



ABRALINE III

**Abrasive delivery system with
filling-level monitoring**

Version 5.1

**Operating and servicing
manual**

Status: 02 / 2006
CPN: 80800-GB-01

KMT *Waterjet Systems*

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KMT GMBH 2005

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2 Correct and proper use

The ABRALINE III abrasive delivery system has been designed solely for continuous supply of natural abrasives. The air-pressurized vessel system continuously monitors the respective filling levels. Electrical monitoring signals can be processed in the control system of an integrated installation.

Modifications and changes to the machine without the manufacturer's approval are prohibited for safety reasons.

The operating, servicing and installation conditions specified in this operating manual must be strictly adhered to.

The Emergency OFF switch must be kept easily accessible at all times.

3 Safety

The ABRALINE III abrasive delivery system is equipped with safety equipment and systems. Incorrect operation and/or misuse can cause dangers for

- the operator's health and safety
- the machine and other property of the owner/operator
- efficient operation of the machine

All persons involved in the installation, commissioning, operation and servicing of the machine must

- be appropriately qualified
- have read this operating manual carefully

IT'S YOUR SAFETY THAT'S INVOLVED!

3.1 Danger sources

The vessel is under an air pressure of a maximum of 7 bar. The expelled jet of abrasive is a danger to the operator if the abrasive is allowed to escape without control from the pressure vessel or the downstream hose pipe at this pressure. Abrasions and potential injuries to the eyes, and other injuries, may be the consequence.

3.2 Approved operators

Only authorized persons may work on this product. Responsibilities for the various activities to be performed on the machine must be clearly defined and adhered to. Poorly defined responsibilities are a safety risk.

The owner must

- make the operating manual accessible to the operator
- ensure that the operator has read and understood the operating manual

Install upstream the machine in the supply circuit a lockable switch which makes operation by unauthorized persons impossible.

3.3 Personal protective equipment

Safety goggles for protection against uncontrolled escape of abrasive must be worn by the operator and any and all persons working in the vicinity of the machine during operation, in order to avoid the dangers mentioned above.

For cleaning work, the operator must wear safety gloves, in order to prevent the ingress of abrasive particles into any open wounds or cracked skin.

3.4 Installation location

The machine must be installed on a solid substrate. Toppling of such a machine can cause physical injuries and damage to property.

Apply appropriate internal procedures and checks in order to ensure that the machine's environment is kept clean and tidy at all times.

3.5 Protective equipment

The machine can be shut down by switching off the master switch on the control cabinet.

4 Handling and installation

4.1 Lifting the machine

The machine may be lifted into its place of operation only using the three lifting eyes which are located on the circumference of the holding tank. The ropes used must be selected appropriately to the machine's total weight.

- Unladen weight: 80 kg
- Gross weight: 530 kg



Fig. 1: lifting eyes

4.2 Transport

It must be ensured for the purpose of loading and transportation that the machine is correctly packed and protected against damage.

5 Product description



Fig. 2: main components

The ABRALINE III abrasive delivery system consists of the following main components:

- Holding tank, incl. sieve insert (1)
- Pressure vessel (2)
- Control cabinet (3)
- Pneumatic control system (4)

The abrasive is put into the holding tank (1) via a sieve insert and temporarily stored. The cone seal between the holding tank (1) and pressure vessel (2) is opened for a period of approx. 15 seconds as soon as the filling level in the pressure vessel reaches its minimum. A logic relay installed in the control cabinet (3) is responsible for control of this sequence. Dropping of the level in the holding tank to a minimum is signaled by means of illumination of a warning light on the control cabinet (3) and on the display. The holding tank (1) must be filled with abrasive if this occurs. Filling can be performed without interruption to ongoing production.

5.1 Holding tank, inc. sieve insert

The steel holding tank also constitutes the load-bearing frame of the complete system. This welded structure is mounted on three "feet" which are braced against one another. The lower section of the holding tank features an annular flange to which the pressure vessel (2) is bolted. A capacitive proximity sensor which indicates approaching lack of abrasive sand in the holding tank via a control diode and on the display is located at the center of the outlet cone.

The upper section of the holding tank features in its interior a sieve insert and is closed by means of a covering hood.

5.2 Pressure vessel

The pressure vessel features a maintenance port, to permit easy access to internal components. The pneumatic control system, consisting principally of the following components, and installed below the control cabinet, is responsible for control of pressure:

- 1 pressure-reduction valve
- 1 electromagnetic (solenoid) valve, normally closed (N/C)
- 1 electromagnetic (solenoid) valve, normally open (N/O) (for bleeding)
- 1 non-return valve

A safety valve ensures simple and trouble-free monitoring of inlet pressure, the inlet opening at 7 bar.

A sealing cone, which is activated by means of compressed air, is located inside the pressure vessel.

A capacitive proximity sensor transmits a signal for shut-down, filling and starting of the system. A flexible hose which conveys the abrasive to the metering station must be connected to the angled outlet socket on the lower part of the pressure vessel.

5.3 Control cabinet with customer-specific signal

The control cabinet can operate at an AC voltage. The internal control voltage is 24 V DC. In addition to the terminal strip, this control cabinet also contains a control relay, which continuously monitors operating states and relays the corresponding control signals to the pneumatic system and the control light.

All of the ABRALINE's states and alarm messages are displayed:

- Fill
- On
- Storage tank empty
- Fill storage tank

The status and alarms can be displayed in German, French and English.

5.4 Funktionsschema

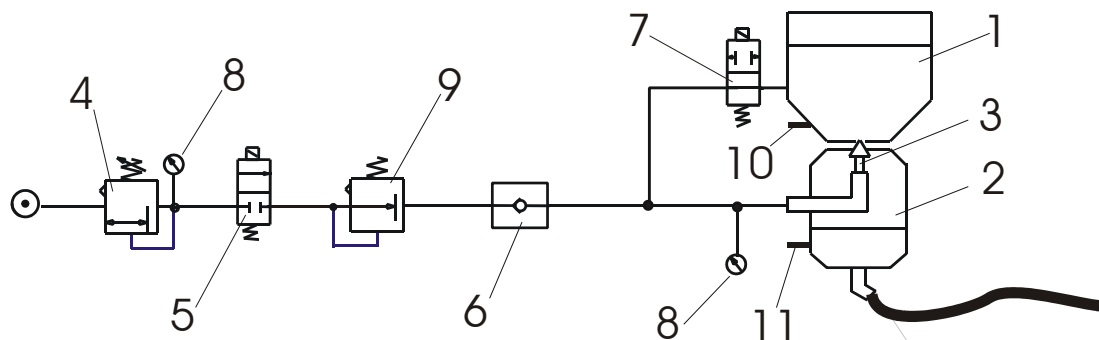


Fig. 3: function diagram

Item	Designation
1	Holding tank, inc. sieve insert
2	Pressure vessel
3	Cone seal
4	Pressure-control valve
5	Electromagnetic (solenoid) valve N/C
6	Non-return valve
7	Exhaust valve (solenoid valve N/O)
8	Pressure gauge
9	Safety valve
10	Filling-level sensor holding tank
11	Filling-level sensor pressure vessel

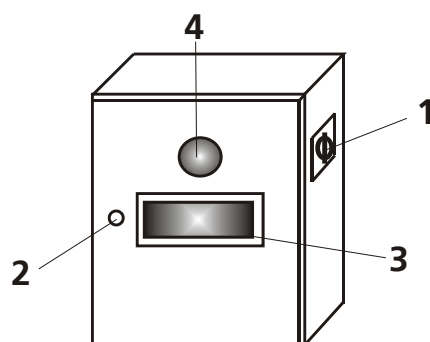


Fig. 4: control cabinet

Item	Designation
1	Master switch, "On/Off"
2	Lock
3	Display
4	Charge light (red) – illuminates in case of a system fault

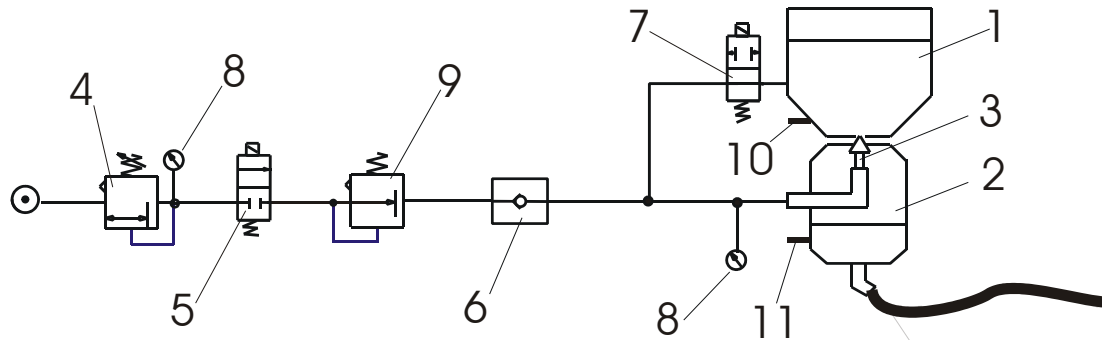


Fig. 5: function diagram

1. Commissioning of the control system starts when the master switch is switched on.
2. If the pressure vessel (2) contains enough abrasive, this condition is registered by the sensor on the pressure vessel. After approx. 15 seconds, the exhaust valve (7) and the solenoid valve (5) close in order to shut the sealing cone (3) and fill the pressure vessel with compressed air. The abrasive is now delivered to the metering device on the cutting head.
3. Once the abrasive level in the pressure vessel (2) reaches its minimum, the exhaust valve (7) opens and the pressure in the vessel (2) escapes. The solenoid valve (5) closes and no further delivery of abrasive takes place.
4. The cone (3) is lowered and abrasive can flow into the pressure vessel (2) from the storage tank (1) for approximately 15 seconds.
5. The sensor (11) reacts as soon as the pressure vessel (2) is full. About 15 seconds later, the exhaust valve (7) then closes and the solenoid valve (5) opens. The compressed air presses the cone against the sealing surface, pressure builds up in the vessel (2) and abrasive is delivered to the metering device.

Warnings if too little abrasive is present:

1. Warning 1:
The red light on the control cabinet flashes, but the machine continues to operate.
 - **Cause:** Holding tank (1) is empty. If the level in the holding tank (1) reaches the minimum, the sensor (10) on the storage tank registers the level.
 - **Remedy:** Fill holding tank (1) with abrasive.
2. Warning 2:
The red light on the control cabinet is on (not flashing).
 - **Cause:** The sensor in the pressure vessel (2) has registered a lack of abrasive for longer than 120 sec. The program is then stopped and is not re-activated until abrasive is topped up. The program then continues automatically.
 - **Remedy:** The pressure vessel (2) is empty and is not being supplied with abrasive. Fill holding tank (1) with abrasive.

See also chapter 8, "Troubleshooting".

The controller assigns each fault message is assigned a separate fault message contact, which is fed to terminals as a floating contact in the control cabinet. See the circuit diagram in the appendix.

Button P4 switches between floating contact statuses "normally open" and "normally closed". Both warning messages 1 and 2 are "normally open" or "normally closed".

Note

The closing pressure and delivery pressure of the system are identical (2 bar min. and 6 bar max.)

5.5 Control cabinet



Fig. 6: control cabinet

- Pressing P1: Displays the operating hours and the software version.
- Pressing P2: Exhaust valved open (7) and solenoid valve (5) open. (can be used by for the solenid valves for function test)
- Pressing P3: Displays the current operating status (inputs and outputs)
- Pressing P4: To switch the floating contacts from “normally open” to “normally closed” press P4 for a duration of min. 10 sec. The customer can use this signal as an additional alarm for his machine control or as a stop of the cutting cycle of the machine.

Note

The factory default setting is “normally open” N/O, which means the switch is closed when an error occurs.

5.6 Technical specification

Net weight:	80 kg
Length:	700 mm
Width:	700 mm
Height:	1.400 mm
Storage-tank capacity:	200 l
Pressure-vessel capacity:	24 l
Operating pressure:	2 – 6 bar (for continuous delivery of abrasive)
Max. compressed-air consumption:	300 l/min (only short-term, for closure of the cone seal)
Quality of compressed air:	dry, free of perspiration water, unooled
Max. abrasive flow:	4.000 g/min
Supply voltage:	85 V – 264 V, 47 Hz – 63 Hz

6 Commissioning



Fig. 7: Commissioning

- Before connecting the abrasive tank, inspect it for any transportation damage which could impair its correct and safe functioning.
- Install the hose line (1¼" pipe connector) from the outlet socket on the lower part of the pressure vessel (3) to the metering system of your cutting machine.
- Connect the 3/4" tubing to the pressure reduction valve(4).

Note

The compressed air must dry, free of perspiration water and unoled. If the compressed air is humid or oiled, there is the danger that abrasive stick together and plugs the equipment.

- Connect the control cabinet to the power supply.
- Lift the cover (1) on the holding tank and check that the sieve insert beneath it is in correct condition. The mesh width must be uniform, since impurities and foreign bodies in the abrasive sand could otherwise cause system failures.
- Fill the holding tank with abrasive and close the cover (1) on the holding tank again.
- The system is now ready for operation and can be activated by setting the master switch (2) to the "On" position.
- Delivery pressure can be set to any value between 2 and 6 bar on the pressure-reduction valve (4), as required.

6.1 Shut-down of the system

Deactivate the system by setting the master switch (2) to its "Off" position after completion of work or for elimination of any faults which may have occurred.

7 Servicing

Servicing and maintenance work is restricted essentially to visual checks.



Fig. 8: Servicing 1

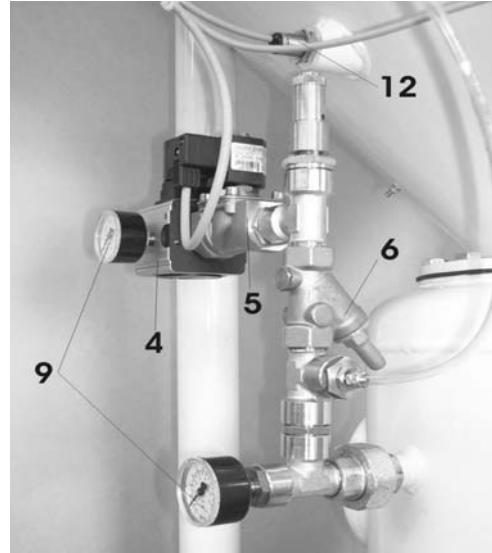


Fig. 9: Servicing 2



Fig. 10: Servicing 3



Fig. 11: Servicing 4

- Check the pressure reduction valve (4), solenoid valves (5+7) and non-return valve (6) for damage and fouling. (Fig. 8, 9, 10)
- Check pressure indicator (9) for correct functioning.
- Check filling-level sensors (10+12) for correct functioning (Fig. 11).
(Control diode on = sensor has reacted)



Abb. 12



Abb. 13

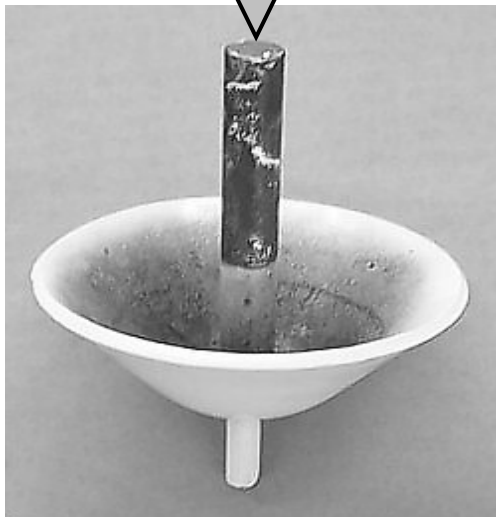
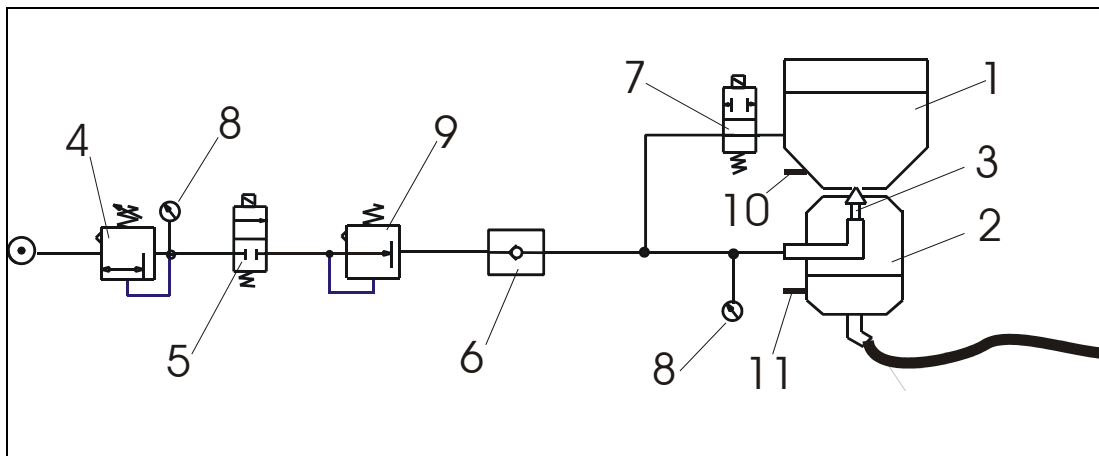


Abb. 14 – CPN 80324



Abb. 14 – CPN 80325

8 Troubleshooting



Problem	Possible cause	Action
ABRALINE III does not deliver abrasive	Interrupted supply line	Check all supply connections (air and electricity)
	Holding tank (1) empty – warning light defective	Check correct functioning of warning light, replace light if necessary; top-up abrasive, observe display
	Defective filling-level sensor (10)	Check filling-level sensor on holding tank for correct functioning, replace if necessary
	Incorrectly set pressure-reduction valve (4)	Set pressure-reduction valve to a closing pressure of min. 2 bar, max. 6 bar
System vents continuously	Defective exhaust valve (11)	Clean the exhaust valve, replace if necessary
Air escaping from holding tank	Seal between pressure vessel (2) and holding tank (1) defective (sealing-ring damage or blockage of the cone seat by foreign body)	Check vicinity of cone seat in pressure vessel for fouling, damage and foreign bodies
System delivers too much abrasive	Delivery pressure set too high	Restrict delivery pressure to 2 to max. 6 bar on pressure reduction valve (4)
System delivers too little abrasive	Abrasive demand too high	Set abrasive metering system(s): maximum total delivery rate: 4,000 g/min.
	Outlet opening on pressure vessel (2) fouled or blocked	Check vicinity of outlet opening in pressure vessel for fouling and foreign bodies

9 Customer and spare parts service

9.1 Customer Service

Our After-Sales Service department can be contacted as follows in case of further technical queries:

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Auf der Laukert 11
61231 Bad Nauheim, Deutschland

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E-Mail: order.service@kmt-waterjet.com

Homepage: www.kmt-waterjet.com

9.2 Spare-Parts Service

KMT Waterjet maintains a spare-parts department with a comprehensive range stocked; the department's staff is also well trained. Immediate delivery is possible in emergencies.

Contact the KMT Waterjet Service department if you need spare parts.

KMT GMBH • Waterjet Systems

Wasserstrahl-Schneidetechnik

Auf der Laukert 11
61231 Bad Nauheim, Deutschland

Tel.: +49-6032-997-115

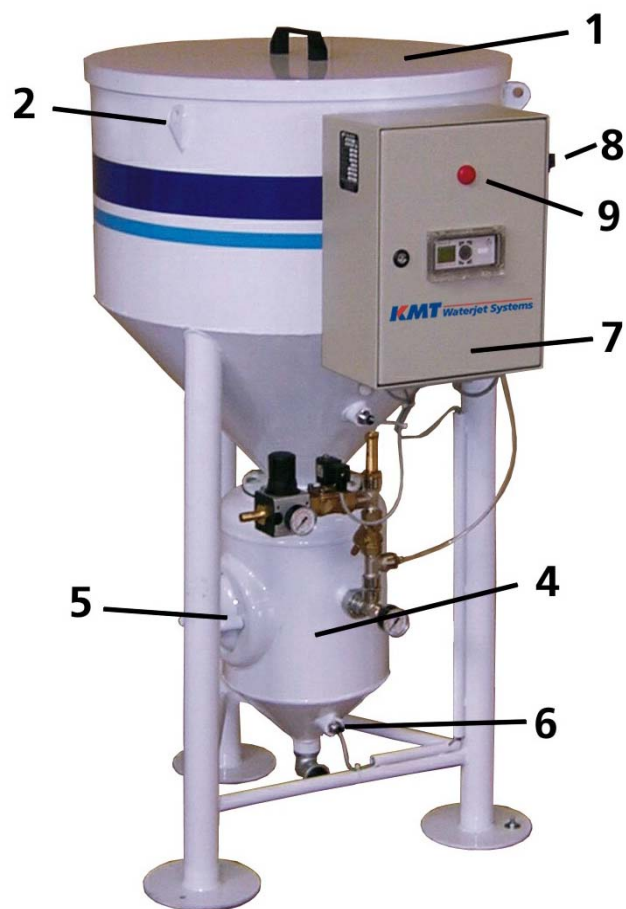
Fax: +49-6032-997-270

E-Mail: order.spares@kmt-waterjet.com

Homepage: www.kmt-waterjet.com

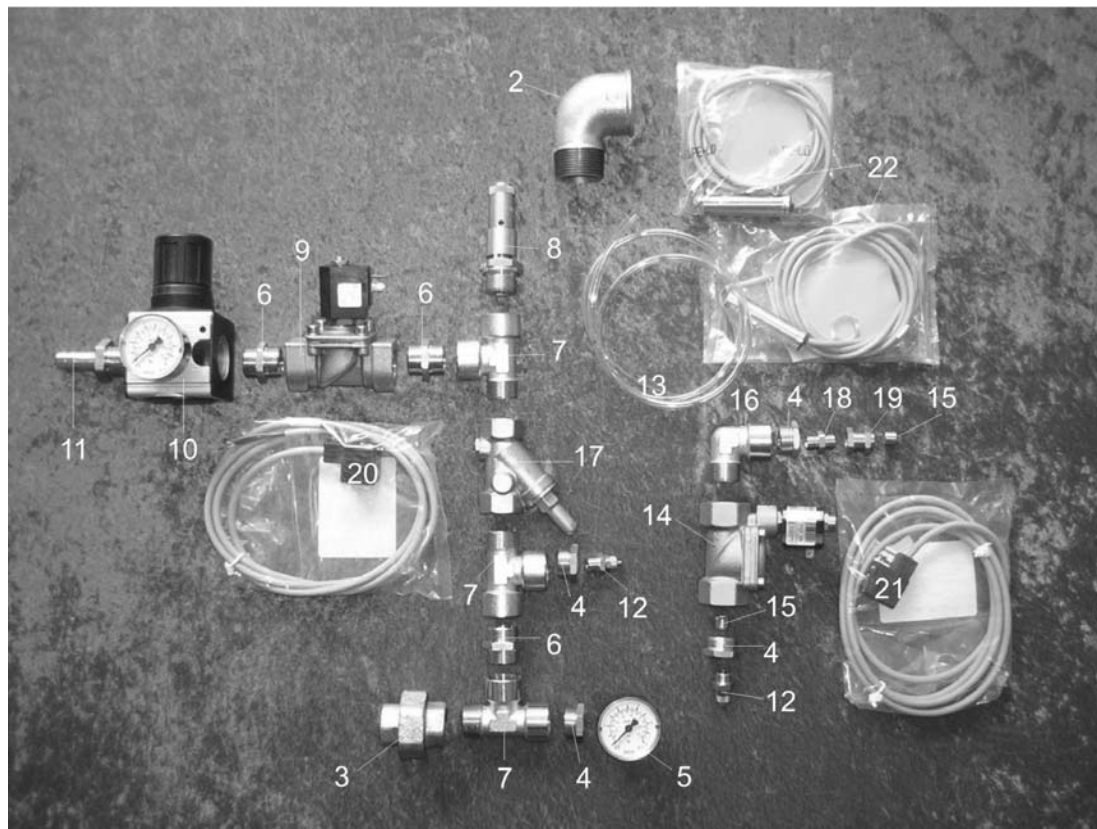
10 Spare-parts and electrical circuit diagram

10.1 Hauptkomponenten / Main Components



Pos	CPN	Qty.	Bezeichnung	Description
01	80310	1	Abdeckung	Cover
02	---	3	Hebeöse	Lifting Eye
03	80311	1	Sieb	Sieve
04	---	1	Druckbehälter, 24 l	Pressure Vessel, 24 l
05	---	1	Wartungsluke	Maintenance Door
06	80312	2	Füllstandssensor	Sensor, Height Level
07	---	1	Schaltschrank	Electrical Panel
08	80316	1	Hauptschalter	Main Switch
09	80317	1	Warnleuchte	Warning Lamp
10	---	1	Pneumatiksteuerung	Pneumatic Control

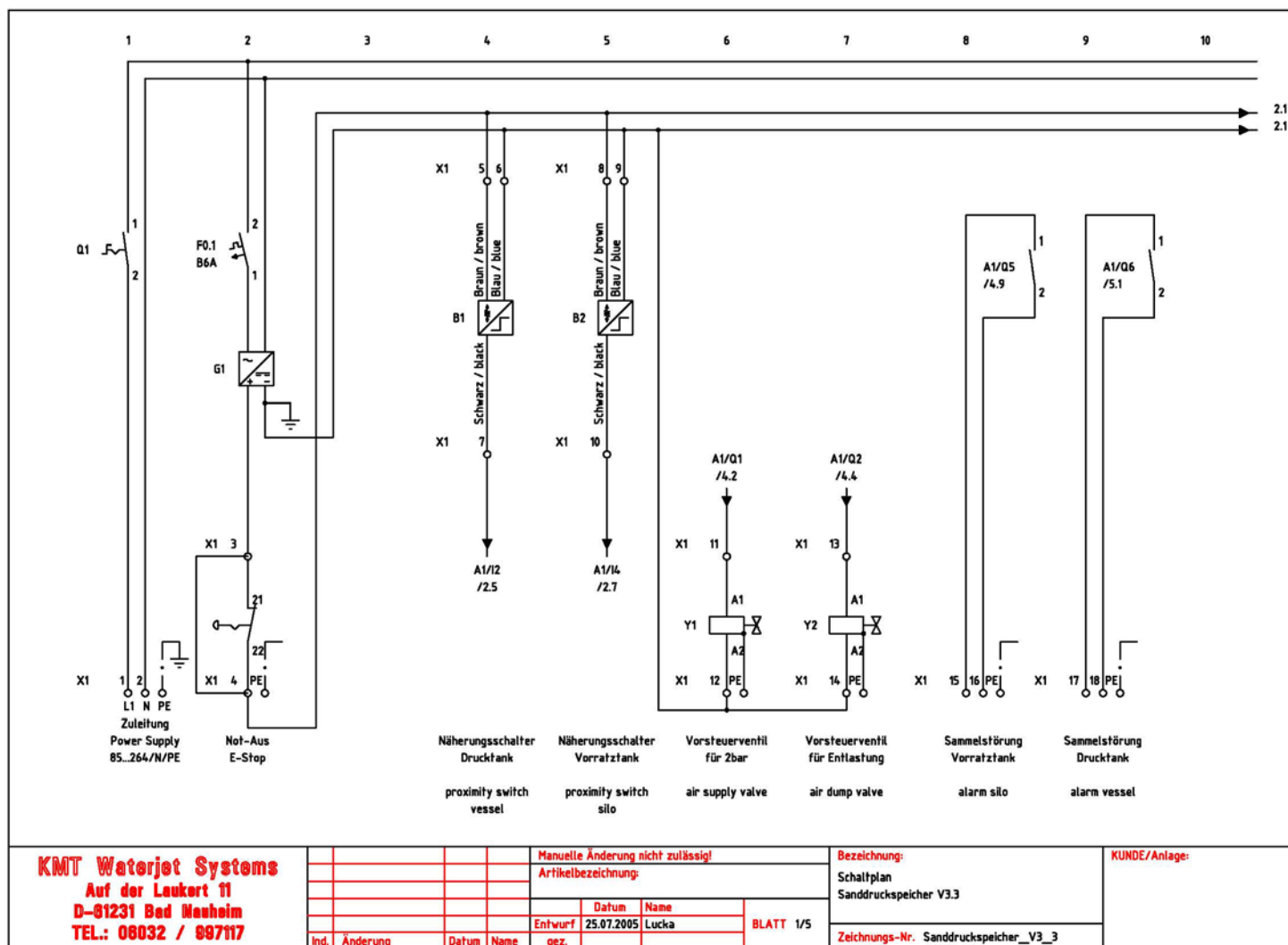
10.2 Pneumatiksteuerung / Pneumatic Control



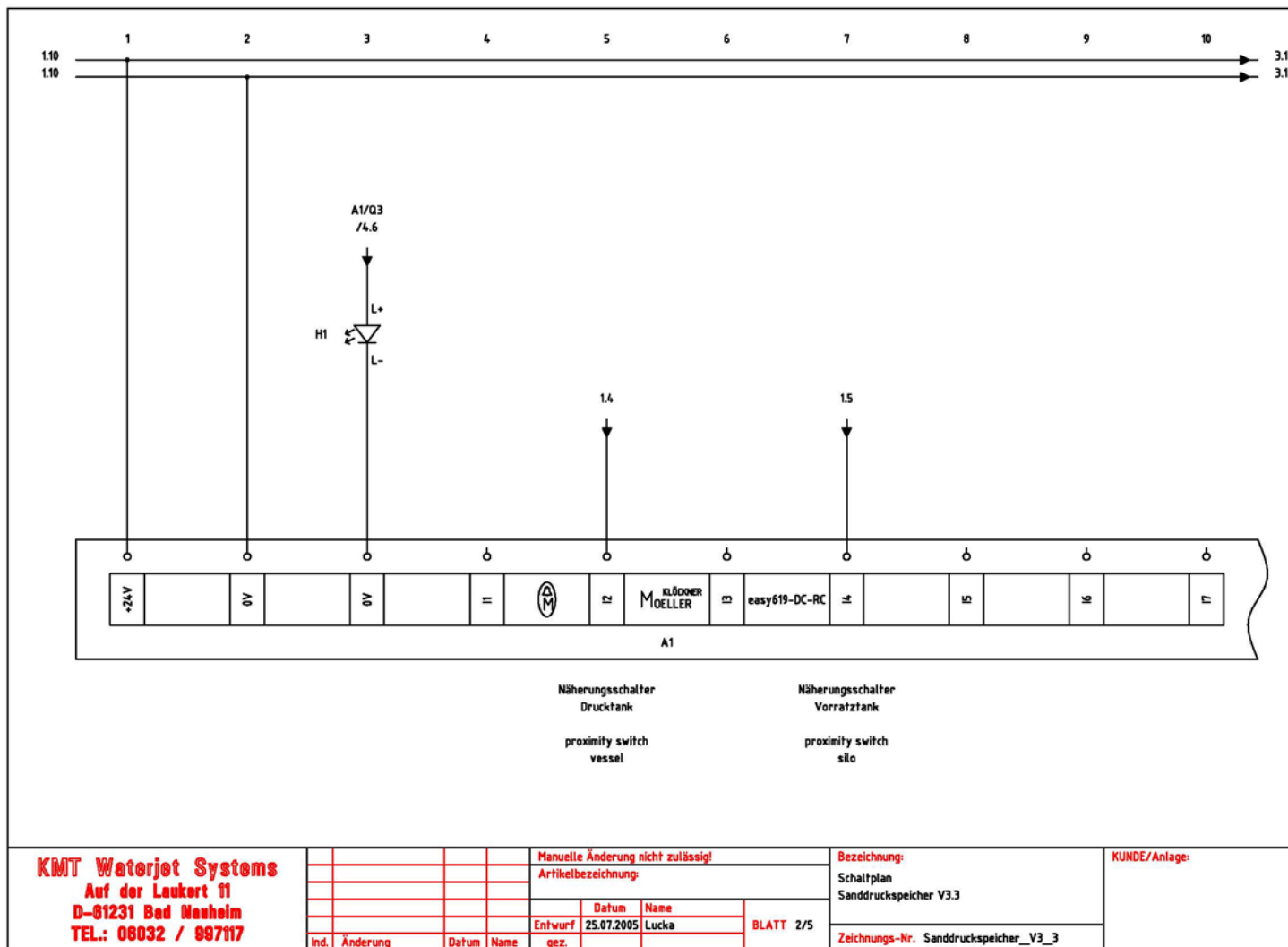
Pos	CPN	Qty	Bezeichnung	Description
1	80649	1	SCHALTSCHRANK ABRALINE KOMPLETT	CONTROL PANEL ABRALINE COMPLETE
2	80620	1	WINKEL 1 1/4" IA	ELBOW 1 1/4" IA
3	80625	1	VERSCHRAUBUNG 3/4"IA	COUPLING 3/4"IO
4	80607	4	NIPPEL REDUKTION MS 1/4"I - 3/4"A	NIPPLE REDUCTION MS 1/4"I - 3/4"A
5	80616	1	MANOMETER WAAGRECHT 1/4" 50mm	GAUGE BACK MOUNTED 1/4" 50mm
6	80609	3	DOPPELNIPPEL MS 3/4"-3/4"	NIPPLE BRASS 3/4"-3/4"
7	80610	3	KUPPLUNG T-STÜCK 3/4" MS	COUPLING T 3/4" BRASS
8	80624	1	VENTIL SICHERHEIT 7bar	VALVE SAFETY 7bar
9	80604	1	MAGNETVENTIL 2/2-WEGE-24V N/C	VALVE, SOLENOID, 2/2 WAY-24V, N/C
10	80602	1	DRUCKMINDERER 3/4"	REDUCER PRESSURE 3/4"
11	80617	1	GEWINDETÜLLE MS 3/4"-16mm	COUPLING HOSE BRASS 3/4"-16mm
12	80615	2	STECKVERSCHRAUBUNG R1/4"x6	CONNECTOR HOSE R1/4"x6
13	49892243	1	SCHLAUCH PNEUMATIK 6/4MM L = 1 METER	HOSE, PNEUMATIC, 6/4MM, L = 1 METER
14	80645	1	MAGNETVENTIL 2/2-WEGE NO	VALVE, SELENOID, 2/2-WAY, NO
15	80643	2	STOPFEN VERSCHLUSS MESSING 1/4"	PLUG BRASS 1/4"
16	80606	1	WINKEL 3/4" IA MS	ELBOW 3/4" IA MS
17	80619	1	RÜCKSCHLAGVENTIL RG 3/4"	VALVE CHECK RG 3/4"
18	80612	1	DOPPELNIPPEL MS 1/4" 1/4"	NIPPLE BRASS 1/4" 1/4"
19	80621	1	VERSCHRAUBUNG SCHOTT 1/4"1-3/8"A	COUPLING, BULKHEAD, 1/4"1-3/8"A
20	80327	1	STECKER VENTIL 3POL.-18MM	PLUG VALVE 3POL.-18MM
21	80328	1	STECKER VENTIL 3POL.-11MM	PLUG VALVE 3POL.-11MM
22	80312	2	SENSOR, FUELLSTAND, ABRALINE	SENSOR, LEVEL, ABRALINE
23	80309	1	SILO, MIT DRUCKBEHÄLTER, ABRALINE	SILO, WITH VESSEL, ABRALINE

10.3 Elektro-Schaltplan / Electric Scheme

Teil 1 von 5 / Part 1 of 5

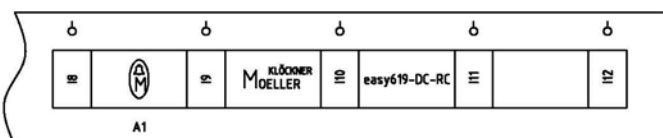


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Teil 3 von 5 / Part 3 of 5

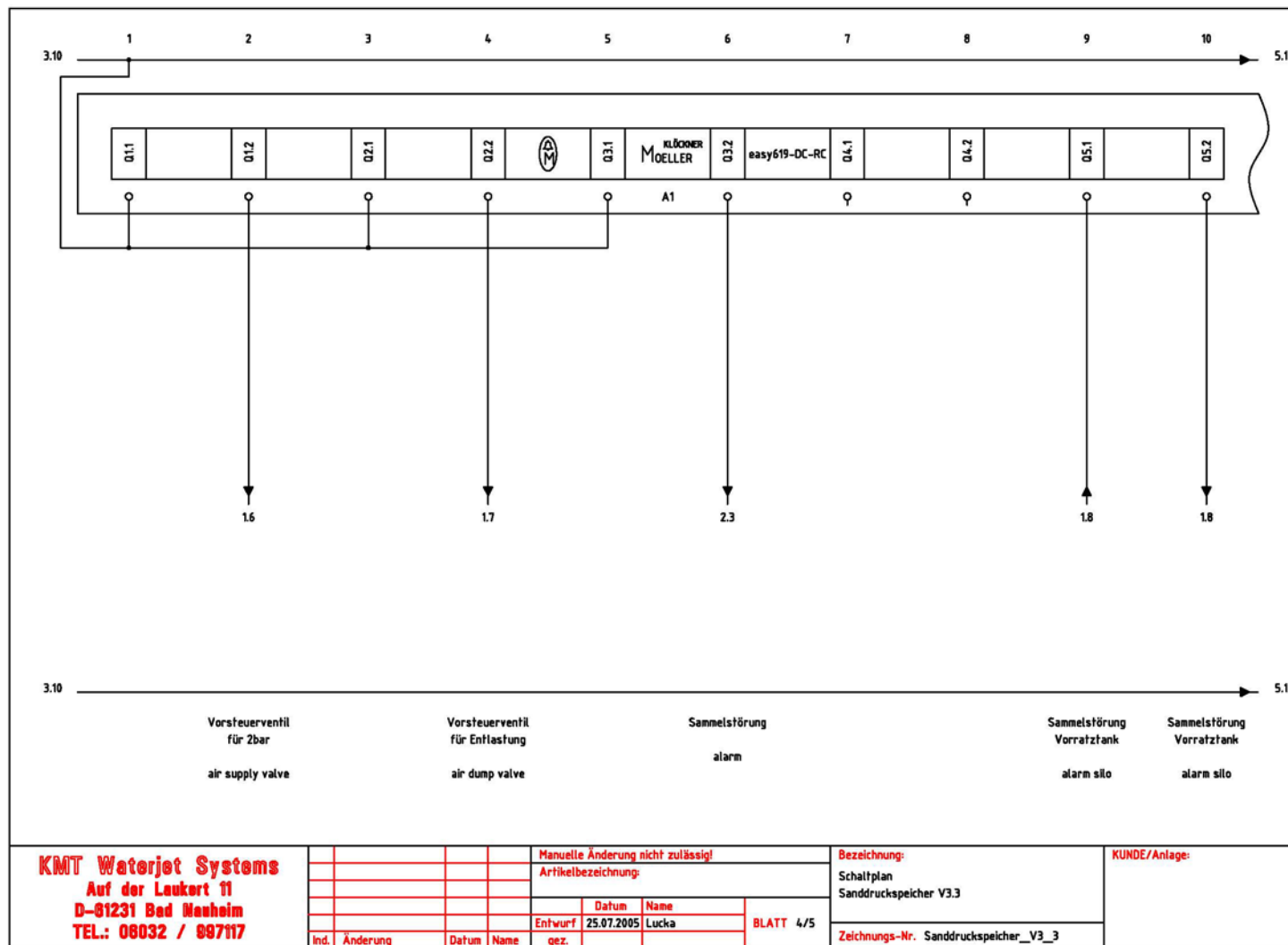
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A1

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