MANN+HUMMEL

# Spin-On Separator LB Box, StarBox, StarBox$^{XT}$

Leadership in Filtration

MANN+HUMMEL

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# 1 Introduction

Spin-on separators from MANN+HUMMEL offer an easy-to-integrate and, above all, maintenance-friendly solution for de-oiling compressed air and gases within a compressor (see chapter 9 Intended use).

This manual is intended for:

**Maintenance and service**

The chapter “Replacing the spin-on separator” contains all the information required for the safe and proper handling of the spin-on separator.

The latest version can be requested from MANN+HUMMEL.

**Development**

The chapter “Product” presents the product and provides the developer with instructions for safe integration.

# 2 Vendor and publisher

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# 3 Guarantee and warranty

Information about the warranty periods and general terms and conditions are available from the manufacturer or at www.mann-hummel.com.

The guarantee and warranty are void if

- changes are made to the product,
- the Installation and Maintenance Manual is not complied with,
- accessories other than those specified by the manufacturer are used,
- the product is used or treated improperly and/or contrary to the intended use.

# 4 Disclaimer

We reserve the right to make technical improvements to the products described in this Installation and Maintenance Manual without notification. Reprinting, translation and copying of this document, or extracts of it, are permitted for internal use. Copyright remains with the publisher. This Installation and Maintenance Manual is not subject to an updating service.

This Installation and Maintenance Manual is compiled to the best of the manufacturer's knowledge. The manufacturer has no influence on the function of this product in its ultimate application. Operators should conduct their own tests to approve the product for their application. Therefore, the manufacturer shall not be held liable for downtime, damage or personal injury resulting from a failure of the product in the application.

# 5 Means of representation

## 5.1 Safety notices

*DANGER!*

*A safety notice with the signal word **DANGER!** indicates a personal risk, which could potentially result in serious or fatal injury.*

*WARNING!*

*A safety notice with the signal word **WARNING!** indicates a personal risk, which could potentially result in moderate injury.*

*CAUTION!*

*A safety notice with the signal word **CAUTION!** warns of damage to property and personal hazards that could result in minor injury.*

# 6 Basic safety instructions

## 6.1 Requirements for maintenance personal

Maintenance personnel must have completed appropriate training and be able to carry out the necessary work and to recognize imminent dangers, and handle them safely.

Personnel responsible for maintenance should have received appropriate training in the handling of compressors, particularly in connection with flammable, asphyxiating, or toxic gases.

Legal regulations must be observed at all times.

# 7 Replacing the spin-on separator

## 7.1 Before starting maintenance work on a compressor

- Please read this Installation and Maintenance Manual in full before you start installing the spin-on separator.
- This Installation and Maintenance Manual must be kept to hand throughout the installation.

Compressors present hazards during and, in some cases, after operation that can cause serious injury if not handled properly. These are in particular:

- Electric motors
  Hazard: Electric current
- Mechanical rotating parts
  Hazard: Clothing entangled in moving parts that keep moving even in the event of body contact.
- Stored energy in the form of compressed air or gases
  Hazard: Pressure surges with possibly hot gases, ejected parts
- Hot surfaces, such as the spin-on separator during or shortly after operation, the exterior of the pressure vessel, residual oil in the replaced spin-on separator
  Hazard: Skin burns on hot surfaces
- Hot, pressurized oil, partly reactive to skin (see safety data sheet)
  Hazard: Burns or chemical burns.
- Flammable, asphyxiating or toxic gases (also see the installation and operating manual, as well as the manufacturer's additional operating instructions for explosion protection)
  Hazard: Explosion, fire, asphyxiation, poisoning

Before starting maintenance work and throughout:

- Switch off and secure the compressor (lock; key with the person performing the maintenance)
- Depressurize the system (e.g. pressure vessel, observe the pressure gauge)
- Start work only after the system has cooled (safety-conscious working, measure if necessary).

## 7.2 Replacing the spin-on separator

1) Identify the spare part, check that it is complete

*Only install spin-on separators that are officially approved by MANN+HUMMEL for integration into the compressor. Installing an unapproved spin-on separator presents unforeseeable risks.*

2) Unscrew the spin-on separator (2) counterclockwise from the filter head (1).
3) Dispose of the spin-on separator in accordance with applicable regulations.
4) Clean the contact surface of the filter head and wipe up any dripped compressor oil.
5) Wet the seal of the spin-on separator (3) with compressor oil.
6) Screw the spin-on separator (2) clockwise onto the filter head (1).
7) Then tighten an additional ¼ to ½ turn.
8) Check that the spin-on separator is firmly seated.
9) Check the spin-on separator and the area surrounding it for contamination from leaked compressor oil.

*At all times avoid skin contact with compressor oil. Immediately bind any leaked oil.*

10) Start the compressor, increase pressure slowly.

*When starting the compressor, ensure that it is completely assembled. Clear the area—nobody should be in the immediate vicinity of the compressor. Surfaces also get hot during trial operation. Do not touch any moving parts during operation.*

11) Check the entire filter system and all lines for leaks.

## 7.3 Maintenance plan

*The spin-on separator is a consumable item and requires no maintenance. It must be replaced at the latest after the specified service life (chapter "Technical data").*

## 7.4 Troubleshooting

| Fault | Possible cause | Remedy |
|---|---|---|
| Oil leak / air leak | Box not fully assembled | Tighten the box ¼ turn |
| | Seal damaged | Replace seal |
| | Seal not oiled | Lubricate the seal and mount the box |
| Rattling noise | Box not fully assembled | Tighten the box ¼ turn |
| Oil leakage / visibly darker air flow | Malfunction of the box | Exchange the box for a new one<br>If you continue to have problems, please contact us |

## 7.5 Disposing of the spin-on separator

Dispose of the spin-on separator according to applicable regulations.

- Dispose of in accordance with the local regulations.
- Not for disposal with household waste.

# 8 Product

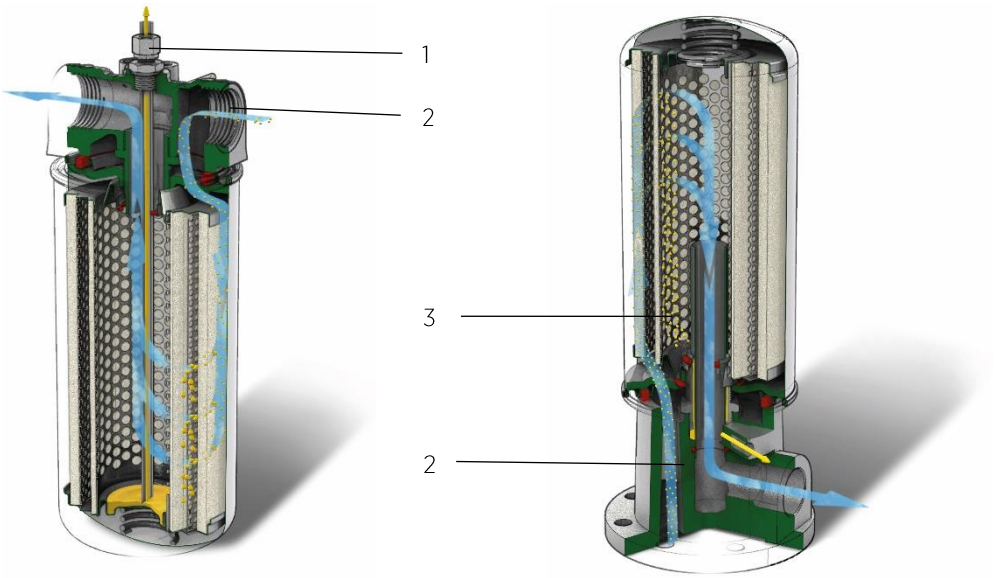
## 8.1 Installation and integration

The spin-on separator is vertically integrated into the compressor, either as a “standing” or “suspended” installation. The filter is attached to the compressor via a filter head (2). The separated oil is recovered via a scavenge line (1) in a suspended installation or via a screw-in nipple (3) in a standing installation. A sufficient return of the separated oil under all operating conditions is essential for the function. During the integration, a secure and vibration-free attachment must also be ensured. Strong heat sources in the immediate vicinity are to be avoided. The required space depends on the installation height and the assembly tools to be used.

The operating conditions are to be selected in such a way that an accumulation of separated water or the formation of condensed water is avoided as far as possible. In cases where this cannot be completely avoided, the "standing" configuration is to be preferred.

A wide range of MANN+HUMMEL products is available for filter heads (2) and screw-in nipples (3). Information is available in the MANN+HUMMEL product catalog for compressor filtration.

An inadequate attachment, insufficient return of the separated oil, corrosion due to water or condensation that has been brought in and overheating can lead to malfunction or complete failure of the separator. This can lead to high residual oil contents, leaks, impermissible differential pressures and, in rarer cases, fires.




Spin-on separator with filter head in a hanging installation

Spin-on separator in a standing installation

# 8.2 Technical data

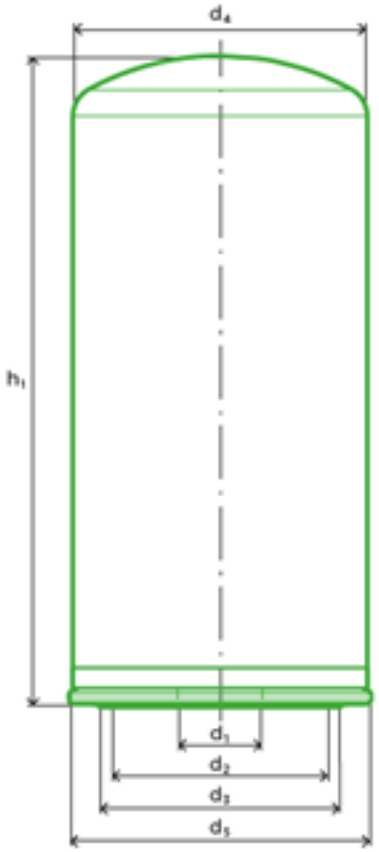
| | |
|---|---|
| Residual oil content[1)] | Max. 3 mg/m³ |
| Initial pressure drop[1)] | 0.3 bar |
| Max. working pressure | 20 bar (see product label!) |
| Operating temperatures[2)] | Continuous[3)]: -20°C to +100 °C<br>Short term[3)]: +120°C |
| Service life | Max. 2.500 h / 1 bar Δp (LB Box)<br>Max. 3.000 h / 1 bar Δp (StarBox)<br>Max. 3.000 h / 1 bar Δp (StarBox$^{XT}$) |

1) At nominal load and 7 bar overpressure. This value may be impaired by inadequate pre-separation, use of a lower ISO VG oil class, and high humidity.

2) Operating temperatures refer to the spin-on separator overall.

3) Temporary: Dwell time at the short-term temperature of no more than 10 min. Time between 2 short-term peaks at least 0.5 h.
We recommend a seal or filter replacement after approx. 300 peaks.

# 8.3 Dimensions and order numbers




| Product | Filter size | Nominal flow[1] [m3/min] [cfm] | Dimensions in mm (inches) | | | | | | Max. working overpressure | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | d1 [2] | d2 | d3 | d4 | d5 | h1 | [bar] | [psi] |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 719/2<br>LB 719/20<br>LB 719/50 | 1,1 [38,8] | M 22x1,5 | 62 (2,44) | 71 (2,80) | 76 (2,99) | 80 (3,15) | 127 (5,00) | 20 | 2,0 |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 962/2<br>LB 962/20<br>LB 962/50 | 2,2 [77,7] | M 24x1,5 | 62 (2,44) | 71 (2,80) | 93 (3,66) | 96 (3,78) | 212 (8,35) | 20 | 2,0 |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 1374/2<br>LB 1374/20<br>LB 1374/50 | 3,3 [116,5] | M 39x1,5 | 100 (3,94) | 111 (4,37) | 136 (5,35) | 140 (5,51) | 177 (6,97) | 20 | 2,0 |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 11 102/2<br>LB 11 102/20<br>LB 11 102/50 | 4,4 [155,3] | M 32x1,5 | 93 (3,66) | 104 (4,09) | 108 (4,25) | 110 (4,33) | 260 (10,24) | 14 | 1,4 |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 13 145/3<br>LB 13 145/20<br>LB 13 145/50 | 5,5 [194,23]<br>6,0 [211,8]<br>6,25 {220,6] | M 39x1,5 | 100 (3,94) | 111 (4,37) | 138 (5,43) | 140 (5,51) | 302 (11,89) | 20 | 2,0 |

1) Nominal flow according to DIN 1945 at 7 bar [0.7 MPa] operating pressure

2) The thread sizes shown correspond to the standard threads of the catalog filters. The thread used may differ.

# 9 Intended use

The intended use is the separation and recovery of compressor oil from a compressed gas flow when operated inside a screw compressor or a compressor of a similar design. The heat caused by compression is cooled and dissipated by oil fed into the compressor stage. After exiting the compressor stage, the oil-gas mixture is subjected to pre-separation or some other type of conditioning so that when it reaches the spin-on separator, the following operating conditions are achieved.

**Operating conditions**

| Limiting factor | Value | Unit | Comment |
|---|---|---|---|
| Oil content | < 5 | $g/m^3_{(n)}$ | $m^3_{(n)}$ = standard cubic meter |
| Oil distribution | | | Oil appears as a finely dispersed mist of droplets, not as a surge or vapor |
| Temperature (continuous) | 100 | °C | |
| Temperature (peak) | 120 | °C | Requirements at maximum temperature: Dwell time of no more than 10 min. Time between 2 short-term peaks at least 0.5 h. We recommend the replacement of a seal after approx. 300 peaks. |
| Oils | 46 | ISO VG | Aggressive oils can adversely affect the service life of seals and adhesives. MANN+HUMMEL tests materials with common compressor oils. |
| Maximum working pressure | 20 (14) | bar | Please observe the labelling on the filter |

*Spin-on separators are designed to use compressed ambient air. Gases that deviate from this can impair the separation performance. The use of oxidation-promoting, chemically aggressive gases or those that can react exothermically due to compression, movement or shearing (swelling pressure or temperature increase) is excluded.*

# 10 Non-intended use

- Use in potentially explosive operating environments (ATEX) and environments with strongly oxidizing gases (e.g. oxygen)
- Operations outside of the limit values and conditions specified under “Technical data”
- On the installation side, the limit values and conditions (technical data) must be ensured throughout operation.

*Deviations from the intended use require prior consent from MANN+HUMMEL.*

# 11 Foreseeable improper use

Any use other than that specified here is excluded.

# 12 Related documents

In addition to this Installation and Maintenance Manual, please observe and apply the following documents:

- If applicable, operating and maintenance instructions for the compressor
- Legal and official requirements for the operation of compressed air systems
- National laws governing the operation of the filter system and the disposal of used spin-on separators in the country of application
- Safety data sheet for the compressor oil used

# 13 Notes on the CE procedures

| Product | Filter size | CE labelling (applied directive) |
|---|---|---|
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 719/2<br>LB 719/20<br>LB 719/50 | No use |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 962/2<br>LB 962/20<br>LB 962/50 | No use |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 1374/2<br>LB 1374/20<br>LB 1374/50 | No use |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 11 102/2<br>LB 11 102/20<br>LB 11 102/50 | No use |
| LB Box<br>StarBox<br>StarBox$^{XT}$ | LB 13 145/3<br>LB 13 145/20<br>LB 13 145/50 | Yes (214/68/EU) |

# 13.1 Declaration of Conformity

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|---|---|---|---|---|---|
| | | Andres | 85 88 | | 26.07.2017 |

## EG-Konformitätserklärung

Attestation of EC Conformity

Hersteller:
Manufacturer

**MANN+HUMMEL GMBH, Geschäftsbereich Industriefiltration**

Hiermit erklären wir, dass die Spin-On-Separatoren der Baugröße LB 13 145/x folgenden einschlägigen Bestimmungen in der jeweils gültigen Fassung entsprechen:
We hereby certify that the air oil sep box in seize LB 13 145/x complies with the following relevant standards as amended:

Richtlinie 2014/68/EU „Europäischen Druckgeräterichtlinie DGRL"
Directive 2014/68/EU "European Directive on Pressure Vessels"

Kategorie: II — Konformitätsbewertungsverfahren: **Modul A2**
Category: — evaluation method of conformity:

Überprüfung durch (check by) TÜV Süd Industrieservice GmbH, 68 167 Mannheim, Dudenstraße 28, Certificate No.: P-IS-AN1-MAN-17-04-2751880-10101724

Angewandte harmonisierte Normen: AD-2000
Applied harmonized standards: AD-2000

Bei einer nicht mit der MANN+HUMMEL GMBH - Geschäftsbereich Industriefiltration - abgestimmten Änderung der Druckbehälter verliert diese Erklärung ihre Gültigkeit.
In case of any modification on the pressure vessel effected without consulting
MANN+HUMMEL GmbH – Business Unit Industrial ‚Filtration
the present attestation shall cease to be effective.

**MANN+HUMMEL GMBH**
**Geschäftsbereich Industriefiltratio**
**(Form SPE-QU-F-0006/Rev.2, 06/2017)**

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(Inspection Representative, Plant Speyer)

i. A. Stefan Kuntz
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