

Heavy Duty Gas Ignitor

**Maximum heat release: 120 kW (410,000 BTU/hr),
Compact design with ignition transformer and
ionisation flame monitor in
EC-tested and approved design
flame proof housing
II 3 G EEx nC IIC T5, PTB- and ATEX approved
suitable for applications in Zone II**

Model ZXA0...
for intermittent operation

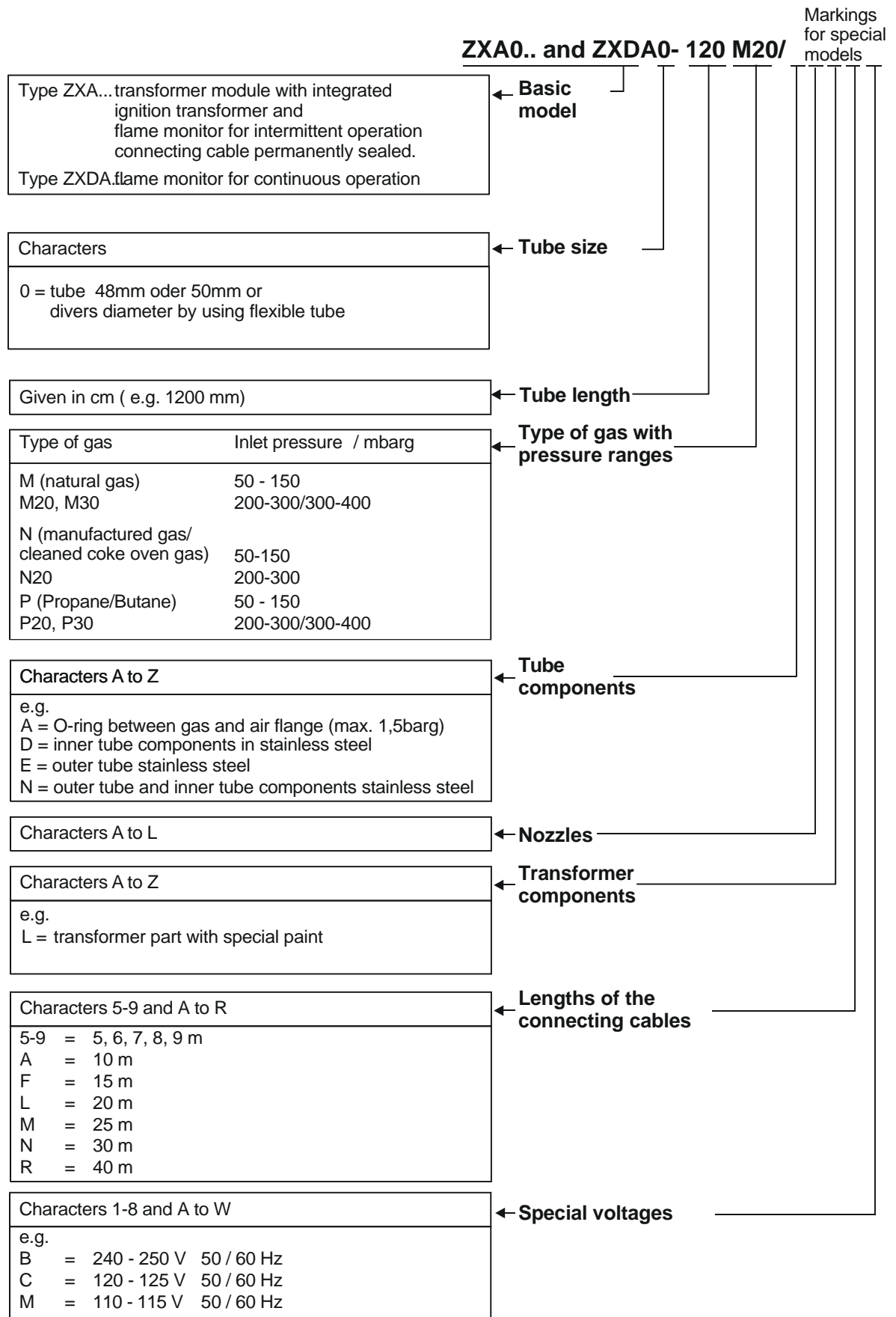
Model ZXDA0...
for continuous operation

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1. Part Numbering System

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



2. Technical Data

Burner Portion

Heat release	max. 120 kW (410,000 BTU/hr)
Flame length	max. 600 mm (approx. 23.5")
Tube length	lengths available from 240 – 15,000 mm, in 10 mm increments
Gas connection	1/2", from left or right
Air connection	1", may be rotated in increments of 90°
Air flow	max. 50 m ³ /h
Air ratio	0.3 – 0.5; remainder must be available from combustion chamber itself
Maximum ambient temperature	ignitor tube: 500°C (932°F); if temperature is higher, combustion air 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 ignitor tube. In case of divisible or tilting tubes the temperature at the division or moving part must not exceed 180°C (356°F).
Maximum back pressure	200 mbarg inside the ignitor housing

Transformer and Flame Monitor

Operating voltage (Flame monitor)	220/ 230 V 50/ 60 Hz (standard), or as specified in the part number
Ignition transformer	(primary) 220/ 230 V 50/ 60 Hz (standard), or as specified in the part number (secondary) 5 kV to ground
Enclosure rating	IP 65 (NEMA 4x)
Connection type	permanently sealed in control cable (IP 65 version) In ex zone the free cable must be connected in housings which obtain the explosionproof acc. to EN50021 or EN50014
Power consumption	ignition transformer: 100 VA flame monitor: 10 VA
Duty cycle	ignition transformer: usually limited to 2 – 3 s by the burner control 15% duty cycle (cycle time 3 min. = 100 %) primary thermal winding protection Flame monitor: any
Ambient temperature	-20°C to +40°C (-4°F to +104°F), where EC approval is required
Start-up requirement	air flow must be ensured as described under 3.1
Explosion proof ratings	II 3 G EEx nC IIC T5 zone 2 div. II
May be connected to controllers on page 8.	

3. Storage, Installation Instructions and Lifetime

Ignitors 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%. Ignitors shall be protected from mechanical damages.

If the tube is longer than 3 m (approx. 118"), the ignitor must be provided with a guide tube. This prevents the tube from bending too much. The end of the ignitor tube should protrude at least 150 mm (approx. 6") from the end of the guide tube, if the ambient heat does not require otherwise.

The gap between carrier tube and ignitor 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 appr. 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. The end user shall therefore take care that regular safety related maintenance checks are carried out at site.

When the appliance has reached the end of its lifetime it must be disposed of according to local regulations.

3.1 Monitoring the Gas and Air Pressures

The gas and air supply pressures have to be monitored at site according to local regulations. Further to that it must be ensured that forced air is passing through the ignitor and purging it before the electrical supply is switched on. For safety reasons any failure in forced combustion air must lead to an immediate interruption of the electrical supply.

Even after shut down the ignitor shall be purged with combustion air to rule out the extremely unlikely accumulation of a flammable mixture in the ignitor's windbox.

4. Flame Monitoring

The flame is monitored using an ionisation electrode. The direct current serves as the flame signal. This direct current flows via the flame from the ignitor tube ground to the ionisation electrode, and to the flame monitor via the connecting rod.

The ionisation electrode and the ignition electrode are aligned according to the drawing on page 12. If new electrodes are employed, they must be bent accordingly, shortened and aligned. It is recommended that a complete electrode support ring instead be ordered. The electrodes on the support ring are already bent and aligned.

The internal resistance of the ionisation path is several M Ω . 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 ceramic insulator for the ionisation electrode may not be heated to temperatures exceeding 500°C (932°F), since this may cause the ignitor to fault. It is therefore necessary to allow at least a minimum quantity of air (10-20% of full load) to flow if, with the ignitor flame shut off, this temperature could still be reached in a hot combustion chamber through either radiation or convection.

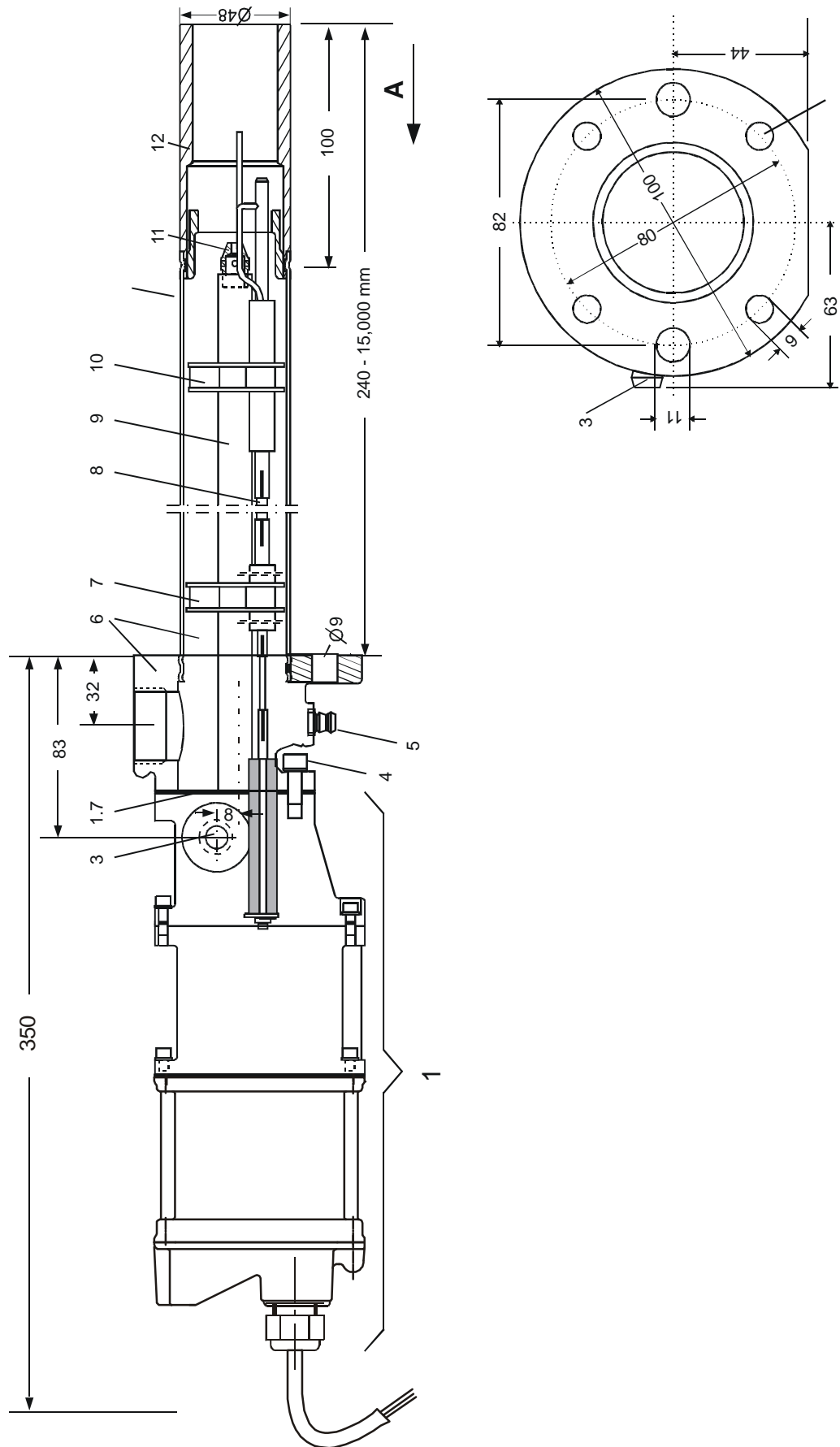
Caution: Do not leave the ignition voltage on during any of the safety time. An ignition-free period of approx. 0.5 seconds must be guaranteed, since the high voltage can suppress the ionisation signal.

5. Construction According to Sectional Drawing

(see also page 6)

The ignitor consist essentially of the transformer module (item 1), into which the ignition transformer and flame monitor are built, the ignitor tube with air/mounting flange (6), gas tube (9) and nozzle (11), as well as the electrode support ring (10). The ignitor tube, which includes the air connection, 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 ignitor.

The gas connection can be made from either the above or below. 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 ignition electrodes are lengthened with connecting rods (8). These rods are guided via two ceramic insulators through the floor of the transformer housing and are supported every 300 mm by intermediate support rings (7).



Ignitor Sectional Drawing

6. Parts List

Item.	Qty.	Description	Part Number	Voltages	Material	Remarks
1	1	Complete transformer and flame monitor module for ZXA...	ZX860K7 ZX860K7/00M ZX860K7/00C ZX860K7/00B	220/230V 110/115V 120/125V 240/250V	with housing and sealed in cable	Standard model Special model Special model Special model
	1	for ZXDA...	ZX860K8 ZX860K8/00M ZX860K8/00C ZX860K8/00B	220/230V 110/115V 120/125V 240/250V		Standard model Special model Special model Special model
1.7	1	Gasket	Z863F1		Frenzelite or similar	Asbestos-free
3	1	Gas pressure test nipple	Z138Z2 or Z138Z102		Brass Ms58 Stainless steel	Standard Special model
4	4	Allen screw	W826F108		Stainless steel	
5	1	Air pressure test nipple	Z138Z1 or Z138Z101		Brass Ms58 Stainless steel	Standard Special model
6	1	Ignitor tube, complete with mixing chamber, mounting flange and air inlet	Z1050Z_ _ _ or Z1056Z_ _ _	Tube length given should be the same as that in the part number for the ignitor	Steel Stainless steel	Standard model Special model Can be rotated in increments of 90°
7	*	Intermediate support ring with 2 ceramic insulators (Z545F11)	Z960K4 or Z960K104		St VII 23 Stainless steel	*Qty. required depends on tube length: 3 rings per meter
8	2	Connecting rods	Z675F_ _ _		Stainless steel	Ø 3.0 mm Please state type of ignitor in your order
9	1	Gas tube	Z521F_ _ or Z521F_ _ _E	Ø15 x 3	St 35,galvanized or stainless steel	Standard Special model Please state type of ignitor in your order
10	1	Electrode support ring with 2 ceramic insulators and 2 electrodes	Z960K13 or Z960K113		St VII 23 Stainless steel	Standard Special model Subject to wear and tear
11	1	Gas nozzle	Natural gas	Z330F4013	Stainless steel 1.4104	Standard
			Propane gas	Z330F2510	Stainless steel 1.4104	Standard
			Coke oven gas	Z985F1	Stainless steel 1.4104	Standard
12	-	Mixing chamber with mixing ring	Component part of item 6	Ø 48 mm 100 mm long	Stainless steel, heat-resistant, Mat.1.4841	Ignition proof to 1180°C (2156°F)

7. Accessories

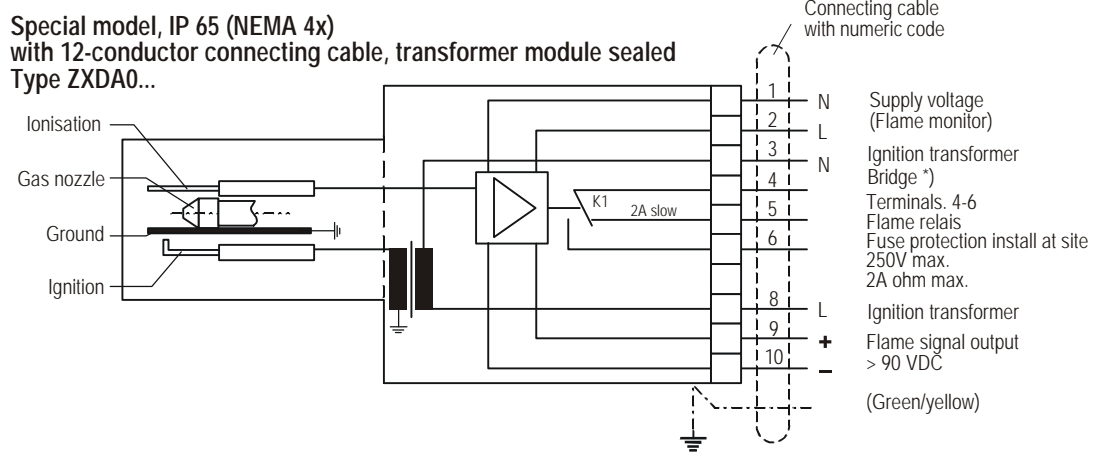
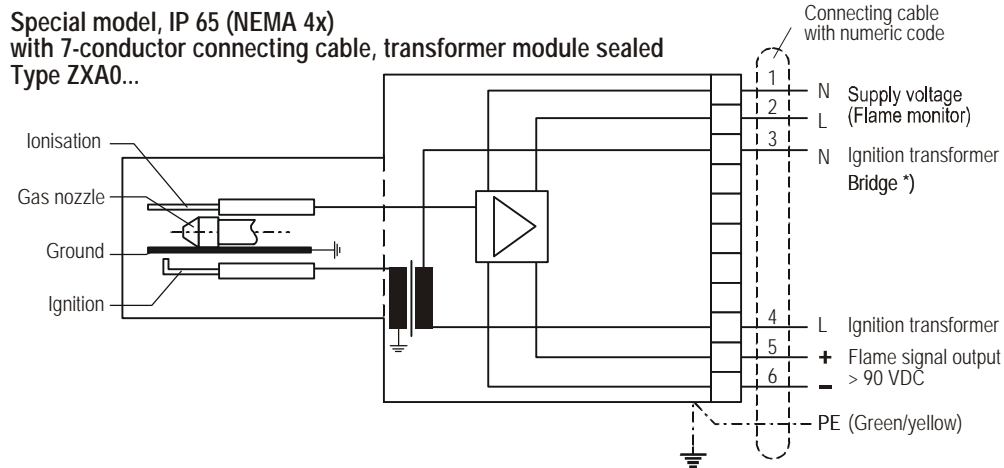
The ignitors can be connected to the following devices:

- AAUS 620 L20 Controller
for intermittent operation,
modular unit
230V 50/60 Hz IP 40
please also refer to the separate description 1.86Se of this product
- AASD 820 L20 Controller
for continuous operation,
modular unit
230V 50/60 Hz IP 40
please also refer to the separate description 1.86De of this product
- A240 K3/306 Controllers
for intermittent or continuous operation, safety time 3 seconds
(5 or 8 seconds also available)
European standard size PC board, 19" rack module
24V DC
please also refer to the separate description 1.93e of this product
- A285 K2.2 Flame Relay
with 2 volt-free relay contacts,
35 mm top hat mounting rail according to EN50022
For burner management systems that meet the applicable standards and requirements for safety-related integration of the ignitor.

It must be ensured the ignition voltage (terminal 8 on the ignitor) is shut off before the end of the ignition safety time, so that there is a brief segment of time without ignition. The high-voltage spark gap can suppress the ionisation signal to such an extent that the flame relay cannot close.

Please also refer to the separate description 1.76e of this product.

8. Electrical Connection



Power supply according to the name plate on the ignitor

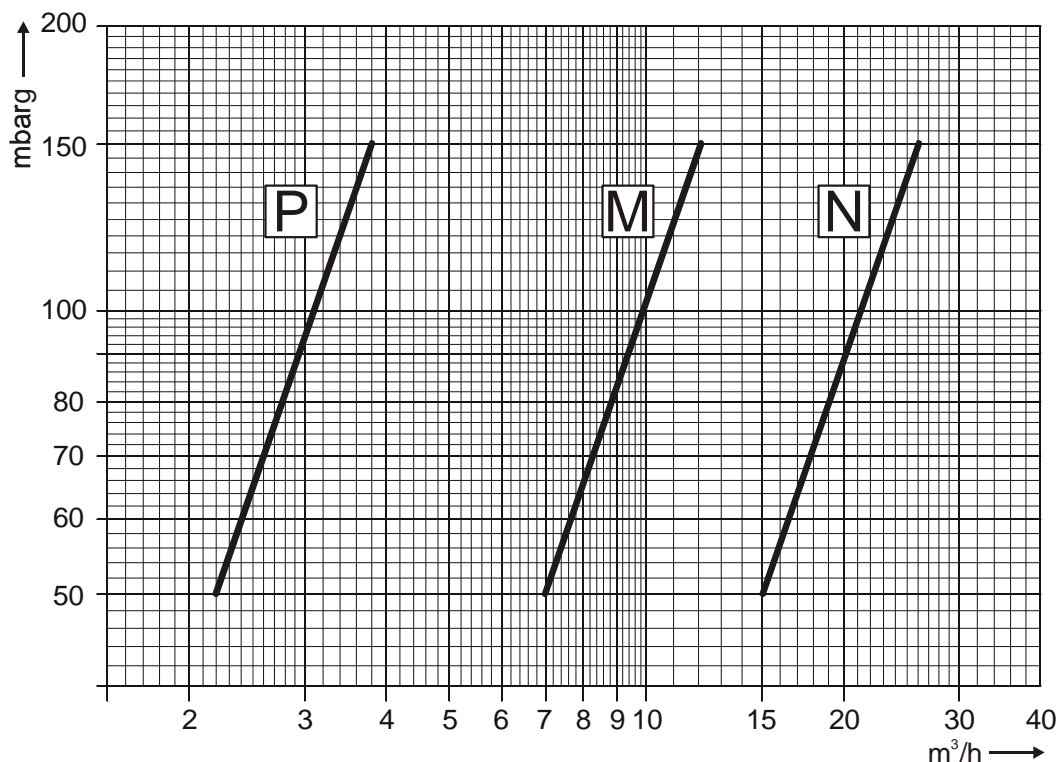
*) Bridge 1-3 if the transformer and flame monitor voltages have the same phases

9. Setting the Required Gas Flow

The ignitors operate in a pressure range of 50-150 mbar, which may be measured using the **gas pressure test nipple (item 3/ sectional drawing)**. 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 ignitor 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	Type of Gas	Nozzle Orifices (mm)	Flame Length (mm)
P	Propane gas	1 x 2.5 + 6 x 1.0	approx. 600
M	Natural gas	1 x 4.0 + 6 x 1.3	approx. 500
N	Coke oven gas	1 x 5.0 + 8 x 2.3	approx. 500

10. Setting the Required Air Flow

The required air flow or air pressure basically depends on the length of the ignitor 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 a ignitor with a tube length of 5 m must be set to 15 mbar + 4 x 10, for a total of 55 mbar.

The blower pressure has to be reduced by an air regulating sleeve to the actually required flow pressure stipulated by the ignitor's tube length. Any furnace backpressure have to be compensated. The flow pressure can be picked up at the **air pressure test nipple (item 5/ sectional drawing)**.

Varying back pressures 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 > 90VDC
3. Flame length approx. 500 mm at a maximum capacity of 120 kW (approx. 410,000 BTU/hr)

11. Maintenance and Alignment

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

If the ignitors 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 ignitor.

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

Performing Maintenance and Replacing Worn Parts

(please compare to the sectional drawing)

Ignitor 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 Part

The transformer module with the ionisation flame monitor is completely interchangeable. To do so, the outer tube must be detached, and the electrode support ring (item 10) and the two 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.

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

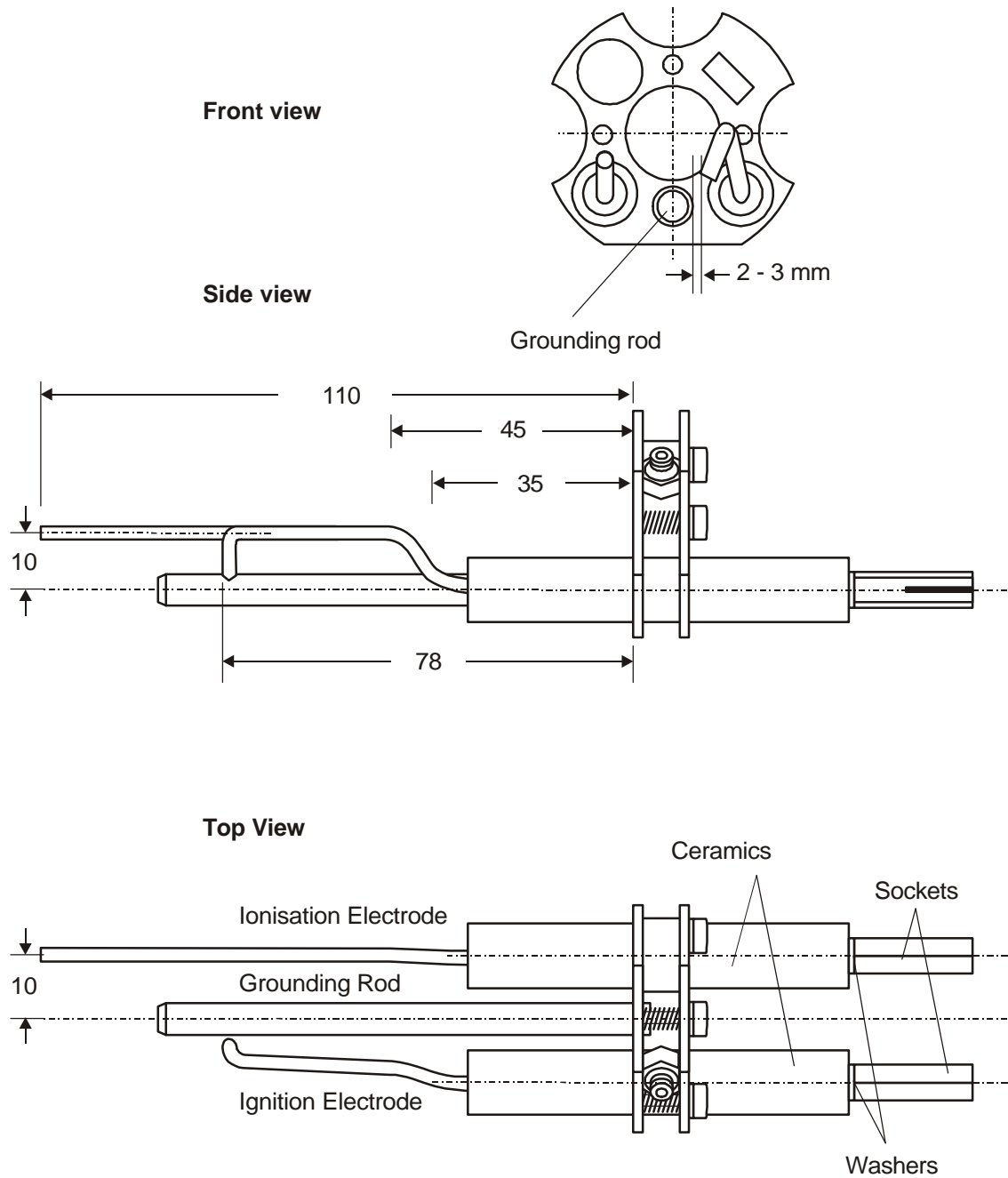
Remove the ignitor tube and loosen the locking screw on the support ring. The ring may then be removed from the gas tube. Slide in the new ring, insert the connecting rods into the sockets and tighten the locking screw. The electrode support ring is placed approx. 55 mm behind the gas nozzle. The alignment of the electrodes is described on page 12. The electrode support rings are normally delivered with the electrodes already bent.

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

Remove the ignitor tube and electrode support ring. 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 electrode support ring is 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.

Note

- ***Installation and maintenance procedures may only be carried out by authorized personnel***
- ***All local regulations 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!***



Alignment of the Z960K13 and Z960K113 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.

Caution: The gas valve must first be closed!

Ignition

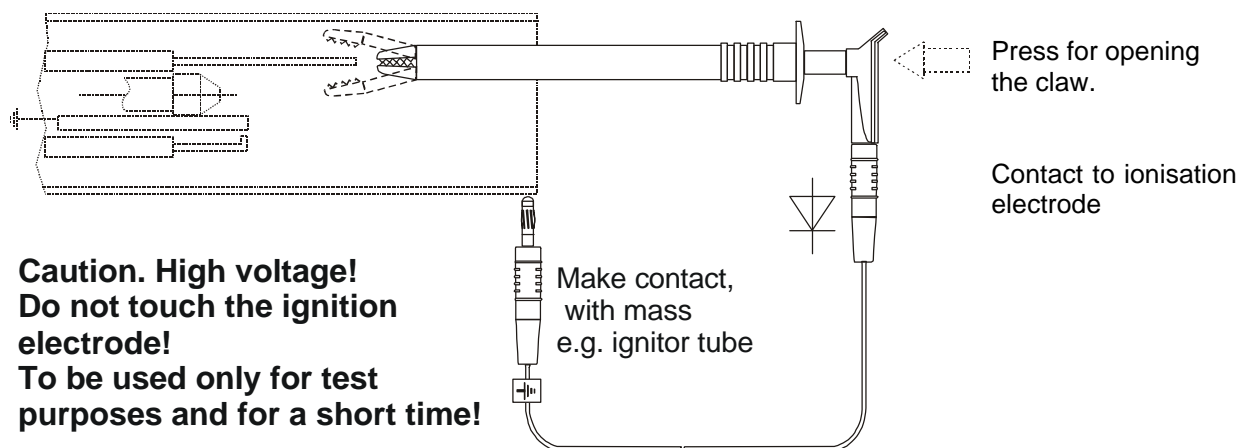
Create an electrical connection to the separate burner control and apply power. The spark gap between the ignition electrode and grounding rod must be visible.

If a spark cannot be seen, or if the device is arcing poorly, the following may be responsible:

- Internal ignition components are damp or dirty: loss of high voltage occurs via the ceramic insulators to ground.
- One or several of the ceramic insulators are broken. Spark discharge also is occurring to ground: remove the ignitor tube (see above), check the insulators and replace if necessary.
- If there is no spark what ever, check the wiring to the high voltage plug. If the wiring is in order, it may be necessary to replace the transformer module.

Ionisation

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!)

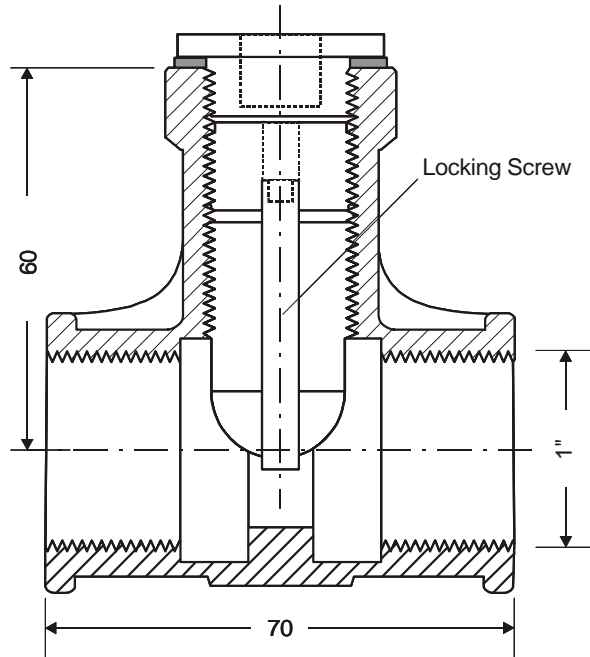


Once contact is made with the test diode at wire 5 and 6 on ZXA0.. and 9 and 10 on ZXDA0.. version the voltage of 90 V d.c. has to be reported.

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

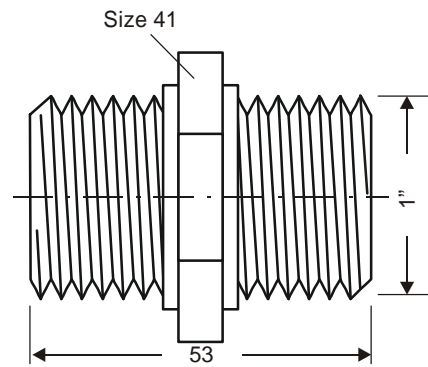
- Is the supply voltage present on terminals 1-2?
- Is the polarity of the test diode correct?
- Are the ceramic insulators damp, dirty or broken?
Remedy: If so, clean or replace. If necessary replace the flame monitor module (item 1).

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



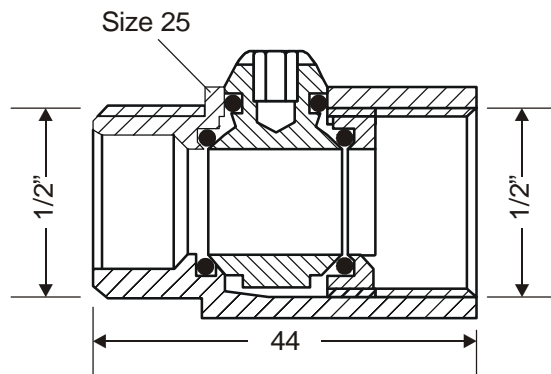
Z 945 Z 2/0FV Air Regulator

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 3/00V 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 Z3 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 Ignitor 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 Ignition electrode internals has been burnt away
Remedy: replace electrode, clean ignitor / burner internals and verify the correct spark gap.
- .2.2 Electrode distance to large or has a short circuit
Remedy: clean ignitor / 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 ignition electrode or ground rod / bolt.
Remedy: clean ignitor / burner internals, and remove layer with emery cloth.
- .2.5 Ceramic insulator is broken
(De-energize the ignitor/ 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/ Ignitor.
- .2.2 Fuel pipe inert with nitrogen.
Remedy: Start the ignitor/ 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 ignitor/ 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 ignition time has elapsed

Possible Causes:

- .1 No ionisation signal.
(Visual check with **fuel valves closed** and de-energized ignitor/ burner.)
- .2 Ignitor/ burner is wired to a Hegwein burner control:
Supply voltage is released simultaneously with operation voltage.
- .3 Ignitor/ burner is wired to burner control of another make:
Ignition spark suppress the ionisation signal.
- .4 Burner/Ignitor has been exposed to excessive temperature from combustion chamber during Burner/ Ignitor 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/ignitor 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 Ignition voltage must be shut off 0.5 seconds before ignition safety time has elapsed.
- .4.1 Leave blower air fully on or in cooling stage while the burner/ignitor 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 ignitor/ 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 back pressures 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 ignitor 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 ignitor position
- .2.2 Remedy: A more powerful burner/ ignitor may be requested.

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

Possible Causes:

- .1 Flame has not extinguished after the previous shut-down 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
- .2 ZXDA.. only : Burner/ Ignitor and burner control are in operation but the volt free contact does not work.

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

- .2.1 Check separate fuse (2AT).

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