



Technical Standard

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Mondi AG.
Mondi Standard Harmonization

CONTROL SYSTEMS PROCESS INTERFACE

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ABBREVIATIONS

AC	Alternating Current
brown field	rebuilt, existing process area
DC	Direct Current
DCS	Distributed Control System
EU	European Union
green field	new process area
HV	High Voltage
I/O	Input/Output, process interface
ICT	Information and Communication Technology
IEC	International Electro technical Commission
MCC	Motor Control Center
MV	Medium Voltage
OPC UA	Open Platform Communications Unified Architecture
OT	Operational Technology
PLC	Programmable Logic Controller
TSN	Time-Sensitive Networking
UPS	Uninterruptible Power Supply
VAC	Volts Alternative Current
VDC	Volts Direct Current

1 GENERAL

This standard describes recommended technology how field devices, instruments and control actuators, including motors, are connected to the control system.

1.1 Codes and Regulations

The equipment and installation shall comply with the following standards, regulations and instructions:

- Local authorities' regulations and recommendations
- Laws and regulations currently in force in the current country
- EU norms and directives
- Project instructions
- Mill instructions
- IEC recommendations

1.2 References

MEIA0015	Operational Technology (OT) Information and Communication Technology (ICT) standard
OT-TS_PROFINET_v1	Technical Standard PROFINET, Mondi Group IM
OT-SP_v1.1a	OT-Security Policy Category "A" Sites, Mondi Group IM

2 CONTROL SYSTEM

The process to be controlled shall be divided functionally into process parts. Each process part shall have its own controllers (process stations) and process interfacing units with cabinets/boxes.

2.1 User Interface

Process operators use mainly the DCS operator stations for process monitoring and control. The DCS operator interface shall support viewing of data of other systems, too. Control places, local panels and mobile operator interface shall be arranged where required for operation of machinery and various processes.

3 I/O'S & SYSTEM ROOMS

There are two options to located instrumentation process interfaces (I/O's). The option which will be used shall be decide and approved by Purchaser in each project.

- 1) Instrumentation will be interfaced with traditional process interfaces (I/O's). I/O's and process controllers will be centralised in the system rooms and mounted to separate I/O cabinets. Terminals for the field cables and motor cables are mounted to separate cross-connection cabinets. Cross connection between these cabinets is done using individual cross connection wires. The I/O

units shall communicate with other systems by Profibus, Profinet, EtherNet/IP or TSN with OPC UA. The principle drawing of system structure is shown in Appendix I on pages 1 and 2.

- 2) The remote I/O units will be located in the field boxes or in MCC rooms. The remote I/O modules connected by Profinet, Ethernet or DCS supplier bus to the process controllers which are centralised to the system rooms. The principle drawing of system structure is shown in Appendix I on page 3.

The control, electrical and system rooms shall be equipped with an air conditioning system with humidity controls and chemical filtering. Heating ventilation and air condition (HVAC) designing of the rooms shall be according to the HVAC Design Criteria standard MH0001.

4 CONNECTION OF FIELD DEVICES

The communication protocol to be decide by Purchaser in each project.

In the green field projects (new process areas) there are two options to connect field devices to field boxes:

- 1) Traditional hardwired signals from field or MCCs to system I/O modules in rack or electrical room
- 2) Profibus PA, Profibus DP and Profinet for instrumentation and device bus for motor controls

The fieldbus is preferred in the green field projects. In the brown field projects (rebuilt) the existing communication protocol will be used.

4.1 Traditional Hardware Signals

Analog (mA, non fieldbus analog devices) and binary (discrete) signals shall be cabled with single or multipair cables and terminated to terminal blocks in field boxes or in MCC's connection box. Analog and binary signals shall be cabled either with single or multi pair cables from field boxes to the cross-connection cabinets in system rooms.

In special cases signals can be wired straight from device to cross-connection cabinets in system rooms.

Discrete inputs and outputs shall be galvanically isolated and powered by the system.

The principle drawing of system structure about traditional hardware signals and centralized I/Os is shown in Appendix I on page 1. The principle drawing of system structure about traditional hardware signals and distributed I/Os is shown in Appendix I on page 3.

4.2 Fieldbus

In the green field projects (new process areas) the field bus to be applied is Profinet, and its extension Profibus PA for process automation. In the brown field projects (rebuilt) the existing communication protocol will be used. The communication protocol to be decide by Purchaser in each project.

In the green field projects Profibus PA will be used for analog signals. Field instruments for Profibus PA connection will be cabled via PA distribution units to Profinet/Profibus gateway modules located in field junction boxes.

The digital signals will be cabled to Remote I/O with the exception of on-off valves which will use Profinet connected solenoid valve blocks located in field mounted junction boxes. The solenoid valve blocks will interface the limit switches for the on-off valves.

Profinet or Profibus DP will be used for motor controls and can be used also for motor operated valves.

Profinet or Profibus DP is used for variable speed drive signals.

The principle drawing of system structure about fieldbus connections and centralized I/Os is shown in Appendix I on page 2. The principle drawing of system structure about fieldbus connections and distributed I/Os is shown in Appendix I on page 3.

4.2.1 Profinet

See Mondi's Technical Standard PROFINET (OT-TS_PROFINET_v1). This standard provide a recommended technical standard for the PROFINET network and covers general aspects related to PROFINET regarding engineering, cabling, mounting, installation and documentation as well as cyber security related aspects. This document does not only cover use case specific documentation but also provides a general overview and comparison of different components, protocols and features as well as their advantages and disadvantages in order to enable the Sites to start a structured approach in the selection, implementation and service processes related to their PROFINET environment.

4.3 Voltage Distribution

Voltage distribution with fuses will be used for the 230 VAC (/24VDC) power supply for field instruments. Individual cables will be connected from each instrument to the power distribution terminals located in junction boxes.

UPS or non-UPS 230VAC voltage supply for field instruments as well as the redundancies of power supplies should be agreed with the purchaser on a project-by-project basis.

These are recommendations for the green field mill and, where applicable, may also be used for brown field mills to the extent agreed with the Purchaser.

In case of distributed I/O, the junction boxes will house necessary converters and power supplies for the Profibus PA, Profibus DP, Profinet and remote I/O modules. This is implemented with two redundant 230VAC/24VDC power supply units. The units are located near to the equipment needing the power (inside MCC's connection box and field boxes).

The power supply units have to be able to operate in redundant mode. The power supply units shall have internal failure detection and an alarm contact. Each unit shall have a separate feeder, 230 VAC. One of the units shall be fed from UPS.

5.1 Signal Ranges

5.1 Signal Ranges

- Analog signal 4 to 20 mA DC (with Hart)
- Fieldbus Profibus PA, Profibus DP, Profinet

– Analog signal	4 to 20 mA DC (with Hart) 0 to 20 mA DC 0 to 10 VDC 0 to 20 VDC
– Fieldbus	Profibus PA, Profibus DP, Profinet

In the brown field the existing communication protocol will be used. The communication protocol to be decide by Purchaser in each project.

5.1.1 Control Voltages

– Binary sensors	24 VDC
– Solenoid valves, < 2.5 W, preferred	24 VDC
– Solenoid valves, > 2.5 W	24 VDC (230 VAC in special cases)
– MCC starter, internal	24VDC or 230 VAC
– Safety devices on field	24 VDC (230 VAC in special cases)
– Auxiliary voltage HV and MV switchgear	110 VDC or 220 VDC Voltage of auxiliary shall always be confirmed with the purchaser

Generally the control voltage is a solidly -earthed voltage of 230 V 50 Hz. Normally it is supplied from 690/230 V or 400/230 V control voltage transformers. For automation and electronic equipment an operational-earthed 400/230 V, 50 Hz voltage secured with UPS equipment will be used. In equipment connected to control systems, 24 V DC is used as field voltage.

Two 24 VDC power supply units (able to operate in redundant mode, one unit is large enough to supply all load) will be used for DCS.

In the brown field the existing power supply system will be used. The extension and improvement to be decide by Purchaser in each project.

5.2 Auxiliary supplies

- Alternating current (AC) 230 VAC
- DCS / PLC 230 VAC (UPS network)
- Direct current (DC) 24 VDC

These auxiliary voltage supplies will be supplied by a centralised UPS arranged in redundant solution.

In the brown field the existing power supply system will be used. The extension and improvement to be decide by Purchaser in each project.

6 NETWORK MANAGEMENT AND NETWORK CABLING

Directives and instructions relating to network management, ICT cabling and cabling systems are given in a separate Operational Technology (OT) Information and Communication Technology (ICT) standard (MEIA0015).

See more about network management at security aspect in separate OT-Security Policy Category “A” Sites (OT-SP_v1.1a).

7 ICT INFRASTRUCTURE

In general all ICT systems shall use Mondi’s common ICT infrastructure and infrastructure management where applicable. See also Operational Technology (OT) Information and Communication Technology (ICT) standard (MEIA0015).

8 NUMBERING

Field devices, cables, field bus cables and field bus equipment shall have individual identifications. The detailed item numbering procedure is described in the project instruction and/or in the mill standard (depending on the project).

Field devices, cables, field bus cables and field bus equipment shall be marked/labelled as given in the project instruction and/or in the mill standard (depending on the project).