

DEXPI 2.0 Specification

Future-proof handover of process and plant
diagrams



Speaker introduction

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- Background in process technology and computer science
- Working for Evonik since 2018
- Active as Head of DEXPI Specifications since 2019
 - THTH presentations in 2022 (DEXPI+ project) and 2024 (DEXPI Process SIG plans)

Previously in THTH Webinars...

- 2024 Spring:
 - **DEXPI** Process Specification – from project to continuous maintenance
- 2023 Spring:
 - IMF and **DEXPI/DEXPI+** (A systems approach to interoperability)
 - P&ID digitalization through **DEXPI**
- 2022 Autumn:
 - **DEXPI+** project - extension of the P&ID spec including BFD and PFD
- 2021 Autumn:
 - Usage of **DEXPI** in the NOAKA project
- 2021 Spring:
 - Experiences from Stora Enso **DEXPI** pilot

This time...
I won't introduce DEXPI

Agenda

- DEXPI 2.0 – what's new?
- DEXPI XML
- DEXPI Spec Generator
- Outlook: DEXPI Process Standard Library

DEXPI 2.0 – what's new?

5 highlighted points

DEXPI 2.0...

1. ...combines the Process specification and the P&ID specification under one roof.
2. ...improves the Process model.
3. ...introduces DEXPI XML as information model format.
4. ...introduces DEXPI XML as the new standard for transporting intelligent flow diagrams.
5. ...is the first version created using the open source DEXPI spec generator.

DEXPI XML

2025-11-12

DEXPI 2.0 Specification - Future-proof handover of process and plant diagrams

DEXPI XML is for P&ID, PFD, and BFD.

This is how it looks like.

Object in a P&ID



P123 : CentrifugalPump

DesignVolumeFlowRate = VolumeFlowRate(
Value=200.0, Unit=VolumeFlowRateUnit.MetreCubedPerHour)

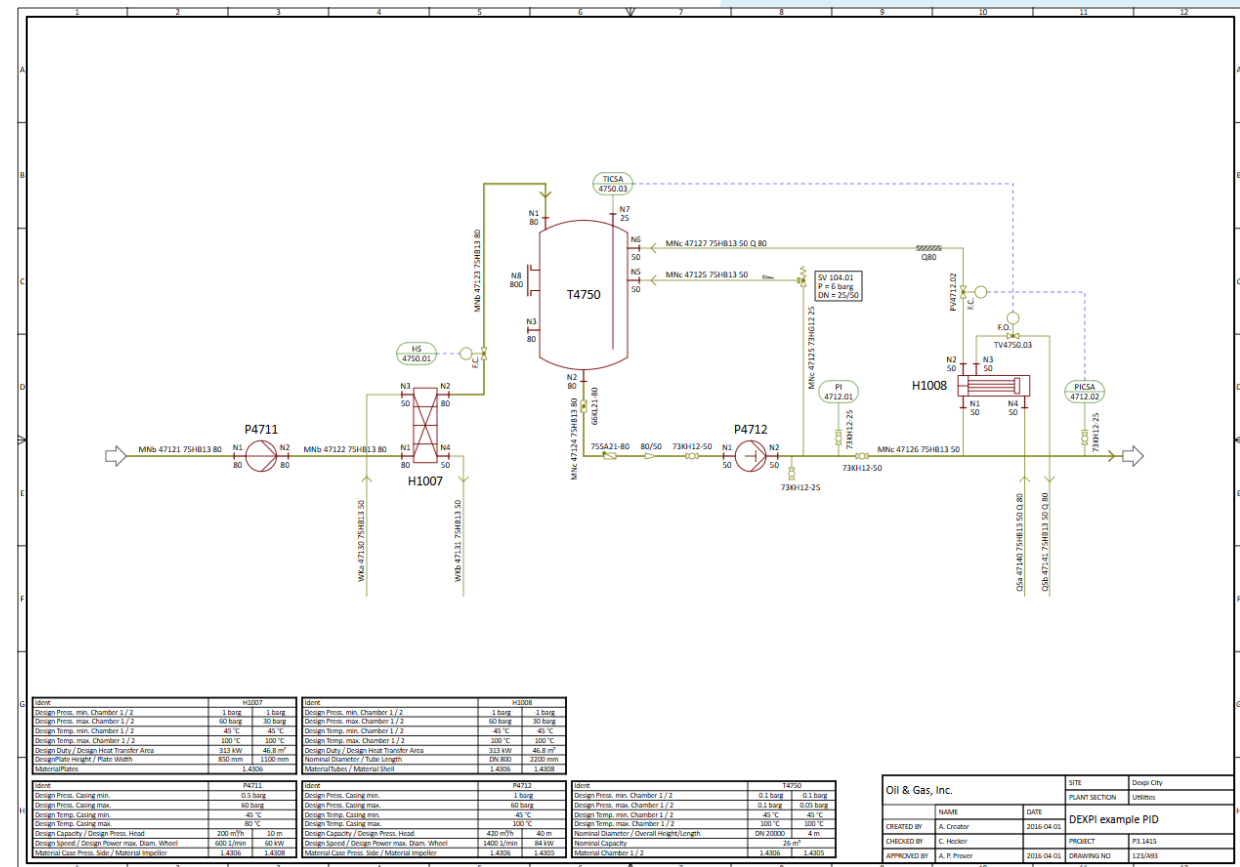
UML Diagram (details removed!)

```
<Model
  name = "mini_pid"
  uri = "http://www.example.org/mini_pid">
  <Import
    source = "http://www.dexpi.org/specification/2.0/Core"
    prefix = "Core"/>
  <Import
    source = "http://www.dexpi.org/specification/2.0/Plant"
    prefix = "Plant"/>
  <Object
    id = "P123"
    type = "Plant/Equipment.CentrifugalPump">
    <Data property = "DesignVolumeFlowRate">
      <AggregatedDataValue type = "Core/PhysicalQuantities.VolumeFlowRate">
        <Data property = "Unit">
          <DataReference data = "Core/PhysicalQuantities.VolumeFlowRateUnit.MetreCubedPerHour"/>
        </Data>
        <Data property = "Value">
          <Double>200.0</Double>
        </Data>
      </AggregatedDataValue>
    </Data>
  </Object>
  ...
```

DEXPI XML is for P&ID, PFD, and BFD.

Some numbers

- DEXPI XML schema: 850 lines
 - Proteus schema: 2.2 k lines
- The example P&ID has 32k xml lines
 - Mainly because of the detailed graphics representations
- Conclusion:
 - Manual creation would be tedious, better use software to systematically create DEXPI XML



DEXPI XML can do more.

DEXPI XML anticipates future use-cases (3 examples)

1. DEXPI XML was designed to be systematically extensible.
 - Necessary for enriching the standard with more (project-specific) types and attributes
2. DEXPI XML allows for formal content restrictions
 - Necessary for reducing variability and introducing (project-specific) requirements
3. DEXPI XML supports a modular approach
 - Prerequisite for efficient (project-specific) mass transport of diagrams
 - Will allow for different visualizations of the same base data

DEXPI Spec Generator



2025-11-12

DEXPI 2.0 Specification - Future-proof handover of process and plant diagrams

The DEXPI Spec Generator

An open-source tool for generating UML information models

- Tool developed for DEXPI e.V. by a contractor in parallel to DEXPI XML and DEXPI 2.0
- Will be made open-source on GitLab soon (expected: Q4 2025)
- By integrating this tool into the CI/CD pipeline, creating an updated DEXPI specification is only a question of updating the sources of the specification in GitLab.

The DEXPI Specificator is a tool for the easy creation, documentation, and distribution of UML-like information models. It has been created by [DEXPI e.V.](#) to support the creation and maintenance of the DEXPI Specification. However, the DEXPI Specificator can handle arbitrary UML-like information models.

To this end, DEXPI Spell, the DEXPI Specification Language, is used. DEXPI Spell permits to define information models in a Python-based declarative format:

```
Vehicles.Vehicle = ABSTRACT_CLASS(
    description='''
        A vehicle (from Latin vehiculum) is a machine designed for
        self-propulsion, usually to transport people, cargo, or both
        (from `Wikipedia <https://en.wikipedia.org/wiki/Vehicle/>`__).
    ''')

Vehicles.Vehicle.CapacityPeople = DATA_PROPERTY(
    description='''
        The maximum number of people the <OWNER> can transport.
    ''',
    type=BUILTIN.Integer,
    lower=0,
    upper=1,
    exampleValue=4)
```

From this input, the DEXPI Specificator can produce different output formats, including DEXPI XML (file format used by DEXPI itself), XMI (exchange format for UML models), and HTML.

Agenda

- DEXPI 2.0 – what's new?
- DEXPI XML
- DEXPI Spec Generator
- **Outlook: DEXPI Process Standard Library**

DEXPI Spec vs. DEXPI Standard

Different mechanism for different purposes

- Primary focus of the **DEXPI specification**:

Enabling the flexible transport of **any** P&ID, PFD, BFD diagram

- This includes „wrong“ and incomplete diagrams.
- That is why...
 - ... everything is optional,
 - ... nearly anything is allowed

This looks like the opposite of a standard?!

The DEXPI Process Standard Library

... is what actually brings a „standard“ into process models.

- During development of DEXPI 2.0, a demand to define a library of process step type templates was identified.
- Instead of „polluting“ the DEXPI Specification with debatable restrictions like naming rules and port cardinality limits, it was decided to separate the concerns and work on a dedicated „DEXPI Process Standard Library“ after release of the DEXPI 2.0 information model.
- Example of differences between the concepts:
 - Process Step „Mixing“ in **DEXPI Process 1.0**:
 - Specialization of ProcessStep with exactly three ports named XL1, XL2, XL3
 - Process Step „Mixing“ in **DEXPI 2.0**:
 - Specialization of ProcessStep **without** port restrictions

Action



Action

- Spread the word: DEXPI (2.0) exists!
- Make yourself familiar with the standard
 - Join the DEXPI 2.0 release event in November 2025
 - Join DEXPI Days in January 2026
 - Check Publications and manual
- Promote the use of digital, standardized Process & Plant Diagram information via DEXPI
 - In research and development
 - In academia and industry
- Consider contributing with your expertise to the creation of the “DEXPI Process Type Standard Library” (DEXPI roadmap item for 2026)

Dates

And other topics



Event Dates

- DEXPI 2.0 Release Events (virtual)
 - Opt 1: 25th of November and
 - Opt 2: 27th of November
 - Remark: The meetings have the same agenda - no need to join both.
- DEXPI Days (face to face)
 - 20th – 22nd of January 2026
 - Info including registration link: <https://dexpi.org/event/dexpi-days-1-0/>
 - Four sequential sessions:
 - Innovation, PIDMIC, Bizz Talks, Tech Talks