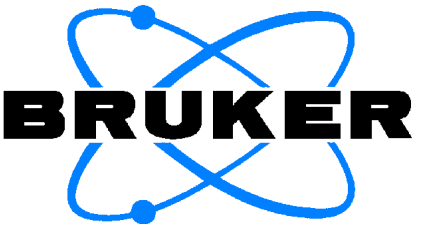

Filter Configurations

for High Resolution NMR and CP MAS

Version 003

BRUKER

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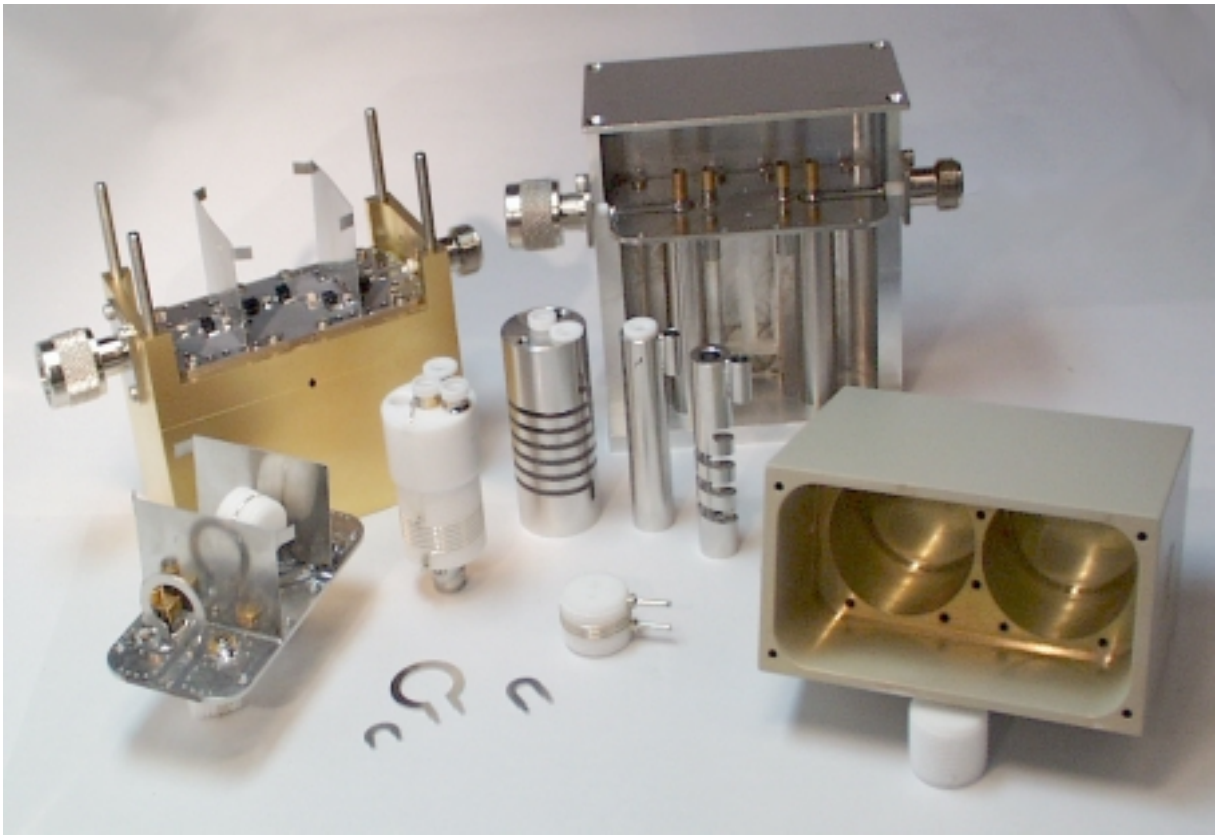
Filter Configurations for HR NMR

1

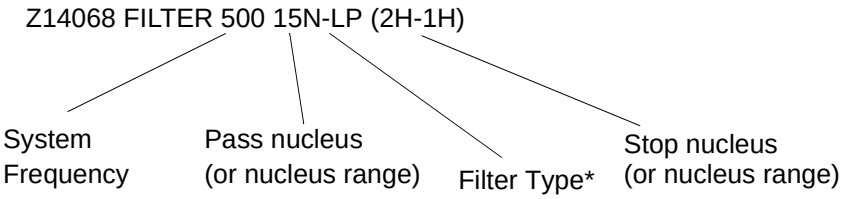
Figure 1.1. High Resolution NMR Filters and Filtercomponents



Introduction 1.1

- 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.
- 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 9*** and send it to BRUKER AG, Production Department.
- The exact order number for the corresponding magnet frequency can be taken from the chapter ***"Available Filters (July 2000)" on page 41***.
- No additional filters are necessary in the lock channel.
- No additional filters are necessary for HPPR CRP 15N and 13C modules.
- No additional filters are necessary for HPPR/2 15N and 13C modules.
- All filters should be mounted on the HPPR and not on the probe
- In cause of more than one filter, the 2H stop should be mounted closer to the HPPR
- Explanation of the filter nomenclature:



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

- For use of outfaced filters (not mentioned in Table ***page 41***) see previous manual versions (Z31430 Index 1 or 2).

Filter Requirements Questionnaire *1.2*

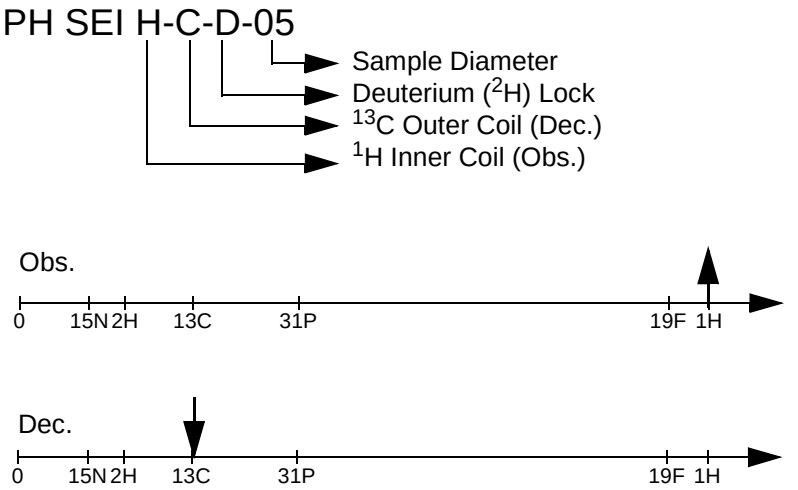
Please fill in the following questionnaire for each probe.

(Part. Nr. / Ser. Nr.)

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

SEI (Selective Inverse) *1.3*

Example:



Required Filters:

Table 1.1. Required Filters for PH SEI H-C-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA	-
	1H Preamp	-
Decoupling Path X-BB Preamplifier	X-BB19F 2HP	0-31P-LP (19F-3H) 2H Stop
	X-BB19F 2HS	0-31P-LP (19F-3H)
	X-BB31P 2HS	-

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

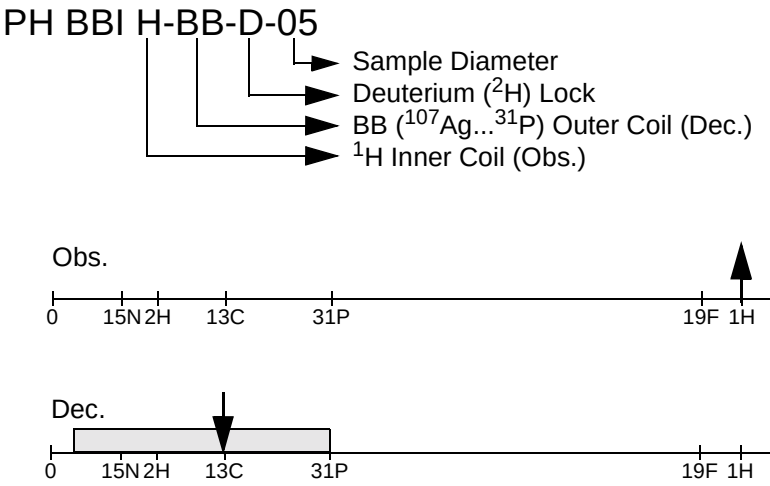
Table 1.2. Required Filters for PH SEI H-F-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA 	1H-PASS / 19-F STOP 
	1H Preamp 	1H-PASS / 19-F STOP 
Decoupling Path X-BB Preamplifier	X-BB19F 2HP 	2H Stop  0-31P,19F-LP (1H) 
	X-BB19F 2HS 	0-31P,19F-LP (1H) 
	X-BB31P 2HS 	not possible

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

BBI (Broad Band Inverse) *1.4*

Example:



Required Filters:

Table 1.3. Required Filters for PH BBI H-BB-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path X-BB Preamplifier	X-BB19F 2HP 	0-31P-LP (19F-3H)  2H Stop 
	X-BB19F 2HS 	0-31P-LP (19F-3H) 
	X-BB31P 2HS 	-

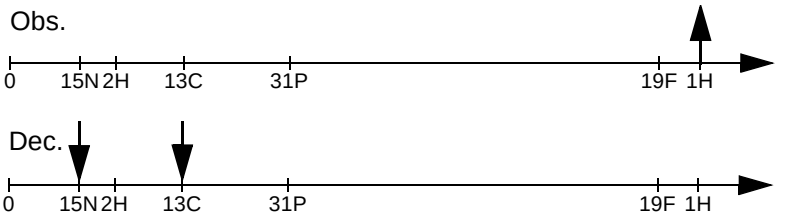
X Observe/ 1H Decoupling might be possible with this configuration.

TXI (Triple X-Nuclei Inverse) *1.5*

Example:

PH TXI H-C/N-D-05

- Sample Diameter
- Deuterium (^{2}H) Lock
- ^{15}N and ^{13}C Outer Coil (Dec.)
- ^{1}H Inner Coil (Obs.)



Required Filters:

Table 1.4. Required Filters for PH TXI H-C/N-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path X-BB Preamplifier 13C	X-BB19F 2HP 	0-31P-LP (19F-3H)  13C-Pass / 2H-Stop 
	X-BB19F 2HS 	0-31P-LP (19F-3H)  13C-Pass / 2H-Stop 
	X-BB31P 2HS 	13C-Pass / 2H-Stop 
Decoupling Path 15N	-	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.

Table 1.5. Required Filters for PH TXI H-C/P-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path X-BB Preamplifier 13C	X-BB19F 2HP 	13C-Pass / 31P-Stop  13C-Pass / 2H-Stop 
	X-BB19F 2HS 	13C-Pass / 31P-Stop 
	X-BB31P 2HS 	13C-Pass / 31P-Stop 
Decoupling Path 31P	-	0-31P-LP (19F-3H)  31-P-Pass / 2H-Stop 

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

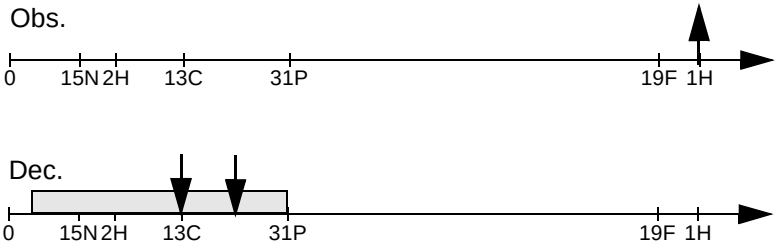
For 31P Observe the X-BB Preamplifier must be plugged in the 31P channel.

TBI (Triple Broad Band Inverse) *1.6*

Example:

PH TBI H-C/BB-D-05

- Sample Diameter
- Deuterium (^{2}H) Lock
- ^{13}C and BB (^{107}Ag...^{31}P) Outer Coil (Dec.)
- ^{1}H Inner Coil (Obs.)



Required Filters:

Table 1.6. Required Filters for PH TBI H-C/BB-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path X-BB Preamplifier 13C	X-BB19F 2HP 	a b
	X-BB19F 2HS 	a b
	X-BB31P 2HS 	a b
Decoupling Path BB	-	a b

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

bFor 13C and 31P decoupling filter requirements is the same as ***"Required Filters for PH TXI H-C/P-D" on page 14***

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

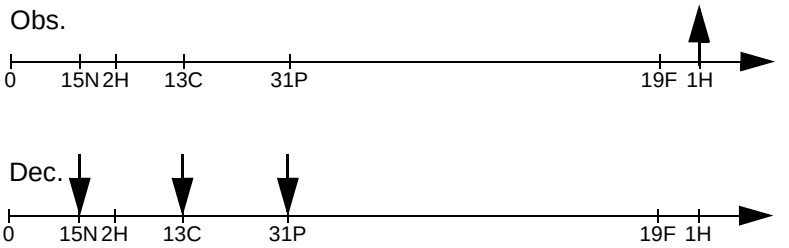
13C Observe/ 1H Decoupling might be possible with this configuration.

QXI (Quattro X-Nuclei Inverse) *1.7*

Example:

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

- Sample Diameter
- Deuterium (^{2}H) Lock
- 15N and 13C Outer Coil (Dec.)
- 31P Inner Coil (Dec.)
- 1H Inner Coil (Obs.)



Required Filters:

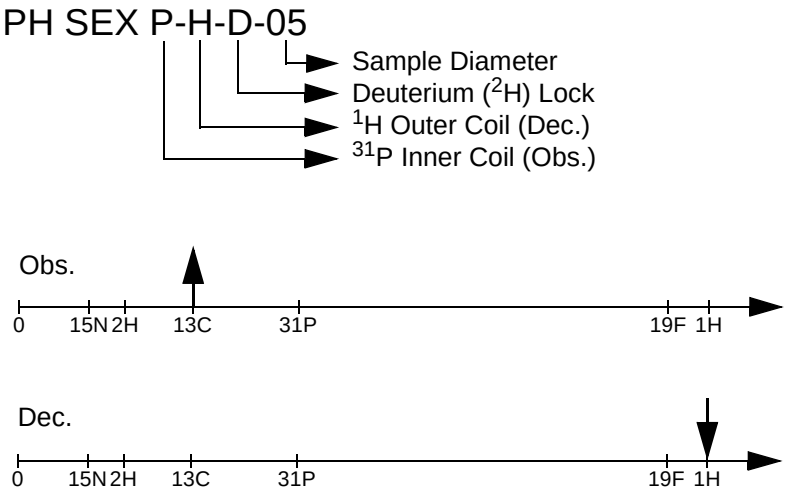
Table 1.7. Required Filters for PH QXI H/P-C/N-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path X-BB Preamplifier 13C	X-BB19F 2HP 	13C-Pass / 31P-Stop  13C-Pass / 2H-Stop 
	X-BB19F 2HS 	13C-Pass / 31P-Stop  13C-Pass / 2H-Stop 
	X-BB31P 2HS 	13C-Pass / 31P-Stop  13C-Pass / 2H-Stop 
Decoupling Path 15N	-	15N-Pass / 2H-Stop 
Decoupling Path 31P		0-31P-LP (19F-3H)  31P-Pass / 2H-Stop 

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

SEX, Dual (Selective X-Nuclei) *1.8*

Example:



Required Filters:

Table 1.8. Required Filters for PH SEX C-H-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier 13C	X-BB19F 2HP 	0-31P-LP (19F-3H)  13C-Pass / 2H-Stop 
	X-BB19F 2HS 	0-31P-LP (19F-3H) 
	X-BB31P 2HS 	-
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-

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

Table 1.9. Required Filters for PH SEX 3H-H-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 3H Preamplifier	3H Preamp 	3H-HP(1H) 
Decoupling Path 1H Preamplifier	1H LNA 	1H-LP(3H) 
	1H Preamp 	1H-LP(3H) 

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

Table 1.10. Required Filters for PH SEX 2H-H-F

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 2H Preamplifier	2H Preamp 	-
Decoupling Path 1H Preamplifier	1H LNA 	1H-Pass / 19F-Stop 
	1H Preamp 	-

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

Table 1.11. 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 X-BB Preamplifier	X-BB19F 2HP 	2H-Stop 
	X-BB19F 2HS 	-
	X-BB31P 2HS 	-
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-

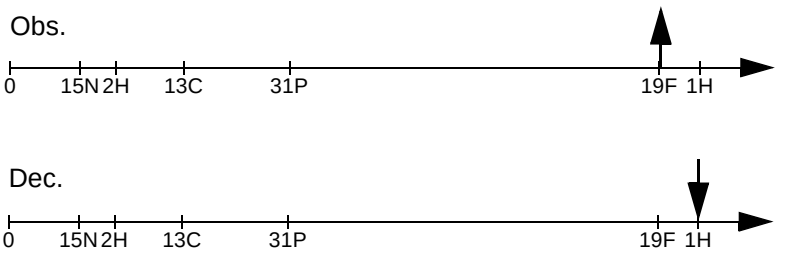
1H Observe / X Decoupling might be possible with this configuration.

SEF (Selective 19F) *1.9*

Example:

PH SEF F-H-D-05

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



Required Filters:

Table 1.12. Required Filters for PH SEF F-H-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 19F Preamplifier	19F Preamp 	0-31P,19F-LP (1H) 
	X-BB19F 2HP 	2H-Stop  0-31P,19F-LP (1H) 
	X-BB19F 2HS 	0-31P,19F-LP (1H) 
Decoupling Path 1H Preamplifier	1H LNA 	1H-PASS /19F-STOP 
	1H Preamp 	1H-PASS /19F-STOP 

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

QNP (Quattro Nuclei Probe) *1.10*

Example:

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

- Sample Diameter
- Deuterium (^{2}H) Lock
- ^{1}H Outer Coil (Dec.)
- ^{15}N, ^{13}C and ^{31}P Inner Coil switchable (Obs.)

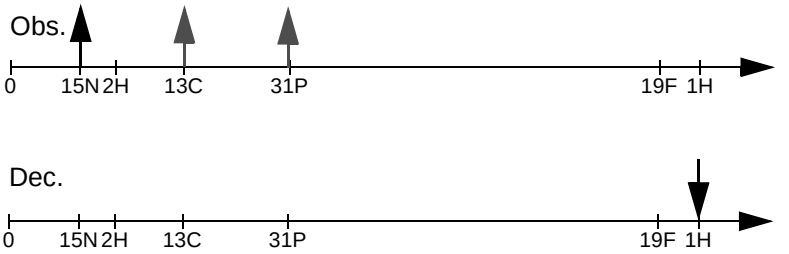


Table 1.13. Required Filters for PH QNP P/C/N-H-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  0-31P-LP (19F-3H) 
	X-BB19F 2HS 	0-31P-LP (19F-3H) 
	X-BB31P 2HS 	-
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-

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

Table 1.14. Required Filters for PH QNP F/P/C -H-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  0-31P,19F-LP (1H)  0-31P-LP (19F-3H)[a] 
	X-BB19F 2HS 	0-31P,19F-LP (1H)  0-31P-LP (19F-3H)[a] 
	X-BB31P 2HS 	19F observe not possible
Decoupling Path 1H Preamplifier	1H LNA 	1H-Pass / 19F-Stop 
	1H Preamp 	1H-Pass / 19F-Stop 

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

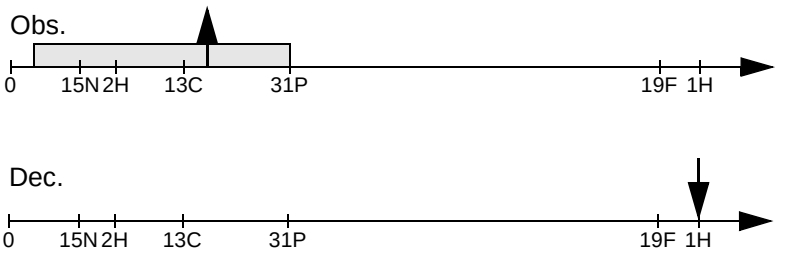
1H Observe / X Decoupling might be possible with this configuration.

BBO (Broad Band Observe) *1.11*

Example:

PH BBO BB-H-D-05

- Sample Diameter
- Deuterium (^{2}H) Lock
- ^{1}H Outer Coil (Dec.)
- BB (^{107}Ag...^{31}P) Inner Coil (Obs.)



Required Filters:

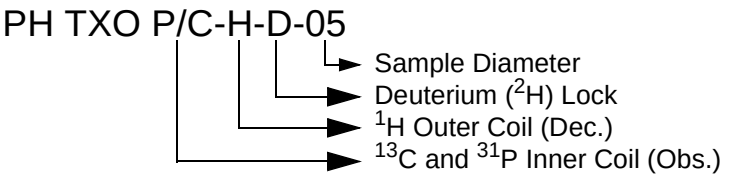
Table 1.15. Required Filters for PH BBO BB-H-D

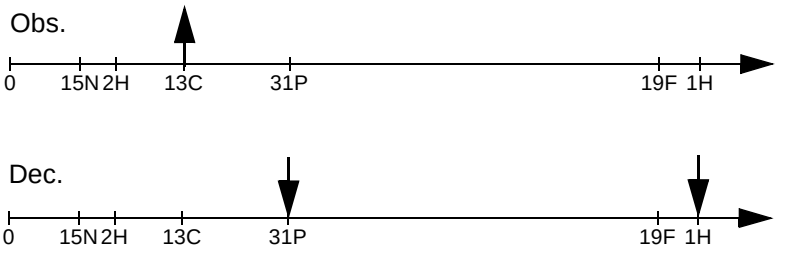
Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  0-31P-LP (19F-3H) 
	X-BB19F 2HS 	0-31P-LP (19F-3H) 
	X-BB31P 2HS 	-
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-

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

TXO (Triple X-Nuclei Observe) *1.12*

Example:





Required Filters:

Table 1.16. Required Filters for PH TXO X/Y-H-D (without 19F)

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  X-Pass / Y-Stop 
	X-BB19F 2HS 	X-Pass / Y-Stop 
	X-BB31P 2HS 	X-Pass / Y-Stop 
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path Y		2H Stop  Y-Pass / X-Stop 

Only X-Observe, Y and 1H Decoupling is possible with this configuration.

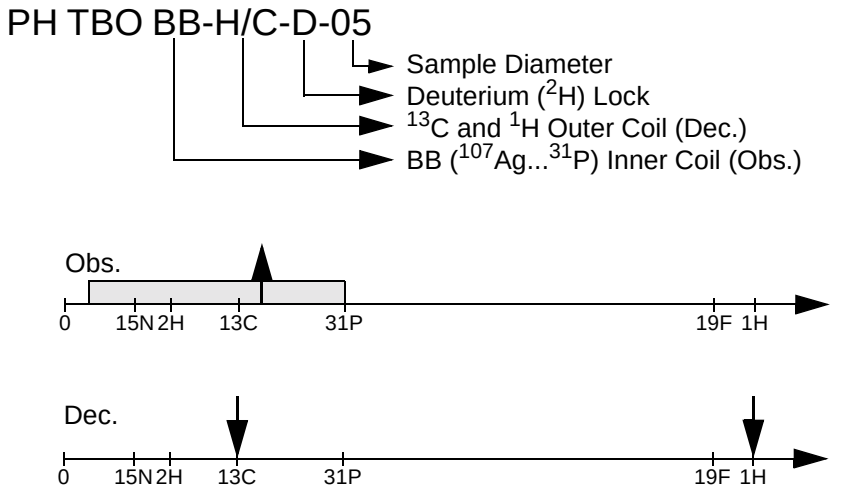
Table 1.17. Required Filters for PH TXO F/Y-H-D (with X=19F)

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	19F Bandpass 
	X-BB19F 2HS 	19F Bandpass 
	X-BB31P 2HS 	-not possible
Decoupling Path 1H Preamplifier	1H LNA 	1H-Pass / 19F-Stop 
	1H Preamp 	-
Decoupling Path Y		2H-Stop  0-31P-LP (19F-3H) 

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

TBO (Triple Broad Band Observe) *1.13*

Example:

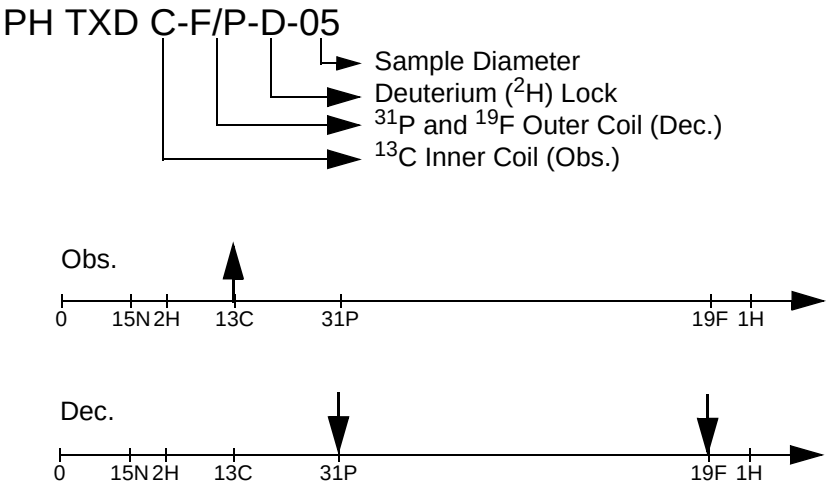


Required Filters:

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

TXD (Triple X-Nuclei Double Decoupling) *1.14*

Example:



Required Filters:

Table 1.18. Required Filters for PH TXD X-H/Y-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  X-Pass / Y-Stop 
	X-BB19F 2HS 	X-Pass / Y-Stop 
	X-BB31P 2HS 	X-Pass / Y-Stop 
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path Y		2H Stop  Y-Pass / X-Stop 

Table 1.19. Required Filters for PH TXD X-F/Z

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  X-Pass / Y-Stop 
	X-BB19F 2HS 	X-Pass / Y-Stop 
	X-BB31P 2HS 	X-Pass / Y-Stop 
Decoupling Path y (19F)		19F Bandpass 
Decoupling Path Z		2H Stop  Z-Pass / X-Stop 

Table 1.20. Required Filters for PH TXD X-H/F-D

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path X-BB Preamplifier	X-BB19F 2HP 	2H-Stop  0-31P-LP (19F-3H) 
	X-BB19F 2HS 	0-31P-LP (19F-3H) 
	X-BB31P 2HS 	-
Decoupling Path 1H Preamplifier	1H LNA 	-
	1H Preamp 	-
Decoupling Path y (19F)	-	19F Bandpass 

Filter Configurations for CP MAS 2

Introduction 2.1

Special filters are required for CP MAS (up to 500W transmitter power). Due to the high decoupling power during acquisition, harmonics of the decoupling signal must be attenuated at least 40dB to prevent saturation of the preamplifier. Other signals (spurious, noise) in the decoupling signal at the observe frequency must be attenuated at least 65dB for frequencies higher than the decoupling frequency and 80dB for lower frequencies. For those reasons a bandpass is required in the decoupling path.

MAS bandpasses have generally the specifications mentioned above, power rating is 500W (100ms, 20% duty cycle).

Nomenclature of MAS filters is pass frequency and filter type following the system frequency and stop frequency range in brackets e.g. Z14067 FILTER 500 13C-BP (0-29SI,P-H). P means 31P and H means 1H.

If 15N is the lowest used frequency, a lowpass can be used in this case e.g. Z14068 FILTER 500 15N-LP (2H-1H).

All CP MAS compatible filters are marked with a * in the chapter: ***"Available Filters (July 2000)" on page 41***.

An overview of available bandpass filters for CP MAS is given in chapter ***"Bandpass Filters for CP MAS Inserts" on page 37***.

For more detailed information see the corresponding ECs.

PH MAS (double resonance) *2.2*

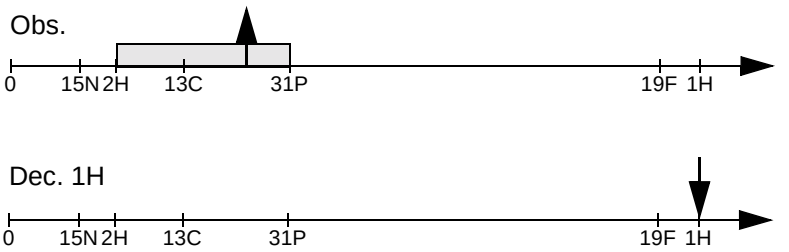
The double resonance MAS probe is available for 1H or 19F decoupling or tunable from 19F to 1H. For the X nuclei different ranges are available, which do not influence the filter requirements.

Example:

MASDVT600WB BL2.5 D-P/H

^{1}H (Dec.)

BB (^{2}H...^{31}P, Obs.)



Required Filters:

Table 2.1. Required Filters for PHMAS BB[a]/H

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path XBB Preamplifier	HPHP X-BB PREAMP MOD.	0-31P-LP (19F-3H)[b] 
Decoupling Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	1H-BANDPASS 

a BB means the tunable x nuclei range

b This Filter is necessary in any case, independent of the X nuclei range

- 1H observe and X decoupling is also possible with this filter configuration.

Table 2.2. Required Filters for PHMAS BB[a]/F

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path XBB Preamplifier	HPHP X-BB PREAMP MOD.	0-31P-LP (19F-3H)[b] 
Decoupling Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	19F-BANDPASS 

a BB means the tunable X nuclei range

b This Filter is necessary in any case, independent of the X nuclei range

- 19F observe and X decoupling is also possible with this filter configuration.

Table 2.3. Required Filters for PHMAS BB[a]/F-H

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path XBB Preamplifier	HPHP X-BB PREAMP MOD.	0-31P-LP (19F-3H)[b] 
Decoupling Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	19F-BANDPASS[c]  1H-BANDPASS[d]  Tunable probes from 19F to 1H can also be used in context with a MAS HFX ADPTER. In this case additional filters are necessary (see: ***"MAS HFX Unit" on page 39***).

a BB means the tunable x nuclei range

b This Filter is necessary in any case, independent of the X nuclei range

c Probe tuned to 1H

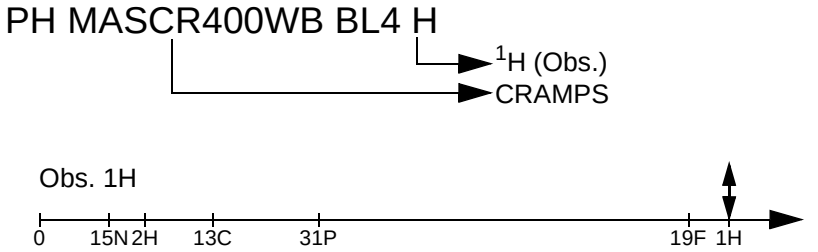
d Probe tuned to 19F

- 19F or 1H observe and X decoupling is also possible with this filter configuration.

PH MAS CRAMPS-H *2.3*

The probe is available for 1H, 19F or tunable from 19F to 1H

Example:



Required Filters:

Table 2.4. Required Filters for PH MASCR H

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	no filters are required

Table 2.5. Required Filters for PH MASCR F

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	no filters are required

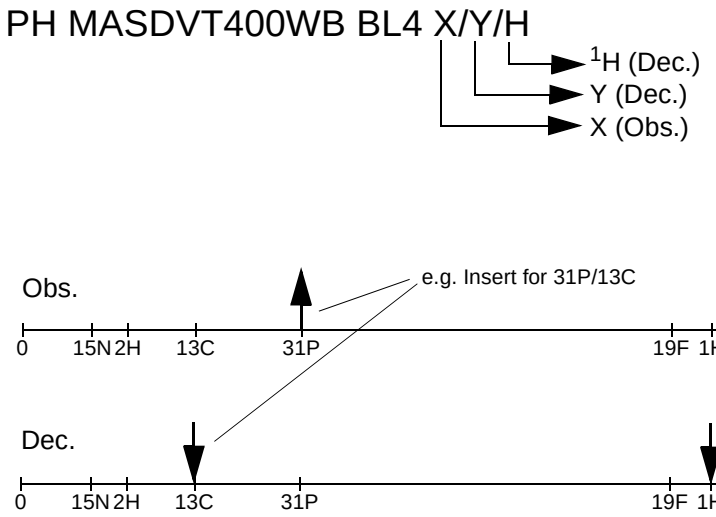
Table 2.6. Required Filters for PH MASCR F-H

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	Tunable cramps probes from 19F to 1H can also be used in context with a MAS HFX ADAPTER. Only in this case filters are necessary (see: ***"MAS HFX Unit" on page 39***)

PH MAS Triple (X/Y/H) 2.4

The probe is available for 1H, 19F or tunable from 19F to 1H. The same filters are required for probes with fix X and Y nuclei or for probes with exchangeable inserts.

Example:



Required Filters:

Table 2.7. Required Filters for PH MAS(TRI) X/Y/H

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path XBB Preamplifier	HPHP X-BB PREAMP MOD.	Depending on the insert, see table: ***"Bandpass Filters for CP MAS Inserts" on page 37***
Decoupling Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	1H-BANDPASS 
Decoupling Path Y	-	Depending on the insert, see table: ***"Bandpass Filters for CP MAS Inserts" on page 37***

- Any combination of observe and decoupling nuclei is possible with this configuration.

Table 2.8. Required Filters for PH MAS(TRI) X/Y/F

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path XBB Preamplifier	HPHP X-BB PREAMP MOD.	Depending on the insert, see table: ***"Bandpass Filters for CP MAS Inserts" on page 37***
Decoupling Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	19F-BANDPASS 
Decoupling Path Y	-	Depending on the insert, see table: ***"Bandpass Filters for CP MAS Inserts" on page 37***

- Any combination of observe and decoupling nuclei is possible with this configuration.

Table 2.9. Required Filters for PH MAS(TRI) X/Y/F-H

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path XBB Preamplifier	HPHP X-BB PREAMP MOD.	Depending on the insert, see table: ***"Bandpass Filters for CP MAS Inserts" on page 37***
Decoupling Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	19F-BANDPASS[a]  1H-BANDPASS[b]  Tunable probes from 19F to 1H can also be used in context with a MAS HFX ADPTER. In this case additional filters are necessary (see: ***"MAS HFX Unit" on page 39***).
Decoupling Path Y	-	Depending on the insert, see table: ***"Bandpass Filters for CP MAS Inserts" on page 37***

a Probe tuned to 1H

b Probe tuned to 19F

- Any combination of observe and decoupling nuclei is possible with this configuration.

Bandpass Filters for CP MAS Inserts *2.5*

Table 2.10. Available Bandpass Filters for CP MAS (July 2000)

Insert (X/Y)	300		400		500		600		750	
	X	Y	X	Y	X	Y	X	Y	X	Y
31P/129XE			Z13976		Z14071		Z14632			
31P/23NA			Z13976		Z14071	Z14901	Z14632			
31P/27AL			Z13976		Z14071	Z14069	Z14632	Z14634		
31P/13C		Z13972	Z13976	Z14107	Z14071	Z14067	Z14632	Z14631		Z14216
31P/113CD			Z13976		Z14071		Z14632			
31P/29SI			Z13976		Z14071	Z14070	Z14632	Z14636		
31P/2H			Z13976		Z14071	Z13509	Z14632	Z14635		
31P/17O			Z13976		Z14071		Z14632	Z14637		
31P/15N			Z13976	Z14040	Z14071	Z14068	Z14632	Z14633		Z14217
31P/14N			Z13976		Z14071	Z14850	Z14632			
7LI/29SI						Z14070		Z14636		
11B/23Na			Z14324			Z14901				
11B/27AL			Z14324			Z14069		Z14634		
11B/13C		Z13972	Z14324	Z14107		Z14067		Z14631		Z14216
11B/29SI			Z14324			Z14070		Z14636		
11B/133Cs			Z14323							
11B/15N			Z14324	Z14040		Z14068		Z14633		Z14217
11B/14N			Z14324			Z14850				
129Xe/29Si						Z14070		Z14636		
129XE/17O								Z14637		
23NA/29SI					Z14901	Z14070		Z14636		
23NA/17O					Z14901			Z14637		
23Na/133Cs					Z14901					
27AL/29SI					Z14069	Z14070	Z14634	Z14636		
27AL/17O					Z14069		Z14634	Z14637		
27Al/133Cs					Z14069		Z14634			
27AL/14N					Z14069	Z14850	Z14634			
27AL/109AG					Z14069		Z14634			
27AL/103RH					Z14069		Z14634			
13C/195Pt	Z13972[a]		Z14107[a]		Z14067[a]		Z14631[a]		Z14216	
13C/29SI	Z13972		Z14107		Z14067	Z14070	Z14631	Z14636	Z14216	
13C/2H	Z13972		Z14107		Z14067	Z13509	Z14631	Z14635	Z14216	

Table 2.10. Available Bandpass Filters for CP MAS (July 2000)

Insert (X/Y)	300		400		500		600		750	
	X	Y	X	Y	X	Y	X	Y	X	Y
13C/17O	Z13972		Z14107		Z14067		Z14631	Z14637	Z14216	
13C/15N	Z13972		Z14107	Z14040	Z14067	Z14068	Z14631	Z14633	Z14216	Z14217
13C/109Ag	Z13972		Z14107		Z14067		Z14631		Z14216	
29Si/2H					Z14070	Z13509	Z14636	Z14635		
29SI/17O					Z14070		Z14636	Z14637		
29SI/15N				Z14040	Z14070	Z14068	Z14636	Z14633		Z14217
29Si/14N					Z14070	Z14850	Z14636			
2H/15N				Z14040	Z13509	Z14068	Z14635	Z14633		Z14217

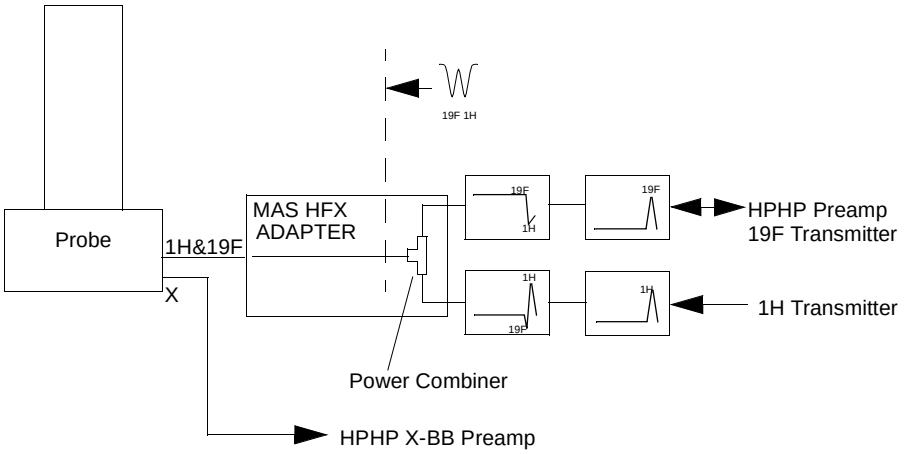
a) -70dB at 195Pt

Note: 15N and 14N Filters up to 700MHz are realized as lowpass

MAS HFX Unit *2.6*

To obtain double resonance (at 19F and 1H) an additional MAS HFX Adapter must be inserted between probe and transmitter. This is only permissible for probes, which are tunable from 19F to 1H. The ADAPTER in context with the probe works as a critical coupled bandpass filter and can be tuned and matched at two resonances. With this configuration are 19F observe, 1H decoupling and vice versa experiments possible.

Figure 2.1. MAS HFX ADAPTER



For more detailed infomation concerning the HFX-Unit see the corresponding manual (B2201) witch is part of the HFX-Unit (200MHz: B1507, 300MHz: B1449, 400MHz: B1456, 500MHz: B1506)

Required Filters:

Table 2.11. Required Filters for Probes with MAS HFX Unit

Channel (Obs./Dec.)	Preamplifier Module Type	Required Filters
Observe Path 19F & 1H Preamplifier	HPHP 19F/1H PREAMP	0-31P,19F-LP (1H)  19F-BANDPASS 
Decoupling Path	-	1H-Pass / 19F-Stop  1H-BANDPASS 

Filter Configurations for CP MAS

Available Filters (July 2000)

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Z00105 FILTER 100 2H PASS

Z00113 FILTER 100 2H STOP

Z14345 FILTER 100 0-31P,19F-LP (1H)

Z6595 FILTER 100 BAND PASS 1H

Z6603 FILTER 100 LOW PASS 1H STOP

Z14903 FILTER 125 0-31P,19F-LP (1H)

Z13381 FILTER 200 1H-BANDPASS *

Z13281 FILTER 200 1H-PASS / 19F-STOP

Z00106 FILTER 200 2H PASS

Z00114 FILTER 200 2H STOP

Z13742 FILTER 200 2H-PASS / 13C-STOP

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

Z13739 FILTER 200 13C-PASS / 15N-STOP

Z13083 FILTER 200 13C-PASS / 2H-STOP

Z6842 FILTER 200 13C-PASS / 31P-STOP

Z13740 FILTER 200 13C-PASS /29SI-STOP

Z13741 FILTER 200 15N-PASS / 13C-STOP

Z13908 FILTER 200 19F-BANDPASS *

Z12967 FILTER 200 23NA-PASS /31P-STOP

Z13015 FILTER 200 27AL-PASS /31P-STOP

Z13744 FILTER 200 29SI-PASS /11B-STOP

Z13743 FILTER 200 29SI-PASS /13C-STOP

Z41001 FILTER 200 31P-PASS / 11B-STOP

Z6843 FILTER 200 31P-PASS / 13C-STOP

Z12968 FILTER 200 31P-PASS /23NA-STOP

Z13111 FILTER 200 LDA/4-TRAFO 13C/31P

Z13382 FILTER 250 1H-BANDPASS *

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

Z00107 FILTER 250 2H PASS

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

Z13894 FILTER 250 117SN-PASS/13C-STOP

Z13892 FILTER 250 117SN-PASS/31P-STOP

Z9146 FILTER 250 13C-PASS / 2H-STOP

Z6818 FILTER 250 13C-PASS / 31P-STOP

Z13893 FILTER 250 13C-PASS/117SN-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 *

Z9774 FILTER 250 205TL-PASS/ 1H-STOP

Z6819 FILTER 250 31P-PASS / 13C-STOP

Z12811 FILTER 2531P-PASS/103RH-STOP

Z13891 FILTER 250 31P-PASS/117SN-STOP

Z13383 FILTER 300 1H-BANDPASS *

Z13270 FILTER 300 1H-PASS / 19F-STOP

Z13763 FILTER 300 1H-LP(3H)

Z00108 FILTER 300 2H PASS

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-PASS / 1H-STOP

Z13329 FILTER 300 0-31P,19F-LP (1H)

Z14331 FILTER 300 0-31P-LP (19F-3H) *

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 (0-2H,P-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
Z7780 FILTER 300 15N-PASS / 6LI-STOP
Z13773 FILTER 300 19F-BANDPASS *
Z42428 FILTER 300 27A-PASS / 31P-STOP
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
Z9384 FILTER 300 LDA/4-TRAFO 13C/31P

Z13384 FILTER 360 1H-BANDPASS *
Z13284 FILTER 360 1H-PASS / 19F-STOP
Z00109 FILTER 360 2H PASS
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

Z13385 FILTER 400 1H-BANDPASS *
Z13271 FILTER 400 1H-PASS / 19F-STOP

Z14180 FILTER 400 1H-LP(3H)
Z6850 FILTER 400 1H-PASS/205TL-STOP
Z00110 FILTER 400 2H PASS
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
Z13204 FILTER 400 2H-PASS 400W
Z14181 FILTER 400 3H-HP(1H)
Z13331 FILTER 400 0-31P,19F-LP (1H)
Z14333 FILTER 400 0-31P-LP (19F-3H) *
Z13148 FILTER 400 10B-PASS / 11B-STOP
Z14324 FILTER 400 11B-BP (0-23NA,F-H) *
Z13149 FILTER 400 11B-PASS / 10B-STOP
Z14107 FILTER 400 13C-BP (0-29SI,P-H) *
Z9095 FILTER 400 13C-PASS / 2H-STOP
Z13432 FILTER 400 13C-PASS / 11B-STOP
Z8831 FILTER 400 13C-PASS / 15N-STOP
Z6841 FILTER 400 13C-PASS / 31P-STOP
Z14040 FILTER 400 15N-LP (2H-1H) *
Z9094 FILTER 400 15N-PASS / 2H-STOP
Z8832 FILTER 400 15N-PASS / 13C-STOP
Z12806 FILTER 400 171YB-PASS / 2H-STO
Z13774 FILTER 400 19F-BANDPASS *
Z6849 FILTER 400 205TL-PASS/ 1H-STOP
Z13202 FILTER 400 23NA-PASS /31P-STOP
Z13322 FILTER 400 27AL-PASS /31P-STOP
Z13976 FILTER 400 31P-BP (0-13C,1H) *
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

Z13386 FILTER 500 1H-BANDPASS *
Z13272 FILTER 500 1H-PASS / 19F-STOP

Z13794 FILTER 500 1H-PASS / 3H-STOP
Z00111 FILTER 500 2H PASS
Z00119 FILTER 500 2H STOP
Z13509 FILTER 500 2H-BP (0-15N,C-1H) *
Z9031 FILTER 500 2H-PASS / 13C-STOP
Z9033 FILTER 500 2H-PASS / 15N-STOP
Z4637 FILTER 500 2H-PASS / 31P-STOP
Z13696 FILTER 500 2H-PASS / 6LI-STOP
Z13795 FILTER 500 3H-HP (1H)
Z13697 FILTER 500 6LI-PASS / 2H-STOP
Z13698 FILTER 500 6LI-PASS /15N-STOP
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)
Z13226 FILTER 500 119SN-PASS/31P-STOP
Z13114 FILTER 500 11B-PASS / 13C-STOP
Z14067 FILTER 500 13C-BP (0-29SI,P-H) *
Z8917 FILTER 500 13C-PASS / 2H-STOP
Z13113 FILTER 500 13C-PASS / 11B-STOP
Z8745 FILTER 500 13C-PASS / 15N-STOP
Z6807 FILTER 500 13C-PASS / 31P-STOP
Z42638 FILTER 500 13C-PASS /203TL-STP
Z14850 FILTER 500 14N-LP (2H-1H)*
Z14068 FILTER 500 15N-LP (2H-1H) *
Z8916 FILTER 500 15N-PASS / 2H-STOP
Z8744 FILTER 500 15N-PASS / 13C-STOP
Z13692 FILTER 500 15N-PASS /29SI-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
Z14901 FILTER 500 23NA-BP(0-SI,11B-H) *
Z14069 FILTER 500 27AL-BP (0-29S,P-H) *
Z14070 FILTER 500 29SI-BP (0-2H,C-H) *
Z13693 FILTER 500 29SI-PASS /15N-STOP

Z13144 FILTER 500 29SI-PASS/31P-STOP
Z14071 FILTER 500 31P-BP (0-13C,1H) *
Z6808 FILTER 500 31P-PASS / 13C-STOP
Z13145 FILTER 500 31P-PASS/29SI-STOP
Z8891 FILTER 500 LDA/4-TRAFO 13C/31P

Z13387 FILTER 600 1H-BANDPASS *
Z13273 FILTER 600 1H-PASS / 19F-STOP
Z14042 FILTER 600 1H-PASS / 3H-STOP
Z6684 FILTER 600 2H PASS
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)
Z13333 FILTER 600 0-31P,19F-LP (1H)
Z14335 FILTER 600 0-31P-LP (19F-3H) *
Z14631 FILTER 600 13C-BP (0-29Si,P-H) *
Z9086 FILTER 600 13C-PASS / 2H-STOP
Z4132 FILTER 600 13C-PASS / 15N-STOP
Z6901 FILTER 600 13C-PASS / 31P-STOP
Z14633 FILTER 600 15N-LP (2H-1H) *
Z9088 FILTER 600 15N-PASS / 2H-STOP
Z4131 FILTER 600 15N-PASS / 13C-STOP
Z14637 FILTER 600 17O-BP (0-15N,SI-H) *
Z13904 FILTER 600 19F-BANDPASS *
Z14634 FILTER 600 27AL-BP (0-29S,P-H) *
Z14636 FILTER 600 29SI-BP (0-15N,C,B-H) *
Z14635 FILTER 600 2H-BP (0-15N,C-1H) *
Z14632 FILTER 600 31P-BP (0-13C,1H) *
Z6900 FILTER 600 31P-PASS / 13C-STOP

Z13900 FILTER 700 1H-BANDPASS *
Z14547 FILTER 700 1H-PASS / 19F-STOP
Z14546 FILTER 700 0-31P,19F-LP (1H)
Z13501 FILTER 700 0-31P-LP (19F-3H) *
Z13500 FILTER 700 13C-PASS / 2H-STOP

Z13498 FILTER 700 15N-PASS / 2H-STOP

Z13905 FILTER 700 19F-BANDPASS *

Z13388 FILTER 750 1H-BANDPASS *

Z13286 FILTER 750 1H-PASS / 19F-STOP

Z7836 FILTER 750 2H PASS

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

Z14217 FILTER 750 15N-BP (2H-1H) *

Z41123 FILTER 750 15N-PASS / 2H-STOP

Z12865 FILTER 750 15N-PASS / 13C-STOP

Z13906 FILTER 750 19F-BANDPASS *

Z13334 FILTER 750 19F-PASS / 1H-STOP

Z12813 FILTER 750 31P-PASS / 13C-STOP

Z13198 FILTER 800 1H-BANDPASS *

Z13288 FILTER 800 1H-PASS / 19F-STOP

Z7839 FILTER 800 2H-PASS / 15N-STOP

Z13937 FILTER 800 0-31P-LP (19F-3H) *

Z7837 FILTER 800 13C-PASS / 2H-STOP

Z13936 FILTER 800 13C-PASS / 31P-STOP

Z7838 FILTER 800 15N-PASS / 2H-STOP

Z13909 FILTER 800 19F-BANDPASS *

Z13335 FILTER 800 19F-PASS / 1H-STOP

Z13199 FILTER 800 19F-PASS / 1H-STOP

Z13938 FILTER 800 31P-PASS / 2H-STOP

Z13901 FILTER 900 1H-BANDPASS *

Z13551 FILTER 900 0-15N-LP(2H,19F-1H)

Z14123 FILTER 900 0-31P-LP (19F-3H) *

Z13550 FILTER 900 13C-1H-HP (2H)

Z13907 FILTER 900 19F-BANDPASS *

Available Filters (July 2000)

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