NAMUR NE 107
Enhanced Diagnostics help improve plant Quality, Safety & Availability

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Endress+Hauser and Rockwell Automation
Strategic Alliance
Preferred Integration

- Ensure our customers get premium integration experience
- Reduce their risk
- Protect cost with assured interoperability
- Reduce OPEX
Dark Age

Must be right
Tx says so

4 – 20mA

Analogue Signal

????????
Middle Ages

What are You?

Communication request using Master Slave

Endress+Hauser Deltabar S
What would you like to know??
Here & Now

Fieldbuses
Peer to Peer

Endress+Hauser
Deltabar S

Your Pump may soon need some maintenance!
Modern plant has information in many forms

- Foundation Fieldbus
- EtherNet IP
- Profibus
- WirelessHART
- HART
- ISA 100
Smart devices have become computers

Travel Deviation
Cycle Counter
Valve Signature
Step Response
Dynamic Error Band
Drive Signal
Output Signal
etc...

Electronics Failure
Sensor Failure
Process Condition
Configuration Warning
RTD Drift
RTD Life Estimation
etc...

Electronics Failure
Sensor Failure
Reverse Flow
Empty Pipe
Calibration Error
Process Condition
Configuration Warning
etc...

pH Electrode Aging
Glass Electrode Failure
Reference Electrode Failure
Reference Electrode Coating
Reference Electrode Poisoning
etc...

Electronics Failure
Sensor Failure
Plugged Impulse Lines
etc...
Key challenges today!

- Difficult to get **overview status** of the process.
- Operators are bombarded with **nuisance alarms** which are irrelevant for them.
- **Inconsistencies in diagnostics** information from different vendors & product classes
- Operators are integral part of control loops and lack tools to take **decisions in critical situations**.
- Different applications, terminals, interfaces with **unsynchronized data**
- **Information** to the right person is a challenge today!

The global process industry loses $20 billion, or five percent of annual production, due to unscheduled downtime and poor quality.

ARC estimates that almost 80 percent of these losses are preventable and 40 percent are primarily the result of operator error.
What is NAMUR?

- NAMUR is an international association of users of automation in process industries.
- Manufacturers of chemical or pharmaceutical products, users of process plants which bear responsibility for operating these plants, or providers of services to these plants
- Organizations with a technical or scientific purpose
What does NAMUR do?

- The results of the work carried out by NAMUR are publicized in **NAMUR recommendations (NE) and worksheets (NA)**

- **NAMUR NE 107** recommendation: “Self-Monitoring and Diagnosis of Field Devices”
  - Diagnostic categorized into 5 status signals
  - Clearly visible & reliable
  - Flexibility in configuration as per need
  - Plant operators to see only status signals
  - Diagnostics must be viewed in context of application
  - Detailed information for specialist
NAMUR NE 107 Status – Diagnostic information which you can act on

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>High severity: signal invalid due to malfunction in the device, sensor, or actuator</td>
</tr>
<tr>
<td>Failed</td>
<td>Medium severity: permissible ambient or process conditions exceeded or the measuring uncertainty of sensors or deviations from the set value in actuators is probably greater than expected</td>
</tr>
<tr>
<td>Out of Specification</td>
<td>Low severity (advisory): although the signal is valid, the remaining life is nearly exhausted or a function will soon be restricted due to operational conditions e.g. aging of a pH-electrode</td>
</tr>
<tr>
<td>Maintenance Required</td>
<td>Signal temporarily invalid (e.g. frozen) due to on-going work on the device</td>
</tr>
</tbody>
</table>

![Status Diagram]
Clear visibility & reliable status
Configuration Flexibility in Devices

Application diagnostics (NE 107)

Example: mass flowmeter

- Coriolis mass flowmeter
  - Gas bubbles in the liquid
  - Fouling, clogging
  - Erosion, corrosion
  - Faulty mounting
  - Asymmetry of measuring tubes (dual tube only)
  - External vibrations
  - Pulsating flow
  - Incomplete filling

On / off switch diagnostics

Failure check function out of specification maintenance required

Connect diagnostic to one status signal

Promass E2-wire
Information in Context

Operator's Console

Maintenance Console

SD_MAINT_ALM
Active

SD_MAINT_ACTIVE
Partial Clogged Sensor

SD_RECOMMENDED_ACTION
Clean Sensor
Information in Context

SD_FAIL_ALM
Active

SD_FAIL_ACTIVE
Pressure sensor failure

SD_RECOMMENDED_ACTION
Change Sensor

Operator's Console

Maintenance Console

SD_FAIL_ALM
Active

SD_FAIL_ACTIVE
Pressure sensor failure

SD_RECOMMENDED_ACTION
Change Sensor
Detailed diagnostics for specialist

Hemal Desai
NAMUR compliant portfolio from Endress+Hauser

Flow

Pressure

Level

Temperature

Plant Asset Management

Analysis
Heartbeat Technology™ - Preferred Integration for Rockwell Users

- Safety
- Quality
- Availability

Heartbeat Technology™
Example: Flow meter Heartbeat Technology™ consists of

**Diagnostics**
- Reliable self-monitoring
  - Continuous, built-in diagnostic functionality
  - Broadest test coverage
  - Quick, concise guidance if an error occurs (NE 107)

**Verification**
- Compliant, traceable testing
  - On-demand, effortless procedure
  - Easy handling, no process interruption
  - Electronic quality reporting

**Monitoring**
- Process consistency analysis
  - Permanent reading of process-related variables
  - Impact assessment
  - External trend analysis
Example: Coriolis flow meter

- **Heartbeat diagnostics (Reliable self-monitoring)**
  - Continuous, built-in diagnostic functionality 24X7
  - Broadest test coverage >95%
  - Quick, concise guidance in case of errors (NE 107)

![Diagram of Coriolis flow meter](image)

- **Check**
  - Failure
  - System OK
  - Out of Specification
  - Maintenance Required
Example: Coriolis flow meter display

1. Measurement page with warning
   - An event occurred. Depending on event status the status symbol for the event level is shown

2. Event page
   - Icon/text according NE 107 (F,M,C,S)

3. Info page
   - Diagnostic event page.
   - Maintenance instructions
Heartbeat Diagnostics in Global Object (Faceplate)
Summary

- NAMUR NE 107
- Good overview of Process & Status
- Clear Harmonized information Independent of source of data
- All relevant information available in easy to use environment.
- Right information to the Right person at Right time.