Integration Test Summary HON03

Honeywell ControlEdge™ Unit Operations Controller and EtherNet/IP plus HART for Life Science

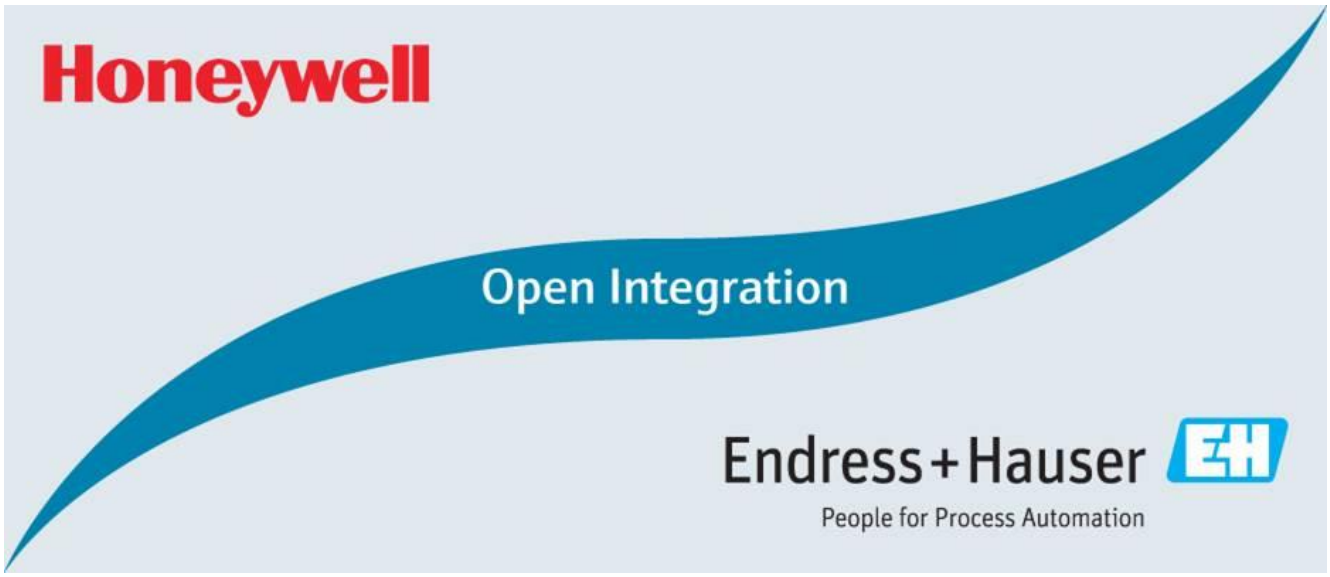

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Table of Contents

1 Document Information

1.1 Purpose and Scope

This document provides a brief summary of Open Integration tests for Reference Topology HON03. All content of this document is jointly developed, reviewed and approved by Honeywell and Endress+Hauser as a common deliverable of Open Integration.

1.2 Document History

This is version 1.00.00 of this document. Version history:

Version	Released	Description
1.00.00	2020-11	Initial version

1.3 Related Documents

Please refer to related documents as listed below:

Document	Description
SD02648S/04/EN/1.20	Reference Topology HON03
SD02649S/04/EN/1.20	Integration Tutorial HON03
SD02651S/04/EN/1.20	List of Tested Devices and Versions HON03

2 Preface

Open Integration focuses on complementary system tests to verify integration and interoperability using practical test conditions. This is done by testing the system versus a reference test network with a relevant variety of components and field devices for defined target applications, and asking questions like this:

Is the system prepared to handle a necessary variety of compliant device implementations?
How does it deal with multiple device revisions and device replacements?
Does it apply reasonable bus settings to share access with other tools or systems?
How can field devices be accessed for configuration or asset health monitoring?
Is this path stable and performing? ...

Open Integration does not test field devices, field network components or systems as such. All parts of a reference topology under test are released and have passed mandatory integration and interoperability tests as defined by technology foundations upfront.

3 General Introduction

This chapter provides a short introduction to Open Integration testing in general:

3.1 Reference Test Network

Open Integration verifies systems versus a reference test network: Figure 1 shows the principle as applied for EtherNet/IP and HART over EtherNet/IP:

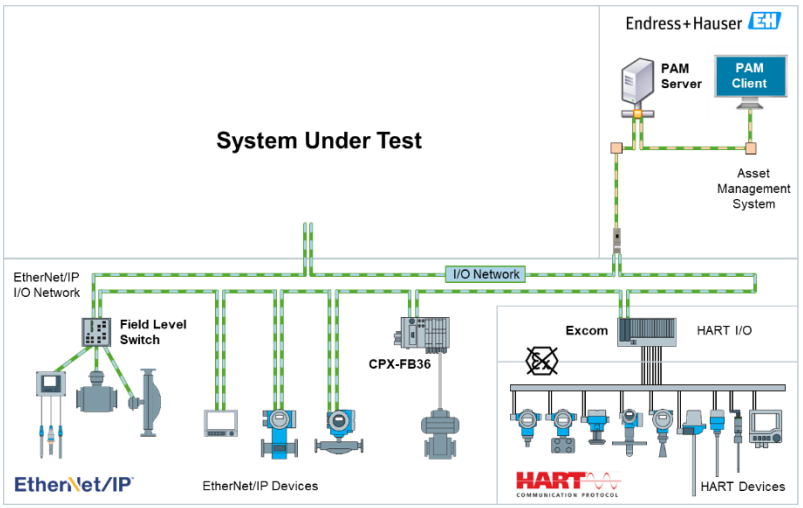

Figure 1: Open Integration Reference Test Network for EtherNet/IP and HART over EtherNet/IP

3.2 Integration Test Scenarios

Open Integration verifies supported means for integration into the system and interoperability with other tools. Figure 2 shows the main test scenarios as considered:

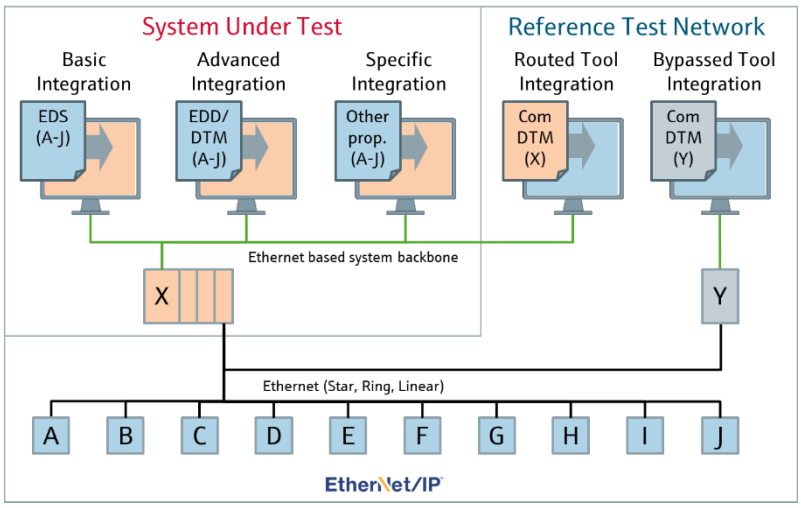

Figure 2: Open Integration Test Scenarios

3.2.1 Basic Integration

This scenario deals with integration of EtherNet/IP devices for commissioning of the EtherNet/IP I/O network and cyclic communication of process values, as well as integration of HART devices in a Remote I/O system. As a result, process values with status information are available for further processing within the control strategy of the system. Test cases related to this scenario are mandatory.

3.2.2 Advanced Integration

This scenario deals with device type specific integration of field devices by means of EDD, FDT/DTM or FDI. As a result, the system is enabled to access additional information from field devices, e.g. for an integrated asset management solution. Test cases related to this scenario are mandatory, if the system under test supports such means.

3.2.3 Specific Integration

This scenario considers proprietary means for integration which may be supported by a specific system, e.g. to simplify commissioning or to provide preconfigured elements for visualization. This is optional and not supported by standard test cases. If relevant, a specific set of additional test cases may be defined.

3.2.4 Routed Tool Integration

Vice versa, this scenario deals with integration of system components under test as access path for plant asset management software provided by Endress+Hauser. Test cases related to this scenario are mandatory, if the system under test supports such means.

3.2.5 Bypassed Tool Integration

This scenario focuses on interoperability to access field devices independently from routing support provided by the system under test. Test cases related to this scenario are optional. Test results may serve to complement a missing routing support, or as performance reference for routing support provided by a system under test.

4 Relevant Test Scenarios

Honeywell ControlEdge™ Unit Operations Controller requires templates for Basic Integration of EtherNet/IP field devices and Remote I/O. This has to be tested. Further on shall be validated how the system supports utilization of HART process values and status information via EtherNet/IP.

Bypassed Tool Integration shall also be considered with Endress+Hauser Plant Asset Management.

Routed Tool Integration is not supported by Honeywell ControlEdge™ Unit Operations Controller.

Advanced and Specific Integration are not required.

5 Summary of Test Results

5.1 Basic Integration

5.1.1 Drivers for EtherNet/IP

Device Type Library

- Templates must be used to integrate EtherNet/IP field devices in Control Builder. These templates are provided by Honeywell and have to be imported in the Control Builder library. EDS files are required as input for generating the EtherNet/IP field device templates.
- EtherNet/IP field devices typically support several connection types. A field device template is needed for each EtherNet/IP device connection type which shall be used in the project.
- The Control Builder device library contains tested templates for Endress+Hauser Promass300/500 and Promag300/500 as well as Turck Excom Remote I/O and FESTO CPX terminals. Other device types may require Honeywell support for preparation of adequate templates.

5.1.2 Field Network Configuration

Network Configuration

- Two different IP networks have been configured, one for the Control Network (FTE) and another one for the I/O Network (Downlink Network).
- All IP addresses must be configured adequately before connecting the network. This can be done by different means as supported by different system components and field devices. Please refer to the Integration Tutorial for further details.
- The ControlEdge™ UOC system has been successfully configured as Device Level Ring Supervisor.

Excom Remote I/O Configuration

- Excom Remote I/O configuration can be done via ControlBuilder or Web server. We recommend using ControBuilder to configure the Remote I/O gateway and IO modules to ensure configuration data integrity.
- Different HART Analog Input templates are available in the Honeywell Control Builder Library. Choose the adequate template according to your application.
- A maximum of eight HART variables can be configured for a four channels HART analog input module. This means that only eight out of sixteen HART values can be used.
- HART variables names are defined per input module, starting from selected values from channel 0 to channel 3. This cannot be edited in the “Data/Status” menu of the I/O template and makes it complicated to identify which HART variable belongs to which channel. Renaming to more useful variable names should be considered in the control strategy to avoid any confusion.
- Alarms can be configured as well for the Turck I/O modules.

EtherNet/IP Field Devices Configuration

- All listed EtherNet/IP field devices have been successfully integrated.
- Pay attention while configuring E+H device totalizers in Control Builder with the configuration assembly: the totalizer unit must be valid for the selected process value, eg “kg” for mass flow versus “l” for volume flow. This is not automatically handled by the template. As a consequence, cyclic communication will not be established if an invalid configuration is downloaded in the ControlEdge™ UOC system.
- Field device Identification Parameters are not displayed in the Advanced Configuration/Statistics menu of the device template. This makes it difficult to check if a selected device template is adequate for the connected device. This point will be fixed by Honeywell.
- Alarms can be configured in the Control Builder field device parameters settings for Endress+Hauser Proline 300/500 devices. This allows alarming of Namur NE107 status with assigned priority and severity.
- The Alarm option is not available for the Festo CPX module.

HART Field Device Configuration

- All listed HART field devices have been successfully integrated.
- There are two ways to access field devices HART data:
    - The first one consists of using the Honeywell IO templates and to configure adequately up to 8 HART variables per HART Analog Input module. This method only provides the HART process data PV, SV, TV and QV.
    - The other option consists of using the HART over CIP protocol feature. This method provides both HART process data as well as CMD48 status and device information.

5.1.3 Online Monitoring and Control Strategy

- Control Builder library provides functions blocks for reading and writing analog and digital signals from HART and EtherNet/IP. These function blocks have been successfully implemented and tested in control modules. Please refer to the Integration Tutorial for further details.
- Network diagnostics, process values and field device status are available in the Online Monitoring view.

EtherNet/IP Device Level Ring Network

- The EtherNet/IP DLR network composed of Honeywell ControlEdge™ UOC systems, Endress+Hauser field devices, Turck Remote I/O and FESTO valve island has been successfully tested.
- Opening the EtherNet/IP ring does not disturb the cyclic communication of configured field devices.

EtherNet/IP Field Devices

- Cyclic communication has been successfully established with all EtherNet/IP devices by using Honeywell templates. Cyclic data are received and displayed in the control strategy. FESTO CPX digital outputs have been successfully controlled from the control module.

HART Field Devices

- The 4..20 mA analog input signals and the HART process variables are successfully received for all Endress+Hauser HART devices connected to the Turck Excom Remote I/O.
- The system does not provide HART Command function blocks in the Control Builder library for sending additional HART commands from the ControlEdge™ UOC system through the Excom Remote I/O to the HART field devices. It is not possible to fully use all device specific features.

5.2 Advanced Integration

- This method is based on HART over CIP protocol supported by Honeywell and Turck and can be used as an additional configuration of the channel IO points.
- This configuration of a channel IO point provides not only the HART process data PV, SV, TV and QV, but also additional device information like Tag, descriptor, Range and units, CMD48 status and HART identification parameters.
- Advanced IO point configuration requires Device Descriptor (DD) templates.
- The default template is the “Generic HART Device”. Device specific HART DDs can be installed via the Honeywell tool “DD Manager”. Once installed, these DDs appear in the DD catalog list and can be assigned instead of the “Generic HART Device”. This is more convenient for the user, e.g. to better understand CMD48 status. Please refer to the Integration Tutorial for more details.
- The system does not decode HART7 device types correctly. In consequence, a wrong “Device Type Mismatch” message is displayed. This error does not impact the functionality and can be ignored.
- HART5 and HART6 device types are correctly decoded. The HART7 issue has been reported to Honeywell development and will be fixed.
- Advanced Integration can be used for a maximum of 32 HART field devices per Turck Excom Remote I/O.
- The use of this feature does not allow parallel access with a Plant Asset Management tool like FieldCare on these HART field devices.

5.3 Specific Integration

- NAMUR status as well as device specific status information can be integrated for EtherNet/IP and HART devices. Please refer to the Integration Tutorial for further details.
- Heartbeat verification and Totalizer handling have been successfully tested for Endress+Hauser Proline 300/500 EtherNet/IP devices.
- Endress+Hauser TrustSens TM371 self-calibration counter and deviation have been successfully transmitted via Excom Remote I/O and received in the ControlEdge™ UOC system. This enables the logging of self-calibration events within the Honeywell system.

5.4 Bypassed Tool Integration

5.4.1 Plant Asset Management

EtherNet/IP Devices

- A CommDTM is required to access EtherNet/IP devices with FieldCare. The "EtherNet/IP Comm Adapter" provided by Schneider Electric has been successfully configured and used.
- Endress+Hauser Promag500 and Promass300 have been successfully scanned, connected and operated.
- DeviceDTM for the Festo CPX system was not available for testing. Field device settings can be configured with Festo Service and Commissioning tool.
- After a device Upload with FieldCare, the device tag is successfully written in the Offline view but not updated in the FieldCare Network Tag view. This issue has been reported to development team and will be fixed in a future FieldCare version.

HART Devices

- The use of HART DTMs is possible as long as the Advanced Integration is not used.
- If Advanced Integration is applied, Plant Asset Management tools cannot be used in parallel.
- Turck CommDTM "BL Service EtherNet" has been successfully installed and Excom Remote I/O has been successfully configured and used within FieldCare.
- The Create Network function works only from the IO card level. Error messages are displayed for empty channels. Workaround to avoid this issue requires the deselect of empty channels from the scanning.
- All HART field devices have been successfully connected and operated.

5.4.2 Web server

- Embedded web server of EtherNet/IP devices provide a very convenient way to configure and operate individual field devices. Prerequisite to this is that the network topology allows access with a web browser running on a web client station.
- Endress+Hauser embedded web server must be enabled to use it.
- We recommend planning EtherNet/IP I/O networks with free ports for at least temporary connection of web client stations to take advantage of embedded web servers during commissioning and for maintenance.

6 Open Integration Result

Reference Topology HON03	Recommended	Not Recommended	Not Applicable
Basic Integration (Honeywell Templates for E/IP devices and HART IO modules)	X		
Advanced Integration (HART over CIP)	X_1		
Specific Integration (NE107, TrustSens, Heartbeat)	X		
Routed Tool Integration			X
Bypassed Tool Integration (Integrated Web Server of E/IP devices and PAM for E/IP device configuration)	X		
Bypassed Tool Integration (PAM for HART device configuration)	X_1		

X_1: The system does not support concurrent use of Advanced Integration via HART channel IO points and Bypassed Integration via device DTMs. If HART over CIP feature is configured in ControlBuilder, it is not possible to operate HART devices in parallel with any Plant Asset Management tool.

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