Rationalisierung • Entwicklung • Automation
Elektronische Geräte und Systeme

REA Elektronik GmbH

REA-JET Print Heads

SK 7	SK 16
SKP 7	SKP 16
SKS 7	SKS 16

for use with

REA-JET Ink Supply Units

Users Manual

Version 1.1

Content

1   Information on hints and warnings

This manual contains general hints and warnings. The meaning of the respective icon is described below.
Hints and warnings are always highlighted by the prefixed icon.

Danger
This icon indicates **that there is direct danger ahead** threatening life or health of people!

Warning
This icon indicates that **there could be danger ahead** threatening life or health of people!

Attention
This icon indicates that there could be danger ahead which could lead to injury of people or damage to equipment.

Information
This icon indicates that this is a useful hint or information for the operator of the system.

2   Proper use of equipment

The REA-JET print head (following: print head) is designed to process low viscosity liquids. Only REA authorized inks and cleaners are allowed to be used within the print heads.

The print head can only be operated with REA-JET hardware and software. The use of any equipment, parts or components that are not REA admitted within the REA-JET coding and marking system the operator has to bear the responsibility for doing so.

The print head is factory adjustedand does not need any additional calibration by the operator (**see also under 5 Safety notes**).

For any unintended use of the REA-JET systems the operator carries the responsibility. REA can not take over any seller´s warranty for damage caused by unintended use of the system.

The present equipment is not meant for use in any explosion hazardous environment.

3   Improper usage of equipment

The coding system is not designed to be operated as a handheld device.
It is forbidden to splash any of the inks or solvent on any persons or living creatures.

The use of any not REA tested and REA approved substances within the REA-JET systems represents an improper use for which REA Elektronik excludes to take over any liability.

4   <u>Scope of supply</u>

Based on the many variations the REA equipment can be configured we resign to list up in detail all types of available components.

A coding and marking system usually consists of the following components:

- REA-JET print head
- Controller
- Input terminal
- Power supply
- Product sensor*
- Shaft encoder*
- Mounting bracket for product sensor*
- Mounting bracket for shaft encoder*
- Print head bracket*

- Ink
- Solvent

* optional

Packaging

The equipment will be either delivered and installed by REA technical staff or shipped to your location in a reusable cardboard container with foam material inlay. This packaging material should be kept for any service purposes. If this is not desired the container can be disposed according to applicable standards.

5   Safety notes

This manual does not claim to contain all necessary information for safe of the system. There could be more information relevant in the respective country.

Before operating the system carefully read the manual.

When working on the system it is mandatory to protect from consumables (ink, solvent) which can injure eyes and skin.
Relevant information can be taken from relevant material safety data sheet.

Manipulating the pneumatical, electrical and/or hydraulical circuits can lead to severe injuries and death in particular cases.
Changes of specific components are subject to be carried out by REA staff or REA representatives only.

Please check all system components and hoses on a regular basis for leakage. In case of a leakage the system has to be turned off and repaired. In a case like that please get in touch with REA service department for support.

Please check all existing connecting lines (electric, hydraulic, pneumatic) as well as fittings on a regular basis. Should any components be damaged or should not be safe anymore make sure to shut the system off and eliminate the failure.
In a case like that please get in touch with REA service department for support.

Should a system be taken out of operation for a longer period of time make sure to flush the system using the adequate cleaner before putting it back into operation (see also chapter 9.3 Flushing of print head).

When shutting down the system it is advisable to drain all pressurized hoses. This can easily be done by switching off and venting the system.
Please follow the guidelines in the users manual of the respective REA-JET ink supply system.

Should a malfunktion occur the system has to be shut off immediately.
Do not reconnect the system before the technical cause of the malfunction is found and fixed. To guarantee a trouble free operation and to preserve warranty coverage only REA original spare parts are allowed to be installed.

The present system is not admitted for use in any explosion hazardous environment.

6   <u>Operator requirements</u>

To install the REA-JET coding and marking system technical knowledge how to set up electrical equipment is required.

For operation and maintenance of the coding and marking system a certified training is mandatory. This training will allow the user to properly work with all system components and will also train for proper handling of consumables such as inks and cleaner.

REA Elektronik GmbH

7   System specification

The present REA-JET print head represents the DOD (**D**rop-**O**n-**D**emand) technology. The DOD principle provides a droplet of ink only when ink is needed to print an image or a character.

Contrary to this technology is the principle of CIJ (continuous ink jet) printers where a continuous jet of ink droplets is generated and only certain droplets which form a character or image are deflected to arrive on the printing surface (canvas).

The advantage of a DOD system lies in its robustness and sturdiness, the ease of use and the wide range of applications.

The REA-JET system components can be combined in multiple ways and allow a flexible combination to meet most customer application requirements.

Technical specification

The print head is made from a pipe which in combination with the back and front panel forms the housing for the mechanical parts.

Please also **see Fig. 7.1 and Fig. 7.2** on the following pages.

The following components are located on the back panel:
- Female connector for print head cable
- Purge button
- Ink connector (a single one for a standard print head, two for a pigmented print head)

The nozzleplate is integrated in the front plate.

Apart from the difference of being a standard or a pigmented print head the heads are constructed the same way.

Standard print heads are used for dye based inks. These inks don´t need to be circulated wherefore one ink connector on the back panel of the print head is adequate.

When pigmented inks are used which are mixed with solid particles it is necessary to evenly dispense these particles at any time. This is the reason why pigmented inks are processed by using a pigmented ink supply unit. A pump makes sure that the pigmented ink is constantly circulating between the print head and the ink supply unit. Therefore a pigmented print head has two ink connectors. One for the ink feed line from ink pump to print head and one for the ink return from print head to ink pump.

Nozzle plates are available in different nozzle sizes to apply the optimum amount of ink for the various areas of application. The following nozzle sizes in micron are available:

-   80 µm
- 130 µm
- 180 µm
- 270 µm
- 350 µm

The print heads are also available in a special mounting style. On the front panel there is a small block sticking out which allows to print in hard to reach areas. These types of print heads have the nozzle plate mounted on the front side of the block.

The following names describe and classify the REA print heads:

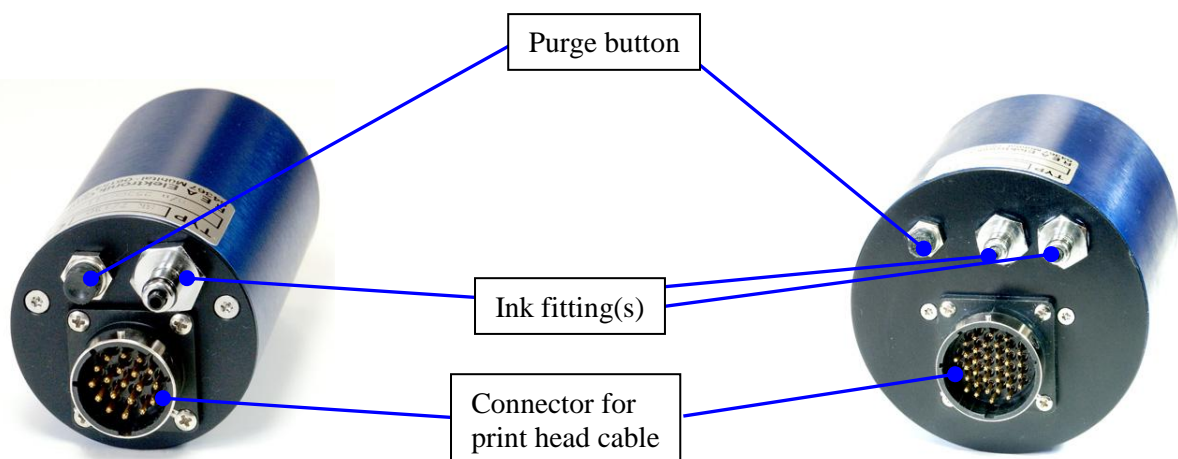| Type	Description	Comment
SK 7	Standard print head, 7 nozzles	
SKP 7	Pigmented print head, 7 nozzles	
SK 16	Standard print head, 16 nozzles	
SKP 16	Pigmented print head, 16 nozzles	
SKS 7	Special print head , small mounting style, 7 nozzles	NOT available as a pigmented version.
SKS 16	Special print head , small mounting style, 16 nozzles	

Tab. 7.1: Print head types

Fig. 7.1: View of backpanel of SK7 (left); SKP 16 (right)

View of backpanel of SK7 (left); SKP 16 (right)
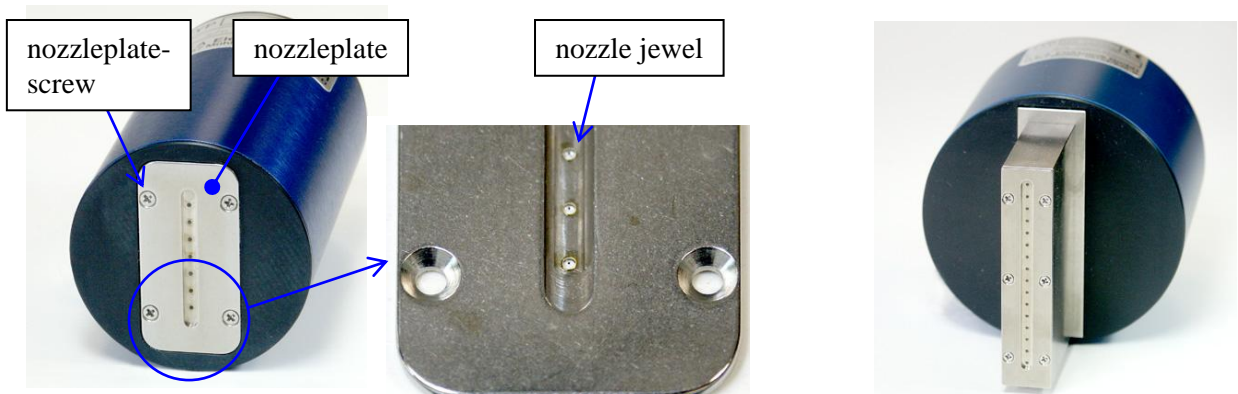

Fig. 7.2: Front view SK 7 (left), small mounting style SKS 16 (right)

8　　Fitting and Comissioning

For better understanding of the start up procedure it is described below how to put a system into operation which consists of the following components:

- Print heads SK16
- Controller
- Input terminal
- Ink supply unit
- Product sensor
- Shaft encoder

When working on the system it is mandatory to protect from consumables (ink, solvent) which can injure eyes and skin.
Make sure you have to have means available (cloth e.g.) to take up escaping consumables.

Before you plug in or plug out any print head connectors make sure that the controller is switched off. This way you avoid damage to the electronic components of the controller and the print head.

With different system configurations the scope of supply can vary. Please always check with your delivery note for completeness.

8.1　　System components

REA-JET Controller	
Input terminal ST200	

Standard print heads (SK7- and SK16-nozzles)	
Print head cable	
Shaft encoder with mounting plate and aluminum measuring wheel	
Product sensor (photo electric sensor or reflex detector)	
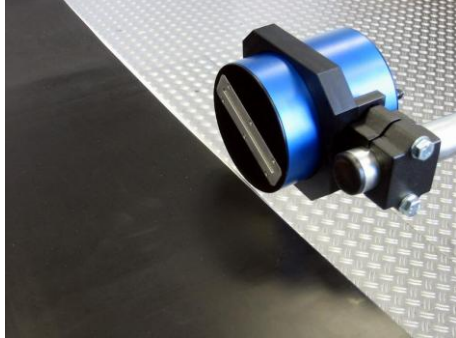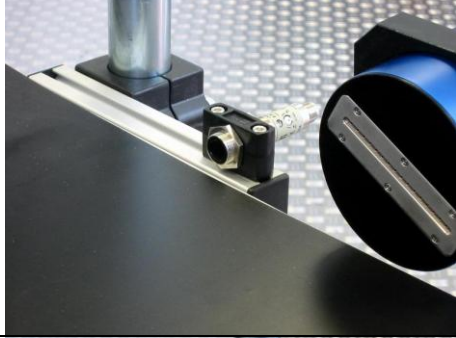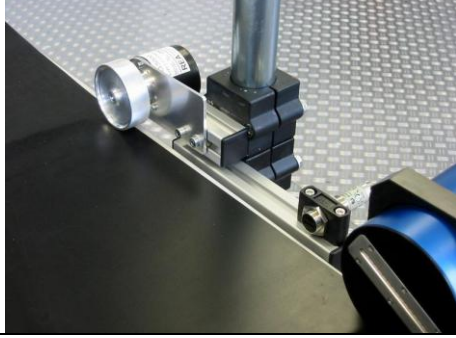
Cable for product sensor (photo electric sensor or reflex detector) and shaft encoder	
Ink supply units TVE = with integrated air supply TVF = powered by factory air	
Ink hose	
T-Connector (for an ink supply unit providing ink for two ore even more print heads at the same time)	

Quick connector Standard system = 1 piece Pigmented system = 2 pieces		
Ink		
Cleaner		
Mounting brackets for product sensor and print head (optional)		

Users manual (on CD-ROM)	

8.2   System assembly instructions

1. Mount print head bracket in the required position at the production line	
2. Mount product sensor (as close as possible to the print head into direction where products come from)	
3. Mount shaft encoder to be optimal able to pick up speed of conveyor belt.	
4. Allocate a secure spot for the input terminal (standard cable length is 3m)	
5. Install the ink supply unit for dye based inks. Ink supply units for pigmented inks (TV-PP) can stand free and do not have to be mounted.	

6. **Connecting cables:** With the bayonet nut connector you connect the print head to the connector on the back panel of the controller (19-pin plug cable for 7-dot print head, 35-pin plug for 16-dot print head).		
7. Connect the controller on it´s backside with the print head.		
8. Connect the product sensor with the connecting cable.		
9. Connect the shaft encoder to the controller.		
10. Connect the controller on it´s back panel side with the eight-pin plug (Y-cable – PS/DG-cable) to the product sensor and the shaft encoder. Connect the input terminal with it´s 12-pin plug to the front panel of the controller. **Attention: the controller must be turned off while doing so.**		
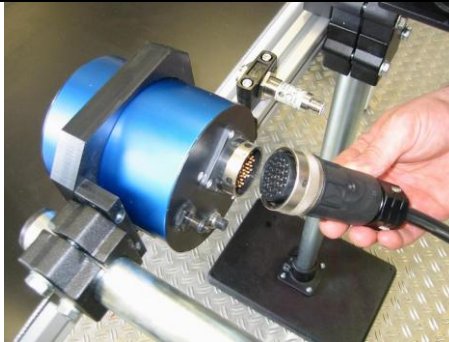
11. Connect the hoses: Mount the ink hose to the ink supply system.	
12. Tighten the cap nut on ink hose. Install ink hose and cut down to needed length (pay attention to straight cutting edges).	
13. Put up ink hose to ink quick disconnector (for pigmented ink supply – TV-PP – two ink quick disconnectors for each print head). <u>Attention:</u> ink hose must not be bent.	
14. Fill in ink into 2 liter ink supply unit. For 5 L and 20 L ink supply units one has to change complete ink tank.	
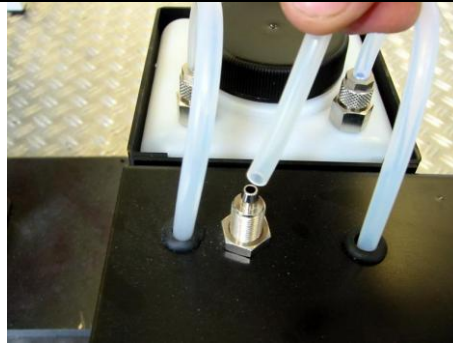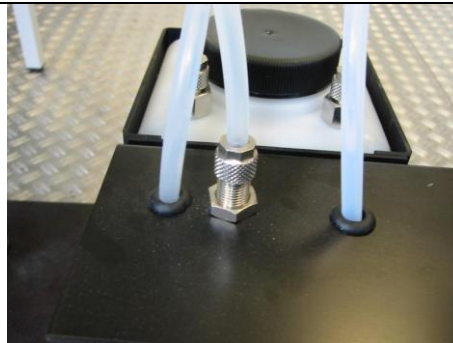
15. After all hoses are connected and all cap nuts are tightened thoroughly the controller and ink supply unit can be connected to power supply respectively to the factory air supply.	
16. **<u>Flushing ink hose:</u>** by pushing down the resistance spring of the fast ink disconnector the overpressure built up from ink supply unit is released and ink starts to leak out.	
17. Let ink level rise up close to quick ink disconnector.	
18. Let a small amounts of ink leak out to clean the ink hose from any cleaner remains.	
19. Shake out remaining ink from ink quick disconnector and click into place on print head.	
20. Switch on controller.	
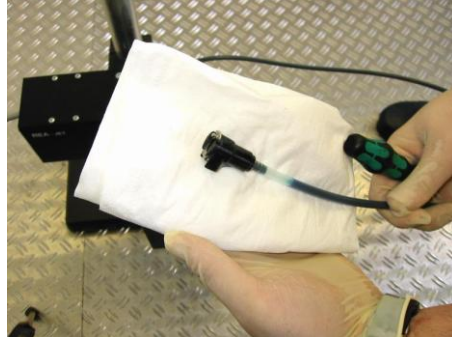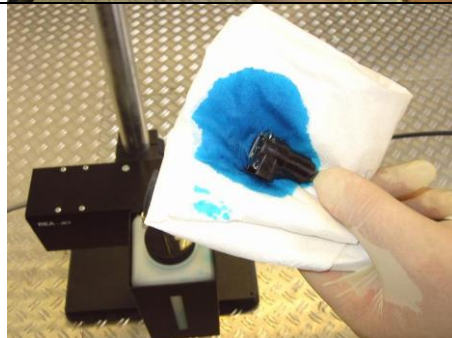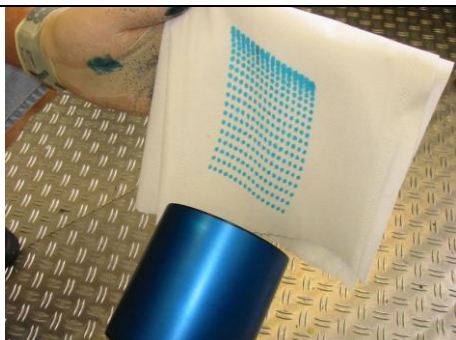
21. Venting print heads Not necessary for pigmented ink supply systems! Put „Dot-Size"-regulator to max. on controller.	
22. Hold print head upright with nozzle plate pointing upwards and push purge button in intervals of 5 to 10 seconds to flood print head with ink.	
23. The procedure is completed when ink is nicely coming from all nozzles. Use a lint free cloth to wipe ink.	

Procedure for pigmented inks:

Should a pigmented ink system be used (TV-PP 2L or TV-PL 2L) skip step 21, 22 and 23 and follow the below described procedure. Also read the respective pigmented ink supply unit manual carefully.

- Open door to pigmented ink supply unit.
- Screw off the transportation cap (without hole) from ink container.
- Shake the 1 liter ink refill bottle well before use.
- Fill in 2/3 of the refill bottle into ink container.
- Shake 1 litre refill bottle well again before you fill in the remaining ink quantity.
- Close the ink container on pigmented ink supply unit with enclosed cap (use cap with ventilation hole).
- Switch on ink supply unit on main switch and start unit by pushing the "Auto" button.

When a pigmented ink supply is used the print heads don´t need to be vented. The system vents itself by circulating the ink.

-   To check all nozzles push the purge button on print head and pull a piece of paper past the print head at the same time. The print head should deliver an even print result with all nozzles working uniformly.

For best printing quality the distance in between product surface and nozzle plate should not be more then 1 to 5 mm.

The system is now ready to go!

8.3   Operation of several print heads with one ink supply unit

It is possible to operate several print heads with one ink supply unit, however, you will have to reckon by part on a considerable loss of ink pressure when using long tubing and a larger quantity of T connectors. If you wish to connect more than two print heads to one ink supply unit you will have to use a respective quantity of T connectors. In the case of pigmented print heads you will have to use twice the quantity of T connectors because the ink runback will also have to be installed as described.

Several print heads supplied by one ink system have always to be installed in parallel, NOT in a line. Furthermore you will have to use the same length of tubing between the T connector and every print head in order to make sure that the pressure is constant for every single print head.. In one or the other case it will be necessary to check such a multi-connection since many external factors can have an additional influence.
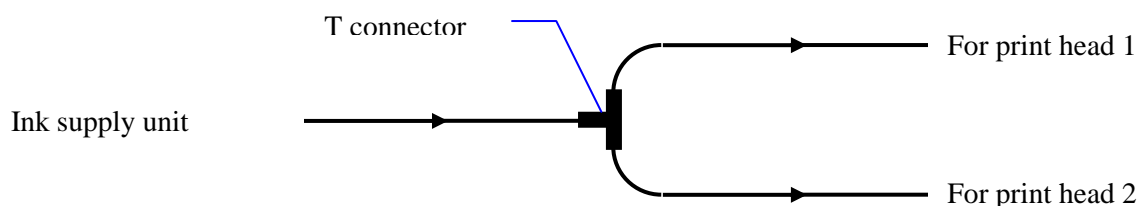
T connector

Ink supply unit

For print head 1

For print head 2

Fig. 8.1:Ink feeding for two print heads (example: standard, non-pigmented print head)

8.4   Adjusting the print image

Adjusting the print image means that the dot size needs to be adjusted according to the print text and the printing surface.

8.5   Adjusting parameters

Adjusting the print image quality is done by adjusting the ink pressure and the by adjusting the dot size at the controller. In most cases the printing surface is a given thing and can not be changed. In few cases a surface treatment is possible to optimize print image quality. To significantly change the dot size the nozzle plate can be replaced to different sized nozzles which involves a major component change.

Very important for print image quality is to select the appropriate ink. When the product surface changes a different ink could be required to secure print image quality.

It is quite a bit of an effort to modify a print head to work with a nozzle plate of different nozzle sizes since the mechanical components of a print head are inter-balanced to the type of nozzles installed.

The following applies fort he adjustable parameters:
- The larger the ink pressure and the larger the „Dot-Size" the larger will be the dot you get.
- The smaller the ink pressure and the smaller the „Dot-Size" the smaller will bet he dot you get.

8.6   „Dot-Size" adjusting procedure

To adjust the dot size of the system us the „Dot-Size" regulator on the controller.
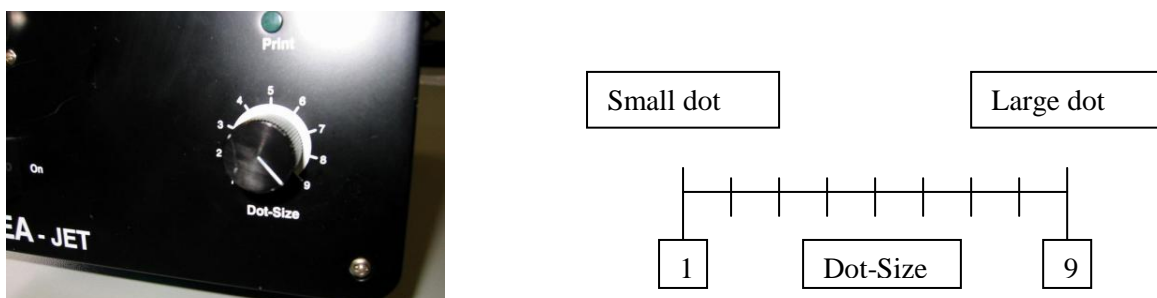
Fig. 8.2. Controller: „Dot-Size"-regulator (left), „Dot-Size" sketch of settings (right)

To adjust the ink pressure settings please consult the manual for the ink supply unit.

8.7   Setting of print height

To adjust the print height one has to slant the print head. The print height is the gap in between the upper and the lower nozzle of the print head. The print head has to be turned counter clock wise while looking onto the nozzle plate. For setting the print height one has to enter the basic parameter menu of the controller.

Fig. 8.3: Print height setting by slanting the print head

9   Maintenance

Ink is meant to dry after a certain time.

Ink might also dry on the nozzle plate once in a while. It does not take a lot effort to clean the nozzle plate again. Therefore please revert to chapter Error! Reference source not found. **Trouble shooting.**
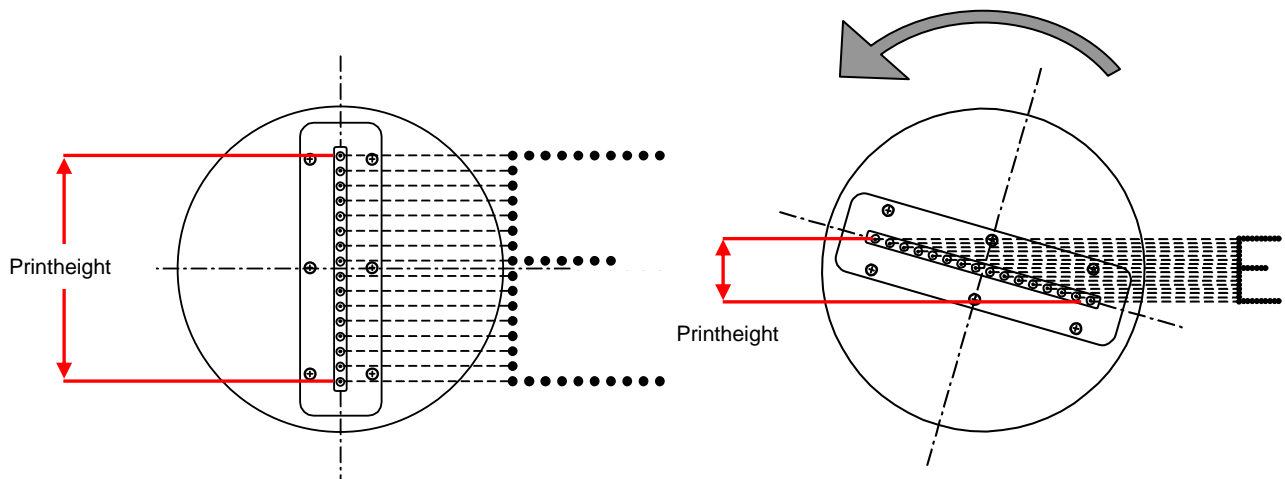
Such as all mechanical devices also the REA-JET print head underlies certain wearing in dependence of the degree of use. As precaution a rotational service is required at the REA service department.

Check complete system and all hoses for leakages once in a while. A certain interval can not be given and is related to degree of use. A visual check is recommended at the beginning of each shift.

Maintenance and service inside the system components are only to be carried out by REA service technicians and can not be performed by untrained customers.

When dismantling ink hoses ink can leak out. A container and absorbent cloth or paper should stand by.

In case of damage the system or print head has to be sent back to REA Elektronik for examination. It is recommended to use the original packaging for shipment.

Never use compressed air for cleaning the system and print heads. This might destroy components. Damages caused by compressed air can only be repaired at REA Elektronik service department.

9.1   Cleaning of nozzle plate and ink chamber

Never apply force when installing or dismantling components to avoid damage. Damages caused by violence or improper use are not covered by warranty.

When dismantling the nozzle plate switch off the controller not to accidentally spill serious amounts of ink within short time.

Place the dismantled nozzle plate on outer edge and never face down to avoid damages to the nozzle diamonds which stick out on the inner side.

Loosen the nozzle plate screws using the right size screw driver.	
Lift up the nozzle plate and remove the nozzle plate sealing ring.	
Place nozzle plate into an ultrasonic bath for approx. 5 minutes.	

For ultrasonic cleaning a plastic or glass container filled with cleaner is recommended. This container with the nozzle plate inside should be taken into the ultrasonic tub.
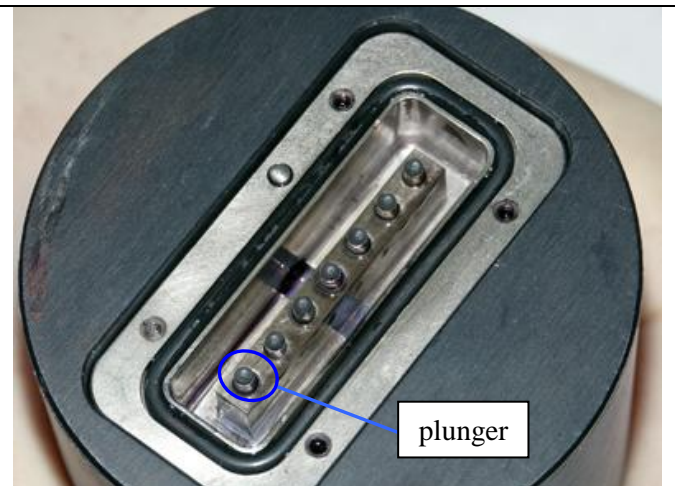
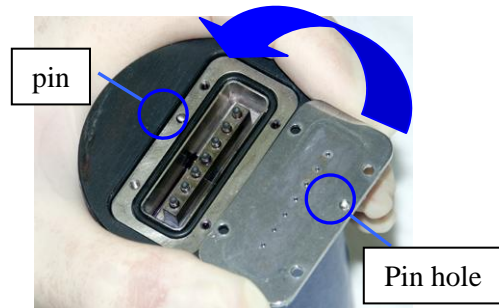|	
Rinse the ink chamber of the print head with cleaner.	

To clean the plunger no grinding substances, metal brushes or sharp items should be used not to avoid leakage of nozzles.

Check plungers for dirt particles and remove them without hurting the plunger. Rinse after cleaning. Assemble the nozzle plate sealing ring.	 plunger
Put the nozzle plate back in place into notch. Make sure that the pin comes to rest in the pin hole of the nozzle plate.	 pin Pin hole
Screw the nozzle plate screws back on and tight screws alternately.	

The print head is now ready to go back into operation. Take into account that the print head might need to be vented again to exhaust any air inside. For venting process go back to table in chapter 8.2 and see step 21.

In case of heavy pollution which can not be cleaned in ultrasonic bath a cleaning needle has to be used to clean the nozzles.

Insert the nozzle cleaning needle only when nozzle plate is dismantled. Insert direction of needle is from outside in to get rid of any blockage.

9.2   Maintenance plan

Depending on the consumables used the terms for cleaning and maintenance procedures can be different. A fixed service plan can only be rolled out after observation. A possible service and maintenance plan could look like described below:

Example service plan:

A)   Once each shift: Cleaning of nozzles with a cleaner soaked cloth and a purge.

B)   Cleaning of nozzle plate with cleaning needle or ultrasonic bath when particles clog the orifices.

C)   After a longer period out of service the print head needs to be cleaned as described in chapter **9.3** with cleaner.

D)   Should the print quality not be OK after cleaning please send the print head back to REA Elektronik for in house service.

> The maintenance plan has to be adapted to your individual needs. Should you need any assistance in setting up such a plan feel free to contact us.

9.3   Flushing of print head

To swap ink types or when putting the printing system out of operation for a longer period of time the print head needs to be flushed. For flushing procedures the cleaner corresponding the ink that is processed has to be used.

> Never mix different ink types and different cleaners. Different fluids might react with each other and could cause damage to the system. Flush all components and hoses thoroughly before changing ink types.

9.3.1   Flushing a standard system

1. Replace your ink container by a container filled with cleaner.
2. Turn ink supply unit on.
3. Push purge button on print head until only cleaner jets out of the nozzles.
4. Dismantle the nozzle plate and flush ink chamber with cleaner.
5. Put nozzle plate back on.

9.3.2   Flushing of pigmented system

On a pigmented system the print head is flushed from the circulation of the pump. Replace the ink in the ink tank with cleaner and let the system print. Refill with fresh cleaner. By ongoing prints the print head and the nozzle plate are flushed since cleaner instead of ink runs through the system.

Also read the user manual of your ink supply unit.

10   <u>Maintenance</u>

For external cleaning of the system no specific skills are required. Cleaning and flushing of the print head (see chapter **9.3 Flushing of print head** is only to be carried out by trained personal.

The print head is made of special aluminium material. It has to be cleaned with the cleaner that is determined for the ink in use. To avoid scratches no aggressive cleaning detergents should be utilized.

Avoid contact plastic parts with solvent. This also includes cables. Solvent can damage the plastic.

Cleaning of hoses, cables and wires can lead to static charge which can cause a spark. Therefore only a water soaked cloth should be used to avoid static charge.

11   Dismantling

Dismantling means to put the printing system out of operation or taking a system apart for service.

Prior to dismantling of ink hoses the ink supply unit has to be switched off and the pressure needs to be released by screwing the cap off or by printing without ink supply unit running. In case of remaining pressure in the system consumables may leak out.

When working on the ink hoses consumables may leak out. Make sure you have to have means available (cloth e.g.) to take up escaping consumables.

To dismantle the system please proceed in the following steps:

1. Switch the controller off.
2. Switch the ink supply unit off and release pressure from ink tank by taking the cap off.
3. Disconnect the print head cable from the unit.
4. Disconnect all hosed from the print head.
5. Take the print head out of the mounting bracket.
6. Should the system be dismantled for service proceed as described in chapter 9.3 to flush the print head and get it ready for shipment.

12   Disposal

Dispose consumables and cleaning material soaked with consumables in an environmentally friendly manner. Hints for proper treatment can be taken from respective material data sheet.

The REA-JET print head is made of high quality material which should be recycled.

13   Trouble shooting

Localization of malfunction:

Malfunction	Possible cause	Possible error recovery
Print head does not print	Clogged nozzle	Release print and flush
		Remove nozzle plate and clean print head
	Fault on print head cable	Disconnect and connect again
		Exchange components
	No signal from controller	Check controller
	Print head defect	Service
Some nozzle do not print	Nozzle clogged	Clean nozzle plate
	Print head out of adjustment	Service at REA Elektronik
TEST TEST		
Permanent ink leakage	Dirt particles on plunger	Cleaning
	Print head out of adjustment	Service at REA Elektronik
TEST		
Print image incomplete	Print head out of adjustment	Service at REA Elektronik
	Pressure not sufficient	Increase pressure
		Replace ink filter
TEST	Ink hose to long (loss of pressure)	Install ink supply unit closer in distance to print head
		Increase pressure
No in flow	No ink in tank	Refill ink
	Ink filter clogged (standard ink supply)	Replace ink filter
	Ink hose clogged	Replace ink hose
	Quick ink disconnect on ink hose not permeable	Check connector and replace if necessary
	Ink viscosity to high	Replace ink
Sloped single ink jets out of nozzle	Dirt particles block orifice	Clean nozzle plate
	Orifice is damaged	Replace nozzle plate, maintenance at REA Elektronik
Continued on following page		

Continuation		
Overspray around dot	Dirt particles in orifice	Clean nozzle plate
	Nozzle damaged	Replace nozzle plate, maintenance at REA Elektronik
	Ink pressure to high	Reduce ink pressure
Frayed print image TEST	Distance product/print head to large	Reduce distance
	Pressure on ink supply to high	Readjust pressure(0,2 to 0,5 bar)
Distorted print image TEST	Unsteady shaft encoder signal	Slip-free junction of shaft encoder and conveyor belt needs to be provided

In case of malfunction please check complete installation. Switch off all system components turn back on.

Check trouble shooting list. Should the malfunction not be cleared away please contact REA for service. Make sure you have all basic parameter settings and serial numbers at hand.

14   Appendix

14.1   Technical data

Connector for print head cable
SK7; SKP7, SKS7:   19- pin connector
SK16; SKP16, SKS16:   35- pin connector

Connector for consumables on ink hose
System plugs / coupling combination

Operating pressure (ink)
Recommended: 0,2 bar to 0,5 bar
Max. ink pressure: 1,0 bar

Ambient conditions – standard (ink depending)
Operating temperature range: -5 °C to + 45 °C
Max. air humidity 90 %, not condensing

Dimensions without hoses
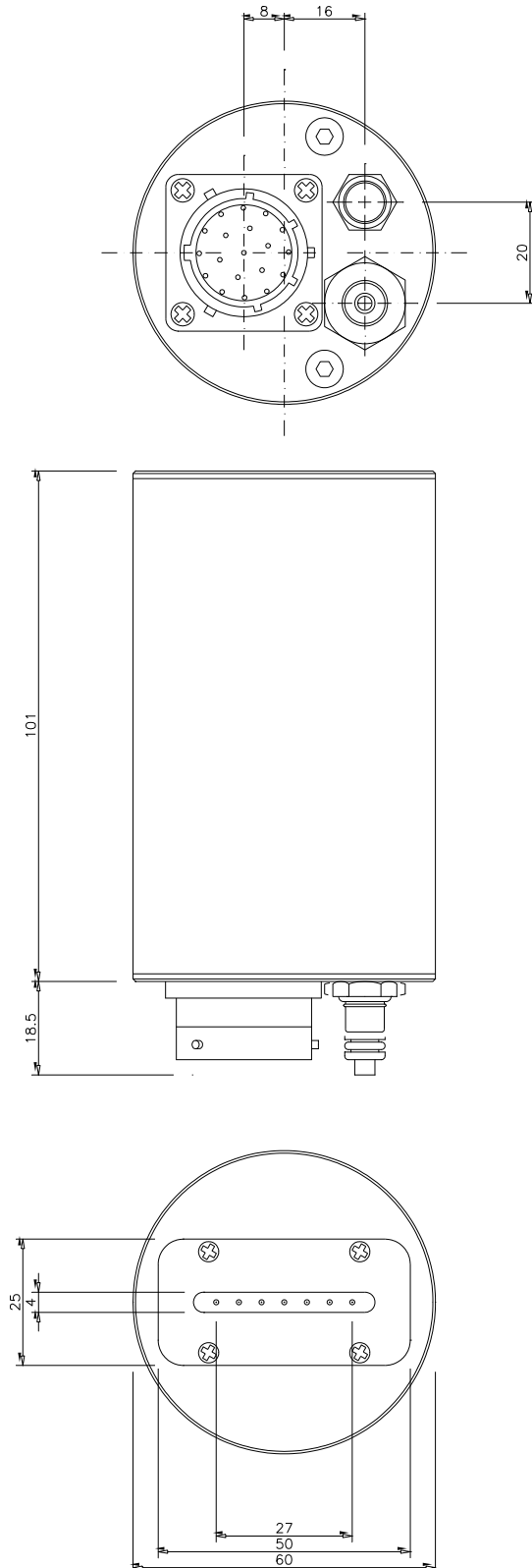See dimensional drawings in chapter 14.2

Optimal distance between product and nozzle plate
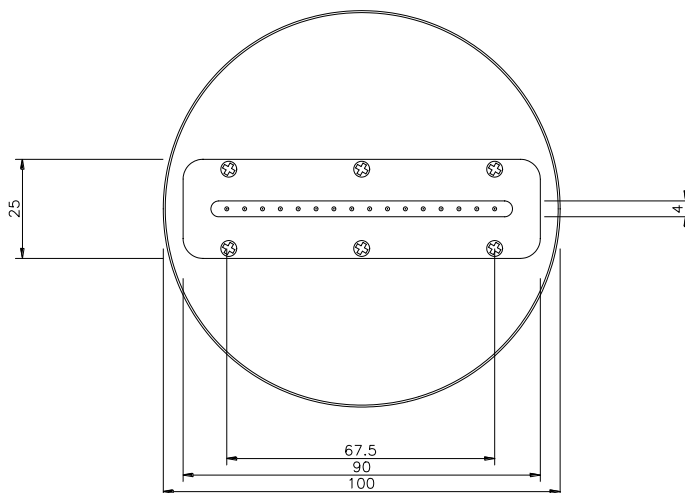1 to 5 mm

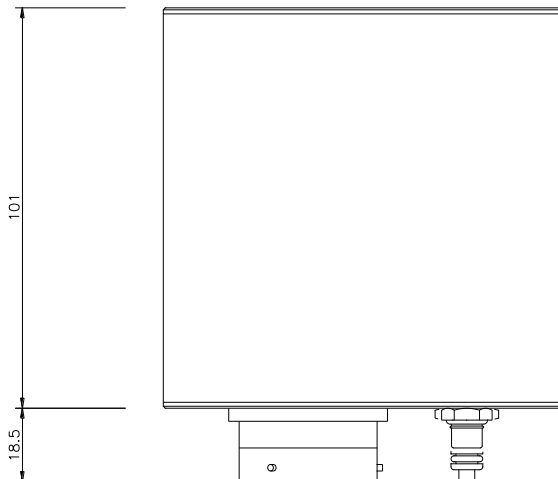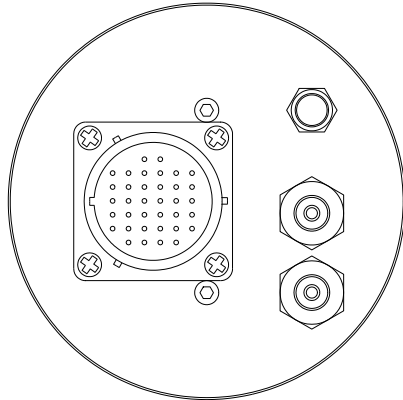Subject to technical amendment.

14.2 Dimensions of print head

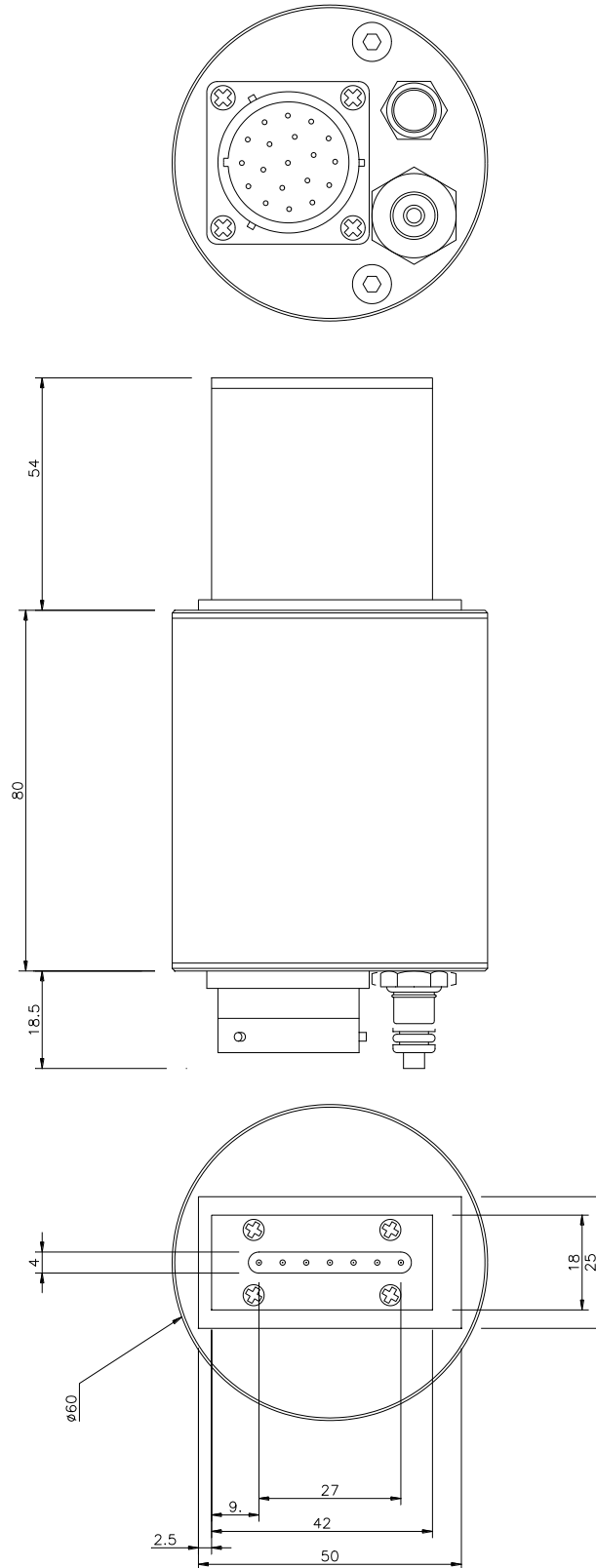**Print head SK7 (SKP 7, pigmented version with two ink connectors)**

050.03x.000 Schreibkopf SK 7/xxx
Printhead SK 7/xxx
011.951.04
14.07.00 /WHi

Print head SKP 16 (SK 16 – standard version has one ink connector only)

050.06x.00

Schreibkopf SKP 16/xxx
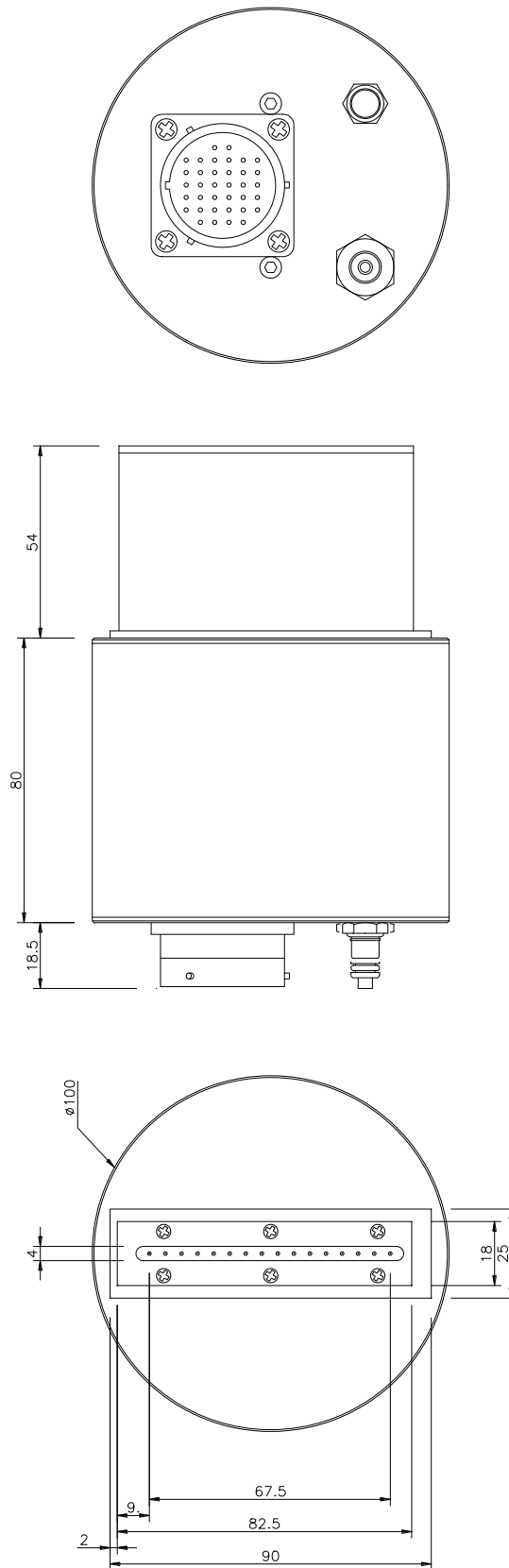Printhead SKP 16/xxx

011.935.00
19.04.05/WHi

Print head SKS 7 (not available as pigmented version)

050.320.XXX Schreibkopf SKS 7/xxx
Printhead   SKS 7/xxx

011.953.01
28.04.98/Whi

Print head SKS 16 (not available as pigmented version)

050.340.XXX Schreibkopf SKS 16/xxx
            Printhead   SKS 16/xxx

011.954.00
13.07.01/WHi

15 Warranty Conditions

REA Elektronik guarantees that the equipment delivered is free of material or manufacturing faults. This guarantee applies for 6 months from the date of dispatch, but does not cover faulty installation, improper use or damage to the equipment.

Repair under warranty

If the equipment purchased fails to function properly within the above guarantee period, REA Elektronik will repair the equipment free of charge. In order to avoid unnecessary costs, you are requested to check all the information provided in the operating instructions thoroughly before coming to the conclusion that the equipment is defective or is not working properly.

Return of the equipment

The original packaging should be used when sending the equipment back for repair. The return must be made at the cost of the sender, and must be adequately insured. REA Elektronik or the relevant representative will return the equipment to the purchaser's address after repair.

General warranty conditions

REA Elektronik accepts no liability for subsidiary or consequential damages, including damages resulting in loss of profit or production, delivery delays, material loss or increased operating or business costs etc.

Customer service after expiration of warranty

In this case, please contact REA Elektronik or the representative responsible for your area.

Subject to technical amendment.

REA Elektronik GmbH, D-64367 Mühltal-Waschenbach, Germany