KÄRCHER

Service Manual

IP 120

1.574-111.0

IP 220

1.574-112.0

Foreword

Good service work requires comprehensive and practical training as well as clear documents.

We therefore provide regular basic training and further training courses for service technicians covering our whole range of products.

In addition, we produce service manuals for the most important units, which can initially be used as instructions and later for reference purposes.

Furthermore, we regularly provide service information about new product developments.

Should you have any additions, corrections or questions regarding this document, please send them to the following quoting the given subject:

international-service@de.kaercher.com

Subject: Fall 105622

The relevant product specialist will then deal with the matter.

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Dry ice basics

Hazards

The following must be noted and observed when operating the unit:

Risk of suffocation by carbon dioxide.

The dry ice pellets consist of solid carbon dioxide. During operation of the unit the carbon dioxide level in the workplace air rises. The workplace must therefore be adequately ventilated. A personal warning device should be used when working in rooms.

Indications of high carbon dioxide concentration in the inhaled air:

– 3..5%, headaches, high respiratory rate.
– 7..10%, headaches, nausea, possible unconsciousness.

If these symptoms occur, switch off the unit immediately and go out into the fresh air.

Before continuing the work, improve the ventilation measures or use respiratory equipment.

Note and observe the dry ice manufacturer's safety data sheet.

There is a risk of electric shocks.

Risk of injuries due to electrostatic discharges, risk of damage to electronic assemblies.

The system is pressurised.

Risk of cold burns.

Dry ice has a temperature of -79°C.

Never touch dry ice or cold parts of the unit without protection.

Wear safety gloves.

Risk of injury due to dry ice pellets flying about.

Wear tightly fitting safety goggles.

Wear safety gloves and long-sleeved protective clothing.

Risk of hearing damage.

Wear hearing protection.

Technical Features

General

– The unit is a dry ice pelletizer.
– Stainless steel housing.

How it works

The unit produces dry ice pellets from liquid carbon dioxide.

Liquid carbon dioxide flows into the cylinder and the pressure drop causes it to solidify, forming dry ice snow. The dry ice snow is compressed by a hydraulic cylinder and is pressed through the extruder plate. This creates cylindrical dry ice rods, which break into pellets.

Control panel IP 120 / IP 220 with:

– Master switch.
– EMERGENCY STOP switch.
– Operation indicator.
– Indicator light for oil level too low.
– Indicator light for oil temperature too high.
– Indicator light for motor overload.
– Indicator light for cycle time exceeded.
– Pushbutton, piston forwards.
– Pushbutton, piston backwards.
– Switch, Manual/0/Auto
– Reset pushbutton.
– OFF pushbutton.
– ON pushbutton.
– Hours counter.
– Pressure gauge, hydraulic oil.
– Pressure gauge, liquid CO_2 supply.
– Weight indicator (optional)
– ON/OFF switch (optional)

Safety features

– EMERGENCY STOP switch in the control panel.
– Pressure limitation valve, pump
– Pressure regulator, non-return valve and safety valve in the CO_2 supply system

Data

– Discharge pressure 13-21 bar (0.13-0.21 MPa)
– IP120 pellet production, max. 120 kg/h
– IP220 pellet production, max. 220 kg/h
– Pellet diameter 3 mm
– Hydraulic oil according to DIN 51524, Part 2
– Hydraulic oil quality 16/13 in accordance with ISO 4406
– Viscosity ISO VG 32
– IP 120, oil quantity 35 litres
– IP 220, oil quantity 60 litres
– IP 120, weight (without hydraulic oil) 340 kg
– P 120, weight (with hydraulic oil) 360 kg
– IP 220, weight (without hydraulic oil) 495 kg
– P 220, weight (with hydraulic oil) 540 kg
– IP 120, sound level (EN 60704-1) 85 dB(A)
– IP 220, sound level (EN 60704-1) 89 dB

IP 120 connection data

– Voltage 3~, 400V/50Hz
– Electric power 4.0 kW
– CO_2 supply G 1/2" BSP internal thread
– CO_2 source CO_2 storage tank, liquid phase (13-21 bar / 0.13-0.21 MPa)

IP 220 connection data

– Voltage 3~, 400V/50Hz
– Electric power 5.6 kW
– CO_2 supply G 1/2" BSP internal thread
– CO_2 source CO_2 storage tank, liquid phase (13-21 bar / 0.13-0.21 MPa)

View from the front, IP 120 / 220

1 Accessories compartment (not IP 120)
2 Fastener, control panel
3 Fastener, housing cover
4 Housing cover, front
5 Discharge pipe
6 Control panel

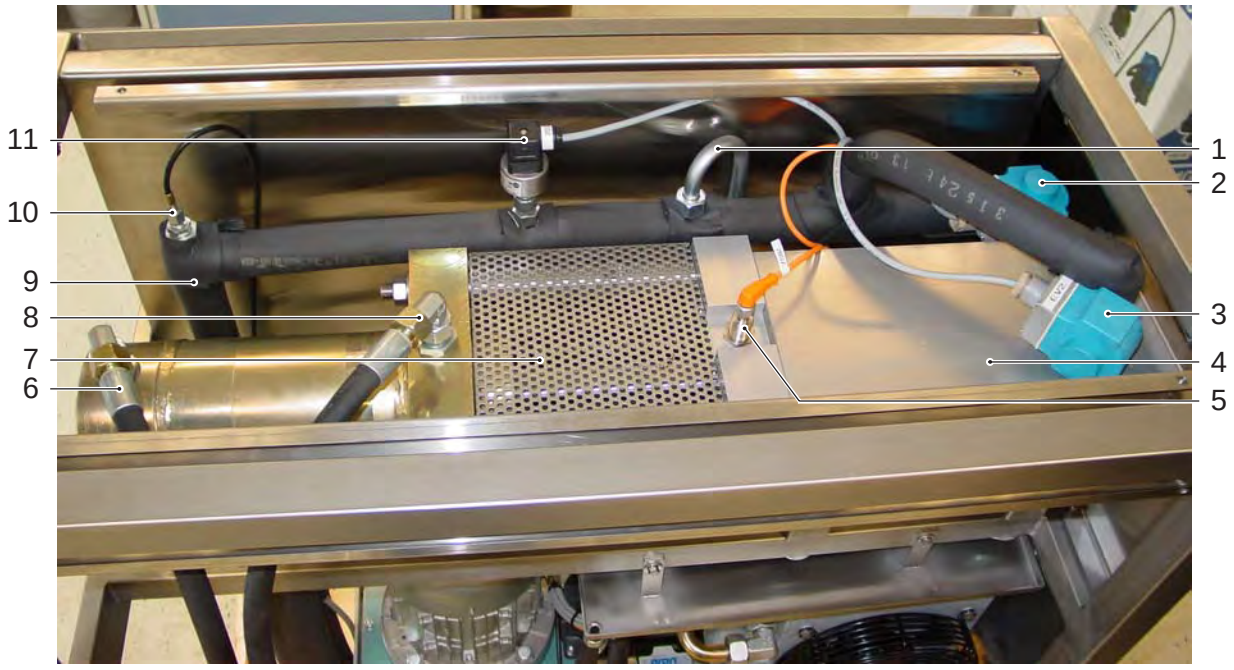
View from the right-hand side, IP 120 / IP 220

1 Housing cover, rear
2 Base feet 4x, adjustable
3 Mains connection cable
4 Connection, CO_2 exhaust
5 Connection, CO_2 supply
6 Connection, condensate discharge
7 Side cover, right hand

View from the left-hand side, IP 120 / IP 220

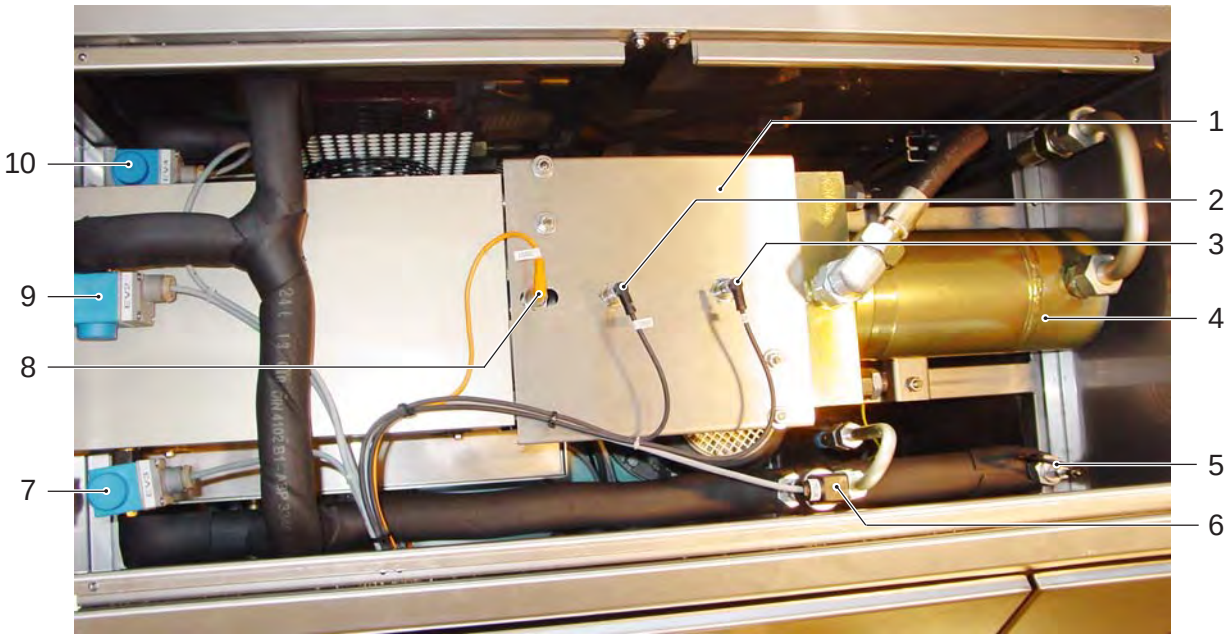
1 Control panel
2 Side cover, left hand
3 Base feet 4x, adjustable
4 Discharge pipe
5 Extruder plate

View from above, IP 120 – housing cover removed



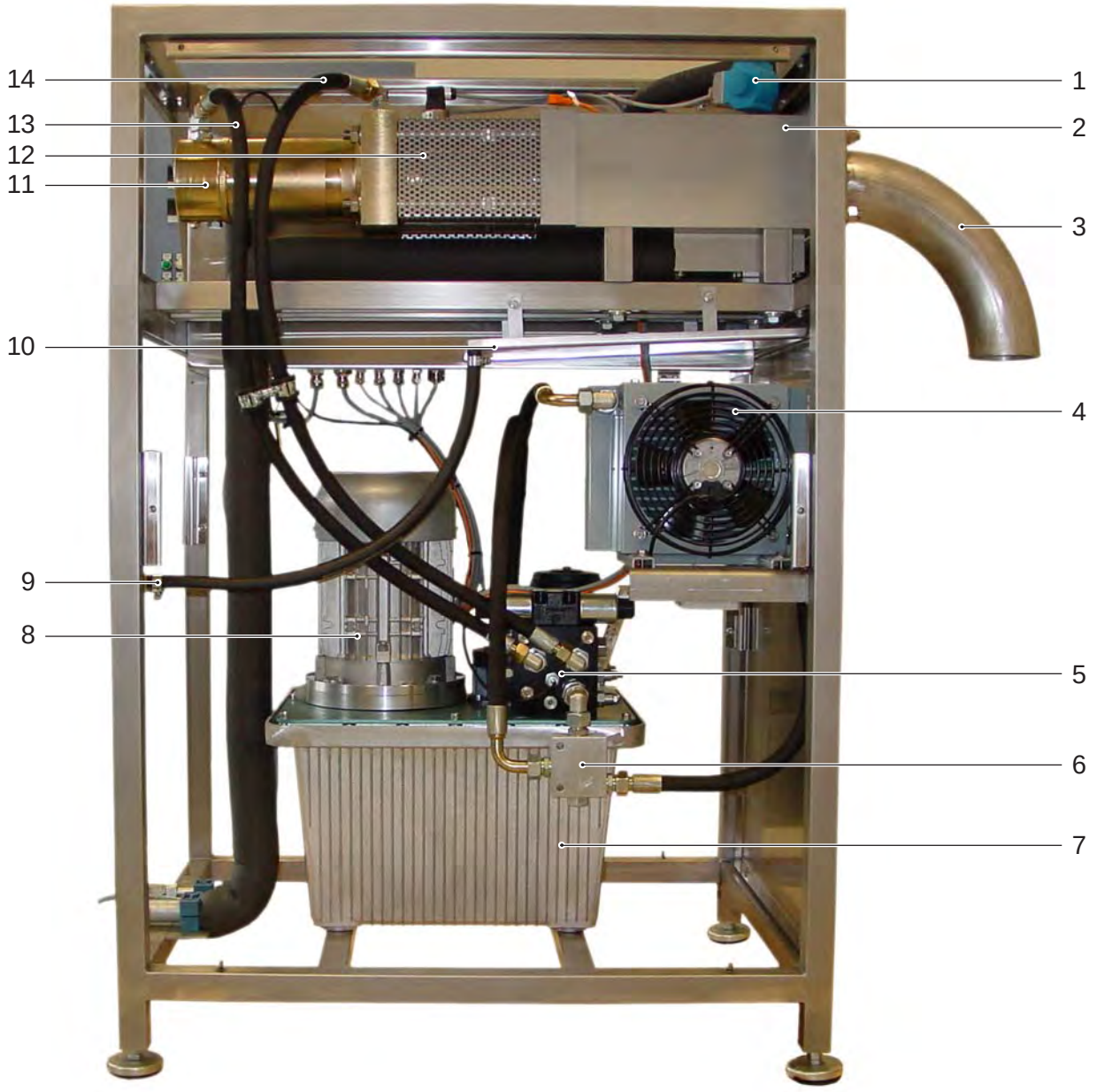
1 Connection, safety valve
2 Solenoid valve (EV3), CO_2 injection nozzle
3 Solenoid valve (EV2), CO_2 injection nozzle
4 Housing, press cylinder
5 Limit switch, piston
6 Hydraulic hose, extend
7 Protective cover, piston
8 Hydraulic hose, retract
9 Pipe, CO_2 supply
10 Pressure gauge connection, CO_2 supply
11 Pressure transmitter, CO_2 supply

View from above, IP 220 – housing cover removed



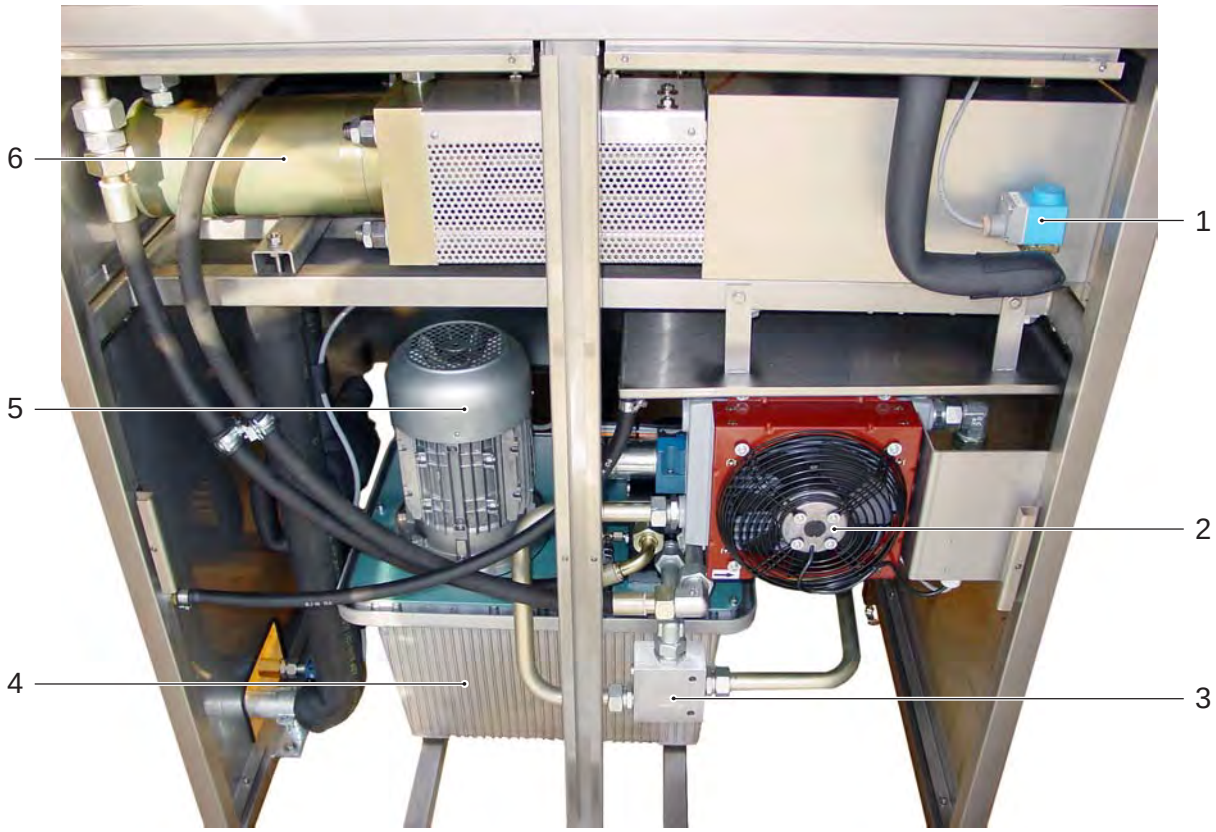
1 Protective cover, piston
2 Switch (20S11), start pressing path
3 Limit switch (20S10), cylinder retracted
4 Hydraulic cylinder
5 Pressure gauge connection, CO_2 supply
6 Pressure transmitter (20S8), CO_2 supply
7 Solenoid valve (EV3), CO_2 injection nozzle
8 Limit switch (20S7), piston extended
9 Solenoid valve (EV2), CO_2 injection nozzle
10 Solenoid valve (EV4), CO_2 injection nozzle

View from the rear, IP 120 – housing cover removed



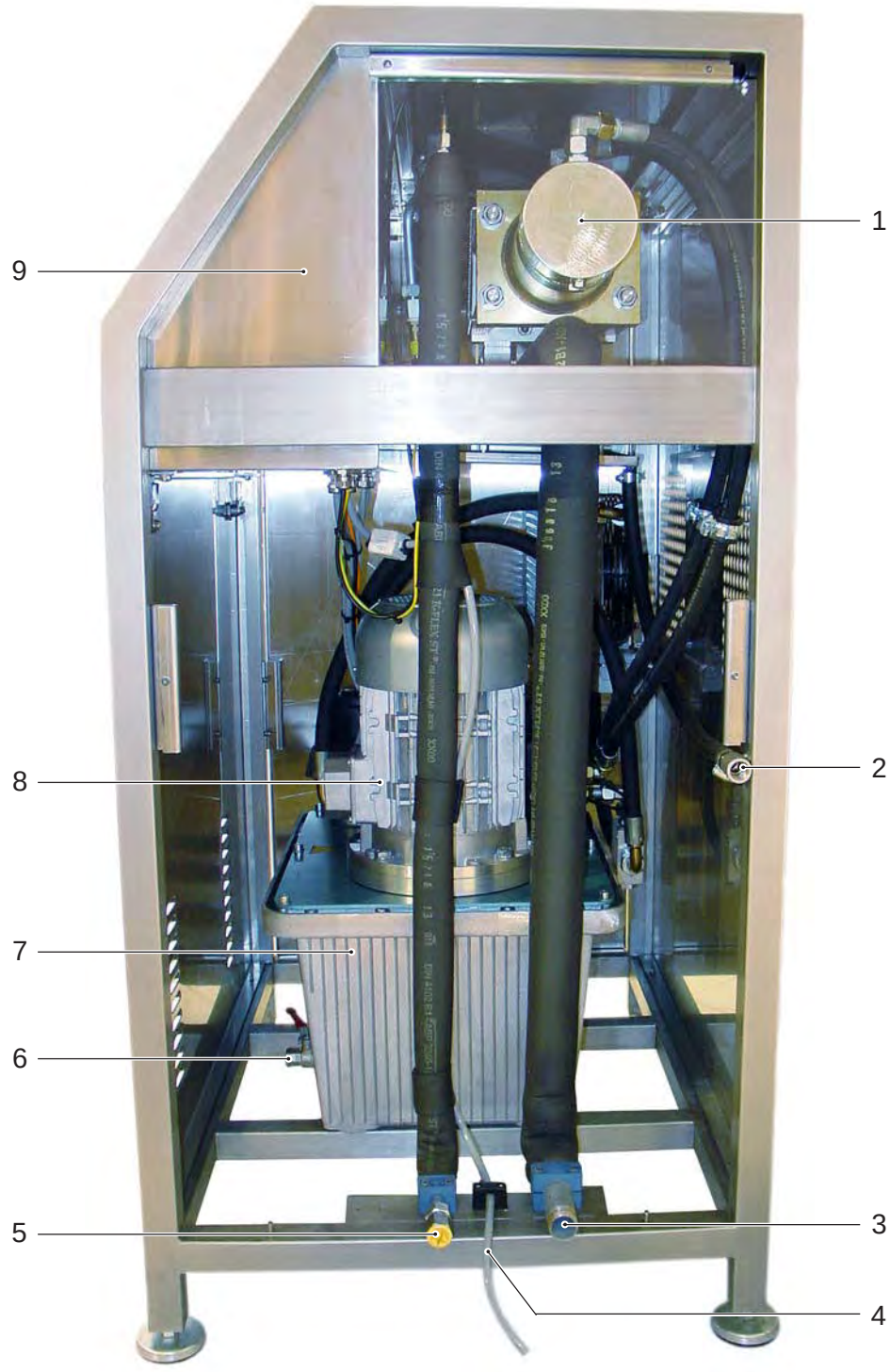
1 Solenoid valve (EV2), CO_2 injection nozzle
2 Housing, press cylinder
3 Discharge pipe
4 Fan (5.02), oil cooler
5 Control block (2.01), hydraulics
6 Flow control valve (4.01)
7 Hydraulic oil tank (1.04)
8 Motor (10M3), hydraulic pump
9 Connection, condensate discharge
10 Condensate drip plate
11 Hydraulic cylinder (3.01)
12 Protective cover, piston
13 Hydraulic hose, extend
14 Hydraulic hose, retract

View from the rear, IP 220 – housing cover removed



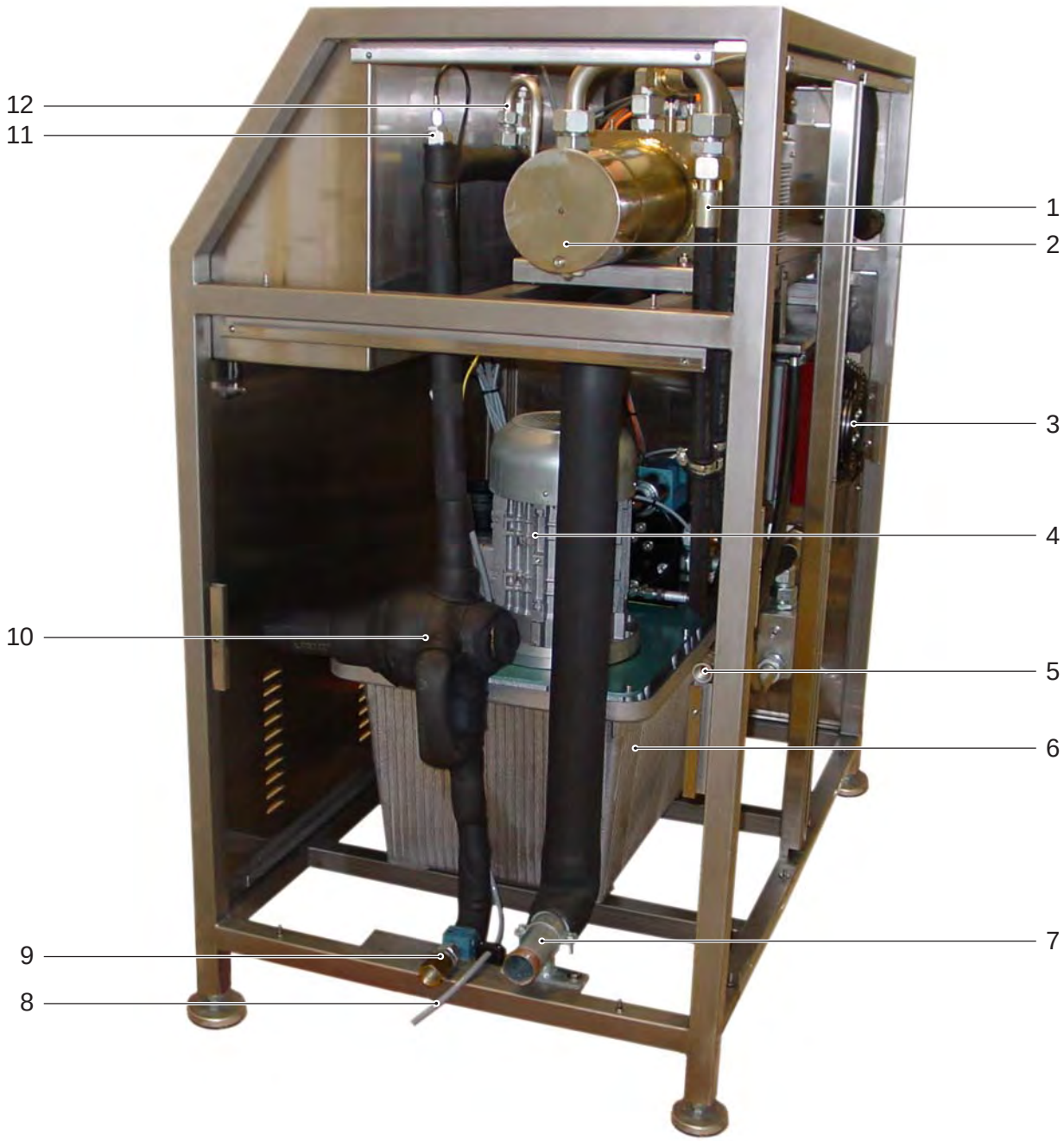
1 Solenoid valve (EV4), CO_2 injection nozzle
2 Fan (5.02), oil cooler
3 Flow control valve (4.01)
4 Hydraulic oil tank (1.04)
5 Motor (10M3), hydraulic pump
6 Hydraulic cylinder (3.01)

View from the right-hand side, IP 120 – side cover removed



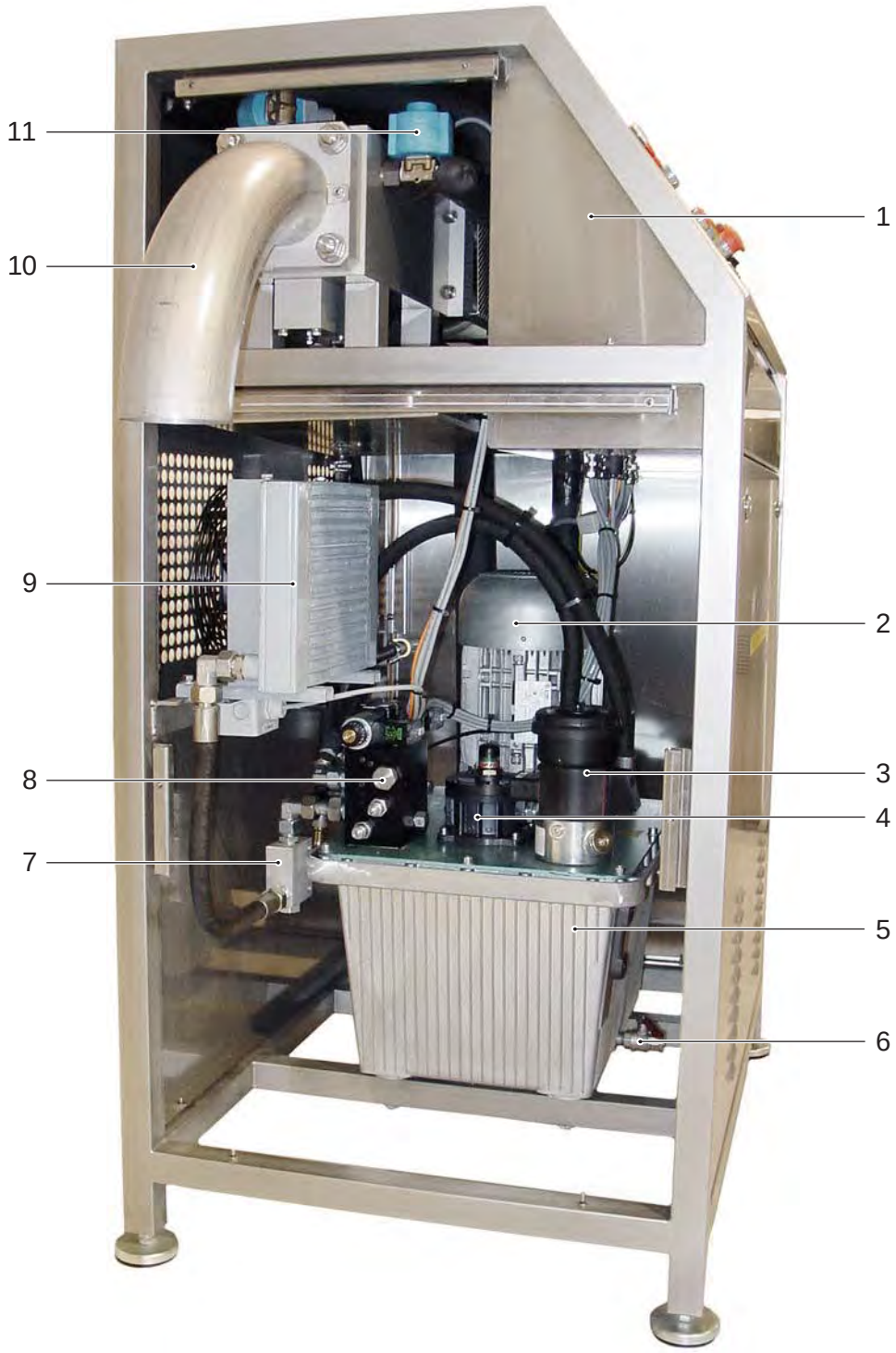
1 Hydraulic cylinder (3.01)
2 Connection, condensate discharge
3 Connection, CO_2 exhaust
4 Mains connection cable
5 Connection, CO_2 supply
6 Drain plug (1.05), hydraulic oil
7 Hydraulic oil tank (1.04)
8 Motor (10M3), hydraulic pump
9 Switchbox

View from the right-hand side, IP 220 – side cover removed



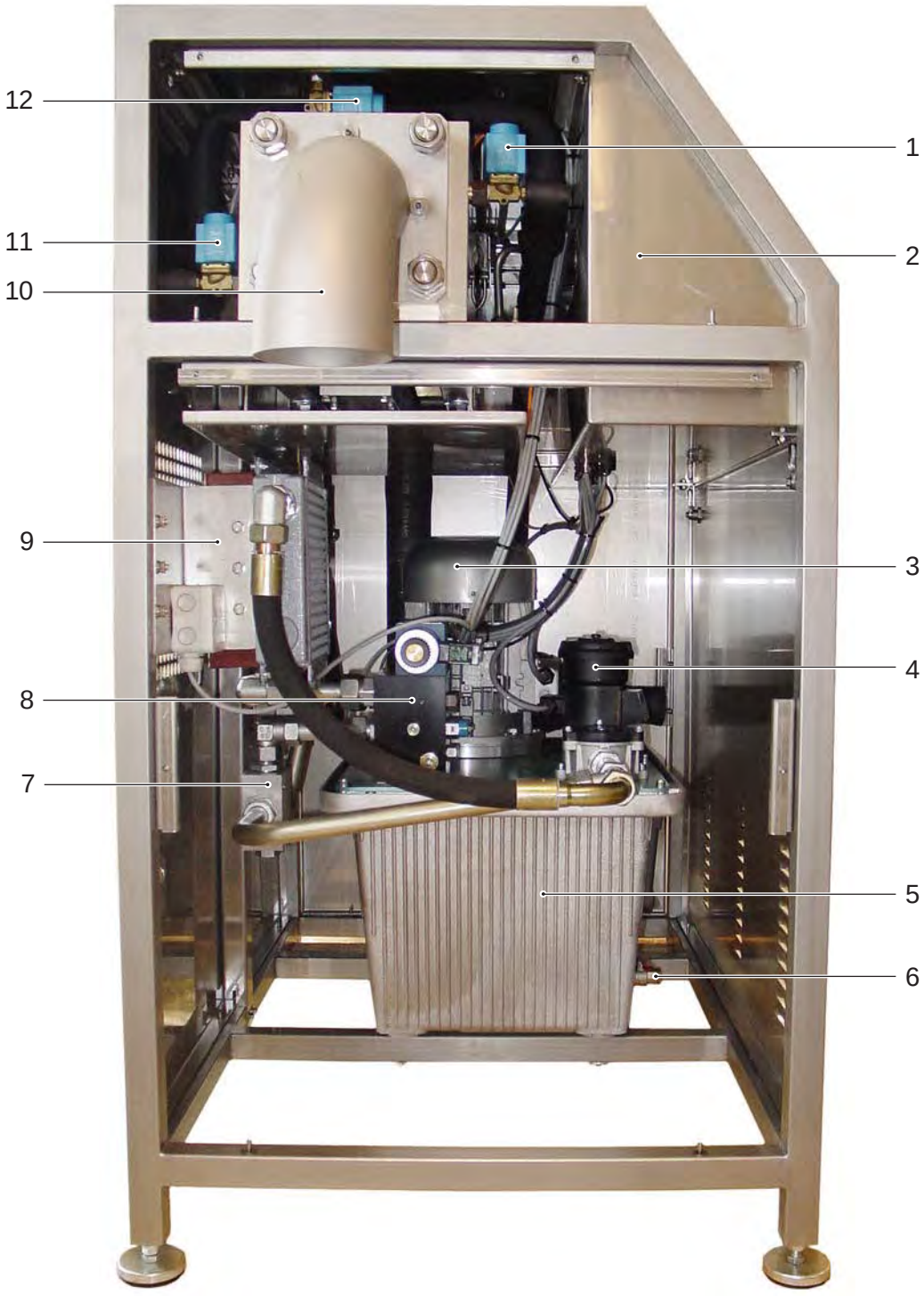
1 Hydraulic hose, extend piston
2 Hydraulic cylinder (3.01)
3 Fan (5.02), oil cooler
4 Motor (10M3), hydraulic pump
5 Connection, condensate discharge
6 Hydraulic oil tank (1.04)
7 Connection, CO_2 exhaust
8 Mains connection cable
9 Connection, CO_2 supply
10 Pressure reduction valve
11 Pressure gauge connection, CO_2 supply
12 Connection, safety valve

View from the left-hand side, IP 120 – side cover removed



1 Switchbox
2 Motor (10M3), hydraulic pump
3 Air filter
4 Oil filter
5 Hydraulic oil tank (1.04)
6 Drain plug (1.05), hydraulic oil
7 Flow control valve (4.01)
8 Control block (2.01), hydraulics
9 Fan (5.02), oil cooler
10 Discharge pipe
11 Solenoid valve (EV3), CO_2 injection nozzle

View from the left-hand side, IP 220 – side cover removed

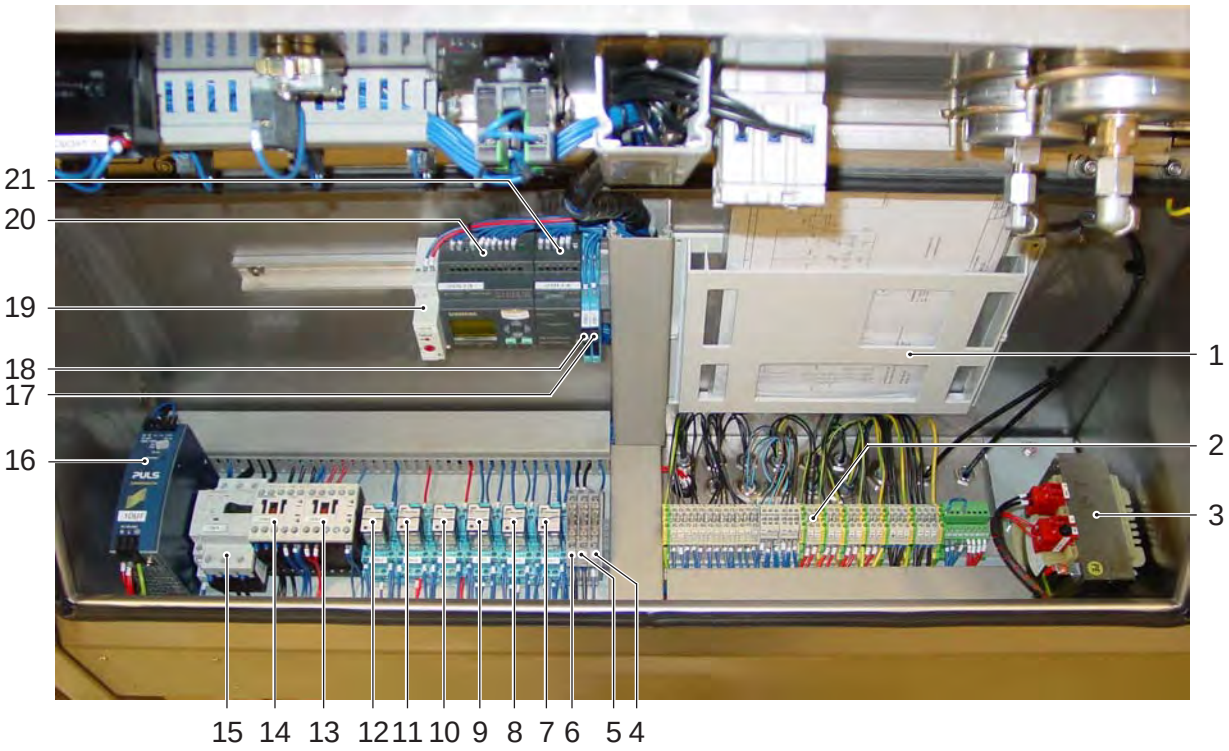


1 Solenoid valve (EV3), CO_2 injection nozzle
2 Switchbox
3 Motor (10M3), hydraulic pump
4 Air filter
5 Hydraulic oil tank (1.04)
6 Drain plug (1.05), hydraulic oil
7 Flow control valve (4.01)
8 Control block (2.01), hydraulics
9 Fan (5.02), oil cooler
10 Discharge pipe
11 Solenoid valve (EV4), CO_2 injection nozzle
12 Solenoid valve (EV2), CO_2 injection nozzle

Control panel, IP 120 / IP 220

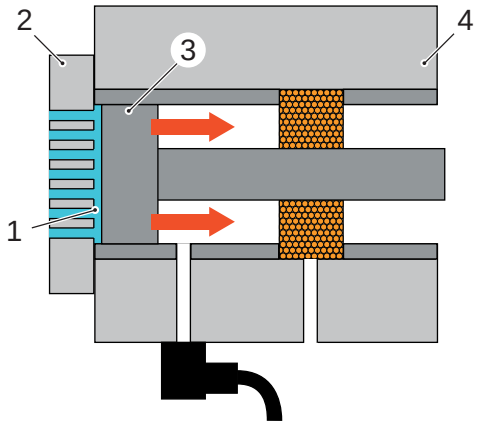
1 Pushbutton (20S4), extend piston
2 Pushbutton (20S3), retract piston
3 Pressure gauge, hydraulic oil
4 Master switch (10S1)
5 Pressure gauge, liquid CO_2 supply
6 Switch (20S2), Manual/0/Auto
7 EMERGENCY-STOP switch (20S1)
8 Operating hours counter (30P7)
9 Pushbutton (30S3), Reset
10 Pushbutton (20S6), OFF
11 Indicator light (20H4), cycle time exceeded
12 Pushbutton (20S5), ON and indicator light (20H5), operation
13 Indicator light (30H7), motor overload
14 Indicator light (30H4), voltage ON
15 Indicator light (30H5), oil level too low
16 Indicator light (30H6), oil temperature too high

Switchbox, IP 120 / IP 220



1 Holder, circuit diagram
2 Terminal connection strip
3 Transformer (10T1)
4 Fuse (F3) (IP 220 = 6A, IP 120 = 5A)
5 Fuse 5A (F1)
6 Fuse 5A (F0)
7 Relay (30K4)
8 Relay (30K3)
9 Relay (30K2)
10 Relay (20K8) (IP 220 only)
11 Relay (20K6)
12 Relay (20K2)
13 Contactor (30K8), fan
14 Contactor (20K4), hydraulic motor
15 Motor protection switch (10F4)
16 Power supply (10U7), 230V-24VDC
17 Auxiliary relay (20K5)
18 Auxiliary relay (20K7)
19 Time relay (20T8) (IP 220 only)
20 Control (20U3), PCS
21 Add-on module (20U4), PCS

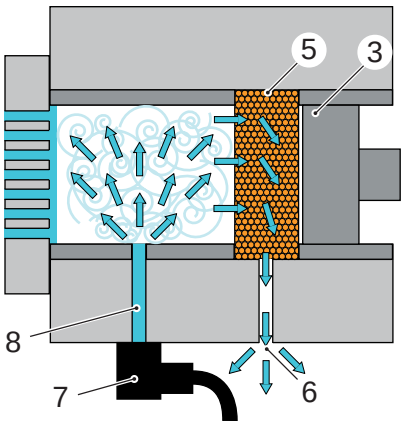
Pellet production flow diagram



Step 1

– Piston (3) moves quickly back.
– One snow plate (1) remains stopped at the extruder plate (2) (hydraulic flow diagram 2).

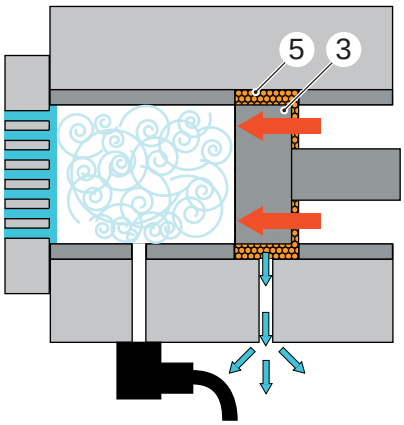
1 Snow plate
2 Extruder plate
3 Piston (3.01)
4 Press cylinder



Step 2

– Piston (3) is behind the exhaust bushing (5).
– CO_2 is injected (8).
– Part of the injected CO_2 becomes solid (CO_2 snow), gaseous CO_2 escapes via the exhaust bushing (5) through the exhaust pipe (6) into the open air (hydraulics diagram 3).

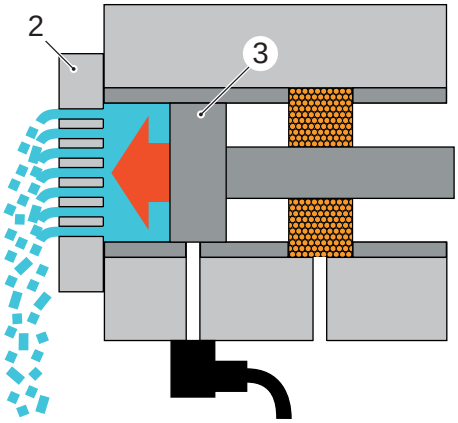
3 Piston (3.01)
5 Exhaust bushing
6 CO_2 exhaust pipe
7 Solenoid valve (EV5)
8 CO_2 injection nozzle



Step 3

– Piston (3) moves quickly forward, until the CO_2 snow is precompressed. The compression begins approximately at the end of the exhaust bushing (5) (hydraulics diagram 4).

3 Piston (3.01)
5 Exhaust bushing

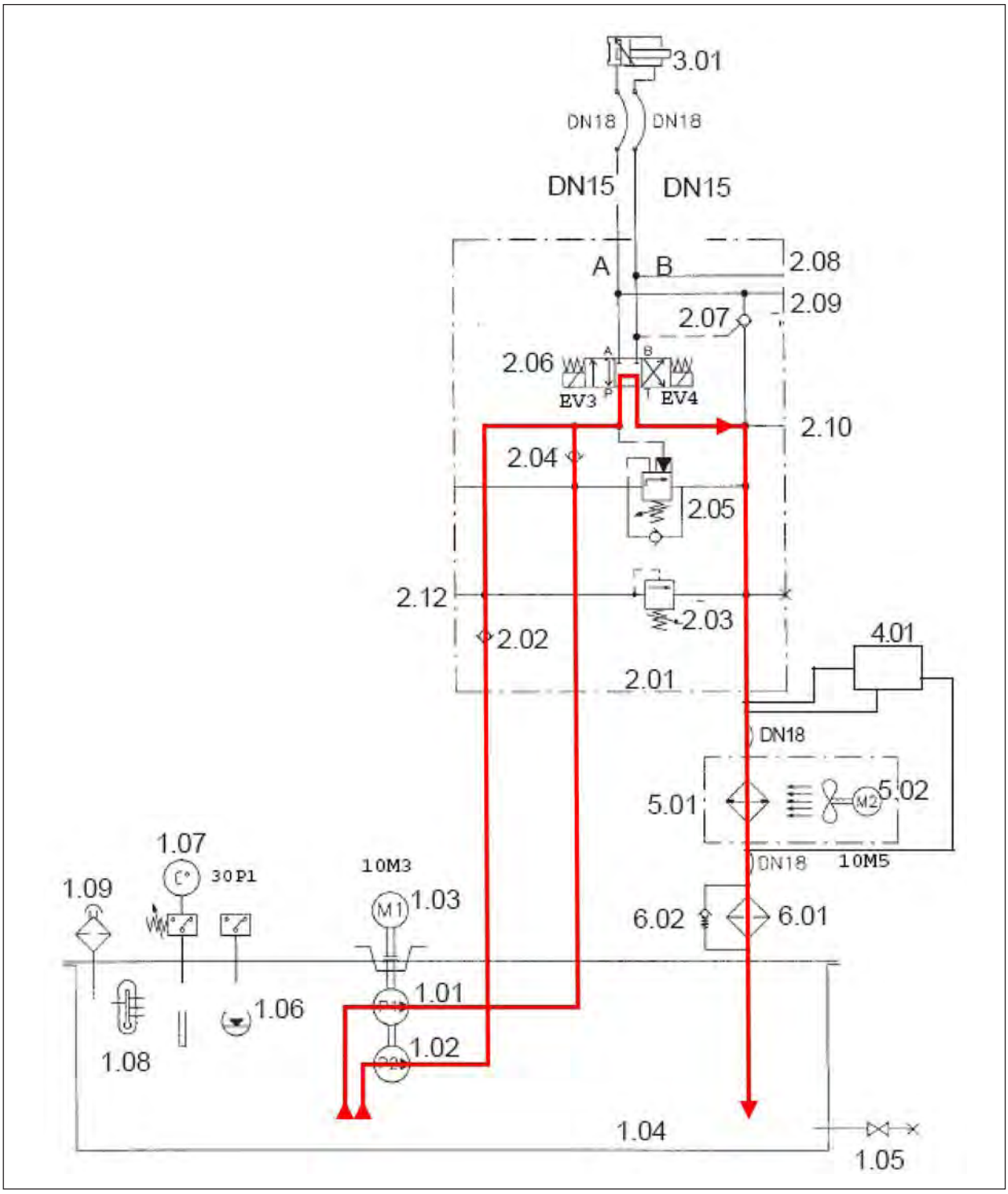


Step 4

– Piston (3) slowly moves further and compresses the CO_2 snow into dry ice.
– The dry ice is compressed by the extruder plate (2).
– The extruder plate (2) gives the dry ice its typical pellet form (hydraulics diagram 5).

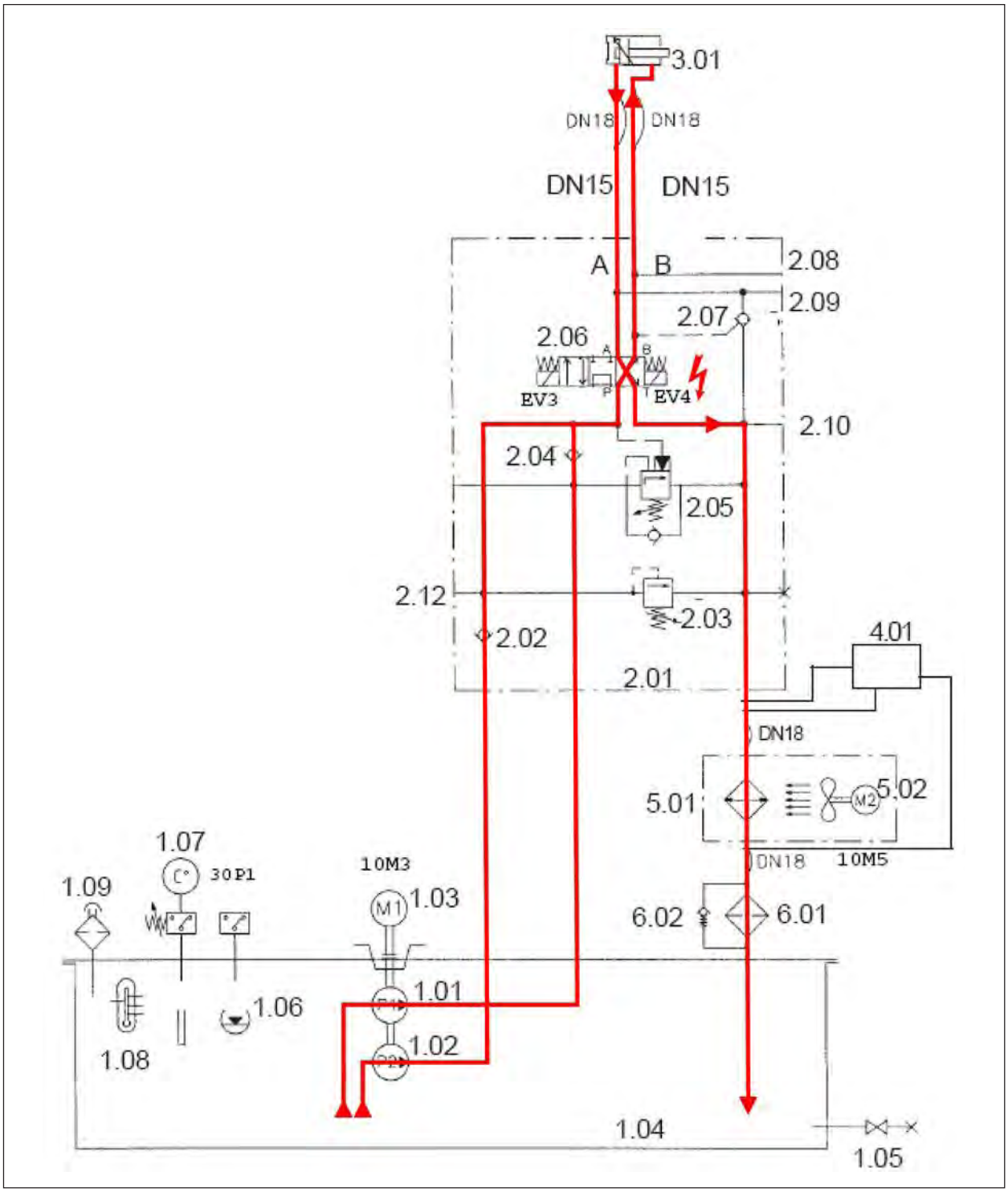
2 Extruder plate
3 Piston (3.01)

Hydraulic flow diagram 1 from Hydraulics plan 0.089-081.0 (IP 120)



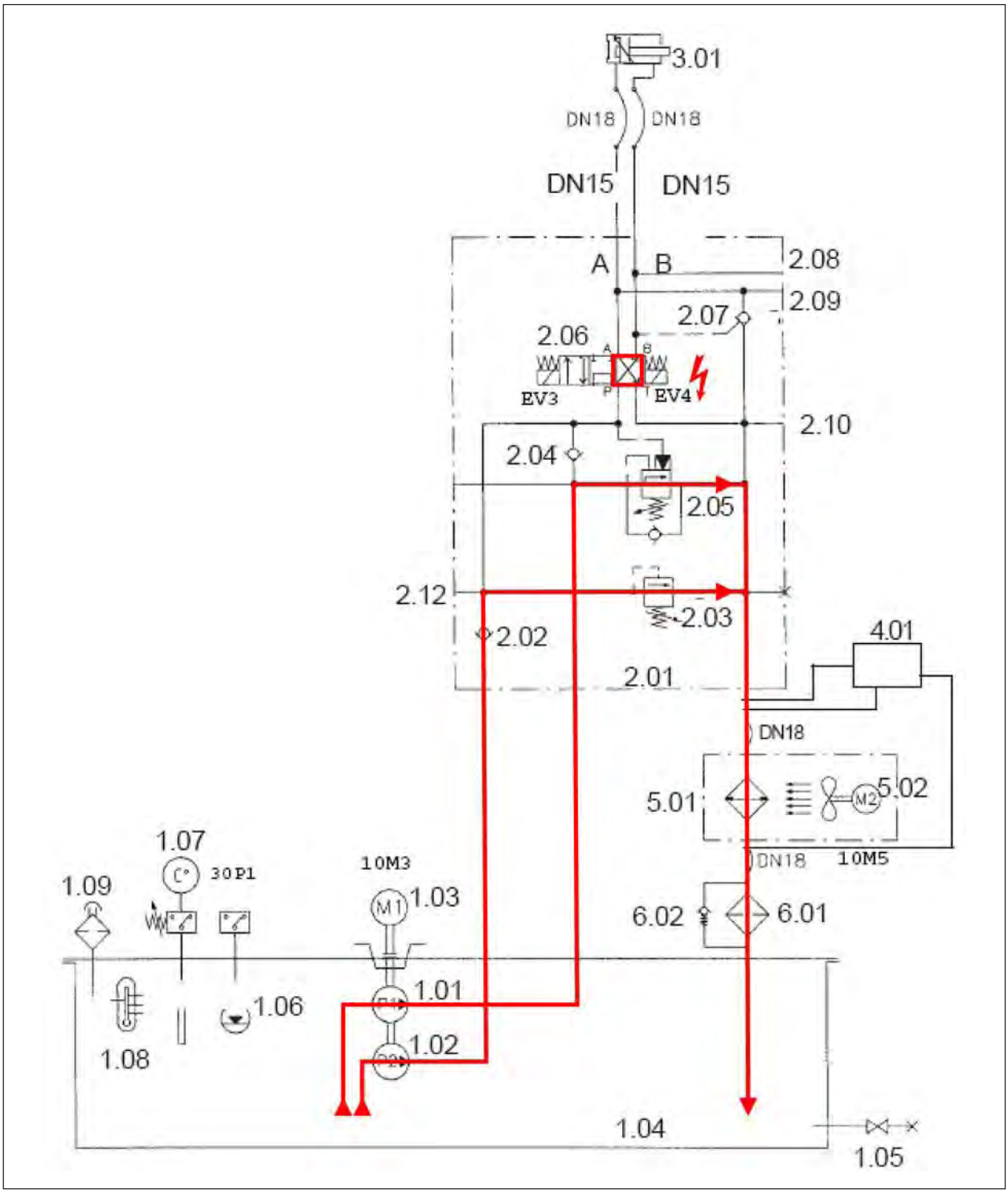
The unit is switched on, no production takes place. There is no current supply to solenoid valves (EV3) and (EV4). The piston (3.01) does not move. The complete oil quantity is pumped directly via the cooler (5.01) back into the hydraulic oil reservoir (1.04).

Hydraulic flow diagram 2 from Hydraulics plan 0.089-081.0 (IP 120)



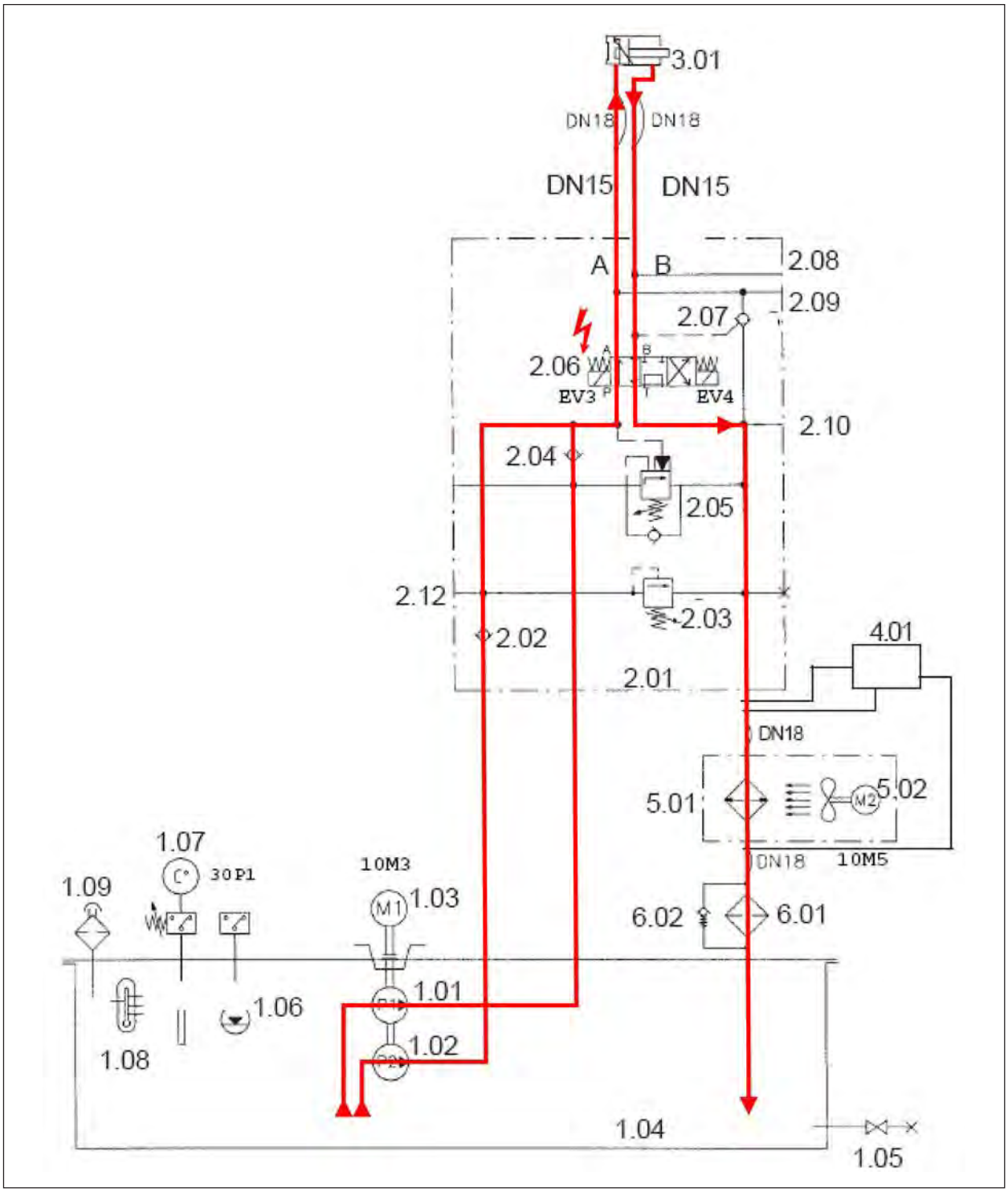
Current is supplied to solenoid valve (EV4), the piston (3.01) moves quickly back. Then CO_2 is injected into the press cylinder.

Hydraulic flow diagram 3 from Hydraulics plan 0.089-081.0 (IP 120)



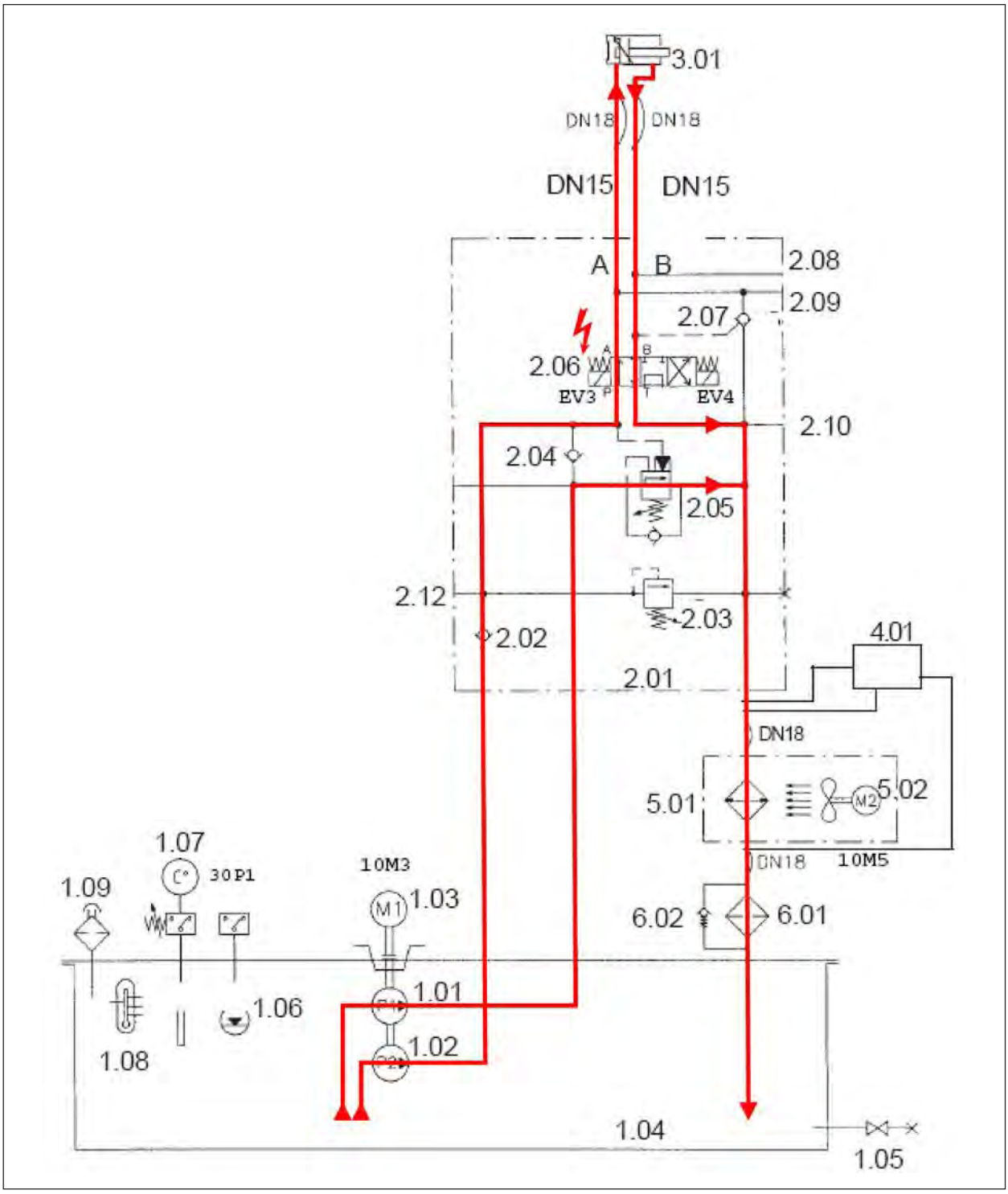
Piston (3.01) has been completely returned and
is mechanically at the limit stop position.

Hydraulic flow diagram 4 from Hydraulics plan 0.089-081.0 (IP 120)



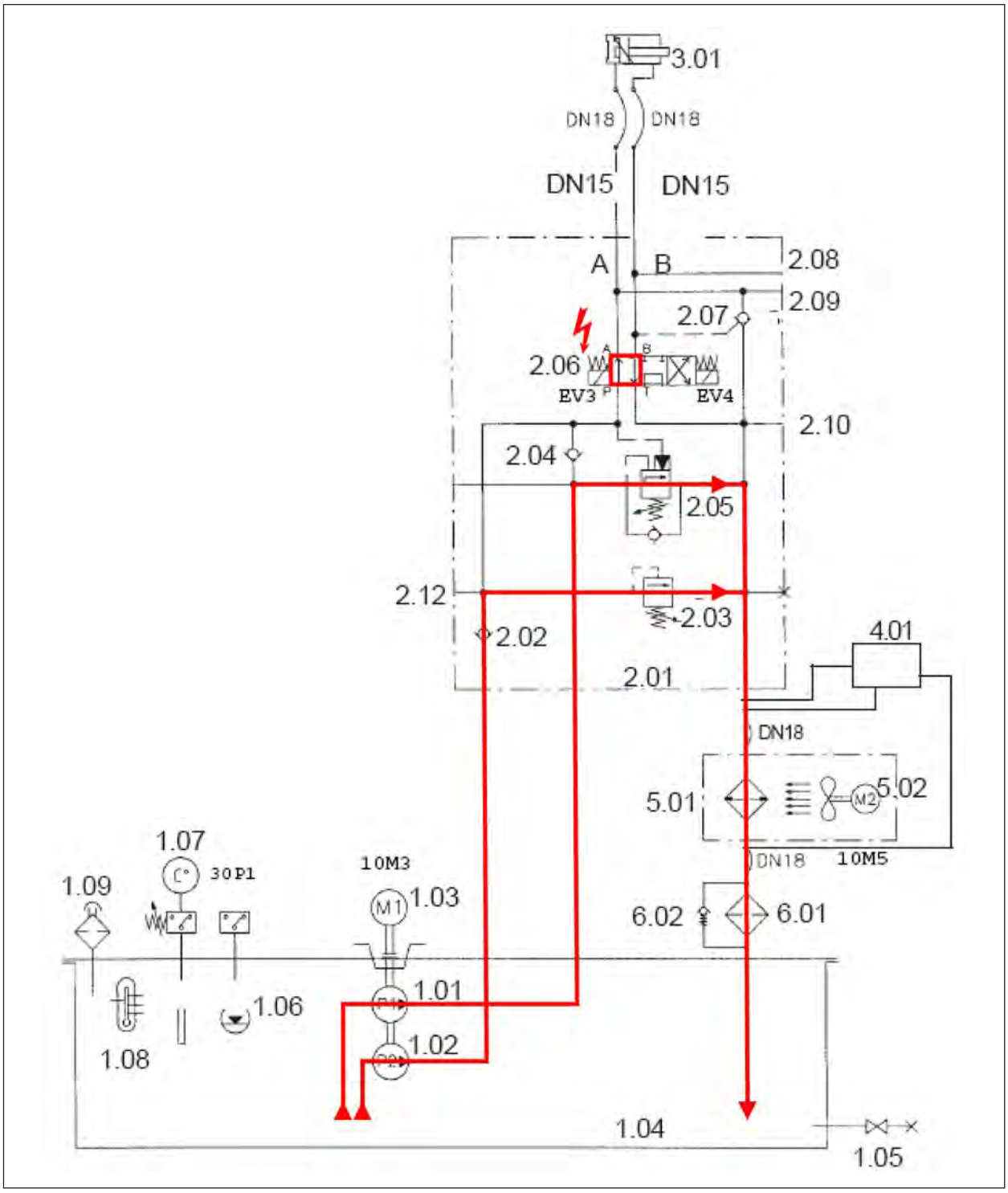
Production is active, current is supplied to solenoid valve (EV3), the piston (3.01) quickly extends (moves outwards). The hydraulic pressure is low.

Hydraulic flow diagram 5 from Hydraulics plan 0.089-081.0 (IP 120)



Production is active, the piston (3.01) slowly extends (moves outwards). The hydraulic pressure is high. The CO_2 snow is compressed and is pressed through the extruder plate as dry ice.

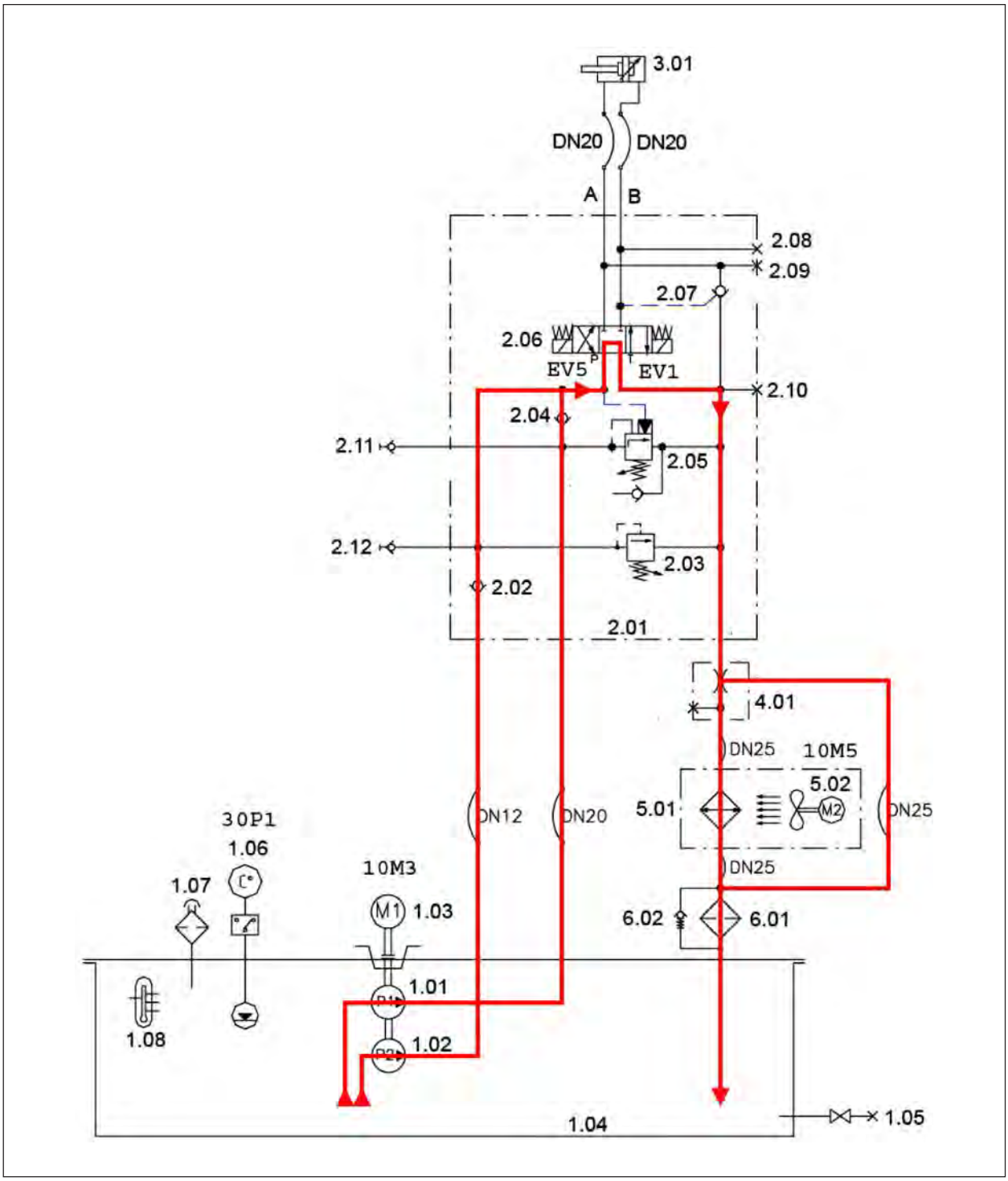
Hydraulic flow diagram 6 from Hydraulics plan 0.089-081.0 (IP 120)



Piston (3.01) has been completely extended and is mechanically at the limit stop position.

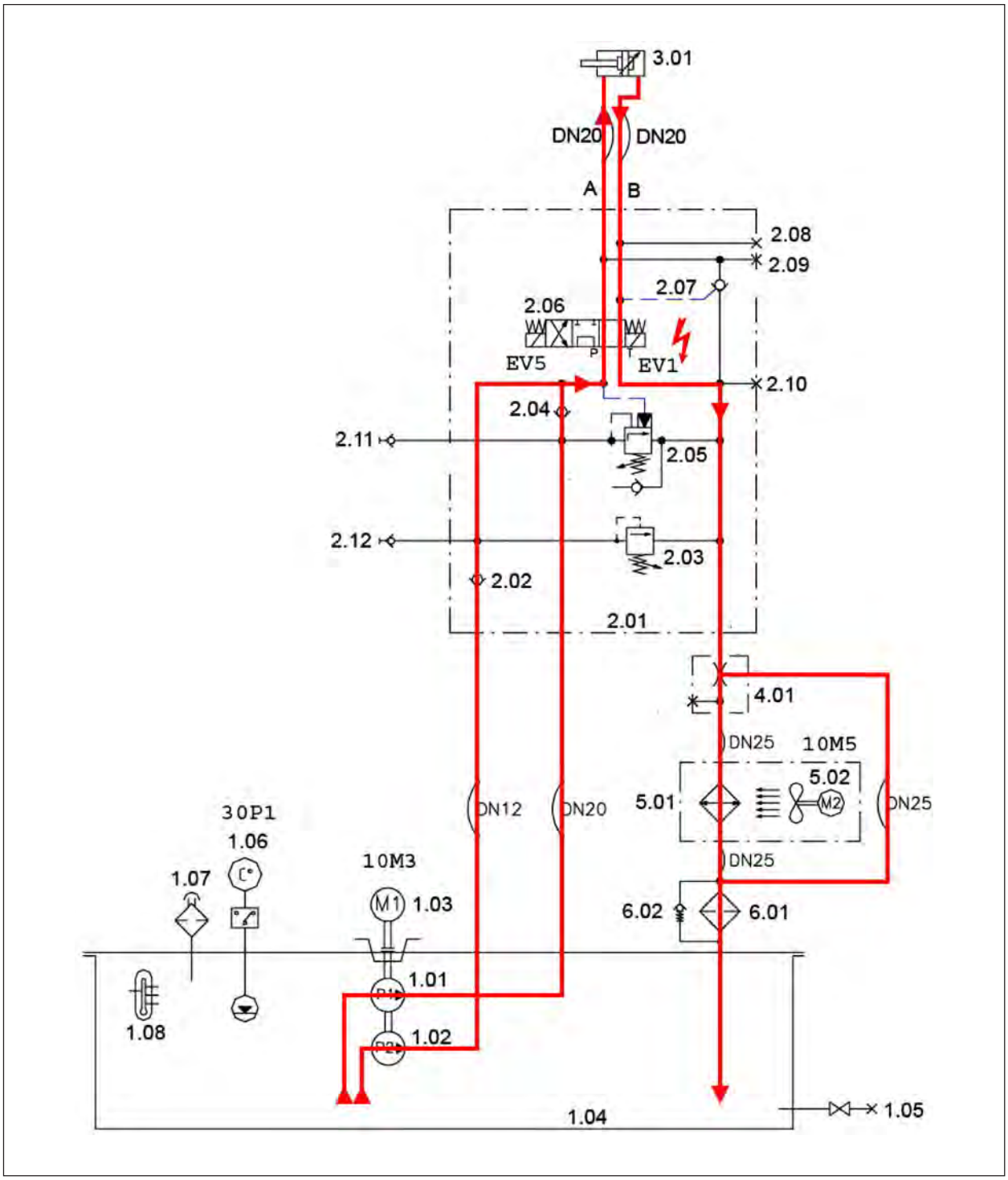
Note:
A production cycle extends from hydraulics diagram 2 to 5. This is constantly repeated during production. If the Stop button is pressed the cycle is completed up to hydraulics diagram 5 inclusive, then the residual quantity of dry ice is pressed out of the press chamber until hydraulics diagram 6 is active.

Hydraulic flow diagram 1 from Hydraulics plan 0.089-082.0 (IP 220)



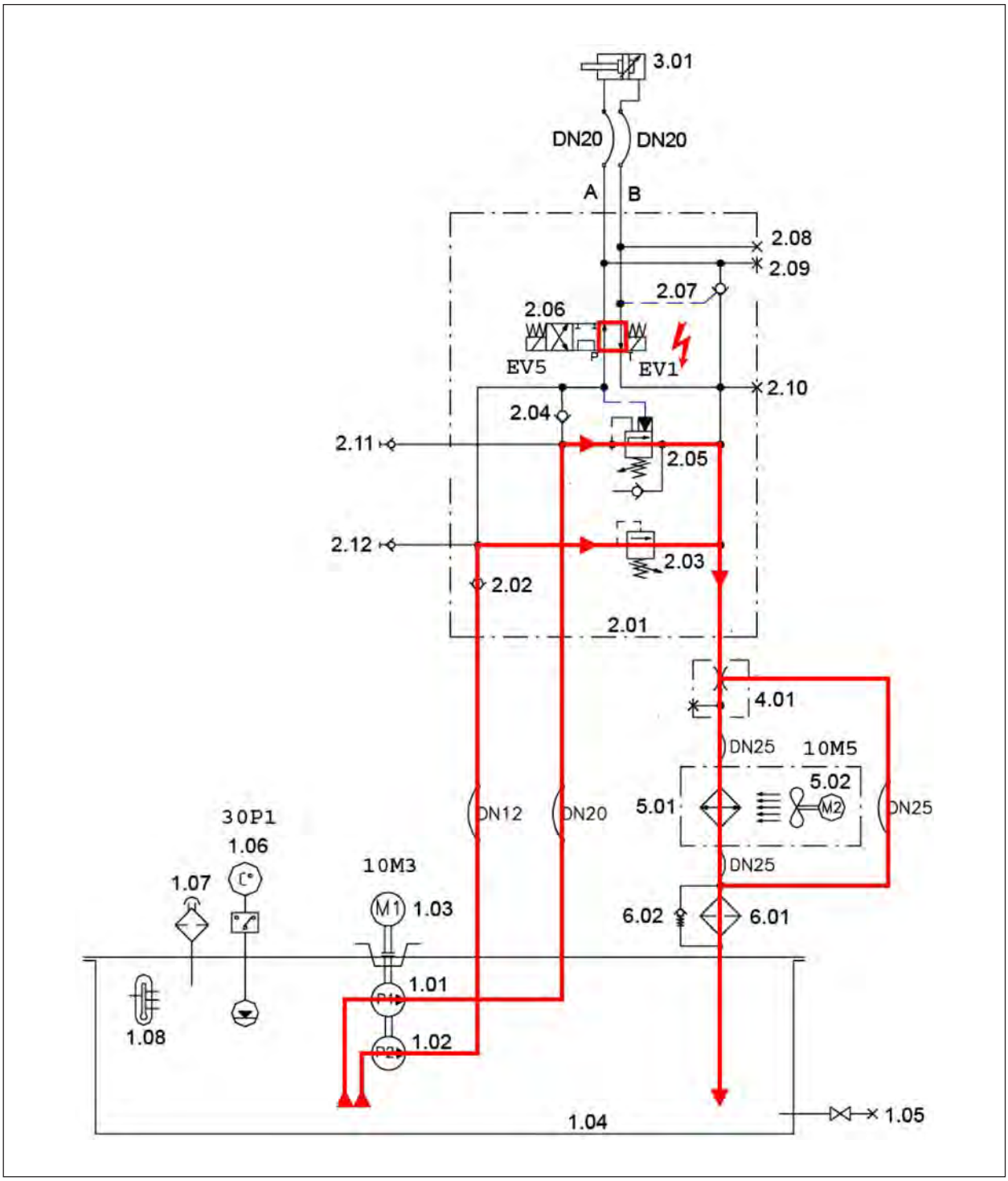
The unit is switched on, no production takes place. There is no current supply to solenoid valves (EV1) and (EV5). The piston (3.01) does not move. The complete oil quantity is pumped directly via the cooler (5.01) back into the hydraulic oil reservoir (1.04).

Hydraulic flow diagram 2 from Hydraulics plan 0.089-082.0 (IP 220)



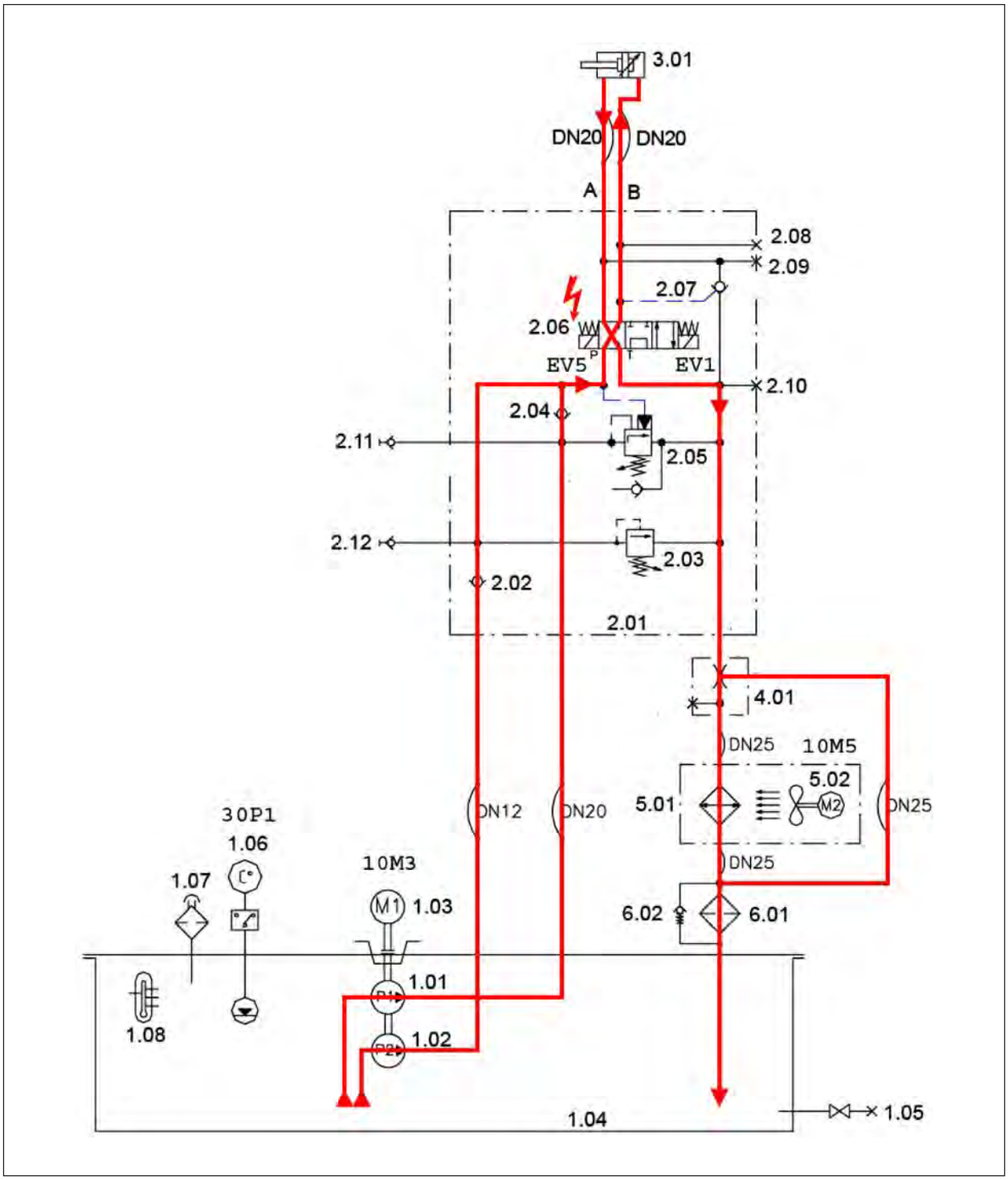
Current is supplied to solenoid valve (EV1), the piston (3.01) moves quickly back. Then CO_2 is injected into the press cylinder.

Hydraulic flow diagram 3 from Hydraulics plan 0.089-082.0 (IP 220)



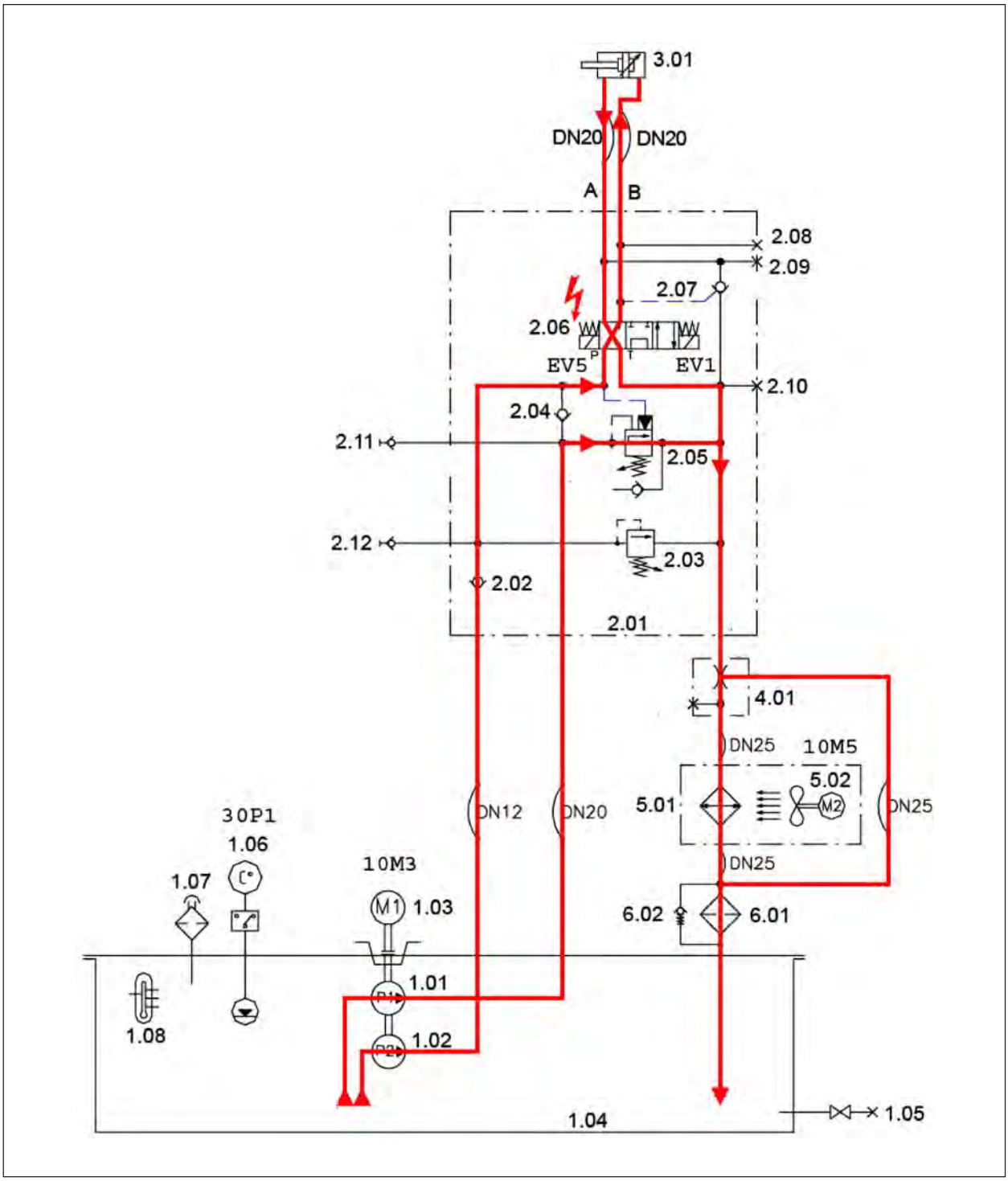
Piston (3.01) has been completely returned and
is mechanically at the limit stop position.

Hydraulic flow diagram 4 from Hydraulics plan 0.089-082.0 (IP 220)



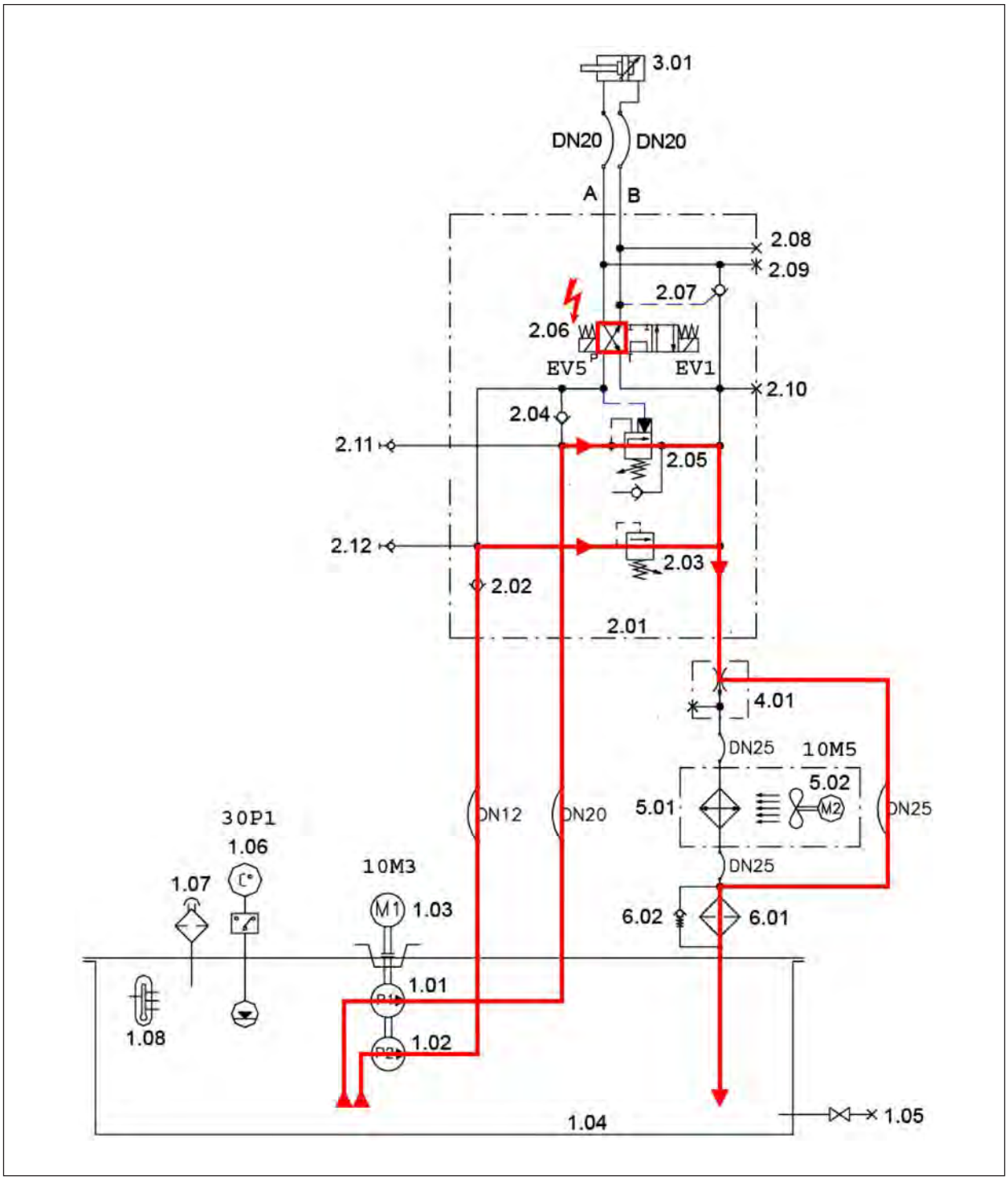
Production is active, current is supplied to solenoid valve (EV5), the piston (3.01) quickly extends (moves outwards). The hydraulic pressure is low.

Hydraulic flow diagram 5 from Hydraulics plan 0.089-082.0 (IP 220)



Production is active, the piston (3.01) slowly extends (moves outwards). The hydraulic pressure is high. The CO_2 is compressed and is pressed through the extruder plate as dry ice.

Hydraulic flow diagram 6 from Hydraulics plan 0.089-082.0 (IP 220)



Piston (3.01) has been completely extended and is mechanically at the limit stop position.

Note:
A production cycle extends from hydraulics diagram 2 to 5. This is constantly repeated during production. If the Stop button is pressed the cycle is completed up to hydraulics diagram 5 inclusive, then the residual quantity of dry ice is pressed out of the press chamber until hydraulics diagram 6 is active.

Dismantling the extruder plate

Discharge pipe

Extruder plate

Extruder plate dismantled

Dismantling the extruder plate

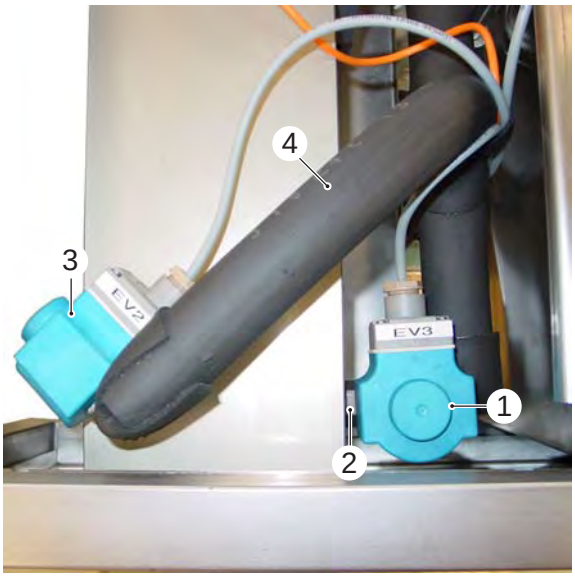
To dismantle the extruder plate (1), the discharge pipe (3) must be removed first.

– Remove nuts (2) and discharge pipe (3) (all three nuts must be removed in the IP 220).
– Remove the screws (4) and then remove the extruder plate (1).

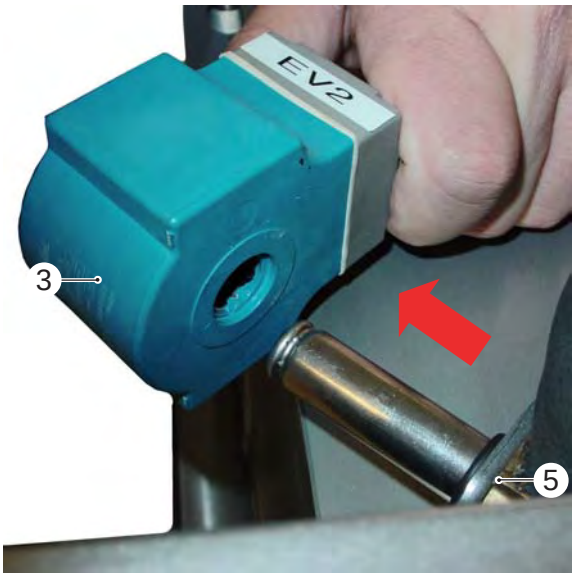
Note:
During installation, ensure that the extruder plate is installed with the „EXIT“ lettering facing upwards and legible from the outside.

1 Extruder plate
2 Nuts, discharge pipe
3 Discharge pipe
4 Nuts, extruder plate (IP 120 = SW24, IP 220 = SW36)

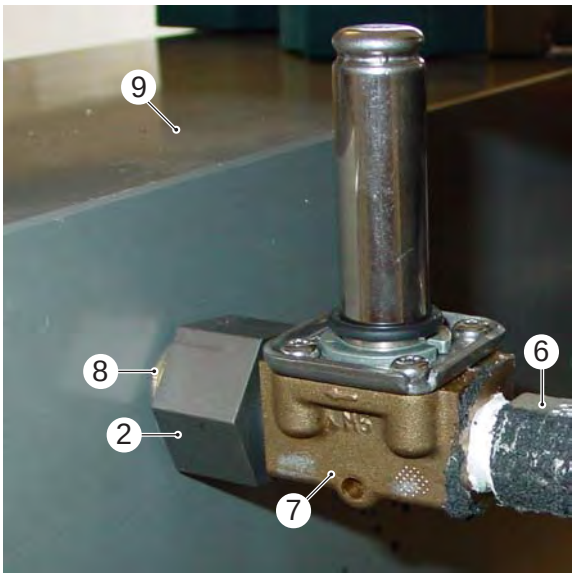
Dismantle solenoid valves / CO_2 injection nozzles, IP 120



Position of the solenoid valve



Pull off the solenoid valve



Solenoid valve removed

Dismantle solenoid valves / CO2 injection nozzles, IP 120

Before dismantling the CO_2 injection nozzle (2), the magnet coil (1) and (3) must be pulled off the solenoid valve (5) and (7) and the CO_2 supply pipe (4) removed.

To do this, remove the magnet coil (1) and (3) in the direction of the arrow (red).

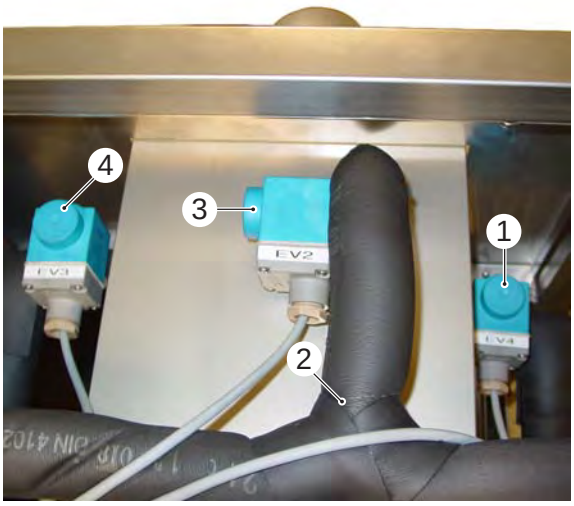
– Loosen the union nut (6) from the solenoid valve (5) and (7) and remove the pipe (4).
– Remove the CO_2 injection nozzle (2) from the housing (9) of the press cylinder and remove the CO_2 injection nozzle together with the sealing ring (8).

Important:
The pipes are pressurised. Close the CO_2 shut-off valve. Switch unit to production until no more pellets are produced. To be safe, allow it to run for a further 2 production cycles.

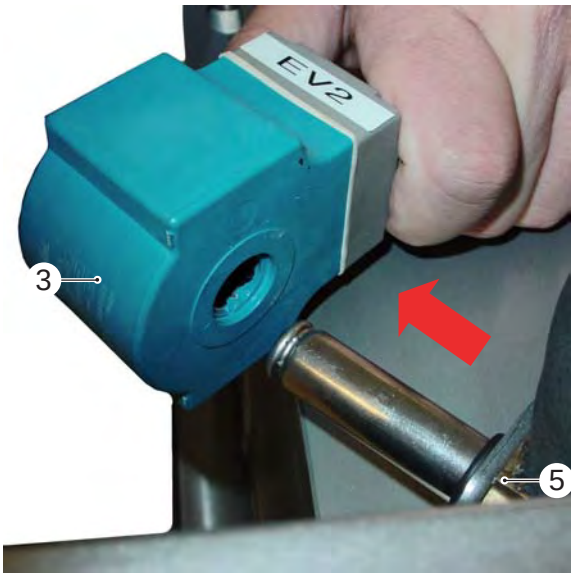
Note:
If the injection valve is dismantled or a threaded connection in pipes is opened, it must always be sealed with Teflon tape on assembly. Otherwise leaks could occur.

1 Magnet coil, solenoid valve (EV3)
2 CO_2 injection nozzle
3 Magnet coil, solenoid valve (EV2)
4 Pipe, CO_2 supply
5 Solenoid valve (EV2), CO_2 injection nozzle
6 Union nut, CO_2 supply line
7 Solenoid valve (EV3), CO_2 injection nozzle
8 Sealing ring, CO_2 injection nozzle
9 Housing, press cylinder

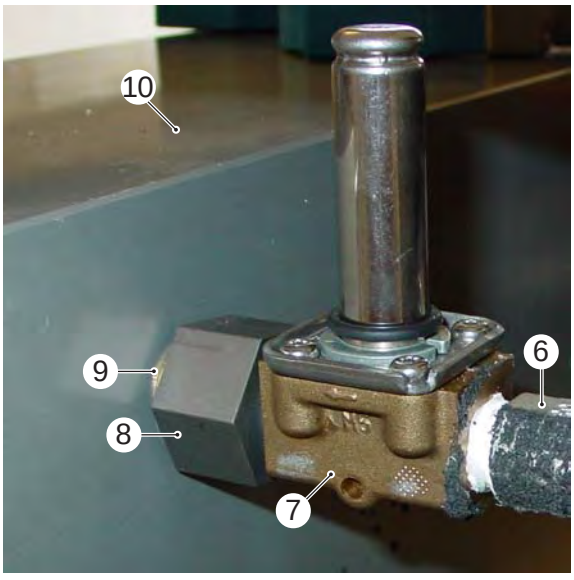
Dismantle solenoid valves / CO_2 injection nozzles, IP 220



Position of the solenoid valve



Pull off the solenoid valve



Solenoid valve removed

Dismantle solenoid valves / CO2 injection nozzles, IP 220

Before dismantling respective the CO_2 injection nozzle (6), the magnet coil (1), (3) or (4) must be pulled off and the CO_2 supply pipe (2) removed.

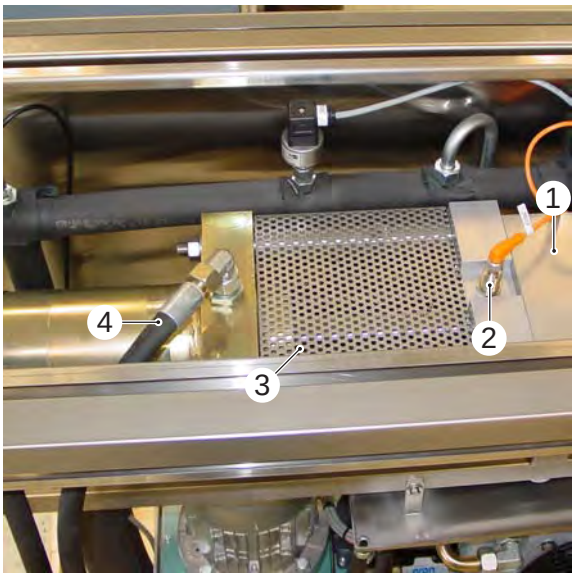
– To do this, remove the magnet coil (1), (3) or (4) in the direction of the arrow (red).
– Loosen the union nut (6) from the relevant solenoid valve and remove the pipe (2).
– Remove the CO_2 injection nozzle (8) from the housing (10) of the press cylinder and remove the CO_2 injection nozzle together with the sealing ring (9).

Important:
The pipes are pressurised. Close the CO_2 shut-off valve. Switch unit to production until no more pellets are produced. To be safe, allow it to run for a further 2 production cycles.

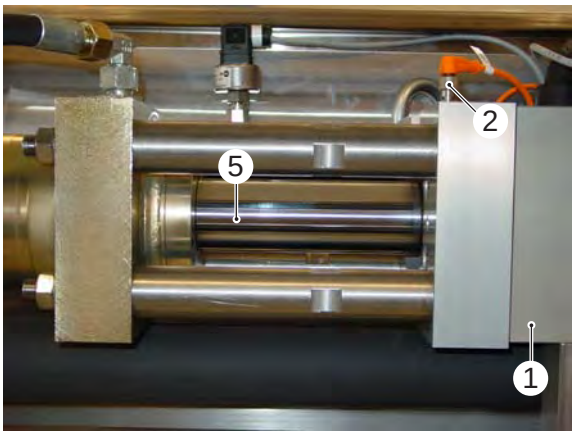
Note:
If the injection valve is dismantled or a threaded connection in pipes is opened, it must always be sealed with Teflon tape on assembly. Otherwise leaks could occur.

1 Magnet coil, solenoid valve (EV4)
2 Pipe, CO_2 supply
3 Magnet coil, solenoid valve (EV2)
4 Magnet coil, solenoid valve (EV3)
5 Solenoid valve, CO_2 injection nozzle
6 Union nut, CO_2 supply line
7 Solenoid valve (EV3), CO_2 injection nozzle
8 CO_2 injection nozzle
9 Sealing ring, CO_2 injection nozzle
10 Housing, press cylinder

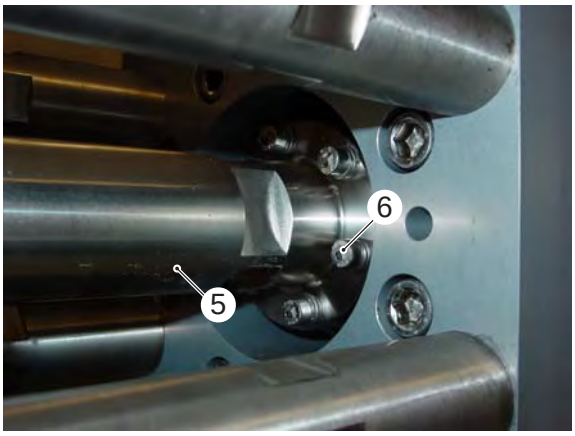
Dismantle piston / exhaust bushings, IP 120



Protective cover



Piston rod without protective cover



Piston fastening

Dismantling the piston / exhaust bushings

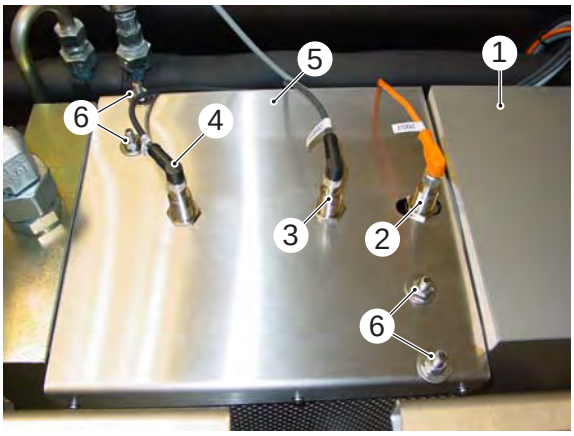
Before dismantling the piston, (see page 36), the extruder plate and the injection nozzle (see pages 31 - 33) must be dismantled.

– Use master switch to switch on the hydraulics.
– Retract piston until the retaining screws (6) are easily accessible.
– Use master switch to switch off the hydraulics.
– Remove the protective cover (3) from above.
– Remove retaining screws (6), at the same time, use a suitable tool to firmly grip the piston rod (5); if necessary use it to turn the piston rod.

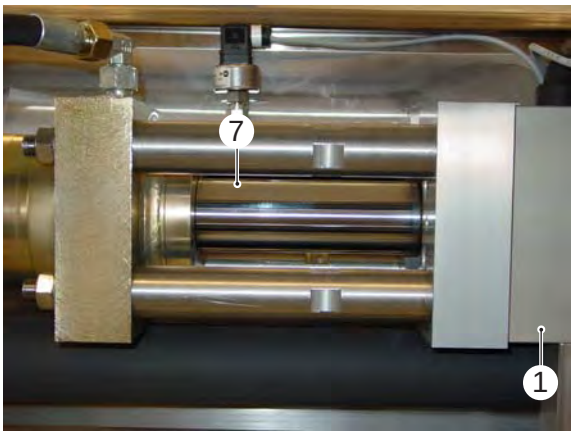
Note:
The hydraulics must always be disconnected from the pressure supply and depressurised before carrying out any work on them. Switch master switch (10S1) to OFF.

1 Housing, press cylinder
2 Limit switch (20S7), piston
3 Protective cover, piston rod
4 Hydraulic hose, retract
5 Piston rod
6 Retaining screws, piston

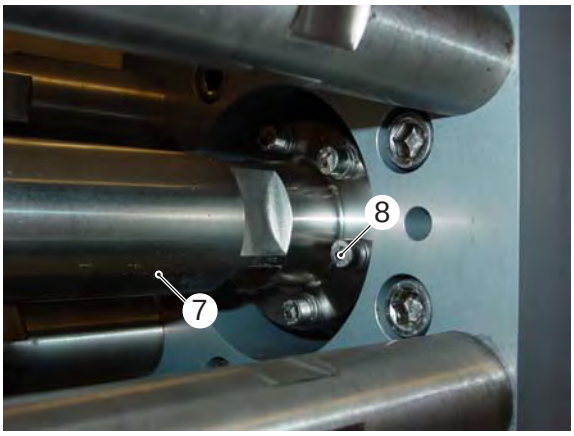
Dismantle piston / exhaust bushings, IP 220



Protective cover



Piston rod without protective cover



Piston fastening

Dismantling the piston / exhaust bushings

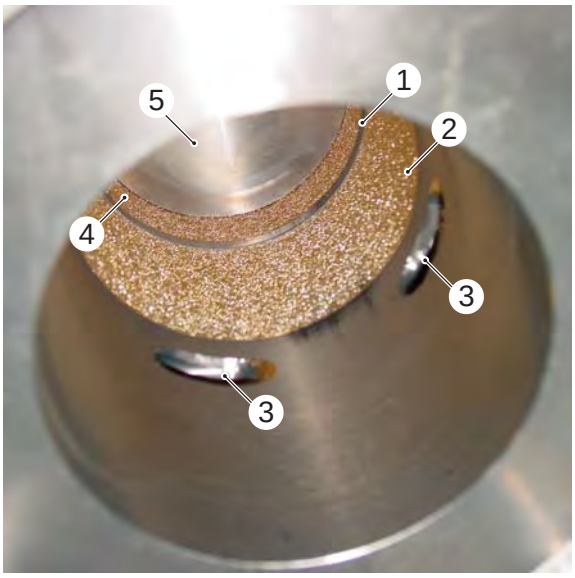
Before dismantling the piston, (see page 36), the extruder plate and the injection nozzle (see pages 31 - 33) must be dismantled.

– Use master switch to switch on the hydraulics.
– Retract piston until the retaining screws (8) are easily accessible.
– Use master switch to switch off the hydraulics.
– Remove the retaining screws (6) of the protective cover (5) and remove the protective cover from above.
– Remove retaining screws (8), at the same time, use a suitable tool to firmly grip the piston rod (7); if necessary use it to turn the piston rod.

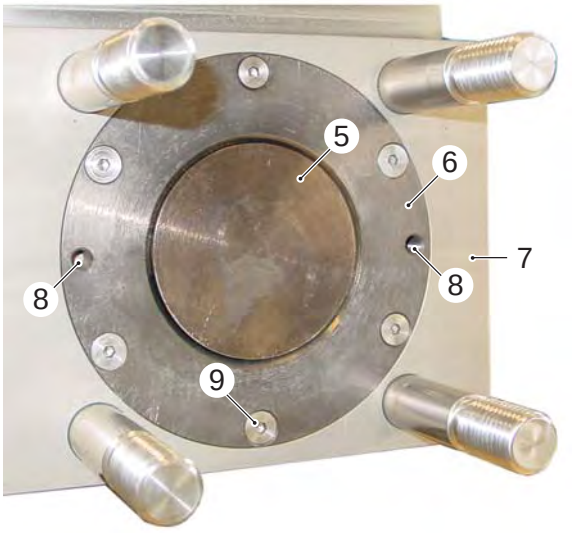
Note:
The hydraulics must always be disconnected from the pressure supply and depressurised before carrying out any work on them. Switch master switch (10S1) to OFF.

1 Housing, press cylinder
2 Limit switch (20S7), piston extended
3 Switch (20S11), start pressing path
4 Limit switch (20S10), piston retracted
5 Protective cover, piston rod
6 Retaining screws, protective cover
7 Piston rod
8 Retaining screws, piston

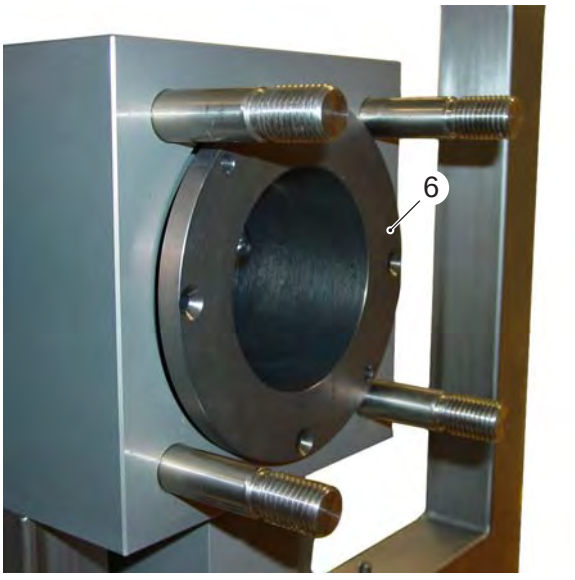
Dismantle piston / exhaust bushings, IP 120 / IP 220



Exhaust bushings



Removing the piston



Removing the press cylinder

Dismantling the piston / exhaust bushings

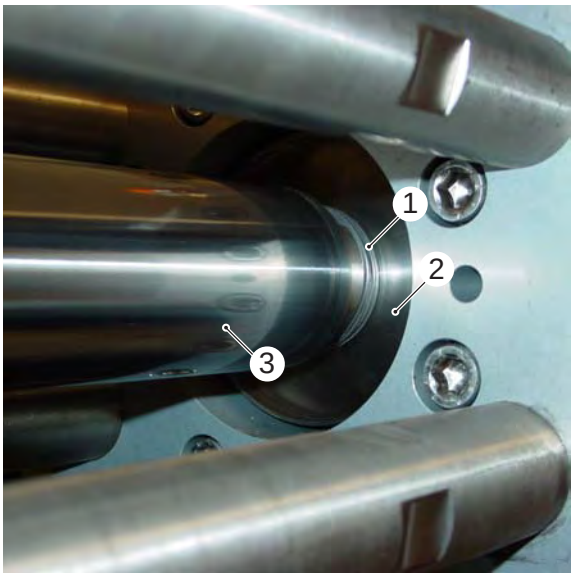
Note:
The injection nozzles (see page 32 and 33) must be dismantled before removing the press cylinder (6).

– Remove the retaining screws (9) and press cylinder (6) from the housing (7) from the front.
– If the press cylinder (6) is stuck, it can be „pressed out“ by pushing suitable screws through the threaded holes (8).
– The exhaust bushings (2) and (4) and spacer ring (1) can now be removed from the housing (7) from the front.
– Remove the piston (5) from the housing (7) of the press cylinder (6) from the front.

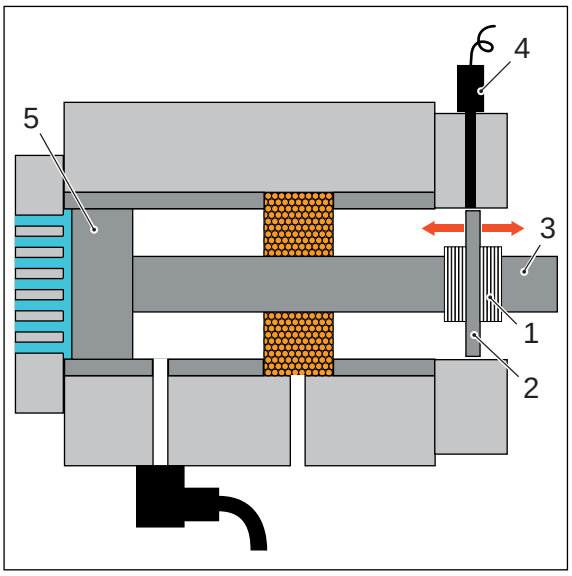
Note:
The hydraulics must always be disconnected from the pressure supply and depressurised before carrying out any work on them. Switch master switch to OFF.

1 Spacer ring, exhaust bushings
2 Front exhaust bushing
3 Inlet opening, CO_2 injection nozzle
4 Rear exhaust bushing
5 Piston
6 Press cylinder
7 Housing, press cylinder
8 Threaded holes, press cylinder removal aid
9 6x retaining screws, press cylinder

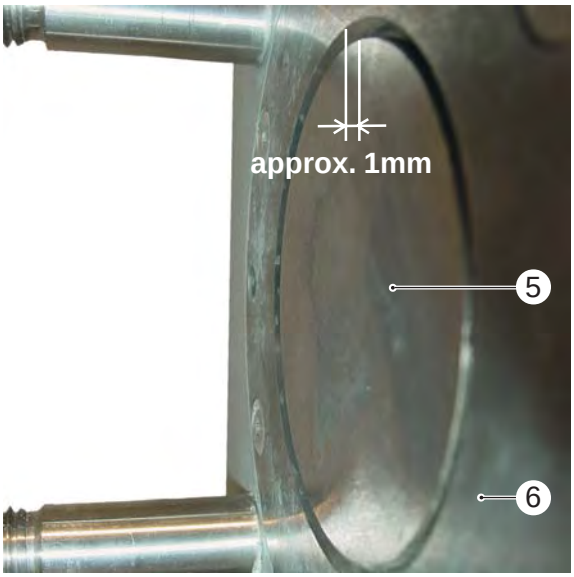
Installing the piston



Spacer washers



Disc setting, limit switch



Distance between piston and press cylinder

Installing the piston

The following must be noted and observed when installing the piston (5).

– The installed, extended piston (5) must be positioned approx. 1mm behind the front, flat surface of the press cylinder (6). The piston (5) may not protrude beyond the press cylinder (6), as otherwise the extruder plate will be damaged or destroyed.

– To establish the correct spacing, a certain number of spacer washers (1) must be installed in front of the disc (2) for actuation of the limit switch. The total number of spacer washers gives the piston setback when the piston is completely extended. The setback should be approx. 0.5-1mm

– To do this, completely extend the installed piston (5) and measure the distance from the front, flat surface of the press cylinder (6), e.g. using a depth gauge.

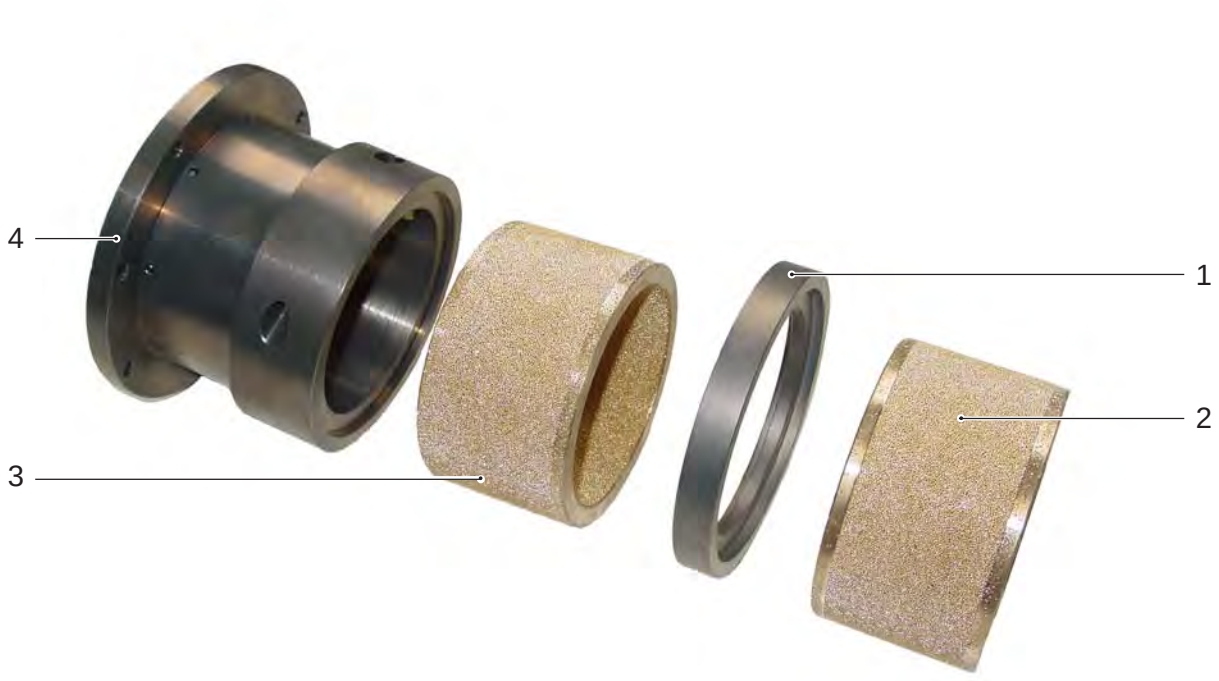
– Remove the disc (2) from the piston rod (3) and fit an appropriate number of spacer washers (1) to establish the required spacing.

  The disc (2) covers the limit switch (4). As soon as the limit switch (4) is covered during production the piston moves back. This means, the position of the disc (2) within the spacer washers (1) gives the thickness of the dry ice disc. The dry ice disc is required to seal the matrix in the extruder plate during injection of the CO_2. The gaseous CO_2 should ideally escape through the exhaust pipe only.

Note:
The hydraulics must always be disconnected from the pressure supply and depressurised before carrying out any work on them. Switch master switch to OFF.

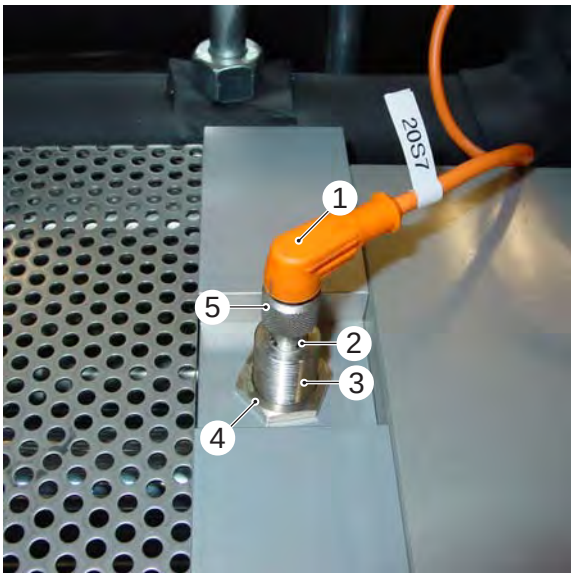
1 Spacer washers, piston
2 Disc, limit switch
3 Piston rod
4 Limit switch (20S7), piston extended
5 Piston
6 Press cylinder

Exhaust bushings

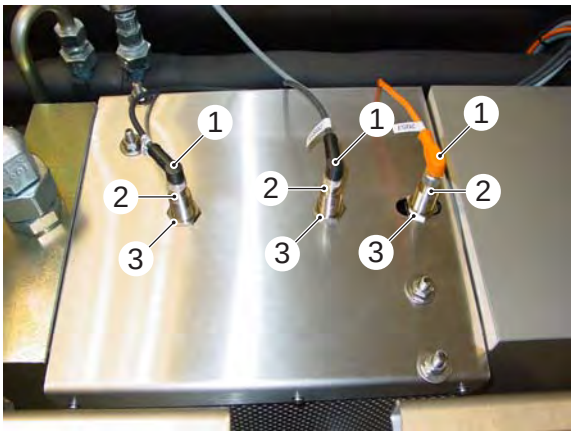


1 Spacer ring, exhaust bushings
2 Rear exhaust bushing
3 Front exhaust bushing
4 Press cylinder

Dismantling limit switch, IP 120 / 220



Limit switch IP 120



Limit switch IP 220

Dismantling the limit switch

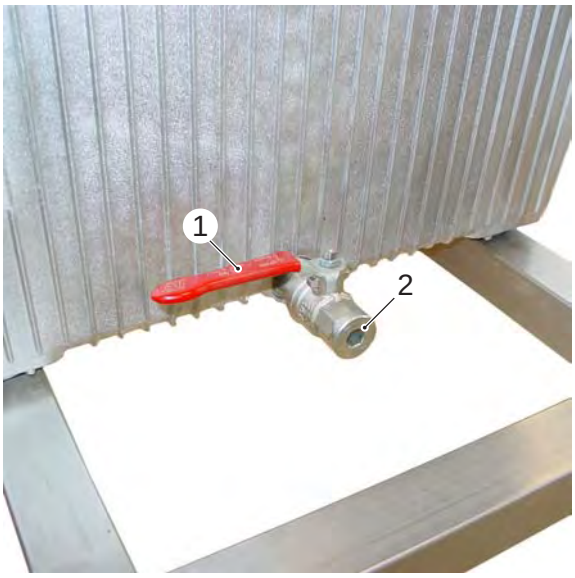
All the limit switches of the IP 120 and the IP 220 are removed as follows, as shown using the example of the limit switch (3):

– Remove union nut (5) of the connector (1) at the limit switch (3).
– Remove the connector (1).
– Loosen the lock nut (4) and remove the limit switch (3).

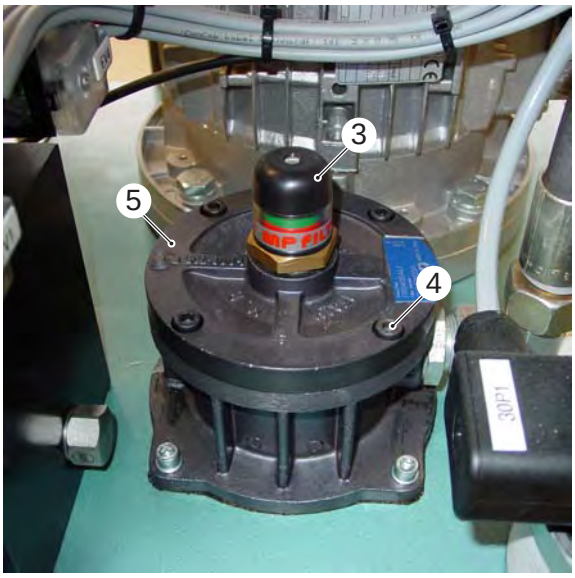
Note:
During assembly ensure that the disc for querying the end position on the piston rod (see page 37) is positioned at the level of the drillhole for the limit switch. Screw in the limit switch (3) until the indicator light (2) lights up when the control voltage is applied to the limit switch (3).

1 Connector, limit switch
2 Indicator light, limit switch
3 Limit switch.
4 Lock nut, limit switch
5 Union nut, connector

Oil and oil filter change, IP 120



Oil drain tap



Oil filter

Oil level indicator

Oil and oil filter change, IP 120

Change the oil only if the oil is hot.

– Place a suitable oil drip pan under the drain tap (1).
– Remove the oil drain plug (2).
– Open the drain tap (1) and let all the oil drain out.
– Close the drain tap (1) and screw in the oil drain plug (2) and tighten.
– Remove the retaining screws (4) on the cover of the oil filler neck (5) and remove the cover.
– Remove the oil filter (3) from the filler cover (5) and replace.
– Pour in new hydraulic oil until the oil level indicator (6) is 3/4 full with oil.
– Fit the cover (5) with the retaining screws (4).
– Start the dry ice pelletizer and check the level at the oil level indicator (6). If necessary, top up the hydraulic oil.

Note:
The oil change can also be carried out using an oil change system.

Note:
The hydraulics must always be disconnected from the pressure supply and depressurised before carrying out any work on them. Switch master switch to OFF.

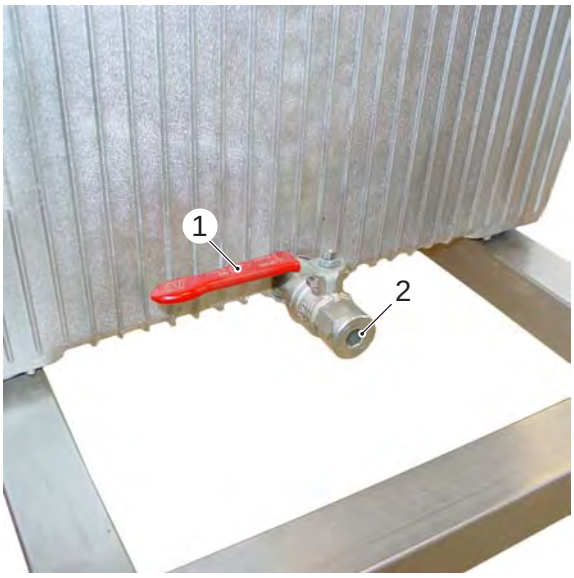
Caution when handling hot oil. It can cause severe burns or result in blindness if it comes into contact with the eyes!

Fire risk!

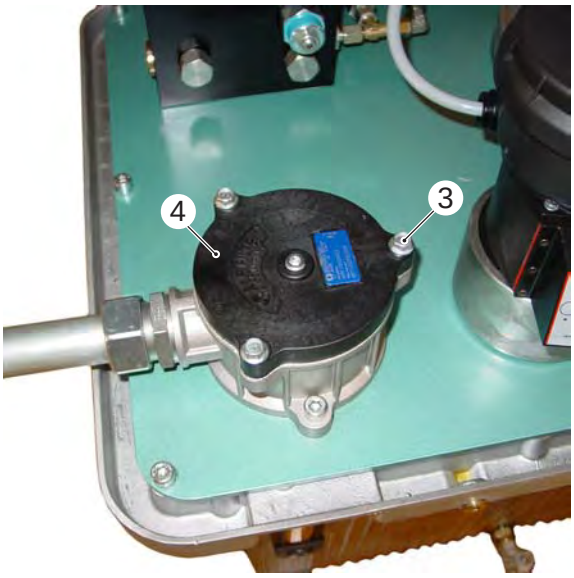
The old hydraulic oil must be collected and disposed of according to the local regulations.

1 Drain tap (1.05), hydraulic vessel
2 Oil drain plug
3 Oil filter (6.01)
4 Retaining screws (4x), oil filler neck cover
5 Cover, oil filler neck
6 Oil level indicator (1.08)

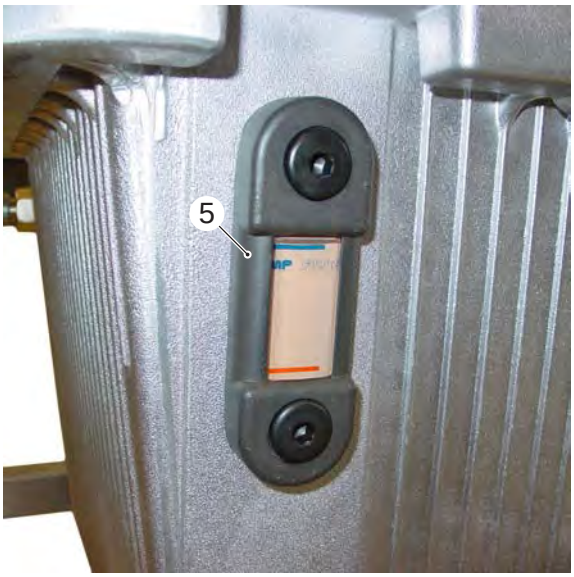
Oil and oil filter change, IP 220



Oil drain tap



Oil filter



Oil level indicator

Oil and oil filter change, IP 220

Change the oil only if the oil is hot.

– Place a suitable oil drip pan under the drain tap (1).
– Remove the oil drain plug (2).
– Open the drain tap (1) and let all the oil drain out.
– Close the drain tap (1) and screw in the oil drain plug (2) and tighten.
– Remove the retaining screws (3) on the cover of the oil filler neck (4) and remove the cover.
– Remove the oil filter from the cover (4) and replace.
– Pour in new hydraulic oil until the oil level indicator (5) is 3/4 full with oil.
– Fit the cover (5) with the retaining screws (3).
– Start the dry ice pelletizer and check the level at the oil level indicator (5). If necessary, top up the hydraulic oil.

Note:
The oil change can also be carried out using an oil change system.

Note:
The hydraulics must always be disconnected from the pressure supply and depressurised before carrying out any work on them. Switch master switch to OFF.

Caution when handling hot oil. It can cause severe burns or result in blindness if it comes into contact with the eyes!

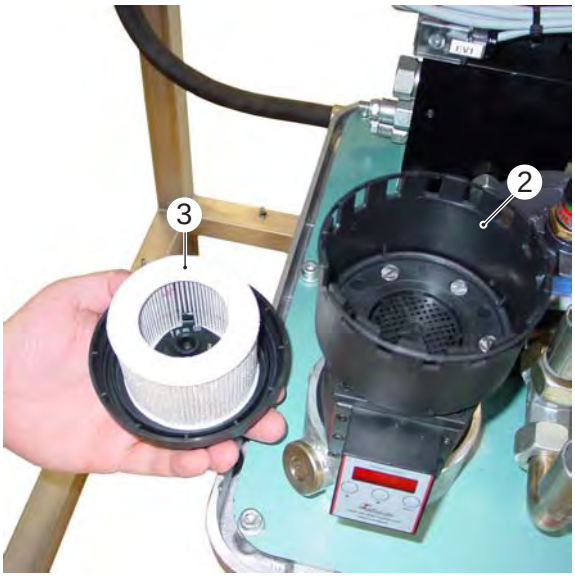
Fire risk!

The old hydraulic oil must be collected and disposed of according to the local regulations.

1 Drain tap (1.05), hydraulic vessel
2 Oil drain plug
3 Retaining screws (3x), oil filler neck cover
4 Cover, oil filler neck
5 Oil level indicator (1.08)

Control air filter, IP 120 / IP 220

Air filter housing



Air filter

Control air filter, IP 120 / IP 200

– Remove the cover (1) of the air filter housing (2) from above.
– Remove the air filter (3) from the cover (1).

1 Cover, air filter housing
2 Air filter housing
3 Air filter

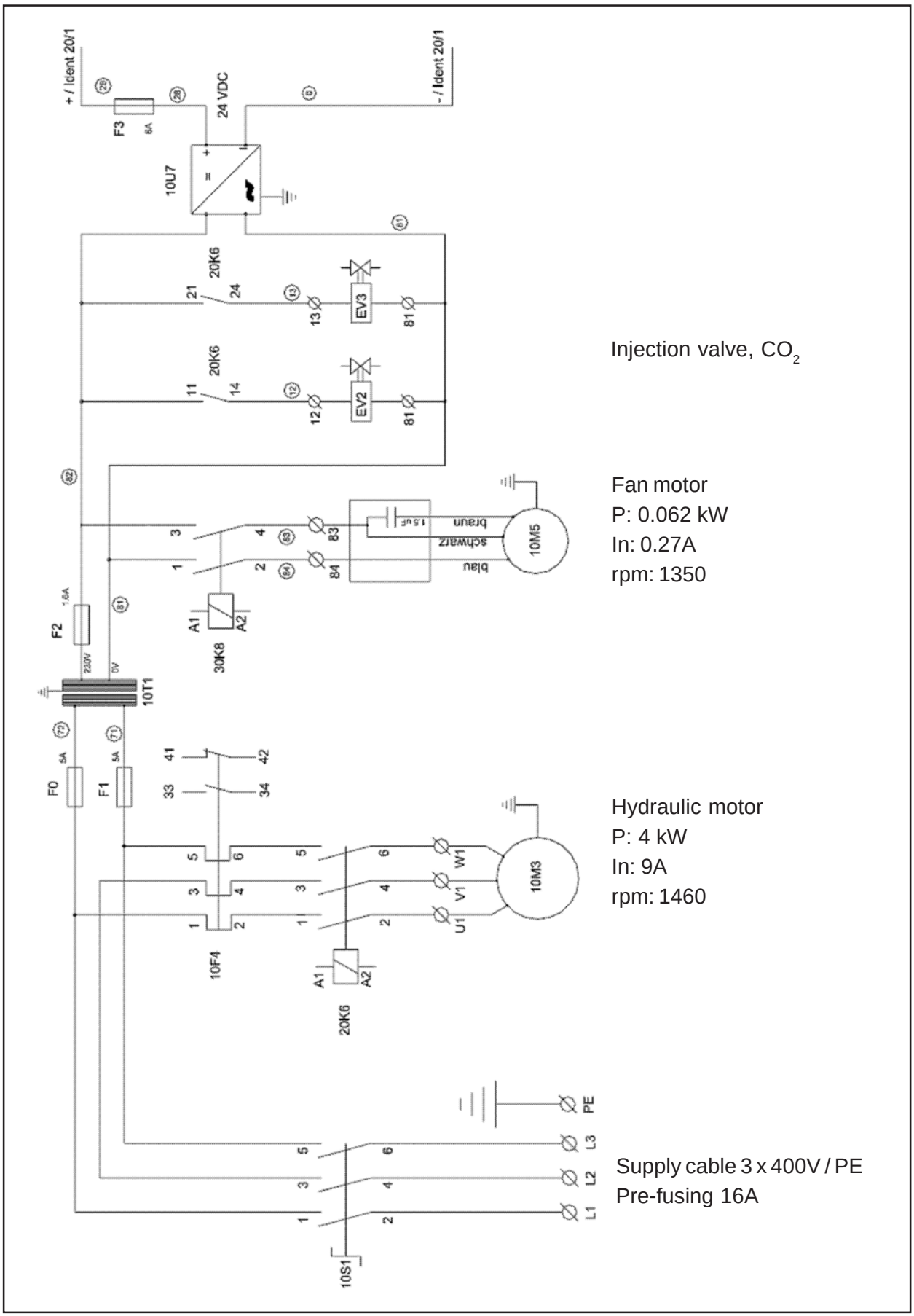
Troubleshooting

Faults with display	Solution
„Oil level too low“ indicator light lights up	– Check hydraulic system for leaks. – Oil level sensor (30P1) is defective - check/replace.
„Oil temperature too high“ indicator light lights up	– Check/clean/replace oil cooler fan (5.02). – Check/replace temperature switch (30P1).
„Motor overload“ indicator light	– Press the Reset pushbutton (30S3). – Restart the unit
„Cycle time exceeded“ indicator light	– Check/replace the extruder plate and piston. – Check/replace limit switch. – Check the electric connection of the hydraulic pump.

Faults without display	Solution
No dry ice snow production	– Wait until liquid carbon dioxide has displaced the gas from the pipe. – Check/replace solenoid valve (EV2, EV3, EV4*). * IP 220 only – Check / adjust the pressure of the carbon dioxide supply.
Too much dry ice snow in the exhaust pipe	– Check/replace solenoid valve (EV2, EV3, EV4*). * IP 220 only – Check/replace exhaust bushings.
Water drips from the unit	– Check/clean condensate drip plate. – Check/clean condensate pipe.

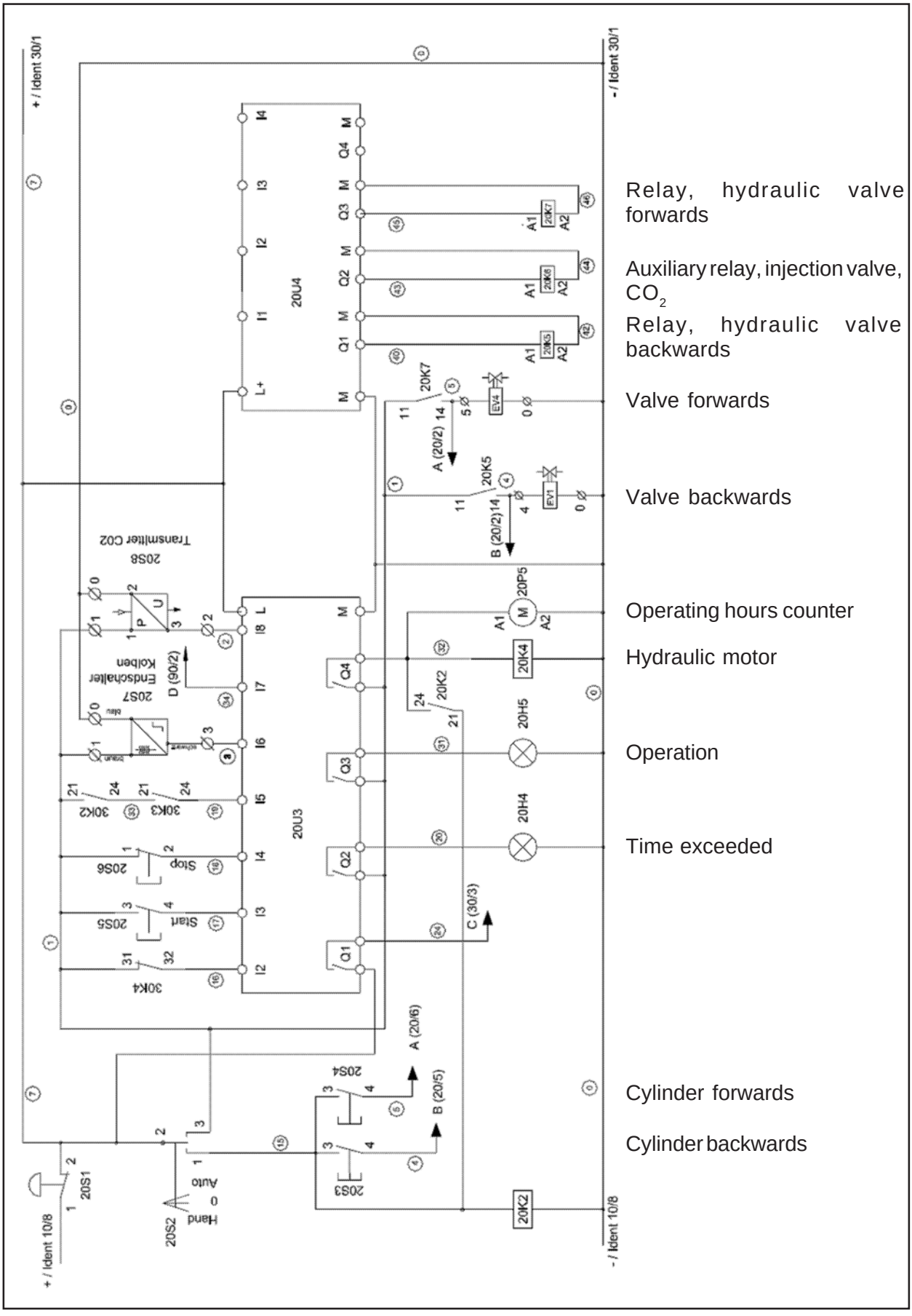
Extract from circuit diagram 0.089-011.0 (IP 120)

Please always use the circuit diagram revision status applicable to the unit version!



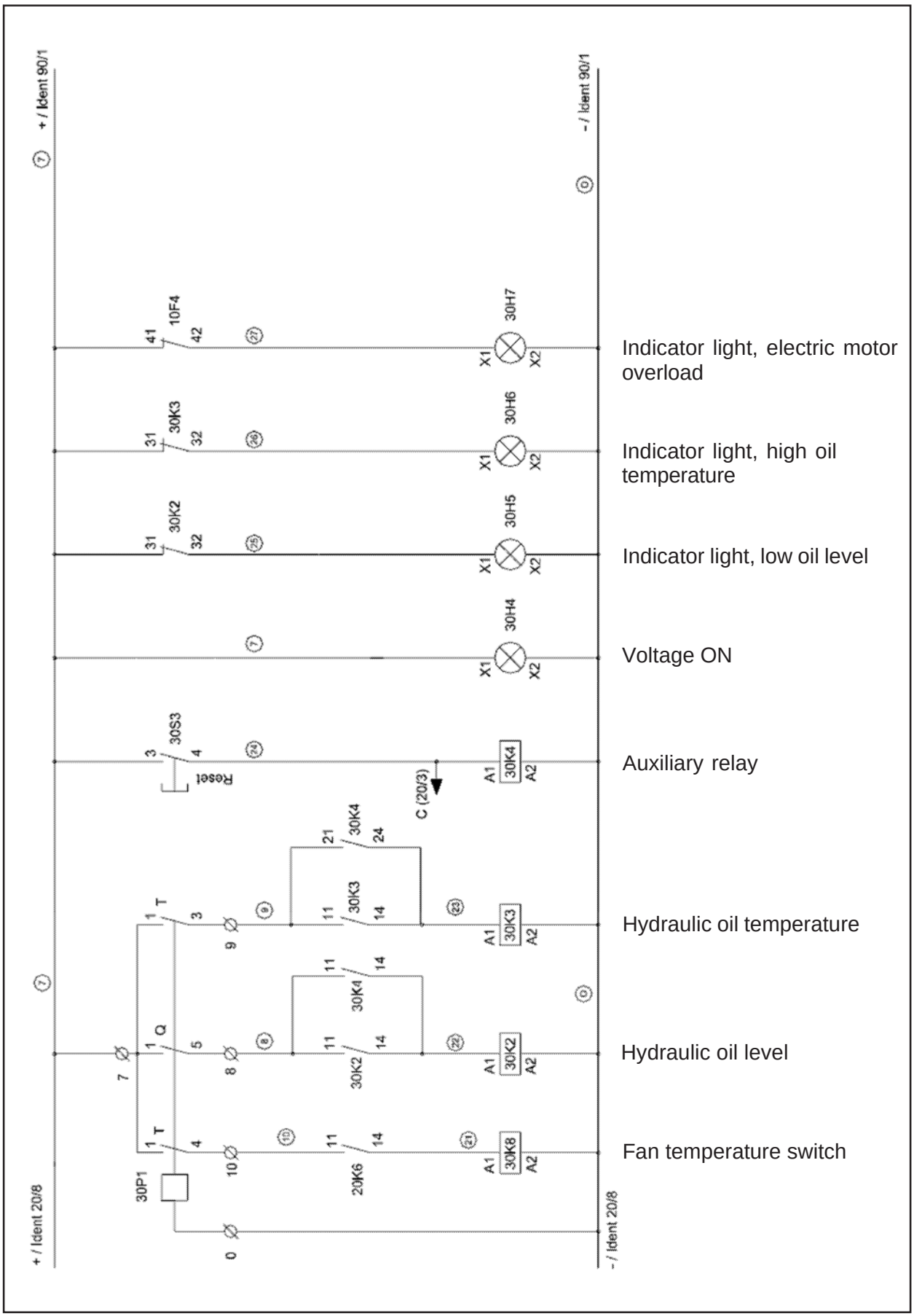
Extract from circuit diagram 0.089-011.0 (IP 120)

Please always use the circuit diagram revision status applicable to the unit version!



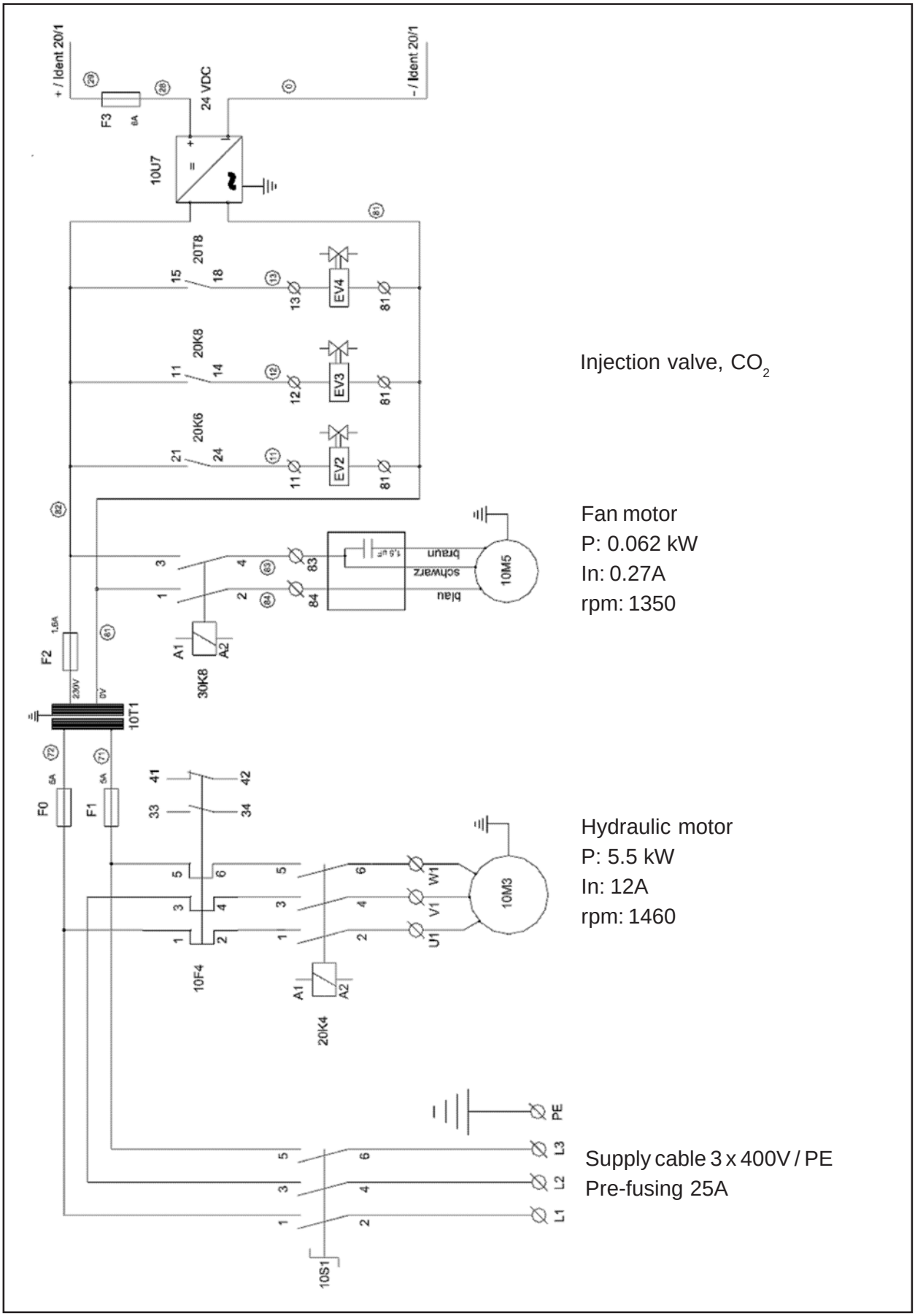
Extract from circuit diagram 0.089-011.0 (IP 120)

Please always use the circuit diagram revision status applicable to the unit version!



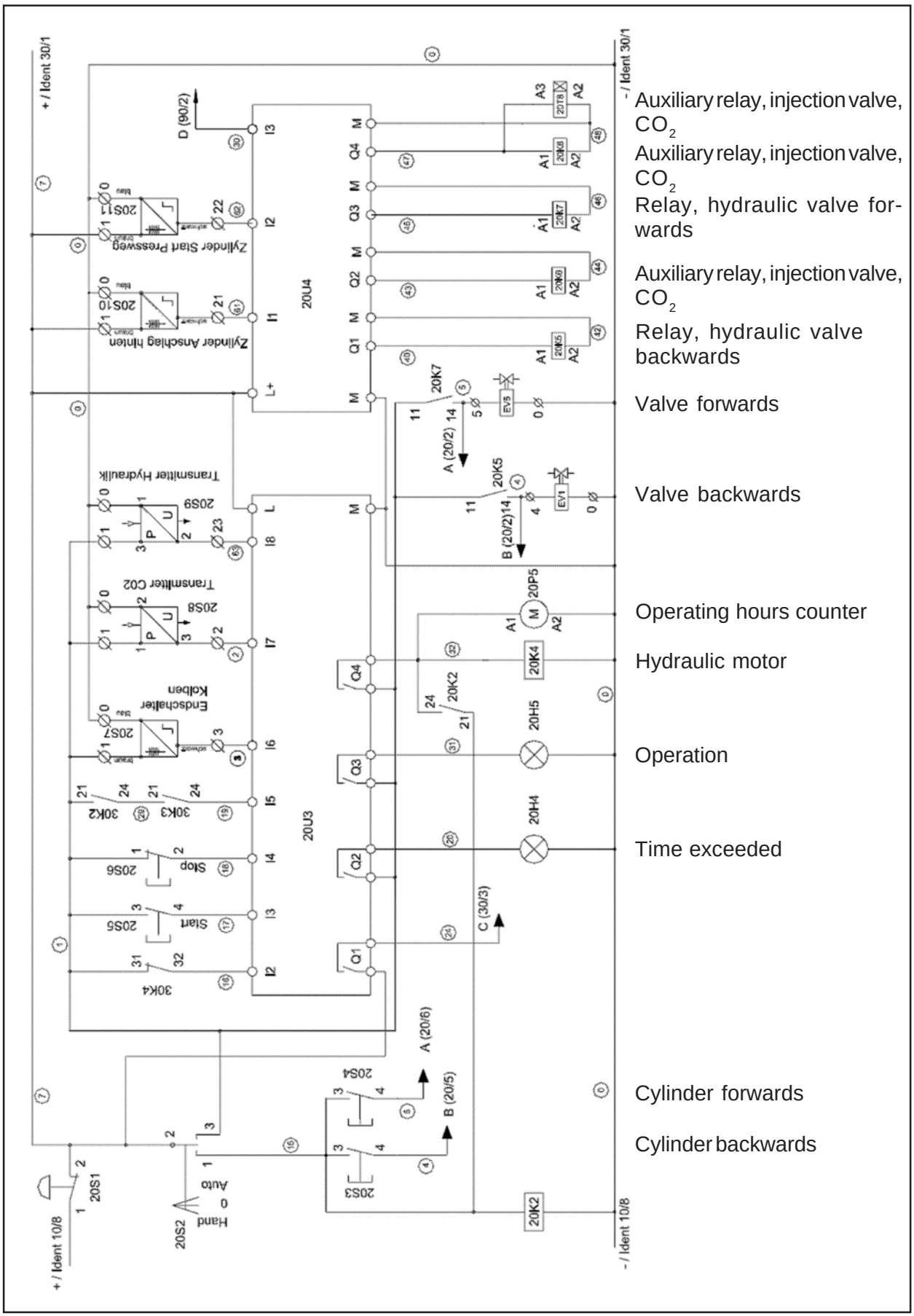
Extract from circuit diagram 0.089-012.0 (IP 220)

Please always use the circuit diagram revision status applicable to the unit version!



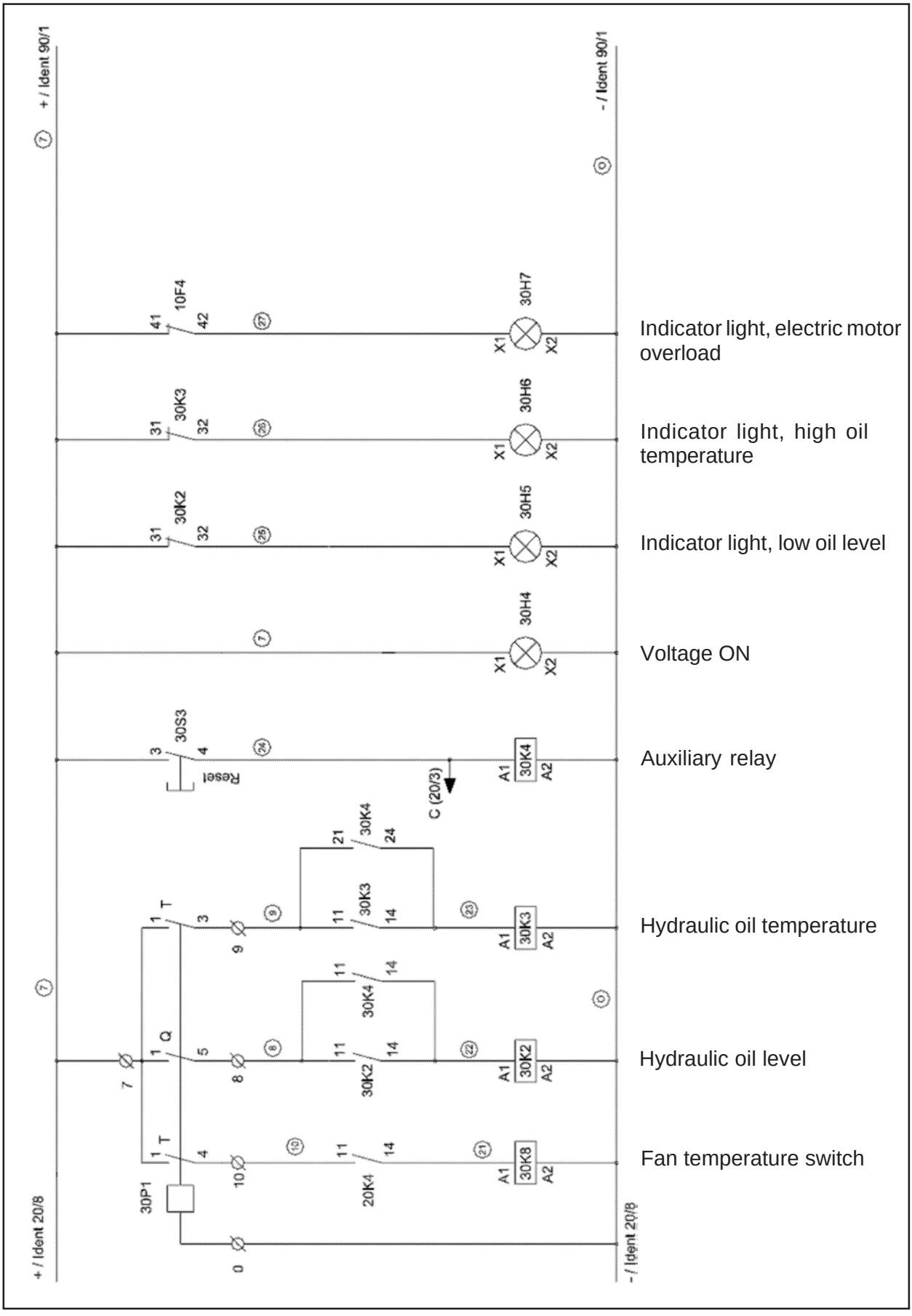
Extract from circuit diagram 0.089-012.0 (IP 220)

Please always use the circuit diagram revision status applicable to the unit version!

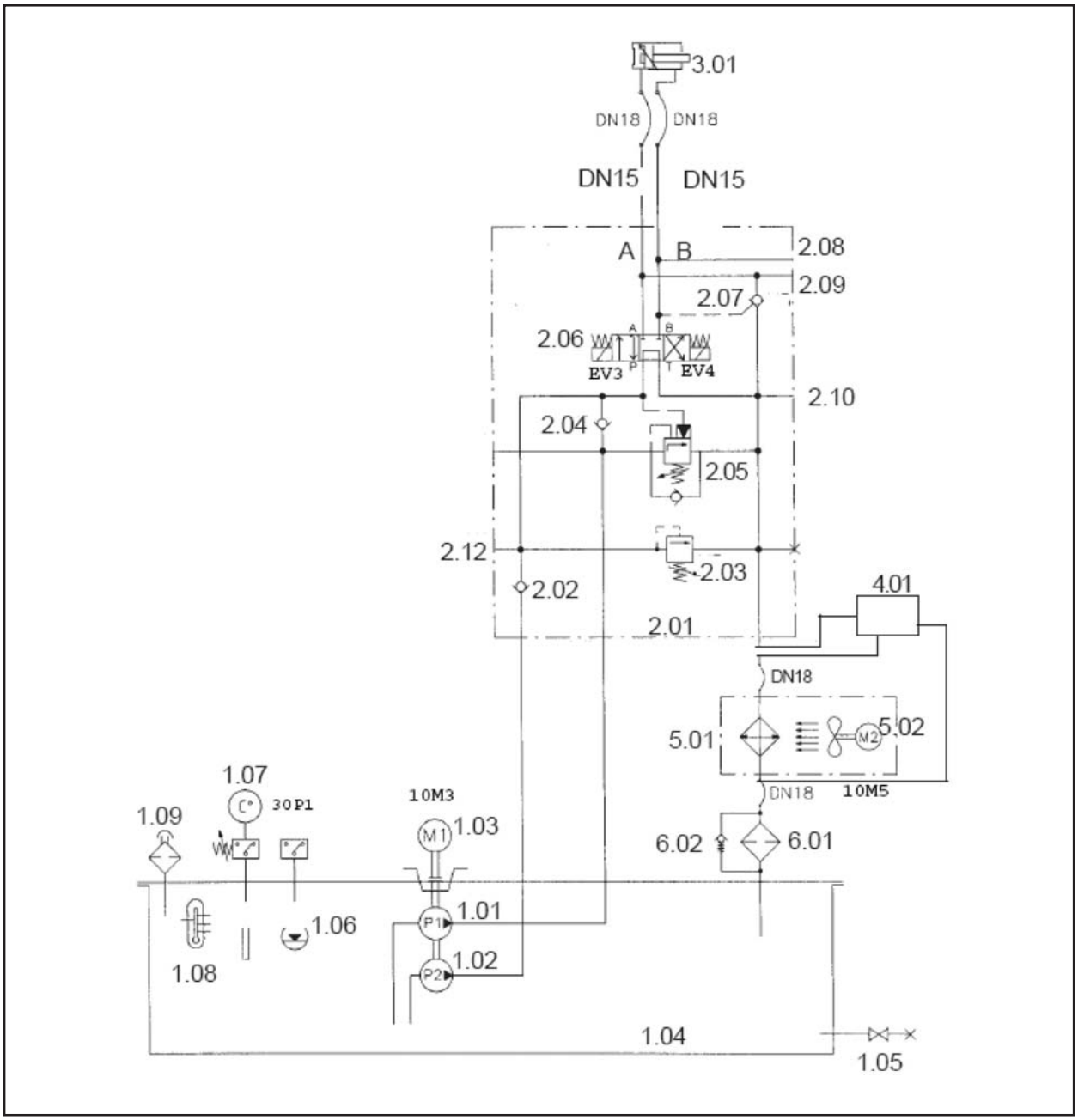


Extract from circuit diagram 0.089-012.0 (IP 220)

Please always use the circuit diagram revision status applicable to the unit version!

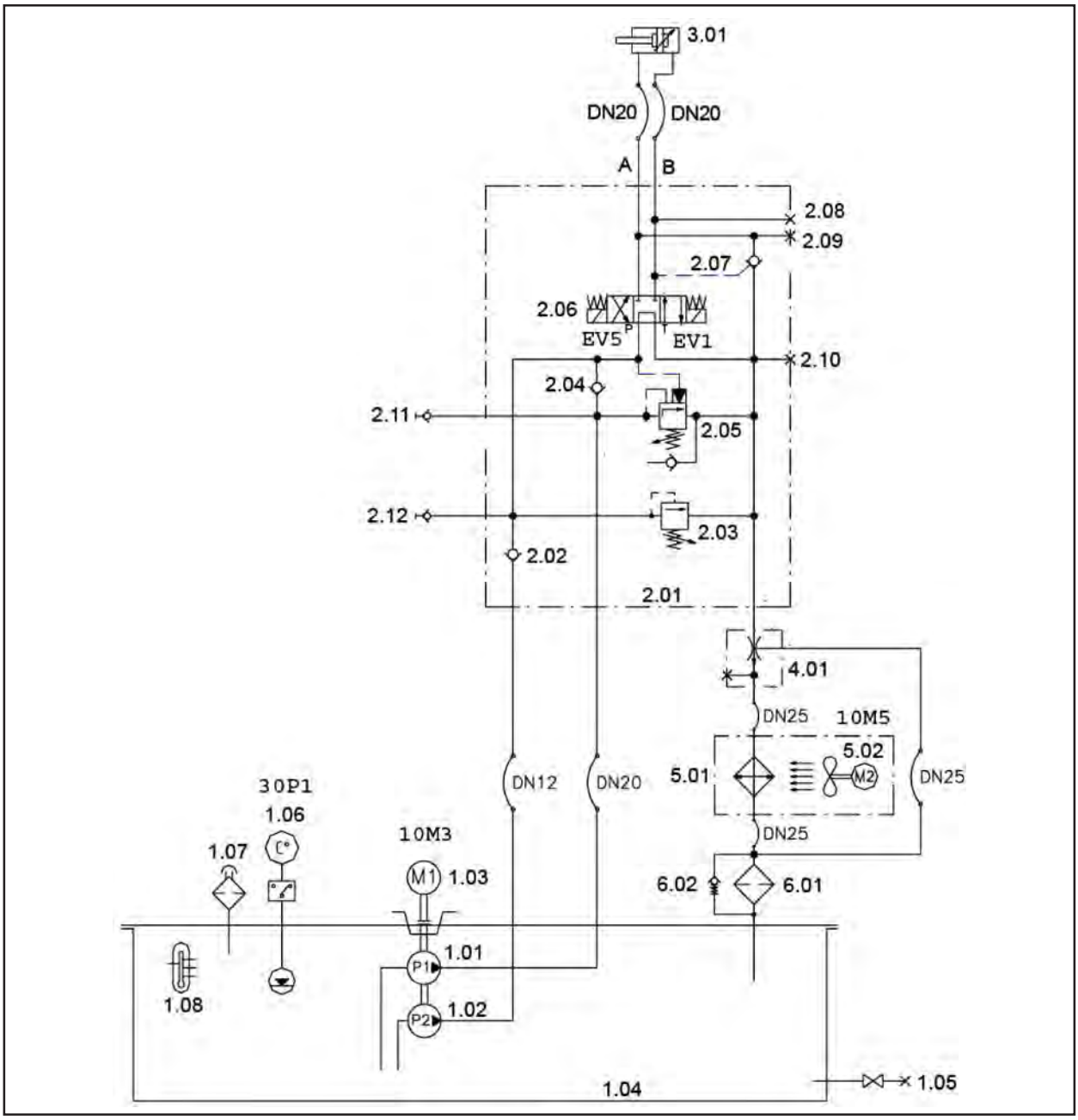


Hydraulics plan 0.089-081.0 (IP 120)



1.01 Hydraulic pump (P1), 27 l/min.
1.02 Hydraulic pump (P2), 9 l/min.
1.03 Electric motor (10M3)
1.04 Hydraulic tank, 40 litres
1.05 Oil drain tap, R1/4''
1.06 Oil level switch (30P1)
1.07 Oil temperature switch (30P1)
1.08 Oil level indicator
1.09 Oil filler neck
2.01 Control block
2.02 Non-return valve „V1“
2.03 Safety valve, 17 MPa „V3“
2.04 Non-return valve „V2“
2.05 Overflow valve, 3 MPa „V4“
2.06 Solenoid valve (EV3/EV4), 24 VAC
2.07 Pilot controlled non-return valve „V5“
2.08 Measuring point „MB“
2.09 Measuring point „MA“
2.10 Measuring point „MT“
2.11 Measuring point „M1“
2.12 Measuring point „M2“
3.01 Hydraulic cylinder
4.01 Flow control valve
5.01 Oil cooler
5.02 Fan (10M5)
6.01 Oil filter
6.02 Bypass valve, oil cooler

Hydraulics plan 0.089-082.0 (IP 220)



1.01 Hydraulic pump (P1), 49 l/min.
1.02 Hydraulic pump (P2), 14 l/min.
1.03 Electric motor (10M3)
1.04 Hydraulic tank, 70 litres
1.05 Oil drain tap, R1/4''
1.06 Oil level and temperature switch (30P1)
1.07 Oil filler neck
1.08 Oil level indicator
2.01 Control block
2.02 Non-return valve „V1“
2.03 Safety valve, 20.5 MPa „V3“
2.04 Non-return valve „V2“
2.05 Overflow valve, 6 MPa „V4“
2.06 Solenoid valve (EV1/EV5), 24 VAC
2.07 Pilot controlled non-return valve „V5“
2.08 Measuring point „MB“
2.09 Measuring point „MA“
2.10 Measuring point „MT“
2.11 Measuring point „M1“
2.12 Measuring point „M2“
3.01 Hydraulic cylinder
4.01 Flow control valve
5.01 Oil cooler
5.02 Fan (10M5)
6.01 Oil filter
6.02 Bypass valve, oil cooler

Technical specifications

Unit type	Unit No.	Circuit Diagram	Hydraulics plan	Operating instructions	Spare parts list
IP 120	1.574-111.0	0.089-011.0	0.089-081.0	5.962-286.0	5.962-288.0
IP 220	1.574-112.0	0.089-012.0	0.089-082.0	5.962-286.0	5.962-289.0

The technical data sheet and the circuit diagram will be included in the next issue of the spare parts CD-ROM (DISIS) and are also available in kaercher-inside (https://kaercher-inside.com).

If required, the operating instructions and the spare parts lists can be ordered as a paper copy from the spare parts service by quoting the relevant part number.

Special Tools

No details.

Tightening torque

M3	1.1 Nm
M4	2.5 Nm
M5	5.1 Nm
M6	8.8 Nm
M8	21.4 Nm
M10	44 Nm
M12	88 Nm
M14	119 Nm
M16	183 Nm
M20	224 Nm