



# **BSMS, BSMS/2**

## **2H-TX User Manual**

**Version 004**

---

**BRUKER**

---

The information in this manual may be altered without notice.

BRUKER accepts no responsibility for actions taken as a result of use of this manual. BRUKER accepts no liability for any mistakes contained in the manual, leading to coincidental damage, whether during installation or operation of the instrument. Unauthorised reproduction of manual contents, without written permission from the publishers, or translation into another language, either in full or in part, is forbidden.

This manual was written by

A. Schwilch

© 31. Oktober 2003: BRUKER BIOSPIN AG

Fällanden, Switzerland

P/N: Z31475  
DWG-Nr: 1178004

# Contents

	<b>Contents .....</b>	<b>3</b>
<b>1</b>	<b>General Description .....</b>	<b>5</b>
1.1	Introduction .....	5
	Versions .....	5
1.2	2H-TX Function Description .....	6
1.3	Real Time Control Inputs .....	6
<b>2</b>	<b>2H-TX Installation .....</b>	<b>7</b>
2.1	General .....	7
2.2	2H-TX Installation .....	7
	Hardware Installation .....	7
	Software Installation .....	9
<b>3</b>	<b>Notes .....</b>	<b>13</b>



# General Description

# 1

## Introduction

1.1

The 2H-TX (2H Amplifier) board is a compact 20W amplifier for 2H NMR experiments. It is primarily intended for decoupling experiments.

## Versions

1.1.1

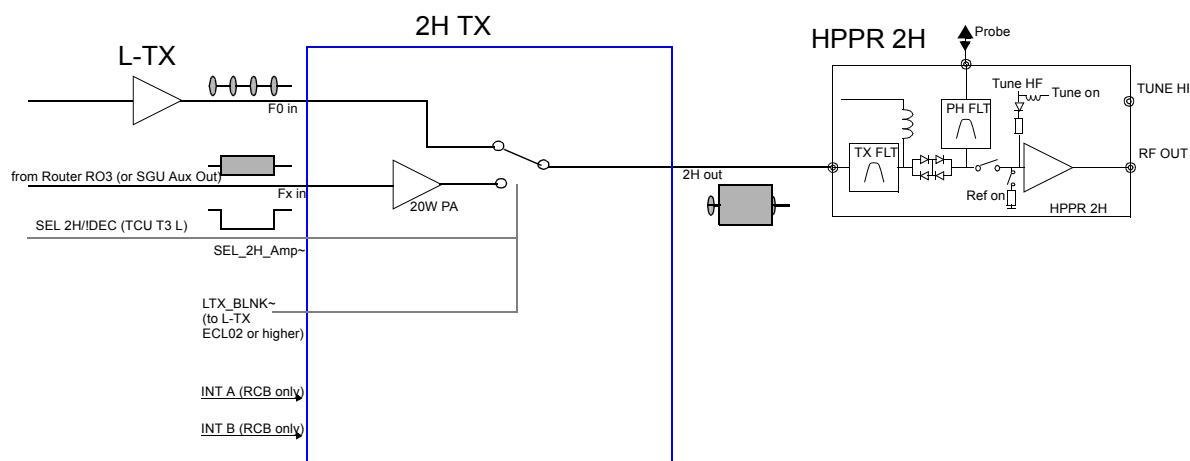
- The 2H-TX is located on the BSMS Realtime Control Board (RCB). Therefore a combination of 2H-TX and RCB is available and also a stand alone RCB is available.
- The 2H-TX is frequency selective (lower band: 200-400MHz, higher band: 500-800MHz) and additionally different for BSMS and BSMS/2. Specifications (except frequency band) are the same for all versions, the only difference is the power supply generation. The BSMS/2 is already equipped with 28V DC necessary for the 2H-TX. The 2H-TX for the BSMS uses a DC/DC converter for generating the 28V.

Refer to the following table for correct ordering

Table 1.1. 2H-TX versions

Rack	Name of components or units	Ordering Number	2H TX Location
BSMS	BSMS 2H-TX/RCB BD 200-400	Z002791	next slot left of LCB (remove an existing RCB, next slot right of CPU)
	BSMS 2H-TX/RCB BD 500-800	Z002792	
BSMS/2	BSMS/2 2H-TX/RCB BD 200-400	Z002793	next slot right of CPU
	BSMS/2 2H-TX/RCB BD 500-800	Z002794	

Figur 1.1. 2H Amplifier



The 2H-TX board delivers maximum 20 watts output power to the HPPR. The input signal (router output RO3) is fed directly to the input of the amplifier. No blanking pulse is required.

An additional switch located on the board is being used for selecting either 2H-TX amplifier or deuterium lock transmitter. The corresponding control signal can be programmed via pulse program and is wired from TCU to 2H-TX. The same signal is being used to blank the lock transmitter (ECL02 or higher). By using this pulse, interferences between NMR experiments and the lock transmitter are prevented. For L-TX ECL00 and ECL01 the Lock Power must be reduced to minimum to prevent interferences.

Refer to the corresponding RCB User Manual (Z31390) for detailed RCB functionality.

# 2H-TX Installation

# 2

## General

## 2.1

Refer to table **"2H-TX versions" on page 5** for selecting the right 2H-TX board version (frequency band and rack dependant).

Every existing BSMS and BSMS/2 (every ECL) can be upgraded with a 2H-TX Board.

An already existing RCB in the rack must be removed before upgrading the BSMS with a 2H-TX board. Any existing wiring to the RCB board can be removed and connected to the corresponding inputs (INT A, INT B) on the 2H-TX/RCB board.

## 2H-TX Installation

## 2.2

### Hardware Installation

### 2.2.1

Figure 2.1. The location of the 2H-TX in the BSMS rack

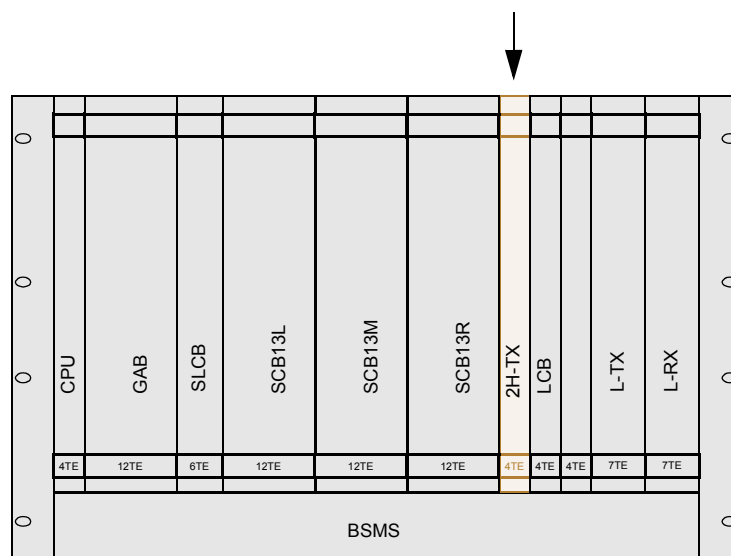
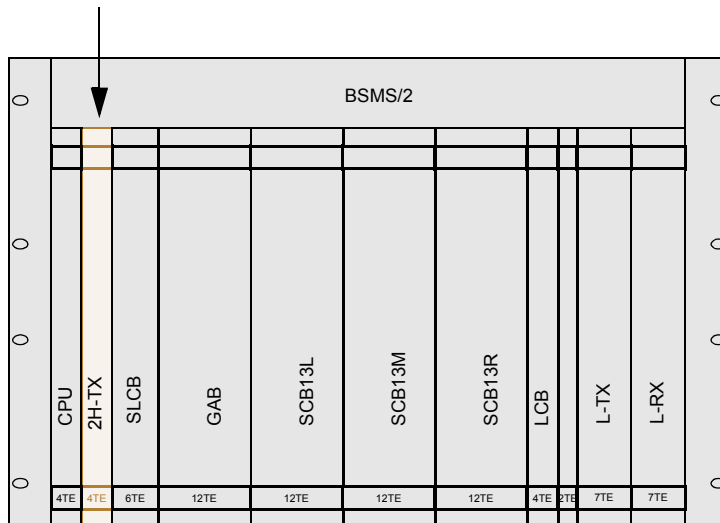


Figure 2.2. The location of the 2H-TX in the BSMS/2 rack



1. 2H-TX and BSMS contain electrostatically sensitive devices. Please follow the general ESD safety rules: Wear the ESD bracelet found inside all BRUKER electronic cabinets. Use a conductive surface to handle the boards. Never touch the wires of the electronic components mounted onto the boards.
2. If the 2H-TX is combined with a RCB refer to the corresponding RCB user manual for correct RCB wiring and jumper setting.
3. Remove the blank front cover just to the left of the LCB (BSMS) or right of the CPU (BSMS/2).
4. Check the jumpers on the 2H-TX. They have to be in position 'A'.
5. Insert the 2H-TX in the slot between SCB13R and LCB (BSM) or between CPU and SLCB (BSMS/2).
6. Connect all additional cables according [Figure 2.3. on Page 9](#)

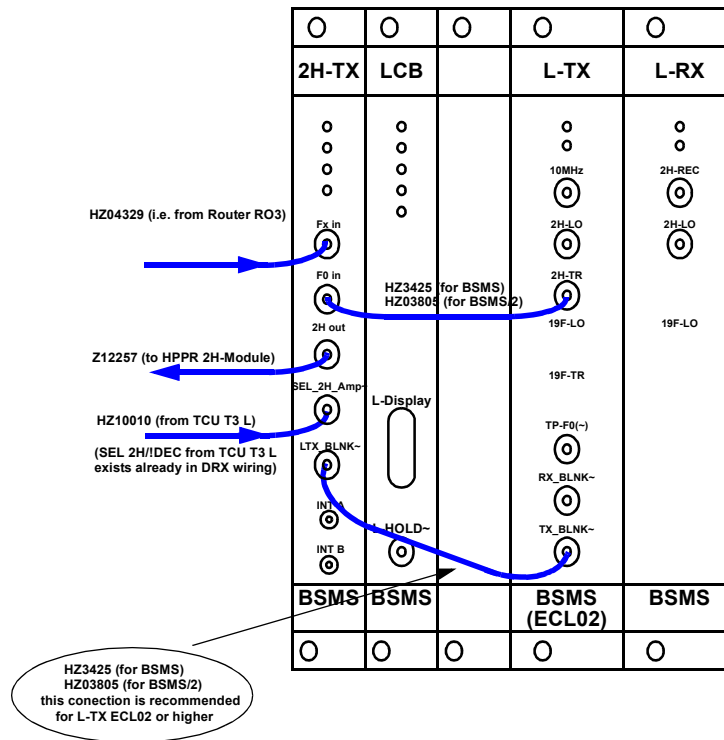
The L-TX (ECL02 or higher) can be blanked during deuterium decoupling. For this reason the connection to the L-TX TX\_BLNK~ input should be done. Refer to the BSMS tool how to enable this input (BSMS -> B: Board function LCB, 8 Trans. Blanking On/Off).

### Remarks:

The 2H\_LOCK\_ON/OFF signal in the 2H HPPR module can not be switched in realtime, therefore the 2H module is always in lock mode. That means the receiving switch is always closed and transmitter switch is being gated by the TP\_F0. During 2H decoupling the internal RF detector closes the transmitter and opens the receiver switch (protection). For decoupling power below the RF detectors threshold the 2H module remains in the lock mode. Therefore a slight nonlinearity in the transmitter path results.



Figure 2.3. Additional 2H-TX Wiring



**Router output selection:**

1. For systems equipped with not more than 3 channels, RO3 from Router 1 (address 3) must be used for the Fx in of the 2H-TX.
2. For systems with more than three channels, the first free Router output must be selected (address 6 or higher).
3. For systems without Router, the auxiliary RF output of SGU1 has to be selected.

**Software Installation**

**2.2.2**

The 2H-TX board has an amplifier addressing scheme similar to the addressing of the BLARH100, BLAX300 and other BRUKER BLA amplifiers. On BLA's the address can be selected at the front side of the amplifier by controlling the appropriate switch. This switch must correspond to the AQR ROUTER output (refer to AVANCE SERVICE manual).

The 2H-TX has a 'software switch' which can be set respectively read by the BSMS Tool. The corresponding address is stored on the BSMS CPU in a nonvolatile memory.

The following step by step procedure shows the correct address selection for the 2H-TX.

1. Install the XWINNMR release 2.5 patchlevel 3 or later. It contains the new BSMS Tool version 2.6 and a new XWINNMR configuration suite necessary to

support 2H-TX.

Note: 2H-TX may be controlled with older XWINNMR versions via direct router commands.

2. Check BSMS Tool version 2.6 and later.

Note: This is part of the above mentioned XWINNMR release. It can be checked via 'bsms -v' unix shell command.

3. Type 'bsms download' in a unix shell. The new BSMS CPU firmware incorporates the necessary interface to the 2H-TX for identification and selection of the router address.

Note: Downloading can take from one minute (if your system is up to date) to one hour (if several boards need to be downloaded).

If the download has been successful and the BSMS 2H-TX is installed correctly the green Ready LED on the 2H-TX is lit.

4. Start 'bsms' and refer to the board functions 'CPU'.  
i.e. '**6 Board functions CPU...**'

Note: The '?' gives a short introduction to the router addressing and shows quick reference guide for the next steps.

5. Start setting of the router address via '**8 Set/read 2H-TX amplifier address**'.

Note: If there is a 2H-TX you will get a valid address, otherwise 255 is displayed. If there has been not selected a router address before, the default router address 3 will be proposed.

6. Save selected router address with '**9 Save configuration to EEPROM**' to keep it permanent in the BSMS CPU memory and leave BSMS Tools.

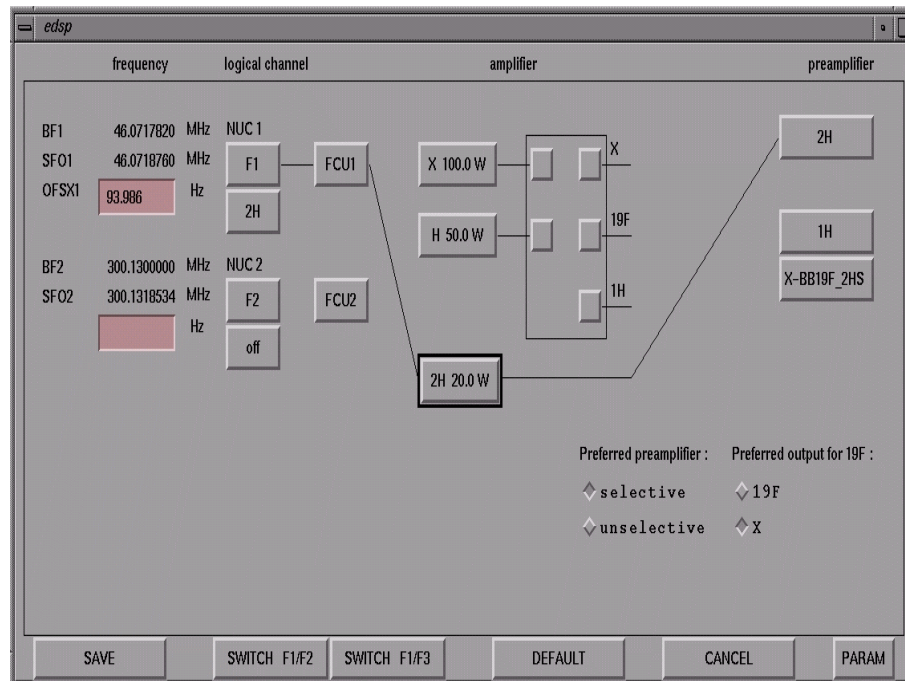
7. Start 'xwinmr' and do a 'cf' (configuration). The BSMS will be checked for existing 2H-TX.

Note: If the BSMS firmware was not upgraded, no 2H-TX can be found. So the firmware update must be done first.

Note: The following warning indicates, that at the position of the 2H-TX connection is conflicting with another amplifier. This is not a problem with router address 3 because the 1W proton amplifier is not used in general. It is recommended to use the 2H-TX on router address 3 to allow 2H observe NMR experiments (i.e. gradient shimming on 2H).



8. Check existing 2H-TX with xwinmr 'edsp'. A similar picture should be shown.







# ***Notes***