

SF₆ Gas Handling

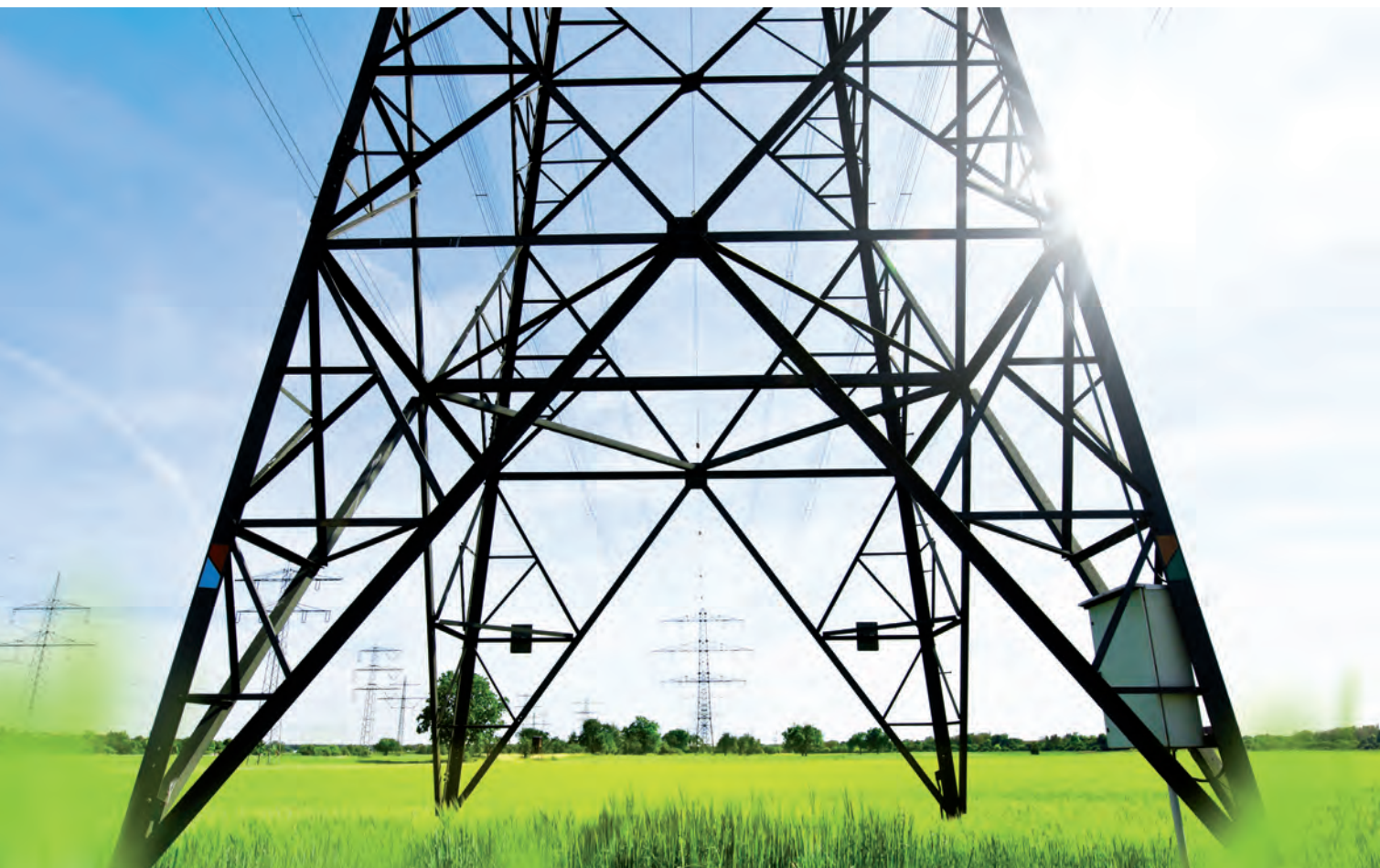


DILO. Sustainably tight.

Table of contents

■ SF ₆ information / General	04 – 08
■ SF ₆ gas refilling and evacuating devices	09 – 26
■ SF ₆ gas service carts	27 – 84
■ Micro Series	31 – 34
■ Mini Series	35 – 44
■ Piccolo Serie	45 – 48
■ Compact Series	49 – 58
■ Economy Serie	59 – 66
■ Mega Series	67 – 84
■ SF ₆ gas storage tanks	85 – 90
■ SF ₆ Accessories	91 – 118
■ Devices for SF ₆ gas monitoring	119 – 128
■ SF ₆ Measuring devices	129 – 157
■ Devices for determination of the SF ₆ gas quality	131 – 144
■ Gas leak detectors	145 – 149
■ Room monitoring devices	150 – 153
■ Accessories	154 – 157
■ SF ₆ Valves and Couplings	158 – 160
■ SF ₆ Leak testing units	161 – 164
■ GIS production plants	165 – 168
■ Special plants	169 – 174
■ Training and certification	175 – 178
■ Services	179 – 185
■ Rental equipment	179
■ Aftersales services	180 – 185

General information



Everything from a single source

Our product range includes everything required for a professional and intelligent gas handling: from simple refilling devices to measuring devices and service carts to special fabrication plants.

In addition to product solutions complying with the latest state-of-the-art, we also offer comprehensive services. Thus fulfilling all customer's requirements in every respect.

DILO. We rely on quality and service.

■ SF₆ information / General

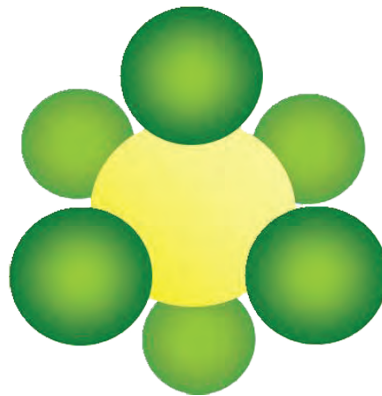
- | | |
|--|---------|
| ■ SF ₆ gas | 05 |
| ■ SF ₆ recovery and re-use | 06 |
| ■ International regulations and guidelines | 07 – 08 |

SF₆ Gas

SF₆ – A gas with unusual properties

SF₆ gas is a synthetically produced insulating and arc quenching gas with excellent **properties**.

- Colourless and odourless
- 5 times heavier than air
- Temperature-resistant up to 500 °C
- Chemically stable
- Non-toxic
- Non-inflammable
- Excellent dielectric properties



SF₆ gas molecule:

SF₆ consists of fluorine and sulphur. Six fluorinated atoms and one sulphur atom.

SF₆ gas in energy distribution

Thanks to its dielectric strength and excellent insulating properties SF₆ has been used as an insulating gas for medium and high voltage components for many years. Its excellent arc quenching properties (100 times faster than air) make it suitable as a proven medium in encapsulated medium and high voltage switchgear for decades.

The use of SF₆ gas allows more compact and material saving switchgear design combined with higher switching capacity and plant security.

Use in other sectors of industry

Moreover, SF₆ gas is also used in other industries such as semi-conductor industry, in display and micro-technology where it mainly serves as etching gas for the production of ultra-fine structures, the so-called "wafers".

In medical technology sulphur hexafluoride is for example used for ultrasonic testing and in ophthalmology. SF₆ is also used in X-ray equipment, radar systems and particle accelerators.

SF₆ recovery and re-use

Although SF₆ is an excellent insulating and quenching medium it is very important to know that:

- SF₆ is a fluorinated gas (F gas) with high global warming potential.
- It is one of the six gases subject to monitoring under the Kyoto protocol.
- 1 kg SF₆ corresponds to a global warming potential more than 22,200 times higher than that of CO₂.
- SF₆ has a life time in the atmosphere of about 3,200 years.

Therefore SF₆ has to be used in closed systems in order to avoid emissions. This is exactly where our core competence - as the world wide leading manufacturer of emission-free gas handling products for medium and high voltage switchgear - lies.

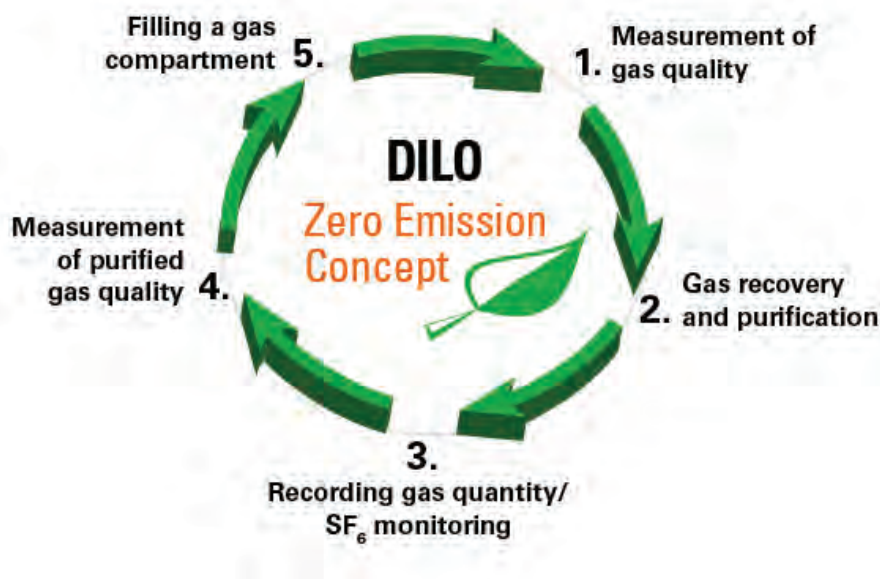
Our customers include renowned companies in the field of energy production and distribution.

Zero emissions and maximum gas re-use is our goal

Our philosophy is based on "Zero emission" and "Maximum gas reuse". Thus we pursue three central claims:

- Environmental protection
- Low running costs
- Compliance with legal regulations

Therefore we have created our "Zero Emission Concept" which defines a technological closed cycle to cover all gas handling processes with high reliability and without any emissions.



For this purpose, high-tech devices and equipment with the best efficiency are available.

In addition to innovative product solutions, we also offer comprehensive and product combined services, generating considerable added value for our customers. This is the reason why switchgear manufacturers and utility companies all over the world have been confident in DILO as a brand for decades.

International regulations and guidelines

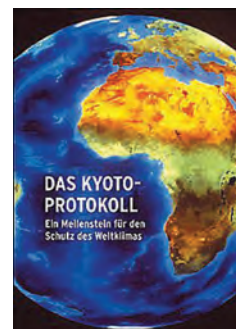
Nowadays, sustainable development and reduction of environmental influences are major topics in the energy industry. Manufacturers of high voltage plants as well as the end users equally admit their responsibility for the whole life time cycle of a plant - from construction until shutdown.

Summary on the most important guidelines:

■ Kyoto protocol

SF₆ gas is listed in the Kyoto protocol as one the six greenhouse gases subject to monitoring. SF₆ has to be used in closed systems in order to avoid emissions.

194 member states agreed to extend the Kyoto protocol until 2020 with the aim of reducing the emission of greenhouse gases.



■ IEC 62271-4 directive

This directive stipulates reclaiming the SF₆ gas down to a final vacuum of < 20 mbar. **The IEC requirements are exceeded by far when using DILO devices as DILO service carts enable a final vacuum of < 1 mbar depending on the type of device.**

■ IEC 60480 guideline

This guideline stipulates the limit values for the re-use of SF₆ gas in medium and high voltage switchgear.



Limit values in accordance with the IEC 60480 guideline

Medium voltage: **-23 °C** dew point at atmospheric pressure

Contamination	Specification
Air and / or CF ₄	3 Vol.-%
H ₂ O	95 mg / kg (ppm _w)
Mineral oil	10 mg / kg (ppm _w)
Total amount of reactive, gaseous decomposition products	50 µl / l (ppm _v) total or 12 µl / l (ppm _v) for (SO ₂ + SOF ₂) or 25 µl / l (ppm _v) HF

High voltage: **-36 °C** dew point at atmospheric pressure

Contamination	Specification
Air and / or CF ₄	3 Vol.-%
H ₂ O	25 mg / kg (ppm _w)
Mineral oil	10 mg / kg (ppm _w)
Total amount of reactive, gaseous decomposition products	50 µl / l (ppm _v) total or 12 µl / l (ppm _v) for (SO ₂ + SOF ₂) or 25 µl / l (ppm _v) HF

International regulations and guidelines

■ European guidelines and directives

The European Union issued further directives that aim to reduce or avoid emissions of fluorinated greenhouse gases, SF₆ gas included.



■ New F-gas regulation (EU) 517/2014

The F-gas regulation (EU) 517/2014, repealing regulation no. 842/2006, will enter into force as of January 1, 2015 and is valid for the following fluorinated greenhouse gases:

- Partly fluorinated hydrocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF₆)

The aim of this regulation is the reduction of fluorinated greenhouse gases. In accordance with this regulation only certified personnel is allowed to recover SF₆ gas in the 28 EU member states. This regulation lays down the required training and certification of personnel as well as the reporting obligations.

■ Certification in accordance with the (EU) 517/2014 F-gas regulation and (EU) 305/2008 regulation

Article 10 of the new regulation (EU) no. 517/2014 refers to existing requirements and states that existing certificates and training attestations issued in accordance with regulation no. 842/2006 shall remain valid, according to the conditions under which they were originally issued. The minimum requirements for the certification of personnel are laid down in regulation (EU) 305/2008.

Personnel carrying out gas handling works (such as filling, measuring and reclaiming of SF₆) shall still be certified.

DILO is an accredited certification company and is authorized to carry out training for the acquisition of the permission to carry out the recovery of SF₆ gas in accordance with this regulation. For more detailed information on our two day training courses at our premises we would be very pleased to provide you with our training leaflet.

■ Reporting in accordance with F-gas regulation (EU) 517/2014 and regulation (EU) 1493/2007

Article 19 of the new regulation (EU) no. 517/2014 stipulates that the manufacturers of SF₆ gas insulated switchgear shall report on the use of SF₆ gas to the European Commission by 31 March 2015 and every year thereafter. Placing 500 tons of CO₂ equivalents (approx. 22 kg SF₆) or more contained with their products on the market per year the manufacturer shall report to the European Commission the quantity of SF₆ contained in each product category.

In addition, a voluntary self-commitment for SF₆ in the energy technology sector is in force since 1998 signed by leading companies and associations in the energy sector, updated in 2005. Data processing and reporting commitment are regulated within it.

SF₆ gas refilling and evacuating devices



For evacuation of air and filling of gas compartments with SF₆ gas DILO offers a wide range of gas refilling devices, evacuating devices and mobile vacuum pumps to simplify practical handling.

■ SF₆ gas refilling and evacuating devices

■ 3-393-R001 SF ₆ gas refilling device	
3-393-R002 SF ₆ gas refilling device	10 – 11
■ 3-001-R001 SF ₆ gas refilling device	
3-001-R002 SF ₆ gas refilling device	12 – 13
■ 3-001-R021 SF ₆ gas refilling device	
3-001-R022 SF ₆ gas refilling device	14 – 15
■ 3-001-4-R002 Evacuating and refilling device	
3-001-4-R022 Evacuating and refilling device	16 – 17
■ B048R03 Portable vacuum pump unit	18 – 19
■ B046R03 Mobile vacuum pump unit	20 – 21
■ B046R20 Mobile vacuum pump unit	22 – 23
■ Z300R11 Mobile vacuum pump unit	
Z300R12 Mobile vacuum pump unit	24 – 25

3-393-R001 / R002

SF₆ gas refilling device

For reliable refilling of SF₆ gas by overpressure

3-393-R001

SF₆ gas refilling device

Portable with rubber hose and couplings DN8 and DN20

3-393-R002

SF₆ gas refilling device

Portable **in a case** with rubber hose and couplings DN8 and DN20

The handy devices allow filling of electrical equipment with SF₆ gas directly from the bottle by overpressure. The primary gauge of the pressure reducer displays the bottle pressure in bar, the secondary gauge indicates the desired filling pressure to be set easily by means of the handle. The bottle pressure can be reduced to the desired filling pressure by the integrated pressure reducer.



- Self-closing couplings for emission-free gas handling
- Available as accessories for the world's most commonly used bottle connections

3-393-R001 / 3-393-R002

SF₆ gas refilling device

Technical data:

Case dimensions: L 475 mm, W 380 mm, H 125 mm
Weight: 7.5 kg

Standard equipment for both versions:

Pressure reducer for SF ₆ gas with W 21.8 x 1/14" thread
5 m long hose DN8
DILO coupling tongue parts DN8 and DN20
Gauge indication in bar
2 operating manuals in 3 languages (German / English / French)

Optional accessories at an extra charge:

SF ₆ bottle connection with 0.96" Whitworth left-handed thread	3-245-R001 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R002 P
SF ₆ bottle connection with G 5/8 thread	3-643-R001 P
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-393-R001	3-948-R006
Packing for 3-393-R002	3-775-R013-C

Note:

Other versions are available on request.

3-001-R001 / R002

SF₆ gas refilling device

For reliable refilling of SF₆ gas by overpressure

3-001-R001

SF₆ gas refilling device

Mobile as cylinder cart with **wire-braided hoses**

3-001-R002

SF₆ gas refilling device

Mobile as cylinder cart with **rubber hoses**

Refilling device as cylinder cart for comfortable on board carrying of a gas bottle. The primary gauge of the pressure reducer displays the bottle pressure in bar, the secondary gauge indicates the desired filling pressure to be set easily by means of the handle. The bottle pressure can be reduced to the desired filling pressure by the integrated pressure reducer.



- Stable frame
- Available as accessories for the world's most commonly used bottle connections
- Hose reel
- Self-closing couplings prevent emissions
- Change of couplings feasible without gas loss

3-001-R001 / 3-001-R002

SF₆ gas refilling device

Technical data:

Dimensions: L 480 mm, W 540 mm, H 1,360 mm
Weight: 24 kg

Standard equipment for both versions:

SF ₆ bottle connection W 21.8 x 1/14"
Ball valve with hand wheel
6 m long hose DN8
Pressure reducer for SF ₆ (0 up to 10 bar)
DILO coupling tongue parts DN8 and DN20
Paint: orange (RAL 2004)
2 operating manuals in 3 languages (German / English / French)

Optional equipment (mounted) at an extra charge:

Special pressure indication kPa	6-0005-R163
---------------------------------	-------------

Optional accessories at an extra charge:

SF ₆ bottle connection with 0.96" Whitworth left-handed thread	3-334-R001 P
SF ₆ bottle connection with G 5/8 thread	3-315-R001 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R003 P
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-001-R001 / 3-001-R002	3-262-R001-C
-------------------------------------	--------------

3-001-R021 / R022

SF₆ gas refilling device

For refilling switchgear with SF₆ gas by overpressure

3-001-R021

SF₆ gas refilling device with electronic weighing scales 0 - 150 kg

Mobile as cylinder cart with **wire-braided hoses**

3-001-R022

SF₆ gas refilling device with electronic weighing scales 0 - 150 kg

Mobile as cylinder cart with **rubber hoses**

Refilling device as cylinder cart for comfortable on board carrying of a gas bottle. The primary gauge of the pressure reducer displays the bottle pressure in bar. The secondary gauge indicates the desired filling pressure to be set easily by means of the handle. The bottle pressure can be reduced to the desired filling pressure by the integrated pressure reducer.

Emissions during the refilling process are avoided by self-closing couplings. The weight of the gas to be refilled can be registered easily by means of integrated weighing scales. The weight is indicated on a display which is switched off automatically if the scales are unused for a longer time. The previous weight indication is reset after switching on by pressing the key.



- Stable frame
- Accuracy of the weighing scales ± 50 g, 0.05 kg increments
- No emissions by self-closing couplings
- Available as accessories for the world's most commonly used bottle connections
- Hose reel
- Couplings can be exchanged without any gas loss

3-001-R021 / 3-001-R022

SF₆ gas refilling device with electronic weighing scales 0 - 150 kg

Technical data:

Dimensions: L 720 mm, W 570 mm, H 1,510 mm
Weight: 48 kg

Standard equipment for both versions:

Weighing scales 0 - 150 kg
SF ₆ bottle connection W 21.8 x 1/14"
Ball valve with hand wheel
6 m long hose DN8
Pressure reducer for SF ₆ (0 up to 10 bar)
DILO coupling tongue parts DN8 and DN20
Paint: orange (RAL 2004)
2 operating manuals in 3 languages (German / English / French)

Optional equipment (mounted) at an extra charge:

Special pressure indication kPa	6-0005-R163
---------------------------------	-------------

Optional accessories at an extra charge:

SF ₆ bottle connection with 0.96" Whitworth left-handed thread	3-334-R001 P
SF ₆ bottle connection with G 5/8 thread	3-315-R001 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R003 P
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-001-R021 / 3-001-R022	3-262-R006-C
-------------------------------------	--------------

3-001-4-R002 / R022

Evacuating and refilling device

For evacuation of air and refilling of gas compartments from SF₆ gas bottles

3-001-4-R002

Evacuating and refilling device

Mobile as cylinder cart

3-001-4-R022

Evacuating and refilling device with electronic weighing scales 0 - 150 kg

Mobile as cylinder cart

In practice the device covers two important functions. The integrated vacuum pump is the core component of the device. This vacuum pump evacuates the air down to < 1 mbar so that no air/gas mixture is produced during the subsequent filling process. The well proven DILO coupling principle ensures safe handling without emission.

Using the 3-001-4-R022 version, the filling weight can be registered comfortably by means of a weighing scale.



- Stable frame
- Accuracy of the weighing scales ±50 g, 0.05 kg increments
- No emissions by self-closing couplings
- Available as accessories for the world's most commonly used bottle connections
- Hose reel
- Couplings can be exchanged without any gas loss

3-001-4-R002 / 3-001-4-R022

Evacuating and refilling device

Technical data 3-001-4-R002:

Dimensions: L 540 mm, W 570 mm, H 1,360 mm
Weight: 55 kg
Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current

Technical data 3-001-4-R022:

Dimensions: L 720 mm, W 570 mm, H 1,510 mm
Weight: 82 kg
Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current

Standard equipment for both versions:

16 m ³ /h vacuum pump for air, final vacuum < 1 mbar
Ball valve with hand wheel
Gauge 0 to -1,200 mbar
Two 6 m long wire-braided hoses DN8
DILLO coupling tongue parts DN8 and DN20
SF ₆ bottle connection W 21.8 x 1/14"
Pressure reducer for SF ₆ (0 up to 10 bar)
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage 100 V / 50 - 60 Hz or 110 - 120 V / 60 Hz	6-0005-R030
Additional price for electrical special voltage 127 V / 50 Hz or 200 V / 50 - 60 Hz	6-0005-R138
Special pressure indication kPa	6-0005-R163

Optional accessories at an extra charge:

SF ₆ bottle connection with 0.96" Whitworth left-handed thread	3-334-R001 P
SF ₆ bottle connection with G 5/8 thread	3-315-R001 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R003 P
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kit for both versions:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R111
---	-------------

Packing:

Packing for 3-001-4-R002	3-262-R001-C
Packing for 3-001-4-R022	3-262-R006-C

B048R03 / R13

Portable vacuum pump unit

For evacuation of air or nitrogen

B048R03

Portable vacuum pump unit

B048R13

Vacuum pump unit with solenoid valve instead of ball valve

This version is equipped with a solenoid valve instead of a ball valve. Therefore, operating errors are avoided since the valve is closed automatically in case of function end or interruption of circuit.

Whenever a separate vacuum pump unit is required: The portable version is a very handy solution. The vacuum pump unit has been specially designed for the evacuation of air or nitrogen. The vacuum pump is the core component with a capacity of 16 m³/h and a final vacuum of < 1 mbar. Thus it is guaranteed that SF₆ gas is not contaminated with air and the good insulation properties of SF₆ are retained.



- Use of self-closing couplings DN20
- Adapters for other nominal widths are available
- Gas refilling device available as accessories
- Different voltage range available as option
- Hose reel
- Digital vacuum indication 0 - 100 mbar

B048R03 / B048R13

Portable vacuum pump unit

Technical data:

Dimensions: L 500 mm, W 400 mm, H 605 mm
Weight: 36 kg
Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current

Standard equipment:

16 m ³ /h vacuum pump, final vacuum < 1 mbar
Vacuum indication in mbar
Ball valve DN20
5 m long hose DN20
DILO coupling tongue part DN20
Electric control
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage 100 V / 50 - 60 Hz or 110 - 127 V / 60 Hz	6-0005-R030
Additional price for electrical special voltage 127 V / 50 Hz or 200 V / 50 - 60 Hz	6-0005-R138

Optional accessories at an extra charge:

SF ₆ gas refilling device	3-393-R001
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kit:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R111
---	-------------

Packing:

Packing for B048R03 / B048R13	3-748-R002-C
-------------------------------	--------------

B046R03 / R13

Mobile vacuum pump unit

For evacuation of air or nitrogen

B046R03

Mobile vacuum pump unit

B046R13

Mobile vacuum pump unit with solenoid valve instead of ball valve

This version is equipped with a solenoid valve instead of a ball valve. Therefore, operating errors are avoided since the valve is closed automatically in case of function end or interruption of circuit.

The mobile vacuum pump unit is convincing by its easy handling. The unit serves for evacuation of air or nitrogen from switchgear. The 40 m³/h vacuum pump enables a final vacuum of < 1 mbar. Thus it is guaranteed that no air / gas mixture is generated and the good insulation properties of SF₆ are retained.



- Steerable and fixing rollers allow comfortable transportation
- Use of self-closing couplings DN20
- Different performances are available (see options)
- Adapters for other nominal widths are available
- Protection of the vacuum pump against overpressure by a solenoid valve
- Digital vacuum indication in mbar

B046R03 / B046R13

Mobile vacuum pump unit

Technical data:

Dimensions: L 910 mm, W 535 mm, H 1,075 mm
Weight: 115 kg
Operating voltage: 208 - 240 V / 380 - 460 V / 50 - 60 Hz alternating current

Standard equipment:

40 m ³ /h vacuum pump for air, final vacuum < 1 mbar
Vacuum indication in mbar
Ball valve DN20
5 m long hose DN20
DILLO coupling tongue part DN20
Electric control
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional equipment (mounted) at an extra charge:

63 m ³ /h vacuum pump, final vacuum < 1mbar	6-0005-R050
100 m ³ /h vacuum pump, final vacuum < 1mbar	6-0005-R051
40 m ³ /h two-stage vacuum pump, final vacuum < 2 x 10 ⁻³ mbar	6-0005-R028
65 m ³ /h two-stage vacuum pump, final vacuum < 2 x 10 ⁻³ mbar	6-0005-R101
Additional price for electrical special voltage	6-0005-R039

Optional accessories at an extra charge:

SF ₆ gas refilling device	3-393-R001
Frame with crane eyelets and plastic cover	B089R04
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kits:

Maintenance package for standard vacuum pump (40 m ³)	6-1048-R112
Maintenance package for 6-0005-R050 / R051 vacuum pump (63 / 100 m ³)	6-1048-R113
Maintenance package for two-stage 6-0005-R028 / R101 vacuum pump (40 / 65 m ³)	6-1048-R114

Packing:

Packing for B046R03 / B046R13	3-748-R001-C
-------------------------------	--------------

B046R20

Mobile vacuum pump unit

For evacuation of air or nitrogen

This vacuum pump unit is "powerful" - its nominal suction capacity is 200 m³/h at 50 Hz for quick and reliable evacuation of air to a final vacuum of 1 mbar. This unit is particularly suitable for the evacuation of large gas compartments.

Two coupling connections (DN20 and DN40) allow the evacuation of two gas compartments at the same time without any manifold that means more efficiency and higher productivity during operation.



- Steerable and fixing rollers allow comfortable transportation
- Use of self-closing couplings DN20 and DN40
- Protection of the vacuum pump against overpressure by a solenoid valve
- Different hose lengths are available as option
- Digital vacuum indication in mbar
- Tool box for hoses and accessories

B046R20

Mobile vacuum pump unit

Technical data:

Dimensions: L 1,310 mm, W 780 mm, H 1,140 mm
Weight: 332 kg
Operating voltage: 208 - 240 V / 380 - 460 V / 50 - 60 Hz 3-phase current

Standard equipment:

Vacuum pump for air, nominal suction capacity 200 m³/h (at 50 Hz), 240 m³/h (at 60 Hz), final vacuum < 1 mbar
Vacuum indication in mbar
Solenoid valve
DILO couplings DN20 and DN40
Electric control
Fixing and steerable rollers
Tool box
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage	6-0005-R039
---	-------------

Optional accessories at an extra charge:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire-braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R050
10 m long wire-braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R100
5 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
10 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R100
Frame with crane eyelets and plastic cover	B089R19
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kit:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R121
---	-------------

Packing:

Packing for B046R20	3-748-R017-C
---------------------	--------------

Z300R11 / R12

Mobile vacuum pump unit

For evacuation of air or nitrogen

Z300R11

Mobile vacuum pump unit

Nominal suction capacity **165 m³/h** vacuum pump

Nominal suction capacity **250 m³/h** Roots pump

Z300R12

Mobile vacuum pump unit

Nominal suction capacity **205 m³/h** vacuum pump

Nominal suction capacity **495 m³/h** Roots pump

This series is very powerful and allows quick evacuation of large gas compartments. A vacuum pump combined with a Roots pump enables to obtain a final vacuum of 2×10^{-2} mbar. Thus not only air but also moisture is removed from the circuit breakers. Therefore the subsequent filling process is prepared perfectly.

Three coupling connections (DN20 and 2 x DN40) allow the evacuation of two gas compartments at the same time without any manifold that means more efficiency and higher productivity during operation.



- Steerable and fixing rollers allow comfortable transportation
- Tool box for hoses and accessories
- Self-closing couplings
- Protection of the vacuum pump against overpressure by a solenoid valve
- Different hose lengths are available as option
- Digital vacuum indication in mbar

Z300R11 / Z300R12

Mobile vacuum pump unit

Technical data:

Dimensions: L 1,250 mm, W 800 mm, H 1,500 mm
Weight: 450 kg
Operating voltage: 208 - 240 V / 380 - 460 V / 50 - 60 Hz 3-phase current

Standard equipment:

Roots pump, mounted on a vacuum pump, final vacuum 2×10^{-2} mbar
Solenoid valve DN50
DILO couplings DN20 and 2 x DN40
Digital vacuum indication in mbar
Electric control
Fixing and steerable rollers
Crane eyelets
Tool box for hoses
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage	6-0005-R039
---	-------------

Optional accessories at an extra charge:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire-braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R050
10 m long wire-braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R100
5 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
10 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R100
Tarpaulin	K029R55
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kit:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R131
---	-------------

Packing:

Packing for Z300R11 / Z300R12	3-1001-R015-C
-------------------------------	---------------

Note:

Vacuum pump units with larger capacities are available on request.

SF₆ gas service carts



■ SF₆ gas service carts

■ Micro Series	31 – 34
■ Mini Series	35 – 44
■ Piccolo Series	45 – 48
■ Compact Series	49 – 58
■ Economy Series	59 – 66
■ Mega Series	67 – 84

SF₆ gas service carts

Nowadays, most emissions are generated by inadequate SF₆ gas handling. But that can be avoided, since DILO offers emission-free and safe solutions for each individual process step.

All maintenance devices are equipped with **oil-free compressors** to avoid the SF₆ gas from being contaminated by oil residues.

We continually combine the leading technology of our service carts developed with many years of experience with the latest customer or market requirements. No matter whether maintenance works are carried out on medium voltage switchgear, high voltage switchgear or on gas-insulated lines our service carts allow very easy, safe and economic maintenance.

DILO's product range is divided into different series with various performance parameters which are designed to meet the varying requirements in SF₆ gas handling.

Selection of service carts

Our specialists would be pleased to assist you with the selection of the right equipment for your application. No matter whether you are interested in small devices or large equipment DILO products will always give you the best technology, emission-free SF₆ gas handling and utmost economic efficiency.

The following list provides a first overview of our devices indicating the most important selection criteria for initial orientation. For the final selection of devices more detailed information is required.

		Example of calculation (Filling pressure p _g 5 bar)				
Model	Volumes recommended	Example of device	Volume	Hose	Final vacuum	Recovery time
Mini modular	< 300 l	B095R12 / B093R30	300 l	DN8, 5 m	< 5 mbar	164 min.
Mini	< 300 l	B143R11	300 l	DN8, 5 m	< 5 mbar	156 min
Piccolo	200 - 800 l	L030R01	600 l	DN20, 5 m	< 5 mbar	132 min
Compact	800 - 1.000 l	B057R03	1.000 l	DN20, 5 m	< 5 mbar	185 min
Compact	800 - 1.000 l	B058R03	1.000 l	DN20, 5 m	< 5 mbar	188 min
Compact	800 - 1.000 l	B057R17	1.000 l	DN20, 5 m	< 1 mbar	117 min
Economy	800 - 1.200 l	L057R01	1.000 l	DN20, 5 m	< 1 mbar	117 min
Mega L170	1.000 - 2.000 l	L170R01	2.000 l	DN20, 5 m	< 1 mbar	118 min
Mega L170	1.000 - 2.000 l	L170R01	2.000 l	DN40, 5 m	< 1 mbar	93 min
Mega L280/L550	> 2.000 l	L280R01	3.000 l	DN20, 5 m	< 1 mbar	145 min
Mega L280/L550	> 2.000 l	L280R01	3.000 l	DN40, 5 m	< 1 mbar	109 min

The above mentioned examples of calculation refer to a gas compartment filled with p_g 5 bar. Regarding the Mega service carts with DN40 hose, the end of the hose is reduced to DN20.

Online-based service cart selection tool

With the online-based selection tool for SF₆ service carts you are now given an excellent possibility for pre-selection to back-up your purchase decision. After entering the maximum SF₆ gas quantity to be recovered and optionally the final recovery vacuum, all suitable devices are promptly displayed. Entry of further details and selection parameters for more precise searches is possible.



Online service cart selection

DILO service carts with TÜV SÜD certified performance data!

Previously, in the buying process, the nominal output of pumps and compressors was frequently compared to obtain a scale based on technical data. But that is a poor comparison, since a whole SF₆ service cart is greater than the sum of its parts. The efficient functional interaction of all components over a real time period required for the recovery of SF₆ gas, for evacuation of air and refilling of the gas compartment under defined conditions is the critical criterion.

DILO identified this lack from the customer's point of view. **This is why DILO, in addition to equipment safety, had the performance data of its SF₆ service carts approved by TÜV SÜD.** Under the supervision of an expert from TÜV SÜD, the following five SF₆ service carts (representing the entire product range) were tested:

- B143R11** – Mini Series
- L030R01** – Piccolo Series
- B057R03** – Kompakt Series
- L057R01** – Economy Series
- L170R01** – Mega Series



To guarantee for a sound and exhaustive comparison, the devices were subjected to the following testing conditions:

- Cold state of the device
- Ambient temperature, approx. 20 °C
- Connection from service cart to vessel: 5 m long wire-braided hose
- Voltage: 380 V/50 Hz (B143R11 type: 220 V/50 Hz)
- Liquid gas storage

The characteristic values stated below were determined through the test:

- **Actual recovery time for SF₆ gas**
- **Lead time required for evacuation of air**
- **Time required for filling the gas compartment with SF₆**

Thanks to our performance data confirmed by TÜV SÜD, you can benefit from objective, measurable parameters for the first time when purchasing a SF₆ service cart.



Download leaflet

SF₆ gas service carts

The most important functions

DILO service carts allow easy and efficient SF₆ gas handling on SF₆ filled switchgear and equipment with the following functions:

■ Recovery of SF₆ gas

The gas is recovered from the gas compartment of the switchgear down to the desired final vacuum (mostly 1 mbar).

■ Purification and drying

When recovering and filling gas compartments the gas is automatically led in the service cart through dry and particles filters which retain decomposition products, moisture and solid particles effectively. For the reuse of SF₆ gas the limit values in accordance with IEC 60480 are to be observed.

■ Gas storage

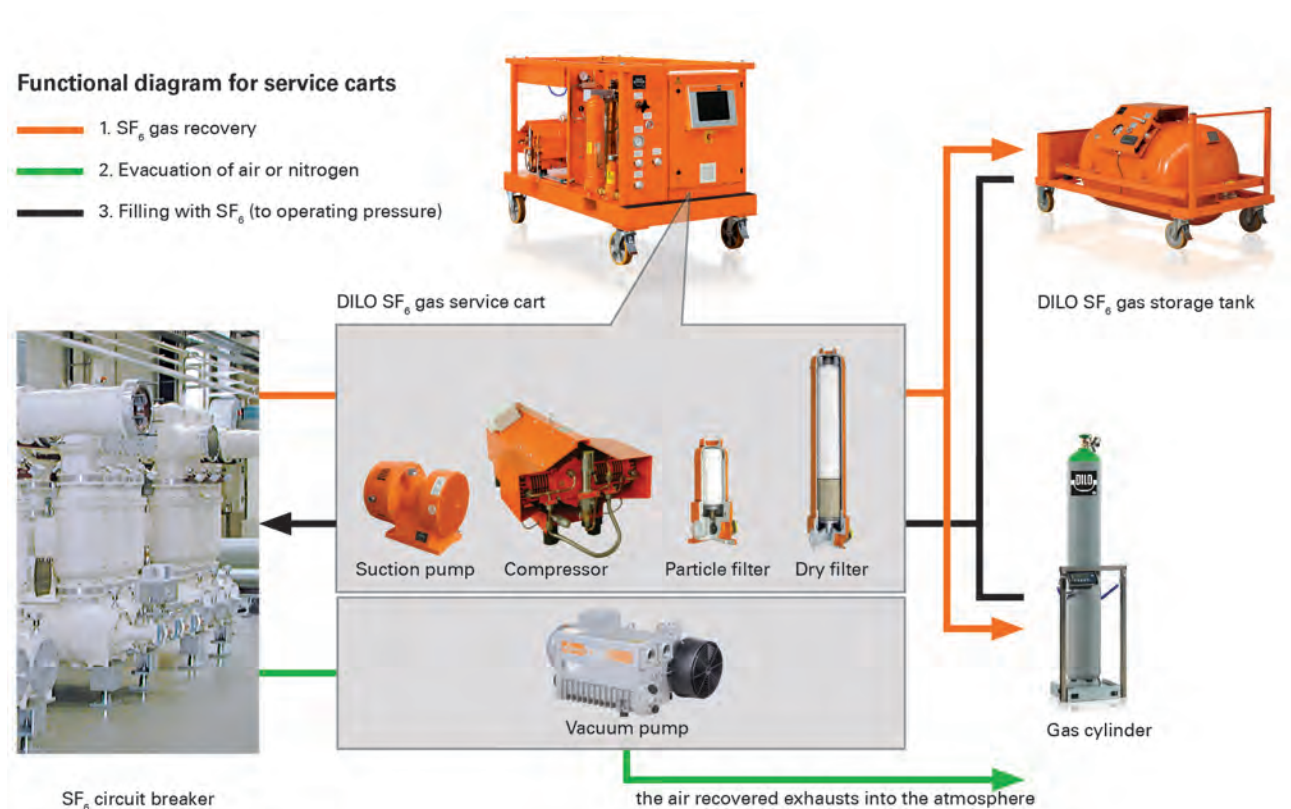
When recovering SF₆ from the circuit breaker the gas is stored in gaseous or liquid form by means of a compressor which compresses the gas.

■ Evacuation of air or nitrogen

Before filling with SF₆ gas the gas compartments must be evacuated in order to avoid mixing with air. Therefore it is evacuated to < 1 mbar with an integrated vacuum pump.

■ Filling the gas compartments with SF₆

The purified gas is returned into the gas compartment with overpressure or by means of a compressor to the desired operating pressure. The SF₆ stored in liquid form is converted into gaseous form via the evaporator installed in the maintenance device.



Micro Series



■ Micro series

■ B160R92 Small service unit

32 - 33

B160R92

Micro Series

For the handling of very small gas quantities

B160R92

Small service unit

This unit of the Micro series has been constructed in such a way that all functions can be carried out fully automated:

- Recovery and storage of SF₆ in an internal or external storage vessel with automatic switch-off when reaching the adjustable final vacuum.
- Automatic purification of the SF₆ gas during the recovery and filling process.
- Filling via pressure reducer by overflowing or by means of the compressor (automatic switchover) from an internal or external storage vessel with automatic switch-off when reaching the adjustable filling pressure.
- Evacuation of air with automatic switch-off when reaching the adjustable final vacuum.

The device has been specially designed for very small gas quantities and is ideally suited for applications, such as SF₆ gas handling on medical devices or electron microscopes.



- Device for gaseous storage of SF₆ gas
- Final vacuum 3 mbar
- Internal storage tank (capacity: 2 l)
- Menu navigation via the 5.7" coloured touch screen
- Installed in a transport case (trolley)

B160R92

Small service unit

Technical data:

Dimensions: L 625 mm, W 500 mm, H 297 mm	
Weight: 30 kg	
Operating voltage: 220 - 240 V / 50 Hz alternating current	
Additional price for electrical special voltage	on request

Standard equipment:

B100R20 oilfree compressor (0.9 m³/h, final pressure p_e 9 bar)
Small diaphragm compressor (1.2 m³/h, final vacuum 3 mbar)
Menu navigation via 5.7" coloured touch screen
Internal 2 l storage tank, max. p_e 9 bar (18 NI or 0.1 kg SF ₆)
Particle filter
Filling pressure reducer
Self-closing input and output miniature coupling
DILO coupling DN8 with hose connection
2 m long connecting hose with self-closing miniature coupling
Transport case (trolley)
2 operating manuals in German, English or French

Optional accessories at an extra charge:

2 m long storage connecting hose with self-closing miniature couplings	6-1116-R020
DILO coupling DN20 with hose connection	6-1161-R012
SF ₆ bottle connection with W 21.8 x 1/14" thread	6-1161-R007
American SF ₆ bottle connection with 0.96" Whitworth left thread	6-1161-R008
English SF ₆ bottle connection with G 5/8 thread	6-1161-R009
1" DIN 477 no. 8 bottle connection for reuse gas bottles	6-1161-R010
Storage bottle (volume: 2 l)	K079R05
Storage bottle (volume: 10 l)	K079R01
Storage bottle (volume: 20 l)	K079R02
Additional operating manuals on CD-ROM	6-0004-R213

Spare part kit:

Exchange compressor for B100R20	B100R20-61
---------------------------------	------------

Packing:

Packing for B160R92	3-775-R024-C
Packing for storage bottle (volume: 2 l)	3-775-R103-C
Packing for storage bottle (volume: 10 l or 20 l)	3-763-R007-C

Mini Series



■ Mini Series

■ B077R11 Pre filter unit	37
■ B078R06 Portable vacuum pump unit	38
■ B093R30 Vacuum compressor unit	39
■ B095R12 Compressor unit	40
■ B132R01 Operating panel for Mini Series	41 – 42
■ B143R11 Small service cart	43 – 44

Mini Series

For efficient SF₆ gas handling on small gas compartments

The Mini Series is perfectly suited for gas handling of small gas compartments and gas reclaiming to < 5 mbar. This series even exceeds the IEC directives which are in effect and can compete with the more powerful series. We recommend using this series for small gas quantities. Oilfree compressors allow gas handling without contamination by oil residues.



- Liquid gas storage
- Transport case to prevent the device from damage (available as option)
- Different hose lengths (available as option)

The handy Mini Series consists of the following individual components which can be assembled as complete unit.

For adsorption of moisture, solid and gaseous decomposition products

B077R11

Pre filter unit (pe 10 bar)



Technical data:

Dimensions: L 180 mm, W 105 mm, H 360 mm
Weight: 4.0 kg

Standard equipment:

Dry filter
Particle filter
DILO coupling DN8
2 operating manuals in German, English or French

Optional accessories at an extra charge:

2 m long rubber hose DN8, with DILO coupling tongue part DN8 on both ends	6-1042-R020
Spare filter cartridge for dry filter	B077-05
Spare filter cartridge for particle filter	B077-06
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for B077R11	3-948-R005
---------------------	-------------------

Mini Series

For evacuation of air

B078R06

Portable vacuum pump unit (10 m³/h, < 1 mbar)

Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current

B078R06S15

Portable vacuum pump unit (10 m³/h, < 1 mbar)

Operating voltage: 110 - 127 V / 50 - 60 Hz alternating current



Technical data:

Dimensions: L 420 mm, W 200 mm, H 320 mm
--

Weight: 20 kg

Standard equipment:

10 m ³ /h vacuum pump with exhaust filter, final vacuum < 1 mbar

Vacuum gauge (-1 to 0 bar)

Ball valve DN8

3 m long rubber hose DN8 with DILO coupling tongue part DN8

2 operating manuals in German, English or French
--

Optional accessories at an extra charge:

SF ₆ gas refilling device	3-393-R001
--------------------------------------	------------

Coupling adapters DN8 for evacuation of hoses	6-1059-R012
---	-------------

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	-------------

Aluminium transport case	3-781-R011
--------------------------	------------

Spare parts kit:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R101
---	-------------

Packing:

Packing for B078R06 / B078R06S15	3-748-R003-C
----------------------------------	--------------

For recovery of SF₆ gas down to 5 mbar in conjunction with the compressor

B093R30

Vacuum compressor unit (3.3 m³/h)

Operating voltage: 220 - 240 V / 50 / 60 Hz alternating current

B093R30S15

Vacuum compressor unit (3.3 m³/h)

Operating voltage: 110 - 127 V / 60 Hz alternating current



Technical data:

Dimensions: L 480 mm, W 325 mm, H 280 mm

Weight: 26 kg

Standard equipment:

3.3 m³/h vacuum compressor for SF₆, final vacuum during gas recovery < 5 mbar

Solenoid valve

Pressure switch

Gauge (-1 to +1.5 bar)

DILO couplings DN8

Electric control

Paint: orange (RAL 2004)

2 operating manuals in German, English or French

Optional accessories at an extra charge:

2 m long rubber hose DN8, with DILO coupling tongue part DN8 on both ends

6-1042-R020

Additional operating manual on CD-ROM

6-0004-R213

Aluminium transport case

3-781-R017

Spare parts kit:

Spare parts kit for vacuum compressor

6-1055-R030

Packing:

Packing for B093R30 / B093R30S15

3-748-R003-C

Mini Series

For liquid SF₆ storage

B095R12

Compressor unit

Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current

B095R12S15

Compressor unit

Operating voltage: 110 - 127 V / 50 - 60 Hz alternating current



Technical data:

Dimensions: L 455 mm, W 310 mm, H 370 mm

Weight: 28 kg

Standard equipment:

Oil-free compressor (1.6 m³/h [at 50 Hz], 50 bar; 1.9 m³/h [at 60 Hz], 50 bar)

Particle filter

Gauge

Filling pressure reducer

DILO couplings DN8

Electric control

Paint: orange (RAL 2004)

2 operating manuals in German, English or French

Optional accessories at an extra charge:

Storage connection with 5 meter long rubber hose DN8, DILO coupling DN8, ball valve DN8 and five different SF ₆ bottle connections	6-1041-R050
2 m long rubber hose DN8 with DILO coupling tongue part DN8 on both ends	6-1042-R020
5 m long rubber hose DN8 with DILO coupling tongue part DN8 on both ends	6-1042-R050
Additional operating manual on CD-ROM	6-0004-R213
Aluminium transport case for B095R12	3-781-R021
Plastic case for B077R11 and accessories	3-781-R022

Spare parts kit:

Spare parts kit for compressor	6-1081-R010
--------------------------------	--------------------

Packing:

Packing for B095R12 / B095R12S15	3-748-R009-C
----------------------------------	---------------------

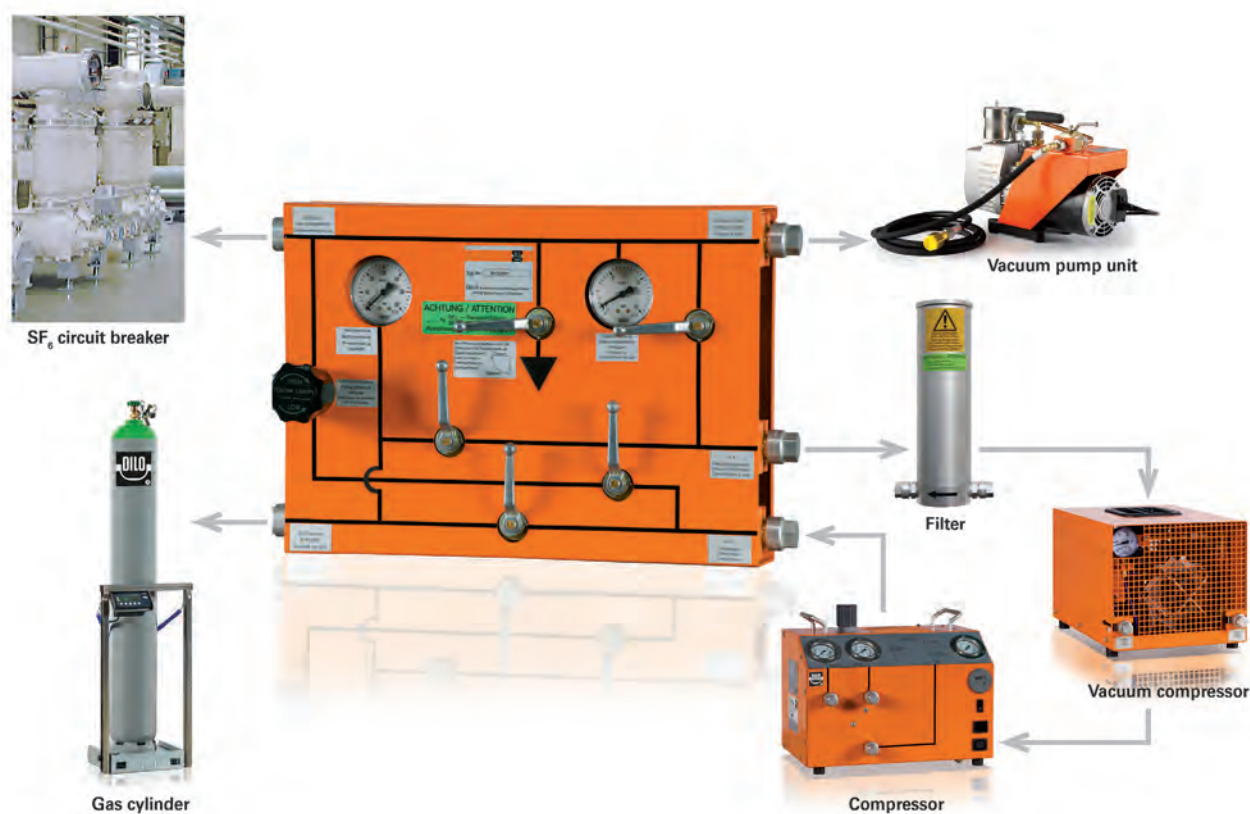
For easy handling of individual components

B132R01

Operating panel for Mini Series

The components of the Mini Series such as vacuum compressor unit, compressor unit and vacuum pump unit can be connected to the operating panel with hoses. Furthermore, an SF₆ bottle and the gas compartment can be connected as well.

Thus, a safe handling is guaranteed. The ball valves can be adjusted in such a way as to carry out the evacuation, filling and gas recovery function without disconnecting the hoses.



- Transport case to prevent the device from damage (available as option)
- Different hose lengths (available as option)

Mini Series

B132R01

Operating panel for Mini Series

Technical data:

Dimensions: L 510 mm, W 320 mm, H 140 mm
Weight: 13 kg

Technical data aluminium transport case:

Dimensions: L 600 mm, W 400 mm, H 180 mm
Weight: 6.5 kg

Standard equipment:

Gauge
Ball valves DN8
Filling pressure reducer
DILO couplings DN8
2 operating manuals in German, English or French

Optional accessories at an extra charge:

Storage connection with 5 m long rubber hose DN8, DILO coupling DN8, ball valve DN8 and five different SF ₆ bottle connections	6-1041-R050
2 m long rubber hose DN8 with DILO coupling tongue part DN8 on both ends	6-1042-R020
5 m long rubber hose DN8 with DILO coupling tongue part DN8 on both ends	6-1042-R050
Additional operating manual on CD-ROM	6-0004-R213
Aluminium transport case	3-781-R008

Packing:

Packing for B132R01	3-775-R014-C
---------------------	---------------------

Packing for all components of the Mini Series: B077R11 / B078R06 / B093R30 / B095R12 / B132R01:

Packing if all components are packed together	3-748-R010-C
---	---------------------

For efficient SF₆ gas handling on small gas compartments

B143R11

Small service cart

The compact and mobile unit meets all requirements for efficient gas handling in the medium voltage range. Compact design and ergonomic aspects have been a guideline for its construction. Compared with the large devices - all necessary functions are integrated including gas purification via dry filter and particle filters and gas storage in liquid form.

The gas is recovered to a final vacuum of < 5 mbar and thus outranges the IEC directives by far. The integrated dry running compressors prevent the SF₆ gas from being contaminated by oil. All values for the gas recovery, evacuation and filling process are displayed on the panel.



B143R11 model with
TÜV SÜD certified
performance data

- Device for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 5 mbar
- Semi-automatic control and 2.8" operating panel
- Digital weighing scales for SF₆ bottles
- Residual gas recovery down to 5 mbar during filter change
- Reduction to transport pressure as integrated special function

Mini Series

B143R11

Small service cart

Technical data:

Dimensions: L 770 mm, W 760 mm, H 1,420 mm
Weight: 215 kg

Standard equipment:

Oil-free compressor (1.6 m³/h [at 50 Hz], 50 bar; 1.9 m³/h [at 60 Hz], 50 bar)
Vacuum compressor for SF ₆ gas recovery (3.3 m³/h, final vacuum < 5mbar)
Vacuum pump for air (14 m³/h, 2-stage, final vacuum < 1 mbar)
Dry filter
Particle filter
Pressure reducer
20 l storage bottle
Digital weighing scales for SF ₆ bottles (with adjustable switching point), 220 - 240 V / 50 - 60 Hz
Indication in bar / mbar, psi / torr (reversible on the panel)
5 m long rubber hose with coupling tongue parts DN8 on both ends
SF ₆ bottle connection with W 21.8 x 1/14" thread
3.0 m long connecting cable
Paint: orange (RAL 2004)
2 operating manuals in German or English

Operating voltage:

220 - 240 V / 50 - 60 Hz alternating current
--

Optional accessories at an extra charge:

Second storage bottle (volume: 20 l)	K079R02
American SF ₆ bottle connection with 0.96" Whitworth left-hand thread	3-334-R002 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R004 P
SF ₆ bottle connection with G 5/8 thread	3-643-R002 P
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kits:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R201
Spare parts kit for compressor	6-1081-R010
Spare parts kit for vacuum compressor	6-1055-R030

Packing:

Packing for B143R11	3-262-R004-C
---------------------	--------------

Piccolo Series



■ Piccolo Series

■ L030R01 SF₆ gas service cart

46 - 48

L030R01

Piccolo series

For SF₆ gas handling on switchgear with reduced filling quantities

L030R01

SF₆ gas service cart

The L030 model of the Piccolo series has been specially designed for modern switchgear with small gas compartments. Due to its compact construction this device fits conveniently onto a euro pallet for transport and is easily manoeuvrable even in the very narrow passage ways of gas insulated switchgear.

The L030 maintenance device is equipped with a compact but high capacity compressor which enables SF₆ reclaiming up to < 5 mbar – a value outperforming current IEC regulations by far. A smart device for “smart grids”.



L030R01 model with
TÜV SÜD certified
performance data



Weight indication for SF₆ bottle scale /
3.6" operating panel



Optional iPad remote control

- Device for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 5 mbar
- Semi-automatic control and 3.6" operating panel
- Optional iPad remote control
- Reversing switch for direction of rotation
- Digital weighing scales for SF₆ bottles
- Residual gas recovery down to 1 mbar during filter change
- Reduction to transport pressure as integrated special function

L030R01

SF₆ gas service cart

Technical Data:

Dimensions: L 1,200 mm, W 800 mm, H 1,170 mm
Weight: 300 kg

Standard equipment:

B100R40 compressor (3.2 m ³ /h, [at 50 Hz], 50 bar; 3.8 m ³ /h [at 60 Hz], 50 bar)
Vacuum compressor for SF ₆ recovery (4.8 m ³ /h, final vacuum < 5 mbar)
Vacuum pump for evacuation of air (16 m ³ /h, final vacuum < 1 mbar)
Dry filter
Particle filter
Indication units in bar / mbar, kPa or psi / torr to be selected on the operating panel
Fork lift provisions
Digital weighing scales for SF ₆ bottles
3 m long storage connecting hose DN8 with coupling tongue part DN20
Frame with crane eyelets
Tool box
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage:

208 - 240 V / 60 Hz 3-phase current	6-030SP-R011
380 - 460 V / 50 Hz or 380 - 480 V / 60 Hz 3-phase current	6-030SP-R012

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage 200 V / 50 - 60 Hz 3-phase current	6-030SP-R017
Additional price for electrical special voltage 600 V / 60 Hz 3-phase current	6-030SP-R019
iPad remote control, WLAN connection	6-030BP-R001
Dew point control for dry filter	6-030TF-R011
Tarpaulin	6-030KA-R001

L030R01**Piccolo Series**

L030R01

SF₆ gas service cart**Optional accessories at an extra charge:**

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire braided hose DN20 with coupling tongue part DN20 on both ends	6-1024-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends	6-1024-R100
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kits:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R301
Spare parts kit for compressor	6-1081-R020
Spare parts kit for vacuum compressor	6-1189-R001

Packing:

Packing for L030R01	3-751-R013-C
---------------------	---------------------

Compact Series



■ Compact Series

- | | |
|--|---------|
| ■ B057R03 SF ₆ gas service cart | 51 – 53 |
| ■ B057R17 SF ₆ gas service cart | 54 – 55 |
| ■ B058R03 SF ₆ gas service cart | 56 – 58 |

B057R.. / B058R..

Compact Series

For easy maintenance on high voltage switchgear

B057R.. / B058R..

SF₆ gas service carts

This robust series comprises several versions allowing gaseous and liquid SF₆ storage. SF₆ gas can be recovered to a final vacuum of < 5 mbar or 1 mbar and exceeds IEC 62271-4 regulations by far.

All devices of this type series are equipped with a semi-automatic control and are easy to operate: The functions are selected by means of a 3-way ball valve and a selector switch. The pressure units (bar/mbar, kPa or psi/torr) can be chosen on the operating panel.

The Compact series is the perfect choice in case a robust and user-friendly device is required for maintenance works on high voltage switchgear.



B058R03



B057R17

- Devices for storage in gaseous or liquid form
- SF₆ gas recovery down to < 5 mbar or 1 mbar
- Semi-automatic control and 3.6" operating panel
- Residual gas recovery down to 5 or 1 mbar during filter change
- Reduction to transport pressure as integrated special function
- All versions are available with tanks which can be assembled under the device with CE marking also available with SQL and ASME approval

For liquid storage

B057R03

SF₆ gas service cart



B057R03 model with
TÜV SÜD certified
performance data

Technical data:

Dimensions: L 1,850 mm, W 950 mm, H 1,220 mm
Weight: 580 kg

Standard equipment:

TM 5.0 B oilfree compressor (5.7 m ³ /h [at 50 Hz], 50 bar; 6.8 m ³ /h [at 60 Hz], 50 bar)
Vacuum compressor for recovery of SF ₆ (4.8 m ³ /h, final vacuum < 5 mbar)
Vacuum pump for evacuation of air (40 m ³ /h, final vacuum < 1 mbar)
Evaporator
Dry filter
Particle filter
Indication units in bar / mbar, kPa or psi / torr to be selected on the operating panel
Fork lift provisions
Digital weighing scales for SF ₆ bottles
5 m long storage connecting hose DN8 with coupling tongue part DN20
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage:

208 - 240 V / 60 Hz 3-phase current	6-057SP-R011
380 - 460 V / 50 Hz or 380 - 420 V / 60 Hz 3-phase current	6-057SP-R012

B057R.. / B058R..

Compact Series

B057R03

SF₆ gas service cart

Mounted on a pressure tank / stowage

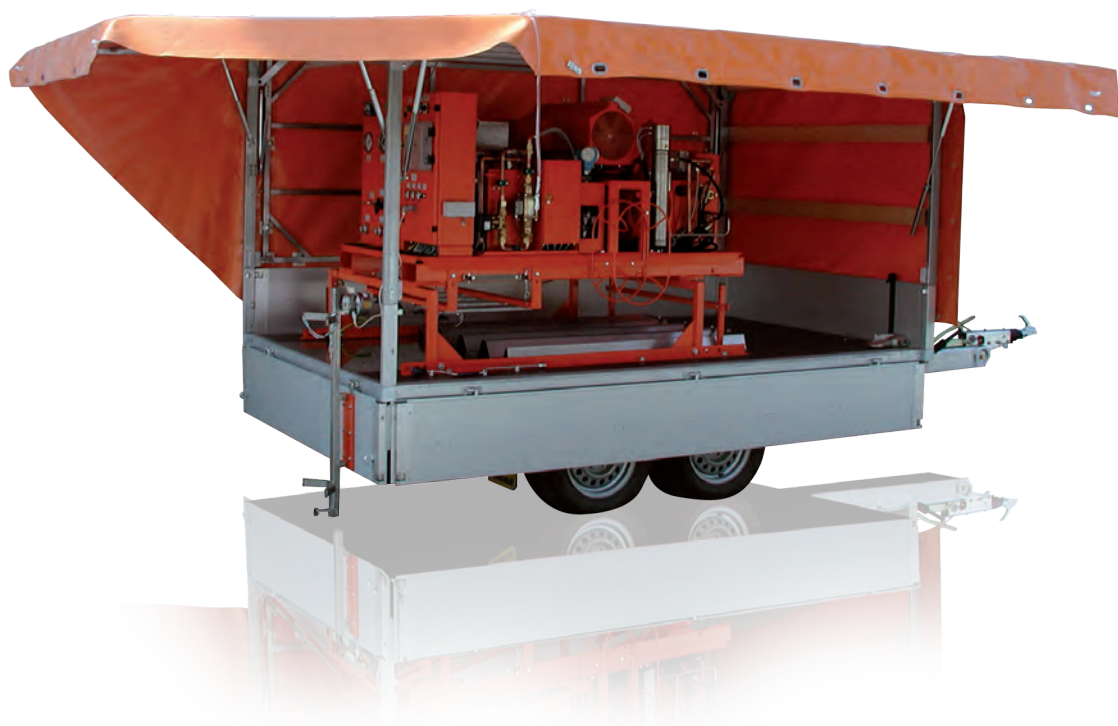
**Optional equipment (mounted) at an extra charge:**

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked	280 kg	2,000	950	1,725	1,050 kg	B171R01B057
600 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked	580 kg	2,000	950	1,935	1,270 kg	B171R02B057
Stowage including 5 SF ₆ -bottles with electronic weight indication and chassis with solid tired wheels	5 x 40 kg	2,500	1,050	2,015	1,320 kg	B175R01B057

B057R03

SF₆ gas service cart

Can be mounted on a trailer with the following accessories:



Technical data:

Dimensions: L 4,500 mm, W 1,700 mm, H 2,280 mm

Max. admissible total weight: 2,000 kg

2 axle car trailer TÜV approved, stowage with weighing device **with** 5 SF₆-bottles, tarpaulin, side and back walls opened by pneumatic springs

B175R11B057

2 axle car trailer TÜV approved, stowage with weighing device **without** SF₆-bottles, tarpaulin, side and back walls opened by pneumatic springs

B175R10B057

B057R.. / B058R..

Compact Series

For recovery of SF₆ down to < 1 mbar with liquid storage**B057R17****SF₆ gas service cart****Technical data:**

Dimensions: L 1,850 mm, W 950 mm, H 1,220 mm
Weight: 500 kg

Standard equipment:

TM 5.0 B oilfree compressor (5.7 m ³ /h [at 50 Hz], 50 bar; 6.8 m ³ /h [at 60 Hz], 50 bar)
Oilfree suction pump for recovery of SF ₆ (15 m ³ /h, final vacuum < 1 mbar)
Vacuum pump for evacuation of air (16 m ³ /h, final vacuum < 1 mbar)
Dry filter
Particle filter
Indication units in bar / mbar, kPa or psi / torr to be selected on the operating panel
Fork lift provisions
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage:

208 - 240 V / 60 Hz 3-phase current	6-057SP-R011
380 - 460 V / 50 Hz or 380 - 420 V / 60 Hz 3-phase current	6-057SP-R012

B057R17

SF₆ gas service cart

Mounted on a pressure tank



When using the B057R17 device type the SF₆ gas is not taken from the storage tank in liquid form!

Optional equipment (mounted) at an extra charge:

Digital weighing scales for one SF ₆ bottle	K091R64
5 m long storage connecting hose DN8 with coupling tongue part DN20	6-1037-R050

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked	280 kg	2.000	950	1.725	1.050 kg	B171R01XB057
600 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked	580 kg	2.000	950	1.935	1.270 kg	B171R02XB057

B057R.. / B058R..

Compact Series

For gaseous storage

B058R03

SF₆ gas service cart



Technical data:

Dimensions: L 1,850 mm, W 950 mm, H 1,220 mm

Weight: 550 kg

Standard equipment:

TM 2.5 B oilfree compressor (11.4 m³/h, final pressure 23 bar at a suction pressure of > p_e 3 bar or 16 bar at vacuum compressor connected in series or at a suction pressure of p_e = 1 bar)

Vacuum compressor for recovery of SF₆ (4.8 m³/h, final vacuum < 5 mbar)

Vacuum pump for evacuation of air (40 m³/h, final vacuum < 1 mbar)

Dry filter

Particle filter

Indication units in bar / mbar, kPa or psi / torr to be selected on the operating panel

Fork lift provisions

Different wrenches

Paint: orange (RAL 2004)

2 operating manuals in German, English or French

Operating voltage:

208 - 240 V / 60 Hz 3-phase current

6-057SP-R011

380 - 460 V / 50 Hz or 380 - 420 V / 60 Hz 3-phase current

6-057SP-R012

B058R03

SF₆ gas service cart

Mounted on a pressure tank



Optional equipment (mounted) at an extra charge:

	Storage capacity at 10 bar	Storage capacity at 16 bar	Storage capacity at 23 bar	Length mm	Width mm	Height mm	Net weight	Article No.
600 l / 25 bar pressure tank in accordance with EC 97/23 regulations and CE marked	42 kg	72 kg	105 kg	1,850	950	1,800	850 kg	B173R01
1,000 l / 25 bar pressure tank in accordance with EC 97/23 regulations and CE marked	70 kg	120 kg	175 kg	2,230	950	1,800	1,100 kg	B173R02

B057R.. / B058R..**Compact Series**

B057R.. / B058R..

SF₆ gas service carts**Optional equipment (mounted) at an extra charge for all service carts of the Compact series:**

Additional price for electrical special voltage 440 - 480 V / 60 Hz 3-phase current	6-057SP-R014
Additional price for electrical special voltage 200 V / 50 - 60 Hz 3-phase current	6-057SP-R017
Additional price for electrical special voltage 210 - 240 V / 50 Hz 3-phase current	6-057SP-R018
Additional price for electrical special voltage 600 V / 60 Hz 3-phase current	6-057SP-R019
Tarpaulin (not for B175R.. trailer)	6-057KA-R001
Tool box	6-057AB-R001
Shelf plate	K174R01

Optional accessories at an extra charge for all Compact service carts:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
7 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R070
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kits for B057R03:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R401
Spare parts kit for TM 5.0 B compressor	6-1010-R011
Spare parts kit for vacuum compressor	6-1189-R001

Spare parts kits for B057R17:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R411
Spare parts kit for TM 5.0 B compressor	6-1010-R011

Spare parts kits for B058R03:

Maintenance package for vacuum pump, dry and particle filter included	6-1048-R401
Spare parts kit for TM 2.5 B compressor	6-1007-R011
Spare parts kit for vacuum compressor	6-1189-R001

Packing for all Compact service carts:

Packing for all devices without pressure tank	3-750-R001-C
Packing for devices with 300 l, 600 l pressure tank or stowage and weighing device	3-751-R001-C
Packing for devices with 1,000 l pressure tank	3-751-R002-C
Transport pallet for B057R03 mounted on a trailer	3-688-R004-C

Economy Series



■ Economy Series

- L057R01 SF₆ gas service cart 61
- L057R11 SF₆ gas service cart 62

L057R..**Economy Series****The range for universal applications**

L057R01 / R11

SF₆ gas service carts

L057 series is a real all-rounder convincing by its compact design, its user-friendly and automated gas handling. Everything is available: the practical tool box for hoses and accessories as well as the digital weighing scales integrated in the device.

The device is equipped with many special functions facilitating the maintenance of the device. In case a filter cartridge has to be exchanged it is possible to recover the SF₆ gas from the filter unit by means of a special function. Afterwards the air can be evacuated.

All functions are displayed on the 10" touch panel (version R01) or on the 3.6" panel (version R11). The operator can easily select the desired language, the required pressure and the vacuum units on the panel.

SF₆ gas handling can be quite easy.



- Devices for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 1 mbar
- Automatic control and 10" touch panel (version R01)
- Reversing switch for direction of rotation
- Digital weighing scales for SF₆ bottles
- Residual gas recovery down to 1 mbar during filter change
- Reduction to transport pressure as integrated special function
- All versions are available with tanks which can be assembled under the device with CE marking also available with SQL and ASME approval
- The service carts can be mounted on a trailer

For liquid storage

L057R01

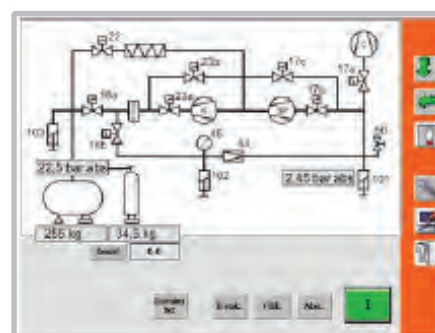
SF₆ gas service cart

Operation, indication of most important process parameters and illustration of selected gas flow on 10" touch panel

Indication units selectable on the touch panel (e. g. bar / mbar/ kg)



L057R01 model with
TÜV SÜD certified
performance data



10" touch panel

Technical data:

Dimensions: L 1,850 mm, W 950 mm, H 1,220 mm

Weight: 640 kg

L057R..

Economy Series

For liquid storage

L057R11

SF₆ gas service cart

Operation via function selector switch and Start / Stop key

Indication of the most important process parameters via 3.6" panel



3,6" Panel

Technical data:

Dimensions: L 1,850 mm, W 950 mm, H 1,220 mm

Weight: 640 kg

L057R..

SF₆ gas service cart

Standard equipment:

TM 5.0 B oilfree compressor (5.7 m ³ /h [at 50 Hz], 50 bar; 6.8 m ³ /h [at 60 Hz], 50 bar)
Oilfree suction pump for recovery of SF ₆ (15 m ³ /h, final vacuum < 1 mbar)
Vacuum pump for evacuation of air (40 m ³ /h, final vacuum < 1 mbar)
Evaporator
Dry filter
Particle filter
Digital weighing scales for SF ₆ bottles
5 m long storage connecting hose DN8 with coupling tongue part DN20
Fork lift provision
Frame with crane eyelets
Tool box
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage for all service carts (3-phase current ranges to be selected):

208 - 240 V / 60 Hz	6-057SP-R011
380 - 460 V / 50 Hz or 380 - 420 V / 60 Hz	6-057SP-R012

L057R..**Economy Series**

L057R..

SF₆ gas service cart

Mounted on a pressure tank / stowage



L057R01 with 300 l pressure tank

Optional equipment (mounted) at an extra charge:

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, fixing and steerable rollers	280 kg	1,850	950	1,725	1,050 kg	B171R01L057
600 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, fixing and steerable rollers	580 kg	2,000	950	1,935	1,270 kg	B171R02L057
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, chassis with solid tired wheels	280 kg	2,500	1,050	1,835	1,250 kg	B172R01L057
600 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, chassis with solid tired wheels	580 kg	2,500	1,050	2,015	1,550 kg	B172R02L057
Stowage including 5 SF ₆ -bottles with electronic weight indication, chassis with solid tired wheels	5 x 40 kg	2,500	1,050	2,015	1,320 kg	B175R01L057

L057R..

SF₆ gas service cart

Can be mounted on a trailer with the following accessories:



Device including stowage with weighing device
with 5 SF₆ bottles on a trailer B175R11L057

Technical data:

Dimensions: L 4,500 mm, W 1,700 mm, H 2,280 mm
Max. admissible total weight: 2,000 kg

2 axle car trailer TÜV approved, stowage with weighing device with 5 SF ₆ -bottles, tarpaulin, side and back walls opened by pneumatic springs included	B175R11L057
2 axle car trailer TÜV approved, stowage with weighing device without SF ₆ -bottles, tarpaulin, side and back walls opened by pneumatic springs included	B175R10L057

L057R..**Economy-Serie**

L057R..

SF₆ gas service carts**Optional equipment (mounted) at an extra charge for all service carts of the Economy series:**

Additional price for electrical special voltage 440 - 480 V / 60 Hz 3-phase current	6-057SP-R014
Additional price for electrical special voltage 200 V / 50 - 60 Hz 3-phase current	6-057SP-R017
Additional price for electrical special voltage 210 - 240 V / 50 Hz 3-phase current	6-057SP-R018
Additional price for electrical special voltage 600 V / 60 Hz 3-phase current	6-057SP-R019
63 m ³ /h vacuum pump, final vacuum < 1 mbar	6-057VP-R001
100 m ³ /h vacuum pump, final vacuum < 1 mbar	6-057VP-R002
40 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-057VP-R004
Automatic control and switching off of the individual functions (only for L057R01) (evacuation, filling, recovery of SF ₆)	6-057AU-R001
Dew point control for dry filter (only for L057R01)	6-057TF-R001
Dew point control for dry filter (only for L057R11)	6-057TF-R011
Removable sheet metal cover of the complete service cart	6-057BL-R001
Tarpaulin	6-057KA-R001
Chassis with solid tired wheels Ø 400 mm	6-057FG-R001

Optional accessories at an extra charge for all Economy service carts:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends	6-1024-R050
10 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends	6-1024-R100
Remote control via PC, LAN connection (only for L057R01)	6-0004-R215
Additional operating manual on CD-ROM	6-0004-R213

Spare parts kits for L057R..:

Maintenance package for L057R.. with standard vacuum pump (40 m ³)	6-1048-R401
Maintenance package for L057R.. with 6-057VP-R001 / R002 vacuum pump (63 / 100 m ³)	6-1048-R421
Maintenance package for L057R.. with two-stage 6-057VP-R004 vacuum pump (40 m ³)	6-1048-R422
Spare parts kit for compressor	6-1010-R011

Packing for L057R..:

Packing for L057R..	3-751-R010-C
Packing for L057R.. with 6-057FG-R001 as option (chassis)	3-788-R023-C
Packing for L057R.. with 6-057BL-R001 as option (sheet metal covering)	3-788-R024-C
Packing for L057R.. with pressure tank (steerable and fixing rollers)	3-751-R011-C
Packing for L057R.. with pressure tank (chassis)	3-788-R011-C
Packing for L057R.. with stowage and weighing device	3-788-R012-C
Transport pallet for L057R.. mounted on a trailer	3-688-R004-C

Mega Series



■ Mega Series

- | | |
|--|---------|
| ■ L170R01 SF ₆ gas service cart | 69 – 74 |
| ■ L280R01 SF ₆ gas service cart | 75 – 78 |
| ■ L550R01 SF ₆ gas service cart | 79 – 83 |

L170R01 / L280R.. / L550R..

Mega Series

Maintenance devices for large and extra large gas compartments

L170R01 / L280R.. / L550R..

SF₆ gas service cart

These service carts are our most powerful devices and guarantee quick maintenance of gas compartments. Thanks to the state-of-the-art control all functions run automatically and are displayed on a 10" touch panel.

Precondition for the construction of this series which allows SF₆ gas recovery down to < 1 mbar was emission-free gas handling. When using the totally gastight DILO couplings and connecting systems emissions will have no chance! Short gas recovery and evacuating times are obtained by using a coupling DN40.

The L170R...series is available with a second DN20 connecting coupling (as option) so that two work steps can be carried out simultaneously. Thus it is possible to evacuate air from a gas compartment while filling SF₆ at the same time or recovering gas from another gas compartment. Multitasking in practice.



- Devices for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 1 mbar
- Automatic control and 10" touch panel
- Reversing switch for direction of rotation
- Digital weighing scales for SF₆ bottles
- Residual gas recovery down to 1 mbar during filter change

- Reduction to transport pressure as integrated special function
- All versions are available with tanks which can be assembled under the device with CE marking also available with SQL and ASME approval
- The service carts can be mounted on a trailer

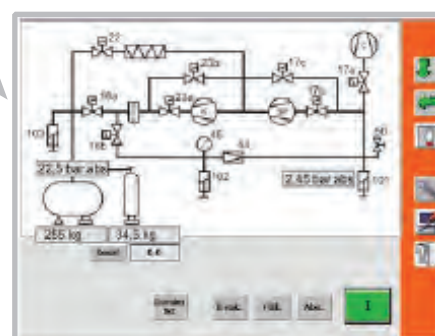
For liquid storage

L170R01

SF₆ gas service cart



L170R01 model with
TÜV SÜD certified
performance data



10" Touchpanel

Additional DN20 connecting coupling for evacuation and filling or gas recovery (K177R01 option)

Technical data:

Dimensions: L 2,250 mm, W 1,050 mm, H 1,220 mm

Weight: 890 kg

L170R01 / L280R.. / L550R..

Mega Series

L170R01

SF₆ gas service cart**Standard equipment:**

B110R11 oilfree compressor (17 m ³ /h [at 50 Hz], 50 bar) (13 m ³ /h [at 60 Hz], 50 bar)
Oilfree suction pump for recovery of SF ₆ (35 m ³ /h, final vacuum < 1 mbar)
Vacuum pump for evacuation of air (63 m ³ /h, final vacuum < 1 mbar)
Operating and indication of the most important process parameters via 10" touch panel
DILO couplings DN20 and DN40
Evaporator
Dry filter
Particle filter
Indicating instruments in bar / mbar
Digital weighing scales for SF ₆ bottles
5 m long storage connecting hose DN8 with coupling tongue part DN20
Fork lift provision
Frame with crane eyelets
Tool box
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage for service carts (3-phase current ranges to be selected):

208 - 240 V / 60 Hz	6-170SP-R011
380 - 460 V / 50 Hz	6-170SP-R012
380 - 420 V / 60 Hz	6-170SP-R013

L170R01

SF₆ gas service cart

Mounted on a pressure tank / stowage



L170R01 with 5 SF₆-bottles



L170R01 with 600 l pressure tank

Optional equipment (mounted) at an extra charge:

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, chassis with solid tired wheels	280 kg	2,500	1,050	1,835	1,500 kg	B172R01L170
600 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, chassis with solid tired wheels	580 kg	2,500	1,050	2,015	1,800 kg	B172R02L170
Stowage including 5 SF ₆ -bottles with electronic weight indication, chassis with solid tired wheels	5 x 40 kg	2,500	1,050	2,015	1,570 kg	B175R01L170

L170R01 / L280R.. / L550R..

Mega Series

L170R01

SF₆ gas service cart

Can be mounted on a trailer with the following accessories:



Device including stowage with weighing device
with 5 SF₆ bottles on a trailer B175R11L057

Technical data:

Dimensions: L 4,500 mm, W 1,700 mm, H 2,280 mm
Max. admissible total weight: 2,500 kg

2 axle car trailer TÜV approved, stowage with weighing device with 5 SF ₆ -bottles, tarpaulin, side and back walls opened by pneumatic springs included	B175R11L170
2 axle car trailer TÜV approved, stowage with weighing device without SF ₆ -bottles, tarpaulin, side and back walls opened by pneumatic springs included	B175R10L170

L170R01

SF₆ gas service cart

Optional equipment (mounted) at an extra charge for all service carts of the L170R01 series:

Additional price for electrical special voltage 440 - 480 V / 60 Hz 3-phase current	6-170SP-R014
Additional price for electrical special voltage 200 V / 50 Hz 3-phase current	6-170SP-R016
Additional price for electrical special voltage 200 V / 60 Hz 3-phase current	6-170SP-R017
Additional price for electrical special voltage 210 - 240 V / 50 Hz 3-phase current	6-170SP-R018
Additional price for electrical special voltage 600 V / 60 Hz 3-phase current	6-170SP-R019
100 m ³ /h vacuum pump, final vacuum < 1 mbar	6-170VP-R001
200 m ³ /h vacuum pump, final vacuum < 1 mbar	6-170VP-R002
40 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-170VP-R003
65 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-170VP-R004
Automatic control with switching off of the individual functions (evacuation, filling, recovery of SF ₆)	6-170AU-R001
Dew point control for dry filter	6-170TF-R001
Removable sheet metal cover for complete service cart	6-170BL-R001
Tarpaulin	6-170KA-R001
Chassis with solid tired wheels Ø 400 mm	6-170FG-R001
Additional DN20 coupling for evacuation and gas recovery or filling at the same time (available for 63 m ³ /h < 1mbar standard vacuum pump)	K177R01

Optional accessories at an extra charge for all service carts of the L170R01 series:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
7 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R070
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long rubber hose DN40 with coupling tongue part DN40 on both ends	6-1075-R050
10 m long rubber hose DN40 with coupling tongue part DN40 on both ends	6-1075-R100
5 m long wire braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R050
10 m long wire braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R100
5 m long rubber hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1079-R050
10 m long rubber hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1079-R100
5 m long wire braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
10 m long wire braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R100
Triple manifold, coupling DN40 to 3 x coupling DN20 with ball valve	3-718-R006
Coupling tongue part DN40 with transition piece to 2 x DN20 2 rubber hoses DN20 (10 m long) with coupling tongue part DN20	6-1235-R001
Remote control via PC, LAN connection	6-0004-R215
Additional operating manual on CD-ROM	6-0004-R213

L170R01 / L280R.. / L550R..

Mega Series

L170R01

SF₆ gas service cart**Spare parts kits for L170R01:**

Maintenance package for L170R01 with standard / 6-170VP-R001 vacuum pump (63 / 100 m ³)	6-1048-R501
Maintenance package for L170R01 with 6-170VP-R002 vacuum pump (200 m ³)	6-1048-R502
Maintenance package for L170R01 with two-stage 6-170VP-R003 / R004 vacuum pump (40 / 65 m ³)	6-1048-R503
Spare parts kit for compressor	6-1091-R111

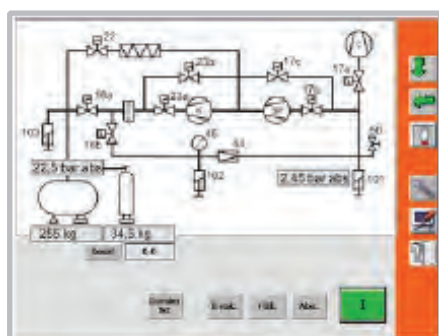
Packing for L170R01:

Packing for L170R01	3-788-R010-C
Packing for L170R01 with 6-170FG-R001 as option (chassis)	3-788-R013-C
Packing for L170R01 with 6-170BL-R001 as option (sheet metal covering)	3-788-R014-C
Packing for L170R01 with pressure tank	3-788-R011-C
Packing for L170R01 with stowage and weighing device	3-788-R012-C
Transport pallet for L170R01 mounted on a trailer	3-688-R005-C

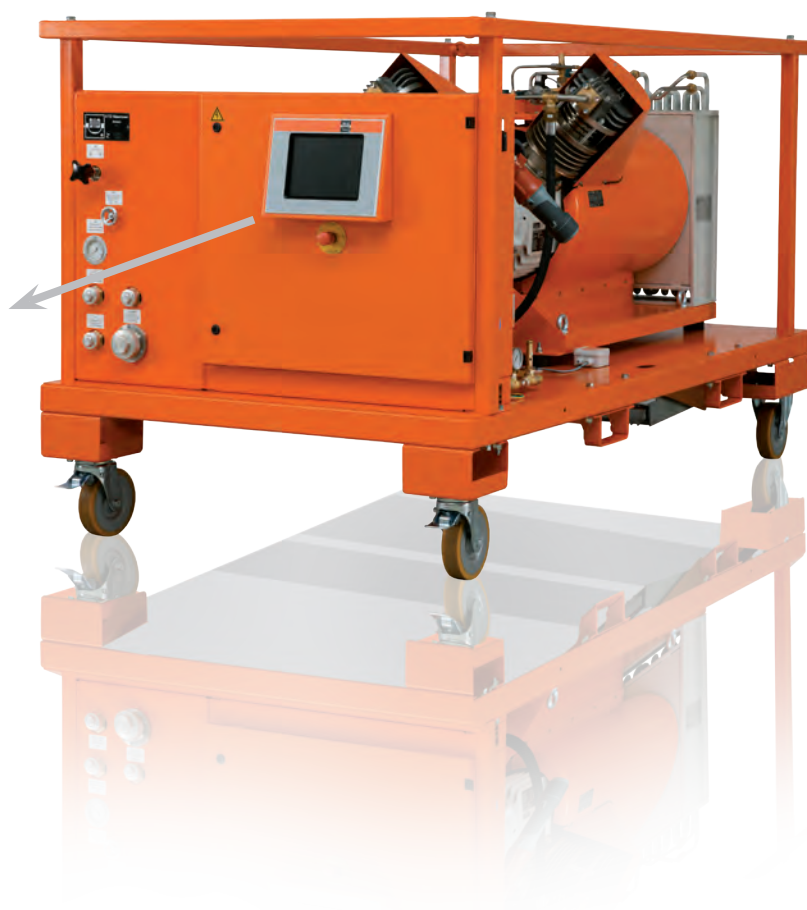
For liquid storage

L280R..

SF₆ gas service cart



10" touch panel



Technical data:

Dimensions: L 2,600 mm, W 1,400 mm, H 1,500 mm

Weight L280R01: 1,350 kg

Weight L280R02: 1,430 kg

L170R01 / L280R.. / L550R..

Mega Series

L280R..

SF₆ gas service cart**L280R01**Oilfree suction pump for recovery of SF₆ (35 m³/h, final vacuum < 1 mbar)**L280R02**Screw pump for recovery of SF₆ (100 m³/h, final vacuum < 1mbar)**Standard equipment for L280R01 and L280R02:**

VTOG oilfree compressor (28 m ³ /h [at 50 Hz], 50 bar) (22 m ³ /h [at 60 Hz], 50 bar)
Vacuum pump for evacuation of air (63 m ³ /h, final vacuum < 1 mbar)
Operating and indication of the most important process parameters via 10" touch panel
DILO couplings DN20 and DN40
Evaporator
Dry filter
Particle filter
Indicating instruments in bar / mbar
Digital weighing scales for SF ₆ bottles
5 m long storage connecting hose DN8 with coupling tongue part DN20
Fork lift provision
Frame with crane eyelets
Tool box
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage for service carts (3-phase current ranges to be selected):

380 - 440 V / 50 Hz	6-280SP-R001
208 - 240 V / 50 Hz	6-280SP-R002

L280R..

SF₆ gas service cart

Mounted on a pressure tank

Optional equipment (mounted) at an extra charge:

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, chassis with solid tired wheels (width 105 mm)	280 kg	3,070	1,400	2,070	1,900 kg	B177R01

**L280R..
SF₆ gas service cart**

Optional equipment (mounted) at an extra charge for all service carts of the L280R.. series:

Additional price for electrical special voltage 208 - 240 V / 60 Hz 3-phase current	6-280SP-R003
Additional price for electrical special voltage 380 - 440 V / 60 Hz 3-phase current	6-280SP-R004
Additional price for electrical special voltage 480 V / 60 Hz 3-phase current	6-280SP-R005
Additional price for electrical special voltage 600 V / 60 Hz 3-phase current	6-280SP-R006
100 m ³ /h vacuum pump, final vacuum < 1 mbar	6-280VP-R001
200 m ³ /h vacuum pump, final vacuum < 1 mbar	6-280VP-R002
40 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-280VP-R003
65 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-280VP-R004
Second dry filter	6-280TR-R001
Second evaporator	6-280VD-R001
Automatic control with switching off of the individual functions (evacuation, filling, recovery of SF ₆)	6-280AU-R001
Dew point control for dry filter	6-280TF-R001
Tarpaulin	6-280KA-R001
Chassis with solid tired wheels Ø 400 mm (for service carts without storage tank)	6-280FG-R001

Optional accessories at an extra charge for all service carts of the L280R.. series:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
7 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R070
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long rubber hose DN40 with coupling tongue part DN40 on both ends	6-1075-R050
10 m long rubber hose DN40 with coupling tongue part DN40 on both ends	6-1075-R100
5 m long wire braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R050
10 m long wire braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R100
5 m long rubber hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1079-R050
10 m long rubber hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1079-R100
5 m long wire braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
10 m long wire braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R100
Triple manifold, coupling DN40 to 3 x coupling DN20 with ball valve	3-718-R006
Coupling tongue part DN40 with transition piece to 2 x DN20 2 rubber hoses DN20 (10 m long) with coupling tongue part DN20	6-1235-R001
Remote control via PC, LAN connection	6-0004-R215
Additional operating manual on CD-ROM	6-0004-R213

L170R01 / L280R.. / L550R..

Mega Series

L280R..

SF₆ gas service cart**Spare parts kits for L280R..:**

Maintenance package for L280R.. with standard / 6-280VP-R001 vacuum pump (63 / 100 m ³)	6-1048-R501
Maintenance package for L280R.. with 6-280VP-R002 vacuum pump (200 m ³)	6-1048-R502
Maintenance package for L280R.. with two-stage 6-280VP-R003 / R004 vacuum pump (40 / 65 m ³)	6-1048-R503
Spare parts kit (valves) for compressor	6-1011-R101
Spare parts kit (piston rings) for compressor	6-1011-R103
Spare parts kit for second 6-280TR-R001 dry filter	3-899-06

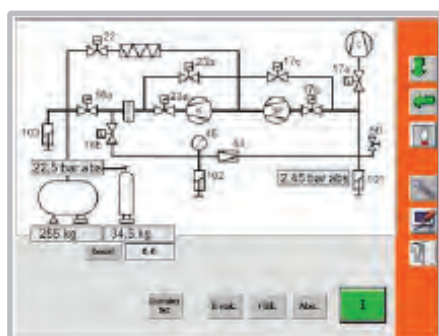
Packing for L280R..:

Packing for L280R..	3-761-R141-C
Packing for L280R.. with 6-280FG-R001 as option (chassis)	3-761-R142-C
Packing for L280R.. with pressure tank	3-761-R143-C

For liquid storage

L550R..

SF₆ gas service cart



10" touch panel



Technical data:

Dimensions: L 2,600 mm, W 1,400 mm, H 1,500 mm

Weight L550R01: 1,450 kg

Weight L550R02: 1,530 kg

L170R01 / L280R.. / L550R..

Mega Series

L550R..

SF₆ gas service cart**L550R01**Oilfree suction pump for recovery of SF₆ (35 m³/h, final vacuum < 1 mbar)**L550R02**Screw pump for recovery of SF₆ (100 m³/h, final vacuum < 1mbar)**Standard equipment for L550R01 and L550R02:**

WTOG oilfree compressor (55 m ³ /h [at 50 Hz], 50 bar) (44 m ³ /h [at 60 Hz], 50 bar)
Vacuum pump for evacuation of air (63 m ³ /h, final vacuum < 1 mbar)
Operating and indication of the most important process parameters via 10" touch panel
DILO couplings DN20 and DN40
Evaporator
Dry filter
Particle filter
Indicating instruments in bar / mbar
Digital weighing scales for SF ₆ bottles
5 m long storage connecting hose DN8 with coupling tongue part DN20
Fork lift provision
Frame with crane eyelets
Tool box
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Operating voltage for service carts (3-phase current ranges to be selected):

380 - 440 V / 50 Hz	6-550SP-R001
208 - 240 V / 50 Hz	6-550SP-R002

L550R..

SF₆ gas service cart

Mounted on a pressure tank



Optional equipment (mounted) at an extra charge:

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with EC 97/23 regulations and CE marked with electronic weight indication, chassis with solid tired wheels (width 105 mm)	280 kg	3,070	1,400	2,070	2,000 kg	B177R01

L170R01 / L280R.. / L550R..**Mega Series**

L550R..

SF₆ gas service cart**Optional equipment (mounted) at an extra charge for all service carts of the L550R.. series:**

Additional price for electrical special voltage 208 - 240 V / 60 Hz 3-phase current	6-550SP-R003
Additional price for electrical special voltage 380 - 440 V / 60 Hz 3-phase current	6-550SP-R004
Additional price for electrical special voltage 480 V / 60 Hz 3-phase current	6-550SP-R005
Additional price for electrical special voltage 600 V / 60 Hz 3-phase current	6-550SP-R006
100 m ³ /h vacuum pump, final vacuum < 1 mbar	6-550VP-R001
200 m ³ /h vacuum pump, final vacuum < 1 mbar	6-550VP-R002
40 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-550VP-R003
65 m ³ /h two-stage vacuum pump with exhaust filter, final vacuum < 2 x 10 ⁻³ mbar	6-550VP-R004
Second dry filter	6-550TR-R001
Second evaporator	6-550VD-R001
Automatic control with switching off of the individual functions (evacuation, filling, recovery of SF ₆)	6-550AU-R001
Dew point control for dry filter	6-550TF-R001
Tarpaulin	6-550KA-R001
Chassis with solid tired wheels Ø 400 mm (for service carts without storage tank)	6-550FG-R001

Optional accessories at an extra charge for all service carts of the L550R.. series:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
7 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R070
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long rubber hose DN40 with coupling tongue part DN40 on both ends	6-1075-R050
10 m long rubber hose DN40 with coupling tongue part DN40 on both ends	6-1075-R100
5 m long wire braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R050
10 m long wire braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R100
5 m long rubber hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1079-R050
10 m long rubber hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1079-R100
5 m long wire braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
10 m long wire braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R100
Triple manifold, coupling DN40 to 3 x coupling DN20 with ball valve	3-718-R006
Coupling tongue part DN40 with transition piece to 2 x DN20 2 rubber hoses DN20 (10 m long) with coupling tongue part DN20	6-1235-R001
Remote control via PC, LAN connection	6-0004-R215
Additional operating instruction on CD-ROM	6-0004-R213

L550R..

SF₆ gas service cart

Spare parts kits for L550R..:

Maintenance package for L550R.. with standard / 6-550VP-R001 vacuum pump (63 / 100 m ³)	6-1048-R501
Maintenance package for L550R.. with 6-550VP-R002 vacuum pump (200 m ³)	6-1048-R502
Maintenance package for L550R.. with two-stage 6-550VP-R003 / R004 vacuum pump (40 / 65 m ³)	6-1048-R503
Spare parts kit (valves) for compressor	6-1012-R101
Spare parts kit (piston rings) for compressor	6-1012-R103
Spare parts kit for second 6-550TR-R001 dry filter	3-899-06

Packing for L550R..:

Packing for L550R..	3-761-R141-C
Packing for L550R.. with 6-550FG-R001 as option (chassis)	3-761-R142-C
Packing for L550R.. with pressure tank	3-761-R143-C

SF₆ gas storage tanks



■ SF₆ gas storage tanks

■ B176R01 SF ₆ gas storage tank	87
■ B176R02 SF ₆ gas storage tank	88
■ B176R03 SF ₆ gas storage tank	89

B176R..**SF₆ gas storage tanks**

These tanks offer sufficient volume to store or withdraw even large gas quantities in gaseous or liquid form – special feature of this type series: for withdrawal of liquid gas, the entire gas content can be withdrawn all at once without having to heat the tank.

The tanks are equipped with digital weighing scales. These weighing scales enable to determine the filling weight with an accuracy of ± 500 g, thus facilitating considerably the SF₆ gas monitoring and the registration of the gas quantities in accordance with the EU directives.



- For liquid or gaseous storage or withdrawal of gas
- Digital weighing scales (measuring accuracy ± 0.4 kg)
- Discharge of the weighing system for transportation is not required
- Additional tool box for hoses and accessories
- Stable frame with driving rod
- Steerable and fixing rollers for comfortable transportation
- Max. operating overpressure 50 bar
- Version in accordance with EC 97/23 pressure equipment directive
ASME and SQL approval are available as option

B176R01

SF₆ gas storage tank - Storage volume 300 l



Technical data:

Dimensions: L 2,000 mm, W 950 mm, H 1,020 mm
Weight: 442 kg
Storage volume: 300 l
Max. operating overpressure: 50 bar
Max. filling weight: 280 kg SF ₆

Standard equipment:

Digital weighing scales with tare function, indication reversible from kg to lb, digit increment 0.2 kg, measuring accuracy ± 0.4 kg, illuminated LCD display, accumulator system with integrated power supply unit and load indicator
Ball valve DN20 / DN8
DILO coupling groove part DN20
Gauge NG 100
Safety valve
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

B176R..

SF₆ gas storage tanks

B176R02

SF₆ gas storage tank - Storage volume 600 l



Technical data:

Dimensions: L 2,000 mm, W 950 mm, H 1,020 mm
Weight: 688 kg
Storage volume: 600 l
Max. operating overpressure: 50 bar
Max. filling weight: 580 kg SF ₆

Standard equipment:

Digital weighing scales with tare function, indication reversible from kg to lb, digit increment 0.2 kg, measuring accuracy ± 0.4 kg, illuminated LCD display, accumulator system with integrated power supply unit and load indicator
Ball valve DN20 / DN8
DILO coupling groove part DN20
Gauge NG 100
Safety valve
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

B176R03

SF₆ gas storage tank - Storage volume 1.000 l



Technical data:

Dimensions: L 2,720 mm, W 950 mm, H 1,020 mm
Weight: 938 kg
Storage volume: 1,000 l
Max. operating overpressure: 50 bar
Max. filling weight: 980 kg SF ₆

Standard equipment:

Digital weighing scales with tare function, indication reversible from kg to lb, digit increment 0.2 kg, measuring accuracy ± 0.4 kg, illuminated LCD display, accumulator system with integrated power supply unit and load indicator
Ball valve DN20 / DN8
DILO coupling groove part DN20
Gauge NG 100
Safety valve
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

B176R..**SF₆ gas storage tanks**

B176R..

SF₆ gas storage tank**Optional equipment (mounted) at an extra charge for all SF₆ gas storage tanks:**

Special pressure indication	6-0005-R006
-----------------------------	-------------

Optional accessories at an extra charge for all SF₆ gas storage tanks:

5 meter long wire-braided hose DN20 with coupling tongue part on both ends	6-1024-R050
8 meter long wire-braided hose DN20 with coupling tongue part on both ends	6-1024-R080
10 meter long wire-braided hose DN20 with coupling tongue part on both ends	6-1024-R100
5 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R050
8 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R080
10 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R100
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for B176R01 / B176R02	3-750-R007-C
Packing for B176R03	3-751-R007-C

SF₆ Accessories



A complete range of accessories for perfect SF₆ gas handling

Besides gas reclaimers, measuring instruments and SF₆ fittings DILO offers a wide range of accessories needed for comprehensive SF₆ gas handling operations.

■ SF₆ Accessories

■ B131R.. Mobile oilfree suction pump unit	92 – 96
■ Z788R.. Retrofit kit for suction pumps	97
■ B007R11 Portable pre-filter unit	
■ B071R11 Portable separating filter unit	99
■ 3-537-R001 Mobile pre-filter unit	100
■ B148R.. Mobile pre-filter unit	101
■ 3-429-R.. SF ₆ Cylinder heater blanket	102
■ 3-558-R.. Precision gauge	103
■ 3-558-R010 Digital precision gauge	104
■ K040R01 Gauge Tee piece	105
■ B178R01 DensiControl DA	106 – 107
■ Z619R01 Digital vacuum gauge	108
■ Z340R21 Adapter kit	109
■ Z415R.. Gas tight cutting device	110 – 111
■ 3-442-R001 Working protection kit	112
■ 3-442-.. Dry vacuum cleaner	113
■ B174R.. Hose reel with spring balancer	114 – 115
■ Z446R.. Hose reel	116 – 117
■ 3-1121-R003 DN20 Quick Controller	118

B131R..

Mobile oilfree suction pump units

The mobile suction pump allows upgrading old SF₆ maintenance devices. Thus it is possible to recover the SF₆ gas from the gas compartment to a final vacuum of 1 mbar by connecting in series the mobile suction pump.



- Separate electric control
- Three different versions or pump performances are available
- Self-closing couplings for emission-free gas handling
- Digital vacuum indication (0 - 400 mbar)
- Steerable and fixing rollers for comfortable handling
- Different wrenches are available as accessories

B131R41

Mobile oilfree suction pump unit 15 m³/h

Final vacuum < 1 mbar



Technical data:

Dimensions: L 550 mm, W 430 mm, H 800 mm
Weight: 80 kg
Operating voltage: 200 - 240 V / 50 - 60 Hz alternating current

Standard equipment:

DILO couplings DN20
Vacuum indication (0 - 400 mbar)
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

B131R..**Mobile oilfree suction pump units**

B131R13

Mobile oilfree suction pump unit 35 m³/h

Final vacuum < 1 mbar

**Technical data:**

Dimensions: L 730 mm, W 550 mm, H 980 mm
--

Weight: 132 kg

Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current

Standard equipment:

DILO couplings DN20 and DN40

Vacuum indication (0 - 400 mbar)

Fixing and steerable rollers

Different wrenches

Paint: orange (RAL 2004)

2 operating manuals in German, English or French
--

B131R61

Mobile oilfree suction pump unit 100 m³/h

Final vacuum < 1 mbar



Technical data:

Dimensions: L 1,060 mm, W 740 mm, H 1,230 mm
Weight: 230 kg
Operating voltage: 380 - 480 V / 50 - 60 Hz 3-phase current

Standard equipment:

DILO couplings DN20 and DN40
Vacuum indication (0 - 400 mbar)
Fixing and steerable rollers
Different wrenches
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

B131R..**Mobile oilfree suction pump units**

B131R..

Mobile oilfree suction pump unit**Optional equipment (mounted) at an extra charge for all oilfree suction pump units:**

Additional price for electrical special voltage for B131R13 and B131R41 100 V / 50 - 60 Hz or 110 - 127 V / 60 Hz or 200 V / 50 - 60 Hz	6-0005-R046
--	--------------------

Optional accessories at an extra charge for all oilfree suction pump units:

Protective cover for suction pump unit B131R13	B131R13G01
Protective cover for suction pump unit B131R41	B131R41G08
5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
7 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R070
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire-braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R050
10 m long wire-braided hose DN40 with coupling tongue part DN40 on both ends	6-1076-R100
5 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
10 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R100
Additional operating manual on CD-ROM	6-0004-R213

Packing:

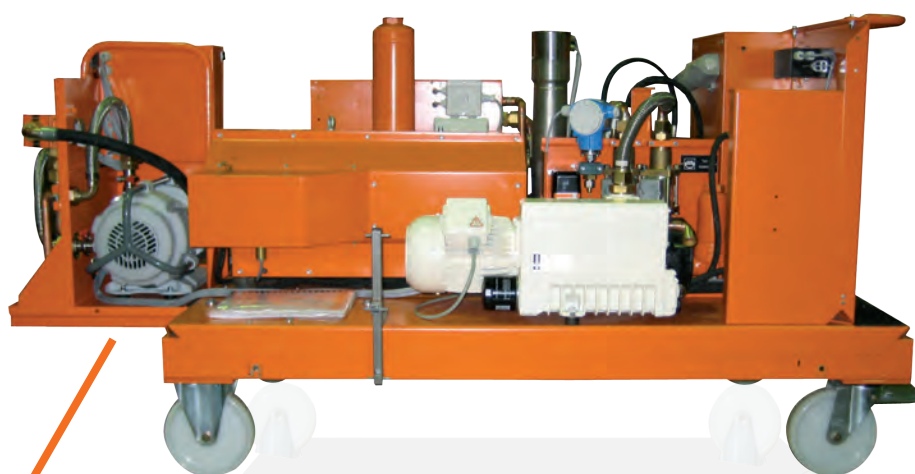
Packing for B131R41 or B131R13	3-671-R001-C
Packing for B131R61	3-750-R001-C

Z788R..

Retrofit kit for suction pumps for SF₆ gas recovery < 1 mbar

In case a mobile unit is not your preferred choice, it is also possible to install suction pumps in an existing service cart to be able to reclaim gas in accordance with the IEC 62271-4 regulation. For more detailed information please contact us indicating the following details:

- Type
- Year of construction
- Commission number
- Working hours



Retrofit kit for the gas recovery
(suction pump) < 1 mbar

Filter units

Pre-filter and separating units

On the assumption that contaminated or humid gas is in the circuit breaker, we recommend the use of pre-filters between switchgear and service cart. Moisture, gaseous and dusty decomposition products as well as oil aerosols are adsorbed by special dry and particle filters during the recovery operation. Thus, service carts are protected effectively against contamination as most of the moisture and decomposition products are collected.

Our pre-filter units are available as portable or mobile version. The filter cartridges can be exchanged easily.

B007R11 / B071R11

Filter unit

For adsorption of moisture and gaseous or dusty decomposition products

B007R11

Portable pre-filter unit (p_e 25 bar)

Dry filters filled with molecular sieve and aluminium oxide Al_2O_3

For adsorption of oil-aerosols, moisture and gaseous or dusty decomposition products

B071R11

Portable separating filter unit (p_e 25 bar)

Separating filters filled with activated carbon granulates and aluminium oxide Al_2O_3



Technical data:

Dimensions: L 440 mm, W 170 mm, H 690 mm

Weight: 35 kg

Standard equipment:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends

2 DILO coupling groove parts DN20 at the filter unit

Paint: orange (RAL 2004)

2 operating manuals in German, English or French

Optional accessories at an extra charge:

2 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R020
Spare filter cartridge (for dry filter B007R11)	3-899-06
Spare filter cartridge activated carbon / Al_2O_3 for B071R11	3-906-06
Spare filter cartridge (for particle filter)	3-377-08
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for B007R11 / B071R11	3-763-R001-C
-------------------------------	---------------------

3-537-R001**Mobile pre-filter unit**

For adsorption of gaseous and dusty decomposition products in large gas compartments

(p_e 25 bar)

**Technical data:**

Dimensions: L 800 mm, W 600 mm, H 850 mm
Weight: 81 kg

Standard equipment:

2 dry filters (filled with molecular sieve and aluminium oxide Al ₂ O ₃)
2 Particle filters
2 DILO coupling groove parts DN20
Ball valves DN20 for switching over
5 m long rubber hose DN20 with 2 DILO coupling tongue parts DN20
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional accessories at an extra charge:

2 m long rubber hose DN20 with coupling tongue part on both ends	6-1017-R020
Spare filter cartridge (dry filter)	3-899-06
Spare filter cartridge (particle filter)	3-377-08
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-537-R001	3-671-R001-C
------------------------	---------------------

B148R03 / R04

Mobile pre-filter unit

For adsorption of gaseous and dusty decomposition products in large gas compartments

B148R03

Mobile pre-filter unit DN20 (p_e 16 bar)

B148R04

Mobile pre-filter unit DN40 (p_e 16 bar)



Technical data:

Dimensions: L 750 mm, W 700 mm, H 1,400 mm
Weight: 140 kg

Standard equipment:

Dry filter 40 l (filled with 15 kg molecular sieve and 15 kg aluminium oxide Al_2O_3)
Particle filter
2 DILO coupling groove parts DN20
2 DILO coupling groove parts DN40 (only for B148R04)
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional accessories at an extra charge:

2 m long rubber hose DN20 with coupling tongue part on both ends	6-1017-R020
5 m long wire-braided hose DN40 with coupling tongue part DN40 on one end and coupling tongue part DN20 on the other end	6-1080-R050
Spare filter cartridge (dry filter)	K077-03
Spare filter cartridge (particle filter)	3-377-08
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for B148R03 / B148R04	3-671-R104-C
-------------------------------	---------------------

Note:

Other versions are available on request.

3-429-R011 / R012**SF₆ Cylinder heater blanket****For heating SF₆ gas bottles**

3-429-R011

SF₆ Cylinder heater blanket 220 - 240 V 1~ 50 / 60 Hz

3-429-R012

SF₆ Cylinder heater blanket 110 - 127 V 1~ 50 / 60 Hz

When removing large quantities of SF₆ gas the gas might be frozen. No problem, we offer the perfect solution.

A thermostatically controlled heater blanket heats the lower part of the gas bottle to prevent the SF₆ gas from freezing. An integrated thermostat prevents the gas bottle from being overheated.

The handling of the heater blanket is easy: it is wrapped around the SF₆ bottle and secured by means of a Velcro strap. For quick gas removal from the bottle we recommend the use of two heater blankets on top of each other.

**Technical data:**

Applicable for cylinder diameter: 200 - 240 mm
Height: 255 mm
Heater performance: 500 W
Operating voltage: 220 - 240 V 1~ / 50 - 60 Hz, 110 - 127 V 1~ / 50 - 60 Hz

Standard equipment:

Connecting line: 1 m
2 operating manuals in 3 languages (German / English / French)

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	-------------

Packing:

Packing for 3-429-R... (cardboard box)	3-948-R002
--	------------

3-558-R001 / R002

Precision gauge

For precise pressure control in gas compartments

3-558-R001

Precision gauge with hose

Indication range: 0 - 10 bar

3-558-R002

Precision gauge with hose

Indication range: 0 - 1,000 kPa

The precision gauge allows the precise control of the pressure in gas compartments. It is a very useful equipment for the operator which can be transported comfortably.



Technical data:

Case dimensions: L 390 mm, W 310 mm, H 150 mm

Standard equipment:

Precision gauge NG 160 / class 0.6

700 mm long wire-braided hose DN8

Handy transport case

2 operating manuals in 3 languages (German / English / French)

Optional accessories at an extra charge:

Coupling tongue part DN8	VK/F-02/8 P
Coupling tongue part DN20 with transition piece to DN8	6-1003-R001
Plug-in coupling tongue part DN7 with transition piece	6-1001-R001
Plug-in coupling tongue part DN12 with transition piece to DN8	6-1002-R001
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-558-R001 / 3-558-R002

3-775-R013-C

Note:

The corresponding couplings have to be ordered separately.

3-558-R010

Digital precision gauge

For pressure control in gas compartments

Indication range -1 to 10 bar

Indication in bar, kPa, psi (reversible) / class 0.1

This is the suitable equipment when precise pressure indication is required. The gauge is equipped with a coupling and hose and can be connected to the gas compartment directly.

**Technical data:**

Case dimensions: L 390 mm, W 310 mm, H 150 mm

Weight: 3.5 kg

Standard equipment:

1 m long teflon hose

DILO coupling DN20

Handy transport case

2 operating manuals in 3 languages (German / English / French)

Optional accessories at an extra charge:

5 point certificate, 11 point certificate or a DKD certificate are available as option

Coupling tongue part DN8

VK/F-02/8 P

Plug-in coupling tongue part DN7 with transition piece

6-1001-R001

Plug-in coupling tongue part DN12 with transition piece to DN8

6-1002-R001

Additional operating manual on CD-ROM

6-0004-R213**Packing:**

Packing for 3-558-R010

3-775-R012-C

K040R01

Gauge Tee piece

For pressure control of SF₆ gas

Indication range: -1 to 15 bar

This gauge is provided as connection between switchgear and service cart, particularly as completion for the Piccolo Series. As the gauge is equipped with two connecting couplings on both ends it can be connected easily.



Technical data:

Dimensions: L 140 mm, W 60 mm, H 182 mm

Standard equipment:

DILO coupling tongue part DN20

DILO coupling groove part DN20

Gauge NG 100

Note:

Other pressure ranges and nominal lengths are available on request.

B178R01

DensiControl DA

For automatic testing of switching points in density monitors

Density monitors are important components in gas monitoring. As safety equipment in switchgear they must function properly. The DensiControl DA allows quick verification of triggering of density monitor switching points by the given parameters such as pressure or temperature.

This device allows precise, quick and easy verification of the switching points. The density monitor type to be checked is selected in the data base and is then installed on the device with a quick clamping mechanism. After starting the measurement the pressure is automatically increased to filling pressure, the switching points are activated and recorded. The switching points can be stored in the system with serial number and temperature indication allowing a data file to be produced for documentation.



- Automatic test process
- Simple installation and removal of the density monitors by quick clamps
- Easy handling and menu navigation via colour touch panel (5.7")
- Storage of 50 density monitor types with their corresponding switching points
- Storage of up to 200 measuring results
- Data transmission to USB stick and data output as a test report
- Indicating pressure units can be selected
- Adjustable user languages: DE, GB and FR
- Trolley for comfortable transportation

B178R01

DensiControl DA

Technical data:

Dimensions: L 406 mm, B 538 mm, H 269 mm
Weight: 17 kg
Operating temperature: 0 °C to +45 °C
Operating voltage: 100 - 240 V / 50 - 60 Hz
Mains fuse: 2 x 3.15 A/T (time delay)
Number of density monitors to be stored: max. 50
Number of measuring values to be stored: max. 200
Interface: USB
Automatic measuring process
Pressure indication in bar p_a or p_e , psi, kPa, MPa
Accuracy of the pressure sensor (0 - 50 °C): ≤ 0.2 % FS

Standard equipment:

Transport case
Basic device with test vessel
5-measuring point certificate for pressure sensor
USB stick with file for evaluating and reading out the measuring data
1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

Different connecting sets are available on request	
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for B178R01	3-775-R003-C
---------------------	--------------

Z619R01**Digital vacuum gauge****For vacuum control in gas compartments**

Battery-operated (2 x 9 V)

Indication range: 0 - 400 mbar / class 0.1

After having evacuated the air or after the recovery of SF₆ gas the device allows precise determination of the vacuum in gas compartments. The device is protected against overpressure up to p_o 9 bar.

**Technical data:**

Case dimensions: W 360 mm, H 290 mm, D 165 mm

Weight: 5.0 kg

Standard equipment:

DILLO coupling tongue part DN20

DILLO coupling tongue part DN8

Elbow and intermediate piece DN8

Handy transport case

2 operating manuals in 3 languages (German / English / French)

Optional accessories at an extra charge:

Additional operating manual on CD-ROM

6-0004-R213**Packing:**

Packing for Z619R01

3-775-R026-C

Z340R21

Adapter kit

For connection to switchgear

Adapters in a portable plastic case for all application ranges including all gas compartment connections for SF₆ switchgear used all over the world such as DN6, DN7, DN8, DN12 and DN20. Furthermore, this kit includes self-closing and open transition pieces in different versions.



Technical data:

Case dimensions: W 500 mm, H 420 mm, D 180 mm

Weight: 8.3 kg

Standard equipment:

ASEA adapter - VK/A-02/20	6-1033-R001
Transition piece DN20 / DN8	6-1092-R007
Plug-in coupling tongue part DN12	6-1002-R001
Transition piece DN20 / DN8	3-251-R001 P
Transition piece DN8 / DN20	3-240-R001 P
Plug-in coupling tongue part DN7	6-1001-R001
Coupling tongue part DN12 / PN10	3-888-R001 T
3-408-R001 to VK/A-02/8	6-1240-R004
Air control valve with VK/A-02/8	6-1155-R001
Siemens adapter	SK-279-R003 P
Coupling tongue part DN20 to coupling tongue part DN8	6-1206-R001

Packing:

Packing for Z340R21	3-775-R013-C
---------------------	--------------

Z415R04 / R03

Gas tight cutting device

For recovery of SF₆ gas from firmly welded gas compartments

Z415R04

Gas tight cutting device

Z415R03

Gas tight cutting device with stud welding machine

This cutting device allows reliable recovery of SF₆ gas in case gas compartments - sealed for life - are to be shut down and the circuit breaker has to be disposed of in an environmentally acceptable manner. Thus SF₆ gas is prevented from escaping into the atmosphere.

In practice, the recovery device is to be mounted on the housing of the circuit breaker to be disposed of and is drilled then. After that it is possible to recover the SF₆ gas contained in the circuit breaker by means of an appropriate service cart. The recovery device is equipped with a DN20 coupling so that the service cart can be connected easily. The large cross-section enables quick recovery of the SF₆ gas.

The recovery device is a useful tool particularly for companies specialized in the disposal of GIS plants.



Z415R04

- Self-closing DILO coupling DN20
- Operation of the hard metal cutter with accumulator or hand drill
- Storage in a robust case
- Other versions are available on request

Z415R04 / R03

Gas tight cutting device

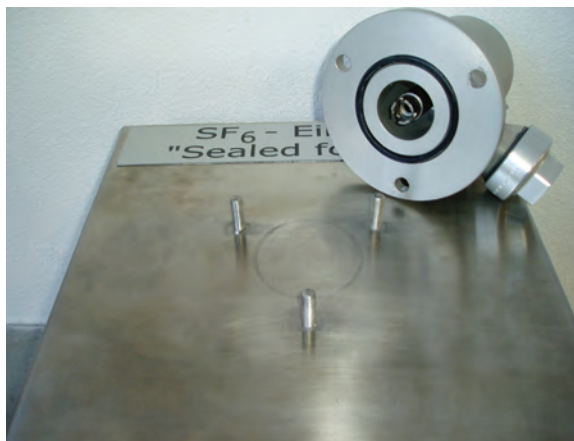
Technical data:

Dimensions of Z415R04: length: 360 mm, width: 295 mm, height: 165 mm
Dimensions of Z415R03: length: 640 mm, width: 460 mm, height: 210 mm
Weight of Z415R04: 4.8 kg
Weight of Z415R03: 24 kg
Operating voltage of the stud welding machine: 115 / 230 V / 50 - 60 Hz

Standard equipment:

Recovery device
Stencil
Hard metal cutter Ø 16 mm
Screw driver
Stud welding machine (only for Z415R03)
2 operating manuals in German or English

Example for use



Fixation of welded stud before assembly on surface



Gas recovery device mounted on the surface – ready for drilling

Note:

The gas tight cutting device is supplied without connecting hose.
The connecting hose has to be ordered separately.

Optional accessories at an extra charge:

5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
---	-------------

Packing:

Packing for Z415R03	3-775-R025-C
---------------------	--------------

3-442-R001

Working protection kit

For decomposed SF₆ gas (with neutralization)

After arc quenching in the circuit breaker solid or gaseous decomposition products are generated the operators have to be protected from effectively. This kit offers effective protection of the staff against toxic decomposition products.

**Technical data:**

Dimensions aluminium trolley: L 655 mm, W 545 mm, H 380 mm
Gross weight: 14.6 kg

Standard equipment:

Piece	Designation	Order No.
1	Aluminium trolley	5001686
2	Disposable overall	5001671*
5 pairs	Disposable overshoes	5001672*
1	Breathing half mask	5001692*
1	Protective goggles	5001693*
2 kits	Gas and particle filter for breathing half mask	1002847*
1	Valves (breathe in and out) for half breathing mask	1002848*
2 pairs	Safety gloves	5001673*
5 pairs	Gloves made of cotton stockinet	9000017*
1	Plastic barrel	5001669*
1 piece	Dustpan with brush	9000062*
5 pieces	Refuse sacks 120 liters	9000063*
2 rolls	Sucking and wiping cloths	9000065*
1 kg	Sodium carbonate	5001670*
1	Vessel for solvent	5001070*
10	Spoon	9000066*
1 pack	Indicator paper	5003235*
1	Safety helmet EN 397, red	9000487
1	1 operating manual (multilingual) on CD-ROM	

* spare material

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	-------------

Packing:

Packing for 3-442-R001	3-748-R015-C
------------------------	--------------

3-442-22 / -25

Dry vacuum cleaner

For recovery of solid decomposition products from the circuit breaker

3-442-22

Dry vacuum cleaner (230 V / 50 - 60 Hz)

3-442-25

Dry vacuum cleaner (120 V / 60 Hz)

For removal of solid decomposition products in switchgear dry vacuum cleaners with dust class H or higher are admissible. Even finest dust particles can be removed with this dry vacuum cleaner to exclude any risk to the operating personnel.



- Dust class H
- Aluminium trolley for comfortable transportation
- Easy filter exchange

Technical data:

Dry vacuum cleaner (aluminium trolley included): L 545 mm, W 480 mm, H 775 mm
Weight with aluminium trolley: 23 kg

Standard equipment:

1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

1 piece spare inlet filter for dry vacuum cleaner (dust class H)	5001682
1 spare hose, 5 m long with connecting sleeve	5001680
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-442-22 / 3-442-25	3-748-R016-C
---------------------------------	--------------

B174R..

Hose reel with spring balancer

Stationary unit for wall assembly

B174R10

Hose reel with spring balancer

with 10 m long rubber hose DN20 and coupling tongue part DN20

B174R15

Hose reel with spring balancer

with 15 m long rubber hose DN20 and coupling tongue part DN20

B174R01

Hose reel with spring balancer

without hose, for a maximum of 15 m hose DN20 with surface coating (GS0120L.....)

The useful tool has been specially adapted to customer requirements in GIS production areas to keep hoses tidy. Therefore these practical accessories allow quick hose installation in GIS production to have everything neat and clean.

The hose reel can easily be mounted and enables convenient reeling and unreeling of the desired hose length. Its optional holder can be swivelled in both directions. The integrated gastight rotary feedthrough ensures that no SF₆ gas escapes into the atmosphere.



Hinge swivelling in both directions
B174R90 (accessories)

- Stable steel frame
- Ready for wall assembly
- Equipped with DN20 connection
- Pressure range -1 up to 60 bar
- Gastight rotary feedthrough
- Comfortable reeling and unreeling of the desired hose length
- Adjustable reel up force
- Hinge swivelling in both directions (available as option)
- Different hose lengths are available

B174R..

Hose reel with spring balance

Technical data:

Dimensions: W 435 mm, H 500 mm, D 470 mm
Gewicht: 31 kg

Optional accessories at an extra charge:

Swivelling hinge for wall assembly	B174R90
1 m long angled rubber hose DN20 (from gas handling plant to hose reel)	GS0320L01000
1.5 m long angled rubber hose DN20 (from gas handling plant to hose reel)	GS0320L01500
1 m long rubber hose DN20 (from gas handling plant to hose reel)	GS0120L01000
1.5 m long rubber hose DN20 (from gas handling plant to hose reel)	GS0120L01500
DN20 quick coupling	3-1121-R003

Packing:

Packing for B174R..	3-1001-R001-C
---------------------	----------------------

Z446R..

Hose reel

Mobile unit for hose reeling

Z446R04

Hose reel for three gas compartment hoses

Z446R06

Hose reel for six gas compartment hoses

Z446R05

Hose reel for eight gas compartment hoses

The hose reel has been specially designed for optimising SF₆ gas handling and for keeping hoses tidy in GIS production. The hose distributor allows to connect several gas compartments at the same time which can be treated by means of an SF₆ maintenance device.

As the unit is equipped with four steerable rollers it can easily be transported to the desired location. The hose reel is of robust construction and can store up to eight hoses.



- Stable steel frame
- Steerable rollers allow easy transport
- With 3, 6 or 8 DN20 hoses available as option
- DN40 connecting hose to gas handling plant
- Different hose lengths are available

Z446R..

Hose reel

Technical data:

Dimensions: L 700 mm, W 700 mm, H 1,100 mm
Weight: 100 kg

Standard equipment:

Reel with four steerable rollers
Optionally available with hoses

Optional accessories at an extra charge:

5 m long wire braided hose DN40 (from gas handling plant to hose reel)	SM0140L05000
10 m long wire braided hose DN40 (from gas handling plant to hose reel)	SM0140L10000
Coupling tongue part DN40 (for DN40 hose)	VK/F-01/40 E
2 m long rubber hose DN20 (from hose reel to gas compartment)	GS0120L02000
3 m long rubber hose DN20 (from hose reel to gas compartment)	GS0120L03000
4 m long rubber hose DN20 (from hose reel to gas compartment)	GS0120L04000
5 m long rubber hose DN20 (from hose reel to gas compartment)	GS0120L05000
6 m long rubber hose DN20 (from hose reel to gas compartment)	GS0120L06000
2 m long wire braided hose DN20 (from hose reel to gas compartment)	SM0120L02000
3 m long wire braided hose DN20 (from hose reel to gas compartment)	SM0120L03000
4 m long wire braided hose DN20 (from hose reel to gas compartment)	SM0120L04000
5 m long wire braided hose DN20 (from hose reel to gas compartment)	SM0120L05000
6 m long wire braided hose DN20 (from hose reel to gas compartment)	SM0120L06000
Coupling tongue part DN20 (for DN20 hose)	VK/F-02/20 P
DN20 quick coupling	3-1121-R003

Packing:

Packing for Z446R..	3-1001-R005-C
---------------------	---------------

3-1121-R003

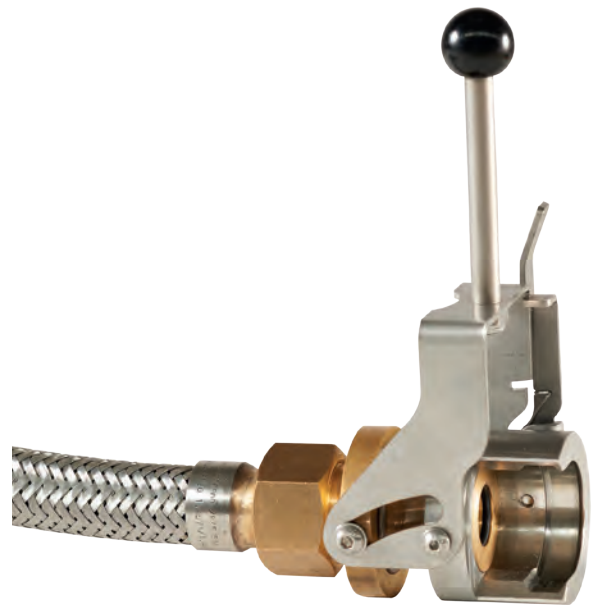
DN20 Quick coupling

For easy coupling and uncoupling of hoses

The quick coupling is very useful in all fields of application where hoses have to be frequently loosened and reconnected e. g. during final tests of completely mounted GIS fields. Thanks to the clamp lock the DN20 hoses can easily be connected without any loss of SF₆ gas. Thus the handling times in GIS production are shortened and productivity is increased considerably.



closed coupling



open coupling

Important note:

The quick coupling is only compatible with DILO coupling groove parts of version 2 (additional "V2" stamp on the flange or wrench size).

- Clamp lock for quick coupling and uncoupling
- Suitable for hoses DN20
- Pressure range up to 10 bar
- No SF₆ gas losses
- Robust version

Please see our product video



Devices for SF₆ gas monitoring



For recording of SF₆ gas consumption rates DILO offers different devices for easy and comfortable monitoring.

■ Devices for SF₆ gas monitoring

■ K091R.. Electronic bottle scales	120 – 121
■ K091R54 Weighing scales	122
■ B152R41 Mass flow measuring system	
B152R51 Mass flow measuring system (battery-operated)	123 – 124
■ B152R90 / R91 Mass flow meter with integrated filling device	125 – 126
■ B195R01 / R02 Weighing unit for "SF ₆ Monitoring Manager"	127 – 128

K091R65 / R67

Electronic bottle scales

For determination of the fill quantity of gas bottles

K091R65 (Standard)

Electronic bottle scales

Digital display with battery compartment (IP54)

K091R67 (Comfort)

Electronic bottle scales

Digital display with internal rechargeable batteries (IP65)

Integrated serial interface for data exchange or monitoring

The electronic bottle scales allow quick and easy determination of the filling capacity of a gas bottle. The large weighing platform and the supporting chain provide additional stability of the gas bottle. The weight is indicated on the illuminated display which switches off automatically if the scales are not used for a certain time. Thanks to the tare function high precision quantification of gas inputs and outputs is possible. The bottle scales can be folded in one step after use -comfortable and space-saving.



- Weighing range: up to 120 kg with tare function
- Digit increment: 10 g
- Accuracy: ± 20 g
- Weight indication reversible from kg to lbs

K091R65 / K091R67

Electronic bottle scales

Technical data K091R65:

Dimensions (if device is ready for operation): L 390 mm, W 450 mm, H 790 mm
Dimensions of weighing platform: L 300 mm, W 310 mm
Dimensions (if device is folded up): L 790 mm, W 450 mm, H 85 mm
Weight: approx. 15.8 kg
Power supply: batteries (4 x 1.5 V AA) / running time in continuous operation up to 72 hours
System of protection: IP54
Operating temperature: -10 bis +40 °C

Technical data K091R67:

Dimensions (if device is ready for operation): L 390 mm, W 450 mm, H 790 mm
Dimensions of weighing platform: L 300 mm, W 310 mm
Dimensions (if device is folded up): L 790 mm, W 450 mm, H 118 mm
Weight: approx. 15.8 kg
Power supply: internal battery (12 V / 2.5 Ah) with battery charger / running time in continuous operation up to 20 hours
System of protection: IP65
Operating temperature: -10 to +40 °C

Standard equipment:

Surface: electrogalvanizing
2 operating manuals in German, English or French

Optional accessories at an extra charge:

Plug 100 - 240 V / 50 - 60 Hz with 2 meter long cable (only K091R65)	05-1820-R026
4 m long cable with M12 plug connectors for serial data exchange (only K091R67)	05-1602-R304
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for K091R65 / K091R67	3-948-R013
-------------------------------	------------

K091R54

Weighing scales

For control of the fill quantity in 600 l gas containers

K091R54

Weighing scales

The weighing scales have been developed specially for large containers used for example in GIS production or in large substations. The weighing range of the device is up to 2,000 kg. The determined weight is indicated on the display immediately.

The integrated serial interface is a special feature allowing data communication with other DILO devices. Thus, not only the weight can be read on the service cart, but the recovery process can also be stopped via the DILO service cart after having reached the provided filling weight. Furthermore, the data can also be transmitted to the laptop or to special monitoring software. There is no easier way of SF₆ monitoring.



- Weighing range: up to 2,000 kg with tare function
- Serial interface
- Digit increment: 0,2 kg
- Accuracy: ± 0,4 kg
- Weight indication reversible from kg to lbs
- Release of the weighing system is not necessary for transportation

Technical data:

Dimensions: L 1.150 mm, W 950 mm, H 775 mm
Net weight: about 107 kg
Operating voltage: 100 - 240 V / 50 - 60 Hz
Power supply unit and internal battery operation up to 20 hours
System of protection: IP65

Standard equipment:

Fixing and steerable rollers
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional accessories at an extra charge:

4 m long cable with M12 plug connectors for serial data exchange	05-1602-R304
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for K091R54	3-1001-R005-C
---------------------	----------------------

B152R41 / R51

Mass flow measuring system

For recording gas quantities from and to the circuit breaker

B152R41

Mass flow measuring system

B152R51

Mass flow measuring system (battery-operated)

Battery operation enables an application independent of the power supply.

With this device, gas monitoring is just that simple. Gas quantities which are filled in and recovered are registered and can be transferred to a computer. The system displays the current mass flow as well as the total mass. It is also equipped with an additional meter which can be reset, add and subtract the gas quantity. Thus, the SF₆ gas monitoring is very easy.



- System can be wall or table mounted
- Coupling groove part DN20
- Measuring accuracy for gases: 0.50 % ± 0.1 kg/h
- PC-Hart modem with PC interface cable (available as option)
- Indication in kg, optionally in lbs

Technical data:

Dimensions: L 400 mm, D 280 mm, H 540 mm
Weight: 26.3 kg
System can be wall or table mounted
Indication in kg, optionally in lbs
Operating temperature: 0 to 50 °C

B152R41 / R51

Mass flow measuring system

B152R41 / B152R51

Mass flow measuring system

Standard equipment:

Coupling groove part DN20
Installed in a metal housing
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage 100 - 127 V / 50 - 60 Hz	6-0005-R119
--	-------------

Optional accessories at an extra charge:

2 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R020
HART modem (USB cable) with visualization software for PC	6-1110-R002
Indication in lbs l lbs/h	6-0005-R130
Aluminium case	3-781-R018
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for measuring device without aluminium case	3-775-R024-C
Packing for measuring device with aluminium case	3-748-R018-C



Visualization software on the PC
(6-1110-R002)



HART modem with
USB interface cable

B152R90 / R91

Mass flow measuring system

B152R90 / B152R90S15

Mass flow meter with automatic filling function

B152R91 / B152R91S15

**Mass flow meter with automatic filling function
and wireless data transmission**

The unique combination of mass flow meter and filling device facilitates the SF₆ gas monitoring considerably. This device does not only enable the registration of the quantities filled in, but allows the automatic filling of a gas compartment at the same time. Thus the operator can select the indication of the gas quantity required or the preset filling value.

After having pressed the start key, the filling quantity required flows from the gas vessel into the gas compartment automatically.



B152R91

- System can be wall or table mounted
- Easy handling via the 5.7" coloured touch screen
- Indication in kg / lbs, bar rel. / bar abs. / kPa / MPa / psi selectable on the operating panel
- Data storing of up to 100 measuring values with names
- Indication on the meter in kg, in 5 g increments, optionally in lbs
- Data transmission via USB or wireless (B152R91 / B152R91S15)

B152R90 / R91

Mass flow measuring system

B152R90 / B152R91

Mass flow meter with automatic filling function

Technical data:

Dimensions: L 400 mm, D 280 mm, H 540 mm
Weight: 29 kg
Operating temperature: 0 to 50 °C
Measuring accuracy for gases: 0.50 % ± 0.1 kg/h
Operating voltage of B152R90 : 230 V / 50 - 60 Hz alternating current
Operating voltage of B152R90S15 : 100 - 127 V / 50 - 60 Hz alternating current
Operating voltage of B152R91 : 230 V / 50 - 60 Hz alternating current
Operating voltage of B152R91S15 : 100 - 127 V / 50 - 60 Hz alternating current

Standard equipment:

DILO coupling DN20
Installed in a metal housing
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Optional accessories at an extra charge:

SF ₆ gas refilling device (for connection to storage bottle)	3-393-R...
2 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R020
Indication on the meter in lbs / lbs/h	6-0005-R130
Aluminium case	3-781-R018
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for measuring device without aluminium case	3-775-R003-C
Packing for measuring device with aluminium case	3-748-R018-C

B195R01 / R02

Weighing unit for "SF₆ Monitoring Manager"

Mobile as cylinder cart

B195R01

Weighing unit for "SF₆ Monitoring Manager" with thermal transfer label printer

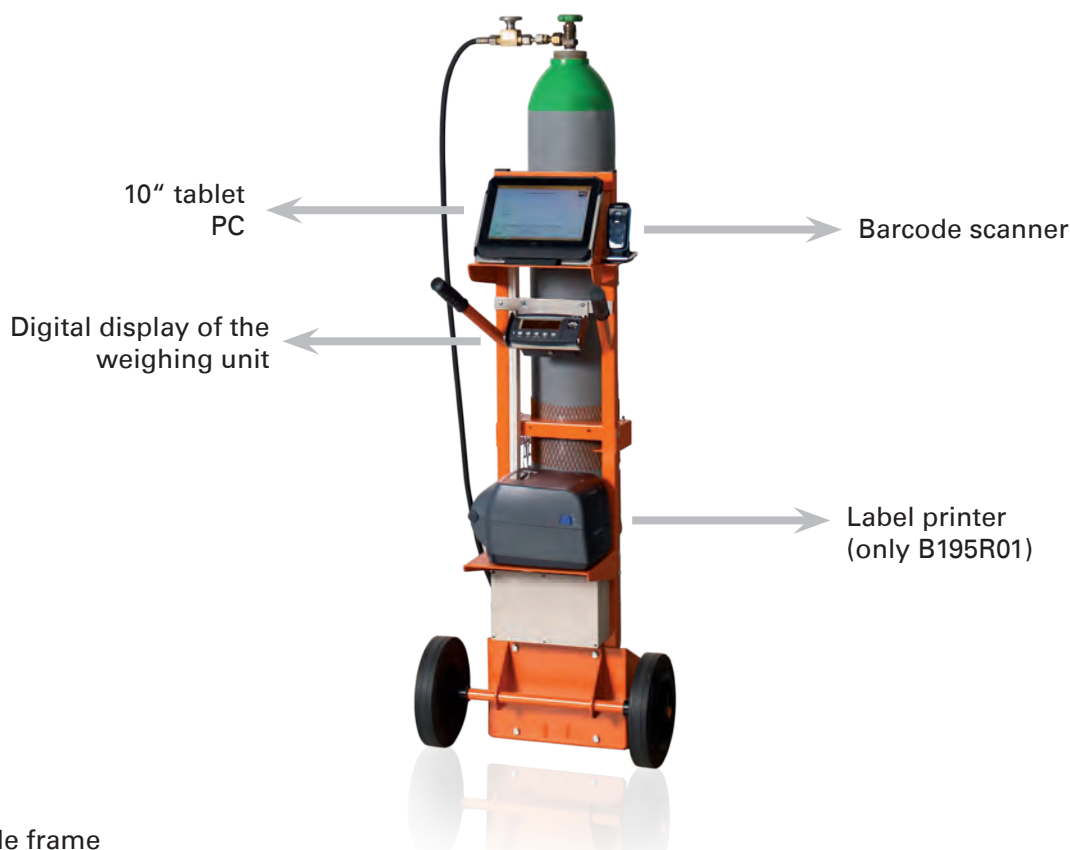
B195R02

Weighing unit for "SF₆ Monitoring Manager" without thermal transfer label printer

This weighing unit is a useful tool for the SF₆ gas bottle management in connection with the „SF₆ Monitoring Manager“, a specially developed database software. The quantity of SF₆ stored in gas bottles is precisely determined by means of electronic scales, incoming and outgoing gas vessels are identified by means of the integrated barcode scanner. The required barcode labels can be printed on site with the label printer (only B195R01).

Gas quantities being filled or withdrawn are registered by the weighing unit and are allocated to the corresponding storage location or customer location via the computer tablet. This unit also enables the registration of the gas quality (e. g. new gas or reuse gas). In filling mode any gas quantities can be withdrawn from the bottle and transferred to other gas vessels. Its difference is immediately registered in the database.

Thus it is possible to survey the gas quantities employed at any time and any location. This considerably simplifies annual reporting in accordance with the CE 1493/2007 directive.



- Stable frame
- Electronic weighing unit: digit increment 10 g, accuracy ± 20 g
- Network independent by Li-Ion battery operation
- 10" tablet computer with database connection
- 2D capable cordless barcode scanner with Bluetooth interface

B195R01 / R02**Weighing unit for “SF₆ Monitoring Manager”**

B195R01 / R02

Weighing unit for “SF₆ Monitoring Manager”**Technical data:**

Dimensions: L 650 mm, W 570 mm, H 1.320 mm
Dimensions of weighing platform: L 300 mm, W 310 mm
Weight: 45 kg
Operating voltage: 100 - 240 V / 50 - 60 Hz alternating current (for battery charger)

Standard equipment:

10" tablet computer with database connection via WLAN and Ethernet
Only for B195R01: Thermal transfer printer for label width to 100 mm, mounting plate included in the scope of supply
Electronic weighing unit
Battery operation with Li-Ion battery
2D capable cordless barcode scanner with Bluetooth interface
Paint: orange (RAL 2004)
2 operating manuals in German, English or French

Important note:

The device can only be operated in connection with the “SF₆ Monitoring Manager” software.

SF₆ Monitoring Manager:

Web-based data software for SF₆ gas monitoring (cloud solution or installation on internal server)

Initial installation	B195R10
Annual user fee including updates and online support	B195R11

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	--------------------

Packing:

Packing for B195R01 / B195R02	3-262-R006-C
-------------------------------	---------------------

SF₆ Measuring devices



A range for all requirements

DILO offers a complete range of measuring devices for all applications including: room monitoring systems, leak detectors, measuring devices to determine the SF₆ quality as well as relevant accessories for simple on-site measurement and retrofit kits for old measuring devices.

■ SF₆ Measuring devices

■ Devices for determination of the SF ₆ gas quality	131 – 144
■ Gas leak detectors	145 – 149
■ Room monitoring devices	150 – 152
■ Accessories	154 – 157

SF₆ Measuring devices

Measuring instruments are used to monitor ambient air, trace leaks and to measure the SF₆ quality of electrical operating equipment.

The SF₆ gas must always be pure since humidity and toxic or corrosive decomposition products in circuit breakers impair the insulating properties of the gas.

The gas quality has to be monitored in accordance with the EC 842/2006 directive on fluorinated gases. The IEC 60480 directive also stipulates the limit values for the re-use of SF₆ gas.

It is absolutely necessary to know the gas quality before carrying out maintenance works on a circuit breaker in order to be able to decide on preparation, re-use or disposal of the SF₆ gas.

The essential **quality criteria** for SF₆ gas in circuit breakers are as follows:

- Humidity (dew point)
- Decomposition products
- Gas purity in %



Devices for determination of the SF₆ gas quality

For verification of several parameters in one operation

3-038-R...

SF₆ Multi-Analyser without return system

3-038R-R...

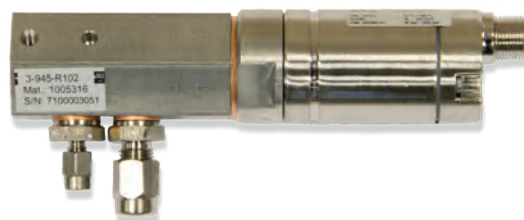
SF₆ Multi-Analyser with return system

This multi-functional device allows the determination of up to six quality parameters with only one measurement:

- SF₆ concentration (%)
- Moisture concentration
- SO₂ concentration (ppm_v)
- OPTION: HF concentration, H₂S concentration, CO concentration (in ppm_v each)

The SF₆ Multi Analyser is a user and maintenance-friendly device which guarantees high measuring accuracy.

First of all, the gas is checked for decompositions products. If critical SO₂ values are determined the measurement can be interrupted. In case of contaminated SF₆ the complete measuring gas can be recovered from the internal vessel. Thus, any contamination of the other sensors is avoided and the functionality of the device is ensured.



If the sensors have to be calibrated they can easily be exchanged by the operator on site. The device is immediately ready for use without loss of time based on the "Plug & Play" principle.

- No emissions of measuring gas
- Modular interchangeability of the sensors
- Easy handling and menu guidance via colour touch screen (5.7")
- Results of up to 100 measurements can be stored with name, date and time
- Data transmission to USB stick
- Adjustable user languages: DE, GB, FR, ES, IT, PT, CZ, PL, CN
- Trolley for comfortable transportation (3-038R-R... version)

Devices for determination of the SF₆ gas quality

3-038(R)-R...

SF₆ Multi-Analyser

Precise and correct results for subsequent measurements can be guaranteed by purging the measuring hoses prior to each measurement.

Another big advantage of the Multi Analyser is its high precision. SF₆ humidity is measured at operating pressure. Thus very precise results are obtained during a short measuring time even in the critical dew point range (< -40 °C). The dew point is calculated at ambient temperature.

The device is very maintenance friendly. The residual lifetime of the SO₂ / HF / H₂S / CO electrochemical sensors is indicated automatically. A very practical and useful device.

Note:

Devices with gas return system: The measuring gas is collected and stored in an internal vessel by means of the compressor. After measurement the stored measuring gas is pumped back automatically from the internal vessel in the gas compartment.

No SF₆ gas is released into the atmosphere!

Technical data:

Dimensions with gas return system: L 500 mm, W 625 mm, H 297 mm
Dimensions without gas return system: L 500 mm, W 625 mm, H 218 mm
Weight with gas return system: 33 kg
Weight without gas return system: 20 kg
Input pressure: p _e 0.3 - 9 bar
Operating temperature: -10 °C to +50 °C
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Operating voltage: 100 - 240 V / 50 - 60 Hz / 10 A
Mains fuse: 2 x 3.15 A/T (time delay)
Number of measured values to be stored: max. 100
Interface: USB
Measuring time: variably calculated by the system, max. 15 minutes
Limit value vol.-%: adjustable from 0.0 to 99.9 vol.-%
Limit value dew point: adjustable from -60 °C to +20 °C
Limit value SO ₂ : adjustable from 0.0 to 499.9 ppm _v
Indication of moisture concentration in dew point °C or °F, referred to atmospheric or input pressure, reversible to indication in ppm _v , ppm _M
Input pressure indication in bar p _a or p _e , psi, kPa, MPa

Standard equipment:

Transport case (trolley version only available for devices with gas return system) 6 m long connecting hose with DILO couplings DN8 and DN20 power plug with 2 m long connecting cable
USB stick with data file for evaluation and reading out of measured data
CD-ROM
1 operating manual (multilingual) on CD-ROM

3-038(R)-R...

SF₆ Multi-Analyser

Sensor data:

	Vol. %	Moisture	SO ₂	Option: HF	Option: H ₂ S	Option: CO
Operating temperature	-10 to +50 °C	-30 to +70 °C	-20 to +50 °C	-20 to +50 °C	-20 to +50 °C	-20 to +50 °C
Measuring range	0 - 100 vol.-%	-60 to +20 °C	0 - 20 ppm _v 0 - 100 ppm _v 0 - 500 ppm _v	0 - 10 ppm _v	0 - 100 ppm _v	0 - 500 ppm _v
Measuring accuracy	±0.5 vol.-%	±2 °C (at > -40 °C) ±3 °C (at < -40 °C)	< ±2 % of measuring range	< ±10 % of measuring range	< ±2 % of measuring range	< ±2 % of measuring range
Measuring gas pressure	atm. pressure	gas compartment pressure	atm. pressure	atm. pressure	atm. pressure	atm. pressure
Flow rate	0.3 - 0.5 l/h	16 - 17 l/h	1 - 3 l/h	1 - 3 l/h	1 - 3 l/h	1 - 3 l/h
Reaction time	< 2 min	< 5 min	< 20 s	< 5 min	< 20 s	< 20 s
Recommended calibration interval	every two years	every two years	every two years (lifetime)	every two years (lifetime)	every two years (lifetime)	every two years (lifetime)
Long term sensitivity drift			< 2 % per month	< 5 % per month	< 2 % per month	< 2 % per month
Overload protection	automatic	automatic	automatic	automatic	automatic	automatic

Ordering designations of the SF₆ Multi-Analyser:

Device without gas return system

3-038- R...

Device with gas return system

3-038R-R...

Single measuring device for percentage measurement 0 - 100 vol. -%	R101
Single measuring device for moisture measurement -60 °C to +20 °C dew point temperature	R102
Two-in-one measuring device for percentage and moisture measurement	R201
Three-in-one measuring device for measurement of percentage, moisture and SO ₂ with 0 - 20 ppm _v	R301
Three-in-one measuring device for measurement of percentage, moisture and SO ₂ with 0 - 100 ppm _v	R302
Three-in-one measuring device for measurement of percentage, moisture and SO ₂ with 0 - 500 ppm _v	R303
Four-in-one measuring device for measurement of percentage, moisture, SO ₂ with 0 - 20 ppm _v and HF with 0 - 10 ppm _v	R401
Four-in-one measuring device for measurement of percentage, moisture, SO ₂ with 0 - 100 ppm _v and HF with 0 - 10 ppm _v	R402
Four-in-one measuring device for measurement of percentage, moisture, SO ₂ with 0 - 500 ppm _v and HF with 0 - 10 ppm _v	R403
Six-in-one measuring device for measurement of percentage, moisture, SO ₂ with 0 - 100 ppm _v , HF with 0 - 10 ppm _v , H ₂ S with 0 - 100 ppm _v and CO with 0 - 500 ppm _v	R602

Options (please inquire separately):

All devices with percentage measuring system are additionally available for SF₆ concentrations in SF₆/CF₄ gas mixtures (measuring accuracy: ±2.0 vol. -%). Thus it is possible to switch over between the SF₆/N₂ and SF₆/CF₄ measurement.

Optional accessories at an extra charge:

Pressure reducer for SF ₆ reference gas bottle with W 21.8 x 1/14" connection	3-974-R003
Discharge gas collecting bag	B151R95
Adapter kit for measuring devices	Z340R10
6 m long connecting hose with self-closing couplings (as extension hose)	3-531-R060
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-038	3-775-R009-C
Packing for 3-038R	3-775-R024-C

Devices for determination of the SF₆ gas quality

For determination of gas purity

3-035-R020 to R025

SF₆ Analyser 973

Since the gas purity is of great importance for the insulation properties of SF₆ gas, it is absolutely necessary to control the most important parameters regularly.

The SF₆ Analyser is based on the dew point measuring principle and scores by its measuring accuracy. The device was specifically designed for moisture measurements in SF₆ switchgear.

The device is optionally available with a SO₂ sensor. Thus the SF₆ Analyser 973 is able to determine up to three parameters.

- Moisture concentration (dew / frost point)
- SF₆ volume percentage
- SO₂ concentration (optionally)



- Integrated measuring gas return system
- Comfortable operation via touch screen
- User configurable display

3-035-R020 to R025

SF₆ Analyser 973

For both humidity and purity measurements accurate and reliable condensation techniques are used.

Furthermore the SF₆ Analyser 973 is equipped with a user configurable full colour active matrix LCD with integrated touch screen.

The device is also equipped with a gas recovery system by which the measured gas can be stored in an internal tank during the measurement procedure. After completion of the measurement, the stored gas may be pumped back automatically or manually into the original compartment or into another vessel. In addition the gas compartment pressure is measured.

Calibration:

Easily check the calibration at any time using the built-in "Ice Test" function.

Technical data:

Dimensions (with handle): W 420 mm, H 155 mm, D 390 mm
Dimensions (external) with transport case: W 650 mm, H 370 mm, D 510 mm
Weight: 16.5 kg
Weight (case included): 32 kg
Measuring range: Frost / dew point: -50 °C to +20 °C however -50 °C at +35 °C ambient temperature is possible
Values are valid for measurements at atmospheric pressure
Humidity content by volume: 40 to 20,000 ppm _v
Humidity content by weight: 5 to 2,500 ppm _w
SF ₆ volume percent: 80.0 to 100.0 vol.-% SF ₆
SO ₂ module: 0...100 ppm _v or 0...500 ppm _v SO ₂
Measuring accuracy: Frost / dew point: ≤ ±0,5 °C ppm _v / ppm _w : ±1 ppm +6 % of measured value SF ₆ volume percent: ±0,5 % SO ₂ : < 2 % of the measuring range Pressure: ±30 mbar
Reproducibility: Frost / dew point: ≤ ±0.2 °C SF ₆ volume percent: ±0.3 % SO ₂ : < 4 % / year or < 2 % / month Pressure: ±10 mbar
Input pressure: p _e 0.01 to p _e 9 bar
Pressure (pumping back): max. p _e 8 bar
Ambient temperature: -10 °C to +45 °C for storage and operation
Power supply: 100 - 120 VAC / 200 - 240 VAC, 50 - 60 Hz (auto switching)
Power consumption: max. 200 watt
Ambient moisture: max. 98 % relative humidity, non condensing during operation

Devices for determination of the SF₆ gas quality

3-035-R020 to R025

SF₆ Analyser 973

Standard equipment:

Housing with handle for transportation and placing
Flow meter with automatic control valve
Internal storage vessel for measuring gas
Measuring gas recovery system
6 / 12 m long connecting hose
DILO couplings DN8 and DN20
Power plug with 3 m long connecting cable
CD-ROM with USB driver
RS 232 / USB interface for transmission of measuring data to PC
Optionally with and without SO ₂ measurement
Transport case
1 operating manual (multilingual) on CD-ROM

Device selection SF₆ Analyser 973:

Device without SO ₂ measurement with 6 m long connecting hose	3-035-R020
Device with SO ₂ measurement and 100 ppm _v measuring module with 6 m long measuring hose	3-035-R021
Device with SO ₂ measurement and 500 ppm _v measuring module with 6 m long measuring hose	3-035-R022
Device without SO ₂ measurement with 12 m long connecting hose	3-035-R023
Device with SO ₂ measurement and 100 ppm _v measuring module with 12 m long measuring hose	3-035-R024
Device with SO ₂ measurement and 500 ppm _v measuring module with 12 m long measuring hose	3-035-R025

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	--------------------

Packing:

Packing for 3-035-R...	3-775-R027-C
------------------------	---------------------

For determination of moisture

3-037-R001

Electronic moisture measuring device with dew point indication

Moisture is the most important criteria for the determination of the gas quality. This device has been designed specially for SF₆ moisture measurements. It also shows a higher resistance against contamination and SF₆ decomposition products than conventional moisture sensors and even minimises the usual long time drifting.

The integrated electronic flow meter supports the minimisation of the gas sample quantity and works independently of its position which is the optimum for gas sampling from circuit breaker. Pressure and temperature influences on the measuring result can be excluded. It is a reliable instrument which is indispensable.



- Indication in °C dew point, quick conversion into ppm values
- Measurement is possible under atmospheric or plant pressure
- Mains operation or operation by NiMH accumulators

Devices for determination of the SF₆ gas quality

3-037-R001

Electronic moisture measuring device with dew point indication

Technical data:

Dimensions (without handle): W 210 mm, H 85 mm, D 250 mm
Dimensions (transport case): W 360 mm, H 290 mm, D 165 mm
Weight: 2.8 kg
Measuring range: -70 to +20 °C dew point
Measuring accuracy: ±2 °C (from -60 to +20 °C), ± 4 °C (from -70 to -60 °C)
Input pressure: p _e 0.5 - 10 bar
Operating temperature: 0 - 50 °C
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Operating voltage: 100 - 240 V / 50 - 60 Hz

Standard equipment:

Moisture measuring device with digital display
2 precise regulating valves and electronic flowmeter
Operation: mains-operated or by NiMH batteries (battery charger is integrated)
2 m long connecting hose with couplings DN8 and DN20
Robust housing with handle for placing and transportation
2 m long connecting cable with mains plug
Black plastic transport case
1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	-------------

Packing:

Packing for 3-037-R001	3-775-R026-C
------------------------	--------------

For measurement of the volume percentage in air and nitrogen mixtures

3-027-R002

SF₆ Volume percentage measuring device

This device serves for measuring the gas purity necessary to maintain the dielectric property for arc quenching in circuit breakers. Thanks to the speed of sound measurement developed by DILO it provides results immediately. The microprocessor installed converts the values measured into the SF₆ volume percentage.

Easy rinsing after the measuring process - and the device can be used again for another gas compartment immediately.

The device can be deployed for measurements of pure SF₆ gas or SF₆ gas mixtures containing N₂ or CF₄.

In this case we kindly ask you to contact DILO.



- Easy handling
- Measurement independent of the air pressure and its position
- Response time about 1 minute
- Digital indication of the measuring values

Devices for determination of the SF₆ gas quality

3-027-R002

SF₆ Volume percentage measuring device

Technical data:

Dimensions (with handle): W 415 mm, H 155 mm, D 450 mm
Dimensions (transport case): W 535 mm, H 180 mm, D 470 mm
Weight: 10.5 kg
Weight with transport case: 14 kg
Measuring media: SF ₆ / N ₂ or SF ₆ / air-gas mixtures
Measuring range: 0 - 100 volume-% SF ₆
Measuring accuracy: ± 0.5 volume-% for SF ₆ / N ₂ -gas mixture or SF ₆ / air-gas mixture
Operating pressure: input pressure of the device without pressure regulation p _a (absolute) = 1.7 to 10 bar (p _e [effective] = 10.2 to 130.5 psi). At a pressure of p _a (absolute) = 1.2 to 1.7 bar (p _e [effective] = 2.9 to 10.2 psi) the function is still guaranteed. However, the response time increases.
Measuring pressure: The measuring process is effected under atmospheric pressure.
Operating temperature: temperature compensation of -20 °C to +50 °C (-4 °F up to +122 °F) ambient temperature
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Response time: Approx. 1 min. with a rinsed connecting hose. The response time as well as the rinsing of the connecting hose depend on the supply pressure. In the most unfavourable case at p _a (absolute) = 1.7 bar (p _e [effective] = 10.2 psi) the time to get an exact measurement is 5 min. if the rinsing valve is not operated.
Flow rate: max. 1.2 g / min. (0.04 oz / min) at 100 % SF ₆ gas and an operating pressure of p _a (absolute) = 10 bar (p _e [effective] = 130.5 psi)
Electrical connection: 220 V - 240 V / 50 - 60 Hz reversible to 110V - 127V / 50 - 60 Hz
Interface: RS232

Standard equipment:

Volume percentage measuring device with digital display
Measuring cell with electronic part
2 m long connecting hose with coupling DN8 and DN20
Housing with front and back covering with big handle for transportation and placing of the device
Mains plug with 2 m long connecting cable
Transport case
1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

Data cable for RS232 interface and CD-ROM with computer indicating programme	6-1106-R001
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-027-R002	3-775-R009-C
------------------------	--------------

Modification for discharge gas collection unit (only for devices delivered up to the middle of 2004)

It is possible to modify the device in such a way as to allow the recovery and storage of measuring gas so that the measuring gas is no longer released into the atmosphere. The B151R95 measuring gas collecting bag is suitable for storing the measuring gas.

Retrofit kit for discharge gas collection unit (modification carried out by DILO)	6-1104-R011
Retrofit kit for discharge gas collection unit (modification executed by the customer)	6-1104-R021

For measurement of the SO₂ concentration in gas mixtures

3-032-R...

Portable SO₂ measuring device with LED indication

Before maintenance works are carried out it is absolutely necessary to know the gas quality. This special equipment allows precise measurement of SO₂ in gas mixtures. Furthermore this device is very resistant against contamination and SF₆ decomposition products and is therefore a reliable instrument for each revision of circuit breakers.



- Minimization of the usual long term drifting
- No pressure and temperature influences on the measuring result
- Indication in ppm_v

Devices for determination of the SF₆ gas quality

3-032-R...

Portable SO₂ measuring device with LED indication

Technical data:

Dimensions (without handle): W 170 mm, H 85 mm, D 260 mm
Dimensions (with handle): W 210 mm, H 85 mm, D 315 mm
Dimensions (transport case): W 360 mm, H 165 mm, D 290 mm
Weight: 2.9 kg
Weight with transport case and accessories: 5.1 kg
Available measuring ranges: R101 = 0 - 20 ppm _v R102 = 0 - 100 ppm _v R103 = 0 - 500 ppm _v
Measuring accuracy: < ± 2 % of the measuring range
Operating temperature: 0 - 40 °C
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Input pressure: p _e 0.5 - 10 bar
Operating voltage: 100 - 265 V / 50 - 60 Hz
Connection: quick coupling
Response time: < 15 s (90 % of the final value)
Measuring time: < 2 minutes
Lifetime of the sensor: 6 months when storing in protective foil; 24 months operating life in air
Long term sensitivity drift: < 2 % of the SO ₂ sensor per month
Flow rate: 1 - 3 l _N / h
Rinsing function: automatic rinsing of the measuring cell with ambient air when switching off
Indication: digital LED display (24 x 48 mm)
Batteries: NiMH batteries rechargeable

Standard equipment:

SO ₂ measuring device with digital display
Operation: mains-operated or with batteries (with integrated battery charger with deep discharge protection and battery charge level indicator), automatic switchover
Automatic rinsing of measuring cell when switching off
2 m long connecting cable with mains plug
4 m long connecting hose with quick couplings DN8 and DN20
Output coupling for connecting a gas collecting unit
Robust housing with handle for placing and transportation
Black plastic case
1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	-------------

Packing:

Packing for 3-032-R...	3-775-R026-C
------------------------	--------------

For precise measurement

3-032-R003

Measuring device for different decomposition products and gas residues

During the operation of gas insulated switchgear decomposition products might occur after a breakdown which has a negative impact on the gas quality in the circuit breaker as well as on the insulation properties.

For this reason the measurement of decomposition products is very important. The measurement can be carried out easily by means of test tubes and plastic bags. The following concentrations can be measured:

- Sulphur dioxide SO_2 : 1 to 500 ppm_v
- Hydrogen fluoride HF: 1.5 to 15 ppm_v
- Oil mist: 1 to 10 mg/m³ (0.16 to 1.6 ppm_v)



- The device is supplied in a handy plastic case. Gastight couplings DN8 and DN20 are also included in the scope of supply.

Devices for determination of the SF₆ gas quality

3-032-R003

Measuring device for different decomposition products and gas residues**Technical data:**

Dimensions: W 198 mm, H 115 mm, D 165 mm
Case dimensions: W 360 mm, H 290 mm, D 165 mm
Weight without case: 2.4 kg

Standard equipment:

Measuring device for decomposition products with flowmeter and needle valve
Safety valve
Mounting for test tubes
DILO connecting couplings in DN8 and DN20
Tube opener
Connecting piece with connecting hose
2 spare O-rings
2 m long flexible connection
Black plastic transport case
1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

10 pieces test tubes for sulphur dioxide SO ₂ type 1/a; measuring range 1 to 25 ppm _v Plastic bags with a volume of 1 litre are needed (3-032-21)	3-032-15
10 pieces test tubes for sulphur dioxide SO ₂ type 20/a; measuring range 20 to 220 ppm _v Plastic bags with a volume of 1 litre are needed (3-032-21)	3-032-16
10 pieces test tubes for sulphur dioxide SO ₂ type 50/b; measuring range 50 to 500 ppm _v Plastic bags with a volume of 1 litre are needed (3-032-21)	3-032-17
10 pieces test tubes for hydrogen fluoride HF type 1.5/b; measuring range 1.5 to 15 ppm _v Plastic bags with a volume of 2 litres are needed (3-032-20)	3-032-18
10 pieces test tubes for detection of oil mist type 1/a; measuring range 1 to 10 mg/m ³ (0.16 to 1.6 ppm _{mass}) Plastic bags with a volume of 10 litres are needed (3-032-22)	3-032-19
5 pieces plastic bags with a volume of 1 litre	3-032-21
5 pieces plastic bags with a volume of 2 litres	3-032-20
3 pieces plastic bags with a volume of 10 litres	3-032-22
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-032-R003	3-775-R026-C
------------------------	---------------------

Gas leak detectors

For quick detection and measuring small SF₆ leaks

3-033-R100

SF₆ Leakcheck

3-033-R110

SF₆ Leakcheck HighSens Version

The SF₆ Leakcheck serves for detection of SF₆ leaks and allows tracing of even smallest leaks on all SF₆ components in a safe and reliable way. The detection limit of the leak system is $1 \cdot 10^{-7}$ mbar l/s (...R100) and $1 \cdot 10^{-8}$ mbar l/s (...R110). The device can be switched over from search mode to measuring mode or concentration measurement.

The Leakcheck is also suitable for the integral leak measurement in closed rooms.



- Programmable alarm threshold
- Comfortable one-hand operation
- Quick return to zero position even after detection of large leaks
- Integral concentration measurement in closed rooms is possible
- LCD touch screen / data storing
- Data transfer via serial interface

Gas leak detectors

3-033-R100 / 3-033-R110

SF₆ Leakcheck

SmartSensor

The system's wear parts are integrated in a plug-in SmartSensor which can be exchanged for maintenance by the operator within a few seconds. Since three SmartSensors are already included in the scope of supply availability of the system is increased considerably. The end of the sensor lifetime is indicated.

Technical data:

Case dimensions: W 486 mm, H 194 mm, D 398 mm
Weight (console): 12.5 kg
Weight (hand-held device): 563 g
Detector: NIC (high voltage ionisation detector)
Detection limit of leak system: up to $1 \cdot 10^{-7}$ mbar l/s or 1 ppm _v
HighSens version (3-033-R110): up to $1 \cdot 10^{-8}$ mbar l/s or 0.1 ppm _v
Response time t ₉₀ : approx. 0.5 s
Recovery time t ₁₀ : approx. 0.5 s
Alarm signal: audible signal, status LED, vibration alarm
Indication: hand-held device with analogue indication, basic unit with digital display, text indicator
Measuring data storage: approx. 100 measuring data can be stored possible transfer to PC or printer via serial interface
Self-diagnosis: suction quantity, sensor lifetime, state of battery charge, hardware failure
Battery: integrated accumulator with automatic charge control, measuring operation (approx. 10h)
Operating temperature: 0 °C to 50 °C
Storage temperature: -10 °C to 60 °C
Operating voltage: 100 - 265 V / 50 - 60 Hz

Standard equipment:

SF ₆ Leakcheck with LCD touch screen
Robust, waterproof plastic case
Hand-held device with 5 m long cable, pluggable
3 pieces of SmartSensors (calibrated)
Power cable
Calibration certificate
1 operating manual (multilingual) on CD-ROM

3-033-R100 / 3-033-R110

SF₆ Leakcheck

Optional accessories at an extra charge:

Spare SmartSensor	3-033-R101
SmartSensor (maintenance)	3-033-R102
5 m long cable extension	3-033-R103
10 m long cable extension	3-033-R104
15 m long cable extension	3-033-R105
300 mm long sensor extension	3-033-R106
500 mm long sensor extension	3-033-R107
Leak calibrator, leak rate min. $3 * 10^{-8}$, max. $1 * 10^{-2}$ mbar l /s, indication required	3-033-R108
Front filter (package 10 pieces each)	3-033-R109
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-033-R100 / 3-033-R110	3-775-R031-C
-------------------------------------	---------------------

Gas leak detectors

For quick tracing of small SF₆ leaks

3-033-R002

SF₆-LeakPointer

The cordless battery-operated device measures in six sensitivity levels within a very short response time. The device switches automatically to the next higher level of sensitivity for detection of larger leaks. It is possible to switch over the device to the most sensitive measuring range by simply pressing the corresponding key.

The SF₆ concentration is displayed next to the indication of the measuring range by an LED bar display and an audible signal.



- Quick response time
- Low "Recovery" time
- Automatic switching over to levels of sensitivity
- Detection of leaks of up to 5 g / year
- Single-handed operation
- Battery-operated
- Temperature-compensated

3-033-R002

SF₆-LeakPointer

Technical data:

Dimensions with case: B 300 mm, H 75 mm, T 230 mm
Weight with case and accessories: 1160 g
Power supply: 3 x 1.5 V alkaline batteries C LR14
Sensitivity: 5 g SF ₆ / year
Operating temperature: -20 °C to +50 °C
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Measuring principle: high voltage ionisation
Response time T90: approx. 1s
Recovery time: approx. 1s
Indication: 8 segment bar display + 7 LED measuring range indication + acoustic signal
Sensor length: 385 mm

Standard equipment:

Carrier case
Three 1.5 V alkaline batteries
Spare sensor
1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

Spare sensor	5008743
Carrier case (for replacement)	5008963
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-033-R002	6-0004-R039
------------------------	-------------

Room monitoring devices

For monitoring the air of SF₆ indoor plant in permanent operation

3-026-R115

SF₆ Air Sensor

The device even detects smallest SF₆ concentrations and displays the current measuring values permanently. For the operating personnel it is absolutely necessary to know that no radioactive source is used. Therefore no special measures must be taken during operation.

The SF₆ Air Sensor guarantees a quick reaction time. Furthermore, there is no cross sensitivity to moisture and unaffected by background contamination and the measuring result remains constant. Parameters for warning messages and alarm tripping are freely configurable.



- Measuring range: 0 up to 1,500 ppm_v SF₆
- High longtime stability
- No maintenance and consumables are required
- Indication of the measuring value via LCD on the front of the device
- Air pressure compensated
- Analogous and serial interface

3-026-R115

SF₆ Air Sensor

Technical data:

Dimensions: W 80 mm, H 150 mm, D 60 mm
Weight: 250 g
Measuring principle: NDIR (double beam)
Measuring range: 0 up to 1,500 ppm _v SF ₆
Measuring accuracy: < ±2 % of measured value
Long-time stability / drift: < ±2 % of measured value / year
Warming time: < 2 min (run-up), 15 min. (full specification)
Response time: < 2 min
Indication: directly via LCD
Operating voltage: 24 V DC, 160 mA, 3.9 W
Ambient moisture: max. 95 % relative humidity, non condensing during operation
Protection class: IP 41
Calibration / Maintenance: is not required due to the life time of sensor (about > 10 years)
Operating temperature: -10 to 40 °C

Standard equipment:

1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

Additional operating manual on CD-ROM	6-0004-R213
---------------------------------------	-------------

Packing:

Packing for 3-026-R115	3-948-R001
------------------------	------------

Important note:

The device can only be used together with the SF₆ Network Monitor. It cannot be operated autonomously.

The device can also be connected with other devices to the SF₆ Network Monitor directly in order to build up monitoring points for SF₆ gas in the room via a network for monitoring.

Room monitoring devices

Central monitoring and indication of measuring values

3-026-R114

SF₆ Network Monitor

The SF₆ Network Monitor is the central control unit from up to five SF₆ Air Sensors to be connected. Warning and alarm thresholds can be set for each SF₆ Air Sensor.

The plug-and-play operating concept makes the handling very comfortable. Measuring values can be stored and called on the 5.7" coloured touch screen, if necessary.



- Different acoustic warning, alarm and malfunction signals
- Own names for each SF₆ Air Sensor connected
- Connection between SF₆ Air Sensors and Network Monitor via bus cable with plug connectors

3-026-R114

SF₆ Network Monitor

Technical data:

Dimensions: W 250 mm, H 218 mm, D 120 mm
Weight: 2.0 kg
Indication: coloured 14.5 cm (5.7") touch screen
Connection: max. 5 SF ₆ Air Sensors via bus system
Max. length of power and bus cable: 150 m / connection
Operating voltage: 100 V - 240 V AC, 50 / 60 Hz, max. 30 VA
Ambient moisture: max. 95 % relative moisture, non condensing during operation
3 relay contacts max. charge: 2.5 A / 230 VAC
Protection class: IP 42
Sound pressure signal: > 75 dbA, 1m

Standard equipment:

1 operating manual (multilingual) on CD-ROM

Optional accessories at an extra charge:

2 m long power and bus cable	3-026-95
10 m long power and bus cable	3-026-96
25 m long power and bus cable	3-026-97
50 m long power and bus cable	3-026-98
Power and bus cable per meter	3-026-99
Connecting parts power and bus cable	3-026-89
Bus-Repeater up to 1,200 m bus length	3-026-85
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for 3-026-R114	3-948-R004
------------------------	------------

Note:

For each SF₆ Air Sensor (3-026-R115) to be connected a power and bus cable is necessary.

The power and bus cable leads from the SF₆ Network Monitor to the first SF₆ Air Sensor and then to the next SF₆ Air Sensor until the last SF₆ Air Sensor is connected.

Accessories

For mobile and preliminary storage of SF₆ measuring gas

B151R95

Discharge gas collecting bag

This bag is a simple and cost-effective system for collecting measuring gas in case it cannot be returned directly into the circuit breaker. Its handling is very easy: Connect the bag with the hose included in the scope of supply to the measuring device.

The discharge gas collecting bag allows collecting the SF₆ from up to 25 measurements. The gas can be removed by means of any service cart. When using this system no SF₆ is released into the atmosphere. It is light, practical and environmentally friendly.



- 52 l capacity
- Light folding bag for comfortable transportation
- Integrated safety valve ($p_e = 100 \text{ mbar}$)
- Self-closing miniature couplings

B151R95

Discharge gas collecting bag

Technical data:

Dimensions folded: L 300 mm, W 600 mm, H 80 mm
Dimensions filled: L 600 mm, W 900 mm, H 300 mm
Weight: 1.2 kg

Standard equipment:

2 operating manuals in German, English or French
--

Optional accessories at an extra charge:

DILO coupling DN20 with hose connection (between service cart and bag)	6-1161-R023
Adapter case for measuring devices	Z340R10
Additional operating manual on CD-ROM	6-0004-R213

Packing:

Packing for B151R95	3-948-R007
---------------------	------------

Note:

All DILO measuring devices equipped with a gas return system can be connected to the discharge gas collecting bag (see data sheets of the SF₆ Measuring devices).

Accessories

Practical kit in a portable plastic case

Z340R10

Adapter for measuring device

When using devices of different construction you will be convinced of this adapter kit. It includes different adapters to enable the connection to older measuring devices as well as pressure reducers for measuring the gas quality in SF₆ bottles. Furthermore, this kit contains adapters for retrofitting self-closing coupling systems.

A kit for all applications.



Z340R10

Adapter for measuring device

Technical data:

Case dimensions: W 360 mm, H 290 mm, D 165 mm
Weight: 4.2 kg

Standard equipment:

Hose connection DN8	3-389-R008 P
Adapter for measuring gas connection	3-969-R001
Adapter for measuring gas connection	3-969-R002
Adapter for measuring gas connection	3-969-R003
Adapter for measuring gas connection	3-969-R004
Transition piece DN20 for bottle pressure reducer	3-240-R003 P
Pressure reducer for SF ₆ reference gas bottle	3-974-R001
Manifold with self-closing couplings	3-817-R004
Manifold for measuring gas output	3-817-R005
4 m long extension hose	6-1116-R040
Instructions for the "application range of the different adapters" in two languages: German / English	

Packing:

Packing for Z340R10	3-775-R026-C
---------------------	--------------

SF₆ Valves and Couplings

Hermetically sealing connections on gas compartments

Are you looking for pressure and vacuum tight valves and couplings for SF₆ gas use? DILO is the right choice! We offer the largest range of products worldwide. Whether for medium voltage switchgear, high voltage switchgear or gas-insulated lines (GIL) our products always meet your requirements.

When using the DILO coupling system a leak rate of better than 1×10^{-8} mbar l/sec. is achieved corresponding to less than 1 cm³ in 3 years.

The DILO sealing principle prevents the loss of SF₆ gas and moisture from penetrating the SF₆ gas system. DILO couplings will eliminate the loss of SF₆ gas by incorrect gas handling. Thanks to their reliability, quality and durability DILO couplings are the world's most widely used connecting system for SF₆ switchgear.



Product range

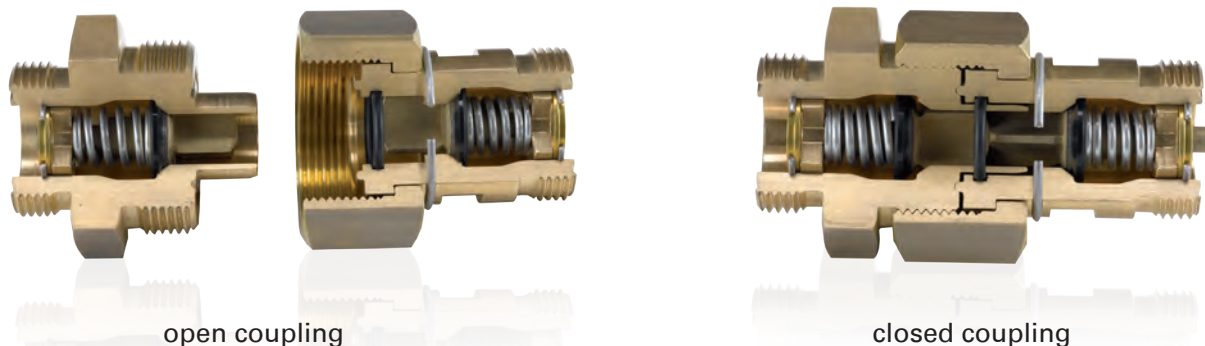
- Couplings available in DN6 to DN40 nominal diameters with different flange shapes, screw-in versions or as plug-in couplings
- Soldering unions, screw-in stubs and gauge connections for gas tight piping
- Ball valves in different versions and pressure ranges
- Pressure and vacuum-tight rubber and wire-braided hoses in different nominal diameters, lengths and finishes
- Transition pieces and adapters for different nominal diameters
- Connections for SF₆ gas cylinders
- Distribution panels and piping as well as customer specific special solutions

Our special catalogue "Valves and connections for SF₆ gas" is available as download from our website.

<http://www.dilo-gmbh.com/downloads/>



DILO sealing principle



DILO couplings allow a connection to be made by simply screwing the two coupling parts together. Before the metal-to-metal seal closes, the pressure and vacuum tight coupling is sealed inside by means of an O-ring. When loosening the coupling parts again, the same O-ring prevents gas loss whilst the self seal valves close.

Advantages of application

- Self-closing coupling system
- Pressure and vacuum-tight even when coupling and uncoupling
- Permanent tightness even when frequently connected and disconnected
- Applicable up to PN 64 bar
- Suitable for temperatures from -40 °C to +80 °C
- Direct connection to DILO service carts without adapter
- Available in different materials even for outdoor switchgear

Approvals and tests

- Certification according to ISO 9001:2008
- HP0 approval as pressure equipment manufacturer
- Production control in accordance with EC 97/23 regulations

SF₆ Leak testing units



Integral leak measurement using SF₆ gas

The integral and automated leakage measurement on serial components and assemblies is the proven strength of these systems. Even the smallest leaks are detected quickly and reliably.

■ SF₆ Leak testing units

- Model range LeakScanner

162 – 164

Model range LeakScanner

Laser-optic test method

Conventional test methods are often time consuming with the results sometimes not being precise enough or not reproducible. With leak testing units by DILO with a laser-optic measurement system and SF₆ test gas, imprecise and complicated test methods are no longer an issue. The laser-optic test method delivers fast and reproducible measurement results. It is particularly suited for quality testing and manufacturing control in the production of sophisticated serial components.

System's benefits:

- Detectable leaks to $1 \cdot 10^{-9}$ mbar l/s (dependent on chamber volume and test time)
- Detection limit of laser system < 1 ppb (0.001 ppm)
- Test results are displayed within a few minutes
- As only rough vacuum (10 - 20 mbar) is needed no expensive stainless steel chambers are required
- Degassing components, moisture and heat do not impair the test result
- In case of SF₆-filled components no handling of additional test gas is required
- The leak test can be carried out under vacuum or atmospheric pressure

Model range "LeakScanner SV" - from S to XXL

DILO builds SF₆ leak testing units for integral leak measurement using SF₆ gas in various sizes - from around 50 l to approx. 50,000 l.

The integral and automated leakage measurement on serial components and assemblies is the proven strength of these systems. Even the smallest leaks are detected quickly and reliably.

We always manufacture the systems according to customer specifications while focussing on a user and maintenance-friendly configuration. We exclusively use hermetically sealed components which do not allow emissions into the environment.

To ensure an optimal workflow, the system design is always adjusted to the customer's production environment.



Download leaflet (in English)

Vacuum test chambers

Vacuum testing of smaller components (without gas handling)

This model range with a chamber volume of approx. 50 - 500 l is the ideal solution for testing smaller components where gas handling can take place outside the test chamber.



Model range "LeakScanner SV"
without gas handling

Vacuum testing of larger components (with or without integrated gas handling)

We manufacture standard systems of this model range with a chamber volume of 500 l to approx. 10,000 l. We recommend this model range where larger components need to be tested or where integrated gas handling in the test chamber is required. In this case, the test objects are filled with SF_6 in the chamber. Gradual evacuation and filling of the test objects is also possible in order to avoid an inadmissible differential pressure between the test object and chamber.



Model range "LeakScanner SV"
with integrated gas handling

Model range LeakScanner

Atmospheric test chamber

Type "LeakScanner SA"

With atmospheric test chambers it is not necessary to evacuate air before the test process. Test chambers of this construction type can be manufactured at significantly lower cost with a significantly larger volume than vacuum chambers. We build these chambers with a chamber volume of up to 50 m³ as standard. This allows for reliable testing of even larger units and assemblies.

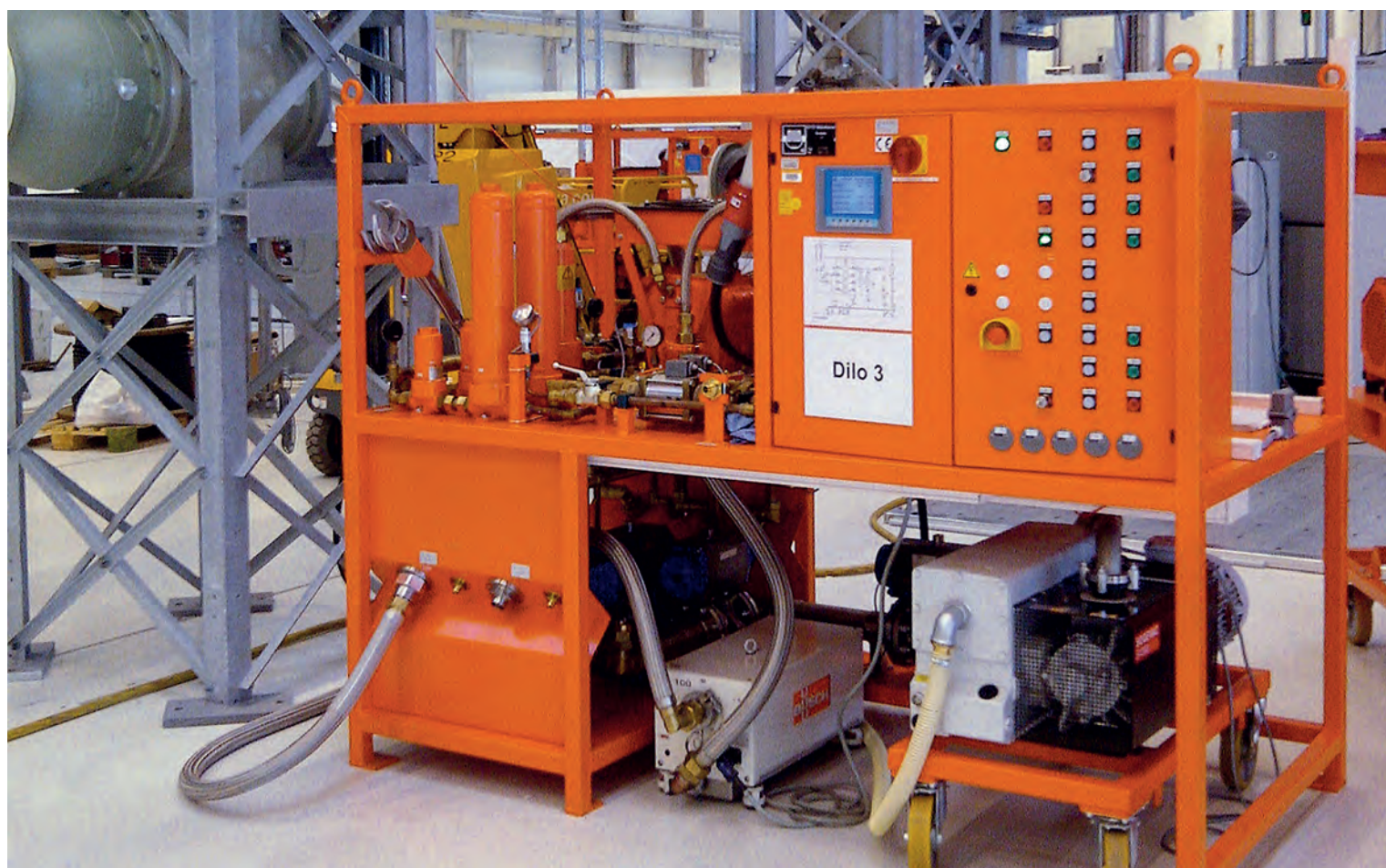
However, we also recommend atmospheric testing when delicate, vacuum-sensitive components such as devices with touch screens need to be tested for their leak tightness.

This system configuration also allows the filling of the test objects with SF₆ gas in the test chamber and subsequent recovery of the gas. However, with atmospheric pressure, the test duration is on average 10 - 30 times longer as the increase in concentration for atmospheric pressure is significantly lower.



Atmospheric test chamber with automatic roller shutter

GIS production plants



Individual complete solutions

Reliable, environmentally friendly and cost effective production prevents emissions in both GIS production and during operation..

Since 1967, DILO has been manufacturing solutions for SF₆ gas handling and has been known as the leading manufacturer worldwide of gas handling plants covering the requirements in each GIS production process.

■ GIS production plants

- GIS production plants

166 – 167

GIS production plants

Automated production process with permanent monitoring of the SF₆ quality requires intelligent and innovative SF₆ gas handling to achieve the highest economic efficiency and exemplary environmental protection. We offer high-performance, customer-specific special equipment for GIS, GIL and GIT applications.

Tailored to customers' needs:

- SF₆ gas handling equipment with automatic process control for the production of SF₆ filled plant and components
- Leak testing units for quick and precise leak detection on GIS components
- Complete product range for gas handling on gas-insulated lines (GIL)
- Accessories for gas handling plants e. g. such as hose reels, quick couplings for DN20 hoses or large filter units
- Measuring and weighing units with special software for quantifying SF₆ gas on different sites
- Separation plants for the preparation of SF₆ gas mixtures with separation efficiency of $\geq 99\%$
- Cooling systems for SF₆ insulated transformers (GIT)
- High capacity storage vessels and pressure tanks for gaseous storage of SF₆ from 1,000 to 20,000 litres
- Construction of complete shop floor piping for GIS production

You will find an overview of our SF₆ gas handling equipment and services for switchgear production in our "SF₆ Units for GIS production" leaflet. The leaflet is available for you to download.



Download leaflet

Individual complete solutions

Reliable, environmentally friendly and costeffective production prevents emissions in both GIS production and during operation.

Together with you, DILO analyses the current situation and the desired workflow in order to develop an appropriate zero emissions solution which convinces by its high efficiency. For this purpose you receive all process elements from a single source - from the planning and project development to the assembly and training.

For switchgear production DILO offers two solutions: The stand alone unit and the complete line solution for an SF₆ network for punctual gas handling of the test stations of the produced GIS units. Thus building up a production line can easily be achieved.

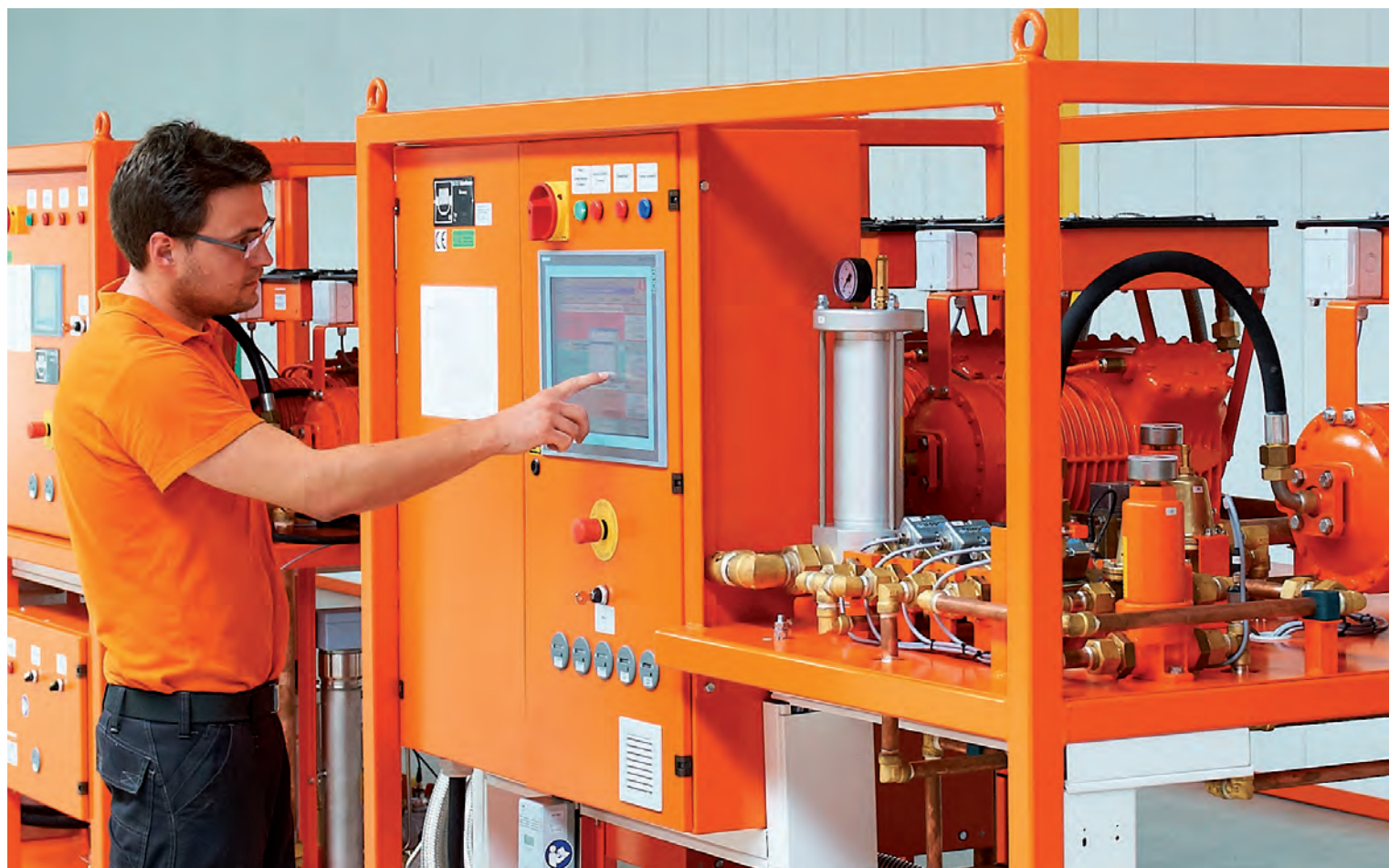


Complete line solution with central unit, storage tank and several work stations.



Powerful stand alone unit with 10 parallel ports for evacuating air, filling the gas chamber and recovery of SF₆ gas.

Special plants



Special application

Technically mature and long term experiences are the basis for individual solutions. We supply a wide range of special plants for emission-free SF₆ gas handling - exactly adapted to the requirements of our customers. We consider each new requirement as an exciting challenge we are pleased to meet.

■ Special plants

■ Separating plants	170
■ Units for gas insulated lines (GIL)	171
■ Refrigeration units for gas insulated transformers (GIT) and accelerators plants	172
■ SF ₆ units for accelerators	173

Separating plants

For purification and preparation of SF₆ gas mixtures

In practice, it often happens that the used SF₆ gas is contaminated with air by inadequate evacuation or not proper gas handling. Used SF₆ gas containing an unacceptably high percentage of nitrogen and air can be prepared by DILO Separating plants to the desired quality. It can then be reused in gas compartments and consequently, costs for storage, disposal, transportation and the expense for new gas can be minimised.

The purity degree of the prepared SF₆ gas corresponds to the following standards:

IEC 60480 – guideline for used SF₆ gas

IEC 60376 – guideline for new SF₆ gas

GB/T 12022/2006 – Chinese standard for new SF₆ gas

- Purity degree of the reclaimed SF₆ gas: $\geq 99\%$
- Gas mixtures with an SF₆ concentration of 40 - 98 % can be separated
- Automatic analysis of the gas mixture and optimisation of the separation process
- Integrated gas return system
- Version for the preparation of SF₆ / CF₄ gas mixtures is available



Download leaflet (in English)



SF₆/N₂ unit for separating SF₆-nitrogen-air mixtures.

Units for gas insulated lines (GIL)

For this special application we supply different high performance devices. Thus efficient handling of large volume GIL lines is no problem.

Product range:

- Compressed-air preparation plants for pressure tests on GIL
- Powerful vacuum pump units with Roots blower for evacuation of air (final vacuum < 1 mbar)
- Mixing and filling plants for homogenous gas mixture with an SF₆ percentage of 10 to 80 %
- High pressure recovery units (final vacuum < 1 mbar) for storage of gas mixtures up to 250 bar
- Large mobile filter units for drying gas
- Cylinder bundles for storage of gas mixtures



SF₆/N₂ mixing plant

Refrigeration units for gas insulated transformers (GIT) and accelerator plants

The essential advantage of our refrigeration units is that the cooling is carried out by means of water outside the transformer. This is to prevent the transformer from being damaged if leaks occur. The cooling systems can be connected to the gas insulated transformer directly and are optimally suited for continuous operation.

Components:

- Circulating pump: 30.0 m³/min
- 30 l dry filter with compressor
- Cooling capacity: ~ 45 kW



Refrigeration unit for cooling the SF₆ gas
in gas insulated transformers (GIT) and accelerators

SF₆ units for accelerators

We also deliver custom-tailored solutions for the SF₆ gas handling of electron accelerators. Compared to the "normal" gas handling in the energy sector, larger SF₆ gas volumes - usually several tons - have to be handled in the field of electron accelerators. Therefore, high-performance system components as well as large supply lines (up to DN 100) are needed, so that the gas volume can quickly and effectively be filled from the storage tank into the accelerator and recovered again. The SF₆ gas is filtered during operation by aid of large filter units and dried at the same time.

On customer request we connect several accelerator units over the hall piping on the central gas handling plant.

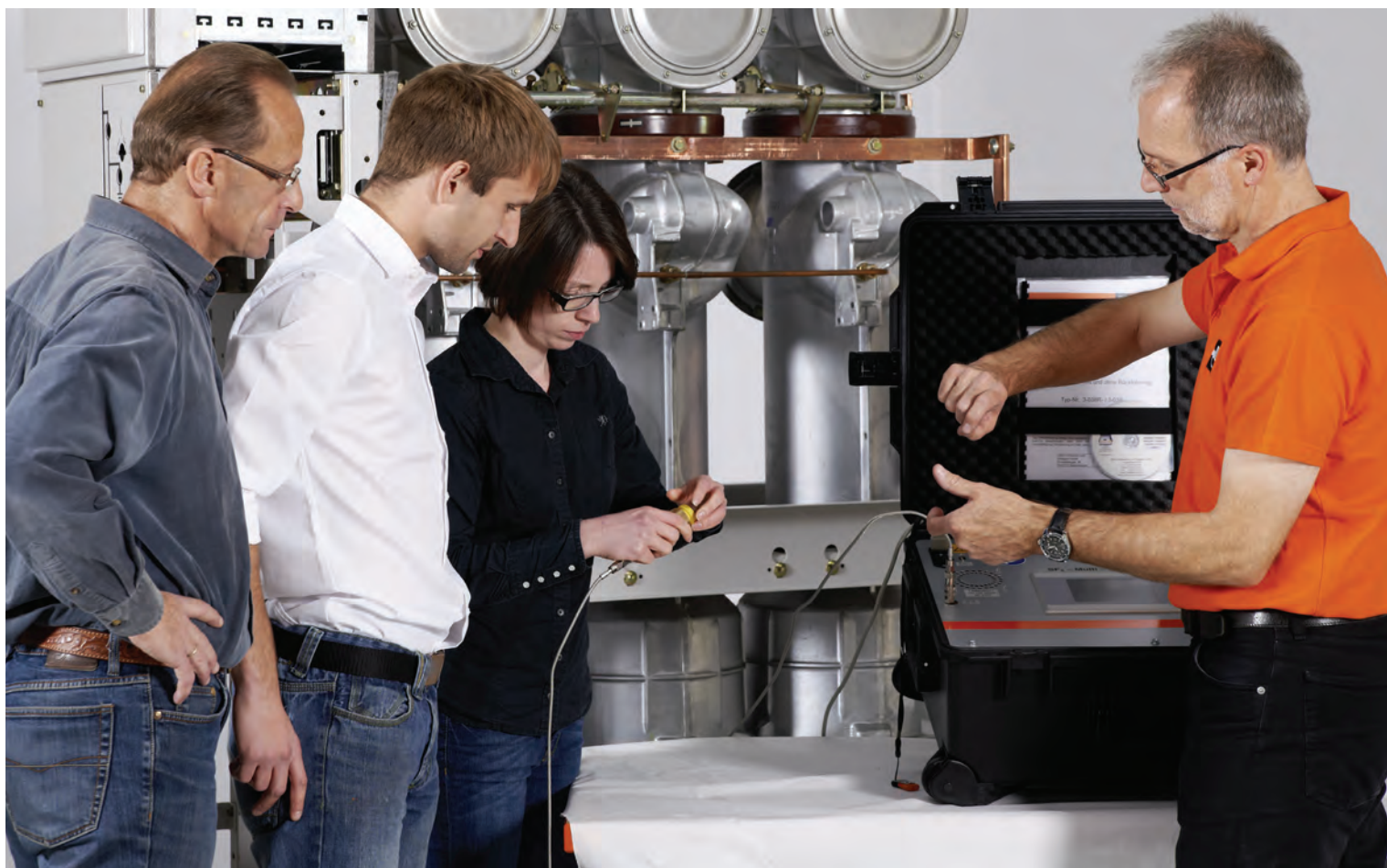


SF₆ gas handling plant for an electron accelerator



Download leaflet (in English)

Training and certification



Training at DILO

For efficient and particularly emission-free SF₆ gas handling well-trained personnel is required. Our modern and well-equipped training center offers best conditions for effective knowledge transfer.

■ Training and certification

■ SF ₆ training and certification	176
■ Customer specific trainings	176
■ E-Learning	178

Training and certification

■ SF₆ training and certification

In addition to our general trainings we also carry out trainings for the acquisition of the permission to carry out the recovery of SF₆ in accordance with the EC regulation no. 517/2014 and 305/2008 as DILO is a state accredited SF₆ certification company.

A large number of participants from power utilities and switchgear manufacturers have been qualified for the recovery of SF₆ gas in our company's training center.

Contact: training@dilo-gmbh.com



Download „SF₆ training and certification“ leaflet



■ Customer specific trainings

Training is also carried out at our customers on site, if desired or in our training center.

The training program is adapted to individual or specific customer requirements. Training can be held on site, in the DILO training center or in the service centers of our authorized foreign agents. The following topics are included: safety, transport regulations, gas handling, environmental protection and practical work.

Contact: training@dilo-gmbh.com



■ SF₆ E-Learning

In cooperation with our partner, Nine Lanterns, we have developed a training concept that enables participants to learn about SF₆ or to build on their existing knowledge of SF₆ at any time or place - on your personal timetable.

The English programme consists of a total of four modules:

Modul 1 - Understanding SF₆ gas

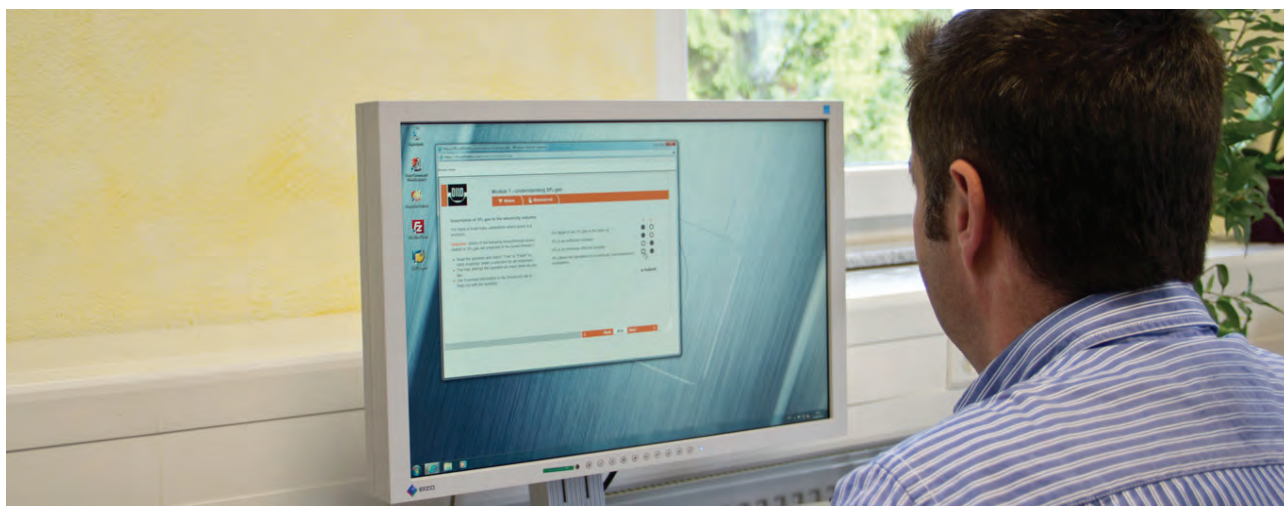
Modul 2 - Working with SF₆ gas

Modul 3 - Monitoring SF₆ gas

Modul 4 - Assessment

Important: this online training is not a substitute for a SF₆ certification and can only be passed in English language.

If you require further information or a 12-month company licence do not hesitate to contact us via:
e-learning@dilo-gmbh.com





In addition to technical services we have systematically enlarged our offer of customer specific training and certification training in the past few years.

In summary, we offer solutions perfectly adapted to each customer's requirements, generating additional benefits for you as our customers and partners.

■ Services

- | | |
|-----------------------|-----------|
| ■ Rental equipment | 180 |
| ■ Aftersales services | 181 – 185 |

Rental equipment

In case service and measuring devices are only needed for a short period of time it is possible to rent our devices. The complete equipment fulfils the necessary requirements of the IEC 62271-4 directive (recovery of SF₆ gas to min. 20 mbar). Almost all rental devices allow SF₆ gas recovery down to < 1 mbar.

The advantages of a rental are as follows:

- Fast availability of the devices
- Possibility for our customers to become familiar with the devices before buying them
- Delivery of the devices with suitable adapters for connecting the gas compartment

Our customers can choose rental equipment from a wide selection of units which include:

- Measuring devices for tracing leaks
- Measuring devices for determination of the SF₆ gas quality
- Pre-filter units
- Vacuum pump unit and suction pump units
- Service carts for liquid gas storage
- Gas mixing units for SF₆/N₂
- Storage tanks, bottles for reuse gas
- Weighing scales and flow meters
- SF₆/N₂ separating units

We also carry out training of operating personnel on site or can propose complete gas handling work to be carried out by qualified DILO personnel.

For providing service carts or other SF₆ units such as vacuum pumps for rental, a declaration of contamination of devices and components needs to be completed by the customer and returned to us. You will find the form for download on our website.

Aftersales services

■ On-site services

Our competent and experienced engineers and technicians will offer you advice and information. Repairs will be carried out either in our factory or at the customer site dependent on the effort required.

Furthermore, our SF₆ certified personnel will also put new devices into service if desired. This start up includes all functional tests as well as detailed instructions and training of the operating personnel.

Our service team is supported by specially trained personnel at our agents all over the world. This is to allow quick and efficient troubleshooting on site.

Our international service team includes more than 30 authorized service centers.

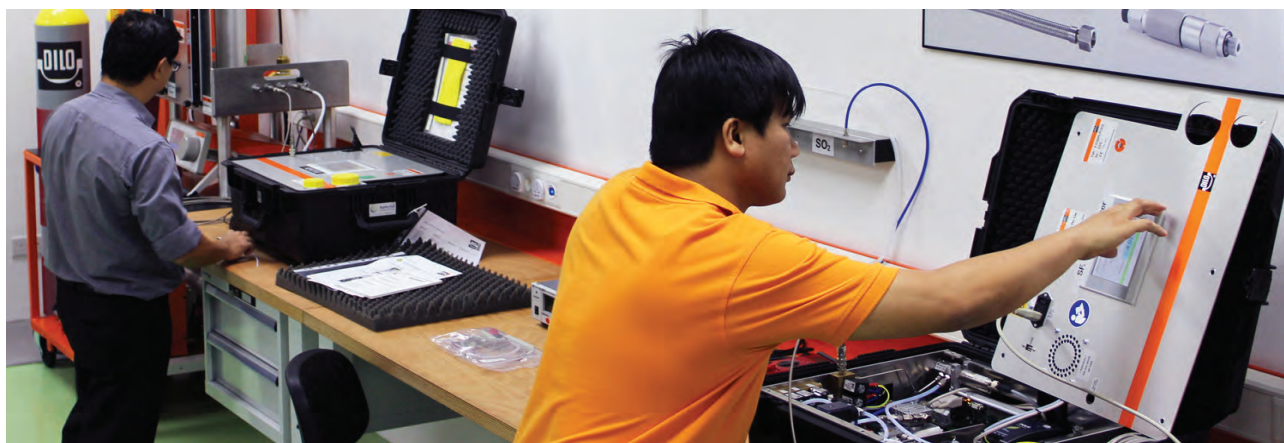


■ Preventative maintenance works

As we only use tested components which correspond to our strict quality standards maintenance requirements are minimised. To ensure a high reliability of operation we recommend preventive maintenance at regular intervals.

Special spare part kits, e. g. for overhauling compressors, vacuum pumps or filter units are part of preventative maintenance.

Regular maintenance works ensure that the devices meet the strict requirements on site. The recommended maintenance and calibration intervals are indicated in the corresponding operating manual of the devices. The measuring devices are calibrated in our works as well as in our service center DILO Asia-Pacific Pte. Ltd. in Singapore and by DILO Company, our North American agency.



Aftersales services

■ Maintenance contracts

It is, however, often recommended to conclude a maintenance contract, especially if a number of devices and installation units can be included. In this case the maintenance works are carried out by our qualified specialised staff. Advantage for our customers: Your own personnel can be deployed elsewhere and your devices are always “up-to-date”.

■ Repair at DILO

Generally, comprehensive maintenance works are carried out in our premises. In case it is necessary to repair service carts or components, such as compressors or vacuum pumps, the customer has to complete a declaration on the contamination of the devices and components returned to DILO.

■ Flexible spare parts logistics

In case of a breakdown or preventive maintenance works being carried out, spare parts can be made available immediately without any problems. Standard parts such as filter cartridges, gaskets or valves are always in stock and can be sent to the customer within a short time. Furthermore, important spare parts are in store at the service centers of our agents abroad.

Spare parts for DILO devices are available for a period of at least 10 years after purchase.



■ SF₆ gas handling on site

Our service package includes comprehensive services. Within Europe we also carry out SF₆ gas handling as a service. Our personnel certified in accordance with the regulation EC no. 305/2008 carry out all works required on site.

This includes measurement of the gas quality, recovery, purification and drying the gas with our service carts, intermediate storage in gas tanks and return to the gas compartment after previous measurement.

We offer our services in case

- the purchase of gas handling devices is generally unviable,
- devices are already available, but no personnel is available (where help or support is needed),
- personnel certified in accordance with the CE 305/2008 regulation are not yet available,
- the SF₆ gas handling should generally be carried out by a specialist.

We certainly comply with the EC regulation on certain fluorinated greenhouse gases 517/2014. The gas is completely reclaimed without loss of gas. Our principle is: "Zero Emission".

■ Preparation of SF₆ gas

Practically SF₆ gas is quite often contaminated with air by inadequate evacuation or incorrect gas handling. Consequently it is absolutely necessary that the SF₆ gas complies with the purity specification (IEC 60480) which means the other gases such as air or nitrogen must be removed. For such applications we can offer the corresponding services.

For larger gas quantities it is recommended to carry out separation works on site. For this purpose the following options can be offered:

1. Rental of a SF₆ / N₂ separating plant and our technicians carry out the separation of the SF₆-air mixture on site.
2. Rental of a device including instruction of the operating personnel. Then the separation works are carried out by the customer.
3. The preparation of gas is carried out in our premises. The SF₆ gas is either returned to the customer or reclaimed by DILO. A certificate on the gas quality and reclaimed gas quantity is issued (F-gas monitoring).



■ Leak tests

Leak tests of components are also carried out in our factory, if desired. This service is advantageous in case only a few parts are to be tested and the purchase of a plant is unviable.

The results measured are reported in a test certificate.

Aftersales services

■ Retrofit

Our guideline is to "save money and protect our environment". Special modules allow the retrofit of old service and maintenance devices in accordance with the IEC directives (recovery to min 20 mbar).

In this way the maintenance of switchgear is carried out in accordance with the latest requirements without any emissions to the environment. Service carts are mostly retrofitted so that gas recovery to < 1 mbar is possible and the value recommended by the IEC is even exceeded.

The retrofit of old service carts is only carried out in our factory.

■ Online registration of device

The online registration enables DILO customers to have new equipment registered so that all relevant information and spare parts are made available in no time, if necessary!



Here you can register your device online

■ Global service centers

The DILO service center DILO Asia-Pacific Pte. Ltd. carries out the after sales service for SF₆ service and measuring devices in the Asia-Pacific region. Our service team is supported by specially trained personnel at our agents all over the world. With more than 30 agents who have been qualified as authorized service centers allow quick and efficient troubleshooting on site.

All standard spare parts are also available in our service centers all over the world.



Agents worldwide

Service Hotline

Our technical after-sales-service is available:

Monday - Thursday: from 7:00 h – 16:00 h CET

Friday: from 7:00 h – 12:00 h CET

Phone : +49 83 33 - 302-94

E-mail: service@dilo-gmbh.com

The type of the devices, commission number of service carts and the serial number of measuring devices are very important for our service team to support you immediately.



For your notes

If you want to stay up to date regarding our product range,
just subscribe to our newsletter on www.dilo-gmbh.com/news.



High pressure tube unions

High pressure tube unions are DILO's second core competence.
For further information please ask for our special catalogue.



Valves and couplings for SF₆ gas

For further information please ask for our special catalogue.

DILO
Armaturen und Anlagen GmbH

Frundsbergstrasse 36
D-87727 Babenhausen/Bayern

Phone: + 49 83 33 - 302-0
Fax: + 49 83 33 - 302-52
E-mail: info@dilo-gmbh.com

