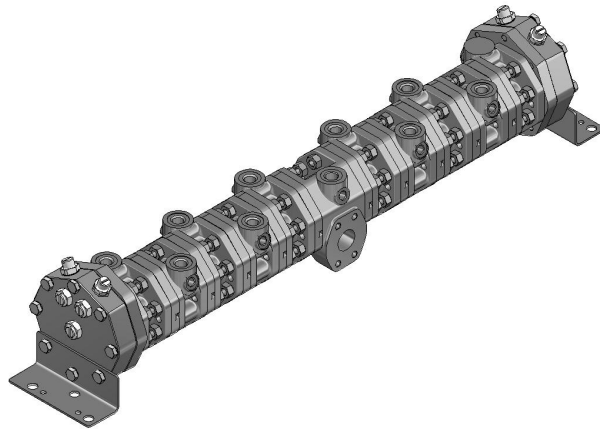




Scherzinger
pump technology

Flow Divider Type 10618 N - GE
part no. 307A9396



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Version: Rev.2.0
Date: 16.04.2021
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1. General

This "OPERATING INSTRUCTIONS" manual contains basic instructions to be followed during installation, operation and maintenance. It is therefore essential that this manual is read and understood prior to assembly and initial operation by the fitter and the relevant specialist staff / operator. It must be readily available at the site where the unit is used at all times.

All figures in rectangular brackets "[]" after individual parts refer to the item "Pos." numbers – see paragraph 8.1 – "Components list".

1.1. Use

The unit described in this "OPERATING INSTRUCTIONS" manual is suitable for a variety of liquid fuels referred to simply as the "fuel".

If you require any further information that is beyond the scope of this "OPERATING INSTRUCTIONS" manual, please contact:

Scherzinger Pumpen GmbH & Co. KG

Bregstrasse 23-25

78120 Furtwangen / Germany

Telephone: 0049 – 7723 – 6506 – 0

Homepage: www.scherzinger.de

E-mail: info@schertzinger.de

If you need further information, please specify precisely the type, year of manufacture and serial number of the unit. These data can be seen on the name plate.

1.2. Product information

This "OPERATING INSTRUCTIONS" manual applies to

Flow Divider Type 10618 N - GE part no. 307A9396

hereinafter simply referred to as "unit".

The unit is numbered consecutively. The serial number is stamped on the name plate.

The issue date and version number of the "OPERATING INSTRUCTIONS" manual can be seen on the cover sheet as well as on the footers.

1.3. Technical data

Ordering Drawing – / Specification – Number	307A9396 / 298A7665
total flow rate	34 GPM (128 l/min) @ 2400 RPM
number of elements	10
flow rate per element	3.4 GPM (12.8 l/min) @ 2400 RPM
flow characteristic	70,59Hz / GPM (18,75Hz / l/min)
pressure range	100 – 1500 psig (7 – 103 bar)
max. steady pressure drop	100 psig (7 bar)
max. fuel temperature	250°F (120°C)
storage temperature	32°F to 122°F (0°C to 50°C)
ambiente temperature	40°F to 140°F (4°C to +60°C)

Fuel purity specification

Definition of fuel purity for flow divider:

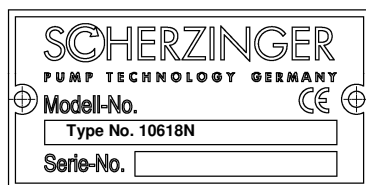
The wearing of a Flow Divider depends on several properties of the particles in the fuel - such as e.g. concentration and hardness.

The following fuel purities are specified:

- For particles with a hardness of ≤ 4 (acc. to Mohs hardness scale)
ISO 4406 - 20/18/15 or NAS 1638 - Class 10
- For particles with a hardness > 4 (acc. to Mohs hardness scale)
ISO 4406 - 16/14/11 or NAS 1638 - Class 5
- Generally, in both cases, particles $> 40 \mu\text{m}$ are not permissible

materials	casings and covers	nodular cast iron, surface treated
	shafts and gears	high grade stainless steel
	bearings	high grade stainless steel
	sealings	Viton
	pickup wheel	stainless steel

The Flow Divider nameplate is stamped as follows:



picture.1 – name plate

Be aware of the name plate mounted directly on the Flow Divider and always maintain it in a fully legible condition.



In the event of one or more of the critical values specified in this section being exceeded ask the manufacturer whether he can approve these operating conditions. If not, the Flow Divider must be modified to suit the application. Otherwise the Flow Divider, or the system into which the Flow Divider is integrated, may be damaged or destroyed and represent a danger to life.

1.4. List of revisions

Revision No.	Description	Date	Author	Approved
2.0	New logo Adaptation to current guidelines	16.04.21	sca	SHM

1.5. Schertzinger offices and local representatives

A list of Schertzinger offices and local representatives worldwide is available in the Internet at:
www.scherzinger.de

2. Safety

The installation and operation of the unit must comply with all national and local health & safety regulations and legislation.

Equipment that is installed incorrectly, operated in a dangerous manner, or poorly maintained is a potential safety hazard and unless all reasonable precautions are taken, injury to personnel or damage to the equipment could result.

2.1. Labelling of instructions in this manual

This "OPERATING INSTRUCTIONS" manual contains safety regulations that if ignored, can cause injury or death to personnel. Warnings are specially marked with the following:

Danger Sign



Sign Refers to
DIN 4844 - W9

High Voltage Sign



Sign Refers to
DIN 4844 – W8

Explosive atmosphere sign



Sign refers to
DIN 4844 – W21

Information that if ignored, can cause damage to the unit or the system it is used in, are marked with the word:

WARNING

Information plates are attached directly to the unit such as:

- sign with direction of rotation
- nameplate with type and serial number
- "DO NOT OPEN" sign
- grounding terminal

The information plates must be observed and preserved.



Non-compliance poses danger to life and limb.



Non-compliance poses danger of electrical shock.



Non-compliance poses risks of explosives hazards

2.2. Personnel qualification and training

The operational, servicing, maintenance and assembly personnel must have the necessary qualifications to carry out these tasks. The area of responsibility, duties and supervision of the staff must be carefully controlled by the operating company.

Personnel that does not possess the necessary skills and knowledge, has to be trained and instructed accordingly.

The operating company must ensure that the contents of this "OPERATING INSTRUCTIONS" manual are fully understood and complied with by the personnel.

2.3. Dangers of non-compliance with safety instructions

Disregarding of safety instructions may cause dangers or be hazardous to life and limb, the environment and the unit itself. It may also result in a liability claim.

Examples of these dangers are:

- failure or malfunction of the unit
- electrical shock
- danger to personnel by mechanical and / or chemical effects
- danger to the environment caused by leakage
- etc.

2.4. Working safely

The safety instructions specified in this “OPERATING INSTRUCTIONS” manual, existing national and international regulations on the prevention of accidents and any other internal working, operating and safety regulations issued by the operating company are to be complied with.

2.5. Safety instructions for the operating company



Hot parts representing a danger for personnel or the environment have to be designed in such a way as to prevent accidental contact.

Leakages must be conducted away so that no danger to personnel or the environment arises. Legal regulations have to be observed.

2.6. Safety instructions for servicing, maintenance, inspection and assembly work

The operating company shall ensure that all servicing, maintenance, inspection and assembly must be performed by authorised, skilled and trained specialist personnel only, who has read and understood the contents of this “OPERATING INSTRUCTIONS” manual.



- All maintenance, assembly and disassembly must be done while the unit is not operating
- Upon completion of the work, all safety and protective devices must immediately be refitted and made operational
- The points listed in paragraph 5 – “Installation” – must be observed before restarting

2.7. Unauthorised conversion and production of replacement parts

Conversion or modification of the unit is strictly forbidden. Original replacement parts and accessories approved by the manufacturer have an essential safety role. The manufacturer refuses every liability and warranty claim for any consequences arising from the use of other parts.

2.8. Improper modes of operation

The operational safety of the unit is only ensured if it is used properly in accordance with paragraph 1 – “General” – of this “OPERATING INSTRUCTIONS” manual. The limiting values specified on the data sheet and in paragraph 1.3 – “Technical data” – must be complied with under any circumstances.

2.9. Lifting of the unit



Care should be taken when lifting the unit. Suitable lifting devices have to be used.



Avoidance of tools and objects falling onto the shear seal valve that would risk damage and sparking due to the kinetic energy of impact. Avoidance of impact contact with possible rusty surfaces combined with objects made of aluminium, for the purpose of avoiding an aluminothermic reaction that could lead to sparking.

3. Transportation and interim storage

3.1. Shipment and protection measures

The unit is shipped in a special transportation box for protection against impact or shock. The inlet and outlet ports are closed with sealing plugs. The unit is filled with a special rust preventing oil to protect it from corrosion. When delivered from Scherzinger factory this rust preventing oil is:

AVIA FLUID HLPD 10

To refill the unit for rust protection on site, every comparable hydraulic oil could be used.

To prevent the unit from damages during transportation it is fixed to the base plate of the transportation box with special fixation clamps.

Scherzinger recommends to store the original transportation box, the sealing plugs and the fixation clamps to guaranty a proper transportation after use.

3.2. Transportation

Scherzinger guarantees that the unit was at the time of delivery working well and that shipment was done in a suitable transportation box. After receipt immediately check the unit for shipping damage. If you discover any damage, immediately contact the forwarder agent and Scherzinger Pumpen or the responsible Scherzinger representative in your area – see paragraph 1.4.

WARNING

The unit must be treated carefully. Rough handling can cause damage to the unit.

3.3. Interim storage

If the unit is directly coming from the manufacturer and not yet unpacked, it is filled with a special rust preventing oil. Besides an appropriate storage see paragraph 1.3 – “storage temperature” – no further steps are necessary.

WARNING

If the unit has been in operation and afterwards should be stored, it must be refilled by way of the inlet with a special rust preventing oil, see paragraph 3.1. Accordingly, it shall be presumed that the oil is distributed within the gear chambers to the discharge side of each element. This can be effected by the “easy-running check” see paragraph 6.2. After refilling with the rust preventing oil all inlet and outlet ports must be sealed with the original or comparable plugs.

Storage temperature has to be observed, see paragraph 1.3 – “storage temperature”.

3.4. Factory return

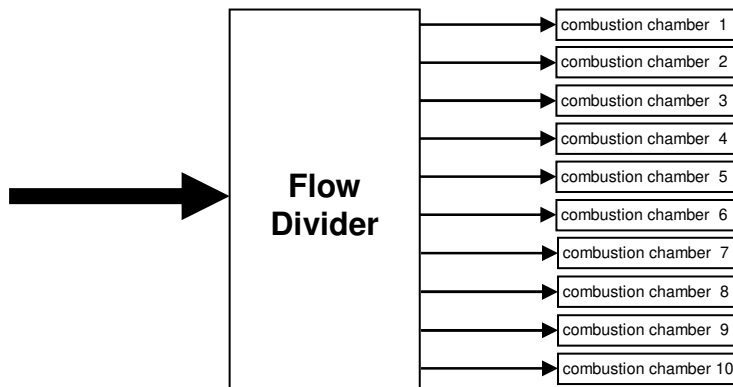
WARNING

When sending the unit back to the manufacturer for repair or maintenance, it has to be filled with special rust preventing oil – see paragraph 3.1 and 3.3 – and sealed with the original or comparable plugs – see para 3.1. The packaging has to be done with the original or comparable transportation box – see paragraph 3.1.

4. Flow Divider design

4.1. Principle design

Flow Dividers are needed in Gas Turbines running on liquid fuel with more than one combustion chamber. Flow Dividers split the incoming main flow of liquid fuel into equal flows to support all the nozzles in the combustion chambers with the same flow rate.

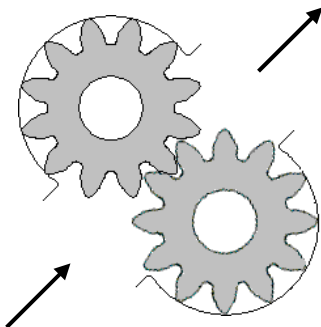


Picture 4.1 – Funktional principle of the Flow Divider

4.2. Detailed description

4.2.1. Design

The fuel is brought from the inlet port(s) to the inlet of each gear pump element so that by the way of the discharge openings each fuel nozzle of the gas turbine is provided with the same fuel quantity. Thereby the gear pump elements are driven by the fuel stream, directly proportional to the speed of the Flow Divider. Each gear pump element consists of two gears [1], rotating in the gear housing [7] with small diametral and lateral clearances.



Picture 4.2 – gear pump element

Drive gears [1] and drive shafts [24; 26] are connected one to another by couplings [42; 43]. The drive shafts [42;43] are carried in high precision bearings [53; 65; 75].

All turning and bearing surfaces of each gear pump elements are lubricated by the fuel, therefore the fuel must be free of any impurity. A filtration according to paragraph 1.3 – “required filtration” – is necessary.

WARNING

In the case of a missing or a coarse fine filter that does not correspond to the officially required filtration, there is the possibility of intruding solid particles. The danger of settling which will ultimately cause abrasion early on with an inadmissible temperature increase will be present.

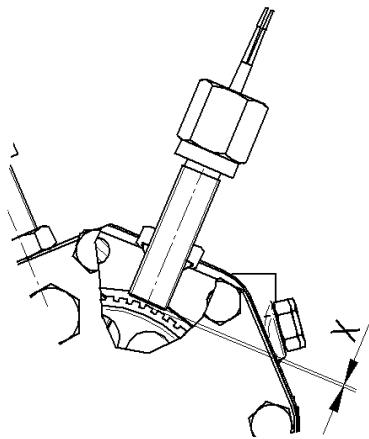
Gears and bearings will be damaged. The operator must secure that the required filtration is used in order to prevent part failures along with a dangerous temperature development.

4.2.2. Magnetic Pickup

The Magnetic Pickups used are according to GE drawing no. 185A1117 as tabulated. This GE drawing specifies all technical data.

To adjust the distance "X" between the Magnetic Pickup and the pickup wheel [35] do as follows:

1. open the plug [40] matching the magnetic pickup
2. remove the plug [12]
3. screw in the magnetic pickup into the threat of the plug [12]
4. insert a distance spacer with a thickness of 0,009 inch \pm 0,001 inch between the magnetic pickup and the pickup wheel [35]
5. screw in the magnetic pickup until the distance spacer starts to jam
6. pull out the distance spacer
7. tighten the magnetic pickup with the sealing nut [13; 14]
8. check the distance again – the distance spacer must fit between the magnetic pickup and the pickup wheel [35] tightly
9. reinsert and tighten the plug [40]
10. repeat these steps with all magnetic pickups



Picture 4.3 – adjust the distance X

WARNING

An incorrect adjustment especially a tightened Magnetic Pickup may lead to heat-generating and spark forming contact with the pickup wheel [35] which potentially presents an explosive danger. Please be aware of the warning label on the Flow Divider to use only the recommended adjustment gage.



Do not unscrew plugs while the Flow Divider is under system pressure or in operation.

The Flow Divider may only be operated with the approved and certified Magnetic Pickups according to the requirements in the Flow Divider Specification or ordering Drawing – see paragraph 1.3 – or with the original installed Magnetic Pickups. In case of non-observance the warranty will void.

5. Installation

Sufficient room for maintenance and servicing works must be ensured when selecting the operating location. It should be possible to install and remove the unit without difficulty.

5.1. Before Installation

The unit should be kept in the original transportation box until it is installed. When unpacking the unit, the following steps must be performed:

1. remove the cover of the transportation box
2. release the unit from the base plate by unscrewing the clamping bolts
3. remove the unit from the base plate with a suitable lifting device – see paragraph 2.9
4. to drain the special rust preventing oil unscrew the cover plate(s) on the inlet port(s)
ATTENTION: Oil is dropping out and should be collected
5. unscrew the plugs from the outlet ports
6. to drain the unit completely unscrew the central plug on the end casing and turn the shaft by a screw driver see paragraph 6.2 – “easy-running” check
7. after drainage reassemble the central plug on the end casing
8. install the unit



As far as dust deposits exist on the unit or on the basement where it will be fixed they should be removed without using compressed air in order to prevent existing dust from creating possible ignition sources on hot surfaces.

5.2. Electrical drive

The Flow Divider Type **Flow Divider Type 10618 N - GE part no. 307A9396** described in this “OPERATING INSTRUCTIONS” manual has no electrical drive.

5.3. Mounting

WARNING

Verify that the supporting surfaces of the mounting brackets mate with bearing surfaces of the base plate so that they can be attached without any external strains and loads. The mounting surfaces of the base plate must be flat and parallel within 0.01 inch (0,25mm).

WARNING

The unit must be mounted vertically, with inlet from the top.

To install the unit perform the following steps:

1. Screw on the unit to the base plate
2. Screw on the connection flange(s) to the inlet port(s) equipped with all necessary seals
3. Screw on the fittings at the discharge ports equipped with all necessary seals

WARNING

The unit must not be subjected to external loads. All pipes must line up naturally without the use of force.



The flow divider including possible additional components have to be included into the potential equalisation of the machinery arrangement. The operator has to make sure that the inlet and outlet connections are grounded equally in order to conduct potential differences, which are caused by the discharging medium. (Ref. 4.2)

5.4. Connection Piping

WARNING

When installing the connection pipes, care must be taken to avoid any strains and loads, which could be caused by thermal expansion and the like.

WARNING

It is very important to install only correct fittings. All fittings must screw in easily, use force only for the final seating.

The connection piping has to be chosen with a suitable inner diameter. Below the maximum allowable flow velocities are shown:

- Inlet connection pipe(s): 11,5 ft/sec (3,5 m/sec)
- Outlet connection pipes: 6,5 ft/sec (2 m/sec)

Choosing smaller diameters will cause higher differential pressure drop and can affect the correct running of the gas turbine.

Ensure that all pipe connections are screwed tight so that there is no possibility of leakage. The flange and thread connections of the inlet and outlet pipes must be executed and observed with special care. An inappropriate connection can cause a leak with the danger of leakage and inflammation of the medium outside of the inlet and outlet pipe.

WARNING

Avoid any operation against the resistance of a reduced or partly closed outlet port. Otherwise this will lead to an unacceptable high internal pressure with temperature increase and destruction of the mechanical parts. The operator has to secure that the incoming fuel pressure at the inlet port is to be observed and regulated by a bypass valve.



Use of a fine filter, as described under Point 1.3. If no fine filter is available, or the available filter is too coarse and does not conform to the prescribed classification, this could lead to penetration by solid particles that could lead to sticking and deposits that would consequently result in functional impairment due to clogging in combination with heat generation caused by reduction in cross-section.

In order to assure maintenance of unreduced input pressure and to prevent possible temperature increase caused by reduction in cross-section, the operator must clean or change the filter at suitable intervals.



Flush and pumping procedures, including the draining of the unit may only take place in accordance to the appropriate policies of the regulatory authority in terms of spraying, jet blasting, and retention time of flowing liquids when nonconductive containers are used. The discharge resistance of floors, electrostatic charge of personnel and their conductive clothes should be considered.

6. Maintenance

6.1. General information

Scherzinger Flow Dividers are manufactured with highest precision. Since even the assembly of the unit is carried out by qualified trained personnel with continuous intermediate inspections, it is absolutely necessary to perform any repair in the manufacturer's works or in workshops with special authorization. Contact data see para 1.4 – "Schertzinger offices".



Opening any screw connection is only permitted after the Flow Divider has cooled down to surrounding temperature. Please consider hereunto the warning label on the Flow Divider.



Before opening it must be determined that no foreign particles will be able to get inside the Flow Divider. These particles can cause essential damage to the Flow Divider.



After all maintenance work it is to ensure that all screw connections are tightened with the necessary torque. In certain cases the screw connections should be secured or sealed with recommended adhesive so that no gas will be able to leak out.



Where electrically non-conductive screw-sealing tape made is used, it is necessary to assure that all parts are electrically conductive or that they are bridged in such a manner that they are conductive.



Should seals be removed in the case of maintenance, they must be replaced and correctly positioned so that they are not jammed and will be able to provide perfect sealing to the exterior. Leaky seals will lead to leaks with the potential danger of inflammation of the fuel outside of the Flow Divider.

6.2. "easy-running" – check

If the Flow Divider shows any signs of malfunction the first check is the easy-running. After the Flow Divider is out of operation and has cooled down to the environmental temperature please perform the following steps:

1. remove the central plug from the cover
2. try to rotate the main drive shaft with a screw driver in the arrow direction
3. if the Flow Divider cannot be rotated by screw driver inform the manufacturer or a local representative – see paragraph 1.4.
4. if the Flow Divider can be rotated by screw driver reassemble the plug – in this case the problem is not with the Flow Divider

6.3. Trouble shooting

If problems occur please check the following:

- Whether connection pipes are absolutely void of any leaks
- Whether connection pipes are blocked up
- Whether connection pipes do place any external strains and loads to the unit
- Whether the used connecting threads are correct

If trouble free operation is not possible after completion of the above points, please contact the manufacturer or local representative immediately.

7. Special instruction for operation with Naphtha only

When operating the Flow Divider with Naphtha we recommend a “break-in-time” of 1000 hours. After this period the Flow Divider / Gas Turbines characteristics should be watched very carefully, especially during a shut down and startup cycle.

WARNING

This can be done max. three times. After maximum 4000 hours of operation, an inspection cycle of the Flow Divider is necessary.

WARNING

If ever within a break-in-time abnormal results of measured Flow Divider / Gas Turbine characteristics are found, the manufacturer of the gas turbine or Scherzinger should be contacted immediately.

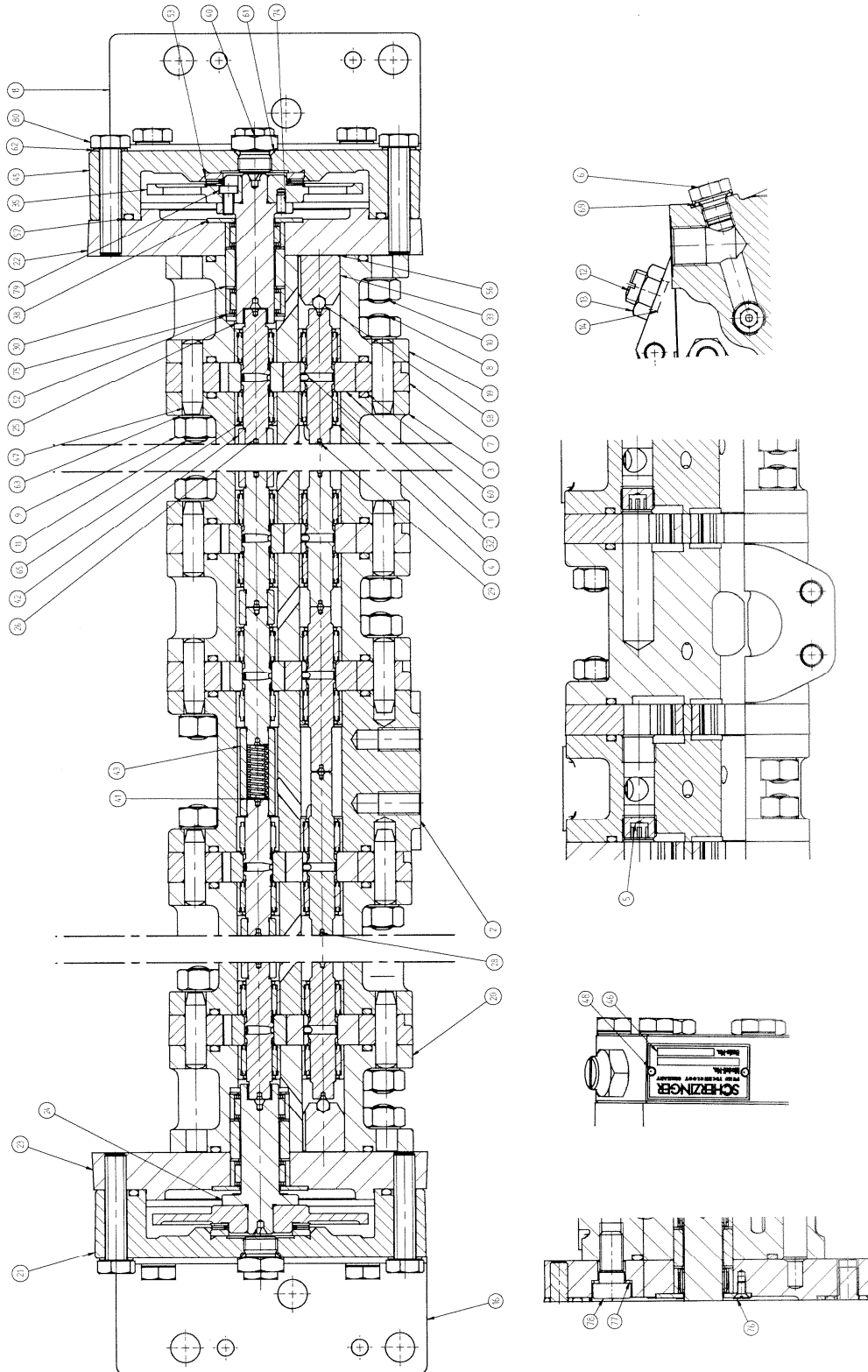
8. Components list

8.1. Components list

Pos.	Qty.	Designation	Part-No.	ID - no.	Description
1	20	gear	10618-007.00	040355	
2	1	casing	10611-001.00	040127	
3	8	casing	10611-001.03	040128	
4	40	ring	10611-010.02	040565	
5	8	plug	10611-061.00	040350	
6	10	plug	7700-061.02	030104	
7	10	gear chamber	10000-004.00	040008	
8	76	screw bolt	10000-024.00	040020	
9	88	nut	10000-026.00	500102	UNF 7/16"-20 2B
10	8	screw bolt	10600-024.00	040058	
11	4	screw bolt	10600-024.01	040059	
12	4	plug	10600-061.01	040062	
13	4	nut	10600-064.00	040065	
14	4	seal	10600-079.00	500115	PTFE
15	1	mounting bracket	10600-129.00	500117	
16	1	mounting bracket	10600-129.01	500118	
19	1	casing	10605-001.02	040085	
20	1	casing	10605-001.04	040086	
21/45	2	casing	10609-001.01	040122	
22	1	flange	10605-002.00	040088	
23	1	flange	10605-002.01	040089	
24/25	2	drive shaft	10605-005.01	040101	
26	10	drive shaft	10605-005.04	040562	
28	2	shaft	10605-006.02	040563	
29	8	shaft	10605-006.03	040564	
30	2	bush	10605-011.00	040107	
32	20	bolt	10605-020.00	040109	
33	2	bolt	10605-021.00	040110	
35	2	pickup wheel	10605-027.00	040112	
38	2	washer	10605-040.00	040115	
40	6	plug	10605-061.00	040117	
41	1	spring	10605-102.00	500123	
42	8	bush	10605-126.00	040119	
43	1	bush	10605-126.01	040120	
46	1	nameplate		500247	
47	20	bolt		701059	ISO 8734 -10m6x36
48	2	grooved drive stud		701073	ISO 8746-2x6
52	4	shim ring		704530	DIN 988-20x28x1
53	2	needle bearing		705022	AX30x47x6 F-203391
56	2	adjusting washer		704525	DIN 988-14x20x0.2
57	2	O-ring		718088	117.07x3.53
58	2	ball		705033	DIN 5401-Ø6
60	22	O-ring		718081	69.44x3.53
61	6	O-ring		718015	14x2.5
62	16	snap		712045	S10
63	88	snap		712046	S11.1
65	40	needle bearing		705127	K12x17x14 F-222610.02.K
69	10	seal		704509	DIN 7603-A14x18x1.5
74	2	bolt		701056	ISO 8734-4m6x10
75	4	needle bearing		705090	18x24x12 F218161.05.K/0 24x28x12 F-602002.AU
76	6	countersink screw		702002	ISO 2009-M4x8
77	4	seal		704507	DIN 7603-A12x17x1.5
78	4	socket cap screw	10605-025.00	500231	7/16"-14 UNCx25
79	6	socket cap screw		702074	DIN 6912-M5x10xA4
80	16	socket cap screw		702117	ISO 4017-M10x50

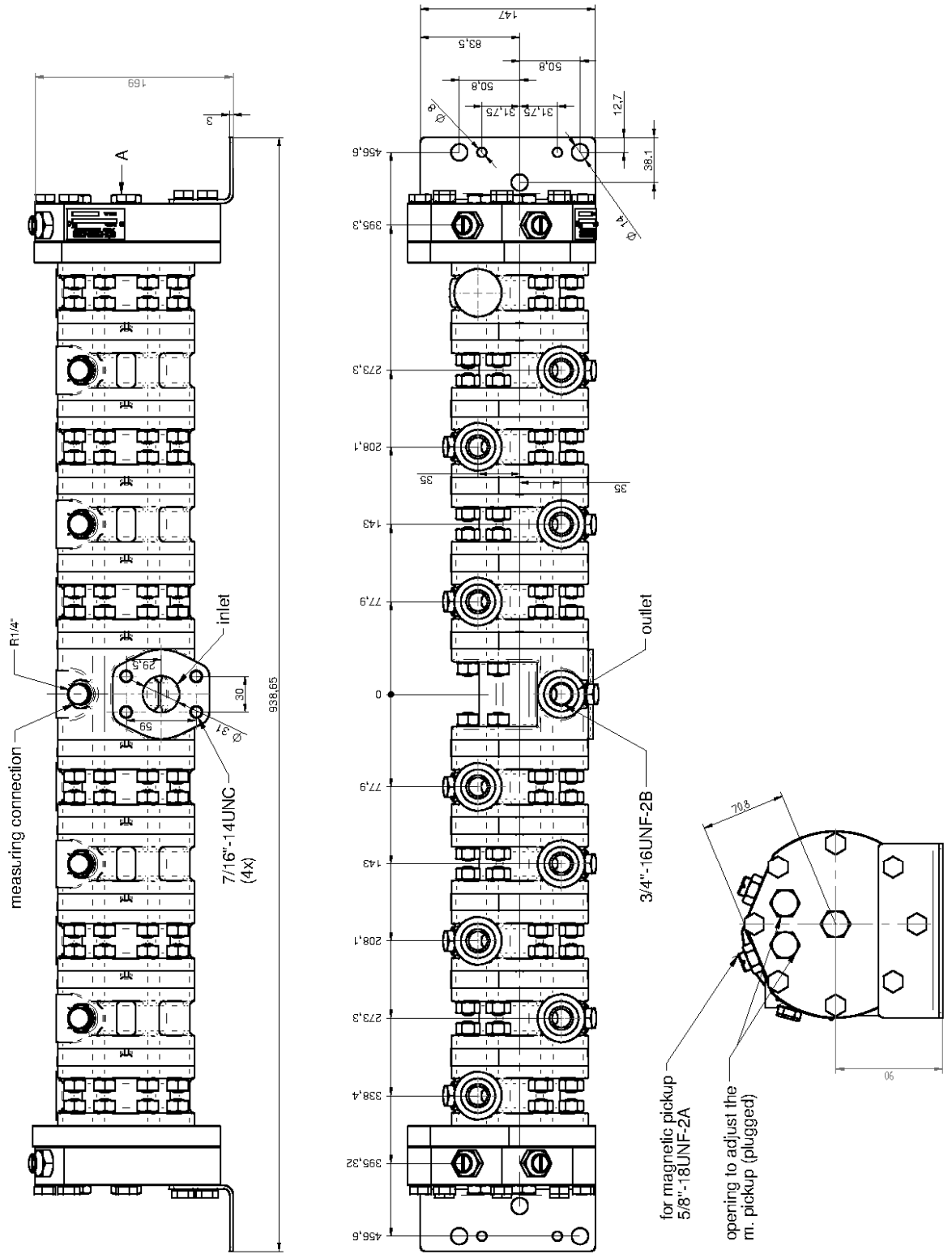
Table 8.1 – components list

8.2. Sectional drawing



Picture 8.2 – sectional drawing

8.3. Dimension sheet



Picture 8.3 – dimension sheet

9. **Declaration of conformity as per Directive 2006/42/EC**
(Machinery Directive)

**Declaration of Conformity
as per Directive 2006/42/EC**

In accordance with EU Directive 2006/42/EC, Appendix II B, dated 17. May 2006, the manufacturer:

Scherzinger Pumpen GmbH & Co. KG
Bregstraße 23-25
78120 Furtwangen / Germany

declares that the product:

Flow Divider Type 10618 N - GE part no. 307A9396

in the model supplied by us without a drive engine, is intended for installation in a machine or for assembly with other machines for a machine/system, and that operation thereof is prohibited until such time as it has been established, that the machine/system into which this unit is to be installed, or with which this unit is to be assembled, complies with the provisions of Directive 2006/42/EC.

The following harmonised standards were applied:

EN ISO 12100:2011
EN ISO 13857:2020
EN ISO 13732-1:2008
EN 809:1998+A1:2009 + AC:2010
EN 60204-1:2019

Applicable directives below:

2006/42/EC **Machinery Directive**



Applicable national standards and specifications:

Accident prevention regulations

Responsible person for documentation: Matthias Derse

Furtwangen, 16.04.2021



(Dipl.-Ing., MBA Matthias Derse)
Managing Director

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heart of hightech

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