USER INFORMATION

6000304E

KEEP FOR FUTURE USE

Rev.C

B.10.20.05

280.3-230
280.3-400
280.6-230
280.6-400

Fluid heater

GRACO N.V.

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REGULAR TESTING OF THE APPLIANCES

Test certificate No.	Test date	Qualified electrical engineers	
		Company	Name

The contractor must ensure that electrical systems and operating materials are only installed, modified and repaired by a qualified electrical engineer or under the management and supervision of a qualified electrical engineer in accordance with the regulations of the electrical industry.

- Electrical systems and fixed electrical operating materials must be checked and tested by a qualified electrical engineer at least once every four years.
- Electrical operating materials not fixed in position, like connection leads with plugs as well as extension and appliance connection leads, must be checked for safe condition at least every six months by a qualified electrical engineer insofar as they are used.

The following additional conditions apply in areas representing an explosion hazard:

Anybody operating an electrical system in areas representing an explosion hazard, should keep it in a proper condition, operate it correctly, maintain constant surveillance, carry out necessary maintenance and repair work without delay and take necessary safety measures according to the circumstances.

The operator should make arrangements to ensure that the electrical systems are checked for their proper condition by a qualified electrical engineer or under the management and supervision of a qualified electrical engineer.

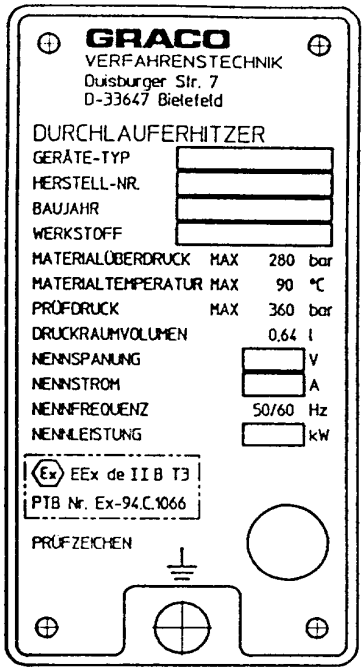
The operator should schedule the checks in such a way that any defect that can be expected, can be identified easily and in time. The checks should be carried out every three years; they can be dispensed with if the electrical installations are constantly under surveillance by a responsible engineer.

Extract from: Electrical systems and operating materials (VBG 4)
Issued on 1st April 1973
§ 3 (1)
Implementation instructions VBG4 to §5 Para. 1 No. 2

Directive on electrical systems in
areas representing an explosion hazard (ElexV)
issued on 26th August 1992
§ 12 (1), § 13 (1)

Note: When the fluid heater is used as a component of a fluid sprayer in accordance with VBG 87, a test of its operational safety must be included in these regular tests.

FLUID HEATER
BASIC VERSION, BASIC APPLIANCE, COMPLETE APPLIANCE



The original manufacturing plate is on the fluid heater.

Read and understand the operator manual and the safety instructions before start-up!

Please compare all specifications and complete, if necessary.

All important sections in this Operator Manual are marked with the following symbols.

⚠ Information that affects safety

Warning against electrical voltage

Important operational directions

Ensure that all other users know and understand all safety directions.

CONTENTS OF USER INFORMATION

The following are included separately: TEST CERTIFICATE (Final acceptance)
EU CONFORMITY DECLARATION
BRIEF OPERATING INSTRUCTIONS, WARNING SIGNS

CORRECT USE

The fluid heater is used for heating coatings or auxiliary agents for surfacing technology as well as similar materials that can still be delivered without any difficulty in order to have a favorable effect on these substances for further processing.

In special cases the fluid heater can also be used to heat compressed air.

Any other purpose above and beyond this is considered as incorrect use. We are not liable for any damage or injury resulting from this; the user will bear sole liability in such cases.

Correct use includes following operating, maintenance and inspection conditions and regulations laid down by us.

The fluid heater may only be installed, maintained and repaired by personnel familiar with, and trained to recognize the inherent dangers.

The relevant accident prevention regulations as well as safety and medical rules must be respected.

Unauthorized modifications to the appliances releases us from any liability for damages arising from this.

The user is responsible for the correct installation of the appliance.

FUNCTIONAL DIAGRAM

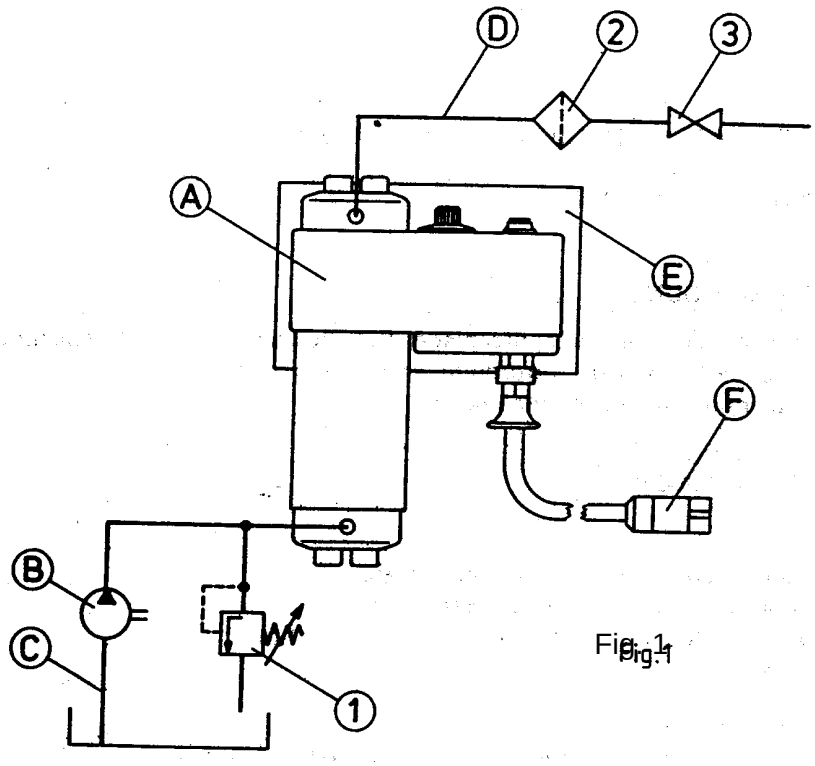


Fig. 1

A FLUID HEATER	D FLUID PRESSURE SYSTEM	1 Pressure regulation valve
B PUMP	E APPLIANCE SUPPORT	2 Filter
C FLUID SUCTION SYSTEM	F POWER SUPPLY	3 Ball valve

DESCRIPTION OF FUNCTIONS

The fluid (coating or auxiliary agent) is sucked into the pump Ⓑ from the container through the fluid suction unit Ⓒ and supplied under pressure in the fluid heater Ⓐ into the fluid pressure system Ⓓ leading to the point of application ③ (ball valve, spray gun etc.).

Normally, a filter ② is fitted in front of the point of application in order to remove contaminants from the fluid.

A pressure regulation valve ① protects the system from an impermissible rise in pressure due to thermal expansion when the point of application is closed.

EQUIPMENT COMPONENTS – IMPORTANT INFORMATION

The following components are required in an operational system:

Ⓐ THE FLUID HEATER

For the functional description of the fluid heater, see "Technical Product Description B.10.20.05-P"

Ⓑ THE PUMP

⚠ The maximum permissible operating excess pressure of the pump is 280 bar. If necessary, the pump's pressure should be limited by means of a safety valve.

⚠ An increase in volume must be taken into account when the fluid is heated in case the fluid pressure system behind the fluid heater is blocked.

When no fluid is discharged, this will result in an pressure increase, that may lead to damage to the line and/or parts of the pump. To prevent this, a pressure-reducing valve is required.

It should be ensured that the pump is suitable for the maximum temperature that can arise at the suction connection. (90°C less heat loss on the line) in the case of heated spraying equipment using circulation.

Ⓒ FLUID SUCTION SYSTEM

As a rule, the fluid suction unit belongs to the pump's standard supply.

The characteristics can be found in the user information for the pump.

Ⓓ FLUID PRESSURE SYSTEM

The fluid pressure system usually consists of pipes and/or hose lines. A filter can be used in order to clean the fluid.

⚠ The pipes must be designed for the maximum overpressure of the pump (see DIN 2445).

The hose line connects the pump to the point of application via the fluid heater.

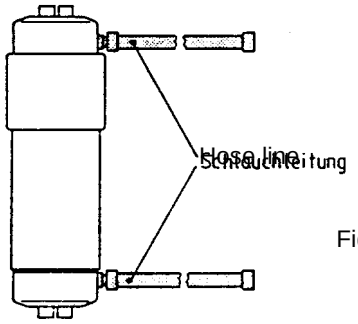


Fig. 2

⚠ For surface coating applications, the hose line must have the following specifications:

- Electrically conducting, max. permissible resistance 3 (10^4 Ohm/m (tested to ISO 8031)
- The inside pipeline coating must be resistant to normal solvents, the outer coating resistant under certain conditions.
- Silicone-free
- Operating temperature up to 90°C or higher.
- Complies with relevant standards (dimensioning, marking)
- The sealing head nipples of the hose fittings are made from austenitic stainless steel or zinc plated and yellow chrome plated steel.
- Working pressure > than that of the pump

The filter PN500 is used in many heated spraying systems.

The filter consists of the housing parts, the filter insert and a pressure relief device (ball valve or drain plug) and a manometer.

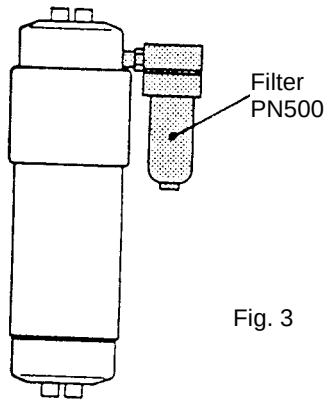


Fig. 3

The connection filter ◄► fluid heater is effected by means of an adapter swivel.

Characteristics of the filter PN500 :

Permissible operating overpressure	500	Bar
Permissible operating pressure	120	°C
Filter area	78	cm²
Nominal diameter	DN6	
Material of wetted housing parts	Austenitic stainless steel (1.4305) or chrome steel (1.4104) depending on the order.	
Pressure container	Group V of the pressure container regulations, therefore no testing necessary	
Filter inserts	made of stainless steel with different mesh sizes	

Ⓔ APPLIANCE SUPPORTS

The appliance supports of the fluid heater are:

Pump trolley as well as wall mounting for the 6 kW version.

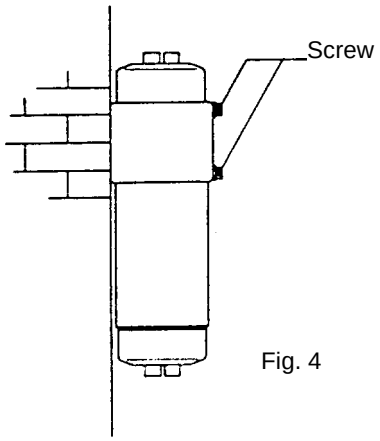


Fig. 4

The majority of fluid heaters are fixed to a building or machine wall without any special fittings just using two screws.

If dowels are used to secure a pump to a wall, the bore holes and the length of the screws must be in accordance with the manufacturer's instructions.

If the plugs and corresponding screws are supplied by us, they comply with the Technical Product Description B.17.90.01-P

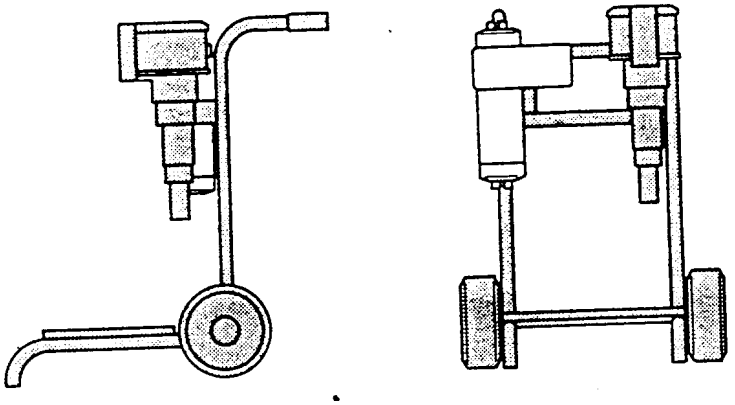


Fig. 5

In conjunction with our pump programme, it is possible to fix the heater to a pump trolley (see the user information for the pumps).

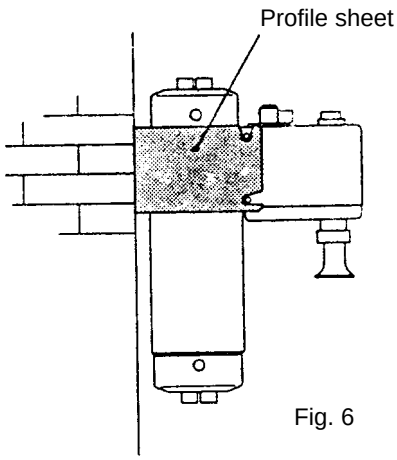


Fig. 6

The wall bracket is designed for fixing two fluid heaters (6 kW version).

Here the heaters are locked in position by two connecting rods. A cable bushing connects the two heaters electrically and a pipe connects the fluid channels.

Ⓕ POWER SUPPLY

Power is normally supplied to the fluid heater via an explosion-proof plug (16 A, 380 V) to conform EN-CEE.

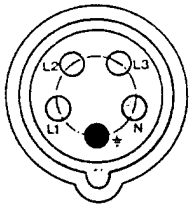


Fig. 7

Heater Type 280.3-230
and 280.6-230

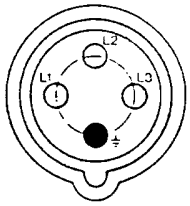


Fig. 8

Heater Type 280.3-400
and 280.6-400

The connections are made in accordance with the circuit diagram on page 17.

The plug also fits in CEE sockets that are not explosion-proof for use outside explosion hazardous areas.

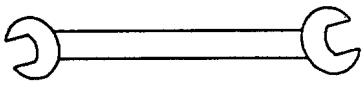
- Other types of connection are available on request.

16 amp fuses must protect the electric circuit of the socket.

All electric wiring (between the socket and plug) should be safeguarded as much as possible to avoid damage.

LIST OF TOOLS

Open-ended spanner DIN 895



SW 24 Filter/fluid heater

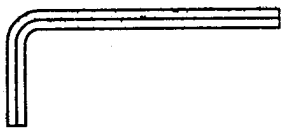
SW 22 Connector/fluid heater

SW 24 Pressure reducing valve

SW 17 Hose line DN6, G 1/4 (fluid pressure system)

SW 22 Hose line DN10, G 3/8 (fluid pressure system)

Allen Screw DIN 911



SW 2,5 Dial thermometer/cover

SW 14 Cover/housing

INSTALLATION

INSTALLATION AND MOUNTING

The fluid heater can be fixed and operated in different positions.

For the build-up position, see "Technical Product Description B.10.20.05-P".

The preferred installation position is to have the fluid inlet and outlet in front and operation on the upper right-hand side.

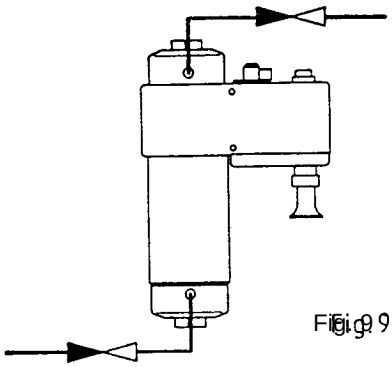


Fig. 9

The indicated flow direction should be reversed for the highest possible air temperature when the heater is used for heating compressed air.

→ Flow direction fluid

← Flow direction air

The following applies to the fixing of the fluid heater :

⚠ The support surface or wall must be smooth and stable

⚠ Plugs and mounting hardware must have correct dimensions

⚠ If the heater is operated at the maximum temperature (90°C), the surface can reach temperatures that can cause burns to people who accidentally touch it.
The heater must therefore be installed in such a place that it cannot be touched accidentally.

⚠ When installing in hazardous locations, zone 1, you should follow the guidelines for explosion prevention (EX-RL) ZH 1/10 (chapter E2), as regards assembly materials.

The weight of the 6 kW fluid heater is about 43 kg for the aluminum model and about 83 kg for the stainless steel model.

We therefore recommend using a lifting appliance for installing the heater
After unscrewing the wall mounting – with plugs and screws adequately dimensioned – the lifting appliance is fixed to the top tie rod between the two heaters.

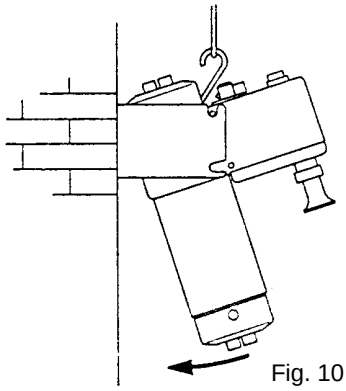


Fig. 10

Do not use the cable bushing between the heaters for fixing.

The ends of the top tie rod are suspended in the case of fluid heaters at an angle.
The fluid heater is then moved round to the vertical position and the nuts tightened.

⚠ Ensure that the load is at no time transported over people's heads if a lifting appliance is used to install the fluid heater

EARTHING

⚠ Within spaces that constitute an explosion hazard, an additional grounding is recommended to prevent sparking causing explosions (see VDE 0165 02/91 point 5.3.3.).

Usually, this is a lead made of copper with a cross-section of 4mm² that is fixed with a protected screwed connection.
The grounding terminal on the fluid heater is situated in the vicinity of the factory nameplate and is identified with ⏚

The heater does not need to be grounded separately if it has a secure contact to the frame or pipelines that in their turn are properly grounded.

If the fluid heater is used in different locations, then it is sufficient to ground the appliance with the connection cable in accordance with EN 50014 05/78 point 13.2.

CONNECTIONS

Pump fluid ◄► heater Fluid heater point

Fluid heater point ◄► of application (consumer)

Plastic lines in hazardous locations must have a conducting resistance to earth of < 10^6 Ω.

When installing curved metal pipes, they should be selected with a radius of curvature on the pipe axis not smaller than 2.5 x the outside diameter of the line.

Provide compensation bends for the pipes to compensate for the thermal expansion.

DIAL THERMOMETER

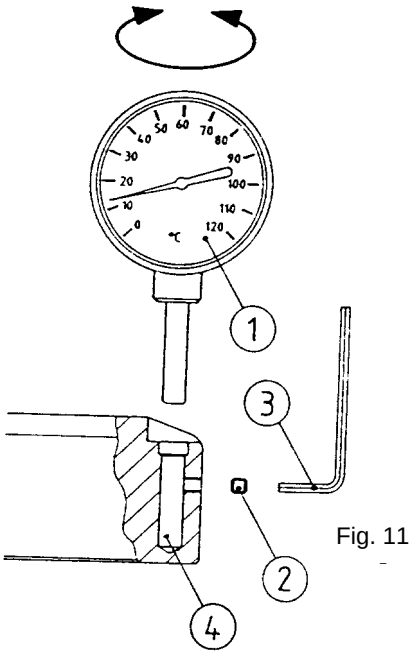


Fig. 11

If a dial thermometer is provided with the fluid heater (in order to prevent transport damage), assembly should be carried out in accordance with Fig. 11

- Insert the dial thermometer ① in the hole in the cover ④.
- Screw in the set screw ② with Allen key ③.
- Align the dial thermometer and lightly tighten the set screw.

If the set screw is tightened too much, the result is an inaccurate temperature display.

FLUID PRESSURE SYSTEM (FILTER PN500)

See page 3

In many cases the filter PN500 is attached to the fluid heater.

If it is to be retrofitted, the following should be noted:

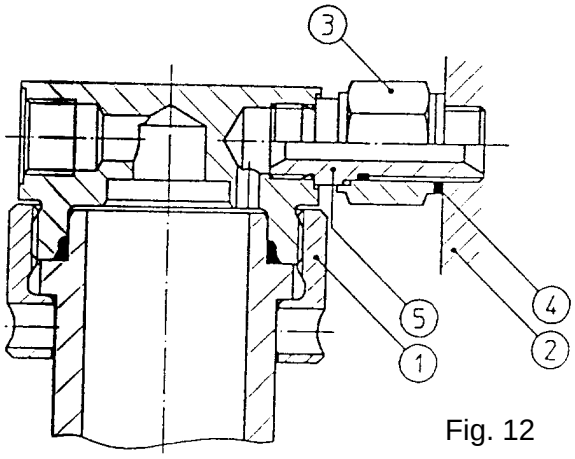


Fig. 12

Screw the nut ③ gently back against the stop of the banjo bolt ⑤.

Screw the filter PN500 ① (with banjo bolt and nut) as far as possible into the cover ② of the fluid heater.

- Do not forget the sealing A 17x21 ④.

Tighten the nut ③ against the cover ② (lock).

GENERAL ASSEMBLY INSTRUCTIONS

- Grease thread lightly.
- Do not use PTFE tape or hemp

⚠ Components not supplied by us must have dimensions that correspond to the given dimensions of the pump and fluid heater.

- Follow the manufacturer's instructions

⚠ Follow the manufacturer's assembly instructions when using cutting rings or double conical rings.

When using hose lines not supplied by us, it should be noted that these may have silicone residues inside as a result of the manufacturing process and they must be carefully flushed out before starting up in the paint systems.

⚠ When liquids are to be pumped that contain chlorinated hydrocarbons (halogenated hydrocarbons), e.g. trichloroethane or methylene chloride, the parts in contact with the fluid may not contain zinc plated parts nor be made of aluminum.

- There can be metal organic reactions that are explosive and extremely caustic.
Use stainless steel fluid heaters and stainless steel pipelines.

START UP

INSTALL FILTER INSERT

The filter attached to the fluid heater does not have an insert.

The filter inserts must be fitted later.

Remove the union nut and take off filter housing. Place the filter insert over the support spring into the housing and re-install the housing.

FLUSHING THE FLUID HEATER

As all fluid heaters are tested in the works after assembly using an anti-corrosion liquid, on installation it is necessary to flush out the rest of this liquid and any other contaminants that may have entered during installation thoroughly with detergent (flushing agent).

After flushing, the solvent must be removed thoroughly from the equipment.

Blowing air through the system does this.

START UP OF APPLIANCE / SYSTEM

In fluid heaters for fluids, the air that has entered the system during the flushing process must subsequently be removed thoroughly.

Continue to discharge fluid at low pressure until all air has been removed.

CONNECTING THE POWER SUPPLY

The mains plug should be inserted in the corresponding socket.

⚠ Within the EX area, only permitted
EX-plugs and connectors may be used.

When the fluid heater is switched on and during operation (in intervals), the green light must be on.

IMPORTANT INFORMATION CONCERNING START-UP AND OPERATION

⚠ Never unscrew any parts from the fluid heater such as the cover during operation.

- Most paint materials can be used without any problems in heated spraying processes.

- The viscosity of solvent-containing paints only drops insignificantly over 70°C.

As a matter of principle, paints materials should not be heated above 80°C as solids can separate and be deposited during the heating.

Do not heat water-based paints above 60°C and 2K PUR paints not above 40°C.

It is essential to contact the paint suppliers when using fast drying paints such as 2K PUR water-based paints.

OPERATION

As a rule, the fluid heater is used for heating fluids.

It is possible to heat compressed air taking care to reverse the flow direction.

See page 6
The fluid should constantly circulate through the fluid heater since otherwise the temperature at the point of application will not be kept constant.
The fluid heater should be thoroughly flushed out with a suitable detergent before prolonged operating pauses. e.g. before holidays.

Please consult the fluid supplier about compatibility of the flushing agent.

In order to prevent fluid residues from hardening, the flushing agent should be left in the fluid heater during operating pauses.

Depending on the flow rate, the desired temperature increase and specific thermal capacity of the fluid, a heating time of 10 to 30 minutes must be expected.

The fluid heater switches over to permanent operation if the flow rate is too high and the set temperature cannot be achieved.

The maximum flow rate for a desired temperature increase essentially depends on the specific thermal capacity of the fluid.

In order to determine a rough indication, the following diagram established for water can be used.

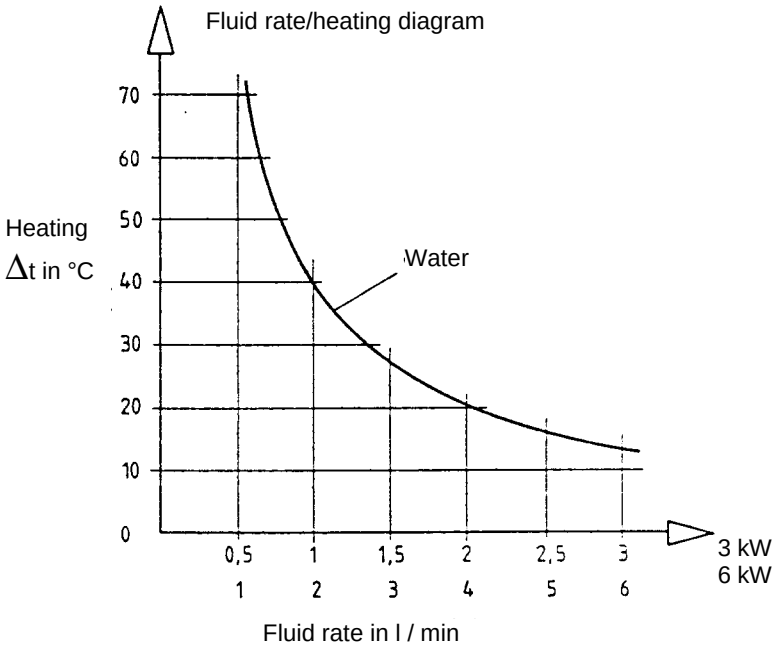


Fig. 13

If the temperature increase is not adequate for the required flow rate, it can be increased by connecting heaters in series.

MAINTENANCE AND INSPECTION, REPAIR

MAINTENANCE AND INSPECTION

- The fluid heater should undergo a daily visual check in order to detect any noticeable damage.
  - Observe the operation of the temperature control by watching the thermometer
  - Checking the electrical supply line for mechanical damage
  - Visual checks for leaks
- The fluid heater must be checked and tested by a qualified electrical engineer at least once every four years (VBG 4).
- If the fluid heater is used in different locations, its safety must be checked and tested by a qualified electrical engineer at least once every six months (VBG 4).
- Fluid heaters in hazardous locations that are not under constant supervision by a responsible engineer should be checked and tested by a qualified electrical engineer at least once every three years (ElexV).

- The channels in the heat exchanger can be cleaned mechanically (bored through). The two covers of the heat exchanger should be removed. When fitting the covers, tighten the screws with the specified tightening torque (see p 13 tightening torque).

Never disassemble or install a pressurized fluid heater.

Unplug the heater from the mains before the housing is opened.

- Regularly dismantle the filter PN500 ; - The top part should remain on the fluid heater. Clean all the other parts thoroughly.
  - The cleaning interval depends on the process fluid or solvent and must be determined by the user.
- The service life of the hose lines is adversely affected, and thus shortened, by surrounding influences (oxygen in air, temperature, light, etc.), even if correctly operated.

  It is recommended that they undergo regular visual checks and occasional checking of performance.

  As a precaution the hose lines should be replaced by new ones at intervals set by the operator (after 2 to 3 years).

REPAIR

Qualified staff (VBG 87) must always carry out repairs.

Qualified electricians (VBG 4) must always carry out repairs to electrical parts.

When parts that affect explosion safety features are repaired, the system must be tested after assembly by a qualified engineer or a routine check should be carried out by the manufacturer (ElexV).

Use only genuine replacement parts. Our obligation to replace equipment is forfeited when non-genuine replacement parts are used (Product Liability Law of 15 December, 1989). The approval for the appliances to be used in hazardous locations no longer applies.

After dismantling, all parts that are to be re-used should be cleaned thoroughly.

Do not damage sealing surfaces. Do not throw parts around or hit them.

Renew all removed seals.

Lubricate all threads and fittings before assembly (grease lightly).

Pressure should be removed from the fluid heater before dismantling.

Replacing the seals

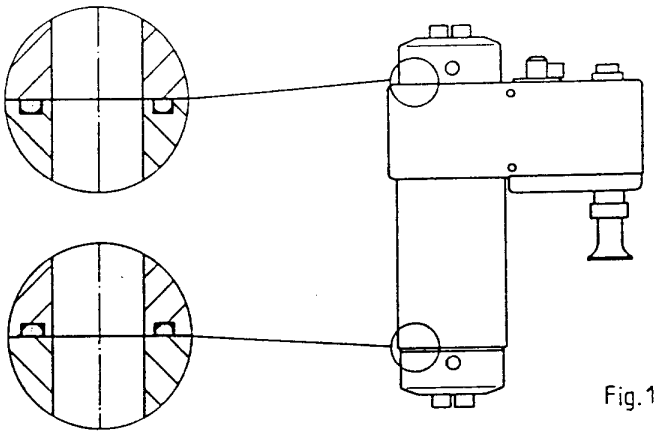


Fig. 14

Take care to fix the seals in the exact assembly position when replaced.

Insert the seal ring in the groove with the chamfer at the bottom.

Replacement of the O-Ring at the filter PN500

Replace the O-ring when it is damaged during retrofitting of the PN500 filter. Pull the new o-ring over the covered thread

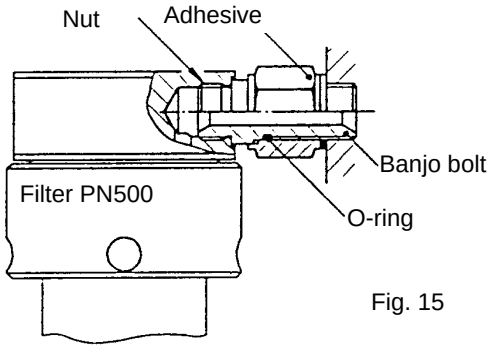


Fig. 15

TIGHTENING TORQUES

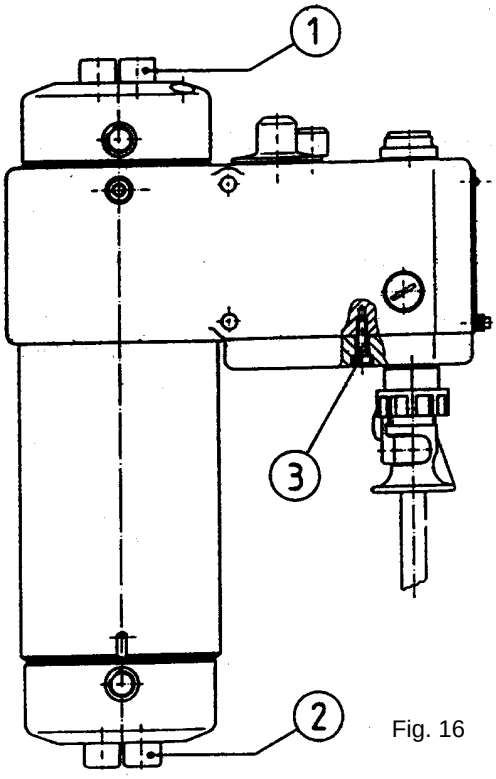


Fig. 16

Pos.	1	2	3
Thread	M 16	M 16	M 6
Material	10.9	10.9	8.8
Tightening torque in Nm	150	150	9

SHUT DOWN

- FOR A SHORT PERIOD
- Switch off pump
- Relieve the pressure in fluid heater by discharging fluid (do not allow to run empty)
- Turn temperature control to the minimum stop

- FOR A PROLONGED PERIOD, FOR THE COMPANY HOLIDAY PERIOD
- Thoroughly flush fluid heater
- Switch off pump
- Relieve the pressure in fluid heater by discharging fluid
- Leave flushing agent in fluid heater
- Remove the mains plug or move the temperature controller to the minimum stop
-

- FOR A LONG PERIOD
- Flush the fluid heater thoroughly
- Drain flushing agent from fluid heater
- Disconnect (unscrew) line to fluid heater
- Disconnect mains plug

ERROR ANALYSIS

Component group	Nature of defect	Defect symptoms	Possible cause	Counter measure
Power supply	The fluid heater does not become warm	The fluid heater remains cold, indicating light does not come on	Power supply fault fuse	Replace the fuse
			Socket not switched on	Switch on socket Note : With some explosions-protected sockets, the mains is only connected by rotating the collar of the plug
	Fluid heating too little	The heating of the fluid lies significantly below the indication of the flow rate – heating diagram	Mains voltage is not the same as the heater's nominal voltage	Replace heater or adapt to mains voltage
			Voltage losses in the power supply	Increase the cross-section of the lead to the socket
Fluid heater	Fluid heater does not become warm	The set temperature lies below the fluid temperature, the indicating light does not come on	Wrong temperature setting.	Adjust the knob.
		The maximum temperature limiter has switched off, indicating light is not on	Temperature control or the maximum temperature limiter is defective	Replace temperature control or the maximum temperature limiter
			Accumulation of heat when the heater heats up	Switch the maximum temperature limiter back on and do not set the temperature control to the maximum temperature during the first heating up phase
		No function of the temperature control, indicating light not on	Contacts of the temperature control burnt out	Replace temperature control
		Indicating light on	Heating foil defective	Replace heating foil
	Indicating light does not come on Note : Indicating light should only come on during the heating up phases	Fluid heater becomes warm	Indicating light defective	Replace indicating light, check temperature control and the maximum temperature limiter for correct function
	Pressure drop in heater too large	Material has settled or hardened in the heater channels	Temperature set for the fluid material too high, the material has a tendency to settle or harden at high temperatures	Open the cover of the heat exchanger and clean the channels mechanically (bore through).
	The set fluid temperature is not reached	The heater switches to permanent operation	Fluid rate too high for heater performance	Reduce flow rate or increase heater performance with an extra heater
		Deposits in the fluid channel	Poor heat transmission from the heat exchanger to the fluid	Open the cover of the heat exchanger and mechanically clean (bore through) the channels
Fluid pressure system	Drop in pressure too high	Kinks in hose line	Incorrect operation	Check hose line
		Filter PN500 clogged	Fluid contaminated	Dismantle filter insert and clean

GENERAL

OPERATING DIAGRAM OF A HEATED SPRAYING SYSTEM

Example of a heated spraying system using a circulation process for paint with a piston pump

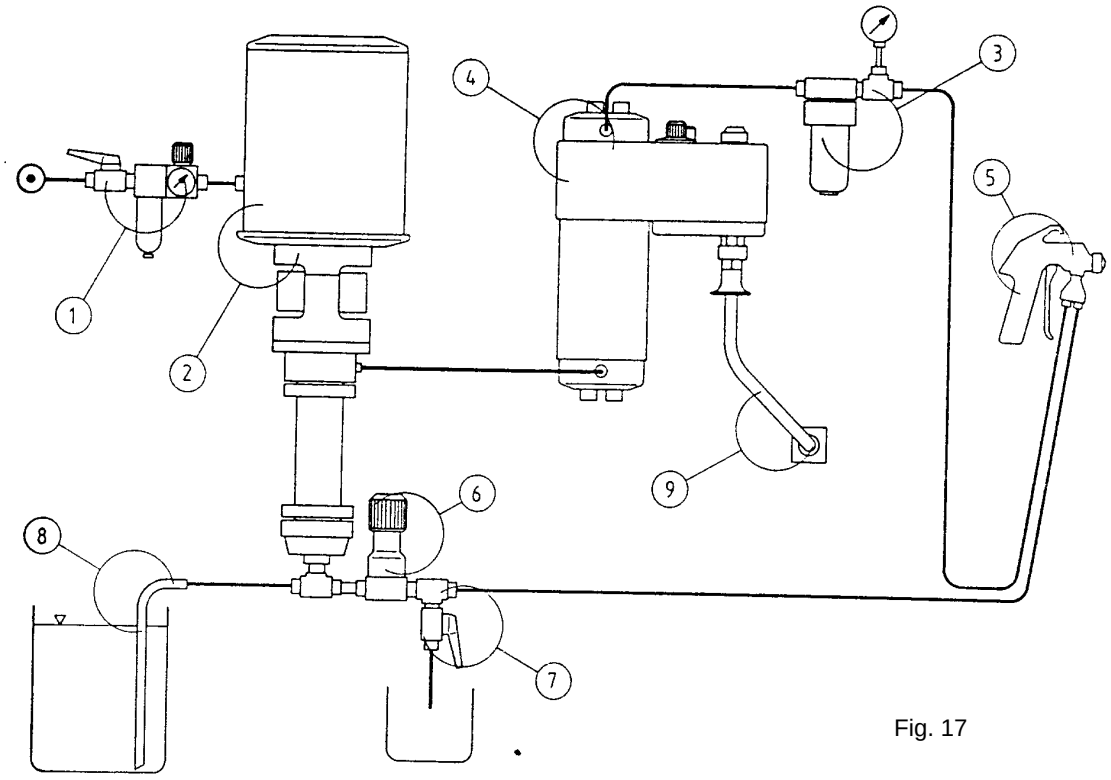


Fig. 17

① Compressed air supply
② Piston pump
③ Filter
④ Fluid heater
⑤ Spray gun
⑥ Pressure reducing valve (return flow)
⑦ Bleed valve
⑧ Suction unit
⑨ Power supply (mains connection)

CIRCUIT DIAGRAMS

Electrical circuit diagram 3 kW

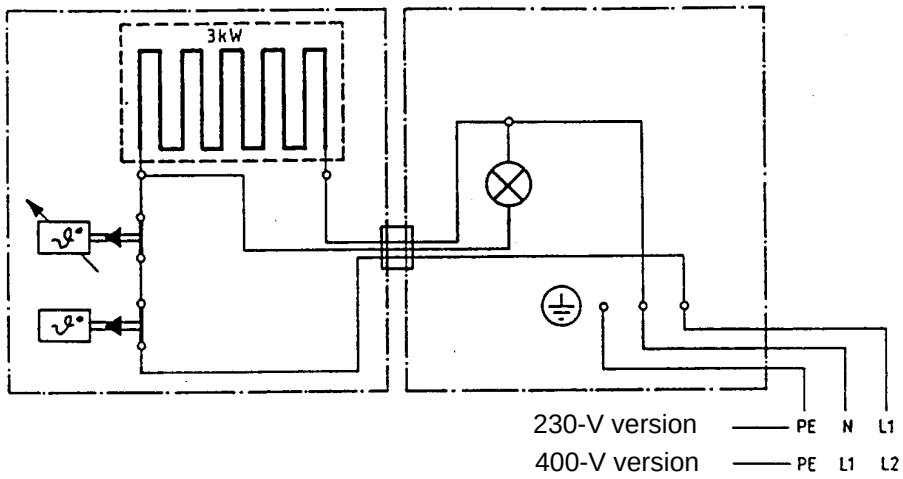


Fig. 18

Electrical circuit diagram 6 kW

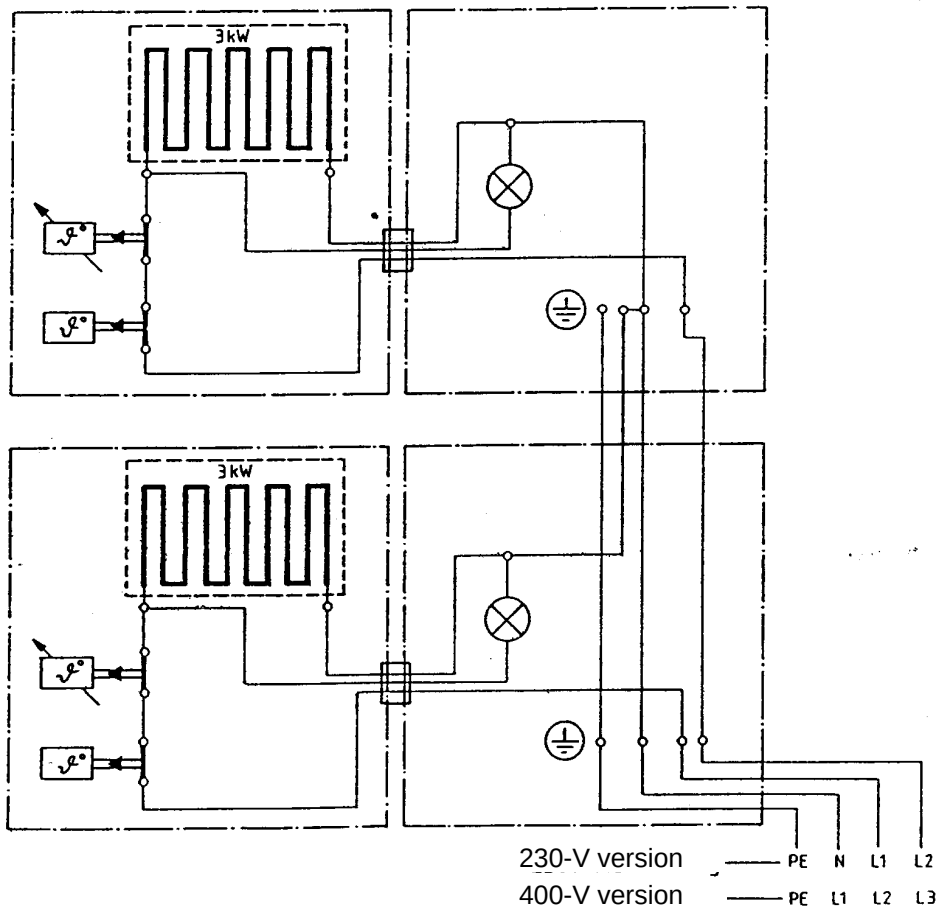


Fig. 19

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) EG-Baumusterprüfbescheinigung

(2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**

(3) EG-Baumusterprüfbescheinigungsnummer

PTB 01 ATEX 1091 X

(4)	Gerät:	Durchlauferhitzer Typ 280 .-...
(5)	Hersteller:	GRACO Verfahrenstechnik GmbH
(6)	Anschrift:	Duisburger Strasse 7, 33647 Bielefeld, Deutschland

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage und den darin aufgeführten Unterlagen zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.

Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 01-11016 festgehalten.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 50014:1997+A1+A2 **EN 50018:1994** **EN 50019:1994**

(10) Falls das Zeichen „X" hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Bau des festgelegten Gerätes gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes.

(12) Die Kennzeichnung des Gerätes muß die folgenden Angaben enthalten:

II 2 G EEx de IIB T3

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Dr.-Ing. U. Klausmeyer
Regierungsdirektor

Braunschweig, 11. September 2001

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(13) # Anlage

(14) **EG-Baumusterprüfbescheinigung PTB 01 ATEX 1091 X**

(15) Beschreibung des Gerätes

Der Durchlauferhitzer Typ 280 .-...dient zur Erwärmung von flüssigen Medien bzw. Druckluft im Bereich der Zone 1. Er wird wahlweise in einfacher Ausführung oder - verblockt - als Doppelerhitzer gefertigt.

Technische Daten

Bemessungsspannung	230 V bzw. 400 V
Bemessungsleistung	3 bzw. 6 kW

(16) Prüfbericht PTB Ex 01-11016

(17) Besondere Bedingungen

1. Die Hinweise in der Bedienungsanleitung sind zu beachten.
2. Die Öffnung des Gehäusedeckels ist nur zum Zweck von Instandsetzungsmaßnahmen durch den Hersteller bzw. entsprechend geschulte Fachkräfte zulässig. Im Ex-Bereich ist der Durchlauferhitzer vor dem Öffnen spannungsfrei zu schalten.
3. Erfolgt der Anschluß des Durchlauferhitzers im explosionsgefährdeten Bereich, so ist die Anschlußleitung (Kabelschwanz) in einem Gehäuse bzw. über eine Steckvorrrichtung anzuschließen, das/die den Anforderungen einer anerkannten Zündschutzart nach EN 50014 Abs. 1.2 entspricht.
4. Diese Hinweise sind jedem Erhitzer in geeigneter Form beizufügen.

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

Erfüllt durch Übereinstimmung mit den vorgenannten Normen.

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Dr.-Ing. U. Klausmeyer
Regierungsdirektor

Braunschweig, 11. September 2001

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 21

GUIDELINES, DIRECTIVES AND REGULATIONS

DIN VDE 0165	Errichten elektrischer Anlagen in explosionsgefährdeten Bereichen Beuth Verlag Gmbh, Berlin 30
DIN 2445	Nathlose Stahlrohre für schwellende Beanspruchung Beuth Verlag Gmbh, Berlin 30
ZH1/10 (Ex-RL)	Richtlinien für die Vermeidung der Gefahren durch explosionsfähige Atmosphäre mit Beispielsammlung – Explosionsschutz-Richtlinien – (Ex-RL)*
ZH1/200	Richtlinien für die Vermeidung von Zündgefahren infolge elektrostatischer Aufladungen*
VBG 4	Elektrische Anlagen und Betriebsmittel*
VBG 23	Verarbeiten von Beschichtungsstoffen*
VBG 87	Arbeiten mit Flüssigkeitsstrahlern*
VbF	Verordnung über brennbare Flüssigkeiten*
ElexV	Verordnung über elektrische Anlage in explosionsgefährdeten Räumen*
DruckbehV	Druckbehälterverordnung*

*Carl Heymanns Verlag KG, Luxemburger Str. 449, 50939 Köln

USER INFORMATION

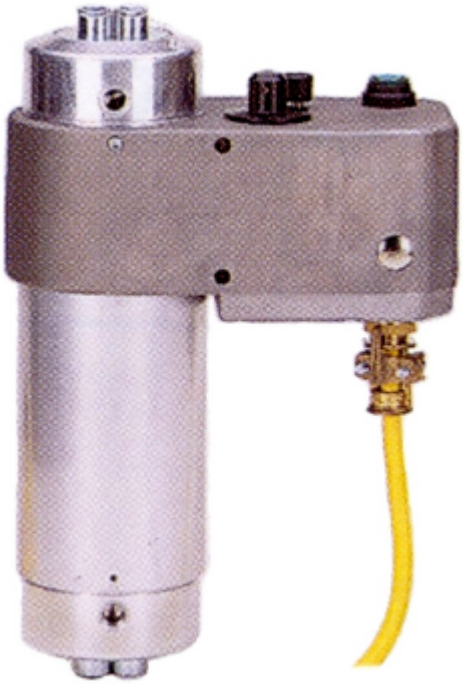
The user information (operating instructions) contains all necessary information about the fluid heater programme, in accordance with the sales catalogue 04.2005-B.

The Technical Product Description B.10.20.05-P, and the Replacement Parts List are standard parts of every operating manual.
For organisational reasons they are issued as separate documents.

FLUID HEATER 280.N-NNN

Explosion-proof fluid heater for heating fluids in particular paints.

The heater can also be used for heating compressed air. (Hot Air Process)



DESCRIPTION OF THE FLUID HEATERS

The fluid heater consists of a heat exchanger Ⓐ, a pressure-sealed space Ⓑ and a high-safety space Ⓒ.

The fluid flows from the connection ① via the bottom cover ② into the heat exchanger and from there through the top cover ⑤ into the outlet ④.

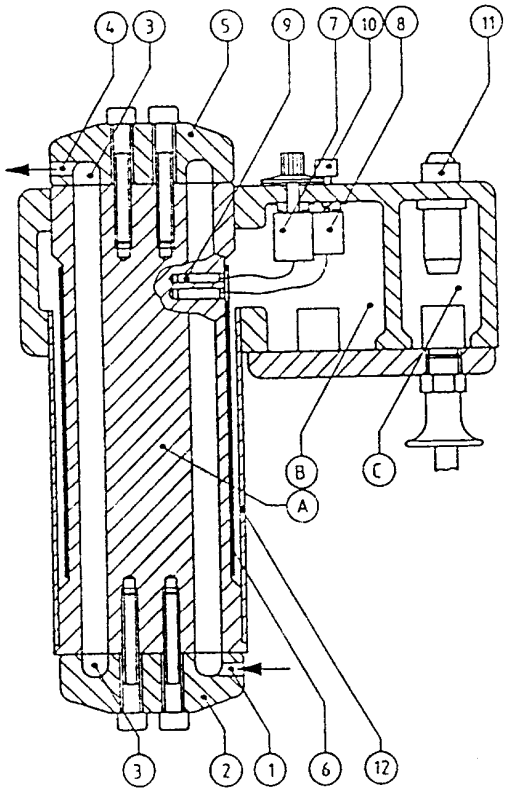
The fluid flow is changed in direction several times by cut-outs ③ in the covers.

A heating foil ⑥ protected by a jacket ⑫ encloses the heat exchanger.

The desired fluid temperature can be set at the temperature control ⑦.

The maximum temperature limiter ⑧, that is connected to a sensor ⑨ in the heat exchanger, switches off when a maximum temperature is exceeded and can be switched back on again after cooling by operating the knob ⑩.

The indicating light ⑪ goes on when operating with the heating interval.
If the heater is used for heating compressed air, the indicated flow direction should be reversed for the highest possible air temperature at the outlet.



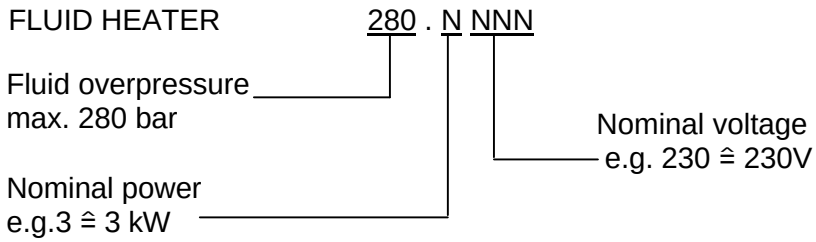
SUITABILITY, MATERIAL

The fluid heater is suitable for use in areas of zone 1 and zone 2 representing explosion hazards. As far as explosion protection is concerned, flammable materials of explosion group IIA and IIB with an inflammation point above 200°C (temperature class T1 to T3) may be used (see VDE 0165 appendix A «Safety characteristics of flammable gases and vapors»).
The fluids that are to be heated must be compatible with the materials in contact with the fluid.
Fluids which contain chlorinated hydrocarbons (halogenated hydrocarbons) e.g. trichloro-ethane or methylene chloride react with aluminum or zinc plated parts to form metal-organic compounds. These compounds are explosive and extremely corrosive.
It is not permitted to use a fluid heater made of aluminum here.
- Use a stainless steel version of the fluid heater -

> Please consult us when processing highly abrasive and aggressive (caustic) materials.

TECHNICAL DATA

KEY TO DESIGNATION



PRODUCT RANGE

Fluid heater	Model
280.3.-230	Al
280.3.-230	SST
280.3.-400	Al
280.3.-400	SST
280.6.-230	Al
280.6.-230	SST
280.6.-400	Al
280.6.-400	SST

For detailed information about standard models, standard equipment, complete systems, and the corresponding part numbers, see Sales Catalogue No. 04.2005.

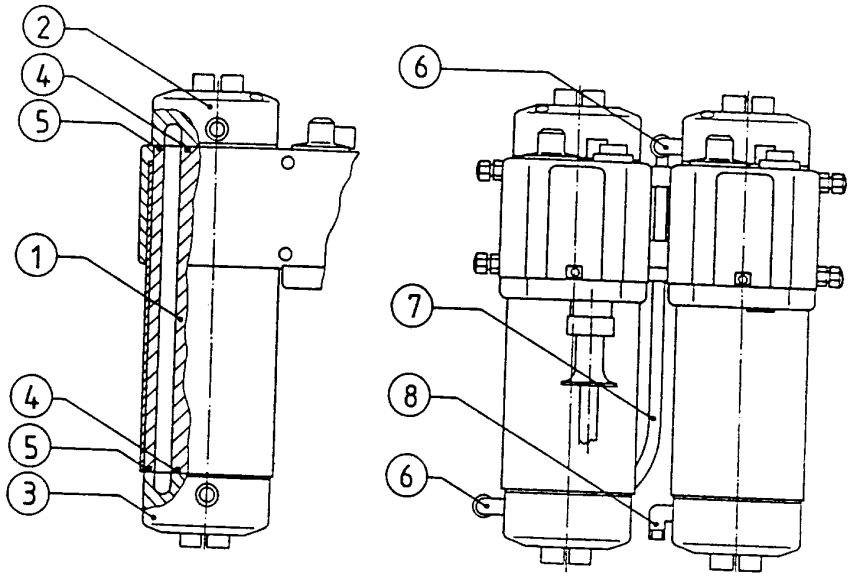
Note : A 6 kW heater consists of two electrically connected 3 kW heaters.

Properties	Fluid heater				Unit
	280.3-230	280.3-400	280.6-230	280.6-400	
Max perm. excess operating Pressure.	280				Bar
Test pressure	360				Bar
Nominal diameter of the fluid channel inside the heater	18				mm
Pressure space volume (filling amount)	0,64		0,128		L
Temperature regulating range	About 20-90				°C
Temperature constancy*	Al 2.0 / SST 3.5				°C
Nominal voltage	230	400	230/400 ⅄	400 △	V
Nominal frequency	50/60				Hz
Nominal current	13	7,5	13	7,5	A
Nominal power	3		6		kW
Weight	Al 21 / SST 41		Al 43 / SST 83		kg
Explosion protection	EEx de IIB T3				-
PTB No.	Ex-94.C.1066				-

* at constant flow rate ⅄ 3-phase system △ 3-phase system without zero conductor

When used for paint spraying use silicone-free process materials (compressed air) and accessories only.

CONSTRUCTION MATERIALS OF WETTED PARTS

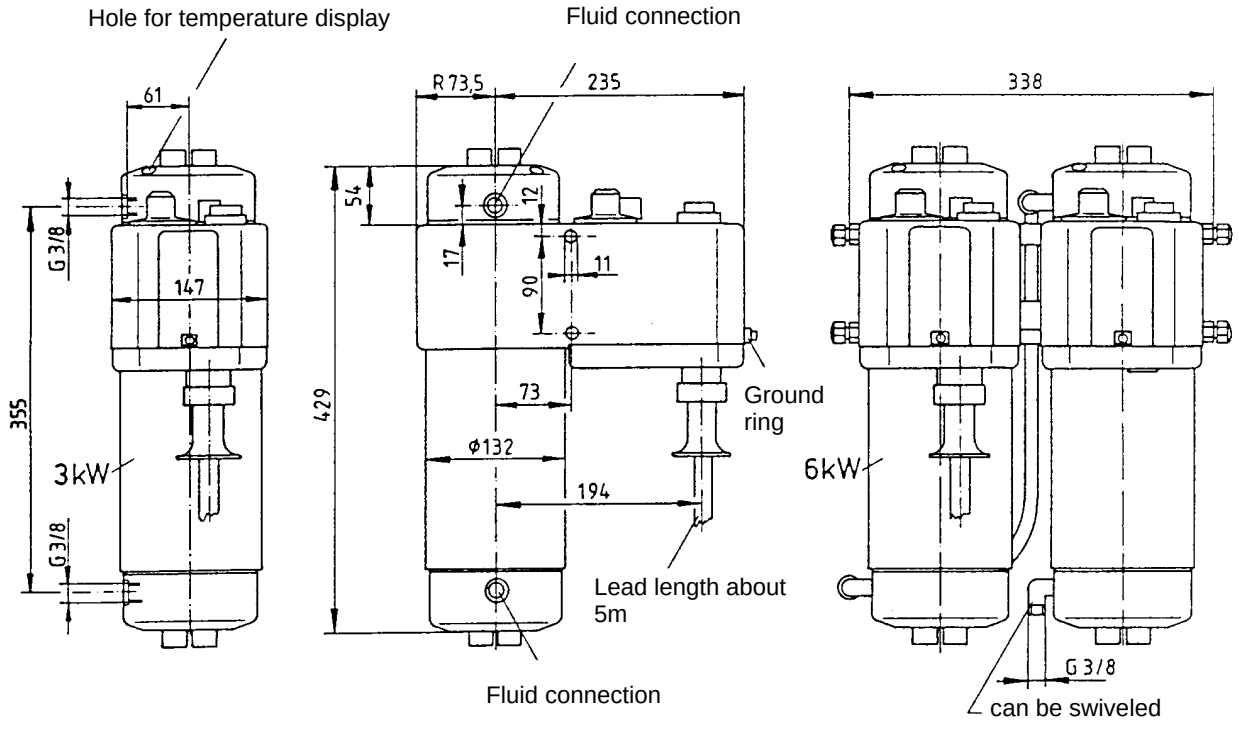


Pos.	Designation	Al models	SST models.
1	Housing D127	Al	SST 1.4305
2	Cover D125	Al	SST 1.4305
3	Cover D125	Al	SST 1.4305
4	Seal	POM	POM
5	Seal	POM	POM

Pos.	Designation	Al models	SST models
6	Cutting ring screwed connection	SST 1.4571	SST 1.4571
7	Bending pipe	SST 1.4541	SST 1.4541
8	Elbow	SST 1.4305	SST 1.4305

Pos. 6-8 only for kW version

DIMENSIONS, CONNECTION THREAD

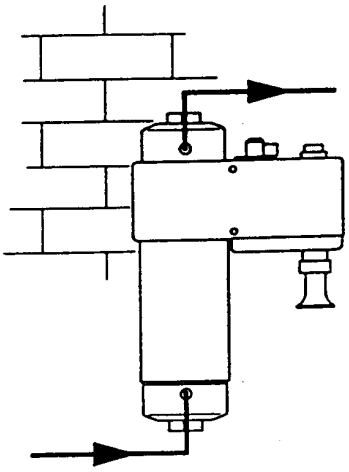


BUILD-UP POSITION

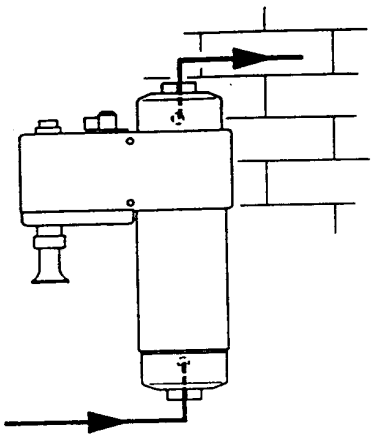
The 3 kW fluid heater can be operated in different positions shown in the following figures.

It is only possible to ensure complete bleeding of the fluid channels in these positions.

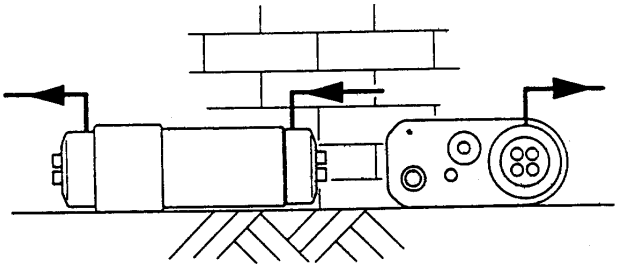
Other installations should be avoided.



Preferred installation
The preferred installation position is to have the fluid inlet and outlet in front and operation from the top.



Restricted suitability
Operating from the left, fluid inlet and outlet from the rear.



Operation from the front, fluid inlet and outlet at the top.

Other installations should be avoided.

The 6 kW heater should only be operated in the vertical position fixed by the wall mounting.

PROTECTION RIGHTS

EP 0 608 569 A1

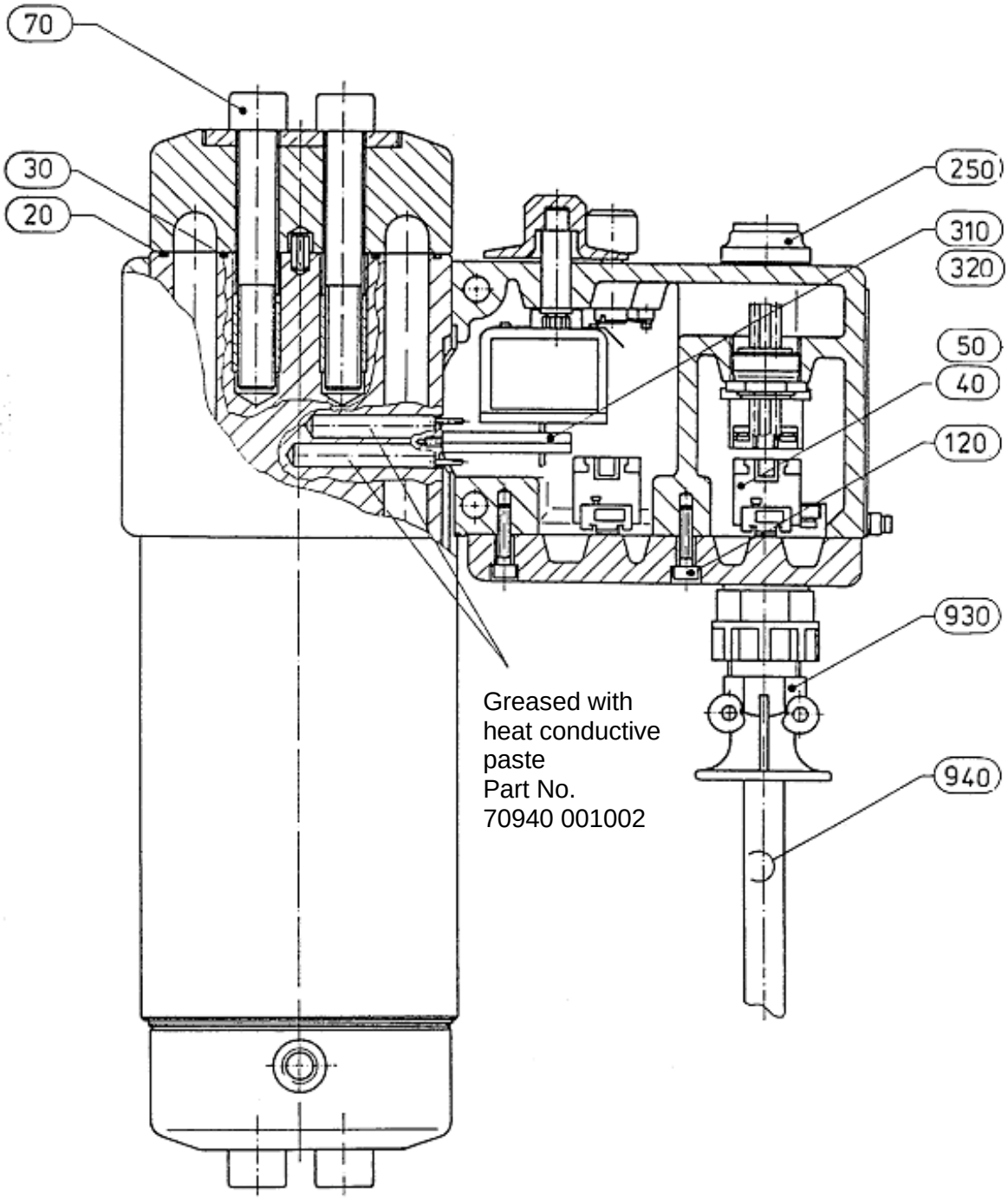
DE 43 00 163 C1

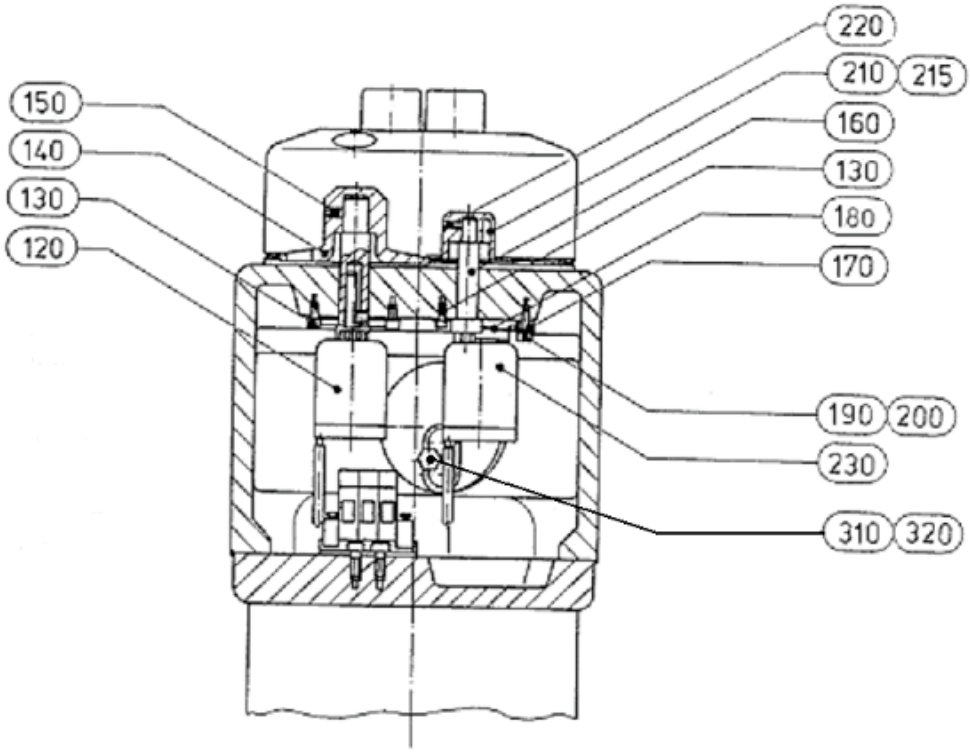
FOOTNOTE

Relevant documentation Sales catalogue 04.2005

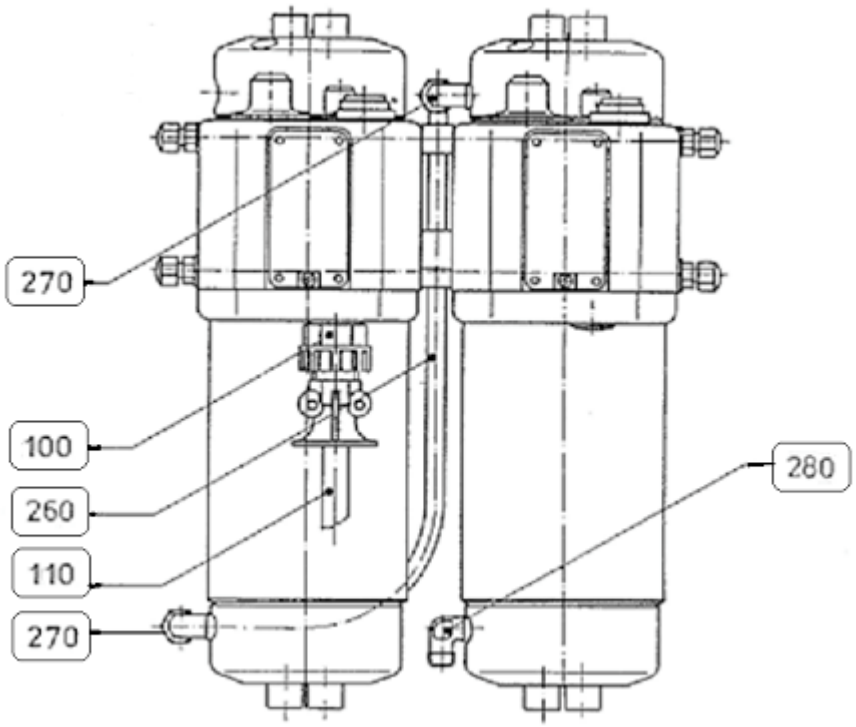
FLUID HEATER

Fluid heater 280.3 - NNN





Fluid heater 280.6 - NNN



List of replacement parts and individual parts that can be used for all fluid heaters of the product range 280.N – NNN

Replacement parts set, seals			Part No. 79978 251005	
Pos. 30	2 off	Sealing washer	59 x 66.1 x 2.5	
Pos. 20	2 off	Sealing washer	110 x 117.1 x 2.5	

Replacement parts set, screws			Part No. 79978 251006	
Pos. 70	4 off	Screw	M 16 x 10	

Replacement parts set, temperature control			Part No. 79978 251007	
Pos. 120	1 off	Temperature control complete	+ 20° to 90°C	
Pos. 130	2 off	Screw	M 3 x 6	
Pos. 140	1 off	Cap	D 60	
Pos. 150	1 off	Set screw	M 5 x 8	

Replacement parts set, temperature limiter			Part No. 79978 251012	
Pos. 130	2 off	Screw	M 3 x 6	
Pos. 230	1 off	Temperature limiter	+ 30° to 110°C	
Pos. 210	1 off	Cap	D 22	
Pos. 215	1 off	Label	RESET D 17	
Pos. 220	1 off	Set screw	M 3 x 8	
Pos. 160	1 off	Bolts	7,95 x 31	
Pos. 170	1 off	Bushing	3.2 x 7 x 4	
Pos. 180	1 off	Spiral spring		
Pos. 190	1 off	Disk	B 3,2	
Pos. 200	1 off	Screw	M 3 x 10	

Replacement parts set, screw			Part No. 79978 251009	
Pos. 120	8 off	Screw	M 6 x 25	

Replacement parts set, threaded bolt			Part No. 79978 251013	
Pos. 310	1 off	Threaded bolt	Hexagonal 8-M 3	
Pos. 320	1 off	Washer	3,1	

Replacement parts set, through terminal			Part No. 79978 251014	
Pos. 40	6 off	Through terminal	Ex 4.0 square mm	
Pos. 50	4 off	Insulating plate	D – MXK4	

Fluid heater 280.3 – 230 AI and 280.3 – 230 SST

Single part, indicating light			Part No. 72067 001032	
Pos. 250	1 off	Indicating light	Ex. 230 V	

Single part, cable entry			Part No. 72510 013002	
Pos. 930	1 off	Cable entry	M 25	

Single part, three-wire lead			Part No. 73463 020071	
Pos. 940	1 off	Three-wire lead complete	NSSHOEU-J, L5400	

Fluid heater 280.6 – 230 Al and 280.6 – 230 SST

Single part, indicating light			Part No. 72067 001032	
Pos. 250	1 off	Indicating light	Ex. 230 V	

Single part, cable entry			Part No. 72510 013003	
Pos. 100	1 off	Cable entry	M 32	

Single part, 4-wire lead			Part No. 73464 020004	
Pos. 110	1 off	Four-wire lead complete	NSSHOEU-J, L5400	

Replacement parts set, bending pipe			Part No. 79978 251011	
Pos. 260	1 off	Bending pipe		
Pos. 270	2 off	Screwed joint	GL 12 R 3/8 keg.	

Single part, Elbow			Part No. 77214 017003	
Pos. 280	1 off	Elbow complete	8 –G 3/8	

Fluid heater 280.3 – 400 Al and 280.3 – 400 SST

Single part, indicating light			Part No. 75261 025002	
Pos. 250	1 off	Fitting	M 30 x 1,5	

Single part, cable entry			Part No. 72510 013002	
Pos. 930	1 off	Cable entry	M 25	

Single part, 3-wire lead			Part No. 73464 020071	
Pos. 940	1 off	Three-wire lead complete	NSSHOEU-J, L5400	

Fluid heater 280.6 – 400 Al and 280.6 – 400 SST

Single part, indicating light			Part No. 75261 025002	
Pos. 250	1 off	Fitting	M 30 x 1,5	

Single part, cable entry			Part No. 72510 013003	
Pos. 100	1 off	Cable entry	M 32	

Single part, four-wire lead			Part No. 73464 020004	
Pos. 110	1 off	Four-wire lead complete	NSSHOEU-J, L5400	

Replacement parts set, bending pipe			Part No. 79978 251011	
Pos. 260	1 off	Bending pipe		
Pos. 270	2 off	Screwed joint	GL 12 R 3/8 keg.	

Single part, elbow			Part No. 77214 017003	
Pos. 280	1 off	Elbow complete	8 –G 3/8	

Fluid heater in basic version


Fluid heater ,Type_____

- without plug
- without dial thermometer
- without swiveling hose connection
- without fastenings

3 kW

Standard version 230 V

Pos.	Model	Material	Weight in kg	Article No.
005	280.3-230	Al	21	79251 001002
006	280.3-230	SST	41	79251 001001

Special version 400 V

Pos.	Model	Material	Weight in kg	Article No.
001	280.3-400	Al	21	79251 001004
002	280.3-400	SST	41	79251 001005

Fluid heater , Type_____

- without plug
- without dial thermometer
- without wall holder
- without fastenings

Standard version 230 V

Pos.	Model	Material	Weight in kg	Article No.
007	280.6-400	Al	43	79251 002002
008	280.6-400	SST	83	79251 002003

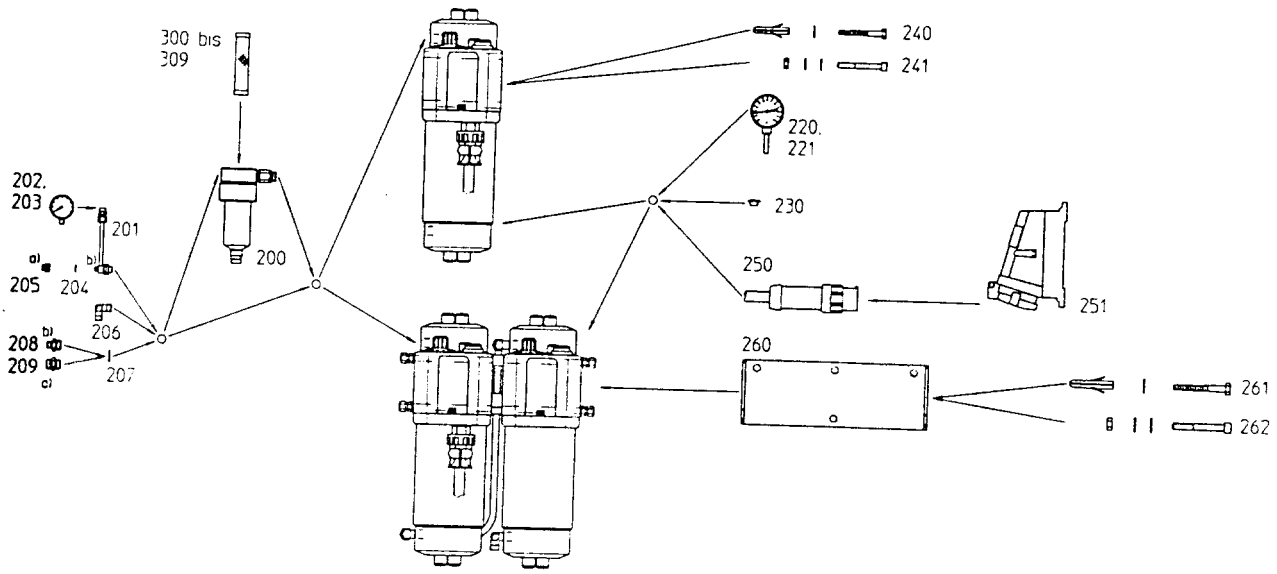
Special version 400 V

Pos.	Model	Material	Weight in kg	Article No.
003	280.6-400	Al	43	79251 002004
004	280.6-400	SST	83	79251 002005

Order Example

Please lay out each order as follows:

1. Designation	2. Pos. No.	3. Part No.
Fluid heater 280.3-230	101	79251 001101



	Pos	Designation	Material	Notes	Article No.
Fluid connection	200	Filter PN 500	SST	Without filter insert	79648 004006
	201	Pipe	SST	G 3/8 – G 1/4 PN	77796 063003
	202	Manometer	CuZn	0 to 160 bar	75782 012001
	203	Manometer	CuZn	0 to 250 bar	75782 013001
	204	Seal washer	SST	A 14 x 18	74188 012090
	205	Connector	SST	G 3/8 A – G 1/4 A	76641 017001
	206	Elbow	SST	8 – G 3/8 flexible	77214 017003
	207	Seal washer	SST	17.2 x 21 x 6	76188 105002
	208	Nipple reduction	SST	G 3/8 A – G 1/4 A	76639 016003
	209	Nipple reduction	SST	G 3/8 A	76640 005001
Temperature display	220	Dial thermometer	-	0 to 120°C	75791 002001
	221	Set screw	St	M 5 x 5	74050 039003
Screw head cover	230	Cap	Plastic	D 24	75560 002006
Wall fastening 3 kW	240	See replacement parts for	-	Heater 3 kW wall	79978 251001
	241	See replacement parts for	-	Heater 3 kW	79978 251002
Power supply	250	Plug Ex	St	4 + PE 16 A 380 V	72605 01004
	251	Wall socket Ex	-	4 + PE 16 A 380 V	72608 01001
Wall fastening 6 kW	260	Bracket	St	-	76746 016001
	261	See replacement parts for		Heater 6 kW wall	79978 251003
	262	See replacement parts for	-	Heater 6 kW	79978 251004
Filter insert	300	Filter insert	SST	c) Mw 0.060 No.	76648 045002
	301	Filter insert	SST	c) Mw 0.075 No.	76648 045004
	302	Filter insert	SST	c) Mw 0.080 No.	76648 045006
	303	Filter insert	SST	c) Mw 0.090 No.	76648 045008
	304	Filter insert	SST	c) Mw 0.140 No.	76648 045009
	305	Filter insert	SST	c) Mw 0.190 No.	76648 045010
	306	Filter insert	SST	c) Mw 0.240 No.	76648 045012
	307	Filter insert	SST	c) Mw 0.320 No.	76648 045014
	308	Filter insert	SST	c) Mw 0.410 No.	76648 045016
	309	Filter insert	SST	c) Mw 0.530 No.	76648 045018

See catalogue 07.5001 for air hoses
See catalogue 07.5003 for fluid hose lines

a) Hose connection G ?
b) Hose connection G ¼
c) Mw = mesh size in mm

GRACO STANDARD WARRANTY

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco´s written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the repaid return of equipment claimed to be defective to an authorized Graco distributor for verification of claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco´s sole obligation and buyer´s sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

Graco does not extend its warranty to accessories, appliances, materials or components which are sold by Graco but are not manufactured by Graco and makes no guarantee, however implied, with regard to the brand capability and suitability for a certain purpose. These parts sold by Graco but not manufactured by Graco (such as electric motors, switches, hoses, etc.) are covered by the warranties of the respective manufacturers. Graco will support the buyer in enforcing any warranty claim with the proviso that in no event can Graco be made liable for indirect, incidental, special or consequential damages which arise from the supply of appliances by Graco under the conditions governed by these provisions, or the supply, performance or use of any products or other goods which are sold under the conditions governed by these provisions, whether as the result of breach of contract, breach of warranty, negligence on the part of Graco or for any other reason.

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