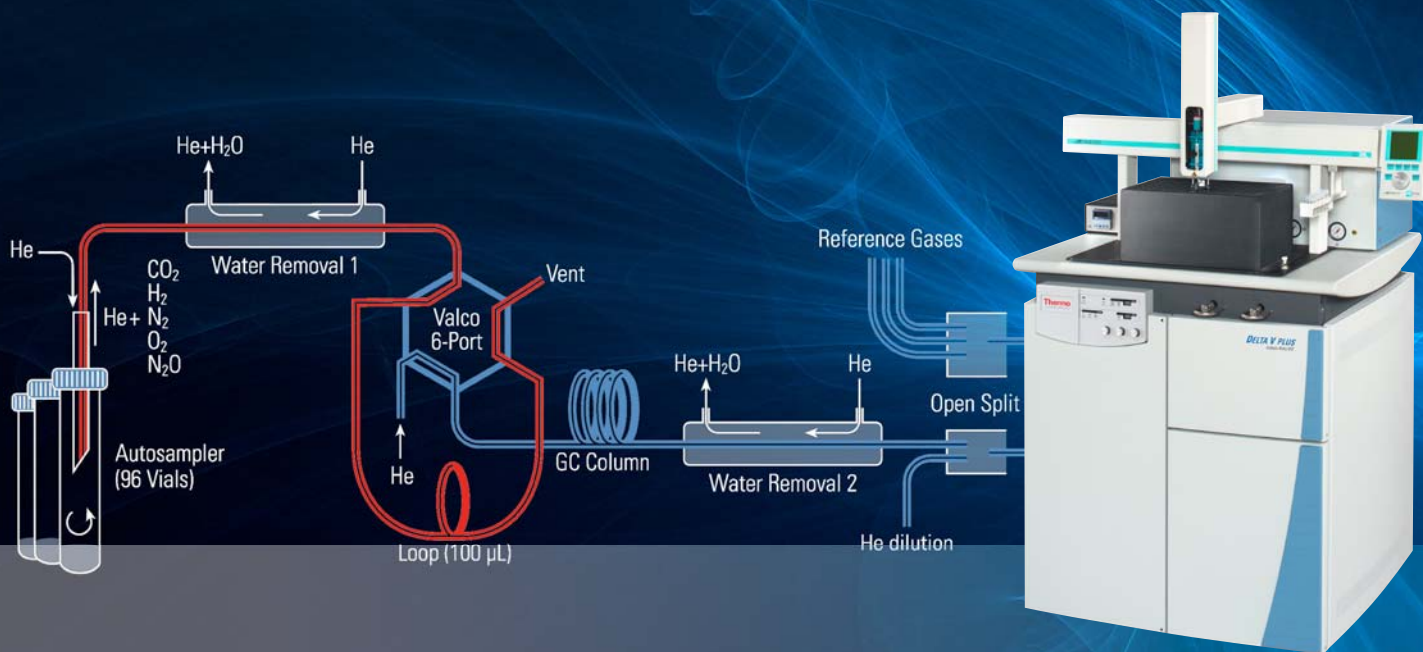




# GasBench II

## Consumables and Parts Catalog

BRE0005920 Revision A December 2015



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This *GasBench II Consumables and Parts Catalog* is intended for use by trained Thermo Fisher Scientific personnel only. Thermo Fisher Scientific discourages use by and denies liability for the consequences of use by other than Thermo Fisher Scientific personnel.

In addition to the *GasBench II Operating Manual*, this document contains technical information about different fundamental parts of the GasBench II device.

#### Contents

- “Spare Parts and Consumables of the GasBench II Device” on page 1
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The individual parts in the spare parts lists mostly refer to adjacent figures. However, not all of them are intended to be bought separately. Instead, it may be more reasonable to buy an entire superordinate unit that contains the individual part of interest.

## Spare Parts and Consumables of the GasBench II Device

Table 1 shows two important constituents of the GasBench II device.

**Table 1.** Two important constituents of GasBench II device

| P/N     | Designation                  |
|---------|------------------------------|
| 1187500 | GasBench II basic module     |
| 1121060 | GasBench II Installation Kit |

Table 2 lists selected spare parts and consumables of the GasBench II basic module.

**Table 2.** Selected parts of GasBench II basic module

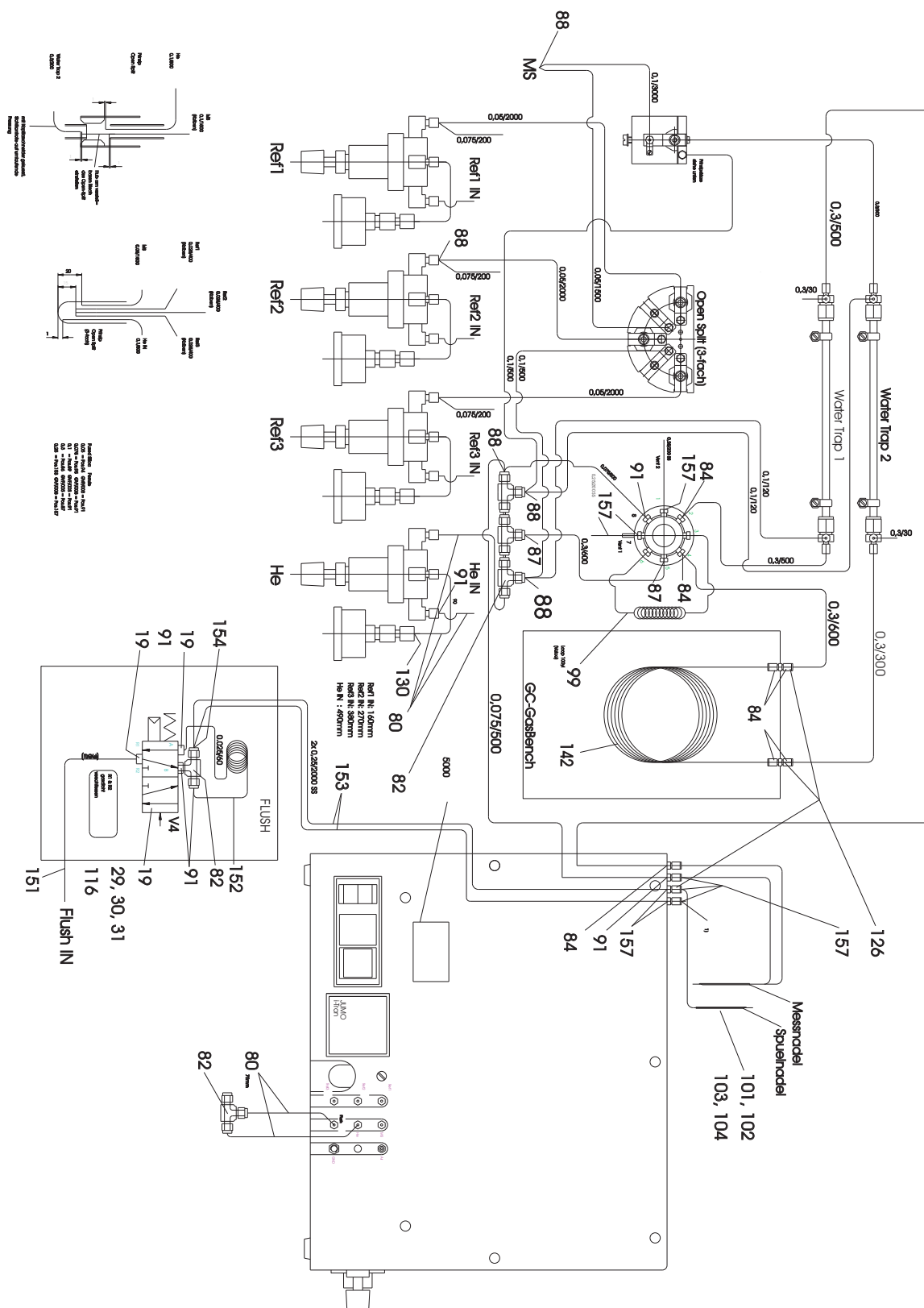
| Pos. in<br>Figure 1 | P/N      | Designation                                      | Qty   |
|---------------------|----------|--------------------------------------------------|-------|
| 13                  | P1002605 | water trap GC-C III                              | 2     |
| 20                  | 0674552  | JUMO iTRON 16 temperature controller             | 1     |
| 21                  | 0281310  | solid state relay, 10 A                          | 1     |
| 84                  | 9000342  | seal ferrule, Valco™, FS1.5 (pack with 5 pieces) | 2     |
| 86                  | 1004640  | capillary, fused silica, ID 0.3 mm               | 2 m   |
| 88                  | 1060170  | ferrule, 1/16", GVF2/003                         | 7     |
| 89                  | 0674910  | capillary, fused silica, not deactivated         | 4.4 m |
| 91                  | 1004850  | ferrule, 1/16", GVF/003                          | 2     |
| 94                  | 0543380  | capillary tubing, fused silica, 0.05             | 7.5 m |
| 95                  | 1045480  | capillary, fused silica, 0.075, 2 m              | 1     |
| 126                 | 1121170  | bulkhead union (Valco)                           | 6     |

Table 3 lists selected spare parts and consumables of the GasBench II Installation Kit.

**Table 3.** Parts of GasBench II Installation Kit

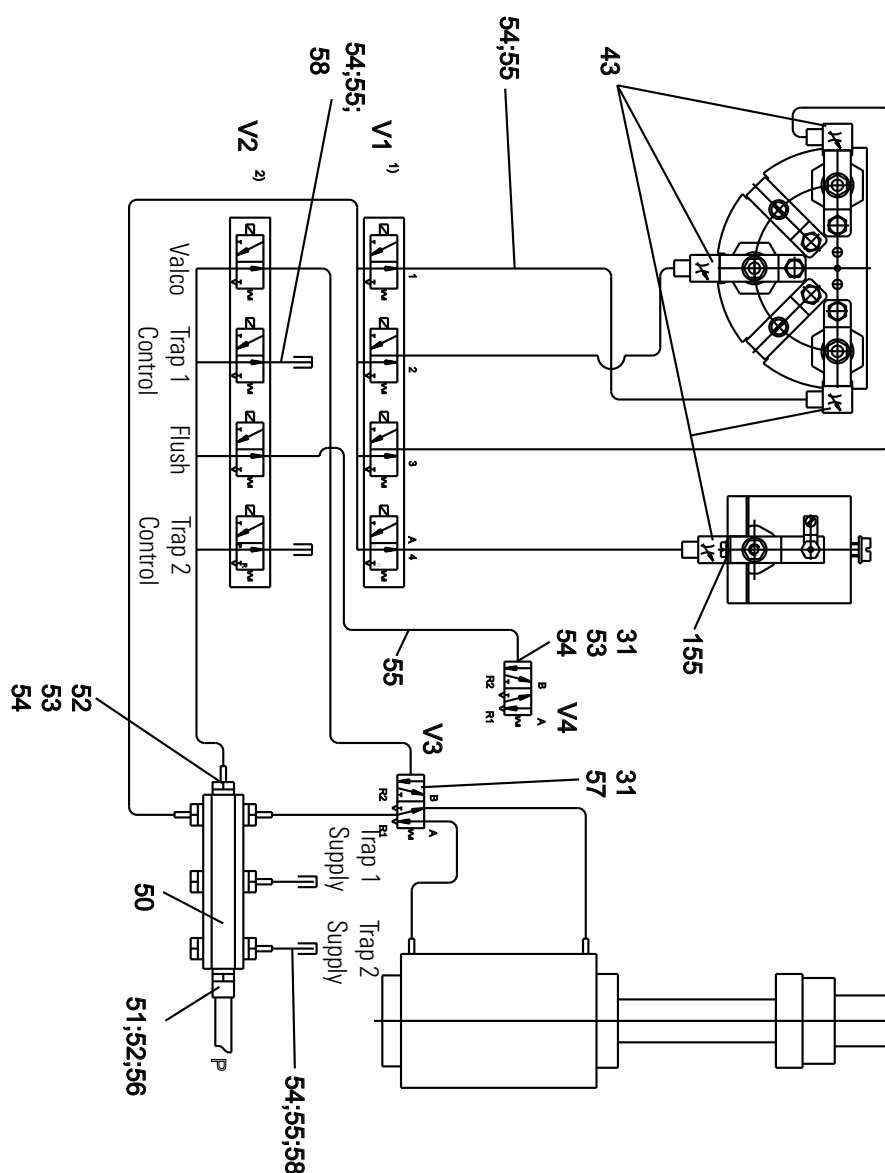
| Pos. in<br>Figure 1 | P/N      | Designation                                     | Qty |
|---------------------|----------|-------------------------------------------------|-----|
| 1                   | 1168770  | borosilicate vial, 12 mL, unwashed              | 100 |
| 8                   | 1121070  | disposable syringe, 1 mL (pack with 100 pieces) | 1   |
| 9                   | 1121080  | disposable needle (pack with 100 pieces)        | 1   |
| 23                  | 1137080  | adapter GasBench needle to needle holder        | 2   |
| 24                  | 1119170  | knurled nut M8                                  | 2   |
| 32                  | P1114290 | gas supply line                                 | 4   |
| 33                  | 1137020  | measurement needle                              | 2   |
| 34                  | 0171911  | PoraPLOT Q capillary column, 25 m × 0.32 mm     | 1   |
| -                   | 0674790  | ferrule, 1/8"-1/16", Teflon                     | 4   |
| -                   | 1004640  | capillary, fused silica, ID = 0.3 mm            | 4 m |
| -                   | 1137390  | hollow nut with 1/16" boring                    | 2   |

Figure 1 shows the tubing scheme of the GasBench II device (P/N 1114262).



**Figure 1.** Tubing scheme of GasBench II device

Figure 2 shows the compressed air scheme of the GasBench II device.



**Figure 2.** Compressed air scheme of GasBench II device

## Capillaries

The GasBench II device contains two groups of capillaries:

- Capillaries that connect two points in the gas flow scheme
  - Usually of size ID = 0.32 mm
  - Length is not important.
- Capillaries that control flows

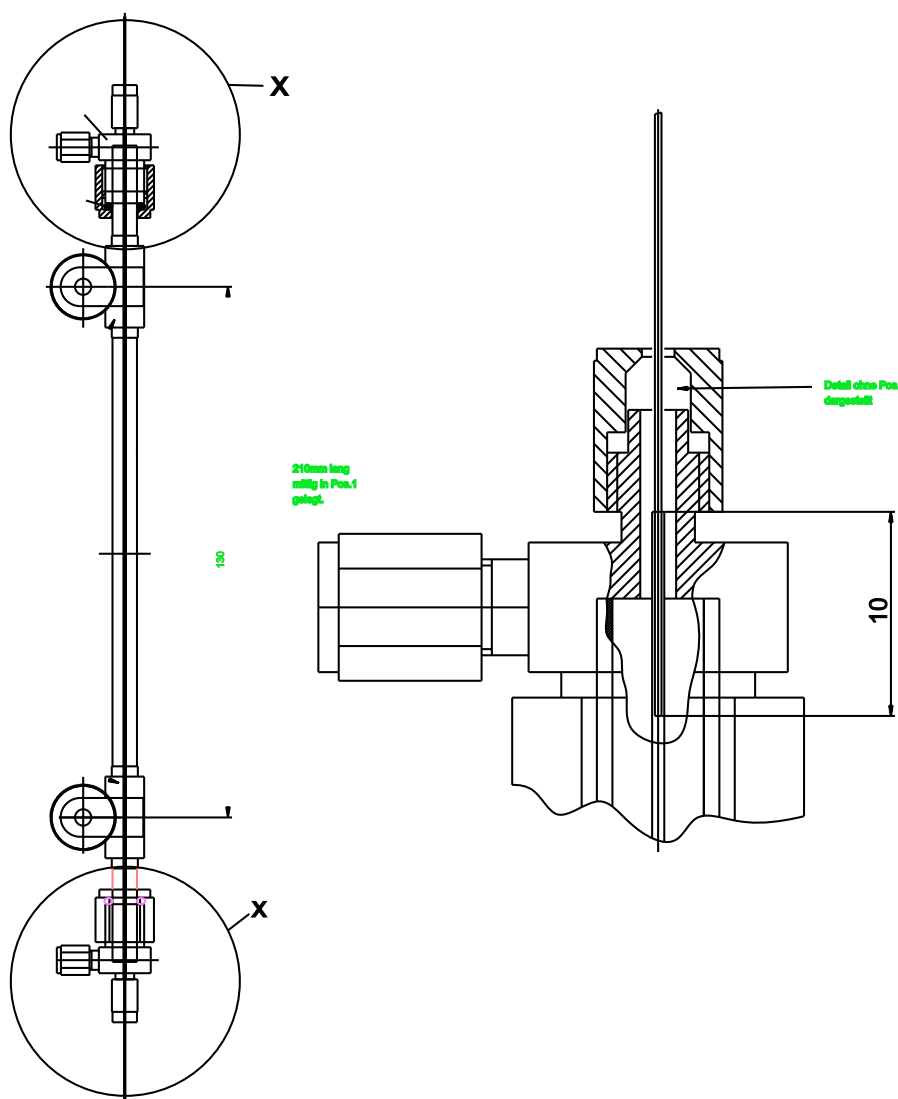
All the capillaries that start from the central gas distribution T-piece belong to this group. There are:

- Two capillaries (0.1/500) that support the open splits with 2 mL/min of helium each.
- Two capillaries (0.1/250) for 4 mL/min of helium to the water trap
- One capillary (0.075/1000) for 0.5 mL/min of helium to the sample needle

An exception is the column itself. It acts as its own flow restriction (1.5 mL/min).

## Water Trap

Figure 3 schematically shows the water trap (P/N 1002605). Table 4 lists selected spare parts and consumables of the water trap.



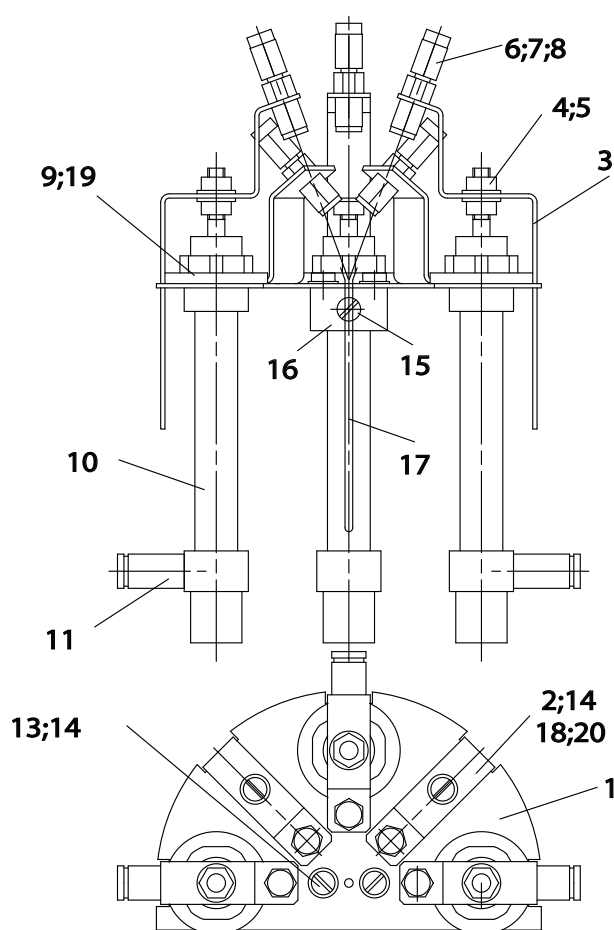
**Figure 3.** Scheme of water trap

**Table 4.** Selected spare parts and consumables of water trap

| Designation                              | P/N     | Qty.   |
|------------------------------------------|---------|--------|
| Nafion tubing for gas dryer, ID = 0.3 mm | 0743390 | 0.25 m |
| ferrule, 1/16", GVF/005                  | 0566390 | 3      |
| ferrule, 1/16", GVF/003                  | 1004850 | 1      |

## Reference Open Split

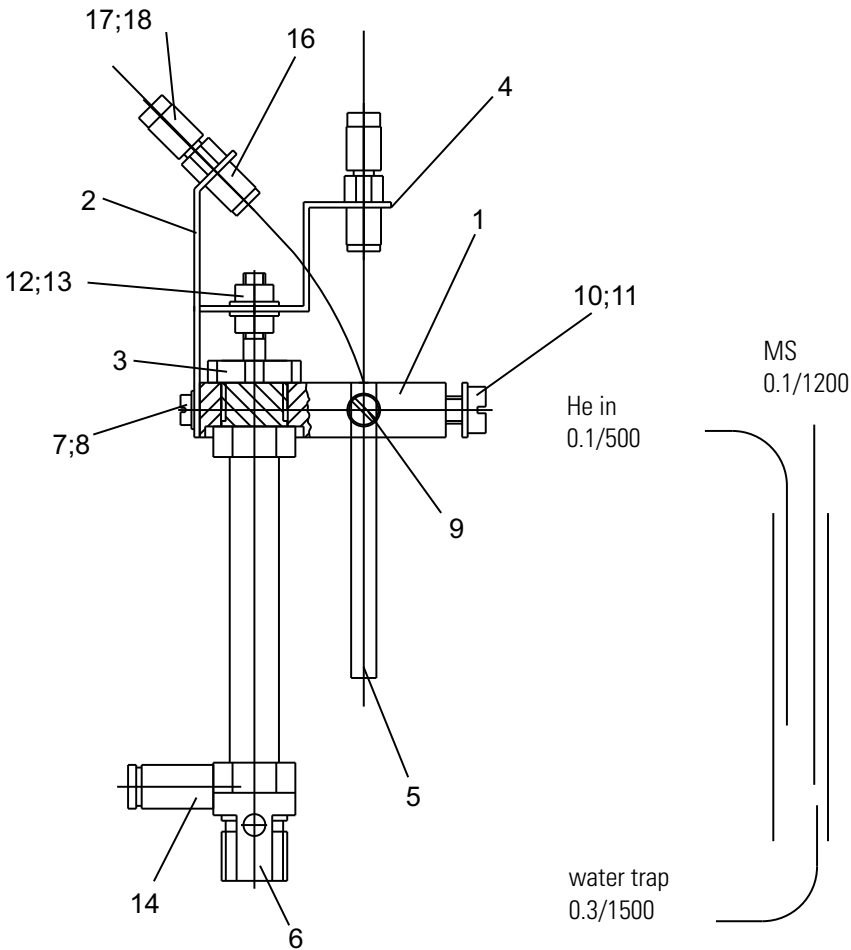
Figure 4 schematically shows the reference open split (P/N 1096570). Table 5 lists important parts of it.

**Figure 4.** Scheme of reference open split**Table 5.** Selected spare parts and consumables of reference open split

| Pos. in Figure 4 | P/N     | Designation                         | Qty. |
|------------------|---------|-------------------------------------|------|
| 8                | 1004850 | ferrule, 1/16", GVF/003             | 5    |
| 17               | 1041800 | glass tube for reference open split | 1    |

# Sample Open Split

Figure 5 schematically shows the sample open split (P/N 1041761). The glass tube **5** of the sample open split has an ID of 0.8 mm and the P/N 1183040.



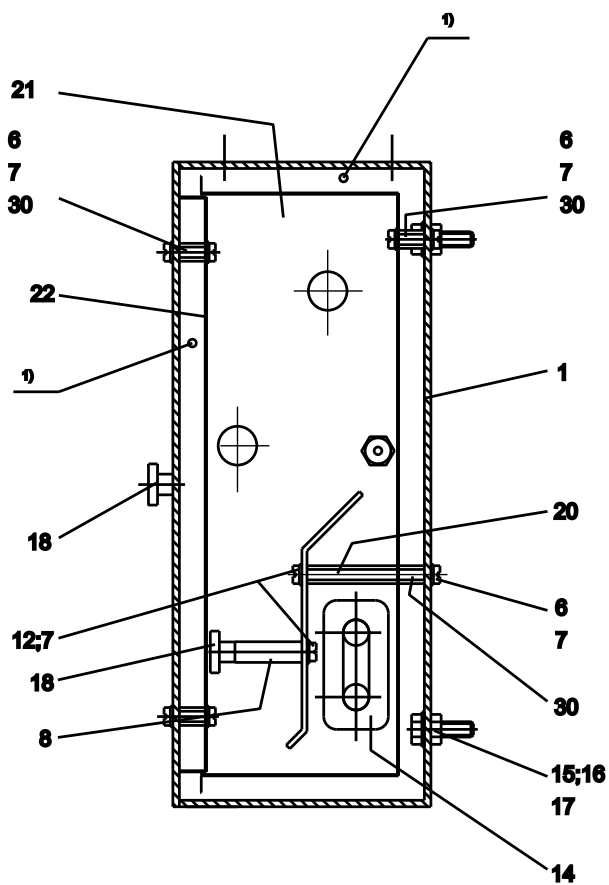
**Figure 5.** Scheme of sample open split

# GC Oven

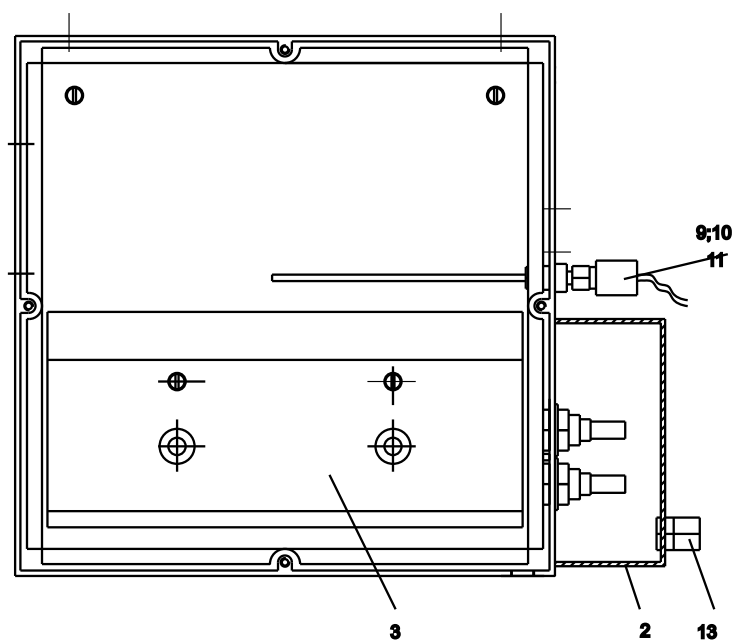
Figure 6 shows the GC oven (P/N 1121100) in front view, whereas shows it in right side view. The thermocouple (type K) and the ribbed radiator listed in Table 6 are two especially important parts of the GC oven.

**Table 6.** Selected spare parts and consumables of GC oven

| Pos. in<br>Figure 6 | P/N     | Designation            | Qty. |
|---------------------|---------|------------------------|------|
| 10                  | 1061390 | thermocouple (type K)  | 1    |
| 14                  | 1123061 | ribbed radiator, 240 W | 1    |



**Figure 6.** GC oven in front view



**Figure 7.** GC oven in right side view

The thermocouple (type K) and the ribbed radiator listed in [Table 7](#) are two especially important parts of the GC oven.

**Table 7.** Selected spare parts and consumables of GC oven

| Pos. in<br>Figure 6 | P/N     | Designation            | Qty. |
|---------------------|---------|------------------------|------|
| 10                  | 1061390 | thermocouple (type K)  | 1    |
| 14                  | 1123061 | ribbed radiator, 240 W | 1    |

## Plug and Measure Adapters

An arbitrary peripheral can be connected to any of the five SUB D connectors of the IRMS. Refer to the Operating Manual of the IRMS.

Each peripheral has its own plug and measure code. This code is encoded either in the cable to the device or in a plug and measure adapter. This is also used for downward compatibility using an old peripheral.

The instrument recognizes the kind of peripheral as well as the SUB D connector used for it, when a configuration requires this device. Otherwise, for example when the device cable is unplugged accidentally, an error message is displayed.

### Plug and Measure Adapter for the GasBench II Device

On the plug and measure adapter (pnm adapter, P/N 2052660) for the GasBench II device, two addresses have already been adjusted by Thermo Fisher Scientific via the two coding switches:

pnm-ID first device

S1 = 8

S2 = 0

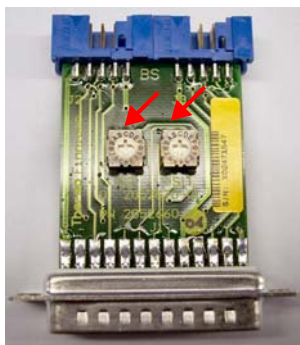
### Plug and Measure Adapter for the Acid Pump

A plug and measure adapter (pnm adapter, P/N 2052660) is also needed to connect the acid pump. On this plug and measure adapter for the acid pump, two addresses have already been adjusted by Thermo Fisher Scientific via the two coding switches. See arrows in [Figure 8](#).

pnm-ID

S1 = 8

S2 = 1



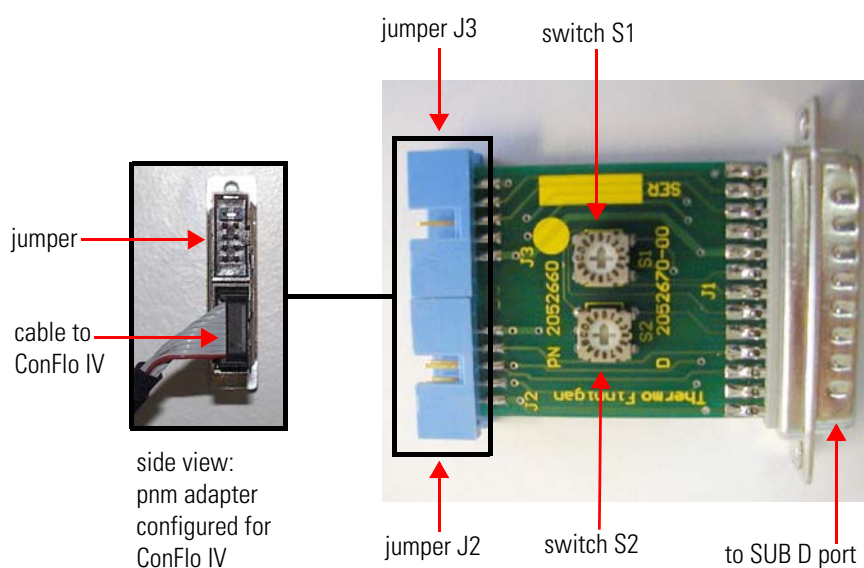
**Figure 8.** Plug and measure adapter for acid pump

## Adjusting the Plug and Measure Adapters

The plug and measure adapter (pnm adapter, [Figure 9](#)) is pre-configured at the factory for a defined instrument (GasBench II device, for example). Thermo Fisher Scientific does not recommend a supplementary re-configuration by the user.

The plug and measure adapter is connected to one of the five identical SUB D ports of the IRMS. The peripheral is then connected to the IRMS via the bottom port of the pnm adapter.

Peripherals are identified by the settings of the turn switches and the jumpers. See [Figure 9](#). The turn switches are used to specify the pnm-ID for the peripheral (for example, for the acid pump, set S1 to 8 and S2 to 1). The jumpers are also used to identify the kind of peripheral that is connected to the IRMS. If indicated, the lowest two contacts of the plug socket at the pnm adapter (either socket J3 or J2) are cut short from outside of the pnm adapter.



**Figure 9.** Plug and measure adapter

Some external options are connected to the SUB D ports without using the plug and measure adapter.

## Grounding Cable for Peripherals

Peripherals that are operated by a plug and measure adapter must be connected to the IRMS by a grounding cable. It is not necessary for peripheral devices that already run using a new cable (PreCon device, GP interface).

The peripheral is connected to the IRMS by a PE cable (bolt as grounding contact). [Figure 10](#) shows the bolt and the grounding cable at the MAT 253 (left) and at the DELTA V series (right).



**Figure 10.** Grounding cable at MAT 253 (left) and DELTA series (right)

## Configuring Plug and Measure Devices

Five SUB D ports are located at the rear side of the IRMS. The external option is recognized, because it is encoded with a pnm ID. The electronics recognizes that an option is connected to a certain port, and which kind of option it is. [Table 8](#) lists the settings for plug and measure devices.

**Table 8.** Settings for plug and measure devices

| Peripheral  | pnm-ID <sup>a</sup><br>1st Device |    | pnm-ID <sup>b</sup><br>2nd Device |    | Jumper<br>pin 9/10 <sup>c</sup> | New<br>cable <sup>d</sup> | Cable P/N  |            |
|-------------|-----------------------------------|----|-----------------------------------|----|---------------------------------|---------------------------|------------|------------|
|             | S2                                | S1 | S2                                | S1 |                                 |                           | 1st Device | 2nd Device |
| ConFlo IV   | 0                                 | 2  | 0                                 | 3  | J3                              |                           |            |            |
| GCC II/III  | 0                                 | 4  | 0                                 | 5  | J3                              |                           |            |            |
| GasBench II | 0                                 | 8  | 0                                 | 9  |                                 |                           |            |            |
| PreCon      | 0                                 | A  | 0                                 | B  |                                 | Yes                       | 2054620    | 2054630    |
| ProRef      | 0                                 | C  | 0                                 | D  | J3                              |                           |            |            |
| MultiInlet  | 0                                 | E  | 0                                 | F  |                                 |                           |            |            |
| Acid pump   | 1                                 | 8  | 1                                 | 9  | J2                              |                           |            |            |
| GC/GP       | 1                                 | 0  | 1                                 | 1  |                                 | Yes                       | 2054640    | 2054650    |
| Dual Inlet  |                                   |    | 0                                 |    |                                 |                           |            |            |
| MP1         |                                   |    | 0                                 |    |                                 |                           |            |            |
| MP2         |                                   |    | 0                                 |    |                                 |                           |            |            |
| TC1         |                                   |    | 0                                 |    |                                 |                           |            |            |
| TC2         | 1                                 | 2  | 1                                 | 3  |                                 |                           |            |            |

<sup>a</sup> by switches inside the pnm adapter or by shortcuts inside the cable.

<sup>b</sup> if two instruments of the same type are installed.

<sup>c</sup> if indicated, the lowest two contacts of the plug socket at the pnm adapter, that is either socket J3 or J2, are cut short (from the outside of the pnm adapter).

<sup>d</sup> No pnm adapter. Instead, it is necessary to exchange the cable.

**NOTICE** The TubeCracker second bank is applied to two ports of the inlet board for external options. Therefore, it has a pnm number. ▲

## Using Peripherals with another IRMS

Practice has shown that in some laboratories, options are not always connected to the same mass spectrometer, especially the Continuous Flow options like the GasBench II device or the PreCon device. Depending on the analytical problem, they are sometimes transferred from one mass spectrometer to another one. It is possible to switch between the newer generation mass spectrometers (Delta V series or MAT 253/253 Plus) and the older generation, when the following important guidelines are observed.

- a. Applying an older peripheral device to a newer generation IRMS:

Use a plug and measure device. In case of the PreCon device and the GP Interface use a new connection cable. Each option delivered after June 2002 is delivered with the necessary hardware. For older devices, order a plug and measure device or a connection cable.

- b. Applying a peripheral device ordered with or for a newer generation mass spectrometer to an older generation IRMS:

Link the connection cable to the driver board.

For most peripherals, the driver board supplied with the older generation IRMS can be used directly.

For peripherals like the GasBench II device, the PreCon device or the TubeCracker, Thermo Fisher Scientific recommends ordering a dedicated driver board.

Alternatively, a new address can be assigned to the driver board delivered with the older generation IRMS.

**NOTICE** Never insert the plug of the peripheral connection cable into the wrong socket on the driver board. Serious damage of the driver board may occur, which is not covered by any warranty.

On the other hand, if the jumpers are set to a wrong address, the device cannot be addressed, but nothing is damaged. ▲

- c. Applying an option using an IEEE interface (HDO device, for example) delivered with an older generation IRMS to a newer generation IRMS:

Install an additional IEEE interface.

## IAEA Primary Standards

Calibrating against international standards requires users to have their own specimens of Primary Standards. Primary Standards are exclusively distributed by the IAEA via agencies in Europe and the US. The reference list shown in [Table 9](#) is taken from *IAEA TECDOC 825* and the *IAEA Analytical Quality Control Services Reference Materials Catalogue 2002-2003*.

**Table 9.** IAEA Primary Standards

| Name                      | Nature            | Isotope                          | Isotopic ratio              | δ [‰]           | Reference standard |
|---------------------------|-------------------|----------------------------------|-----------------------------|-----------------|--------------------|
| V-SMOW                    | water             | <sup>2</sup> H/ <sup>1</sup> H   | (155.761 ± 0.05) ×10e-6 (1) | 0               | VSMOW              |
|                           |                   |                                  | (155.751 ± 0.08) ×10e-6 (2) |                 |                    |
|                           |                   |                                  | (155.601 ± 0.12) ×10e-6 (3) |                 |                    |
|                           |                   | <sup>18</sup> O/ <sup>16</sup> O | (2005.20 ± 0.45) ×10e-6 (4) | 0               | VSMOW              |
|                           |                   | <sup>17</sup> O/ <sup>16</sup> O | (379.91 ± 0.8) ×10e-6 (5)   | 0               | VSMOW              |
| SLAP                      | water             | <sup>2</sup> H/ <sup>1</sup> H   | (89.021 ± 0.05) ×10e-6 (1)  | -428.0 (6)      | VSMOW              |
|                           |                   |                                  | (89.12 ± 0,07) ×10e-6 (2)   |                 |                    |
|                           |                   |                                  | (88.88 ± 0.18) ×10e-6 (3)   |                 |                    |
|                           |                   | <sup>18</sup> O/ <sup>16</sup> O | (1893.91 ± 0.45) ×10e-6 (7) | -55.50 (6)      | VSMOW              |
|                           |                   |                                  |                             |                 |                    |
| NBS-19                    | calcite           | <sup>13</sup> C/ <sup>12</sup> C |                             | 1.95 (8)        | VPDB               |
|                           |                   | <sup>18</sup> O/ <sup>16</sup> O |                             | -2.20 (8)       | VPDB               |
|                           |                   |                                  |                             | 28.6 (9)        | VSMOW              |
| Intercomparison materials |                   |                                  |                             |                 |                    |
| GISP                      | water             | <sup>2</sup> H                   |                             | -189.73 ± 0.87  | VSMOW              |
|                           |                   | <sup>18</sup> O                  |                             | -24.784 ± 0.075 | VSMOW              |
| NBS-18                    | calcite           | <sup>13</sup> C                  |                             | -5.029 ± 0.049  | VPDB               |
|                           |                   | <sup>18</sup> O                  |                             | -23.035 ± 0.172 | VPDB               |
| IAEA-CO-1                 | calcite           | <sup>13</sup> C                  |                             | 2.48 ± 0.025    | VPDB               |
|                           |                   | <sup>18</sup> O                  |                             | -2.437 ± 0.073  | VPDB               |
| IAEA-CO-8                 | calcite           | <sup>13</sup> C                  |                             | -5.749 ± 0.063  | VPDB               |
|                           |                   | <sup>18</sup> O                  |                             | -22.667 ± 0.187 | VPDB               |
| IAEA-CO-9                 | BaCO <sub>3</sub> | <sup>13</sup> C                  |                             | -47.119 ± 0.149 | VPDB               |
|                           |                   | <sup>18</sup> O                  |                             | -15.282 ± 0.093 | VPDB               |

Refer to: *IAEA-TECDOC-825*: Reference and intercomparison materials for stable isotopes of light elements. Proceedings of a consultants meeting held in Vienna, 1-3 December 1993. International Atomic Energy Agency (IAEA). Refer to Chapter 5.2 Environmental Level, pp. 55 in: *IAEA Analytical Quality Control Services Reference Materials Catalogue 2002-2003*. First edition, January 2002. Edited by Analytical Quality Control Services, International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna.

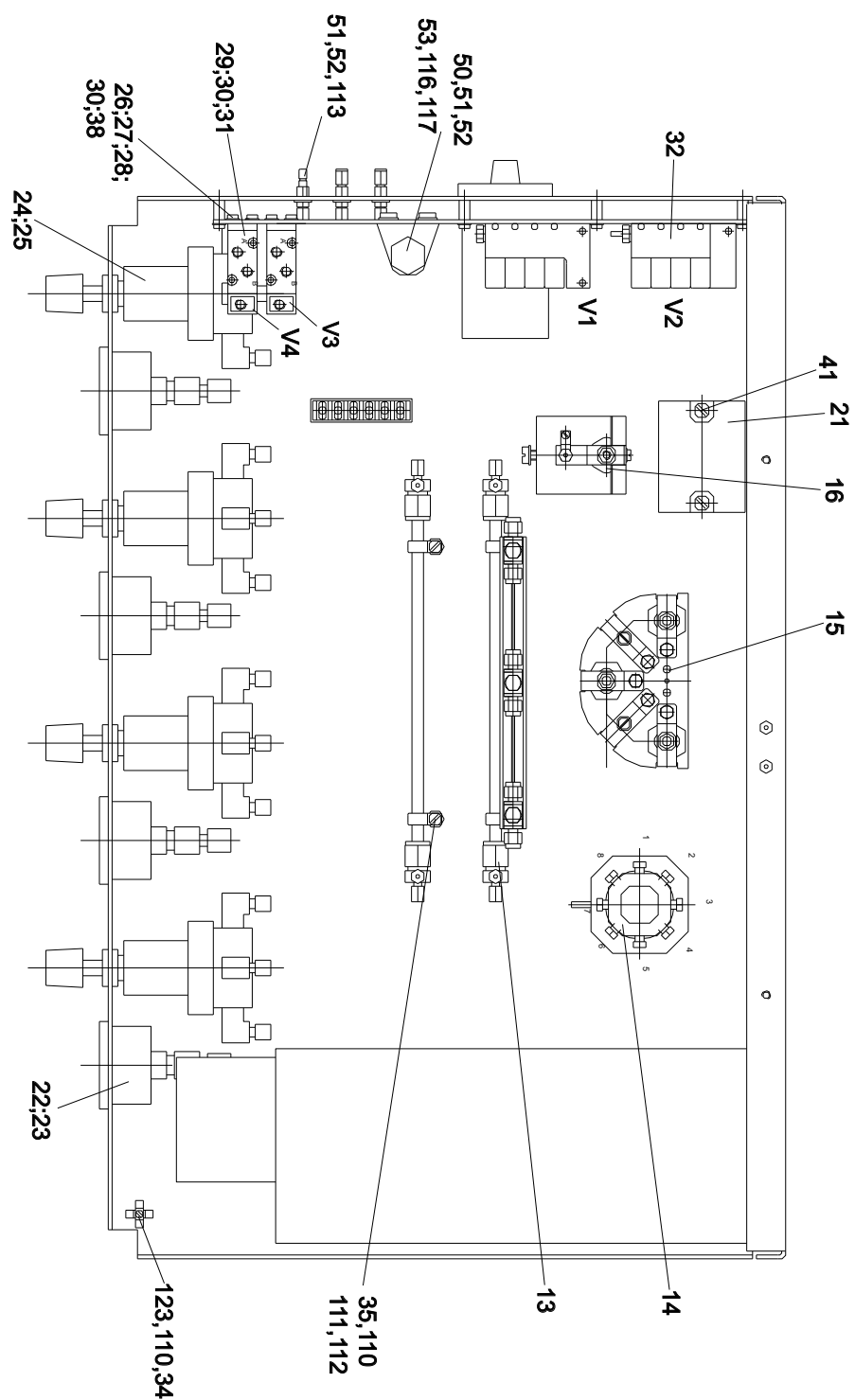
## Outdated Version

The GasBench II device allows using the third reference inlet for reference gases. No more pressure regulator is required to adjust Flush Fill. Instead, use the pressure reducer of the reference gas tank.

As no additional pressure regulator is available when flushing with helium (when preparing carbonates, for example), control the flush gas amount by timing. Therefore, in the *Time Events* list of the method, use the *Flush Fill - On* column to switch helium flow on and off.

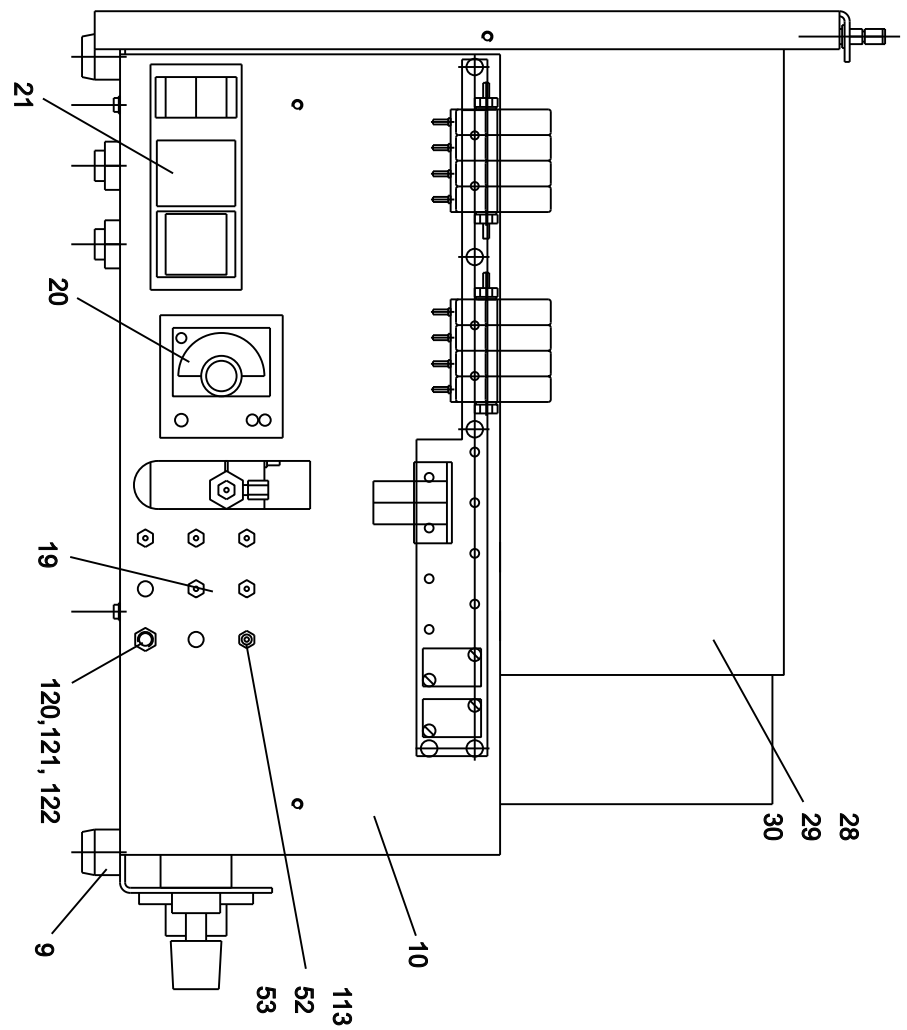
The recommended flush gas amount is 500 mL. This means to switch on Flush Fill for 300 s, if the flow is 100 mL/min. Adjust the time to smaller values, if the flow is higher or to higher values, if the flow is lower. For details, see [Figure 4](#) and [Figure 5](#).

[Figure 11](#) shows the outdated version of the GasBench II device (P/N 1114260) in top view.



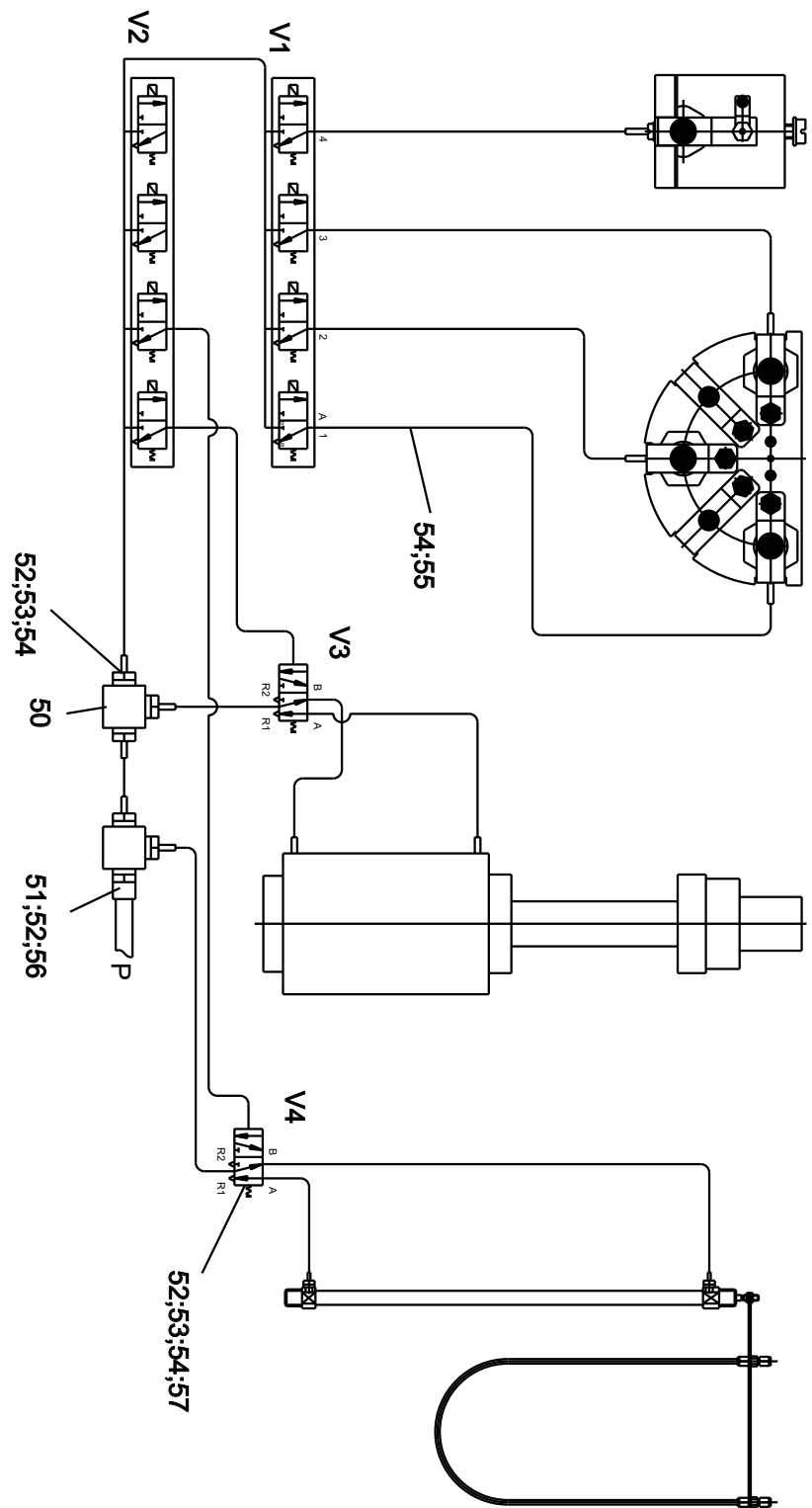
**Figure 11.** Outdated GasBench II device in top view

Figure 12 shows the outdated version of the GasBench II device (P/N 1114260) in side view.



**Figure 12.** Outdated GasBench II device in side view

Figure 13 shows the compressed air scheme.



**Figure 13.** Compressed air scheme of outdated GasBench II device (until 2002)

Figure 14 shows the tubing scheme of the outdated version of the GasBench II device (P/N 1114260).

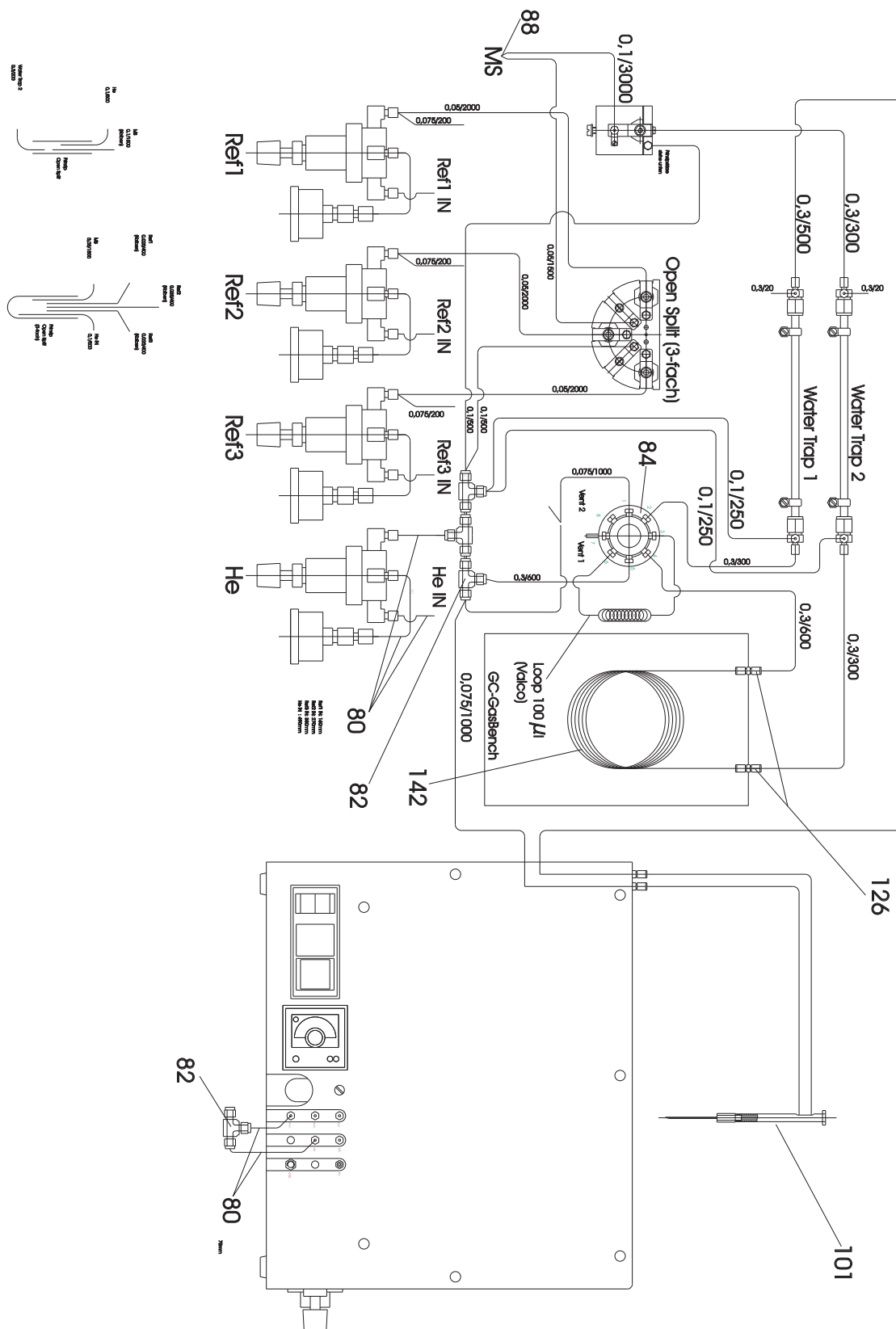


Figure 14. Tubing scheme of outdated GasBench II device (until 2002)





