



## **Heavy Duty Gas Igniter**

**Maximum heat release: 600 kW (2,050,000 BTU/hr),  
Compact design with integrated spark transformer**

**Model ZT2...**

**Ionisation monitored**

Table of Contents

1. Part Numbering System ..... 3

2. Technical Data ..... 4

3. Storage, Installation Instructions and Lifetime ..... 4

4. Flame Monitoring..... 5

5. Construction According to Sectional Drawing..... 5

6. Available Spare Parts and Wear and Tear Parts ..... 7

7. Accessories ..... 8

8. Electrical Connection..... 8

9. Setting the Required Gas Flow ..... 9

10. Setting the Required Air Flow ..... 9

11. Maintenance and Alignment..... 10

12. Electrical Function Test (without Flame) Using A10Z2 Test Diode ..... 12

13. Gas- and Air-Regulating Components (to be ordered separately) ..... 13

14. Troubleshooting..... 14

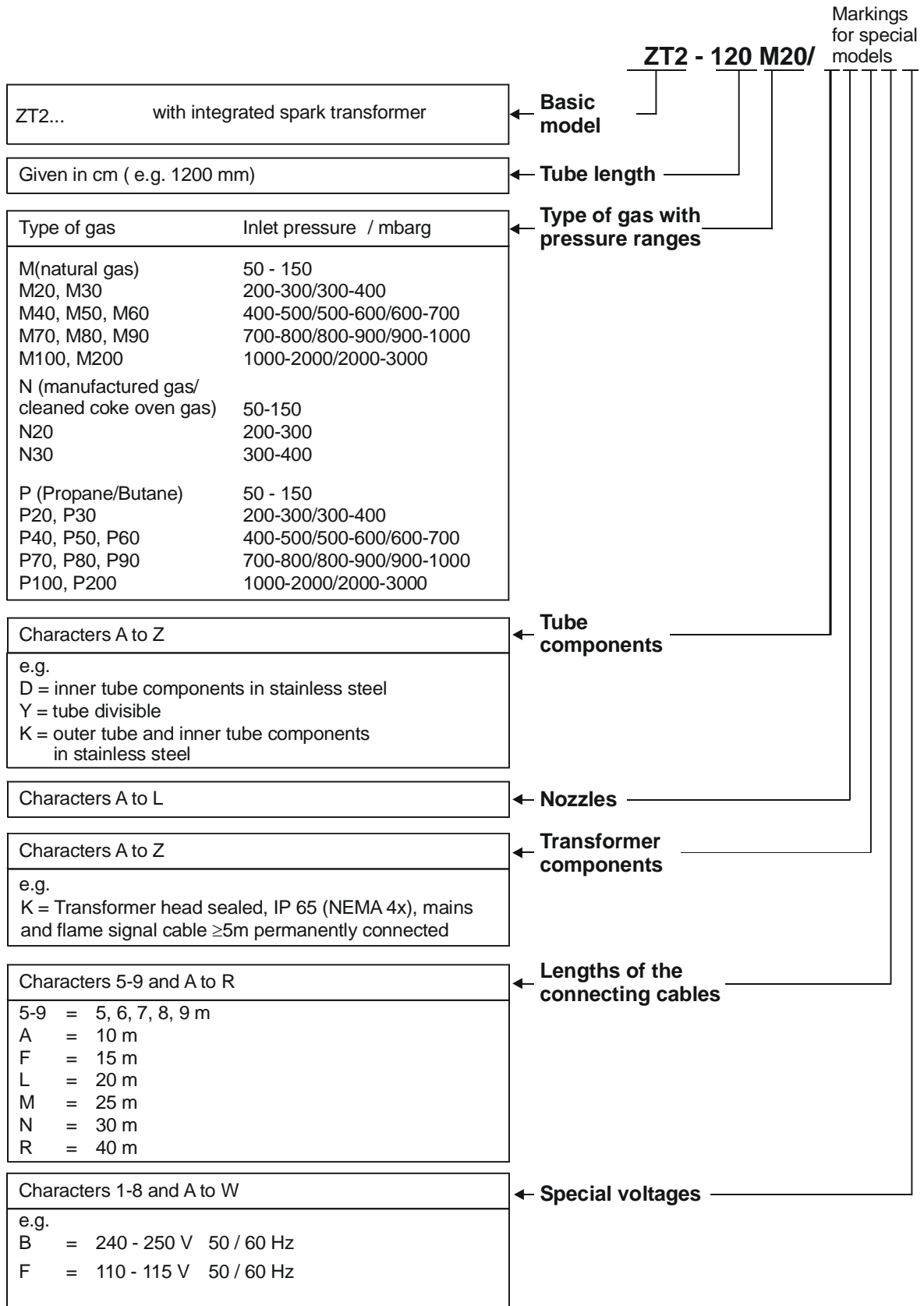
15. Approvals ..... 17

**Note**

- *Please read this manual and adhere to it when making use of the device*
- *Installation and maintenance procedures may only be carried out by authorized personnel*
- *All local regulations and the prevailing codes of practice must be observed during installation.*
- *Improper installation, alignment and maintenance, as well as modifications by the customer, can all lead to personal injury or property damage, as well as loss of warranty!*

# 1. Part Numbering System

The example below shows how the most important igniter information is incorporated into the part number:



## 2. Technical Data

### Burner Part

Heat release .....	max. 600 kW (2,050,000 BTU/hr)
Flame length.....	max. 2000 mm (approx. 80")
Tube length.....	lengths available from 240 –15,000 mm, in 10 mm increments
Gas connection.....	1", from top or bottom (design pressure max. 10bar)
Air connection.....	2", may be rotated in increments of 90°
Airflow .....	max. 300 m <sup>3</sup> /h
Air ratio .....	0.3 – 0.5; remainder must be available from combustion chamber itself
Maximum ambient temperature.....	igniter tube: 500°C (932°F); if temperature is higher, combustion air (20% min.) must be left on to serve as cooling air, and a stainless steel outer tube must be used. At temperatures > 700°C (1292°F), additional cooling air must be supplied in the gap between the guide tube and igniter tube.
Maximum back pressure .....	200 mbarg inside the igniter housing

### Transformer head

Operating voltage (transformer) .....	(primary) 220/ 230 V 50/ 60 Hz (standard), or as specified in the part number ..... (secondary) 2 x 5 kV electrode against electrode
Enclosure rating.....	IP 54 (NEMA 4) (standard) or IP 65 (NEMA 4x) (special)
Connection type.....	plug connection (IP 54 version), permanently sealed in mains cable and flame signal cable (IP 65 version)
Power consumption.....	spark transformer: 2 x 100 VA
Duty cycle .....	spark transformer: usually limited to 2 – 3 s by the burner control
Ambient temperature.....	0°C to +60°C (+32°F to +140°F), -20°C to +60°C (-4°F to +140°F) with special design IP 65
Monitoring with ionisation flame rod .....	See electrical connection (no flame monitor integrated)

May be connected to controllers on page 8.

## 3. Storage, Installation Instructions and Lifetime

Igniters are to be stored in a dry and dust-free place. Ambient temperature during storage shall be 0 – 60°C. No operation and storage below dew point. Moisture must not exceed 60%. Igniters shall be protected from mechanical damages.

If the tube is longer than 3 m (approx. 118"), the igniter must be provided with a guide tube. This prevents the tube from bending too much. The end of the igniter tube should protrude at least 200 mm (approx. 8") from the end of the guide tube, if the ambient heat does not require otherwise.

The gap between carrier tube and igniter tube ought to be 5 mm (app. 0.2") or more.

In case of higher furnace temperatures additional cooling air may be supplied into the gap through a separate port.

The device has a limited service life. It is designed for app. 250,000 start-ups. For 50 start-ups per day its lifetime would be about 10 years. This time decreases under bad conditions e.g. dust, high or low temperature, moisture, aggressive gases. When the appliance has reached the end of its lifetime it must be disposed of according to local regulations.

## 4. Flame Monitoring

The flame is monitored by an ionisation electrode which must be doused into the flame. This flame rod reports to a separate flame monitor which is energized by an a.c. voltage. The burning flame creates a conductive connection to burner mass and acts as a rectifier for the small ionisation current. This d.c. signal is amplified in the flame monitor, which in turn switches a signal.

The ionisation electrode and the ignition electrode are aligned according to the drawing on page 12. The electrode support ring is only available as one unit. The electrodes on the support ring are already bent and aligned.

The internal resistance of the ionisation path is several M $\Omega$ . This high resistance requires good insulation for the electrodes and the connecting rods. Therefore, it is important to clean the insulators more often if the combustion air contains dust; avoid moisture.

The temperature of the ceramics must not exceed 500°C. Please see also chapter 'Technical Data; Maximum ambient temperature'.

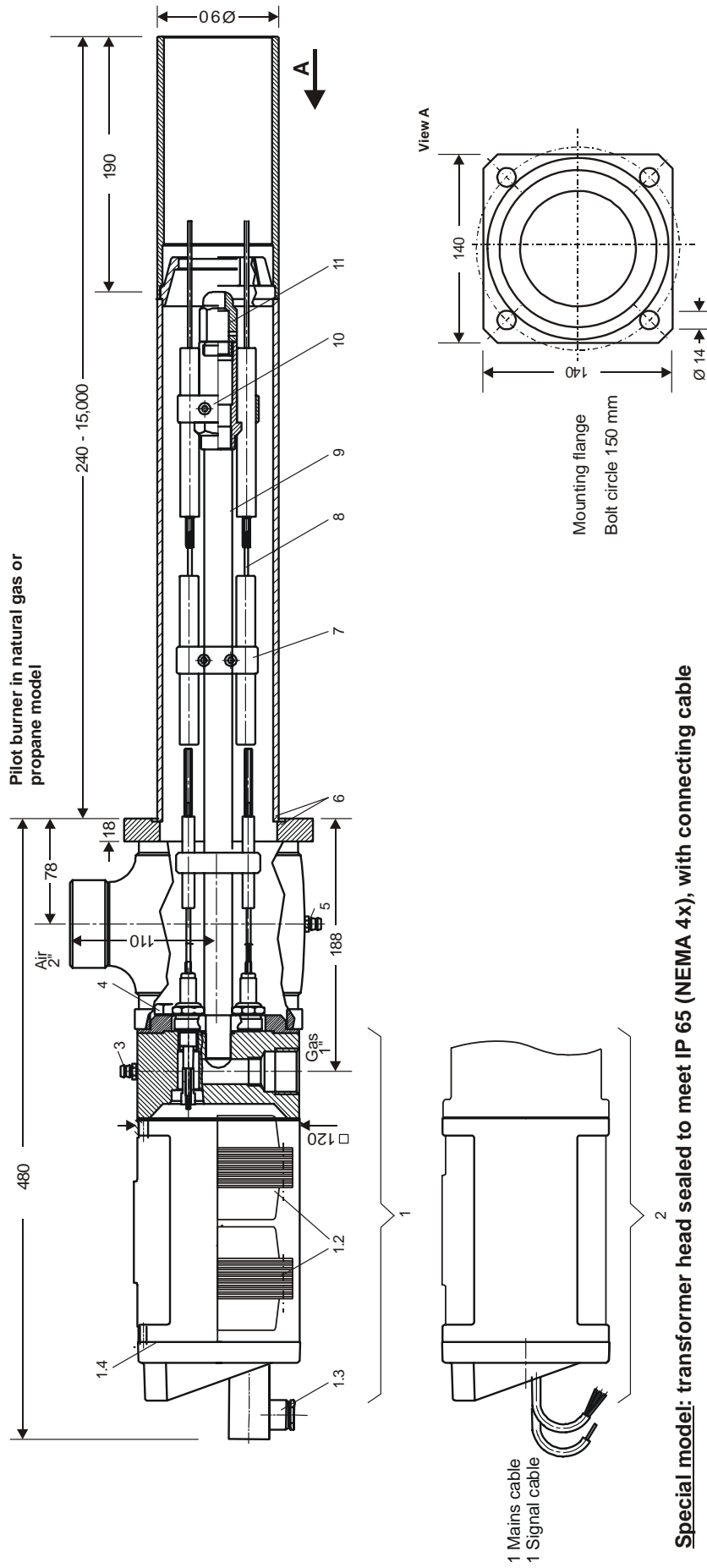
## 5. Construction According to Sectional Drawing

(see also page 6)

The igniter consist essentially of the transformer module (item 1 or 2), into which the spark transformers are built, the igniter tube which includes the air connection, mounting flange and mixing chamber (6), gas tube (9) and nozzle (11), as well as the electrode support ring (10). The igniter tube, is threaded onto the transformer module, and, after loosening four screws (4), can be detached or rotated in 90° increments according to the location of the air supply. When rotating the tubes, one must be careful not to twist the inner support rings and rods. This could disrupt operation of the igniter.

The gas connection can be made from either the top or bottom. The unused opening is plugged with a stopper into which the gas pressure test nipple (3) has also been screwed. The electrode support ring (10) is attached to the end of the gas tube. The ionisation and spark electrodes are lengthened with connecting rods (8). These rods are guided via 3 ceramic insulators through the floor of the transformer housing and are supported every 300 mm by intermediate support rings (7).

**Standard model:** transformer head enclosure rating IP 54 (NEMA 4), with plug connection



**Special model:** transformer head sealed to meet IP 65 (NEMA 4x), with connecting cable

**Igniter Sectional Drawing**

## 6. Available Spare Parts and Wear and Tear Parts

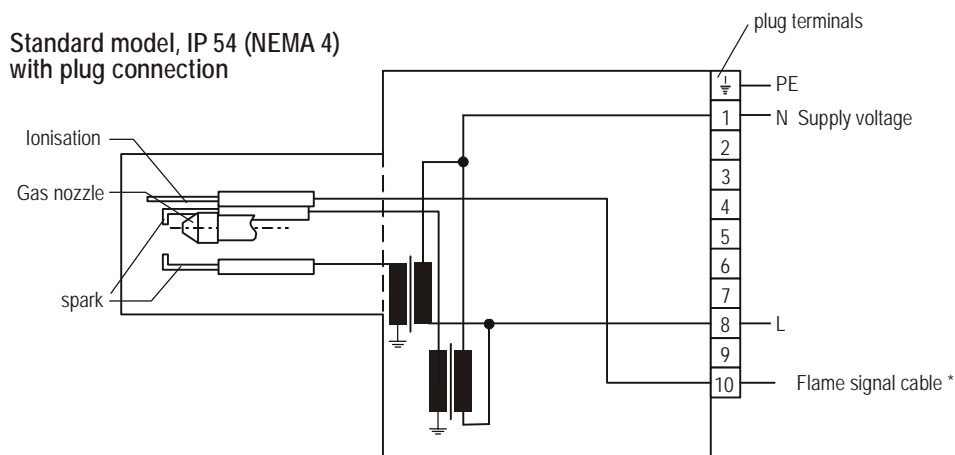
Item.	Qty.	Description	Part Number	Voltages	Material	Remarks
1	1	Complete transformer head for ZT2...	Z280K1 Z280K1/00F Z280K1/00B	220/230V 110/120V 240/250V	with housing, plug connection and gas flange	Standard model Special model Special model
1.2	2	Single transformer	Z546K230 Z546K115 Z546K00B	220/230V 110-120V 240/250V	Without housing	Standard model Special model Special model
1.3	1	90°plug with 2 M20x1.5 cable glands	A5Z1			10-pole, max. 2.5mm <sup>2</sup> (AWG 14)
2	1	Complete transformer head/ IP65 (NEMA 4X) for ZT2...	Z280K6_ _ _	Special model instead of Item 1: With supplementary information indicating cable length and voltage requirements (see <i>Part Numbering System</i> , page 3)		
6	1	Igniter tube, complete with mixing chamber, mounting flange and air flange	Z1445Z_ _ _		Stainless steel	Standard model  Can be rotated in increments of 90°
7	*	Intermediate support ring with 3 ceramic insulators (Z545F4)	Z365K3		Stainless steel	*Qty. required depends on tube length: 3 rings per meter
10	1	Electrode support ring with 3 ceramic insulators and 3 electrodes	Z911K1		Stainless steel	Standard  <b>Subject to wear and tear</b>
11	1	Gas nozzle	Natural gas	Z530F100-6x30H	Stainless steel	Standard
			Propane gas	Z530F60-6x25V	Stainless steel	
			Coke oven gas	Z530F130-6x30V	Stainless steel	

## 7. Accessories

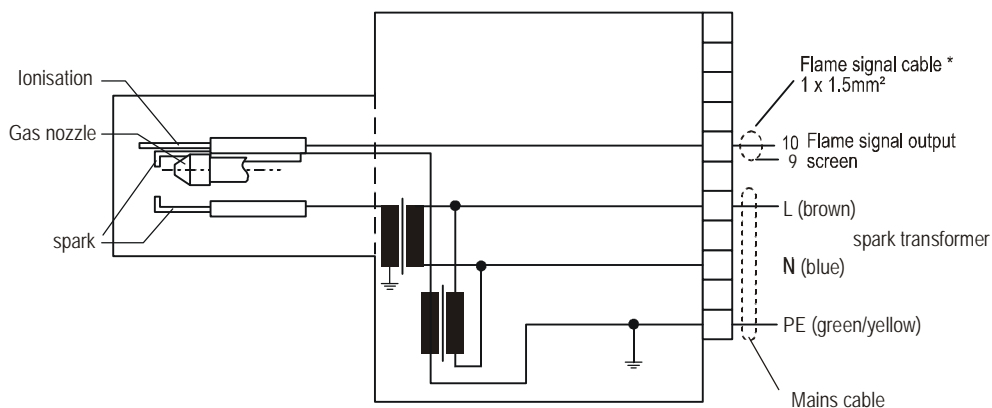
The igniters can be connected to the following devices:

- Flame monitor D-IO 55-10  
for intermittent operation  
surface type unit  
230 V 50/60 Hz  
also available for 115 V 50/60 Hz  
see also separate brochure
- Burner control D-GF 55-10  
for intermittent operation  
surface type unit  
230 V 50/60 Hz  
also available for 115 V 50/60 Hz  
see also separate brochure

## 8. Electrical Connection



Special model enclosure rating IP 65 (NEMA 4x)  
with mains cable and flame signal cable  
transformer head sealed



Power supply according to the name plate on the igniter

\*) If wired to flame monitors or burner controls of Hegwein or another make: Adhere to relevant operating manual.

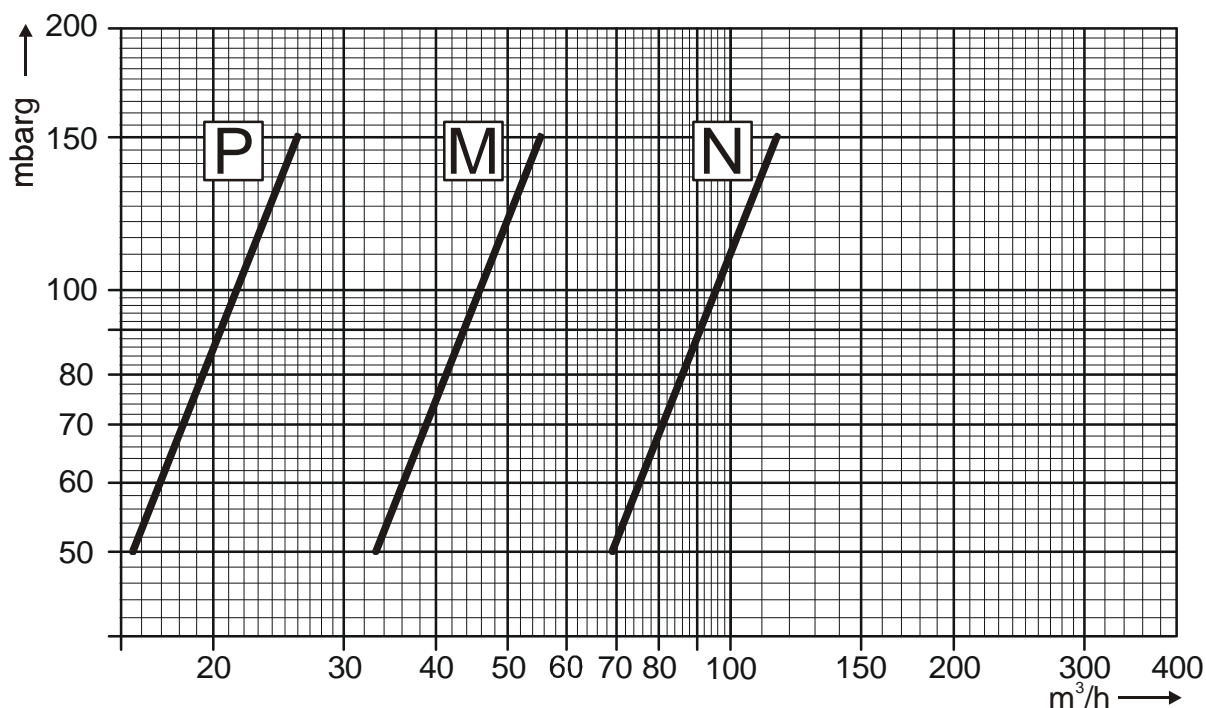
## 9. Setting the Required Gas Flow

The igniter operates in a pressure range of 50-150 mbar, which may be measured using the **gas pressure test nipple (item 3/ sectional drawing)**. Open the test nipple by turning the inserted Allen screw anti clockwise by 1 ½ turns. Connect the hose with pressure gauge immediately ( be aware of the pressure). After measurement close test nipple by turning clockwise immediately.

The gas flow can be selected according to the diagram below. Pressure is set using a ball valve to a value of 100 mbar.

If, when placing an order, a higher gas pressure is given, then pressure-reducing restrictors are screwed into the threads of both gas inlets at the factory. This allows the pressure of the igniter to be set to a level above 150 mbar. If high admission pressure is available at the plant, then pressure can be restricted to levels below 150 mbar using the ball valve.

At admission pressure levels above 500 mbar, this setting becomes extremely difficult. In these cases one should request from Hegwein the appropriate pressure-reducing restrictors and indicate the admission pressure.



Character	Gas	Nozzle Orifices (mm)	Flame Length (mm)	Notes
P	Propane	Z530F60-6x25V	ca. 2000	Standard
M	Natural gas	Z530F100-6x30H	ca. 2000	Standard
N	Manuf. gas	Z530F130-6x30V	ca. 2000	Standard

The graphs shown are based on average values regarding gas density, gas composition, calorific value, igniter version and igniter tube length as well as optimised surrounding (unimpeded burn out and no back pressure in combustion chamber). The supply pressure derived from the graphs should therefore be regarded as guide numbers only. The actually required values can deviate, depending on site conditions.

## 10. Setting the Required Air Flow

The required airflow or air pressure basically depends on the length of the igniter tube. 15 mbar of flow pressure are required for tube lengths up to 1 m, with an additional 10 mbar for each additional meter.

For example, the air pressure on an igniter with a tube length of 3 m must be set to 15 mbar + 2 x 10 mbar, for a total of 35 mbar.

The blower pressure has to be reduced by an air-regulating sleeve to the actually required flow pressure stipulated by the igniter's tube length. Any furnace backpressure has to be compensated. The flow pressure can be picked up at the **air pressure test nipple (item 5/ sectional drawing)**. Open the test nipple by turning the inserted Allen screw anti clockwise by 1 ½ turns. Connect the hose with pressure gauge immediately ( be aware of the pressure). After measurement close test nipple by turning clockwise immediately.

Varying backpressures with fluctuations exceeding 20% require a differential pressure regulator on the air supply side.

If the air pressure has been set correctly, the following will occur:

1. Immediate ignition
2. Good optical flame image / flame signal
3. Flame length approx. 2000 mm at a maximum capacity of 600 kW (approx. 2,050,000 BTU/hr) at unimpeded burn out

## 11. Maintenance and Alignment

These igniters do not require any special maintenance. They should, however, be checked periodically (e.g., every 3 months) for proper operation.

If the igniters are operated using air that contains dust, this check should be performed at shorter intervals, since electrically conductive dirt deposits or moisture on the ceramic insulators can lead to a fault in the igniter.

The intrinsic impedance of the ionisation path amounts to several MΩ. Such high resistance requires that the ceramic insulators be in perfect condition.

### Performing Maintenance and Replacing Worn Parts

(please compare to the sectional drawing)

#### **Igniter Tube** (may be rotated in 90° increments)

After loosening the four screws (item 4), the tube may be removed. Depending on the position of the air connection the tube may be turned and tightened.

#### **Transformer head**

The transformer head is completely interchangeable. To do so, the outer tube must be detached, and the electrode support ring (item 10) and the three 3 mm rods (item 8) must be removed. The gas tube must then be unscrewed.

**Caution:** If necessary, remove the pressure-reducing restrictors, which are screwed in to the two threaded gas inlets, and put them into the new transformer module.

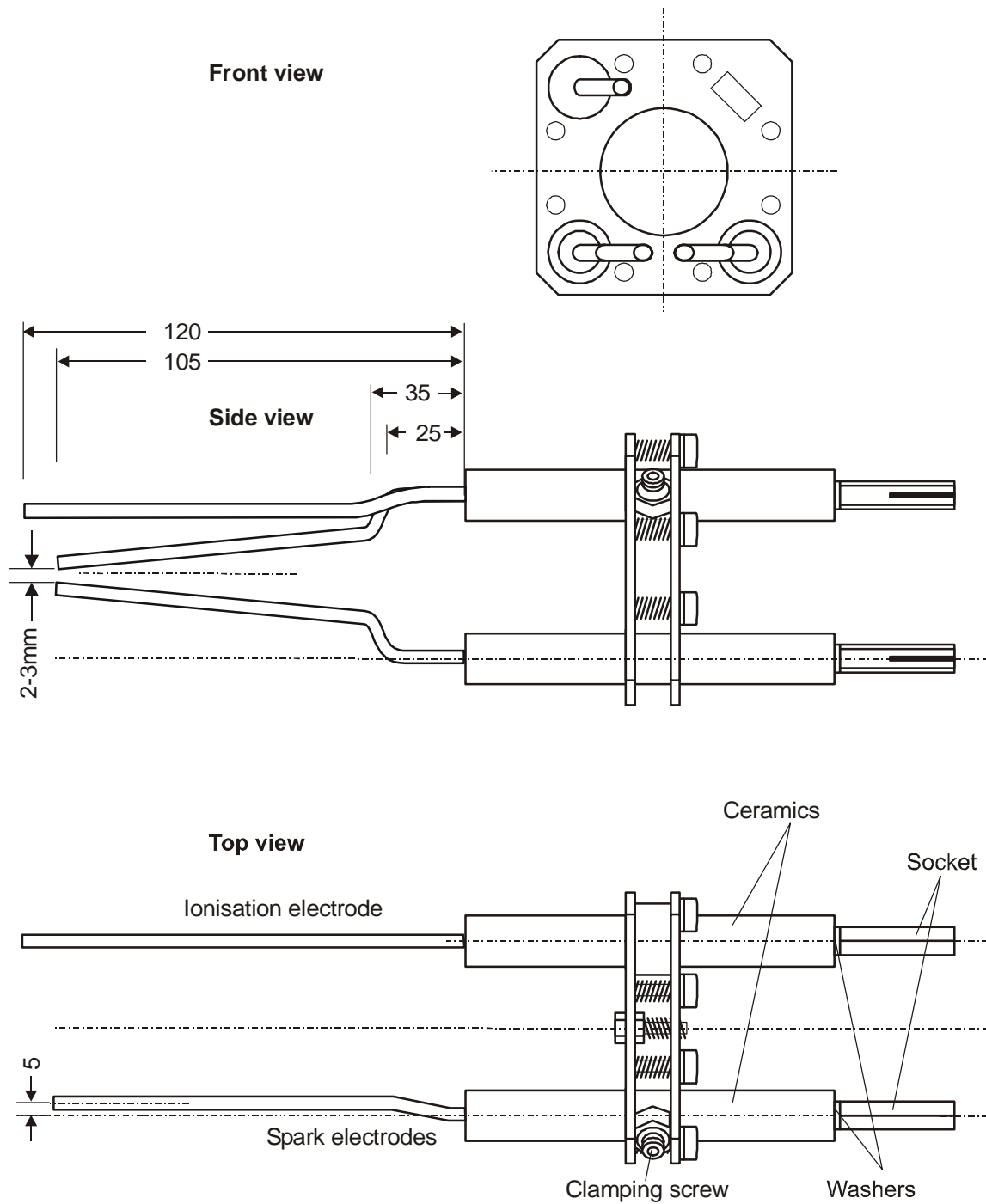
If only the spark transformer is to be replaced loosen the screws (item 1.1). Remove the old transformer from the aluminum housing and insert a new one.

#### **Electrode Support Ring** (subject to wear and tear, exempted from manufacturer's warranty)

Remove the igniter tube and loosen the locking screw on the support ring. The ring may then be removed from the gas tube. Slide in the new ring, insert the connecting rods into the sockets and tighten the locking screw. The electrode support ring is placed behind the gas nozzle. The alignment of the electrodes is described on page 11. The electrode support rings are normally delivered with the electrodes already bent.

#### **Intermediate Support Ring** (for tube lengths greater than 600 mm)

Remove the igniter tube and electrode support ring and the nozzle holder at the gas tube end tip. Loosen the locking screw of each support ring and remove them from the tube. Slide on the new intermediate support rings and insert the connecting rods. The intermediate support rings should be spaced at intervals of 300 mm from one another. Finally, the nozzle holder and the electrode support ring are slid onto the gas tube and the connecting rods are inserted into the sockets on the ring. Tighten all locking screws on the support rings, while observing that the rods do not become twisted.



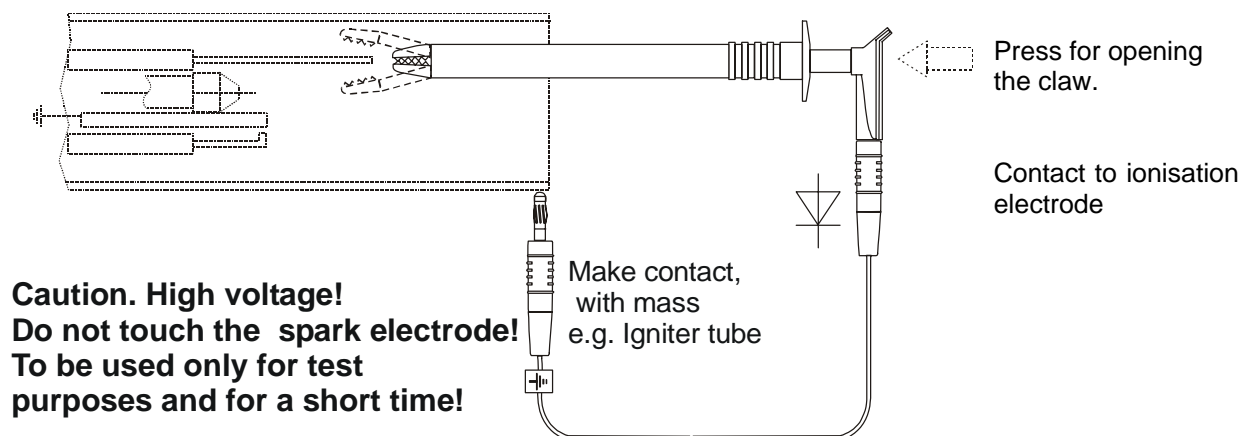
**Alignment of the Z911K1 Electrode Support Rings**  
 Complete with ceramics and pre-bent electrodes

## 12. Electrical Function Test (without Flame) Using A10Z2 Test Diode

This test diode is employed to perform a purely electrical function test. Such a test should be carried out by authorized personnel only.

**Caution: The gas valve must first be closed!**

With the aid of the test diode A10Z2 (rectifier built in to a cable), may be simulated a flame signal to the flame monitor, once power is applied. The diode must be clamped to the ionisation electrode, the other end of the cable should make contact with burner mass (note the polarity!)



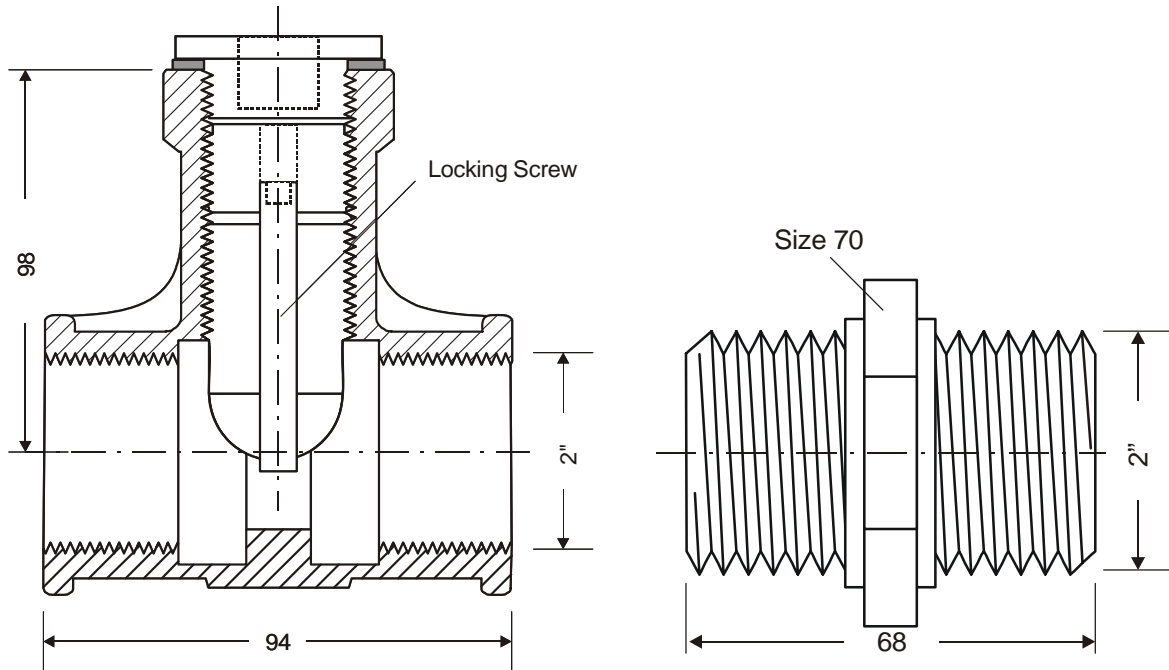
Once contact is made with the diode, the burner control should go into operation.

If there is no flame signal, the following should be checked:

- Is the supply voltage present on external flame monitor or burner control?
- Is the polarity of the test diode correct?
- Are the ceramic insulators damp, dirty or broken?  
Remedy: If so, clean or replace. If necessary replace the transformer (item 1 or 2).

**In case of spark problems please see chapter 'Trouble shooting'.**

### 13. Gas- and Air-Regulating Components (to be ordered separately)

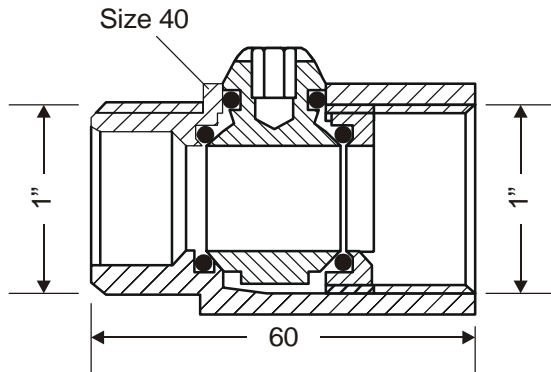


**Z 945 Z 6/0FV Air Regulator**

Housing: galvanized GTW 40 cast iron  
 Cone: Ms 58 brass  
 Cover: Ms 58 brass  
 Temperature range  $-20^{\circ} - +60^{\circ}\text{C}$  ( $-4^{\circ} - +140^{\circ}\text{F}$ ),  
 Pressure 300mbar max.

**Z 946 F 10/00V Double Nipple**

Galvanized GTW 40 cast iron  
 Temperature range  $-20^{\circ} - +60^{\circ}\text{C}$  ( $-4^{\circ} - +140^{\circ}\text{F}$ ),  
 Pressure 300mbar max.



**Z 845 Z5 Ball Valve (for setting the gas flow pressure)**

Housing: Ms 58 brass  
 Gaskets: Teflon  
 Temperature range  $-20^{\circ} - +60^{\circ}\text{C}$  ( $-4^{\circ} - +140^{\circ}\text{F}$ ),  
 Pressure 300mbar max.

## 14. Troubleshooting

The following items have to be carried out step by step

### 14.1 Spark cannot be seen

#### **Possible Causes:**

- .1 Igniter has not been energized
- .2 Spark suppresses the ionisation signal.  
(Visual check in dark surrounding with **fuel valves closed**.)



Caution: do not touch high voltage electrode.)

#### **Possible Reasons/ Remedy**

- .1.1 Remedy: Check wiring.  
Check BMS.
- .2.1 Spark electrode internals has been burnt away  
Remedy: replace electrode, clean igniter / burner internals and verify the correct spark gap.
- .2.2 Electrode distance to large or has a short circuit  
Remedy: clean igniter / burner internals, replace worn parts and verify the correct spark gap of 2-3 mm.
- .2.3 Spark transformer faulty  
Remedy: Replace spark transformer.
- .2.4 Tinder on the spark electrode or ground rod / bolt.  
Remedy: clean igniter / burner internals, and remove layer with emery cloth.
- .2.5 Ceramic insulator is broken  
(De-energize the igniter/ burner.  
Remove outer tube.)  
Remedy: Replace ceramic insulator.

### 14.2 Flame cannot be seen

#### **Possible Causes:**

- .1 No combustion air.  
(Check pressure at test nipple).
- .2 No fuel  
(Check pressure at test nipple).
- .3 Air/Fuel ratio not correct.  
(Check fuel and air pressure at test nipple)

#### **Possible Reasons / Remedy**

- .1.1 Sleeves or valves are completely closed.  
Flap or valve does not work.
- .1.2 Pipe is clogged.
- .2.1 Fuel pipe too long.  
Remedy: Install valve close to Burner/ Igniter.
- .2.2 Fuel pipe inert with nitrogen.  
Remedy: Start the igniter/ burner several times to get the inert gas removed and replaced by fuel.
- .2.3 Shut off valve is out of order.  
Remedy: Replace fuel valve.
- .3.1 Check correct fuel and air pressure adjustment.  
Use diagram values given in igniter/ burner manual.
- .3.2 Correct fuel type?
- .3.3 Clean combustion air?

### 14.3 Flame can be seen but no flame signal present after safety spark time has elapsed

#### **Possible Causes:**

- .1 No ionisation signal.  
(Visual check with **fuel valves closed** and de-energized igniter/ burner.)
- .2 Igniter/ burner is wired to a Hegwein burner control:  
Supply voltage is released simultaneously with operation voltage.
- .3 Igniter/ burner is wired to burner control of another make:  
spark suppress the ionisation signal.
- .4 Burner/Igniter has been exposed to excessive temperature from combustion chamber during Burner/Igniter stand still. Ceramics are too hot, the insulation resistance has dropped to a value that is too low.
- .5 The setting of the fuel and air pressures at the burner/igniter are not correct. Flame root is not in the area of the ionisation electrode.
- .6 After failure correction of item1- 5 a flame signal is still not available.  
If flame signal is still not reported though step 1 to 5 have been verified.

#### **Possible Reasons / Remedy**

- .1.1 Ionisation electrode has been burnt away.  
Remedy: Replace electrode and verify the correct spark gap.
- .1.2 Ceramic insulator is broken.  
Remedy: Replace insulator.
- .2.1 Operation voltage must lag supply voltage at least by 0.5 seconds.
- .3.1 Spark voltage must be shut off 0.5 seconds before spark safety time has elapsed.
- .4.1 Leave blower air fully on or in cooling stage while the burner/igniter is switched off.
- .5.1 Adjustment and correction of the corresponding devices.  
Use diagram values as given in the available manual.
- .5.2 Flame is pushed out of the igniter/ burner mouth: Fuel or/ and air flow insufficient.
- .6.1 Remedy: Check complete wiring with test diode A10Z2.  
See manual.

### 14.4 Shut off during operation

#### **Possible Causes:**

- .1 Varying backpressures or supply pressures cause the flame to trip.



#### **Possible Reasons / remedy**

- .1.1 Check pressure at the test nipples. Fluctuations require a differential pressure regulator on the air and fuel supply side.
- .1.2 Burner or igniter test should be carried out outside combustion chamber.  
**Local safety regulations must be observed.**
- .2 Pilot flame is strongly influenced or when suffocated by the main flame.
  - .2.1 Remedy: Change igniter position
  - .2.2 Remedy: A more powerful burner/ igniter may be requested.

## **14.5 Automatic shut-down at start-up when a flame is reported before the spark fuel valve have been opened**

### ***Possible Causes:***

- .1 Flame has not extinguished after the previous shutdown due to a leaking valve and is still present when system is restarted.

### ***Possible Reasons / remedy***

- .1.1 Remedy: Replace valve.

## **14.6 Electrical Malfunction**

- .1 Burner control does not start

- .1.1 Remedy: Devices of a different make can cause trouble. See chapter.

In case of questions please give us the exact type designation as given on the nameplate.

## 15. Approvals



### EG-Konformitätserklärung / *EC Declaration of Conformity*

Hersteller/ *Manufacturer* Georg Hegwein GmbH & Co. KG

Anschrift/ *Address* Am Boschwerk 7, D-70469 Stuttgart

Produktbezeichnung  
*Product description* Gas-Zündbrenner der Baureihe ZT...  
Gas igniters ZT...

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein, vorausgesetzt, dass es installiert, gewartet und entsprechend seiner Bestimmung eingesetzt wird. Die einschlägigen Vorschriften und Hinweise aus der Bedienungsanleitung sind zu beachten.

*The described product complies with the following provisions of Council Directive, provided that it is installed, maintained and used in applications for which it was made, in accordance with relevant installation standards and manufacturer's instructions.*

Richtlinie des Rates 90/396/EWG (Gasgeräte-Richtlinie)  
*Council Directive 90/396/EEC (Gas appliance directive)*

Richtlinie des Rates 89/336/EWG (EMV-Richtlinie)  
*Council Directive 89/336/EEC (EMC Directive)*

Richtlinie des Rates 73/23/EWG (Niederspannungsrichtlinie)  
*Council Directive 73/23/EEC (Low Voltage Directive)*

Wir bestätigen die Konformität des oben bezeichneten Produkts mit folgenden Normen:

*We confirm the conformity of the above mentioned product with the following standards:*

EN 50081-1  
EN 50082-2  
EN 55011  
EN 60730-1

Aussteller  
*Issuer* Georg Hegwein GmbH & Co. KG

Ort, Datum  
*Place, date* Stuttgart, 20.09.2003

Rechtsverbindliche Unterschrift  
*Legally binding signature*

\\PRIMERGY060\Vertrieb\Vorlagen\Formulare\Konformität\KONF\_ZT.DOC

  
Dr. Ing. U. Greul

15.12.2003 15:50

Georg Hegwein GmbH + Co. KG  
Am Boschwerk 7  
D-70469 Stuttgart  
Tel.: +49 711 13 57 88-0  
Fax: +49 711 13 57 88-5

Banken: Deutsche Bank Stuttgart 9 212 200  
BLZ 600 700 70  
IBAN: DE04600700700921220000  
SWIFT: DEUTDE33  
Postbank Stuttgart 655 36-705  
BLZ 600 100 70

Kommanditgesellschaft:  
Stuttgart HRA 4951  
USt-IdNr.:  
DE 147 512 966  
Steuernummer/Tax ID:  
93153/01730

Persönlich haftende Gesellschafterin:  
Hegwein GmbH  
Stuttgart HRB 4303  
Geschäftsführung:  
Prof. Dr.-Ing. Peter Martin (Vorsitzender),  
Dr.-Ing. Ulrich Greul

**DURAG GROUP**  
*Solutions for Emission  
and Combustion*  
www.hegwein.de  
e-mail: hegwein@durag.de