

## Reference Topology RA01

Rockwell Automation ControlLogix and EtherNet/IP plus HART  
for Food & Beverage Industry





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## 1 Document Information

### 1.1 Purpose and Scope

This document specifies the Open Integration Reference Topology RA01. All content of this document is jointly developed, reviewed and released by Rockwell Automation 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	2018-10	Initial version

### 1.3 Related Documents

Please refer to related documents as listed below:

Document	Description
SD02273S/04/EN/01.18	Integration Tutorial RA01
SD02274S/04/EN/01.18	Integration Test Summary RA01
SD02275S/04/EN/01.18	List of Tested Devices and Versions RA01

## 2 Target Market

### 2.1 Industry Application

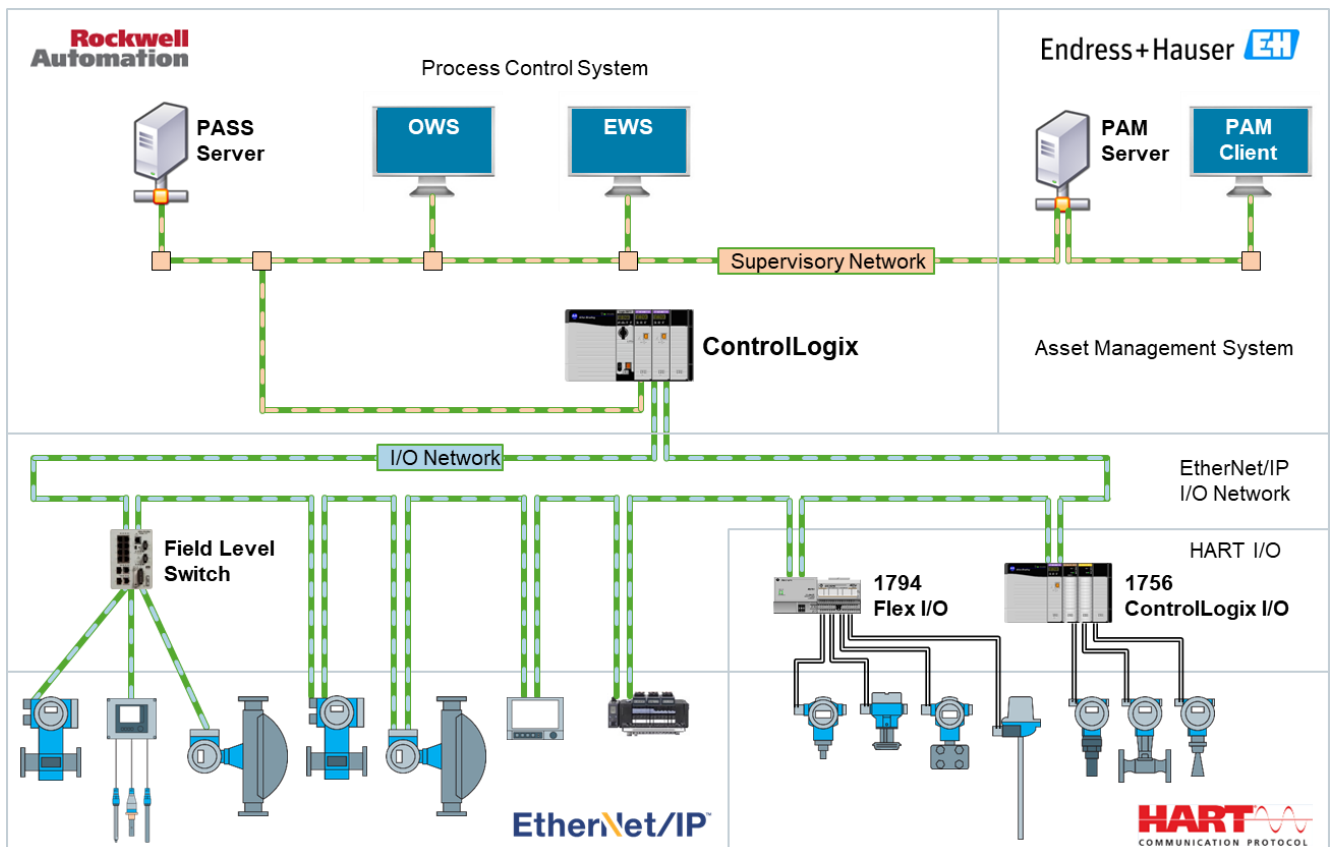
This reference topology is designed to serve applications in Food / Beverage industries.

### 2.2 Fieldbus Technology

This reference topology is designed for instrumentation with EtherNet/IP, complemented with HART devices for relevant parameters where EtherNet/IP options are not yet available or not reasonable to be used.

## 3 Reference Topology

### 3.1 Overview





### 3.2 Process Control System

The process control system shown top left to middle in the overview is provided by Rockwell Automation:

ControlLogix controllers are connected to two separate Ethernet networks: The Supervisory Network connects to system servers and workstations, while the I/O Network connects to underlying field devices and remote I/O units via EtherNet/IP. Core element on the Supervisory Network is an engineering workstation (EWS) for control engineering with Studio 5000 Logix Designer, complemented with PlantPAx system servers (PASS) and operator workstations (OWS) for process visualization, as required.

Reference hardware:

	Article	Description
ControlLogix  	1756-An	1756 Chassis n slots
	1756-PB75	19.2 - 32V DC Power Supply (5V @ 13 Amp)
	1756-L72	Logix 5572 Controller with 4 Mbytes Memory
	1756-EN2T	EtherNet 10-100M Bridge Module for Supervisory Network
	1756-EN2TR	EtherNet 10-100M Bridge Module (2-Ports) for I/O Network
	1756-N2	Empty Slot Filler for 1756 Chassis

### 3.3 Asset Management System

The asset management system shown top right in the overview is provided by Endress+Hauser:

A FieldCare PAM server connects to the Supervisory Network and serves as a gateway to PAM clients. PAM clients may be installed on PCs or run on tablets like the Field Xpert SMT70 for mobile use.

This part covers all required means for process device configuration and asset health monitoring for all connected EtherNet/IP and HART devices. Rockwell Automation supports the necessary access paths via ControlLogix to EtherNet/IP as well as 1756 ControlLogix I/O or 1794 Flex I/O to HART with a set of corresponding Comm- and ModuleDTMs.

## 3.4 Field Network Infrastructure





### 3.4.1 EtherNet/IP I/O Network

The EtherNet/IP I/O Network is mandatory for this reference topology, with relevant impact to integration tests.

The EtherNet/IP I/O Network may be built in a star, linear bus or device level ring (DLR) topology, as well as in a hybrid network topology composed of those. For increased plant availability, this topology assumes applying DLR as the backbone and the preferred option to connect all DLR capable EtherNet/IP devices and remote I/O units. EtherNet/IP devices which do not support DLR may be connected in star topology via managed field level switches. HART devices can be connected either via HART capable 1756 ControlLogix I/O or 1794 Flex I/O.

Rockwell Automation and Endress+Hauser recommend using components as listed below:

Reference hardware:


 <b>Rockwell Automation</b>	Article	Description
Stratix 5700 	1783-BMS10CGN	Managed Industrial Ethernet Switch with Static and InterVLAN Routing. 8x Fast Ethernet Copper Ports, 2x Gigabit Ethernet Combo Ports.
Stratix 5400 	1783-HMS8TG8EG4CGN	Managed Industrial Ethernet Switch with Static and InterVLAN Routing. 8x Gigabit Ethernet Copper Ports, 8x PoE Gigabit Ethernet Copper Ports, 4x Gigabit Ethernet Combo Ports.
ETAP 	1783-ETAP	EtherNet/IP Tap with 3 copper ports. Enables single port device to connect to a device level ring network.

### 3.4.2 HART I/O

HART I/O is necessary to connect complementary HART devices, as required if EtherNet/IP options are not reasonable to be used. This topology considers two alternative HART I/O options provided by Rockwell Automation:


#### 3.4.2.1 1756 ControlLogix I/O

Reference hardware:

<b>Rockwell Automation</b>	<b>Article</b>	<b>Description</b>
<b>ControlLogix</b> 	1756-An	1756 Chassis n slots
	1756-PB75	19.2 - 32V DC Power Supply (5V @ 13 Amp)
	1756-EN2TR	EtherNet 10-100M Bridge Module (2-Ports)
	1756-IF8IH +	Analog Differential Isolated Input HART - Current 8 Pts (36 Pin)
	1756-TBCH	36 Pin Screw Clamp Block With Standard Housing
	1756-OF8IH +	Analog Output HART Isolated - Current 8 Pts (36 Pin)
	1756-TBCH	36 Pin Screw Clamp Block With Standard Housing
	1756-N2	Empty Slot Filler for 1756 Chassis

#### 3.4.2.2 1794 Flex I/O

Reference hardware:

<b>Rockwell Automation</b>	<b>Article</b>	<b>Description</b>
<b>Flex IO</b> 	1794-AENTR	FLEX I/O Dual Port EtherNet/IP Adapter Module
	1794-IF8IH +	Isolated Input HART Analog Module, 8 Point
	1794-TB3	3-wire screw terminal base (16 I/O; 18 common; 18 +V)
	1794-OF8IH +	Isolated Output HART Analog Module, 8 Point
	1794-TB3	3-wire screw terminal base (16 I/O; 18 common; 18 +V)









### 3.5 Field Devices



Open Integration reference topologies must be tested versus a selection of most relevant field devices for the target market defined in chapter 2.1. This serves to verify that the system under test is capable to handle a necessary variety of certified field devices. All field devices are fully compliant to standards but may be implemented versus different version of standards and each field device typically implements only a subset of relevant compliant means.



This chapter defines a basic set of field devices for verification of this reference topology. For more details, please refer to latest list of tested devices and versions for this reference topology, referenced in chapter 1.3.

#### 3.5.1 EtherNet/IP devices

Reference hardware:






Endress+Hauser  People for Process Automation		Article	Description	Device Type
<b>Liquiline</b> 		CM44x	Liquid Analyzer Transmitter	0x109C
		CPS11D	Memosens Digital pH Sensor	
		CYK10	Memosens Digital Data Cable	
<b>Promag 100</b> 		5H1B	Electromagnetic Flow Transmitter	0x103A
<b>Promag 300/500</b> 		5H5B02	Electromagnetic Flow Transmitter	0x103C
<b>Promass 100</b> 		8F1B	Coriolis Flow Transmitter	0x104A
<b>Promass 300/500</b> 		8E3B08	Coriolis Flow Transmitter	0x103B

Endress+Hauser  <small>People for Process Automation</small>	Article	Description	Device Type
<b>Memograph M</b> 	RSG45	Advanced Data Manager	0x107A

 <small>FLUID CONTROL SYSTEMS</small>	Article	Description	Device Type
<b>Valve Island</b> 	320835	Valve Island 8652 8-bank ALQ AL	0x21CC

### 3.5.2 HART devices

Reference hardware:

Endress+Hauser  <small>People for Process Automation</small>	Article	Description	Device Type
<b>Cerabar M</b> 	PMC51	Absolute and Gauge Pressure Transmitter	0x0019
<b>Deltapilot S</b> 	FMB70	Hydrostatic Level Transmitter	0x001A 0x111A
<b>iTHERM</b> 	TM401+ TMT82	Temperature Transmitter	0x00CC 0x11CC
<b>Cerabar S</b> 	PMC71	Absolute and Gauge Pressure Transmitter	0x0018 0x1118

Endress+Hauser  <small>People for Process Automation</small>	Article	Description	Device Type
<b>Liquicap M</b> 	FMI51	Capacitance Level Transmitter	0x001D
<b>Deltapilot M</b> 	FMB50	Hydrostatic Level Transmitter	0x0023
<b>Deltabar S</b> 	FMD78	Differential Pressure Transmitter	0x0017 0x1117
<b>Levelflex</b> 	FMP51	Guided Radar Level Transmitter	0x0022 0x1122
<b>Smartec S</b> 	CLD134	Conductivity Transmitter	0x0097
<b>Micropilot</b> 	FMR52	Radar Level Transmitter	0x0028 0x1128
<b>Prowirl 200</b> 	7F2B	Vortex Flow Transmitter	0x0038 0x1138
<b>Prosonic M</b> 	FMU40	Ultrasonic Level Transmitter	0x0011

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