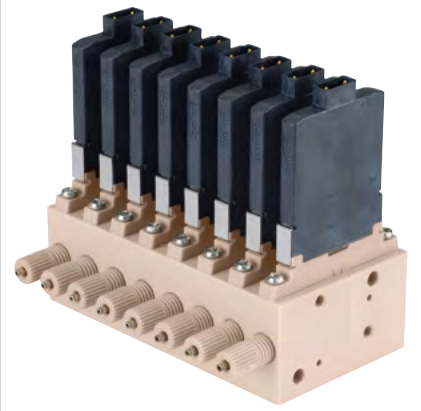
DATA SHEET

Type 5120



Dosing head and electronics for precise time-pressure dosing

- Maximum dosing accuracy in the ml to µl range
- Coordinated components for reliable results
- High flexibility in dosing quantity
- Intuitive software control
- Modular system structure

Product variants described in the data sheet may differ from the product presentation and description.

Type description

Type 5120 offers a standardised solution for liquid dosing in an open control loop based on the time-pressure dosing principle. The core components of this system include dosing electronics with communication gateway and a dosing head with dosing needles. Precisely controlling the dosing time with a resolution of less than 0.1 ms achieves remarkable accuracy, especially with small liquid volumes in the µl range. This solution is characterised by its compact footprint and easy installation, and can be seamlessly integrated into various pressure-time dosing applications. Compared to closed control loops, the dosing system often proves to be a more cost-effective choice when immediate feedback on the dosing volume is not required. Type 5120 is an integral system platform in which both the control and the fluidics can be easily customised and expanded. The comprehensively coordinated dosing ecosystem can be conveniently sourced from a single supplier.

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1. General technical data

Product properties	
Dimensions	Further information can be found in chapter "5. Dimensions" on page 7.
Materials (wetted)	
Dosing valve	Dosing valve: PEEK, FFKM
Dosing needle	Dosing needle: stainless steel, ETFE
Dosing needles	
Length	20 mm (see chapter "5. Dimensions" on page 7)
Diameter	0.51 mm and DN 0.95 mm
Material	Stainless steel
Datasheets of single components	Fieldbus gateway, see **Type ME43** ▶ Backplane System Connect, see **Type BPX3** ▶ I/O module (8DO module variant), see **Type ME44** ▶ Flipper solenoid valve with media separation, see **Type 6650** ▶ Cable plug for Bürkert solenoid valve Type 6650, see **Type 2504** ▶ Fittings with UNF thread ¼"...28 (PEEK), see **Type TVU003** ▶ Bürkert Communicator software, see **Type 8920** ▶ USB-büS interface set, see **Type 8923** ▶
Performance data	
Qualified dosing volume	
Minimum volume	5 µl (smaller volumes are possible with decreasing accuracy)
Maximum volume	28 ml per 10 s at 1 bar (higher values are possible with longer activation time or higher pressure)
Accuracy of dosing quantity	< 1 % CV (coefficient of variation) > 5 µl (see chapter "6. Performance specifications" on page 9)
Dosing repeatability	< 0.2 % (after teach-in and with constant ambient conditions, see chapter "6. Performance specifications" on page 9)
Minimum time between dosings	25 ms
Maximum dosing pressure	3 bar (up to 7 bar on request)
Resolution activation time	0.1 ms
Maximum trigger delay (based on CANopen)	10 ms
Electrical data	
Operating voltage	24 V DC
Voltage tolerance	± 5 % (including residual ripple)
Approvals and conformities	
Approvals and conformities	Further information can be found in the datasheets of the individual components.
Product connections and communication	
Fluidic connection	
Port connection of dosing head	UNF thread ¼"...28, flat bottom (inlet and outlet)
Digital communication interface	Industrial Ethernet: PROFINET, EtherNet/IP, Modbus TCP, EtherCAT®
Dosing needles	
Port connection of dosing needles	UNF thread ¼"...28, flat bottom

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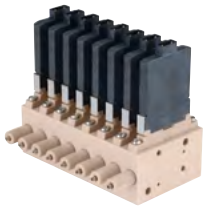
2. Product variants

2.1. Overview of functional elements

Product variant	USB büS interface set	Gateway and electronics	Dosing head	Needle diameter [mm]	Typical dosing volume [µl]	Dosing valve Type	Article no.
8-station starter dosing kit	Included	Industrial EtherNet	1×8 station	0.51	< 20	6650	20115227
8-station industrial dosing kit	Not included 1.)	Industrial EtherNet	1×8 station	0.51	< 20	6650	20115185
8-station starter dosing kit	Included	Industrial EtherNet	1×8 station	0.95	> 20	6650	20078965
8-station industrial dosing kit	Not included 1.)	Industrial EtherNet	1×8 station	0.95	> 20	6650	20078964
1-station starter dosing kit	Included	Industrial EtherNet	1×1 station	0.51	< 20	6650	20115230
1-station industrial dosing kit	Not included 1.)	Industrial EtherNet	1×1 station	0.51	< 20	6650	20115229
1-station starter dosing kit	Included	Industrial EtherNet	1×1 station	0.95	> 20	6650	20078967
1-station industrial dosing kit	Not included 1.)	Industrial EtherNet	1×1 station	0.95	> 20	6650	20078966
Dosing electronics starter kit	Included	Industrial EtherNet	Not included	Not included	Not included	None	20078969
Dosing electronics	Not included 1.)	Industrial EtherNet	Not included	Not included	Not included	None	20078968
8-station dosing head	Not included 1.)	Not included	1×8 station	0.51	< 20	6650	20115233
8-station dosing head	Not included 1.)	Not included	1×8 station	0.95	> 20	6650	20081545
1-station dosing head	Not included 1.)	Not included	1×1 station	0.51	< 20	6650	20115234
1-station dosing head	Not included 1.)	Not included	1×1 station	0.95	> 20	6650	20081546

1.) A büS stick is mandatory (it is included in the USB-büS interface set).

Example picture	Accessory	Description
	USB büS interface set	The interface sets consist of a USB-büS stick and the necessary connection cables to establish this connection. The büs stick (see **Type 8923** ▶.) and the Bürkert Communicator software (see **Type 8920** ▶.) is mandatory to setup the system.
	Gateway and electronics	The combination of a gateway for industrial Ethernet and fieldbus standards (see **Type ME43** ▶) and an output module (see **Type ME44** ▶.) controls the activation time of the valves. To connect the gateway and the output module, a backplane (see **Type BPX3** ▶.) is included. On one backplane you can install 3 modules. If more modules are required, additional backplanes can be connected to the gateway.
	Dosing head	The dosing head consists of the distribution manifold for fluid handling, the dosing valve(s) and the needles.
	Dosing needle	The selection of the needle is crucial for dosing accuracy and target precision. Needle dimensions should be chosen based on the target dosing volume (for further information see "6. Performance specifications" on page 9).
	Dosing valve	Further information can be found in data sheet **Type 6650** ▶. Other valve types are available on request (e.g. Type 6712, 6724 or 6757). We will be happy to assist you with the design of the fluidic system.

3. Approvals and conformities

3.1. General notes

- The approvals and conformities listed below must be stated when making enquiries. This is the only way to ensure that the product complies with all required specifications.
- Not all available variants can be supplied with the below mentioned approvals or conformities.

3.2. Conformity

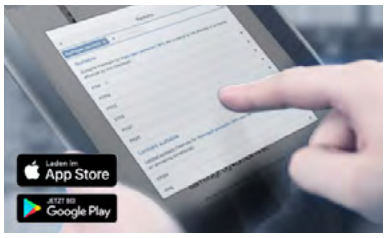
In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

3.3. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

4. Materials

4.1. Bürkert resistApp



Bürkert resistApp – Chemical Resistance Chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

Start Chemical Resistance Check

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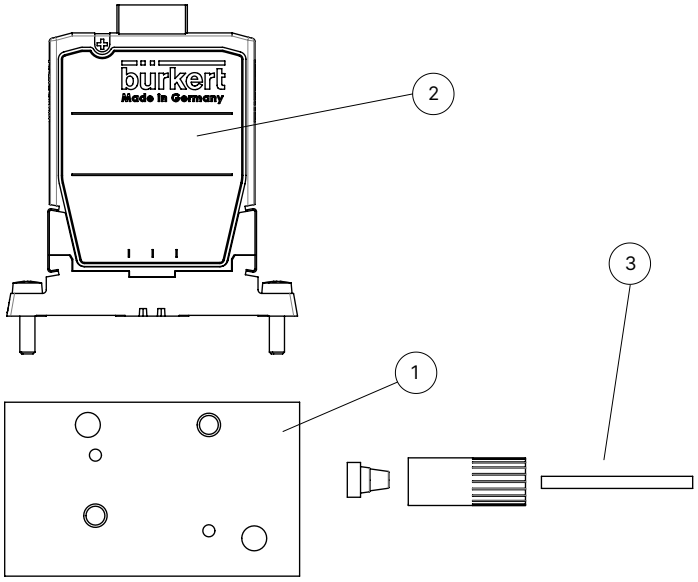
4.2. Material specifications

Wetted parts of 1-station and 8-station dosing head with Type 6650



No.	Component	Material
1	Distribution manifold	PEEK
2	Flipper solenoid valve with media separation Type 6650	Seal: FFKM Body: PEEK
3	Dosing needle	Stainless steel, ETFE

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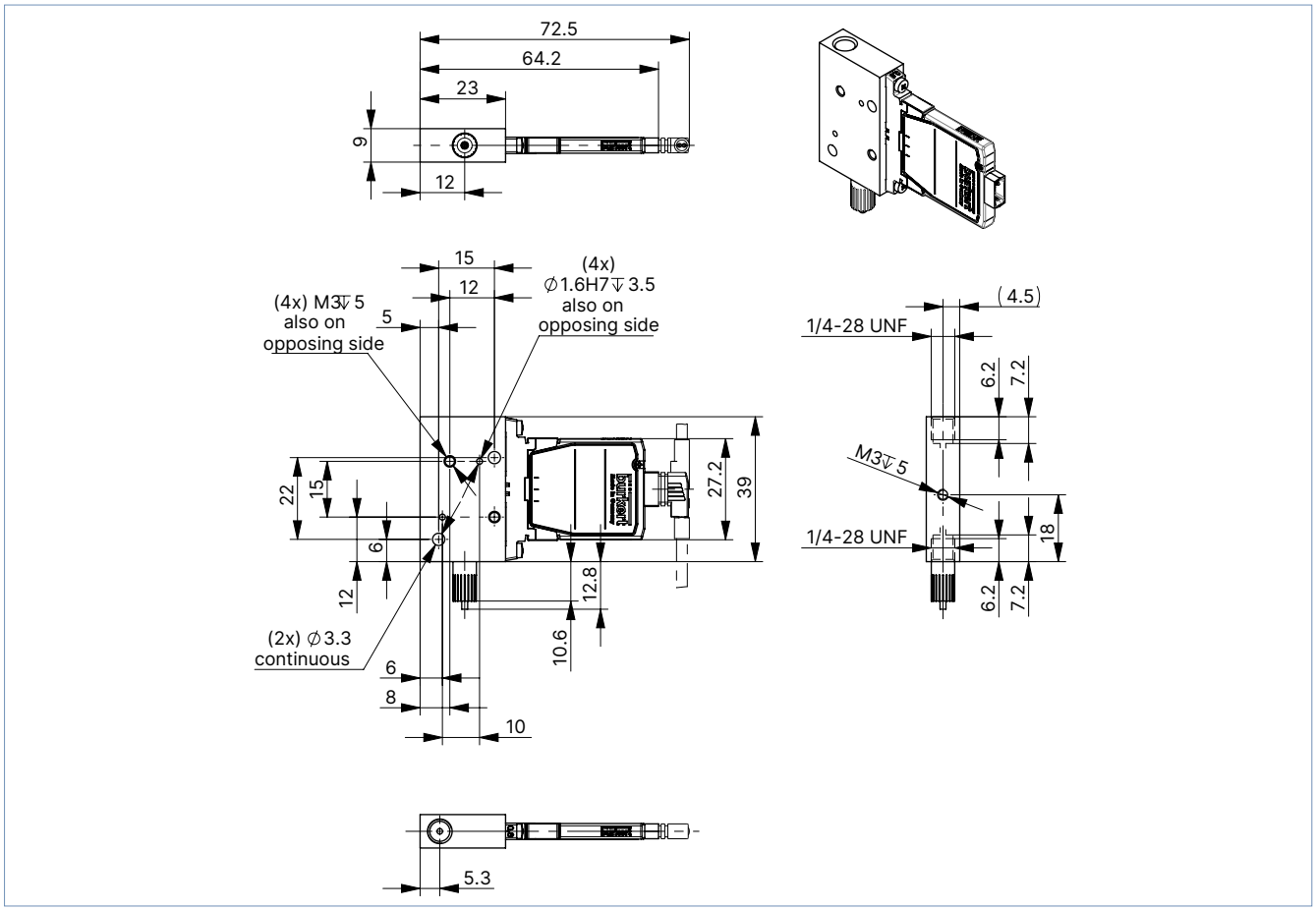
5. Dimensions

5.1. 1-station dosing head

Note:
Dimensions in mm



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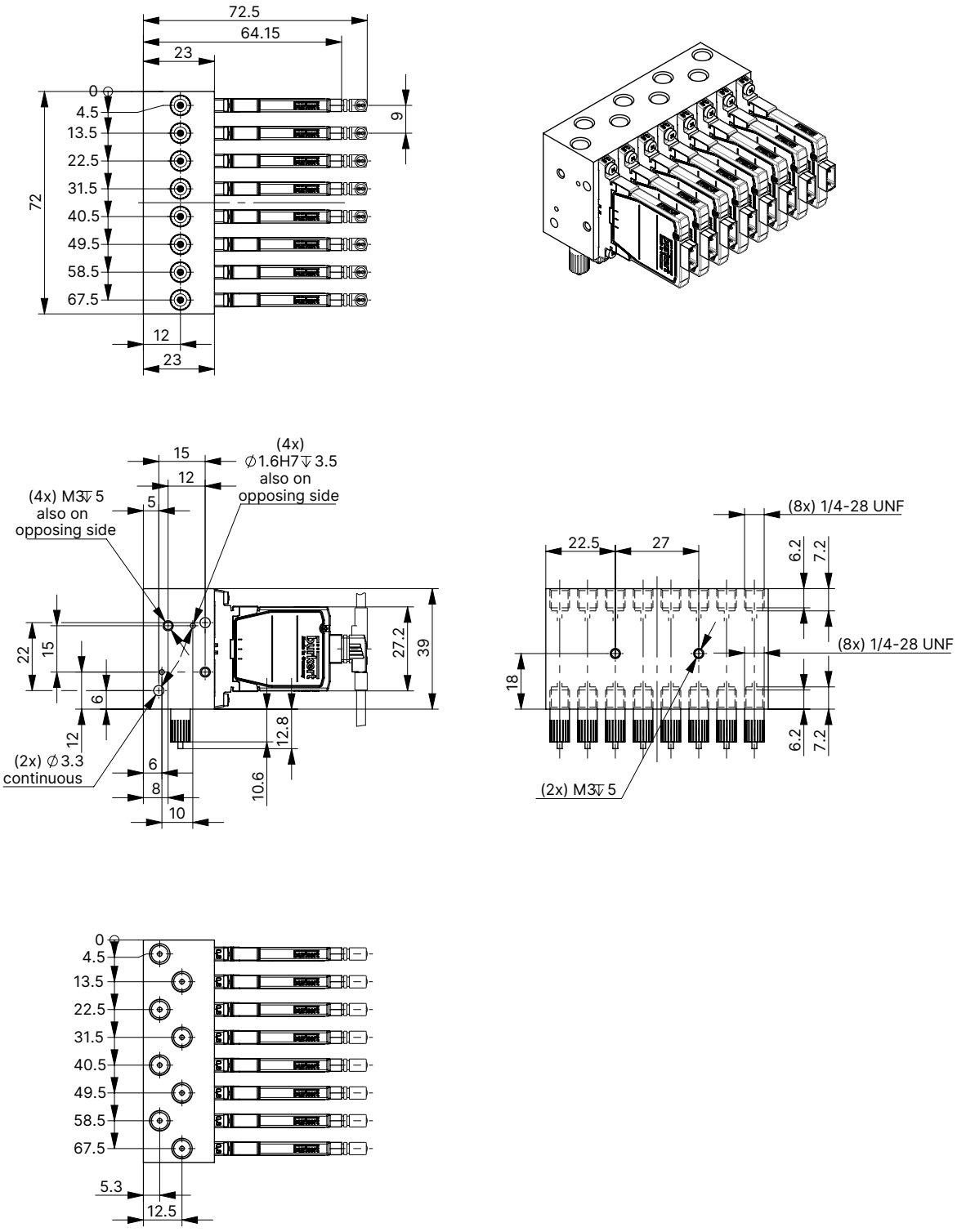
5.2. 8-station dosing head

Note:
Dimensions in mm



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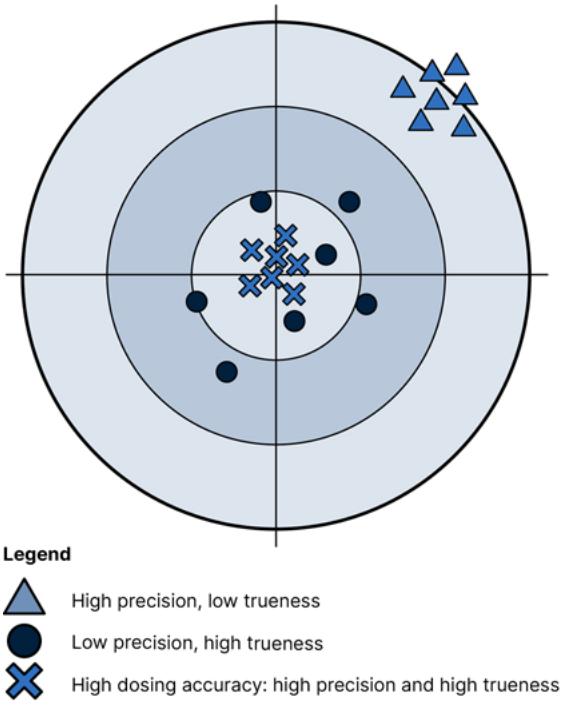
6. Performance specifications

6.1. General definition

Dosing accuracy

To achieve a high dosing quality, the right amount of fluid (dosing accuracy) must be delivered to the right place (target precision) at the right time. Dosing accuracy encompasses both the precision and trueness (or deviation) of a dosing series performed by a single valve. Precision refers to the closeness of agreement between several consecutive dosings by one valve. It is significantly influenced by the system design, including factors such as valve type, pressure regulation, tube diameters, and needle. The CV value (coefficient of variance) is typically used as a measure of precision.
Trueness (or deviation) describes the difference between the mean value of several dispenses and the target dosing amount. This deviation is a systematic error that can be fully compensated through adjustment. After a teach-in and under constant conditions, the dosing system exhibits excellent repeatability. This means that precise dosing accuracy can be consistently achieved across all dosing points, ensuring a high trueness of the entire system.
The following illustration clearly shows the relationship between precision and trueness.



Target precision

The target precision describes how precisely a target is hit over a defined distance between the dosing needle and the target. Typically a microtiter plate with 3.7 × 3.7 mm cavity size (384-well) can be precisely hit from a vertical distance of ≤ 50 mm.

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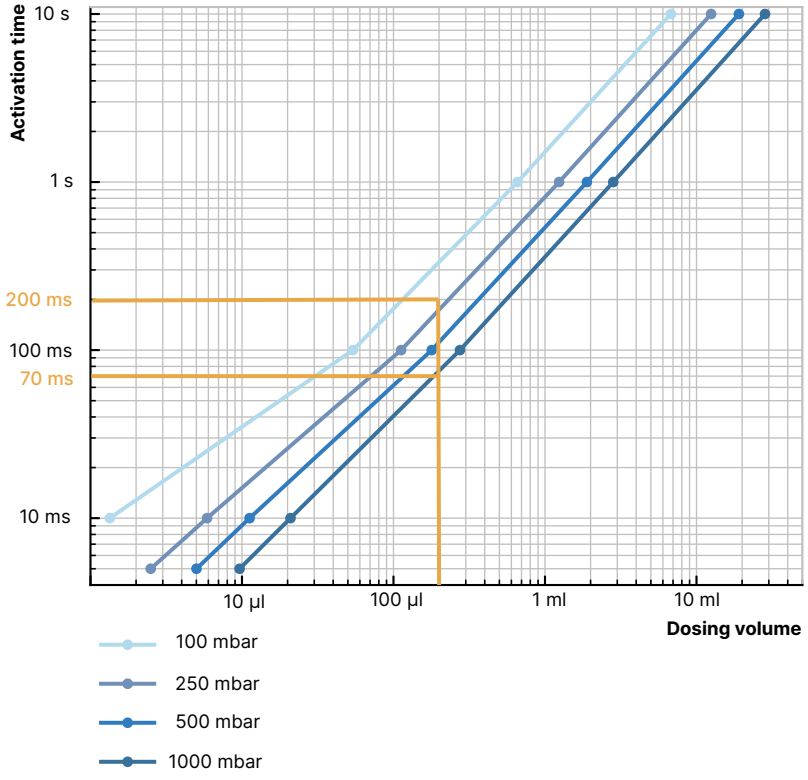
6.2. Reading example for the design of the dosing system

The following example shows how you can use the diagrams (see chapter "6.3. Diagram for dosing system design volume" on page 10) to correctly design your own dosing system. In this example, a target dosing quantity of 200 µl has been selected. To find the parameters, follow the 200 µl line vertically to the intersection of the pressure curve that seems most suitable for the application. From this intersection, follow the horizontal lines up to the 'Activation time' axis and obtain the corresponding valve activation time required. This time depends on the pressure and the needle diameter.
If you use a needle different from 0.95 mm, see the corresponding diagram. In this example at 250 mbar inlet pressure with the 0.95 mm needle, the activation time required for 200 µl is around 200 ms. If the inlet pressure is increased to 1000 mbar, the time is reduced to around 70 ms.

Dosing needle with 0.95 mm diameter, Type 6650, DN 0.8



6.3. Diagram for dosing system design volume

The diagrams are used to design the system. Different dosing needles are available depending on the application. The reading example describes how to read the diagrams depending on the requirements (see "6.4. Diagram for dosing system design accuracy" on page 12).

Note:
The following diagrams uses double-logarithmic scales so that the large volume range from microliter to milliliter range can be displayed. All illustrated results are real measured values determined using a defined reference set-up.

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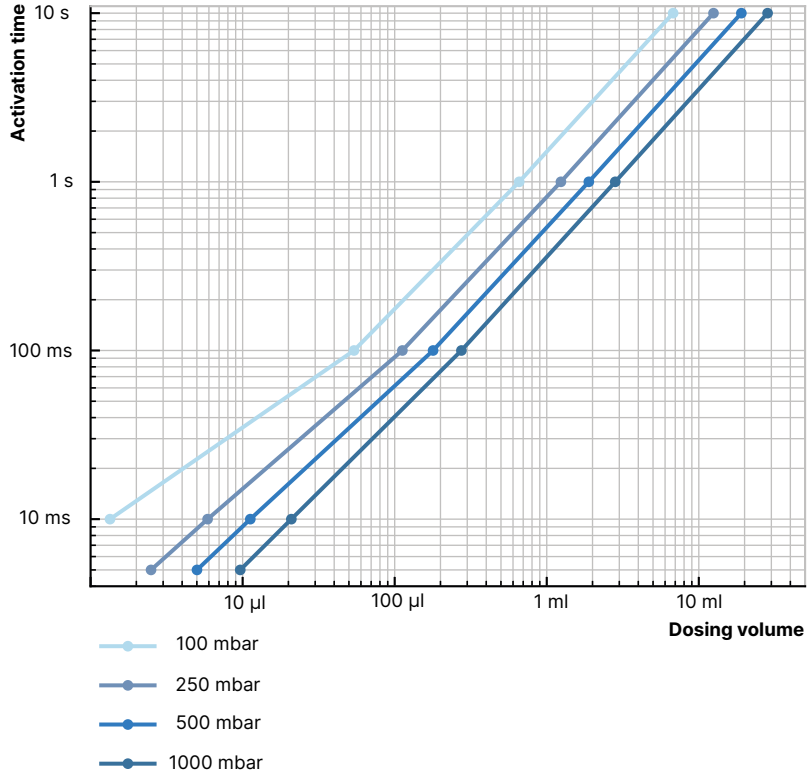
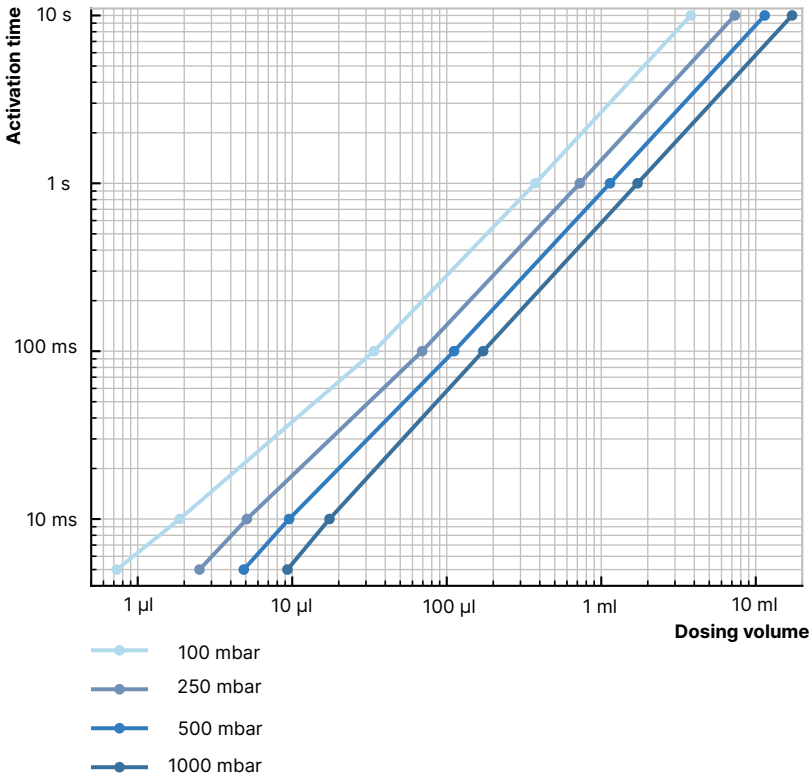
Dosing needle with 0.95 mm diameter, Type 6650, DN 0.8

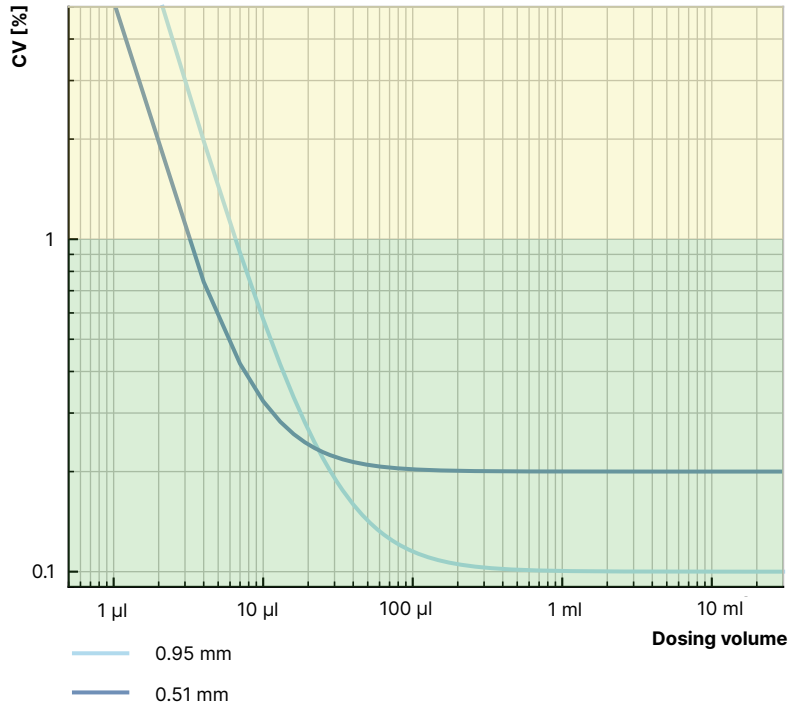


Dosing needle with 0.51 mm diameter, Type 6650, DN 0.8



6.4. Diagram for dosing system design accuracy

The achievable accuracy is often an additional criteria for selecting the right components. To specify the accuracy, the coefficient of variation (CV) is used. It describes the ratio of the standard deviation to the mean value over several doses.
The following diagram shows typical accuracy values depending on the needle and the dosing quantity. For larger quantities, the dosing needle with 0.95 mm diameter is generally more suitable with typical CV values in the 0.1 % range. For quantities < 20 µl, the dosing needle with 0.51 mm diameter typically offers higher accuracy over several dosings.



In addition to the accuracy of the individual dosing point, the sample distribution in systems with several dosing points is another important criterion. This distribution of the dosing points can be completely equalised by calibrating the dosing point with a so-called teach-in.

6.5. Reference setup

The data presented in the diagram pertains to a standardised measurement setup. Pressure is precisely regulated within a media container. A precision pressure regulator maintains constant pressure, ensuring repeatable conditions. The pressure values for the tests range from 100 mbar to 1000 mbar. Hoses with an internal diameter of 1.6 mm and a length of 500 mm supply the dosing heads. All measurements on the reference setup are conducted under laboratory conditions at + 23 °C.

7. Product installation

Further information can be found in the **operating instructions Type 5120** ▶.

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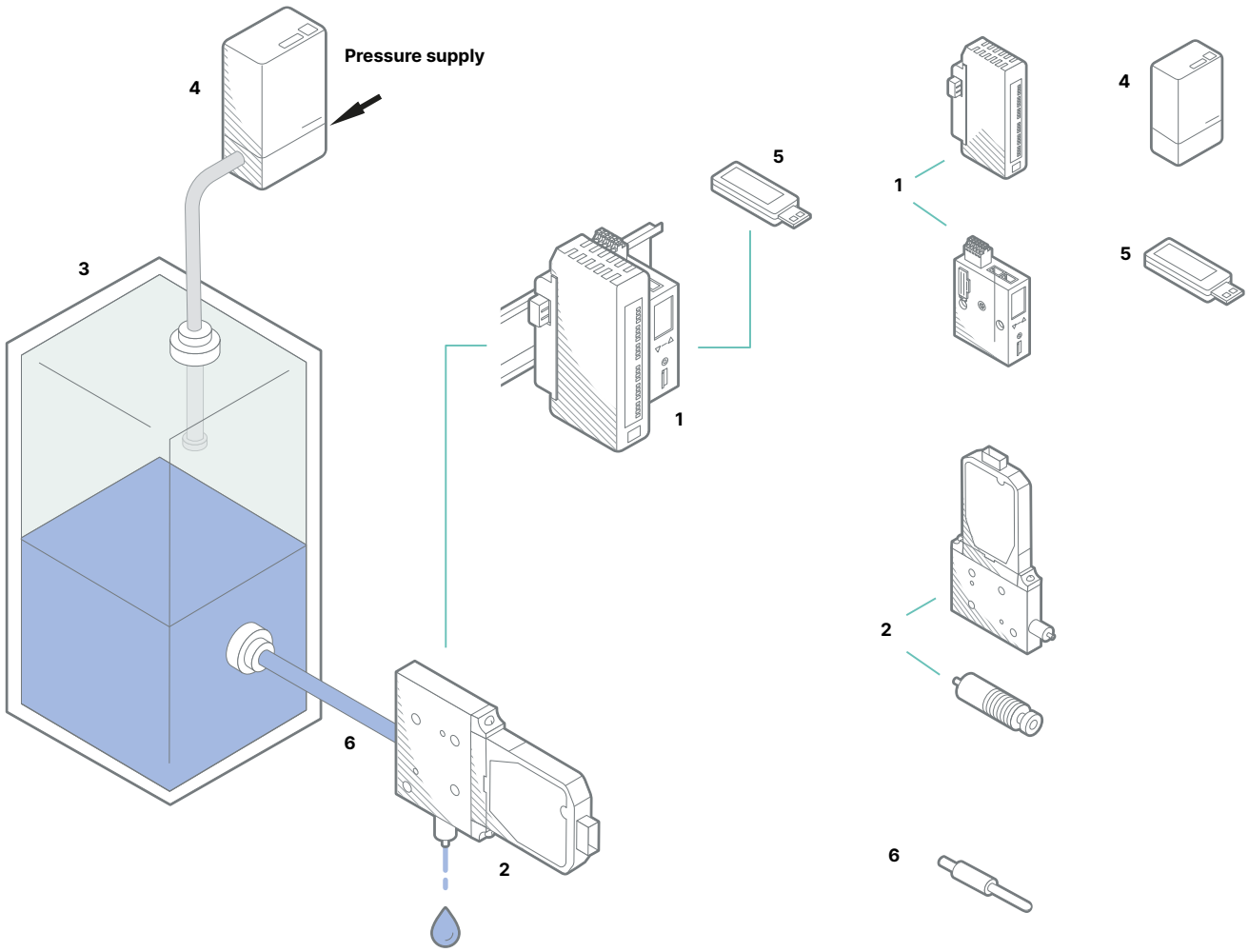
8. Networking and combination with other Bürkert products

8.1. Time-pressure dosing

Time-pressure dispensing is used for the precise dispensing of liquids for a variety of experiments, analyses or syntheses. This technology enables the controlled dispensing of reagents or solvents in laboratory equipment such as test tubes, petri dishes, sample containers or reaction vessels.

The liquids are contained in a suitable medium container which is pressurised to a defined pressure and kept stable by a precision pressure regulator. When the dosing valve is opened, the pressure causes the medium to be dispensed through a dosing needle. The dosing quantity is determined by the pressure in the container and the switch-on time of the valve. The pressure and time can be adjusted to optimise the dosing accuracy or to change the dosing quantity.



No.	Component	Description
1	Type ME43 fieldbus gateway and Type ME44 I/O module	Combination of gateway for industrial Ethernet and fieldbus standards (Type ME43) and output module (Type ME44) to control the impulse duration of the valves. To connect the gateway and the output module, a backplane (Type BPX3) is included.
2	Dosing head with flipper solenoid valve with media separation Type 6650	The dosing head consists of the distribution manifold for fluid handling, the dosing valve(s) and the dosing needle(s).
3	Medium container	The medium container stores the substance to be dosed. Here, the medium is pressurised.
4	Pressure controller for precise pressure-time dosing Type 8763 LFPC	The pressure controller regulates the target pressure inside the medium container.
5	büS stick Type 8923	The interface sets consist of a USB-büS stick and the necessary connection cables to establish the connection. The büS stick (Type 8923) and the Bürkert Communicator software (Type 8920) are mandatory for system setup.
6	Tubings and fittings	The tubings and fittings are needed to connect all fluidic components (Type TVU003).

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9. Ordering information

9.1. Bürkert eShop

Bürkert eShop – Easy ordering and quick delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

Order online now

9.2. Bürkert product filter

Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements?
Use the Bürkert product filter and find suitable articles for your application quickly and easily.

Try out our product filter

9.3. Bürkert 3D model of 1-station and 8-station dosing head

Bürkert 3D model – Interactive animation

The 3D model and interactive animation are available on the website of the dosing head Type 5120.

See website of the Type 5120 ▸ under "Applications and Tools".

9.4. Ordering chart

Note:
Further information can be found in chapter "2.1. Overview of functional elements" on page 4.

9.5. Ordering chart accessories

Note:
Special designs for connection plates on request

Description	Article no.
Bürkert Communicator software	Download from **Type 8920** ▸
USB büS interface set 1 (Type 8923) for connection to the Bürkert Communicator software: includes connection cable (M12 and micro USB), stick with integrated terminating resistor, power supply and software	772426
büS Y-plug	772420
Programming cable büS stick, cable length: 700 mm	774863
Adapter cable büs stick, cable length: 200 mm	774862
DC cable for gateway signal, cable length: 300 mm	60029077

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Pressure controller for precise pressure-time dosing (Typ 8763) (other variants on request)	318291
Gas/air pump SP 570 EC, 12 V DC (250 mA), ≥ 2 l/min, ≥ 1000 mbar	906327
Gas/air pump SP 600 EC-DV, 12 V DC (400 mA), ≥ 3 l/min, ≥ 1300 mbar	906379
Gas/air pump SP 620 EC-BL-DV, 12 V DC (500 mA), ≥ 2.8 l/min, ≥ 1300 mbar, brush-free	906380
Cable plug for Type 6650 valve with cable, 2-pin, single cable, cable length: 500 mm (Type 2504)	670164
Cable plug for Type 6650 valve with cable, 2-pin, cable length: 5 m (Type 2504)	680840
Type TVU003 fittings with UNF thread ¼"...28 (PEEK)	60021735
Type TVU003 collet ⅛" (PTFE), yellow	787061
Threaded bottle DURAN® pressure plus, clear glass, 1000 ml	907524
Multiple distributor, screw cap GL 45 with 4 threaded necks and hose connection set	60024904
Dosing needle, diameter: 0.95 mm	60021738
Dosing needle, diameter: 0.51 mm	60039435

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