Original instruction manual

DIL HDHF Dm vacuum generator

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Preface

This instruction manual contains all information required by section 3 of the German Machine Safety Code ‘Requirements for placing on the market’ (in respect of the Machinery Directive 2006/42/EC in its respective applicable version).

This instruction manual is intended for people who work or will work on or with the generator described here.

Only familiarity with this instruction manual can prevent faults occurring on the generator and guarantee trouble-free operation. It is therefore important that people responsible for use of the equipment are familiar with this instruction manual.

The instruction manual forms part of the user information relating to placing the generator on the market, and should be kept so that it is accessible to the operating company and user. If the generator is moved to a different site, the operating and/or usage instructions (including those from component suppliers) must also be included with it.

In all phases of its working life, the information in the operating and usage instructions (also those of third party suppliers) must be observed. Carefully read the relevant sections of the instruction manual before beginning work.

The DIL Technologie GmbH accepts no liability for damage and breakdowns resulting from non-adherence to the information contained in this instruction manual.

Note!

If using as an installation part or retrofitting part in an existing system, all parts of the system’s operating instructions remain binding and must be adhered to.

1 Installation declaration

We DIL Technologie GmbH

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declare that the incomplete machine – HDHF-Dm Vacuum generator –

which this declaration relates to complies with the following standards or normative documents:

Applicable directives:

Council Directive **2006/42/EC of 29/12/2009**

Applicable harmonised standards:

DIN EN ISO 12100:2010 – General principles for design – Risk assessment and risk reduction (ISO 12100:2010, English version EN ISO 12100:2010

DIN EN 4414 Pneumatic fluid power – General rules and safety requirements for systems and their components (ISO 4414:2010); English version EN ISO 4414:2010

DIN EN ISO 11201–11205:2010–10 Title (English): Acoustics – Noise emitted by machinery and equipment –

DIN EN ISO 14159 – Safety of machinery – Hygiene requirements for the design of machinery

The manufacturer declares that the above-named product is an incomplete machine as understood under the terms of the Machinery Directive. The product is exclusively intended for fitting into a machine or incomplete machine, and therefore does not comply with all requirements of the Machinery Directive.

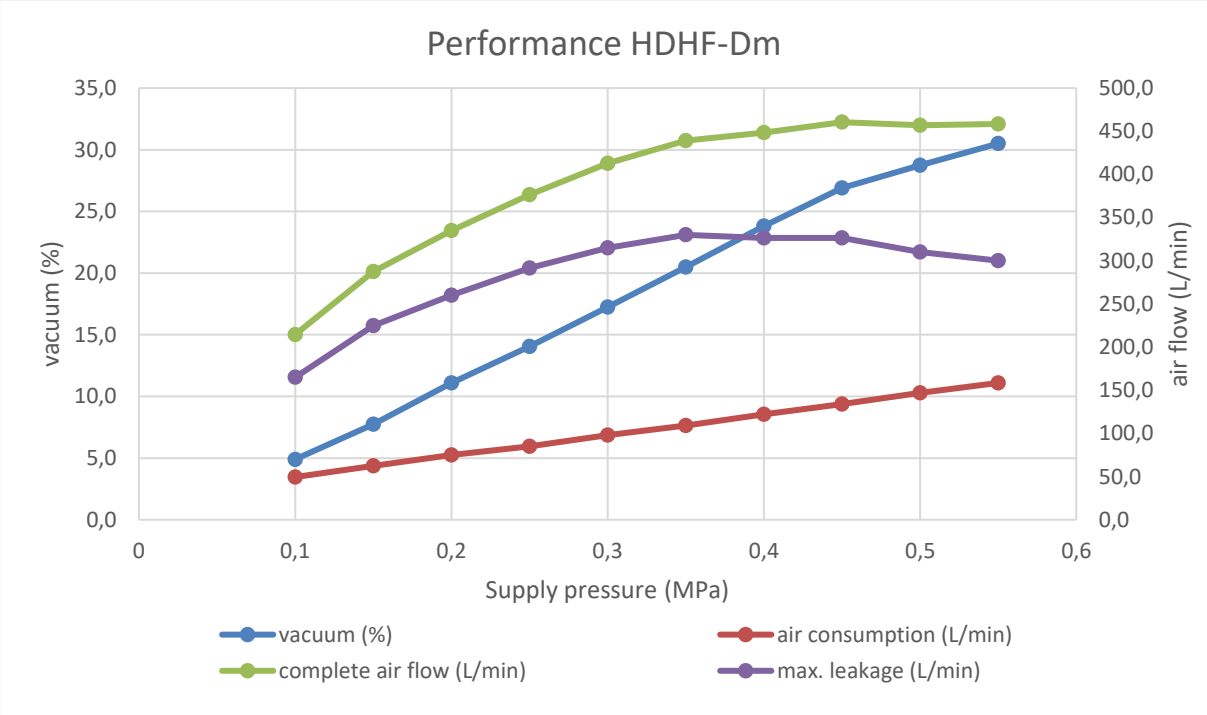
The particular technical documents as required by Appendix VII Part B have been issued. The representative responsible for compiling the technical documents is obliged to supply them to national authorities upon receipt of a substantiated request to do so. They will be supplied either in paper form in the post or on electronic data carriers.

It is not permitted to put the product into operation until it is determined that the machine in which the above-mentioned product is fitted meets all fundamental requirements of the Machinery Directive.

2 Technical data

Supply values, operating point

Air pressure:	3.5 bar
Supply flow volume:	110 l/min
Leakage volume:	330 l/min
Vacuum (at 3.5 bar):	20.0%
Maximum supply pressure:	0.5 – 5 bar
Generator material:	1.4571 **(X6CrNiMoTi17-12-2)**, V4A
Dimensions LxWxH:	38 mm x 30 mm x 92 mm
Total weight:	180g
Sound pressure level without sound absorber:	under 77 dB(A)
Sound pressure level with sound absorber:	under 67 dB(A)



The key figures were recorded at a temperature of approx. 20°C and are subject to a tolerance of approx. +- 10%.

3 Basic safety instructions

The health and safety of people working on or with the equipment can only be guaranteed when the safety measures set out in this instruction manual are adhered to.

3.1 Dangers when handling the device

In principle, the standard accident prevention regulations apply, especially with regard to machine-related safety.

3.2 Intended use

The supplied generator's operational safety is only guaranteed when it is used as intended.

Intended use also includes observance of the operating and/or usage instructions (including those of component suppliers), as well as adherence to all requirements for maintenance and servicing works.

The DIL HDHF Vacuum Generator was solely designed for the use in vacuum production and temporarily holding of objects in the food sector.

The DIL Technologie GmbH cannot be held liable for damages resulting from gripping other kinds of products or objects. In the event of damage, responsibility lies with the operator, and cannot be transferred to the DIL Technologie GmbH.

3.3 Improper use

No warranty or liability claims for injury to persons or material damages can be entertained if they are a result of one or more of the following causes:

- Improper assembly, commissioning, operation or maintenance of the vacuum generator
- Operation of the vacuum generator when it is not in perfect condition
- The improper use of
  - Equipment
  - Accessories
- Improperly carried out repairs
- Disaster situations caused by ingress of foreign objects and force majeure
- Unauthorised structural changes to the vacuum generator
- Unauthorised changes to the performance data

3.4 Inspection obligations

When the DIL Technologie GmbH transfers the vacuum generator to the operator, responsibility for meeting maintenance and inspection obligations also transfers to the operator of the vacuum generator.

4 Training of personnel

- Only personnel who have been instructed and trained in its use may work with the vacuum generator. The equipment must only be put into operation by a suitably qualified employee of the operating company who has been assigned by the operating company to operate it, and who has thoroughly studied all chapters of this instruction manual.
- Personnel's responsibilities for operating, setting up and maintaining the equipment must be clearly determined.
- Personnel who are being trained must only work on or with the vacuum generator under the supervision of an experienced person.
- Servicing and repair works, as well as maintenance and cleaning works, must only be carried out by specially trained and qualified skilled personnel. When doing so, they must observe all instructions relating to servicing as well as all relevant safety regulations and all local regulations.

Personnel / Activity	Trained personnel	Personnel with suitable technical training	Supervisor with relevant expertise
Commissioning		X	X
Setup, preparation		X	X
Troubleshooting	X	X	X
Fault rectification		X	X
Cleaning	X	X	X
Maintenance	X	X	X
Repair			X
Disposal	X	X	X

4.1 Behaviour in the event of faults

In the event of irregularities/faults, work must be ceased immediately. Faults should be rectified, and if required, workplace supervisors and/or customer service/servicing must be made aware of the situation.

4.2 Behaviour in the event of hazards

Steps must be determined by the operating company.

4.3 Rescuing people, first aid

Steps must be determined by the operating company.

4.4 Structural changes to the vacuum generator

Structural changes to the vacuum generator and its accessories generally require the written authorisation of the DIL Technologie GmbH. If this requirement is infringed, any and all liabilities and guarantees on the part of the manufacturer become null and void!

Any structural changes carried out by the operating company or third parties are the responsibility of the operating company. If any such changes cause damages, the manufacturer cannot be held liable for these damages, or for any consequential damages (also against third parties).

4.5 Product observation

The operating company must inspect the vacuum generator at regular intervals for defects that could influence safety and must evaluate the resulting error statistics. The operating company must immediately notify the manufacturer of any such faults discovered in this way, so that the manufacturer is able to resolve them as quickly as possible.

In the time between noticing the fault and its complete elimination, the operating company is responsible for deciding how to proceed. The company should decide whether the vacuum generator will be operated as normal, operated in a restricted mode (with special warning notices and instructions specifically tailored to the problem being experienced – see the Equipment Usage Directive) or whether the vacuum generator is put out of operation.

5 Installation and assembly

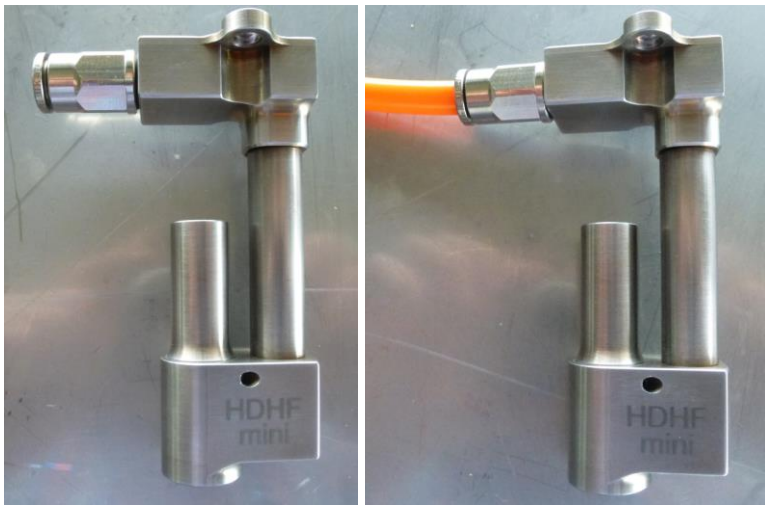
5.1 Installation site, site of use

The vacuum generator can be integrated into a fully or partially automated machine, or be used manually.

Responsibility for appropriate fitting of the generator to any other machines or systems that may be in use lies solely with the operator of the generator. (For more information see section Drawings)

5.2 Supply connections

The vacuum generator is supplied via a compressed air line. This can be done via a compressed air push-in fitting.



Picture 1: vacuum generator without (left) and with (right) compressed air supply

Note!

A compressed air supply must be connected to supply the vacuum generator. As standard, the vacuum generator is equipped with a quick-release coupling with Ø 8mm. The diameter can be reduced. However, it must be kept in mind that this restricts the air flow. In general, it is recommended not to reduce the diameter below 6mm.

6 Commissioning/Setup

6.1 Safety regulations

Only put the vacuum generator into operation if the following requirements are met:

- The vacuum generator is in perfect technical condition.
- The vacuum generator will be used for its intended purpose.
- The information contained in the operating manual will be observed.

6.2 Personnel requirements

(See section 4 Training of personnel)

6.3 First operation/Setting and monitoring the compressed air supply

Connection of a suitable compressed air supply line in a depressurised state. The operating pressure must be set after connection. Setting an operating pressure outside the optimum range (0.5 to 5 bar) leads to operation of the vacuum nozzle outside the optimum working conditions. This leads to a change in the performance data of the vacuum nozzle. (See section 2 Technical data)

The vacuum generator must only be supplied with operating air that has been sufficiently filtered. Supplying with unfiltered air can lead to a changing of performance data. For this reason, we recommend monitoring the performance data in respect of the flow volume, operating pressure and the resulting vacuum.

Responsibility for appropriate fitting of the vacuum generator to any other machines or systems that may be in use lies solely with the operator of the vacuum generator.

6.4 Use of appropriate suction cups

The use of the appropriate suction cup plays a decisive role in the optimum use of the vacuum generator, and therefore also for the optimum gripping and holding of the desired products. The choice of suction cup depends on the product to be gripped. The choice of a suitable suction cup should be made in discussion with the DIL Technologie GmbH. Furthermore, the DIL Technologie GmbH also provides the service of developing product-specific suction cups.

7 Monitoring, cleaning and repair

7.1 Safety regulations

Ensure that regulations on the prevention of accidents are adhered to!

After all servicing and maintenance work is complete, return the machine to its safe to operate state and check:

- That loosened screw connections have been firmly retightened
- Seal tightness and correct connection of connections/lines

All repair works must be performed in the exact order that they are listed. Only use approved auxiliary materials and operating materials. Only original spare parts must be used.

7.2 Monitoring performance data

Checking the noise level

When using a sound absorber, the noise levels must be checked every week, to guarantee the performance data with respect to the sound barrier. If discrepancies occur, check the noise level; if required clean/replace the sound absorber or contact servicing.

Checking operating pressure and flow rate

Ideally, a pressure regulator should be installed in the generator's compressed air inlet, to monitor and adjust the operating air. Furthermore, a flow meter should be installed in the feed line. In this way, the operating parameters can be monitored and the functioning of the equipment can be guaranteed.

Checking the resulting vacuum

The resulting vacuum is essential for gripping and holding the desired products. For this reason, it is a good idea to check the vacuum. The measurement can be made using an adaptor. A vacuum measuring device for monitoring the absolute values can be connected to the adaptor's connecting piece.

If the values for flow and vacuum do not correspond to the output data of the vacuum generator, it should be cleaned accordingly to ensure proper operation of the vacuum generator. If the cleaning does not achieve the desired result, the filter contained in the vacuum generator (see chapter 7.6) should be replaced.

7.3 Cleaning

The vacuum generator must be regularly cleaned and cared for. How often this occurs depends predominantly on the work it is used for and on environmental conditions. Contamination of the generator can lead to negative effects on the performance data. Below follows some information on the types of cleaning required, along with the cleaning intervals.

Interval	Part
Daily or, depending on nature of product, every shift	Suction cup
Daily	Sound absorber
Daily	HDHF base body

Cleaning the suction cup:

The respective suction cup can be cleaned in dismantled state both manually or mechanically. The cleaning procedures and methods, as well as possible cleaning procedures, must be individually adapted to the used suction cup. The definition and type of cleaning is the responsibility of the operator.

Cleaning the sound absorber:

Once the sound absorber has been dismantled, its components can be cleaned manually or mechanically.

Cleaning the base body:

The generator can be cleaned simply by flushing out the nozzle with water or water mixed with cleaning agent. Larger food particles should first be manually removed, for example, using compressed air.

Heavier soiling that cannot be removed using this procedure, or soiling that is a result of contaminated compressed air, should first be cleaned off using an ultrasonic bath.

Important!
When cleaning with a cloth, it is essential that a lint-free cloth is used, as deposits from cloths can lead to the vacuum nozzle becoming blocked, which therefore negatively affects the performance data. For this reason, cleaning using cloths should be avoided wherever possible.

Note!
Only clean the vacuum generator using cleaning agents that are approved for use in the food industry.

7.4 Fitting/Defitting and attachment of silencer

A silencer is mounted by sliding it onto the vacuum nozzle. A corresponding mechanism is provided in the silencer which locks the silencer onto the suction bell. For further information regarding the silencer, we recommend that you also read the corresponding instructions.

7.5 Fitting a suction cup

A suction cup is fitted via a connection adaptor, which depends on the type of suction cup being used. (See also section 6.4 Use of appropriate suction cups)

The mounting is threaded so that a quick and easy installation can be achieved. Please note that the HDHF has a fine thread that can be damaged by the improper use of other adapters.

7.6 Replacing the filter

If the generated vacuum does not correspond to a range of 17-22% after cleaning the vacuum generator and operation with 3.5bar and sufficient air flow, it is recommended to check the filter installed in the compressed air supply and replace it if necessary. To do this, the supply connection must first be dismantled. As shown in the figure below, the filter must be unscrewed from the supply line using a 7 x 1 mm slotted screwdriver.

A replacement filter can then be inserted into the vacuum generator and screwed in as far as it will go using the slotted screwdriver. After the filter has been replaced, it is recommended to check the vacuum again.

8 Spare parts

Various spare parts and accessories are available for operating the vacuum generator. (see document Spare parts and accessories)

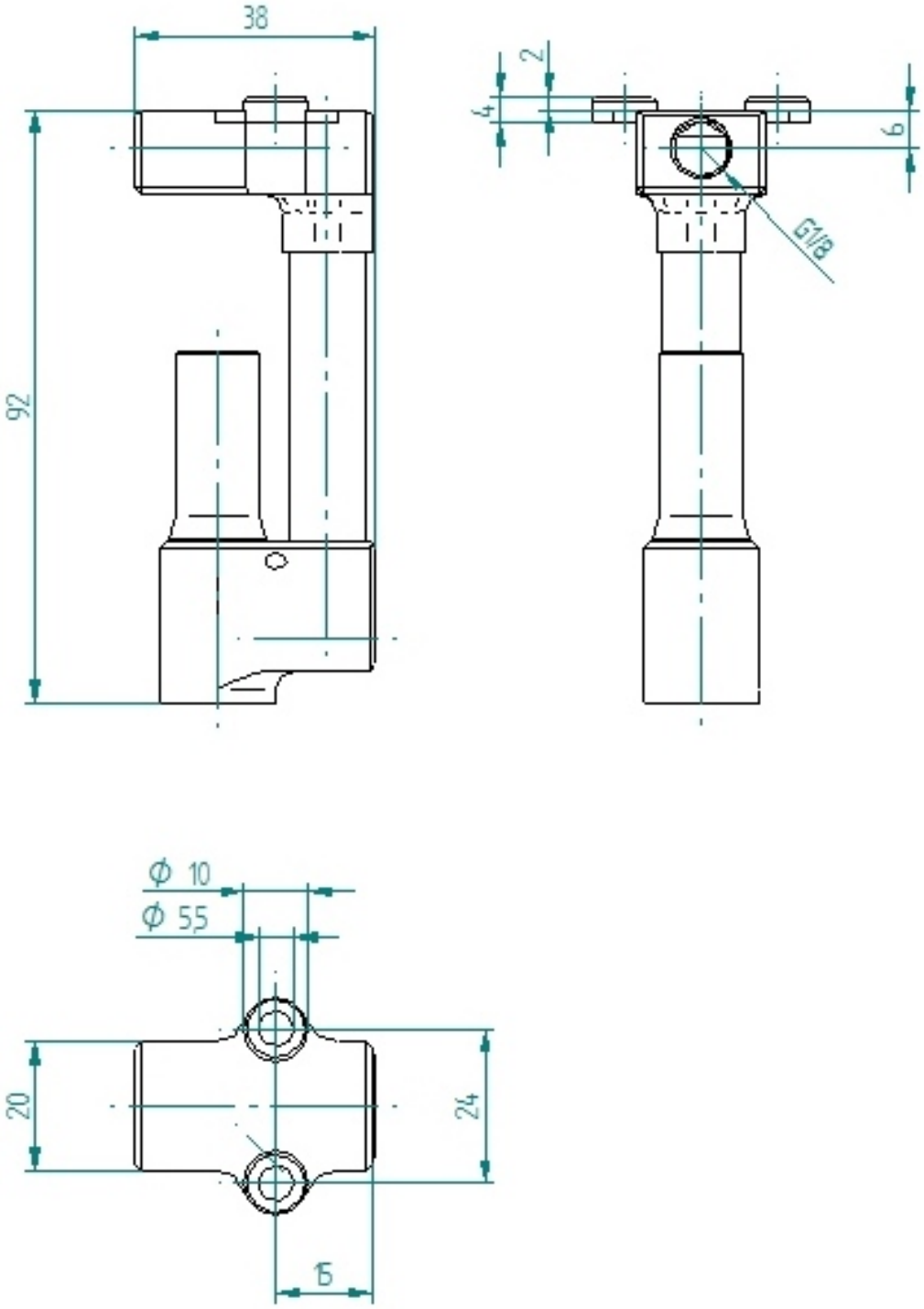
9 Troubleshooting

The following lists of faults are based on the current state of knowledge. In the context of a continuous process of improvement, these should be updated on the basis of current knowledge and experiences.

Description of fault	Possible causes	Fault remedy
Product does not stick to the suction cup	• Wrong suction cup • Operating pressure too low • Flow rate too low • Nozzle dirty	• Check operating pressure and reset if required • Clean the generator • Adjust the suction cup • Check/adjust the compressed air supply • Replace the filter
Deviation from performance data	• Nozzle dirty • Operating pressure too low • Supply line's diameter is too narrow	• Check operating pressure and reset if required • Clean the generator/nozzle • Check/adjust the compressed air supply

10 Appendix

10.1 Drawings



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