiring and installation costs
- Enables Multivariable transmitters
- Reduced control room real estate
- Simplify installation
- Reduce number of drawings
- Simplify maintenance



X



I/O cards & power supply for a 350-field device installation.

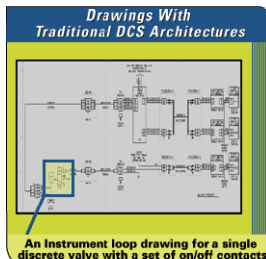


Traditional Installation

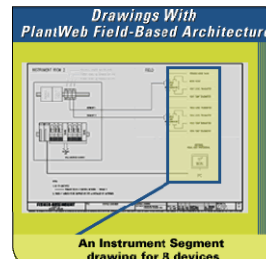
I/O cards & power supply for a 350-field device installation.



PlantWeb Architecture

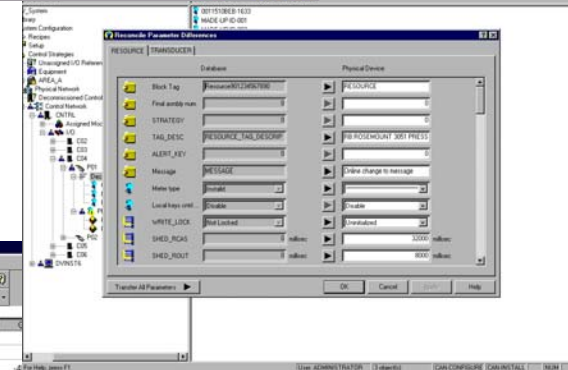
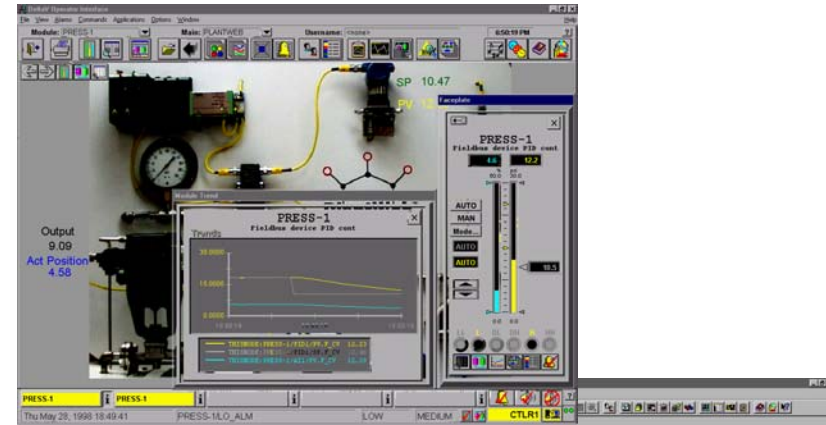


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Fieldbus Benefits - II

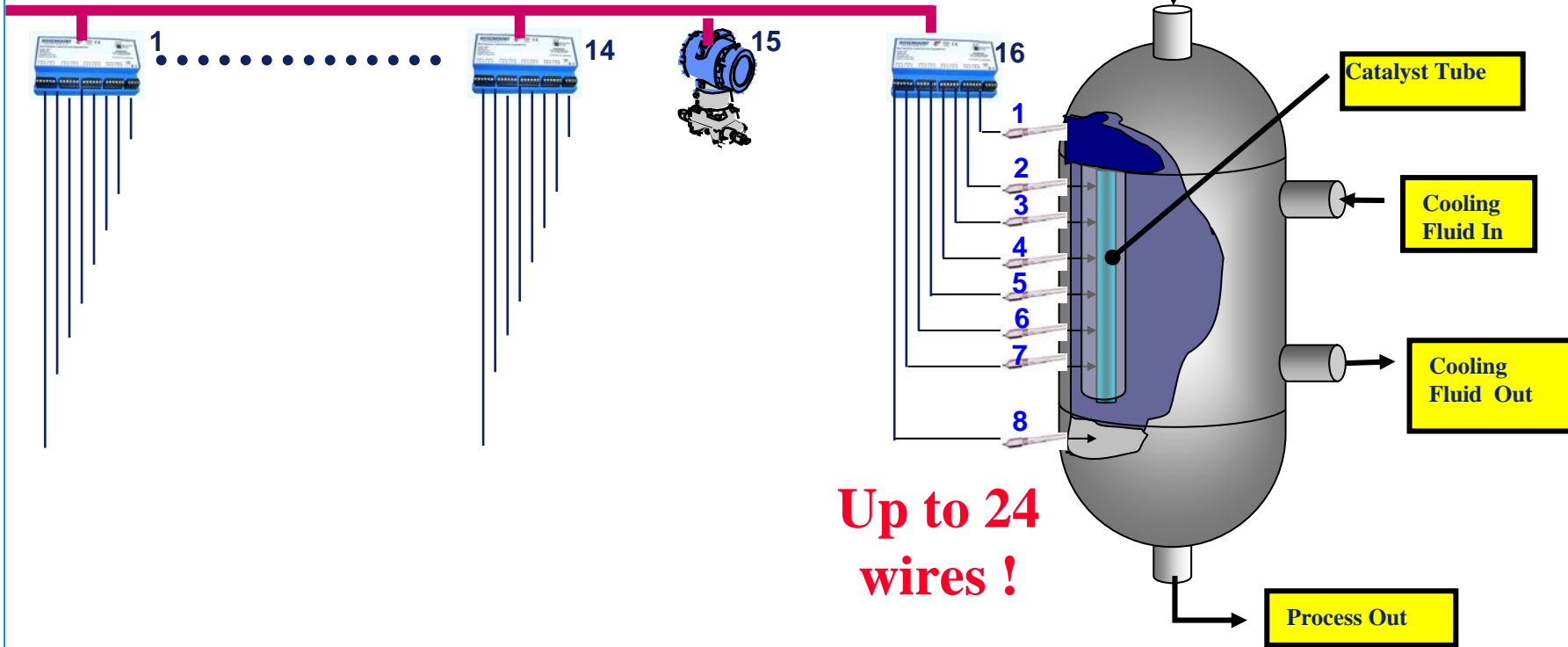
- Functional
 - Direct reading of variables in Engineering Units
 - Every reading contain information on measurement health
 - Remote access to device calibration and diagnostics
 - Control in the field
 - Advanced diagnostics
 - Easier maintenance
 - Better plant performance throughout its life



	A	B	C	D	E	F
1	Production Rate	157.32	Ton/Hr	Target Rate	150.00	Over/Under
2						
3	Production Total	27,459.55	Ton	Total Target	27,946.31	Over/Under
4						
5	Capacity Rate	192.50	Ton/Hr			
6						
7	Backlog	4,652.45	Ton			
8						
9	Remaining Run	29.57	Hour			
10						
11						
12	Order	10,000	Ton	Feed A Rqd	9524.09	Feed B Rqd
13				Feed A Avail	9260.00	Feed B Avail
14	Run Time	63.56	Hr			
15	Delivery Request	80.00	Hr	Current Rate Del	93.14	Over/Under
16				New Target Rate	183.16	
17						
18						
19						
20						
21						

Fieldbus enables Multi-sensor applications

Fieldbus H1 - two wires

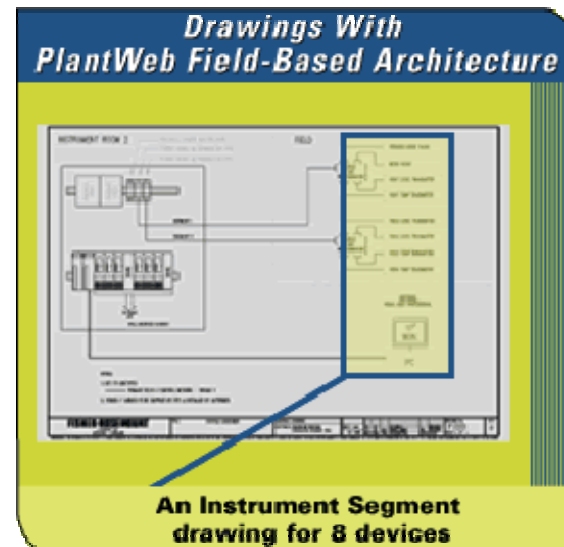
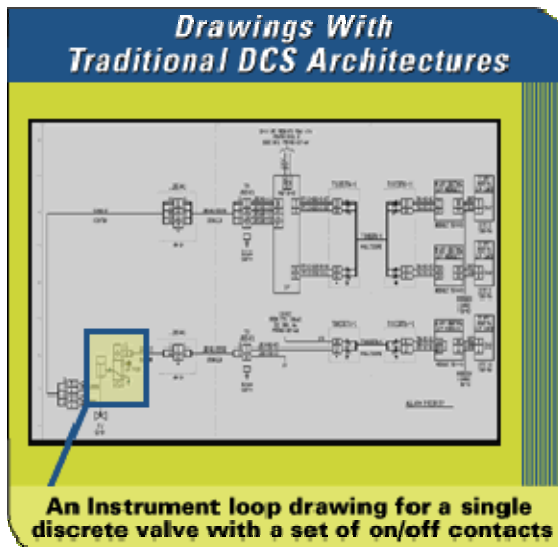


Chemical Reactors

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Process Management

Reduced Capital and Engineering Costs

- Drawing Cost
 - With **FOUNDATION fieldbus**, one instrument segment drawing can replace as many as 16 traditional instrument loop drawings.



Reduced Capital and Engineering Costs

- Commissioning Cost
 - Checking wiring
 - Connecting instruments
 - Troubleshooting.

100

15

Commissioning With Traditional DCS Architectures

- ▶ Individually ring out wiring
- ▶ Attach device
- ▶ Verify communications
- ▶ Verify link to control strategy

**Typical time: 2 hr/device
for 2 technicians**

Commissioning with PlantWeb

- ▶ Check segment wiring
- ▶ Attach device
- ▶ Drag-and-drop commissioning

**Typical time: 25 min/device
for 1 technician**



Conventional

Courtesy: Cargill Corporation

Fieldbus

A photograph of an industrial control room. In the foreground, there is a grey metal structure, possibly a control panel or a rack. In the background, a rack of purple fieldbus cables is visible. A yellow bracket highlights a specific section of the cables. The cables are organized in a neat, parallel fashion. The overall scene is dimly lit, typical of an industrial control room.

Courtesy: Cargill Corporation




Conventional

256 I/O



Fieldbus

**4,000
Fieldbus 'I/O'**

A blurred background image of an industrial facility, likely a refinery or chemical plant, featuring several tall distillation columns and a complex network of pipes and walkways under an overcast sky.

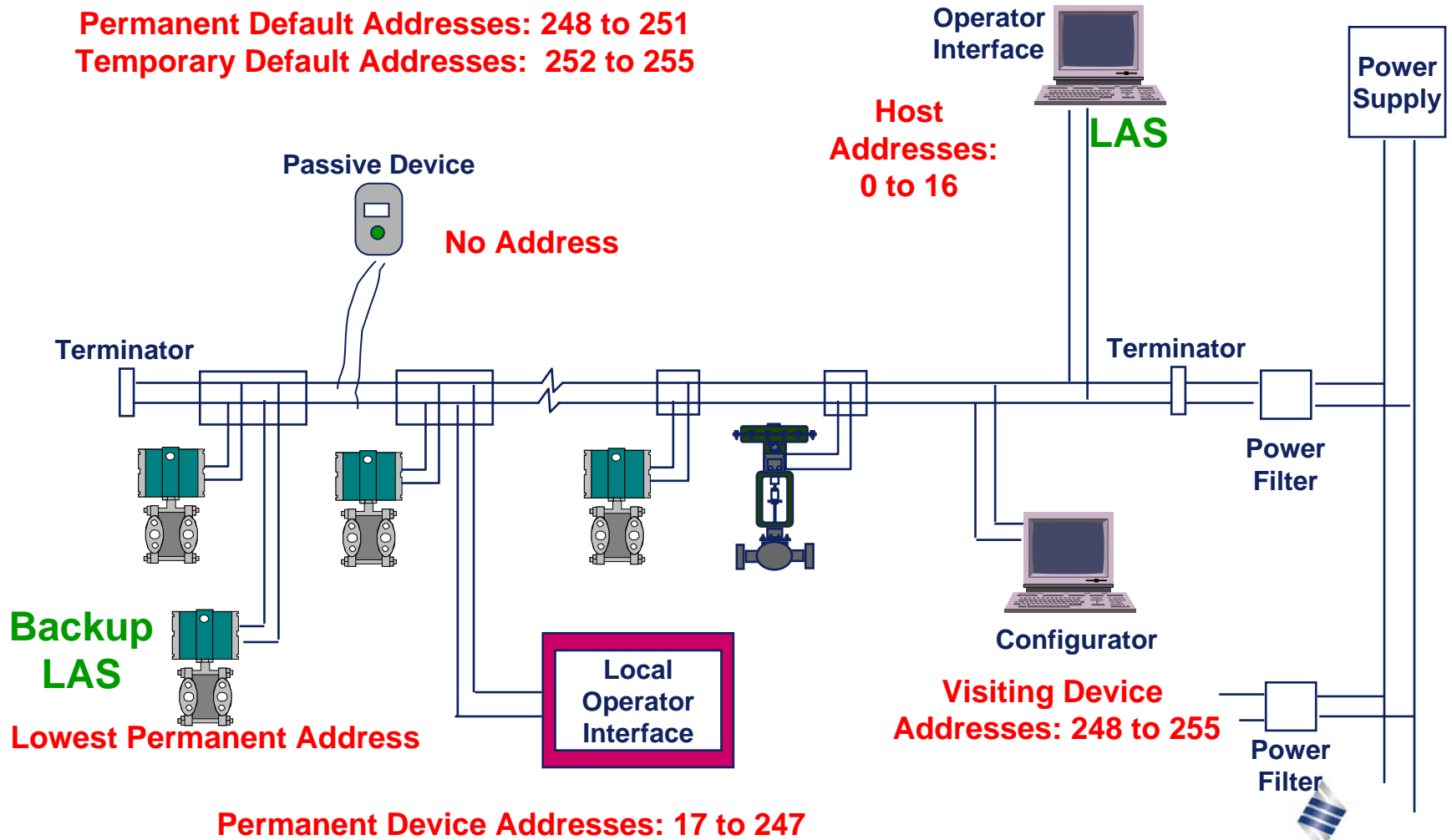
Fieldbus brings dramatic savings in installation and commissioning, but the real value is seen during plant operation...

Device Identification

- Each Device is uniquely identified
- Device ID
 - Manufacturer Identification, Model Type, Serial Number, etc.
Ex.: 001151-3244-FR-TEMP-0x8104E434
- Device Name (TAG)
 - Set by the user. Identifies function, physical location in the process, etc.
 - Ex.: TT-BA123A
- Device Address
 - Unique numerical address on the segment
Ex.: 23

Addressing

Permanent Default Addresses: 248 to 251
Temporary Default Addresses: 252 to 255



Automatic Address Assignment

- Devices may be connected to the bus with the same permanent default address.
- A configuration utility in the host assigns an unused valid address to each device.
- This feature allows fast and safe commissioning of the Fieldbus Network!
- No dip switches, no pre-configuration.

As New Devices Are Attached, They may be Identified and Moved to Permanent Addresses

The screenshot displays the Emerson DeltaV software interface. The main window is titled 'Exploring DeltaV' and shows a tree view of the system configuration. A yellow arrow points from the 'Decommissioned Fieldbus Devices' table to the 'Fieldbus device properties' dialog box.

Name	Type	Device ID	Address	Manufacturer	Device Type	Revision
PT101	Standby Device	0011513051DVT70861539287135941	236	Rosemount Inc.	3051 Fieldbus Pressure Transmitter	2

Fieldbus device properties

Object type: Standby Device

Modified: --

Modified by: --

Device tag: PT101

Description:

Device ID: 0011513051DVT70861539287135941

Address: 236

Manufacturer: Rosemount Inc.

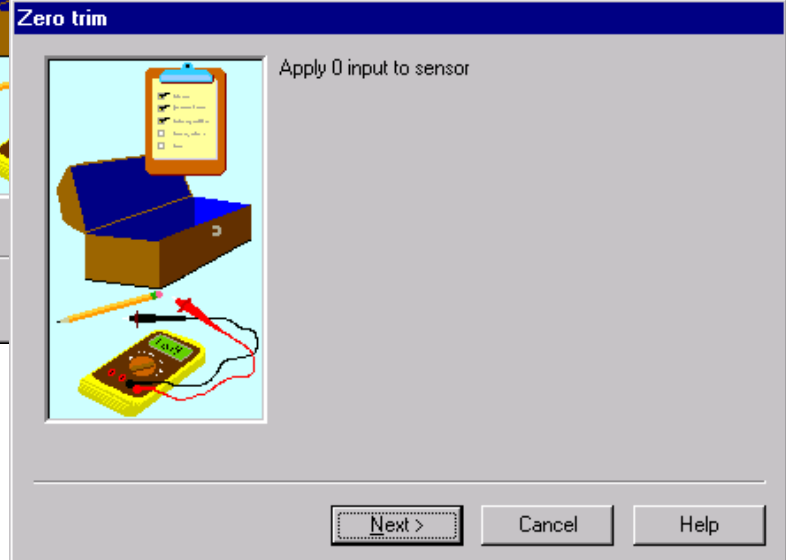
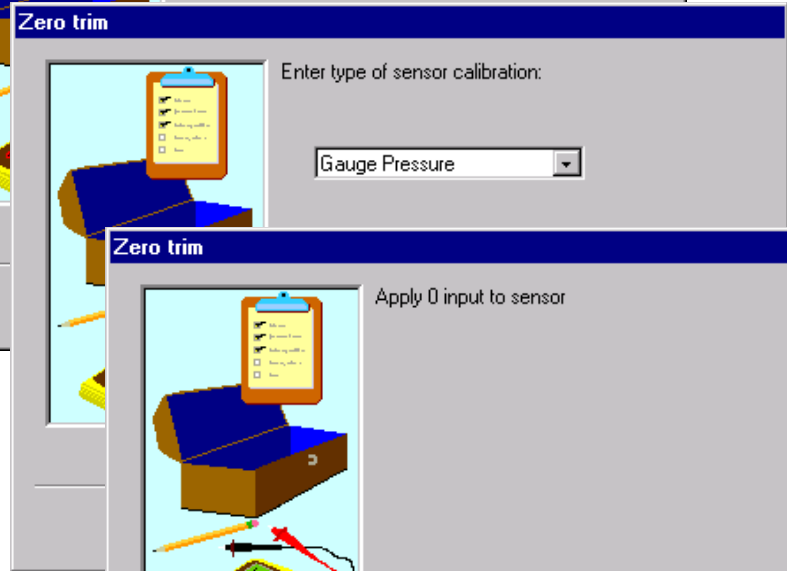
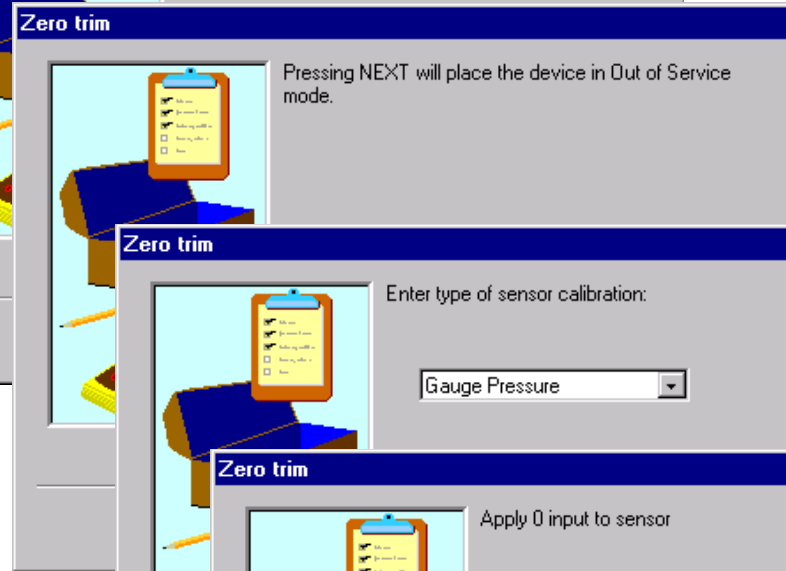
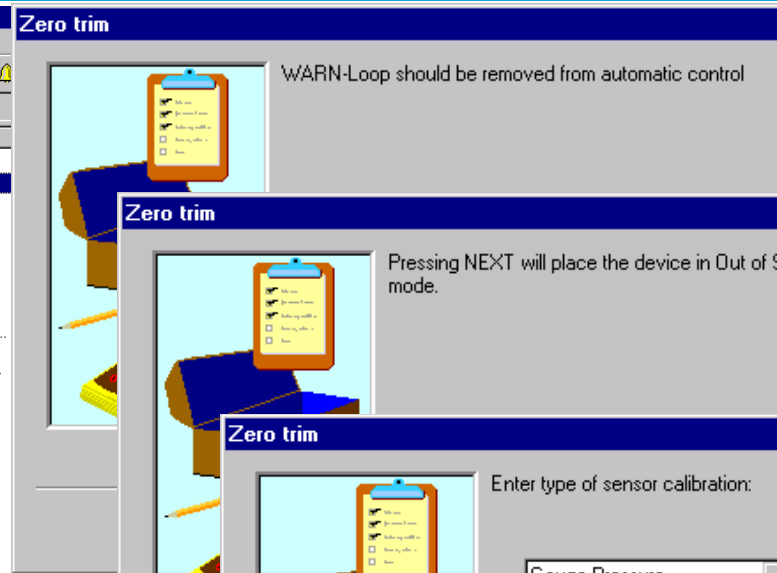
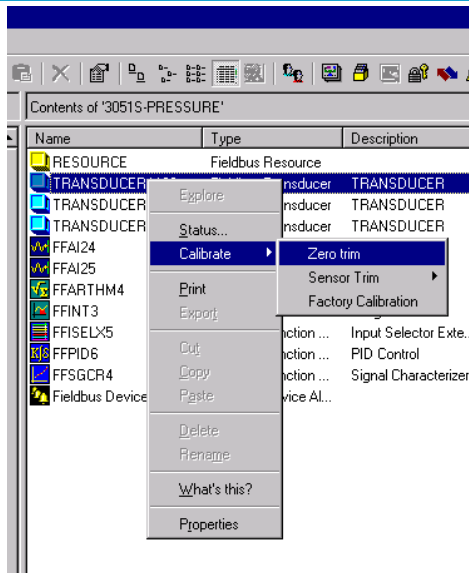
Device type: 3051 Fieldbus Pressure Transmitter Device revision: 2

For Help, press F1 User: ADMINISTRATOR 1 object(s) selected CAN-CONFIGURE CAN-DOWNLOAD Assigned to: CTRL-1

Methods Simplify Maintenance and Reduce Errors

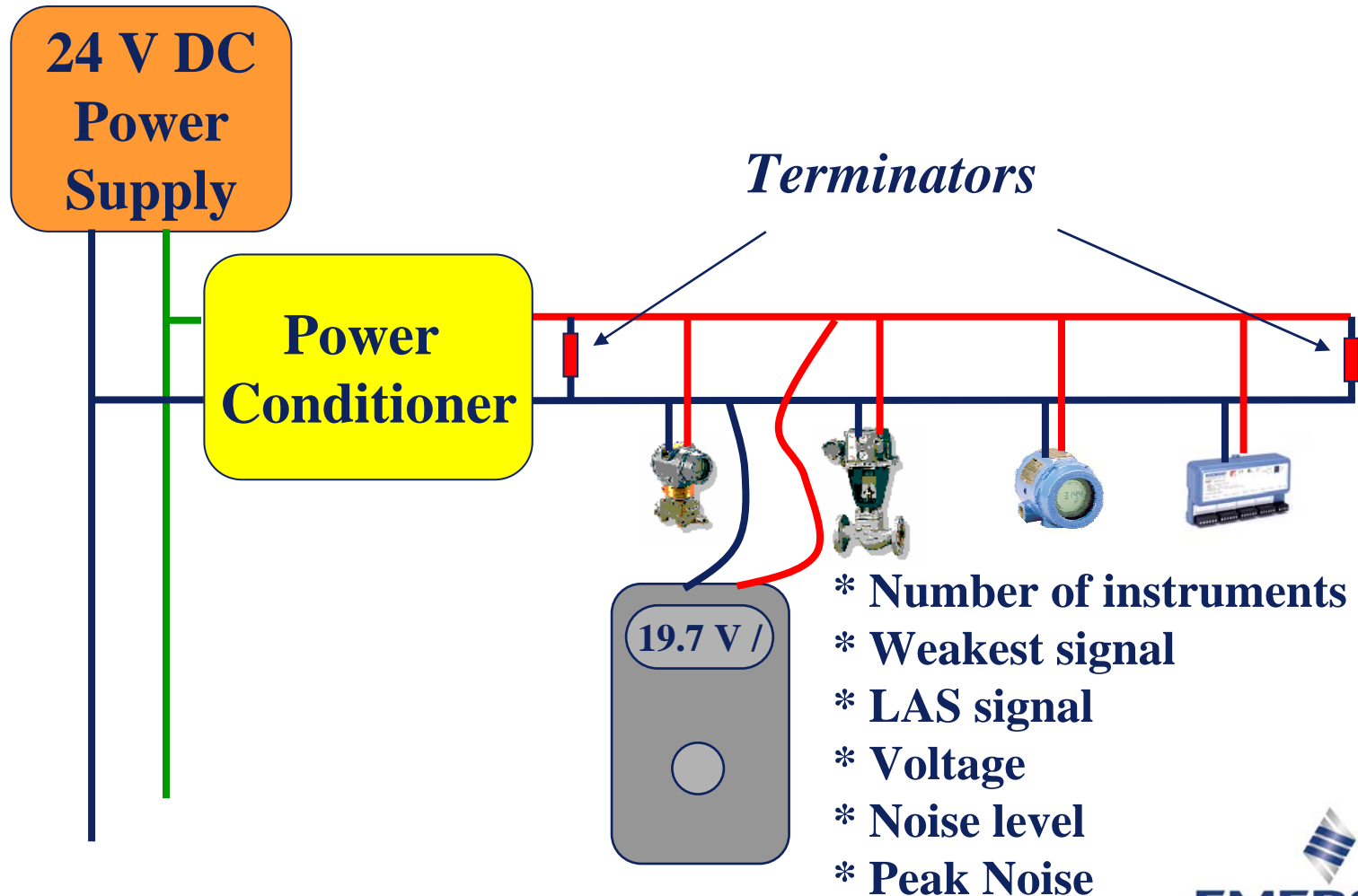


Zero This Transmitter!



1. Set MODE_BLK.TARGET to OOS
2. Apply zero pressure to the sensor and allow the to reading stabilize
3. Set value CAL_POINT_LO to 0
4. Set SENSOR_CAL_DATE to the current date.
5. Set SENSOR_CAL_WHO to the person responsible for the calibration.
6. Set SENSOR_CAL_LOC to the calibration location.
7. Set SENSOR_CAL_METHOD to User Trim
8. Set MODE_BLK.TARGET to AUTO

Troubleshooting made easy



Device Maintains Statistics For Communication Diagnostics

The screenshot displays the DeltaV System interface. On the left, a tree view shows the hierarchy: DeltaV System > Control Network > BUSTER > F_BUS_ > Communications > Primary > I/O > C05 Fieldbus H1 Card, 2 Ports > P02 (auto-sense when...) > MV3244_0107. The main window shows a table of device statistics for 'Card 5 - Port 1 - Device PDT1_3244 - Address 33'. The statistics include RequestsSent (26300), AbortsRxd (0), and many others. A status bar at the bottom indicates a device is being added at address 30.

Name	Description	Value
PhysDevTag	Physical Device Tag	PDT1_3244
State	State	Commissioned

Fieldbus Device Communication Statistics	
Card 5 - Port 1 - Device PDT1_3244 - Address 33	
Statistic :	Value :
RequestsSent	26300
AbortsRxd	0
InitSent	1
InitPosConRxd	1
InitNegConRxd	0
AbortsSent	0
AbortPosConRxd	0
AbortNegConRxd	0
PcrTimeoutsRxd	0
RejectsRxd	0
NumFasAborts	0
LastAbortLocal	0
LastAbortReason	0
NumDIIDtPdsSent	26295
NumDIIDtPdsReceived	45548
NumDIIDtTransferTimeouts	0
NumStackReceiveQFulls	0
NumDIIRetrys	0
Negative Conf	0
LocalStackErr	0
MissedViewListScan	31730
NumLiveListAppearances	1

8/16/00 11:36:08 AM F_BUS_/I01/C05/P02 MV3244_0107 Being added at device address30

Commissioning

- Devices and variables identified by tag
- Status indicates measurement health
- Instrument automatically inform the control system when is being serviced
- Reading in Engineering units practically eliminates the need for instrument ranging
- Communication statistics at device level indicates installation issues
- Easy to use troubleshooting tools

Increased Plant Availability

- Reduced turnaround time
 - Condition monitoring, diagnostics, standard function blocks, device recognition and auto configuration allows reduction of up to 15% of turnaround time.
 - Plant Web also reduces turnaround effort by making available up-to-date instrument information, reducing the number of instruments or valves that require removing from the line, and helping predict and pinpoint equipment problems, wear, and corrosion.

Example –Small Project

Options to Address Project Requirements

- Single Loop controllers w/PC Interface**
- PLC w/Remote I/O and PC Interface**
- DCS w/ Remote I/O**
- DCS with Fieldbus Technology**

Single Loop Controllers w/PC

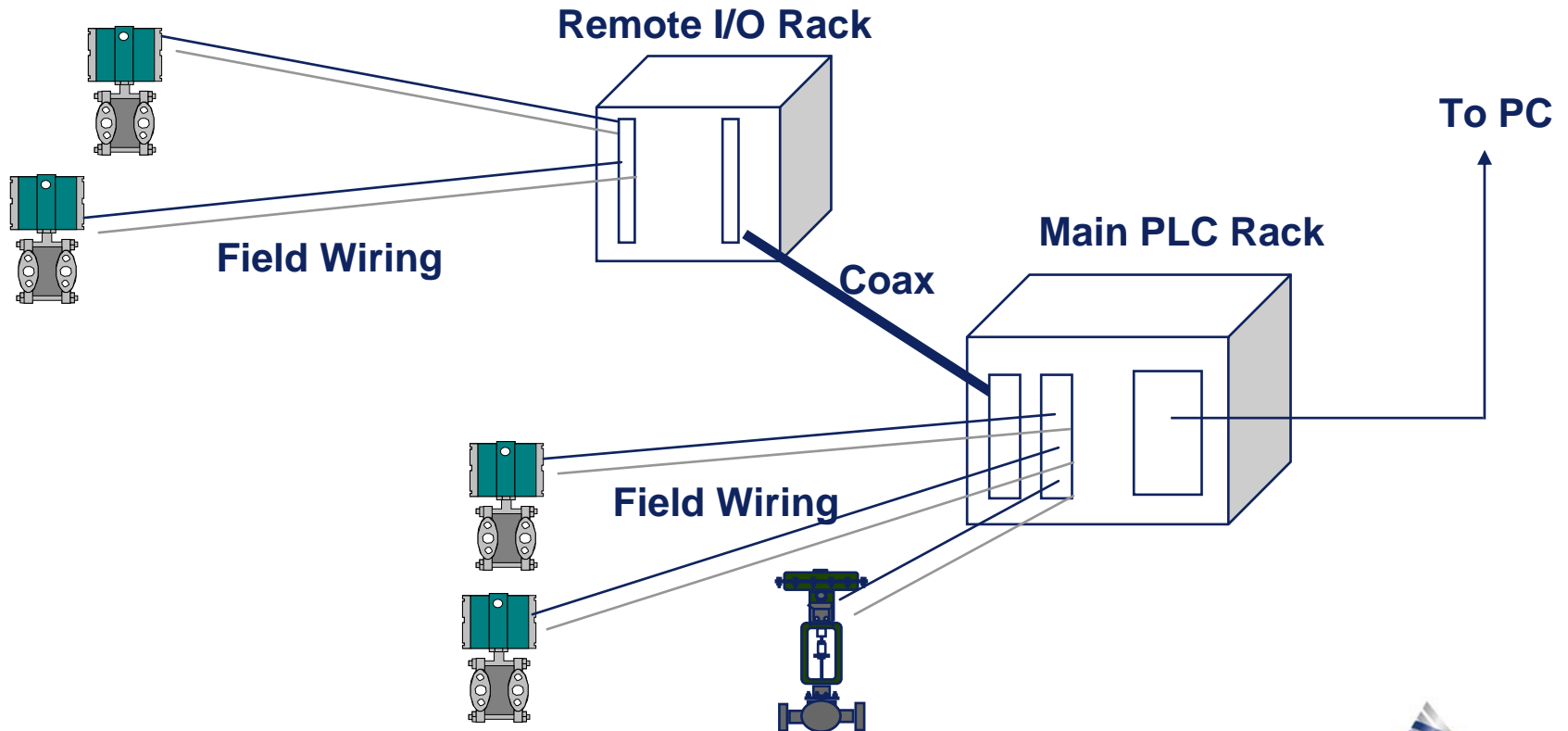
- + Are widely available and considered Field Proven**
- + SLC's are used in the plant, so no training issue**
- Training Required for user Interface**
- Interface to SLC's may require a Custom Driver**
- SLC's cannot interface w/ Smart Xmittrs**
- Each type smart Xmittr requires handheld \$\$**
- Remote Diagnostics may not be possible**
- SLC's will require a Control Panel and Shelter \$\$**
- Wiring required from field to Shelter \$\$**
- SLC's will have I/O constraints**

PLC w/RI/O and PC Interface

- + Field Proven**
- + Are also used in Plant , Training not a Problem**
- + Reduced wiring required from field to Shelter \$\$**
- Training Required for user interface**
- Interface to PLC's may require a Custom Driver**
- PLC's cannot interface w/ Smart Xmittrs**
- Each smart Xmittr will require a separate HH \$\$**
- Remote Diagnostics may not be possible**
- PLC's will require an Enclosure \$\$**
- Control App requires hybrid implementation**
- Control App must be maintained by Plant Staff**

Fieldbus vs. PLC w/RI/O , PC

Typical Field to PLC I/O

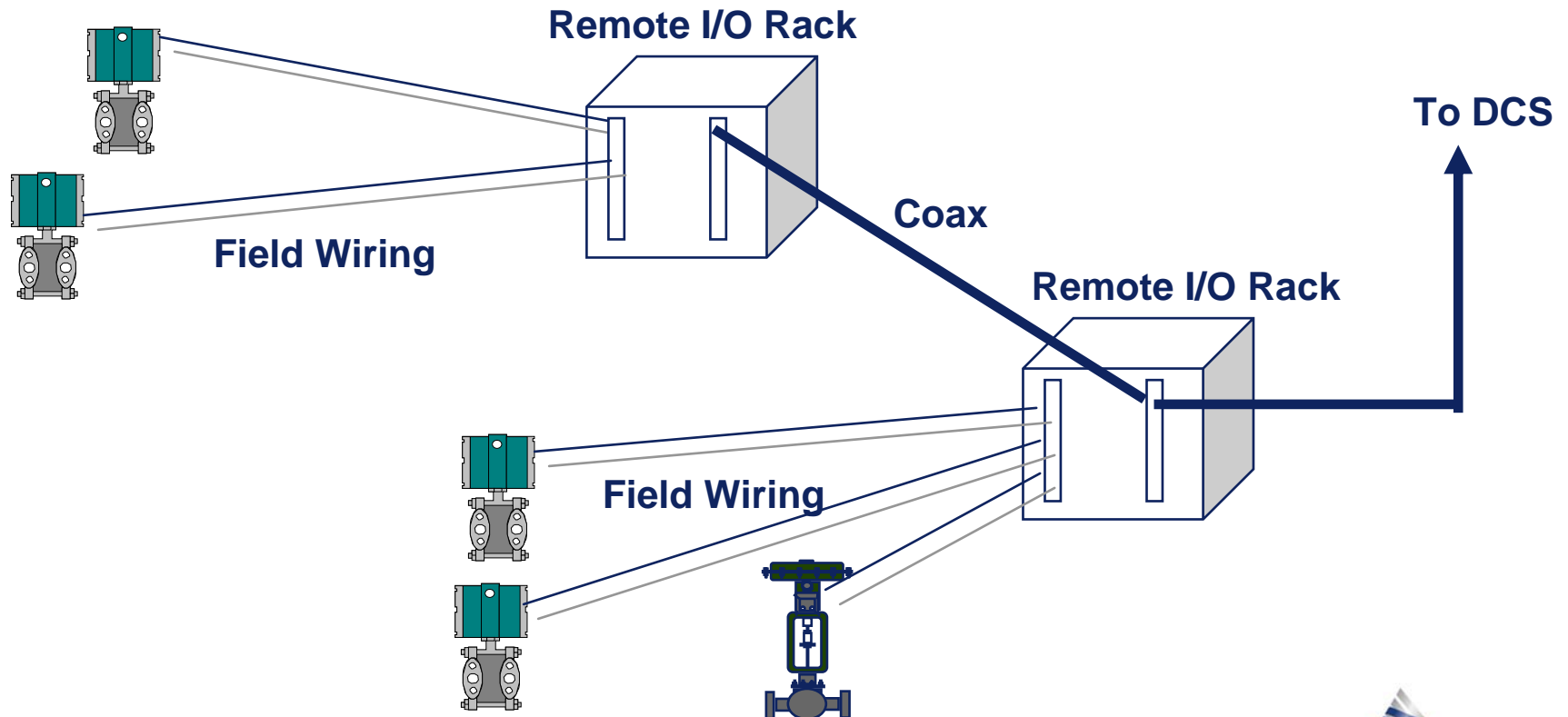


DCS w/ Remote I/O

- + Field Proven**
- + Are also used in Plant, Training not a Problem**
- + Control App requires Powerful Function Blocks**
- + Control App must be maintained by Plant Staff**
- DCS cannot interface w/ all Smart Xmittrs**
- Other smart Xmittr will require a separate HH \$\$**
- Remote Diagnose not possible on all Xmittrs**
- Remote I/O will require an Enclosure \$\$**
- Wiring required from field to Enclosures \$\$**
- DCS requires rack space, reconfiguration \$\$**

DCS w/ Remote I/O

Typical Field to DCS I/O

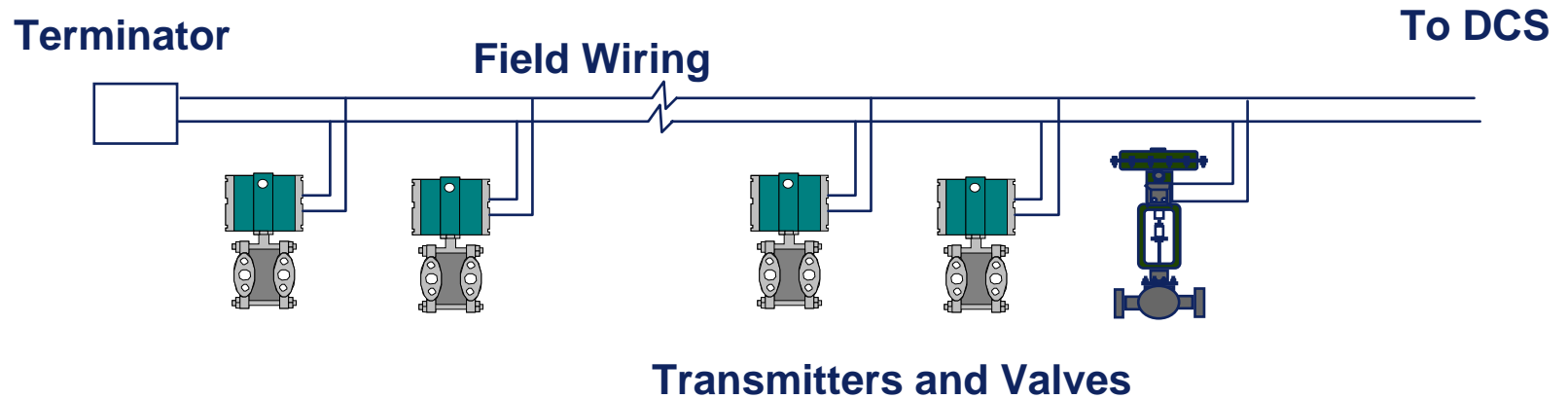


DCS with Fieldbus Technology



















- + DCS can interface w/ all Xmittrs, valves and motors**
- + No separate handheld required \$\$**
- + Remote Diagnostics for all Xmittrs, valves and motors.**
- + No Remote I/O Enclosures \$\$**
- + No Wiring required from field to Enclosures \$\$**
- + Control App requires Powerful Function Blocks**
- + Control App must be maintained by Plant Staff**
- + Field Proven**

Fieldbus Interface to DCS

Fieldbus Loop(s) Typical



Evaluation Summary For This Project

	Compliance w/Spec			Cost		
	Intel Inst.	Remote Diagns.	Reports	Install.	Hwd	Eng.
PLC w/MMI						
DCS w/Fieldbus						
DCS w/RI/O						

DCS with Fieldbus Technology

	Fieldbus Foundation	Profibus	FIP	CAN	LON
Performance	●	◐	◐	◐	○
Security	●	○	○	○	○
Phy Installation	●	○	○	○	◐
Std Powerful Control, Mon, Diagnostics	●	○	○	○	◑
Open	●	◑	◑	●	◑
Interoperability	●	○	○	○	○

Summary – Benefits of Fieldbus Foundation

- **Supported by Major Vendors**
- **Both Continuous and Discrete Requirements Are Met By FF Function Block Set Capability**
- **Field Changes Can Be Easily Accommodated**
- **Setup and Diagnostics Can Be Made Easy**
- **Installed Cost Significantly Less Other Technologies**

