

EcoMCC3 20

Low Pressure Color Changer

Operation manual

MCC00003EN, V04



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Translation of the original operation manual

MCC00003EN, V04

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Information about the document

This document describes the correct handling of the product.

- » Read the document prior to every activity.
- » Prepare the document for the application.
- » Pass on the product only together with the complete documentation.
- » Always follow safety instructions, handling instructions and specifications of every kind.
- » Illustrations can deviate from the technical construction.

Validity range of the document

This document describes the products with the following material numbers:

K17550004V
EcoMCC3 20



N14800002V
EcoMCC3 20



Hotline and Contact

If you have queries or would like technical information, please contact your dealer or sales partner.

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1 Product overview

1.1 Overview

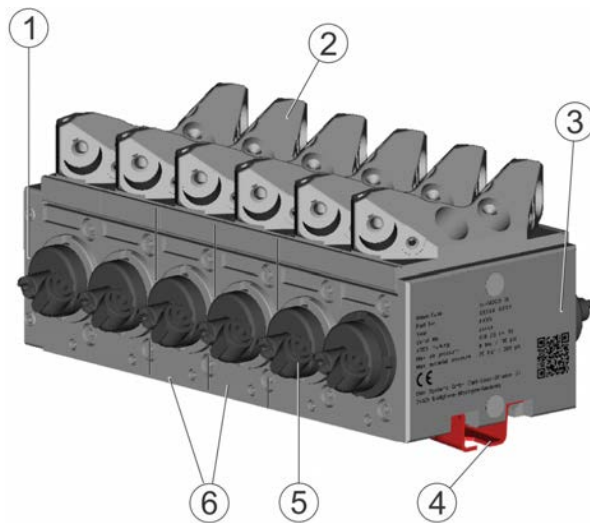


Fig. 1: Overview

- 1 Material outlet
- 2 Hose connection material inlet
- 3 Type plate
- 4 Profile rail
- 5 Control air valve
- 6 Connector block

1.2 Short description

Color changers switch the color of the paint supplied to atomizers in painting applications. Depending on their design, the feed lines for the different colors run in a single channel (1-channel color changer) or in two independent channels (2-channel color changer). Valves in the connector block of the color changer control the material flow.

2 Safety

2.1 Presentation of Notes

The following notes can appear in this instruction:

DANGER!

High risk situation that can lead to serious injuries or death.

WARNING!

Medium risk situation that can lead to serious injuries or death.

CAUTION!

Low risk situations that can lead to minor injuries.

NOTICE!

Situations that can lead to material damage.

ENVIRONMENT!

Situations that can lead to environmental damage.

Additional information and recommendations.

2.2 Intended Use

The modular color changer **EcoMCC3 20** is designed for the use in industrial paint applications in potentially explosive atmospheres. The color changer may only be used within the approved technical data and in areas conforming to the EX labeling 12 "Technical data".

Misuse

If used improperly, it can cause serious injuries.

Examples of wrong use are:

- » Use in explosive areas Ex zone 0
- » Unauthorized modification

EX labelling

II 2G Ex h IIA T6 Gb X

- II - Device group II: all areas except mining
- 2G - Device category 2 (for gaseous atmosphere)
- h - Ignition protection category
- IIA - Explosion group
- T6 - Temperature class
- Gb - Device category and device protection level: Gb (zone 1)
- X - Restriction: The device is configured for operation in an ambient temperature of 15°C to 40°C.

The color changer is approved for areas with potentially explosive atmospheres. The color changer control unit must be approved for use in the EX zone or placed outside the EX zone.

2.3 Safety devices

The operator must install safety devices securing the operation in potentially explosive area and conforming to the health requirements and safety requirements according to EC Machinery Directive 2006/42/EC.

This could be, for example, the following safety devices for the complete system:

- » Fire protection
- » Entry protection
- » Technical ventilation
- » Emergency stop function

The painting booth must meet the requirements of EN 12215 "Coating plants - Spray booths for application of organic liquid coating materials - Safety requirements".

The control must meet the requirements of Performance Level d of EN 13849-1 "Safety of machines - Safety-related parts of controls - Part 1: General Design Principles".

More information is available in the German DGUV Information 209-046 "Lackierräume und -einrichtungen für flüssige Beschichtungsstoffe" and DGUV Information 209-052 "Elektrostatiches Beschichten".

The following norms are applicable based on the coating material used:

- » Flammable coating materials:
 - » EN 50176 "Stationary electrostatic application equipment for flammable liquid coating material - Safety requirements".
- » Non-flammable coating materials:
 - » EN 50348 "Stationary electrostatic application equipment for non-flammable liquid coating material - Safety requirements".

2.4 Safety signs

No special security markings are made on the color changer.

2.5 Residual risks

Fires

Fire hazard when handling flammable coating materials and cleaning agents.

- » The color changer including fire safety must be integrated in a safety concept conforming to ↪ 2.3 "Safety devices".
- » Observe coating materials and cleaning agent safety data sheets.
- » Observe the ban on smoking in the danger zone and nearby areas. Handling of open flames, fire and other ignition sources is forbidden.
- » Observe all general safety instructions.

Hazardous substances

Contact with hazardous liquids or vapors can cause serious injury or death.

- » The color changer must be integrated in a complete system safety concept including mechanical ventilation.
- » Observe coating materials and cleaning agent safety data sheets.
- » Wear specified protective equipment.

Media

Materials and control air are under high pressure and can cause serious injuries.

- » Depressurize the system before any maintenance work and protect it against reconnection.
- » Observe approved operating pressures ↪ 12 "Technical data".

High voltage

In direct charging mode the color changer is under high voltage and can cause death or serious injuries by electrical shock and discharge.

- » Ensure complete discharge by means of an grounding rod before touching the color changer.

2.6 Property damage

Replacement Parts

Replacement parts that are not approved by Dürr Systems may not withstand the full operational loads.

It can result in property damage and production disruption.

- » Use exclusively original replacement parts.

Property damage due to hardening material

The master lacquer-hardener mixture hardens on expiry of the pot time. If the material in the product hardens or components come in contact with the master lacquer-hardener mixture, the product will be damaged or destroyed.

- » Observe pot time ↪ 12.10 "Material specification".
- » Purge product ↪ 7.3 "Rinsing", e. g. in the case of:
 - » Production interruptions
 - » Production end

2.7 Conduct in the event of a hazardous situation

Conduct in case of danger depends on the operator's installation situation.

Basically:

- » Shut down the power supply.
- » Secure against reconnection.
- » Discharge the residual energy.
- » Verify no current is present.
- » Close media lines.
- » Relieve the lines.

2.8 Emergency shutdown

1. Press an Emergency Stop button:
 - » on the operation console of the robot station
 - » in the painting booth
2. Pay attention to the company's internal emergency regulation.

2.9 Installation schematic

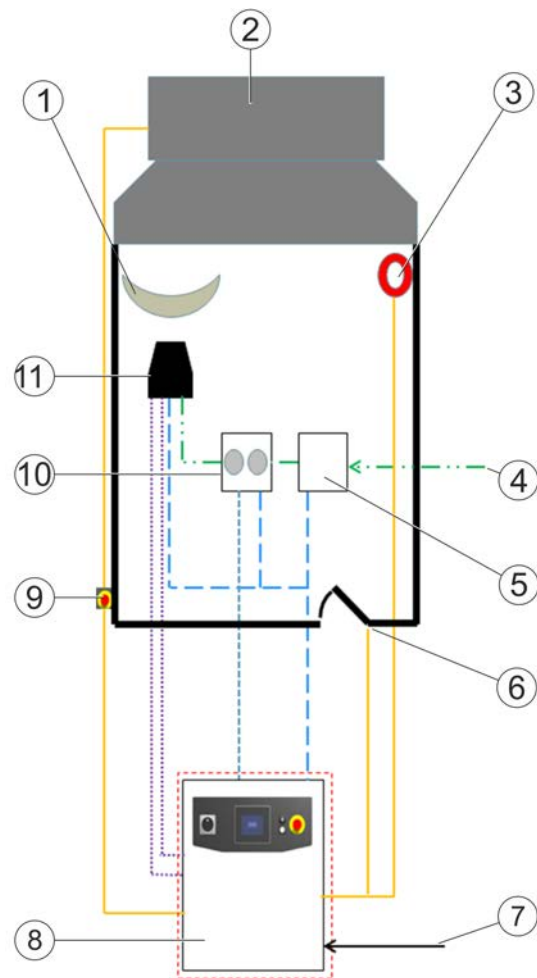


Fig. 2: Installation plan

- Emergency stop circuit
- Cabin wall
- ... High voltage
- ... Medium
- - - Pneumatic system
- - - Drive
- 1 Work piece
- 2 Technical ventilation
- 3 Infrared flame detector
- 4 Paint Supply
- 5 Color changer
- 6 Entry protection
- 7 Power supply and air supply
- 8 Control cabinet
- 9 Emergency stop outside the booth
- 10 Gear wheel pump
- 11 Atomizer

2.10 Staff qualification

WARNING!

Inadequate qualification

Wrong estimation of dangers can cause serious injury or death.

- Only sufficiently qualified persons may execute all work.
- Some work requires additional qualification. Additional qualifications of specialized personnel are marked with a “+”.

This document is intended for qualified personnel in industry and craftsmanship.

Electrician

Electricians assemble, install, service and repair electrical systems in a professional manner.

Furthermore, electrical engineers have the following knowledge:

- » Guidelines, Standards and Rules of Engineering
- » Local conditions
- » Electrical Systems and Their Loading Limits
- » Technical Measures for occupational safety and health

Mechanic

The mechanic is trained specifically for the field of work in which he works.

Furthermore, he has the following knowledge:

- » Guidelines, Standards and Rules of Engineering
- » Local conditions
- » Technical Measures for occupational safety and health

The mechanic is responsible for the following activities on equipment and components:

- » Assembly
- » Waiting
- » Maintenance
- » Disassembly

+ additional qualification explosion protection

In addition to the knowledge of the various specialist fields, the mechanic has knowledge of regulations and safety measures when working in potentially explosive areas.

Dürr Systems offers special product training for ☞ “Hotline and Contact”.

2.11 Personal protective equipment

Wear the required personal protective equipment when working. Provide the following personal protective equipment:



Anti-Static Safety Boots

Protect feet from crushing, falling items and slipping on slippery ground.

Moreover, anti-static safety boots reduce electrostatic charge by discharging the electrostatic charges.



Eye protection

Protects eyes from dust, paint drops and particles.



Protective gloves

Protect the hands from:

- » mechanical forces
- » Thermal forces
- » Chemical effects



Protective workwear

Tight fitting workwear with low tear strength, tight sleeves and no hanging parts.



Respirator mask

Protects from hazardous gases, vapors, dust and similar materials and media.



Safety boots

Protect feet from crushing, falling items and slipping.

3 Design and Function

3.1 Color changer

3.1.1 Design

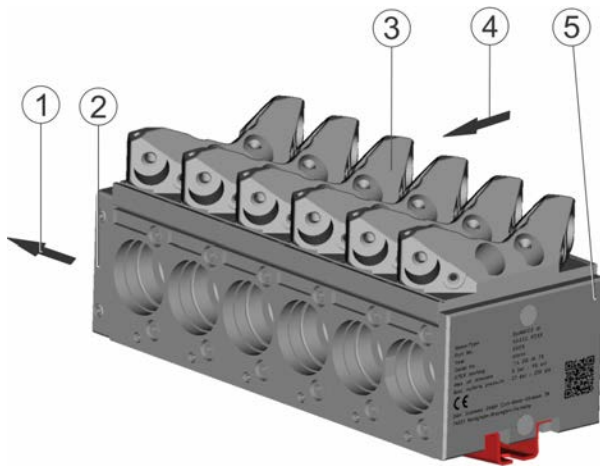


Fig. 3: Color Changer without valves and push-in fittings

- 1 Material outlet
- 2 Connector plate
- 3 Middle block
- 4 Material inlet
- 5 End block

Connector plate

The dosing pump, paint pressure regulator, atomizer and other components can be connected to the connector plate. The middle channel of the color changer leads into the subsequently connected component. The connector plate comes in different designs and is screwed onto the last block of the color changer.

Example: Connector plate with connection for Dürr color gland

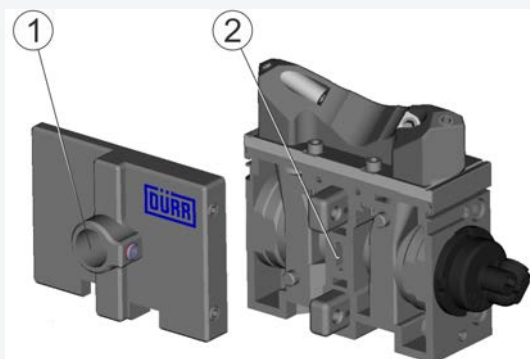


Fig. 4: Connector plate with adapter

» The downstream components are connected to the middle channel (2) via an adapter (1).

Middle blocks

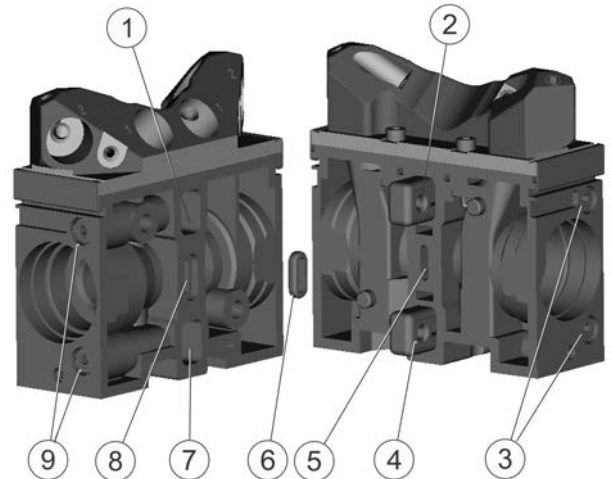


Fig. 5: Block connection

The color changer has a modular design. Any number of blocks can be connected to each other. Different types of blocks fulfill different requirements.

The individual blocks are connected by pins (2), (4) and matching holes (1), (7) and fastened with clamping bolts (3), (9). The middle channel (5), (8) is sealed with a custom seal (6).

For information on connecting the blocks see [9.4 "Assembly"](#).

End block

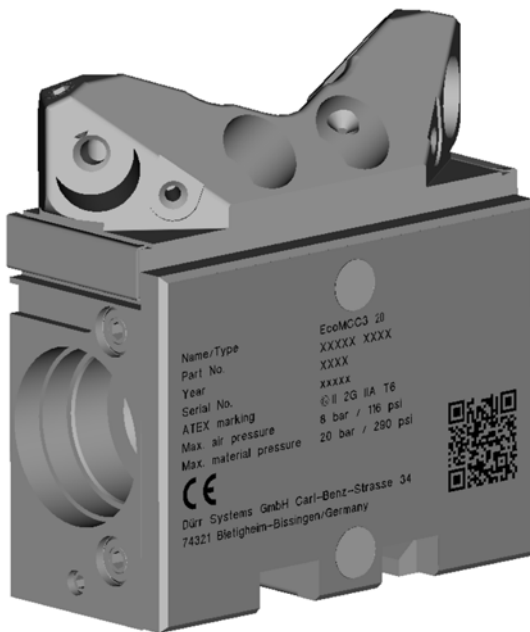


Fig. 6: End block with type plate

Here the middle channel of the color changer ends in an end block.

Custom color blocks

A custom color, a lower quantity application, can be connected to the custom color block. The custom color can also be pressed in, scraped off and cleaned in the custom block. Custom color blocks are wider than normal middle blocks. Different custom color blocks are required for 1-channel and 2-channel color changers.

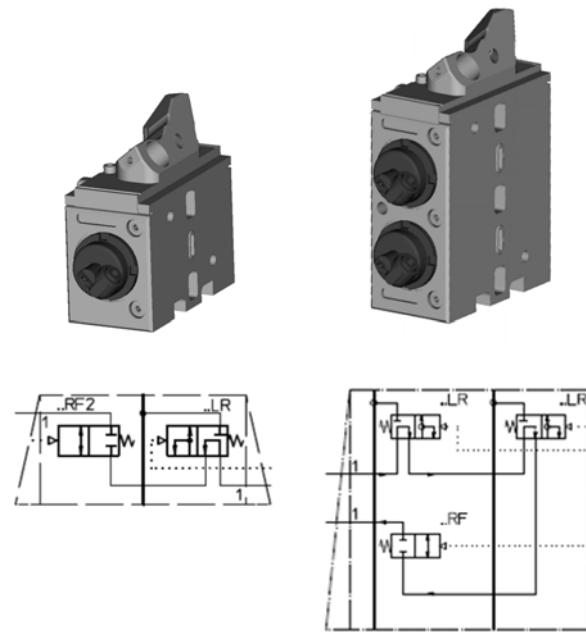


Fig. 7: Custom color blocks

3.1.2 Designs

Color changers are available in two versions:

- » Color changer with one middle channel (1-channel color changer)
- » Color changer with two independent channels (2-channel color changer)

1-channel blocks and 2-channel blocks must not be combined with each other.

The procedures described in this instructions manual are examples and ensure safe operation of all versions.

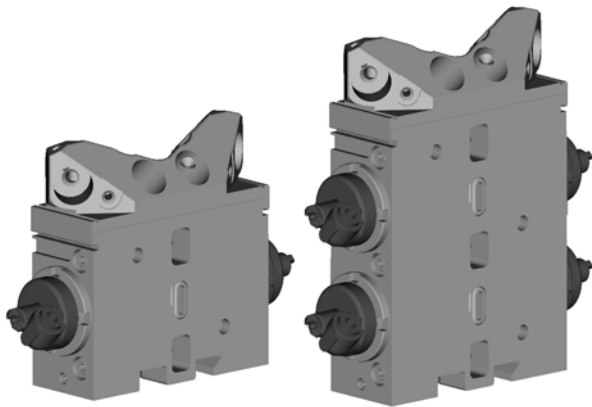


Fig. 8: 1-channel block and 2-channel block

The 1-channel color changer is used in systems with a single color line. The 2-channel color changer is used in systems requiring fast color changes. While the color in the upper channel is applied, the next to be used color can be pressed in the bottom channel.

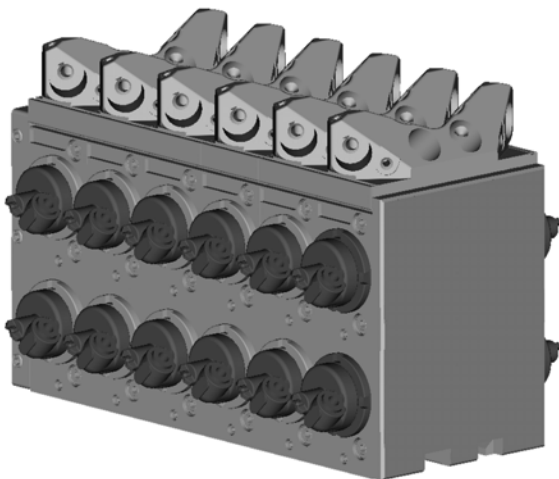


Fig. 9: 2-channel color changer

3.2 Valves

3.2.1 Construction

2/2-directional control valves are screwed into the color changer.

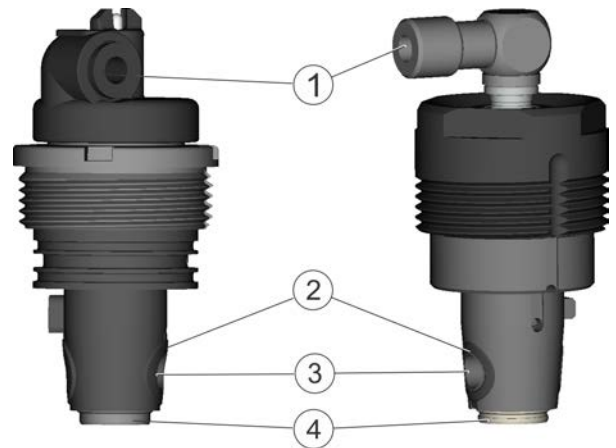



Fig. 10: Valve

- 1 Control air connection
- 2 Molded seal
- 3 Material inlet
- 4 Middle channel seal

 By default, plastic valves are used in the color changer, and stainless steel valves are an option ↪ 9.4.2 “Assembling valves”.

Both valves have cylindrical bodies. The top is housing the pneumatic actuator with piston and compression spring. The bottom part contains the valve needle with material inlet and material outlet and depending on the design also a paint circulation channel. The piston and valve needle move in the housing. A spring is pressing on the piston to keep the valve closed.

3.2.2 Designs

Depending on the application, different 2/2-directional control valves are used in the color changer.

- » Plastic valve without paint circulation
- » Plastic valve with paint circulation
- » Stainless steel valves without paint circulation
- » Stainless steel valve with paint circulation

Valves without paint circulation

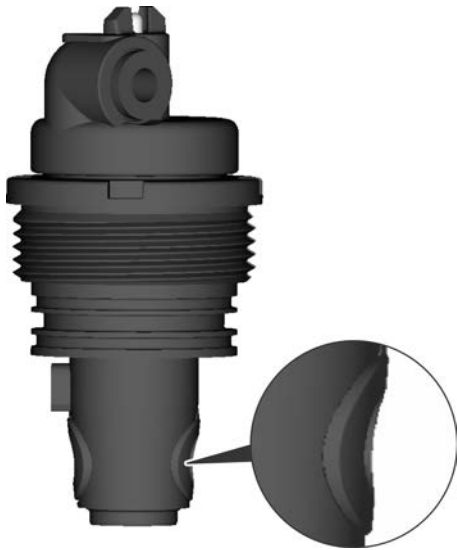


Fig. 11: Plastic valve without paint circulation

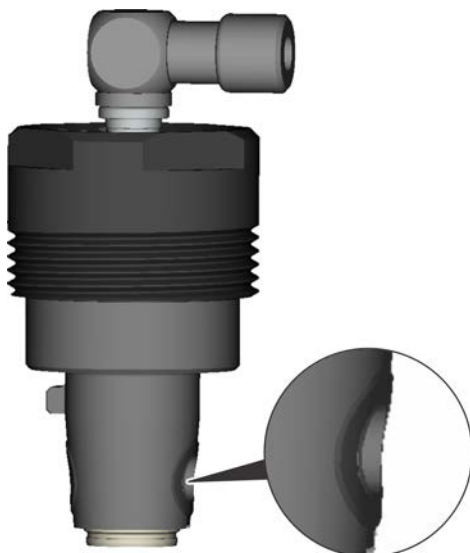


Fig. 12: Stainless steel valve without paint circulation

Valves without paint circulation are used as input. They have an inlet opening at the side. Valves without paint circulation are used in tap line operation. When the needle is closed, material is flowing through the inlet and stops behind the needle. Plastic valves without paint circulation are identified by a black groove nut, stainless steel valves by a black cap nut.

Valves with paint circulation

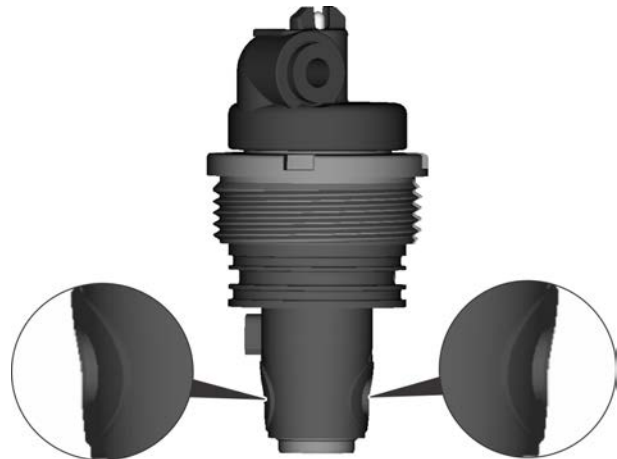


Fig. 13: Plastic valve with paint circulation

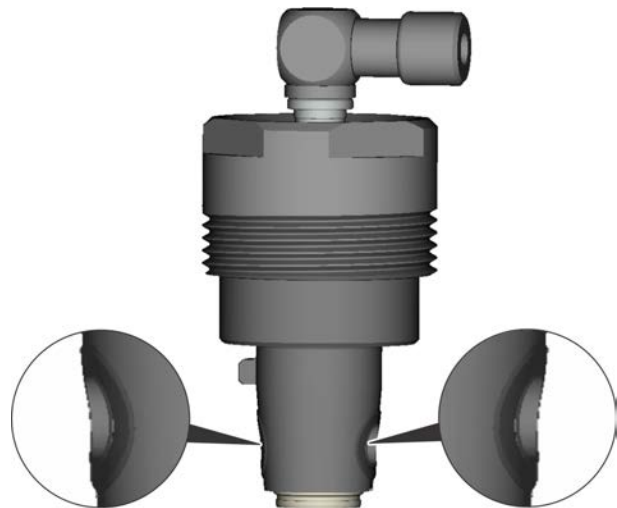


Fig. 14: Stainless steel valve with paint circulation

Valves with paint circulation are used as circulation valves. They have two openings at the side for inlet and recirculation of the media. When the valve is closed, material flows through the inlet. The material remains on the needle and flows through the recirculation to the paint supply. Plastic valves with paint circulation are identified by a gray grooved nut, stainless steel valves by a gray cap nut.

3.2.3 Operation

Plastic and stainless steel valves differ in their operation.

In the plastic valve a spring presses onto the bottom part of the piston and upon opening the valve is pushed into the color changer. A pin on the valve lid indicates the state of the valve:

- » Valve closed: Pin stands out from the valve casing.
- » Valve open: Pins countersunk in the valve casing

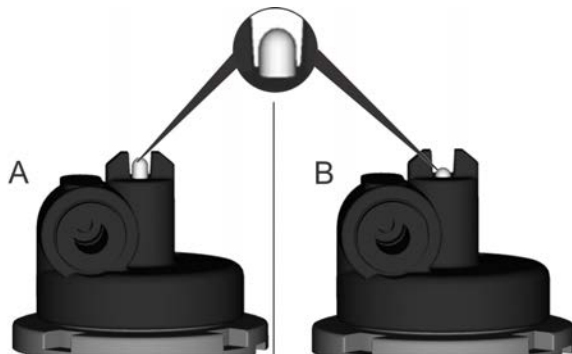


Fig. 15: Operation of plastic valve

- A Valve closed
- B Valve open

In the stainless steel valve a spring presses onto the upper part of the piston and upon opening the valve is pushed out of the color changer. This creates a stroke of 5mm. The position of the control air connection indicates the state of the valve:

- » Valve closed: Control air connection on top of the valve casing.
- » Valve open: Control air connection stands out from the valve casing.

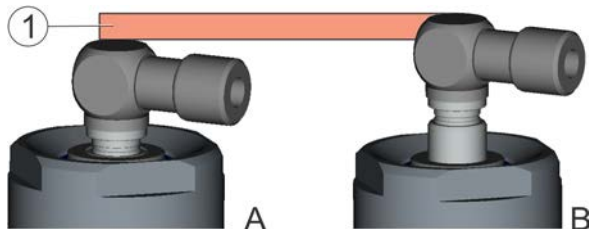


Fig. 16: Operation of stainless steel valve

- A Valve closed
- B Valve open
- 1 Stroke

i The steps to assemble, commission and maintain the color changer are described using the plastic valve. Steps for the stainless steel valve are identical.

3.3 Pressure sensor

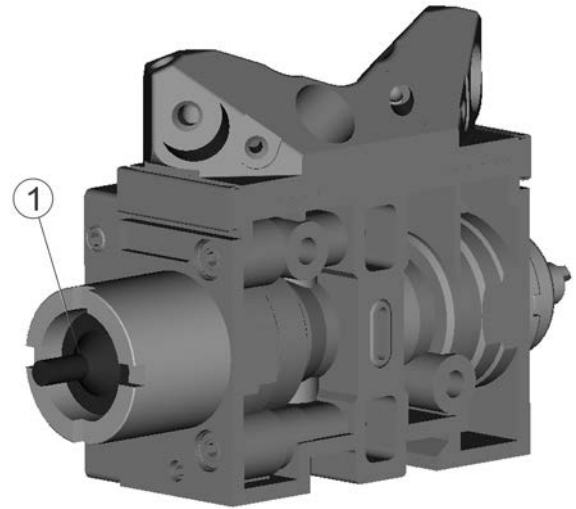


Fig. 17: Pressure sensor

A pressure sensor (1) can be installed in the color changer to replace the valve. The pressure sensor contains a measuring membrane to indicate the pressure in the paint channel to the control unit. The control unit monitors the pressure in the color changer and issues a signal on deviation.

3.4 Connections

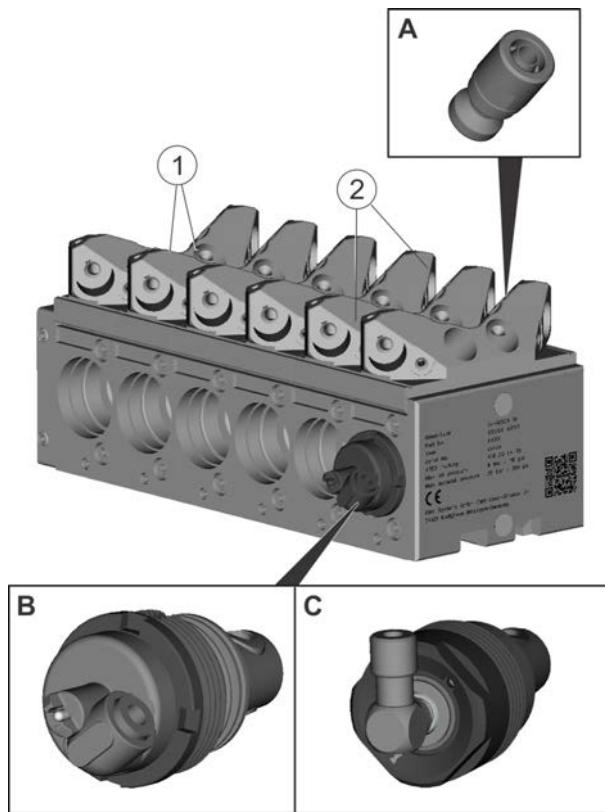


Fig. 18: Connections

Each block has two threaded connectors (1) and (2) each, which are fitted for the different media. The inner threaded connectors (1) of the connection block are attached to the feed lines. The outer threaded connectors (2) of the connection block are attached to the return lines. Return lines are required for valves with paint circulation. The threaded connectors (2) remain unused for valves without paint circulation.

Hoses are attached to the push-in fittings (A) ↪ 5.2 “Connecting the color changer”. The plug-in connector (A) is directly screwed into the threaded connectors (1) and (2).

The pneumatic valves (B) and (C), screwed into the color changer, use compressed air to control the material flow into the middle channel.

Version

The color changer can be connected in two different ways:

- » Left version
- » Right version

Special blocks are available for both versions.

↪ 13.1 “Replacement parts”

Left version

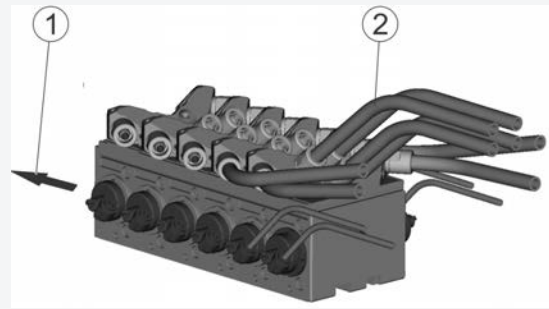


Fig. 19: Left version

- 1 Flow direction
- 2 Hose

In the left version, the hoses are connected from the right; the material flows from the color changer to the left. The connector plate is located left of the color changer.

Right version

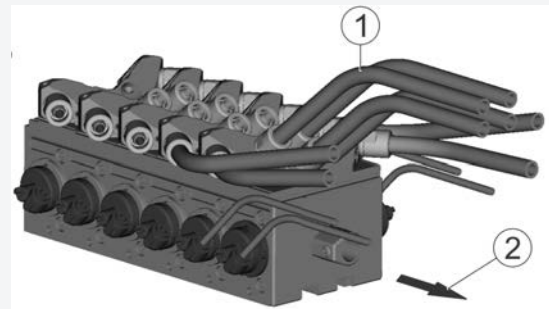


Fig. 20: Right version

- 1 Hose
- 2 Flow direction

In the right version, the hoses are connected from the right; the material flows from the color changer to the right. The connector plate is located right of the color changer.

3.5 Connection types

Depending on the connected push-in fittings and valves used the color changer is suitable for “tap line” or “circulation”.

“Tap line” connection: paint flows into the valve without circulation and stops at needle until needle opens.

In the “Circulation” connection type: paint flows into the valve with paint circulation, stops at the needle seat and flows towards the return line. This prevents easily settling paint from blocking the valve.

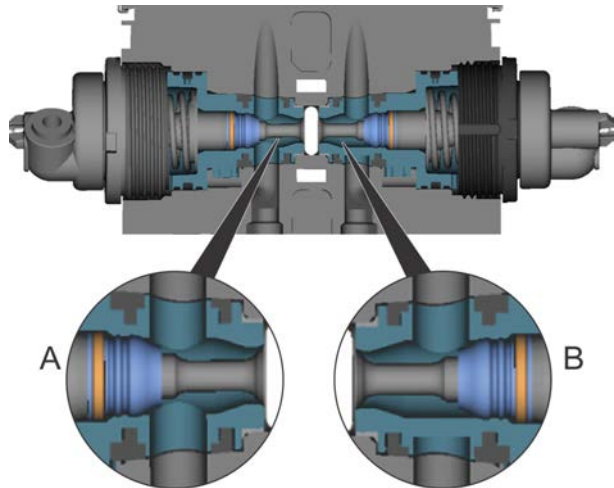


Fig. 21: Plastic valve

- A Circulation
- B Tap line

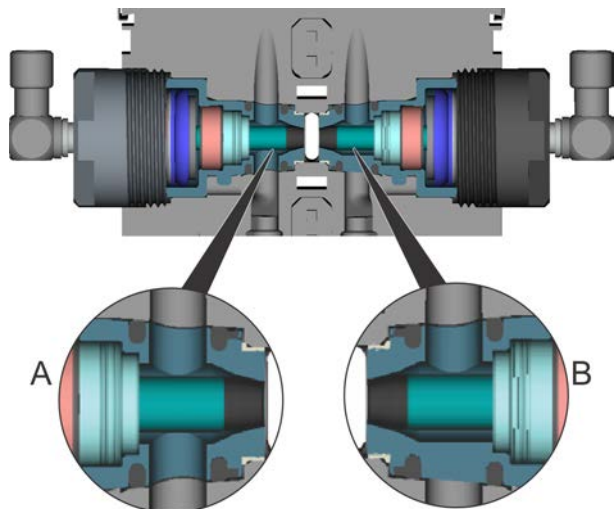


Fig. 22: Stainless steel valve

- A Circulation
- B Tap line mode

1-channel color changer in tap line mode

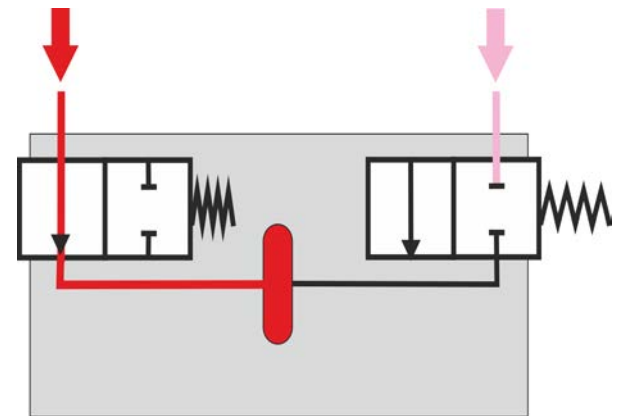


Fig. 23: Tap line mode for 1-channel color changer

When the 1-channel color changer is used in tap line mode, two separate feed lines feed a common color channel. Two supply lines are connected to each block, through which different paints can be fed to the color changer. The flow is controlled by valves without paint circulation.

1-channel color changer in circulation mode

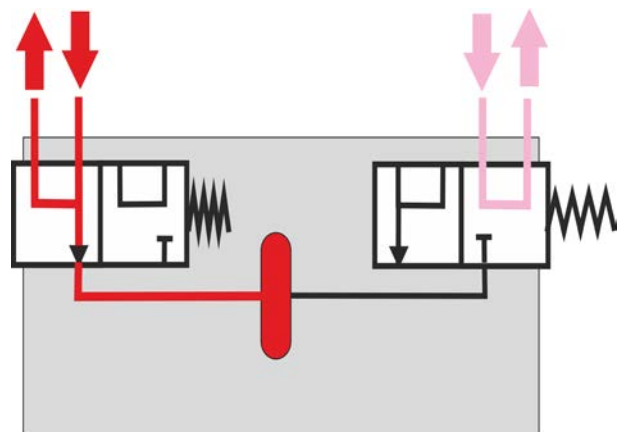


Fig. 24: 1-channel color changer in circulation mode

When the 1-channel color changer is used in circulation mode, two extra return lines are connected. The flow is controlled by valves with paint circulation.

2-channel color changer in tap line mode

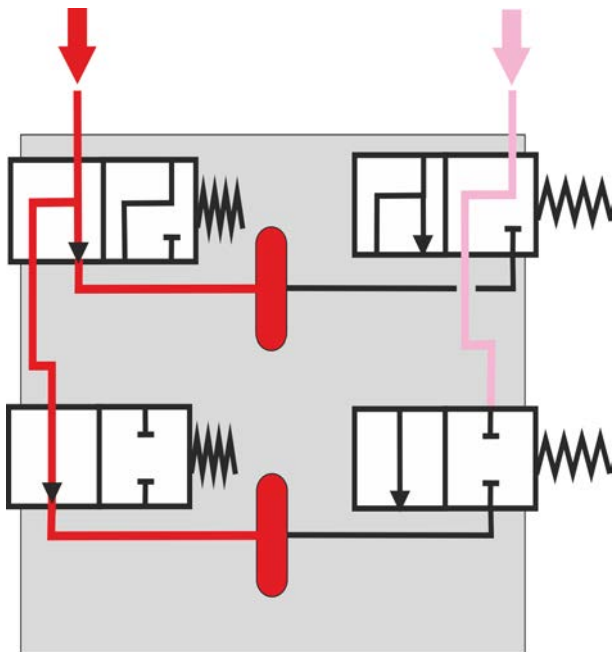


Fig. 25: Tap line mode for 2-channel color changer

When the 2-channel color changer is used in tap line mode, two independent parallel channels are fed by a single feed line in the block. Two lines are connected to each block feeding the different colors to the color changer. To supply material to the bottom row, the top row must be fitted with valves with paint circulation. The bottom row is controlled by valves without paint circulation.

2-channel color changer in circulation mode

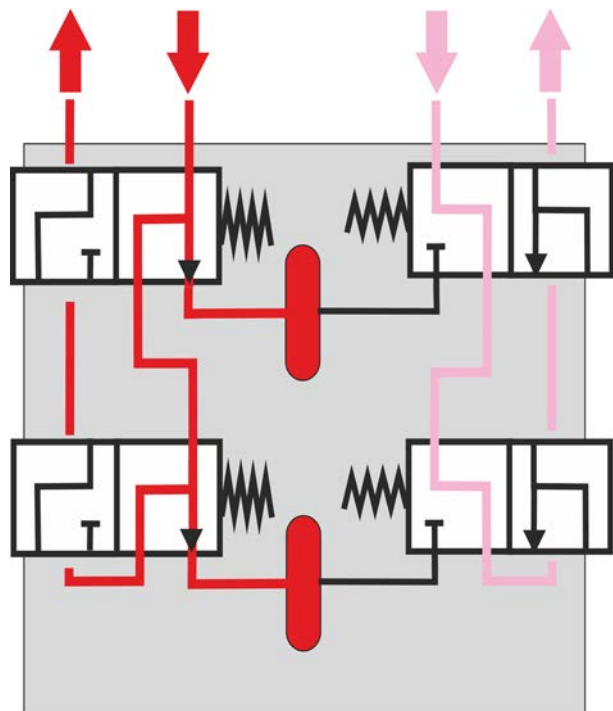


Fig. 26: 2-channel color changer in circulation mode

When the 2-channel color changer is used in circulation mode, two extra return lines are connected. The flow in both rows is controlled by valves with paint circulation.

4 Transport, scope of supply and storage

4.1 Transport

! NOTICE!

Property damage due to improper transport

Improper transport of the color changer may cause damage.

- Protect the color changer from shock.
- Protect the color changer from moisture.
- Protect the color changer from vibration.

4.2 Scope of delivery

The scope of supply only includes the color changer.

Inspect delivery on receipt for completeness and integrity.

Report defects immediately ↪ "Hotline and Contact".

4.3 Packaging

Unpacking

1. Check the packaging for damage.
 - ⇒ Immediately notify the customer service of any damage.
2. **DANGER!**
Danger of explosion from static charges on plastic film and foils
 Remove all plastic wrapping from the color changer before entering potentially explosive atmospheres.
3. **ENVIRONMENT!**
Incorrect disposal
 Incorrectly disposed packaging material can damage environment.
 - Dispose of material no longer required in an environment-friendly manner.
 - Observe local disposal specifications.
4. Check the unwrapped color changer for damage.
 - ⇒ Immediately notify the customer service of any damage.
5. Transport the color changer to the assembly location.

Packing

Initial situation:

- » Hoses, connections and valves are disassembled.
 - » ↪ 9.3.2 “Disassembly of hoses and components”
 - » ↪ 9.3.4 “Disassembling hoses, connections and valves”
 - » Color changer is cleaned ↪ 8.2 “Cleaning”.
1. Pack the color changer in its original packaging.

If the original packaging is lost or damaged, the new packaging for storage or transport must ensure the following:

- Protection from dirt and dust
- Protection from moisture
- Protection from vibration and shocks

4.4 Storage

Storage of Replacement Parts

The same storage provision as for the color changer apply to the replacement parts.

Ambient Conditions

1. Observe the following environmental conditions for the storage of the color changer:
 - » Relative humidity: 35% – 90%
 - » Ambient temperature: 15°C to 40°C°°
 - » Protect from dust and dirt.
 - » Protect from direct sun light.
 - » Protect from vibrations.
 - » Protect from pressure loads.
 - » Observe the packaging instructions.
2. Insert plastic plugs into the threaded connections.
 - ⇒ Protect the inside of the color changer from dirt.

5 Assembly

5.1 Assembly of the color changer

DANGER!

Explosive atmosphere

The product is installed in potentially explosive atmospheres. Disregarding the safety regulations of these areas may cause death due to explosion.

- Stop the system before carrying out any work.
- Disconnect the system from compressed air and material supply system.
- Secure the system against being switched on again.
- Relieve the lines.
- Check for an explosive atmosphere prior to entering into a potentially explosive area.
- Integrate product in a safety concept. Pay attention to the details in ↪ 2.3 “Safety devices”.
- Observe all general safety instructions for handling the total system.

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Protective equipment:

- » Safety boots

1. Remove the plastic plugs from the threaded connections.

Do not discard the plastic plugs and reuse them when storing the color changer again (↪ 4.4 “Storage”).

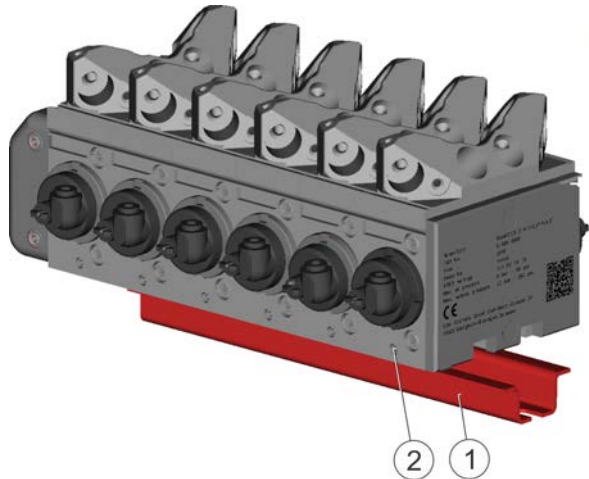


Fig. 27: Mount color changer on the profile rail

2. The color changer is delivered fully assembled and operational.

Place color changer on the profile rail (1).

3. **NOTICE!**
Leaking due to wrong positioning

Ensure that the color changer is mounted straight on the profile rail.

4. For color changers with up to 5 blocks, it is sufficient to only tighten the threaded pins of the first and last blocks. On longer color changers, threaded pins on at least every third block must be tightened.

Tighten threaded pins (2) by hand.
⇒ The color changer is mounted on the profile rail (1).

Personnel:

- » Electrician
- » + additional qualification explosion protection

Protective equipment:

- » Safety boots

1. Ground the color changer via the profile rail (1).

5.2 Connecting the color changer

Shorten hoses

Personnel:

- » Mechanic
- » + additional qualification explosion protection

To ensure proper functioning and to prevent a shorter life cycle of the hose lines due to additional stress, it is necessary to fulfill the requirements according to “DIN 20066:2012-01 - Fluid engineering - Hydraulic hose lines - Dimensions, Requirements”.

1. Cut off the first 30cm of the unrolled hose.
2. Straighten out the hose by hand.
3. Observe the bend radii of the hoses.
4. Use a hose cutter to cut off the hose at right angle to a length including sufficient reserve length.
5. Check hoses for soiling. Check hoses and blow out any contaminants with compressed air.
6. Connect hose to the plug-in fittings.

Connect hoses

NOTICE!

Damage due to wrong traverse of hoses

Improper routing of the hoses can cause damage and lead to production loss.

- Observe the minimum bend radius.
- Do not place hoses over sharp edges.
- Do not step on the hoses.
- Do not run hoses through small metal pipes.

The first block is connected to thinner and pulsation air. From here the cleaning agent flows through the whole color changer. The remaining blocks are connected to the individual color lines.

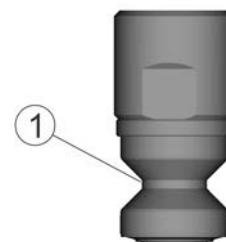


Fig. 28: Dürr color glands

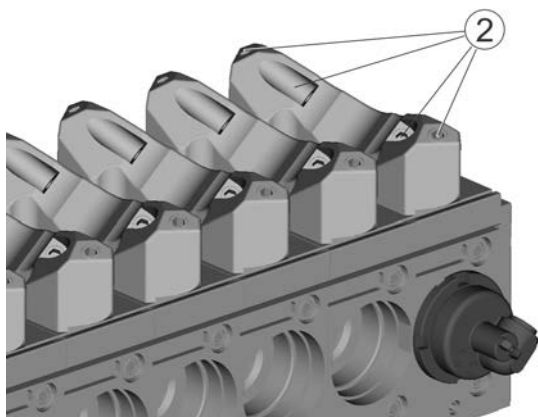


Fig. 29: Color changer top view

2 Threaded pin

Personnel:

- » Mechanic
- » + additional qualification explosion protection

1. Lightly grease the thread of the cap nut ↪ 12.9 “Operating and auxiliary materials”.
2. Pull the end of the hose through the cap nut.
3. Push the straight end cut of the hose up to the stop onto the nipple of the push-in fitting.
4. Tighten the cap nut by hand.
5. Tighten cap nut up to the stop using 8Nm.
⇒ The cap nut clamps and seals the hose.
6. Loosen the threaded pins (2) using a hexagon socket spanner.
7. Push the color gland into the color changer.
8. Tighten threaded pin (2).
⇒ Threaded pin (2) grips into the groove (1), thus holding the hose in the color changer.

6 Commissioning

6.1 Safety Instructions

WARNING!

Risk of injury due to escaping material

Escaping compressed material can cause serious injury.

Before working on the product:

- Disconnect the system, in which the product is installed, from compressed air, high voltage and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.

6.2 General notes

Requirements

- » Color changer is mounted on profile rail ↪ 5.1 “Assembly of the color changer”.
- » Hoses are connected ↪ 5.2 “Connecting the color changer”
- » Valves are connected ↪ 9.4 “Assembly”.
- » Operating pressures are set ↪ 12 “Technical data”.

6.3 Check safety devices

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Protective equipment:

- » Protective gloves
- » Anti-Static Safety Boots

1. Check, whether the safety devices conform to the specifications ↪ 2.3 “Safety devices”.

6.4 Commissioning


Personnel:

- » Mechanic
- » + additional qualification explosion protection

Protective equipment:

- » Protective gloves
- » Anti-Static Safety Boots

1. Check input pressures ↪ 12.4 “Operating values”.
2. Purge color changer ↪ 7.3 “Rinsing”.
3. Fill color into the system.

 Before putting the color changer in operation after a long downtime or repairs, carry out steps 1. - 2. again.

7 Operation

7.1 Switching on and off

The color changer is switched on and off by using the super-ordinated control.

7.2 Checks

Checks must be carried out on the color changer after commissioning and in weekly intervals.

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Requirements:

- » System is switched off and secured against restart.
- » Media hoses are depressurized.
- » No explosive atmosphere is present in potentially explosive zones.
- » Technical ventilation is switched on.

1. Check cleanliness of color changer.
 - ⇒ Clean color changer if contaminated (↪ 8.2 "Cleaning").

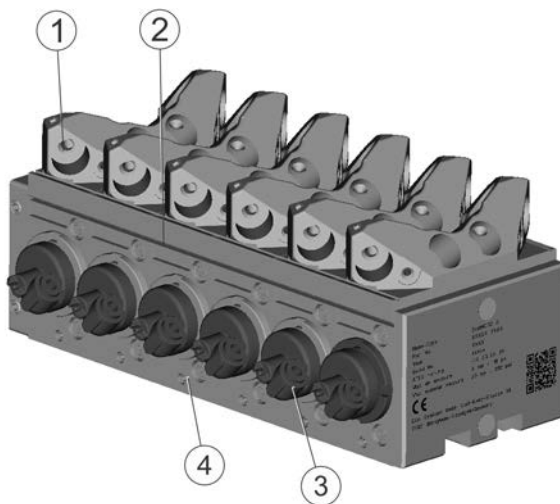


Fig. 30: Points for checking

2. Check following spots for tightness:
 - » Hose connection (1)
 - » Connection of top and bottom block parts (2)
 - » Valve inspection port (3)
 - » Connection of individual blocks (4)

7.3 Rinsing

7.3.1 Rinsing program

The color changer can be purged via the parent control system. The figures below show recommendations for the design and execution of the purging program.

The duration of the purging program depends on the installation, operating pressures and the media used.
Test the purging program with the paint in use.

The individual steps of the purging program can be visualized in the control system. Various colored bits represent the following states:

Blue bit - Component is opened.

White bit - Component is closed.

Green bit - Nominal value is called.

Gray bit - System is checking if the previous step was processed.

Purging technique thinner / pulsation air

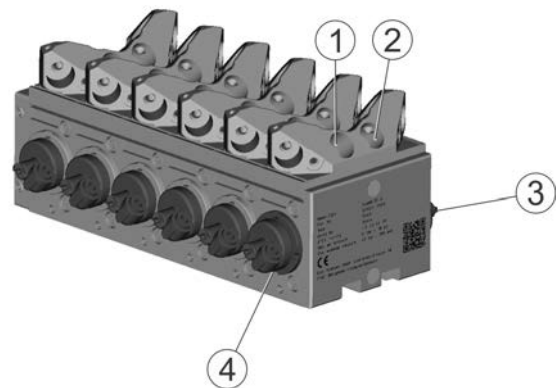


Fig. 31: Configuration purging valves thinner / pulsation air

If only thinner and pulsation air are used for purging, pulsation air (1) and thinner (2) are connected to the first middle block. The pulsation air valve (4) and thinner valve (3) are opened and closed alternately. The created aerosol mixture purges the channels of the color changer.

If the color changer is not completely purged after the first run, start the purging program again.

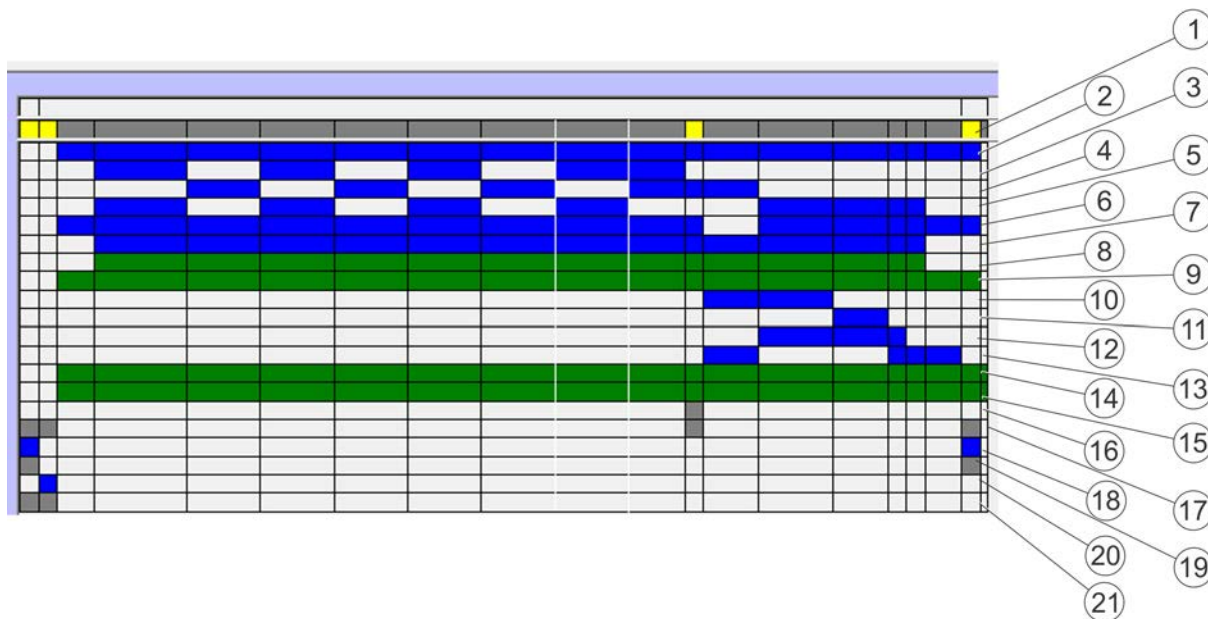


Fig. 32: Example of purging program thinner / pulsation air

- | | |
|---|--|
| ■ Blue bit | 10 Quick purge |
| □ White bit | 11 Quick purging air 1 |
| ■ Green bit | 12 Quick purging atomizer |
| ■ Gray bit | 13 Main needle |
| 1 Total duration of purging procedure ↪ "Start purging program" | 14 Nominal value for shaping air |
| 2 Bypass | 15 Nominal value for motor air |
| 3 Thinner 3 | 16 Check if nominal value motor air is reached |
| 4 Thinner 1 | 17 Check if ghost without movement is active |
| 5 Pulsation air | 18 Move to start position |
| 6 Recirculation 1 | 19 Check if start position is reached |
| 7 Gear wheel pump | 20 Move to purging position |
| 8 Nominal value dosing pump | 21 Check if purging position is reached |
| 9 Nominal value paint pressure regulator | |

Purging technique thinner / pulsation air / return

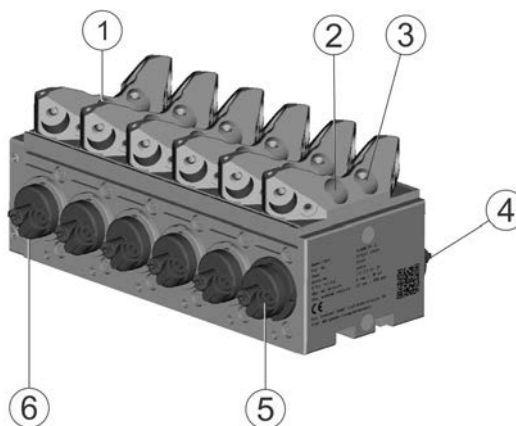


Fig. 33: Configuration purging valves thinner / pulsation air / return

When purging technique thinner / pulsation air / return is used, pulsation air (1), thinner (3) and an additional return (2) are connected to the middle block. Upon starting the purging program, the return valve (5) is opened first. Then, the pulsation air valve (6) opens and pushes the discharged paint d through the return out of the color changer. There is thus less material to be purged through the atomizer. Pulsation air valve (6) and thinner valve (4) open alternately and purge the atomizer with an aerosol mixture.

If the color changer is not completely purged after the first run, repeat the purging program until the desired outcome is achieved.

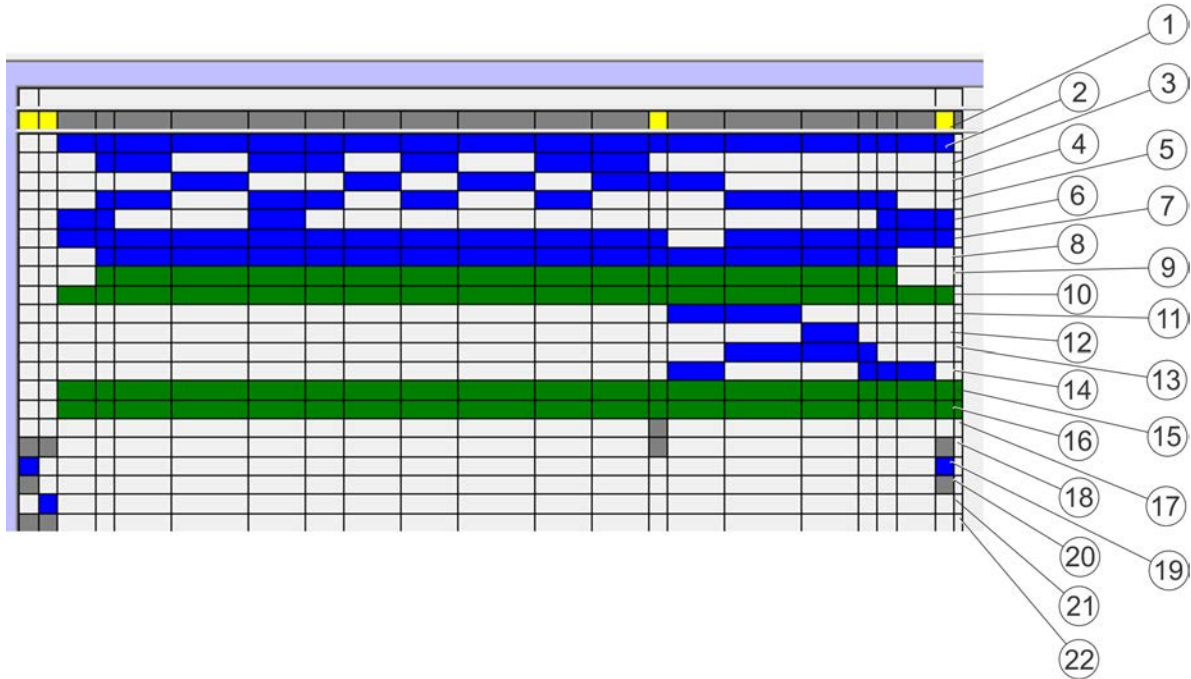


Fig. 34: Example of purging program thinner / pulsation air / return

- | | | | |
|---|--|----|---|
| | Blue bit | 10 | Nominal value paint pressure regulator |
| | White bit | 11 | Quick purge |
| | Green bit | 12 | Quick purging air 1 |
| | Gray bit | 13 | Quick purging atomizer |
| 1 | Total duration of purging procedure ↪ "Start purging program" | 14 | Main needle atomizer |
| 2 | Bypass | 15 | Nominal value for bearing air |
| 3 | Thinner 3 | 16 | Nominal value for motor air |
| 4 | Thinner 1 | 17 | Check if nominal value motor air is reached |
| 5 | Pulsation air | 18 | Check if ghost without movement is active |
| 6 | Recirculation 2 | 19 | Move to start position |
| 7 | Recirculation 1, if atomizer is present, otherwise main needle | 20 | Check if start position is reached |
| 8 | Gear wheel pump | 21 | Move to purging position |
| 9 | Nominal value dosing pump | 22 | Check if purging position is reached |

Start purging program

Pressure of pulsation air must be 0.5bar lower than thinner pressure.

The purging program is started via the parent control system and takes up to 30 seconds to complete.

Program schedule:

- » Wait time after painting: 5 seconds
- » Position check: 5 seconds
- » Pressure build-up: 0.4 seconds
- » Push old paint out of color changer: 1 second
- » Thinner / pulsation air alternating with return (1): 0.8 seconds
- » Thinner / pulsation air alternating with return (2): 0.8 seconds
- » Thinner / pulsation air alternating (1): 0.8 seconds
- » Thinner / pulsation air alternating (2): 0.8 seconds
- » Thinner / pulsation air alternating (3): 0.8 seconds
- » Thinner / pulsation air alternating (4): 0.8 seconds
- » Charging valve 1 to main needle: 0.6 seconds
- » Wait time after purging process: 2 seconds
- » Clean nozzle: 0.6 seconds
- » Quick purging and blow out (1): 0.8 seconds
- » Quick purging and blow out (2): 0.6 seconds
- » Quick purging and blow out (3): 0.4 seconds
- » Blow dry nozzle 2: 0.2 seconds
- » Pressure reduction: 0.4 seconds
- » Wait time after purging process: 5 seconds

8 Cleaning

8.1 Safety recommendations

DANGER!

Unsuitable cleaning agents and cleaning tools

Using the unsuitable cleaning agents can create a potentially explosive mixture. Tools can be potential ignition sources.

- Do not use sparking tools, e.g. steel brushes.
- Use a special wooden tool to clean notches and grooves.
- Do not use any thinner spray guns.
- Do not rub off with dry cloth (electrostatic charge)
- Ensure that:
 - » The flashpoint of the cleaning agent is at least 5K above the ambient temperature.
 - » Technical ventilation is operational.

WARNING!

Danger to health from harmful or irritant substances

Contact with hazardous liquids or vapors, can result in serious injury or death.

- Ensure that the forced ventilation is operational.
- Follow safety data sheets.
- Wear specified protective clothing.

NOTICE!

Unsuitable cleaning agents

Unsuitable detergents can cause material damage.

- Only use cleaning agents approved by the material manufacturer.
- Follow safety data sheets.

NOTICE!

Unsuitable Cleaning Tools

Unsuitable cleaning tools can cause damage.

- Only use cloths, soft brushes and paint-brushes.
- Do not use abrasive cleaning tools.
- Do not use compressed air for cleaning.
- Do not use any thinner spray guns.
- Do not use high pressure for cleaning agents.

8.2 Cleaning

Protective equipment:

- » Eye protection
- » Protective gloves
- » Respirator mask
- » Protective workwear

Requirements:

- » System is switched off and secured against restart.
 - » No explosive atmosphere is present in potentially explosive zones.
 - » Technical ventilation is switched on.
1. Use approved cleaning agents to wet a piece of cloth without plastic fibers, or brushes.
 2. Use a wetted cloth to wipe residual material off of the color changer. Do not clean the color changer and components in an ultrasound bath.

- Use a wetted cloth to wipe residual material off of the push-in fittings.

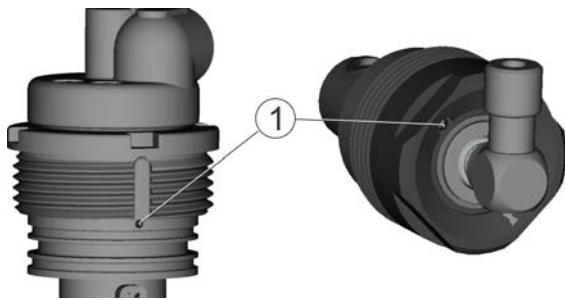


Fig. 35: Valve inspection port

- Ensure that no cleaning agents enter the valve inspection port (1). Use a wetted cloth to wipe residual material off of the valves.

9 Maintenance

9.1 Safety notes

WARNING!

Unsuitable tools in hazardous areas.

Tools that do not have Ex permission can generate sparks and cause a fire or an explosion. Serious injuries or death can result.

- If possible, carry out cleaning and maintenance work outside the Ex zones.
- For activities within the Ex zone, use tools with the corresponding Ex labeling.

WARNING!

Risk of injury due to escaping material and compressed air

Escaping compressed material can cause serious injury.

Before carrying out any work:

- Disconnect the system, in which the color changer is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.

WARNING!

Danger to health from harmful or irritant substances

Contact with hazardous liquids or vapors, can result in serious injury or death.

- Ensure that the forced ventilation is operational.
- Follow safety data sheets.
- Wear specified protective clothing.

WARNING!

Risk of injury from unsuitable replacement parts in explosive areas.

Replacement parts not compliant with the specifications of the ATEX guidelines can cause explosions in an explosive atmosphere. Serious injuries and death can be the consequence.

- Use exclusively original replacement parts.

NOTICE!

Damage due to improper maintenance work

Carrying out maintenance work that is not described in this instructions manual can result in errors in assembly and cause material damage.

- Only carry out work mentioned in this instructions manual.

9.2 Maintenance schedule



If a maintenance assistant is used in the system visualizer, the maintenance intervals of the maintenance assistant are valid.

Interval	Maintenance work
Weekly	Visual inspection, clean if necessary ↪ 8.2 "Cleaning" Checking Tightness ↪ 7.2 "Checks"
At the time of every disassembly	Checking Components ↪ 9.3.6 "Cleaning and checking components"

9.3 Dismantling

9.3.1 Dismantle color changer

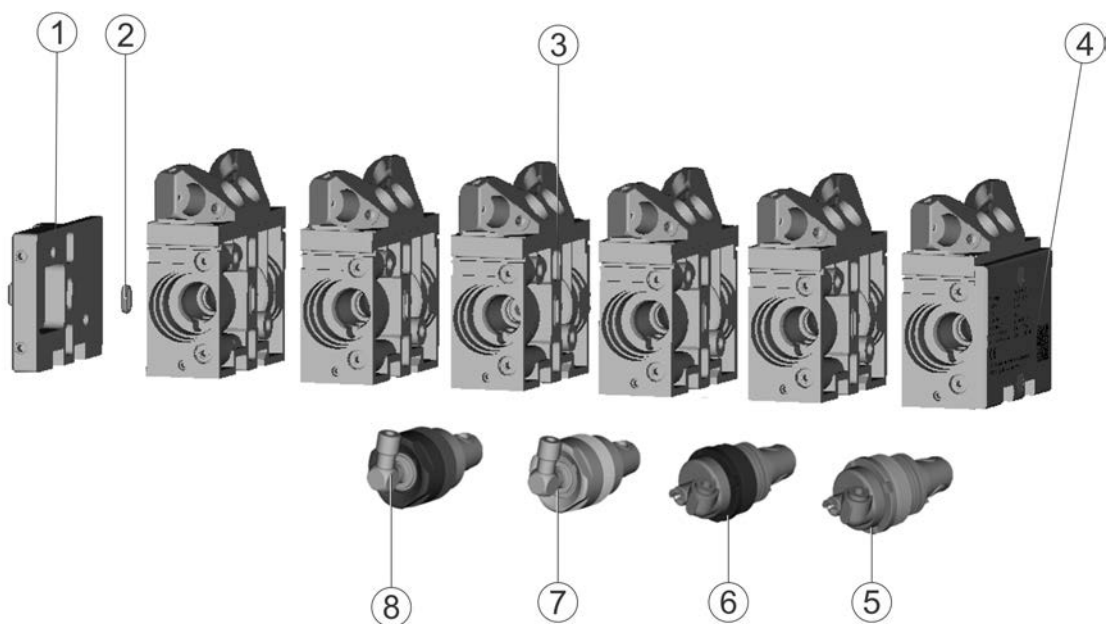


Fig. 36: Exploded view

- | | | | |
|---|----------------------------------|---|---|
| 1 | Connector plate | 5 | Plastic valve with paint circulation |
| 2 | Seal of the middle color channel | 6 | Plastic valve without paint circulation |
| 3 | Middle block | 7 | Stainless steel valve with paint circulation |
| 4 | End plate | 8 | Stainless steel valve without paint circulation |

Maintenance work is split into the following steps:

- » ↪ 9.3.2 "Disassembly of hoses and components"
- » ↪ 9.3.3 "Removing the color changer from the profile rail"
- » ↪ 9.3.4 "Disassembling hoses, connections and valves"
- » ↪ 9.3.5 "Disassembling blocks"
- » ↪ 9.3.6 "Cleaning and checking components"
- » ↪ 9.4 "Assembly"
- » ↪ 9.4.2 "Assembling valves"
- » ↪ 9.4.3 "Assembling connections"



The color changer can be installed in or near the painting booth. Individual blocks and valves can be replaced in the painting booth. Larger maintenance work must be carried out in a workshop, and not in the painting booth.

9.3.2 Disassembly of hoses and components

⚠ WARNING!

Risk of injury due to escaping material and compressed air

Escaping compressed material can cause serious injury.

Before carrying out any work:

- Disconnect the system, in which the color changer is installed, from compressed air and material supply.
- Secure the system against being switched on again.
- Depressurize the lines.

Disassemble hoses

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Requirements:

- » System is switched off and secured against restart.
- » System has been purged and depressurized.
- » No explosive atmosphere is present in potentially explosive zones.

1. Loosen cap nut.
2. Pull hose from nipple.
3. Remove control air push-in fitting from valve.

9.3.3 Removing the color changer from the profile rail

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Requirements:

- » System is switched off and secured against restart.
- » No explosive atmosphere is present in potentially explosive zones.
- » Hoses are disassembled. ↪ 9.3.2 “Disassembly of hoses and components”

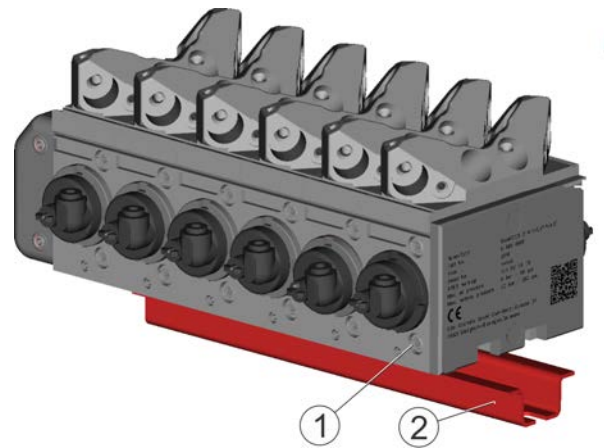


Fig. 37: Loosen threaded pins

1. Loosen threaded pins (1).

i The threaded pins are nondetachable.

2. Remove the color changer from the profile rail (2).

9.3.4 Disassembling hoses, connections and valves

i Small jobs on the color changer can be carried out in the painting booth.

Requirements for working in the painting booth:

- » System is switched off and secured against restart.
- » System has been purged and depressurized.
- » No explosive atmosphere is present in potentially explosive zones.

Requirements for working in the workshop:

- » Hoses are disassembled. ↪ 9.3.2 “Disassembly of hoses and components”
- » Color changer is dismantled from the profile rail. ↪ 9.3.3 “Removing the color changer from the profile rail”

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Special tool:

- » Socket wrench for valve disassembly

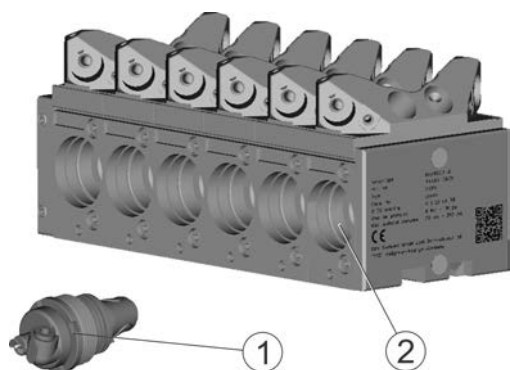


Fig. 38: Disassembling valves

1. **! NOTICE!**
Material damage due to unsuitable tools
 Use a socket wrench for valve disassembly (↪ 13.2 “Tools”) and unscrew valves in counterclockwise direction from the connector block (approx. 3 rotations).
2. **! NOTICE!**
Damage due to unremoved sealing rings
 If the sealing ring does not sit on the valve (1), remove the sealing ring from the blocks.
3. Check thread (2) of the color changer for contaminants. Clean if contaminated (↪ 8.2 “Cleaning”).

9.3.5 Disassembling blocks

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Requirements:

- » Color changer is dismantled from the system. ↪ 9.3.3 “Removing the color changer from the profile rail”
- » Push-in fittings and valves are disassembled. ↪ 9.3.4 “Disassembling hoses, connections and valves”
- » System has been purged and depressurized.

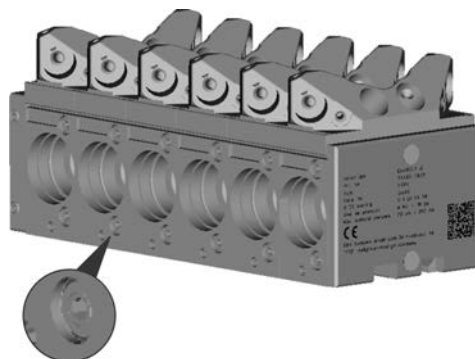


Fig. 39: Loosen clamping bolt

1. Loosen the clamping bolts on the blocks.
 ⇨ Bolts are sufficiently loosened when they move freely in their bores.

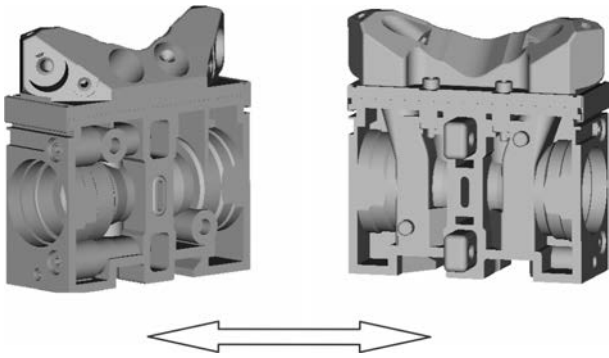


Fig. 40: Separate blocks

2. Separate the blocks by hand.

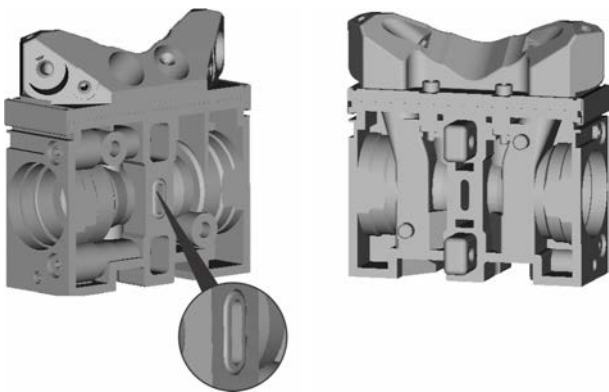


Fig. 41: Remove custom seals

3. Remove custom seal out of the middle channel.

! NOTICE!

Damage due to separating top and bottom block parts

Never separate the top and bottom block parts.

9.3.6 Cleaning and checking components

! NOTICE!

Damage due to unsuitable cleaning tools

Unsuitable cleaning tools can damage the surface of the color changer.

- Only use cloths, soft brushes and paint-brushes.
- Do not use any thinner spray guns.
- Do not use high pressure for cleaning agents.
- Do not use abrasive cleaning tools.
- Do not clean in an ultrasound bath.

Personnel:

- » Mechanic
- » + additional qualification explosion protection

1. Clean blocks.

Let blocks dry before assembly.

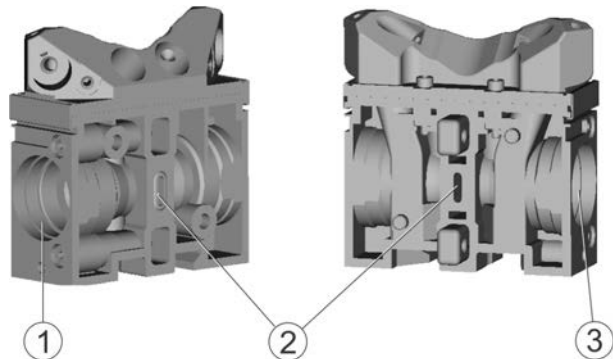


Fig. 42: Check blocks

2. Perform the following checks:

- » Contact surfaces of the blocks are clean.
- » Contact surfaces of the blocks are plane and smooth.
- » All cone pieces (counterpart of clamping bolts) are in correct position.
- » Threads (1) and (3) are clean.
- » Middle channel (2) is free from foreign bodies.

3. Clean the valves.

Let valves dry before assembly.

4. Perform the following checks:

- » All seals are clean.
- » Valve is centered correctly.

9.4 Assembly

9.4.1 Color changer assembly

! NOTICE!

Damage due to foreign objects in the color changer

After maintenance works foreign objects can remain in the color changer.

- Rinse the color changer prior to putting into operation.

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Special tool:

- » Socket wrench for valve disassembly (↪ 13.2 “Tools”)
- » Hexagon socket (↪ 13.2 “Tools”)

Requirements:

- » Blocks are cleaned and checked. ↪ 9.3.6 “Cleaning and checking components”
- » Valves are cleaned and checked. ↪ 9.3.6 “Cleaning and checking components”

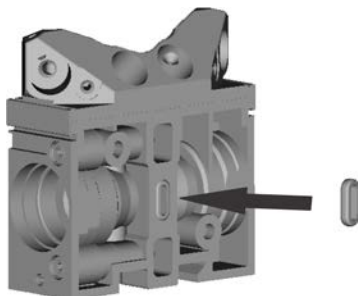


Fig. 43: Insert custom seals

1. **! NOTICE!**

Damage due to old custom sealings

Grease custom seals (1) lightly and insert them into the seat (2) of the middle channel.

2. Check correct fit of custom seals (1).
3. Connect the blocks by hand.

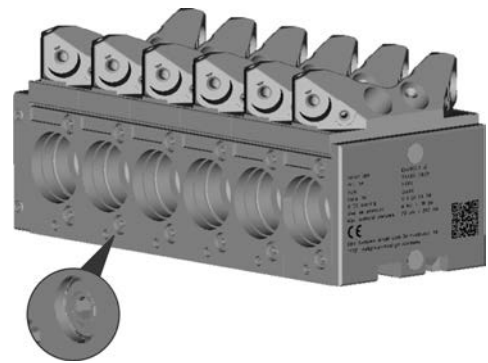


Fig. 44: Tighten clamping bolts

4. Lightly screw in the clamping bolts on the blocks.
5. Tighten clamping bolts alternately with a tightening torque of 1.5Nm.

9.4.2 Assembling valves

! CAUTION!

Danger due to flying debris

Only apply compressed air to fully screwed in valve.

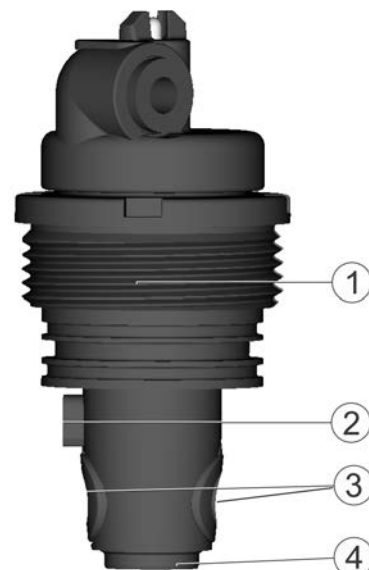


Fig. 45: Preparing the valve installation

1. Lightly grease the thread, molded seals (2) and sealing ring (3).
2. Check fit of molded seal (2) and sealing ring (3).

! NOTICE!

Damage to the color changer

If you are forcing the valve into the color changer, the color changer can get damaged.

- Place the valve in the connector block and turn slowly until the position pin slots into the connector block.

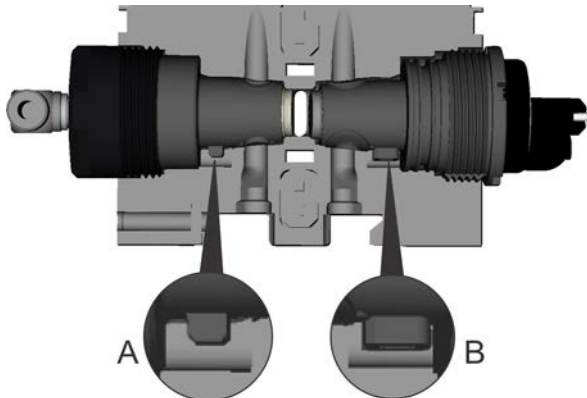


Fig. 46: Valve installation

- A Position pin of plastic valve in groove
 - B Position pin of stainless steel valve in groove
3. The valve must be inserted, so that the valve position pin (1) slots into the groove in the connector block.

i Only after the position pin is correctly seated in the groove, the valve can be screwed into the color changer.

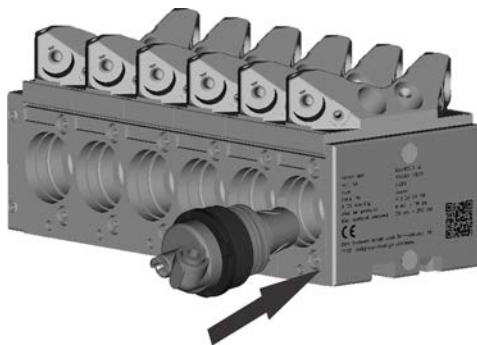


Fig. 47: Screwing in valves

! NOTICE!

Material damage due to unsuitable tools

! NOTICE!

Damage attempting to screw valve in flush

The top side of valve is not flush with housing of connector block. Do not attempt to screw in valve with excessive force, it will damage the valve.

Use a box wrench for the valve disassembly and screw valves in clockwise direction into the connector block (approx. 3 rotations).

- » Tightening torque plastic valve: 2.5Nm
- » Tightening torque stainless steel valve 5Nm

9.4.3 Assembling connections

1. Assemble color changer on profile rail ↪ 5.1 “Assembly of the color changer”.
2. Connect hoses ↪ 5.2 “Connecting the color changer”.
3. Check tightness of assembled color changer with compressed air or solvent.

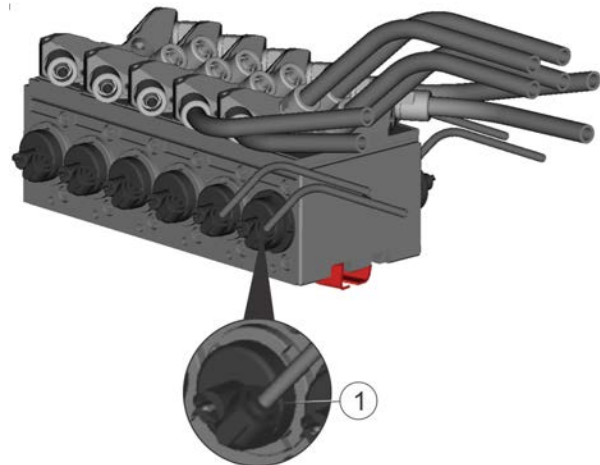


Fig. 48: Connecting the control air hose

4. Connect the control air at the top of the valve (1).

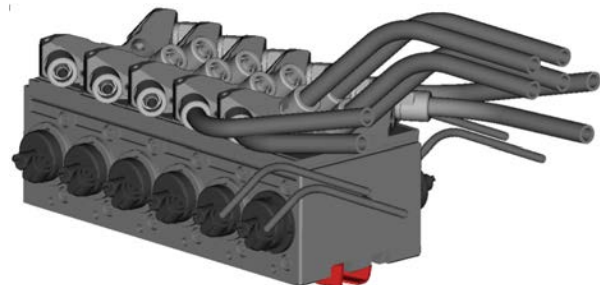


Fig. 49: Color changer with hoses

10 Faults

10.1 Defects table

Fault description	Cause	Remedy
Paint not fed	Valves defect	Replace valves » ↪ 9.3.4 “Disassembling hoses, connections and valves” » ↪ 9.4 “Assembly”
Leak between blocks	Custom sealing of the middle channel damaged or worn out	Replace the custom sealing of the middle channel » ↪ 9.3 “Dismantling” » ↪ 9.4 “Assembly”
Paint residue dripping on color changer	Damage to hose or hose connection	Replace damaged hose or hose connection » ↪ 9.3.2 “Disassembly of hoses and components” » ↪ 5.2 “Connecting the color changer”
Control air or paint leaking from valve inspection port	Valves sealing defect	Replace valve » ↪ 9.3.4 “Disassembling hoses, connections and valves” » ↪ 5.2 “Connecting the color changer”
Leakage between top and bottom parts of block	Block irreparably damaged	Replace block » ↪ 9.3.5 “Disassembling blocks” » ↪ 5.1 “Assembly of the color changer”

11 Disassembly and Disposal

11.1 Disposal

Personnel:

- » Mechanic
- » + additional qualification explosion protection

Protective equipment:

- » Protective gloves

Requirements

- » System has been purged.
- » Hoses, connections and valves of color changer are disassembled. ↪ 9.3.4 “Disassembling hoses, connections and valves”
- » Color changer is disassembled. ↪ 9.3 “Dismantling”

1.



ENVIRONMENT!

Environmental pollution from paint and cleaning agent residue!

Clean individual parts of the color changer
↪ 8.2 “Cleaning”.

2. Remove seals and dispose of them professionally.
3. Dispose color changer components professionally.

12 Technical data

12.1 Dimensions and weight

1-channel block

Indication	Value
Length	30 mm
Width	approx. 77 mm
Height	approx. 83 mm
Weight without valves	0.293 kg
Weight with plastic valves	0.368 kg
Weight with stainless steel valves	0.484 kg

2-channel block

Indication	Value
Length	30 mm
Width	approx. 77 mm
Height	approx. 119 mm
Weight without valves	0.335 kg
Weight with plastic valves	0.474 kg
Weight with stainless steel valves	0.706 kg

12.2 Connections

Detail	Value
Material inlet	6 x 9 mm or 9 x 12 mm
Material outlet	4 x 6 mm
Pulsation air	6 x 8 mm
Control air	2.7 x 4 mm
Push-in fitting	Dürr color gland G 1/8"

Hoses are not part of the scope of delivery of the color changer.

12.3 Operating conditions

Detail	Value
Ambient temperature	15 to 40 °C
Relative humidity max.	20 to 80%
ATEX marking	II 2G IIA T6

12.4 Operating values

Detail	Value
Media operating pressure. min.	0 bar
Media operating pressure, max.	20 bar
Control air operating pressure	5 - 10 bar
Pressure resistance	30 bar
Burst pressure	> 40 bar

12.5 Compressed air quality

- » Purity classes according to ISO 8573-1: 1:4:1
- » Limitations for purity class 4 (pressure dew point max.):
 - » $\leq -3^{\circ}\text{C}$ at 7bar absolute
 - » $\leq +1^{\circ}\text{C}$ at 9bar absolute
 - » $\leq +3^{\circ}\text{C}$ at 11bar absolute

12.6 Characteristic curve of the outflow rate

Flow rates were determined using the following points:

- » Polar white, WBL-UNI, 76 mPa*s, $p = 1,193$ g/ml
- » Fire opal, WBL-UNI, 122 mPa*s, $p = 1,026$ g/ml

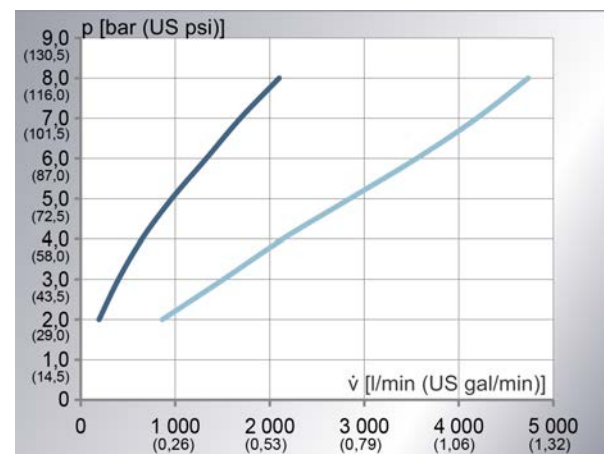


Fig. 50: Flow rate diagram

- Polar white
- Fire opal

12.7 Tightening torques

Detail	Value
Screw-in thread	12 Nm
Cap nut (hose)	8 Nm
Plastic valve	2.5 Nm
Stainless steel valve	5 Nm
Clamping bolt between blocks	1.5 Nm
Clamping bolt between color changer and cap rail	0.7 Nm

12.8 Type plate

Type plate

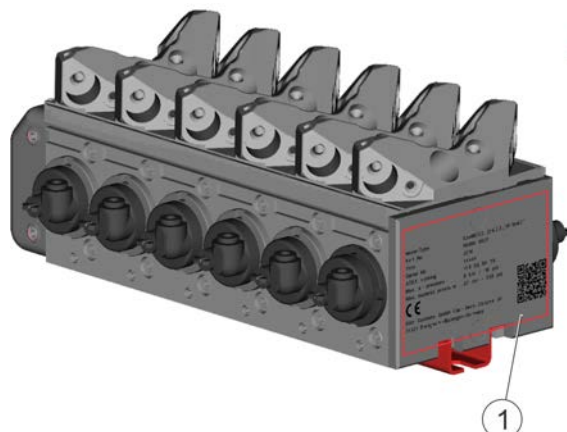


Fig. 51: Position of type plate

1 Type plate

The type plate is screwed onto the end block and features the following data:

- » Product name
- » Material number
- » Year of manufacture
- » Serial number
- » EX labelling
- » Maximum air pressure
- » Maximum material pressure
- » Manufacturer
- » QR code

12.9 Operating and auxiliary materials

Indication	Value
Lubricant for seals	Klüber-Syntheso Glep 1
Mounting paste for screws	Molykote TP-42
Thread protection	Loctite 542

12.10 Material specification

Material

Suitable Material:

- » Water or solvent based paints
- » Cleaning agents and solvents

Material specifications:

- » Vapor pressure max 0.5 bar above atmosphere
- » Ignition temperature > 50 °C
- » Max. temperature 40 °C, always 5 K below flashpoint

Viscosity

Detail	Value
Viscosity min.	50 mPa*s
Viscosity max.	180 mPa*s

13 Replacement parts, tools and accessories

13.1 Replacement parts

Color Changer

Position numbers refer to figure Fig. 36

Item	Replacement parts	Material No.
1	Connector block with paint circulation 1-channel end right	M01130231
-	Connector block without paint circulation 1-channel end right	M01130237
-	Connector block with paint circulation 2-channel end left	M01130235
-	Connector block without paint circulation 2-channel end left	M01130241
1	Connector block with paint circulation 1-channel end left	M01130232
-	Connector block without paint circulation 1-channel end left	M01130238
-	Connector block with paint circulation 2-channel end right	M01130234
-	Connector block without paint circulation 2-channel end right	M01130240
2	Sealing for middle color channel	M08190015
3	Middle block with paint circulation 1-channel	M01130230

Item	Replacement parts	Material No.
-	Middle block without paint circulation 1-channel	M01130236
-	Middle block with paint circulation 2-channel	M01130233
-	Middle block without paint circulation 2-channel	M01130239
5	Stainless steel control valve without paint circulation	N32400004
6	Stainless steel control valve with paint circulation	N32400003
7	Plastic control valve with paint circulation	N32300009
8	Plastic control valve without paint circulation	N32300008
-	Custom color block with return for 1-channel color changer	M01130242
-	Custom color block with return for 2-channel color changer	M01130243
-	1-channel color changer 2-channel color changer	See type plate

Valve

Position numbers relate to Fig. 10

Item	Replacement parts	Material number
2	Molded seal plastic valve	M08190014
2	Molded seal stainless steel valve	M08190041
4	Sealing ring plastic valve to middle channel	M08010332
4	Sealing ring stainless steel valve to middle channel	M08010437

13.2 Tools

Tools for working on color changer: The tool is not included in the scope of supply ↪ 13.4 "Order".

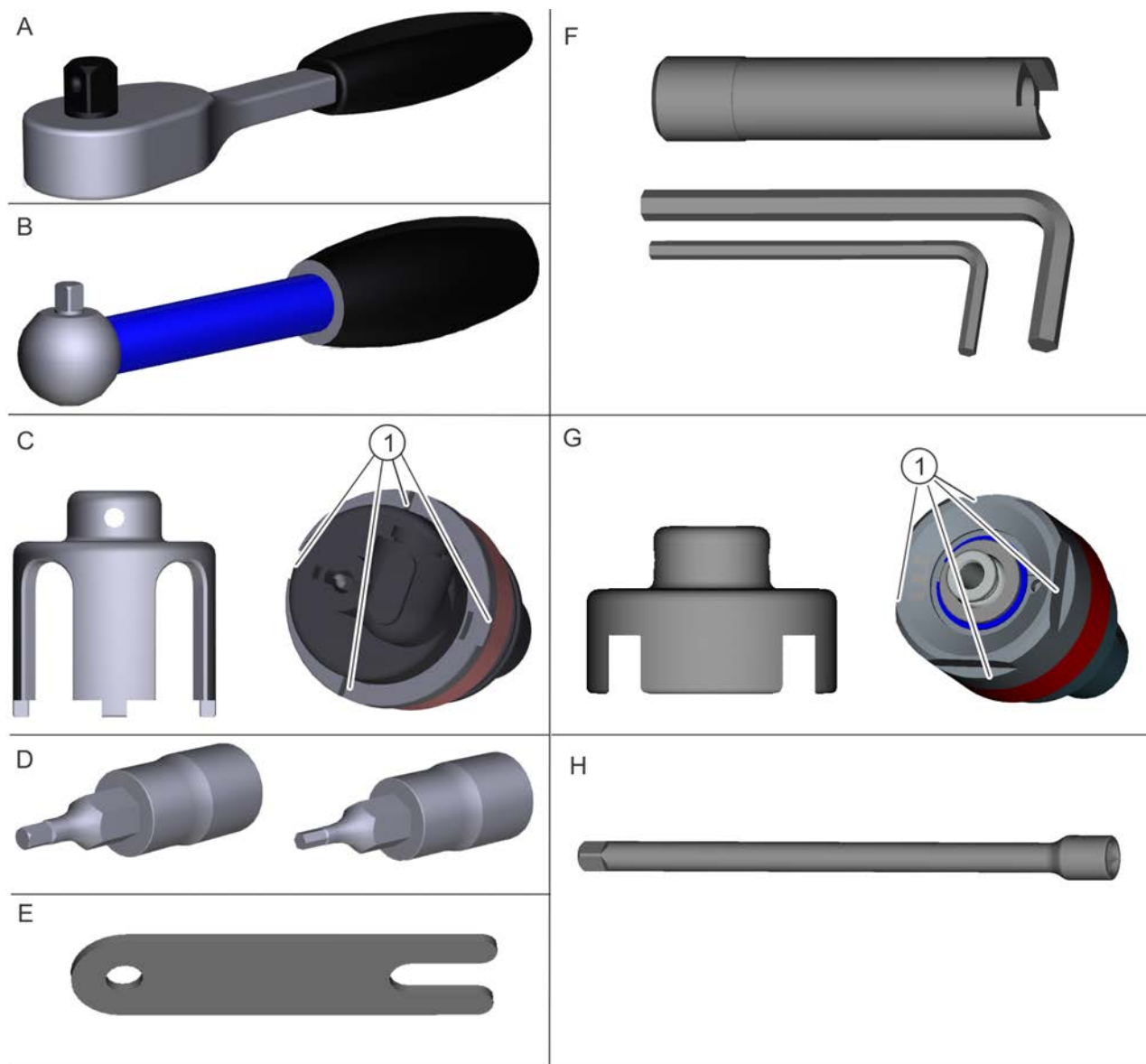



Fig. 52: Tool set

- | | | | |
|---|--|---|---|
| A | Ratchet | E | Disassembly tool for control air connection |
| B | Torque wrench for valve assembly | F | Calibrating tool for torque wrench |
| C | Box wrench for valve disassembly (valve with control air connection) | G | Box wrench for valve disassembly (without control air connection) |
| D | Hexagon socket | H | Extension |

 Box wrench for valve disassembly (C), (D) is a special tool. The box wrench fits in the four grooves (1) of the valve and ensures a safe assembly and disassembly without damage.

A box wrench (W11020025 (SW15) / W11020027 (SW13)) for cap nuts facilitates the easier assembly/disassembly of cap nuts on hose connections.

Item number	Accessories	Material number
A, B, C, D	Tool kit plastic valve	W02100049
A, B, C, D, E, F, G, H	Tool kit stainless steel valve	W02100094

13.3 Accessories

Position numbers refer to figure Fig. 18

Item number	Accessories	Material number
A	Dürr color gland 4x6 Dürr color gland 6x9 Dürr color gland 9x12	M58030136 M58030134 M58030125
-	Signs kit EcoMCC3 20 AB Channel	M44510203
-	Signs kit EcoMCC3 20 A Channel	M44510202
-	Adhesive Loctite 454 3gr	W31010015

13.4 Order

WARNING!

Risk of injury from unsuitable replacement parts in explosive areas.

Replacement parts not compliant with the specifications of the ATEX guidelines can cause explosions in an explosive atmosphere. Serious injuries and death can be the consequence.

- Use exclusively original replacement parts.

WARNING!

Risk of injury from unsuitable replacement parts

Parts of third party suppliers may not bear the loads. Serious injuries and death can result.

- Only use original replacement parts.

Ordering replacement parts, tools and accessories as well as information on products that are listed without order number → “Hotline and Contact”.

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