

<b>Outdoor Current Transformer SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 1 of 14

# **Outdoor Current Transformer Type JGF 245...550**

## **Service and Maintenance Manual**

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 2 of 14

## Content

<b>1</b>	<b>Description of the design .....</b>	<b>3</b>
1.1	Structure .....	3
1.2	Insulator .....	3
1.3	SF6-gas and density monitor .....	3
1.3.1	Recycling and disposal of the insulating gas .....	4
1.4	Terminals .....	4
1.4.1	Primary terminals .....	4
1.4.2	Secondary terminals .....	4
1.4.3	Earthing terminals .....	5
<b>2</b>	<b>Transport.....</b>	<b>5</b>
2.1	Transport by Truck.....	5
<b>3</b>	<b>Commissioning .....</b>	<b>6</b>
3.1	Unpacking.....	6
3.2	Inspection .....	6
3.3	Installation of the transformer .....	7
3.4	Connection.....	9
3.4.1	Primary terminals .....	9
3.4.2	Secondary terminals .....	9
3.4.3	Earthing pads.....	9
3.4.4	Torque .....	9
<b>4</b>	<b>Maintenance.....</b>	<b>10</b>
4.1	Gas monitoring .....	10
4.2	Maintenance and conservation .....	10
4.3	Primary terminal connections.....	10
4.4	Checking of the density monitor.....	10
<b>5</b>	<b>Recycling and disposal.....</b>	<b>14</b>
	<b>Manufacturers address .....</b>	<b>14</b>

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 3 of 14

## 1 Description of the design

### 1.1 Structure

Current transformer in head type design for system voltages from 245 kV up to 550 kV. The transformer fully meets the IEC and national standards. Dimensions according to the related outline drawing. Range of ambient temperature: -40° C to +40° C. Other temperature ranges on request. The metal housings are made of corrosion-resistant aluminum alloys.

The current transformer part with the current transformer ring cores, placed in a thick walled core protection housing, is located in the head housing. The primary current may flow one time or depending on the design option for primary re-connection design two or four times through the ring cores. The secondary leads are guided through a bushing tube inside the composite insulator to the secondary terminal box.

A field graded bushing is located inside the composite insulator.

A spacious terminal box, the SF6-filling valve and the density monitor with test valve are located at the bottom side of the composite insulator.

A rupture disc, made of a corrosion-resistant nickel alloy, is installed on top of the transformer, protected by an aluminum hood. The nominal breaking pressure of the rupture disc is adjusted at a pressure of  $p_e = 9 \text{ bar} / 20^\circ \text{ C}$ .

The rated diameter is about 150 mm.

All gaskets are made of chambered, single-piece O-rings.

### 1.2 Insulator

The transformers are equipped with composite insulators with silicone rubber sheds.

### 1.3 SF6-gas and density monitor

Pure SF6 insulating gas in accordance with IEC 376 is used for insulation. For the Gas-filling the transformer is equipped with a Dilo DN 20 type valve terminal.

The maximum leakage rate of the transformer is <0.2% per year. The gas density is monitored by using a temperature-compensated density monitor (see Figure 9). The density monitor is mounted on a self-closing gauge coupling with a test valve. Therefore the density monitor has not to be removed for inspection. It also must not be removed for filling the transformer. The display of the density monitor is equipped with a red and a green area in the scales and has a diameter of > 80mm. There are two alarm contacts:

**First Alarm:** Minimum operating pressure  $p_e = 3.5 \text{ bar} / \text{at } 20^\circ \text{ C} / \text{and below is reached}$ . At this pressure all dielectric tests are performed.

**Second Alarm:** At  $p_e = 2.9 \text{ bar} / \text{at } 20^\circ \text{ C} / \text{and below} \Rightarrow \text{shutdown required!}$

The alarm contacts are connected to terminals inside the terminal box.

<b>Outdoor Current Transformer with SF<sub>6</sub>-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 4 of 14

Dew Point:  $\leq -25$  ° C, relative to 20°C, related to the gas at 1 bar abs. /20°C.

### 1.3.1 Recycling and disposal of the insulating gas

Take care of the national guidelines for the disposal of SF<sub>6</sub> as insulating gas. For a proper disposal of the SF<sub>6</sub> insulating gas, you have to order a company able to dispose the SF<sub>6</sub> professionally, according to the current standards.

## 1.4 Terminals

### 1.4.1 Primary terminals

For the dimensions of the terminals please refer to the related drawing. The drawings are in accordance with the specified standards.

### 1.4.2 Secondary terminals

The secondary windings are connected to a gas tight secondary gas-air bushing. Insulated wires are connecting the bushing and the secondary terminals inside the terminal box. A predetermined fuse link in the secondary circuit wiring in the terminal box protects the secondary windings against damage by short circuit near the secondary terminals.

The connectors are standard spring type terminal blocks, optional connecting bolts (M10), made of high quality copper alloy are available. Each terminal can be earthed to an earthing bus. The terminal designations are in accordance with the specified standards. Located at the bottom of the terminal box a 295 x 55 mm removable blanking plate (see Figure 1) for insertion of cables with max. 26 mm diameter is provided. A vent hole with a sieve provides ventilation for the terminal box. The protection class of the terminal box is IP 54.

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 5 of 14

### 1.4.3 Earthing terminals

Two earthing terminals are provided at the base of the transformer (for minimum 2 x M12 x 55 mm, spaced 60 mm), located at the front left and rear right (refer to fig.1).

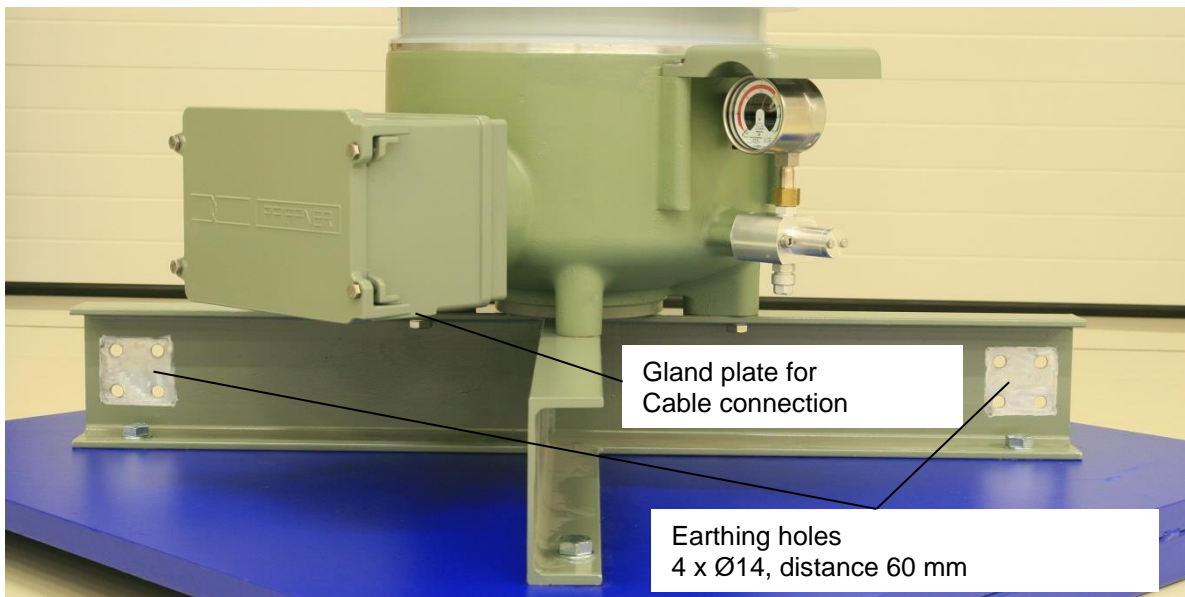


fig 1: Location of earthing holes at the transformers base and of gland plate at the terminal box

## 2 Transport

### 2.1 Transport by Truck

- Transportation in horizontal position. The terminal box is facing forward and is located to the side, the rating plate shows upwards and the density monitor is located upwards. (see Figure 2).

➔ Secure the transformer firmly by using straps connected to the truck.

The base and the head of the transformer to be supported by using suitable wooden wedges.

Put vibration pads between transformer and wooden wedges to protect the transformer against impacts (see Figure 2).

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 6 of 14

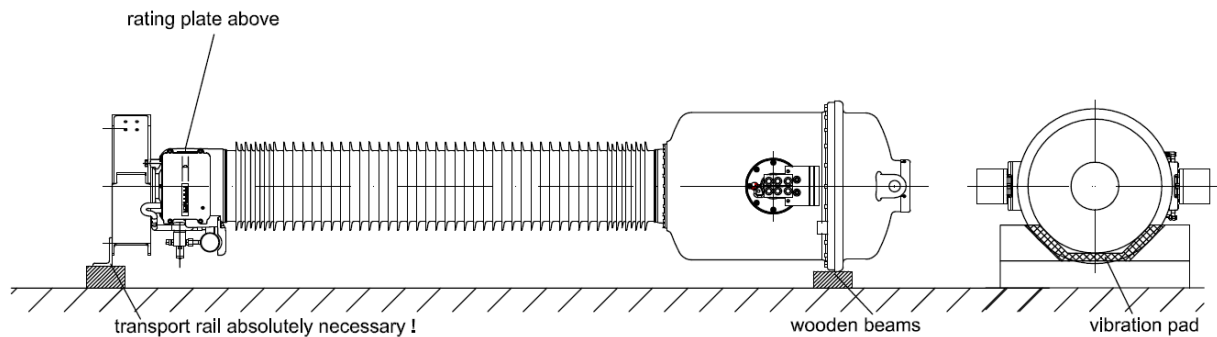


fig 2: Transport position

### 3 Commissioning

#### 3.1 Unpacking

After opening the shipping container or the crates if used the transformer should be checked for signs of damage in accordance with chapter 3.2.

In case of faults PFIFFNER Germany or the country's representatives should be informed immediately.

#### 3.2 Inspection

The transformers are individually tested and supplied with a transport gas pressure of  $p_e = 0.5 \text{ bar} / 20^\circ \text{ C}$ .

Before mounting the transformer should be checked for damage:

- No detectable gas leakage
- The density monitor has to display a transport pressure of  $P_e = 0.5 + / - 0.1 \text{ bar}$  at  $20^\circ \text{ C}$
- No signs of damage at insulator, primary connectors and cover, terminal box and density monitor.

**- The two outside glued shock indicators for 20g or 30g should not be triggered.**

If the 20g indicator is triggered: Check packaging and transformer for visual damage. If no further damage can be seen, the transformer can be put into operation.

If the 30g indicator is triggered alone or together with the 20g indicator: The transformer has to be send back for inspection to the factory.

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 7 of 14



fig 3: Indicator not tripped



fig 4: Indicator tripped

### 3.3 Installation of the transformer

**Center of gravity S of the transformer: Refer to outline drawing**

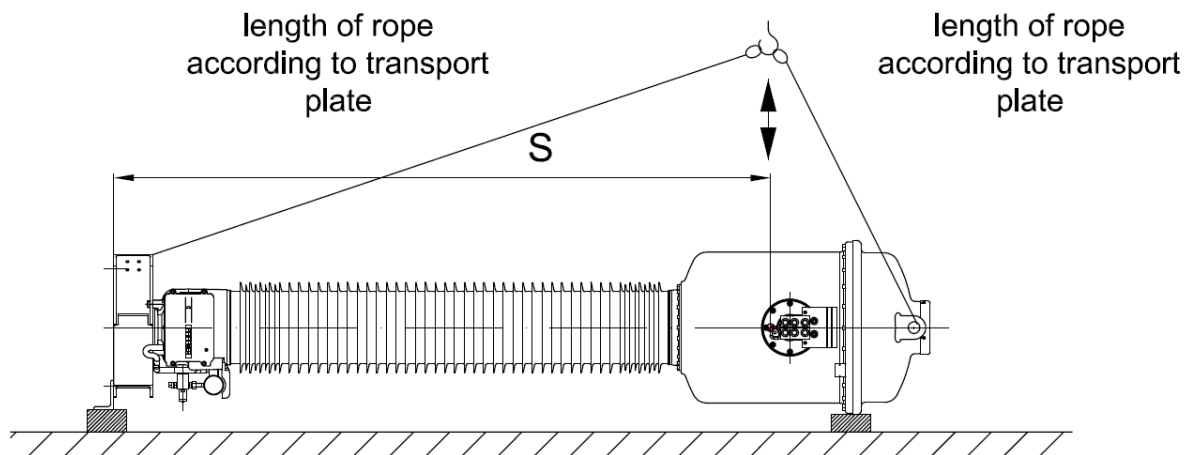


fig 5: Lifting of the transformer

The transformer is lifted by using of the appropriate lifting lugs at the tank (see Figure 5, 6 and 7).

The transformer is put in upright position manually (see Figure 6).

For the lifting of the transformer the lifting lugs at the tank are used as well (see Figure 6 and 7)

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 8 of 14

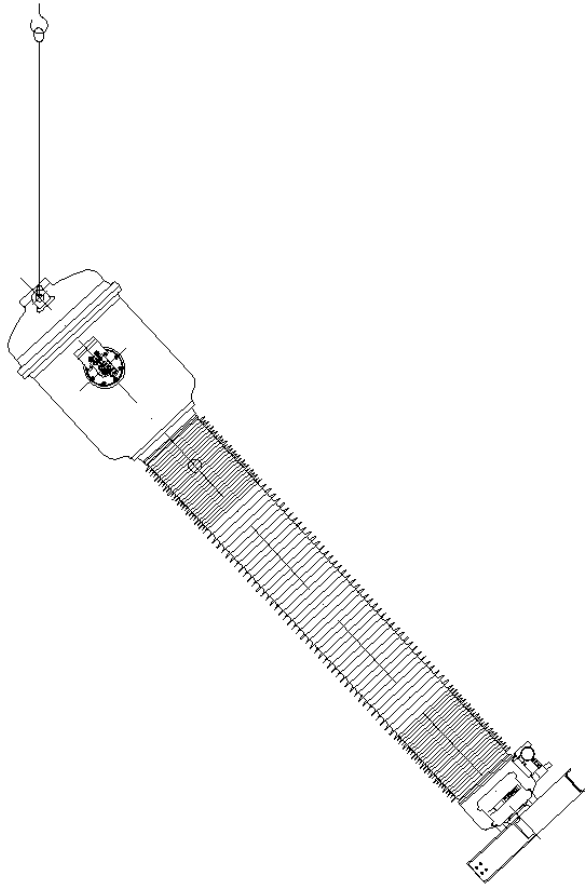


fig. 6: Lifting to upright position

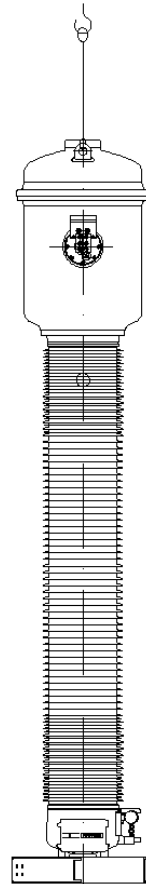


fig. 7: Vertical lifting

If the installation platform is not totally flat appropriate adjustments measures should be done first.



<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 9 of 14

### 3.4 Connection

#### 3.4.1 Primary terminals

Before mounting remove the oxide layer on the contact surface of the terminals by using a brush. Lubricate the contact surfaces with contact grease.

#### 3.4.2 Secondary terminals

For delivery one end of each secondary winding of the transformer is connected to earth. The winding is short circuited.

For bolt type terminals: The bolt is connected to the earthing bar by using a grounding link.

**=>Never ever operate a current transformer with open secondary windings!**

#### 3.4.3 Earthing pads

Before mounting remove the aluminum oxide layer on the contact surface by using a brush. Lubricate the contact surfaces with contact grease.

#### 3.4.4 Torque

Sekundary-Bolts M10	10 Nm
Earting Connections M12	72 Nm
Cover of the terminal box	10 Nm

### 3.5 Gas-filling

After commissioning, prior to put in service the transformer has to be filled with SF6 gas up to the operating pressure in accordance with the nameplate value.

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 10 of 14

## 4 Maintenance

The Current Transformer doesn't need any maintenance work, except the density monitor (see 4.4 Checking of the density monitor)

### 4.1 Gas monitoring

The monitoring of the gas pressure is provided by the alarm-contacts of the density monitor. The alarm contacts of the density monitor are executing the monitoring of gas pressure and are communicating the eventual necessity of gas filling.

### 4.2 Maintenance and conservation

Exterior cleaning in accordance with the substation inspection rules of the user.  
Aeration sieve in the terminal box checked for cleanliness.

### 4.3 Primary terminal connections

Checking of all connections and torque moments.

### 4.4 Checking of the density monitor

A function check of the density monitor alarm contacts should be done during the routine substation shut down. Guidance for the use of the density monitor test connection can be given on request.

Attention: The disassembly of the density monitor (see Figure 9) for review is not required. In case a replacement of the density monitor should become necessary the connecting nut of the density monitor connection valve is to be loosened (see Figure 8). When refitting the monitor the nut should only be fastened manually or **very carefully and softly with an SW 32 open-end wrench**.

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 11 of 14

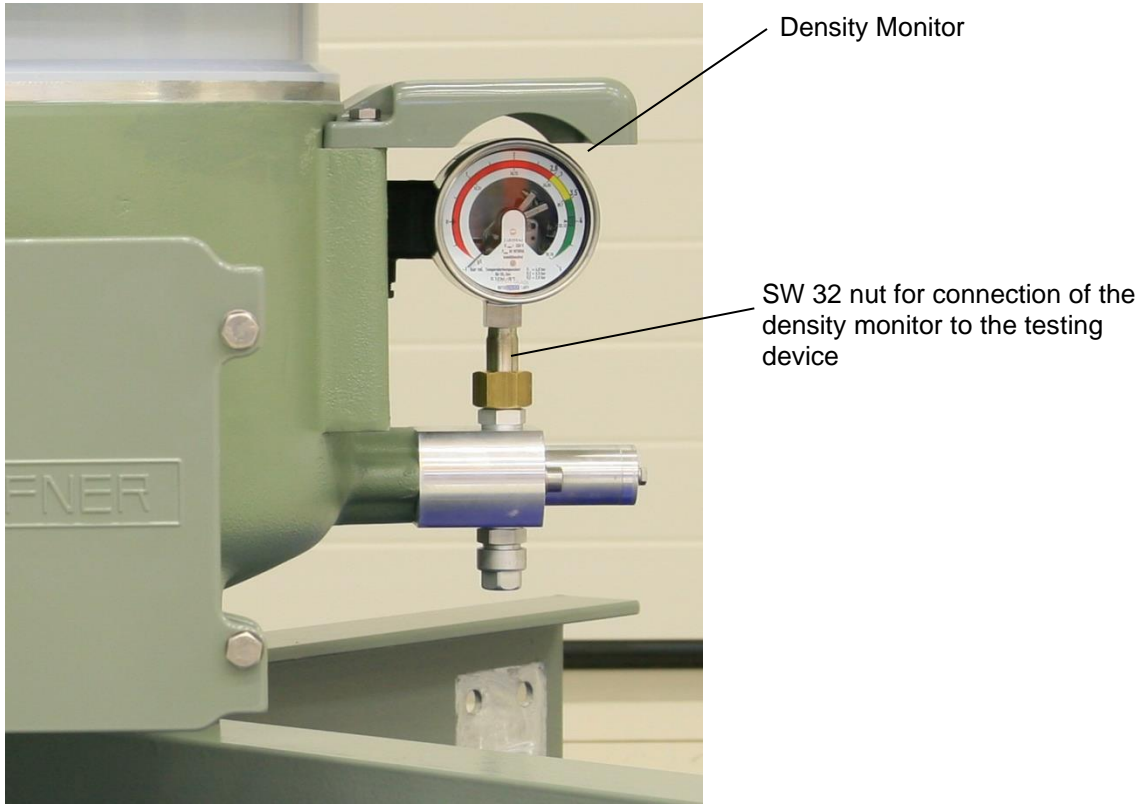


fig 8: Connection of the density monitor

<b>Outdoor Current Transformer with SF<sub>6</sub>-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 12 of 14

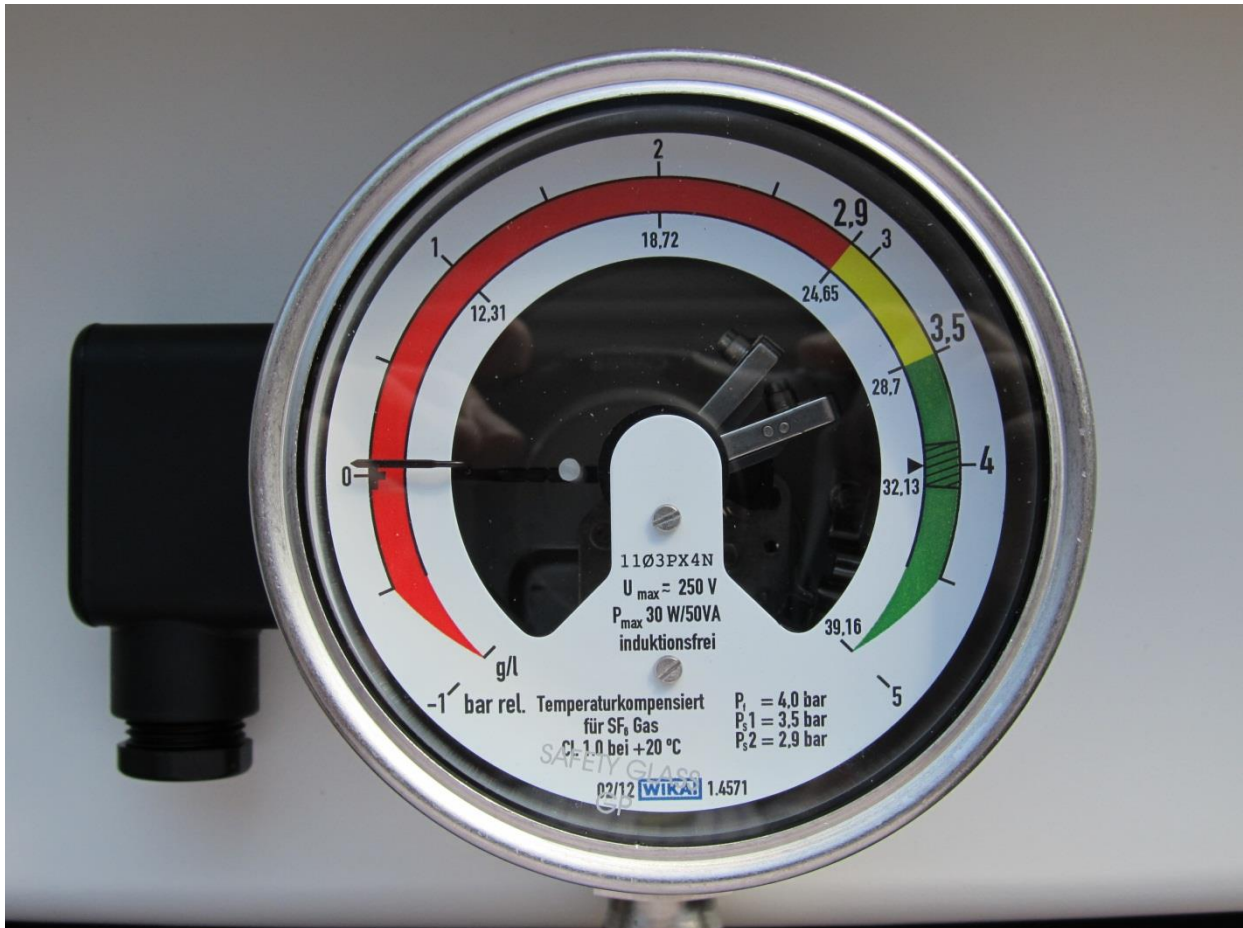


fig 9: Density Monitor

### Filling of the transformer:

The control of the filling pressure is normally done via the temperature-compensated density monitor.

If the filling is done using gas from the bottle:

Fill up first on only about 80% of the nominal operating pressure  $P_e = 2.6 \text{ bar} / 20^\circ \text{ C}$ . After about 4 hours the transformer can be filled to the nominal operating pressure.

Pressure control by using a non-temperature compensated pressure gauge: Refer to the table below and the following diagram.

<b>Outdoor Current Transformer with SF6-Gas Insulated Type JGF 245...550</b>			<b>MU 2300 English</b>
Responsible for process: Str	Released: Str	Version: 30.07.2020	Page 13 of 14

Filling Table ( temperature - pressure )							
temperature	pressure	temperature	pressure	temperature	pressure	temperature	pressure
-30	2,94	-15	3,27	1	3,6	16	3,92
-29	2,96	-14	3,29	2	3,63	17	3,94
-28	2,98	-13	3,31	3	3,65	18	3,96
-27	3	-12	3,33	4	3,67	19	3,98
-26	3,03	-11	3,35	5	3,69	20	4
-25	3,05	-10	3,37	6	3,71	21	4,02
-24	3,07	-9	3,39	7	3,73	22	4,04
-23	3,09	-8	3,42	8	3,75	23	4,06
-22	3,11	-7	3,44	9	3,77	24	4,08
-21	3,14	-6	3,46	10	3,8	25	4,1
-20	3,16	-5	3,48	11	3,81	26	4,12
-19	3,18	-4	3,5	12	3,84	27	4,14
-18	3,2	-3	3,52	13	3,86	28	4,16
-17	3,22	-2	3,54	14	3,38	29	4,18
-16	3,24	-1	3,56	15	3,9	30	4,2
		0	3,58				
temperature in °C							
pressure relative ( Pe ) in bar							

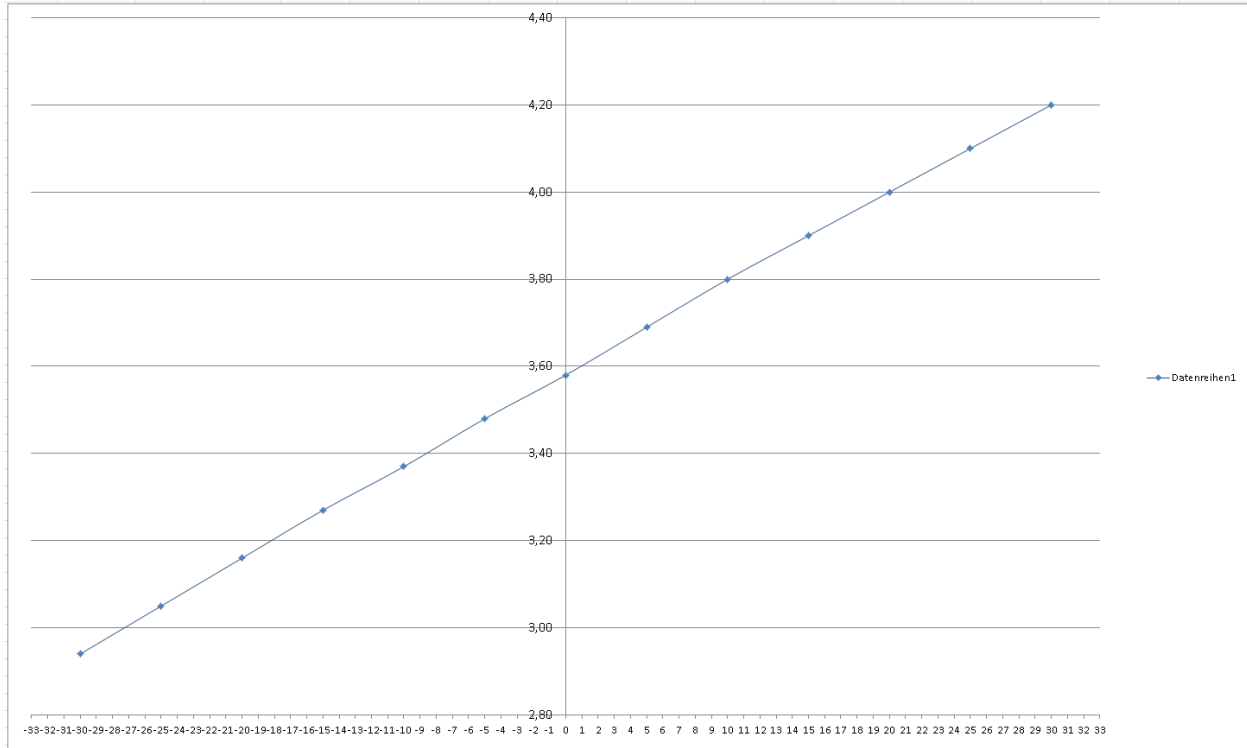
**Outdoor Current Transformer with SF6-Gas Insulated  
Type JGF 245...550**
**MU 2300**
**English**

Responsible for process: Str

Released: Str

Version: 30.07.2020

Page 14 of 14



## 5 Recycling and disposal

For a proper recycling and disposal of the current transformer, you have to order a company able to dispose the current transformer professionally, according to the current regulations.

### Manufacturers address

PFIFFNER Deutschland GmbH  
Zusestrasse 6  
D-25524 Itzehoe

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Fax: +49 4821 408 27-29

Home page: [www.pfiffner-deutschland.de](http://www.pfiffner-deutschland.de)