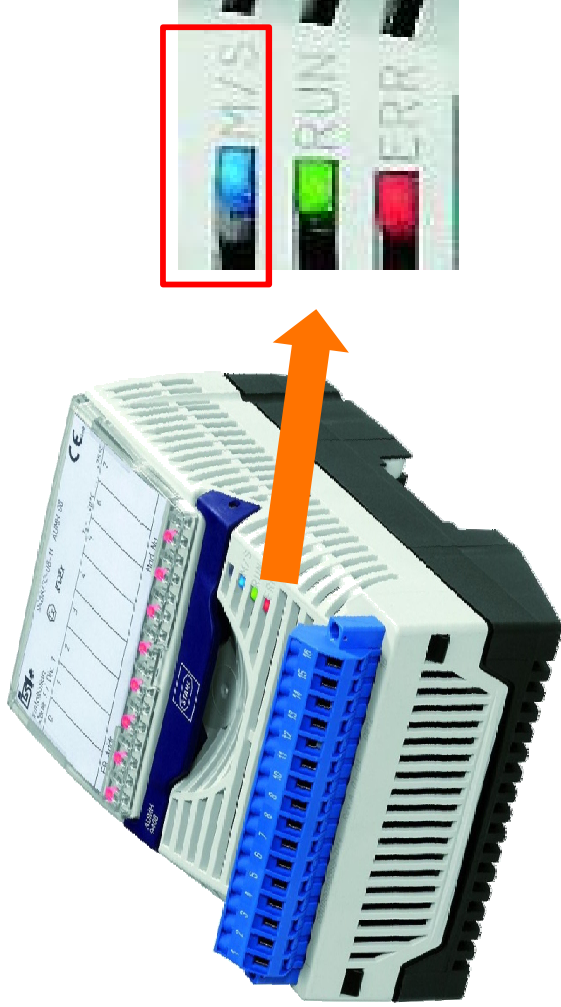




Remote I/O & NE107

New diagnostics



- > **"ERR"**: e.g. module is damaged, no function any more
– replacement required immediately!
- > **"M/S"** "Out of Specification": e.g. module operates at too high ambient temperature – external action required (e.g. activate cooling)!
- > **"M/S"** "Maintenance Required": e.g. module potentially damaged (e.g. because of too high ambient temp.) or end of service life reached – replacement recommended



flash





When does failures happen... ...and no spare on stock





Remote I/O & NE107

Pro-active Maintenance!



> **Integrated wear-out detection – better process availability – less stress!**

- Modules measure continuously all relevant operating parameters: ambient temp., temp. changes, load of module, no. of switch-on situations etc.
- The nominal service life time (here: 15 years) is reduced accordingly.
- before the end of service life is reached, a „maintenance required“ message is produced in time (here 12 months before the calculated end of service life) – opportunity based maintenance is possible now!



Asset Management and NE107

via e.g. DTM technology



9475/3x-08-xx
IS1 IOM (Slot 2)
IS1 CPM



Signale/Diagnosen
Parameter
I&M
Kommentar
Anschlüsse
Info

Signale / Diagnosen IOM

Direct Mode aktiv

Diagnosen

| Icon | Name | Wert |
|------|-------------------------|--|
| | Moduldiagnose | Redundante Railverbindung zu IOM gestört |
| | Temperaturüberwachung | OK |
| | Steckplatz Adressierung | OK |
| | Betriebsüberwachung | OK |
| | Ausgänge | Hardwareabschaltung !! |

Signale

| Nr. | Tag | Messwert(int) | Messwert(phys) | Einheit | 0% | 50% | 100% | Diagnosen |
|-----|-----------|---------------|----------------|---------|-----------------------|-----|-----------------------|-----------|
| 0 | DO_0 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 1 | DO_1 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 2 | DO_2 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 3 | DO_3 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 4 | DO_4 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 5 | DO_5 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 6 | DO_6 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 7 | DO_7 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 8 | Status_S0 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 9 | Status_S1 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 10 | Status_S2 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 11 | Status_S3 | ?-? | 0,0000 | | <input type="radio"/> | | <input type="radio"/> | |
| 12 | Status_S4 | n | n | n | | | | n |



NE107 via Fieldbus

PROFIBUS DP?



| System | Status |
|--|---|
| DCS and PLC | partly implemented |
| Asset-Management Systems | mostly implemented by FDT/DTM and EDD |
| Fieldbusses PROFIBUS PA FF H1 ↑ PROFIBUS DP HART PROFINET FF HSE / F-ROM other Ethernet protocols | OK (Profile 3.02) OK (FF-912) no planned OK OK no / vendor specific |
| Field devices | increasing *) |
| Remote I/O Systems | NEW |





New: Status bit for process signals

used with PROFIBUS DP



> Status Bit for process value:

| Status Bit | Signal |
|------------|---|
| 0 | not valid  |
| 1 | OK  |

> NEW:

Each signal comes with a status
(similar to PROFIBUS PA, FF H1 etc.)

> But:

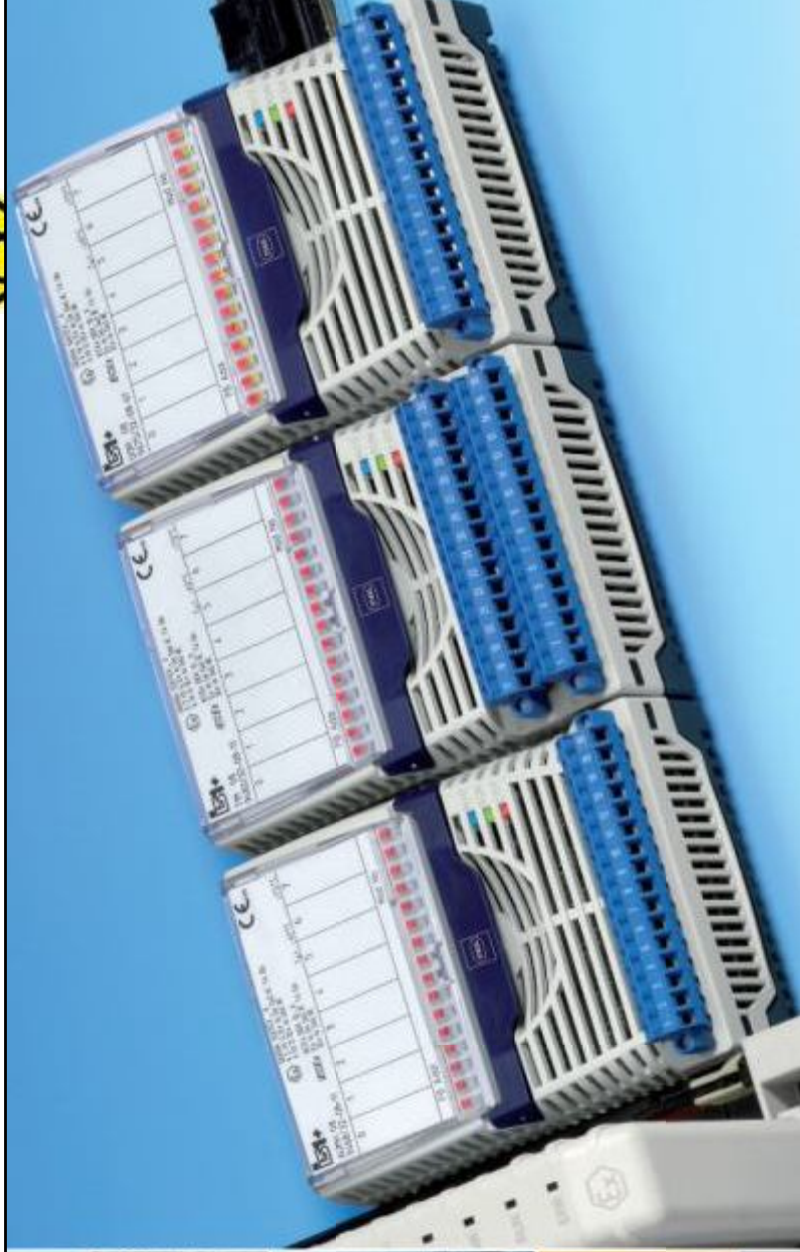
Only limited good/bad information
(1 Bit – PROFINET uses 1 Byte!)

| Daten | Byte | Betriebsart | | | | | | |
|--------|-------|-------------|-------|---------|---------|---------|---------|-------|
| | | 8AI | 8AO | 6AI+2AO | 8AI/8AO | 8AI+4HV | 8AO+4HV | 8PA |
| Input | 1 | A0 | S0-S7 | A0 | A0 | A0 | S0-S7 | 0 |
| | 2 | A1 | A0 | A1 | A1 | A1 | A0 | 0 |
| | 3 | A2 | A1 | A2 | A2 | A2 | A1 | HV-P1 |
| | 4 | A3 | A2 | A3 | A3 | A3 | A2 | |
| | 5 | A4 | A3 | A4 | A4 | A4 | A3 | HV-P2 |
| | 6 | A5 | A4 | A5 | A5 | A5 | A4 | |
| | 7 | A6 | A5 | A6 | A6 | A6 | A5 | HV-P3 |
| | 8 | A7 | A6 | A7 | A7 | A7 | A6 | |
| | 9 | A0 | S0-S7 | A0 | A0 | A0 | S0-S7 | 0 |
| | 10 | A1 | A0 | A1 | A1 | A1 | A0 | 0 |
| | 11 | A2 | A1 | A2 | A2 | A2 | A1 | HV-P1 |
| | 12 | A3 | A2 | A3 | A3 | A3 | A2 | |
| | 13 | A4 | A3 | A4 | A4 | A4 | A3 | HV-P2 |
| | 14 | A5 | A4 | A5 | A5 | A5 | A4 | |
| | 15 | A6 | A5 | A6 | A6 | A6 | A5 | HV-P3 |
| | 16 | A7 | A6 | A7 | A7 | A7 | A6 | |
| | 17 | A0 | S0-S7 | A0 | A0 | A0 | S0-S7 | 0 |
| | 18 | A1 | A0 | A1 | A1 | A1 | A0 | 0 |
| 19-22 | | | | | | | HV-P1 | |
| 23-26 | | | | | | | HV-P2 | |
| 27-30 | | | | | | | HV-P3 | |
| 31-34 | | | | | | | HV-P4 | |
| 35-38 | | | | | | | | |
| 39-42 | | | | | | | | |
| 43-46 | | | | | | | | |
| 47-50 | | | | | | | | |
| Output | 1-2 | A00 | A00 | A06 | A00 | A00 | A00 | A00 |
| | 3-4 | A01 | A01 | A07 | A01 | A01 | A01 | A01 |
| | 5-6 | A02 | A02 | | A02 | A02 | A02 | A02 |
| | 7-8 | A03 | A03 | | A03 | A03 | A03 | A03 |
| | 9-10 | A04 | A04 | | A04 | A04 | A04 | A04 |
| | 11-12 | A05 | A05 | | A05 | A05 | A05 | A05 |
| | 13-14 | A06 | A06 | | A06 | A06 | A06 | A06 |
| | 15-16 | A07 | A07 | | A07 | A07 | A07 | A07 |



Remote I/O with NE107 Diagnostics

Innovation & added value!



**Conclusion and end:
When buying a new remote I/O system – make sure it supports NE107!**



 Thankyou

The word "Thankyou" is written in a blue, sans-serif font. To its left is a stylized logo consisting of two overlapping chevron shapes: a grey one on top and an orange one on the bottom.

Setting the Standard for Automation™



ISA DELHI SECTION
Asia Pacific District

Asset Management System Interface with Field devices

Unnikrishnan.R

Manager – Technical Support

Process Automation Division

Pepperl + Fuchs

Standards
Certification
Education & Training
Publishing
Conferences & Exhibits

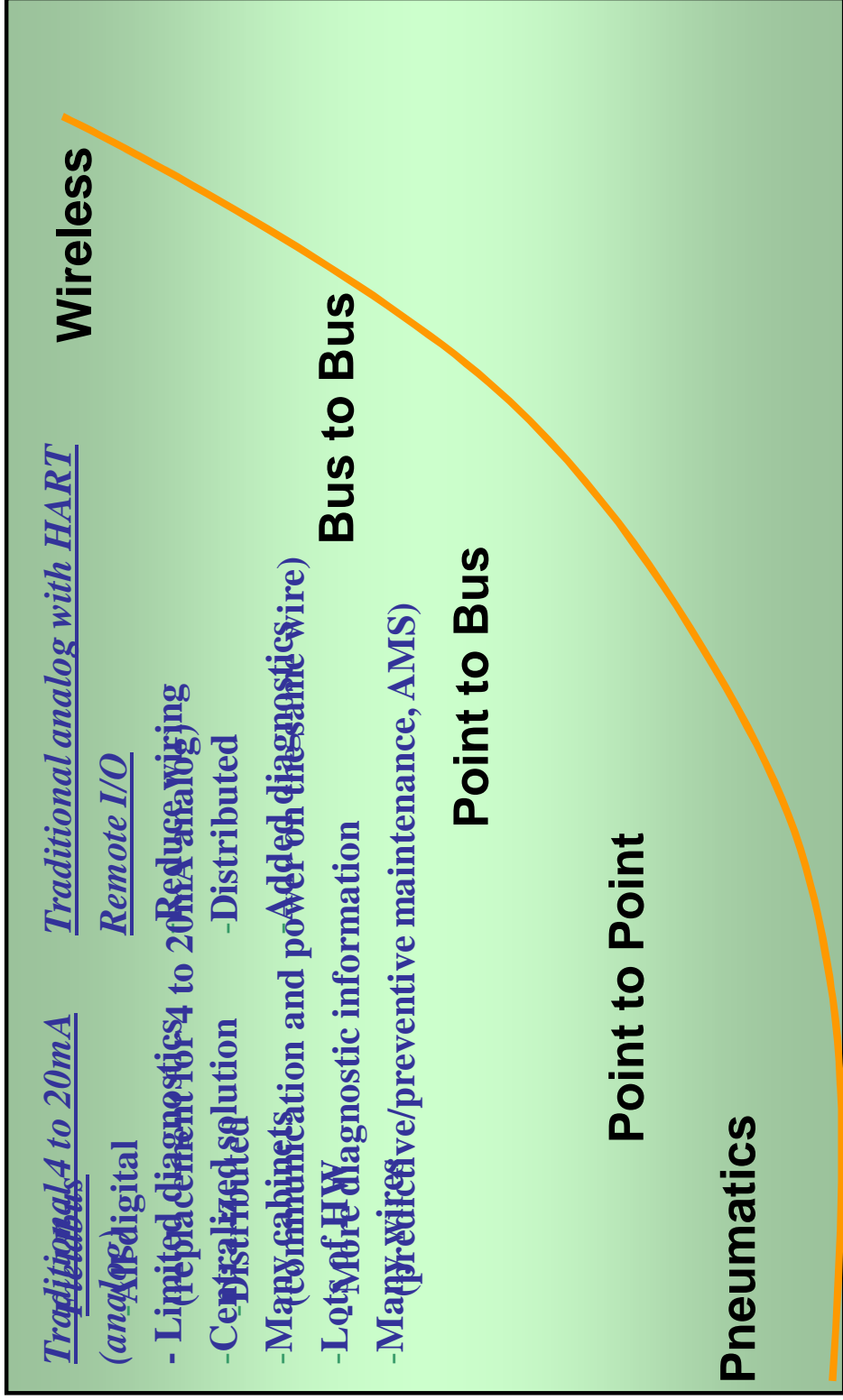


Agenda

- **Introduction**
- **Control System History**
- **Asset Management System**
- **Asset Management in HART Technology**
- **Asset Management in Fieldbus Technology**



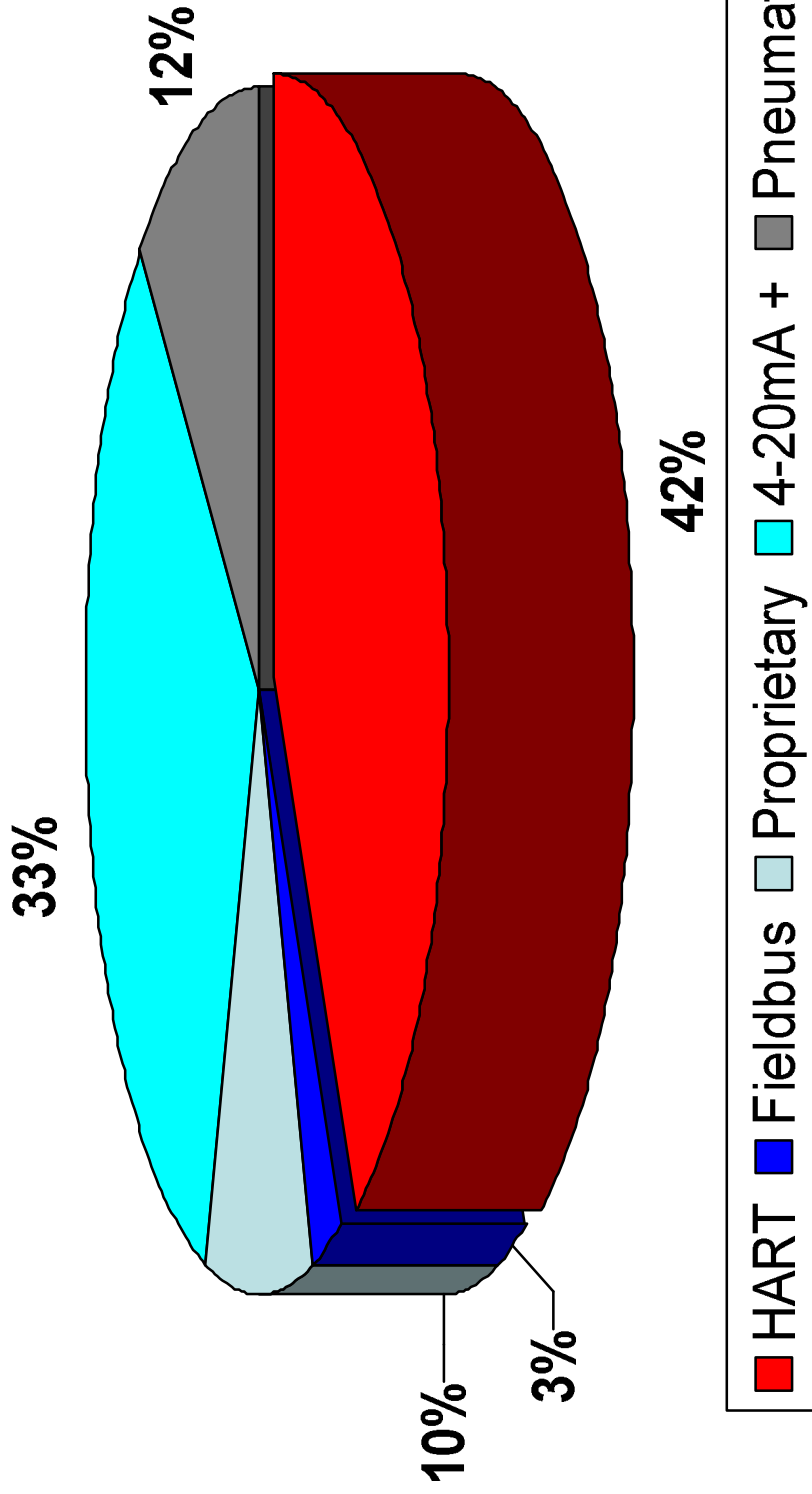
Control System History



gd onhceT d bai avA

Worldwide Installations

~ 56 Million Devices at Y.E. 2006



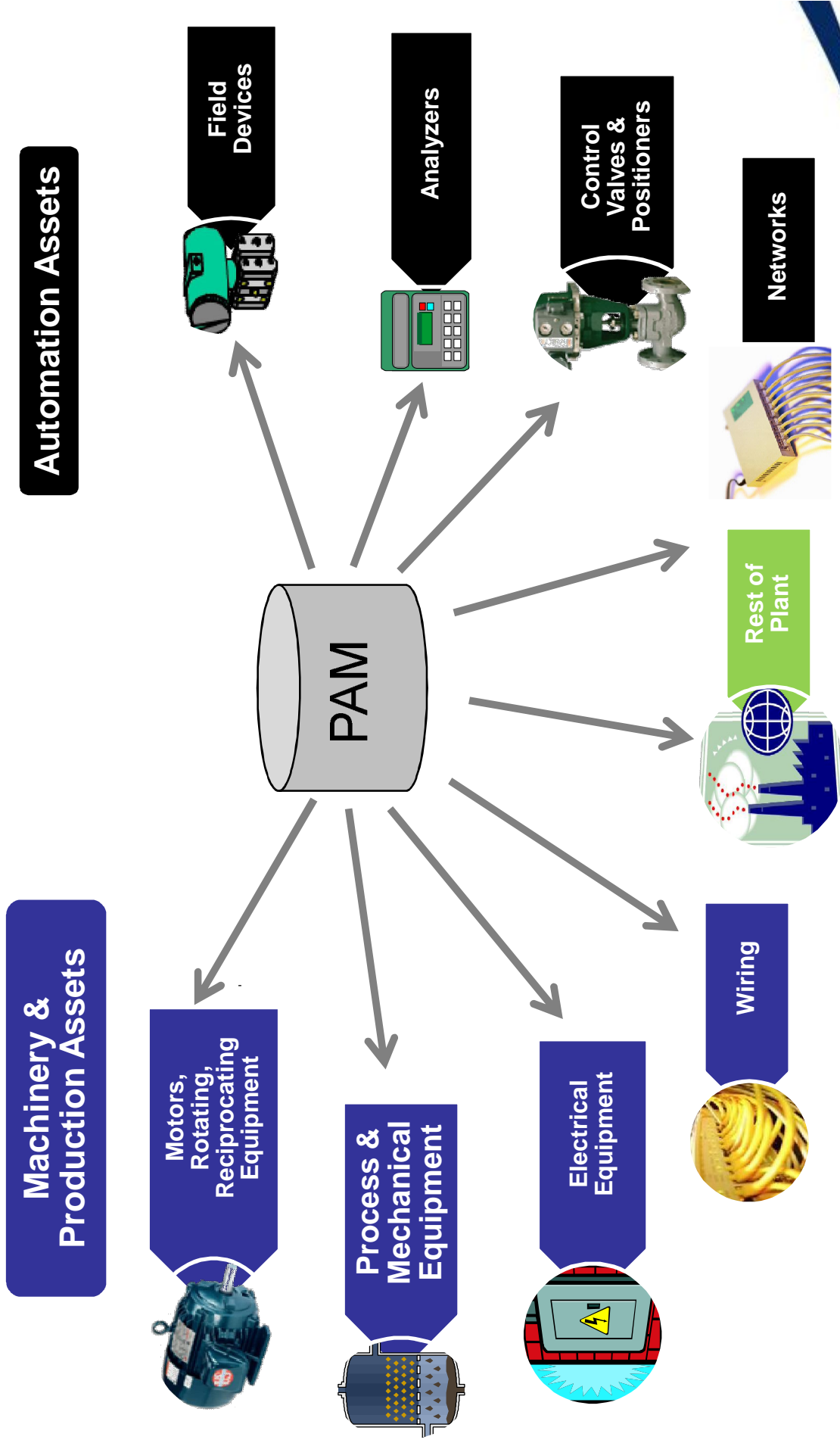


ASSET MANAGEMENT SYSTEM

1. Asset management is the system of monitoring and maintaining things of value to an entity or group.
2. It is a systematic process of operating, maintaining, upgrading, and disposing of assets cost-effectively.
3. Asset Management System helps in predictive analysis and using the extracted data to predict future trends and behavior patterns.



PAM Manages Performance, Availability, and Reliability of Plant Assets



Source: ARC Advisory Group – Courtesy Paul Sereiko

Example Suppliers of PAM Systems

- ABB
- Bently Nevada
- Bruel Kjaer Vibro
- Emerson Process Management
- FLIR Systems
- Honeywell
- Invensys
- Rockwell Automation
- SKF Condition Monitoring
- Yokogawa
-



Bently Nevada™ Asset Condition Monitoring



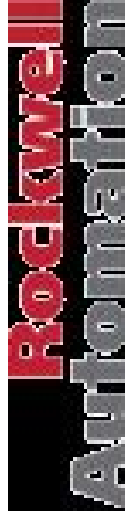
Bruel & Kjaer Vibro



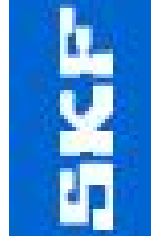
Honeywell



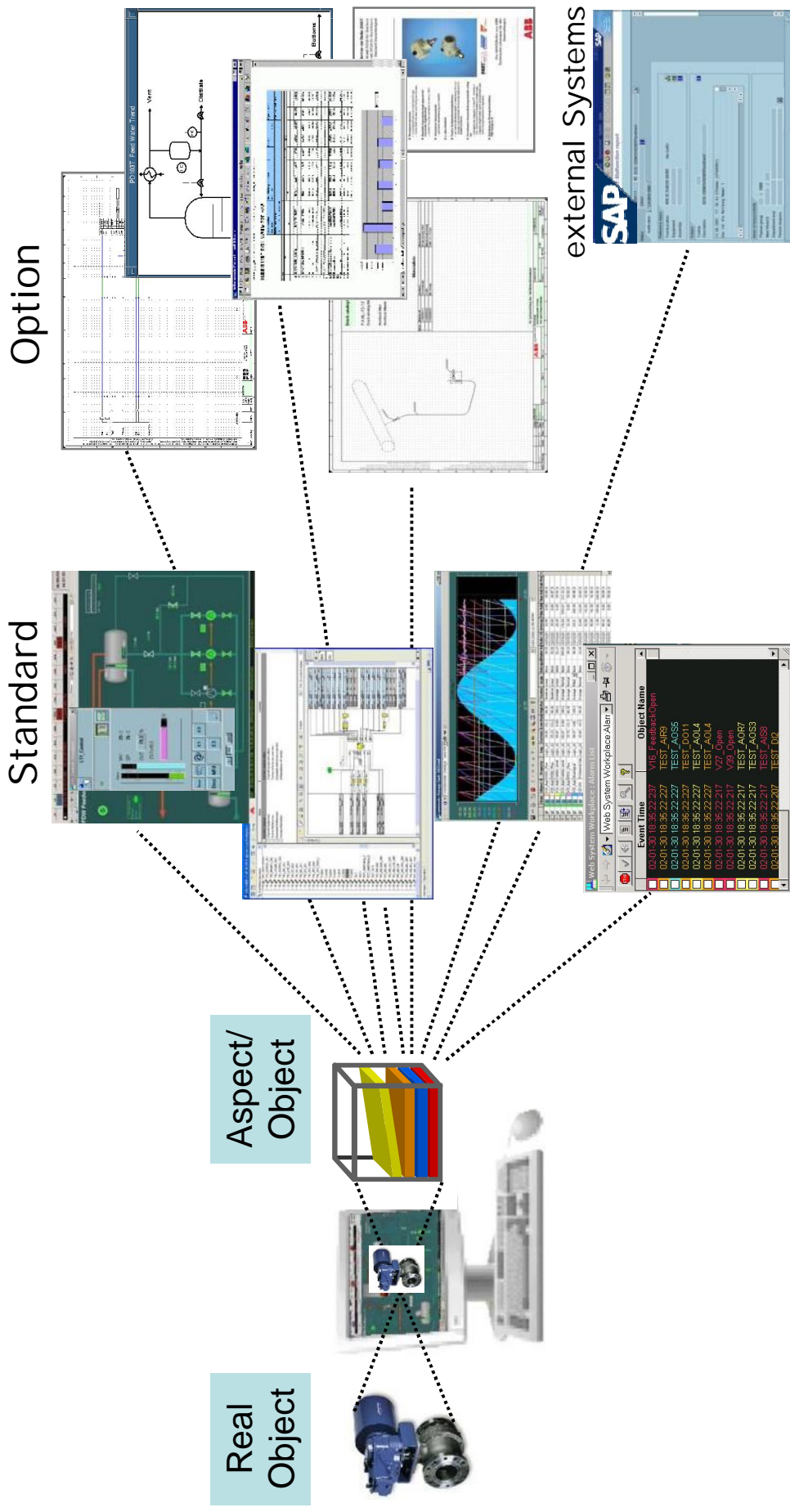
THE WORLD LEADER IN INFRARED TECHNOLOGY



YOKOGAWA 



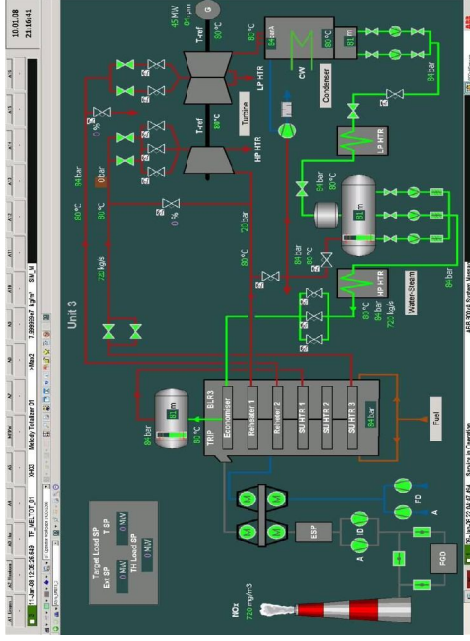
Integration of information



Roll based, optimized workplaces



Operation

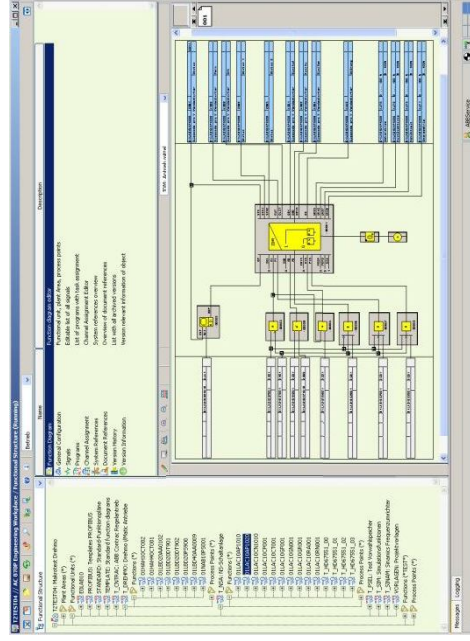


The screenshot shows the 'e-on' software interface for 'Prozessüberwachung KW Schönbach-Block C'. It features a 'Tabelle / Gesamtprozess' overview with several data panels:

- Übersicht:** Shows overall process status with indicators for 'Completierung', 'Anlagen', 'Ausstellen', 'Störsignale', and 'Prozesssignale'.
- Prozessgütekennwerte:** A table of key performance indicators for various process parameters.
- Bedienstatus:** A table showing the operational status of different components.
- Systemparameter:** Lists system parameters like 'T Sp/VA-HD/AV' and 'T Sp/VA-LOD'.
- Dampfparameter:** Lists steam parameters such as 'P Fischelempf v Turbine' and 'T Fischelempf v Turbine'.
- Kondensator:** Shows condenser parameters like 'P abs. Kondensator'.
- Wetterdaten:** Provides weather information including 'Außentemperatur' and 'Relative Luftfeuchtigkeit'.

Plant optimization

Service



The screenshot shows the 'Diagnosis and maintenance management' screen in the ABB software. It features a list of active alarms and their conditions:

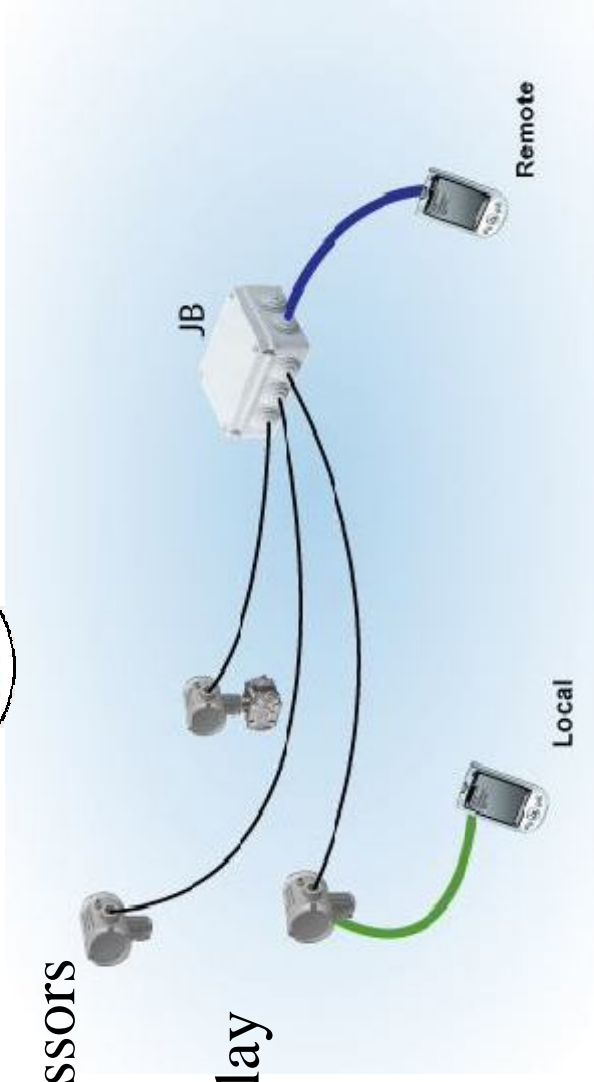
- Alarm List:** A table with columns for 'Active Alarm', 'Source Name', and 'Condition'. It lists various alarms such as 'High Pressure Heater Overheat' and 'Turbine Vibration'.
- Alarm Details:** A panel showing details for a selected alarm, including its 'Source Name' and 'Condition'.
- Alarm Management:** A panel for managing alarms, including options to 'Acknowledge', 'Reset', and 'Clear'.

Diagnosis and maintenance management

HART = Highway Addressable Remote Transducer



- Allows local and remote access to instrument configuration
- Instruments have microprocessors
 - More sophisticated
 - May not have a local display



HART is a fully open and de-facto communication protocol for process industries
 Almost 70% of SMART field devices are **HART** capable

HART data is available anywhere on the 4-20mA

HART Benefits

| Benefits | HART Instruments |
|-----------------------------------|------------------|
| Accuracy and stability | ✓ |
| Reliability | ✓ |
| Multivariable | ✓ |
| Computations | ✓ |
| Diagnostics | ✓ |
| Multiple sensor inputs | ✓ |
| Ease of commissioning | ✓ |
| Tag ID | ✓ |
| Remote configuration | ✓ |
| Loop checks | ✓ |
| Adjustable operational parameters | ✓ |
| Access to historical data | ✓ |
| Multidrop networking | ✓ |
| Access by multiple host devices | ✓ |
| Extended communication distances | ✓ |
| Field-based control | ✓ |
| Interoperability | ✓ |

HART Load Requirement

HART protocol has a min. sensitivity of 200 mV p-p.
This also means that for 1 mA p-p
(+0.5 mA to -0.5 mA) FSK current modulation,
min. load is 200 Ω according to Ohm's Law.

HART protocol specified load requirement for the loop

230 Ω ... 1,100 Ω

HART Network: Point-to-Point

AI device



PLC/DCS



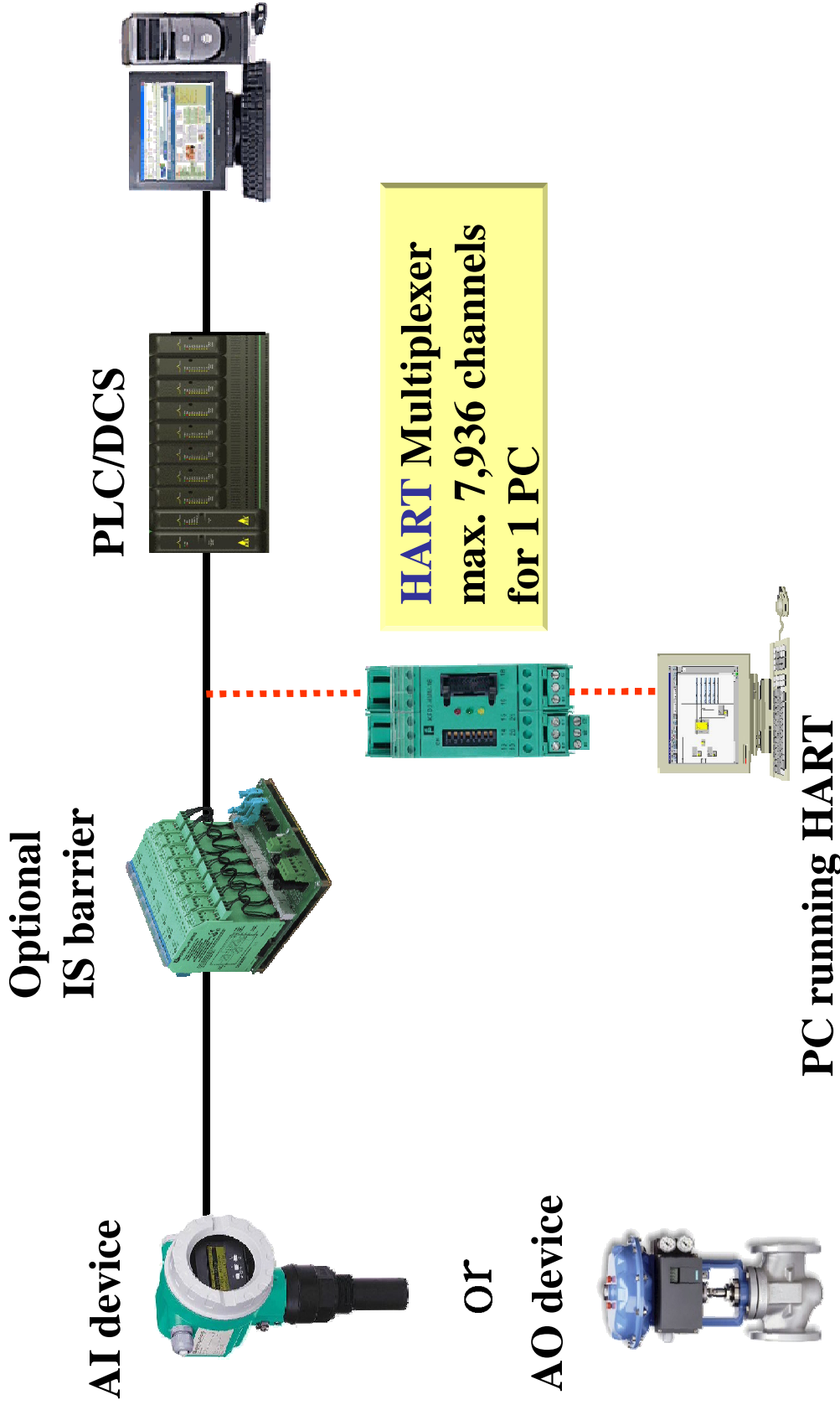
or

AO device



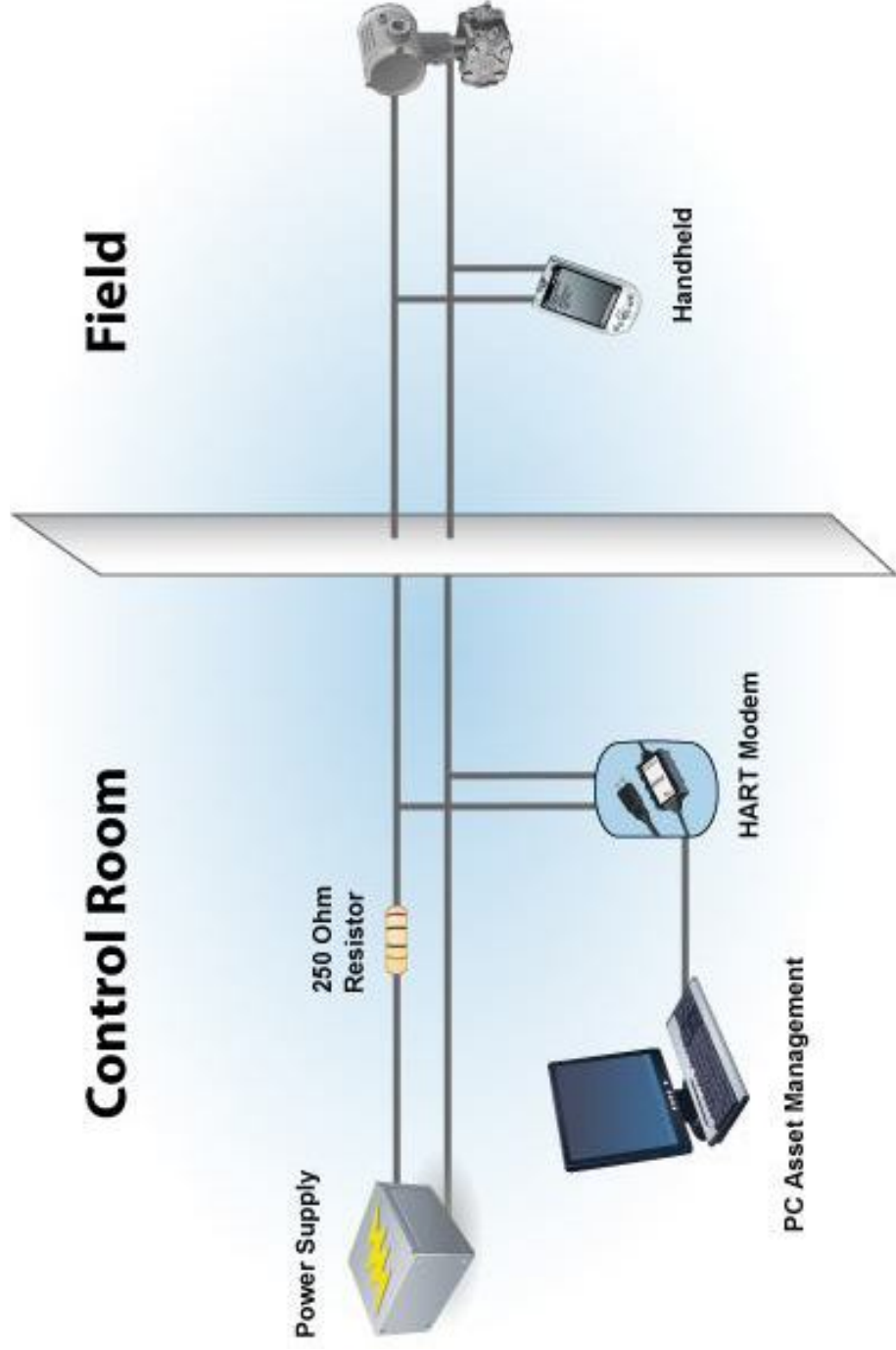
Point-to-point network
Hybrid: 4/20 mA + HART
Polling address = 0

HART Network: HART Multiplexer



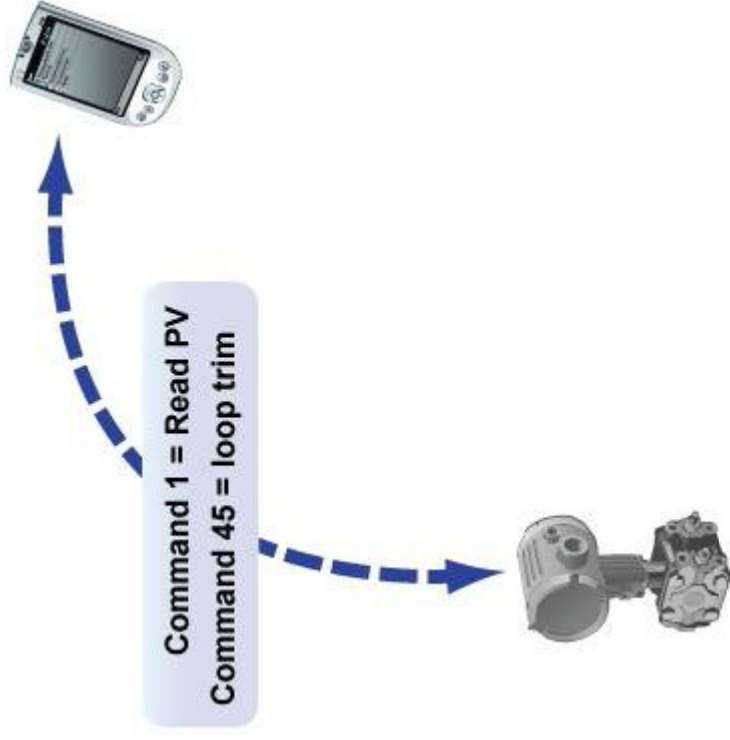
**PC running HART
Asset Management maintenance software**

Understanding HART Electrical Connection



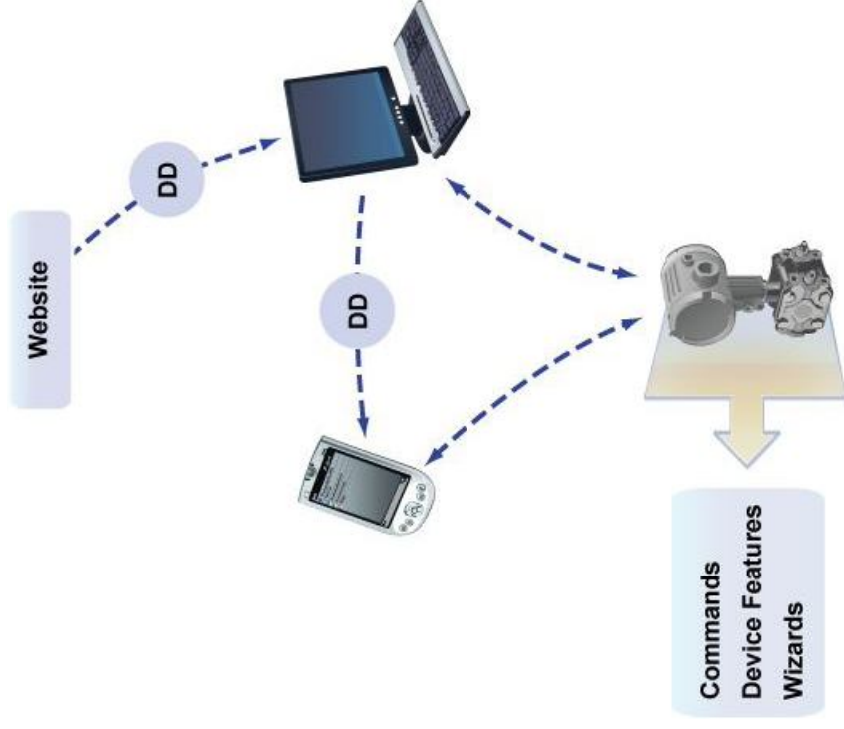
Understanding HART Commands

- There are three classes of HART commands
 - Universal
 - PV – TAG – Diagnostic
 - Common Practice
 - Calibration – PV range
 - Device Specific
 - Linearization tables – Technology specific



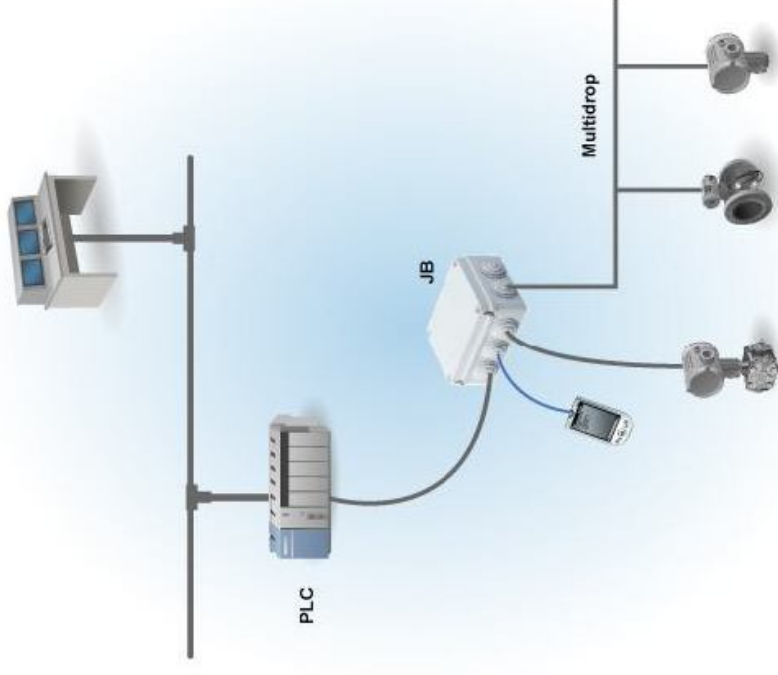
Understanding HART Device Description (DD)

- All the information needed by the host to fully communicate with a field device.
- Handheld host
 - Simple instruments
 - IS version for hazardous areas
- PC-based host
 - Asset management
 - Condition monitoring



Understanding HART Communication Modes

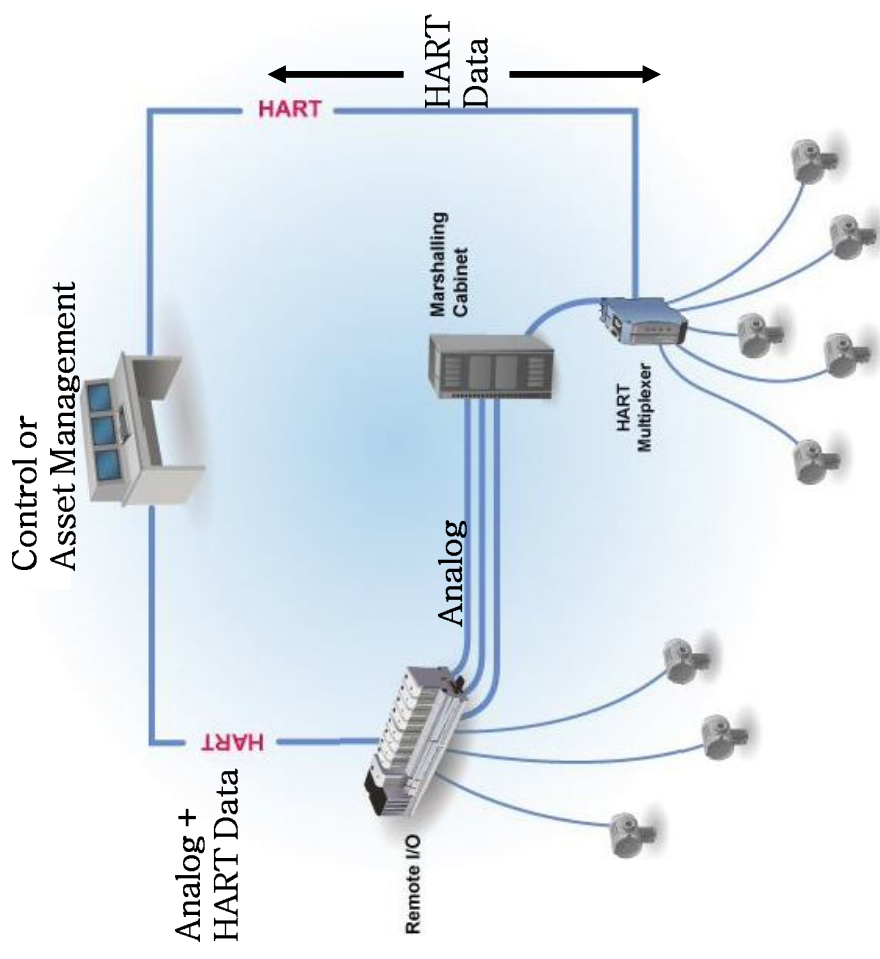
- **Master-Slave Mode:**
 - Communication is initiated by a master device
 - Point-to-point or multi-drop
- **Primary Master:**
 - Control room (system)
- **Secondary Master:**
 - Handheld
- **Burst Mode:**
 - Master instructs the slave device to continuously broadcast a standard HART reply message (e.g. PV) until instructed to stop.



Understanding HART Multiplexer/Pass through Operation



- HART multiplexers
 - Monitor PVs
 - Typically a PC (SCADA) acts as the host
 - Can be added as retrofit
- Remote I/O can pass HART commands to the host
 - Connect to I/O as though it were a modem
 - Read/write all data



From



- Wireless is a new enhancement to the HART Technology
- Idea
 - Keep the well known and proven protocol
 - Change the physical layer from the modulated sinus on the 4 to 20 mA loop to radios and create the first wireless standard for Process Automation