



Bruker BioSpin

# Filter Configurations ●

for High Resolution NMR (and HR MAS)

Version 008

think forward

NMR Spectroscopy

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This manual was written by

Arthur Schwilch,

© November 17, 2009: Bruker BioSpin AG

Fällanden, Switzerland

P/N: Z31430

DWG-Nr.: 1140008

For further technical assistance on the for High Resolution NMR (and HR MAS) unit, please do not hesitate to contact your nearest BRUKER dealer or contact us directly at:

**Bruker BioSpin AG**

Industriestr. 26

CH-8117 Fällanden

Switzerland

Telephone: +41 44 825 91 11

Telefax: +41 44 825 96 96

E-Mail: [sales@bruker-biospin.ch](mailto:sales@bruker-biospin.ch)

Internet: [www.bruker.com](http://www.bruker.com)

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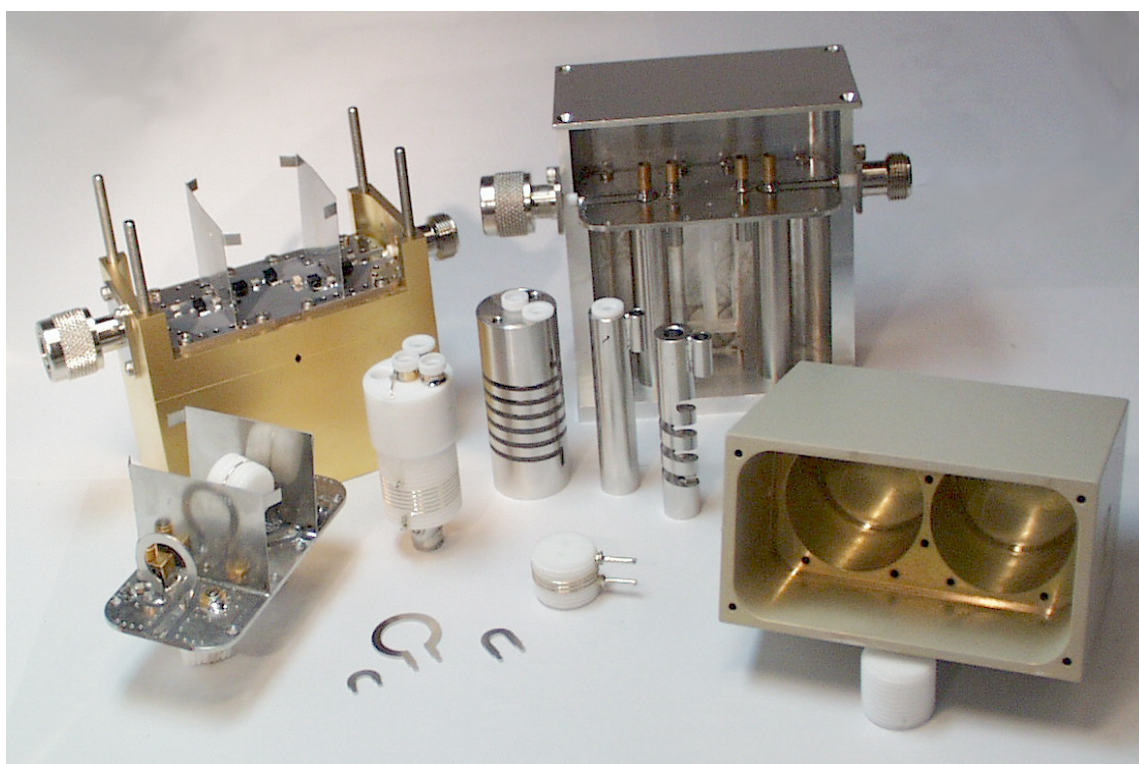
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# Filter Configurations for HR NMR and HR MAS

# 1

Figure 1.1. High Resolution NMR Filters and Filtercomponents



## Introduction

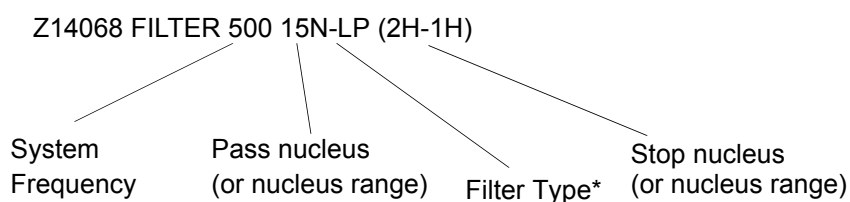
## 1.1

**!** For use of phased-out filters (not mentioned in Table [page 51](#)) or old HPPR modules see previous manual versions.

- The following chapter helps to select the necessary filter type dependent on the preamplifier and the probe.
- System orders with multiple probes require only the combined minimum set of filters.

## Filter Configurations for HR NMR and HR MAS

- Only standard operation is guaranteed with the recommended filter configuration. Non-standard operation (observe on outer coil and decoupling on inner coil) may also be possible with the recommended filter configuration.
- With individual probe orders the current configuration at the customer's labs should be obtained to avoid ordering filters which are already at the site.
- If your probe is not included in this list, please fill in the filter requirements questionnaire on **page 10** and send it to BBIO-CH, Production Department.
- The exact order number for the corresponding magnet frequency can be taken from the chapter **"Available Filters (November 2009)" on page 51**.
- No additional filters are necessary in the lock channel.
- No additional filters are necessary for cryoprobe operation.
- For HR MAS are exactly the same filters required as for high resolution NMR (for the corresponding probe).
- All filters should be mounted on the HPPR/2 and not on the probe
- In cause of more than one filter, the 2H stop should be mounted closer to the HPPR
- For filters with increased EMC and shielding requirements see the corresponding EC.
- Explanation of the filter nomenclature:








\*) LP=low pass, HP= high pass, BP=band pass

- Special "non reflective" (NR) filters are available for 15N (e.g. FILTER 900 15N-NR (2H,F-H). The second harmonic of 15N is being terminated and not reflected by the filter.







Table 1.1. Currently<sup>a</sup> used preamplifiers for 1H (HR)

| Preamplifier                    |  |
|---------------------------------|--|
| HPPR/2 1H MODULE 200-250        |  |
| AQS 1H2H PREAMP 300-400         |  |
| HPPR/2 1H2H MODULE 300-400      |  |
| HPPR/2 1H LNA MODULE 500-900    |  |
| HPPR/2 1H HPLNA MODULE 200-1000 |  |

<sup>a</sup> AVIII Spectrometer

Table 1.2. Currently<sup>a</sup> used preamplifiers for X (HR)

| Preamplifier                              |   |
|---|---|
| HPPR/2 XBB19F 2HS MODULE 200-250, 500-700 |  |
| HPPR/2 XBB31P 2HS MODULE 750-1000         |  |
| AQS XBB19F 2HS PREAMP 300-400             |  |
| HPPR/2 XBB19F 2HS MODULE 300-400          |  |

<sup>a</sup>AVIII Spectrometer

# Filter Configurations for HR NMR and HR MAS

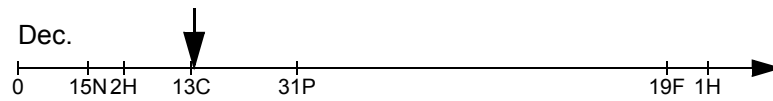
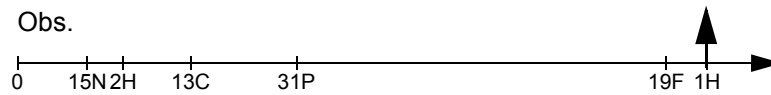
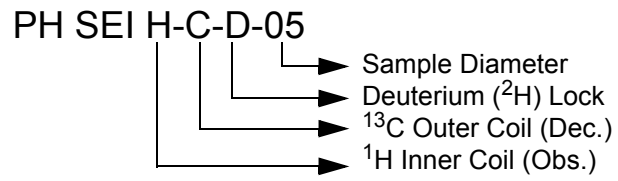
## Filter Requirements Questionnaire

1.2

Please fill in the following questionnaire for each probe.

(Part. Nr. / Ser. Nr.)











|                           |               |  |
|---------------------------|---------------|--|
| Bruker Order Number       |               |  |
| Spectrometer Type         |               |  |
| Probe                     |               |  |
| Transmitter Configuration | 1H            |  |
|                           | 19F           |  |
|                           | X             |  |
|                           | Y             |  |
|                           | Z             |  |
| HPPR/2 Configuration      | 1H            |  |
|                           | 19F           |  |
|                           | XBB           |  |
|                           | ...           |  |
| Lock                      | 2H            |  |
|                           | 19F           |  |
|                           | 2H Lockswitch |  |
| Existing Filter 1         |               |  |
| Existing Filter 2         |               |  |
| ...                       |               |  |
| ...                       |               |  |
| ...                       |               |  |
| Experiment 1              | Obs1 {Dec1}   |  |
| Experiment 2              | Obs2 {Dec2}   |  |
| ...                       |               |  |
| ...                       |               |  |

**Example:**

# Filter Configurations for HR NMR and HR MAS














## Required Filters:

Table 1.3. Required Filters for PH SEI H-C-D

| Channel (Obs./Dec.)                  | Preamplifier Module Type  | Required Filters  |
|--------------------------------------|---|---|
| Observe Path<br>1H Preamplifier      | HPPR/2 1H HPLNA MODULE 200-1000            | -   |
|                                      | HPPR/2 1H MODULE 200-250                   | -   |
|                                      | AQS 1H2H PREAMP 300-400                    | -   |
|                                      | HPPR/2 1H2H MODULE 300-400                 | -   |
|                                      | HPPR/2 1H LNA MODULE 500-900               | -   |
| Decoupling Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H)  |
|                                      | HPPR/2 XBB31P 2HS MODULE 750-1000         | -   |
|                                      | AQS XBB19F 2HS PREAMP 300-400            | -   |
|                                      | HPPR/2 XBB19F 2HS MODULE 300-400         | -   |

13C Observe/ 1H Decoupling might be possible with this configuration.

Table 1.4. Required Filters for PH SEI H-F-D

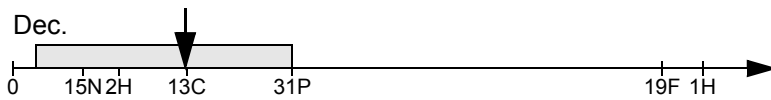
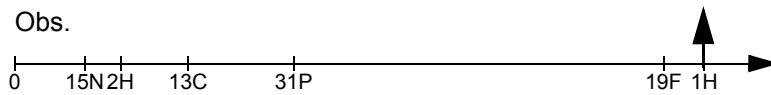
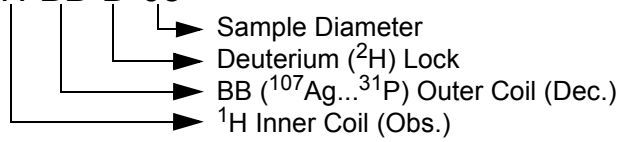
| Channel (Obs./Dec.)                  | Preamplifier Module Type   | Required Filters  |
|--------------------------------------|--|---|
| Observe Path<br>1H Preamplifier      | HPPR/2 1H HPLNA MODULE 200-1000            | 1H-PASS / 19-F STOP  |
|                                      | HPPR/2 1H MODULE 200-250                   | 1H-PASS / 19-F STOP  |
|                                      | AQS 1H2H PREAMP 300-400                    |   |
|                                      | HPPR/2 1H2H MODULE 300-400                 |   |
|                                      | HPPR/2 1H LNA MODULE 500-900               | 1H-PASS / 19-F STOP  |
| Decoupling Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P, 19F-LP (1H)   |
|                                      | HPPR/2 XBB31P 2HS MODULE 750-1000         | not possible  |
|                                      | AQS XBB19F 2HS PREAMP 300-400            | - <sup>a</sup>  |
|                                      | HPPR/2 XBB19F 2HS MODULE 300-400         | -   |

a only for ECL≤1: Filter 0-31P, 19F-LP(1H) is required for 19F Observe and 1H Decoupling

19F Observe/1H Decoupling might be possible with this configuration.











**Example:**

PH BBI H-BB-D-05



**Required Filters:**

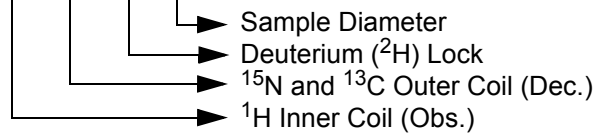
*Table 1.5. Required Filters for PH BBI H-BB-D*

| Channel (Obs./Dec.)                  | Preamplifier Module Type   | Required Filters  |
|--------------------------------------|--|---|
| Observe Path<br>1H Preamplifier      | HPPR/2 1H HPLNA MODULE 200-1000            | -   |
|                                      | HPPR/2 1H MODULE 200-250                   |   |
|                                      | AQS 1H2H PREAMP 300-400                    |   |
|                                      | HPPR/2 1H2H MODULE 300-400                 |   |
|                                      | HPPR/2 1H LNA MODULE 500-900               | -   |
| Decoupling Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H)  |
|                                      | HPPR/2 XBB31P 2HS MODULE 750-1000         | -   |
|                                      | AQS XBB19F 2HS PREAMP 300-400            | -   |
|                                      | HPPR/2 XBB19F 2HS MODULE 300-400         | -   |

X Observe/ 1H Decoupling might be possible with this configuration.

**Example:**







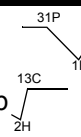







PH TXI H-C/N-D-05





**Required Filters:**

*Table 1.6. Required Filters for PH TXI H-C/N-D*
























| Channel (Obs./Dec.)                         | Preamplifier Module Type  | Required Filters   |
|---|---|--|
| Observe Path<br>1H Preamplifier             | HPPR/2 1H HPLNA MODULE 200-1000             | -  |
|   | HPPR/2 1H MODULE 200-250                    |  |
|   | AQS 1H2H PREAMP 300-400                     |  |
|   | HPPR/2 1H2H MODULE 300-400                  |  |
|   | HPPR/2 1H LNA MODULE 500-900                | -  |
| Decoupling Path<br>X-BB Preamplifier<br>13C | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H) <br>13C-Pass / 2H-Stop |
|   | HPPR/2 XBB31P 2HS MODULE 750-1000         | 13C-Pass / 2H-Stop                      |
|   | AQS XBB19F 2HS PREAMP 300-400             | 13C-Pass / 2H-Stop                      |
|   | HPPR/2 XBB19F 2HS MODULE 300-400          | 13C-Pass / 2H-Stop                      |
| Decoupling Path<br>15N                      | -no Preamplifier or some X Preamplifier   | 15N-Pass / 2H-Stop                      |

13C Observe/ 1H Decoupling might be possible with this configuration.

For 15N Observe the X-BB Preamplifier must be plugged in the 15N channel.

# Filter Configurations for HR NMR and HR MAS

Table 1.7. Required Filters for PH TXI H-C/P-D

| Channel (Obs./Dec.)                         | Preamplifier Module Type  | Required Filters   |
|---|---|--|
| Observe Path<br>1H Preamplifier             | HPPR/2 1H HPLNA MODULE 200-1000              | -  |
|   | HPPR/2 1H MODULE 200-250                     | -  |
|   | HPPR/2 1H LNA MODULE 500-900                 | -  |
|   | AQS 1H2H PREAMP 300-400                      | -  |
|   | HPPR/2 1H2H MODULE 300-400                   | -  |
| Decoupling Path<br>X-BB Preamplifier<br>13C | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700    | 13C-Pass / 31P-Stop   |
|   | HPPR/2 XBB31P 2HS MODULE 750-1000           | 13C-Pass / 31P-Stop    |
|   | AQS XBB19F 2HS PREAMP 300-400              | 13C-Pass / 31P-Stop   |
|   | HPPR/2 XBB19F 2HS MODULE 300-400           | 13C-Pass / 31P-Stop   |
| Decoupling Path<br>31P                      | no Preamplifier   | 0-31P-LP (19F-3H) <br>31-P-Pass / 2H-Stop  |
|   | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 31-P-Pass / 13C-Stop    |
|   | HPPR/2 XBB31P 2HS MODULE 750-1000          | 31-P-Pass / 13C-Stop    |
|   | AQS XBB19F 2HS PREAMP 300-400              | 31-P-Pass / 13C-Stop    |
|   | HPPR/2 XBB19F 2HS MODULE 300-400           | 31-P-Pass / 13C-Stop    |

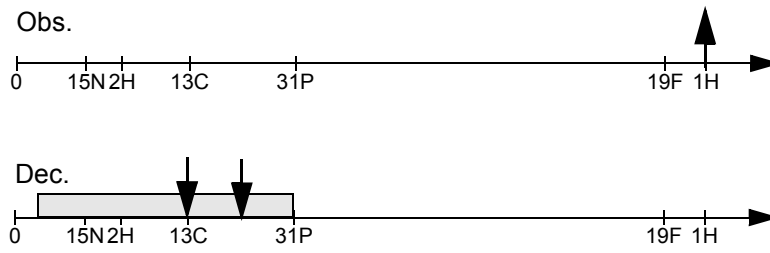
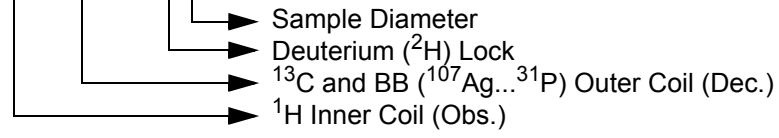
13C Observe/ 1H Decoupling might be possible with this configuration.  
For 31P Observe the X-BB Preamplifier must be plugged in the 31P channel.

TBI (Triple Broad Band Inverse)

1.6

**Example:**










PH TBI H-C/BB-D-05



# Filter Configurations for HR NMR and HR MAS

## Required Filters:

Table 1.8. Required Filters for PH TBI H-C/BB-D

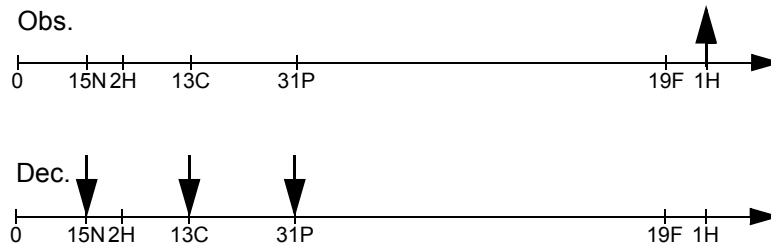
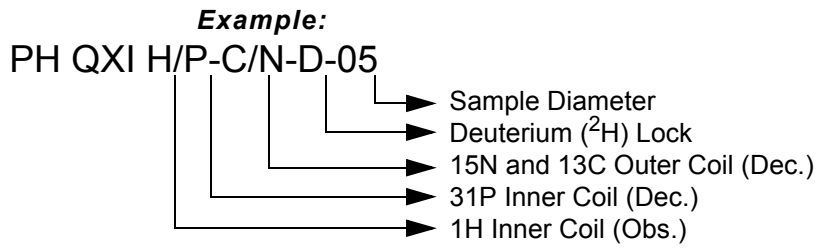
| Channel (Obs./Dec.)                         | Preamplifier Module Type  | Required Filters |
|---|---|------------------|
| Observe Path<br>1H Preamplifier             | HPPR/2 1H HPLNA MODULE 200-1000            | -                |
|   | HPPR/2 1H MODULE 200-250                   |                  |
|   | HPPR/2 1H LNA MODULE 500-900               | -                |
|   | AQS 1H2H PREAMP 300-400                    | -                |
|   | HPPR/2 1H2H MODULE 300-400                 | -                |
| Decoupling Path<br>X-BB Preamplifier<br>13C | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | a b              |
|   | HPPR/2 XBB31P 2HS MODULE 750-1000        | a b              |
|   | AQS XBB19F 2HS PREAMP 300-400            | a b              |
|   | HPPR/2 XBB19F 2HS MODULE 300-400         | a b              |
| Decoupling Path<br>BB                       | -no Preamplifier or some X Preamplifier   | a b              |

a For 13C and 15N decoupling filter requirements is the same as **"Required Filters for PH TXI H-C/N-D" on page 17**

b For 13C and 31P decoupling filter requirements is the same as **"Required Filters for PH TXI H-C/P-D" on page 18**

For additional decoupling nuclei please contact the nearest local Bruker office.
















13C Observe/ 1H Decoupling might be possible with this configuration.



# Filter Configurations for HR NMR and HR MAS




















## Required Filters:

Table 1.9. Required Filters for PH QXI H/P-C/N-D

| Channel (Obs./Dec.)                         | Preamplifier Module Type   | Required Filters   |
|---|--|--|
| Observe Path<br>1H Preamplifier             | HPPR/2 1H HPLNA MODULE 200-1000             | -  |
|   | HPPR/2 1H MODULE 200-250                    | -  |
|   | HPPR/2 1H LNA MODULE 500-900                | -  |
|   | AQS 1H2H PREAMP 300-400                     | -  |
|   | HPPR/2 1H2H MODULE 300-400                  | -  |
| Decoupling Path<br>X-BB Preamplifier<br>13C | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 13C-BP (0-SI, 11B-H)    |
|   | HPPR/2 XBB31P 2HS MODULE 750-1000        | 13C-BP (0-SI, 11B-H)   |
|   | AQS XBB19F 2HS PREAMP 300-400            | 13C-BP (0-SI, 11B-H)  |
|   | HPPR/2 XBB19F 2HS MODULE 300-400         | 13C-BP (0-SI, 11B-H)  |
| Decoupling Path<br>15N                      | no Preamplifier or some X Preamplifier   | 15N-Pass / 2H-Stop    |
| Decoupling Path<br>31P                      | no Preamplifier or some X Preamplifier   | 31P-BP(0-11B, 19F-H)  |

13C Observe/ 1H Decoupling might be possible with this configuration.

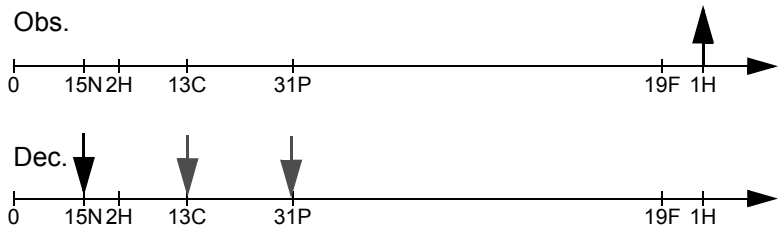
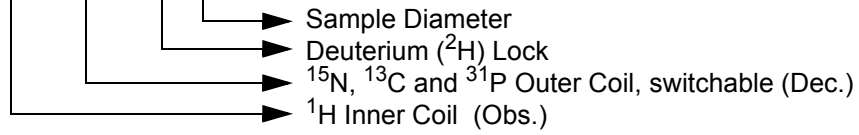
*Table 1.10. Required Filters for PH QXI H/F-C/N-D*

| Channel (Obs./Dec.)                         | Preamplifier Module Type   | Required Filters   |
|---|--|--|
| Observe Path<br>1H Preamplifier             | HPPR/2 1H HPLNA MODULE 200-1000            | 1H-PASS / 19-F STOP   |
|   | HPPR/2 1H MODULE 200-250                   | 1H-PASS / 19-F STOP   |
|   | HPPR/2 1H LNA MODULE 500-900               | 1H-PASS / 19-F STOP   |
|   | AQS 1H2H PREAMP 300-400                    | -  |
|   | HPPR/2 1H2H MODULE 300-400                 | -  |
| Decoupling Path<br>X-BB Preamplifier<br>13C | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 13C-BP (0-SI, 11B-H)    |
|   | HPPR/2 XBB31P 2HS MODULE 750-1000         | 13C-BP (0-SI, 11B-H)   |
|   | AQS XBB19F 2HS PREAMP 300-400            | 13C-BP (0-SI, 11B-H)    |
|   | HPPR/2 XBB19F 2HS MODULE 300-400         | 13C-BP (0-SI, 11B-H)    |
| Decoupling Path<br>15N                      | no Preamplifier or some X Preamplifier   | 15N-Pass / 2H-Stop    |
| Decoupling Path<br>19F                      | no Preamplifier or some X Preamplifier   | 0-31P, 19F-LP (1H) <br>19F-BANDPASS  |

13C Observe/ 1H Decoupling might be possible with this configuration.

*Example:*











PH QNI H-P/C/N-D-05





**Required Filters:**














*Table 1.11. Required Filters for PH QNI H-P/C/N-D*

| Channel (Obs./Dec.)                  | Preamplifier Module Type   | Required Filters  |
|--------------------------------------|--|---|
| Observe Path<br>1H Preamplifier      | HPPR/2 1H HPLNA MODULE 200-1000            | -   |
|                                      | HPPR/2 1H MODULE 200-250                   | -   |
|                                      | HPPR/2 1H LNA MODULE 500-900               | -   |
|                                      | AQS 1H2H PREAMP 300-400                    | -   |
|                                      | HPPR/2 1H2H MODULE 300-400                 | -   |
| Decoupling Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H)  |
|                                      | HPPR/2 XBB31P 2HS MODULE 750-1000        | -   |
|                                      | AQS XBB19F 2HS PREAMP 300-400            | -   |
|                                      | HPPR/2 XBB19F 2HS MODULE 300-400         | -   |

X Observe / 1H Decoupling might be possible with this configuration.

# Filter Configurations for HR NMR and HR MAS

Table 1.12. Required Filters for PH QNI H-F/P/C -D

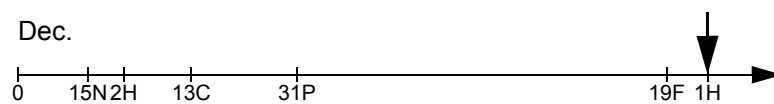
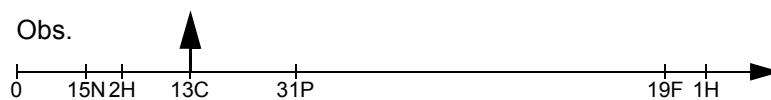
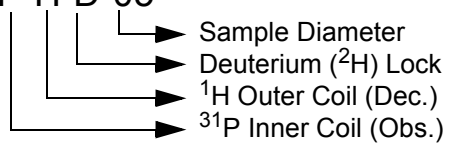
| Channel (Obs./Dec.)                  | Preamplifier Module Type  | Required Filters   |
|--------------------------------------|---|--|
| Observe Path<br>1H Preamplifier      | HPPR/2 1H HPLNA MODULE 200-1000            | 1H-Pass / 19F-Stop  |
|                                      | HPPR/2 1H MODULE 200-250                   | 1H-Pass / 19F-Stop  |
|                                      | HPPR/2 1H LNA MODULE 500-900               | 1H-Pass / 19F-Stop  |
|                                      | AQS 1H2H PREAMP 300-400                    | -  |
|                                      | HPPR/2 1H2H MODULE 300-400                 | -  |
| Decoupling Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P, 19F-LP (1H)  |
|                                      | HPPR/2 XBB31P 2HS MODULE 750-1000         | 19F decoupling not possible  |
|                                      | AQS XBB19F 2HS PREAMP 300-400            | _a   |
|                                      | HPPR/2 XBB19F 2HS MODULE 300-400         | -  |

a only for ECL <=1 and 19F(1H) Experiment, Filter 0-31P, 19F-LP(1H) is required

X Observe / 1H Decoupling might be possible with this configuration.

**Example:**











PH SEX P-H-D-05



# Filter Configurations for HR NMR and HR MAS













## Required Filters:

Table 1.13. Required Filters for PH SEX C-H-D

| Channel (Obs./Dec.)                      | Preamplifier Module Type   | Required Filters  |
|--|--|---|
| Observe Path<br>X-BB Preamplifier<br>13C | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700<br> | 0-31P-LP (19F-3H)  |
|  | HPPR/2 XBB31P 2HS MODULE 750-1000<br>         | -   |
|  | AQS XBB19F 2HS PREAMP 300-400<br>             | -   |
|  | HPPR/2 XBB19F 2HS MODULE 300-400<br>          | -   |
| Decoupling Path<br>1H Preamplifier       | HPPR/2 1H HPLNA MODULE 200-1000<br>           | -   |
|  | HPPR/2 1H MODULE 200-250<br>                  | -   |
|  | HPPR/2 1H LNA MODULE 500-900<br>             | -   |
|  | AQS 1H2H PREAMP 300-400<br>                 | -   |
|  | HPPR/2 1H2H MODULE 300-400<br>              | -   |












1H Observe / 13C Decoupling might be possible with this configuration.

*Table 1.14. Required Filters for PH SEX 3H-H-D*

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>3H Preamplifier    | HPPR/2 3H MODULE                 | 3H-HP(1H)  |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000  | 1H-LP(3H)  |
|                                    | HPPR/2 1H MODULE 200-250         | 1H-LP(3H)  |
|                                    | HPPR/2 1H LNA MODULE 500-900     | 1H-LP(3H)  |
|                                    | AQS 1H2H PREAMP 300-400          | 1H-LP(3H)  |
|                                    | HPPR/2 1H2H MODULE 300-400       | 1H-LP(3H)  |

1H Observe/ 3H Decoupling might be possible with this configuration.










*Table 1.15. Required Filters for PH SEX 2H-H-F*

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters   |
|------------------------------------|--|--|
| Observe Path<br>2H Preamplifier    | HPPR/2 2H MODULE 200-250, 500-900  | -  |
|                                    | AQS 1H2H PREAMP 300-400            | -  |
|                                    | HPPR/2 1H2H MODULE 300-400         | -  |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000    | 1H-Pass / 19F-Stop  |
|                                    | HPPR/2 1H MODULE 200-250           | 1H-Pass / 19F-Stop  |
|                                    | HPPR/2 1H LNA MODULE 500-900       | 1H-Pass / 19F-Stop  |
|                                    | AQS 1H2H PREAMP 300-400            | -  |
|                                    | HPPR/2 1H2H MODULE 300-400         | -  |

1H Observe/ 2H Decoupling might be possible with this configuration.

# Filter Configurations for HR NMR and HR MAS

Table 1.16. Filters for PH SEX X-H-D (x=all X-nuclei except 2H, 3H, 13C)

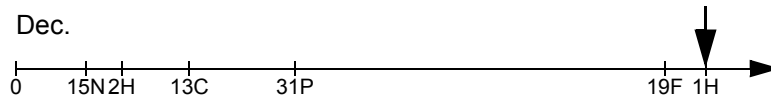
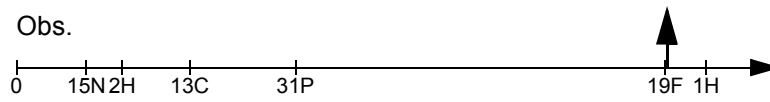
| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters |
|------------------------------------|--|------------------|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | -                |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | -                |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | -                |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -                |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000             | -                |
|                                    | HPPR/2 1H MODULE 200-250                    | -                |
|                                    | HPPR/2 1H LNA MODULE 500-900               | -                |
|                                    | AQS 1H2H PREAMP 300-400                   | -                |
|                                    | HPPR/2 1H2H MODULE 300-400                | -                |

1H Observe / X Decoupling might be possible with this configuration.

**Example:**

PH SEF F-H-D-05















- Sample Diameter
- Deuterium ( $^2\text{H}$ ) Lock
- $^1\text{H}$  Outer Coil (Dec.)
- $^{19}\text{F}$  Inner Coil (Obs.)



# Filter Configurations for HR NMR and HR MAS

## Required Filters:

Table 1.17. Required Filters for PH SEF F-H-D

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>19F Preamplifier   | HPPR/2 19F MODULE                          | 0-31P,19F-LP (1H)    |
|                                    | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P,19F-LP (1H)    |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | - <sup>a</sup>  |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -   |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000             | 1H-PASS /19F-STOP    |
|                                    | HPPR/2 1H MODULE 200-250                   | 1H-PASS /19F-STOP   |
|                                    | HPPR/2 1H LNA MODULE 500-900              | 1H-PASS /19F-STOP  |
|                                    | AQS 1H2H PREAMP 300-400                   | -   |
|                                    | HPPR/2 1H2H MODULE 300-400                | -   |

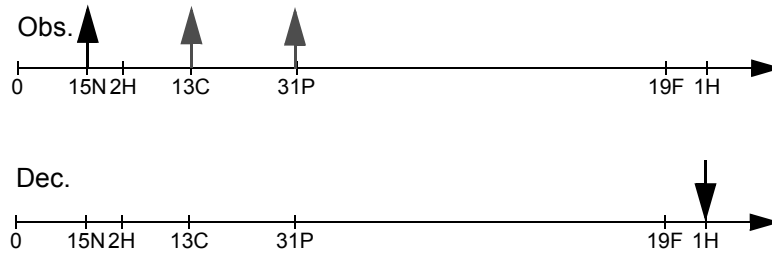
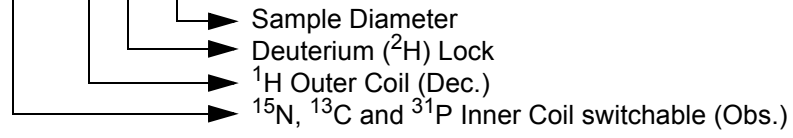
<sup>a</sup> only for ECL <=1 Filter 0-31P,19F-LP(1H) is required

1H Observe / 19F Decoupling might be possible with this configuration.



**Example:**











PH QNP P/C/N-H-D-05



# Filter Configurations for HR NMR and HR MAS















## Required Filters:

Table 1.18. Required Filters for PH QNP P/C/N-H-D

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H)  |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | -   |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | -   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -   |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000             | -   |
|                                    | HPPR/2 1H MODULE 200-250                    | -   |
|                                    | HPPR/2 1H LNA MODULE 500-900               | -   |
|                                    | AQS 1H2H PREAMP 300-400                   | -   |
|                                    | HPPR/2 1H2H MODULE 300-400                | -   |

1H Observe / X Decoupling might be possible with this configuration.

Table 1.19. Required Filters for PH QNP F/P/C -H-D

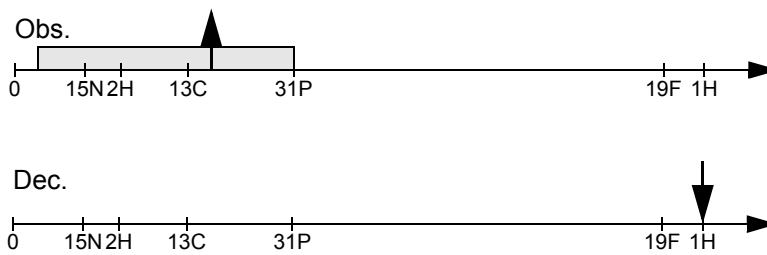
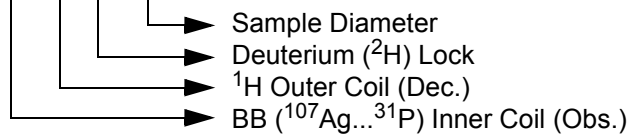
| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P,19F-LP (1H) <br>0-31P-LP (19F-3H) <sup>a</sup>  |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | 19F observe not possible  |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | _b  |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -   |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000            | 1H-Pass / 19F-Stop   |
|                                    | HPPR/2 1H MODULE 200-250                   | 1H-Pass / 19F-Stop   |
|                                    | HPPR/2 1H LNA MODULE 500-900             | 1H-Pass / 19F-Stop   |
|                                    | AQS 1H2H PREAMP 300-400                  | -   |
|                                    | HPPR/2 1H2H MODULE 300-400               | -   |

a This filter is only necessary for 13C decoupling and must be removed for 19F decoupling or observe  
 b only for ECL <=1 Filter 0-31P,19F-LP(1H) is required

1H Observe / X Decoupling might be possible with this configuration.











*Example:*

PH BBO BB-H-D-05



**Required Filters:**

Table 1.20. Required Filters for PH BBO BB-H-D

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H)  |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | -   |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | -   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -   |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000            | -   |
|                                    | HPPR/2 1H MODULE 200-250                  | -   |
|                                    | HPPR/2 1H LNA MODULE 500-900             | -   |
|                                    | AQS 1H2H PREAMP 300-400                  | -   |
|                                    | HPPR/2 1H2H MODULE 300-400               | -   |

1H Observe / X Decoupling might be possible with this configuration.

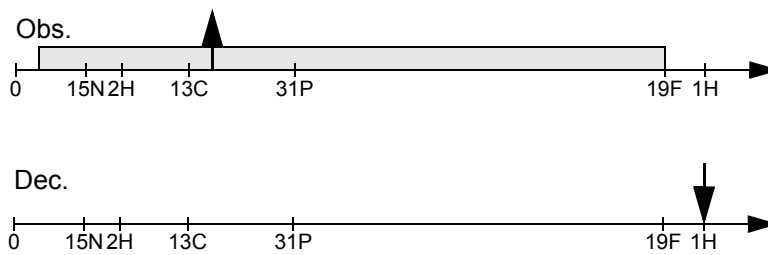
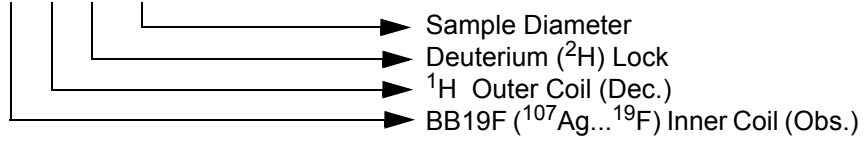
# Filter Configurations for HR NMR and HR MAS

## BBO BBF-H (Broad Band Observe)

1.13















*Example:*

PA BBO BBF-H-D-05 Z



**Required Filters:**

*Table 1.21. Required Filters for PH BBO BBF-H (valid for Standard-, Plus- and SmartProbes)*

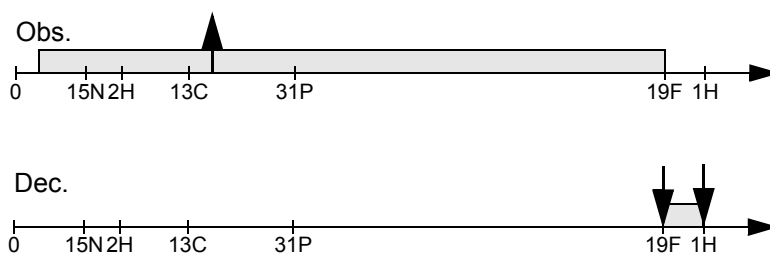
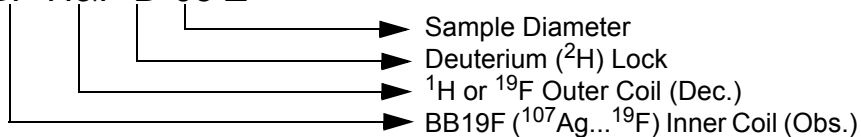
| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters   |
|------------------------------------|--|--|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P, 19F-LP (1H) <br>0-31P-LP (19F-3H) <sup>a</sup>  |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | 19F observe not possible   |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | _b   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -  |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000            | 1H-Pass / 19F-Stop    |
|                                    | HPPR/2 1H MODULE 200-250                 | 1H-Pass / 19F-Stop    |
|                                    | HPPR/2 1H LNA MODULE 500-900             | 1H-Pass / 19F-Stop    |
|                                    | AQS 1H2H PREAMP 300-400                  | -  |
|                                    | HPPR/2 1H2H MODULE 300-400               | -  |

a This filter is only necessary for 13C decoupling and must be removed for 19F decoupling or observe

b only for ECL <=1 Filter 0-31P, 19F-LP(1H) is required

*Example:*

PA BBO BBF-H&F-D-05 Z

















Depending on the decoupling nucleus, different filter configurations are required.



**Required Filters:**

Table 1.22. Required Filters for PH BBO BBF-H&F (valid for Standard-, Plus- and SmartProbes) for Experiments with 1H Decoupling









| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters   |
|------------------------------------|--|--|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P, 19F-LP (1H) <br>0-31P-LP (19F-3H) <sup>a</sup>  |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | 19F observe not possible   |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | - <sup>b</sup>   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | -  |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000           | 1H-Pass / 19F-Stop   |
|                                    | HPPR/2 1H MODULE 200-250                 | 1H-Pass / 19F-Stop    |
|                                    | HPPR/2 1H LNA MODULE 500-900             | 1H-Pass / 19F-Stop    |
|                                    | AQS 1H2H PREAMP 300-400                  | -  |
|                                    | HPPR/2 1H2H MODULE 300-400               | -  |

a This filter is only necessary for 13C decoupling and must be removed for 19F decoupling or observe

b only for ECL <=1 Filter 0-31P, 19F-LP(1H) is required

## Filter Configurations for HR NMR and HR MAS

Table 1.23. Required Filters for PH BBO BBF-H&F (valid for Standard-, Plus- and SmartProbes) for Experiments with <sup>19</sup>F Decoupling and <sup>107</sup>Ag-<sup>31</sup>P Observe

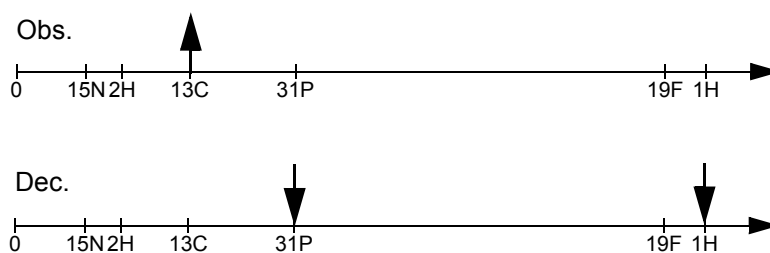
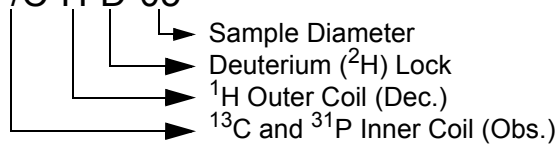
| Channel (Obs./Dec.)               | Preamplifier Module Type  | Required Filters  |
|-----------------------------------|---|---|
| Observe Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700<br> | 0-31P-LP (19F-3H)  |
|                                   | HPPR/2 XBB31P 2HS MODULE 750-1000<br>         | -   |
|                                   | AQS XBB19F 2HS PREAMP 300-400<br>             | 0-31P-LP (19F-3H)  |
|                                   | HPPR/2 XBB19F 2HS MODULE 300-400<br>          | 0-31P-LP (19F-3H)  |
| Decoupling Path                   | no preamplifier (1H preamplifier must be bypassed for <sup>19</sup> F decoupling)   | 19F-BANDPASS       |

## TXO (Triple X-Nuclei Observe)

1.15

**Example:**














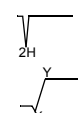








PH TXO P/C-H-D-05



























# Filter Configurations for HR NMR and HR MAS

## Required Filters:

Table 1.24. Required Filters for PH TXO X/Y-H-D (without 19F)

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700<br>  | X-Pass / Y-Stop<br>              |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000<br>          | X-Pass / Y-Stop<br>              |
|                                    | AQS XBB19F 2HS PREAMP 300-400<br>              | X-Pass / Y-Stop<br>              |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400<br>           | X-Pass / Y-Stop<br>              |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000<br>             | -   |
|                                    | HPPR/2 1H MODULE 200-250<br>                    | -   |
|                                    | HPPR/2 1H LNA MODULE 500-900<br>               | -   |
|                                    | AQS 1H2H PREAMP 300-400<br>                   | -   |
|                                    | HPPR/2 1H2H MODULE 300-400<br>                | -   |
| Decoupling Path Y                  | -no Preamplifier   | 2H Stop<br>Y-Pass / X-Stop<br> |
|                                    | HPPR/2 XBB19F 2HS MODULE 200-250 500-700<br> | Y-Pass / X-Stop<br>            |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-900<br>         | Y-Pass / X-Stop<br>            |
|                                    | AQS XBB19F 2HS PREAMP 300-400<br>            | Y-Pass / X-Stop<br>            |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400<br>         | Y-Pass / X-Stop<br>            |

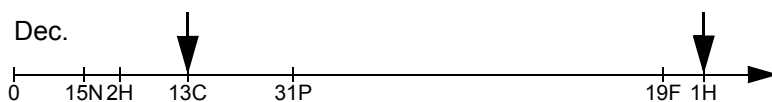
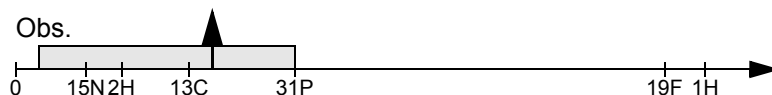
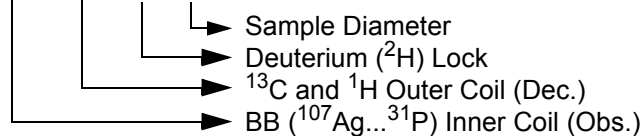
*Table 1.25. Required Filters for PH TXO F/Y-H-D (with X=19F)*

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters   |
|------------------------------------|--|--|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700    | 19F Bandpass    |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000            | -not possible  |
|                                    | AQS XBB19F 2HS PREAMP 300-400                | 19F Bandpass    |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400             | 19F Bandpass    |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000              | 1H-Pass / 19F-Stop    |
|                                    | HPPR/2 1H MODULE 200-250                     | 1H-Pass / 19F-Stop    |
|                                    | HPPR/2 1H LNA MODULE 500-900                | 1H-Pass / 19F-Stop   |
|                                    | AQS 1H2H PREAMP 300-400                    | -  |
|                                    | HPPR/2 1H2H MODULE 300-400                 | -  |
| Decoupling<br>Path Y               | no Preamplifier  | 2H-Stop <br>0-31P-LP (19F-3H)  |
|                                    | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | 0-31P-LP (19F-3H)   |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | -  |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | 0-31P-LP (19F-3H)   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | 0-31P-LP (19F-3H)   |

Y Observe, 19F and 1H Decoupling might be possible with this configuration.

**Example:**

PH TBO BB-H/C-D-05



**Required Filters:**

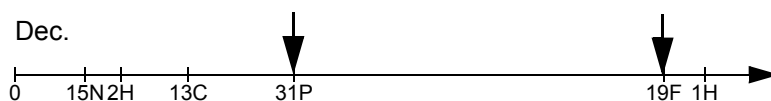
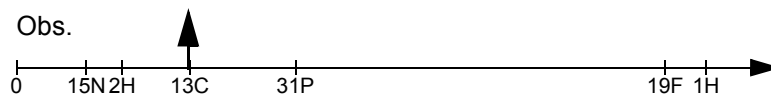
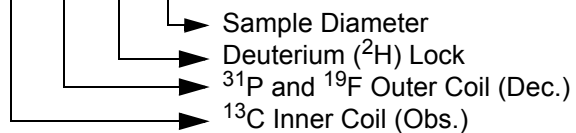
Please contact the nearest Bruker head office for TBO filter requirements.

TXD (Triple X-Nuclei Double Decoupling)

1.17

**Example:**
























PH TXD C-F/P-D-05



# Filter Configurations for HR NMR and HR MAS

## Required Filters:




















Table 1.26. Required Filters for PH TXD X-H/Y-D

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters   |
|------------------------------------|--|--|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700    | X-Pass / Y-Stop   |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000            | X-Pass / Y-Stop   |
|                                    | AQS XBB19F 2HS PREAMP 300-400                | X-Pass / Y-Stop   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400             | X-Pass / Y-Stop   |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000               | -  |
|                                    | HPPR/2 1H MODULE 200-250                      | -  |
|                                    | HPPR/2 1H LNA MODULE 500-900                 | -  |
|                                    | AQS 1H2H PREAMP 300-400                     | -  |
|                                    | HPPR/2 1H2H MODULE 300-400                  | -  |
| Decoupling Path Y                  | no Preamplifier  | 2H Stop <br>Y-Pass / X-Stop  |
|                                    | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700  | Y-Pass / X-Stop   |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000          | Y-Pass / X-Stop   |
|                                    | AQS XBB19F 2HS PREAMP 300-400              | Y-Pass / X-Stop   |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400           | Y-Pass / X-Stop   |
















## TXD (Triple X-Nuclei Double Decoupling)

Table 1.27. Required Filters for PH TXD X-F/Z-D

| Channel (Obs./Dec.)               | Preamplifier Module Type  | Required Filters   |
|-----------------------------------|---|--|
| Observe Path<br>X-BB Preamplifier | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700<br>   | X-Pass / Y-Stop<br>   |
|                                   | HPPR/2 XBB31P 2HS MODULE 750-1000<br>           | X-Pass / Y-Stop<br>   |
|                                   | AQS XBB19F 2HS PREAMP 300-400<br>               | X-Pass / Y-Stop<br>   |
|                                   | HPPR/2 XBB19F 2HS MODULE 300-400<br>            | X-Pass / Y-Stop<br>   |
| Decoupling Path<br>Y (19F)        | no preamplifier or some X preamplifier  | 19F Bandpass<br>  |
| Decoupling Path<br>Z              | no preamplifier   | 2H Stop<br><br>Z-Pass / X-Stop<br> |
|                                   | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700<br> | Z-Pass / X-Stop<br>   |
|                                   | HPPR/2 XBB31P 2HS MODULE 750-1000<br>         | Z-Pass / X-Stop<br>   |
|                                   | AQS XBB19F 2HS PREAMP 300-400<br>             | Z-Pass / X-Stop<br>   |
|                                   | HPPR/2 XBB19F 2HS MODULE 300-400<br>          | Z-Pass / X-Stop<br>   |

# Filter Configurations for HR NMR and HR MAS

Table 1.28. Required Filters for PH TXD X-H/F-D

| Channel (Obs./Dec.)                | Preamplifier Module Type   | Required Filters  |
|------------------------------------|--|---|
| Observe Path<br>X-BB Preamplifier  | HPPR/2 XBB19F 2HS MODULE 200-250, 500-700<br> | 0-31P-LP (19F-3H)  |
|                                    | HPPR/2 XBB31P 2HS MODULE 750-1000<br>         | -   |
|                                    | AQS XBB19F 2HS PREAMP 300-400<br>             | 0-31P-LP (19F-3H)  |
|                                    | HPPR/2 XBB19F 2HS MODULE 300-400<br>          | 0-31P-LP (19F-3H)  |
| Decoupling Path<br>1H Preamplifier | HPPR/2 1H HPLNA MODULE 200-1000<br>           | -   |
|                                    | HPPR/2 1H MODULE 200-250<br>                  | -   |
|                                    | HPPR/2 1H LNA MODULE 500-900<br>             | -   |
|                                    | AQS 1H2H PREAMP 300-400<br>                 | -   |
|                                    | HPPR/2 1H2H MODULE 300-400<br>              | -   |
| Decoupling Path<br>Y (19F)         | no preamplifier or some X preamplifier   | 19F Bandpass     |

# *Available Filters (November 2009)*

# 2

Z102659 FILTER 85 0-31P,19F-LP (1H)  
Z41044 FILTER BIOSPEC- 85 1H+19F PASS

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Z00113 FILTER 100 2H STOP  
Z14345 FILTER 100 0-31P,19F-LP (1H)  
Z002044 FILTER BIOSPEC-100 1H+19F PASS

---

Z9214 FILTER BIOSPEC-125 1H+19F PASS  
Z14903 FILTER 125 0-31P,19F-LP (1H)

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Z002054 FILTER BIOSPEC-200 1H+19F PASS  
Z13381 FILTER 200 1H-BANDPASS  
Z13281 FILTER 200 1H-PASS / 19F-STOP  
Z00114 FILTER 200 2H STOP  
Z107721 FILTER 200 2H-LP(13C)  
Z13327 FILTER 200 0-31P,19F-LP (1H)  
Z14329 FILTER 200 0-31P-LP (19F-3H)  
Z13088 FILTER 200 11B-PASS / 13C-STOP  
Z41000 FILTER 200 11B-PASS / 31P-STOP  
Z13087 FILTER 200 13C-PASS / 11B-STOP  
Z13083 FILTER 200 13C-PASS / 2H-STOP  
Z6842 FILTER 200 13C-PASS / 31P-STOP  
Z13908 FILTER 200 19F-BANDPASS  
Z12967 FILTER 200 23NA-PASS /31P-STOP  
Z13015 FILTER 200 27AL-PASS /31P-STOP  
Z41001 FILTER 200 31P-PASS / 11B-STOP  
Z6843 FILTER 200 31P-PASS / 13C-STOP  
Z12968 FILTER 200 31P-PASS /23NA-STOP

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Z13382 FILTER 250 1H-BANDPASS  
Z13279 FILTER 250 1H-PASS / 19F-STOP

## Available Filters (November 2009)

Z00115 FILTER 250 2H STOP  
Z13439 FILTER 250 3H-PASS / 1H-STOP  
Z13328 FILTER 250 0-31P,19F-LP (1H)  
Z14330 FILTER 250 0-31P-LP (19F-3H)  
Z12810 FILTER 250 103RH-PASS/31P-STOP  
Z9146 FILTER 250 13C-PASS / 2H-STOP  
Z6818 FILTER 250 13C-PASS / 31P-STOP  
Z13375 FILTER 250 14N-PASS/195PT-STOP  
Z42386 FILTER 250 15N-PASS / 2H-STOP  
Z13376 FILTER 250 195PT-PASS/14N-STOP  
Z13902 FILTER 250 19F-BANDPASS  
Z110651 FILTER 250 1H-HP(0-13C)  
Z9774 FILTER 250 205TL-PASS/ 1H-STOP  
Z6819 FILTER 250 31P-PASS / 13C-STOP  
Z12811 FILTER 250 31P-PASS/103RH-STOP

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Z002084 FILTER BIOSPEC-300 1H+19F PASS  
Z13383 FILTER 300 1H-BANDPASS  
Z13763 FILTER 300 1H-LP (3H)  
Z13270 FILTER 300 1H-PASS / 19F-STOP  
Z00116 FILTER 300 2H STOP  
Z9327 FILTER 300 2H-PASS / 13C-STOP  
Z9330 FILTER 300 2H-PASS / 15N-STOP  
Z7781 FILTER 300 2H-PASS / 19F-STOP  
Z13764 FILTER 300 3H-HP (1H)  
Z13329 FILTER 300 0-31P,19F-LP (1H)  
Z14331 FILTER 300 0-31P-LP (19F-3H)  
Z100288 FILTER 300 0-195PT-LP(13C)  
Z13029 FILTER 300 119SN-P 13C-29SI-ST  
Z8742 FILTER 300 119SN-PASS/31P-STOP  
Z9229 FILTER 300 11B-PASS / 31P-STOP  
Z13972 FILTER 300 13C-BP (0-SI,11B-H)  
Z9328 FILTER 300 13C-PASS / 2H-STOP  
Z12853 FILTER 300 13C-PASS / 14N-STOP  
Z8955 FILTER 300 13C-PASS / 15N-STOP  
Z6845 FILTER 300 13C-PASS / 31P-STOP  
Z9329 FILTER 300 15N-PASS / 2H-STOP

Z8954 FILTER 300 15N-PASS / 13C-STOP  
Z13773 FILTER 300 19F-BANDPASS  
Z42428 FILTER 300 27A-PASS / 31P-STOP  
Z15174 FILTER 300 31P-BP(0-11B,19F-H)  
Z9228 FILTER 300 31P-PASS / 11B-STOP  
Z6844 FILTER 300 31P-PASS / 13C-STOP  
Z42427 FILTER 300 31P-PASS / 27A-STOP  
Z8741 FILTER 300 31P-PASS /119S-STOP  
Z13373 FILTER 300 31P-PASS/195PT-STOP  
Z9244 FILTER 300 6LI-PASS / 2H-STOP  
Z7779 FILTER 300 6LI-PASS / 15N-STOP  
Z102690 FILTER 300 7LI - 1H-HP (13C)  
Z9384 FILTER 300 LDA/4-TRAFO 13C/31P

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Z13384 FILTER 360 1H-BANDPASS  
Z13284 FILTER 360 1H-PASS / 19F-STOP  
Z00117 FILTER 360 2H STOP  
Z13330 FILTER 360 0-31P,19F-LP (1H)  
Z14332 FILTER 360 0-31P-LP (19F-3H)  
Z42364 FILTER 360 13C-PASS / 2H-STOP  
Z8829 FILTER 360 13C-PASS / 15N-STOP  
Z6828 FILTER 360 13C-PASS / 31P-STOP  
Z42363 FILTER 360 15N-PASS / 2H-STOP  
Z8830 FILTER 360 15N-PASS / 13C-STOP  
Z13903 FILTER 360 19F-BANDPASS  
Z6829 FILTER 360 31P-PASS / 13C-STOP  
Z41153 FILTER 360 LDA/4-TRAFO 13C/31P

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Z13385 FILTER 400 1H-BANDPASS  
Z13271 FILTER 400 1H-PASS / 19F-STOP  
Z6850 FILTER 400 1H-PASS/205TL-STOP  
Z00118 FILTER 400 2H STOP  
Z9032 FILTER 400 2H-PASS / 13C-STOP  
Z9093 FILTER 400 2H-PASS / 15N-STOP  
Z12805 FILTER 400 2H-PASS / 171YB-ST  
Z5785 FILTER 400 2H-PASS / 31P-STOP  
Z14181 FILTER 400 3H-HP (1H)

## Available Filters (November 2009)

Z104117 FILTER 400 0-13C LP (119SN)  
Z13331 FILTER 400 0-31P,19F-LP (1H)  
Z14333 FILTER 400 0-31P-LP (19F-3H)  
Z13148 FILTER 400 10B-PASS / 11B-STOP  
Z104116 FILTER 400 119SN BP(0-24NA,19F-1H)  
Z14324 FILTER 400 11B-BP (0-23NA,P-H)  
Z13149 FILTER 400 11B-PASS / 10B-STOP  
Z14107 FILTER 400 13C-BP (0-SI,11B-H)  
Z9095 FILTER 400 13C-PASS / 2H-STOP  
Z13432 FILTER 400 13C-PASS / 11B-STOP  
Z8831 FILTER 400 13C-PASS / 15N-STOP  
Z107715 FILTER 400 13C-LP(31P)  
Z107713 FILTER 400 15N-NR(2H,F-H)  
Z8832 FILTER 400 15N-PASS / 13C-STOP  
Z12806 FILTER 400 171YB-PASS / 2H-STO  
Z104194 FILTER 400 19F-1H HP(0-31P)  
Z13774 FILTER 400 19F-BANDPASS  
Z14180 FILTER 400 1H-LP (3H)  
Z6849 FILTER 400 205TL-PASS/ 1H-STOP  
Z13202 FILTER 400 23NA-PASS /31P-STOP  
Z13322 FILTER 400 27AL-PASS /31P-STOP  
Z15309 FILTER 400 29SI-BP(0-2H,13C-H)  
Z13976 FILTER 400 31P-BP(0-11B,19F-H)  
Z6840 FILTER 400 31P-PASS / 13C-STOP  
Z13323 FILTER 400 31P-PASS /27AL-STOP  
Z7785 FILTER 400 57FE PASS / 1H-STOP  
Z42408 FILTER 400 6LI-PASS / 2H-STOP  
Z13017 FILTER 400 LDA/4-TRAFO 13C/31P

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Z13794 FILTER 500 1H-LP (3H)  
Z13272 FILTER 500 1H-PASS / 19F-STOP  
Z00119 FILTER 500 2H STOP  
Z9031 FILTER 500 2H-PASS / 13C-STOP  
Z9033 FILTER 500 2H-PASS / 15N-STOP  
Z4637 FILTER 500 2H-PASS / 31P-STOP  
Z13795 FILTER 500 3H-HP (1H)  
Z102949 FILTER 500 0-13C LP (119SN)

Z13332 FILTER 500 0-31P,19F-LP (1H)  
 Z14334 FILTER 500 0-31P-LP (19F-3H)  
 Z14299 FILTER 500 117SN-LP (119SN)  
 Z14300 FILTER 500 119SN-HP (117SN)  
 Z13114 FILTER 500 11B-PASS / 13C-STOP  
 Z14067 FILTER 500 13C-BP (0-SI,11B-H)  
 Z8917 FILTER 500 13C-PASS / 2H-STOP  
 Z13113 FILTER 500 13C-PASS / 11B-STOP  
 Z8745 FILTER 500 13C-PASS / 15N-STOP  
 Z107716 FILTER 500 13C-LP(31P)  
 Z42638 FILTER 500 13C-PASS /203TL-STP  
 Z8916 FILTER 500 15N-NR(2H,F-H)  
 Z8744 FILTER 500 15N-PASS / 13C-STOP  
 Z13597 FILTER 500 19F-BANDPASS  
 Z12866 FILTER 500 19F-PASS / 31P-STOP  
 Z13346 FILTER 500 19F-PASS /205TL-STP  
 Z42639 FILTER 500 203T-PASS / 13C-STP  
 Z13345 FILTER 500 205TL-PASS /19F-STP  
 Z104159 FILTER 500 31P-1H HP(13C)  
 Z14071 FILTER 500 31P-BP(0-11B,19F-H)  
 Z14973 FILTER 500 31P-HP (2H)  
 Z6808 FILTER 500 31P-PASS / 13C-STOP  
 Z13145 FILTER 500 31P-PASS/29SI-STOP  
 Z13697 FILTER 500 6LI-PASS / 2H-STOP

-----  
 Z14042 FILTER 600 1H-LP (3H)  
 Z13273 FILTER 600 1H-PASS / 19F-STOP  
 Z6685 FILTER 600 2H STOP  
 Z9087 FILTER 600 2H-PASS / 13C-STOP  
 Z9089 FILTER 600 2H-PASS / 15N-STOP  
 Z8753 FILTER 600 2H-PASS / 19F-STOP  
 Z14260 FILTER 600 3H-HP (1H)  
 Z105097 FILTER 600 6Li-LP (2H)  
 Z13333 FILTER 600 0-31P,19F-LP (1H)  
 Z14335 FILTER 600 0-31P-LP (19F-3H)  
 Z100315 FILTER 600 101RU-LP (15N-H)  
 Z14631 FILTER 600 13C-BP(0-SI,11B-H)

## Available Filters (November 2009)

Z9086 FILTER 600 13C-PASS / 2H-STOP  
Z4132 FILTER 600 13C-PASS / 15N-STOP  
Z107714 FILTER 600 13C-LP(31P)  
Z9088 FILTER 600 15N-NR(2H,F-H)  
Z4131 FILTER 600 15N-PASS / 13C-STOP  
Z13904 FILTER 600 19F-BANDPASS  
Z14632 FILTER 600 31P-BP(0-11B,19F-H)  
Z15088 FILTER 600 31P-HP (2H)  
Z6900 FILTER 600 31P-PASS / 13C-STOP

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Z13900 FILTER 700 1H-BANDPASS  
Z14841 FILTER 700 0-13C-LP (31P)  
Z13501 FILTER 700 0-31P-LP (19F-3H)  
Z14711 FILTER 700 13C-1H-HP(15N)  
Z15283 FILTER 700 13C-BP (0-29SI,P-H)  
Z13500 FILTER 700 13C-PASS / 2H-STOP  
Z13498 FILTER 700 15N-NR(2H,F-H)  
Z13905 FILTER 700 19F-BANDPASS  
Z14993 FILTER 700 19F-BP (0-31P,1H)  
Z14842 FILTER 700 31P-1H-HP (2H)  
Z15105 FILTER 700 31P-BP(0-11B,19F-H)

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Z12935 FILTER 750 2H STOP  
Z13099 FILTER 750 2H-PASS / 15N-STOP  
Z14336 FILTER 750 0-31P-LP (19F-3H)  
Z14216 FILTER 750 13C-BP (0-29SI,P-H)  
Z41122 FILTER 750 13C-PASS / 2H-STOP  
Z12864 FILTER 750 13C-PASS / 15N-STOP  
Z12812 FILTER 750 13C-PASS / 31P-STOP  
Z41123 FILTER 750 15N-NR(2H,F-H)  
Z12865 FILTER 750 15N-PASS / 13C-STOP  
Z13906 FILTER 750 19F-BANDPASS  
Z15033 FILTER 750 31P-1H HP(2H)  
Z12813 FILTER 750 31P-PASS / 13C-STOP

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Z7839 FILTER 800 2H-PASS / 15N-STOP  
Z13936 FILTER 800 0-13C LP (31P)



Z13937 FILTER 800 0-31P-LP (19F-3H)  
Z103187 FILTER 800 13C-BP(0-Si,11B-H)  
Z7837 FILTER 800 13C-PASS / 2H-STOP  
Z7838 FILTER 800 15N-NR(2H,F-H)  
Z13909 FILTER 800 19F-BANDPASS  
Z13288 FILTER 800 1H-BP (0-31P,19F)  
Z13938 FILTER 800 31P-1H HP (2H)  
Z103105 FILTER 800 31P-BP(0-11B, 19F-1H)

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Z104178 FILTER 850 0-31P-LP (19F-3H)

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Z13901 FILTER 900 1H-BANDPASS  
Z14645 FILTER 900 0-13C-LP (31P)  
Z14123 FILTER 900 0-31P-LP (19F-3H)  
Z13550 FILTER 900 13C-1H-HP (2H)  
Z13551 FILTER 900 15N-NR(2H,F-H)  
Z13907 FILTER 900 19F-BANDPASS  
Z103107 FILTER 900 31P-BP(0-11B, 19F-1H)

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Z106115 FILTER 950 0-31P-LP (19F-3H)  
Z106131 FILTER 950 13C-1H-HP (2H)  
Z106130 FILTER 950 15N-NR(2H,F-H)

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Z109597 FILTER 1000 0-31P-LP (19F-3H)  
Z109596 FILTER 1000 13C-1H-HP (2H)  
Z109595 FILTER 1000 15N-NR(2H,F-H)



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