

OPERATING MANUAL
ThermoGrip® Induction unit
ISG 2200 – 208V



Bilz Werkzeugfabrik GmbH & Co. KG • Vogelsangstrasse 8 • 73760 Ostfildern
Phone ++49/711/34801-0 • Fax ++49/711/3481256

Guide to this operating manual

Foreword

This operating manual is part of the technical documentation for the ThermoGrip® Induction unit ISG2200 made by BILZ Werkzeugfabrik GmbH & Co. KG

The operating manual contains all information necessary for proper use of the unit. The contents correspond to the design status of the ISG2200 at the point in time of compiling this manual. Subject to changes in design and technical data on account of on-going further developments and customised rating.

No claims may be deduced from the contents of this manual (data, diagrams, drawings, descriptions, etc.) Subject to errors!

The operation manual intends to make it easier for you to get to know your ThermoGrip® induction unit ISG2200 and to use it properly and safely for its intended purpose.

Please inform us if you should find any printing errors, incomprehensible information or incorrect information on reading through this operating manual.

Structure

The operating manual contains important instructions for operating ISG 2200 safely, properly and economically, for avoiding dangers, reducing repair costs and standstill periods, and for increasing the reliability and service life of the induction unit.

The manual consists of 8 chapters and an appendix containing further information.

The headline shows the current chapter.

The foot line shows the date of compilation on the left, the name of the unit in the middle and the page number on the right.

Symbols and pictograms

Warnings are marked by warning triangles with a hazard symbol, and warn of dangers resulting in personal injury or damage to property.



General warning



Hazard posed by electric current or voltage

Commands are marked by circles with hazard symbol or squares with instructions, and prescribe an activity or the use of certain items or objects.



Wear goggles



Wear safety gloves

Notes are marked by the information pictogram and contain recommendations or other additional information.

Example:



Detailed instructions for the chemical test method are available from your supplier.

Lists are marked by the symbol

Example:

- Can be used for high speeds
- Highest clamping forces
- Slim body chuck

Activities are marked by the symbol and provide instructions for the stated activity. The result of the activity can be stated as explanation.

Example:

- Change coil
- Set shrinking time
- Remove tool

Contents

<i>Guide to this operating manual</i>	2
Foreword.....	2
Structure	2
Symbols and pictograms.....	3
<i>Contents</i>	4
<i>1. Unit overview</i>	6
<i>2. General information about ThermoGrip®</i>	7
<i>3. General safety instructions</i>	8
3.1 Choice of the erection site.....	8
3.2 Hazards from electric components	9
3.3 Hazards from hot parts	9
3.3.1 Protecting the shrink chuck from overheating.....	10
3.4 Hazards from electromagnetic radiation	10
3.5 Special hazards.....	10
<i>4. Initial commissioning ISG2200</i>	11
4.1 Assembly	11
4.2 Initial commissioning.....	11
<i>5. Control buttons of the ISG2200</i>	11
5.1 Keys and light emitting diodes	11
5.2 LED display	12
5.3 Configuration of the ISG2200.....	12
5.3.1 Setting of the fan running time	12
<i>6. Shrinking</i>	13
6.1 Basis information on Shrinking	13
6.2 Procedures involved in shrinking in, shrinking out or changing a tool	13
6.2.1 Shrinking in	14
6.2.2 Shrinking out	14
6.2.3 Tool change	15
6.3 Shrink-fitting operating modes.....	15
6.3.1 Shrinking of standard ThermoGrip® chucks : automatic mode	15
6.3.2 Shrinking of other chucks : manual mode	16
<i>7. Cleaning and maintenance</i>	17
<i>8. Service</i>	17

<i>Appendix</i>	18
A 1. Troubleshooting	18
A 2. Selection table for coil plates	18
A 4. Scope of supply	19
A 4.1 Possible additions and optional accessories	19
A 5. EC STATEMENT OF CONFORMITY	20
A 6. Instructions 5 Finger-Safety Glove	21

1. Unit overview



Picture 1: ThermoGrip® induction unit ISG2200

Picture 2: control panel and display



2. General information about ThermoGrip®

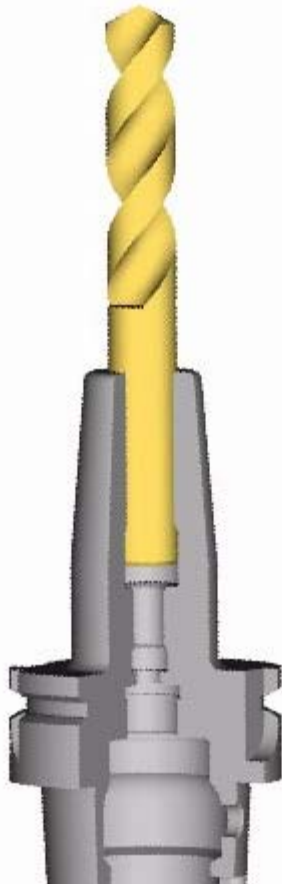


Bild 3: Shrunk-in tool

Shrinking is known as a technique for joining non-detachable connections, but also offers remarkable advantages for the reversible chucking of tools. By the **inductive heating with high energy density**, tools can be changed in a matter of seconds.

A heated cylindrical tool is pushed into a heated and expanded bore of the chuck; after the chuck has cooled down again a high radial clamping force is applied. When handled properly, the clamping operation is reversible and can be repeated as often as required. The possible clamping forces are higher than when using conventional clamping techniques.

With the help of special coils, the clamping area of the chuck is heated.

A screen surrounding the coil prevents magnetic flux to a great extent. The control components and the high frequency generator are integrated in the housing. The coil is moved down manually by the user and goes automatically upwards after the shrinking time. You only need one coil for all clamping diameters. All cables to the movable coil are guided and protected.

The energy acts briefly and partially on the clamping area. This means that little energy is stored in the clamping chuck and the cooling-down time is reduced accordingly. In order to reduce the cooling-down time even further, **cooling adaptors** are used, which work by being in contact with the hot clamping diameter of the chuck, transferring the heat quickly into the

adaptors. One fan is used to cool the chuck holder while it is heated. On starting the generator also the fan is automatically started and switches off after the pre-selected time (1-10 minutes).

Advantages of ThermoGrip® clamping technology at one glance:

- Quick shrinking in and out
- High clamping forces
- Higher tool and spindle life thanks to good true running ($< 3 \mu\text{m}$)
- Good surface finish due to high rigidity of the tool clamping system
- High flexural yield strength and radial crushing strength also with long body lengths
- Slim body of the chucks for high speeds
- Only local but yet homogeneous heating of the chuck
- Rapid cooling down of the tool and chuck
- Specific heat-resistant steel gives the chucks a high tool life and makes them dimensionally stable

3. General safety instructions

A new technique has been introduced for ThermoGrip® which makes tool change with the matching ThermoGrip® shrinking chuck practical, efficient and energy saving. The ThermoGrip® induction generator has been designed to state-of-the-art engineering at the point in time of delivery, and is safe to operate. Nevertheless, the unit can pose a hazard, if it is not used by trained or at least instructed staff and/or not used for its proper purpose. Please therefore comply with the following instructions:



Read the operating manual carefully before initial commissioning and operation of the unit, and become well acquainted with the control elements!



The operating manual is an integral part of the ThermoGrip® induction generator and must be easily accessible, legible and understandable for all persons working with the unit.



The unit may only be operated by trained, instructed staff!



The unit may only be used for its proper purpose and in correctly functioning state!

The ThermoGrip® induction generator is specially rated and designed for tool change with ThermoGrip® shrink chucks (frequency selection, heating time, etc.). When other shrink chuck shapes and designs are shrunk in or out, problems can occur including lasting damage to the chucks or to the induction unit itself.



Use only ThermoGrip® shrink chucks! No guarantee can be assumed for any other chucks!

The manufacturer can no longer guarantee safe operation of the unit after unauthorised modifications or interventions in the unit. The risk of endangering life and limb of the operator or third parties, and the risk of damage to the ThermoGrip® induction generator and other items of property is borne by the user alone!

3.1 Choice of the erection site

ISG 2200 is designed as a bench-top unit and should be erected safely and free of vibrations at a dry workplace which is as free as possible from dust and dirt.



Erect the unit free of vibrations; protect from contamination and moisture!

Avoid direct sunlight for better visibility of the LCD display.

3.2 Hazards from electric components

The unit contains live components with dangerous voltages. Please observe the following points for your own safety:



Opening the machine is only allowed by Bilz – service staff!



Do not allow metal chips and liquids to penetrate into the unit!



Keep the unit clean and clean it regularly!



Only suitable tools and chucks should be shrunk!



Do not introduce any items through the ventilation grids!

3.3 Hazards from hot parts

The very effective form of heating heats only the relevant marginal zones of the ThermoGrip[®] chuck with very little heat soak. The **surface of the chuck can heat up to approx. 400°C (750°F)**. The cooling adaptors can also get hot, but the coil and tools do not heat up during proper operation, or only to a negligible extent.



Caution! Risk of injury from burning on the hot parts!

For your own safety, comply with the following safety measures when working with the unit:



Ensure that hot parts cannot be touched by mistake!



Never leave hot shrink chucks standing open but cover them immediately with the cooling adaptors and place them in their holders on the cooling positions!



Do not place hot tools on flammable surfaces, but only on heat-resistant surfaces!



When shrinking tools in and out, always wear the supplied gloves as protection from burning and cut injuries!



Apart from the chuck and tool, do not introduce metallic objects into the inner area of the coils, as otherwise these will heat up too!



During operation, never reach into the heating area of the coils, as rings, chains, or other jewellery can heat up very quickly!



Wear goggles when shrinking!

3.3.1 Protecting the shrink chuck from overheating

The chuck and tool can overheat as a result of incorrectly entered shrink parameters and repeated heating up of a shrink chuck in a short period of time. This is why the shrink parameters must be entered with particular care (at a lower setting if in doubt). Repeated heating up of the (chuck) tools must be avoided (particularly when the shrinking procedure has failed).



Avoid overheating of the shrink chuck from excess shrinking energy and extremely long shrinking times!

No flammable substances should be kept in the vicinity of the unit because of the conceivable risk of overheating of the unit and (chuck) tools.



Do not keep flammable substances in the vicinity of the unit!



Do not use flammable cleaning agents!

3.4 Hazards from electromagnetic radiation

When the unit is used properly, there is no magnetic radiation to the immediate surroundings. The radiation safety of the unit has been tested and verified by CE/FSS-part 18 test. If the induction heating is started up without a shrink chuck being located in the coil, the magnetic field affects the immediate vicinity of the coil.

For your own safety, please comply with the following rules:



Do not introduce any units susceptible to interference into the vicinity of the unit!



If you have a cardiac pacemaker, please consult the manufacturer or your doctor. In rare cases, interference is possible!

3.5 Special hazards

Ensure that no parts of your body or items are brought into the movement zone of the coil during operation of the induction unit. The weight of the coil could cause crushing and cuts in combination with tool cutting edges.



Caution in the moving zone of the coil: risk of crushing and cuts!

Please also observe the extra safety instructions in the appendix for any unit options and supplementary equipment.

4. Initial commissioning ISG2200

4.1 Assembly

Caution:

Ensure that the unit is not damaged during the unpacking process. Tilt the unit, so that it stands on its feet and pull it out of the carton at the housing. Only carry the unit at the housing and not at the coil or the guide unit.

4.2 Initial commissioning

- Adjust feet and take care of safe position
- Do not cover the ventilation slits at the back side or the bottom surface of the unit
- Remove the transport locks from the coil
- Move the coil downwards or upwards with the handle (check mobility)
- connect a plug to the power cord and plug it into a 208V outlet
- switch on the main switch
- After switching on, the control panel shows the serial no. of the unit for 5 seconds. After this, the generator version number is displayed for 4 seconds. When the version numbers are displayed , the decimal point between the two parts of the display will light up. The unit is now ready for operation .

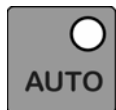
5. Control buttons of the ISG2200

5.1 Keys and light emitting diodes

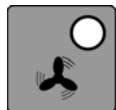
All work and adjustment procedures are triggered by means of 5 foil buttons on the control panel. The buttons can be used for the following procedures:



To start shrinking (start of the generator) or to stop shrinking (stop of the generator);
To unlock coil clamping (Position)



To switch between automatic- (LED on) and manual (LED off) mode.



To switch the fan on and off



To increase the shrinking time (automatic mode only).




To decrease the shrinking time (automatic mode only).

5.2 LED display

- Automatic-mode:
When the unit is not in Operation, the selected shrinking time is displayed in seconds. On starting the shrinking operation, the display changes to show the remaining operation time of the generator in seconds, counting down.
- Manual mode:
The complete shrinking time is always displayed, counting up.
- Error:
In case of error , an error number will be displayed (see Annex A1).

5.3 Configuration of the ISG2200


When the unit is switched on , the fan running time can be set . The fan starts every time the unit is operated and the running time can be set between 1 and 10 minutes .

The fan can be switched off following the heating phase by means of the  key.




5.3.1 Setting of the fan running time

- Switch off ISG2200

➤  Push

- Switch on ISG2200 while pressing 

- Release 

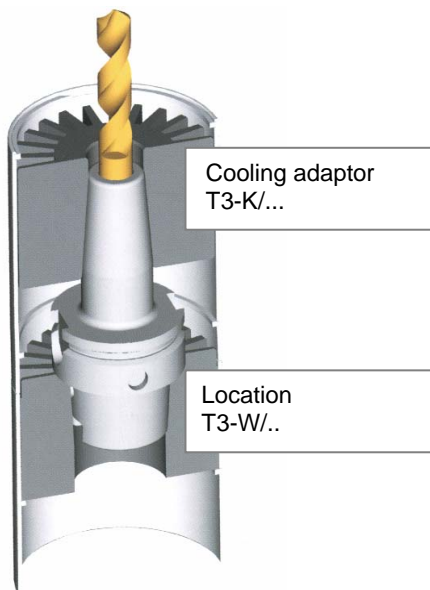
The running time from 1 to 10 minutes can now be set using the  - und  - keys . After setting the required running time, the ISG2200 can be returned to normal mode by means of the 

6. Shrinking

Please note that with the ISG 2200 you can only shrink carbide tools with diameter 6 – 20mm due to the lower generator performance, contrary to the ISG 3200. First of all some basic information and advice for the shrinking of tools.

6.1 Basis information on Shrinking

ThermoGrip® clamping chucks can be used for temperatures of max. 450°C, without any changes in material or concentricity. The change in colour of the chuck at its front area results from oxidation and does not influence quality or performance of ThermoGrip® clamping chucks. Despite the high temperature resistance compared to standard clamping chuck materials, the expansion is only in the range of few one-hundredth mm. Therefore use only tools with grinded shanks of the tolerance h6. The shrinking of tools with a shank tolerance h7 cannot be guaranteed!



Ensure that the used tool shafts have no bumps or warps in the chucking zone.

On account of the necessary shrinking temperatures, only move the chuck in the matching tool holders until it has cooled down, and wear additional safety gloves. Pay attention to the safe, straight position of the chuck in the tool holder. Cover the chuck with the matching cooling adaptor as soon as possible after shrinking. The longer you wait before fitting the cooling adaptor, the more heat is transferred to the holding zone in the chuck (e.g. HSK, SK ...) and thus to the tool. When positioning the cooling adaptor, ensure that you do not damage the cutting edge.

Although it is theoretically also possible to shrink tools with shafts to DIN 6535 Form HB and HE or similar forms with not closed cylinder geometry, you should give preference to cylindrical shafts such as e.g. DIN 6535 Form HA, as these allow the highest holding forces and smallest imbalances.

In order to obtain the best chucking forces, only put clean, grease-free shafts in the chuck. Ensure that no cutting edges are in the chucking zone when selecting the shrink-in depth.

6.2 Procedures involved in shrinking in, shrinking out or changing a tool

For your own safety, when working with ISG2200 obey the following rules:



Always observe the safety instructions for all shrinking procedures!



Use safety gloves!



Wear goggles!

6.2.1 Shrinking in

To shrink in a tool, insert the chuck in the matching tool holder (T3-W...) on the ventilation grid above the guide unit with the machine switched on (coil is located at the upper end position of the cylinder). For tools with short shrink-in depth and ThermoGrip® chucks, you can put the tools 5 mm deep in the front zone of the chuck. Move the coil downwards over the chuck, so that the bottom edge lies on the metallic cover disc of the coil on the chuck or with smaller diameters more or less in the same line with the front side of the chuck . Please use the correct plate (see Annex A2).

After having reached the coil position, the coil is stopped by pressing the green button. (see drawing) When coil is stopped, the green LED of the start-button is on (generator ready). In automatic mode (AUTO – LED on) , select the shrink time and press the **Start/Stop**-button. Apply



pressure on the tool during the subsequent heating phase to support the shrinking procedure. If the tool is inserted but the shrinking time has not finished, it is advisable to stop the heating

process with the **Start/Stop**-button to avoid heating the tool unnecessarily. In manual mode (AUTO – LED off) , the tool is heated as long as the **Start/Stop**-button is pressed (max. 50 seconds). For long tools and chucks which do not correspond to ThermoGrip® insert the tools during the heating up phase. Following the heating process, the coil moves up automatically. The green LED of the Start-button goes out. It is always possible to wait with inserting the tool until the coil has moved up again.

Then immediately fit the matching cooling adaptor and place the tool with the tool holder and cooling adaptor on one of the cooling positions.

6.2.2 Shrinking out

In order to shrink out a tool, put the chuck in the matching tool holder (T3-W..) on the ventilation grid underneath the guide unit with the machine switched on. Proceed in the same way as for shrinking in. Help to release the tool by pulling it gently.



Place the removed tool on a heat-resistant surface and protect other persons from touching the tool and hot chuck by mistake.

Immediately fit the matching cooling adaptor and place the tool with tool holder and cooling adaptor on one of the cooling stations.

6.2.3 Tool change

During a heating-up phase you have the possibility of removing a chucked tool first and replacing it immediately by another tool. First, shrink the tool out as described under 6.2.2. In this case, do not stop the heating process with the **Start/Stop**-button. Wait until the coil has moved up again and insert the new tool.



Place the removed tool and a heat-resistant surface and protect other persons from touching the tool and hot chuck by mistake.

Immediately fit the matching cooling adaptor and leave the chuck on the fan until it has cooled down or place the tool together with the tool holder and cooling adaptor on the optional cooling station.

6.3 Shrink-fitting operating modes

6.3.1 Shrinking of standard ThermoGrip® chucks : automatic mode

The time parameters for the standard ThermoGrip® chucks depending on the tool diameter are displayed on a sticker at the front side of the ISG2200.

When the unit is switched on, it will be in automatic mode. AUTO – LED will light up. Following tools can be shrunk in this mode :

Tool Type	Ø- Range in mm
Carbide	6 ... 20mm
High Speed Steel (HSSE)	N/A

The shrink time can be selected by means of the **+** - und **-** - keys on the right hand side of the control panel.

Move the coil down to the chuck so that the bottom edge of the metal coil plate is resting on the chuck. Please always use the correct plate (see Annex A2).

After the coil has reached its position , it can be locked by pressing the green button on the linear unit.

The green LED on the start key will light up when the coil is locked (generator ready).

The shrinking operation can now be started by pressing the **Start/Stop**-button.

While shrinking tools in or out, the tool can be inserted or taken out before the programmed time setting has been finished . This is caused by the min. / max. tolerances of the tool diameter and the bore diameter in the chuck. To avoid heating up the chucks more then necessary , press the **Start/Stop**-button when the tool drops in or can be taken out. This will reduce the cooling time to a minimum.

Use the appropriate cooling adaptor immediately after operation and leave the chuck on the fan until it has cooled down or place the tool together with the tool holder and cooling adaptor on the optional cooling station.

6.3.2 Shrinking of other chucks : manual mode

Use the manual mode to shrink other chucks. Move the coil down to the chuck so that the bottom edge of the metal plate is resting on the chuck.

Please use always the correct plate (see Annex A2).

After the coil has reached its position , it can be locked by pressing the green button on the linear unit.

The green LED on the start key will light up when the coil is locked (generator ready).

The shrinking operation can now be carried out by means of the **Start/Stop**-key.

As long as this key is pressed, the chuck will be heated with maximum power.

Use the appropriate cooling adaptor immediately after operation and leave the chuck on the fan until it has cooled down or place the tool together with the tool holder and cooling adaptor on the optional cooling station.

7. Cleaning and maintenance

The machine is to be cleaned regularly. To do so, disconnect it from the power (pull the mains plug). The machine can be cleaned on the outside using a damp cloth and commercially available (solvent-free) cleaning agent.

Protect the guide rod from rust by greasing it occasionally.



Do not use compressed air and no cleaning agents!
Opening the machine and repairing it is only allowed by Bilz – service staff!

8. Service

This operating manual can only provide a general description of the functions and control of the ThermoGrip[®] induction generator.

For special solutions and for carrying out repairs and any modifications not described in this manual, Bilz Werkzeugfabrik GmbH & Co. KG is gladly available. In case of problems or queries, please note the machine serial number and the software status. you can find the serial number either on the nameplate on the back of the machine, or together with the serial number as display text in the control display after switching on the machine, and in the menu service under the version number.

You can contact us under this address:

Bilz Werkzeugfabrik GmbH & Co. KG
Vogelsangstrasse 8, DE-73760 Ostfildern
P.O.B. 1155, DE-73747 Ostfildern
Tel. ++49/7 11/3 48 01-0
Fax ++49/7 11/3 4812 56
e-mail: info@bilz.de

You can find the latest news about ThermoGrip[®] on the Internet pages www.bilz.de and www.thermogrip.de.

Appendix

A 1. Troubleshooting

Fault message		Possible cause	Elimination
E1	CURRENT FAULT	- current monitoring of the coil diagnoses over/under current	- try again
E2	END LEVEL RUNNING	- Generator program running	- wait a minute before next input
E3	SAFETY CIRCUIT OPEN	- coil temperature >60°	- let coil cool down - check cause
E5	IDENTIFICATION ERROR		- unsuitable shrinking geometry for shrinking process
EF	TELEGRAM FAULT		- please contact the manufacturer

If the above malfunctions prevent the ISG2200 from being operated, please contact the supplier or customer services.

A 2. Selection table for coil plates

Ø- Range in mm	Plate	Ident-No.
... < 8	ISGS306-45x9x20	99952897
6 ... 20	ISGS306-2 45X22X10	99947164

A 3. Technical data

Voltage	3*208V / 50 Hz
Maximum current	3*15 A
Weight	25 kg
Dimensions L/W/H	390x310x640mm

A 4. Scope of supply

- Processor controlled induction generator ISG2200
- Safety gloves
- Operating manual

A 4.1 Possible additions and optional accessories

Tool holder for	HSK-32	T3-W/HSK32	36100108
	HSK-40	T3-W/HSK40	36100109
	HSK-50	T3-W/HSK50	36100110
	HSK-63	T3-W/HSK63	36100111
	HSK-80	T3-W/HSK80	36100112
	HSK-100	T3-W/HSK100	36100107
	SK-40	T3-W/SK40	36100113
	SK-50	T3-W/SK50	36100114
	Cooling adaptor for ThermoGrip®	Ø 6.0- 9	T3-K/6-9
Ø 9.1- 12		T3-K/9,1-12	36100125
Ø 12.1-16		T3-K/12,1-16	36100120
Ø 16.1-22		T3-K/16,1-22	36100122
Measuring adaptor	6 mm	T3-M 0600	37100016
	8 mm	T3-M 0800	37100017
	10 mm	T3-M 1000	37100018
	12 mm	T3-M 1200	37100019
	14 mm	T3-M 1400	37100020
	16 mm	T3-M 1600	37100021
	18 mm	T3-M 1800	37100022
	20 mm	T3-M 2000	37100023
Cooling grid		T3-Z/WZ	37100173

Transportation trolley

ThermoGrip® chuck with various holders and further cooling adaptors, please **see brochure or on request.**

A 5. EC STATEMENT OF CONFORMITY

In accordance with the EC Machine Directive 89/392/EEC, Appendix II A

We herewith declare

BILZ Werkzeugfabrik GmbH & Co. KG

that the machine designated below corresponds to the pertinent safety and health requirements of the EC machine directive with regard to its design and construction and in the version brought into circulation.

In the event of any changes to the machine for which we have not been consulted, this statement becomes null and void.



Designation of the machine:	Induction unit
Machine type:	ISG2200
Pertinent EC directives:	EC-Maschinenrichtlinie (89/392/EEC version 91/368/EEC, 93/44/EEC) EC-low voltage directive (73/23/EEC)
Applied essential standards, in particular:	FCC Part 18 (Edition 10-1-98)

THE COMPANY

Company name:	Bilz Werkzeugfabrik
Company form:	GmbH & Co. KG
Headquarters:	Vogelsangstr.8 DE- 73760 Ostfildern Phone: ++49/7 11/3 48 01 – 0 Fax: ++49/7 11/3 48 12 56 E-Mail : vertrieb@bilz.de Internet : www.bilz.de
General manager	Michael Voss
Register of companies:	A 313, Esslingen am Neckar
Year founded:	1919

Ostfildern, May 16, 2000

A 6. Instructions 5 Finger-Safety Glove

Description: 5-Finger-heat protection glove, outer layer consisting of para-aramide-yarn (KEVLAR) fine knitted fabric lined with aramide felt and 100% Nornex knitted fabric

Availability: size 10

Colour: yellow

**Manufacturer/
Supplier** JUTEC GmbH, Mellumstr. 23-25, DE-26125 Oldenburg

Description: These gloves have been designed to protect your hands. They are made of the materials named above. The characteristic features of these gloves are their long service life and outstanding comfort.

Category:



Instructions: Check that the gloves offer suitable protection for the activity your are currently performing. Select the gloves to fit the size of your hands. Remove the gloves from the wrapping.

When using the gloves, pay attention to the following points:

The open structure of these gloves means that they cannot protect your hands from punctures and impacts from pointed objects. Penetration by liquids is also possible. For protection from chemicals, gloves resistant to such substances should be worn over these gloves. Oil, grease and moisture reduce the resistance of all gloves to cutting damage and should be avoided. KEVLAR gloves are resistant to tearing. Do not use these gloves near machines with moving parts, as your hands could get pulled into the machine.

**Care and
repairs:**

KEVLAR gloves can be dry-cleaned or washed according to the instructions on the label. Wash in water and mild detergent at maximum 40°C. DO NOT USE softening agents, bleach or oxidising agents, as these weaken the aramide fibres and reduce the cut-resistance of the gloves. After washing the gloves, check them carefully for any cuts and worn places. Do not use gloves which are damaged too much and can no longer be repaired, as these no longer offer adequate protection.

Storage: The gloves should be kept in their original wrapping in a dry, clean place. Avoid exposing the gloves to moisture or high temperatures.

Warning: The degree of protection required by a special task depends on the risks involved. You yourself bear final responsibility for selection of the best safety equipment for the risks involved in your workplace. Please check whether this article offers adequate protection for the jobs of work you have to perform. We offer a whole range of cut- and heat-proof KEVLAR gloves for high-risk jobs of work.