

ONE VISION. ZERO EMISSIONS.



Solutions and systems for the handling of:

SF₆ GAS



50 PLUS YEARS
SF₆ GAS HANDLING

QUALITY. MADE IN GERMANY.



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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 trust in quality, innovation, reliability and flexibility.

SF₆ INFORMATION / GENERAL

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■ SF₆ – A GAS WITH UNUSUAL PROPERTIES

SF₆ gas is a synthetically produced insulating and arc quenching gas with substantial 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.

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

- SF₆ is a fluorinated gas (F gas) with the highest global warming potential
- It is one of the six gases subject to monitoring under the Kyoto protocol
- Relating to the greenhouse effect, 1 kg SF₆ corresponds to a GWP value more than 22,800 times higher than of 1 kg CO₂.

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 / PARIS CONVENTION

SF₆ gas is listed in the Kyoto protocol as one of the six greenhouse gases subject to monitoring. SF₆ has to be used in closed systems in order to avoid emissions. 191 member states agreed to extend the Kyoto protocol until 2020 with the aim of reducing the emission of greenhouse gases.

The Paris Convention agreed to reduce climate-damaging greenhouse gases under the United Nations Framework Convention on Climate Change (UNFCCC) as of 2020. 195 member states negotiated and adopted this agreement on the twenty-first session of the Conference of the Parties under the framework convention on climate change in Paris on 12 December 2015.

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.

IEC 60480:2019 – Re-use of SF₆ gas

Substance	Concentration		
	Pure SF ₆	SF ₆ /N ₂ mixtures	SF ₆ /CF ₄ mixtures
SF ₆	> 97 Vol.-%	± 5 % from the nominal value	± 5 % from the nominal value
Air and CF ₄ / Air and N ₂	Air and/or CF ₄ : < 30.000 µl/l		Air and/or N ₂ : < 30.000 µl/l
H ₂ O	< 200 µl/l (-36°C frost point @ 1 atm)		
Mineral oil	10 mg/kg		
Total quantity of reactive, gaseous decomposition products (expressed in HF equivalent)	50 µl/l total or 12 µl/l for (SO ₂ +SOF ₂) or 25 µl/l HF		

Reference: IEC 60480:2019

µl/l ≙ ppm_v



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 current F-gas regulation (EU) 517/2014, valid as of 1 January 2015, shall replace the former F-gas regulation 842/2006. The new regulation shall be binding and directly applicable in all EU member states. It contains extended obligations which are relevant for switchgear manufacturers, maintenance companies and facility operators alike. The regulation still aims at the prevention of emissions.

The DILO delivery program comprises products and services which will support you in effectively implementing the current directive.

CERTIFICATION IN ACCORDANCE WITH THE (EU) 517/2014 F-GAS REGULATION AND (EU) 2015/2066 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) 2015/2066.

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) 1191/2014

Article 19 of the F-Gas Regulation No. 517/2014 states that the use of the SF₆ gas must be reported to the European Commission for imported quantities of 500 t CO₂ equivalent (approx. 22 kg SF₆) in systems/products or more and for imported quantities of 100 t CO₂ equivalent (approx. 4.4 kg SF₆) as bulk (cylinders, containers...) or more each year by 31 March of the following year. Exported quantities must be reported by the producer for quantities of 100 t CO₂ equivalent (approx. 4.4 kg SF₆) as bulk (cylinders, containers...) or more.

For the registration of SF₆ gas consumption and its stock management, DILO offers different devices and the corresponding software (see the "devices for SF₆ gas monitoring" paragraph). Furthermore, the used SF₆ gas can be prepared. You will find more detailed information in our "Purification and preparation of SF₆ gas mixtures" chapter.

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



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

SF₆ GAS REFILLING AND EVACUATING DEVICES

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■ SF₆ GAS REFILLING DEVICE

For reliable refilling of SF₆ gas by overpressure

3-393-R001

SF₆ gas refilling device for high voltage

Portable with rubber hose and couplings DN8 and DN20, Pressure range 0 up to 10 bar

3-393-R002

SF₆ gas refilling device for high voltage

Portable in a case with rubber hose and couplings DN8 and DN20, Pressure range 0 up to 10 bar

3-393-R115

SF₆ gas refilling device for medium voltage

Portable in a case with rubber hose and couplings DN8 und DN6, Pressure range 0 up to 2,5 bar



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, psi and kPa, 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
- Primary gauge NG63, class 1.6 / Secondary gauge NG100, class 1.0
- Available as accessories for the world's most commonly used bottle connections



3-393-R001 / 3-393-R002 / 3-393-R115

SF₆ gas refilling device

Technical data:

Case dimensions: L 500 mm, W 420 mm, H 180 mm
Weight: 7.5 kg

Standard equipment for 3-393-R001 and 3-393-R002:

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, kPa,psi
operating manual
Transport case (only for 3-393-R002)

Standard equipment for 3-393-R115:

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 DN6
Gauge indication in bar, kPa, psi
operating manual
Transport case

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	6-0004-R213

Packing:

Packing for 3-393-R001	3-948-R006
Packing for 3-393-R002 and 3-393-R115	05-1990-R003

Note:

Other versions are available on request.

■ 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, psi and kPa, 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. During the refilling process emissions are avoided by self-closing couplings.



- 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
- Primary gauge NG63, class 1.6 / Secondary gauge NG100, class 1.0



3-001-R001 / R002

SF₆-Gasnachfüllgerät

Technical data:

Dimensions: L 480 mm, W 540 mm, H 1,360 mm
Weight: 30 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), indication in bar / psi / kPa
DILLO coupling tongue parts DN8 and DN20
Paint: orange (RAL 2004)
operating manuals

Optional accessories at an extra charge:

American SF ₆ bottle connection with 0.96" Whitworth left-handed thread	3-334-R002 P
Chinese SF ₆ bottle connection with G 5/8 thread	3-643-R002 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R004 P
Additional operating manual	6-0004-R213

Packing:

Packing for 3-001-R001 / 3-001-R002	3-262-R001-C
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■ SF₆ GAS REFILLING DEVICE

For refilling switchgear with SF₆ gas by overpressure

3-001-R021

SF₆ gas refilling device with electronic weighing scales 0 - 120 kg

Mobile as cylinder cart with wire-braided 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, psi and kPa. 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 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.



- Stable frame
- Accuracy of the weighing scales ±20 g, 10 g increments
- Integrated serial interface for data exchange or monitoring
- 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
- Primary gauge NG63, class 1.6 / Secondary gauge NG100, class 1.0



3-001-R021

SF₆ gas refilling device

Technical data:

Dimensions: L 720 mm, W 570 mm, H 1,360 mm
Weight: 40 kg
Weighing range: 0 - 120 kg with tare function / accuracy: ± 20g
Digital display with internal battery (IP65)
Integrated serial interface for data exchange or monitoring
Weight indication reversible from kg to lbs
Power supply: internal battery (12 V / 2.5 Ah) with battery charger / running time in continuous operation up to 20 hours
Protection class: IP65
Operating temperature: -10 to +40 °C

Standard equipment:

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), indication in bar / psi / kPa
DILO coupling tongue parts DN8 and DN20
Paint: orange (RAL 2004)
operating manual

Optional accessories at an extra charge:

American SF ₆ bottle connection with 0.96" Whitworth left-handed thread	3-334-R002 P
Chinese SF ₆ bottle connection with G 5/8 thread	3-643-R002 P
English SF ₆ bottle connection with G 5/8 thread	3-245-R004 P
4 m long cable with M12 plug connectors for serial data exchange	05-1602-R304
Additional operating manual	6-0004-R213

Packing:

Packing for 3-001-R021	3-262-R006-C
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EVACUATING AND REFILLING DEVICE

Zum Evakuieren von Luft und Füllen von Gasräumen aus SF₆-Gasflaschen durch Überdruck

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 - 120 kg

Mobile as cylinder cart

3-001-4-R122

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 DILLO 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. 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.



- Stable frame
- Accuracy of the weighing scales ±20 g (±50 g only for 3-001-4-R122), 10 g increments
- Integrated serial interface for data exchange or monitoring
- 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
- Primary gauge NG63, class 1.6 / Secondary gauge NG100, class 1.0



EVACUATING AND REFILLING DEVICE

3-001-4-R002 / R022 / R122

Evacuating and refilling device

Technical data 3-001-4-R002:

Dimensions: L 540 mm, W 570 mm, H 1,360 mm
Weight: 63 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: 73 kg
Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current
Weighing range: 0 - 120 kg with tare function / accuracy: ± 20g (only for 3-001-4-R022)
Weighing range: 0 - 150 kg with tare function / accuracy: ± 50g (only for 3-001-4-R122)
Digital display with internal battery (IP65)
Integrated serial interface for data exchange or monitoring
Weight indication reversible from kg to lbs
Power supply: internal battery (12 V / 2.5 Ah) with battery charger / running time in continuous operation up to 20 hours
Protection class: IP65
Operating temperature: -10 to +40 °C

Standard equipment:

vacuum pump for air (16 m ³ /h [at 50 Hz]; 19m ³ /h [at 60 Hz]), final vacuum < 1 mbar
Ball valve with hand wheel
Gauge 0 to -1,200 mbar
Two 6 m long wire-braided hoses DN8
DILO 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), indication in bar / psi / kPa
Paint: orange (RAL 2004)
Electrical connecting cable 3 m
operating manual

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

■ EVACUATING AND REFILLING DEVICE



3-001-4-R002 / R022 / R122

Evacuating and refilling device

Optional accessories at an extra charge:

American SF ₆ bottle connection with 0.96" Whitworth left-handed thread	6-0005-R030
Chinese SF ₆ bottle connection with G 5/8 thread	6-0005-R138
English SF ₆ bottle connection with G 5/8 thread	3-245-R004 P
4 m long cable with M12 plug connectors for serial data exchange	05-1602-R304
Electrical connecting cable 3 x 1.5 AWG 13 (available lengths 5 - 50 m)	6-1053-R001
operating manual	6-0004-R213

Spare parts kit:

Annual maintenance package for vacuum pump	6-1048-R111
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Packing:

Packing for 3-001-4-R002	3-262-R001-C
Packing for 3-001-4-R022 / R122	3-262-R006-C

For the safe filling and refilling of porcelain insulators in outdoor switchgear

B190R11

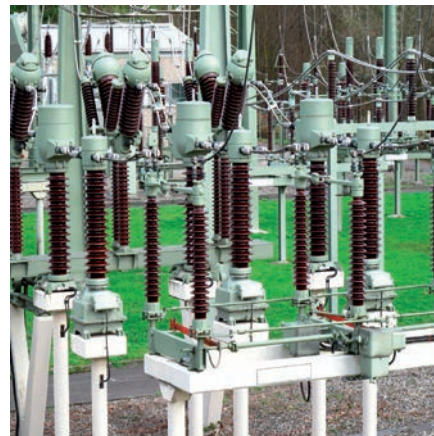
Remote commissioning unit

Finest hairline cracks may occur on porcelain insulators for circuit breakers or other SF₆ insulated electrical equipment such as measuring or current transformers during transportation or as a result of material stress. Filling the gas compartment with SF₆ may lead to dangerous bursting of the insulator.

Thanks to the “CommGuard Web” filling unit it is now possible, for the very first time, to fill porcelain insulators in a controlled and safe way from a distance of up to 100 m. This unit enables the operator to control and monitor the fully automated filling process using a smartphone, tablet or laptop from outside the danger zone.

The device is equipped with an external temperature sensor and fills the gas compartment to a constant gas density. The temperature-compensated filling pressure is thus achieved with a precision of ± 50 mbar. Furthermore, there is the option of connecting DILO weighing scales to the unit and the gas quantity filled in can be precisely recorded (e.g. K091R67, 3-001-R021 ± 20 g).

Different types of gas compartments can be added and recalled in the data base. Data recording completes the functions of the compact unit and sets new quality standards.



Safe and controlled filling of porcelain insulators by means of the “CommGuard Web” unit

- Robust and light portable unit with integrated storage space for accessories
- Simple operation using smartphone, tablet or laptop via WLAN
- Visual and acoustic signalling of system conditions on site
- Temperature compensation of the filling pressure
- Recording of the SF₆ weight
- Data connection via FTP interface


B190R11**Remote commissioning unit****Technical data:**

Dimensions: W 500 mm, H 190 mm, D 295 mm
Weight: 8 kg
Operating temperature: 0 to 50 °C
Pressure range: max. 10 bar absolute
Max. WLAN range: up to 100 m depending on local conditions
Measurement accuracy: pressure ± 0.05 bar
Operating voltage: 110 - 240 V / 50 - 60 Hz alternating current

Standard equipment:

DILO couplings DN8 for storage cylinders and gas compartments
Gas compartment temperature recording: 0 to 50 °C
Weight recording via easy connection for WE100 scales (e.g. K091R67, 3-001-R021)
2 operating manuals in German or English

Optional accessories at an extra charge:

SF ₆ gas refilling device (for connection to storage cylinders)	3-393-R...
2 m long rubber hose DN8 with DILO coupling tongue part DN8 on both ends	6-1042-R020
Detached WLAN antenna with magnetic base	05-1850-R001
4 m long cable with M12 connectors for serial data exchange with WE100 scales	05-1602-R304
Additional operating manual	6-0004-R213

Packing:

Packing for B190R11	05-1990-R003
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For evacuation of air or nitrogen

B046R03

Mobile vacuum pump unit with ball valve

B046R13

Mobile vacuum pump unit with solenoid valve

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 (standard version) enables a final vacuum of < 1 mbar. Thus it is guaranteed that no air/gas mixture can be generated and the excellent insulation properties of SF₆ are maintained. The 2-stage vacuum pump (available as option) even reaches a final vacuum of 0.0067 mbar.

The B046R13 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.

Both versions are available in different performance classes (see optional equipment), so that all requirements can be easily met.



- 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 (B046R13)
- Digital vacuum indication in mbar
- With practical storage tray for accessories

MOBILE VACUUM PUMP UNIT

B046R03 / R13

Mobile vacuum pump unit

Technical data for 40 m³/h vacuum pump, final vacuum < 1 mbar:

Dimensions: Length 890 mm, Width 610 mm, Height 1,050 mm
Weight: 115 kg
Operating voltage: 208 - 240 V / 380 - 460 V / 50 - 60 Hz 3-phase current

Standard equipment:

Vacuum pump for air 40 m ³ /h [at 50 Hz]; 48 m ³ /h [at 60 Hz], final vacuum < 1 mbar
Digital vacuum indication in mbar
Ball valve DN20
5 m long hose DN20
DILO coupling tongue part DN20
Electric control
Fixing and steerable rollers
Storage tray for accessories
Different wrenches
Paint: orange (RAL DESIGN 2004)
Operating manual

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage 208 - 240 V / 50 Hz 3-phase current (40 m ³ /h, < 1 mbar)	6-0005-R039
Vacuum pump 63 m ³ /h [at 50 Hz]; 76 m ³ /h [at 60 Hz], final vacuum < 1 mbar, 3-phase current (208 - 240 V / 60 Hz, 380 - 460 V / 50 - 60 Hz)	6-0005-R050
Vacuum pump 63 m ³ /h [at 50 Hz]; 76 m ³ /h [at 60 Hz], final vacuum < 1 mbar, 3-phase current (208 - 240 V / 50 Hz)	6-0005-R167
Vacuum pump 100 m ³ /h [at 50 Hz]; 120 m ³ /h [at 60 Hz], final vacuum < 1 mbar, 3-phase current (208 - 240 V / 60 Hz, 380 - 460 V / 50 - 60 Hz)	6-0005-R051
Vacuum pump 100 m ³ /h [at 50 Hz]; 120 m ³ /h [at 60 Hz], final vacuum < 1 mbar, 3-phase current (208 - 240 V / 50 Hz)	6-0005-R168
Two-stage vacuum pump with exhaust filter, type RH0060, final vacuum 0.0067 mbar, nominal suction capacity (55 m ³ /h [at 60 Hz]; 65 m ³ /h [at 60 Hz]), 3-phase current (208 - 240 V / 50 - 60 Hz, 380 - 460 V / 50 - 60 Hz)	6-0005-R170
Two-stage vacuum pump with exhaust filter, type RH0090, final vacuum 0.0067 mbar, nominal suction capacity (80 m ³ /h [at 50 Hz]; 95 m ³ /h [at 60 Hz]), 3-phase current (208 - 240 V / 50 - 60 Hz, 380 - 460 V / 50 - 60 Hz)	6-0005-R171
Other operating voltages are available on request	

Optional accessories at an extra charge:

SF ₆ gas refilling device	3-393-R001
Plastic cover	6-046KA-R001
Electrical connecting cable 5 x 2.5 AWG 13 (available lengths 5 - 30 m)	6-1053-R002
Additional operating manual	6-0004-R213



B046R03 / R13

Mobile vacuum pump unit

Spare parts kits:

Annual maintenance package for standard vacuum pump (40 m ³)	6-1048-R112
Annual maintenance package for vacuum pump 6-0005-R050 (63m ³) / 6-0005-R051 (100 m ³)	6-1048-R113
Annual maintenance package for two-stage vacuum pump 6-0005-R170 RH60	6-1048-R116
Annual maintenance package for two-stage vacuum pump 6-0005-R171 RH90	6-1048-R117

Packing:

Packing for B046R03 / B046R13	3-748-R001-C
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MOBILE VACUUM PUMP UNIT

For evacuation of air or nitrogen

B046R20

Mobile vacuum pump unit

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 m ³ /h (at 50 Hz), 240 m ³ /h (at 60 Hz), final vacuum < 1 mbar
Digital 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)
operating manual

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage	6-0005-R039
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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
Electrical connecting cable 5 x 2.5 AWG 13 for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R002
Electrical connecting cable 5 x 6 AWG 9 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R003
Additional operating manual	6-0004-R213

Spare parts kit:

Annual maintenance package for vacuum pump	6-1048-R121
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Packing:

Packing for B046R20	3-748-R017-C
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MOBILE VACUUM PUMP UNIT

For evacuation of air or nitrogen

Z300R11

Fahrbarer Vakuumpumpenstand

Nominal suction capacity (160 m³/h [at 50 Hz]; 190 m³/h [at 60 Hz]) vacuum pump

Nominal suction capacity (250 m³/h [at 50 Hz]; 300 m³/h [at 60Hz]) Roots pump

Z300R12

Fahrbarer Vakuumpumpenstand

Nominal suction capacity (200 m³/h [at 50 Hz]; 240 m³/h [at 60 Hz]) vacuum pump

Nominal suction capacity (500 m³/h [at 50 Hz]; 600 m³/h [at 60 Hz]) 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 / R12

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)
operating manual

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage	6-0005-R039
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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
Electrical connecting cable 5 x 6 AWG 9 for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R003
Electrical connecting cable 5 x 10 AWG 7 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R005
Additional operating manual	6-0004-R213

Spare parts kit:

Annual maintenance package for vacuum pump	6-1048-R131
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Packing:

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

Vacuum pump units with larger capacities are available on request.



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.

SF₆ GAS SERVICE CARTS

Micro Series	35
Mini Series	41
Piccolo Series	53
Compact Series	57
Economy Series	65
Mega Series	73

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 **oilfree DILO compressors** to avoid the SF₆ gas from being contaminated by oil residues.

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: recovery times (Filling pressure p _e 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	DN20, 5 m	< 5 mbar	134 min
Piccolo	200 - 800 l	L030R02	600 l	DN20, 5 m	< 1 mbar	145 min
Compact	800 - 1.000 l	B057R03	1,000 l	DN20, 5 m	< 5 mbar	185 min
Compact	800 - 1,000 l	B057R17	1,000 l	DN20, 5 m	< 1 mbar	127 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	78 min
Mega L400	> 2.000 l	L400R01	3,000 l	DN20, 5 m	< 1 mbar	152 min
Mega L400	> 2.000 l	L400R01	3,000 l	DN40, 5 m	< 1 mbar	74 min
Mega L600	> 2,000 l	L600R01	3,000 l	DN20, 5 m	< 1 mbar	146 min
Mega L600	> 2,000 l	L600R01	3,000 l	DN40, 5 m	< 1 mbar	63 min

The above mentioned examples of calculation refer to a gas compartment filled with p_e 5 bar. For the mega devices with DN40 hose, a DN40 connection is used at the gas compartment and at the service cart.

TIME CALCULATION

Our web-based time calculator is a useful tool considerably facilitating the pre-selection of SF₆ service carts. 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.



DILLO 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.

DILLO identified this lack from the customer's point of view. This is why DILLO, 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 eight SF₆ service carts (representing the entire product range) were tested:

- B143R11 – **Mini Series**
- L030R02 – **Piccolo Series**
- B057R03 – **Compact Series**
- B057R17 – **Compact Series**
- L057R01 – **Economy Series**
- L170R01 – **Mega Series**
- L400R01 – **Mega Series**
- L600R.. – **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: 400 V/50 Hz (Type B143R11: 230 V/50 Hz)
- » Liquid gas storage

*When using a rubber hose the times are extended slightly.

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

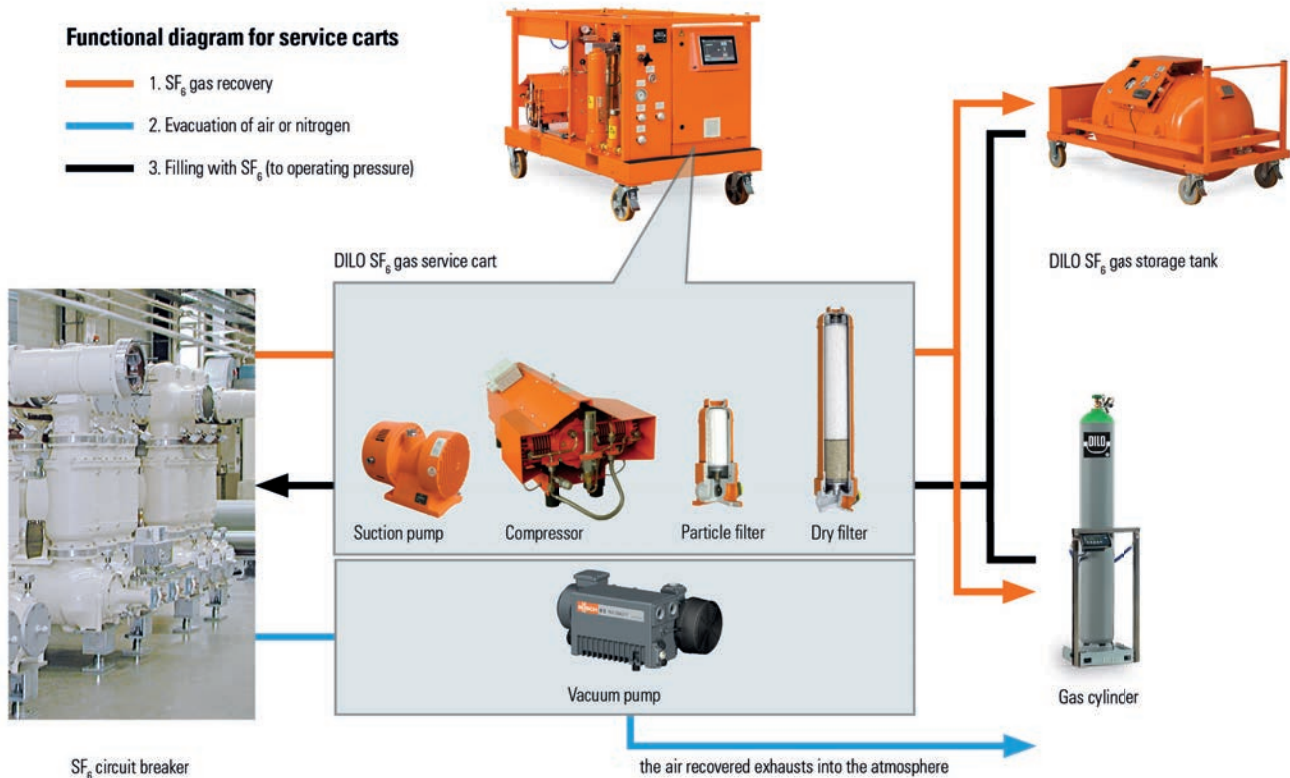
Thanks to our performance data confirmed by TÜV SÜD, you can benefit from objective, measurable parameters for the first time when purchasing a SF₆ service cart.

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

B160R92 Small service unit 36

MICRO SERIES

Portable service unit for the handling of small SF₆ gas quantities

B160R92S16:

SF₆-Gas Service cart

Operating voltage: 220 – 240 V/50Hz

B160R92S15:

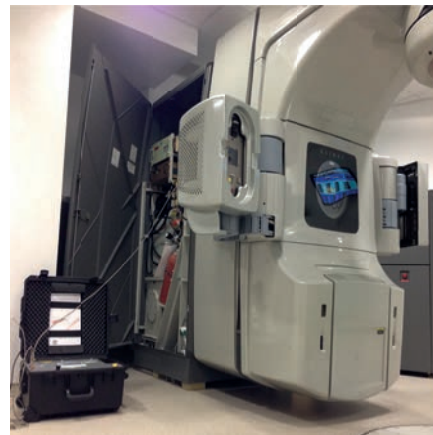
SF₆-Gas Service cart

Operating voltage: 100 - 127 V/50-60 Hz und 220 - 240 V/60 Hz

This compact service unit has been specially designed for very small gas quantities and is perfectly suited for applications such as SF₆ gas handling on medical devices, electron microscopes or medium voltage components.

The device includes all functions required for professional and emission-free SF₆ gas handling such as: gas recovery down to < 10 mbar, purification during the recovery and filling process, gaseous storage in an internal vessel or external pressure tank, evacuation of air to < 10 mbar with automatic switch-off as well as automatic filling of the gas compartment until reaching the desired final pressure.

All functions run fully automated and can be easily set on the coloured touch panel.



The B160R92 unit is adapted to the requirements of small gas compartments. The photo shows the device during service works on a medical radiation unit.

- SF₆ recovery down to < 10 mbar
- Gaseous storage of SF₆
- Internal storage tank (capacity: 2 l)
- Menu navigation via 5.7" coloured touch panel
- Pressure and vacuum units can be changed
- Comfortable trolley version



B160R92

SF₆-Gas Service cart

Technical data:

Dimensions: L 625 mm, W 500 mm, H 297 mm
Weight: 30 kg

Standard equipment:

Oilfree DILO compressor (0.9 m ³ /h, final pressure p _e 9 bar)
Small diaphragm compressor (1.2 m ³ /h, final vacuum < 10 mbar)
Menu navigation via 5.7" coloured touch screen
Reversible units for pressure (bar abs./bar rel./psig/kPa/Mpa) and vacuum (mbar/torr)
Internal 2 l storage tank, max. p _e 9 bar (18 NI or 0.1 kg SF ₆)
Dry and Particle filters
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)
Operating manual

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: 10 l)	05-1144-R001
Storage bottle (volume: 20 l)	05-1144-R002
Additional operating manual	6-0004-R213

Customer-specific adapters for connecting service carts / measuring devices to gas compartments on request.

Spare part kit:

Exchange compressor for B100R20	B100R20-61
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Packing:

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

■ MICRO SERIES

Mobile service unit for the handling of small SF₆ gas quantities
For liquid storage

B160R11:

SF₆ gas service unit

Operating voltage 220 - 240 V/50 - 60 Hz

B160R11S15:

SF₆ gas service unit

Operating voltage 100 - 127 V/50 - 60 Hz

The compact service unit has been specially designed for very small SF₆ gas quantities and is perfectly suited for applications such as SF₆ gas handling on medical devices, electron microscopes or in research centres.

The small and compact device includes all functions required for professional and emission-free SF₆ gas handling: recovery down to ≤ 2 mbar, liquid storage in an external pressure vessel, evacuation of air down to ≤ 2 mbar as well as filling of the gas compartment to the desired final filling pressure.



The B160R11 service unit is adapted to the requirements of small gas compartments. The photo shows the device during service works on an irradiation unit.

- SF₆ gas recovery and evacuation of air down to ≤ 2 mbar
- Liquid storage
- Menu navigation via 3.5" colour touch panel
- Selectable pressure and vacuum units
- Practical transport case (trolley)
- Option: automatic function for filling and recovery of SF₆ as well as for the evacuation of air



B160R11

Mobile service unit

Technical data:

Dimensions: Length 625 mm, Width 500 mm, Height 366 mm
Weight: 53.5 kg

Standard equipment:

Oilfree DILLO compressor (1.6 m ³ /h [at 50 Hz], 50 bar; 1.9 m ³ /h [at 60 Hz], 50 bar)
Small diaphragm compressor (3.3 m ³ /h, final vacuum ≤ 2 mbar)
Menu navigation via 3.5" colour touch panel
Selectable units for pressure (bar p _a /bar p _e /psi p _a /psi p _e /kPa p _a /kPa p _e /MPa p _a /MPa p _e) and vacuum (mbar / torr)
2 particle filters
Filling pressure reducer
Self-closing inlet and outlet coupling DN8
Transport case (trolley)
3 m long connecting cable (with inlet connector C19 and Schuko plug)
Operating manual

Optional accessories at an extra charge:

2 m long PTFE storage connecting hose, DN4, DILLO couplings DN8, ball valve DN8 and five different SF ₆ cylinder connections	6-1400-R020
Automatic control and switch off of the individual functions (evacuation of air, filling and recovery of SF ₆) when reaching final values	K141R25
2 m long wire braided hose DN8 with coupling tongue part DN8 on both ends	6-1130-R020
5 m long wire braided hose DN8 with coupling tongue part DN8 on both ends	6-1130-R050
Storage cylinder (volume: 10 l)	05-1144-R001
Storage cylinder (volume: 20 l)	05-1144-R002
Pre-filter unit (recommended for protection of the service unit)	B077R11
Plastic case for B077R11	3-781-R022
Accessories box with: 1 pre-filter unit, 2 storage cylinders (2 l), 2 wire braided hoses DN8 (2 m long) with coupling tongue part DN8 on both ends, 1 PTFE storage connecting hose (2 m long) DN4. Additional stowage for 3-033-R002 SF ₆ Leak Pointer (not included in the scope of supply)	B160R20
Plug adapter set 16 A / 250 V AC	05-1292-R001
Additional operating manual on CD-ROM	6-0004-R213

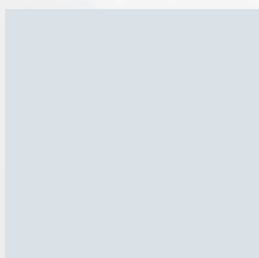
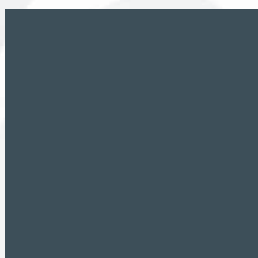
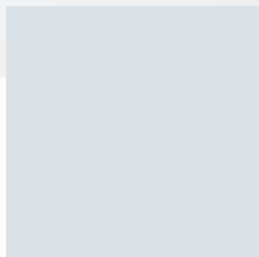
Customer-specific adapters for connecting service carts or measuring devices to gas compartments are available on request.

Spare parts kit:

Spare parts kit for B100R30 compressor	6-1081-R010
Spare filter cartridge (dry filter) for B077R11	B077-05
Spare filter cartridge (particle filter) for B077R11	B077-06

Packing:

Packing for B160R11 service unit	3-775-R024-C
Packing for B160R20 accessories box	3-775-R024-C
Packing for storage cylinders (volume: 10 l or 20 l)	3-763-R007-C
Packing for pre-filter unit B077R11	3-948-R005



MINI SERIES

B095R12 Compressor unit	43
B093R30 Vacuum compressor unit	44
B093R51 Suction pump unit	45
B078R09 / R19 Portable vacuum pump unit	46
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B132R01 Operating panel for Mini Series	48
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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)



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:

Oilfree DILO compressor (1.6 m ³ /h [at 50 Hz], 50 bar; 1.9 m ³ /h [at 60 Hz], 50 bar)
Particle filter
Gauge
Filling pressure reducer
DILO couplings DN8
Electric control
3 m long electrical connecting cable
Paint: orange (RAL 2004)
Operating manual

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
2 m long wire-braided hose DN8 with DILO coupling tongue part DN8 on both ends	6-1130-R020
5 m long wire-braided hose DN8 with DILO coupling tongue part DN8 on both ends	6-1130-R050
Aluminium transport case for B095R12	3-781-R021
Operating manual	6-0004-R213

Spare parts kit:

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

Packing for B095R12 / B095R12S15	3-748-R003-C
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■ MINI SERIES

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: Length 510 mm, Width 325 mm, Height 290 mm
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Weight: 24 kg

Standard equipment:

vacuum compressor for SF ₆ [3,3 m ³ /h (at 50 Hz); 4 m ³ /h (at 60 Hz), final vacuum during gas recovery < 5 mbar
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Solenoid valve

Pressure sensor

Digital vacuum indication (0 - 400 mbar)
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DILO couplings DN8

Electric control

2 m long electrical connecting cable

Paint: orange (RAL 2004)

Operating manual

Optional accessories at an extra charge:

2 m long DN8 rubber hose with DILO coupling tongue part DN8 on both ends	6-1042-R020
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2 m long DN8 wire-braided hose with DILO coupling tongue part DN8 on both ends	6-1130-R020
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Operating manual	6-0004-R213
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Aluminium transport case	3-781-R017
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Spare parts kit:

Spare parts kit for vacuum compressor	05-1647-R100
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Packing:

Packing for B093R30 / B093R30S15	3-748-R003-C
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For recovery of SF₆ gas < 1 mbar in conjunction with the compressor

B093R51

Suction pump unit (3 m³/h)

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

B093R51S15

Suction pump unit (3 m³/h)

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



Technical data:

Dimensions: Length 510 mm, Width 325 mm, Height 290 mm
Weight: 24 kg

Standard equipment:

Oilfree suction pump for recovery of SF ₆ (3 m ³ /h [at 50 Hz]; 3,6 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Solenoid valve
Pressure sensor
Digital vacuum indication (0 - 400 mbar)
DILO couplings DN8
Electric control
2 m long electrical connecting cable
Paint: orange (RAL 2004)
Operating manual

Optional accessories at an extra charge:

2 m long DN8 rubber hose with DILO coupling tongue part DN8 on both ends	6-1042-R020
2 m long DN8 wire-braided hose with DILO coupling tongue part DN8 on both ends	6-1130-R020
Operating manual	6-0004-R213
Aluminium transport case	3-781-R017

Packing:

Packing for B093R51 / B093R51S15	3-748-R003-C
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MINI SERIES

Portable vacuum pump unit for evacuation of air

B078R09

Portable vacuum pump unit (with ball valve)

Operating voltage: 208 - 240 V / 50 - 60 Hz alternating current

B078R09S15

Portable vacuum pump unit (with ball valve)

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

B078R19

Portable vacuum pump unit (with solenoid valve)

Operating voltage: 208 - 240 V / 50 - 60 Hz alternating current

B078R19S15

Portable vacuum pump unit (with solenoid valve)

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



Technical data:

Dimensions: L 435 mm, W 270 mm, H 370 mm
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Weight: 29 kg

Standard equipment:

Vacuum pump for evacuation of air (16 m ³ /h [at 50 Hz]; 19 m ³ /h [at 60 Hz]), final vacuum < 1 mbar

DILO couplings DN20

Ball valve or solenoid valve DN20

Digital vacuum indication 0 - 400 mbar
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3 m long electrical connecting cable

Operating manual

Optional accessories at an extra charge:

SF ₆ gas refilling device	3-393-R001
5 m long DN8 rubber hose, DN8 coupling tongue part on one end and DN20 coupling tongue part on the other end	6-1138-R050
5 m long DN20 rubber hose, DN8 coupling tongue part on one end and DN20 coupling tongue part on the other end	6-1120-R050
5 m long DN20 rubber hose, DN20 coupling tongue part on both ends	6-1017-R050
5 m long DN8 wire-braided hose, DN8 coupling tongue part on one end and DN20 coupling tongue part on the other end	6-1173-R050
5 m long DN20 wire-braided hose, DN8 coupling tongue part on one end and DN20 coupling tongue part on the other end PN 40 bar	6-1359-R050
5 m long DN20 wire-braided hose, DN20 coupling tongue part on both ends PN 40 bar	6-1024-R050
Operating manual	6-0004-R213
Aluminium transport case	3-781-R024

Spare parts kit:

Maintenance package for vacuum pump	6-1048-R111
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Packing:

Packing for B078R..	3-748-R003-C
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For adsorption of moisture, solid and gaseous decomposition products

B077R20

Pre filter unit (p_e 50 bar)



Technical data:

Dimensions: L 180 mm, W 106 mm, H 360 mm
Weight: 4.0 kg

Standard equipment:

Dry filter
Particle filter
DILO coupling DN8
Operating manual

Optional accessories at an extra charge:

2 m long rubber hose DN8, with DILO coupling tongue part DN8 on both ends	6-1042-R020
2 m long wire-braided hose DN8, with DILO coupling tongue part DN8 on both ends	6-1130-R020
Spare filter cartridge for dry filter	B077-05
Spare filter cartridge for particle filter	B077-06
Additional operating manual	6-0004-R213
Plastic case for B077R20	3-781-R022

Packing:

Packing for B077R20	3-948-R005
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MINI SERIES

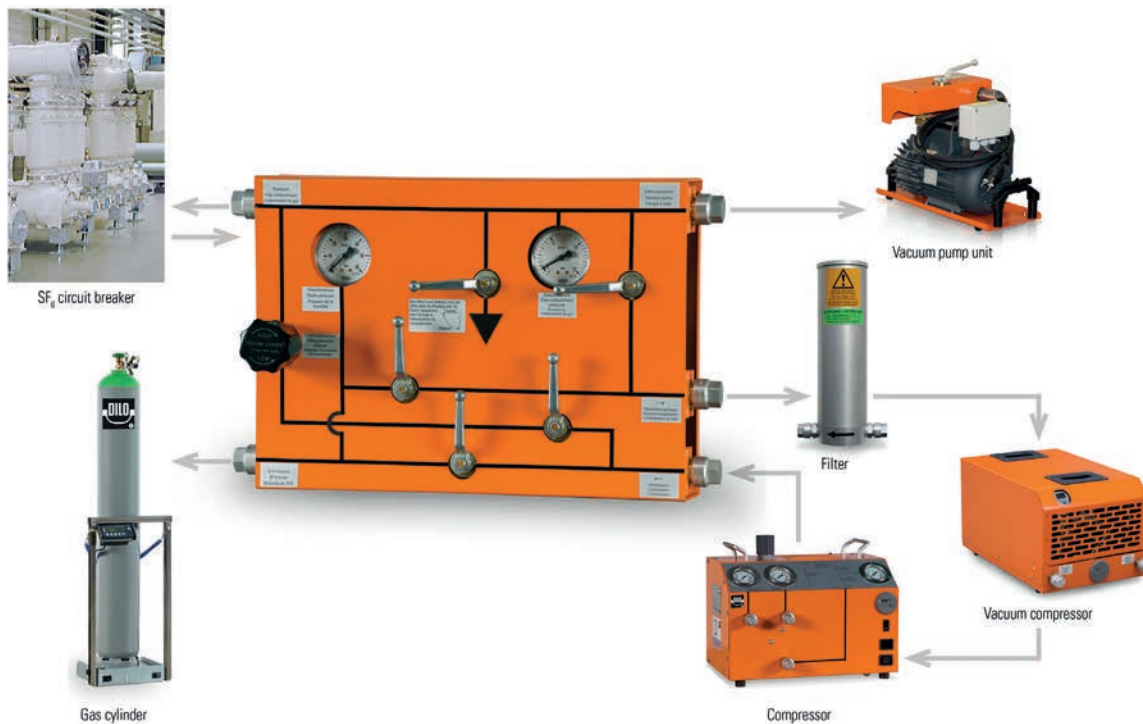
For easy handling of individual components

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)



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
Operating manual

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
2 m long wire-braided hose DN8 with DILO coupling tongue part DN8 on both ends	6-1130-R020
5 m long wire-braided hose DN8 with DILO coupling tongue part DN8 on both ends	6-1130-R050
Additional operating manual on CD-ROM	6-0004-R213
Aluminium transport case	3-781-R008

Packing:

Packing for B132R01	3-775-R014-C
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Packing for all components of the Mini Series: B095R12 / B093R30 / B078R09 / B078R19 / B077R11 / B132R01:

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

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 the main focus for its construction.

The maintenance unit allows gas recovery down to a final vacuum of < 5 mbar and keeps pace with large devices. All necessary functions are integrated including gas purification via dry filter and particle filters as well as gas storage in liquid form. Operation of the device via colour touch panel sets a new standard in this device category as icons are clearly displayed for a quick overview of the entire process.

Equipped with four solid tired wheels, the unit can be conveniently moved on uneven and gravel ground. The integrated tool box keeps hoses and accessories tidy. Thus the B143R11 is a compact, efficient and user-friendly device complying with the requirements in the MV field.



B143R11 model with TÜV SÜD confirmed performance data

- Device for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 5 mbar
- Semi-automatic control and 3.5" colour touch panel
- DN20 coupling for recovery, evacuation and filling operations
- Digital weighing scales for SF₆ bottles
- Residual gas recovery down to 5 mbar during filter change
- Reduction to transport pressure as integrated special function



B143R11

Small service cart

Technical data:

Dimensions: L 690 mm, W 750 mm, H 1,300 mm
Weight: 180 kg (without storage bottle)

Standard equipment:

Oilfree DILO compressor (1.6 m ³ /h [at 50 Hz], 50 bar; 1.9 m ³ /h [at 60 Hz], 50 bar)
Vacuum compressor for SF ₆ gas recovery (3.3 m ³ /h, final vacuum < 5mbar)
Vacuum pump for air (16 m ³ /h, final vacuum < 1 mbar)
Dry filter
Particle filter
Pressure reducer
Digital weighing scales for SF ₆ bottles (with automatic switching off), 0 - 120 kg with tare function, accuracy ± 20 g
Indication in bar / mbar, Pa, psi / torr (reversible on the touch panel)
SF ₆ bottle connection with W 21.8 x 1/14" thread
3.0 m long connecting cable
Paint: orange (RAL 2004)
Operating manual

Operating voltage:

220 - 240 V / 50 - 60 Hz alternating current
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Optional accessories at an extra charge:

5 m long rubber hose DN8 with coupling tongue part DN8 on one end and coupling tongue part DN20 on the other end	6-1138-R050
5 m long rubber hose DN20 with coupling tongue part DN20 on one end and coupling tongue part DN8 on the other end	6-1120-R050
5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
3 m long storage connection with rubber hose DN8, DILO coupling DN8, ball valve DN8 and 5 different SF ₆ cylinder connections / for carrying out special functions	6-1041-R030
Transition piece DN20 / DN8 / for carrying out special functions	6-1206-R001
5 m long wire braided hose DN8 with coupling tongue part DN8 on one end and coupling tongue part DN20 on the other end	6-1173-R050
5 m long wire braided hose DN20 with coupling tongue part DN20 on one end and coupling tongue part DN8 on the other end PN 40 bar	6-1359-R050
5 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 40 bar	6-1024-R050
Storage bottle (volume: 20 l)	05-1144-R002
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
SF ₆ reuse cylinder connection with thread G1"	3-851-R002 P
Transformer for special voltage 100 - 127 V	3-829-R010
Tarpaulin	05-0885-R080
Additional operating manual	6-0004-R213

 MINI SERIES

B143R11

Small service cart

Ersatzteilpakete:

Annual maintenance package for SF ₆ dry filter, particle filter and vacuum pump (16 m ³ /h)	6-1048-R203
Spare parts kit for compressor	6-1081-R010
Spare parts kit for vacuum compressor	05-1647-R100
Spare part kit (SF ₆ dry and particle filter)	6-1101-R101

Packing:

Packing for B143R11	3-262-R008-C
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PICCOLO-SERIE

L030R02 SF₆ gas service cart 54

PICCOLO SERIES

For SF₆ gas handling on switchgear with reduced filling quantities

L030R02

SF₆ gas service cart

The L030R02 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 device is operated via a 3.5" colour touch panel where icons are clearly displayed and allow a quick overview of the entire process.

The L030R02 maintenance device is equipped with a compact but high capacity compressor which enables SF₆ reclaiming up to < 1 mbar – a value outperforming current IEC regulations by far. A smart device for "smart grids".



L030R02 model with TÜV SÜD confirmed performance data



Optional remote control via mobile devices

- Device for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 1 mbar
- Semi-automatic control and 3.5" colour touch panel
- Optional remote control via mobile devices
- 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



L030R02

SF₆ gas service cart

Technical Data:

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

Standard equipment:

B100R40 oilfree DILO compressor (3.2 m ³ /h, [at 50 Hz], 50 bar; 3.8 m ³ /h [at 60 Hz], 50 bar)
Oilfree suction pump for recovery of SF ₆ (3 m ³ /h [at 50 Hz]; 3,6 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Vacuum pump for evacuation of air (25 m ³ /h [at 50 Hz]; 30 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Operation and indication of important process parameter via 3.5" colour touch panel with protective cover
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 (with automatic switching off), 0 - 120 kg with tare function, accuracy ± 20 g
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)
Operating manual

Operating voltage:

208 - 240 V / 60 Hz 3-phase current	6-030SP-R011
380 - 440 V / 50 Hz or 380 - 480 V / 60 Hz 3-phase current	6-030SP-R012

Optional equipment (mounted) at an extra charge:

WiFi operation via mobile devices such as smartphone, tablet, iPad or laptop	on request
Dew point control for dry filter	6-030TF-R011
Tarpaulin	6-030KA-R001

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 PN 40 bar	6-1024-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 40 bar	6-1024-R100
5 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R100
Electrical connecting cable 5 x 2.5 AWG 13 for 200 - 600 V (available lengths 5 - 30 m)	6-1053-R002
Operating manual	6-0004-R213

 **PICCOLO SERIES**

L030R02

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

Annual maintenance package for SF ₆ dry filter, particle filter and vacuum pump (25 m ³ /h)	6-1048-R302
Spare parts kit for compressor	6-1081-R020
Spare part kit (SF ₆ dry and particle filter)	6-1101-R111

Packing:

Packing for L030R02	3-751-R013-C
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COMPACT SERIES

B057R03 SF ₆ gas service cart	59
B057R17 SF ₆ gas service cart	62

COMPACT SERIES

For easy maintenance on high voltage switchgear

B057R..

SF₆ gas service carts

The model series in its robust design offers different versions with vacuum compressor or suction pump for liquid 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 7" multi-touch panel. 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.



B057R17

- Devices for storage in gaseous or liquid form
- SF₆ gas recovery down to < 5 mbar or 1 mbar
- Semi-automatic control and 7" 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 the recovery of SF₆ < 5 mbar with liquid storage

B057R03

SF₆ gas service cart



Technical data:

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

Standard equipment:

TM 5.0 B oilfree DILO compressor; delivery rate: (6,5 m ³ /h ([at 50/60 Hz]) at medium suction pressure with SF ₆)
Vacuum compressor for recovery of SF ₆ (4,8 m ³ /h [at 50 Hz]; 5,8 m ³ /h [at 60 Hz], final vacuum < 5 mbar)
Vacuum pump for evacuation of air (40 m ³ /h [at 50 Hz]; 48 m ³ /h [at 60 Hz], 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, 0 - 120 kg with tare function, accuracy ± 20 g
5 m long storage connecting hose DN8 with coupling tongue part DN20
Different wrenches
Paint: orange (RAL 2004)
Operating manual

Operating voltage:

208 - 240 V / 60 Hz 3-phase current	6-057SP-R011
380 - 440 V / 50 Hz or 380 - 480 V / 60 Hz 3-phase current	6-057SP-R012

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 2014/68/EU regulations and CE marked	280 kg	2,000	950	1,725	1,050 kg	B171R01B057
600 l / 50 bar pressure tank in accordance with 2014/68/EU 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 SF ₆ -bottles, tarpaulin, side and back walls opened by pneumatic springs	B175R11B057
2 axle car trailer TÜV approved, stowage with weighing device without SF ₆ -bottles, tarpaulin, side and back walls opened by pneumatic springs	B175R10B057

Standard equipment for both versions:

2 Supports for hoses and connecting cable
Tool cabinet with 3 drawers
LED lighting

Options for both versions:

Hose reel with 15 m long DN20 hose	K197R100
Pre-filter unit DN20	B007R11

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 DILLO compressor; delivery rate: (6,5 m³/h [at 50/60 Hz]) at medium suction pressure with SF₆

Oilfree suction pump for recovery of SF₆ (15 m³/h [at 50 Hz]; 18 m³/h [at 60 Hz], final vacuum < 1 mbar)

Vacuum pump for evacuation of air (25 m³/h [at 50 Hz]; 30 m³/h [at 60 Hz], final vacuum < 1 mbar)

Dry filter (water absorption capacity: 175 g at a dew point of -36 °C)

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)

Operating manual

Operating voltage:

208 - 240 V / 60 Hz 3-phase current

6-057SP-R011

380 - 440 V / 50 Hz or 380 - 480 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 SF ₆ bottles, 0 - 120 kg with tare function, accuracy ± 20 g	K091R64
5 m long storage connecting hose DN8 with coupling tongue part DN20	6-1037-R050

	Speicherkapazität	Länge mm	Breite mm	Höhe mm	Leer-gewicht	Artikelnummer
300 l / 50 bar pressure tank in accordance with 2014/68/EU regulations and CE marked	280 kg	2,000	950	1,725	1,050 kg	B171R01XB057
600 l / 50 bar pressure tank in accordance with 2014/68/EU regulations and CE marked	580 kg	2,000	950	1,935	1,270 kg	B171R02XB057

 COMPACT SERIES


B057R...

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 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	L057R01G14

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
5 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R050
7 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R070
10 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R100
Electrical connecting cable 5 x 6 AWG 9 for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R003
Electrical connecting cable 5 x 10 AWG 7 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R005
Operating manual	6-0004-R213

Ersatzteilpakete für B057R03:

Annual maintenance package for SF ₆ dry filter, particle filter and vacuum pump	6-1048-R401
Spare parts kit for TM 5.0 B compressor	6-1010-R011
Spare parts kit for vacuum compressor	05-1476-R101
Spare part kit (SF ₆ dry and particle filter)	6-1101-R121

Ersatzteilpakete für B057R17:

Annual maintenance package for SF ₆ dry filter, particle filter and vacuum pump	6-1048-R401
Spare parts kit for TM 5.0 B compressor	6-1010-R011
Spare part kit (SF ₆ dry and particle filter)	6-1101-R121

Packing for all Compact service carts:

Packing for all devices without pressure tank	3-751-R010-C
Packing for devices with 300 l, 600 l pressure tank or stowage and weighing device	3-751-R001-C
Transport pallet for B057R03 mounted on a trailer	3-688-R004-C



ECONOMY-SERIE

L057R01 SF₆ gas service cart 66

ECONOMY SERIES

The model range for universal applications

L057R01

SF₆ gas service carts

This series not only captivates with its compact construction and modern design, but also combines state-of-the-art technology and ergonomics. It is a real all-rounder and covers all practical requirements on a user-friendly device.

Everything is available: The integrated drawer for adapters and hoses as well as the digital weighing scales. Modern control technology in conjunction with a user-friendly interface in several languages make device operation simple and convenient. The external covering of the device protects the integrated components and considerably reduces noise. Thanks to various options, the device can be configured individually.

A protective cover with shading function combined with a swivelling control panel allows glare-free and ergonomic working at the optimum working height. An additional USB and Ethernet connection is integrated in the control panel for data exchange.

A state-of-the-art device that meets all customer requirements.



- Devices for liquid storage of SF₆ gas
- Gas recovery down to < 1 mbar
- Automatic control and 10" capacitive multi-touch panel
- Optional remote control via mobile devices
- Reversing switch for direction of rotation
- Digital weighing scales for SF₆ cylinders
- Residual gas recovery down to 1 mbar during filter change
- Automated special functions for emission-free maintenance of the device
- All versions are available with tanks that can be assembled under the device; with CE marking or optionally with SQL or ASME approval
- The service carts can also be mounted onto a trailer, if required



L057R01
SF₆ gas service carts
For liquid storage



A swivelling control panel allows ergonomic working.



Operation, indication of the important process parameters and illustration of the selected gas flow on the control panel. Indication units (e.g. bar/mbar/kg) can be selected directly on the panel.



Lockable drawer for storing tools, adapters and hoses.



With TÜV SÜD confirmed performance data





L057R01

SF₆ gas service carts**Technical data:**

Dimensions: Length: 1,850 mm, Width: 950 mm, Height: 1,350 mm

Weight: 755 kg

Standard equipment:

TM 5.0 B oilfree DILO compressor; delivery rate: [6.5 m ³ /h (at 50/60 Hz)] at medium suction pressure with SF ₆
Oilfree suction pump for recovery of SF ₆ gas [15 m ³ /h (at 50 Hz); 18 m ³ /h (at 60 Hz), final vacuum < 1 mbar)
Vacuum pump for evacuation of air (40 m ³ /h [at 50 Hz]; 48 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Operation and indication of the important process parameters via 10" multi-touch panel with protective cover
Evaporator
Dry filter (water absorption capacity: 175 g at a dew point of -36 °C)
Particle filter 1 µm
Selectable pressure and vacuum units
Digital weighing scales for SF ₆ cylinders (with automatic switch off function), 0 - 120 kg with tare function, accuracy ±20 g
2 m long storage connecting hose DN8 with coupling tongue part DN20
Fork lift provisions
Crane eyelets
Tool tray as stowage
Fixing and steerable rollers
Different wrenches
Protection class IP54
Sound pressure level < 70dB(A)
Paint: anthracite-orange
Operating manual

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

208 - 240 V / 60 Hz	6-057SP-R011
380 - 440 V / 50 Hz or 380 - 480 V / 60 Hz	6-057SP-R012

L057R01

SF₆ gas service carts

Mounted onto a pressure tank / stowage



L057R01 with 300 l pressure tank

Optional additional equipment (mounted) at an extra charge:

	Storage capacity	Length mm	Width mm	Hight mm	Net wight	Article No.
300 l / 50 bar pressure tank in accordance with 2014/68/EU regulations and CE marked with electronic weight indication, fixing and steerable rollers	280 kg	1,850	950	1,860	1,120 kg	B179R01L057
600 l / 50 bar pressure tank in accordance with 2014/68/EU regulations and CE marked with electronic weight indication, fixing and steerable rollers	580 kg	1,850	950	1,985	1,340 kg	B179R02L057
300 l / 50 bar pressure tank in accordance with 2014/68/EU regulations and CE marked with electronic weight indication, chassis with solid tired wheels	280 kg	2,500	1,050	1,945	1,350 kg	B179R11L057
600 l / 50 bar pressure tank in accordance with 2014/68/EU regulations and CE marked with electronic weight indication, chassis with solid tired wheels	580 kg	2,500	1,050	2,075	1,650 kg	B179R12L057
Stowage including 5 SF ₆ cylinders with electronic weight indication, chassis with solid tired wheels	5 x 40 kg	2,500	1,050	2,075	1,390 kg	B175R61L057

ECONOMY SERIES

L057R01

SF₆ gas service carts

Can be mounted onto a trailer with the following accessories:



Device including stowage
with weighing device and 4 SF₆ cylinders on the B175R11L057 trailer

Technical data:

Dimensions: Length: 4,500 mm, Width: 1,700 mm, Height: 2,280 mm

Max. admissible total weight: 2,000 kg
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2-axle car trailer TÜV-approved, stowage with weighing device with 4 SF ₆ cylinders, tarpaulin, side and back walls open by pneumatic springs	B175R51L057
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2-axle car trailer TÜV-approved, stowage with weighing device without 4 SF ₆ cylinders, tarpaulin, side and back walls open by pneumatic springs	B175R52L057
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Standard equipment for both versions:

2 fixing facilities for hoses and connecting cable
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Tool cabinet with 3 drawers

LED lighting

Options for both versions:

Hose reel with 15 m long hose DN20	K197R100
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Pre-filter unit DN20	B007R11
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L057R01

SF₆ gas service carts

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

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
Vacuum pump, (63 m ³ /h [at 50 Hz]; 76 m ³ /h [at 60 Hz]), final vacuum < 1 mbar	6-057VP-R001
Vacuum pump, (100 m ³ /h [at 50 Hz], 120 m ³ /h [at 60 Hz]), final vacuum < 1 mbar	6-057VP-R002
Two-stage vacuum pump with exhaust filter, type RH0060, nominal suction capacity (55 m ³ /h [at 50 Hz]; 65 m ³ /h [at 60 Hz]), final vacuum 0.0067 mbar	6-057VP-R007
Automatic control and switch off function (evacuation, filling, recovery of SF ₆) when reaching the corresponding final values	K141R11
Dew point control for dry filter	K129R08
Tarpaulin	6-057KA-R002
Chassis with solid tired wheels Ø 400 mm	6-057FG-R001
Exhaust control for vacuum pump	K203R01
Additional coupling DN20 for simultaneous evacuation and recovery or filling	K177R12
Filling up to pa 15 bar instead of pa 10 bar	K205R02
Recovery of storage tank down to 1 mbar	K204R01
Remote control (Wi-Fi) via mobile devices	K176R13

Optional equipment at an extra charge for all service carts of the Economy series:

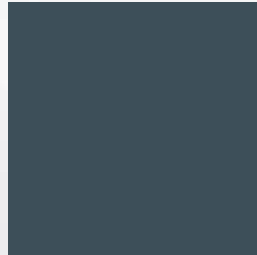
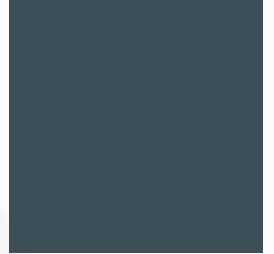
5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R100
Electrical connecting cable 5 x 6 AWG 9 for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R003
Electrical connecting cable 5 x 10 AWG 7 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R005
Relief of fixing and steerable rollers for transport	K223R057

Spare parts kits for L057R01:

Annual maintenance kit for L057R01 with standard vacuum pump (40 m ³ /h)	6-1048-R401
Annual maintenance kit for L057R01 with 6-057VP-R001 / R002 vacuum pump	6-1048-R421
Annual maintenance kit for L057R01 with 2-stage 6-057VP-R007 vacuum pump	6-1048-R424
Spare parts kit for compressor	6-1010-R011
Spare filter kit (for SF ₆ dry and particle filter)	6-1101-R121

Packing for L057R01:

Packing for L057R01	3-788-R024-C
Packing for L057R01 with 6-057FG-R001 as option (chassis)	3-788-R023-C
Packing for L057R01 with pressure tank (fixing and steerable rollers)	3-751-R001-C
Packing for L057R01 with pressure tank (chassis)	3-788-R011-C
Packing for L057R01 with pressure tank (chassis) or stowage and weighing scales	3-788-R011-C
Transport pallet for L057R01 (trailer-mounted)	3-688-R004-C



MEGA SERIES

L170R01 SF ₆ gas service cart	74
L400R01 SF ₆ gas service cart	82
L600R ... SF ₆ gas service cart	85

MEGA SERIES

Maintenance devices for large and extra large gas compartments

L170R01

SF₆ gas service cart

The L170 service cart has been developed as entry-level model of the Mega Series for the gas handling on large gas compartments. Thanks to the state-of-the-art control all functions run automatically and are displayed on a 10" multi-touch screen. A new software with intuitive user navigation makes operation very easy and comfortable. This service cart can optionally be operated via smartphone, tablet or laptop.

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 DILLO couplings and connecting systems emissions will have no chance! Short gas recovery and evacuating times are obtained by using a coupling DN40.

The L170 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 high quality capacitive 10" multi-touch panel
- Optional remote control via mobile devices
- Reversing switch for direction of rotation
- Digital weighing scales for SF₆ cylinders
- 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



L170R01
SF₆ gas service cart

For liquid storage



A graphic-based software makes operation easy and comfortable.



L170R01 model with TÜV SÜD confirmed performance data

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

 MEGA SERIES

L170R01

SF₆ gas service cart

Standard equipment:

B110R11 oilfree DILO compressor; delivery rate: (19 m ³ /h [at 50 Hz]; 15 m ³ /h [bei 60 Hz]) at medium suction pressure with SF ₆
Oilfree suction pump for recovery of SF ₆ gas (35 m ³ /h [at 50 Hz]; 42 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Vakuumpumpe zum Evakuieren von Luft (63 m ³ /h [at 50 Hz]; 76m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Operating and indication of the most important process parameters via 10" multi-touch panel with protective cover
DILO couplings DN20 and DN40
Evaporator
Dry filter (water absorption capacity: 175 g at a dew point of -36 °C)
Particle filter
Pressure and vacuum units can be set
Digital weighing scales for SF ₆ bottles (with automatic switching off), 0 - 120 kg with tare function, accuracy ± 20 g
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)
Operating manual

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

208 - 240 V / 60 Hz	6-170SP-R011
380 - 440 V / 50 Hz	6-170SP-R012
380 - 480 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 2014/68/EU 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 2014/68/EU 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

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
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Max. admissible total weight: 2,500 kg
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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
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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
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Standard equipment for both versions:

2 Supports for hoses and connecting cable

Tool cabinet with 3 drawers

LED lighting

Optionen für beide Varianten:

Hose reel with 15 m long DN20 hose	K197R100
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Pre-filter unit DN20	B007R11
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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 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
Two-stage vacuum pump with exhaust filter, type RH0060, final vacuum 0.0067 mbar Nominal suction capacity (55 m ³ /h [at 50 Hz]; 65 m ³ /h [at 60 Hz])	6-170VP-R008
Two-stage vacuum pump with exhaust filter, type RH0090, final vacuum 0.0067 mbar Nominal suction capacity (80 m ³ /h [at 50 Hz]; 95 m ³ /h [at 60 Hz])	6-170VP-R009
Automatic control with switching off of the individual functions (evacuation, filling, recovery of SF ₆) when reaching the corresponding final values	K141R11
Dew point control for dry filter	K129R04
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 < 1 mbar standard vacuum pump)	K177R01
Remote control via mobile devices	K176R11
Kit for remote control router	K176R21
Kit for remote control router with extended functions	On request

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 wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-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
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
Electrical connecting cable 5 x 10 AWG for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R005
Electrical connecting cable 5 x 16 AWG 5 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R004
Operating manual	6-0004-R213



L170R01

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

Annual maintenance package for L170R01 with standard / 6-170VP-R001 vacuum pump (63 / 100 m ³)	6-1048-R501
Annual maintenance package for L170R01 with 6-170VP-R002 vacuum pump (200 m ³)	6-1048-R502
Annual maintenance package for L157R01 with 2-stage 6-170VP-R008 (RH0060)	6-1048-R505
Annual maintenance package for L170R01 with 2-stage 6-170VP-R009 (RH0090)	6-1048-R506
Spare parts kit for compressor	6-1091-R111
Spare part kit (SF ₆ dry and particle filter)	6-1101-R131

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-R024-C
Packing for L170R01 with pressure tank	3-788-R011-C
Packing for L170R01 with stowage and weighing device	3-788-R011-C
Transport pallet for L170R01 mounted on a trailer	3-688-R005-C



Maintenance devices for large and extra large gas compartments

L400R01 / L600R.. **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" multi-touch screen. A new software with intuitive user navigation makes operation very easy and comfortable. This service cart can optionally be operated via smartphone, tablet or laptop.

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

All types are available with additional connecting couplings DN20 and DN40 (as option) for simultaneous operation. 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.



L600 with sheet metal covering
available as option

- Devices for liquid storage of SF₆ gas
- SF₆ gas recovery down to < 1 mbar
- Automatic control and high quality capacitive 10" multi-touch panel
- Optional remote control via mobile devices
- Reversing switch for direction of rotation
- Digital weighing scales for SF₆ cylinders
- 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

MEGA SERIES

L400R01

SF₆ gas service cart

For liquid storage



A graphic-based software makes operation easy and comfortable.



L400R01 / L600R.. model
with TÜV SÜD confirmed
performance data

Technical data:

Dimensions: L 2.600 mm, W 1.400 mm, H 1.500 mm

Weight: L400R01: approx. 1350 kg



L400R01

SF₆ gas service cart

Standard equipment for L400R01:

B200R.. oilfree DILO compressor (40 m ³ /h [at 50/60 Hz], 50 bar)
Oilfree suction pump for recovery of SF ₆ (35 m ³ /h [at 50 Hz]; 42 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Vakuumpumpe zum Evakuieren von Luft (63 m ³ /h [bei 50 Hz]; 76 m ³ /h [bei 60 Hz], final vacuum < 1 mbar)
Operating and indication of the most important process parameters via 10" multi-touch panel with protective cover
DILO couplings DN20 and DN40
Evaporator
Dry filter (water absorption capacity: 175 g at a dew point of -36 °C)
Particle filter
Pressure and vacuum units can be set
Digital weighing scales for SF ₆ cylinders (with automatic switch off), 0 - 120 kg with tare function, accuracy ± 20 g
5 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)
Operating manual

Operating voltage for all service carts of the L400R01 series (3-phase current ranges to be selected):

380 - 440 V / 50 Hz or 380 - 480 V / 60 Hz	6-400SP-R001
Additional price for electrical special voltage 220 - 240 V / 60 Hz	6-400SP-R002
Additional price for electrical special voltage 220 - 240 V / 50 Hz	Auf Anfrage
Additional price for electrical special voltage 200 V / 50, 60 Hz	Auf Anfrage
Additional price for electrical special voltage 600 V / 60 Hz	Auf Anfrage

Optional equipment (mounted) at an extra charge for all service carts of the L400R01 series:

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with 2014/68/EU 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



L400R01

SF₆ gas service cart**Optionale Zusatzausstattung (montiert) gegen Aufpreis für Servicegeräte der Baureihe L400R01:**

Vacuum pump, (100 m ³ /h [at 50 Hz]; 120 m ³ /h [at 60 Hz]), final vacuum < 1 mbar	6-400VP-R001
Vacuum pump, (200 m ³ /h [at 50 Hz]; 240 m ³ /h [at 60 Hz]), final vacuum < 1 mbar	6-400VP-R002
Two-stage vacuum pump with exhaust filter, type RH0060, final vacuum 0.0067 mbar Nominal suction capacity (55 m ³ /h [at 50 Hz]; 65 m ³ /h [at 60 Hz])	6-400VP-R004
Two-stage vacuum pump with exhaust filter, type RH0090, final vacuum 0.0067 mbar Nominal suction capacity (80 m ³ /h [at 50 Hz]; 95 m ³ /h [at 60 Hz])	6-400VP-R005
Automatic switch off function (evacuation, filling, recovery of SF ₆) when reaching the corresponding final values	K141R11
Dew point control for dry filter	K129R04
Tarpaulin	K029R27
Sheet metal covering	Auf Anfrage
Chassis with solid tired wheels Ø 400 mm (for service carts without storage tank)	K088R17
Additional DN20 and DN40 coupling for evacuation and gas recovery or filling at the same time	K177R61
Remote control via mobile devices	K176R11
Kit for remote control router	K176R21
Kit for remote control router with extended functions	On request

Optional accessories at an extra charge for service carts of the L400R01 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 wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-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
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
Electrical connecting cable 5 x 10 AWG 7 for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R005
Electrical connecting cable 5 x 16 AWG 5 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R004
Additional operating manual	6-0004-R213

Spare parts kits for L400R01:

Annual maintenance package for L400R01 with standard vacuum pump (63 m ³ /h) / (100 m ³)	On request
Annual maintenance package for L400R01 with vacuum pump (200 m ³ /h)	On request
Annual maintenance package for L400R01 with two-stage vacuum pump (RH0060)	6-1048-R505
Annual maintenance package for L400R01 with two-stage vacuum pump (RH0090)	6-1048-R506
Spare parts kit (valves and piston rings) for compressor	6-1341-R111
Spare parts kit (SF ₆ dry filter and particle filter)	6-1101-R131



L600R...

SF₆ gas service cart

Packing for L400R01:

Packing for L400R01	3-761-R141-C
Packing for L400R01 with chassis (as option)	3-761-R142-C
Packing for L400R01 with pressure tank	3-761-R143-C

Technical data:

Dimensions: L 2.600 mm, W 1.400 mm, H 1.500 mm
Weight L600R01: approx. 1.350 kg
Weight L600R02: approx. 1.430 kg

L600R01:

Oilfree suction pump for recovery of SF ₆ (35 m ³ /h [at 50 Hz]; 42 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
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L600R02:

Oilfree suction pump for recovery of SF ₆ (85 m ³ /h [at 50 Hz]; 105 m ³ /h [at 60 Hz], final vacuum < 1 mbar)

Standard equipment for L600R01 and L600R02:

B200R.. oilfree DILO compressor (60 m ³ /h [at 50/60 Hz], 50 bar)
Vacuum pump for evacuation of air (63 m ³ /h [at 50 Hz]; 76 m ³ /h [at 60 Hz], final vacuum < 1 mbar)
Operating and indication of the most important process parameters via 10" multi-touch panel with protective cover
DILO couplings DN20 and DN40
Evaporator
Dry filter (water absorption capacity: 175 g at a dew point of -36 °C)
Particle filter
Pressure and vacuum units can be set
Digital weighing scales for SF ₆ cylinders (with automatic switch off), 0 - 120 kg with tare function, accuracy ± 20 g
5 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)
Operating manual



L600R...

SF₆ gas service cart

Operating voltage for service carts of the L600R01 series (3-phase current ranges to be selected):

380 - 440 V / 50 Hz or 380 - 480 V / 60 Hz	6-600SP-R001
Additional price for electrical special voltage 220 - 240 V / 60 Hz	6-600SP-R002
Additional price for electrical special voltage 200 V / 50, 60 Hz	on request
Additional price for electrical special voltage 220 - 240 V / 50 Hz	on request
Additional price for electrical special voltage 600 V / 60 Hz	on request

Operating voltage for service carts of the L600R02 series (3-phase current ranges to be selected):

380 - 440 V / 50 Hz	6-600SP-R011
Additional price for electrical special voltage 220 - 240 V / 60 Hz	6-600SP-R012
Additional price for electrical special voltage 380 – 480 V / 60 Hz	6-600SP-R013
Additional price for electrical special voltage 200 V / 50, 60 Hz	on request
Additional price for electrical special voltage 220 - 240 V / 50 Hz	on request
Additional price for electrical special voltage 600 V / 60 Hz	on request

Optional equipment (mounted) at an extra charge for all service carts of the L600R.. series:

	Storage capacity	Length mm	Width mm	Height mm	Net weight	Article No.
300 l / 50 bar pressure tank in accordance with 2014/68/EU 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

Optionale Zusatzausstattung (montiert) gegen Aufpreis für alle Servicegeräte der Baureihe L600R..:

Vacuum pump, (100 m ³ /h [at 50 Hz]; 120 m ³ /h [at 60 Hz]), final vacuum < 1 mbar	6-600VP-R001
Vacuum pump, (200 m ³ /h [at 50 Hz]; 240 m ³ /h [at 60 Hz]), final vacuum < 1 mbar	6-600VP-R002
Two-stage vacuum pump with exhaust filter, type RH0060, final vacuum 0.0067 mbar Nominal suction capacity (55 m ³ /h [at 50 Hz]; 65 m ³ /h [at 60 Hz])	6-600VP-R005
Two-stage vacuum pump with exhaust filter, type RH0090, final vacuum 0.0067 mbar Nominal suction capacity (80 m ³ /h [at 50 Hz]; 95 m ³ /h [at 60 Hz])	6-600VP-R007
Second dry filter	K119R22
Second evaporator	6-600VD-R001
Automatic switch off function (evacuation, filling, recovery of SF ₆) when reaching the corresponding final values	K141R11
Dew point control for dry filter	K129R04
Tarpaulin	K029R27
Sheet metal covering	Auf Anfrage
Chassis with solid tired wheels Ø 400 mm (for service carts without storage tank)	K088R17
Additional DN20 and DN40 coupling for evacuation and gas recovery or filling at the same time	K177R61
Remote control via mobile devices	K176R11
Kit for remote control router	K176R21
Kit for remote control router with extended functions	On request



L600R...

SF₆ gas service cart

Optional accessories at an extra charge for service carts of the L600R.. series:

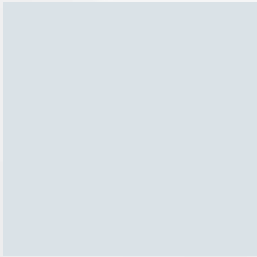
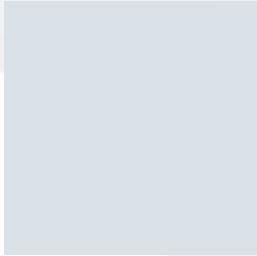
5 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R050
7 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R070
10 m long rubber hose DN20 with coupling tongue part DN20 on both ends	6-1017-R100
5 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-R050
10 m long wire braided hose DN20 with coupling tongue part DN20 on both ends PN 64 bar	6-1365-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
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
Electrical connecting cable 5 x 10 AWG 7 for 380 - 600 V (available lengths 5 - 30 m)	6-1053-R005
Electrical connecting cable 5 x 16 AWG 5 for 200 - 240 V (available lengths 5 - 30 m)	6-1053-R004
Additional operating manual	6-0004-R213

Spare parts for L600R..:

Annual maintenance package for L600R.. with standard vacuum pump (63 m ³ /h) / (100 m ³ /h)	on request
Annual maintenance package for L600R.. with vacuum pump (200 m ³ /h)	on request
Annual maintenance package for L600R.. with two-stage vacuum pump (RH0060)	6-1048-R505
Annual maintenance package for L600R.. with two-stage vacuum pump (RH0090)	6-1048-R506
Spare parts kit (valves) for compressor	6-1341-R111
Spare parts kit for second 6-550TR-R001 dry filter	3-899-06
Spare part kit (SF ₆ dry and particle filter)	6-1101-R131

Packing for L600R..:

Packing for L600R..	3-761-R141-C
Packing for L600R.. with chassis (as option)	3-761-R142-C
Packing for L600R.. with pressure tank	3-761-R143-C



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.

ACCESSORIES FOR SERVICE CARTS

Remote control router in transport case	90
SF ₆ gas storage tanks	92
Gas cylinder	97
Filter units	100
Manifolds	103
Oilfree suction pump units	104



■ REMOTE CONTROL ROUTER IN TRANSPORT CASE

For secure connection of DILO devices to the Internet

K176R21

Mobile remote control router for Ethernet devices

K176R31/ K176R32

Mobile remote control router for Ethernet and MPI devices, IIoT-Ready

The flexible K176R21 / R31 / R32 routers allow remote access to the connected DILO device via the Internet. The router is protected in the transport case and can be magnetically attached to a wide variety of devices with just a few simple steps. The Internet connection is possible via LAN or mobile network. Error analysis, operation or software adaptation of the connected devices can thus be carried out quickly and easily by our specialists from the Babenhausen location all over the world, at low cost and in a short period of time.

For this purpose, the router establishes a securely encrypted VPN connection to a cloud-based remote control service. This guarantees full protection against unauthorised access. If desired, a separate VPN channel can also be established for our customers. This allows to call up the systems status remotely with a tablet, smartphone or PC.

When used with older special units, the K176R31 router can access to S7-200 controls via MPI interface. This router can also serve as IIoT gateway to various cloud providers. Thus, you can store and analyse important data centrally in the future.



- Router connection to the Internet via LAN
- Router connection to the Internet via mobile radio through LTE (4G)
- Connection to DILO devices via LAN to router
- Connection to DILO devices via MPI to router (only for K176R31)
- SMS or E-mail is possible in case of alarm (only for K176R31 and K176R32)
- IIoT-Ready (Industrial Internet of Things) (only for K176R31 and K176R32)



K176R21 / R31

Mobile remote control router for Ethernet devices

Technical data:

Dimensions: L: 150 mm, W: 140 mm, H: 70 mm	Transport case: L: 400 mm, W: 300mm, H: 160mm
Net weight: approx. 0.7 kg	Transport case: 2.6 kg
Operating voltage: 100 - 240 V / 50 - 60 Hz	
Mobile standard: 4G (LTE) worldwide, frequency band 1.8 GHz	
Plug in power supply unit 24 V with adapter for EU, UK, US	
Protection class: IP20	

Standard equipment:

SIM card for mobile network is not included!
Operating manual

Optional accessories at an extra charge:

GSM roof antenna, 2 m long cable	05-1958-R011
Operating manual	6-0004-R213
Annual fee VPN channel for customer system monitoring and operation	4000463

Packing:

Packing for K176R21/ K176R31/ K176R32	3-948-R008
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■ SF₆ GAS STORAGE TANKS

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.



View on the operating panel

- For liquid or gaseous storage or withdrawal of gas
- Digital weighing scales (measuring accuracy ± 0.4 kg)
- Pressure indication in bar, MPa, psi
- 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 2014/68/EU 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
Operating temperature: -10 °C to +50 °C

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 DN8
DILO coupling groove part DN20
Gauge NG 100
Safety valve
Paint: orange (RAL 2004)
Operating manual

■ 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
Operating temperature: -10 °C to +50 °C

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 DN8
DILO coupling groove part DN20
Gauge NG 100
Safety valve
Paint: orange (RAL 2004)
operating manual



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
Operating temperature: -10 °C to +50 °C

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 DN8
DILO coupling groove part DN20
Gauge NG 100
Safety valve
Paint: orange (RAL 2004)
Operating manual

SF₆ GAS STORAGE TANKS

B176R...

SF₆ gas storage tank**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 PN 64 bar	6-1365-R050
7 meter long wire-braided hose DN20 with coupling tongue part on both ends PN 64 bar	6-1365-R070
10 meter long wire-braided hose DN20 with coupling tongue part on both ends PN 64 bar	6-1365-R100
5 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R050
7 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R070
10 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R100
Operating manual	6-0004-R213

Packing:

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

■ GAS CYLINDER FOR NEW GAS (without filling)



New SF₆* as well as used SF₆ with a SO₂ content of < 250 ppmV

Manufactured according to technical regulations for compressed gases with TÜV certificate.
Gas cylinder labelling in accordance with DIN EN 1089



Valve for new SF₆* as well as used SF₆ with a SO₂ content of < 250 ppm_v in accordance with DIN 477 no. 6
W21.8 x 1/14" Brass

Important note

USE

The use of new gas cylinders (green marked with green label) is admissible for

- new SF₆**
- as well as used SF₆ with a SO₂ content of < 250 ppm_v

Attention: If the gas quality cannot be defined or the gas contains decomposition products (≥ 250 ppmv SO₂) it is stipulated in the DIN EN 1089-3 standard to use Reuse cylinders (yellow marked with orange label) for road transport.

REPEATED INSPECTION:

The user of the gas cylinders is responsible to carry out the repeated inspections on pressure vessels for transportation of gases with the 2A classification code in accordance with ADR every 10 years. Please observe local rules and regulations.

ADR REGULATIONS FOR THE TRANSPORTATION ON ROADS:

Label for new SF₆*:

UN 1080

Label for used SF₆ with a SO₂ content of < 250 ppmv:

UN 3163

Classification code: 2A

Hazard label: 2.2

Volume	Outside diameter	Length without valve	Empty weight	Max. filling ratio (Only for UN 1080)**	Test pressure	Article number
10 l	approx. 140 mm	approx. 820 mm	approx. 15.6 kg	1,55 kg/l	300 bar	05-1144-R001
20 l	approx. 204 mm	approx. 825 mm	approx. 31.6 kg	1,55 kg/l	300 bar	05-1144-R002
40 l	approx. 204 mm	approx. 1,520 mm	approx. 46.1 kg	1,50 kg/l	250 bar	05-1144-R004
600 l	approx. 770 mm	approx. 2,120 mm	approx. 460 kg	1,06 kg/l	70 bar	05-1144-R006

* at 15°C ambient temperature

** For UN 3163 dependent on air content. The filling degree can be requested from DILLO

■ GAS CYLINDERS FOR USED GAS

Used SF₆ with a SO₂ content of ≥ 250 ppm_v

Manufactured according to technical regulations for compressed gases with TÜV certificate.
Gas cylinder labelling in accordance with DIN EN 1089



Valve for used SF₆ with a
SO₂ content of ≥ 250 ppm_v in accordance with
DIN 477 no. 8 - 1"
Stainless steel

Important note

USE

The SF₆ gas is to be stored in reuse cylinders (yellow marked with orange label) if:

- With a SO₂ content of ≥ 250 ppmV
- The SF₆ gas quality is undefined

REPEATED INSPECTION

The user of the cylinders is responsible to carry out the repeated inspections on pressure vessels for transportation of gases with the 2T and 2TC classification code in accordance with ADR every 5 years. Please observe local rules and regulations.

ADR REGULATIONS FOR THE TRANSPORTATION ON ROADS:

Label for used SF₆ with a SO₂ content of ≥ 250 ppm_v:

Toxic and **non**-corrosive:

UN 3162

Toxic and corrosive:

UN 3308

If the gas quality is undefined we recommend using the UN 3308 label.

Classification code: 2T / 2TC

Hazard label: 2.3 / 2.3 + 8



Volume	Outside diameter	Length without valve	Empty weight	Max. filling ratio**	Max. filling pressure*	Test pressure	Article number
10 l	approx. 204 mm	approx. 455 mm	approx. 17 kg	1,35 kg/l	200 bar	250 bar	05-1630-R001
20 l	approx. 204 mm	approx. 775 mm	approx. 22 kg	1,35 kg/l	150 bar	250 bar	05-1630-R002
40 l	approx. 204 mm	approx. 1,520 mm	approx. 46 kg	1,35 kg/l	150 bar	250 bar	05-1630-R004
600 l	approx. 770 mm	approx. 2,120 mm	approx. 615 kg	0,94 kg/l	64 bar	100 bar	05-1630-R060

* at 15°C ambient temperature

** Dependent on the air content in SF₆ gas (here max. 10 % air content). The filling degree can be requested from DILO

Packing for gas cylinders:

Packing for gas cylinder 10 l	3-763-R007-C
Packing for gas cylinder 20 l	3-763-R007-C
Packing for gas cylinder 40 l	3-763-R002-C
Packing for pressure tank 600 l	3-1001-R300-C

FILTER UNIT

For adsorption of moisture and gaseous or dusty decomposition products

B007R11

Portable pre-filter unit (p_g 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_g 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
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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
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Paint: orange (RAL 2004)

Operating manual

Optional accessories at an extra charge:

2 meter long rubber hose DN20 with coupling tongue part on both ends	6-1017-R020
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2 meter long wire braided hose DN20 with coupling tongue part on both ends PN 40 bar	6-1024-R020
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Spare filter cartridge (for dry filter B007R11)	3-899-06
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Spare filter cartridge activated carbon / Al_2O_3 for B071R11	3-906-06
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Spare filter cartridge (for particle filter)	3-377-08
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Operating manual	6-0004-R213
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Packing:

Packing for B007R11 / B071R11	3-763-R001-C
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MOBILE PRE-FILTER UNIT



For adsorption of gaseous and dusty decomposition products in large gas compartments (p_e 25 bar)

3-537-R001

Mobile pre-filter unit



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_2O_3 ; water absorption capacity: 175 g at a dew point of $-36^\circ C$)
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)
Operating manual

Optional accessories at an extra charge:

2 m long rubber hose DN20 with coupling tongue part on both ends	6-1017-R020
2 meter long wire braided hose DN20 with coupling tongue part on both ends PN 40 bar	6-1024-R020
Spare filter cartridge (dry filter)	3-899-06
Spare filter cartridge (particle filter)	3-377-08
Operating manual	6-0004-R213

Packing:

Packing for 3-537-R001	3-671-R001-C
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MOBILE PRE-FILTER UNIT

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

B148R03

Mobile pre-filter unit DN20 (p_e 26 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)
Operating manual

Optional accessories at an extra charge:

2 m long rubber hose DN20 with coupling tongue part on both ends	6-1017-R020
2 meter long wire braided hose DN20 with coupling tongue part on both ends PN 40 bar	6-1024-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 (B148R03)	3-377-08
Spare filter cartridge particle filter (B148R04)	K072-07
Additional operating manual	6-0004-R213

Packing:

Packing for B148R03 / B148R04	3-671-R104-C
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Note: Other versions are available on request.

For gas handling on several gas compartments at the same time

3-718-R006 / 3-718-R036 / 3-718-R002

Manifolds

The DILO manifolds help to significantly increase the efficiency of gas handling with service carts in the GIS unit production or at utility companies.

The standard DILO manifolds are equipped with three DN20 connections as well as a DN20 or DN40 connection to the service cart. Thus, it is possible to recover, to evacuate or to fill three gas compartments at the same time.



3 x DN20 / 1 x DN40
Order no.: 3-718-R006

4 x DN20
Order no.: 3-718-R036

4 x DN20 without couplings
Order no.: 3-718-R002

- Gas-tight version
- Self-closing couplings
- Ball valves individually lockable
- Suitable for wall assembly

Packing:

Packing for 3-718-R002 / 3-718-R006	3-775-R013-C
Packing for 3-718-R036	3-775-R014-C

MOBILE OILFREE SUCTION PUMP UNIT

B131R41

Mobile oilfree suction pump unit 15 m³/h

Final vacuum < 1 mbar

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
- 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

Other performances are available upon request:

Mobile oilfree suction pump unit 35 m³/h

B131R13

Mobile oilfree suction pump unit 100 m³/h

B131R61



B131R41

Mobile oilfree suction pump unit 15 m³/h

Technical data:

Dimensions: L 550 mm, W 430 mm, H 800 mm
Weight: 80 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
3 m long electrical connecting cable
Paint: orange (RAL 2004)
operating manual

Optional equipment (mounted) at an extra charge:

Additional price for electrical special voltage for B131R41 100 V / 50 - 60 Hz or 110 - 127 V / 60 Hz or 200 V / 50 - 60 Hz	6-0005-R046
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Optional accessories at an extra charge:

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 DN20 with coupling tongue part DN20 on both ends PN 40 bar	6-1024-R050
7 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends PN 40 bar	6-1024-R070
10 m long wire-braided hose DN20 with coupling tongue part DN20 on both ends PN 40 bar	6-1024-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
Operating manual	6-0004-R213

Packing:

Packing for B131R41	3-671-R001-C
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■ RETROFIT KIT FOR SUCTION PUMPS

for SF₆ gas recovery < 1 mbar

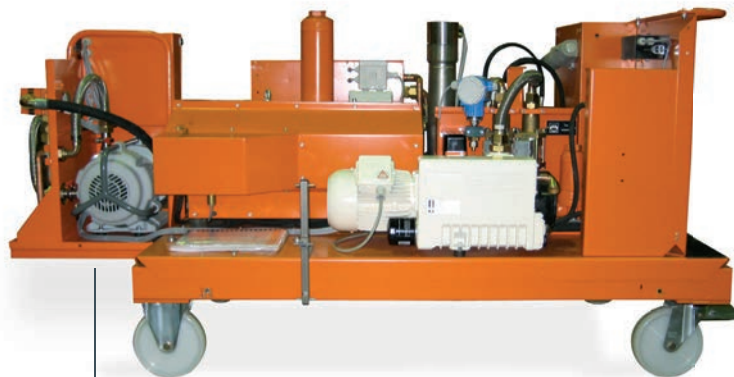
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Saugpumpennachrüstsatz

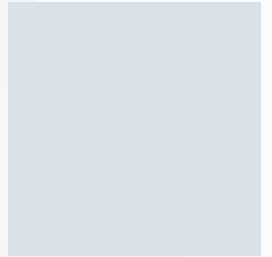
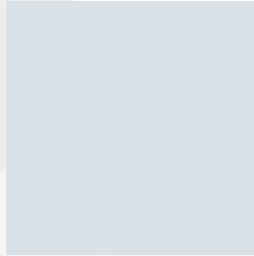
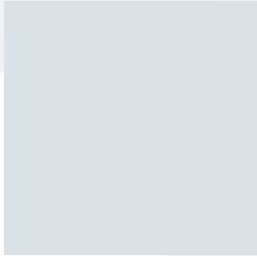
In case a mobile unit is not your preferred choice, it is also possible to install suction pumps in an existing service cart to be able to reclaim gas in accordance with the IEC 62271-4 regulation.

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



SF₆ ACCESSORIES

SF ₆ gas drying unit	108
Pressure measuring devices	110
Other accessories	112

■ SF₆ GAS DRYING UNIT

For continuous drying of SF₆ gas during operation

Z1024R01

SF₆ gas drying unit

In the past, if a high moisture content was measured in the SF₆ gas, then preventive maintenance had to be carried out all the time, i.e. contaminated gas had to be recovered and replaced by new gas in order to prevent any malfunctions.

With the SF₆ gas drying unit the SF₆ can be recovered from the gas compartment while the switchgear is in operation, dried in the closed circuit and refilled into the gas compartment without having to switch off the electrical equipment. This makes the maintenance of switchgear simple and efficient and minimises the operating costs.

Two different functions for drying, depending on the number of existing connecting couplings at the gas compartment, are available:

- » Drying in a circuit, i.e. permanent circulation from and to the gas compartment (for this, 2 connecting couplings are needed).
- » Storage in the internal 20 l vessel, drying through the internal dry filters and subsequent pumping back (for this, 1 connecting coupling is required).

The maximum quantity of gas to be recovered is calculated from the pressure difference between the nominal and minimum admissible filling pressure of the unit. High-precision pressure and moisture sensors in the drying unit monitor the drying process and ensure continuous and trouble-free operation. For example, the system stops automatically if the pressure falls below the set gas compartment pressure. The 7" colour touch panel displays all important information, such as the current moisture content or the gas compartment pressure.



- Continuous gas drying even during operation of the switchgear
- Fully automated process
- Dew point measurement at the inlet and outlet
- Pressure monitoring of the gas compartment
- Simple and intuitive operation via 7" colour touch panel
- Optional operation via mobile devices

■ SF₆ GAS DRYING UNIT



Z1024R01

SF₆ gas drying unit

Technical data:

Dimensions: Length 1,200 mm, Width 800 mm, Height 1,200 mm
Weight: 400 kg
Operating voltage: 220 - 240 V / 50 - 60 Hz alternating current
Measuring range of SF ₆ gas humidity: -55 to +30 °C atmospheric dew point
Ambient temperature: 0 to 40 °C

Standard equipment:

Oilfree DILLO compressor (1.6 m ³ /h [at 50 Hz], 50 bar; 1.9 m ³ /h [at 60 Hz], 50 bar)
Vacuum compressor (3.3 m ³ /h; final vacuum < 2.0 mbar)
3 dry filters (water absorption capacity: 3x 175 g at a dew point of -36°C)
3 particle filters
Storage vessel: 20 l; 16 bar p _g
2 DILLO couplings DN8
Indication in bar/mbar, Pa, psi / Torr selectable at the 7" touch panel
10 m long connecting cable
Paint: orange (RAL DESIGN 2004)
Operating manual

Optional accessories at an extra charge:

Transition piece DN20 / DN8	6-1206-R001
5 m long wire braided hose DN8 with coupling tongue part DN8 on one end and coupling tongue part DN20 on the other end	6-1173-R050
5 m long wire braided hose DN20 with coupling tongue part DN8 on one end and coupling tongue part DN20 PN 40 bar on the other end	6-1359-R050
5 m long wire braided hose DN8 with coupling tongue part DN8 on both ends	6-1070-R050
Evacuating and venting function of the filters	On request
Operation via mobile devices	On request

Packing:

Packing for Z1024R01	3-751-R017-C
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PRECISION GAUGE

For precise pressure control in gas compartments

3-558-R001

Precision gauge with hose

Indication unit in bar, kPa, psi

Indication range: 0 - 10 bar / 0 - 1000 kPa / 0 - 145 psi

The digital precision gauge allows precise determination of pressure in gas compartments.

The connecting hose for measuring devices is equipped with a self-closing coupling so that no SF₆ gas can escape into the atmosphere during the testing process. The device can be transported comfortably and safely in the handy plastic case.



Technical data:

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

Weight: 4.0 kg

Grundausrüstung:

Precision gauge NG 160 / class 0.6

1 m long Teflon hose with connecting coupling for measuring devices

Handy transport case

Operating manual

Optional accessories at an extra charge:

Coupling tongue part DN8	6-1161-R011
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Coupling tongue part DN20	6-1161-R012
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Operating manual	6-0004-R213
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Other transition pieces are available on request.

Packing:

Packing for 3-558-R001	05-1990-R003
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For pressure control in gas compartments

3-558-R010/A
with 5 point certificate

3-558-R010/B
with 11 point certificate

3-558-R010/C
with DKD certificate

Indication range -1 to 10 bar / 0 - 10 bar / 0 - 1000 kPa / 0 - 145 psi
 Indication in bar, kPa, psi (reversible) / class 0.1

This is a useful tool when precise pressure indication is required.

The connecting hose for measuring devices is equipped with a self-closing coupling so that no SF6 gas can escape into the atmosphere during the testing process. The device can be transported comfortably and safely in the handy plastic case.



Technical data:

Case dimensions: L 390 mm, W 310 mm, H 150 mm
Weight: 3.5 kg

Standard equipment:

Digital precision gauge -1 to 10 bar /class 0.1
1 m long Teflon hose with connecting coupling for measuring devices
Handy transport case
Operating manual

Optional accessories at an extra charge:

Coupling tongue part DN8	6-1161-R011
Coupling tongue part DN20	6-1161-R012
Additional operating manual	6-0004-R213

Other transition pieces are available on request.

Packing:

Packing for 3-558-R010	05-1990-R004
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DIGITAL VACUUM GAUGE

For vacuum control in gas compartments

Z619R01

Digital vacuum gauge

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_e 9 bar.



Technical data:

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

Weight: 5.0 kg

Standard equipment:

DILO coupling tongue part DN20

DILO coupling tongue part DN8

Elbow and intermediate piece DN8

Handy transport case

Operating manual

Optional accessories at an extra charge:

Additional operating manual	6-0004-R213
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Packing:

Packing for Z619R01	05-1990-R004
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Attention: For the operation of the device two 9-V batteries are necessary which are **not** included in the scope of supply.

GAUGE TEE PIECE



For pressure control of SF₆ gas

K040R01

Gauge Tee piece

Indication unit in bar, kPa, psi

Indication range: -1 - to 15 bar / -100 - 1,500 kPa / -14,5 to 220 psi

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

Packing:

Packing for K040R01

3-948-R003

Note: Other pressure ranges and nominal lengths are available on request.

ADAPTER KIT

For connection to SF₆ switchgear

Z340R21

Adapter kit

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:

Coupling groove part DN20 to ASEA adapter	6-1033-R001
Coupling groove part DN20 to coupling tongue part 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
Coupling groove part DN8 to coupling tongue part DN6	6-1240-R004
Coupling groove part DN8 to Michelin valve	6-1155-R001
Coupling groove part DN20 to Siemens adapter G1 1/4"	SK-279-R003 P
Coupling groove part DN8 to coupling tongue part DN20	6-1206-R001

Packing:

Packing for Z340R21	05-1990-R003
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For connection to SF₆ switchgear

**Z340R40
Adapter kit**

The practical adapter kit contains DILO DN8 transition pieces for the most commonly used SF₆ gas compartment connections. The self-closing sealing principle of the couplings ensures that no SF₆ is released into the atmosphere during coupling and uncoupling.



Technical data:

Case dimensions: W 500 mm, H 420 mm, D 180 mm
Weight: 6.5 kg

Standard equipment:

Coupling groove part DN8 to plug-in coupling tongue part DN7	6-1045-R002
Coupling groove part DN8 to plug-in coupling tongue part DN12	6-1045-R003
Coupling groove part DN8 to coupling tongue part DN20	6-1206-R001
Coupling groove part DN8 to coupling tongue part DN6	6-1240-R004
Coupling groove part DN8 to coupling tongue part DN12	6-1240-R005
Coupling groove part DN8 to Michelin valve	6-1155-R010
Coupling groove part DN8 to ASEA adapter	6-1033-R003

Packing:

Packing for Z340R40	05-1990-R003
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ADAPTER KIT DN20

For connection to SF₆ switchgear

Z340R41

Adapter kit DN20

The practical adapter kit contains DILO DN20 transition pieces for the most commonly used SF₆ gas compartment connections. The self-closing sealing principle of the couplings ensures that no SF₆ is released into the atmosphere during coupling and uncoupling.



Technical data:

Case dimensions: W 500 mm, H 420 mm, D 180 mm
Weight: 9.4 kg

Standard equipment:

Coupling groove part DN20 to plug-in coupling tongue part DN7	6-1033-R001
Coupling groove part DN20 to plug-in coupling tongue part DN12	6-1092-R007
Coupling groove part DN20 to coupling tongue part DN8	6-1002-R001
Coupling groove part DN20 to coupling tongue part DN6	3-251-R001 P
Coupling groove part DN20 to coupling tongue part DN12	3-240-R001 P
Coupling groove part DN8 to Michelin valve	6-1001-R001
Coupling groove part DN20 to Siemens adapter G1/4"	3-888-R001 T
Coupling groove part DN20 to ASEA adapter	6-1240-R004

Packing:

Packing for Z340R41	05-1990-R003
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For measuring devices

**Z340R42
Adapter kit**

The practical adapter kit includes self-closing connecting couplings for all DILO measuring devices. This ensures that no SF₆ is released into the atmosphere during coupling and uncoupling. A pressure reducer with metal membrane for verification of the gas quality in cylinders and containers is included as well.



Technical data:

Case dimensions: W 500 mm, H 420 mm, D 180 mm
Weight: 5.5 kg

Standard equipment:

Pressure reducer for SF ₆	3-974-R003
Hose connection DN6 (3-389-R018 P + 3-408-R001)	6-1161-R013
Hose connection DN12 (3-389-R009 P + 3-888-R001)	6-1161-R014
Hose connection DN7 (3-389-R008 P + 3-308-R002)	6-1161-R015
Hose connection DN12 (3-389-R009 P + 3-307-R002)	6-1161-R016
ASEA adapter – miniature quick coupling	6-1033-R004
1" connection for gas cylinder (reuse gas)	3-851-R003 P

Packing:

Packing for Z340R42	05-1990-R003
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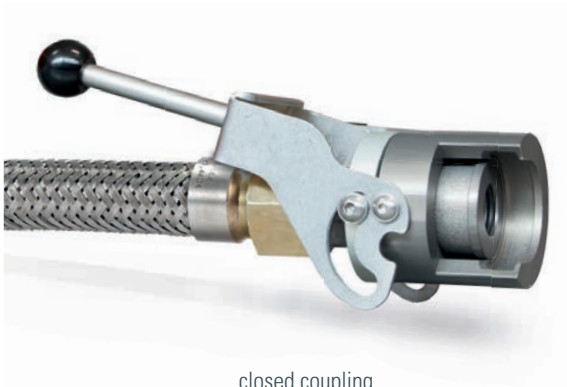
DN20 QUICK COUPLING

For easy coupling and uncoupling of hoses

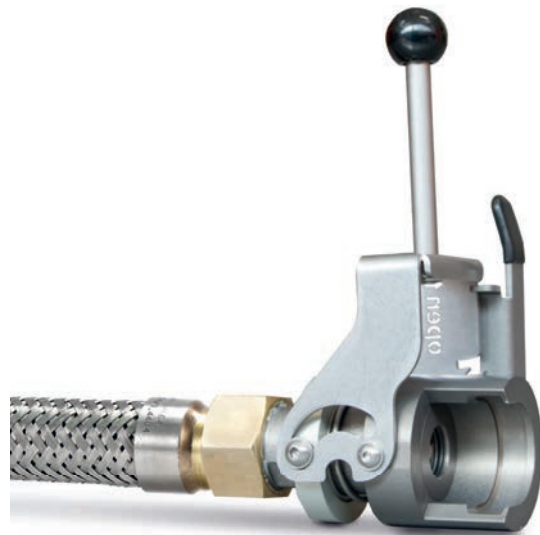
3-1121-R003

DN20 Quick coupling

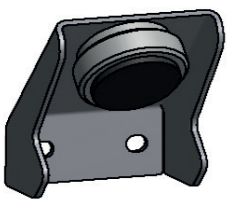
The quick coupling is very useful in all fields of application where hoses have to be frequently loosened and reconnected e. g. during final tests of completely mounted GIS fields. Thanks to the clamp lock the DN20 hoses can easily be connected without any loss of SF₆ gas. Thus the handling times in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



closed coupling



open coupling



Fixing facility for safe wall assembly and dust protection

Article-no. 3-1121-R093

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
- Robust version

HOSE REEL WITH SPRING BALANCER



Stationary unit for wall assembly

B174R10

Hose reel with spring balancer

With abrasion-proof 10 m long (GS1020L10000) rubber hose DN20 and coupling tongue part DN20

B174R15

Hose reel with spring balancer

With abrasion-proof 15 m long (GS1020L1500) rubber hose DN20 and coupling tongue part DN20

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 05-1805-R011 (accessories)

- Stable steel frame, ready for wall assembly
- Abrasion-proof rubber hose (GS1020) with surface coating
- 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

HOSE REEL WITH SPRING BALANCER

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	05-1805-R011
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..	3-748-R020-C
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Upon request we also supply customer-specific devices such as multiple stationary or mobile hose reels with or without distribution panel.



Hose reel for three gas compartment hoses with spring balancer and valve connections (on left side)

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

HOSE REEL

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) PN 40 bar	SM0120L02000
3 m long wire braided hose DN20 (from hose reel to gas compartment) PN 40 bar	SM0120L03000
4 m long wire braided hose DN20 (from hose reel to gas compartment) PN 40 bar	SM0120L04000
5 m long wire braided hose DN20 (from hose reel to gas compartment) PN 40 bar	SM0120L05000
6 m long wire braided hose DN20 (from hose reel to gas compartment) PN 40 bar	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
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WORKING PROTECTION KIT



For decomposed SF₆ gas (with neutralization)

3-442-R001

Working protection kit

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 915 mm, W 465 mm, H 485 mm
Gross weight: 28 kg

Standard equipment:

Piece	Designation	Order No.
1	Aluminium trolley	05-0452-R008
2	Disposable overall	3-442-02*
5 pairs	Disposable overshoes	3-442-03*
1	Breathing half mask	05-0453-R101*
1	Protective goggles	05-0453-R111*
1 kit	Gas and particle filter and filter cover for breathing half mask	3-442-31*
1 kit	Valves (breathe in and out) for half breathing mask	3-442-32*
2 pairs	Safety gloves	3-442-06*
5 pairs	Gloves made of cotton stockinet	3-442-07*
1	Plastic barrel	05-0442-R001*
1 pack	Refuse sacks 120 liters	05-0594-R001*
2 rolls	Sucking and wiping cloths	05-0595-R001*
1 kg	Sodium carbonate	05-0443-R001*
1	Vessel for solvent	05-0285-R005*
10	Spoon	3-442-17*
1 pack	Indicator paper	05-0780-R001*
1	Safety helmet EN 397, orange	05-1612-R001
1	Operating manual	

For removal of solid decomposition products please use the dry vacuum cleaner!

* spare material

Optional accessories at an extra charge:

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

Packing for 3-442-R001	3-748-R025-C
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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 (230 V / 50 - 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 800 mm, W 600 mm, H 410 mm

Weight with aluminium trolley: 21 kg

Standard equipment:

Operating manual

Optional accessories at an extra charge:

1 piece spare inlet filter for dry vacuum cleaner (dust class H)	05-0451-R002
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1 spare hose, 5 m long with connecting sleeve	05-0450-R020
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Additional operating manual	6-0004-R213
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Packing:

Packing for 3-442-22 / 3-442-25	3-748-R026-C
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■ GAS TIGHT CUTTING DEVICE



For recovery of SF₆ gas from firmly welded metallic gas compartments „sealed for life“

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. An integrated sinter filter prevents solid particles from entering the service cart during the recovery process.

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



Z415R04



Z415R03

- Self-closing DILO coupling DN20 with integrated sinter filter
- Operation of the hard metal cutter with accumulator or hand drill
- Storage in a robust case

■ GAS TIGHT CUTTING DEVICE

Z415R04 / R03

Gas tight cutting device

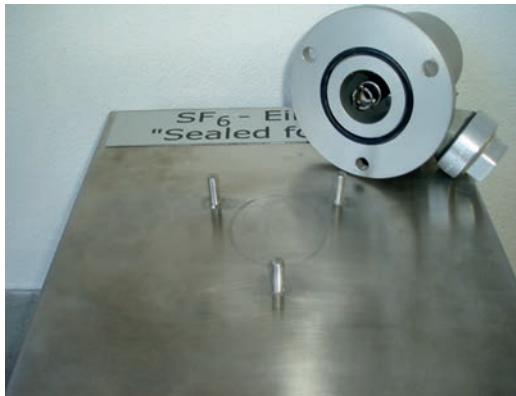
Technical data:

Dimensions of Z415R04: length: 360 mm, width: 295 mm, height: 165 mm
Dimensions of Z415R03: length: 665 mm, width: 570 mm, height: 250 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 with coupling DN20, integrated sinter filter and aluminium covering cap
Stencil
5 hard metal cutters Ø 16 mm
Screw driver
Stud welding machine (only for Z415R03)
Operating manual

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
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Packing:

Packing for Z415R03	05-1990-R001
Packing for Z415R04	05-1990-R004

For SF₆ gas recovery from non-metallic gas compartments “sealed for life”

Z415R05

Gasdichte Schneidvorrichtung mit Haltelaschen

This version has been specially designed for emission-free SF₆ gas recovery from non-metallic gas compartments - sealed for life - (e. g. medium voltage components of epoxy resin) often with uneven, convex or round surface.

The cutting device can be mounted easily on the components to be disposed of by means of lashing and ratchet straps to allow drilling the epoxy resin part without any problems. For gas recovery the service cart is connected via a DILO coupling. A sinter filter integrated in the cutting device prevents solid particles from entering the service cart during the gas recovery process.

This device configuration is particularly interesting for companies specialized in the disposal and recycling of medium voltage components.



Prior to the gas recovery process the gastight cutting device can be mounted on the medium voltage components by means of a ratchet strap.

- Operation of the device with accumulator or hand drill
- Self-closing DILO coupling as connection to the service cart
- Device with lashing and ratchet strap
- Integrated sinter filter
- Storage in a stable transport case

Further versions are available on request.

GAS TIGHT CUTTING DEVICE WITH LASHING STRAPS

Z415R05

Gas tight cutting device with lashing straps

Technical data:

Dimensions: length: 360 mm, width: 295 mm, height: 165 mm

Weight: 4.8 kg

Standard equipment:

Recovery device with coupling DN8, integrated sinter filter and aluminium covering cap
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4 m long ratchet strap

Tool and spare parts box

Spiral drill

Operating manual

Packing:

Packing for Z415R05	05-1990-R004
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■ SF₆ CYLINDER HEATER BLANKET



For heating SF₆ gas bottles

3-429-R021

SF₆ Cylinder heater blanket (900 W) 220 - 240 V 1~ 50 / 60 Hz

3-429-R022

SF₆ Cylinder heater blanket (900 W) 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.

The handling of the heater blanket is easy: it is wrapped around the SF₆ cylinder, fastened with wire springs and connected to the power supply.

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.



Technical data:

Applicable for cylinder diameter: 205 - 230mm
Height: 300 mm
Heater performance: 900 W
Operating voltage: 220 - 240 V 1~ / 50 - 60 Hz, 110 - 127 V 1~ / 50 - 60 Hz

Standard equipment:

Connecting line: 1.5 m
Operating manual

Optional accessories at an extra charge:

Additional operating manual	6-0004-R213
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Packing:

Packing for 3-429-R... (cardboard box)	3-948-R002
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For recording of SF₆ gas consumption rates DILO offers different devices with PC interface allowing easy and comfortable SF₆ stock management in connection with a database driven-software.

DEVICES FOR SF₆ GAS MONITORING

K091R.. Electronic bottle scales	132
K091R54 Weighing scales	134
B152R41 Mass flow measuring system	135
B152R51 Mass flow measuring system (battery-operated) ..	136
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■ 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 easily and compactly in one step after use.



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



K091R65 (K067

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: a) Plug 100 - 240 V / 50 - 60 Hz with 2 meter long cable (only K091R65) b) Batteries (4 x 1.5 V AA) / Not included in the delivery
Protection class: IP54
Operating temperature: -10 to +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
Protection class: IP65
Operating temperature: -10 to +40 °C

Standard equipment:

Surface: electrogalvanizing
Operating manual
Plug 100 - 240 V / 50 - 60 Hz with 2 meter long cable (only K091R65)

Optional accessories at an extra charge:

4 m long cable with M12 plug connectors for serial data exchange (only K091R67)	05-1602-R304
Additional operating manual	6-0004-R213

Packing:

Packing for K091R65 / K091R67	3-775-R033-C
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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 2,500 kg. The determined weight is indicated on the display immediately.

The integrated serial interface is a special feature allowing data communication with other DIL0 devices. Thus, not only the weight can be read on the service cart, but the recovery process can also be stopped via the DIL0 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- 2,500 kg with tare function
- Serial interface
- Digit increment: 0,1 kg
- Accuracy: ± 0,3 kg
- Weight indication reversible from kg to lbs
- Easy unloading of the weighing system during transport



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
Protection class: IP65

Standard equipment:

Fixing and steerable rollers
Paint: orange (RAL 2004)
Operating manual

Optional accessories at an extra charge:

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

Packing:

Packing for K091R54	3-1001-R005-C
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■ MASS FLOW MEASURING SYSTEM



For recording gas quantities from and to the circuit breaker

B152R41 / B152R41S15

Mass flow measuring system

with an additional resettable, adding and subtracting counter

B152R51

Mass flow measuring system (battery-operated with charge indicator)

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.



B152R41

- System can be wall or table mounted
- Max. flow rate: 400 kg/h
- 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

MASS FLOW MEASURING SYSTEM

B152R41 / R51

Mass flow measuring system

Technical data:

Dimensions: L 400 mm, D 280 mm, H 540 mm
Weight: 20 kg
System can be wall or table mounted
Indication in kg, optionally in lbs
Operating temperature: 0 to 50 °C
Operating voltage of B152R41: 220 - 240 V / 50 - 60 Hz alternating current
Operating voltage of B152R41S15: 110 - 127 V / 50 - 60 Hz alternating current

Standard equipment:

Coupling groove part DN20
Installed in a metal housing
Paint: orange (RAL 2004)
Operating manual

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 lbs/h	6-0005-R130
Aluminium case	3-781-R018
Additional operating manual	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 / 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)

■ MASS FLOW MEASURING SYSTEM

B15290 / R91

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)
Operating manual

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	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

WEIGHING UNIT FOR "SF₆ MONITORING MANAGER"



Mobile as cylinder cart

B195R01

With thermal transfer label printer

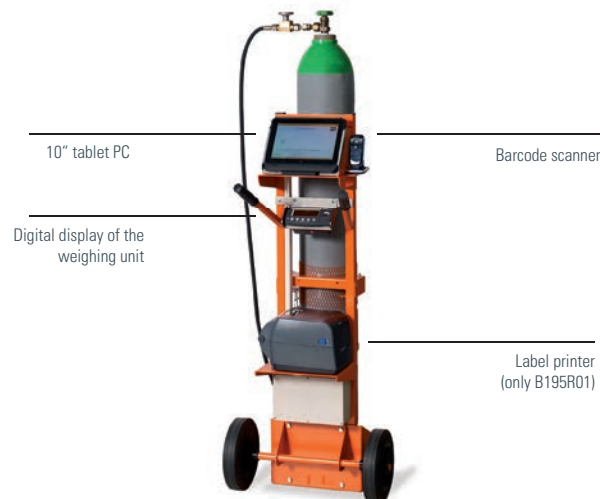
B195R02

Without thermal transfer label printer

This weighing unit is a useful tool for the stock management of SF₆ cylinders in connection with the "SF₆ Monitoring Manager" 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.

For detailed information on the "SF₆ Monitoring Manager" database software please see our B195R10 / R11 data sheet.



- 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 via LAN/WLAN
- 2D capable cordless barcode scanner with Bluetooth interface

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 LAN/WLAN
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)
Operating manuals

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

Optionales Zubehör gegen Aufpreis:

Additional operating manual	6-0004-R213
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Packing:

Packing for B195R01 / B195R02	3-262-R006-C
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OPERATING UNIT FOR "SF₆ MONITORING MANAGER" SOFTWARE



Monitoring system for connection to digital weighing scales and filling devices with portable case

B195R30

Operating unit for "SF₆ Monitoring Manager" Software

This operating unit is a useful tool for the stock management of SF₆ cylinders and containers in connection with the "SF₆ Monitoring Manager" database software. The integrated interface allows the connection of the operating unit to all DILO weighing scales and gas refilling devices equipped with a serial interface for data exchange or monitoring.

The device is portable and can therefore be used on different sites and allows access to the central monitoring database via LAN/WLAN connection.

Incoming and outgoing gas vessels are identified by means of the integrated barcode scanner. The barcode labels for clear identification of the vessels can be printed on site with the label printer.

The monitoring system considerably simplifies the stock management of gas quantities currently in use for switchgear production or at utility companies. Thus, the time-consuming manual registration of SF₆ gas quantities in use is no longer an issue.

For more information on the „SF₆ Monitoring Manager“ software please see our separate data sheet.



The operating unit can be easily connected to digital DILO weighing scales or gas refilling devices.

- 10" tablet computer with database connection via LAN/WLAN
- Interface for electronic weighing units and gas refilling devices
- 2D capable cordless barcode scanner with Bluetooth interface
- Thermal transfer printer for label width to 100 mm
- Stable plastic case

OPERATING UNIT FOR "SF₆ MONITORING MANAGER" SOFTWARE

B195R30

Operating unit for "SF₆ Monitoring Manager" Software

Technical data:

Dimensions: L 610 mm, W 470 mm, H 280 mm
Weight: 17 kg
Operating voltage: 100 - 240 V / 50 - 60 Hz alternating current

Standard equipment:

10" tablet computer with database connection via LAN/WLAN
Thermal transfer printer for label width to 100 mm
2D capable cordless barcode scanner with Bluetooth interface
Black transport case
Operating manual

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	6-0004-R213
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Packing:

Packing for B195R30	3-775-R027-C
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■ „SF₆ MONITORING MANAGER“ SOFTWARE



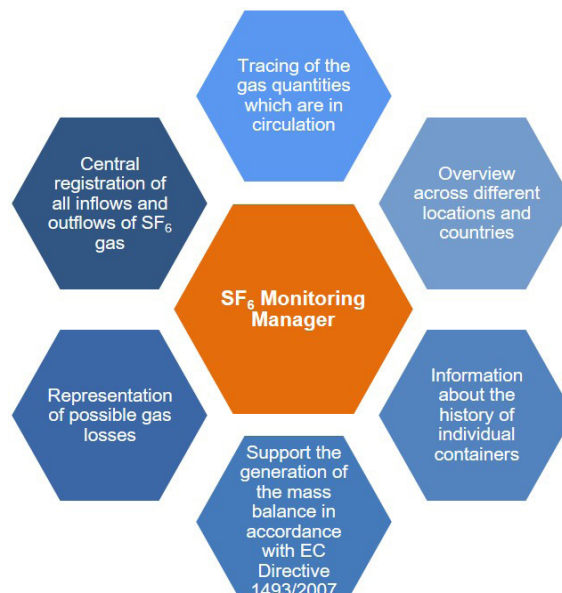
Software for the central stock management of SF₆ gas

B195R10 / R11

„SF₆ Monitoring Manager“ Software

The "SF₆ Monitoring Manager" is a database-driven software tool for the intelligent stock management of SF₆ gas in switchgear production and for utility companies. All DILO weighing systems and gas refilling devices as well as mass flowmeters with digital interfaces can be connected to the database.

The user-friendly software makes it possible to monitor and log the SF₆ stock – even across different locations and countries. All incoming and outgoing SF₆ vessels can be recorded and logged by means of the software. The history of vessels is thus traceable via an automatically assigned ID number. Vessels can also be freely defined, e.g. cylinders, containers, stationary tanks or GIS components. The supervisor can make changes and manual entries.



The key monitoring parameters at a glance:

Behälterart und ID-Nummer

- Type of vessel and ID number
- Date of addition and withdrawal
- Net weight
- Tare weight
- Storage location
- Supplier
- Type of gas (new gas, reuse gas, gas for disposal)
- Gas quality (moisture, SF₆ percentage)
- Recipient address

Other customer-specific data can be added. There are four more fields available for this purpose.

„SF₆ MONITORING MANAGER“ SOFTWARE

B195R10 / R11

„SF₆ Monitoring Manager“ Software

The statistics centre provides information about the total gas quantity, broken down by countries and sites. Any gas leaks can likewise be "tracked" within a specified time period per vessel. Finally, the user gets a so-called "at a click" overview of the current SF₆ stock, even at different locations, whereby the generation of the SF₆ mass balance in accordance with 1191/2014 EU Directive and the compliance and asset management is considerably simplified.

Serial number	Gas weight	Address	Container info	Container type
1002	130 / 30	Main Stock, Babenhausen, DEU	GIS component	Bus bar
0001	24 / 40	DILO, Assembly Workshop, Babenhausen, DEU		40 I-SF6-Cyl.
9000	400 / 4000	Dilo, Gas Stock, Babenhausen, DEU	stationary	Storage vessel
1001	30 / 6	DILO, Goods Receipt, Babenhausen/Schwaben, DEU	GIS component	Earthing switch
0006	16 / 52	DILO, Assembly Workshop, Babenhausen, DEU		50 I-SF6-Cyl.
1000	59.4 / 100	DILO, Assembly Workshop, Babenhausen, DEU	GIS component	Circuit Breaker
0005	100 / 600	DILO, Goods Receipt, Babenhausen/Schwaben, DEU		600 I-SF6-Tank
0007	23 / 40	Dilo, Gas Stock, Babenhausen, DEU		40 I-SF6-Cyl.
0008	22 / 40	DILO, Assembly Workshop, Babenhausen, DEU		40 I-SF6-Cyl.
0002	41 / 40	DILO, Goods Receipt, Babenhausen/Schwaben, DEU		40 I-SF6-Cyl.

+ New container

The software can also be upgraded for other gases upon request.

Software-Features

- Web-based front-end
- Windows operating system
- Cloud or network solution
- Able to deal with multiple clients
- User and authorisation management
- Data collection terminal connection via LAN/WLAN
- Encrypted data transmission
- Central software update in the Cloud

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

The DILO license terms and the general terms and conditions for software use apply.



A RANGE FOR ALL REQUIREMENTS

DILOR 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	146
SF ₆ gas detectors	162
Density monitor testing devices	170
Accessories for measuring devices	178

DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

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 517/2014 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 %



For verification of several parameters with only one measurement

3-035R-R...
MIRROR-ANALYSER^{SF6}

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

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

The MIRROR-ANALYSER^{SF6} uses the physical dew point mirror measuring principle which is characterised by its high precision and utmost reliability in order to measure the moisture content. By cooling the integrated mirror the moisture content of the gas is determined by measuring the temperature depending on the condensation or icing of the mirror. The other parameters of SF₆ quality are determined by measuring the speed of sound (SF₆ volume percentage) and electrochemical reaction (SO₂ concentration).



- High accuracy and reliability in moisture determination (dew point mirror measuring principle)
- No emissions of measuring gas (integrated gas return system)
- Modular interchangeability of the sensors
- Low maintenance due to self-test functions
- Easy and user-friendly menu navigation via high quality 7" capacitive colour touch screen
- Results of up to 500 measurements can be stored with name, date and time
- USB- and LAN connection
- Adjustable user languages: DE, EN, FR, ES
- Compact design, easy handling and transportation (installed in a trolley case)
- Optional remote control via mobile devices

DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

3-035R-R...

MIRROR-ANALYSER SF₆

The "MIRROR-ANALYSER SF₆" is a compact, user- and maintenance-friendly device which guarantees high measuring precision. The unit allows different kinds of measurements and treatment of the measuring gas in one of the following ways:

- » The measuring gas can be stored in an internal storage vessel and pumped back into the gas compartment (up to 10 bar p_g)
- » External storage of the measuring gas into a cylinder
For measurements on cylinders, vessels or gas compartments with higher pressure (max. inlet pressure 35 bar p_g) or if the measuring gas should not be pumped back into the unit, a cylinder can be connected directly to the outlet (max. 10 bar p_g). It is not necessary to use a pressure reducer and to separate the device from the gas cylinder or the gas compartment.
- » External storage of the measuring gas into a gas collecting bag
An external gas collecting bag can be connected allowing continuous measurements (inlet pressure max. 35 bar p_g) without pumping the gas back. Afterwards it is possible to empty the external bag by using the MIRROR-ANALYSER SF₆, a service cart or compressor unit.

Precise and correct results for subsequent measurements can be guaranteed by rinsing the measuring hose prior to each measurement. The device is very maintenance-friendly. The residual lifetime of the SO₂ electrochemical sensor is indicated automatically. The dew point mirror has self-test functions.

A very practical and useful device.

Technical data:

Dimensions: Length 500 mm, Width 625 mm, Height 297 mm
Weight: approx. 27.5 kg
Inlet pressure: pe 0.2 – 35 bar
Operating temperature: -10 °C to +40°C
Ambient moisture: max. 90 % relative moisture, non-condensing during operation
Operating voltage: 100 - 240 VAC 50/60 Hz
Number of measured values to be stored: max. 500
Interface: USB/LAN
Measuring time: variably calculated by the system (5-7 min; max. 10 min)
Limit value dew point: adjustable from -50°C to +20°C
Limit value vol.-%: adjustable from 0.0 to 99.9%
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 inlet pressure, reversible to indication in ppm _v , ppm _M
Inlet pressure indication in p _a or p _g , psi, kPA, MPa

Standard equipment:

Transport case; 6 m long connecting hose with DIL0 couplings DN8 and DN20; 2 m long connecting cable
USB stick with data evaluation and reading out of measured data
Operating manual



3-035R-R...

MIRROR-ANALYSER SF₆

Sensor data:

	Frost- /Dew point	Volume percentage	SO ₂
Measuring principle	Dew point mirror (physical measuring principle)	Velocity of sound	Electrochemical reaction
Measuring range	-50 °C to +20 °C	0 - 100.0 Vol.-% SF ₆	0 - 20 ppm _v 0 - 100 ppm _v 0 - 500 ppm _v
Measuring accuracy	±0,5 °C	±0,5 %	< 2 % of the measuring range
Reproducibility	±0,2 °C	±0,3 %	< 4 % / year or < 2 % / month
Long-term stability			< 2% signal loss / month
Recommended calibration interval	2 years	2 years	2 years

Ordering designation of the MIRROR-ANALYSER SF₆:

Single measuring device for moisture: -50 to +20°C	3-035R-R102
Two-in-one measuring device for moisture: -50 to +20°C, percentage 0-100 vol.-%	3-035R-R201
Three-in-one measuring device for moisture: -50 to +20°C, percentage 0-100 vol.-%, SO ₂ with 0-20 ppm _v	3-035R-R301
Three-in-one measuring device for moisture -50 to +20°C, percentage 0-100 vol.-%, SO ₂ with 0-100 ppm _v	3-035R-R302
Three-in-one measuring device for moisture -50 to +20°C, percentage 0-100 vol.-%, SO ₂ with 0-500 ppm _v	3-035R-R303

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:

External compressor for increase of pressure for application of the MIRROR-ANALYSER SF ₆ in medium voltage switchgear with a pressure < 0.2 bar p _e	3-826-R003
Discharge gas collecting bag	B151R95
Adapter case for measuring devices	Z340R42
6 m long connecting hose with self-closing couplings (as extension hose)	3-531-R060
Remote control via mobile devices	K176R11
Kit for remote control router	K176R21
Kit for remote control router with extended functions	On request

Packing:

Packing for 3-035R-R...	3-775-R024-C
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DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

For verification of several parameters in one operation

3-038R-R...

MULTI-ANALYSER SF₆ with gas return system

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

- » SF₆ volume percentage (%)
- » Moisture concentration
- » SO₂ concentration (ppm_v)
- » Option: HF concentration (ppm_v)
- » Option: CO concentration (ppm_v)
- » Option: H₂S concentration (ppm_v)



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

The MULTI-ANALYSER SF₆ is a battery-operated, compact, user- and maintenance-friendly device which guarantees high measuring accuracy. The unit allows different kinds of measurements and treatment of the measured gas in one of the following ways:

- » The measured gas can be stored in an internal storage vessel and pumped back into the gas compartment (up to 10 bar p_g)
 - » For measurements on cylinders, vessels or gas compartments with higher pressure (max. inlet pressure 35 bar p_g) a pressure reducer is not needed. If the gas should not be pumped back into the SF₆ filled equipment, a cylinder can be connected directly to the outlet. It is not necessary to disconnect the device from the gas compartment, the vessel or cylinder with the higher pressure.
 - » An external gas collecting bag can be connected allowing continuous measurements (inlet pressure max. 35 bar p_g) without pumping the gas back. The external bag can be emptied by using the MULTI-ANALYSER SF₆, a service cart or compressor unit.
- No gas emissions during the measuring process
 - Modular interchangeability of all sensors
 - Operation with or without battery (external power supply)
 - Exchangeable battery (replacement and separate shipping is possible)
 - Easy and user-friendly menu navigation via high quality 7" capacitive colour touch screen
 - Optional remote control
 - Automatic interval measurement is possible
 - USB and LAN connection
 - Storage of up to 500 measurement results with name
 - Adjustable user languages: DE, EN, FR, ES, IT, PT, CZ, PL, CN, JPN, RUS
 - Compact design, easy handling and transportation (installed in a trolley case)



3-038R-R...

MULTI-ANALYSER SF₆

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

Another big advantage of the MULTI-ANALYSER SF₆ is its high precision. The SF₆ moisture 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 atmospheric pressure.

The device is very maintenance-friendly. The residual lifetime of the electrochemical sensors is displayed automatically. A very practical and useful device.

No SF₆ gas is released into the atmosphere!

Technical data:

Dimensions: Length 406 mm, Width 538 mm, Height 269 mm
Weight: 25 kg
Inlet pressure: p ₀ 0.2 - 35 bar
Operating temperature: -10 °C to +50 °C
Ambient moisture: max. 90 % relative moisture, non condensing during operation
Operating voltage: 85 - 264 VAC, 47 - 63 Hz (exchangeable battery)
Number of measured values to be stored: 500
Interface: USB/LAN
Measuring time: variably calculated by the system, max. 15 minutes
Indication of moisture concentration in dew point °C or °F, referred to atmospheric or inlet pressure, reversible to indication in ppm _v , ppm _M
Indication of inlet pressure in bar, psi, MPa and kPa (in p ₀ or p _e)

Standard equipment:

Transport case; 6 m long connecting hose with DILO couplings DN8 and DN20; 2 m long connecting cable
USB stick with data file for evaluation and reading out of measured data
Operating manual

DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

3-038R-R...

MULTI-ANALYSER SF₆

Sensor data:						
	Vol.-%	Moisture	SO ₂	Option: HF	Option: H ₂ S	Option: CO
Measuring principle	Velocity of sound	Electronic dew point measurement (capacitive)	Electrochemical reaction	Electrochemical reaction	Electrochemical reaction	Electrochemical reaction
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 (to > -40 °C) ±3 °C (to < -40 °C)	< ±2 % of measuring range	< ±10 % of measuring range	< ±2 % of measuring range	< ±2 % of measuring range
Adjustable limit value	0,0 – 100,0 vol.-%	-60 – +20 °C	0,0 – 20,0 ppm _v 0,0 – 100,0 ppm _v 0,0 – 500,0 ppm _v	0,0 – 10,0 ppm _v	0,0 – 100,0 ppm _v	0,0 – 500,0 ppm _v
Recommended calibration interval	2 years	2 years	2 years (lifetime)	2 years (lifetime)	2 years (lifetime)	2 years (lifetime)

Ordering designations of the MULTI-ANALYSER SF₆:

Device with gas return system

3-038R-

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 and 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 and 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 and 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 and SO ₂ with 0 – 100 ppm _v , HF with 0 – 10 ppm _v , CO with 0 – 500 ppm _v and H ₂ S with 0 -100 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:

External compressor for increase of pressure for application of the MULTI-ANALYSER SF ₆ in medium voltage switchgear with a pressure of < 0.2 bar p _g	3-826-R003
Gas collecting bag, volume 52 l	B151R95
Adapter case for measuring devices	Z340R42
6 m long connecting hose with self-closing couplings (as extension hose)	3-531-R060
Additional operating manual	6-0004-R213
Remote control via mobile devices	K176R01
Remote control router kit	K176R21
Remote control router kit with extended functions	On request

Packing:

Packing für 3-038R-R...	3-775-R104
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For continuous monitoring of the gas quality

B169R...

SF₆ gas monitoring system

The device is used to monitor and record the quality of the SF₆ gas in a gas compartment. The following quality parameters can be determined with only one measurement:

- » SF₆ volume percentage (%)
- » Moisture concentration (°C atmosphere, °C pressure, °F atmosphere, °F pressure, ppm_v, ppm_w)
- » SO₂ concentration (ppm_v)

The user can select between three measurement modes:

- » Continuous measurement
- » Pulse measurement with automatic measurement data recording
- » Single measurement



For the measurement, the gas compartment is equipped with two partially separated couplings. The gas is taken from one of the two couplings, temporarily stored in the internal gas collecting bag of the gas monitoring system and then pumped back into the gas compartment through the second coupling after the measurement has been taken. Alternatively, the gas outlet coupling of the device can also be connected to an external vessel where the gas is collected after the measurement.

The gas monitoring system is characterised by simple and user-friendly handling and easy maintenance. All gas sensors are easily accessible and can be replaced by the user according to the „plug & play“ principle. The device is operated via a 3.5“ colour touch screen with intuitive menu navigation.

Due to the use of self-closing couplings, SF₆ cannot escape into the atmosphere either during measurement or when pumping back. The gas monitoring system is available as a stand-alone system or as a component of an SF₆ service cart (installation).

If the SF₆ gas is to be stored in the liquid form after measurement, we offer to equip the system with a more powerful compressor (B100R30, final pressure 50 bar p_e) instead of the standard compressor (B100R20, final pressure 9 bar).

DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

B169R...

SF₆ gas monitoring system

- Inlet pressure max. 50 bar p_e
- Storage of up to 500 measurement results with name, date and time assignment
- Adjustable user languages: DE, EN, FR
- Selectable pressure and moisture units
- LAN connection and SD cards slot
- Export of measurement data as CSV file

Technical data:

Dimensions: Width: 600 mm Height: 550 mm Depth: 430 mm
Weight: 40 kg
Inlet pressure: 1.5 - 50 bar p _e
Operating temperature: -10 °C to +50 °C
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Operating voltage: (dependant on integrated compressor) Order no. B169RX0X (B100R20 compressor): 85-264 V AC, 47-63 Hz order no. B169RX5X (B100R30 compressor): 220-240 V AC, 50-60 Hz
Number of measured values to be stored: max. 500
Interface: LAN
Limit value vol.-%: adjustable from 0.0 to 99.9 vol.-%
Limit value moisture concentration: adjustable from -60 °C to +20 °C, -76 to +68 °F, 10 to 24000 ppm _v , 1.23 to 2959 ppm _w
Limit value SO ₂ : adjustable from 0.0 to 499.9 ppm _v (dependant on the integrated SO ₂)
Indication of moisture concentration in °C or °F, referred to atmospheric or inlet pressure, reversible to indication in ppm _v ppm _w
Inlet pressure indications in bar p _a , bar p _e , psi p _a , psi p _e , kPa p _a , kPa p _e , MPa p _a , MPa p _e

Sensor data:

	Vol. %	Moisture	SO ₂
Measuring principle	Velocity of sound	Electronic dew point measurement	Electrochemical reaction
Measuring range	0-99.9 vol.-%	-60 to +20 °C -76 to +68 °F 10 to 24000 ppm _v 1.23 to 2959 ppm _w	0 to 20 ppm _v 0 to 100 ppm _v 0 to 500 ppm _v
Measuring accuracy	±0.5 vol.-%	±2 °C (at > -40 °C) ±3 °C (at < -40 °C)	< ±2 % of measuring
Measuring gas pressure	Atmospheric pressure	Atmospheric pressure	Atmospheric pressure
Flow rate	0.3 - 0.5 l/h	16 - 17 l/h	1 - 3 l/h
Reaction time	< 2 min	< 5 min	< 20 s
Recommended calibration interval	2 years	2 years	2 years (lifetime)
Long term stability			< 2 % signal loss per month



B169R...

SF₆ gas monitoring system

Standard equipment:

2 m long connecting hoses with DILO couplings DN8
Operating instructions

Ordering designations of the SF ₆ gas monitoring system:					
Order no. B169...	Percentage measurement	Moisture measurement	SO ₂ measurement	Installation / stand-alone	Compressor
R101	Yes	No	No	Installation	B100R20
R104	Yes	No	No	Stand alone	B100R20
R151	Yes	No	No	Installation	B100R30
R154	Yes	No	No	Stand alone	B100R30
R201	Yes	Yes	No	Installation	B100R20
R204	Yes	Yes	No	Stand alone	B100R20
R251	Yes	Yes	No	Installation	B100R30
R254	Yes	Yes	No	Stand alone	B100R30
R301	Yes	Yes	20 ppm _v	Installation	B100R20
R302	Yes	Yes	100 ppm _v	Installation	B100R20
R303	Yes	Yes	500 ppm _v	Installation	B100R20
R304	Yes	Yes	20 ppm _v	Stand alone	B100R20
R305	Yes	Yes	100 ppm _v	Stand alone	B100R20
R306	Yes	Yes	500 ppm _v	Stand alone	B100R20
R351	Yes	Yes	20 ppm _v	Installation	B100R30
R352	Yes	Yes	100 ppm _v	Installation	B100R30
R353	Yes	Yes	500 ppm _v	Installation	B100R30
R354	Yes	Yes	20 ppm _v	Stand alone	B100R30
R355	Yes	Yes	100 ppm _v	Stand alone	B100R30
R356	Yes	Yes	500 ppm _v	Stand alone	B100R30

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.

DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

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



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 principle: Electronic moisture measurement (capacitive)
Measuring range: -60 to +20 °C dew point
Measuring accuracy: ± 2 °C (from -40 to +20 °C), ± 3 °C (from -60 to -40 °C)
Input pressure: p_g 0.5 - 10 bar
Operating temperature: -10 to +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
Operating manual

Optional accessories at an extra charge:

Discharge gas collecting bag (for emission-free measurement)	B151R95
Additional operating manual	6-0004-R213

Packing:

Packing for 3-037-R001	05-1990-R004
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DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

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



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
Measuring principle: Chemical reaction
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: -10 to 50 °C
Ambient moisture: up to 90 % relative moisture, non condensing during operation
Input pressure: p _g 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:

Discharge gas collecting bag (for emission-free measurement)	B151R95
Additional operating manual	6-0004-R213

Packing:

Packing for 3-032-R...	05-1990-R004
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DEVICES FOR DETERMINATION OF THE SF₆ GAS QUALITY

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 SO₂: 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_{mass})



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



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
Measuring principle: Chemical reaction

Standard equipment:

Measuring device for decomposition products with flowmeter and needle valve
Safety valve
Mounting for test tubes
DILLO 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
Operating manual

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)	05-1026-R001
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)	05-1026-R002
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)	05-1026-R003
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)	05-1026-R010
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)	05-1026-R015
10 pieces plastic bags with a volume of 1 litre	05-1025-R001
10 pieces plastic bags with a volume of 2 litres	05-1025-R002
3 pieces plastic bags with a volume of 10 litres	05-1025-R004
Adapter for emptying the discharge gas collecting bag	3-969-R005
Additional operating manual	6-0004-R213

Packing:

Packing for 3-032-R003	05-1990-R004
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■ SF₆ GAS DETECTORS

For quick detection and quantification of small SF₆ leaks

3-033-R200

LEAKSPY^{SF6} (Sensor length 300 mm)

The cordless battery-operated LEAKSPY^{SF6} precisely measures SF₆ concentration in air by means of a non dispersive infrared sensor (NDIR sensor) and indicates the value on a graphic display in ppm_v. The device allows precise localisation of leaks by searching the highest SF₆ concentration. Thanks to the high accuracy and the low detection limit it is possible to carry out integral measurements as well as measurements for determination of leakage rates.

To protect the device from particles the sensor is equipped with a filter which can be cleaned and/or exchanged easily by the operator. In case there is SF₆ contamination already existing, the LeakSpy can be adjusted to this value. Thus it is possible to detect leakages even in already contaminated areas. The SF₆ concentration is indicated in ppm_v as well as by an audible signal.



The measuring sensor extension (included in the scope of supply), which can be installed between the device and the measuring sensor, if necessary allows measurements on measuring points difficult to access.

- Detection of SF₆ leakages up to 3 g / year
- Quick response time
- No cross sensitivity to moisture and most volatile organic compounds (VOCs)
- Small, lightweight, easy to use
- A shoulder belt facilitates mobile and ergonomic working
- Battery-operated (operating time > 12 hours)
- Exchangeable accumulator (parallel loading of a second accumulator in separate charging unit possible)



3-033-R200
LEAKSPY SF₆

Technical data:

Dimensions 3-033-R200: W 125 mm, H 142 mm, L 280 / 555 mm (without / with sensor)
Sensor length: 300 mm
Weight: 1,580 g
Power supply: lithium ion batteries (operating time > 12 hours)
Measuring principle: non-dispersive infrared sensor (NDIR)
Measuring range: 0 – 1.000 ppm _v SF ₆
Detection limit: 3 ppm _v SF ₆
Sensitivity: 3 g SF ₆ / year
Accuracy: < 50 ppm _v : ±4 % (v. 50 ppm _v) ± ±2 ppm _v ; 50 - 100 ppm _v : ±5 % (v. 100 ppm _v) ± ±5 ppm _v ; 100 - 1000 ppm _v : ±2 % (v. 1000 ppm _v) ± ±20 ppm _v
No cross sensitivity to moisture (0 - 100 % relative moisture, non condensing) and volatile organic compounds
Indication accuracy: 1 ppm _v
Indication unit: ppm _v , g/y, cc/s
Operating temperature: 0 °C to +50 °C
Storage temperature: -10 °C to +60 °C
Response time: T90: < 1s
Temperature and pressure compensated
Indication: graphic display + audible signal

Standard equipment:

Shoulder belt
Measuring sensor extension (Length: 1 m)
Carrier case
Battery charger
1 accumulator
Separate charging unit
Operating manual

Optional accessories (spare parts) at an extra charge:

Shoulder belt	5009904
Measuring hose	5007237
Sensor	3-033-R200-20
Particle filter	5008928
Transparent cap	5008933
Additional accumulator	5008922
Carrier case (for replacement) without foam lining	5006807
Foam lining for carrier case	5009110
Additional operating manual	6-0004-R213

Packing:

Packing for 3-033-R200	05-1990-R002
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■ SF₆ GAS DETECTORS

For quick tracing of small SF₆ leaks

3-033-R002

SF₆-LeakPointer

The cordless battery operated device measures in seven levels of sensitivity within a short response time. Even after the detection of large leaks the device returns to zero position quickly.

The SF₆ LeakPointer is easy to operate with one hand. Leakages can be easily detected via the clearly visible LED display or the audible signal (can be switched off). Continuous operation of the device is possible.



- Quick response time
- Quick "Reset" time
- Detection of leaks of up to 5 g / year
- Comfortable single-handed operation
- Battery-operated (with capacity check)
- Temperature-compensated



3-033-R002

SF₆-LeakPointer

Technical data:

Dimensions with case: W 65 mm, H 229 mm, D 65 mm
Weight with case and accessories: 560 g
Power supply: 2 x 1.5 V alkaline batteries C LR14 (Not included in the delivery)
Measuring principle: high voltage ionisation
Sensitivity: 5 g SF ₆ / year
Operating temperature: 0 °C to +52 °C
Ambient moisture: max. 90 % relative moisture, non condensing during operation
Response time T90: approx. 1 second
Reset time: approx. 1 second
Indication: 7 LED measuring range indication and acoustic signal (disconnectable)
Sensor length: 355 mm

Standard equipment:

Carrying case
Spare sensor
Operating manual

Optional accessories at an extra charge:

Spare sensor kit (3 pieces)	5002016
Spare case	5010354
Additional operating manual	6-0004-R213

Packing:

Packing for 3-033-R002	6-0004-R039
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■ SF₆ GAS DETECTORS

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
Recommended monitoring range per sensor: 250 m ²
Calibration / Maintenance: is not required due to the life time of sensor (about > 10 years)
Operating temperature: -10 to 40 °C

Grundausrüstung:

Operating manual

Optionales Zubehör gegen Aufpreis:

Additional operating manual	6-0004-R213
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Packing:

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

SF₆ GAS DETECTORS

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 / 2 connecting lines
Max. length of power and bus cable: 150 m (per connecting line)
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:

Operating manual

Optional accessories at an extra charge:

External visual and acoustic alarm transmitter 230 V	05-1093-R001
External visual and acoustic alarm transmitter 115 V	05-1093-R003
2 m long power and bus cable	05-1602-R302
10 m long power and bus cable	05-1602-R310
25 m long power and bus cable	05-1602-R325
50 m long power and bus cable	05-1602-R350
Power and bus cable per meter	05-1602-R300
Connecting parts power and bus cable	3-026-89
Bus-Repeater up to 1,200 m bus length	3-026-85
Additional operating manual	6-0004-R213

Packing:

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

DENSITY MONITOR TESTING DEVICES

For automatic testing of switching points in density monitors

B178R01

DensiControl DA

The F-gas regulation (EU) 517/2014 stipulates regular verification of density monitors installed in switchgear. The DensiControl DA allows quick checking to see whether the density monitor switching points are triggered in time.

This device allows precise, quick and easy verification of the switching points. The density monitor to be tested is mounted onto the device by means of a quick clamping device or a plug-in coupling (depending on the connection). 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.



Exemplary construction, the connecting parts are **not** included in the scope of supply



Mechanical connection

- Automatic test process
- Simple installation and removal of the density monitors by quick clamps
- Easy handling and menu navigation via capacitive colour touch panel (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
- Optional remote control via mobile devices



B178R01

DensiControl DA

Technische Daten:

Dimensions: L 406 mm, W 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 and Ethernet
Automatic measuring process
Pressure indication in bar pa / pe, kPa pa / pe, psi pa / pe, MPa pa / pe
Accuracy of the pressure sensor (0 - 50 °C): ≤ 0.1 % FS

Standard equipment:

Transport case
Basic device with test vessel and adapter plate with quick coupling
5-measuring point certificate for pressure sensor
USB stick with file for evaluating and reading out the measuring data
Operating manual

Optional accessories at an extra charge:

Different connecting sets are available on request	
Remote control via mobile devices	K176R11
Kit for remote control router	K176R21
Kit for remote control router with extended functions	On request
Additional operating manual	6-0004-R213

Mechanical and electrical connections at an extra charge:

Test kit for density monitor with square flange 80 mm	B178R01-01V1
Test kit for density monitor with 2 hole flange	B178R01-02V1
Test kit for density monitor with flange Ø 40 mm	B178R01-03V1
Plug-in adapter for density monitor with DILO coupling tongue part DN20	6-1161-R039
Plug-in adapter for density monitor with DILO coupling tongue part DN8	6-1161-R038
Plug-in adapter for density monitor with ASEA connection	6-1161-R040
Plug-in adapter for density monitor with G1/2" gauge union	6-1161-R041
Other connecting kits are available on request	
Connecting cable kit	B178R01-84

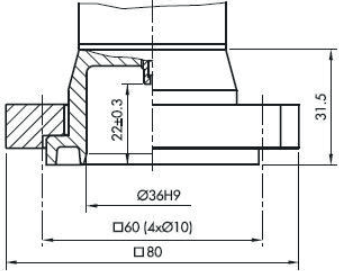
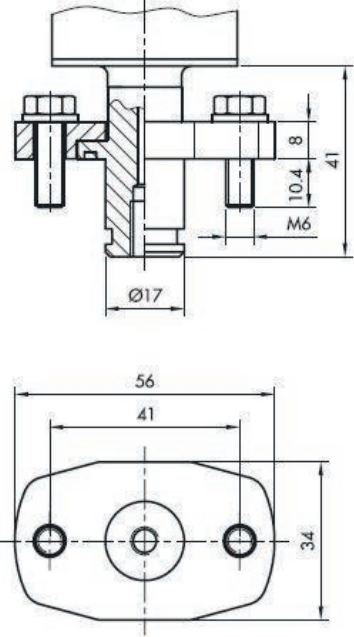
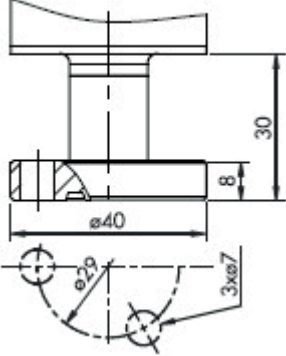
Packing:

Packing for B178R01	3-775-R104
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DENSITY MONITOR TESTING DEVICES

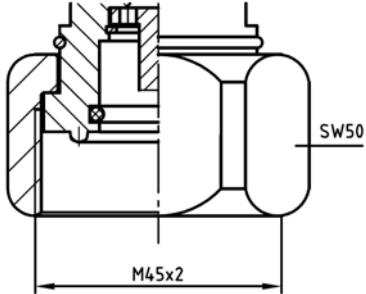
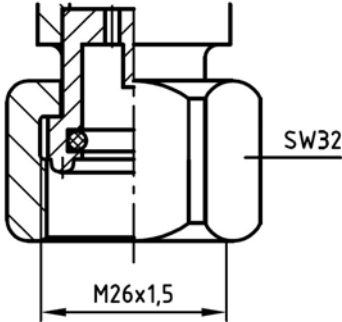
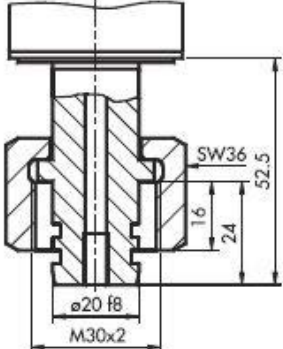
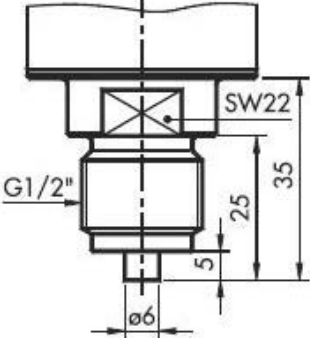
B178R01

DensiControl DA

Gas connection of density monitor	Required test kit / adapter
	B178R01-01V1
	B178R01-02V1
	B178R01-03V1

B178R01

DensiControl DA

Gas connection of density monitor	Required test kit / adapter
	<p>6-1161-R039</p>
	<p>6-1161-R038</p>
	<p>6-1161-R040</p>
	<p>6-1161-R041</p>

DENSITY MONITOR TESTING DEVICES

Device for automatic verification of switching points of installed density monitors

B178R51

DensiControl IN with connecting kit and 6 m long measuring hose

The (EU) F-gas regulation 517/2014 stipulates regular verification of density monitors installed in switchgear. In combination with a DILO lock valve it is possible to quickly check whether the density monitor switching points are triggered in time without disassembling the density monitor. Thus, the DensiControl IN allows very quick, easy and precise verification of the switching points without SF₆ emission.

The density controller to be verified is selected in the database and is separated from the gas compartment with the lock valve. After starting the measurement the gas in the density monitor is slowly released and collected in the internal storage vessel. During that procedure, the switching points are activated and recorded automatically. Furthermore, the switching points can be stored in the system with serial number and switchgear temperature and downloaded for documentation later on. After the measurement, the collected gas is pumped back into the switchgear.



In combination with a special lock valve the DensiControl IN density monitor testing device allows reliable verification of density monitors directly on the gas compartment.

- Automatic test process
- Test of density monitor without disassembly and without SF₆ emission (assembly of density monitor on lock valve is necessary)
- Easy handling and menu navigation via colour touch panel (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: German, English and French
- Trolley for comfortable transportation



B178R51

DensiControl IN

Technical data:

Dimensions: L 406 mm, W 538 mm, H 269 mm
Weight: 21 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 monitor types to be stored: max. 50
Number of measuring values to be stored: max. 200
Interface: USB and Ethernet
Automatic measuring process
Pressure indication in bar pa / pe, kPa pa / pe, psi pa / pe, MPa pa / pe
Accuracy of the pressure sensor (0 - 50 °C): ≤ 0.1 % FS

Standard equipment:

Transport case
Basic device with internal storage vessel
Connecting kit and 6 m long measuring hose
5-measuring point certificate for pressure sensor
USB stick
DILLO connecting couplings DN8 and DN20
Operating manual

Optional accessories at an extra charge:

Different connecting cables on request	
6 m long measuring hose extension	B178R51-02
Remote control via mobile devices	K176R11
Kit for remote control router	K176R21
Kit for remote control router with extended functions	On request
Additional operating manual	6-0004-R213
Angle piece for DILLO connecting couplings	3-817-R008

Packing:

Packing for B178R51	3-775-R104
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DENSITY MONITOR TESTING DEVICES

For emission-free disassembly or verification of density monitors

3-1150-R...

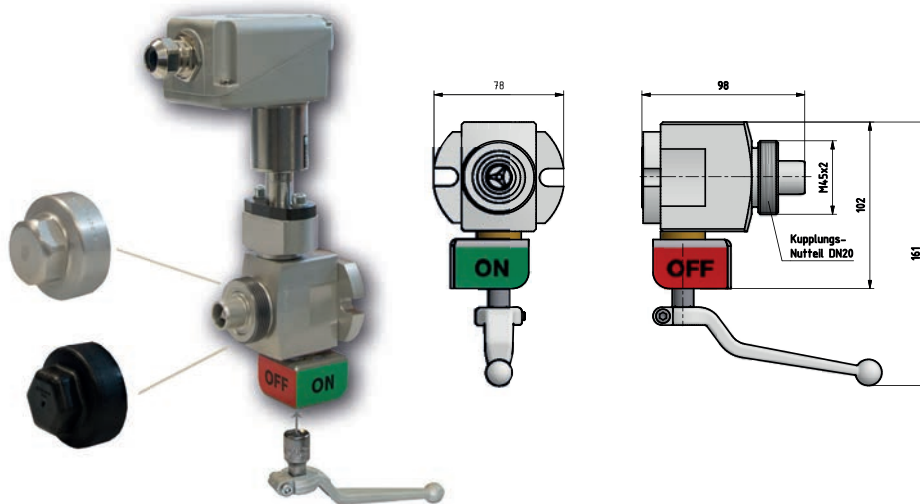
Lock valve for density monitors PN16 DN20

Density monitors can be verified directly at the gas compartment or disassembled for external tests without having to recover the gas from switchgear by means of these lock valves. The valve securely separates the assembled density monitor from the gas compartment. In combination with the DensiControl IN (B178R51) density monitor testing device it is also possible to quickly and easily verify the density monitor switching points on switchgear completely free of emissions in accordance with the (EU) 517/2014 directive (F-gas regulation).

For separating the density monitor from the gas compartment just put a lever on the valve and turn it by 90°. The switching position of the valve is indicated by a red/green label.

For connecting the gas compartment different connection are available; the connecting side of the valve is equipped with a connecting coupling DN20. The gas handling can also be carried out via this integrated DN20 coupling – a useful “Two-in-one solution” which is perfectly suited for retrofitting as well.

The 3-1150-R... type is the perfect match for tight installation conditions. If more variety in arranging the density monitors is desired, we recommend the 3-1190-R... version with different connections (see separate data sheet).



Lock valve with mounted density monitor

Optional accessories at an extra charge:

Lever for ball valve	3-1150-11
Covering cap (aluminium)	VK/KN-04/20 T
Covering cap (plastic)	VK/KN-04/20 PA
Different adapters for density monitor are available on request	

For emission-free disassembly or verification of density monitors

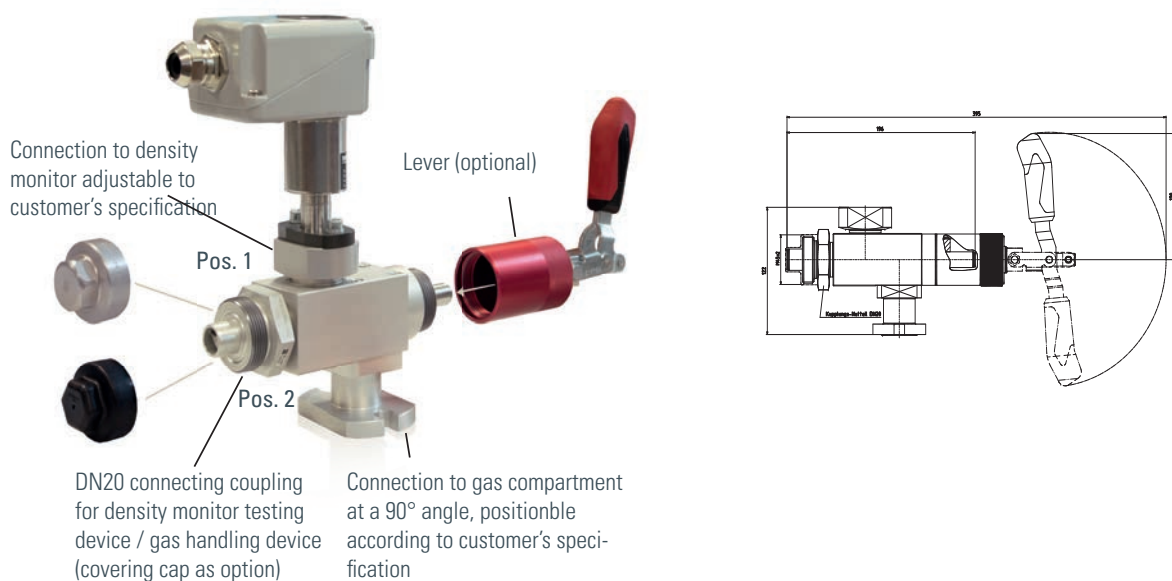
3-1190-R...

Lock valve for density monitors PN16 DN20

Density monitors can be verified directly at the gas compartment or disassembled for external tests without having to recover the gas from switchgear by means of these lock valves. The valve securely separates the assembled density monitor from the gas compartment. In combination with the DensiControl IN (B178R51) density monitor testing device it is also possible to quickly and easily verify the density monitor switching points on switchgear completely free of emissions in accordance with the (EU) 517/2014 directive (F-gas regulation).

For separating the density monitor from the gas compartment just screw on the separate lever and turn it by 180°.

The user benefits from the design's high variety. Thus, customer-specific connections on the units can be realised. The couplings and density monitor connections can be arranged according to customer's requirements. Furthermore, the complete gas handling can be carried out directly via the integrated DN20 coupling with the lock valve – a useful „Two-in-one solution“ which is perfectly suited for retrofitting.



Connection to density monitor (pos. 1) and connecting coupling (pos. 2) are exchangeable – the positioning is carried out according to customer's requirement!

Optional accessories at an extra charge:

Lever	3-1190-04
Covering cap (aluminium)	VK/KN-04/20 T
Covering cap (plastic)	VK/KN-04/20 PA
Different adapters for density monitor according to customer's specification	

ACCESSORIES FOR MEASURING DEVICES

Emission-free reclamation and storage of gases

B151R40

Discharge collection unit 220 - 240 V / 50 / 60 Hz

B151R40S15

Discharge collection unit 110 - 127 V / 50 / 60 Hz

This device allows the intermediate storage of measuring gas in gaseous or liquid form. It is thus the perfect complement for measuring devices without automatic gas return system (return pump function).

The discharge gas collection unit features by its easy and user-friendly handling. The gas compartment and the measuring device are connected to the discharge gas collection unit. It is possible to control the measurement via the 3.5" colour touch panel. The measuring gas is collected automatically during the measuring process and is stored in the internal vessel by means of the integrated compressor. After completion of the measurement the gas can either be pumped back into the gas compartment or stored in an external cylinder.

An additional feature: SF₆ gas stored in external bags can easily be stored into a gas cylinder without the use of another gas handling device.

Thanks to the self-closing couplings the SF₆ gas is not released into the atmosphere neither while measuring nor when pumping the gas back.

The maximum storage capacity depends on the flow rate of the connected measuring device and the measurement time. With a flow rate of 30 l/h and a measuring time of 15 minutes per measuring process it is possible to store a total of 40 measurements in the internal vessel.



- Automated process
- Easy handling via 3.5" colour touch panel
- User-friendly menu navigation
- Indication pressure units can be freely selected
- Adjustable user languages: DE, GB, FR
- Trolley for comfortable transportation



B151R40

Discharge collection unit

Technical data:

Dimensions: Length: 625 mm, Width: 500 mm, Height: 297 mm
Weight: 40.8 kg

Standard equipment:

Transport case
Oilfree DILO compressor 1.6 m ³ /h, 50 bar
Particle filter
Self-closing couplings for gas compartment and measuring device
Connecting hoses and socket for measuring device
Automatic control
Operating manua

Optional accessories with additional price:

SF ₆ cylinder connection W 21.8 x 1/14" with coupling	6-1161-R007
American SF ₆ cylinder connection with 0.96" left-hand thread with coupling	6-1161-R008
Chinese SF ₆ cylinder connection with G5/8" thread with coupling	6-1161-R036
English SF ₆ cylinder connection with G5/8" thread with coupling	6-1161-R009
Reuse-gas cylinder connection G1"	6-1161-R010
Adapter case for measuring devices	Z340R10
Additional operating manua	6-0004-R213

Packing:

Packing for B151R40	3-775-R024-C
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ACCESSORIES FOR MEASURING DEVICES

For increase of pressure level

3-826-R003 / R004 / R005

Compressor unit for SF₆ measuring devices

The test pressure for gas analysis in medium voltage switchgear is often too low. For this reason the compressor unit is needed to compress the gas to be measured so that there is sufficient pressure for the gas measuring devices connected downstream from the compressor unit.

As the device is leak-tested there are no SF₆ emissions. The oilfree compression avoids the SF₆ test gas from being contaminated with oil mist. Any contamination of the measuring gas e. g. caused by traces of moisture can therefore be excluded.

The small compressor is almost maintenance-free and easy to handle.



The diaphragm compressor is connected between the medium voltage breaker and the measuring device by means of the corresponding connecting hose.

- Suitable for all DILO SF₆ measuring devices
- Oilfree DILO compressor
- Gas-tight and emission-free
- Simple operation
- Low maintenance



3-826-R003 / R004 / R005

Compressor unit for SF₆ measuring devices

Technical data:

Dimensions: L 200 mm, W 100 mm, H 170 mm
Weight: 2.3 kg
Operating voltage: 3-826-R003: 230 V / 50 Hz, 3-826-R004: 120 V / 50 -60 Hz, 3-826-R005: 110 - 127 V / 50 - 60 Hz
Mains fuse (2 pieces each): at 230 V: 1,0 A (T) / at 120 V: 3,15 A (T) / at 110-127 V: 3,15 A (T)
Motor capacity: 65 W
Protection class: IP20
Final vacuum: < 100 mbar
Final pressure: p _g = 2,5 bar, max.
Ambient temperature in service: +5 °C to +40 °C
Delivery rate: 5.5 l / min

Standard equipment:

ON / OFF switch
Thermo switch
Mains fuse
Connecting cable
Connecting hose
Operating manual

Optional accessories at an extra charge:

Black transport case for compressor unit	3-781-R023
Additional operating manual	6-0004-R213

Packing:

Packing for 3-826-R003 / 3-826-R004 / 3-826-R005 (without transport case)	3-712-R002-C
Packing for 3-826-R003 / 3-826-R004 / 3-826-R005 (with transport case)	05-1990-R004

ACCESSORIES FOR MEASURING DEVICES

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 from the discharge gas collecting bag with any service cart and by means of the supplied hose and coupling. When using this system no SF₆ is released into the atmosphere. It is light, practical and environmentally friendly.

Folded discharge gas collecting bag



Filled discharge gas collecting bag



- 52 l capacity
- Light folding bag for comfortable transportation
- Integrated safety valve (pe = 100 mbar)
- Self-closing miniature couplings
- DILLO coupling DN8 with hose connection (to recover the bag)



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:

Integrated safety valve (pe = 100 mbar)
1 m long connecting hose with self-closing miniature coupling
DILO coupling DN8 with hose connection
Operating manual

Optional accessories at an extra charge:

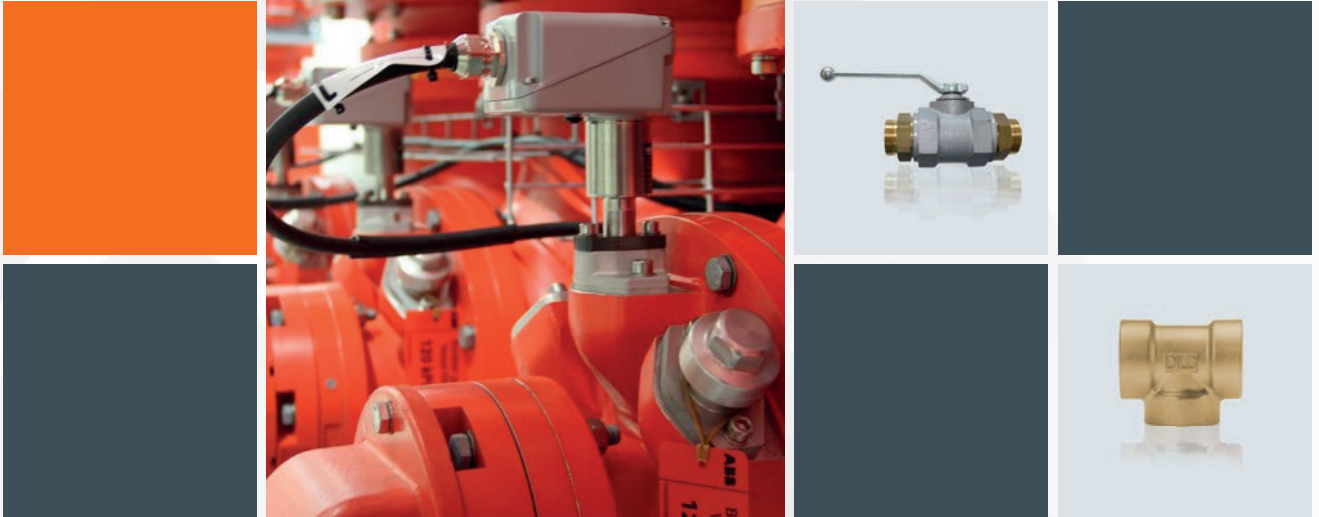
DILO coupling DN20 with hose connection (between service cart and bag)	6-1161-R023
Adapter case for measuring devices	Z340R10
Additional operating manual	6-0004-R213

Packing:

Packing for B151R95	3-948-R007
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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).



THE PERFECT CONNECTION TO THE GAS COMPARTMENT

Are you looking for pressure and vacuum tight valves and couplings for SF₆ gas use? DILLO 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.

SF₆ VALVES AND COUPLINGS

SF ₆ Valves and Couplings	186
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■ SF₆ VALVES AND COUPLINGS

DIE PERFEKTE VERBINDUNG ZUM GASRAUM

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.

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.

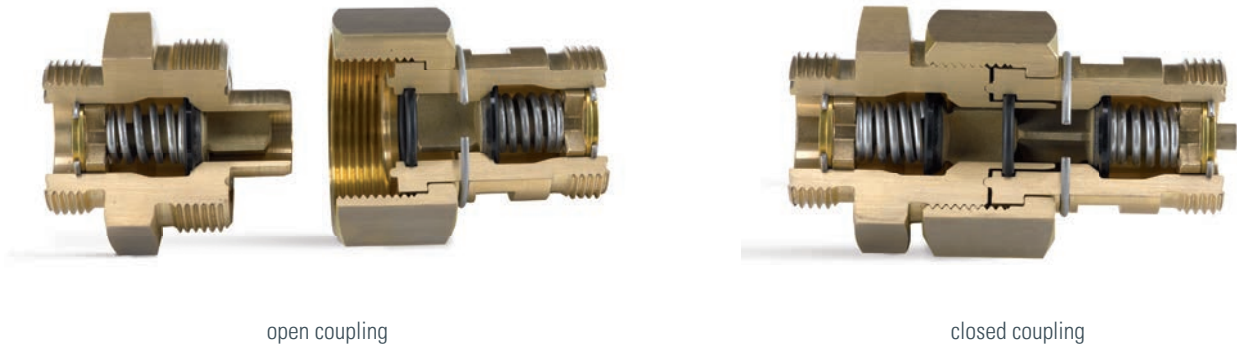


PRODUCT RANGE

- 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.

DILO SEALING PRINCIPLE



open coupling

closed coupling

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
- Leak rate $\leq 1 \times 10^{-8}$ mbar l/s (DN6 - DN20) **
- 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

DILO holds the following approvals and certificates:

- ISO 9001:2015 certification
- Confirmation of quality assurance in accordance with KTA 1401
- ISO 14001:2015 certification
- HPO approval as a pressure equipment manufacturer
- Production monitoring in accordance with the Pressure Equipment Directive 2014/68/EU
- Certified company in accordance with the Ordinance on Specialised Waste Management Companies (Entsorgungsfachbetriebsverordnung – EfbV)

* Special versions for low temperatures on request

** Leak rate DN40 on request



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 190

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.

Detailed information can be found on our website.

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.



Example
Model range "LeakScanner SV"
without gas handling

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

We manufacture systems of this model range with a chamber volume of 500 l to approx. 20,000 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 SF₆ 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.



Example
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. 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.



Example
Atmospheric test chamber with automatic roller shutter



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 world-wide of gas handling plants covering the requirements in each GIS production process.

■ GIS PRODUCTION PLANTS

■ GIS production plants 194

■ 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.

INDIVIDUAL COMPLETE SOLUTIONS

Reliable, environmentally friendly and cost-effective 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.

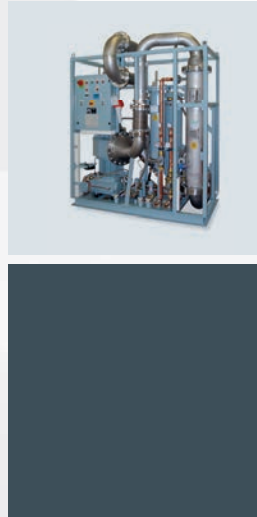
For switchgear production DILO offers two solutions: The stand alone unit and the complete line solution for an SF₆ network for punctual gas handling of the test stations of the produced GIS units. Thus building up a production line can easily be achieved.



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 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

Units for gas insulated lines (GIL)	198
Refrigeration units for gas insulated transformers (GIT) and accelerators plants	199
SF ₆ units for accelerators	200

■ 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 (paint according to customer requirements)

■ 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



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	202
Customer specific trainings	202

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 2015/2066 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

All further information can be found on our website.



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

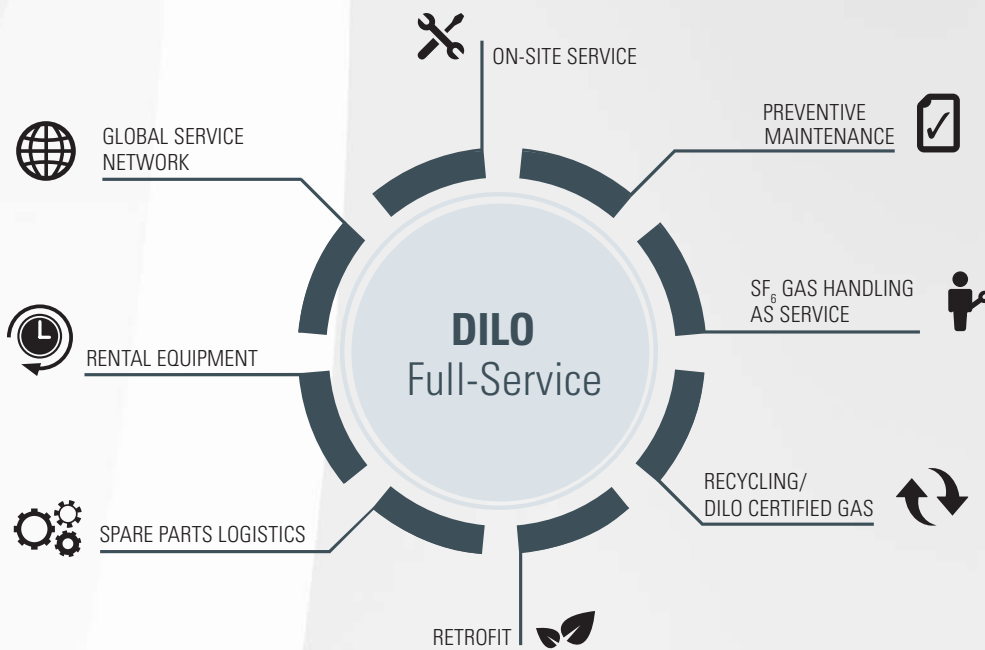




DILo is proud to offer a wide range of worldwide on-site services. A “one stop” shop that caters for all of your SF₆ service needs – from preventive equipment maintenance to replacement parts and gas services.

AFTER SALES SERVICES

after sales services 204



■ AFTER SALES SERVICES

ON-SITE SERVICE

Our highly experienced engineers and technicians are ready to assist you, and together with you and depending on your schedule requirements, will determine if repairs or preventive equipment maintenance is best performed on-site or at one of our local service points or production facilities.

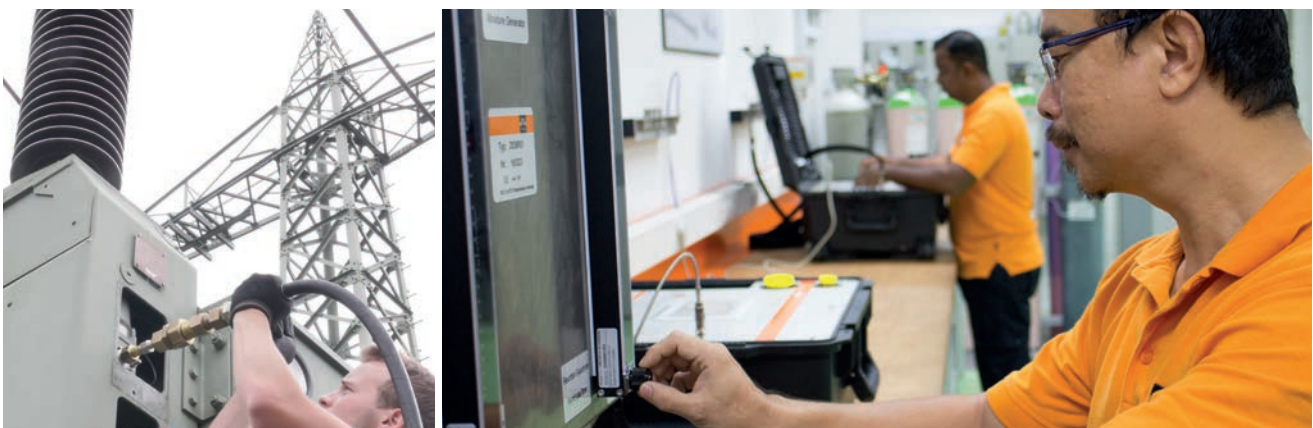
- Fast on-site troubleshooting
- Support and service by highly qualified service engineers and technicians
- Commissioning for new systems
- Complete operator training
- Maintenance trainings on site or at DILO's premises
- Worldwide availability of services



PREVENTIVE MAINTENANCE

Routine maintenance is the key to system reliability and SF6 processing performance. With this program, owners of DILO equipment can look forward to years of trouble-free service and eliminate unwanted downtime.

- DILO equipment maintenance contracts with flexible service intervals based on your equipment usage
- Exclusive use of OEM spare parts kits for overhauling all major components
- All maintenance performed by experienced and DILO trained service technicians
- Calibration of test equipment is performed at our service centers in Germany, DILO USA and DILO Singapore





SF₆ GAS HANDLING AS COMPLETE SERVICE

Our services also include complete SF₆ gas handling which, depending on your location, is based on various directives (EC, US EPA, etc.) and includes all applicable record keeping requirements. This is a convenient cost effective solution when ownership of gas handling equipment is not economical or properly trained and certified personnel is not available.

- SF₆ analysis using DILO test equipment and trained technicians
- SF₆ recovery, purification and drying using state-of-the-art DILO service carts
- Intermediate storage in approved gas vessels
- Filling of your gas insulated equipment with SF₆
- All services are performed by highly experienced and certified DILO technicians or via our DILO service network

RETROFIT

DILO is determined to save your money, and to protect our environment is our main goal when upgrading older recovery equipment.

- Nachrüstung älterer Service- und Messgeräte entsprechend den aktuellen IEC-Richtlinien (Absaugung bis ≤ 20 mbar)
- Oftmals ist mit der Nachrüstung der Servicegeräte eine Gasabsaugung bis ≤ 1 mbar möglich und der empfohlene IEC-Richtwert wird sogar übertroffen. Somit entstehen praktisch keine Emissionen.
- Spezielle Retrofit-Module für eine einfache Nachrüstung

ERSATZTEILLOGISTIK

Sollte kurzfristig ein Ersatzteil nötig sein – bei DILO ist das kein Problem. Standardteile sind in der Regel auf Lager und können schnell versandt werden.

- Service and test equipment can be upgraded to allow gas recovery to ≤ 20 mbar or lower to meet current IEC directives
- Availability of state-of-the-art suction pumps to allow SF₆ recovery to final pressures of ≤ 1 mbar – eliminating virtually any SF₆ emissions during the gas recovery process
- Complete "plug and play" upgrade kits simplify retrofits

RENTAL OF SF₆ DEVICES

In case service and measuring devices are only needed for a short period of time it is possible to rent our devices.

This way, short-term requirements of devices can be covered quickly and in a flexible way. Also, before buying equipment, rental can be an option.

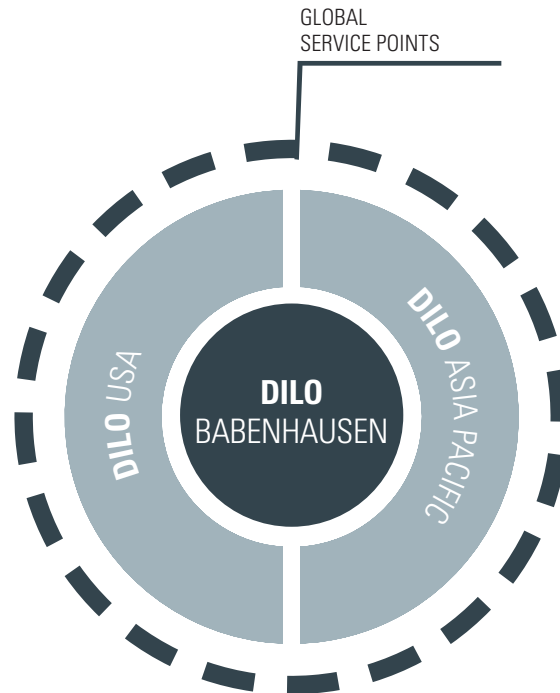
- Comprehensive fleet of service and measuring units
- Adequate accessories such as storage tanks and re-use SF₆ gas cylinders
- Service carts allowing gas recovery down to < 1 mbar
- Supply of all suitable adapters for connection to the gas compartments
- On-site instruction of the operating personnel upon request

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:

■ AFTER SALES SERVICES

DILO SERVICES ALL AROUND THE WORLD

Our service team is supported by specially trained personnel at our agents all over the world to guarantee quick troubleshooting on site. For this reason, we founded our DILO Asia-Pacific Pte. Ltd. service centre in 2013 supporting our national agents in Southeast Asia.



- Our service organisation consists of the main DILO service centre in Babenhausen (Germany) as well as the two service centres DILO USA and DILO Asia-Pacific (Singapore) and other national service points
- More than 30 agents worldwide are qualified and authorized DILO service points
- Quick reaction time on service requests on site
- Additional availability of standard spare parts at our local service points

You will find the addresses of our international service partners on our website www.dilo-gmbh.com under "Produktservice".



DILO SERVICEZENTRALE IN BABENHAUSEN

Mo. - Do.: von 07:00 h - 16:00 h MEZ

Freitag: von 07:00 h - 12:00 h MEZ

Telefon: +49 (0) 83 33 - 302-94



You can also request for our assistance online. You will find our online form on our website www.dilo.com under "Produktservice".

We will take care of your request immediately!

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



DILO CERTIFIED GAS / SF₆ RECYCLING

As an SF₆ gas handling specialist with over 50 years of experience, we have expanded our service portfolio to include the new "DILO Certified Gas" service range.

On the one hand it includes the preparation of used SF₆ gas in our company, on the other hand we also offer on request ready-prepared gas mixtures of so-called "Alternative Gases" according to customer specifications under the term "DILO Certified Gas".

We guarantee the quality of our "DILO Certified Gas" with our seal of quality.

DILO CERTIFIED GAS

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DILO CERTIFIED GAS

SF₆ RECONDITIONING INSTEAD OF SF₆ DISPOSAL

In practice, the SF₆ gas used is often contaminated with air, nitrogen and/or tetrafluoromethane (CF₄) due to inadequate evacuation or incorrect gas handling. This is no longer a problem! Since used SF₆ gas, which no longer complies with IEC 60480, can now be treated accordingly at DILO:

- Preparation of gas mixtures with SF₆, air, N₂ and/or CF₄
- Purification of gas mixtures with an SO₂ content of < 250 ppm_v



Our customers benefit from the preparation of SF₆ gas by:

- Reduced costs for SF₆ disposal
- Minimised costs for new SF₆ gas
- Low transport and storage costs
- Emission-free preparation of gas
- Improved "carbon footprint" through reuse

NEW GAS QUALITY BY PREPARATION

Thanks to the combination of several DILO preparation units, we can also process extremely poor qualities to SF₆ with a purity of > 99.9 %. This not only exceeds Reuse standards, but "DILO Certified Gas" even exceeds the relevant specifications for new gas.

Quality level after preparation

Substance	DILO Quality / "Certified Gas"	Norm	
		IEC 60376 (New gas)	ASTM D2472-15
SF ₆	> 99,9 Vol.% (> 99,99 wt%)	> 98,5 Vol.%	≥ 99,8 wt%
H ₂ O	≤ 8 ppm _v	< 200 µl/l	≤ 8 ul/l
Frost point (100 kPa)	≤ -62 °C	-36 °C	-62 °C
Total acidity (HF äq.)	< 0.1 µl/l	< 7 µl/l	≤ 0.3 ppm _w
Air	< 500 µl/l	< 10,000 µl/l	≤ 500 ppm _w (± 2500 µl/l)
CF ₄	< 500 µl/l	< 4,000 µl/l	≤ 500 ppm _w (± 830 µl/l)
Oil mist	< 1 mg/kg	< 10 mg/kg	–
SO ₂	< 0,1 µl/l	–	–

*For use in mixtures with N₂/CF₄ a purity of SF₆ of 99.7 % by volume is recommended.

µl/l = ppm_v; mg/kg = ppm_w; wt% = percentage by weight

OUR PORTFOLIO "DILO CERTIFIED GAS"

Regardless of whether you want to dispose of SF₆ gas, prepare contaminated SF₆ or buy used gas in new gas quality: Our services are perfectly made to fit your needs.

Basic options:

- The gas supplied remains with DILO
- - Preparation of your supplied gas and return delivery for reuse at your premises
- - Purchase of "DILO Certified Gas" in new gas quality as economic and ecological alternative to the purchasing of new SF₆ gas

We offer you additional services:

- We supply all gases exclusively in TÜV-certified pressure vessels.
- All gases are delivered with a DILO certificate.
- DILO supplies documents for the SF₆ mass balance, such as weighing and measurement reports, for the SF₆ gas monitoring.
- For "DILO Certified Gas", only carefully cleaned pressure vessels are used to prevent contamination of the prepared gas.
- Pressure vessels (cylinders, 600 l tanks) can be rented on request.
- We carry out the TÜV repeated inspection of pressure vessels.
- We take care of logistics matters and deliver according to the valid transport regulations.
- We guarantee fast throughput and processing times through optimised processes.
- On request, our qualified personnel can carry out the gas handling on your site.



DILO CERTIFIED GAS

DILO IS A CERTIFIED WASTE MANAGEMENT COMPANY

DILO is a specialist in waste management certified by TÜV SÜD in accordance with the German Waste Management Ordinance (EfbV). The seal of quality gives our customers on the one hand the certainty that a professional, emission-free SF₆ gas handling is carried out, and on the other hand the certainty that the technical and legal framework conditions are fulfilled and that all waste management processes are fully documented.



The incoming and outgoing amounts of the prepared SF₆ gas for issuing the SF₆ mass balance according to the (EU) F-Gas Regulation are also precisely documented.

TÜV certification according to EfbV is part of our integrated Quality Assurance Management system and is subject to an annual audit.



DILO LABORATORY

In our DILO Lab, each batch of the prepared SF₆ gas is analysed for compliance with the purity criteria using gas chromatography and spectroscopy, as are all mixtures of so-called Alternative Gases. We thus ensure continuous quality monitoring.

Using state-of-the-art measuring instruments such as mass and infrared spectrometers, even the smallest impurities in gases can be analysed for decomposition and by-products down to the ppm range. The mixing ratio of all "alternative insulating gas mixtures" produced is also continuously monitored. Only if the gases fully comply with the required specifications they receive the "DILO Certified Gas" seal of quality.



PRODUCTION OF GAS MIXTURES - ALTERNATIVE GASES

As part of our "DILO Certified Gas" range of services, we can also supply on request **ready-prepared mixtures of Alternative Gases** in liquid or gaseous form exactly in accordance with your specifications - including a DILO quality certificate. We prepare gas mixtures on the basis of Novec™ 4710 or Novec™ 5110, but we also supply other insulating gas mixtures - exactly according to your requirements.

Therefore, the individual gas components must not be transported and mixing of the gas on site is not necessary. The result is: high accuracy of the required gas mixtures as well as time and cost savings and thus higher operating efficiency.

Gas chromatographic and spectroscopic tests in our DILO Lab ensure a consistently high level of quality.

Contact: certified-gas@dilo-gmbh.com





COMPLETE PRODUCT RANGE FOR SF₆-FREE GAS HANDLING

As a pioneer in SF₆ gas handling with over 50 years of experience, we were able to combine tradition with the requirements of new gas mixtures.

With the devices of our product lines C4 and C5, gas compartments in the medium and high voltage range can be filled and recovered without emission. The gas quality can also be reliably determined in the usual way and any leaks detected.

ALTERNATIVE GASES

Alternative Gases	216
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ECO-EFFICIENT INSULATING GASES FOR SWITCHGEAR

ENVIRONMENTALLY FRIENDLY SF₆ SUBSTITUTE

The so-called „Alternative Gases“ are usually special gas mixtures with fixed defined mixing ratios calling for new, more stringent requirements on the design of the device. **SF₆ service and measuring devices can therefore not be used for Alternative Gases!**

As a pioneer in SF₆ gas handling with over 50 years of experience, we were able to combine tradition with the requirements of new gas mixtures. Even if Alternative Gases are used, the gas must be recovered from the gas compartment, during service works. The air must then be evacuated and the gas compartment refilled. In this respect, the handling does not differ noticeably from that of the SF₆ gas.

With our „Zero Emission Concept“ we have defined a closed technological cycle that covers all gas handling processes with high reliability and without emissions.

ALTERNATIVE QUENCHING AND INSULATING GASES „READY FOR USE“

As part of our „DILo Certified Gas“ range of services, we can also supply on request ready-prepared mixtures of Alternative Gases in liquid or gaseous form exactly in accordance with your specifications - including a DILo quality certificate. We prepare gas mixtures based on Novec™ 4710 or Novec™ 5110, but we also supply other insulating gas mixtures - exactly according to your requirements.

Therefore, the individual gas components must not be transported and mixing of the gas on site is not necessary. The result is: high accuracy of the required gas mixtures as well as time and cost savings and thus higher operating efficiency.

Gas chromatographic and spectroscopic tests in our in-house laboratory ensure a consistently high level of quality.

Contact: certified-gas@dilo-gmbh.com





DILO PRODUCT LINES C4 AND C5

We offer all devices for the emission-free handling of gas mixtures on the basis of 3M™ Novec 4710 or 3M™ Novec 5110, ranging from service carts and measuring devices up to units for recovery of gas mixtures and mixing units. We also have the correct solution for the handling of other gas mixtures with CO₂, N₂ or O₂.



PRODUCT LINES	
C4	C5
3M™ Novec™ 4710*) (C ₄ F ₇ N)	3M™ Novec™ 5110*) (C ₅ F ₁₀ N)

With the devices of our product lines C4 and C5, gas compartments in the medium and high voltage range can be filled and recovered without emission. The gas quality can also be reliably determined in the usual way and any leaks detected. Detailed information can be found on our website in the section „Alternative Gases“.

MANUFACTURER-INDEPENDENT DEVELOPMENT

As a specialist for gas handling, DILO also works with manufacturers and institutes that do not focus on the basic gases mentioned above. Thanks to our in-house expertise in all

fields of gas and gas mixture handling, we can offer you individual product solutions. DILO can supply you a suitable product for your special application, starting with concept development through detailed technical development and complete control development, the production of individual and special systems right up to commissioning.

Do you have any questions or need advice? We are pleased to help you.

Contact:

Martin Göppel, Project Manager Alternative Gases

martin.goepfel@dilo-gmbh.com

*) 3M and Novec are registered trademarks of 3M

■ FOR YOUR NOTES

ONE VISION. ZERO EMISSIONS.



SF ₆ GAS	ALTERNATIVE GASES	INDUSTRIAL GAS EQUIPMENT	HIGH PRESSURE PRODUCTS
DILO CERTIFIED GAS	AFTER SALES SERVICES	TRAINING & CERTIFICATION	


QUALITY. MADE IN GERMANY.

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