Internationales Know-How in der Flammenüberwachung
International Know-How in Flame Detection

Operating Instructions

Burner Igniter

BZ –V 230/1 G2

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1. Description of the igniter

The burner igniter type BZ –V 230/1 G2 has been designed for the direct ignition of gas and oil burners, as required by practical considerations. It consists of a high-energy ignition module and the control logic for a traversing unit. The electronic assemblies are housed in an aluminum die-cast casing dimensioned 200 x 230 x 110 mm. All input and output signals for the individual components will be transmitted via plug-in connectors, with the high-voltage connection being kept separately. This will ensure that the on-site wiring efforts can be reduced to a minimum. The high-energy spark plug (= HS spark plug) with the plug extension (extendable towards the burner system as required) is connected with the power electronics thru a special high-voltage cable.

The pneumatic traversing unit for the ignition lance which has a stroke of 300 mm (a stroke extension is possible) pulls the high-energy spark plug out of the flame area after the successful ignition. This will ensure that the admissible maximum temperatures at the spark plug are not exceeded. The limit switches installed in the igniter will always signal the relevant cylinder position.
The modular and flexible design of the appliance will make it possible to adapt it to new or modified burner systems without any problems.

2. Operating principle

All input and output signals will be connected with the burner igniter via plug-in connectors that are protected against polarity reversal and marked by different colors (for the pin configurations please refer to the terminal diagrams). The operating voltage of 230 V AC / 50 Hz supplies the ignition module and the control valve for the traversing unit (another valve voltage is possible). The input voltage will be fused with an F 3 T 2.5 A fine-wire fuse (5 x 20) on the control module (additional printed circuit board).

The ignition module and the solenoid valve of the traversing unit will be activated via an internal relay. The relay control will be supplied by an external voltage of 24 V DC (current consumption 0.1 A) which is to be provided by the relevant boiler control (control system). The control voltage will be fused with an F 4 1.25 A fine-wire fuse (5 x 20) on the control module, for which the igniter’s maximum admissible ON period (2 min) needs to be observed.

The operating voltage supplied to the ignition module will be transformed to 1.6 kV, so that a capacitor can be charged. If the relevant voltage has been achieved, a spark gap inside the casing becomes conductive and the capacitor will be discharged thru the high-energy spark plug. This will generate a light arc with a high energy content. The electronic system has been dimensioned in such a way that a discharge frequency of approx. 30 Hz will be generated. The energy content of the firing sparks as well as the high ignition frequency will make it possible to ignite the fuel-air mixture in the burner without any problems.

An internal circuit will report and signal via a potential-free relay contact (changeover contact) and a light diode (which is installed in the cover lid) that the igniter works properly. This will make it possible to control an external monitoring relay, to name just one example. The igniter is protected against short-circuits and over-voltage. Should the unit be activated with the discharge circuit open or with the high-energy spark plug being defective, the voltage supplied from the mains will be switched off and blocked. A re-start is only possible with the line voltage being switched off. An ON period of ED 66 % can be ensured despite the high current generated during the ignition process.

The igniter will be deactivated by switching off the control voltage, and the traversing unit will return in its initial position (= home position).

3. Traversing unit

The traversing unit for the ignition lance consists of a double-action pneumatic cylinder without piston rod and with adjustable end-of-stroke damping. This type of linear drive allows a minimum mounting height and a (standard) stroke of 300 mm (see Fig. 5). The magnetic piston installed in the cylinder will ensure the contactless position detection.

There are 4 female threads each on the front sides of the cylinder heads for fixing the cylinder. The dimensions (standard) of the traversing unit can be taken from Fig. 6. The ignition lance will be attached to a driving angle. The traversing unit will be supplied in completely pre-assembled conditions, which means that the 5/2 directional valve and the two limit switches have already been installed on the cylinder. This entire assembly is installed on a mounting plate.

The mounting dimensions make it possible to install an NW 25 PN 16 flange (see Fig. 4). The combination apparatus with its filter, moisture trap, pressure control valve and manometer is pre-assembled and can be installed in the plant close to the cylinder, so that only the media supply lines still have to be connected.

4. Installation

The igniter shall be installed in a vertical position, if possible, by taking the local conditions into account and by observing the valid regulations. The mounting dimensions can be taken from Fig. 1. Make sure when determining the installation site that the admissible ambient temperatures are not exceeded.

The cables are linked through plug-in connectors which are identified by different colors. The configuration is detailed in the relevant terminal diagrams. All connections inside the plug-in connectors are screwable, so that no special tools will be required.

The operating voltage of 230 V AC / 50 Hz will be fed in via plug-in connector X 1 through a shielded cable (this connection can be supplied as pre-fabricated cable). The solenoid valve will be connected via plug-in connector X5, while the limit switches of the traversing unit will be connected via plug-in connectors X 6 and X 7. The signal to the control system will be transmitted thru plug-in connector X 8, the potential-free check-back signal „Ignition on“ (changeover contact) thru connector X 3. The direct voltage of 24 V required for controlling the igniter will be supplied thru connector socket X 4.

Only the original high-voltage ignition cable must be used for the connection with the ignition lance. In order to avoid losses, the shortest possible connection shall be selected for the cable when planning the plant layout. The high-voltage cable will be supplied with the relevant plug-in connector’s are pre-assembled (standard length 2 m). Please make sure when laying out the cables that they cannot get in touch with the hot parts of the burner or with the fuel supply (in the case of oil burners). Nor should the flexibility of the cables be restricted in any way, so that they get buckled or over-strained while being moved in or out. The ignition cable will be plugged in at the high-voltage output of the igniter and at the ignition lance and fastened finger-tight with the union nut (no tool to be used). The union nut of the ignition lance is located at the angle plug (please observe the direction of rotation).

The potential equalization line which is laid out along the ignition cable shall be connected between igniter casing and ignition lance. In order to do this, use the earth-terminal screw at the casing (marked with the grounding sign) and the grounding clamp at the ignition lance. The casing shall be integrated into the potential equalization system of the plant.

The pneumatic traversing unit will be completely supplied with all components and mounting elements belonging to it (see section 3 above). The dimensions can be taken from Fig. 5 and 6. If the entire assembly kit includes a flange, the pneumatic cylinder there will be pre-assembled and can be directly screwed onto the DN 25 PN 16 mating flange at the combustion side. All transport locking devices shall be removed before the installation. No welding work must be carried out at the plant, once the cylinder has been installed, because this may damage the sealing system. Should any welding work at the plant become necessary, the cylinder must be disassembled and electrically insulated.

The combination apparatus with the filter, moisture trap, pressure control valve and manometer shall be installed in such a way that the pressure hose coming with the delivery as a connection with the cylinder cannot get in touch with the hot parts of the burner or with the fuel supply (in the case of oil burners). The compressed air can now be connected at the existing hose connector, the cooling and purge air at the ½“ ball valve.

The ignition lance should be installed in a protective tube, which must not extend into the flame. Such kind of protective tube with a fitting mating flange for the ignition lance, the traversing unit and the cooling and purge air can also be supplied, if the technical details have been agreed (see Fig. 4). When installing the ignition lance, the union nut at the lance guide and the mounting clamp will be loosened, so that the lance can be carefully inserted.
The location for installing the high-voltage spark plug at the burner shall be carefully selected, so that it is as close as possible to the burner nozzle during the ignition process, since this is the place with the most favorable fuel-air mixture. After the precise position has been established in tests, the position can be adjusted with the help of the mounting clamp of the ignition lance at the traversing unit. The high-voltage spark plug must be removed from the hot area of the flame immediately after the ignition process.

5. Commissioning

Make sure before putting the high-voltage igniter into operation that the unit has been professionally assembled by observing all valid regulations (see section 4 above). Check very carefully that all components are in faultless conditions and, especially, that the correct connections of all input and output signals have been established. Operating the unit with defective high-voltage cables or plug-in connectors is not admissible. Check the proper seat of all clamping connections, of the high-voltage cables and of the potential equalization line. The spark plug must also be tightly fitted in the ignition lance. Care shall be taken that the cover lid of the igniter is always closed before activating the unit because of the high voltage generated inside.

When a complete ignition system with traversing unit and assembly kit is supplied, the parameters of the pneumatic cylinder will be pre-set, with the operating pressure at the pressure control of the combination apparatus being set at 4.5 bar. However, the plant pressure must be checked again and re-adjusted, if the need arises. In order to set the required pressure, pull up the setting knob and turn it clockwise until the pressure starts rising. If you wish to decrease the pressure, turn the setting knob in the opposite direction (i.e. anti-clockwise). The setting knob must then be pushed down again until it snaps into place, so as to avoid an unintentional re-adjustment.

Before putting the traversing unit into operation, check that the connections are in the proper place. Moreover, the traveling area of the ignition lance must not be obstructed by any obstacles. Also check that the mounting clamp of the ignition lance is tightly fitted on the movable drive. Move the piston by hand under pressureless conditions, so that it makes 2 strokes and check the adjustment of the limit switches while moving the piston. If the relevant switch is approached, an internal LED will light. After this, move the carriage into its center position. The trial run can now start. After the pressure has been re-applied, the piston will move into its upper end position. The traveling speed can be set with the help of the throttle check valves that are located next to the air inlet at the valve (they have been pre-set in the factory). While doing so, loosen the lock nut,
set the valve screw with a screwdriver and re-tighten it (a right turn will increase, a left turn decrease the speed). The end-of-stroke damping will be set with the relevant valve needles next to the air inlet at the cylinder.

6. Faults & breakdowns

Fault	Possible cause	Remedy
No firing spark	power plug not plugged in	check power plug
Equipment indicator lamp off	system voltage broken down	change fuse
No activation thru the line-side	check the control electronics	control system
No firing spark	HS cable not connected	check cable connection at the igniter and at the ignition lance
Equipment indicator lamp	spark plug defective	replace spark plug
Lights briefly	spark gap defective	repair spark gap (see chapter repairs)
No checkback signal	receptacle at the igniter not connected	plug in receptacle
	incorrect connection	check cable connection
Ignition lance moves out again switch	limit switch „moved in“ not approached or overrun	check function of the limit switches and re-adjust
Signal generator cylinder	signal generator shifted	re-adjust signal generator
Does not work properly	signal generator defective	replace signal generator
	ferritic parts too close to the	remove these parts or signal generator replace them by non-magnetic material
Cylinder moves too hard into both end positions	incorrect setting of the end-of-stroke damping	correct setting with valve needle
Piston end positioning	valve needle fully screwed in	re-set valve needle positions

7. Repairs

Attention!

Wear parts must only be exchanged by suitably qualified personnel. Only original parts must be used. Disconnect the unit or the ignition lance from the operating voltage before doing any repair work (unplug power plug X 1). The igniting voltage may be retained at the HS capacitor and at the spark gaps for approx. 20 sec, even after the igniter has been disconnected from the power.

7.1. Replacing the high-energy spark plug

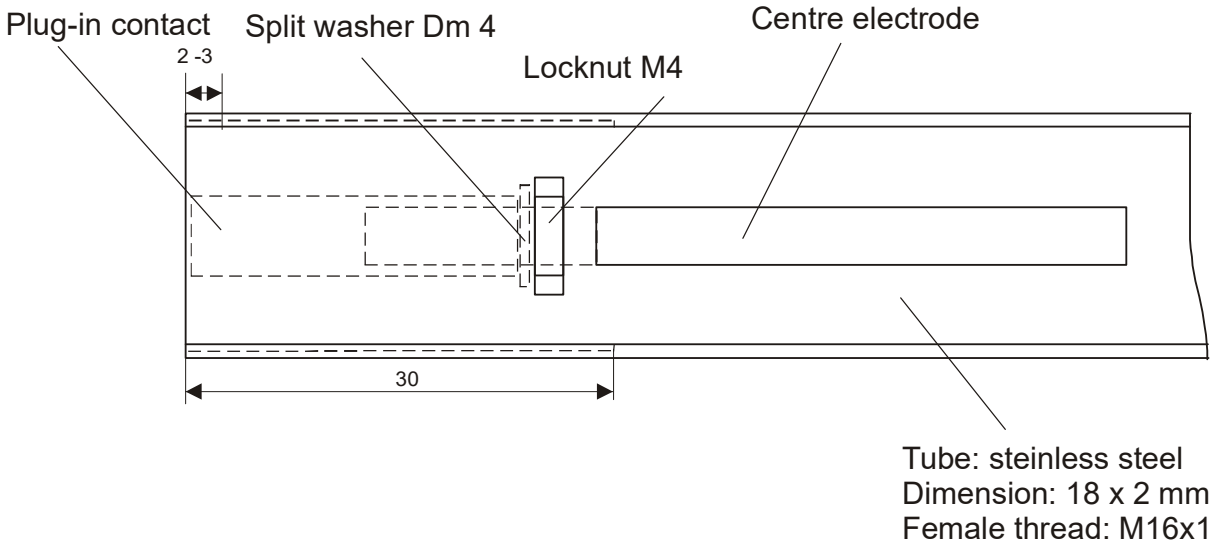
- Disconnect the high-voltage cable and the potential equalization line from the ignition lance.
- Close the ball valve of the cooling and purge air inlet.
- Mark the mounting position of the ignition lance at the driving angle.
- Remove the ignition lance from the mounting device of traversing unit.
- Pull the ignition lance out of the protective tube (beware of high temperatures!).
- Unscrew the worn-out high-energy spark plug.
- Remove the protective hose from the replacement plug. High-temperature paste has been applied to the thread (which prevents the spark plug from sticking).
- Fit the new spark plug into the ignition lance and fasten it finger-tight.
- The re-assembly will be done in reverse order.
- Re-connect all unplugged cable connections.

7.2 Replacing the spark plug connector

- Disassemble the ignition lance as described in section 7.1 above.
- Unscrew the high-energy spark plug.
- Loosen the locking screw for the high-voltage angle plug, for which purpose loosens the M3 lock nut and remove the hexagon socket head cap screw.
- Turn out the angle plug.
- The center electrode can gently be pulled out of the tube.
- Check the plug-in contact. If it is defective or shows traces of contact erosion, unscrew and replace it.

- In order to do so, loosen the M4 lock nut that locks the plug-in contact (this will prevent the spark plug from being shifted around when being screwed in).
- Screw in a new plug-in contact and lock it with the M4 lock nut.
- Check the spacing of the ceramic insulators on the center electrode.
- Plug the angle plug for the high-voltage connection onto the center electrode.
- Insert the center electrode gently into the tube and screw the connector in.
- The spacing between the plug-in connector and the end of the tube should be approx. 2 mm. It can be set and adjusted by turning the plug-in connector on the center electrode in or out. The position will then have to be fixed with the help of the lock nut. In order to do so, the center electrode will have to be pulled out of the lance tube once again.
- Screw in and lock the hexagon socket head cap screw.
- Screw in the spark plug.
- Re-install the ignition lance in reverse order.
- Re-connect the high-voltage cable and the potential equalization line.
- Plug in the power plug.

Fig. 7



7.3 Replacing the spark gap

Caution: High voltage!

The spark gap can only be replaced in pairs. Disconnect the unit from the operating voltage before attempting any work on it (unplug power plug X 1). The unit generates a voltage of approx. 1 600 V for the ignition process. This voltage may be retained at the high-voltage capacitor and at the spark gaps for approx. 20 sec, even after the igniter has been disconnected from the power.

The heat sink (E1) that connects the two spark gaps is located next to the high-voltage capacitor (C1) and will become visible, after the casing has been opened (see Fig. 2). The heat sink can be removed, after both M5 nuts have been loosened with a socket wrench. Turn out both spark gaps. Please take care when fitting in the new spark gaps that they are screwed in finger-tight (i.e. without using any tools). The heat sink can be re-assembled and fixed with the M5 nuts and tooth lock washers. Close the cover lid of the casing and re-connect the operating voltage.

8. Maintenance

The robust design of the igniter does not require any maintenance. Should deposits settle on the spark plug due to the plant's specific conditions, they can be removed with a cloth or a brush (**but do not use metal brushes, in order to avoid short circuits**). A schedule fixing a regular cleaning cycle may be set up for this purpose (but beware of the spark plug temperatures). The cylinder of the pneumatic traversing unit may have to be disassembled and cleaned after approx. 8 000 operating kilometers, if the need arises, and the wear parts have to be exchanged. The necessary maintenance instructions will be supplied together with the wear part kit.

9. Spare parts

The high-energy spark plug and the spark gaps are wear parts and will not come under the warranty conditions. The service life of these parts depends on the number of ignitions.

9.1 Spare part list

High-energy spark plug:	Type HK 20/40	Part No. Z 100.3
Spark gap:	Type V 800 XN	Part No. Z 106.3
High-voltage cable:	Type K 01	Part No. Z 103
Cylinder wear part kit:	Type 11133	Part No. Z 110.8

10. Technical data of the igniter

Power supply:	230 V AC / 50 Hz
Control voltage:	24 V DC from the control system
Current consumption:	0.7 A
Igniting voltage:	1 600 V
Ignition frequency:	25 Hz … 30 Hz
Maximum continuous ignition:	2 min (ED 66%)
Check-back contact:	potential-free, switching current/voltage 1.25 A/250 VAC minimum switching load 10 mW (0.1 V/1.0 mA)
Degree of protection:	IP 65
Casing:	aluminum-die-cast casing, RAL color 7001 (gray)
Dimensions:	(w x h x d) 200 x 230 x 110 mm
Mounting dimensions:	180 x 255 mm (w x h)
Ambient temperature:	-15 … +60° C
Spark plug temperature:	600° C; (800° C for a short time)
Spark plug service life:	10^6 firing sparks (approx. 12 ignition hrs with 25 sparks/s)
Ignition lance diameter:	18 mm
Ignition lance length:	supplied in accordance with specific plant
Requirements	
ignition lance connection:	2-m high-voltage cable (other lengths on request)
EMC basic standard in the interference industrial sector:	satisfies the requirements of EN 61000-6-2 (emitted 08/02) and of EN 61000-6-4 (noise immunity 08/02) CE mark awarded

11. Technical data of the traversing unit

Operating voltage of the valve:	230 V / 50 Hz or 24 V DC
Mounting:	see Fig. 6
Ambient and media temperature:	-10° C … +80° C
Installation position:	any
Medium:	filtered, un-oiled compressed air (others on request)
Lubrication:	for-life lubrication (grease) thru the factory (additional oil spraying not required)
Operating pressure range:	P_{max} 8 bar

12. Limit switches

Magnetic proximity switches for signaling the relevant end position approached

- make contact element for the connecting voltage of 10 - 240 VAC/DC (U_{max} see label)
- current carrying capacity 0.5 A
- direct current (DC): brown +, blue –
- setting for the hollow hexagon wrench: 1.5 (max.) 0.25 Nm

13. Combined filter/control apparatus

- completely pre-assembled with manometer and mounting bracket
- operating pressure range of the input: 0 – 16 bar
- operating pressure range of the output: 0.5 – 8 bar
- G1/8 connection or pressure tube Ø 6 mm
- air inlet ducts to be cleaned before putting unit into operation
- install the unit with the mounting bracket
- plug in the lines and observe the direction of flow (arrows on top of the unit)
- pull up the setting knob and turn it clockwise (see arrow on the setting knob)
- open the compressed-air inlet and turn the setting knob clockwise until the required pressure is reached (pre-set at 4.5 bar)

lock the setting knob

14. Assembly kit (optional)

In order to complete the traversing unit, an assembly kit can be supplied. It consists of:

- a flange for attaching the traversing unit that can also be used for mounting purposes on the combustion plant,
- a connecting socket for the cooling and purge air,
- a ball valve installed there.

Technical data:

Flange:	DIN 2527/B, NW 25, PN 16
Material:	stainless steel
Cooling air connection:	½“

15. Delivery conditions

Deliveries will basically be made on the basis of our General Terms and Conditions.

Please note

The spark gap and the high-energy spark plug are wear parts and thus exempted from the warranty, since their service life depends on the number of ignitions and the conditions of use.

16. Warranty

From the day of delivery we accept the warranty for a period of 24 months to eliminate possibly errors or defects may cause an exchange. Requirement is, that an error can be attributed to defects in components or manufacture.
The warranty is void if procedures are performed by the user or by third parties that is not expressly authorized in writing by us.

Repairs will be done exclusively in our own repair shop. We do not accept repair bills from others. The delivery of faulty equipment at d.s.f. GmbH must be freight free.

17. Liability

We are not liable for consequential damages of any nature, which may arise in combination with any of our products. For any claims resulting from the failure to comply with this instruction manual, d.s.f. GmbH will also not be liable in any way.

Fig. 1 – Casing dimensions

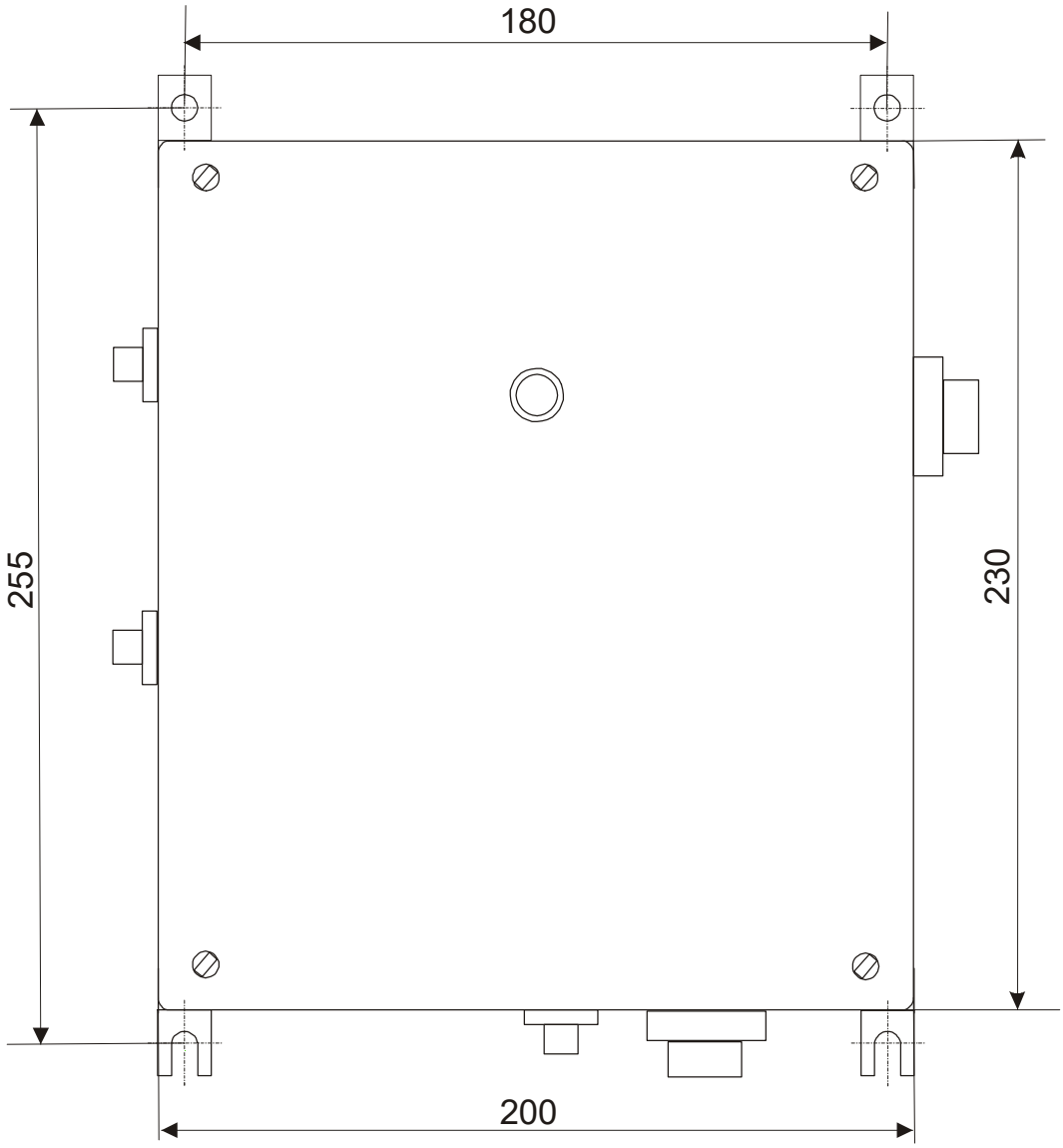
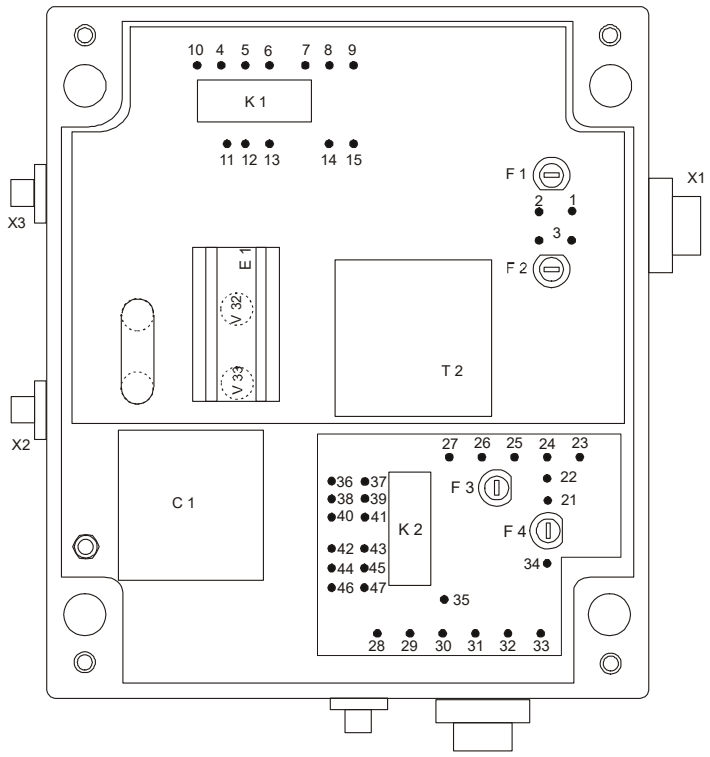
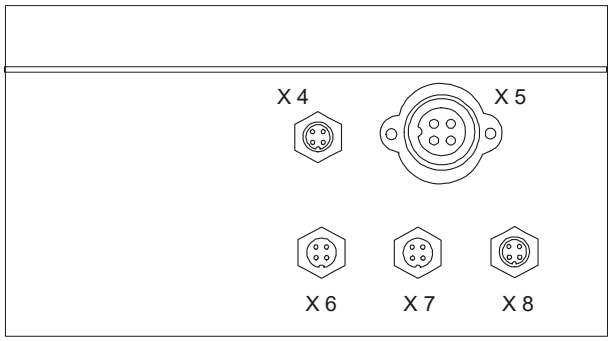


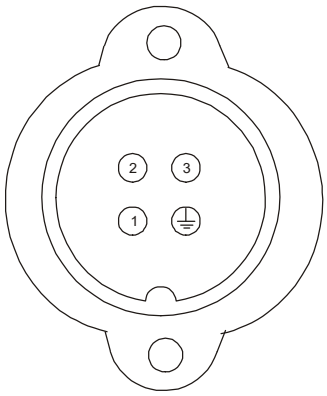
Fig. 2 – Unit design & configuration





21	operating voltage L1
22	operating voltage N
23	protective conductor
4	LED connection, tin-coated
8	LED connection, anode
C1	capacitor
E1	Heat sink
F1	fast 1,0 A fuse
F2	fast 3,15 A fuse
F3	fast 2,5 A fuse
F4	fast 1,25 A fuse
K1	Relay
K2	Control relay
V32	Spark gap
V33	Spark gap
X1	Power plug
X2	High-voltage connection
X3	connector socket for check-back
X4	Connector socket for control voltage “Ignition on”
X5	female unit socket for valve connection
X6	female unit socket for end position moved out
X7	female unit socket for end position moved in
X8	connector socket for check-back limit switches end position

Fig. 3 – Wiring diagrams

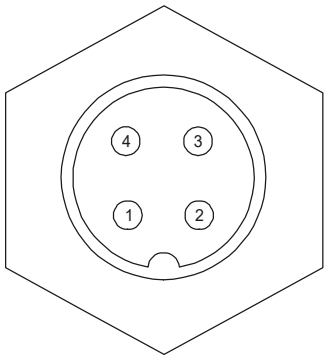


Connector socket X 1

1 - conductor L
2 - neutral
3 - screen
⏚ - protective conductor

max. cross section: 1,5 mm²

Fig. 3.1 – Checkback signal „Ignition on“

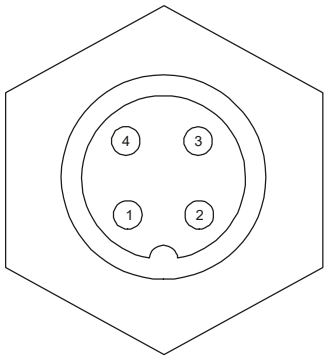


Connector socket X 3

1 - foot contact
2 - opening contact
3 - closing contact
4 - free

max. cross section: 0,75 mm²

Fig. 3.2 – Control „Ignition on“



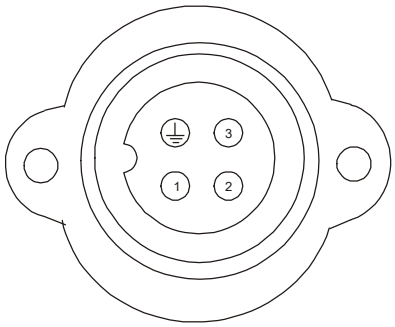
Connector socket X 4
color coding: green

1 + 4 - free

2 + 3 - control voltage
24 V/DC

max. cross. section: 075 mm²

Fig. 3.3 – Solenoid valve connection

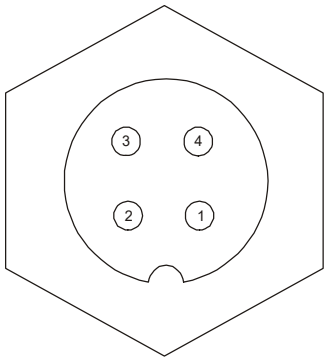


Female unit socket X 5

1 - conductor L
2 - neutral
3 - free
⏚ - protective conductor

max. cross section 1,5 mm²

Fig. 3.4 – Limit switch „Cylinder moved out“



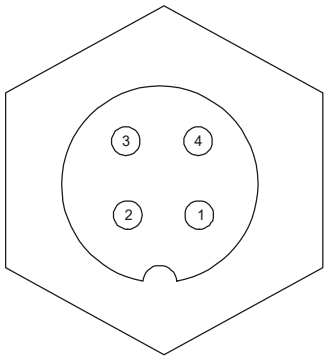
Female unit socket X 6
color coding: blue

1 + 2 - closing contact
“cylinder moved out”

3 + 4 - free

max. cross section: 0,75 mm²

Fig. 3.5 – Limit switch „Cylinder moved in“



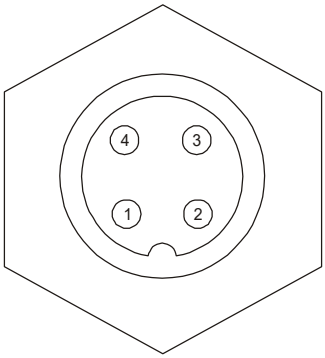
Female unit socket X 7
color coding: yellow

1 + 2 - free

3 + 4 - closing contact
“cylinder moved in”

max. cross section: 0,75 mm²

Fig. 3.6 – Cylinder position message



Connector socket X 8
Color coding: red

1 + 2 - closing contact
"cylinder moved out"

3 + 4 - closing contact
"cylinder moved in"

Max. cross section: 0,75 mm²

Fig. 4 – Overview over the traversing unit

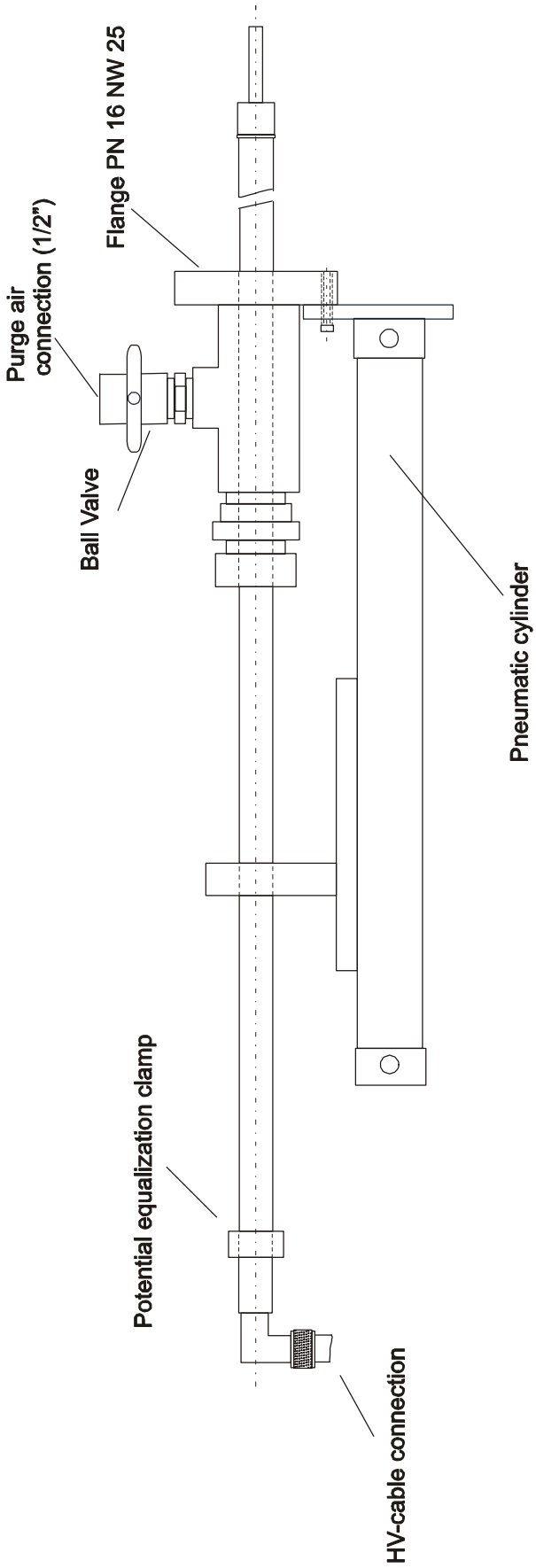
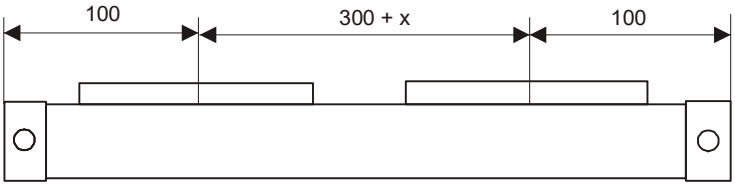
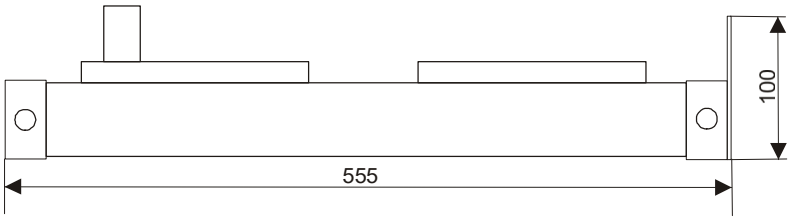


Fig. 5 – Cylinder dimensions



X = stroke can be extended to up to 6 000 mm

Fig. 6 – Traversing unit dimensions



Subject to changes and modifications in the sense of the technical progress without prior notice (Status: Oct. 2016).

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