

Operating manual

GF 75 - GF 1050

Read the operating manual before commissioning the furnace.



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General information

This furnace is an electrically heated top hat furnace for fusing glass. Other applications must be agreed upon in writing with Nabertherm.

The multi-layer heat insulation is of exceptionally high quality and energy-saving.

The furnace is equipped with a Controller that provides extensive protection against incorrect operation. A long-life NiCr-Ni thermocouple is used for measuring and controlling the furnace chamber temperature.

Model	Width* mm	Depth* mm	Height* mm	Weight kg
GF 75/..	850	750	570 ¹	70 ¹
GF 190	1340	910	660 ¹	165 ¹
GF 240	1450	1200	660 ¹	205 ¹
GF 380	1650	1400	1350	350
GF 420	2100	1250	1270	350
GF 520	1650	1550	1350	350
GF 600	2450	1400	1270	540
GF 920	2550	1550	1350	670
GF 1050	2750	1600	1350	780

¹without substructure

*Outer dimensions

Technical specifications:

Furnace ratings: see the ratings sign on the left side of the furnace

Dimensions and weights: see table

Protection class: 1

Enclosure rating of the furnace: IP 10

Thermal safety according to EN 605192-2, 1993:

- without safety controller: Class 0, in case of error no protection for furnace or material.
- with safety controller: Class 2, in case of error furnace and material are protected

Ambient conditions:

Temperature: 5 - 40 °C

Humidity: max. 95%, non-condensing

Safety



ATTENTION! Hot surface
- Risk of burns -

Be careful when the cover is opened when hot

- There is a risk of burns at some parts of the surface.
- The heat outlet of the housing surface must not be obstructed.
- Do not bring any flammable materials close to the furnace.
- Operating the furnace with explosive gasses or mixtures, or with explosive gasses or mixtures created in the process is not permitted.
- Only use materials of which the properties and the melting temperatures are known (marking of the materials).
- Do not place any objects on the cover of the furnace.
- The furnace may only be operated with quartz tubes that are in working order.
- Do not place any objects on the furnace as otherwise the carrying-off of heat is impeded, the furnace is damaged and there is a fire hazard.

With 230 V models: Ensure that:

- the distance between the safety cut-out and the socket to which the furnace is connected is as short as possible.
- no extension cable is used between the socket and the furnace.

Ventilation:

Depending on the type of material used, there is the possibility of hazardous gasses or fumes being released. These gasses and fumes must be led outdoors appropriately by the furnace's exhaust.

Mounting the furnace

Please inform us immediately of any transport damages or incomplete deliveries!

- Place the furnace on the base frame included in the delivery.
- The connection to the furnace of models GF 75 - GF 240 is pluggable and can be disconnected during transport.
- **When mounting, maintain a safety distance of 0.5m to all sides and 1m to the ceiling.**
- Provide sufficient room ventilation.
- Mount the Controller at the left side of the furnace (if not factory-installed).

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- Connect the plug of the Controller (C 30) to the socket of the switchgear.
 - Connect the furnace's plug into the corresponding power socket (do not use an extension cable).

During the baking process hazardous gasses and fumes may be released. Therefore it is necessary to lead the „exhaust fumes“ from the ventilation openings outdoors in an appropriate way.

Commissioning the furnace

The furnace must be fired once to dry the insulation and to attain an oxide protection layer on the resistance wire coil, please see also the Controller instructions. This may cause an unpleasant smell.

- Close the cover and secure it with the lock
- Heat up the furnace to 500 °C in 6 hours, heat up to 850 °C at full power, maintain this temperature for 15 minutes, let furnace cool down on its own. To enter the temperatures and times, please read the instructions for the Controller.

The heating elements can break easily when cold. Take special care of this when charging the furnace with products and removing them, and also when cleaning the furnace.

During the baking process the cover may only be opened briefly.

While baking gasses, fumes and humidity are released which may result in discolouration or corrosion of the furnace.

Our top hat furnaces should not be used as drying ovens.

The sight hole/fresh air openings can be opened to shorten the cooling phase after baking.

Maintenance/errors

Regularly clean the inside of the furnace with a vacuum cleaner. **Attention:** While doing this do not touch the heating elements to avoid damaging them.

**In the case of commercial use:
Please observe the safety regulations applicable to your country.**

According to a regulation of the German employer's liability insurance association the furnace must be checked by a qualified electrician at specified intervals.

If the heating elements are damaged the furnace must be switched off immediately. Damaged tubes are to be replaced before commissioning.

The furnace switchgear * is equipped with silent semiconductor relays. Semiconductor relays are resistant to wear.

* The switchgear of model GF 1050 is equipped with contactors. The heating contactor is a expendable part. Depending on the local conditions and the heavy duty, the contactor must be checked in regular intervals and exchanched latest after 1 year.

Use the error search list (Troubleshooting), the repair instructions and the circuit diagram (see the following pages) to identify and eliminate errors.

Only a qualified electrician may carry out work on the electrical system.

Cracks in the insulation:

The insulation of the furnace consists of very high-quality fire-resistant material. As a result of heat expansion, cracks appear in the insulation after a few heating cycles. However, these cracks have no influence on the function or quality of the furnace.

Troubleshooting

Error	Cause	Error elimination
Controller does not switch on	No voltage or Controller is defective	<ul style="list-style-type: none"> • Check/replace the fuse(s) of the connection • Check/replace the fuse of the Controller • Check plug connection
Controller indicates error	See Controller instructions	
No heating of the furnace chamber after the program has started or very slow heating of the furnace chamber or selected final temperature is not reached	Error while entering the program Fuse/s of the connection is/are defective Heating element is defective	Check heating program (see Controller instructions) Check fuse(s) of the connection, replace if necessary. Inform Nabertherm service if the new fuse blows as soon as it is screwed in. Search for fractures, if no fractures are visible: <ul style="list-style-type: none"> • Close the cold furnace • Switch on the furnace for about 5 seconds (not longer) • Remove mains plug • Open cover • By carefully touching the heating radiators check the heat at various positions cold radiators = heating circuit defective, for repair, see repair instructions
	No heating power as a result of undervoltage	Have checked by Nabertherm service.

Repair instructions

Only a qualified electrician may carry out work on the electrical system!

Ordering spare parts

In writing, by phone or via the Internet:

www.nabertherm.com

State the following information from the ratings sign:

- Furnace model
- Production or serial number
- Year of construction

Safety advice

The furnaces contain ceramic fibre material in the insulation. In the Federal Republic of Germany actively handling this fibre (e.g. replacing the insulation) is subject to the regulations of the German ordinance concerning hazardous materials, Annex V No. 7 "Artificial mineral fibres" of June 12, 1998. In the other territories of the European Community ceramic

fibres are classified by the Directive 98/69/EC of the Commission of December 5, 1997 as follows: CARC. Cat. 2; R 49; Xi R 38. Working on the fibre insulation must therefore be executed in such a way that the fibre dusts released are kept at a minimum.

We recommend wearing a breathing mask (P2 or higher), gloves as well as a protective suit.

Replacing the heating coil

Removal

- Remove mains plug
- Remove protective cover of the electrical terminals on the side walls of the cover
- Loosen and remove terminals at the ends of the heating coil
- Remove wall ducts
- Pull out heating coil

Insertion

- If cleaning is not possible, insert new wall ducts or quartz tubes.
- Install the heating coil in the tubes, push connection ends through the holes.
- Insert the wall ducts from the outside.
- Create the electrical connections with new terminals:
Hold bottom part of terminals with pliers, tighten the screw.
- Cut off any excess twisted wire ends.
- Mount the protective cover of the electrical terminals.

Repairing the insulation

If the insulation of the furnace chamber shows serious damages, it must be repaired.

Exchanging the thermocouple

- Remove mains plug
- Remove protective cover of the electrical terminals on the side wall of the furnace
- Remove the safety screw of the thermocouple
- Remove the cable ends of the thermocouple
- Screw out defective thermocouple and insert new one
- Connect new thermocouple (green cable to „+“, white to „-“)

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- Attach thermocouple to furnace housing with safety screw
 - Mount protective cover
 - Check function

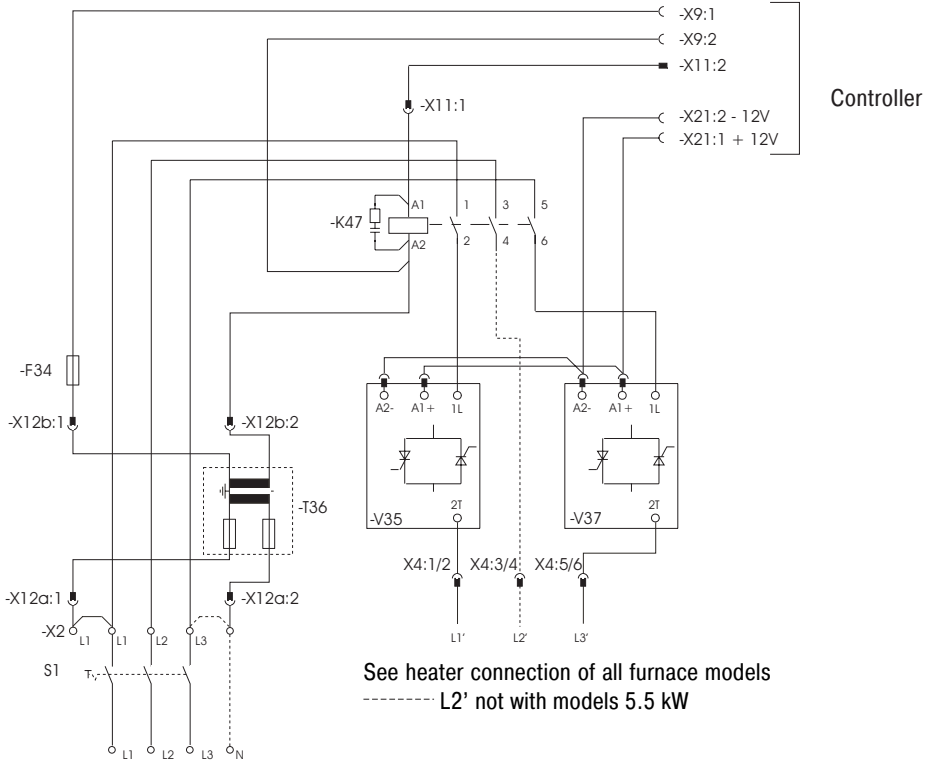
Exchanging the contactor

Ensure that:

- the terminals are fastened tightly!
- the anti-interference capacitor is connected to the contactor coil!

Circuit diagrams

Switchgear with semiconductor relay without door contact
 200-600V ~ > 3,6kW, 3/PE 3/N/PE, 50/60Hz

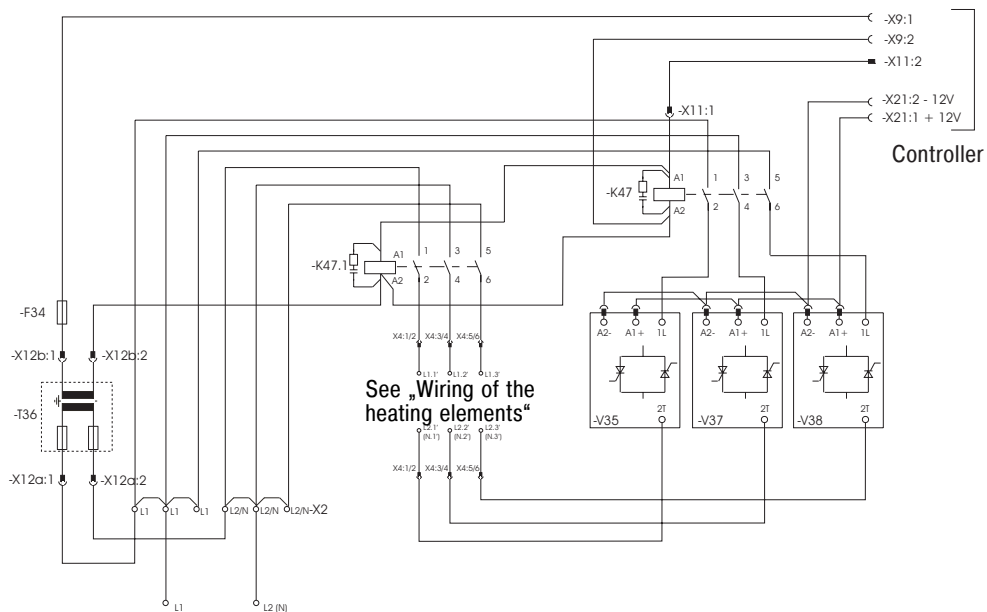


See heater connection of all furnace models
 ----- L2' not with models 5.5 kW

Power supply see ratings sign

- F34 Fuse control current
- K47 Safety contactor
- S1 Main switch (not all models)
- T36 Control transformer (not all models)
- V35 Semiconductor relay
- V37 Semiconductor relay
- X4 Furnace connector only for GF 75 - GF 240

Switchgear with semiconductor relay > 6.4 kW without door contact
 200-240V ~, 1/N/PE + 2/PE, 50/60Hz

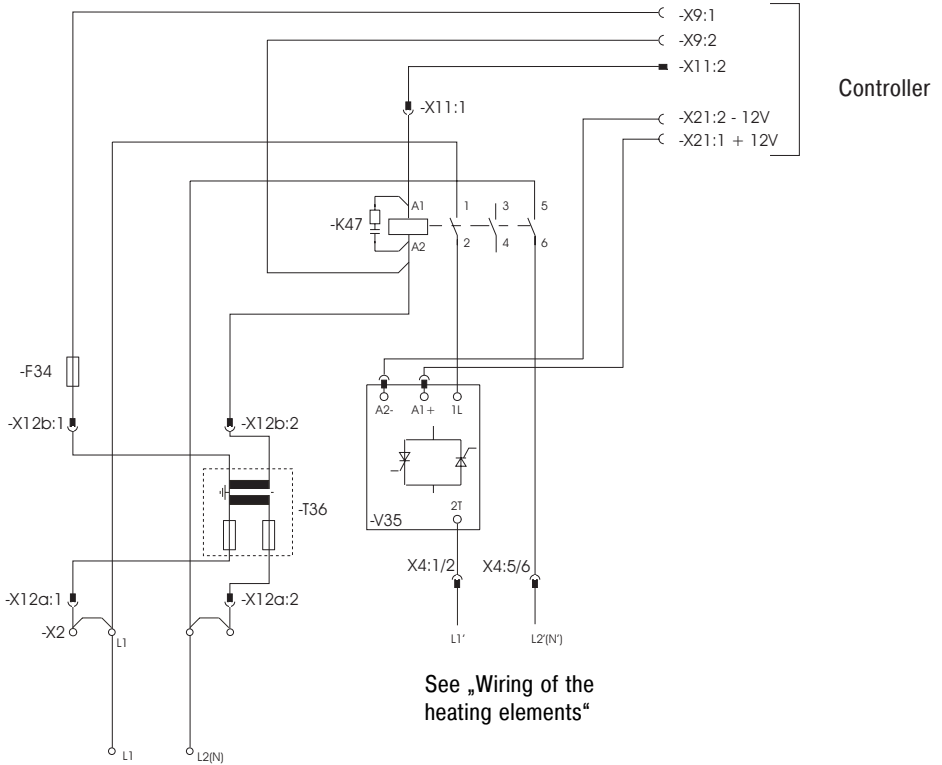


Power supply see ratings sign

See „Wiring of the heating elements“

- F33 Fuse control current
- K47 Safety contactor
- K 47.1 Safety contactor
- T36 Control transformer
- V35 Semiconductor relay
- V37 Semiconductor relay
- V38 Semiconductor relay
- X4 Furnace connector only for GF 75 - GF 240

Switchgear with semiconductor relay without door contact
 200-240V ~ < 5,5kW, 1/N/PE 2/PE, 50/60Hz

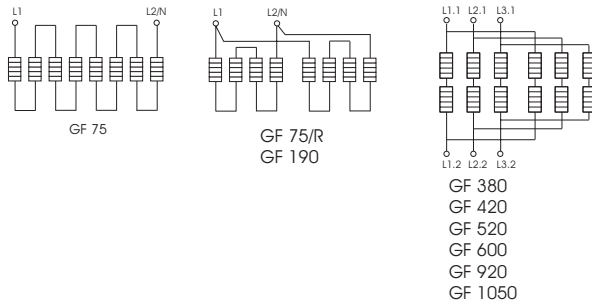


Power supply see ratings sign

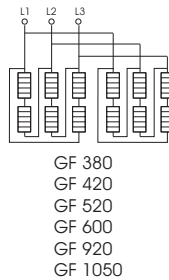
- F34 Fuse control current
- K47 Safety contactor
- S1 Main switch (not all models)
- T36 Control transformer (not all models)
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- V37 Semiconductor relay
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Wiring of the heating elements

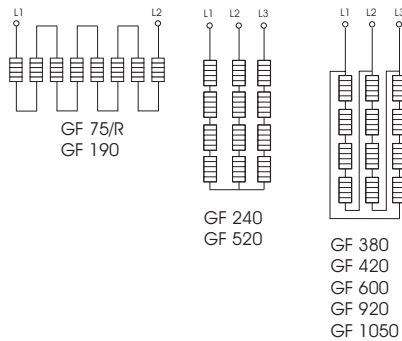
200 - 240V 1/N/PE, 2PE



200 - 240V 3/(N)/PE



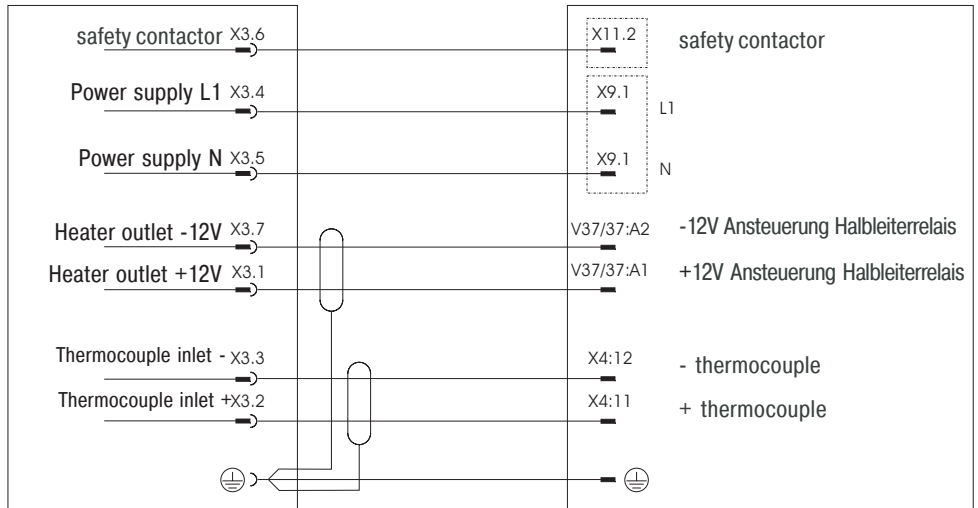
380 - 400V



C 30/S 10 for GF furnaces with semiconductor relay 7 pin connector

Connector C 30/S10

Switchgear



Declarations of conformity

for furnaces with Nabertherm switchgear including Controller

EC – DECLARATION OF CONFORMITY

according to EC Low-Voltage Directive No. 73/23/EC modified through 93/68/EC
and EMC Directive 89/336/EC

Nabertherm GmbH, Bahnhofstr. 20, 28865 Lilienthal

Electrically heated fusing furnace

Model	GF 75	GF 75R	GF 190	GF 240	GF 380
Tmax	950 °C	950 °C	950 °C	950 °C	950 °C
Nominal voltage	230 V 1/N/PE ~	400 V 2/N/PE ~	400 V 2/N/PE ~	400 V3/N/PE ~	400 V3/N/PE ~
Power rating	3,6 kW	5,5 kW	6,4 kW	11 kW	15 kW
Model	GF 420	GF 520	GF 600	GF 920	GF 1050
Tmax	950 °C	950 °C	950 °C	950 °C	950 °C
Nominal voltage	400 V3/N/PE ~	400 V 3/N/PE ~	400 V3/N/PE ~	400 V3/N/PE ~	400 V3/N/PE ~
Power rating	18 kW	15 kW	22 kW	26 kW	32 kW

For all Furnaces: Nominal frequency of 50/60 Hz

Harmonized standards/valid EC Directives:

Low-Voltage Directive:	EN 60335-1	EN 60519-1 EN 60519-2
EMC-Directive:	EN 61000-6-1	EN 61000-6-3

Lilienthal, 30.06.2004



Thomas Adamek



Gernot Fäthke

Notes

Headquarters:

No responsibility is accepted for the correctness of this information, we reserve the right to make technical alterations