Integration Test Summary ME01

Mitsubishi Electric MELSEC System Q and PROFIBUS for Water & Wastewater Industry

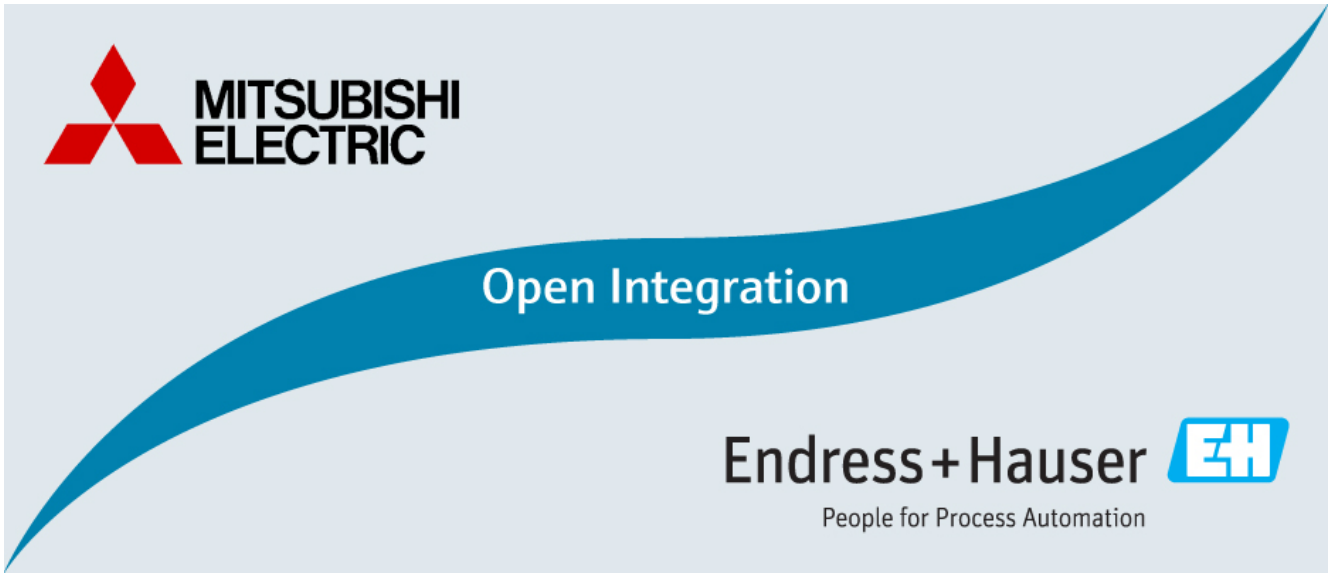

Table of Contents

1 Document Information

1.1 Purpose and Scope

This document provides a brief summary of Open Integration tests for Reference Topology ME01. All content of this document is jointly developed, reviewed and approved by Mitsubishi Electric 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	2015-03	Initial version

1.3 Related Documents

Please refer to related documents as listed below:

Document	Description
SD01431S/04/EN/02.15	Reference Topology ME01
SD01432S/04/EN/02.15	Integration Tutorial ME01
SD01434S/04/EN/02.15	List of Tested Devices and Versions ME01

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 masters? 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 PROFIBUS:

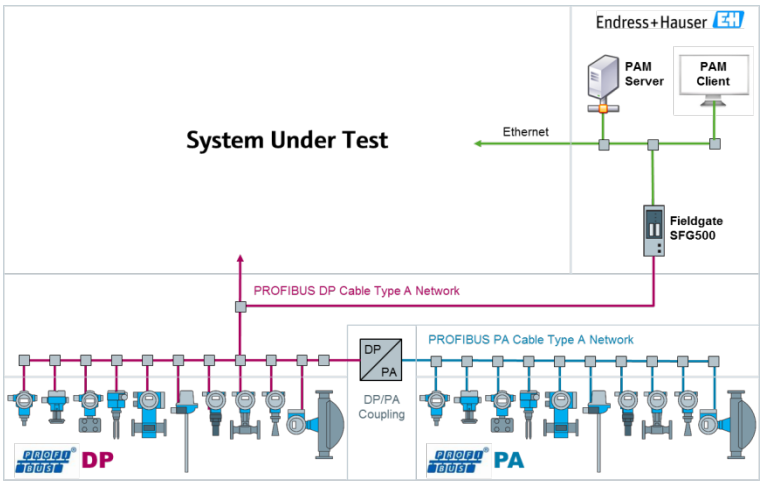

Figure 1: Open Integration Reference Test Network for PROFIBUS

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:

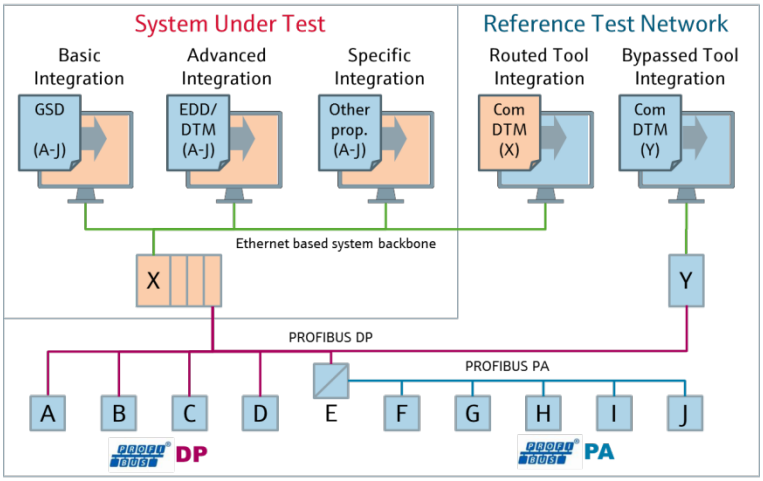

Figure 2: Open Integration Test Scenarios

3.2.1 Basic Integration

This scenario deals with integration of field devices for commissioning of the PROFIBUS network and cyclic communication of process values by means of GSD. 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 integration of field devices also for acyclic communication by means of EDD, 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 requested 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 must 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 with other masters connected to the PROFIBUS network to access field devices independently from routing support provided by the system under test. Test cases related to this scenario are mandatory. 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 for ME01

Mitsubishi Electric MELSEC System Q utilizes Basic Integration by means of GSDs for PROFIBUS. This has to be tested. Advanced Integration by means of EDD or DTM is not relevant. Specific Integration is not required.

Mitsubishi Electric MELSEC System Q supports Routed Tool Integration by means of Communication DTMs. Since the reference topology allows a direct connection via one controller, as well as a remote connection via cascaded controllers interlinked with CC Link IE field, this has to be tested for both options.

Mitsubishi Electric MELSEC System Q shall also be tested whether to share access with other PROFIBUS master devices for Bypassed Tool Integration.

5 Summary of Test Results for ME01

5.1 Basic Integration

The basic integration workflow for integration of PROFIBUS devices by means of GSD with Mitsubishi Electric MELSEC System Q has been successfully tested for a variety of devices at different baud rates as follows: (read baud rate ✔ = supported, ✗ = not supported by device, greyed = not applicable)

PROFIBUS devices		PROFIBUS ID	Baudrate Baud										
			9.6k	19.2k	31.25k	45.45k	93.75k	187.5k	500k	1.5M	3M	6M	12M
Master	QJ71PB92V		✔	✔	✗	✗	✔	✔	✔	✔	✔	✔	✔
PA Slave	Cerabar M	0x1553	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
PA Slave	Promag 50	0x1525	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
PA Slave	Prosonic M	0x152C	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
PA Slave	Deltapilot M	0x1555	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
PA Slave	Micropilot	0x1559	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
PA Slave	Deltabar M	0x1554	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
PA Slave	iTHERM	0x1551	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
DP Slave	Prosonic S	0x1540	✗	✗	✔	✔	✔	✔	✔	✔	✔	✔	✔
DP Slave	Liquiline	0x155D	✔	✔	✗	✔	✔	✔	✔	✔	✔	✔	✔
DP Slave	Promag 53	0x1526	✔	✔	✗	✔	✔	✔	✔	✔	✔	✔	✔
DP Slave	Promag 400	0x1562	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Device Type Library

- All required GSD files can be successfully imported into the GX Works2 PROFIBUS library.
- All imported GSDs are assigned to a predefined library folder PA.
- Automatic import of related device bitmaps failed a few times, but could be fixed by manually adding the corresponding bitmaps.
- Multiple GSD versions for same device type can be handled by appropriate renaming.

Field Network Configuration

- All slave devices can be successfully integrated into a network configuration.
- All slave modules can be configured according to slot definitions as specified in GSD. However, the GX Configurator DP does not check for valid module assignments. Invalid assignments will not allow cyclic communication with that slave.
- Bus parameters settings are updated automatically according to configured slaves and the defined baud rate.
- The calculated timing parameters allowed access also with a secondary master. In case the target rotation time needs to be adjusted, manually overwrite the calculated “min slave interval”.
- The calculated slave watchdog time must be increased to 200 ms or higher to get all connected slaves into data exchange mode.
- The DPV1 support option is selected by default, but without further use. This does not work for some of the tested devices. (Prosonic S, Prosonic M). Data exchange mode can be established if DVP1 support is disabled.

Control Strategy

- As the Mitsubishi System Q PLC is based on 16 bit data format, all received/sent PROFIBUS telegrams need to be converted in order to send/read the correct data from the slaves. To achieve this, a GX Works2 function block library “Profibus_Endress_Hauser” is provided with four function blocks:
    - “DP_to_Float_with_Status” used to convert analog inputs telegrams.
    - “Float_to_DP” used to convert analog outputs telegrams.
    - “DP_to_Inputs_1xbyte_Stat_1xbyte” used to convert digital inputs telegrams.
    - “Outputs_1xbyte_Stat_1xbyte_to_DP” used to convert digital outputs telegrams.
- Data exchange between PLC and PROFIBUS slaves by using these function blocks has been successfully tested.

5.2 Routed Tool Integration

The MX CommDTM-PBDP is intended for short term access to single PROFIBUS slaves only. In combination with FieldCare, it allows establishing of temporary one by one connections to the majority of tested device types, but it was not possible to connect with latest DTMs which use parallel requests for performance optimization.

This does not match the requirements of plant wide access for device configuration or asset health monitoring. Therefore we do not recommend applying this in customer projects.

5.3 Bypassed Tool Integration

The MELSEC System Q PROFIBUS master and Fieldgate SFG500 showed no issues in sharing access to the same PROFIBUS network. The default bus timing parameters as calculated by GX Configurator DP where adequate to allow access also for SFG500. Increase of target rotation time via manually increase of calculated “min slave interval” may be used to further improve the performance for device configuration.

It must be considered that the SFG500 adapts to the current bus parameters only at time when connected. If the network configuration is changed e.g. by adding or removing slaves via GX Configurator DP, the SFG500 needs to be disconnected from the PROFIBUS or rebooted to adapt accordingly.

Bypassed Tool Integration of Mitsubishi Electric MELSEC System Q and Fieldgate SFG500 can be recommended for device configuration and asset health monitoring in projects.

6 Open Integration Result

Reference Topology ME01	Recommended	Not Recommended	Not Applicable
Basic Integration	X		
Advanced Integration			X
Specific Integration			X
Routed Tool Integration		X	
Bypassed Tool Integration	X		

www.endress.com/open-integration