

## 4.6 Representation of Pipes and Control Fittings

Depending on the purpose, there are various methods for representing piping systems (plant systems) in a drawing.

### 4.6.1 The Technical Drawing

Piping and plant systems can be represented as standard technical drawings using one, two or even three views.

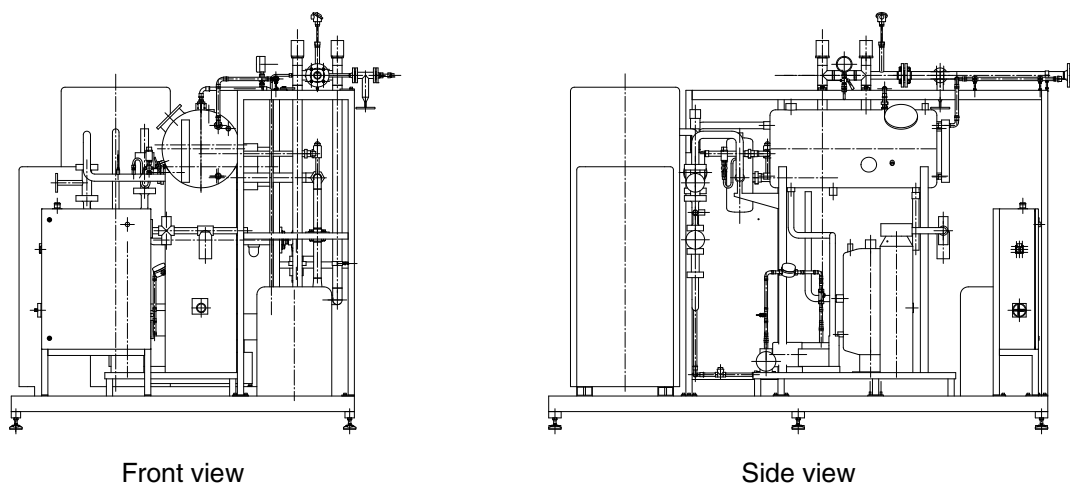
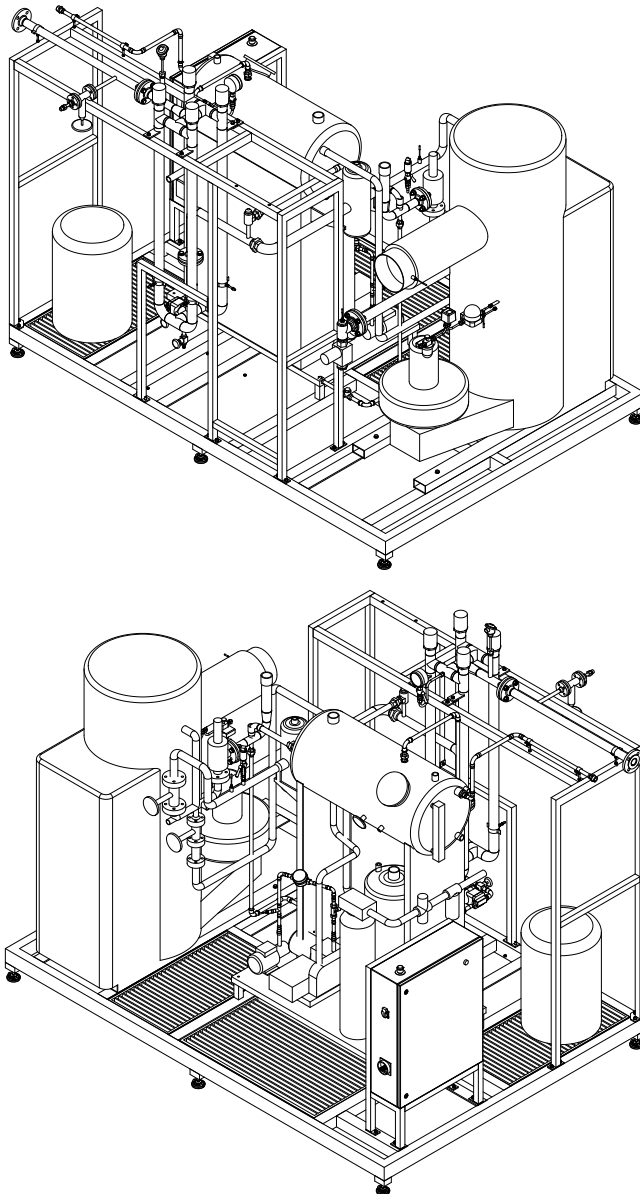


Fig. 4.16 Example technical drawing

This type of representation can be difficult to read for complex systems and in any case requires the trained eye of a skilled technician or engineer.

For our HL 960 training system, you will find this kind of representation of the complete system in the Appendix, Section 8., Chapter 8, Page 125

#### 4.6.2 3-D Piping Diagram



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In the age of CAD design, there are a wide range of options for representing a plant system in three dimensions, viewed from several perspectives.

Here, we can see the system shown in Chapter 4.6.1, Page 43 as a technical drawing in three dimensions.

A combined representation of a system as a technical drawing and an additional 3-D view is standard practice.

You will find a combined representation of our HL 960 training system in the Appendix, Chapter 8, Page 125.

Fig. 4.17 Technical drawing (3-D illustration)

The technical drawings and 3D illustrations discussed here are to scale.

### 4.6.3 Isometric Piping Diagram

It is only possible to obtain a three dimensional impression of a piping system with a perspective representation.

Isometric representation is the chosen method for piping systems.

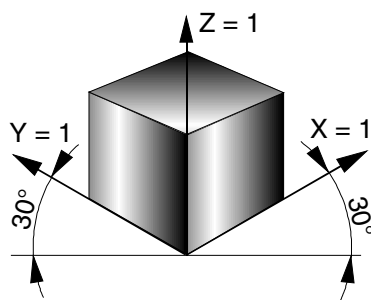


Fig. 4.18 Isometric representation

The key features are as follows:

- The three principal planes are represented as surfaces.
- Vertical edges are shown vertically.
- Horizontal edges are shown 30° below horizontal.
- All edges (height, length, width) are shown with the same proportions (1:1:1).

The isometric piping diagram is a not to scale isometric projection of a pipe with dimensioned pipe course. It is useful for representing extensive systems in a single diagram.

It includes dimensions that specify the course of the pipes and the position of control fittings, brackets and measuring, control and regulating devices.

The fittings are not accurately illustrated, they are represented symbolically.

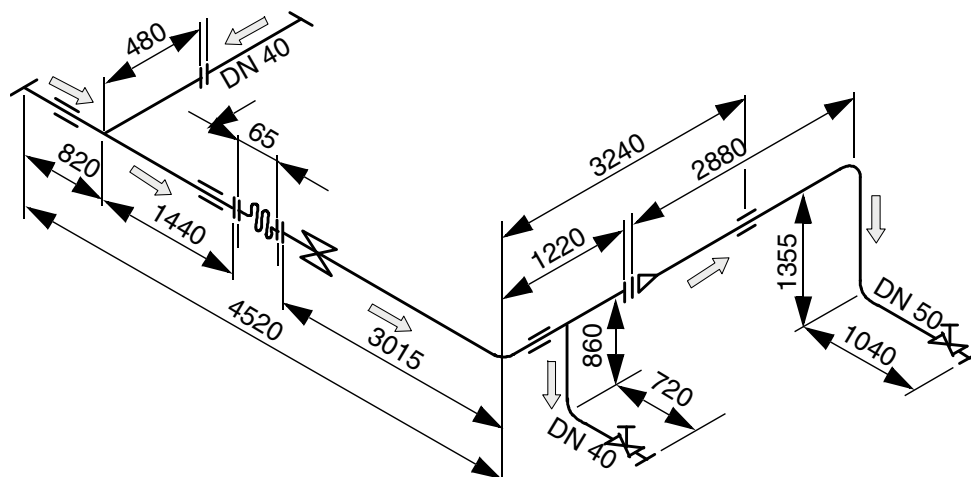
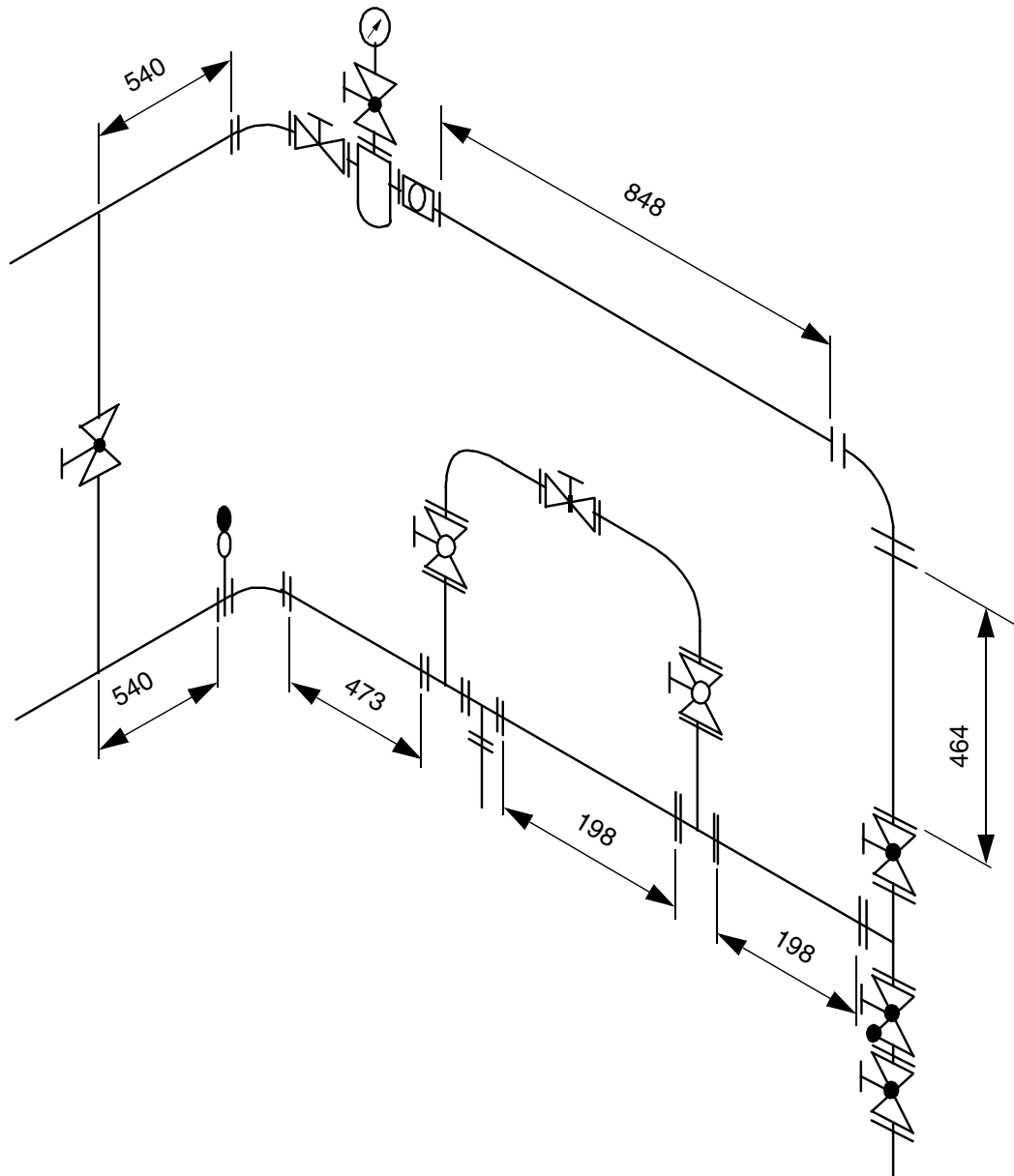












Fig. 4.19 Dimensioned isometric pipe course



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Fig. 4.20 Here is an extract from an isometric representation of the HL 960

Explanation of the graphical symbols for the extract from the HL 960 shown on Fig. 4.20, Page 46 and for the PI diagram Fig. 4.22, Page 48.

Symbol	Name
	Drive with manual operation
	Gate valve
	Shut-off valve
	Two-way valve
	Non-return valve
	Inspection glass
	Pressure gauge
	Dirt trap
	Condensate drain
	Hose fitting with rapid action coupling

### 4.6.4 PI Flow Diagram

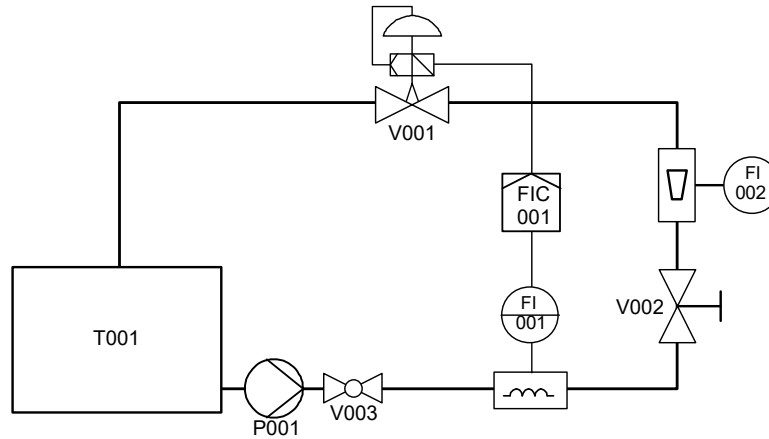


Fig. 4.21 Example of a PI flow diagram

The piping and instrumentation flow diagram represents the pipes using lines and the fittings and other equipment using graphical symbols set out in DIN EN ISO 10628.

Overall, a PI flow diagram is a simplified, schematic representation of the layout and function of a system.

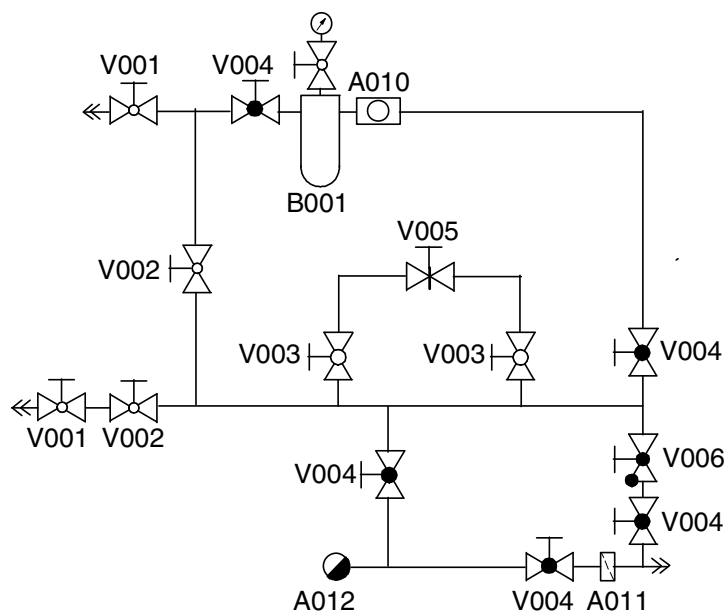


Fig. 4.22 PI flow diagram for HL 960