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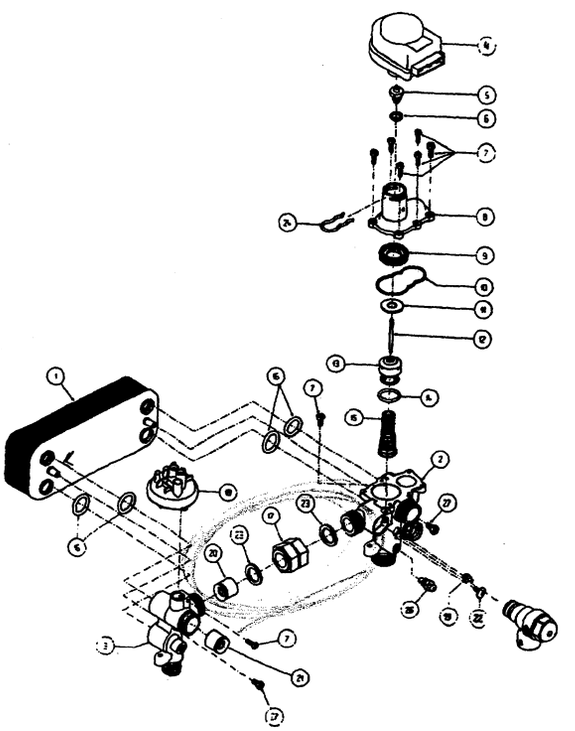
Remarks:
This application was filed on 17 - 03 - 2003 as a divisional application to the application mentioned under INID code 62.

(54) Boiler

(57) A boiler is provided with a heat exchanger having a front face provided with a sanitary inlet port, a sanitary outlet port, a heating inlet port and a heating outlet port, and a hydraulic group for connecting the secondary heat exchanger to a heating circuit and to a sanitary circuit; the hydraulic group is provided with a one-level pressure switch for the heating circuit, a three way valve provided with and electric actuation group, a sanitary flow switch provided with filter, and a by pass valve; the hydraulic group features a first connection assembly and second connection assembly; the hydraulic group having a flow pipe for connecting the first and the second connection assemblies and a by pass valve arranged inside the flow pipe, which is parallel to the front face of the secondary heat exchanger.



EP 1 384 960 A1

Description

General

[0001] The present invention relates to a boiler provided with a functional group featuring an aggressive price/performance ratio, a reference architecture with system standardization, reduction of the number of components to prevent codes proliferation, simplification of assembly and testing procedures with consequent reduction of production time, modular design for use on boilers with different architectures.

[0002] A product featuring pexformance and reliability improvements enabling to minimize field failures and to switch from an hydraulic to a motorized system using components made of composite material.

Modified elements

[0003] The elements presenting a greater innovation as compared to the current model are in bold type (reference European patent no. 0652408, enclosed)

- Inclusion of quick fastening systems with o-ring seals and fastening pin or clamping screw.
- Inclusion of hoses with fastening pin at one of the two ends
- Previous by-pass valve (head + spring + sealing ring nut) replaced by a by-pass valve, diameter 20, providing easier and more reliable disassembly
- Application of a limestone-proof system consisting of a check valve (reference our European patent request no. 97830588.6 filed on November 11, 1997)
- the group has been conceived as modular in order to obtain with the same components the following versions :

    - heating only
    - heating only with connection to remote boiler
    - heating + sanitary water

- the hydraulic group inside the boiler has been standardized leaving to the template, provided separately with different configurations, the function to match the various types of plant loading system available in the different countries.
- Inclusion of one-level safety pressure switch for heating purposes to replace the mechanical differential flow switch consisting of a diaphragm, a cap, a spring, a spindle and a micro for the electric signal. The differential flow switch authorizes gas ignition when the following two conditions under its control occur:

    - The water pressure is sufficient
    - The pump is running

    The one-level pressure switch, connected to the electronic card, checks the water pressure while circulation is kept under control by an intelligent probe. The one-level pressure switch is a completely new component and its use allows to replace the differential flow switch increasing reliability and making the control of water pressure easier.
- Inclusion of a 3-way electric actuator allowing to switch from a 3-way hydraulic system with intermediate control lever (at rest when in heating position) to a direct electric actuator of new design with built-in over stroke (at rest when in sanitary water position) to reduce the user's waiting time for the hot sanitary water.
- Inclusion of a sanitary flow switch complete with filter, allowing to switch from a diaphragm (venturi) priority system for sanitary water to a sanitary priority system with a float + magnet flow switch controlled by a reed switch to reduce the user's waiting time for hot sanitary water.

Enclosed please find :

[0004]

- 3 color assembly views of the new hydraulic group
- diagram of the new hydraulic circuit
- exploded view of the new hydraulic group evidencing the sanitary flow switch, the 3-ways actuator and the new pressure switch
- drawing of the heating by-pass
- specifications and drawing of the electric actuator
- specifications and drawing of the heating pressure switch
- specifications and drawing of the sanitary pressure switch

[0005] It is an object of the present invention to achieve the above tasks in a straightforward and economic way. According to the present invention there is provided a boiler comprising a heating circuit, a sanitary circuit a main heat exchanger connected to the heating circuit, a secondary heat exchanger having a front face provided with a sanitary inlet port, a sanitary outlet port, a heating inlet port and a heating outlet port, and a hydraulic group for connecting the secondary heat exchanger to the heating circuit and to the sanitary circuit; said hydraulic group comprising a one-level pressure switch for the heating circuit a three way valve provided with and electric actuation group, a sanitary flow switch provided with filter, a by pass valve; the boiler further comprising a first connection assembly provided with quick fastening means comprising pin or clamping screw for connecting said first connection assembly to said secondary heat exchanger and second connection assembly comprising quick fastening means for connecting said second connection assembly to the secondary heat exchanger, the first connection assembly connecting the heating circuit to the heating outlet port

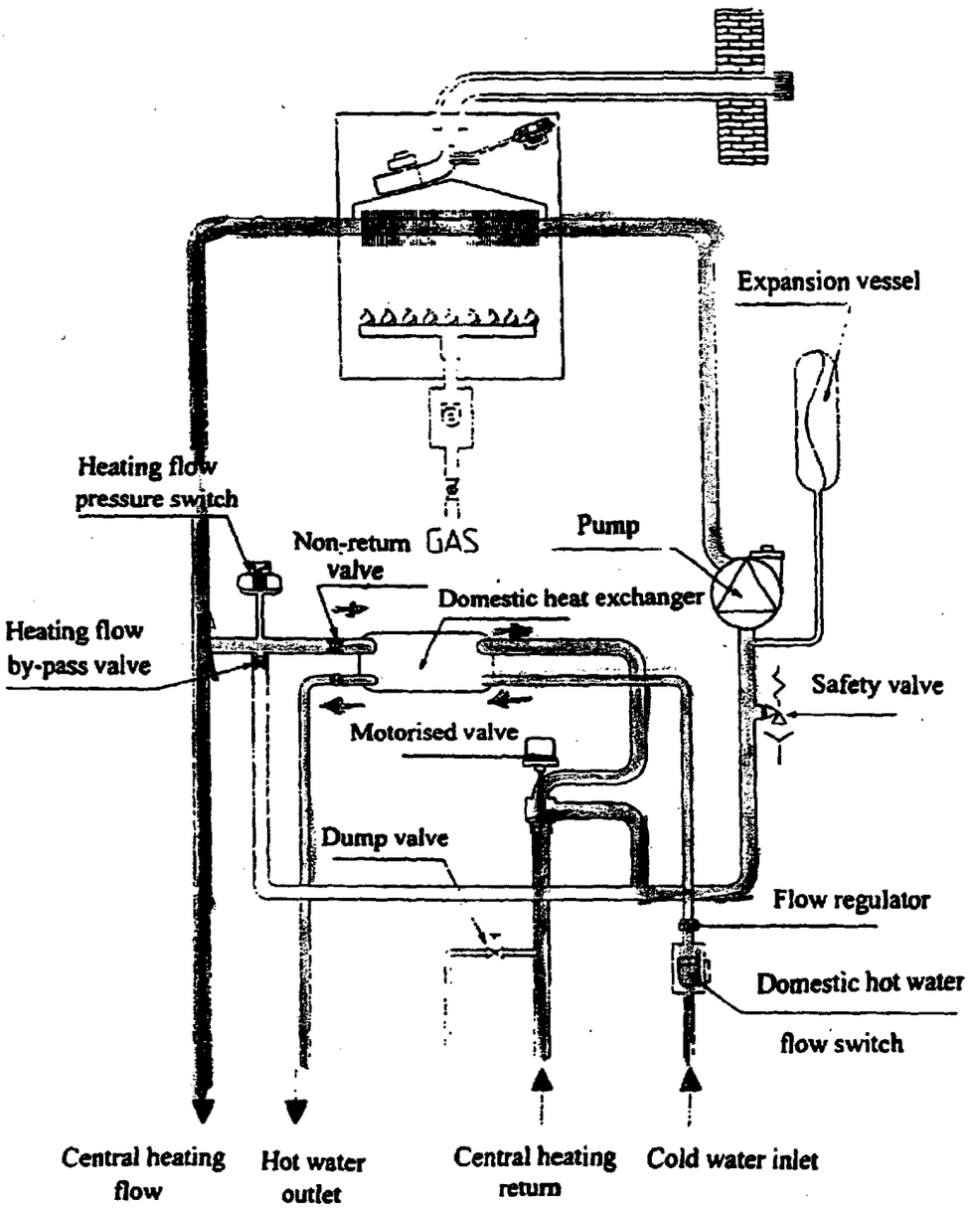
and the sanitary circuit to the sanitary inlet port and the second connection assembly connecting the heating circuit to the heating inlet port and the sanitary circuit to the sanitary outlet port; characterised in that said hydraulic group comprises a flow pipe for connecting the first and the second connection assemblies and a by pass valve arranged inside said flow pipe; said flow pipe being parallel to said front face of the secondary heat exchanger.

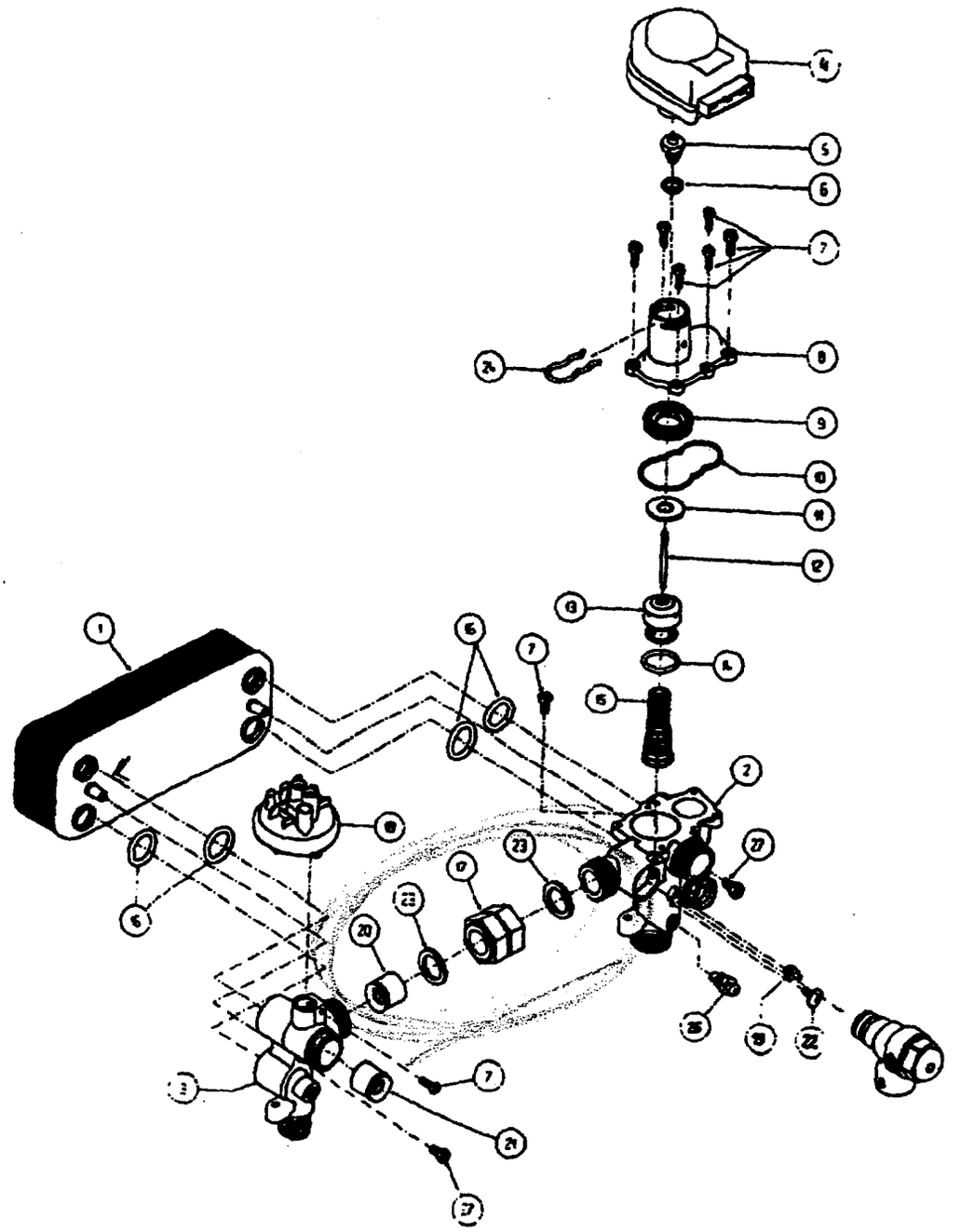
Claims

1. Boiler comprising a heating circuit, a sanitary circuit a main heat exchanger connected to the heating circuit, a secondary heat exchanger having a front face provided with a sanitary inlet port, a sanitary outlet port, a heating inlet port and a heating outlet port, and a hydraulic group for connecting the secondary heat exchanger to the heating circuit and to the sanitary circuit; said hydraulic group comprising a one-level pressure switch for the heating circuit a three way valve provided with and electric actuation group, a sanitary flow switch provided with filter, a by pass valve; the boiler further comprising a first connection assembly provided with quick fastening means comprising pin or clamping screw for connecting said first connection assembly to said secondary heat exchanger and second connection assembly comprising quick fastening means for connecting said second connection assembly to the secondary heat exchanger, the first connection assembly connecting the heating circuit to the heating outlet port and the sanitary circuit to the sanitary inlet port and the second connection assembly connecting the heating circuit to the heating inlet port and the sanitary circuit to the sanitary outlet port; **characterised in that** said hydraulic group comprises a flow pipe for connecting the first and the second connection assemblies and a by pass valve arranged inside said flow pipe; said flow pipe being parallel to said front face of the secondary heat exchanger.

2. Boiler according to claim 1, **characterised in that** said sanitary flow switch and said three way valve is arranged in the first connection assembly.

3. Boiler according to claim 1 or 2, **characterised in that** said pressure switch is arranged in said second connection assembly.


Expansion vessel
Heating flow
pressure switch
GAS
Non-return
valve
Pump
Domestic heat exchanger
Heating flow
by-pass valve
Safety valve
Motorised valve
Dump valve
Flow regulator
Domestic hot water
flow switch
Central heating
flow
Hot water
outlet
Central heating
return
Cold water inlet



Hidraulic group part list

Item	Quantity	Drawing number
27 screw M5x10 TE/C	2	0679/B
26 air release valve	1	0603/33
25 safety valve	1	0676/10
24 motorised valve spring	1	0676/18
23 gasket d. 24x17x2	2	0641/64
22 special screw M4x12 Fe	1	0637/5
21 non return valve	1	0676/9
20 heating flow by-pass valve	1	0676/8
19 plug	1	0679/13
18 heating flow pressure switch 1 level	1	0679/6
17 flow pipe connection	1	0679/3
16 o-ring r. 15	4	0640/157
15 conical spring for diverter valve	1	9679/7
14 o-ring 3075	1	0635/68
13 diverter valve bobbin	1	0676/25
12 bobbin rod	1	0635/6
11 bobbin gasket	1	0676/26
10 diverter valve cover gasket	1	0635/140
9 inner ring group	1	0635/75
8 diverter valve cover	1	0676/16
7 screw M4 x07 x12 TE/C	8	0635/24
6 nipple gasket	1	0635/70
5 nipple	1	0635/51
4 motorised valve	1	0676/17
3 hot water pipe fitting	1	0679/2
2 diverter valve and flow switch manifold	1	0679/1
1 domestic heat exchanger 24000 kcal/h	1	0636/32

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27 screw M5x10 TE/C	2	0679/B
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20 heating flow by-pass valve	1	0676/8
19 plug	1	0679/13
18 heating flow pressure switch 1 level	1	0679/6
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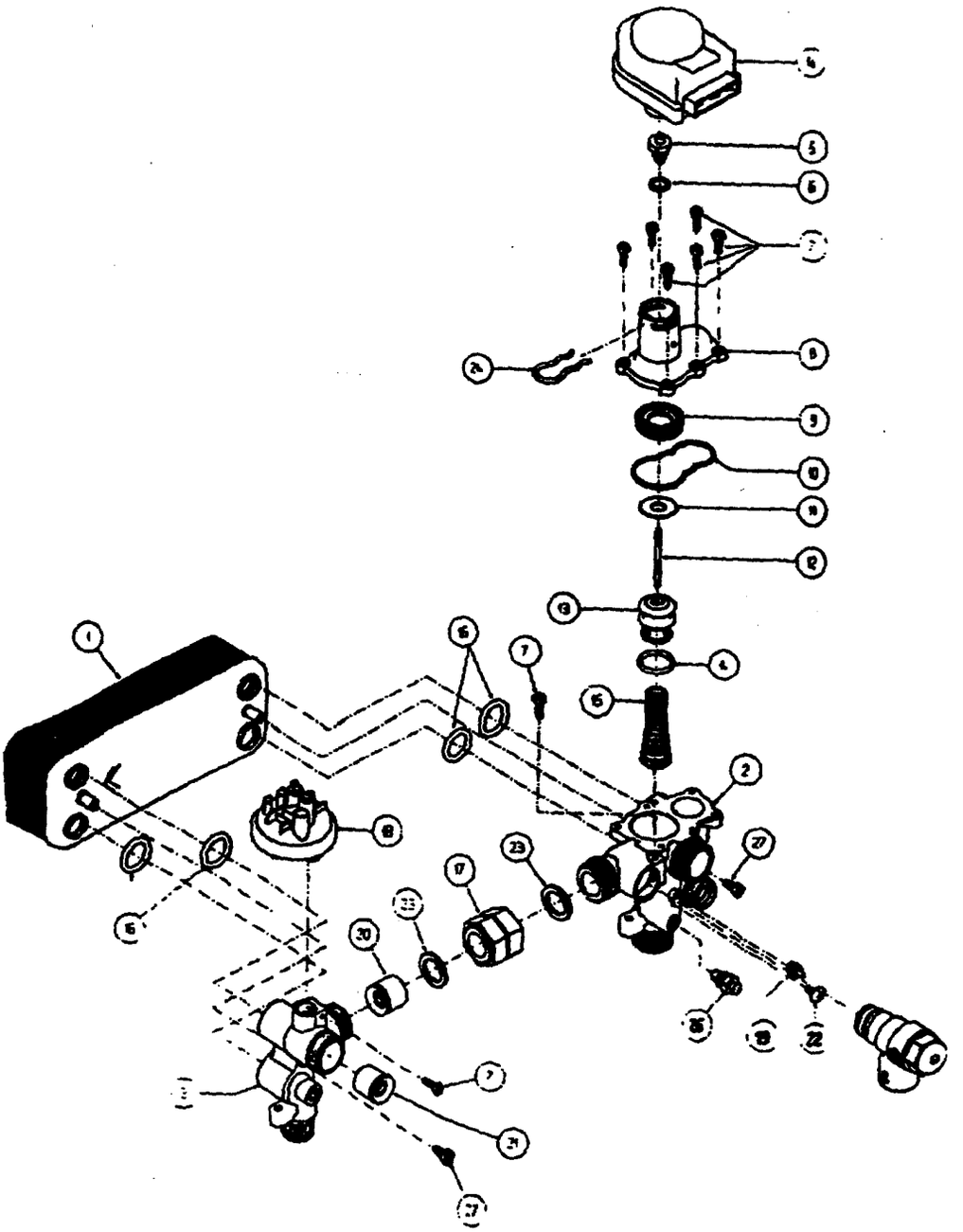
15 conical spring for diverter valve	1	9679/7
14 o-ring 3075	1	0635/68
13 diverter valve bobbin	1	0676/25
12 bobbin rod	1	0635/6
11 bobbin gasket	1	0676/26
10 diverter valve cover gasket	1	0635/140
9 inner ring group	1	0635/75
8 diverter valve cover	1	0676/16
7 screw M4 x07 x12 TE/C	8	0635/24
6 nipple gasket	1	0635/70
5 nipple	1	0635/51
4 motorised valve	1	0676/17
3 hot water pipe fitting	1	0679/2
2 diverter valve and flow switch manifold	1	0679/1
1 domestic heat exchanger 24000 kcal/h	1	0636/32



Heating flow pressure switch specification

Voltages	Currents
230 Vac	50 mA
24 Vdc	20 – 40 mA
5 Vdc	1 – 2 mA

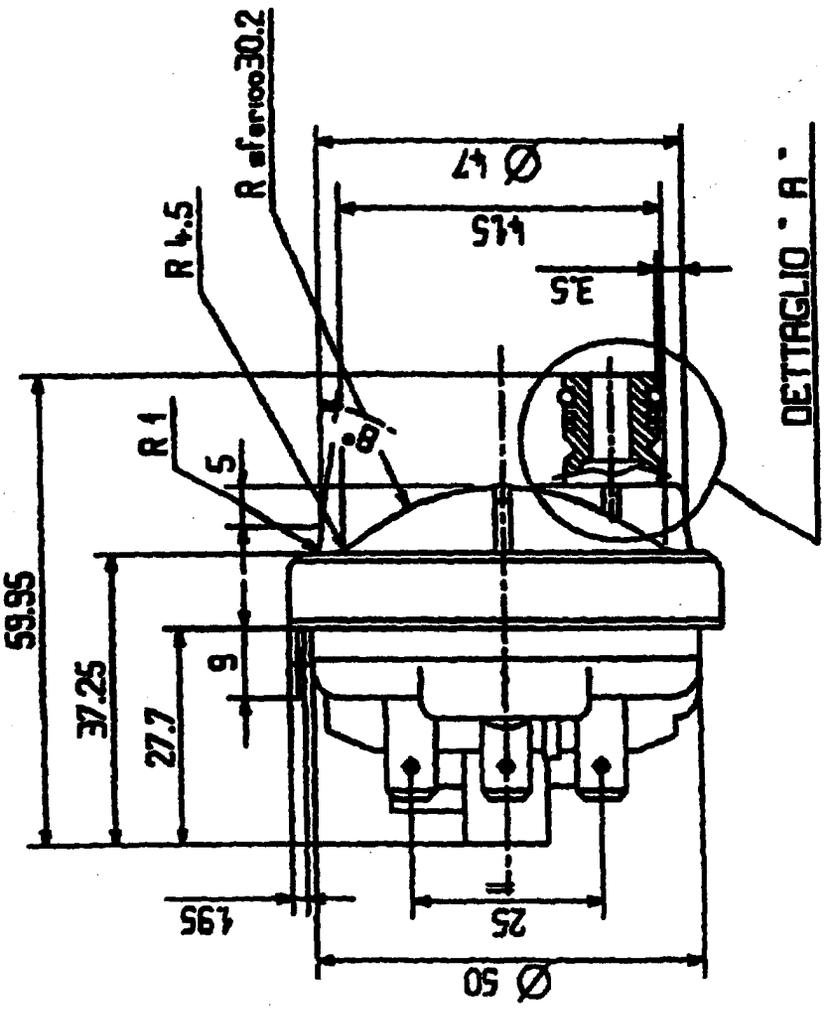
Water temperature range: +3° C - +90° C

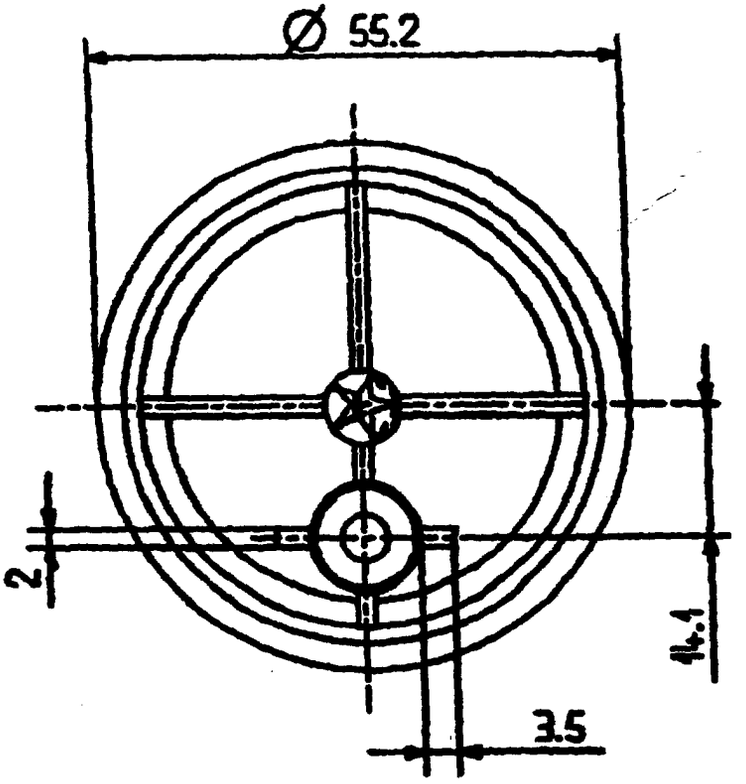
Max working pressure: 3 bar

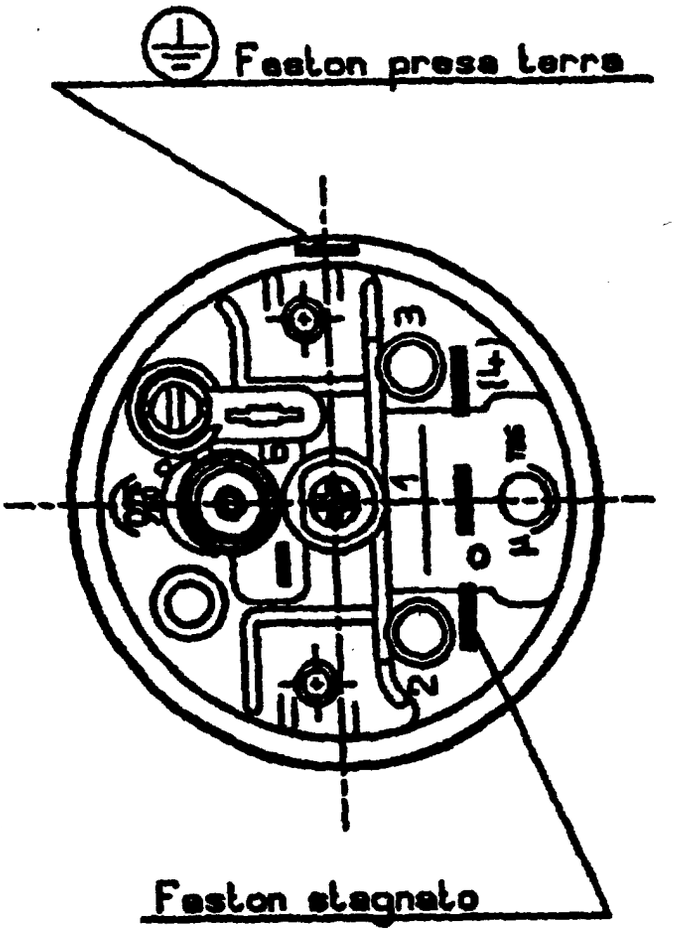
Working parameters:

ON: 0.25 – 0.45 bar with increasing pressure
OFF: 0.1 – 0.2 bar with decreasing pressure

Brass terminal 6.3 x 0.8 (DIN 46244)


R sferico 30.2
R 4.5
R 1
5
8°
59.95
37.25
27.7
9
47 Ø
41.5
3.5
DETTAGLIO "A"
1.95
25
50 Ø

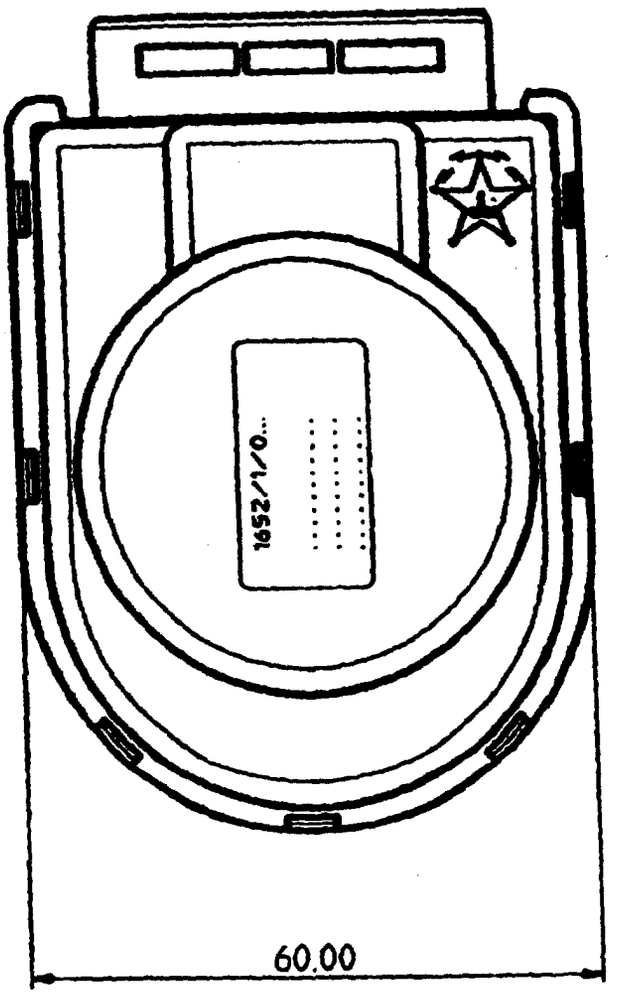

Ø 55.2
2
4.1
3.5


Faston presa terra
Faston stagnato

Motorised valve specification

Voltage:	220/240 V 50/60 Hz
Temperature range:	-20° C / 70° C
Stroke:	7.5 mm
Force:	10 N to 70 N
Timing:	opening valve 4.8 s at 60 Hz 6 s at 50 Hz closing valve 3.2 s at 60 Hz 4 s at 50 Hz

Degrees of protection: IP20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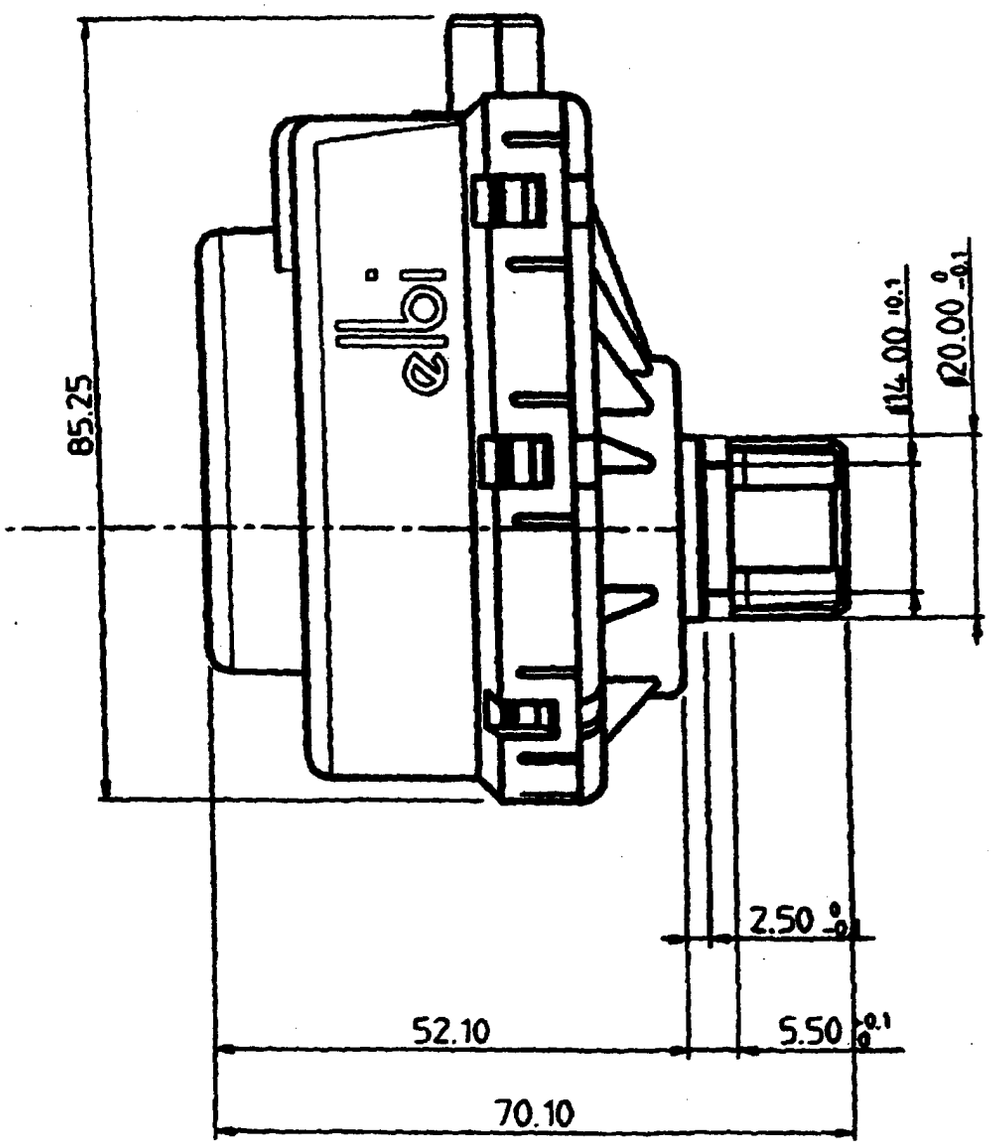
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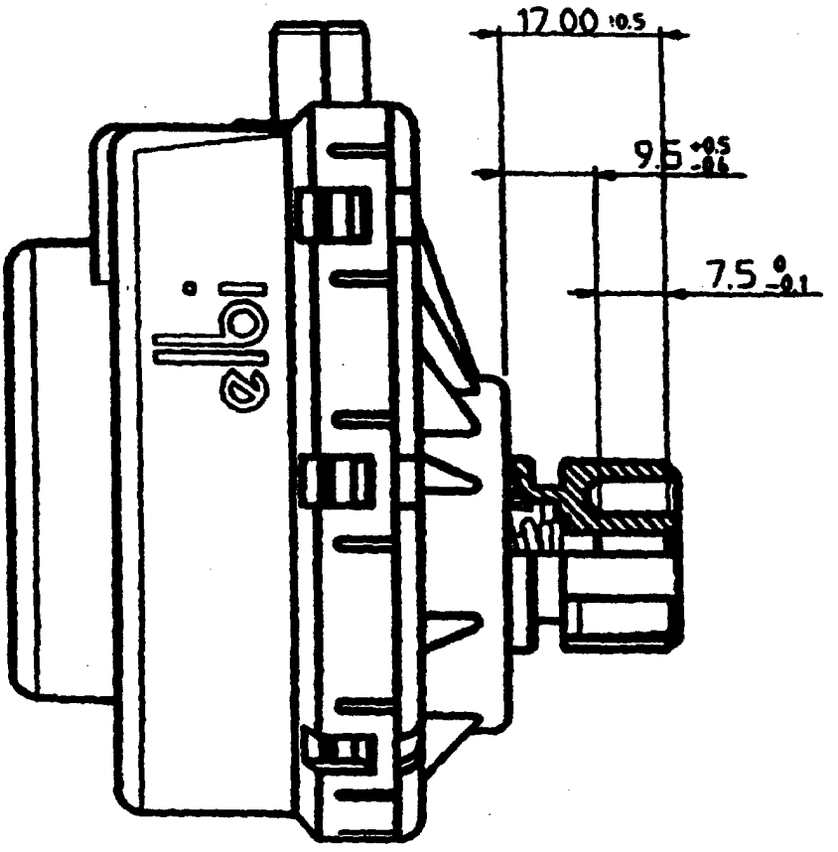
ebi
Ø14.00 ±0.1
Ø20.00 -0.1
2.50 -0.1
52.10
5.50 -0.1
70.10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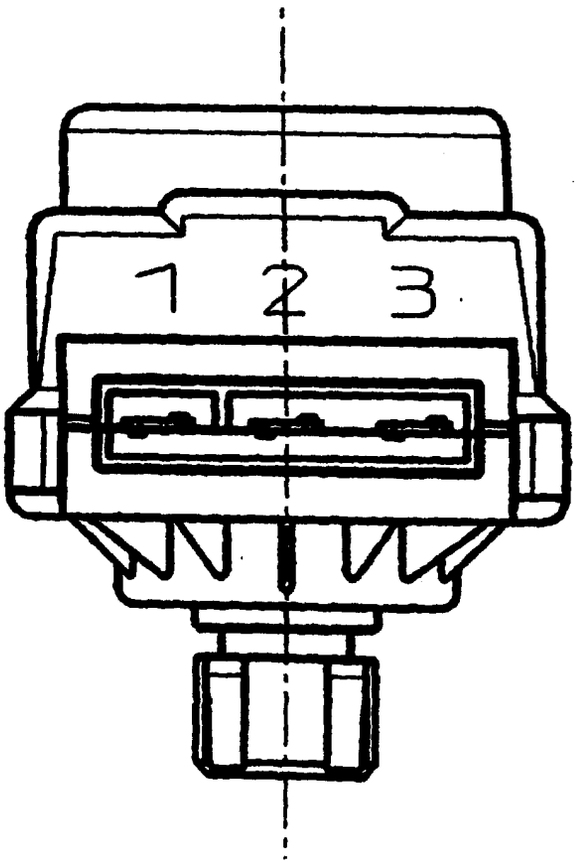
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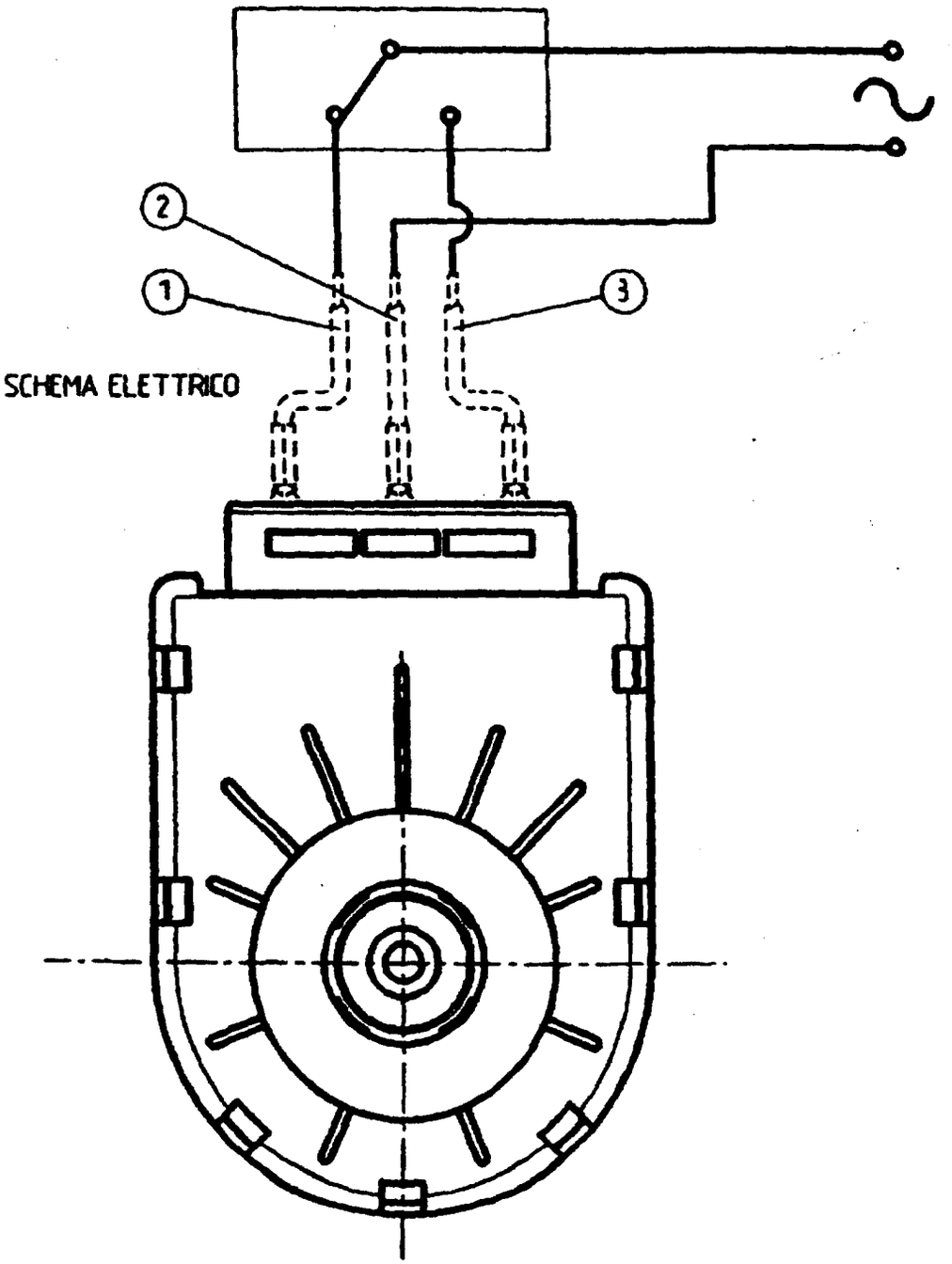

2
1
3
SCHEMA ELETTRICO

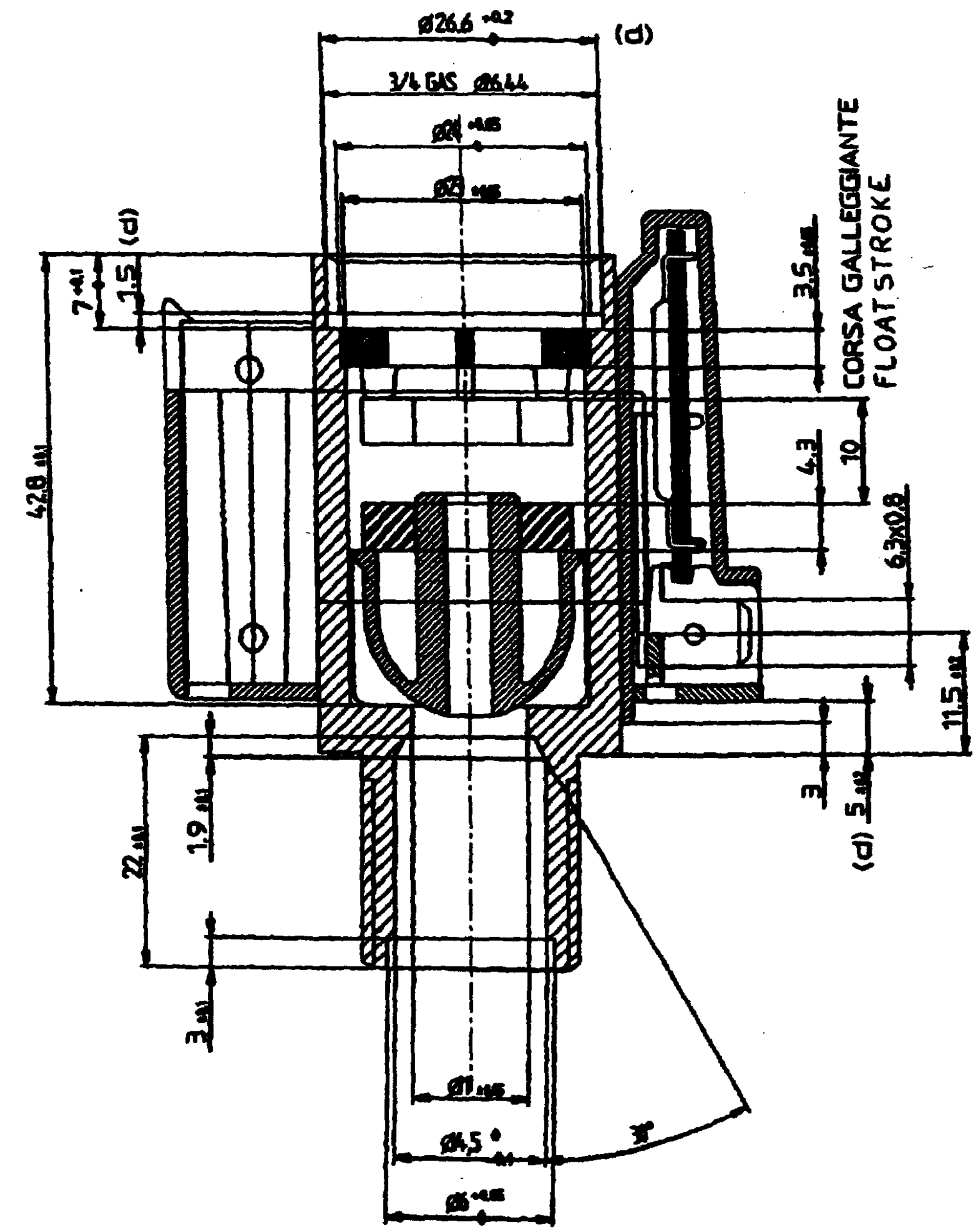
Flow switch specification

Item	Material	Code
Printed circuit	FR2 – Cu 35 micron thickness	204142
Reed NA Philips RI 46-EBB		205147
Permanent ring magnet	Hardferrite 26/16	507001
Float	Acetalica naturale	354000
Washer	Acetalica naturale	703006
Faston CS 6.3x0.8	OT 63 H20 UNI 4892	301099
Reed support	PA66 FV nat. + red color	760139
Body	CuZn 40Pb2 ½ DURO	210134

Note: **WRC omologation**

Plastic materials UL94 HB

Technical and electrical characteristics as per BERETTA n° 001/97 Flow Switch specification


Ø26.6
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3/4 GAS Ø26.44
CORSA GALLEGGIANTE
FLOAT STROKE
3.5
10
4.3
6.3x0.8
11.5
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(d) 5
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7
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(d)
1.9
22
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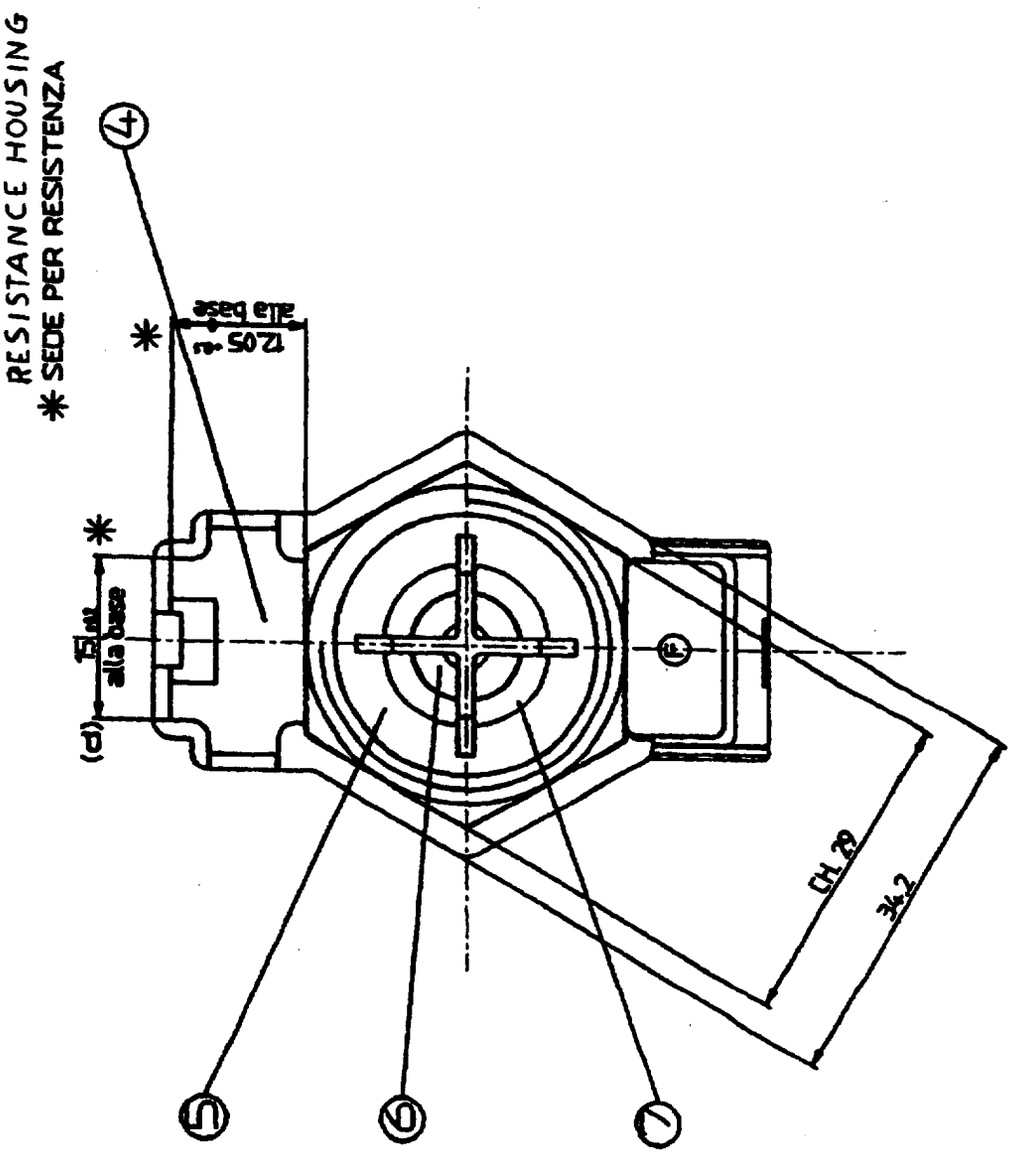
30°
Ø4.5
Ø6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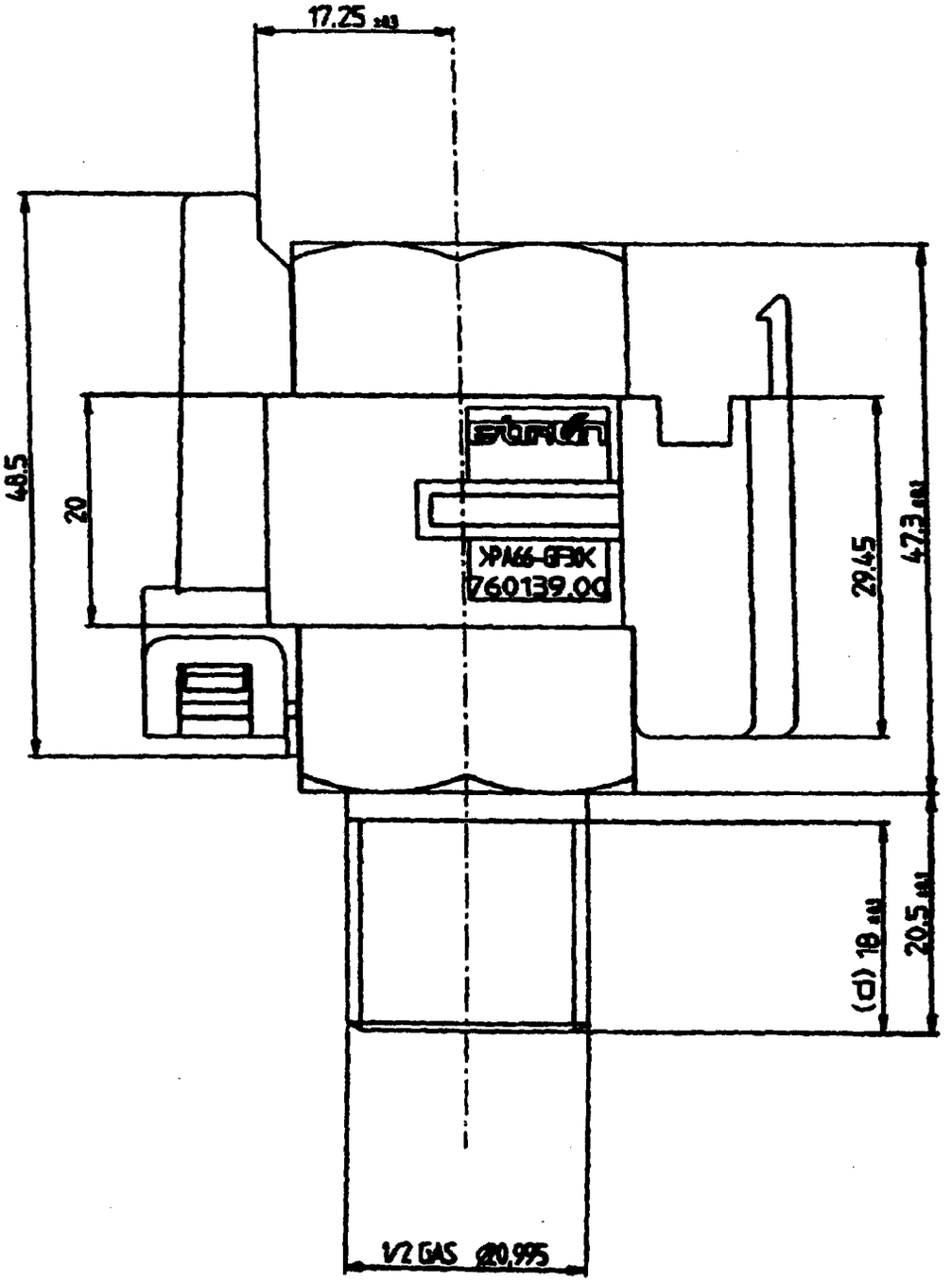
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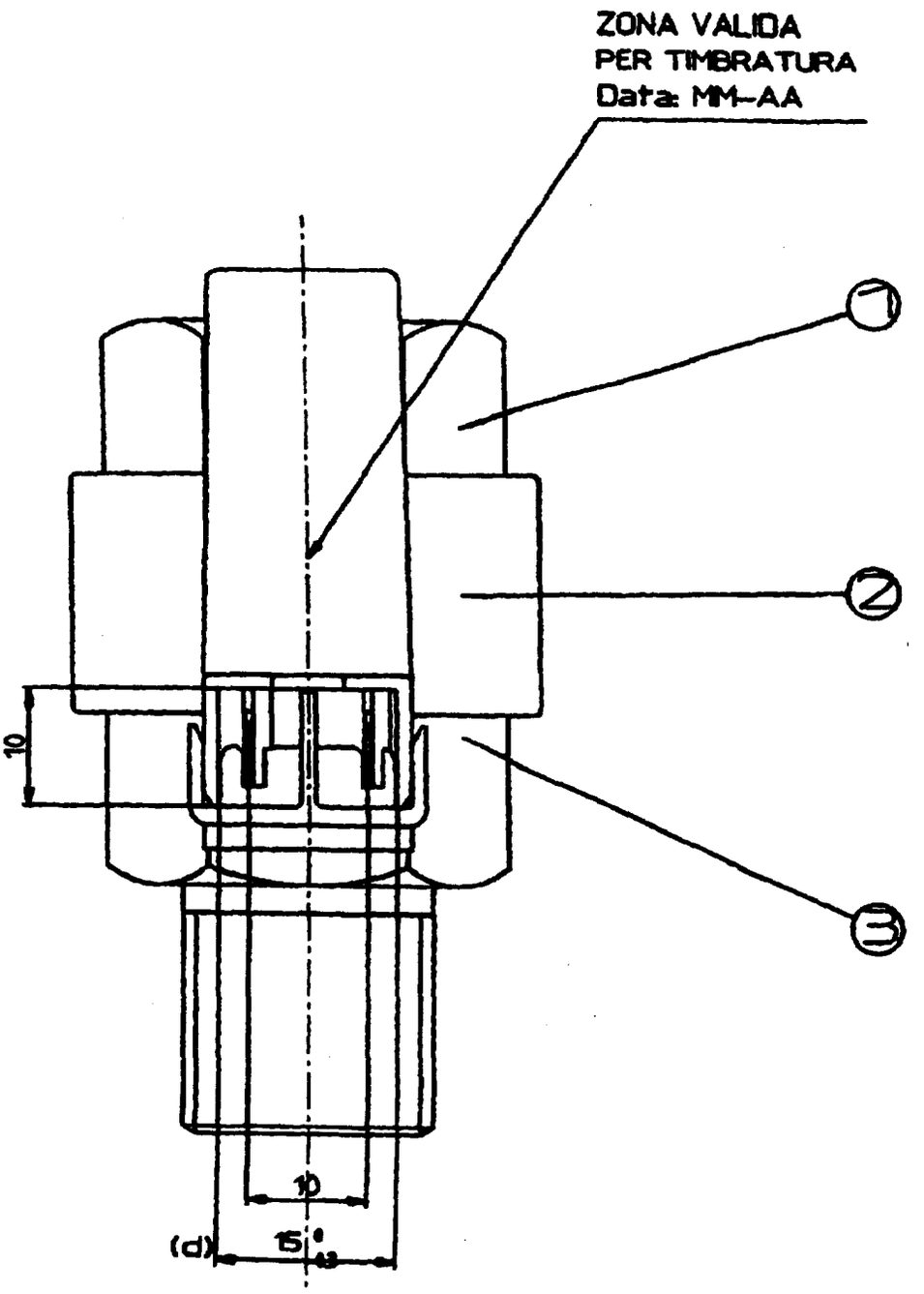
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PER TIMBRATURA
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(d)
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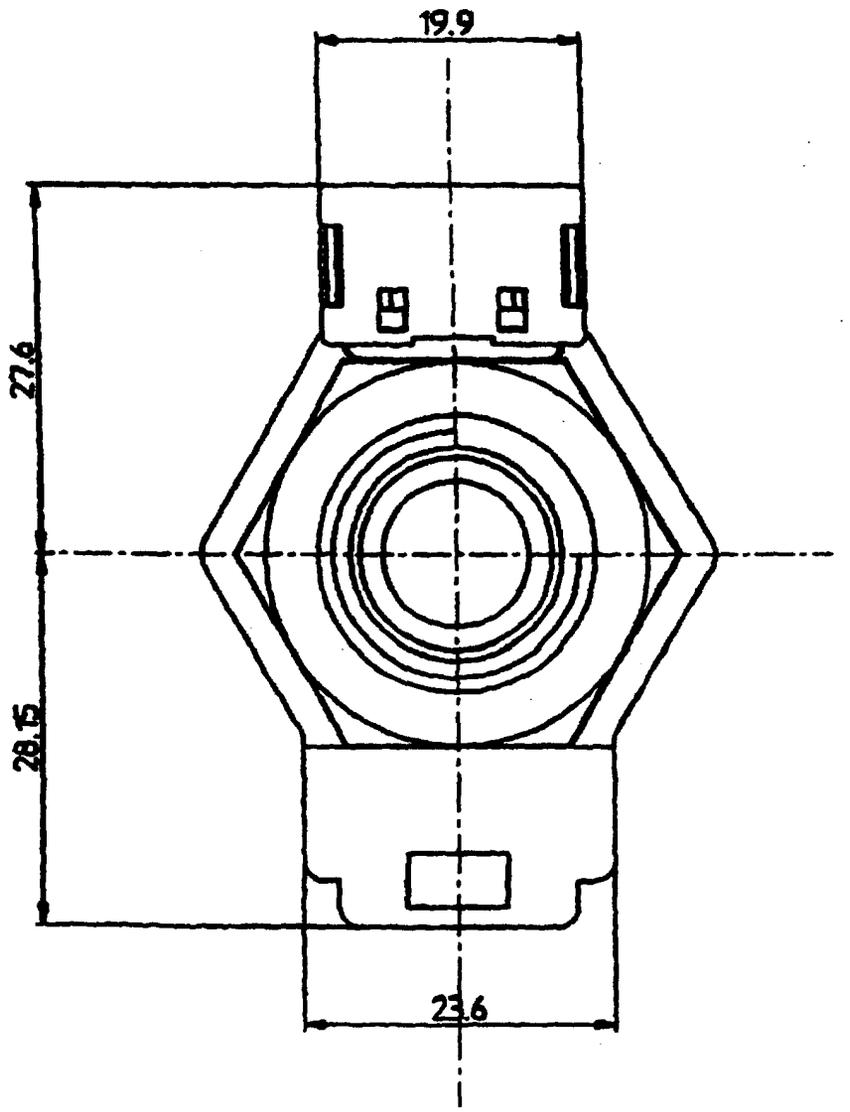
19.9
27.6
28.15
23.6

By-pass valve specification

Plastic part material:	P.O.M. ULTRAFORM S2320
Max working temperature:	100° C
Max temperature level before deformation:	150° C

Spring characteristics:

Wire diameter:	0.6 mm
External diameter:	9 +/-0.1 mm
Number of turns:	7
Free length:	23.3 +/-0.5 mm
Compression at L 17 mm	0.245 kg +/-10%
Compression at L 12 mm	0.440 kg +/-10%
Material:	INOX AISI 302

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 00 5950

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 797 057 A (FUGAS SRL) 24 September 1997 (1997-09-24) * figure 11 * -----	1	F24H9/14

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 October 2003	Van Gestel, H

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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07-10-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0797057 A	24-09-1997	IT MI960567 A1	22-09-1997
		DE 69605644 D1	20-01-2000
		DE 69605644 T2	31-05-2000
		EP 0797057 A2	24-09-1997
		ES 2142522 T3	16-04-2000

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82