WirelessHART®
Siemens
— Innovative Technology and Products for Process Industry

Customer’s name
Place and Time
Presenter

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Agenda

- Wireless Technology — At a glance
  - WirelessHART Product Summary
  - Initial Background and Technology
  - Product Features & Customer Benefits
  - Typical Applications
  - Use Cases and Industries
  - Summary
Customers current situation

Customers continuous challenges in face to changing market and regulation situations:

- **TCO reduction** and **productivity improvements** are the new keys in comprehensive business situation; competition pressure, fast changing product trend, environmental regulations …
- Reduce commissioning and maintenance time and cost are the main issues to reduce customer’s TCO (*commissioning and maintenance costs > 3 x HW costs –by ARC*)
- Increase productivity & decrease plant down time by **increasing plant transparency**, e.g. reduce black measurement points, asset management etc.
Q: Why Wireless in your plant?
A: Wireless helps to realize your challenges!

- Do your plant running pretty well since many years, but …
  - Legacy DCS does not support maintenance information, loosing valuable information
  - Information is only available per manual site checking, high cost & non-timely

- You do enjoy the benefits of a modern automation system, but …
  - There are necessary measurement points not implemented due to high cost or harsh environment issues
  - Possible measures for process optimization e.g. temporarily measurements are always postponed due to high installation costs and efforts

In both cases: Wireless helps!
Nothing more to lose, except wires!
Wireless technology today for process automation
Siemens Industrial Wireless solution

WirelessHART closes gap in wireless product portfolio
Remote wireless communication
Secure for widely distributed process station

Security and wireless technology no contradiction
### Industrial Wireless LAN
**Reliable, Ruggedness, Secure**

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Ruggedness</th>
<th>Data security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle data communication (deterministic)</td>
<td>Metal enclosure with high degree of protection</td>
<td>Simple configuration</td>
</tr>
<tr>
<td>Linking important stations (e.g. alarm messages) to critical data</td>
<td>Use in humid and dusty areas</td>
<td>Quick start-up</td>
</tr>
<tr>
<td>Monitoring the radio connection</td>
<td>Protected against vibration and shock</td>
<td>Access control (authentication)</td>
</tr>
<tr>
<td>System detects if station is no longer accessible in the radio field</td>
<td>Low costs for maintenance and service</td>
<td>Selection of access authorizations</td>
</tr>
<tr>
<td>Controlled radio field (RCoax)</td>
<td>Extended temperature range</td>
<td></td>
</tr>
<tr>
<td>Reliable illumination in areas with a high level of interference emission</td>
<td>Suitable for indoor and outdoor use</td>
<td></td>
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</tbody>
</table>

**Complete and proven portfolio is ready to go**

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Wireless Technology – At a glance

WirelessHART Product Summary

Initial Background and Technology

Product Features & Customer Benefits

Typical Applications

Use Cases and Industries

Summary
WirelessHART product family

- **SITRANS TF280** WirelessHART Temperature Transmitter
- **SITRANS P280** WirelessHART Pressure Transmitter
- **SITRANS AW200** WirelessHART Adapter

- **Function Block Library** Integration in PCS 7 / S7 (Product owner: I IS)
- **IE/WSN-PA LINK** WirelessHART Gateway
- **SITRANS MDS** Maintenance Diagnostic Station
# Product summary

## WirelessHART transmitters
**SITRANS TF280, P280**
- Battery powered, Radio integrated WirelessHART temperature and pressure transmitter
- High reliability, compact design, ultra-low power consumption, practical LUI and operating buttons etc.

## WirelessHART Adapter
**SITRANS AW200**
- Simply connect to existing 4-20mA/HART devices, enables measurement value and intelligent diagnostic data transmitted wirelessly
- Support up to 4 HART devices in multi drop mode
- Support burst mode, event notification, standard EDD etc.

## WirelessHART Gateway
**IE/WSN-PA LINK**
- Connects a WirelessHART network to a plant host application, e.g. DCS, PLC etc.
- Build-in Network Manager manages network automatically (setup, security, availability, …)
- Ease of use configuration with standard internet browsers
Initial Background and Technology
Initial Background and Technology

Wireless answers …

Saving cable cost

- No cable cost (≈ 20$/Meter - by ARC survey)
- No cable wear, No constant maintenance cost

Easy & Flexible installation

- Flexible place & replace the devices
- Possible to mount in environmentally difficult location
- Measurement points at movable locations

Maintenance friendly

- Reduce time and work of installation, commissioning, engineering
- Provide valuable diagnostic information for efficient predictive maintenance
Initial Background and Technology

Why WirelessHART for process industry?

HART is the ideal basis for a wireless instrument network
- Proven in use protocol for process industry
- Approx. 30 million installed HART devices

WirelessHART answers industrial requirement
- Reliable, Secure, Simple
- Built on standards (IEC61158, 61804-3, 61591e-1, IEEE802.15.4)

Low power consumption
- Designed specifically for low power operation (IEEE 802.15.4)

Protect customers investments
- Same Tools, Instruments, Know How as HART
- Interoperability between vendors devices
The first open wireless field communication standard, released on Sept. 2007

An evolutionary extension to the proven HART technology

Backing of major vendors, ABB, E+H, Emerson, P+F, Siemens, etc.
Initial Background and Technology

WirelessHART Network overview and components

- **Instruments**, T, P, L, …
  - Radio built in device
- **Adapter**
  - Add wireless capability to existing HART device
- **Repeater**
  - Extend the network
- **Handheld Terminal**
  - Join instruments to network
  - Reading PV or diagnostics
- **Gateway**
  - Builds network and provides Host connection
  - Built-in Network and Security manager
Initial Background and Technology

WirelessHART Reliability is a key feature

WirelessHART mesh topology with self-organizing and self-healing characteristics

DSSS (Direct Sequence Spread Spectrum, coding diversity) technology and adjustable transmission power (power diversity) provide reliable communication

Adjusts communication paths (pre-scheduled time window) for optimal performance, which enables reliable, power-efficient, and scalable communication

“Hops” across channels to avoid radio interference, coexistence with other wireless networks with black listing function
Initial Background and Technology

WirelessHART - Robust security and data privacy

Encryption
128-bit AES encryption

Verification
Message Integrity Codes

Authentication
Device network Management

Key Management
Rotating keys

Robust Operation
Channel hopping Mesh infrastructure

Security is not an option, it is built in!
Initial Background and Technology

WirelessHART - Smart Power Management

- **Low Power consumption**
  - Sitrans TF280 / P280: 1mW with 1 measurement/min

- **Selectable power options**
  - Battery powered
  - Line powered
  - Loop powered
  - Solar powered *(future implementation)*
  - Energy scavenging *(future implementation)*
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Product Features & Customer Benefits

WirelessHART Temperature and Pressure transmitter

SITRANS TF280

SITRANS P280
Product Features & Customer Benefits

Features of SITRANS TF280 and P280

- **Local User Interface** with functional display items and icons

- **Push buttons** for efficient setup and maintenance even without additional handheld devices or tools

- **Back light** function for friendly field maintenance
Product Features & Customer Benefits

Features of SITRANS TF280 and P280

- **Battery status** in LUI and life time per day unit indicates in network manager overview

- **Sleep mode** for efficient battery life management

- **High measurement accuracy** for increased productivity
Product Features & Customer Benefits

Features of SITRANS TF280 and P280

- 90 degree / 180 degree Display mounting flexibility
- Antenna direction adjustable depends on mounting
- Physical HART maintenance port for commissioning
- Configurable with standard tools supporting EDD, e.g. SIMATIC PDM
Plug into standard wired HART/4-20mA instruments to pass the instrument data through a WirelessHART network to the gateway

### Plug into legacy system

- **PV**: Standard HART device
- **HART**: SITRANS SAW200
- **Legacy DCS**: 4-20 mA, no HART support

### Plug into New installation

- **PV**: Standard HART device
- **HART**: SITRANS SAW200
- **4-20 mA or HART**: Wireless transmission

**Product Features & Customer Benefits**

**SITRANS AW200 Features**

- **Point-to-point** connection, or connect up to 4 devices in **multi-drop mode**

- Configurable with standard tools **supporting EDD**, e.g. SIMATIC PDM, HART handheld communicator

- Support **burst mode** and **event notification** for adapter and sub devices
**Product Features & Customer Benefits**

**SITRANS AW200 Features**

- **Power** up single connected device with battery or devices can be powered externally

- **Antenna position** adjustable in vertical plane

- **Direct mounting** on the field device or **separate mounting** with mounting kit
Product Features & Customer Benefits

IE/WSN-PA LINK Features

- **Open TCP/IP communication**
- **Open standardized user interface by using of HART OPC server**
- **High security** level for the wireless data communication
- **Easy network configuration and monitoring using web interface**
Product Features & Customer Benefits

IE/WSN PA LINK Features

- **Scalable connection** up to 100 WirelessHART devices
  - Max. 50 devices: up to 15 sec latency
  - Max. 100 devices: up to 60 sec latency

- **Simple host system connection** to Simatic system and 3rd party system

- **Coexistence** with other wireless technologies thanks to Black listing function

- **Remote antenna** option (Max. 10 m)

- Installation in Zone 2

- Housing in **IP 65**
Product Features & Customer Benefits
IE/WSN-PA LINK Web interface

- Build-in Network Manager setup and manages a WirelessHART network
- Web server to optimize network performance and security settings
Product Features & Customer Benefits

IE/WSN PA LINK Web interface features

- **Diagnostics**: Check the communication status, client/server parameters etc.
- **Monitor**: Customized Web pages for monitoring the data of the field devices
- **Explorer**: View of the values of the field devices
- **Setup**: Configure the Link for operation, security and host system integration
Product Features & Customer Benefits

Maintenance and Diagnostic Station SITRANS MDS

Freeware! 1)

1) In market entry phase of WirelessHART products, it is free of charge for customers. Standard delivery with IE/WSN-PA Link, single purchase for promotion use under order number 7MP2910-0AA00-0AA0

Siemens Added value for WirelessHART Solution!
Product Features & Customer Benefits

SITRANS MDS Functions

- Windows based application for retrieving and managing maintenance information from field devices
- Uses SIMATIC PDM to get diagnostic data
- English and German language selectable
Product Features & Customer Benefits

SITRANS MDS Features

- Selectable update interval for all devices and/or an individual device
  - Minutes, hours, days, months
- Maintenance icons compliance to NAMUR (NE 107)
- Synchronize with project data
- Opens a HTML file with the maintenance information
  - Can be printed
  - Can be sent by email
  - Can be copied into any other application
- United tab columned Form view
  - Identification
  - Details
  - Diagnostic
  - Maintenance order
  - History
- Devices list shown in a tree-view
- Easy and simple operation
- Just type in comments
- See all the operation history with time stamp
- Can be printed
- Can be sent by email
- Can be copied into any other application
Product Features & Customer Benefits

Function Block Lib./Faceplates for Simatic PCS 7/S7

- Only one connection (cable or IWLAN) to IE/WSN-PA LINK for
  - Controller
  - SIMATIC PDM
  - Internet browser
- Function Block for CFC programming available
- Block icons and faceplates for Operator and Maintenance stations available
Agenda

Wireless Technology — At a glance

WirelessHART Product Summary

Initial Background and Technology

Product Features & Customer Benefits

Typical Applications

Use Cases and Industries

Summary
Typical Applications

WirelessHART typical applications

Application 1
Make central access to stranded information in field devices—without impact on the running system

Application 2
Usage of wireless instead of wired communication
Current situation

Approx. 30 million HART devices installed worldwide,

But…

- Only 10% of devices used HART information
- Diagnostics data on HART devices are stuck in the field
- Available only per costly on-site inspection
- Diagnostics data are needed for
  - Increase productivity
  - Increase availability
  - Increase quality
  - Decrease plant down time
  - Avoid unplanned shut-downs
Typical Applications

WirelessHART Application 1

Wireless unleash stranded information!

- Wireless communication in legacy system
- Valuable intelligent device information available in maintenance station
- No change, no risk on existing running system
- Utilize existing HART tools and experience
- Coexistent with IWLAN
- Diagnostic and configuration information realize new level of plant performance
### Typical Applications

**Customers benefit of Application 1**

- No risk on existing running system to enjoy benefit of latest wireless technology
- Valuable intelligent device information helps predictive / preventive maintenance
- Saving man power due to reduced preventive maintenance efforts
- Protect existing capital investment and knowhow
- Increase productivity and plant availability
- Flexible in the comprehensive business situation by tie up with technology trend – be ahead!
Typical Applications

Background of Application 2

Current situation

- Wired system results in high Total Costs of Ownership (TCO)
  - Cabling
  - Commissioning
  - Maintenance

- Existing black measurement point
  - Environmentally difficult
  - Cost-efficiency

- Plant expansion and replacement require huge budget
Typical Applications
WirelessHART Application 2

Wireless instead of wired communication!

- Additional or redundant measurement become cost-effective
- Interoperability with multi-vendor HART devices
- Reduce wiring cost (≈20$/Meter, by ARC survey), commissioning and maintenance costs
- Easy installation, flexible mounting
- Simple integration to existing SIMATIC system or 3rd party system
- Best use of wired and wireless devices in one system
Typical Applications

Customers benefit of Application 2

- Best use of wired and wireless devices in one system depends on application
- Ad-hoc measurements become cost-effectively, simple, and easy
- Flexible in plant expansion and renewing
- Reduce TCO by saving total plant lifecycle costs, e.g. cable costs, commissioning and maintenance costs, man power, etc.
- Easy integration to host system, e.g. PCS 7, S7 system, other vendors DCS system
- Interoperability with multi-vendor WirelessHART devices
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Typical use cases

- Hard to reach locations
- Process efficiency calculations
- Better insight into process
- Ad-hoc measurements
- Additional measurements from multivariable devices
- Moving equipment measurements

Typical Industry

- Oil & Gas
- Chemical
- F & B
- W / WW
- Pharmacy
- Metal & Mining
Typical use cases

Health, Safety & Environmental
- Safety showers
- Gas detectors
- Steam traps
- Water / Discharge Treatment
  - Flow
  - pH
- Stack emissions
- Relief valves

Typical Industry
- Refinery
- Oil & Gas
- Chemical
- W / WW
- Power
Typical use cases

**Asset Management**
- Maintenance
- Calibration
- Record valve signatures
- Radar echo curves
- Diagnostics
- Valve position feedback
- Device health status

**Typical Industry**
- Chemical
- Refinery
- Oil & Gas
- W / WW
- Power
- Pharmacy
- F & B
- Cement & Glass
- Metal & Mining
- Pulp and Paper
Typical use cases

**Equipment Monitoring**
- Vibration
- Corrosion
- Oil pressure
- Air flow
- Bearing temperatures

**Typical Industry**
- Cement & Glass
- Metal & Mining
- Oil & Gas
- Chemical
- Pulp und Paper
Typical use cases

Temporary measurement
- Test measurement
- Ad-hoc measurements
- Redundant measurement

Typical Industry
- Laboratory
- F & B
- Pharmacy
- Chemical
- O & G
Target Industries

- Chemical
- Refinery
- Oil & Gas
- Food & Beverage
- Pharmaceutica
- Water & Wastewater
- Steel & Metal
- Others
- Others

Wherever Wireless Technology Contributes…
### Defined classes of wireless applications

<table>
<thead>
<tr>
<th>Category</th>
<th>Class</th>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>0</td>
<td>Emergency action</td>
<td>(always critical)</td>
</tr>
<tr>
<td>Control</td>
<td>1</td>
<td>Closed loop regulatory control</td>
<td>(often critical)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Closed loop supervisory control</td>
<td>(usually non-critical)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Open loop control</td>
<td>(human in the loop)</td>
</tr>
<tr>
<td>Monitoring</td>
<td>4</td>
<td>Alerting</td>
<td>Short-term operational consequence (e.g. event-based maintenance)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Logging and downloading / uploading</td>
<td>No immediate operational consequence (e.g. history collection, sequence-of-events, preventive maintenance)</td>
</tr>
</tbody>
</table>

Source: ISA 100
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Summary
Wireless benefits Customer’s plant

😊 Reduce TCO by saving initial costs and maintenance costs
  - Saving time and cost in planning, engineering, commissioning, testing, repair and replacement of wires
  - Reduce manpower on manual checking of status of field devices
  - **One** Ethernet cable to the IE/WSN-PA LINK, using IWLAN components is possible

😊 Increase productivity and transparency
  - Reduce plant down time by increased plant transparency
  - Efficient collection and use of valuable diagnostic information
  - Access to harsh environmental or previously uneconomical to reach measurement points

😊 Improved flexibility
  - Greater physical mobility in mounting
  - Temporary measurements to increase performance or bug fixing of process
  - Ease of replacement and expanding the plant
Siemens added value+

- **Total Automation Solution** with Siemens automation system SIMATIC PCS 7 and SIMATIC S7, various SITRANS HART field devices, engineering & software tools e.g. SIMATIC PDM, SITRANS MDS, Asset Management System, Function blocks for integration in control strategy etc.

SITRANS Series HART Devices
Siemens added value++

- **Industrial Wireless Solution** with new WirelessHART products for field level, IWLAN SCALANCE W products family for entire plant communication, telecontrol system SINAUT, and other more wireless HMI, RFID, sensors…
Siemens added value+++

- **Worldwide Customized Support** with leading technology, latest industrial trend, future oriented knowhow and experience in standardization activities…
WirelessHART Highlights

The right technology
WirelessHART
at the right time!

Reliable, Robust, Secure
Based on IEEE 802.15.4
Open and interoperable standard

2.4 GHz frequency hopping, spread spectrum technology for coexistence in global applications

Self organizing, self healing, wireless mesh network

Proven in use protocol, easy set up, protect customers’ investments on hardware, software, tools and knowhow
Thank you for your attention!

For more information
www.siemens.com/wirelesshart